# User's Manual

PowerViewerPlus Software for the PX8000



IM 760881-01EN 1st Edition

# **Product Registration**

Thank you for purchasing YOKOGAWA products.

YOKOGAWA provides registered users with a variety of information and services.

Please allow us to serve you best by completing the product registration form accessible from our homepage.

# http://tmi.yokogawa.com/

This user's manual explains the handling precautions, features, and operating procedures of PowerViewerPlus. To ensure correct use, please read this manual thoroughly before beginning operation.

After reading this manual, keep it in a safe place.

For the handling precautions, features, and operating procedures of the PX8000, see the PX8000 User's Manual.

For information on how to use Windows, see the relevant manuals.

### **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 functionality. The figures given in this manual may differ from those that actually appear on your screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
- Copying or reproducing all or any part of the contents of this manual without the permission of YOKOGAWA is strictly prohibited.
- The TCP/IP software of this product and the documents concerning it have been developed/created by YOKOGAWA based on the BSD Networking Software, Release 1 that has been licensed from the Regents of the University of California.

### **Trademarks**

- Microsoft, MS-DOS, Windows, Windows Vista, and Excel are registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.
- · Adobe and Acrobat are registered trademarks or trademarks of Adobe Systems Incorporated.
- In this manual, the <sup>®</sup> and TM symbols do not accompany their respective registered trademark or trademark names.
- Other company and product names are trademarks or registered trademarks of their respective companies.

#### **Revisions**

September 2014 1st Edition

# Notes about Using This Software

# Storing the CD-R

Keep the original CD for this software in a safe place. To use this software, install it on a PC hard disk, and run it from the PC.

# Notes on Using the Software

- To allow a PX8000 to communicate with a PC through the PX8000's USB interface, a USB driver must be installed in the PC. When you install the software in the PC, the USB driver is also installed automatically.
- When you connect a PX to a PC and use the software to control the PX, you cannot use multiple types of communication interface at the same time.
- · Do not perform the following operations while using the software. Doing so may cause errors.
  - Using another software application to operate the PX
  - · Operating the PX directly
- 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.
- If a connection error occurs, turn off the PX and then turn it back on.

# How to Use This Manual

# **Structure of the Manual**

This manual contains 11 chapters and an index.

Title	Description
Product Overview	N
	Describes the features of the product and the system requirements for using the
	product.
Configuring PX's	Communication Control Settings
	Describes how to connect the PX to a PC.
Installation and S	Starting and Exiting the Software
	Describes how to install and start the software.
PX-PC Communi	cation
	Describes how to configure the settings for PX-PC communication.
PX Configuration	1
	Describes how to configure the PX measurement conditions and other settings.
Executing Measu	irements
	Describes how to start and stop measurement.
Analyzing Measu	ired Data
	Describes how to analyze measured data.
Saving and Load	ing Setup Parameters
	Describes how to save and load setup parameters.
Other Features	
	Describes the help feature and how to view the software version information.
Troubleshooting	
	Describes error messages.
Specifications	
	Provides the software specifications.
Index	
	Product Overview Configuring PX's Installation and S PX-PC Communi PX Configuration Executing Measu Analyzing Measu Saving and Load Other Features Troubleshooting Specifications

# Software Version That This Manual Covers

This manual describes PowerViewerPlus software version 1.01. For instructions on how to view the software version, see section 9.2.

# Terms and Conditions of the Software License

Yokogawa Meters & Instruments Corporation, a Japanese corporation (hereinafter called "Yokogawa"), grants permission to use this Yokogawa Software Program (hereinafter called the "Licensed Software") to the Licensee on the conditions that the Licensee agrees to the terms and conditions stipulated in Article 1 hereof You, as the Licensee (hereinafter called "Licensee"), shall agree to the following terms and conditions for the software license (hereinafter called the "Agreement") based on the use intended for the Licenseed Software.

Please note that Yokogawa grants the Licensee permission to use the Licensed Software under the terms and conditions herein and in no event shall Yokogawa intend to sell or transfer the Licensed Software to the Licensee.

Licensed Software Name: PowerViewerPlus Software for the PX8000

#### Number of License:

#### Article 1 (Scope Covered by these Terms and Conditions)

- 1.1The terms and conditions stipulated herein shall be applied to any Licensee who purchases the Licensed Software on the condition that the Licensee consents to agree to the terms and conditions stipulated herein.
- 1.2The "Licensed Software" herein shall mean and include all applicable programs and documentation, without limitation, all proprietary technology, algorithms, and knowhow such as a factor, invariant or process contained therein.

#### Article 2 (Grant of License)

- 2.1Yokogawa grants the Licensee, for the purpose of single use, non-exclusive and non-transferable license of the Licensed Software with the license fee separately agreed upon by both parties.
- 2.3The Licensee is, unless otherwise agreed in writing by Yokogawa, not entitled to copy, change, sell, distribute, transfer, or sublicense the Licensed Software. 2.3The Licensed Software shall not be copied in whole or in part except for keeping one (1) copy for back-up purposes. The Licensee shall secure or supervise the copy
- of the Licensed Software by the Licensee itself with great, strict, and due care. 2.4In no event shall the Licensee dump, reverse assemble, reverse compile, or reverse engineer the Licensed Software so that the Licensee may translate the Licensed
- Software into other programs or change it into a man-readable form from the source code of the Licensed Software. Unless otherwise separately agreed by Yokogawa, Yokogawa shall not provide the Licensee the source code for the Licensed Software.
- 2.5The Licensed Software and its related documentation shall be the proprietary property or trade secret of Yokogawa or a third party which grants Yokogawa the rights. In no event shall the Licensee be transferred, leased, sublicensed, or assigned any rights relating to the Licensed Software.
- 2.6Yokogawa may use or add copy protection in or onto the Licensed Software. In no event shall the Licensed Software may include a software program licensed for re-use by a third party (hereinafter called "Third Party Software", which may include any software program from affiliates of Yokogawa made or coded by themselves.) In the case that Yokogawa is granted permission to sublicense to third parties by any licensors (sub-licensor) of the Third Party Software pursuant to different terms and conditions than those stipulated in this Agreement, the Licensee shall observe such terms and
- conditions of which Yokogawa notifies the Licensee in writing separately. 2.8In no event shall the Licensee modify, remove or delete a copyright notice of Yokogawa and its licenser contained in the Licensed Software, including any copy thereof.

#### Article 3 (Restriction of Specific Use)

3.1The Licensed Software shall not be intended specifically to be designed, developed, constructed, manufactured, distributed or maintained for the purpose of the following events:

- Operation of any aviation, vessel, or support of those operations from the ground;, Operation of nuclear products and/or facilities;,
- b)
- Operation of nuclear weapons and/or chemical weapons and/or biological weapons; or Operation of medical instrumentation directly utilized for humankind or the human body.
- 3.2Even if the Licensee uses the Licensed Software for the purposes in the preceding Paragraph 3.1, Yokogawa has no liability to or responsibility for any demand or damage arising out of the use or operations of the Licensed Software, and the Licensee agrees, on its own responsibility, to solve and settle the claims and damages and to defend, indemnify or hold Yokogawa totally harmless, from or against any liabilities, losses, damages and expenses (including fees for recalling the Products and reasonable attorney's fees and court costs), or claims arising out of and related to the above-said claims and damages.

#### Article 4 (Warranty)

- 4.1The Licensee shall agree that the Licensed Software shall be provided to the Licensee on an "as is" basis when delivered. If defect(s), such as damage to the medium of the Licensed Software, attributable to Yokogawa is found, Yokogawa agrees to replace, free of charge, any Licensed Software on condition that the defective Licensed Software shall be returned to Yokogawa's specified authorized service facility within seven (7) days after opening the Package at the Licensee's expense. As the Licensed Software is provided to the Licensee on an "as is" basis when delivered, in no event shall Yokogawa warrant that any information on or in the Licensed
- Software, including without limitation, data on computer programs and program listings, be completely accurate, correct, reliable, or the most updated. 4.2Notwithstanding the preceding Paragraph 4.1, when third party software is included in the Licensed Software, the warranty period and terms and conditions that apply shall be those established by the provider of the third party software. 4.3When Yokogawa decides in its own judgement that it is necessary, Yokogawa may from time to time provide the Licensee with Revision upgrades and Version upgrades
- separately specified by Yokogawa (hereinafter called "Updates"). 4.4Notwithstanding the preceding Paragraph 4.3, in no event shall Yokogawa provide Updates where the Licensee or any third party conducted renovation or improvement of the Licensed Software
- 4.5THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF QUALITY AND PERFORMANCE, WRITTEN, ORAL, OR IMPLIED, AND ALL OTHER WARRANTIES INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED BY YOKOGAWA AND ALL THIRD PARTIES LICENSING THIRD PARTY SOFTWARE TO YOKOGAWA.
- 4.6Correction of nonconformity in the manner and for the period of time provided above shall be the Licensee's sole and exclusive remedy for any failure of Yokogawa to comply with its obligations and shall constitute fulfillment of all liabilities of Yokogawa and any third party licensing the Third Party Software to Yokogawa (including any liability for direct, indirect, special, incidental or consequential damages) whether in warranty, contract, tort (including negligence but excluding willful conduct or gross negligence by Yokogawa) or otherwise with respect to or arising out of the use of the Licensed Software.

Article 5 (Infringement)

- 5.1 If and when any third party should demand injunction, initiate a law suit, or demand compensation for damages against the Licensee under patent right (including utility model right, design patent, and trade mark), copy right, and any other rights relating to any of the Licensed Software, the Licensee shall notify Yokogawa in writing to that effect without delay.
- 5.2In the case of the preceding Paragraph 5.1, the Licensee shall assign to Yokogawa all of the rights to defend the Licensee and to negotiate with the claiming party. Furthermore, the Licensee shall provide Yokogawa with necessary information or any other assistance for Yokogawa's defense and negotiation. If and when such a claim should be attributable to Yokogawa, subject to the written notice to Yokogawa stated in the preceding Paragraph 5.1, Yokogawa shall defend the Licensee and negotiate with the claiming party at Yokogawa's cost and expense and be responsible for the final settlement or judgment granted to the claiming party in the preceding Paragraph 5.1.
- 5.3When any assertion or allegation of the infringement of the third party's rights defined in Paragraph 5.1 is made, or when at Yokogawa's judgment there is possibility of such assertion or allegation, Yokogawa will, at its own discretion, take any of the following countermeasures at Yokogawa's cost and expense.
  - To acquire the necessary right from a third party which has lawful ownership of the right so that the Licensee will be able to continue to use the Licensed Software: To replace the Licensed Software with an alternative one which avoids the infringement; or
  - To remodel the Licensed Software so that the Licensed Software can avoid the infringement of such third party's right.
- 5.4lf and when Yokogawa fails to take either of the countermeasures as set forth in the preceding subparagraphs of Paragraph 5.3, Yokogawa shall indemnify the Licensee only by paying back the price amount of the Licensed Software which Yokogawa has received from the Licensee. THE FOREGOING PARAGRAPHS STATE THE ENTIRE LIABILITY OF YOKOGAWA AND ANY THIRD PARTY LICENSING THIRD PARTY SOFTWARE TO YOKOGAWA WITH RESPECT TO INFRINGEMENT OF THE INTELLECTUAL PROPERTY RIGHTS INCLUDING BUT NOT LIMITED TO, PATENT AND COPYRIGHT.

#### Terms and Conditions of the Software License

#### Article 6 (Liabilities)

- 6.1If and when the Licensee should incur any damage relating to or arising out of the Licensed Software or service that Yokogawa has provided to the Licensee under the conditions herein due to a reason attributable to Yokogawa, Yokogawa shall take actions in accordance with this Agreement. However, in no event shall Yokogawa be liable or responsible for any special, incidental, consequential and/or indirect damage, whether in contract, warranty, tort, negligence, strict liability, or otherwise, including, without limitation, loss of operational profit or revenue, loss of use of the Licensed Software, or any associated products or equipment, cost of capital, loss or cost of interruption of the Licensee's business, substitute equipment, facilities or services, downtime costs, delays, and loss of business information, or claims of customers of Licensee or other third parties for such or other damages. Even if Yokogawa is liable or responsible for the damages attributable to Yokogawa and to the extent of this Article 6, Yokogawa shall be released or discharged from part or all of the liability under this Agreement if the Licensee modifies, combines with other software or products, or causes any deviation from the basic specifications or functional specifications, without Yokogawa's prior written consent.
- 6.2All causes of action against Yokogawa arising out of or relating to this Agreement or the performance or breach hereof shall expire unless Yokogawa is notified of the claim within one (1) year of its occurrence.
  6.3In no event, regardless of cause, shall Yokogawa assume responsibility for or be liable for penalties or penalty clauses in any contracts between the Licensee and its customers.

#### Article 7 (Limit of Export)

Unless otherwise agreed by Yokogawa, the Licensee shall not directly or indirectly export or transfer the Licensed Software to any countries other than those where Yokogawa permits export in advance.

#### Article 8 (Term)

This Agreement shall become effective on the date when the Licensee receives the Licensed Software and continues in effect unless or until terminated as provided herein, or the Licensee ceases using the Licensed Software by itself or with Yokogawa's thirty (30) days prior written notice to the Licensee.

#### Article 9 (Injunction for Use)

During the term of this Agreement, Yokogawa may, at its own discretion, demand injunction against the Licensee in case that Yokogawa deems that the Licensed Software is used improperly or under severer environments other than those where Yokogawa has first approved, or any other condition which Yokogawa may not permit.

#### Article 10 (Termination)

Yokogawa, at its sole discretion, may terminate this Agreement without any notice or reminder to the Licensee if the Licensee violates or fails to perform this Agreement. However, Articles 5, 6, and 11 shall survive even after the termination.

#### Article 11 (Jurisdiction)

Any dispute, controversies, or differences between the parties hereto as to interpretation or execution of this Agreement shall be resolved amicably through negotiation between the parties upon the basis of mutual trust. Should the parties fail to agree within ninety (90) days after notice from one of the parties to the other, both parties hereby irrevocably submit to the exclusive jurisdiction of the Tokyo District Court (main office) in Japan for settlement of the dispute.

#### Article 12 (Governing Law)

This Agreement shall be governed by and construed in accordance with the laws of Japan. The Licensee expressly agrees to waive absolutely and irrevocably and to the fullest extent permissible under applicable law any rights against the laws of Japan which it may have pursuant to the Licensee's local law.

#### Article 13 (Severability)

In the event that any provision hereof is declared or found to be illegal by any court or tribunal of competent jurisdiction, such provision shall be null and void with respect to the jurisdiction of that court or tribunal and all the remaining provisions hereof shall remain in full force and effect.

# Contents

	Notes about Using This Software	ii	
	How to Use This Manual	iii	2
	Software Version That This Manual Covers	iv	
	Terms and Conditions of the Software License	V	
Chapter 1	Product Overview		3
-	1.1 Product Overview	1-1	
	1.2 Workflow	1-5	
	1.3 System Requirements	1-6	4
Chapter 2	Configuring PX's Communication Control Settings		
-	2.1 Connecting the PX to Your PC	2-1	
	2.2 Setting USB Control Parameters	2-2	5
	2.3 Setting GP-IB Control Parameters	2-3	
	2.4 Setting Ethernet Control Parameters	2-4	
Chapter 3	Installation and Starting and Exiting the Software		6
-	3.1 Installation and Uninstallation	3-1	
	3.2 Starting and Exiting the Software	3-12	
Chapter 4	PX-PC Communication		7
	4.1 Configuring a New Set of PX-PC Communication Parameters (New connection)	4-1	
	4.2 Making the Communication Settings and Device Settings the Same as Those of the		
	Loaded File	4-4	8
	4.3 Using the Same Communication Settings as the Last Time		
	4.4 Switching to Offline		
Chapter 5	PX Configuration		9
	5.1 PX Configuration	5-1	
Chapter 6	Executing Measurements		10
	6.1 Executing Measurements	6-1	
Chapter /	Analyzing Measured Data	7 4	11
	7.1 Analysis Screen		
	Displaying the Analysis Screen		
	Toolbar Load Waveform Data (WPF file)		
	Save Data to CSV File		Арр
	Convert WPF File to CSV File		
	Recalculate Numeric Data		
	Select the History Waveform Number to Show		
	Turn On and Off Window Displays		Index
	Arrange Windows		
	Detail Settings of Each Window		
	Printing Analysis Results		
	Turning On or Off the Toolbar Text Display		
	-		

ex

1

#### Contents

	7.2	Numeric Display	
	7.3	Bar Graph Display	
	7.4	Vector Display	
	7.5	Waveform Display	
		Main Waveform Display Area	
		Zoom Waveform Display Area	
		History Waveform Display Area	
		X-Y Waveform Display Area	
		Measurement Result Display Area	
		Toolbar	
		Configuring Channels	
		Configuring the Display	
		Split Display	
		Moving Waveforms and Zooming (Expanding/Reducing) Vertically	7-38
		Moving Waveforms and Zooming (Expanding/Reducing) Horizontally	7-39
		Annotations	7-40
		Transferring to the Clipboard	7-54
		Reverse Video	
		Switching the Displayed Group	7-56
		Cursor Measurement	
		Automated Measurement	7-60
		Waveform Computation	7-72
	7.6	FFT Display	7-80
Chapter 8	Sav	ing and Loading Setup Parameters	
	8.1	Saving and Loading Setup Parameters	8-1
Chapter 9	Oth	er Features	
	9.1	Help Feature	9-1
	9.2	Viewing the Version Information	9-3
	9.3	Setting the Displayed Language	
	9.4	Editing the Displayed Language	
Chapter 10	Trou	ubleshooting	
-	10.1	If a Problem Occurs	10-1
	10.2	Error Messages	10-2
Chapter 11	Spe	cifications	
	11.1	Specifications	11-1

# 1.1 Product Overview

You can use the software to connect the PX8000 (hereafter referred to as the PX) to a PC and use the following features.

- · Retrieve, display, and save data that the PX has measured and setup parameters.
- Remotely control the PX.

You can connect a single PX to a PC and use the software to control the PX.

# **Compatible Measuring Instruments**

You can use the software with the following YOKOGAWA measuring instruments.

Product Name	Model	_
PX8000	PX8000	

### **Information Area**

The following information is displayed in the upper left of the screen.



1

#### Menus

The software has the following menus.



Connection: Used to configure the communication between the PX and PC.



Setting: Used to set PX's measurement conditions.



Measure: Used to execute measurements.



Analysis: Used to display measured results using numbers, bar graphs, vectors, waveforms, FFT, etc.



Save: Used to save and load setup parameters.



Exit: Used to close the software.

You can use the following menus of the software to process data. The details of each feature are provided below.

## Connection



You can connect a PX to the PC in which the software is installed through a communication interface. You can select any of the three available interfaces and search for devices to view the PXs that you can connect to.

## Setting



You can configure the PX settings, such as the voltage range, current range, and wiring system.

## Measure



Use this menu to start and stop PX measurements.

# PX Data Update Interval and the Software's Display Update Interval

When you click the Start/Stop button on the software, the PX starts acquiring measured data. The software collects image data from the PX and displays the PX screen in the software window.

- The PX data acquisition interval varies depending on measurement conditions including trigger conditions, record length, and math.
- The software's display update interval is set using the Measure screen (section 6.1).

#### Case 1: PX data acquisition interval < the software's display update interval

When the PX data acquisition interval is shorter than the software's display update interval, there will be measurement screens that will not be displayed on the software.



#### Case 2: PX data acquisition interval > the software's display update interval

When the PX data acquisition interval is longer than the software's display update interval, the software collects data after the data on the PX is updated, so the data displayed on the software will appear to be in sync with the PX data acquisition interval.



In either case, all the measured waveform data is retained in the PX. When you click the Start/Stop button on the software to stop data acquisition on the PX, the waveform data is collected from the PX into the software. Therefore, even in case 1, no data is left out from the collected waveform data, and you can use the waveform data to calculate numeric data, waveform data, and math data on the software.

#### Saving Measured Data

Measured waveform data is saved in WPF format (.wpf extension) in the PC. You can also save the waveform data and numeric data based on the waveform data in CSV format (.csv extension) using the Analysis menu, which is described later.

To save PX setup parameters and the software setup parameters, use the Save menu, which is described later.

1

## **Analysis**



Use this menu to display data that the PX has measured in the following manner.

## **Types of Display Screens**

The following types of display screens are available.

#### Numeric

Displays PX's measurement data numerically. For models with the harmonic measurement option (/G5), harmonic measurement data is also displayed.

#### Bar graph

Displays measured harmonic components for each harmonic order. Bar graphs can be displayed when the PX is equipped with the harmonic measurement option (/G5).

#### Vector

Displays using vectors the relationship of the phase difference and magnitude (rms value) between the fundamental waves U(1) and I(1) of each element assigned to the selected wiring unit. Vectors can be displayed when the PX is equipped with the harmonic measurement option (/G5).

#### Waveform

Displays the waveform data that has been collected from the PX.

#### FFT

Displays the results of taking the FFT of the waveform data that has been collected from the PX.

#### Save



Use this menu to save and load PX setup parameters and the software setup parameters.





Use this menu to close the software.

# 1.2 Workflow

The following figure shows the software workflow.



# 1.3 System Requirements

# PC

• CPU

Dual core or more 64-bit processor

- Memory 2 GB or more recommended
- HDD
   10GB free space or more

## **Operating System**

English version of Windows Vista,\* Windows 7,\* Windows 8,\* or Windows 8.1\*

\* Only 64-bit versions are supported.

# **Communication Board**

• GP-IB

NI (National Instruments)

- PCI-GPIB or PCI-GPIB+1
- PCIe-GPIB or PCIe-GPIB+1
  - 1 On Windows Vista or Windows 7: Use driver NI-488.2 Ver.2.7.2 or later. On Windows 8 or Windows 8.1: Use driver NI-488.2 Ver.3.1.0 or later.
- GPIB-USB-HS<sup>2</sup>
  - 2 On Windows Vista or Windows 7: Use driver NI-488.2 Ver. 2.8.1 or later. On Windows 8 or Windows 8.1: Use driver NI-488.2 Ver.3.1.0 or later.
- Ethernet

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

• USB

A USB port that supports USB Revision 1.1 or higher

# Display, Disk Drive, Printer, and Mouse

- Display Resolution
   1366×768 dots or higher
- Disk Drive
   A drive that can read CD-Rs
- Operating System

Operating system mentioned above

## ΡΧ

Product Name	Model
PX8000	PX8000

Number of PX8000s that can be connected to a PC: 1

# System Configuration Example and Performance Reference

For reference, the performance when the following PC and measurement data are used is provided on the next page.

### PC

PC 1		
Manufacturer:	Dell	
Model:	T1700	
	CPU:	Intel Xeon E3-1240V2 (3.4 GHz/4 core HT 4th generation)
	Memory:	DDR3 PC3-10600 4 GB
	HDD:	250 GB

### PC 2 (Customize PC 1)

Manufacturer:	Dell	
Model:	T1700	
	CPU:	Intel Xeon E3-1240V2 (3.4 GHz/4 core HT 4th generation)
	Memory:	DDR3 PC3-10600 16 GB
	SSD:	240 GB

#### PC 3

Manufacturer:	ASUS	
Model:	U24E PX	2430
	CPU:	Intel i5 2430M (2.4 GHz/2 core HT 2nd generation)
	Memory:	DDR3 PC3-10600 4 GB
	HDD:	750 GB

### **Measurement Data**

### Measurement Data 1

Record Length:	1 Mpoint
Time/div:	50 ms/div
Measurement Data:	Voltage, current, and active power of elements 1 to 3
	(U1, I1, P1, U2, I2, P2, U3, I3, P3)
WPF File Size:	18 MB

#### Measurement Data 2

Record Length:	100 Mpoint
Time/div:	100 ms/div
Measurement Data:	Voltage, current, and active power of elements 1 to 3
	(U1, I1, P1, U2, I2, P2, U3, I3, P3)
WPF File Size:	1777 MB

## **Performance (Reference)**

#### **Differences by Communication Interface**

Measurement data transfer time [s] between the PC and PX8000 when PC 1 is used

Measurement Data	Communication Interface			
	USB Interface	Ethernet	GP-IB	
Measurement Data 1	6	7	27	
Measurement Data 2	515	570	2544	

The measurement data processing speed and communication speed between the PX and PC increase in the following order.

GP-IB < Ethernet < USB Interface

#### **Differences by Memory and Storage Medium**

Measurement data loading and computation time [s] when PC 1 is used

Measurement Data	Memory	Communication Interface		
		SSD	Hybrid Hard Disk Drive	Hard Disk Drive
Measurement Data 1	4 GB	3	4	5
	16 GB	2	3	4
Measurement Data 2	4 GB	55	70	70
	16 GB	40	41	41

Measurement data loading speed and computation speed increase in the following order.

- Memory: 4 GB < 16 GB
- Storage medium: Hard disk drive = Hybrid hard disk drive < SSD

#### **Differences by PC Specifications**

Communication, computation, and CSV conversion time [s] when measurement data 1 is used

PC	Communication	Calculation	CSV Conversion		
			Waveform	Numeric	Direct
			Data	Data	Conversion*
PC 1	6	5	8	6	13
PC 2	6	2	8	6	13
PC3	6	6	14	8	22

 Converting waveform data (WPF file) directly to CSV format without loading the data in the software.

Communication, computation, and CSV conversion time [s] when measurement data 2 is used

PC	Communication	Calculation	CSV Conversion		
			Waveform	Numeric	Direct
			Data	Data	Conversion*
PC 1	515	133	955	91	1135
PC 2	515	60	660	38	726
PC3	515	194	1575	189	1672

Measurement data computation speed and CSV conversion speed increase with higher PC specifications.

#### Note.

The performance data provided above is for reference. It does not guarantee the performance.

# 2.1 Connecting the PX to Your PC

### CAUTION

Be sure to turn off the PC and the PX before you connect or remove communication cables. Otherwise, erroneous operation or internal circuitry damage may result.

### When Using the USB Interface

Connect the USB port for PCs (type B connector) on the side panel of the PX to the PC.

### When Using the GP-IB Interface

The PX is equipped with an IEEE St'd 488-1978 24-pin GP-IB connector. Use a GP-IB cable that conforms to this standard.

Connect the cable to the GP-IB connector on the side panel of the PX.

Use an appropriate connector to connect the other end of the cable to the PC.

#### When Using the Ethernet Interface

To connect the PX to the PC, use a straight UTP (Unshielded Twisted-Pair) or STP (Shielded Twisted-Pair) cable through a hub or similar device. Connect the cable to the ETHERNET port on the side panel of the PX. The data rate varies depending on the product. Use a hub, cables, and network card that are appropriate for the data rate.



#### Note

- When you connect to a 100BASE-TX network, use a category 5 or better UTP (unshielded twisted-pair) or STP (shielded twisted-pair) cable.
- Do not connect the PX to the PC directly. Direct communication is not guaranteed to work.

# 2.2 Setting USB Control Parameters

### Procedure

There are no USB control parameters.

To view the serial number that is used in USB TMC communication, see section 2.4 in the PX8000 Communication Interface User's Manual (IM PX8000-17EN).

### Description

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. The PX8000 ID is its instrument number. When you connect the PX to the PC, make sure that the PX ID does not overlap with those of other devices.

#### Note.

- When you connect a PX to a PC and use the software to control the PX, you cannot use multiple types of communication interface at the same time.
- The PX may not operate properly if the PX is connected to the PC through converters (such as a GP-IB to USB converter). For more details, contact your nearest YOKOGAWA dealer.

# 2.3 Setting GP-IB Control Parameters

#### Procedure

Follow the procedure in section 3.4 in the PX8000 Communication Interface User's Manual (IM PX8000-17EN) to set the GP-IB control parameters.

### Description

#### **Setting the Address**

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

Each device that is connected in a GP-IB system has its own unique address. This address is used to distinguish between different devices. Therefore, you must assign a unique address to the PX when you connect it to a PC or other device.

#### Note.

- When the controller (PC) is using the GP-IB bus, do not change the address of any connected devices.
- When you connect a PX to a PC and use the software to control the PX, you cannot use multiple types of communication interface at the same time.
- On the PC end, use a GP-IB board (or card) made by NI (National Instruments). For details, see section 1.3.
- The PX may not operate properly if the PX is connected to the PC through converters (such as a GP-IB to USB converter). For more details, contact your nearest YOKOGAWA dealer.

# 2.4 Setting Ethernet Control Parameters

### Procedure

Follow the procedure in section 1.4 in the PX8000 Communication Interface User's Manual (IM PX8000-17EN) to set the Ethernet control parameters.

## Description

### **Setting Ethernet Control Parameters**

To use the software over a network, set the TCP/IP parameters.

#### Note\_

- When the controller (PC) is using the Ethernet interface, do not change the above settings of any connected devices.
- When you connect a PX to a PC and use the software to control the PX, you cannot use multiple types of communication interface at the same time.
- The PX may not operate properly if the PX is connected to the PC through converters (such as a GP-IB to USB converter). For more details, contact your nearest YOKOGAWA dealer.

# 3.1 Installation and Uninstallation

### Installation

Prepare the CD that contains the software. Before installing the software, close all programs that are currently running.

If an older version of PowerViewerPlus is installed, uninstall it from Control Panel (see page 3-9). The following procedure explains how to install the software on Windows 7. The windows that appear will vary depending on the operating system.

- 1. Turn on the PC and start Windows. Log on as an administrator.
- 2. Insert the installation disk that contains this software into the CD drive.
- 3. On the PC, select the CD drive.

#### Installing PowerViewerPlus

4. Double-click PowerViewerPlus\_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**.

PowerViewerPlus			
Welcome to the PowerVie	ewerPlus S	etup Wizard	
The installer will guide you through the ste	ps required to insta	ill PowerViewerPlus (	on your computer.
WARNING: This computer program is prot Unauthorized duplication or distribution of or criminal penalties, and will be prosecute	this program, or an	y portion of it, may re	sult in severe civil
	Cancel	< <u>B</u> ack	Next >

#### 3.1 Installation and Uninstallation

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.

😸 PowerViewerPlus		- • ×		
License Agreemen	t			
Please take a moment to read t Agree", then "Next". Otherwise		ou accept the terms below, click ''I		
Terms and Condition	s of the Software Lic	ense 🔺		
Yokogawa Meters & Instruments Corporation, a Japanese corporation (hereinafter called "Yokogawa"), grants permission to use this Yokogawa Software Program (hereinafter called the "Licensed Software") to the Licensee on the conditions that the Licensee agrees to the terms and conditions stipulated in Article 1 hereof.				
C I Do Not Agree				
	Cancel	< <u>B</u> ack <u>N</u> ext >		

- 7. Select the installation destination, and click Next.
  - Click **Browse** to specify the destination. The default installation destination is as follows: C:\ProgramFiles\YOKOGAWA\PowerViewerPlus

B PowerViewerPlus		
Select Installation Folde	Ş.	
The installer will install PowerViewerPlus	to the following folder.	
To install in this folder, click "Next". To i	nstall to a different folder, enter it be	low or click "Browse".
Eolder: C:\Program Files\Y0K0GAWA\Pow	erViewerPlus\	B <u>r</u> owse
		<u>D</u> isk Cost
Install PowerViewerPlus for yourself, or	r for anyone who uses this compute	r:
Everyone		
⊂ Just <u>m</u> e		
	Cancel < <u>B</u> ack	Next >

**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.

😸 PowerViewerPlus			
Confirm Installation			
The installer is ready to install PowerView	erPlus on your corr	puter.	
Click "Next" to start the installation.			
		1	1
	Cancel	< <u>B</u> ack	<u>N</u> ext >

9. When the software installation finishes normally, the following window appears. Click Finish to complete the installation. YOKOGAWA > PowerViewerPlus > PowerViewerPlus will be added to All Programs in the Windows Start menu.

PowerViewerPlus			- • 💌
Installation Complete			
PowerViewerPlus has been successfully	installed.		
Click "Close" to exit.			
	Cancel	< <u>B</u> ack	

Next, the YKMUSB driver installation wizard starts automatically.

# Installing YKMUSB (USB Driver)

1. Follow the instructions on the screen, and then click Next.

25	Welcome to the InstallShield Wizard for YKMUSB64
0	The InstallShield(R) Wizard will install YKMUSB64 on your computer. To continue, click Next.
	WARNING: This program is protected by copyright law and international treaties.
	< Back Next > Cancel

2. If the USB cable is connected to the PC, remove the cable, and click Next.

岁 YKMUSB64 - InstallShield Wizard	×
Disconnect USB cable	
Disconnect USB cable from the instruments to install USB Driver.	
InstallShield	
< <u>B</u> ack Next >	Cancel

**3.** A window prompting you to start the installation appears. If the installation settings are okay, click **Install**. The software installation starts.

Click **Back** if you want to change the installation settings.

Click **Cancel** to cancel the installation.

H YKMUSB64 - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back

- **4.** The "User Account Control" window will appear during the installation. Click **Allow** or **Yes** to continue the installation. The installation will continue.
- **5.** A "Window Security" window will appear during the installation. Click **Install**. The installation will continue.
- **6.** When the software installation finishes normally, the following window appears. Click **Finish** to complete the installation.



Next, the Microsoft Visual C++ 2008 Redistributable setup wizard starts automatically.

## Installing Microsoft Visual C++ 2008 Redistributable Setup

- **1.** The "User Account Control" window will appear during the installation. Click **Allow** or **Yes** to continue the installation. The installation will continue.
- 2. Follow the instructions on the screen, and then click Next.



3. If you agree with the license terms, select I have read and accept the licence terms, and click Next.

Otherwise, select Cancel. The installation will be canceled.

🔀 Microsoft Visual C++ 2008 Redistributable Setup	- • •
License Terms	
Be sure to carefully read and understand all the rights and restrictions desc license terms. You must accept the license terms before you can install the	
MICROSOFT SOFTWARE LICENSE TERMS MICROSOFT VISUAL C++ 2008 RUNTIME LIBRARIES (X86, IA64 AND X64) PACK 1 These license terms are an agreement between Microsoft Corporation (or b where you live, one of its affiliates) and you. Please read them. They app software named above, which includes the media on which you received it, terms also apply to any Microsoft • updates,	based on bly to the
Press the Page Down key to see more text.	Print
I have read and accept the license terms. <pre></pre>	<u>C</u> ancel

**4.** When the software installation finishes normally, the following window appears. Click **Finish** to complete the installation.



If a National Instrument's (NI's) USB driver is already installed in a Windows Vista system, you must switch the USB driver using the OS device manager according to the procedure on the next page.

#### Changing the USB Driver

If a National Instrument's (NI's) USB driver is already installed in a Windows Vista system, you must switch the USB driver using the OS device manager according to the following procedure. This procedure is not necessary on Windows 7, Windows 8, or Windows 8.1.

- 1. Turn on the PX, and connect the PX to the PC using a USB cable.
- 2. On the Windows Start menu, right-click Computer, and click Manage.
- 3. Click Device Manager.
- 4. Right-click USB Test and Measurement Device (IVI)\* under USB Test and Measurement Devices.\* Select Update Device Software. The Hardware Update Wizard starts.
  - \* The folder name varies depending on the type of USB driver, which is made by NI (National Instruments).



5. Select Browse my computer for driver software.



6. Select Let me pick from a list of device drivers on my compyter, and then click Next.

~		×
G	Update Driver Software - USB Test and Measurement Device (IVI)	
	Browse for driver software on your computer	
	Search for driver software in this location:	
	C:\Users\Public\Documents	
	Include subfolders	
	A transmission that for the first statement of the	
	Let me pick from a list of device drivers on my computer This list will show installed driver software compatible with the device, and all driver software in the same category as the device.	
	Next Cancel	ſ
		- C

7. Select PX series, and then click Next. The software installation starts.

Update Driver Software - USB Test and Measure	ement Device (IVI)
Select the device driver you want to ins Select the manufacturer and model of your hard have a disk that contains the driver you want to	Iware device and then click Next. If you
Show compatible hardware	
Model	
This driver is digitally signed.	Have Disk
	Next Cancel

#### 3.1 Installation and Uninstallation

**8.** When the software installation finishes normally, the following window appears. Click **Close** to complete the installation.



**9.** Keep the USB cable connected between the PX and PC, turn off the PX, and then turn it back on.

The USB driver folder will be changed as follows.



## Uninstallation

This section explains how to uninstall the software on Windows 7.

- 1. On the Windows Start menu, click Control Panel.
- 2. Click Uninstall a program in the Control Panel.

## **Uninstalling PowerViewerPlus**

- 3. Right-click PowerViewerPlus, and then click Uninstall.
- 4. A uninstallation confirmation window appears.

Click Yes to uninstall PowerViewerPlus.

Click No to cancel.

**5.** On Windows Vista or Windows 7, the "User Account Control" window will appear during the uninstallation. Click **Allow** or **Yes** to continue the installation. The uninstallation will continue.

## **Uninstalling YKMUSB (USB Driver)**

**6.** On the uninstallation window, right-click **YKMUSB**, and then click **Uninstall**. The uninstallation will proceed in a similar manner as described above.

### Uninstalling Microsoft Visual C++ 2008 Redistributable

6. On the uninstallation window, right-click **Microsoft Visual C++ 2008 Redistributable**, and then click **Uninstall**. The uninstallation will proceed in a similar manner as described above.

# 3.2 Starting and Exiting the Software

# **Preparation before Starting the Software**

Do the following before you start the software.

- Turn on the PX8000.
- Connect communication cables, and set communication interface parameters. (See chapter 2.)

# **Starting the Software**

- 1. To start the software, click the Start button, All Programs, YOKOGAWA, PowerViewerPlus, and then PowerViewerPlus.
- 2. The "User Account Control" window will appear during the installation. Click Allow or Yes.

Menu area

When the software starts, the Connection menu will appear.

- To switch to online mode and collect data from the PX into the PC, proceed to chapter 4, "PX-PC Communication."
- · To remain in offline mode and perform analysis using the setup parameters and measured data that

have already been collected, select in the menu area, and proceed to chapter 7, "Analyzing Measured Data."

# Exiting the Software

- 1. Click in the menu area. The exit screen appears.
- 2. Click Yes. The software will close.



# 4.1 Configuring a New Set of PX-PC Communication Parameters (New connection)

1. Click with the menu area. The Connection screen appears.

When you start the software, this screen appears automatically.



If you have connected the PX through the GP-IB or Ethernet interface, the following message appears. Follow the procedure on the next page to set the communication parameters.



If the above message appears even after you set the communication parameters, check the following items.

- Is the PX turned on?
- · Is the communication interface cable connected?
- If a National Instrument's (NI's) USB driver is already installed in a Windows Vista system, you must switch the USB driver using the OS device manager. (See page 3-6.)
## **Connection Condition**

2. To create a new connection, click New Connection.

0	Connection Condition
0	New Connection
	Same Condition as Loaded File
	Same Condition as Last Execution

## **Equipment List**

#### **Connection Procedure**

3. Select how to connect the PX to the PC from USB-TMC, Ether, and GPIB.

📿 Equip#	ent List	t		
🖲 USB-TN	/IC	🔘 Ether	🔘 GPIB	D
Device S	Search			
Model	Serial	Status		
			2	

#### 4. Click Device Search.

•

- The following information is displayed about the connectable PXs.
- USB connection:
- GP-IB connection: Ethernet connection:
  - Model name, serial number (instrument number), GP-IB address Model name, serial number (instrument number), IP address

Model name, serial number (instrument number)

#### Example of a USB Connection



#### Note\_

If you connect the PX to the PC through the USB interface, turn on the PX, and then start the software, a list of connectable PXs will appear.

## **Starting the Connection**

5. Click Connect. The communication with the peer PX begins.

C Connection		
Connect		

If an online connection is established between the PX and PC, the software window changes as follows.

#### Information Area

The connection status in the information area shown in the upper left of the window changes as follows.



#### **Connect Status Illustration**

An illustration indicating the connection status is displayed as shown below.



#### Installed Module Information

- (9: Power element (Element, a pair of 760811 voltage module and 760812 current module)
- AUX module (MotorMode = OFF)
- O: AUX module (MotorMode = ON)

For example, 000 indicates that two power elements and one AUX module are installed.

#### Note.

- You cannot proceed to Setting or Measure until an connection is established.
- If any of the following circumstances apply when you click Connection to start communication, a communication error will occur.
  - The peer PX is not ready to measure.
  - · The GP-IB address, IP address, user name, or password is incorrect.
  - There is no response from the peer PX.
  - · When multiple PXs are connected, not all the PX models or options are the same.
- The following settings on the PX are turned off when an online connection is established. If the connection changes to offline, the settings return to their original states.
  - Averaging
  - Auto range
- The history of the measurement data before online connection is cleared when an online connection is established.

## 4.2 Making the Communication Settings and Device Settings the Same as Those of the Loaded File

To execute the operation described in this section, load the device settings into this software in advance according to the procedure provided in section 8.1, "Saving and Loading Setup Parameters."

- 1. Click pin the menu area. The Connection screen appears.
- 2. In the Connection Condition dialog box, click Same Condition as Loaded File.

Connection Condition
New Connection
Same Condition as Loaded File
Same Condition as Last Execution

## **Starting the Connection**

3. Click Connect. The communication with the peer PX begins.



#### Note.

- · You cannot proceed to Setting or Measure until an connection is established.
- If any of the following circumstances apply when you click Connection to start communication, a communication error will occur.
  - The peer PX is not ready to measure.
  - · The GP-IB address, IP address, user name, or password is incorrect.
  - There is no response from the peer PX.
  - · You are trying to connect to a different PX from the last time.
  - When multiple PXs are connected, not all the PX models or options are the same.

# 4.3 Using the Same Communication Settings as the Last Time

- **1.** Click in the menu area. The Connection screen appears.
- 2. In the Connection Condition dialog box, click Same Condition as Last Execution.

Connect	ion Cond	lition	
New Conr	nection		
🔘 Same Cor	ndition as	Loaded File	
💿 Same Cor	ndition as	Last Executio	on

#### Note\_

You cannot select "Same Condition as Last Execution" the first time you start the software.

## Starting the Connection

3. Click Connect. The communication with the peer PX begins.

Connection	
Connect	

#### Note.

- You cannot proceed to Setting or Measure until an connection is established.
- If any of the following circumstances apply when you click Connection to start communication, a communication error will occur.
  - The peer PX is not ready to measure.
  - The GP-IB address, IP address, user name, or password is incorrect.
  - There is no response from the peer PX.
  - You are trying to connect to a different PX from the last time.
  - When multiple PXs are connected, not all the PX models or options are the same.

## 4.4 Switching to Offline

- 1. Click in the menu area. The Connection screen appears.
- 2. While connected, click Disconnect. The connection between the PX and PC is disconnected.



When the connection is cut and the PX and PC are offline, an illustration indicating this state appears.



## 5.1 PX Configuration

Setting			
C Acquire	🖉 Input		
Time / div 10ms/div 👻	Element Independent   Off  On		
Record Length 2.5M	Element1 Element2	AUX7	AUX8
ACQ Mode Normal -	Wiring 1P2W - 1P2W -	MotorMode OFF -	
ACQ Count 🛛 Infinite 1 🚔	U range 6V 🔹 1.5V 👻	Pm Scaling 1.0000 🚔	
Weight 16 -	Irange 5V V 5A V	SyncSource None -	
Time Base 💿 Int 💿 Ext	Ext Sensor On	Sense Type 🛛 🗸 🗸	Analog
Pulse/Rotate 1 🚖	SensorRatio(mV/A) 10.0000 🔿 10.0000 🔿	Range 250V -	250V
Calculation Mode Measure Off @ On Setting Numeric Off @ On Setting	SyncSource U1 V2 V	Bandwidth FULL 👻	FULL
Calculation	Line Filter OFF	Coupling DC -	DC
Mode Measure ◯ Off	Freq Filter OFF	Probe 10:1 -	10:1
Numeric Off On Setting	Scaling OFF	AUX7 AUX8	
Harmonics Off I On Setting	VT Scaling 1.0000 🖨 1.0000 🖨	Scaling Mode         Off         Off           A         1.0000         1.0000	
Math Off On Setting	CT Scaling 1.0000 🖨 1.0000 🖨	B 0.0000 0.0000	
	SF Scaling 1.0000 - 1.0000	P1[X] 1.0000 1.0000 P1[Y] 1.0000 1.0000	
X-Y Setting		P9DV1 5 0000 5 0000	
O Trigger			
Mode Single - Sett	ting O Simple		
Position 50.0 🗢 🐒	C Enhanced		
Delay 0.00 to us Sour	arce U1 -		
Hold Off 0.00 🔿 us Slop	pe Rise 💌		
	el 0.00 🚔 V		

## **Notes on Operation**

Note the following points when you use the software to configure the PX.

- For details on settings, see the PX User's Manual IM PX8000-01EN.
  - There are two ways to view the PX User's Manual.
  - Use the help feature. For details, see page 9-2.
  - View the PDF file in the Manuals folder on the CD-R.

Examples of Setting screens are provided in the remainder of this section.

Unavailable tools, setting boxes, and setup parameters appear dimmed.

If waveform data (WPF file) is loaded in offline mode, all settings appear dimmed, and you can check the settings that were used when the WPF file was saved.

## **Configuring Waveform Acquisition**

C Acquire		
Time / div	10ms/div 👻	
Record Length	2.5M -	
ACQ Mode	Normal 👻 –	—— Acquisition mode
ACQ Count	🔽 Infinite 👘 1 🚔 —	Measurement count
Weight	16 -	—— You can set this when the acquisition r
Time Base	💿 Int 💿 Ext	is Average and the count is Infinite.
Pulse/Rotate	1	

For details on settings, see the following chapters in the PX User's Manual IM PX8000-01EN.

- Time/div: Chapter 4
- Record length, acquisition mode, measurement count, attenuation constant, time base, pulse per rotation: Chapter 6

## Input Settings

🖸 Input							
Element Independent	💿 Off 🔘 On						
	Element 1	Element2	1	A	UX7	AUX8	
Wiring	1P2W 👻	1P2W 👻	MotorMode	OFF	•		
U range	6V -	1.5V -	Pm Scaling	1	.0000		
I range	5V 🔹	5A 👻	SyncSource	None	•		
Ext Sensor	On 👻	Off 🔹	Sense Type	Analog	-	Analog	•
SensorRatio(mV/A)	10.0000 🚖	10.0000 🌲	Range	250V	•	250V	•
SyncSource	U1 🔻	U2 -	Bandwidth	FULL	-	FULL	-
Line Filter	OFF 👻	OFF 👻	Coupling	DC	•	DC	•
Freq Filter	OFF 👻	OFF 👻	Probe	10:1	•	10:1	•
Scaling	OFF 👻	OFF 🔻		AUX7	AUX8		_
VT Scaling	1.0000 🚖	1.0000 ≑	Scaling Mode	Off	Off		
CT Scaling	1.0000 🚖	1.0000 🚖	AB	1.0000	1.0000		
SF Scaling	1.0000 🜲	1.0000 🔶			1.0000		
			P1[Y]	1.0000	1.0000		
			P2F√1	5 0000	5.0000		

You can set these when Scaling Mode is not set to Off

For details on settings, see the following chapters in the PX User's Manual IM PX8000-01EN.

- Wiring system, synchronization source (Element), line filter, frequency filter, scaling, VT ratio, CT ratio, power coefficient (SF), motor mode, Pm scaling, synchronization source (AUX): Chapter 2
- Voltage range, current range, external current sensor, sensor conversion ratio, scaling mode (AUX), sensor type (input signal type), range (AUX, bandwidth limit, input coupling, probe attenuation: Chapter 3

## **Calculation Settings**

(	🖉 Calcula	tion		)
Automated measurement of waveform parameters	Mode – Measure	Off  On	Setting	The Off/On of each item indicates the computation setting on the PX.
Numeric computation	- Numeric	🔘 Off 💿 On		Even if all of them are Off, the software can compute
Harmonic measurement ——— Waveform computation ———		<ul> <li>Off <ul> <li>Off <ul> <li>On</li> <li>Off <ul> <li>On</li> </ul> </li> </ul></li></ul></li></ul>		the items and display the results.
X-Y waveform display		—— X-Y	Setting	The corresponding detail setting box will appe

For details on settings, see the following chapters in the PX User's Manual IM PX8000-01EN.

- Automated measurement of waveform parameters: Chapter 16
- Numeric computation, harmonic measurement: Chapters 2 and 9
- Harmonic measurement: Chapter 9
- Waveform computation: Chapter 17 and 18
- X-Y waveform display: Chapter 13

## Detailed Setting Box for Automated Measurement Of Waveform Parameters Item tab



#### Other tab

		<sup>1</sup>															
ime Range 1	-5.00 🜲	div	Detail Paramet	er													_
me Range2				U1	I1	P1	U2	12	P2	AUX7	AUX8	MATH1	MATH2	MATH3	MATH4	MATH5	M
ne kangez	5.00 ≑	div	Mode	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Cycle Mode	OFF		Distal	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90
			Mesial	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50
de Trace	U1	~		10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%		10.0%	10.0%	10.0%	10
				Auto	Auto	Auto		Auto	Auto	Auto	Auto	Auto		Auto	Auto	Auto	AL
			Integ Mode	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Nc
			<														۴
			< Delay Setup	U1	I1	P1	U2	II2	P2	AUX7	AUX8	MATH1	L MATH2	MATH3	3 MATH	4 MATH	
				U1 Off	I1 Off	P1 Off	U2 Off			AUX7 Off	AUX8	MATH1	L MATH2	2 MATH3 Off	3 MATH	4 MATH Off	
			Delay Setup		Off			I2	P2								
			Delay Setup Mode Polarity Edge Count	Off	Off	Off	Off	I2 Off	P2 Off	Off							
			Delay Setup Mode Polarity Edge Count Reference	Off Rise	Off Rise 1	Off Rise 1	Off Rise 1	I2 Off Rise	P2 Off Rise 1	Off Rise 1	Off Rise 1	Off Rise	Off Rise	Off Rise	Off Rise	Off Rise 1 Trace	
			Delay Setup Mode Polarity Edge Count Reference RT:Trace	Off Rise 1 Trao U1	Off Rise 1 e Trao U1	Off Rise 1 e Trace U1	Off Rise 1 Trace U1	I2 Off Rise 1 Trace U1	P2 Off Rise 1 Trace U1	Off Rise 1 Trace U1							
			Delay Setup Mode Polarity Edge Count Reference RT:Trace RT:Polarity	Off Rise 1 Trao U1 Rise	Off Rise 1 e Trao U1 Rise	Off Rise 1 e Trace U1 Rise	Off Rise 1 Trace U1 Rise	I2 Off Rise 1 Trace U1 Rise	P2 Off Rise 1 Trace U1 Rise	Off Rise 1 Trace U1 Rise							
			Delay Setup Mode Polarity Edge Count Reference RT:Trace	Off Rise 1 Trao U1 Rise	Off Rise 1 e Trao U1	Off Rise 1 e Trace U1	Off Rise 1 Trace U1	I2 Off Rise 1 Trace U1	P2 Off Rise 1 Trace U1	Off Rise 1 Trace U1							

riod ZeroCross V Formula	UserDefined Fu	nction		
S Formula	ns 🔹 📃 Function	Expression	Name	Unit
SQ Formula TYPE1	<ul> <li>Function 1</li> </ul>	P(E1)-P(E2)	P-loss	W
Averaging Off   Pc Formula	Function2	(UPPK(E1)-UMPK(E1))/2/UDC(E1)*100	U-ripple	8
	(1076) Function3	(IPPK(E1)-IMPK(E1))/2/IDC(E1)*100	I-ripple	8
Count 🥃 Select Standard IEC76-1(	(1976)  Function4	DELTAU1RMS(SA)	D-Urms	V
Phase 180degrees  P1	0.5000 E Function5	DELTAU2RMS(SA)	D-UrmsS	V
	Function6	DELTAU3RMS(SA)	D-UrmsT	V
P2	0.5000 📃 Function7	DELTAU1MN(SA)	D-UmnR	V
	Function8	DELTAU2MN(SA)	D-UmnS	V
	Function9	DELTAU3MN(SA)	D-UmnT	V
[ 1 ] [ 2 ]	Function 10	360-PHIU1U3(SA)+PHIU1U2(SA)	PhiU3	deg
lement	E Function 11	PPPK(E1)-PMPK(E1)	Pp-p	W
[ 1P2W ] [ 1P2W ]	E Function 12	DELTAU1RMN(SA)	F12	٧
η Formula	E Function 13	DELTAU2RMN(SA)	F13	V
P2 • P1 •	E Function 14	DELTAU3RMN(SA)	F14	V
	Function 15	DELTAU1DC(SA)	F15	V
η 1 = * 100[%] η 2 = * 1	100[%] 📃 Function 16	DELTAU2DO(SA)	F16	V
P1 • P2 •	E Function 17	DELTAU3DO(SA)	F17	V
	E Function 18	DELTAU1MN(SA)	F18	V
Off • Off •	E Function 19	DELTAU2MN(SA)	F19	V
$\eta 3 =$	100[%]	DELTAU3MN(SA)	F20	V
Udef1 = P1 + None + None + None + No	one 🔹			
Udef2 = P1 • + None • + None • + No	one 🔻			
⊿ Measure SigmaA SigmaB				
Type				
	•			_

## **Detailed Setting Box for Numeric Computation**



Harmonics	<b>x</b>
PLL Source	U1 -
Min Order	1 🔹
Max Order	100 🚔
Thd Formula	1/Total 👻
Start Position	-5.000 div
	OK Cancel

### **Detailed Setting Box for Waveform Computation**

StartPoint	-5.00 ≑ div		Math1	Math2	Math3	Math4	Math5	Math6	Math7	Math8	
EndPoint	5.00 🔷 div	Operation	User Defin	e Off	Off	Off	Off	Off	Off	Off	
Constant Setup	5.00 🗢 🖬	Display	On			On	On	On		On	
		Unit									
К1	1.0000	Label	Math1		Math3	Math4	Math5			Math8	
K2	1.0000	Scaling Mod	le Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
КЗ	1.0000	Upper								1.0000	
NO	1.0000	Lower								-1.0000	
К4	1.0000	Source									You can set these when
К5	1.0000	Source 1									Operation is not set to C
1.5	1.0000	Source2									Operation is not set to C
К6	1.0000	Thr Upper								0.000000	
К7	1.0000	Thr Lower								0.000000	
N	1.0000	Shift	0.00us	0.00us	0.00us	0.00us	0.00us	0.00us	0.00us	0.00us	
K8	1.0000	Expression	C1			C4		C6		C8 )	
FFT Setup							Filter Setup				
StartPoint	-5.00 ≑	div		FFT1	FFT2				Filter 1	Filter 2	
		Dis	play	Off	Off		Filter Type	Gaus	is 🔹	Gauss 🔻	
FFT Points	1k	Uni	t				Filter Band		Pass •	Low-Pass	
Main Ratio	50%	▼ Typ	e	PS	PS		riter banu	LOW			
		Sut	Туре	LOGMAG	LOGMAG		CutOff1		10.0 ≑	% 10.0 🔷 %	
Window Layout	Side	Sou	irce	U1	U1		CutOff2		10.0 🜲	% <u>10.0</u> ∲ %	
FFT Window		Sou	irce1				Cuton2		10.0	70 10.0 70	
			irce2								
Window	Hanning	<ul> <li>Ver</li> </ul>	t.ScaleMode	Auto	Auto						
Damping Rate	100 🜲	% Cer									
		Ser	nsitivity								
Force1	100 🛬	1.00			Log Hz						
Force2	100 🜲				Auto						
		Lef			OkHz						
		Rig			500kHz						
		Ho			250kHz						
		Spa	in	500kHz					ſ	OK Cancel	

#### Detailed Setting Box for X-Y Waveform Display

Main Ratio	50% -	Window1						
		Display	Off 👻		XY1	XY2	XY3	XY4
Window Layout	Side 🔻	Start Point	-5.00 🌻 div	Display	On	Off	Off	Off
Combine Display	Off 🔻			X Trace	U1	U1	U1	U1
Dot Connect	Line 🔻	End Point	5.00 ≑ div	Y Trace	I1	I1	I1	I1
Decimation Trace Clear on Start	100k •	Display	Off 🔻		XY5	XY6	XY7	XY8
Trace Clear on Start	On 🔻	Display	Off 🔻		XY5	XY6	XY7	XY8
		Start Point	-5.00 🖨 div	Display	On	Off	Off	Off
				X Trace	U1	U1	U1	U1
		End Point	5.00 ≑ div	Y Trace	I1	I1	I1	I1

## **Trigger Settings**

The items in the setting box varies depending on the trigger type, trigger source, and so on.

Setting Box Example for When Trigger Type Is Simple

	C Trigger			
	Mode	Single 👻	Setting	Simple
Position —	Position	50.0 🚖 😠		Enhanced
Delay —	Delay	0.00 🚖 us	Source	U1 🔻
	Hold Off	0.00 🚖 us	Slope	Rise 👻
			Level	0.00 🚔 V
			Hysteresis	Low -

Setting Box Example for When Trigger Type Is Enhanced

C Trigger								
Mode	Single 👻	Setting	🔘 Simple		A State	B State	Level	Hys
Position	50.0 🔿 😠		Enhanced	U1	High	High	0.00	Low
		Туре	A -> B(N) ->	I1	Off	Off	0	Low
Delay	0.00 🚖 us	Type		P1	Off	Off	0.00	Low
Hold Off	0.00 🚔 us	ACondition	Enter 👻	U2	Off	Off	0	Low
				12	Off	Off	0.00	Low
		BCondition	Enter 👻	P2	Off	Off	0.00	Low
		Count	1 🚔	AUX7	Off	Off		Low
				AUX8	Off	Off		Low
		1						

For details on settings, see the chapter 5 in the PX User's Manual IM PX8000-01EN.

## 6.1 Executing Measurements

1. Click in the menu area. The Measure screen appears. 💌 Meas 0 1 - Sec Numeric+Wave -ON P. callode Start/Stop U1 : 6V Position : 0.00 div Kain:2.0K 📝 Detail Setting Save time to stop Urms1 \_\_\_\_ Histor W History clear at the start Clear **P** LoggerSetup Irms1 \_\_\_\_ Bun Calibration Calibrated at the start Calibrated every time Automatic calibration of Aux **P**1 F R λ1 NULL Off \_ \_ \_ \_ 🔿 On Setting 12.00V 3.010V 250.1V 🜍 Waveform data stor V Detail Setting 12.007 250.07 1.0000 10.000 10.000 Save Setup History One 👻 Select Save Trace All ON ♥ U1 ♥ I1 ♥ P1 ♥ U2 ♥ 12 ♥ P2 Harmonics Statu: PLL:01 -----AUX7 1**0.00**a 250 07 Location C#Program Files#YOKOGAWA#F Folder... B 🔽 AutoNamine 15.00 V 50.0000E Name Save ? PrintTo 2014/04/17 15:19:3

## **Notes on Operation**

Note the following points when you use the software to configure the PX.

- For details on settings, see the PX User's Manual IM PX8000-01EN.
  - There are two ways to view the PX User's Manual.
  - Use the help feature. For details, see page 9-2.
  - View the PDF file in the Manuals folder on the CD-R.

Examples of Measure screens are provided in the remainder of this section.

## **Measurement Control Settings**

Measurement control  Start/Stop  Detail Setting  Save time to stop  History History clear at the start Clear  LoggerSetup Run at the start Calibration Calibrated at the start Calibrated every time Automatic calibration of Aux	<ul> <li>Select the che</li> <li>When waveford data is downloat the save destistic storage dialog</li> <li>The history is Even if this cha clearing the h</li> </ul>	eck box to show rm acquisition baded from the nation folder an g box. cleared when a neck box is not istory of the PX le, for example- is started.	ent (waveform ac v detail settings. is stopped on the PX to the PC and nd file name in th a PX measurement selected, if certai ( are met—as a re —the history is cl	PX, waveform I saved. Specify e waveform data It starts. In conditions for sult of changing
		Affect NULL	Update Value	
	U1			
	I1	~		
	U2			
	I2	<b>v</b>	$\checkmark$	
	AUX7			
	AUX8			
			ОК	Cancel

For details on settings, see the following chapters in the PX User's Manual IM PX8000-01EN.

- History Clear: Chapter 26 (Clear Trace)
- LoggerSetup: Chapter 6
- Calibration: Chapter 26 (Calibration)
- NULL: Chapter 26

( **...** 

## Waveform Data Storage Settings

🕼 Waveform data storage	
✓ Detail Setting       Save Setup       History	Select the check box to show storage settings (for History and Select Save Trace). For details, see the chapter 24 in the PX User's Manual IM PX8000-01EN.
Select Save Trace         All ON           V U1         V U2         V AUX7           V I1         V I2         V AUX8           V P1         P P2	If you do not select the All ON check box and select the traces to be saved individually, depending on the waveform traces that are not selected (not saved), this software may not be able to compute the following measurement items and
Location C¥Program Files¥YOKOGAWA¥F Folder	computations that are computed on the PX. Example: • Synchronization Source • PLL Source
Name Save	<ul> <li>Measurement Functions of Wiring Unit (Σ Function)</li> <li>Delta Computation</li> <li>Harmonic Measurement</li> </ul>

#### Location

Specify the folder to save the file.

#### AutoNaming

If you select the AutoNaming check box, files are saved with the name Auto\_yyyymmddhhmmss. wpf.

yyyymmddhhmmss is a 14-digit number consisting of the year, month, day, hour, minute, and second. The year is four digits; the hour is based on a 24-hour clock.

#### Name

To specify the file name, clear the AutoNaming check box, and enter the file name.

- File name: You can assign any name that is allowed on your PC.
- · Extension: .wpf

#### **Save Button**

Saves the waveform data opened in this software.

#### **Measure Screen**

The Measure screen simply displays the PX screen in the software.

**Turns on or off software display updating** Appears dimmed when turned off.

Software display update interval Set the interval for collecting display data from the PX and updating the software display.
PX display setting For details, see the chapter 7 in the PX User's Manual IM PX8000-01EN.
1 ▼ <sub>Sec</sub> Numeric+Wave ▼

## **Staring a Measurement**

Click the Start/Stop button to start a measurement on the PX.



#### Note

While a measurement is in progress, the icons in the menu area are unavailable. You cannot change to a different mode (connection, analysis, exit, etc.).

#### **Stopping a Measurement**

Click the Start/Stop button to stop a measurement.

If the Save time to stop check box is selected in the Measurement control box and you stop a measurement, the waveform data measured by the PX is downloaded to the PC.

Vaveform data is under downloa	ad
	Cancel

6

#### 6.1 Executing Measurements

In the following situations, waveform data (WPF file) becomes larger, and downloading takes longer in proportion to the file size.

- There are many waveform data values of each channel due to the record length and time scale settings (T/div).
- There are many traces (waveforms) whose Select Save Trace check box is selected.
- There is a large amount of history waveform data as a result of performing a long measurement with History under Save Setup set to ALL.

If downloading takes a long time even when the amount of data is reduced, improve the operating environment (see section 1.3).

### **Information Area**

#### WPF Data Hold Status

When measured data is collected, the WPF data hold status in the information area shown in the upper left of the window changes as follows.



#### **Harmonic Measurement**

The harmonic measurement indicator in the information area shown in the upper left of the window changes as follows depending on the harmonic measurement status.

NoG5	: The harmonic measurement (/G5) opt	tion is not installed.
NoData	: No harmonic measured data present.	
🎆 ок	: OK is displayed when all the following Acquisition time base:	conditions are met. Int
	Sample rate:	2 MS/s or higher
	Time scale (TIME/DIV):	2 ms/div or higher
	PLL source fundamental frequency:	20 Hz to 6.4 kHz range
	<ul> <li>Data required for FFT analysis:</li> </ul>	At least twice the window width
Error	: At least one of the above conditions is If you move the cursor to harmonic me error is occurring, the condition that is	easurement in the information area when an

## 7.1 Analysis Screen

## **Displaying the Analysis Screen**



Unavailable tools, setting boxes, and setup parameters appear dimmed.



## Load Waveform Data (WPF file)

You can load waveform data (WPF file) that has already been collected in the PC into the software and analyze it.

Loading is not possible in online mode. To load data into the software, switch to offline mode by following the message that appears.

#### Note.

- · For instructions on how to load the setup parameters of the PX or the software, see chapter 8.
- · Numeric data and waveform data saved in CSV format cannot be loaded.

## Save Data to CSV File

You can save data in CSV format. Clicking the CSV Save arrow show the following menu.

<u>t</u>	Wave Data	Save the WPF waveform data of the current history number and waveform math data to a CSV file.
	Numeric Data	- Save the numeric data of the current history number to a CSV file.
	Wave Data (ALL)	$-$ Save the WPF waveform data of all history numbers and $_{ m y}$ waveform math data to a CSV file.
		Save the numeric data of all history numbers to a CSV file.

## **Convert WPF File to CSV File**

You can convert waveform data (WPF file) directly to CSV format without loading the data in the software.

V Direct 9	Save	×
Input(WPF	) file	
Name		File
Output(CS	V) file	
Save Set	tting	
Wave	e Data ALL 🔻 1 📩	
Nume	eric Data ALL 👻 1 📩	
Location	C:¥Program Files¥YOKOGAWA¥PowerViewerPlus¥Data¥	Folder
Location	]	T Older
AutoNa	aming	
Name	20140417154137.csv	File
	1	
		Execution Cancel

Data saved in CSV format will be as follows.

#### Waveform Data

- · Number of lines: The number of waveform data points. 100 M lines max.
- Number of data values per line: 1

#### Numeric data

- Number of lines: Measurement count. 99999 max.
- Number of data values per line: The number of items in the numeric data. 40000 max.

#### Note\_

The maximum CSV file size that can be opened with Excel 2007 to 2013 is 1,048,576 rows by 16,384 columns. As such, if the number of data values per line exceeds 16,384 in a numeric data CSV file, the portion in excess will not be loaded in Excel.

## **Recalculate Numeric Data**

You can set calculation conditions on numeric data and recalculate the data.

	Element1 Element2		AUX7	AUX8		
ensorRatio(mV/A)	10.0000 🚖 10.0000 🚖	-	OFF 🔻			
yncSource U	11 ▼ U2 ▼	Pm Scaling	1.0000 🚖			
caling 0	FF V OFF V	SyncSource	None 👻			
T Scaling	1.0000 🔃 1.0000 🔤		AUX7 AUX8			
T Scaling	1.0000 🖨 🛛 1.0000 🖨	Scaling Mode	AX+B AX+B	=		
		0	1.0000 1.0000			
F Scaling	1.0000 🚖 🛛 1.0000 🚖	В	0.0000 0.0000			
		P1[X]				
		P1[Y]				
		Polyl	5 0000 5 0000			
riod ZeroCros	s -		Harmonics			
	S Formula	Urms*Irms 👻	PLL Source	U1 -		
attern Low	SQ Formula	TYPE1 -	Min Order	1		
hase 180degree	es 🔻 Pc Formula	]	Max Order	100		
	Select Standard	IEC76-1(1976) 👻	Max Order	100		
	P1	0.5000	Thd Formula	1/Total 👻		
	P2	0.5000	Start Position	-5.000 div		
			UserDefined Fur	nction		
lement [ 1 ] [ 1P2W ]	[ 2 ] [ 1P2W ]		E Constitut			
			Function	Expression	Name	Unit
n Formula	[ 112* ]		E Function	Expression P(E1)-P(E2)	Name P-loss	Unit W
η Formula	[ 112* ]					
η Formula P2 -	[ 112* ] [P1	•	Function 1	P(E1)-P(E2)	P-loss	W
η 1 =	* 100[%] $\eta$ 2 =	▼ 	Function 1 Function 2 Function 3 Function 4	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E1)-IMPK(E1))/2/IDC(E1)*100 DELTAU1RMS(SA)	P-loss U-ripple I-ripple D-Urms	W % % V
P2 -	P1	• •••••• 100[%]	Function1 Function2 Function3 Function4 Function5	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E1)-IMPK(E1))/2/IDC(E1)*100 DELTAU1RMS(SA) DELTAU2RMS(SA)	P-loss U-ripple I-ripple D-Urms D-UrmsS	W % % V V
η 1 = P2	$*100[\%]$ $\eta 2 = \frac{P1}{P2}$		Function1 Function2 Function3 Function4 Function5 Function6	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E1)-IMPK(E1))/2/IDC(E1)*100 DELTAU1RMS(SA) DELTAU2RMS(SA) DELTAU3RMS(SA)	P-loss U-ripple I-ripple D-Urms D-UrmsS D-UrmsT	W % % V V V
$\eta 1 = \frac{\boxed{P2}}{\boxed{P1}}$	* 100[%] $\eta 2 = \frac{P1}{P2}$	•	Function 1 Function2 Function3 Function4 Function5 Function6 Function7	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E1)-IMPK(E1))/2/IDC(E1)*100 DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAUISMS(SA) DELTAUIMN(SA)	P-loss U-ripple I-ripple D-Urms D-UrmsS D-UrmsT D-UmnR	W % % V V V V
$\eta 1 = \frac{P2}{P1}$ $\eta 3 = \frac{Off}{P1}$	$* 100[\%]$ $\tau_1 2 = \frac{P_1}{P_2}$	▼ ▼ * 100[%]	Function1 Function2 Function3 Function4 Function5 Function6 Function7 Function8	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E1)-IMPK(E1))/2/IDC(E1)*100 DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAUIRMS(SA)	P-loss U-ripple I-ripple D-Urms D-UrmsS D-UrmsT D-UmnR D-UmnS	W % % V V V V V V
$\eta 1 = \frac{\boxed{P2}}{\boxed{P1}}$	* 100[%] $\eta 2 = \frac{P1}{P2}$	•	Function1 Function2 Function3 Function4 Function5 Function6 Function7 Function8 Function9	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E1)-UMPK(E1))/2/DC(E1)*100 DELTAUIRMS(SA) DELTAU2RMS(SA) DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAU2MN(SA) DELTAU2MN(SA)	P-loss U-ripple D-Urms D-UrmsS D-UrmsT D-UmnR D-UmnS D-UmnS D-UmnT	W % % V V V V V V V V
$\eta 1 = \frac{P2}{P1}$ $\eta 3 = \frac{Off}{P1}$	$* 100[\%]$ $\tau_1 2 = \frac{P_1}{P_2}$	▼ ▼ * 100[%]	Function 1 Function2 Function3 Function4 Function5 Function6 Function7 Function8 Function9 Function10	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (UPPK(E1)-IMPK(E1))/2/IDC(E1)*100 DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAUIRMS(SA) 800-PHILUTUS(SA)+PHILUTU2(SA)	P-loss U-ripple I-ripple D-UrmsS D-UrmsS D-UmmR D-UmnR D-UmnS D-UmnT PhiU3	W % V V V V V V V deg
$\eta 1 = \frac{P2}{P1}$ $\eta 3 = \frac{Off}{Off}$	* 100[%] $\tau_1 2 = \frac{P1}{P2}$ * 100[%] $\tau_1 4 = \frac{Off}{Off}$	• • • 100[%]	Function 1 Function 2 Function 3 Function 6 Function 6 Function 7 Function 8 Function 9 Function 10 Function 11	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (UPPK(E1)-MPK(E1))/2/UDC(E1)*100 DELTAUIRMS(SA) DELTAU2RMS(SA) DELTAU3RMS(SA) DELTAU3RMS(SA) DELTAU3MN(SA) DELTAU3MN(SA) 280-PHIU110(SA)-PHIU1102(SA) PPPK(E1)-PMPK(E1)	P-loss U-ripple I-ripple D-Urms D-UrmsS D-UrmsT D-UmnT D-UmnS D-UmnT PhiU3 Pp-p	W % % V V V V V V deg W
$\eta 1 = \frac{\boxed{P2}  \bullet}{\boxed{P1}  \bullet}$ $\eta 3 = \frac{\boxed{Off}  \bullet}{\boxed{Off}  \bullet}$	$ * 100[30] \qquad \tau_1 2 = \frac{P1}{P2}$ $ * 100[30] \qquad \tau_1 4 = \frac{Off}{Off}$	• • • •	Function 1 Function 2 Function 3 Function 4 Function 5 Function 6 Function 7 Function 1 Function 11 Function 11	P(E1)-P(E2) (UPPK(E)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E)-UMPK(E1))/2/DC(E1)*100 DELTAU2RMS(SA) DELTAU2RMS(SA) DELTAU2RMS(SA) DELTAU2RMS(SA) DELTAU2RMS(SA) DELTAU2RMS(SA) 880-PHU1U10S(SA)-PHU1U2(SA) PPPK(E1)-PMPK(E1) DELTAU2RMS(SA)	P-loss U-ripple D-Urms D-UrmsT D-UrmsT D-UmnR D-UmnR D-UmnT PhiU3 Pp-p F12	W % V V V V V V deg W V
$\eta 1 = \frac{\boxed{P2}  \bullet}{\boxed{P1}  \bullet}$ $\eta 3 = \frac{\boxed{Off}  \bullet}{\boxed{Off}  \bullet}$ $\operatorname{Iddef1} = \boxed{P1}  \bullet$	* 100[%] $\tau_1 2 = \frac{P1}{P2}$ * 100[%] $\tau_1 4 = \frac{Off}{Off}$	• • • •	Function 1 Function 2 Function 3 Function 4 Function 6 Function 6 Function 7 Function 9 Function 10 Function 11 Function 12 Function 13	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E1)-IMPK(E1))/2/IDC(E1)*100 DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAUIMN(SA) DELTAUIMN(SA) DELTAUIMN(SA) 800-PHIU1U3(SA)+PHIU1U2(SA) PPPK(E1)-PMPK(E1) DELTAUIRMN(SA) DELTAUIRMN(SA)	P-loss U-ripple I-ripple D-Urms D-UrmsS D-UrmsS D-UmnT D-UmnT PhiU3 Pp-p F12 F13	W % % V V V V V V deg W V V V V
$\eta = \frac{\boxed{P2}  \bullet}{\boxed{P1}  \bullet}$ $\eta = \frac{\boxed{Off}  \bullet}{\boxed{Off}  \bullet}$ $ddef1 = \boxed{P1}  \bullet$	* 100[X] $\tau_1 2 = \frac{P1}{P2}$ * 100[X] $\tau_1 4 = \frac{Off}{Off}$ + None + None	• * 100[k] • * None •	Function 1 Function 2 Function 3 Function 4 Function 5 Function 6 Function 9 Function 9 Function 10 Function 11 Function 12 Function 13	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E1)-MPK(E1))/2/UDC(E1)*100 DELTAUIRMS(SA) DELTAU2RMS(SA) DELTAU3RMS(SA) DELTAU3RMS(SA) DELTAU3MN(SA) DELTAU3MN(SA) 280-PHIU1U3(SA)+PHIU1U2(SA) PPPK(E1)-PMPK(E1) DELTAU3RMS(SA) DELTAU3RMS(SA)	P-loss U-ripple I-ripple D-Urms D-UrmsS D-UrmsT D-UmnT P-UmnT PhiU3 Pp-p F12 F13 F14	W % V V V V deg W V V V V V V V
$\eta 1 = \frac{P2}{P1} \checkmark$ $\eta 3 = \frac{Off}{Off} \checkmark$ $\eta 3 = \frac{Off}{Off} \checkmark$ $\theta def 1 = P1 \checkmark$ $\theta def 2 = P1 \checkmark$	* 100[X] $\tau_1 2 = \frac{P1}{P2}$ * 100[X] $\tau_1 4 = \frac{Off}{Off}$ + None + None	• * 100[k] • * None •	Function 1 Function 2 Function 3 Function 4 Function 4 Function 7 Function 7 Function 9 Function 10 Function 11 Function 12 Function 14 Function 14	P(E1)-P(E2) (UPPK(E)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E)-UMPK(E1))/2/DC(E1)*100 DELTAU2RMS(SA) DELTAU2RMS(SA) DELTAU2RMS(SA) DELTAU2MN(SA) DELTAU2MN(SA) DELTAU2MN(SA) B0-PHU1U10S(SA)-PHU1U102(SA) PPPK(E1)-PMPK(E1) DELTAU2RMN(SA) DELTAU2RMN(SA) DELTAU2RMN(SA) DELTAU3RMN(SA) DELTAU1DC(SA)	P-loss U-ripple I-ripple D-Urms D-UrmsS D-UrmsT D-UmnS D-UmnS D-UmnT PhiU3 Pp-p F12 F13 F14 F15	W % V V V V deg W V V V V V V V
$\eta 1 = \frac{P2}{P1} \checkmark$ $\eta 3 = \frac{Off}{Off} \checkmark$ $\partial def1 = P1 \checkmark$ $\partial def2 = P1 \checkmark$	* 100[X] $\tau_1 2 = \frac{P1}{P2}$ * 100[X] $\tau_1 4 = \frac{Off}{Off}$ + None + None	▼ ▼ * 100[%] ▼ * None ▼ * None ▼	Function 1 Function 2 Function 3 Function 4 Function 6 Function 7 Function 7 Function 9 Function 10 Function 10 Function 11 Function 13 Function 14 Function 15	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (UPPK(E1)-IMPK(E1))/2/UDC(E1)*100 DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAUIRMS(SA) DELTAUIMN(SA) DELTAUIMN(SA) 300-PHIU1U3(SA)+PHIU1U2(SA) PPPK(E1)-PMPK(E1) DELTAU3MM(SA) DELTAU3MM(SA) DELTAU3MM(SA) DELTAU3MM(SA) DELTAU3MM(SA) DELTAU3MM(SA) DELTAU3MM(SA) DELTAU3MM(SA)	P-loss U-ripple I-ripple D-Urms D-UrmsS D-UrmsT D-UmnR D-UmnS D-UmnT PhIU3 Pp-p F12 F13 F14 F15 F15 F16	W % % V V V V V deg W V V V V V V
$\eta 1 = \frac{P2}{P1}$ $\eta 3 = \frac{Off}{Off} \cdot \mathbf{v}$ $Jdef1 = P1 \cdot \mathbf{v}$ $Jdef2 = P1 \cdot \mathbf{v}$ $d Measure$	* 100[X] $\tau_1 2 = \frac{P1}{P2}$ * 100[X] $\tau_1 4 = \frac{Off}{Off}$ + None + None + None + None SigmaA Sign	▼ ▼ * 100[%] ▼ + None ▼ ▼ + None ▼ maB	Function 1 Function 2 Function 3 Function 4 Function 5 Function 6 Function 7 Function 10 Function 11 Function 12 Function 14 Function 15 Function 16 Function 16	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E1)-UMPK(E1))/2/UDC(E1)*100 DELTAUIRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRO(SA) DELTAUZRO(SA)	P-loss U-ripple D-Urms D-Urms D-UrmsT D-UmnT D-UmnT Philu3 Pp-p F12 F13 F14 F15 F16 F16 F17	W % % V V V V V deg W V V V V V V
$\eta 1 = \frac{P2}{P1}$ $\eta 3 = \frac{Off}{Off} \cdot \mathbf{v}$ $Jdef1 = P1 \cdot \mathbf{v}$ $Jdef2 = P1 \cdot \mathbf{v}$ $d Measure$	* 100[X] $\tau_1 2 = \frac{P1}{P2}$ * 100[X] $\tau_1 4 = \frac{Off}{Off}$ + None + None + None + None	▼ ▼ * 100[%] ▼ * None ▼ * None ▼	Function 1 Function 2 Function 3 Function 4 Function 4 Function 7 Function 7 Function 10 Function 11 Function 11 Function 12 Function 13 Function 14 Function 15 Function 17 Function 17	P(E1)-P(E2) (UPPK(E)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E)-UMPK(E1))/2/DC(E1)*100 DELTAU2RMS(SA) DELTAU2RMS(SA) DELTAU2RMS(SA) DELTAU2MN(SA) DELTAU2MN(SA) DELTAU2MN(SA) BELTAU2MN(SA) DELTAU2RMN(SA) DELTAU2RMN(SA) DELTAU2RMN(SA) DELTAU2RMN(SA) DELTAU2RMN(SA) DELTAU2RMN(SA) DELTAU2RO(SA) DELTAU2C(SA) DELTAU2RO(SA) DELTAU2RO(SA)	P-loss U-ripple I-ripple D-Urms D-UrmsT D-UmnT D-UmnT PhiU3 Pp-p F12 F13 F14 F15 F16 F17 F18	W % % V V V V V deg W V V V V V V
$\eta 1 = \frac{\boxed{P2}  \checkmark}{\boxed{P1}  \checkmark}$ $\eta 3 = \frac{\boxed{Off}  \checkmark}{\boxed{Off}  \checkmark}$ Jdef 1 = $\boxed{P1}  \checkmark$	* 100[X] $\tau_1 2 = \frac{P_1}{P_2}$ * 100[X] $\tau_1 4 = \frac{Off}{Off}$ + None + None + None + None SigmaA Sign	▼ ▼ * 100[%] ▼ + None ▼ ▼ + None ▼ maB	Function 1 Function 2 Function 3 Function 4 Function 5 Function 6 Function 7 Function 10 Function 11 Function 12 Function 14 Function 15 Function 16 Function 16	P(E1)-P(E2) (UPPK(E1)-UMPK(E1))/2/UDC(E1)*100 (IPPK(E1)-UMPK(E1))/2/UDC(E1)*100 DELTAUIRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRMS(SA) DELTAUZRO(SA) DELTAUZRO(SA)	P-loss U-ripple D-Urms D-Urms D-UrmsT D-UmnT D-UmnT Philu3 Pp-p F12 F13 F14 F15 F16 F16 F17	₩           %           %           V           V           V           deg           W           V           V           V           V           V           V           V           V           V           V           V           V           V           V           V           V           V           V

The items that you need to set are the same as those in section 5.1. However, the settings in section 5.1 are for the PX. The settings (calculation conditions) in this section are for the software. Therefore, these settings are not synchronized to those of section 5.1.

## Select the History Waveform Number to Show

You can specify the number of the waveform that you want to analyze from the loaded waveform data (WPF file).

## **Turn On and Off Window Displays**

You can turn on and off the display of each window.

· Models with the harmonic measurement (/G5 option)



• Models without the harmonic measurement (/G5 option)



#### Note\_

The X-Y window is displayed in the waveform window. When you turn on the X-Y window and the waveform window is off, both the waveform window and X-Y window are turned on.

## **Arrange Windows**



#### Cascade

- Displayed windows are cascaded so that all the window titles can be seen.
- The active window will be shown in front of all cascaded windows.
- The order in which the windows are cascaded varies depending on the types of windows that are being displayed.

#### Tile

- · All displayed windows are tiled.
- The order in which the windows are arranged varies depending on the types of windows that are being displayed.

## **Detail Settings of Each Window**

🂫 🔹	Click here to show a menu for selecting the detail setting dialog box.
Vindow letail setting	Shortcut menu
button	Numeric     Section 7.2       Bar     Section 7.3       Vector     Section 7.4       Save Layout     Load Layout
	Save the layout of each measurement window to a file. File name extension: mvl Saved layout information can also be loaded.

#### Note.

You can set the details of the waveform window and FFT window using the toolbar in the respective window.

## **Printing Analysis Results**

You can print analysis results (Xreport function).

#### **Starting the Report Function**

When you start the report function, the Xreport window appears, and the waveform shown in the waveform display area of the software appears in the window.



#### Toolbar



#### Available when Edit mode is enabled

#### **Xreport window**

The Xreport window consists of the following four items.

- Report List:
- Layout View: Displays elements such as waveforms and measured results

Displays a list of report files with layout images

- Element Properties: View and edit element properties
- Basic Information: View and edit the header, footer, author, date, and comment

#### **Report List**

The report files in the following folder are listed with layout images.

PowerViewerPlus installation folder > Report folder

The default installation folder for Windows 7, Windows 8, or Windows 8.1 is

C: ¥Program Files ¥YOKOGAWA ¥Power Viewer Plus ¥Report

The default installation folder for Windows Vista is

C:¥Users¥user name¥Documents¥YOKOGAWA¥PowerViewerPlus¥Report)

- Up to 64 report files can be displayed in the Report List.
- The most recent file is displayed at the top of the list; the oldest file is displayed at the bottom.
- Report files contain position information of elements to be arranged in the Layout View, properties, and basic information. The report file selected in the Report List is laid out in the Layout View.
- Five default report files (Sample1 to 5) are provided. You can edit these files.

#### Layout View

The Layout View consists of elements and basic information (header, footer, author, date, and comment).

There are four types of elements, and multiple elements can be arranged. When you create an element, a unique sequential ID is assigned to the element. You cannot delete Element1.

- Text element
  - An element for arranging text
- · Window image element

An element for arranging an image of the waveform display area. You can select from main, zoom, and XY displays of Time view waveforms or from main, zoom, and XY displays of FFT view waveforms. However, FFT Main, FFT Zoom, and FFT XY can only be arranged when an FFT view is displayed in the waveform display area.

· Measured result element

An element for arranging measured results of the automated measurement (waveform parameters, history statistics, or cycle statistics). You can arrange a measured result element even if measured results are not displayed in the waveform display area.

• Image element An element for arranging image data. You can arrange jpg, bmp, tif, and png images.

#### Note

The elements in printing (Xreport function) are the above elements that make up the Layout View. They are not the power elements (the combinations of voltage modules and current modules) of the PX.

#### **Editing Reports**

#### Selecting a Layout

Click the layout that you want to use from the Report List. The Layout View, Element Properties, and Basic Information are arranged according to the selected layout settings.



#### Switching to Edit Mode

Click **Edit mode** on the toolbar. When Edit mode is enabled, you can add and delete elements and change element properties.

#### Adding an Element

- 1. From the Add element drop-down list, select the element you want to add. You can select the element from the following.
  - Add Text (text element)
  - Add Window Image (window image element)
  - · Add Measure Result (measured result element)
  - Add Image (image element)
- 2. A crosshair cursor appears in the Layout View. Drag the cursor to add the element of the desired size.

#### **Changing the Element Size**

Enable Edit mode and drag the frame of an element to change its size.

#### **Changing Element Properties**

The properties of the selected element are displayed. You can change a property by enabling Edit mode and clicking the field of the target item.

Common Property

Element ID: This is automatically assigned when an element is created and cannot be changed.

#### • Editing a Text Element (Text)

-	Element Prop	perties	
-	Element ID	Element1	— Select the element number.
-	Туре	Text —	Select the type
	Text	PowerViewerPlus Report	(Text, Window Image, Measure Result, Image).
			— Edit text (can be edited regardless of whether Edit mode is on).
	Font	MS UI Gothic(24) —	—— Set the display font.
	Align	Center	— Select the line alignment (Left, Center, Right).
	BackCold	No Fill —	

#### • Editing a Window Image Element

Element Pro	perties	
Element ID	Element1	
🗉 Туре	Window Image	
Target		Select the displayed waveform

• Editing a Measured Result Element (Measure Result)

-	Element Prop	oerties	
-	Element ID	Element1	
=	Туре	Measure Result	
	Target	Time Viewer -	——Select the measurement target (Time Viewer, FFT Viewer)
	Font	MS UI Gothic(9) -	Set the display font.
	Align	Center -	Select the line alignment (Left, Center, Right).
	ColNum	4 -	Set the number of rows.
	RowNum	6 –	Set the number of columns.
	BackColo	No Fill –	Set the background color.
	AutoFon	False -	Turns auto font size on or off <sup>*</sup>

\* If AutoFontSize is set to True, the font size setting is disabled.

#### 7.1 Analysis Screen

• Editing an Image Element (Image)

•	Element ID	Element1	
3	Туре	Image	
	FilePath		——— Specify the image file path.
	HAlign	Left	——— Select the horizontal position (Left, Center, Right)
	VAlign	Тор	——————————————————————————————————————
	Zoom	Auto	——— Set the size of the image file
			(Auto, Fix, 0.50, 2.00, a specified value).

- \* Auto: The size is adjusted so that the image fits within the image element frame. Fix: The image is displayed in the original size.
  - 0.50: The image is displayed at one-half the original size.
  - 2.00: The image is displayed at twice the original size.
  - Any: The image is expanded or reduced to the specified size.

#### **Deleting an Element**

- 1. In the Layout View, select the element that you want to delete.
- Click Delete element on the toolbar. The selected element is deleted. However, you cannot delete Element1.

#### Moving and Element to the Front or Back

Select the element you want to move, and click Move to front or Move to back on the toolbar.

#### **Changing Basic Information**

Click the Header, Footer, Author, Date, and Comment fields, and change the information. You can change the information regardless of whether Edit mode is on. Basic information is displayed at a given position in the Layout View. You cannot hide or delete the Basic Information box, but if you edit and empty the text fields, nothing will be displayed.

-	Properties	
	Header	Header
	Footer	Footer
	Author	Author
	Date	Date: 2014/03/18
		Comment
	Comment	

#### Arranging the Elements

Click **Options** on the toolbar. The Options dialog box appears.

Options			
Grid			Selected: The positions are determined based on an equally spaced grid. Not selected: The positions are determined freely.
Grid	5	Pixels	Range: 1 to 100

#### Undoing and Redoing an Edit Operation

In the Layout View, you can undo and redo the following edit operations once.

- · Add or delete an element
- · Move the position or change an attribute of an element
- Set the page style (horizontal or vertical)
- Report's basic information (Header, Footer, Date, Author, Comment)

#### Saving, Loading, and Deleting Report Files

#### Loading

You can open a report file that is not shown in the Report List. The type of report files that you can open are reports (.xrt).

- 1. Click Open on the toolbar. An Open dialog box appears.
- 2. Select the report file you want to open, and click **Open**. The report file is laid out in the Layout View.

When you open a report file, any file that is open is closed.

#### Saving

- 1. Click Save as on the toolbar. A Save As dialog box appears.
- 2. Set the save destination, file name, and file type, and then click **Save**. The current settings are saved.

• If you save a report file in the following folder, the file appears in the Report List. PowerViewerPlus installation folder > Report folder

The default installation folder for Windows 7, Windows 8, or Windows 8.1 is C:¥Program Files¥YOKOGAWA¥PowerViewerPlus¥Report

The default installation folder for Windows Vista is

C:¥Users¥user name¥Documents¥YOKOGAWA¥PowerViewerPlus¥Report)

- You can save report files in report (.xrt) and rich text (.rtf) formats.
  - If you save a file in report (.xrt) format, it can be opened.
  - If you save a file in rich text format (.rtf), it can be opened in Microsoft Word. You cannot edit the file using WordPad.

#### Deleting

- **1.** From the Report List, select the file you want to delete.
- 2. Click Delete report on the toolbar. The selected file is deleted.

The report files in the following folder can be deleted.

PowerViewerPlus installation folder > Report folder

The default installation folder for Windows 7, Windows 8, or Windows 8.1 is

 $C: \verb"¥Program Files \verb"¥YOKOGAWA \verb"¥PowerViewerPlus \verb"¥Report" \\$ 

The default installation folder for Windows Vista is

C:¥Users¥user name¥Documents¥YOKOGAWA¥PowerViewerPlus¥Report)



#### **Printing a Report**

**Selecting the Print Orientation** 

On the toolbar, click **Portrait** or **Landscape**.

#### **Print Preview**

On the toolbar, click **Print preview**. A preview appears in a window.

#### Printing

- 1. On the toolbar, click Print. A Print dialog box appears.
- 2. Set the printer, print range, copies, and so on, and then click **OK**. A report is output to the specified printer.



## Turning On or Off the Toolbar Text Display

Toolbar text button

The toolbar text display toggles on and off every time you click the Toolbar text button.



### **Measurement Screen**

When you start the software for the first time, all possible windows are displayed tiled.



- · You can maximize or minimize any measurement window.
- After you maximize a window, you can click a window arrange button (Cascade or Tile) to clear the maximization and arrange the windows as specified.
- The close button in the upper right of each measurement window is unavailable. To close a measurement window, click the appropriate window display on/off button.
- Right-click the measurement window to display the detail setting dialog box of the window. This is not possible from the waveform or FFT window. Use the toolbar in the respective window.
- The bar graph window and vector window can be displayed when the PX is equipped with the harmonic measurement option (/G5).

## 7.2 Numeric Display

The numeric display shows measured data numerically. You can customize the types of functions to display, the display order, the font size, the color, and so on.

#### **Numeric Window**

NO.	FUNCTION	ELEMENT	ORDER	WTID	DATA	UNITS	
1	Urms	1		1	3.360524	V	
2	Umn	1		1	3.360745	V	
3	Udc	1		1	-0.008027	V	
4	Urmn	1		1	3.025733	V	
5	Uac	1		1	3.360515	V	
6	CfU	1		1	0.000000		
7	Irms	1		1	352.937103	A	
8	Imn	1		1	391.437622	A	
9	Idc	1		1	-19.362360	A	
10	Irmn	1		1	352.417664	A	
11	Iac	1		1	352.405579	A	
12	CfI	1		1	0.000000		

## **Function**

Displays the functions.

For the function symbols and definitions, see section 1.1, "Items That This Instrument Can Measure" in the PX User's Manual IM PX8000-01EN.

### **Element**

Displays the elements.

## Order

Displays the harmonic order of numeric data when the harmonic data display is set to ON (see section 5.1).

"-----" is displayed when the harmonic data display is set to OFF or for functions that harmonic orders cannot be specified.

## WTID

Displays the ID of the PX from which data was collected.

## **Setting the Display Items**

You can change the function, element, and harmonic order display items by following the procedure below. You cannot change them while measured data collection is in progress.

You can also set the display items using the detail setting dialog box, which is described on the next page.

- 1. Click a Function, Element, Order, or WT ID cell. A list box appears.
- 2. Select the item you want to display.





WTID is fixed at 1. You cannot change it.

## **Detail Setting Dialog Box**

You can change the function, element, and harmonic order display items.

A detail setting dialog box appears when you perform any of the following operations.

- Right-click the numeric window.
- · Click the window detail setting button when the numeric window is selected (active).
- · Select Numeric in the shortcut menu of the window detail setting button.

Numeric Detail			×
Config			
Items 🔢	▼ Text		
Font 12	<ul> <li>Background</li> </ul>		
Function			
All Calect			
Set Set Urms Irms Umn Imn Udc Idc Urmn Irmn Uac Iac CfU CfI	Set Set Uppeak P Umpeak S Ippeak Q Impeak PF Pppeak PP Pmpeak Pc	ni	
Harmonics Function			Order
All     Select			<ul> <li>Order</li> <li>All          Select     </li> </ul>
Set         Set           FreqPLL         Phi(k)           U(k)         PhiU()           I(k)         PhiI(k)           P(k)         Uhdf()           S(k)         Indf(k)           Q(k)         Phd(k)           P(k)         Uhdf()           S(k)         Indf(k)           Q(k)         Phf(k)	<ul> <li>Rs(k)</li> <li>Ithd</li> <li>Xs(k)</li> <li>Pthd</li> <li>Rp(k)</li> <li>Uthf</li> <li>Xp(k)</li> <li>Ithf</li> </ul>	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Start Total v End Total v
ALX(Motor) All Select Aux3(Speed) Aux4(Torque) Aux6 Aux6 Aux7 Aux8 Pm2 Pm3 Pm4	Delta	User Defined Function	Element All Select Element1 SigmaA Element2 SigmaB Element3 Element4 WTID All Select 1 2 3 4 Start Position 1 (1 - 40000)
		ок (	Cancel Apply

Recalculate button

Click here to apply the settings in the detail setting dialog box to the display and show the recalculated numeric data.

#### Items

Select the number of numeric data items to display from 12, 24, 48, 200, 400, 800, 1000, 2000, 4000, 8000, 10000, 20000, and 40000.

#### Font

Set the font size to a value between 6 to 40 in steps of 2.

#### Text and Background

Select the text and background colors.

Background Background Basic colors: Custom colors: Define Custom Colors >> OK Cancel	Text	Color
<u>C</u> ustom colors:	Background	
		Qustom colors:

#### Function, Harmonics, AUX(Motor), Delta, and User Defined Function

- If you select **AII**, all functions will be selected. The check boxes of each function will remain unchanged and will appear dimmed.
- · If you select Select, you can select functions individually.
- If you select a **Set** check box, all the check boxes of the functions in the column will be selected. If you clear it, all the check boxes of functions will be cleared.

#### Harmonics

- If you select AII, all harmonic orders will be selected. The harmonic selection box conditions will remain unchanged and will appear dimmed.
- If you select **Select**, you can set the start and end harmonic orders.

#### Element

- If you select **All**, all elements will be selected. The check boxes of each element will remain unchanged and will appear dimmed.
- · If you select Select, you can select elements individually.

#### Note.

Functions, elements, and harmonic orders that cannot be selected depending on the PX specifications or options will be unavailable.

#### WTID

The All button is always selected. The Select button is disabled.

#### **Start Position**

Set the line number in the numeric data display that you want to start applying the above settings to.

Selectable range: 1 to the value specified in the Items box.

#### **Applying the Settings**

Click **OK** or **Apply** to apply the settings to the numeric display. Items that cannot be set are not displayed (skipped).

## 7.3 Bar Graph Display

You can select a wiring unit to display vectors of the phase differences and amplitudes (rms values) of the fundamental signals, U(1) and I(1), in each element in the unit. The positive vertical axis is set to zero (angle zero), and the vector of each input signal is displayed.

The bar graph window can be displayed when the PX is equipped with the harmonic measurement option (/G5).



Harmonics

#### Note

When logarithmic coordinates are used (Log Scale), if a value is negative, its absolute value is displayed with a red bar graph.

## **Detail Setting Dialog Box**

A detail setting dialog box appears when you perform any of the following operations.

- Right-click the bar graph window.
- · Click the window detail setting button when the bar graph window is selected (active).
- Select Bar in the shortcut menu of the window detail setting button.

Order			Function	Element	Zoom	Y Scale Type	Color
Start	Total 💌	<b>V</b>	U	1	1.00	Logarithm	
		<b>V</b>	I	1	1.00	Logarithm	
End	100 🔻		Р	1	1.00	Logarithm	

#### Shows or hides all bar graphs at once

#### Recalculate button

Click here to apply the settings in the detail setting dialog box to the display and show the recalculated numeric data.

## Start and End

Select the harmonic order of the numeric data to display.

- Start harmonic order: Total, DC, 1 to 490
- End harmonic order: 10 to 500

The difference between the start and end harmonic orders must at least be 10.

### **Function**

Select the bar graph to display using the check boxes. The bar graph is displayed for the combination of the functions and elements that you select. Up to three bar graphs can be displayed.

#### Element

Select which element to display the bar graph of.

- 1. Click an Element cell. An element selection box appears.
- 2. Select an element.

#### Zoom

Select the vertical zoom factor of the bar graph.

- 1. Click a Zoom cell. A zoom factor selection box appears.
- 2. Set the vertical zoom factor.

## **Y Scale Type**

The vertical scale of the bar graph is automatically set depending on the function.

Function	Y Scale Type
U, I, P, S, Q	Log
λ, φ, φU, φI, Ζ, Rs, Xs, Rp, Xp	Linear
## 7.4 Vector Display

You can select a wiring unit to display vectors of the phase differences and amplitudes (rms values) of the fundamental signals, U(1) and I(1), in each element in the unit. The positive vertical axis is set to zero (angle zero), and the vector of each input signal is displayed.

The bar graph window can be displayed when the PX is equipped with the harmonic measurement option (/G5).



## **Detail Setting Dialog Box**

A detail setting dialog box appears when you perform any of the following operations.

- · Right-click the vector window.
- · Click the window detail setting button when the vector window is selected (active).
- Select Vector in the shortcut menu of the window detail setting button.

#### Shows or hides all vectors at once

	Vector	Object	U Mag	I Mag	
lumeric ON 👻	Vector 1	Element 1	1.000	1.000	
	Vector2	Element 1	1.000	1.000	

#### Recalculate button

Click here to apply the settings in the detail setting dialog box to the display and show the recalculated numeric data.

#### Numeric

Select whether to show numeric data (on or off).

#### **Object**

Select the element or wiring unit to display. The available options vary depending on the elements of the waveform data (WPF file) in analysis.

#### U Mag/I Mag

Set the zoom factor of fundamental wave U(1) and I(1). When you zoom the vectors, the value that indicates the size of the vector display's peripheral circle changes according to the zoom factor.

7

## 7.5 Waveform Display

Displays the waveform data that has been collected from the PX.

The waveform window has the following five display areas.

- · Main waveform display area: The loaded waveform data is displayed in its entirety.
- Zoom waveform display area: A section of the loaded waveform data is displayed.
- History waveform display area: All records of waveform data collected numerous times using the trigger single(N) mode or history function are displayed.
- XY waveform display area: An X-Y display is shown using the channel (trace name) displayed in the main or zoom waveform display area.
- Measurement result display area: Measured values of cursor measurement, auto measurement, math measurement, and so on are displayed numerically.



## **Showing and Hiding Display Areas**

Click a display area button on the toolbar to show or hide the corresponding area.



## **Display Area Size**

You can drag the boundary of display area to change its size.

## Main Waveform Display Area



00

#### **Tooltip display**

If you leave the pointer on a waveform for about 1 second, the information about that point appears. For example, in the case of a voltage waveform, the time and voltage will appear. Information is displayed for main and zoom waveforms. It is not displayed for history or XY waveforms.





**Zoom Waveform Display Area** 

Double-click to show the display setting window.

#### **Maximum Zoom Factor**

The maximum zoom factor varies depending on the displayed data. Zooming is not possible if it would cause the number of displayed points to be 10 or less.

#### Moving the Zoom Position

You can move the zoom position using one of the following three methods.

- Dragging
  - Drag the thick frame in the main waveform display area. You can use the scroll function to automatically move the zoom position.
- Using the display setting window Double-click the bottom edge of the zoom waveform display area to display a display setting window. Enter a value in the zoom start position box, and click OK.
- Page scrolling You can drag the scroll box at the bottom of the zoom waveform display area.

#### Scrolling the Zoom Waveform



Set the scroll rate using the control bar.

#### Note.

Scrolling is not possible while waveform parameters are being measured or while computation is progress.

#### Specifying the Zoom Position

To specify the zoom position in the display setting dialog box, enter the value of the left edge of the range you want to zoom. The values that you can specify vary depending on the zoom factor and the displayed waveform.

• By entering the data point

Enter the data point as an integer to display from that data point.

• By entering the time

Enter a real number in relative time display mode to display from that point in time. You can use the following unit prefix: m (10<sup>-3</sup>), u (10<sup>-6</sup>), n (10<sup>-9</sup>), p (10<sup>-12</sup>).

Examples:

 $\begin{array}{ll} 1.23 & \rightarrow 1.23 \text{ s} \\ 1.23 \text{ ms} \rightarrow 1.23 \text{ ms} \\ 1.23\text{E-}3 \rightarrow 1.23 \text{ ms} \\ 0.00123 \rightarrow 1.23 \text{ ms} \end{array}$ 



Show or hide the waveforms.

#### Selecting the Displayed Waveform

ALL ON

All history waveforms are displayed in the main waveform display area. ALL OFF

Only the active waveform is displayed in the main waveform display area.

Selecting the check box next to the history waveform shows the corresponding waveform in the main waveform display area.

#### Selecting the Active Waveform

If you click the history waveform that you want to activate, the waveform is enclosed in a blue frame, the history number is highlighted, and the waveform is displayed in the main waveform display area. If several waveforms are displayed, the active waveform will appear brighter than the other waveforms.

- · Cursor measurement is performed on the active waveform.
- · The number of the active waveform appears highlighted in the history waveform display area.

## X-Y Waveform Display Area



#### Selecting the Source Waveform

Click Main under Range to display an X-Y waveform using the waveform displayed in the main waveform display area. Click Zoom to display an X-Y waveform using the waveform displayed in the zoom waveform display area.

#### Setting the X-Axis

From the X-Trace list, select the waveform to assign to the X-axis (trace name). The Y-axis is assigned with a waveform other than that assigned to the X-axis.

#### Overlaying on the X-Y waveform

The active waveform in the history waveform window can be overlaid on the X-Y waveform display area. If Range is set to Main, the waveform in the main waveform display area is overlaid. If Range is set to Zoom, the waveform in the zoom waveform display area is overlaid.

#### Note.

X-Y waveform is displayed using the P-P data shown in the main, zoom, or history waveform display area.

## Measurement Result Display Area

Cursor measurement results are displayed in the measurement result area. For details, see "Cursor Measurement" (page 7-57).

#### **Toolbar**



## **Configuring Channels**

Click 🚧 to display a channel setting dialog box. For each channel, set the waveform display conditions, groups, and so on.

#### **Setting Groups**

You can register channels (trace names) in groups. Channels (trace names) can be divided into up to 10 groups. Displayed waveforms are set in units of these groups. The maximum number of channels that can be registered in a single group is 90.

For the procedure to change the displayed group, see page 7-56.

	Channel number											
			- Select the t	ab of the	e group	yo	u w	ant to se	et.			
				⊢ Er	nter the	gro	up	name.				
r	_	-										~
	Channel Setting											x
	Share channel set ing in Main/Zoom					n	<ul> <li>Main Setting</li> <li>Zoom Setting</li> </ul>					
	1	Gi	r1 Gr2 G	ir3 🗍 Gr4	4 🗍 Gr5	T	Gr	6 🗍 Gr7	Gr8	Gr9	Gr10	
	C	ro	up Name Group1									
	[		Trace	Display	ON/OFF			Scal	e		Color	⊿
	ľ	ю.	Trace	Waveform	Readout	Log	On	Min	Max	Auto	Color	
			U1		X			-1.000E1	1.000E1			
	l	-	I1		X			-5.000E3	5.000E3			
		3	P1					-2.000E4	3.000E4			
	ŀ	4	U2					-2.000E1	2.000E1			
	ŀ	_	12					-2.000E1	2.000E1			
	-	6	<u>I1</u>					-2.000E1	2.000E1			
	-	_	Math1					-4.995E-30	5.005E-30			
	-	_	Math2					-4.995E-30	5.005E-30			
		_	<none></none>					***	***			
	ŀ	10	<none></none>	6	<b>1</b>		10 10	***	***		14	
	L		**		U	0	U	M	M	N	M	
	Copy Setting CopyItem Copy Paste OK Cancel Apply More Options											

---- Channels (trace names) registered in the group



#### Manually Setting the Waveform Mapping

Click Detail setting to expand the dialog box.

The main waveform display area can be divided into sub areas. For each channel number, you can specify in which sub area to display the waveform using mapping numbers ranging from 1 to 16. Select the **Mapping** check box, and then select the mapping number from the drop-down menu. If you clear the Mapping check box, the manual mappings are not applied.

#### Setting the Display Format

Click Detail setting to expand the dialog box.

For each channel number, set the display format and the number of displayed digits.



Logic cells and the Bit Setting dialog box that appears are invalid.

#### Shared Channel (Trace Name) Settings

Setup parameters are shared between the main waveform display area and zoom waveform display area. Cursor measurement values use the settings of the main waveform display. To use separate settings in each window, clear the **Share channel setting in Main/Zoom** check box. Select **Main Setting** or **Zoom Setting**, and then set the channel (trace name) settings.

#### **Copying and Pasting Settings**

You can copy the settings of the selected channel (trace) and paste them to another channel. You can specify in advance which items to copy in the Copy Item Setting dialog box that appears by clicking **CopyItem**. This dialog box also appears when you paste, so you can remove unneeded items then.

Cha	nnel Setting									x
	📝 Share chann	el setting in	Main/Zoo	m		Main	Setting 🤇	) Zoon	n Setting	
Gr	r1 🗍 Gr2 🗍 (	ars 🗍 Gra	4 🗍 Gr5	Ī	Gr	6 Gr7	Gr8	Gr9	Gr10	
Gro	Group Name Group1									
No.	Trace	Display	ON/OFF			Sca	le		Color	⊿
NO.	Trace	Waveform	Readout	Log	On	Min	Max	Auto	COTOR	
1	μι		X			-1.000E1	1.000E1			
2	I1		X			-5.000E3	5.000E3			
3	P1		X			-2.000E4	3.000E4			
4	U2					-2.000E1				
5	12					-2.000E1				
6	I1					-2.000E1				
7	Math1		X			-4.995E-30	5.005E-30			
	Math2					-4.995E-30	5.005E-30			
9	<none></none>					***				
10	<none></none>					***	***			_
	++	0	0	0	0	K	N	N	M	_ ▼
	Copy Setting CopyItem Cop	y Past	te	OK		Cancel	Apply		More Opti	ions

Pastes the copied settings to the selected channel number Copies the settings of the selected channel number

Select the items to copy in the Copy Item Setting dialog box that appears.

Trace Display				
Wavefori	🔽 Readout			
Scale				
V Log	🔽 On	V Min	Max	
Color				
Display Format				
FormatType	🔲 DecimalPoint			

#### **Collective Operation in the Window**

The channel setting dialog box has buttons that you can use to select and change items collectively.



Turn on or off the selected range at once

#### Verifying before Updating

If you click Apply after changing some settings, the settings are applied immediately to the display setting window.

## **Configuring the Display**

Click 🛃 to display a display setting dialog box. Click the Graticule, Horizontal Axis, Color, Size, and Other information tabs, and configure the display settings.

#### Note.

You can also double-click the scale display area of the horizontal axis to display the display setting dialog box.

#### Setting the Grid

Click the Grid tab.



#### Setting the Horizontal Axis

Click the Xaxis tab.



- Zoom start position of the zoom waveform display area

#### **Zoom Start Position**

If the time display is relative time, the setting varies depending on whether you enter an integer or a real number. Integer input: Start data position Real number input:

Start time (you can use the m, n, u, and P unit prefixes)

#### Set the display colors.



To change the waveform color, use the channel setting dialog box. For details, see page 7-30.

#### Setting the Waveform Thickness and Grid Line Thickness

Click the Size tab.

LineWidth
Wave       1 px     Waveform thicknes       Grid     (1 to 6 px)       1 px     Grid line thicknes       (1 to 6 px)     (1 to 6 px)

**Displaying Scale Information in the Waveform Display Area** Click the **Other Information** tab.

Display Setting							
Grid Xaxis Color Size Other Information							
📝 Display T/div							
🗖 Display V/div							
☑ Display 0 Level							
✓ Display all vertical scale value							
OK Cancel Apply							



If several waveforms are displayed in the waveform display area, the V/div and 0 Level of the active waveform are displayed.

#### **Displaying Multiple Vertical Scales**

When several waveforms are displayed in the waveform display area, you can display the vertical axis range of each waveform.



#### Note.

If there is only one waveform in the waveform display area, multiple vertical axes are not displayed.

#### Verifying the Changed Settings

If you click Apply after changing some settings, the settings are applied immediately to the waveform display while keeping the display setting dialog box open.

#### Note.

Supplementary Grid on the Grid tab and Scale on the Xaxis tab can be set only when the horizontal axis unit is Hz for an FFT waveform.

## Split Display



Clicking the arrow on the right of u displays a split display setting dialog box.

Share split setting in Main/	Zoom
Split number of Main	Auto 👻
Split number of Zoom	Auto 👻

Select this check box to share settings between the main waveform display area and zoom waveform display area.

#### Setting the Number of Divisions

The number of divisions in the main waveform display area and zoom waveform display area can be set to Auto or a number between 1 to 16. If set to Auto, the area is divided by the number of display source waveforms.

#### Waveform Mapping

When the window is split, the waveforms are mapped to the split areas in ascending order by channel number. You can also specify how waveforms are mapped. For the procedure to map the waveforms as you like, see page 7-31.

#### Splitting the History Waveform Display Area

If split display is enabled, the history waveform display area is split under the same conditions as the main waveform display area.

## Moving Waveforms and Zooming (Expanding/Reducing) Vertically

- **1.** Click ₿.
- 2. Drag the waveform you want to move.
- **3.** Click the waveform you want to zoom. The selected waveform expands relative to the clicked position. Right-click to reduce the waveform relative to the clicked position.



Right-click a waveform to reduce.

You can move and zoom waveforms in the main waveform display area and zoom waveform display area.

## Moving Waveforms and Zooming (Expanding/Reducing) Horizontally

- 1. Click 👰.
- **2.** Drag the zoom target area (the thick frame or within the thick frame) in the main waveform display area, or drag the zoom waveform display area.
- **3.** Click a point in the main waveform display area or zoom waveform display area to expand the zoom display waveform relative to that point. Right-click to reduce the waveform relative to the clicked position.



Click in the zoom waveform display area to expand; right-click to reduce.

You can move and zoom waveforms in the main waveform display area and zoom waveform display area.

#### Note.

Let is available only when the zoom waveform display area is showing. For instructions on how to display the zoom waveform display area, see page 7-24.

## Annotations

You can insert annotations in the waveform view.

- 1. Click A to enable or disable Annotation mode.
- 2. Click the arrow on the right of 'A to select the annotation type.
  - The following eight annotation types are available.
  - Text (see page 7-42)
  - Delta T (see page 7-43)
  - Delta V (see page 7-44)
  - Marker (see page 7-45)
  - Delta Marker (see page 7-46)
  - Waveform Parameter (see page 7-48)
  - History Statistics (see page 7-50)
  - Cycle Statistics (see page 7-52)

Depending on the annotation that you select, the toolbar and the pointer displayed in the waveform view vary.

**3.** Depending on the annotation that you selected, perform the appropriate operations to insert the annotation.

If an annotation is selected in Annotation mode and you click an annotation of another type that is already inserted, the annotation type changes to that type.



#### Inserting Annotations Using the (Right-Click) Shortcut Menu

When in Annotation mode, a shortcut menu is displayed when any of the following operations is carried out. Click New and then the type of annotation to insert the annotation in the screen.

#### · Shortcut Menu That Appears When You Right-click in the Waveform View

Right-click to display a shortcut menu.



#### Shortcut Menu That Appears When You Right-click on a Waveform

Move the pointer over the waveform to display the information of that point.



g	ght-click to display a shortcut menu.								
	New	•	<	Text					
	Delete			Delta T					
	Сору			Delta V					
	Paste			Marker					
	Edit			Delta Marker					
		1		Waveform Parameter					
				History Statistics					
				Cycle Statistics					

Delta Marker is not available.

#### **Copying and Pasting Annotations**

Click the annotation you want to copy to select it, and then right-click to display a shortcut menu. Then, click **Copy**. Right-click the point where you want to paste the annotation, and click **Paste** on the shortcut menu that appears.

#### **Editing an Annotation**

Click the annotation you want to edit to select it, and then right-click to display a shortcut menu. Then, click **Edit**. The corresponding annotation dialog box appears. Edit the properties, and click **OK** or **Apply**.

#### **Deleting an Annotation**

- Click the annotation you want to delete to select it, and press the **Delete** key.
- Click the annotation you want to delete to select it, and then right-click to display a shortcut menu. Then, click **Delete**.

#### Annotation Types (Linked and unlinked annotations)

As described earlier, there are eight types of annotations. These annotation can be divided into linked annotations and unlinked annotations.

#### Linked Annotations

- Linked annotations are linked to waveforms.
- You can insert a linked annotation for each waveform. Even if you change the displayed group, these annotations remain linked to their corresponding waveforms.
- Delta T, Delta V, Marker, Delta Marker, Waveform Parameter, History Statistics, and Cycle Statistics are linked annotations.
- · Text annotations when they are linked to waveforms are connected with link lines.

#### **Unlinked Annotations**

- Unlinked annotations are not linked to waveforms.
- Text annotations that are not connected by link lines are unlinked annotations. Their positions change depending on the window size.

Text annotation example



7

#### **Display Areas in Which Annotations Can Be Inserted**

- Text, Delta T, and Delta V annotations can be inserted in the main waveform display area, zoom waveform display area, and XY waveform display area.
- Marker, Delta Marker, Waveform Parameter, History Statistics, and Cycle Statistics annotations can be inserted in the main waveform display area and zoom waveform display area.
- Only Delta T annotations can be inserted for logic waveforms.

#### Text Pointer Icon: A

If you select Text annotation and double-click in the waveform view or a waveform, the following setting dialog box appears. You can set the display format of the annotation.

If you double-clicked a waveform, an annotation linked to the waveform is inserted. You can set the font type and color.



You can select the color assigned to the displayed waveform group.

Changing the text size

Voltanis

#### **Display Example**



Annotation with a frame

Moving an annotation



Select the annotation and then drag.

Drag one of the four corners of the frame.

Voltage

When you select an annotation, a frame appears.

If the linked point flows outside of the waveform view when zooming or changing the scale, the link line disappears.

#### Delta T Pointer Icon: 🚫

When you select Delta T annotation and perform procedure a or b below in the waveform view, the X value is displayed.

a. Drag horizontally.



b. Double-click to display the dialog box below. You can set the trace (waveform) that the annotation is linked to, the display format, the arrow style, and other items.

The measurement range of the new X value displayed when you double-click is 2 div.

Annotation Setting (⊿T)	Preview of the value to be displayed
Preview 40.040ms	(You cannot edit this.)
Trace U1	Trace (waveform) to link the annotation to.
Display Format	
Font Dut the frame	
Display Method Auto   Decimal Digits 6	
Arrow Style	
Arrow Size	
Show auxiliary line	Thickness of the auxiliary lines that pass
Link cursor	through the arrow tips
Hide value	
Apply OK Cancel	<sup>L</sup> Display a Delta T annotation between vertical cursors.

#### **Display Example**

Delta T annotation with auxiliary lines



Moving a Delta T annotation



Select an arrow and drag. To only move the value, you can move it in the same manner as with a text annotation.

If the arrow flows outside of the waveform view



If an arrow flows outside of the waveform view when zooming or changing the scale, the value is not displayed.

Changing the text size Same procedure as for text annotations.

#### Delta T annotation between vertical cursors



Changing the length of an arrow line



Select an arrow tip and drag. The value is updated according to the length of the arrow line.

7

#### Delta V Pointer Icon: 10

When you select Delta V annotation and perform procedure a or b below in the waveform view, the Y value is displayed.

a. Drag vertically.



b. Double-click to display the dialog box below. You can set the trace (waveform) that the annotation is linked to, the display format, the arrow style, and other items.

The measurement range of the new Y value displayed when you double-click is 2 div. Annotation Setting (⊿T) - 23 Preview of the value to be displayed (You cannot edit this.) 40.040ms Preview U1 Trace (waveform) to link the annotation to. Trace Display Format Font... Put the frame Display Method Auto Decimal Digits 6 Arrow Style Arrow Size -Show auxiliary line -Thickness of the auxiliary lines that pass through the arrow tips Link cursor Hide value Display a Delta V annotation between Apply OK Cancel horizontal cursors.

#### **Display Example**



Moving a Delta V annotation



Select an arrow and drag. To only move the value, you can move it in the same manner as with a text annotation.

When the waveform is zoomed vertically



Delta V annotation between horizontal cursors



Changing the length of an arrow line



Select an arrow tip and drag. The value is updated according to the length of the arrow line.

Changing the text size Same procedure as for text annotations.

The length of the arrow line does not change even if the waveform is zoomed. The value is updated according to the zoom factor.

## Marker Pointer Icon: 🔊

A marker annotation displays the trace, X value, and Y value at the double-clicked point. If you select Marker annotation and double-click a waveform, the following setting dialog box appears.

- You can set the trace (waveform) that the annotation is linked to, the format, the marker shape, and other items.
- There are four marker shapes. Each time a marker annotation is inserted, a shape different from the previous one is used.

Annotation Setting (Marker)	┌ Preview the annotation to be displayed
Preview U1 (5.746ms, 3.8039V)	(You cannot edit this.)
Trace U1	Trace (waveform) to link the annotation to.
Format Trace Name & XAxis & YAxis	Displayed items
Marker	
Style 🗙 🗸 Size Small 🔻	
Display Format	
Font Put the frame	
Display Method Decimal Digits	
Vertic Auto	
Horiz Auto	
Apply OK Cancel	
	1

#### **Display Example**



Trace X value Y value

#### Moving a marker



Select a marker and drag. Only the marker moves. The value is updated according to where the marker moves to.

Changing the text size Same procedure as for text annotations. Moving an annotation



Select the annotation and then drag. Only the annotation moves. If the linked point flows outside of the waveform view when zooming or changing the scale, the link line disappears.

## Delta Marker Pointer Icon:

A Delta Marker annotation displays the Delta T (X value) and Delta V (Y value) between two markers.

- If you select Delta Marker annotation and drag between two points on a waveform, the Delta T and Delta V annotations between the two markers are displayed.
- Between two traces (waveforms), only the Delta T marker is displayed.



Double-clicking an annotation displays the following setting dialog box.

- For the marker, you can set the source trace (waveform), marker shape, and so on.
- There are four marker shapes. Each time a marker annotation is inserted, a shape different from the previous one is used.
- For Delta T and Delta V markers, you can set the display format, arrow style, and so on. Click the ΔT and ΔV tabs to switch between the two.

Annotation Setting (⊿Marker)	
Marker1 U1  Marker2 I1 Marker Style + Size Small	Marker source trace (waveform)
⊿T       △V         Preview       3.080ms         Display Format       Put the frame         Font       Put the frame         Display Method       Auto         Arrow Style         ✓ Show arrow       ✓         ✓ Show auxiliary line       ✓	
Apply OK Cancel	

#### **Display Example**

Delta Marker annotation with auxiliary lines



Auxiliary lines

Moving a Delta T annotation

#### .. . .



Select a marker and drag. The length of the arrow line, values, and auxiliary lines are updated according to where the marker is moved to.

## Changing the length of an arrow line (Delta T annotation only)



Select an arrow tip and drag. The marker moves and the value is updated according to the length of the arrow line.



Select the arrow of a Delta T annotation and drag. To only move the value, you can move it in the same manner as with a text annotation.

#### Moving a Delta V annotation



Select the arrow of a Delta V annotation and drag. To only move the value, you can move it in the same manner as with a text annotation.

#### If the arrow flows outside of the waveform view

For Delta Markers, if the arrows of Delta T and Delta V annotations flow outside of the waveform view when zooming or changing the scale, the values are not displayed.

#### Changing the text size

Same procedure as for text annotations.

## Waveform Parameter Pointer Icon:

When you select Waveform Parameter annotation and perform procedure a or b below in the waveform view, the measured values of waveform parameters is displayed.

a. Drag horizontally.



b. Double-click to display the dialog box below. You can set the measurement items, the trace (waveform) to which the annotation is linked, the display format, the arrow style, and other items. The measurement range of the new waveform parameters displayed when you double-click is 2 div.

Annotation Setting(Waveform P	arameter)	×	
測定項目 On			┌─ Trace (waveform) to link
Peak to peak value 💢 🗾	Trace I1	•	the annotation to.
Amplitude	Column 1		The number of horizontally-displayed
Maximum Di 🔤	Column 1		items (columns).
High level			
Average			
Middle			
RMS AND T	Display Format		
Standard deviation 🕰 🗖	Font	Put the frame	
Overshoot 🕂 🕂 🗖	Displa	ay Method Decimal Digits	
Undershoot -	YAxis Parameter Auto		
Rise time 🔨 🗖	TAXIS Parameter Auto	- <u>-</u> -	
Fall time	XAxis Parameter Auto	▼ 5 ▼	
Frequency			See the descriptions of the Delta T and
Period	Arrow Style		Delta V annotations.
Plus width	· ·		Use the controls next to Y Axis
Minus width	Arrow Size	▲ → ▼	Parameter to set the display method
Pulse count	Show auxiliary line		and the number of decimal places for
Burst1	,		the vertical-axis waveform parameters.
Burst2		J	Use the controls next to X Axis
Average frequency			
Average period			Parameter to set the display method
Int1TY			and the number of decimal places for the horizontal-axis waveform
Int2TY			
Int1XY 🙍 🗖	[		parameters.
Int2XY	Apply	OK Cancel	There are no Link cursor and Hide value
8			options, which are available for Delta T
			and Delta V annotations.

Measurement items Int1XY and Int2XY cannot be selected.

#### **Display Example**

Waveform parameter annotation with auxiliary lines



Moving a waveform parameter annotation



Select the arrow of a waveform parameter annotation and drag. To only move the value, you can move it in the same manner as with a text annotation.

## Changing the length of an arrow line



Select an arrow tip and drag. The value is updated according to the length of the arrow line.



When you start moving an annotation vertically, the pointer changes to  $\ensuremath{\big|}$  .



When you start moving an annotation horizontally, the pointer changes to

The value is updated according to the measurement scope at the new location.

#### If the arrow flows outside of the waveform view

If an arrow flows outside of the waveform view when zooming or changing the scale, the value is not displayed.

#### Changing the text size

Same procedure as for text annotations.

#### **Copying and Pasting Annotations**

You can perform the following operations by right-clicking an annotation or in the view.

Operation	Right-clicking an annotation	Right-clicking in the view
New	No	Yes
Delete	Yes	No
Сору	Yes	No
Paste	No	Yes
Edit	Yes	No

#### **Saving and Loading Annotations**

- When setup parameters are saved, only unlinked annotations are saved. When you load setup parameters, only unlinked annotations are restored.
- · For details on saving setup parameters, see chapter 8.

## History Statistic Pointer Icon:

When you select History Statistics annotation and perform procedure a or b below in the waveform view, the measured values of the history statistics are displayed.

a. Drag horizontally.



b. Double-click to display the dialog box below. You can set the measurement items, the trace (waveform) to which the annotation is linked, the display format, the arrow style, and other items. The measurement range of the new history statistics displayed when you double-click is 2 div.

Annotation Settings(History Stat	tistics)	
測定項目 On		rrace (waveform) to link
Peak to peak value Amplitude Maximum Minimum High level Low level Average Middle FMS Standard deviation Average Complete	Trace U1  Column  Histogram  Display YAxis  Linear  Log  Display Format  Font  Put the frame	the annotation to. The number of horizontally-displayed items (columns).
Overshoot     Image: Constraint of the shoot       Undershoot     Image: Constraint of the shoot       Rise time     Image: Constraint of the shoot       Fall time     Image: Constraint of the shoot       Frequency     Image: Constraint of the shoot       Period     Image: Constraint of the shoot       Plus width     Image: Constraint of the shoot	Display Method     Decimal Digits       YAxis Parameter     Auto     5       XAxis Parameter     Auto     5       Arrow Style	See the descriptions of the Delta T and Delta V annotations.
Minus width Minus width Duty Pulse count Burst1 Burst2 Average frequency Average period IntITY IntITY IntIXY IntIXY O O O O O O O O O O O O O	Arrow Size	<ul> <li>Use the controls next to Y Axis Parameter to set the display method and the number of decimal places for the vertical-axis waveform parameters. Use the controls next to X Axis Parameter to set the display method and the number of decimal places for the horizontal-axis waveform parameters.</li> <li>There are no Link cursor and Hide value options, which are available for Delta T and Delta V annotations.</li> </ul>

Measurement items Int1XY and Int2XY cannot be selected.

#### **Display Example**

#### History statistic annotation with additional lines



	History No.	P-P	Amp	▲
	0000	13.788mV 🏌	13.283mV 🏌	
•	0001	13.729mV	13.271mV	
	0002	13.738mV	13.275mV	
	0003	13.737mV	13.271mV	
	0004	13.750mV	13.267mV	
	0005	13.717mV	13.262mV	
	0006	13.738mV	13.262mV	
	0007	13.700mV	13.258mV	
	0008	13.738mV	13.254mV	
	0009	13.683mV	13.254mV	
	0010	13.721mV	13.254mV	
	0011	13.679mV	13.254mV	
	0012	13.650mV \downarrow	13.250mV	
	0013	13.667mV	13.246mV	
s	0014	13.733mV	13.246mV	
	< <p>&lt; </p>			

#### **Resizing Arrows and Moving History Statistic Annotations**

The procedure for resizing arrows and moving annotations

are the same as for waveform parameter annotations.

#### If the arrow flows outside of the waveform view

If an arrow flows outside of the waveform view when zooming or changing the scale, the value is not displayed.

#### Changing the text size

Same procedure as for text annotations.

#### Note\_

Canceling Annotation mode

In Annotation mode, a cancel button and a progress bar are displayed. Click the Cancel button to cancel Annotation mode.

If you cancel Annotation mode, the waveform display area only shows an arrow that indicates the annotation range and not the values.



## Cycle Statistic Pointer Icon:

When you select Cycle Statistics annotation and perform procedure a or b below in the waveform view, the measured values of the cycle statistics are displayed.

a. Drag horizontally.



b. Double-click to display the dialog box below. You can set the measurement items, the trace (waveform) to which the annotation is linked, the display format, the arrow style, and other items. The measurement range of the new cycle statistics displayed when you double-click is 2 div.

Annotation Settings(Cycle Statistics)		The reference trace for cycle statistic measurements.
測定項目 On Peri	riodic Waveform U1	- Trace (waveform) to link
Peak to peak value 🕦 🗖 Tra	ace U1 V	the annotation to.
Amplitude 11.2 Colu Maximum 11.1 Colu		The number of horizontally-displayed
Minimum Hist	stogram	items (columns).
High level	Display	
HVELASE	YAxis 🔘 Linear 🔘 Log	
I MMO	play Format	
Standard deviation 🕀 🗖	Font Dut the frame	
Overshoot 700 Indershoot	Display Method Decimal Digits	
Rise time 🔨 🗖	Axis Parameter Auto	
Fall time XA: Frequency	Axis Parameter Auto	See the descriptions of the Delta T and Delta
Period 🕂 🗐	row Style	V annotations.
Minus width	Arrow Size	<ul> <li>Use the controls next to Y Axis Parameter to set the display method and the number</li> </ul>
Duty Pulse count	Show auxiliary line	of decimal places for the vertical-axis
Burst 1		waveform parameters.
Burst2	Í	Use the controls next to X Axis Parameter to set the display method and the number
Average period		of decimal places for the horizontal-axis
Int1TY		waveform parameters.
Int1XY 🔊 🗖 🚽		There are no Link cursor and Hide value     aptions which are available for Delta T and
Int2XY O	Apply OK Cancel	options, which are available for Delta T and Delta V annotations.

Measurement items Int1XY and Int2XY cannot be selected.

#### **Display Example**

#### Cycle statistic annotation with additional lines



	Cycle No.	P-P	Amp	
	0000	13.667mV	13.288mV 🏌	
≻	0001	13.646mV	13.287mV	
	0002	13.650mV	13.283mV	
s	0003	13.654mV	13.287mV	
	0004	13.671mV	13.279mV	
	0005	13.633mV 🜡	13.279mV	
	0006	13.687mV	13.279mV	
	0007	13.754m∀↑	13.283mV	
	0008	13.679mV	13.283mV	
	0009	13.692mV	13.275mV	
	0010	13.687mV	13.279mV	
	0011	13.700mV	13.279mV	
	0012	13.712mV	13.275mV	
	0013	13.675mV	13.279mV	
s				
-	4			⊳

#### **Resizing Arrows and Moving Cycle Statistic Annotations**

The procedure for resizing arrows and moving annotations are the same as for waveform parameter annotations.

#### If the arrow flows outside of the waveform view

If an arrow flows outside of the waveform view when zooming or changing the scale, the value is not displayed.

#### Changing the text size

Same procedure as for text annotations.

#### Note\_

Canceling Annotation mode

In Annotation mode, a cancel button and a progress bar are displayed. Click the Cancel button to cancel Annotation mode.

If you cancel Annotation mode, the waveform display area only shows an arrow that indicates the annotation range and not the values.



## **Transferring to the Clipboard**

Clicking 📋 transfers the displayed waveform display area as image data to the clipboard. You can paste the transferred image data in a compatible application.



#### Note.

Only the displayed range in the view is transferred.

## **Reverse Video**

Clicking **automatically sets the colors suitable for monochrome printing.** Clicking the button again sets the colors back to the original colors.



# **|**|



## Switching the Displayed Group

If groups have been registered, you can click 😭 or 🚼 to switch the displayed group.



— The currently displayed group number

For details on configuring display groups, see page 7-30.

Note\_

If there are no configured groups, 🚰 and 😭 are unavailable. (Nothing will happen even if you click them).

## **Cursor Measurement**

#### **Measuring with Vertical Cursors**

Click the arrow on the right of  $\bigwedge$  and select **Vertical Cursor** to display two vertical cursors in the main waveform display area and zoom waveform display area. The measurement result area displays the measured value at each cursor position (time), the differences in times and measured values between the two cursors, and so on.

You can drag each cursor. You can click within the window to move Cursor 1 to that position. You can right-click within the window to move Cursor 2 to that position.



#### Measuring with Horizontal Cursors

Click the arrow on the right of  $\sum$  and select **Horizontal Cursor** to display two horizontal cursors in the main waveform display area and zoom waveform display area. The measurement result area displays the measured value at each cursor.

You can drag each cursor. You can click within the window to move Cursor 1 to that position. You can right-click within the window to move Cursor 2 to that position.



#### Measuring with Vertical/Horizontal Cursors

Click the arrow on the right of 🔂 and select **Vertical/Horizontal Cursor** to display four cursors (two vertical cursors and two horizontal cursors) in the main waveform display area and zoom waveform display area. The measurement result area displays the measured value at each cursor and the differences in measured values.
#### Measuring with XY Cursors

Click the arrow on the right of 🖾 and select **XY Cursor** to display four cursors in the XY waveform display area (two vertical cursors and two horizontal cursors). You can drag each cursor. The measurement result area displays the measured value at each cursor and the differences in measured values.



#### **Cursor Measurement of History Waveforms**

When history waveforms are displayed, only the active waveform is applicable for cursor measurement.

#### Linking Vertical Cursors or Horizontal Cursors

You can move the two vertical or two horizontal cursors simultaneously by dragging a vertical cursor or horizontal cursor while holding down the Ctrl key.

#### \*\*\* Indication

If the measurement result is invalid, "\*\*\*" is displayed as the measured value.

#### Note\_

You can copy the contents of the measurement result display area to the clipboard. Specify the range to be copied, and press Ctrl+C. The measured results are copied to the clipboard. The following three methods can be used to specify the range.

- · Press Ctrl+C without specifying a range to copy
  - All the contents in the measurement result display area are copied.
- Click a trace
  - All rows are selected except for the cursor position information.
- Click a trace name
  - The trace name row that you clicked is selected.
  - Click here to select all rows except for the cursor position information. Click again to clear the selection.

					×
		Cursor(1)	Cursor(2)	Cursor Diff	
No.		45,861 🛓	57,064 🛓	11,20	3
Re ative	time	- 8.278m	14.128m	22.40	6 n
• Trac	э 🛛	Value(1)	Value(2)	Value Diff	۵
U1 [V]		-325.31m	-3.7659	-3.4406	
[11[A]		-371.95	-370.86	1.0938	
Ì.					٢
П					

 If no range is specified, all contents are copied 7

## Automated Measurement

For waveforms that are displayed on the screen, various measurement items (waveform parameters), such as maximum and minimum values, can be measured automatically and their statistics can be calculated.

1. Click the arrow on the right of 🙀 to select the auto measurement type.

The following three auto measurement types are available.

- Automated measurement of waveform parameters (see page 7-60)
- Automated measurement of history statistics (see page 7-66)
- Automated measurement of cycle statistics (see page 7-69)

Depending on the automated measurement that you select, the toolbar controls vary.

2. In the selected automated measurement dialog box, set the measurement items and the conditions for displaying measured results, and then click **OK**.

#### **Automatically Measuring Waveform Parameters**

For waveform parameters, you can set and measure voltage parameters, time parameters, and area parameters.

#### Setting the Measurement Items

Clicking the arrow on the right of 🕌 and selecting **Waveform Parameter** displays a Waveform Parameter Settings dialog box.



Clicking OK in the Waveform Parameter Settings dialog box begins an automated measurement. Two vertical cursors are displayed in the main waveform display area, and the measured results of waveform parameters are displayed in the measurement results display area.

#### Specifying the Automated Measurement Range

You can change the range over which to perform automated measurement of waveform parameters. Drag the two vertical cursors to change the measurement start point and the measurement end point. Waveform parameters are remeasured.





#### Items That Can Be Measured

For waveform parameters, you can set and measure voltage parameters, time parameters, and area parameters.

#### Note.

- If there are two or more cycles of a waveform in the measurement scope, time parameters are measured for the first cycle.
- · For FFT waveforms, only the maximum and minimum values can be measured.
- · Logic waveforms cannot be automatically measured.

#### Voltage measurement items

Peak to peak value: P-P value (Max – Min) [V] Amplitude: Amplitude (High – Low) [V] Maximum: Maximum voltage [V] Minimum: Minimum voltage [V] High level: High level voltage [V] Low level: Low level voltage [V] Average: Average voltage (1/n)Σxi [V] Middle: Mean value of amplitude (Max + Min)/2 [V] RMS: Rms value  $(1/\sqrt{n})(\Sigma(xi)^2)^{1/2}$  [V] Standard deviation: Standard deviation  $(1/n(\Sigma x^2 - (\Sigma x^2)/n)^{1/2})$ Overshoot: Overshoot level (Max – High)/(High – Low)×100 [%] Undershoot: Undershoot level (Low – Min)/(High – Low)×100 [%]



#### Time measurement items

Rise time: Rise time [s] Fall time: Fall time [s] Frequency: Frequency [Hz] Period: Period [s]

Plus width: Time width where the measured values are at or above the mesial value [s] Minus width: Time width where the measured values are at or below the mesial value [s] Duty: Duty ratio (+Width/Period×100) [%]



Pulse: Pulse count (Set the measurement scope to the pulse you want to measure.) When Pulse = 3



Burst1, Burst2: Set the measurement scope to the burst width [s] you want to measure.



#### Area measurement items

Int1TY: Area under the positive parts

Int2TY: Area under the positive parts - area under the negative parts

Int1XY: • Total area in which the start and stop points trace multiple identical closed curves

- Area enclosed by a curve connecting the start and stop points
- Area in which the start and stop points trace the shape of a figure eight
- Area in which the start and stop points trace a closed curve in a spiral loop

Int2XY: • When each Y data point corresponds to a single X data point

- · When the amplitude contains negative parts
- · When multiple Y data corresponds to X data

#### Int1TY

Sum of only the positive curve areas:  $S_1 + S_2$ 

 $S_2$ 

#### Int2TY

Sum of the positive and negative curve areas: S1+S3-S2



#### Int1XY





(2) When the Waveform Extends into the Negative Side



(3) When Multiple Y Data Corresponds to X Data



#### \*\*\* Indication

If the measurement result is invalid or impossible, "\*\*\*" is displayed as the measured value. Waveforms with small amplitudes may fail to produce correct readings.

#### Note.

- Automated measurement may take some time depending on the conditions such as the measurement scope, the number of measurement items, and the waveforms to be measured.
   For example, if the measurement item is Pulse count, Burst1, Burst2, Average frequency, or Average period and the number of data points exceeds 1 Mpoint, computation will take a long time.
   Canceling automated measurement
- You cannot cancel an automated measurement when it is in progress.

#### Saving Waveform Parameters' Automated Measurement Data

To save the measured results, save the application settings to a file using the setup parameter save/load function. For details, see section 8.1.

The waveform parameters' automated measurement data that is saved can be loaded into the software along with the waveform data by using the setup parameter save/load function.

#### Note.

•

You can copy the contents of the measurement result display area to the clipboard.

Specify the range to be copied, and press Ctrl+C. The measured results are copied to the clipboard. The following three methods can be used to specify the range.

- Press Ctrl+C without specifying a range to copy
- All the contents in the measurement result display area are copied.
- Click "Measure Item"

All rows are selected except for the cursor position information.

- Click a measurement item
  - The row of the clicked measurement item is selected.
  - Click here to select all rows except for the cursor position information.

Click again to clear the selection.

						X
	Cur	sor(1)	Cursor(2	)	Cursor Dif	f
No.	269,067 🛓		854,713 🚭		585,	646
Relative time	-	46.1866m	70.94	126m	117.1	292m
• Measure Ite	m	l	л		I1	4
P-P	ſυţ	9.	.5440 V		2.8152 A	
Amp	Î,ŧ	17	7.022mV		-76.196mA	
Max	ΓŢ	4.	.7707 V		6.6216 W	
	<u>~ .</u> ]		3300 U		E04 00-W	

 If no range is specified, all contents are copied

#### **Automated Measurement of History Statistics**

The software performs statistical processing on all waveforms (history waveforms) that have been collected while collecting waveforms.

#### Setting the Measurement Items

Clicking the arrow on the right of 🚵 and selecting **History Statistics** displays a History Statistics Settings dialog box.



Clicking OK in the History Statistics Settings dialog box begins an automated measurement. Two vertical cursors are displayed in the main waveform display area, and the measured results of history statistics are displayed in the measurement results display area.

#### Specifying the Automated Measurement Range

You can change the range over which to perform automated measurement of history statistics. Drag the two vertical cursors to change the measurement start point and the measurement end point. History statistics are remeasured.





No.	Cursor(	1) Cur ,546 릎	sor(2) 776,693 🙀	Cursor Diff 590,147	
Relative Time		.626908	0.553386	1.180294	
Statistics Item Histogram	P-P(U1)	Amp(U1)	Max(U1)	Min(U1)	Histogram of statistical results In the History Statistics Settings dialog box, set whether to show or hide this area
Max	13.879mV	13.283mV	7.1042mV	-6.7333mV	(see the previous page).
Min	13.696mV	13.238mV	6.9500m¥	-6.8000mV	
Avg	18.750mV	13.255mV	6.9909mV	-6.7593mV	— History statistics
StdDev	42.051uV	12.919uV	32.672u¥	19.999uV	Max: Maximum
Count	21	21	21	21	Min: Minimum
History No.	P-P(U1)	Amp(U1)	Max(U1)	Min(U1) ≜	
0000	18.808mV T	13.283mV	7.0083mV	-6.8000mV	Avg: Average
0001	13.738mV	13.279mV	6.9958mV	-6.7417mV	StdDev: Standard deviation
0002	13.804mV	13.267mV	7.0250mV	-6.7792mV	Count: The number of cycles
0003	13.738mV	13.262mV	6.9875mV	-6.7500mV	
0004	13.738mV	13.254mV	7.0000m¥	-6.7375nV	
0005	13.746mV	13.254mV	6.9708mV	-6.7750mV	Measurement items and channels
0006	13.712mV	13.250mV	6.9750mV	-6.7375mV	
0007	13.800mV	13.246mV	7.0292m	.7708mV	
8000	13.725mV	13.246mV	6.9917m∀	-6.7333⊪V ↑	
0009	18.758mV	18.242mV	6.9625mV	-6.7958mV	
0010	18.750mV	18.288mV	6.9917m∀	-6.7583mV	Mandana and adata and a second
0011	**** V ↓	*** V 🖕	*** (		— Maximum and minimum markers
0012	*∺* V	<b>***</b> ≉ V	*** Y~	<u>*** ∀</u>	↑: The maximum value of each measurement item
					↑: The minimum value of each measurement item
listory n	umbers				
)ouble-c	lick a hi	story nu	mber to	display	
		ng histor		• •	

Items That Can Be Measured

For history waveforms, you can set and measure voltage parameters, time parameters, and area parameters. Items that can be measured are the same as those of the automated measurement of waveform parameters. (see pages 7-61 to 7-64).

#### \*\*\* Indication

If the measurement result is invalid or impossible, "\*\*\*" is displayed as the measured value. Waveforms with small amplitudes may fail to produce correct readings.

#### Note\_

Canceling history statistic measurement

While history statistic measurement is in progress, a progress bar and a Cancel button are displayed. Click the Cancel button to cancel history statistic measurement.

	Pleas	culation is e wait for	a momen	ıt.	
_					
		Cano			
		Cano	-		

 If the total number of items that is determined by the number of history waveforms, the number of channels, and the number of measurement items exceeds 100000, computation may not be possible. Change the number of displayed channels and measurement items so that 100000 is not exceeded.

#### Saving History Statistics' Automated Measurement Data

To save the measured results, save the application settings to a file using the setup parameter save/load function. For details, see section 8.1.

The history statistics' automated measurement data that is saved can be loaded into the software along with the waveform data by using the setup parameter save/load function.

#### Note\_

You can copy the contents of the measurement result display area to the clipboard. Specify the range to be copied, and press Ctrl+C. The measured results are copied to the clipboard. The following three methods can be used to specify the range.

Press Ctrl+C without specifying a range to copy

All the contents in the measurement result display area are copied.

- Click "Statistics Item"
   All rows are selected except for the cursor position information and histogram.
- Click a statistics item to copy

The row of the clicked statistics item is selected.

Click here to select all rows except for the cursor position information and the histograms.
 Click again to clear the selection.

-	Cursor(1	n cu	sor(2)	Cursor Diff	)
No.		,546 🛔	776,693 🛔	590,147	
Relative Time	-0.	626908	0.553386	1.180294	
Statistics Item	P-P(U1)	Amp(U1)	Max(U1)	Min(U1)	If no range is specified
Histogram					all contents are copied
Max	13.879mV	13.283mV	7.1042mV	-6.7333mV	
Min	13.696mV	13.238mV	6.9500mV	-6.8000mV	
Avg	13.750mV	13.255mV	6.9909mV	-6.7593mV	
StdDev	42.051uV	12.919uV	32.672uV	19.999uV	
Count	21	21	21	21	
History No.	P-P(U1)	Amp(U1)	Max(U1)	Min(U1)	
0000	13.808mV ↑	13.283mV 🏌	7.0083mV	-6.8000mV	
0001	13.738mV	13.279mV	6.9958mV	-6.7417mV	
0002	13.804mV	13.267mV	7.0250mV	-6.7792mV	

#### **Automated Measurement of Cycle Statistics**

The software determines the cycles in the displayed waveform starting with the oldest data, measures the selected automated measurement parameters over the data within the cycles, and performs statistical processing. How the cycle is determined is the same as with the normal waveform parameter Period. You can select whether to apply the cycle of the specified waveform to all waveforms or determine the cycle for each waveform separately.

#### Setting the Measurement Items

Clicking the arrow on the right of 🔛 and selecting **Cycle Statistics** displays a Cycle Statistics Settings dialog box.



Clicking OK in the Cycle Statistics Settings dialog box begins an automated measurement. Two vertical cursors are displayed in the main waveform display area, and the measured results of cycle statistics are displayed in the measurement results display area.

#### Specifying the Automated Measurement Range

When the measurement range is set to Cursor range, you can change the range over which to perform automated measurement of cycle statistics. Drag the two vertical cursors to change the measurement start point and the measurement end point. Cycle statistics are remeasured. When the measurement range is set to All, moving the cursors will not cause cycle statistics to be remeasured.



	Cursor(1)	Cursor(2)		Cursor Diff
No.	186,546 🖶		693 🙀	590,1
Relative Time	-0.626308	0.5	53386	1.180
Statistics Item	P-P	(U1)		Max(U1)
Histogram		) M N		
Ma×		13.754mV		7.0083m
Min		13.633mV		6.9208m
Avg		13.684mV		6.9538m
StdDev		31.455uV		25 <b>.</b> 155u
Count		11		11
Cycle No.	( Р-Р	(U1)		Max(U1)
0000		13.650mV		6.9333m
0001		13.654mV		6.9208m
0002		18.671mV		6.9500m
0003		13.633m 🗍	<b>)</b>	6.9500m
0004		13.687mV		6.9542m
0005		13.754m (†	片	6.9542m
0006		18.679mV		6.9708m
0007		13.692mV		6.9292m
0008		13.687mV		6.9875m
0009		13.700mV		6.9333m
0010		18.712mV		7.0083m

#### Displaying Cycle Statistic Results

**Histogram of statistical results** In the Cycle Statistics Settings dialog box, set whether to show or hide this area (see the previous page).

- Cycle statistics Max: Maximum Min: Minimum Avg: Average StdDev: Standard deviation Count: The number of cycles

- Measurement items and channels

- Maximum and minimum markers

- ↑: The maximum value of each measurement item
- ↑: The minimum value of each measurement item

Cycle numbers Double-click a cycle number to display the corresponding cycle waveform.

#### Items That Can Be Measured

On each cycle of the waveforms, you can set and measure voltage, time, and area items. Items that can be measured are the same as those of the automated measurement of waveform parameters. (see pages 7-61 to 7-64).

#### Cycle Trace

Select the trace that will be used as the reference cycle for performing cycle statistic measurement. If Own has been selected, cycle statistic measurement is performed using each trace's cycle. Cycle statistic result area will show the measured results over the time period for the least number of cycles.



The number of cycles in the channel with the slowest cycle (CH3) is four, so statistical processing is performed on the four oldest cycles of the data for CH1 and CH2. The remaining data is not used for statistical processing.

#### \*\*\* Indication

If the measurement result is invalid or impossible, "\*\*\*" is displayed as the measured value. Waveforms with small amplitudes may fail to produce correct readings.

#### Note.

- Canceling cycle statistic measurement
  - While cycle statistic measurement is in progress, a progress bar and a Cancel button are displayed. Click the Cancel button to cancel cycle statistic measurement.



· If the total number of items that is determined by the number of cycles and the number of measurement items exceeds 100000, computation may not be possible. Change the measurement scope and the number of measurement items so that 100000 is not exceeded.

#### Saving Cycle Statistics' Automated Measurement Data

To save the measured results, save the application settings to a file using the setup parameter save/load function. For details, see section 8.1.

The cycle statistics' automated measurement data that is saved can be loaded into the software along with the waveform data by using the setup parameter save/load function.

#### Note.

You can copy the contents of the measurement result display area to the clipboard.

Specify the range to be copied, and press Ctrl+C. The measured results are copied to the clipboard. The following three methods can be used to specify the range.

- · Press Ctrl+C without specifying a range to copy
  - All the contents in the measurement result display area are copied.
- Click "Statistics Item"
- All rows are selected except for the cursor position information and histogram.
- Click a statistics item to copy

The row of the clicked statistics item is selected.

Click here to select all rows except for the cursor position information and the histograms. Click again to clear the selection.

	Cursor(1)	Cursor(2)	Cursor Diff	)
No.	186,546 🙀	776,693	<u>4</u> 호 호 590,147	1
Relative Time	-0.626908	0.5533	86 1.18029	4
Statistics Item	P-P(	.01)	Max(U1)	If no range is specifie
Histogram				all contents are copied
Max		13.754mV	7.0083mV	
Min		13.633mV	6.9208mV	
Avg		13.684mV	6.9538mV	
StdDev		31.455uV	25.155uV	
Count		11	11	
Cycle No.	P-P(	U1)	Max(U1)	
0000		13.650mV	6.9333mV	
0001		13.654mV	6.9208mV	
0002		13.671mV	6.9500mV	

# Waveform Computation

Computation can be performed on up to 100 Mpoints of data.\* Computed results can be displayed in Math1 to Math32.

- The maximum number of data points depends on the options that are installed in the PX.
  - No /M1 or /M2 option: 10 Mpoints
  - /M1 option: 50 Mpoints
  - /M2 option: 100 Mpoints

#### **Displaying Math Waveforms**

Click is to display a Math Setting dialog box for configuring the math waveform display. Set expressions, filters, FFTs, and other math operations to display math waveforms.



Computation takes time in the following situations.

- The number of data points to be computed is large.
- The expression is complex, or there are many operands.

To reduce the computation time, try the following:

- Turn off unnecessary computations.
- Change the record length and time setting (T/div) to reduce the number of data points to be computed.
- Simplify the expression.
- Improve the operating environment (see section 1.3).

#### **Setting Expressions**

Click an Expression cell in the Math Setting dialog box to display a user-defined expression setting dialog box. Create an expression using variables and operators.





#### **Setting Filters**

Use the FILT1 and FILT2 tabs in the Math Setting dialog box to set the filters.

#### Setting the Math Start Point, the Number of Math Points and Math Start History

- You can set the computation range by specifying the math start point and the number of math points. You can also change the computation range by adjusting the math range bar, which is displayed in the waveform display window.
- With history waveforms, you can set the number of the history waveform at which to start computation (math start history), the math start point, and the number of math points. With this computation setting, waveforms are assigned in order from 0 to positive integers starting with the oldest waveform.

#### Note.

The maximum number of math points is 100 Mpoints<sup>\*1</sup> (50 Mpoints<sup>\*2</sup> if there are 11 or more math channels).

Math S	etting					×		
No.	Label	Unit	Expression	C	ionst.	Value	4	
Math1	Math1		C1*C2	K	1	1.000E0		
Math2	Math2			K	2	1.000E0		
Math3	Math3			K	3	1.000E0		
Math4	Math4			K	4	1.000E0		
Math5	Math5				5	1.000E0		
Math6	Math6			K		1.000E0		
Math7	Math7				7	1.000E0		Switches between filter 1 and 2
Math8	Math8			K		1.000E0		Owneries between inter 1 and 2
Math9	Math9			K		1.000E0		– Math start point
Math10	Math10	1		K	10	1.000E0	$\overline{\nabla}$	•
FET	* Setting	+		Math Setti	00	+	*	(0 to the number of waveform points)
		Window	FILT1 FILT2	Math start	-	h Points		-Number of math points
Point	ts	Rect	Type: Gauss 👻		0	100,100		When the number of math channels
200	K 🔍 🗸		Band: LowPass -					
C	start point	Hanning	LowPass	Math start	history			is 10 or less 1 to 100M*1
		FlatTop	CutOff1: 3.0 % (15.00kHz)		U			<ul> <li>When the number of math channels</li> </ul>
	0		-CutOff2: 3.0 % (15.00kHz)	ОК		Cancel		is 11 or more 1 to 50M*2
						Cancel		
C			Cutoff frequencies					form on which to start math

\*1,\*2 The maximum number of data points depends on the options that are installed in the PX.

- No /M1 or /M2 option: 10 Mpoints for \*1 and \*2
- /M1 option: 50 Mpoints for \*1 and \*2
- /M2 option: 100 Mpoints for \*1, 50 Mpoints for \*2

#### **Specifying FFT Settings**

Use the FFT Setting area in the Math Setting dialog box to set the FFT.

No.         Label         Unit         Expression         Const.         Yalue         Z           Math1         G1#G2         K1         1.000E0         K1         1.000E0           Math2         Math2         K1         1.000E0         K3         1.000E0           Math3         Math5         Math4         K4         1.000E0         K3         1.000E0           Math5         Math5         Math5         K4         1.000E0         K3         1.000E0           Math5         Math5         Math6         K4         1.000E0         K7         1.000E0           Math5         Math5         Math5         Math5         Math5         1.000E0         K8         1.000E0           Math3         Math5         Math5         Math5         1.000E0         K8         1.000E0           Math10         V         V         V         V         V         V         V           Points         Vindow         FILT1         FILT2         Math Start         Math Points         0         100,100           Points         Q         Vindow         V         V         V         V         V         V         V         V         V	Math Se	etting					<b>—</b> X	
Math2         K2         1.000E0           Math3         Math3         K3         1.000E0           Math4         K4         1.000E0         K4         1.000E0           Math5         K5         1.000E0         K4         1.000E0           Math5         Math6         K5         1.000E0         K4         1.000E0           Math5         Math6         K5         1.000E0         K6         1.000E0           Math8         Math8         Math9         K5         1.000E0         K7         1.000E0           Math8         Math9         FT         S         1.000E0         K8         1.000E0           Math10         FILT1         FILT2         Math Setting         K10         1.000E0         K10         N100E0	No.	Label	Unit	Expression	-	△ Const.	Value	4
Math3         Math4         Math4         Math4         Math4         Math4         Math4         Math4         Math5         Math5         Math5         Math5         Math5         Math5         Math5         Math5         Math5         Math6         K5         1.000E0         K5         1.000E0         K5         1.000E0         K7         1.000E0         K7         1.000E0         K7         1.000E0         K8         K10         1.000E0         K8         K10         1.000E0         K8         K10	Math1	Math1		C1*C2		K1	1.000E0	
Math4         K4         1.000E0           Math5         K5         1.000E0           Math6         K8         1.000E0           Math7         K8         1.000E0           Math8         Math8         K3           Math10         K10         K10           Math8         S         S           Math8         S         S           Math10         S         S           FFT Setting         FILT1         FILT2           Points         FlatTop         Gauss           Cutoff1:         3.0 % (15.00KH2)         O           O         Lotoff2:         S.0 % (15.00KH2)	Math2	Math2				К2	1.000E0	
Maths         K5         1.000E0           Maths         Maths         K5         1.000E0           Maths         Maths         K6         1.000E0           Maths         Maths         K6         1.000E0           Maths         Maths         K6         1.000E0           Maths         Maths         Maths         K6         1.000E0           Maths         Maths         K10         1.000E0         K3         1.000E0           Maths         Maths         Maths         K10         1.000E0         K10         1.000E0           FFT Setting         Window         FILT1         FILT2         Math Setting         Math start         Math Points         0         100,100           Gauss          O         100,100         Math start history         0         0         0         0         0         0         Cutoff1:         3.0 % (15.00KHz)         OK         Cancel         0<	Math3	Math3				КЗ	1.000E0	
Math8         K6         1.000E0           Math7         Math7         Nath7         Nath7           Math8         Math8         K6         1.000E0           Math8         Math8         K8         1.000E0           Math10         Imath8         Imath8         K8         1.000E0           FFT Setting         Imath8         Imath8         Imath8         Imath8           Points         Imath8         Imath8         Imath8         Imath8         Imath8           Points         Imath8         Imat8         Imat8         Imat8	Math4	Math4				К4	1.000E0	
Math7         Math7         K7         1.000E0           Math8         Math8         K3         1.000E0           Math8         Math9         K3         1.000E0           Math10         \$         V         K3         1.000E0           FFT Setting         FILT1         FILT2         Math Setting         Math Setting           Points         Vindow         Fect         Band:         0         100,100           FFT star         point         FlatTop         Cutoff1:         3.0 % (15.00kH2)         OK         Cancel	Math5	Math5				К5	1.000E0	
Math8         Math8         K8         1.000E0           Math3         Math3         K10         1.000E0           Math10         \$         \$         V         \$           FFT Setting         FILT1         FILT2         Math Setting           Points         \$         V         \$         0           200K         FlatTop         Gauss         O         100,100           Gutoff1:         3.0 % (15.00kH2)         OK         Cancel	Math6	Math6				К6	1.000E0	
Math3         Math3         K3         1.000E0           Math10         Math10         \$ </th <th>Math7</th> <th></th> <th></th> <th></th> <th></th> <th>К7</th> <th>1.000E0</th> <th></th>	Math7					К7	1.000E0	
Math10         K10         K10         Concentration           FFT Setting         FILT1         FILT2         Math Setting           Points         Vindow         Rect         Type: Gauss         Math Setting           EFT star         point         Gauss         O         100,100           FFT star         point         FilatTop         Cutoff1:         3.0         % (15.00kHz)           OK         Cancel         Cancel         OK         Cancel	Math8					К8		
FFT Setting     FILT1     FILT2     Math Setting       Points     FILT1     FILT2     Math Setting       200K     Image: Construction of the set of the								
FFT Setting     FILT1     FILT2     Math Setting       Points     Type: Gauss     0     100,100       Band:     LowPass     0     0       FFT star     point     FlatTop     Cutoff1:     3.0 % (15,00kHz)       O     Cutoff2:     3.0 % (15,00kHz)     OK	Math10							
FFT points	Points		Rect Hanning FlatTop	Type: Gauss  Type:	Math : Math :	start N 0 start histor	100,100 y	

#### Operator menu

The operators that you can specify can be accessed from the Function button in the user-defined expression setting dialog box.

SHIFT, ABS	HIFT, ABS, SQRT, LOG, EXP, NEG, SQR, CUBE, F1, F2					
SIN, COS, "	N, COS, TAN, ATAN, PH					
PWHH, PW	VHH, PWHL, PWLH, PWLL, PWXX, FV, DUTYH, DUTYL					
DIF, DDIF, I	IF, DDIF, INTG, IINTG					
FILT1, FILT	ILT1, FILT2, HLBT, MEAN, BIN					
LS	S LS-REAL, LS-IMAG, LS-MAG, LS-LOGMAG, LS-PHASE					
RS	RS RS-MAG, RS-LOGMAG					
PS	PS PS-MAG, PS-LOGMAG, PSD-MAG, PSD-LOGMAG					
CS	CS-REAL, CS-IMAG, CS-MAG, CS-LOGMAG, CS-PHASE					
TF	F TF-REAL, TF-IMAG, TF-MAG, TF-LOGMAG, TF-PHASE					
СН	CH CH-MAG					
TREND	TREND, TREND_HH, TREND_LL, TREND_XX					
TRENDM	TRENDM, TRENDM_HH, TRENDM_LL, TRENDM_XX					
TRENDD	TRENDD, TRENDD_HH, TRENDD_LL, TRENDD_XX					
TRENDF	_					
ZC, ZCEXT						
	SHIFT, ABS SIN, COS, PWHH, PW DIF, DDIF, I FILT1, FILT LS RS PS CS TF CH TREND TREND TRENDM TRENDD TRENDF					

#### Limitations on Expressions

- When m ≤ n, an expression for Mathm cannot include the variable Mn (operations for Mathn).
   Example of an expression that is not allowed: Math5 = M6 + M3
- Only one source waveform can be specified in an FFT.
   Example of an expression that is not allowed: PS-MAG(C1+C2)

 A computation cannot be performed on the result of an FFT. Example of an expression that is not allowed: PS-MAG(C1)+C2 Notes on computation

• An FFT is not possible if the display record length of the waveform is less than number of math points that is required.

#### **Filter Settings**

• Type/Band

Gauss (gauss): Lowpass Sharp (sharp): Lowpass/Highpass/Bandpass IIR (Butterworth): Lowpass/Highpass/Bandpass

CutOff1/CutOff2

Set either or both cutoff frequencies as a ratio to the sampling frequency. The allowable range is 2.0% to 30.0% (0.2% steps). If you set Band to **Bandpass**, specify both the CutOff1 and CutOff2 orders. The higher the filter order, the longer the computation.

#### Math start point

When computation is executed, the math start point and the math range bar appear. You can move the math start point by dragging the math start point mark or the left edge of the math range bar.



#### Math points

When you click the left edge of the math range bar, a horizontal arrow cursor appears. You can drag the edge to change the math start point and the number of math points. When you click the right edge of the math range bar, a horizontal arrow cursor appears. In this situation, you can only change the number of math points.

#### Variables and Operators

The following variables and operators can be used in expressions. You can use up to 63 characters to define an expression. You can register up to 32 expressions.

#### Variable

Variable	Example Description				
Сх	C1+C2	Value measured on channel CHx			
My	ABS(M1)	Computed (Math) value			
Т	SIN(T)	Integrated data value over time			

x: Stands for a number. Specify the number according to the number of channels that are loaded. For example, if three channels, CH1, CH5, and CH8, are loaded, specify the channels as C1, C2, and C3.

y: Number

#### Operators

Operators	Example	Description			
+, -, *, /	C1+C2	Basic arithmetic on the two specified waveforms			
SHIFT	SHIFT(C1,time <sup>1</sup> )	Phase shift			
ABS	ABS(M1)	Absolute value of the specified waveform			
SQRT	SQRT(C2)	Square root of the specified waveform			
LOG	LOG(C1)	Logarithm of the specified waveform			
EXP	EXP(C1)	Exponent of the specified waveform			
NEG	NEG(C1)	Inversion			
SQR	SQR(C1)	Square of the specified waveform			
CUBE	CUBE(C1)	Cube of the specified waveform			
F1	F1(C1,C2)	$\sqrt{ C1^2+C2^2 }$ of the specified waveform			
F2	F2(C1,C2)	$\sqrt{ C1^2-C2^2 }$ of the specified waveform			
SIN	SIN(T)	Sine of the specified waveform			
COS	COS(C1)	Cosine of the specified waveform			
TAN	TAN(C1)	Tangent of the specified waveform			
ATAN	ATAN(C1,C2)	Arctangent of the two specified waveforms (a value within $\pm \pi$ )			
PH	PH(C1,C2)	Phase between the two specified waveforms			
TREND	TREND(C1)	RMS value for each cycle of the specified waveform <sup>2</sup>			

r	- i						
Operators	Example	Description					
TREND_HH	TREND_HH(C1)	RMS value for each cycle of the specified waveform (rising edge) <sup>2</sup>					
TREND_LL	TREND_LL(C1)	RMS value for each cycle of the specified waveform (falling edge) <sup>2</sup>					
TREND_XX	TREND_XX(C1)	RMS value for each half cycle of the specified waveform <sup>2</sup>					
TRENDM	TRENDM(C1)	MEAN value for each cycle of the specified waveform <sup>2</sup>					
TRENDM_HH	TRENDM_HH(C1)	MEAN value for each cycle of the specified waveform (rising edge) <sup>2</sup>					
TRENDM_LL	TRENDM_LL(C1)	MEAN value for each cycle of the specified waveform (falling edge) <sup>2</sup>					
TRENDM XX	TRENDM XX(C1)	MEAN value for each half cycle of the specified waveform <sup>2</sup>					
TRENDD	TRENDD(C1)	DC value for each cycle of the specified waveform <sup>2</sup>					
TRENDD HH	TRENDD HH(C1)	DC value for each cycle of the specified waveform (rising edge) <sup>2</sup>					
TRENDD LL	TRENDD LL(C1)	DC value for each cycle of the specified waveform (falling edge) <sup>2</sup>					
TRENDD XX	TRENDD XX(C1)	DC value for each half cycle of the specified waveform <sup>2</sup>					
TRENDF	TRENDF(C1)	Frequency for each cycle of the specified waveform <sup>2</sup>					
TRENDF HH	TRENDF HH(C1)	Frequency for each cycle of the specified waveform (rising edge) <sup>2</sup>					
TRENDF LL							
	TRENDF_LL(C1)	Frequency for each cycle of the specified waveform (rising edge) <sup>2</sup>					
ZC	ZC(C1)	Zero-crossing of the specified waveform <sup>2</sup>					
ZC	ZC(EXT)	Zero-crossing of the TRIGGER IN terminal input <sup>2</sup>					
K1 to 10	C1+K1	Constant (set a specific value)					
PWHH	PWHH(M1,A,B)	Computation of a pulse width between a rising edge and the next rising edge <sup>3</sup>					
PWHL	PWHL(C2,A,B)	Computation of a pulse width between a rising edge and the next falling edge <sup>3</sup>					
PWLH PWLH(C1,A,B) Computation of a pulse width between a falling edge an		Computation of a pulse width between a falling edge and the next rising edge <sup>3</sup>					
PWLL	VLL PWLL(C1,A,B) Computation of a pulse width between a falling edge and						
DMM		falling edge <sup>3</sup>					
PWXX	PWXX(C2,A,B)	Computation of a pulse width between a rising/falling edge and the					
		next rising/falling edge <sup>3</sup>					
FV	FV(C1,A,B)	Reciprocal of PWHH <sup>3</sup>					
DUTYH	DUTYH(C1,A,B)	Duty cycle between a rising edge and the next rising edge <sup>3</sup>					
DUTYL	DUTYL(C1,A,B)	Duty cycle between a falling edge and the next falling edge <sup>3</sup>					
DIF	DIF(C1)	Derivative of the specified waveform					
DDIF	DDIF(C1)	Second-order derivative of the specified waveform					
INTG	INTG(C1)	Integral of the specified waveform					
IINTG	IINTG(C1)	Second-order integral of the specified waveform					
FILT1	FILT1(C1)	Filtering of the specified waveform					
FILT2	FILT2(C1)	Filtering of the specified waveform					
HLBT	HLBT(C1)	Hilbert function of the specified waveform					
Mean	MEAN(C1)	10th order moving average of the specified waveform					
BIN	BIN(C1,A,B)	Binarization of the specified waveform <sup>3</sup>					
LS-REAL	LS-REAL(C1)	Real part of the linear spectrum of the specified waveform					
LS-IMAG	LS-IMAG(C1)	Imaginary part of the linear spectrum of the specified waveform					
LS-MAG	LS-MAG(C1)	Amplitude of the linear spectrum of the specified waveform					
LS-LOGMAG	LS-LOGMAG(C1)	Logarithmic amplitude of the linear spectrum of the specified					
		waveform					
LS-PHASE	LS-PHASE(C1)	Phase of the linear spectrum of the specified waveform					
RS-MAG	RS-MAG(C1)	Magnitude of the specified waveform's RMS spectrum					
RS-LOGMAG	RS-LOGMAG(C1)	Logarithmic magnitude of the specified waveform's RMS spectrum					
PS-MAG	PS-MAG(C1)	Amplitude of the power spectrum of the specified waveform					
PS-LOGMAG	PS-LOGMAG(C1)	Logarithmic amplitude of the power spectrum of the specified waveform					
PSD-MAG	PSD-MAG(C1)	Amplitude of the power spectrum density of the specified waveform					
PSD-LOGMAG	PSD-LOGMAG(C1)	Logarithmic amplitude of the power spectrum density of the specified					
		waveform					
CS-REAL	CS-REAL(C1,C2)	Real part of the cross spectrum of the two specified waveforms					
CS-IMAG	CS-IMAG(C1,C2)	Imaginary part of the cross spectrum of the two specified waveforms					
CS-MAG	CS-MAG(C1,C2)	Amplitude of the cross spectrum of the two specified waveforms					
CS-LOGMAG	CS-LOGMAG(C1,C2)	Logarithmic amplitude of the cross spectrum of the two specified waveforms					
CS-PHASE	CS-PHASE(C1,C2)	Phase of the cross spectrum of the two specified waveforms					
TF-REAL	TF-REAL(C1,C2)	Real part of the transfer function of the two specified waveforms					
TF-IMAG	TF-IMAG(C1,C2)	Imaginary part of the transfer function of the two specified waveforms					

#### 7.5 Waveform Display

Operators	Example	Description
TF-LOGMAG	TF-LOGMAG(C1,C2)	Logarithmic amplitude of the transfer function of the two specified
		waveforms
TF-PHASE	TF-PHASE(C1,C2)	Phase of the transfer function of the two specified waveforms
CH-MAG	CH-MAG(C1,C2)	Amplitude of the coherence function of the two specified waveforms

- 1 The unit of time is seconds. The number of clocks is used when the time base is an external clock signal (Ext).
- 2 For details, see the appendix 9, "User-Defined Computation" in the PX User's Manual IM PX8000-01EN.
- 3 Set the source waveform and the upper and lower limits of the threshold levels.

#### **FFT Settings**

#### Points (number of math points)

Select 100, 200, 500, 1000, 2000, 5000, 10000, 20000, 50000, 100000, 200000, 500000, 1000000, or 2000000.

#### Note\_

If an FFT with 1000000 or more points is executed, only M1 is calculated and displayed.

#### FFT start point

When the number of loaded points is less than 10M: Specify a number between 0 and "the number of loaded points – the number of FFT points."

When larger than 10M: Specify a number between the math start point and "math start point + 10M – the number of FFT points."

#### Window (time window)

Select the Rect (rectangle), Hanning (hanning), or FlatTop (flat-top) window.

#### **Displaying the FFT Range**

The FFT range is indicated with a green bar in the main waveform display window and zoom waveform display window.

Drag the bar to move the math range.

If FFT cannot be performed, the bar indicating the range and the word "FFT" turn red.

\*\* 코 토국왕 삼 🍬 - 🗅 📑 💲 💈 🙌 - 삶 - 🗐 💷 🖬



#### Icon Displayed during Math Measurement

A progress bar is displayed while math measurement is in progress.

#### Note.

- Canceling computation
  - While computation is in progress, a progress bar and a Cancel button are displayed. Click the Cancel button to cancel the computation.

If you cancel a computation, nothing will be displayed in the waveform display area or measurement result area.

	Please wa	tion is runnir ait for a mon	ent.	
	_			
		Cancel		

#### **Computational accuracy**

Single-precision floating-point type

#### **Details of Various Computations**

For details on each function, see the appendix 9, "User-Defined Computation" in the PX User's Manual IM PX8000-01EN.

- TREND functions (TREND, TRENDM, TRENDD, TRENDF)
- Zero crossing function (ZC)
- Filter (FILT1/FILT2)
- Hilbert Function (HLBT)
- Phase Function (PH)
- Binary Conversion(BIN)
- Pulse width computation (PWHH/PWHL/PWLH/PWLL/PWXX)
- FFT function
  - Linear spectrum (LS-REAL/LS-IMAG/LS-MAG/LS-LOGMAG/LS-PHASE)
  - Rms spectrum (RS-MAG/RS-LOGMAG)
  - Power spectrum (PS-MAG/PS-LOGMAG)
  - Power spectrum density (PSD-MAG/PSD-LOGMAG)
  - Cross spectrum (CS-REAL/CS-IMAG/CS-MAG/CS-LOGMAG/CS-PHASE)
  - Transfer function (TF-REAL/TF-IMAG/TF-MAG/TF-LOGMAG/TF-PHASE)
  - Coherence function (CH-MAG)
  - Time window of FFT functions

# 7.6 FFT Display

The FFT waveform display area shows an FFT waveform of the math waveform defined with an FFT function<sup>2</sup> for an expression in the Math Setting dialog box<sup>1</sup> of the waveform window.

1 See page 7-73.



The FFT window has the following five display areas.

- Main waveform display area: The loaded waveform data is displayed in its entirety.
- · Zoom waveform display area: A section of the loaded waveform data is displayed.
- History waveform display area: All records of waveform data collected numerous times using the trigger single(N) mode or history function are displayed.
- XY waveform display area: An X-Y display is shown using the channel (trace name) displayed in the main or zoom waveform display area.
- Measurement result display area: Measured values of cursor measurement, auto measurement, math measurement, and so on are displayed numerically.

### Toolbar

The toolbar in the FFT window is the same as that in the waveform display window. However, the following four buttons are not available.

- By : Move waveforms and zoom (expand/reduce) vertically
- A state of the sta
- 🚼 , 🚰 :Switch the displayed group



#### Note\_

- The display settings of the waveform display window's toolbar are separate from the settings of the FFT display window's toolbar.
- FFT waveforms are not displayed if the expressions in the Math Setting dialog box of the waveform window do not contain FFT functions.

# FFT Waveform Display Area



#### **Tooltip display**

If you leave the pointer on a waveform for about 1 second, the information about that point appears. Information is displayed for FFT and zoom waveforms.



## **Zoom Waveform Display Area**

This is the same as the zoom waveform display area of the waveform display window. For details, see page 7-26.

#### **History Waveform Display Area**

This is the same as the history waveform display area of the waveform display window. For details, see page 7-28.

# X-Y Waveform Display Area

This is the same as the X-Y waveform display area of the waveform display window. For details, see page 7-29.

#### Measurement Result Display Area

Cursor measurement results are displayed in the measurement result area. For details, see "Cursor Measurement" (page 7-57).

# 8.1 Saving and Loading Setup Parameters

1. Click [] in the menu area. The File screen appears.

JUTOJ	File	Location C#	Program Files¥YOKOGAV	VA¥PowerViewerPlus						
	ALL (Measured data and Setting)     PowerViewer Setting	Date	Comment	PowerViewer Setting	Equipment Setting	Mean rement Data	Serial No.	File Name	Module Configuration	
		2014/05/29 14/28	Test Condition 01	Tomor Fichier Optimie	Equipment Setting	Hodsoronicini Dolla	91NA19939		000	
	C Equipment Setting + Measured data	2014/05/29 14:24		*		*	91NA19999		000	
			. Test Condition 058	*			91NA19999		000	
	A Contraction (	2014/05/29 14:24:	. Test Condition 069				91NA19999	Data0531	000	
			. Test Condition 156	*				Set1056		
			. Test Condition 226	*				Set1023		$\rightarrow$ List of saved data
			. Test Condition 408	*				Set1865		
		2014/05/29 14:26					91NA19999			
		2014/05/29 14:27: 2014/05/29 14:28:			*	*	91NA19999 91NA19999			
		2014/05/29 14:28: 2014/05/29 14:28:					91NA19999 91NA19999		000	
		2014/02/20 14:20.					31NA13333	Datauoob	999	
	G File Information									
	Comment									
	Test Condition 028									
	·									
	Location									
	C#Program Files#YOKOGAWA#Powe Folder_									
	C AutoNaming									
	Name									
-1	Data0647									
	Dalaone/									
	Save Load									
а.		× (					_	_		•

# Selecting the Type of File to Save

Select the type of data to save from the following:

- ALL (Measured data and Setting)
- · PowerViewer Setting: The software setup parameters will be saved.

• Equipment Setting + Measured data: The PX setup parameters and measured data will be saved. Depending on the option you select, the illustration changes.

File Type	
ALL (Measured data	a and Setting)
🖱 PowerViewer Settin	ıg
🔘 Equipment Setting ·	+ Measured data

#### Note.

Waveform data is saved in WPF format (.wpf extension) when a measurement stops. For details on the saving of waveform data, see chapter 6.

To save waveform data and numeric data in CSV format (.csv extension), see page 7-2.

# **Setting the Save Conditions**

S File Information
Comment
SWI:OFF SW2:OFF
Location
C:¥Program Files¥YOKOGAWA¥Powe Folder
AutoNaming
Name
PX_Setting_001
Save

#### Comment

You can enter a comment if you like. Number of characters that you can enter:

- Up to 100 characters per line
  - Up to 6 lines

## Location

Specify the folder to save the file.

## **Auto Naming**

If you select the AutoNaming check box, files are saved with the name Auto\_yyyymmddhhmmss.cfg. yyyymmddhhmmss is a 14-digit number consisting of the year, month, day, hour, minute, and second. The year is four digits; the hour is based on a 24-hour clock.

#### Name

To specify the file name, clear the AutoNaming check box, and enter the file name.

- File Name: You can assign any name that is allowed on your PC.
- Extension: .cfg

#### **Save Button**

Executes the saving of data.

## **Load Button**

Loads the file that is selected in the saved-file list.

#### Note\_

- If a wpf file is loaded in online mode, the mode switches to offline.
- To load setup parameters and apply them to the PX, after loading the setup parameters, connect to the PX according to the procedure described in section 4.2.
- For instructions on how to load waveform data, see "Load waveform data (WPF file)" on page 7-2.

# List of Saved Files

Date and time when the file was saved

		An asterisk app /					etting. quipment Setting.			
			An asterisk appears when the file contains Measurement Data.							
							nber of the PX that was In the file was saved			
					whe • E: • A:	n the file Power n AUX mo	about the PX modules e was saved nodule dule (MotorMode = OF odule (MotorMode = ON			
tion C:¥Pr	l ogram Files¥YOKOGAV	Wi¥PowerViewerPlus								
<b>^</b>	Comment	Denner) General Cetting	Environment Setting	Management Data	Seciel No.	Cile News	Madula Configuration			
ate	Comment	PowerViewer Setting	Equipment Setting	Measurement Data			Module Configuration			
ate ) 14/05/29 14:23:	Test Condition 01	*	*	*	01NA10000	Data0286	000			
ate 014/05/29 14:23: 014/05/29 14:24:	Test Condition 01 Test Condition 025		*		91NA 19999 91NA 19999	Data0286 Data0468	88A 88A			
ate 014/05/29 14:23: 014/05/29 14:24: 014/05/29 14:24:	Test Condition 01 Test Condition 025 Test Condition 068	*	*	* *	91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511	99A 99A 99A			
ate 014/05/29 14:23: 014/05/29 14:24: 014/05/29 14:24: 014/05/29 14:24:	Test Condition 01 Test Condition 025	* * *	* * *	* * *	91NA 19999 91NA 19999	Data0286 Data0468 Data0511	88A 88A			
ate 014/05/29 14:23: 014/05/29 14:24: 014/05/29 14:24: 014/05/29 14:24: 014/05/29 14:25:	Test Condition 01 Test Condition 025 Test Condition 068 Test Condition 069	* * * *	* * *	* * *	91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511 Data0531	99A 99A 99A			
ate 014/05/29 14:23: 014/05/29 14:24: 014/05/29 14:24: 014/05/29 14:24: 014/05/29 14:25: 014/05/29 14:25:	Test Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156	* * * * *	* * *	* * *	91NA 19999 91NA 19999 91NA 19999	Data0296 Data0468 Data0511 Data0531 Set1056	99A 99A 99A			
ate <u>114/05/29 14:28:</u> <u>114/05/29 14:24:</u> <u>114/05/29 14:24:</u> <u>114/05/29 14:25:</u> <u>114/05/29 14:25:</u> <u>114/05/29 14:26:</u> <u>114/05/29 14:26:</u>	Tect Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156 Test Condition 226	* * * * *	* * * *	* * * * *	91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999	Data0286           Data0468           Data0511           Data0531           Set1056           Set1023           Set1065           Data506B	99A 99A 99A			
ate 111/05/29 14:23: 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:25: 111/05/29 14:25: 111/05/29 14:26: 114/05/29 14:26: 114/05/29 14:26:	Tect Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156 Test Condition 226	* * * * *	* * * * * *	* * * *	91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511 Data0531 Set1056 Set1023 Set1065 Data506B Data506B				
ate 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:25: 114/05/29 14:25: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:28:	Tect Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156 Test Condition 226	* * * * *	* * * * * * * *	* * * * * * *	91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511 Data0531 Set1056 Set1023 Set1065 Data506B Data506B Data548B	660 660 660 660			
ate 111/05/29 14:23: 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:25: 111/05/29 14:25: 111/05/29 14:26: 114/05/29 14:26: 114/05/29 14:26:	Tect Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156 Test Condition 226	* * * * *	* * * * * *	* * * *	91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511 Data0531 Set1056 Set1023 Set1065 Data506B Data506B				
ate 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:25: 114/05/29 14:25: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:28:	Tect Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156 Test Condition 226	* * * * *	* * * * * * * *	* * * * * * *	91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511 Data0531 Set1056 Set1023 Set1065 Data506B Data506B Data548B	660 660 660 660			
ate 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:25: 114/05/29 14:25: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:28:	Tect Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156 Test Condition 226	* * * * *	* * * * * * * *	* * * * * * *	91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511 Data0531 Set1056 Set1023 Set1065 Data506B Data506B Data548B	660 660 660 660			
ate 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:25: 114/05/29 14:25: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:28:	Tect Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156 Test Condition 226	* * * * *	* * * * * * * *	* * * * * * *	91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511 Data0531 Set1056 Set1023 Set1065 Data506B Data506B Data548B	800 800 800 800			
ate 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:25: 114/05/29 14:25: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:28:	Tect Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156 Test Condition 226	* * * * *	* * * * * * * *	* * * * * * *	91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511 Data0531 Set1056 Set1023 Set1065 Data506B Data506B Data548B	660 660 660 660			
ate 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:25: 114/05/29 14:25: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:28:	Tect Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156 Test Condition 226	* * * * *	* * * * * * * *	* * * * * * *	91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511 Data0531 Set1056 Set1023 Set1065 Data506B Data506B Data548B	660 660 660 660			
ate 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:25: 114/05/29 14:25: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:28:	Tect Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156 Test Condition 226	* * * * *	* * * * * * * *	* * * * * * *	91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511 Data0531 Set1056 Set1023 Set1065 Data506B Data506B Data548B	800 800 800 800			
ate 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:24: 114/05/29 14:25: 114/05/29 14:25: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:26: 114/05/29 14:28:	Tect Condition 01 Test Condition 025 Test Condition 068 Test Condition 069 Test Condition 156 Test Condition 226	* * * * *	* * * * * * * *	* * * * * * *	91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999 91NA 19999	Data0286 Data0468 Data0511 Data0531 Set1056 Set1023 Set1065 Data506B Data506B Data548B	800 800 800 800			

# 9.1 Help Feature

# **Displaying Help**

**Click the help button.** If Adobe Reader is installed on your PC, it will start, and the PDF file of the software user's manual will open.

You can look up how to use the software and terminology.



# **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.



## **Obtaining the Latest User's Manual and Alteration Notices**

To obtain the PDF files of the latest user's manual and alteration notices, visit the YOKOGAWA website indicated below, click Y-LINK to show the manual download page. Download the user's manual and alteration notices for the software from this page.

http://tmi.yokogawa.com/service-support/

Change the file name of the manual or alternation notice to that shown below, and overwrite the existing file in the Manuals folder in the software installation folder that you specified in the procedure described on page 3-2. Then, you will be able to view the file by clicking User's Manual or Alteration of User's Manual on the Help menu.

- User's manual file name:
- JA\_PowerViewerPlus Users Manual.pdf
- Alteration notice file name:
- JA PowerViewerPlus Alterations.pdf

#### Note.

- You can download Adobe Reader from the Adobe website.
- The latest user's manual and alteration notice that you can download from the YOKOGAWA website correspond to the latest version of this software. If necessary, update the software. You can download updates to the software from the YOKOGAWA website indicated above.

# Viewing the PX8000 User's Manual

- 1. Right-click the help 🕜 button.
- 2. Click Equipment Manual.
- 3. Click the manual you want to view.



- Getting Started Guide
  - Describes the installation procedure, precautions, specifications, etc.
- User's Manual [Operation] Describes how to use the various functions.
- User's Manual [Function]
   Describes the various functions.
- Communication Interface
   Describes communication commands.

# 9.2 Viewing the Version Information

- 1. Right-click the help 🕜 button.
- 2. Click About.



# 9.3 Setting the Displayed Language

- 1. Right-click the help 🕜 button.
- 2. Click Change Language.
- 3. Select the language you want to use.

User's Manual Alterations of User's Manual Equipment Manual About	F			
Change Language Language Editor	+ -	<ul> <li>Image: A start of the start of</li></ul>	English Japanese	

## **Customizing the Displayed Language**

To customize the displayed language, edit the language file by following the procedure in section 9.4.

If there is a language file that you create (custom file), the submenu will appear as follows:



Select Custom to load the custom file.

# 9.4 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.

User's Manual Alterations of User's Manual Equipment Manual About	×	
Change Language	+	
Language Editor		Edit the displayed langua

 In the Language Editor dialog box, click the cells in the Current column to edit the text to display.

lo	Section	Comment	Original	Current				
1	WINDOW	WindowNumeric	Numeric	Numeric				
	WINDOW	WindowBar	Bar	Bar				
	WINDOW	WindowVector	Vector	Vector	<			
	WINDOW	WindowWave	Wave	Wave	Click			
	WINDOW	WindowFft	FFT	FFT				
	ASSIST	AssistConnect	Connect	Connect	¥			
	ASSIST	AssistSetting	Setting	Setting	Numeric			
	ASSIST	AssistMeasure	Measure	Measure				
	ASSIST	AssistAnalysis	Analysis	Analysis	Edit the ch	aracte	er s	tring to disp
)	ASSIST	AssistFile	File	File				
1	ASSIST	AssistHelp	Help	Help				
2	ASSIST	AssistExit	Exit	Exit				
3	CONNECT	Title	Connect	Connect				
ŧ	CONNECT	ConnectCondition	Connection Condition	Connection Condition				
5	CONNECT	ConnectNewCondition	New Connection	New Connection				
5	CONNECT	ConnectSameConditionFile	Same Condition as Loaded	Same Condition as Load	ded File			
7	CONNECT	ConnectSameConditionLast	Same Condition as Last Ex	Same Condition as Last	t Execution			
3	CONNECT	ConnectEquipmentList	Equipment List	Equipment List				
9	CONNECT	ConnectDeviceSearch	Device Search	Device Search				
0	CONNECT	ConnectConnection	Connection	Connection			-	
E	1							

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:\Program Files\Yokogawa\PowerViewerPlus\Language

# Loading Saved Language Information

Click Load to load a language information file into the Language Editor dialog box.

# 10.1 If a Problem Occurs

If a message appears on the PC screen, see section 10.2, "Error Messages." If servicing is necessary, or if the instrument does not operate properly even after you have attempted to deal with the problem according to the instructions in this section, contact your nearest YOKOGAWA dealer.

Problems and Solut	ions
Unable to communication	ate with the PX 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 page 1-6).
Unable to change the	e Function, Element, and Order settings in the dialog boxes.
	Click a Function, Element, or Order cell to show a combo box.
	Then select the appropriate item.
Waveforms are not d	isplayed.
	In the channel setting dialog box, change the Min and Max values under Scale (see page 7-31).
Waveform traces over	rflow from the screen.
	In the channel setting dialog box, click Auto under Scale or change the Min and Max values to appropriate values under Scale (see page 7-31).
Even when the <b>Softv</b> does not change.	vare display update interval on the Measure screen is changed, the display update interval of the software
	The display update interval of the software is not synchronized to the display update interval of the PX. It is dependent on the performance of your PC and the communication interface (USB, GP-IB, or Ethernet). If the software's display update interval is set to 1 s, the software cannot keep up, and some of the data points that the PX is measuring will not be collected. Configure your environment by referring to the items below.
	<ul> <li>The communication interfaces listed in descending order by data rate are as follows: USB, Ethernet GP-IB.</li> </ul>
	Use a faster PC.

# 10.2 Error Messages

Message	Corrective Action
<ul> <li>Equipment can not be found.</li> <li>Check the power supply condition.</li> <li>Check Device Manager.</li> <li>Refer to help.</li> </ul>	<ul> <li>Check the following items.</li> <li>Is the PX turned on?</li> <li>Is the GP-IB, Ethernet, or USB cable connected properly?</li> <li>If you are using GP-IB, are the GP-IB addresses in the same system all unique? Is the GP-IB address set on the PX the same as the GP-IB address set in PowerViewerPlus? Is the GP-IB driver installed correctly in your PC?</li> <li>If you are using Ethernet, are the IP address, user name, and password set to the same values on the PX and PowerViewerPlus?</li> <li>If you are using USB, are the ID used in the same system all unique? Is the ID set on the PX the same as the ID set in PowerViewerPlus? Is the USB driver installed correctly in your PC?</li> <li>If you are using USB, is the USB driver is appropriate for the PX?</li> </ul>
Update rate is out of range Stop timer is out of range Wave observe is out of range Please input a value from 0.001 to 9999.	The value that you tried to set is outside the allowed range. Set a value within the allowed range.

# 11.1 Specifications

Item	Specifications	
Data formats that the se	oftware can save to	
	The following table lists the	e data formats (extensions) that the software can save to. Note that CSV files
	cannot be loaded into the	software.
	Setup parameters <sup>1</sup>	CFG format (.cfg)
	Numeric data	CSV format (.csv)
	Waveform data	CSV format (.csv), WPF format (.wpf)
	1 Setup parameters canno	t be saved to CSV files.
Data formats that the se	oftware can load from	
	The following table lists the	e files that the software can load from.
	Model	PX8000
	Setup parameters	CFG format (.cfg)
	Numeric data <sup>2</sup>	_
	Waveform data <sup>2</sup>	WPF format (.wpf)
	2 CSV data cannot be load	led into the software.
Views	The following types of data	are displayed.
	Numeric data	
	<ul> <li>Bar graph<sup>3</sup></li> </ul>	
	Vector <sup>3</sup>	
	Waveform	
	• FFT	
	3 Harmonic measurement	option must be installed in the PX.
PX configuration	All functions that are availa	ble as communication commands
System Requirements	See section 1.3.	

# Index

#### 

В	Page
bar graph	7-21
basic information	

С Р	age
cascade	7-4
CD-R, storage	ii
channel settings 7	7-30
	7-54
	7-35
comment	8-2
communication board	1-6
computation	7-72
connection condition	4-2
Connection menu	4-1
connection, starting	4-3
	10-2
CPU	1-6
CSV, save to	7-2
cursor	7-57
cycle statistics	7-69

D	Page
display	. 1-6
display format	7-31
display screens, types	. 1-4
display settings	7-34

<u>E</u>	Page
element	7-7, 7-16
element properties	
end harmonic order	
Equipment	8-1
equipment list	4-2
error messages	10-2
Ethernet	1-6
Ethernet control	2-4
exiting	3-12

F	Page
FFTFFT display file menu file names	7-75 7-80 8-1
file type function	8-1

# G Page GP-IB 1-6 GP-IB control 2-3 grid 7-34 group, setting 7-30 group, switching 7-56

Н	Page
harmonic order	7-16
HDD	. 1-6
help feature	. 9-1
history statistics	
history waveform display area	7-28
horizontal axis	7-34
horizontal cursor	7-58

I F	age
image element	7-7
installation	3-1

<u>L</u>	Page
language	. 9-4
language editor	. 9-5
Layout View	. 7-7
load	. 8-2
location	. 8-2

M	Page
main waveform display area	. 7-25
measured result element	7-7
Measure screen	6-1
memory	1-6
menus	
messages	. 10-2
mouse	

N	Page
new connection	4-1
numeric display	7-16

0	
offline	. 4-6
OS	. 1-6

Ρ	Page
PC	1-6
PC and PX, connection	2-1
PowerViewer Setting	8-1
print	7-6
printer	1-6
print preview	7-13
problems	10-1
problems and solutions	10-1

#### Index

R	Page
report file	7-11
report function	
Report List	
report, printing	7-13
revisions	i

Z	Page
zoom waveform display area	7-26

S	Page
save conditions	8-2
saved files, list	8-3
saving	6-3
Setting screen	5-1
setup parameters, saving	8-1
software licensing agreement	v
software, starting	
Software Version	
specifications	. 11-1
split	
split display	
start harmonic order	7-21
system requirements	1-6

### т

т	Page
text element	
tile	
tone	
toolbar	7-2, 7-6, 7-30, 7-80
toolbar text	
trademarks	i

# U

U	Page
uninstallation USB	. 1-6
USB control USB driver	

## V

V	Page
vertical cursor	7-57

Page

#### W

waveform data loading	7-2
Waveform data storage	6-2
waveform display	7-24
waveform mapping	7-31
waveform, moving	7-38
waveform parameters	7-60
waveform window	7-24
waveform, zooming	7-38
window arrangement	7-4
window image element	7-7
workflow	
wpf	6-3
WPF file	
WTID	7-16

# Χ

X	Page
Xreport	7-6
XY cursor	. 7-59
X-Y waveform display area	. 7-29
Y	Page
YKMUSB	3-4