HIOKI

9624-50

Instruction Manual

PQA-HiVIEW PRO

EN

600146394

Contents

Chapter 4
Analyzing Measurement Data _____35

Chapter 5
Analyzing Measurement Data from the Hioki PW3198, 3196 _____83

Chapter 6
Analyzing Measurement Data
from the Hioki 3197 _____115

vi

Contents

User's License Agreement

Important

Please read the following agreement carefully. This user's license agreement (hereafter referred to as Agreement) is a legal contract between the software user (individual or institution) and HIOKI E. E. CORPORATION (hereafter referred to as HIOKI). The term "software" includes any related electronic documentation and computer software and media, as well as any printed matter (such as the Instruction Manual).
By installing, reproducing, or using the software, you, the Licensee, agree to accept the license terms set forth in this Agreement.

This software is protected by copyright laws, international copyright agreements, as well as non-corporate laws. The software is a licensed product, and is not sold to the user.

1. License

This Agreement grants you, the Licensee, a license to install a single copy of the software on a specified computer system.

2. Explanation of other rights and restrictions

-1. Restrictions on reverse engineering, decompiling, and disassembling:

You may not reverse engineer, decompile, or disassemble the software.

-2. Separation of components:

This software is licensed for use as a single product. You may not separate the components for use on multiple computer systems.

-3. Loaning:

You may not loan or lease the software.

-4. Transfer of software:

You may transfer full rights in accordance with this Agreement. However, if you do so, you may not retain any copy of the software, but must transfer the software in its entirety (all components, media, related documentation such as the Instruction Manual, and this Agreement), and must ensure that the receiver of the software agrees with the terms set forth in this Agreement.

-5. Cancellation:

In the event that the terms and conditions set forth in this Agreement are violated, HIOKI retains the right to cancel this Agreement without compromise of any of its other rights. In this event, you must destroy all copies of the software and its components.

3. Copyright

The title and copyright rights concerning the software's related documentation, such as the Instruction Manual and copies of the software, are the property of HIOKI and other licensors, and are protected by copyright laws and international agreement regulations. Accordingly, you must treat the software as you would any other copyrighted document. However, you are permitted to make copies as indicated in (A) and (B) below provided such copies are not intended for use other than back-up purposes.

(A) You may make a single copy of the software.

(B) You may install this software on a single computer.

However, you may not reproduce the documentation supplied with the software, such as the Instruction Manual.

4. Dual media software

You may receive the same software on more than one type of media. However, regardless of the type and size of media provided, you may only use one media type and only on a single computer. You must not use or install the other media on any other computer. Furthermore, except when transferring the software as stipulated above, you may not loan, lease, or transfer the other media to any other user.

5. Warranty

-1. HIOKI reserves the right to make changes to the software specifications without any prior warning.

-2. If the software does not operate in accordance with the supplied Instruction Manual, or the software media or Instruction Manual are damaged in any way, you have one year from the date of purchase to apply for either an exchange or repair at HIOKI's discretion.

-3. In no event will HIOKI be liable for any damages resulting from fire, earthquake, or actions of a third party under the conditions stated in item number 2 above, or for any damage caused as a result of your using the software incorrectly or under unusual circumstances. Further, the warranty is invalid if the following occurs:

(A) Damage incurred through transport, moving, droppage, or any other kind of impact after you purchased the software.

(B) Damage incurred through any form of alteration, unwarranted servicing, or any other type of mistreatment.

-4. In the event that the software is exchanged or repaired, the period of warranty expires on the latest occurring date out of the day stated in the original warranty, and exactly 6 months from the day the exchanged/repaired software is returned to you.

-5. Regardless of the grounds for making a legal claim, HIOKI and its licensors will not be liable for any damage incurred (including, but not limited to: lost profits, suspension of business, loss of data or lost savings) unstated in the warranty terms for the use of this software. This is true even if HIOKI is notified of the possibility of such damages. In any event, HIOKI's liability shall be limited only to replacing defective software with software that is not defective.

Introduction

Thank you for purchasing the HIOKI "Model 9624-50 PQA-HiVIEW PRO." To obtain maximum performance from the instrument, please read this manual carefully, and keep it handy for future reference.
The 9624-50 PQA-HiVIEW PRO is a PC program for use with the Model PW3198, 3196 and 3197 Power Quality Analyzers.

Registered trademarks

The company and product names used in this instruction manual are the trademarks or registered trademarks of their respective owners.

Confirming Package Contents and Handling the CD

When you receive the software, inspect it carefully to ensure that no damage occurred during shipping.
If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.

9624-50 PQA-HiVIEW PRO
Program Software (CD)
The latest version can be downloaded from our web site.

Install guide

⚠CAUTION

CD Handling Precautions

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

• Always hold the disc by the edges, so as not to make fingerprints on the disc or scratch the printing.
• Never touch the recorded side of the disc. Do not place the disc directly on anything hard.
• Do not wet the disc with volatile alcohol or water, as there is a possibility of the label printing disappearing.
• To write on the disc label surface, use a spirit-based felt pen. Do not use a ball-point pen or hard-tipped pen, because there is a danger of scratching the surface and corrupting the data. Do not use adhesive labels.
• Do not expose the disc directly to the sun's rays, or keep it in conditions of high temperature or humidity, as there is a danger of warping, with consequent loss of data.
• To remove dirt, dust, or fingerprints from the disc, wipe with a dry cloth, or use a CD cleaner. Always wipe spherical from the inside to the outside, and do no wipe with circular movements. Never use abrasives or solvent cleaners.
• Hioki shall not be held liable for any problems with a computer system that arises from the use of this CD, or for any problem related to the purchase of a Hioki product.

In the interests of ongoing product developments, there may be minor discrepancies between screen displays and the operating instructions, and in the data conversion process.

Symbols and Terminology

The following symbols in this manual indicate the relative importance of cautions and warnings.

Symbols

⚠CAUTION	Indicates that incorrect operation presents a possibility of injury to the user or damage to the instrument.
NOTE	Indicates advisory items related to performance or correct operation of the instrument.

(p.)	Indicates the location of reference information.
*	Indicates that descriptive information is provided below.

Mouse Operation Terminology

Click	Press and quickly release the left button of the mouse.
Right-click	Press and quickly release the right button of the mouse.
Double click	Quickly click the left button of the mouse twice.
Drag	While holding down the left button of the mouse, move the mouse and then release the left button to deposit the chosen item in the desired position.
Activate	Click on a window on the screen to activate that window.

Other Terminology

- Unless otherwise specified, "Windows" represents Windows 2000, Windows XP, Windows Vista, Windows 7 (32bit/64bit) or Windows 8 (32bit/64bit).

- Dialog box represents a Windows dialog box.

- Menus, dialogs, buttons in a dialog, and other names on the screen are indicated in brackets.

Example: **File-Open** indicates that you should click **File** in the menu bar, and then click **Open** in the displayed pull-down menu.

Overview

Chapter 1

Product Overview and Features

The Hioki 9624-50 PQA-HiView Pro is a software application for analyzing binary-format measurement data from the Hioki PW3198, 3196 and 3197 Power Quality Analyzers on a computer.
The PQA-HiView Pro can load and read only binary data recorded with the Hioki PW3198, 3196 and 3197 Power Quality Analyzers.
It cannot read text or CSV data.

The 9624-50 PQA-HiView Pro offers the following functions.

Display and Analyze Measurement Data (p. 17)
Analyze measurement data in greater detail using the same display as the PW3198, 3196, and 3197 Power Quality Analyzers. You can also display and compare multiple graphs.

Print Displayed Windows(p. 64) and Copying (p. 75)
Print and copy displayed windows for use in other applications.

Generate Measurement Data Reports (p. 66)
Print any measurement as a report. You can also save it as a rich text format file, and use it in other applications.

Display Measurement and Calculation Values (Maximum, Minimum and Average) (p. 38)
Use the A/B cursors to view maximum, minimum and average values within any time span.

Convert Measurement Data to CSV Format (p. 76)
Convert any span of measurement data to CSV format. Load converted files into computer spreadsheet programs.

Calculate Demand and Integral Power
Hioki PW3198(p. 92),
Hioki 3197(p. 117), Hioki 3196(p. 92)
From the measurement data, calculate maximum and average demand values, and integral power.

(Hioki PW3198, 3196 only)

Download measurement data from the PW3198, 3196 Power Quality Analyzer (p. 111)
Connect the Hioki PW3198, 3196 to a computer via LAN to download data from its internal memory and data files from the PW3198 or 3196's SD/PC Card.

Display measurement data in EN50160 mode (p. 103)

Judge anomalies according to the ITIC (CBEMA) Curve* (p. 95)
* Commonly used in the USA, the ITIC Curve is a standard for evaluating voltage anomalies by specifying a range of acceptable tolerance. A "User-Defined Curve" can be optionally defined for voltage anomaly evaluation.

Operation Flowchart

First things to do after purchasing ● **Install the 9624-50 PQA-HiVIEW PRO program (p. 5)**

Launch the program (p. 11)

View measurement data

Load measurement data (p. 13)

Measurement data can be downloaded from Hioki PW3198, 3196 to the computer.(p. 111)

Display and analyze the measurement data (p. 17)

Print (p. 64)

Generate a report (p. 66)

To use measurement data with another application

Copy the screen image to the clipboard(p. 75)

Convert to CSV file (p. 76)

Close the program (p. 12)

Create and load an integrated settings file

To analyze data or generate reports with the same settings

Save the integrated settings file

Settings file for generating reports (.RPF)*

Settings file for limit value curve (.UCV)

Settings file for measurement result classification (.ESP)

Integrated settings file (.QAP)*

* Only settings files for report generation and the integrated settings file are available for data from Hioki 3197.

Load an integrated settings file

Setup   Chapter 2

Hardware and OS Requirements (System Configuration)

The 9624-50 PQA-HiVIEW PRO requires the following hardware and software. Please verify your system configuration.

Computer Type	PC/AT compatible
Operating System	English version of any of the following operating systems: • Microsoft Windows XP • Microsoft Windows Vista • Microsoft Windows 7 • Microsoft Windows 8
Memory	At least 512 MB
Display	XGA (1024 x 768 dots) or higher
Disk System	CD-ROM drive (Used only for installation)
Printer	Required for report printing on the computer. Either color or monochrome can be used, but the fastest possible printing is recommended.

NOTE   For some models, proper operation cannot be guaranteed even when the above requirements are satisfied.

Installing the 9624-50 PQA-HiVIEW PRO Program

Install the program by the following procedure.
Windows XP or Windows Vista, Windows 7, Windows 8 should be installed by your Systems Administrator.

Note: The description and message may vary depending on the operating system in use.

NOTE Installation may not be possible when other applications are running.
Before installing, close all applications that you can.
When an anti-virus program is running, installation may not be possible even when no virus exists. In this case, change your anti-virus program settings as necessary to allow installation to proceed.

---

1 Start the computer.

Close all running programs.

---

2 Insert the program CD into the CD-ROM drive.

---

3 In the English folder, double click **Setup.exe** (the extension may not be displayed) to start the installer.

(\English\setup.exe)

The installer starts when you double click.

4 In the installer, click **Next** and confirm the installation destination.

Next

The installation destination folder can be changed on this screen.

The installation destination is displayed.

To change the installation destination, click **Change** to select another folder. There is normally no need to change it.

Next

If you are not changing the installation destination, click **Next**.

5 Click **Install** to start installing.

Install **Click**

Installation starts.

Progress is displayed during installation.
To interrupt installation in progress,
click **Cancel**.

Click **Finish** to finish installation.

Finish **Click**

Installation finished

6 Remove the CD from the CD-ROM drive.

Refer to Chapter 3, "Basic Operations" (p. 11) for the next procedure.

Uninstalling the Program

Use the following procedure to uninstall the program.

1 From the Windows **Start** menu, select the **Control Panel**, and click **Uninstall a program**.

Programs
Click
Uninstall a program

2 Select **9624-50 PQA-HiView Pro** and click the **Remove** (or **Change/Remove**) button.

Click

A confirmation dialog appears when you click **Remove** (or **Change/Remove**).

Change/Remove

3 Click **Yes**.

The uninstall process begins.

The uninstall progress status is displayed.

9624-50 PQA-HiVIEW PRO Ver 2.00 - InstallShield Wizard
Do you want to completely remove the select... of its features?
Click
Yes   Yes   No

4 Click (✖).

Click

Finish

The 9624-50 PQA-HiView Pro program is uninstalled.
The uninstall procedure is finished.

Basic Operations Chapter 3

Starting and Closing the Program

Starting the Program

Open the Windows **Start** menu and click **All Programs − HIOKI − HIOKI 9624-50 − 9624-50V2**.

The main window, entitled **HIOKI 9624-50 PQA-HiVIEW PRO**, appears.

Closing the Program

The program can be closed by any of the following methods.

Method 1
From the menu bar, click **File – Exit**

Click

Method 2
Click the Close button (✖) at the top right corner of the window

Click

Close button

Maximizes the window.

Minimizes the window.

Loading Data

Measurement data recorded with the Hioki PW3198, 3196 or 3197 Power Quality Analyzer can be loaded by the PQA-HiView Pro program.
However, it can load only binary format measurement data. Text and CSV format data cannot be loaded.

To load measurement data:

PW3198

You can insert a SD Card with stored measurement data into a SD Card reader connected to the computer, or transfer the measurement data over LAN to the computer, and then load it.

See: "Downloading Measurement Data from the Power Quality Analyzer (LAN Download Function)" (p. 111)

> NOTE
> - It may take an extremely long time to directly load large measurement data files using the USB function. It is recommended to load such files after first copying them to the computer.
> - Do not disconnect the USB device while downloading data. Doing so may cause the program to forcibly terminate.

3197

You can use the special-purpose application program bundled with the Hioki 3197 to download the measurement data, and the load it.

See: The instructions (PDF) for the special-purpose application program on the CD-R supplied with the Hioki 3197

3196

You can insert a PC Card with stored measurement data into a PC Card reader connected to the computer, or transfer the measurement data over LAN to the computer, and then load it.

See: "Downloading Measurement Data from the Power Quality Analyzer (LAN Download Function)" (p. 111)

File Types

The data to be loaded is specified by its folder.
The following data files can be loaded from that folder.

File Contents		File Extension	PW3198	3197	3196
Setting data		.SET	●	●	●
TIME PLOT data		.ITV	●	●	●
Event data	Lists	.EVT	●	●	●
	Voltage/current waveforms		●	●	●
	Numerical values		●	——	●
Flicker data (Delta V10, IEC)		.FLC	●	——	●
Transient over voltage waveform data		.TRN	●	——	●
Event voltage fluctuation datal		.WDU	● (Part of inrush current graph)	●	●
High-order harmonic waveform files		.HHC	●	——	——
EN50160 data		EN50160.EN	—— (Calculated internally)	——	●
EN50160 event data		EVENT.EN	—— (Calculated internally)	——	●
Inrush current graph data		.INR	—— (Part of event voltage fluctuation data)	●	——
Demand graph data		.DEM	—— (Calculated internally)	●	——

Loading Data

1 Click the 📂 (Open button), or select **File – Open** on the menu bar.

The Open dialog box appears.

2 Select the folder containing the measurement data from the PW3198, 3196 or 3197 to be loaded.

Measurement data from the PW3198, 3196 or 3197 is stored in folders named as follows:

B + *date* + *serial number* (8 digits)

Example: B6040302

2nd folder
April 3
Year 2006
Binary data

3 Click the **OK** button to load the selected data.

The loaded data is displayed on screen. Refer to the following for the details of each screen.

See: "Analyzing Measurement Data" (p. 35)

Analyzing Two Types of Measurement Data

Two instances of the PQA-HiView Pro program can be started and run at the same time.
You can take advantage of this capability to compare measurement data from multiple PW3198, 3196, and 3197 instruments.

NOTE
- Reading a folder containing a large amount of data may take some time. The time required to read the data depends on the computer system.
- It may take an extremely long time to directly load large measurement data files using the USB function. It is recommended to load such files after first copying them to the computer.
- Do not disconnect the USB device while downloading data. Doing so may cause the program to forcibly terminate.

Estimated Loading Time

(Example 1) To load measurement data into the PQA-HiView Pro from a SD card inserted in the computer.

Loading time: About 30 seconds

Loading conditions:
- Computer System Configuration

Computer	Xeon CPU 3.20 GHz
OS	Microsoft Windows XP
Memory	2 GB

- Measurement Data

Capacity	177 MB
ITV files	TIME PLOT(ALL DATA, MAX/MIN/AVG)
EVT files	1000 items

(Example 2) When loading measurement data to the 9624-50 from an SD memory card inserted into a note-book computer

Loading time: About 10 seconds

Loading conditions:
- Computer System Configuration

Computer	Core2Duo CPU 1.58 GHz
OS	Microsoft Windows XP
Memory	2 GB

- Measurement Data

Capacity	309 MB
ITVfiles	TIME PLOT(ALL DATA, MAX/MIN/AVG)
EVTfiles	1000 items

Data can be loaded faster if you first copy the data from the SD/PC card to the computer's hard disk.

Loading recording data

You can use the buttons on the standard toolbar to scroll backwards and forwards through repeated recording data (PW3198) (p. 22).

Displays the previous set of data.

Displays the next set of data.

Viewing Measurement Data

Screens

When the Model 9624-50 starts up, the main window appears.
Measurement data windows are displayed on the main window.Applicable measurement data windows are shown when measurement data is loaded.

Example: After loading measurement data from Hioki PW3198

Menu bar

Read data folder

Window tool bar
You can change the content displayed in the measurement windows, and magnify or reduce waveform views.

Close
Maximize
Minimize

Tool bar (standard)

Tool bar (window)
Click the icons to open different windows for viewing measurement data, or to show and hide windows.Move the mouse over the tool bar to see tool descriptions.

Measurement windows
Windows can be changed from the menu bar or from the tool bar (for displaying windows).

Pop-Up menu
Appears when you right click on each window.
Operations are the same as on the menu bar.

Status bar
Shows the current status and information about each window.

Menu Bar Operations

Clicking a menu item displays one of the pull-down menus shown below. Items not available for the current window are grayed out.

HIOKI 9624-50 PQA-HiVIEW PRO - [C:\HIOKI\data

File   Edit   View   EVENT LIST   Report   Window   Help

1   2   3   4   5   6   7

1 File

Click **File** and select from the pull-down menu.

The same operations are available on the tool bar (p. 22).

Open		Opens a file.	(p. 15)
Recent folder		Displays recently used folders.	
Download		Downloads data from internal memory of the PW3198, 3196 or SD/PC card via LAN.	(p. 111)
Close		Closes the currently active window.	
Repeated Recording		Loads measurement data created using the PW3198's repeated recording function.	
Print		Prints the currently active window.	(p. 64)
Save the active data as a CSV file		Saves the loaded data as a CSV format file.	(p. 76)
Open integrated settings file		Loads a integrated settings file for the PQA-HiView Pro.	(p. 33)
Save integrated settings file		Saves a integrated settings file for the 9624-50.	(p. 33)
Currently-used integrated settings file		Displays recently used integrated settings file.	
Change Settings Folder		Specifies the folder in which settings data is stored.	(p. 33)
Exit		Closes the PQA-HiView Pro program.	(p. 12)

2 Edit

Click **Edit** and select from the pull-down menu.

The same operations are available on the tool bar (p. 22).

Copy		Displays can be copied to the clipboard.	(p. 75)
Convert CSV Harmonic Content Percentages		Converts harmonic voltage values from a nominal voltage basis to a fundamental wave basis when converting to CSV-format data (EN50160 data only).	(p. 81)
Option		Configures functionality that is not used during normal measurement.	(p. 82)

3 View ●●

Click **View** and select the window or items to display from the pull-down menu.

The same operations are available on the tool bar (p. 22).

Tool Bar		Toggles the display of the standard tool bar (top) and window display tool bar (left).	
EVENT LIST Window		Opens the event list window. You can re-order the displayed list by selecting **Sort by Time (–)**, **Sort by Time (+)** or **Sort by Priority**.	(p. 53)
EVENT DATA Window		Opens the event details window. You can select the following window data types: • Voltage/Current Waveform Window • Voltage/Transient Waveform Window • Voltage Waveform Window • Current Waveform Window • High-order harmonics • Vector Window • DMM Window • Harmonic Bar Graph Window • Harmonic List Window	(p. 83)
ITIC Window		Opens the ITIC Window. An EVT file containing voltage swell, dip or interruption data must be loaded in order to display this window.	(p. 95)
Open new TIME PLOT Window		Opens up to ten new TIME PLOT windows. You can select the following window data types: • RMS Window (Trends) • Voltage Window (Detailed Trends) • Harmonics Window • Interharmonics Window	(p. 40)
Delta V10 Flicker Window		Opens the Delta V10 Flicker Window. (An FLC file of Delta V10 flicker data must be loaded in order to display this window)	(p. 100)
IEC Flicker Window		Opens the IEC Flicker Window. (An FLC file of IEC flicker data must be loaded in order to display this window)	(p. 101)
Voltage Fluctuation Event Graph		Opens the Event Voltage Fluctuation Window (The selected event must include an event voltage fluctuation graph WDU file in order to display this window.)	PW3198, 3196 (p. 89) 3197 (p. 115)
Inrush Current Event Graph		Opens the Inrush Current Graph Window. (The selected event must include a rush current graph INR/WDU file in order to display this window.)	PW3198 (p. 89) 3197 (p. 116)
Integral Power Window		The Integral Power opening dialog is displayed, and after setting, the Integral Power window appears.	PW3198, 3196 (p. 92) 3197 (p. 117)
Demand Window		The Demand opening dialog is displayed, and after setting, the Demand Window appears.	PW3198, 3196 (p. 94) 3197 (p. 118)
A and B cursor		Select to demarcate a span or view values at cursor positions.	(p. 38)
EN50160		Switches between normal and EN50160 display modes.	(p. 102)
Display Status Screen...		Displays the settings on the Hioki PW3198,3197, 3196.	(p. 63)
Application Appearance		Changes the application's appearance.	

4 EVENT LIST/ EVENT DATA/ TIME PLOT/ ITIC ●●●●●●●●●●●●●●●●●●●●●●●●●●●

The menu displayed depends on the selected window.
Click **EVENT LIST**, **EVENT DATA**, **TIME PLOT** or **ITIC** to select a window from the corresponding pull-down menu.
You can also right click and select a window to switch to from the pop-up menu.

EVENT LIST

Sort by Time (-)	(p. 53)
Sort by Time (+)	
Sort by Priority	
Order of CH	
Add Tab	(p. 56)
Tabs	(p. 56)

EVENT DATA

VOLTAGE/CURRENT WAVEFORM	(p. 59)
VOLTAGE/ TRANSIENT WAVEFORM	(p. 60)
VOLTAGE WAVEFORM	(p. 61)
CURRENT WAVEFORM	(p. 62)
High Order harmonics	(p. 87)
VECTOR	(p. 84)
DMM	(p. 84)
HARMONICS BAR GRAPH	(p. 85)
HARMONICS LIST	(p. 86)
FFT Analysis	(p. 88)

TIME PLOT

RMS (TREND)	(p. 43)
VOLTAGE (DetailTrend)	(p. 44)
HARMONICS (Harmonic Fluctuations)	(p. 45)
INTERHARM (Inter-Harmonic Fluctuations)	(p. 46)
Event Distribution Graph (View the event distribution as a graph.)	(p. 50)
Import (Display other measurement data at the same time.)	(p. 42)

ITIC

Limit Value Curve...	(p. 95)

5 Report

Click Report and select from the pull-down menu.

Report Wizard		Sets the conditions for creating a report.	(p. 66)
User Report		Selects customized user report output. You can also customize application menus.	(p. 73)
All Data **All TIME Plot** **TP Voltage & Current** **Integrated Power & Demand** **Harmonics** **List & Waveforms All Events** **Flicker** **EN50160**		Selects a standard report output format.	(p. 73)

6 Window

Click **Window** and select from the pull-down menu.

The same operations are available on the tool bar (p. 22).

Tile		Arranges display of all open windows.	(p. 25)

7 Help

Click **Help** and select from the pull-down menu.

9624-50 PQA-HiView Pro Help...	Displays the instruction manual
Version of 9624-50 PQA-HiView Pro...	Displays version information

Tool Bar Operations

Tool bar (standard) ●●●

1		**Open**	(p. 15)
2		**Download**	(p. 111)
3		**Report Wizard**	(p. 66)
4		**Print**	(p. 64)
5		**Copy**	(p. 75)
6		**Open integrated settings file**	(p. 33)

7	**Save integrated settings file**	(p. 33)
8	**Tile**	(p. 25)
9	**A and B cursors**	(p. 38)
10	**Switch to EN50160 Window**	(p. 102)
11	**Displays the previous set of data created with the repeated recording function.**	(p. 16)
12	**Displays the next set of data created with the repeated recording function.**	(p. 16)

Tool bar (window) ●●●

1		**Show/hide EVENT LIST Window**	(p. 53)
2		**Show/hide EVENT DATA Window**	(p. 57)
3		**Show/hide ITIC Window**	(p. 95)
4		**Open new TIME PLOT Window**	(p. 40)
5		**Open Delta V10 Flicker Window**	(p. 100)
6		**Open IEC Flicker Window**	(p. 101)
7		**Open Voltage Fluctuation Event Graph**	(p. 89)
8		**Open Inrush Current Graph**	(p. 89)
9		**Open Integrated Power Window**	(p. 92)
10		**Open Demand Window**	(p. 94)
11		**Open EN50160 Overview Window**	(p. 94)
12		**Open EN50160 Harmonic Window**	(p. 106)
13		**Open EN50160 Measurement Result Classification Window**	(p. 108)
14		**Open EN50160 Signaling Window**	(p. 107)
15		**Open Status Window**	(p. 63)

Changing Windows

You can change the selected window to a different window.

1 Activate the window whose contents you wish to switch by clicking it.

The selected active window's type is shown to the right of the View menu.

2 Click the window name for the selected active item and select the window to switch to from the pull-down menu.

When a Time Plot window is active in step 1 above

The active window is replaced.

You can also select from the pop-up menu.

A pop-up menu appears when you right click on a window.

Select the window to switch to from the pop-up menu.

Window List

Windows for analyzing data from the PW3198

Window Name		See Page
Event List Window		(p. 53)
Time Plot	RMS (Trends)	(p. 43)
	Voltage (Detailed Trends)	(p. 44)
	Harmonics (Harmonic Fluctuations)	(p. 45)
	Interharm (Inter-Harmonic Fluctuations)	(p. 46)
Event Data Window	Voltage/Current	(p. 59)
	Voltage/Transient	(p. 60)
	Voltage	(p. 61)
	Current	(p. 62)
	High-order Harmonics Graph	(p. 87)
	Vector	(p. 84)
	DMM	(p. 84)
	Harmonics Bar Graph	(p. 85)
	Harmonics List	(p. 86)
ITIC Window	Tolerance Curve	(p. 95)
Delta V10 Flicker Window		(p. 100)
IEC Flicker Window		(p. 101)
Event Voltage Fluctuation/Inrush Current Graph Window		(p. 89)
Integrated Power Window		(p. 92)
Demand Window		(p. 94)
EN50160 Window	Overview	(p. 104)
	Harmonic	(p. 106)
	Measurement Result Classification	(p. 108)
Status Window		(p. 63)

Windows for analyzing data from the 3197

Window Name		See Page
Event List Window		(p. 53)
Time Plot	RMS (Trends)	(p. 43)
	Voltage (Detailed Trends)	(p. 44)
Event Data Window	Voltage/Current	(p. 59)
	Voltage	(p. 61)
	Current	(p. 62)
Voltage Fluctuation Event Graph		(p. 115)
Inrush Current Event Graph		(p. 116)
Integrated Power Window		(p. 117)
Demand Window		(p. 118)
Status Window		(p. 63)

Windows for analyzing data from the 3196

Window Name		See Page
Event List Window		(p. 53)
Time Plot	RMS (Trends)	(p. 43)
	Voltage (Detailed Trends)	(p. 44)
	Harmonics (Harmonic Fluctuations)	(p. 45)
	Interharm (Inter-Harmonic Fluctuations)	(p. 46)
Event Data Window	Voltage/Current	(p. 59)
	Voltage/Transient	(p. 60)
	Voltage	(p. 61)
	Current	(p. 62)
	Vector	(p. 84)
	DMM	(p. 84)
	Harmonics Bar Graph	(p. 85)
	Harmonics List	(p. 86)
ITIC Window	Tolerance Curve	(p. 95)
Delta V10 Flicker Window		(p. 100)
IEC Flicker Window		(p. 101)
Voltage Fluctuation Event Graph		(p. 89)
Integrated Power Window		(p. 92)
Demand Window		(p. 94)
EN50160 Window	Overview	(p. 104)
	Harmonic	(p. 106)
	Signaling	(p. 107)
	Measurement Result Classification	(p. 108)
Status Window		(p. 63)

Arranging Windows (Window Layout)

All currently open windows can be displayed by arranging the application's windows.

Click the ▤ (Tile) button or select **Window – Tile** from the menu bar.

Adding TIME PLOT windows

You can add TIME PLOT windows.
Click the [icon] button (to open a new TIME PLOT window) or select **View – Open new TIME PLOT Window** from the menu bar. You can also right-click and select the command from the pop-up menu.

TIME PLOT windows added to the screen.

You can add up to 10 TIME PLOT windows. When the number of windows that can be displayed is exceeded, new windows will be added as tabs.

Undocking measurement windows from the main window

Measurement windows other than **TIME PLOT** windows can be undocked from the main window and displayed as separate (floating) windows. Right-click on the title bar of the measurement window you wish to display as a separate window and select **Floating** from the pop-up menu.

The selected measurement window will be displayed as a separate (floating) window.

You can also undock a window by dragging its title bar to the position at which you wish it to be displayed. You can also double-click the title bar.

Docking a floating measurement window in the main window

You can dock a separate (floating) measurement window in the main window. Right-click on the title bar of the separate measurement window and select **Docking** from the pop-up menu.

The selected measurement window will be docked in the main window.

You can also double-click title bar.

Specifying the docking position of measurement windows

You can specify the docking position of measurement windows.

Drag the title bar of the measurement window, align it with the cursor shown on the main window to specify the desired docking position, and drop the window.

Example: When the "4" application appearance has been selected

Hiding a specific measurement window

You can temporarily hide a specific measurement window in order to display other measurement windows at a larger size. Click the 🔲 button (to automatically hide the window) at the top right of the screen. You can also right-click on the title bar of the measurement window you wish to hide and select **Auto Hide** from the pop-up menu.

The measurement window will be hidden and shown as a tab at the edge of the main window.
Moving the mouse pointer to the tab of a hidden measurement window will cause the window to be redisplayed. The position and size of other measurement windows will not be affected.

Saving and Loading integrated settings file

About integrated settings file

The PQA-HiView Pro can save and reload the following settings as a integrated settings file.
After saving a integrated settings file, you can reload it to view data or create reports using the same settings as when the file was saved. The types of settings files that can be saved are different for the Hioki PW3198, 3196 and 3197.

The procedure described here is for saving and loading integrated settings file. Refer to the indicated reference pages for the procedures to save and load discrete (non-integrated) files.

Settings File	File Extension	File Contents	PW3198, 3196	3197	Reference
Report Wizard Settings File	.RPF	(Report Wizard Window) Report output item settings can be saved.	●	●	(p. 66)
User-Defined Curve Settings File	.UCV	(Curve Editing Window) Upper and lower limit curves can be edited and saved.	●	–	(p. 97)
Measurement Result Classification Settings File	.ESP	(EN50160 Measurement Result Classification Editor Window) Different classification tables for EN50160 measurement results can be edited and saved.	●	–	(p. 109)
integrated settings file (This file type combines all three of the above file types, although the Hioki 3197 supports only the Report Wizard Settings File data.)	.QAP	All data defined for the User-defined Curve Settings file, Measurement Result Classification file and Report Wizard Settings file are stored together.	●	●	(p. 33)

Specify the Save Destination for the integrated settings file Beforehand

The default save destination is the **My Documents** folder.
By specifying another save destination before saving the integrated settings file, all settings files will be saved to the new destination in the future.

1 Select **File – Change of Setting Data Storage Folder** from the menu bar.

The Open dialog box opens.

2 Select the folder in which to save integrated settings file, and click the **OK** button.

Saving a integrated settings file

The data for each type of settings file is combined and stored in a single file.

1 Click the 🖫 (Save integrated settings file) button or select **File – Save** integrated settings file from the menu bar.

The Save dialog box opens.

2 Enter the file name to be saved in the dialog, and click **Save**.

The current settings are saved in the specified file.

Loading a integrated settings file

1 Click the 📖 (Open integrated settings file) button or select **File – Open** integrated settings file from the menu bar.

The Open dialog box opens.

2 Select the name of the file to open in the dialog, and click **Open**.

The settings loaded from the file are applied to each setting item.

Analyzing Measurement Data

Chapter 4

Displaying Graphs

Enlarging and scrolling graphs

To enlarge a graph
Activating the graph window displays a dedicated toolbar. Select the item you wish to change from the pull-down menu on the toolbar.

Enlarge the Y-axis   Enlarge the X-axis (1cycle/div:1 period/div)

TIME PLOT enlarging the X-axis

Grid units	: Select the desired display interval for the graph scale from the right menu.
1 day/window width	: Displays the graph so that the width of the window is equivalent to one day.
1 week/window width	: Displays the graph so that the width of the window is equivalent to one week.
Display all	: Displays the graph so that all data fits in the window.
AB cursor range	: Displays the range of data selected by the A and B cursors in one window.
User setting	: Rotate the mouse wheel while holding down the Ctrl key for fine-grained control over the graph scale.

To scroll a graph:
You can scroll up, down, left, and right on the graph window by moving the mouse pointer to the top of the window and dragging. You can also scroll left, right, up, and down by dragging the scrollbars on the right and bottom of the window.

Tip:
Dragging the mouse while holding down the Ctrl key on the keyboard enlarges the range over which you moved.
Rotating the mouse wheel while holding down the Ctrl key on the keyboard enlarges or reduces the display around the mouse pointer's position.

Changing the Displayed Channels, Line Colors, and Thicknesses

1 Select Waveform Display Settings from right-click and displayed pop-up menu on the graph window.

2 Specify the displayed channel, line, and thickness settings on the Settings dialog box.

Specifies the color of displayed lines.

Specifies the thickness of displayed lines.

Specifies the channel to display.

Viewing Measurement Data as Numerical Values (Cursor Measurement)

The values measured at the A and B cursor positions (cursor values) can be displayed numerically. Maximum, minimum and average values within a span of measurement data (between cursors) can also be checked by demarcating the span with the cursors.

Measurement values can be confirmed in the A/B cursor dialog. An image of the displayed numerical values can be copied to other applications.

Windows supporting cursor measurement: Waveform and Graph windows

Example: Viewing measurement values in a Time Plot window.

1 Click the [icon] (A and B cursors) button or select **View – A, B cursor** from the menu bar.

You can also right click and select from the pop-up menu.
The A/B cursors appear in the window, and a dialog box indicates values at the cursor positions. Displayed contents differ according to the type of data displayed.

2 You can move the cursors either by dragging them or by pressing the left and right cursor keys on the keyboard.

Between A and B cursors

Delta V10 alarm output period (PW3198 only) Indicates periods for which the Delta V10 alarm was output.

Cursor A: Light Blue
Cursor B: Purple

Cursor A (Light Blue)

Cursor B (Purple)

3 To view the maximum, minimum, and average values for the desired period, move the A and B cursors to the respective positions to specify the appropriate range.

Time and numerical values at A and B cursor locations
Differences between A and B data (B – A)
Time of 1 interval has been added to the time
Maximum
Average
Minimum

The values at the cursor positions in the active window are displayed.

Moving the A and B cursors to the position whose measured values you wish to check

4 You can use the toolbar buttons to move the A and B cursors to the desired positions.

A cursor

)A(	**Summon to [A] window** Moves the A cursor to the window	⊘	**To [A] zero-cross position** Moves the A cursor to the zero-cross position.
▲	**To maximum value position** Moves the A cursor to the maximum value.	◀	**To previous event position** Moves the A cursor to the previous event position.
▼	**To minimum value position** Moves the A cursor to the minimum value.	▶	**To next event position** Moves the A cursor to the next event position.

A/B cursor reset
Moves the A and B cursors to the beginning and end of the data, respectively.

A/B cursor interval lock
Locks the interval between the A and B cursors.

B cursor

Horizontal cursors
Displays horizontal cursors and Y-axis values.

⚠**CAUTION**

The results displayed at the A and B cursors differ from product display values in the following circumstances:
Error notation:
Example: A value is displayed even when the PW3198 displays 0.000 Hz.

5 You can view measured values for the graph's Y-axis by moving the cursor vertically.

To display the horizontal cursor on the Y-axis on the graph, press the U button on the toolbar.

Horizontal cursor on the Y-axis on the graph

Horizontal cursors

To move the horizontal cursor on the Y-axis, align the mouse pointer with the cursor and drag it up or down as desired.

Viewing a Time Series Graph [TIME PLOT]

Data measured with the Power Quality Analyzer can be displayed as a time series graph (Time Plot window). The program's Time Plot windows correspond to each Time Plot screen on the Power Quality Analyzer.

The following types of Time Plot windows can be displayed up to ten windows at a time.
- **RMS (Trends) Window (p. 43)**
- **VOLTAGE (Detailed Trends) Window (p. 44)**
- **HARMONICS Window (Hioki PW3198, 3196 only) (p. 45)**
- **INTERHARM (Interharmonics) Window (Hioki PW3198, 3196 only) (p. 46)**

Opening and Switching Time Plot Windows

1 Load the measurement data.

See: "Loading Data" (p. 15)

2 Click the 📈 (Open Time Plot Window) button or select **View – Open new TIME PLOT window** from the menu bar.

A Time Plot Window opens.

You can open up to ten windows by clicking the button or selecting from the menu bar repeatedly.

Time Plot Window

Click an event marker to view an event phenomenon in the other windows.

See: "Viewing Event Phenomena" (p. 50)

Scrolls the window

Move a scroll box or click within the scroll bar.
When scrolling horizontally, all open Time Plot windows scroll together.

Switching Windows

3 Activate the Time Plot window to be switched, and select the desired window to display from the **TIME PLOT** menu.

You can also right click and select from the pop-up menu.

Which windows can be selected depends on the measured data type.

Viewing Measurement Data as Numerical Values (Cursor Measurement)

4 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

The 30-minute average for the voltage in the cursor-selected range can be output to a CSV file. Activate the TIME PLOT window, right-click the mouse, and select **Output a voltage mean value during 30min...** from the pop-up menu. This functionality is available when the **Voltage mean value during 30min** checkbox is selected under **Options** on the **Edit** menu.

> **Loading other measurement data**

5 Other measurement data can be displayed at the same time.
Activate the TIME PLOT window, right-click the mouse, and select **Import**... from the pop-up menu.

Specify the measurement data you wish to display.

The data is displayed as the IMPORT waveform.

Viewing RMS Fluctuations (Trends) [TIME PLOT – RMS]

1 Open a Time Plot window.

See: "Opening and Switching Time Plot Windows" (p. 40)

2 Activate the Time Plot window and select **RMS(Trends)** from the **TIME PLOT** menu.
You can also right click and select from the pop-up menu.
The RMS(Trends) window opens.

Maximum MAX (Blue)
Average AVG (Yellow-Green)
Minimum MIN (Red)

Scrolls the window

Changing Displayed Contents

3 When the RMS(Trends) window is active, it's own tool bar is displayed.
Select the items you want to change from the pull-down menus in the RMS window's tool bar.

Window tool bar

Display item

Y-axis scale   X-axis scale

MIN/ MAX/ AVG/ all

Channel
U2-U1, I1+I2 indicate the results of the calculations shown.

See: For more information about display items, see Appendix 5.($\Rightarrow$ p.A13)

Viewing Voltage Fluctuations (Detailed Trends)   [TIME PLOT – VOLTAGE]

1 Open a Time Plot window.

See: "Opening and Switching Time Plot Windows" (p. 40)

2 Activate the Time Plot window and select **VOLTAGE data(Detailed Trends)** from the **TIME PLOT** menu.

You can also right click and select from the pop-up menu.
The Voltage data window opens.

CH1   (Red)
CH2   (Yellow-Green)
CH3   (Blue)
CH4   (Light Blue)

Scrolls the window

Voltage fluctuation data consists of pairs of maximum and minimum values for every measurement interval. Therefore, expanding the horizontal scale reveals the data as a series of vertical lines between each pair of maximum and minimum values at each measurement interval. There is no horizontal line through the space between measurement intervals.

With the PW3198, voltage-synchronized current and frequency fluctuations can be viewed.

Changing Displayed Contents

3 When the Voltage data window is active, it's own tool bar is displayed.

Select the items you want to change from the pull-down menus in the Voltage window's tool bar.

Window tool bar

Display item   Channel   Y-axis scale   X-axis scale
(PW3198 only)

See: For more information about display items, see Appendix 5. (⇒ p.A13)

Viewing Harmonic Fluctuations (Hioki PW3198, 3196 only)   [TIME PLOT – HARMONICS]

1 Open a Time Plot window.

See: "Opening and Switching Time Plot Windows" (p. 40)

2 Activate the Time Plot window and select **HARMONICS** from the **TIME PLOT** menu.

You can also right click and select from the pop-up menu.
The HARMONICS window opens.

Displayed orders

Displayed harmonic orders can be set from the tool bar.

Scrolls the window

Data from 400 Hz measurements can be analyzed up to the 10th harmonic order.

Phase angle display

⊖   :Displays the voltage-current phase difference with [MAX/MIN/AVG].
⊖avg   :Displays the voltage-current phase difference using average values [AVG].
Uphase/Iphase :Displays the voltage/current phase angle using average values [AVG].

Changing Displayed Contents

3 When the Harmonics window is active, it's own tool bar is displayed.

Select the items you want to change from the pull-down menus in the Harmonics window's tool bar.

See: For more information about display items, see Appendix 5. (⇒ p.A13)

Window tool bar

Display item   MAX/MIN/AVG   Y-axis scale (fixed)   X-axis scale

Displayed orders
Up to six harmonic orders (from 0 or 1 to 50) can be selected for display together.
The vertical axis has a fixed logarithmic scale.

**Viewing Inter-Harmonic Fluctuations
(Hioki PW3198, 3196 only)   [TIME PLOT – INTERHARM]**

1 Open a Time Plot window.

See: "Opening and Switching Time Plot Windows" (p. 40)

2 Activate the Time Plot window and select **INTERHARM** from the **TIME PLOT** menu.

You can also right click and select from the pop-up menu.
The INTER-HARMONIC window opens.

Displayed harmonic orders
can be set from the tool bar.

Scrolls the window

Changing Displayed Contents

3 When the Interharm window is active, it's own tool bar is displayed.

Select the items you want to change from the pull-down menus in the Interharm window's tool bar.

See: For more information about display items, see Appendix 5. ($\Rightarrow$ p.A13)

Window tool bar

Display item   MAX/MIN/AVG   Y-axis scale (fixed)   X-axis scale

Displayed orders
Up to six inter-harmonic orders (from 0.5 to 49.5) can be selected for display together.
The vertical axis has a fixed logarithmic scale.

Comparing Multiple TIME PLOT Windows

Multiple RMS value fluctuation(Trends) window graphs being displayed on the TIME PLOT window can be superimposed on the display. This functionality allows you to easily compare fluctuations.

1 Activate the waveform you wish to superimpose.

2 Select **Overlap Wave Graph** from the pop-up menu.

3 The semi-transparent waveform moves with the cursor. Move it over the graph on top of which you wish to superimpose it to compare the graphs.

You can fine-tune the graph display in the vertical and horizontal directions with the cursor keys while the graphs are superimposed.

The superimposed graphs can be copied into the clipboard by right clicking the mouse or pressing **Alt + Print-Screen** on the keyboard.

The darkness of the superimposed images can be adjusted with the mouse wheel.

Viewing 1 day / 1 week's data

You can easily display 1 day or 1 week's data. You can also scroll per day.

Open the TIME PLOT window, and from the X-axis scale menu select 1 day / screen size or 1 week / screen size.

The screen will be automatically adjusted to the scale for 1 day or 1 week's data to be displayed, and the A/B cursors will automatically be ON and the left end of the graph will be displayed at the start of the page break.

You can scroll the screen by per day units.

If the A/B cursors are left in this position while measurement data is stored in a CSV file (p. 76), you can create a CSV file with 1 day's worth of data.

Viewing Event Phenomena

An event name or marker is displayed in each window (Event Marker function).
Each displayed window is interlinked, so by clicking an event's name or marker, you can view other characteristics related to that event in other windows.

Measurement data from the Hioki PW3198, 3196 is displayed differently than that from the 3197.

Event Viewing Windows	Event Display		
	Event Occurrence	Voltage Fluctuation Graph (WDU event)	Inrush Current Graph (INRUSH event) (Hioki PW3198, 3196 only)
Event List Window	Event items indicate the contents of events. You can visually check the frequency of events.		
		The WDU column shows **WDU** events.	The INRUSH column shows **INRUSH** events.
Time Plot Window	▼ (The display color varies with the event type. For more information, see "Appendix 6 Event Item Notation". Event markers are displayed at the times that event occurred.	▼ (Blue) Event markers are displayed at the times when voltage fluctuations occurred.	▼ (Pink) Event markers are displayed at the times that inrush current occurred.
Voltage Fluctuation Event Window	Displays the message, "Specified file xxx does not exist."	Displays the waveform for the event selected in another window.	
Inrush Current Graph Window (Hioki PW3198, 3196 only)			
Event Data Window	Displays the waveform for the event selected in another window. Event markers ▼ (yellow-green) are displayed at event occurrences.		
ITIC Window (Hioki 3196 only)	———	◆ (CH1: Red) ◆ (CH2: Yellow-Green) ◆ (CH3: Blue)	———

Example: Viewing event phenomena in a Time Plot window

Event Marker

Click

Click

Click on overlapping event markers to display a menu on the graph. Select an event marker from the menu.
If more than 30 event markers overlap, they are displayed in submenus of up to 30 markers each.

The selected event marker becomes hollow.

When multiple event markers overlap

Example: Displaying the event distribution

Select Event Distribution from the TIME PLOT window pop-up menu. To disable the display, deselect Event Distribution.

The distribution of event occurrence is shown on the graph, allowing you to easily ascertain in which time period the most events occurred.

Example: Graph of a voltage fluctuation event (WDU) in measurement data from Hioki PW3198

Event List Window

Event Content ── Click to display the event graph.

No.	Date	Time	Event Ca...	CH	IN...	W...U
1	08/09	18:28:22.096	Ext (Stop)			
2	08/04	19:07:17.631	Dip	CH1	IN	WDU
3	08/04	15:45:05.600	Dip	CH1	IN	WDU

WDU Indicates that a voltage fluctuation event graph exists

INRUSH Indicates that an inrush current graph exists (Hioki PW3198, 3197 only)

To view the same event phenomenon in other windows:

Activate the window and click the desired event item, or select it with the up- or down-arrow keys on the keyboard. The background color of the selected event list will change.

TIME PLOT Window

5.00 V/div ── U1 ── U2   **(Event Markers)**
110.00   **Event Occurrences**

▼ (Blue) Voltage fluctuation event (WDU) occurrence

▼ (Pink) Inrush current event (INRUSH) occurrence (Hioki 3197 only)

▼ (Red) An event occurrence other than the above types

To view the same event phenomenon in other windows:
Activate the window and click the desired event marker, or select it with the up- or down-arrow keys on the keyboard. The selected event marker becomes hollow (▽).

Event List Window

Event Occurrences

ITIC Window
(Hioki PW3198, 3196 only)

TIME PLOT Window

Voltage Fluctuation Event Graph Window

Voltage Fluctuation Event Window

Voltage Fluctuati **(Event Marker)**   17.6...
Ydiv x1   Tdiv   **Event Occurrence**
50.00 V   ── CH1   ── CH2

▼ (Blue) Voltage fluctuation event (WDU) occurrence

▼ (Pink) Inrush current event (INRUSH) occurrence (Hioki 3197 only)

▼ (Red) An event occurrence other than the above types

Displays the graph for the event selected in another window.
When an inrush current event marker is selected in another window, the inrush current screen appears. (Hioki PW3198, 3197 only).

ITIC Window (Hioki 3196 only)

100   **(Event Markers)**
0   **Event Occurrences**
1m 10m 100m 1 10 100

◆ (Red) Event occurrence on CH1

◆ (Yellow-Green) Event occurrence on CH2

◆ (Blue) Event occurrence on CH3

To view the same event phenomenon in other windows:
Activate the window and click the desired event marker. The selected event marker blinks.

Event Data Window

x1 ▼ │ x10 ▼ 2cycle/div ▼ T x20 ▼ 100μs/div ▼
H1-2: 50 0 V/div H4: 50.00 V/div ── CH1   ── CH2   ── CH4
                  (Event marker)
                  Event occurrence

▼ (Yellow-Green)..... Location at which event occurred
Displays the locations at which events occurred.

Viewing Events as a List [EVENT LIST]

Event occurrences within data measured with the Hioki PW3198, 3196 can be displayed as a list (the Event List window).

The Event List window is equivalent to the **EVENT – LIST** screen on the Hioki PW3198, 3196.

You can re-order the displayed list by selecting **Sort by Time (–)**, **Sort by Time (+)** or **Sort by Priority**.

1 Load the measurement data.

See: "Loading Data" (p. 15)

To display the Event List window, the loaded data must include an EVT file.

2 Click the (Show/hide EVENT LIST window) button or select **View – EVENT LIST Window** from the menu bar.

The Event List window opens.

+	Displays event details as a tree. Click + to toggle the display.	
No.	Event ID.	
Time and date	Time and date at which event occurred.	
Event items	Event type.	
ch	Channel on which event occurred.	
IN/OUT	Event IN and OUT.	
WDU	Indicates there is a voltage event fluctuation graph.	
INRUSH	Inrush current graph display.	
Event period	Period during which the event state persisted.	
Peak value	Waveform peak value display (not shown for RMS data).	
Worst value	RMS value display.	
Others	Transient	Worst value detection time + count + event continuation period.
	Swell/dip/interruption	Worst value detection time + worst value detection channel + measured value.
	Other	Worst value detection time + measured value.

Click an event, or select using the up/down arrow keys on the keyboard to view the event phenomenon in other windows.

See: "Viewing Event Phenomena" (p. 50)

⚠ CAUTION | Binary data from the HiTETER is displayed for worst values and measured values. These displays may differ from DMM and TIME PLOT notation. Additionally, values that are not possible during normal operation are saved in data when errors occur, and those values are displayed.

Viewing event details

3 Click + on the Event List window.

Multiple events included when the event occurred are displayed.

Click + again to display only the representative event.

Re-Ordering the Display of Events

4 Make the Event List window active, and select **Sort by Time (–)**, **Sort by Time (+)**, **Sort by Priority** (Hioki 3196 only) or **Sort by Channel** from the **EVENT LIST** menu.

You can also right click and select from the pop-up menu.
The list is re-ordered according to your selection.

You can click a column heading to sort the list in ascending or descending order for that column.

To revert the display, select **All** from the pop-up menu over the column in question.

> **Displaying only specific events**

5 Move the mouse to the item, right-click, and select **Filter** from the pop-up menu.

To return to the original display, right-click on the item and select **All** from the pop-up menu.

6 The [Execute Filter] dialog box will be displayed. Set the filter conditions as desired and click the **OK** button.

Specifies the filter conditions.

Specifies the filter target.

Displays the top 10 candidates.

> **Counting events**

7 Right-click the mouse on the Event List window and select **Event Counter** on the pop-up menu.

8 The Event Counter dialog box is displayed with an event count for each item.

Switching the Event List window

9

Up to three event lists with different conditions can be created. You can click the tab to switch the display. Select Add to add a new event list. Up to three lists can be added. You can also add a new list by selecting **Event List - Add Tab** from the menu, and you can display a list of all tabs currently being displayed by selecting **Event List - Tabs**.

Viewing Event Measurement Data [EVENT DATA]

Data measured with the Hioki PW3198, 3196 upon the occurrence of an event can be displayed as a graph (Event Data window).
The Event Data window is equivalent to the VIEW screen displayed when you select an event in the Event List on the Hioki PW3198, 3196 and press the ENTER key.

The Event Data window can be switched between the following ten types.

■ **VOLTAGE/CURRENT Window (p. 59)**

■ **VOLTAGE/TRANSIENT Window (p. 60)**

■ **VOLTAGE Window (p. 61)**

■ **CURRENT Window (p. 62)**

■ **VECTOR Window (p. 84)**

■ **DMM Window (p. 84)**

■ **HARMONICS BAR GRAPH Window (p. 85)**

■ **HARMONICS LIST Window (p. 86)**

In this manual, the above windows are collectively called "Event Data windows".

Opening and Switching Event Data Windows

1 Load the measurement data.
See: "Loading Data" (p. 15)

2 Click the 📊 (Show/hide EVENT DATA window) button or select **View – EVENT DATA Window** from the menu bar.
The Event data window opens.

Event data window

Click an event marker or an event in the Event List to display a graph of the event.
See: "Viewing Event Phenomena" (p. 50)

> ## Switching Windows

3 Activate the Event Data window and select the desired window from the **EVENT DATA** menu.

You can also right click and select from the pop-up menu.

Viewing Voltage/Current Waveforms   [VOLTAGE/CURRENT]

1 Open the Event Data window.

See: "Opening and Switching Event Data Windows" (p. 57)

2 Activate the Event Data window and select the **VOLTAGE/CURRENT** window from the **EVENT DATA** menu.

You can also right click and select from the pop-up menu.
The Voltage/Current Waveform window opens.

Y-axis scale of voltage waveform

Y-axis scale of current waveform

X-axis scale of waveform

Window tool bar

Move to previous or next event

Voltage waveform

CH1 (Red)
CH2 (Yellow-Green)
CH3 (Blue)
CH4 (Light Blue)

Up to 14 cycles (50 Hz) , 16 cycles (60 Hz) or 112 cycles (400 Hz) can be analyzed.

Current waveform

Scrolls the window

Viewing Measurement Data as Numerical Values (Cursor Measurement)

3 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

Time and numerical values at A and B cursor locations

Between A and B cursors

Differences between A and B data (B – A)

The time difference between cursors is calculated using internal data resolution of less than 0.001 seconds, but the last digit (0.001 s) may not be exact.

Cursor A (Light Blue)

Cursor B (Purple)

Viewing Voltage/Transient Waveforms (PW3198, 3196)   [VOLTAGE/TRANSIENT]

1 Open the Event Data window.

See: "Opening and Switching Event Data Windows" (p. 57)

The Voltage/Transient window can only be displayed when a TRN file is loaded.

2 Activate the Event Data window and select the **VOLTAGE/TRANSIENT** window from the **EVENT DATA** menu.

You can also right click and select from the pop-up menu.
The Voltage/Transient Waveform window opens.

Window tool bar

Y-axis scale of voltage waveform | X-axis scale of waveform | Y-axis scale of transient waveform | X-axis scale of transient waveform

Move to left transient
Move to right transient
Move to previous or next event

Click to display the waveform to the left or right of the transient.

CH1 (Red)
CH2 (Yellow-Green)
CH3 (Blue)
CH4 (Light Blue)

Voltage waveform

Transient waveform (Magnified)

Scrolls the window

Viewing Measurement Data as Numerical Values (Cursor Measurement)

3 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

Time and numerical values at A and B cursor locations

Between A and B cursors

Differences between A and B data (B – A)
The wavelength is the reciprocal of the time between the A/B cursors.
Time data is 0 µs at the left end of the transient data.

Cursor A (Light Blue)   Cursor B(Purple)

Viewing Voltage Waveforms   [VOLTAGE]

1 Open the Event Data window.

See: "Opening and Switching Event Data Windows" (p. 57)

2 Activate the Event Data window and select the **VOLTAGE** window from the **EVENT DATA** menu.

You can also right click and select from the pop-up menu.
The Voltage window opens.

Y-axis scale of voltage waveform

X-axis scale of waveform

Window tool bar

Move to previous or next event

CH1   (Red)
CH2   (Yellow-Green)
CH3   (Blue)
CH4   (Light Blue)

Up to 14 cycles (50 Hz), 16 cycles (60 Hz) or 112 cycles (400 Hz) can be analyzed.

Scrolls the window

Viewing Measurement Data as Numerical Values (Cursor Measurement)

3 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

Viewing Current Waveforms   [CURRENT]

1 Open the Event Data window.

See: "Opening and Switching Event Data Windows" (p. 57)

2 Activate the Event Data window and select the **CURRENT** window from the **EVENT DATA** menu.

You can also right click and select from the pop-up menu.
The Current window opens.

Y-axis scale of voltage waveform

X-axis scale of waveform

Window tool bar

CH1   (Red)
CH2   (Yellow-Green)
CH3   (Blue)
CH4   (Light Blue)

Up to 14 cycles (50 Hz),
16 cycles (60 Hz) or 112 cycles
(400 Hz) can be analyzed.

Move to previous
or next event

Scrolls the window

Viewing Measurement Data as Numerical Values (Cursor Measurement)

3 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

Viewing Measurement Settings

Instrument settings recorded on the Hioki PW3198, 3196 or 3197 can be viewed in the Status window. Of course, the settings cannot be changed here.

The Status window can only be displayed when a SET file is loaded.
In addition, the EN50160 setting tab is not displayed unless EN50160 data is loaded
(Hioki 3196 only).

1 Click the 🖳 (Status window Icon) button or select **View – Display Status Screen** from the menu bar.

The Status window appears.

2 Select the tabs to view each setting.

Example: Hioki PW3198 Status Window

Example: Hioki 3197 Status Window

Printing Measurement Data

Each display screen can be printed out. In addition, all open Time Plot windows can be printed together on one page.

1 Activate a window to be printed, and display the area to print.

The qualification for printing is that whatever is displayed will be printed as it appears.
Maximize windows for clearest printing of large quantities of data.

2 Click the (Print) button or select **File – Print** from the menu bar.

The Print Setup dialog box opens.

3 Select the items you need to print, and click the **Print** button.

To print a logo or comment in the Logo field (p. 65)
Select the logo or text to be printed.
- **Unselected**: The field will be blank.
- **HIOKI Logo**: Select an image file to print.
  If you fail to select an image, the HIOKI logo is printed.
- **Text**: The field will contain your entered text.

To print the time and date or comment in the Time field (p. 65)
Select the content to be printed.
- **Unselected**: The field will be blank.
- **Time**: The printing time(date) will be printed.
- **Text**: The field will contain your entered text.

Select to include maximum, minimum and average values and channel information in the printout.

Print Setup

- Print in Logo Box
  - Logo
  - Text
  - Text to print
- Print related markers at the same time
- Define print x-axes area
  - Limit within Screen
  - All Area

- Print in Time Box
  - Time
  - Text
  - Text to print

- Print in Comment Box
  - Load a comment file

Print... | Print Preview | Page Setup... | Cancel

Starts printing.

Cancels printing.

Shows a preview of the printout.

Selects the printing destination.

To print comments in the Comment field (p. 65)
Enter the contents to be printed (up to three lines).
To load the contents of a text file, click the **Load a comment file** button.

To print TIME PLOT measurement data across all measurement periods
Select the period you wish to print.
- Display area only: Prints one sheet including the display area only.
- All areas: Prints multiple pages including reduced views of all data windows.

Printout Example

Sample of an Event Waveform Printout

Paper setting: A4
Printing orientation: Portrait

The window type is automatically printed here.

Logo Field

Time Field

Comment Field

Generating Reports

Reports are generated from loaded measurement data, and can be printed out or saved as rich text format (.rtf) files.
Rich text format files can be loaded and edited in application programs such as Wordpad (supplied with Windows), or Microsoft Word.

Reports can be generated by three methods.

Report Generation Method	Details
Generate report contents automatically (Auto)	Report contents are generated without selecting output items. Items that can be output with auto report generation are limited.
Generate report with specified contents (Custom Settings)*	Report contents are generated by selecting output items. Note that for transient waveforms, the Transient Waveform selection is available only when Worst Case is selected.
Generate report with specified detailed contents (Detailed Settings)*	Report contents are generated from selected details of each output item and channel.

* Report generation settings can be saved and reloaded as integrated settings files.

See: "Report Output Items" (p. 70) for the items available for output in reports.

1 Confirm the span of data to be used in generating the report.

When the report wizard starts, the measurement data span is determined automatically from the current display state and position of the cursors in the window.
Set the A/B cursor locations if you want the report to specify a particular waveform span.
See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

If the A/B cursors are not enabled, the report is automatically generated using all loaded measurement data.

2 Click the (Report Wizard) button or select **Report – Report Wizard** from the menu bar.

The **Report Wizard – Start Page** dialog box opens.
The Report Wizard cannot be started unless a window is already open.

3 Make settings in the Start Page dialog box.

1. Select a report generation method.
2. Set the starting and ending times of the data span to be reported.
   (These are automatically set to match the loaded data when the Report Wizard starts, but you can change them here.)
3. If report output is to include a demand graph, set the demand time span here.
4. Make settings for printing as occasion demands.
   (Comments and other information can printed in the Logo, Time and Comment fields, shown below.)
5. Click **Next**.
   If **Auto** is selected: **The Report Wizard – Last Page** dialog box opens.
   If **Custom Settings** is selected: **The Report Wizard – Individual Setting Page** dialog box opens.(p. 68)
   If **Detailed Settings** is selected: **The Report Wizard – Detailed Setting Page** dialog box opens.(p. 69)

1 Click

2 Select

3 Select

4 Select

5 Click

Logo Field Output Settings

• **Unselected**: The field will be blank.
• **HIOKI Logo**: Select an image file for output. If no file name is selected, the HIOKI logo is output.
• **Text**: The field will contain your entered text.

The logo is output only when printing. Logo data cannot be output to a rich text format file.

Starting Page No.
Specify the number for the first page of report output.

Comment Field Output Settings
Enter the contents to be output (up to three lines).
To load the contents of a text file, click the Load a **comment file** button.

Time Field Output Settings
• **Unselected**: The field will be blank.
• **Time**: Outputs the time(date) of report generation.
• **Text**: The field will contain your entered text.

Logo Field   **Time Field**   **Comment Field**

Printout Example

4 In the Last Page dialog, select whether to save or print the report.

Prints a report.
Opens the Print dialog for you to make printer settings and **print**.

Saves a report to a rich text format file.
Opens the **Save RTF File** dialog where you can specify the save destination and name.

Preview
Displays a preview of printout contents before printing.

Page Setup
Displays the **Print** dialog. Printer and paper selections can be made here.

After saving the rich text file, opens the file with the default application associated with RTF files (Microsoft Word etc). You can use the application to add comments and other information.

Selecting Custom Settings

Make settings in the **Individual Setting Page** dialog box.

1. Select those items to be output in the report.
   Note that Transient Waveform can be selected only when Worst Case is selected.
2. Click **Next**.
   The **Report Wizard – Last Page** dialog box opens.

Dialog Example for Hioki PW3198

Settings can be saved and reloaded later.
You can save your report selections as a Report Wizard Settings file that you can simply reload whenever you want to create another report with the same settings.
The Report Wizard Settings file contains all custom and detailed report output settings.
You can register saved settings on the menu bar. Once registered, you can print reports simply by selecting the item on the menu bar. See page (p. 73).

Printout Example: (p. 71)

Selecting Detailed Settings

Make settings in the **Detail Setting Page** dialog box.

1. Select those items to be output in the report.
2. Click **Next**.
   The pages of displayed setting items depend on the loaded measurement data.

3196		3197	
Page	Setting Items	Page	Setting Items
1/4	Voltage Fluctuations, RMS Fluctuations	1/2	Voltage Fluctuations, RMS Fluctuations
2/4	Harmonic Fluctuations	2/2	Demand, Integrated Power
3/4	Interharmonic Fluctuations		
4/4	IEC Flicker, Demand, Integrated Power		

3. Click **Next**.
   The **Report Wizard – Last Page** dialog box opens.(p. 68)

Example: Voltage and RMS fluctuations in the Hioki PW3198 dialog (page 1/4)

1 Select

Select graph plotting of thresholds and reference traces.

Graph plotting methods are selectable:
- **Single**
  All channels are plotted on one graph, and output on one page.
- **Division**
  One graph is divided into sections for each channel, and all channel sections are arranged and output on one page.
- **Separate**
  Each channel is plotted on a separate graph, and output as one graph per page.

2 Click

Loads the settings (SET) file, after which threshold data can be entered as the reference line value.

Report output graph colors can be selected. The **Color Setting** dialog box opens. Graph colors set here are applied only to graphs output in reports.

Settings can be saved and reloaded later.
For your convenience, you can save your report selections as a Report Wizard Settings file that you can simply reload whenever you want to create another report with the same settings.
The Report Wizard Settings file contains all custom and detailed report output settings.
You can register saved settings on the menu bar.
Once registered, you can print reports simply by selecting the item on the menu bar. See page (p. 73).

Printout Example: (p. 72)

Report Output Items

*1. Report output items are fixed for **Auto** report generation, but are selectable for **Custom Settings** or **Detailed Settings** report generation.
*2. Transient Waveform can be selected only when Worst Case is selected.
*3. Output for each channel can be set independently.

●: Can be output, ×: Cannot be output

Report Output Item	PW3198, 3196[*1]			3197[*1]			Output Contents
	Auto	Custom	Detailed	Auto	Custom	Detailed	
RMS Voltage Fluctuation Graph	●	●	●*3	●	●	●*3	Outputs a graph of rms voltage fluctuation that can be displayed in a Time Plot window.
RMS Current Fluctuation Graph	×	●	●*3	×	●	●*3	Outputs a graph of rms current fluctuation that can be displayed in a Time Plot window.
Voltage Fluctuation, RMS Fluctuation, Integral Power Graph, Demand Graph	×	●	●*3	×	●	●*3	Outputs a graph of integral power and demand that can be displayed in a Time Plot window.
Harmonic Fluctuations, Inter-harmonic Fluctuations, Flicker Graph	×	×	●*3				Outputs a graph of Flicker that can be displayed in a Time Plot window.
Voltage Total Harmonic Distortion Level Graph	●	●	●*3	●	●	●*3	Outputs a graph of voltage total harmonic distortion levels that can be displayed in a Time Plot window.
Current Total Harmonic Distortion Level Graph	×	●	●*3				Outputs a graph of current total harmonic distortion levels that can be displayed in a Time Plot window.
EN50160 Overview	●	●	×				Outputs the contents displayed in the EN50160 Overview window.
EN50160 Signaling	●	●	×				Outputs the contents displayed in the EN50160 Signaling window.
EN50160 Harmonics	×	●	×				Outputs the contents displayed in the EN50160 Harmonics window.
EN50160 Measurement Result Classification	×	●	×				Outputs an EN50169 measurement result classification table.
Worst Case	●	●	×	●	●	×	Outputs the five worst-case values for each voltage swell, dip, interruption and transient event within the reporting span. The worst-case values are maximum voltage swell, maximum continuous voltage swell duration, minimum voltage dip, maximum continuous voltage dip duration, maximum continuous voltage interruption duration and maximum transient value.
Transient Waveform *2	×	●	×				Outputs the worst-case transient waveform.
Maximum/ Minimum List	●	●	×	●	●	×	Outputs a list of voltage fluctuations (each channel separately), rms fluctuations (voltage and current on each channel separately), frequency, and maximum and minimum values of active, reactive and apparent power within the reporting span.
Detailed List of All Events	●	●	×	●	●	×	Outputs a list of all events and event details. The order of the output list can be set to either chronological or priority sequence in the Event List window.
All Event Waveforms	●	●	×	●	●	×	Outputs all event waveforms.
Settings List	×	●	×	×	●	×	Outputs a list of settings for the currently loaded data. These are the settings displayed in the Settings window when you select View – SYSTEM from the menu bar.

Report Printout Example

Auto Settings

Custom Settings

Detailed Settings

Printing with a Specified Report Format

You can print reports in a specified format, and you can also create reports in a custom user-configured format.

Printing reports in a specified format

Select **Reports** from the menu bar and select the desired report format.

A report including the current data will be printed in the specified report format.

All Data	Prints a report including all data that can be configured using individual settings.
All Time Plot	Prints a report including all TIME PLOT data.
TP Voltage & Current	Prints a report including TIME PLOT voltage and current data.
Integrated Power & Demand	Print a report including integral power and demand data.
Harmonics	Prints a report including harmonics data.
List & Waveformes of All Events	Prints a report including an event list and all event waveforms.
Flicker	Prints a report including flicker data. (This functionality is available for IEC flicker only.)
EN50160	Prints a report including EN50160 results.

Printing reports in a custom user-configured format

You can print reports in a custom user-configured report format.

Select **Report - User Reports** from the menu bar and select the desired user-configured report format.
A report including the current data will be printed in the specified format.

Configuring custom report formats

If **Individual Settings** or **Detailed Settings** was selected as the report creation method, you can save the configured report format.

1. Configure a report format as desired using the report wizard (see).
2. Save a report wizard integrated settings file.
   The filename will subsequently be shown in the menu.

Report Wizard: Individual Settings Page

Report Wizard: Detailed Settings Page

3. Select **Report - User Reports - Report Menu Editor** from the menu bar to display the Report Menu Editor.
   Menu items are shown in order.

	Selects the report wizard integrated settings file to register in the menu.
	Removes the selected item from the menu. The corresponding file is not deleted.
	Changes the menu order by moving the selected item up and down in the list.

Copying a displayed image into the clipboard

Image data can be copied to the clipboard and pasted into other applications such as Microsoft Word and Microsoft Excel. You can also copy and paste the measured values displayed on the A/B Cursor dialog box.

1 Click on the window you wish to copy to activate it.

To copy the DMM or harmonic list to Microsoft Word or Microsoft Excel, specify the range of data to copy.

DMM					
POWER		VOLTAGE		CURRENT	
Freq	59.998 Hz				
P1	2.517kW	U1	202.63 V	I1	25.729 A
P2	2.658kW	U2	205.22 V	I2	27.632 A
P3	2.409kW	U3	201.63 V	I3	25.582 A
Psum	7.584kW	U4	0.00 V	I4	0.000 A
S1	2.987kVA	THD-U1	0.89 %	THD-I1	0.86 %
S2	3.267kVA	THD-U2	1.12 %	THD-I2	1.21 %
S3	3.008kVA	THD-U3	1.03 %	THD-I3	1.38 %
Ssum	9.261kVA	THD-U4	----- %	THD-I4	----- %

2 Click the (copy) button, right-click and select **Copy** from the pop-up menu, or select **Edit - Copy** from the menu bar.

3 Paste the copied image into the desired application (Microsoft Word, Microsoft Excel, etc.).

Example: Copying and pasting five different windows into Microsoft Word

Storing Measurement Data in a CSV File

Measurement data (in binary format) can be converted to CSV format.
Data converted to CSV format can be used in spreadsheet programs such as Excel.

Refer to the "Appendix" (p. A1) and the instruments' instruction manuals for file format details.

⚠CAUTION	The results of CSV conversion differ from product display values in the following circumstances.
	Error notation:
	Example: A display of 0.000 Hz on the PW3198 will appear as OVER.

Convertible Data   ●:Convertible, −:Non-Convertible

Conversion Procedure	Window	Hioki PW3198	Hioki 3197	Hioki 3196
Convert time-series data to CSV format (for the span demarcated by A/B cursors) (p. 77)	Time Plot	●	●	●
	Flicker Graph	●	−	●
	Voltage Fluctuation Event	●	●	●
	Inrush Current Graph	●	●	−
	Integrated Power	●	●	●
Convert waveform data to CSV format (p. 79)	Voltage/Current Waveform	●	●	●
	Voltage/Transient Waveform	●	−	●
	Voltage Event Waveform	●	●	●
	Current Event Waveform	●	●	●
Convert demand data to CSV format (p. 80)	Demand	●	●	●

Convert Time-Series Data to CSV Format

1 Activate the window with the data to be converted.

Demarcate the span for conversion

2 Click the 🔼 (A and B cursor) button, or select **A and B cursor** in the **View** menu.

You can also right click and select from the pop-up menu.
The A/B cursors appear in the window, and a dialog box indicates values at the cursor positions.
Displayed contents differ according to the type of data displayed.
You can change everything when the A/B cursors are OFF.

3 Click the point where you want to move the cursor, or press the right- or left-arrow key on the keyboard to move the cursor.

Between A and B cursors

Cursor A: Light Blue
Cursor B: Purple

Cursor A (Light Blue)   Cursor B (Purple)

78

Chapter 4 Analyzing Measurement Data

Select the items to be converted to CSV format

4 From the **File** menu, select **Save the active data as a CSV file**.

You can also right click and select from the pop-up menu.

The Select Data for CSV Conversion dialog box opens.
Displayed contents differ according to the type of data displayed.

5 Select the check boxes of the items to be converted to CSV format.

Example

Shows the number of currently selected measurement items

Time Plot Window Example

Voltage Event Fluctuation Window Example

Integrated Power Window Example

IEC Flicker Window Example

The number of selected measurement items displayed at the upper right of the Select Data for CSV Conversion dialog cannot exceed 256.
Microsoft Excel is unable to load more than 256 items in one CSV format data file.

Inrush Current Window Example

6 Click the **OK** button.

The Save As dialog box opens.

7 Select the save destination and enter the name of the file to save.

1 Select

2 Enter

3 Click

Converting Waveform Data to CSV Format

1 Open the window with the waveform to be converted.

See: "Loading Data" (p. 15)

2 **To convert an event waveform**
Make the Event Waveform window active, and select **Save the active data as a CSV file – Event waveform data** from the **File** menu.

The currently displayed event waveform is converted. All event waveform data (all events) included in the file are converted to CSV format data.

To convert transient waveform data (Hioki PW3198, 3196 only)
Make the Voltage/Transient Waveform window active, and select **Save the active data as a CSV file – Event transient waveform data** from the **File** menu.

You can also right click and select from the pop-up menu.
The Select Data for CSV Conversion dialog box opens.

3 Select the check boxes of the items to be converted to CSV format.

Example

Shows the number of currently selected measurement items

Event Waveform Example

Transient Waveform Example

The time is recorded in the format "h:mm:ss.000."

4 Click the **OK** button.

The Save As dialog box opens.

5 Select the save destination and enter the name of the file to save.

Converting Demand Data to CSV Format

1 Make the Demand window active, and select **Save the active data as a CSV file** from the **File** menu.

The Select Data for CSV Conversion dialog box opens.

2 Select the check boxes of the items to be converted to CSV format.

Shows the number of currently selected measurement items

3 Click the **OK** button.

The Save As dialog box opens.

4 Select the save destination and enter the name of the file to save.

Before Converting Harmonic Voltage Measurement Data (EN50160 Mode) to CSV Format (Hioki 3196 only)

For EN50160 mode measurements with the Hioki 3196, harmonic voltage (as opposed to inter-harmonic voltage) content is recorded as a percentage (of Uref) relative to the nominal voltage. This harmonic voltage can be converted from percentage of the nominal voltage (% of Uref) to percentage of the fundamental waveform voltage (% of Ufnd) and saved in CSV format.The PW3198 records this data as a percentage of the fundamental waveform voltage (% of Ufnd).

1 Switch to EN50160 mode.

See: "Switching to EN50160 Display Mode" (p. 102)

2 Select **Convert harmonic % to CSV** in the **Option** menu.

The Convert harmonic % to CSV dialog box opens.

3 Select the check box, and click the **OK** button.

Using Optional Functions

This section describes how to configure special function operation. These functions are not used during normal measurement, and their settings need not be changed during normal operation.

Unit Prefixes
Fix "KW".
Unify the electricity-related unit to a unit with k, such as kW.
Do not use any unit prefix with "V":
Set the voltage unit as V and do not use any unit prefix such as k.
Do not use any unit prefix with "A":
Set the current unit as A and do not use any unit prefix such as k.

Enabling voltage 30-minute averages allows you to select voltage 30-minute averaging from the pop-up menu when you right-click on the [TIME PLOT] screen.

PW3198: 3P3W2M connections
With 3P3W2M connections, channel 3 values can be calculated from channels 1 and 2 and shown for reference. The instantaneous waveforms u3 and i3 are calculated as (u2-u1) and (-i1-i2), respectively.

TIME PLOT/EVENT: Harmonics (PW3198 only)
Allows you to change the method used to calculate harmonics data shown on the [TIME PLOT] screen's harmonic and event data DMM graphs and redisplay the graphs accordingly.

Output Voltage 30-minute Average
This option can be selected from the pop-menu by right-clicking on the **TIME PLOT** window. Average voltage values will be recalculated every 30 minutes within the range specified by the A and B cursors and output to a CSV file. (Values cannot be recalculated for data for which the interval is greater than 30 minutes.)

Example output

Voltage 30-minute average
Interval,2010/11/17   00:00:00   ～   2010/11/17 07:30:00
„U1[V],U4[V]
,maximum value,106.27E+0,000.00E-3 ———————— Maximum, average, and minimum voltage
,average value,105.47E+0,000.00E-3   values recalculated every 30 minutes
,minimum value,104.80E+0,000.00E-3

„U1,U4
Date, time,[V],[V]
2010/11/17,00:00:00,105.43E+0,000.00E-3 ———— Voltage values recalculated
2010/11/17,00:30:00,106.27E+0,000.00E-3   every 30 minutes
2010/11/17,01:00:00,105.96E+0,000.00E-3

Analyzing Measurement Data from the HiokiPW3198,3196 Chapter 5

Viewing detailed event measurement data

[EVENT DATA]

Data measured with the Hioki PW3198, 3196 upon the occurrence of an event can be displayed as a graph (Event Data window).

The conditions under which events occurred can be analyzed using the following graphs on the Event Data window:

- **VOLTAGE/CURRENT Window (p. 59)**
- **VOLTAGE/TRANSIENT Window (p. 60)**
- **VOLTAGE Window (p. 61)**
- **CURRENT Window (p. 62)**
- **VECTOR Window (p. 84)**
- **DMM Window (p. 84)**
- **HARMONICS BAR GRAPH Window (p. 85)**
- **HARMONICS LIST Window (p. 86)**

In this manual, the above windows are collectively called "Event Data windows".
For more information about how to open an Event Data window, see "Opening and Switching Event Data Windows" (p. 57)

Viewing the Vector Display   [VECTOR]

1 Open the Event Data window.

See: "Opening and Switching Event Data Windows" (p. 57)

2 Activate the Event Data window and select the **VECTOR** window from the **EVENT DATA** menu.

You can also right click and select from the pop-up menu.

The Vector window opens.

When using a 3P4W connection, the positive-, negative-, and zero-phase components are displayed. For the 3196, these values are obtained using the calculations listed on the attached table.

Display Types
VALUE (RMS)
PHASE (Phase Angles)

Numerical Display Method (for phase angles)
±180 (0 to 180º Lead)
lag360 (0 to 360º Lag)

Axis Display
LINEAR (Linear Display)
LOG (Logarithmic Display)

Reference Source (for phase angles)
Order number

Window tool bar

Move to previous or next event
Voltage on each channel

Calculated values of positive-, negative- and zero-phase voltage

Vectors

Up to 10 harmonic orders can be analyzed from 400 Hz measurements.

Calculated values of positive-, negative- and zero-phase current
Current on each channel

Viewing the DMM Display   [DMM]

1 Open the Event Data window.

See: "Opening and Switching Event Data Windows" (p. 57)

2 Activate the Event Data window and select the **DMM** window from the **EVENT DATA** menu.

You can also right click and select from the pop-up menu.

The DMM window opens.

Viewing Harmonics on a Bar Graph   [HARMONICS BAR GRAPH]

1 Open the Event Data window.

See: "Opening and Switching Event Data Windows" (p. 57)

2 Activate the Event Data window and select the **HARMONICS BAR GRAPH** window from the **EVENT DATA** menu.

You can also right click and select from the pop-up menu.

The Harmonics Bar Graph window opens. For the PW3198, the high-order harmonics components are displayed at the far right.

Display Types
VALUE (RMS)
PHASE (Phase Angles)

Axis Display
LINEAR (Linear Display)
LOG (Logarithmic Display)

Show/hide inter-harmonics
iHarmOFF
iHarmON

Channel

Order number

Move to previous or next event

Window tool bar

High-order harmonic voltage

Voltage

High-order harmonic current

Current

Power

Data from 400 Hz measurements can be analyzed up to the 10th harmonic order.

High-order harmonics bar graph

Viewing Harmonics in a List   [HARMONICS LIST]

1 Open the Event Data window.

See: "Opening and Switching Event Data Windows" (p. 57)

2 Activate the Event Data window and select the **HARMONICS LIST** window from the **EVENT DATA** menu.

You can also right click and select from the pop-up menu.
The Harmonics List window opens.

Display Types
VALUE (RMS)
Display item
PHASE (Phase Angles)

Show/hide inter-harmonics
iHarmOFF
iHarmON

Channel

Window tool bar

Move to previous or next event

Order	[V]	Order	[V]	Order	[V]	Order	[V]
0	- 0.01	16	0.02	32	0.00	48	0.00
1	205.39	17	0.21	33	0.02	49	0.01
2	0.11	18	0.09	34	0.00	50	0.00
3	0.93	19	0.02	35	0.05	THD	0.77 (%)
4	0.03	20	0.01	36	0.02		
5	0.45	21	0.08	37	0.05		
6	0.02	22	0.07	38	0.03		
7	1.10	23	0.07	39	0.03		
8	0.07	24	0.03	40	0.02		
9	0.17	25	0.04	41	0.05		
10	0.02	26	0.00	42	0.00		
11	0.21	27	0.02	43	0.01		
12	0.01	28	0.01	44	0.00		
13	0.15	29	0.01	45	0.01		
14	0.01	30	0.01	46	0.01		
15	0.05	31	0.06	47	0.03		

Data from 400 Hz measurements can be analyzed up to the 10th harmonic order.

Viewing High-order Harmonic Details(PW3198)

The PW3198 POWER SUPPLY QUALITY ANALYZER can be used to observe high-order harmonics at a high level of detail. The high-order harmonics graph is only displayed when there is high-order harmonic data (HHC file). A time series graph representing 40 ms of the waveform obtained using 200 kHz high-speed sampling is shown.

1 Activate the event data and select **Event Data – High-order Harmonics** from the menu bar.

Current Y-axis scale
Voltage Y-axis scale   X-axis scale
Window tool bar
Move to previous or next event
Scrolls the window

CH1 (Red)
CH2 (Yellow-Green)
CH3 (Blue)
CH4 (Light Blue)

> **Viewing Measurement Data as Numerical Values (Cursor Measurement)**

2 You can check measured values using the cursor. You can also display maximum, minimum, and average values for the desired range.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

Frequency Analysis of High-order harmonics (Frequency Analysis)

1 Activate the event data screen and from the **Event Data** menu select **High-order Harmonics**. Right click and from the pop-up menu select **FFT Analysis**.
You cannot select **Frequency Analysis** in any other screen besides the **High-order Harmonics** screen.

2 The area of the target to be analyzed in the **High-order Harmonics** graph will turn grey and the **Frequency Analysis** window will open.
When the A/B cursors are ON, you can read the measurement values.

Viewing Voltage Fluctuation Details（3196）

[Voltage Fluctuation Event Graph]

Voltage fluctuation phenomena (swells, dips and interruptions) that occurred within data measured by the Hioki 3196 can be displayed graphically (in the Voltage Fluctuation Event Graph window).
A Voltage Fluctuation Event Graph can be displayed only when an Event file (WDU file) is loaded. Event files can be confirmed in the Event List (p. 53).
A Voltage Fluctuation Event Graph is a 10-second（3196） time series graph of rms voltage calculated over one half-cycle-shifted waveform.

1 Specify the event file (WDU file) to display using the Voltage Fluctuation Event Graph.

2 Click the 🔲 (Open Voltage Fluctuation Event Graph) button or select **View – Voltage Fluctuation Event Graph** from the menu bar.

The Voltage Fluctuation Event Graph window opens.

When there is no WDU file for the selected event, the display will show, "No voltage fluctuation graph data is available for the specified event."

Viewing Measurement Data as Numerical Values (Cursor Measurement)

3 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

Viewing Voltage Fluctuation Details and the Inrush Current Graph (Hioki PW3198 only)

[Event Voltage Fluctuation and Inrush Current Graph]

Voltage fluctuation phenomena (swells, dips, and interruptions) and inrush current phenomena that occurred within data measured by the Hioki PW3198 can be displayed graphically (in the Voltage Fluctuation Event Graph window).

A Voltage (current) Fluctuation Event data Graph can be displayed only when an event file (WDU file) is loaded.

Event files can be confirmed in the Event List (p. 53). A Voltage Fluctuation Event Graph is a 30-second (PW3198) time series graph of RMS voltage and current calculations over one half-cycle-shifted waveform.

1 Specify the event (INRUSH) to display on the inrush current graph. To display event voltage (current) fluctuation data, specify event (WDU).

See: "Viewing Events as a List [EVENT LIST]" (p. 53)

2 Click the [icon] (Open Voltage Fluctuation Event Graph) button or select **View – Voltage Fluctuation Event Graph** from the menu bar. You can also select inrush current with the button or from the menu bar.

The Voltage Fluctuation Event Graph window and Current Fluctuation Event Graph window opens.

Window tool bar

CH1 (Red)
CH2 (Yellow-Green)
CH3 (Blue)
CH4 (Light Blue)

Y-axis scale

X-axis scale

The time position at which the inrush event occurred is indicated with an event marker (▼) (in pink).

Scrolls the window

When there is no WDU file for the selected event, the display will show, "No inrush current graph data is available for the specified event."

Viewing Measurement Data as Numerical Values (Cursor Measurement)

3 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

Viewing Integral Power [Integrated Power Window]

PW3198, 3196

Integral power measured with the Hioki PW3198, 3196 Power Quality Analyzer can be displayed as a time series graph (Integrated Power window).

1 Load the measurement data.
See: "Loading Data" (p. 15)

2 Click the Wh (Open Integrated Power window) button or select **View – Integrated Power Window** from the menu bar.
The Integrated Power window opens.

3 Set the starting time and span for analysis, and click the **OK** button.

Start integration

Measurement period   2011/03/25 12:05:00 - 03/29 10:50:00

Integration   2011/03/25   12:05:00

Analysis period   1   Day

OK   Cancel

When the confirmation dialog box is displayed, click the **OK** button.

Start integration

2011/03/25 12:05:00 - 1 Day

Confirm this

OK   Cancel

If the analysis start time does not fall within the measurement interval, you will not be able to start integral power calculation.

See: For more information about display items, see "Appendix 5" (p. A13)

Display item
(selectable with PW3198 only)   Y-axis scale   X-axis scale

Window tool bar
Integral power per
(vertical) division

Integrated Power WP+

WP+   Ydiv x 2   Tdiv 15h/div

Cursor position: 0.5798MWh 01/20 16:00:00   Maximum integrated power value: 2.1529MWh
0.2500MWh/div

Indicates integral
power at the cursor
position, and maxi-
mum integral power.

Cursor Position
You can move the cursor with the
mouse or by pressing the left/right
arrow keys on the keyboard.

1.0

0.5000M

Scrolls the window

01/17   01/18   01/18   01/19   01/20   01/20   01/21
13:00:00   04:00:00   19:00:00   10:00:00   01:00:00   16:00:00   07:00:00

Viewing Measurement Data as Numerical Values (Cursor Measurement)

4 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

When the A/B Cursor dialog is open, A/B cursor movement has priority over the usual screen cursor.

Viewing a Demand Graph   [Demand Window]

PW3198, 3196

Data measured with the Hioki 3196 Power Quality Analyzer can be displayed as a demand graph (Demand window).

1 Load the measurement data.

See: "Loading Data" (p. 15)

2 Click the [Dem] (Open Demand window) button or select **View – Demand Window** from the menu bar.

The Start Demand Calculation dialog box opens.

3 Set the starting time, demand period and analysis time span, and click the **OK** button.

When the confirmation dialog box is displayed, click the **OK** button.

See: For more information about display items, see "Appendix 5" (p. A13)

X-axis scale

Window tool bar

Indicates maximum and average demand values, load factor, and the demand value at the cursor position

Cursor Position
You can move the cursor with the mouse or by pressing the left/right arrow keys on the keyboard.

Average demand value

Scrolls the window

Testing Measurement Data Conformance   [ITIC]

Voltage swell, dip and interruption data are displayed on a graph and judged against upper and lower limit curves (tolerance curves).

The graph plots percentage of nominal voltage (vertical axis) against time (in seconds, horizontal axis).

Event	Time [s]	Percent Nominal Voltage [%]
Voltage Swell	Continuous Swell Duration	Maximum Swell Voltage
Voltage Dip	Dip Duration	Residual Voltage (Dip Voltage Minimum)
Interruption	Continuous Interruption Duration	Residual Voltage (Interruption Voltage Minimum)

Two types of tolerance curves are available: the ITIC Curve used mainly in the USA, and a user-defined curve which can be set as needed.

See: "Setting Tolerances (Making a User-Defined Curve)" (p. 97)

When using the PW3198, transient events are also included in judgments. The event count is incremented by 1 for each event, and the data for the worst value is used.

1 Load the measurement data.

See: "Loading Data" (p. 15)

To display a tolerance curve, a EVT file containing voltage swell, dip or interruption data must be loaded.

2 Click the ▶ (Open ITIC window) button or select **View – ITIC Window** from the menu bar.
The ITIC window opens.

Window tool bar

Tolerance Curve
ITIC (ITIC Curve)
User (User-Defined Curve)
The User definition selection is displayed only when setting the tolerance curve.

Channel   Y-axis scale   X-axis scale

`Curve |ITIC ▼| |all CH ▼| Ydiv |x1 ▼| Tdiv |x1 ▼|`

Total number of events above the upper curve threshold
(up to 2000% on the vertical axis)

Total number of events below the lower curve threshold

Total number of events on all current selected channels

Total Events:15   Upper Violations:0   Lower Violations:0
Longer Events:28

Total number of events with duration exceeding 1000 s
(not displayed of no event exceeds 1000 s)

Vertical axis: Percent Nominal Voltage [%]

Event Markers

CH1 ◆ (Red)
CH2 ◆ (Yellow-Green)
CH3 ◆ (Blue)

Upper-limit curve

Lower-limit curve

Click an event marker to view an event phenomenon in the other windows.

See: "Viewing Event Phenomena" (p. 50)

Horizontal Axis: Elapsed Time [s]

Scrolls the window

The event marker for the selected event blinks.
When "all CH" is selected for the channel on this window's tool bar, multiple event markers blink if an event occurred on multiple channels at the same time.

NOTE   **About CBEMA and ITIC Curves**
Mainly used in the USA, both curves are tolerance ranges for judging rms voltage fluctuations according to voltage swell, dip and interruption events.
The CBEMA Curve was created by the Computer Business Equipment Manufacturers Association. Later, CBEMA established a Working Group called the ITIC (Information Technology Industry Council), which created the ITIC Curve. Use of the CBEMA Curve in applications is now being replaced with the ITIC Curve.

Setting Tolerances (Making a User-Defined Curve)

Tolerance limits can be set freely.
To make user settings, select **User** (User-Defined Curve) as the **Curve** item on the tool bar in the ITIC window. A user-defined curve is a convenient way to provide a SEMI Curve (p. 99) for tolerance judgments.

1 Select the **User** Curve setting on the ITIC window tool bar.

2 Select **ITIC – Tolerance Curve** from the menu bar.
You can also right click and select from the pop-up menu.
The Curve Editor appears.

ITIC Window Sample Graph
(The vertical and horizontal axes of the graph are displayed at minimum magnification)

Tolerance Curve Dialog

3 Enter numerical values in the upper and lower limit fields.

Up to 20 decimal values can be entered in the x(s) and y(%) fields to define upper and lower curve limits. Millisecond values can be entered for x(s) by appending an "m" unit designator.

Enter values on consecutive lines to reach the edge of the graph.

See: "Curve Tables (Reference)" (p. 99)

User-Defined Curve Range
x(s): 1 ms to 1000 s
y(%): 0 to 2000

Click here to display a sample graph of the data entered for a user-defined curve.

Click here to set ITIC Curve data ("Curve Tables (Reference)" (p. 99)).

Click **Save** to display the Save dialog for saving your entered user-defined curve data. User-defined curves can be saved with any file name.

To load a previously saved user-defined curve
Click **Open** and select a file to load.

Closes the Curve Editor without changing the user-defined curve.

4 Click the **OK** button.

The curve with the specified contents appears in the ITIC window.

Curve Tables (Reference)

ITIC Curve Chart

Upper limit curve		Lower limit curve	
x [s]	y [%]	x [s]	y [%]
1 m	200	20 m	0
3 m	140	20 m	70
3 m	120	500 m	70
500 m	120	500 m	80
500 m	110	10	80
1000	110	10	90
		1000	90

SEMI Curve Chart

Upper limit curve		Lower limit curve	
x [s]	y [%]	x [s]	y [%]
		20 m	0
		20 m	50
		200 m	50
		200 m	70
		500 m	70
		500 m	80
		10	80
		10	90
		1000	90

SEMI curve is made by the SEMI (Semiconductor Equipment and Materials International). It judges the voltage dip and interruption only, and has easier limit than the ITIC curve between 20ms and 200ms.
There is no upper limit curve in the SEMI curve, but we recommend using the upper limit value; x:1m, y:200 and x:1000, y:200.

CISPR24 Curve Chart

Upper limit curve		Lower limit curve	
x [s]	y [%]	x [s]	y [%]
		20 m	30
		500 m	30
		500 m	95
		5	95
		5	100
		1000	100

Per operating judgment standard C

Viewing a Flicker Graph

Viewing a Delta V10 Flicker Graph   [Delta V10 Flicker Window]

Data measured with the Hioki PW3198, 3196 Power Quality Analyzer can be displayed as a flicker graph (Delta V10 Flicker window).

1 Load the measurement data.

See: "Loading Data" (p. 15)

The Delta V10 Flicker window can be displayed only when an FLC file containing Delta V10 Flicker data is loaded.

2 Click the ⚡ (Open Delta V10 Flicker window) button or select **View – Delta V10 Flicker Window** from the menu bar.

The Delta V10 Flicker window opens.

Delta V10 alarm output period display (PW3198 only)
Indicates the period during which the Delta V10 alarm was being output by the PW3198 .

Channel   Y-axis scale   X-axis scale

Window tool bar

Blue =
value at each minute
Red =
fourth largest value each hour
Yellow-Green =
hourly running average

Scrolls the window

Viewing Measurement Data as Numerical Values (Cursor Measurement)

3 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

Viewing an IEC Flicker Graph   [IEC Flicker Window]

Data measured with the Hioki PW3198, 3196 Power Quality Analyzer can be displayed as flicker graph (IEC Flicker window).

1 Load the measurement data.

See: "Loading Data" (p. 15)

The IEC Flicker window can be displayed only when an FLC file containing IEC Flicker data is loaded.

2 Click the [Flic] (Open IEC Flicker Window) button or select **View – IEC Flicker Window** from the menu bar.

The IEC Flicker window opens.

Channel   Y-axis scale   X-axis scale

Window tool bar

Pst:
Short-term voltage flicker (Red)
Plt_10min:
Long-term voltage flicker
(Calculates 2 hours' worth of Pst data
every 10 minutes)(Yellow-Green)
Plt:
Long-term voltage flicker
(IEC61000-4-15 supported)(Blue)

Scrolls the window

Viewing Measurement Data as Numerical Values (Cursor Measurement)

3 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

NOTE   The flicker value demanded by IEC61000-4-30 standard is the Plt value.
The every 2-hour value of Plt_10min is the same as the Plt value.

Switching to EN50160 Display Mode

Two switchable display modes are provided for Hioki PW3198, 3196 measurement data: **Normal display** mode and **EN50160 display** mode.
The Normal display mode is initially enabled when data is loaded.

Click the 🔲 (Switch to EN50160 Window) button or select **View – EN50160** from the menu bar.

Click 🔲 to toggle between Normal and EN50160 display modes.

The 🔲 tool appears pressed when the EN50160 display mode is enabled.

🔲	**Normal Display Mode**

Windows:
TIME PLOT, Event List, Event Data, ITIC, Delta V10 Flicker, IEC Flicker, Event Voltage Fluctuation, Integrated Power Value, and Demand

Event List window (p. 53)   Time Plot Window (p. 40)

ITIC window (p. 95)

Event data window (p. 83)
You can switch the Event Data window to the Harmonic or DMM window.
(Right click inside the window and select a window to switch to from the pop-up menu.)

🔲	**EN50160 Display Mode**

Windows:
EN50160 data (Overview, Harmonic, Signaling, and Measurement result classification)

Overview window (p. 104)   Harmonic window (p. 106)

Signaling window (p. 107)

Measurement Result Classification window (p. 108)

The EN50160 display mode is available only when an EN50160 file has been loaded.

Viewing EN50160 Mode Measurement Data

Data measured on the Hioki PW3198, 3196 with the EN50160 function enabled can be displayed in the EN50160 window.

The EN50160 mode provides the following four windows:
- ■ **Overview Window (p. 104)**
- ■ **Harmonic Window (p. 106)**
- ■ **Signaling Window (p. 107) (Hioki 3196 only)**
- ■ **Measurement Result Classification Window (p. 108)**

To enable the PW3198's EN50160 function
Select the PW3198's EN50160 simple configuration pattern and conduct measurements. If any of the following settings are changed, you will be unable to place the instrument in EN50160 mode:

System settings	TIME PLOT interval	10min
	Measurement frequency	50 Hz/60 Hz (Not supported with 400 Hz measurement.)
	THD type	THD-F
Event settings	Swell	110%
	Dip	90%
	Frequency	0.5 Hz

For more information about how to configure these and other settings, see the PW3198's instruction manual.

Overview Window

1 Click the [EN] (Open EN50160 Overview Window) button, or select **View – EN50160** from the menu bar to activate the EN50160 mode.

See: "Switching to EN50160 Display Mode" (p. 102)

When the EN50160 mode is activated, the button appears pressed, and the View – EN50160 item in the menu has a check mark.

2 Click the [■] (Open EN50160 Overview window) button or select **View – Overview** from the menu bar.

The Overview window opens.

You can select the data time span to display.

All	Display data for all times available in the EN data file.
Specific	Display data from the specified starting date for the specified span (Period).

Display Start Date

Display Span

Window tool bar

Select whether to include other (flagged) data when a statistical voltage swell, dip or interruption occurs.

Including flagging data	Includes flagged data in statistics
Excluding flagging data	Excludes flagged data from statistics

The Good% value can be changed. (p. 105)

Reference: When a voltage swell, dip or interruption event occurs, other parameter data (such as frequency) might interfere with the reliability of the occurrence data. In that case, other data can be flagged so that when a voltage swell, dip or interruption event occurs, the other data can be excluded from the statistics to improve reliability.

Changing the Good% value

3 Click the Good% setting area.

The Change Good% dialog box opens.

4 Enter a new value for the Good%, and click the **OK** button.

The entered Good% value is reflected in the Overview window.

Harmonic Window

1 Click the 🔲 (Switch to EN50160 Window) button, or select **View – EN50160** from the menu bar to activate the EN50160 mode.

See: "Switching to EN50160 Display Mode" (p. 102)

When the EN50160 mode is activated, the button appears pressed, and the View – EN50160 item in the menu has a check mark.

2 Click the 📊 (Open EN50160 Harmonic window) button or select **View – Harmonic** from the menu bar.

The Harmonic window opens.

Orders from the 2nd to the 50th can be selected. The first order is not selectable.

Window tool bar

Shows the display starting date, span (period) and flag status (reflecting the settings in the Overview window)

Signaling Window (Hioki 3196 only)

1 Click the 🔲 (Switch to EN50160 Window) button, or select **View – EN50160** from the menu bar to activate the EN50160 mode.

See: "Switching to EN50160 Display Mode" (p. 102)

When the EN50160 mode is activated, the button appears pressed, and the View – EN50160 item in the menu has a check mark.

2 Click the 🔳 (Open EN50160 Signaling window) button or select **View – Signaling** from the menu bar.

The Signaling window opens.

Select whether to include other (flagged) data when a statistical voltage swell, dip or interruption occurs. (p. 108)

Display Starting Date

Window tool bar

The Good% value can be changed. (p. 107)

Changing the Good% value

3 Click the Good% location.

The Change Good% dialog box opens.

Click

4 Enter a new value for the Good%, and click the **OK** button.

The entered Good% value is reflected in the Signaling window.

Measurement Result Classification Window

Results can be classified as needed, and saved.

1 Click the 📟 (Switch to EN50160 Window) button, or select **View – EN50160** from the menu bar to activate the EN50160 mode.

See: "Switching to EN50160 Display Mode" (p. 102)

When the EN50160 mode is activated, the button appears pressed, and the View – EN50160 item in the menu has a check mark.

2 Click the 🟦 (Open EN50160 Measurement Result Classification window) button or select **View – Measurement Result Classification** from the menu bar.

The Measurement Result Classification window opens.

Display Starting Date and Span (Period) (reflecting the settings in the Overview window)

You can edit the table's time span and voltage classifications.

See: "Changing Measurement Result Classifications" (p. 108)

Indicates the number of voltage swell, voltage dip, and interruption occurrence in red.

Voltage u
In the event of a voltage swell, Voltage u represents the maximum swell voltage (% of nominal voltage).
In the event of a voltage dip or interruption, Voltage u represents the residual voltage (% of nominal voltage).

Duration
Represents the duration of a voltage swell, voltage dip, or interruption.

See: "Three-Phase RMS Voltage Fluctuation Graph" (p. 110)

Changing Measurement Result Classifications

3 Make the Measurement Result Classification window active and select **Measurement Result Classification – Editor of Measurement Result Classification**.

You can also right click and select from the pop-up menu.
The Measurement Result Classification editor window opens.

4 Change the entries in the desired Duration or Voltage fields.

Enter Voltage classifications.   Enter Duration classifications.

To return duration and voltage classifications to their defaults
(see "Measurement Result Classification Defaults" below)
Click **Set as Default Value**. Duration and voltage classification values are reset to their defaults.

To save the current classification settings
Click **Save**.
Saves the duration and voltage classification values in the table displayed in the Measurement Result Classification Editing window as a measurement results classification settings (ESP) file.

To load an existing classification settings file
Click **Open**.
Loads a measurement results classification settings (ESP) file and applies its contents to the Measurement Result Classification Editing window.

5 Click the **OK** button.

The duration and voltage classification values in the table displayed in the Measurement Result Classification Editing window are applied to the Measurement Result Classification window.

Measurement Result Classification Defaults

Swell, Dip, Interruption

Voltage u (% of Uref)	Duration t (seconds)							
	0.5cyc < t ≤ 100 m	100 m < t ≤ 500 m	500 m < t ≤ 1	1 < t ≤ 3	3 < t ≤ 20	20 < t ≤ 60	60 < t ≤ 180	180 < t
180 < u								
160 < u ≤ 180								
140 < u ≤ 160								
120 < u ≤ 140								
110 < u ≤ 120								
70 ≤ u < 90								
40 ≤ u < 70								
10 ≤ u < 40								
1 ≤ u < 10								
u < 1								

Three-Phase RMS Voltage Fluctuation Graph

Swell

Duration of swell

Maximum swell voltage

IN

OUT

Threshold value

Hysteresis

Dip

Hysteresis

Threshold value

IN

OUT

Residual voltage of dip

Duration of dip

Interruption

IN   OUT

Hysteresis

Threshold value

Residual voltage of interruption

Duration of interruption

Downloading Measurement Data from the Power Quality Analyzer (LAN Download Function)

You can download data from the Hioki PW3198 or 3196's internal memory and data files from its SD/PC Card by connecting it to the computer via LAN.
Refer to "Control and Monitoring Using the LAN Interface" in the Hioki PW3198, 3196 Power Quality Analyzer Detailed Instruction Manual for the LAN settings.

Before Connecting the Hioki PW3198, 3196 to the LAN

NOTE	Confirm that the PW3198, 3196 SETTING or ANALYZING display is selected. Making connections and downloading are not possible when the PW3198, 3196 display is WAITING (awaiting measurement) or RECORDING. To connect the computer to the PW3198 via the LAN, the port number 3198 is used. Configure the LAN setting to use the port number 3198.

1 Click the ⬛ (Download) button or select **File – Download** from the menu bar.

The Download dialog box opens.

Example: PW3198

2 Select the name of the connected device (3196 or PW3198) and enter the IP address for the PW3198 or 3196 power quality analyzer.

A history is retained of the last ten connected IP addresses.
Click ⬇ to display this history.

3 Click the [🔄] (Update) button.

Connection is established to the Hioki PW3198, 3196, and the data file list is refreshed.
When refreshing is complete, the Hioki PW3198, 3196 internal memory and PC Card data files are displayed in the data file list.

4 Select a data file to download from the data file list.

Error Message

Hioki PW3198, 3196 internal memory and PC Card file list

Check whether data exists in the Hioki PW3198, 3196 internal memory.
[icon]: No data

[icon]: Data exists

Download the selected folder, and open it in the PQA-HiView Pro.

Download selected data.

Folders whose names do not begin with [B] cannot be opened with the 9624-50 PWA-HiView Pro software.

5 Click the Download and Open or **Download** button.

The Choose dialog box opens.

6 Select the save destination and, Click the **OK**, start downloading.

If you clicked the **Download and Open** button, the data will be opened after it finishes downloading.

NOTE When replacing the SD or PC card of the measuring instrument, click the "Update" button to refresh the data file list.

Storing Measurement Data in a PQDIF File (PW3198)

Measurement data from the PW3198 (typically stored as a binary file) can be converted to a PQIDF file (with a .PQD extension).

> **NOTE** PQDIF format
>
> The PQDIF format for power quality data has been defined by IEEE 1159.3 and can be read by compatible applications.

Converting measurement data to the PQDIF format

1 Select **File - Save the active data as a PQDIF file...** from the menu bar.

The [PQDIF_Converter] dialog box will be displayed. The contents of the dialog box will vary with the type of data displayed.

2 Select the checkbox for each data type you wish to convert to the PQDIF format so that it changes to ☑ .

Specify the file name.

Compress the file.

Time Plot :	Time Plot screen data
Integ Wh:	Integral power data
Harmonics:	Harmonic data
Inter-Harm:	Inter-harmonics
Higher-Harm:	High-order harmonics
Event Data:	Event data
Transient:	Transient
WDU:	Event voltage fluctuation data
Flicker:	Flicker

3 Click the SAVE button.

The measurement data will be output as a .PQD file.

Analyzing Measurement Data from the Hioki 3197

Chapter 6

Viewing Voltage Fluctuation Details

[Voltage Fluctuation Event Graph]

Voltage fluctuation phenomena (swells, dips and interruptions) that occurred within data measured by the Hioki 3197 can be displayed graphically (in the Voltage Fluctuation Event Graph window).
A Voltage Fluctuation Event Graph can be displayed only when an Event file (WDU file) is loaded.
Event files can be confirmed in the Event List (p. 53).
A Voltage Fluctuation Event Graph is a 3-second time series graph of rms voltage calculated over one half-cycle-shifted waveform.

1 Load the measurement data.

See: "Loading Data" (p. 15)

2 Click the [🔳] (Open Voltage Fluctuation Event Graph) button or select **View – Voltage Fluctuation Event Graph** from the menu bar.

The Voltage Fluctuation Event Graph window opens.

When there is no WDU file for the selected event, the display will show, "No voltage fluctuation graph data is available for the specified event."

Viewing Measurement Data as Numerical Values (Cursor Measurement)

3 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

Viewing an Inrush Current Graph

[Inrush Current Event Graph]

Data measured with the Hioki 3197 Power Quality Analyzer when an inrush current event occurs can be displayed as a graph (Inrush Current Event Graph).

The inrush current graph can be displayed only when an event (INR) file is loaded. Event files can be confirmed in the Event List (p. 53). This is a 30-second time series graph of rms current calculated every half cycle.

1 Load the measurement data.

See: "Loading Data" (p. 15)

2 Click the 📊 (Open Inrush Current Event Graph) button or select **View – Inrush Current Event Graph** from the menu bar.

The Inrush Current Event Graph window opens.

When there is no WDU file for the selected event, the display will show, "No inrush current graph data is available for the specified event."

Viewing Measurement Data as Numerical Values (Cursor Measurement)

3 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

Viewing Integral Power   [Integrated Power Window]

Integral power measured with the Hioki 3197 Power Quality Analyzer can be displayed as a time series graph (Integrated Power window).

1 Load the measurement data.

See: "Loading Data" (p. 15)

2 Click the [Wh] (Open Integrated Power window) button or select **View – Integrated Power Window** from the menu bar.

The Integrated Power window opens.

See: For more information about display items, see "Appendix 5" (p. A13)

Display item   Y-axis scale   X-axis scale

Window tool bar

Integral power per (vertical) division

Integrated Power WP+

WP+   Ydiv x 2   Tdiv 15h/div

Cursor position: 0.5798MWh 01/20 16:00:00 Maximum integrated power value: 2.1529MWh
0.2500MWh/div

Indicates integral power at the cursor position, and maximum integral power.

Cursor Position
You can move the cursor with the mouse or by pressing the left/right arrow keys on the keyboard.

1.00

0.5000M

01/17   01/18   01/18   01/19   01/20   01/20   01/21
13:00:00   04:00:00   19:00:00   10:00:00   01:00:00   16:00:00   07:00:00

Scrolls the window

Viewing Measurement Data as Numerical Values (Cursor Measurement)

3 Measurement values can be confirmed using the cursors. In addition, the minimum, maximum and average values over any span can be displayed.

See: "Viewing Measurement Data as Numerical Values (Cursor Measurement)" (p. 38)

When the A/B Cursor dialog is open, A/B cursor movement has priority over the usual screen cursor.

Viewing a Demand Graph   [Demand Window]

Data measured with the Hioki 3197 Power Quality Analyzer can be displayed as a demand graph (Demand window).

1 Load the measurement data.

See: "Loading Data" (p. 15)

If the measurement duration of the loaded data is too short, the Demand window cannot be displayed.

2 Click the [Dem] (Open Demand window) button or select **View – Demand Window** from the menu bar.

The Demand window opens.

See: For more information about display items, see "Appendix 5" (p. A13)

Display item   Y-axis scale   X-axis scale

Window tool bar

Indicates maximum and average demand values, load factor, and the demand value at the cursor position

Cursor Position
You can move the cursor with the mouse or by pressing the left/right arrow keys on the keyboard.

Average demand value

Scrolls the window

MAX demand value: 15.90kW   01/31 13:30:00   AVE demand value: 6.00kW
Cursor position: 15.09kW   01/18 14:00:00   Load factor: 37.7%
5000 W/div

Specifications   Chapter 7

General Specifications

Supported Model	• Model 3196 Power Quality Analyzer • Model 3197 Power Quality Analyzer • Model PW3198 Power Quality Analyzer
Supplied Media	One CD-R disc
Accessories	Install guide

Hioki PW3198 Function Specifications and Calculation Formulas

Data Reading Functions

Reading Data	Binary data recorded by the PW3198 SET files.............................. Setting data ITV files .... TIME PLOT data EVT files.............................. Event data (lists, voltage/current waveforms, numerical values) FLC files.............................. Flicker data (Delta V10, IEC) TRN files .... Transient over voltage waveform data WDU files .... Event voltage fluctuation data HHC files............................. High-order harmonic waveform data
Reading Method	Reads the above file types in folder units
Maximum Data Capacity	Up to 32 GB

Data Display Functions

■ SYSTEM Display Function

Screen Display	SYSTEM (Settings) content display

■ TIME PLOT Display Function

Screen Display	Display of one to four of the following screens 1. RMS fluctuation (trend) 2. Voltage fluctuation (detail trend) 3. Harmonics fluctuation (phase angle: average value only) 4. Interharmonics fluctuation
Number of Display Screens	Up to 10
Cursor Function	A and B cursors (specify an interval for calculations)
Event Marker Function	Uses the marker to indicate where an event has occurred (selectable using the cursor key).

■ EVENT List Display Function

Screen Display	EVENT list content display
Display Method Selection	Chronological or priority order, select ascending or descending channel order, sortable by item.
Filter function	Displays only events containing particular phenomena.
WDU Display Function	Displays "WDU" for a selected event with event voltage fluctuation data. Displays "INRUSH" when inrush current event data is available.

■ EVENT Data Display Function

Display Function	Displays the event data selected on the Event list display screen (Synchronized switch-over) Displays the event marker data selected on the TIME PLOT display screen (Synchronized switch-over)
Screen Display	One of the following 5 screen displays 1. Waveform displays Voltage/current waveforms, 4-channel voltage waveforms, 4-channel current waveforms, Voltage/transient waveforms, high-order harmonic display 2. Vector displays RMS or Harmonic Phase Angle display 3. DMM displays Power, Voltage or Current display 4. Harmonics Bar Graph displays RMS or Phase Angle display 5. Harmonics List display RMS or Phase Angle display
Cursor Function	A and B cursors on the waveform display window (specify an interval for calculations)
Zero/Positive/Negative Phase Calculation Function	Simultaneously displays the voltage and current of zero/positive/negative phase sequence components in the vector window when analyzing 3P3W3M, 3P4W line data.
Event Marker Function	Uses the marker to indicate where an event has occurred on the waveform display screen.

■ Flicker Graph Display Function

Screen Display	Displays the Delta V10 flicker graph or IEC flicker graph (The graph to be displayed depends on the data saved.)
Cursor Function	A and B cursors (specify an interval for calculations)

■ Event Voltage Fluctuation Graph Display Function/Inrush Current Graph Display Function

Event Voltage Fluctuation Graph Screen Display	Displays the WDU event data selected on the Event list window. Displays the WDU event marker data selected on the TIME PLOT window.
Event Inrush Current Graph Screen Display	Displays the INRUSH event data selected on the Event list window. Displays the INRUSH event marker data selected on the TIME PLOT window.
Cursor Function	A and B cursors (specify an interval for calculations)
Event Marker Function	Uses the marker to indicate where an event has occurred

■ Frequency Analysis Function

Frequency Analysis Function	Displays the FFT-analyzed graph in relation to high-order harmonics instantaneous waveforms.
FFT calculation	FFT calculation (8000 point fixed)
Window Function	Hanning window fixed
Frequency Analysis Graph	Items (Voltage/Current), Y-axis (Linear/logarithm), X-axis (Linear/logarithm) Can be selected.
A/B cursor	Reads the frequency and level at A cursor.

Integrated Power Calculation Function

■ Settings

Analysis Start Time	Year, month, day, hour, minute and second settings
Analysis Period	1 to 35 days

■ Display Method and Calculation Items

Screen Display	Integral Power graph
Displayed Items	WP+, WP−, WQ LAG, WQ LEAD
Numerical Display	Maximum integral power during measurement
Cursor Function	Normal cursor (indicates integral power at cursor position) A/B cursor (with functionality for calculating values inside specified interval)

Demand Calculation Function

■ Settings

Analysis Start Time	Year, month, day, hour, minute and second settings
Demand Period	5, 10, 15 or 30 minutes, or 1, 2, 3, 6 or 12 hours (can be set to the measurement interval of the PW3198, or longer)
Analysis Period	1 to 35 days

■ Display Method and Calculation Items

Screen Display	Demand Graph
Displayed Items	Pdem+, Pdem−, Qdem LAG, Qdem LEAD
Numerical Display	Maximum demand value during measurement, average demand during measurement
Cursor Function	Normal cursor (indicates demand at cursor position)

ITIC Curve Display Function

Display Function	Plots points for the events below on the limit curve. 1. Points to indicate the duration of swell and maximum swell voltage 2. Points to indicate the duration of dip and residual voltage 3. Points to indicate the duration of interruption and residual voltage
Percent of Nominal Voltage	Calculates the proportion of maximum swell voltage or residual voltage to nominal voltage in percentage. Percent of nominal voltage = Peak value / UReference x 100 UReference: Nominal voltage Peak value: Maximum swell voltage in case of swell or residual voltage in case of dip/interruption
Violation Count Display	Number of upper-limit violations, number of lower-limit violations, and total number of events
Limit Curve Selection	ITIC curve, user-defined curve (e.g., arbitrary curve) ITIC curve values

Upper Limit Curve		Lower Limit Curve	
Horizontal axis [s]	Vertical axis [%]	Horizontal axis [s]	Vertical axis [%]
1 m	200	20 m	0
3 m	140	20 m	70
3 m	120	500 m	70
500 m	120	500 m	80
500 m	110	10	80
1000	110	10	90
———	———	1000	90

EN50160 Data Viewer Function

Screen Display	EN50160 windows 1 to 3 below are displayed simultaneously. 1. Overview window 2. Harmonic window 3. Measurement result classification window
Screen Switching	Note that you must switch the normal display mode into the EN50160 display mode by pressing the EN button once.

Copy Function

Copy Contents	Text or image copied to clipboard as appropriate for displayed content

Print Function

Printing Format	Screen Image printing
Printing Paper Sizes	A4 and Letter
Print Preview	Provided
Simultaneous Printing	Logo/Model, time (with selectable text to print)
Marker Simultaneous Printing	MAX/MIN/AVG, channel, order (with printing turned ON/OFF)

CSV Format Conversion Function

Convertible Screens	TIME PLOT window, Event waveform window, Flicker graph window, Event voltage fluctuation window, Inrush current window, Demand window, Integrated power value window, High-order harmonics window
Specific Conversions	1. Range specified with A and B cursors (TIME PLOT window, Flicker graph window, Event voltage fluctuation window, Inrush current window, Integrated power value window) 2. Full range (Event waveform window, Demand window)
Conversion Items	The conversion items, channels, and MAX/ MIN/ AVG can be selected.

Voltage 30-minute average function

Calculation	Recalculates the RMS voltage between the A and B cursors as the 30-minute voltage average.
Output	Output to CSV file.
Output items	Period, maximum value, average value, minimum value, date, time, 30-minute voltage average for CH1 to CH3

Select Text Function

Text Selectable Windows	DMM window, Harmonics list window
Copying	Saves data in the selected range as text.

Download via LAN

Communications Method	Protocol: TCP/IP
Connection Method	LAN connection using Ethernet

Report Creation Function

Output Format	Prints out a report containing information set with the report wizard or saves it in a Rich Text format file.		
Report Generation Methods	**Report Output Items**	Automatic (Fixed Output)	Individual Setting (Selectable)	Detail Setting (Selectable)
	RMS voltage fluctuation graph in Time Plot window	●	●	●
	RMS current fluctuation graph in Time Plot window	✕	●	●
	Voltage fluctuation, RMS fluctuation, harmonic fluctuation, inter-harmonic fluctuation in Time Plot window	✕	✕	●
	Flicker graph, integral power graph, demand graph	● (except flicker)	●	●
	Total harmonic voltage distortion graph in Time Plot window	●	●	●
	Total harmonic current distortion graph in Time Plot window	✕	●	●
	EN50160 Overview data	●	●	✕
	EN50160 Harmonic data	✕	●	✕
	EN50160 measurement result classification data	✕	●	✕
	Worst case	●	●	✕
	Transient waveform	✕	●*	✕
	Max/min list	●	●	✕
	All-event waveform	●	●	✕
	All-event detail list	●	●	✕
	Setting list	✕	●	✕

*. Transient waveform is selectable only when worst case is selected.

Setting Save Function

Files to Save	• User-defined curve file • Setting file for sorting measurement results • Setting file for report wizard • Integrated settings file (combining the three files above)

PQDIF Format Conversion Function

Supported standard format	IEEE1159.3-2003
Specific Conversions	Full range
Conversion Items	Time Plot, Integ Wh, Harmonics, Inter-Harm Event Data, Transient, WDU, Higher-Harm, Flicker
Output file extension	PQD
Compression	Compressed/Uncompressed

Calculation Formulas

■ Demand Power [Pdem, Qdem]

Wiring Configuration / Parameter	Single Phase 2-Wire 1P2W	Single Phase 3-Wire 1P3W	Three-phase, 3-wire 3P3W2M	Three-phase, 3-wire 3P3W3M	Three-phase, 4-wire 3P4W
Pdem+	$$Pdem+ = \frac{1}{h}\sum_{1}^{h}\left(\left|P1(+)\right|\right)$$	$$Pdem+ = \frac{1}{h}\sum_{1}^{h}\left(\left|Psum(+)\right|\right)$$			
	• h: Measurement period • (+):Use this value (amount of consumption) only when the numerical value is positive.				
Pdem-	$$Pdem- = \frac{1}{h}\sum_{1}^{h}\left(\left|P1(-)\right|\right)$$	$$Pdem- = \frac{1}{h}\sum_{1}^{h}\left(\left|Psum(-)\right|\right)$$			
	• h: Measurement period • (-):Use this value (amount of regeneration) only when the numerical value is negative.				
QdemLAG	$$Qdem_{LAG} = \frac{1}{h}\sum_{1}^{h}\left(\left|Q1(+)\right|\right)$$	$$Qdem_{LAG} = \frac{1}{h}\sum_{1}^{h}\left(\left|Qsum(+)\right|\right)$$			
	• h: Measurement period • (+):Use this value (amount of lag) only when the numerical value is positive.				
QdemLEAD	$$Qdem_{LEAD} = \frac{1}{h}\sum_{1}^{h}\left(\left|Q1(-)\right|\right)$$	$$Qdem_{LEAD} = \frac{1}{h}\sum_{1}^{h}\left(\left|Qsum(-)\right|\right)$$			
	• h: Measurement period • (-):Use this value (amount of lead) only when the numerical value is negative.				

Hioki 3197 Function Specifications

Data Reading Functions

Reading Data	Binary data recorded by the 3197 SET files........ Setting data ITV files .... TIME PLOT data EVT files........ Event data (list and voltage/current waveforms) WDU files ...... Event voltage fluctuation data INR files......... Inrush current graph data DEM files....... Demand graph data
Reading Method	Reads the above file types in folder units
Maximum Data Capacity	4 MB

Data Display Functions

■ SYSTEM Display Function

Screen Display	SYSTEM (Settings) content display

■ TIME PLOT Display Function

Screen Display	Displays the following windows 1. RMS fluctuation (trends) 2. Voltage fluctuation (detail trends)
Number of Display Screens	Up to 10
Cursor Function	A and B cursors (specify an interval for calculations)
Event Marker Function	Uses the marker to indicate where an event has occurred (selectable using the cursor key).

■ Integral Power Display Function

Screen Display	Integral Power graph
Displayed Items	WP+, WP−, WQ LAG, WQ LEAD
Numerical Display	Maximum integral power during measurement
Cursor Function	Normal cursor (indicates integral power at cursor position)

■ **Demand Display Functions**

Screen Display	Demand Graph
Displayed Items	Pdem+, Pdem−, Qdem LAG, Qdem LEAD
Numerical Display	Maximum demand value during measurement, average demand during measurement
Cursor Function	Normal cursor (indicates demand at cursor position)

■ **EVENT List Display Function**

Screen Display	EVENT list content display
Display Method Selection	Chronological
WDU Display Function	Displays "WDU" for a selected event with event voltage fluctuation data.
INRUSH Display Function	Displays "INRUSH" for a selected event with event inrush current data.

■ **EVENT Data Display Function**

Display Function	Displays the event data selected on the Event list display screen (Synchronized switch-over) Displays the event marker data selected on the TIME PLOT display screen (Synchronized switch-over)
Screen Display	One of the following screen displays Waveform displays: Voltage/current waveforms, voltage waveforms, current waveforms
Cursor Function	A and B cursors on the waveform display window (specify an interval for calculations)
Event Marker Function	Uses the marker to indicate where an event has occurred on the waveform display screen.

■ **Event Voltage Fluctuation Graph Display Function**

Screen Display	Displays the WDU event data selected on the Event list window. Displays the WDU event marker data selected on the TIME PLOT window.
Cursor Function	A and B cursors (specify an interval for calculations)
Event Marker Function	Uses the marker to indicate where an event has occurred

■ **Inrush Graph Display Function**

Screen Display	Displays the INRUSH event data selected on the Event list window. Displays the INRUSH event marker data selected on the TIME PLOT window.
Cursor Function	A and B cursors (specify an interval for calculations)
Event Marker Function	Uses the marker to indicate where an event has occurred

Copy Function

Copy Contents	Text or image copied to clipboard as appropriate for displayed content

Print Function

Printing Format	Screen Image printing
Printing Paper Sizes	A4 and Letter
Print Preview	Provided
Simultaneous Printing	Logo/Model, time (with selectable text to print)
Marker Simultaneous Printing	MAX/MIN/AVG, channel (with printing turned ON/OFF)

CSV Format Conversion Function

Convertible Screens	TIME PLOT window, Event waveform window, Event voltage fluctuation window, Inrush Current Event Graph window, Demand window, Integrated power value window
Specific Conversions	1. Range specified with A and B cursors (TIME PLOT window, Event voltage fluctuation window, Inrush Current Event Graph window, Integrated power value window) 2. Full range (Event waveform window, Demand window)
Conversion Items	The conversion items, channels, and MAX/ MIN/ AVG can be selected.

Voltage 30-minute average function

Calculation	Recalculates the RMS voltage between the A and B cursors as the 30-minute voltage average.
Output	Output to CSV file.
Output items	Period, maximum value, average value, minimum value, date, time, 30-minute voltage average for CH1 to CH3

Report Creation Function

Output Format	Prints out a report containing information set with the report wizard or saves it in a Rich Text format file.

Report Generation Methods	Report Output Items	Automatic (Fixed Output)	Individual Setting (Selectable)	Detail Setting (Selectable)
	RMS voltage fluctuation graph in TIME PLOT window	●	●	●
	RMS current fluctuation graph in TIME PLOT window	✕	●	●
	Voltage fluctuation and RMS fluctuation in TIME PLOT window	✕	✕	●
	Total harmonic voltage distortion graph in TIME PLOT window	●	●	●
	Worst case	●	●	✕
	Max/min list	●	●	✕
	All-event waveform	●	●	✕
	All-event detail list	●	●	✕
	Setting list	✕	●	✕

Setting Save Function

Files to Save	• Setting file for report wizard • Integrated settings file

Hioki 3196 Function Specifications and Calculation Formulas

Data Reading Functions

Reading Data	Binary data recorded by the 3196
	SET files.............................. Setting data
	ITV files .... TIME PLOT data
	EVT files............................. Event data (lists, voltage/current waveforms, numerical values)
	FLC files............................. Flicker data (Delta V10, IEC)
	TRN files .... Transient over voltage waveform data
	WDU files .... Event voltage fluctuation data
	EN50160.EN files................ EN50160 data
	EVENT.EN files................... EN50160 event data
Reading Method	Reads the above file types in folder units
Maximum Data Capacity	512 MB

Data Display Functions

■ SYSTEM Display Function

Screen Display	SYSTEM (Settings) content display

■ TIME PLOT Display Function

Screen Display	Display of one to four of the following screens
	1. RMS fluctuation (trends)
	2. Voltage fluctuation (detail trends)
	3. Harmonics fluctuation
	4. Interharmonics fluctuation
Number of Display Screens	Up to 10
Cursor Function	A and B cursors (specify an interval for calculations)
Event Marker Function	Uses the marker to indicate where an event has occurred (selectable using the cursor key).

■ EVENT List Display Function

Screen Display	EVENT list content display
Display Method Selection	Chronological or priority order
WDU Display Function	Displays "WDU" for a selected event with event voltage fluctuation data.

■ EVENT Data Display Function

Display Function	Displays the event data selected on the Event list display screen (Synchronized switch-over) Displays the event marker data selected on the TIME PLOT display screen (Synchronized switch-over)
Screen Display	One of the following 5 screen displays 1. Waveform displays Voltage/current waveforms, 4-channel voltage waveforms, 4-channel current waveforms, Voltage/transient waveforms 2. Vector displays RMS or Harmonic Phase Angle display 3. DMM displays Power, Voltage or Current display 4. Harmonics Bar Graph displays RMS or Phase Angle display 5. Harmonics List display RMS or Phase Angle display
Cursor Function	A and B cursors on the waveform display window (specify an interval for calculations)
Zero/Positive/Negative Phase Calculation Function	Simultaneously displays the voltage and current of zero/positive/negative phase sequence components in the vector window when analyzing 3P4W line data.
Event Marker Function	Uses the marker to indicate where an event has occurred on the waveform display screen.

■ Flicker Graph Display Function

Screen Display	Displays the Delta V10 flicker graph or IEC flicker graph (The graph to be displayed depends on the data saved.)
Cursor Function	A and B cursors (specify an interval for calculations)

■ Event Voltage Fluctuation Graph Display Function

Screen Display	Displays the WDU event data selected on the Event list window. Displays the WDU event marker data selected on the TIME PLOT window.
Cursor Function	A and B cursors (specify an interval for calculations)
Event Marker Function	Uses the marker to indicate where an event has occurred

Integrated Power Calculation Function

■ Settings

Analysis Start Time	Year, month, day, hour, minute and second settings
Analysis Period	1 to 31 days

■ Display Method and Calculation Items

Screen Display	Integrated Power Value (consumed value + returned value) [Wh]
Numerical Display	Displays the following values within the analysis period Maximum integrated power value (the last integrated power value within an analysis period)
Cursor Function	The following cursor functions are available • Normal cursor (displays integrated power value at cursor position) • A and B cursors (specify an interval for calculations)

Demand Calculation Function

■ Settings

Analysis Start Time	Year, month, day, hour, minute and second settings
Demand Period	5, 10, 15 or 30 minutes, or 1, 2, 3, 6 or 12 hours (can be set to the measurement interval of the 3196, or longer)
Analysis Period	1 to 31 days

■ Display Method and Calculation Items

Screen Display	Demand graph (consumption values only)
Numerical Display	Displays the following values within the analysis period • AVG Demand value (average demand within the analysis period) • MAX Demand value (peak demand within the analysis period) • Load factor (average demand / maximum demand x 100[%])
Cursor Function	Normal cursor (displays demand value at cursor position)

ITIC Curve Display Function

Display Function	Plots points for the events below on the limit curve. 1. Points to indicate the duration of swell and maximum swell voltage 2. Points to indicate the duration of dip and residual voltage 3. Points to indicate the duration of interruption and residual voltage
Percent of Nominal Voltage	Calculates the proportion of maximum swell voltage or residual voltage to nominal voltage in percentage. Percent of nominal voltage = Peak value / UReference x 100 UReference: Nominal voltage Peak value: Maximum swell voltage in case of swell or residual voltage in case of dip/interruption
Violation Count Display	Number of upper-limit violations, number of lower-limit violations, and total number of events
Limit Curve Selection	ITIC curve, user-defined curve (e.g., arbitrary curve) ITIC curve values

Upper Limit Curve		Lower Limit Curve	
Horizontal axis [s]	Vertical axis [%]	Horizontal axis [s]	Vertical axis [%]
1 m	200	20 m	0
3 m	140	20 m	70
3 m	120	500 m	70
500 m	120	500 m	80
500 m	110	10	80
1000	110	10	90
——	——	1000	90

EN50160 Data Viewer Function

Screen Display	EN50160 windows 1 to 4 below are displayed simultaneously.
	1. Overview window
	   Corresponds to the EVENT-EN50160-Over View window of the 3196.
	2. Harmonic window
	   Corresponds to the EVENT-EN50160-Harmonics window of the 3196.
	3. Measurement result classification window
	   Corresponds to the EVENT-EN50160-Events window of the 3196.
	4. Signaling details window
	   Corresponds to the EVENT-EN50160-Signaling window of the 3196.

Screen Switching	Note that you must switch the normal display mode into the EN50160 display mode by pressing the EN button once.

Copy Function

Copy Contents	Text or image copied to clipboard as appropriate for displayed content

Print Function

Printing Format	Screen Image printing
Printing Paper Sizes	A4 and Letter
Print Preview	Provided
Simultaneous Printing	Logo/Model, time (with selectable text to print)
Marker Simultaneous Printing	MAX/MIN/AVG, channel, order (with printing turned ON/OFF)

CSV Format Conversion Function

Convertible Screens	TIME PLOT window, Event waveform window, Flicker graph window, Event voltage fluctuation window, Demand window, Integrated power value window
Specific Conversions	1. Range specified with A and B cursors (TIME PLOT window, Flicker graph window, Event voltage fluctuation window, Integrated power value window) 2. Full range (Event waveform window, Demand window)
Conversion Items	The conversion items, channels, and MAX/ MIN/ AVG can be selected.

Voltage 30-minute average function

Calculation	Recalculates the RMS voltage between the A and B cursors as the 30-minute voltage average.
Output	Output to CSV file.
Output items	Period, maximum value, average value, minimum value, date, time, 30-minute voltage average for CH1 to CH3

Select Text Function

Text Selectable Windows	DMM window, Harmonics list window
Copying	Saves data in the selected range as text.

Download via LAN

Communications Method	HTTP
Connection Method	LAN connection using Ethernet

Report Creation Function

Output Format	Prints out a report containing information set with the report wizard or saves it in a Rich Text format file.

Report Generation Methods	Report Output Items	Automatic (Fixed Output)	Individual Setting (Selectable)	Detail Setting (Selectable)
	RMS voltage fluctuation graph in Time Plot window	●	●	●
	RMS current fluctuation graph in Time Plot window	✕	●	●
	Voltage fluctuation, RMS fluctuation, harmonic fluctuation, inter-harmonic fluctuation in Time Plot window	✕	✕	●
	Flicker graph, integral power graph, demand graph	● (except flicker)	●	●
	Total harmonic voltage distortion graph in Time Plot window	●	●	●
	Total harmonic current distortion graph in Time Plot window	✕	●	●
	EN50160 Overview data	●	●	✕
	EN50160 Signaling data	●	●	✕
	EN50160 Harmonic data	✕	●	✕
	EN50160 measurement result classification data	✕	●	✕
	Worst case	●	●	✕
	Transient waveform	✕	●*	✕
	Max/min list	●	●	✕
	All-event waveform	●	●	✕
	All-event detail list	●	●	✕
	Setting list	✕	●	✕

*. Transient waveform is selectable only when worst case is selected.

Setting Save Function

Files to Save	• User-defined curve file • Setting file for sorting measurement results • Setting file for report wizard • Integrated settings file (combining the three files above)

Calculation Formulas

■ Integrated Power WH [Wh]

$$WH = \frac{\displaystyle\sum_{n=1}^{N} (Psum)}{k}$$

N: integrated sample count
n: sample count

- k = constant for per-hour conversion

Intervals	1 seconds	3 seconds	15 seconds	30 seconds	1 minutes	5 minutes	10 minutes	15 minutes	30 minutes	1 hours	2 hours
k	3600	1200	240	120	60	12	6	4	2	1	0.5

- $Psum$ = the average value during each interval
- This integrated power value includes both consumed power (+ values) and returned power (- values).

■ Demand Power [W]

$$Dem = \frac{\displaystyle\sum_{d=1}^{D} (Psum+\ )}{D}$$

D: Count of average values of each interval within the demand period
d: Count of samples

- $Psum+$ = the average value of each interval calculated by adding consumed power (+ values) as is, and 0 for returned power (- values).

■ Positive, Negative, and Zero Phase Calculation

$$Component = \frac{1}{3}\sqrt{\begin{array}{l}(V1 \bullet cos(\alpha) + V2 \bullet cos(\beta + seq2) + V3 \bullet cos(r + seq3))^2 + \\ (V1 \bullet sin(\alpha) + V2 \bullet sin(\beta + seq2) + V3 \bullet sin(r + seq3))^2\end{array}}$$

Zero phase: $seq2 = 0°$, $seq3 = 0°$
Positive phase: $seq2 = 120°$, $seq3 = 240°$
Negative phase: $seq2 = 240°$, $seq3 = 120°$

Voltage component:
V1 = U1, V2 = U2, V3 = U3,
α = Phase angle of U1, β = Phase angle of U2, γ = Phase angle of U3

Current component:
V1 = I1, V2 = I2, V3 = I3,
α = Phase angle of I1, β = Phase angle of I2, γ = Phase angle of I3

■ Depth of Event [%] in ITIC Window or Measurement result classification Window

The depth is calculated as the proportion of peak voltage to nominal voltage.
Percent of nominal voltage = Peak value / UReference x 100
Peak value: Peak voltage of the event
UReference: Nominal voltage

Appendix

Appendix 1   PW3198 Data-header Composition

Text Time-sequence Data-header Composition

Remark: Each item is separated by a comma (,).

Classification	Header	Explanation	
Date and Time	Date	Date	2001/8/20
	Time	Time	8:12:00
Status information	Status1,Status2	measurement data status information table. **See:** ($\Rightarrow$ p.A5)	C0010000,00000000
RMS voltage refreshed each cycle	Umax1,..,Umax4	Maximum RMS voltage refreshed each cycle	CH1 - CH4
	Umin1,..,Umin4	Minimum RMS voltage refreshed each cycle	CH1 - CH4
RMS current refreshed each cycle	Imax1,..,Imax4	Maximum RMS current refreshed each cycle	CH1 - CH4
	Imin1,..,Imin4	Minimum RMS current refreshed each cycle	CH1 - CH4
Frequency cycle	Freq_wav-max	Maximum frequency cycle	
	Freq_wav-min	Minimum frequency cycle	
Instantaneous flicker value	S(t)max1,,3	Maximum instantaneous flicker value S(t)	CH1 - CH3
	S(t)min1,,3	Minimum instantaneous flicker value S(t)	CH1 - CH3

Appendix 1 PW3198 Data-header Composition

Classification	Header	Explanation		
	MaxFreq	Frequency		
	MaxFreq10s	10-second frequency		
	MaxUrms1,...,MaxUrms4	RMS voltage value	CH1 - CH4	
	MaxU+peak1,...,MaxU+peak4	Voltage waveform peak (+)	CH1 - CH4	
	MaxU-peak1,...,MaxU-peak4	Voltage waveform peak (-)	CH1 - CH4	
	MaxIrms1,...,MaxIrms4	RMS current value	CH1 - CH4	
	MaxI+peak1,...,MaxI+peak4	Current waveform peak (+)	CH1 - CH4	
	MaxI-peak1,...,MaxI-peak4	Current waveform peak (-)	CH1 - CH4	
	MaxUavg	Average RMS voltage value	avg	
	MaxIavg	Average RMS current value	avg	
	MaxP1,...,MaxP3	Active power	CH1 - CH3	
	MaxPsum	Sum of active power	sum	
	MaxS1,...,MaxS3	Apparent power	CH1 - CH3	
	MaxSsum	Sum of apparent power	sum	
	MaxQ1,...,MaxQ3	Reactive power	CH1 - CH3	
	MaxQsum	Sum of reactive power	sum	
	MaxPF1,...,MaxPF3	Power factor/Displacement power factor	CH1 - CH3	
	MaxPFsum	Sum of Power factor/Displacement power factor	sum	
	MaxKF1,...,MaxKF4	K factor	CH1 - CH4	
RMS value fluctuation Maximum value	MaxUunb,MaxUunb0	Voltage negative-phase unbalance factor, voltage zero-phase unbalance factor		
	MaxIunb,MaxIunb0	Current negative-phase unbalance factor, current zero-phase unbalance factor		
	MaxUzero,MaxUpos,MaxUneg	Voltage unbalance (zero-phase, positive-phase, negative-phase)		
	MaxIzero,MaxIpos,MaxIneg	Current unbalance (zero-phase, positive-phase, negative-phase)		
	MaxUdc4,MaxIdc4	Voltage DC, Current DC	CH4	
	MaxUharmH1,,,MaxUharmH4	High-order harmonic voltage component	CH1 - CH4	
	MaxIharmH1,,,MaxIharmH4	High-order harmonic current component	CH1 - CH4	
	MaxUthd1,...,MaxUthd4	Total harmonic voltage distortion factor	CH1 - CH4	
	MaxIthd1,...,MaxIthd4	Total harmonic current distortion factor	CH1 - CH4	
	MaxU1(0),...,MaxU4(50)	Harmonic voltage	CH1 - CH4	0 - 50th
	MaxI1(0),...,MaxI4(50)	Harmonic current	CH1 - CH4	0 - 50th
	MaxP1(0),...,MaxP3(50)	Harmonic power	CH1 - CH3	0 - 50th
	MaxUphase1(1),...,MaxUphase4(50)	Harmonic voltage phase angle	CH1 - CH4	1st - 50th
	MaxIphase1(1),...,MaxIphase4(50)	Harmonic current phase angle	CH1 - CH4	1st - 50th
	MaxPphase1(1),...,MaxPphase3(50)	Harmonic voltage-current phase difference	CH1 - CH3	1st - 50th
	MaxPsum(1),...,MaxPsum(50)	Sum of harmonic power	sum	1st - 50th
	MaxPphasesum(1),...,MaxPphasesum(50)	Sum of harmonic voltage-current phase difference	sum	1st - 50th
	MaxU1(0.5),...,MaxU4(49.5)	Inter-harmonic voltage	CH1 - CH4	0.5 - 49.5th
	MaxI1(0.5),...,MaxI4(49.5)	Inter-harmonic current	CH1 - CH4	0.5 - 49.5th

Classification	Header	Explanation		
	MinFreq	Frequency		
	MinFreq10s	10-second frequency		
	MinUrms1,...,MinUrms4	RMS voltage value	CH1 - CH4	
	MinU+peak1,...,MinU+peak4	Voltage waveform peak (+)	CH1 - CH4	
	MinU-peak1,...,MinU-peak4	Voltage waveform peak (-)	CH1 - CH4	
	MinIrms1,...,MinIrms4	RMS current value	CH1 - CH4	
	MinI+peak1,...,MinI+peak4	Current waveform peak (+)	CH1 - CH4	
	MinI-peak1,...,MinI-peak4	Current waveform peak (-)	CH1 - CH4	
	MinUavg	Average RMS voltage value	avg	
	MinIavg	Average RMS current value	avg	
	MinP1,...,MinP3	Active power	CH1 - CH3	
	MinPsum	Sum of active power	sum	
	MinS1,...,MinS3	Apparent power	CH1 - CH3	
	MinSsum	Sum of apparent power	sum	
	MinQ1,...,MinQ3	Reactive power	CH1 - CH3	
	MinQsum	Sum of reactive power	sum	
	MinPF1,...,MinPF3	Power factor/Displacement power factor	CH1 - CH3	
	MinPFsum	Sum of Power factor/Displacement power factor	sum	
	MinKF1,...,MinKF4	K factor	CH1 - CH4	
RMS value fluctuation Minimum value	MinUunb,MinUunb0	Voltage negative-phase unbalance factor, voltage zero-phase unbalance factor		
	MinIunb,MinIunb0	Current negative-phase unbalance factor, current zero-phase unbalance factor		
	MinUzero,MinUpos,MinUneg	Voltage unbalance (zero-phase, positive-phase, negative-phase)		
	MinIzero,MinIpos,MinIneg	Current unbalance (zero-phase, positive-phase, negative-phase)		
	MinUdc4,MinIdc4	Voltage DC, Current DC	CH4	
	MinUharmH1,,,MinUharmH4	High-order harmonic voltage component	CH1 - CH4	
	MinIharmH1,,,MinIharmH4	High-order harmonic current component	CH1 - CH4	
	MinUthd1,...,MinUthd4	Total harmonic voltage distortion factor	CH1 - CH4	
	MinIthd1,...,MinIthd4	Total harmonic current distortion factor	CH1 - CH4	
	MinU1(0),...,MinU4(50)	Harmonic voltage	CH1 - CH4	0 - 50th
	MinI1(0),...,MinI4(50)	Harmonic current	CH1 - CH4	0 - 50th
	MinP1(0),...,MinP3(50)	Harmonic power	CH1 - CH3	0 - 50th
	MinUphase1(1),...,MinUphase4(50)	Harmonic voltage phase angle	CH1 - CH4	1st - 50th
	MinIphase1(1),...,MinIphase4(50)	Harmonic current phase angle	CH1 - CH4	1st - 50th
	MinPphase1(1),...,MinPphase3(50)	Harmonic voltage-current phase difference	CH1 - CH3	1st - 50th
	MinPsum(1),...,MinPsum(50)	Sum of harmonic power	sum	1st - 50th
	MinPphasesum(1),...,MinPphase-sum(50)	Sum of harmonic voltage-current phase difference	sum	1st - 50th
	MinU1(0.5),...,MinU4(49.5)	Inter-harmonic voltage	CH1 - CH4	0.5 - 49.5th
	MinI1(0.5),...,MinI4(49.5)	Inter-harmonic current	CH1 - CH4	0.5 - 49.5th

Appendix 1 PW3198 Data-header Composition

Classification	Header	Explanation		
	AvgFreq	Frequency		
	AvgFreq10s	10-second frequency		
	AvgUrms1,...,AvgUrms4	RMS voltage value	CH1 - CH4	
	AvgU+peak1,...,AvgU+peak4	Voltage waveform peak (+)	CH1 - CH4	
	AvgU-peak1,...,AvgU-peak4	Voltage waveform peak (-)	CH1 - CH4	
	AvgIrms1,...,AvgIrms4	RMS current value	CH1 - CH4	
	AvgI+peak1,...,AvgI+peak4	Current waveform peak (+)	CH1 - CH4	
	AvgI-peak1,...,AvgI-peak4	Current waveform peak (-)	CH1 - CH4	
	AvgUavg	Average RMS voltage value	avg	
	AvgIavg	Average RMS current value	avg	
	AvgP1,...,AvgP3	Active power	CH1 - CH3	
	AvgPsum	Sum of active power	sum	
	AvgS1,...,AvgS3	Apparent power	CH1 - CH3	
	AvgSsum	Sum of apparent power	sum	
	AvgQ1,...,AvgQ3	Reactive power	CH1 - CH3	
	AvgQsum	Sum of reactive power	sum	
	AvgPF1,...,AvgPF3	Power factor/Displacement power factor	CH1 - CH3	
	AvgPFsum	Sum of Power factor/Displacement power factor	sum	
	AvgKF1,...,AvgKF4	K factor	CH1 - CH4	
RMS value fluctuation Average value	AvgUunb,AvgUunb0	Voltage negative-phase unbalance factor, voltage zero-phase unbalance factor		
	AvgIunb,AvgIunb0	Current negative-phase unbalance factor, current zero-phase unbalance factor		
	AvgUzero,AvgUpos,AvgUneg	Voltage unbalance (zero-phase, positive-phase, negative-phase)		
	AvgIzero,AvgIpos,AvgIneg	Current unbalance (zero-phase, positive-phase, negative-phase)		
	AvgUdc4,AvgIdc4	Voltage DC, Current DC	CH4	
	AvgUharmH1,,,AvgUharmH4	High-order harmonic voltage component	CH1 - CH4	
	AvgIharmH1,,,AvgIharmH4	High-order harmonic current component	CH1 - CH4	
	AvgUthd1,...,AvgUthd4	Total harmonic voltage distortion factor	CH1 - CH4	
	AvgIthd1,...,AvgIthd4	Total harmonic current distortion factor	CH1 - CH4	
	AvgU1(0),...,AvgU4(50)	Harmonic voltage	CH1 - CH4	0 - 50th
	AvgI1(0),...,AvgI4(50)	Harmonic current	CH1 - CH4	0 - 50th
	AvgP1(0),...,AvgP3(50)	Harmonic power	CH1 - CH3	0 - 50th
	AvgUphase1(1),...,AvgUphase4(50)	Harmonic voltage phase angle	CH1 - CH4	1st - 50th
	AvgIphase1(1),...,AvgIphase4(50)	Harmonic current phase angle	CH1 - CH4	1st - 50th
	AvgPphase1(1),...,AvgPphase3(50)	Harmonic voltage-current phase difference	CH1 - CH3	1st - 50th
	AvgPsum(1),...,AvgPsum(50)	Sum of harmonic power	sum	1st - 50th
	AvgPphasesum(1),...,AvgPphase-sum(50)	Sum of harmonic voltage-current phase difference	sum	1st - 50th
	AvgU1(0.5),...,AvgU4(49.5)	Inter-harmonic voltage	CH1 - CH4	0.5 - 49.5th
	AvgI1(0.5),...,AvgI4(49.5)	Inter-harmonic current	CH1 - CH4	0.5 - 49.5th

Delta V10 Flicker Text Time-sequence Data-header Composition

Classification	Header	Explanation	Example
Date and Time	Date	Date	2001/11/02
	Time	Time	17:19:00
Delta V10	dv10_1,..,dv10_3	Delta V10 instantaneous value	CH1-3 0.081
	max_1,..,max_3	Delta V10 total maximum value	CH1-3 0.158
	dv10max_1,..,dv10max_3	Delta V10 maximum value for one hour	CH1-3 0.000
	dv10max4_1,..,dv10max4_3	Delta V10 fourth largest value for one hour	CH1-3 0.000
	dv10avg_1,..,dv10avg_4	Delta V10 average value for one hour	CH1-3 0.000

IEC Flicker Text Time-sequence Data-header Composition

Classification	Header	Explanation	Example
Date and Time	Date	Date	2002/3/5
	Time	Time	15:24:15
Status	Pst Flag	Pst flag 0: Normal / 1: Affected by voltage fluctuation	1
	Plt Flag	Plt flag 0: Normal / 1: Affected by voltage fluctuation	0
Pst, Plt	Pst 1	CH1 Pst	0.325
	Pst 2	CH2 Pst	0.386
	Pst 3	CH3 Pst	0.359
	Plt 1	CH1 Plt (IEC standard compatible)	0.325
	Plt 2	CH2 Plt (IEC standard compatible)	0.386
	Plt 3	CH3 Plt (IEC standard compatible)	0.359
	Plt_10min1	CH1 Plt (every 10 minutes)	0.325
	Plt_10min2	CH2 Plt (every 10 minutes)	0.386
	Plt_10min3	CH3 Plt (every 10 minutes)	0.359

Status information

First data block upper 16bit Status1

MSB															LSB
b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16

b1: Flag concept (when 1, dip/swell/interruption flag is set)
b2: 1 if measured value is invalid (invalid immediately after setting is changed)
b3: 1 if harmonics-related measured values are invalid (invalid when the input frequency is out of range)
b4: 1 if 10-sec frequency is invalid
b5: Synchronization source synchronization loss
b6: CH1 synchronization loss
b7: CH2 synchronization loss
b8: CH3 synchronization loss
b9: CH4 synchronization loss
b10: U1 out of range
b11: U2 out of range
b12: U3 out of range
b13: U4 out of range
b14: U1 crest factor exceeded
b15: U2 crest factor exceeded
b16: U3 crest factor exceeded

First data block lower 16bit Status1

MSB															LSB
b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16

b1: U4 crest factor exceeded   b5: I4 out of range   b9: I4 crest factor exceeded   b13: Q1 out of range

Appendix 1 PW3198 Data-header Composition

b2: I1 out of range	b6: I1 crest factor exceeded	b10: P1 out of range	b14: Q2 out of range
b3: I2 out of range	b7: I2 crest factor exceeded	b11: P2 out of range	b15: Q3 out of range
b4: I3 out of range	b8: I3 crest factor exceeded	b12: P3 out of range	b16: S1 out of range

Second data block upper bit Status2

MSB															LSB
b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11	b12	b13	b14	b15	b16

b1: S2 out of range
b2: S3 out of range
b3 to b16: Undefined

Method for converting a hexadecimal value to a string consisting of 0s and 1s

Hexadecimal	1/0 string			
F		1	1	1	1
E		1	1	1	0
D		1	1	0	1
C		1	1	0	0
B		1	0	1	1
A		1	0	1	0
9		1	0	0	1
8		1	0	0	0
7		0	1	1	1
6		0	1	1	0
5		0	1	0	1
4		0	1	0	0
3		0	0	1	1
2		0	0	1	0
1		0	0	0	1
0		0	0	0	0

Example: CE48 "1100111001001000"

Appendix 2 3197 Data-header Composition

Classification	Header	Explanation
Date Time Status	Date	Date
	Time	Time
	Status	Status
TIME PLOT DIP/SWELL	Umax1, Umax2, Umax3	Voltage Maximum value
	Umin1, Umin2, Umin3	Voltage Minimum value
TIME PLOT RMS Maximum Values	MaxFreq	Frequency
	MaxUrms1, MaxUrms2, MaxUrms3	Voltage
	MaxU+peak1, MaxU+peak2, MaxU+peak3	Voltage Waveform Peak+
	MaxU-peak1, MaxU-peak2, MaxU-peak3	Voltage Waveform Peak-
	MaxIrms1, MaxIrms2, MaxIrms3, MaxIrms4	Current
	MaxI+peak1, MaxI+peak2, MaxI+peak3, MaxI+peak4	Current Waveform Peak+
	MaxI-peak1, MaxI-peak2, MaxI-peak3, MaxI-peak4	Current Waveform Peak-
	MaxUave	Voltage for 3phase
	MaxIave	Current for 3phase
	MaxPsum, MaxSsum, MaxQsum	Active Power, Apparent Power, Reactive Power
	MaxPFsum, MaxUunb	Power Factor
	MaxUthd1, MaxUthd2, MaxUthd3	Total Harmonic Voltage Distortion Ratio
TIME PLOT RMS Minimum Values	MinFreq	Frequency
	MinUrms1, MinUrms2, MinUrms3	Voltage
	MinU+peak1, MinU+peak2, MinU+peak3	Voltage Waveform Peak+
	MinU-peak1, MinU-peak2, MinU-peak3	Voltage Waveform Peak-
	MinIrms1, MinIrms2, MinIrms3, MinIrms4	Current
	MinI+peak1, MinI+peak2, MinI+peak3, MinI+peak4	Current Waveform Peak+
	MinI-peak1, MinI-peak2, MinI-peak3, MinI-peak4	Current Waveform Peak-
	MinUave	Voltage for 3phase
	MinIave	Current for 3phase
	MinPsum, MinSsum, MinQsum	Active Power, Apparent Power, Reactive Power
	MinPFsum, MinUunb	Power Factor
	MinUthd1, MinUthd2, MinUthd3	Total Harmonic Voltage Distortion Ratio
TIME PLOT RMS Average Values	AveFreq	Frequency
	AveUrms1, AveUrms2, AveUrms3	Voltage
	AveU+peak1, AveU+peak2, AveU+peak3	Voltage Waveform Peak+
	AveU-peak1, AveU-peak2, AveU-peak3	Voltage Waveform Peak-
	AveIrms1, AveIrms2, AveIrms3, AveIrms4	Current
	AveI+peak1, AveI+peak2, AveI+peak3, AveI+peak4	Current Waveform Peak+
	AveI-peak1, AveI-peak2, AveI-peak3, AveI-peak4	Current Waveform Peak-
	AveUave	Voltage for 3phase
	AveIave	Current for 3phase
	AvePsum, AveSsum, AveQsum	Active Power, Apparent Power, Reactive Power
	AvePFsum, AveUunb	Power Factor
	AveUthd1, AveUthd2, AveUthd3	Total Harmonic Voltage Distortion Ratio
TIME PLOT Energy Quadergy	WP+, WP-	Energy (Delivered, Received)
	WQ_LAG, WQ_LEAD	Quadergy (Lagging, Leading)

Appendix 3 3196 Data-header Composition

Text Time-sequence Data-header Composition

Remark: Each item is separated by a comma (,).

Classification	Header	Explanation		
Date and Time	Date	Date	2001/8/20	
	Time	Time	8:12:00	
Voltage fluctuation*	Umax1,..,Umax3	Max. value of voltage fluctuation	CH1 - CH3	
	Umin1,..,Umin3	Min. value of voltage fluctuation	CH1 - CH3	
RMS value fluctuation Maximum value	MaxFreq	Frequency		
	MaxUrms1,...,MaxUrms4	RMS voltage value	CH1 - CH4	
	MaxU+peak1,...,MaxU+peak4	Voltage waveform peak (+)	CH1 - CH4	
	MaxU-peak1,...,MaxU-peak4	Voltage waveform peak (-)	CH1 - CH4	
	MaxIrms1,...,MaxIrms4	RMS current value	CH1 - CH4	
	MaxI+peak1,...,MaxI+peak4	Current waveform peak (+)	CH1 - CH4	
	MaxI-peak1,...,MaxI-peak4	Current waveform peak (-)	CH1 - CH4	
	MaxUave	Average RMS voltage value	ave	
	MaxIave	Average RMS current value	ave	
	MaxP1,...,MaxP3	Active power	CH1 - CH3	
	MaxPsum	Sum of active power	sum	
	MaxS1,...,MaxS3	Apparent power	CH1 - CH3	
	MaxSsum	Sum of apparent power	sum	
	MaxQ1,...,MaxQ3	Reactive power	CH1 - CH3	
	MaxQsum	Sum of reactive power	sum	
	MaxPF1,...,MaxPF3	Power factor/Displacement power factor	CH1 - CH3	
	MaxPFsum	Sum of Power factor/Displacement power factor	sum	
	MaxKF1,...,MaxKF4	K factor	CH1 - CH4	
	MaxUunb	Voltage unbalance factor		
	MaxIunb	Current unbalance factor		
	MaxUthd1,...,MaxUthd4	Total harmonic voltage distortion factor	CH1 - CH4	
	MaxIthd1,...,MaxIthd4	Total harmonic current distortion factor	CH1 - CH4	
	MaxU1(1),...,MaxU4(50)	Harmonic voltage	CH1 - CH4	1st - 50th
	MaxI1(1),...,MaxI4(50)	Harmonic current	CH1 - CH4	1st - 50th
	MaxP1(1),...,MaxP3(50)	Harmonic power	CH1 - CH3	1st - 50th
	MaxPhase1(1),...,MaxPhase3(50)	Harmonic voltage-current phase difference	CH1 - CH3	1st - 50th
	MaxPsum(1),...,MaxPsum(50)	Sum of harmonic power	sum	1st - 50th
	MaxPhasesum(1),...,MaxPhasesum(50)	Sum of harmonic voltage-current phase difference	sum	1st - 50th
	MaxUtihd1,...,MaxUtihd4	Total harmonic voltage distortion factor	CH1 - CH4	
	MaxItihd1,...,MaxItihd4	Total harmonic current distortion factor	CH1 - CH4	
	MaxU1(0.5),...,MaxU4(49.5)	Inter-harmonic voltage	CH1 - CH4	0.5 - 49.5th
	MaxI1(0.5),...,MaxI4(49.5)	Inter-harmonic current	CH1 - CH4	0.5 - 49.5th

*: When ΔU is selected as the voltage recording setting, Umax1, …..Umax3 becomes dUmax1, …..dUmax3, and Umin1, …..Umin3 becomes dUmin1, …..dUmin3.

Classification	Header	Explanation		
RMS value fluctuation Minimum value	MinFreq	Frequency		
	MinUrms1,...,MinUrms4	RMS voltage value	CH1 - CH4	
	MinU+peak1,...,MinU+peak4	Voltage waveform peak (+)	CH1 - CH4	
	MinU-peak1,...,MinU-peak4	Voltage waveform peak (-)	CH1 - CH4	
	MinIrms1,...,MinIrms4	RMS current value	CH1 - CH4	
	MinI+peak1,...,MinI+peak4	Current waveform peak (+)	CH1 - CH4	
	MinI-peak1,...,MinI-peak4	Current waveform peak (-)	CH1 - CH4	
	MinUave	Average RMS voltage value	ave	
	MinIave	Average RMS current value	ave	
	MinP1,...,MinP3	Active power	CH1 - CH3	
	MinPsum	Sum of active power	sum	
	MinS1,...,MinS3	Apparent power	CH1 - CH3	
	MinSsum	Sum of apparent power	sum	
	MinQ1,...,MinQ3	Reactive power	CH1 - CH3	
	MinQsum	Sum of reactive power	sum	
	MinPF1,...,MinPF3	Power factor/Displacement power factor	CH1 - CH3	
	MinPFsum	Sum of Power factor/Displacement power factor	sum	
	MinKF1,...,MinKF4	K factor	CH1 - CH4	
	MinUunb	Voltage unbalance factor		
	MinIunb	Current unbalance factor		
	MinUthd1,...,MinUthd4	Total harmonic voltage distortion factor	CH1 - CH4	
	MinIthd1,...,MinIthd4	Total harmonic current distortion factor	CH1 - CH4	
	MinU1(1),...,MinU4(50)	Harmonic voltage	CH1 - CH4	1st - 50th
	MinI1(1),...,MinI4(50)	Harmonic current	CH1 - CH4	1st - 50th
	MinP1(1),...,MinP3(50)	Harmonic power	CH1 - CH3	1st - 50th
	MinPhase1(1),...,MinPhase3(50)	Harmonic voltage-current phase difference	CH1 - CH3	1st - 50th
	MinPsum(1),...,MinPsum(50)	Sum of harmonic power	sum	1st - 50th
	MinPhasesum(1),...,MinPhasesum(50)	Sum of harmonic voltage-current phase difference	sum	1st - 50th
	MinUtihd1,...,MinUtihd4	Total harmonic voltage distortion factor	CH1 - CH4	
	MinItihd1,...,MinItihd4	Total harmonic current distortion factor	CH1 - CH4	
	MinU1(0.5),...,MinU4(49.5)	Inter-harmonic voltage	CH1 - CH4	0.5 - 49.5th
	MinI1(0.5),...,MinI4(49.5)	Inter-harmonic current	CH1 - CH4	0.5 - 49.5th

Appendix 3 3196 Data-header Composition

Classification	Header	Explanation		
RMS value fluctuation Average value	AvgFreq	Frequency		
	AveUrms1,...,AveUrms4	RMS voltage value	CH1 - CH4	
	AveU+peak1,...,AveU+peak4	Voltage waveform peak (+)	CH1 - CH4	
	AveU-peak1,...,AveU-peak4	Voltage waveform peak (-)	CH1 - CH4	
	AveIrms1,...,AveIrms4	RMS current value	CH1 - CH4	
	AveI+peak1,...,AveI+peak4	Current waveform peak (+)	CH1 - CH4	
	AveI-peak1,...,AveI-peak4	Current waveform peak (-)	CH1 - CH4	
	AveUave	Average RMS voltage value	ave	
	AveIave	Average RMS current value	ave	
	AveP1,...,AveP3	Active power	CH1 - CH3	
	AvePsum	Sum of active power	sum	
	AveS1,...,AveS3	Apparent power	CH1 - CH3	
	AveSsum	Sum of apparent power	sum	
	AveQ1,...,AveQ3	Reactive power	CH1 - CH3	
	AveQsum	Sum of reactive power	sum	
	AvePF1,...,AvePF3	Power factor/Displacement power factor	CH1 - CH3	
	AvePFsum	Sum of Power factor/Displacement power factor	sum	
	AveKF1,...,AveKF4	K factor	CH1 - CH4	
	AveUunb	Voltage unbalance factor		
	AveIunb	Current unbalance factor		
	AveUthd1,...,AveUthd4	Total harmonic voltage distortion factor	CH1 - CH4	
	AveIthd1,...,AveIthd4	Total harmonic current distortion factor	CH1 - CH4	
	AveU1(1),...,AveU4(50)	Harmonic voltage	CH1 - CH4	1st - 50th
	AveI1(1),...,AveI4(50)	Harmonic current	CH1 - CH4	1st - 50th
	AveP1(1),...,AveP3(50)	Harmonic power	CH1 - CH3	1st - 50th
	AvePhase1(1),...,AvePhase3(50)	Harmonic voltage-current phase difference	CH1 - CH3	1st - 50th
	AvePsum(1),...,AvePsum(50)	Sum of harmonic power	sum	1st - 50th
	AvePhasesum(1),...,AvePhasesum(50)	Sum of harmonic voltage-current phase difference	sum	1st - 50th
	AveUtihd1,...,AveUtihd4	Total harmonic voltage distortion factor	CH1 - CH4	
	AveItihd1,...,AveItihd4	Total harmonic current distortion factor	CH1 - CH4	
	AveU1(0.5),...,AveU4(49.5)	Inter-harmonic voltage	CH1 - CH4	0.5 - 49.5th
	AveI1(0.5),...,AveI4(49.5)	Inter-harmonic current	CH1 - CH4	0.5 - 49.5th

Delta V10 Flicker Text Time-sequence Data-header Composition

Classification	Header	Explanation	Example
Date and Time	Date	Date	2001/11/02
	Time	Time	17:19:00
Delta V10	dv10_1,..,dv10_3	Delta V10 instantaneous value	0.081
	max_1,..,max_3	Delta V10 total maximum value	0.158
	dv10max_1,..,dv10max_3	Delta V10 maximum value for one hour	0.000
	dv10max4_1,..,dv10max4_3	Delta V10 fourth largest value for one hour	0.000
	dv10avg_1,..,dv10avg_4	Delta V10 average value for one hour	0.000

IEC Flicker Text Time-sequence Data-header Composition

Classification	Header	Explanation	Example
Date and Time	Date	Date	2002/3/5
	Time	Time	15:24:15
Pst, Plt	Pst 1	CH1 Pst	0.325
	Pst 2	CH2 Pst	0.386
	Pst 3	CH3 Pst	0.359
	Plt 1	CH1 Plt (IEC standard compatible)	0.325
	Plt 2	CH2 Plt (IEC standard compatible)	0.386
	Plt 3	CH3 Plt (IEC standard compatible)	0.359
	Plt_10min1	CH1 Plt (every 10 minutes)	0.325
	Plt_10min2	CH2 Plt (every 10 minutes)	0.386
	Plt_10min3	CH3 Plt (every 10 minutes)	0.359

Appendix 4 Measurement Settings and Instrument Status

Correspondence between status window tabs and PW3198 settings screens

9624-50 tab name	PW3198 settings screen
Measurement	[SYSTEM] - [DF1] - [*Main*] / [*Recording*]
Event voltage	[SYSTEM] - [DF2] - [*Event Settings 1*]
Event power	[SYSTEM] - [DF3] - [*Event Settings 2*] - [*Power/Other*]
Voltage harmonics	[SYSTEM] - [DF3] - [*Event Settings 2*] - [*Harmonics*]
Current harmonics	[SYSTEM] - [DF3] - [*Event Settings 2*] - [*Harmonics*]
Power harmonics	[SYSTEM] - [DF3] - [*Event Settings 2*] - [*Harmonics*]
Harmonic phase difference	[SYSTEM] - [DF3] - [*Event Settings 2*] - [*Harmonics*]

Correspondence between status window tabs and 3196 setting screens

9624-50 tab name	3196 settings screen
Measurement	[SYSTEM] - [DF1] - [*Main*] / [*Recording*]
Event voltage	[SYSTEM] - [DF2] - [*Event Settings 1*]
Event power	[SYSTEM] - [DF3] - [*Event Settings 2*] - [*Power/Other*]
Voltage harmonics	[SYSTEM] - [DF3] - [*Event Settings 2*] - [*Harmonics*]
Current harmonics	[SYSTEM] - [DF3] - [*Event Settings 2*] - [*Harmonics*]
Power harmonics	[SYSTEM] - [DF3] - [*Event Settings 2*] - [*Harmonics*]
Harmonic phase difference	[SYSTEM] - [DF3] - [*Event Settings 2*] - [*Harmonics*]
EN50160 (1)	[EVENT] - [DF4] - [EN50160] - [Setting1] (when EN50160 measurement is ON)
EN50160 (2)	[EVENT] - [DF4] - [EN50160] - [Setting2] (when EN51060 measurement is ON)
EN50160 (3)	[EVENT] - [DF4] - [EN50160] - [Setting3] (when EN51060 measurement is ON)

Correspondence between status window tabs and 3197 settings screens

9624-50 tab name	3197 settings screen
Measurement	Some [SYSTEM] measurement settings and recording events
Events	Event part of [SYSTEM] recorded events

Appendix 5   TIME PLOT Item Notation

9624-50 notation			PW3198 notation	3197 notation	3196 notation
Screen	Notation	Measurement item			
RMS Window (Trends)	Freq	Frequency	Freq	Freq	Freq
	U	RMS voltage	Urms	U	U
	U	Voltage DC (when channel 4 is a DC signal)	Udc	-	-
	Upeak+/-	Voltage waveform peak	Upeak+/-	Upeak+/-	Upeak+/-
	I	RMS current	Irms	Irms	I
	I	Current DC (when channel 4 is a DC signal)	Idc	-	I
	Ipeak+/-	Current waveform peak	Ipeak+/-	Ipeak+/-	Ipeak+/-
	Uavg	RMS voltage (CH Average)	Uavg	Uavg	Uavg
	Iavg	RMS current (CH Average)	Iavg	Iavg	Iavg
	P	Active power	P	P	P
	S	Apparent power	S	S	S
	Q	Reactive power	Q	Q	Q
	PF	Power factor	PF	PF	PF
	KF	K factor	KF	-	KF
	Uunb	Voltage negative-phase unbalance factor	Uunb	Uunb	Uunb
	Iunb	Current negative-phase unbalance factor	Iunb	Iunb	Iunb
	U-THD	Total harmonic voltage distortion factor	Uthd-F/R	THD	U-THD
	I-THD	Total harmonic current distortion factor	Ithd-F/R	-	I-THD
	U-iTHD	Total inter-harmonic voltage distortion factor	-	-	U-iTHD
	I-iTHD	Total inter-harmonic current distortion factor	-	-	I-iTHD
	Upos	Voltage positive-phase component	Upos	-	-
	Uneg	Voltage negative-phase component	Uneg	-	-
	Uzero	Voltage zero-phase component	Uzero	-	-
	Ipos	Current positive-phase component	Ipos	-	-
	Ineg	Current negative-phase component	Ineg	-	-
	Izero	Current zero-phase component	Izero	-	-
	UharmH	High-order harmonic voltage component	UharmH	-	-
	IharmH	High-order harmonic current component	IharmH	-	-
	Freq10s	10-sec frequency	Freq10s	-	-
	Uunb0	Voltage zero-phase unbalance factor	Uunb0	-	-
	Iunb0	Current zero-phase unbalance factor	Iunb0	-	-
	Udc	Voltage DC	Udc	-	-
	Idc	Current DC	Idc	-	-
Voltage fluctuation data (detail trends)	Urms1/2	RMS voltage refreshed each half-cycle	Urms1/2	DIP/ SWELL	Urms
	Irms1/2	RMS current refreshed each half-cycle	Irms1/2	-	-
	Freq_wav	Frequency cycle	Freq_wav	-	Freq_wav
	S(t)	Instantaneous flicker	S(t)	-	S(t)

Appendix 5 TIME PLOT Item Notation

9624-50 notation			PW3198 notation	3197 notation	3196 notation
Screen	Notation	Measurement item			
Harmonics	U1,..,4	Harmonic voltage	Uharm	-	U
	I1,..,4	Harmonic current	Iharm	-	I
	P1,.,3,sum	Harmonic power	Pharm	-	P
	⊖1,.,3,sum	Harmonic voltage-current phase difference	Pphase	-	⊖
	⊖avg 1,.,3,sum	Harmonic voltage-current phase difference (average value only)	Pphase (AVG)	-	-
	Uphase1,..,4	Harmonic voltage phase difference	Uphase	-	-
	Iphase1,..,4	Harmonic current phase difference	Iphase	-	-
Inter-harmonic	U1,..,4	Inter-harmonic voltage	Uiharm	-	U
	I1,..,4	Inter-harmonic current	Iiharm	-	I
Integrated Power	WP+	Active integrated power (consumption)	WP+	WP+	-
	WP-	Active integrated power (regeneration)	WP-	WP-	-
	WQ LAG	Reactive integrated power (lag)	WQ LAG	WQ LAG	-
	WQ LEAD	Reactive integrated power (lead)	WQ LEAD	WQ LEAD	-
Demand	Pdem+	Active power demand (consumption)	Pdem+	Pdem+	-
	Pdem-	Active power demand (regeneration)	Pdem-	Pdem-	-
	QdemLAG	Reactive power demand (lag)	QdemLAG	QdemLAG	-
	QdemLEAD	Reactive power demand (lead)	Qdem LEAD	Qdem LEAD	-

Appendix 6 Event Item Notation

Event item notation

No.	color	PW3198 event item		3196/3197 event item	
1	▼	Tran	Transient overvoltage	Transient	Transient
2	▼	Swell	Swell	Swell	Swell
3	▼	Dip	Dip	Dip	Dip
4	▼	Intrpt	Interruption	Interrupt	Interruption
5	▼	Irms1/2	Inrush current	Inrush	In-rush current
6	▼	Freq	Frequency	Frequency	Frequency (upper)
7	▼	-	-	Frequency	Frequency (lower)
8	▼	Freq_wav	Frequency cycle	-	-
9	▼	Upk	Voltage waveform peak	U peak+	Voltage peak (+)
10	▼	-	-	U peak-	Voltage peak (-)
11	▼	Urms (SENSE)	RMS voltage	U rms	RMS voltage (upper)
12	▼	-	-	U rms	RMS voltage (lower)
13	▼	Upp	Voltage DC fluctuation	-	-
14	▼	Ipk	Current waveform peak	I peak+	Current peak (+)
15	▼	-	-	I peak-	Current peak (-)
16	▼	Irms	RMS current	I rms	RMS current (upper)
17	▼	-	-	I rms	RMS current (lower)
18	▼	Ipp	Current DC fluctuation	-	-
19	▼	P	Active power	P	Active power
20	▼	S	Apparent power	S	Apparent power
21	▼	Q	Reactive power	Q	Reactive power
22	▼	PF	Power factor/displacement power factor	PF	Power factor
23	▼	Uunb	Voltage negative-phase unbalance factor	U unbalance	Voltage unbalance factor
24	▼	Uunb0	Voltage zero-phase unbalance factor	-	-
25	▼	Iunb	Current negative-phase unbalance factor	I unbalance	Current unbalance factor
26	▼	Iunb0	Current zero-phase unbalance factor	-	-
27	▼	Uharm	Harmonic voltage	U harm	Harmonic voltage
28	▼	Iharm	Harmonic current	I harm	Harmonic current
29	▼	Pharm	Harmonic power	P harm	Harmonic power
30	▼	PPhase	Harmonic voltage-current phase difference	P harm(phase)	Harmonic phase difference
31	▼	Uthd	Total harmonic voltage distortion factor	U-THD	Harmonic total voltage distortion factor
32	▼	Ithd	Total harmonic current distortion factor	I-THD	Harmonic total current distortion factor
33	▼	-	-	U iharm	Inter-harmonic voltage
34	▼	-	-	I iharm	Inter-harmonic current
35	▼	-	-	U-iTHD	Inter-harmonic total voltage distortion factor
36	▼	-	-	I-iTHD	Inter-harmonic total current distortion factor a
37	▼	KF	K factor	KF	K factor
38	▼	UharmH	High-order harmonic voltage component	-	-
39	▼	IharmH	High-order harmonic current component	-	-
40	▼	Wave	Voltage waveform comparison	Wave	Voltage distortion factor
41	▼	Timer	Timer event	Ext(Timer)	Timer event
42	▼	Cont	Continuous event	-	-
43	▼	Ext	External event	Ext(I/O)	External I/O
44	▼	Manu	Manual event	Ext(Manual)	Manual event
45	▼	Start	Start	Ext(Start)	External event start

No.	color	PW3198 event item		3196/3197 event item	
46	▼	Stop	Stop	Ext(Stop)	External event end
47	▼	GPS_IN	GPS	-	-
48	▼	GPS_OUT	GPS	-	-
49	▼	GPS_Err	GPS	-	-

NOTE   When printing with a monochrome printer, some colors may not be discernible, for example when using the report wizard.

Appendix 7   Error Messages

If you encounter an error dialog box, refer to the table below to determine the appropriate action based on the dialog box's contents. The error dialog box can be dismissed with the OK button.

Error display	Cause	Corrective action and additional information
No TIME PLOT data.	Because the measurement period is shorter than the interval, there is no TIMEPLOT file.	See event data or other data.
No Setting File.	There is no loadable settings file.	If you copied the file, copy it back to its original location.
User resources are low or due to lack of memory, this application cannot run. Please quit other applications to increase memory.	There is insufficient memory to run the application.	Exit other applications.
Could not open the clipboard.	System error	Try the operation again. If the error persists, restart the computer.
Erroneous file:	The indicated file may be corrupt.	If you copied the file, copy it back to its original location.
The transient data is not available.	There is no transient file.	If you copied the file, copy it back to its original location.
Error has occurred. _____ Windows will automatically close the program.	System error	Try the operation again. If the error persists, restart the computer.
Failed to create a file.	The application was unable to create the specified folder.	Consult with your computer administrator to verify that you have write privileges for the specified file.
Unable to load files as specified folder contains data for multiple models.	Multiple sets of measurement data exist in the same folder.	Copy entire folders instead of individual files.
The selected folder does not contain any compatible data.	The necessary file does not exist.	If you copied the file, copy it back to its original location.
File not found.	The indicated file is corrupt or does not exist.	If you copied the file, copy it back to its original location.
Cannot open file.		
Cannot load file.		
Error. unreadable.		
Incorrect IP Address	The specified IP address is incorrect.	Verify the IP address.
Connection failed.	The application is unable to send or receive data via the LAN.	Consult with your network administrator.
Measurement in progress. Cannot download.	The connected instrument is currently performing measurement. Data cannot be downloaded while measurement is in progress.	Download the data once measurement is complete.
PC card not found.	No PC card has been inserted into the connected instrument.	Check the instrument.

Error display	Cause	Corrective action and additional information
No files found in internal memory.	No files exist in the internal memory.	No files exist in internal memory while the instrument is in the setting state.
No files found in PC card.	No files exist on the PC card.	Check the instrument's settings.
No files found in PC card nor in internal memory.	No files exist in the instrument's internal memory or on the PC card.	Check the instrument's settings.
Incompatible file. Cannot download.	Files other than measurement files include files that cannot be downloaded.	Specify the measurement file.
Time-out is occurred.	Communications timed out.	Repeat the operation. If the issue persists, consult with your network administrator.
Data format error.	The card does not conform to the specified format.	Back up the card's contents and reformat it.
Memory Capacity Shortage.	There is insufficient memory to run the application.	Exit other applications.
Cannot be connected.	Unable to send or receive data.	Verify that the URL or IP address is correct.
Communication error is occurred.	Unable to send or receive data.	Consult with your network administrator.
URL was not found.	The specified URL cannot be found.	Verify the URL.
File save failed.	The application was unable to properly save the file.	Repeat the operation. If the issue persists, consult with your computer administrator.
Unable to create the report using the selected method due to missing data.	The required data is not present.	Review the selected report content.
Unable to output associated report as the currently loaded data does not include the following data. Continue?	The required data is not present.	The report related to the required data will not be output. To revise the settings, click "No" to return to the settings screen.
Unable to output associated report as the specified period does not include the following data. Continue?	The indicated data is not present in the specified period.	The related report will not be output. To revise the settings, click "No" to return to the settings screen.
Unable to output the entire specified period as the following data includes too many data points for the specified period. Continue?	The specified period includes too many data points.	The entire specified period cannot be output. To revise the settings, click "No" to return to the settings screen.
There is no data.	There is no display data.	Review the display settings.
OLE initialization failed. Make sure that the OLE libraries are the correct version.	The application was unable to initialize OLE.	Consult with your computer administrator.
No SD card.	No SD card has been inserted into the connected instrument.	Insert an SD card into the instrument.
No file in SD card.	No files exist on the instrument's SD card.	No files exist on the instrument's SD card.
Illegal file name is included	The instrument's SD card contains a folder that includes a file with an illegal filename.	The file in question cannot be downloaded. Change its filename.
The file does not exist in the specified folder.	No files exist in the folder on the instrument's SD card.	Check the folder name and select another folder.
Unable to start application. You may be able to start the application after reinstalling it.	The application may not have been installed properly.	Delete the application and reinstall it as described in the instruction manual.
Unable to allocate memory.	There is insufficient memory to run the application.	Exit other applications.

Appendix 7 Error Messages

Index

Index

HIOKI

http://www.hioki.com

Our regional
contact
information