pendulum

TimeView

Modulation Domain Analyzer SW

Users Manual

4031 600 29001
June 2018 - Third Edition

pendulum

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User's Manual

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General Information

About this Manual

This manual describes all functions and features of the Pendulum TimeView™ software application.

The manual also provides the user an opportunity to familiarize themselves with the application through examples included at the end of selected sections.

Support

Email: service@pendulum.se
Website: http://www.pendulum.se.

Phone: +48 (58) 681 89 01

2 Preparation for Use

Hardware Support

The following Pendulum hardware is supported by the latest version (v2.1.24) of the TimeView™ application:

CNT-81
CNT-90
CNT-90 XL
CNT-91
CNT-91R

Obtaining the Software

From CD

It is recommended the TimeView™ software be obtained via the internet (see Download) to insure installation of the most recent version.

A copy of the TimeView™ software is included on the Pendulum Instruments documentation CD, shipped with all new equipment.

To request a copy of the CD please contact the Pendulum sales office nearest you, determined at the following website: http://www.pendulum.se

Download

The latest version of the TimeView™ application is downloadable at https://pendulum.se/files/manuals/cdmanual/software/TimeView_2-1-24_Setup.exe

Select the “Download TimeView” link on the right hand side of the page. This will save a file on your computer called “TimeView_#_Setup.exe” (where # refers to the current version of the software i.e. 2-1-24).

Once downloaded the file may automatically run. If it does try to run a security window may appear requiring confirmation to run the file. If ready to install the software click Run, and follow the instructions found under *Preparation for Use - Installing TimeView™ - Completing the Installation*. Otherwise, the installer can be run at a later time by double clicking the downloaded file.

Installation

System Requirements

A machine capable of running Windows XP/Vista/7/10 with at least 70MB of free hard drive space.

Obtaining a License

It is not necessary to obtain a license to install the TimeView™ software, however the following limitations are present when using an unlicensed copy:

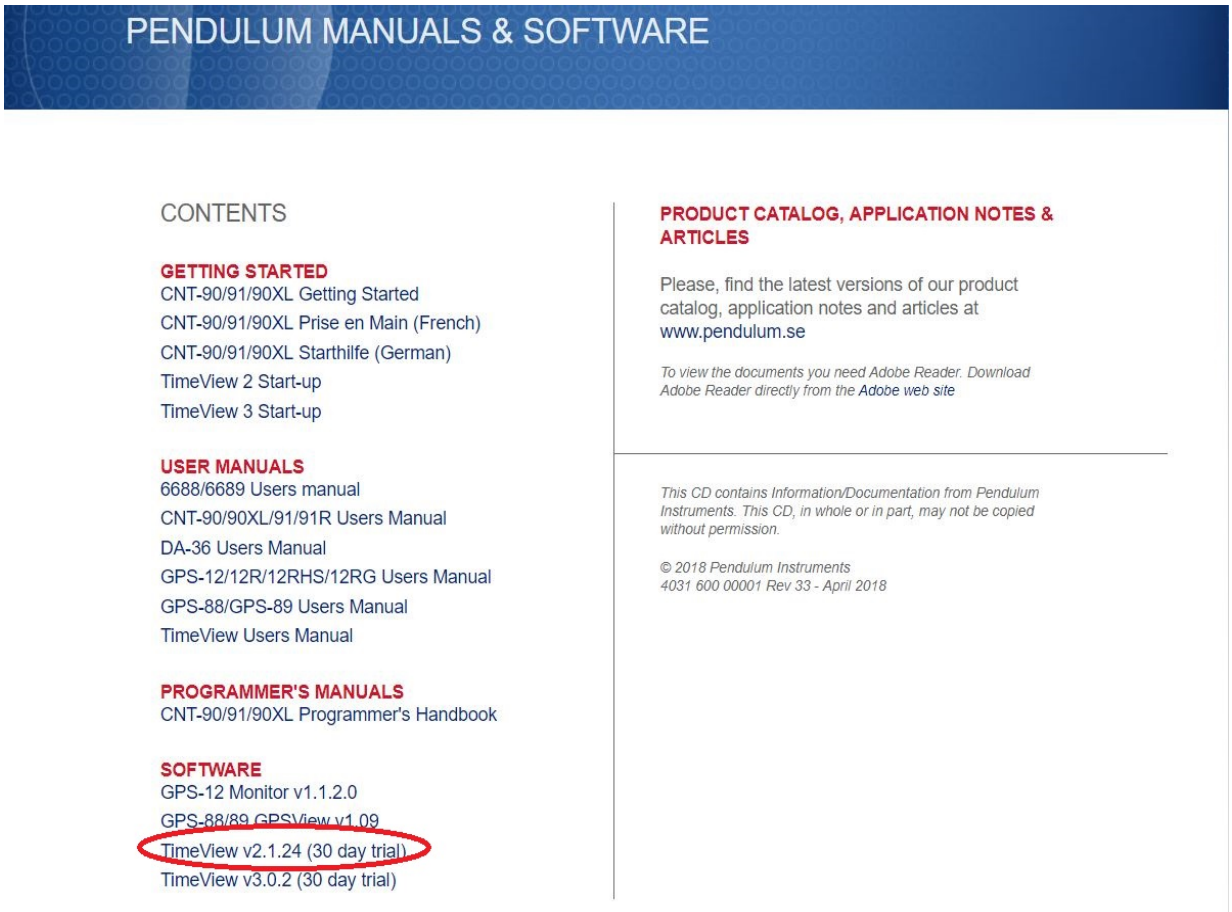
- The TimeView™ software expires after a 30 day trial period. This will make the software unusable until a license is acquired.
- Some functionality is disabled in the unlicensed copy.

To obtain a license contact your sales representative, or closest office, determined at the following website: http://www.pendulum.se

Installing TimeView™

Running the Installer From Documentation CD

1. Insert the Pendulum Documentation CD.
   a. An explorer window should automatically appear similar to that shown below within 30 seconds. If the browser window does not open follow steps i - iv below, otherwise skip to step 2.



   i. To open the explorer window click Start on the Windows Taskbar.
   ii. Click on My Computer.

iii. In the My Computer window that opens double click on the CD drive containing the documentation CD. If the above explorer window opens skip to 2.
iv. If a list of files is displayed double click the file index.htm. This should open a browser window similar to the one above. If the window still does not open please contact Pendulum Support found under *GENERAL INFORMATION - Support*.

2. Click the TimeView v2.1.24 (30 day trial) link, as shown circled in red in the above browser window.
3. Two security warning windows may appear. Click Run in both windows.
4. If the InstallShield window for TimeView™ appears skip to the section *Completing the Installation*. If the InstallShield window does not appear please contact Pendulum Support found under *GENERAL INFORMATION - Support*.

Running the Installer from a Downloaded File

1. Locate the TimeView .exe file downloaded from the internet, and double click that file e.g. TimeView_2-1-24_Setup.exe.
2. Two security warning windows may appear. Click Run in both windows.
3. If the InstallShield window for TimeView™ appears skip to the section *Completing the Installation*. If the InstallShield window does not appear please contact Pendulum Support found under *GENERAL INFORMATION -Support*.

Completing the Installation

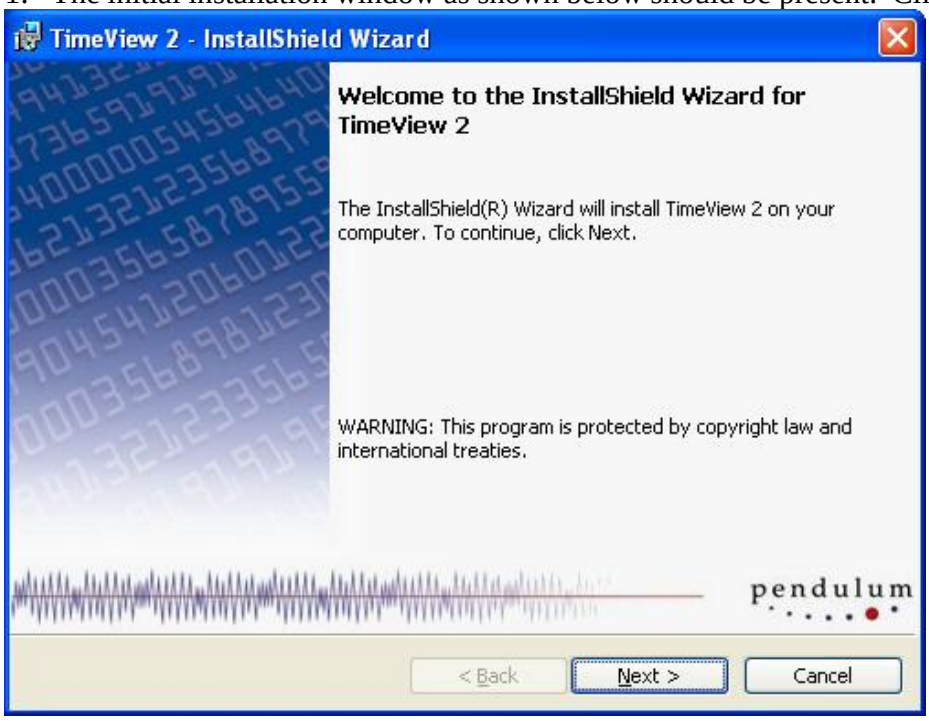
This consists of two mandatory sections and one optional section.

- TimeView™ Application Installation (mandatory)
- Visa Runtime Installation (mandatory)
- License Entry (optional)

Two suites of software require installation for proper function of TimeView™. The first is the TimeView™ application itself. The second is a suite called VISA Runtime, which enables TimeView™ to use various hardware interfaces to communicate with Pendulum equipment. Both installations are covered below.

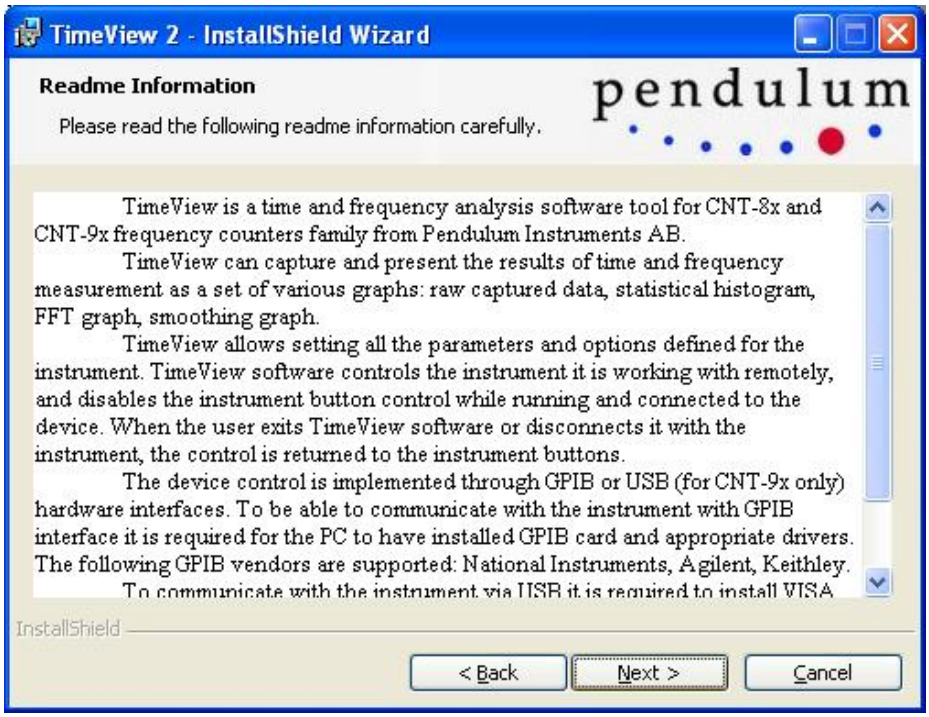
TimeView™ Application Installation

1. The initial installation window as shown below should be present. Click *Next*.

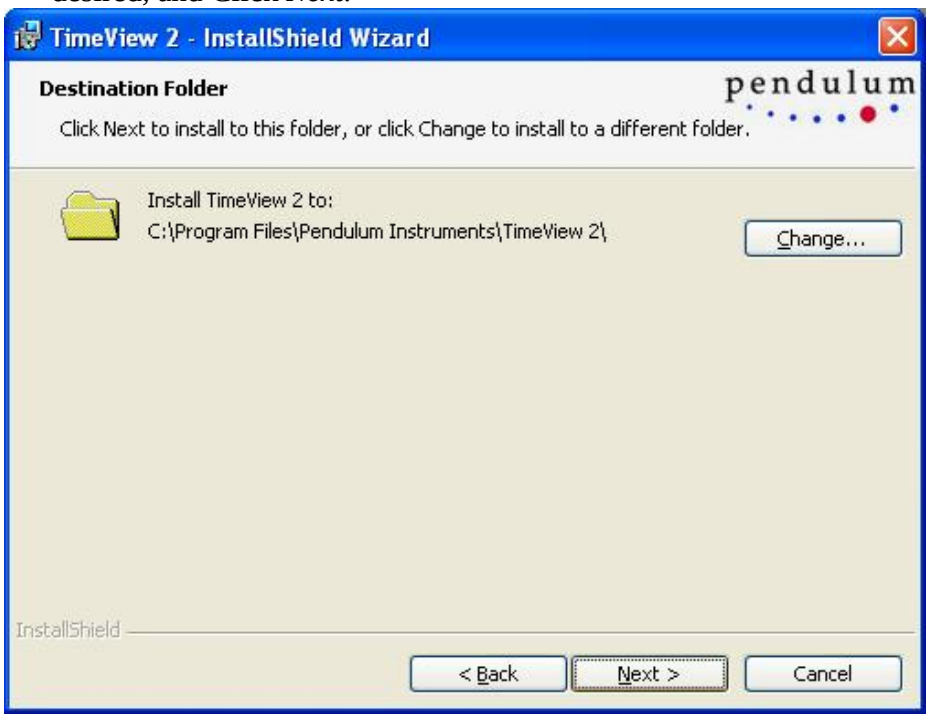


2. The License Agreement appears as shown below. Select the radio button next to the "I accept …" statement after reading the agreement, and click *Next*.

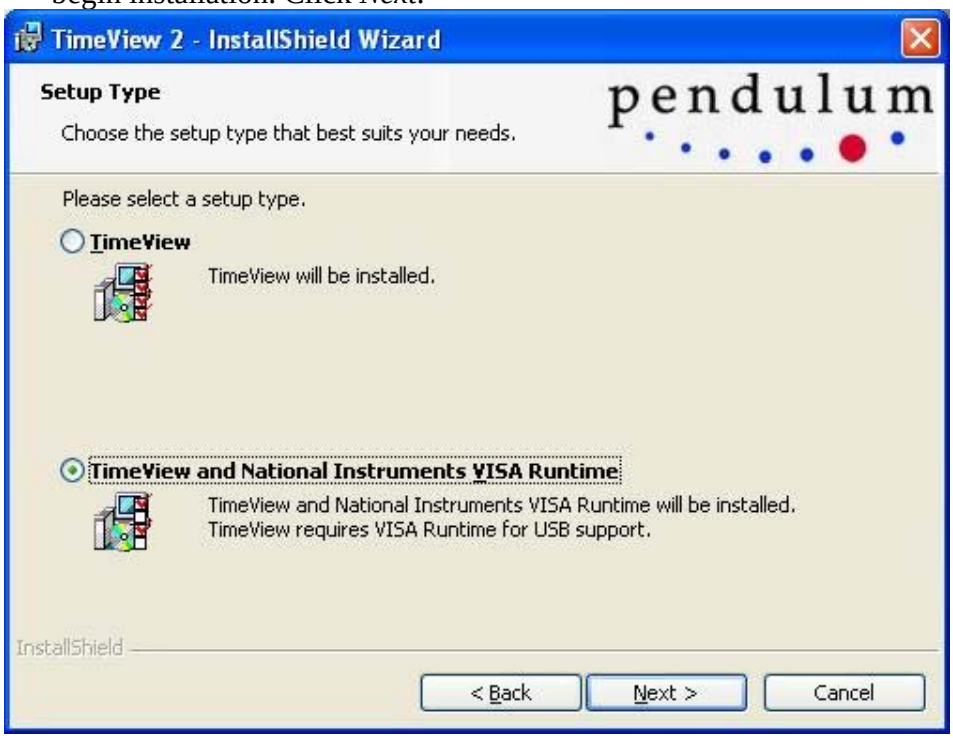
3. The Readme information window is displayed. Click *Next* after reading the information.



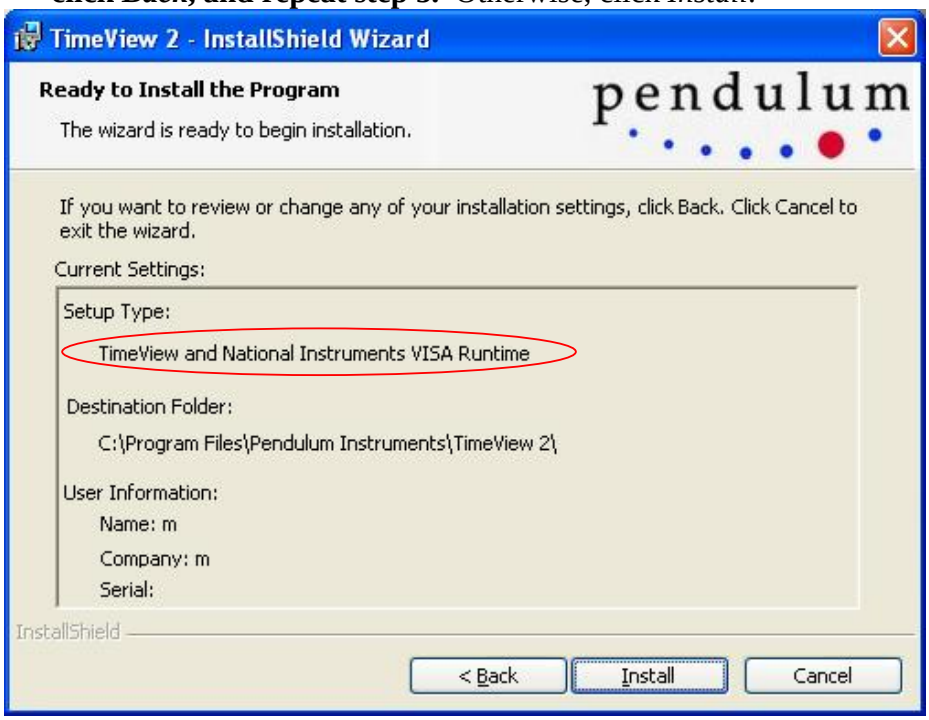
4. The next window allows selection of where to install TimeView™. It is recommended to keep the default location, but change the default location if desired, and Click *Next*.



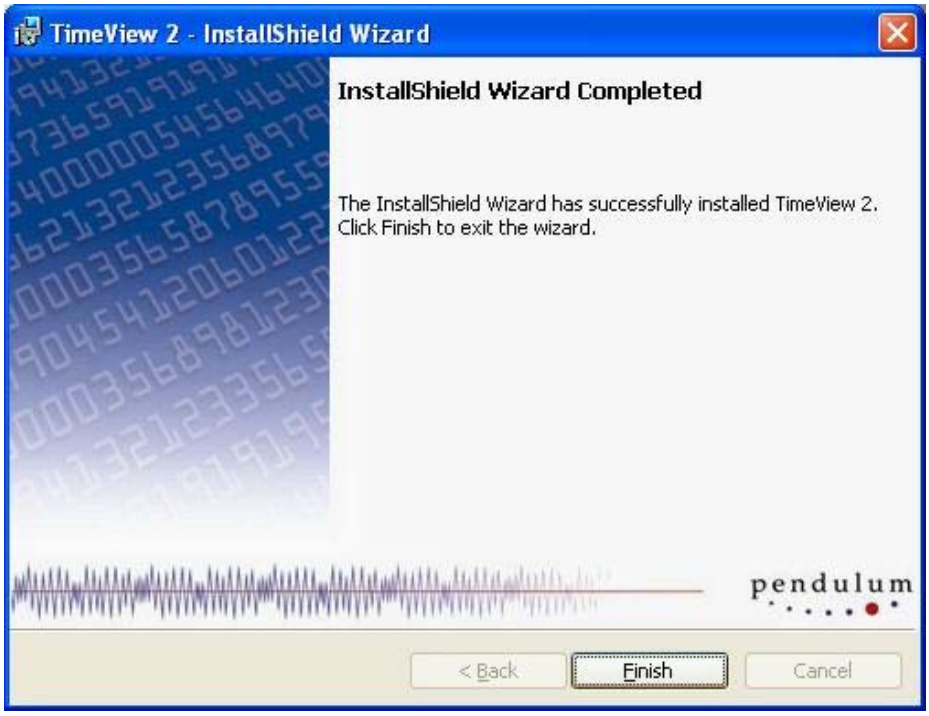
5. **IMPORTANT: Select the radio button to install both TimeView™ and VISA Runtime as shown below.** TimeView™ **requires** the VISA Runtime software suite to communicate with any Pendulum hardware via all interface types e.g. USB.
   After completing the TimeView™ installation the VISA Runtime suite will begin installation. Click *Next.*



6. The below window summarizes the installation selections for TimeView™. **Review, and make sure under "Setup Type" it states TimeView and National Instruments VISA Runtime circled in red below. If it does not, click *Back*, and repeat step 5.** Otherwise, click *Install*.

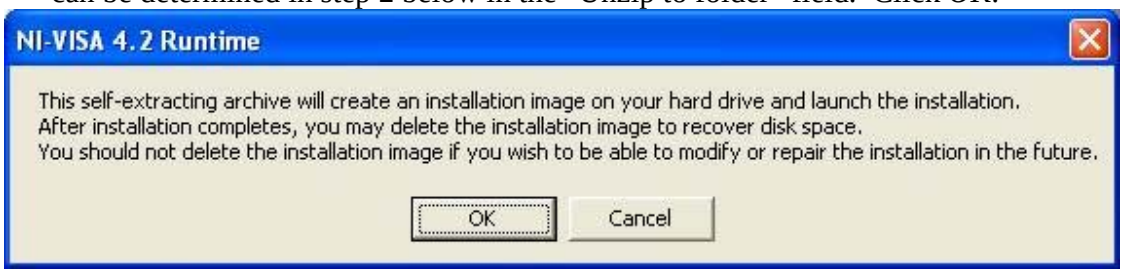


7. If the installation was successful the following window is displayed. Click *Finish*.

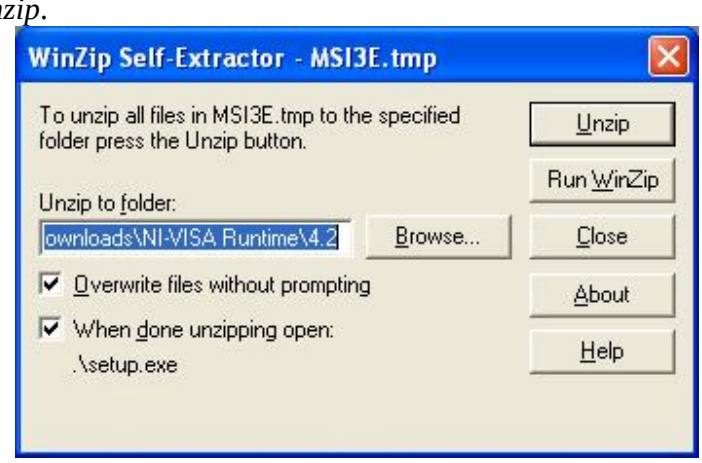


VISA Runtime Installation

1. The self-extracting files can be removed after this installation. Their location can be determined in step 2 below in the "Unzip to folder" field. Click *OK*.



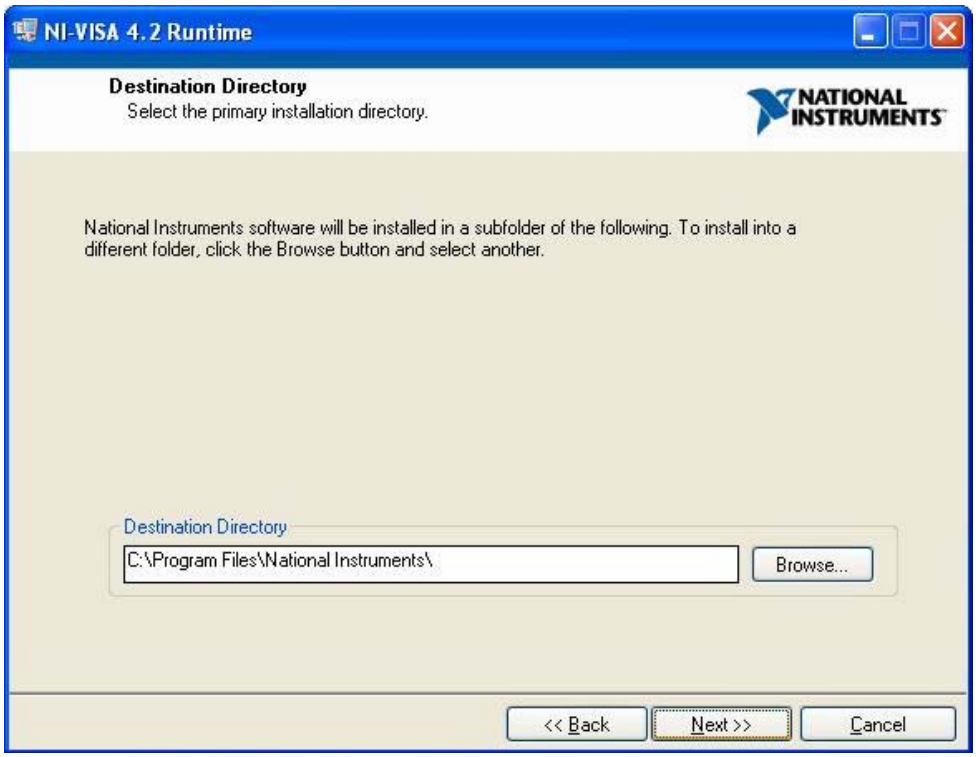
2. The VISA Runtime software suite must be extracted. The destination folder for extraction can be changed, however it is recommended to use the default. Click *Unzip*.



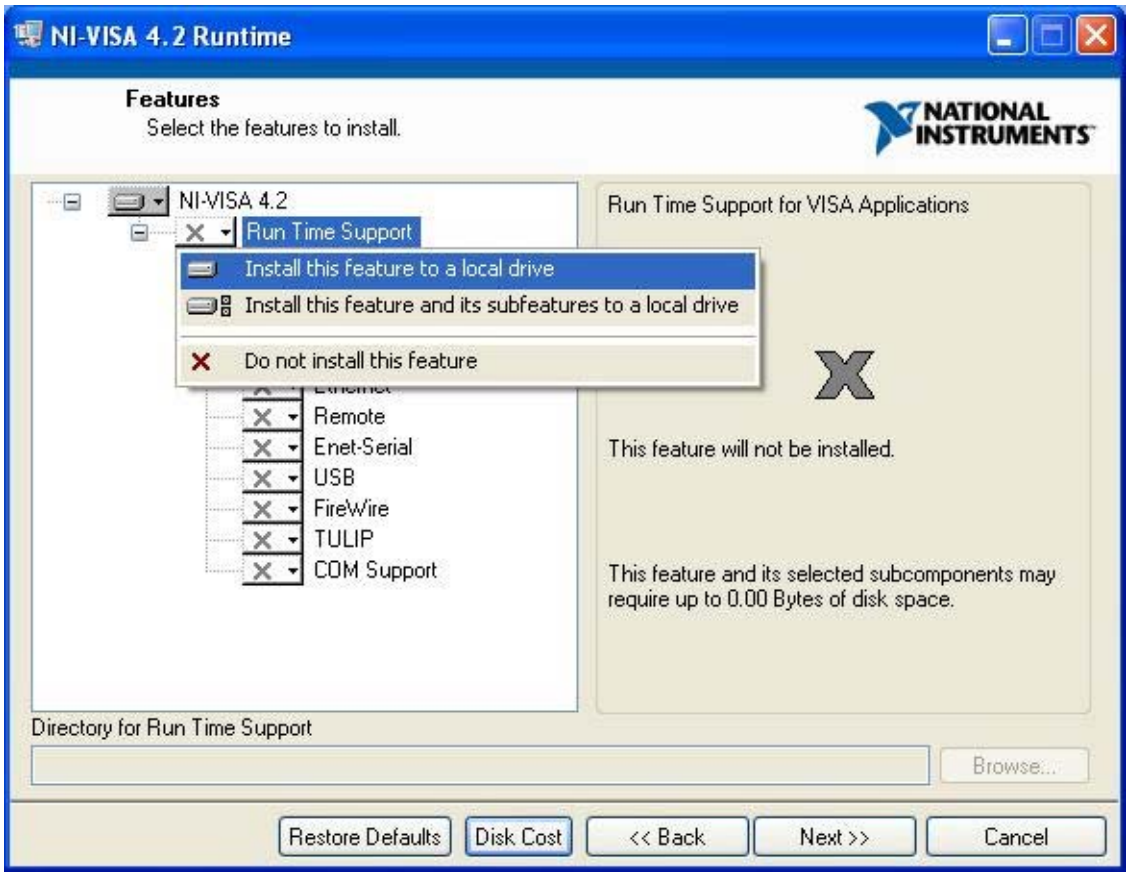
3. After Extracting the files click *OK* in the window that appears confirming how many files were extracted.

4. The NI-VISA Runtime installation window should have automatically launched after extraction of the files, but it will most likely be **minimized** on the Windows Taskbar. Click on the "NI-VISA 4.2 Runtime" task on the Taskbar to bring up the following window. If the below installation window is not present on the Windows Taskbar, it will be necessary to navigate to the Unzip folder destination in step 2, and double click Setup.exe in that folder. Click *Next* in the below window.

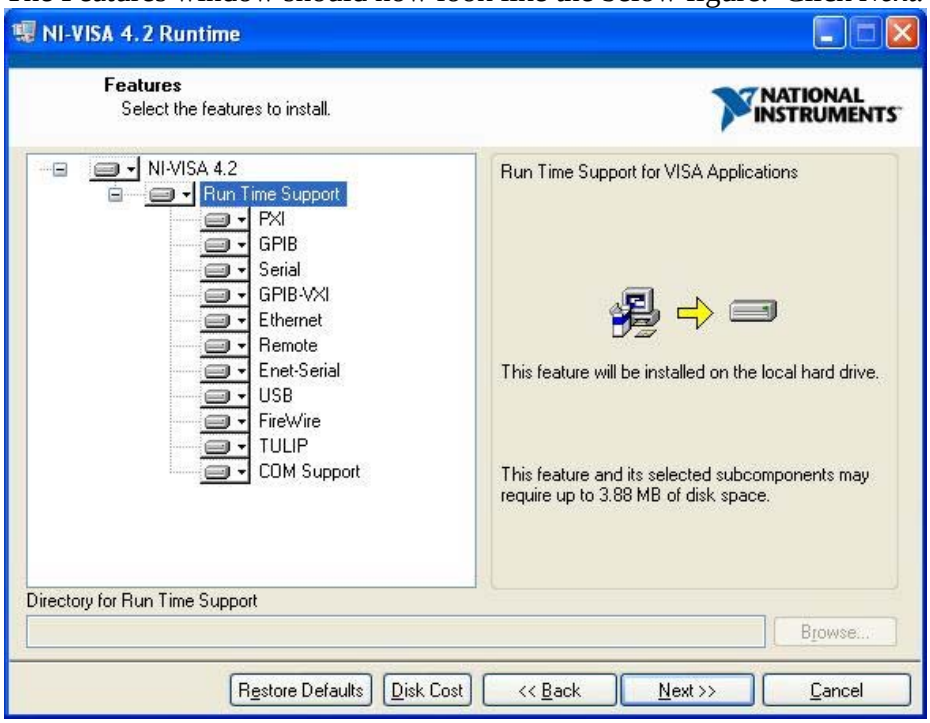
5. Selection of the destination directory for installation is possible, but again it is recommended to leave this its default. Click *Next*.



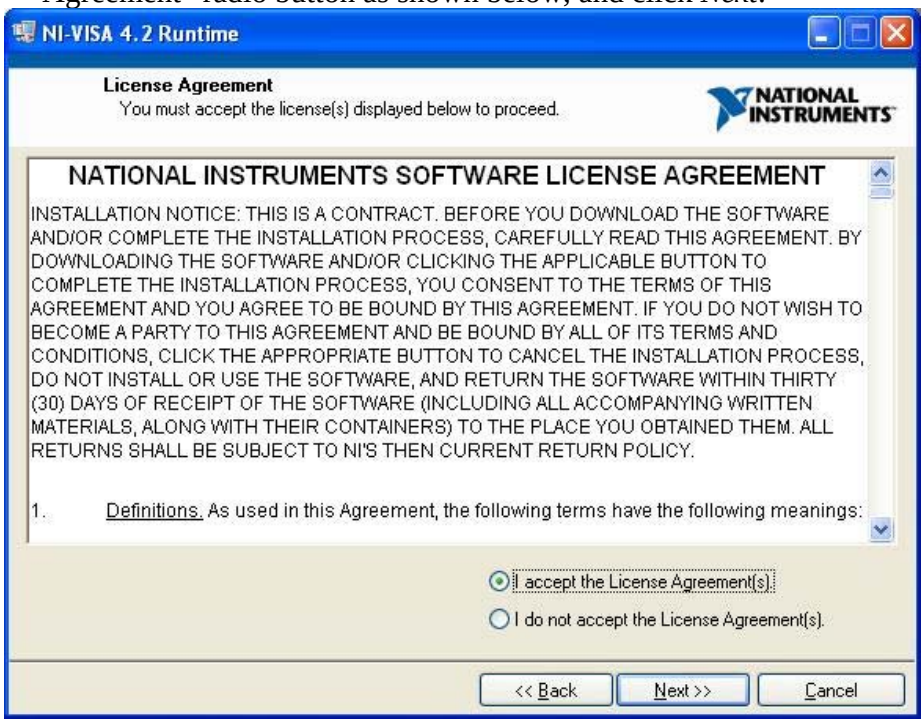
6. The following window allows selective installation of the software supporting the equipment hardware interfaces. It is recommended to install all interface support. This requires approximately 23MB of hard drive space (this space requirement was included in the overall hard drive space total listed in the *System Requirements* section). To make sure all features are installed click on the drop down next to "Run Time Support" and select "Install this feature to a local drive" as shown in the below window.



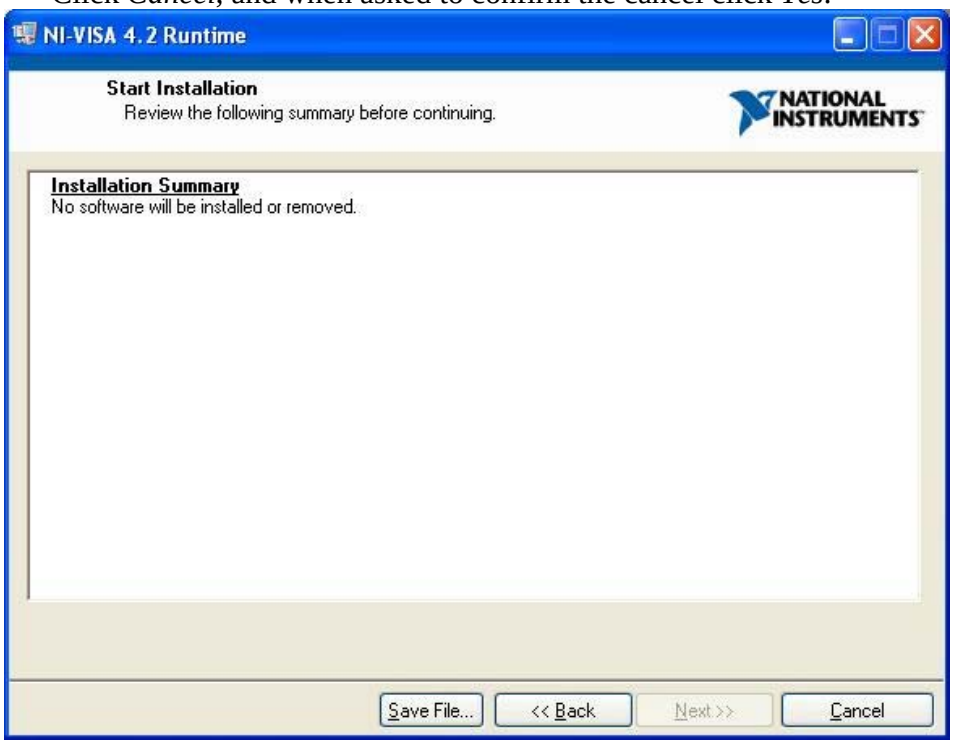
The Features window should now look like the below figure. Click *Next.*



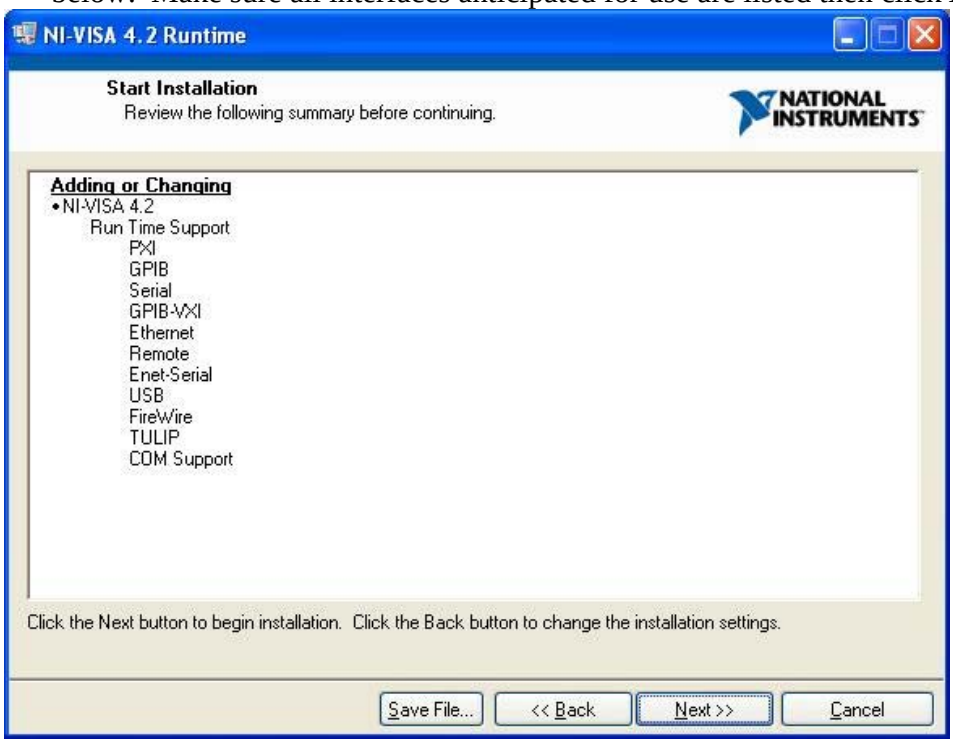
7. If this is the first time the VISA Runtime software is installed the below licensing agreement window appears. Select the "I accept the License Agreement" radio button as shown below, and click *Next*.



8. If the NI-VISA software is already installed the below window will appear. Click *Cancel*, and when asked to confirm the cancel click *Yes*.



9. The summary window of selected components to install appears as shown below. Make sure all interfaces anticipated for use are listed then click *Next*.

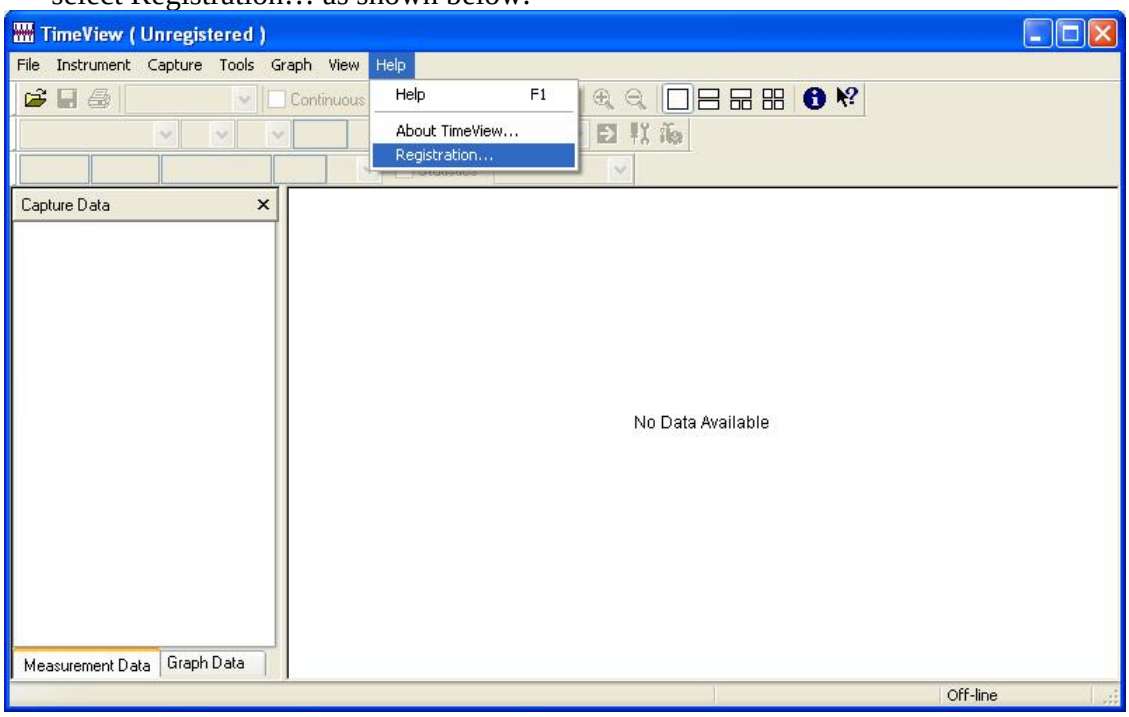


10. The installation will begin. At the conclusion of the installation a window stating the installation is complete will appear. Click on *Finish*. A prompt to restart the computer is presented. The computer must be restarted before the software is operational.

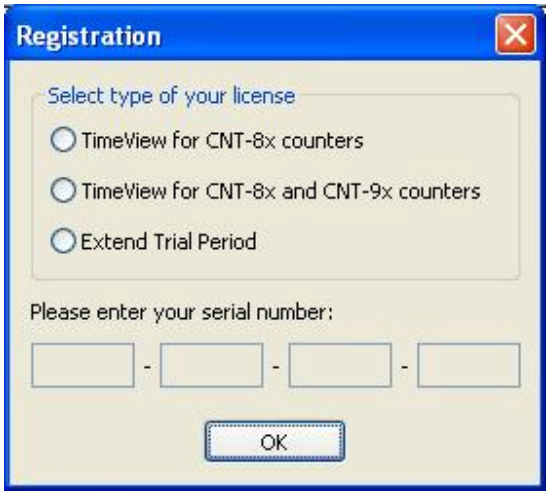
11. After restart, the installation is complete.

License Entry

1. To install the license launch the TimeView™ application by use of the shortcut on the desktop, or by navigating the Windows Start Menu to the Pendulum Instruments folder, and selecting the TimeView™ application. In the TimeView™ window click on Help located on the main menu bar and select Registration… as shown below.



2. In the registration window select the correct radio button for the type of license purchased, enter the 16 digit case-sensitive key, and click OK. The "Unregistered" indication on the main window title bar will disappear, and the product is licensed.



Running TimeView™ and Hardware Connection

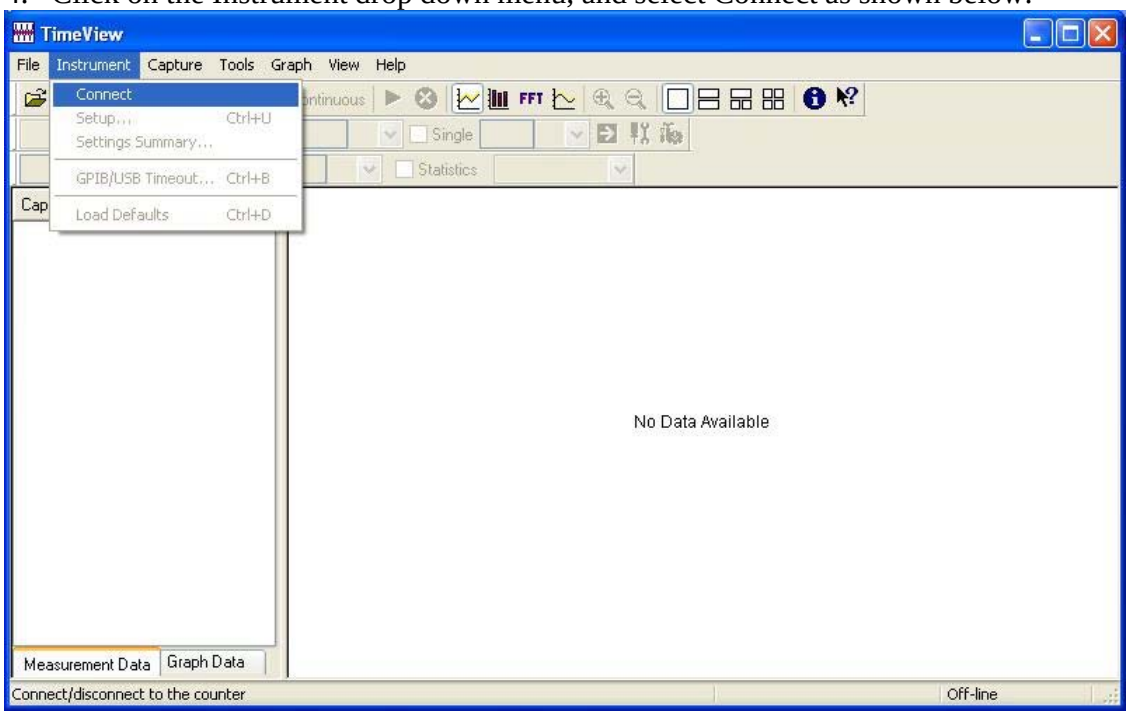
To enable the majority of functions in TimeView™ hardware must be connected through the application.

A very limited set of functionality is enabled when using a saved data file.

Connecting Hardware

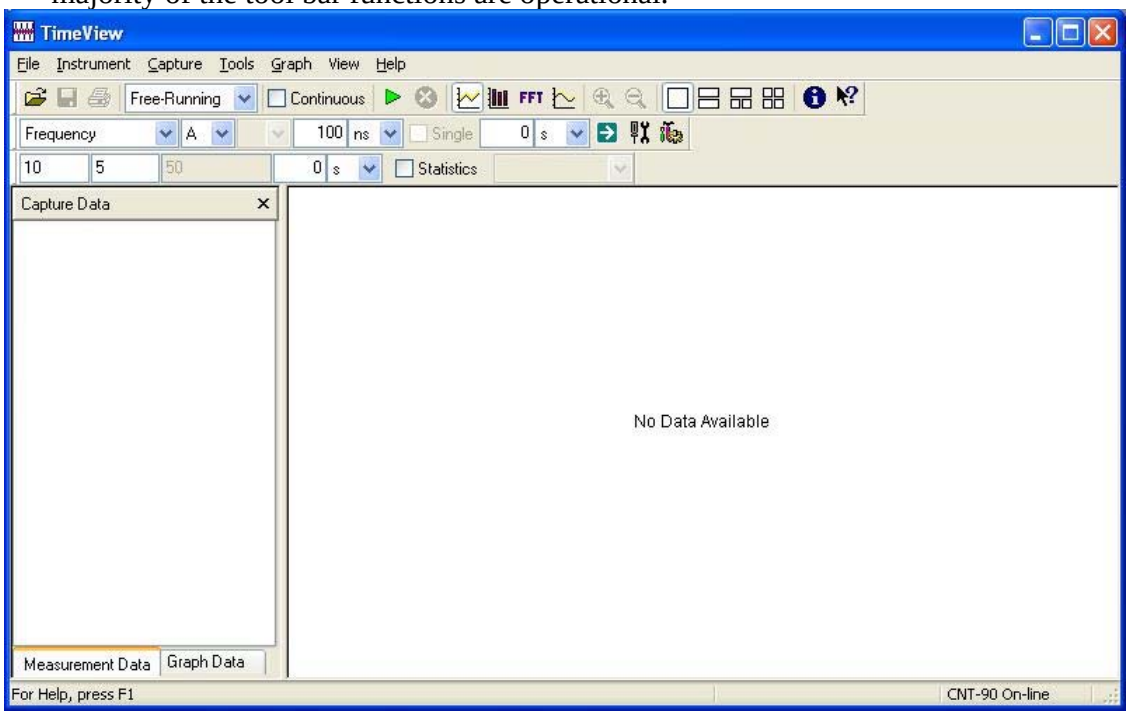
To connect hardware to the application via most hardware interfaces use the following procedure:

1. Launch TimeView™.
2. Connect the piece of equipment to the chosen interface on the computer e.g. USB.
3. Turn on the piece of equipment, and wait for 10 seconds.
4. Click on the Instrument drop down menu, and select Connect as shown below.



5. The piece of equipment should be automatically recognized, and a window as shown below should appear. In this case the piece of equipment is a CNT-90. Click OK to connect the equipment. If the piece of equipment is not automatically detected please refer to the Troubleshooting section.

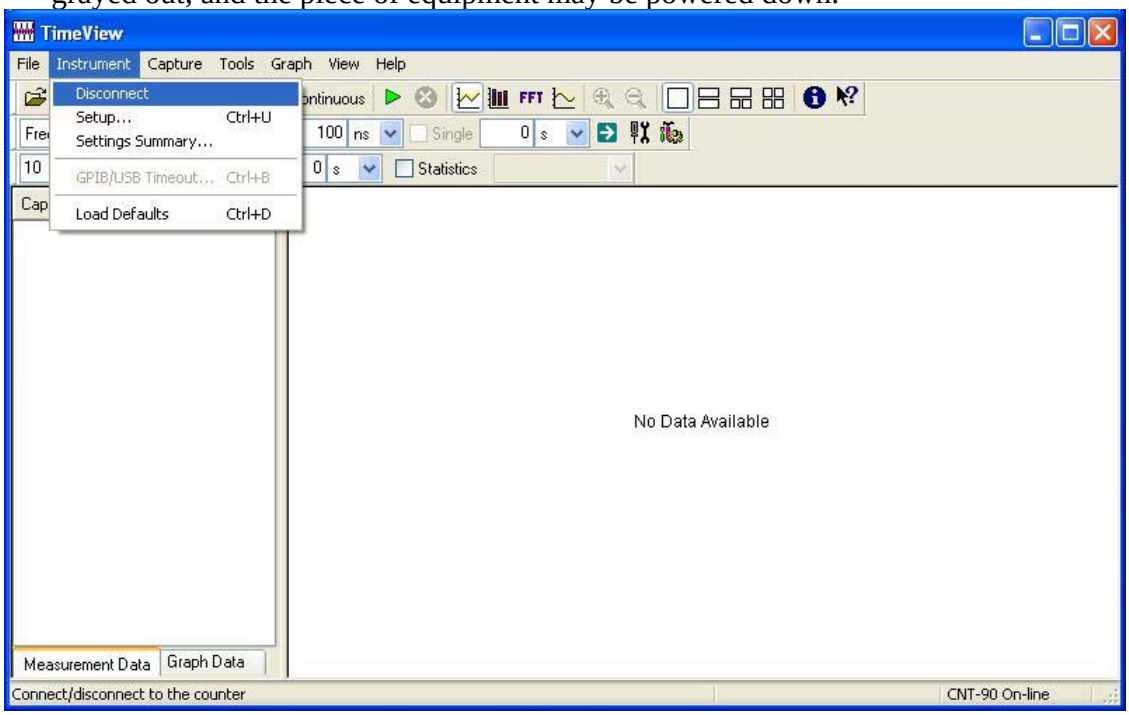
6. The main TimeView™ window should now appear as below. As shown the majority of the tool bar functions are operational.



Disconnecting Hardware

Most hardware requires it be disconnected from TimeView™ before it can be powered down. To disconnect the hardware:

1. Click on Instrument located on the main menu bar, and select Disconnect as shown below. The majority of the functions on the toolbars should now be grayed out, and the piece of equipment may be powered down.



Quick Measurement / Capture Examples

Performing a Quick Measurement

This section will allow you to use your counter to make a very quick measurement in TimeView™ giving you a feeling for how the application works. The application must be installed, and the counter connected via USB to the computer.

Physically Cable the Counter

Connect a BNC cable from the 10 MHz output on the rear of the counter to the channel A input on the front panel.

Connect the Device in TimeView™

Follow the procedure in ***Preparation for Use – Running TimeView™ and Hardware Connection - Connecting Hardware***.

Configure TimeView™

On the TimeView™ menu (see ***User Interface – Interface Overview***) select *Instrument – Setup*. In the window that appears click on the *Default Settings* button at the bottom and Click *OK*. This will properly set the configuration of the counter.

Make the Measurement

On the Standard Toolbar click the green arrow (Run Capture. See: ***User Interface – Toolbar Pane – Standard Toolbar***). This will display graph of frequency vs. time. Referring again to the ***Toolbar Pane*** section of this manual you can explore the user interface with the newly generated capture, or recapture using a different capture or measurement type.

Included Capture Examples

Some examples of different captures are installed with TimeView™. They are found in the Samples folder normally located at C:\Program Files\Pendulum Instruments\TimeView 2\Samples. To view these files, start the TimeView™ application. Click on File – Open. Navigate to the Samples folder, and open any of the files found within. These will allow you to explore some features of the user interface without a real capture.

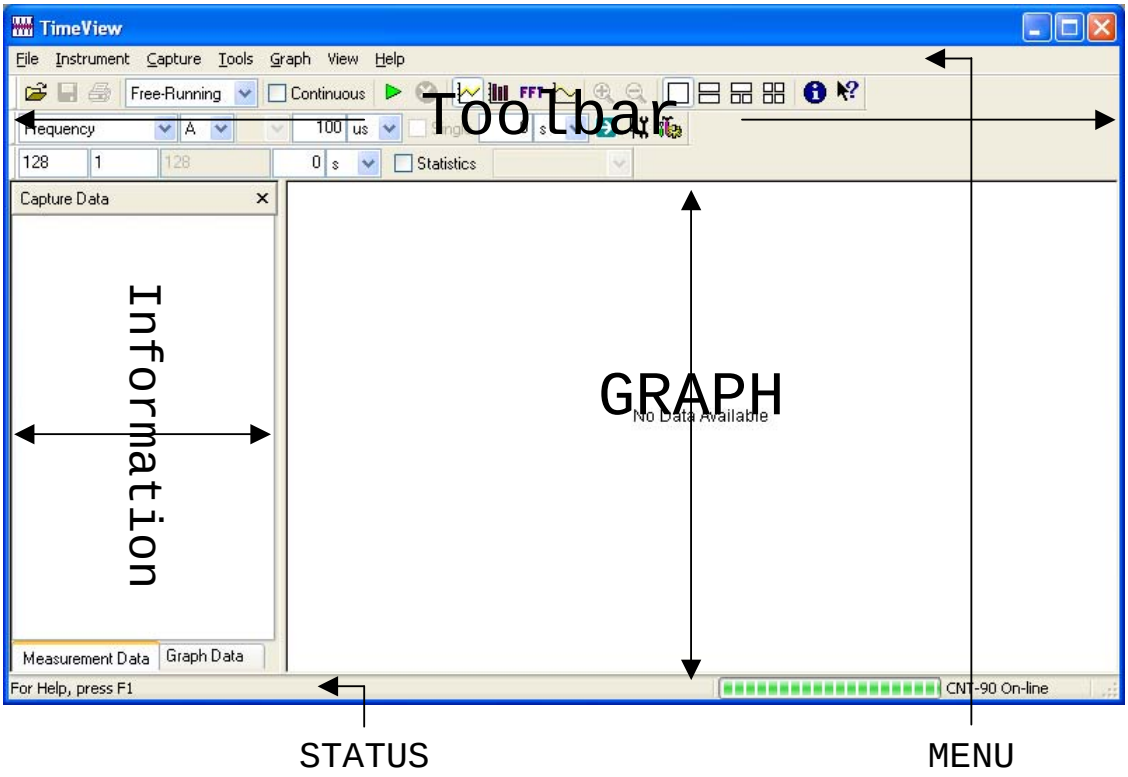
3 User Interface

Preface

This section assumes one of the Pendulum devices listed under ***Preparation for Use - Hardware Support*** is connected to the computer and subsequently the TimeView™ application. It is necessary to have a piece of equipment connected to enable the majority of the menu options covered in this section. Please follow the procedure found under ***Preparation for Use – Connecting Hardware*** to connect a device.

Interface Overview

The following describes the application interface, and defines the terminology associated with different pieces of the application interface. The terminology defined here will be used throughout the rest of this manual.

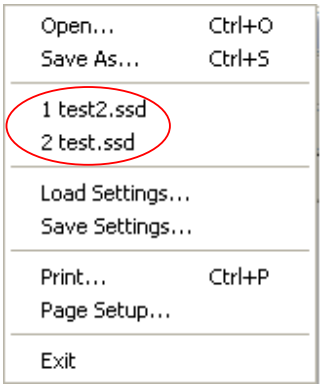


As defined above, the application is broken up into five main **panes**: Menu, Toolbar, Information, Graph, and Status.

The Toolbar, Information, and Graph panes are comprised of sub-panes, selectable and modifiable by the user. The following sections of this manual describe these panes, and their functions in detail.

Menu Pane

File



Open: Opens a data file created by the TimeView™ application.

*.ssd – Free Running Measurement File
*.rsd – Repetitive Sampling Data File
*.wad – Waveform Data File
*.tsd – Timestamp Data File

Save As: Saves the current captured waveform data (enabled with license).

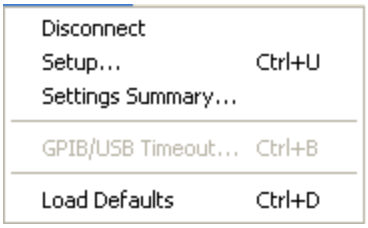
Load/Save Settings: Loads/Saves the current application configuration to allow easy, quick switching between different types of measurements.

Print: Prints the currently active graph. If zoomed only the zoomed portion is printed (enabled with license).

Recent Files: The area circled in red lists recently opened waveform data files. This area will remain blank until the first file is opened.

Instrument

Configures settings associated with the counter.



(Dis)Connect: Connects or disconnects a Pendulum device to the TimeView™ application.
Note: A device should always be **disconnected** using this menu function **before the cable from device to computer is disconnected.**

Setup: See below.

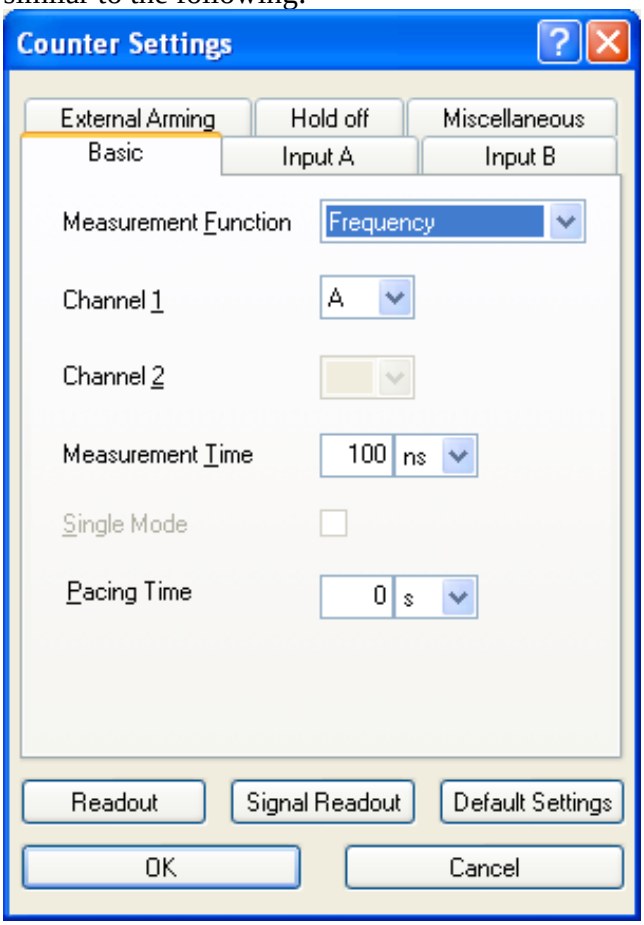
Settings Summary: Opens a window displaying the current counter settings.

GPIB/USB Timeout: This is a device specific menu item, only enabled for particular Pendulum equipment. Allows the user to set the amount of time the application will wait for data from the device before incurring a timeout error.

Load Defaults: Resets the counter to its default configuration. This does not affect application settings. Only affects the Counter Toolbar in the application.

Setup

Configures connected counter settings. Opens a window with access to all configurable settings available on the device. The functions present in the window are device dependent i.e. different devices may have different options. Please refer to the User Manual of the equipment for an explanation of these settings. The window should appear similar to the following:

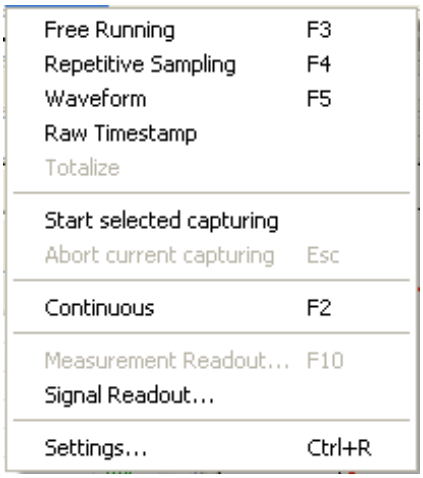


Selecting “Default Settings” will reset **all** tabs of the device’s settings to their defaults, not just those settings on the currently selected tab.

Capture

Configures settings to control capture, and display of waveforms.

NOTE: For a detailed discussion of the following four menu items please refer to ***User Interface – Toolbar Pane – Standard – Capture Type***.



Free Running: Captures the selected measurement function e.g. frequency in a continuous block of time.

Repetitive Sampling: Captures the selected measurement function e.g. frequency at delayed time intervals. Requires external arming.

Waveform: Captures the shape of the waveform in terms of voltage vs. time.

Raw Timestamp: Captures trigger level crossings on the measured waveform. The captured data consists of groups each containing four samples. Time marks are displayed by a square wave with its positive and negative transitions corresponding to the positive and negative transitions of the measured waveform.

Totalize: (CNT-91 only) Allows different arithmetic combinations of two waveforms measured on the A and B channels. After the measurement is performed the arithmetic combinations are available through the contextual menu on the graph i.e. by right-clicking on the graph area a menu is displayed allowing selection of which arithmetic combination to display.

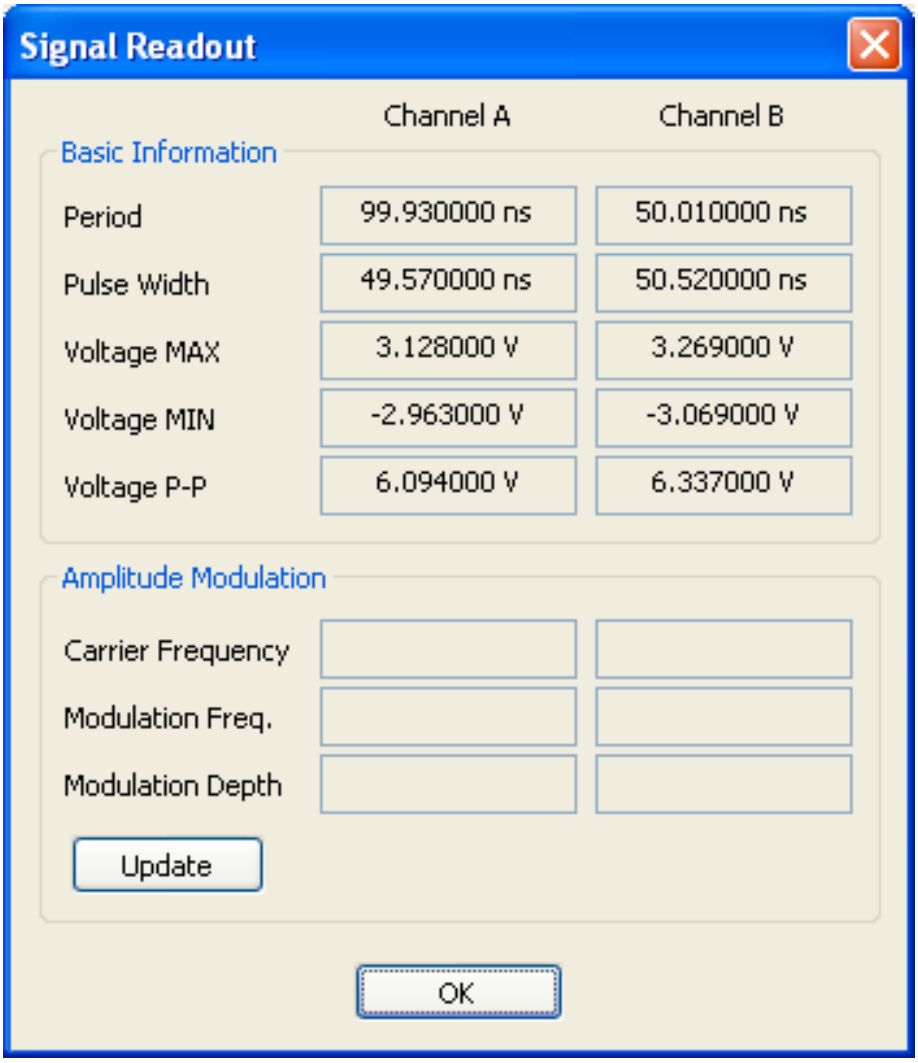
Start selected capturing: Captures waveform data per the current measurement configuration.

Continuous: Will continuously capture waveform data per the current measurement configuration until manually interrupted.

Abort Current Capturing: Stops a continuous capture.

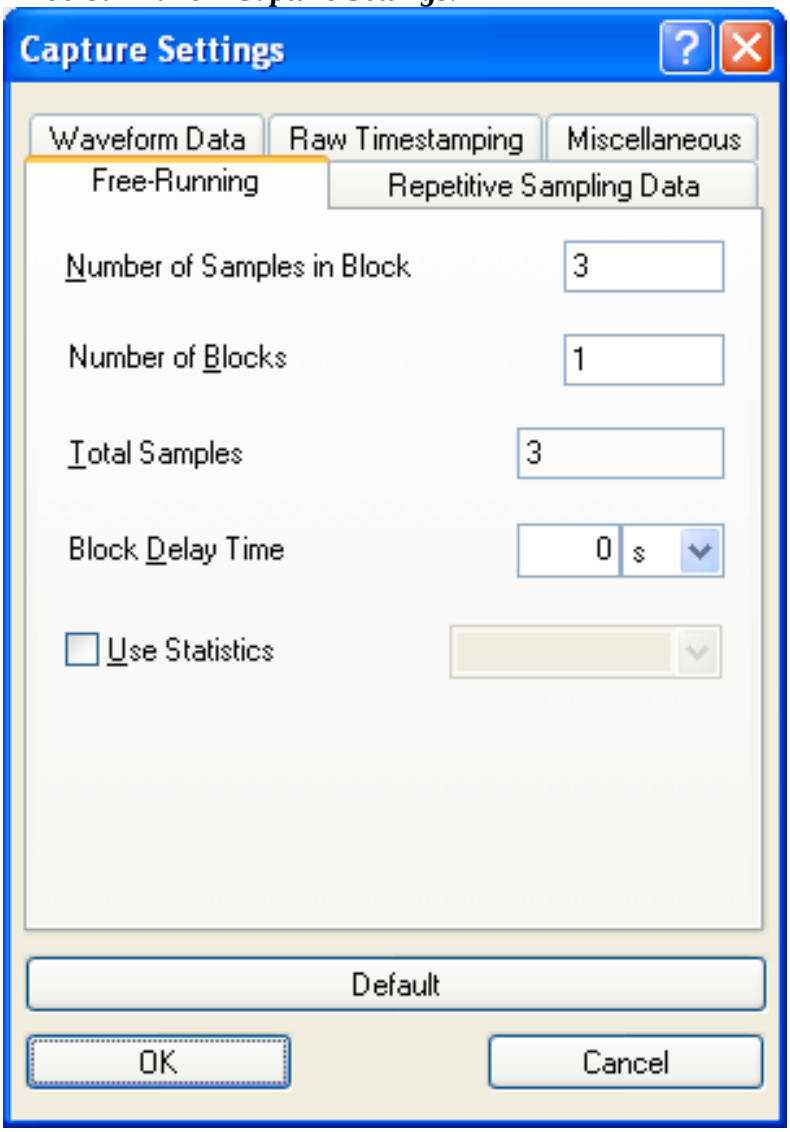
Measurement Readout: Displays a real-time readout of a selected measurement function e.g. frequency in a separate window. Is only enabled when Capture Type is set to Free Running.

Signal Readout: Displays a snapshot summary of basic information about the current signal read by the counter. “Update” will refresh the display. A window similar to the following is displayed.


Signal Readout
Channel A
Channel B
Basic Information
Period
99.930000 ns
50.010000 ns
Pulse Width
49.570000 ns
50.520000 ns
Voltage MAX
3.128000 V
3.269000 V
Voltage MIN
-2.963000 V
-3.069000 V
Voltage P-P
6.094000 V
6.337000 V
Amplitude Modulation
Carrier Frequency
Modulation Freq.
Modulation Depth
Update
OK

Settings

The settings window mirrors all of the functions available on the Toolbars for each of the different Capture Types. All of these settings are covered in detail under ***User Interface – Toolbar Pane – Capture Settings***.



The Miscellaneous tab in the Settings window contains a "Use Data Backup" option. ? This will automatically save the collected waveform data after each capture. The save behaves identical to the "Save as" function in the File Menu.

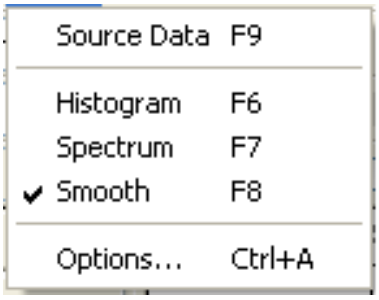
NOTE:

In the settings window the "Default" button only resets the defaults for the currently displayed tab, all of the other tabs will maintain the user defined settings. To reset all of the tabs to their defaults it is necessary to cycle through each tab, and click the "Default" button.

Under the “Free Running” tab the “Use Statistics” setting always maintains the users setting even when the “Default” button is pushed i.e. no default exists for this setting.

Tools

Allows selection between different graphical displays, and the configuration of the settings for each display type.



Source Data: Displays the raw data as collected per the measurement function setting.

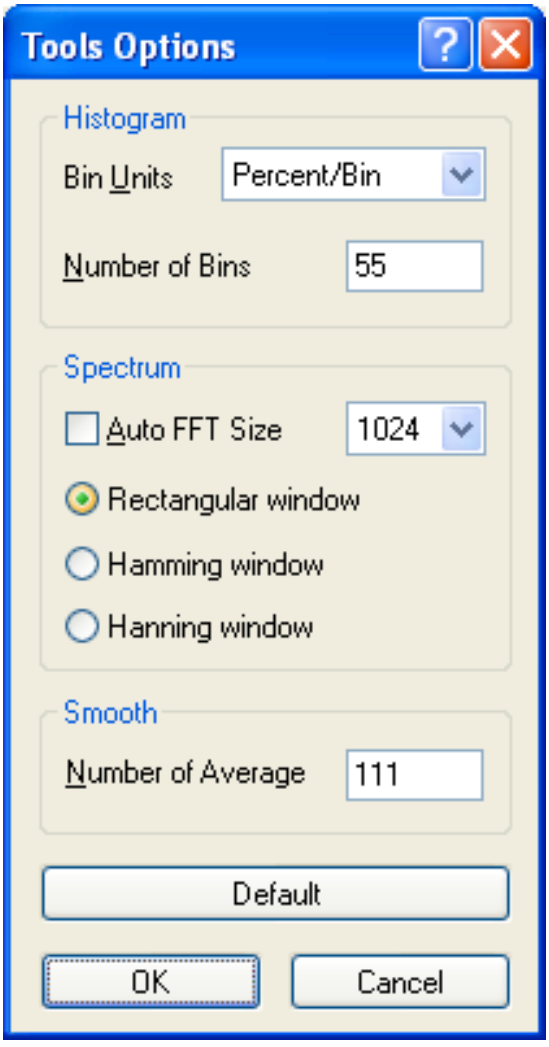
Histogram: Displays the data as a histogram.

Spectrum: Displays the data in its frequency spectrum using the FFT.

Smooth: Displays a waveform based on the averaging of a user definable number of coincident points.

Options

The window to the right is displayed.



Histogram

Bin Units: Toggles the y-axis to have units of either a percentage of samples per bin, or number of samples per bin.

Number of Bins: Changes the granularity of the range of values associated with each bin, or bar in the histogram.

Spectrum

Auto FFT Size: The application will make the decision of the ideal number of points to compute the FFT if selected.

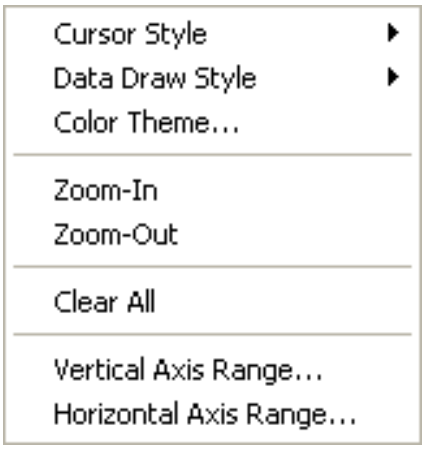
Windows: Each window offers different advantages in calculation of the FFT. The discussion of those advantages is beyond the scope of this document.

Smooth

Number of Average: The number of coincident points to use when finding the average value for a particular point. This will affect the total number of points displayed on the graph. For example with 100 samples a "Number of Average" = 50 would reduce the total number of points on the graph to 50.

Graph

Controls the display of the graphs.



Cursor Style: Changes the cursors displayed on the graph to a small circle, medium rectangle, or large cross.

Data Draw Style: Various line styles for display of the data.

Color Theme: Controls the colors of graphical objects. One custom theme can be created, which is automatically saved when "OK" is clicked.

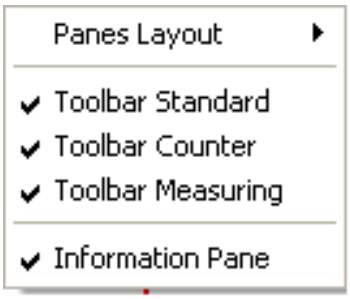
Zoom In/Out: Zooms in and out on the graph, however a better way to zoom is to click-and-hold on the graph while dragging the dotted rectangular box formed from the click-and-hold action over the desired region.

Clear All: Deletes the collected data, removing the graphs, and numerical data. **NOTE: This operation cannot be undone.**

Vertical/Horizontal Axis Range: Allows manual definition of magnitudes of units and ranges to show on the axes.

View

Configures what Panes are visible in the application.

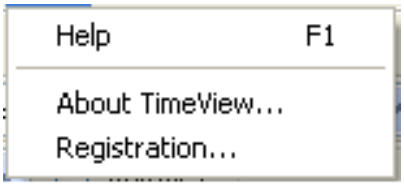


Panes Layout: Changes the number of graphs that appear in the graph pane. Up to four graphs can be displayed simultaneously. Each new graph is randomly chosen from the options remaining. To change the graph appearing in one of the new graph sub-panes, click on that sub-pane, and select the desired graph from the Tools Menu or the Toolbar.

The other options in the menu cause removal of the listed Toolbars, and/or the Information Pane from the application.

Help

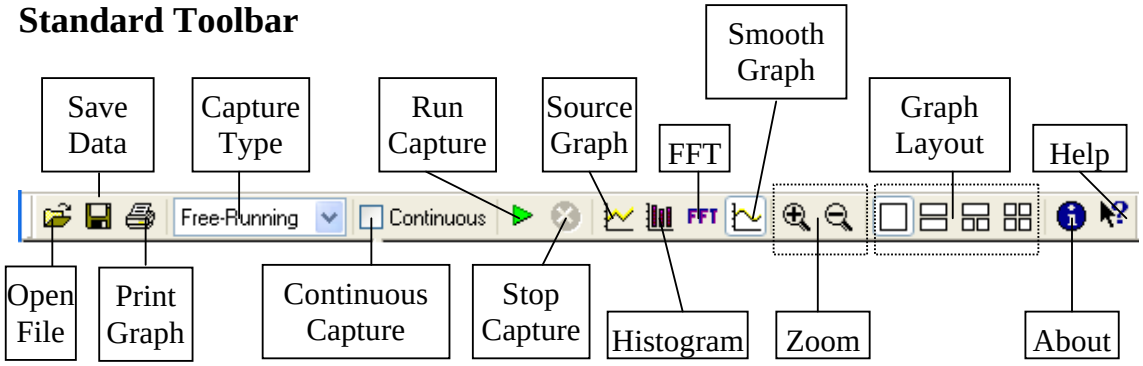
Opens the TimeView™ help, displays version information, and allows registration of the product.



Toolbar Pane

The Toolbar Pane consists of three toolbars. From top to bottom these are: Standard, Counter, and Measuring. The Toolbar Pane allows faster access to all but a few of the same functions available through the Menu Pane.

Standard Toolbar



Open File

Opens a data file created by the TimeView™ application.

*.ssd – Free Running Measurement File
*.rsd – Repetitive Sampling Data File
*.wad – Waveform Data File
*.tsd – Timestamp Data File

Save Data

Saves the current captured waveform data (enabled with license) per the types listed in *Open File*.

Print

Prints the currently active graph. If zoomed only the zoomed portion is printed (enabled with license).

Capture Type

The list of types displayed in the dropdown menu changes based on connected hardware. Five capture types exist over all hardware lines.

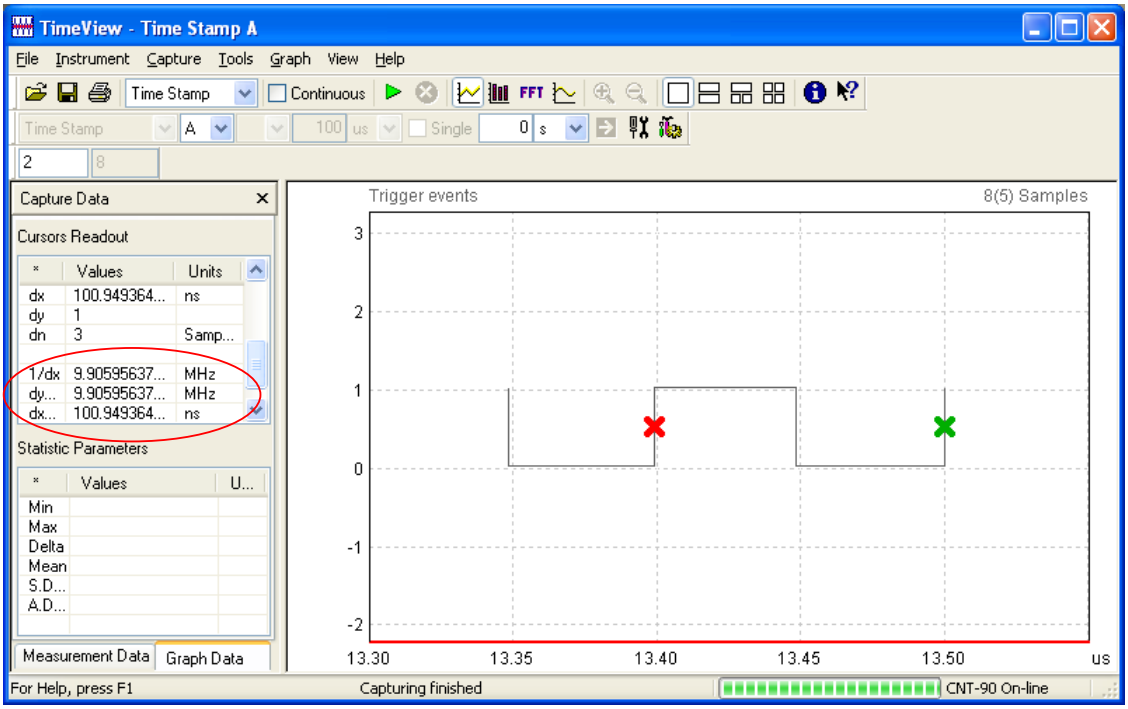
Free Running: Captures the selected measurement function e.g. frequency (see ***User Interface – Toolbar Pane – Counter – Measurement Function)*** in a continuous block of time.

Repetitive Sampling: Captures the selected measurement function e.g. frequency at delayed time intervals. Requires external arming. NOTE: Once external arming is enabled it will be used for all other capture types until disabled.

Waveform: Captures the shape of the waveform in terms of voltage vs. time.

Raw Timestamp: Captures trigger level crossings on the measured waveform. The captured data consists of groups each containing four samples. Time marks are displayed by a square wave with its positive and negative transitions corresponding to the measured waveform and its trigger level crossings with positive and negative slope. Up to 125 kHz (interpolator calibration ON) or 250 kHz (interpolator calibration OFF), all transitions can be timestamped, both positive (+ Slope) and negative (- Slope). Above these limits there will be a certain deadtime, 8 µs resp. 4 µs, before the next group can be recorded. Changing the pacing parameter can also extend the sampling interval. See below.

Example:



The figure above displays the result of a raw timestamp function on a 10MHz periodic input signal, zoomed to show only one group. The group consists of four timestamps taken on consecutive trigger level crossings, i.e. without deadtime. Consequently the timestamps in this case are recorded every 50 ns. The time to the next group of timestamps is set by the pacing parameter. Its setting range is 0 - 500 s, but the real minimum time is 4 µs or 8 µs, the latter value being valid if the interpolator calibration is ON. You can see the influence of the pacing by zooming out the graph. However, the counter that accumulates clock ticks every 10 ns is not interrupted but read off at the pacing intervals. From there the basic

10 ns resolution can be improved to 100 ps (CNT-90) or 50 ps (CNT-91) by the analog interpolators that are continually calibrated, if this function is activated. The tradeoff is the longer deadtime. The cursors (red and green X's) are positioned to measure one period of the input waveform from one zero crossing to the next with positive slope.

You also need an event counter to keep track of the total number of periods of the input signal at the timestamps recorded for the positive transitions. You can see the contents of this counter as a new graph by right-clicking in the graph and then selecting Event Count from the pop-up menu.

By combining event and timestamp data in a postprocessing block, you can calculate the statistics functions ADEV and MADEV, also by right-clicking in the Trigger Event graph and selecting the desired function from the pop-up menu.

Totalize: (CNT-91 only) Allows different arithmetic combinations of two waveforms measured on the A and B channels. After the measurement is performed the arithmetic combinations are available through the contextual menu on the graph i.e. by right-clicking on the graph area a menu is displayed allowing selection of which arithmetic combination to display.

Continuous Capture

Continually collects data, and displays each collection until manually stopped, at which point the last collected and displayed data is kept.

Run Capture

Runs the measurement.

Abort Active Capture

Stops the current measurement.

Source (raw) Graph

Displays a graph of the data as collected per the measurement function with no manipulation (see ***User Interface – Toolbar Pane – Counter – Measurement Function***).

Histogram

Displays a graph of the collected data in a histogram. Uses the Histogram settings as described under ***User Interface – Menu Pane – Tools – Options***.

FFT

Displays a graph of the collected data after application of a FFT. Uses the FFT settings as described under ***User Interface – Menu Pane – Tools – Options***.

Smoothed Graph

Displays a graph of the collected data after application of the smoothing algorithim. Uses the Smooth settings as described under ***User Interface – Menu Pane – Tools – Options***.

Zoom

Zooms the current graph in/out about the midpoint of x-axis by dividing/multiplying the total time displayed on the x-axis by 2.

Two better methods exist for zooming:

- Better: Click and hold on the graph dragging the cursor over the portion of interest on the graph.
- Best: Position the cursors on the graph (see ***User Interface – Graph Pane – Cursors***) to cover the range of interest, then use the "Zoom In To Cursors" function from the graph's contextual menu (see ***User Interface – Graph Pane – Contextual Menu***).

NOTE: The Auto Range must be selected in the Define Axis window to enable the toolbar zoom functions. The Define Axis window is opened via a contextual menu on the graph (see ***User Interface – Graph Pane – Contextual Menu***).

Graph Layout

Controls how many graphs (up to four) are displayed in the graph pane.

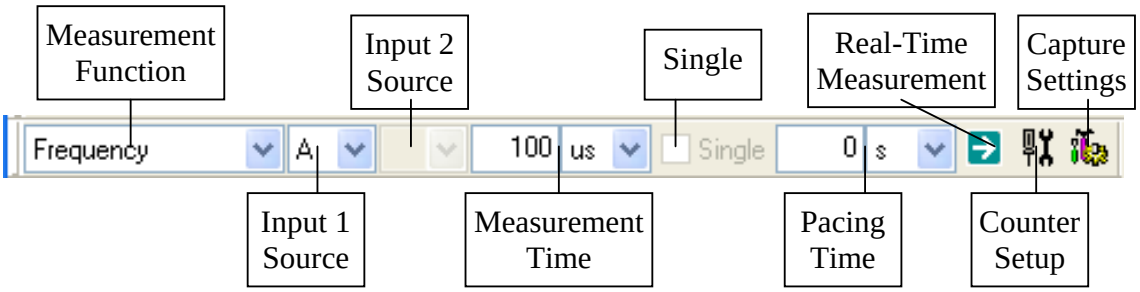
Each new sub-pane in the graph pane can be configured to display a different type of graph by clicking in the desired sub-pane, then selecting one of the four different types of graphs (Source, Histogram, FFT, Smooth) from the toolbar.

About/Help

About displays information about the TimeView™ application.

Click on Help then on a piece of the application to open the TimeView™ help documentation to information about that specific piece of the application if it exists.

Counter Toolbar



Measurement Function

Allows selection of the different measurements possible on the connected counter. For a description of the possible measurements please refer to the User Guide for the counter.

Input 1 Source

Selects the source input on the counter to use as input 1 in the application.

Input 2 Source

Selects the source input on the counter to use as input 2 in the application. This input is only used with particular Measurement Functions. If the Measurement Function requires this input it will become available in the application when that function is selected.

Measurement Time

For CNT-9X see **Single-cycle Measurement** for an important note.
Sets the time interval between samples. For Burst measurements the time interval should be shorter than the burst.

Single-cycle Measurement

The CNT-9X is a single-cycle measurement machine ALWAYS. In the TimeView™ application the **Single-Cycle Measurement** checkbox is grayed out and the greater value in EITHER **Measurement Time** or **Pacing** is used to set the effective measurement time interval. It is recommended that **Measurement Time** be used exclusively on the CNT-9X with **Pacing** set to zero.
Select this option to perform single-cycle measurements, e.g. single-shot Time Interval measurement function. If Single is on, measurement time is converted to "Time between measurements". Leave Single switched off (default) to perform average measurements over set measuring time. Always select single for Jitter measurements.

Pacing (Interval Between Measurements)

For CNT-9X see **Single-cycle Measurement** for an important note.
Sets the time between individual measurements.

Real-Time Measurement Readout

Opens a window that displays a real-time readout of whichever Measurement Function is selected.

Counter Settings

Please refer to the counter User Guide for information on how to configure these settings.

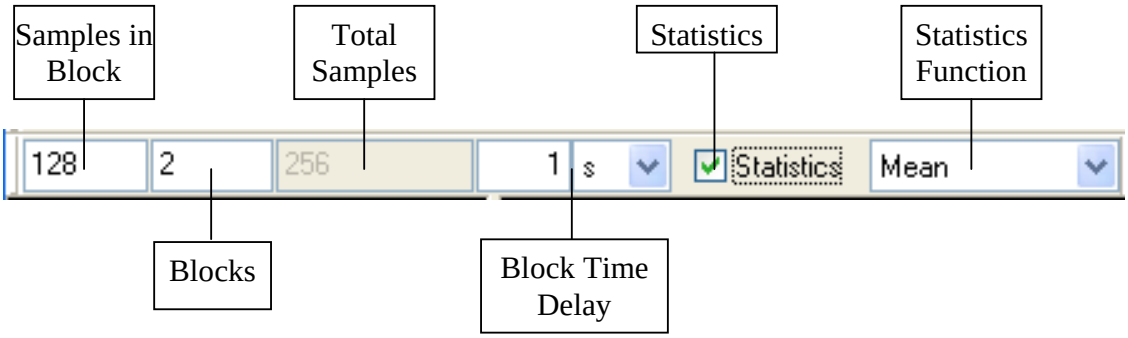
Capture Settings

See: Menu/Capture/Settings

Measuring Toolbar

Unlike the other Toolbars, which activate or deactivate fields based on choice of Capture Type, but maintain the same layout, the Measuring Toolbar changes its layout based on the Capture Type selected. Thus five different Measuring Toolbars exist one for each Capture Type as shown below:

Free Running



Samples in Block

The number of samples per block.

Blocks

The number of blocks of samples to collect.

Total Samples

Total number of samples = samples in block x blocks

Block Time Delay

The time interval to wait between capturing each block of samples.

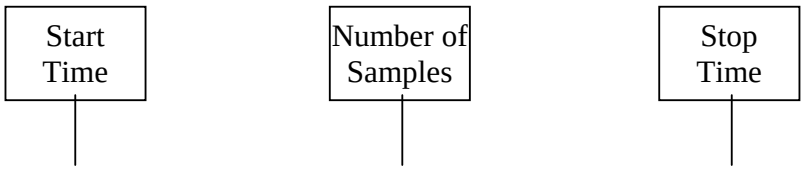
Statistics

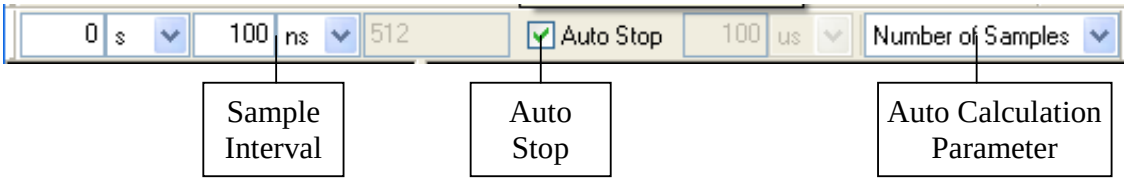
Collects the data based on measurement settings, then calculates and displays the value associated with the selected Statistics Function.

Statistics Function

The selected statistics algorithm is applied to the collected data, and the result displayed in the graph pane.

Repetitive Sampling





Start Time

Sets a delay from the arming signal to the start of data collection.

Sample Interval

The interval at which samples are collected

Number of Samples

Stops the data collection after a given number of samples.

Auto Stop

Automatically chooses a stop time. ***Stop Time*** in the ***Auto Calculation Parameter*** performs the same function as this function.

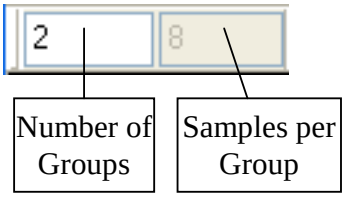
Stop Time

Stops the collection of data after a given time, or displays the stop time that was automatically selected if Auto Stop is enabled properly per its requirements.

Auto Calculation Parameter

The value of the parameter selected is automatically chosen by the application. If ***Stop Time*** is the selected parameter ***Auto Stop*** is superfluous.

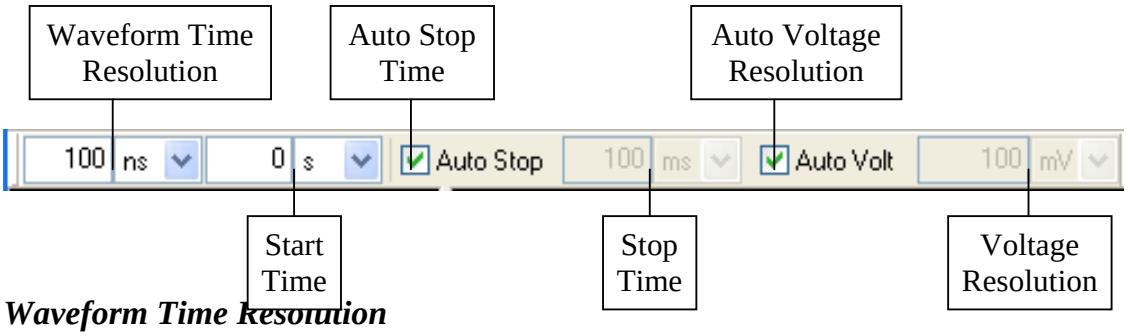
Time Stamp



Number of Groups

This is the only selectable parameter. Each group contains four samples. Please see ***User Interface – Toolbar Pane – Standard Toolbar – Capture Type – Raw Timestamp*** for an example and more detailed description.

Waveform



Waveform Time Resolution

The minimum time between successive samples at a voltage resolution level.

Setting the resolution higher than the period of the input wave can cause only one cycle of the wave to be displayed even if ***Stop Time*** is set so it would display multiple cycles.

Example:
Assuming a 10 MHz sine wave input signal, the period is 100 ns.

If the resolution is set at 100ns then the expected number of cycles will appear based on the ***Stop Time***. For a ***Stop Time*** = 300 ns, 3 cycles will be displayed.

If everything remains set the same, except the resolution is changed to 150 ns, the middle cycle of the 3 expected cycles will be missing.

Start Time

Sets a delay to start the data collection.

Auto Stop Time

The application sets the stop time.

Stop Time

Manually set the stop time of data collection.

Auto Voltage Resolution

The application sets the trigger step interval between voltage levels to a value resulting in approximately 50 steps between peak-to-peak voltage levels.

Voltage Resolution

Manually set the step interval voltage between trigger events.

Information Pane

Like its name, the information pane displays information pertaining to the measurement setup as well as detailed information about values associated with the graph cursors.

Mesurement Data

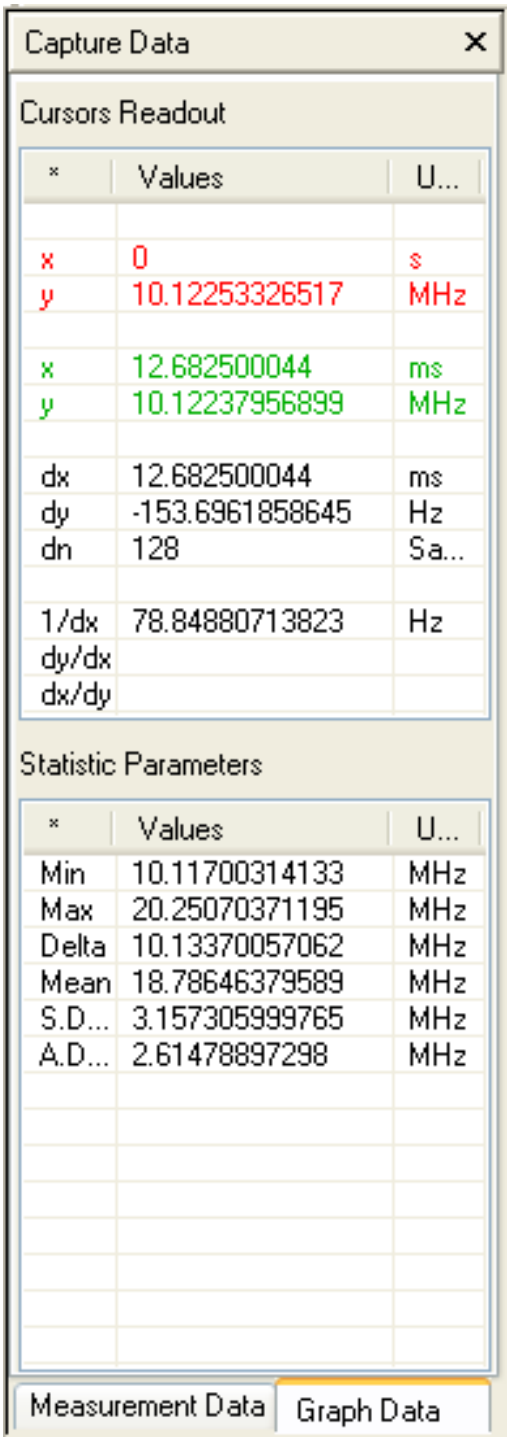
This tab provides a brief summary of high-level settings for the current measurement.

Graph Data

Cursors Readout:
Displays information about the cursors including absolute position, distance of separation, and the associated units.

As the cursors are moved in the graph pane these values are dynamically updated.

Statistic Parameters:
This field offers the advantage of displaying all of the statistics for the measurement without requiring an individual run for each desired statistic. The statistics also appear for some capture types without a statistics option on their toolbar.



Graph Pane

Displays the information collected from the measurement in visual form.

The pane can be split into up to four separate sub-panes. Each sub-pane can contain a different graph type.

To change the type of graph displayed click in the graph pane, or sub-pane if the graph pane is split, and click on one of the graph types from the Standard Toolbar.

Cursors

Two cursors appear on graph, or on the sub-pane of the currently selected graph if the graph pane is split. The left most cursor (red by default) can be moved by using the arrow keys on the keyboard. The right most cursor (green by default) can be moved by holding the shift key, and simultaneously pressing the arrow keys.

Contextual Menu

A contextual menu is available on each graph by performing a right click with the mouse. The contextual menu changes depending on the graph type.

Common functions available on Free Running, FFT, and Smooth graph types:

Zoom In/Out:

Provides the same functionality as the zoom functions on the standard toolbar.

Zoom In To Cursors:

This is the best way to zoom into a particular region of a graph. By setting the cursors to the desired range using the techniques described in ***User Interface – Graph Pane – Cursors***, and then selecting this function, the graph zooms the data between the cursors.

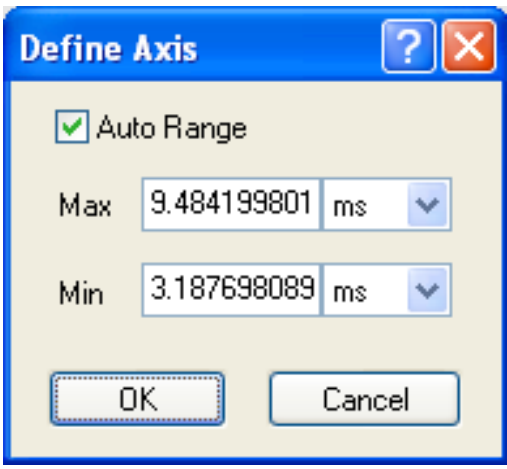
Zoom Out Full Graph:

Zooms out to the extent necessary to display all of the collected data. This is the fastest way to return the graph to its furthest zoom.

Horizontal/Vertical Axis:

Manually sets the range of the x or y axis. To manually set the range, deselect Auto Range, and enter the desired values into the Max/Min fields.

NOTE: Deselecting the Auto Range checkbox will disable the ability to zoom. The Auto Range check box must be checked to zoom.



The Vertical Axis has an AutoZoom option. This automatically adjusts the vertical range to create some space between min/max points and the edges of the graph. It is recommended to leave this option selected.

Histogram:

Limited Histogram:

Acts similar to a zoom. Based on the position of the cursors, selection of this option will zoom the histogram to only display the range necessary to contain the data between the cursors.

Full Histogram:

Returns the histogram to the necessary range to display all of the collected data.

Limit Statistics to Data Between Cursors:

Recalculates the statistics based on the values between the cursors, and places lines on the source graph representing the new range of data used to calculate the statistical values.

NOTE: The statistics are calculated based on sampled points. Even though the Source Graph may display lines connecting those points, and the new limited range may include those lines, the lines themselves don't contain actual data that can be used in the statistical calculation. This may result in an inability to compute the statistics due to lack of actual data.

Reset Limits:

Resets the Limit to include the entire range of data.

Source Graph:

Limit Tools to Data Between Cursors:

Changes the range of data used in the calculation of the other graph types, updating those graphs to reflect their calculations based on the newly defined data range.

Reset Limits:

Resets the Limit to include the entire range of data.