

Instruction Manual

PQ ONE

- ✓ The scope of this manual is limited to PQ ONE, a freeware application for HIOKI Power Quality Analyzers.
- ✓ For more information about how to your Power Quality Analyzer, see its user manual.
- ✓ Although HIOKI has taken utmost caution to ensure the accuracy of this manual's contents, please contact your supplier or the International Sales and Marketing Department at HIOKI headquarters with any questions or errors.
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- ✓ This manual includes copyrighted content.
- ✓ It is prohibited to reproduce, duplicate, or modify the contents of this manual without prior authorization from HIOKI.
- ✓ Be sure to read your Power Quality Analyzer's user manual before using this software.

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1. Introduction

PQ ONE is a freeware application for analyzing measurement data from a HIOKI Power Quality Analyzer on a computer.

Supported model	Product name
PQ3100	Power Quality Analyzer
PW3198	Power Quality Analyzer
PQ3198	Power Quality Analyzer

PQ ONE provides the following functionality:

- Display and analysis of measurement data
The software's event statistics function allows you to check the conditions under which events occurred.
You can group three phases of trend data together on a single graph.
- Easy creation of reports
You can output reports that present screen contents without the need to configure complex settings.

This manual may refer to PQ ONE as "the software".

1.1. Precautions concerning reproduction, copyright, and other use

■ Copyright

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■ Terms of use

Commercial use, for example bundling of the software with other software or publications for commercial purposes, is prohibited without the consent of the copyright holder. In addition, it is prohibited to reverse-engineer or modify the software without the consent of the copyright holder.

■ Disclaimer

- The software is provided as freeware. It may be used freely by the user, who is solely responsible for such use.
 - HIOKI is not responsible for any damage arising from the use of the software.
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 - The software is subject to modification without notice.
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- Windows, Microsoft .NET Framework and Microsoft WORD are registered trademarks or trademarks of Microsoft Corporation in the United States.

1.2. System requirements

The following system is required in order to use PQ ONE:

Operating system	OS: Windows10 (32bit / 64bit) , Windows11 (Must be updated with most recent service pack as of August 1, 2023.) The above OS requirements are satisfied. Microsoft .NET Framework 4.5.2 or later must be installed on above operating system. (In non-English environments, the appropriate language pack must also be installed.)
Display	Resolution of 1,024 x 768 or greater

- The software may not operate on some computers, even if the above system requirements are satisfied.
- An SD memory card is required in order for the computer to be able to load the measurement data.
- Use Microsoft Word (2010 or later) to review the reports that have been created.
In the case of other software, the layout may be looked wrong.
- If the frequency analysis display does not appear, please install "Visual C ++ Redistributable Package for Visual Studio 2015" on your PC. (⇒p.44)

2. Setup

To install the software from the CD included with the PQ3100,PQ3198 Power Quality Analyzer, refer to the PQ3100 / PQ3198 Power Quality Analyzer user manual.

If you downloaded PQ ONE from website, unzip the ZIP file and then execute SetUp.exe.

Double-click

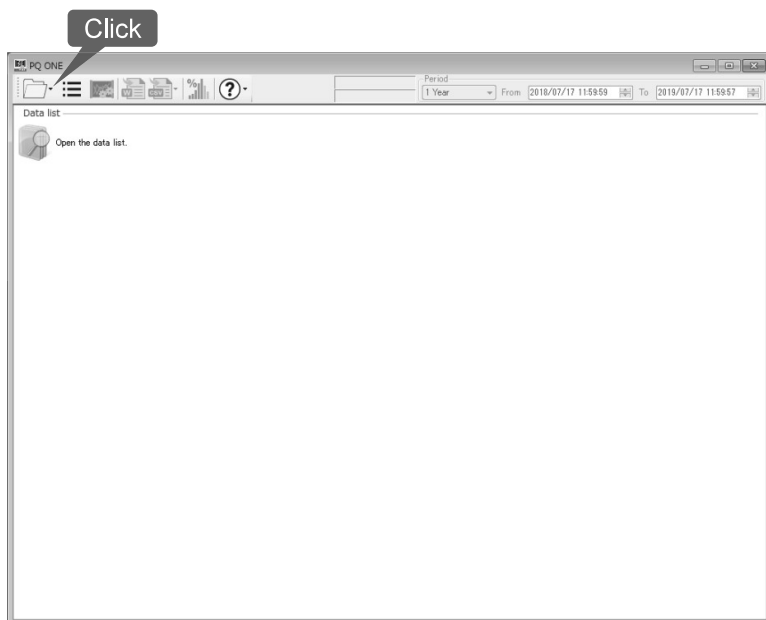
Name	Date modified
Manual	2020/10/23 10:16
PQONE_Eng.msi	2020/10/23 9:51
setup.exe	2020/10/23 9:51

3. Using the software

3.1. Loading measurement data

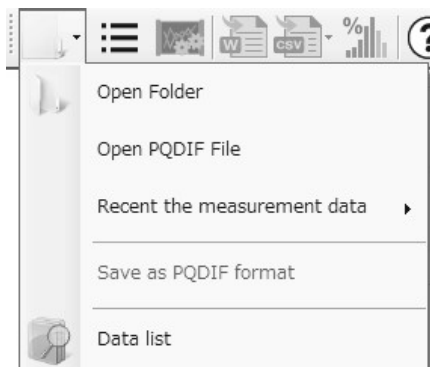
- Loading the folder containing the measurement data

From the [Start] menu, select [All programs] - [HIOKI] - [PQONE] - [PQONE] to launch the application.



Click the data selection icon to display the menu.

When you click the menu, the specified data is read or the screen related to the menu is displayed.



- Do not delete the data while displaying. Do not disconnect the HDD or device which stores the displayed data. Doing so may cause the program to forcibly terminate.

■ Read the data from [Data list]

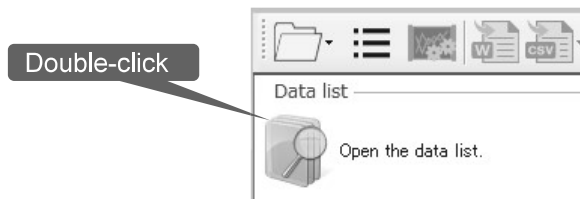
Display the data list screen

The Data list screen is displayed when you carry out one of the following actions:

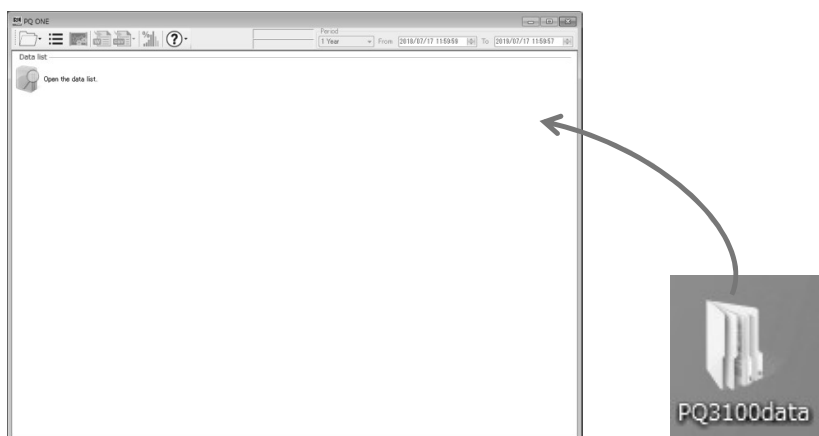
- Click the [Data list] menu from the data selection menu.



- Double-click the icon displayed on the initial screen.



- Drag & drop the folder having the measurement data.



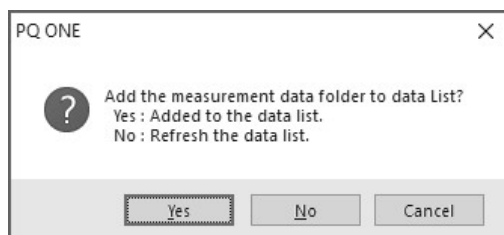
Register measurement data information in the data list

Drag and drop a folder containing measurement data to register it in the data list.

PQ ONE automatically recognizes data that can be displayed even if you drag and drop a folder in a higher hierarchy of data folders or multiple data folders in a batch.

The following message will appear during drag & drop.

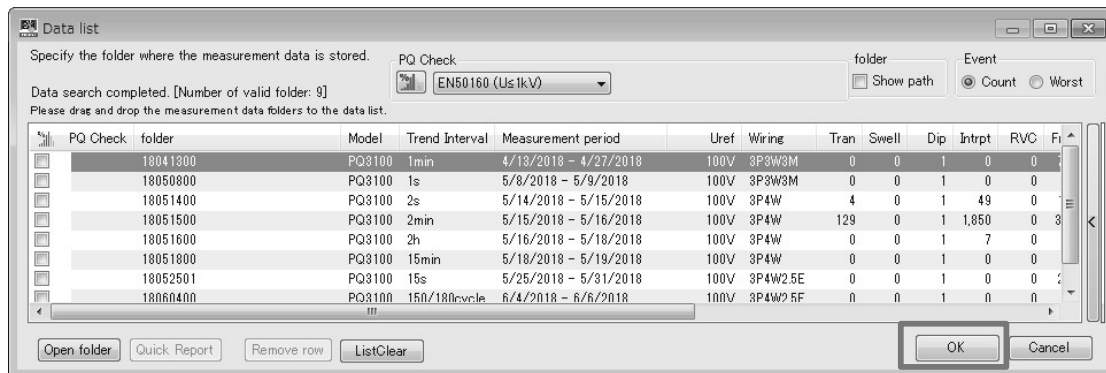
- If you select [Yes], the data information will be added to the data list.
- If you select [No], the data information is added after clearing the data list.



- * When dragged and dropped onto the data list, it is automatically added to the data list without any message being displayed.

Display the data list screen

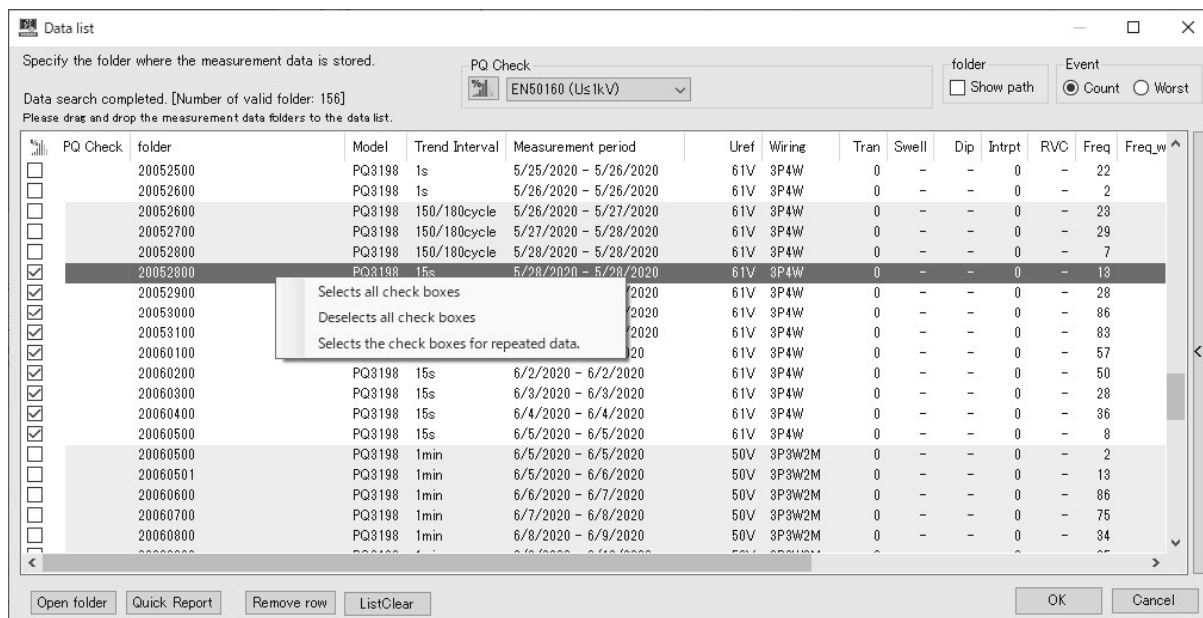
To read the data, select the data you want to read and press the [OK] button.



The data list screen allows you to manage and output data information.
For details on the Data List, see Chapter 7, "Displaying data list". (⇒p.78)

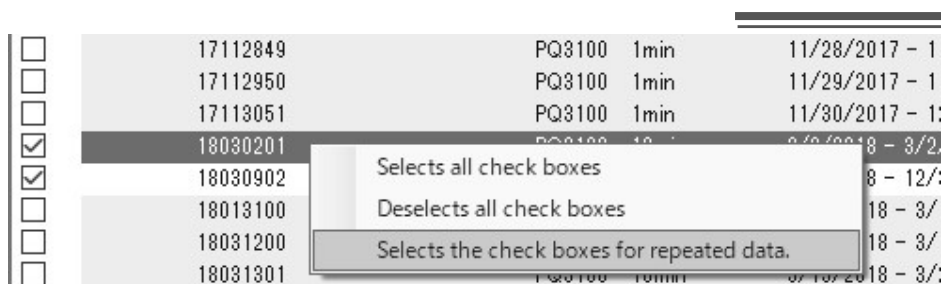
■ Read repeated data from [Data list] at once.

If you want to read the repeated data, check the data you want to read and click the [OK] button.



The data that can be read together have the same background color.

If you select [Selects the check boxes for repeated data] from the context menu, you can check the data that can be read together.



* Conditions for judging repeated data:

- The following status items must be the same.
Model, Wiring (CH123, CH4), Frequency,
Uref(nominal voltage), Trend interval, Recording Items
- The folder name must be in the format of repeated recording.
(Refer to the instruction manual of HIOKI Power Quality Analyzer)
- Measurement periods do not overlap.

* Even if the background of the list is not the same color, it may be judged as repeated data if the conditions match.

* When the repeated data is read, the data folder name is displayed as "(first folder) ... (last folder)".
You can also choose between full path display and data name display for the title bar. (⇒p.65)

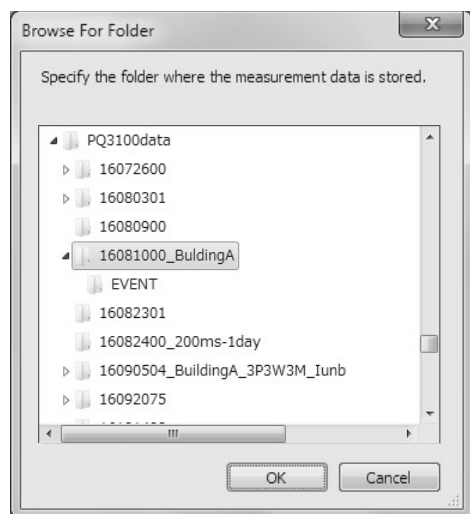


■ Read the data from [Open Folder] menu

When you click the [Open Folder] menu from the data selection menu,
the measurement data folder selection screen is displayed.

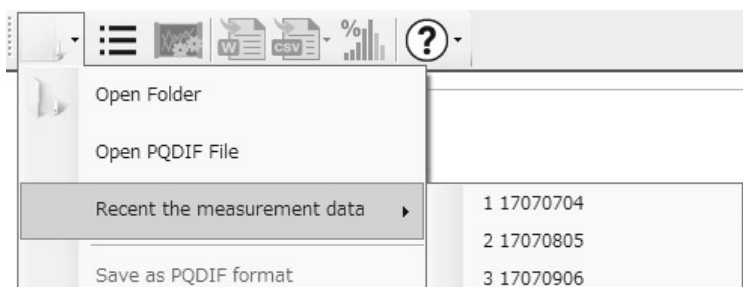
If the specified folder is a measurement data folder, reading of the measurement data starts.

When you select the folder that contains multi-data, the data list screen is displayed.

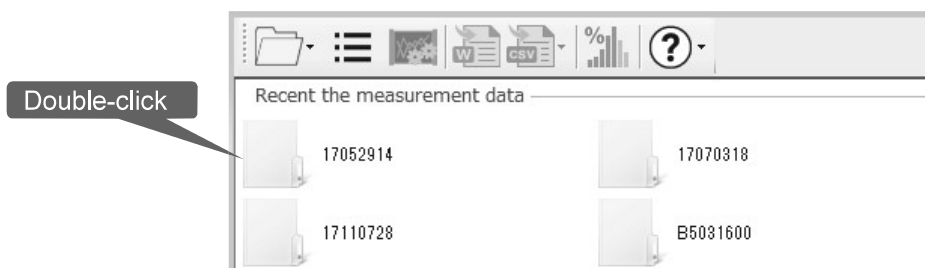


■ Read the data from [Recent the measurement data] menu

When you click the [Recent the measurement data] menu from the data selection menu, the measurement data (maximum 10 data) read in the most recent time is displayed. Select the menu or double-click the icon displayed on the initial screen to read the selected data.

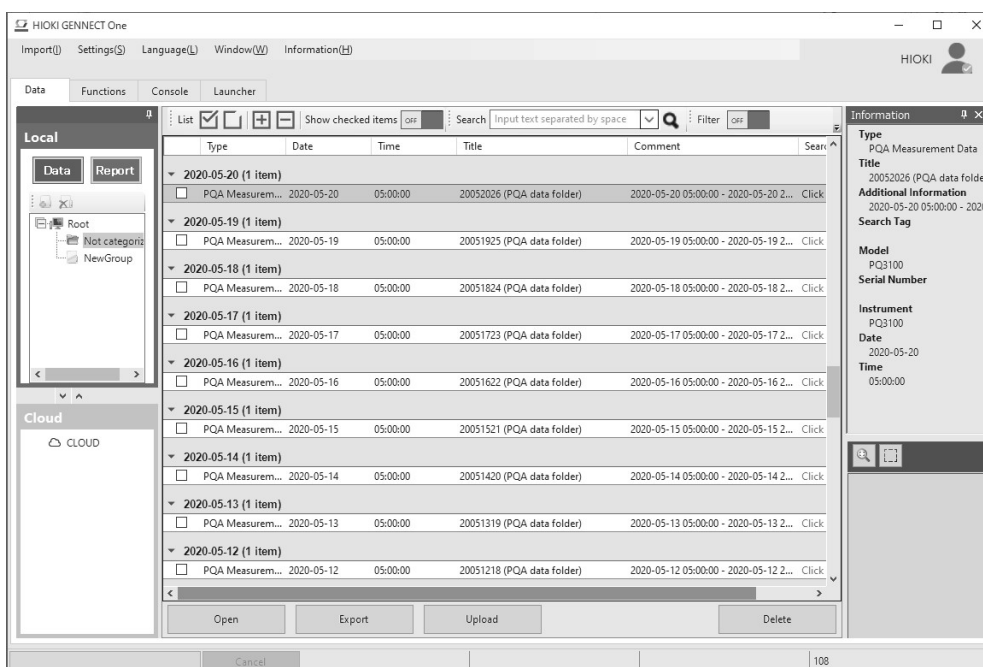


The same selected data can also be loaded when double-clicking the icon in the recently used measurement data column that appears on the PQ ONE initial screen.



■ Read data imported by GENNECT One

HIOKI "GENNECT One" application is a free application software that allows centralized management of multiple measurement devices in a LAN, automatic transfer of measurement files, and remote control.



PQ ONE can read PQ3100 and PQ3198 measurement data imported to the computer by GENNECT One.

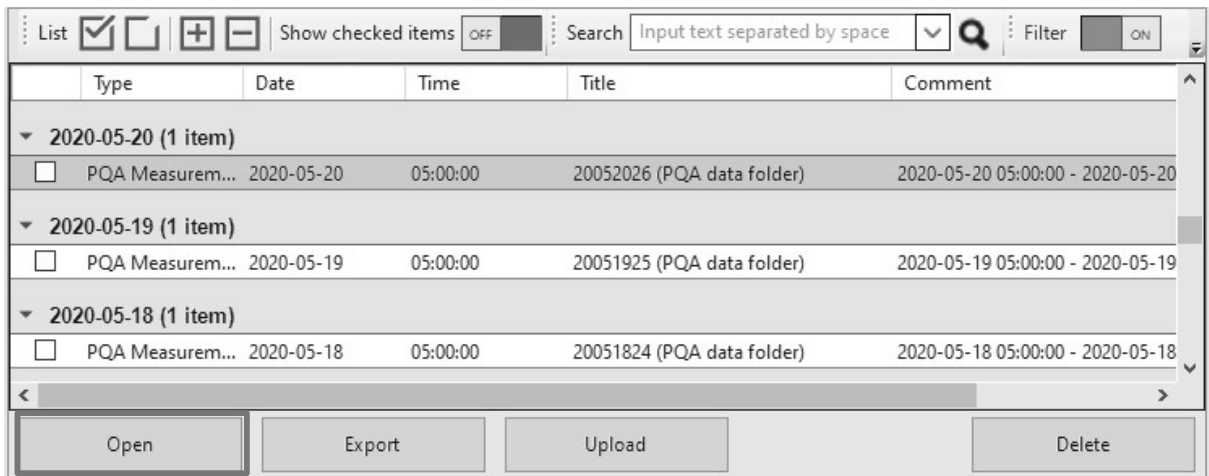
* GENNECT One does not support PW3198.

* Please refer to GENNECT One instruction manual for how to import data to GENNECT One.

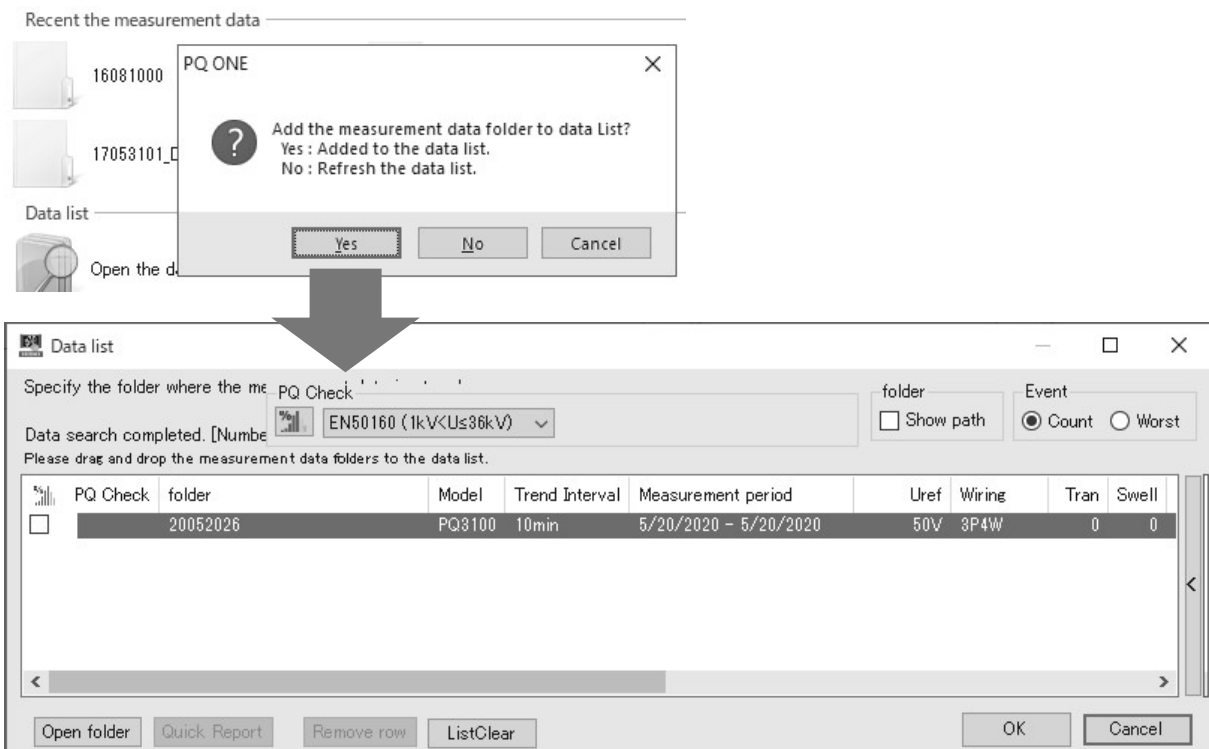
Open data (Local data)

Follow the procedure below to load the measurement data imported into GENNECT One into PQ ONE.

Select "PQA measurement data" from the data list displayed on the [Data] screen of GENNECT One and click the [Open] button.



Clicking the [Open] button will launch PQ ONE and display the same message as when you drag & drop a data folder.



Select the data you want to load in the data list and click the [OK] button to load the measurement data into PQ ONE.

Open data (Cloud Data)

Measurement data can be shared and managed among multiple users by linking GENNECT One and GENNECT Cloud.

PQ3100 and PQ3198 measurement data uploaded to the cloud in conjunction with GENNECT Cloud can also be loaded into PQ ONE using the following procedure.

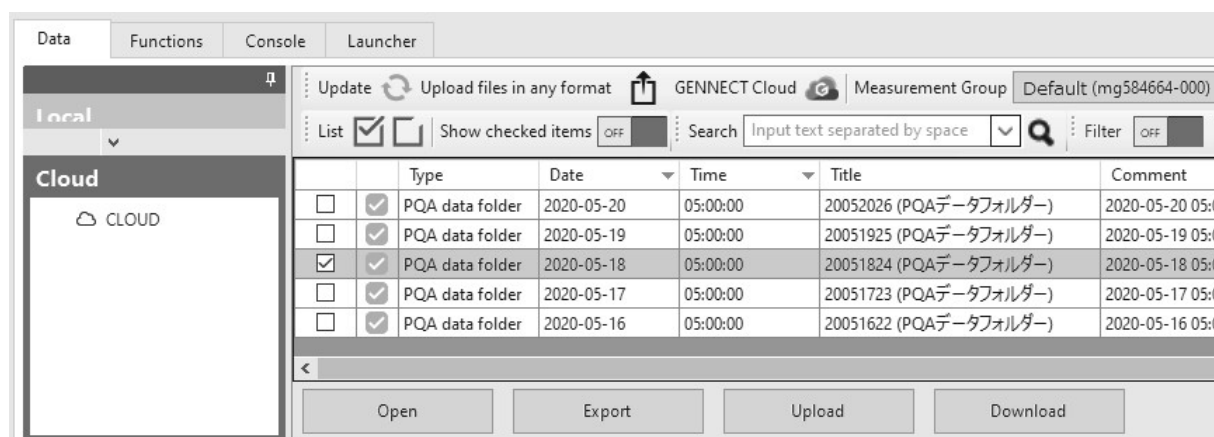
* GENNECT Cloud is a dedicated GENNECT cloud service operated by HIOKI.

By linking GENNECT One and GENNECT Cloud, you can remotely monitor or operate (Remote monitoring mode) instruments connected to your computer. You can also share files with another user in your account.

Please refer to the GENNECT One User's Manual for details.

After logging into GENNECT Cloud with GENNECT One, the "Cloud" area will appear on the left side of the [Data] screen in GENNECT One.

Click on the "Cloud" area to see the measurement data and files uploaded to GENNECT Cloud, select "PQA Data Folder" and click the [Open] button.



Click the [Open] button to start PQ ONE in the same way as when opening local data, then select the data you wish to load in the data list and click the "OK" button. (⇒p.9)

Open repeated data

Repeated measurement data can be read at once by selecting and opening multiple data.

Please use the following method to load multiple data at once from GENNECT One.

* Since GENNECT One creates and manages a folder for each imported measurement data, all the data selected from GENNECT One are judged not to be repeated data in the data list display. For this reason, they are not displayed with the same background color on the data list of PQ ONE. Check if the checked data can be loaded together and load them together.

The following methods can be used to display the data together.

Select "PQA measurement data" you want to display together from the data list of GENNECT One and click the [Open] button.

List ☒ ☐ ☐ ☐ Show checked items ☐ Search Input text separated by space Filter

Type	Date	Time	Title	Comment
▼ 2020-05-20 (1 item)				
☒	PQA Measurem...	2020-05-20	05:00:00	20052026 (PQA data folder) 2020-05-20 05:00:00 - 2020
▼ 2020-05-19 (1 item)				
☒	PQA Measurem...	2020-05-19	05:00:00	20051925 (PQA data folder) 2020-05-19 05:00:00 - 2020
▼ 2020-05-18 (1 item)				
☒	PQA Measurem...	2020-05-18	05:00:00	20051824 (PQA data folder) 2020-05-18 05:00:00 - 2020
▼ 2020-05-17 (1 item)				
☒	PQA Measurem...	2020-05-17	05:00:00	20051723 (PQA data folder) 2020-05-17 05:00:00 - 2020
▼ 2020-05-16 (1 item)				
☒	PQA Measurem...	2020-05-16	05:00:00	20051622 (PQA data folder) 2020-05-16 05:00:00 - 2020
▼ 2020-05-15 (1 item)				
☒	PQA Measurem...	2020-05-15	05:00:00	20051521 (PQA data folder) 2020-05-15 05:00:00 - 2020
▼ 2020-05-14 (1 item)				
☒	PQA Measurem...	2020-05-14	05:00:00	20051420 (PQA data folder) 2020-05-14 05:00:00 - 2020

Open Export Upload Delete

When PQ ONE is activated and the [No] button in the message is pressed to display the data list, only the information of the data selected in GENNECT One will be displayed in the data list.

Data list

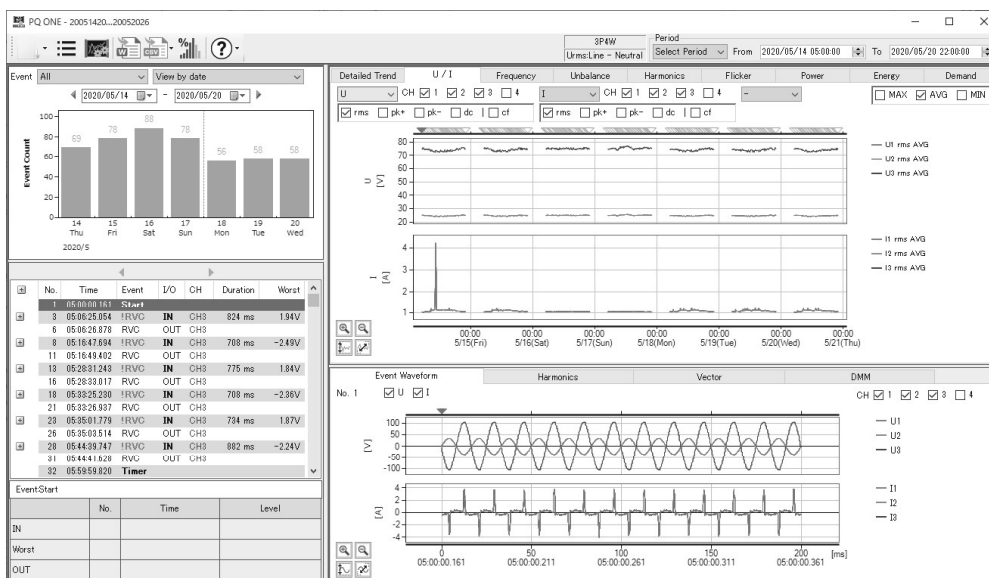
Specify the folder where the measurement data is stored. PQ Check folder EN50160 (1kV<Us36kV) Show path Event ☒ Count ☐ Worst

Data search completed. [Number of valid folder: 7]
Please drag and drop the measurement data folders to the data list.

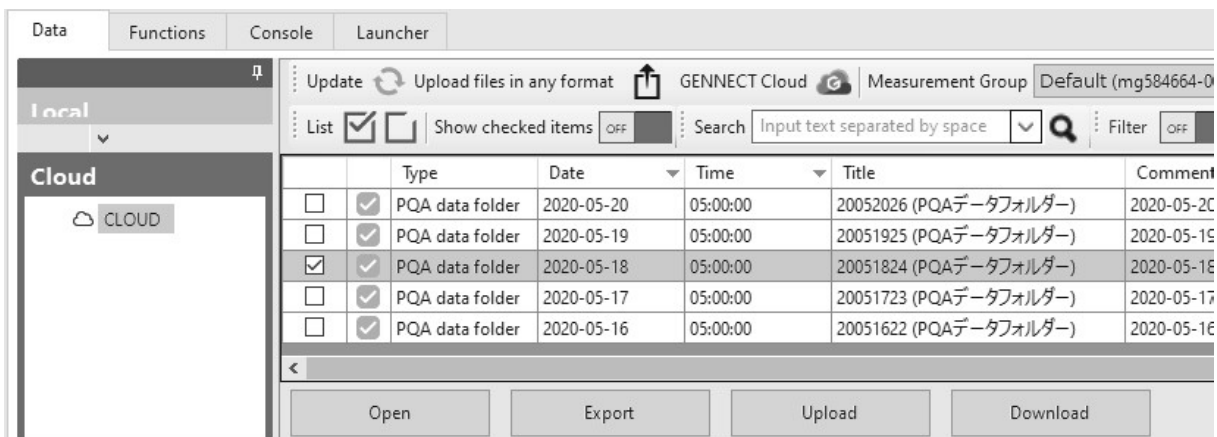
PQ Check	folder	Model	Trend Interval	Measurement period	Uref	Wiring	Tran	Swell	Dip	Intrpt	RVC	Freq
☒	20052026	PQ3100	10min	5/20/2020 - 5/20/2020	50V	3P4W	0	0	0	0	39	0
☒	20051521			- 5/15/2020	50V	3P4W	0	0	0	0	58	0
☒	20051622			- 5/16/2020	50V	3P4W	0	0	0	0	69	0
☒	20051723			- 5/17/2020	50V	3P4W	0	0	0	0	59	0
☒	20051824			- 5/18/2020	50V	3P4W	0	0	0	0	37	0
☒	20051420	PQ3100	10min	5/14/2020 - 5/14/2020	50V	3P4W	0	0	0	0	50	0
☒	20051925	PQ3100	10min	5/19/2020 - 5/19/2020	50V	3P4W	0	0	0	0	39	0

Open folder Quick Report Remove row ListClear OK Cancel

Click [Selects all check boxes] in the context menu to select all data and press the [OK] button to collectively display the selected data in PQ ONE.

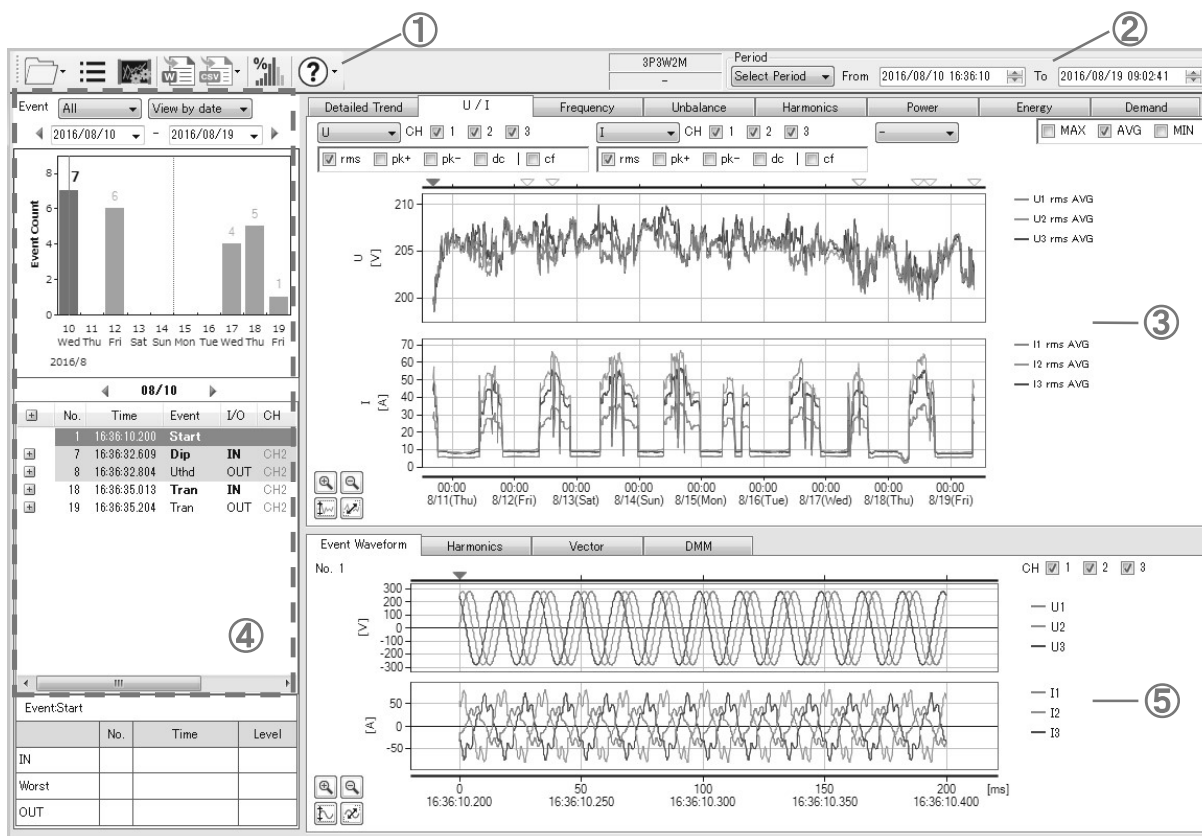


PQ3100, PQ3198 measurement data uploaded to the cloud can also be read together in the same way by selecting the data to be displayed together and performing a series of operations.



* When the data list is displayed from GENNECT One, the list may be displayed in an unordered order. In this case, please load the data after sorting them by folder name or measurement period.

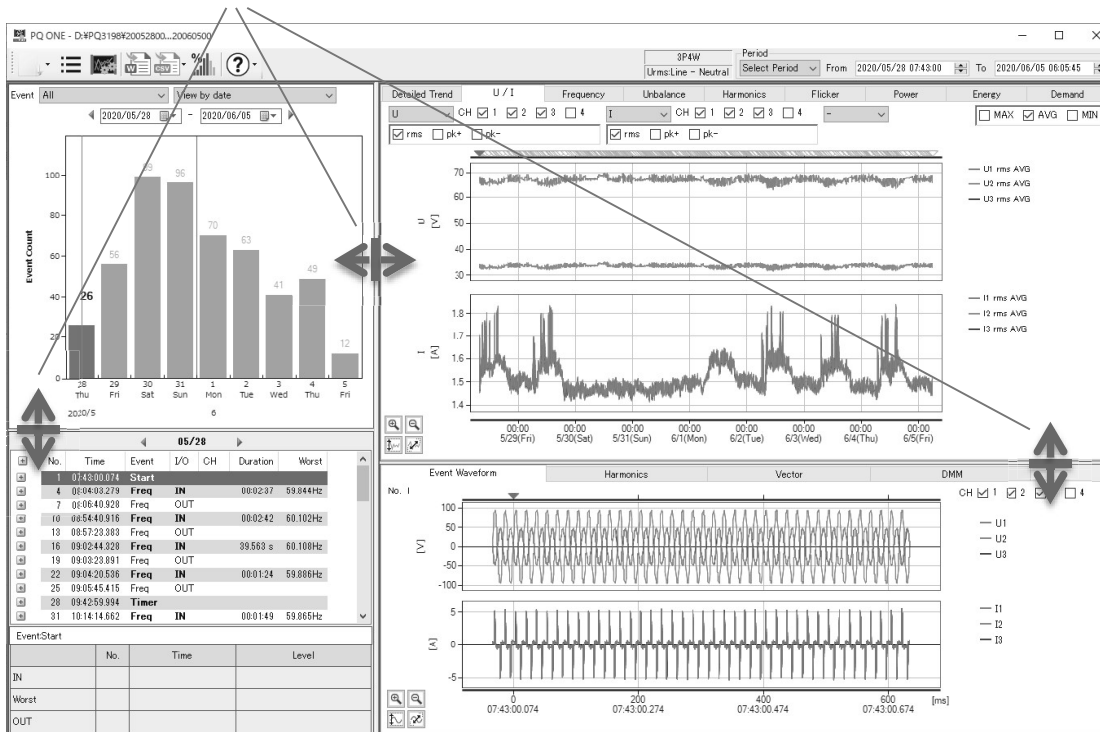
3.2. Main screen layout



①	Toolbar		Selects measurement data to load. (⇒p.4)
			Sets options. (⇒p.65)
			Loads a settings file that was saved together with measurement data. (⇒p.63)
			Creates a report. (⇒p.70)
			Converts measurement data (in binary format) to CSV format. (⇒p.76)
			Displays the Statistics/Standards screen. (⇒p.55)
			Displays the instruction manual.
②	Period		Sets the period for the trend data. (⇒p.15)
③	Trend graph		Displays the trend for measured values. (⇒p.15)
④	Event list		Displays the characteristics of the event that occurred as a bar graph and list. The bar graph indicates the number of times the event occurred. (⇒p.37)
⑤	Event data		Displays detailed data for the event selected in the event list. (⇒p.42)

Change display size

You can change the area size by operating the split bar on the screen.



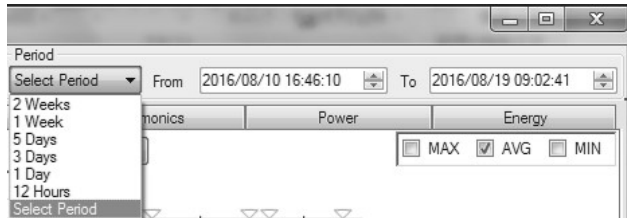
If you want to restore the display position and size of PQ ONE, display the context menu on the toolbar and select the [Initialize the display] menu.



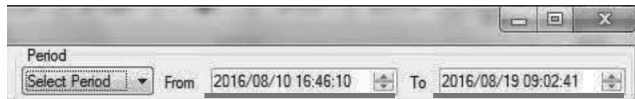
3.3. Viewing the trend graph

■ Selecting the period

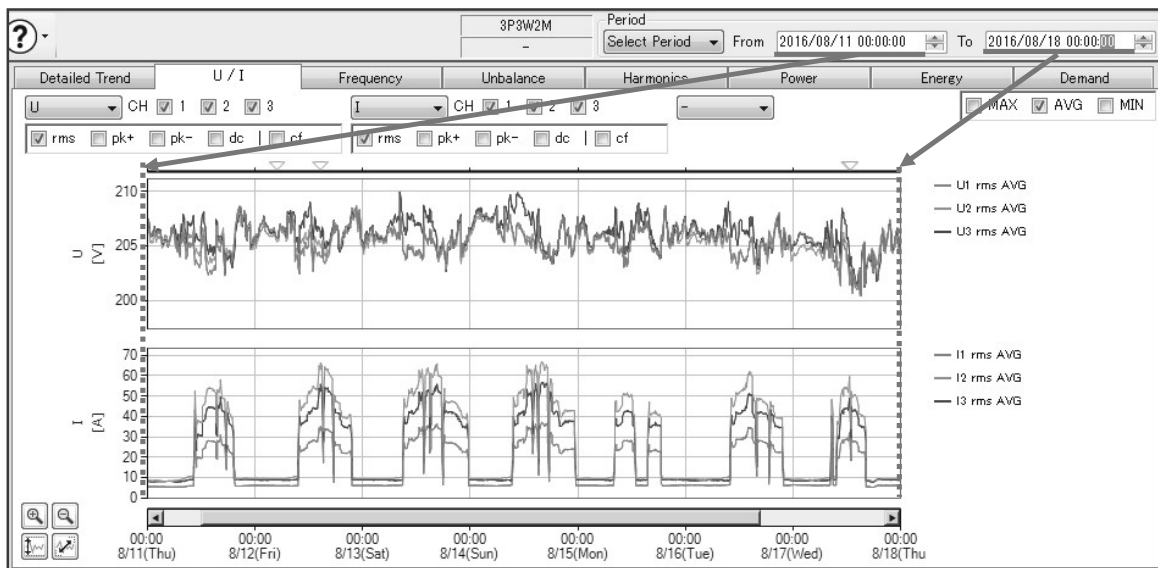
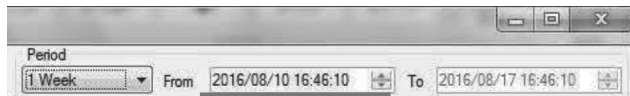
Select the period you wish to display in the window under [Period] on the top right of the window. The period setting applies to all trend graph tabs.



[Select Period] allows you to set the display start time (From) and the display end time (To) for trend graphs.

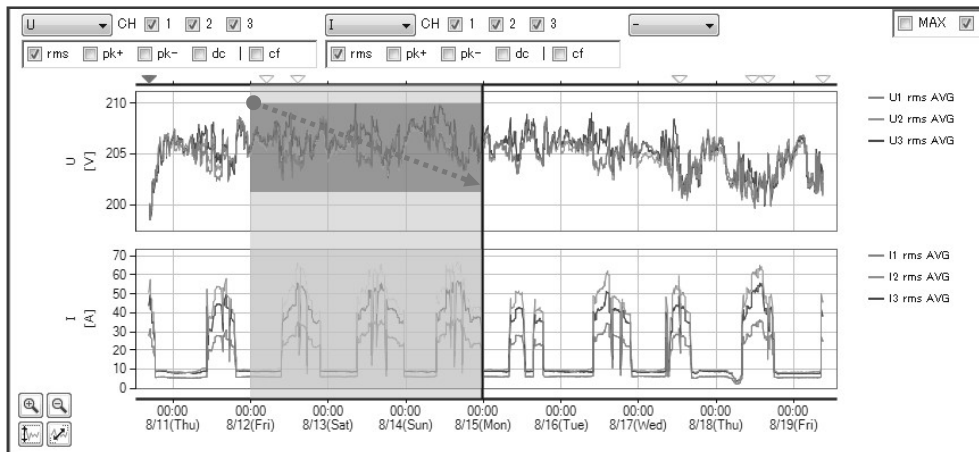


Value other than [Select Period] allows you to set only the display start time (From) for trend graphs. The display end time (To) will be set automatically.

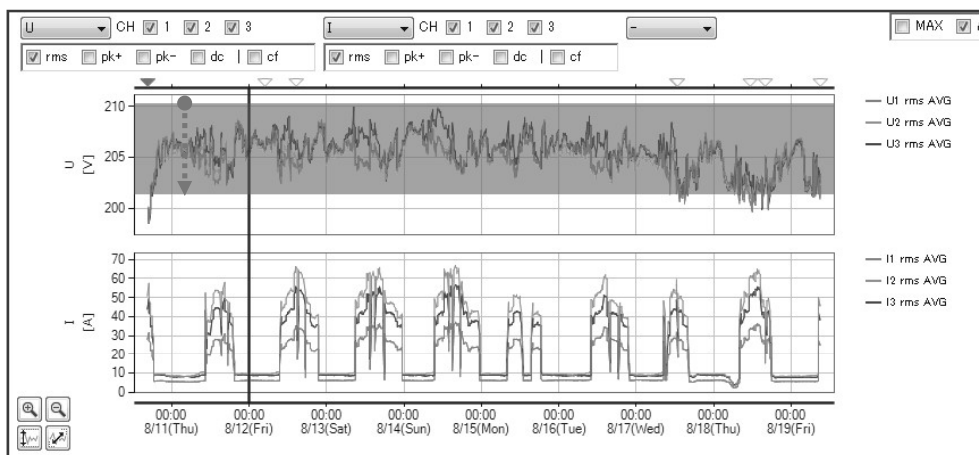


■ Zooming in on the trend graph

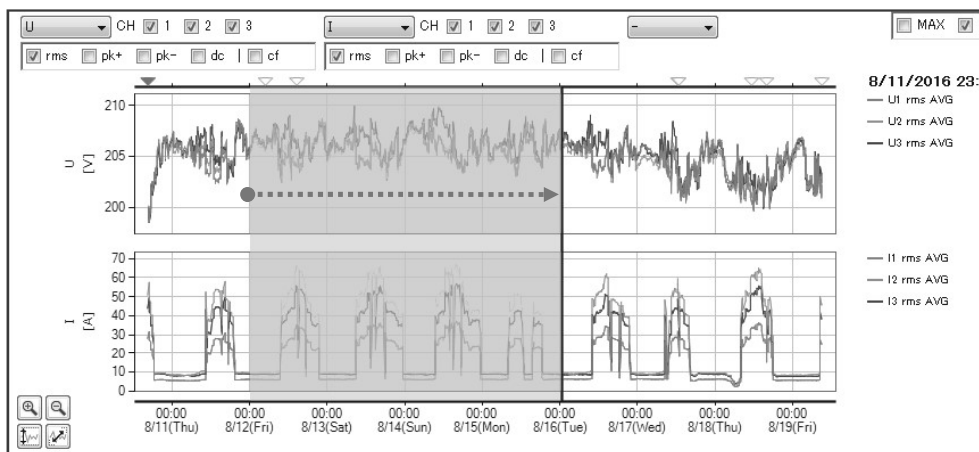
You can zoom in on the selected portion of the trend graph by dragging the mouse.



Drag the mouse diagonally to zoom in on both the Y-axis and X-axis (time axis).



Drag the mouse vertically to zoom in on only the Y-axis.

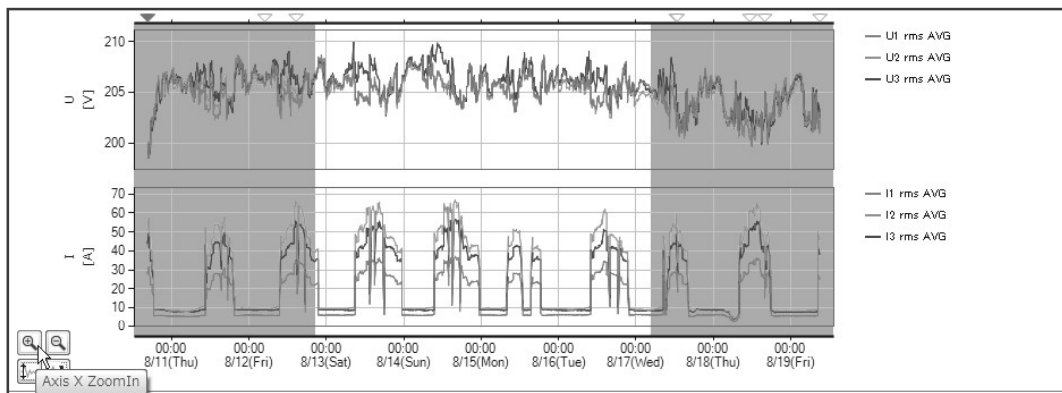


Drag the mouse horizontally to zoom in on only the X-axis.

■ Adjusting the range of the X-axis on the trend graph

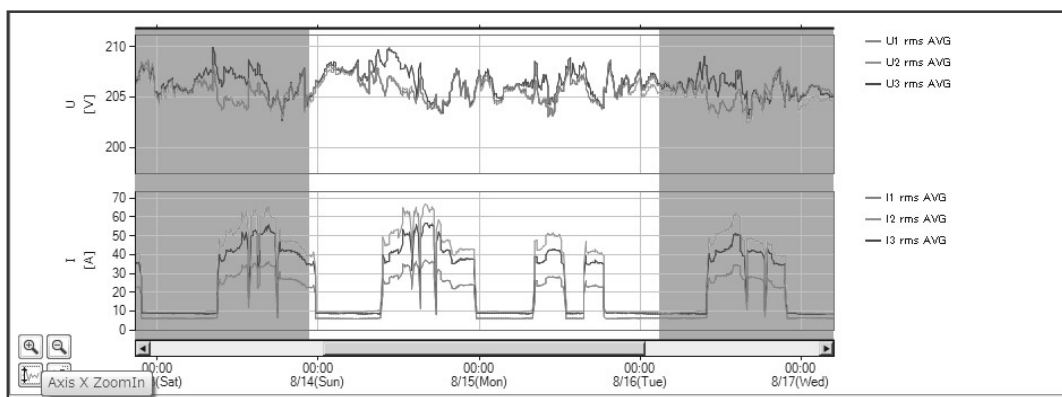
Click  to zoom in on the X axis range. Click  to zoom out the X axis range.

Move the mouse cursor over  to display the zoom area on the graph.



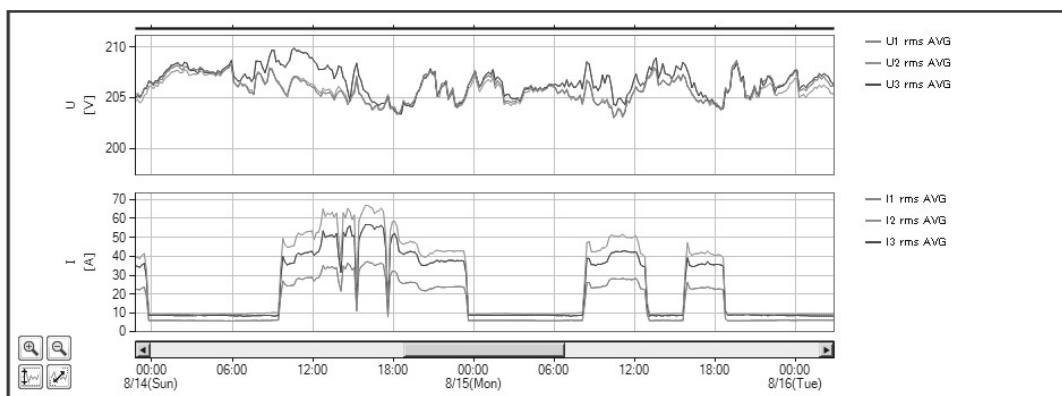
 Click

 Click



 Click

 Click



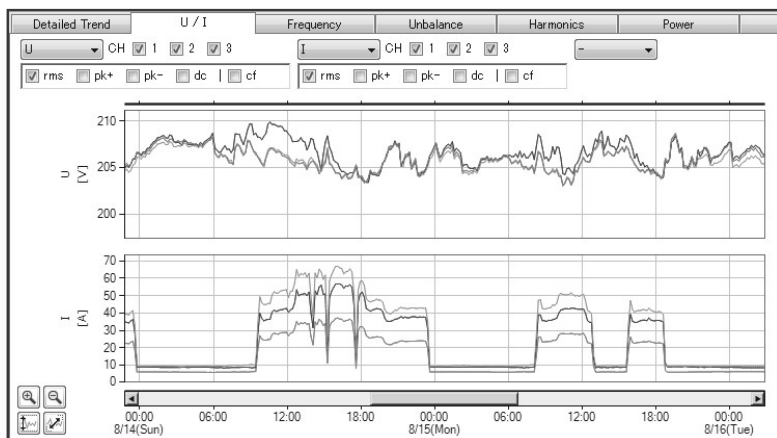
When the cursor is displayed, adjust the range around the cursor position as the center.

* The maximum zoom-in range of the X axis is 12 point.

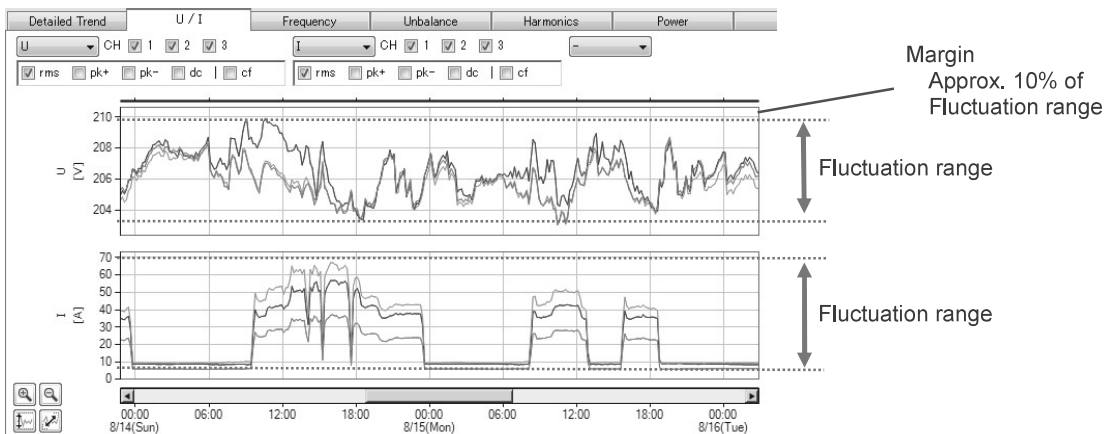
■ Adjusting the range of the Y-axis on the trend graph

Clicking  automatically adjusts the range of the Y-axis so that the maximum value and minimum value for the period fit on the graph.

Clicking successively cycles the adjusted range through scale settings (1) through (3) below.

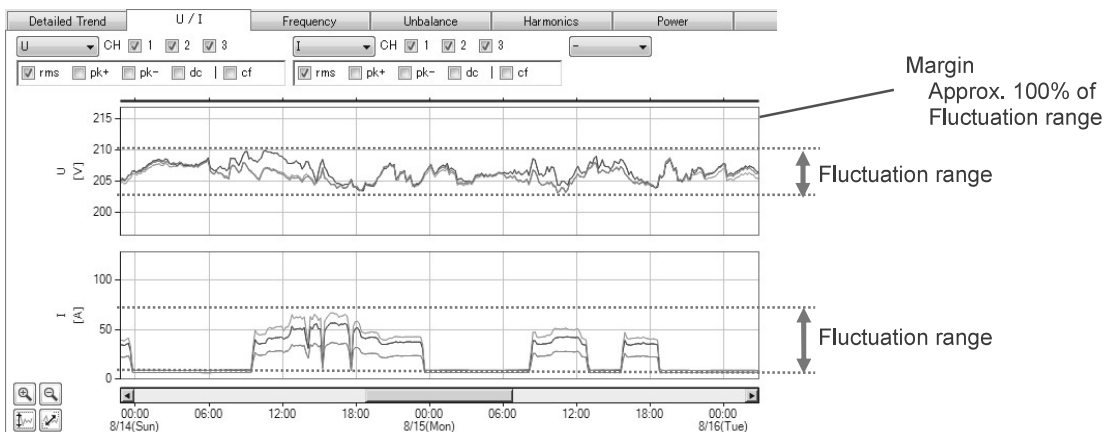


First click

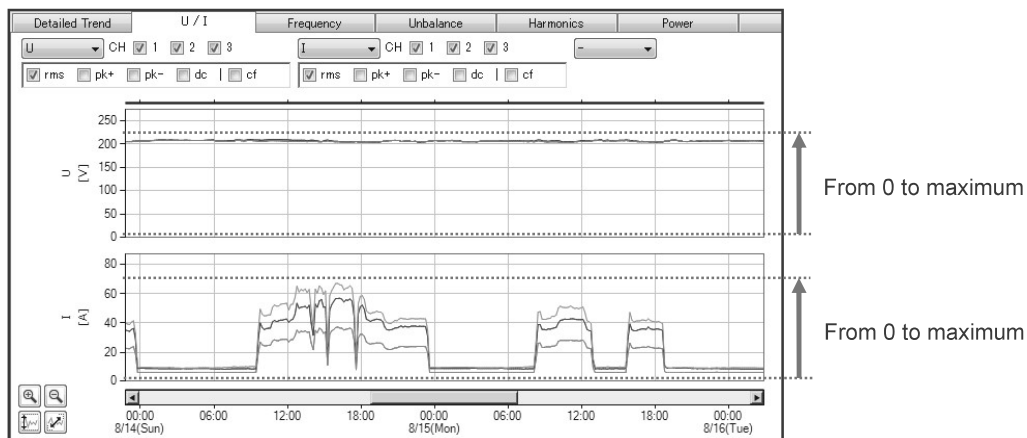


(1) Y-axis range : Fluctuation range $\pm$ a margin of approximately 10%
(applied to positive side only if the lower limit value is 0)

Second click



- (2) Y-axis range : Fluctuation range $\pm$ a margin of approximately 100%
(applied to positive side only if the lower limit value is 0)

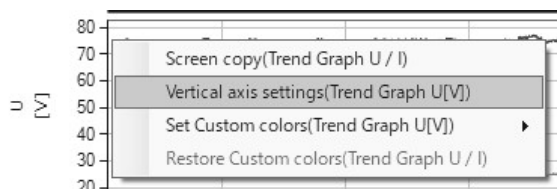
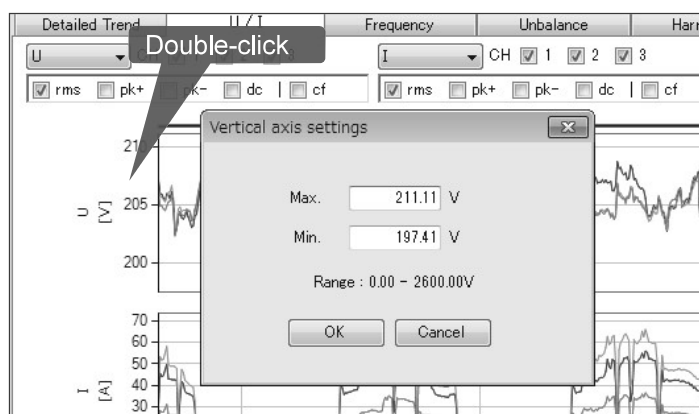


- (3) Renders the graph using 0 as the reference without regard to the fluctuation range

Clicking  one more time reverts to scale (1).

Y-axis display range specification

To specify the display range of the Y-axis, double-click on the Y-axis or click on [Vertical Axis Setting] from the pop-up menu to display the vertical axis setting screen.

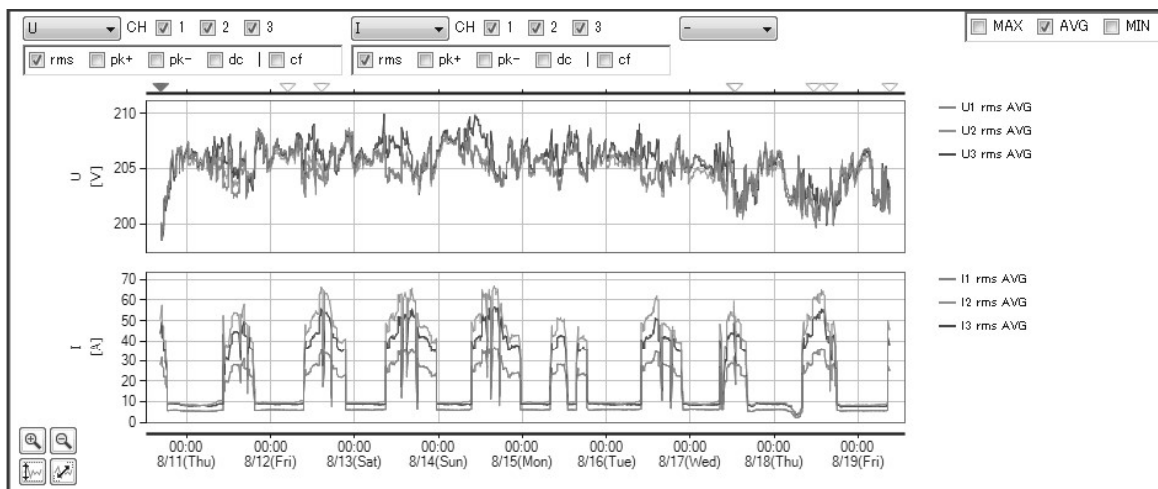
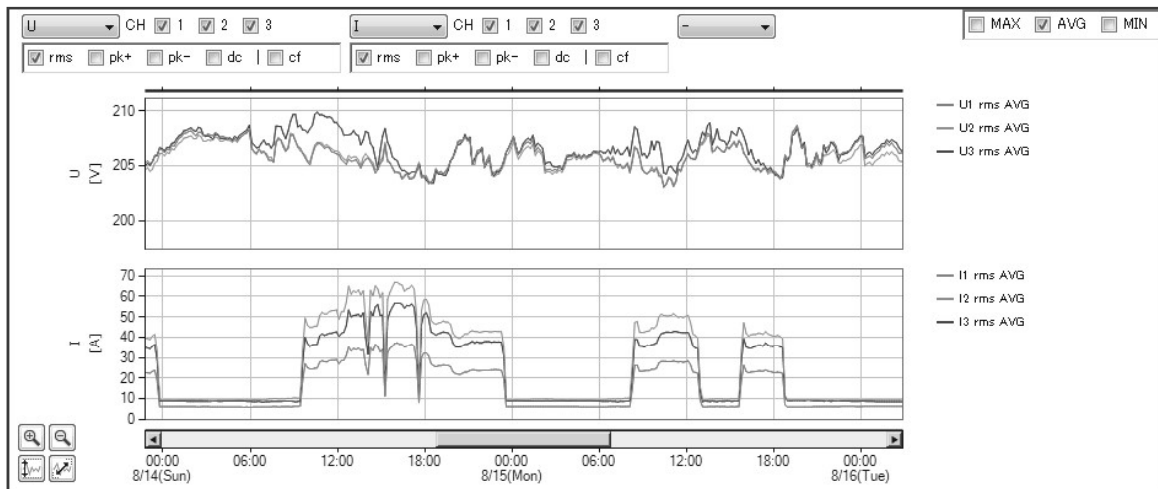


* The maximum and minimum values of the specifiable ranges are automatically set from the voltage and current ranges of the status.

■ Displaying the entire trend graph

Clicking  allows you to display the entire trend graph by canceling any zoom setting that has been applied to the graph.

(This functionality allows you to revert the graph's X- and Y-axis to the initial state.)

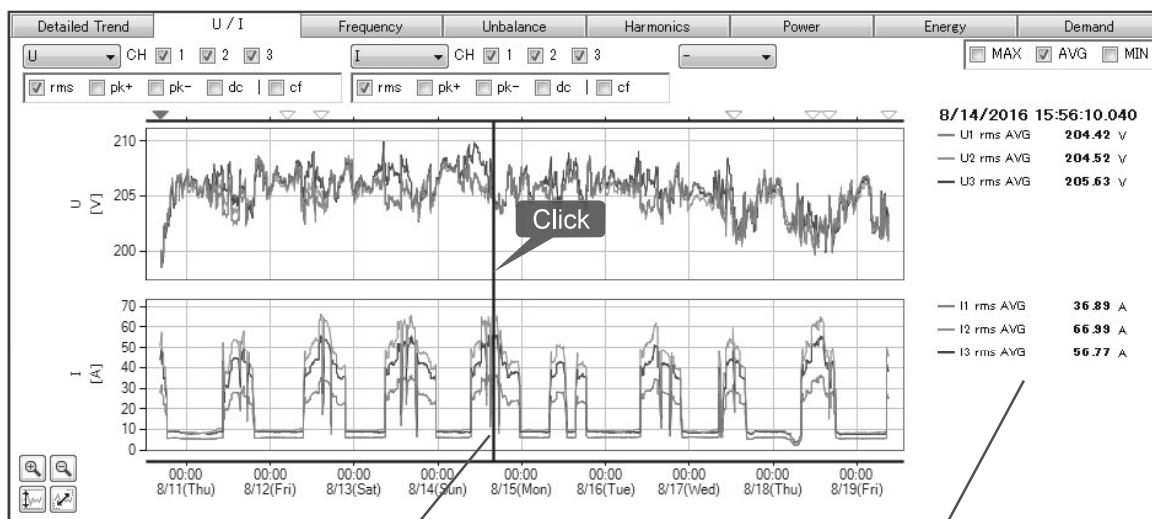


■ Displaying measured values

Clicking inside the trend graph area displays a cursor along with the measured value at that point in time.

To move the cursor, click at the position to which you wish to move it.

Clicking outside the trend graph area hides the cursor.



Cursor

Cursor time and measured value

■ Selecting display parameters

Measurement data is divided by tab. Select the parameters you wish to display from among those on each tab.

The available parameters vary with the model of the power quality analyzer you're using. For more information about measurement parameters, see your Power Quality Analyzer's user manual.

Tab	Measurement parameter	
Detail Trend	U rms1/2 I rms1/2 Inrush Freq_wav Pinst	RMS voltage refreshed each half-cycle RMS current refreshed each half-cycle Inrush current Frequency (1 wave) Instantaneous flicker
U / I	U rms U pk+ / U pk- U dc U cf I rms I pk+ / I pk- I dc I cf U avg I avg	RMS voltage (200ms) Voltage waveform peak (+/-) Voltage DC value Voltage crest factor RMS current (200ms) Current waveform peak (+/-) Current DC value Current crest factor RMS voltage (CH Average) RMS current (CH Average)
Frequency	Freq f10s / Freq10s	Frequency (200ms) Frequency (10s)
Unbalance	Uunb0 Uunb Iunb0 Iunb U zero U neg U pos I zero I neg I pos	Voltage zero-phase unbalance factor Voltage negative-phase unbalance factor Current zero-phase unbalance factor Current negative-phase unbalance factor Voltage zero-phase component Voltage negative-phase component Voltage positive-phase component Current zero-phase component Current negative-phase component Current positive-phase component
Harmonics	Uthd Ithd U harm I harm P harm U iharm I iharm KF U harmH I harmH TDD	Total harmonic voltage distortion factor Total harmonic current distortion factor Harmonic voltage Harmonic current Harmonic power Inter-harmonic voltage Inter-harmonic current K factor High-order harmonic voltage component High-order harmonic current component Total demand distortion

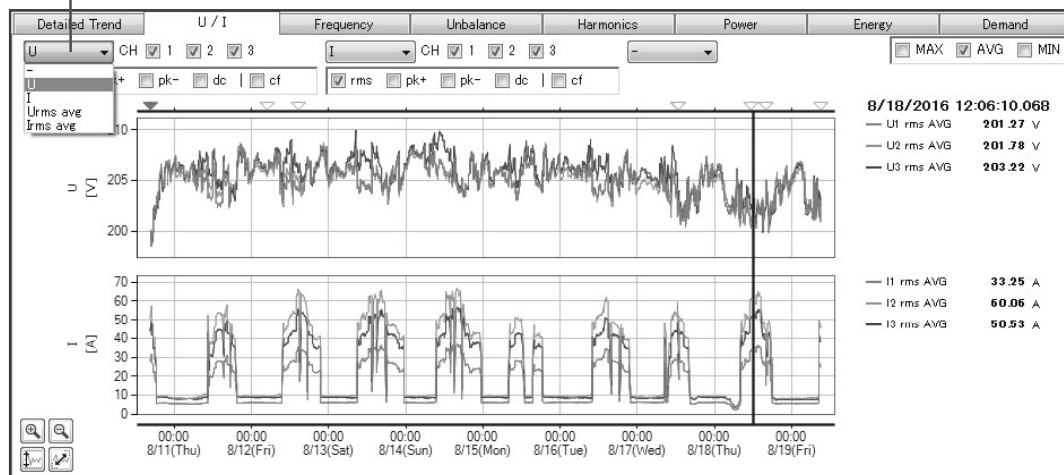
* For details on TDD(Total Demand Distortion), see Chapter 4 "Setting options". (⇒p.65)

Tab		Measurement parameter	
Flicker	Pst, Plt	Pst Plt10min Plt	Short-term flicker Long-term flicker (10 minutes) Long-term flicker (2 hours)
	$\Delta V10$	1min 1hMAX 1h4th 1hAVG	$\Delta V10$ (every minute) $\Delta V10$ 1-hour maximum value $\Delta V10$ 1-hour fourth-largest value $\Delta V10$ 1-hour average value
Power		P S Q PF / DPF Eff	Active power Apparent power Reactive power Power factor / Displacement power factor Power efficiency
Energy		WP+ / WP- WQlag / WQlead WS Ecost	Active electric energy (+/-) Reactive electric energy (lag/lead) Apparent electric energy Energy cost
Demand		Dem P+ / Dem P- Dem Qlag / Dem Qlead Dem S Dem PF Dem WP+ / Dem WP- Dem WQlag / Dem WQlead Dem WS	Active power demand value (+/-) Reactive power demand value (lag/lead) Apparent power demand value Power factor demand value Active power demand quantity (+/-) Reactive power demand quantity (lag/lead) Apparent power demand quantity
mains signaling		Msv1 Msv2	mains signaling voltage 1 mains signaling voltage 2

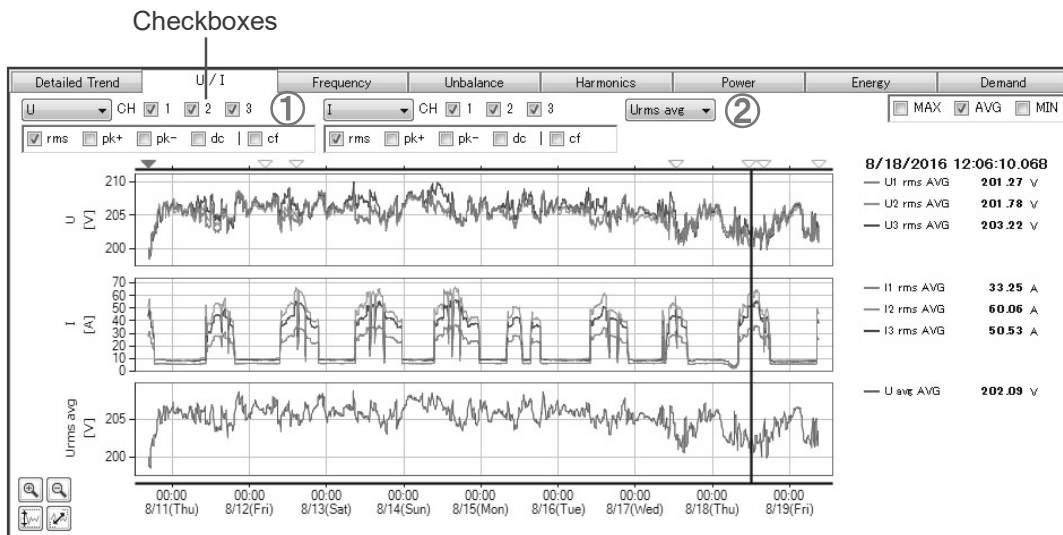
* For details on mains signaling, see the "mains signaling" tab section. ($\Rightarrow$ p.36)

You can display up to three trend graphs at the same time. First, select the parameter you wish to display from the drop-down menu. Selecting [-] hides the tab.

Drop-down menu

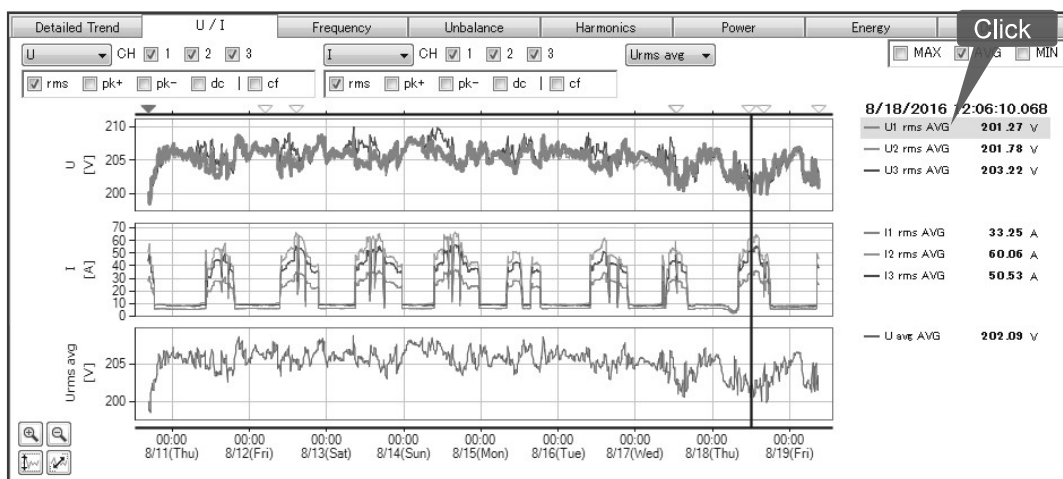


Next, select the channel(s) and detailed measurement parameter settings from the available checkboxes.



- ① If one or more checkboxes are displayed after you select a parameter from the drop-down menu, select the channel(s) and detailed parameter settings using those checkboxes.
- ② If no checkboxes are displayed, the graph will be rendered once you have selected a parameter on the drop-down menu.

You can highlight a parameter so that it is rendered with a thicker line in the graph by clicking it in the legend. Click the parameter in the legend again to cancel the highlighting.

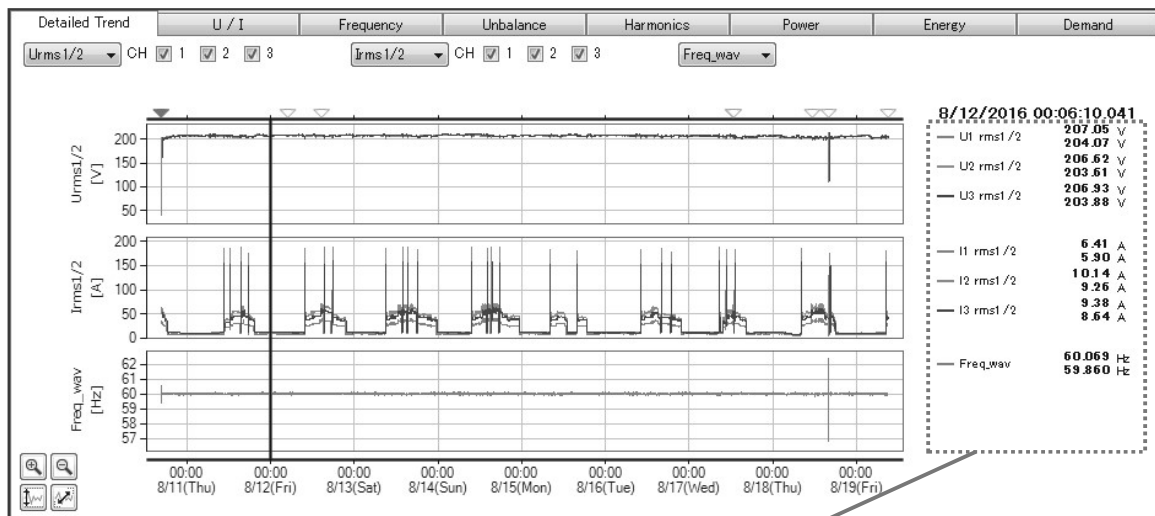


■ [Detailed Trend] Tab

The [Detailed Trend] tab allows you to check the fluctuation range within the recording interval (in the form of the vertical line connecting the maximum and minimum values).

Selectable parameters

PQ3100	PW3198 / PQ3198
U rms1/2	U rms1/2
I rms1/2	I rms1/2
Inrush	Inrush
Freq_wav	Pinst
Pinst	



Two cursor values are shown for each parameter on the [Detailed Trend] tab.

Top value : Maximum value during the recording interval

Bottom value : Minimum value during the recording interval

■ [U/I] Tab

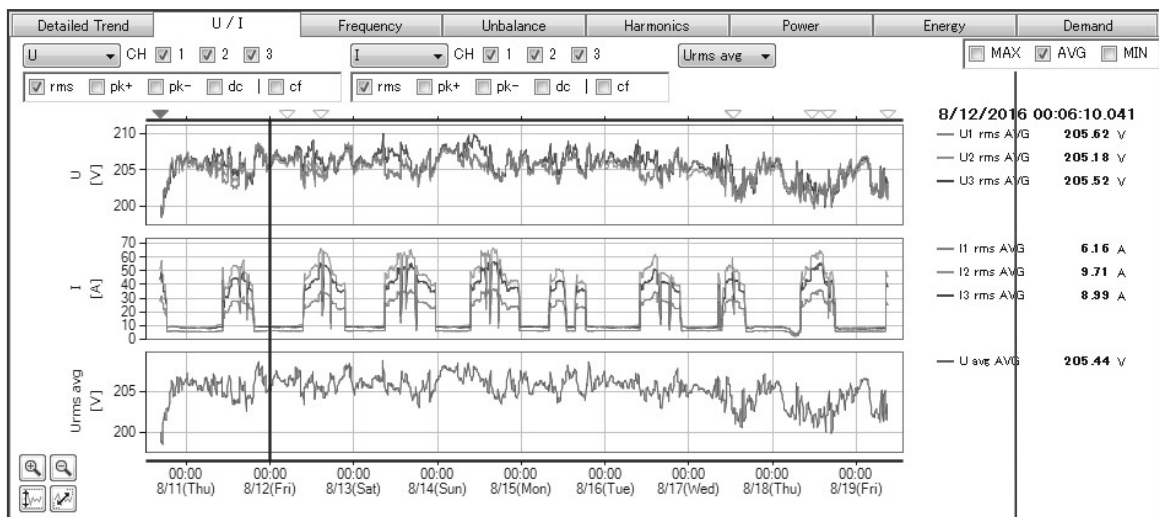
The [U/I] tab displays trend graphs for parameters related to voltage and current.

Select the maximum, minimum, and average value for the recording interval using the checkboxes at the top left of the window(☒ MAX ☒ AVG ☒ MIN).

Selectable parameters

PQ3100	PW3198 / PQ3198
U rms	U rms
U pk+	U pk+
U pk-	U pk-
U dc	U dc
U cf	I rms
I rms	I pk+
I pk+	I pk-
I pk-	I dc
I dc	U avg
I cf	I avg
U avg	
I avg	

* Udc and Idc of PW3198,PQ3198 data are only CH4 in case of CH4: DC setting.



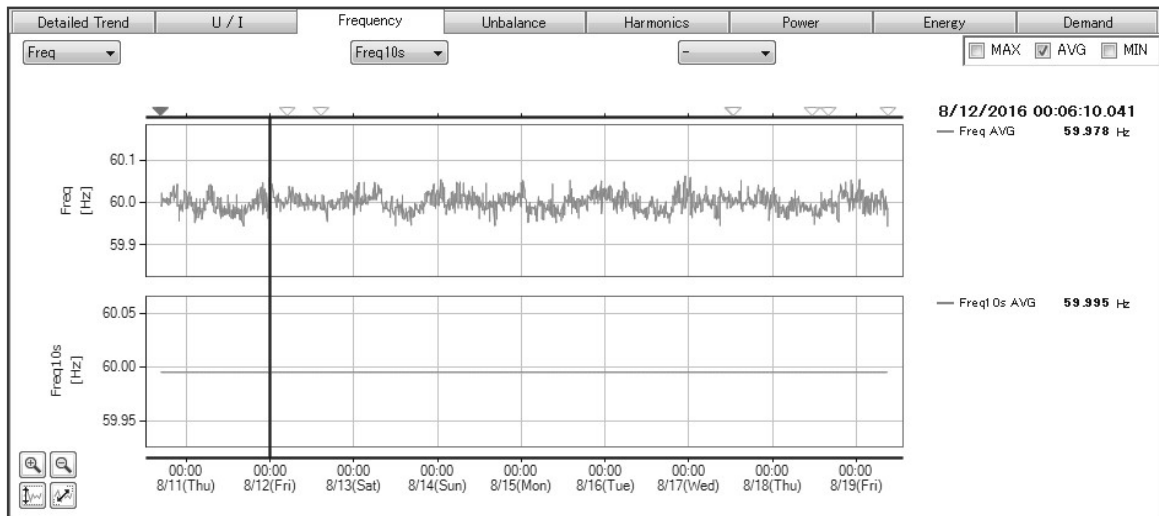
MAX: Maximum value
AVG: Average value
MIN: Minimum value

■ [Frequency] Tab

The [Frequency] tab displays trend graphs for parameters related to frequency.

Selectable parameters

PQ3100	PW3198 / PQ3198
Freq	Freq
Freq10s	f10s



* The frequency (10s) item name of PW3198 / PQ3198 data is displayed as "f10s" from V9.00.

■ [Unbalance] Tab

The [Unbalance] tab displays trend graphs for parameters related to the unbalance factor.

Selectable parameters

PQ3100 / PW3198 / PQ3198

Uunb0

Uunb

Iunb0

Iunb

U zero

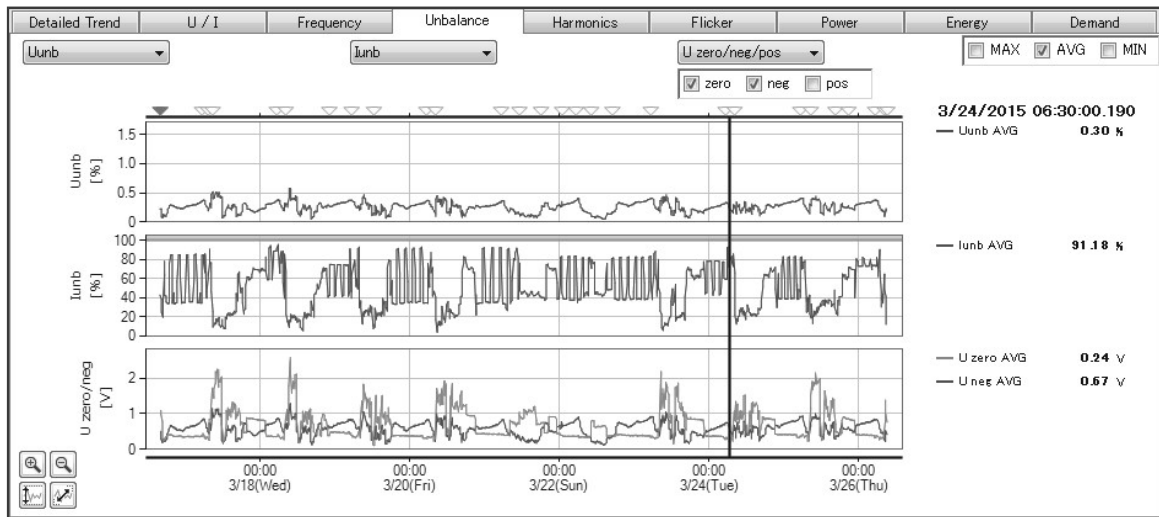
U neg

U pos

I zero

I neg

I pos



■ [Harmonics] Tab

The [Harmonics] tab consists of a [Trend] tab and a [Peak Level] tab .

[Trend] Tab

The [Trend] tab allows you to check trend graphs for THD and the harmonic components of voltage, current, and power.

Selectable parameters

PQ3100

U thd-f/U thd-r

I thd-f/I thd-r

U harm

I harm

P harm

KF

U iharm

I iharm

TDD

PW3198 / PQ3198

U thd-f/U thd-r

I thd-f/I thd-r

U harm

I harm

P harm

KF

U iharm

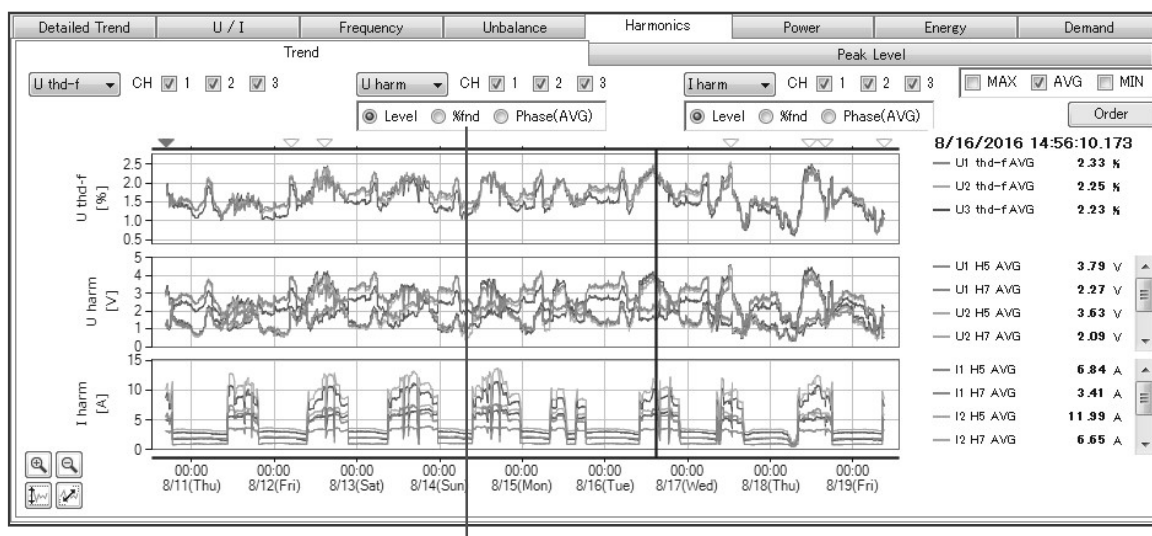
I iharm

U harmH

I harmH

TDD

* For details on TDD(Total Demand Distortion), see Chapter 4 "Setting options". (⇒p.65)



level : Level
%fnd : Content percentage
phase : Phase

[U harm], [I harm], [P harm] ... These values indicate the harmonic components of voltage, current, and power. Select from level, content percentage, and phase.

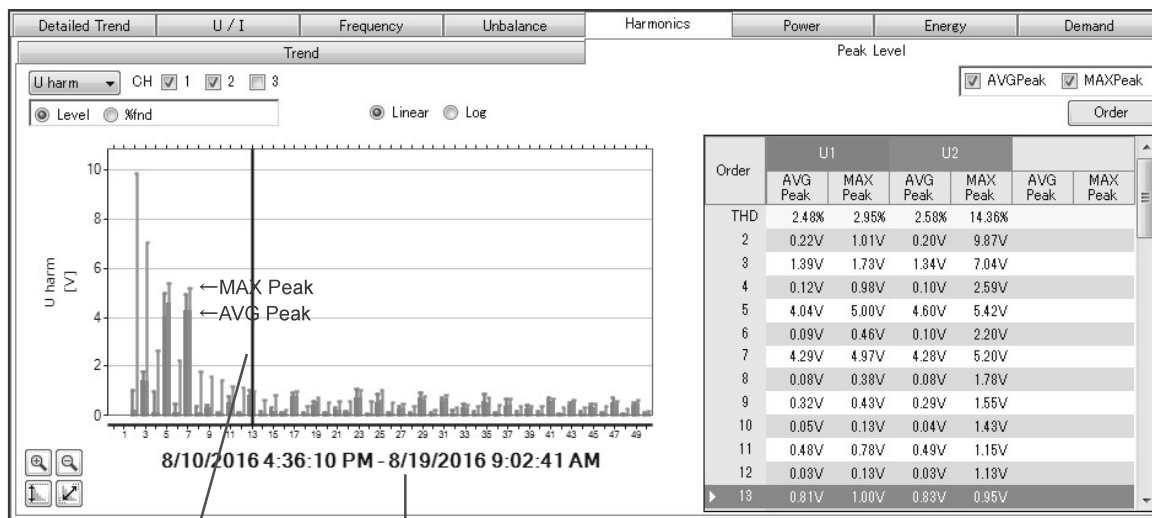
For [U harm] and [I harm] phase data, only the average value (AVG) for the recording interval is displayed. Minimum and maximum values are not shown, even if the MIN or MAX checkboxes are selected

[U iharm], [I iharm] ... These values indicate voltage and current interharmonics. Select from level and content percentage.

Clicking the [Order] button will display a dialog box that allows you to select the harmonic or interharmonic display order.

[Peak Level] Tab

The [Peak Level] tab displays the peak level (maximum value) during the voltage harmonic or current harmonic display interval as a bar graph.



Cursor Peak level detection interval

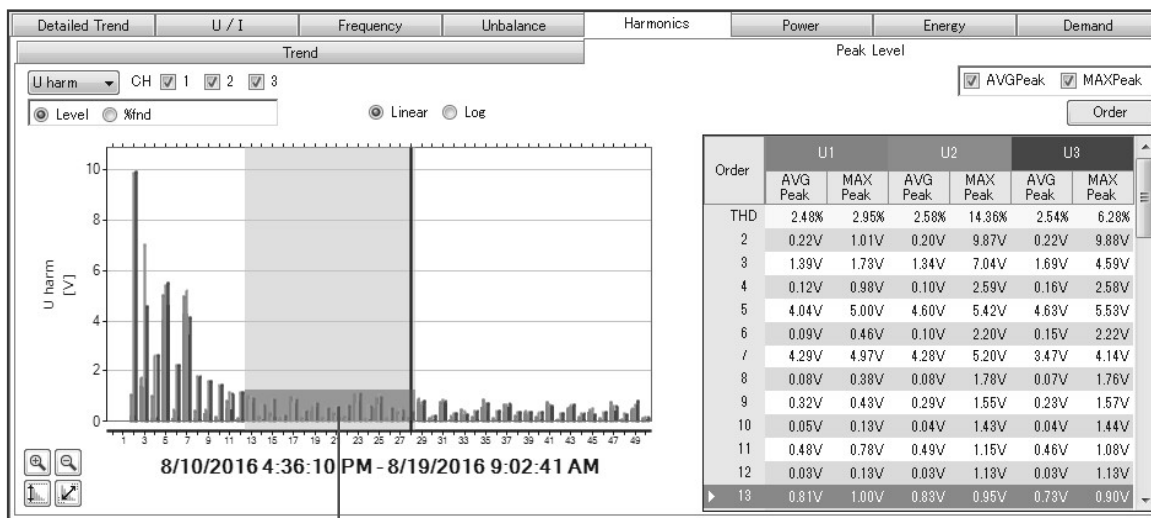
The interval set with the [Period] setting is used as the peak level detection interval. To change the peak level detection interval, change the [Period] setting.

Clicking the harmonic bar graph displays a cursor. You can check the measured value for the order selected with the cursor on the harmonic list on the right side of the window.

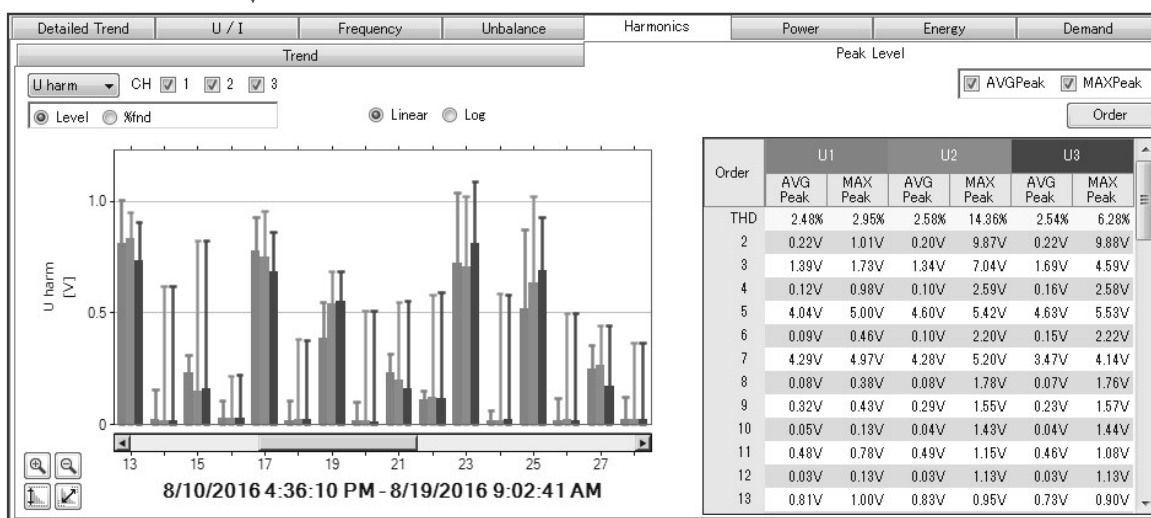
Select the type of peak level using the AVG Peak and MAX Peak checkboxes(☒ AVGPeak ☒ MAXPeak).
 [AVG Peak] detects the peak average value (AVG) during the recording interval.
 [MAX Peak] detects the peak maximum value (MAX) during the recording interval.

Clicking the [Order] button displays a dialog box that allows you to select the display order.

You can zoom in on the bar graph by dragging the mouse.



Zoom in on this area



Clicking  automatically adjusts the range of the Y-axis so that the bar graph being displayed fits on the display.

Clicking  cancels the zoom setting and reverts to the display from the 0th to 50th order.

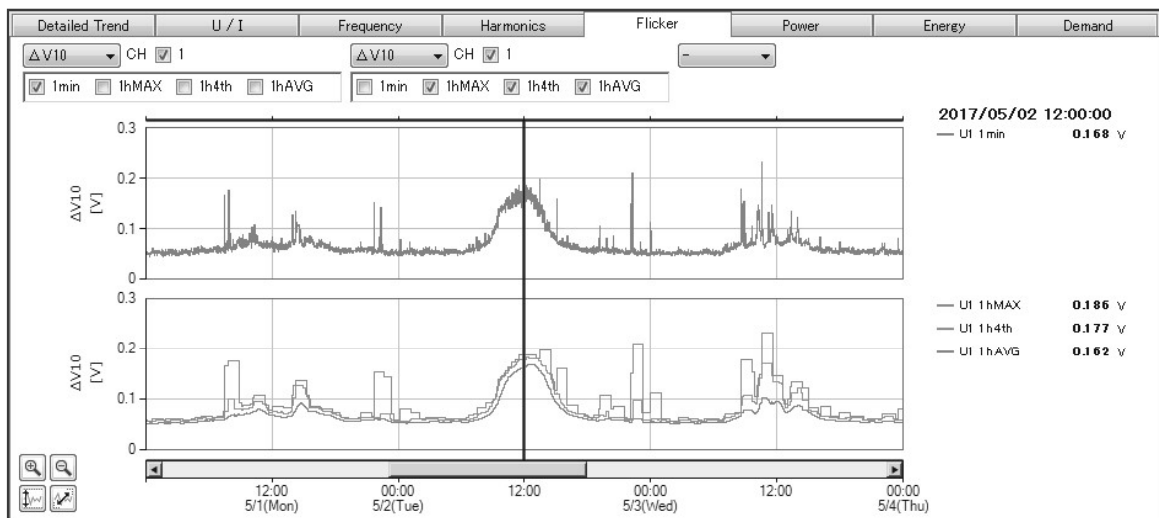
■ [Flicker] Tab

The [Flicker] tab displays trend graphs for parameters related to flicker.

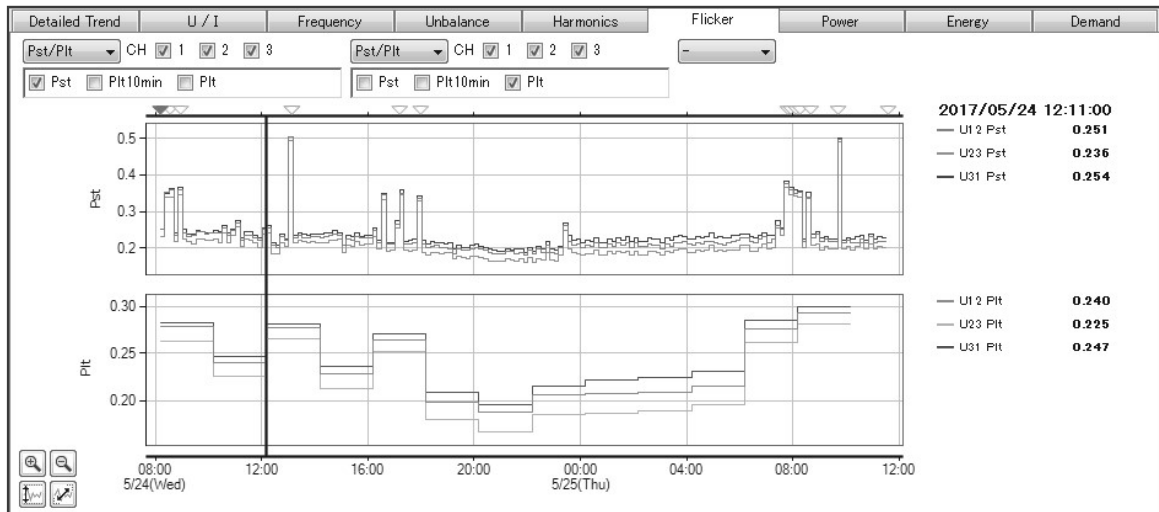
Selectable parameters

PQ3100 / PW3198 / PQ3198

- Pst, Plt
- Pst
- Plt10min
- Plt
- $\Delta V10$
- 1min
- 1hMAX
- 1h4th
- 1hAVG



Example $\Delta V10$ display



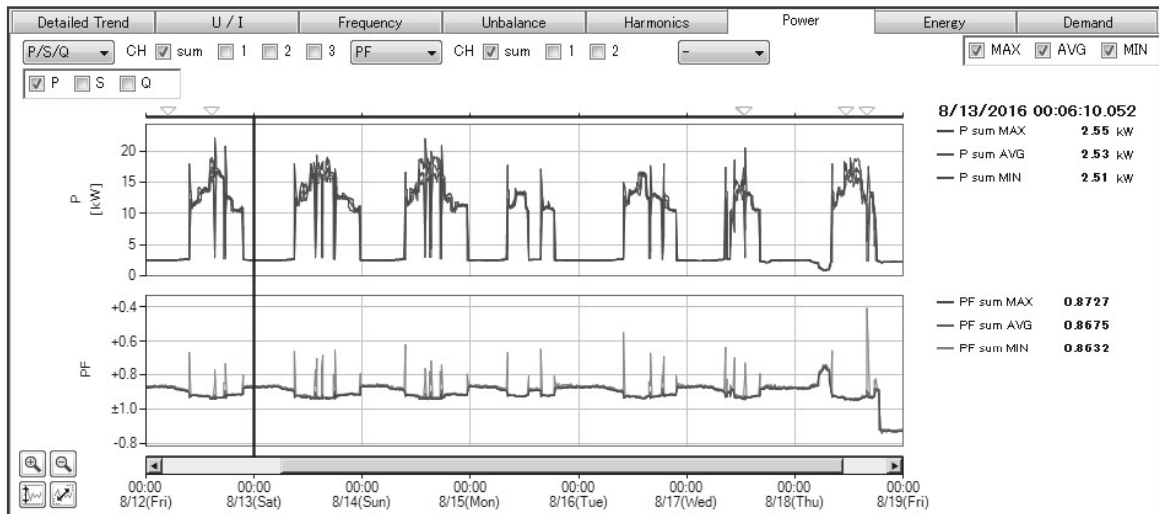
Example Pst/Plt display

■ [Power] Tab

The [Power] tab displays trend graphs for parameters related to power.

Selectable parameters

PQ3100 / PW3198	PQ3198
P	P
S	S
Q	Q
PF/DPF	PF/DPF
	Eff



■ [Energy] Tab

The [Energy] tab displays trend graphs for parameters related to energy.

Selectable parameters

PQ3100

WP+

WP-

WQlag

WQlead

WS

Ecost

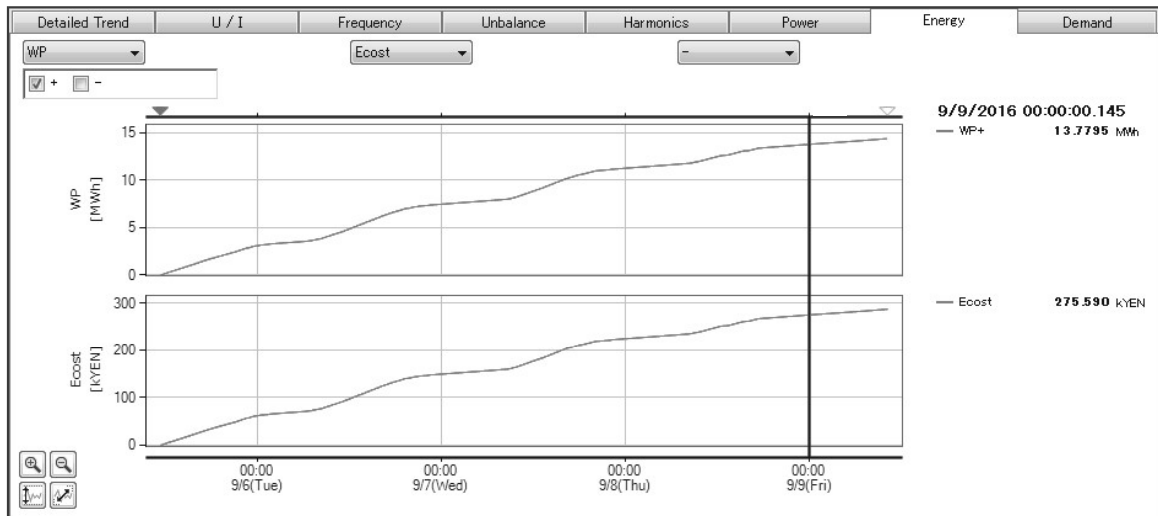
PW3198 / PQ3198

WP+

WP-

WQlag

WQlead



■ [Demand] Tab

The [Demand] tab displays bar graphs for parameters related to demand value / demand quantity.

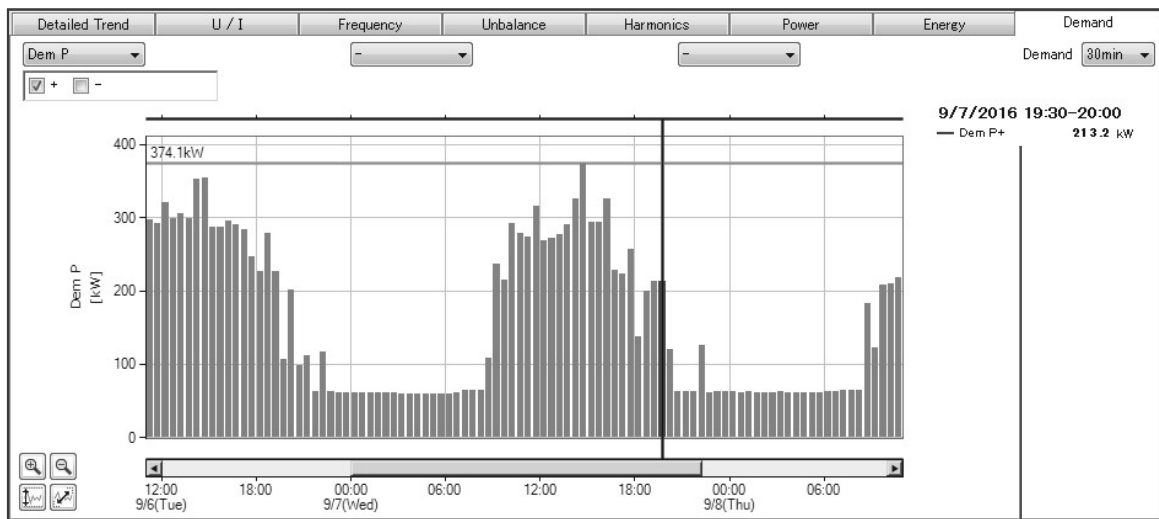
Selectable parameters

PQ3100

Dem P+
Dem P-
Dem Qlag
Dem Qlead
Dem S
Dem PF
Dem WP+
Dem WP-
Dem WQlag
Dem WQlead
Dem WS

PW3198 / PQ3198

Dem P+
Dem P-
Dem Qlag
Dem Qlead



Demand value for time interval shown in different color

Select the demand period from the drop-down menu (Demand **30min**) at the top right of the window. The demand periods that can be selected vary with the recording interval.

- 15min ... Displays demand values for 0 min. to 15 min., 15 min. to 30 min., 30 min. to 45 min., and 45 min. to 60 min. for each hour.
- 30min ... Displays demand values for 0 min. to 30 min. and for 30 min. to 60 min. for each hour.
- 1hour ... Displays demand values for each hour.
- 2hour ... Displays demand values for each two-hour period.

If the recording time does not agree with the end of the demand period, the demand value is calculated for the shifted time period.

Example: If recording begins with a 30 min. recording interval at 00:10, there will be a 10 min. discrepancy between the demand period and the recording time. Consequently, demand values will be calculated and displayed for a series of time periods that have been shifted by 10 min.

■ [mains signaling] Tab

The [mains signaling] tab displays trend graphs for parameters related to mains signaling voltage.

* mains signaling :

The control signal, one of the measurement parameters required by IEC 61000-4-30, is applied to the mains to control various industrial equipment remotely.

For details, see the instruction manual of PQ3198 (V2.00 or later).

Selectable parameters

PQ3198 (V2.00 or later)

Msv1

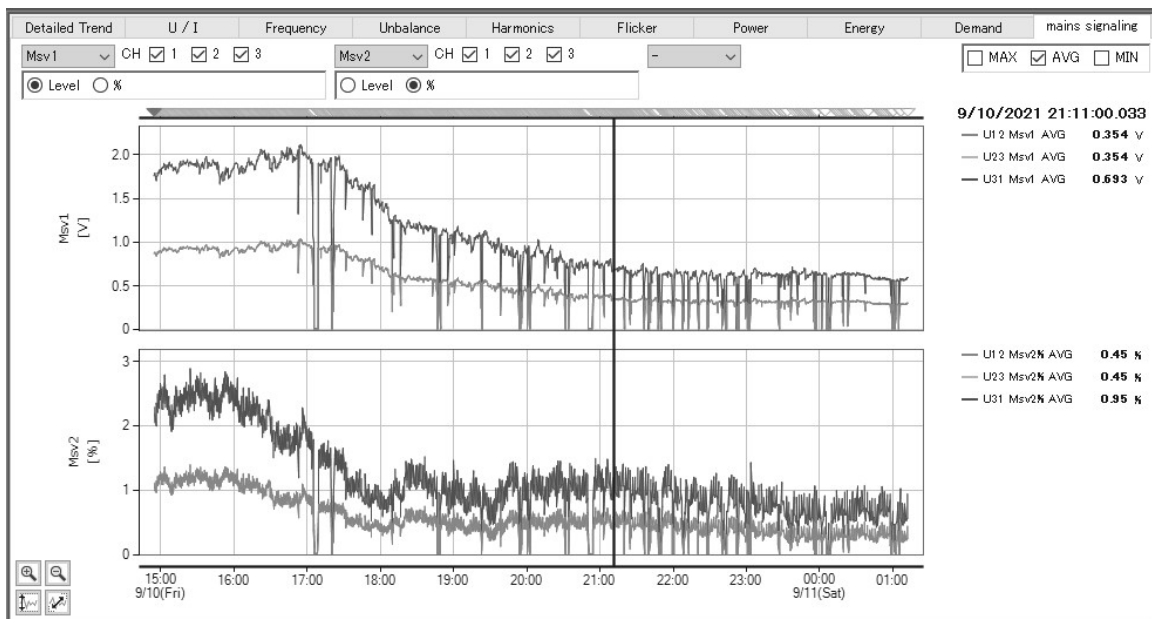
Msv1%

Msv2

Msv2%

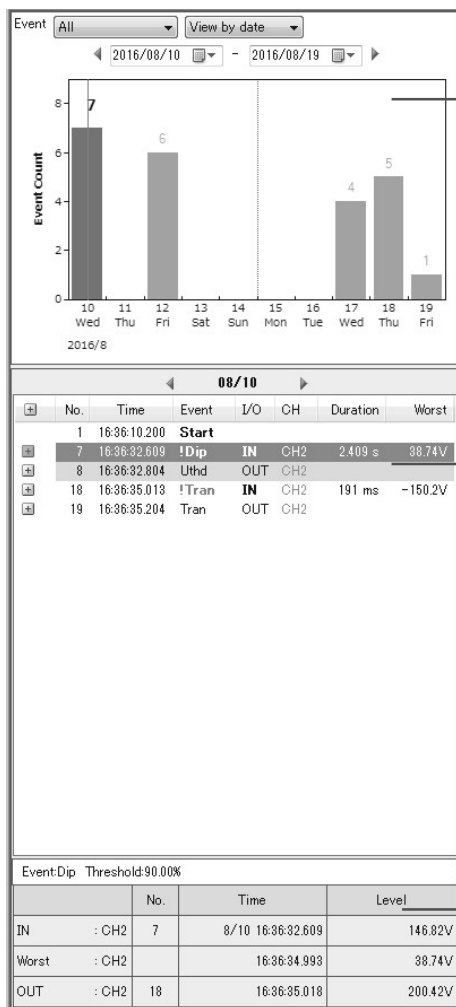
* Msv1 and Msv2 are levels.

Msv1% and Msv2% are content percentages.



3.4. Reviewing events

Using the event list on the left side of the window, you can check the time and characteristics of any events that occurred.



Event Statistics graph
Displays the number of events that occurred as a bar graph.

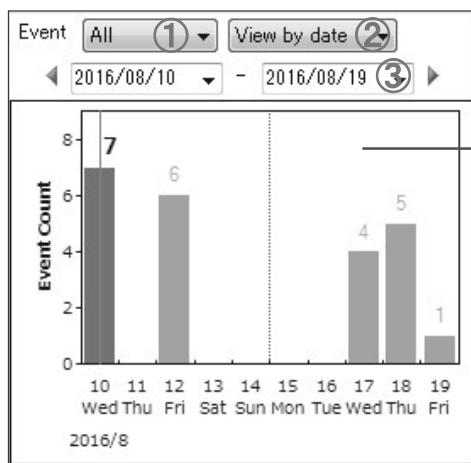
Event list
Displays event characteristics.
Time ... Time at which the event occurred
Event ... Event type
(Red character indicates the event, including a special event data.)
I/O ... IN: Event start / OUT: Event end
CH ... Channel on which event occurred
Duration ... Duration from IN to OUT (displayed at IN)
Worst ... Worst level during event duration (displayed at IN)

Event list (detailed)
Displays the IN time, worst value, OUT time, and level for the selected event.

* In the case of repeated data, the event numbers are reassigned and displayed in the order of measurement data.

* For repeated data, the event number is rearranged in the order of the measured data.

■ Event statistics graph

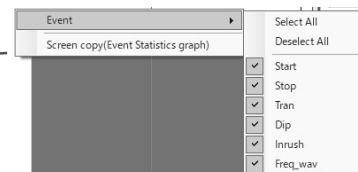


Events that are included in the event statistics graph can be reviewed on trend graphs.

▽ indicates the event's start time.

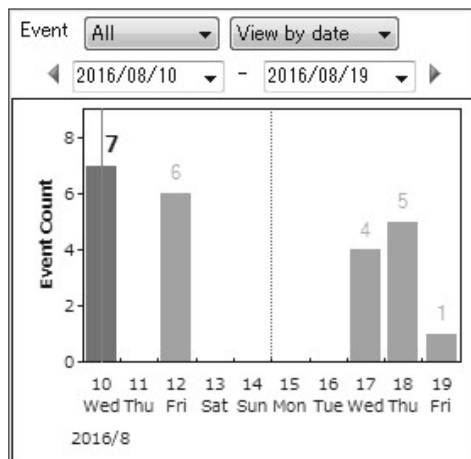
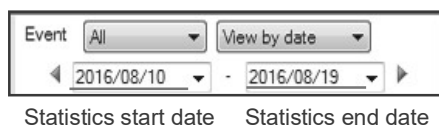
▼ indicates the event that is selected on the event list.

- ① Selects which events to include in the count.
Selecting [All] causes all events to be included in the count. Selecting a particular type of event causes only occurrences of that event to be counted. For events with IN and OUT times, IN times are counted.
If you select [Custom], you can select multiple events.
(Select the event from the pop-up menu.)

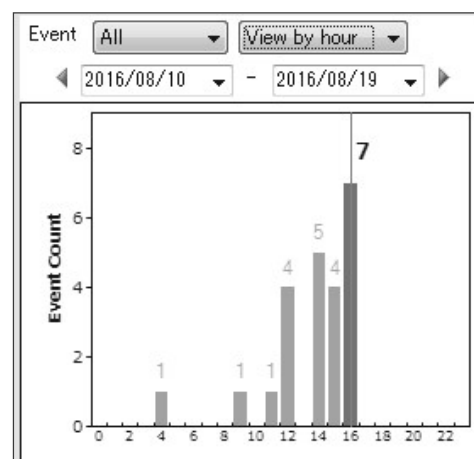


- ② Selects the type of statistic.
[View by date] tabulates the number of events for each day.
[View by hour] tabulates the number of events by hour (in units of 1 hour.).
[ITIC Curve] displays ITIC curve (tolerance curve). (⇒p.40)
[User-defined Curve] displays a user-specified limit curve. (⇒p.41)

- ③ Sets the statistic period.
If you wish to tally events during a specific period or display a statistics graph starting with a particular day of the week, this setting allows you to specify that period of time (in days).



Example [View by Date] display

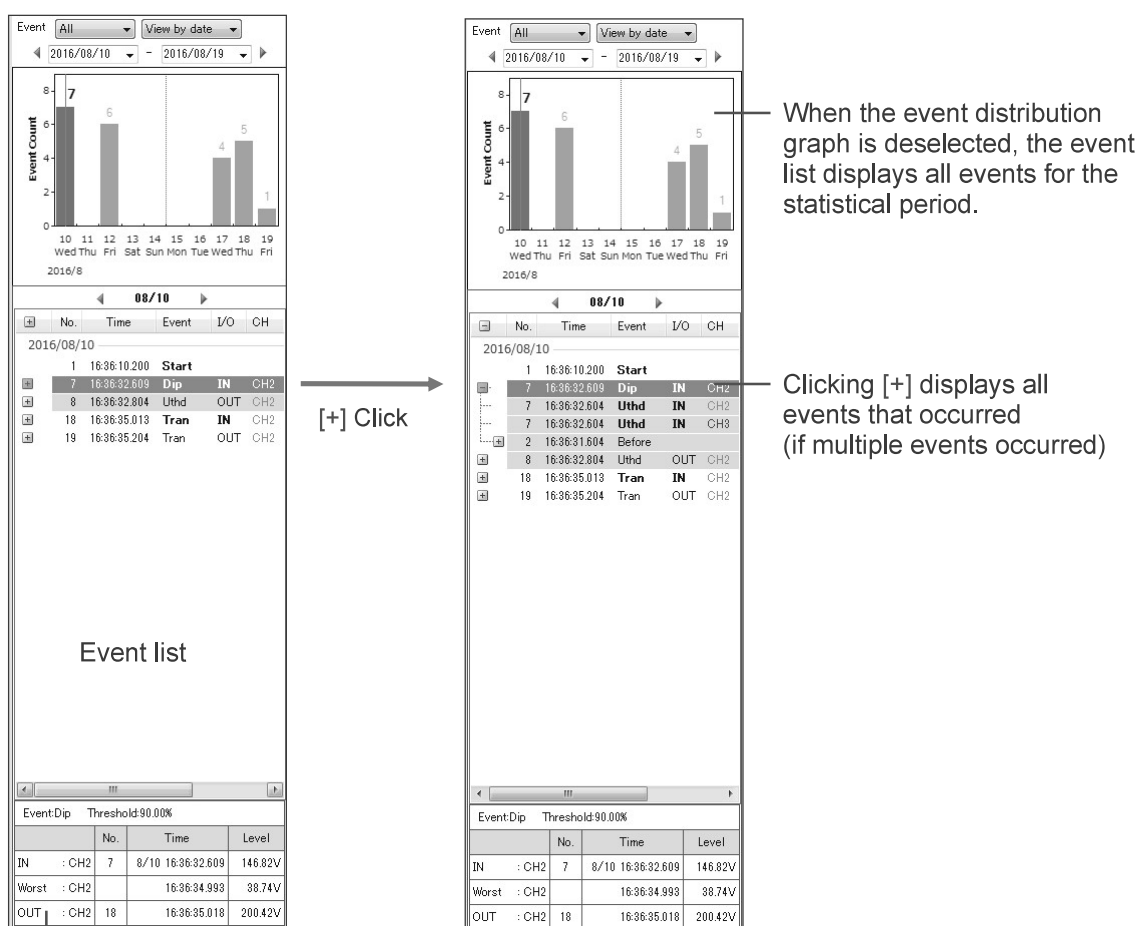


Example [View by Hour] display

■ Event list

Clicking on the event statistics graph displays a cursor. The event list displays data for the bar graph that is selected with the cursor.
(When the cursor is hidden, all events are displayed.)

Events included in the event statistics graph (that is, events selected as described in ① on the previous page) are displayed in bold.



Event list (detailed)

Detailed information is displayed for the selected event. For events with IN and OUT times, the same information is displayed regardless of which time is selected.

* For PW3198 data, some of the event names are replaced with the name of PQ3100.

▪ Irms1/2 → Inrush

* For PW3198 / PQ3198 data, some of the event names are replaced with the name of PQ3100.

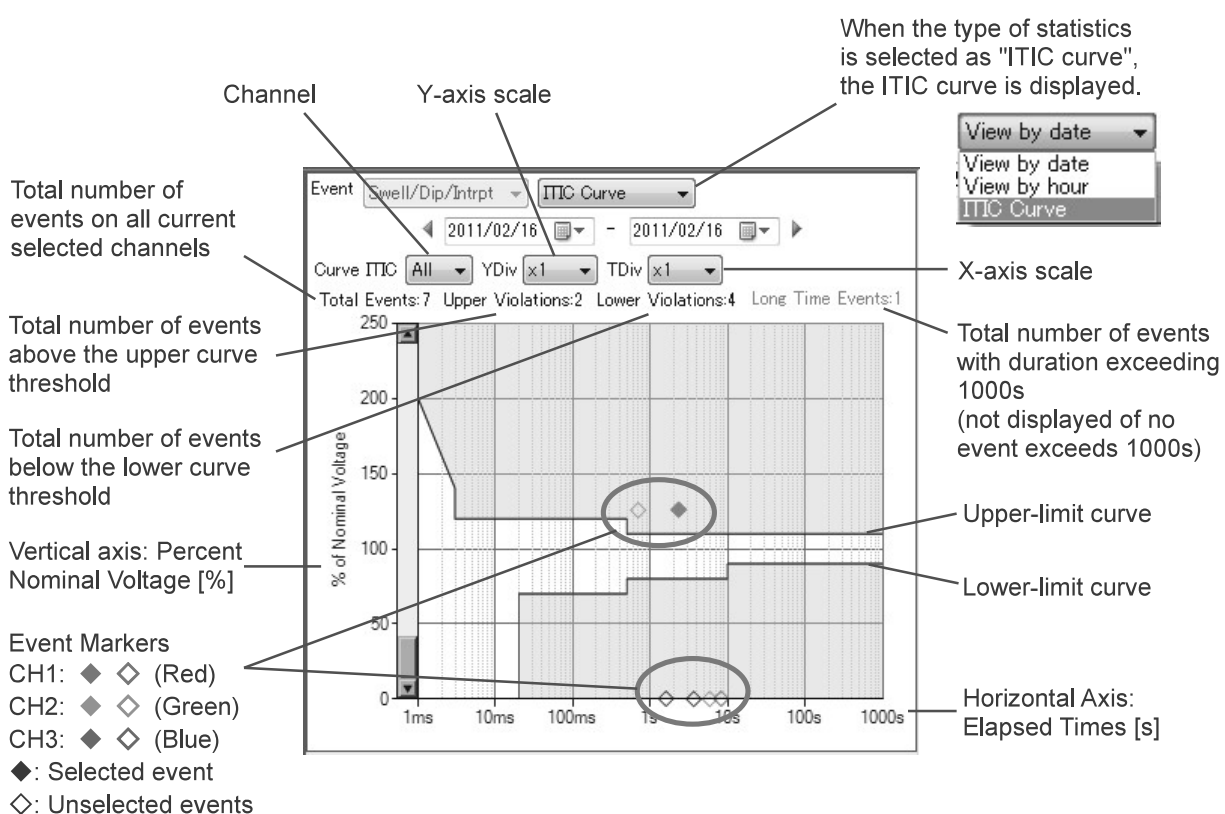
▪ Cont → After

* In the After (Cont) event display, if the end time of the event waveform and the start time of the next event do not match, the After (Cont) events may not be displayed.

■ ITIC Curve

Voltage swell, dip, and interruption data are displayed on a graph and judged against ITIC 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)
Transient	Transient Width	Maximum Transient Voltage

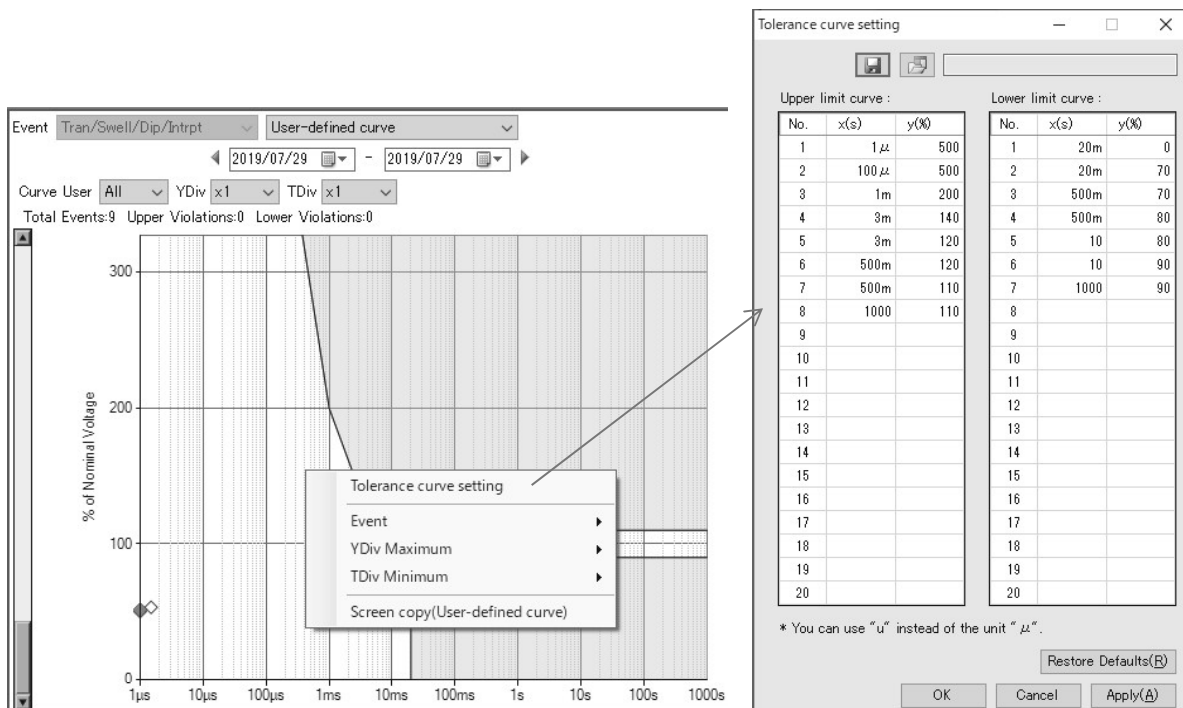


Click on the event mark to change the selected event.

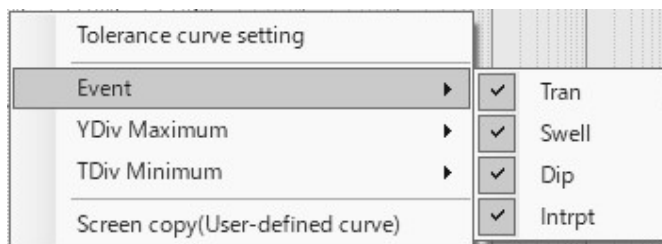
* Events with duration of less than 1 μ m will not be marked.

■ User-defined Curve

You can display a user-defined curve (Tolerance curve) in which the upper and lower limit value curves can be set. Select [Tolerance curve setting] from the context menu to display the setting dialog. The default is the ITIC curve setting value.



In the user-defined curve, you can select the target event from the context menu



For ITIC curves and user-defined curves, you can select the display range from the context menu.

- YDiv maximum value : 500% to 2000% (default) (100% delimiter)
- TDiv minimum value : 1μs (default), 100μs, 1ms

3.5. Viewing event data

This section describes how to display detailed data for the event that is selected in the event list. Event data is recorded using approx. 200ms aggregation.

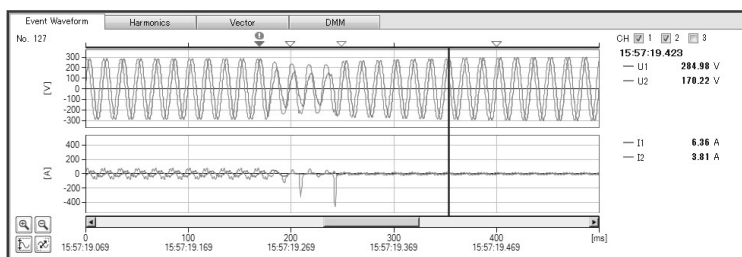
Event data is displayed on the following four tabs: [Event Waveform], [Harmonics], [Vector], and [DMM].

[Event Waveform] displays the voltage waveforms and current waveforms from CH1 to CH4.

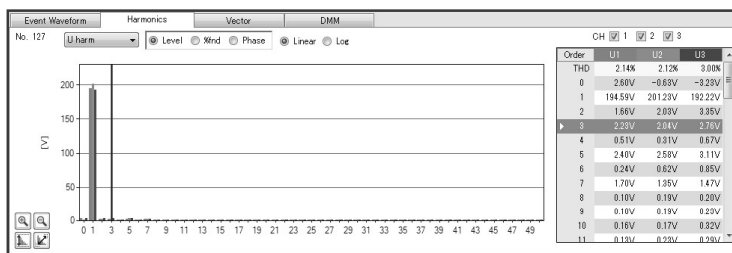
[Harmonics] displays the harmonic voltage, harmonic current, and harmonic power as a bar graph and list.

[Vector] displays the phase relationship between voltage and current as a vector diagram.

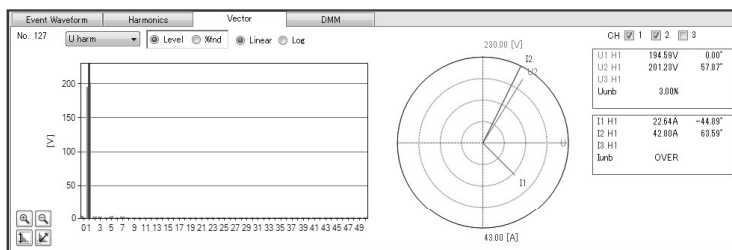
[DMM] displays measured value lists for voltage, current, and power.



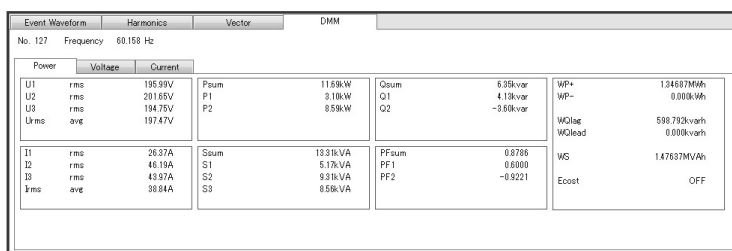
[Event Waveform]



[Harmonics]



[Vector]



[DMM]

■ [Event Waveform] Tab

Select the channel(s) you wish to display using the checkboxes (CH ☒ 1 ☒ 2 ☒ 3) on the right side of the window.

Select the voltage/current waveform you wish to display using the checkbox (☒ U ☒ I) on the left side of the screen.

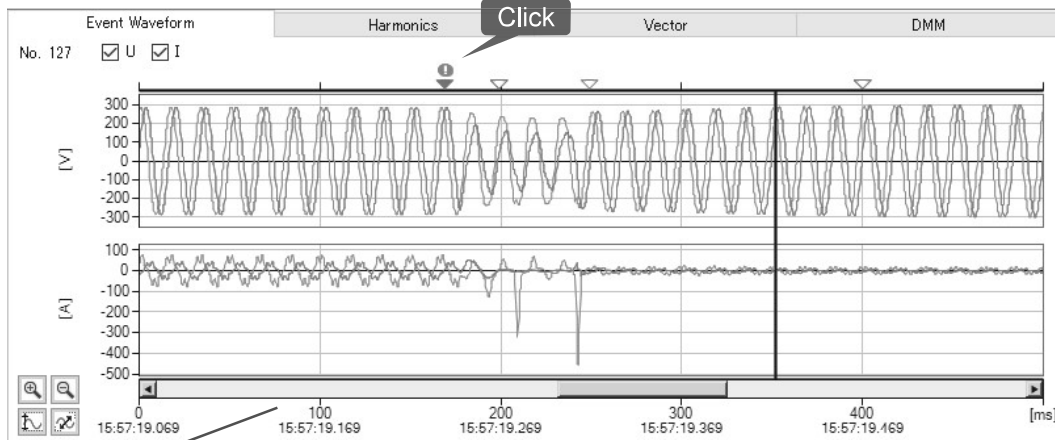
▼ indicates an event occurrence. (▼ indicates the event that is selected in the event list.)

! indicates the presence of special event data. Clicking the icon opens a separate window displaying the data. For more information about each type of data, see your Power Quality Analyzer's user manual.

Dip, Swell, Intrpt, Inrush IN → Displays event trend data.

Tran IN → Displays transient waveforms.

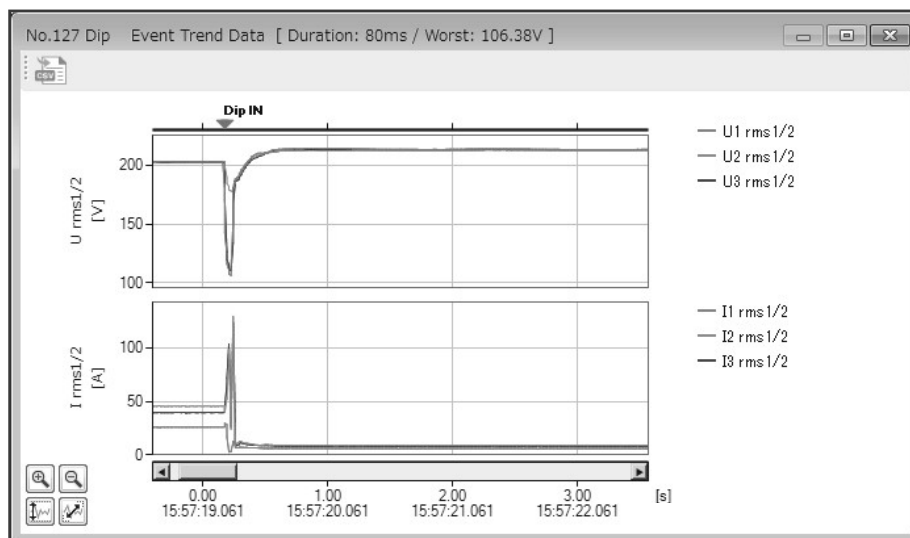
UharmH, IharmH IN → Displays High-order Harmonics.



Time axis

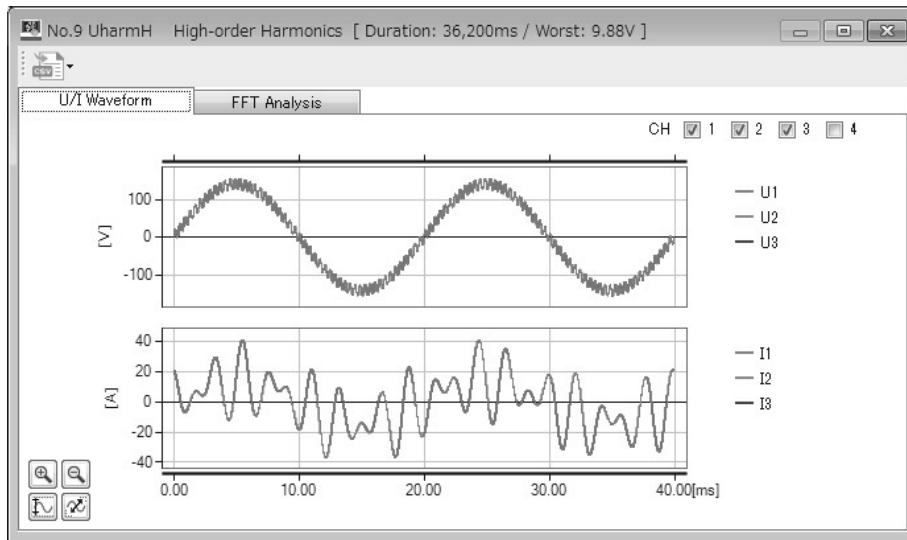
Top: Elapsed time, where the start time of the approx. 200 ms aggregation is treated as 0 ms

Bottom: Time



Example event trend data display

The PW3198 and the PQ3198 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).

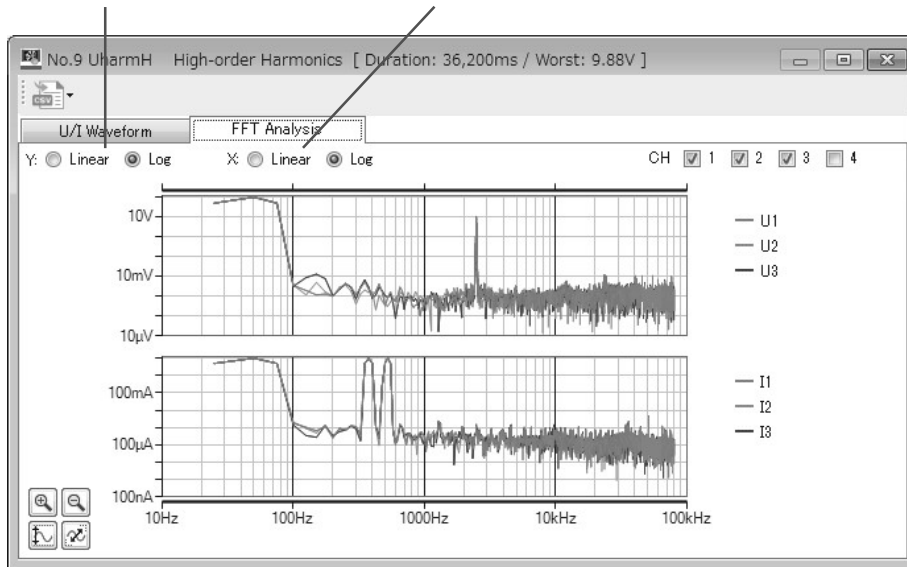


Example high-order harmonics display

The frequency analysis can be displayed on the screen displaying the high-order harmonic waveform.

Y-axis scale
Linear (equal interval)
Log (log axis)

X-axis scale
Linear (equal interval)
Log (log axis)

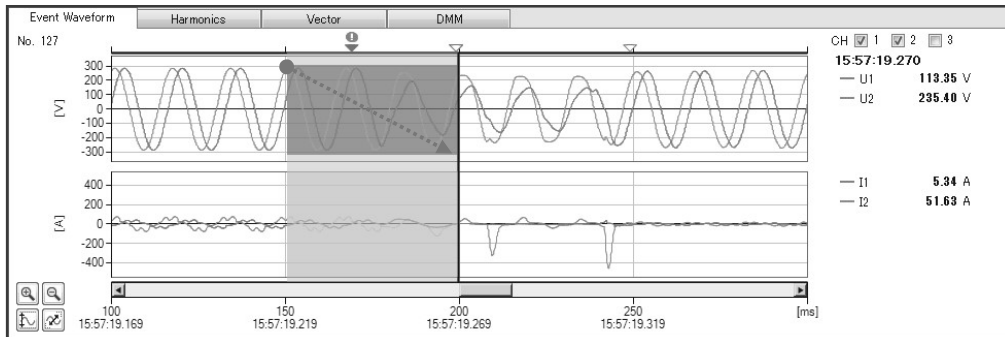


Example frequency analysis display

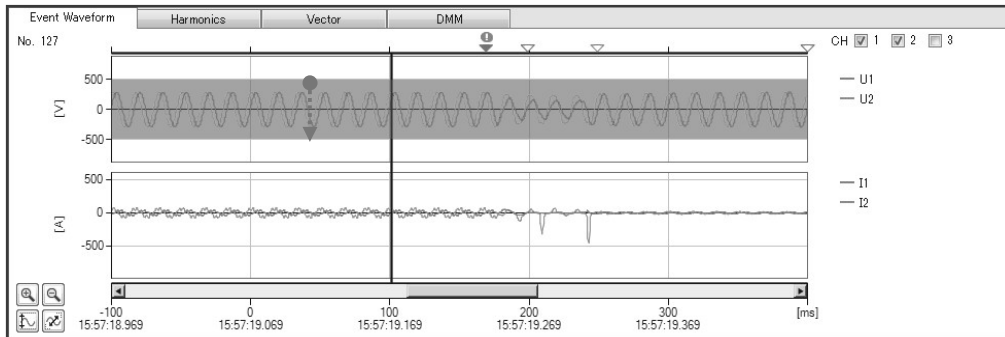
- * If the frequency analysis display does not appear, please install "Visual C ++ Redistributable Package for Visual Studio 2015" on your PC.

Zooming in on waveform graph

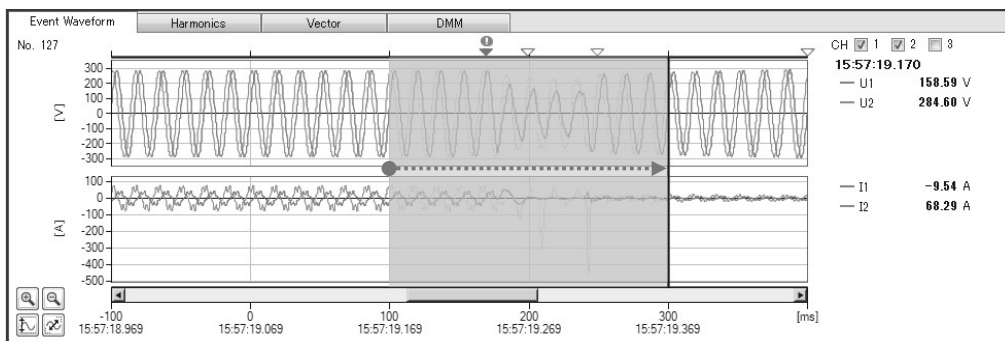
You can zoom in on a graph by dragging the mouse.



Drag the mouse diagonally to zoom in on both the Y-axis and X-axis (time axis).



Drag the mouse vertically to zoom in on only the Y-axis.

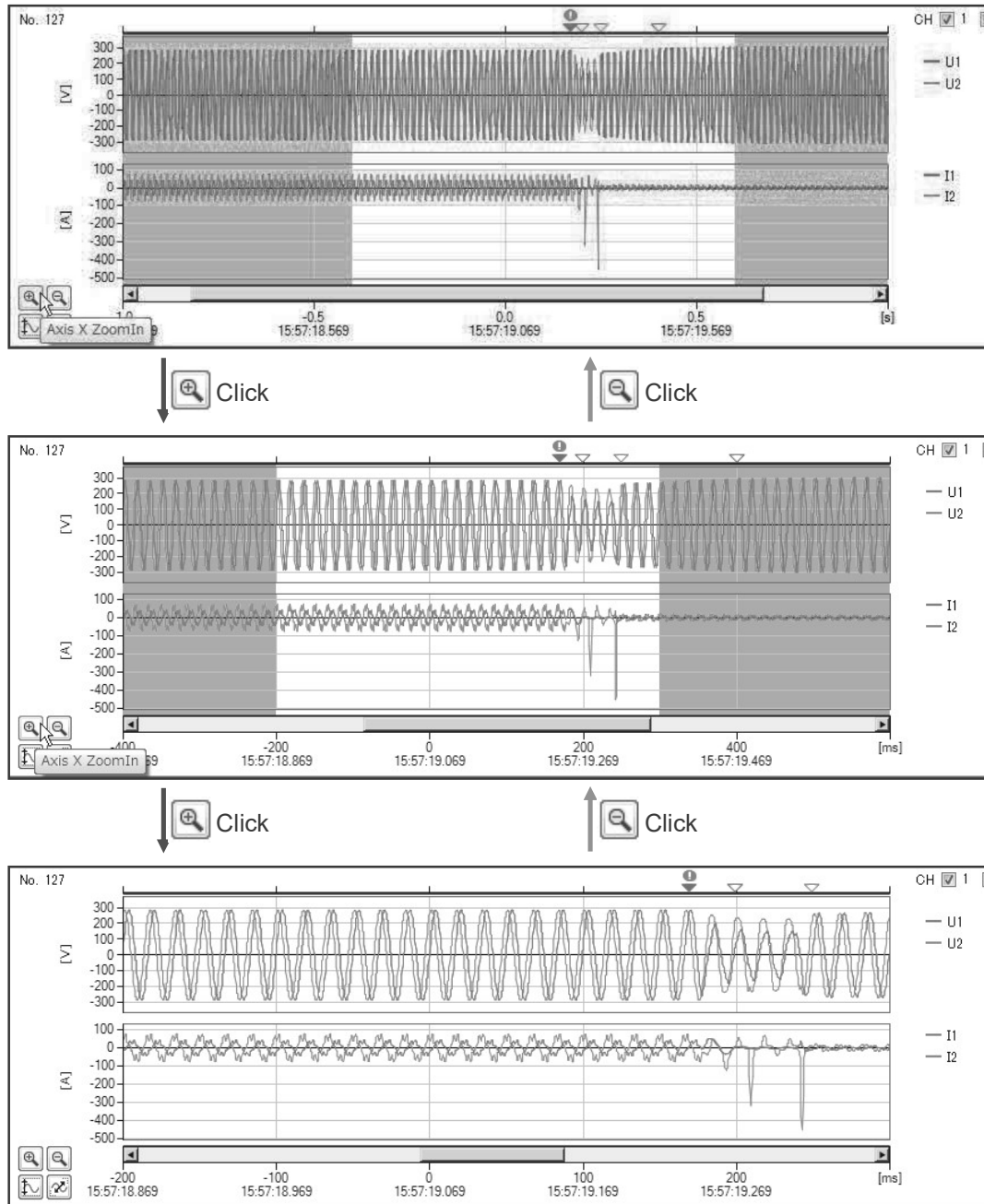


Drag the mouse horizontally to zoom in on only the X-axis.

Automatically adjusting the X-axis on waveform graphs

Click  to zoom in on the X axis range. Click  to zoom out the X axis range.

Move the mouse cursor over  to display the zoom area on the graph.

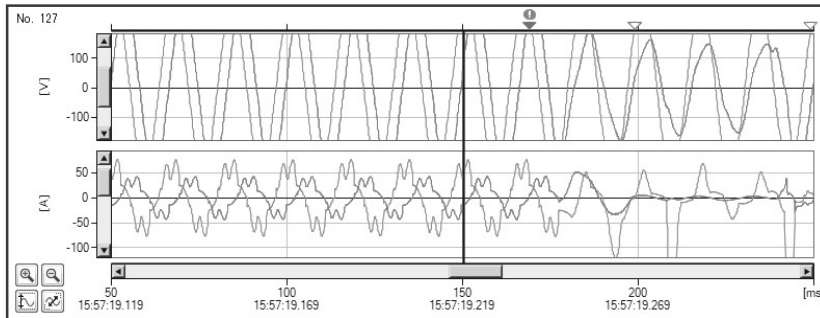


When the cursor is displayed, adjust the range around the cursor position as the center.

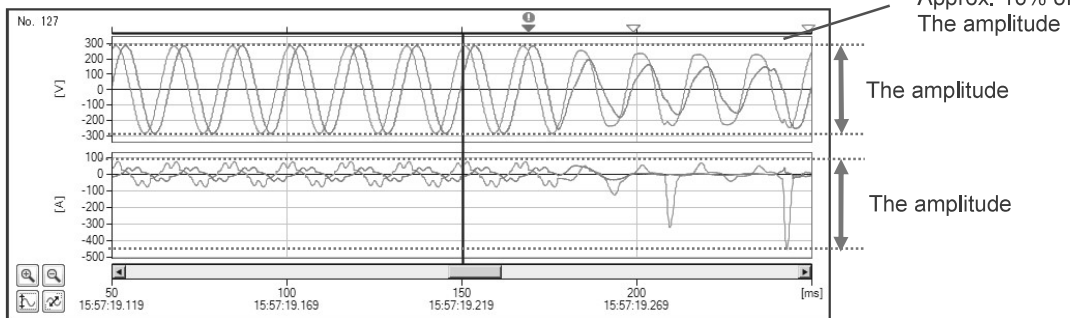
Automatically adjusting the Y-axis on waveform graphs

Clicking  automatically adjusts the range of the Y-axis so that the waveform peak during the period fits on the graph.

Clicking successively cycles the adjusted range through scale settings (1) through (2) below.

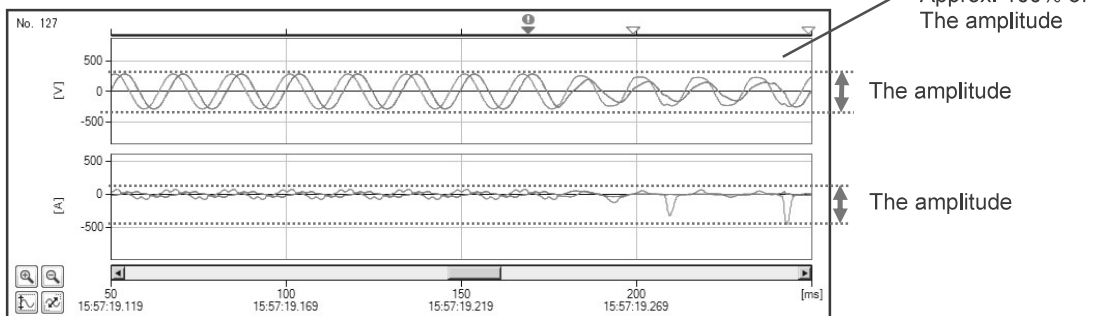


↓  First click



(1) Y-axis range : The amplitude $\pm$ a margin of approximately 10%

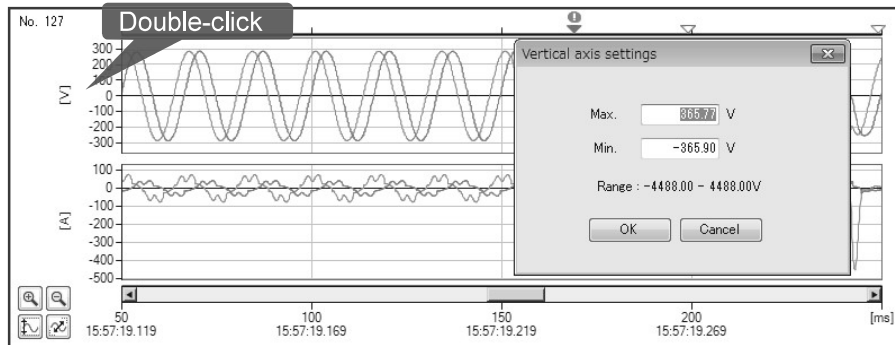
↓  Second click



(2) Y-axis range : The amplitude $\pm$ a margin of approximately 100%

Clicking  one more time reverts the graph to scale (1).

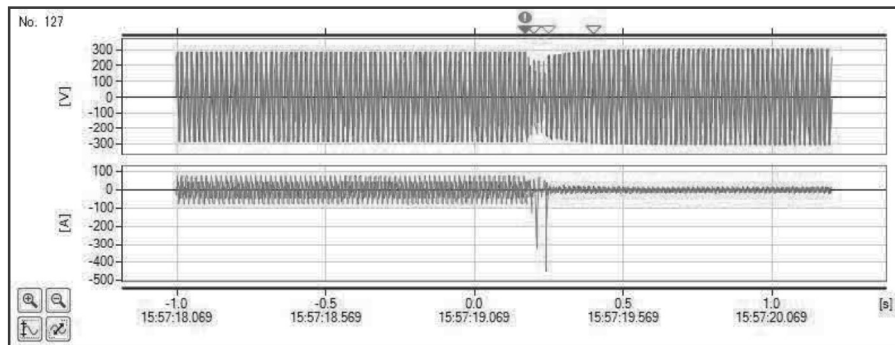
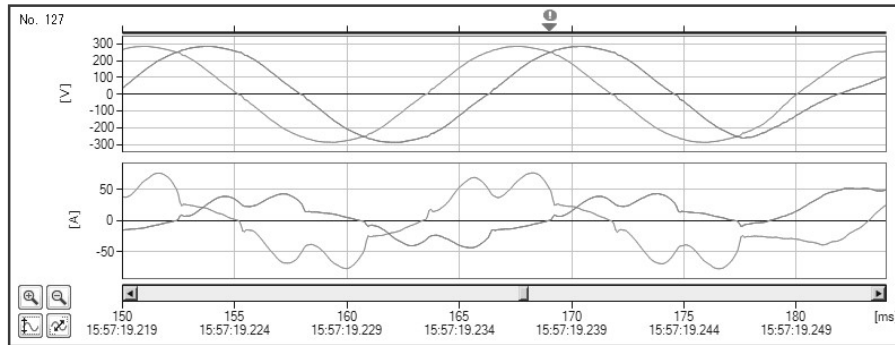
Double-clicking on the Y-axis allows you to specify the display range for the Y-axis.



Displaying the entire waveform graph

Clicking  allows you to display the entire waveform graph by canceling any zoom setting that has been applied to the graph.

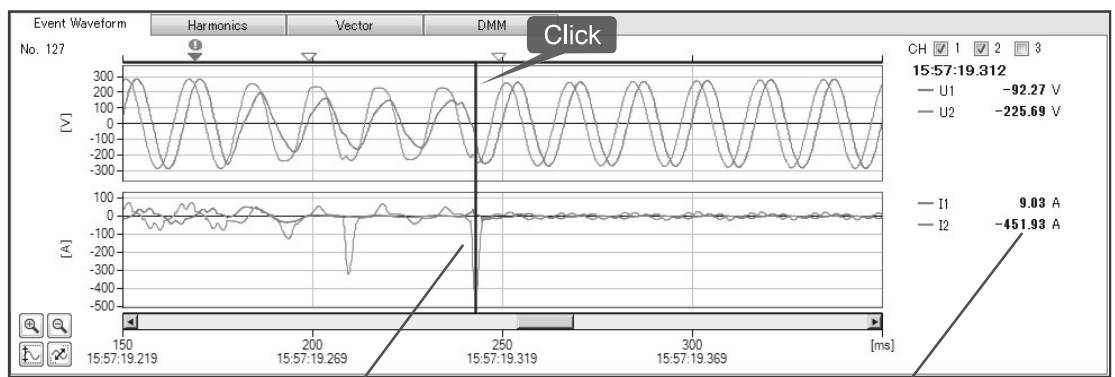
(This button let you revert both the X-axis and Y-axis on the graph to their initial states.)



Displaying measured values

Clicking inside the waveform graph area displays a cursor along with the measured value at that time.

To move the cursor, click at the position to which you wish to move it.
Clicking outside the waveform graph area hides the cursor.

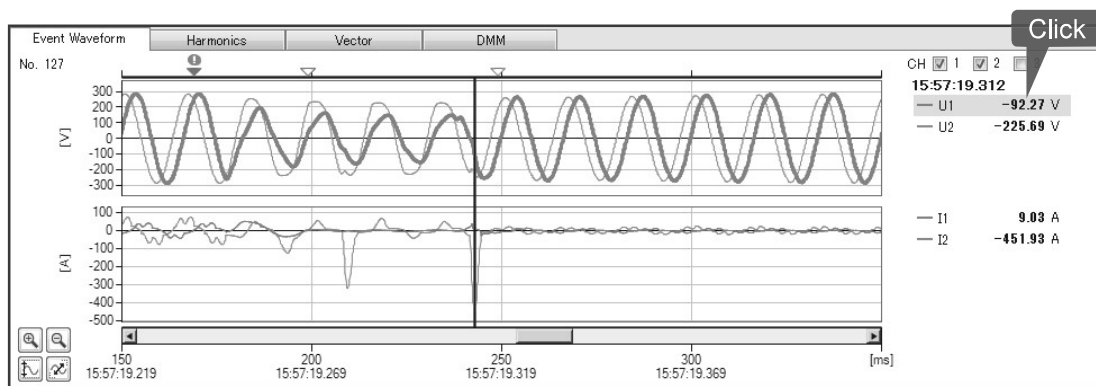


Cursor

Cursor time and measured value

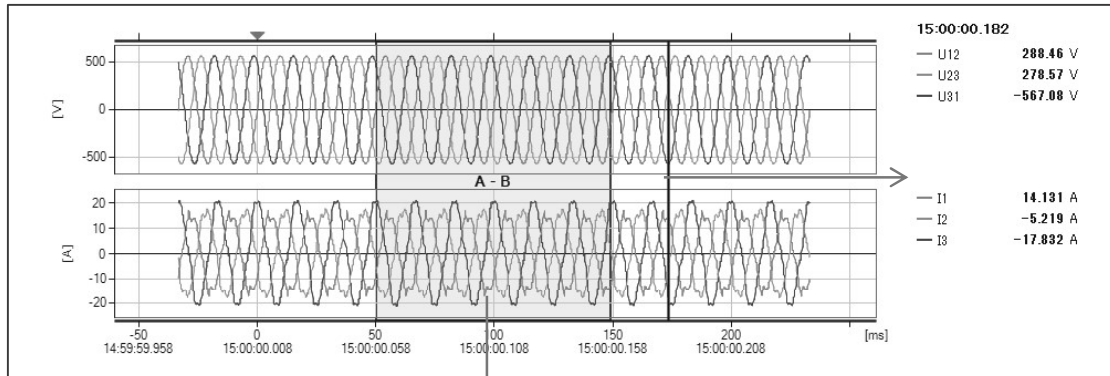
Highlighting a waveform graph

You can highlight a parameter so that its graph is rendered with a thicker line by clicking it in the legend. Click the parameter in the legend again to cancel the highlighting.



Displaying A and B cursor

You can display the A and B cursor in addition to the cursor in the event waveform graph. You can use the A and B cursor to view the readings at the cursor position and to determine the maximum, minimum, and difference between cursors.

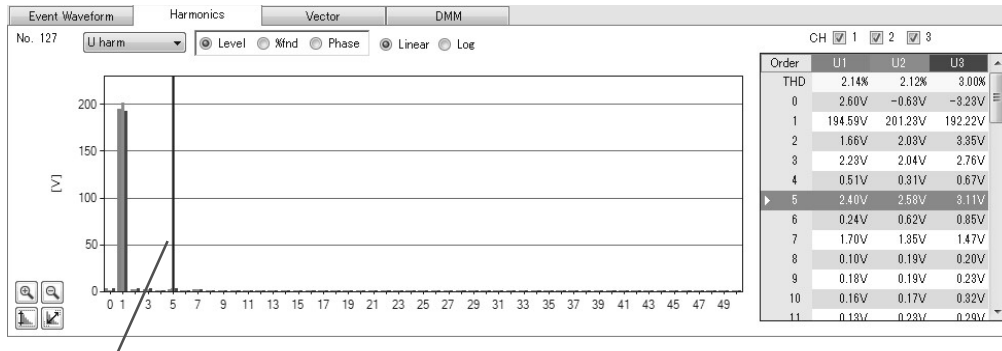


Event Waveform A - B						
	A	B	$\Delta(B-A)$	MAX	MIN	
Time	15:00:00.058	15:00:00.157	0.099 s			
U12 [V]	-22.84	-148.45	-125.60	565.38	-565.20	
U23 [V]	-486.50	-407.28	79.22	566.89	-566.80	
U31 [V]	509.25	555.59	46.34	567.60	-568.16	
I1 [A]	-10.675	-12.666	-1.991	17.259	-17.244	
I2 [A]	-0.717	2.045	2.762	17.885	-17.893	
I3 [A]	20.510	20.487	-0.023	21.341	-21.265	

To move the cursor, drag and move the cursor you want to move.

■ [Harmonics] Tab

The [Harmonics] tab displays voltage harmonics and current harmonics as a bar graph using approx. 200 ms aggregation.

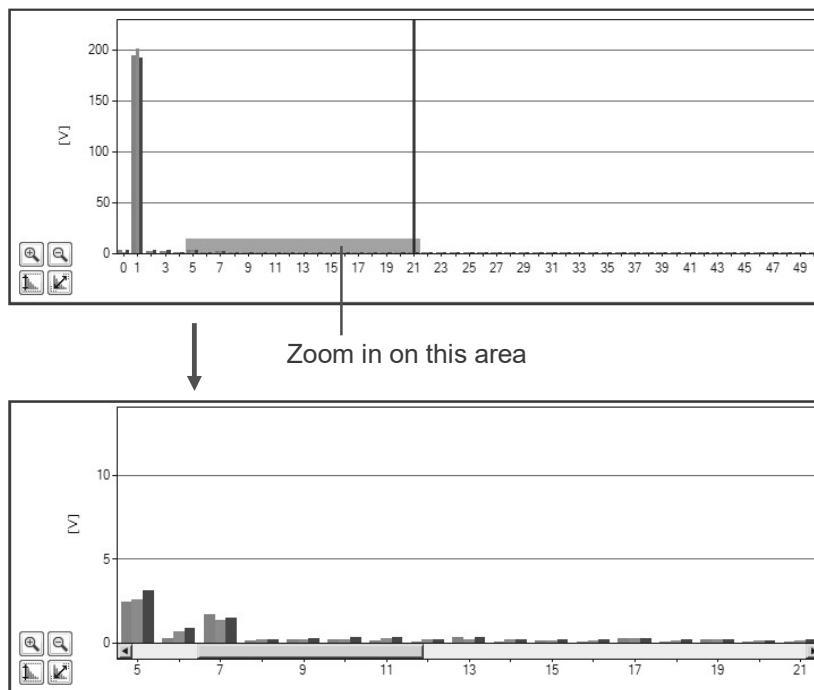


Cursor

Clicking the harmonic bar graph displays a cursor.

You can check the measured value for the order selected with the cursor in the harmonic list on the right side of the window.

In addition, you can zoom in on the bar graph by dragging the mouse.



Clicking  automatically adjusts the range of the Y-axis so that the displayed bar graph fits on the display.

Clicking  cancels the zoom setting and reverts to the display from the 0th to 50th order.

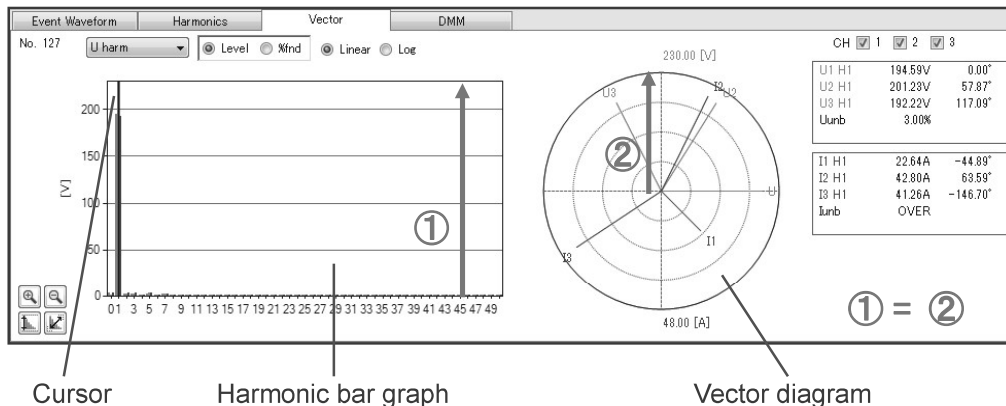
Click  to zoom in on the X axis range. Click  to zoom out the X axis range.

Double-clicking on the Y-axis allows you to specify the display range for the Y-axis.

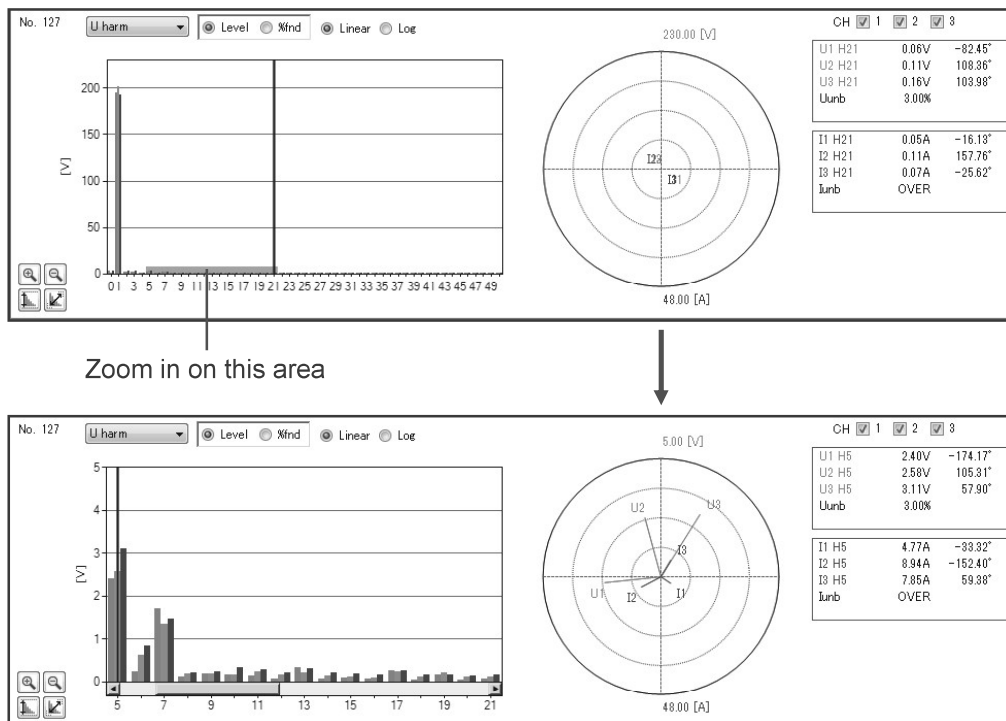
■ [Vector] Tab

The [Vector] tab displays the phase relationship between the voltage (U harm) and current (I harm) as a vector diagram for each harmonic order from CH1 to CH4.

Clicking inside the harmonic bar graph area displays a cursor. The vector diagram for the order selected with the cursor is displayed on the right side of the window.



The range of the Y-axis on the bar graph ① is used as the radius of the vector diagram ②. To zoom in on the vector diagram, drag the mouse to zoom in on the harmonic bar graph.



The vector diagram zooms in along with the harmonic bar graph.

Vectors for [U harm] and [I harm] parameters not displayed on the bar graph are not changed.

Clicking     allows you to zoom in and out of the bar graph.

■ [DMM] Tab

The [DMM] tab displays measured values at the time of event occurrence using approx. 200 ms aggregation. The interface consists of [Power], [Voltage], and [Current] tabs.

• [Power] Tab

The [Power] tab displays parameters related to power.

Event Waveform				Harmonics				Vector				DMM			
No. 127				Frequency 60.158 Hz											
Power				Voltage				Current							
U1	rms	195.99V		Psum	11.69kW			Qsum	6.35kvar			WP+	1.34687MWh		
U2	rms	201.65V		P1	3.10kW			Q1	4.13kvar			WP-	0.000kWh		
U3	rms	194.75V		P2	8.59kW			Q2	-3.60kvar			WQlag	598.792kvarh		
Urms	avg	197.47V										WQlead	0.000kvarh		
I1	rms	26.37A		Ssum	13.31kVA			PFsum	0.8786			WS	1.47637MVAh		
I2	rms	46.19A		S1	5.17kVA			PF1	0.6000			Ecost	OFF		
I3	rms	43.97A		S2	9.31kVA			PF2	-0.9221						
Irms	avg	38.84A		S3	8.56kVA										

• [Voltage] Tab

The [Voltage] tab displays parameters related to voltage.

Event Waveform				Harmonics				Vector				DMM			
No. 127				Frequency 60.158 Hz				Uunb 3.00 %							
Power				Voltage				Current							
U1	rms	195.99V		U1	pk+	285.24V		U1	dc	2.60V		U1	thd_f	2.14%	
U2	rms	201.65V		U2	pk+	285.24V		U2	dc	0.00V		U2	thd_f	2.12%	
U3	rms	194.75V		U3	pk+	285.11V		U3	dc	-3.23V		U3	thd_f	3.00%	
Urms	avg	197.47V													
				U1	pk-	-285.50V		U1	cf	1.4567					
				U2	pk-	-284.98V		U2	cf	1.4145					
				U3	pk-	-284.86V		U3	cf	1.4640					

• [Current] Tab

The [Current] tab displays parameters related to current.

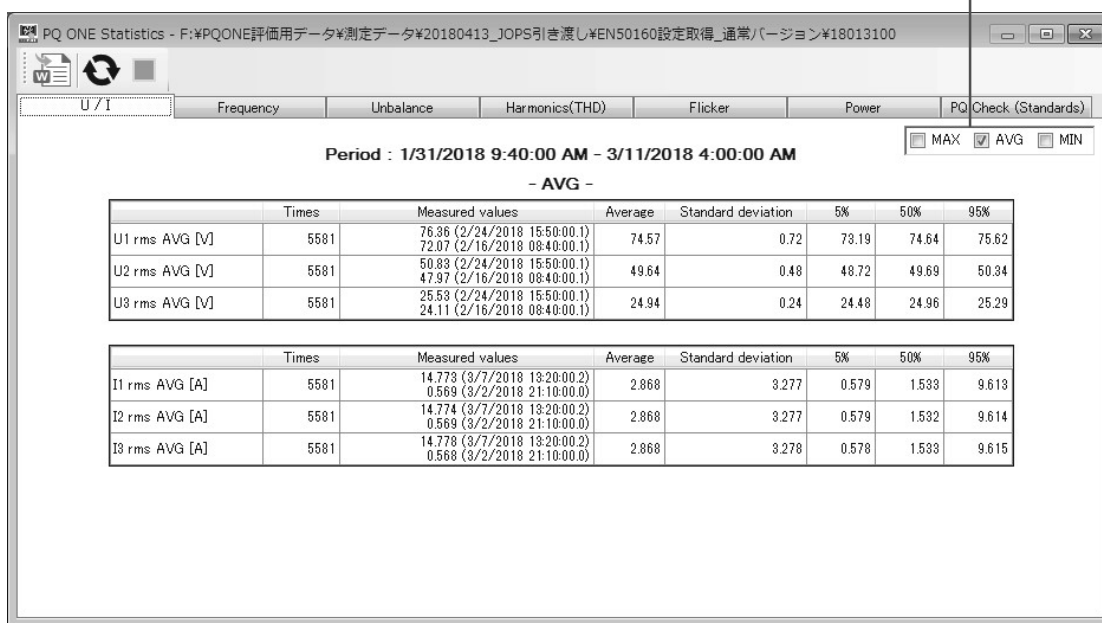
Event Waveform				Harmonics				Vector				DMM			
No. 127				Frequency 60.158 Hz				Iunb OVER							
Power				Voltage				Current							
I1	rms	26.37A		I1	pk+	53.54A		I1	dc	0.00A		I1	thd_f	26.75%	
I2	rms	46.19A		I2	pk+	79.60A		I2	dc	-2.20A		I2	thd_f	26.25%	
I3	rms	43.97A		I3	pk+	161.75A		I3	dc	0.00A		I3	thd_f	24.00%	
Irms	avg	38.84A													
				I1	pk-	-44.25A		I1	cf	2.0303		KF1	3.96		
				I2	pk-	-129.45A		I2	cf	2.9025		KF2	3.86		
				I3	pk-	-98.17A		I3	cf	3.6789		KF3	3.36		

3.6. Displaying statistics screen

You can confirm the statistics of trend data in the statistics screen.

Clicking  displays the [PQ ONE Statistic] screen.

MAX: Maximum value
AVG: Average value
MIN: Minimum value



Example statistics screen

You can confirm the statistical values of representative items or trend graph display items on the statistics screen..

The display content can be set as an option. (⇒p.68)

You can confirm the statistics for the following items on the statistics screen.

U/I (U rms, I rms), Frequency (freq), Unbalance (Uunb, Uunb0, Iunb, Iunb0)
Harmonics (THD), Flicker (Pst, Plt), Power (P, S, Q, PF)

You can confirm the following statistics on the statistics screen.

Count, Measured value range (Time at which the event occurred), Average value,
Standard deviation, % value (⇒p.68)

The statistics show only the items that have been measured.

You can select the MAX / AVG / MIN display of statistics.

If you changed the trend display period, click  button and update the statistics value.
You cannot change the trend display period on the statistics screen.

For PQ3198 and PW3198 data, when the option to Show the total duration of “PF event” is enabled, the number of times and duration of PF events are displayed on the [Power] tab. (⇒p.68)

PQ ONE Statistics - C:\SampleData\B1031415

U / I Frequency Unbalance Harmonics(THD) **Power** PQ Check (Standards) GB Standards

- PF Event -

	Event Count	Duration
PF1 LAG (+)	0	-----
PF1 LEAD (-)	1	41.600 s
PF1 TOTAL	1	41.600 s

	Event Count	Duration
PF2 LAG (+)	0	-----
PF2 LEAD (-)	1	40.800 s
PF2 TOTAL	1	40.800 s

	Event Count	Duration
PF3 LAG (+)	0	-----
PF3 LEAD (-)	1	41.200 s
PF3 TOTAL	1	41.200 s

	Event Count	Duration
PF123 LAG (+)	0	-----
PF123 LEAD (-)	3	51.600 s
PF123 TOTAL	3	51.600 s

The each CH value and the total value of CH1, 2, 3 are displayed.

If the worst value of PF event is positive, it will be counted as LAG.

If the worst value of PF event is negative, it will be counted as LEAD.

3.7. Displaying standards screen

The [PQ Check(Standards)] tab of the statistics screen allows you to evaluate and analyze according to the specified standards.

The standard value is displayed when the statistics screen is displayed and the [PQ Check(Standards)] tab is selected,

■ [PQ Check(Standards)] tab

EN50160 display mode

This mode is evaluated and analyzed according to the EN50160 standards.

•View Configuration

The screenshot shows the 'PQ Check (Standards)' configuration window. At the top, there are tabs for 'U / I', 'Frequency', 'Unbalance', 'Harmonics(THD)', 'Flicker', 'Power', and 'PQ Check (Standards)'. The 'PQ Check (Standards)' tab is active. Below the tabs, there are several configuration options: 'Standards' (set to 'EN50160 (U≤1kV)'), 'Time' (set to '1/31/2018 9:40 AM - 3/11/2018 4:00 AM'), 'Nominal Voltage (Uref)' (set to '100V'), 'Mean Period of RMS Value' (set to '10 min'), and 'Statistics' (set to 'Per week'). There is also a 'Week No. 1 - 4 [1/31/2018 9:40 AM - 2/28/2018 9:40 AM]' dropdown. A checkbox for 'Excluding flagging data' is present. The main area displays three tables: 'Power Frequency', 'Supply Voltage Variations', and 'Flicker'. Each table shows compliance results for various ranges and thresholds.

Range	Threshold	Compliance	
60Hz +0.6Hz / -0.6Hz	99.5%	100.0%	passed
60Hz +2.4Hz / -3.6Hz	100.0%	100.0%	passed

Range	Threshold	Compliance			
		U1	U2	U3	
100V +10.0% / -10.0%	95.0%	0.0%	0.0%	0.0%	FAILED
100V +10.0% / -15.0%	100.0%	0.0%	0.0%	0.0%	FAILED

Range	Threshold	Compliance			
		U1	U2	U3	

①	Standards	Select the items of the display from the following items. [EN50160($U \leq 1kV$)], [EN50160($1kV < U \leq 36kV$)], [Custom]
②	Time	Displays the total period of the standards. This is the same period as the trend display period.
③	Nominal Voltage (Uref)	Displays the nominal voltage of the measured data. If the nominal voltage is out of range, a warning is displayed. (EN50160 : $U \leq 1kV$ or $1kV < U \leq 36kV$)
④	Mean Period of RMS Value	Displays the trend interval of the measured data. If the trend interval is out of range, a warning is displayed. (EN50160 : 10min)

⑤	Statistics	Displays the period of the standard. (EN50160 : Per week)
⑥	Display period	Select the period of the display period. The standard value is displayed for four periods at a time.
⑦	Excluding flagging data	Select whether to include other (flagged) data when a statistical voltage swell, dip or interruption occurs. If checked, flagged data is excluded from statistics.
⑧	Standard value	Display standard value by display period. You can collapse the standard value display for that period by clicking the triangle in the top right corner.

•Displayed items

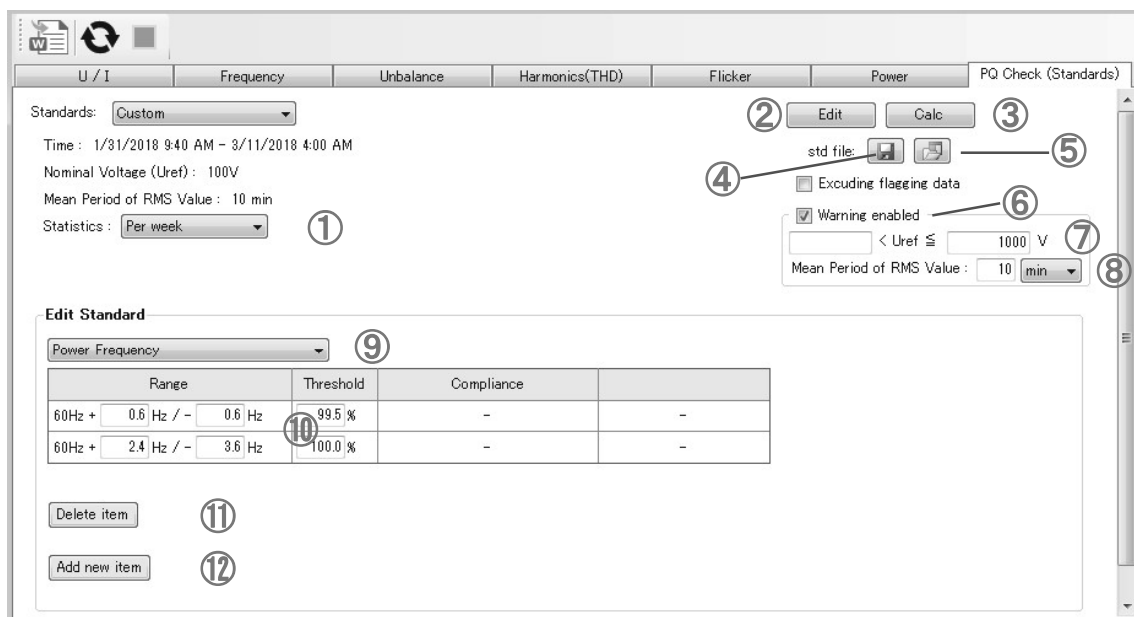
For EN51060 display, the specified item is fixed to the following:

Power Frequency,
Supply Voltage Variations,
Flicker,
Supply Voltage Unbalance,
Harmonic Voltage (THD, 2-25th),
Supply Voltage Dip/Swell (Additional Information),
Rapid Voltage Change (Additional Information / Norway)

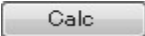
Custom mode

This mode is evaluated and analyzed according to the set item, range and threshold value.
You can save or load the settings as .std extension files.

•View Configuration (Edit mode)



①	Statistics	Select the period of the standard. Per day / Per week / Per month / All of the time
②	Edit	Change the custom settings.

③		Calculate the current settings and display the results.
④		Save the custom settings as a ".std" extension file.
⑤		Load the custom settings (.std file).
⑥	Warning Enabled	Sets the warning display for nominal voltage and Mean Period of RMS Value. For Custom mode, Do not display a judgment when a warning is displayed.
⑦	Warning Enabled (Uref)	Set the nominal voltage range when the warning display is enabled.
⑧	Warning Enabled (Mean Period of RMS Value)	Set the trend interval value when the warning display is enabled.
⑨	Display item	Select the items you want to evaluate and analyze.
⑩	Range, Threshold	Select the range and the threshold you want to evaluate and analyze.
⑪		Decrease the display item. The bottom item will be deleted.
⑫		Increase the display item. Max 20 items, and the same item can be displayed up to two.

• Custom displayed item

For custom display, the specified item is set from the following:

Power Frequency
 Supply Voltage Variations
 Rapid Voltage Change
 Flicker
 Voltage Unbalance
 Harmonic Voltage(2th-25th)
 Harmonic Voltage(26th-50th)
 Interharmonic Voltage(0.5th-24.5th)
 Interharmonic Voltage(25.5th-49.5th)
 Supply Voltage Dip/Swell
 Current RMS
 Current Unbalance
 Harmonic Current(2th-25th)
 Harmonic Current(26th-50th)
 Interharmonic Current(0.5th-24.5th)
 Interharmonic Current(25.5th-49.5th)
 High Frequency Harmonic Voltage
 High Frequency Harmonic Current
 Power (sum)
 Power
 Power Factor (sum)
 Power Factor

■ [GB Standards] tab

This mode is evaluated and analyzed according to the GB standards(Guobiao standards).

The [GB standard] tab is displayed when the option to Show the [GB Standard] tab is enabled. (⇒p.68)

■View Configuration (Edit mode)

PQ ONE Statistics - C:\SampleData\PQ3198_Dip\19072900_Dip

☐ Flicker ☒ Power ☐ Energy ☐ Demand ☐ PQ Check (Standards) **GB Standards**

Measurement information ①
 Company / Office: Department:
 Measurement location: Period From: 7/29/2019 12:00:00 AM
 Measurement line: To: 7/30/2019 12:00:00 AM
 Condition: Interval: 1min

Measurement status ②
 Voltage level: 200V Wiring method: 3P3W3M Line - Line
 Nominal voltage(V): 200.00 VT(PT) ratio: 1
 Reference short-circuit capacity(MVA): 10 CT ratio: 1
 Minimum short-circuit capacity(MVA): 10 Frequency(Hz): 60
 User contract capacity(MVA): 10 Result(%): 95.00
 Power supply capacity(MVA): 10 ☒ Harmonics : Display both (level, content rate) ③
☒ Custom ④

Fundamental voltage(V) ⑦

CH	Maximum	Average	Minimum	95%
CH1	207.02	199.16	181.22	203.65
CH2	207.18	199.75	182.08	203.85
CH3	206.83	199.62	182.79	203.59

Harmonic current content rate(%) ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭

Order	CH	Maximum	%	Average	%	Minimum	%	95%	Threshold	Result	Pass(%)
2	CH1	2.61	1.38	0.08	0.04	0.01	0.00	0.06	2.00	passed	100.00
	CH2	2.07	1.10	0.05	0.03	0.00	0.00	0.05		passed	100.00
	CH3	1.99	1.03	0.05	0.03	0.00	0.00	0.05		passed	100.00
3	CH1	8.60	4.53	0.58	0.29	0.01	0.01	0.59	4.00	passed	100.00
	CH2	5.42	2.82	0.78	0.39	0.20	0.10	0.60		passed	100.00
	CH3	6.80	3.51	0.94	0.47	0.01	0.01	0.63		passed	100.00
4	CH1	7.24	3.81	0.03	0.01	0.00	0.00	0.02	2.00	passed	100.00
	CH2	5.96	3.09	0.03	0.01	0.00	0.00	0.02		passed	100.00
	CH3	4.49	2.31	0.03	0.01	0.00	0.00	0.02		passed	100.00
5	CH1	10.82	5.70	5.28	2.88	0.33	0.16	4.97	4.00	FAILED	64.10
	CH2	11.13	5.98	5.57	2.81	0.44	0.22	5.07		FAILED	62.78
	CH3	11.65	6.02	5.89	2.97	0.65	0.33	5.33		FAILED	60.69
6	CH1	6.20	3.26	0.06	0.03	0.00	0.00	0.04	2.00	passed	100.00
	CH2	6.04	3.13	0.07	0.03	0.00	0.00	0.04		passed	100.00

①	Measurement information	Set the header information output to the report.
②	Measurement status	Of the header information output to the report, set the status information and so on.
③	Harmonics : Display both	When checked, both harmonics and interharmonics items are displayed for both level and content.

④	Custom	When checked, the following items can be set to arbitrary values. Nominal voltage, Reference short-circuit capacity, Result, Threshold Settings can be saved and loaded as a .limit extension file.
⑤		Collapse all the display.
⑥		Expand all of the display.
⑦	Standard value	Display standard value by display period. You can collapse the standard value display by clicking the triangle in the top right corner.
⑧	Maximum value	If the display item has the "MAX value", the maximum value of the "MAX value" is displayed. If there is no "MAX value", the maximum value of the "AVG value" is displayed.
⑨	Average value	Displays the average value of the "AVG value" of the display item.
⑩	Minimum value	If the display item has the "MIN value", the minimum value of the "MIN value" is displayed. If there is no "MIN value", the minimum value of the "AVG value" is displayed.
⑪ ⑫ ⑬ ⑭	% value Threshold Result Passing rate	The result is displayed based on the numerical value specified in "Result" of the measurement status. The ratio of the measured value below the "Threshold" value to the total "AVG value" is displayed as the "Passing rate". It is displayed in the "Result" column whether the passing rate is equal to or higher than the "Result" value of the measurement status. The "% value" displays the "% value" of the average value. (The default value is 95%.)
⑮		Output the report in .xlsx format. The output content is fixed.

• Standards displayed item

The display items are fixed to the following items.

Fundamental voltage and Fundamental current indicate the harmonic 1st level value.

Items marked with "***" are items that display the "Result" based on the "Threshold" value.

Fundamental voltage	
Harmonic current content rate	**
Voltage THD	**
Flicker Pst	
Flicker Plt	**
Voltage deviation (Upper limit / Lower limit)	**
Fundamental current	
Harmonic current level	**
Frequency	**
Voltage unbalance	**
Active Power	
Reactive Power	
Apparent Power	
Power Factor	
Interharmonics voltage content rate	**
Interharmonics current level	

* About voltage deviation value

The voltage deviation value is calculated based on the following calculation formula.

$$\text{Voltage deviation (\%)} = (U_{\text{rms}} - U_{\text{ref}}) \div U_{\text{ref}} \times 100\%$$

U_{rms} : Voltage RMS value

U_{ref} : Nominal voltage

If the voltage deviation is positive, it is treated as the upper limit value,
and if it is negative, it is treated as the lower limit value.

The result is judged by the larger absolute value of the upper and lower limits.

Upper limit of voltage deviation(%)

CH	Maximum	Average	Minimum	Threshold	Result
CH1	3.53	-----	-----	7.00	-----
CH2	3.61	-----	-----		-----
CH3	3.43	-----	-----		-----

Lower limit of voltage deviation(%)

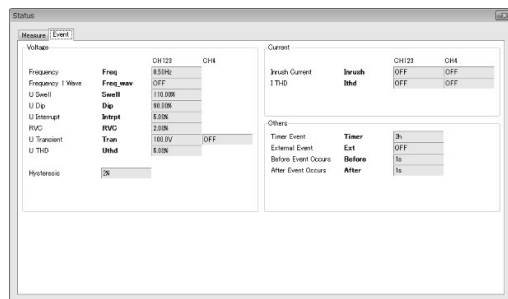
CH	Maximum	Average	Minimum	Threshold	Result
CH1	-----	-0.34	-9.16	-7.00	passed
CH2	-----	-0.04	-8.71		passed
CH3	-----	-0.10	-8.36		passed

Example voltage deviation

3.8. Displaying measurement data settings

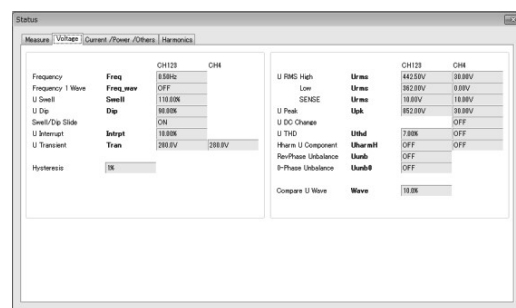


The [Status] window allows you to review measurement data settings.

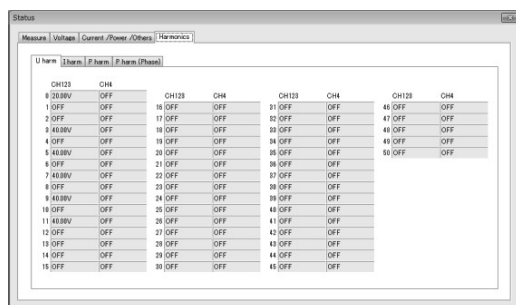


[Event] Tab

Example display for the PQ3100



[Voltage] Tab



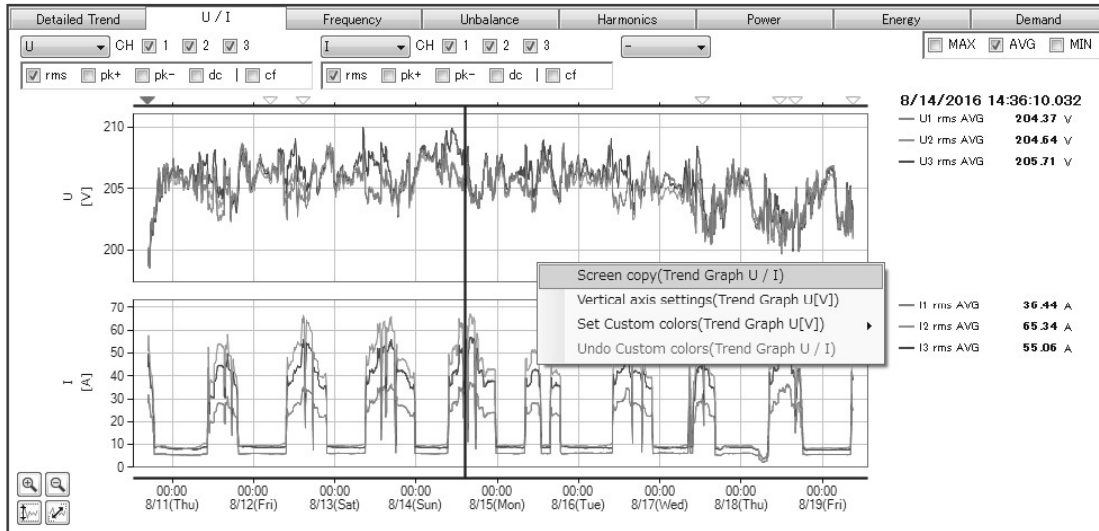
[Harmonics] Tab

Example display for the PW3198, PQ3198

3.9. Screen copy

The trend graph and event data display can copy the displayed screen to the Clipboard.

Select [Screen copy] from pop-up menu on the screen you want to copy.



Screen copy menu

The list of trend graph (harmonic peak level) and event data (harmonics display) can copy the text format to the Clipboard.

CH ☒ 1 ☒ 2 ☒ 3 ☐ 4

Order	U1	U2	U3
THD	0.05%	0.04%	0.04%
0	0.01V	0.00V	0.05V
1	99.87V	100.16V	99.94V
2	0.04V	0.03V	0.03V
3	0.01V	0.01V	0.01V
4	0.01V	0.00V	0.00V
5	0.01V	0.01V	0.01V

Screen copy(Harmonics)
List copy(Harmonics)
Vertical axis settings(Harmonics)

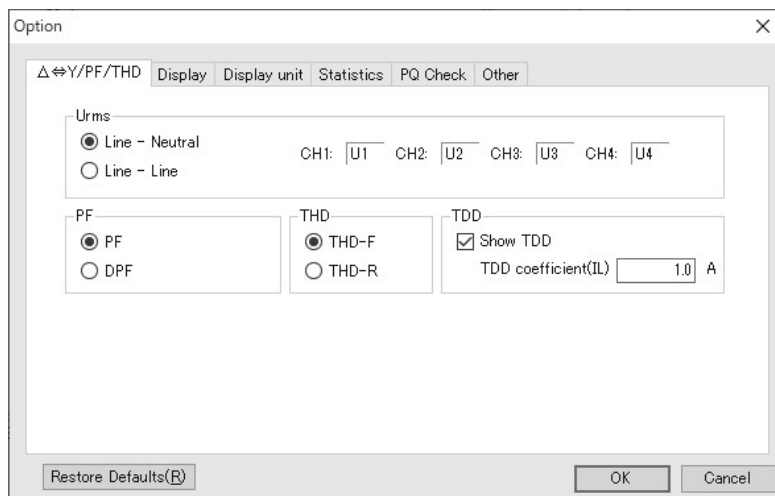
List copy menu

4. Setting options

Clicking  displays the [Option] window.

The [Option] window allows you to set the displayed parameters, language, cache file and etc.

■ [$\Delta \leftrightarrow Y$ /PF/THD] Tab

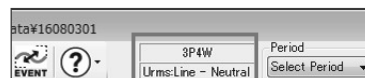


By changing the settings on the [$\Delta \leftrightarrow Y$ /PF/THD] tab, you can switch the parameters shown on trend graphs.

The default setting of each item is the setting used for measurement. (The setting is changed whenever loading the new measurement data.)

The specific parameters available for selection vary with the model of Power Quality Analyzer that generated the data as well as its settings (wiring). For more information, see your Power Quality Analyzer's user manual.

- "Urms" : Urms(Line-Neutral / Line-Line) can be switched when using 3P3W3M, 3P4W, or 3P4W2.5E. The setting of Urms is displayed on the top toolbar.



- "PF" : Switches the power factor display to PF / DPF display.
Both cannot be displayed at the same time.
- "THD" : Switches the harmonic distortion ratio display to THD-F / THD-R display.
Both cannot be displayed at the same time.
- "TDD" : Configure settings related to TDD display.

* About TDD (Total Demand Distortion)

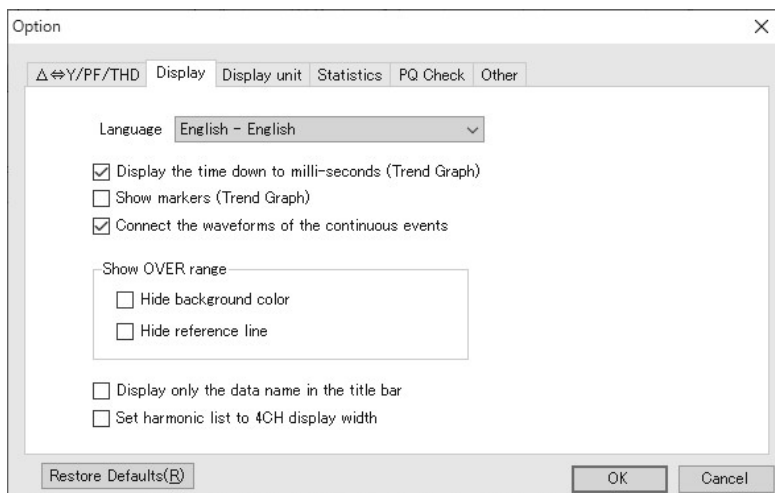
"TDD" value specified by IEEE519 is displayed according to the following formula.

The TDD value is only an average value and is calculated for each channel.

$$\text{TDD (average) (\%)} = \text{"I THD-F (average)" } \times \text{"I harm(1st order)(average)" } \div \text{"TDD coefficient" }$$

The settings on the [$\Delta \leftrightarrow Y$ /PF/THD] tab affect only trend graphs. Changing the settings does not affect the threshold values of related events or measured values in the event list.

■ [Display] Tab



By changing the settings on the [Display] tab, you can switch some of the PQ ONE displays.

- “Language” : You can select the display language by changing the language selection. Changing the language selection will be effective from the next restart. The following languages can be selected as the display language.

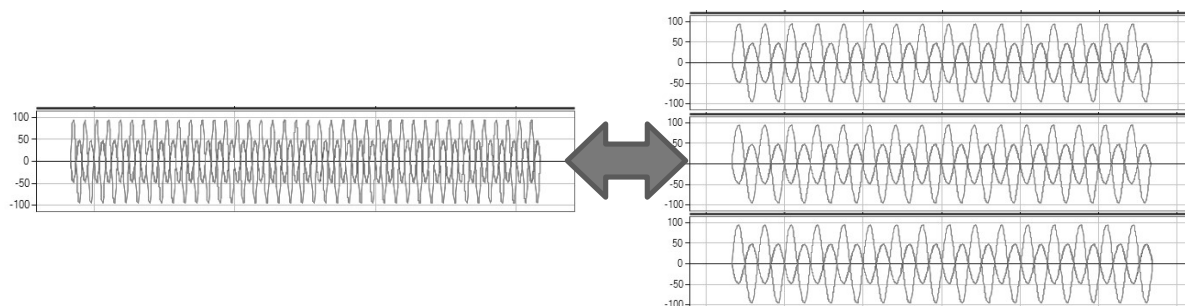
Japanese / English / Chinese (Simplified) / Chinese (Traditional) / Korean / German / French / Italian / Spanish / Turkish

When [Auto] is selected, the display language is set according to the [Region and Language] setting of the Windows OS.

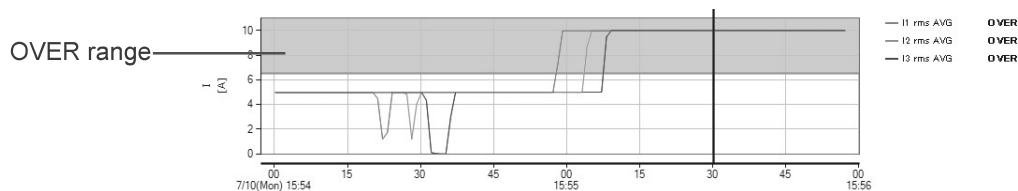
If a language other than the above is specified, English will be displayed.



- “Display the time down to milli-seconds (Trend Graph)” : Enable/disable milliseconds in the trend graph display.
- “Show markers (Trend Graph)” : Switches between displaying and not displaying markers on the trend graph.
- “Connect the waveforms of the continuous events” : Selects whether event waveforms of continuous events are connected and displayed.



- “Show OVER range” : You can switch the display of the background color and reference line representing the OVER range of the trend graph.



- “Display only the data name in the title bar” :
The data name displayed in the title bar can be switched between full path name notation and data name notation.
- “Set harmonic list to 4CH display width” :
The display width of the list shown in the following screen can be switched between 3CH and 4CH widths.
Trend graph Harmonic peak level (⇒p.5)
Event data Harmonic (⇒p.52)

■ [Display unit] Tab

	Automatic	Unit	Number of decimal places
Voltage	☒	V	2
Current	☒	A	2
Power	☒	kW, kvar, kVA	2
Energy	☒	kWh, kvarh, kVAh	2
Frequency	☒	Hz	3
Percentage	☒		2
Degree	☒		2
Power Factor	☒		4
Energy Cost	☒		2
Others	☒		2

By changing the settings on the [Display Unit] tab, you can fix the display unit and the number of digits after the decimal point of the measured value.

- “Automatic”: When the check button is ON, the measured value is displayed in the default unit and number of digits. With the check button at the top, you can turn ON / OFF collectively.
- “Unit” : Sets the auxiliary unit for fixed display by measurement item.
- “Number of decimal places” : Sets the number of decimal places for fixed display.

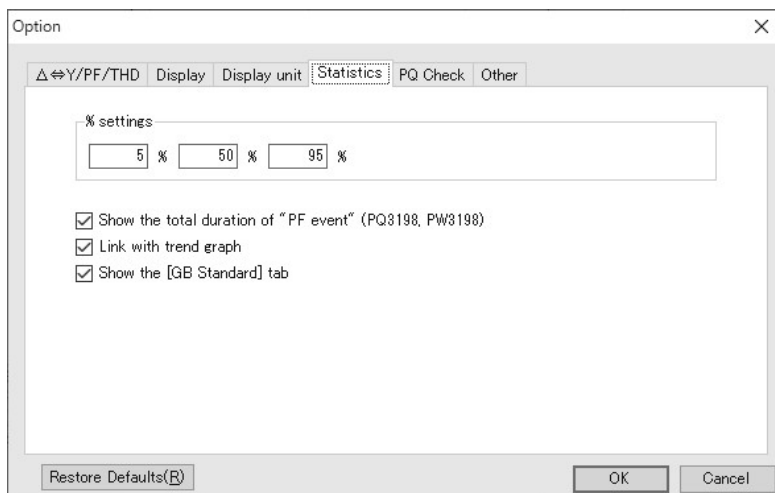
Voltage	☐	V	2
Current	☒	mV	0
Power	☒	kV	1
Energy	☒	MV	2
		kWh, kvarh, kVAh	3
			4

Report output and CSV output are also linked to this setting.

The event trend data, transient waveform, and high-order harmonic display are linked to the settings when the screen is redisplayed.

Log (log axis) display is not linked with this setting.

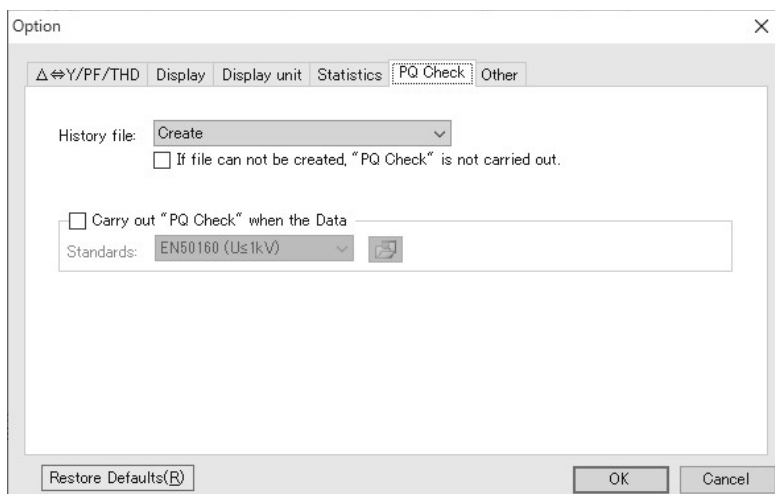
■ [Statistics] Tab



By changing the settings on the [Statistics] tab, you can change the display contents of the statistical value display and standard value display.

- “% settings” : Set up the standards for displaying the “% value” on the statistics screen. (⇒p.55)
The defaults of “% value” are 5%, 50% and 95%.
- “Show the total duration of “PF event” (PQ3198, PW3198)” :
Displays the number of times and duration of PF events on the statistics screen. (⇒p.56)
- “Link with trend graph” : the items displayed on the trend graph are displayed on the statistical screen.
(⇒p.55)
- “Show the [GB standard] tab” : Displays the standard value tab according to the GB standard
(Guobiao standards) on the statistical screen. (⇒p.60)

■ [PQ Check] Tab

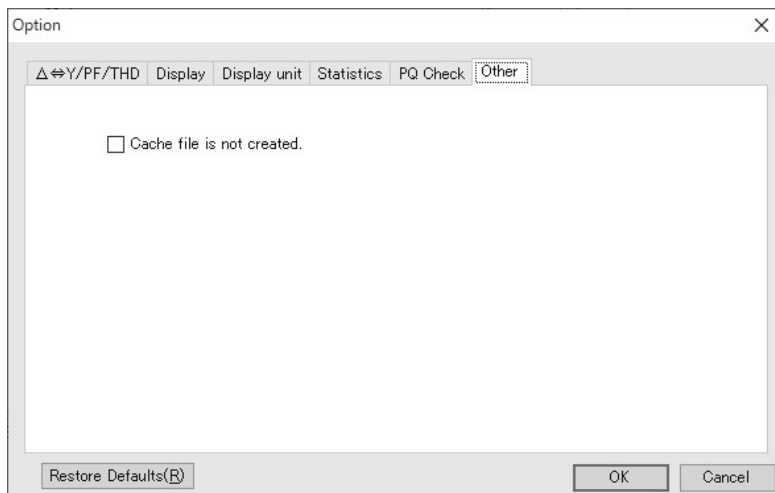


By changing the settings on the [PQ Check] tab, you can configure the settings related to the PQ Check function that can be performed on the Data List screen. (⇒p.79)

- “History file” : If you allow the creation of a history file, a file named "pqone.dat" will be kept in the data folder. By saving the check history, you can shorten the execution time of previously executed conditions.

- “If file can not be created, “PQ Check” is not carried out.” :
If a history file cannot be created, PQ Check is aborted.
- “Carry out “PQ Check” when the Data” :
PQ Check is automatically performed under the specified conditions when the data list is displayed or when the data list is registered.

■ [Other] Tab



You can change the following items on the [Others] tab.

- “Cache file is not created” :
PQ ONE creates a cache file to the HDD for faster trend graph drawing process.
Check [Cache file is not created] if you do not want to create a cache file.
The cache file is automatically deleted when exiting the PQ ONE.

* About the [Restore Defaults] button

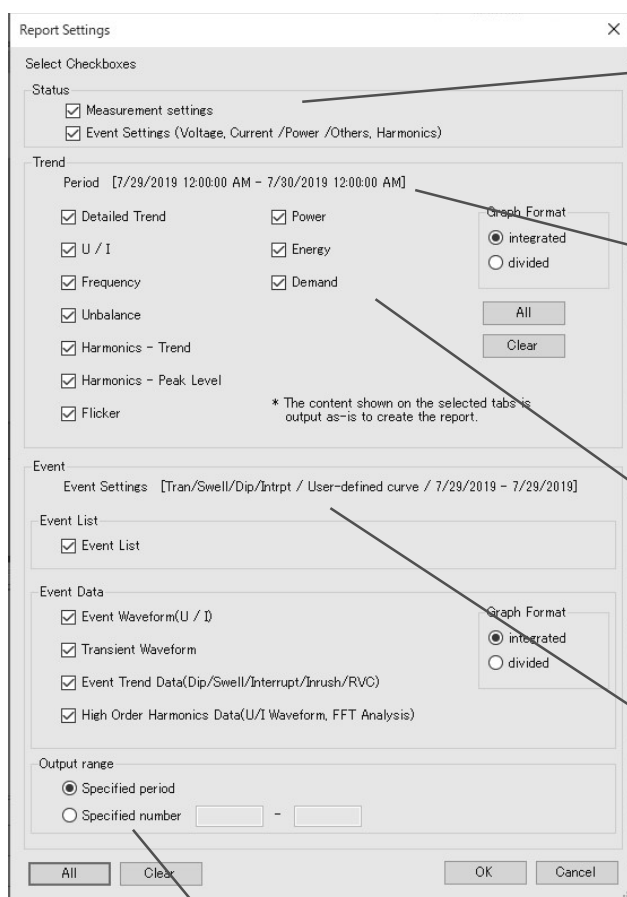
Click the [Restore Defaults] button to initialize the option settings.
(Changing the language selection will be effective from the next restart.)

5. Creating reports

This section describes how to create reports presenting loaded measurement data in the Word file format (.docx).

5.1. Creating reports of trend / event information

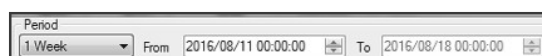
Clicking  displays the [Report Setting] dialog box.



The **Report Settings** dialog box is divided into several sections:

- Select Checkboxes:**
 - Status:** ☒ Measurement settings, ☒ Event Settings (Voltage, Current /Power /Others, Harmonics)
 - Trend:**
 - Period: [7/29/2019 12:00:00 AM - 7/30/2019 12:00:00 AM]
 - ☒ Detailed Trend, ☒ Power, ☒ U / I, ☒ Energy, ☒ Frequency, ☒ Demand, ☒ Unbalance, ☒ Harmonics - Trend, ☒ Harmonics - Peak Level, ☒ Flicker
 - Graph Format:** ☒ integrated, ☐ divided
 - Buttons: All, Clear
- Event:**
 - Event Settings: [Tran/Swell/Dip/Intrpt / User-defined curve / 7/29/2019 - 7/29/2019]
 - Event List:** ☒ Event List
 - Event Data:**
 - ☒ Event Waveform(U / I), ☒ Transient Waveform, ☒ Event Trend Data(Dip/Swell/Interrupt/Inrush/RVC), ☒ High Order Harmonics Data(U/I Waveform, FFT Analysis)
 - Graph Format:** ☒ integrated, ☐ divided
 - Output range:** ☒ Specified period, ☐ Specified number [] - []
 - Buttons: All, Clear, OK, Cancel

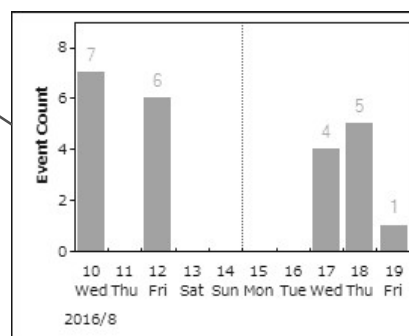
Outputs the status contents.
In the case of repeated data, you can select to output only the first data or output all data.



The **Period** window shows a dropdown menu set to **1 Week**, with **From** and **To** date/time fields set to 2016/08/11 00:00:00 and 2016/08/18 00:00:00 respectively.

The [Period] setting from the main window is used. To change the report period, you must change the [Period] setting.

The content shown on the selected tabs is output as-is to create the report.



You can specify the output range of event information.

Event list items and event data included in the event statistics graph are output. To change the event type or period, change the event statistics graph setting.

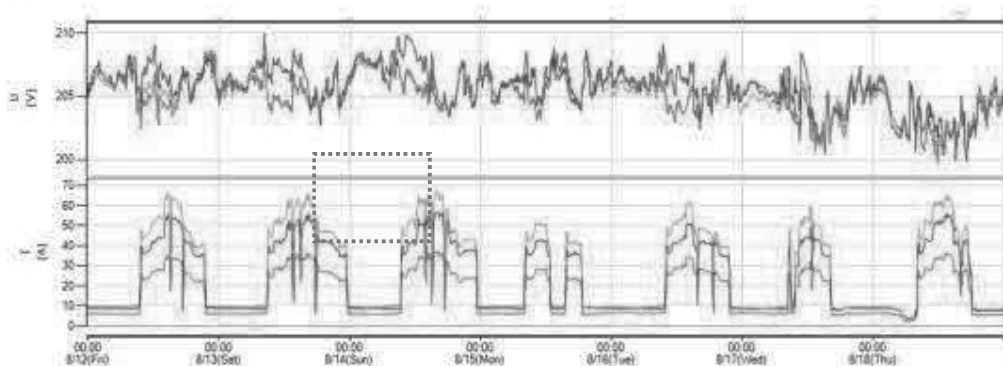
* For Microsoft WORD compatible applications, the layout may be looked wrong.

■ Selecting the graph format

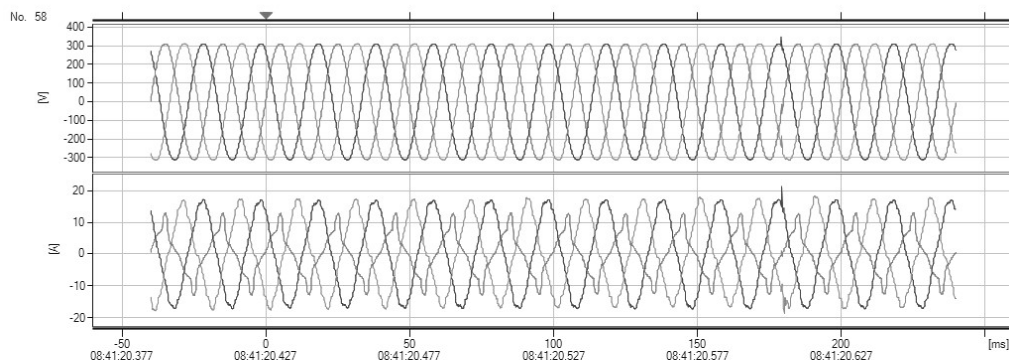
Two graph output formats are available: [Integrated] and [Divided].

[Integrated] → Graphs are grouped on a single X-axis by tab to create the report.

[U / I]



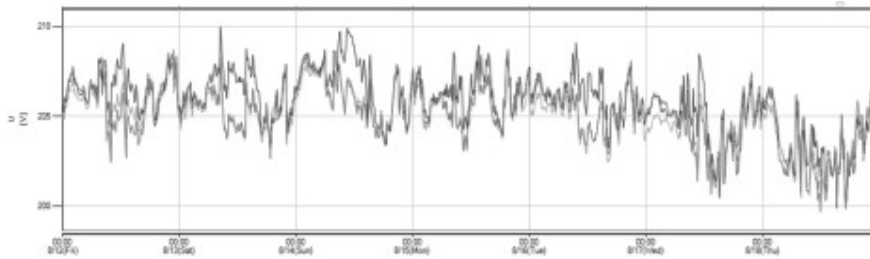
Example trend display



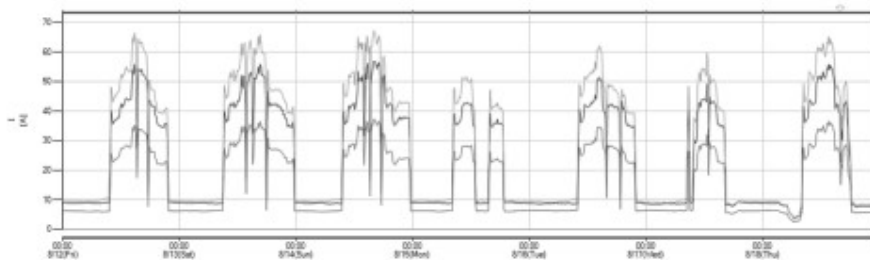
Example event waveform display

[Divided] → Graphs are not grouped by tab. Instead, the report is created one parameter at a time.

[U / I]

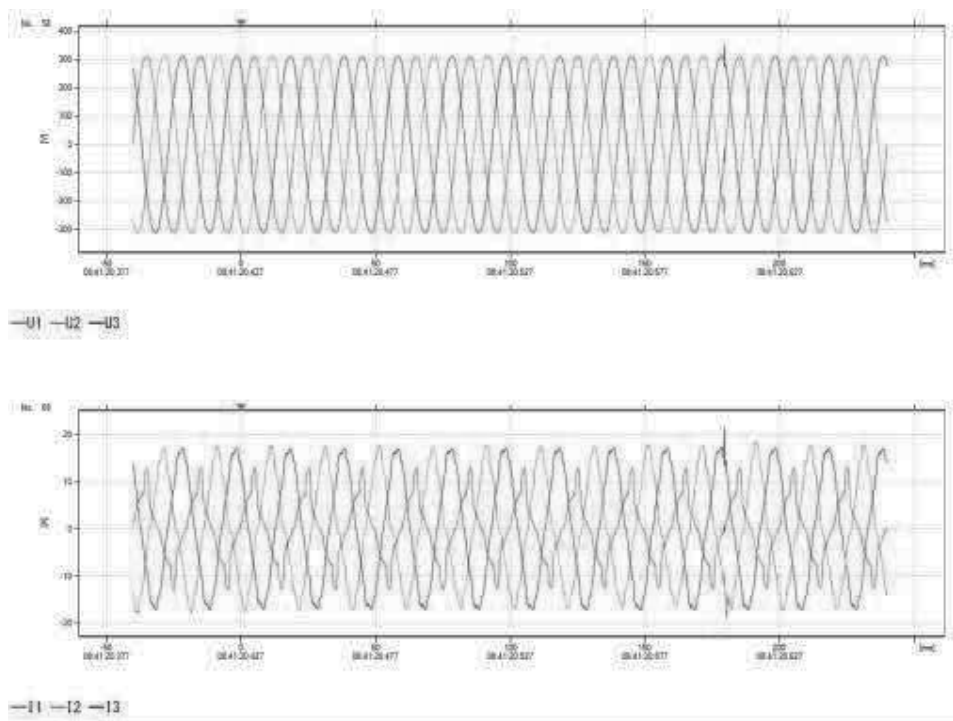


—U1 rms AVG —U2 rms AVG —U3 rms AVG



—I1 rms AVG —I2 rms AVG —I3 rms AVG

Example trend display



Example event waveform display

◆ Example report

The example report shown in this section is based on the following settings:

Report Settings

Select Checkboxes

Trend
Period [8/10/2016 4:36:10 PM ~ 8/19/2016 9:02:41 AM]

☒ Detailed Trend ☒ Power
☒ U / I ☒ Energy
☒ Frequency ☒ Demand
☒ Unbalance
☒ Harmonics - Trend
☒ Harmonics - Peak Level
☐ Flicker

Graph Format
☒ integrated
☐ divided

All Clear

* The content shown on the selected tabs is output as-is to create the report.

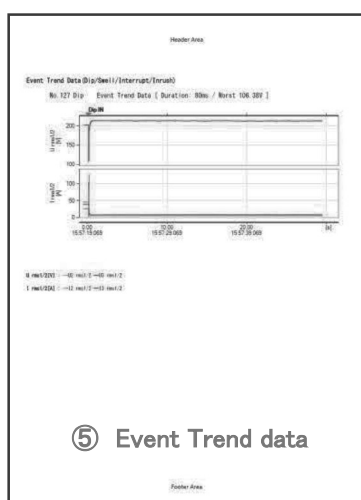
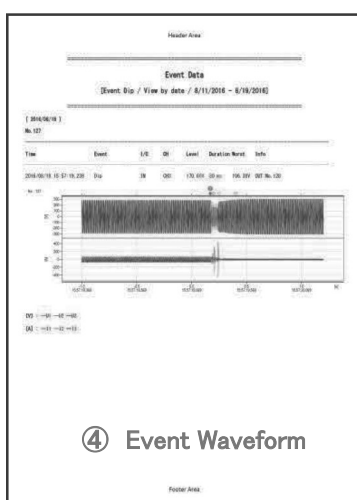
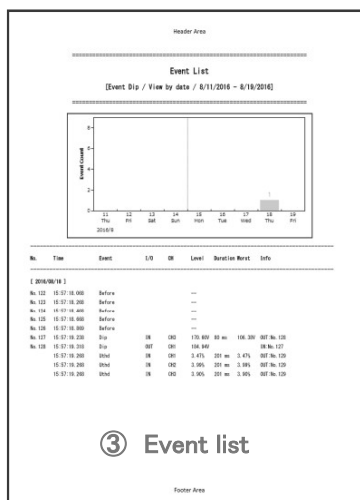
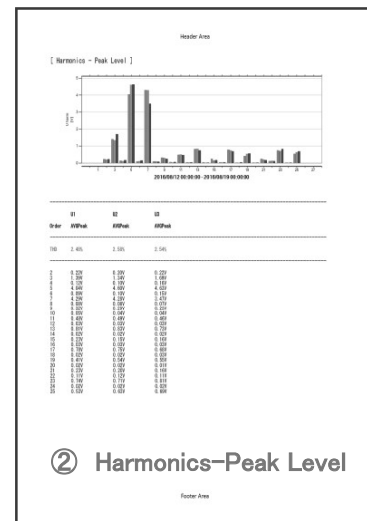
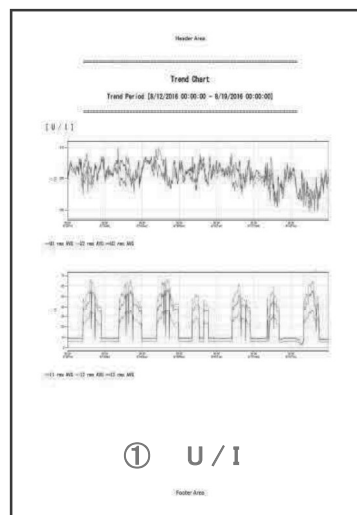
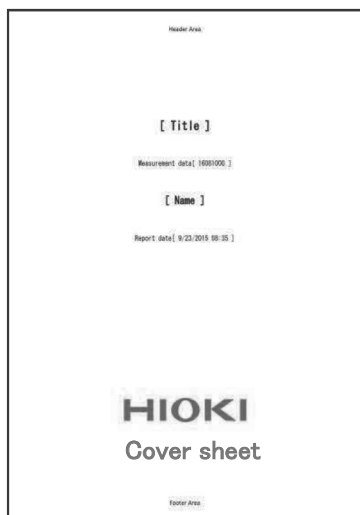
Event
Event Settings [All / View by date / 8/10/2016 ~ 8/19/2016]

Event List
☒ Event List

Event Data
☒ Event Waveform(U / I)
☒ Transient Waveform
☒ Event Trend Data(Dip/Swell/Interrupt/Inrush/RVC)
☐ High Order Harmonics Data(U/I Waveform)

Graph Format
☒ integrated
☐ divided

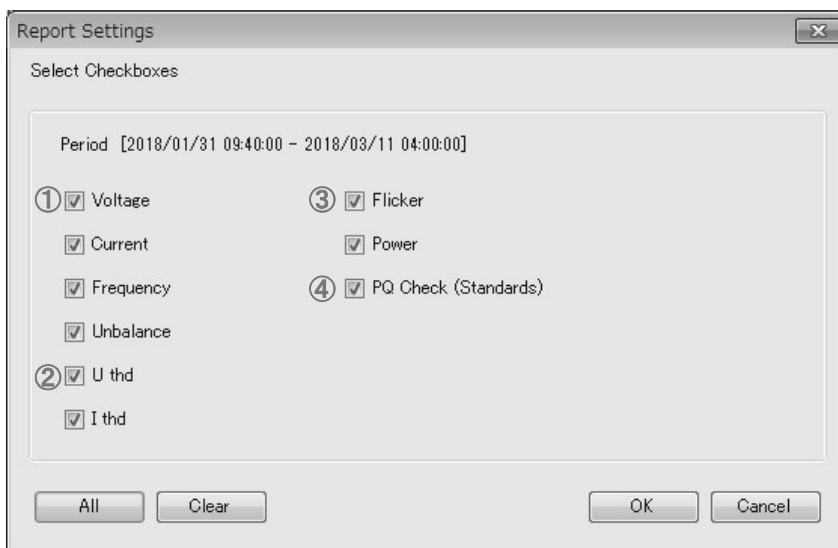
All Clear OK Cancel



5.2. Creating reports of statistics / standards

In the statistics screen, you can create reports of statistics and standards.

Clicking  in the statistics screen displays the [Report Settings] dialog box.



Create reports the contents of the checked tab.

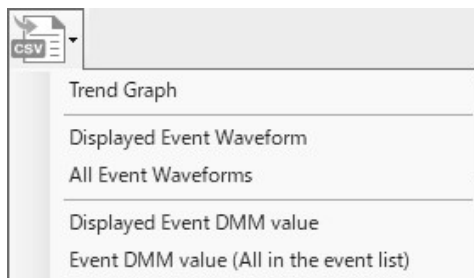


* For Microsoft WORD compatible applications, the layout may be looked wrong.

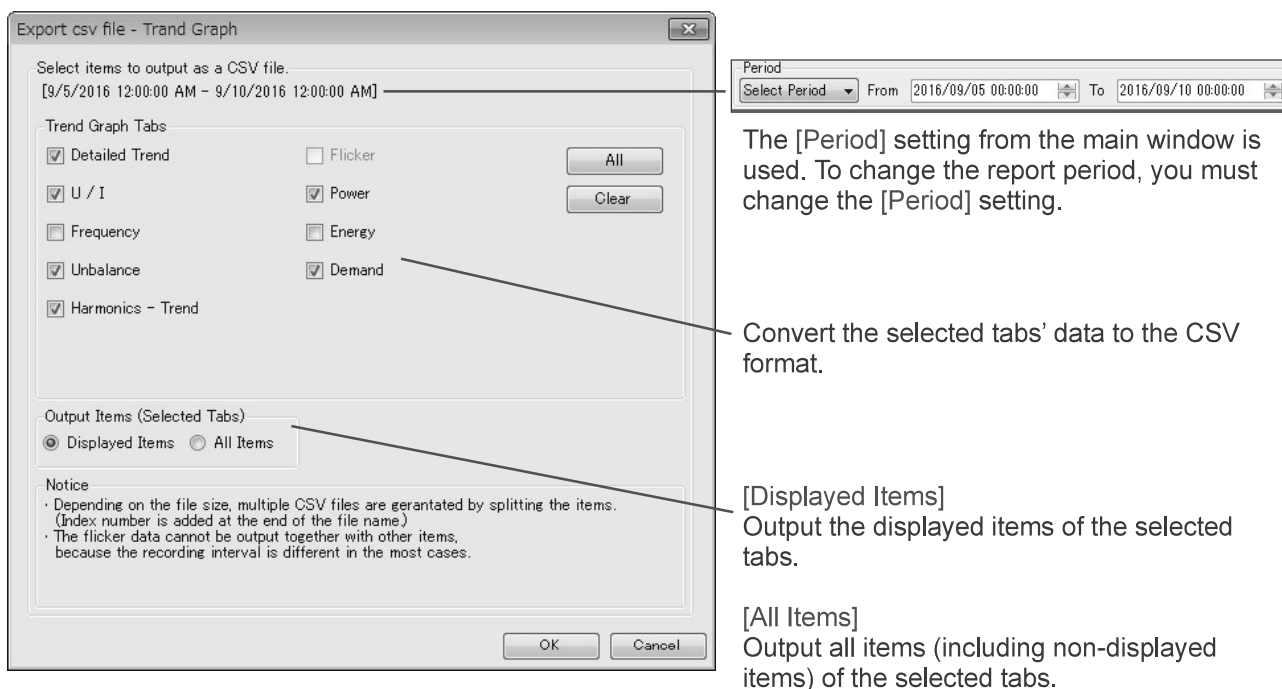
6. Converting measurement data to CSV format

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.

Click  and select the data to convert to the CSV format.



[Trend Graph] → Convert trend data to CSV format.
Set the items to output by the below [Export CSV file – Trend Graph] screen.



[Displayed Event Waveform] → Convert the displayed event waveform on screen to CSV format.

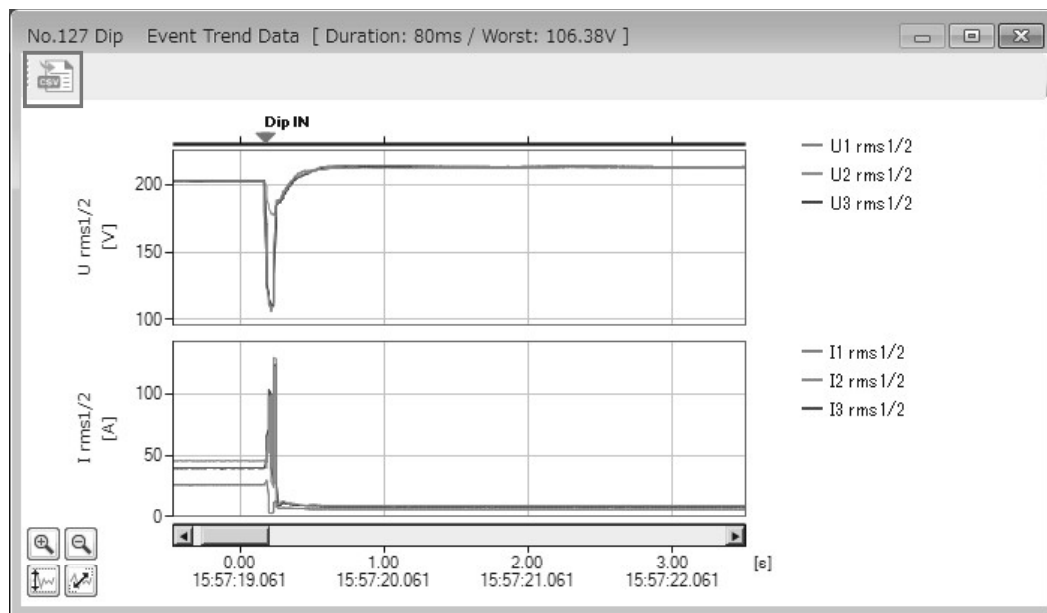
[All Event Waveforms] → Convert all event waveforms in the file to CSV format.

[Displayed Event DMM value] → Convert DMM values of selected events to CSV format.

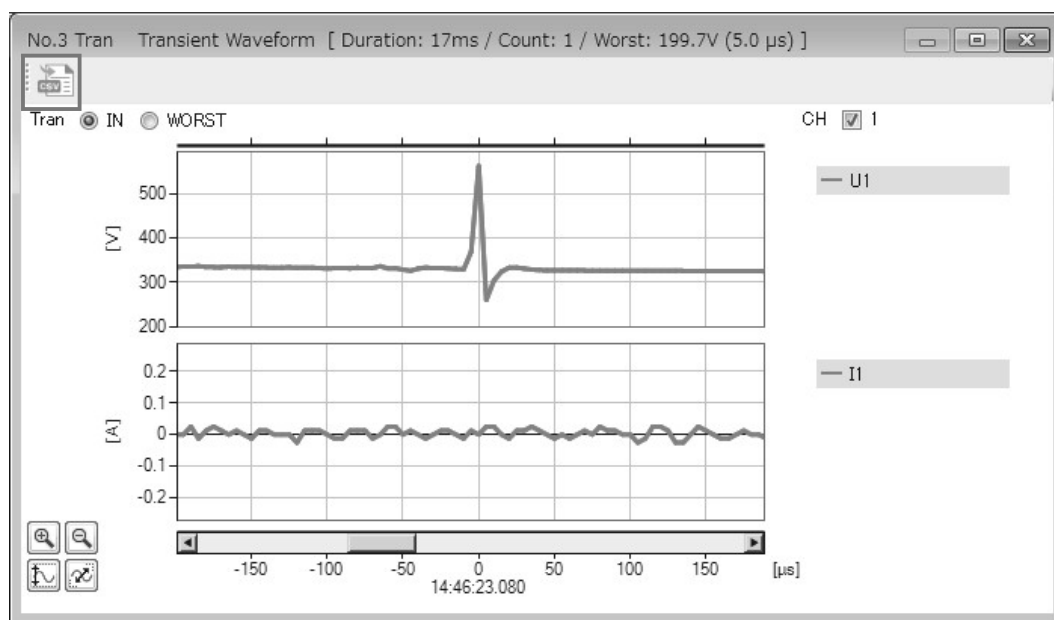
[Event DMM value (All in the event list)] → Convert the DMM values of all listed events to CSV format.

To convert the data in other independent screens (event trend data, transient waveform,

high-order harmonics) to CSV format, Click  in the each display window.



Event trend data



Transient waveform

* About date/time output of CSV output

Date and time output in CSV output is in the following format.

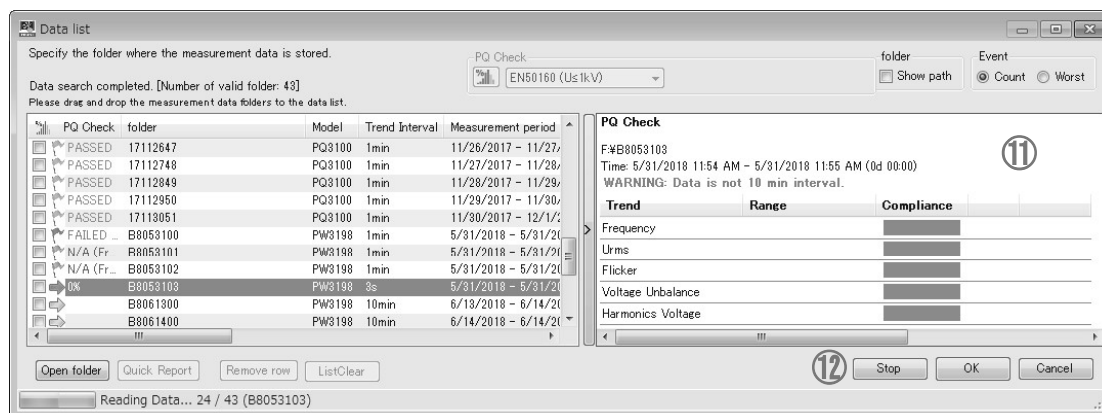
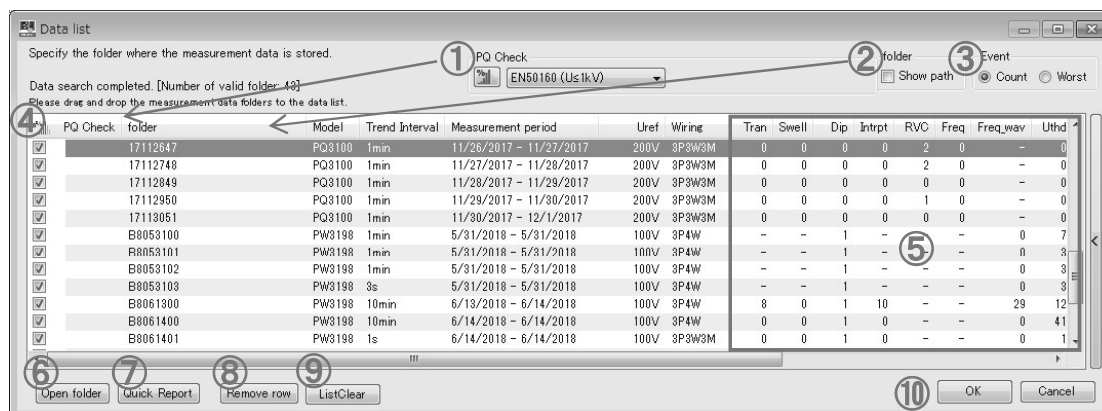
Date : YYYY/MM/DD (YYYY: year, MM: month, DD: day)

Time : hh:mm:ss.000 (hh: hour, mm: minute, dd: second, 000: millisecond)

7. Displaying data list

On the data list screen, data information can be managed and output.

For how to display the data list, see 3.1. "Loading measurement data". (⇒p.5)



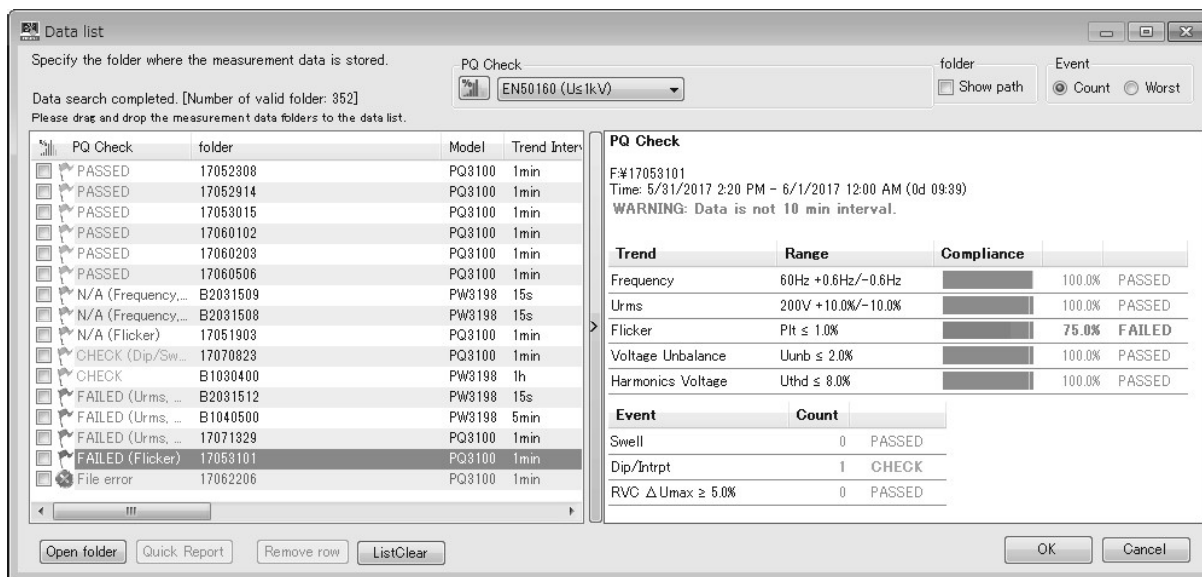
①	PQ Check	Execute the PQ Check (simplified standard result display function). Click  to start PQ Check.
②	Folder	Folder name (data name) is switched to the path display.
③	Event	Select which the number of events or the worst value to display.
④	Check button	Used to select data for "Quick Report" and "Remove rows".
⑤	Event information	Display the number of events or the worst value according to the setting of ③. The number of events or the worst value is not displayed in the following cases. - There is not event statistic data in the data folder → [N/A] - Event OFF or Events that does not display the worst value → [-]
⑥	[Open folder]	Open the selected measurement data folder by the explorer.
⑦	[Quick Report]	Create a report of multi-data trend graph.
⑧	[Remove row]	Remove the selected data from the data list.
⑨	[ListClear]	Clear the data list.
⑩	[OK]	Load the selected measurement data to the PQ ONE.
⑪	PQ Check result area	Display the results of the PQ Check.
⑫	[Stop]/[Resume]	Suspend the PQ Check. / Resume the PQ Check.

■ Execute the PQ Check

Calculate the data registered in the data list according to the specified standard condition and display the result.



For standards settings and .std file, see 3.7. "Displaying standards screen". (⇒p.57)



PQ Check results are executed according to the contents of the standards settings.
 PQ Check results are aggregated for each standard setting and displays the worst value.
 * Example) In the case of EN50160, PQ Check results are aggregated every week.

The results follow the following:

- PASSED : All the specified items are passed.
- FAILED : The specified item contains failed.
- N/A : The specified item contains N/A.
- CHECK : Event (Swell, Dip, Intrpt, RVC) occurred, Interval or Uref is out of range, etc.

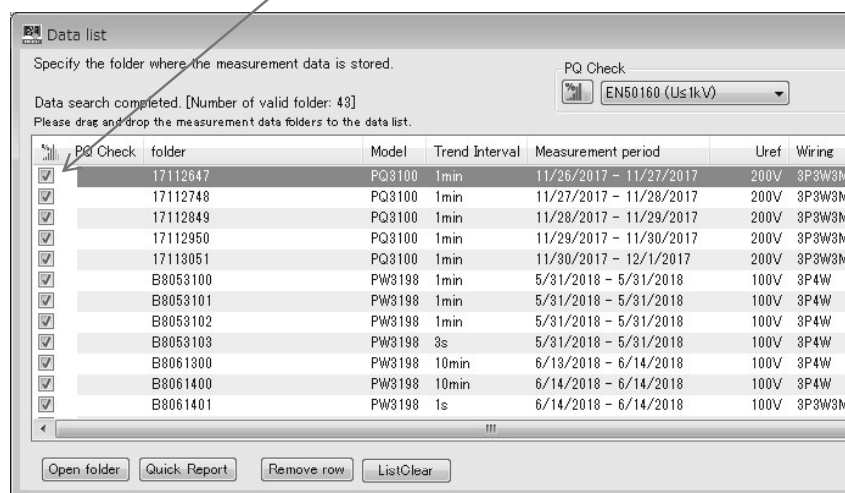
■ Create the quick report

Select the data and items displayed on the data selection screen and create them as reports in Word format (.docx).

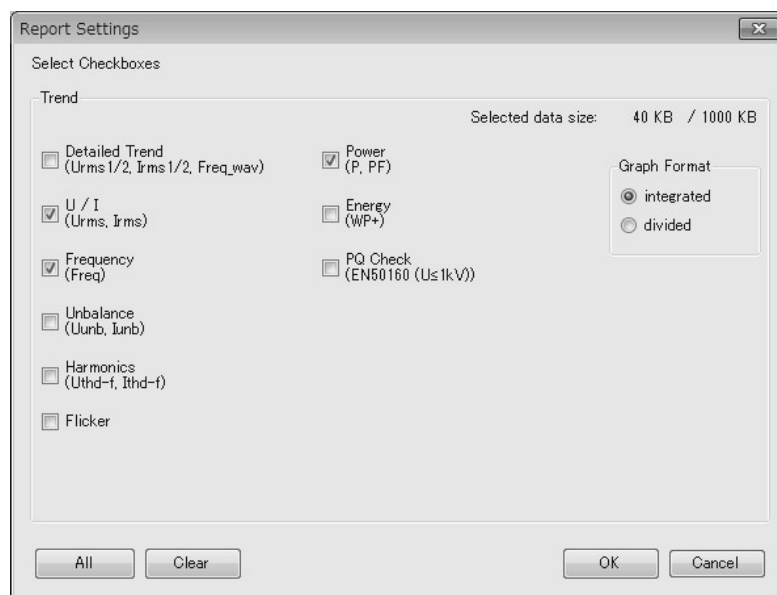
Quick report is useful for data previews, repeat record checking, and multi-data comparisons.

If you want to see the details, create reports with the creating reports function. (⇒p.70)

Select the data you want to create report.



Clicking **Quick Report** displays the [Report Setting] dialog box.
Select the trend items and the graph format.



Clicking and specify a file name on the [File Save as] dialog, the quick report is created.

Example quick report (U/I 5data)



* For Microsoft WORD compatible applications, the layout may be looked wrong.

8. Storing Measurement Data in a PQDIF file

Measurement data can be converted to a PQDIF file (with a .PQD extension).

* PQDIF format.

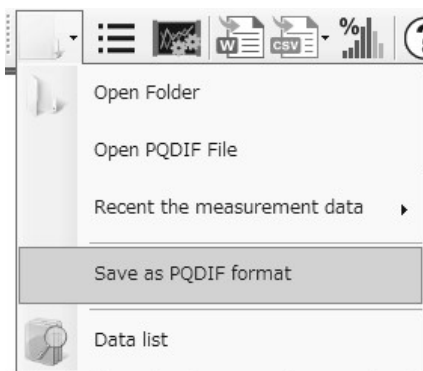
The PQDIF format for power quality data has been defined by IEEE 1159.3 and can be read by compatible applications.

◆ Converting measurement data to the PQDIF format

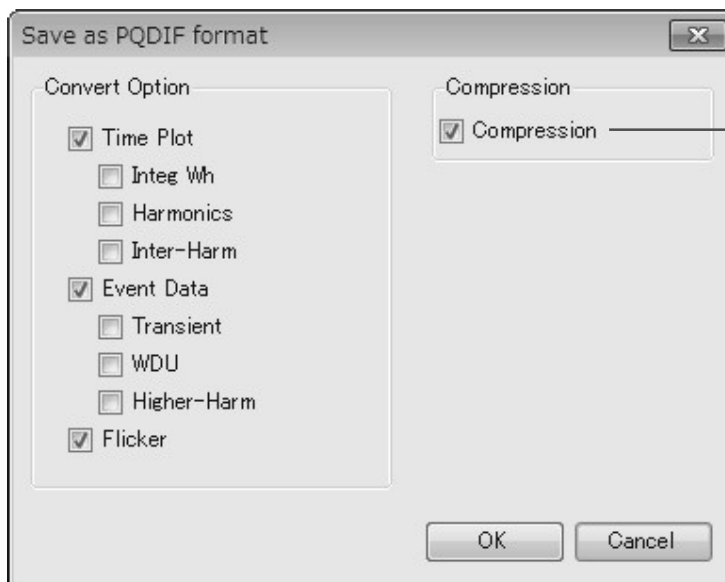
Select [Save as PQDIF format] menu.

The [Save as PQDIF format] dialog box will be displayed.

The contents of the dialog box will vary with the type of data displayed.



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



Compress the file.

Time Plot: Time Plot screen data
Integ Wh: Integral power data
Harmonics: Harmonic data
Inter-Harm: Inter-harmonics

Event Data: Event data
Transient: Transient
WDU: Event voltage fluctuation data
Higher-Harm: High-order harmonics
Flicker: Flicker

Click the [OK] button, the measurement data will be output as a .PQD file.

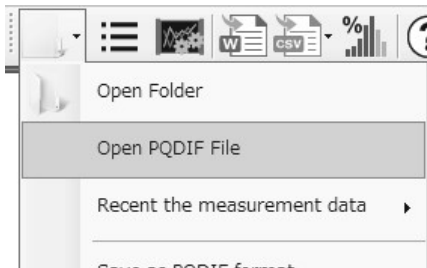
* Invalid values are output as "0.0".

9. Open a PQDIF file

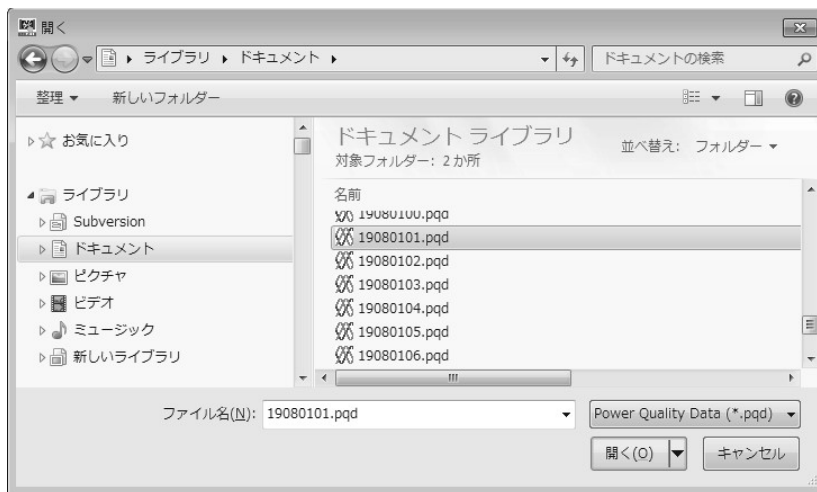
Files saved in PQDIF format (.pqd extension) can be read into PQ ONE.

◆ Open a PQDIF file

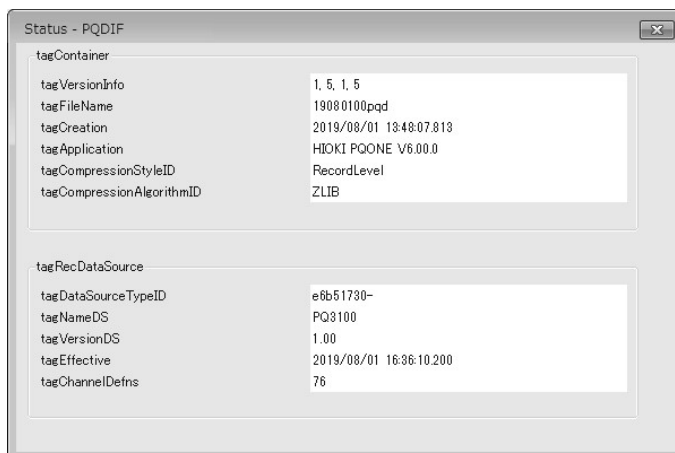
Select [Open PQDIF File] menu.



Select the file you want to display and click the [Open] button to read the file.



When the "Status" display is opened, a part of header PQDIF information is displayed.



10. Specifications

10.1. General specifications

Supported model	PQ3100 Power Quality Analyzer PW3198 Power Quality Analyzer PQ3198 Power Quality Analyzer
Operating system	OS: Windows10 (32bit / 64bit) , Windows11 (Must be updated with most recent service pack as of August 1, 2023.) The above OS requirements are satisfied. Microsoft .NET Framework 4.5.2 or later must be installed on above operating system. (In non-English environments, the appropriate language pack must also be installed.)
Display	Resolution of 1,024 x 768 or greater
Availability	1 application disc (CD-R) Download from homepage

10.2. Functional specifications

-1. Data loading

Loadable data formats	Binary data recorded by the supported model Files saved in PQDIF format (*.pqd)
Maximum loadable file size	8 GB

-2. Data display functionality

Layout	The application consists of the following four windows: Event statistics graph / Event list / Trend graph / Event data
Event statistics graph	Displays a bar graph with time on the horizontal axis and the number of event IN marks on the vertical axis. The user can set the horizontal axis to [View by Date] or [View by Hour].
Event list	Displays the times, durations, and worst values of events that occurred during the time period selected on the event statistics graph.
Trend graph	Displays trend graphs for the selected parameters.
Event data	Displays the voltage and current waveforms, harmonic measured values, and power parameters at the IN or OUT time of the event selected in the event list.
ITIC Curve User-defined Curve	Plots points of the event at the transient, voltage swell, voltage dip and interruption to the limit curve.

-3. Report creation function

Output format	Formats displayed data as a report and saves it in the Word file format (.docx).
---------------	--

-4. CSV format conversion function

Convertible screens	Trend graph window, Event waveform window, Event trend data window, Event DMM window, Transient waveform window, High-order harmonics window, statistics/standards window
Conversion items	Displayed items on screen, or all items

-5. Copy function

Copying to the clipboard	Screen images can be copied to the clipboard.
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Appendix

Appendix1 Header Information of CSV Format

Trend Data Header Information (Excluding Flicker)

Classification	Header	Explanation
Date and Time	Date Time	Date Time
Measurement Data	Status1	Status information1 (⇒p.89)
Status Information	Status2	Status information2 (⇒p.89)
Detailed Trend	Uc_rms1/2_xxx Ic_rms1/2_xxx Inrushc_xxx Freq_wav_xxx Uc_Pinst_xxx	RMS voltage refreshed each half-cycle RMS current refreshed each half-cycle Inrush current Frequency(1wave) Instantaneous flicker
U / I	Uc_rms_xxx Uc_pk+_xxx Uc_pk-_xxx Uc_dc_xxx Uc_cf_xxx Ic_rms_xxx Ic_pk+_xxx Ic_pk-_xxx Ic_dc_xxx Ic_cf_xxx U_avg_xxx I_avg_xxx	RMS voltage (200ms) Voltage waveform peak(+) Voltage waveform peak(-) Voltage DC value Voltage crest factor RMS current (200ms) Current waveform peak(+) Current waveform peak(-) Current DC value Current crest factor RMS voltage(CH average) RMS current(CH average)
Frequency	Freq_xxx f10s_xxx / Freq10s_xxx	Frequency(200ms) Frequency(10s) (PQ3198, PW3198 / PQ3100)
Unbalance	Uunb0_xxx Uunb_xxx Iunb0_xxx Iunb_xxx U_zero_xxx U_neg_xxx U_pos_xxx I_zero_xxx I_neg_xxx I_pos_xxx	Voltage zero-phase unbalance factor Voltage negative-phase unbalance factor Current zero-phase unbalance factor Current negative-phase unbalance factor Voltage zero-phase component Voltage negative-phase component Voltage positive-phase component Current zero-phase component Current negative-phase component Current positive-phase component
Harmonics	Uc_thd-f_xxx / Uc_thd-r_xxx Ic_thd-f_xxx / Ic_thd-r_xxx Uc_Hk_xxx Uc_%Hk_xxx Uc_phk_xxx Ic_Hk_xxx Ic_%Hk_xxx Ic_phk_xxx Pc_Hk_xxx Pc_%Hk_xxx Pc_phk_xxx KFc_xxx Uc_harmH_xxx Ic_harmH_xxx TDDc_AVG	Total harmonic voltage distortion factor Total harmonic current distortion factor Harmonic voltage(level) Harmonic voltage(content percentage) Harmonic voltage phase angle Harmonic current(level) Harmonic current(content percentage) Harmonic current phase angle Harmonic power(level) Harmonic power(content percentage) Phase difference of harmonic voltage and harmonic current K factor High-order harmonic voltage component High-order harmonic current component TDD value(average)

Classification	Header	Explanation
Power	Pc_xxx Sc_xxx Qc_xxx PFc_xxx / DPFc_xxx Eff1_xxx / Eff2_xxx	Active power Apparent power Reactive power Power factor / Displacement power factor Power efficiency
Energy	WP+ WP- WQlag WQlead WS Ecost	Active electric energy(+) Active electric energy(-) Reactive electric energy (lag) Reactive electric energy(lead) Apparent electric energy Energy cost
Demand	Dem_P+ Dem_p- Dem_Qlag Dem_Qlead Dem_S Dem_PF Dem_WP+ Dem_WP- Dem_WQlag Dem_WQlead Dem_WS	Active power demand value(+) Active power demand value(-) Reactive power demand value(lag) Reactive power demand value(lead) Apparent power demand value Power factor demand value Active power demand quantity(+) Active power demand quantity(-) Reactive power demand quantity(lag) Reactive power demand quantity(lead) Apparent power demand quantity
mains signaling	Uc_Msv1_xxx Uc_Msv1%_xxx Uc_Msv2_xxx Uc_Msv2%_xxx	mains signaling voltage 1 level mains signaling voltage 1 content percentage mains signaling voltage 2 level mains signaling voltage 2 content percentage

Pst, Plt Flicker Header Information

Classification	Header	Explanation
Date and Time	Date Time	Date Time
Status Information	Pst_Flag Plt_Flag	0:Normal 1:Affected by voltage fluctuation 0:Normal 1:Affected by voltage fluctuation
Pst, Plt Flicker	Uc_Pst Uc_Plt10min Uc_Plt	Short-term flicker Long-term flicker(10 minutes) Long-term flicker(2 hours)

ΔV_{10} Flicker Header Information

Classification	Header	Explanation
Date and Time	Date Time	Date Time
ΔV_{10} Flicker	Uc_1min Uc_1hMAX Uc_1h4th Uc_1hAVG	ΔV_{10} (every minute) ΔV_{10} 1-hour maximum value ΔV_{10} 1-hour fourth-largest value ΔV_{10} 1-hour average value

Event Waveform Header Information

Classification	Header	Explanation
Event No.	EventNo	Event No. of event list
Date and Time	Date Time	Date Time
Event Waveform	Uc Ic	Voltage waveform Current waveform

Event Waveform Header Information

Classification	Header	Explanation
Event Information	No. Event I/O	Event No. of event list Event type IN: Event start / OUT: Event end
Date and Time	Date Time	Date Time
Frequency	Freq Freq10s	Frequency(200ms) Frequency(10s)
Voltage	Uc rms / Urms avg Uc pk+ Uc pk- Uc dc Uc cf	RMS voltage Voltage waveform peak(+) Voltage waveform peak(-) Voltage DC value Voltage crest factor
Current	Ic rms / Irms avg Ic pk+ Ic pk- Ic dc Ic cf	RMS current Current waveform peak(+) Current waveform peak(-) Current DC value Current crest factor
Power	Pc / Psum Sc / Ssum Qc / Qsum PFc / PFsum DPFc / DPFsum Eff1 / Eff2	Active power Apparent power Reactive power Power factor Displacement power factor Power efficiency
Energy	WP+ WP- WQlag WQlead WS Ecost	Active electric energy(+) Active electric energy(-) Reactive electric energy (lag) Reactive electric energy(lead) Apparent electric energy Energy cost
Unbalance	Uunb0 Uunb Iunb0 Iunb	Voltage zero-phase unbalance factor Voltage negative-phase unbalance factor Current zero-phase unbalance factor Current negative-phase unbalance factor
Harmonics	Uc thd_f / Uc thd_r Ic thd_f / Ic thd_r KFc Uc harmH Ic harmH	Total harmonic voltage distortion factor Total harmonic current distortion factor K factor High-order harmonic voltage component High-order harmonic current component
mains signaling	Uc Msv1 Uc Msv1% Uc Msv2 Uc Msv2%	mains signaling voltage 1 level mains signaling voltage 1 content percentage mains signaling voltage 2 level mains signaling voltage 2 content percentage

- The legend of trend or event data screen becomes the header of a CSV file.
- [c] represents the measurement channel.
- [k] in harmonics represents the harmonic order.
- For maximum value, [Max] is shown as [xxx]. For average value, [AVG] is shown as [xxx].
For minimum value, [MIN] is shown as [xxx].

■ Status Information (PQ3100)

Status Information 1 (32bit)

MSB								...								LSB
b31	b30	b29	b28	b27	b26	b25	b24	...	b7	b6	b5	b4	b3	b2	b1	b0

b31: Flag concept (when 1, dip/swell/interruption flag is set)

b30: 1 if measured value is invalid

b29: 1 if harmonics-related measured values are invalid

b28: 1 if 10s frequency is invalid

b27: 1 if 200ms frequency is out of range

b26: 1 if 1-wave frequency is out of range

b25: Synchronization source synchronization loss

b24: Synchronization source synchronization loss (same as b25)

b23: CH1 synchronization loss

b22: CH2 synchronization loss

b21: CH3 synchronization loss

b20: CH4 synchronization loss

b19: CH1 to CH3 synchronization loss (bitwise OR)

b18: No zero adjustment for voltage

b17: No zero adjustment for CH123 of the current

b16: No zero adjustment for CH4 of the current

b15: U1 out of range

b14: U2 out of range

b13: U3 out of range

b12: U4 out of range

b11: U1 to U3 out of range (bitwise OR)

b10: U1 crest factor exceeded

b9: U2 crest factor exceeded

b8: U3 crest factor exceeded

b7: U4 crest factor exceeded

b6: U1 to U3 crest factor exceeded (bitwise OR)

b5: I1 out of range

b4: I2 out of range

b3: I3 out of range

b2: I4 out of range

b1: I1 to I3 out of range (bitwise OR)

b0: I1 crest factor exceeded

Status Information 2 (32bit)

MSB								...								LSB
b31	b30	b29	b28	b27	b26	b25	b24	...	b7	b6	b5	b4	b3	b2	b1	b0

b31: I2 crest factor exceeded

b30: I3 crest factor exceeded

b29: I4 crest factor exceeded

b28: I1 to I3 crest factor exceeded (bitwise OR)

b15: Power outage during interval time

b14: Undefined

b13: Undefined

b12: Undefined

b27: P1 out of range

b26: P2 out of range

b25: P3 out of range

b24: P1 to P3 out of range (bitwise OR)

b11 to b0: Undefined

b23: S1 out of range

b22: S2 out of range

b21: S3 out of range

b20: S1 to S3 out of range (bitwise OR)

b19: Q1 out of range

b18: Q2 out of range

b17: Q3 out of range

b16: Q1 to Q3 out of range (bitwise OR)

▪ The status information is output in hexadecimal. Please convert it to binary to confirm the status.

■ Status Information (PW3198)

Status Information 1 (32bit)

MSB								...								LSB
b31	b30	b29	b28	b27	b26	b25	b24	...	b7	b6	b5	b4	b3	b2	b1	b0

b31: Flag concept (when 1, dip/swell/interruption flag is set)

b30: 1 if measured value is invalid

b29: 1 if harmonics-related measured values are invalid

b28: 1 if 10s frequency is invalid

b27: Synchronization source synchronization loss

b26: CH1 synchronization loss

b25: CH2 synchronization loss

b24: CH3 synchronization loss

b23: CH4 synchronization loss

b22: U1 out of range

b21: U2 out of range

b20: U3 out of range

b19: U4 out of range

b18: U1 crest factor exceeded

b17: U2 crest factor exceeded

b16: U3 crest factor exceeded

b15: U4 crest factor exceeded

b14: I1 out of range

b13: I2 out of range

b12: I3 out of range

b11: I4 out of range

b10: I1 crest factor exceeded

b9: I2 crest factor exceeded

b8: I3 crest factor exceeded

b7: I4 crest factor exceeded

b6: P1 out of range

b5: P2 out of range

b4: P3 out of range

b3: Q1 out of range

b2: Q2 out of range

b1: Q3 out of range

b0: S1 out of range

Status Information 2 (32bit)

MSB								...								LSB
b31	b30	b29	b28	b27	b26	b25	b24	...	b7	b6	b5	b4	b3	b2	b1	b0

b31: S2 out of range

b30: S3 out of range

b29: Undefined

b28: Undefined

b27 to b0: Undefined

▪ The status information is output in hexadecimal. Please convert it to binary to confirm the status.

■ Status Information (PQ3198)

Status Information 1 (32bit)

MSB								...								LSB
b31	b30	b29	b28	b27	b26	b25	b24	...	b7	b6	b5	b4	b3	b2	b1	b0

b31: Flag concept (when 1, dip/swell/interruption flag is set)

b30: 1 if measured value is invalid

b29: 1 if harmonics-related measured values are invalid

b28: 1 if 10s frequency is invalid

b27: Synchronization source synchronization loss

b26: CH1 synchronization loss

b25: CH2 synchronization loss

b24: CH3 synchronization loss

b23: CH4 synchronization loss

b22: U1 out of range

b21: U2 out of range

b20: U3 out of range

b19: U4 out of range

b18: U1 crest factor exceeded

b17: U2 crest factor exceeded

b16: U3 crest factor exceeded

b15: U4 crest factor exceeded

b14: I1 out of range

b13: I2 out of range

b12: I3 out of range

b11: I4 out of range

b10: I1 crest factor exceeded

b9: I2 crest factor exceeded

b8: I3 crest factor exceeded

b7: I4 crest factor exceeded

b6: P1 out of range

b5: P2 out of range

b4: P3 out of range

b3: P4 out of range

b2: Q1 out of range

b1: Q2 out of range

b0: Q3 out of range

Status Information 2 (32bit)

MSB								...								LSB
b31	b30	b29	b28	b27	b26	b25	b24	...	b7	b6	b5	b4	b3	b2	b1	b0

b31: Q4 out of range

b30: S1 out of range

b29: S2 out of range

b28: S3 out of range

b27: S4 out of range

b26: 1 if forced time setting is performed.

b25: Undefined

b24: Undefined

b23 to b0: Undefined

• The status information is output in hexadecimal. Please convert it to binary to confirm the status.

Appendix2 Standard items

Item name	Criteria of judgement
Power Frequency	The percentage of the duration of the Freq event in which the maximum or minimum value of "Freq10" is outside the specified range.
Supply Voltage Variations	The percentage that the average value of "Urms" falls within the specified range.
Rapid Voltage Change	The number of times the ΔU_{ss} and ΔU_{max} value of the RVC event is out of range is counted for each period.
Flicker	The percentage that the average value of "Pst" and "Plt" falls within the specified range.
Voltage Unbalance	The percentage that the average value of "Uunb" and "Uunb0" falls within the specified range.
Harmonic Voltage(2th-25th)	The percentage that the average value of "Uthd" and "Uharm Level (2nd-25th)" falls within the specified range.
Harmonic Voltage(26th-50th)	The percentage that the average value of "Uharm Level (26th-50th)" falls within the specified range.
Interharmonic Voltage(0.5th-24.5th)	The percentage that the average value of "Uthd" and "Ui harm Level (0.5th-24.5th)" falls within the specified range.
Interharmonic Voltage(25.5th-29.5th)	The percentage that the average value of "Ui harm Level (25.5th-49.5th)" falls within the specified range.
Supply Voltage Dip/Swell	The number of Swell, DIP, and Intrpt events is classified by the percentage of the worst value to the reference value and the duration of the event.
Current RMS	The percentage that the average value of "Irms" falls within the specified range.
Current Unbalance	The percentage that the average value of "Iunb" and "Iunb0" falls within the specified range.
Harmonic Current(2th-25th)	The percentage that the average value of "Ithd" and "Iharm Level (2nd-25th)" falls within the specified range.
Harmonic Current(26th-50th)	The percentage that the average value of "Iharm Level (26th-50th)" falls within the specified range.
Interharmonic Current(0.5th-24.5th)	The percentage that the average value of "Ithd" and "li harm Level (0.5th-24.5th)" falls within the specified range.
Interharmonic Current(25.5th-29.5th)	The percentage that the average value of "li harm Level (25.5th-49.5th)" falls within the specified range.
High Frequency Harmonic Voltage (UharmH)	The percentage that the average value of "UharmH" falls within the specified range.
High Frequency Harmonic Current (IharmH)	The percentage that the average value of "IharmH" falls within the specified range.
Power (sum) Power	The percentage that the average value of "P", "S", "Q" falls within the specified range.
Power Factor (sum) Power Factor	The percentage that the absolute value of the average value of "PF" or "DPF" falls within the specified range.

- " " indicates trend item name. (Example : "Urms" indicates Voltage RMS value.)

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Edited and published by HIOKI E.E. CORPORATION

Printed in Japan

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