# MAXIM

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APPLICATION NOTE 3358

# OneWireViewer User's Guide, Version 1.4

*Abstract: This User's Guide explains the OneWireViewer software program and how it can be used to evaluate the unique features of 1-Wire® and iButton® devices.*

## Introduction

The OneWireViewer is a Java™-based software package to explore Maxim's 1-Wire and iButton devices with a personal computer. The 1-Wire and iButton devices communicate over a single data line plus ground reference, using the 1-Wire protocol. Several 1-Wire adapters are available for USB and serial ports. The OneWireViewer provides a user interface to evaluate the unique features of 1-Wire and iButton products, including Thermochron® (temperature logging), Hygrochron™ (real-time temperature and humidity), A to D (analog to digital), clock, memory, and file operations.

## Installation and the First-Time-Run Setup Wizard

Refer to application note 4373, "OneWireViewer and iButton® Quick Start Guide," for the installation of the OneWireViewer. As the application note explains, the OneWireViewer comes bundled with the 1-Wire drivers.

When running the OneWireViewer for the first time, the program prompts the user for some setup information. The screenshot below shows the initial screen of the Setup Wizard. It lists the 1-Wire adapters that the OneWireViewer detects and can support on the current platform. For the **Select Port** field, choose USB1 if only a single DS9490 USB adapter is connected to the PC. Then click the **Next** button. Similarly, if using other adapters, please click on the tab with the adapter's part number, and make the appropriate selection in the Select Port field (which is typically COM1 for serial-port adapters and LPT1 for parallel-port adapters). Then click Next.
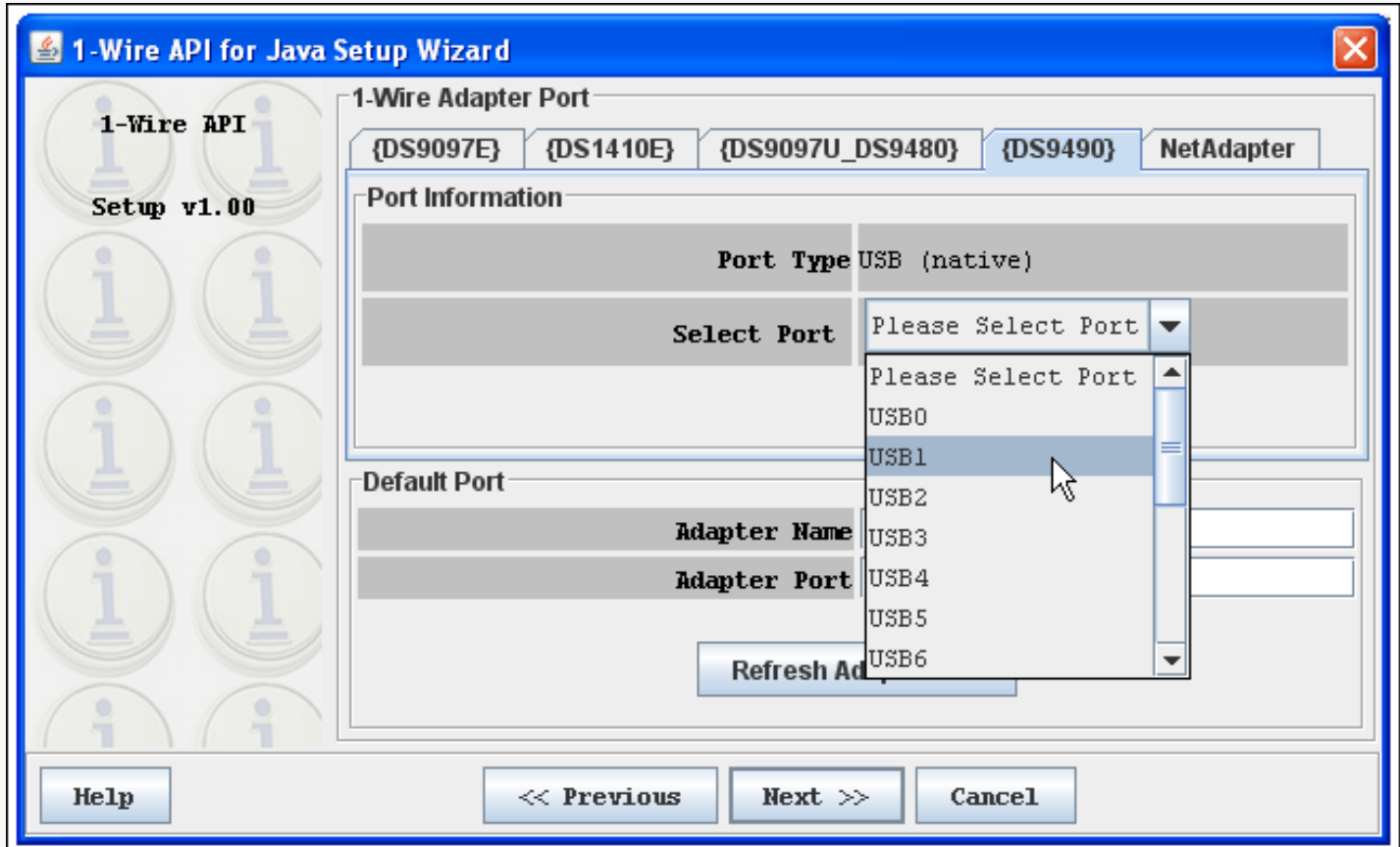


**Note**: Not shown here are the next two screens of the setup wizard. Since the two screens, **Device Polling Rate** and **1-Wire Search Mode** already have preferred settings prefilled, it is recommended that you simply click the Next button on each screen.

## Program Main Window

The main window of the OneWireViewer consists of four areas: **Device List** (top left), **1-Wire Search Mode** (bottom left), Tab area (to the right) and menus (top row). The width of the device list/search mode area can be adjusted by horizontally moving the vertical scroll bar that separates these areas from the tab area. The Device List/1-Wire Search Mode areas can be removed/restored by clicking on one of the tiny triangles to the right of the device list.
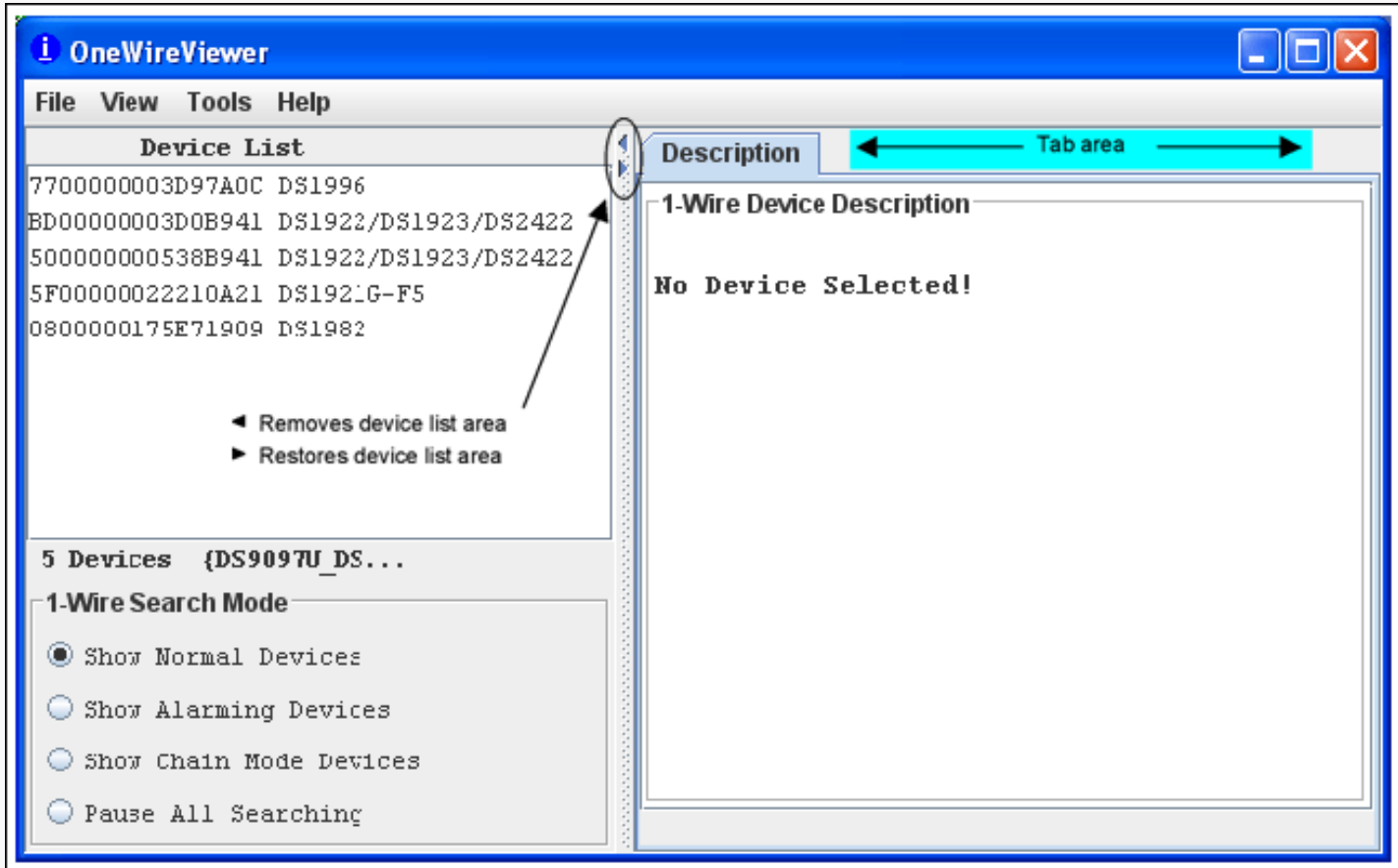


### Viewer Menus

#### File

> **Close** (to exit program)
> Has a subtitle Alt-1 (instead of Alt+F4). The Program will end with Alt+F4 as well as Alt+1. The '1' must be pressed on the normal keypad, not the numeric keypad, to be accepted.

#### View

> **Show Message Log** (to read error messages)
> Opens a new window that displays a device access log and error messages.
>
> **Show Tab in New Window** (to view multiple functions or devices simultaneously)
> To use this function, first select a device, then select one of the available tabs. Then use Show Tab in New Window, which moves the selected tab into a window of its own. The main window will then revert back to the **Description** tab.
>
> **Show Device Alternate Names** (to see alternate names in the device list)
> Example: Thermochron instead of DS1921G-F5 to the right of the ROM ID

#### Tools

> **Pick Adapter** (to change the communication port and 1-Wire port adapter)
> Opens a new window for selecting one of several 1-Wire port adapters, port type, and port number. For more information see **Appendix B**.
>
> **XML Tagging** (to load device tags that can be displayed in the device list)
> Opens a new window to select the file that holds the XML tags of the devices in use. See application note 158, "1-Wire® Tagging with XML," for tag specification and how to create tag files that are compatible with the OneWireViewer.

**1-Wire Speed** (to select the preferred 1-Wire speed)
Allows selection of standard speed or overdrive speed. Most 1-Wire devices support both speed modes. To use overdrive speed, the port adapter must also support overdrive. If overdrive is selected and the port adapter does not support overdrive, an error message will appear when trying to access an overdrive-supporting 1-Wire device.

**Device Poll Rate** (to set the frequency at which the 1-Wire net is searched for devices)
The rates are 1s, 5s, 10s, 30s, 1min, 5min, and immediate poll. The typical value is 1s, which yields the fastest response.

## Help

**About** (displays the version numbers of the software components that comprise the OneWireViewer)
Opens a window that displays: the site from which the source code of the 1-Wire API and OneWireViewer can be downloaded; the API version; the version numbers of the various viewers; and the location of the onewireviewer.properties file on the local hard drive. The OneWireViewer is provided as a source code example in the 1-Wire API for Java Kit.

## Viewer Window Areas

### Device List

This is the area that displays the ROM IDs of devices on the network and the device part numbers/names. The 1-Wire Search Mode controls whether a device is included in the list. Devices that arrive on the network are appended at the bottom of the list. If XML tags have been defined (see the section *Viewer Menus, Tools, XML Tagging* above), the device list shows the tags instead of the part numbers/names. In addition, only the functionality associated with their tags is exercisable.

Below the device list, the total number of devices on the network and the type of port adapter are displayed. In this example, the adapter is a DS9097U. The { } brackets around the adapter name indicate that it uses a native TMEX driver.

### 1-Wire Search Mode (affects the contents of the device list)

**Show Normal Devices**
When checked, the list shows *all* devices on the network.

**Show Alarming Devices**
When checked, the list shows *only* devices that respond to the Conditional Search ROM command, e.g., because of an alarming condition.

**Show Chain Mode Devices**
When checked, the list shows *only* devices that support the Chain Mode. This feature allows detecting the physical sequence of all the devices in a linear network that are wired for Chain Mode. An example device is the DS28EA00 1-Wire digital thermometer.

**Pause All Searching** (to stop/restart searching the network for arriving/departing devices)
When checked, the 1-Wire network is no longer searched. This minimizes the communication traffic on the network (e.g., to facilitate catching events with an oscilloscope), and freezes the content of the device list. An error message will be generated if one selects a device that has departed from the network. With the searching paused, one cannot access devices that have arrived because they are not included in the device list. To end the pause, check Show Normal Devices.

### Tab Area

Once a device is selected, the Description tab appears with a short description of the device. Depending on the device, additional tabs may appear that provide access to the applicable device function viewers. See the *Supported Devices* table below for a list of devices and applicable device viewers.
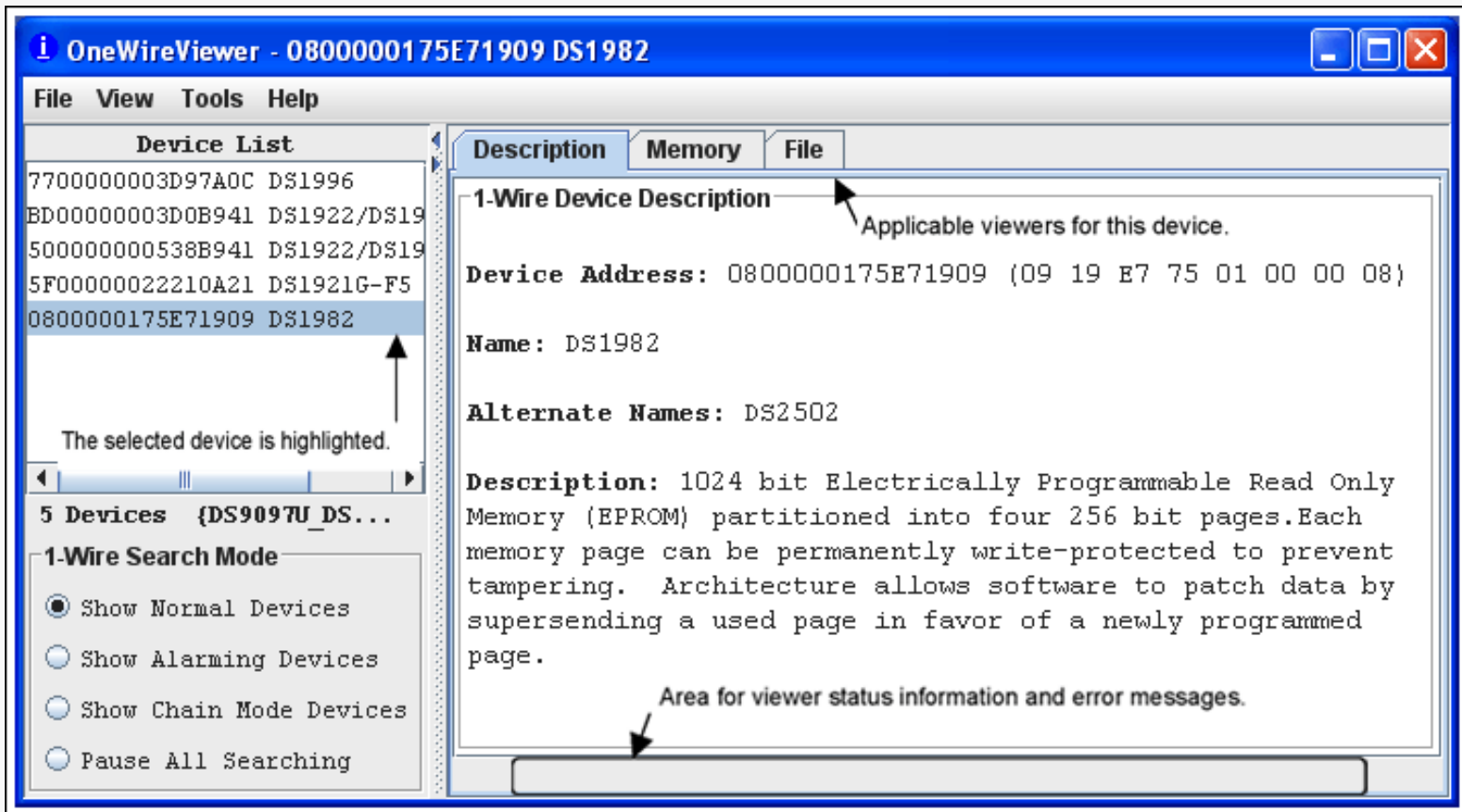
The 1-Wire and iButton products support a broad set of features. The following table, sorted by family code, shows the applicable device function viewers.

**Supported Devices**

| Supported Devices | Family Code | Thermochron | Mission | Temperature | Humidity | Switch | A to D | Clock | Memory | File |
|---|---|---|---|---|---|---|---|---|---|---|
| DS1990A, DS1990R | 01 | | | | | | | | | |
| DS1993L | 06 | | | | | | | | ✓ | ✓ |
| DS1992L | 08 | | | | | | | | ✓ | ✓ |
| DS1982, DS2502 | 09 | | | | | | | | ✓ | ✓ |
| DS1995L | 0A | | | | | | | | ✓ | ✓ |
| DS1985, DS2505 | 0B | | | | | | | | ✓ | ✓ |
| DS1996L | 0C | | | | | | | | ✓ | ✓ |
| DS1920, DS1820 | 10 | | | ✓ | | | | | | |
| DS2406 | 12 | | | | | ✓ | | | ✓ | ✓ |
| DS1971,[1] DS2430A[1] | 14 | | | | | | | | ✓ | (✓) |
| DS28E04 | 1C | | | | | ✓ | | | ✓ | ✓ |
| DS2450 | 20 | | | | | | ✓ | | | |
| DS1921 | 21 | ✓ | | ✓ | | | | ✓ | ✓ | ✓ |
| DS1822 | 22 | | | ✓ | | | | | | |
| DS1973, DS2433 | 23 | | | | | | | | ✓ | ✓ |
| DS1904, DS2415 | 24 | | | | | | | ✓ | | |
| DS2438 | 26 | | | ✓ | ✓ | | ✓ | ✓ | | |
| DS2417 | 27 | | | | | | | ✓ | | |
| DS18B20 | 28 | | | ✓ | | | | | | |
| DS2408 | 29 | | | | | ✓ | | | | |
| DS2431 | 2D | | | | | | | | ✓ | ✓ |
| DS2760, DS2762 | 30 | | | ✓ | | | ✓ | | | |
| DS1977 | 37 | | | | | | | | ✓ | ✓ |
| DS2413 | 3A | | | | | ✓ | | | | |
| DS1922,[2] DS2422[2] | 41 | | ✓ | ✓ | | | (✓) | ✓ | ✓ | ✓ |
| DS1923 | 41 | | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ |
| DS28EA00[3] | 42 | | | ✓ | | | | | | |
| DS28EC20 | 43 | | | | | | | | ✓ | ✓ |

[1] It is possible to format this device; however, there is no memory left to store a file.
[2] A-to-D support applies to the DS2422 only.
[3] This device supports Chain Mode; see data sheet for more information.

## Device Function Viewers

### Thermochron (Temperature Logging)

The Thermochron viewer gives real-time information on the mission parameters and status of the selected Thermochron iButton connected to the OneWireViewer. The user can start a new mission, end (disable) a running mission, view and download the mission's temperature log, and see (but not download) the mission's temperature histogram and alarm log. Similar to the Mission viewer, the Thermochron viewer is used only for the DS1921 series of temperature loggers and their features. See also the *Supported Devices* table above.

The tab structure of the Thermochron viewer consists of two areas: **Command** (top), and device data tabs (bottom). The Command tab includes three buttons to operate the device's logging function and to select the temperature scale (°C or °F). Depending on the size of the Thermochron tab, there can be scroll bars for both areas.

**Sample Thermochron Viewer Tab**

| Description | Temperature | Clock | Memory | File | **Thermochron** |

**Command**

| Refresh Mission Results | Start New Mission | Disable Mission |

☐ Fahrenheit  ☑ Celsius

| **Status** | Temperatures | Histogram | Alarm Log |

| | |
|---|---|
| Is Mission Active? | true |
| Mission Start: | Tue Jul 14 16:51:00 CDT 2009 |
| Sample Rate: | Every 1 minute(s) |
| Number of Mission Samples: | 1342 |
| Total Samples: | 1342 |
| Roll Over Enabled? | false |
| Roll Over Occurred? | Roll over has NOT occurred |
| Active Alarms: | High Temp, Low Temp |
| Next Clock Alarm At: | Sun Jul 19 00:00:00 CDT 2009 |
| High Temperature Alarm: | 25 °C |
| Low Temperature Alarm: | 10 °C |

Done Setting up viewer

**Thermochron Viewer Commands**

> **Refresh Mission Results** (to read device status, temperature, histogram, and alarm log)
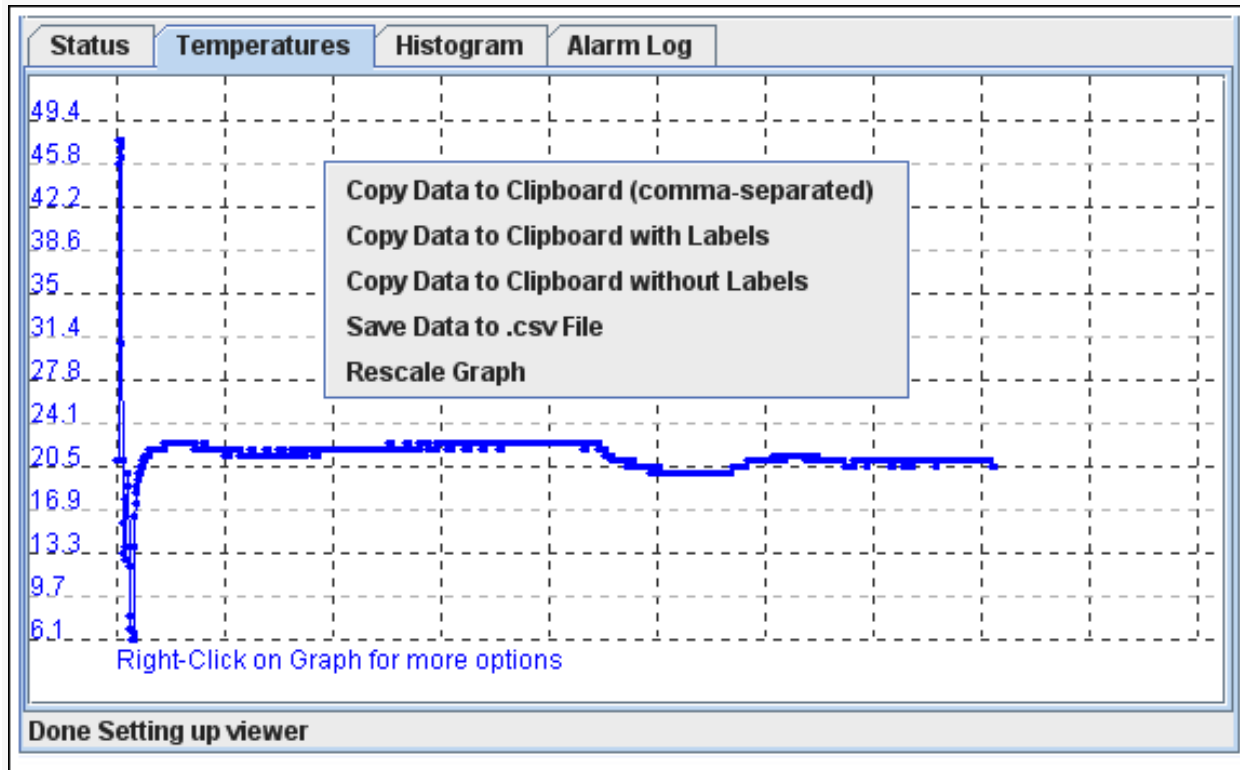> This allows a mission to be monitored in progress without changing device viewers.
>
> **Start New Mission** (to allow the user to enter all data necessary to start a new mission)
> This command opens a new window in which the user enters the parameters for the next mission.
>
> **Disable Mission** (to stop a running mission)
> This command stops a mission. The collected data remains stored in the device.
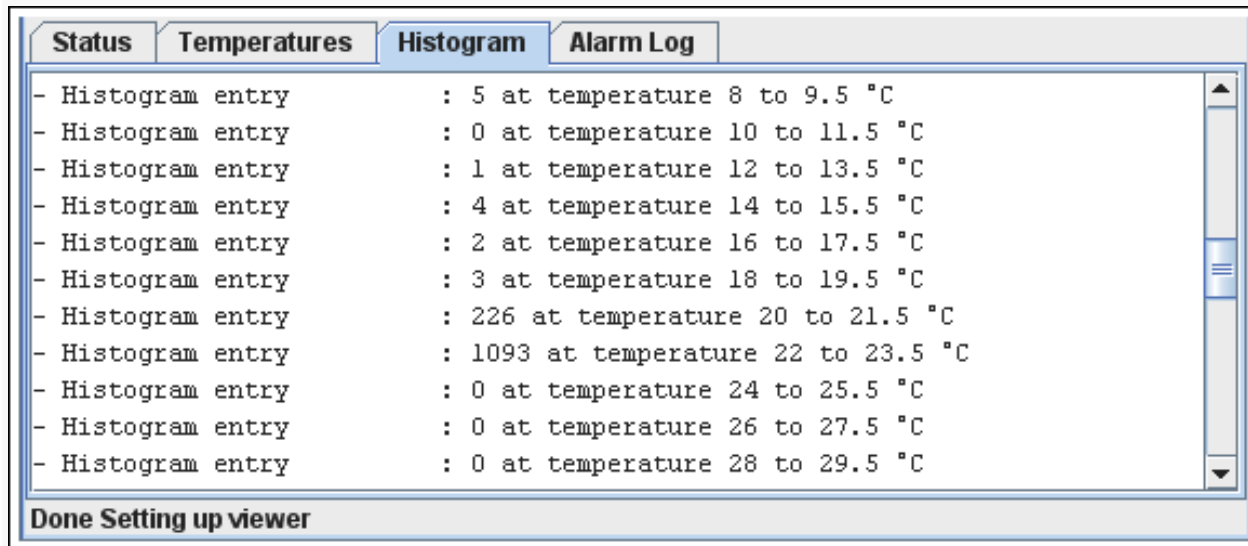
**When the Thermochron Tab is active, the Thermochron viewer**:

- Automatically reads the device status, temperature, histogram, and alarm log.
- Automatically displays the device status on the **Status** tab.
- Displays the temperature log as a graphic (if you open the **Temperatures** tab).
- Displays the temperature histogram in text form (if you open the **Histogram** tab).
- Displays the alarm log in text form (if you open the **Alarm Log** tab).
- Allows the temperature scale to be changed between °C (default) and °F; the selected scale is memorized.
- Allows activation of automatic rescaling of the temperature log graph.
- Allows the graph data to be exported by using the clipboard or saving as a CSV (Excel) file.
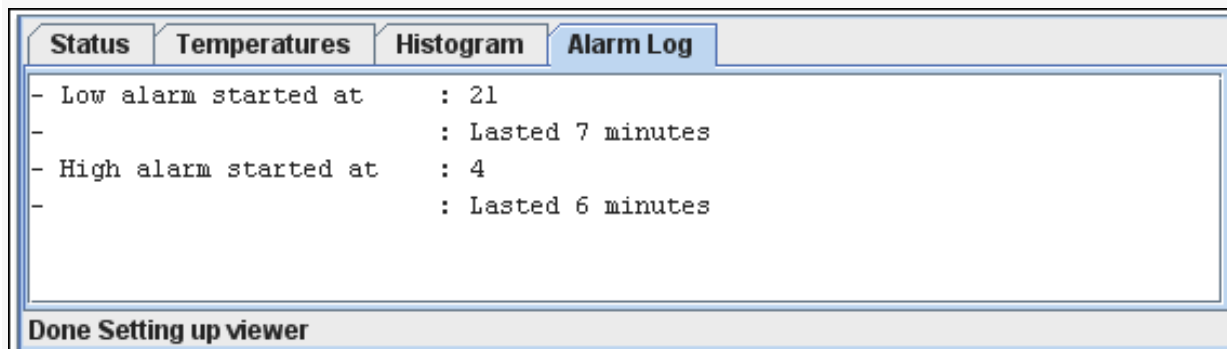
**Sample Temperature Log Graphic**

| Status | Temperatures | Histogram | Alarm Log |

```
49.4
45.8
42.2        Copy Data to Clipboard (comma-separated)
38.6        Copy Data to Clipboard with Labels
35          Copy Data to Clipboard without Labels
31.4        Save Data to .csv File
27.8        Rescale Graph
24.1
20.5
16.9
13.3
9.7
6.1
        Right-Click on Graph for more options
```

Done Setting up viewer

**Sample Histogram**

| Status | Temperatures | Histogram | Alarm Log |

```
- Histogram entry          : 5 at temperature 8 to 9.5 °C
- Histogram entry          : 0 at temperature 10 to 11.5 °C
- Histogram entry          : 1 at temperature 12 to 13.5 °C
- Histogram entry          : 4 at temperature 14 to 15.5 °C
- Histogram entry          : 2 at temperature 16 to 17.5 °C
- Histogram entry          : 3 at temperature 18 to 19.5 °C
- Histogram entry          : 226 at temperature 20 to 21.5 °C
- Histogram entry          : 1093 at temperature 22 to 23.5 °C
- Histogram entry          : 0 at temperature 24 to 25.5 °C
- Histogram entry          : 0 at temperature 26 to 27.5 °C
- Histogram entry          : 0 at temperature 28 to 29.5 °C
```

Done Setting up viewer

**Sample Alarm Log**

| Status | Temperatures | Histogram | Alarm Log |

```
- Low alarm started at     : 21
-                          : Lasted 7 minutes
- High alarm started at    : 4
-                          : Lasted 6 minutes
```

Done Setting up viewer

**Start New Mission Window (default)**



It is recommended that you synchronize the device's real-time clock (RTC) to the PC. Enter the mission start delay in minutes. Sampling rate, mission start delay, temperature alarms, and rollover depend on the technical requirements of the mission. See the respective DS1921-series data sheets for guidelines. The clock alarm functions are not relevant for a device on a mission. The default settings, therefore, can be accepted.

**Notes**:

- The time reference in the alarm log (e.g., "Low alarm started at: 21") indicates minutes after the start of the mission. To find the day and time when the alarm occurred, manually add the indicated time to the mission start date and time.
- The Thermochron viewer does not enable the temperature-high and temperature-low alarm search. As a result, if a temperature alarm occurs during the mission, the device will not be identified as an alarming device unless there is also a timer alarm.
- For the alarm-frequency and alarm-time values to be updated in the device, **Enable Clock Alarm?** must be checked. Otherwise, the current (i.e., previous mission's) settings remain in effect for the new mission.

## Mission (Temperature and Humidity Logging)

The Mission viewer gives real-time information on the mission parameters and status of the selected Temperature Logger iButton connected to the OneWireViewer. The user can start a new mission, end (disable) a running mission, view and download the mission's temperature and humidity log, and set/enable/disable passwords for the device. The Mission viewer is similar to the Thermochron viewer, but is used for the DS1922 series of iButton products, the DS1923 Hygrochron and its features, and the DS2422 1-Wire temperature/data logger. See also the *Supported Devices* table above.

The tab structure of the Mission viewer consists of two areas: **Command** (top), and device data tabs (bottom). The Command tab includes six buttons to operate the logging function of the device, to manage passwords, and to select the temperature scale (°C or °F). Depending on the size of the **Mission** tab, there may be scroll bars for both areas.

**Sample Mission Viewer Tab**

| Description | Temperature | Humidity | Clock | Memory | File | **Mission** |

**Command**

| Refresh Mission Results | Start New Mission | Disable Mission |

| Set Container Password | Set Device Password | Set Password Enable |

☐ Fahrenheit  ☑ Celsius

| Status | Temperature | Humidity |

| | |
|---|---|
| Mission in Progress? | true |
| SUTA Mission? | false |
| Waiting for Temperature Alarm? | false |
| Sample Rate: | Every 60 second(s) |
| Mission Start Time: | Wed Jul 15 16:58:01 CDT 2009 |
| Mission Sample Count: | 30 |
| Roll Over Enabled? | true(no rollover occurred) |
| First Sample Timestamp: | Wed Jul 15 16:58:01 CDT 2009 |
| Total Mission Samples: | 30 |
| Total Device Samples: | 7317 |
| Temperature Logging: | 0.5 C |
| Temperature High Alarm: | 25 °C (ALARMED) |
| Temperature Low Alarm: | 15 °C (ALARMED) |
| Data Logging: | 0.6 %RH |
| Data High Alarm: | 79.808 %RH (ALARMED) |
| Data Low Alarm: | 39.5 %RH |

*These lines are blank for the DS1922*

If this area remains empty, passwords are enabled. It is necessary to first set the container password with the current device passwords (at least the read password) to access the device.

Done Setting up viewer

**Mission Viewer Commands**

**Refresh Mission Results** (to read device status, temperature log, and data log)
This allows a mission in progress to be watched without changing device viewers. If passwords are enabled for the device, the user must first use the **Set Container Password** command before access is granted to device data.

**Start New Mission** (to allow the user to enter all data necessary to start a new mission)
This command opens a new window in which the user enters the parameters for the next mission. If passwords are enabled for the device, the user must first use the Set Container Password command before access is granted to device data.

**Disable Mission** (to stop a running mission)
This command stops a mission. The data collected remains stored in the device. If passwords are enabled for the device, the user must first use the Set Container Password command before access is granted to device data.

**Set Container Password** (to tell the viewer the read and write password of the device)
If the device has passwords enabled, the viewer needs to know the passwords to access the device. This command prompts the user to enter a read password in a separate small window. Once the read password is entered, the user is asked to enter the full-access password. The viewer does not memorize the passwords after the session with a particular device is closed. Passwords are 8-byte hexadecimal strings.

**Set Device Password** (to write a read password and a full-access password to the device)
If the user wants to activate passwords with the device, the passwords must first be written to the device and then enabled to take effect. This command prompts the user to specify/enter a read password in a separate small window. Once the read password is entered, the user is asked to enter the full-access password. Next the passwords are written to the respective device registers. The viewer does not memorize the passwords after the session with a particular device is closed. Passwords

entered with this command are automatically taken as container passwords; there is no need to reenter these passwords as container passwords. Passwords need to be entered as 8-byte hexadecimal strings.

**Set Password Enable** (to enable or disable the use of passwords with the device)
This command allows the user to activate (enable) passwords that were written to the device previously. If passwords are enabled, this command allows the user to disable them. This command does not erase passwords in the device.

**When the Mission tab is active, the Mission viewer:**

- Automatically reads the device status, temperature log, and data log.
- Automatically displays the device status on the Status tab.
- Displays the temperature log as a graphic (if you open the **Temperature** tab).
- Displays the humidity or data log as a graphic (if you open the **Humidity** or Data tab).
- Allows the temperature scale to be changed between °C (default) and °F; the selected scale is memorized.
- Allows activation of automatic rescaling of the log graphs.
- Allows log data to be exported by using the clipboard or saving as a CSV (Excel) file.

**Sample Temperature Log Graphic (humidity/data log looks similar)**

**Start New Mission Window (default)**
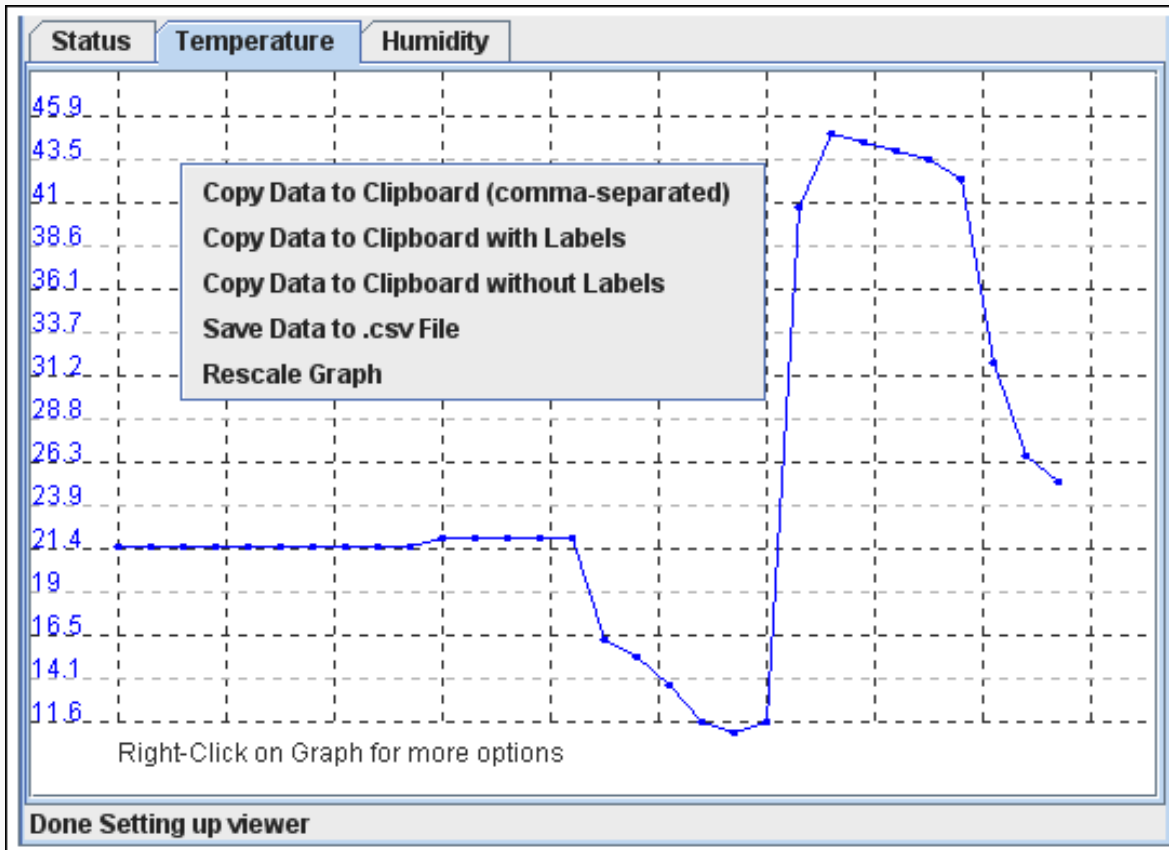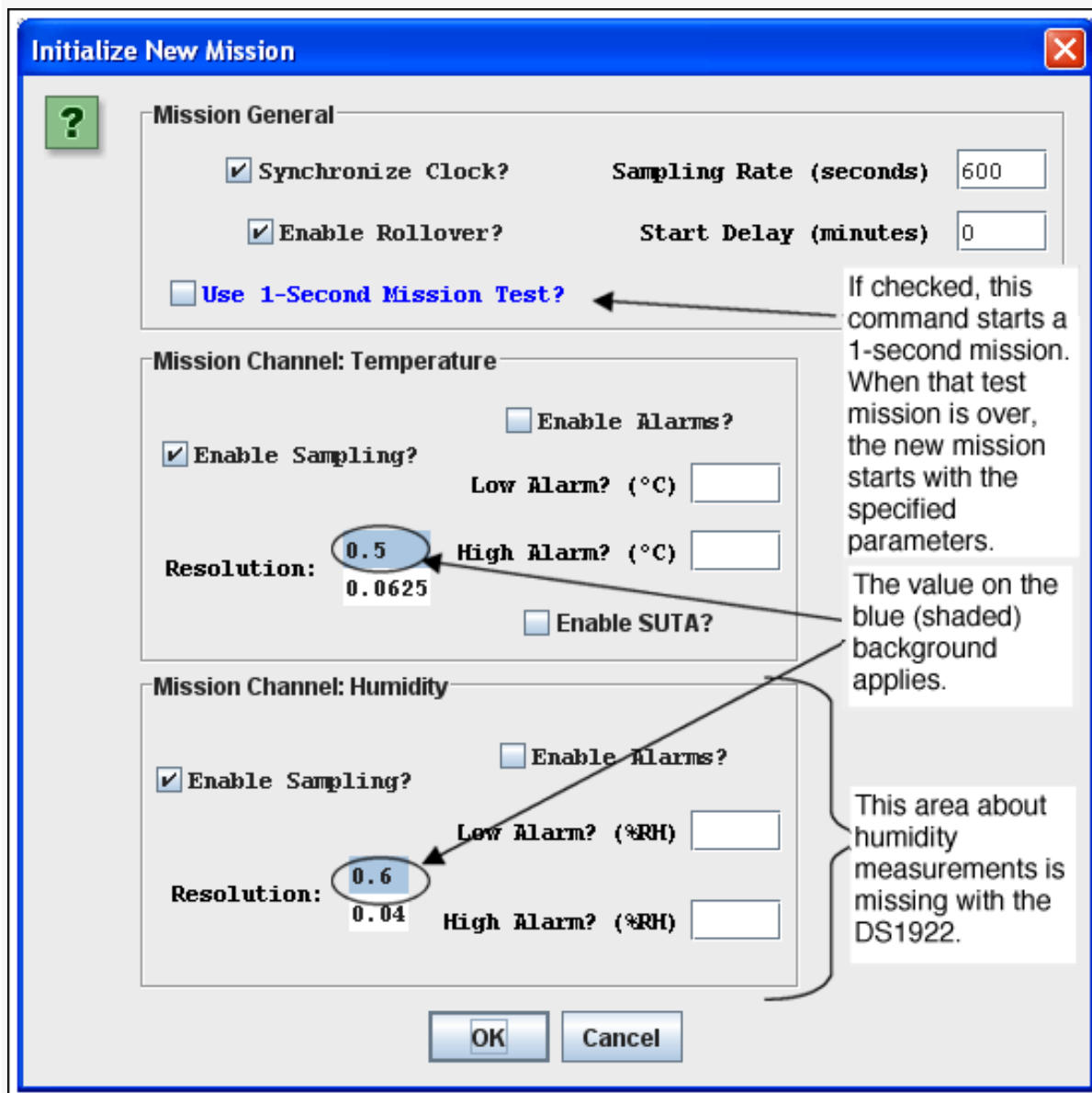


It is recommended that you synchronize the device's RTC to the PC. Enter the sampling rate in seconds (between samples). Enter the mission's **Start Delay** in minutes. SUTA means Start mission Upon Temperature Alarm. Sampling rate, mission start delay, resolution, alarms, and rollover depend on the technical requirements of the mission. See the respective device data sheets for details and guidelines.
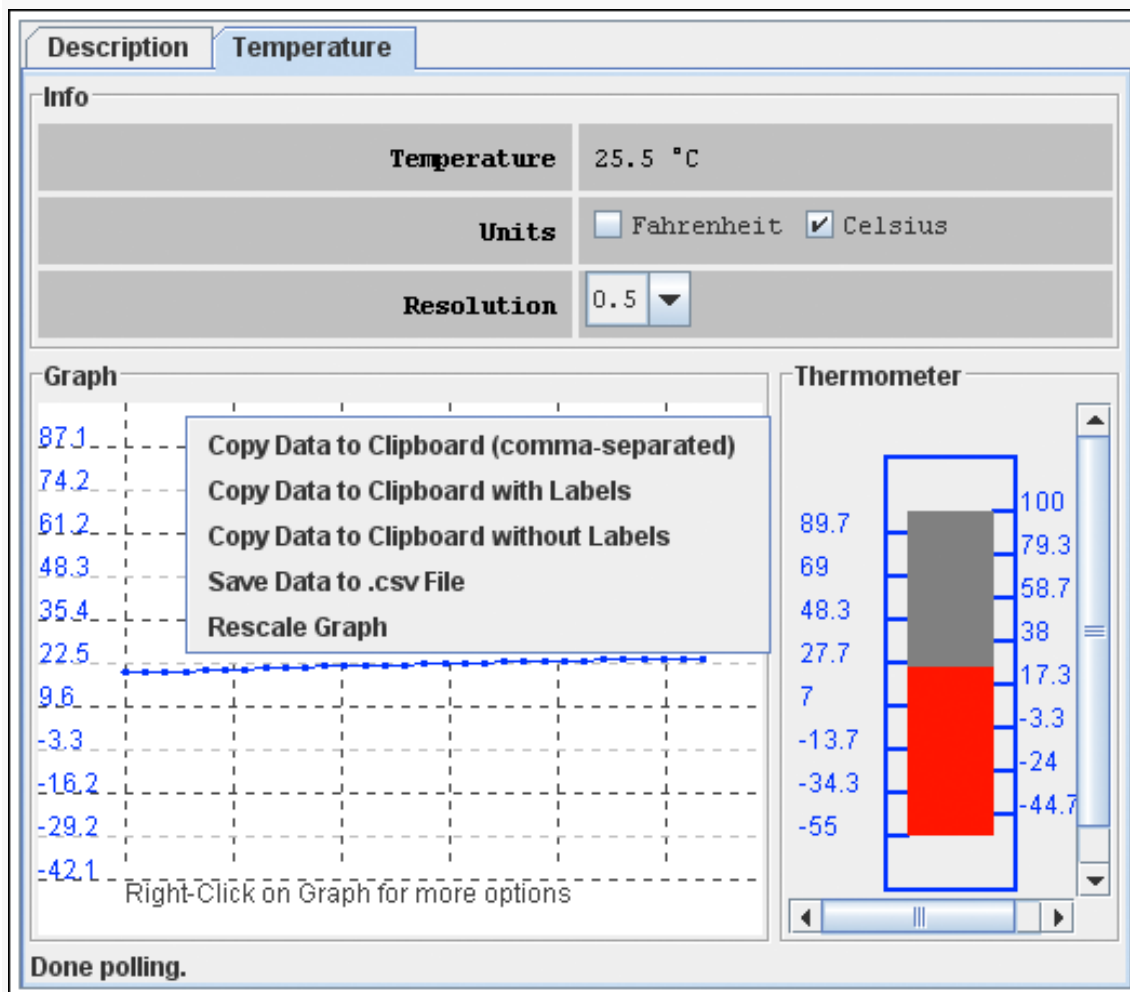
**Notes**:

- **Mission Samples Count** on the Status tab indicates the number of valid samples in the datalog memory. This number stops incrementing when the memory is full.
- **Total Mission Samples** indicates the number of samples taken during a mission. This number continues incrementing when a rollover occurs.
- The **Use 1-Second Mission Test?** is not needed for B1 revision parts (date code 2007 and newer; serial numbers 005A900h to 005C09Fh, 0064200h and higher).
- Although the part is found as an alarming device, a **Temperature High Alarm** is not flagged on the Status tab. If there is a **Temperature Low Alarm**, both the high and low alarm are flagged on the Status tab.

## Temperature

The Temperature viewer gives a real-time temperature reading of the selected 1-Wire temperature device connected to the OneWireViewer. The temperature log on the screen is created from temperature data stored in the PC's memory. This is different from Thermochron and Mission viewers, where the temperature logging is performed inside an iButton, whether or not the device is connected to the OneWireViewer.

The tab structure of the Temperature viewer consists of three areas: **Info** (top), **Graph** (bottom left), and **Thermometer** (bottom right). Depending on the size of the Temperature tab, there may be scroll bars for the Thermometer, Graph, and Info area. The Temperature viewer applies to devices that contain a digital thermometer. See the *Supported Devices* table above for the list of devices.

**Sample Temperature Tab**



**When the Temperature tab is active, the Temperature viewer:**

- Continuously issues the device-specific command to perform a temperature conversion.
- After each conversion reads the temperature registers of the selected device.
- Converts the reading from the device-specific format into a conventional format.
- Displays the result as a number, graph, and thermometer scale.
- Compresses the horizontal scale of the graph, as needed, to display additional readings.
- Allows the temperature scale to be changed between °C (default) and °F; the selected scale is memorized.
- Allows the resolution of the temperature display (some devices only) to be changed.
- Allows activation of automatic rescaling of the graph.
- Allows graph data to be exported by using the clipboard or saving as a CSV (Excel) file.

**Notes**:

- The Temperature viewer closes whenever the selected device is found to be missing from the network or when another device is selected.
- To keep the Temperature viewer running while evaluating other devices, first activate the Temperature viewer. Then on the **View** menu (see *Program Main Window*), select Show Tab in New Window which will restart the Temperature viewer in a new window. This separate window will remain open, even if the device disappears from the network.
- With the DS1922L, DS1922T, and DS1923, the temperature readings displayed are software corrected. For the DS1922E, software correction does not apply.
- The Temperature viewer cannot read the temperature of a Thermochron (DS1921, DS1922, or DS1923) that is currently running a mission.
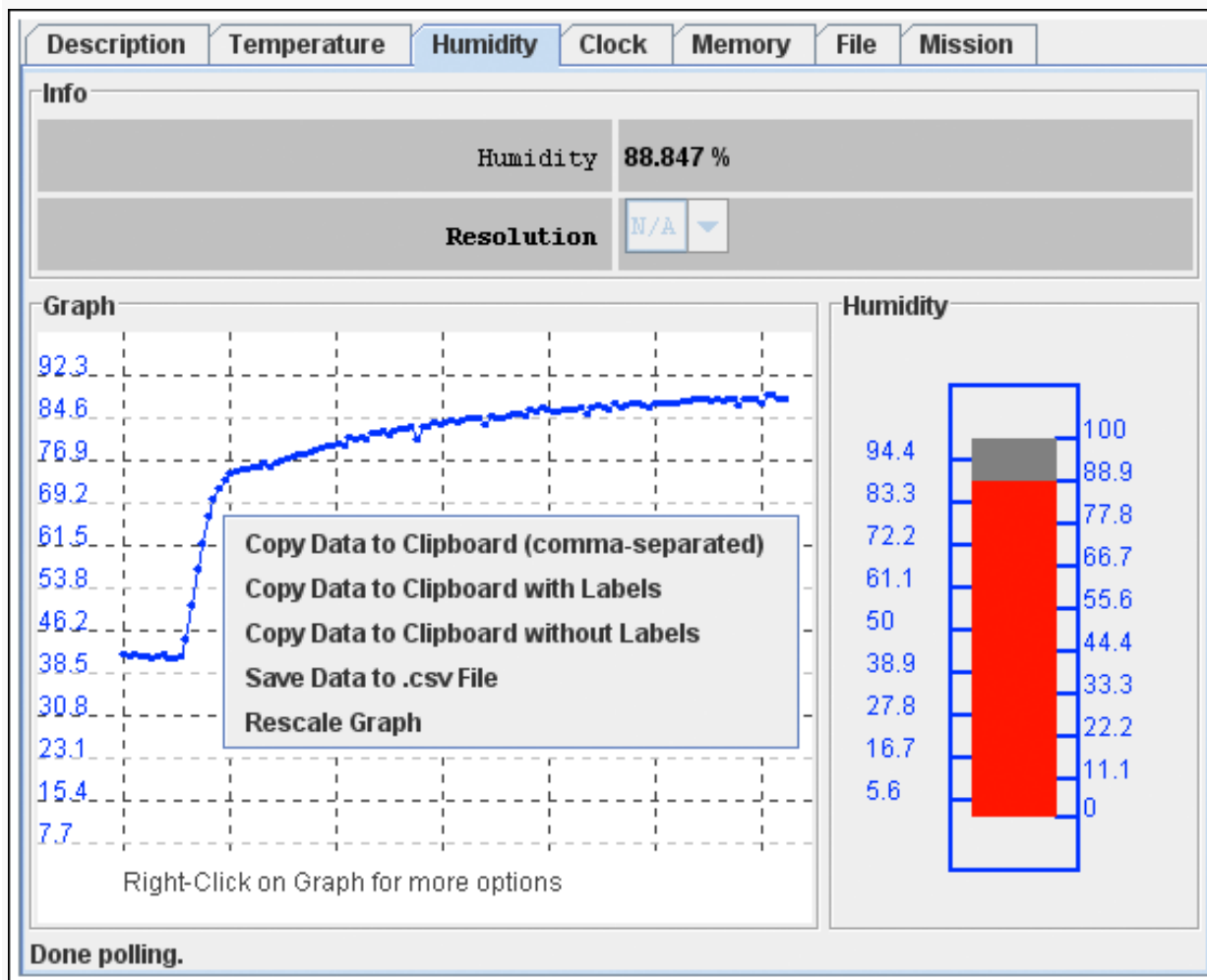
## Humidity

The Humidity viewer gives a real-time humidity reading of the selected 1-Wire humidity device connected to the OneWireViewer. The humidity log on the screen is created from humidity data stored in the PC's memory. This is different from Mission viewer, where the humidity logging is performed inside an iButton whether or not it is connected to the OneWireViewer.

The tab of the Humidity viewer consists of three areas: **Info** (top), **Graph** (bottom left), and **Humidity** (bottom right). Depending on the size of the Humidity tab, there may be scroll bars for the graph and/or humidity area. The Humidity viewer applies primarily to the DS1923.

The viewer may also support other devices that can be set up to measure humidity. See the *Supported Devices* table above for the list of devices.

**Sample Humidity Tab**



**When the Humidity tab is active, the Humidity viewer**:

- Continuously issues the device-specific command to perform a humidity conversion.
- After each conversion reads the humidity registers of the selected device.
- Converts the reading from the device-specific format into a conventional format.
- Displays the result as a number, graph, and humidity scale.
- Compresses the horizontal scale of the graph, as needed, to display additional readings.
- Allows activation of automatic rescaling of the graph.
- Allows graph data to be exported by using the clipboard or saving as a CSV (Excel) file.

**Notes**:

- The Humidity viewer closes whenever the selected device is found to be missing from the network or when another device is selected.
- To keep the Humidity viewer running while evaluating other devices, first activate the Humidity viewer. Then on the View menu (see *Program Main Window*), select Show Tab in New Window which will restart the Humidity viewer in a new window. This separate window will remain open, even if the device disappears from the network.
- To watch humidity and temperature simultaneously, open the Humidity and Temperature viewers in separate windows.
- With the DS1923, the humidity readings displayed are software corrected; they are not compensated for temperature or saturation drift.
- The Humidity viewer cannot read the humidity of a DS1923 that is currently running a mission.

## Switch

The Switch viewer gives real-time information on the I/O channels of the selected 1-Wire addressable switch device connected to the OneWireViewer. This information includes the channel's state, the logic level at its output, and the state of the associated activity latch. The user can change (toggle) the state of the I/O channel and clear its activity latch. Each I/O channel of a multichannel addressable switch device can be operated individually.

The tab of the Switch viewer consists of two areas: **Features** (top), and **Channels** (bottom). The Features area lists device-specific characteristics. The number of switches (i.e., number of channels) for the selected device is indicated by the number of channel boxes in the channels area. A digital switch can be closed (**State** = true) or open (**State** = false). **Level** shows the logic equivalent of the voltage at the switch output. Each channel has two command buttons associated with it. Depending on the size of the Switch tab and/or the device, there may be scroll bars for both areas. The Switch viewer applies to all devices that contain one or more electronic switches. See the *Supported Devices* table above for the list of devices.

**Sample Switch Tab**



**Switch Viewer Channel Commands**

> **Toggle State** (to toggle the state of the switch between on and off)
> This command allows the switch's state to be changed through the 1-Wire network.
>
> **Clear Activity** (to clear the channel's activity latch)
> This command allows the switch's activity latch to be cleared through the 1-Wire network.

**When the Switch tab is active, the Switch viewer**:

- Continuously reads the state of all channels of the selected device.
- Automatically updates the state, level, and activity information in the Channels area.

**Notes**:

- To use a switch channel as a remote digital sensor, the switch must be off (State = false).
- See the respective device data sheets for more details on how the individual channels operate.

## A to D (Analog to Digital)

The A to D viewer gives a real-time voltage reading on the analog inputs of the selected 1-Wire ADC connected to the OneWireViewer. The user can select which channels of a multichannel ADC are included in the polling.

The tab of the A to D viewer (for an analog-to-digital converter, ADC) consists of two areas: **Features** (top), and **Channels** (bottom). The Features area lists device-specific characteristics. For each channel, there is a channel box in the Channels area. **A to D Voltage** shows the voltage reading of the analog input. Depending on the size of the A to D tab and/or the number of channels, there may be scroll bars for both areas. The A to D viewer applies to devices that contain an ADC with one or more input channels. See the *Supported Devices* table

above for the list of devices.

**Sample A to D Tab**



**When the A to D tab is active, the A to D viewer**:

- Continuously reads/converts the input voltage of the selected channels.
- For the selected channels, automatically updates the voltage reading in the Channels area.
- Allows the channels that are monitored (see **Include in Poll**) to be selected.

**Notes**:

- If a channel is not included in the poll, the display for this channel will "freeze", and not show the actual input voltage.
- The voltage range, resolution, voltage alarm thresholds, and alternate channel functions can be set on the byte level through the **Memory** tab. See the respective device data sheet for more details.

## Clock

The Clock viewer gives a real-time reading of the RTC in the selected 1-Wire device connected to the OneWireViewer. This viewer also tells the time difference between the RTC in the 1-Wire device and in the PC. The user can synchronize the RTC in the 1-Wire device to the one in the PC or halt the RTC oscillator in the 1-Wire device.

The tab of the Clock viewer consists of two areas: **Info** (top), and **Config** (bottom). Depending on the size of the tab area, there may be scroll bars (horizontal, vertical) for the Info area. The current time is always displayed in the 24-hour format with time zone. The Clock viewer applies to all devices that contain an RTC. See the *Supported Devices* table above for the list of devices.

| Description | Temperature | Clock | Memory | File | Mission |

**Info**

|  |  |
|---|---|
| **Current Time** | Tue Jul 14 15:15:22 CDT 2009 |
| **Difference from PC Time** | 8 seconds |

**Config**

[ Synchronize Clock to PC Time ]    [ Halt Real-Time Clock ]

Done polling.

---

| Description | Temperature | Clock | Memory | File | Thermochron |

**Info**

|  |  |
|---|---|
| **Current Time** | Clock is not running |
| **Difference from PC Time** | N/A |

**Config**

[ Synchronize Clock to PC Time ]    [ Halt Real-Time Clock ]

Done polling.

**When the Clock tab is active, the Clock viewer**:

- Continuously reads the time registers of the selected device.
- Converts the reading from the device-specific format into a conventional format.
- Displays the time read from the device (automatically updated with every reading).
- Allows the RTC oscillator to be stopped and restarted.
- Allows the time/date of the computer (PC or workstation) to be copied to the time registers in the device (i.e., click on **Synchronize Clock to PC Time**); this function also restarts a halted RTC oscillator.

**Notes**:

- If the 1-Wire device uses a binary counter as RTC (e. g., the DS1904, DS2415, DS2417), the **Clock** viewer sets the device clock to UTC (also known as Greenwich Mean Time, GMT). If the RTC of the 1-Wire device counts seconds, hours, days, months, and years in separate registers (e.g., the DS1921, DS1922), the Clock viewer sets the device clock to the local time.

## Memory

The Memory viewer displays in hexadecimal format the data of the selected memory bank of the selected 1-Wire memory device connected to the OneWireViewer. The user can change the data (see *Hex Editor* below) and write it back to the 1-Wire device.

The tab of the Memory viewer consists of three areas: **Banks** (top), **Info** (bottom left), and **Contents** (center right). Two buttons below the Contents area allow the data of a selected memory bank to be reread (**Refresh**) and data that was manually entered in the contents area to be written to the 1-Wire device (**Commit Changes**). Depending on the size of the tab area, there may be scroll bars for the Info and Contents area. The Memory viewer applies to all devices that contain general-purpose user memory and/or special function/register pages. See the *Supported Devices* table above for the list of devices. A memory bank must first be selected before its data (Contents) and characteristics (Info) will be displayed. The Contents area is automatically refreshed whenever the bank selection changes.

**Sample Memory Tab (DS1922L)**



| Description | Temperature | Clock | **Memory** | File | Mission |

**Banks**

```
Scratchpad with CRC and Password
User Data Memory
Register control
Data log
```

**Info**

| | |
|---|---|
| **Start Address** | |
| **Bank Size** | |
| **Is General Purpose?** | |
| **Is Non-Volatile?** | |
| **Is Read-Only?** | |
| **Is Read-Write?** | |
| **Is Write-Once?** | |

**Contents**

[ Refresh ] [ Commit Changes ]

Done Setting up viewer.

**When the Memory tab is active, the Memory viewer**:

- Lists the names of the available banks.
- Displays the characteristics and contents of the selected bank.
- Allows the contents of the selected bank to be changed.
- Allows the new data to be copied to the selected bank.

**Sample Memory Tab with Scratchpad Selected**

| Description | Temperature | Clock | **Memory** | File | Mission |

**Banks**

Scratchpad with CRC and Password
User Data Memory
Register control                                                          TA1  TA2  E/S
Data log

**Info**

| | |
|---|---|
| **Start Address** | 0H |
| **Bank Size** | 32 bytes |
| **Is General Purpose?** | false |
| **Is Non-Volatile?** | false |
| **Is Read-Only?** | false |
| **Is Read-Write?** | true |
| **Is Write-Once?** | false |

**Contents**

Page 0 (0H) [Target address, offset 06 02 9F]

0A 00 00 00 00 00 00 7E 00 00 00 FC 00 D1 70 C2

00 00 00 01 01 14 10 07 09 00 40 E4 FF FF FF FF

[Refresh]  [Commit Changes]

Done updating viewer contents.

**Notes**:

- The number of the memory banks and their respective names depend on the type of the device viewed.
- The display format in the content field varies with the device and memory bank selected. For most devices there are 2 x 16 bytes per page. With EPROM devices, there are n x 8 bytes (special function registers only). With the DS1977 the format is 2 x 32 bytes per page.
- If the selected memory bank is a scratchpad, the target address TA1, TA2, and the E/S byte (offset) are displayed above the scratchpad contents. With other memory banks and depending on the device, one will see device-specific information associated with a memory page.
- To write to the device, select the bytes to be changed in the Contents field, type new data, and click on Commit Changes. This method applies to all memory blocks shown in the Memory tab. The viewer will perform the necessary steps (e.g., write scratchpad, copy scratchpad) to update the device memory or register. See the section *Auxiliary Functions* text editor (hex/ASCII editor) for more details.
- Writing to an EPROM device requires a port adapter that supports 12V programming pulses.

## File

The File viewer displays the file names and directory structure of the selected 1-Wire memory device connected to the OneWireViewer. The user can format the device, create/delete directories and files, edit files (see *Hex Editor* and *ASCII Editor*), resize files, and write them back to the 1-Wire device.

The File viewer supports the 1-Wire File Structure. (See application note 114, "1-Wire File Structure.") The tab of the File viewer consists of two areas: **Directory** (center left), and **File Contents** (center right). In addition, there are eight command buttons. The vertical bar between Directory and File Contents can be moved horizontally to change the size of the areas. Depending on the size of the file tab, there may be scroll bars for the Directory and File Contents area. The File viewer applies to all devices that contain general-purpose user memory. See the *Supported Devices* table above for the list of devices.

**Sample File Tab**
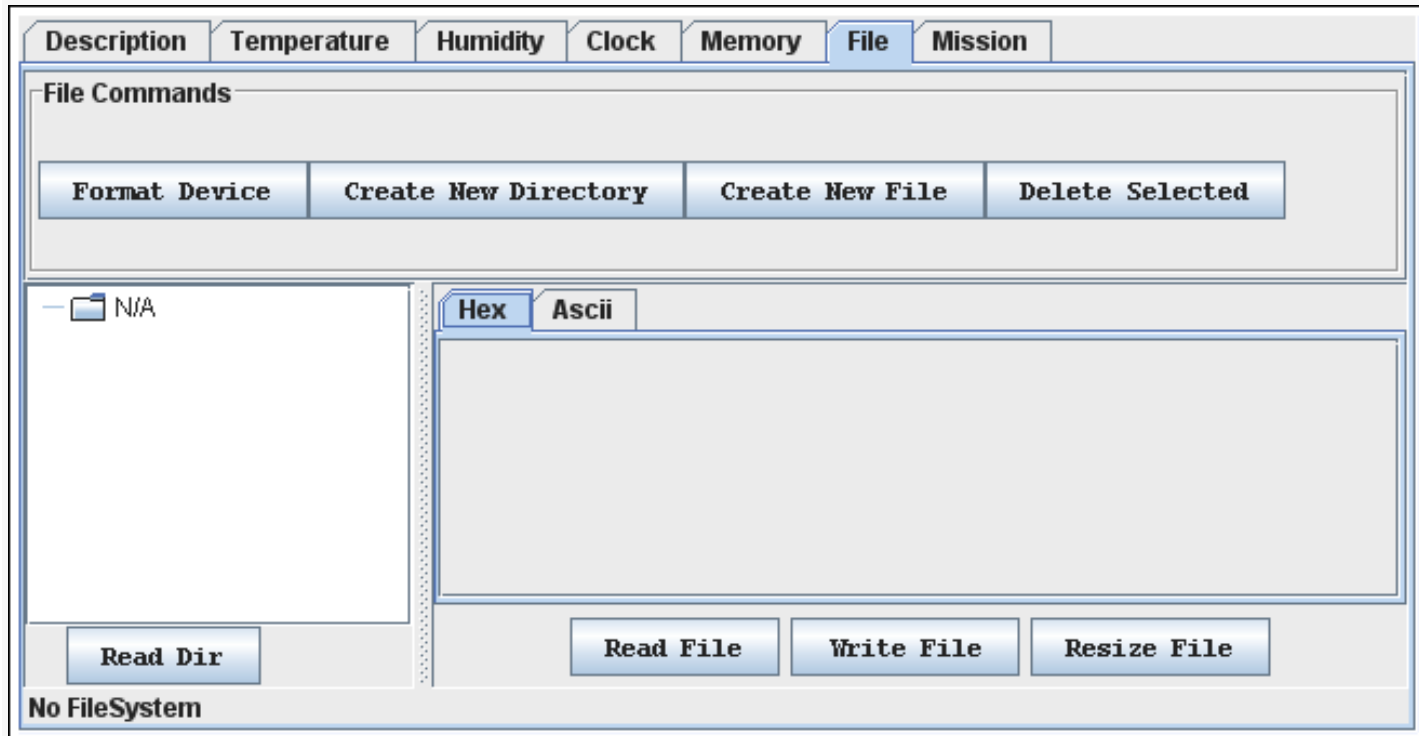


**File Viewer Commands**

**Format Device** (to create a root directory in the device)
The device must be formatted before files can be created. See application note 114 (cited above) for additional information. Formatting does not erase the memory. Data from previous sessions will eventually be overwritten.

**Create New Directory** (to create a file directory or subdirectory)
Directory names are up to four ASCII characters long.

**Create New File** (to create a file in the device)
File names are up to four ASCII characters plus a numeric extension in the range from 0 to 99. Certain extensions are reserved for special purposes, e.g., 100 for Append Files (EPROM devices only). (For more information see Table 1 in application note 114, "1-Wire File Structure.")

**Delete Selected** (to delete a file or directory)
This function deletes the entry of the file in the directory or removes a subdirectory. It does not erase the file contents. However, with the file entry or subdirectory removed, the file is no longer accessible through the **File** viewer. The file data can be recovered on the byte level through the Memory viewer (see above).

**Read Dir** (to read the device directory)
Displays file and directory names.

**Read File** (to read and display the contents of the selected file)
The file contents can be viewed as data bytes or as text. Click on the **Hex** or **Ascii** tab to change the view.

**Write File** (to write changes to the device)
This function assumes that the *size* of the file has *not changed*. If the file size has changed, first use **Resize File** to specify the new file length. Write File includes an automatic readback for verification.

**Resize File** (to change the size of a file)
This function allows specification of the number of bytes that will be used for the file. If the new size is lower than the number of characters (bytes) in the content area, the data will be truncated at the end. If the new size is too large, 00h bytes will be appended at the end of the file. A file first needs to be read before it can be resized.

**When the File tab is active, the File viewer**:

- Provides access to various file and directory functions.
- Allows a file to be selected or a directory to be opened.
- Allows the file's contents and size to be changed.
- Allows the new contents to be written to the device.

**Sample File Tab with Directory and File Data Displayed**
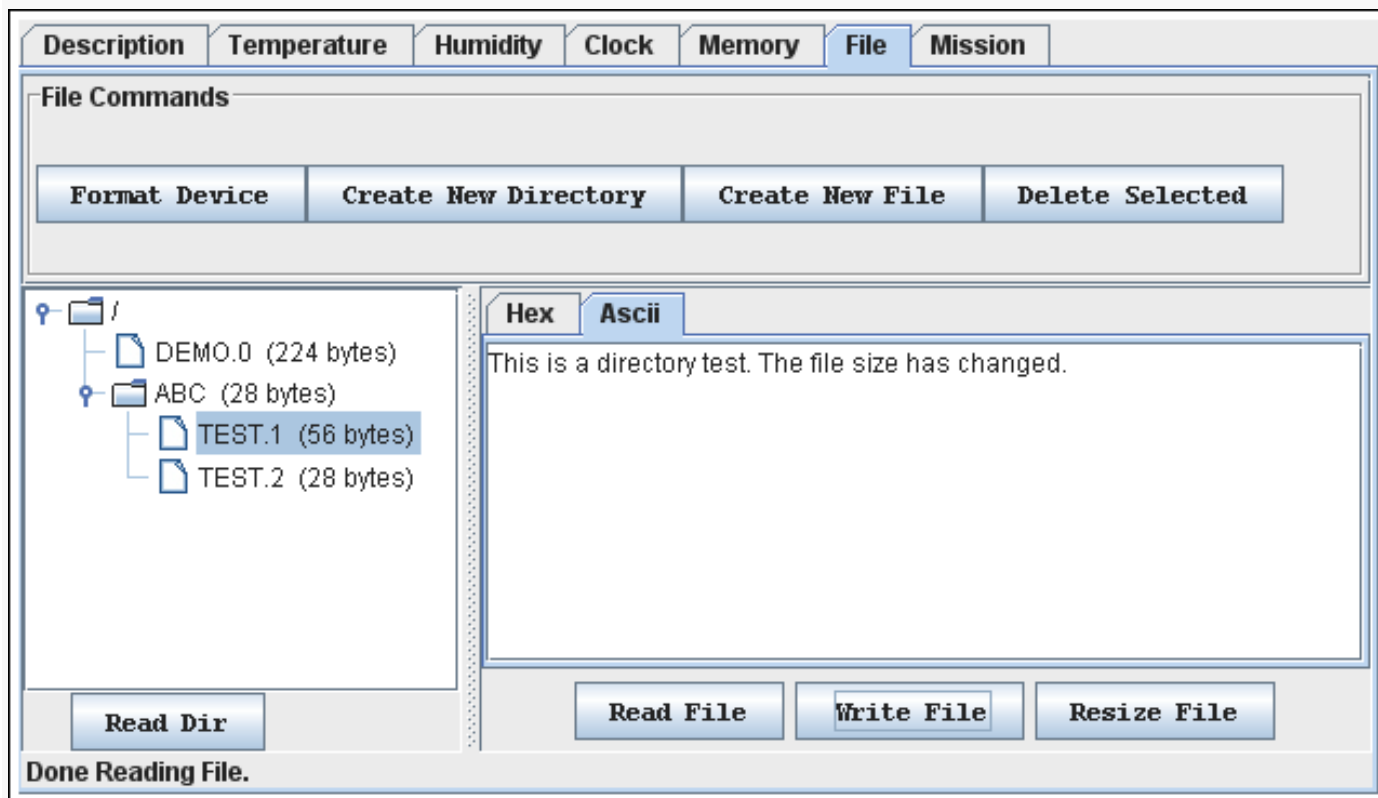


**Notes**:

- The 1-Wire File Structure allows multiple devices to be formatted as one cluster. For this reason when formatting a device, the device needs to be selected again, even if the File viewer already accesses it.
- Before data can be written to a file, the file must first be created as a new file.
- The file size is a multiple of 28 bytes (59 bytes with the DS1977). Changing the file size through Resize File automatically updates the file size in the display's directory area. Changing the file size to 0 bytes is equivalent to first deleting and then creating the same file again.
- A new file is filled with 00h bytes and has a size of 28 bytes (59 bytes with the DS1977).
- To change the contents of a file (hex as well as ASCII format), select the section (bytes/characters) to be changed, type the new contents, and click on Write File. If the file is edited on the **ASCII** tab, there will be an automatic resize when the file is written back to the device. See **Auxiliary Functions**, and sections *Hex Editor with File Viewer* and *ASCII Editor* for more details.
- Writing to an EPROM device requires a port adapter that supports 12V programming pulses.
- When accessing another device, the file contents area still shows data from the most recently accessed file.
- To copy data from a disk file to the File viewer and vice versa, use the editing, copy, and paste functions of the operating system.

## Auxiliary Functions

### Hex Editor

The Memory viewer allows the user to enter data in hex format. The File viewer expects hex input when the Hex tab is selected. There are three ways to use the hex editor:

1. **Change**: select one or more bytes and replace them with the same number of new bytes.
2. **Delete**: select one or more bytes and delete them.
3. **Insert**: position the cursor between bytes in the contents field and enter one or more bytes.

With special function registers or EPROM devices one should only change (overwrite) bytes, but not insert or delete bytes.

**Hex Editor with Memory Viewer**

| | |
|---|---|
| **Editing area** | All fields with white background that are displayed in the Contents area of the viewer. *Each field is treated as an independent entity*. More than one field can be updated before committing the changes. |
| **Changing data** | Using the cursor, select a range of adjacent bytes in the editing area and type as many new bytes as are selected. Entering data overwrites the selected range and changes the background color of the field to yellow. When finished, click on Commit Changes. |
| **Deleting data** | Using the cursor, select one or more adjacent bytes in the editing area and press the "delete" key on the keyboard. This removes as many bytes as are selected in the editing area and changes the background color of the affected field to yellow. When finished, click on Commit Changes. The viewer will ask for permission to pad the affected field(s) in the editing area with 00h bytes. This padding, however, does not happen and data at the end of the affected field(s) remains unchanged. All other data in the field(s) is shifted to the left (lower address) according to the number of bytes deleted. |
| **Inserting data** | Position the cursor in a field of the editing area and type the data to be inserted. This changes the background color of the field to yellow and shifts existing data to the right of the cursor *out of the field*, where it is lost. When finished, click on Commit Changes. |
| **Verifying data** | Click the Refresh button and scroll to the updated field in the editing area. |
| **Error handling** | Numbers from 0 to 9 and characters (upper/lower case) from A to F are accepted. Other characters can be entered in the editing area, but are not written to the device. Spaces are optional between bytes; they are taken as delimiters. |

**Hex Editor with File Viewer**

| | |
|---|---|
| **Editing Area** | Multiple rows of 16 bytes each in the Hex tab of the viewer; the last row can be shorter (partially editable). *Each row is treated as an independent entity.* More than one row can be updated before committing the changes. Use the Resize button to set the size of the editing area, as needed. The description below assumes that the editing area contains data, which was obtained by selecting a file in the directory area and then clicking the Read File button. |
| **Changing data** | Using the cursor, select a range of adjacent bytes in the editing area and type as many new bytes as are selected. Entering data overwrites the selected range and changes the background color of the row to yellow. When finished, click on Write File. |
| **Deleting data** | Using the cursor, select one or more adjacent bytes in the editing area and press the "delete" key on the keyboard. This removes as many bytes as are selected in the editing area and changes the background color of the affected field to yellow. When finished, click on Write File. There is no padding at the end, and data deleted at the end remains unchanged. All other data in the row(s) is shifted to the left (lower address) according to the number of bytes deleted. |
| **Inserting data** | Position the cursor in a row of the editing area and type the data to be inserted. This changes the background color of the field to yellow and shifts existing data to the right of the cursor out of the row, where it is lost. When finished, click on Write File. |
| **Verifying data** | After writing, the file is automatically read back and its data is displayed. |
| **Error handling** | Numbers from 0 to 9 and characters (upper/lower case) from A to F are accepted. Other characters can be entered in the editing area, but an error message appears if there is an attempt to write the file to the device. Spaces are optional between bytes; they are taken as delimiters. |

**ASCII Editor (File Viewer Only)**

| | |
|---|---|
| **Editing area** | This is a large blank field in the ASCII tab of the viewer. The size of the file can be changed using the Resize button. The description below assumes that the editing area is filled with "blanks" or contains data, which was obtained by selecting a file in the directory area and then clicking Read File. |
| **Changing data** | Using the cursor, select a range of adjacent characters in the editing area and type as many new characters as are selected. Entering data overwrites the selected range. When finished, click Write File. |
| **Deleting data** | Using the cursor, select one or more adjacent characters in the editing area and press the "delete" key on the keyboard. This removes as many characters as are selected in the editing area. When finished, click on Write File. Instead of padding at the end, the file is automatically resized. |
| **Inserting data** | Position the cursor in the editing area and type the text to be inserted. No text is deleted. When finished, click on Write File. The file is automatically resized. |
| **Verifying data** | After writing, the file is automatically read back and its data is displayed. |
| **Error handling** | All characters are accepted, including those that are not found on the English keyboard. |

## Appendix A. 1-Wire Port Adapters

The following table lists the 1-Wire adapters that the OneWireViewer supports. The name shown in the Short Reference column is used to identify a category of adapter during the program setup. The DS9097E is a legacy adapter that relies on the bit timing of the UART that is controlling the COM port. This method is described in application note 214, "Using a UART to Implement a 1-Wire Bus Master." The DS1410E is another legacy adapter, which works with the LPT (parallel) port.

**1-Wire Port Adapter Table**

| Port Type | Short Reference | Ordering Part Number | Extended Features |
|---|---|---|---|
| COM | DS9097U | DS9097U-009#<br>DS9097U-S09#<br>DS1411-009#<br>DS1411-S09# | Overdrive, power delivery, built-in serial number (009-suffix only) |
| COM | DS9097U | DS9097U-E25# | Overdrive, power delivery, EPROM programming |
| COM | DS9097E* | DS9097E# | EPROM programming |
| COM | DS9097E* | DS9097#<br>DS1413# | None |
| LPT | DS1410E* | DS1410E-001# | Overdrive, power delivery |
| USB | DS9490 | DS9490B#<br>DS9490R# | Overdrive, power delivery, built-in serial number |
| USB | DS9480** | (Future product) | (Similar to the DS9097U) |

*Not recommended for new designs. **Future product—contact factory for information.

## Extended Features

### Overdrive
The standard 1-Wire data rate is 15.3kbps. All iButtons and 1-Wire devices support this communication speed. Most 1-Wire devices also support overdrive speed, which is typically 125kbps.

### Power Delivery
Most iButtons and 1-Wire devices are parasite powered. This means that they derive their operating energy from the 1-Wire net during communication. Some devices, however, require more energy than can be accumulated in this fashion. For these devices, choose an adapter with the power-delivery feature.

### EPROM Programming
iButton and 1-Wire devices that are one-time-programmable (OTP) incorporate technology called electrically programmable read only memory (EPROM). EPROM programming requires 12V programming for writing. Although all adapters can read an EPROM iButton, only adapters with EPROM programming capability can write to them.

### NetAdapter
The NetAdapter is a set of driver software for the host, which has direct access to a 1-Wire adapter and a client computer, which does not have a suitable port for a 1-Wire adapter or lacks a suitable hardware driver. The NetAdapter is not discussed in this document. However, detailed information can be downloaded from Class NetAdapterHost and Class NetAdapter.

## Appendix B. Changing the 1-Wire Adapter and Communication Port

To change the 1-Wire adapter and the port *at the same time*, click on **Tools** on the viewer menu and select **Pick Adapter**. This opens the Pick Adapter window. The sample below also includes the DS9490 tab, indicating that the driver for the USB adapter has been installed as described in step 4 of application note 4373, "OneWireViewer and iButton® Quick Start Guide." For more information on the adapters listed, see *Appendix A*.

**Pick Adapter Window**
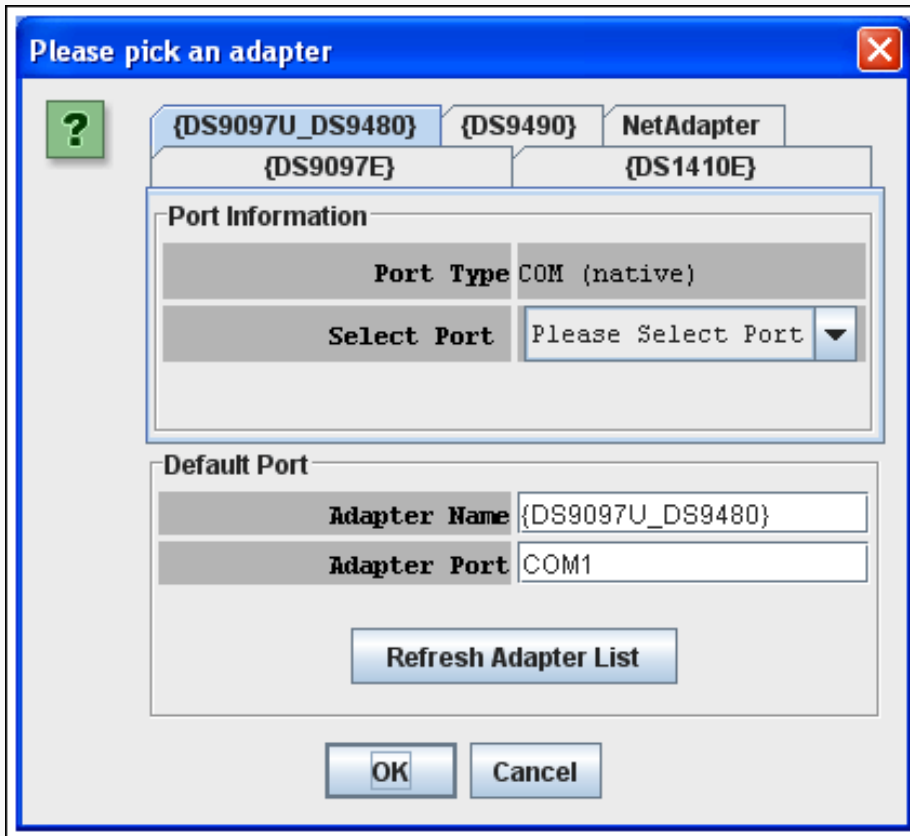


After the new adapter is plugged into the appropriate port, click on the tab that matches the adapter's name. Next select the port number where the adapter is plugged in, and click on **OK**. If the program found the specified adapter on the selected port, a window opens with the text **Loaded Adapter Successfully!** Otherwise the message will be **Failed To Load Adapter! 1-Wire Net not available**. In either case, click on **OK** which takes you to the main window of the OneWireViewer. If the adapter change was not successful, the viewer continues working with the previously chosen adapter.
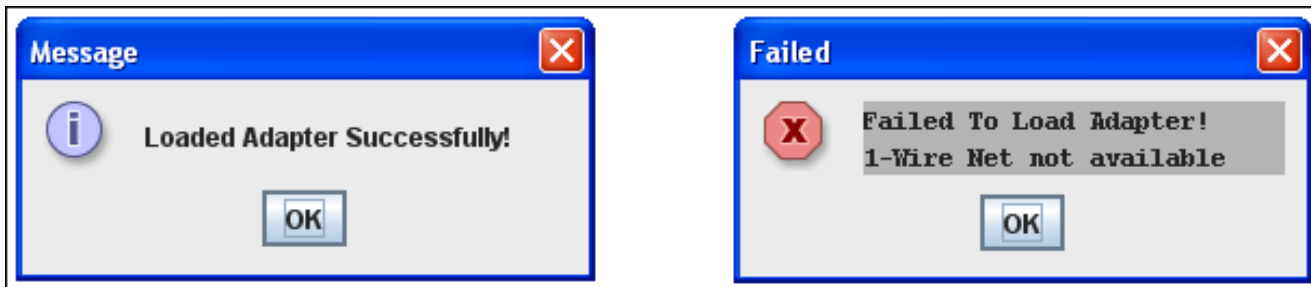


To change the adapter type *without changing the port*, close the OneWireViewer, exchange the adapters, and start the OneWireViewer again. The adapter selection window of the installation section will open. Now click on the corresponding adapter tab, select the port, and click OK.

## Appendix C. Uninstall

After installation, the OneWireViewer is listed under the folder **1-Wire Drivers x86** or **1-Wire Drivers x64** when using the Windows **Start Programs** sequence. To uninstall the 1-Wire drivers along with the OneWireViewer application, use the Windows **Add or Remove Programs** utility and select **1-Wire Drivers Version x.xx**, where x.xx represents the actual version number.

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**Related Parts**

| DS1411: | QuickView -- Full (PDF) Data Sheet |
| DS2480B: | QuickView -- Full (PDF) Data Sheet -- Free Samples |
| DS2490: | QuickView -- Full (PDF) Data Sheet |
| DS9097U-009: | QuickView -- Full (PDF) Data Sheet |
| DS9097U-E25: | QuickView -- Full (PDF) Data Sheet |
| DS9097U-S09: | QuickView -- Full (PDF) Data Sheet |
| DS9490: | QuickView -- Full (PDF) Data Sheet |

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