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**User's  
Manual**

**Model 760122  
Application Software  
WTVIEWER**

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## Foreword

Thank you for purchasing WTVIEWER application software (Model 760122) for the WT210<sup>\*1</sup>/WT230<sup>\*1</sup>, WT500, WT1600, and WT3000 Digital Powermeters. This user's manual contains useful information about the functions and operating procedures of WTVIEWER and lists the handling precautions of the software. To ensure correct use, please read this manual thoroughly before beginning operation.

<sup>\*1</sup> For information about the WT210/WT230, see the WTVIEWER help menu.

After reading this manual, keep it in a convenient location for quick reference in the event a question arises during operation.

For the handling precautions, functions, and operating procedures of the WT210, WT230, WT500, WT1600, and WT3000 Digital Powermeters, see the user's manual that came with the instrument.

Refer to the manuals that came with your version of Windows for information on how to use that program.

## Notes

- This document covers version 7.01 of WTVIEWER. A WTVIEWER version upgrade is required to support all<sup>\*2</sup> of the WT210, WT230, and WT3000 models. The upgrade program can be downloaded from the Web page below.

<sup>\*2</sup> See page xii for the WT firmware versions supported by WTVIEWER.

[www.yokogawa.com/tm/tm-softdownload.htm](http://www.yokogawa.com/tm/tm-softdownload.htm)

- In order to perform communications with a personal computer (hereinafter, PC) via a WT500 or WT3000 with a USB interface, a USB driver must be installed in the PC. The driver can be downloaded from the Web page below.

[www.yokogawa.com/tm/tm-softdownload.htm](http://www.yokogawa.com/tm/tm-softdownload.htm)

- When connecting WTs to a single PC for control using WTVIEWER, multiple types of communication interfaces cannot be used at the same time.
- Only when the communication interfaces used are the same, the models are the same, and the specifications included in the options are the same, can multiple WTs be connected to a single PC for simultaneous control by WTVIEWER.
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# Product Overview

WTViewer allows you to use the following functions when a PC is connected to the WT.

- Load the data measured on the WT and settings into the PC and display and save the data.
- Display and transfer files on the WT (FTP client/server function).
- Remotely control the WT.

Up to four WTs (only one WT if the communication interface is RS-232) can be connected to the PC, and the measured data of multiple WTs can be loaded.

## On-Line and Off-Line Modes

WTViewer operates in two different modes: On-Line and Off-Line.

### On-Line Mode

In On-Line mode, you can use a communication interface in the table below to change WT settings on the PC, or load or save measured data or settings from the WT on the PC. Also, using the FTP client function (when using Ethernet), you can transfer measured data, settings (setup data/information), and screen image data between the WT and PC.

WT Model	Communication Interface Type			
	GP-IB	RS-232	ETHERNET	USB
WT210	Y	Y	x	x
WT230	Y	Y	x	x
WT500	Y	N	Y(VXI11)	Y(USB-TMC) <sup>*1</sup>
WT1600	Y	Y	Y	x
WT3000	Y	Y	Y	Y <sup>*1</sup>

Y: Supported<sup>\*2</sup>, X: Not supported

<sup>\*1</sup> In order to perform communications with a personal computer (hereinafter, PC) via a WT500 or WT3000 with a USB interface, a USB driver must be installed in the PC. The driver can be downloaded from the Web page below.

[www.yokogawa.com/tm/tm-softdownload.htm](http://www.yokogawa.com/tm/tm-softdownload.htm)

<sup>\*2</sup> The installed communication interface type differs depending on the specifications of the WT.

### Note

- When connecting WTs to a single PC for control using WTViewer, multiple types of communication interfaces cannot be used at the same time.
- Only when the communication interfaces used are the same, the models are the same, and the specifications included in the options are the same, can multiple WTs be connected to a single PC for simultaneous control by WTViewer.

## Off-Line Mode

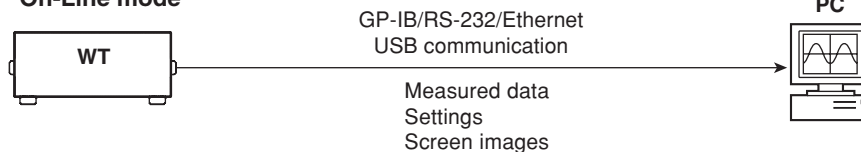
In Off-Line mode you can load and display various kinds of files on WTVewer that were saved by WTVewer<sup>\*4</sup> without the WT and PC being connected.

<sup>\*4</sup> For details on the data formats in which WTVewer can save, and the data formats that can be loaded by WTVewer, see page x.

## Note

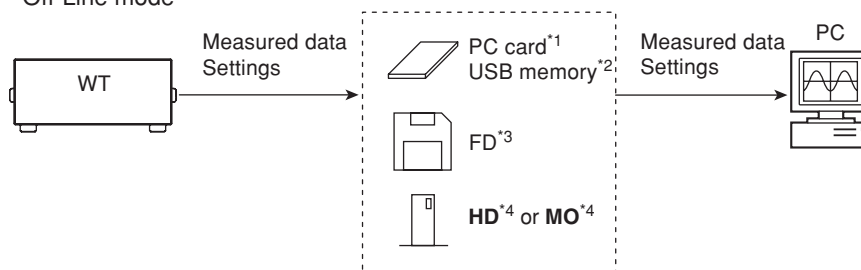
File data that were saved from the WT to the memory medium can be loaded onto the PC using the "File Reader" software program that starts automatically. The data can be displayed on the PC or saved in CSV format on the PC's memory media.

### On-Line mode



Loads measured data from the WT at the display update rate of the PC to be displayed on the screen and saved on a storage medium. Measured data, settings, and screen images can be transferred between the WT and the PC.

### Off-Line mode



<sup>\*1</sup> WT3000 only.

<sup>\*2</sup> WT500 and WT3000 only.

<sup>\*3</sup> WT1600 only.

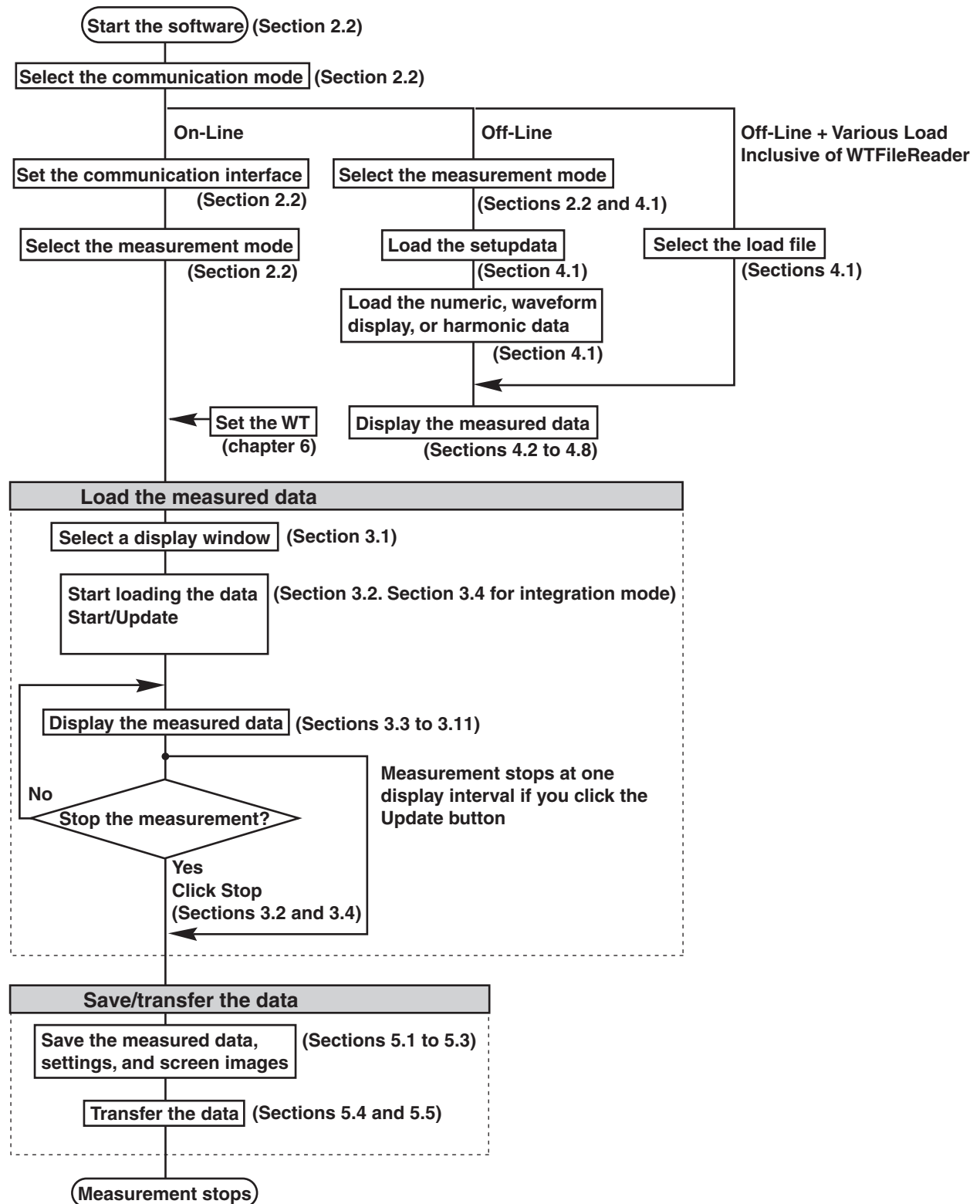
<sup>\*4</sup> WT1600 only. Connect using SCSI.

Loads the data measured on the WT that has been saved to the storage medium and displays the data on the screen or saves the data to a storage medium on the PC.



## Flow of Operation

The figure below shows the general flow of operation up to the point when the WT displays data.



### Display Screen Types

The following are the main display screen types. For information on the meanings of each type, see the WT main unit user's manual.

---

#### Numeric View

Displays numeric data from the WT during normal measurement. On the WT500 and WT3000, numeric harmonic data can also be displayed.

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#### Harmonics List

Numerically displays measured values from the WT during harmonic measurement. Select when using the WT1600.

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#### Wave

Displays waveform display data acquired from the WT. On the WT210/WT230, the harmonic option is required.

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#### Bar Graph

Displays a bar graph of harmonic components at each order during harmonic measurements.

---

#### Vector

Displays the relationship between the phase difference of the fundamental wave of each element when performing harmonic measurements.

---

#### Trend

Displays the trends of all measurement functions for the object being measured during normal and harmonic measurement

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#### Waveform computation (WT3000 only)

Display the result of various waveform computations performed on the waveform display data loaded from the WT.

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#### FFT (WT3000 only)

Displays the power spectrum of the input signal through FFT (Fast Fourier transform).

---

#### Cycle-by-cycle measurement (WT3000 only)

Displays the voltage, current, power, and other parameters for each cycle of the AC input signal.

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#### Numeric View (Synchronization Mode, WT1600 and WT3000 only)

This is the display when in Normal Mode (Synchronization Mode). You can display multiple measured values from the WT in a single window. Also, you can create (define) expressions by combining multiple measured values from the WT, and display the results of computations using those expressions. For example, you can find total power by adding measured power values from two WTs, or divide them to find efficiency.

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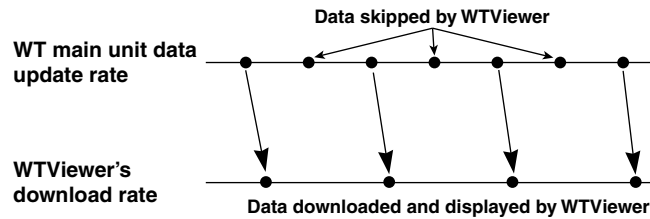
### WT Data Update Rate and WTVIEWER Data Download Rate

The WTVIEWER operation screen contains buttons for starting and stopping download of measured data, and an Update button for updating measured data.

When the Start button is clicked, WTVIEWER begins downloading measured data. When the download is complete, the PC waits for the WT to update the data. When the WT finishes updating the data, WTVIEWER resumes the download. The operation repeats until the Stop button is pressed.

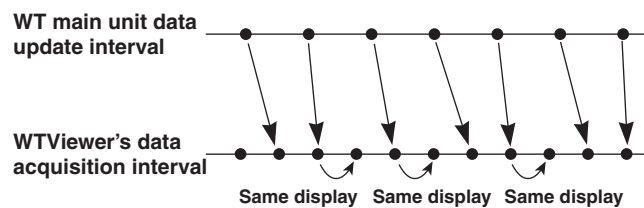
#### WT Data Update Rate < WTVIEWER Data Download Rate

If the WT data update interval is shorter than the time required for WTVIEWER to acquire measured data once, there will be some data that WTVIEWER does not acquire.



#### WT Data Update Interval > WTVIEWER Data Acquisition Interval

If the data update rate on the WT is longer than the time it takes for WTVIEWER to acquire one set of measured data, WTVIEWER will only be able to download data after the WT has updated it, so the WTVIEWER's display will appear to have the same update rate as the WT.



If the Stop button is clicked during a download, the download will continue until the complete set of data is downloaded. As such, there is a time lag between the time when the Stop button is pressed and the time the WTVIEWER display stops.

If you click the Update button, data is updated one time only. In this situation the measurement interval is the same as the display update interval on the PC. It is independent of the display update rate of the WT.

The display update rate of the PC depends on the CPU, memory, quantity of data being displayed, and the number of WT's connected.

## WTViewer File Formats

### Data Format (Extension) That Can Be Saved by WTViewer.

The data formats (extensions) that can be saved by WTViewer are given in the table below. Note that CSV files cannot be read by WTViewer. These types of files can be opened in commercial spreadsheet programs (such as Excel).

#### File Types and Extensions

Type	WT1600		WT500, WT3000	
Settings	CSV format (.csv)	BIN format (.set)	— <sup>*1</sup>	CFG format (.cfg)
Numeric data	CSV format (.csv)	BIN format (.wta)	CSV format (.csv)	WTN format (.wtn)
Waveform display data	CSV format (.csv)	BIN format (.wta)	CSV format (.csv)	WTW format (.wtw)
Harmonic data	CSV format (.csv)	BIN format (.wta)	— <sup>*2</sup>	— <sup>*2</sup>
Waveform sampling data <sup>*3</sup> (Math and FFT data)	—	—	CSV format (.csv)	WVF format (.wvf) and (.hdr)
Cycle-by-cycle data <sup>*3</sup>	—	—	CSV format (.csv)	CBC format (.cbc)

<sup>\*1</sup> If WTViewer is working with the WT500 or WT3000, the function whereby settings are saved in CSV format is not available.

<sup>\*2</sup> The WT500 and WT3000 measures the numeric data of normal measurement and harmonic data simultaneously in normal measurement mode. Therefore, harmonic data is stored as numeric data. Unlike the WT1600 that measures and stores only the harmonic data, the WT500 and WT3000 does not create files containing only harmonic data.

<sup>\*3</sup> If WTViewer is controlling the WT500 or WT1600, the function for saving the waveform sampling data and cycle-by-cycle data is not available.

<sup>\*4</sup> If you save the data in WVF format, two files, .wvf and .hdr, are created. To load data in WVF format into WTViewer, place these files in the same directory. The two files make up a single set. Both files must be present to load the data.

### Data Formats (Extensions) That Can Be Loaded by WTViewer

Files that can be loaded by WTViewer are given in the table below. Data saved using Auto Saving (described in section 3.3) cannot be loaded by WTViewer.

#### File Types and Extensions

Type	WT1600		WT500, WT3000	
Settings	SET format (.set)	—	CFG format (.cfg)	—
Numeric data	WTViewer format (.wta)	—	WTN format (.wtn)	—
Waveform display data	WTViewer format (.wta)	WT1600 format <sup>*1,*2</sup> (.wvf) and (.hdr)	WTW format (.wtw)	—
Harmonic data	WTViewer format (.wta)	—	— <sup>*3</sup>	—
Waveform sampling data <sup>*3</sup> (Math and FFT data)	—	—	WVF format <sup>*1</sup> (.wvf) and (.hdr)	—
Cycle-by-cycle data	—	—	CSV format (.csv)	CBC format (.cbc)

<sup>\*1</sup> If you save the data in WVF format, two files, .wvf and .hdr, are created. To load data in WVF format into WTViewer, place these files in the same directory. The two files make up a single set. Both files must be present to load the data.

<sup>\*2</sup> Load the setting information (with the .set extension) before loading the waveform data in WT1600 format (with the .wvf extension). If the settings are not loaded, the waveform will not be displayed.

<sup>\*3</sup> The WT500 and WT3000 measures the numeric data of normal measurement and harmonic data simultaneously in normal measurement mode. Therefore, harmonic data is stored as numeric data. Unlike the WT1600 that measures and stores only the harmonic data, the WT500 and WT3000 does not create files containing only harmonic data.

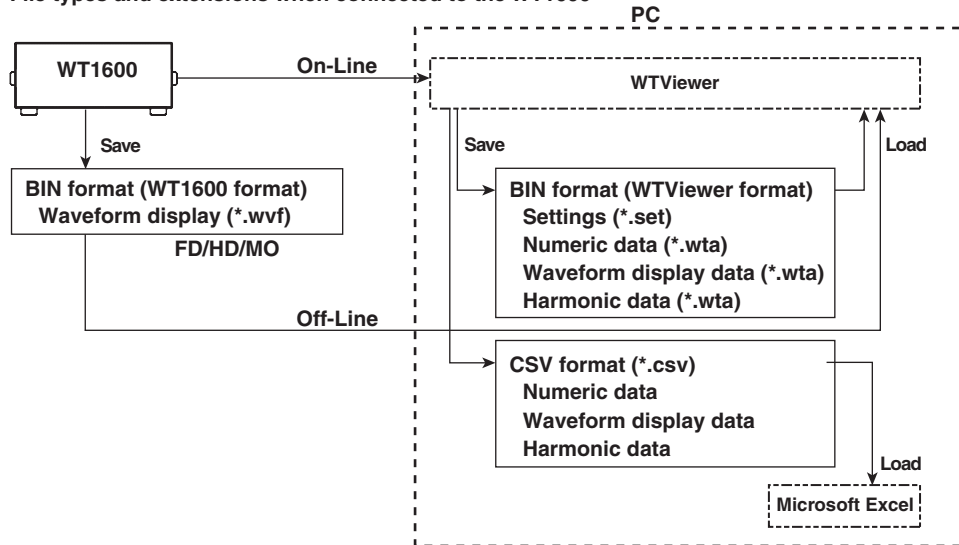
### .wtd Files

Measured data files saved by the WT main unit. The WTFileReader program that starts from WTVIEWER can load files with the .wtd extension and display them. For details see section 4.1. "Various Load Inclusive of WTFileReader." Note that .wtd files cannot be loaded directly onto WTVIEWER.

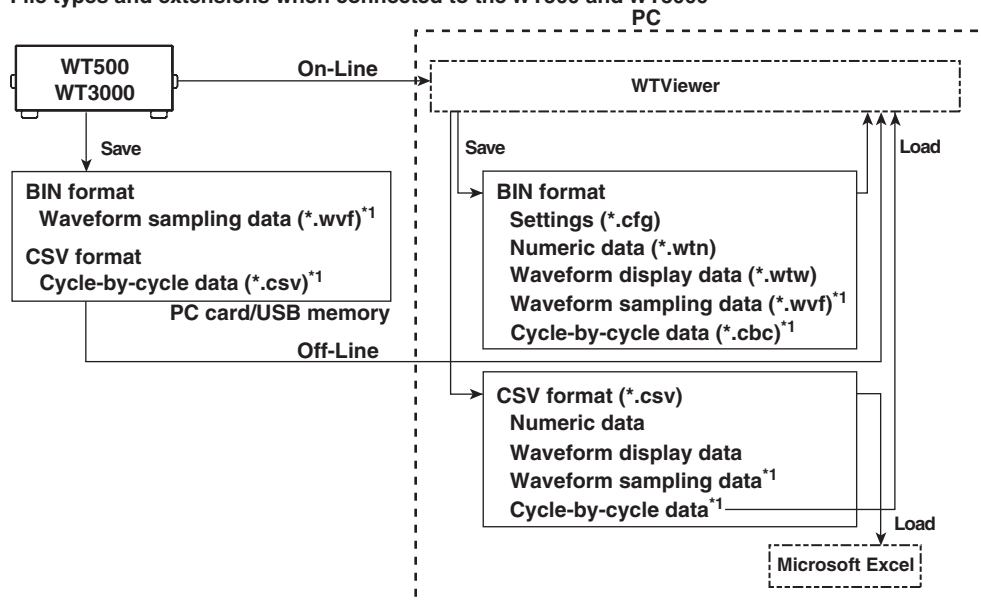
### .udf Files

The .udf files contain definitions of expressions composed of combinations of measured values from the WT (WT user defined computation: WTV function). WTV functions are expressions that are defined and saved on WTVIEWER. They differ from the user-defined functions created on the WT main unit. For details, see section 3.13.

File types and extensions when connected to the WT1600



File types and extensions when connected to the WT500 and WT3000



\*1 WT3000 only

# System Requirements

## PC

- **CPU**  
Celeron 500 MHz or higher (recommended)
- **Memory**  
256 MB or more (recommended)
- **VRAM**  
4 MB or more
- **Hard Disk**  
500 MB or more of free space

## Operating System

Microsoft Windows 2000, or Windows XP.

## Communications Port

- **GP-IB**  
NI (National Instruments) AT-GPIB, PCI-GPIB, PCI-GPIB+, PCMCIA-GPIB, PCMCIA-GPIB+, with driver NI-488.2 version 1.60 or later (however, version 2.3 is not supported).
- **RS-232**  
An available COM port on the PC
- **Ethernet**  
10BASE-T or 100BASE-TX compatible Ethernet port
- **USB**  
A USB Rev. 1.1 or later USB port

## Display, Printer, and Mouse

Must be compatible with the operating systems listed above.

## WT Main Unit

The WT types that support communication between the PC and WT using WTVIEWER are as follows:

WT Model	Firmware Version
WT210 <sup>*1</sup>	1.06 or later
WT230 <sup>*1</sup>	1.06 or later
WT500	1.01 or later
WT1600	2.01 or later
WT3000	4.01 or later

<sup>\*1</sup> For information about the WT210/WT230, see the WTVIEWER help menu.

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## 1.1 Connecting the PC to the WT

### CAUTION

When connecting or removing communication cables, always turn the power to the PC and instrument OFF. Failure to do so may cause a malfunction or damage to the internal circuitry.

#### GP-IB Based Control

The GP-IB connector on the WT is a 24-pin IEEE Standard 488-1978 connector. Be sure to use a GP-IB cable that complies to the IEEE Standard.

Connect the cable to the GP-IB connector on the rear panel of the WT.

For connections to the PC, use a connector compatible with your PC.

#### Serial Based Control (RS-232)

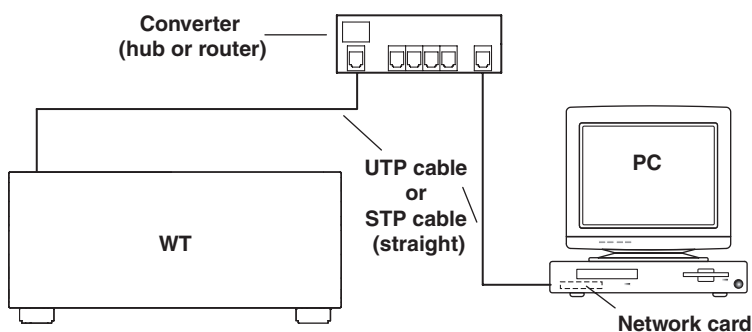
Before connecting the WT and the PC with a cable, open the system device manager on the PC and check for an available communications port. Connect an interface cable to an available COM port.

For connections to the PC, use a connector compatible with your PC.

#### Ethernet Based Control

The WT500, WT1600 and WT3000 support Ethernet communications (optional).

To connect the WT and PC, attach a straight UTP (unshielded twisted pair) or STP (shielded twisted pair) cable through a hub or other converter to the Ethernet port on the rear panel of the WT. The transfer speed differs depending on the model. Use a converter, cable, and network card appropriate for the transfer speed.



#### Note

- When connecting to a 100BASE-TX network, use a UTP (unshielded twisted pair) or STP (shielded twisted pair) cable of category 5 or higher.
- Avoid one-to-one connections between the WT and the PC (a hub should be used). We cannot guarantee results using a direct connection.

#### USB Based Control

The WT500 and WT3000 supports communication with a PC via a USB port (optional).

Use the PC connection port (type B connector) on the rear panel of the WT to connect to the PC.

---

## 1.2 GP-IB Control Settings

### *Procedure*

#### **With the WT500 (for Products with the /C1 Suffix Code)**

Set the GP-IB control according to the procedures given in section 2.5 in the WT500 Communication Interface User's Manual (IM760201-17E).

#### **With the WT1600 (for Products with the /C1 Suffix Code)**

Set the GP-IB control according to the procedures given in section 1.5 in the WT1600 Communication Interface User's Manual (IM760101-11E).

#### **With the WT3000**

Set the GP-IB control according to the procedures given in section 1.5 in the WT3000 Communication Interface User's Manual (IM760301-17E).

### *Explanation*

When using the software in On-line mode via the GP-IB interface, select GP-IB on the WT main unit.

#### **Setting the Address**

Set the address of the WT in the following range.  
1 to 30

When connecting via GP-IB, each device has its own unique system-internal GP-IB address. This address is used to differentiate the devices. As such, when connecting the WT to a PC or other device, you must make sure not to enter the same address for the WT as the other device.

#### **Note**

---

- Do not change the address while the controller (PC) or other device is using GP-IB.
  - When connecting WTs to a single PC for control using WTViewer, multiple types of communication interfaces cannot be used at the same time.
  - Only when the communication interfaces used are the same, the models are the same, and the specifications included in the options are the same, can multiple WTs be connected to a single PC for simultaneous control by WTViewer.
  - Use an NI (National Instruments) model GP-IB port (or card) on the PC side. For details, see page xii.
  - If a converter is used along the communication cable connecting the WT and PC (for example, a GP-IB-to-USB or RS-232-to-USB converter), malfunctions can occur. For details, consult with your Yokogawa dealer or representative.
-

## 1.3 RS-232 Control Settings

### Procedure

#### With the WT1600 (for Products with the -C2 Suffix Code)

Set the RS-232 control according to the procedures given in section 2.6 in the WT1600 Communication Interface User's Manual (IM760101-11E).

#### With the WT3000 (for Products with the -C2 Option)

Set the RS-232 control according to the procedures given in section 2.6 in the WT3000 Communication Interface User's Manual (IM760301-17E).

### Explanation

When using the software in On-line mode via the RS-232 interface, select RS-232 on the WT main unit.

### Note

- When connecting WTs to a single PC for control using WTViewer, multiple types of communication interfaces cannot be used at the same time.
- Only when the communication interfaces used are the same, the models are the same, and the specifications included in the options are the same, can multiple WTs be connected to a single PC for simultaneous control by WTViewer.
- If a converter is used along the communication cable connecting the WT and PC (for example, a GP-IB-to-USB or RS-232-to-USB converter), malfunctions can occur. For details, consult with your Yokogawa dealer or representative.

---

## 1.4 Ethernet Control Settings

### **Procedure**

#### **With the WT500 (for Products with the /C7 Suffix Code)**

Set the ethernet control according to the procedures given in section 11.3 in the WT500 User's Manual (IM760201-17E).

#### **With the WT1600 (for Products with the -C10 Option)**

Set the ethernet control according to the procedures given in following sections.

- Section 13.2 in the WT1600 User's Manual (IM760101-01E).
- Section 3.2 in the WT1600 Communication Interface User's Manual (IM760101-11E)

#### **With the WT3000 (for Products with the -C7 Option)**

Set the ethernet control according to the procedures given in following sections.

- Section 5.2 in the WT3000 Expansion Function User's Manual (IM760301-51E).
- Section 4.3 in the WT3000 Communication Interface User's Manual (IM760301-17E)

### **Explanation**

When using the software in On-line mode with the WT1600 or WT3000 via network, select Network on the WT main unit.

### **Note**

---

- To apply the settings, you must power cycle the WT.
  - When connecting WTs to a single PC for control using WTVIEWER, multiple types of communication interfaces cannot be used at the same time.
  - Only when the communication interfaces used are the same, the models are the same, and the specifications included in the options are the same, can multiple WTs be connected to a single PC for simultaneous control by WTVIEWER.
  - If a converter is used along the communication cable connecting the WT and PC (for example, a GP-IB-to-USB or RS-232-to-USB converter), malfunctions can occur. For details, consult with your Yokogawa dealer or representative.
-

## 1.5 USB Control Settings (WT500 and WT3000 Only)

The WT500 and WT3000 can be operated from a PC using USB. However, a USB driver must be installed on the PC. Before beginning the procedure below, download the driver from the following Web page.

[www.yokogawa.com/tm/tm-softdownload.htm](http://www.yokogawa.com/tm/tm-softdownload.htm)

### Procedure

#### With the WT500

The USB control setting item is not present.

#### With the WT3000 (for Products with the /C12 Suffix Code)

Set the USB control according to the procedures given in section 3.4 in the WT3000 Communication Interface User's Manual (IM760301-17E).

### Explanation

When using the software in On-line mode via USB interface, select USB on the WT main unit.

Each device that can connect via USB has its own unique system-internal ID. This ID is used to differentiate the devices. As such, when connecting the WT3000 to a PC or other device, you must make sure not to enter the same ID for the WT as the other device.

### Note

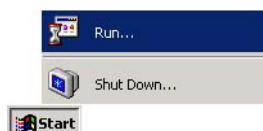
- Do not change the address while the controller or other device is using the ID.
- When connecting WTs to a single PC for control using WTViewer, multiple types of communication interfaces cannot be used at the same time.
- Only when the communication interfaces used are the same, the models are the same, and the specifications included in the options are the same, can multiple WTs be connected to a single PC for simultaneous control by WTViewer.
- If a converter is used along the communication cable connecting the WT and PC (for example, a GP-IB-to-USB or RS-232-to-USB converter), malfunctions can occur. For details, consult with your Yokogawa dealer or representative.

## 2.1 Installation

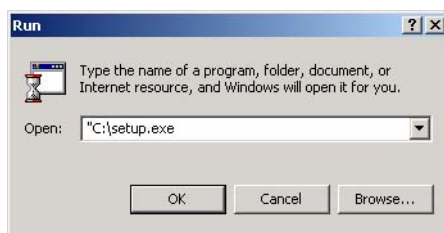
Have the CD-ROM for this software ready. Exit all programs that are currently running before starting the installation.

If an older version of WTVIEWER is already installed on the PC, you must uninstall that version before proceeding with the installation of the new one.

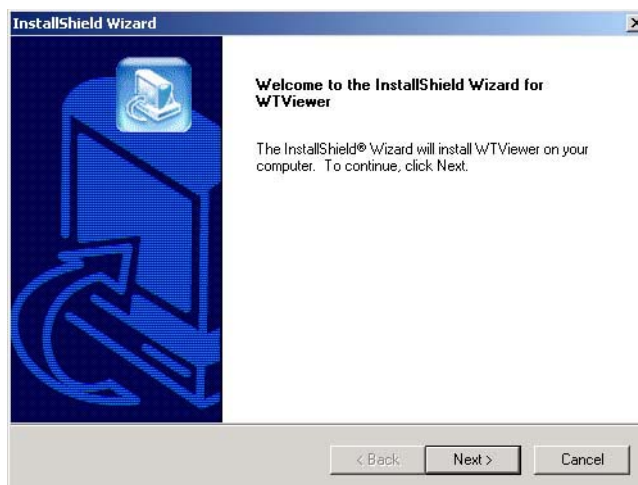
1. Turn ON the PC and start Windows.
2. Insert the WTVIEWER CD-ROM into the CD-ROM drive.
3. From the **Start** menu, choose **Run**. The Run dialog box appears.



4. Specify the **Setup.exe** file from the system CD-ROM root directory in the **Open** box, then click **OK**. The InstallShield Wizard preparation progress bar is displayed. When the InstallShield Wizard preparation is finished, the InstallShield Wizard dialog box appears.

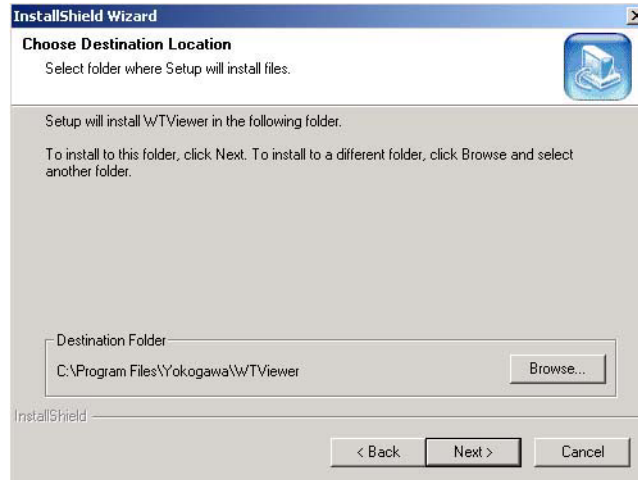


5. Click **Next**. The Choose Destination Location window is displayed.

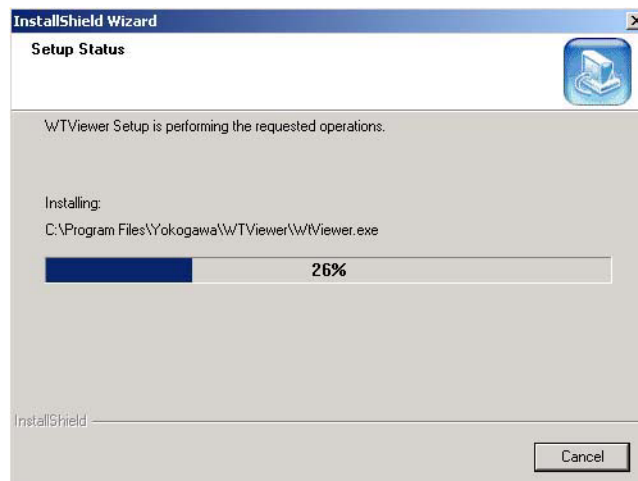
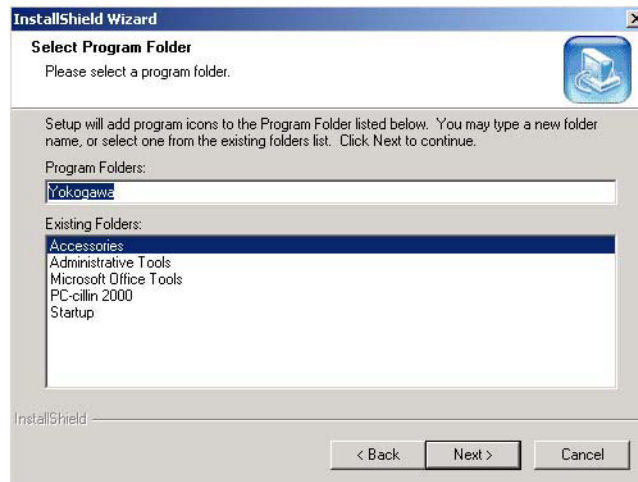


## 2.1 Installation

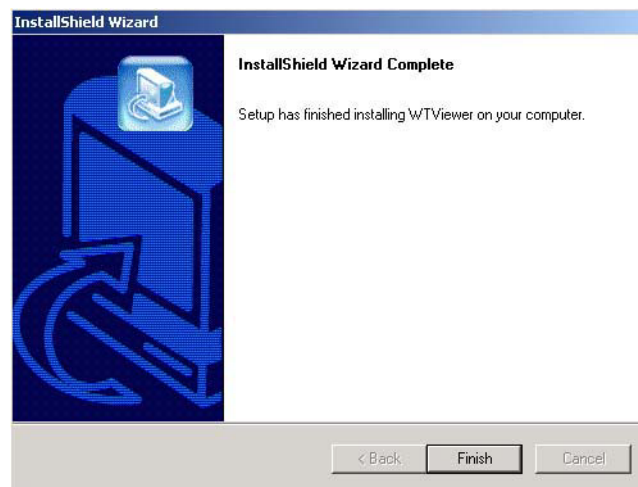
6. C:\Program Files\Yokogawa\WTVViewer is shown by default under Destination Folder. Click the **Browse** button if necessary to change the installation destination.
7. Click **Next**. The program folder selection dialog box is displayed. You can click **Back** to return to the previous screen.



8. Select a program folder from the list, or enter a new folder name.
9. Click **Next**. The setup status progress bar is displayed, and the software installation begins. If the installation is successful, the InstallShield Wizard complete dialog box appears.



10. Click **Finish**.





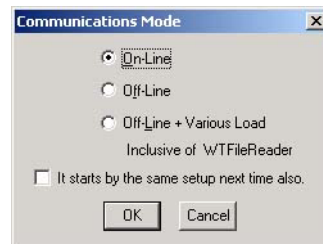
## 2.2 Running and Exiting the Software (Communication and Measurement Mode Settings)

### Running the Software

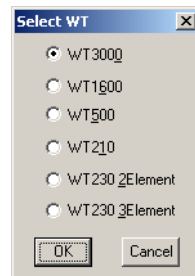
1. From the **Start** menu, choose **Programs > Yokogawa > WTVIEWER > WTVIEWER**. WTVIEWER starts. Upon startup, the Communications Mode dialog box is displayed.

### Selecting the Communication Mode

2. Select the communication mode, then click the **OK** button.
  - If you select Off-Line, the Select WT dialog box appears. Proceed to step 3.
  - If you select On-Line, the Communications Interface dialog box appears. Proceed to step 4.
  - If you select Off-Line + Various Load Inclusive of WTFileReader, various files saved on the WT and WTVIEWER are loaded after starting up in Off-Line mode. Stored files (\*.wtd files) saved on the WT in Float format can be loaded on WTFileReader. Continue on to page 4-4, "Various Load Inclusive of WTFileReader."



3. If you selected Off-Line in step 2, then select the target WT, and click the OK button. Proceed to step 6 (page 2-6).

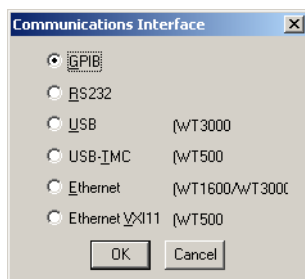


## 2.2 Running and Exiting the Software (Communication and Measurement Mode Settings)

### Selecting the Communications Interface

4. If you selected On-Line in step 2, then select a communication interface, and click the **OK** button. The connection dialog box for the selected communications interface is displayed.

The installed communication interface type differs depending on the specifications of the WT. Make sure you check the specifications before selecting a communication interface.

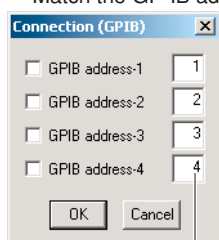


### Entering Communications Interface Settings

5. Enter the detailed settings as shown below according to the communication interface selected in step 4, then click the **OK** button. After loading the WT settings, the Measurement Mode dialog box is displayed.

#### When GPIB is Selected

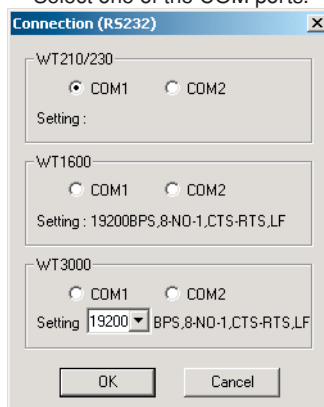
- Up to four units can be set for each WT model. Select the GP-IB address for the target WT. Communication is made with the selected addresses.
- Match the GP-IB address with the address set on the WT



GP-IB address

#### When RS232 is Selected

- One unit of the WT can be set.
- Select one of the COM ports.



#### Baud Rate

- WT210/WT230  
Fixed at 9600
- WT1600  
Fixed at 19200
- WT3000  
Select 19200 or 38400

#### Data format

Fixed at 8-NO-1

#### Handshaking Method

Fixed at CRS-RTS

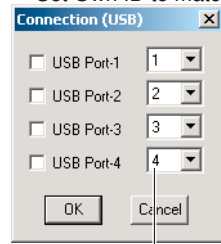
#### Terminator

Fixed at LF

## 2.2 Running and Exiting the Software (Communication and Measurement Mode Settings)

### When USB is Selected

- Up to four WT3000s can be set. Select the target USB Ports. Communication is made with the selected IDs.
- Set Own ID to match that of the WT.

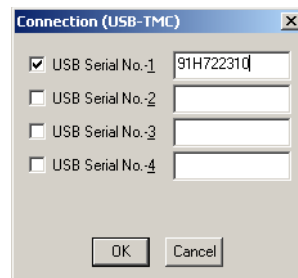
A dialog box titled "Connection (USB)" with a close button (X) in the top right corner. It contains four rows, each with a checkbox and a dropdown menu. The first row is checked and the dropdown shows "1". The second row is unchecked and shows "2". The third row is unchecked and shows "3". The fourth row is unchecked and shows "4". At the bottom are "OK" and "Cancel" buttons.

Own ID

### When USB-TMC is Selected

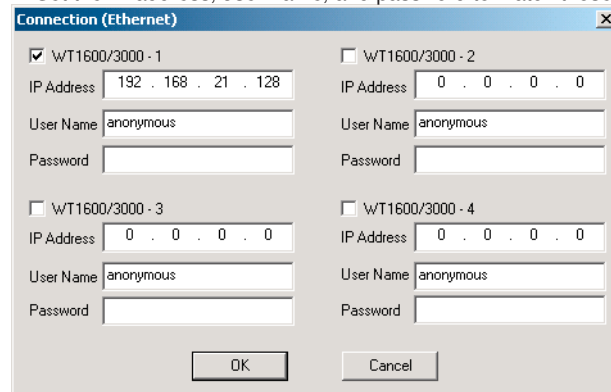
- Up to four WT500s can be set. Select the target USB Serial No. Communication is made with the selected USB Serial No.
- Set Own USB Serial No. to match that of the WT.  
To display the USB Serial No. of the WT, perform this operation:

MISC > Remote Control

A dialog box titled "Connection (USB-TMC)" with a close button (X) in the top right corner. It contains four rows, each with a checkbox and a text input field. The first row is checked and the text field contains "91H722310". The other three rows are unchecked and their text fields are empty. At the bottom are "OK" and "Cancel" buttons.

### When Ethernet is Selected

- Up to four WT1600s or WT3000s can be set. Select the target WT1600/WT3000. Communication is made with the selected addresses
- Set the IP address, user name, and password to match those of the WT.

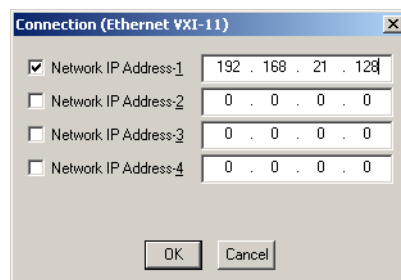
A dialog box titled "Connection (Ethernet)" with a close button (X) in the top right corner. It contains four rows, each with a checkbox and a set of input fields for IP Address, User Name, and Password. The first row is checked. The IP Address field contains "192 . 168 . 21 . 128". The User Name field contains "anonymous". The Password field is empty. The other three rows are unchecked and their input fields are empty. At the bottom are "OK" and "Cancel" buttons.

## 2.2 Running and Exiting the Software (Communication and Measurement Mode Settings)

### When Ethernet VXI-11 is Selected

- Up to four WT500s can be set. Select the target Network IP Address. Communication is made with the selected Network IP Address.
- Set the Network IP Address to match those of the WT.  
To display the Network IP Address (VXI-11) of the WT, perform this operation:

MISC > Remote Control



### Note

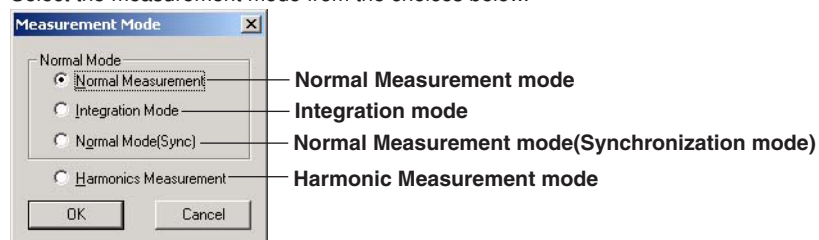
- For information on how to set the IP address, user name, and password on the WT when Ethernet is selected, see the WT main unit user's manual.
- When connecting a single WT to a single PC for WT control using WTVIEWER, multiple types of communication interfaces cannot be used at the same time. Also, even if they have identical communication interfaces, different models (for example the WT1600 and WT3000) cannot be connected to a single PC for simultaneous control using WTVIEWER.

### Selecting the Measurement Mode

6. Select a measurement mode, then click **OK**. The software starts.

#### With the WT1600

Select the measurement mode from the choices below.

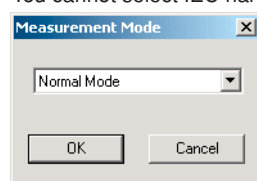


#### With the WT3000

Select the measurement mode from the following:

- Normal Mode (normal measurement, integration, harmonic measurement)
- Wide Band Harmonics (wide bandwidth harmonic measurement)
- Math (waveform computation)
- FFT
- CycleByCycle (cycle-by-cycle measurement)
- Normal Mode (Sync)

For the details on the measurement modes, see the WT User's Manual.  
You cannot select IEC harmonic measurement mode on WTVIEWER.



### Note

On the WT500, the selection of the measurement mode is not present.

### Changing the Communication Settings

You can change the communication mode, measurement mode, or communication interface set when the software is first started (see the previous section).

#### Changing the Communications Mode

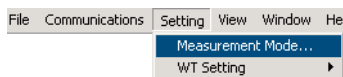
1. Choose **Communications > Communications Mode** from the menu bar. The Communication Mode dialog box (see page 2-4) appears.



2. Select On-Line or Off-Line.

#### Changing the Measurement Mode

1. Choose **Setting > Measurement Mode** from the menu bar. The Measurement Mode dialog box is displayed.



2. Select a measurement mode, then click **OK**.

#### Note

---

On the WT500, the selection of the measurement mode is not present.

---

#### Changing the Communications Interface

1. Choose **Communications > Communications Interface** from the menu bar. The Communications Interface dialog box (see page 2-4) appears.



2. Select a communication interface, and click the **OK** button. The connection dialog box (see pages 2-5 and 2-6) for the selected communications interface is displayed.

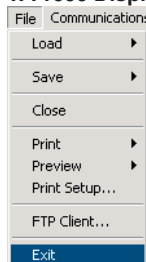
The installed communication interface type differs depending on the specifications of the WT. Make sure you check the specifications before selecting a communication interface.

3. After entering settings (see pages 2-5 and 2-6) for the communication interface selected in step 2, click the **OK** button.

### Exiting the Software

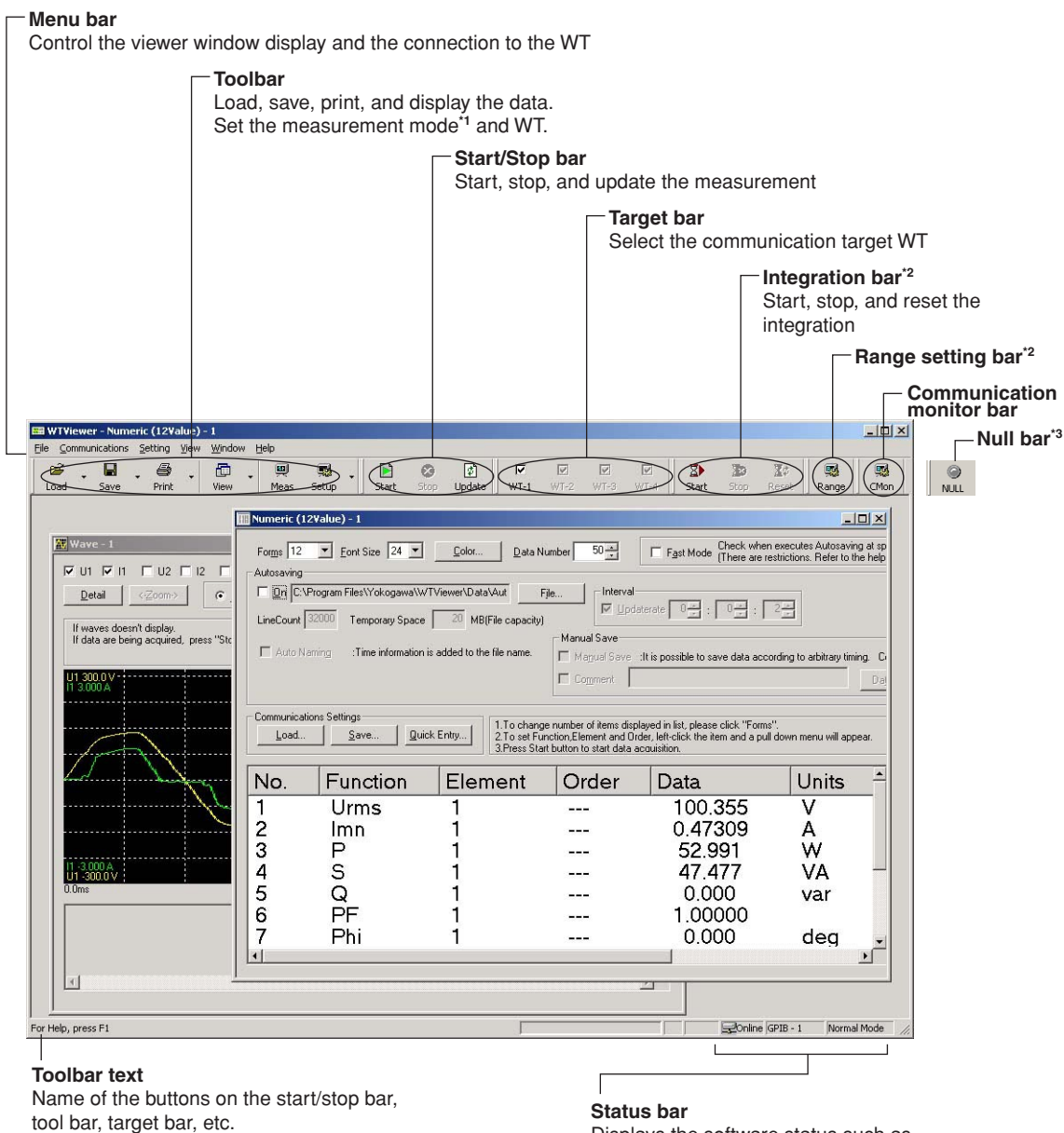
Choose **File > Exit WTVIEWER** on the menu bar.

#### WT1600 Display Example



## 2.3 Basic Operations on the Main Window

Display Example: When the WT3000 is connected



\*<sup>1</sup> Meas bar is not displayed when the WT500 is connected

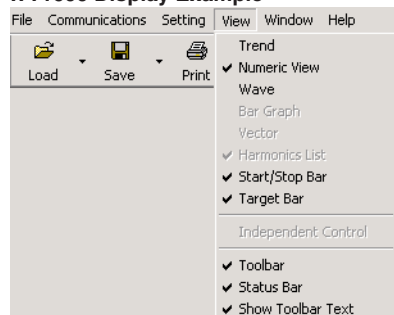
\*<sup>2</sup> Displayed when the WT500 or WT3000 is connected.

\*<sup>3</sup> Displayed when the WT500 is connected.

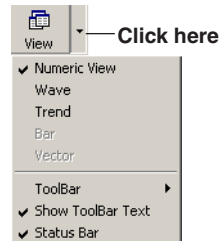
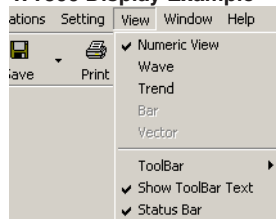
## 3.1 Selecting a Display Window

Before starting measurement, click **View** on the menu bar or **View** on the toolbar and select a display screen.

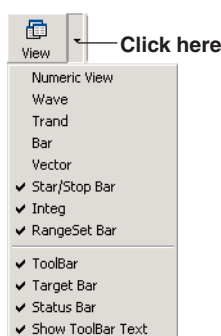
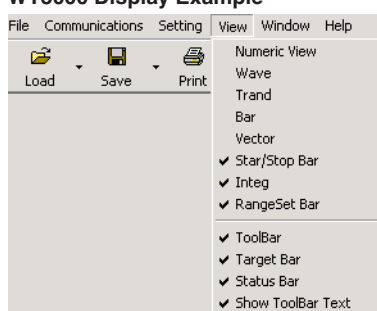
**WT1600 Display Example**



**WT500 Display Example**



**WT3000 Display Example**



### Display Items Common to All Instruments

#### Trend

Displays a trend window.

#### Numeric View

Displays a window for numeric data in normal measurement mode. On the WT500 and WT3000, numeric harmonic measured data can also be displayed.

#### Wave

Displays the waveform display data screen.

#### Bar Graph

Displays a bar graph screen. On the WT1600, this can be selected when in harmonic measurement mode.

#### Vector

Displays a vector window. On the WT1600, this can be selected when in harmonic measurement mode.

#### Start/Stop Bar

Displays the Start, Stop, and Update operation buttons for normal measurement. On the WT500 and WT3000, harmonic measurement is also executed.

#### Target Bar

Check boxes for selecting WTs for communications.

#### Toolbar

Operation buttons for data loading/saving, printing, display, measurement modes, and WT settings.

#### Status Bar

Displays the status of the software in terms of the communication mode, communication interface, measurement mode, and other conditions. In the bottom of the display screen.

#### Toolbar Text

Displays the names of the operation buttons in the start/stop bar, toolbar, target bar, and other locations.

### 3.1 Selecting a Display Window

---

#### WT1600-Specific Display Items

---

##### Harmonics List

Displays a window for numeric data in harmonic measurement mode. On the WT3000, the normal numeric display screen is able to display numeric data from harmonic measurement.

##### Independent Integration Control

An item displayed in Integration mode. Displays integration settings and the integration Start, Stop, and Reset operation buttons.

---

#### WT3000-Specific Display Items

---

##### Math waveform

Displays the Math waveform screen. Selectable in waveform computation (Math) mode.

##### FFT waveform

Displays the FFT waveform screen. Selectable in FFT mode.

##### Cycle-by-cycle data

Displays the cycle-by-cycle measurement data as numeric values and as a graph. Selectable in cycle-by-cycle measurement mode.

---

#### WT500 and WT3000-Specific Display Items

---

##### Integration Bar

Displays the integration Start, Stop, and Reset operation buttons. On the WT1600, these buttons appear in the screen displayed when setting the measurement mode to Integration mode.

##### Range Settings Bar

Displays the Range button. When this button is clicked, a setting screen for the WT measuring range is displayed.

---

#### WT500-Specific Display Items

---

##### Null bar

Select on or off of the null function.

---

#### Note

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- When certain screens are active and data acquisition is started, data for all inactive display windows are also updated. If there are inactive screens, the measurement rate is slower than when only active screens are displayed. The more inactive screens that are displayed, the slower the measurement interval. Therefore, do not display unnecessary screens.
- Some screens cannot be selected depending on the measurement mode for the WT3000.
  - Waveform and trend screens cannot be selected if the measurement mode is set to wide bandwidth harmonic measurement.
  - Only numeric and Math waveform screens can be selected if the measurement mode is set to waveform computation (Math) mode.
  - Only numeric and FFT waveform screens can be selected if the measurement mode is set to FFT mode.
  - Only numeric screens can be selected if the measurement mode is set to Normal Mode (Synchronization Mode).

For details on the limitations regarding the measurement modes and displays, see the WT3000 User's Manual.

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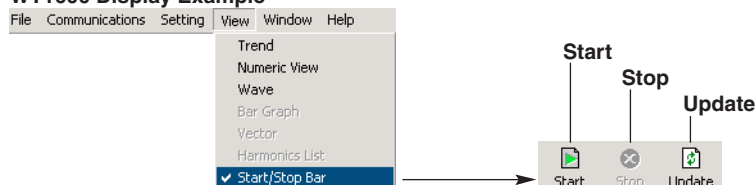


## 3.2 Starting and Stopping Data Acquisition (Normal and Harmonic Measurement Modes), and Selecting the WT for Communication

### Starting Data Acquisition

1. Choose **View > Start/Stop Bar** to display the **Start**, **Stop**, and Update operation buttons.

#### WT1600 Display Example



2. Click **Start** or **Update**. Data acquisition begins.

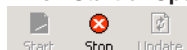


- If the WT data update rate is shorter than the time required for WTVIEWER to download measured data once, when you click Start, WTVIEWER acquires measured data from the WT at the display update rate of the PC.
- If the data update rate on the WT is longer than the time it takes for WTVIEWER to download one set of measured data, when you click Start, WTVIEWER will only be able to download and display data after the WT has updated it, so measured data will appear to be acquired at the data update rate of the WT.
- If you click Update, WTVIEWER loads and displays the measured data from the WT once.

#### Before Download starts or when Stop is clicked



#### When Start or Update is clicked



### Note

- When downloading measured data other than that in the currently opened measured data display screen, start data acquisition after selecting a display screen as in section 3.1.
- If communication is being carried out with several WTs, the Start, Stop, and Update buttons apply to all currently selected WTs as shown by the check marks in the target bar (see below). However, there is no synchronization of data updating.

### Stopping Data Acquisition

Click **Stop**. Downloading of measured data from the WT stops.

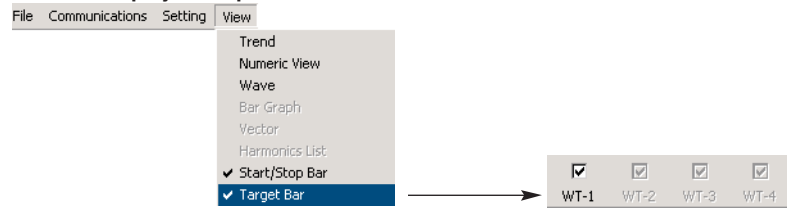


## 3.2 Starting and Stopping Data Acquisition

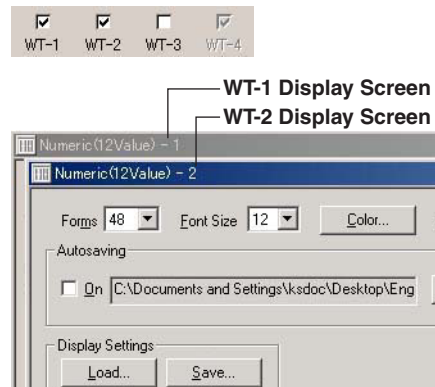
### Select a WT for Communications

1. Select **View > Target Bar** from the menu bar to display the check boxes for selecting WTs for communications with the PC.

#### WT1600 Display Example



2. Select the check boxes for the WTs with which you wish to carry out communications (WT-1, WT-2, WT-3, WT-4).
  - Communication is enabled with the WTs whose check boxes are active and selected. Unselected WTs are connected to the PC but cannot be controlled through communication.
  - For example, if WT-1, WT-2, and WT-3 are connected but only WT-1 and WT-2 are selected in the target bar, only the screens from WT-1 and WT-2 are displayed in the PC screen.
  - Only when the communication interfaces used are the same, the models are the same, and the specifications included in the options are the same, can multiple WTs be connected to a single PC for simultaneous control by WTViewer. However, there is no synchronization of data updating.



### 3.3 Numeric Value Display Function

You can display trends and waveforms after setting up measurement functions and elements in the numeric value screen. Trend and waveform graphs cannot be displayed for items whose settings have not been entered.

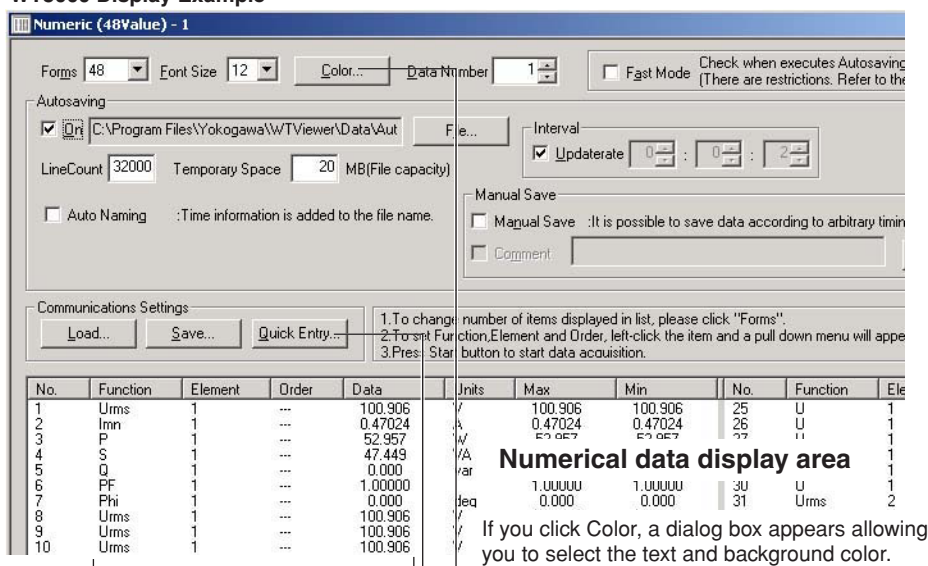
On the WT1600, since you change to harmonic measurement mode to measure harmonics, there is a separate screen for displaying only harmonic data (harmonics list display). See section 3.5.

With the WT500 and WT3000, since harmonics can also be measured in normal measurement mode, harmonics can be displayed together with numeric data from other normal measurements in the numeric screen described in this section.

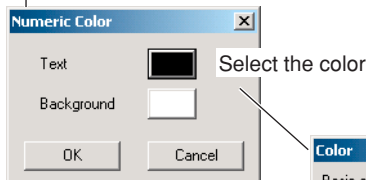
#### Displaying the Numeric Screen

Choose **View > Numeric** in the menu bar.

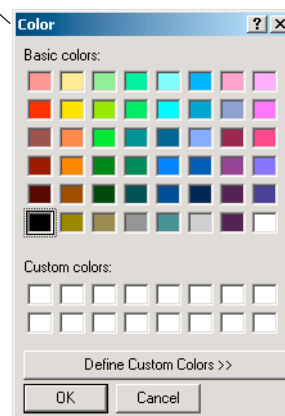
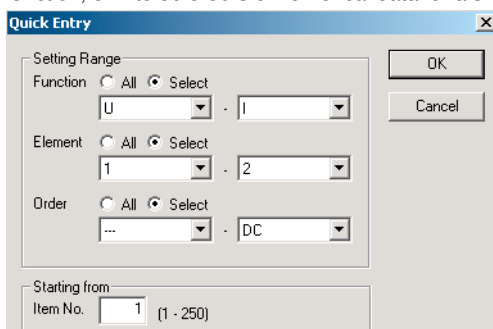
##### WT3000 Display Example



Click in the intersection of one item and its Function, Element, or Order (Order is on the WT500 and WT3000 only) to display a combo box, then select the various items.



If you click Quick Entry (available on the WT500 and WT3000 only), a dialog box is displayed. Select a numerical display range in the Function, Element, and Order boxes, and in the Starting from ItemNo. box, set from which item number to start in the display. This is effective when you want to display numerical data from multiple elements for a single function, or 1 to 50 orders of numerical data for a single function.



\* On the WT1600, the Order, Max, and Min items are not included in the numeric data display area. The Quick Entry button appears only in the harmonic list display (see section 3.5) of harmonic measurement mode.

### 3.3 Numeric Value Display Function

---

#### Forms

Select the number of numeric data to display.

- Select 12, 24, 48, or 250\*1.
- If you select 250, all of the currently downloadable numeric data of measurement functions and elements are displayed.

\*1 100 when the measurement mode is synchronization mode (see section 3.13)

#### Font Size

Select the font size from the list.

The size can be set from 10 to 40 in steps of 2 (10, 12, 14, ...38, 40).

#### Color

Select a text and background color.

#### Data Number

Indicates how many numeric data have been downloaded from the WT up to the currently displayed data. After data has finished downloading, you can change the Data Number setting to display the desired numeric data.

#### Temporary Space

A temporary quantity of memory is set to display numeric data. The larger this quantity, the larger the Data Number becomes.

- You can set the space in the range from 20 to 1000 MB.
- It cannot be set larger than the amount of free space on the PC's hard disk.

#### Function

Select the measurement function of numeric data to display.

1. Click on the **Function** column. A combo box opens.
2. Select the measurement function for each item in this column.

#### Element

Select the element of numeric data to display.

1. Click the **Element** column. A combo box opens.
2. Select the element for each item in this column.

#### Order (WT500 and WT3000 Only)

Select the order of numeric data to display.

1. Click the **Order** column. A combo box opens.
2. Select an order.

#### Max, Min (WT500 and WT3000 Only)

Displays the maximum and minimum values for each display item of the numeric data downloaded from the WT. When measurement is started, the Max and Min values are updated to reflect the first-measured data.

#### Quick Entry (WT500 and WT3000 Only)

Lets you set the displayed measurement function, element, and order all at once. For example, this is effective when you want to display numeric data from multiple elements for a single function, or 1 to 50 orders of numeric data for a single function.

1. Click **Quick Entry**. A dialog box opens.
2. Set the numeric value display range for the **Function**, **Element**, and **Order** boxes.
3. In the **Item No.** box under **Starting from**, enter the item number from which you wish to start applying the settings.

## Saving Numeric Data While Downloading

### Auto Saving

While downloading numeric data from the WT, it is automatically saved in CSV format. Saved files can be opened in commercial spreadsheet programs (such as Excel).

- When the On check box is selected, numeric data is automatically saved to a file when data starts downloading (see section 3.2).
- When the On check box is selected, the time stamp of each data is the time at which WTVIEWER updated the data. If the On check box is not selected, all data time stamps are set uniformly to the time that the data was saved upon clicking the Save button. In both cases, this is not the time the data was measured on the WT.
- If a file name is not specified, the default name AutoSave.csv is used.
- If the numeric data saved in a single file exceeds the Line Count described below, file names are incremented and new files are saved as in: AutoSave.csv, AutoSave\_0000.csv, AutoSave\_0001.csv, ...AutoSave\_9999.csv.
- If a file name is specified, that name is used in place of the AutoSave portion of the file name that is automatically assigned when no file name is specified. Up to 1001 files can be saved using a single specified name.
- To specify a file name, click File.

### File

Enter the file name for automatic saving.

1. Click **File**. The Numeric Data Save dialog box is displayed.
2. Enter a file name and save destination and click **Save**.

### Line Count

Specify the number of lines of numeric data to be saved to a single file during automatic saving.

- If the saved numeric data is opened in a spreadsheet program such as Excel, 1 save's worth of the measured data is displayed on one row of the open sheet. This number of lines (corresponding to numbers of measurements in WTVIEWER) is set as the Line Count.
- For example, if you set Line Count to 10 and begin downloading measured data, 10 times worth of the measured data is saved to a single file, and the next ten times ( 11 to 20) are saved to the next file. This process continues until all measured data is downloaded.

### Interval

Set the interval for downloading numeric data.

- If the Updaterate check box is selected, data is saved at the data update rate of the WT while data is being downloaded.
- If the Updaterate check box is not selected, the time interval box is enabled. Data from the WT is saved at the specified time interval during download. The time interval can be specified in the range from 0:0:2 to 24:0:0 (hr:min:sec). For example, if the time interval is set to 0:00:30 (30 seconds), the data update rate on the WT is not set to 30 seconds, but the rate at which data is acquired from the WT and saved on the PC is 30 seconds. Also, if the data update rate on the WT were 2 seconds in this case, the update rate of the data saved on the WTVIEWER would have a temporal width of  $30 \pm 2$  seconds.

### 3.3 Numeric Value Display Function

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#### **Note**

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- When Autosaving, turn OFF all resident software on the PC. Since virus checking software, for example, frequently checks the files created by WTVIEWER, the PC's performance would be notably reduced. When you exit virus checking software, make sure your networking environment is sufficiently protected from infection by viruses in other ways.
  - Files saved through Autosaving cannot be opened on WTVIEWER. These types of files can be opened in commercial spreadsheet programs (such as Excel). To save files in a format that can be opened by WTVIEWER, see section 5.2.
  - When measurement is finished and you close the numeric value screen, all data other than that which was visible up to that point is deleted. Using the AutoSaving function, you can save data during download.
  - Even if you close the numeric value screen after measurement is finished, the data visible up to that point is held until you either exit WTVIEWER, change the communication mode, or start the next measurement. If you click View or View on the menu bar and select the numeric value screen, the data that was visible before closing the screen is displayed.
- 

#### **Fast Mode**

If you select Fast Mode, communication is sped up, synchronization with the main unit is performed as much as possible, and numeric data is automatically saved.

#### • **Fast Mode Restrictions**

- The following are the recommended interfaces for communication.  
WT1600: GP-IB  
WT3000: GP-IB, Ethernet

#### **Note**

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WT500: Every interface is available to the Fast Mode.

---

When using a communication interface other than the ones above, all data may not be able to be saved when the display update rate on the main unit is 50 ms. In this case, after setting the display update rate on the WT to 100 ms or higher, set the WTVIEWER Forms (see 3-6 page) to 48 or less. When editing the display update rate setting of the WT or the setting for the number of Forms on WTVIEWER, open the saved file in a commercially available spreadsheet program, check the time stamp of each data, convert the WTVIEWER data update rate, and use that value as a guideline.

- Due to error between the times on the PC and WT, the number of acquired data may fluctuate.

Guideline:

For a PC with an Intel Pentium 3, 1 GHz, a WT display update rate of 50 ms, and WTVIEWER Forms set to 48 or less, data can be saved twenty times per second.

- On the PC screen, only one save's worth of numeric data can be displayed.
- If the Autosaving On check box is also not selected, automatic saving is not performed.
- While numeric data is being downloaded in Fast mode, measuring range information is not acquired from the WT. If the WT measuring range is set to Auto range and is then changed, the numeric value display on the WT and PC screens may differ.
- Display is not updated on screens other than the numeric value screen and the waveform screen.

### Saving/Loading Numeric Display Settings

#### Communications Settings

Numeric value display settings can be saved in CSV format (setting information files) and loaded.

- **Save**

After setting up the numeric display, the file is saved in CSV format.

1. Click **Save**. The Save Communications Settings dialog box is displayed.
2. Enter a **file name** and **save destination** and click **Save** button. The numeric value display settings are saved.

- **Load**

You can load previously saved numeric value display setting files.

1. Click **Load**. The Load Communications Settings dialog box is displayed.
2. Select a **file name** and **save destination** and click **Open** button. The saved numeric value display setting file is loaded.

### Starting Download of Numeric data

By carrying out the procedure described in "Starting Data Acquisition" in section 3.2, the data is loaded from the WT.

#### **Note**

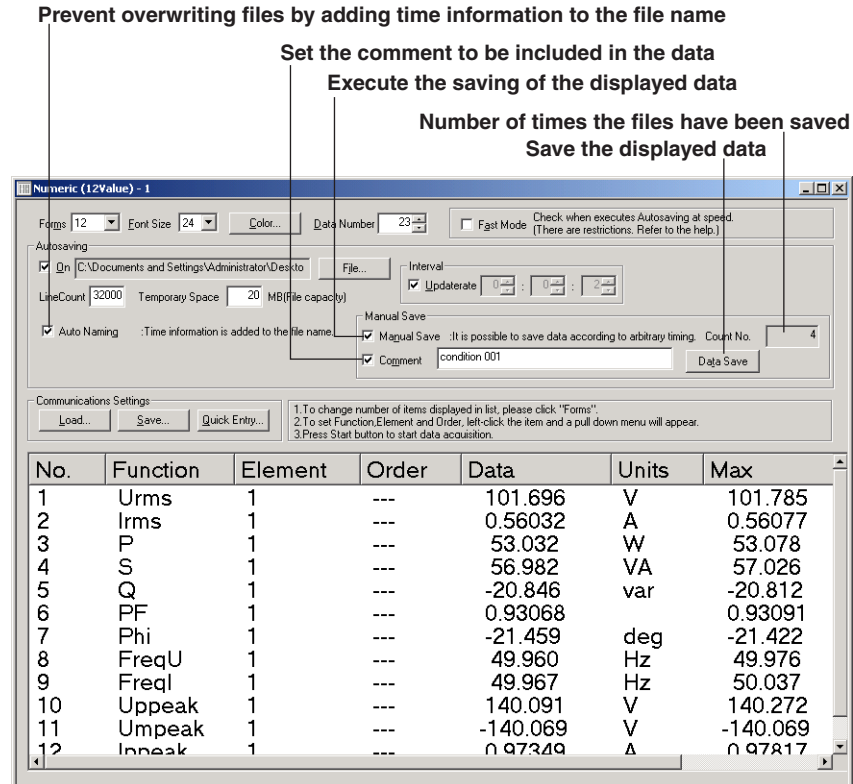
- If numeric data is not downloaded from the WT to WTVIEWER, no measured values are displayed in the numeric value screen.
- There are setting items that cannot be changed while data is being downloaded.

### 3.3 Numeric Value Display Function

#### Saving the Measured Data Currently Displayed While Retrieving the Numeric Data

##### Manual Save

WTVIEWER saves the measured data currently displayed to a file in CSV format while retrieving numeric data from the WT. You can select only the measured data you want to save.



- **Specifying the Manual Save Settings and Starting the Measurement**

1. Select the **Autosaving ON** check box.
2. Select the **Manual Save** check box.
3. Check the **UpdateRate** check box.
4. As necessary, select the **Auto Naming** check box.
5. As necessary, set the **Comment**.
6. Click **START**. The measurement starts, and WTVIEWER is ready to save the data. Count No. is set to zero.

- **Saving the Measured Data Currently Displayed**

7. Click **Data Save**. The numeric data displayed when you click Data Save is saved, and Count No. is incremented.
8. As necessary, change the Comment.

You can save only the measured data you want by repeating step 7 (and 8).

- **Stopping the Measurement**

9. Click **STOP**. The measurement stops, and data is saved in CSV format. The file name is set to the name specified in the File box under AutoSaving.



## Preventing the Overwriting of Files

### Auto Naming

You can prevent overwriting files by selecting the Auto Naming check box. If a file with a same name as that specified in the File box under Auto Saving already exists when you are saving a file, the file is saved with a different name by adding date and time information to the name. If the Auto Naming check box is not selected, a file with the same name is overwritten.

- **Date and Time Added to the File Name**

- **Date**  
YY/MM/DD (year/month/day), a six-digit number. The lowest two digits are used for the year.
- **Time**  
HH:MM:SS (hour/month/second), a six-digit number. The 24-hour clock is used for the hour.

If a file with the same name already exists, the file name that is used through the Auto Naming function is as follows.

File name specified in the File box under Auto Saving:     dataABC  
Time when the file was saved: 9 hours 50 minutes and 32 seconds on October 3,  
2006  
File name that is saved:             dataABC061003095032.csv

The software has a function that saves files by adding a sequence number (\_0000, \_0001, and so on) to the file name when the number of lines of numeric data to be saved to a file exceeds the value specified by Line Count (see page 3-7). This function also works in manual saving.

If the number of lines of numeric data to be saved to a file exceeds the specified line count in the example above, the following files are saved sequentially.

dataABC061003095032\_0000.csv  
dataABC061003095032\_0001.csv

## 3.4 Starting, Stopping, Pausing, and Resetting Integration

This section covers the WT500, WT1600 and WT3000 separately.

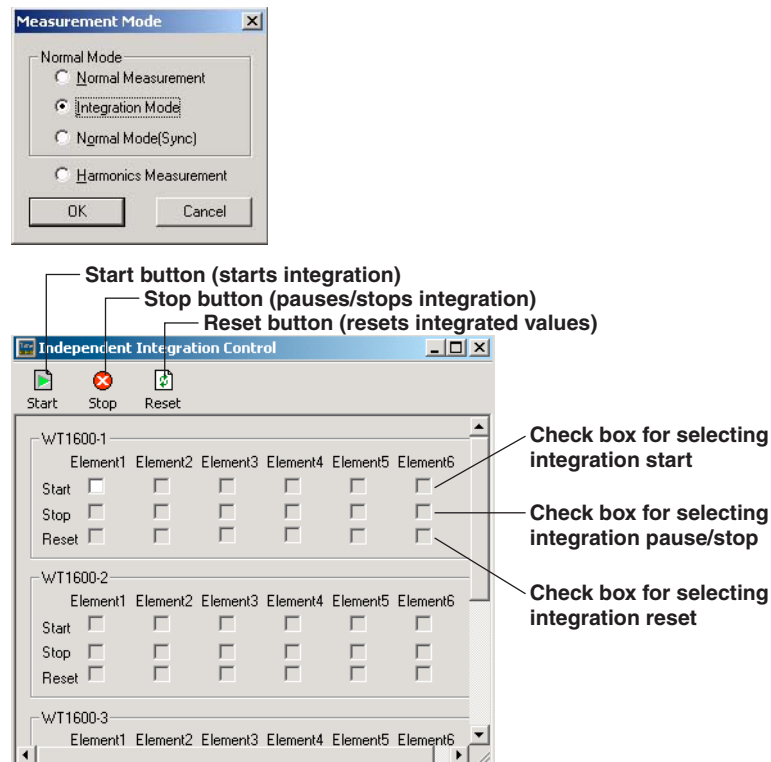
For a description of setting a WT3000 as the target for communication, see page 3-16.

For a description of setting a WT500 as the target for communication, see page 3-18.

### With the WT1600

#### Integration Settings

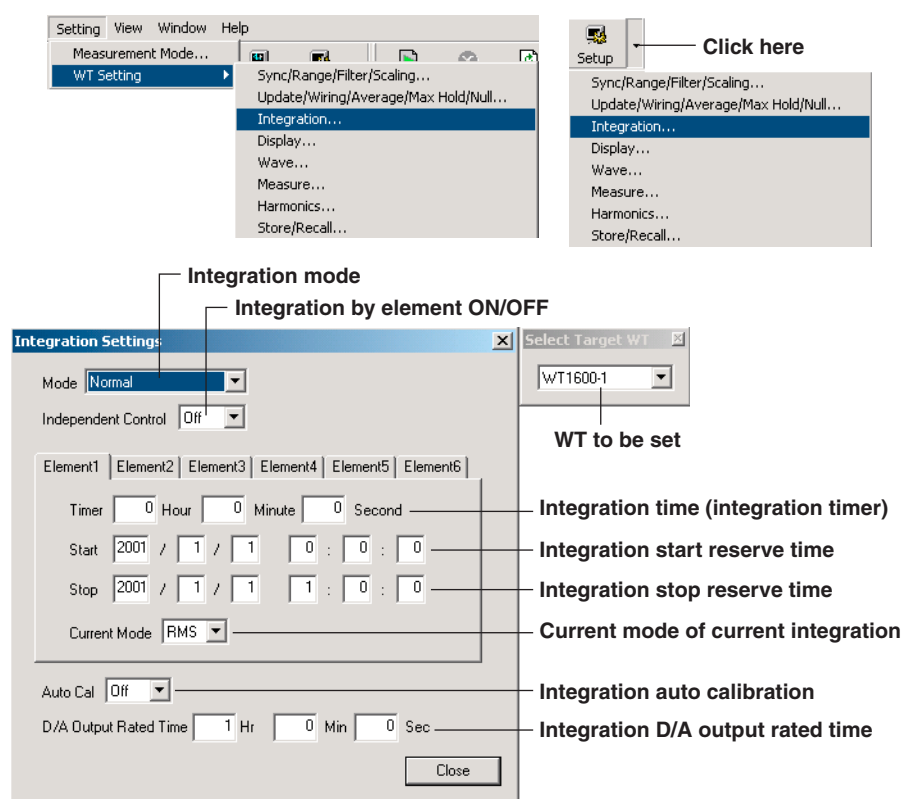
1. Choose **Setting > Measurement Mode** from the menu bar. The Measurement Mode dialog box is displayed.
2. Select the Integration Mode option and click **OK**. The Independent Integration Control dialog box is displayed.



#### Note

- The Independent Integration Control dialog box only appears when in Integration mode. When you change the measurement mode, the dialog box closes.
- Integration Start, Stop, and Reset are executed in the Independent Integration Control dialog box. Measured data from the WT cannot be downloaded.
- To display the dialog box, choose View > Independent Control from the menu bar.
- Before integration is started, only the Start check box is active.
- After integration is started, the Stop check box becomes active.
- After integration is paused or stopped, the Start and Reset check boxes become active.
- If the Start/Stop/Reset check box is not selected, clicking the Start/Stop/Reset button is invalid.
- If you click Start/Stop/Reset and an error occurs, an error message is displayed.
- Even if the measurement mode is Integration mode, if you click Start/Stop/Update (see section 3.2) when the trend or numeric value screen is displayed, you can start, stop, or update normal mode data acquisition.

3. Select **Setting > WT Setting > Integration** from the menu bar, or click Setup and select Integration. The Integration Settings and Select Target WT dialog boxes appear.
4. Select the target WT in the Select Target WT dialog box.
5. In the Integration Settings dialog box, set the **Mode** (integration mode), **Independent Control** (integration by element (independent integration)), **Timer** (integration time (integration timer)), **Start** (reserved time for integration start), **Stop** (reserved time for integration stop), **Current Mode** (current mode for current integration), **Auto Cal** (integration auto calibration), and **D/A Output Rated Time** (integration D/A output rated time), and other settings.
  - For information on the meanings of each item, see the WT main unit user's manual.
  - If you will not change the integration settings, skip to "Starting Integration" on the next page.

**Note**

- Settings cannot be changed during integration or if integration has been paused. Click Reset, or change the settings after integration stops.
- If you click Reset, the WT integration data disappears, but the integrated values remain on WTVIEWER. When displaying the integrated values in the numeric data display area on WTVIEWER, the integrated values remain displayed as-is. However, if you start integration again, the integrated values are updated.

6. Click **Close**. The Integration Settings and Select Target WT dialog boxes close.

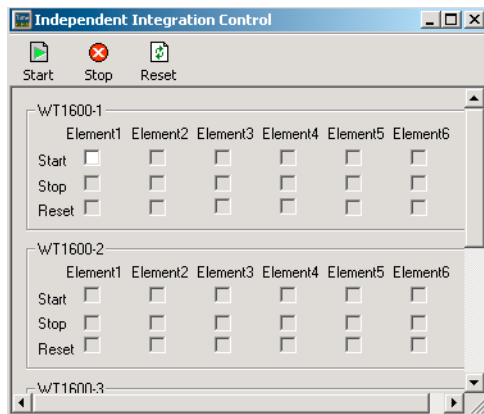
### 3.4 Starting, Stopping, Pausing, and Resetting Integration

#### Starting Integration

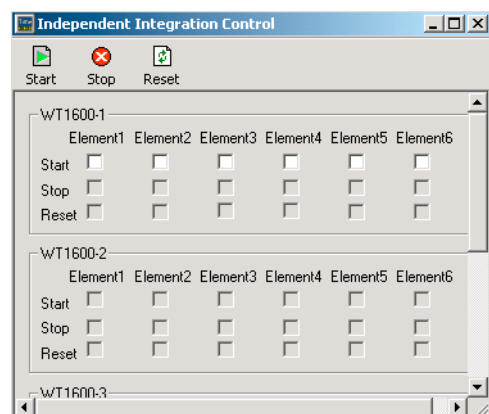
Check the following before starting integration.

- Set up the measurement function and elements (see section 3.3) so that the integrated values are displayed in the numeric data display area.
  - If integrated values are not downloaded from the WT to WTViewer, no integrated values are displayed even if integration is started. Start data download (see section 3.2).
1. Select **Display > Independent Integration Control** from the menu bar, or click **View** and select Independent Integration Control. The Independent Integration Control dialog box is displayed.
  2. Of the **Start check boxes** corresponding to elements 1-6 of the WT selected for integration, select the elements on which you wish to perform integration. If integration by element is turned Off, only the Start check box of Element 1 is enabled. Select the Element 1 Start check box.
  3. Click **Start**. If integration by element is turned ON, integration begins on the selected elements. If integration by element is turned OFF, integration begins on all elements installed in the WT.

When integration by element is ON



When integration by element is OFF



#### Stopping/Pausing Integration

1. In the Independent Integration Control dialog box, of the **Stop check boxes** corresponding to elements 1-6 of the WT selected for integration, select the elements on which you wish to pause or stop integration. If integration by element is turned Off, only the Start check box of Element 1 is enabled. Select the Element 1 Start check box.
2. Click **Stop**. If integration by element is turned ON, integration pauses on the selected elements. If integration by element is turned OFF, integration pauses on all elements installed in the WT.

#### Note

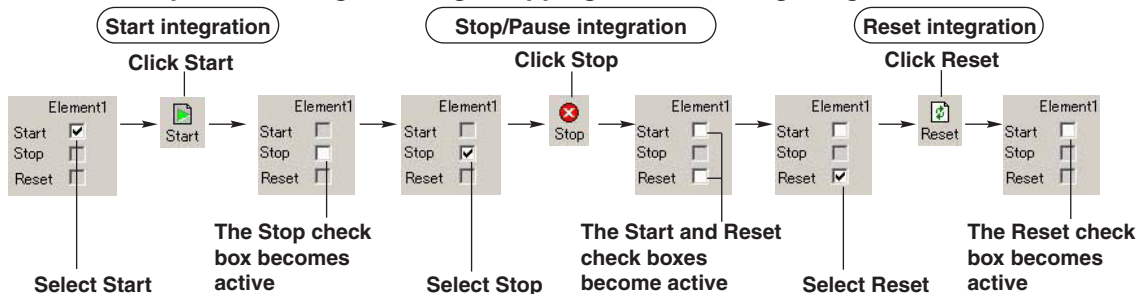
- If Stop is clicked before the specified integration time or reserved time is reached, integration is paused. If you then click Start, integration resumes.
- If you click Reset and then Start while paused or if integration stopped because the specified integration time or reserved time was reached, integration is reset and starts from the beginning.

**Resetting Integration**

1. In the Independent Integration Control dialog box, of the **Reset check boxes** corresponding to elements 1-6 of the WT selected for integration, select the elements on which you wish to reset integration. If integration by element is turned Off, only the Reset check box of Element 1 is enabled. Select the Element 1 Reset check box.
2. Click **Reset**. If integration by element is turned ON, integration is reset on the selected elements. If integration by element is turned OFF, integration is reset on all elements installed in the WT.

**Note**

If you click Reset, the WT integration data disappears, but the integrated values remain on WTVIEWER. When displaying the integrated values in the numeric data display area on WTVIEWER, the integrated values remain displayed as-is. However, if you start integration again, the integrated values are updated.

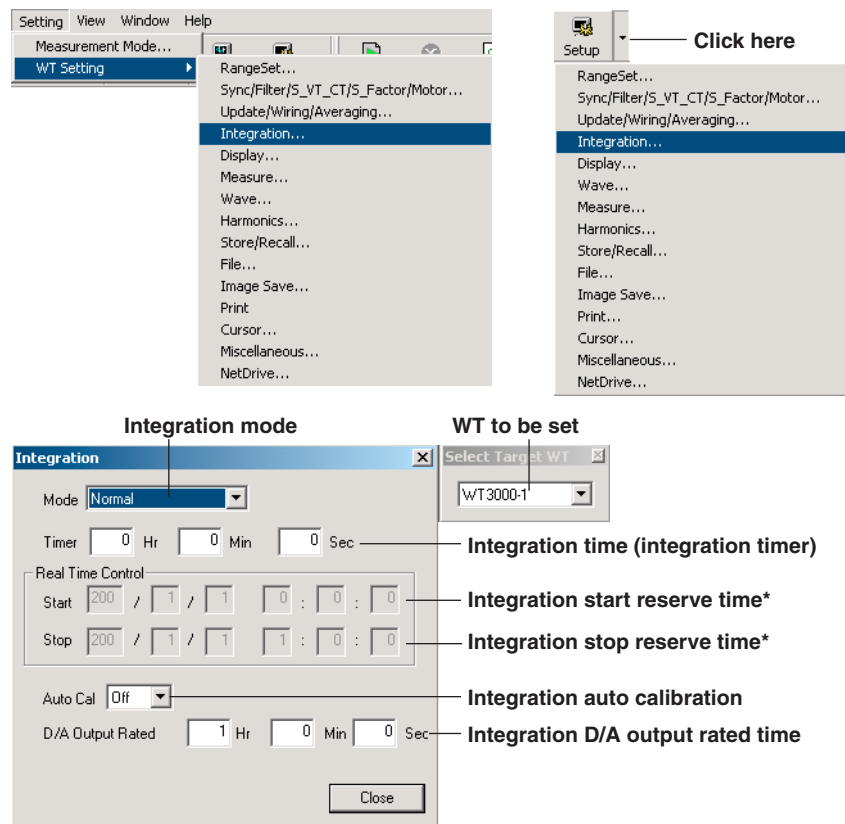
**Example of Starting, Pausing, Stopping, and Resetting Integration**

### 3.4 Starting, Stopping, Pausing, and Resetting Integration

#### With the WT3000

##### Integration Settings

1. Select **Setting > WT Setting > Integration** from the menu bar, or click **Setup** and select **Integration**. The Integration and Select Target WT dialog boxes appear.
2. Select the target WT in the Select Target WT dialog box.
3. In the Integration dialog box, set the **Mode** (integration mode), **Time** (integration time (integration timer)), **Start** (reserved time for integration start), **Stop** (reserved time for integration stop), **Auto Cal** (integration auto calibration), and **D/A Output Rated Time** (integration D/A output rated time), and other settings.
  - For information on the meanings of each item, see the WT main unit user's manual.
  - If you do not need to change the integration settings, skip to "Starting Integration" on the next page.



\* Enabled during real time integration mode.

#### Note

- Integration can only be used in Normal mode.
- Integration is not allowed during waveform acquisition. Begin integration after waveforms have been loaded.
- Settings cannot be changed during integration or if integration has been paused. Click Reset, or change the settings after integration stops.
- If you click Reset, the WT integration data disappears, but the integrated values remain on WTViewer. When displaying the integrated values in the numeric data display area on WTViewer, the integrated values remain displayed as-is. However, if you start integration again, the integrated values are updated.

4. Click **Close**. The Integration and Select Target WT dialog boxes close.

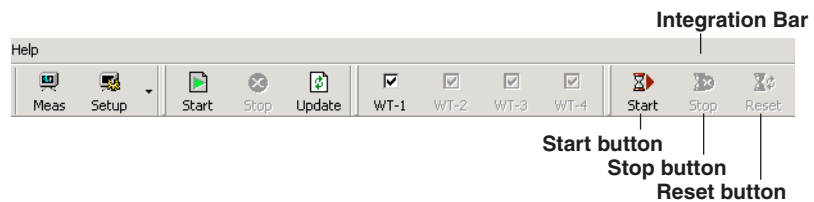
### Starting Integration

**Check the following before starting integration.**

- Set up the measurement function and elements (see section 3.3) so that the integrated values are displayed in the numeric data display area.
- If integrated values are not downloaded from the WT to WTVIEWER, no integrated values are displayed even if integration is started. Start data download (see section 3.2).

Click **Start** on the integration bar. Integration begins on all elements installed in the WT.

If you select Integration bar in the View menu, the Start, Stop, and Reset operation buttons are displayed in the same row as other tool bars.



### Stopping/Pausing Integration

Click **Start** on the integration bar. Integration pauses on all elements installed in the WT.

#### Note

- If Stop is clicked before the specified integration time or reserved time is reached, integration is paused. If you then click Start, integration resumes.
- If you click Reset and then Start while paused or if integration stopped because the specified integration time or reserved time was reached, integration is reset and starts from the beginning.

### Resetting Integration

Click **Reset** on the integration bar. Integration is reset on all elements installed in the WT.

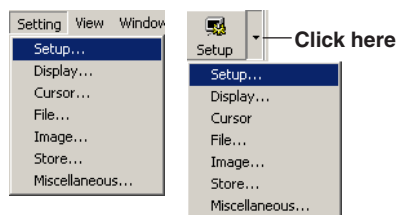
#### Note

If you click Reset, the WT integration data disappears, but the integrated values remain on WTVIEWER. When displaying the integrated values in the numeric data display area on WTVIEWER, the integrated values remain displayed as-is. However, if you start integration again, the integrated values are updated.

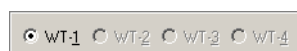
#### With the WT500

##### Integration Settings

1. Choose **Setting > Setup** from the menu bar, or click **Setup** and select **Setup**. The Measurement Conditions Setting dialog box is displayed.

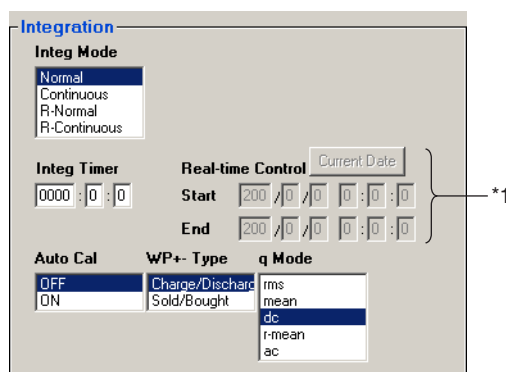


2. Click the **Efficiency/Averaging/Integration** tab. Setting dialog box for each function is displayed.
3. Select the target WT.



4. In the Integration box, set the **Integ Mode** (integration mode), **Integ Timer** (integration time (integration timer)), **Start** (reserved time for integration start), **Stop** (reserved time for integration stop), **Auto Cal** (integration auto calibration), **WP+- Type** (integration type for power integration), and **q Mode** (current mode for current integration), and other settings.

For details on each function, see the WT User's Manual.



\*1 If real time counting integration mode, this box becomes active.

5. Click **OK**. The Measurement Conditions Setting dialog box closes.



## Starting Integration

Check the following before starting integration.

- Set up the measurement function and elements (see section 3.3) so that the integrated values are displayed in the numeric data display area.
- If integrated values are not downloaded from the WT to WTVIEWER, no integrated values are displayed even if integration is started. Start data download (see section 3.2).

Click **Start** on the integration bar. Integration begins on all elements installed in the WT.

If you select Integration bar in the View menu, the Start, Stop, and Reset operation buttons are displayed in the same row as other tool bars.



## Stopping/Pausing Integration

Click **Start** on the integration bar. Integration pauses on all elements installed in the WT.

### Note

- If Stop is clicked before the specified integration time or reserved time is reached, integration is paused. If you then click Start, integration resumes.
- If you click Reset and then Start while paused or if integration stopped because the specified integration time or reserved time was reached, integration is reset and starts from the beginning.

## Resetting Integration

Click **Reset** on the integration bar. Integration is reset on all elements installed in the WT.

### Note

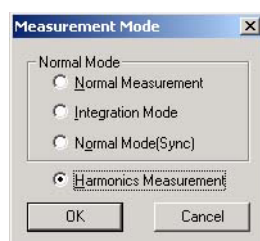
If you click Reset, the WT integration data disappears, but the integrated values remain on WTVIEWER. When displaying the integrated values in the numeric data display area on WTVIEWER, the integrated values remain displayed as-is. However, if you start integration again, the integrated values are updated.

## 3.5 Harmonics List Display Function

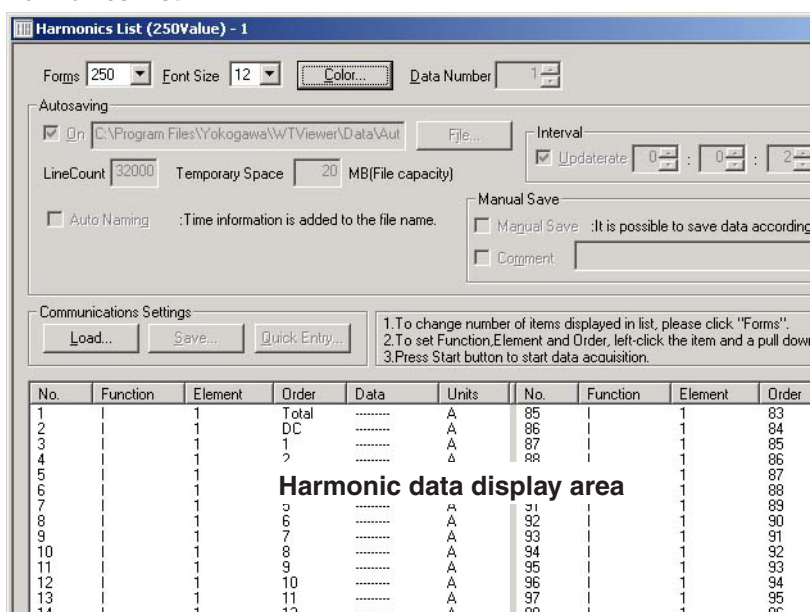
This section describes the WT1600. For the WT500 and WT3000, see section 3.3. On the WT1600, since you change to harmonic measurement mode to measure harmonics, there is a separate screen for displaying only harmonic data (harmonics list display). Therefore, the harmonics list display is explained separately in this section. With the WT500 and WT3000, since harmonics can also be measured in normal measurement mode, harmonics can be displayed together with numeric data from other normal measurements in the numeric screen described in section 3.3.

### Displaying the Harmonics List

1. Choose **Setting > Measurement Mode** from the menu bar. The Measurement Mode dialog box is displayed.
2. Select the Harmonic Measurement option (harmonic measurement mode) and click **OK**. The Harmonics List dialog box is displayed.



### Harmonics List

The image shows the 'Harmonics List (250Value) - 1' dialog box. It has a title bar and a close button. The main area contains several settings: 'Forms' (250), 'Font Size' (12), 'Color...' button, 'Data Number' (1), 'Autosaving' section with 'On' checked and a file path, 'LineCount' (32000), 'Temporary Space' (20 MB), 'Interval' (0:0:2), 'Manual Save' section with 'Manual Save' and 'Comment' options, and 'Communications Settings' with 'Load...', 'Save...', and 'Quick Entry...' buttons. Below these settings is a table with columns: No., Function, Element, Order, Data, Units, No., Function, Element, Order. The table contains 14 rows of data. A text box at the bottom right contains instructions: '1. To change number of items displayed in list, please click "Forms". 2. To set Function, Element and Order, left-click the item and a pull down. 3. Press Start button to start data acquisition.'

### Forms

Select the number of harmonic data to display.

- Select 12, 24, 48, or 250.\*1
- If you select 250, all of the currently downloadable harmonic data of measurement functions and elements are displayed.

\*1 100 when the measurement mode is synchronization mode (see section 3.13)

**Font Size**

Select the font size from the list.

The size can be set from 10 to 40 in steps of 2 (10, 12, 14, ...38, 40).

**Color**

Select a text and background color. Click a color to display the Color dialog box. For details, see page 3-5.

**Data Number**

Indicates how many harmonic data have been downloaded from the WT up to the currently displayed data. After data has finished downloading, you can change the Data Number setting to display the desired numeric data.

**Temporary Space**

A temporary quantity of memory is set to display numeric data. The larger this quantity, the larger the Data Number becomes.

- You can set the space in the range from 20 to 1000 MB.
- It cannot be set larger than the amount of free space on the PC's hard disk.

**Function**

Select the measurement function of harmonic data to display.

1. Click on the **Function** column. A combo box opens.
2. Select the measurement function for each item in this column.

**Element**

Select the element of the harmonic data to display.

1. Click the **Element** column. A combo box opens.
2. Select the element for each item in this column.

**Order**

Select the order of harmonic data to display.

1. Click the **Order** column. A combo box opens.
2. Select an order.

**Quick Entry**

Lets you set the displayed measurement function, element, and order all at once. For example, this is effective when you want to display harmonic data from multiple elements for a single function, or 1 to 100 orders of harmonic data for a single function. Click Quick Entry to display a display item setting dialog box (see page 3.5).

1. Click **Quick Entry**. A dialog box opens.
2. Set the harmonic data range for the **Function**, **Element**, and **Order** boxes.
3. In the **Item No.** box under **Starting from**, enter the item number from which you wish to apply settings.

#### Saving Harmonic Data While Downloading

##### Auto Saving

While downloading numeric data from the WT, it is automatically saved in CSV format. Saved files can be opened in commercial spreadsheet programs (such as Excel).

- When the On check box is selected, numeric data is automatically saved to a file when data starts downloading (see section 3.2).
- When the On check box is selected, the time stamp of each data is the time at which WTVIEWER updated the data. If the On check box is not selected, all data time stamps are set uniformly to the time that the data was saved upon clicking the Save button. In both cases, this is not the time the data was measured on the WT.
- If a file name is not specified, the default name AutoSave.csv is used.
- If the numeric data saved in a single file exceeds the Line Count described below, file names are incremented and new files are saved as in: AutoSave.csv, AutoSave\_0000.csv, AutoSave\_0001.csv, ...AutoSave\_9999.csv.
- If a file name is specified, that name is used in place of the AutoSave portion of the file name that is automatically assigned when no file name is specified. Up to 1001 files can be saved using a single specified name.
- To specify a file name, click File.

- **File**

Enter the file name for automatic saving.

1. Click **File**. The Save Numeric Data dialog box is displayed.
2. Enter a file name and save destination and click **Save**.

- **Line Count**

Specify the number of lines of harmonic data to be saved to a single file during automatic saving.

- If the saved harmonic data is opened in a spreadsheet program such as Excel, 1 save's worth of the measured data is displayed on one row of the open sheet. This number of lines (corresponding to numbers of measurements in WTVIEWER) is set as the Line Count.
- For example, if you set Line Count to 10 and begin downloading measured data, 10 times worth of the measured data is saved to a single file, and the next ten times ( 11 to 20) are saved to the next file. This process continues until all measured data is downloaded.

- **Interval**

Set the interval for downloading harmonic data.

- If the Updaterate check box is selected, data is saved at the data update rate of the WT while data is being downloaded.
- If the Updaterate check box is not selected, the time interval box is enabled. Measured data from the WT is saved at the specified time interval during download. The time interval can be specified in the range from 0:0:2 to 24:0:0 (hr:min:sec).

**Note**

- When Autosaving, turn OFF all resident software on the PC. For example, since virus checking software frequently checks the files created by WTVIEWER, the PC's performance would be notably reduced. When you exit virus checking software, make sure your networking environment is sufficiently protected from infection by viruses in other ways.
- Files saved through Autosaving cannot be opened on WTVIEWER. These types of files can be opened in commercial spreadsheet programs (such as Excel). To save files in a format that can be opened by WTVIEWER, see section 5.2.
- When measurement is finished and you close the harmonics list screen, all data other than that which was visible up to that point is deleted. Using the AutoSaving function, you can save data during download.
- Even if you close the harmonics list value screen after measurement is finished, the data visible up to that point is held until you either exit WTVIEWER, change the communication mode, or start the next measurement. If you click View or View on the menu bar and select the harmonics list value screen, the data that was visible before closing the screen is displayed.

**Saving/Loading Harmonics list Display Settings****Communications Settings**

Harmonics list display settings can be saved in CSV format (setting information files) and loaded.

- **Save**

After setting up the harmonics list display, the file is saved in CSV format.

1. Click **Save**. The Save Communications Settings dialog box is displayed.
2. Enter a **file name** and **save destination** and click **Save** button. The harmonics list display settings are saved.

- **Load**

You can load previously saved harmonics list display setting files.

1. Click **Load**. The Load Communications Settings dialog box is displayed.
2. Select a **file name** and **save destination** and click **Open** button. You can load previously saved harmonics list display setting files.

**Starting Download of Harmonic Data**

By carrying out the procedure described in "Starting Data Acquisition" in section 3.2, the data is loaded from the WT.

**Note**

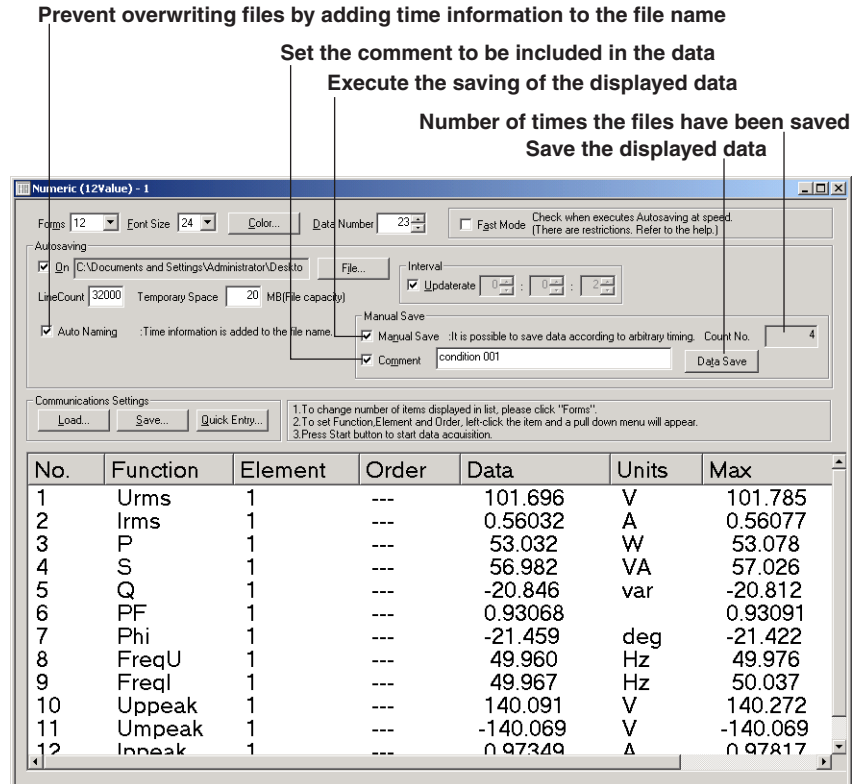
- If harmonic data is not downloaded from the WT to WTVIEWER, no harmonic data are displayed in the harmonics list screen.
- There are setting items that cannot be changed while data is being downloaded.

### 3.5 Harmonics List Display Function

#### Saving the Measured Data Currently Displayed While Retrieving the Numeric Data

##### Manual Save

WTVIEWER saves the measured data currently displayed to a file in CSV format while retrieving numeric data from the WT. You can select only the measured data you want to save.



- **Specifying the Manual Save Settings and Starting the Measurement**

1. Select the **Autosaving ON** check box.
2. Select the **Manual Save** check box.
3. Check the **Update rate** check box.
4. As necessary, select the **Auto Naming** check box.
5. As necessary, set the **Comment**.
6. Click **START**. The measurement starts, and WTVIEWER is ready to save the data. Count No. is set to zero.

- **Saving the Measured Data Currently Displayed**

7. Click **Data Save**. The numeric data displayed when you click Data Save is saved, and Count No. is incremented.
8. As necessary, change the Comment.

You can save only the measured data you want by repeating step 7 (and 8).

- **Stopping the Measurement**

9. Click **STOP**. The measurement stops, and data is saved in CSV format. The file name is set to the name specified in the File box under AutoSaving.

## Preventing the Overwriting of Files

### Auto Naming

You can prevent overwriting files by selecting the Auto Naming check box. If a file with a same name as that specified in the File box under Auto Saving already exists when you are saving a file, the file is saved with a different name by adding date and time information to the name. If the Auto Naming check box is not selected, a file with the same name is overwritten.

- **Date and Time Added to the File Name**

- Date

YY/MM/DD (year/month/day), a six-digit number. The lowest two digits are used for the year.

- Time

HH:MM:SS (hour/month/second), a six-digit number. The 24-hour clock is used for the hour.

If a file with the same name already exists, the file name that is used through the Auto Naming function is as follows.

File name specified in the File box under Auto Saving: dataABC

Time when the file was saved: 9 hours 50 minutes and 32 seconds on October 3, 2006

File name that is saved: dataABC061003095032.csv

The software has a function that saves files by adding a sequence number (\_0000, \_0001, and so on) to the file name when the number of lines of numeric data to be saved to a file exceeds the value specified by Line Count (see page 3-7). This function also works in manual saving.

If the number of lines of numeric data to be saved to a file exceeds the specified line count in the example above, the following files are saved sequentially.

dataABC061003095032\_0000.csv

dataABC061003095032\_0001.csv

## 3.6 Waveform Display Function

This section describes use of the WT3000. The WT1600 has six elements, so waveforms U5, I5, U6, and I6 are displayed. Also, with the motor function of the WT, Speed and Torque waveforms are displayed.

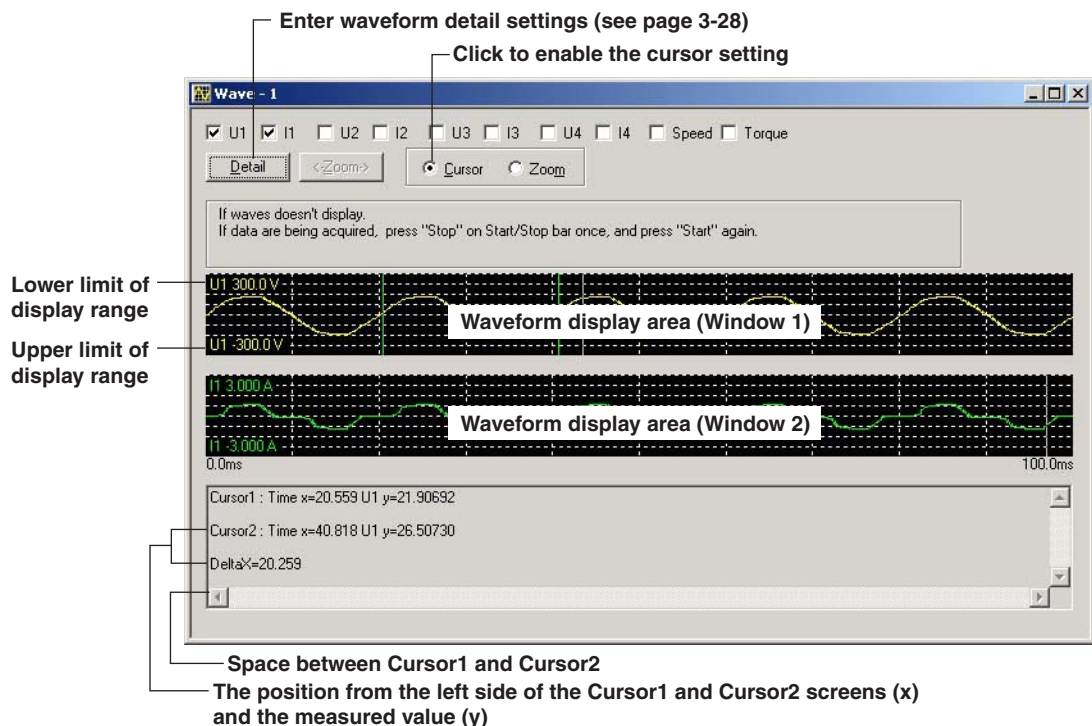
On the WT3000, set the measurement mode to Normal first by carrying out the procedure given in "Changing the Measurement Mode" on page 2-7 and then display the waveform.

### Displaying the Waveform

Choose **View > Wave** in the menu bar. The Wave dialog box opens.

#### Cursor Setting Screen

Example with two Windows. To set the number of windows, see page 3-28.)



- **U1 to I4**

(U1-I6 on the WT1600. U1-I3 on the WT500. Speed and Torque may also be displayed depending on the WT models and options.)

Select the check box to select the waveform to be displayed. This is linked to the Ch from the Wave Detail dialog box (see page 3-28).

- **Cursor**

Click here to set Cursor1 and Cursor2 in the waveform display area.

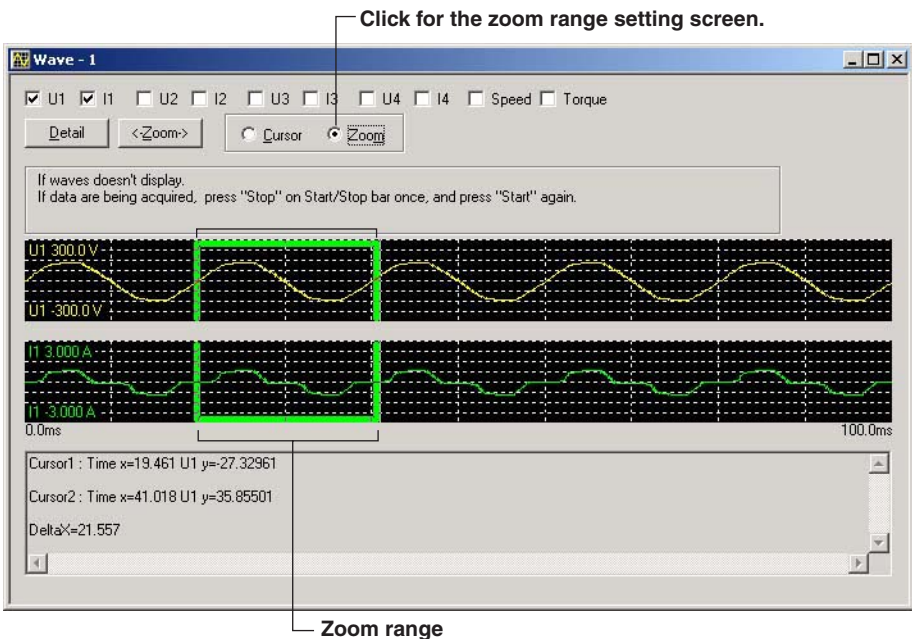
#### Cursor1, Cursor2

You can set the position of cursors on waveforms.

- The line that appears when you first click on the desired waveform is Cursor1.
- The line that appears the next time you click is Cursor2. The position of Cursor2 can be changed any number of times.
- To change the position of Cursor1, double-click in the waveform display area, delete cursors 1 and 2, and set new cursors.
- In the bottom of the waveform display area, the position from the left side of the Cursor1 and Cursor2 screens (x) and the measured value (y) are displayed.



### Zoom Area Setting Screen

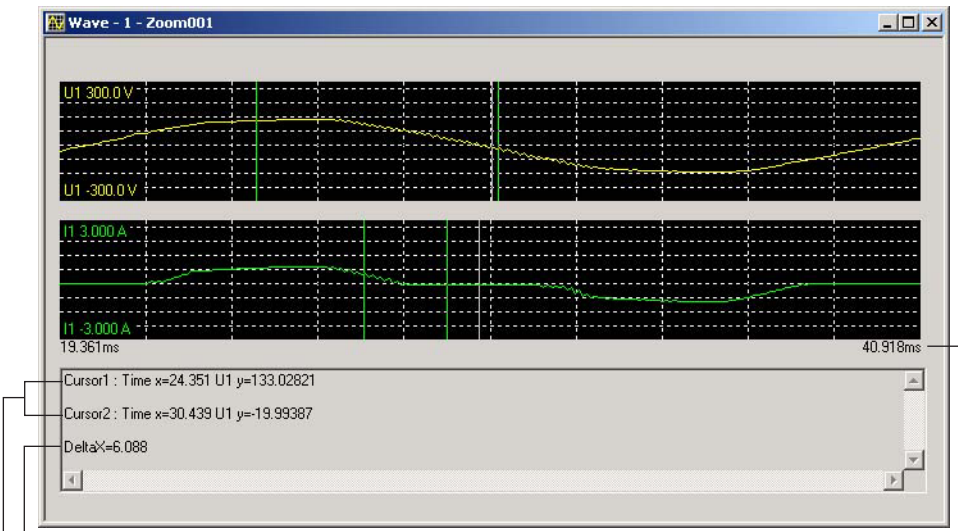


#### • Zoom (Time Axis Direction)

Click here to set the time axis zoom range in the waveform display area.

1. Drag the area to zoom in the waveform display area. The zoomed range is set simultaneously in all of the displayed waveform display areas.
2. Click **<-Zoom->**. A screen appears in which all waveforms in the waveform display area are zoomed.

You can set Cursor1 and Cursor2 on these zoomed waveforms. For the procedure, see the previous page.



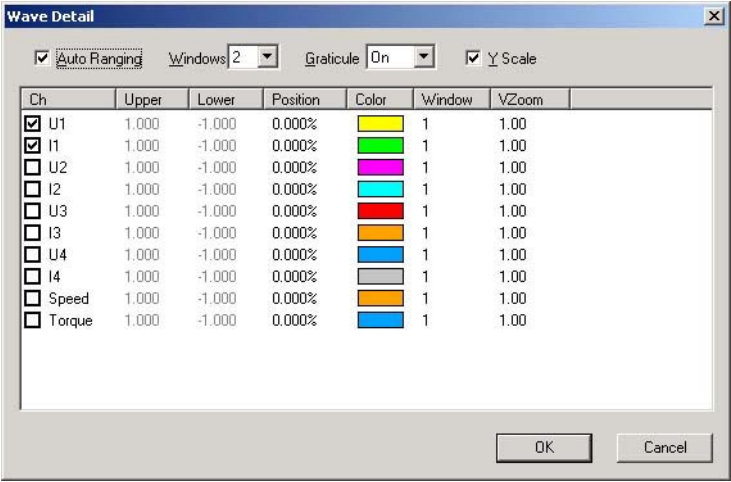
Space between Cursor1 and Cursor2

The position from the left side of the Cursor1 and Cursor2 screens (x) and the measured value (y)

Time from measurement start

Entering Waveform Detail Settings

Click **Detail** in the Wave dialog box. The Wave Detail dialog box is displayed.



Auto Ranging

- **When the Auto Ranging Check Box is Selected**  
Displayed in the same display range as the WT settings.
- **When the Auto Ranging Check Box is Not Selected**  
If you click the Upper or Lower column, a combo box is displayed. You can set the Upper limit and Lower limit of the display range for each channel.

Windows

Select the number of displayed waveform windows between 1 and 6. If two or more windows are specified and you click the Window column to display the combo box, you can specify which waveform display area (or Window, as numbered from the top) to use for displaying the waveform.

Graticule

Select whether (On) or not (Off) to display a grid in the waveform display area.

Y Scale

Select whether or not to display the upper and lower limit values in the waveform display area (by selecting or clearing the check box).

Ch

Select the check box to select the waveform to be displayed. This is linked with the waveform display/do not display setting in the Wave dialog box (see page 3-26).

Upper, Lower

If the Auto Ranging check box is not selected, set the Upper and Lower limit of the display range.

1. Click the **Upper** or **Lower** column. A combo box opens.
2. Set the upper or lower limit value of the display range.

**Position**

Set the waveform display position in the up/down direction in the waveform display area. With the center of the vertical axis taken to be the zero amplitude line, the upper and lower limits of the window are 100% and -100%, respectively.

1. Click on the **Position** column. A combo box opens.
2. Set the waveform display position in the up/down direction in the waveform display area.

**Color**

Select the waveform display color.

1. Click the **Color** column. A combo box opens.
2. Select the waveform display color.

**Window**

When the waveform display screen is divided, set how many waveform areas (Windows) from the top in which the waveform is to be displayed.

1. Click the **Window** column. A combo box opens.
2. Select the waveform display area.

**VZoom (Vertical Zoom)**

Set the zoom factor for the vertical axis of the waveform.

1. Click the **VZoom** column. A combo box opens.
2. Set the vertical axis zoom factor.

**Setting the X-Axis (Time Axis)**

Set the X-axis in the Wave dialog box that opens when you select **Setting > WT Setting > Wave**.

**Note**

The X-axis (time axis) setting is applied to the WT. If you load the data from the WT after changing the setting, the change is applied to the PC display.

**Starting Downloading of Waveform Display Data****When Connected to the WT1600**

1. Turn ON Wave Sampling on the WT (section 6.2) and load the waveform display data on the WT.
2. Load the waveform display data from the WT by carrying out the procedure described in "Starting Data Acquisition" in section 3.2.

**Note**

WTViewer cannot display the waveform unless the waveform display data is loaded on the WT.

**When Connected to the WT500 or WT3000**

Load the waveform display data from the WT by carrying out the procedure described in "Starting Data Acquisition" in section 3.2.

**Note**

- If you start loading the waveform display data on WTViewer, the WT500 and WT3000 screen automatically switches to Wave. If you close the Wave dialog box on WTViewer and start measurement, the WT screen automatically returns to the original display.
- Waveform can be displayed only when the measurement mode is Normal for the WT3000.

### 3.6 Waveform Display Function

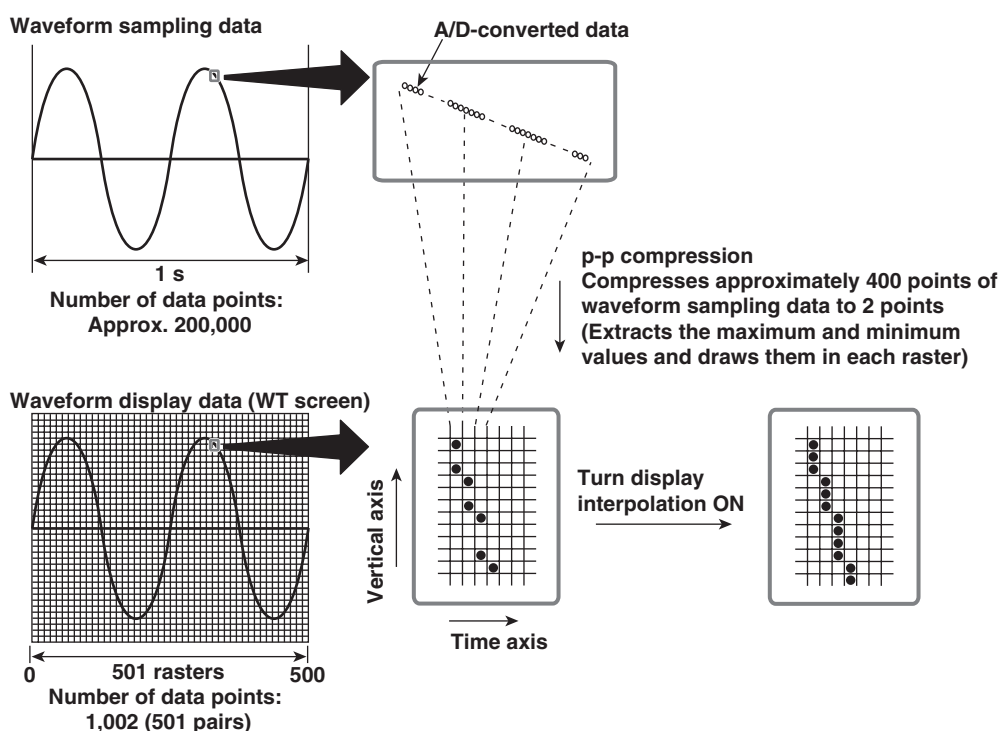
#### Note

##### Displayed Points on the Screen and Waveform Display

The number of data points sampled on the WT (waveform sampling data) and the number of data points displayed on the screen (waveform display data) are different. The number of waveform sampling data is approximately 200,000 points on the WT1600 and WT3000, approximately 100,000 points on the WT500 per second for an input waveform. The number of waveform display data points on the screen is fixed to 1002 due to the construction of the screen. Because the number of waveform sampling data points is normally greater than that of the waveform display data on the screen, the waveform display data\*<sup>1</sup> obtained by P-P compressing\*<sup>2</sup> the waveform sampling data per given segment is displayed on the screen.

\*<sup>1</sup> The original data of the waveform display data (sampling data before P-P compression) can be saved in waveform computation (Math) or FFT mode on the WT3000. The data cannot be displayed or saved on the WT1600.

\*<sup>2</sup> P-P compression is the determination of the maximum and minimum value of sampled data every certain period.



##### When Displaying the Waveform Display Data on the WT Screen

On the WT500, WT1600 and WT3000, the number of display segments in the time axis direction within one screen is 501. By displaying the P-P compressed maximum and minimum values (2 points) of the waveform display data in each segment, the data appears as a waveform. Therefore, the number of data points is 1002.

##### When Displaying the Waveform Display Data on the PC Monitor Using WTViewer

P-P compressed waveform display data is sent from the WT to the PC and the waveforms are displayed on the PC monitor. When displaying waveforms using WTViewer, the number of display segments in the time axis direction within one screen is 1002. By separating out the P-P compressed maximum and minimum values and displaying one point of the waveform display data in each segment, the data appears as a waveform.

As above, since waveform display on the WT's screen differs from the mechanism of waveform display on WTViewer, if you compare both waveforms so that you can see waveform display data point by point, there are times when the waveforms can appear different. Also, since there are cases in which the order in which data is sent to the PC from the WT differs by model, depending on the WT connected, the waveform tracking may appear different even if the same WTViewer were used to display the waveform.

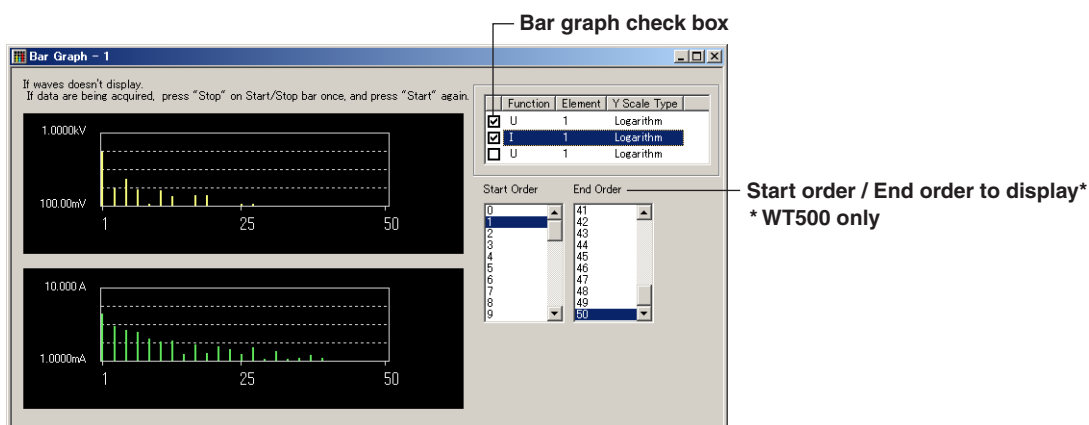
## 3.7 Bar Graph Display Function

### Preparation to Display Bar Graphs

- On the WT3000, set the measurement mode to Normal or Wide-Band Harmonics (see page 2-7).
- In the numeric list<sup>\*1</sup>, select measurement functions, elements, and orders.
  - <sup>\*1</sup> Harmonics list on the WT1600 (see section 3.5)

### Displaying Bar Graphs

Choose **View > Bar Graph** in the menu bar. The Bar Graph dialog box opens.



### Displaying Multiple Bar Graphs

Up to three bar graphs can be displayed.

Select the **Bar Graph check boxes**. A bar graph of the selected measurement functions and elements is displayed.

### Function

Select the measurement function to be displayed.

- Click on the **Function** column. A combo box opens.
- Select the measurement function for each item in this column.

### Element

Select element to be displayed.

- Click the **Element** column. A combo box opens.
- Select the element for each item in this column.

### Start Order / Stop Order(WT500 only)

Select the order of numeric data to display.<sup>\*1</sup>

- Start Order:0 to 40
- Stop Order:10 to 50

<sup>\*1</sup> The difference between the start order and the end order must be greater than or equal to 10.

### 3.7 Bar Graph Display Function

---

#### Changing the Displayed Bar Graph

You can change the Data Number in the harmonics list screen (or the numeric value screen on the WT500 and WT3000) to display the desired number of bar graphs. However, on the WT1600, you must set the downloaded harmonic data in the harmonics list display (see section 3.5) so that the harmonic data of the harmonic measurement and element is acquired that is necessary for displaying the bar graph.

#### **Note**

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- In the case of the WT1600, even if you stop data acquisition and change the measurement function and elements in the bar graph screen, the bar graph of the changed measurement function and elements is not displayed. Start data acquisition only after you have set up the measurement functions and elements you wish to display in the harmonics list display screen ahead of time.
  - In the case of the WT500 and WT3000, if you do not stop data acquisition, you cannot change the measurement functions and elements displayed in the bar graph screen.
  - The bar graph screen can be displayed only in Normal or Wide-Band Harmonics mode on the WT3000.
  - Up to three bar graph screens can be displayed. The bar graph display colors are displayed on the PC screen according to the default color settings on the WT.
- 

#### Starting Download of Harmonic Data

By carrying out the procedure described in “Starting Data Acquisition” in section 3.2, the data is loaded from the WT.

#### **Note**

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- On the WT1600, if harmonic data is not downloaded from the WT to WTViewer, no bar graphs are displayed even if the bar graph screen is opened.
  - There are setting items that cannot be changed while data is being downloaded.
-

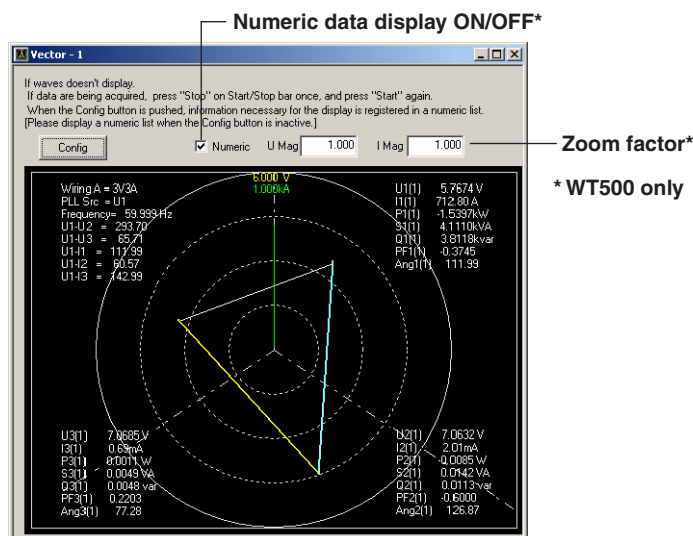
## 3.8 Vector Display Function

### Preparation to Display Vector

- On the WT3000, set the measurement mode to Normal or Wide-Band Harmonics (see page 2-7).
  - In the numeric list<sup>\*1</sup>, select measurement functions, elements, and orders.
- <sup>\*1</sup> Harmonics list on the WT1600 (see section 3.5)

### Displaying the Vector

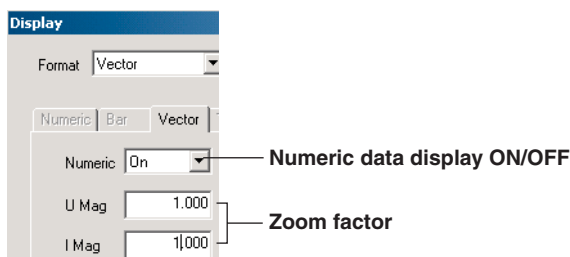
Choose **View > Vector** in the menu bar. Only one vector window can be displayed. The displayed contents are the same as the vector display on the WT main unit screen.



### Setting the Vector Zoom Factor and Turning ON/OFF Numeric Data Display on the WT1600 and WT3000

You can set the vector zoom factor and turn numeric data display in the WT vector screen ON and OFF\* by choosing **Setting > WT Setting > Display**, and editing the Display dialog box.

- \* The ON/OFF setting for the numeric data display on the WT is only reflected in the screen display of the WT. It does not apply to the PC display.



### Changing the Displayed Vector

You can change the Data Number in the harmonics list screen (or the numeric value screen on the WT500 and WT3000), to display the desired number of vectors. However, you must set the downloaded harmonic data (or numeric data on the WT500 and WT3000) in the harmonics list display on the WT1600 (see section 3.5) or the numeric value display (see section 3.3) on the WT500 and WT3000 so that the harmonic data of the harmonic measurement function and element is acquired that is necessary for displaying the vectors.

### 3.8 Vector Display Function

#### Vector Display Colors

The vector display colors are displayed on the PC screen according to the default color settings on the WT.

#### Starting Harmonic Data Acquisition

On the harmonics list display of the WT1600 (see section 3.5), or the numeric value display of the WT500 and WT3000 (see section 3.3), start data acquisition (see section 3.2) after setting up the harmonic measurement functions and elements in advance.

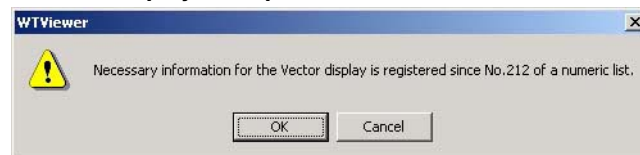
#### Note

- If harmonic data is not downloaded from the WT to WTViewer, no vector data are displayed in the vector screen.
- The vector screen can be displayed only in Normal or Wide-Band Harmonics mode on the WT3000.
- There are setting items that cannot be changed while data is being downloaded.

#### Registering the Information Required for Vector Display (Vector Display Data) in the Numeric List

1. Click Config. A message asking you to confirm the operation appears.

##### WT3000 Display Example



2. Click OK.

In the case of the WT3000, data required for vector display (vector display data) means the following 39<sup>\*1</sup> measured data.

- Measured values of the fundamental components U, I, P, S, Q, PF, and Phi of elements 1 to 4<sup>\*2</sup>.
- $\Sigma A$  and  $\Sigma B^{*3}$  of  $\Phi i U i\_U j, \Phi i U i\_U k, \Phi i U i\_I i, \Phi i U i\_I j,$  and  $\Phi i U i\_I k$
- FreqU of element 1

For the WT1600:	For the WT500:
*1.: 58	*1.: 27
*2.: Elements 1 to 6	*2.: Elements 1 to 3
*3.: $\Sigma A$ , $\Sigma B$ , and $\Sigma C$	*3.: $\Sigma A$

This is explained using the WT3000 as an example.

The number of measured data that can be acquired in one communication with the WT is 250. Therefore, if 212 or more data are acquired from the WT, a portion of the vector display data is lacking, and there are times when vectors cannot be displayed or numeric data on the vector display reads -----.

For example, if harmonic data of orders 1 to 30 are acquired from the WT for U and I on elements 1 to 4, 240 data total are acquired.

In this case, the vector display data is incomplete, and vectors cannot be displayed.

You can use this function in such cases where you wish to give precedence to vector display even if a portion of the harmonic data is lacking.

If the function is used, vector display data is acquired as the 212th through 250th of the measured data acquired from the WT.

In the above example, vector display data is acquired from the WT in place of orders 3-30 of harmonic data for I on element 4.

On the WT1600, vector display data is acquired for number 193 and after on the numeric list. On the WT500, vector display data is acquired for number 224 and after on the numeric list.



## 3.9 Trend Display Function

### Preparation to Display Trend

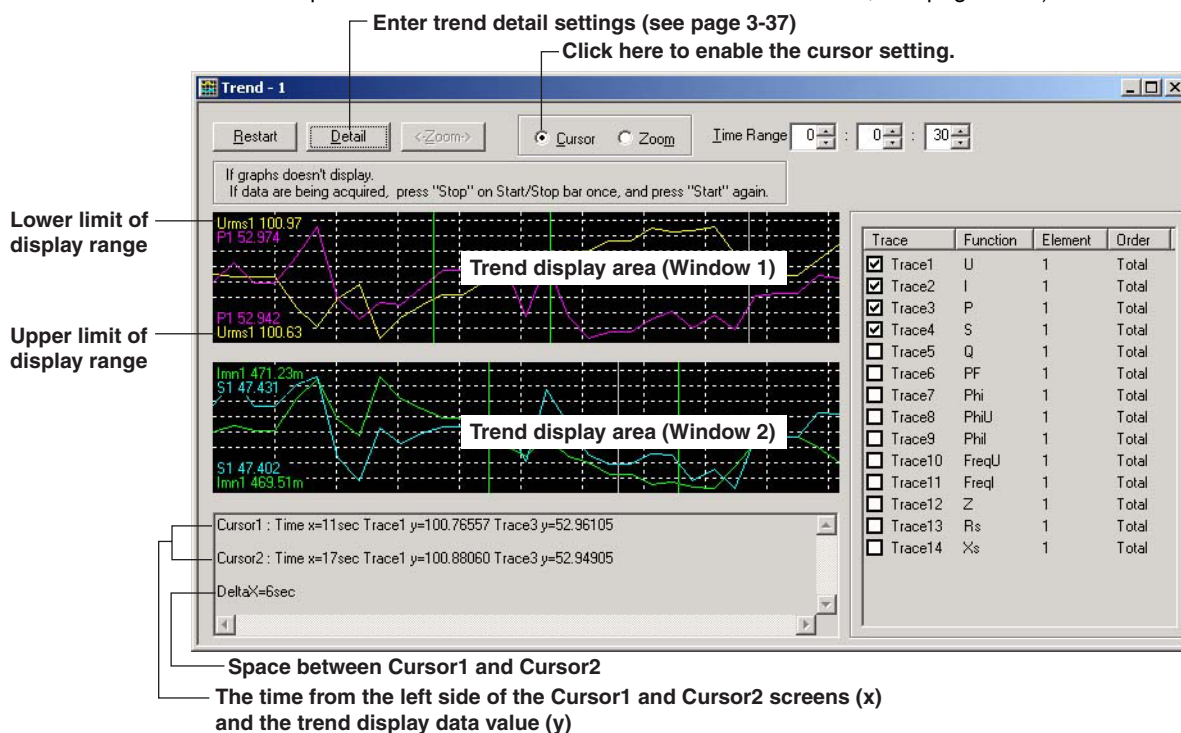
- On the WT3000, set the measurement mode to Normal Mode(see page 2-7).
  - In the numeric list<sup>\*1</sup>, select measurement functions, elements, and orders.
- <sup>\*1</sup> Harmonics list on the WT1600 Harmonic Measurement mode (see section 3.5)

### Displaying Trends

Choose **View > Trend** in the menu bar. The Trend dialog box opens.

### Cursor Setting Screen

Example with two windows. To set the number of windows, see page 3-37.)



### Note

- If you change the size of the trend screen during trend display, the size of the trend display area also changes.
- The data updating of the trend display is fixed to 1 second regardless of the Updaterate setting in the numeric value screen. For example, if Updaterate is set to 2 seconds in the numeric value screen, the same data is plotted twice in the trend display.
- If the Time Range setting in the trend display is large, measured values are P-P compressed for plotting in trends, so the size changes may not be able to be accurately displayed.

### Restart

If you start downloading trend display data (see page 3-38) and then click here, the trend display is restarted. Previous trends will be deleted.

### Time Range

Set the time width of the trend display area. If the trend exceeds the specified time range, new data will overwrite old data in the trend display.

### 3.9 Trend Display Function

- **Trace**

Select the check box to select the waveform to be displayed. These are linked to Trace in the Trend Detail dialog box (see page 3-37).

- **Cursor**

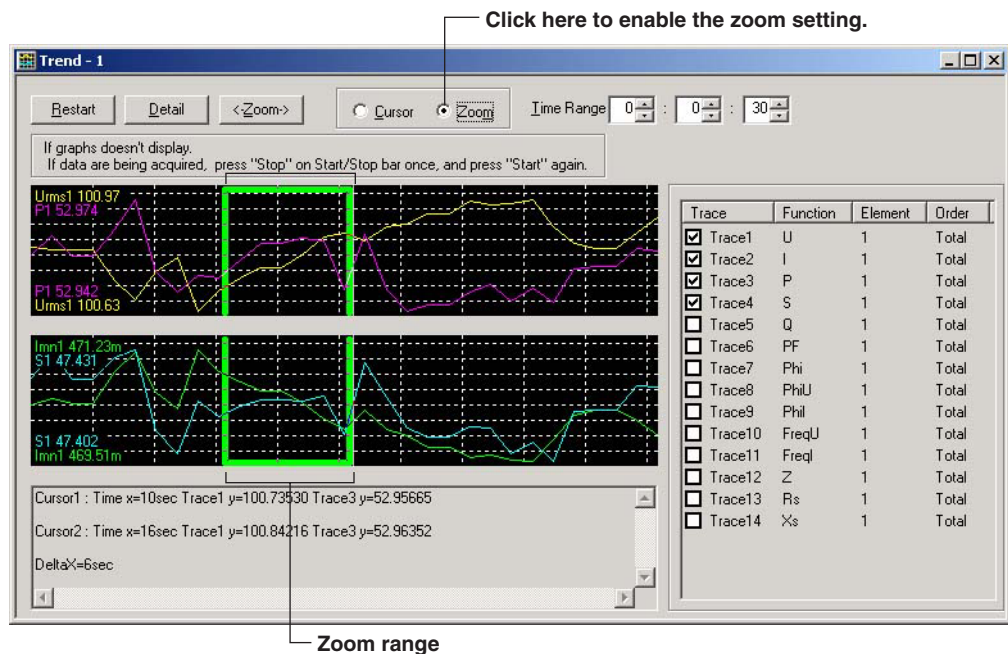
Click here to set Cursor1 and Cursor2 in the trend display area.

- **Cursor1, Cursor2**

You can set the position of cursors on trends.

- The line that appears when you first click on the desired trend is Cursor1.
- The line that appears the next time you click is Cursor2. The position of Cursor2 can be changed any number of times.
- To change the position of Cursor1, double-click in the trend display area, delete cursors 1 and 2, and set new cursors.
- In the bottom of the trend display area, the time from the left side of the Cursor1 and Cursor2 screens (x) and the trend display data value (y) are displayed.

#### Zoom Area Setting Screen



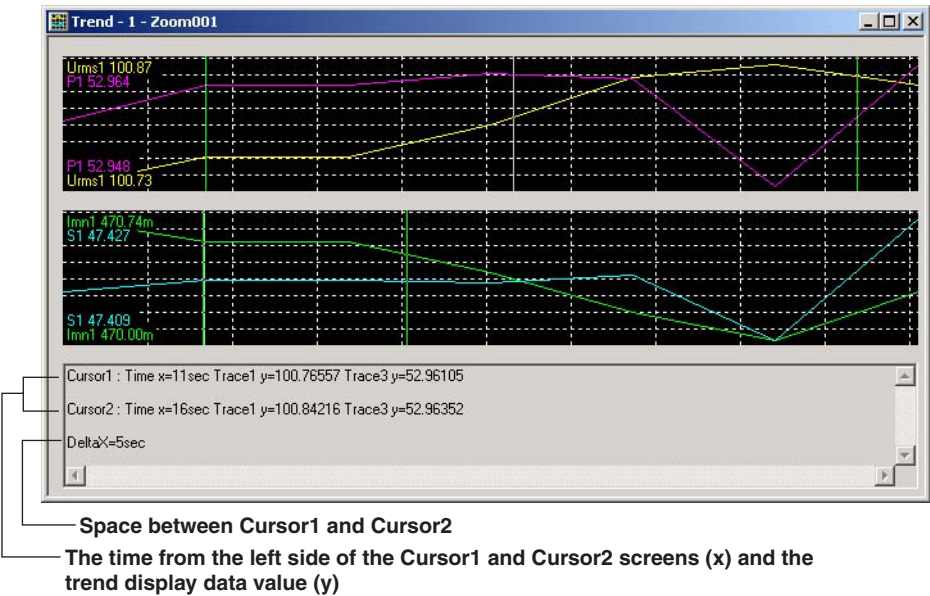
- **Zoom (Time Axis Direction)**

If you select this, you can set the time axis zoom range in the trend display area.

1. Drag the area to zoom in the trend display area. The zoomed range is set simultaneously in all of the displayed trend display areas.
2. Click <-Zoom>. A screen appears in which all trends in the trend display area are zoomed.

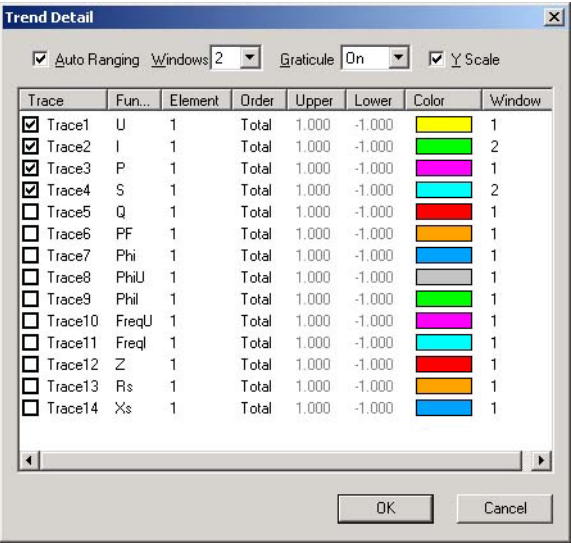
You can set Cursor1 and Cursor2 on these zoomed trends. For the procedure, see the previous page.

Zoom Screen



Entering Trend Graph Detail Settings

Click **Detail** in the Trend dialog box. The Trend Detail dialog box is displayed.



Auto Ranging

- **When the Auto Ranging Check Box is Selected**  
Trends are automatically switched according to the downloaded values.
- **When the Auto Ranging Check Box is Not Selected**  
If you click the Upper or Lower column, a combo box is displayed. You can set the Upper limit and Lower limit of the display range for each trend (trace).

Windows

Set the number of waveform display windows between 1 and 6. If two or more windows are specified and you click the Window column to display the combo box, you can specify which trend display area (or Window, as numbered from the top) to use for displaying the trend.

Graticule

Select whether (**On**) or not (**Off**) to display a grid in the trend display area.

### 3.9 Trend Display Function

---

#### **Y Scale**

Select whether or not to display the upper and lower limit values in the trend display area (by selecting or clearing the check box).

#### **Trace**

Select the check box to select the trend to be displayed. These are linked to Trace in the Trend dialog box (see page 3-35).

#### **Function**

Select the measurement function to be displayed.

1. Click on the **Function** column. A combo box opens.
2. Select the measurement function for each item in this column.

#### **Element**

Select element to be displayed.

1. Click the **Element** column. A combo box opens.
2. Select the element for each item in this column.

#### **Order**

Select the order of harmonic data to display.

1. Click the **Order** column. A combo box opens.
2. Select an order.

#### **Upper, Lower**

If the Auto Ranging check box is not selected, set the Upper and Lower limit of the display range.

1. Click the **Upper** or **Lower** column. A combo box opens.
2. Set the upper or lower limit value of the display range.

#### **Color**

Select the trend display color.

1. Click the **Color** column. A combo box opens.
2. Select the trend display color.

#### **Window**

When the trend screen is divided, set how many waveform areas (Windows) from the top in which the waveform is to be displayed.

1. Click the **Window** column. A combo box opens.
2. Select the trend display area.

#### **Starting Download of Trend Display Data**

Numeric data is downloaded from the WT to WTViewer, and that P-P compressed trend display data is displayed in the trend screen. Start data download (see section 3.2). There are setting items that cannot be changed while data is being downloaded.

#### **Note**

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The trend screen can only be displayed in Normal mode on the WT3000.

---

## 3.10 Displaying the Computed Waveform (Math Waveform) (WT3000 Only)

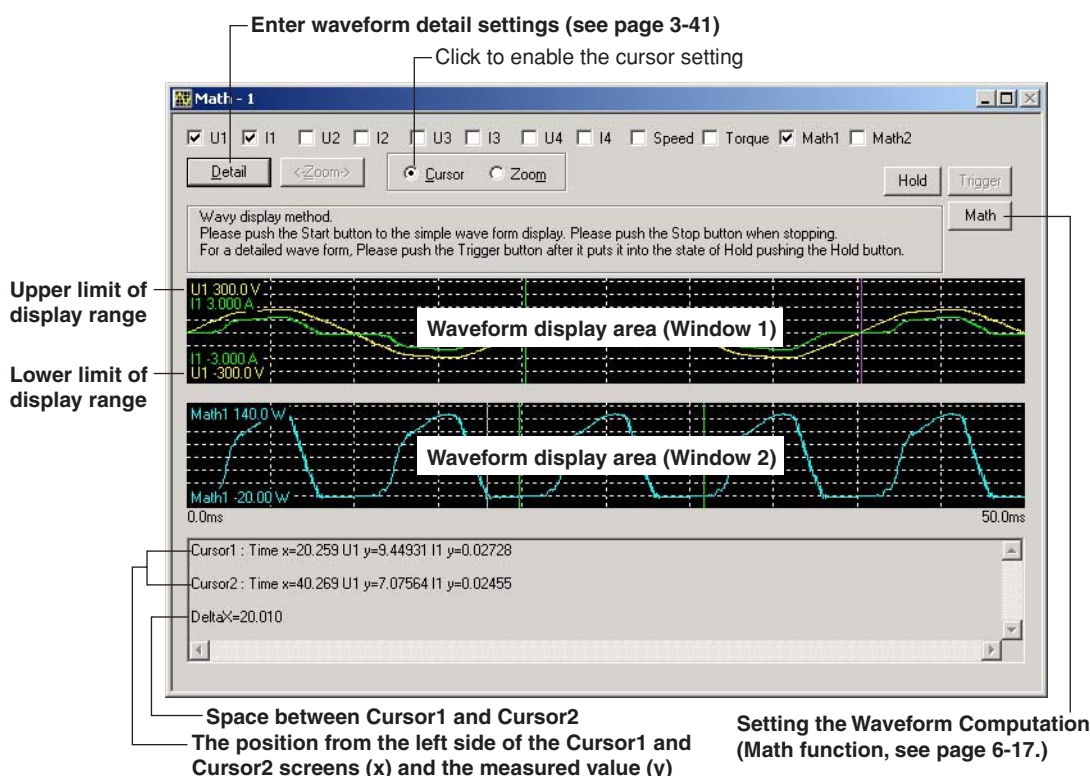
The functions explained in this section can be used when the advanced computation function (/G6 option) is installed in the WT3000.

### Displaying the Computed Waveforms

Set the measurement mode to Math by carrying out the procedure given in “Changing the Measurement Mode” on page 2-7. The computed waveform (Math) screen appears.

### Cursor Setting Screen

(Example with two windows. To set the number of windows, see page 3-41.)



- **U1 to I4, Math1, and Math2**

(On the motor version of the WT3000, Speed and Torque are displayed.)

Select the waveforms you wish to display (select or clear the check boxes). This is linked to the Ch from the Wave Detail dialog box (see page 3-41).

- **Cursor**

Click here to set Cursor1 and Cursor2 in the waveform display area.

#### Cursor1, Cursor2

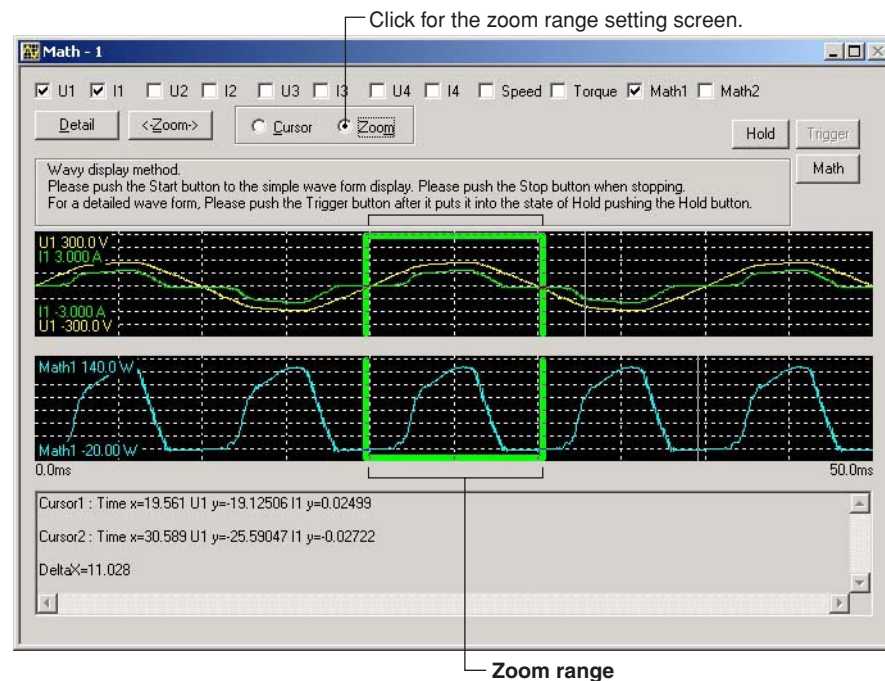
You can set the position of cursors on waveforms.

- The line that appears when you first click on the desired waveform is Cursor1.
- The line that appears the next time you click is Cursor2. The position of Cursor2 can be changed any number of times.
- To change the position of Cursor1, double-click in the waveform display area, delete cursors 1 and 2, and set new cursors.
- In the bottom of the waveform display area, the position from the left side of the Cursor1 and Cursor2 screens (x) and the measured value (y) are displayed.



### 3.10 Displaying the Computed Waveform (Math Waveform) (WT3000 Only)

#### Zoom Area Setting Screen

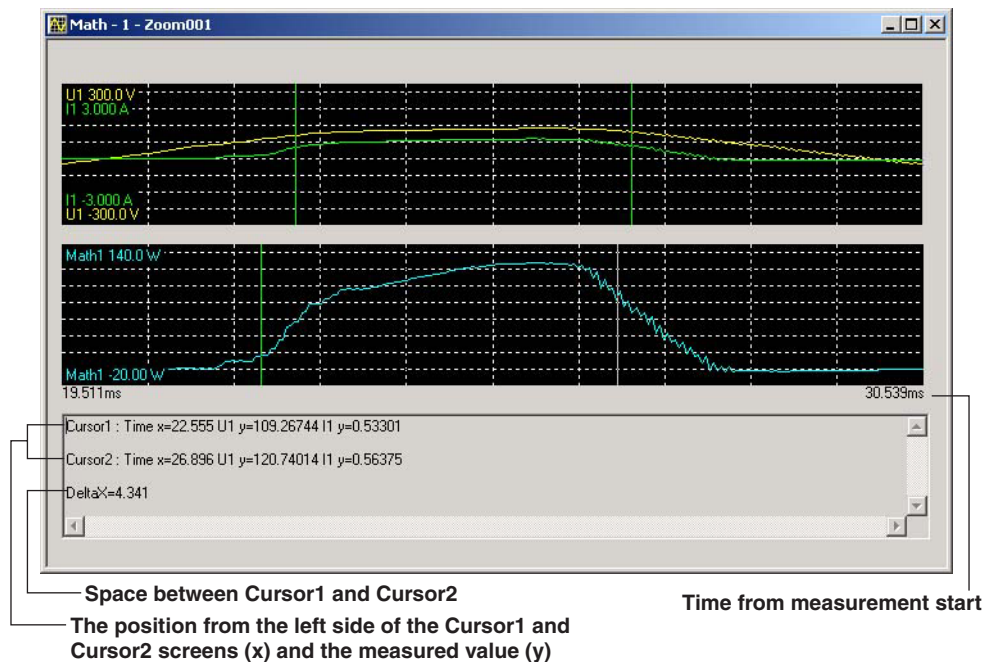


- **Zoom (Time Axis Direction)**

Click here to set the time axis zoom range in the waveform display area.

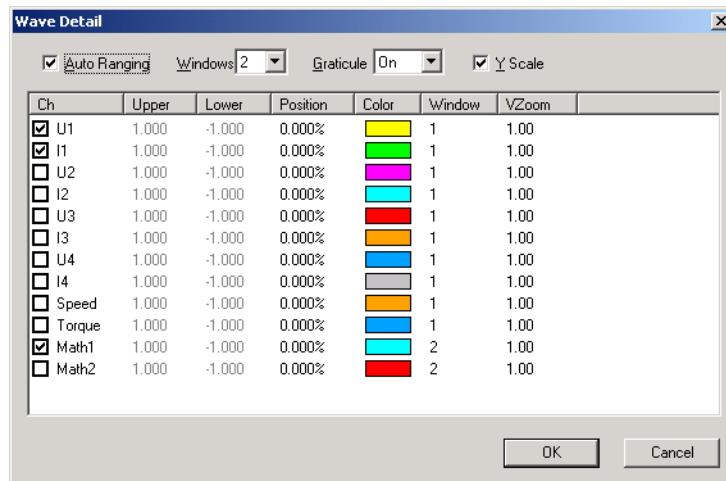
1. Drag the area to zoom in the waveform display area. The zoomed range is set simultaneously in all of the displayed waveform display areas.
2. Click **<-Zoom->**. A screen appears in which all waveforms in the waveform display area are zoomed.

You can set Cursor1 and Cursor2 on these zoomed waveforms. For the procedure, see the previous page.



### Entering Math Waveform Detail Settings

Click **Detail** in the Math dialog box. A Wave Detail dialog box opens.



#### Auto Ranging

- **When the Auto Ranging Check Box Is Selected**

Displayed in the same display range as the WT settings.

- **When the Auto Ranging Check Box Is Not Selected**

If you click the Upper or Lower column, a combo box is displayed. You can set the Upper limit and Lower limit of the display range for each channel.

#### Windows

Select the number of displayed waveform windows between 1 and 6. If two or more windows are specified and you click the Window column to display the combo box, you can specify which waveform display area (or Window, as numbered from the top) to use for displaying the waveform.

#### Graticule

Select whether (**On**) or not (**Off**) to display a grid in the waveform display area.

#### Y Scale

Select whether or not to display the upper and lower limit values in the waveform display area (by selecting or clearing the check box).

#### Ch

Select the waveforms you wish to display (select or clear the check boxes). This is linked with the waveform display/do not display setting in the Math dialog box (see page 3-39).

#### Upper, Lower

If the Auto Ranging check box is not selected, set the Upper and Lower limit of the display range.

1. Click the **Upper** or **Lower** column. A combo box opens.
2. Set the upper or lower limit value of the display range.

#### Position

Set the waveform display position in the up/down direction in the waveform display area. With the center of the vertical axis taken to be the zero amplitude line, the upper and lower limits of the window are 100% and -100%, respectively.

1. Click on the **Position** column. A combo box opens.
2. Set the waveform display position in the up/down direction in the waveform display area.

### 3.10 Displaying the Computed Waveform (Math Waveform) (WT3000 Only)

---

#### Color

Select the waveform display color.

1. Click on the **Color** column. A combo box opens.
2. Select the waveform display color.

#### Window

When the waveform display screen is divided, set how many waveform areas (Windows) from the top in which the waveform is to be displayed.

1. Click on the **Window** column. A combo box opens.
2. Select the waveform display area.

#### VZoom (Vertical Zoom)

Set the zoom factor for the vertical axis of the waveform.

1. Click on the **VZoom** column. A combo box opens.
2. Set the vertical zoom factor.

#### Setting the X-Axis (Time Axis)

Set the X-axis (time axis) depending on the type of displayed data.

- **When Displaying the Waveform Sampling Data**

The X-axis (time axis) is set to the display update rate on the WT. Set the value in the Update/Wiring/Averaging dialog box that opens by choosing **Setting > WT Setting > Update/Wiring/Averaging**.

- **When Displaying the Waveform Display Data**

Set the X-axis in the Wave dialog box that opens by choosing **Setting > WT Setting > Wave**.

#### Setting the Equation, Scale, Unit, and Label of Computed Waveforms

Set the values in the Math dialog box that opens by choosing **Setting > WT Setting > Math**.

#### Note

---

- The settings of the X-axis (time axis) and the equation, scale, unit, and label of waveforms are applied to the WT. If you load the data from the WT after changing the setting, the change is applied to the display on the PC.
  - The display scale of the computed waveform may not be stable if you select auto scaling in the cases described below. In such case, use manual scaling.
    - The amplitude of the input signal used in the waveform equation is not stable.
    - The amplitude of the computed waveform is near the threshold level used to switch the scaling setting.
- 

#### Starting Downloading of Waveform Display Data

The following two types of data related to waveforms are available in waveform computation (Math) mode.

##### Waveform Sampling Data

Data acquired at the WT3000's sample rate (approximately 200 kS/s).

##### Waveform Display Data

Waveform sampling data that has been P-P compressed (see the note on page 3-30) to a set of 1002 data points for displaying the waveform on the WT screen.

If you do not load either of the data above from the WT into WTVIEWER, the waveform is not displayed even if the measurement mode is set to waveform computation (Math) mode.



### Loading the Waveform Sampling Data

1. Click **Hold** to set the WT in the hold condition.
2. Click **Trigger**.

If you click Trigger, the WT measures once and returns to the hold condition. The waveform sampling data that the WT acquired with this measurement is loaded into the PC.

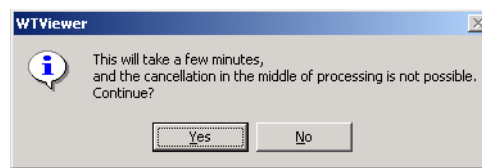
- **When the Data Update Rate Is Less Than or Equal to 250 ms**

The waveform sampling data is transmitted from the WT to the PC and displayed on the PC screen. Proceed to step 4.

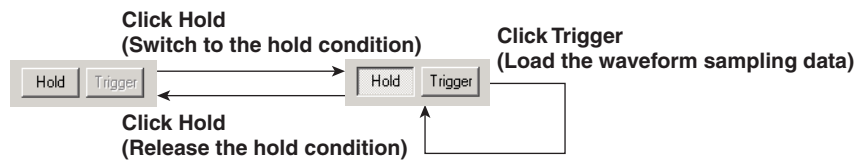
- **When the Data Update Rate Is Greater Than or Equal to 500 ms**

A message asking you to confirm the data loading operation appears. Proceed to step 3.

3. Click **Yes**. The waveform sampling data is transmitted from the WT to the PC and displayed on the PC screen.



4. To repeat the loading of the waveform sampling data, return to step 2. To release the hold condition, click Hold.



### Loading the Waveform Display Data

Carry out the procedure described in “Starting Data Acquisition” in section 3.2 to load the waveform display data.

#### Note

- The waveform sampling data and waveform display data cannot be loaded simultaneously.
- If you click Hold and the WT is in the hold condition, you cannot load the waveform display data by clicking Start. Release the hold condition, and then click Start.
  - If the waveform display data is being loaded by clicking Start, you cannot click Hold. Click Stop to stop the loading of the waveform display data, and then click Hold.
- Because the number of waveform sampling data points is greater than that of waveform display data points, it takes a long time to load the data from the WT. For details on the number of data points, see section 9.3 in the WT3000 User's Manual. The number of data points is large in the following cases.
  - The number of waveforms that is loaded and displayed on the PC is large.
  - The data update rate is long.
- If the waveform sampling data is displayed, the size of the computed waveform (Math) screen cannot be changed.
- It may take a long time to display the zoom screen if you click the Zoom button and any of the following cases apply when the waveform sampling data is displayed.
  - The data update rate is long.
  - The zoom range is wide.

To view the details of the waveform sampling data quickly in the case above, save the data to a file in CSV format according to the procedure in section 5.2, and draw the waveform on another application such as Excel.

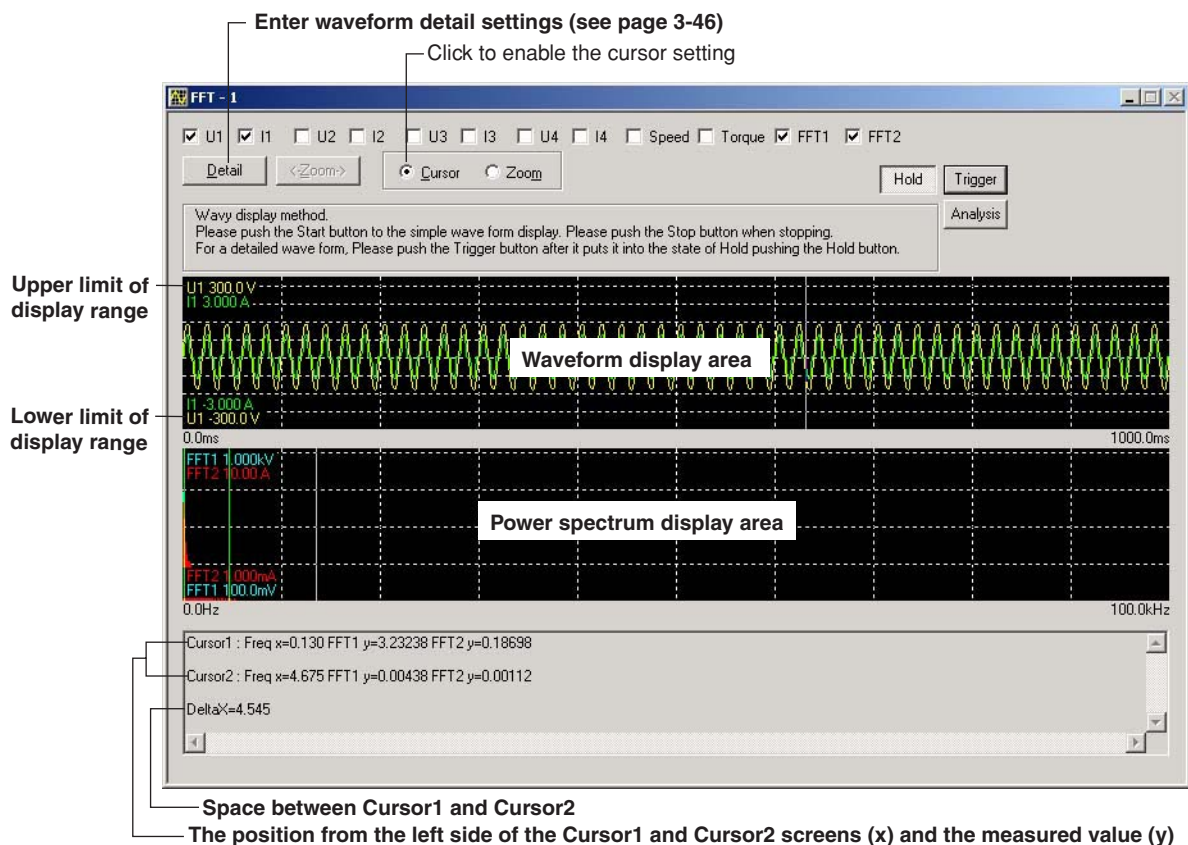
## 3.11 Displaying the FFT (Power Spectrum Waveform) (WT3000 Only)

The functions explained in this section can be used when the advanced computation function (/G6 option) is installed in the WT3000.

### Displaying the Power Spectrum Waveform

Set the measurement mode to FFT by carrying out the procedure given in “Changing the Measurement Mode” on page 2-7. The input waveform and FFT waveform (power spectrum) are displayed on two windows.

#### Cursor Setting Screen



- **U1 to I4, FFT1, and FFT2**

(On the motor version of the WT3000, Speed and Torque are displayed.)

Select the waveforms you wish to display (select or clear the check boxes). This is linked to the Ch from the Wave Detail dialog box (see page 3-46).

- **Cursor**

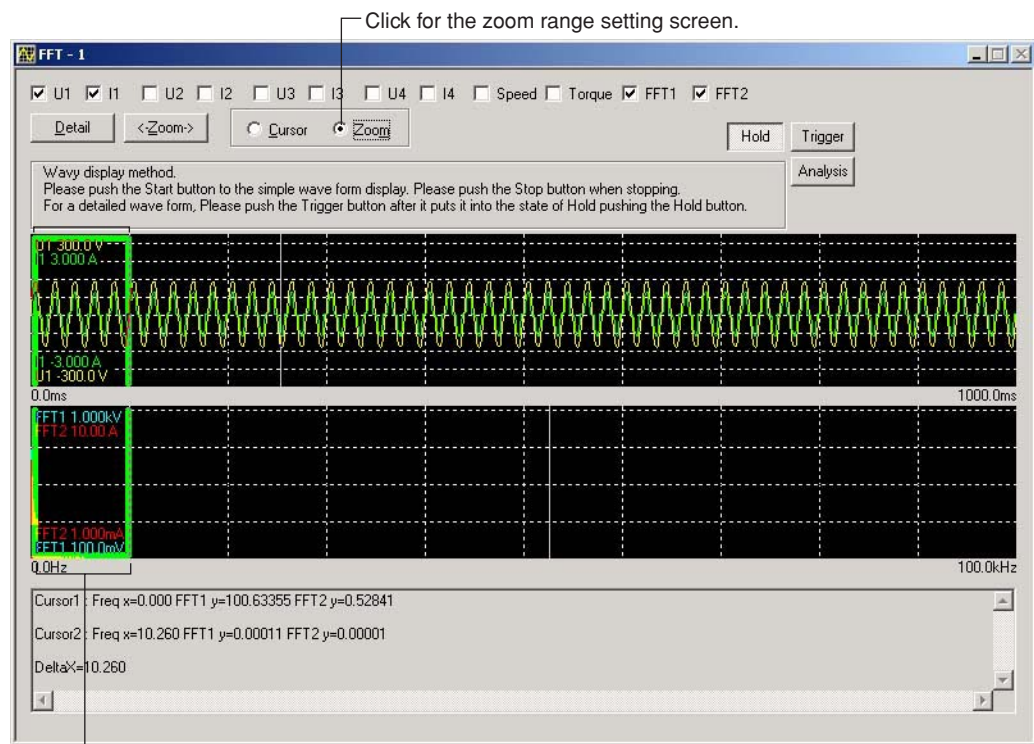
Click here to set Cursor1 and Cursor2 in the waveform display area.

#### Cursor1, Cursor2

You can set the position of cursors on waveforms.

- The line that appears when you first click on the desired waveform is Cursor1.
- The line that appears the next time you click is Cursor2. The position of Cursor2 can be changed any number of times.
- To change the position of Cursor1, double-click in the waveform display area, delete cursors 1 and 2, and set new cursors.
- In the bottom of the waveform display area, the position from the left side of the Cursor1 and Cursor2 screens (x) and the measured value (y) are displayed.

### Zoom Area Setting Screen



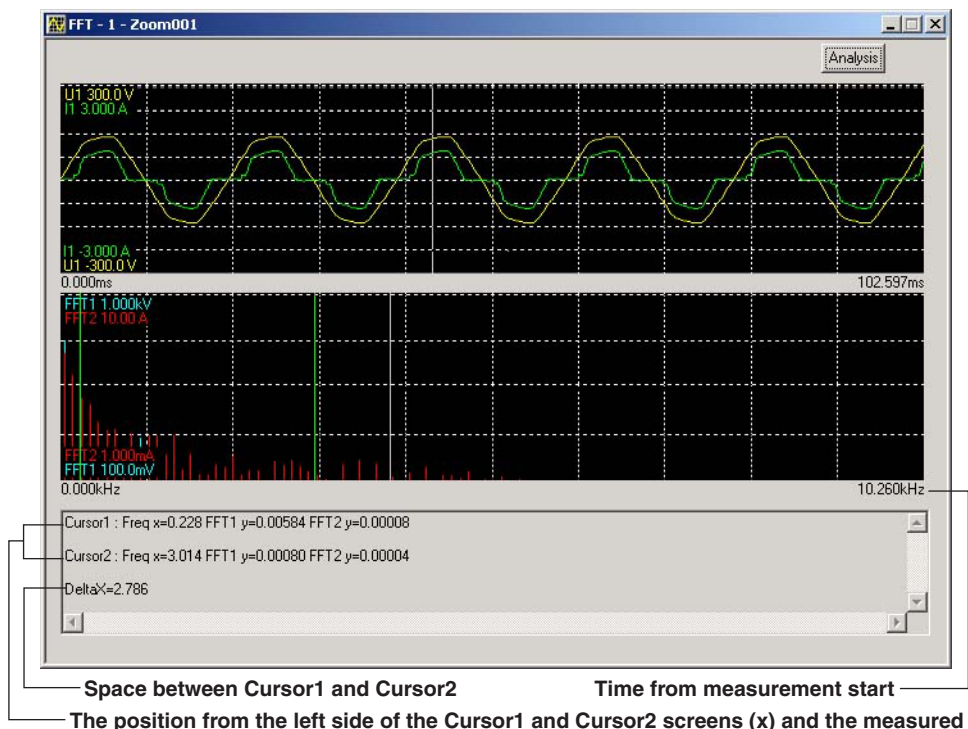
#### Zoom range

#### • Zoom (Time Axis Direction)

Click here to set the time axis zoom range in the waveform display area.

1. Drag the area to zoom in the waveform display area. The zoomed range is set simultaneously in all of the displayed waveform display areas.
2. Click **<-Zoom->**. A screen appears in which all waveforms in the waveform display area are zoomed.

You can set Cursor1 and Cursor2 on these zoomed waveforms. For the procedure, see the previous page.



### 3.11 Displaying the FFT (Power Spectrum Waveform) (WT3000 Only)

#### Entering Power Spectrum Waveform Detail Settings

Click **Detail** in the FFT dialog box. A Wave Detail dialog box opens.

The Wave Detail dialog box contains the following settings:

- ☒ Auto Ranging
- Windows: 2
- Graticule: On
- ☒ Y Scale

Ch	Upper	Lower	Position	Color	Window	VZoom	YScaleType
<input checked="" type="checkbox"/> U1	1.000	-1.000	0.000%	Yellow	1	1.00	
<input checked="" type="checkbox"/> I1	1.000	-1.000	0.000%	Green	1	1.00	
<input type="checkbox"/> U2	1.000	-1.000	0.000%	Magenta	1	1.00	
<input type="checkbox"/> I2	1.000	-1.000	0.000%	Cyan	1	1.00	
<input type="checkbox"/> U3	1.000	-1.000	0.000%	Red	1	1.00	
<input type="checkbox"/> I3	1.000	-1.000	0.000%	Orange	1	1.00	
<input type="checkbox"/> U4	1.000	-1.000	0.000%	Blue	1	1.00	
<input type="checkbox"/> I4	1.000	-1.000	0.000%	Grey	1	1.00	
<input type="checkbox"/> Speed	1.000	-1.000	0.000%	Orange	1	1.00	
<input type="checkbox"/> Torque	1.000	-1.000	0.000%	Blue	1	1.00	
<input checked="" type="checkbox"/> FFT1	1.000	-1.000		Cyan	2		Log
<input checked="" type="checkbox"/> FFT2	1.000	-1.000		Red	2		Log

Buttons: OK, Cancel

#### Auto Ranging

- **When the Auto Ranging Check Box Is Selected**  
Displayed in the same display range as the WT settings.
- **When the Auto Ranging Check Box Is Not Selected**  
If you click the Upper or Lower column, a combo box is displayed. You can set the Upper limit and Lower limit of the display range for each channel.

#### Windows

The number of windows is fixed to 2. It cannot be changed.

#### Graticule

Select whether (**On**) or not (**Off**) to display a grid in the waveform display area.

#### Y Scale

Select whether or not to display the upper and lower limit values in the waveform display area (by selecting or clearing the check box).

#### Ch

Select the waveforms you wish to display (select or clear the check boxes). This is linked with the waveform display/do not display setting in the FFT dialog box (see page 3-44).

#### Upper, Lower

If the Auto Ranging check box is not selected, set the upper and lower limit of the display range.

1. Click the **Upper** or **Lower** column. A combo box opens.
2. Set the upper or lower limit value of the display range.

### 3.11 Displaying the FFT (Power Spectrum Waveform) (WT3000 Only)

#### Position

Set the waveform display position in the up/down direction in the waveform display area. With the center of the vertical axis taken to be the zero amplitude line, the upper and lower limits of the window are 100% and –100%, respectively.

1. Click on the **Position** column. A combo box opens.
2. Set the waveform display position in the up/down direction in the waveform display area.

You cannot set the positions of power spectrum FFT1 and FFT2.

#### Color

Select the waveform display color.

1. Click on the **Color** column. A combo box opens.
2. Select the waveform display color.

#### Window

The mapping of the waveform display is as shown below. It cannot be changed.

Ch	Window
U1 to I4, Torque, and Speed	1
FFT1 and FFT2	2

#### VZoom (Vertical Zoom)

Set the zoom factor for the vertical axis of the waveform.

1. Click on the **VZoom** column. A combo box opens.
2. Set the vertical zoom factor.

You cannot set the VZoom value of power spectrum FFT1 and FFT2.

#### YScale Type

Set the type of Y-axis scale of power spectrum FFT1 and FFT2.

1. Click on the **YScale Type** column. A combo box opens.
2. Select **Log** (logarithmic) or **Lin** (linear).

YScale Type of the input waveform (U1 to I4, Torque, and Speed) is fixed to Lin (linear).

#### Setting the FFT Source and Label

Set the FFT source and label in the FFT dialog box that opens by choosing **Setting > WT Setting > FFT**.

#### Setting the Number of FFT Points and Time Window

Set the number of FFT points and time window in the FFT dialog box that opens by choosing **Setting > WT Setting > Display > FFT**.

#### Note

- The FFT source, label, the number of FFT points, and time window settings are applied to the WT. If you load the data from the WT after changing the settings, the change is applied to the display on the PC.
- The X-axis (time axis) display range of the waveform screen on the PC screen is as follows:
  - When the number of FFT points is 20 k: 100 ms
  - When the number of FFT points is 200 k: 1000 ms
- The X-axis (frequency) display range of the FFT (power spectrum waveform) screen on the PC screen is fixed to 0 kHz to 100 kHz. If you wish to view the details of the power spectrum waveform, use the zoom function.

#### Starting Downloading of Waveform Display Data

Two types of data related to the input waveforms (U1 to I4) are available in FFT mode as shown below. The data related to the power spectrum waveform is handled as waveform sampling data.

##### Waveform Sampling Data

Data acquired at the WT3000's sample rate (approximately 200 kS/s).

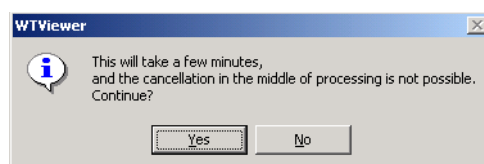
##### Waveform Display Data

Waveform sampling data that has been P-P compressed (see the note on page 3-30) to a set of 1002 data points for displaying the waveform on the WT screen.

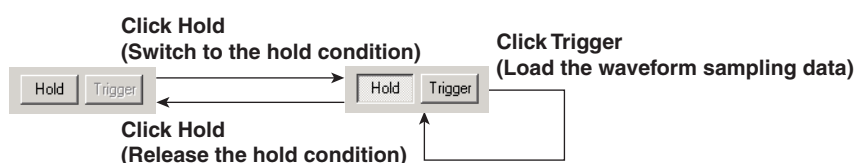
If you do not load either of the data above from the WT into WTViewer, the waveform is not displayed even if the measurement mode is set to FFT mode.

#### Loading the Waveform Sampling Data

1. Click **Hold** to set the WT in hold condition.
  2. Click **Trigger**.  
If you click Trigger, the WT measures once and returns to the hold condition. The waveform sampling data that the WT acquired with this measurement is loaded into the PC.
- **When the Number of FFT Points Is 20 k**  
The waveform sampling data is transmitted from the WT to the PC and displayed on the PC screen. Proceed to step 4.
  - **When the Number of FFT Points Is 200 k**  
A message asking you to confirm the data loading operation appears. Proceed to step 3.
3. Click **Yes**. The waveform sampling data is transmitted from the WT to the PC and displayed on the PC screen.



4. To repeat the loading of the waveform sampling data, return to step 2. To release the hold condition, click Hold.



#### Loading the Waveform Display Data

Carry out the procedure described in “Starting Data Acquisition” in section 3.2 to load the waveform display data. Because the power spectrum waveform data is considered waveform sampling data, the data is not displayed when you carry out this procedure.

#### Note

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- The waveform sampling data and waveform display data cannot be loaded simultaneously.
  - If you click Hold and the WT is in the hold condition, you cannot load the waveform display data by clicking Start. Release the hold condition, and then click Start.
  - If the waveform display data is being loaded by clicking Start, you cannot click Hold. Click Stop to stop the loading of the waveform display data, and then click Hold.
- Because the number of waveform sampling data points is greater than that of waveform display data points, it takes a long time to load the data from the WT. For details on the number of data points, see section 9.3 in the WT3000 User's Manual.
- If the waveform sampling data is displayed, the size of the FFT screen cannot be changed.
- It may take a long time to display the zoom screen if you click the Zoom button and any of the following cases apply when the waveform sampling data is displayed.
  - The data update rate is long.
  - The zoom range is wide.

To view the details of the waveform sampling data quickly in the case above, save the data to a file in CSV format according to the procedure in section 5.2, and draw the waveform on another application such as Excel.

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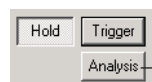


### 3.11 Displaying the FFT (Power Spectrum Waveform) (WT3000 Only)

#### Displaying or Saving the List of Peak Values of the Power Spectrum Waveform

You can display or save the list of peak values of the power spectrum waveform that has been acquired through steps 1 to 3 on page 3-48.

Click Analysis to open the Analysis dialog box. The peak values are listed in descending order by THD value. A cursor (a line highlighted in blue) is displayed in the list. A white cursor is also displayed on the power spectrum waveform. This cursor is linked to the cursor in the list.



Click

Tab for the FFT data list

No	Freq[Hz]	Measure	THD[%]
Total		101.561234	100.00
1	50	101.481529	99.92
2	250	3.296794	3.25
3	150	1.361137	1.34
4	350	1.250405	1.23
5	550	0.899704	0.89
6	850	0.575608	0.57
7	950	0.509528	0.50
8	650	0.365068	0.36
9	450	0.303234	0.30
10	60	0.221587	0.22
11	40	0.199327	0.20
12	750	0.152526	0.15
13	1350	0.135215	0.13
14	70	0.128883	0.13
15	1250	0.110577	0.11
16	1550	0.101127	0.10
17	1150	0.091917	0.09
18	1050	0.085825	0.08
19	80	0.081827	0.08
20	30	0.080520	0.08
21	1750	0.076587	0.08

Cursor

Slider  
Drag the slider to move the cursor.

Scroll bar  
Drag the scroll bar to scroll the list display.  
The cursor does not move.

Move by specifying the cursor position

Save the list display data.

Set the number of peaks to be listed in the range of 1 to 1000

Select this check box to set the minimum displayed value of the THD in the range of 0.01 to 100%.

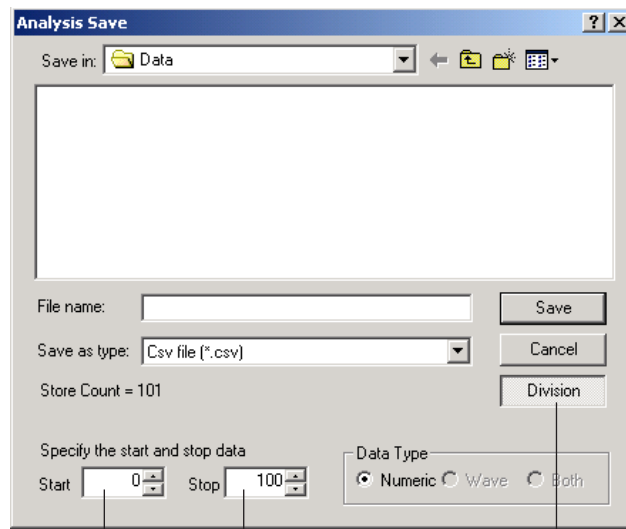
You can also display the list of peak values from the zoom window (see page 3-45) by clicking Analysis at the upper right of the screen. The range of data that is listed corresponds to the range displayed in the zoom window.



### Saving the List Display Data

You can save the data displayed in the list in CSV format.

1. Click **Save**. The Analysis Save dialog box opens.



2. Enter the **save destination** and the file name.
  - To save all the data, proceed to step 5.
  - To save a portion of the data, proceed to step 3.
3. Click **Division**. Text boxes for entering the start and end numbers appear.
4. Set the range of list numbers to be saved in the Specify a change start and stop boxes.
5. Click **Save** to save the data.  
 The list display data of the FFT data (FFT1 or FFT2) that is displayed is saved. To save the FFT data that is not being displayed, switch the FFT data tab in the Analysis dialog box to display the list and then save the data.

## 3.12 Displaying the Cycle-by-Cycle Data (WT3000 Only)

The functions explained in this section can be used when the cycle-by-cycle measurement function (/CC option) is installed in the WT3000.

### Displaying the Cycle-by-Cycle Data

Set the measurement mode to CycleByCycle by carrying out the procedure given in "Changing the Measurement Mode" on page 2-7. The Cycle by Cycle screen appears. The numeric list screen is always shown in the Cycle by Cycle screen. When the data is loaded, the graph of the measured data is displayed.

### Numeric List Screen

Reset the measurement.

Start the measurement.

Enter detailed display settings.

#### Range Status

Indicates whether peak over-range occurred during measurement (Over or OK).

#### Peak Over Item

Displays the item on which a peak over-range occurred and its polarity.

#### Scroll bar

Drag the slider to select the cycle for displaying the data.

Data display cycle number

The screenshot shows the "Cycle by Cycle Results - 1" screen. At the top, there is a scroll bar and a "Data display cycle number" box showing "1". Below the scroll bar, there are two status indicators: "Range Status (All Cycle)" with "Over" and "OK" options, and "Peak Over Item" with "U:", "I:", and "Motor:" options. Below these, there is a section for "Push the trigger button" and "after pushing the reset button." with a "Set" button. Below this, there is a section for "Element and Function can be set with a set button." and "When the item of the Function item is pressed, the graph is displayed on the foremost side." Below this, there is a table with the following data:

Function	Element1	Element2	Element3	Element4	SigmaA	SigmaB	Other
U	101.252	101.274	101.047	101.024	101.263	101.036	
I	0.56338	0.55997	0.56116	0.56457	0.56167	0.56287	
P	53.052	52.742	52.756	53.066	105.793	105.822	
S	57.043	56.710	56.703	57.036	98.513	98.501	
Q	20.962	20.841	20.786	20.906	0.000	0.000	
PF	0.93003	0.93002	0.93039	0.93040	1.00000	1.00000	
Freq							50.050
Speed							0.00123
Torque							0.00087
Pm							0.00000

### Data list

Displays the data of the cycle that is shown in the data display cycle number box.

- Freq is the synchronization source frequency.
- The cell is blank if the relevant data display is turned OFF in the detailed display settings or if there is no data.
- The data below is always blank.
  - U, I, P, S, Q, and PF in the Other column.
  - Freq, Speed, Torque, and Pm of the Element1 to SigmaB columns

### Note

You cannot change the size of the numeric list screen.

### 3.12 Displaying the Cycle-by-Cycle Data (WT3000 Only)

#### Peak Over Item

There are two methods for displaying the peak over-range polarity depending on the detection method.

- Detection by data

If peak over-range occurs in the data from the A/D converter during the measurement of the cycle for which the data is displayed, the peak over-range polarity is displayed as +, -, or  $\pm$ .

- Detection by hardware

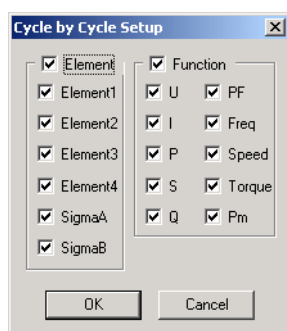
If any hardware peak over-range is detected during the measurement of all cycles, HP (Hardware Peak) is displayed for the data. It detects peak over-range that cannot be detected using the "detection by data" method such as pulse noise with a peak width that is shorter than the sampling interval of the A/D converter.

#### Note

- If a peak over-range is detected, the data of the cycle-by-cycle measurement may not be correct. Increase the measurement range so that peak over-range does not occur.
- The hardware peak over-range detection circuit detects peak over-range before the input signal enters the line filter circuit of the WT. Therefore, a hardware peak over-range (HP) may be indicated even if high frequency noise is attenuated by turning the line filter ON.

### Entering the Detailed Settings of the Numeric List Screen

Click  on the numeric list screen. The Setup dialog box opens.



#### Element

Select the elements or wiring units for displaying the data (select or clear the check boxes).

#### Function

Select the measurement functions for displaying the data (select or clear the check boxes).

#### Note

If you load the data from the WT after changing the element and function settings, the change is applied to the display on the PC.

3.12 Displaying the Cycle-by-Cycle Data (WT3000 Only)

**Graph Display of the Measured Data**

Close the graph screen.

Set the vertical axis of the graph.

Measurement function

Minimum, maximum, and average values of the measured data

**Cursor**  
Displayed at the position corresponding to the data display cycle number on the numeric list screen.

**Graph color**  
The character colors of Element1 to Others on the data list of the numeric list screen are used for the graph colors. The graphs are drawn in order from Element1 to Others. If the graphs overlap, the color of the overlapping graph is displayed.

**Cycle by Cycle Results - 1**

Range Status (All Cycle): Over, OK

Peak Over Item: U, I, Motor

Push the trigger button [icon] after pushing the reset button. [icon] (When the main body is not Reset status.)

[icon] Element and Function can be set with a set button.

When the item of the Function item is pressed, the graph is displayed on the foremost side.


Function	Element1	Element2	Element3	Element4	SigmaA	SigmaB	Other
U	101.252	101.274	101.047	101.024	101.263	101.036	
I	0.56338	0.55997	0.56116	0.56457	0.56167	0.56287	
P	53.052	52.742	52.756	53.066	105.793	105.822	
S	57.043	56.710	56.703	57.036	98.513	98.501	
Q	20.962	20.841	20.786	20.906	0.000	0.000	
PF	0.93003	0.93002	0.93039	0.93040	1.00000	1.00000	
Freq							50.050
Speed							0.00123
Torque							0.00087
Pm							0.00000

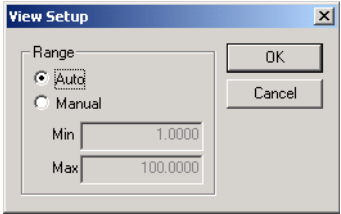
**Set the graph color**  
Set the graph color on the color setup dialog box that opens by clicking here.

**Note**

If you load the data from the WT after changing the graph color, the change is applied to the display on the PC.

### Setting the Vertical Axis of the Graph

Click  on the graph screen. The View Setup dialog box opens.



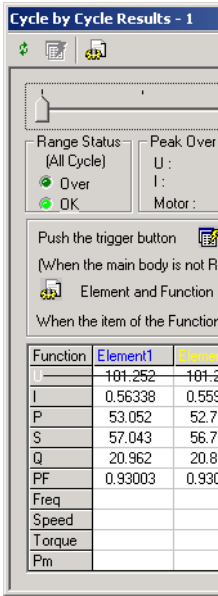
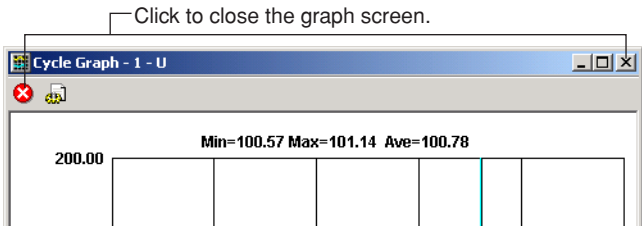
Set the vertical axis setting of the graph to Auto or Manual.

- **Auto**  
The vertical scale is automatically set according to the values loaded from the WT.
- **Manual**  
You can set the bottom edge (Min) and top edge (Max) of the graph.

**Note**

The grid on the graph screen is automatically set according to the size of the graph screen.

### Closing/Redisplaying the Graph Screen



If you close the graph screen, the word "Function" on the numeric list screen turns white. Click to redraw the graph screen.

3.12 Displaying the Cycle-by-Cycle Data (WT3000 Only)

Starting Downloading of Waveform Display Data

RESET button

Data load button

Click to start loading the data.  
To load the data again after loading the data once, click the RESET button to reset the measured data.

Function	Element1	Element2	Element3	Element4	SigmaA	SigmaB	Other
U	101.252	101.274	101.047	101.024	101.263	101.036	
I	0.56338	0.55997	0.56116	0.56457	0.56167	0.56287	
P	53.052	52.742	52.756	53.066	105.793	105.822	
S	57.043	56.710	56.703	57.036	98.513	98.501	
Q	20.962	20.841	20.786	20.906	0.000	0.000	
PF	0.93003	0.93002	0.93039	0.93040	1.00000	1.00000	
Freq							50.050
Speed							0.00123
Torque							0.00087
Pm							0.00000

Note

- It takes a long time to load the data from the WT in the following cases.
- The number of measurement cycles is large.
  - The synchronization source frequency is low (the cycle is long).

Aborting the Data Download

If you start loading the data when the timeout value of the cycle-by-cycle measurement exceeds 10 s, the following screen appears. Click **Cancel** to cancel the data loading.

CBC Measuring...

Measuring CycleByCycle data.  
If you want to cancel , please push cancel button.

Cancel

Click here

## 3.13 Numeric Value Display Function (Synchronization Mode)

You can display multiple measured values from the WT in a single window. Also, you can create expressions that combine multiple measured values from the WT (WTV viewer user defined computation: WTV function), and display the results of computations using those expressions. For example, you can find total power by adding measured power values from two WTs, or divide them to find efficiency.

The functions explained in this section can be used when connected to the WT1600 or WT3000, can not be used when connected to the WT500.

### Displaying the Numeric Screen(Synchronization Mode)

Set the measurement mode to Normal Mode(Synchronization Mode) by carrying out the procedure given in "Changing the Measurement Mode" on page 2-7. Numeric Window(Synchronization Mode) is displayed.

Each function and operating procedure in the Numeric View (Synchronization Mode) screen except for the following are the same as the numeric display in section 3.3. For details, see section 3.3.

- Forms
- WT ID
- WF Settings

### WT3000 Display Example

Select the number of numeric data to display. Select 12, 24, 48, or 100.

No.	Function	Element	Order	WT ID	Data	Units	Measure
1	WF01	---	---	---	100.188	V	1
2	WF02	---	---	---	100.203	V	1
3	WF03	---	---	---	100.069	V	1
4	WF04	---	---	---	473.600m	A	4
5	WF05	---	---	---	564.901m	A	5
6	WF06	---	---	---	0.000	A	5
7	WF07	---	---	---	53.0084	W	5
8	WF08	---	---	---	52.7245	W	5
9	WF09	---	---	---	0.000	W	5
10	WF10	---	---	---	100.188	V	1

Setting WTV functions

Displays ID of the WT that acquired the data.

### Note

If WTV functions (WF01–WF15) are set as the displayed items for Function, the Element, Order, and WT ID boxes always display ---.

### 3.13 Numeric Value Display Function (Synchronization Mode)

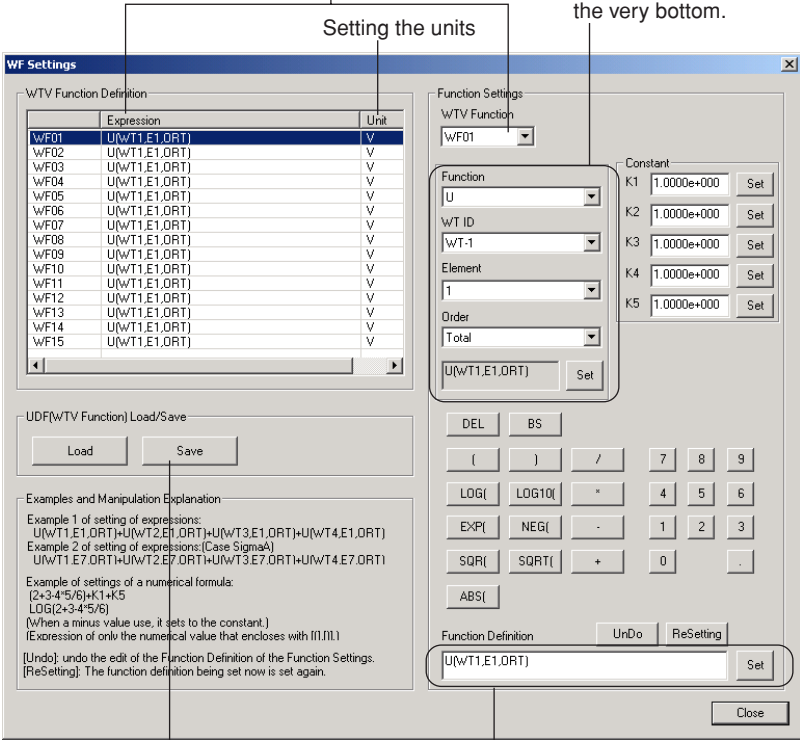
#### Setting the WTV Function (WF)

You can define 15 expressions (WF01–WF15).

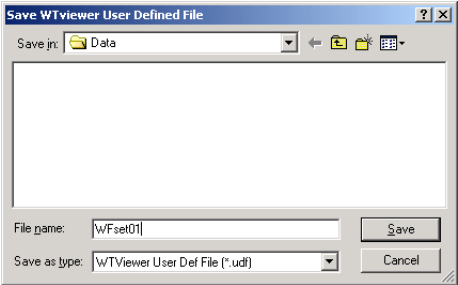
Click the WTV function to be set.  
Enter the expression using the menus and buttons in the right side of the dialog box.

#### Entering Operands

The operands set for the Function, WT ID, Element, and Order are displayed in the lower area.  
If you press the Settings button, the currently displayed operand is added to the WTV function definition box at the very bottom.



The WTV function definition is saved to a file called a *.udf file*.  
Enter a destination file name and location and click Save.



#### WTV Function Definition Box

WTV functions can be defined by combining operands, constants, and computational symbols.  
If you press the Set button, the WTV function is applied and added to the WTV function definition box in the left part of the dialog box.

#### Note

- Waveforms, trends, bar graphs, and vectors cannot be displayed in Numeric View (Synchronization Mode).
- The WTV function definition data is saved to the PC. The WTV function definition data is not saved on the WT main unit.



#### Loading a WTV Function Definition

You can load definitions in the following two ways.

- **From the WF Settings Dialog Box**

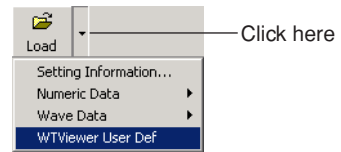
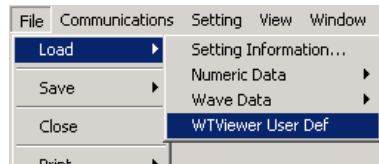
1. Click **Load**. The Load dialog box opens.



2. Enter a file name and location and click Load. The WTV function settings are loaded.

- **From the Menu/Toolbar**

1. Click **File > Load > WTVviewer User Def** from the menu bar, or **Load > WTVviewer User Def** from the toolbar. The Load dialog box opens.



2. Enter a file name and location and click **Load**. The WTV function settings are loaded.

## 4.1 Loading Settings, and Numeric, Waveform, and Harmonic Data

The file saved on WTVViewer in the data formats (extension) given in the following table can be loaded. Data saved using Auto Saving (described in section 3.3) cannot be loaded by WTVViewer.

**File Types and Extensions**

Type	WT1600	WT500, WT3000
Settings	SET format (.set)	CFG format (.cfg)
Numeric data	WTVViewer format (.wta)	WTN format (.wtn)
Waveform display data	WTVViewer format (.wta)	WT1600 format <sup>*1,*2</sup> (.wvf) and (.hdr)      WTW format (.wtw)
Harmonic data	WTVViewer format (.wta)	— <sup>*3</sup>
Waveform sampling data (Math and FFT data)	—	WVF format <sup>*1</sup> (.wvf) and (.hdr)
Cycle-by-cycle data	—	CSV format (.csv)      CBC format (.cbc)

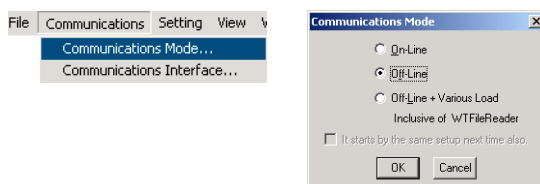
<sup>\*1</sup> If you save the data in WVF format, two files, .wvf and .hdr, are created. To load data in WVF format into WTVViewer, place these files in the same directory. The two files make up a single set. Both files must be present to load the data.

<sup>\*2</sup> Load the setting information (with the .set extension) before loading the waveform data in WT1600 format (with the .wvf extension). If the settings are not loaded, the waveform will not be displayed.

<sup>\*3</sup> The WT500 and WT3000 measures the numeric data of normal measurement and harmonic data simultaneously in normal measurement mode. Therefore, harmonic data is stored as numeric data. Unlike the WT1600 that measures and stores only the harmonic data, the WT500 and WT3000 does not create files containing only harmonic data.

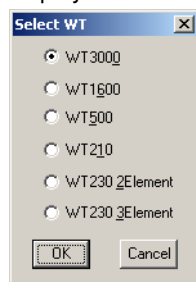
**Select one of the following according to the WTVViewer's current communication mode.**

- If in On-Line mode, start with step 1.
  - If in Off-Line Mode
    - To load settings or measured data after switching the measurement mode, start from step 4.
    - In the following case, select File > Various Load from the menu bar. Continue on to page 4-4, "Loading Settings and Measured Data in On-Line + Various Load Inclusive of WTFileReader."
    - Load settings or measured data. The measurement mode automatically switches according to the loaded settings.
    - Load files (\*.wtd files) saved on the WT in Float format on WTFileReader.
1. When in On-Line mode, choose **Communications > Communications Mode** from the menu bar. The Communications Mode dialog box is displayed.
  2. Select **Off-Line** or **Off-Line + Various Load Inclusive of WTFileReader**, then click **OK**.
    - If you selected Off-Line, proceed to step 3.
    - If you selected Off-Line + Various Load Inclusive of WTFileReader, skip to page 4-4, "Loading Various Files, Settings, and Measured Data."

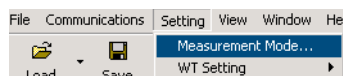


## 4.1 Loading Settings, and Numeric, Waveform, and Harmonic Data

3. Select a WT to work with, then click **OK**. The Measurement Mode dialog box is displayed. Proceed to step 5.



4. Choose **Setting > Measurement Mode** from the menu bar. The Measurement Mode dialog box is displayed.

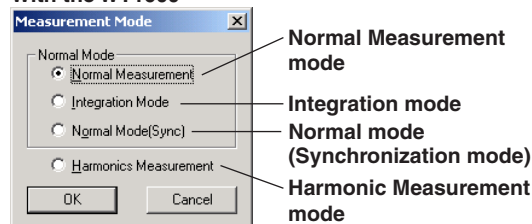


### Note

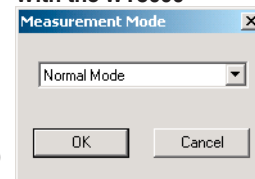
There is no need to select the measurement mode (Procedure 4 and 5) on the WT500.

5. Select a measurement mode, then click **OK**.  
The type of display screen that can be selected in the Display menu differs depending on the measurement mode selected here. Select the same mode as the measurement mode selected when the data file was saved.

With the WT1600



With the WT3000



To load the settings, proceed to step 6.

For loading WTV function definitions in Normal mode (Synchronization Mode), see section 3.13 (WT1600 and WT300 only).

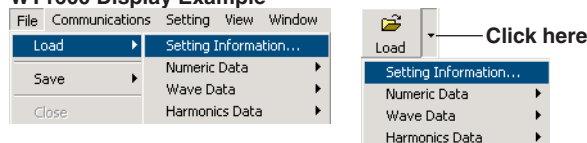
To load the following data saved on WTVviewer, proceed to step 8 on the next page.

- Numeric data
- Math data (WT3000 only)
- Waveform display data
- FFT data (WT3000 only)
- Harmonic data (WT1600 only)
- Cycle-by-cycle data (WT3000 only)
- Numeric data (Synchronization Mode, WT1600 and WT300 only)

### Loading Settings

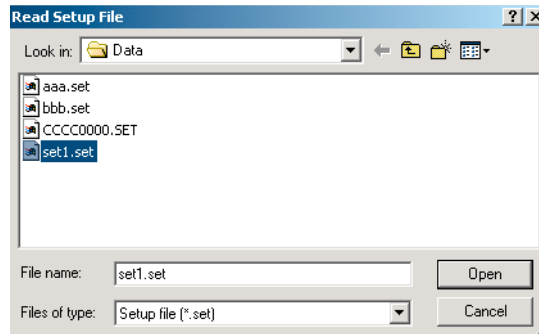
6. Choose **File > Load > Setting Information**, or click **Load** in the toolbar and select Setting Information. The Read setup file dialog box appears.

WT1600 Display Example



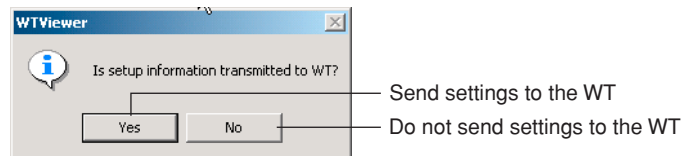
On the WT500 and WT3000, since harmonics are measured and saved along with numeric data in Normal Measurement mode, there is no Harmonic data item in the load menu.

7. Select a settings file, then click **Open**. The setting data is loaded on WTViewer.  
On the WT1600, the settings file extension is .set. On the WT500 and WT3000, the settings file extension is .cfg.



### Note

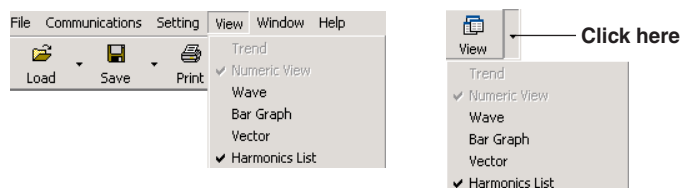
- If you change to On-Line mode after loading settings and the communication target is the WT1600, the following dialog box is displayed.



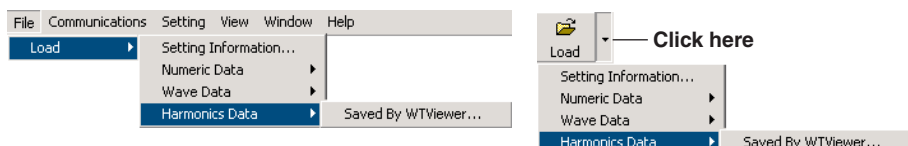
- Settings and numeric data (or harmonic data) are saved in files with extension .wta, .wtn, and .wtw. When files of these extensions are loaded, settings and numeric data (or harmonic data) are loaded.
- If WTViewer is started in offline mode and waveform display data files of extension .wvf are loaded without loading settings, data is not displayed. If you open a waveform display data file after loading settings, the maximum scaling value and number of displayed digits become those of the loaded settings. Displays opened before settings were loaded are changed according to the newly acquired settings.

### Loading Numeric Values, Waveform Displays, Harmonic, Math, FFT, or Cycle-by-Cycle Data

8. Click **View** on the menu bar or click **View** on the toolbar and select a display screen.

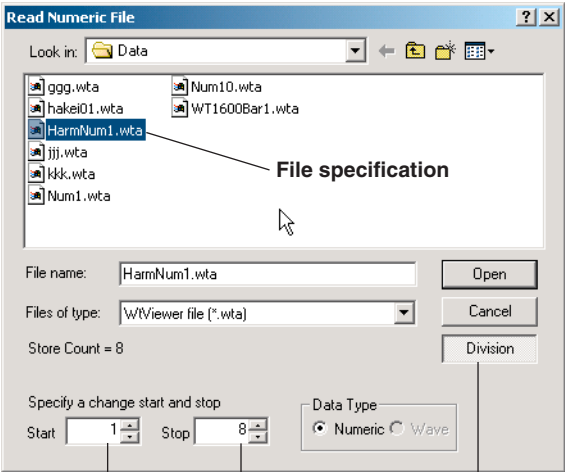


9. Choose **File > Load** in the menu bar or click Load and select a file type to load. A dialog box appears in which you can select a data file.



## 4.1 Loading Settings, and Numeric, Waveform, and Harmonic Data

10. Select a file, then click **Open**.



Click here to display a box for specifying the Store start and Stop numbers.

Specify the Data Number range to load as store numbers

### Specifying a Start and Stop Number for Divided Store

When loading numeric data and harmonic data, you can specify a range of data numbers (see section 3.3 or 3.5) to load from the data saved in the files being loaded. You can set the data numbers in the range of those that were used when the numeric data or harmonic data was saved (see section 5.2).

### Data Type

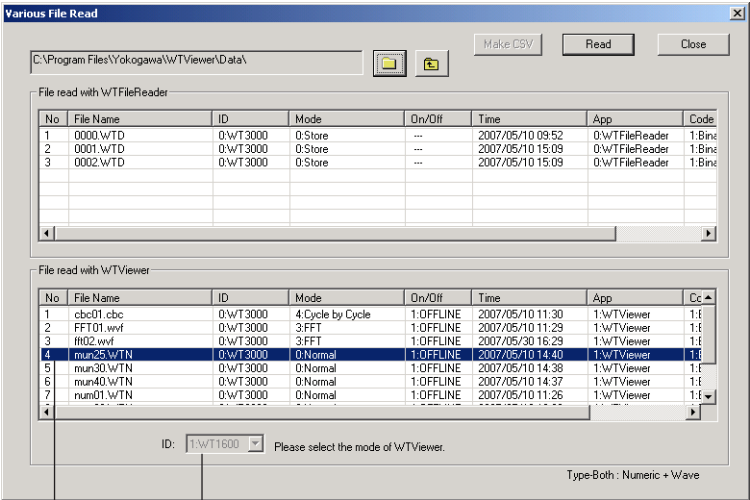
Displayed according to the type of file being loaded.

### Note

When loading numeric or harmonic data, in step 10 above, if you set the Store start and stop numbers the same, only one data number of data among the data saved in the files being loaded is loaded.

## Loading Settings and Measured Data under “Various File Read.”

1. Select **File read with WTFileReader** or **File read with WtViewer**, and select the files to load.
2. Click **Load**.

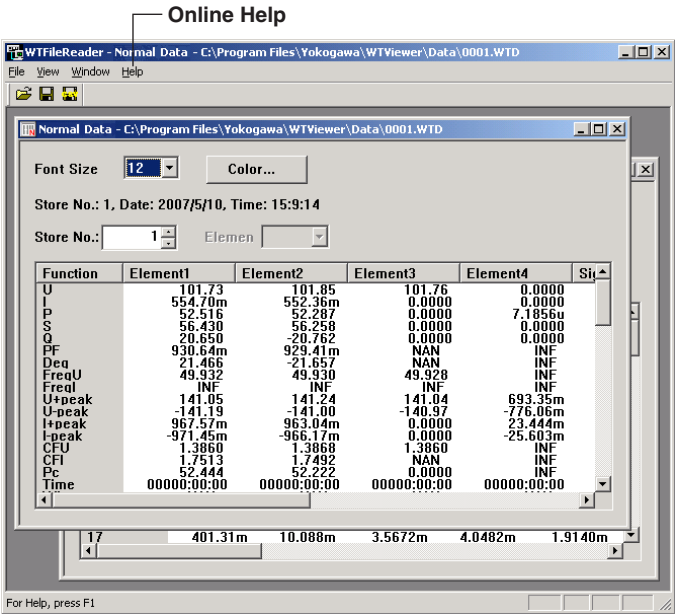


Specifying the WT's ID When Saving Data (for the WT1600, WT210, or WT230)  
File specification (a line highlighted in blue)

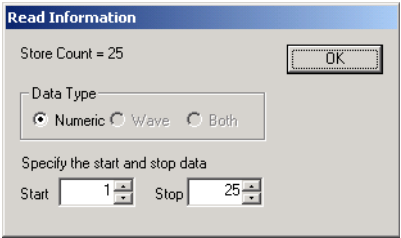
# 4.1 Loading Settings, and Numeric, Waveform, and Harmonic Data

If you selected WtFileReader Target File, the WtFileReader program starts.  
The selected files are displayed on WtFileReader.  
For information on operating WtFileReader, see the WtFileReader online help.  
If you selected WtViewer Target File, the selected files are displayed on WtViewer.  
If you selected Numeric Data, proceed to step 3.

## Example of display on WtFileReader



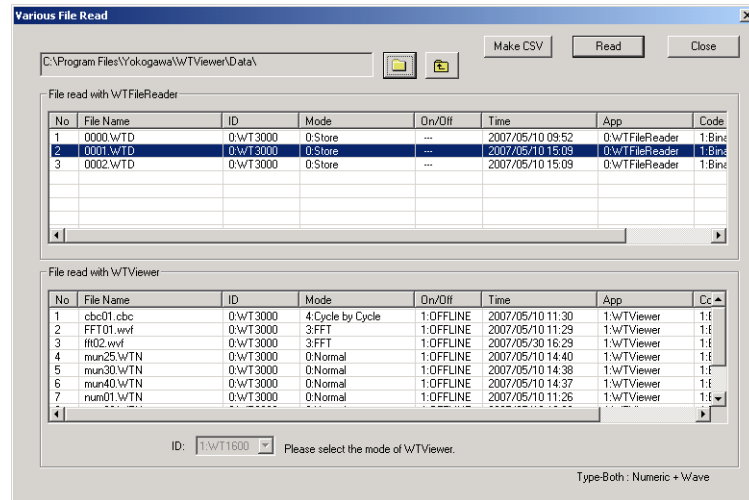
3. Specify the Data Number range to load as store numbers, then click OK.



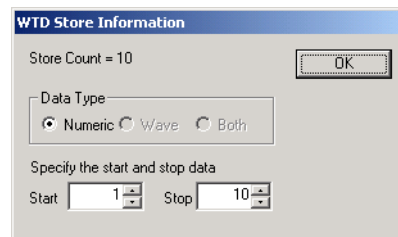
## 4.1 Loading Settings, and Numeric, Waveform, and Harmonic Data

### Converting \*.wtd Files to CSV Format under Loading Various Files

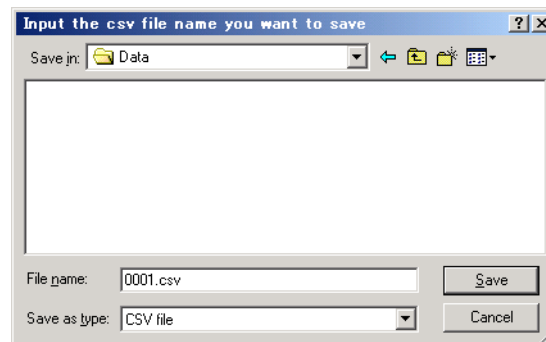
1. With **WTFileReader** target files, select the file to convert.
2. Click **Make CSV**.



3. Specify the range of Data Numbers to convert to CSV format as store numbers, then click **OK**.



4. Enter a destination **file name** and **location** and click **Save**. The data is saved in CSV format.



## 4.2 Numeric Display Function

On the WT1600, since you change to harmonic measurement mode to measure harmonics, there is a separate screen for displaying only harmonic data (harmonics list display). See section 4.3.

With the WT500 and WT3000, since harmonics can also be measured in normal measurement mode, harmonics can be displayed together with numeric data from other normal measurements in the numeric screen described in this section.

In steps 8 to 10 in section 4.1, numeric data is loaded and displayed.

### WT3000 Display Example

No.	Function	Element	Order	Data	Units	Max	Min	No.	Fur
1	Urms	1	---	101.638	V	101.759	101.614	85	Urm
2	Irms	1	---	557.156m	A	557.156m	556.183m	86	Urm
3	P	1	---	52.7068	W	52.7104	52.6517	87	Urm
4	Q	1	---	56.6282	var	56.6311	56.5748	88	Urm
5	U	1	1	20.7060	V	20.7218	20.6752	89	Urm
6	I	1	1	930.753m	A	930.867m	930.636m	90	Urm
7	P	1	1	21.4475	W	21.4659	21.4296	91	Urm

### Forms

Select the number of numeric data to display.

- Select 12, 24, 48, or 250.\*1
- If you select 250, all of the currently downloading numeric data of measurement functions and elements are displayed.

\*1 100 when the measurement mode is synchronization mode (see section 4.10)

### Font Size

Select the font size from the list.

The size can be set from 10 to 40 in steps of 2 (10, 12, 14, ...38, 40).

### Color

Select a text and background color. For details, see section 3.3.

### Data Number

Indicates how many numeric data have been downloaded from the WT up to the currently displayed data. After data has finished loading, you can change the Data Number setting to display the desired numeric data.

### Function

Shows the measurement function for each item.

### Element

Shows the elements for each item.



## 4.2 Numeric Display Function

---

### **Order (WT500 and WT3000 Only)**

Displays the orders of numeric data.

### **Max, Min (WT500 and WT3000 Only)**

Displays the maximum and minimum values for each display item of the numeric data downloaded from the WT.

## 4.3 Harmonics List Display

This section describes the WT1600. For the WT500 and WT3000, see section 4.2. On the WT1600, since you change to harmonic measurement mode to measure harmonics, there is a separate screen for displaying only harmonic data (harmonics list display). Therefore, that screen is explained separately in this section. With the WT500 and WT3000, since harmonics can also be measured in normal measurement mode, harmonics can be displayed together with numeric data from other normal measurements in the numeric screen described in section 4.2.

In steps 8 to 10 in section 4.1, harmonic data is loaded and displayed.

### WT1600 Display Example

No.	Function	Element	Order	Data	Units	No.	Function	Element	Order
1	I	1	Total	-----	A	85	I	1	83
2	I	1	DC	-----	A	86	I	1	84

#### Forms

Select the number of harmonic data to display.

- Select 12, 24, 48, or 250.\*<sup>1</sup>
- If you select 250, all of the currently downloading harmonic data of measurement functions and elements are displayed.

\*<sup>1</sup> 100 when the measurement mode is synchronization mode (see section 4.10)

#### Font Size

Select the font size from the list.

The size can be set from 10 to 40 in steps of 2 (10, 12, 14, ...38, 40).

#### Color

Select a text and background color. For details, see section 3.3.

#### Data Number

Indicates how many harmonic data have been downloaded from the WT up to the currently displayed data. After data has finished loading, you can change the Data Number setting to display the desired numeric data.

#### Function

Shows the measurement function for each item.

#### Element

Shows the elements for each item.

#### Order

Displays the orders.

## 4.4 Waveform Display Function

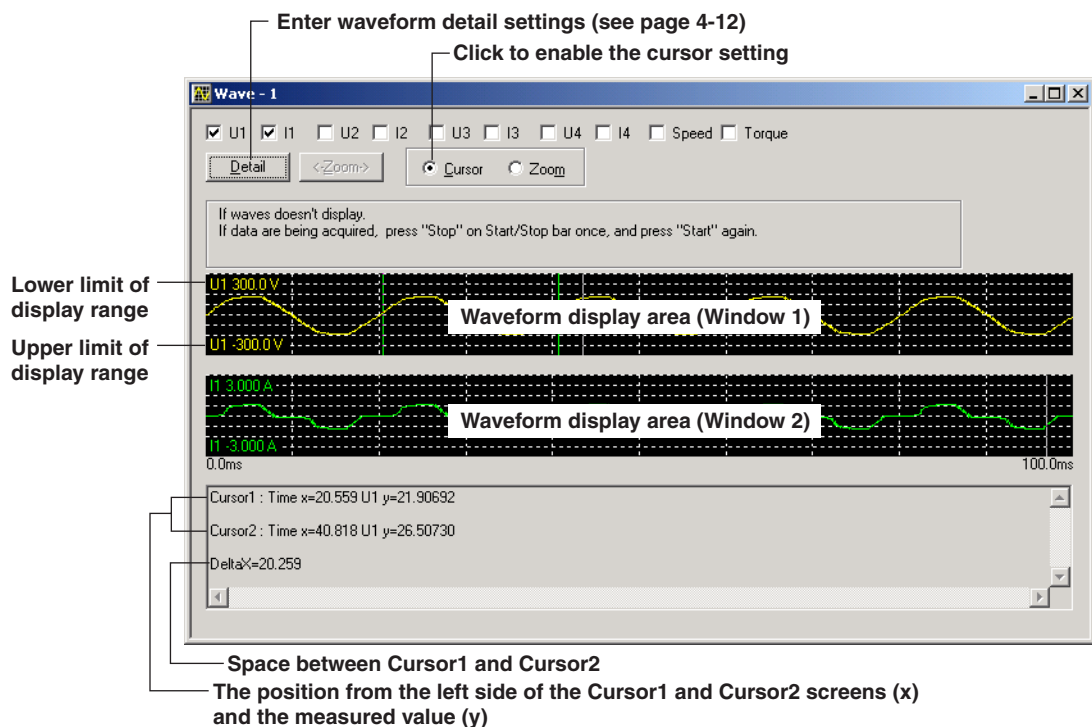
This section describes use of the WT3000 screen. The WT1600 has six elements, so waveforms U5, I5, U6, and I6 are displayed. Also, with the motor function of the WT, Speed and Torque waveforms are displayed.

### Displaying the Waveform

In steps 6 to 10 in section 4.1, waveform display data is loaded and displayed.

### Cursor Setting Screen

Example with two windows. To set the number of windows, see page 4-12.)



- **U1 to I4**

(U1-I6 on the WT1600. U1-I3 on the WT500. Speed and Torque may also be displayed depending on the WT models and options.)

Select the check box to select the waveform to be displayed. If you select waveforms that are not saved, they are not displayed. The Ch from the Wave Detail dialog box (see page 4-12) is linked.

- **Cursor**

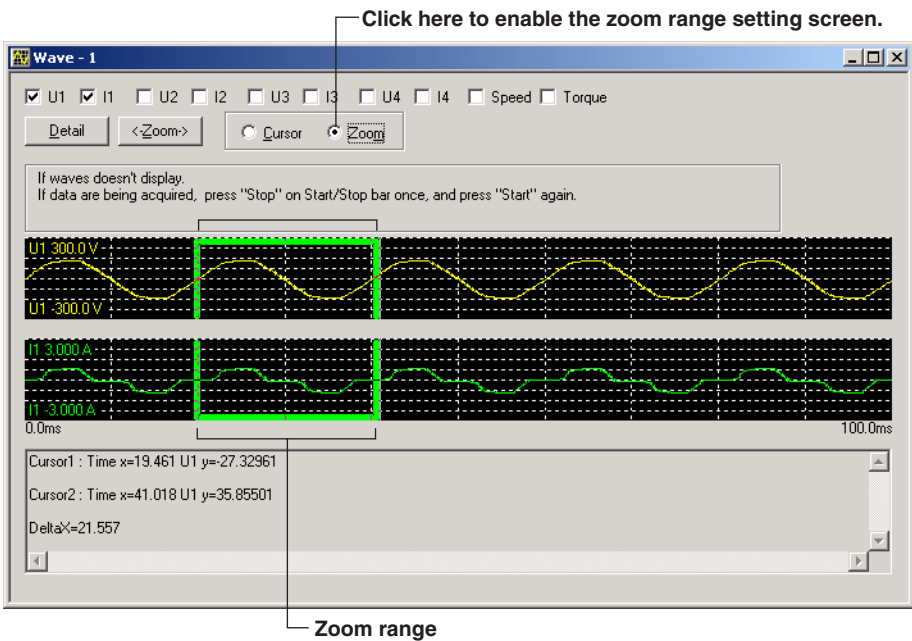
If you select this, you can set Cursor1 and Cursor2 in the waveform display area.

#### Cursor1, Cursor2

You can set the position of cursors on waveforms.

- The line that appears when you first click on the desired waveform is Cursor1.
- The line that appears the next time you click is Cursor2. The position of Cursor2 can be changed any number of times.
- To change the position of Cursor1, double-click in the waveform display area, delete cursors 1 and 2, and set new cursors.
- In the bottom of the waveform display area, the position from the left side of the Cursor1 and Cursor2 screens (x) and the measured value (y) are displayed.

### Zoom Area Setting Screen

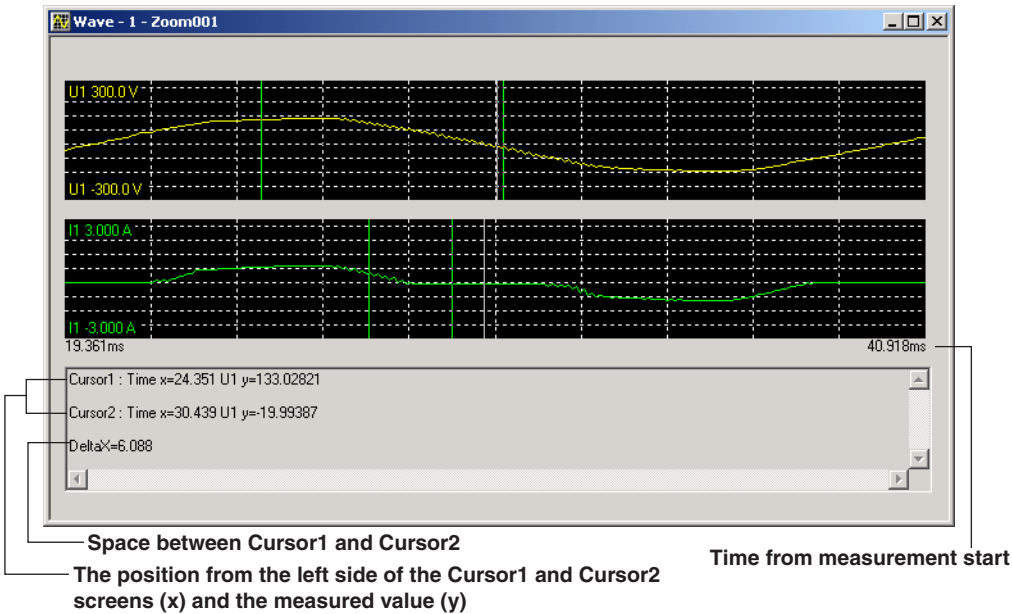


#### • Zoom (Time Axis Direction)

Click here to set the time axis zoom range in the waveform display area.

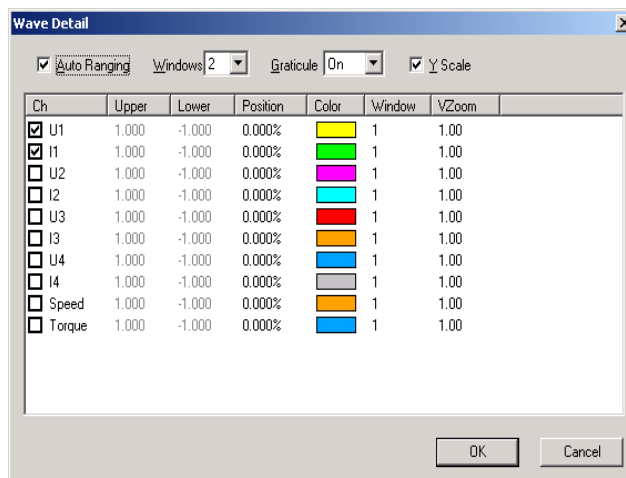
1. Drag the area to zoom in the waveform display area. The zoomed range is set simultaneously in all of the displayed waveform display areas.
2. Click <-Zoom->. A screen appears in which all waveforms in the waveform display area are zoomed.

You can set Cursor1 and Cursor2 on these zoomed waveforms. For the procedure, see the previous page.



### Entering Waveform Detail Settings

Click **Detail** in the Wave dialog box. The Wave Detail dialog box is displayed.



#### Auto Ranging

- **When the Auto Ranging Check Box is Selected**

Displayed in the same display range as the WT settings.

- **When the Auto Ranging Check Box is Not Selected**

If you click the Upper or Lower row, a combo box is displayed. You can set the Upper limit and Lower limit of the display range for each channel.

#### Windows

Set the number of waveform display windows between 1 and 6. If two or more windows are specified and you click the Window row to display the combo box, you can specify which waveform display area (or Window, as numbered from the top) to use for displaying the waveform.

#### Graticule

Select whether (**On**) or not (**Off**) to display a grid in the waveform display area.

#### Y Scale

Select whether or not to display the upper and lower limit values in the waveform display area (by selecting or clearing the check box).

#### Ch

Select the check box to select the waveform to be displayed. This is linked with the waveform display/do not display setting in the Wave dialog box (see page 4-10).

#### Upper, Lower

If the Auto Ranging check box is not selected, set the Upper and Lower limit of the display range.

1. Click the **Upper** or **Lower** column. A combo box opens.
2. Set the upper or lower limit value of the display range.

**Position**

Set the vertical waveform display position in the waveform display area. With the center of the vertical axis taken to be the zero amplitude line, the upper and lower limits of the window are 100% and -100%, respectively.

1. Click on the **Position** column. A combo box opens.
2. Set the waveform display position in the up/down direction in the waveform display area.

**Color**

Select the waveform display color.

1. Click the **Color** column. A combo box opens.
2. Select the waveform display color.

**Window**

When the waveform display screen is divided, set how many waveform areas (Windows) from the top in which the waveform is to be displayed.

1. Click the **Window** column. A combo box opens.
2. Select the waveform display area.

**VZoom (Vertical Zoom)**

Set the zoom factor for the vertical axis of the waveform.

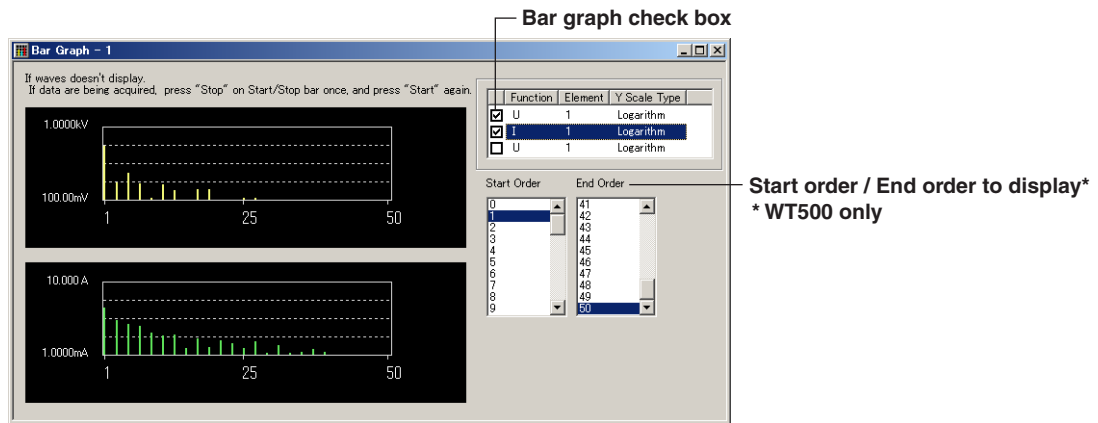
1. Click the **VZoom** column. A combo box opens.
2. Set the vertical axis zoom factor.

**Note**

Since waveform display on the WT's screen differs from the mechanism of waveform display on WTVIEWER, if you compare both waveforms so that you can see waveform display data point by point, there are times when the waveform tracking can appear different. For details, see the Note in section 3.6.

## 4.5 Bar Graph Display Function

Harmonic data (or numeric data on the WT500 and WT3000) loaded in steps 6 to 10 in section 4.1 is displayed in bar graphs.



### Displaying Multiple Bar Graphs

Up to three bar graphs can be displayed.

Select the **Bar Graph check boxes**. A bar graph of the selected measurement functions and elements is displayed.

### Function

Select the measurement function to be displayed.

1. Click on the Function column. A combo box opens.
2. Select the measurement function for each item in this column.

### Element

Select element to be displayed.

1. Click the **Element** column. A combo box opens.
2. Select the element for each item in this column.

### Start Order / Stop Order(WT500 only)

Select the order of numeric data to display\*1.

- Start Order:0 to 40
- Stop Order:10 to 50

\*1 The difference between the start order and the end order must be greater than or equal to 10.

### Changing the Displayed Bar Graph

You can change the Data Number in the harmonics list screen (or the numeric value screen on the WT500 and WT3000), to display the desired number of bar graphs. However, with the WT1600, the harmonic measurement functions and elements required to display the bar graph must be saved in the harmonic data file to be loaded.

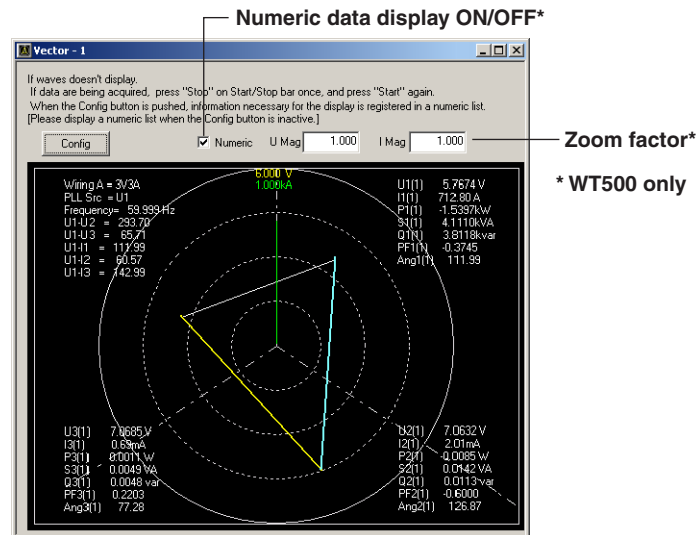
### Note

- Load data after setting up the measurement functions and elements you wish to display in advance.
- Up to three bar graph windows can be displayed. The bar graph display colors are displayed on the PC screen according to the default color settings on the WT.

## 4.6 Vector Display Function

Harmonic data (or numeric data on the WT3000) loaded in steps 6 to 10 in section 4.1 is displayed in vectors.

Only one vector window can be displayed. The display windows differ depending on the loaded setting information file.



### Changing the Displayed Vector

You can change the Data Number in the harmonics list screen (or the numeric value screen on the WT500 and WT3000), to display the desired number of vectors. However, the harmonic measurement functions and elements required to display the vectors must be saved in the harmonic data file to be loaded (or the numeric data file with the WT500 and WT3000).

### Registering the Information Required for Vector Display (Vector Display Data) in the Numeric List

Even if the communication mode is Off-Line, you can register the information required for vector display (vector display data) in the numeric list.

However, the vector display uses measured data that is loaded, therefore even if you register vector display data in the numeric list it is not reflected in the numeric or vector displays.



## 4.7 Displaying the Computed Waveform (Math Waveform) (WT3000 Only)

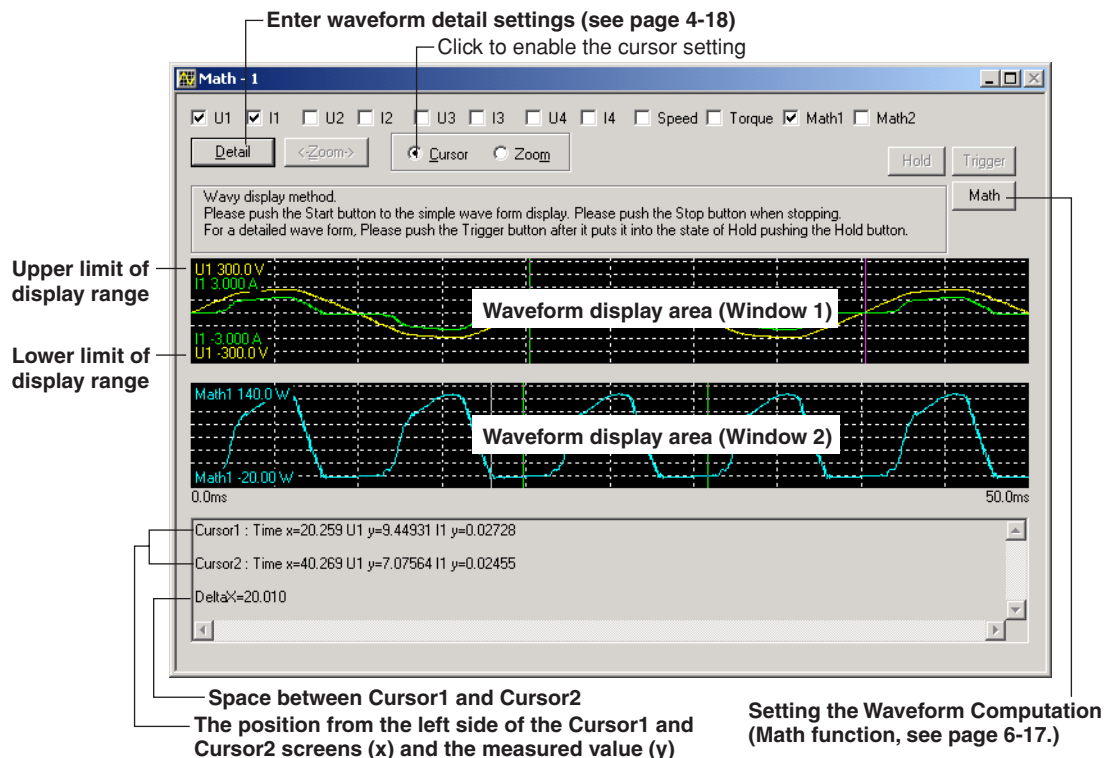
The functions explained in this section can be used when the advanced computation function (/G6 option) is installed in the WT3000.

### Displaying the Computed Waveforms

Load the waveform display data by carrying out steps 6 to 10 in section 4.1.

#### Cursor Setting Screen

(Example with two windows. To set the number of windows, see page 4-18.)



- **U1 to I4, Math1, and Math2**  
(On the motor version of the WT3000, Speed and Torque are displayed.)  
Select the waveforms you wish to display (select or clear the check boxes).  
Waveforms that are not saved are not displayed even if the check box is selected.  
This is linked to the Ch from the Wave Detail dialog box (see page 4-18).

- **Cursor**

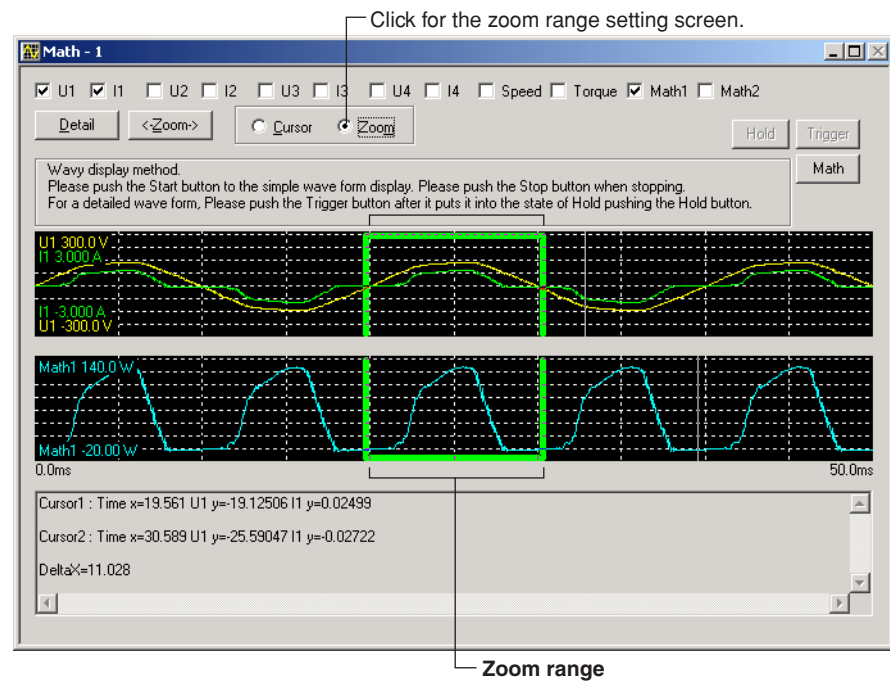
Click here to set Cursor1 and Cursor2 in the waveform display area.

#### Cursor1, Cursor2

You can set the position of cursors on waveforms.

- The line that appears when you first click on the desired waveform is Cursor1.
- The line that appears the next time you click is Cursor2. The position of Cursor2 can be changed any number of times.
- To change the position of Cursor1, double-click in the waveform display area, delete cursors 1 and 2, and set new cursors.
- In the bottom of the waveform display area, the position from the left side of the Cursor1 and Cursor2 screens (x) and the measured value (y) are displayed.

### Zoom Area Setting Screen

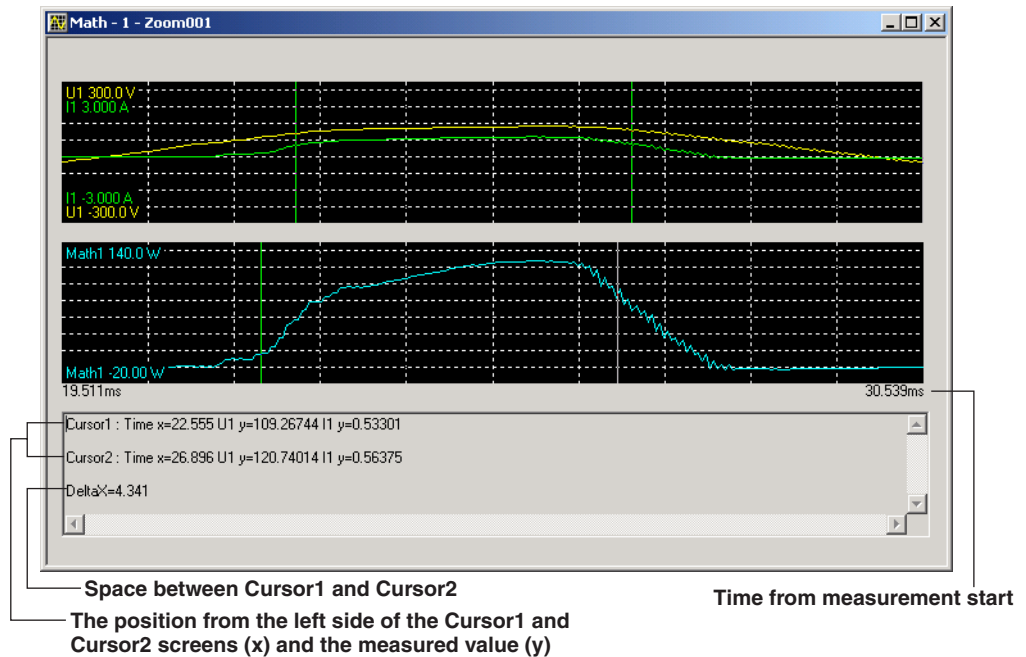


#### • Zoom (Time Axis Direction)

Click here to set the time axis zoom range in the waveform display area.

1. Drag the area to zoom in the waveform display area. The zoomed range is set simultaneously in all of the displayed waveform display areas.
2. Click **<-Zoom->**. A screen appears in which all waveforms in the waveform display area are zoomed.

You can set Cursor1 and Cursor2 on these zoomed waveforms. For the procedure, see the previous page.



## 4.7 Displaying the Computed Waveform (Math Waveform) (WT3000 Only)

### Entering Waveform Detail Settings

Click **Detail** in the Wave dialog box. A Wave Detail dialog box opens.

The Wave Detail dialog box contains the following settings and table:

☒ Auto Ranging    Windows: 2    Graticule: On    ☒ Y Scale

Ch	Upper	Lower	Position	Color	Window	VZoom
<input checked="" type="checkbox"/> U1	1.000	-1.000	0.000%	Yellow	1	1.00
<input checked="" type="checkbox"/> I1	1.000	-1.000	0.000%	Green	1	1.00
<input type="checkbox"/> U2	1.000	-1.000	0.000%	Magenta	1	1.00
<input type="checkbox"/> I2	1.000	-1.000	0.000%	Cyan	1	1.00
<input type="checkbox"/> U3	1.000	-1.000	0.000%	Red	1	1.00
<input type="checkbox"/> I3	1.000	-1.000	0.000%	Orange	1	1.00
<input type="checkbox"/> U4	1.000	-1.000	0.000%	Blue	1	1.00
<input type="checkbox"/> I4	1.000	-1.000	0.000%	Grey	1	1.00
<input type="checkbox"/> Speed	1.000	-1.000	0.000%	Orange	1	1.00
<input type="checkbox"/> Torque	1.000	-1.000	0.000%	Blue	1	1.00
<input checked="" type="checkbox"/> Math1	1.000	-1.000	0.000%	Cyan	2	1.00
<input type="checkbox"/> Math2	1.000	-1.000	0.000%	Red	2	1.00

Buttons: OK, Cancel

#### Auto Ranging

- **When the Auto Ranging Check Box is Selected**  
Displayed in the same display range as the WT settings.
- **When the Auto Ranging Check Box is Not Selected**  
If you click the Upper or Lower column, a combo box is displayed. You can set the Upper limit and Lower limit of the display range for each channel.

#### Windows

Select the number of displayed waveform windows between 1 and 6. If two or more windows are specified and you click the Window column to display the combo box, you can specify which waveform display area (or Window, as numbered from the top) to use for displaying the waveform.

#### Graticule

Select whether (**On**) or not (**Off**) to display a grid in the waveform display area.

#### Y Scale

Select whether or not to display the upper and lower limit values in the waveform display area (by selecting or clearing the check box).

#### Ch

Select the waveforms you wish to display (select or clear the check boxes). This is linked with the waveform display/do not display setting in the Math dialog box (see page 4-16).

#### Upper, Lower

If the Auto Ranging check box is not selected, set the Upper and Lower limit of the display range.

1. Click the **Upper** or **Lower** column. A combo box opens.
2. Set the upper or lower limit value of the display range.

**Position**

Set the waveform display position in the up/down direction in the waveform display area. With the center of the vertical axis taken to be the zero amplitude line, the upper and lower limits of the window are 100% and –100%, respectively.

1. Click on the **Position** column. A combo box opens.
2. Set the waveform display position in the up/down direction in the waveform display area.

**Color**

Select the waveform display color.

1. Click on the **Color** column. A combo box opens.
2. Select the waveform display color.

**Window**

When the waveform display screen is divided, set how many waveform areas (Windows) from the top in which the waveform is to be displayed.

1. Click on the **Window** column. A combo box opens.
2. Select the waveform display area.

**VZoom (Vertical Zoom)**

Set the zoom factor for the vertical axis of the waveform.

1. Click on the **VZoom** column. A combo box opens.
2. Set the vertical zoom factor.

**Note**

- Because the waveform display on the WT screen and the waveform display on WTViewer are different in construction, the waveform trace may appear differently if you compare the waveforms in a condition in which each point of the waveform display data can be seen. For details, see the note in section 3.6.
- If the waveform sampling data is displayed, the size of the computed waveform (Math) screen cannot be changed.
- It may take a long time to display the zoom screen if you click the Zoom button and any of the following cases apply when the waveform sampling data is displayed.
  - The data update rate is long.
  - The zoom range is wide.

To view the details of the waveform sampling data quickly in the case above, save the data to a file in CSV format according to the procedure in section 5.2, and draw the waveform on another application such as Excel.

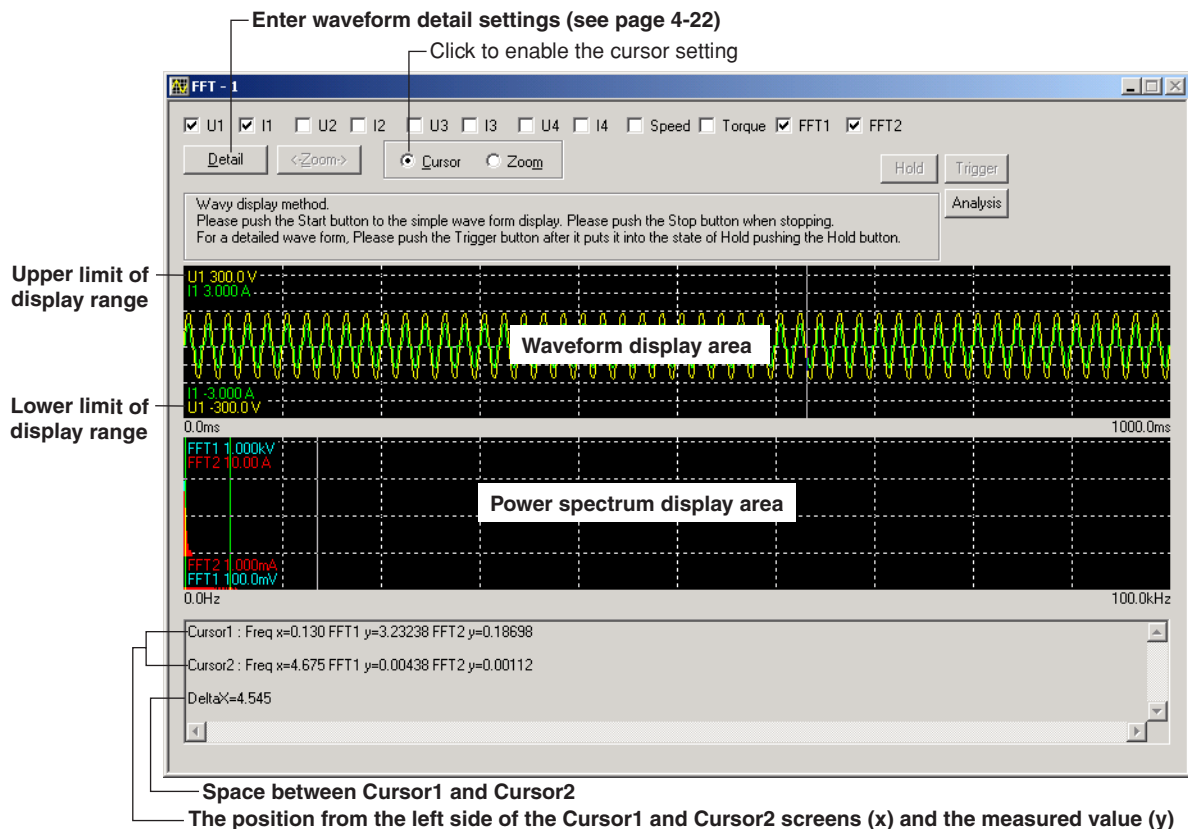
## 4.8 Displaying the FFT (Power Spectrum Waveform) Display (WT3000 Only)

The functions explained in this section can be used when the advanced computation function (/G6 option) is installed in the WT3000.

### Displaying the Power Spectrum Waveform

Load the waveform display data by carrying out steps 6 to 10 in section 4.1.

#### Cursor Setting Screen



- **U1 to I4, FFT1, and FFT2**

(On the motor version of the WT3000, Speed and Torque are displayed.)  
Select the waveforms you wish to display (select or clear the check boxes).  
Waveforms that are not saved are not displayed even if the check box is selected.  
This is linked to the Ch from the Wave Detail dialog box (see page 4-22).

- **Cursor**

Click here to set Cursor1 and Cursor2 in the waveform display area.

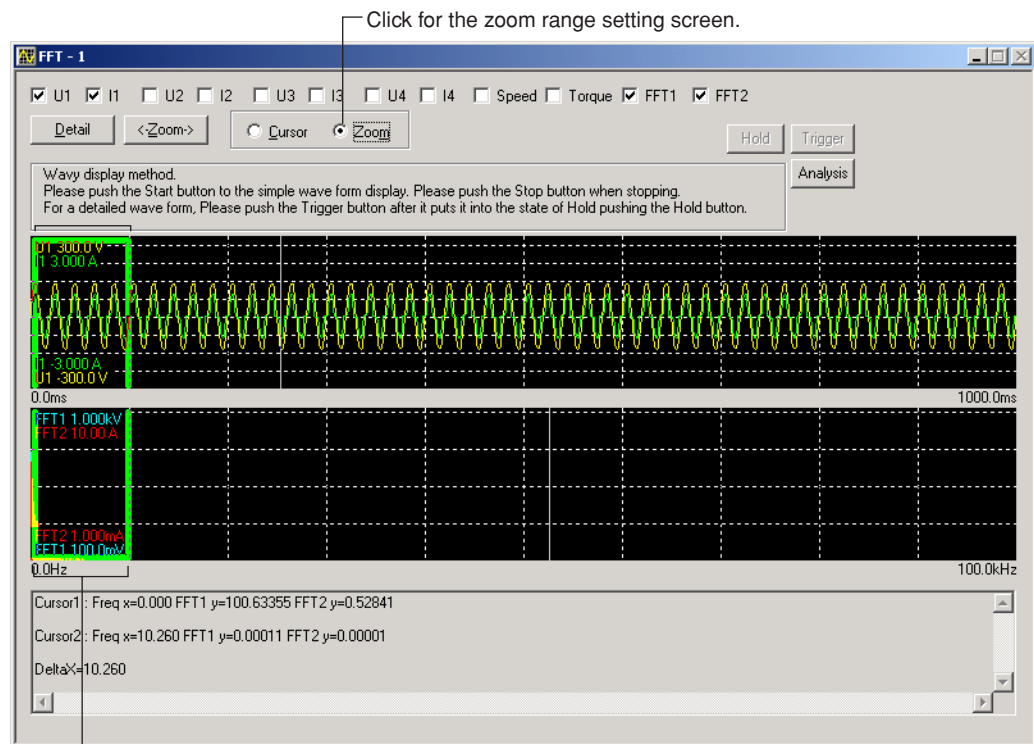
#### Cursor1, Cursor2

You can set the position of cursors on waveforms.

- The line that appears when you first click on the desired waveform is Cursor1.
- The line that appears the next time you click is Cursor2. The position of Cursor2 can be changed any number of times.
- To change the position of Cursor1, double-click in the waveform display area, delete cursors 1 and 2, and set new cursors.
- In the bottom of the waveform display area, the position from the left side of the Cursor1 and Cursor2 screens (x) and the measured value (y) are displayed.

## 4.8 Displaying the FFT (Power Spectrum Waveform) Display (WT3000 Only)

### Zoom Area Setting Screen

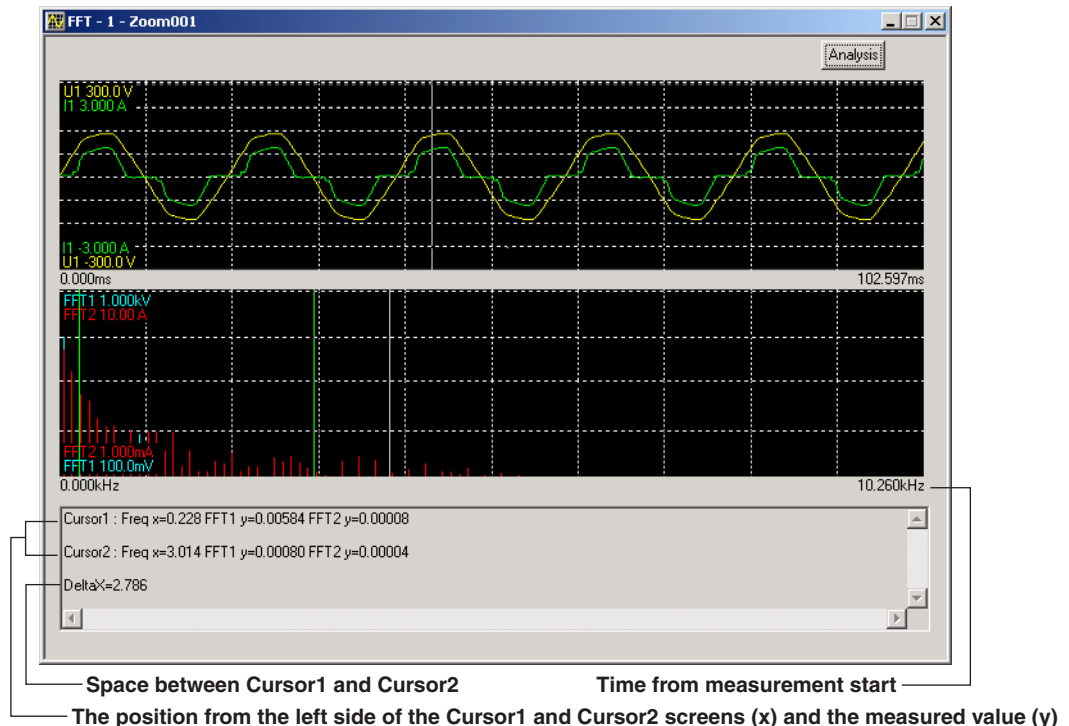


- **Zoom (Time Axis Direction)**

Click here to set the time axis zoom range in the waveform display area.

1. Drag the area to zoom in the waveform display area. The zoomed range is set simultaneously in all of the displayed waveform display areas.
2. Click **<-Zoom->**. A screen appears in which all waveforms in the waveform display area are zoomed.

You can set Cursor1 and Cursor2 on these zoomed waveforms. For the procedure, see the previous page.



## 4.8 Displaying the FFT (Power Spectrum Waveform) Display (WT3000 Only)

### Entering Waveform Detail Settings

Click **Detail** in the Wave dialog box. A Wave Detail dialog box opens.

The Wave Detail dialog box contains the following settings:

- ☒ Auto Ranging
- Windows: 2
- Graticule: On
- ☒ Y Scale

Ch	Upper	Lower	Position	Color	Window	VZoom	YScaleType
<input checked="" type="checkbox"/> U1	1.000	-1.000	0.000%	Yellow	1	1.00	
<input checked="" type="checkbox"/> I1	1.000	-1.000	0.000%	Green	1	1.00	
<input type="checkbox"/> U2	1.000	-1.000	0.000%	Magenta	1	1.00	
<input type="checkbox"/> I2	1.000	-1.000	0.000%	Cyan	1	1.00	
<input type="checkbox"/> U3	1.000	-1.000	0.000%	Red	1	1.00	
<input type="checkbox"/> I3	1.000	-1.000	0.000%	Orange	1	1.00	
<input type="checkbox"/> U4	1.000	-1.000	0.000%	Blue	1	1.00	
<input type="checkbox"/> I4	1.000	-1.000	0.000%	Grey	1	1.00	
<input type="checkbox"/> Speed	1.000	-1.000	0.000%	Orange	1	1.00	
<input type="checkbox"/> Torque	1.000	-1.000	0.000%	Blue	1	1.00	
<input checked="" type="checkbox"/> FFT1	1.000	-1.000		Cyan	2		Log
<input checked="" type="checkbox"/> FFT2	1.000	-1.000		Red	2		Log

Buttons: OK, Cancel

#### Auto Ranging

- **When the Auto Ranging Check Box Is Selected**

Displayed in the same display range as the WT settings.

- **When the Auto Ranging Check Box is Not Selected**

If you click the Upper or Lower column, a combo box is displayed. You can set the Upper limit and Lower limit of the display range for each channel.

#### Windows

The number of windows is fixed to 2. It cannot be changed.

#### Graticule

Select whether (**On**) or not (**Off**) to display a grid in the waveform display area.

#### Y Scale

Select whether or not to display the upper and lower limit values in the waveform display area (by selecting or clearing the check box).

#### Ch

Select the waveforms you wish to display (select or clear the check boxes). This is linked with the waveform display/do not display setting in the FFT dialog box (see page 4-20).

#### Upper, Lower

If the Auto Ranging check box is not selected, set the Upper and Lower limit of the display range.

1. Click the **Upper** or **Lower** column. A combo box opens.
2. Set the upper or lower limit value of the display range.

**Position**

Set the waveform display position in the up/down direction in the waveform display area. With the center of the vertical axis taken to be the zero amplitude line, the upper and lower limits of the window are 100% and -100%, respectively.

1. Click on the **Position** column. A combo box opens.
2. Set the waveform display position in the up/down direction in the waveform display area.

You cannot set the positions of power spectrum FFT1 and FFT2.

**Color**

Select the waveform display color.

1. Click on the **Color** column. A combo box opens.
2. Select the waveform display color.

**Window**

The mapping of the waveform display is as shown below. It cannot be changed.

Ch	Window
U1 to I4, Torque, and Speed	1
FFT1 and FFT2	2

**VZoom (Vertical Zoom)**

Set the zoom factor for the vertical axis of the waveform.

1. Click on the **VZoom** column. A combo box opens.
2. Set the vertical zoom factor.

You cannot set the VZoom value of power spectrum FFT1 and FFT2.

**YScale Type**

Set the type of Y-axis scale of power spectrum FFT1 and FFT2.

1. Click on the **YScale Type** column. A combo box opens.
2. Select **Log** (logarithmic) or **Lin** (linear).

YScale Type of the input waveform (U1 to I4, Torque, and Speed) is fixed to Lin (linear).

**Note**

- Because the waveform display on the WT screen and the waveform display on WTViewer are different in construction, the waveform trace may appear differently if you compare the waveforms in a condition in which each point of the waveform display data can be seen. For details, see the note in section 3.6.
- If the waveform sampling data is displayed, the size of the FFT screen cannot be changed.
- It may take a long time to display the zoom screen if you click the Zoom button and any of the following cases apply when the waveform sampling data is displayed.
  - The data update rate is long.
  - The zoom range is wide.

To view the details of the waveform sampling data quickly in the case above, save the data to a file in CSV format according to the procedure in section 5.2, and draw the waveform on another application such as Excel.



## 4.9 Displaying the Cycle-by-Cycle Data (WT3000 Only)

The functions explained in this section can be used when the cycle-by-cycle measurement function (/CC option) is installed in the WT3000.

### Displaying the Cycle-by-Cycle Data

Load the cycle-by-cycle data (.cbc) by carrying out steps 6 to 10 in section 4.1.

#### Numeric List Screen

Reset the measurement.

Start the measurement.

Enter detailed display settings.

#### Range Status

Indicates whether peak over-range occurred during measurement (Over or OK).

#### Peak Over Item

Displays the item on which a peak over-range occurred and its polarity.

#### Scroll bar

Drag the slider to select the cycle for displaying the data.

Data display cycle number

The screenshot shows the 'Cycle by Cycle Results' screen. At the top, there is a title bar and a scroll bar. Below the scroll bar, there are two sections: 'Range Status (All Cycle)' and 'Peak Over Item'. The 'Range Status' section shows 'Over' and 'OK' buttons. The 'Peak Over Item' section shows 'U:', 'I:', and 'Motor:' labels. Below these sections, there is a text area with instructions: 'Push the trigger button [icon] after pushing the reset button. [icon] (When the main body is not Reset status.)' and 'Element and Function can be set with a set button. [icon] When the item of the Function item is pressed, the graph is displayed on the foremost side.' At the bottom, there is a table with the following data:

Function	Element1	Element2	Element3	Element4	SigmaA	SigmaB	Other
U	101.252	101.274	101.047	101.024	101.263	101.036	
I	0.56338	0.55997	0.56116	0.56457	0.56167	0.56287	
P	53.052	52.742	52.756	53.066	105.793	105.822	
S	57.043	56.710	56.703	57.036	98.513	98.501	
Q	20.962	20.841	20.786	20.906	0.000	0.000	
PF	0.93003	0.93002	0.93039	0.93040	1.00000	1.00000	
Freq							50.050
Speed							0.00123
Torque							0.00087
Pm							0.00000

#### Data list

Displays the data of the cycle that is shown in the data display cycle number box.

- Freq is the synchronization source frequency.
- The cell is blank if the relevant data display is turned OFF in the detailed display settings or if there is no data.
- The data below is always blank.
  - U, I, P, S, Q, and PF in the Other column.
  - Freq, Speed, Torque, and Pm of the Element1 to SigmaB columns

#### Note

You cannot change the size of the numeric list screen.

### Peak Over Item


There are two methods for displaying the peak over-range polarity depending on the detection method.

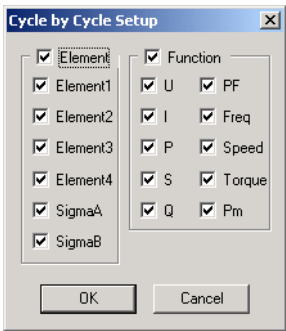
- Detection by data  
If peak over-range occurs in the data from the A/D converter during the measurement of the cycle for which the data is displayed, the peak over-range polarity is displayed as +, -, or  $\pm$ .
- Detection by hardware  
If any hardware peak over-range is detected during the measurement of all cycles, HP (Hardware Peak) is displayed for the data. It detects peak over-range that cannot be detected using the "detection by data" method such as pulse noise with a peak width that is shorter than the sampling interval of the A/D converter.

### Note

- If a peak over-range is detected, the data of the cycle-by-cycle measurement may not be correct. Increase the measurement range so that peak over-range does not occur.
- The hardware peak over-range detection circuit detects peak over-range before the input signal enters the line filter circuit of the WT. Therefore, a hardware peak over-range (HP) may be indicated even if high frequency noise is attenuated by turning the line filter ON.

### Entering the Detailed Settings of the Numeric List Screen

Click  on the numeric list screen. The Setup dialog box opens.



### Element

Select the elements or wiring units for displaying the data (select or clear the check boxes).

### Function

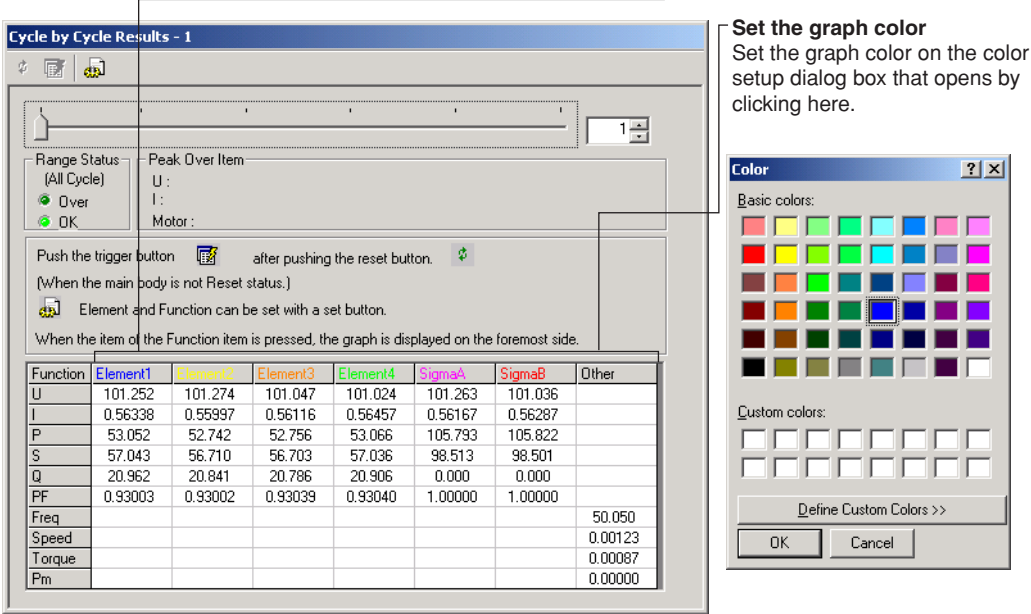
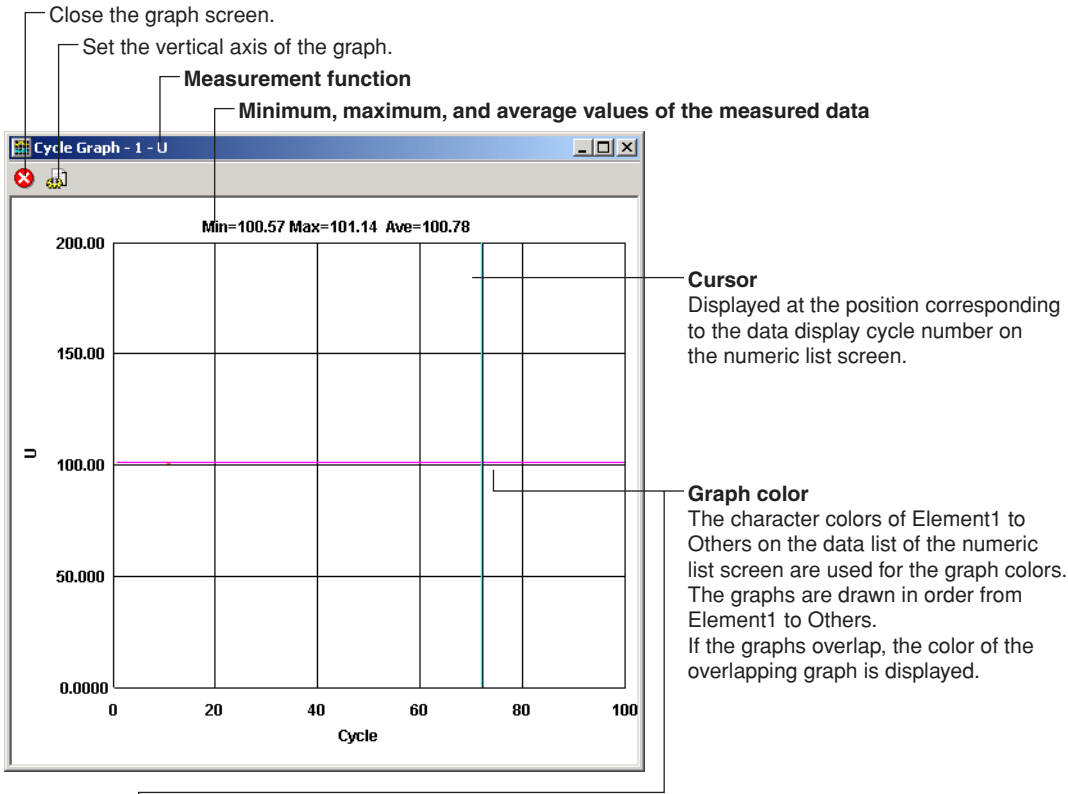
Select the measurement functions for displaying the data (select or clear the check boxes).

### Note

If you load the data from the WT after changing the element and function settings, the change is applied to the display on the PC.

4.9 Displaying the Cycle-by-Cycle Data (WT3000 Only)


Graph Display of the Measured Data

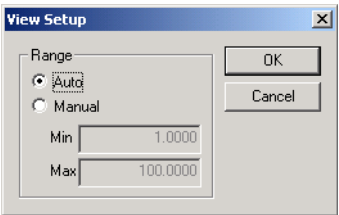


Note

If you load the data after changing the graph color, the change is applied to the display on the PC.

Setting the Vertical Axis of the Graph

Click  on the graph screen. The View Setup dialog box opens.



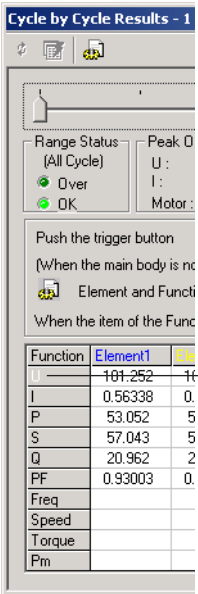
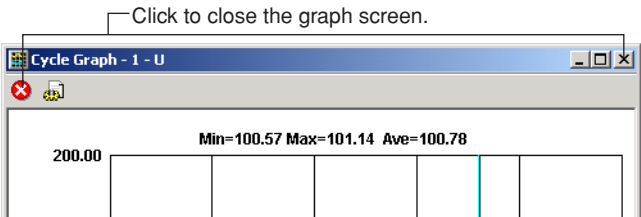
Set the vertical axis setting of the graph to Auto or Manual.

- **Auto**  
The vertical scale is automatically set according to the loaded values.
- **Manual**  
You can set the bottom edge (Min) and top edge (Max) of the graph.

**Note**

The grid on the graph screen is automatically set according to the size of the graph screen.

Closing/Redisplaying the Graph Screen



If you close the graph screen, the word "Function" on the numeric list screen turns white. Click to redraw the graph screen.

## 4.10 Numeric Value Display Function (Synchronization Mode)

The functions explained in this section can be used when connected to the WT1600 or WT3000, can not be used when connected to the WT500.

### Displaying the Numeric Screen(Synchronization Mode)

In steps 8–10 in section 4.1, numeric data is loaded and displayed.

Each function and operating procedure in the Numeric View (Synchronization Mode) screen except for the following are the same as the numeric display in section 4.2. For details, see section 4.2.

- Forms
- WT ID
- WF Settings

### WT3000 Display Example

Select the number of numeric data to display. Select 12, 24, 48, or 100.

No.	Function	Element	Order	WT ID	Data	Units	Measure
1	WF01	---	---	---	100.188	V	1
2	WF02	---	---	---	100.203	V	1
3	WF03	---	---	---	100.069	V	1
4	WF04	---	---	---	473.600m	A	4
5	WF05	---	---	---	564.901m	A	5
6	WF06	---	---	---	0.000	A	5
7	WF07	---	---	---	53.0084	W	5
8	WF08	---	---	---	52.7245	W	5
9	WF09	---	---	---	0.000	W	1
10	WF10	---	---	---	100.188	V	1

Setting WTV functions

Displays ID of the WT that acquired the data.

### Note

If WTV functions (WF01–WF15) are set as the displayed items for Function, the Element, Order, and WT ID boxes always display ---.

### Changing the WTV Function (WF) Definition

Even if the communication mode is Off-Line, you can change, save, or load the WTV function definitions.

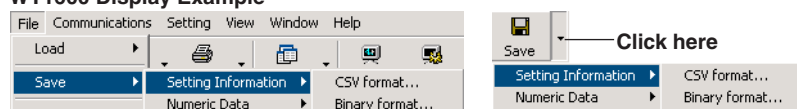
However, the numeric display uses measured data that is loaded, therefore even if you change the WTV function definition, it is not reflected in the numeric display.

## 5.1 Saving Settings

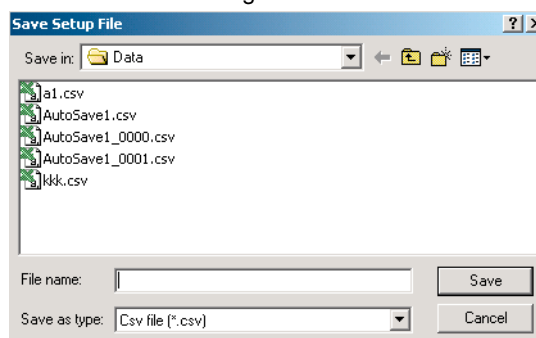
You can save WT settings that were entered in Off-Line mode. For details on the data format of settings, see section 5.2.

1. Choose **File > Save > Setting Information** from the menu bar, or click **Save** and select Setting Information.
2. Select a save format. The Save Setup File dialog box appears.
  - On the WT1600, select from CSV or BIN format. BIN is a format that can be loaded by WTVIEWER. CSV format can be opened in commercial spreadsheet programs (such as Excel).
  - On the WT500 and WT3000, only CFG format can be selected. CFG is a format that can be loaded by WTVIEWER.

### WT1600 Display Example



3. Enter a **save location** and a **file name**.
4. Click **Save**. The settings are saved.



### Note

Settings saved in CSV format can be opened in commercial spreadsheet programs (such as Excel).

### Example

Set Data									
Input									
ElementOb	Element1								
WiringPatte	[1 P2W]	[1 P2W]	[1 P2W]	[1 P2W]	[1 P2W]	[1 P2W]			
WiringSigm	1 P2W	1 P2W	1 P2W						
Wiring	None	None	None	None	None	None			
WiringSigmaforElem									
PhiHeaderStr									
Module	ModuleID	1000V	5A_Sen	1000V	5A_Sen	1000V	5A_Sen	1000V	
	Label								
	Unit								
	Terminal		Direct		Direct		Direct		
	AutoRange	Off	Off	Off	Off	Off	Off	Off	
	VoltageRar	1.5V		AUTO		AUTO		AUTO	
	CurrentRange		AUTO		AUTO		AUTO		
	CurrentRangeSen		AUTO		AUTO		AUTO		
	LineFilter	Off	Off	Off	Off	Off	Off	Off	
	ZeroCrossf	Off	Off	Off	Off	Off	Off	Off	
	VerticalZoc	x1	x1	x1	x1	x1	x1	x1	
	SensorRatio		0		0		0		

If you load data saved in BIN format by WTVIEWER when in On-Line mode, you can change the WT settings. Also, if you load BIN format data when in Off-Line mode, the display conditions of the measured data become those of the loaded file.

## 5.2 Saving Numeric, Waveform, and Harmonic Data

You can save the data displayed on WTVIEWER in the data formats given in the table below. Note that CSV format files cannot be read by WTVIEWER. These types of files can be opened in commercial spreadsheet programs (such as Excel).

**File Types and Extensions**

Type	WT1600		WT500, WT3000	
Settings	CSV format (.csv)	BIN format (.set)	— <sup>*1</sup>	CFG format (.cfg)
Numeric data	CSV format (.csv)	BIN format (.wta)	CSV format (.csv)	WTN format (.wtn)
Waveform display data	CSV format (.csv)	BIN format (.wta)	CSV format (.csv)	WTW format (.wtw)
Harmonic data	CSV format (.csv)	BIN format (.wta)	— <sup>*2</sup>	— <sup>*2</sup>
Waveform sampling data <sup>*3</sup> (Math and FFT data)	—	—	CSV format (.csv)	WVF format (.wvf) and (.hdr)
Cycle-by-cycle data <sup>*3</sup>	—	—	CSV format (.csv)	CBC format (.cbc)

<sup>\*1</sup> If WTVIEWER is working with the WT500 or WT3000, the function whereby settings are saved in CSV format is not available.

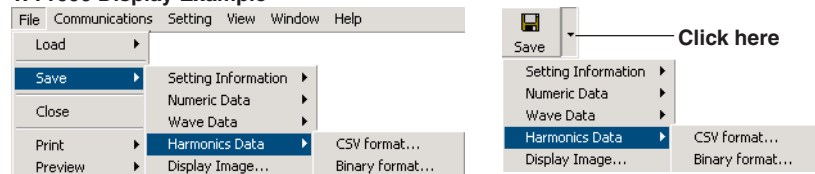
<sup>\*2</sup> The WT500 and WT3000 measures the numeric data of normal measurement and harmonic data simultaneously in normal measurement mode. Therefore, harmonic data is stored as numeric data. Unlike the WT1600 that measures and stores only the harmonic data, the WT500 and WT3000 does not create files containing only harmonic data.

<sup>\*3</sup> If WTVIEWER is controlling the WT500 or WT1600, the function for saving the waveform sampling data and cycle-by-cycle data is not available.

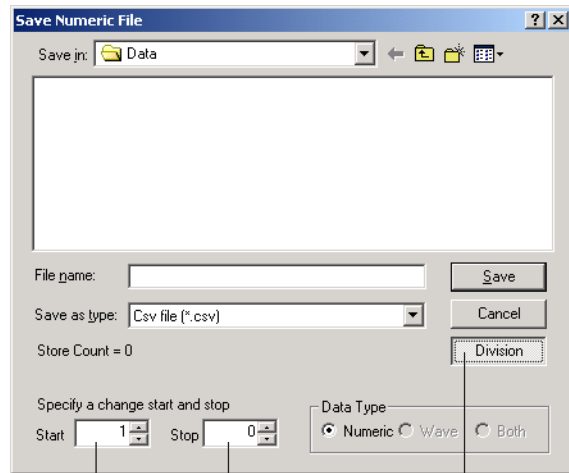
<sup>\*4</sup> If you save the data in WVF format, two files, .wvf and .hdr, are created. To load data in WVF format into WTVIEWER, place these files in the same directory. The two files make up a single set. Both files must be present to load the data.

1. Choose **File > Save** from the menu bar, or click **Save**.
2. Select a data type to save from Numeric, Wave Data, or Harmonics Data.
3. Select a save format. The dialog box corresponding to the data opens.

**WT1600 Display Example**



4. Enter a save location and a file name.
  - If saving CSV format numeric and harmonics data, proceed to step 5.
  - If saving data other than CSV format numeric and harmonics data, proceed to step 7.



Enter the Data Number range of the stored data to be saved.

Click here to display a box for specifying the store Start and Stop numbers.

5. If saving CSV format numeric and harmonics data, click Division. The store Start and Stop number entry boxes appear.
6. Specify the data numbers to save in the store Start and Stop number boxes.
  - Specify the range of data numbers (see section 3.3 or 3.5) to save out of the data loaded on WTVIEWER.
7. Click **Save**. The data is saved.

### Note

- If the Save button is clicked to save data, all data time stamps are set uniformly to the time that the data was saved upon clicking the Save button. When saving using the AutoSaving function described in section 3.3 or 3.5, the time stamp of each data is the time at which WTVIEWER updated the data. In both cases, this is not the time the data was measured on the WT.
- If you select multiple target WTs (from WT-1, WT-2, WT-3, and WT-4), only the measured data (numeric, waveform, and harmonics data) of the smallest-numbered WT is saved. This data is saved even if it is not displayed.
- When measurement is finished and you close the numeric or harmonics list screen, all data other than that which was visible up to that point is deleted. To save data other than visible data as well, save the data before closing the numeric or harmonics list display. Using the AutoSaving function, you can save data during download (in CSV format only).
- Even if you close the numeric or harmonics list screen after measurement is finished, the data visible up to that point is held until you either exit WTVIEWER, change the communication mode, or start the next measurement. If you click Display or View on the menu bar and select the numeric or harmonics list screen, the data that was visible before closing the screen is displayed.
- If Off-Line mode, if data displayed under certain settings (for example, A.set) is loaded using different settings (for example B.set) and then saved in CSV or BIN format, the saved data changes to the B.set settings.



### Saving Data in Waveform Computation (Math) and FFT Modes on the WT3000

The saving of the data in waveform computation (Math) and FFT modes differ from other measurement modes.

In waveform computation (Math) or FFT mode, you can display waveform sampling data or waveform display data (see page 3-28). The procedure to save the data for each type of data is explained below.

#### Saving the Waveform Sampling Data

1. Load the waveform sampling data from the WT3000 in waveform computation (Math) or FFT mode.
2. Like the waveform display data in other measurement modes explained on the previous page, choose **File > Save** and select the data format to save the file. If you are saving the data in CSV format, you can click the Detail button to set the save options (see the next page).

#### Note

---

- If the waveform display data is loaded after the waveform sampling data is loaded from the WT3000 in waveform computation (Math) or FFT mode, the waveform sampling data that was loaded in advance is held in the PC. (However, the data cannot be redisplayed on the PC screen.) It is possible to save the waveform sampling data by choosing File > Save while the waveform display data is being displayed.
  - Even if you change to other measurements modes and load numeric or waveform display data after loading the waveform sampling data from the WT3000, the waveform sampling data is held in the PC (however, the data cannot be redisplayed on the PC screen). You can save the waveform sampling data by switching to waveform computation (Math) or FFT mode and choosing File > Save.  
If you load additional waveform sampling data from the WT3000 after changing to waveform computation (Math) or FFT mode, the waveform sampling data loaded previously is lost.
- 

#### Saving the Data in CSV Format

- If you are saving the waveform sampling data in CSV format in waveform computation (Math) or FFT mode, and the number of data lines exceeds 32000, the data is divided into multiple files every 32000 lines. In this case, the files are saved with name containing an incrementing sequence number as follows: Data\_001.csv, Data\_002.csv, Data\_003.csv, ..., and Data\_999.csv.
- For details on the number of waveform sampling data points, see section 9.3 in the WT3000 User's Manual.

#### Saving the Data in WVF Format

If you save the data in WVF format, two files, .wvf and .hdr, are created. To load data in WVF format into WTViewer, place these files in the same directory. The two files make up a single set. Both files must be present to load the data.

Detail Setting Screen

Select the waveform to be saved

Select or deselect all waveforms to be saved (ALL ON or ALL OFF)

Save Wave File

Save in: Data

File name:

Save as type: Csv file (\*.csv)

Save

Cancel

Normal

Trace Name	Record Length	Sampling Interval
<input checked="" type="checkbox"/> U1	20000	5.00000usec
<input checked="" type="checkbox"/> I1	20000	5.00000usec
<input checked="" type="checkbox"/> U2	20000	5.00000usec
<input checked="" type="checkbox"/> I2	20000	5.00000usec
<input checked="" type="checkbox"/> U3	20000	5.00000usec
<input checked="" type="checkbox"/> I3	20000	5.00000usec
<input checked="" type="checkbox"/> U4	20000	5.00000usec
<input checked="" type="checkbox"/> I4	20000	5.00000usec
<input checked="" type="checkbox"/> Speed	20000	5.00000usec
<input checked="" type="checkbox"/> Torque	20000	5.00000usec
<input checked="" type="checkbox"/> FFT1	10001	10.00000sec
<input checked="" type="checkbox"/> FFT2	10001	10.00000sec

ALL ON

Data Settings

Range: ALL

Comp.: None

Comp. Rate: 5

ASCII File Settings

☐ No header

☐ Time Info.

Data Settings

Range	ALL	All data
	Zoom	Data displayed in the active zoom window screen
		All data if there is no active zoom screen
	Cursor	Data in the cursor range of the waveform window
		All data if cursors are not set
Comp.	None	No compression
	PP	PP compression
	Simple	Simple decimation
Comp. Rate	Can be set if compression is set to PP or Simple	

ASCII File Settings

- No Header Include or not include the header
- Time Info. Include or not include time information

If both the No Header and Time Info. check boxes are not selected

Header

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Math Data												
2	Item	U1	I1	U2	I2	U3	I3	U4	I4	Speed	Torque	Math1	Math2
3	1	3.1E-01	2.66E-02	4.21E-01	1.87E-02	2.20E-02	6.421	1.32E-01	-1.53E-03	-6.59E-03	3.42E-04	3.48E-03	1.31E-01
4	2	1.31E-01	2.33E-02	3.08E-01	1.54E-02	8.88E-03	6.7601	1.32E-01	-8.07E-03	2.94E-03	3.42E-04	3.05E-03	1.31E-01
5	3	4.70E-01	2.66E-02	5.34E-01	2.20E-02	1.22E-02	6.9862	1.94E-02	-4.80E-03	1.99E-03	6.06E-03	1.25E-02	4.70E-01
6	4	5.83E-01	2.00E-02	5.34E-01	2.52E-02	1.54E-02	6.9862	1.32E-01	-4.80E-03	-6.59E-03	3.42E-04	1.17E-02	5.83E-01
7	5	1.4876	2.98E-02	8.73E-01	2.20E-02	2.52E-02	6.9862	1.94E-02	1.74E-03	-8.72E-04	1.30E-03	4.44E-02	1.4876
8	6	1.1485	2.33E-02	1.325	1.87E-02	8.88E-03	7.4383	1.94E-02	-8.07E-03	-4.69E-03	3.42E-04	2.67E-02	1.1485

Data number

If both the No Header and Time Info. check boxes are selected

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	0	1.31E-01	2.66E-02	4.21E-01	1.87E-02	2.20E-02	6.421	1.32E-01	-1.53E-03	-6.59E-03	3.42E-04	3.48E-03	1.31E-01
2	0.000005	1.31E-01	2.33E-02	3.08E-01	1.54E-02	8.88E-03	6.7601	1.32E-01	-8.07E-03	2.94E-03	3.42E-04	3.05E-03	1.31E-01
3	0.00001	4.70E-01	2.66E-02	5.34E-01	2.20E-02	1.22E-02	6.9862	1.94E-02	-4.80E-03	1.99E-03	6.06E-03	1.25E-02	4.70E-01
4	0.000015	5.83E-01	2.00E-02	5.34E-01	2.52E-02	1.54E-02	6.9862	1.32E-01	-4.80E-03	-6.59E-03	3.42E-04	1.17E-02	5.83E-01
5	0.00002	1.4876	2.98E-02	8.73E-01	2.20E-02	2.52E-02	6.9862	1.94E-02	1.74E-03	-8.72E-04	1.30E-03	4.44E-02	1.4876
6	0.000025	1.1485	2.33E-02	1.325	1.87E-02	8.88E-03	7.4383	1.94E-02	-8.07E-03	-4.69E-03	3.42E-04	2.67E-02	1.1485
7	0.00003	1.7136	2.66E-02	1.438	2.52E-02	8.88E-03	7.5514	-9.36E-02	-1.46E-02	1.99E-03	3.42E-04	4.55E-02	1.7136
8	0.000035	1.7136	1.35E-02	1.7771	3.18E-02	1.22E-02	7.6644	-2.07E-01	-8.07E-03	5.80E-03	-1.11E-02	2.31E-02	1.7136

Time Info.

### Saving the Waveform Display Data

1. Load the waveform display data from the WT3000 in waveform computation (Math) or FFT mode.
2. Set the measurement mode to Normal.
3. From the View menu, choose Wave (see section 3.1).  
The waveform does not appear, but you can save the data in this condition.
4. Choose **File** > **Save** and select the data format to save the data.

#### **Note**

---

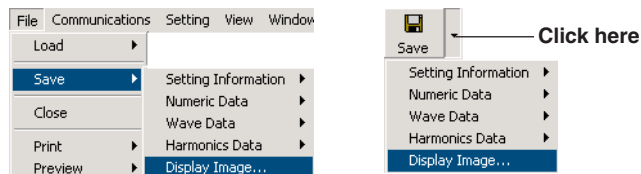
The waveform display data of waveform computation or FFT is held in the PC even if the waveform is not displayed as a result of switching the measurement mode. The waveform display data is held until new waveform display data is loaded.

---

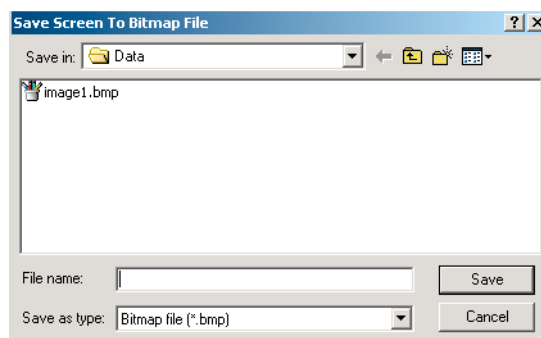
## 5.3 Saving PC Screen Image Data

When connected to the WT1600, you can save WTVIEWER screen images in BMP (.bmp) format. Only active display screens can be saved.

1. Choose **File > Save > Display Image** from the menu bar, or click **Save** and select Display Image. The Save Screen To Bitmap File dialog box appears.



2. Enter a **save location** and a **file name**.



3. Click **Save**. The screen image data is saved.

### Note

This function cannot be used when connected to the WT500 or WT3000. Use the Windows print screen function.

## 5.4 Transferring Data between the WT and the PC (FTP Client Function)

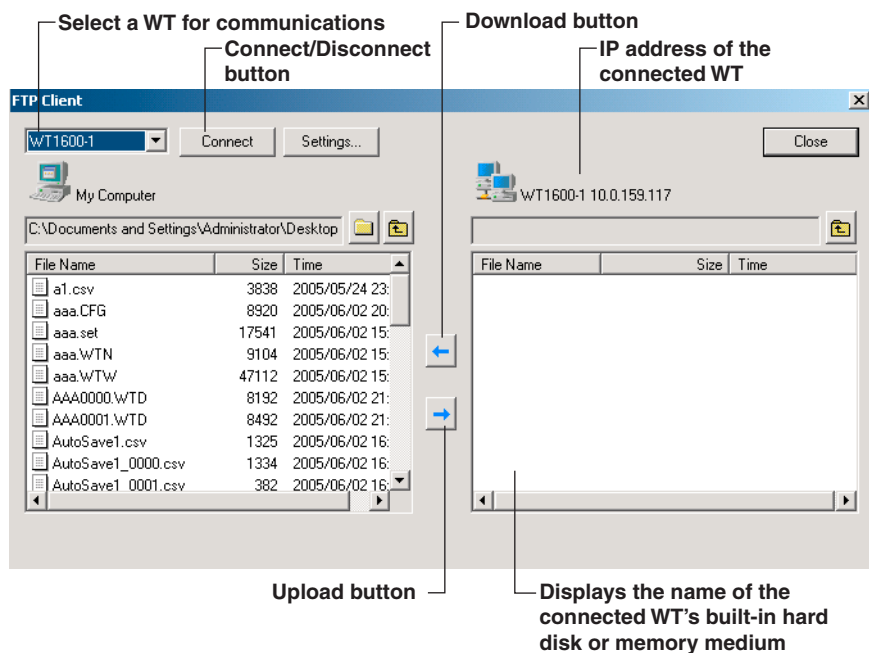
If the WT and PC are configured for Ethernet communications, files can be exchanged between the WT's and PC's internal hard disks and other memory media.

1. Choose **File > FTP Client** from the menu bar. The FTP Client dialog box is displayed.
  - If the communication interface is GP-IB or RS-232, proceed to step 2.
  - If the communication interface is Ethernet, proceed to step 4 on the next page.

### WT1600 Display Example



2. Click **Settings**. The Connection (Ethernet) dialog box is displayed.



3. Select target WTs and enter the **IP address**, **user name**, and **password** for each, then click **OK**. The Connection (Ethernet) dialog box closes.

### WT500 Display Example

### WT1600 and WT3000 Display Example

### Note

- If you click OK, file transfer using Ethernet is enabled, but the communication interface (GP-IB and RS-232) settings cannot be changed.
- Even if the communication interface is GP-IB or RS-232, connect an Ethernet cable between the WT and PC in addition to a GP-IB cable or serial interface cable.



4. Select a single target WT, then click **Connect**. The IP address and the name of the hard disk or other memory media for the WTs available for communications is displayed. Connect changes to Disconnect.

The conditions under which Connect and Disconnect are displayed are as follows.

- Connect: When not connected, or when paused
- Disconnect: When connected

### Note

If you click Disconnect, the connection with the WT is dropped, and the hard disk or memory medium name disappears from the screen.

5. After specifying the files to upload (transfer from the PC to the WT) or download (transfer from the WT to the PC) and the transfer destination, click Upload  or Download .

### Note

You can drag and drop files to the destination to transfer them.

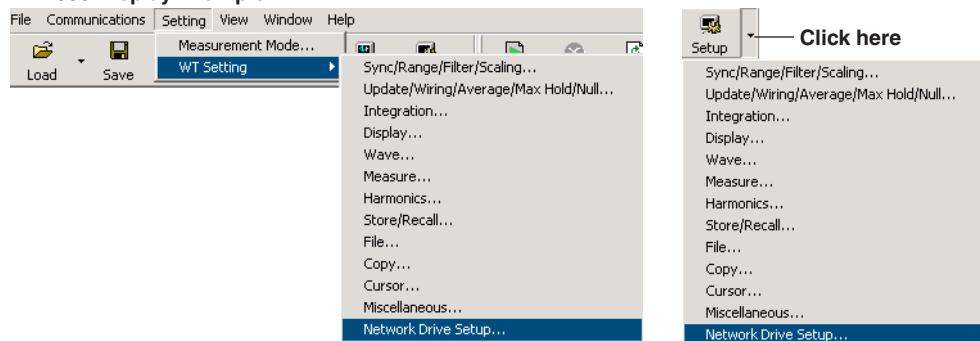
## 5.5 FTP Server Function

When the WT and PC are Ethernet communication-enabled, you can connect a WT acting as the the FTP server to the PC and save data from the WT built-in hard disk or memory medium directly on the PC.

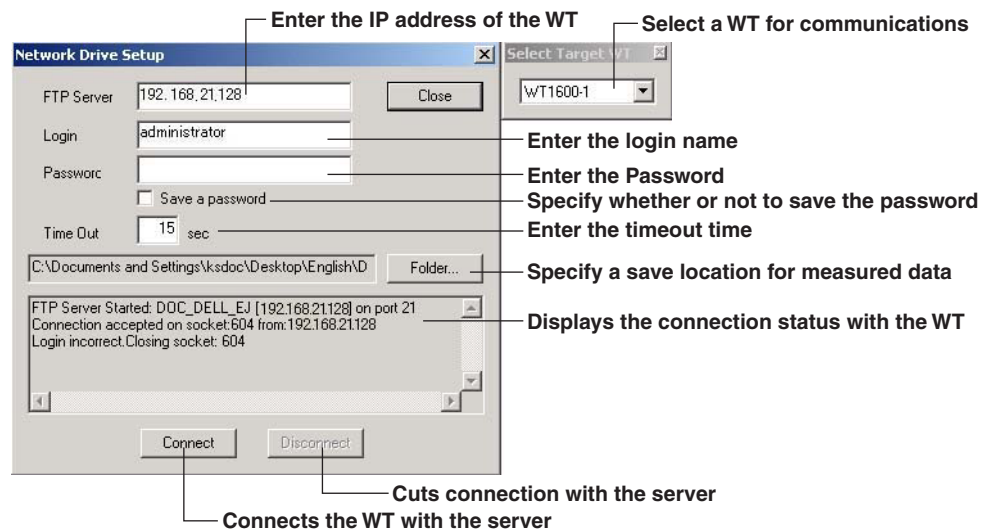
The functions explained in this section can be used when connected to the WT1600 or WT3000, can not be used when connected to the WT500.

1. Choose **Setting > WT Setting > Network Drive Setup** from the menu bar, or click **Setup** and select **Network Drive Setup**. The Network Drive Setup and Select Target WT dialog boxes appear.

WT1600 Display Example



2. Select the target WT in the Select Target WT dialog box.
3. In the Network Drive Setup dialog box, set the WT IP address, login name, password, timeout time, and measured data save location.

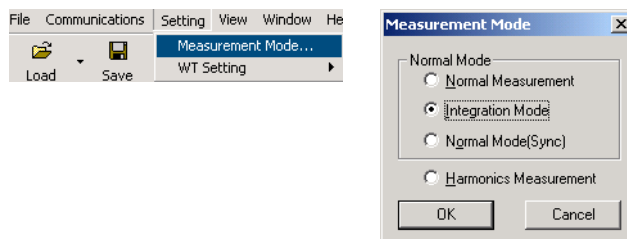


4. Click **Connect**. A server connection is opened with the WT. Disconnect becomes active.  
To close the server connection, click **Disconnect**.

## 6.1 Precautions While Operating the Software

You can use WTVIEWER to enter settings on the WT. The following are points to note when entering settings.

- For details on settings, see the WT main unit user's manual.
- Check the user's manual for the input range, number of characters, supported characters, and other restrictions for text box entry of each item. An error message will appear if the settings do not fall within those limits.
- When Normal Measurement or Harmonics Measurement mode is set on the WT1600, integration settings cannot be entered. You must choose **Setting > Measurement Mode > Integration Mode** ahead of time.

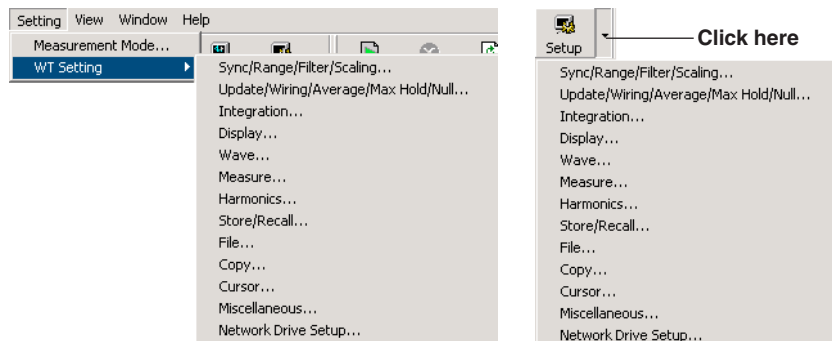


- Except for execution buttons such as Execute, Send, and Store Start, all settings are applied to the WT each time a setting is entered.
- Multiple setting dialog boxes cannot be displayed. Close the open settings dialog box then open a new settings dialog box.
- WTVIEWER cannot be used to enter display color settings on the WT, select screen image colors, enter a network printer name, select a resolution when printing screen images to a network printer, or for other tasks. These settings must be entered on the WT directly.
- Integration settings cannot be entered while in Harmonics Measurement mode, or when downloading waveforms.
- If the settings dialog box is displayed during communication with the WT, data display and measurement pauses. When the settings dialog box is closed, data display and measurement resumes.
- To display the waveform, bar graph, vector, or trend screen, first set up the measurement functions and elements in advance in the numeric value screen or harmonics list screen.



## 6.2 Settings Dialog Box (WT1600)

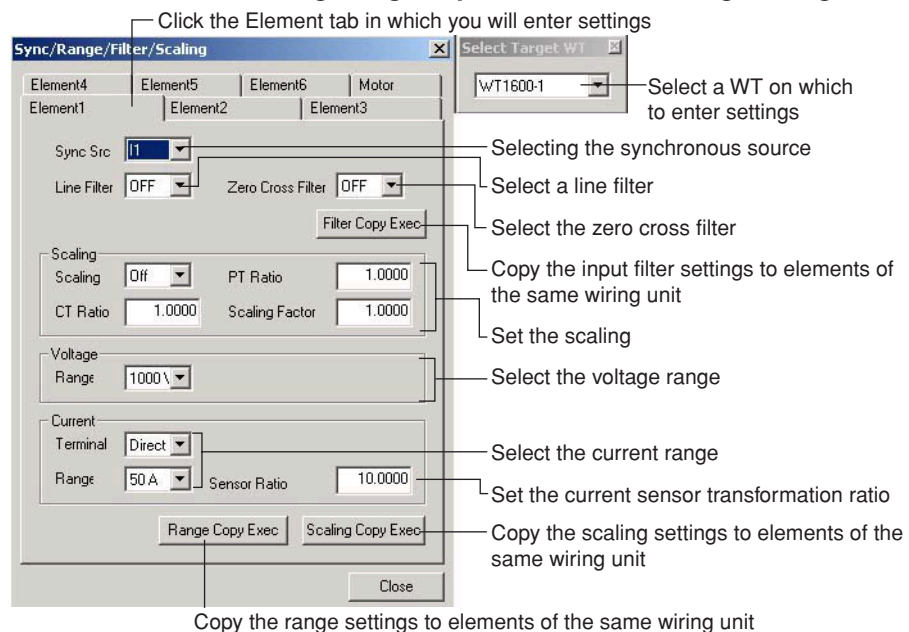
1. Choose **Setting > WT Setting** from the menu bar, or click **Setup**.



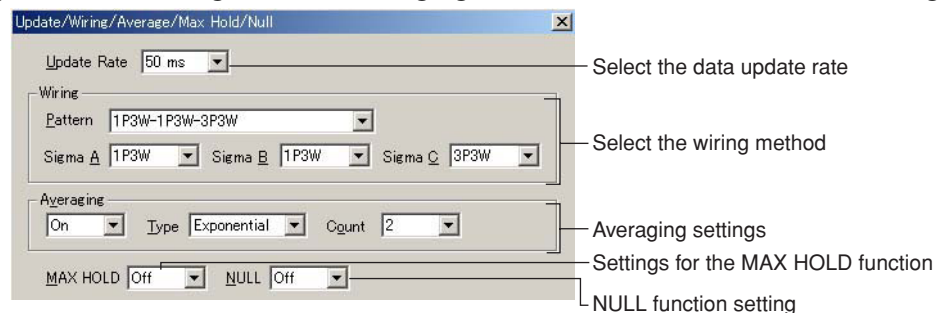
2. Select the item for which you wish to enter settings. The dialog box for the selected item appears.
3. Change the settings as needed.

The following shows a display example of the settings dialog box. The Select Target WT dialog box is displayed simultaneously with all setting screens. Enter settings after selecting the target WT in the Select Target WT dialog box.

### Synchronous Source, Measuring Range, Input Filter, and Scaling Settings



### Data Update Rate, Wiring Method, Averaging, MAX Hold, and Null Function Settings



### Integration Settings

Integration Settings dialog box annotations:

- Mode: Normal (Select the Integration mode)
- Independent Control: Off (Turn integration by element ON or OFF)
- Element1 to Element6 tabs (Click the Element tab in which you will enter settings)
- Timer: 0 Hour 0 Minute 0 Second (Set the integration time)
- Start: 2001 / 1 / 1 0 : 0 : 0 (Set the integration start reserve time)
- Stop: 2001 / 1 / 1 1 : 0 : 0 (Set the integration stop reserve time)
- Current Mode: RMS (Select the current/integration mode of the current mode)
- Auto Cal: Off (Turn integration auto calibration ON or OFF)
- D/A Output Rated Time: 1 Hr 0 Min 0 Sec (Set the integration D/A output rated time)
- Close button

### Setting the Display Format

#### Numeric Value or Harmonics Data Display Format

Display dialog box annotations:

- Format: Numeric+Wave (Select the number of display items or list display)
- Click the display format tab in which you will enter settings
- Numeric, Bar, Vector, Trend, Wave, Information tabs
- Type: Single List (Enter the settings for the selected display format)
- 8 Lists & 16 Lists table:
 

Item No.	Function	Element	Order
1	U	1	Total
2	I	1	Total
3	P	1	Total
4	S	1	Total
5	Q	1	Total
6	U	1	1
7	I	1	1
8	P	1	1
9	S	1	1
10	Q	1	1
11	PF	1	1
12	Angle	1	1
13	AngleU	1	2

 (Click to display a combo box and select settings)
- Single List & Dual List section:
 

List No.	Function	Element	List No.	Function	Element
1	U	1	2	I	1
- Sigma List section:
 

Order
1

 (Select the Sigma List orders)
- If Single or Dual List is selected, set the measurement functions and elements.
- Close button

#### Bar Graph Display Format

Bar Graph Display Format dialog box annotations:

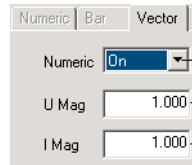
- Bar Format: Single (Set the number of screen divisions)
- Start Order: 1 (Set the display range of orders)
- Stop Order: 100 (Set the display range of orders)
- Item No., Function, Element table:
 

Item No.	Function	Element
1	U	1
2	I	1
3	P	1

 (Set the measurement functions and elements for the bar graph to display)

## 6.2 Settings Dialog Box (WT1600)

### Vector Display Format

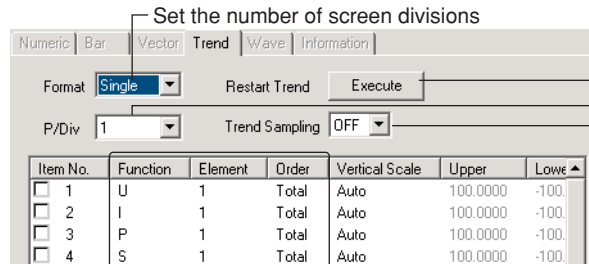


The Vector Display Format dialog box has three tabs: Numeric, Bar, and Vector. The Numeric tab is active. It contains a 'Numeric' dropdown menu set to 'On', and two input fields for 'U Mag' and 'I Mag', both set to '1.000'.

Turn numeric data display ON or OFF

Set the zoom factor

### Trend Display Format



The Trend Display Format dialog box has five tabs: Numeric, Bar, Vector, Trend, and Wave. The Trend tab is active. It contains a 'Format' dropdown menu set to 'Single', a 'Restart Trend' button, and an 'Execute' button. Below these are 'P/Div' (set to 1) and 'Trend Sampling' (set to OFF). At the bottom is a table with columns: Item No., Function, Element, Order, Vertical Scale, Upper, and Lower.

Set the number of screen divisions

Restart the trend

Set the time axis

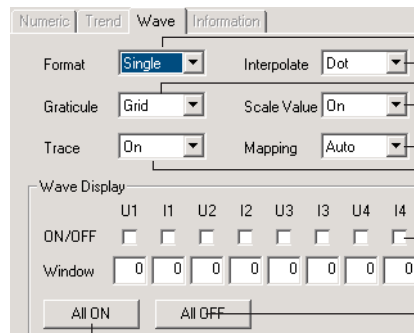
Select whether to acquire trend data

Item No.	Function	Element	Order	Vertical Scale	Upper	Lower
<input type="checkbox"/> 1	U	1	Total	Auto	100.0000	-100.
<input type="checkbox"/> 2	I	1	Total	Auto	100.0000	-100.
<input type="checkbox"/> 3	P	1	Total	Auto	100.0000	-100.
<input type="checkbox"/> 4	S	1	Total	Auto	100.0000	-100.

Click to display a combo box and select settings

If Manual is selected, you can enter the Upper and Lower settings

### Waveform Display Format



The Waveform Display Format dialog box has four tabs: Numeric, Trend, Wave, and Information. The Wave tab is active. It contains a 'Format' dropdown menu set to 'Single', an 'Interpolate' dropdown menu set to 'Dot', a 'Graticule' dropdown menu set to 'Grid', a 'Scale Value' dropdown menu set to 'On', a 'Trace' dropdown menu set to 'On', and a 'Mapping' dropdown menu set to 'Auto'. Below these is a 'Wave Display' section with a grid of checkboxes for U1, I1, U2, I2, U3, I3, U4, and I4. Below the grid are 'All ON' and 'All OFF' buttons.

Set the number of screen divisions

Select whether or not to interpolate the display

Select a graticule

Turn display of scale values ON or OFF

Select how waveforms are assigned to windows

Turn display of labels ON or OFF

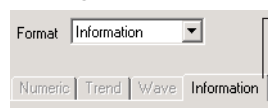
Select the waveforms to be displayed

Select in which window to display the waveform

Turn display of all waveforms OFF

Turn display of all waveforms ON

### Setting Information List



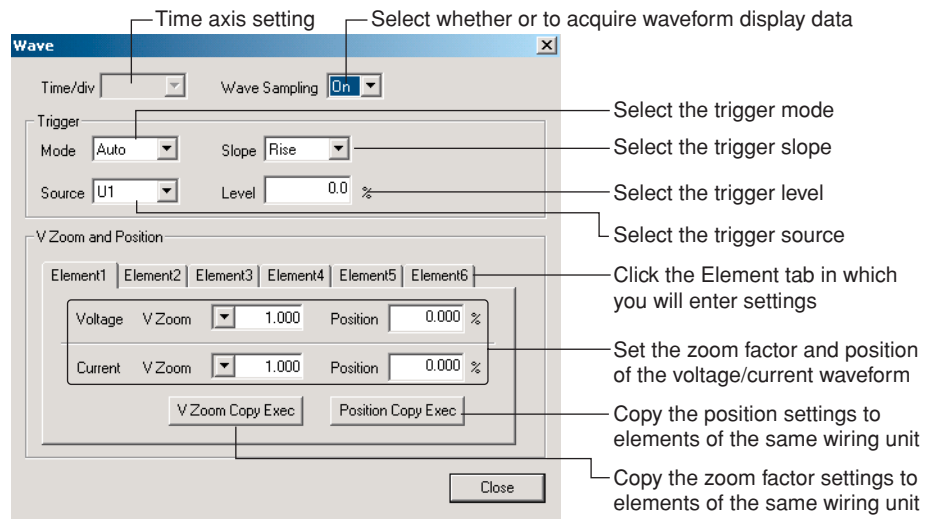
The Setting Information List dialog box has a 'Format' dropdown menu set to 'Information' and four tabs: Numeric, Trend, Wave, and Information. The Information tab is active.

Display list of settings in the WT screen

The list selected on the WT is displayed. You cannot select the list to be displayed using WTVIEWER. This is also true when controlling the WT through WTVIEWER. To select the list to be displayed, perform the following procedure.

1. Enter Off-Line mode on WTVIEWER, or execute Clear Remote on the WT.
2. Select a setting information list in the Display menu of the WT.
3. Open a connection again to the WT from WTVIEWER (On-Line mode).

### Entering Waveform Display Data Acquisition Conditions and Setting the VZoom and Vertical Position



Entering Power Measurement and Computation Conditions

Measure

Freq Item

Item 1 U1 Item 2 I1 Item 3 U2

Delta Computation

Object SigmaA Type OFF

S Formula

Urms\*Irms Phase 180 Lead/Lag

Sync Measure

Master

Pc Formula

IEC76-1(1976) P1 0.5000 P2 0.5000

User Defined

F1 ☒ Expression URMS(E1) Unit V

F2 ☒ Expression IRMS(E1) Unit A

F3 ☐ Expression UPPK(E1) Unit V

F4 ☐ Expression IPPK(E1) Unit A

Close

Select the signal for frequency measurement

Select the wiring unit for delta computation

Select the delta computation type

Select the formula for apparent power

Select the phase difference display format

Select Master or Slave

Set the formula for corrected power

Set user-defined math expressions

Set the units for computed results of user-defined math

Select the user defined computations to execute

User Define Function

Function Settings

User Function F1

Function

Urms

Element

1

Order

Urms(E1)

Set

DEL

BS

( )

LOG( )

LOG10( )

EXP( )

NEG( )

SQR( )

SQRT( )

ABS( )

7 8 9 /

4 5 6 \*

1 2 3 -

0 . +

Function Definition

Urms(E1)

Set

Undo ReSetting

Select user-defined math number which you will enter settings

Entering Operands  
The operands set for the Function, Element, and Order are displayed in the lower area. If you press the Set button, the currently displayed operand is added to the Function definition box at the bottom.

User Define Functions can be defined by combining operands, constants, and computational symbols. If you press the Set button, the User Define Function is applied and added to the User Define Function definition box in the left part of the dialog box.

Harmonic Measurement Settings

Harmonics

Mode

ON

Object

SigmaA

PLL Source

U1

Thd Formula

1/Total

Analysis Order

Min Order 0 Max Order 100

Window

8192

Close

Turn harmonic measurement ON or OFF

Select the wiring unit for measurement

Select the formula for strain factor

Select the PLL source

Set the range of analysis orders

Select the data length

6-6

IM 760122-01E

## Store Settings

Store/Recall dialog box annotations:

- Select Store here (points to Mode dropdown)
- Execute store start (points to Store Start button)
- Execute store stop (points to Store Stop button)
- Initialize the WT internal memory (points to Initialize Memory button)
- Select the store mode (points to Mode dropdown in Settings)
- Select the store destination (points to Store to dropdown)
- Set the number of times to store (points to Count field)
- Set the store interval (points to Interval fields)
- Set the store reserve time (points to Real Time Start/End fields)
- Select the type of data to store (points to Type dropdown in Store Contents)
- Click to display the detailed settings screen (points to Item List button)
- Select the data format when saving stored data (points to Type dropdown in Store File Settings)
- Enter comments (points to Comment field)
- Enter a file name (points to File Name field)
- Enter the save destination drive (points to Drive field)
- Select to turn ON the Auto Naming function (points to Auto Naming checkbox)

**Detailed Setting Screen for Stored Data**  
 (An example of the screen when numeric data is selected)

Item List dialog box annotations:

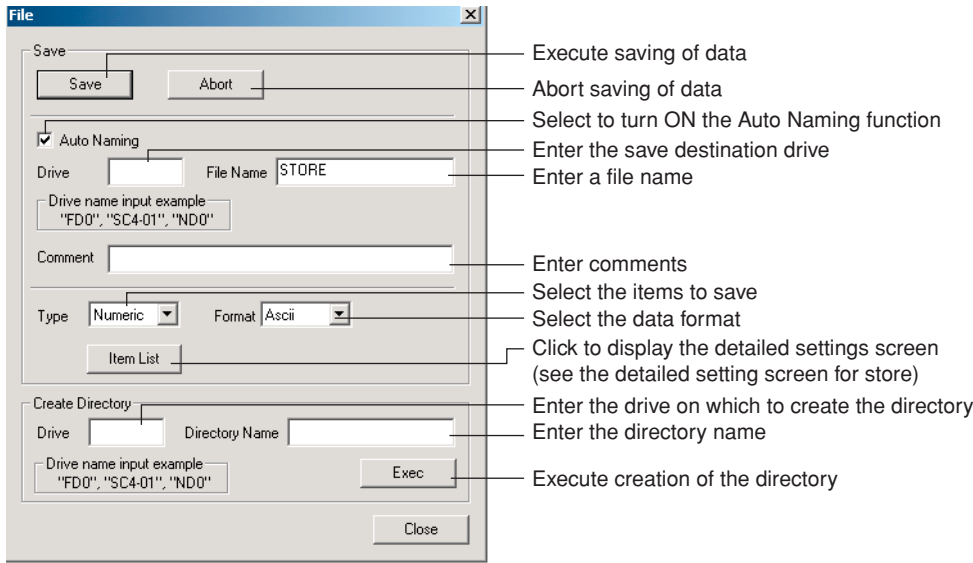
- Clears all check boxes (points to All Clear button)
- Selects all check boxes (points to All Set button)
- Select the items to be stored (points to the list of checkboxes)

## Recall Settings

Store/Recall dialog box annotations:

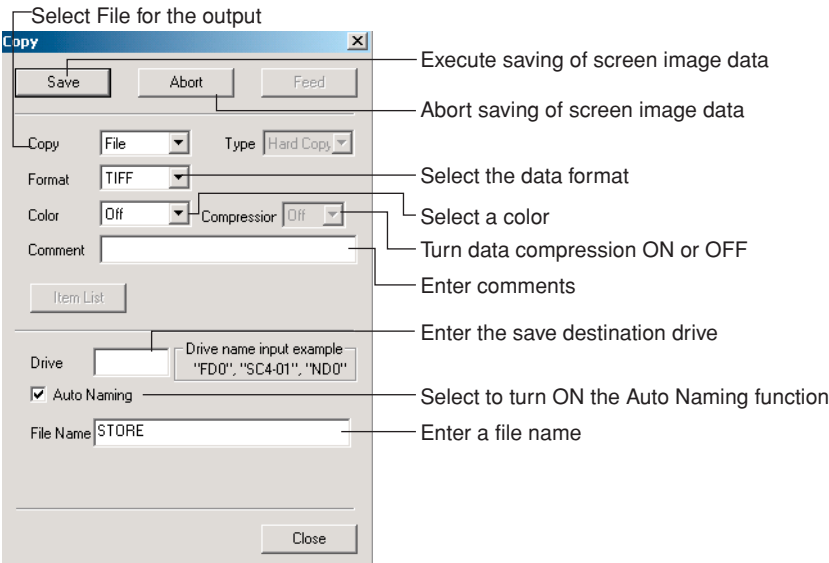
- Select Recall here (points to Mode dropdown)
- Enter the data number to recall (points to Recall Data field)
- Execute recall on the WT (points to OK button)

Data Save Settings

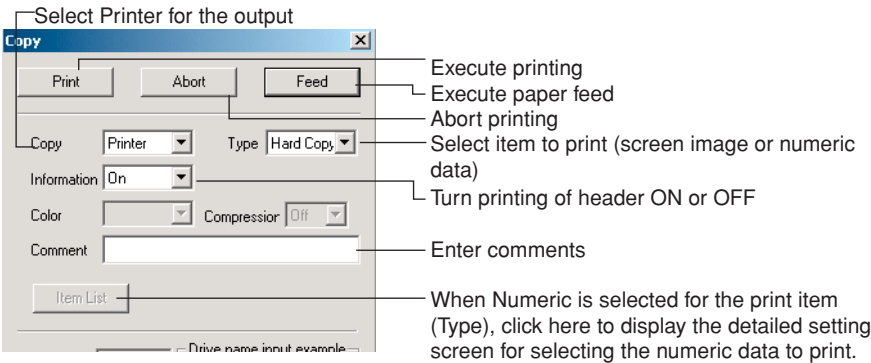


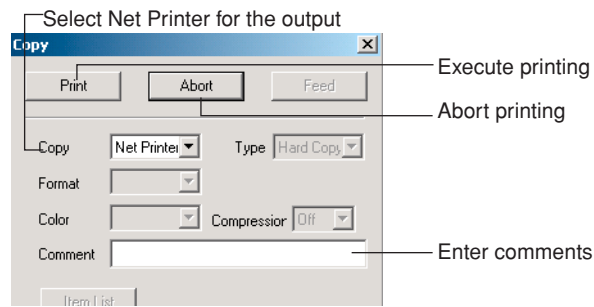
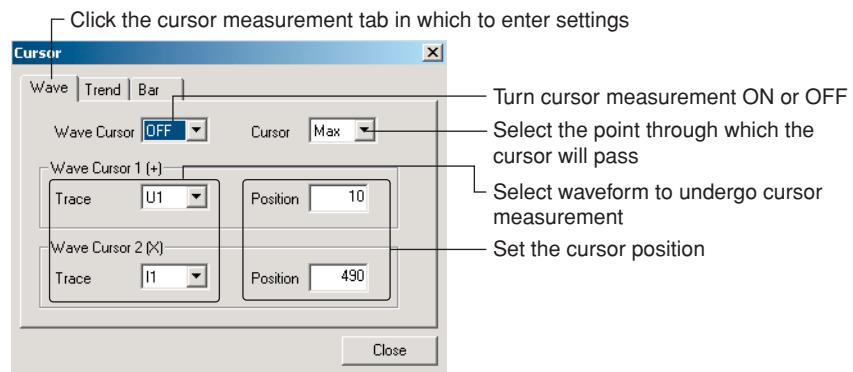
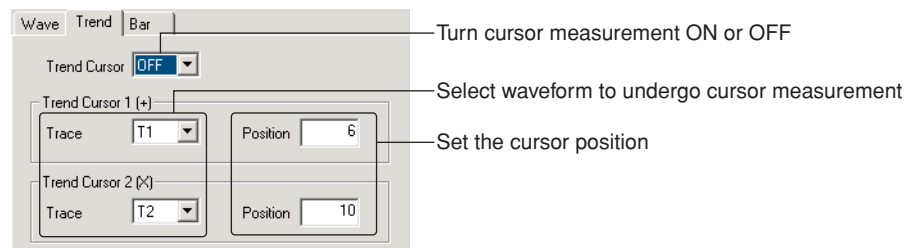
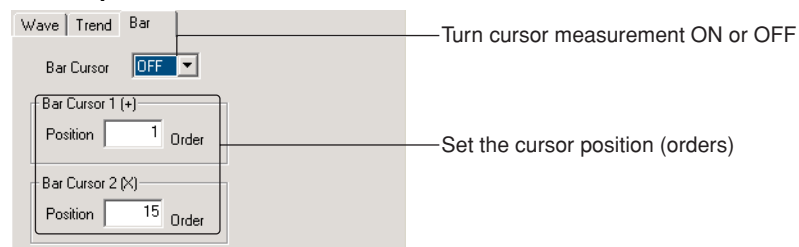
Saving Screen Images, Printing on the WT's Built-In Printer, and Setting Up Network Printers

Screen Image Saving



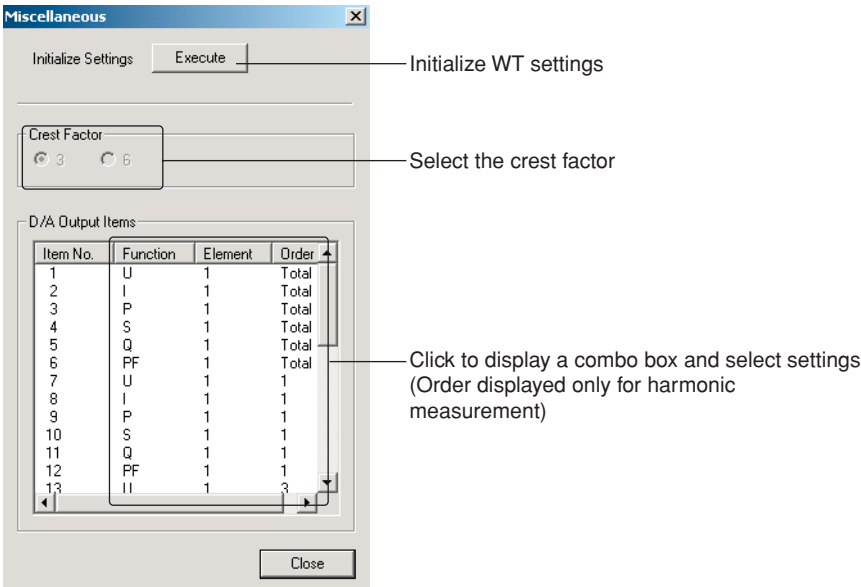
Printing on the WT's Built-In Printer



**Printing on Network Printers****Cursor Measurement Settings****Waveform Cursor Measurement****Trend Cursor Measurement****Bar Graph Cursor Measurement**



Initializing the WT, Selecting the Crest Factor, and Entering D/A Output Settings



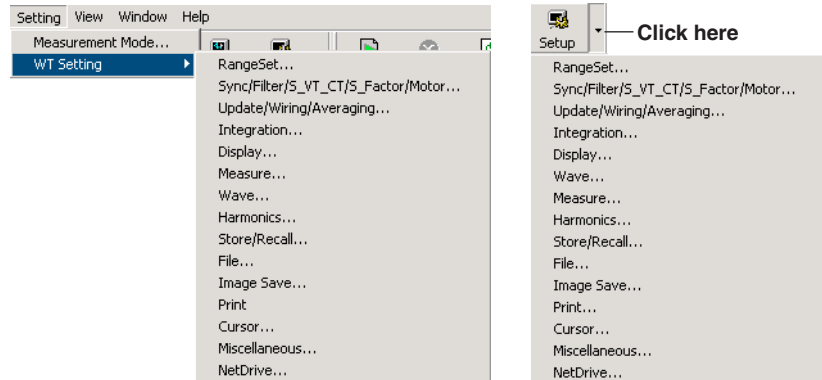
For information on initializing the WT, see the WT user's manual.

FTP Server Function Settings

For information on the WT Setting > Network Drive Setup command, see section 5.5, "FTP Server Function."

## 6.3 Settings Dialog Box (WT3000)

1. Choose **Setting > WT Setting** from the menu bar, or click **Setup**.



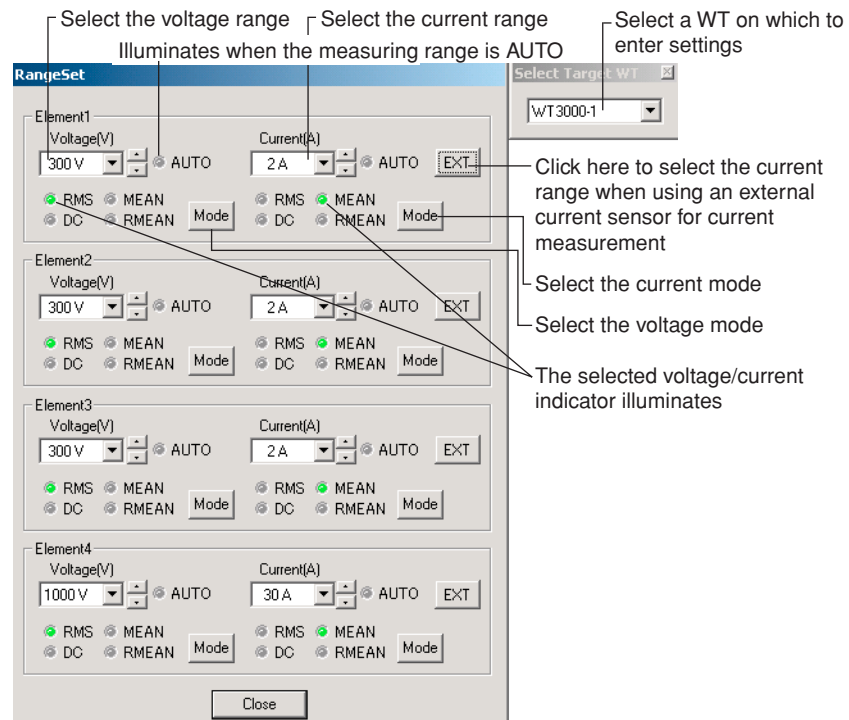
You can also display the dialog box for selecting the measuring range and voltage/current mode by clicking **Range** on the range setting bar.



2. Select the item for which you wish to enter settings. The dialog box for the selected item appears.
3. Change the settings as needed.

The following shows a display example of the settings dialog box. The Select Target WT dialog box is displayed simultaneously with all setting screens. Enter settings after selecting the target WT in the Select Target WT dialog box.

### Selecting the Measuring Range and Voltage/Current Mode



Synchronous Source, Input Filter, Scaling, External Current Sensor Conversion Ratio, and Motor Evaluation Function Settings

Selecting the Synchronous Source

Click the tab of the item to set

Sync/Filter/S\_VT\_CT/S\_Factor/Motor

Sync | Filter | S\_VT\_CT | S\_Factor | Motor

Element1 I1

Element2 I1

Element3 I1

Element4 I4

Close

Select the synchronous source

Selecting the Input Filter

Sync | Filter | S\_VT\_CT | S\_Factor | Motor

Element1

Line Filter OFF Zero Cross Filter OFF

Element2

Line Filter OFF Zero Cross Filter OFF

Element3

Line Filter OFF Zero Cross Filter OFF

Element4

Line Filter OFF Zero Cross Filter OFF

Select a line filter

Select a frequency filter (zero cross filter)

### Scaling and External Current Sensor Transformation Ratio Settings

Set the external current sensor transformation ratio

Set the VT ratio      Set the CT ratio

Sync	Filter	S_VT_CT	S_Factor	Motor
Element1				
VT Ratio		1.0000	CT	1.0000
Sensor Ratio (mV/A)		10.0000		
Element2				
VT Ratio		1.0000	CT Ratio	1.0000
Sensor Ratio (mV/A)		10.0000		
Element3				
VT Ratio		1.0000	CT Ratio	1.0000
Sensor Ratio (mV/A)		10.0000		
Element4				
VT Ratio		1.0000	CT Ratio	1.0000
Sensor Ratio (mV/A)		10.0000		

Turn the scaling function ON or OFF

Set the scaling factor

Sync	Filter	S_VT_CT	S_Factor	Motor
Scaling <input type="button" value="Off"/>				
Element1				
Scaling Factor 1.0000				
Element2				
Scaling Factor 1.0000				
Element3				
Scaling Factor 1.0000				
Element4				
Scaling Factor 1.0000				

### Motor Evaluation Function Settings

Sync	Filter	S_VT_CT	S_Factor	Motor
Line Filter <input type="button" value="Off"/> Pole 2				
Sync Source NONE				
Speed				
Range 1 V		Sense Type Analog		
Pulse 0.0000		10000.000		
Scaling 1.0000		Unit rpm		
Pulse N 60		Sync I1		
Torque				
Range 20 V		Sense Type Analog		
Pulse -50.0000		50.0000		
Pulse Rated Upper 50.0000		Rated 15000.000		
Pulse Rated Lower -50.0000		Rated 5000.000		
Scaling 1.0000		Unit Nm		
Pm				
Scaling 1.0000		Unit W		

Select a line filter  
 Set the number of motor poles  
 Select the synchronous source  
 Select the analog range for the revolution signal  
 Select the type of revolution signal  
 Set the pulse range for the revolution signal (upper limit lower limit)  
 Set the scaling factor for the revolution signal  
 Set the units of revolution speed  
 Set the number of pulses per revolution of the revolution signal  
 Select the frequency measurement source  
 Select the analog range for the torque signal  
 Select the type for the torque signal  
 Set the pulse range for the torque signal (upper limit lower limit)  
 Set the pulse positive rated value for the torque signal (torque)  
 Set the pulse positive rated value for the torque signal (pulse frequency)  
 Set the pulse negative rated value for the torque signal (pulse frequency)  
 Set the pulse negative rated value for the torque signal (torque)  
 Set the units of torque  
 Set the scaling factor for the torque signal  
 Set the units of motor output  
 Set the factor for calculating the motor output

### Data Update Rate, Wiring Method, Wiring Compensation, Efficiency Correction, Averaging, Efficiency Equation, and Null Function Settings

**Update/Wiring/Averaging**

Update: 500 ms

Efficiency... (Opens a dialog box for setting up the efficiency formula.)

Wiring

Element1: 3P3W(3V3A) | Element2: 3P3W(3V3A) | Element3: 3P3W(3V3A) | Element4: 1P2W

Wiring: OFF | OFF | OFF | OFF (Select the wiring method)

Efficiency Compensation: OFF | 3P3W(3V3A) Compensation: On (Turn two-wattmeter method compensation ON or OFF)

Element Independent: OFF (Turn efficiency compensation ON or OFF)

Averaging: OFF | Type: Exponential | Count: 2 (Averaging settings)

NULL: OFF (NULL function setting)

Close

**Efficiency Formula Setting**

WiringEfficiency

Element: [ 1 ] [ 2 ] [ 3 ] [ 4 ] (Displays the selected wiring method)

[ 3P3W(3V3A) : A ] [ 1P2W ]

ETA1 =  $\frac{P_B}{P_A} \times 100\%$  | ETA2 =  $\frac{P_A}{P_B} \times 100\%$  (Select the formula for efficiency)

ETA3 =  $\frac{1}{1} \times 100\%$  | ETA4 =  $\frac{1}{1} \times 100\%$

Udef1 = P1 + NONE + NONE + NONE | Udef2 = P1 + NONE + NONE + NONE (Set items to add to the parameters used in the efficiency formula)

Close

### Integration Settings

**Integration**

Mode: R-Normal (Select the Integration mode)

Timer: 0 Hr 0 Min 0 Sec (Set the integration time)

Real Time Control

Start: 200 / 1 / 1 0 : 0 : 0 (Set the integration start reserve time)

Stop: 200 / 1 / 1 1 : 0 : 0 (Set the integration stop reserve time)

Auto Cal: Off (Turn integration auto calibration ON or OFF)

D/A Output Rated: 1 Hr 0 Min 0 Sec (Set integration D/A output rated time)

Close

## Setting the Display Format

### Numeric Value or Harmonics Data Display Format

Select the number of display items or list display

Enter the settings for the selected display format

Click the display format tab in which you will enter settings

Click to display a combo box and select settings

Select the display page. Not available when Single or Dual List is selected

If Single or Dual List is selected, set the measurement functions and elements.

**Display**

Format: Numeric

Numeric | Bar | Vector | Trend | Wave

Type: 16 List

4 Lists & 8 Lists & 16 Lists

Item No.	Function	Element	Order
1	U	1	Total
2	I	1	Total
3	P	1	Total
4	S	1	Total
5	Q	1	Total
6	PF	1	Total
7	Phi	1	Total
8	Pc	1	Total
9	FreqU	1	Total
10	FreqI	1	Total
11	Uppeak	1	Total
12	Umpeak	1	Total
13	Ippeak	1	Total

Single List & Dual List

List No.	Function	Element	List No.	Function	Element
1	U	1	2	I	1

Page No.  
No. 1

Close

### Bar Graph Display Format

Set the number of screen divisions

Set the display range of orders

Set the measurement functions and elements for the bar graph to display

Numeric | Bar | Vector | Trend | Wave

Bar Format: Single

Start Order: 1

Stop Order: 100

Item No.	Function	Element
1	U	1
2	I	1
3	P	1

Vector Display Format

Numeric Bar Vector T

Numeric  Turn numeric data display ON or OFF

U Mag  Set the zoom factor

I Mag

Object  Select the wiring unit

Trend Display Format

Numeric Bar Vector Trend Wave

Format  Restart Trend  Restarts the trend

T/Div  Time axis setting

Item No.	Function	Element	Order	Vertical Scale	Upper	Lower
<input checked="" type="checkbox"/> 1	U	1	Total	Auto	100.0000	-100.
<input checked="" type="checkbox"/> 2	I	1	Total	Auto	100.0000	-100.
<input checked="" type="checkbox"/> 3	P	1	Total	Auto	100.0000	-100.
<input checked="" type="checkbox"/> 4	S	1	Total	Auto	100.0000	-100.
<input checked="" type="checkbox"/> 5	Q	1	Total	Auto	100.0000	-100.
<input checked="" type="checkbox"/> 6	PF	1	Total	Auto	100.0000	-100.

Click to display a combo box and select settings

If Manual is selected for the time axis setting, you can enter the Upper and Lower settings

Waveform Display Format

Numeric Bar Vector Trend Wave

Format  Interpolate  Select whether or not to interpolate the display

Graticule  Scale Value  Turn display of scale values ON or OFF

Trace  Mapping  Select how waveforms are assigned to windows

Wave Display

	U1	I1	U2	I2	U3	I3	U4	I4	Spec	Torque
ON/OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Window	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

All ON All OFF

Turn display of all waveforms OFF

Turn display of all waveforms ON

Select in which window to display the waveform

Select the waveforms to be displayed

**Display Format of the Computed Waveform (Math Waveform)**

Set the number of screen divisions

Select the graticule

Show/hide the waveform labels

Format:  Interpolate:

Graticule:  Scale Value:

Trace Label:  Mapping:

Wave Display

	U1	I1	U2	I2	U3	I3	U4	I4	Speed	Torque	Math1	Math2
ON/OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Window	0	0	1	1	2	2	3	3	0	0	1	1

Select whether to interpolate the display

Show/hide the scale values

Select the waveform mapping

Select the waveforms to be displayed

Turn the waveform display OFF collectively

Turn the waveform display ON collectively

Set which window to display the waveform

**Display Format of the FFT**

Set the number of screen divisions

Select the graticule

Show/hide the waveform labels

Format:  Interpolate:

Graticule:  Scale Value:

Trace Label:

FFT Points:  FFT Window:

Disp Start:  Disp End:

Vertical Scale:  Spectrum Type:

Setting the Number of Computed Points

Select the time window

Select the display type of the power spectrum

Select the scale type of the Y-axis (signal amplitude)

Set the display range of the X-axis (frequency)

**Display Format of the Cycle-by-Cycle Measurement**

Select the displayed functions

Select the displayed elements/wiring units

Item No.	Function	Element
1	Freq	1
2	U	1
3	I	1
4	P	1
5	S	1

Page No.

Select the displayed page



Entering Power Measurement and Computation Conditions

Measure

Freq Item

option is used. U1-I4 are assigned in order.

Delta Computation

Object

SigmaA

Type

Delta->Star

S.Q

TYPE1

Phase

180 Lead/Lag

Sync Measure

Master

Pc Formula

IEC76-1(1976)

P1

0.5000

P2

0.5000

User Defined

	Expression	Unit
<input checked="" type="checkbox"/>	F1 UMN(E1)	V
<input checked="" type="checkbox"/>	F2 UMN(E2)	A
<input checked="" type="checkbox"/>	F3 UMN(E3)	V
<input type="checkbox"/>	F4 UMN(E4)	A
<input type="checkbox"/>	F5 U(E1,ORT)	V
<input type="checkbox"/>	F6 I(E1,ORT)	A

MAX

Off

Close

Select the signal for frequency measurement

Select the wiring unit for delta computation

Select the delta computation type

Select the formula for apparent power

Select the phase difference display format

Select Master or Slave

Set the formula for corrected power

Set user-defined math expressions

Set the units for computed results of user-defined math

Select the user defined computation to execute

Settings for the MAX HOLD function

User Define Function

Function Settings

User Function

F01

Function

U

Element

1

Order

Total

U(E1,ORT)

Set

DEL

BS

(

)

LOG(

LOG10(

EXP(

NEG(

SQR(

SQRT(

ABS(

7

8

9

/

4

5

6

\*

1

2

3

-

0

.

+

Function Definition

Undo

ReSetting

U(E1,ORT)

Set

Select user-defined math number which you will enter settings

Entering Operands

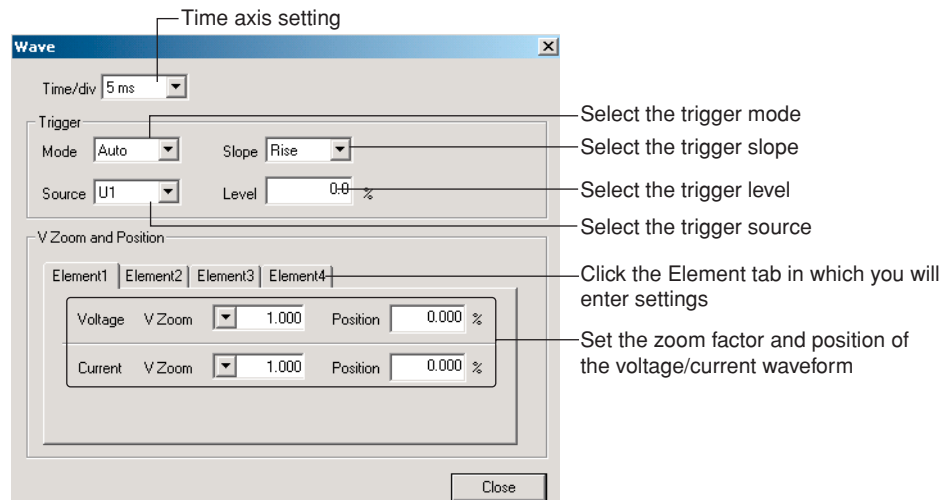
The operands set for the Function, Element, and Order are displayed in the lower area. If you press the Set button, the currently displayed operand is added to the Function definition box at the bottom.

User Define Functions can be defined by combining operands, constants, and computational symbols. If you press the Set button, the User Define Function is applied and added to the User Define Function definition box in the left part of the dialog box.

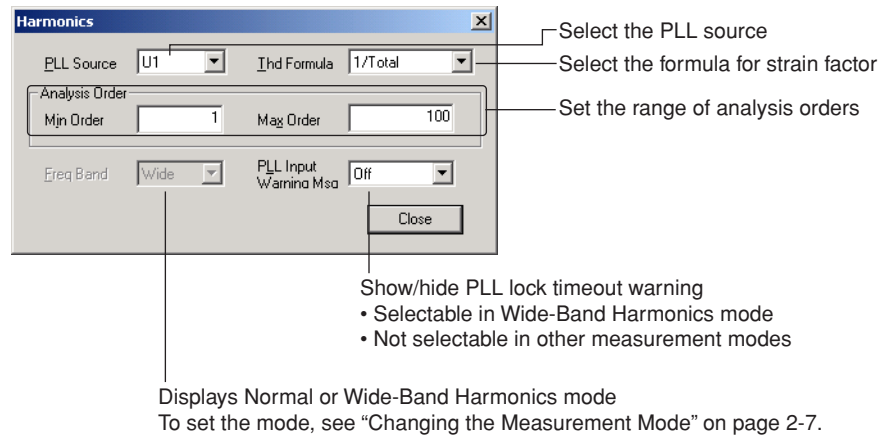
6-18

IM 760122-01E

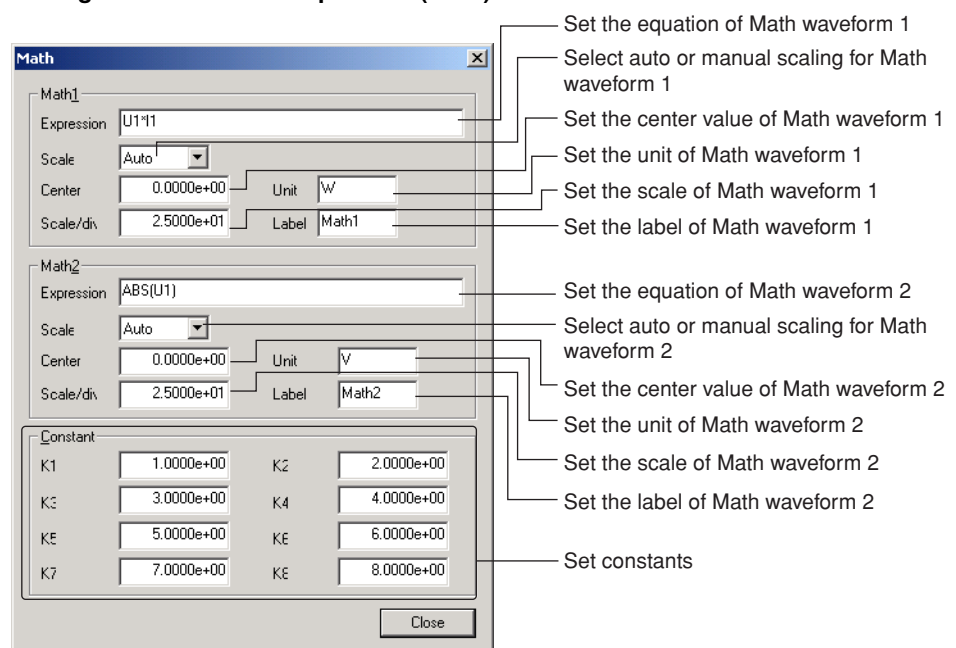
## Entering Waveform Display Data Acquisition Conditions and Setting the VZoom and Vertical Position



## Harmonic Measurement Settings



## Setting the Waveform Computation (Math)



Setting the FFT

Turn ON/OFF the FFT1 display  
Set the FFT1 target  
Set the FFT1 label

Turn ON/OFF the FFT2 display  
Set the FFT2 target  
Set the FFT2 label

Select the trigger slope  
Select the trigger level

Select the trigger source  
Select the trigger mode

The FFT dialog box contains two sections for FFT1 and FFT2. Each section has a 'Display' dropdown set to 'ON', an 'Objec' dropdown set to 'U1' and 'I1' respectively, and a 'Label' text field set to 'FFT1' and 'FFT2'. Below these is a 'Trigger' section with 'Mode' set to 'Auto', 'Slope' set to 'Rise', 'Source' set to 'U1', and 'Level' set to '0.0 %'. A 'Close' button is at the bottom right.

Setting the Cycle-by-Cycle Measurement

Select the synchronization source  
Set the cycle count

Select the slope of the synchronization source  
Set the timeout

Select the trigger slope  
Select the trigger level

Select the trigger source  
Select the trigger mode

The CycleByCycle dialog box features a 'Sync Source' dropdown set to 'U1', a 'Sync Slope' dropdown set to 'Rise', a 'Cycle Count' spinner set to '100', and a 'Time Out' spinner set to '12 sec'. It also includes a 'Trigger' section with 'Mode' set to 'Auto', 'Slope' set to 'Rise', 'Source' set to 'U1', and 'Level' set to '0.0 %'. A 'Close' button is located at the bottom.

## Store Settings

**Store/Recall** dialog box annotations:

- Select Store here (points to the Store/Recall tab)
- Mode: Store (dropdown menu)
- Execute store start (points to Store Start button)
- Execute store stop (points to Store Stop button)
- Initialize the WT internal memory (points to Initialize Memory button)
- Select the store mode (points to Mode dropdown)
- Select the store destination (points to Store to dropdown)
- Set the number of times to store (points to Count input field)
- Set the store interval (points to Interval input fields)
- Set the store reserve time (points to Real Time Start/End date/time pickers)
- Select the type of data to store (points to Type dropdown)
- Click to display the detailed settings screen (points to Item List button)
- Select the data format when saving stored data (points to Store File Settings Type dropdown)
- Enter comments (points to Comment input field)
- Enter a file name (points to File Name input field)
- Enter the save destination drive (points to Drive input field)
- Select to turn ON the Auto Naming function (points to Auto Naming checkbox)
- When trying to initialize the internal memory where the data is stored, select whether or not to display an alert message (points to Init Memory Alert Msg dropdown)

## Detailed Setting Screen for Stored Data

(An example of the screen when numeric data is selected)

**Item List** dialog box annotations:

- Clears all check boxes (points to All Clear button)
- Selects all check boxes (points to All Set button)
- Select the items to be stored (points to the list of items with checkboxes)

Item List contents (Numeric type):

<input checked="" type="checkbox"/> U	<input checked="" type="checkbox"/> I	<input checked="" type="checkbox"/> P	<input checked="" type="checkbox"/> S	<input checked="" type="checkbox"/> Q
<input checked="" type="checkbox"/> PF	<input checked="" type="checkbox"/> Phi	<input type="checkbox"/> PhiU	<input type="checkbox"/> Phil	<input checked="" type="checkbox"/> FreqU
<input checked="" type="checkbox"/> FreqI	<input type="checkbox"/> Z	<input type="checkbox"/> Rs	<input type="checkbox"/> Xs	<input type="checkbox"/> Rp
<input type="checkbox"/> Xp	<input type="checkbox"/> UhdI	<input type="checkbox"/> IhdI	<input type="checkbox"/> PhdI	<input type="checkbox"/> Uthd
<input type="checkbox"/> Ithd	<input type="checkbox"/> Pthd	<input type="checkbox"/> Uthf	<input type="checkbox"/> Ithf	<input type="checkbox"/> Uthf
<input type="checkbox"/> Itf	<input type="checkbox"/> hvf	<input type="checkbox"/> hcf	<input type="checkbox"/> Uppeak	<input type="checkbox"/> Umpeak
<input type="checkbox"/> Ippeak	<input type="checkbox"/> Impeak	<input type="checkbox"/> CfU	<input type="checkbox"/> CfI	<input type="checkbox"/> Pc
<input type="checkbox"/> Time	<input type="checkbox"/> WP	<input type="checkbox"/> WPP	<input type="checkbox"/> WPM	<input type="checkbox"/> q

## Recall Settings

**Store/Recall** dialog box annotations (Recall mode):

- Select Recall here (points to the Store/Recall tab)
- Mode: Recall (dropdown menu)
- Enter the data number to recall (points to Recall Data input field)
- Execute recall on the WT (points to OK button)

Data Save Settings

Execute saving of data

Abort saving of data

Select to turn ON the Auto Naming function

Enter the save destination drive

Enter a file name

Enter comments

Select the items to save

Select the data format

Click to display the detailed settings screen (see the detailed setting screen for store)

Enter the drive on which to create the directory

Enter the directory name

Execute creation of the directory

Screen Image Saving Settings

Select the data format

Select a color

Turn data compression ON or OFF

Enter comments

Execute saving of screen image data

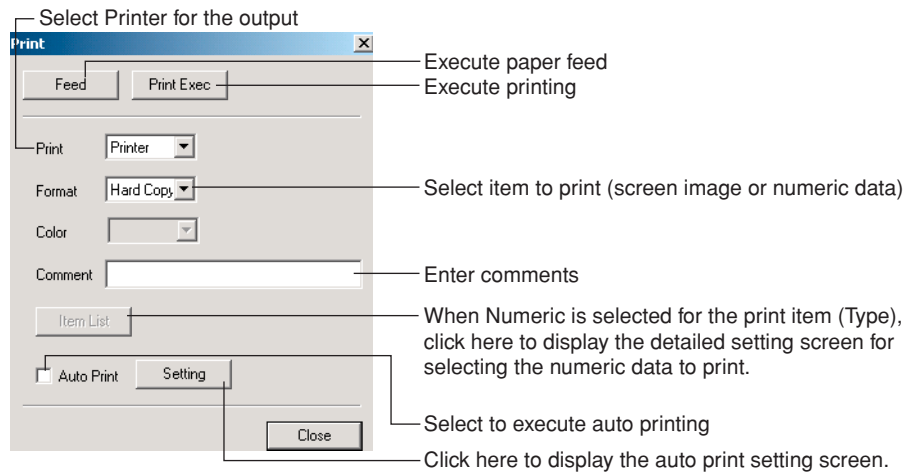
Enter the save destination drive

Select to turn ON the Auto Naming function

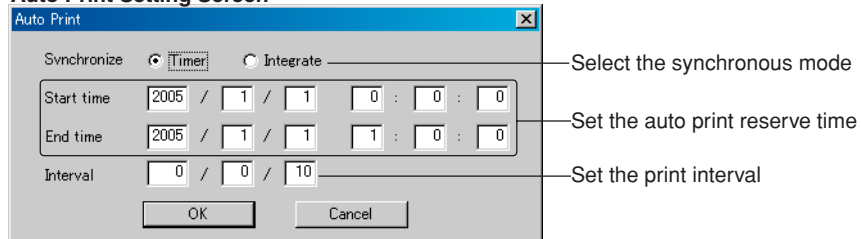
Enter a file name

## Settings for Printing on the WT's Built-In Printer and Network Printers

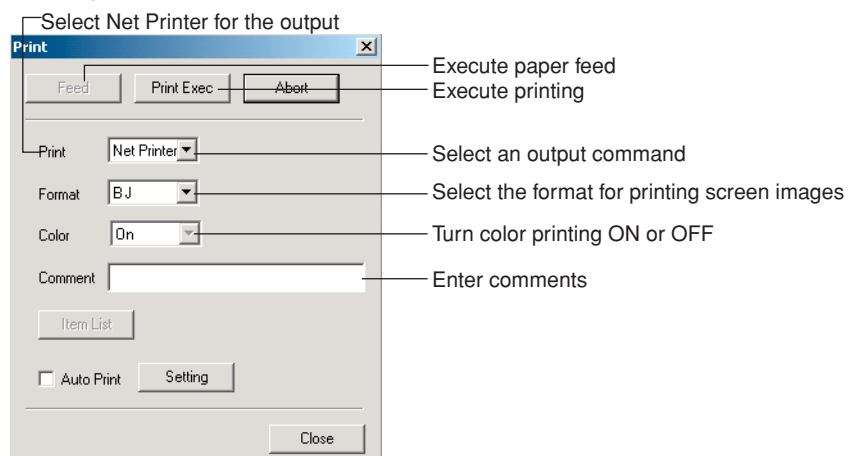
### Printing on the WT's Built-In Printer



### Auto Print Setting Screen

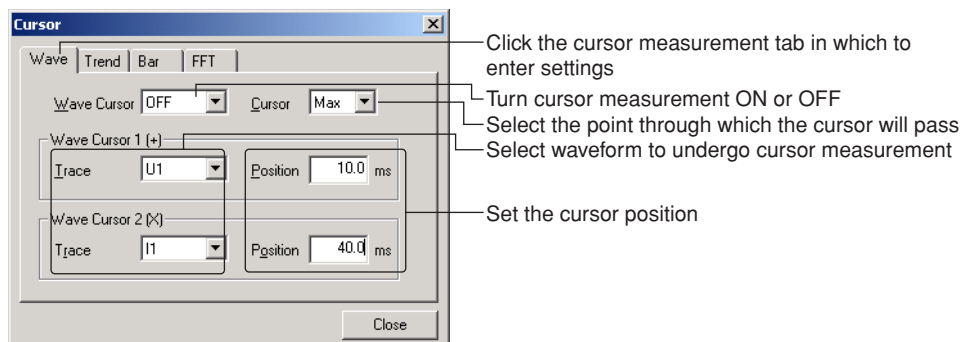


### Printing on Network Printers



## Cursor Measurement Settings

### Waveform Cursor Measurement



6.3 Settings Dialog Box (WT3000)

Trend Cursor Measurement

WaveTrendBarFFT

Trend CursorOFF

Trend Cursor 1 (+)

TraceT1Position100

Trend Cursor 2 (x)

TraceT2Position900

Turn cursor measurement ON or OFF

Select waveform to undergo cursor measurement

Set the cursor position

Bar Graph Cursor Measurement

WaveTrendBarFFT

Bar CursorOFF

Bar Cursor 1 (+)

Position1Order

Bar Cursor 2 (x)

Position15Order

Turn cursor measurement ON or OFF

Set the cursor position (orders)

Cursor Measurement of the FFT

WaveTrendBarFFT

FFT CursorOFF

FFT Cursor 1 (+)

TraceFFT1Position100

FFT Cursor 2 (x)

TraceFFT2Position900

Turn cursor measurement ON or OFF

Select waveform to undergo cursor measurement

Set the cursor position

Initializing the WT, Selecting the Crest Factor, and Entering D/A Output Settings

Miscellaneous

Initialize SettingsExecute

Crest Factor

36

D/A Output Items

Item No.	Function	Element	Order	RangeMode	RatedMax	RatedMin
1	U	1	Total	Fixed	100.0000	-100.0000
2	I	1	Total	Fixed	100.0000	-100.0000
3	P	1	Total	Fixed	100.0000	-100.0000
4	S	1	Total	Fixed	100.0000	-100.0000
5	Q	1	Total	Fixed	100.0000	-100.0000
6	PF	1	Total	Fixed	100.0000	-100.0000
7	Phi	1	Total	Fixed	100.0000	-100.0000
8	FreqU	1	Total	Fixed	100.0000	-100.0000
9	FreqI	1	Total	Fixed	100.0000	-100.0000
10	NONE	----	----	Fixed	100.0000	-100.0000
11	NONE	----	----	Fixed	100.0000	-100.0000
12	NONE	----	----	Fixed	100.0000	-100.0000
13	NNNF	----	----	Fixed	100.0000	-100.0000

Initialize WT settings

Select the crest factor

Click to display a combo box and select settings

Close

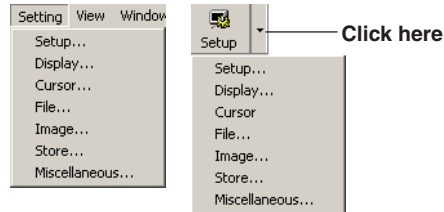
For information on initializing the WT, see the WT user's manual.

FTP Server Function Settings

For information on the WT Setting > Network Drive Setup command, see section 5.5, "FTP Server Function."

## 6.4 Settings Dialog Box (WT500)

1. Choose **Setting** from the menu bar, or click **Setup**.



You can also display the dialog box for selecting the measuring range by clicking Range on the range setting bar.

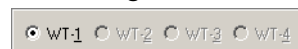


2. Select the item for which you wish to enter settings. The dialog box for the selected item appears.
3. Change the settings as needed.

The following shows a display example of the settings dialog box. Enter settings after selecting the target WT in the Select Target WT box.

For details on each function, see the WT User's Manual.

### Select Target WT box





Wiring / Ranges / Scaling / Sync Source / Filters / Update Rate Settings

Select a WT on which to enter settings

Check to turn on the scaling function. The VT Ratio, CT Ratio, and Scaling Factor boxes become active.

The WT Setup dialog box is divided into several tabs: Efficiency / Averaging / Integration, Measure / Freq Items / Harmonics / Delta Measure, and User Defined Function. The 'Wiring / Ranges / Scaling / Sync Source / Filters / Update Rate' tab is active. It features three columns for Element 1, Element 2, and Element 3. The 'Wiring' section includes a table for selecting voltage and current ranges. The 'Ranges' section has dropdowns for Voltage and Current. The 'Scaling' section includes checkboxes for VT Ratio, CT Ratio, and Scaling. The 'Sync Source' section has dropdowns for U1, U2, U3, and Ext Clk. The 'Filters' section has checkboxes for Line Filter and Freq Filter. The 'Update Rate' section has a dropdown for the update rate. The 'Sensor Ratio' section has a dropdown for the sensor ratio. The 'ExtSensor' checkbox is checked, and the 'Sensor Ratio' dropdown is active, showing options like Auto, 10V, 2V, 1V, 500mV, 200mV, 100mV, and 50mV. The 'Copy Settings' button is located at the bottom right.

Check to use external sensor for current input. On the current range setting box, the external sensor range choices are displayed. The Sensor Ratio setting box becomes active.

Copy the settings to other elements.

Current

Auto  
10V  
2V  
1V  
500mV  
200mV  
100mV  
50mV

☒ ExtSensor

Sensor Ratio [mV/A] 10.0000

for Products with the external sensor input option

## Efficiency / Averaging / Integration Settings

These boxes become active when you select R-Normal (Real-Time Integratio) or R-Continuous (Real-Time Continuous Integration) in the Integ Mode box. Click Current Date to set curret time in the Start and End box

**WT Setup**

WT-1 WT-2 WT-3 WT-4

Wiring / Ranges / Scaling / Sync Source / Filters / Update Rate

Efficiency / Averaging / Integration Measure / Freq Items / Harmonics / Delta Measure User Defined Function

**Efficiency**

ETA1 =  $\frac{P3}{P3} \times 100\%$  ETA2 =  $\frac{P3}{P3} \times 100\%$

Udef1 P1 None None None None

Udef2 P1 None None None None

**Averaging**

Type	Count
Exp	4
Lin	8
	16
	32
	64

**Integration**

Integ Mode: Normal, Continuous, R-Normal, R-Continuous

Integ Timer: Start 0000:00:00, End 200:00:00

Real-time Control: Current Date

Auto Cal: OFF, ON

W/P+ Type: Charge/Discharge, Sold/Bought

q Mode: rms, mean, dc, r-mean, ac

Check to turn on the averaging function.  
The Type and Count boxes become active.

## Measure / Frequency Items / Harmonics / Delta Measure Settings

**WT Setup**

WT-1 WT-2 WT-3 WT-4

Wiring / Ranges / Scaling / Sync Source / Filters / Update Rate

Efficiency / Averaging / Integration Measure / Freq Items / Harmonics / Delta Measure User Defined Function

**Measure**

S Formula	S.Q Formula	Phase	Sync
Urms*Irms	Type 1	180 Lead/Lag	Master
Umean*Imean	Type 2	360 degrees	Slave
Udc*I <sub>dc</sub>	Type 3		
Umean*Imean			

**Frequency Items**

Frequency 1 Frequency 2

**Harmonics**

PII Source	Measured Min	Max	Thd Formula
U1	0	44	1/Total
I1	1	45	1/Fundament.
I2		46	
I3		47	
Ext Clk		48	
		49	
		50	

**Delta Measure**

Element 1 Element 2 Element 3

Measure Type: [ 1P2W ] [ 1P2W ] [ 1P2W ]

DeltaF Mode: rms, mean, dc, r-mean, ac

for Products with the delta computation option

for Products with the harmonic measurement option

for Products without the frequency measurement add-on option

User Defined Function Setting

Click the user defined function to be set.  
Enter the expression using the menus and  
buttons in the lower side of the dialog box.

Setting the units

WT Setup

WT-1 WT-2 WT-3 WT-4

Efficiency / Averaging / Integration    Wiring / Ranges / Scaling / Sync Source / Filters / Update Rate    Measure / Freq Items / Harmonics / Delta Measure    User Defined Function

User Defined Function

ON/OFF	Expression	Unit	Max Hold
<input checked="" type="checkbox"/> F1	WNI(E1)/T(I(E1))*3600	W	<input type="checkbox"/> OFF <input checked="" type="checkbox"/> ON
<input checked="" type="checkbox"/> F2	URMSMAX(E1)	V	
<input checked="" type="checkbox"/> F3	IRMSMAX(E1)	A	
<input checked="" type="checkbox"/> F4	PMAX(E1)	W	
<input checked="" type="checkbox"/> F5	UPPEAKMAX(E1)	V	
<input checked="" type="checkbox"/> F6	UMPEAKMAX(E1)	V	
<input checked="" type="checkbox"/> F7	IPPEAKMAX(E1)	A	
<input checked="" type="checkbox"/> F8	F1()+F2()+F3()+F4()+F5()+F6()+F7()+F1()+F2()+F3()	A	

Function Settings

Function	Element	Order
Urms:URMS	1	Total
Urmx:UMN	2	DC
Udc:UDC	3	1
Urmx:URMN	3	2
Uac:UAC	3	3
Irms:IRMS	4	4
Imx:IMN	5	5
Idc:IDC	6	6
Imx:IRMN	7	7
Iac:IAC	8	8
P	9	9
S		
Q		
PF:LAMBDA		

Function Definition

UnDo ReSetting

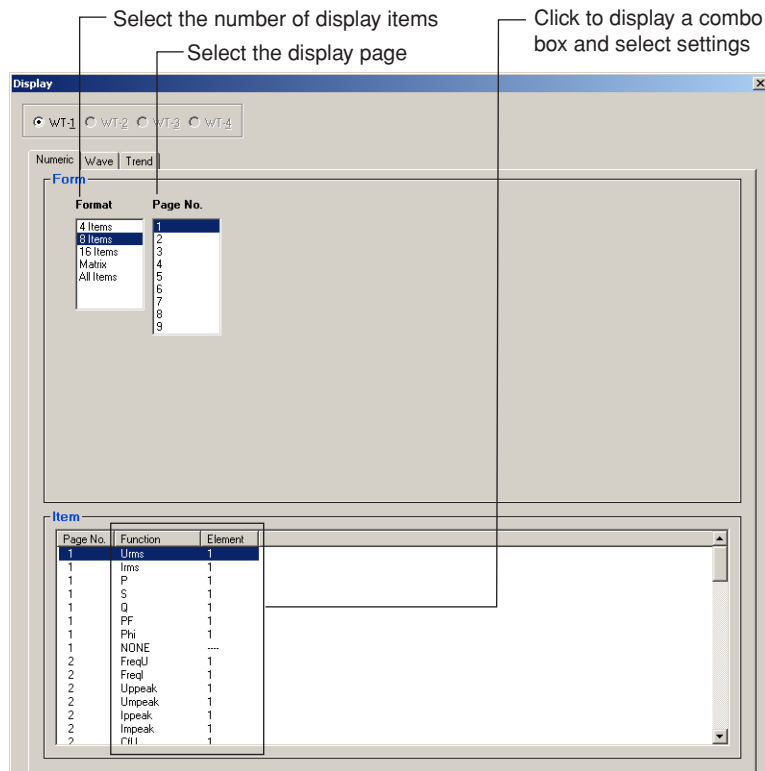
Entering Operands

The operands set for the Function, Element, and Order are displayed in the lower area. If you press the Settings button, the currently displayed operand is added to the function definition box at the very bottom.

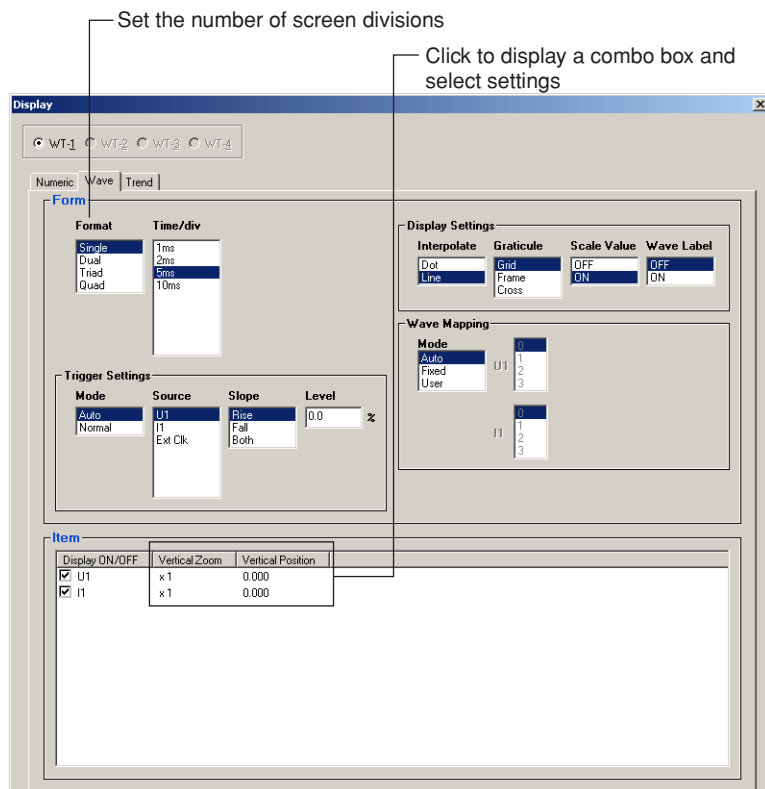
Function Definition Box

User defined functions can be defined by combining operands, and computational symbols. If you press the Set button, the user defined function is applied and added to the user defined function definition box in the upper

## Display Format Setting (Numeric Display)



## Display Format Setting (Waveform Display)



Display Format Setting (Trend Display)

Set the number of screen divisions

Click to display a combo box and select settings

WT1 WT2 WT3 WT4

Numeric Wave Trend

Form

Format

Single  
Dual  
Triad  
Quad

Time/div  
3s/div  
6s/div  
10s/div  
30s/div  
1min/div  
3min/div  
6min/div  
10min/div  
30min/div  
1hour/div  
3hour/div  
6hour/div  
12hour/div  
1day/div

Display Settings

Interpolate  
Dot  
Line

Graticule  
Grid  
Frame  
Cross

Scale Value  
OFF  
ON

Wave Label  
OFF  
ON

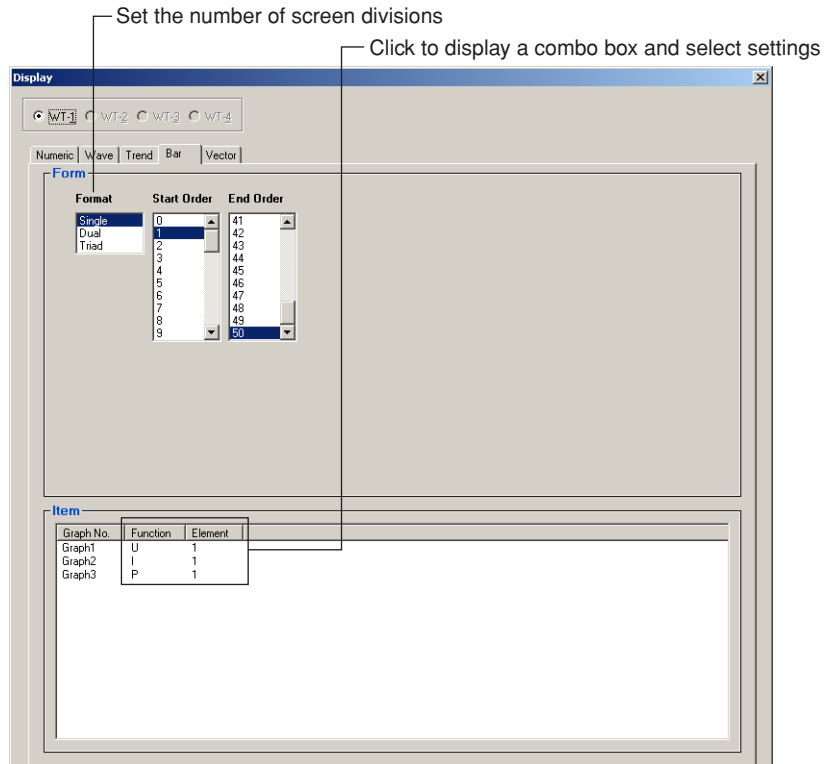
Item

Display ON/OFF	Function	Element	Scaling	Upper	Lower	
<input checked="" type="checkbox"/>	T1	Urms	1	Auto	1.000e+02	-1.000e+02
<input checked="" type="checkbox"/>	T2	Irms	1	Auto	1.000e+02	-1.000e+02
<input checked="" type="checkbox"/>	T3	P	1	Auto	1.000e+02	-1.000e+02
<input checked="" type="checkbox"/>	T4	S	1	Auto	1.000e+02	-1.000e+02
<input checked="" type="checkbox"/>	T5	Q	1	Auto	1.000e+02	-1.000e+02
<input checked="" type="checkbox"/>	T6	PF	1	Auto	1.000e+02	-1.000e+02
<input checked="" type="checkbox"/>	T7	Phi	1	Auto	1.000e+02	-1.000e+02
<input checked="" type="checkbox"/>	T8	FreqJ	1	Auto	1.000e+02	-1.000e+02

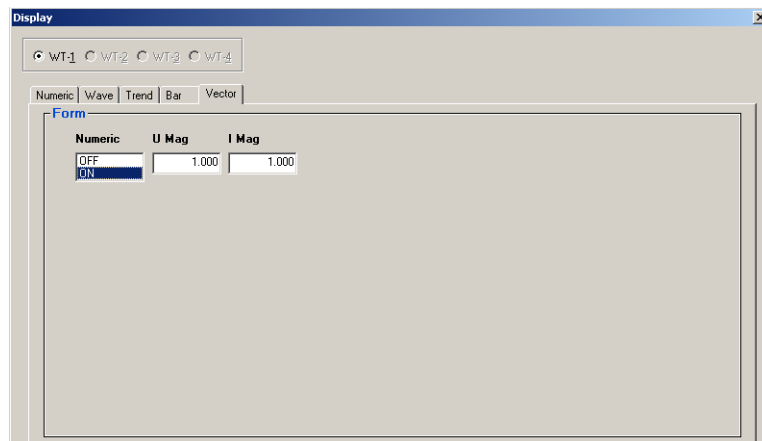
6-30

IM 760122-01E

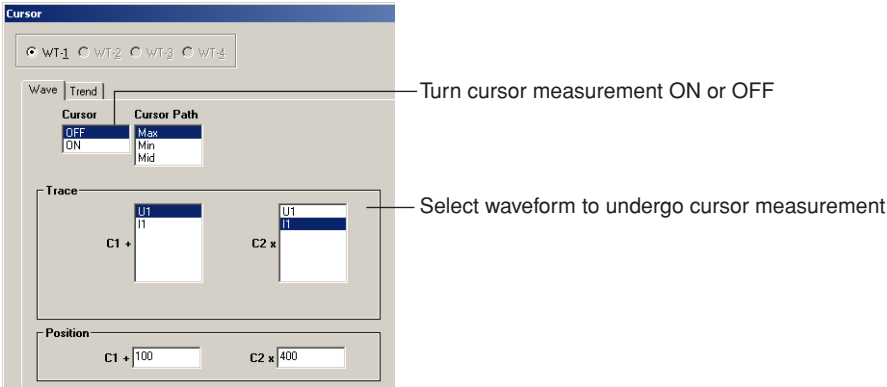
### Display Format Setting (Bar Graph Display, for Products with the harmonic measurement option)



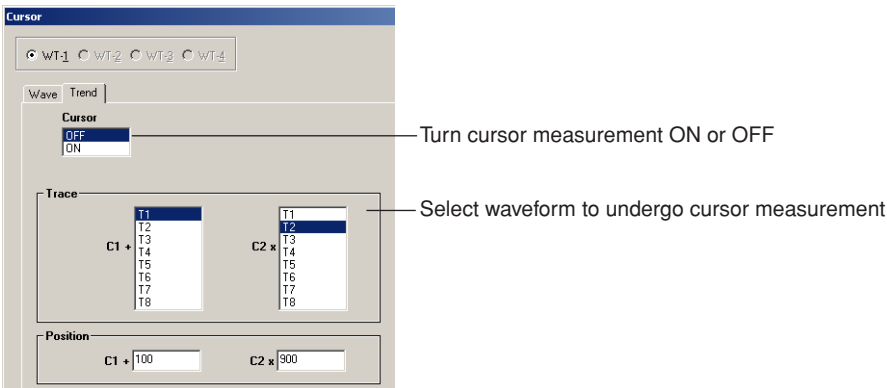
### Display Format Setting (Vector Display, for Products with the harmonic measurement option)



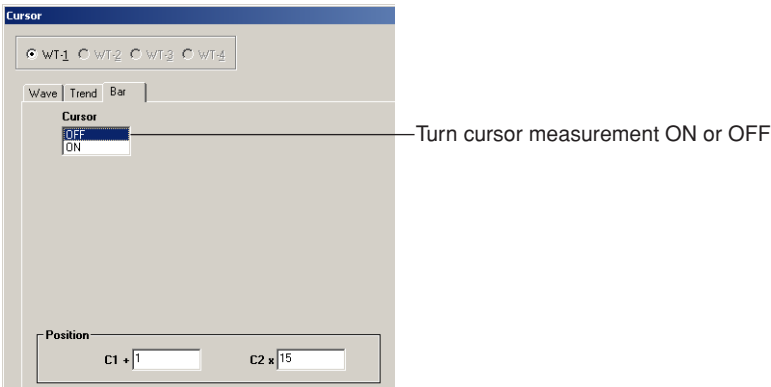
Cursor Measurement Settings (Waveform Display)



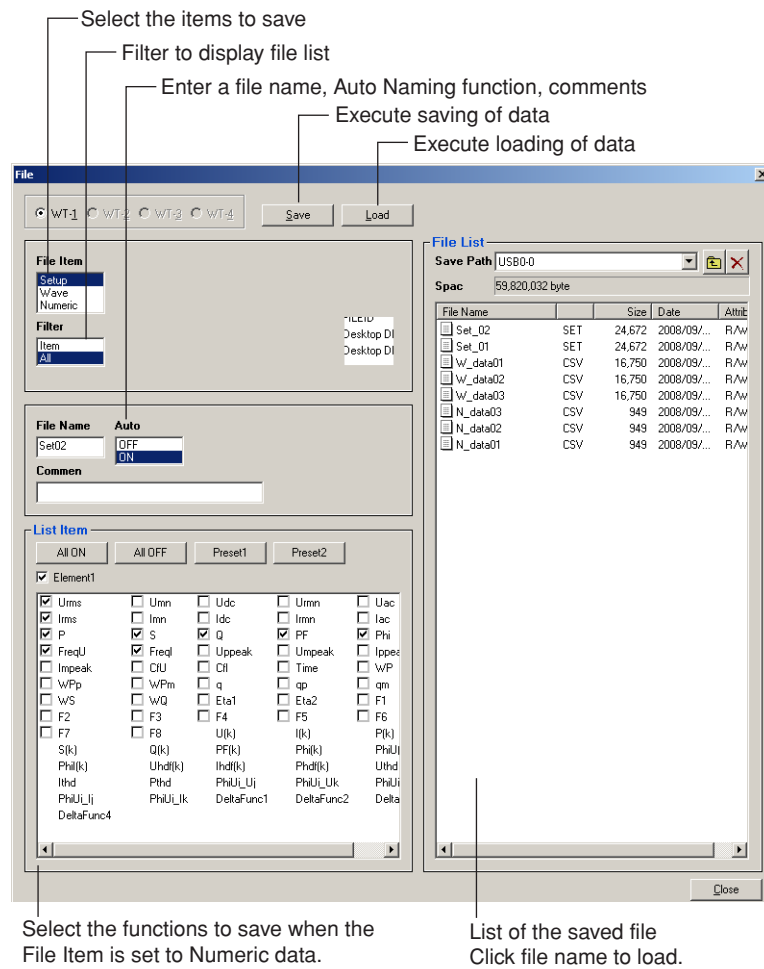
Cursor Measurement Settings (Trend Display)



Cursor Measurement Settings (Bar Graph Display, for Products with the harmonic measurement option)



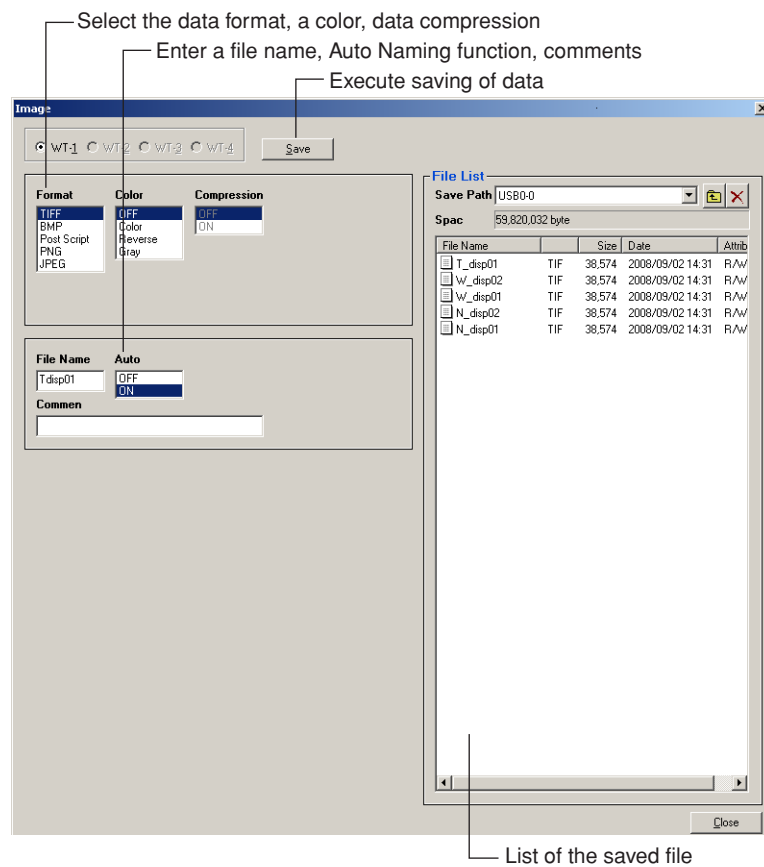
## Data Save / Load Settings

**Note**

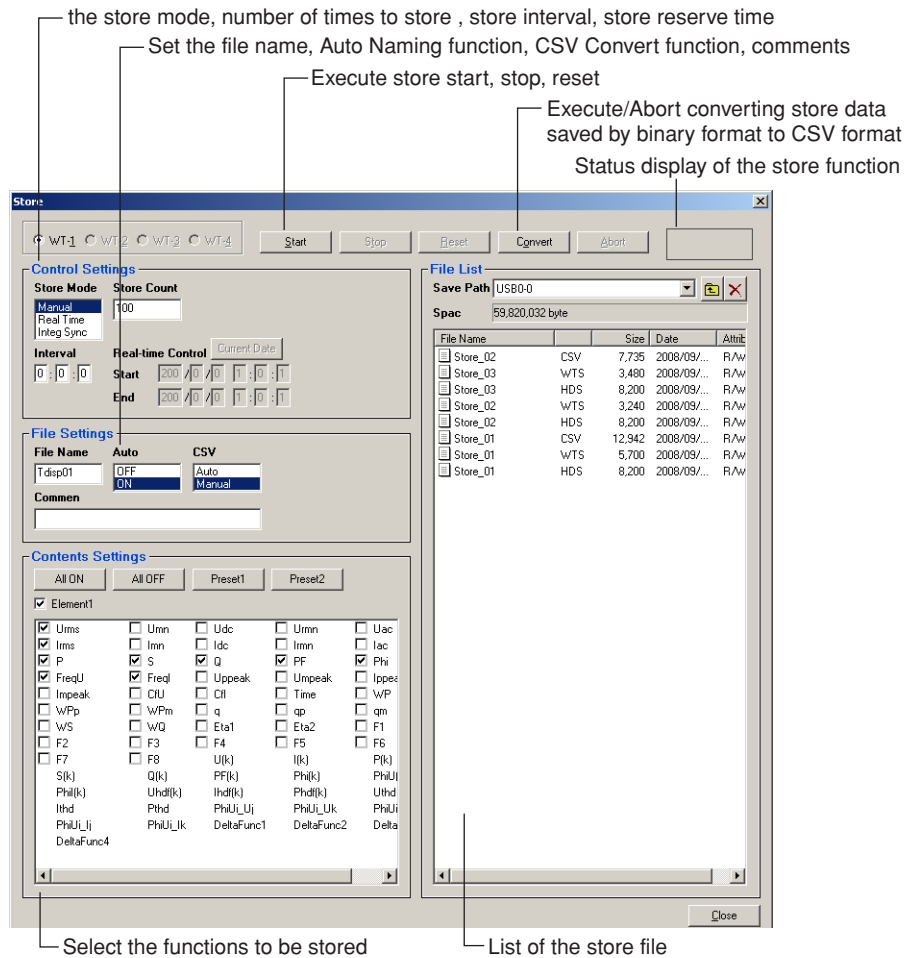
- When the items to save are not selected, the saving of the data cannot be executed.
- When the file to load is not selected in the file list, the loading of the file cannot be executed.



### Screen Image Saving Settings



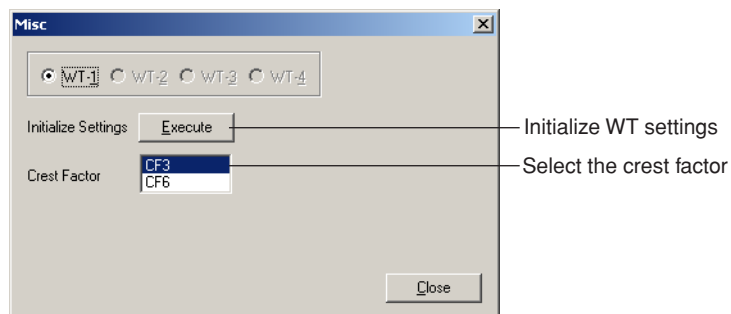
## Store Settings



## Note

- Settings cannot be changed while the store function is in progress or has stopped or CSV converting.
- When the file to convert CSV format (\*.WTS or \*.HDS) is not selected in the file list, the CSV convert function cannot be executed.

## Initializing the WT, Selecting the Crest Factor



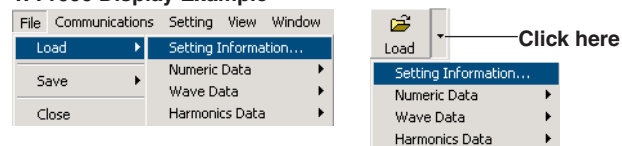
## 6.5 Sending Setting Files to the WT1600

If you load settings saved in the PC on WTVIEWER, you can send those settings to the WT1600. The following explains operations when WTVIEWER is in On-Line mode.

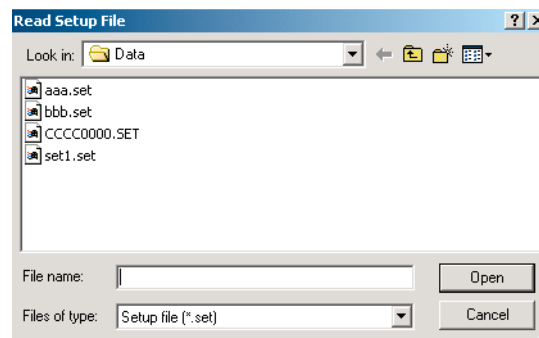
- After loading settings saved on the PC when WTVIEWER is in Off-Line mode, if you change to On-Line mode, the dialog box in step 3 below appears for you to select whether to send the settings to the WT1600.
- This function is not applicable to the WT3000.

1. Choose **File > Load > Setting Information**, or click **Load** and select Setting Information. The Read setup file dialog box appears.

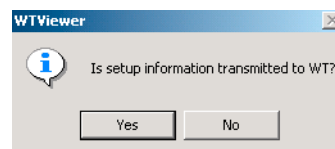
### WT1600 Display Example



2. Select a settings file, then click **Open**.



3. Click **Yes**. The setting information is sent to the WT1600.



## 7.1 Launching, Starting, and Stopping the Communication Monitor

You can display and save the communication commands and data that are exchanged between this program and the WT.

If changing the WT settings, acquiring measured data, or in other cases, you can check whether certain kinds of commands or data are being sent or received.

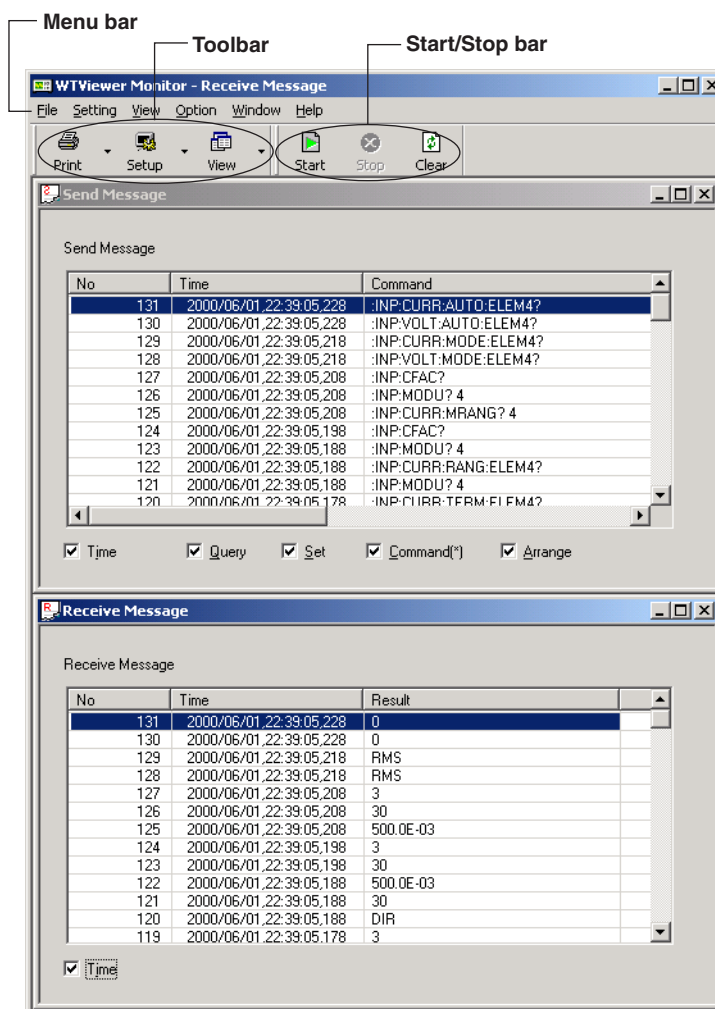
You can reference this when creating your own software to control the WT, or copy communication commands for reuse.

### Launching the Communication Monitor Function

Click **CMon** (communication monitor). The WTVIEWER Monitor window opens.



The WTVIEWER Monitor window is always the active window.  
To change this, see section 7.2.



## 7.1 Launching, Starting, and Stopping the Communication Monitor

---

### Starting/Stopping the Communication Monitor

Click CMon to open the WTVIEWER Monitor. The communication monitor function starts automatically. With the monitor started, if you operate WTVIEWER to change WT settings or acquired measured data, the communication command, measured data, or other relevant information appears in the WTVIEWER Monitor.

To stop the communication monitor function, click **Stop**.



To restart the stopped communication monitor function, click **Start**.



To clear any send/receive messages that are displayed, click **Clear**.



## 7.2 Communication Monitor Display Settings

### Selecting Display Items for the Send/Receive Message Window

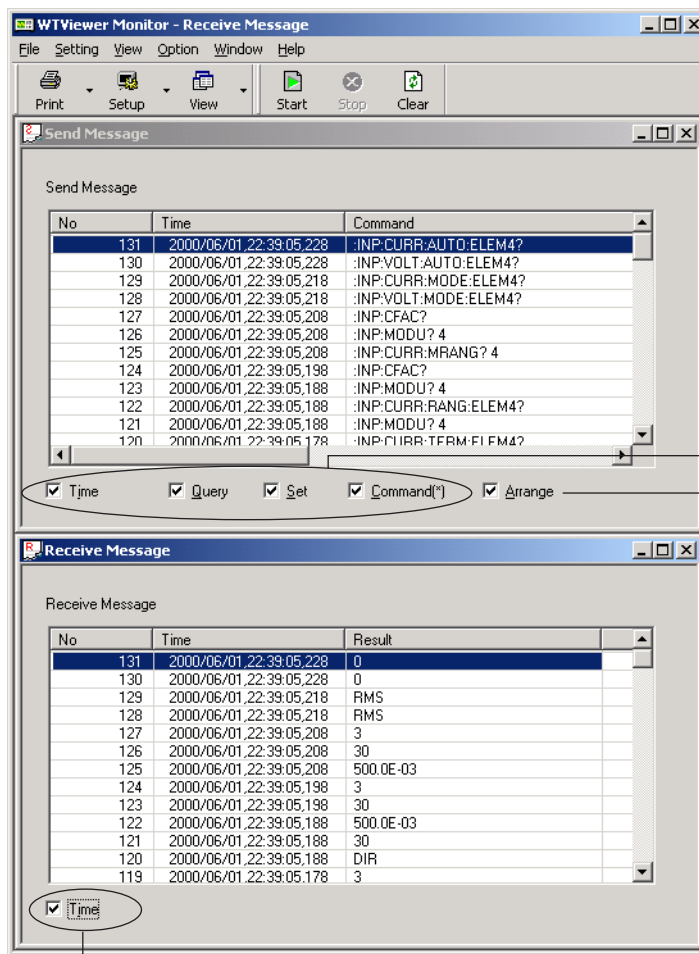
Select whether or not to display time, queries, settings, and commands in the send/receive message window by selecting or clearing the corresponding check boxes.

### Selecting to Display or Not Display Repeated Commands of the Same Type

If the same communication command is sent more than once in succession, the command is only displayed once. For example, if the \*CLS command\*<sup>1</sup> is sent multiple times, \*CLS appears only once in the sent message window.

If the communication command syntax differs, the individual commands are displayed separately.

\*1 Clears the standard event register, extended event register, and error queue.



Selecting the display items

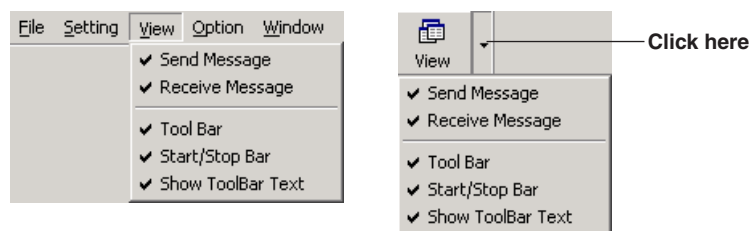
Selecting to display or not display repeated commands of the same type

Selecting the display items

## 7.2 Starting/Stopping the Communication Monitor

### Turning Display of the Send/Receive Message Window, Toolbar, and Start/Stop Bar ON/OFF

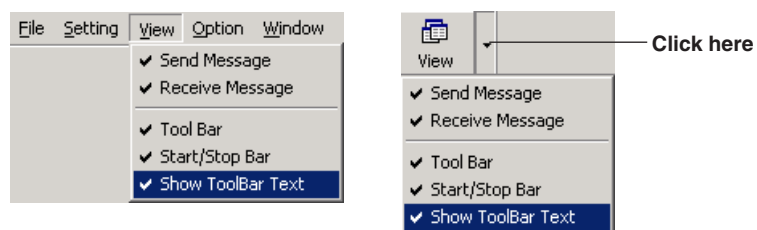
Click the menu bar **View** or click the toolbar **View** to turn each display ON or OFF.



### Changing the Size of the Toolbar

Click Menu bar **View > Show ToolBar Text**, or **Toolbar View > Show ToolBar Text**.

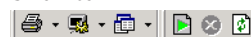
The toolbar and start/stop bar displays change from small to large.



large bar



small bar



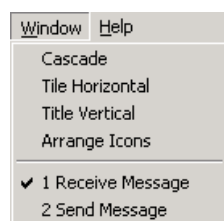
### Making the WTVIEWER Monitor Window Always Active or Not Always Active

On the Menu bar, click **Option > A** (Always active).



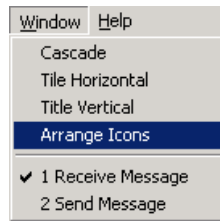
Selecting the Window Display: Cascade, Tile Vertically, or Tile Horizontally

Click **Window** on the menu bar and select the desired display format.



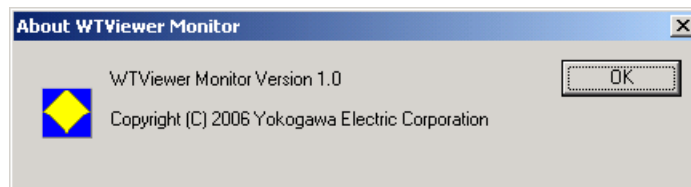
### Arranging Icons

Click Menu bar **Window > Arrange Icons**. All the minimized windows (icons) are arranged in the lower left corner of the main window of the software.



### Viewing Version Information of the WTVIEWER Monitor

On the Help menu, choose About WTVIEWER Monitor. The About WTVIEWER Monitor dialog box opens.

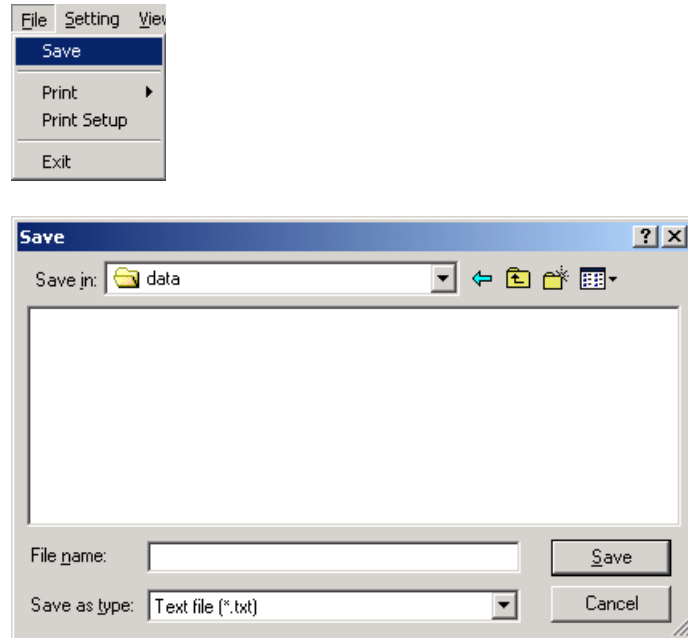




### 7.3 Saving and Printing Communication Data

## Saving Communication Data

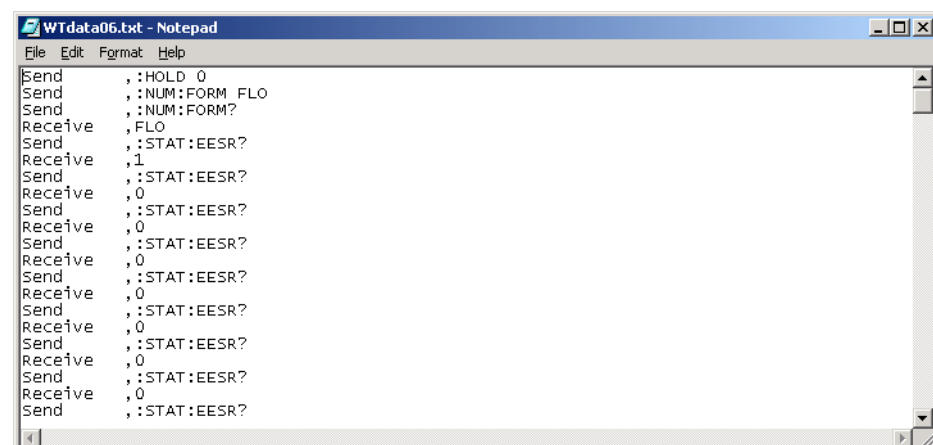
1. On the File menu, click **File > Save**. The Save dialog box opens.



2. Enter a destination file name and location and click Save. The communication data are saved.

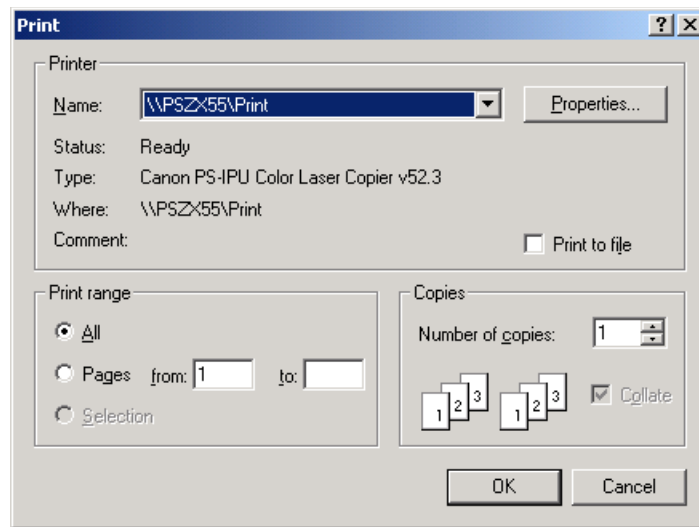
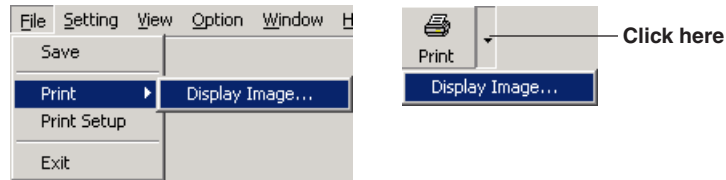
Communication data (both sent and received data) are saved to a single file in time series order. This is convenient for checking what kind of data was returned from the WT for which commands.

Even if the Arrange check box in the send message box is selected and the commands are displayed as one command, if communication data are saved, a file is registered each time the communication command is sent.



**Printing Communication Data**

1. From the send/receive message window, click the window to be printed to make it active.
2. On the menu bar, click **File > Print > Display image**, or click **Print > Display image** on the toolbar. The Print dialog box opens.



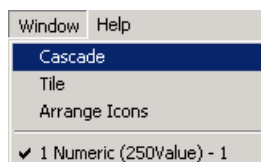
3. Select the printer to be used, print range, number of copies, and other necessary settings.
4. Click OK. An image of the screen as it appeared when Image Screen was selected in step 2 is printed.

## 8.1 Cascading or Tiling Windows

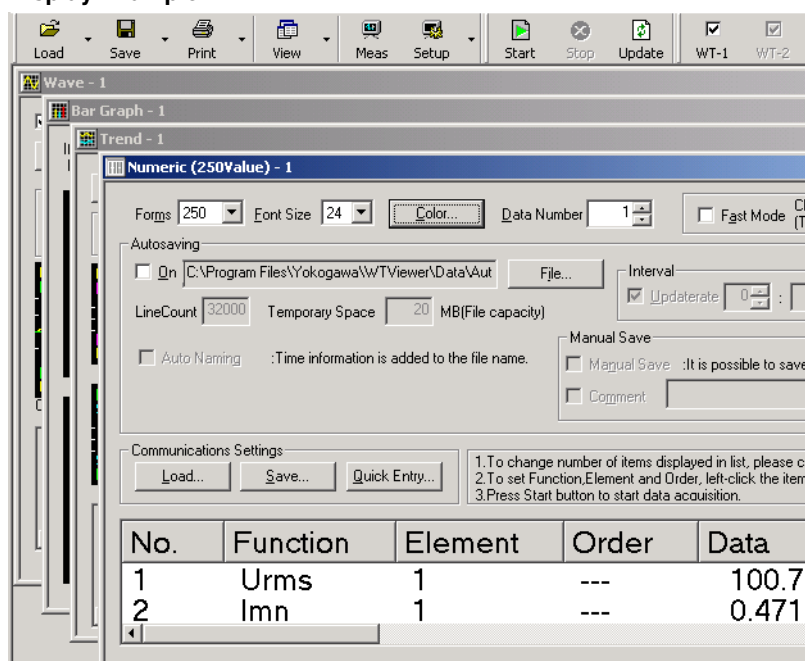
Window functions are useful for arranging the display, when multiple graphs or lists are displayed.

### Cascading Windows

On the Window menu, choose Cascade. Windows are cascaded so that the title of all displayed windows can be seen.



### Display Example

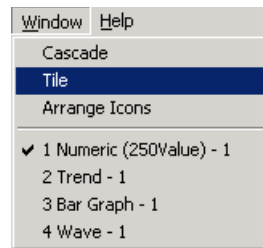


- Windows are cascaded so that the title of all displayed windows can be seen.
- The active graph or list window becomes the front window after the cascade operation.
- The cascade order varies depending on the type of displayed window.

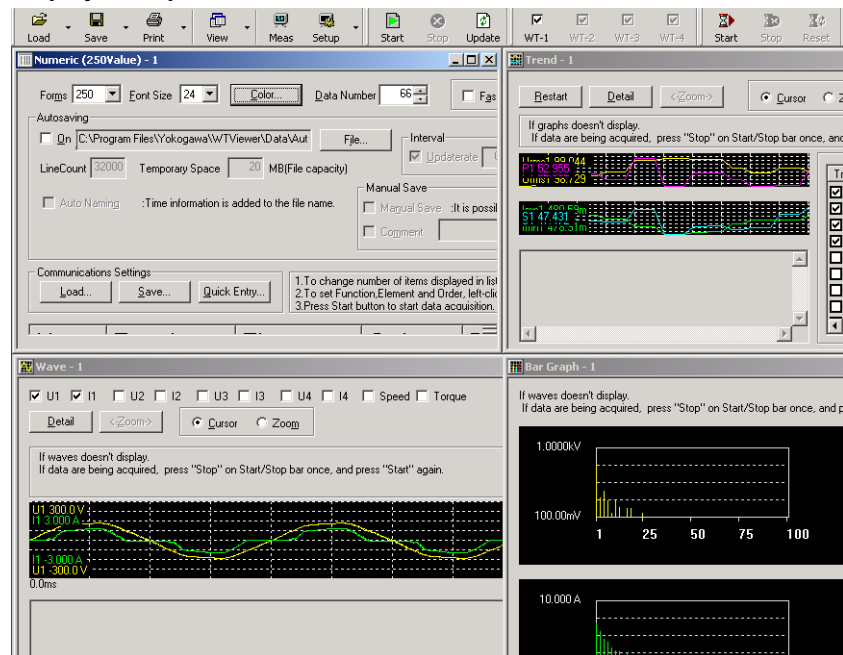
## 8.1 Cascading or Tiling Windows

### Tiling Windows

On the Window menu, choose Tile. All the displayed windows are tiled.



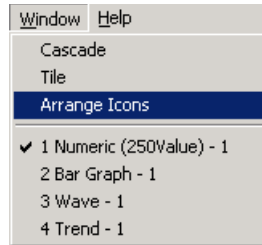
### Display Example



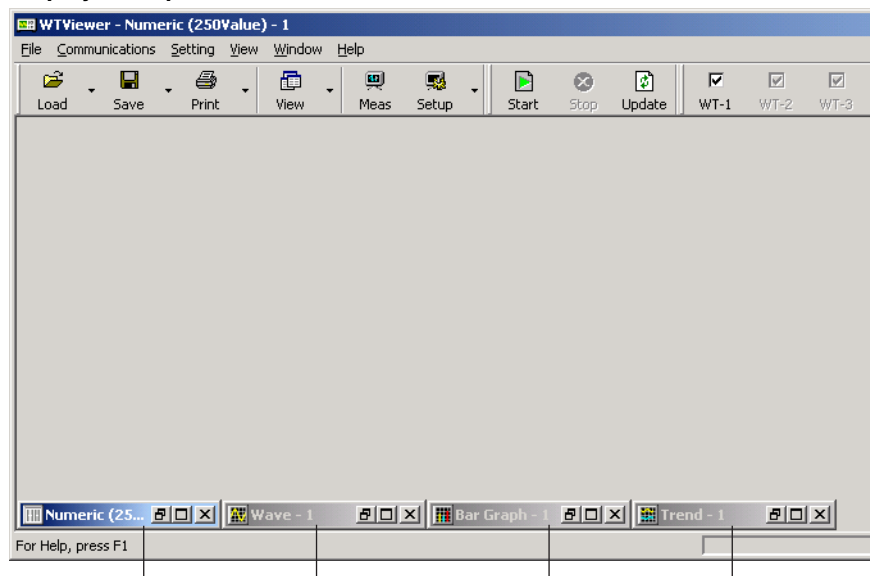
- All the displayed windows are tiled so that the windows do not overlap each other.
- The active graph or list window becomes the active window after the tile operation.
- The arrangement order varies depending on the type of displayed window.

## 8.2 Arranging Icons

On the Window menu, choose Arrange Icons. All the minimized windows (icons) are arranged in the lower left corner of the main window of the software.



### Display Example



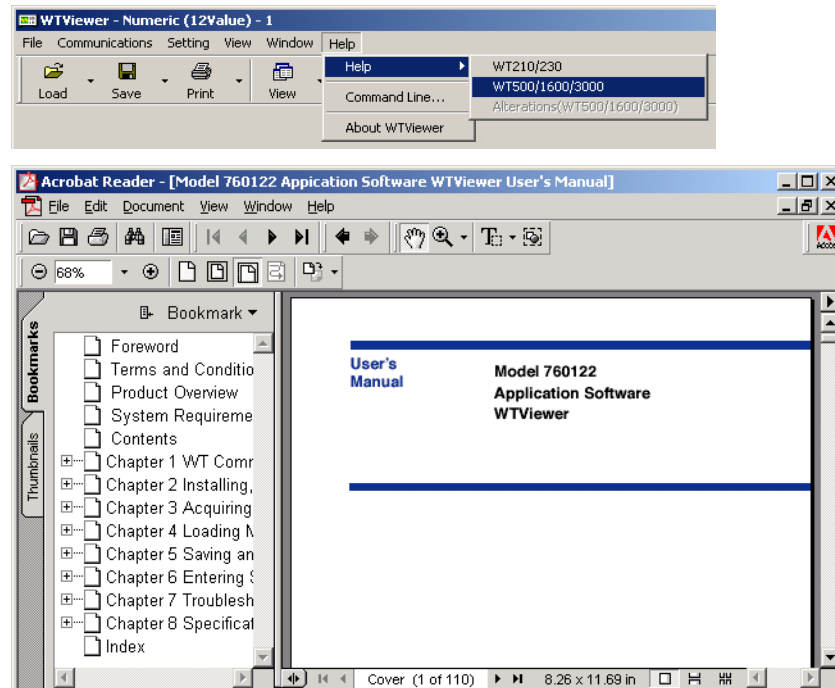
Minimized window (icon)

This function is useful when various windows have been minimized (icons) and the icons have been moved (within or outside the main window of the software).

## 8.3 Help Function

### Procedure

From the Help menu, choose Help > user's manual. If Adobe Reader is installed in the PC, Adobe Reader starts and opens the PDF file of the software user's manual. You can use the toolbar.



### Explanation

#### Online Help

The user's manual of the software is displayed as a help document in PDF (Portable Document Format). You can find information about operating procedures of this software and terminology. You can view PDF files using Adobe Reader, a freeware.

If there is an alteration notice, you can choose **Help > Help Topics > Alteration Notice** from the toolbar to view the PDF file of the alteration notice.

#### Viewing the Most Recent User's Manual or Alteration Notice

To obtain the most recent PDF files of the user's manual and alteration notice, click "Manual Download" on the YOKOGAWA's Web page shown below. Then, download the user's manual and alteration notice of this software program.

[www.yokogawa.com/tm/wtpz/760122/tm-760122\\_01.htm](http://www.yokogawa.com/tm/wtpz/760122/tm-760122_01.htm)

Rename the downloaded user's manual and alteration notice as indicated below according to the product that you are using, and copy (overwrite) the files in the software installation folder that you specified when you carried out the steps on page 2-2. You will be able to view the most recent operating instructions by selecting the user's manual or alteration notice from the Help menu.

User's Manual File Name	Alteration Notice File Name
IM760122-01E.pdf	AlterationsE.pdf

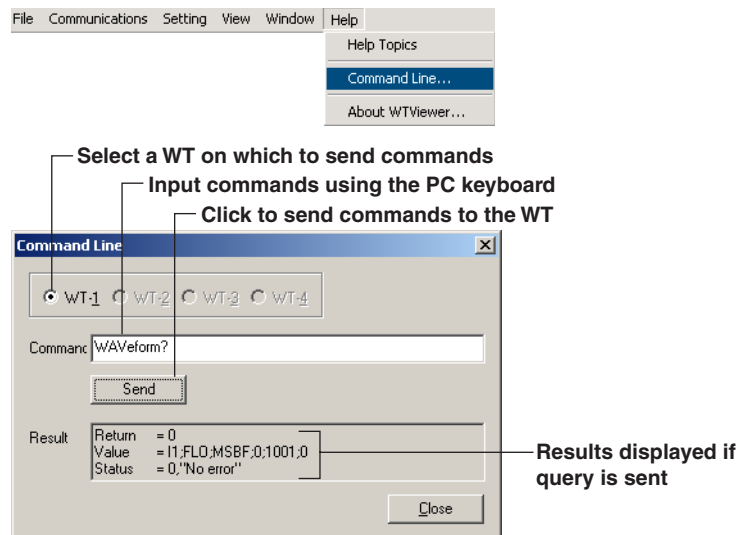
**Note**

- You can download Adobe Reader from Adobe System's Web page.
- The most recent user's manual and alteration notice that you can download from YOKOGAWA's Web page correspond to the most recent version of this software program. Update the software program as necessary. The program for updating the software can be downloaded from YOKOGAWA's Web page above.

## 8.4 Using the Command Line

Using communications commands, you can perform communication between the WT and WTVIEWER. For details on communications commands, see the WT Communications Interface User's Manual.

1. Choose **Help > Command Line** from the menu bar. The Command Line dialog box is displayed.



2. Enter communications commands in the Command field using the PC keyboard.
3. Click **Send**. The command is sent to the WT. If a query was sent, the results are displayed in the Result field.

### Note

If you change a setting on the WT using the command line, those changes will not be reflected in the setting change dialog boxes accessed by choosing Setting > WT Setting in the menu bar (see section 6.2 or 6.3).



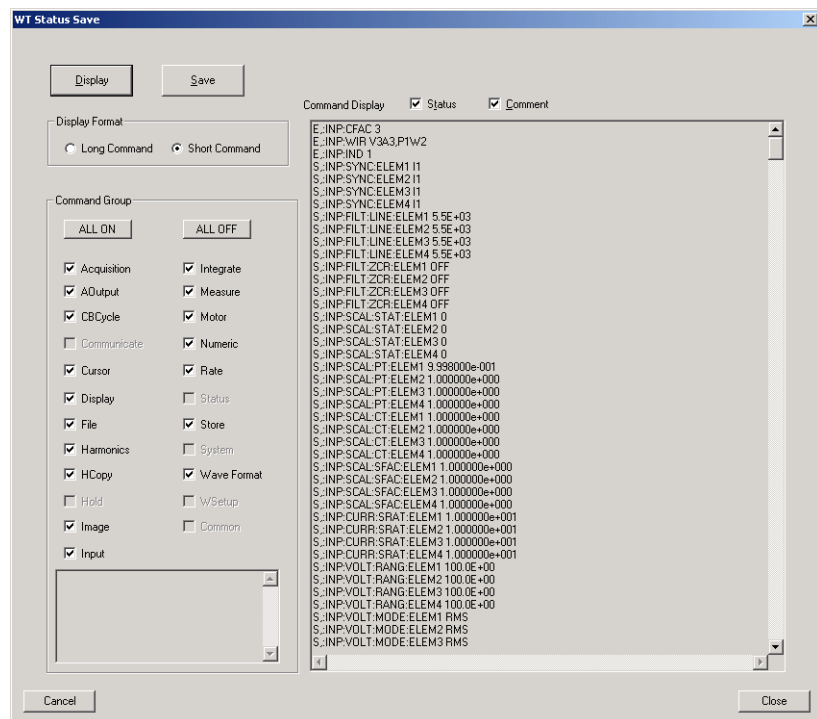
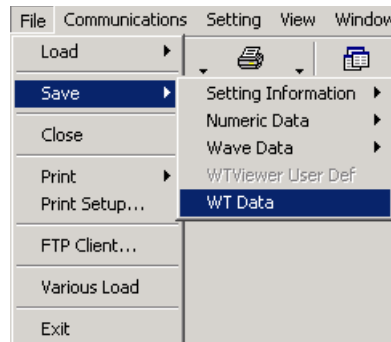
## 8.5 Displaying/Saving WT Settings in Command Format

You can display or save the current WT settings in command format. When setting the WT to the current setup, this allows you to confirm which commands should be sent to the WT.

You can reference this when creating your own software to control the WT, or copy communication commands for reuse.

The functions explained in this section can be used when connected to the WT1600 or WT3000, can not be used when connected to the WT500.

1. Select **File > Save > WT Data**. The WT status save window is displayed.



2. In the display format box, select Long command or Short command.



Long commands are written without abbreviations.

Short commands are abbreviated.

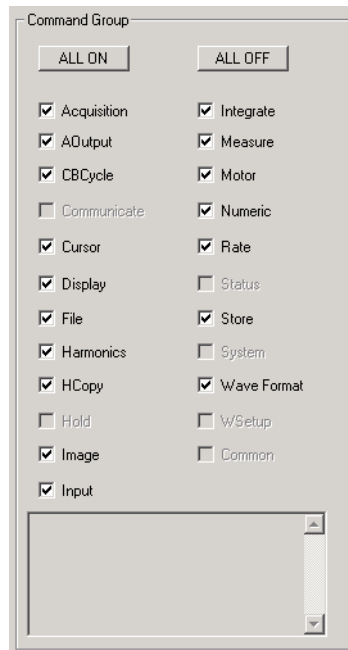
For details, see the WT Communications Interface User's Manual.

## 8.5 Displaying/Saving WT Settings in Command Format

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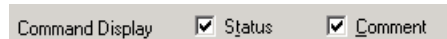
3. Select the command group to be displayed or saved in the command group box.

### WT3000 Display Example



The dialog box titled "Command Group" contains two buttons at the top: "ALL ON" and "ALL OFF". Below these are two columns of checkboxes. The left column includes: Acquisition (checked), AOutput (checked), CBCycle (checked), Communicate (unchecked), Cursor (checked), Display (checked), File (checked), Harmonics (checked), HCopy (checked), Hold (unchecked), Image (checked), and Input (checked). The right column includes: Integrate (checked), Measure (checked), Motor (checked), Numeric (checked), Rate (checked), Status (unchecked), Store (checked), System (unchecked), Wave Format (checked), WSetup (unchecked), and Common (unchecked). At the bottom of the dialog is a large empty text area with a vertical scrollbar on the right side.

4. Select items to display in the command display box.



The dialog box titled "Command Display" contains two checkboxes: "Status" (checked) and "Comment" (checked).

The following are the three statuses.

- A: Settings that can be set any time
- E: Settings that affect other settings
- S: Settings that may not be available depending on the status (for example, the measuring range cannot be changed during computation).

5. Click **View**. The change is reflected in the PC display.



A button labeled "Display" with a small icon of a monitor.

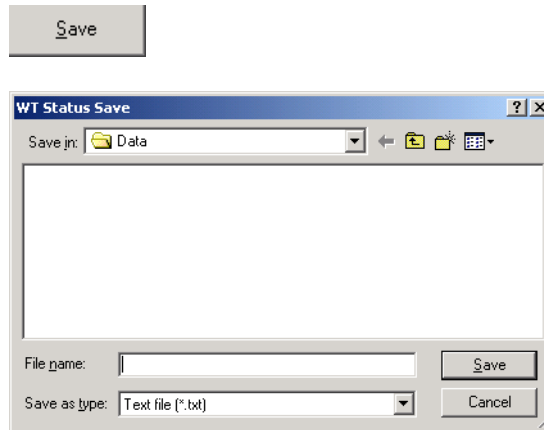
### Note

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- If you press the View button after changing the settings for display format, command group, and command display, the change is reflected in the PC display.
  - Difference from the Communication Monitor Function
    - Using this function, you can display or save the current WT settings all together by command group.  
However when using the communication monitor function (chapter 7), if you change the WT settings, only the sent commands relating to those changes are displayed.
    - The commands that can be displayed or saved with this function are those relating to the WT settings.  
Commands requesting WT measured data, or measured data received from the WT cannot be displayed or saved.  
To display or save these commands or measured data, use the communication monitor function (chapter 7).
-

### Saving WT settings

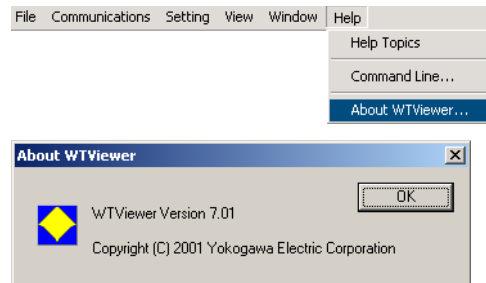
1. Click Save. The WT Status Save dialog box is displayed.



2. Enter a file name and save destination and click Save button. The displayed setting commands are saved.

## 8.6 Checking Version Information

Choose **Help > About WTVIEWER** on the menu bar. The version of the software is displayed.



## 9.1 Malfunction? First, Investigate.

When messages appear on your PC screen, refer to section 9.2, “Error Messages.” If service is required, or if corrective actions fail to resolve the problem, contact your dealer or Yokogawa representative.

### Symptoms and Corrective Actions

Unable to communication with the WT using GP-IB.

The communication function may not operate correctly if a GP-IB card other than those by National Instruments is used. Use a GP-IB card by NI (see page xii).

Unable to change settings for Function, Element, and Order in each dialog box.

Unable to change settings for Function, Element, and Order in each dialog box. If you click in the Function, Element, or Order areas, a combo box appears. Select the necessary items.

Download is started, but waveforms, bar graphs, vector, and trends are not displayed.

After stopping data downloading (see section 3.2), select the items you wish to display from the View menu, and after the display screen opens, begin the data download again.

The check box in the waveform display screen is selected and data download started, but the waveform is not displayed.

- Click Detail. Change the Position and VZoom values in the Wave Detail dialog box (see section 3.6).
- When in Harmonics mode, only the waveform of the element determined by the wiring settings is displayed. Check whether the wiring settings are correct.

If the wave or trend graph is displayed, it extends beyond the screen.

Click the Details in the display screen, then select Auto Ranging or change the Upper, Lower, and V Zoom settings to appropriate values (see section 3.6 or 3.9).

Waveforms saved by the WT in Off-Line mode cannot be displayed.

- Open the waveform screen from the View menu.
- To display waveform data saved on the WT in Off-Line mode with the .wvf extension, you must load the setting information file for the WT from the time the data was saved. Load the setting information before loading the waveform data.

In Integration mode, integration starts on elements other than those selected.

Independent Element Integration may be turned OFF. Choose Setting > WT Setting > Integration, then check that Independent Control is turned ON.

Even when the Update Rate is changed using the Setting > WT Setting > Update/Wiring/Average/Max Hold/Null command sequence, the WTViewer screen update rate does not change.

The display update rate on WTViewer does not match that of the WT, and depends on the characteristics and communication interface (GP-IB, Ethernet, USB, RS-232) of the PC. If the WT is operating at a high setting such as 50 ms, WTViewer can not keep up, and some data gets skipped. If you want to match the display update rates of the WT and WTViewer, refer to the following items and make appropriate adjustments to your environment.

- The WTViewer display update rate will be faster the fewer number of data that are downloaded from the WT to WTViewer.
- The ranking of interfaces in terms of fastest to slowest is GP-IB, Ethernet, USB, and RS-232.
- Use a PC with fast performance.

Example:

The WTViewer display update rate can possibly be matched under the following conditions: one unit of the WT, Fast Mode ON, using a communication interface of GP-IB, Ethernet, or USB, and a display update rate on the WT of 100 ms.

When measurement is complete and the measured data history is viewed, data with small numbers is not displayed.

Because the number of measurements was large, old data was discarded and cannot be viewed. Change the Temporary Space setting (section 3.3 or 3.5) to increase the amount of temporary memory used. Temporary Space is set in the hard disk on which WTViewer was installed. If the disk is partitioned, set the partition on which WTViewer was installed. Check to make sure that there is sufficient space available on the hard disk or partition (Temporary Space + 200 MB or more).

The time stamps of all data are the same when the data is saved in CSV format.

Turn auto saving ON and start the measurement (see section 5.2).

## 9.2 Error Messages

Message	Corrective Action
Failed to initialize communications. Select cancel. to enter Off-Line mode.	<p>Check the following:</p> <ul style="list-style-type: none"> <li>• Whether the power to the WT is ON.</li> <li>• Whether the GP-IB/RS-232/Ethernet/USB cable is correctly connected.</li> <li>• For GP-IB, whether a unique GP-IB address is set in the same system. Or, whether the GP-IB address set for the WT and WTVIEWER are the same. Or, whether the GP-IB communication driver is correctly installed in the PC.</li> <li>• For RS-232, check whether the connection speed settings on the WT and WTVIEWER match</li> <li>• For Ethernet, check whether the IP address, user name, and password settings on the WT and WTVIEWER match</li> <li>• For USB, whether a unique ID is set in the same system. Or, whether the ID set for the WT and WTVIEWER are the same. Or, whether the USB communication driver is correctly installed in the PC.</li> </ul>
<p>Please input a value between 0.0001 and 99999.9999.</p> <p>Please input a value between 0.1 and 100.</p> <p>Please input a value between -1.000 and 100.000.</p> <p>Please input a value between -100.0 and 100.0.</p> <p>Please input a value between -130.000 and 130.000.</p> <p>Please input a value between -9.9999E+30 and 9.9999E+30.</p> <p>Please input a value between 0 and 5.00.</p> <p>Please input a value between 0 and 500.</p> <p>Please input a value between 0 and 10.00.</p> <p>Please input a value between 0 and 20.00.</p> <p>Please input a value between 0 and 50.0.</p> <p>Please input a value between 0 and 100.0.</p> <p>Please input a value between 0 and 200.0.</p> <p>Please input a value between 0 and 0.500.</p> <p>Please input a value between 0 and 1,000.</p> <p>Please input a value between 0 and 2,000.</p> <p>Please input a value between 0 and 3600.</p> <p>Please input a value between 0 and 99990.</p> <p>Please input a value between 1 and 150.</p> <p>Please input a value between 10 and 3000.</p> <p>Please input a value between 10 and 100000.</p> <p>Please input a value between -10000000000 (-10G) and 10000000000 (10G).</p>	<p>The entered value is outside the allowable range. Enter a value within the range.</p>
Problem with the relationship between the start and stop date/time.	Confirm the start and stop time settings for integration and storing.
Please input a correct file name.	Reenter settings in the WT Setting menu such as turning Auto Naming ON, setting the file name, and keeping the file name within eight characters.
Please input a directory name.	Reenter settings in the WT Setting menu such as the directory name, and keep the directory name within eight characters.
Please input a drive name.	Reenter settings in the WT Setting menu such as the drive name, or set a correct drive name such as FD0 or SC4-01.
Failed to secure memory.	Check whether the hard disk has sufficient free space. Temporary Space, the temporary memory storage area (see section 3.3 or 3.5) is set in the hard disk on which WTVIEWER was installed. If the disk is partitioned, set the partition on which WTVIEWER was installed. Check to make sure that there is sufficient space available on the hard disk or partition (Temporary Space + 200 MB or more).
The difference in start and stop is 10 orders.	Set the difference in the Start Order and Stop Order for the bar graph to 10 or more.

Message	Corrective Action
The difference in start and end must be at least 10.	Set the difference between Disp Start and Disp End of the power spectrum waveform greater than or equal to 10.
The value that you were going to set is beyond the current max value that can set. Set the max value that can set?	
Please set different values to "Max" and "Min".	Check that the Max and Min settings are not set to the same value.
Data of CycleByCycle not found.	
Acquisition data not found. Please retry after the data acquisition with "Trigger" button.	
Check whether Hold of Acquisition data is Off. If On, execute again after releasing Hold.	
Cycle By Cycle measurement status became "Time Out". Please reset measurement. And, execute again after doing an appropriate measure (for example setting "Time out" of "CycleByCycle dialog" to an appropriate value).	<ul style="list-style-type: none"> <li>• Check that the timeout value is set longer than the result of (the period of the synchronization source signal × the number of measurement cycles).</li> <li>• Check that the period of the synchronization signal is not longer than expected.</li> <li>• Check that the synchronization source signal level is not too low.</li> </ul>
Can not set, because Cycle By Cycle measurement status is "Complete". Reset Cycle By Cycle measurement status?	
The file isn't CBC file. Or, it is opening. Please close a file.	
There is no response from the WT. Switching to Off-Line mode.	Check whether the power to the WT is turned ON, or the cable connecting the PC and main unit is correctly connected.
An error occurred while transferring setting information to the WT. Restore settings prior to transfer?	Check whether the power to the WT is turned ON, or the cable connecting the PC and main unit is correctly connected.
Illegal value.	Numeric data and harmonic data, Check whether, when these files are loaded, the store start and stop numbers are correct.

# 10.1 Functions

Item	Specifications	
Measurement mode	WT500	The selection of the measurement mode is not present.
	WT1600	Normal Measurement mode, Integration Mode, Synchronization Mode, Harmonic Measurement mode
	WT3000	Normal Measurement mode, Wide Bandwidth Harmonic Measurement mode, Waveform Computation (Math) mode, FFT mode, Cycle-by-Cycle mode, Synchronization Mode

## Data Formats That Can Be Saved

The data formats (extensions) that can be saved by WTVIEWER are given in the table below. Note that CSV format files cannot be read by WTVIEWER.

Type	WT1600		WT500, WT3000	
Settings	CSV format (.csv)	BIN format (.set)	— <sup>*1</sup>	CFG format (.cfg)
Numeric data	CSV format (.csv)	BIN format (.wta)	CSV format (.csv)	WTN format (.wtm)
Waveform display data	CSV format (.csv)	BIN format (.wta)	CSV format (.csv)	WTW format (.wtw)
Harmonic data	CSV format (.csv)	BIN format (.wta)	— <sup>*2</sup>	— <sup>*2</sup>
Waveform sampling data <sup>*3</sup> (Math and FFT data)	—	—	CSV format (.csv)	WVF format (.wvf) and (.hdr)
Cycle-by-cycle data <sup>*3</sup>	—	—	CSV format (.csv)	CBC format (.cbc)

<sup>\*1</sup> If WTVIEWER is controlling the WT500 or WT3000, the function for saving the settings in CSV format is not available.

<sup>\*2</sup> The WT500 and WT3000 measures the data of normal measurement and harmonic data simultaneously in normal measurement mode. Therefore, harmonic data is stored as numeric data. Unlike the WT1600 that measures and stores only the harmonic data, the WT500 and WT3000 does not create files containing only harmonic data.

<sup>\*3</sup> If WTVIEWER is controlling the WT500 or WT1600, the function for saving the waveform sampling data and cycle-by-cycle data is not available.

<sup>\*4</sup> If you save the data in WVF format, two files, .wvf and .hdr, are created. To load data in WVF format into WTVIEWER, place these files in the same directory.

## Data Formats That Can Be Loaded

Files that can be loaded by WTVIEWER are given in the table below. Data saved using Auto Saving (described in section 3.3) cannot be loaded by WTVIEWER.

Type	WT1600		WT500, WT3000	
Settings	SET format (.set)	—	CFG format (.cfg)	—
Numeric data	WTVIEWER format (.wta)	—	WTN format (.wtm)	—
Waveform display data	WTVIEWER format (.wta)	WT1600 format <sup>*1,*2</sup> (.wvf) and (.hdr)	WTW format (.wtw)	—
Harmonic data	WTVIEWER format (.wta)	—	— <sup>*3</sup>	—
Waveform sampling data <sup>*3</sup> (Math and FFT data)	—	—	WVF format <sup>*1</sup> (.wvf) and (.hdr)	—
Cycle-by-cycle data	—	—	CSV format (.csv)	CBC format (.cbc)

<sup>\*1</sup> If you save the data in WVF format, two files, .wvf and .hdr, are created. To load data in WVF format into WTVIEWER, place these files in the same directory.

<sup>\*2</sup> Load the settings (.set extension) before loading the waveform data in the WT1600 format (.wvf extension). The waveform is displayed only if the settings are loaded.

<sup>\*3</sup> The WT500 and WT3000 measures the data of normal measurement and harmonic data simultaneously in normal measurement mode. Therefore, harmonic data is stored as numeric data. Unlike the WT1600 that measures and stores only the harmonic data, the WT500 and WT3000 does not create files containing only harmonic data.



## 10.1 Functions

Item	Specifications
Data Display Update Rate	Differs depending on the PC processing speed, type of communication interface used, and number of data loaded from the WT to WTVIEWER.
Display Windows	<p><b>Numeric View</b> Displays numeric data acquired from the WT by WTVIEWER in normal measurement mode. On the WT500 and WT3000, harmonic data can also be displayed.</p> <p><b>Harmonics List</b> Displays harmonic data acquired from the WT by WTVIEWER in harmonic measurement mode. On the WT1600, harmonic measurement mode must be selected. On the WT500 and WT3000, other numeric data is displayed together in the numeric display screen in normal measurement mode as above.</p> <p><b>Trace</b> Displays waveform data acquired from the WT by WTVIEWER.</p> <p><b>Bar Graph</b> Displays a bar graph of harmonic components at each order during harmonic measurements. On the WT1600, harmonic measurement mode must be selected.</p> <p><b>Vector</b> Displays the relationship between the phase difference of the fundamental wave of each element and the amplitude (RMS value) when performing harmonic measurements. On the WT1600, harmonic measurement mode must be selected.</p> <p><b>Trend</b> Displays the trends of all measurement functions for the object being measured during normal and harmonic measurement</p> <p><b>Waveform computation (WT3000 only)</b> Display the result of various waveform computations performed on the waveform display data loaded from the WT.</p> <p><b>FFT (WT3000 only)</b> Displays the power spectrum of the input signal through FFT (Fast Fourier transform).</p> <p><b>Cycle-by-cycle measurement (WT3000 only)</b> Displays the voltage, current, power, and other parameters for each cycle of the AC input signal.</p> <p><b>Numeric View (Synchronization Mode, WT1600 and WT3000 only)</b> This is the display when in Normal Mode (Synchronization Mode). Displays multiple measured values from the WT in a single window. Also, Creates (defines) expressions by combining multiple measured values from the WT. And displays the results of computations using those expressions.</p>
Entering Settings on the WT	All functions that can be done with communication commands

## 10.2 System Configuration

Item	Specifications																														
PC	CPU Celeron 500 MHz or higher (recommended) Memory 256 MB or more recommended VRAM 4 MB or more HDD 500 MB or more of free space																														
OS	Windows 2000, or Windows XP.																														
Screen Resolution	1024 x 768 pixels or higher																														
Communication Interface	GP-IB NI (National Instruments) AT-GPIB, PCI-GPIB, PCI-GPIB+, PCMCIA-GPIB, PCMCIA-GPIB+, with driver NI-488.2 version 1.60 or later. (however, version 2.3 is not supported) RS-232 An available COM port on the PC ETHERNET 10BASE-T or 100BASE-TX compatible Ethernet port USB A USB Rev. 1.1 or later USB port  Table of WT Compatibility <table><tr><th>WT Model</th><th>GP-IB</th><th>RS-232</th><th>ETHERNET</th><th>USB</th></tr><tr><td>WT210</td><td>Y</td><td>Y</td><td>x</td><td>x</td></tr><tr><td>WT230</td><td>Y</td><td>Y</td><td>x</td><td>x</td></tr><tr><td>WT500</td><td>Y</td><td>N</td><td>Y(VXI11)</td><td>Y(USB-TMC)<sup>*1</sup></td></tr><tr><td>WT1600</td><td>Y</td><td>Y</td><td>Y</td><td>x</td></tr><tr><td>WT3000</td><td>Y</td><td>Y</td><td>Y</td><td>Y<sup>*1</sup></td></tr></table> Y: Supported <sup>*2</sup> , X: Not supported <sup>*1</sup> In order to perform communications with a personal computer (hereinafter, PC) via a WT500 or WT3000 with a USB interface, a USB driver must be installed in the PC. <a href="http://www.yokogawa.com/tm/tm-softdownload.htm">www.yokogawa.com/tm/tm-softdownload.htm</a> <sup>*2</sup> The installed communication interface type differs depending on the specifications of the WT.	WT Model	GP-IB	RS-232	ETHERNET	USB	WT210	Y	Y	x	x	WT230	Y	Y	x	x	WT500	Y	N	Y(VXI11)	Y(USB-TMC) <sup>*1</sup>	WT1600	Y	Y	Y	x	WT3000	Y	Y	Y	Y <sup>*1</sup>
WT Model	GP-IB	RS-232	ETHERNET	USB																											
WT210	Y	Y	x	x																											
WT230	Y	Y	x	x																											
WT500	Y	N	Y(VXI11)	Y(USB-TMC) <sup>*1</sup>																											
WT1600	Y	Y	Y	x																											
WT3000	Y	Y	Y	Y <sup>*1</sup>																											
WT Firmware (ROM) Versions Supported by WTVIEWER <table><tr><th>WT Model</th><th>Firmware Version</th></tr><tr><td>WT210<sup>*3</sup></td><td>1.06 or later</td></tr><tr><td>WT230<sup>*3</sup></td><td>1.06 or later</td></tr><tr><td>WT500</td><td>1.01 or later</td></tr><tr><td>WT1600</td><td>3.01 or later</td></tr><tr><td>WT3000</td><td>4.01 or later</td></tr></table> <sup>*3</sup> For information about the WT210/WT230, see the WTVIEWER help menu.		WT Model	Firmware Version	WT210 <sup>*3</sup>	1.06 or later	WT230 <sup>*3</sup>	1.06 or later	WT500	1.01 or later	WT1600	3.01 or later	WT3000	4.01 or later																		
WT Model	Firmware Version																														
WT210 <sup>*3</sup>	1.06 or later																														
WT230 <sup>*3</sup>	1.06 or later																														
WT500	1.01 or later																														
WT1600	3.01 or later																														
WT3000	4.01 or later																														

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