
**User's
Manual**

**Harmonic Measurement
Software for WT5000
(IEC 61000-3-2 Compliant)**

Harmonic/Flicker Measurement Software for WT5000 consists of the following software applications.

- IEC 61000-3-2 Harmonic Measurement Software
- IEC 61000-3-3 Voltage Fluctuation and Flicker Measurement Software
- IEC 61000-3-11 Voltage Fluctuation and Flicker Measurement Software
- IEC 61000-3-12 Harmonic Measurement Software

Of these applications, this user's manual explains the handling precautions, features, and operating procedures of the **IEC 61000-3-2 Harmonic Measurement Software**. To ensure correct use, please read this manual thoroughly before beginning operation.

After reading this manual, keep it in a safe place for quick reference in the event that a question arises.

The manuals for the Harmonic/Flicker Measurement Software for WT5000 are listed on the next page. Please read all manuals.

For information about the handling precautions, functions, and operating procedures of WT5000 Precision Power Analyzer and the Voltage Fluctuation and Flicker Measurement Software for WT5000 as well as the handling and operating procedures for Windows, see the manuals for those products.

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions. The figures given in this manual may differ from those that actually appear on your screen.
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Revisions

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Manuals

The following manuals, including this one, are provided as manuals for the **Harmonic/Flicker Measurement Software for WT5000**. The manuals explain the handling precautions, features, and how to operate each software.

PDF Data of Manuals

The downloaded zip file contains the following PDF data files. The zip file also contains Japanese manuals.

File Name	Manual Title	Manual No.
IEC61000-3-2 Users Manual.pdf	This manual. Harmonic Measurement Software for WT5000 (IEC 61000-3-2 Compliant) User's Manual	IM D024-01EN
IEC 61000-3-3 Users Manual.pdf	Voltage Fluctuation/Flicker Measurement Software for WT5000 (IEC 61000-3-3 Compliant) User's Manual	IM D024-02EN
IEC 61000-3-11 Users Manual.pdf	Voltage Fluctuation/Flicker Measurement Software for WT5000 (IEC 61000-3-11 Compliant) User's Manual	IM D024-03EN
IEC 61000-3-12 Users Manual.pdf	Harmonic Measurement Software for WT5000 (IEC 61000-3-12 Compliant) User's Manual	IM D024-04EN

Online Help

The above user's manuals are incorporated in the software as help files.
For instructions on how to use the help feature, see section 12.3.

* You can also view the WT5000 User's Manual from the online help.

Manual Title	Manual No.
WT5000 Precision Power Analyzer Features Guide	IM WT5000-01EN
WT5000 Precision Power Analyzer User's Manual	IM WT5000-02EN
WT5000 Precision Power Analyzer Getting Started Guide	IM WT5000-03EN
WT5000 Precision Power Analyzer Communication Interface User's Manual	IM WT5000-17EN

Notes about Using This Software

Notes on Using the Software

- To allow a WT5000 to communicate with a PC through the WT5000's USB interface, a USB driver must be installed in the PC. When you install the software in the PC, the USB driver can also be installed.
- Do not operate the WT5000 while using this software. Doing so may cause errors.
- The software may not be able to continue if the PC enters standby or hibernation mode. Disable standby and hibernation modes when you use the software.
- This software can only control one WT5000 at a time. Also, it cannot connect multiple PCs to the same WT5000.
- If a connection error disrupts the connection between the WT5000 and the PC, turn the WT5000 OFF and then ON again.

How to Use This Manual

Structure of the Manual

This user's manual consists of the following sections.

Chapter	Title	Description
1	Product Overview	Explains the software's features and the details of its applicable standards.
2	Preparation before Use	Explains how to connect the WT5000 to a PC and how to install this software.
3	Starting and Using the Software	Explains how to start the software and describes the main window.
4	Using the Start and Exit Pages	Explains how to select a test schedule menu and how to close the software.
5	Using the Open Page to Load Measured Data and Setting Information	Explains how to load setting information and measured data.
6	Using the Connection Page to Establish a Connection between the PC and a WT5000	Explains how to establish a connection between the WT5000 and a PC.
7	Using the Setting Page to Configure Measurement and Judgment Conditions	Explains how to set general test conditions.
8	Using the Measure Page to Make Measurements	Explains how to execute a compliance test.
9	Using the Analysis Page to Display Judgment Results and Measured Data	Explains how to display judgment results and measured data.
10	Using the Print Page to Print Reports	Explains how to print a report.
11	Using the Save Page to Save Setting Information and Measured Data	Explains how to save setting information and measured data.
12	Other Features	Explains how to arrange windows, use the help function, and display the software's version information.
13	Troubleshooting	Lists various error messages.
14	Specifications	Lists the specifications of the software.
	Index	

Software Versions That This Manual Applies To

This manual applies to **IEC 61000-3-2 Harmonic Measurement Software** versions 6.61 or later. If you are using an older version, you will not be able to use all of the features described in this manual.

The software version is displayed in the upper right of this software's window. For details, see sections 3.2 and 12.4.

Software License Agreement

Yokogawa Test & Measurement Corporation

Harmonic/Flicker Measurement Software for WT5000 Software License Agreement

Important: Read the following terms and conditions carefully.

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Article 4: Limitation of Liability

YOKOGAWA will not be held liable for any damages incurred in relation to This Software.

Article 5: Court with Jurisdiction

Should a dispute arise as a result of using This Software or in regards to this license agreement, both parties agree to discuss the issue in good faith. If an agreement cannot be reached, the Tokyo District Court shall be the exclusive agreement jurisdictional court of the first hearing.

Contents

Manuals	ii
Notes about Using This Software	iii
How to Use This Manual.....	iv
Software Versions That This Manual Applies To	v
Software License Agreement.....	vi
Chapter 1 Product Overview	
1.1 Explanation of Functions	1-1
1.2 PC System Requirements	1-8
1.3 Applicable Standards	1-9
1.4 Flow of Operation	1-15
1.5 Terminology Related to Harmonics	1-17
Chapter 2 Preparation before Use	
2.1 Connecting the WT5000 and the PC.....	2-1
2.2 Setting the USB Control	2-3
2.3 Setting the GP-IB Control.....	2-5
2.4 Setting the Ethernet Control	2-6
2.5 Installation and Uninstallation.....	2-8
Chapter 3 Starting and Using the Software	
3.1 Starting the Software.....	3-1
3.2 Basic Operations	3-3
Chapter 4 Using the Start and Exit Pages	
4.1 Selecting a Test Schedule Menu	4-1
4.2 Closing the Software	4-6
Chapter 5 Using the Open Page to Load Setting Information and Measured Data	
5.1 Loading Setting Information and Measured Data	5-1
5.2 Checking the Repeatability of the Measured Data	5-6
Chapter 6 Using the Connection Page to Establish a Connection between the PC and a WT5000	
6.1 Establishing a New Connection Between the PC and a WT5000	6-1
6.2 Using the Connection Settings from a Loaded File	6-5
6.3 Using the Same Connection Settings as Before	6-6
6.4 Ending a Connection by Switching to Offline Mode.....	6-7
Chapter 7 Using the Setting Page to Configure Measurement and Judgment Conditions	
7.1 Setting General Test Conditions	7-1
7.2 Setting the WT5000 Measurement Conditions.....	7-7
7.3 Setting the WT5000 Judgment Conditions.....	7-12
7.4 Setting the Optional Conditions.....	7-21

1

2

3

4

5

6

7

8

9

10

11

12

13

14

Index

Chapter 8 Using the Measure Page to Make Measurements

8.1	Previewing Harmonic Data and Waveform Data	8-1
8.2	Setting the Display of the Test Preview	8-3
8.3	Setting the Display of the List Preview	8-9
8.4	Setting the Display of the Bar Preview	8-10
8.5	Setting the Display of the Wave Preview.....	8-12
8.6	Making Simple User Designated Value Measurement	8-15
8.7	Making Compliance Test (Harmonic Measurements).....	8-17
8.8	Making Compliance Simple Test	8-21

Chapter 9 Using the Analysis Page to Display Judgment Results and Measured Data

9.1	Displaying a Graph of All Judgments	9-1
9.2	Displaying a List and Graph of Harmonic Current Values	9-8
9.3	Displaying a Harmonic Bar Graph.....	9-15
9.4	Displaying a List of Measured Harmonic Values	9-17
9.5	Displaying a Trend Graph.....	9-18
9.6	Displaying a Waveform Graph.....	9-22
9.7	Displaying the Results of Simple Compliance Tests.....	9-26

Chapter 10 Using the Print Page to Print Reports

10.1	Setting a Report's Title and Comments	10-1
10.2	Setting the Print Mode, Print Language and Output Form	10-4
10.3	Setting Print Details (Detail Setting)	10-5
10.4	Printing	10-7

Chapter 11 Using the Save Page to Save Setting Information and Measured Data

11.1	Saving Setting Information and Measured Data.....	11-1
11.2	Saving Measured Data in CSV Format	11-6

Chapter 12 Other Features

12.1	Cascading Windows	12-1
12.2	Tiling Windows	12-2
12.3	Using the Help Function	12-3
12.4	Viewing Version Information	12-5
12.5	Setting the Displayed Language	12-6
12.6	Editing the Displayed Language.....	12-7

Chapter 13 Troubleshooting

13.1	Troubleshooting.....	13-1
13.2	Error Messages	13-2

Chapter 14 Specifications

14.1	Specifications	14-1
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Index

1.1 Explanation of Functions

The Harmonic Measurement Software can measure the harmonics produced by electrical equipment according to IEC standards (for an overview, see section 1.3) and display and save the judgment results.

Applicable Measurement Instruments

This software is dedicated to YOKOGAWA's WT5000 Precision Power Analyzers.

For the handling precautions, features, and operating procedures of the WT5000, see the WT5000 User's Manual.

This user's manual (IM D024-01EN) describes the case when this software is used in combination with the WT5000 (hereinafter referred to as the WT).

Applicable Standard

For the applicable standards, see section 1.3.

Setting Up Test Schedule Menus

You can arrange the following steps as you like to create test schedule menus.



Start: Select and edit test schedule menus.



Open: Load measured data and WT setting information files.



Connection: Configure the connection between the PC and a WT.



Setting: Set compatibility and measurement conditions.



Measure: Measure voltage fluctuation and flicker.



Analysis: Display measured results as bar and trend graphs.



Print: Print screen images and reports.



Save: Save measured data and setting information files.



Exit: Close the software.

1.1 Explanation of Functions

You can start this software and then operate it according to the order of one of the test schedule menus. By designing appropriate menus, you can make the testing process smoother. You can also avoid forgetting and skipping steps when you have to repeat the same process over and over again.

Here are more details about each step:

Start



Use to select and edit test schedule menus. There are five preset standard test schedule menus available in addition to custom test schedule menus that you can make yourself (located under the "User Setting" option button).

Open



Loading Setting Information

You can load setting information files that contain information such as the measurement mode, bar graph and list display formats, standard and measurement settings, the measurement time, and report titles and comments (reports contain information such as judgment results and lists and graphs of measured data values).

Loading Measured Data and Waveform Data

You can load the harmonic measurement data, waveform data, harmonic measurement conditions, and setting information that have been saved to a file.

Connection



Use to connect the PC on which this software is installed to a WT through a USB, GP-IB, or Ethernet interface.

Setting



Standard and Measurement Settings

You can set judgment conditions according to the IEC 61000-3-2 or JIS standard.

Setting the Measurement Time

The measurement time is the time between the start of the measurement to the end of the measurement. The time for measuring harmonics is set in units of 1 s in advance. The harmonics can be measured continuously for the specified time. The measurement time can be changed when equipment that emits harmonics that fluctuate over time is measured or when confirming that the emitted harmonics do not change even when the equipment is operated over extended time.

Edition Settings for IEC 61000-4-7 or JIS C 61000-4-7

JIS: Japanese Industrial Standard

IEC 61000-4-7 or JIS C 61000-4-7 specifies requirements for measurement instruments.

You can set the IEC or JIS edition from the following. This setting affects the window function (measurement period) of the WT.

Edition No. of the IEC 61000-4-7	Edition No. of the JIS C 61000-4-7	Window Function of the WT (Measurement Period)	
		50 Hz	60 Hz
Edition 1.0	2007 JA	16 cycles (320 ms)	16 cycles (267 ms)
Edition 2.0	2007	10 cycles (200 ms)	12 cycles (200 ms)
A1 of the Edition 2.0	-----	10 cycles (200 ms)	12 cycles (200 ms)

For more details, see chapter 14.

Measure

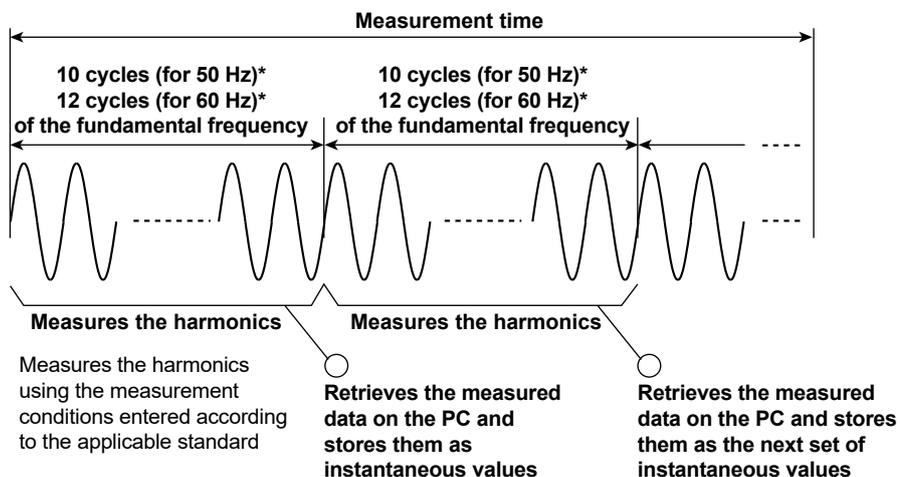


There are two measurement modes that you can select from the Measure submenu: Compliance test and Test preview. The software acquires different types of data and performs different operations for each measurement mode.

Compliance Test

• When in On-Line Mode

Measurement and evaluation of harmonics conforming to IEC 61000-3-2 or JIS can be made while making harmonic measurements on the WT.



One set of harmonic measurement data (handled as instantaneous values by the software) consists of harmonic data measured every 200 ms (10 cycles for 50 Hz and 12 cycles for 60 Hz)*. The instantaneous values, the mean value, and the maximum value of the measured data retrieved within the measurement time (see next page) can be evaluated to determine whether they are within the limits of the standard.

* For when the IEC 61000-4-7 edition is set to 2.0 or 2.0 A1. When the IEC 61000-4-7 edition is set to 1.0, the number of cycles is 16 (320 ms at 50 Hz or 267 ms at 60 Hz).

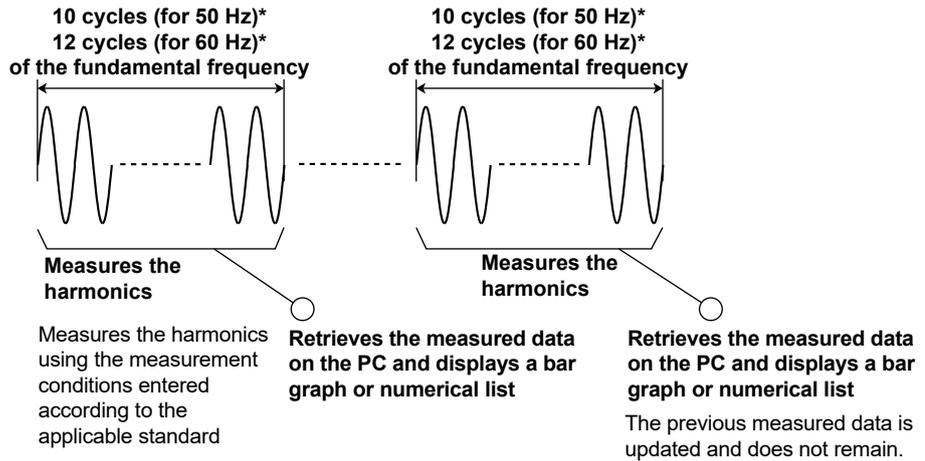
• When in Off-Line Mode

Evaluation can be made on the loaded measurement data according to the method complying with IEC 61000-3-2 or JIS.

Test Preview

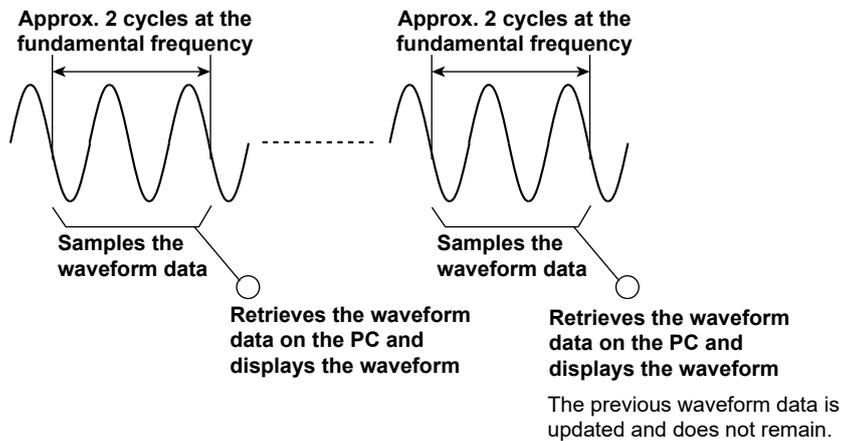
You can only select Test preview in online mode. As the WT measures the harmonic current, you can observe the harmonic fluctuations as they appear on a list and bar graphs of measured values. You can also observe the measured waveform. Unlike the compliance test, the harmonic preview is only for observing the state of a harmonic current. It does not determine whether or not a device conforms to certain standards. New data replaces old data. The software only retains the most recently acquired values.

• **Test Preview, List Preview, Bar Preview**



* For when the IEC 61000-4-7 edition is set to 2.0 or 2.0 A1. When the IEC 61000-4-7 edition is set to 1.0, the number of cycles is 16 (320 ms at 50 Hz or 267 ms at 60 Hz).

• **Waveform Preview**



Starting/Stopping Measurements

Harmonic measurement on the WT can be started from your PC when in On-Line mode. The measurement cannot be started when in Off-Line mode.

- **Compliance Test**

After you start WT harmonic current analysis from your PC, the PC will acquire and save the values that the WT measures. All of the data that is acquired during the specified measurement time is saved. After the specified measurement time is reached, the PC will automatically end measurement and data acquisition. You can also stop data acquisition from the PC before the measurement time is reached.

- **Test Preview**

After you start WT harmonic current analysis from your PC, the PC will acquire the values that the WT measures. New data replaces old data. The software only retains the most recently acquired data. Unlike the compliance test, the test preview is only for observing the state of a harmonic current. It do not determine whether or not a device conforms to certain standards.

Analysis



The result of the evaluation as to whether the harmonic current data up to order 40 is within the limits of IEC 61000-3-2 or JIS and the corresponding measured data can be displayed.

Display of the Evaluation Result within the Entire Measurement Time

Evaluation can be made as to whether all of the harmonic measurement data in the measurement time are within the limits according to the settings specified in "Setting the Standard and Measurement Environment" (as described earlier), and the results can be displayed collectively.

List and Bar Graph Display of Harmonic Current

A list and bar graphs of the harmonic measurement data and the standard limits can be displayed for each order. Moreover, the evaluation as to whether harmonic current data is within the limits can be displayed using different colors. The harmonic current data to be evaluated is the mean value, the maximum value, and instantaneous values (one set of harmonic measurement data) of the measured data within the measured time. Harmonic current can be displayed for each input element of the WT.

Bar Graph Display of Harmonic Voltage, Current, and Phase Angle

You can display the measured data for each harmonic in a bar graph. The software will display the instantaneous values in the bar graph (instantaneous values are the values that are acquired at each measurement of the harmonic current).

List Display of Harmonic Voltage, Current, and Phase Angle

You can display the measured data for each harmonic in a list. The software will display the instantaneous values in the list (instantaneous values are the values that are acquired at each measurement of the harmonic current).

Trend Graph Display of Harmonic Measurements

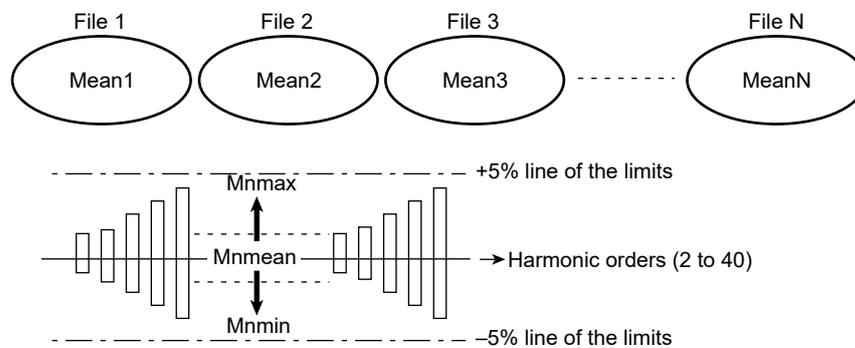
For each harmonic, you can use a trend graph to show how the harmonic measurement data fluctuates over time.

Waveform Display of Voltage and Current

You can display a waveform that is measured immediately after the measurement time finishes. The software will display approximately two waveform periods. You can click on an area to display a cursor and show the instantaneous values there.

Repeatability of Measured Data

The mean value in the harmonics measurement data saved to files can be compared, and the difference in the measured data can be displayed on a bar graph or numerical list for each order. This function can be used to evaluate whether the difference between data measured under the same measurement conditions when harmonics are measured using the same product or same product model is within ±5% of the limits (confirmation of repeatability).



$$Mnmean = (Mean1 + Mean2 + Mean3 + \dots + MeanN)/N$$

(Mnmean: The value derived by summing the mean values of each file (Mean1, Mean2, Mean3, ... MeanN) and dividing by the number of summed values (N). The value can be determined for each order.)

$$Mnmax = [Mean1, Mean2, Mean3, \dots, MeanN]max$$

(Mnmax: The maximum value among the mean values of each file. The value can be determined for each order.)

$$Mnmin = [Mean1, Mean2, Mean3, \dots, MeanN]min$$

(Mnmin: The minimum value among the mean values of each file. The value can be determined for each order.)

Judgement of the +5% of the limit

$$\frac{Mnmax - Mnmean}{Limit} \times 100 < 5 \quad [\%]$$

Judgement of the -5% of the limit

$$\frac{Mnmin - Mnmean}{Limit} \times 100 > -5 \quad [\%]$$

Display of Simple Test Judgment Results

Judgment can be made as to whether the measured data of the simple test is within limits, and the results of the judgment can be displayed collectively.

Print



To create reports, you can attach titles and comments to harmonic measurement data lists and bar graphs and then save them to .pdf or .bmp files or print them.

Save



Saving Setting Information

You can save setting information, such as measurement settings, measurement time, bar graph and list display formats, and report titles and comments, to an .ini file (reports contain information such as judgment results and lists and graphs of measured data values).

Saving Measured Data and Waveform Data

The software can save the measured data and waveform data that it acquires from the WT to an .fdt file. When the software saves this data, it will also save the WT harmonic measurement conditions along with the setting information described above to an .ini file.

Saving Measured Data and Waveform Data to CSV Format

You can use this software to save the harmonic measurement data and waveform data that the PC has acquired from the WT to a CSV file. This software cannot load CSV files, but you can use another program on the PC to load and view the CSV files that you save.

Exit



Use to close the software.

Online Mode and Offline Mode

Online Mode

The software is in online mode when the PC is connected to the WT through a USB, GPIB, or Ethernet interface. The software must be in online mode to acquire harmonic data from the WT as the data is being measured. You can switch to Online mode from the Connection page. In online mode, you can change the WT settings from the PC.

Offline Mode

You can load previously saved harmonic measurement data into the software. You can change the settings and reanalyze the loaded data, and you can display a variety of lists and graphs.

1.2 PC System Requirements

PC

CPU: Dual core or more processor
Memory: 2 GB or more recommended
Storage: 10 GB free space or more

Operating System

English version of Windows 8.1 or Windows 10

Communication Card

USB

A USB port that supports USB Revision 1.1 or higher

GP-IB

NI (National Instruments)

	OS	
	Windows 8.1	Windows 10
	Version of the driver NI-488.2	
PCI-GPIB	3.1.0 or later	15.5.0 or later
PCI-GPIB+		
PCIe-GPIB		
PCIe-GPIB+		
GPIB-USB-HS		
GPIB-USB-HS+	14.0 or later	

Ethernet

An Ethernet port that supports 10BASE-T, 100BASE-TX, or 1000BASE-T

Display and Mouse

Display Resolution: 1366 × 768 dots or higher
Operating System: Operating system mentioned above

WT5000

WT firmware version 2.01 or later with the following functions.

- IEC Harmonic/Flicker measurement feature (/G7 option)
- USB, GP-IB, or Ethernet interface (standard)

WT Firmware Versions and Selectable IEC 61000-4-7 Edition Numbers

In WT firmware versions 2.01 and later, you can select the IEC 61000-4-7 or JIS C 61000-4-7 edition.

Editon No. of the IEC 61000-4-7

- Edition 1.0
- Edition 2.0
- A1 of the Edition 2.0

Editon No. of the JIS C 61000-4-7

- 2007 JA
- 2007

IEC 61000-4-7 or JIS C 61000-4-7 specifies requirements for measurement instruments. For details, see chapter 14.

1.3 Applicable Standards

This software supports the following standards:

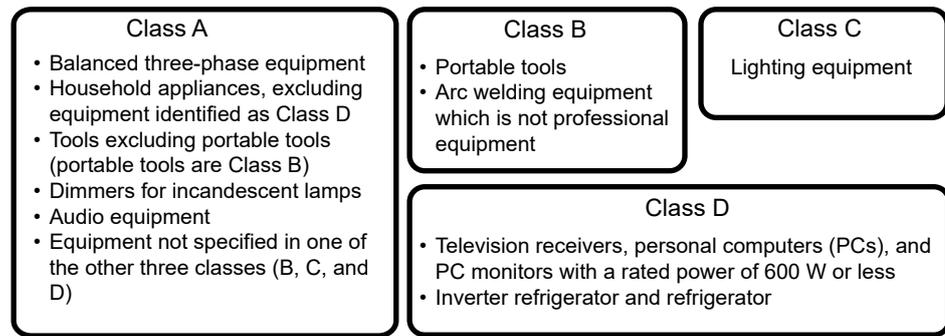
- IEC 61000-3-2 Edition 3.0:2005 and A2 of the Edition 3.0:2009, IEC 61000-3-2 Edition 4.0:2014
- EN61000-3-2:2006/A2:2009, EN61000-3-2:2014
- IEC 61000-4-7 Edition 1.0:1991, Edition 2.0:2002 and A1 of the Edition 2.0:2008
- JIS C61000-3-2:2011 JIS: Japanese Industrial Standard
- JIS C61000-4-7:2007

This section gives an overview of the standards. For further details, see the actual text of the applicable standard.

Scope and Classification

The limits for harmonic current emissions (IEC 61000-3-2 or JIS) are applicable to electrical and electronic equipment having an input current of up to 16 A (up to 20 A for JIS) per phase and connected to public low-voltage distribution systems. Classification is made depending on the type of equipment. IEC 61000-3-2 Edition 4.0 does not define the limits for some types of equipment. For details, see the applicable standard.

— **Electrical and electronic equipment having an input current up to 16 A per phase** —



Limits

The limits are specified for each class. IEC 61000-3-2 assumes a phase voltage of 220 V, 230 V, and 240 V for specifying the limits. For equipment of differing rated voltage, conversion may be necessary. For the conversion equation, see “Conversion of Limits” (page 1-12). The limits of JIS C-61000-3-2:2011 are the same as those of IEC 61000-3-2. However, limits indicated on the next page apply to air conditioners of class A whose active power exceeds 600 W.

Limits for Class B Equipment

Harmonic order n	Maximum permissible harmonic current [A]
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq n \leq 39$	$0.15 \times (15/n)$
Even harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq 40$	$0.23 \times (8/n)$

1.3 Applicable Standards

In JIS C61000-3-2:2011, the limits below apply to air conditioners whose active power exceeds 600 W.

Harmonic order n	Maximum permissible harmonic current [A]
Odd harmonics	
3	$2.30 + 0.00283(W-600)$
5	$1.14 + 0.00070(W-600)$
7	$0.77 + 0.00083(W-600)$
9	$0.40 + 0.00033(W-600)$
11	$0.33 + 0.00025(W-600)$
13	$0.21 + 0.00022(W-600)$
$15 \leq n \leq 39$	$(0.15 + 0.00020(W-600)) \times (15/n)$
Even harmonics	
2	$1.08 + 0.00033(W-600)$
4	$0.43 + 0.00017(W-600)$
6	$0.30 + 0.00012(W-600)$
$8 \leq n \leq 40$	$(0.23 + 0.00009(W-600)) \times (8/n)$

Limits for Class B Equipment

Limits for Class A equipment $\times 1.5$

Limits for Class C Equipment

Classification is made according to the active power of the equipment shown below. For single-phase equipment, the classification is made using the active power of the single-phase power. For multi-phase equipment, the classification is made using the sum of the active powers all phases (three phases if three-phase).

- **Equipment with active input power exceeding 25 W**

Does not exceed the limits of Class C, which are shown below.

Harmonic order n	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency [%]
2	2
3	$30 \times \lambda^*$
5	10
7	7
9	5
$11 \leq n \leq 39$ (Odd harmonics only)	3

* λ is the power factor (circuit power factor).

For the fundamental current and power factor, use the measured values under maximum load conditions of the equipment.

However, the limit of Class A apply to incandescent lighting equipment that has built-in dimmers or consists of dimmers built in an enclosure.

For discharge lighting equipment hat has built-in dimmers or consists of independent dimmers or dimmers built in an enclosure, the following conditions apply:

- The harmonic current values for the maximum load condition derived from the percentage of Class C shall not be exceeded.
- In any dimming position, the harmonic current shall not exceed the value of current allowed in the maximum load condition.
- The equipment shall be tested according to the conditions given in C.5.

• **Equipment with active input power less than or equal to 25 W**

Shall meet one of the two conditions below.

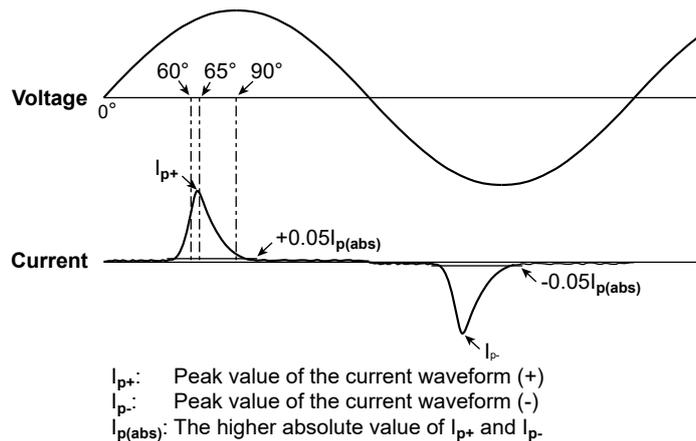
1. Does not exceed the power ratio limits of Class D.
2. The third and fifth harmonics shall not exceed the limits given in the table below. Moreover, the relationship of the fundamental voltage waveform and the input current waveform shall be as shown in the figure below.

Harmonic order n	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency [%]
3	86
5	61

The relationship of the fundamental supply voltage waveform and the input current waveform is as follows, where the zero crossing of the fundamental supply voltage is assumed to be at 0° (degrees).

- Beginning of the current flow: It reaches the 5 % current threshold before or at 60°
- Current peak: Before or at 65°
- End of the current flow: It does not fall below the 5 % current threshold before 90°.

The 5% current threshold is defined to be 5% of the maximum absolute peak value ($I_{p(abs)}$).



Limits for Class D Equipment

Shall meet the maximum permissible harmonic current (power ratio limit) per watt and the maximum permissible current given in the next table. The concept of power (active power) of single- or multi-phase equipment is the same as Class C.

Harmonic order n	Maximum permissible harmonic current per watt [mA/W] (Power ratio limit)	Maximum permissible harmonic current (Odd harmonics only) [A]
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
13 ≤ n ≤ 39 (Odd harmonics only)	3.85/n	Same as class A.

1.3 Applicable Standards

Conversion of Limits

IEC 61000-3-2 assumes a phase voltage of 220 V, 230 V, and 240 V for specifying the limits. For equipment of differing rated voltage, conversion may be necessary. Convert the limits of all the classes using the following equations and apply them. However, conversion to a phase voltage of 220 V or 240 V is not necessary.

Phase voltage

$$\text{Converted limit} = \text{Limit of each class} \times \frac{230}{\text{Rated voltage of the equipment}}$$

Line voltage of three-phase

$$\text{Converted limit} = \text{Limit of each class} \times \frac{400}{\text{Rated voltage of the equipment}}$$

Simple Test

Equipment whose compliance test result meets the conditions below can be tested using the simple test method the next time the equipment is updated.

- Harmonic current: Below 60 % of the applicable limits
- THD of the supply current: Less than 15 %

Products that fulfill the following requirements are deemed to comply with the applicable limits.

- Active input power: Within ± 20 % of that of the originally tested product
- THD of the supply current: Less than 15 %

Specifications of Supply Source, Measurement Equipment, Test Conditions, and Application Method of Limits.

This section lists only the items. For detailed specifications, see the applicable standard.

Power Supply

- Supply voltage and frequency range.
- Permissible range of harmonics contained in the supply voltage.
- Voltage peak value and phase offset between the waveform zero crossing and the peak value.
- Internal impedance of the supply source.
- Angle between the fundamental voltage on each pair of phases in the case of a three-phase source.

Measurement Equipment

- Error of the measurement equipment.
- Input impedance of the measurement equipment.
- Time constant of the internal processing when measuring harmonics.

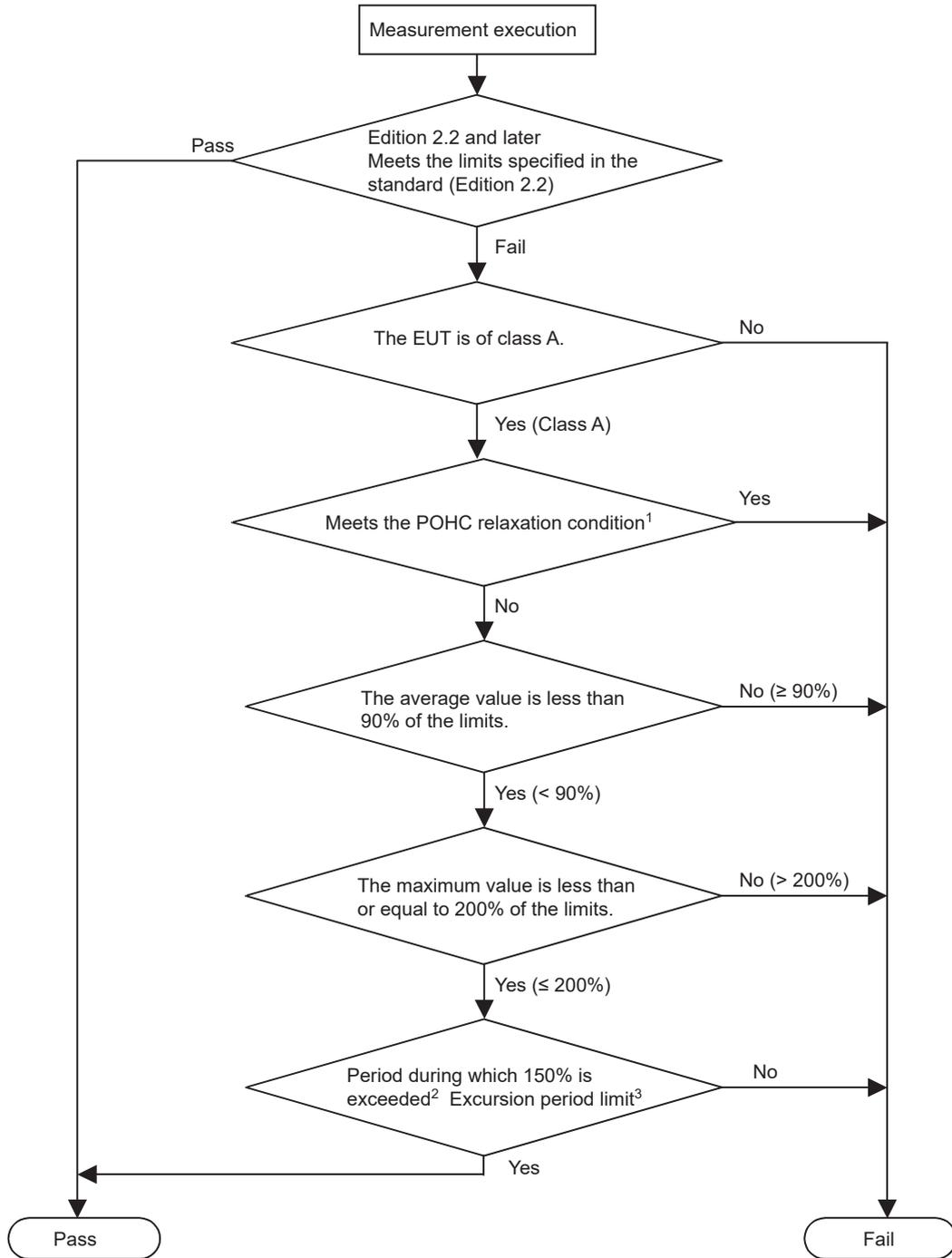
Test Conditions

- Test conditions for television/audio equipment and lighting equipment.
- Test conditions for general equipment not specified in the applicable standard.
For example, performing tests by setting the equipment to a condition that produces the maximum total harmonic current (THC).
- Specification of the repeatability of the measurement results.
- Specification of the observation time (measurement time) to achieve the repeatability of the measurement results.

Application Method of Limits

- Derivation of the fundamental current and power factor (circuit power factor) of class C equipment.
- Derivation of the power (active power) used by class D equipment
- Specifications when comparing the harmonic current limits and measured values for each order.
 - Compare the specified limit and the mean value of the harmonic current within the measurement time and evaluate.
 - Compare the value that is 1.5 times the specified limit and the maximum value of the harmonic current within the measurement time and evaluate.
- 200% short-term relaxation conditions
If all of the following conditions are met for each order, up to 200% of the specified limits is permitted.
 - The EUT belongs to Class A for harmonics.
 - The excursion beyond 150 % of the applicable limits lasts less than 10 % of the test observation period or in total 10 min (within the test observation period), whichever is smaller.
 - The average value of the harmonic current, taken over the entire test observation period, is less than 90 % of the applicable limits.
- POHC relaxation of the specification
If the total partial odd harmonic currents (POHC) of order above and including 21 is less than the specified POHC limit, the average of the odd harmonic currents of order above and including 21 is permitted to be 1.5 times the specified limits.

Decision Process for Determining Whether 200% Short-Term Relaxation or POHC Relaxation Is Applicable



- 1 The 200% short-term relaxation and POHC relaxation cannot be applied together to a single test.
- 2 Period during which instantaneous values exceed 150% of the applicable limit.
- 3 10% of the test observation period or 10 minutes (within the test observation period), whichever is smaller.

Window Function of the WT (Measurement Period)

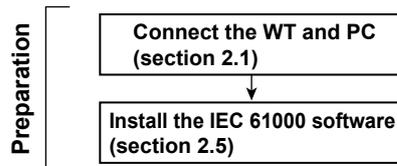
The width of the window function (measurement period) for the measurements is defined by IEC 61000-4-7. For details, see page 1-3 or chapter 14.

1.4 Flow of Operation

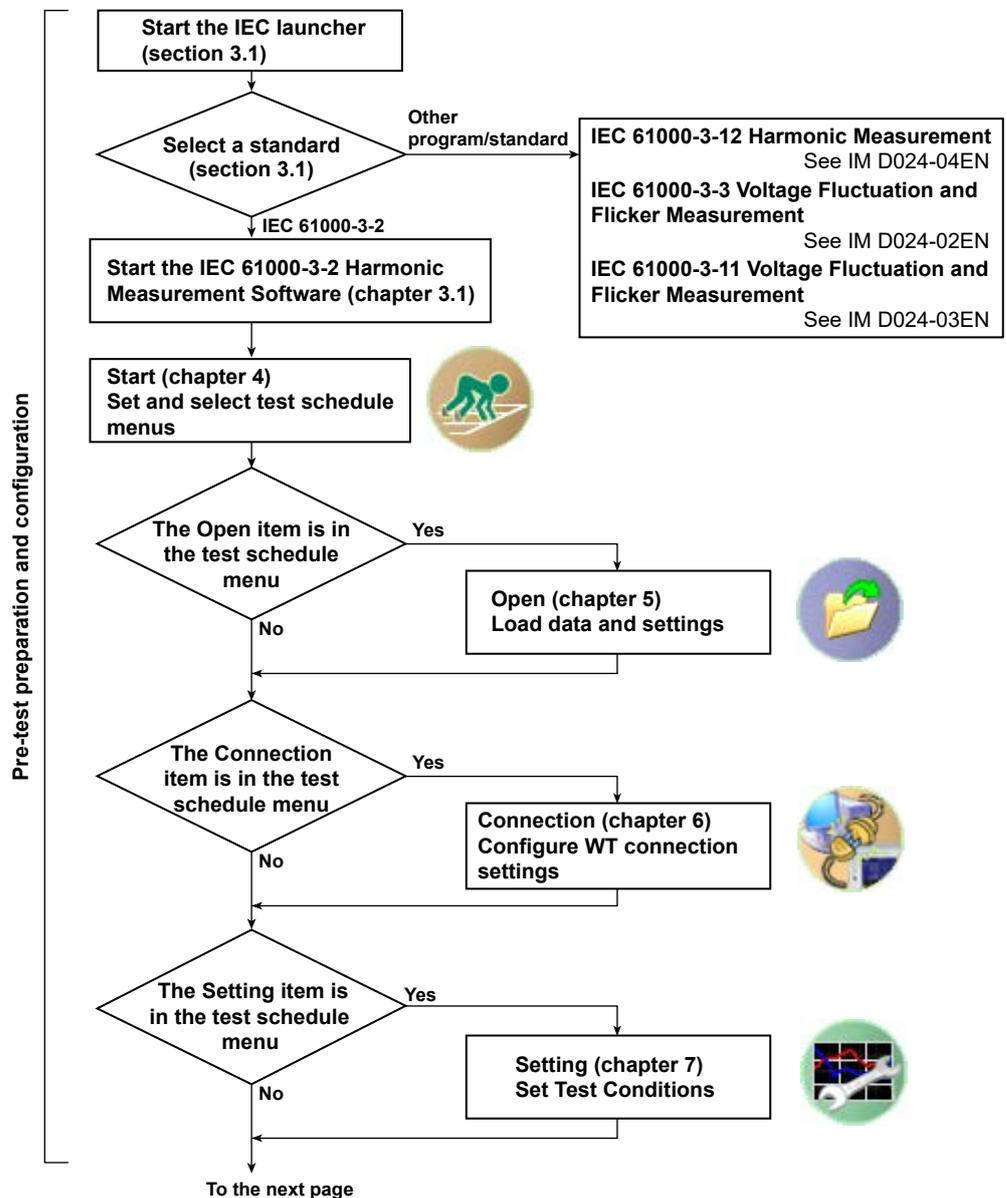
To display and judge harmonic measurement data using this software, the WT and PC must be connected, the harmonic/flicker measurement software for WT5000 (IEC 61000 software) must be installed, WT measurement conditions must be set, and judgment conditions of the applicable standard must be set. Follow the steps below.

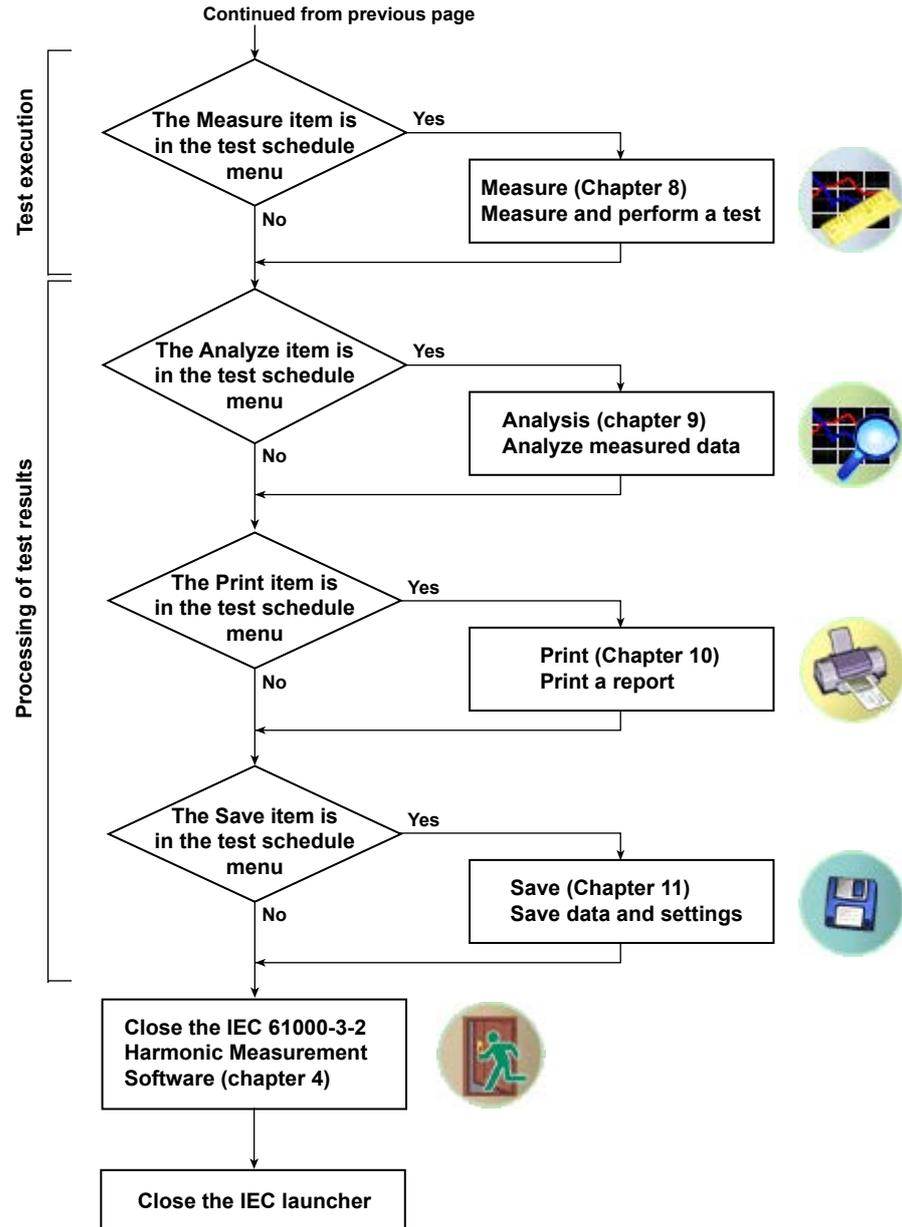
The available communication interfaces for connecting the WT to the PC are USB, GP-IB, and Ethernet.

Preparation Flow Chart



Test Flowchart





1.5 Terminology Related to Harmonics

Harmonics refer to sine waves whose frequency is an integer multiple of the fundamental wave (normally sine waves of commercial frequency 50-Hz or 60-Hz) excluding the fundamental frequency.

Fundamental Wave (Fundamental Component)

The sine wave with the longest period among the different sine waves derived from the periodic complex wave. Or the sine wave that has the fundamental frequency within the components of the complex wave.

Fundamental Frequency

The frequency corresponding to the longest period in the periodic complex wave. The frequency of the fundamental wave.

Distorted Wave

A wave that differs from the fundamental wave.

Higher Harmonic

A sine wave with frequency that is an integer multiple (twice or greater) of the fundamental frequency.

Harmonic Component

Waveform component with frequency that is an integer multiple (twice or greater) of the fundamental frequency.

Harmonic Order

Integer ratio of the harmonic frequency with respect to the fundamental frequency. IEC defines the maximum harmonic order that is measured to be 40.

PLL Source

When measuring harmonics, the fundamental period (period of the fundamental signal) must be determined in order to analyze the higher orders. The PLL (Phase Locked Loop) source is the signal that is used to determine the fundamental period.

THC (Total Harmonic Component)

Sum (rs value) of harmonic currents of orders 2 to 40.

$$\sqrt{\sum_{k=2}^{40} I(k)^2}$$

I(k): rms current of each order
k: harmonic order

THD (Total Harmonic Distortion)

The ratio of the rms value of all harmonics of orders 2 to 40 and the rms value of the fundamental wave.

• V THD

$$\frac{\sqrt{\sum_{k=2}^{40} U(k)^2}}{U(1)} \times 100$$

• A THD

$$\frac{\sqrt{\sum_{k=2}^{40} I(k)^2}}{I(1)} \times 100$$

• P THD

$$\left| \frac{\sum_{k=2}^{40} P(k)}{P(1)} \right| \times 100$$

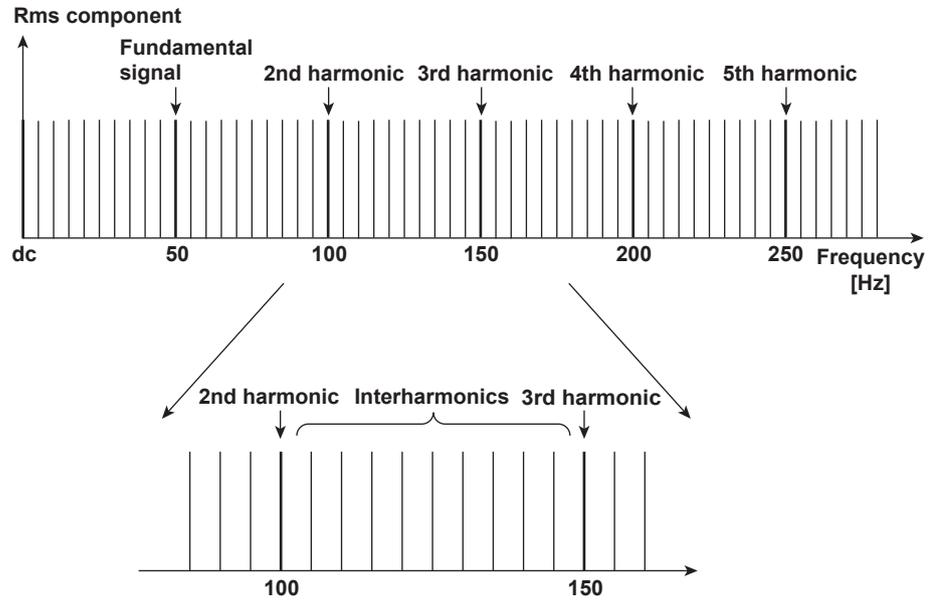
U(k): rms voltage of each order, U(1): rms voltage of the fundamental signal
I(k): rms current of each order, I(1): rms current of the fundamental signal
P(k): active power of each order, P(1): active power of the fundamental signal
k: harmonic order

1.5 Terminology Related to Harmonics

Interharmonics

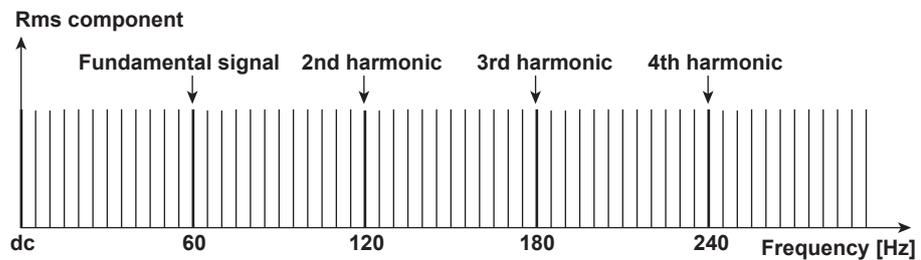
If the input signal is 50 Hz in IEC harmonic measurement, Fourier transform is taken on 10 periods of the input signal to derive frequency components of 5-Hz resolution. Thus, the section between each harmonic order is divided into 10 frequency components. The components between each harmonic order are called interharmonics.

When the fundamental signal is 50 Hz



If the input signal is 60 Hz, 12 periods of the input waveform are divided into frequency components of 5-Hz resolution. Thus, the section between each harmonic order is divided into 12 frequency components.

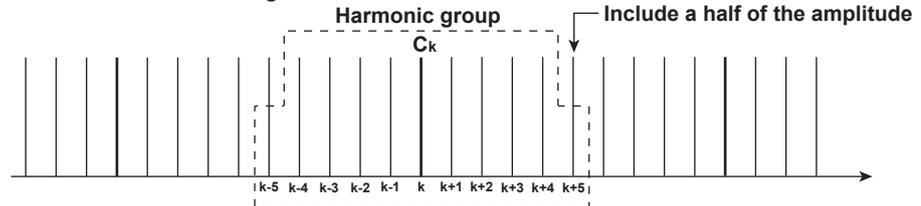
When the fundamental signal is 60 Hz



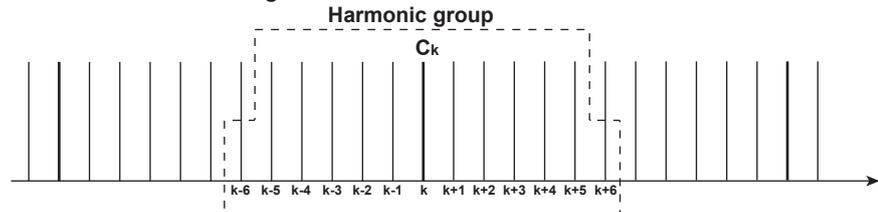
Harmonic Group

The combined value of a harmonic and its adjacent interharmonics (rms value). The computing method to combine the harmonic and its two adjacent interharmonics is not simple addition, but the square root of the sum of the square of each component. A half of the amplitude is included for the interharmonic that is in the middle of two harmonics.

When the fundamental signal is 50 Hz



When the fundamental signal is 60 Hz



$$G_{g,n} = \sqrt{\frac{C_{k-5}^2}{2} + \sum_{i=-4}^4 C_{k+i}^2 + \frac{C_{k+5}^2}{2}} \quad (\text{for 50 Hz})$$

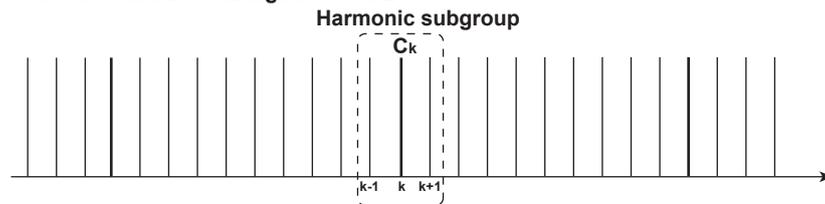
$$G_{g,n} = \sqrt{\frac{C_{k-6}^2}{2} + \sum_{i=-5}^5 C_{k+i}^2 + \frac{C_{k+6}^2}{2}} \quad (\text{for 60 Hz})$$

C_k: frequency component for every 5 kHz

Harmonic Subgroup

The combined value (rms value) of a harmonic and its two adjacent interharmonics. The computing method to combine the components is the average of the sum of the squares as with the harmonic group.

When the fundamental signal is 50 Hz



$$G_{sg,n} = \sqrt{\sum_{i=-1}^1 C_{k+i}^2}$$

C_k: frequency component for every 5 kHz

THDG (Group Total Harmonic Distortion)

The ratio of the sum of all harmonic groups of orders 2 to 40 with respect to the group related to the fundamental wave.

• V THDG

$$\frac{\sqrt{\sum_{k=2}^{40} U_g(k)^2}}{U_g(1)} \times 100$$

• A THDG

$$\frac{\sqrt{\sum_{k=2}^{40} I_g(k)^2}}{I_g(1)} \times 100$$

U_g(k), I_g(k): rms value of the harmonic group of each order
k: harmonic order

1.5 Terminology Related to Harmonics

THDS (Subgroup Total Harmonic Distortion)

The ratio of the sum of all harmonic sub groups of orders 2 to 40 with respect to the sub group related to the fundamental wave.

• **V THDS**

$$\frac{\sqrt{\sum_{k=2}^{40} U_{sg}(k)^2}}{U_{sg}(1)} \times 100$$

• **A THDS**

$$\frac{\sqrt{\sum_{k=2}^{40} I_{sg}(k)^2}}{I_{sg}(1)} \times 100$$

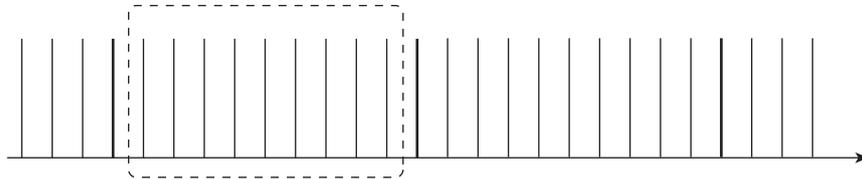
$U_{sg}(k)$, $I_{sg}(k)$: rms value of the harmonic subgroup of each order
 k : harmonic order

Interharmonic Group

The combined value (rms value) of all interharmonic components between two consecutive harmonic frequencies.

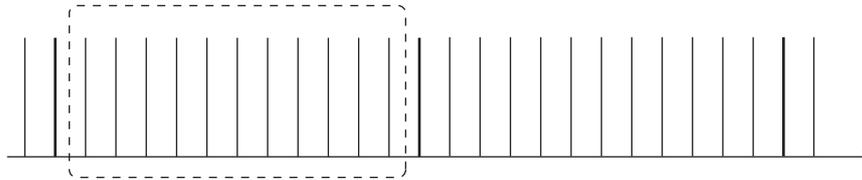
When the fundamental signal is 50 Hz

Interharmonic group



When the fundamental signal is 60 Hz

Interharmonic group

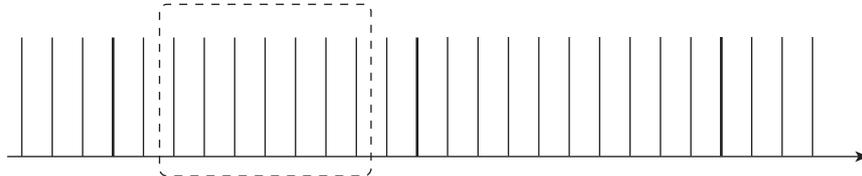


Interharmonic Center Subgroup

The combined value (rms value) of all interharmonic components between two consecutive harmonic frequencies excluding the frequency components adjacent to the harmonic frequencies.

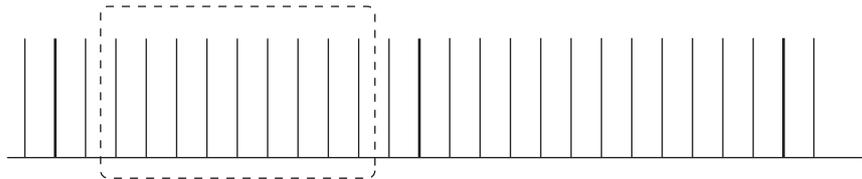
When the fundamental signal is 50 Hz

Interharmonic center subgroup



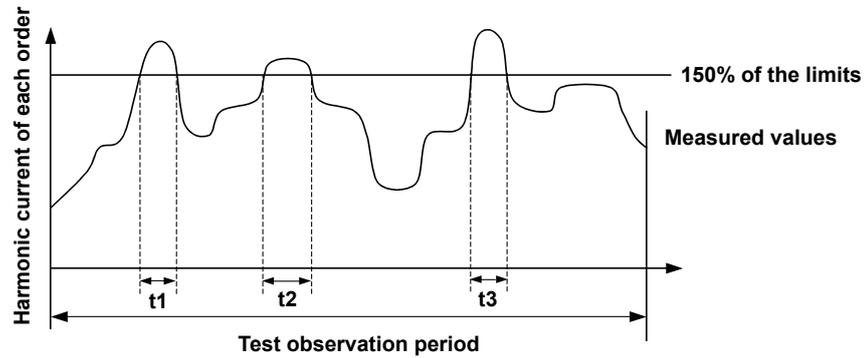
When the fundamental signal is 60 Hz

Interharmonic center subgroup



200% Short-Term Relaxation

Calculating the period during which 150% of the applicable limit is exceeded and determining whether or not the relaxation condition applies



When the test observation period is less than 100 minutes

$$t1 + t2 + t3 \times 10\% \text{ of the test observation period}$$

When the test observation period is greater than or equal to 100 minutes

$$t1 + t2 + t3 < 10 \text{ minutes}$$

POHC: The combined value of all odd harmonic currents greater than or equal to order 21 (Partial Odd Harmonic Current)

$$\sqrt{\sum_{k=21, 23}^{39} I(k)^2}$$

I(k): rms current of odd harmonics above and including order 21

k: harmonic order, odd value above and including 21

PoHC Maximum: The maximum value of the combined value of all odd harmonic currents greater than or equal to order 21

The POHC maximum derived from individual measured data points within the measurement time. If this value is less than the POHC Limit below, the relaxation condition (see page 1-13) is applied.

POHC Limit

$$\sqrt{\sum_{k=21, 23}^{39} I_L(k)^2}$$

I_L(k): limits of odd harmonics above and including 21 as specified by the applicable standard

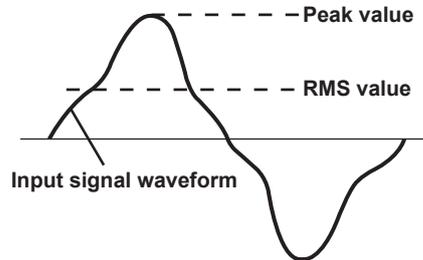
k: harmonic order, odd value above and including 21

1.5 Terminology Related to Harmonics

Crest Factor

The crest factor is defined as the ratio of the peak value of the waveform to the rms value.

$$\text{Crest factor (CF)} = \frac{\text{Peak value}}{\text{RMS value}}$$



The crest factor on the WT is determined by the maximum peak value that can be applied for rated input in terms of a multiplication factor.

$$\text{Crest factor (CF)} = \frac{\text{Peak value that can be input}}{\text{Measurement range}}$$

You can select a crest factor of 3 or 6.

For details on the measurement accuracy and crest factor of the IEC standard, see chapter 14, "Specifications." Highly accurate measurements can be performed by setting the crest factor to 3.

2.1 Connecting the WT5000 and the PC

CAUTION

When connecting or disconnecting communication cables, make sure to turn OFF the PC and the WT. Otherwise, erroneous operation or damage to the internal circuitry may result.

French

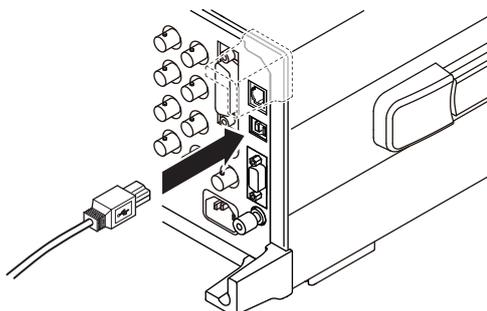
ATTENTION

Toujours mettre le PC et le WT hors tension avant de brancher ou de débrancher des câbles de communication, pour éviter tout dysfonctionnement ou panne du circuit interne.

When Controlling the WT through the USB

Connect the USB port for PCs (type B connector) on the rear panel of the WT to the PC. For details on the connection procedure and the specifications of the USB interface, see the WT main unit user's manual.

- Sections 2.2 and 2.3 in the Communication Interface User's Manual (IM WT5000-17EN)



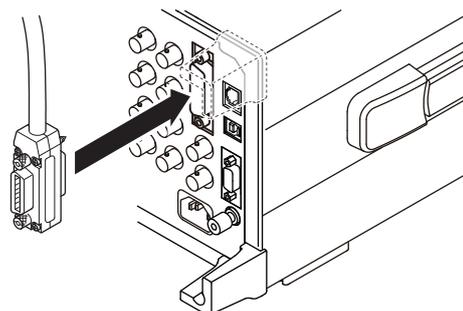
When Controlling the WT through the GP-IB

The GP-IB available on the WT is a 24-pin connector that conforms to the IEEE St'd 488-1978. Use a GP-IB cable that conforms to this standard. Connect the cable to the GP-IB connector on the rear panel of the WT.

For details on the connection procedure and the specifications of the GP-IB interface, see the WT main unit user's manual.

- Sections 3.2 and 3.3 in the Communication Interface User's Manual (IM WT5000-17EN)

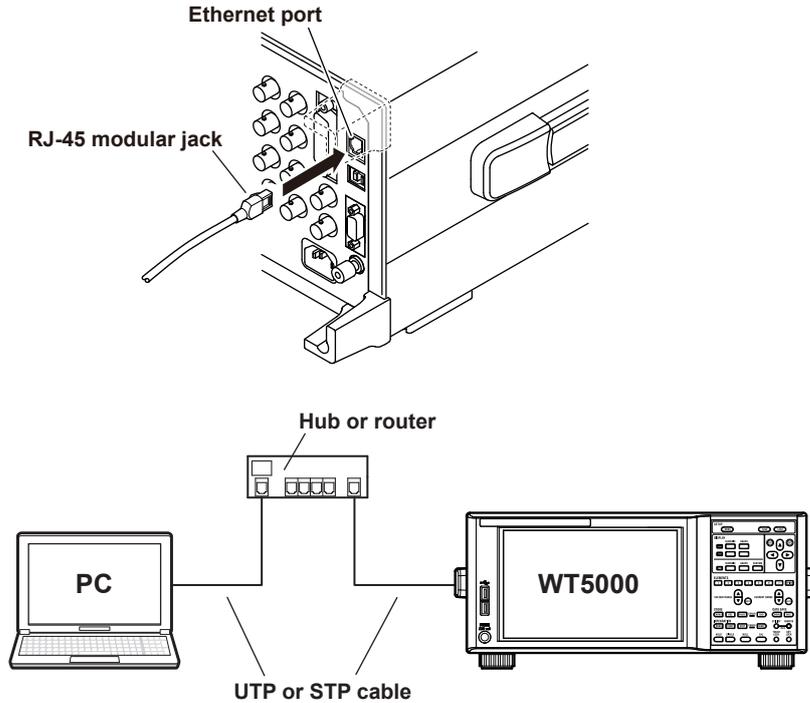
Use an appropriate connector for your PC to connect the other end of the GP-IB cable.



When Controlling the WT through the Ethernet Interface

Connect the WT and your PC through a hub using straight UTP (Unshielded Twisted-Pair) or STP (Shielded Twisted-Pair) cables. Connect the cable to the ETHERNET port on the rear panel of the WT. Use hubs, cables, and Ethernet NIC that are appropriate for the data rate. For details on the connection procedure and the specifications of the Ethernet interface, see the WT main unit user's manual.

- Sections 1.2 and 1.3 in the Communication Interface User's Manual (IM WT5000-17EN)



Note

- Use a cable, hub, or router that supports the data rate of your network.
 - Do not directly connect the WT to the PC without using a hub. Operations are not guaranteed for communications using direct connection.
-

2.2 Setting the USB Control

Procedure

Starting the WT5000

1. Turn on the WT5000 power switch to start the WT5000.
For details on how to turn on the power switch, see in the WT5000 Getting Started Guide (IM WT5000-03EN).

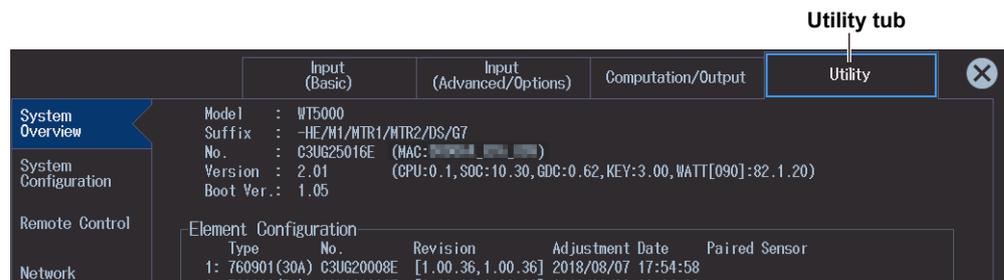
Utility Settings Overview (Utility)

You can display the remote control setting screen from the utility settings overview screen. The utility settings overview screen can be opened mainly using the following two methods.

- * For information about the utility settings overview screen, see section 1.4 in the User's Manual, IM WT5000-02EN.

Procedure Using the Setup Menu

1. Tap the **Setup** icon (), or press **MENU** under SETUP.
2. Tap the **Utility** tab. The utility settings overview screen appears.

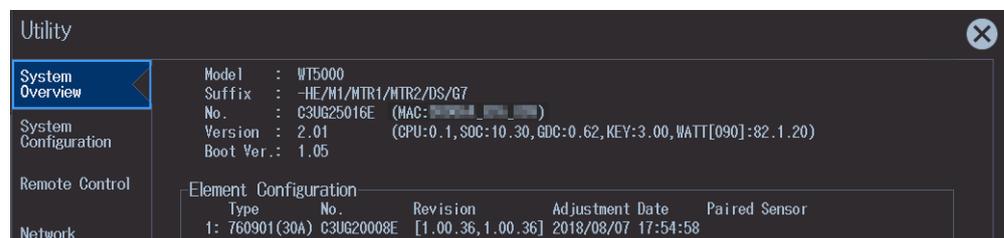


Note

You can also display the utility settings overview screen by moving the cursor on the Utility tab using the arrow keys and then pressing SET.

Procedure Using the UTILITY Key

1. Press **UTILITY** on the front panel. The utility settings overview screen appears.



2.2 Setting the USB Control

Checking the Serial Number

Check that the serial number used for USB TMC communication is displayed under Serial No.

Configure remote control.



Explanation

Each device that is connected through USB has its own unique ID in the USB system. This ID is used to distinguish between different devices. When you connect the WT to the PC, make sure that the WT ID does not overlap with those of other devices.

Note

- Refer to section 2.5, and install YOKOGAWA's USB driver in the PC.
- When you connect a WT to the PC and use the software to control the WT, you cannot use multiple types of communication interface at the same time.
- You can connect one WT or multiple WTs to a PC and use the software to control the them.
- The software may not operate correctly, if an adapter is inserted in the middle of the connection between the WT and the PC (for example, GP-IB-to-USB adapter).

2.3 Setting the GP-IB Control

Procedure

Starting the WT5000

1. Turn on the WT5000 power switch to start the WT5000.

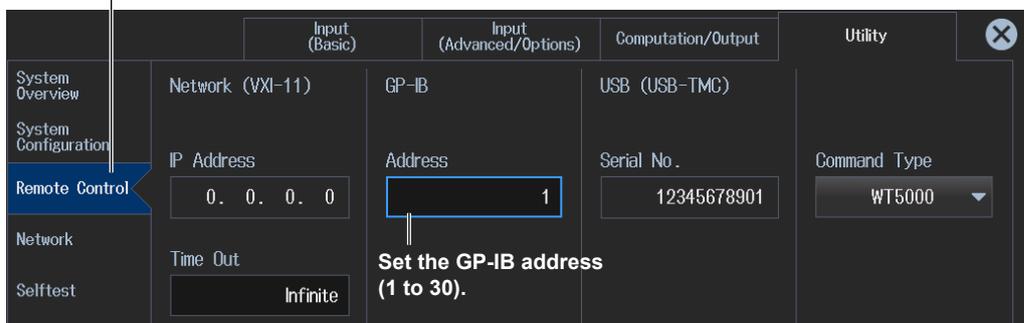
Remote Control Settings (Remote Control)

1. Refer to section 2.2, and open the utility settings overview screen.
2. Tap the **Remote Control** button.
The remote control setting screen (Network (VXI-11), GP-IB, USB (USB-TMC)) appears.

Setting the GP-IB Address

3. Tap **Address**. Use the displayed input box to set the GP-IB address.

Configure remote control.



Explanation

To use the software in On-Line mode through the GP-IB interface, operate the WT to select GP-IB.

Setting the Address

Set the WT address within the following range.
1 to 30

Each device that can be connected via GP-IB has a unique address within the GP-IB system. This address is used to distinguish the device from others. Therefore, make sure that the WT address does not overlap with other devices when connecting the WT to the PC.

Note

- Do not change the address while the controller (PC) or other devices are using the GP-IB system.
- When connecting the WT to a single PC and controlling the WT using this software, multiple communication interfaces cannot be used simultaneously.
- Use a GP-IB card by National Instruments on the PC end. For details, see section 1.2.
- The software may not operate correctly, if an adapter is inserted in the middle of the connection between the WT and the PC (for example, GP-IB-to-USB adapter).

2.4 Setting the Ethernet Control

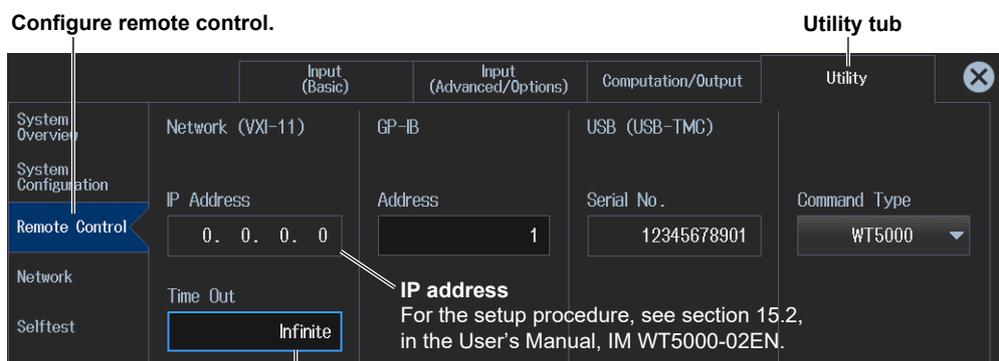
Procedure

Starting the WT5000

1. Turn on the WT5000 power switch to start the WT5000.

Remote Control Settings (Remote Control)

1. Refer to section 2.2, and open the utility settings overview screen.
2. Tap **Remote Control**.
A remote control setup screen (Network(VXI-11/GP-IB/USB(USB-TMC)) appears.
3. Tap **Time OUT**. Use the displayed input box to set the timeout value.

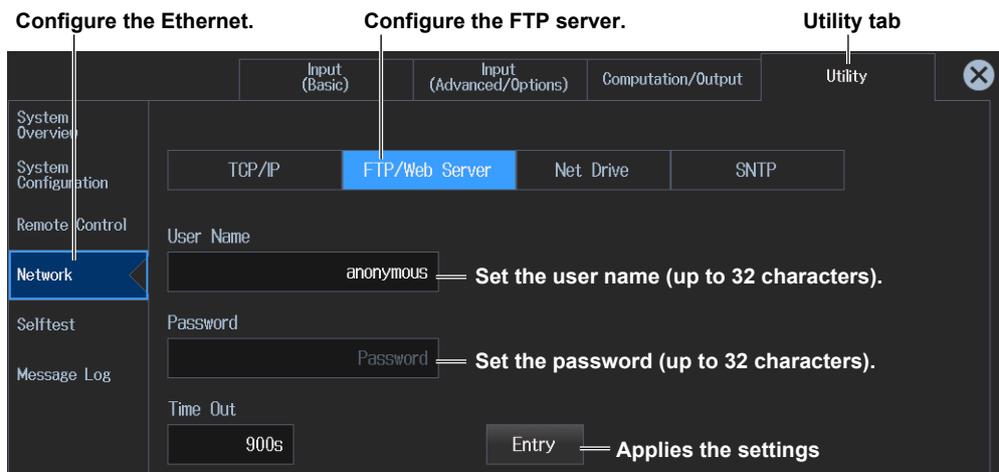


Set the timeout period (Infinite, 1 to 3600 s)

Configure the Ethernet

Setting the User Name and Password

4. Tap **Network**.
An Ethernet setup screen (TCP/IP, FTP Server, Net Drive, SNTP) appears.
5. Tap **FTP/Web Server**. An FTP/Web Server screen appears.
A password is not required if the login name is anonymous.
For the keyboard operation of the WT, see the WT user's Manual.



Setting TCP/IP

You must enter TCP/IP settings to control the WT from a PC through the network. For the setup procedure, see the following WT user's manual.

- Features Guide (IM WT5000-01EN)
- User's Manual (IM WT5000-02EN)

Explanation

To use the software in On-Line mode through the network, operate the WT to select Network.

Setting the User Name

- Enter the user name to allow access to the WT.
- Enter up to 32 characters.
- The characters that can be used are 0-9, A-Z, %, _, () (parentheses), - (minus sign).
- If you specify anonymous, the WT can be accessed from the PC without a password.

Setting the Password

- Enter the password of the user name to allow access to the WT.
- Enter up to 32 characters.
- The characters that can be used are 0-9, A-Z, %, _, () (parentheses), - (minus sign).
- If you set the user name to anonymous, the WT can be accessed from the PC without a password.

Setting the Timeout Value

The WT closes the connection to the network if there is no access for a certain period of time (timeout value).

The available settings are 1 to 3600 s, or Infinite. The default value is Infinite.

Note

- To activate the settings, you must power cycle the WT.
- When connecting the WT to a single PC and controlling the WT using this software, multiple communication interfaces cannot be used simultaneously.
- The software may not operate correctly, if an adapter is inserted in the middle of the connection between the WT and the PC (for example, GP-IB-to-USB adapter).

2.5 Installation and Uninstallation

Procedure

Installation

Before installing the software, close all programs that are currently running. If an older version of the Harmonic/Flicker Measurement Software for WT5000 is installed, uninstall it first (see page 2-12).

The following procedure explains how to install the software on Windows 10. The windows that appear will vary depending on the operating system.

Note

A dialog box regarding administrator privileges may appear during the installation. If this happens, follow the message in the dialog box.

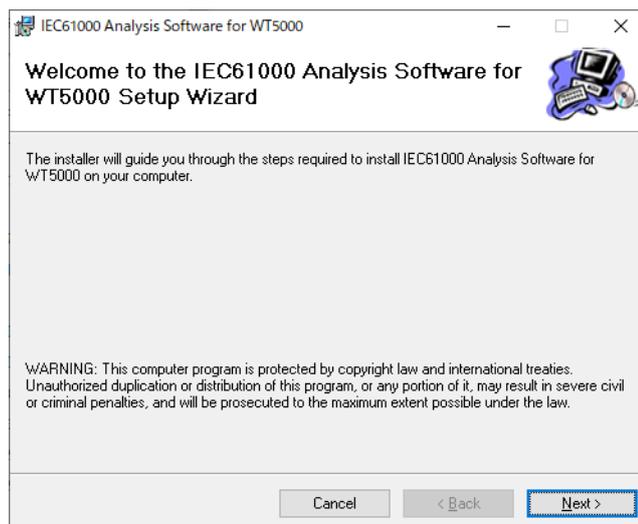
1. Turn on the PC and start Windows.
2. Download the software from the following YOKOGAWA Web page.
<https://tmi.yokogawa.com/support/download-software-drivers-firmware/>
3. Unzip the downloaded file.

Installing Harmonic/Flicker Measurement Software for WT5000

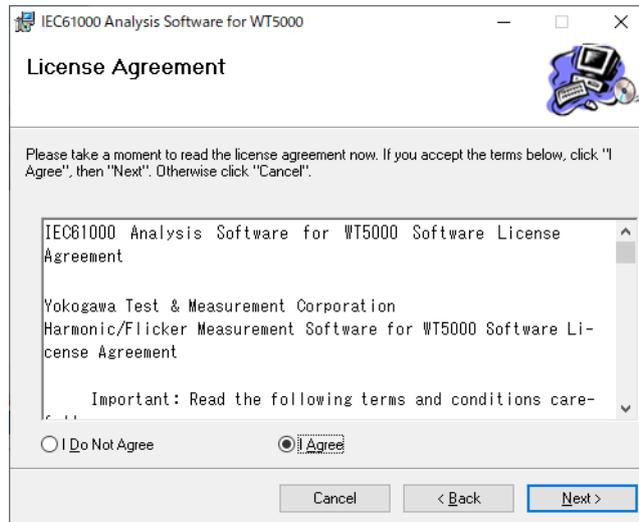
4. Double-click **Installer.exe**.



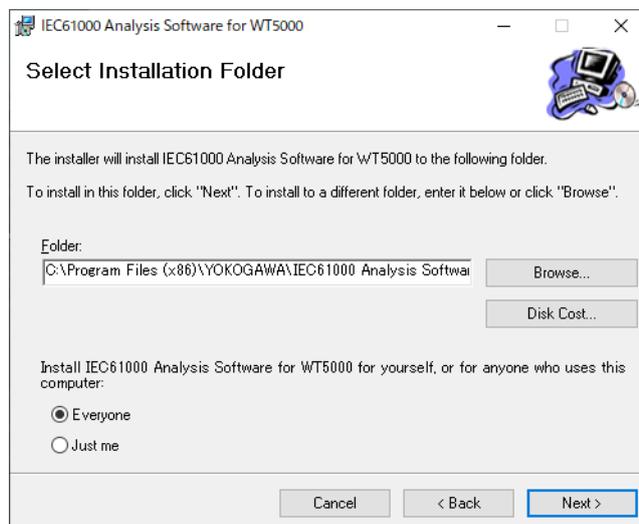
5. The "User Account Control" window will appear. Click **Allow** or **Yes** to continue the installation. The installer starts. Follow the instructions on the screen, and then click **Next**.



6. If you agree with the license agreement, select **I Agree**, and click **Next**. Otherwise, select **I Do Not Agree**. The installation will be canceled.

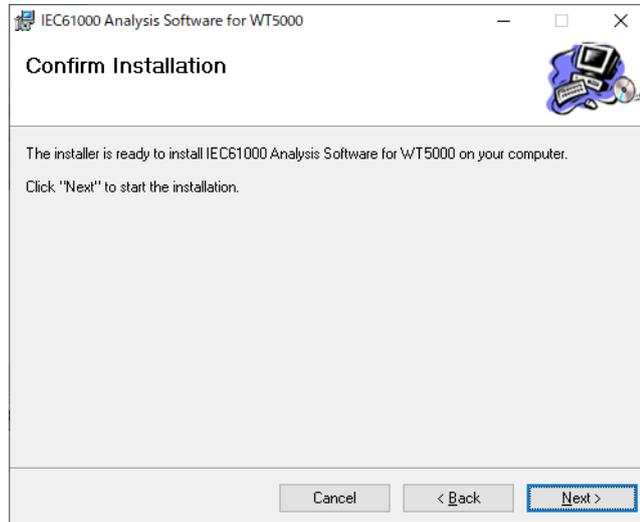


7. Select the installation destination, and click **Next**.
Click **Browse** to specify the destination. The default installation destination is as follows:
- Windows 32-bit version
C:\Program Files\YOKOGAWA\IEC61000 Analysis Software for WT5000
 - Windows 64-bit version
C:\Program Files (x86)\YOKOGAWA\IEC61000 Analysis Software for WT5000

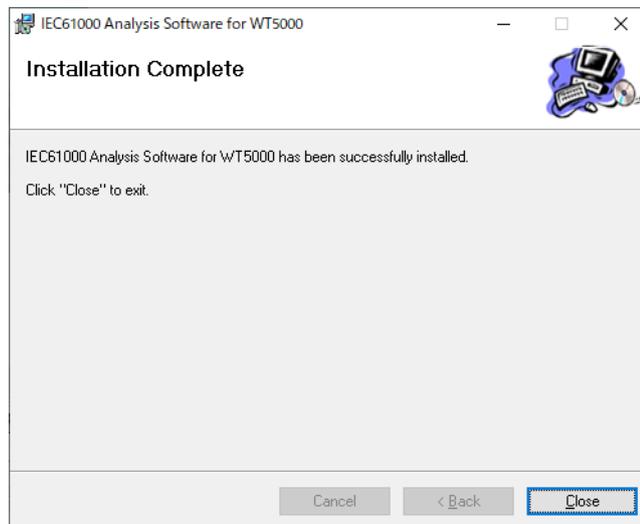


2.5 Installation and Uninstallation

8. A window prompting you to start the installation appears. If the installation settings are okay, click **Next**. The software installation starts.
- Click **Back** if you want to change the installation settings.
- Click **Cancel** to cancel the installation.



9. When the software installation finishes normally, the following window appears. Click **Close** to complete the installation. YOKOGAWA > IEC61000 for WT5000 will be added to the Windows Start menu.



Next, the USB driver (YTUSB) installation wizard starts automatically.

Note

After the installation finishes, a Program Compatibility Assistant window may appear. The installation has been completed successfully, so select "**This program installed correctly**" or **Cancel** to close the window.

Installing USB driver (YTUSB)

1. Click **YTUSB Install**.



If the “User Account Control” window appears during the installation, click **Allow** or **Yes** to continue the installation.

2. Follow the instructions on the screen, and then click **Next**.

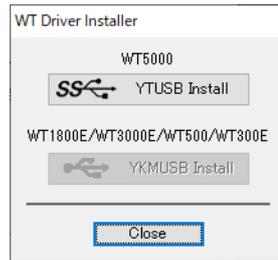


3. When the software installation finishes normally, the following screen appears. Click **Finish** to complete the installation.



2.5 Installation and Uninstallation

4. Click **Close** to complete the installation.



Uninstallation

This section explains how to uninstall the software on Windows 10.

1. On the  (**Start**) menu, click  (**Settings**). The Windows setup window appears.
2. In the Windows setup window, select **Apps**. The Apps window appears.
3. From the items on the left side of the window, select **Apps & features**.

Uninstalling Harmonic/Flicker Measurement Software for WT5000

4. From the list displayed on the right side of the window, select **IEC61000 Analysis Software for WT5000**, and click **Uninstall**.
A window appears for confirming the uninstallation of the selected app and related information.
5. Click **Uninstall**.
6. If the "User Account Control" window appears during the uninstallation, click **Allow** or **Yes** to continue the uninstallation.
7. A uninstallation confirmation window appears.
Click **Yes** to uninstall IEC61000 Analysis Software for WT5000.
Click **No** to cancel.

Uninstalling YTUSB (USB Driver)

4. From the list of apps and features displayed on the right side of the screen, select **Windows driver package and then Yokogawa Test & Measurement Corporation (WinUSB) YTUSB (mm/dd/yyyyx.x.x.x)**, and click **Uninstall**.
The uninstallation will proceed in a similar manner as described above.

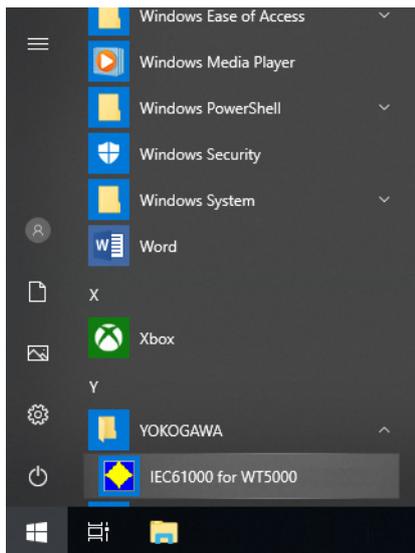
3.1 Starting the Software

Procedure

Starting the Software

1. Choose  (Start) > YOKOGAWA > IEC61000 Analysis for WT5000.

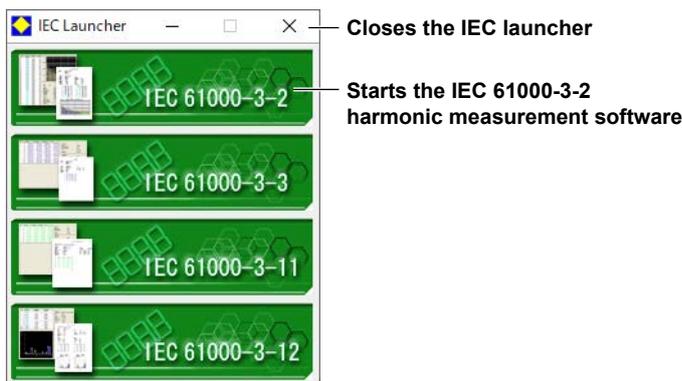
The procedure above applies when the default software installation destination and program folder are used. If you changed the installation destination or program folder at installation, select the corresponding location.



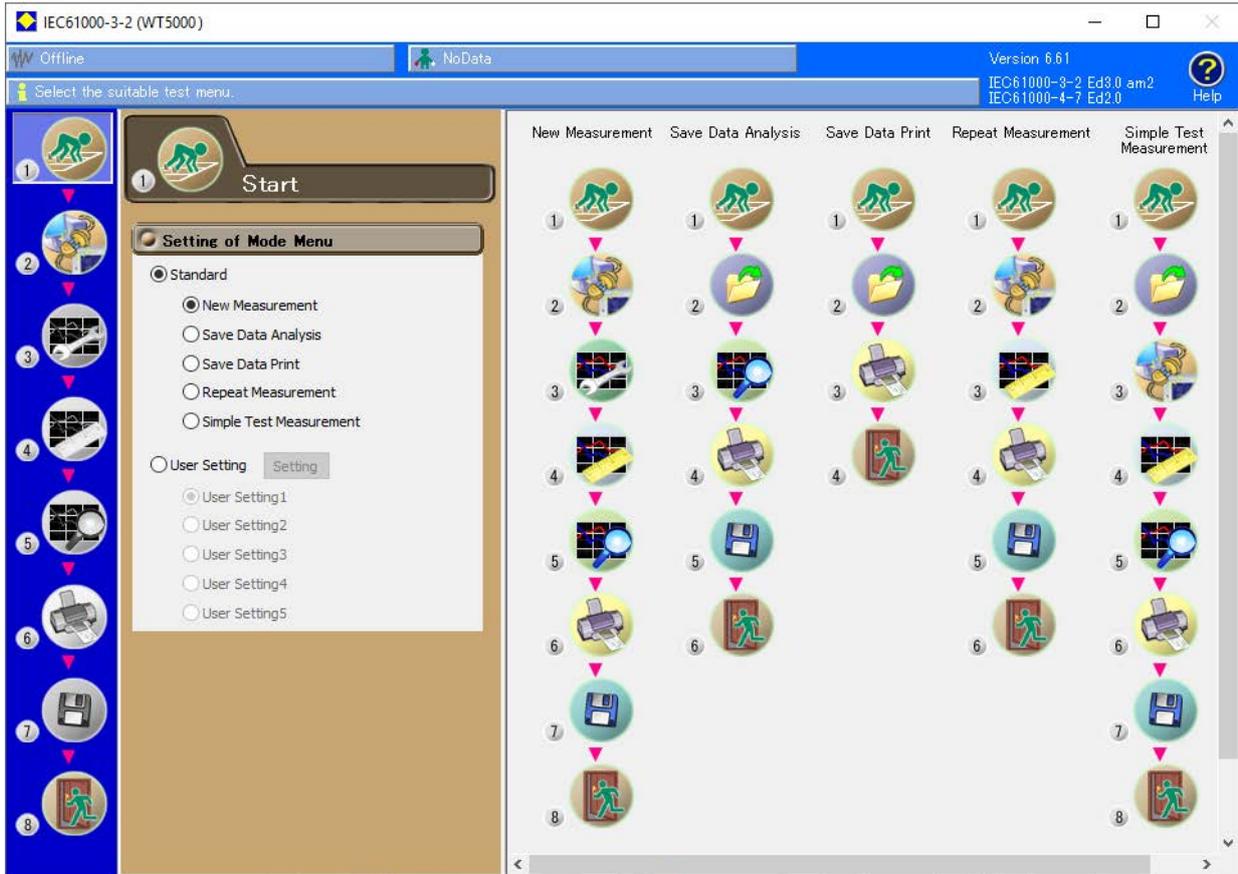
2. The "User Account Control" window will appear. Click **Allow** or **Yes**. The IEC Launcher appears. Use it to select the appropriate standard.

Selecting a Standard

3. Select **IEC 61000-3-2** to open the IEC 61000-3-2 harmonic measurement software.



3.1 Starting the Software



Explanation

You can start this software by accessing its shortcut from the start menu's program folder. This software is installed in the location that you specified in the previous chapter.

Selecting a Standard

To analyze the harmonics of a device with an electric current not greater than 16 A, select **IEC 61000-3-2**. The IEC 61000-3-2 Harmonic Measurement Software will start. If you select a different standard, the program that corresponds to that standard will start. For information about the programs that correspond to other standards, see their user's manuals (the help function, see section 12.3).

3.2 Basic Operations

Information area

Connection status: Online/offline (see chapter 6)

Information bar
Notices appear here.

Judgment results (chapter 8)

Help button (chapter 12)

Compliance judgment standard number and edition

Software version

Menu area

The test schedule menu items, such as Connection, Measure, and Print, appear here. When you click an icon, its submenu appears. Icons that cannot be selected are dimmed.

Submenu area

In the Start window, you select the test schedule menu here. In other windows, boxes for configuring the settings of the selected menu item appear here.

Setting and display area

The following types of information are displayed.

- Configuration dialog boxes
- Measurement and judgment results
- Print previews
- Information about loaded or saved files

The currently selected icon is highlighted.

Menu Area Icons



Start

Use to select and edit test schedule menus. There are five preset standard menus available, in addition to custom test schedule menus that you can make yourself (located under the “User Setting” option button).



Open

Use to open the following kinds of files:

- Setting information files that contain information such as measurement conditions and judgment conditions.
- Measured data files that contain measured data acquired by the PC from a WT.



Connection

Use to connect the PC to the WT through a USB, GP-IB, or Ethernet interface.



Setting

Use to set measurement and judgment conditions.



Measure

Use to measure harmonics. You can also preview test data.



Analysis

Use to display measured results using a variety of lists and graphs.



Print

You can attach comments and titles to a list of measured values and print the list as a report.



Save

Use to save the following kinds of files.

- Setting information files that contain information such as measurement conditions and judgment conditions.
- Measured data files that contain measured data acquired by the PC from a WT.
- CSV files that contain measured data and waveform data.



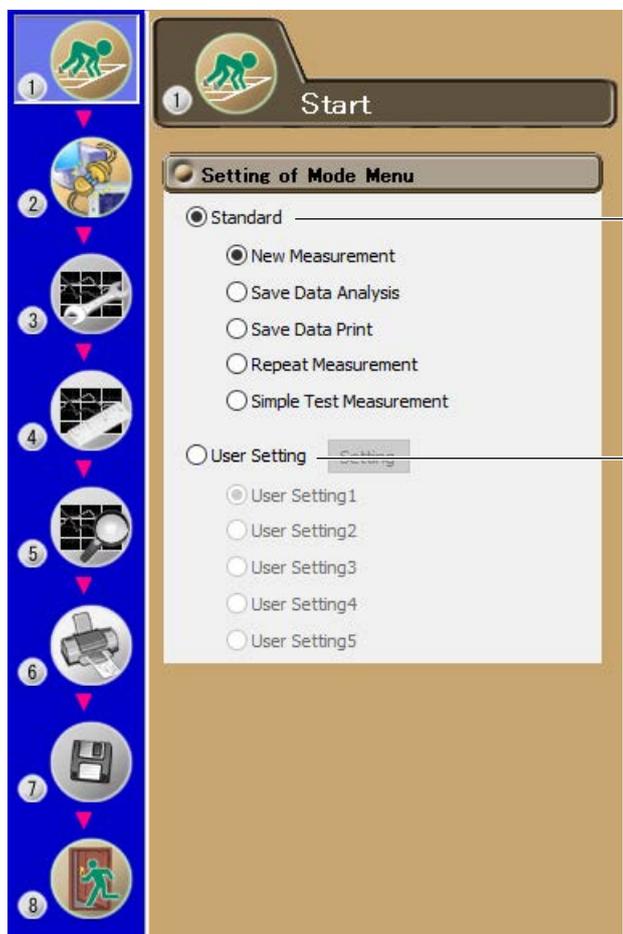
Exit

Use to close the software.

4.1 Selecting a Test Schedule Menu

Procedure

1. Select the  icon in the menu area. The Start submenu appears.

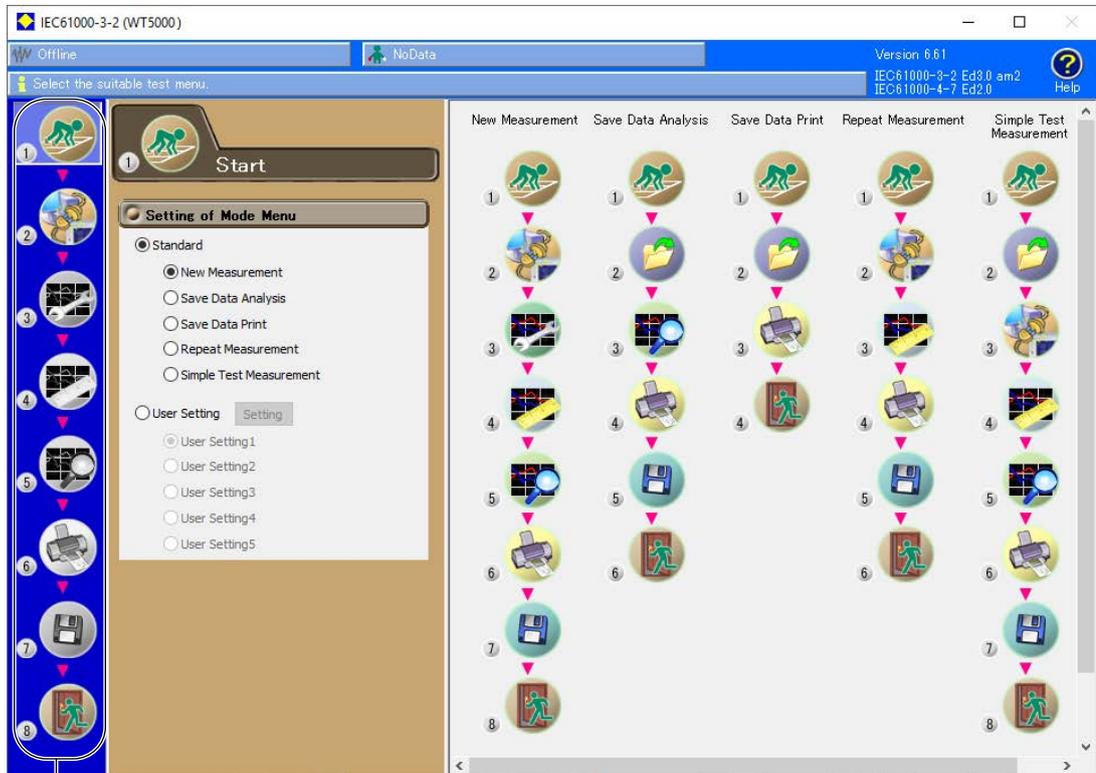
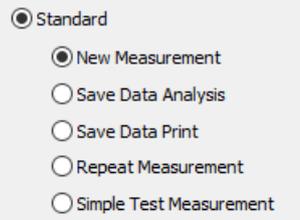


The screenshot shows a vertical menu on the left with eight numbered icons. The first icon, a person running, is highlighted with a blue background and a red arrow pointing to it from the number '1'. To the right, the 'Start' submenu is open, showing a header with the running icon and the word 'Start'. Below the header is a section titled 'Setting of Mode Menu' with two main options: 'Standard' (selected) and 'User Setting'. The 'Standard' option has five sub-options: 'New Measurement', 'Save Data Analysis', 'Save Data Print', 'Repeat Measurement', and 'Simple Test Measurement'. The 'User Setting' option has five sub-options: 'User Setting1', 'User Setting2', 'User Setting3', 'User Setting4', and 'User Setting5'. A 'Caching' button is visible next to the 'User Setting' option. To the right of the submenu, there are two callout boxes: one for 'Standard (page 4-2)' stating 'There are five standard menus.' and one for 'User Setting (page 4-3)' stating 'You can select and edit specific custom test schedule menus.'

4.1 Selecting a Test Schedule Menu

Selecting One of the Standard Menus

2. Click **Standard**.
3. Select one of the following test schedule menus. The test schedule menu that you select will appear in the menu area on the left.
 - New Measurement
 - Save Data Analysis
 - Save Data Print
 - Repeat Measurement
 - Simple Test Measurement

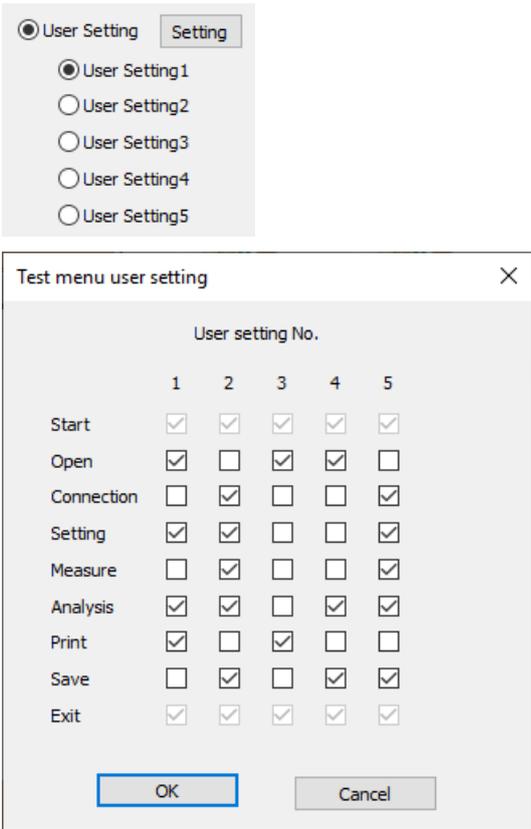


Menu area

The icons of the test schedule menu that you select appear.

Creating Your Own Custom Test Schedule Menu (User Setting)

- 2. Click **User Setting**.
- 3. Click **Setting**. The menu customization dialog box appears (the dialog box is labeled "Test menu user setting").
- 4. Use the check boxes to select the menu items that you want to include in each of the five custom test schedule menus (labeled as "User Setting" 1 to 5 in the start window).
- 5. Click **OK**.
- 6. Select the custom test schedule menu that you want to use from "User Setting" 1 to 5. The icons representing the steps that are included in the custom test schedule menu that you select will appear in the menu area on the left.



Explanation

Selecting a Test Schedule Menu

A test schedule menu lays out the overall test structure. You can choose from test schedule menus that contain different combinations of the following 9 steps. For more information on each step, see section 1.1.



Start: Select and edit test schedule menus.



Open: Load measured data and WT setting information files.



Connection: Configure the connection between the PC and a WT.



Setting: Set compatibility and measurement conditions.



Measure: Measure voltage fluctuation and flicker.



Analysis: Display measured results as bar and trend graphs.



Print: Print screen images and reports.



Save: Save measured data and setting information files.



Exit: Close the software.

Icon Display



Icon Number

This number indicates an icon's order in a menu.

Standard Menus

The following five standard menus are available.

- **New Measurement:** Set measurement and judgement conditions, make measurements, and then print and save the data.
- **Save Data Analysis:** Analyze, print, and save data that was measured and saved in the past.
- **Save Data Print:** Print data that was measured and saved in the past.
- **Repeat Measurement:** Make measurements with the same measurement and judgement conditions that you used for the previous measurement, and print and save data without analyzing it.
- **Simple Test Measurement:** Measure only the input power and the THD of the input power. A simple test can only be performed if the conditions for applying the simple test have been met in the previous compliance test (see section 1.3).

Setting Up Custom Test Schedule Menus

You can create custom test schedule menus by selecting what steps to include in them. You can create up to five different custom test schedule menus.

- Start and Exit steps are always selected. You cannot deselect them.
- The steps are arranged in the order that they appear in in the menu customization dialog box. You cannot change this order.

Icon Activation/Deactivation

Some icons are not available depending on the connection status with the WT or the availability of measured data. These types of icons appear dimmed.

Selectable (activated)



Not selectable (deactivated)



For example, the Measure icon cannot be selected when the Connection menu has been set such that the software is in offline mode. Icons such as Open, Connection, and Setting cannot be selected during measurement.

The following is a list of each icon and when it cannot be selected.

Start	During measurement
Open	During measurement
Connection	During measurement
Setting	During measurement
Measurement	When the software is in offline mode
Analysis	During measurement, or when there is no measured data to analyze
Print	During measurement, or when there is no measured data to print
Save	During measurement, or when there is no measured data to save
Exit	During measurement

4.2 Closing the Software

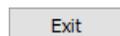
Procedure

1. Select the  icon in the menu area. The Exit submenu appears.



Closing the IEC 61000-3-2 Harmonic Measurement Software

2. Click **Exit**. The software closes.



Closing the IEC61000 Launcher

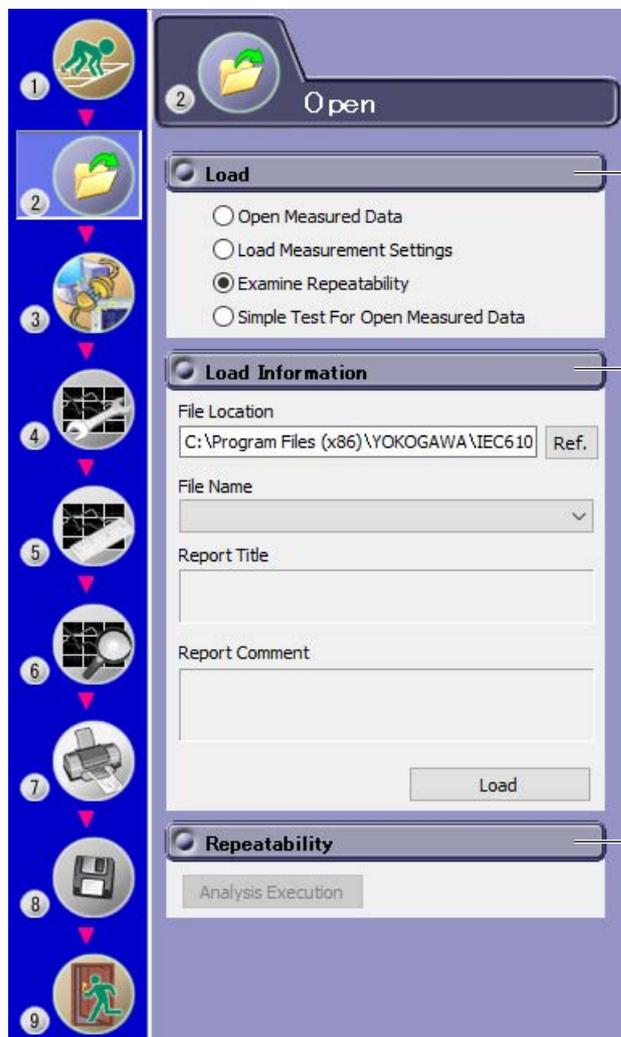
Click the icon below.



5.1 Loading Setting Information and Measured Data

Procedure

1. Select the  icon in the menu area. The Open submenu appears.



The screenshot shows a software interface with a vertical menu on the left and a main window on the right. The main window is titled 'Open' and contains three sections: 'Load', 'Load Information', and 'Repeatability'. The 'Load' section has four radio button options: 'Open Measured Data', 'Load Measurement Settings', 'Examine Repeatability' (which is selected), and 'Simple Test For Open Measured Data'. The 'Load Information' section has a 'File Location' field with the text 'C:\Program Files (x86)\YOKOGAWA\IEC610' and a 'Ref.' button, a 'File Name' dropdown menu, a 'Report Title' text box, and a 'Report Comment' text box. A 'Load' button is at the bottom of this section. The 'Repeatability' section has an 'Analysis Execution' button. A vertical menu on the left contains nine numbered icons: 1 (person walking), 2 (folder), 3 (gears), 4 (chart), 5 (chart), 6 (magnifying glass), 7 (printer), 8 (floppy disk), and 9 (person walking).

1 Select the  icon in the menu area. The Open submenu appears.

2 **Load (page 5-2)**
Select the type of data to load.

3 **Load Information (page 5-2)**
Select a file to open. When you select a file, its information appears.

4 File Location
C:\Program Files (x86)\YOKOGAWA\IEC610 Ref.

5 File Name

6 Report Title

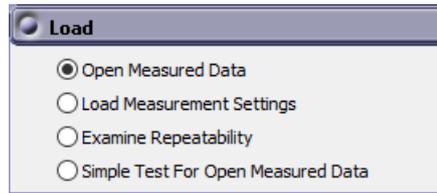
7 Report Comment

8 Load

9 **Repeatability (section 5.2)**
Analyzes the repeatability of the measured data.
(Only appears when you select Examine Repeatability under Load.)

Selecting the Type of Data to Load

2. Select one of the two data types listed under Load.



Load

- Open Measured Data
- Load Measurement Settings
- Examine Repeatability
- Simple Test For Open Measured Data

Note

- In the test schedule menu described in section 4.1, select Simple Test Measurement, and only if you are about to execute a simple compliance test, select the Simple Test For Open Measured Data option.
 - If you have already executed a test and want to analyze the saved compliance test results or simple compliance test results, select the Open Measured Data option.
-

Selecting a File to Open

3. Specify the file location. There are two places where you can specify the file location.

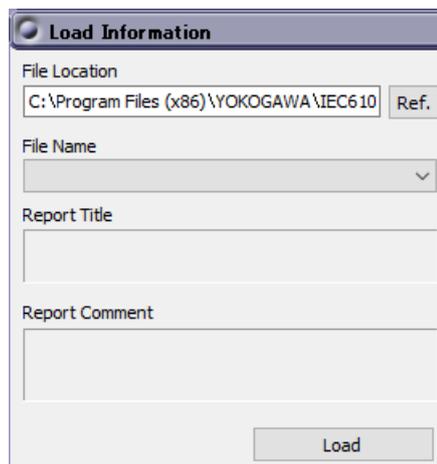
- Under Load Information in the submenu
- At the top of the setting and display area

When you specify the file location, information about the files that can be loaded appears in the setting and display area.

4. Select a file to open. When there is more than one available file, you can select which file to open using one of the following two methods.

- Click  next to the File Name box under Load Information. A list of available files appears. Select a file from the list.
- Select a file to open from one of the files listed in the setting and display area.

5. Click **Load**, or double-click the file you want to open. The software will open the measured data or setting information file.



Load Information

File Location
C:\Program Files (x86)\YOKOGAWA\IEC610 Ref.

File Name
▼

Report Title
[Text Box]

Report Comment
[Text Box]

Load

Note

- When the software is in online mode, it will switch to offline mode if you load setting information or measured data.
 - If an error occurs while loading the setting information, the settings are reset to their default values.
 - If an error occurs while loading measured data or setting information, the data may not be loaded properly. Confirm the filename and extension and then reopen the file.
 - You cannot load setting information, measured data, or waveform data while making measurements.
-

Configuring File Information Display Settings

1. Right-click the file information heading area at the top of the setting and display area. A list of the different types of information that can be displayed appears.
2. Select the type of information that you want to be displayed.

Date	Report Title	Report Comment	Measured Data	File Name	Element
2019/11/21 10:52	Date	al model Pattern A	*	20191121_001_WT5	5 _A 5 _A 30 _A 30 _A 30 _A 30 _A
2019/11/19 16:10	Report Title	al model Pattern A	*	M302_20191119161005	5 _A 5 _A 30 _A 30 _A 30 _A 30 _A
2019/11/19 16:56	Report Comment	al model Pattern A	*	M302_20191119165650	5 _A 5 _A 30 _A 30 _A 30 _A 30 _A
2019/11/25 14:33	Measured Data	al model Pattern A	*	M302_20191125143320	5 _A 5 _A 30 _A 30 _A 30 _A 30 _A
2019/11/26 12:00	File Name	al model Pattern A	*	M302_20191126120045	5 _A 5 _A 30 _A 30 _A 30 _A 30 _A
	Element				

Explanation

Loading Setting Information

You can load the setting information that has been saved using the procedure described in section 11.1.

- A dash appears in the Measured Data column for setting information files.
- Setting information file names have the following extension.
Extension: .ini
- Setting information files contain the following:
 - Measurement and judgment conditions (see chapter 7)
Data that has been acquired from the WT or loaded from a file can be judged using loaded judgment conditions.
 - Display settings (see chapters 8 and 9).
 - Report titles and comments (see section 10.1)
You can put comments and titles on reports of data acquired from the WT or loaded from files, and then print and save the reports. For more information about printing and saving, see chapters 10 and 11.

Loading Measured Data

You can load the measured data, waveform data, and setting information that has been saved using the procedure described in section 11.1.

The following two types of measured data files are available.

- **Files that only contain the measured data of compliance tests (do not contain the measured data of simple tests)**
 - An asterisk appears in the Measured Data column for files that contain measured data.
 - Files are composed of two types of files with the following extensions.
.fdt Measured data (compliance test data)
.ini Setting information

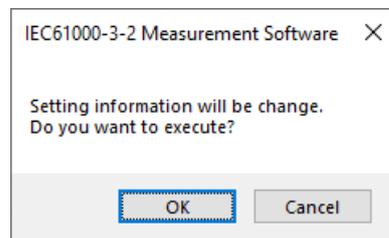
When measured data of the WT3000E/WT3000 series is loaded

- “*(Old)” appears in the Measured Data column of the file information display area.
- You cannot perform rejudgment by changing the conditions of the standard because this is an offline analysis.

5.1 Loading Setting Information and Measured Data

- **Files that contain both the measured data of compliance tests and the measured data of simple tests**
 - These files are saved when you select Simple Test Measurement in the test schedule menu described in section 4.1, execute a simple compliance test, and save the measured data of the test.
 - Two asterisks appear in the Measured Data column of the file information display area.
 - Files are composed of two types of files with the following extensions.
 - .fdt Measured data (The following two types of data are included.)
 - Simple test data
 - Compliance test data that has been specified as the test reference for the simple test
 - .ini Setting information

Measurement data contains the setting information that was used to measure the data. When you load the measured data, the setting information will also be loaded.



When the data is loaded, the judgment result is displayed.

Display example: PASS



Note

- This software cannot load CSV files.
 - You cannot load measured data, waveform data, or setting information while running the harmonic or waveform preview on the Measure page.
-

Loading Measured Data for Simple Tests

To perform a simple test, you must load the measured data of the compliance test that will be used as the test reference of the simple test. You can load the measured data that you saved in section 11.1. The following two types of measured data files can be loaded.

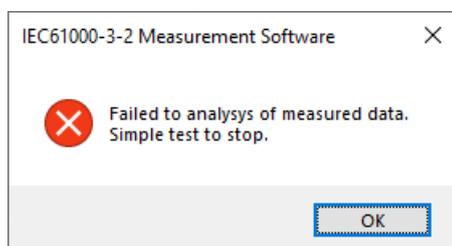
- Files that only contain the measured data of compliance tests (do not contain the measured data of simple tests)
- Files that contain both the measured data of compliance tests and the measured data of simple tests

For details, see "Loading Measured Data" on page 5-3.

When the measured data of the compliance test that will be used as the test reference is loaded, the software determines whether the conditions for applying the simple test (see section 1.3) have been met.

If the conditions have not been met, the message below will appear.

If this message appears, you cannot execute the simple test.



Kinds of File Information

- Date: When the file was saved.
Displayed in this format: year/month/day hour:minute:second
- Report Title (See section 10.1)
- Report Comment (See section 10.1)
- Measured Data:
 - : Setting information file
 - *(Old): Setup parameter file of the WT3000E/WT3000 series
 - *: Files that only contain the measured data of compliance tests (do not contain the measured data of simple tests)
 - ** : Files that contain both the measured data of compliance tests and the measured data of simple tests
- File Name (See section 11.1)
- Element: The WT5000 element configuration is displayed with icons in order from elements 1 to 7 from the left and.
When measured data of the WT3000E/WT3000 is loaded, elements are displayed with numbers.

Measured Data	File Name	Element
*	20191121_001_WT5	5% 5% 30, 30, 30, 30,
*(Old)	SampleData_3-2	30, 30, 30, 30

Moving the mouse pointer over a line in the element configuration shows the detailed element information (model, instrument number).

```
WT5000 Element1 : 760902, "
WT5000 Element2 : 760902, "
WT5000 Element3 : 760901, "
WT5000 Element4 : 760901, "
WT5000 Element5 : 760901, "
WT5000 Element6 : 760901, "
```

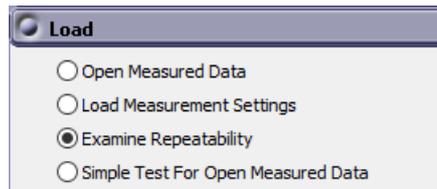
Sorting the file list

You can sort the list of loaded files in ascending or descending order by clicking an item heading area. The sorted item heading area shows ^ (ascending) or v (descending).

5.2 Checking the Repeatability of the Measured Data

Procedure

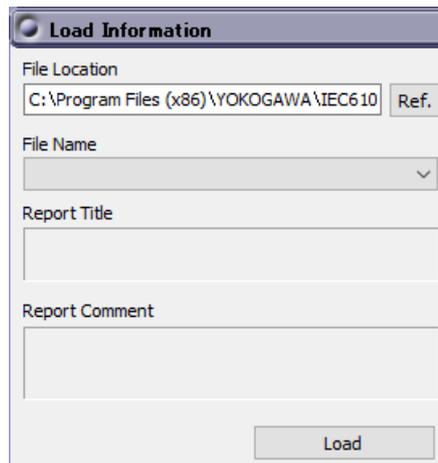
1. Select the  icon in the menu area. The Open submenu appears. For general information about the Open submenu, see section 5.1.
2. Select **Examine Repeatability** listed under Load.



Selecting a File to Open

3. Specify the file location. There are two places where you can specify the file location.

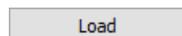
- Under Load Information in the submenu



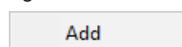
- At the top of the setting and display area
When you specify the file location, information about the files that can be loaded appears in the setting and display area.

4. Select a file to open. You can select which file to open using one of the following two methods. Information about the selected file is displayed at the bottom of the setting and display area in the file analysis list.

- Click  next to the File Name box under Load Information. A list of available files appears. Select a file from the list and Click **Load**.



- Double-click a file in the measured data file list.
- Drag a file from the measured data file list to the file analysis list.
- Click  while a file is selected in the measured data file list.
- Right-click a file in the measured data file list, and then click **Add**.



Note

This software can load data saved in files with .fdt and .ini extensions. This software cannot load CSV files (files with .csv extensions).

5.2 Checking the Repeatability of the Measured Data

5. Repeat step 4 to select all of the files that you want to compare.

Specify the measured data file location.

File Location: C:\YOKOGAWA\IEC61000 Analysis Software for WT5000\Samples

Date	Report Title	Report Comment	Measured Data	File Name	Element
2019/12/02 11:24:14	*****appliances	Experimental model Pattern A	*	M302_20191202112412	30%
2019/12/02 11:38:12	*****appliances	Experimental model Pattern A	*	M302_20191202113810	30%, 30%
2019/12/02 19:32:41	*****appliances	Experimental model Pattern A	*	M302_20191202193239	5%
2019/12/02 19:41:54	*****appliances	Experimental model Pattern A	*	M302_20191202194151	5%, 5%
2019/12/02 20:05:15	*****appliances	Experimental model Pattern A	*	M302_20191202200513	30%, 30%, 30%, 30%, 5%, 5%
2019/12/02 20:20:13	*****appliances	Experimental model Pattern A	*	M302_20191202202011	30%

Measured data file list

Click to add the file currently selected in the upper measured data file list to the lower file analysis list.

Repeatability Data

Date	Report Title	Report Comment	Measured Data	File Name	Element
2019/12/02 11:24:14	*****appliances	Experimental model Pattern A	*	M302_20191202112412	30%
2019/12/02 11:24:14	*****appliances	Experimental model Pattern A	*	M302_20191202112412	30%
2019/12/02 20:20:13	*****appliances	Experimental model Pattern A	*	M302_20191202202011	30%

File analysis list
A list of the files selected for repeatability analysis.

Unselecting a File Selected for Analysis

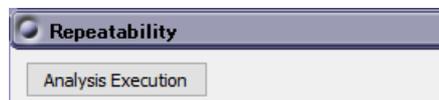
6. To unselect a file selected for analysis:

- Click  while a file is selected in the file analysis list.
- Drag a file in the file analysis list to .
- Press **Delete** key while a file is selected in the file analysis list.
- Right-click a file in the file analysis list, and then click **Delete**.

Delete

Starting Analysis

7. Click **Analysis Execution**. The analysis menu appears, and the results of the analysis of the measured data's repeatability appear.

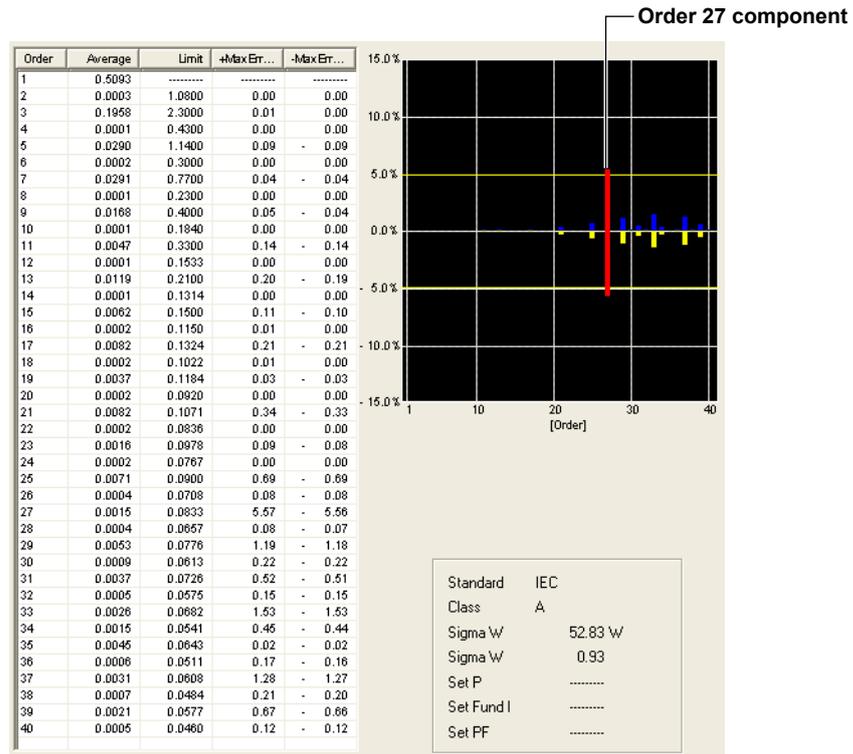


Note

- For multi-phase equipment, it is recommended that files of the same input element (same phase) be selected and the data be compared. The repeatability cannot be evaluated correctly when using measured data of different phases.
- If only one file has been selected for analysis, the Analysis Execution button will be unavailable.
- If the software is in online mode, it will switch to offline mode when analysis starts.
- In the analysis menu, items other than repeatability will be dimmed and unavailable.
- When you start analysis, the Measure, Print, and Save menus will be dimmed and unavailable.

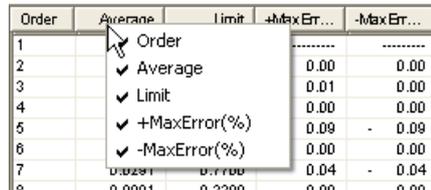
5.2 Checking the Repeatability of the Measured Data

Example of Comparison: The difference at order 27 exceeds 5%.



Configuring File Information Display Settings

1. Right-click the file information heading area at the top of the setting and display area. A list of the different types of information that can be displayed appears.
2. Select the type of information that you want to be displayed.



Note

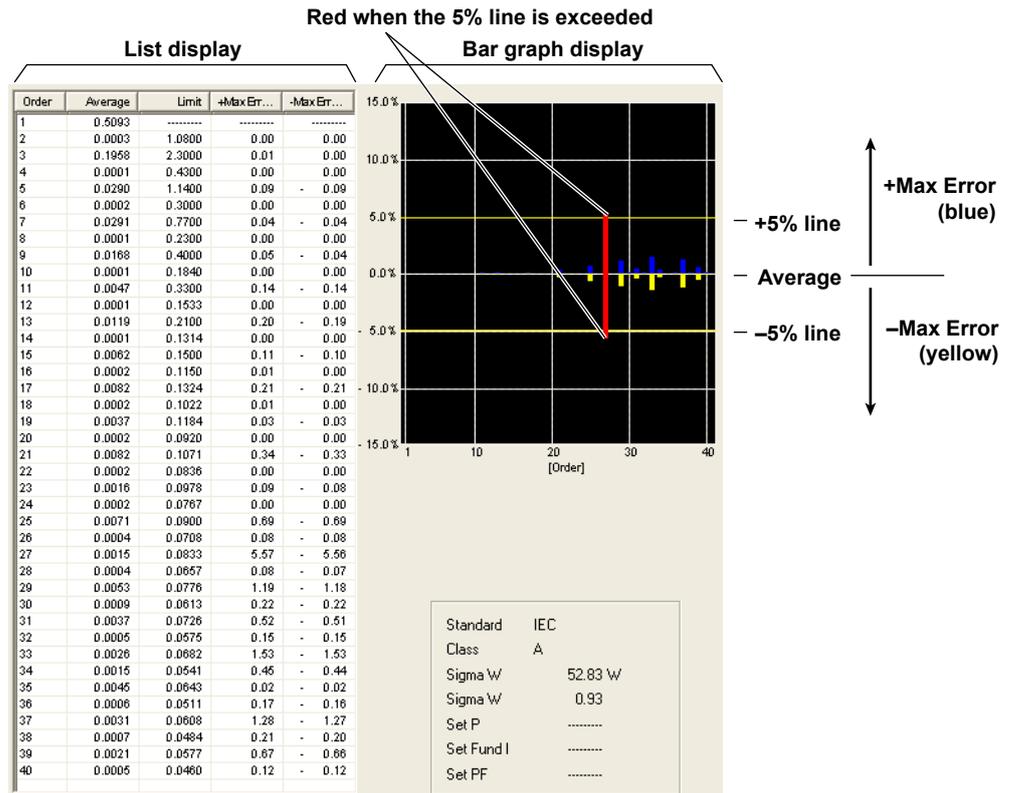
The order is always displayed. You cannot hide it.

Explanation

The mean value in the harmonics measurement data saved to files can be compared, and the difference in the measured data can be displayed on a bar graph and list for each order. This function can be used to evaluate whether the difference between data measured under the same measurement conditions when harmonics are measured using the same product or same product model is within 5% of the limits (confirmation of repeatability).

Repeatability of Measurement Data Window

The following figure shows an example of comparison.



Maximum (Mnmax)

Maximum value among the average values of each order

Minimum (Mnmin)

Minimum value among the average values of each order

Average (Mnmean)

Average of the average values of each order of the selected file

+Max Error

Ratio (%) of the difference between Mnmax and Mnmean of each order

$$\frac{\text{Mnmax} - \text{Mnmean}}{\text{Limit}} \times 100$$

-Max Error

Ratio (%) of the difference between Mnmin and Mnmean of each order

$$\frac{\text{Mnmin} - \text{Mnmean}}{\text{Limit}} \times 100$$

5.2 Checking the Repeatability of the Measured Data

Color

- **Bar Graph**

The bar graph that is displayed for each order is displayed using a length converted from the +Max Error or –Max Error. The meaning of the colors is indicated in the following table.

 Blue	Difference (error) less than the +5% line for +Max Error.
 Yellow	Difference (error) less than the –5% line for –Max Error.
 Red	Difference (error) greater than or equal to the +5% line for +Max Error. Difference (error) greater than or equal to the –5% line for –Max Error.

* The names of the sample colors of Microsoft Word or Excel are used for the names of the colors.

- **List**

The average, limit, +maximum error, and –maximum error for each order are displayed using values in black.

Number of Files That Can Be Compared

To evaluate the repeatability of the measured data, multiple files must be selected.
Number of files that can be compared: 2 to 10

Note

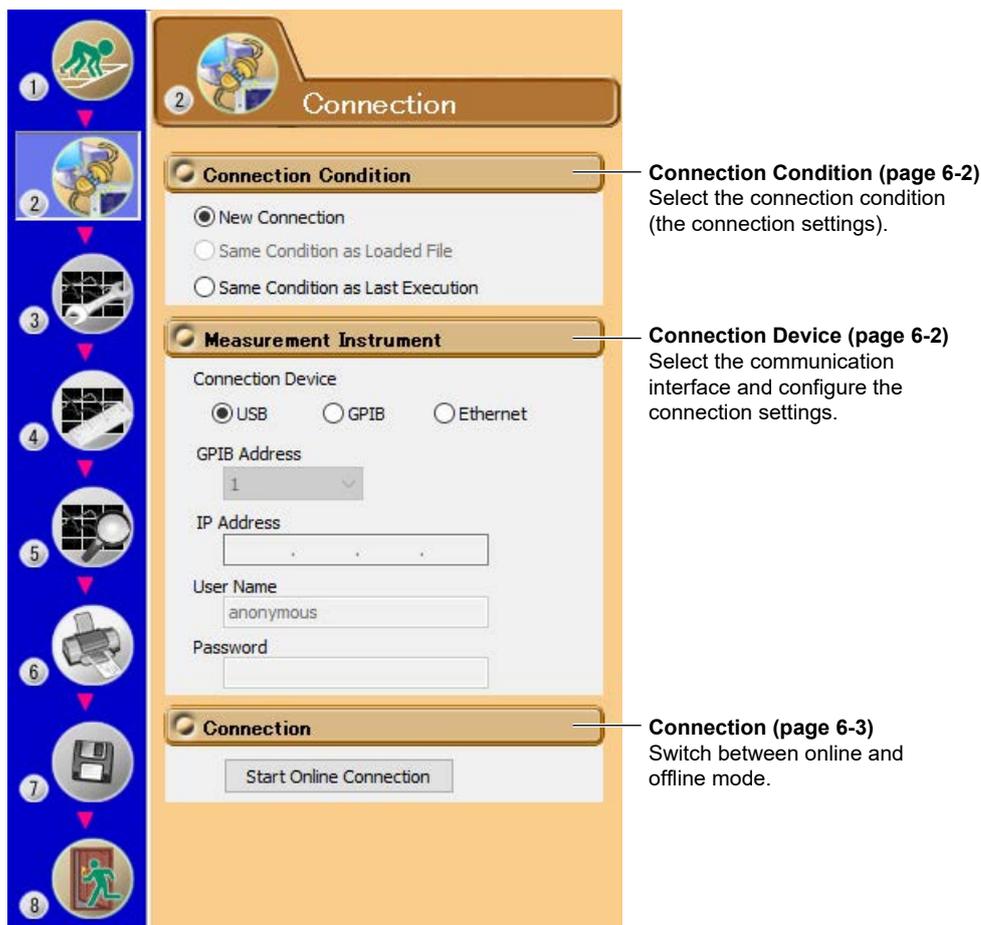
- For multi-phase equipment, it is recommended that files of the same input element (same phase) be selected and the data be compared. The repeatability cannot be evaluated correctly when using measured data of different phases.
 - Even if only one file is selected, the Repeatability of Measurement Data window will open. In this case, no comparison is made.
 - To evaluate the repeatability, check that the measured data saved to the file to be compared was measured under the following conditions.
 - Same DUT (not the same model, but the same equipment).
 - Same test conditions.
 - Same test equipment.
 - Same atmospheric conditions (when the DUT is affected by them).
-

6.1 Establishing a New Connection Between the PC and a WT5000

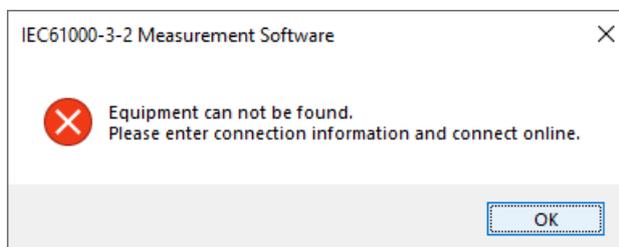
Procedure

1. Select the  icon in the menu area. The Connection submenu appears.

The connectable WTs are automatically detected when you start the software, and the information of the first connectable device found is displayed.



If no connectable WT is found, the following message appears.

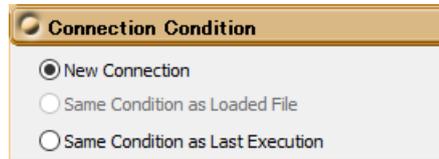


If the above message appears even after the manual search, check the following items.

- Is the WT turned on?
- Is the communication interface cable connected?
- Are the communication settings (GP-IB address, IP address, etc.) of each WT unique?

Connection Condition

2. Select **New Connection**.



The screenshot shows a dialog box titled "Connection Condition" with three radio button options: "New Connection" (selected), "Same Condition as Loaded File", and "Same Condition as Last Execution".

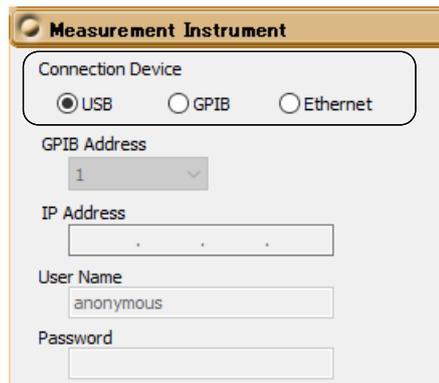
Note

- You can only select Same Condition as Loaded File if you load setting information or measured data using the procedure described in section 5.1.
 - To perform a simple test, select the Same Condition as Loaded File option.
 - You cannot select Same Condition as Last Execution when you first start up the software.
-

Connection Device

The configuration of the connection device that is automatically detected and displayed can be changed.

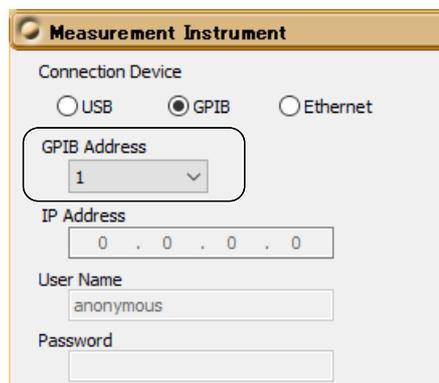
3. Select **USB, GPIB, or Ethernet**.
- If you select USB, proceed to step 6.
 - If you select GP-IB, proceed to step 4.
 - If you select Ethernet, proceed to step 5.



The screenshot shows the "Measurement Instrument" dialog box. Under "Connection Device", the "USB" radio button is selected. Below it, the "GPIB Address" is set to "1". The "IP Address" field is empty. The "User Name" field contains "anonymous" and the "Password" field is empty.

Selecting a Communication Address (GP-IB)

4. Select the GP-IB address of the WT that you intend to connect to.



The screenshot shows the "Measurement Instrument" dialog box. Under "Connection Device", the "GPIB" radio button is selected. The "GPIB Address" dropdown menu is highlighted and shows "1". The "IP Address" field now contains "0 . 0 . 0 . 0". The "User Name" field contains "anonymous" and the "Password" field is empty.

Proceed to step 6.

Note

- GP-IB address number 0 is reserved for the PC and cannot be selected.
-

Setting the IP Address, User Name, and Password (Ethernet)

5. Set the IP address, user name, and password of the WT that you intend to connect to.

The screenshot shows a dialog box titled "Measurement Instrument". It has three radio buttons under "Connection Device": "USB", "GPIB", and "Ethernet", with "Ethernet" selected. Below this is a "GPIB Address" dropdown menu showing "1". A rounded rectangular box contains the "IP Address" field with "192 . 168 . 0 . 1", the "User Name" field with "anonymous", and the "Password" field with six dots.

Making the Connection

6. Click **Start Online Connection**. The software will establish a connection between the PC and the WT. The configuration and measurement operations listed onwards can be performed once the software has automatically determined that communication is possible.

The screenshot shows a dialog box titled "Connection" with a single button labeled "Start Online Connection".

Note

- You cannot proceed to measurement, analysis, printing, or saving until an online connection has been established.
- If you click Start Online Connection and establish a connection, but the connected WT is not in a measurement-ready state, a communication error will occur. If the GP-IB address, IP address, user name, or password is wrong, or if the PC is simply unable to connect to the WT, a communication error will occur.

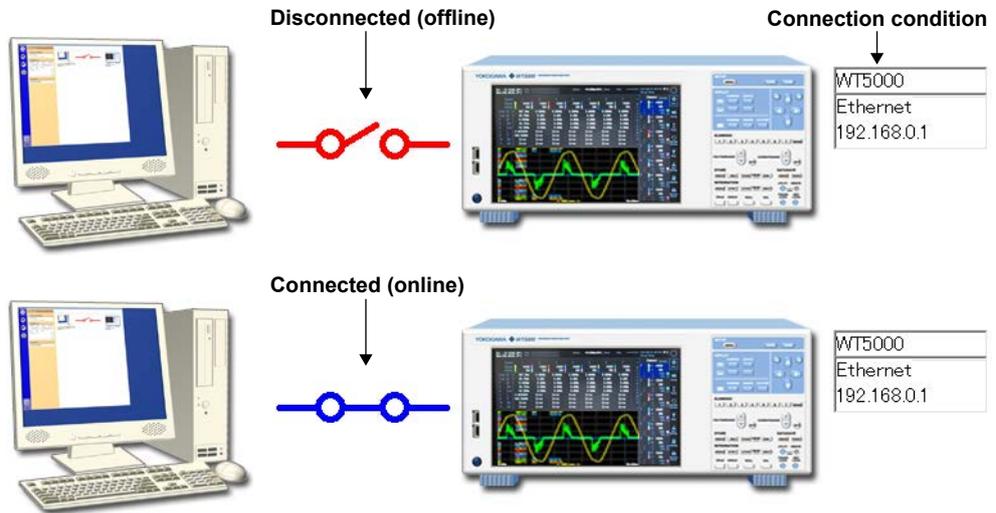
Explanation

Selecting a Communication Address

- **GP-IB**
Select the GP-IB address of the WT that you intend to connect to.
Selectable range: 1 to 30
- **Ethernet**
 - Set the IP address of the WT that you intend to connect to.
Selectable range: 0.0.0.0 to 255.255.255.255
 - You can set the user name and password of the WT that you intend to connect to.
Usable characters: Those characters that the WT supports.

Displaying Connection Conditions and Status

The connection conditions that you set in the Connection submenu appear in the setting and display area along with the current connection status.



The connection status also appears in the information area.



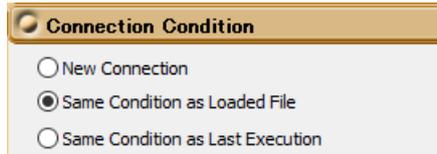
Note

- It can take more than 10 seconds to switch from offline to online mode.
- We recommend that you use a National Instruments GP-IB card. GP-IB cards made by other companies may not function properly.

6.2 Using the Connection Settings from a Loaded File

Procedure

1. Select the  icon in the menu area. The Connection submenu appears. For general information about the Connection submenu, see section 6.1.
2. Select **Same Condition as Loaded File** under Connection Condition.

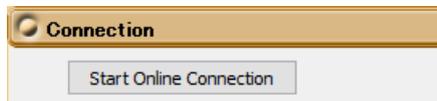


Note

- You can only select Same Condition as Loaded File if you load setting information using the process described in section 5.1.
- To perform a simple test, select the Same Condition as Loaded File option.

Making the Connection

3. Click **Start Online Connection**. The software will establish a connection between the PC and the WT. The configuration and measurement operations listed onwards can be performed once the software has automatically determined that communication is possible.



Note

- You cannot proceed to measurement, analysis, printing, or saving until an online connection has been established.
- If you click Start Online Connection and establish a connection, but the connected WT is not in a measurement-ready state, a communication error will occur. If the GP-IB address, IP address, user name, or password is wrong, or if the PC is simply unable to connect to the WT, a communication error will occur.

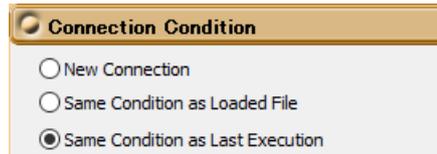
Explanation

Follow this procedure to use the settings from a file that has been loaded according to the procedure described in “Loading Setting Information” in section 5.1.

6.3 Using the Same Connection Settings as Before

Procedure

1. Select the  icon in the menu area. The Connection submenu appears. For general information about the Connection submenu, see section 6.1.
2. Select **Same Condition as Last Execution** under Connection Condition.

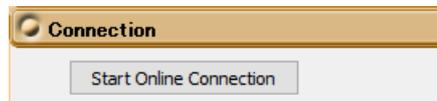


Note

- You cannot select Same Condition as Last Execution when you first start up the software.
- To perform a simple test, select the Same Condition as Loaded File option.

Making the Connection

3. Click **Start Online Connection**. The software will establish a connection between the PC and the WT. The configuration and measurement operations listed onwards can be performed once the software has automatically determined that communication is possible.



Note

- You cannot proceed to measurement, analysis, printing, or saving until an online connection has been established.
- If you click Start Online Connection and establish a connection, but the connected WT is not in a measurement-ready state, a communication error will occur. If the GP-IB address, IP address, user name, or password is wrong, or if the PC is simply unable to connect to the WT, a communication error will occur.

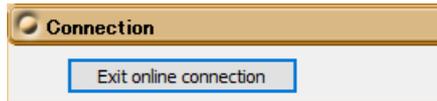
Explanation

Follow this procedure to set the connection settings to the same as when you last closed this software.

6.4 Ending a Connection by Switching to Offline Mode

Procedure

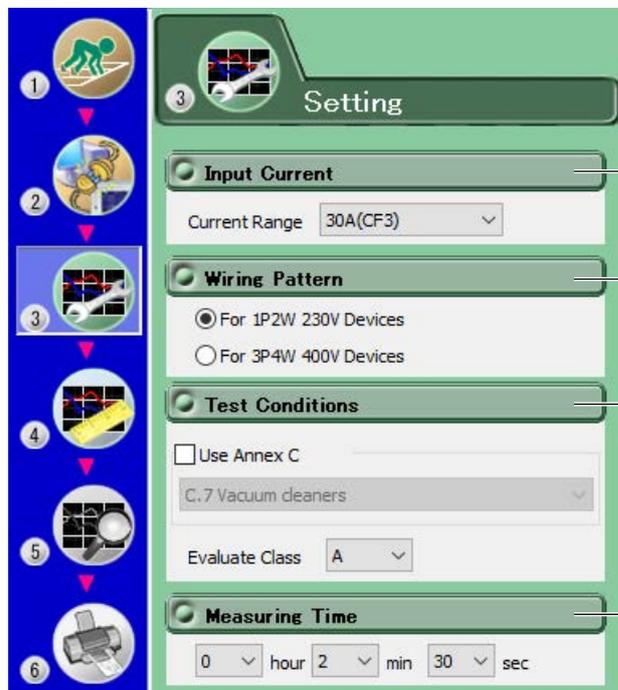
1. Select the  icon in the menu area. The Connection submenu appears. For general information about the Connection submenu, see section 6.1.
2. When you are in online mode, click **Exit online connection**. The software will disconnect from the WT.



7.1 Setting General Test Conditions

Procedure

1. Select the  icon in the menu area. The Setting submenu appears.



The screenshot shows a vertical menu on the left with six numbered icons (1-6) and a main 'Setting' panel on the right. The 'Setting' panel has a title bar with a gear icon and the word 'Setting'. Below the title bar are four sections, each with a green header and a callout line pointing to it:

- Input Current (page 7-1)**: Select the current range to measure. The dropdown menu shows '30A(CF3)'.
- Wiring pattern (page 7-2)**: Select the wiring pattern of the circuit whose current you will measure. There are two radio button options: 'For 1P2W 230V Devices' (selected) and 'For 3P4W 400V Devices'.
- Test conditions (page 7-2)**: Set the test conditions. There is a checkbox for 'Use Annex C' (unchecked) and a dropdown menu showing 'C.7 Vacuum cleaners'. Below it is an 'Evaluate Class' dropdown menu showing 'A'.
- Measurement time (page 7-4)**: Set the measurement time based on the conditions of the EUT. The time is set to 0 hour, 2 min, and 30 sec.

In the setting and display area, you can switch between basic settings and advanced settings by clicking these buttons:  . For details, see sections 7.2 and 7.3.

 Basic settings

 Advanced settings

Input Current

2. Select the current range to measure.

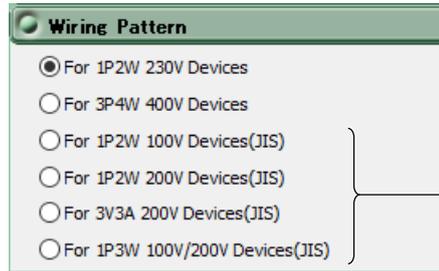


Note

CF3 and CF6 indicate which value the crest factor is set to (3 or 6).

Wiring Pattern

3. Select the wiring pattern of the circuit you will measure.



If the "The JIS regulation used" check box under Regulation in the Option tab is selected, you can select JIS standards.

Note

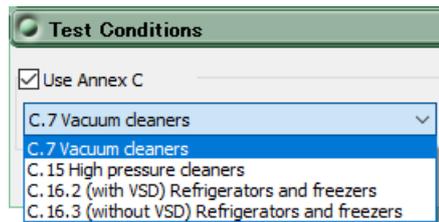
When you switch wiring patterns, the following settings, which are displayed in the setting and display area, will change to default values that are appropriate to the wiring pattern that you select. For details, see sections 7.2 and 7.3.

- The WT settings (the settings on the WT Measurement Instrument tab)
- The testing judgment conditions (the settings under the Standard tab).

Test Conditions

4. When using Annex C of IEC61000-3-2 Ed4.0, select the check box, and select the equipment test conditions.

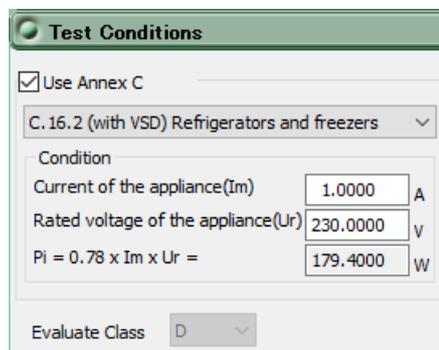
When not using Annex C, proceed to step 6.



Note

When using test conditions of Annex C that are not in the menu, proceed to step 6, in the same manner as when not using Annex C.

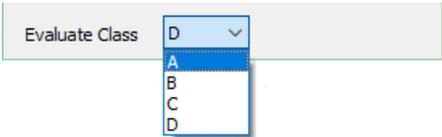
5. If you select Annex C16.2 of IEC61000-3-2 Ed4.0, specify Current of the appliance (I_m) and Rated voltage of the appliance (U_r). Effective power of the appliance (P_i) is calculated automatically.



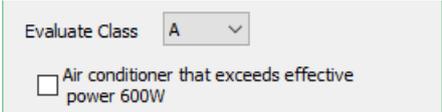
- 6. If selected not to use Annex C of IEC61000-3-2 Ed4.0 but selected the following items, select the DUT class from A, B, C, and D.
 - Not use Annex C (check box not selected)
 - Use Annex C7
 - Use Annex C15

The display shown below appears when you set the wiring pattern to one of the following:

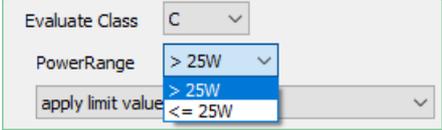
- For 1P2W 230V Devices
- For 3P4W 400V Devices



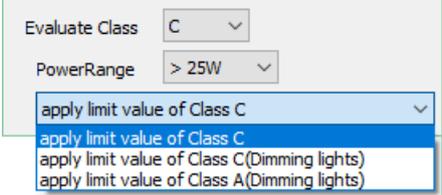
- 7. If you have set the wiring pattern to one of the items below and you select class A for the test conditions, select whether the equipment is an air conditioner whose active power exceeds 600 W.
 - For 1P2W 100V Devices (JIS)
 - For 1P2W 200V Devices (JIS)
 - For 3P3W 200V Devices (JIS)
 - For 1P3W 100V/200V Devices (JIS)



- 8. If you select class C, specify whether or not the power range exceeds 25 W.
 - If you select >25W, proceed to step 9.
 - If you select <=25W, proceed to step 10.



- 9. If you select class C and the power range exceeds 25 W, select the limit to apply.
 - apply limit value of Class C
 - apply limit value of Class C (Dimming lights)
 - apply limit value of Class A (Dimming lights)

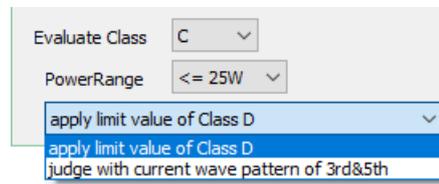


Proceed to step 10.

7.1 Setting General Test Conditions

10. If you select class C and the power range is 25 W or lower, select one of the following:

- apply limit value of Class D
- judge with current wave pattern of 3rd&5th



Proceed to step 9.

Measurement Time

11. If you selected the following items for Annex C of IEC61000-3-2 Ed4.0, set the measurement time.

- Not use Annex C (check box not selected)
- Use Annex C7
- Use Annex C15



Note

When you change test conditions or the measurement time, the judgment conditions on the standard tab that are displayed in the setting and display area will change accordingly. For details, see section 7.3.

Explanation

Wiring Pattern

When you are measuring using the limits specified by IEC 61000-3-2, select one of the following wiring patterns:

- For 1P2W 230V Devices
- For 3P4W 400V Devices

When you are measuring using the limits specified by JIS C 61000-3-2, select one of the following wiring patterns:

- For 1P2W 100V Devices (JIS)
- For 1P2W 200V Devices (JIS)
- For 3P3W 200V Devices (JIS)
- For 1P3W 100V/200V Devices (JIS)

Test Conditions

Use Annex C

Select whether to use Annex C of IEC61000-3-2 Ed4.0 from the following. The settings vary depending on the test conditions of the equipment selected here.

- Not use Annex C (check box not selected)
- C.7 Vacuum cleaners
- C.15 High pressure cleaners
- C.16.2 (with VSD) Refrigerators and freezers
- C.16.3 (without VSD) Refrigerators and freezers

When using test conditions of Annex C that are not in the options, clear the Use Annex C check box.

Current of the appliance (Im), Rated voltage of the appliance (Ur), Effective power of the appliance (Pi)

If you selected "C16.2 (with VSD) Refrigerators and freezers," the power ratio limits of Class D are applied according to the effective power of the appliance (Pi) calculated as a result of setting Current of the appliance (Im) and Rated voltage of the appliance (Ur).

- Current of the appliance (Im)
Selectable range: 0.0001 to 100.0000 A
Default value: 1A

- Rated voltage of the appliance (Ur)
Selectable range: 0.1 to 1000.0 V

If you select the wiring system, the Ur setting is changed in sync to the default value. The default value is as follows:

Wiring Pattern	Ur
For 1P2W 230V Devices	230.00 V
For 3P4W 400V Devices	400.00 V
Other than those above	Not synchronized to the wiring system

- Effective power of the appliance (Pi)
If you set Im and Ur, Pi is calculated automatically with the following equation.
 $P_i = 0.78 * I_m * U_r$

Class (Evaluate Class)

Select the class from A, B, C, and D, according to the classifications specified in the standard. The setup information varies depending on the class selected here.

Depending on the "Use Annex C" setting, the class is as follows:

Use Annex C	Class
C16.2 (with VSD) Refrigerators and freezers	Fixed to D
C16.3 (without VSD) Refrigerators and freezers	Fixed to A
Other than those above	Selectable from A, B, C, and D

Class A

- See section 7.3 for selecting the lower power limit for applying the limits
- Selecting Whether to Apply the Limit for Air Conditioners Exceeding 600 W for JIS Class A
In JIS Class A, special limits are defined for air conditioners that exceed 600 W. You can select whether to apply this limit.

Class B

The setup information is the same as class A. The limits applied are 1.5 times the limits for class A.

Class C

Specify whether or not the EUT's active power exceeds 25 W.

- When the Active Power of the EUT Exceeds 25 W (>25 W)
You can set the limit to apply to "apply limit value of Class A" or "apply limit value of Class C."
 - The limit of Class A (Dimming lights) is applied to incandescent lighting equipment that has built-in dimmers or consists of dimmers built in an enclosure.
 - The limit of Class C (Dimming lights) is applied to equipment other than incandescent lighting equipment that has built-in dimmers or consists of dimmers built in an enclosure.
 - The limit value of Class C is applied to other lighting equipment.

For details on setting the fundamental current and the power factor, see section 7.3.

7.1 Setting General Test Conditions

- When the Active Power of the EUT Is Less Than or Equal to 25 W (≤ 25 W)
The IEC standard specifies that either “the power ratio limits of class D” or “the conditions of harmonic order 3 and 5” are met.
 - Evaluating by Applying the Power Ratio Limits of Class D
The same power ratio limit of class D is applied.
For details on setting the power, see section 7.3.
 - Evaluating on the Conditions of Harmonic Order 3 and 5
The IEC standard specifies the current ratio of harmonic order 3 and 5 to the fundamental frequency and the relationship between the fundamental current and the current waveform (see page 1-11).
For details on setting the fundamental current and judgement of the waveform, see section 7.3.

Class D

For information about the following settings, see section 7.3.

- Selecting the Power
- Selecting the Lower Power Limit for Applying the Limits

Measurement Time

The measurement time is the time between the start of the measurement to the end of the measurement. The time for measuring harmonics can be set in advance. The harmonics can be measured continuously for the specified time. The measurement time can be changed when equipment that emits harmonics that fluctuate over time is measured or when confirming that the emitted harmonics do not change even when the equipment is operated over extended time.

Selectable range: 0 H 0 M 1 S to 24 H 0 M 0 S in units of 1 s.

An error occurs if a time exceeding 24 hours is specified.

Depending on the “Use Annex C” setting, the measurement time is as follows:

Use Annex C	Class
Not use Annex C (check box not selected)	Setting possible
Annex C.7 Vacuum cleaners	Setting possible*
Annex C.15 High pressure cleaners	Setting possible*
Annex C.16.2 (with VSD) Refrigerators and freezers	Fixed to 1 hour
Annex C.16.3 (without VSD) Refrigerators and freezers	Fixed to 2 minutes 30 seconds

* Settings under 2 minutes are prohibited by the standard, and therefore, a warning is displayed, and the setting change is considered invalid.

Note

Depending on the environment of the PC onto which this software was installed, an error occurs if you specify a time longer than the memory area that can be reserved. If this happens, the following measures can be taken to increase the upper limit of time that can be specified.

- Close other software applications
 - Restart the software
 - Restart the PC
 - Expand the memory installed in the PC
-

7.2 Setting the WT5000 Measurement Conditions

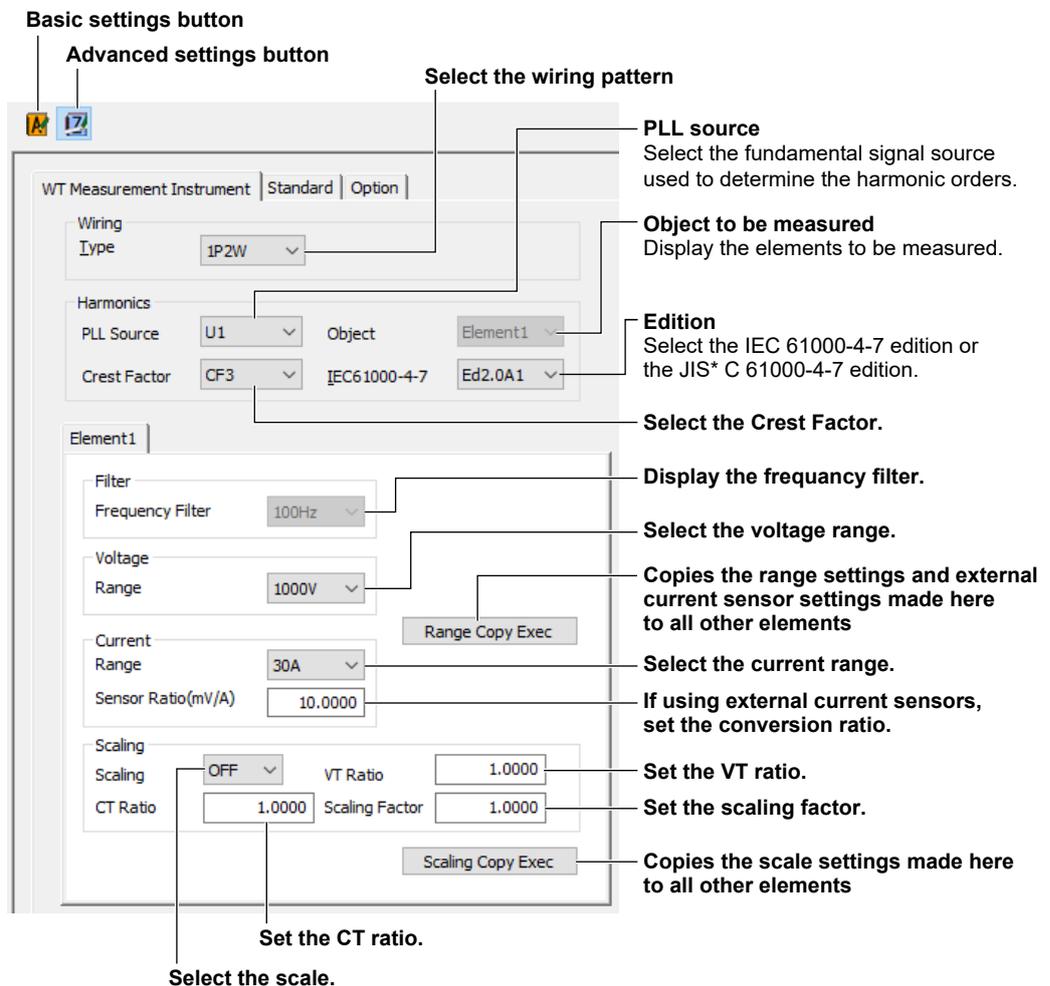
Procedure

1. Select the **WT Measurement Instrument** tab in the setting and display area. The WT measurement condition configuration dialog box appears.
2. Click the basic settings button  or the advanced settings button .
3. Configure the various settings.

Note

When you select the basic settings button, the following settings are unavailable. To adjust these settings, click the advanced settings button.

- Frequency Filter
- Scaling Copy Exec
- All of the settings under Scaling



Basic settings button

Advanced settings button

Select the wiring pattern

PLL source
Select the fundamental signal source used to determine the harmonic orders.

Object to be measured
Display the elements to be measured.

Edition
Select the IEC 61000-4-7 edition or the JIS* C 61000-4-7 edition.

Select the Crest Factor.

Display the frequency filter.

Select the voltage range.

Copies the range settings and external current sensor settings made here to all other elements

Select the current range.

If using external current sensors, set the conversion ratio.

Set the VT ratio.

Set the scaling factor.

Copies the scale settings made here to all other elements

Set the CT ratio.

Select the scale.

* If the "The JIS regulation used" check box under Regulation in the Option tab is selected, you can select the JIS C 61000-4-7 edition.

Explanation

Edition of the Standard

In WT firmware versions 2.01 and later, you can select the IEC 61000-4-7 or JIS C 61000-4-7 edition.

Editon No. of the IEC 61000-4-7 Editon No. of the JIS C 61000-4-7

- Edition 1.0
- Edition 2.0
- A1 of the Edition 2.0
- 2007 JA
- 2007

IEC 61000-4-7 or JIS C 61000-4-7 specifies requirements for measurement instruments. For details, see chapter 14.

Copying the Range

You can copy the range settings configured for one element to all other elements with the same wiring. The voltage range, the current range, and the external current sensor range are copied.

Copying the Scaling Settings

You can copy the scaling settings configured for one element to all other elements with the same wiring. The settings that are copied are:

- VT ratio
- CT ratio
- Scaling factor

For information about the following settings and how to make settings from the WT, see the following manuals.

Setting	Manuals	Refer To
Wiring Pattern	Features Guide, IM WT5000-01EN	4 Input Settings (Advanced/Options)
	User's Manual, IM WT5000-02EN	Section 2.1
PLL source	Features Guide, IM WT5000-01EN	16 IEC Harmonic Measurement (Option)
	User's Manual, IM WT5000-02EN	Section 5.1
Crest factor	Features Guide, IM WT5000-01EN	4 Input Settings (Advanced/Options)
	User's Manual, IM WT5000-02EN	Section 2.9
Frequency filter	Features Guide, IM WT5000-01EN	4 Input Settings (Advanced/Options)
	User's Manual, IM WT5000-02EN	Section 2.7
Voltage/current range	Features Guide, IM WT5000-01EN	4 Input Settings (Advanced/Options)
	User's Manual, IM WT5000-02EN	Sections 2.2 and 2.3
Scaling	Features Guide, IM WT5000-01EN	4 Input Settings (Advanced/Options)
	User's Manual, IM WT5000-02EN	Sections 2.4 and 9.1

Note

- When the wiring system is pattern 1 (when all are 1P2W), range, and scaling are copied to all other elements.
- When taking measurements with this software, the antialiasing filter cutoff frequency is fixed at 30 kHz.
- The exponential average function of the WT is ON.

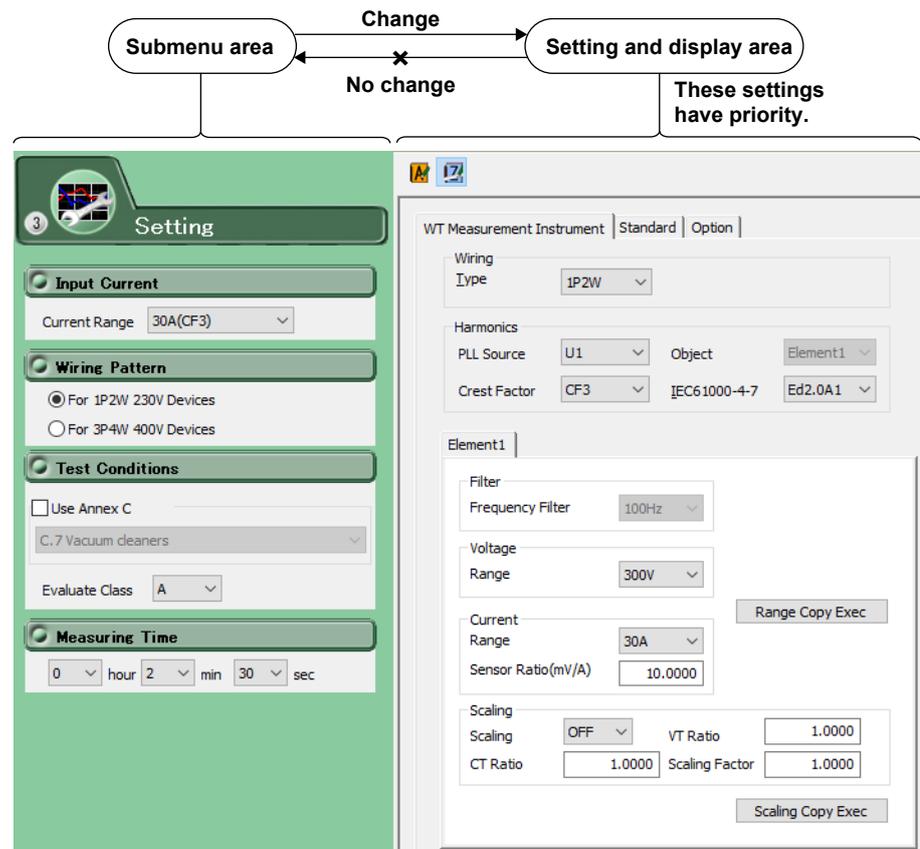
Shared Settings between the Submenu and the Setting and Display Area

When you change the following settings in the submenu, the settings in the setting and display area will also change.

- Current Range (see page 7-10)
- Wiring Pattern (see page 7-11)
- Test Conditions (see section 7.3)
- Measurement time (see section 7.3)

The settings in the submenu will not change when you change the settings in the setting and display area.

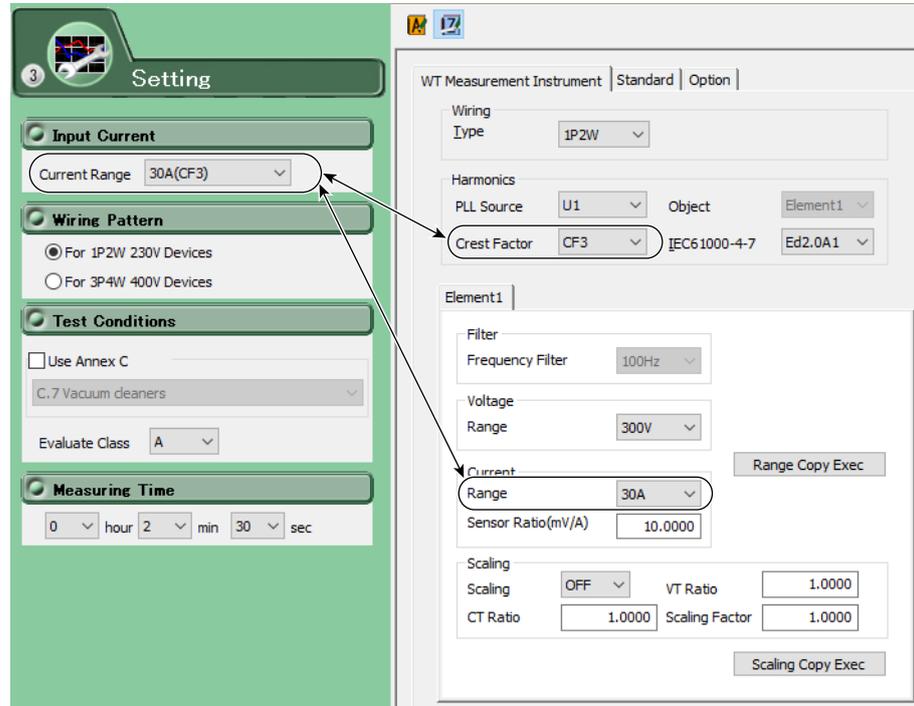
When the settings in the submenu and the setting and display area are different, the settings in the setting and display area take precedence.



7.2 Setting the WT5000 Measurement Conditions

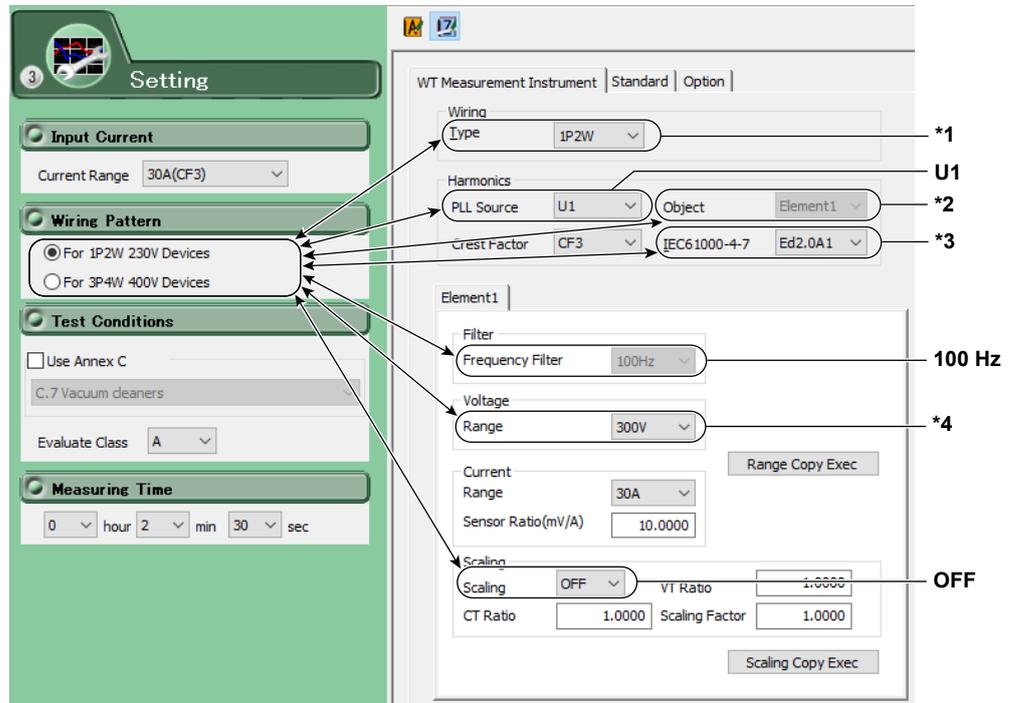
Setting Changes Based on Current Range Selection

When you select a current range in the Setting submenu, the settings marked off in the following figures will also change.



Setting Changes Based on Wiring Pattern Selection

When you select a wiring pattern in the Setting submenu, the settings marked off in the following figures change to their default values. The values in the figures are the default values.



*1 The default setting for Wiring Pattern varies depending on the wiring pattern.

Wiring Pattern	Wiring
For 1P2W 230V Devices	1P2W
For 3P4W 400V Devices	3P4W ^{*5}
For 1P2W 100V Devices (JIS)	1P2W
For 1P2W 200V Devices (JIS)	1P2W
For 3P3W 200V Devices (JIS)	3V3A ^{*5}
For 1P3W 100V/200V Devices (JIS)	1P3W ^{*5}

*5 An error message appears in the following cases.

- If the number of elements is insufficient
- If the wiring of the same type of modules cannot be configured

*2, *4 The default setting for Object and Voltage Range varies depending on the wiring pattern.

Wiring Pattern	Object	Voltage Range
For 1P2W 230V Devices	Element 1	300V
For 3P4W 400V Devices	SigmaA ^{*6}	300V
For 1P2W 100V Devices (JIS)	Element 1	150V
For 1P2W 200V Devices (JIS)	Element 1	300V
For 3P3W 200V Devices (JIS)	SigmaA ^{*6}	300V
For 1P3W 100V/200V Devices (JIS)	SigmaA ^{*6}	150V

*6 If the error described above in *5 occurs because of the selected wiring pattern, Object is automatically set to Element 1.

*3 The default setting depends on the wiring pattern as shown below.

Wiring Pattern	Label	Setting
For 1P2W 230V Devices	IEC 61000-4-7	Ed2.0A1 ^{*7}
For 3P4W 400V Devices	IEC 61000-4-7	Ed2.0A1 ^{*7}
For 1P2W 100V Devices (JIS)	JIS C 61000-4-7	2007
For 1P2W 200V Devices (JIS)	JIS C 61000-4-7	2007
For 3P3W 200V Devices (JIS)	JIS C 61000-4-7	2007
For 1P3W 100V/200V Devices (JIS)	JIS C 61000-4-7	2007

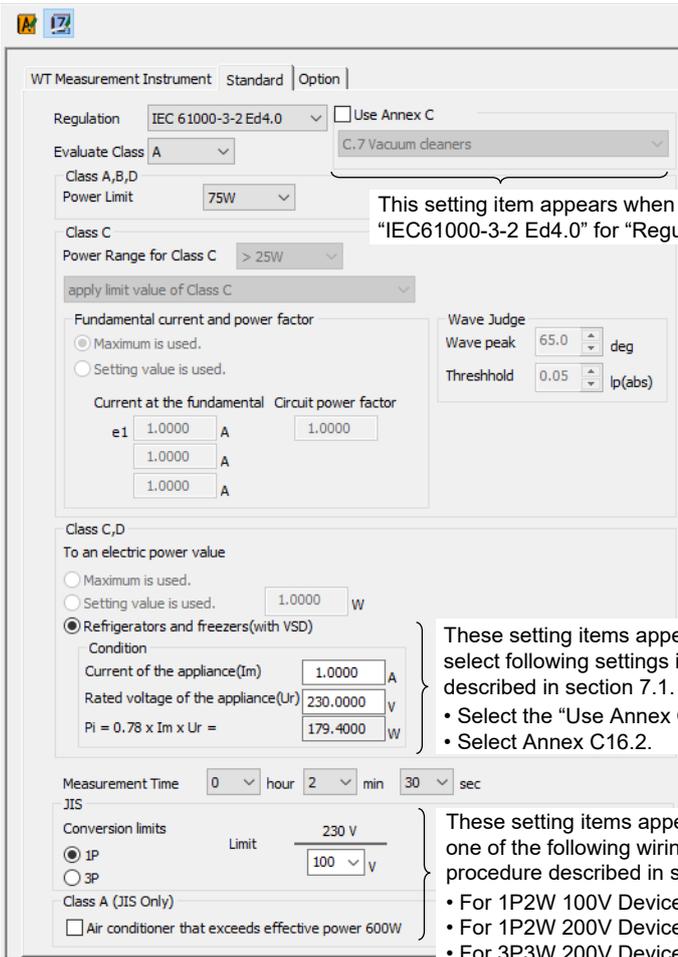
7.3 Setting the WT5000 Judgment Conditions

Procedure

1. Select the **Standard** tab in the setting and display area. The judgment condition configuration dialog box appears.
2. Configure the various settings.

Note

The items that you can set are the same whether you press the basic settings button  or the advanced settings button .



WT Measurement Instrument Standard | Option

Regulation: IEC 61000-3-2 Ed4.0 Use Annex C

Evaluate Class: A C.7 Vacuum cleaners

Class A,B,D Power Limit: 75W

Class C Power Range for Class C: > 25W

apply limit value of Class C

Fundamental current and power factor

Maximum is used.

Setting value is used.

Current at the fundamental: e1 1.0000 A 1.0000 A 1.0000 A

Circuit power factor: 1.0000

Wave Judge

Wave peak: 65.0 deg

Threshold: 0.05 Ip(abs)

Class C,D

To an electric power value

Maximum is used.

Setting value is used. 1.0000 W

Refrigerators and freezers(with VSD)

Condition

Current of the appliance(I_m): 1.0000 A

Rated voltage of the appliance(U_r): 230.0000 V

P_i = 0.78 x I_m x U_r = 179.4000 W

Measurement Time: 0 hour 2 min 30 sec

JIS

Conversion limits

1P Limit: 230 V

3P Limit: 100 V

Class A (JIS Only)

Air conditioner that exceeds effective power 600W

This setting item appears when you select "IEC61000-3-2 Ed4.0" for "Regulation."

These setting items appear when you select following settings in the procedure described in section 7.1.

- Select the "Use Annex C" check box.
- Select Annex C16.2.

These setting items appear when you select one of the following wiring patterns in the procedure described in section 7.1.

- For 1P2W 100V Devices (JIS)
- For 1P2W 200V Devices (JIS)
- For 3P3W 200V Devices (JIS)
- For 1P3W 100V/200V Devices (JIS)

Explanation

For explanations of these terms, see section 1.3 and 1.5.

Standard (Regulation)

The software can make measurements and evaluations according to the IEC or JIS standard (see section 1.3).

To select JIS, you must set the edition (IEC 61000-4-7; see section 7.2) on the WT Measuring Instrument tab to a value other than Ed2.0 A1.

When you change the Standard setting, the edition (see section 7.2) label and setting on the WT Measuring Instrument tab will change as shown below.

- When you change from IEC to JIS

Setting for IEC	Label	Setting for JIS
Ed1.0	JIS C 61000-4-7	2007 JA
Ed2.0	JIS C 61000-4-7	2007
Ed2.0A1	JIS C 61000-4-7	Change from IEC to JIS is not possible.

- When you change from JIS to IEC

Setting for JIS	Label	Setting for IEC
2007 JA	IEC 61000-4-7	Ed1.0
2007	IEC 61000-4-7	Ed2.0

Use Annex C

If you select IEC61000-3-2 Ed4.0 for the standard, you can select from the following for Annex C.

- Not use Annex C (check box not selected)
- C.7 Vacuum cleaners
- C.15 High pressure cleaners
- C.16.2 (with VSD) Refrigerators and freezers
- C.16.3 (without VSD) Refrigerators and freezers

When using test conditions of Annex C that are not in the options, clear the Use Annex C check box.

Class (Evaluate Class)

Select the class from A, B, C, and D, according to the classifications specified in the standard. The setup information varies depending on the class selected here.

Class A, B, and D**Selecting the Lower Power Limit for Applying the Limits**

Select 50W, 75W, None, or Infinity. When the active power of the EUT is less than the selected power, the limits are not applied.

Class C**Power Range**

Specify whether or not the EUT's active power exceeds 25 W.

- When the Active Power of the EUT Exceeds 25 W (>25 W)
 - You can set the limit to apply to "apply limit value of Class A" or "apply limit value of Class C."
 - The limit of Class A (Dimming lights) is applied to incandescent lighting equipment that has built-in dimmers or consists of dimmers built in an enclosure.
 - The limit of Class C (Dimming lights) is applied to equipment other than incandescent lighting equipment that has built-in dimmers or consists of dimmers built in an enclosure.
 - The limit value of Class C is applied to other lighting equipment.

Set the fundamental current and the power factor.

7.3 Setting the WT5000 Judgment Conditions

- When the Active Power of the EUT Is Less Than or Equal to 25 W (≤ 25 W)
The IEC standard specifies that either “the power ratio limits of class D” or “the conditions of harmonic order 3 and 5” are met.
 - Evaluating by Applying the Power Ratio Limits of Class D
The same power ratio limit of class D is applied.
Set the power.
 - Evaluating on the Conditions of Harmonic Order 3 and 5
The IEC standard specifies the current ratio of harmonic order 3 and 5 to the fundamental frequency and the relationship between the fundamental current and the current waveform (see page 1-11).
Set the fundamental current and judgement of the waveform (Wave peak and Threshold).

Fundamental current and power factor

Determine whether to set the EUT fundamental current and power factor values that are necessary for determining the limits by specifying them manually or by measuring them.

You can also set the fundamental current and the power factor to the values that you measure according to the procedure in section 8.6. If you are going to measure the values, first set the load of the EUT as high as possible.

Wave Judge (judgement of the waveform)

You can enter the following values.

- Wave peak (Wave peak phase limit)
- Threshold (Current threshold limit)
Set the current threshold limit as a percentage of the maximum absolute current peak value $I_p(\text{abs})$. For example, to set 5%, enter 0.05.

Class D

To an electric power

Determine whether to set the power value that is necessary for determining the limits by specifying it manually or by measuring it.

You can also specify the value that you measure according to the procedure in section 8.6. If you are going to measure the value, first set the load of the EUT as high as possible.

Measurement Time

The measurement time is the time between the start of the measurement to the end of the measurement. The time for measuring harmonics can be set in advance. The harmonics can be measured continuously for the specified time. The measurement time can be changed when equipment that emits harmonics that fluctuate over time is measured or when confirming that the emitted harmonics do not change even when the equipment is operated over extended time.

Selectable range: 0 H 0 M 1 S to 24 H 0 M 0 S in units of 1 s.

An error occurs if a time exceeding 24 hours is specified.

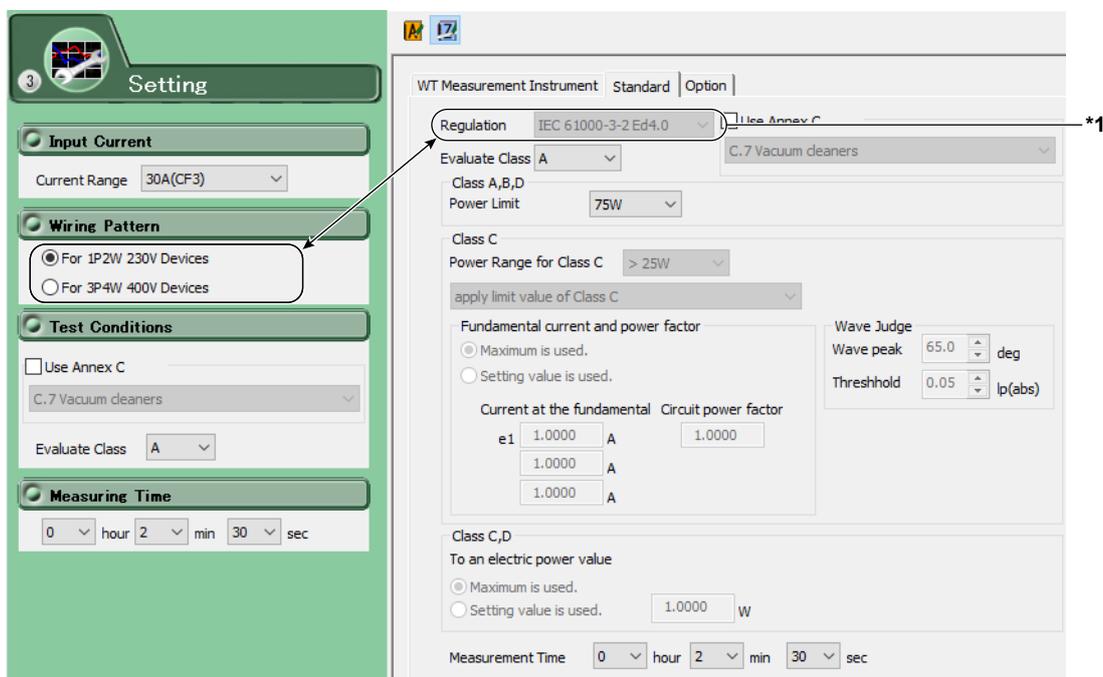
Note

Depending on the environment of the PC onto which this software was installed, an error occurs if you specify a time longer than the memory area that can be reserved. If this happens, the following measures can be taken to increase the upper limit of time that can be specified.

- Close other software applications
 - Restart the software
 - Restart the PC
 - Expand the memory installed in the PC
-

Setting Changes Based on Wiring Pattern Selection

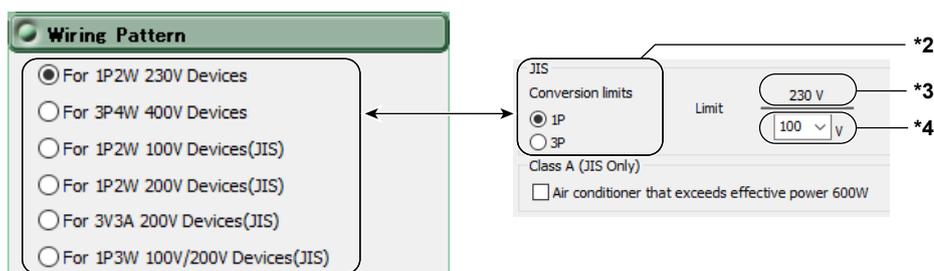
When you select a wiring pattern in the Setting submenu, the settings marked off in the following figures change to their default values. The values in the figures are the default values.



Wiring Pattern	*1
For 1P2W 230V Devices	IEC61000-3-2 Ed 4.0
For 3P4W 400V Devices	IEC61000-3-2 Ed 4.0

If the "The JIS regulation used" check box under Regulation in the Option tab is selected, you can select JIS standards.

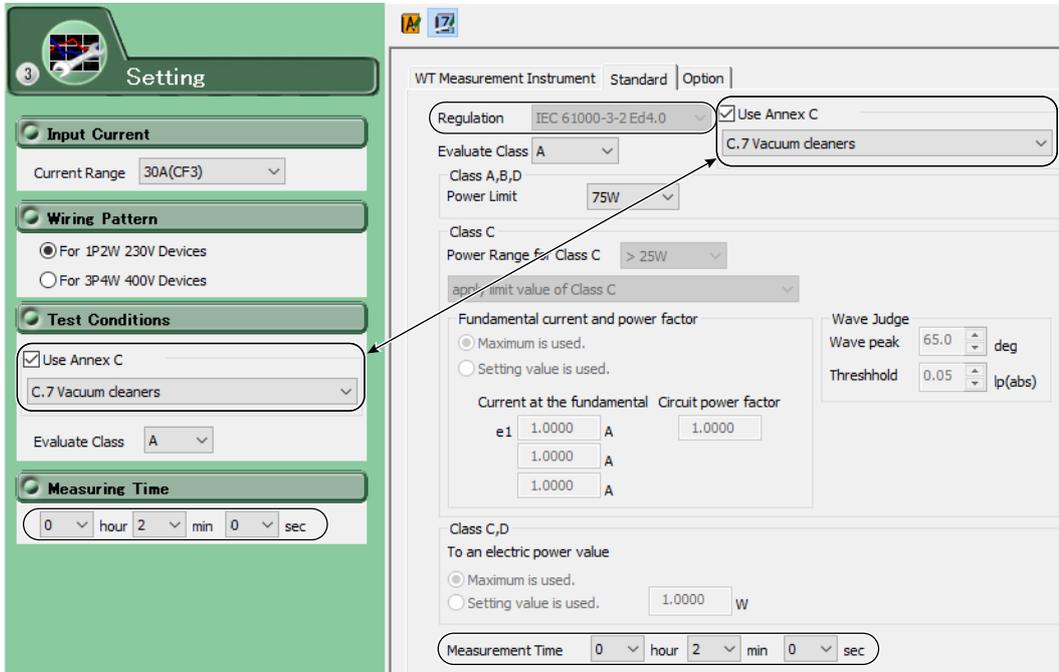
Wiring Pattern	*1 Regulation	*2 Conversion Limis	*3 Numerator of the limit equation	*4 Denominator of the limit equation
For 1P2W 230V Devices	IEC61000-3-2 Ed4.0	---	---	---
For 3P4W 400V Devices	IEC61000-3-2 Ed4.0	---	---	---
For 1P2W 100V Devices (JIS)	JIS	Single Phase	230V	100V
For 1P2W 200V Devices (JIS)	JIS	Single Phase	230V	200V
For 3P3W 200V Devices (JIS)	JIS	three Phase	400V	200V
For 1P3W 100V/200V Devices (JIS)	JIS	Single Phase	230V	100V



Setting Changes Based on “Use Annex C”

Changes when you select “C.7 Vacuum cleaners” or “C.15 High pressure cleaners.”

The settings marked off in the following figures will also change. And the regulation and the measurement time will change to its default value. The value in the figures are the default values.



Changes when you select “C.16.2 (with VSD) Refrigerators and freezers.”

The settings marked off in the following figures will also change. And the regulation, evaluate class, to an electric power value, and measurement time will change to their default values. The value in the figures are the default values.

The screenshot shows the 'Setting' page for the WT5000 instrument. The 'Test Conditions' section is active, showing 'Use Annex C' checked and 'C.16.2 (with VSD) Refrigerators and freezers' selected. The 'Evaluate Class' is set to 'D'. The 'Measuring Time' is set to 1 hour, 0 minutes, and 0 seconds. The 'Regulation' is set to 'IEC 61000-3-2 Ed4.0'. The 'Power Limit' is set to 75W. The 'Fundamental current and power factor' section shows 'Maximum is used' selected. The 'Class C,D' section shows 'Refrigerators and freezers(with VSD)' selected. The 'Measurement Time' is set to 1 hour, 0 minutes, and 0 seconds.

Changes when you select “C.16.3 (without VSD) Refrigerators and freezers.”

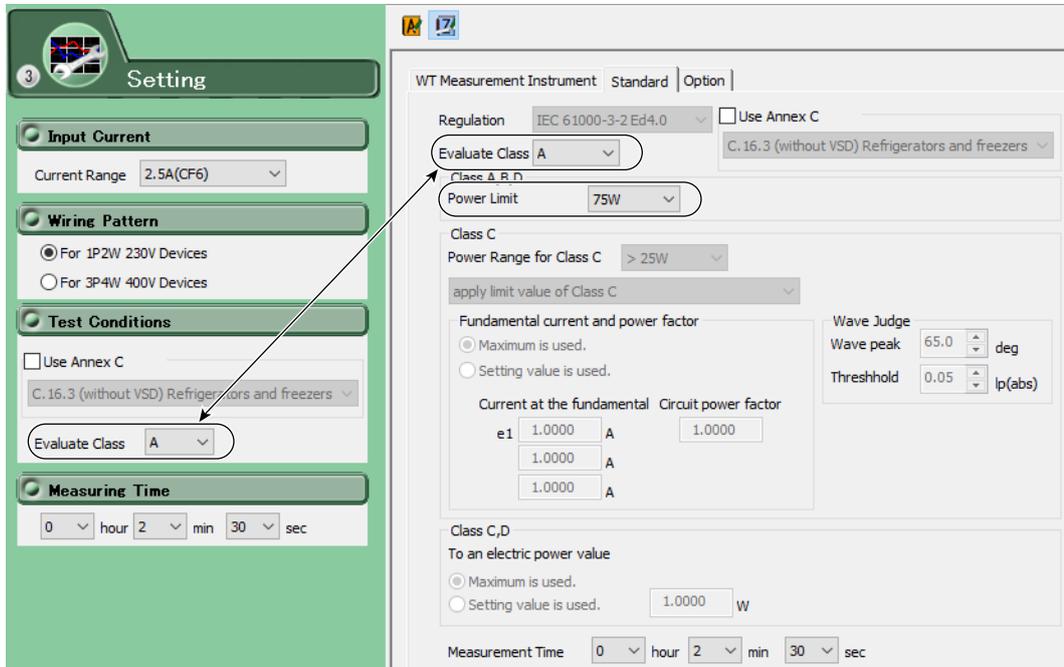
The settings marked off in the following figures will also change. And the regulation, evaluate class, and measurement time will change to their default values. The value in the figures are the default values.

The screenshot shows the 'Setting' page for the WT5000 instrument. The 'Test Conditions' section is active, showing 'Use Annex C' checked and 'C.16.3 (without VSD) Refrigerators and freezers' selected. The 'Evaluate Class' is set to 'A'. The 'Measuring Time' is set to 0 hours, 2 minutes, and 30 seconds. The 'Regulation' is set to 'IEC 61000-3-2 Ed4.0'. The 'Power Limit' is set to 75W. The 'Fundamental current and power factor' section shows 'Setting value is used' selected. The 'Class C,D' section shows 'To an electric power value' selected. The 'Measurement Time' is set to 0 hours, 2 minutes, and 30 seconds.

Setting Changes Based on Class Selection

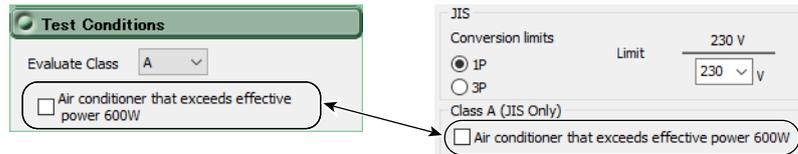
Changes when you select “Class A” or “Class B.”

The settings marked off in the following figures will also change. And the lower power limit for applying the limits will change to its default value. The value in the figures are the default values.



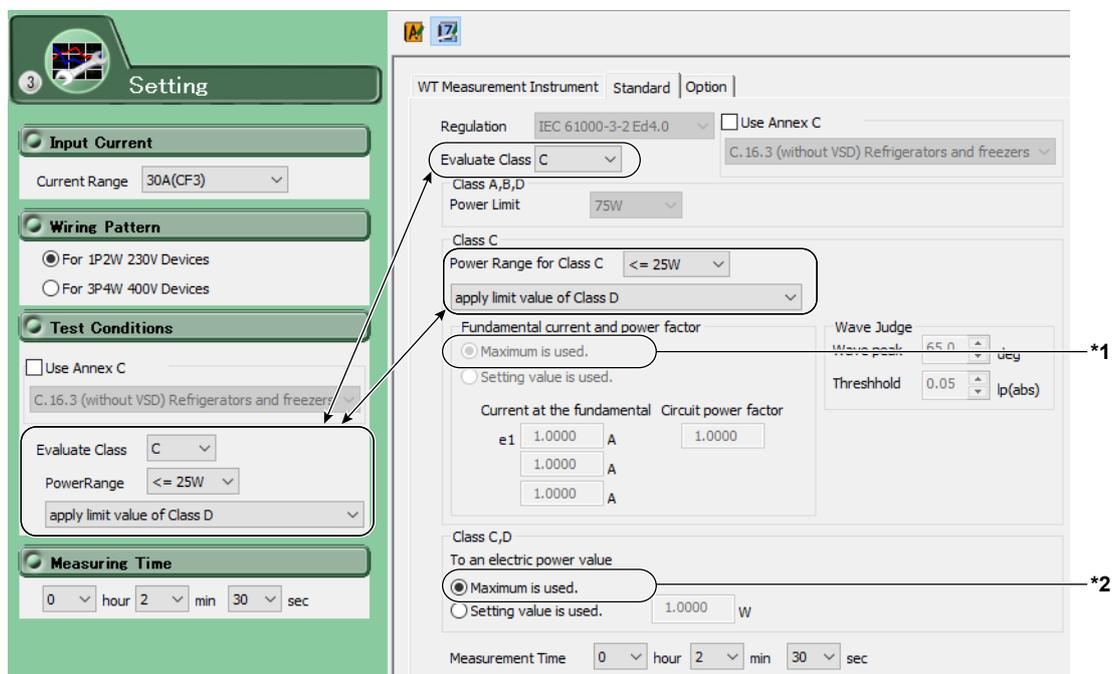
This appears when you set the wiring pattern to one of the items below (which use JIS limits) and set the class to A.

- For 1P2W 100V Devices (JIS)
- For 1P2W 200V Devices (JIS)
- For 3P3W 200V Devices (JIS)
- For 1P3W 100V/200V Devices (JIS)



Changes when you select “Class C.”

The settings marked off in the following figures will also change. And the fundamental current and the power factor will change to their default values. The values in the figures are the default values.



*1 The setting for the fundamental current and the power factor values is set to “Maximum is used” by default when:

- You set the power class to “> 25W.”
- You set the power class to “<= 25W” and you set the limits to “judge with current wave pattern of 3rd&5th.”

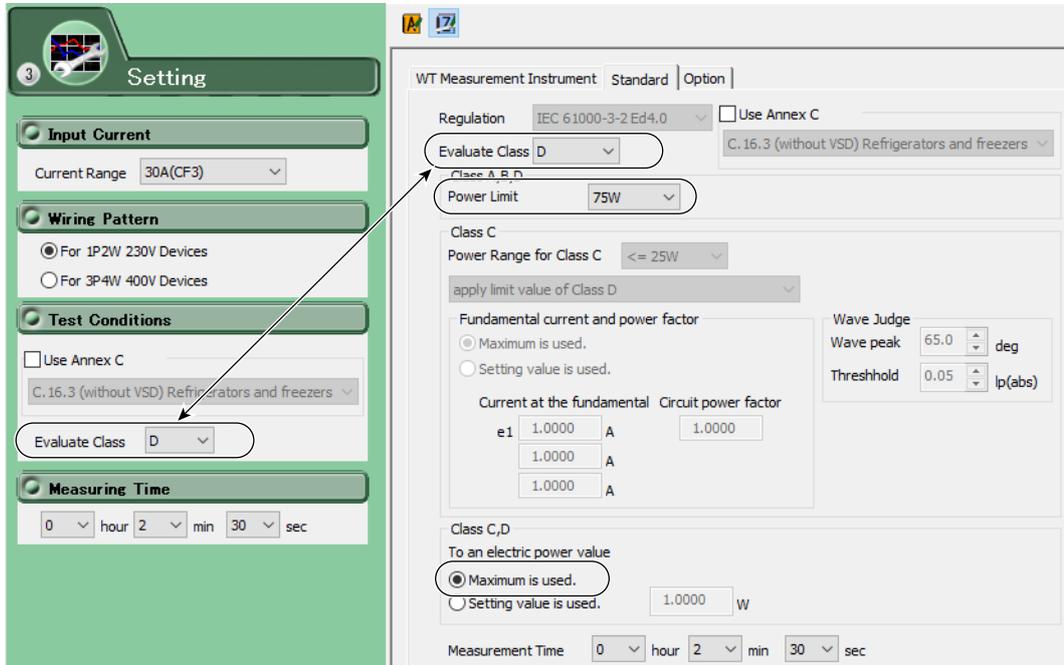
*2 The setting for the power value is set to “Maximum is used” by default when:

- You set the power class to “<= 25W” and you set the limits to “apply limit value of Class D.”

7.3 Setting the WT5000 Judgment Conditions

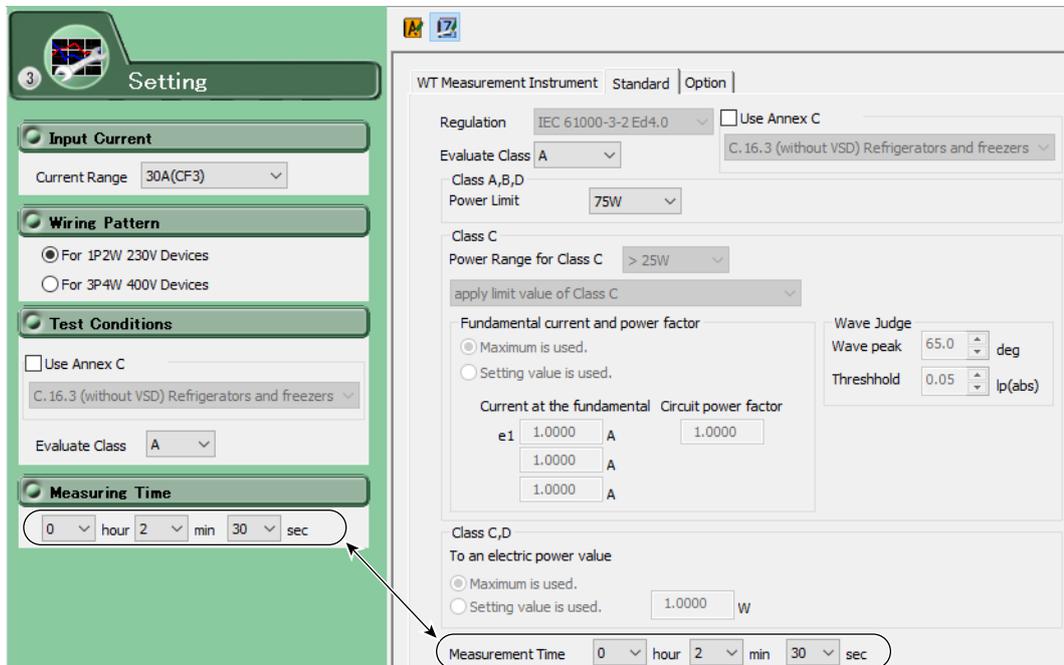
Changes when you select “Class D.”

The settings marked off in the following figures will also change. And the lower power limit for applying the limits and the power factor will change to their default values. The values in the figures are the default values.



Setting Changes Based on Measurement Time Selection

The settings marked off in the following figures will also change.



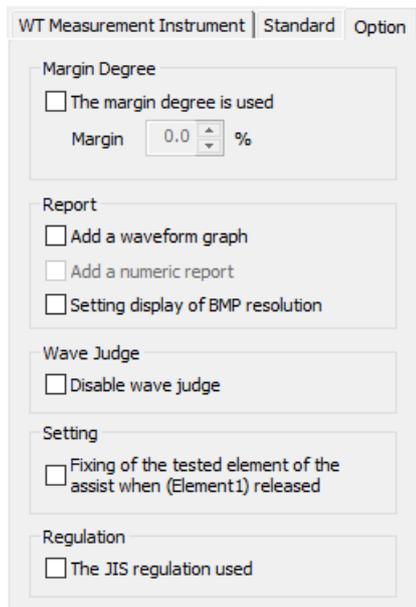
7.4 Setting the Optional Conditions

Procedure

1. Select the **Option** tab in the setting and display area. The optional condition configuration dialog box appears.
2. Configure the various settings.

Note

The items that you can set are the same whether you press the basic settings button  or the advanced settings button .



Explanation

For explanations of these terms, see section 1.5.

Margin Degree

- **The margin degree is used**

Select whether or not to set a margin degree for judgment. If you choose to set a margin degree, specify it as a percentage. If you set the margin degree to 5.00%, the limits will be narrowed by 5%. If you set the margin degree to 0.00%, the limits will be used as is.

Report

- **Add a waveform graph**

Select this check box to include a waveform graph in the report.

- **Setting display of BMP resolution**

In the BMP item under Output Form of the Print menu, the selectable output resolutions appear. (See section 10.2.)

Wave Judge

- **Disable wave judge**

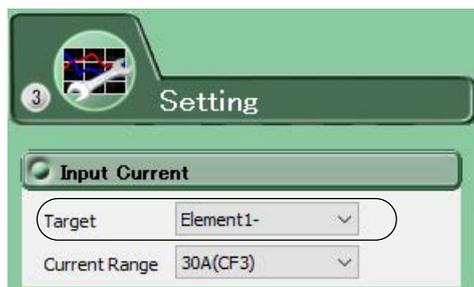
Select this check box to not include wave judgment in the overall judgment (see section 8.7).

Setting

- **Fixing of the tested element of the assist when (Element1) released**

Select the check box to select the target element.

A target element setting box appears in the Setting submenu area.



If the check box is not selected, the target element is fixed to element 1.

Regulation

- **The JIS regulation used**

- When the language is Japanese

The check box is always selected. On the Standard tab, you can select JIS in addition to IEC 61000-3-2 Ed3.2 A2 and IEC 61000-3-2 Ed4.0.

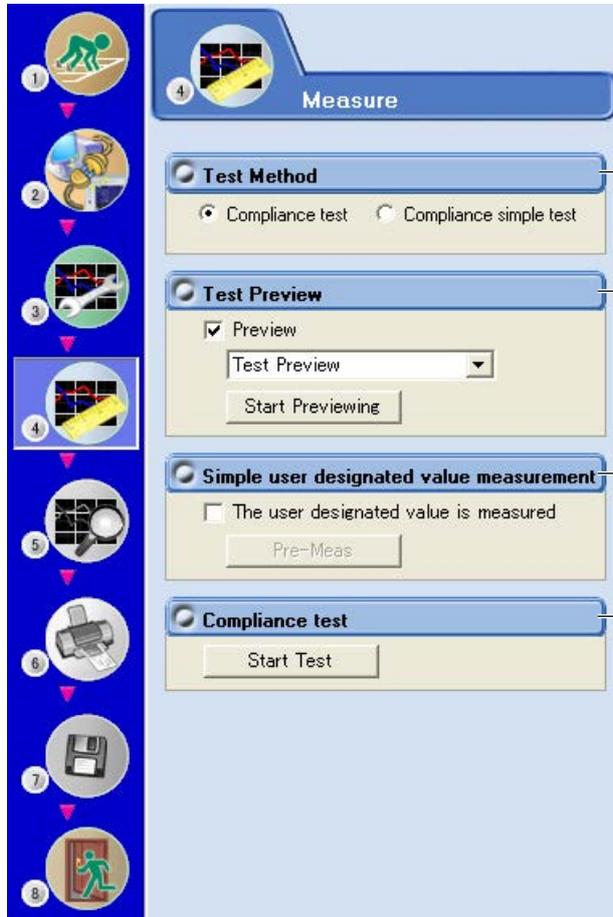
- When the language is not Japanese

The check box can be cleared. If the check box is cleared, the JIS standard is not displayed under the standard options. In this way, you can prohibit the JIS standard from being selected.

8.1 Previewing Harmonic Data and Waveform Data

Procedure

1. Select the  icon in the menu area. The Measure submenu appears.



Test Method (section 8.8)
Appears if you have selected Simple Test Measurement in the test schedule menu described in section 4.1. You can execute a simple test.

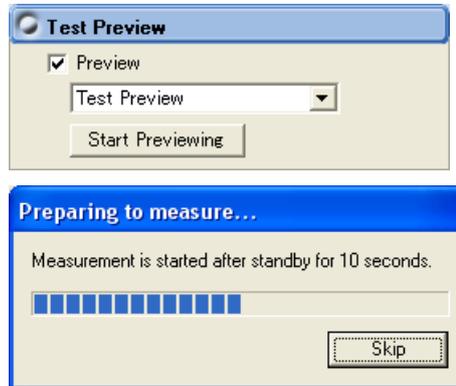
Test preview (page 8-2)
Before you start a test, you can check harmonic measurement data and waveform data. You can execute a compliance test without previewing data.

Simple user designated value measurement (section 8.6)
Appears if you set the class to C or D in the test conditions described in chapter 7. The fundamental current, circuit power factor, and power values are measured.

Compliance test (section 8.7)
Executes a compliance test based on harmonic measurement.

Previewing Test Data

2. Select the **Preview** check box.
3. Select the preview that you want to display.
4. Click **Start Previewing**. A message will appear to indicate that you have to wait before measurement starts. After that, the measured harmonic values will appear in the display area.

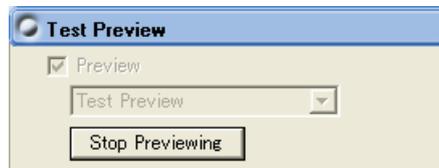


Note

When you preview the harmonics of a current, the data that had been acquired or loaded before the preview is discarded. Be sure to save any compliance test data before you begin a test preview (for information on how to save data, see chapter 11).

Stopping a Test Preview

Click **Stop Previewing**.



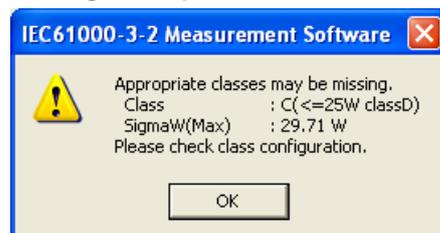
Checking the Class Setting and Active Power

When you stop previewing, the software checks whether the measured active power is within the standard limits of each class.

Class	Active Power P Range
A	No specification
A (JIS, P > 600W, Air conditioner)	P > 600W
B	No specification
C (P > 25W)	P > 25W
C (P ≤ 25W)	P ≤ 25
D	P ≤ 600W

A message appears if the measured active power is outside the standard limits. Check whether the class setting is correct.

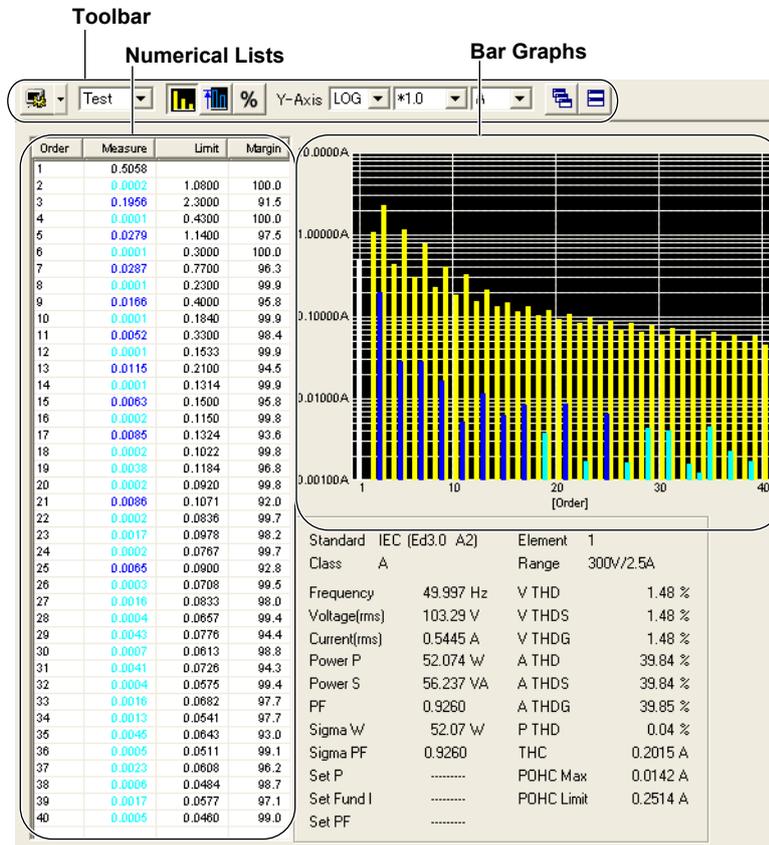
Message example



8.2 Setting the Display of the Test Preview

Procedure

An Example of the Test Preview



Measured value lists
For explanations of these terms, see section 1.5.

An Example of the Setting and Display Area

Sampled data count

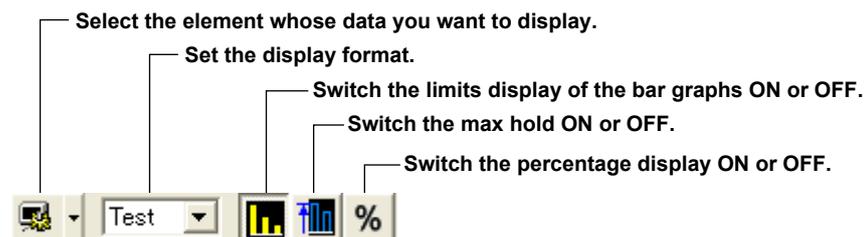
When a preview is being displayed, the display here is 0/0. When a compliance test is being executed, the number of times measured data has been acquired is displayed (for details, see section 8.7).

Measure time

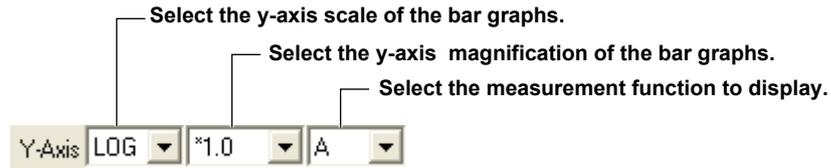
When a preview is being displayed, the display here is 0.0 sec/[the measurement time set according to the procedure described in chapter 7]. When a compliance test is being executed, the amount of time for which measured data has been acquired is displayed (for details, see section 8.7).

Sample Count : 0/0 Measure Time : 0.0sec/150sec

Toolbar



8.2 Setting the Display of the Test Preview



Selecting the Element Whose Data You Want to Display

Click . If input elements 1 to 3 are being measured, as you click the icon, the displayed data will switch from element 1, to element 2, to element 3, to element 1, and so on. Click ▼ to select an element directly.

Selecting the display format

Select **Test**(Bar+List), **Bar**, **List**, or **Simple***

* Simple appears when you are performing a simple compliance test (see section 8.8).

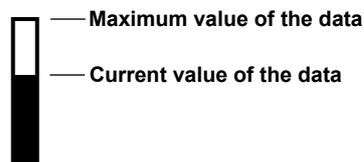


Switching the Limits Display of the Bar Graphs ON or OFF.

Click to select whether or not to display the limits in the bar graph. The limits are displayed using yellow bars. Limits are only applied to harmonic current values. There are no specified limits for voltages or phase angles. So limits for these values are not displayed.

Switching the Max Hold ON or OFF.

Click to turn MaxHold ON. The maximum value of the measured data is held when MaxHold is ON. When MaxHold is ON, bars are displayed as shown below.



Switching the Percentage Display ON or OFF.

Click to turn the percentage display ON and display the following items as percentages.

- **Numerical lists**
 - The relative harmonic data or content of each order
 - Limits
- **Bar graphs**
 - The Y-axis scale

- **Measured value lists**
 - THC
 - POHC
 - POHC maximum
 - POHC limit
- The percentage display is applied only to harmonic current.
- Percentage display is valid when the class is set to C in the test conditions and one of the following conditions is met:
 - You set the power class to "> 25W."
 - You set the power class to "<= 25W" and you set the limits to "judge with current wave pattern of 3rd&5th."
- On the Percentage Display, The relative harmonic content of current of each order can be displayed on bar graphs with the specified fundamental current (fundamental current specified in advance when making Class C evaluation, see section 3.5) taken to be 100%.
- When limits are specified by the relative harmonic content of order 3 and 5 such as the limits for Class C equipment with active input power less than or equal to 25 W, bars corresponding to the magnitude of the values are displayed.
- When the magnification of the Y-axis scale is *1.0, the maximum scale of Y-axis is 100.00%.

Selecting the Y-Axis (Current Magnitude) Scale

Selecting the Type of Y-Axis Scale

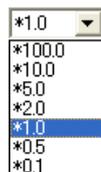
Select LIN (linear) or LOG (logarithmic).



Selecting the Magnification

When the type of scale is LIN, select *100.0, *10.0, *5.0, *2.0, *1.0, *0.5, or *0.1.

When the type of scale is LOG, select *100.0, *10.0, *1.0, or *0.1.



Selecting the Measurement Function to Display

Select A, V, or Deg (for current, voltage, or phase angle).



Explanation

Colors of the numerical lists and bar graphs of the current

The table below describes what the colors. Condition 1, Condition 2, 200% short-term relaxation, and POHC relaxation conditions that appear in the table are defined below.

Condition 1

The maximum harmonic current over the measurement time is within 1.5 times the specified limit. Evaluation is made on each order.

Condition 2

The mean harmonic current over the measurement time is within the specified limit. Evaluation is made on each order.

200% Short-Term Relaxation Conditions

If all of the following conditions are met, up to 200% of the specified limits is permitted.

- The EUT belongs to Class A for harmonics.
- The excursion beyond 150% of the applicable limits lasts less than 10% of the test observation period or in total 10 min (within the test observation period), whichever is smaller.
- The average value of the harmonic current, taken over the entire test observation period, is less than 90% of the applicable limits.

POHC Relaxation Condition

If the maximum value of the sum of partial odd harmonic currents (POHC) of order above and including 21 is less than the specified POHC limit, the mean of the odd harmonic currents of order above and including 21 is permitted to be 1.5 times the specified limit.

	Blue	Limit not exceeded.
	Red	Limit exceeded.
	Yellow (applies only to bar graph)	Limit specified by the applicable standard.
	Black (applies only to numerical list)	No applicable limit is specified. (The measured value of the fundamental frequency and orders that are not applicable is displayed in black.)
	White (applies only to numerical list)	No applicable limit is specified. (The bar graph of the fundamental frequency and orders that are not applicable is displayed in white.)
	Turquoise	The measured data is less than the larger of the two values, 0.6% of the mean rms current and 5 mA.
	Aqua	Limit exceeded. Excluded from applying the limits because the maximum active power is less than the minimum power (75 W or 50 W) for applying the limits or set to Infinity.

* The names of the sample colors of Microsoft Word or Excel are used for the names of the colors.

Colors of the numerical lists and bar graphs of the voltage and phase angle

There are no voltage or phase angle limits. Bar graphs of harmonic voltage or phase angle are displayed in white. The values displayed in the list are black.

Numerical Lists

Limit

- The limits specified in the applicable standard are displayed in a list for each order.
- The harmonic data shown in the Test preview consists of instantaneous values, so the listed limit values and yellow bars are shown using values that are 1.5 times larger than the limits.
- The limits are applied only to harmonic current.
- If the Percentage Display check box is selected, the relative harmonic content of the limit of each order can be displayed with the specified fundamental current (fundamental current specified in advance when making Class C evaluation, see section 7.3) taken to be 100%.
- When limits are specified by the relative harmonic content of order 3 and 5 such as the limits for Class C equipment with active input power less than or equal to 25 W, the current value converted from the relative harmonic content of order 3 and 5 with the fundamental current specified in advance (see section 7.3) taken to be 100% is displayed.

Margin

- Indicates the margin to the limit. For each order, the margin is derived from the following equation using the limits and measured values displayed in the list.

$$\frac{\text{Limit} - \text{measured value}}{\text{Limit}} \times 100$$

- The margin only applies to harmonic current values.
- The color of the values changes depending on whether or not you select “The margin degree is used” check box described in section 7.4.
 - When the Margin Degree Is Used
 - Blue indicates that a value has exceeded the margin that you specified according to the procedure in section 7.4.
 - Red indicates that a value is at or below the margin that you specified according to the procedure in section 7.4.
 - When the Margin Degree Is Not Used
 - Values are displayed in black.

Bar Graphs

Bar Graph of Harmonic Current or Voltage

The software displays the instantaneous values acquired within the measurement time for each harmonic order.

Bar Graph of Harmonic Phase Angles

Bar graphs of the phase angle of the harmonic current with respect to the fundamental current for each order can be displayed. However, the phase angle with respect to the fundamental voltage is displayed on the bar graph for the fundamental current.

- When the harmonic phase is leading the fundamental current, a positive phase angle is indicated; when the harmonic phase is lagging the fundamental current, a negative phase angle is indicated.
- When the fundamental current is leading the fundamental voltage, a negative phase angle is indicated; when the fundamental current is lagging the fundamental voltage, a positive phase angle is indicated.

Measured Value Lists

For explanations of these terms, see section 1.5.

Sigma W

Sigma W is the active power for all grouped phases (all measured input elements).

Note

- When applying the power ratio limit on Class C or D multi-phase equipment, the harmonic current per watt derived from the total active power (Sigma W) of all phases (three phases if three-phase) and the power ratio limit are compared and evaluated.
 - Equipment whose Sigma W exceeds 600 W is considered Class A equipment under the standard. Use caution because the software makes evaluations using the class selected in standard and measurement environment settings (see section 7.3).
-

Set P, Set Fund I, and Set PF

For Set P, the power value (see section 7.3) specified in advance is displayed when making Class C or D evaluations.

For Set Fund I and Set PF, the fundamental current and power factor values (see section 7.3) specified in advance are displayed respectively when making Class C evaluations.

Note

In section 7.1, if you selected the "Use Annex C" check box and selected "C16.2 (with VSD) Refrigerators and freezers," these items are displayed as follows:

- Set P: C16.2 Im (current of the appliance)
 - Set Fund I: C16.2 Ur (rated voltage of the appliance)
 - Set PF: C16.2 Pi (effective power of the appliance)
-

8.3 Setting the Display of the List Preview

Procedure

An Example of the List Preview

For information about the functions of toolbar icons other than those listed below, see section 8.2.

Turning Each of the Measured Value Lists (Columns) ON and OFF

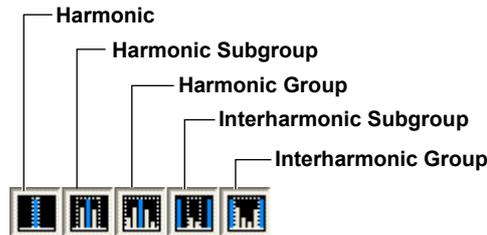


Diagram illustrating the structure of measured value lists (columns) with labels pointing to specific icons:

- Harmonic
- Harmonic Subgroup
- Harmonic Group
- Interharmonic Subgroup
- Interharmonic Group

Ord.	Measu...	Measu...	Measu...	Measu...	Measu...	Limit
1	0.50	0.50	0.50	0.0000	0.0000	
2	0.00	0.00	0.00	0.0001	0.0002	1.62
3	0.19	0.19	0.19	0.0002	0.0002	3.45
4	0.00	0.00	0.00	0.0001	0.0002	0.64
5	0.02	0.02	0.02	0.0002	0.0002	1.71
6	0.00	0.00	0.00	0.0001	0.0001	0.45
7	0.02	0.02	0.02	0.0001	0.0001	1.15
8	0.00	0.00	0.00	0.0001	0.0001	0.34
9	0.01	0.01	0.01	0.0001	0.0001	0.60
10	0.00	0.00	0.00	0.0001	0.0001	0.27
11	0.00	0.00	0.00	0.0001	0.0001	0.49
12	0.00	0.00	0.00	0.0002	0.0002	0.23
13	0.01	0.01	0.01	0.0001	0.0001	0.31
14	0.00	0.00	0.00	0.0001	0.0001	0.19
15	0.00	0.00	0.00	0.0000	0.0001	0.22
16	0.00	0.00	0.00	0.0003	0.0003	0.17
17	0.00	0.00	0.00	0.0001	0.0001	0.19
18	0.00	0.00	0.00	0.0003	0.0003	0.15
19	0.00	0.00	0.00	0.0001	0.0001	0.17
20	0.00	0.00	0.00	0.0002	0.0002	0.13
21	0.00	0.00	0.00	0.0001	0.0001	0.16
22	0.00	0.00	0.00	0.0003	0.0003	0.12
23	0.00	0.00	0.00	0.0001	0.0001	0.14
24	0.00	0.00	0.00	0.0003	0.0003	0.11
25	0.00	0.00	0.00	0.0002	0.0002	0.13
26	0.00	0.00	0.00	0.0004	0.0004	0.10
27	0.00	0.00	0.00	0.0002	0.0002	0.12
28	0.00	0.00	0.00	0.0004	0.0004	0.09
29	0.00	0.00	0.00	0.0002	0.0003	0.11
30	0.00	0.00	0.00	0.0009	0.0009	0.09
31	0.00	0.00	0.00	0.0002	0.0002	0.10
32	0.00	0.00	0.00	0.0005	0.0005	0.08
33	0.00	0.00	0.00	0.0002	0.0003	0.10
34	0.00	0.00	0.00	0.0016	0.0016	0.08
35	0.00	0.00	0.00	0.0002	0.0002	0.09
36	0.00	0.00	0.00	0.0005	0.0005	0.07
37	0.00	0.00	0.00	0.0002	0.0003	0.09
38	0.00	0.00	0.00	0.0000	0.0000	0.07

Parameter List:

- Element 1
- Standard IEC (Ed3.0 A2)
- Class A
- Range 300V/25A
- Frequency 50.000 Hz
- Voltage(rms) 103.22 V
- Current(rms) 0.5449 A
- Power P 52.074 W
- Power S 56.246 VA
- PF 0.9258
- V THD 1.48 %
- V THDS 1.48 %
- V THDG 1.48 %
- A THD 39.89 %
- A THDS 39.89 %
- A THDG 39.90 %
- P THD 0.04 %
- THC 0.2020 A
- POHC 0.0140 A
- POHC Limit 0.2514 A
- Sigma W 52.07 W
- Sigma PF 0.9258
- Set P -----
- Set Fund I -----
- Set PF -----

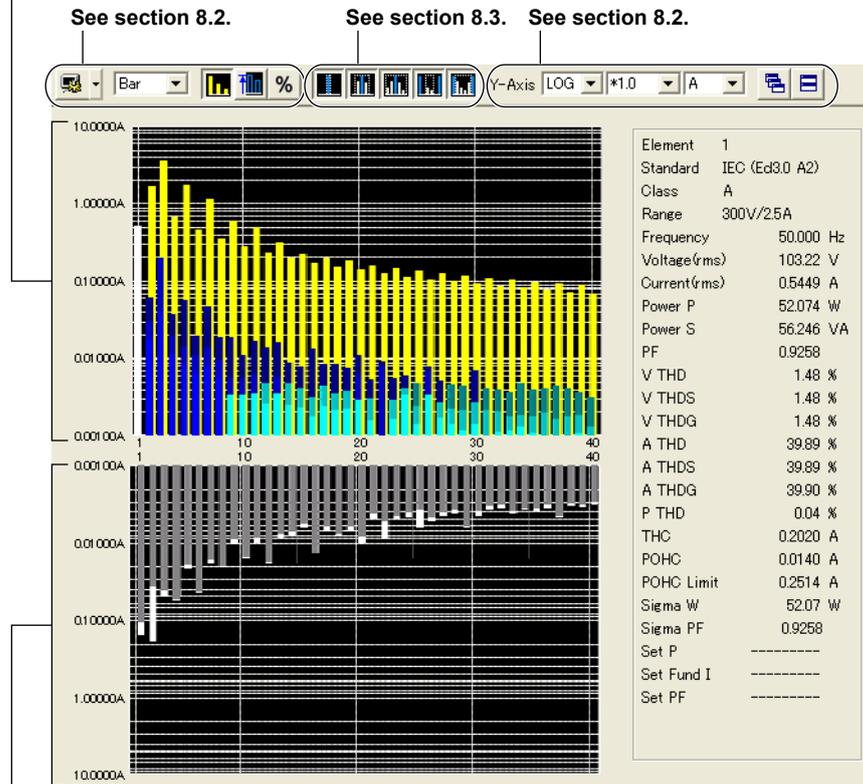
For details on the numerical lists, see section 8.2.

8.4 Setting the Display of the Bar Preview

Procedure

An Example of the Bar Preview

The harmonic, harmonic group, harmonic subgroup, and limit displays area



The interharmonic group and interharmonic center subgroup display area*

- * Appears when the interharmonic group display button  is pressed or when the interharmonic center subgroup button  is pressed.

For details on the bar graph, see section 8.2.

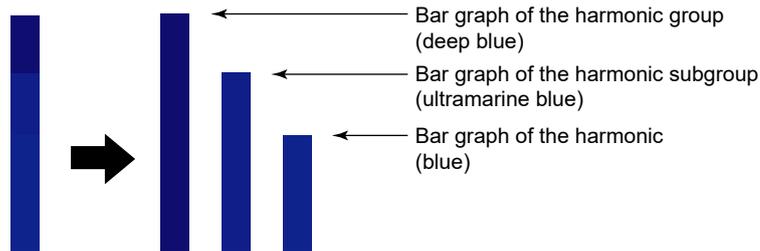
Explanation**Color of Bars****Color of the Harmonic bar graph**

See section 8.2.

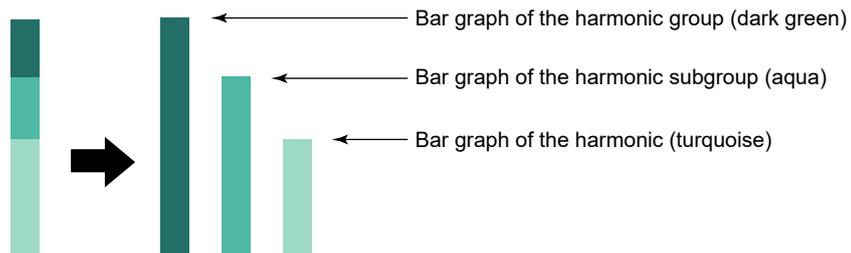
Color of the Harmonic Group and Harmonic Subgroup of Current

The harmonic, harmonic group, and harmonic subgroup are superimposed on the bar graph.

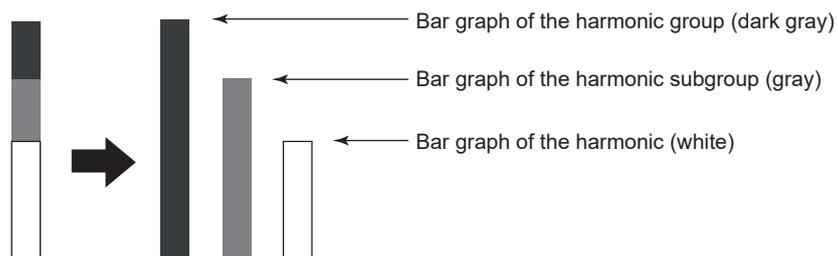
- When the Measured Values Are within the Limit



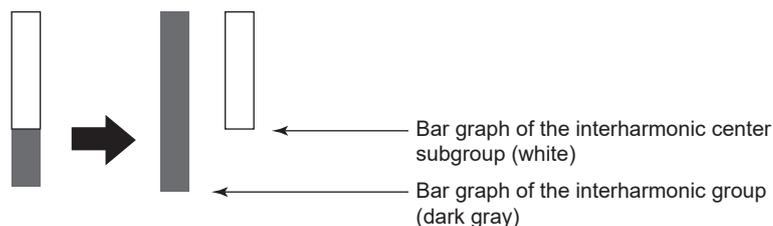
- When Evaluation Is Not Made Because the Measured Data Is Less than the Larger of the Two Values, 0.6% of the Mean Rms Current and 5 mA

**Color of the Harmonic Group and Harmonic Subgroup of Voltage**

The harmonic, harmonic group, and harmonic subgroup are displayed as shown below. There is no need to compare with the limit to make evaluations.

**Color of the Interharmonic Group and Interharmonic Center Subgroup**

The interharmonic group and interharmonic center subgroup are displayed as shown below. There is no need to compare with the limit to make evaluations.



8.5 Setting the Display of the Wave Preview

Procedure

An Example of the Waveforms Preview

Select the element whose data you want to display.
See section 8.2.

Select the max hold.

Select the X-axis scale.

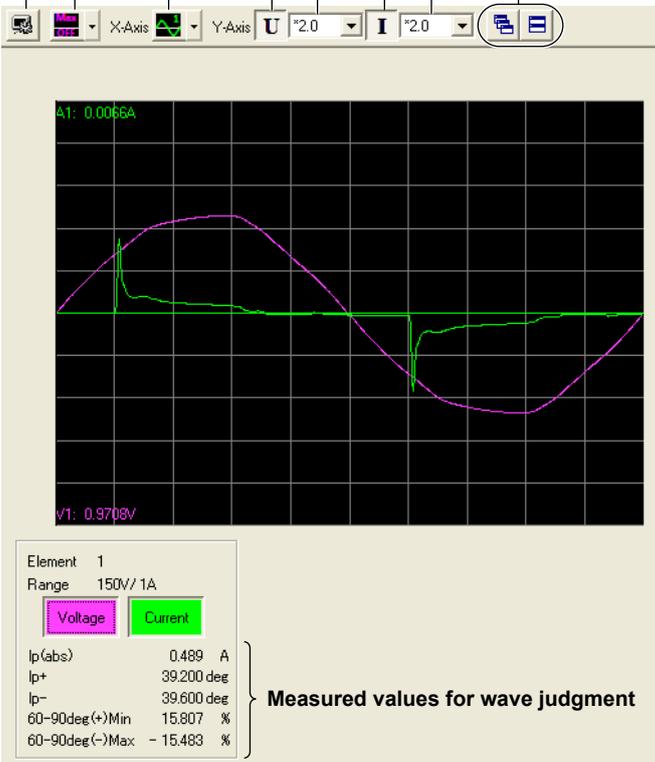
Switch the voltage waveform display ON or OFF.

Select the voltage waveform magnification.
See section 8.2.

Switch the current waveform display ON or OFF.

Select the current waveform magnification.
See section 8.2.

Window arrangement buttons.
See chapter 12.



Element 1	
Range	150V/1A
<input type="checkbox"/> Voltage <input checked="" type="checkbox"/> Current	
I_p (abs)	0.489 A
I_{p+}	39.200 deg
I_{p-}	39.600 deg
60-90deg(+)Min	15.807 %
60-90deg(-)Max	-15.483 %

Measured values for wave judgment

Selecting the Max Hold

Click . Select **Dotted**, **Line**, or **None**.

The button indication changes depending on the current setting.

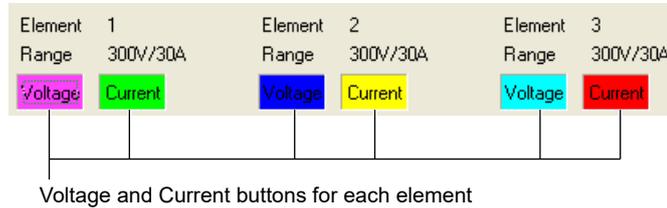
Selecting the Max Hold

Click . Select **ALL**, **Cycle**, **Half Cycle+**, or **Half Cycle-**.

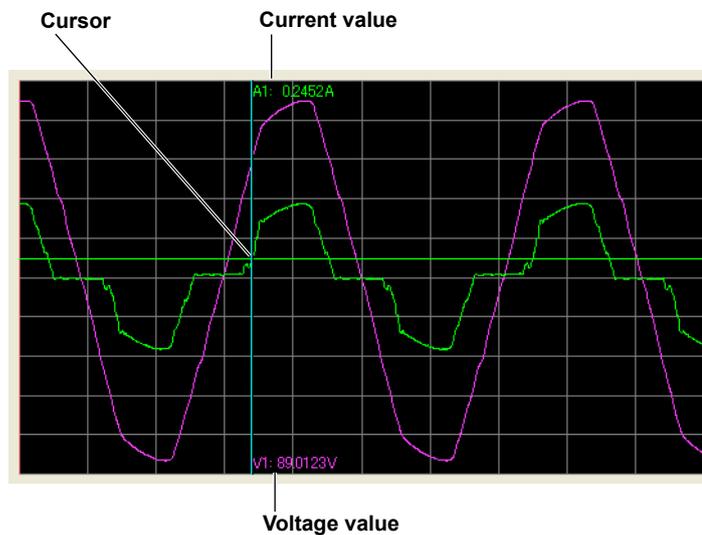
The button indication changes depending on the current setting.

Switching the Waveform Display ON or OFF.

You can show or hide an element's voltage or current waveform by clicking on the Voltage and Current buttons for each element in the show/hide box.

Show/hide box (an example of the three-phase input)**Using the Cursor to Display Current and Phase Angle Values**

When you click an area of the waveform, a cursor will appear there. The current and phase angle values at the cursor position will be displayed.

**Explanation****Display Colors**

The following colors are assigned to the waveforms of each input element in order, starting with the lowest numbered element. If you are previewing the waveforms of elements 1, 2, and 3, the following colors will be assigned to the element's voltage and current waveforms:

Element	Voltage Waveform	Current Waveform
Element 1	Pink	Bright green
Element 2	Blue	Yellow
Element 3	Turquoise	Red

* The colors and corresponding names are the same as those in Microsoft Word and Microsoft Excel.

Measured Values for Wave Judgment

This appears when you set the following judgment conditions (see section 7.3).

- Class C
- The Active Power Is Less Than or Equal to 25 W (≤ 25 W)
- Evaluating on the Conditions of Harmonic Order 3 and 5

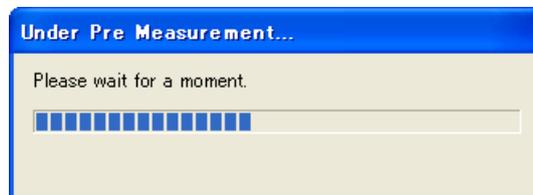
8.6 Making Simple User Designated Value Measurement

Procedure

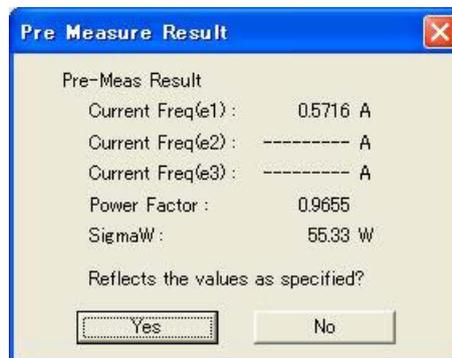
1. Select the  icon in the menu area. The Measure submenu appears. For general information about the Measure submenu, see section 8.1.
2. Select the **user designated value is measured** check box.



3. Click **Pre-Meas**. A message will appear to indicate that pre-measurement is taking place.



After 10 seconds of pre-measurement, the Pre Measure Result message appears.



8.6 Making Simple User Designated Value Measurement

4. Select whether or not to use the results of pre-measurement to set the fundamental current, circuit power factor, and power values described in section 7.3. If you select **Yes**, the values will be set to the pre-measured values.

The screenshot displays a software interface for configuring measurement settings. The left sidebar, titled "Setting", contains four sections: "Input Current" (Current Range: 2.5A(CF6)), "Wiring Pattern" (radio buttons for 1P2W 230V and 3P4W 400V), "Test Conditions" (checkbox for "Use Annex C", dropdown for "C.7 Vacuum cleaners", Evaluate Class: C, PowerRange: <= 25W, and a dropdown for "judge with current wave pattern of 3rd&5th"), and "Measuring Time" (0 hour, 2 min, 30 sec). The main panel, titled "WT Measurement Instrument", shows "Standard" selected. It includes "Regulation" (IEC 61000-3-2 Ed4.0), "Evaluate Class" (C), "Class A,B,D" (75W), and "Class C" settings (Power Range: <= 25W, "judge with current wave pattern of 3rd&5th"). Under "Fundamental current and power factor", the "Setting value is used" option is selected. It shows "Current at the fundamental" (e1: 0.0793 A) and "Circuit power factor" (0.6757). A "Wave Judge" section shows "Wave peak" (65.0 deg) and "Threshold" (0.05 lp(abs)). The "Class C,D" section shows "To an electric power value" with "Setting value is used" selected, displaying 7.1785 W. The "Measurement Time" is set to 0 hour, 2 min, 30 sec.

Explanation

Simple User Designated Value Measurement

For class C and class D, to perform compliance tests, users can specify the fundamental current and circuit power factor, or the power value to perform compliance tests. If you measure the fundamental current, circuit power factor, and power value using the procedure described in this section, you can apply the measured results to the fundamental current, circuit power factor, and power value in the judgment conditions described in section 7.3.

8.7 Making Compliance Test (Harmonic Measurements)

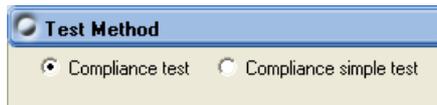
Procedure

1. Select the  icon in the menu area. The Measure submenu appears. For general information about the Measure submenu, see section 8.1.

Selecting the Test Method

This only appears if you have selected Simple Test Measurement in the test schedule menu described in section 4.1.

2. Select **Compliance test**.



Starting a Test

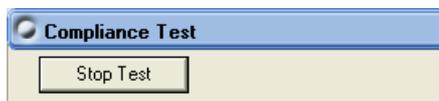
3. Click **Start Test**. A dialog box opens that indicates that you have to wait before measurement starts. Then measured harmonic values appear in the measured harmonic values lists and bar graphs.



In section 7.1, if you selected the “Use Annex C” check box and selected “C.7 Vacuum cleaners” or “C.15 High pressure cleaners,” the test is performed for maximum, 50%, and minimum.

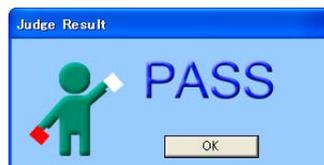
Stopping a Test

- **Stopping Automatically**
The software will stop testing automatically once the specified measurement time has been reached.
- **Stopping Manually**
Click **Stop Test**. If the WT is measuring, it will stop when measurement ends normally and data has been acquired.



Once the test is finished, the overall judgment appears.

Display example: PASS



The overall judgment also appears in the information area.



8.7 Making Compliance Test (Harmonic Measurements)

Explanation

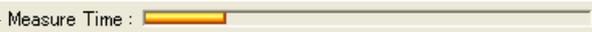
An Example of the Setting and Display Area during a Compliance Test

Sampled data count

One sample count is equivalent to 200 ms (10 cycles for 50 Hz and 12 cycles for 60 Hz)* worth of measured instantaneous data values. This data is acquired by the software and displayed. In this example, 145 samples have been acquired.

Measure time

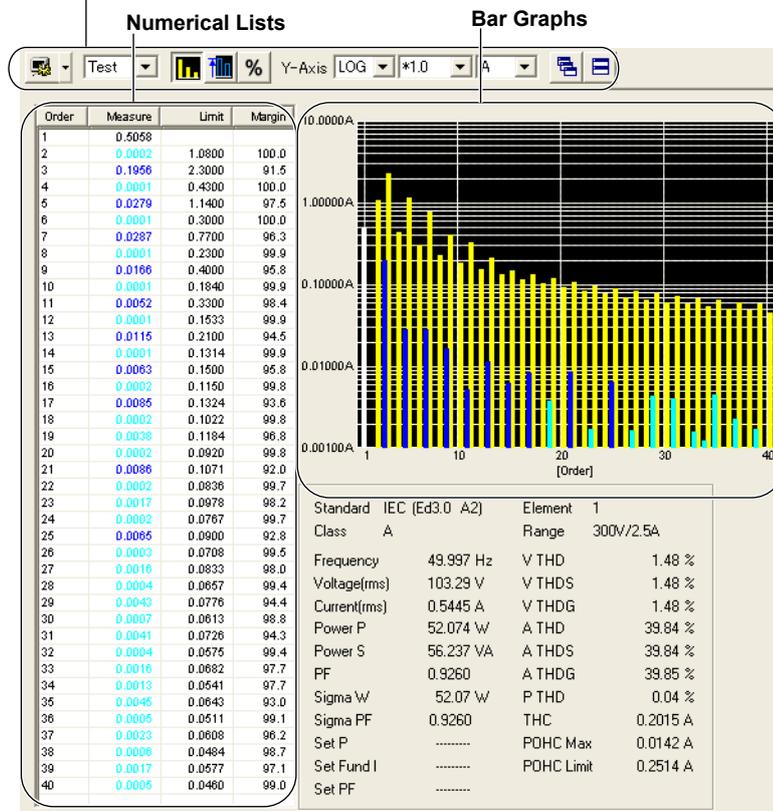
The amount of time that has elapsed since the start of measurement/the measurement time set according to the procedure described in chapter 7.

Sample Count : 145/145 Measure Time :  29.0sec/150sec

* For when the IEC 61000-4-7 edition is set to 2.0 or 2.0 A1. When the IEC 61000-4-7 edition is set to 1.0, the number of cycles is 16 (320 ms at 50 Hz or 267 ms at 60 Hz).

Toolbar

See section 8.2.



Measured value lists
For explanations of these terms, see section 1.5.

Selecting the display format of the setting and display area

Only Test(Bar+List) is valid. Even if you select a different display format (Bar or List) by clicking one of the display format selection icons in the toolbar, measured data will not be displayed.

Judgment

If all of the elements that are tested pass, PASS appears. Otherwise, FAIL appears.

 PASS

 FAIL

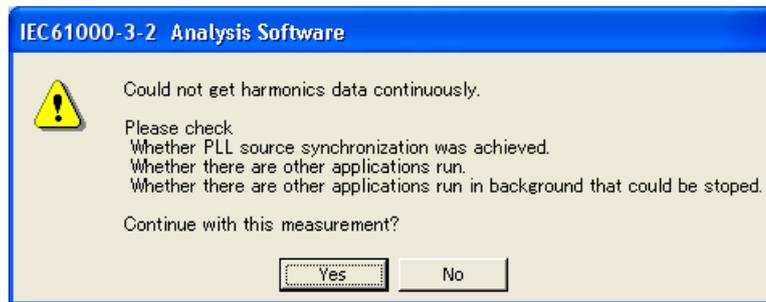
 FAIL (Margin Short)

The limit has not been exceeded, but the margin specified in section 7.4 has been exceeded.

 NoData

Error Messages during Measurement

The following error message may appear when measurement is executed in Compliance Test.



This software retrieves large amount of measured data from the WT. The error message may appear if the CPU on the PC is overloaded and cannot keep up with the data transfer. Lighten the load placed on the CPU on the PC by checking the points listed below.

- Do not operate or run other programs.
- Close memory-resident programs (turn them OFF).
- Disable the standby mode.
- Use the software on a PC that satisfies the system requirements given in section 1.2.

Checking the Test Conditions

When the test is finished, before making an overall judgment, the software checks the following items to determine whether the test conditions are appropriate.

- Checking the Class Setting and Active Power
- Fundamental current and circuit power factor for class C
- Active power for class D

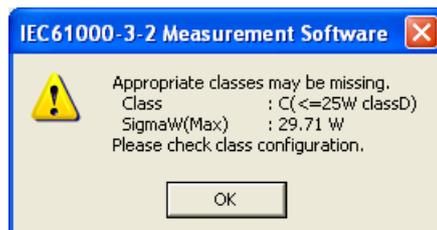
Checking the Class Setting and Active Power

The software checks whether the measured active power is within the standard limits of each class.

Class	Active Power P Range
A	No specification
A (JIS, P > 600W, Air conditioner)	P > 600W
B	No specification
C (P > 25W)	P > 25W
C (P ≤ 25W)	P ≤ 25
D	P ≤ 600W

A message appears if the measured active power is outside the standard limits. Check whether the class setting is correct.

Message example



After you confirm the message, the overall judgment is displayed.

8.7 Making Compliance Test (Harmonic Measurements)

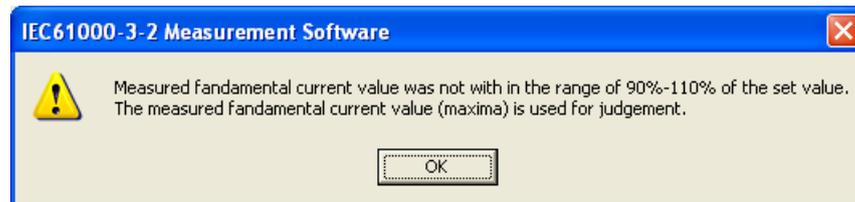
Checking the Fundamental Current and Circuit Power Factor for Class C

When you specify the fundamental current and circuit power factor for a class C test, the software checks the fundamental current and circuit power factor.

- Fundamental current check
The software checks whether the measured value of the fundamental current is greater than or equal to 90% and less than or equal to 110% of the specified value.
- Circuit power factor check
The software checks whether the measured value of the circuit power factor is greater than or equal to 90% and less than or equal to 110% of the specified value.

Classifications in Class C		Fundamental Current Check	Circuit Power Factor Check
P>25W	Apply limit value of class C	Yes	Yes
	Apply limit value of class C (dimming lights)	No	No
	Apply limit value of class A (dimming lights)	No	No
P≤25	Apply limit value of class D	No	No
	Judge with current wave pattern of 3rd & 5th	Yes	No

A message appears if the measured values are outside the above ranges. Check whether the specified values are correct.



After you confirm the message, the overall judgment is displayed.

- If the fundamental current is outside the above range, judgment is performed with the maximum measured value of the fundamental current of input element 1 as the reference.
- If the circuit power factor is outside the above range, judgment is performed with the maximum measured value of the circuit power factor of the wiring unit as the reference.

Checking the Active Power for Class D

When you specify the active power for a class D test, the software checks whether the measured active power is greater than or equal to 90% and less than or equal to 110% of the specified value.

A message appears if the measured values are outside the above ranges. Check whether the specified values are correct.



After you confirm the message, the overall judgment is displayed.

If the active power is outside the above range, judgment is performed with the maximum measured active power as the reference.

8.8 Making Compliance Simple Test

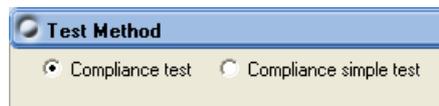
Procedure

1. Select the  icon in the menu area. The Measure submenu appears. For general information about the Measure submenu, see section 8.1.

Selecting the Test Method

This only appears if you have selected Simple Test Measurement in the test schedule menu described in section 4.1.

2. Select **Compliance simple test**.



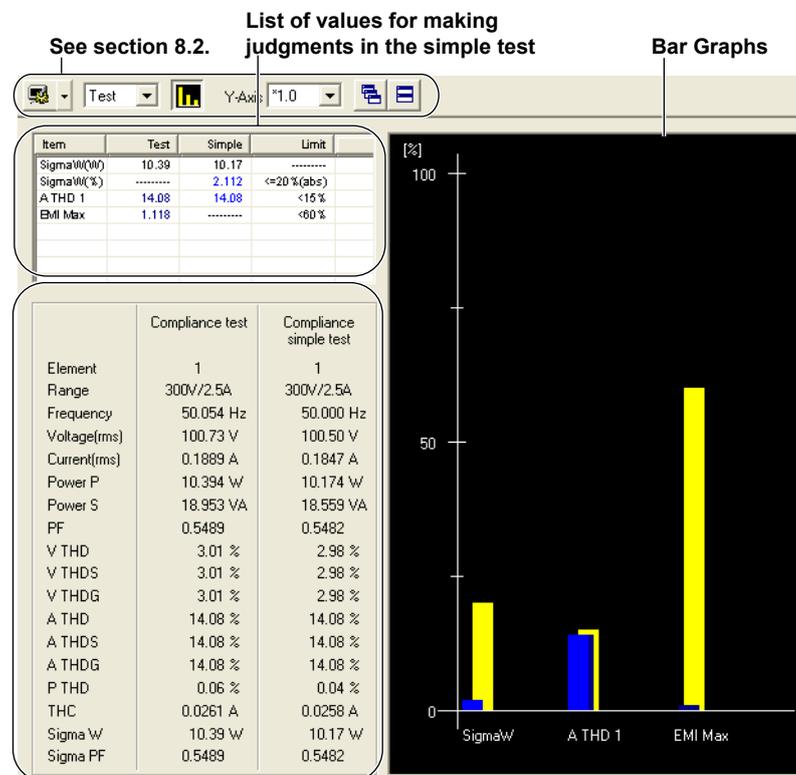
Previewing Test Data

3. Follow the procedure in section 8.1 to select the preview you want to execute, and click Start Previewing.

This section will explain what happens when you execute the simple test preview. For information about other previews, see the appropriate sections indicated below.

- Test preview: Section 8.2
- List preview: Section 8.3
- Bar preview: Section 8.4
- Wave preview: Section 8.5

Example of a Simple Test Preview

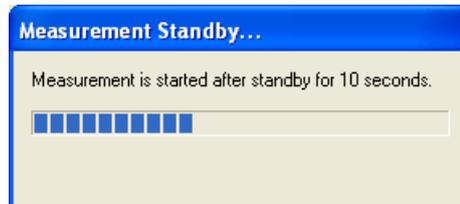
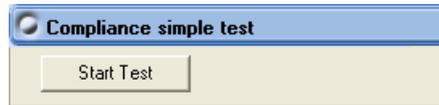


Measured value lists

For explanations of these terms, see section 1.5.

Starting a Test

- 4. Click **Start Test**. A dialog box opens that indicates that you have to wait before measurement starts. Then measured harmonic values appear in the measured harmonic values lists and bar graphs.



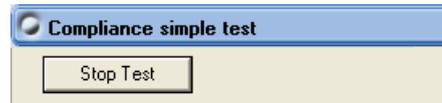
Stopping a Test

- **Stopping Automatically**

The software will stop testing automatically once the specified measurement time has been reached.

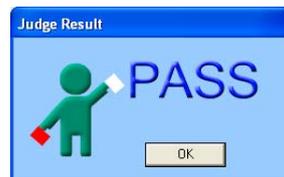
- **Stopping Manually**

Click **Stop Test**. If the WT is measuring, it will stop when measurement ends normally and data has been acquired.



Once the test is finished, the overall judgment appears.

Display example: PASS



The overall judgment also appears in the information area.



Explanation

List of Values for Making Judgments in the Simple Test

The list consists of the following items.

- Test: Measured data of the compliance test that has been specified as the test reference for the simple test
- Simple: Measured values of the simple test
- SigmaW(W)
Maximum measured active power
- SigmaW(%)
Magnitude of the active power of the simple test in reference to the active power of the compliance test

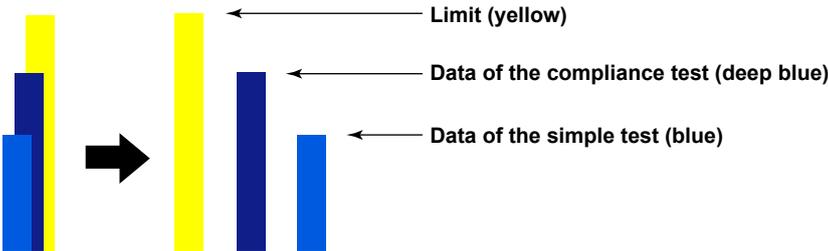
$$\left(\frac{\text{Maximum SigmaW of the simple test}}{\text{Maximum SigmaW of the compliance test}} - 1 \right) \times 100$$
- A THD
Measured current THD at the point where SigmaW(W) is at its maximum value (the number of displayed elements varies depending on the wiring pattern)
- EMI Max
Magnitude of the measured harmonic current in the compliance test compared to the harmonic current limit
100 - the minimum margin degree (%)

The value colors are as follows:

- A THD and EMI Max of the compliance test
Deep blue (the conditions for executing simple tests are met)
- SigmaW(%) of the simple test
Blue if the value is within the limit and red if the value exceeds the limit
- A THD of the simple test
Blue if the value is less than the limit and red if the value is greater than or equal to the limit

Bar Graphs

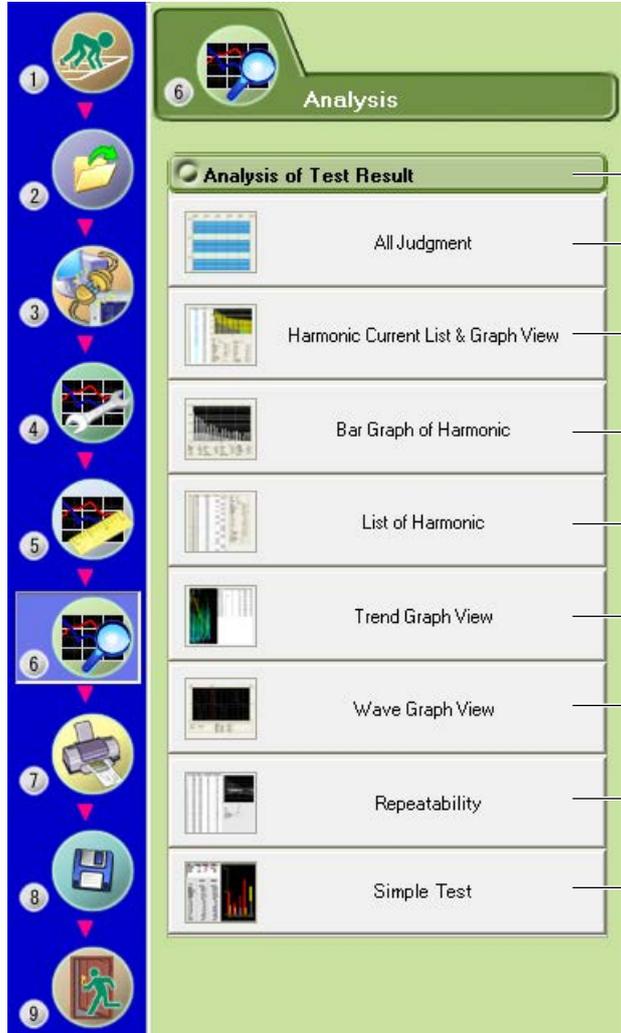
The listed judgment values of the simple test are displayed in a bar graph. The bar colors are the same as the colors of the values described above. The limit is displayed in yellow.



9.1 Displaying a Graph of All Judgments

Procedure

1. Select the  icon in the menu area. The Analysis submenu appears.



The screenshot shows a vertical menu on the left with icons numbered 1 through 9. To the right is the 'Analysis' submenu with the following items:

- Analysis of Test Result**: Measured data can be displayed.
- All Judgment**: All Judgment (page 9-2)
- Harmonic Current List & Graph View**: Harmonic Current List & Graph View (section 9.2)
- Bar Graph of Harmonic**: Bar Graph of Harmonic (section 9.3)
- List of Harmonic**: List of Harmonic (section 9.4)
- Trend Graph View**: Trend Graph View (section 9.5)
- Wave Graph View**: Wave Graph View (section 9.6)
- Repeatability**: Repeatability (section 5.2)
- Simple Test**: Simple Test (section 9.7). This will be available if you select Simple Test Measurement in the test schedule menu described in section 4.1.



Window arrangement buttons
For details, see chapter 12.



Displays cascaded windows



Displays tiled windows

Note

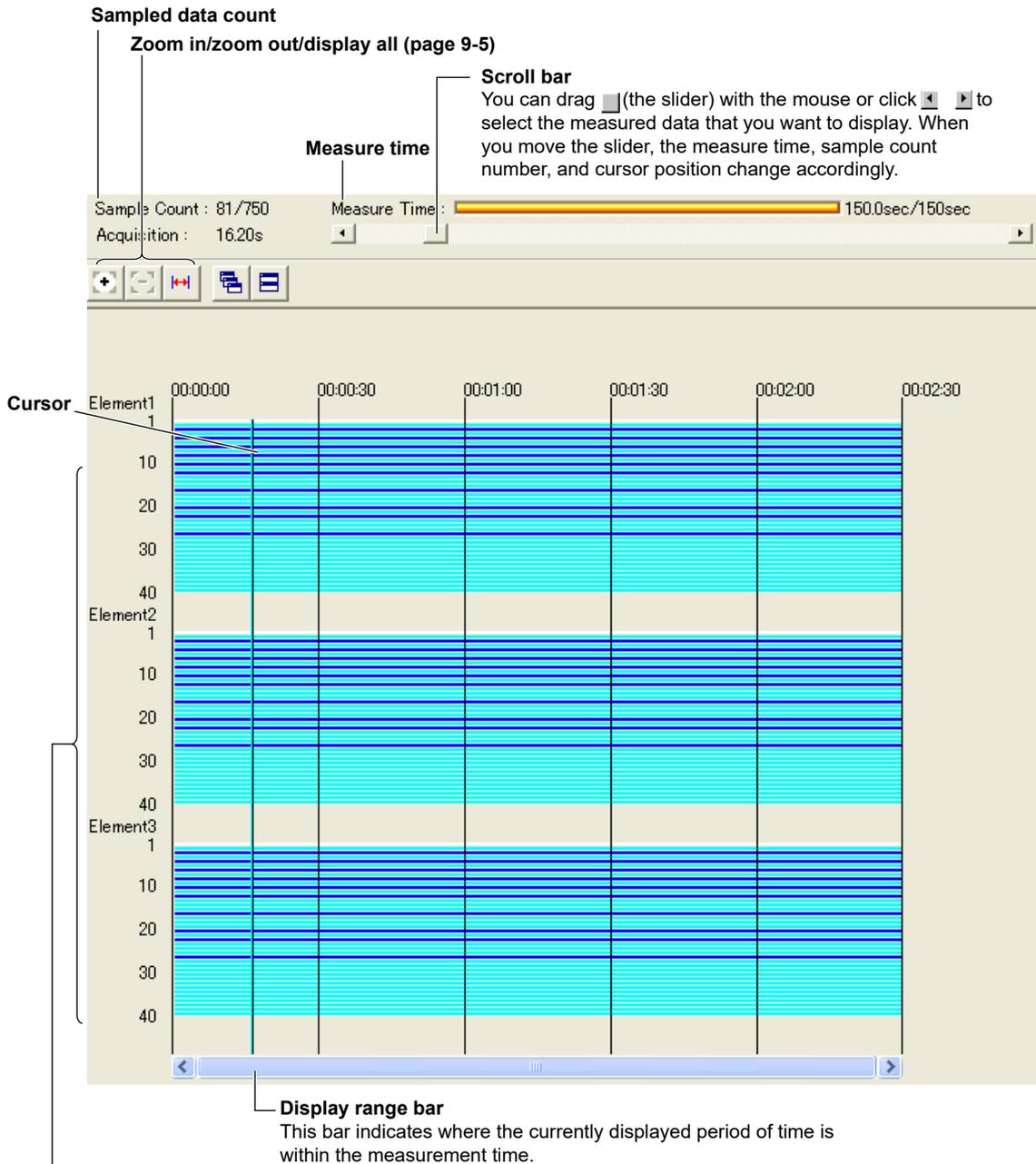
Notes when switching to the Measure window

While in the Analysis window, if you click the Measure icon and switch to the Measure window, the measured data will be discarded. Save the data if you do not want it to be discarded (see chapter 11 for information on how to save data).

9.1 Displaying a Graph of All Judgments

Displaying a Graph of All Judgments

2. Click **All Judgment**. A graph of all judgments appears.



Judgment graph

This graph shows the judgment results for all data within the measurement time. The judgments for each element are displayed in different colors, depending on the judgment results. The judgment results that are displayed here will change if you shift the displayed time range using the display range bar.

Explanation

The software displays a graph that shows whether each of the values for current harmonic that are measured within the specified measurement time are within their limits according to the settings described in section 7.3, "Setting the WT5000 Judgment Conditions."

The input elements that are measured vary depending on the Wiring Pattern setting (see chapter 7 for details). The software makes judgments for every input element that is set in the Wiring Pattern setting.

Evaluation Colors

The table below describes what the colors in the evaluation graph indicate. Condition 1, Condition 2, 200% short-term relaxation, and POHC relaxation conditions that appear in the table are defined below.

Condition 1

The maximum harmonic current over the measurement time is within 1.5 times the specified limit. Evaluation is made on each order.

Condition 2

The mean harmonic current over the measurement time is within the specified limit. Evaluation is made on each order.

200% Short-Term Relaxation Conditions

If all of the following conditions are met, up to 200% of the specified limits is permitted.

- The EUT belongs to Class A for harmonics.
- The excursion beyond 150 % of the applicable limits lasts less than 10 % of the test observation period or in total 10 min (within the test observation period), whichever is smaller.
- The average value of the harmonic current, taken over the entire test observation period, is less than 90 % of the applicable limits.

POHC Relaxation Condition

If the maximum value of the sum of partial odd harmonic currents (POHC) of order above and including 21 is less than the specified POHC limit, the mean of the odd harmonic currents of order above and including 21 is permitted to be 1.5 times the specified limit.

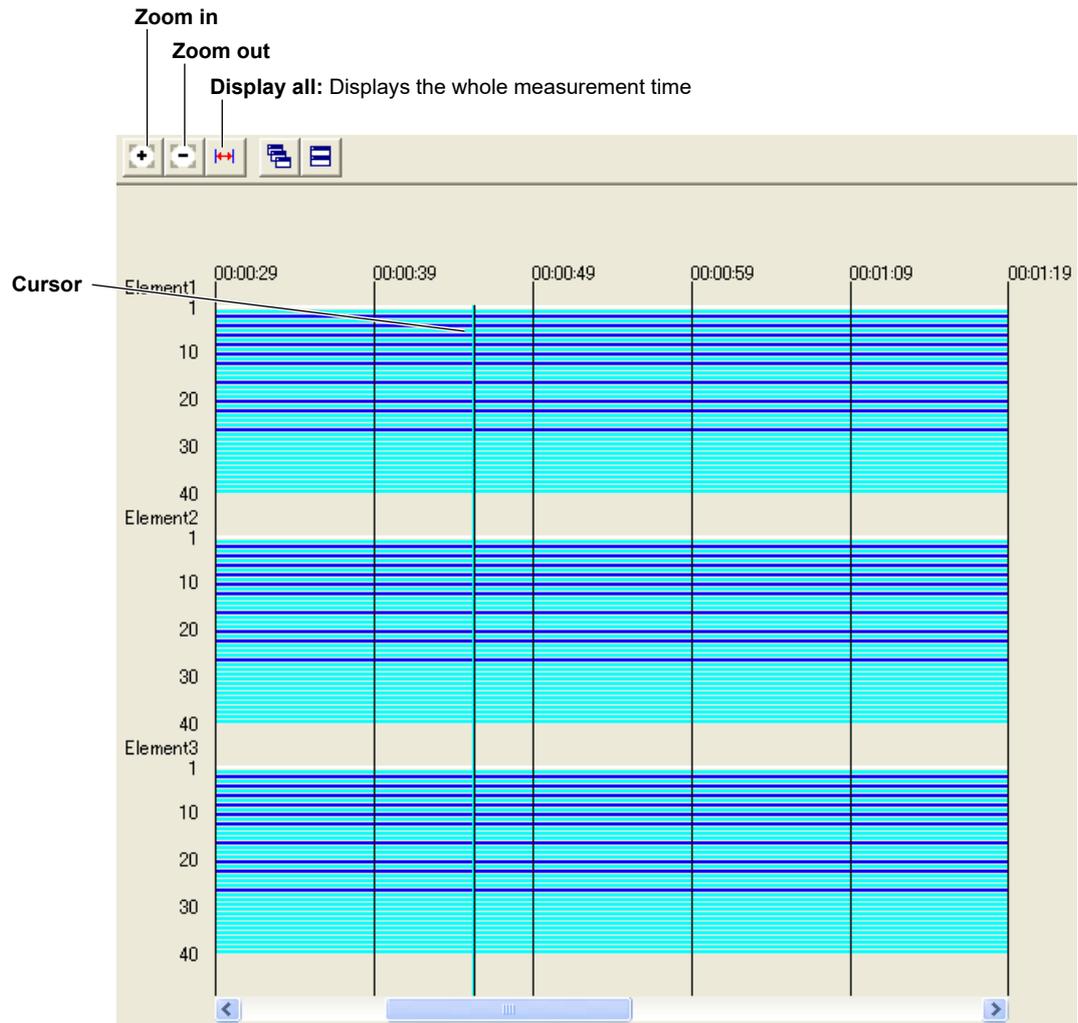
9.1 Displaying a Graph of All Judgments

 Blue	Both Conditions 1 and 2 are met
 White	A limit has not been specified.
 Bright green	<ul style="list-style-type: none">• Condition 1 is met.• Condition 2 is not met.• POHC Relaxation Condition is met.
 Yellow	<ul style="list-style-type: none">• Condition 1 is met.• Condition 2 is not met.• POHC Relaxation Condition is not met.
 Green	<ul style="list-style-type: none">• Condition 1 is not met.• Condition 2 is met.• The 200% short-term relaxation conditions are met.
 Orange	<ul style="list-style-type: none">• Condition 1 is not met.• Condition 2 is met.
 Pink	<ul style="list-style-type: none">• Condition 1 is not met.• Condition 2 is not met.• POHC Relaxation Condition is met.
 Red	None of the Condition 1, Condition 2, 200% short-term relaxation, or POHC relaxation conditions is met.
 Turquoise	The measured data is less than the larger of the two values, 0.6% of the mean rms current and 5 mA.
 Aqua	<ul style="list-style-type: none">• None of the Condition 1, Condition 2, 200% short-term relaxation, or POHC relaxation conditions is met.• Excluded from applying the limits because the maximum active power is less than the minimum power (75 W or 50 W) for applying the limits or set to Infinity.

* The names of the sample colors of Microsoft Word or Excel are used for the names of the colors.

If the evaluation of all the data points over the measurement time is blue, bright green, green, turquoise, or aqua, Judgment on the Overall Evaluation Graph window indicates PASS. If the evaluation of any data point is yellow, orange, pink, or red, Judgment indicates FAIL.

Zooming In and Out



The Zoom In and Zoom Out Icons

Each time you click one of the zoom icons, the software will zoom in or zoom out from the cursor. The zoom levels are:

- 25 s
- 50 s
- 100 s (1 min 40 s)
- 200 s (3 min 20 s)
- 400 s (6 min 40 s)
- 800 s (13 min 20 s)
- 1600 s (26 min 40 s)
- 3200 s (53 min 20 s)

⋮

The entire measurement time

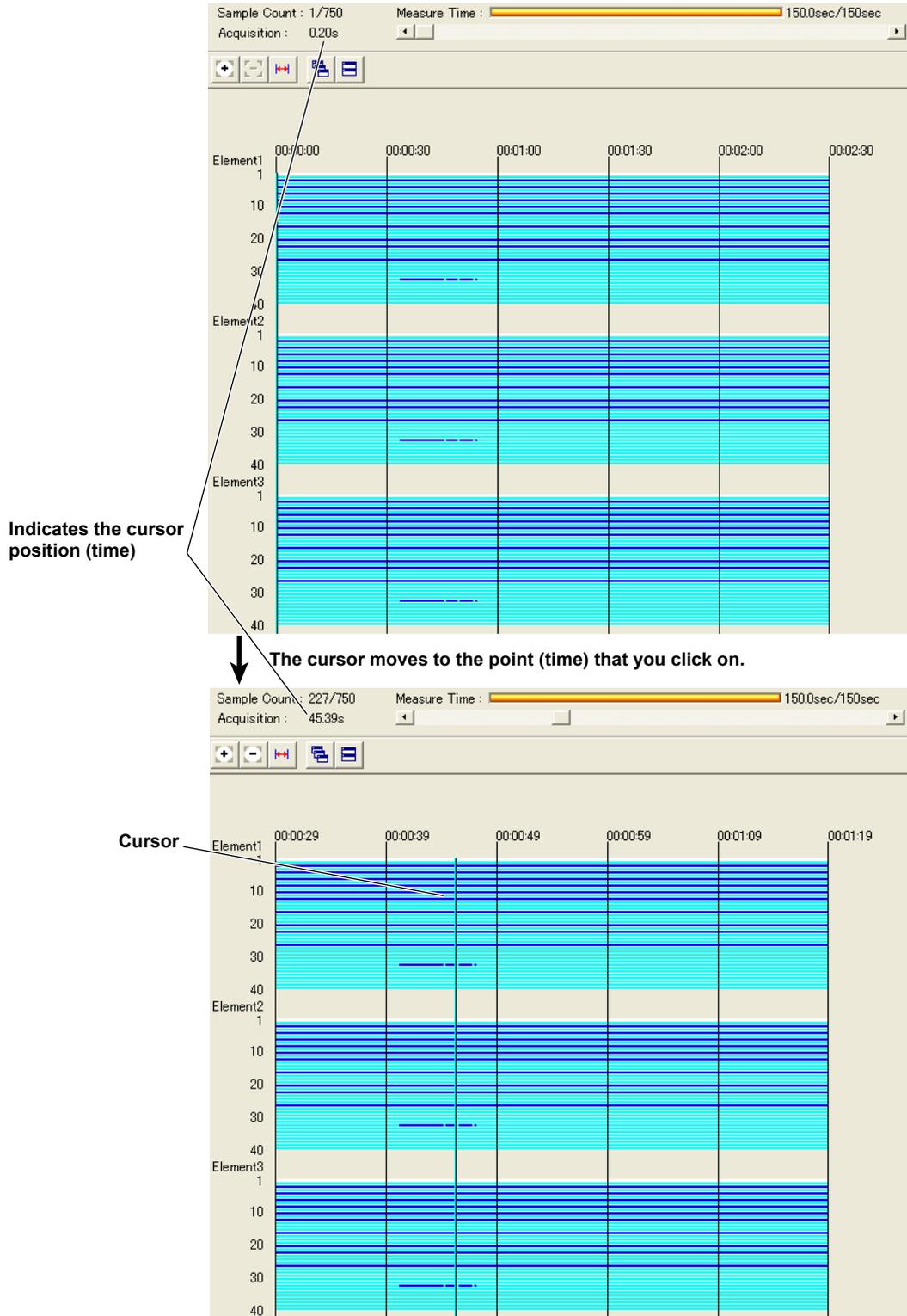
If a zoom out would cause the zoomed display to show more than 75% of the measurement time, the entire measurement time will be displayed. For example, if the measurement time is 1 h, the 3200 s (53 min 20 s) level will not be displayed because it would show 89% of the entire measurement time.

9.1 Displaying a Graph of All Judgments

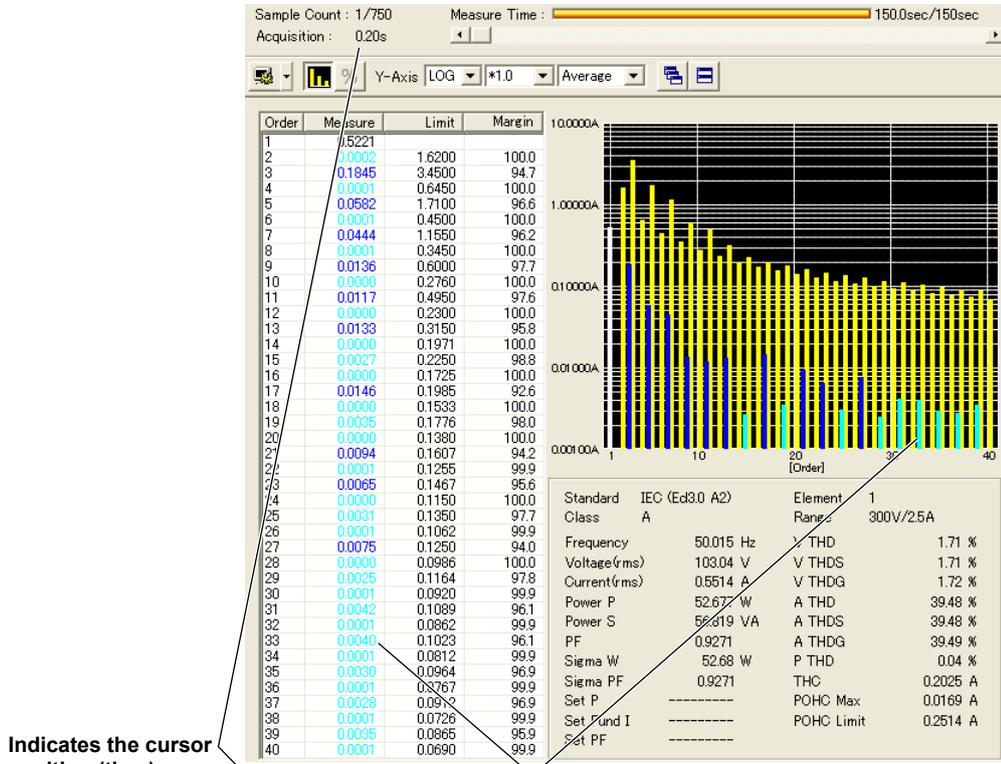
Using the Graph of All Judgments Effectively

You can select specific measured data that you want to examine more closely on the graph of all judgments to display bar graphs and lists of the measured data. The following example shows how to display an harmonic list and bar graph for element 1.

1. Use the mouse to click the appropriate area. The cursor will shift to the time position that you click.

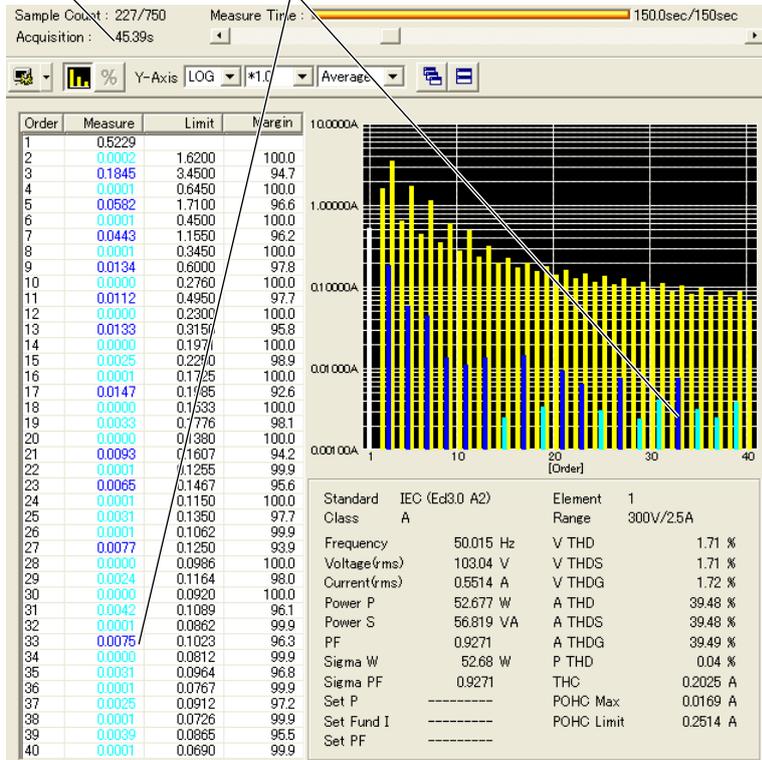


- In the submenu, select Harmonic Current List and Graph View, and then select Instant from the list in the setting and display area. A bar graph for the instantaneous values from the cursor position will appear. For detailed information about the bar graph display, see section 9.3.



Indicates the cursor position (time)

The level of the 33th harmonic order changes, and the judgment changes from turquoise to blue.



9.2 Displaying a List and Graph of Harmonic Current Values

Procedure

1. Select the  icon in the menu area. The Analysis submenu appears. For general information about the Analysis submenu, see section 9.1.

Displaying a List and Graph of Harmonic Current Values

2. Click **Harmonic Current List and Graph View**. A list and graph of harmonic current values appear.



Scroll bar
When displaying instantaneous values, you can drag  (the slider) with the mouse or click   to select the measured data that you want to display. When you move the slider, the measure time, sample count number, and displayed measured data (instantaneous values) change accordingly.

Toolbar

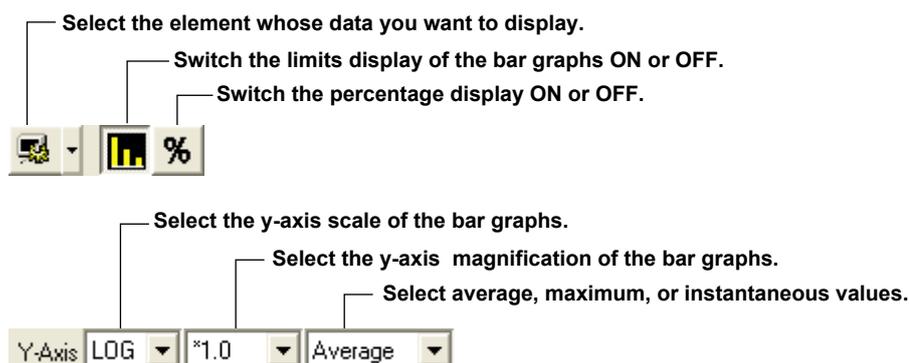
Numerical List

Order	Measure	Limit	Margin
1	0.5221		
2	0.0002	1.6200	100.0
3	0.1845	3.4500	94.7
4	0.0001	0.6450	100.0
5	0.0582	1.7100	96.6
6	0.0001	0.4500	100.0
7	0.0444	1.1550	96.2
8	0.0001	0.3450	100.0
9	0.0136	0.6000	97.7
10	0.0000	0.2760	100.0
11	0.0117	0.4950	97.6
12	0.0000	0.2300	100.0
13	0.0133	0.3150	95.8
14	0.0000	0.1971	100.0
15	0.0027	0.2250	98.8
16	0.0000	0.1725	100.0
17	0.0146	0.1985	92.6
18	0.0000	0.1533	100.0
19	0.0035	0.1776	98.0
20	0.0000	0.1380	100.0
21	0.0094	0.1607	94.2
22	0.0001	0.1255	99.9
23	0.0065	0.1467	95.6
24	0.0000	0.1150	100.0
25	0.0031	0.1350	97.7
26	0.0001	0.1062	99.9
27	0.0075	0.1250	94.0
28	0.0000	0.0986	100.0
29	0.0025	0.1164	97.9
30	0.0001	0.0920	99.9
31	0.0042	0.1089	96.1
32	0.0001	0.0862	99.9
33	0.0040	0.1023	96.1
34	0.0001	0.0812	99.9
35	0.0030	0.0964	96.9
36	0.0001	0.0767	99.9
37	0.0028	0.0912	96.9
38	0.0001	0.0726	99.9
39	0.0035	0.0865	95.9
40	0.0001	0.0690	99.9

Bar Graph

Standard IEC (Ed3.0 A2) Element 1
Class A Range 300V/2.5A
Frequency 50.015 Hz V THD 1.71 %
Voltage(rms) 103.04 V V THDS 1.71 %
Current(rms) 0.5514 A V THDG 1.72 %
Power P 52.677 W A THD 39.48 %
Power S 56.819 VA A THDS 39.48 %
PF 0.9271 A THDG 39.49 %
Sigma W 52.68 W P THD 0.04 %
Sigma PF 0.9271 THC 0.2025 A
Set P ----- POHC Max 0.0169 A
Set Fund I ----- POHC Limit 0.2514 A
Set PF -----

Measured value lists
For explanations of these terms, see section 1.5.

Toolbar**Selecting the Element Whose Data You Want to Display**

Click . If input elements 1 to 3 are being measured, as you click the icon, the displayed data will switch from element 1, to element 2, to element 3, to element 1, and so on. Click ▼ to select an element directly.

Switching the Limits Display of the Bar Graphs ON or OFF.

Click to select whether or not to display the limits in the bar graph. The limits are displayed using yellow bars. Limits are only applied to harmonic current values. There are no specified limits for voltages or phase angles. So limits for these values are not displayed.

Switching the Percentage Display ON or OFF.

Click to turn the percentage display ON and display the following items as percentages.

- **Numerical lists**
 - The relative harmonic data or content of each order
 - Limits
- **Bar graphs**
 - The Y-axis scale
- **Measured value lists**
 - THC
 - POHC
 - POHC maximum
 - POHC limit
- The percentage display is applied only to harmonic current.
- Percentage display is valid when the class is set to C in the test conditions and one of the following conditions is met:
 - You set the power class to "> 25W."
 - You set the power class to "<= 25W" and you set the limits to "judge with current wave pattern of 3rd&5th."
- On the Percentage Display, The relative harmonic content of current of each order can be displayed on bar graphs with the specified fundamental current (fundamental current specified in advance when making Class C evaluation, see section 7.3) taken to be 100%.

9.2 Displaying a List and Graph of Harmonic Current Values

- When limits are specified by the relative harmonic content of order 3 and 5 such as the limits for Class C equipment with active input power less than or equal to 25 W, bars corresponding to the magnitude of the values are displayed.
- When the magnification of the Y-axis scale is *1.0, the maximum scale of Y-axis is 100.00%.

Selecting the Y-Axis (Current Magnitude) Scale

- **Selecting the Type of Y-Axis Scale**

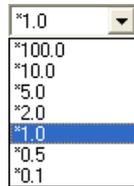
Select LIN (linear) or LOG (logarithmic).



- **Selecting the Magnification**

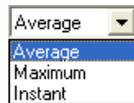
When the type of scale is LIN, select *100.0, *10.0, *5.0, *2.0, *1.0, *0.5, or *0.1.

When the type of scale is LOG, select *100.0, *10.0, *1.0, or *.1.



Selecting Average, Maximum, or Instantaneous Values

Select Average, Maximum, or Instant.



Explanation**List Display****Limit**

- The limits specified in the applicable standard are displayed in a list for each order.
- The limits are applied only to harmonic current.
- If the Percentage Display check box is selected, the relative harmonic content of the limit of each order can be displayed with the specified fundamental current (fundamental current specified in advance when making Class C evaluation, see section 7.3) taken to be 100%.
- When limits are specified by the relative harmonic content of order 3 and 5 such as the limits for Class C equipment with active input power less than or equal to 25 W, the current value converted from the relative harmonic content of order 3 and 5 with the fundamental current specified in advance (see section 7.3) taken to be 100% is displayed.

Margin

- Indicates the margin to the limit. For each order, the margin is derived from the following equation using the limits and measured values displayed in the list.

$$\frac{\text{Limit} - \text{measured value}}{\text{Limit}} \times 100$$

- The margin only applies to harmonic current values.
- The color of the values changes depending on whether or not you select “The margin degree is used” check box described in section 7.4.
 - When the Margin Degree Is Used
 - Blue indicates that a value has exceeded the margin that you specified according to the procedure in section 7.4.
 - Red indicates that a value is at or below the margin that you specified according to the procedure in section 7.4.
 - When the Margin Degree Is Not Used
 - Values are displayed in black.

Bar Graph Display

Average/Maximum/Instantaneous Value

The software displays bar graphs and lists in three ways depending on whether you select to display average, maximum, or instantaneous values. This section explains the differences between each display.

- **Average value display**

- Values and bars for each harmonic order
The software averages the measured data (instantaneous values) of each harmonic order that is acquired within the measurement time and displays those averages.
- Measured items that appear to the right of the list
The software averages the values acquired for each measured item within the measurement time and displays those averages.
- Limit values and bars
The software displays numbers and yellow bars that indicate the values of the limits.

- **Maximum value display**

- Values and bars for each harmonic order
The software finds and displays the maximum value from each harmonic order's measured values by comparing the instantaneous values that have been acquired within the measurement time.
- Items that appear to the right of the list
The software finds and displays the maximum value for each measured item by comparing the instantaneous values that have been acquired within the measurement time.
- Limit values and bars
The software displays numbers and yellow bars that are 1.5 times greater than the values of the limits.

- **Instantaneous value display**

- Values and bars for each harmonic order
The software displays the instantaneous values acquired within the measurement time for each harmonic order.
- Measured items that appear to the lower right of the list
The software displays the instantaneous values acquired within the measurement time.
- Limit values and bars
The software displays numbers and yellow bars that are 1.5 times greater than the values of the limits.
- Selecting values
Use the scroll bar to change the displayed instantaneous values.

Note

When the software is displaying average or maximum values, using the scroll bar will have no effect on the harmonic current list and graph displays.

Colors of the numerical lists and bar graphs of the current

The lengths for the bar graphs are determined by the size of the measured data that they represent. The meanings of bar colors are as follows:

	Blue	Limit not exceeded.
	Bright green (applies only to average list)	When the same conditions of bright green on page 9-4 applies.
	Green (applies only to maximum list and Instantaneous list)	When the same conditions of green on page 9-4 applies.
	Red	Exceeds the limit.
	Yellow (applies only to bar graph)	The limit specified by the standard.
	Black (applies only to numerical list)	No applicable limit is specified. (The measured value of the fundamental frequency and orders that are not applicable is displayed in black.)
	White	No applicable limit is specified. (The bar graph of the fundamental frequency and orders that are not applicable is displayed in white.)
	Turquoise	The measured data is less than the larger of the two values, 0.6% of the mean rms current and 5 mA.
	Aqua	<ul style="list-style-type: none"> • Limit exceeded. • Excluded from applying the limits because the maximum active power is less than the minimum power (75 W or 50 W) for applying the limits or set to Infinity.

* The names of the sample colors of Microsoft Word or Excel are used for the names of the colors.

Colors of the numerical lists and bar graphs of the voltage and phase angle

There are no voltage or phase angle limits. Bar graphs of harmonic voltage or phase angle are displayed in white. The values displayed in the list are black.

Measured Value Lists

For explanations of these terms, see section 1.5.

- **Sigma W**

Sigma W is the active power for all grouped phases (all measured input elements).

Note

- When applying the power ratio limit on Class C or D multi-phase equipment, the harmonic current per watt derived from the total active power (Sigma W) of all phases (three phases if three-phase) and the power ratio limit are compared and evaluated.
- Equipment whose Sigma W exceeds 600 W is considered Class A equipment under the standard. Use caution because the software makes evaluations using the class selected in standard and measurement environment settings (see section 7.3).

- **Set P, Set Fund I, and Set PF**

For Set P, the power value (see section 3.5) specified in advance is displayed when making Class C or D evaluations.

For Set Fund I and Set PF, the fundamental current and power factor values (see section 7.3) specified in advance are displayed respectively when making Class C evaluations.

Note

In section 7.1, if you selected the "Use Annex C" check box and selected "C16.2 (with VSD) Refrigerators and freezers," these items are displayed as follows:

- Set P: C16.2 Im (current of the appliance)
- Set Fund I: C16.2 Ur (rated voltage of the appliance)
- Set PF: C16.2 Pi (effective power of the appliance)

9.2 Displaying a List and Graph of Harmonic Current Values

Mutual Relationship of Graphs and Lists

When using the scroll bar to select the time of acquisition and displaying the measured data on a graph window or list window displaying a certain instantaneous value, the other graph window or list window also shows the measured data at the same time of acquisition.

9.3 Displaying a Harmonic Bar Graph

Procedure

1. Select the  icon in the menu area. The Analysis submenu appears. For general information about the Analysis submenu, see section 9.1.

Displaying a Harmonic Bar Graph

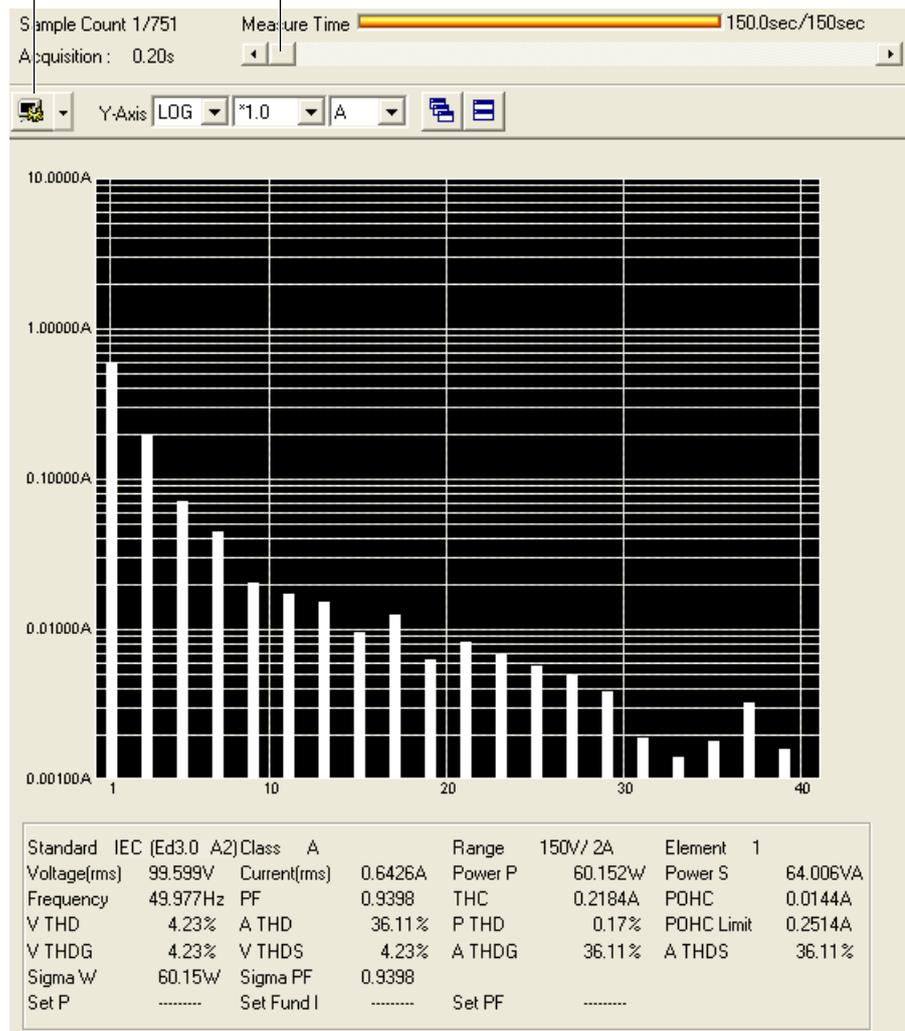
2. Click **Bar Graph of Harmonic**. A harmonic bar graph appears.



Select the element whose data you want to display.

Scroll bar

You can drag  (the slider) with the mouse or click   to select the measured data that you want to display. When you move the slider, the measure time, sample count number, and displayed measured data (instantaneous values) change accordingly.



9.3 Displaying a Harmonic Bar Graph

Changing the Y-Axis Scale (the Size of the Current Waveform)

- **Selecting the Type of Y-Axis Scaling**

Select **LIN** (linear) or **LOG** (logarithmic).



- **Selecting the Scale**

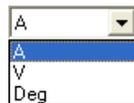
When the scaling type is LIN, you can select ***100.0**, ***10.0**, ***5.0**, ***2.0**, ***1.0**, ***0.5**, or ***0.1**.

When the scaling type is LOG, you can select ***100.0**, ***10.0**, ***1.0**, or ***0.1**.



Selecting the Measurement Function to Display

Select **A**, **V**, or **Deg** (for current, voltage, or phase angle).



Explanation

Bar Graph of Harmonic Current or Voltage

The software displays the instantaneous values acquired within the measurement time for each harmonic order.

Bar Graph of Harmonic Phase Angles

Bar graphs of the phase angle of the harmonic current with respect to the fundamental current for each order can be displayed. However, the phase angle with respect to the fundamental voltage is displayed on the bar graph for the fundamental current.

- When the harmonic phase is leading the fundamental current, a positive phase angle is indicated; when the harmonic phase is lagging the fundamental current, a negative phase angle is indicated.
- When the fundamental current is leading the fundamental voltage, a negative phase angle is indicated; when the fundamental current is lagging the fundamental voltage, a positive phase angle is indicated.

Bar Graph Display Color

The bar graph is displayed in white.

Note

This bar graph does not display limits.

Selecting Instantaneous Values

Use the scroll bar to change the displayed instantaneous values.

9.4 Displaying a List of Measured Harmonic Values

Procedure

1. Select the  icon in the menu area. The Analysis submenu appears. For general information about the Analysis submenu, see section 9.1.

Displaying a List of Measured Harmonic Values

2. Click **List of Harmonic**. A list of measured harmonic (instantaneous) values appears.



Select the element whose data you want to display.

Scroll bar

You can drag  (the slider) with the mouse or click   to select the measured data that you want to display. When you move the slider, the measure time, sample count number, and displayed measured data (instantaneous values) change accordingly.

Sample Count 1/751 Measure Time  150.0sec/150sec
 Acquisition: 0.20s  

Order	Voltage	Current	Phase
1	99.5103	0.6044	- 3.2338
2	0.0097	0.0002	- 47.7778
3	1.1672	0.1978	172.1774
4	0.0078	0.0001	98.1320
5	3.5916	0.0718	-172.5704
6	0.0074	0.0001	152.8828
7	1.2732	0.0444	14.7376
8	0.0062	0.0001	-69.8724
9	0.3505	0.0201	- 35.7702
10	0.0057	0.0001	10.8410
11	1.0343	0.0172	-128.1912
12	0.0063	0.0001	-174.5042
13	0.2227	0.0153	90.4600
14	0.0114	0.0001	-98.1076
15	0.1404	0.0096	58.6028
16	0.0106	0.0001	6.4659
17	0.5255	0.0125	- 84.4614
18	0.0075	0.0001	66.2833
19	0.4109	0.0062	-145.9786
20	0.0069	0.0001	176.6561
21	0.0651	0.0081	118.2499
22	0.0065	0.0001	- 87.3873
23	0.0252	0.0068	15.1334
24	0.0065	0.0001	116.4332
25	0.1070	0.0058	- 20.3889
26	0.0056	0.0001	154.9531
27	0.1641	0.0049	-165.1704
28	0.0060	0.0002	- 7.3691
29	0.0802	0.0038	-169.4965
30	0.0052	0.0001	5.7312
31	0.0893	0.0019	45.7083
32	0.0046	0.0002	-166.0961
33	0.0355	0.0014	99.5781
34	0.0061	0.0002	132.2832
35	0.0840	0.0018	- 62.4868
36	0.0051	0.0002	21.6218
37	0.0512	0.0033	- 19.6206
38	0.0042	0.0002	- 45.1142
39	0.0674	0.0016	127.7705
40	0.0043	0.0001	-147.7231

Element	1
Standard	IEC (Ed3.0 A2)
Class	A
Range	150V/ 2A
Frequency	49.977 Hz
Voltage(rms)	99.599 V
Current(rms)	0.6426 A
Power P	60.152 W
Power S	64.006 VA
PF	0.9398
V THD	4.23 %
V THDS	4.23 %
V THDG	4.23 %
A THD	36.11 %
A THDS	36.11 %
A THDG	36.11 %
P THD	0.17 %
THC	0.2184 A
POHC	0.0144 A
POHC Limit	0.2514 A
Sigma W	60.15 W
Sigma PF	0.9398
Set P	-----
Set Fund I	-----
Set PF	-----

9.5 Displaying a Trend Graph

Procedure

1. Select the  icon in the menu area. The Analysis submenu appears. For general information about the Analysis submenu, see section 9.1.

Displaying a Trend Graph

2. Click **Trend Graph View**. A trend graph appears.



Configuring a Trend Graph

Auto range

- **When the auto range button is pressed**
The range changes automatically to match the loaded data.
- **When the auto range button is not pressed**
When you click the Upper or Lower column headings, a combo box appears that allows you to set the display range upper and lower limits for each trace.

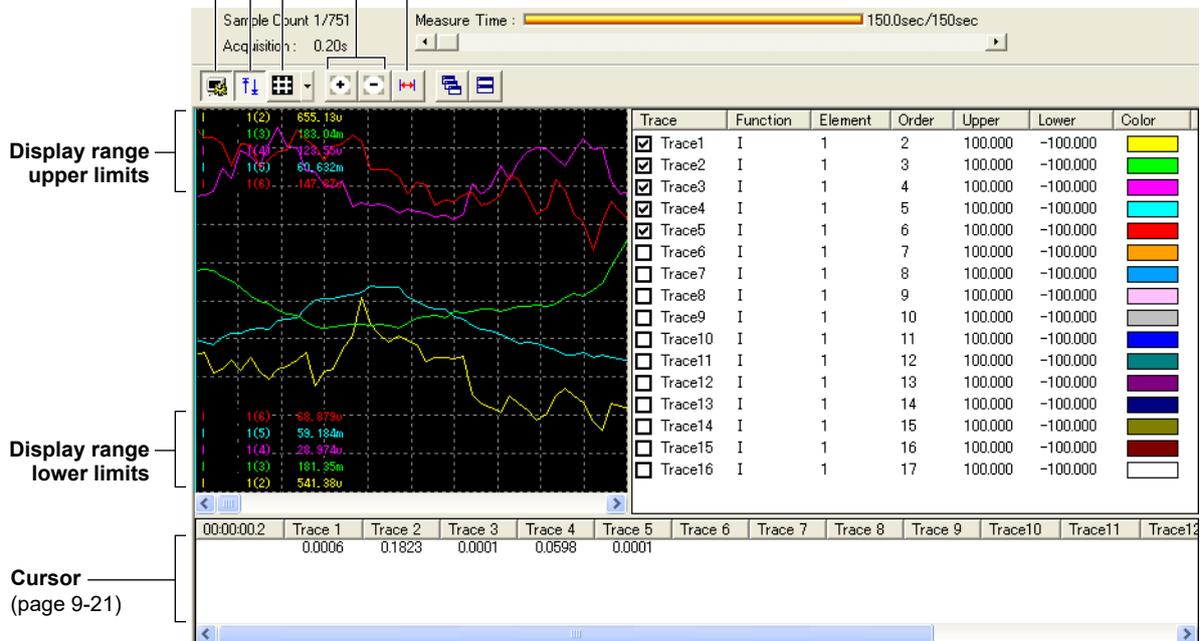
Grid

- You can select the type of grid that will be displayed in the trend display area from Dotted, Line, and None.
- Dotted: A grid with dotted lines is displayed.
 - Line: A grid with solid lines is displayed.
 - None: No grid is displayed.

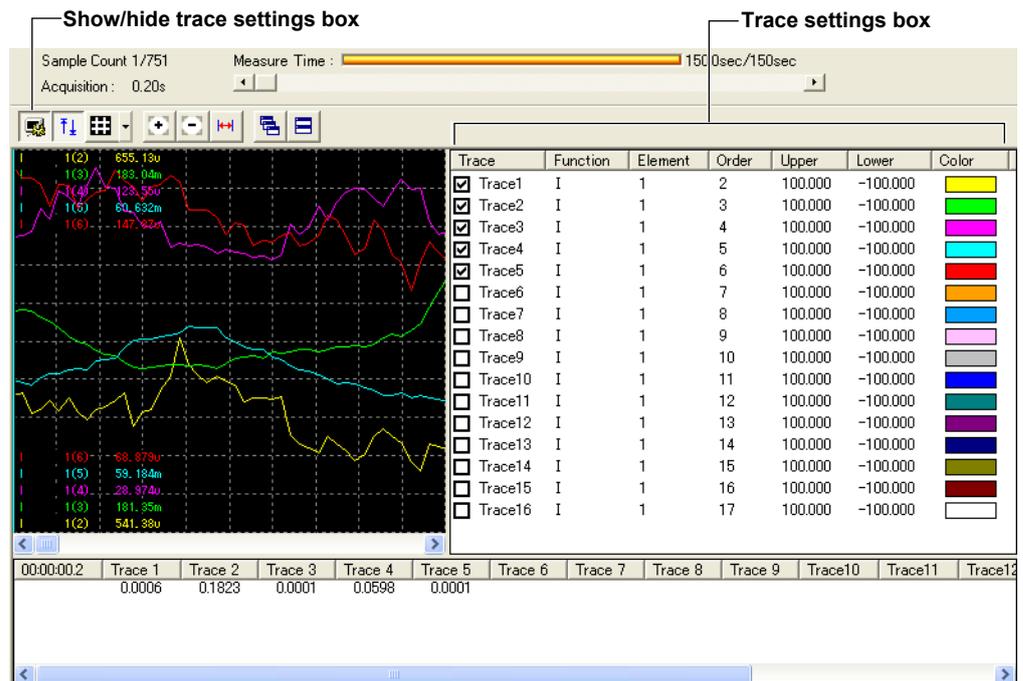
Show/hide trace settings box (page 9-19)

Zoom in/zoom out (see page 9-21)

Display all: Displays the whole measurement time



Configuring Traces



Trace

Select the trends you want to display (select or clear the check boxes).

Function

Select the measurement function to be displayed.

1. Click the **Function** column. A combo box opens.
2. Select the measurement function.

Note

You can select from the following measurement functions.

- U Voltage
- I Current
- P Power
- S Apparent power
- SigmaW Active power of all phases
- SigmaPF Power factor of all phases
- Freq Fundamental frequency of the PLL source
- LAMBDA Power factor
- POHC Sum of odd harmonic currents of order above and including 21
- THC Total harmonic current
- PHI Phase angle

Element

Select the element to be displayed.

1. Click the **Element** column. A combo box opens.
2. Select the element.

9.5 Displaying Trend Graphs

Order

Select the harmonic order that you want to display.

1. Click the **Order** column heading. A dialog box appears.
2. Select the harmonic order you want to display.

Upper and 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 edit box opens.
2. Set the upper or lower limit value of the display range.

Color

Select the display color of the trend.

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

Zooming In and Zooming Out

Zoom in

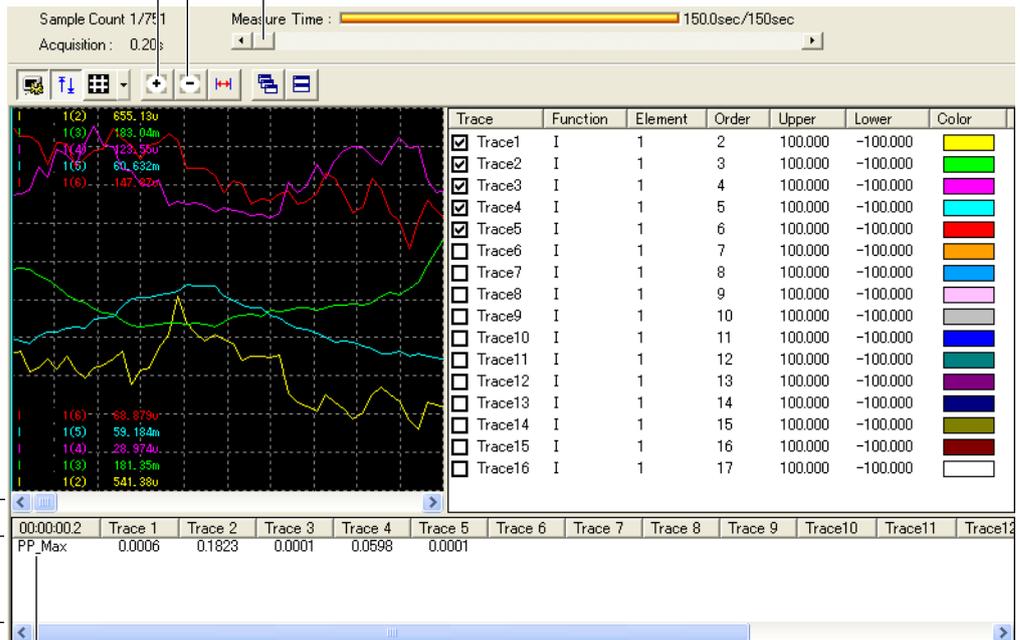
Click to zoom in. You can zoom in until the trend display area contains 2 s worth of data.

Zoom out

Click to zoom out. You can zoom out until the trend display area contains the data for all of the elapsed time.

Scroll bar

You can drag  (the slider) with the mouse or click   to select the measured data that you want to display.



PP_Max

In the trend display, if not all the measured values can be displayed because the specified time axis value is set too high, measured values are P-P compressed and displayed.*

When this occurs, PP_Max is displayed here. To display values without P-P compression, zoom in on the time axis.

* P-P Compression (Peak-to-Peak Compression)

In P-P compression, a maximum and minimum value are extracted from the values measured over a given period of time and are used to produce a compressed measured value. For details, see the WT5000 Features Guide, IM WT5000-01EN.

Cursor

When you click somewhere on the trend display area, a cursor will appear there. You can move the cursor by dragging it.

Slider

Move along the time axis to the waveform that you want to display.

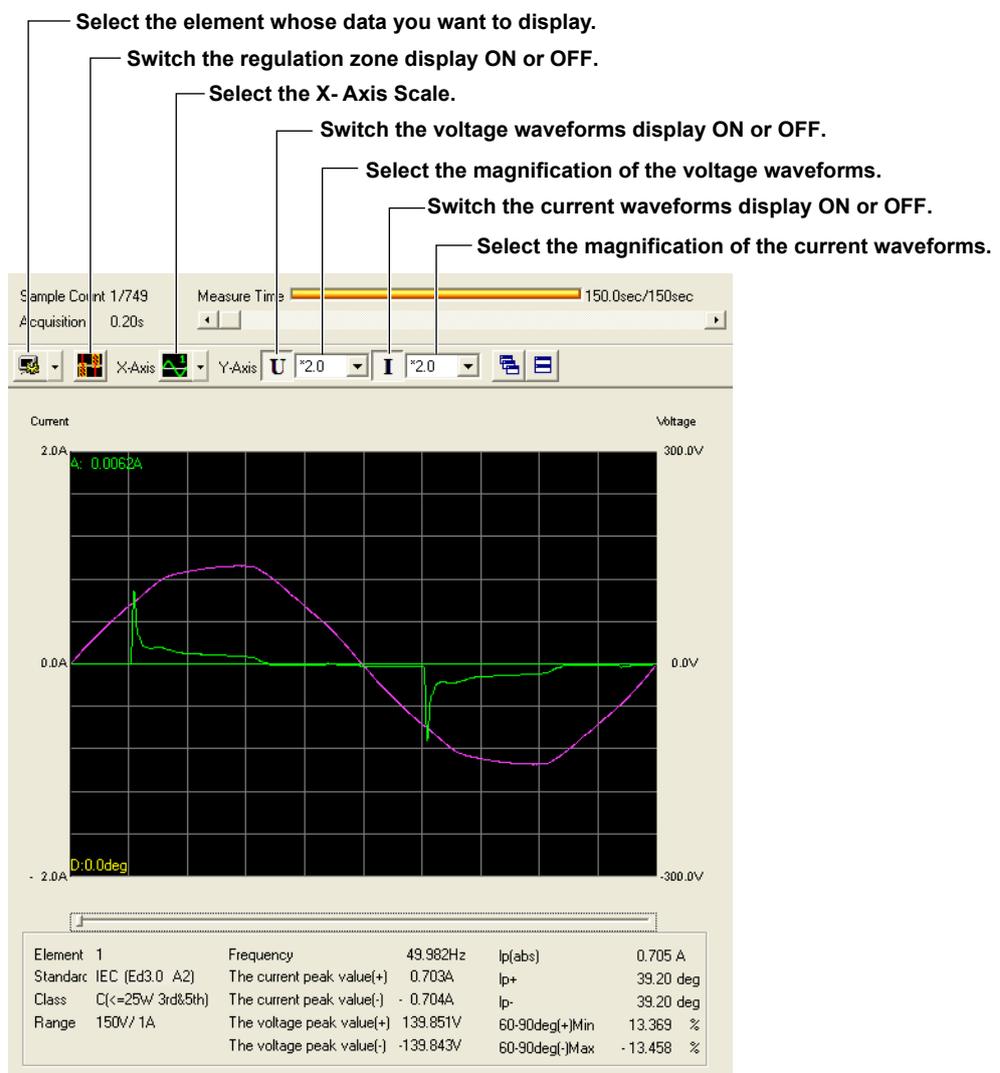
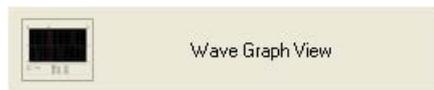
9.6 Displaying a Waveform Graph

Procedure

1. Select the  icon in the menu area. The Analysis submenu appears. For general information about the Analysis submenu, see section 9.1.

Displaying a Waveform Graph

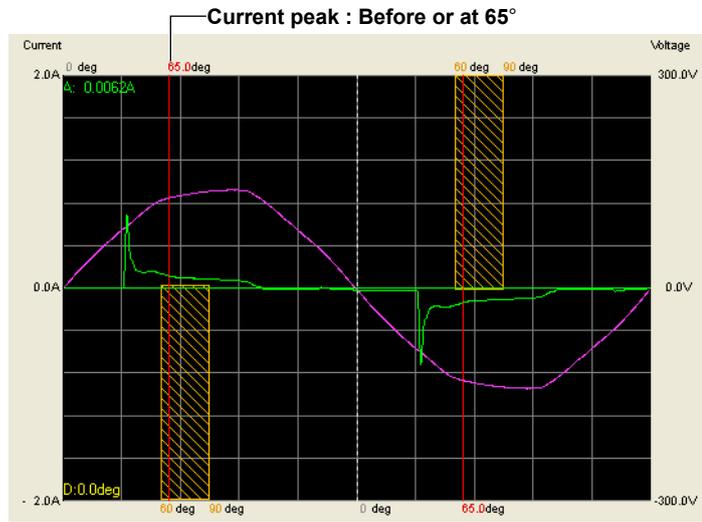
2. Click **Wave Graph View**. A waveform graph appears.



Measured values for wave judgment

Switching the Regulation Zone Display ON or OFF.

Click . You can select whether to display the wave judgment regulation zones. There are the following two regulation zones.



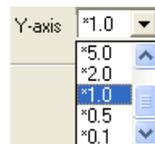
Beginning of the current flow to the end of the current flow: 5% between 60° to 90°

Switching the Limits Display of the Bar Graphs ON or OFF.

Click . Select **ALL**, **Cycle**, **Half Cycle+**, or **Half Cycle-**. The button indication changes depending on the current setting.

Changing the Y-Axis Scale (the Size of the Voltage and Current Waveforms)

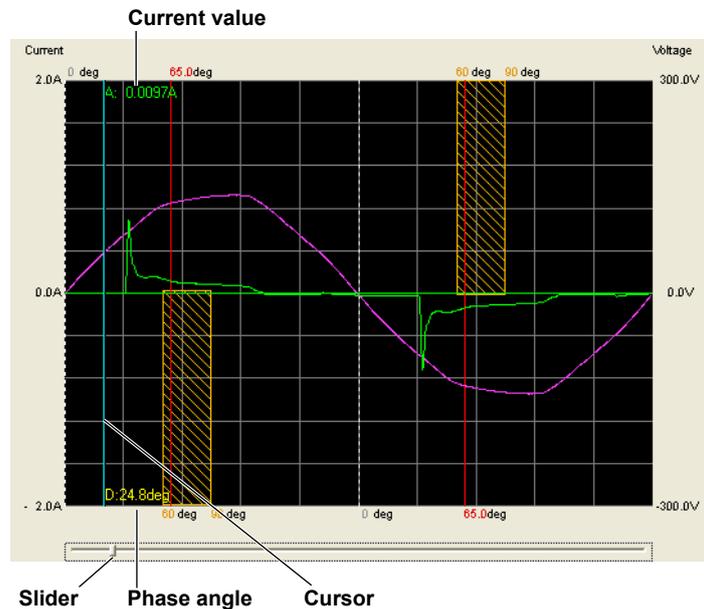
Select *100.0, *10.0, *50, *2.0, *1.0, *0.5, or *0.1.



9.6 Displaying a Waveform Graph

Using the Cursor to Display Current and Phase Angle Values

When you click an area of the waveform, a cursor will appear there. The current and phase angle values at the cursor position will be displayed.



Explanation

The waveform data is acquired immediately after the measurement for a compliance test is finished. The software acquires and displays a waveform graph of about two periods using 8000 points of current and voltage waveform data. You can display waveform graphs for each WT input element. This waveform data is different than the waveform data that is displayed in the waveform preview.

Note

Using the scroll bar will have no effect on the waveform graph display.

Switching the Regulation Zone Display ON or OFF

You can show or hide the regulation zone display when you set the following judgment conditions (see section 7.3).

- Class C
- The Active Power Is Less Than or Equal to 25 W (≤ 25 W)
- Evaluating on the Conditions of Harmonic Order 3 and 5

Numeric Value Displays below the Graph

- Frequency
The average value of all frequencies (frequency of the fundamental signal of the PLL source) within the measurement time.
- Current Peak (+)
Maximum positive value of the current waveform displayed.
- Current Peak (-)
Maximum negative value of the current waveform displayed.
- Voltage Peak (+)
Maximum positive value of the voltage waveform displayed.
- Voltage Peak (-)
Maximum negative value of the voltage waveform displayed.

Measured Values for Wave Judgment

This appears when you set the following judgment conditions (see section 7.3).

- Class C
- The Active Power Is Less Than or Equal to 25 W (≤ 25 W)
- Evaluating on the Conditions of Harmonic Order 3 and 5

The displayed contents are shown below. For details on wave judgment, see section 1.3.

- $I_p(\text{abs})$: The higher absolute value of the peak value of the current waveform (+) and (-)
- I_{p+} : Phase angle of the peak value of the current waveform (+)
- I_{p-} : Phase angle of the peak value of the current waveform (-)
- 60-90deg(+)Min: Minimum current between 60° to 90° in the positive half cycle
- 60-90deg(-)Max: Maximum current between 60° to 90° in the negative half cycle

Colors of measured values

- I_{p+} and I_{p-} are displayed in red when the “wave peak phase” set in section 7.3 is exceeded.
- 60-90deg(+)Min is displayed in red when it is less than or equal to the “current threshold” set in section 7.3.
- 60-90deg(-)Max is displayed in red when it is greater than or equal to the “current threshold” set in section 7.3.

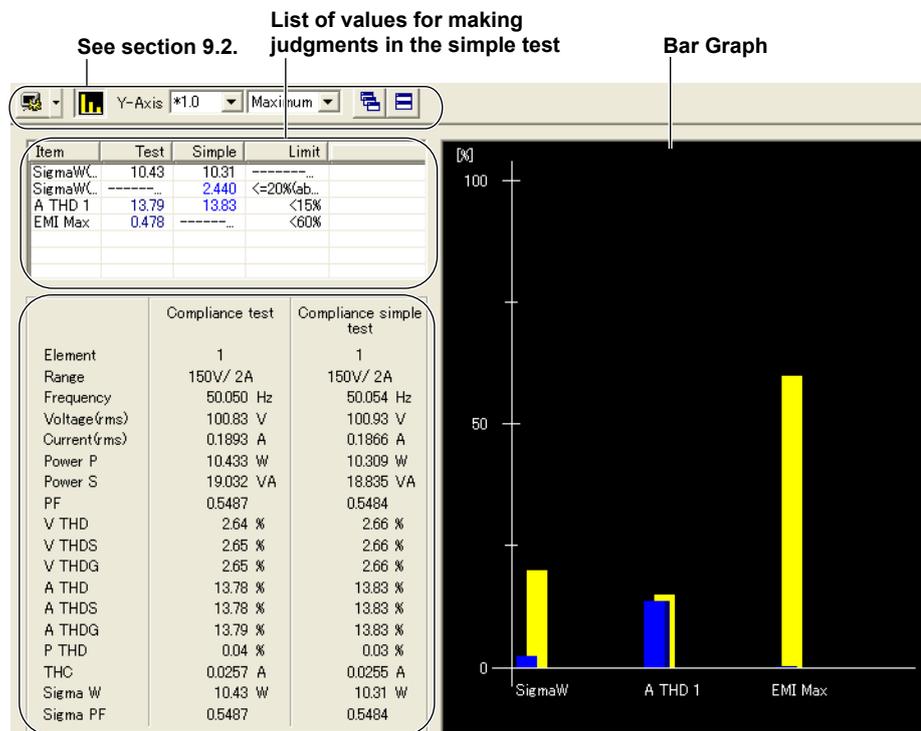
9.7 Displaying the Results of Simple Compliance Tests

Procedure

1. Select the  icon in the menu area. The Analysis submenu appears. For general information about the Analysis submenu, see section 9.1.

Displaying the Results of Simple Compliance Tests

2. Click **Simple Test**. The results of simple compliance tests appears.



Measured value lists

For explanations of these terms, see section 1.5.

Explanation

List of Values for Making Judgments in the Simple Test

The list consists of the following items.

- Test : Measured data of the compliance test that has been specified as the test reference for the simple test
- Simple : Measured values of the simple test
- SigmaW(W)
Maximum measured active power
- SigmaW(%)
Magnitude of the active power of the simple test in reference to the active power of the compliance test

$$\left(\frac{\text{Maximum SigmaW of the simple test}}{\text{Maximum SigmaW of the compliance test}} - 1 \right) \times 100$$
- A THD
Measured current THD at the point where SigmaW(W) is at its maximum value (the number of displayed elements varies depending on the wiring pattern)
- EMI Max
Magnitude of the measured harmonic current in the compliance test compared to the harmonic current limit
100 - the minimum margin degree (%)

The value colors are as follows:

- A THD and EMI Max of the compliance test
Deep blue (the conditions for executing simple tests are met)
- SigmaW(%) of the simple test
Blue if the value is within the limit and red if the value exceeds the limit
- A THD of the simple test
Blue if the value is less than the limit and red if the value is greater than or equal to the limit

Bar Graphs

The listed judgment values of the simple test are displayed in a bar graph. The bar colors are the same as the colors of the values described above. The limit is displayed in yellow.

Displaying Other Analysis Results

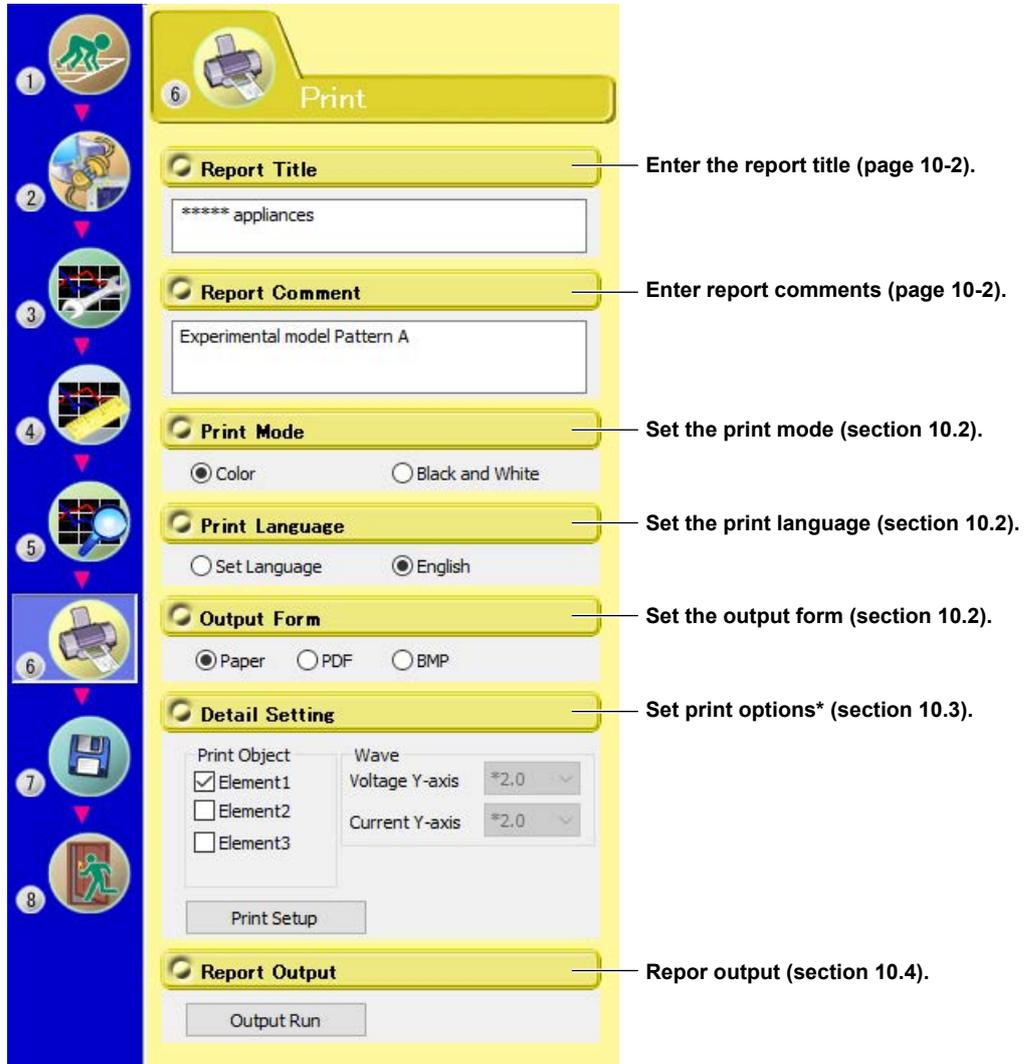
When you execute a simple compliance test, the following buttons become available in addition to the simple test button. The analysis results that appear when you click these buttons are the measured data of the simple compliance test. The data is not the measured data of the compliance test that has been specified as the test reference for the simple test.



10.1 Setting a Report's Title and Comments

Procedure

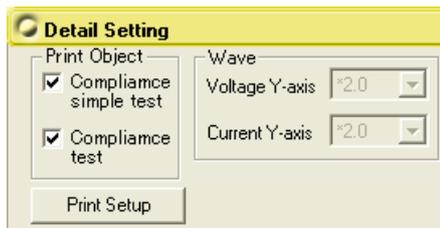
1. Select the  icon in the menu area. The Print submenu appears.



The screenshot shows the 'Print' submenu with the following sections and callouts:

- 1** (Printer icon): Select the printer icon in the menu area.
- 2** (Report Title): Enter the report title (page 10-2). The text field contains "***** appliances".
- 3** (Report Comment): Enter report comments (page 10-2). The text field contains "Experimental model Pattern A".
- 4** (Print Mode): Set the print mode (section 10.2). Options: Color, Black and White.
- 5** (Print Language): Set the print language (section 10.2). Options: Set Language, English.
- 6** (Output Form): Set the output form (section 10.2). Options: Paper, PDF, BMP.
- 7** (Detail Setting): Set print options* (section 10.3). Includes checkboxes for Element1, Element2, Element3 and dropdowns for Voltage Y-axis and Current Y-axis (both set to *2.0).
- 8** (Report Output): Repor output (section 10.4). Includes an "Output Run" button.

* The following appears if you have selected Simple Test Measurement in the test schedule menu described in section 4.1.



The 'Detail Setting' dialog box shows the following configuration:

- Print Object:**
 - Compliance simple test
 - Compliance test
- Wave:**
 - Voltage Y-axis: *2.0
 - Current Y-axis: *2.0
- Buttons:** Print Setup

10.1 Setting a Report's Title and Comments

Switches pages
Click the page you want to display the print preview of.

Print
Zooms the print preview in or out

Print preview

The screenshot shows the 'Print' dialog box on the left and a 'Print preview' window on the right. The dialog box includes the following sections:

- Report Title:** A text box containing '**** appliances'.
- Report Comment:** A text box containing 'Experimental model Pattern A'.
- Print Mode:** Radio buttons for 'Color' (selected) and 'Black and White'.
- Print Language:** Radio buttons for 'Set Language' and 'English' (selected).
- Output Form:** Radio buttons for 'Paper' (selected), 'PDF', and 'BMP'.
- Detail Setting:** A 'Print Object' section with a checked box for 'Element1' and dropdown menus for 'Voltage Y-axis' and 'Current Y-axis', both set to '*2.0'. There are 'Print Setup' and 'Output Run' buttons at the bottom.

The 'Print preview' window displays a report titled '**** appliances(Average)'. It includes a table of parameters and a bar chart. The table lists various electrical parameters such as Current, Voltage, Power, and Power Loss. The bar chart shows the results of the simulation, with a legend indicating 'In' (blue), 'Out' (red), and 'Power Loss' (green).

2. Enter the report title and the report comments in their respective boxes.

Report Title

**** appliances

Report Comment

Experimental model Pattern A

Explanation

You can create reports using the data measured with the software.

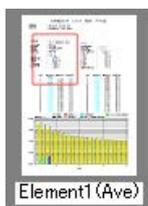
Switching the Page to Display a Print Preview Of

The following pages can be displayed in the print preview.

- Compliance simple test (Simple)
This appears if you have selected Simple Test Measurement in the test schedule menu described in section 4.1.
- Compliance test
 - Elements data (Element)
 - Average data (Ave), Maximum data (Max)
- Waveform data (Wave)
To display waveforms in the print preview and print them, select the "Add a waveform graph" check box under "Report" in the Option tab described in section 7.4.

Print Preview Display Range

If the print preview is being zoomed in on, the displayed area is indicated with a red frame.

**Moving the Print Preview Display Range**

Drag the red frame (which indicates the display range) to move the display range.

Setting the Title and Comment of Reports

As necessary, you can set the title and comment of a report.

- **Number of Characters That Can Be Entered**

See the table below.

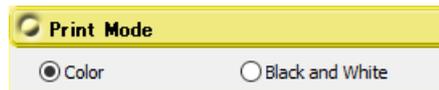
Item	Number of Characters That Can Be Entered
Title	Up to 40 characters can be entered.
Comment	Up to 1000 characters can be entered.
	Up to 90 characters can be displayed on one line.
	Up to 6 lines can be displayed.

10.2 Setting the Print Mode, Print Language and Output Form

Procedure

Selecting the Print Mode

1. Select Color or Black and White under Print Mode. When you change the print mode, the print preview in the setting and display area will change accordingly.



The screenshot shows a yellow header bar with the text "Print Mode". Below the header, there are two radio button options: "Color" (which is selected) and "Black and White".

Selecting a Print Language

2. Select English or Set Language under Print Language. When you change the print language, the print preview in the setting and display area will change accordingly.



The screenshot shows a yellow header bar with the text "Print Language". Below the header, there are two radio button options: "Set Language" and "English" (which is selected).

Selecting a Output Form

3. Select Paper, PDF or BMP under Output Form.



The screenshot shows a yellow header bar with the text "Output Form". Below the header, there are three radio button options: "Paper" (which is selected), "PDF", and "BMP".

Selecting the BMP Resolution

4. On the Option tab in the setting and display area of section 7.4, if you selected the "Setting display of BMP resolution" check box, select the BMP resolution.



The screenshot shows a yellow header bar with the text "Output Form". Below the header, there are three radio button options: "Paper", "PDF", and "BMP" (which is selected). To the right of the "BMP" option is a dropdown menu with "Low" selected.

Explanation

Selecting the BMP Resolution

You can select the resolution from the following:

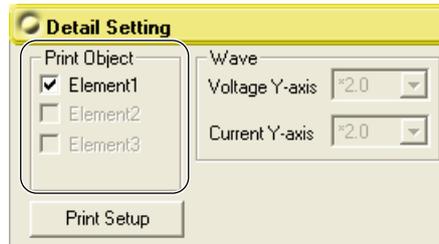
- Lowest: Approx. 2MB, 768 × 1024
- Low: Approx. 9MB, 1536 × 2048
- High: Approx. 36MB, 3072 × 4096
- Highest: Approx. 147MB, 6144 × 8192

10.3 Setting Print Details (Detail Setting)

Procedure

Selecting the Elements Whose Data You Want to Print

1. In the Print Object box, select the elements whose data you want to print.



Selecting Whether or Not to Use the Margin Degree in Judgment

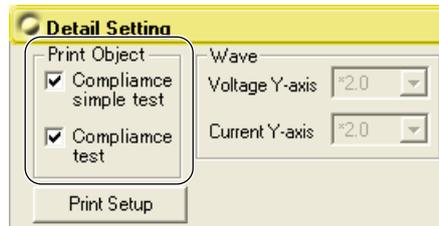
2. To print judgments that use the margin degree, select "The margin degree is used" check box under "Margin Degree" in the Option tab described in section 7.4.

Selecting Whether or Not to Print Waveforms

3. To print waveforms, select the "Add a waveform graph" check box under "Report" in the Option tab described in section 7.4.

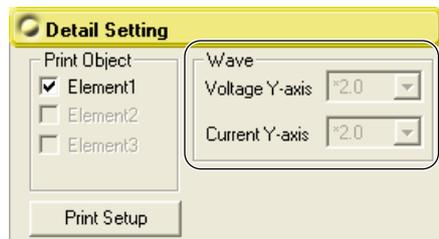
Selecting the Type of Measured Data to Print

4. When you have selected Simple Test Measurement in the test schedule menu described in section 4.1 and have executed a simple compliance test, select the type of data to print.



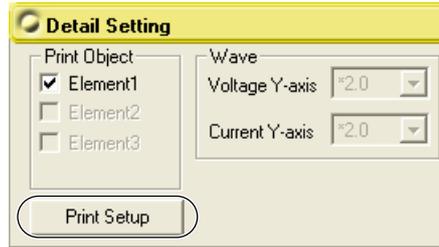
Changing the Y-Axis Scale (the Size of the Voltage and Current Waveforms)

5. Select *100.0, *10.0, *50, *2.0, *1.0, *0.5, or *0.1.

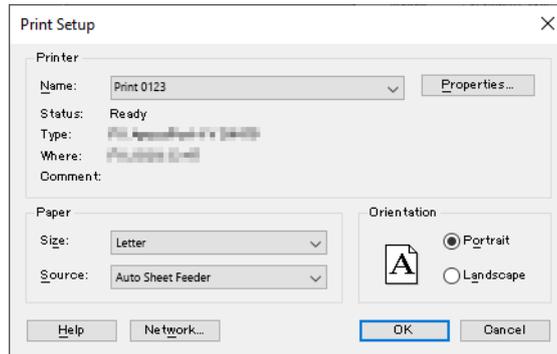


Setting Up the Printer

- 6. Choose **Print Setup**. The Print Setup dialog box opens.



- 7. Enter appropriate settings for **Printer**, **Size**, **Source**, and **Orientation**.
- 8. Click **OK**.



Explanation

Selecting the Elements Whose Data You Want to Print

The elements that you can select are determined by the options that you select for Wiring and Object in section 7.2.

Margin Degree Judgments

If you select “The margin degree is used” check box under “Margin Degree” in the Option tab described in section 7.4, the judgments based on the margin values for each harmonic will be printed in red and blue (for information about what each color means, see section 9.2).

Type of Measured Data to Print

- Compliance simple test: Measured data of the simple test
- Compliance test: Measured data of the compliance test that has been specified as the test reference for the simple test.

Selecting the Magnification of the Waveform's Y-axis (Voltage or Current Amplitude) Scale

If you select the “Add a waveform graph” check box under “Report” in the Option tab described in section 7.4, you can select the magnification of the Y-axis (voltage or current amplitude) scale of the waveform graph in reports.

Print Setup

Make printer settings according to your system environment.

10.4 Printing

Procedure

Printing a Report

You can print a report when measured data has been acquired or has been loaded from memory.

1. Click **Output Run**.
 - If Paper has been selected, proceed to step 2.
 - If PDF or BMP has been selected, proceed to step 3.



2. Enter appropriate settings for **Printer, Range, Copies**, etc. Click **OK**. The report is printed.
3. Set the **location** and **file name** to save to. Click **Save**. The report is saved in the specified output format (PDF or BMP).

Printing a Report Using the Print Button

1. Click the  button. A Print dialog box appears.
2. Enter appropriate settings for **Printer, Range, Copies**, etc. Click **OK**. The report is printed.

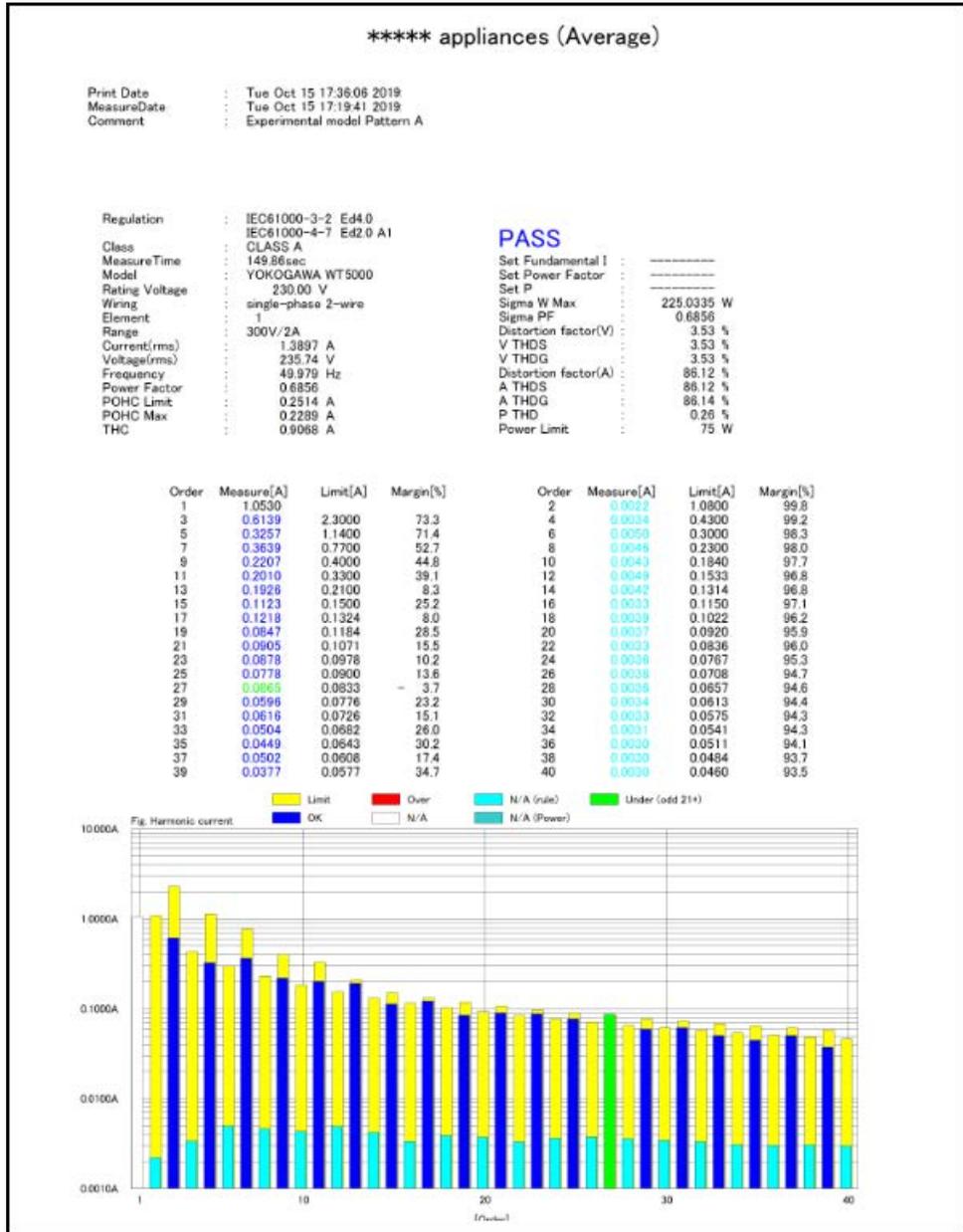
Explanation

Set the printer according to the environment of the system that you are using.

Printing Reports

You can print a report when the measured data has been retrieved (or loaded).
 You can print a report for each input element (see section 10.3).

Print example of a report



11.1 Saving Setting Information and Measured Data

Procedure

1. Select the  icon in the menu area. The Save submenu appears.



The screenshot shows a vertical menu on the left with icons numbered 1 through 8. Step 7 is highlighted, showing a 'Save' submenu. The submenu has two sections: 'Save Method' and 'Save Information'. 'Save Method' has three radio button options: 'Save Measured Data to File' (selected), 'Save Measurement Setting to File', and 'Save Measured CSV Data'. 'Save Information' has text input fields for 'Report Title' (containing '***** appliances'), 'Report Comment' (containing 'Experimental model Pattern A'), and 'Save Location' (containing 'C:\Program Files (x86)\YOKOGAWA\IEC610'). There is also an 'AutoNaming' checkbox and a 'File Name' input field. A 'Save' button is at the bottom right.

Save Method (page 11-2)
Select the type of data to save and the file format to save it to.

Save Information (page 11-2)
Set the location and file name to save to.

Execute save operation (page 11-2)

11.1 Saving Setting Information and Measured Data

Configuring File Information Display Settings

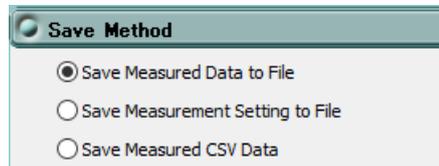
1. Right-click the file information heading area at the top of the setting and display area. A list of the different types of information that can be displayed appears.
2. Select the type of information that you want to be displayed.

Date	Report Title	Report Comment	Measured Data	File Name	Element
2019/11/21 10:52	Date	Experimental model Pattern A	*	20191121_001_WT5	5.0 5.0 30.0 30.0 30.0 30.0
2019/11/19 16:10	Report Title	Experimental model Pattern A	*	M302_20191119161005	5.0 5.0 30.0 30.0 30.0 30.0
2019/11/19 16:56	Report Comment	Experimental model Pattern A	*	M302_20191119165650	5.0 5.0 30.0 30.0 30.0 30.0
2019/11/25 14:33	Measured Data	Experimental model Pattern A	*	M302_20191125143320	5.0 5.0 30.0 30.0 30.0 30.0
2019/11/26 12:00	File Name	Experimental model Pattern A	*	M302_20191126120045	5.0 5.0 30.0 30.0 30.0 30.0
	Element				

Saving the Measured Data

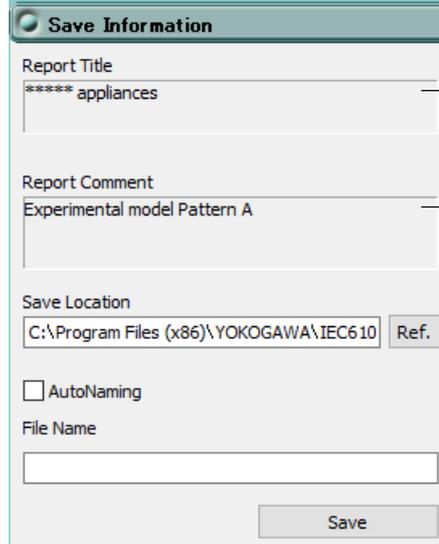
You can save the measured data when the measured data has been retrieved (or loaded).

1. Select **Save Measured Data to File**.



The **Save Method** dialog box contains three radio button options: **Save Measured Data to File** (selected), **Save Measurement Setting to File**, and **Save Measured CSV Data**.

2. After selecting a folder in the **Save in** box, enter the name of the file you want to save in the **File name** box.
3. Click **Save** to save the measured data.



The **Save Information** dialog box has the following fields: **Report Title** (containing "***** appliances"), **Report Comment** (containing "Experimental model Pattern A"), **Save Location** (containing "C:\Program Files (x86)\YOKOGAWA\IEC610" and a "Ref." button), an **AutoNaming** checkbox (unchecked), and a **File Name** text box. A "Save" button is at the bottom right.

Section 10.1 explains how to set report titles and comments.

Note

You cannot save the measured data while the measurement is in progress.

Saving the Setting Information

1. Select **Save Measurement Setting to File**.

2. After selecting a folder in the **Save in** box, enter the name of the file you want to save in the **File name** box.
3. Click **Save** to save the setting information.

Section 10.1 explains how to set report titles and comments.

Note

You cannot save the setting information while the measurement is in progress.

Explanation

Kinds of File Information

- Date: When the file was saved.
Displayed in this format: year/month/day hour:minute:second
- Report Title (See section 10.1)
- Report Comment (See section 10.1)
- Measured Data: When measured data is included in a file, an asterisk appears.
 - : Setting information file
 - *: Files that only contain the measured data of compliance tests (do not contain the measured data of simple tests)
 - ***: Files that contain both the measured data of compliance tests and the measured data of simple tests
- Element (See section 5.1)

When measured data of the WT3000E/WT3000 series is loaded

- “*(Old)” appears in the Measured Data column of the file information display area.
- You cannot perform rejudgment by changing the conditions of the standard because this is an offline analysis.

Sorting the file list

You can sort the list of loaded files in ascending or descending order by clicking an item heading area. The sorted item heading area shows ^ (ascending) or v (descending).

Saving Measured Data

You can use this software to save the harmonic measurement data and waveform data that the PC has acquired from the WT to a file. When the software saves this data, it will also save the WT harmonic measurement conditions along with the setting information described below.

The following two types of measured data files are available.

- Files that only contain the measured data of compliance tests (do not contain the measured data of simple tests)
 - An asterisk appears in the Measured data column for files that contain measured data.
 - Two files will be saved with the following extensions.
 - .fdt Measured data (compliance test data)
 - .ini Setting information
- Files that contain both the measured data of compliance tests and the measured data of simple tests
 - These files are saved when you select Simple Test Measurement in the test schedule menu described in section 4.1, execute a simple compliance test, and save the measured data of the test.
 - Two asterisks appear in the Measured Data column of the file information display area.
 - Two files will be saved with the following extensions.
 - .fdt Measured data (The following two types of data are included.)
 - Simple test data
 - Compliance test data that has been specified as the test reference for the simple test
 - .ini Setting information

File Name

You can select any file name that the PC will recognize.

Saving Setting Information

When in online mode, the software can save the following setting information to a file.

- Measurement and judgement conditions (see chapter 7)
- All display settings (see chapters 8 and 9)
- Report titles and comments (see section 10.1)

File Name/Extension

You can select any file name that the PC will recognize.

Extension: .ini

11.2 Saving Measured Data in CSV Format

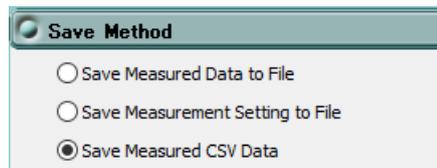
Once the following kinds of data has been acquired or loaded, it can be saved to CSV file format.

- Numeric data
- Waveform data

Note

You cannot save measured data in CSV format while measurement is taking place.

1. Select **Save Measured CSV Data**.



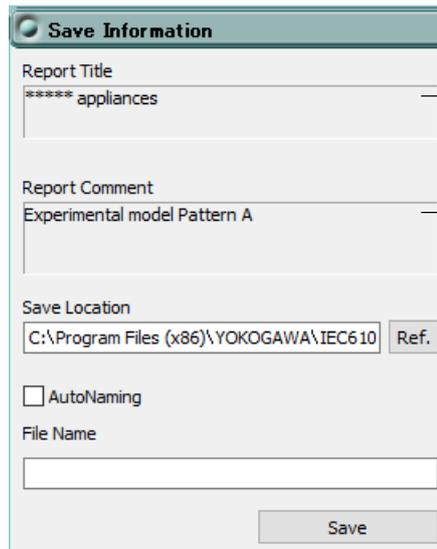
Save Method

Save Measured Data to File

Save Measurement Setting to File

Save Measured CSV Data

2. Specify the **Save Location**, and enter the file name in the File Name box.
3. Click **Save**. The measured data is saved to CSV format.



Save Information

Report Title
***** appliances

Report Comment
Experimental model Pattern A

Save Location
C:\Program Files (x86)\YOKOGAWA\IEC610 Ref.

AutoNaming

File Name

Save

Section 10.1 explains how to set report titles and comments.

Explanation

You can save data to CSV file format after it has been acquired or loaded. When you save the data in CSV format, you can view it using a PC spreadsheet program (such as Microsoft Excel).

Note

This software cannot load CSV files.

File Name/Extension

You can select any file name that the PC will recognize.

Extension: .csv

If AutoNaming is not used when saving to a CSV file, the file is saved with the following name.

"Text written in the file name box"+ "_CSV".csv

Data Types

The following data is saved for each measured input element:

Voltage values

Current values

Active power

Φ (phase angle)

Apparent power

Circuit power factor

FreqPLL

None (Blank column)

Uthd : Voltage THD

UthdG

UthdS

Ithd : Current THD

IthdG

IthdS

Distortion factor (P THD)

Phi

FreqU

Thc

Pohc

Voltage waveform data (8000 points)

Current waveform data (8000 points)

When you save the measured data of a simple compliance test in CSV format, the data is saved in the following order.

- Measured data of the simple compliance test
- Measured data of the compliance test that has been specified as the test reference for the simple test

Data Size

Under the following circumstances, the software will produce an approximately 9-MB file with about 18000 lines.

- Compliance test
- Wiring pattern set to 3P4W 400 V, and the measured input elements set to 1 to 3
- Measurement time set to 2 min 30 s

11.2 Saving Measured Data in CSV Format

Example of Numeric Data Saved to CSV Format and Then Opened Using Microsoft Excel

CSV format version

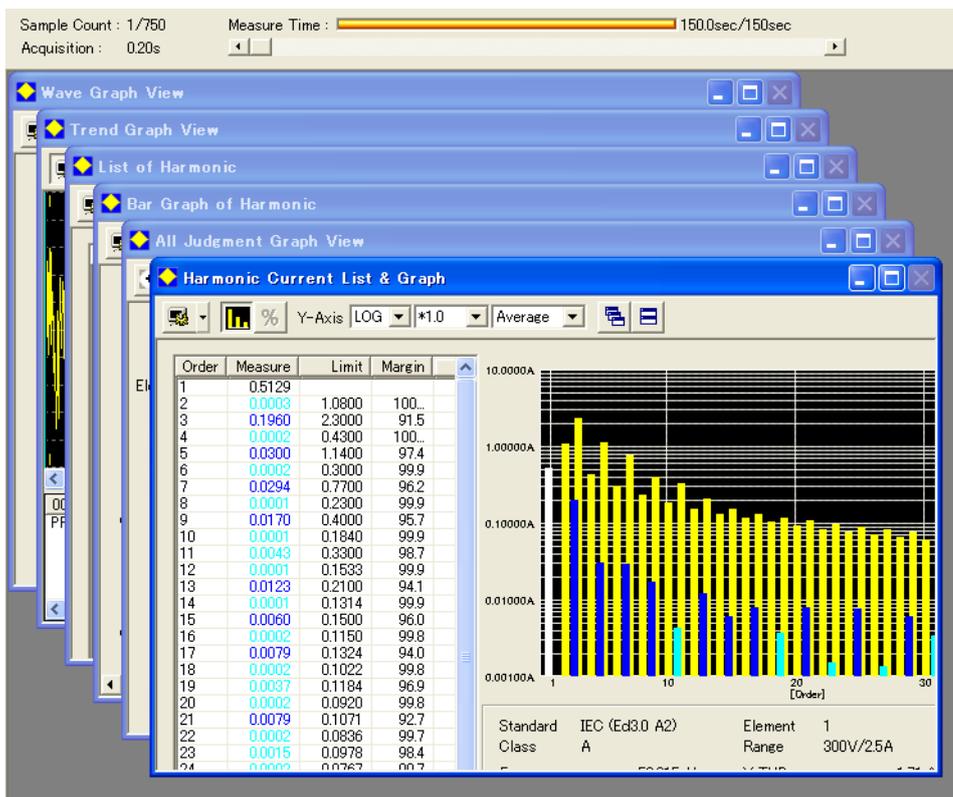
	A	B	C	D	E	F	G	H	
1	Version	Version 6.61							
2	Date :	Wed Dec 25 09:09:16 2019							
3	Data Count	750	Harmonic order →						
4									
5	Element1	[Voltage]							
6		TOTAL	DC	1	2	3	4	5	
7		0	227.4638	9.91 E+37	227.3139	0.012305	3.133281	0.014134	6.849628
8		1	227.7043	9.91 E+37	227.5568	0.011549	3.069359	0.008112	6.812357
9		2	228.7904	9.91 E+37	228.6054	0.085499	3.927741	0.055045	7.480665
10	Measured data number ↓	3	228.9171	9.91 E+37	228.7328	0.004214	3.927471	0.012069	7.473825
11		4	229.1548	9.91 E+37	228.97	Harmonic measurement data			
12		5	229.2077	9.91 E+37	229.0322	0.013065	3.799509	0.00228	7.328438
13		6	229.1287	9.91 E+37	228.9533	0.004982	3.786766	0.006735	7.326857
14		7	228.9838	9.91 E+37	228.8042	0.008128	3.85345	0.001724	7.409199
15		8	229.0703	9.91 E+37	228.89	0.018216	3.867439	0.006321	7.427949
16		9	229.3022	9.91 E+37	229.1293	0.020213	3.735632	0.009218	7.30666
17		10	229.1132	9.91 E+37	228.9341	0.019301	3.835332	0.008106	7.406432
18		11	229.2236	9.91 E+37	229.0517	0.014132	3.711365	0.020655	7.283534
19		12	229.5771	9.91 E+37	229.4232	0.014941	3.366014	0.012666	6.946555

12.1 Cascading Windows

Procedure

Click . The windows are cascaded so that you can see the title of each window.

An Example of Cascaded Windows within the Analysis Window



Explanation

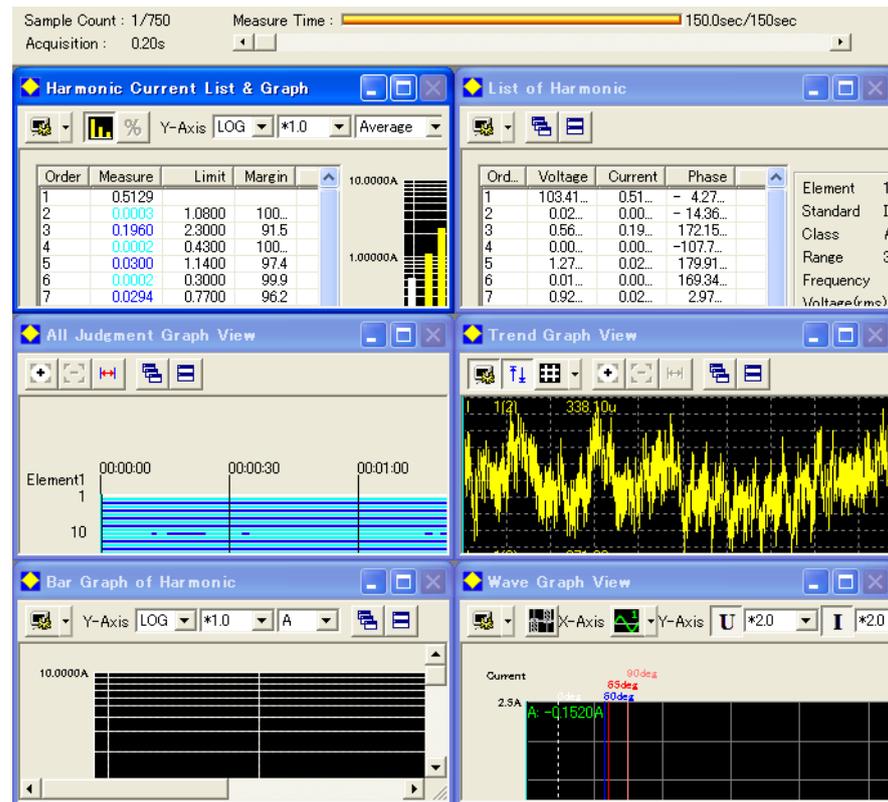
- Windows are cascaded so that the title of all displayed windows can be seen.
- The active graph or list window becomes the front window after the cascade operation.
- The cascade order varies depending on the type of displayed window.

12.2 Tiling Windows

Procedure

Click . The windows are tiled so that they do not overlap with each other.

An Example of Tiled Windows within the Analysis Window



Explanation

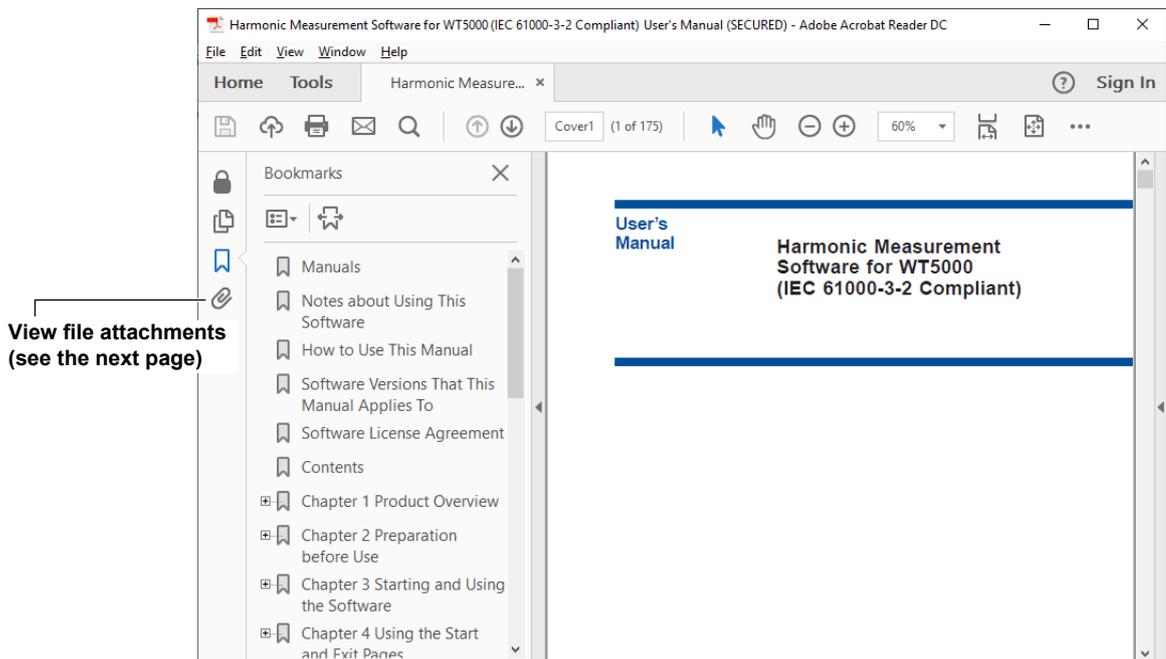
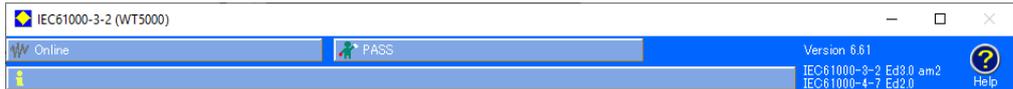
- All the displayed windows are tiled so that the windows do not overlap each other.
- The active graph or list becomes the active window after carrying out the tile operation.
- The arrangement order varies depending on the type of displayed windows.

12.3 Using the Help Function

Procedure

Displaying Help

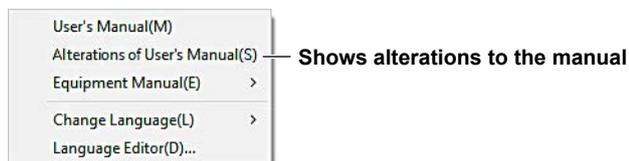
Click , the help button. If Adobe Acrobat Reader is installed on the PC, it will start up and open the PDF User's Manual for this software.



Displaying Alteration Notices

If alteration notices are available, you can view them by following the procedure below.

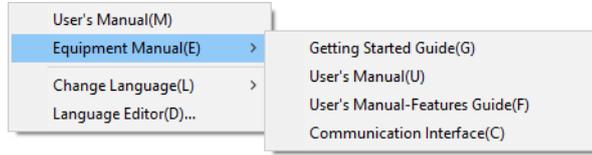
1. Right-click the help  button.
2. Click **Alterations of User's Manual**.



* The Alterations of User's Manual menu item is displayed only when there are alteration notices for the user's manual.

View the WT User's Manual

1. Right-click the help  button.
2. Click **Equipment Manual**.
3. Click the manual you want to view.



Explanation

Online Help

The user's manual is displayed as a help document in PDF. You can find information about operating procedures of this software and terminology.

* To view the PDF data, you need Adobe Acrobat Reader or a software application that can open PDF data.

If there is an alteration notice, you can display it by clicking Help and then clicking **Alterations of User's Manual**. This will open a 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, go to the following Web page, and then browse to the download page.

<https://tmi.yokogawa.com/support/download-software-drivers-firmware/>

If there are alteration notices, they are downloaded as file attachments to the user's manual. You can view and save file attachments by following the procedure below.

1. Open the user's manual PDF file with Adobe Acrobat Reader, and select file attachment  in the navigation panel. A file attachment panel appears.
2. In the file attachment panel, select a file attachment. You can click the appropriate icons in the top area of the file attachment panel to display, save, and perform other operations on the file attachment.

Rename the downloaded user's manual and alteration notice as indicated below, and copy (overwrite) the files in the software installation folder that you specified when you carried out the steps on page 2-8. You will be able to view the most recent operating instructions by selecting the **User's Manual** or **Alterations of User's Manual** from the **Help** menu.

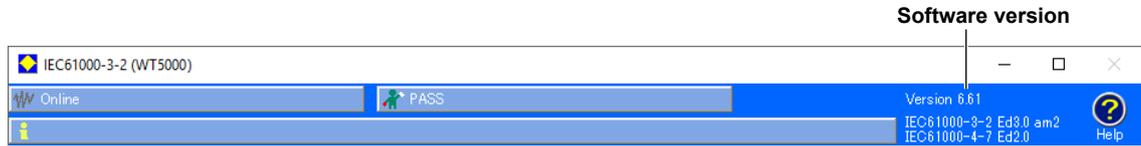
- User's Manual File Name IMD024-01EN.pdf
- Alteration Notice File Name Alterations-01E.pdf

Note

- You can download Adobe Acrobat 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.

12.4 Viewing Version Information

The IEC 61000-3-2 Harmonic Measurement Software version number appears in the information area.



Note

The software version is different for each operation mode indicated below.

- IEC 61000-3-2 Harmonic Measurement
- IEC 61000-3-3 Voltage Fluctuation and Flicker Measurement
- IEC 61000-3-11 Voltage Fluctuation and Flicker Measurement
- IEC 61000-3-12 Harmonic Measurement

If any function is updated, the version of the other function may not change.

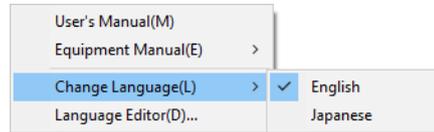
For the most recent version of the software, check the YOKOGAWA's Web page below.

<https://tmi.yokogawa.com/support/download-software-drivers-firmware/>

The program for updating the software as well as the most recent user's manual and alteration notice (see section 12.3) can be downloaded from YOKOGAWA's Web page above.

12.5 Setting the Displayed Language

1. Right-click the help  button.
2. Click **Change Language**.
3. Select the language you want to use.



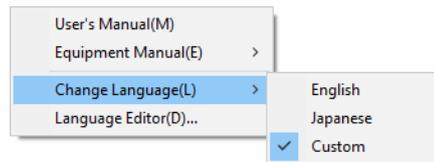
Note

Depending on the operating system, some language fonts may not be installed. In such cases, if you change the language, text will not be displayed properly. To display the text properly, you need to install appropriate fonts in the operating system.

Customizing the Displayed Language

To customize the displayed language, edit the language file by following the procedure in section 12.6.

If there is a language file that you create (custom file), the submenu will appear as follows:



Select **Custom** to load the custom file.

12.6 Editing the Displayed Language

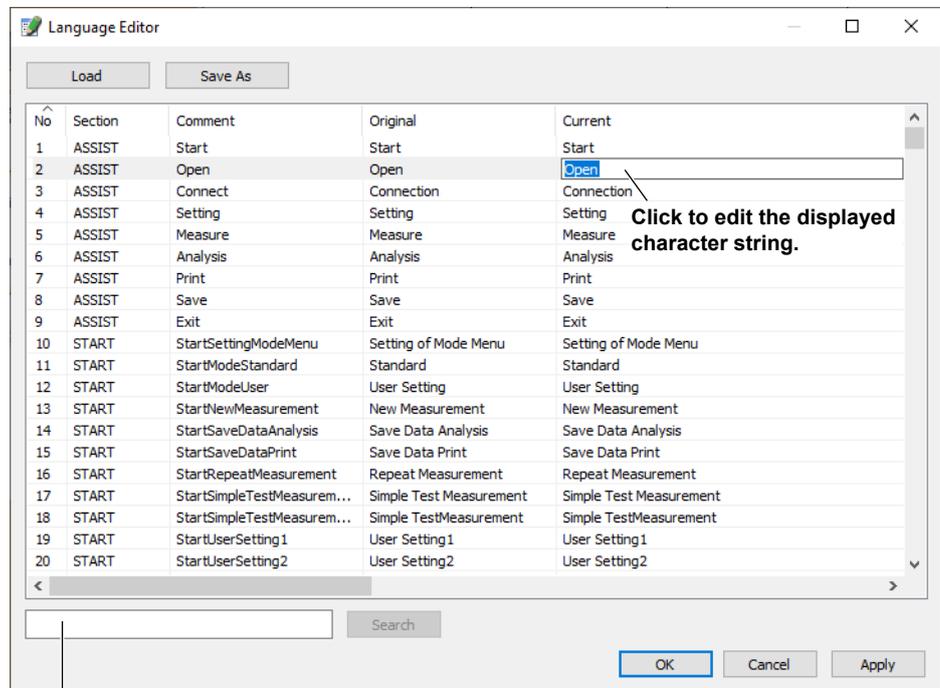
You can edit the text that is displayed in the dialog boxes and windows of the software.

Editing the Displayed Language

1. Right-click the help  button.
2. Click **Language Editor**.



3. In the Language Editor dialog box, click the cells in the Current column to edit the text to display.



You can search for a character string by entering the string here and clicking Search.

Saving the Edited Language Information

Click **Save As** to save the edited language information to a file. The file name extension is .lang.

Note

The English and Japanese language information files are in the following folder.

C:\Users\<User>\Documents\YOKOGAWA\IEC61000 Analysis Software for WT5000\Language

Loading Saved Language Information

Click **Load** to load a language information file into the Language Editor dialog box.

13.1 Troubleshooting

If a message is displayed on the PC display, see section 13.2, "Error Messages."

Problems and Solutions

Unable to communicate with the WT using USB.

Using Device Manager, check whether the USB driver is appropriate for the WT series. If the driver is not appropriate, switch to the appropriate USB driver (see page 2-11).

Unable to communicate with the WT using GP-IB.

Communication may not work properly on GP-IB cards other than those of NI (National Instruments). Use a GP-IB card by NI (see section 1.2).

Measurement stops suddenly.

Close the memory-resident software running on the PC. For example, if virus checking software frequently checks the communications between this software and the PC, the performance of the PC may decline drastically. If you choose to stop the virus check and use the PC, please do so in a network environment that is well protected against viruses.

13.2 Error Messages

Message	Corrective Action
Measured data will be initialized. Do you want to execute?	Select OK to initialize the measured data. Otherwise, select Cancel.
Data was lost. Please check your settings and try again.	The communication may be disconnected. Check the cable, noise, etc.
Connection error. Please check your settings and try again.	Check the following items. <ul style="list-style-type: none">• The WT is turned ON.• The USB, GP-IB, or Ethernet cable is connected properly.• For USB, check that a USB hub is not being used.• For GP-IB, check that a unique GP-IB address is assigned within the system. Check that the GP-IB address specified on the WT matches the address specified on the software. Check that the GP-IB communication driver is installed correctly in the PC.• For Ethernet, check that the IP address, user name, and password specified on the WT match those specified on the software.
Peak over. Please check your settings and try again.	Check that the voltage or current range is appropriate.
Frequency error. Please check your settings and try again.	Check the frequency and voltage range.
Unrecognized error. Please check your settings and try again.	An unexpected error occurred.
All the data will be discarded. Do you want to continue?	Select OK to discard the current data. Otherwise, select Cancel.
Write failed.	Check the destination medium. <ul style="list-style-type: none">• Check that the storage medium is present.• Check that there is enough free space on the storage medium.• Check that the storage medium is formatted.• Check that the storage medium is not write-protected.
Please input a value from 0.0001 to 99999.9999.	The value you tried to specify is out of range.
Please input a value from 0.01 to 999.99.	Set the value within the allowed range.
Please input a value from 1.00 to 99.99.	
Please input a value from 0.10 to 99.99.	
Please input value from 0:30 to 15:00.	
Please input a value from 1 to 99999.	
Please input a value from 1 to 99.	
Please input a value from 0.10 to 9.99.	

14.1 Specifications

Item	Specification
Software*	Harmonic measurement/judgment software that can measure harmonic currents and judge the results of those measurements based on IEC or JIS standards. Displays and prints measurements and judgments. The software's executable file name is IEC61000.exe.
Compatible measurement devices*	WT5000 (Model: WT5000)
Applicable standards*	IEC 61000-3-2 Edition 3.0:2005 and A2 of the Edition 3.0:2009, IEC 61000-3-2 Edition 4.0:2014 <ul style="list-style-type: none"> • EN 61000-3-2:2006/A2:2009, EN 61000-3-2:2014 • IEC 61000-4-7 Edition 1.0:1991, Edition 2.0:2002, A1 of the Edition 2.0:2008 • JIS C61000-3-2:2011, abbreviated as JIS • JIS C61000-4-7:2007
Features	<p>Acquisition and loading of measured data and waveform data to be judged.</p> <ul style="list-style-type: none"> • Configuration of WT measurement conditions • Online acquisition of measured data and waveform data from the WT (online mode) • Loading of previously saved measured data and waveform data (offline mode) <p>Measurement modes*</p> <ul style="list-style-type: none"> • Compliance test, Simple test <ul style="list-style-type: none"> - In online mode Measures the harmonics of the data acquired from the WT, and judges those harmonics based on IEC or JIS. - In offline mode Judges the measured data loaded from a file according to IEC or JIS. • Test preview Only available in online mode. As the WT measures the harmonic appear on a list or bar graph of measured values and waveform. <p>Standard and measurement settings</p> <p>Sets the classification of the equipment under test (EUT) as defined in IEC or JIS and evaluation conditions within each class.</p> <p>Measurement time</p> <p>The time from the start to the end of measurement. Measurement time can be set in one-second intervals within the range of 0 h 0 min 1 s to 24 h 0 min 0 s.</p> <p>Report titles/comments</p> <p>Report titles and comments can be entered. Report formats: color/black and white; English/Japanese. Reports are printed and saved to .bmp or .pdf files along with measured data.</p> <p>Measure start/stop</p> <p>Measurement can be started in online mode.</p> <p>Display of judgment results, measured data, and waveform data</p> <p>When a compliance test is performed, the software will display judgments as to whether or not the data complies with IEC or JIS, along with the measured data and waveform data that was judged.</p> <ul style="list-style-type: none"> • Display of all judgment results within the measurement time Determines whether or not all of the data within the measurement time is within the set limits, and displays the result. • Harmonic current list and graph display Displays the measured harmonic values and the limits for each order set by the standard for those values in both a list and a bar graph. • Bar graph display of harmonic voltage, current, and phase angle Displays the measured data for each harmonic in a color-coded bar graph. • List display of harmonic voltage, current, and phase angle values Displays the measured data for each harmonic in a color-coded list. • Trend graph display Displays a graph that shows data fluctuations over time. • Waveform display of voltage and current Displays a waveform of data measured immediately after the measurement time (displays approximately two waveform periods).

14.1 Specifications

Item	Specification
	<ul style="list-style-type: none"> • Repeatability of measured data Compares the harmonic measurement data that is saved to files, and displays the difference in the measured data on a bar graph and numerical list. Enables confirmation of whether the difference between data measured using the same product is within 5% as defined by the standard (confirmation of repeatability). • Display of simple test judgment results Judges whether the measured data of the simple test is within limits and displays the results collectively.
	<p>Loading of measured data, waveform data, and setting information</p> <ul style="list-style-type: none"> • Loading and saving of setting information Setting information files that contain measurement settings, the measurement time setting, and report titles and comments can be saved. Saved setting information files can be loaded. • Loading and saving of measured data and waveform data Harmonic measurement data and waveform data files can be saved. Measurement settings, the measurement time setting, and report titles and comments are also saved, along with the WT harmonic measurement conditions set using the software. The saved measured data, waveform data, harmonic measurement conditions, and setting information can be loaded. • Saving of measured data and waveform data to CSV format Harmonic measurement data and waveform data can be saved to CSV files. Saved CSV files can be opened with PC programs that support CSV file format.
	<p>Printing and saving of reports</p> <p>Reports can be saved to .pdf or .bmp files. Report files can also be printed.</p>
System requirements	See section 1.2.

* The width of the window function (measurement period) for measurements on the WT5000 is the same as defined by IEC 61000-4-7 or JIS C 61000-4-7.

Edition No. of the IEC 61000-4-7	Edition No. of the JIS C61000-4-7	Window Function of the WT (Measurement Period)	
		50 Hz	60 Hz
Edition 1.0	2007 JA	16 cycles (320 ms)	16 cycles (267 ms)
Edition 2.0	2007	10 cycles (200 ms)	12 cycles (200 ms)
A1 of the Edition 2.0	-----	10 cycles (200 ms)	12 cycles (200 ms)

Compatibility between the WT5000 Precision Power Analyzer and IEC

In the EN 61000-3-2:2006/A2:2009 (IEC 61000-3-2 Edition 3.0:2005/A2:2009) standard or EN61000-3-2:2014 the requirements for measurement instruments are specified in EN 61000-4-7 (IEC 61000-4-7).

The WT5000 complies with the items related to EN 61000-3-2:2006/A2:2009 (IEC 61000-3-2 Edition 3.0:2005/A2:2009) or EN61000-3-2:2014 of EN 61000-4-7 shown below in the range indicated in the table on the next page.

- EN 61000-4-7:1993 (IEC 61000-4-7 Edition 1.0:1991)
- EN 61000-4-7:2002 (IEC 61000-4-7 Edition 2.0:2002)
- EN 61000-4-7:2002 and A1:2009 (IEC 61000-4-7 Edition 2.0:2002 and A1:2008)

Compatibility between the WT5000 Precision Power Analyzer and JIS

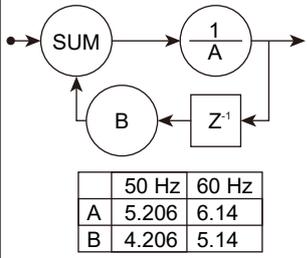
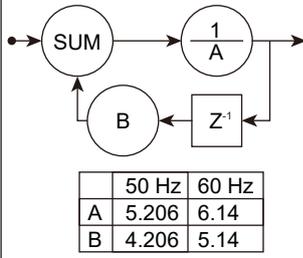
In the JIS C 61000-3-2:2011 standard, the requirements for measurement instruments are specified in JIS C 61000-4-7.

The WT5000 complies with the items related to JIS C 61000-3-2:2011 (IEC 61000-3-2 Edition 3.0:2005/A2:2009) of EN 61000-4-7 shown below in the range indicated in the table on the next page.

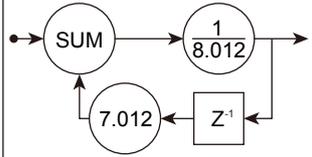
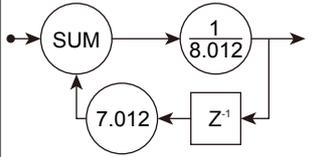
- JIS C 61000-4-7:2007 JA (appendix JA)
- JIS C 61000-4-7:2007

14.1 Specifications

EN 61000-4-7:1993 (IEC 61000-4-7 Edition 1.0:1991) or JIS C 61000-4-7:2007 (appendix JA)

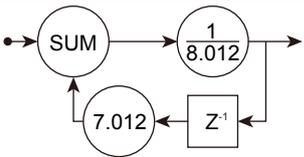
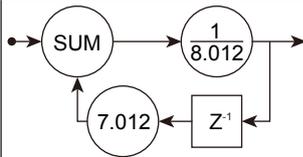
Item	EN 61000-4-7:1993 IEC 61000-4-7 Edition 1.0:1991 JIS C 61000-4-7:2007 (appendix JA)	WT5000	Compliance																		
Current measurement error	5% of the permissible limits or 0.15% I _r of the rated current I _r , whichever is greater	Frequency of the 40th order of the fundamental frequency 60 Hz When the crest factor is 3, 0.3% of reading+0.05% of range → Error within 5% at the limit that is greater than or equal to 1.1% of the input range When the crest factor is 6, 0.3% of reading+0.1% of range → Error within 5% at the limit that is greater than or equal to 2.2% of the input range Accuracy at 2.4 kHz (direct input)	Compliant within the range in the left column for direct input																		
Instrumental loss of the current input circuit	Voltage drop of 0.15 V or less	Instrumental loss Approx. 6.5 mΩ + approx. 0.3 μH	Compliant up to 23 Apk for the 1st order																		
Crest factor of the current input circuit	3 Overload display is necessary.	3 or 6 With overload display	Compliant																		
Range structure of the current input circuit and withstand overload input	Direct input range: 0.1, 0.2, 0.5, 1, 2, 5, 10, and 16A ranges are desirable	0.5, 1, 2, 5, 10, 20, 30 A range (when the crest factor is 3) 0.25, 0.5, 1, 2.5, 5, 10, and 15 A range (when the crest factor is 6)	Compliant in the range indicated in the left column. To make accurate measurements, pay attention to the crest factor and range selections.																		
	External sensor range: 0.1 V to 10 V are adequate.	0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10 V (when the crest factor is 3) 0.025, 0.05, 0.1, 0.25, 0.5, 1, 2.5, 5 V (when the crest factor is 6)																			
	Excessive input is 1.2 times the range (continuous) and 10 times (1 s)	Direct input Peak value of 90 A or rms value of 33 A, whichever is less (continuous) Peak value of 150 A or rms value of 50 A, whichever is less (1 s) External sensor input Peak value at 5 times the range or 25 V, whichever is less (continuous) Peak value at 10 times the range or 25 V, whichever is less (1 second)																			
Anti-aliasing filter	50 dB or higher	50 dB or more for 8 kHz or less	Compliant																		
Window function shape	Rectangular	Rectangular	Compliant																		
Window width	16 cycles (50 Hz and 60Hz)	10 cycles (50 Hz)/12 cycles (60 Hz)	Compliant																		
Relative deviation of the sampling frequency and fundamental frequency	Within ±0.03%	Within ±0.03%	Compliant																		
Grouping of interharmonics	Not required	No grouping function	Compliant																		
Smoothing	Time constant: 1.5 s	Time constant: 1.5 s	Compliant																		
Smoothing filter coefficient (window width: 200 ms)	 <table border="1" data-bbox="486 1758 678 1848"> <thead> <tr> <th></th> <th>50 Hz</th> <th>60 Hz</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>5.206</td> <td>6.14</td> </tr> <tr> <td>B</td> <td>4.206</td> <td>5.14</td> </tr> </tbody> </table>		50 Hz	60 Hz	A	5.206	6.14	B	4.206	5.14	 <table border="1" data-bbox="865 1758 1056 1848"> <thead> <tr> <th></th> <th>50 Hz</th> <th>60 Hz</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>5.206</td> <td>6.14</td> </tr> <tr> <td>B</td> <td>4.206</td> <td>5.14</td> </tr> </tbody> </table>		50 Hz	60 Hz	A	5.206	6.14	B	4.206	5.14	Compliant
	50 Hz	60 Hz																			
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	50 Hz	60 Hz																			
A	5.206	6.14																			
B	4.206	5.14																			
General specifications	The effects of temperature, humidity, supply voltage, common-mode voltage, static electricity, and electromagnetic field must be specified.	See the items in the general specifications	Compliant in the range of the general specifications																		

**EN 61000-4-7:2002 (IEC 61000-4-7 Edition 2.0:2002) or
JIS C 61000-4-7:2007**

Item	EN 61000-4-7:2002 IEC 61000-4-7 Edition 2.0:2002 JIS C 61000-4-7:2007	WT5000	Compliance
Current measurement error	5% of the permissible limits or 0.15% I_r of the rated current I_r , whichever is greater	Frequency of the 40th order of the fundamental frequency 60 Hz When the crest factor is 3, 0.3% of reading+0.05% of range → Error within 5% at the limit that is greater than or equal to 1.1% of the input range When the crest factor is 6, 0.3% of reading+0.1% of range → Error within 5% at the limit that is greater than or equal to 2.2% of the input range Accuracy at 2.4 kHz (direct input)	Compliant within the range in the left column for direct input
Instrumental loss of the current input circuit	Voltage drop of 0.15 V_{rms} or less	Instrumental loss Approx. 6.5 m Ω + approx. 0.3 μH	Compliant up to 23 Arms for the 1st order
Crest factor of the current input circuit?	5 Arms range or less: 4 10 Arms range or less: 3.5 Range above 10 Arms: 2.5 Overload display is necessary.	3 or 6 With overload display	Compliant
Range structure of the current input circuit and withstand overload input	Direct input range: 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, and 100 A ranges are desirable	0.5, 1, 2, 5, 10, 20, 30 A range (when the crest factor is 3) 0.25, 0.5, 1, 2.5, 5, 10, and 15 A range (when the crest factor is 6)	Compliant in the range indicated in the left column. To make accurate measurements, pay attention to the crest factor and range selections.
	External sensor range: 0.1 V to 10 V are adequate.	0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10 V (when the crest factor is 3) 0.025, 0.05, 0.1, 0.25, 0.5, 1, 2.5, 5 V (when the crest factor is 6)	
	Excessive input is 1.2 times the range (continuous) and 10 times (1 s)	Direct input Peak value of 90 A or rms value of 33 A, whichever is less (continuous) Peak value of 150 A or rms value of 50 A, whichever is less (1 s) External sensor input Peak value at 5 times the range or 25 V, whichever is less (continuous) Peak value at 10 times the range or 25 V, whichever is less (1 second)	
Anti-aliasing filter	50 dB or higher	50 dB or more for 10 kHz or less	Compliant
Window function shape	Rectangular	Rectangular	Compliant
Window width	10 cycles (50 Hz)/12 cycles (60 Hz)	10 cycles (50 Hz)/12 cycles (60 Hz)	Compliant
Relative deviation of the sampling frequency and fundamental frequency	Within $\pm 0.03\%$	Within $\pm 0.03\%$	Compliant
Grouping of interharmonics	Required	Grouping function available	Compliant
Smoothing	Time constant: 1.5 s	Time constant: 1.5 s	Compliant
Smoothing filter coefficient (window width: 200 ms)			Compliant
General specifications	The effects of temperature, humidity, supply voltage, common-mode voltage, static electricity, and electromagnetic field must be specified.	See the items in the general specifications	Compliant in the range of the general specifications

14.1 Specifications

EN 61000-4-7:2002 and A1:2009 (IEC 61000-4-7 Edition 2.0:2002 and A1:2008)

Item	EN 61000-4-7:2002 +A1:2009 IEC 6100-4-7 Editon 2.0:2002 + A1:2008	WT5000	Compliance
Current measurement error	5% of the permissible limits or 0.15% I_r of the rated current I_r , whichever is greater	Frequency of the 40th order of the fundamental frequency 60 Hz When the crest factor is 3, 0.3% of reading+0.05% of range → Error within 5% at the limit that is greater than or equal to 1.1% of the input range When the crest factor is 6, 0.3% of reading+0.1% of range → Error within 5% at the limit that is greater than or equal to 2.2% of the input range Accuracy at 2.4 kHz (direct input)	Compliant within the range n the left column for direct input
Instrumental loss of the current input circuit	Voltage drop of 0.15 Vrms or less	Instrumental loss Approx. 6.5 mΩ + approx. 0.3 μH	Compliant up to 23 Arms for the 1st order
Crest factor of the current input circuit	5 Arms range or less: 4 10 Arms range or less: 3.5 Range above 10 Arms: 2.5 Overload display is necessary.	3 or 6 With overload display	Compliant
Range structure of the current input circuit and withstand overload input	Direct input range: 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, and 100 A ranges are desirable	0.5, 1, 2, 5, 10, 20, 30 A range (when the crest factor is 3) 0.25, 0.5, 1, 2.5, 5, 10, and 15 A range (when the crest factor is 6)	Compliant in the range indicated in the left column. To make accurate measurements, pay attention to the crest factor and range selections.
	External sensor range: 0.1 V to 10 V are adequate.	0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10 V (when the crest factor is 3) 0.025, 0.05, 0.1, 0.25, 0.5, 1, 2.5, 5 V (when the crest factor is 6)	
	Excessive input is 1.2 times the range (continuous) and 10 times (1 s)	Direct input Peak value of 90 A or rms value of 33 A, whichever is less (continuous) Peak value of 150 A or rms value of 50 A, whichever is less (1 s) External sensor input Peak value at 5 times the range or 25 V, whichever is less (continuous) Peak value at 10 times the range or 25 V, whichever is less (1 second)	
Anti-aliasing filter	50 dB or higher	50 dB or more for 10 kHz or less	Compliant
Window function shape	Rectangular	Rectangular	Compliant
Window width	10 cycles (50 Hz)/12 cycles (60 Hz)	10 cycles (50 Hz)/12 cycles (60 Hz)	Compliant
Relative deviation of the sampling frequency and fundamental frequency	Within ±0.03%	Within ±0.03%	Compliant
Grouping of interharmonics	Required Applies to the second and higher harmonics.	Grouping function available Applies to the second and higher harmonics.	Compliant
Smoothing	Time constant: 1.5 s	Time constant: 1.5 s	Compliant
Smoothing filter coefficient (window width: 200 ms)			Compliant
General specifications	The effects of temperature, humidity, supply voltage, common-mode voltage, static electricity, and electromagnetic field must be specified.	See the items in the general specifications	Compliant in the range of the general specifications

Index

A	Page	I	Page
address.....	6-3	icon.....	3-4
all judgments, graph of.....	9-1	IEC 61000-3-12.....	1-9
antialiasing filter.....	7-8	IEC 61000-4-7.....	1-3
applicable measurement instruments.....	1-1	information area.....	3-3
applicable standard.....	1-1	information bar.....	3-3
auto range.....	9-18	installation.....	2-8
average value.....	9-12	instantaneous values.....	9-12
averaging.....	7-8		
		J	Page
C	Page	JIS C 61000-4-7.....	1-3
cascading.....	12-1	judgment conditions.....	7-12
Color.....	9-20		
comments.....	10-1	L	Page
communication address.....	6-2	limits.....	1-9
compliance test.....	1-3	Lower.....	9-20
connection.....	6-1		
connection conditions.....	6-2	M	Page
connection device.....	6-2	magnification.....	9-10
connection status.....	3-3	margin.....	9-11
CSV file, saving to.....	11-6	maximum value.....	9-12
CSV format.....	11-6	measured data, loading.....	5-1
Current Peak (-).....	9-24	measured data, saving to CSV format.....	11-6
Current Peak (+).....	9-24	measurement conditions.....	7-7
cursor.....	9-21, 9-24	measurement time.....	1-2, 7-4
		menu area.....	3-3
D	Page		
distorted wave.....	1-17	N	Page
		new connection.....	6-1
E	Page		
Element.....	9-19	O	Page
error messages.....	13-2	offline mode.....	1-7
Ethernet control.....	2-5, 2-6	offline, switching to.....	6-7
evaluation colors.....	9-3	online.....	6-3
		online mode.....	1-7
F	Page	operation, flow chart.....	1-15
file information.....	5-3	Order.....	9-20
Frequency.....	9-24		
Function.....	9-19	P	Page
functions, explanation of.....	1-1	password.....	6-3
fundamental frequency.....	1-17	PLL source.....	1-17, 9-24
fundamental wave.....	1-17	printer setup.....	10-6
		printing.....	10-1
G	Page	print language.....	10-4
GP-IB control.....	2-1, 2-5	print mode.....	10-4
graph.....	9-8	print preview.....	10-2
grid.....	9-18		
		R	Page
H	Page	range, copying.....	7-8
harmonic bar graph.....	9-15	report.....	10-1
harmonic component.....	1-17	report, printing.....	10-7
harmonic measurement.....	8-17		
harmonic order.....	1-17		
harmonic preview.....	8-2		
harmonic values, list of measured.....	9-17		
help.....	12-3		
higher harmonic.....	1-17		

Index

S	Page
scale, type of	9-10
scaling settings, copying.....	7-8
setting and display area.....	3-3
setting information, loading.....	5-1
slider	9-21, 9-24
software, closing.....	4-6
Software License Agreement.....	vi
software, starting	3-1
software window	3-3
specifications	14-1
standards, applicable.....	1-9
standard, selection	3-1
standard test schedule menu	4-2
starting the software	3-1
submenu area.....	3-3
system requirements	1-8

T	Page
test conditions.....	7-2
test schedule menus.....	1-1
test schedule menu, selection	4-1
test, starting	8-17, 8-22
test, stopping	8-17, 8-22
THC	1-17
tiling	12-2
timeout value	2-7
title	10-1
Trace	9-19
trend graph	9-18

U	Page
uninstallation.....	2-12
Upper.....	9-20
USB control	2-1, 2-3
USB driver	2-11
user name.....	6-3
User Setting.....	4-3
user's manual	12-3

V	Page
version information	12-5
Voltage Peak (-).....	9-24
Voltage Peak (+).....	9-24

W	Page
waveform graph.....	9-22
waveform preview.....	1-4
windows, cascading.....	12-1
windows, tiling	12-2
wiring pattern	7-2

Y	Page
Y-axis.....	9-10
YTUSB.....	2-11

Z	Page
zooming in	9-5, 9-21
zooming out.....	9-5, 9-21

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