Quick Manual

POWER QUALITY ANALYZER

KEW6315

KYORITTSU ELECTRICAL INSTRUMENTS WORKS, LTD.
• Preface
This Quick manual is a simplified version of the full instruction manual which can be found in the supplied CD-ROM. This manual is intended only as a handy reference guide and should only be used after having read the full instruction manual which contains full details on each function of this instrument and the items contained in the package.

• Safety Warning!
The instruction manual contains warnings and safety procedures which have to be observed to ensure safe operation of the instrument and maintain it in a safe condition. Thus, these operating instructions have to be read prior to using the instrument.

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The latest software can be downloaded from our homepage: http://www.kew-ltd.co.jp.
1. Instrument Overview

Feature
This is a Clamp-type Power Quality Analyzer that can be used for various wiring systems.
It can be used for simple measurements of instantaneous/ integration/ demand values, and also for
analysis of harmonics and events related to power quality and for the simulation of power factor
correction with capacitor banks. Moreover, it can display waveforms and vectors of voltage and current.
Data can be saved either in the SD card or the internal memory, and can be transferred to PC via USB,
or in real time via Bluetooth communication.

Safety construction
Designed to meet the international safety standard IEC 61010-1 CAT.IV 300V/ CAT.III 600V/ CAT.II 1000V.

Power quality analysis
KEW6315 is designed to meet the international standard IEC61000-4-30 Class S and can measure
frequency and r.m.s. voltage with high accuracy, and also can analyze harmonics. Moreover, it can
measure swell, dip, interruption, transient, inrush current and flicker all at once without a gap.

Power measurement
KEW6315 measures active/reactive/apparent power, electrical energy, power factor, r.m.s. current, phase
angle and neutral current simultaneously.

Wiring configuration
KEW6315 supports: Single-phase 2-wire (4ch), Single-phase 3-wire (2ch), Three-phase 3-wire (2ch) and
Three-phase 4-wire.

Demand measurement
Electricity consumption can be easily monitored so as not to exceed the target maximum demand values.

Waveform/ vector display
Voltage and current can be displayed by waveform or vector.

Saving data
KEW6315 is endowed with a logging function with the preset recording interval. Data can be saved by manual
operation or by specifying date & time. Screen data can be saved by using the Print Screen function.

Dual power supply system
KEW6315 operates either with AC power supply or with batteries. Both dry-cell batteries (alkaline) and
rechargeable batteries (Ni-MH) can be used. To charge the rechargeable battery, use the charger which is
manufactured by the same company as the batteries. In the event of power interruption, while operating with
AC power supply, power to the instrument is automatically restored by the batteries in the instrument.

Large display
TFT color display with large screen.

Light & compact design
Clamp sensor type, compact and light weight design.

Application
Data in the SD card or the internal memory can be saved in PC via USB. Analysis of the downloaded
data and instrument settings are possible by using the special software “KEW Windows for KEW6315”.
Real-time communication is available via Bluetooth.

Input/ Output function
Analog signals from thermometers or light sensors can be measured simultaneously with electrical power
data via 2 analog inputs (DC voltage); when any events related to power quality occur, signals can be
transmitted to alarm devices via one digital output.
Functional overview

Start/Stop
Choose either “Quick start guide” or “Start now” to start recording. Can do simple and fast start-up setting by selecting “Quick start guide”.

See “2. Start/Stop Recording” for further details.

Inst/Integration/Demand
Display the avg/ max/ min instantaneous values of current/ voltage/ active power/ apparent power/ reactive power. Integration values also can be viewed by switching screens. Moreover, demand values with the preset target value can also be checked.

See “5. Inst/Integration/Demand” for further details.

Vector and Wiring check
Vectors of voltage and current per CH are displayed on a graph. KEW6315 will perform wiring check.

See “6. Vector” for further details.
Functional overview

Waveform
Waveforms of voltage and current per CH are displayed on a graph.

See “7. Waveform” for further details.

Harmonic Analysis
Harmonic components of voltage and current per CH are displayed on a graph.

See “8. Harmonic Analysis” for further details.

Setting (SET UP)
Make settings for KEW6315 and measurements.

See “10. Setting” for further details.

Power Quality (QUALITY) event
Display voltage swell, dip, int, transient, inrush current and flicker.

2. Start/ Stop Recording

Steps for measurement

Can start recordings with simple steps by selecting "Quick start guide".
Ensure your safety and do the appropriate preparations before starting measurements.

(1) Select the item you want to record.
* The number of selected items will have effect on file size and also on max recording time.

(2) Select the wiring system to be measured.
* Select a proper wiring system for accurate measurements.

(3) Connect to the circuit to be tested.
* Read and follow the safety precautions described in the instruction manual.

(4)(5) Check the Test environment.
* Self-diagnosis, wiring check and detection of connected sensors will be performed in this test.
* It is recommended to do this test for ensuring the testing conditions are correct.
Select the rec. interval  
Select the rec. method  
Check the selected method  
Start recording

(6) Select a recording interval.  
* Selecting a short interval gets the file size large. In this case, a long period recording cannot be performed.  
See P.38.

(7)(8)(9) Select a recording method.  
See P.11.

(10) Prepared. Recording will start.  
The mark “REC” will appear on the screen when the recording starts and the green LED (status indicator) lights up.  
If you want to terminate the recording, press the “START/STOP” button and follow the instructions displayed on the screen.
(2) Wiring system

Any of the followings can be selected.

Orientation of Clamp sensor

Reverse clamping switches the symbols (+/-) for active power (P).
(4)/(5) Test Environment Check

Test environment check
Select "Start test" and press the "ENTER" button to start the test. The test result will be displayed on the screen.

Wiring check
Test results of each item will be displayed. * NG result may be given, even if the wiring is correct, at the measurement site under bad power factors.

Self-diagnosis
Operating condition of the instrument system will be checked and the result will be displayed.

Sensor detection
The connected sensors are automatically detected and their max Ranges will be set.
NG judgment

Wiring check

Close the result display. Then, the blinking vectors and the values of NG items will be displayed. If all the results are OK, the ideal vector diagram will be displayed at the lower left corner.

Criteria of judgment and cause

<table>
<thead>
<tr>
<th>Check</th>
<th>Criteria of Judgment</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Frequency of V1 is within 40 - 70Hz.</td>
<td>- Voltage clip is firmly connected to the DUT?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Measuring too high harmonic components?</td>
</tr>
<tr>
<td>AC voltage</td>
<td>AC voltage input is 10% or more of (Nominal voltage x VT).</td>
<td>- Voltage clip is firmly connected to the DUT?</td>
</tr>
<tr>
<td>input</td>
<td></td>
<td>- Voltage test lead is firmly connected to the AC voltage input terminal on the instrument?</td>
</tr>
<tr>
<td>Voltage</td>
<td>AC voltage input is within ±20% of reference voltage (V1).</td>
<td>- Settings are matched with the wiring system under test?</td>
</tr>
<tr>
<td>balance</td>
<td></td>
<td>- Voltage clip is firmly connected to the DUT?</td>
</tr>
<tr>
<td></td>
<td>* (not checked in single-phase wiring)</td>
<td>- Voltage test lead is firmly connected to the AC voltage input terminal on the instrument?</td>
</tr>
<tr>
<td>Voltage</td>
<td>Phase of AC voltage input is within ±10º of reference value (proper vector).</td>
<td>- Voltage test leads are properly connected? (Connected to proper channels?)</td>
</tr>
<tr>
<td>phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>Current input is 5% or more and 110% or less of (Current Range x CT).</td>
<td>- Clamp sensors are firmly connected to the Power input terminals on the instrument?</td>
</tr>
<tr>
<td>input</td>
<td></td>
<td>- Setting for Current Range is appropriate for input levels?</td>
</tr>
<tr>
<td>Current</td>
<td>- Power factor (PF, absolute value) at each CH is 0.5 or more.</td>
<td>- Arrow mark on the Clamp sensor and the orientation of flowing current coincide with each other? (Power supply to Load)</td>
</tr>
<tr>
<td>phase</td>
<td>- Active power (P) at each CH is positive value.</td>
<td>- Clamp sensors are connected properly?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Self-diagnosis

If “NG” judgment is given frequently, there might be something wrong with the instrument. Stop using the instrument and refer to “Troubleshooting” in the instruction manual.

Sensor detection

If the detection result is NG, each sensor type will be displayed in red.

Criteria of judgment and cause

<table>
<thead>
<tr>
<th>Causes</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of current sensor</td>
<td>- Types of the connected current sensors are harmonized? Types of the current sensors used for measurements should be the same.</td>
</tr>
<tr>
<td>??? (cause unknown)</td>
<td>- Current sensors are firmly connected to the instrument?</td>
</tr>
<tr>
<td></td>
<td>- If any failures are in doubt:</td>
</tr>
<tr>
<td></td>
<td>Exchange the connections of the sensors and test again.</td>
</tr>
<tr>
<td></td>
<td>Connect the current sensor, for which “NG” is given, to the CH on which another sensor is properly detected.</td>
</tr>
<tr>
<td></td>
<td>If the result “NG” is given for the same CH, a defect of the instrument is suspected. A defect of sensor is suspected if “NG” is given for the same sensor connected to another CH.</td>
</tr>
<tr>
<td></td>
<td>Stop using the instrument and the sensor, if any defects are in doubt, and refer to “Troubleshooting” in the instruction manual.</td>
</tr>
</tbody>
</table>
(8)/(9) Setting for recording method

The following explains how to set recording start date and time.

(8) Specify the recording start date and time.

During the selected period, KEW6315 performs recording at the preset intervals. Example: When the date & time are specified as above, the recording period will be as follows.

From 8:00 on August 2, 2013 to 18:00 on August 7, 2013,

(9) Specify the recording time period.

KEW6315 performs recording during the selected time period at the preset intervals, and repeats recording processes during the preset time span. Example: When the time period is specified as above, the recording period is as follows. KEW6315 does not record data between 18:00 and 8:00.

(i) 8:00 to 18:00 on August 1, 2013,
(ii) 8:00 to 18:00 on August 2, 2013,
(iii) 8:00 to 18:00 on August 3, 2013,
(iv) 8:00 to 18:00 on August 4, 2013,
(v) 8:00 to 18:00 on August 5, 2013,
(vi) 8:00 to 18:00 on August 6, 2013,
(vii) 8:00 to 18:00 on August 7, 2013, and
(viii) 8:00 to 18:00 on August 8, 2013.
Switching of displayed parameters

Basically, the **Cursor Key** is used for selecting an item, the **ENTER Key** is for confirming the selection, and the **ESC Key** is for canceling the alternation. Taking the procedures in “Quick Start Guide” as an example, Key operations are explained as follows.

Press the **Cursor Key** to move the **blue highlight**, showing the item is being selected, over the items in blue letters. In the screen at the left is the Recording start screen. Press the **Cursor Key** and move the blue highlight on the desirable recording method, and press the **ENTER Key** to confirm the selection. To quit the start guide, press the **ESC Key**.

If the display of the selectable items is similar to the one shown to the left, then the up, down, right and left **Cursor Keys** can be used. Use the **Cursor Keys** to select the proper wiring system and press the **ENTER Key** to confirm the selection. To return to the previous screen and cancel the changes, press the **ESC Key**.

To alter the numbers such as **Date/ Time**, move the blue highlight over digits with the right and left **Cursor Keys** and alter the number with the up and down **Cursor Keys**. In the screen to the left, the tenth place of the day is being selected. The number can be increased or decreased by 1 with the up/ down **Cursor Keys**. Press the **ENTER Key** to confirm the selection, or press the **ESC Key** to return to the previous screen and cancel the changes.
3. Instrument Layout

**Front View**

- **Function Key**
  - Execute the displayed function.

- **PRINT SCREEN Key**
  - Save the displayed screen as BMP file.

- **DATA HOLD Key/KEY LOCK Key**
  - Hold the readings on the display.
  - Measurement continues while the readings are being held on the display.
  - Long press (at least 2 sec) disables all Keys to prevent operational errors. Another long press (at least 2 sec) is required to restore the disabled Keys.

- **LCD Key**
  - Turn on/off the backlight.
  - Long press (at least 2 sec) changes the brightness and contrast.

- **Cursor Key**
  - Select items or switch displays.

- **ENTER Key**
  - Confirm the entries.

- **ESC Key/RESET Key**
  - Cancel setting changes and return to the previous settings.

- **SETUP Key**
  - Change and confirm: Basic, Measurement, Recording and other settings, and also edit the saved data.

**Keys**

- **START/STOP Key**
  - Start/stop measurement.

- **Power Key**
  - Power on/off.

- **Status LED**
  - Green: Light up: Recording & measuring
  - Blink: Stand-by
  - Red: Blink: Backlight is off.

**Display (LCD)**

**Keys**

- **W/Wh**
  - View inst, integration and demand values.

- **Vector**
  - View phases.

- **Waveform**
  - View voltage/current waveforms.

- ** Harmonic Analysis**
  - View harmonic voltage, current and power energy.

- **Power Quality**
  - View the detailed info about: swell, dip, int, transient, inrush current and flicker.
**KEW6315 Connector**

- **AC voltage Input Terminal** (VN, V1, V2, V3)
- **Current Input Terminal** (A1, A2, A3, A4)
- **Power Connector**
- **Terminal Cover**

**Side face**

- **SD Card Slot**
- **USB port**
- **Analog Input/ Digital Output Terminal**

**Battery case**

- **Battery Cover**
## Icons on the LCD

<table>
<thead>
<tr>
<th>Icon</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Battery Icon]</td>
<td>KEW6315 is operating with battery. This icon varies in 4 steps according to the battery power condition.</td>
</tr>
<tr>
<td>![AC Power Icon]</td>
<td>KEW6315 is operating with AC power.</td>
</tr>
<tr>
<td>![Display Update Icon]</td>
<td>Holding the display update.</td>
</tr>
<tr>
<td>![Lock Icon]</td>
<td>Keys are locked.</td>
</tr>
<tr>
<td>![Buzzer Off Icon]</td>
<td>Buzzer is off.</td>
</tr>
<tr>
<td>![SD Card Icon]</td>
<td>SD card is set and available.</td>
</tr>
<tr>
<td>![Recording Icon]</td>
<td>Recording the data on the SD card.</td>
</tr>
<tr>
<td>![SD Card Icon]</td>
<td>Available free space in the SD card is not enough.</td>
</tr>
<tr>
<td>![SD Card Icon]</td>
<td>Failed to access to the SD card.</td>
</tr>
<tr>
<td>![Internal Memory Icon]</td>
<td>Internal memory is available. * This icon is displayed when a measurement starts without SD card.</td>
</tr>
<tr>
<td>![Recording Icon]</td>
<td>Recording the data in the internal memory.</td>
</tr>
<tr>
<td>![Internal Memory Icon]</td>
<td>Available free space in the internal memory is not enough.</td>
</tr>
<tr>
<td>![Standby Icon]</td>
<td>Stand-by mode</td>
</tr>
<tr>
<td>![Recording Icon]</td>
<td>Recording the measured data.</td>
</tr>
<tr>
<td>![Full Icon]</td>
<td>Capacity of recording media is full.</td>
</tr>
<tr>
<td>![SD Card Icon]</td>
<td>USB is available.</td>
</tr>
<tr>
<td>![Bluetooth Icon]</td>
<td>Bluetooth is available.</td>
</tr>
</tbody>
</table>
Symbols on the LCD

<table>
<thead>
<tr>
<th>Symbols displayed on the LCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>V'*1</td>
</tr>
<tr>
<td>P</td>
</tr>
<tr>
<td>PF</td>
</tr>
<tr>
<td>DC1</td>
</tr>
<tr>
<td>An*'2</td>
</tr>
<tr>
<td>WP+</td>
</tr>
<tr>
<td>WP-</td>
</tr>
<tr>
<td>THD</td>
</tr>
<tr>
<td>Pst (1min)</td>
</tr>
</tbody>
</table>

'*1 W screen: Displays of V and VL can be “customized” when “3P4W” is selected.

'*2 W screen: “An” is displayed only when “3P4W” is selected.

'*3 W screen: Displays of PA and C can be “customized”.

Backlight and Contrast Adjustment

Hold down the “☀” LCD Key at least 2 sec to show the sliding bar to adjust the backlight brightness and display contrast. Use the Cursor Key to slide the cursor on the bar for the adjustment. Press the ENTER Key and exit from the adjustment mode. Press the ESC or LCD Key again to cancel the adjustment and exit from the adjustment mode.

Brightness adjustment
Backlight brightness can be changed by 11 levels.

Contrast adjustment
Contrast can be changed by 11 levels.
4. Getting Started

Power supply
KEW6315 operates with either an AC power supply or batteries. Capable of performing measurements in the event of AC power interruption, power to the instrument is automatically restored by the batteries installed in the instrument. AA size alkaline battery (LR6) and AA size rechargeable battery (Ni-MH) can be both used. To charge the rechargeable battery, use the charger which is manufactured by the same company as the batteries. KEW6315 cannot charge batteries.

If an AC supply is interrupted and the batteries have not been inserted, the instrument goes off and all data may lost.

Battery Mark on the LCD/ Battery level
Power supply icon changes as follows, and the battery icon varies according to the battery condition.

<table>
<thead>
<tr>
<th>Power supply icon</th>
<th>Battery level</th>
<th>4-level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powered by AC</td>
<td>Possible continuous measurement hours:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- approx 3 hours with size AA alkaline batteries, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- approx 4.5 hours with size AA Ni-MH (1900mA/h) batteries.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* These are ref. values with LCD turned off.</td>
<td></td>
</tr>
<tr>
<td>Powered by battery</td>
<td>Instrument works normally.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Voltage of full-charged Ni-MH battery is lower than the one of the full-charged alkaline battery, so the level indicator may not be the same as the one shown above even after fully charged.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Measurement continues, but data save is ceased.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Further data will not be saved, but the data measured before the battery level drops to the lowest level are saved.)</td>
<td></td>
</tr>
</tbody>
</table>

How to install batteries:

Install batteries in correct polarity as marked inside.

Battery power is consumed even if the instrument is being off. Remove all the batteries if the instrument is to be stored and will not be in use for a long period.
Cord Connection

Voltage test leads

Power cord

Clamp sensor

Rated supply voltage : 100 - 240VAC(±10%)
Rated supply frequency : 45 - 65Hz
Max power consumption : 20VAmax

Start-up Screen

Model name and software version will be displayed upon powering on the instrument. Stop using the instrument if it does not get started properly, and refer to the “Trouble-shooting” in the instruction manual.
5. Inst/Integration/Demand values

Switching screens
Press the F1 button to toggle the screens.

W (Inst value) Wh (Integration value) Demand

inst value: “W”
Switching the items to be displayed
Use the right and left Cursor Keys to switch the displayed systems and the up and down Cursor Keys to switch the avg, max and min inst values.
Switching screens
Press the button to toggle the screens.

Switching the items to be displayed
Use the right and left Cursor Keys to switch the displayed systems and the up and down Cursor Keys to switch the avg, max and min inst values.

W (Inst value)
Wh (Integration value)
Demand

Zoom
Zoom and display the selected items.

4-split
8-split

Customize
Select and change the items to be displayed.

Trend
Changes of measured values are displayed on a graph.
Integration value: “Wh”

Switching the measurement items
Select the proper system with the right and left Cursor Keys and the CH with the up and down Cursor Keys.

![Diagram of measurement items]

-  \( \Sigma \): sum of the all measured values
-  \( \sum \): sum of measured values per CH

Demand

Switching the measurement items
Switch and select the items with the up and down Cursor Keys.

![Diagram of demand measurement]

-  Time left
-  DEM Target
-  DEM Guess
-  DEM Present
-  DEM Max
-  W
Parameters displayed when selecting [Meas.] on the right row.

**Time left**
Count down the time set by: [SETUP] → [Measurement] → [Demand] → [Measurement].

**DEM Target**
Set the value by: [SETUP] → [Measurement] → [Demand] → [Target].

**DEM Guess**
Estimate and display the demand value that would be when this demand interval ends.

**Present value x demand interval**
Elapsed time from the start of the measurement

**DEM Present**
Demand value (average power) within a demand interval.

(Integration values of “WP+” from the start of measurement) x 1 hour

**DEM Max with recorded date**
Max demand recorded in a measuring period is displayed.
Displayed value will be refreshed if any higher demands are detected.
Parameters displayed when selecting “ ” (Change in specific period) on the right row.

**Time left**
Count down the time set by: [SETUP] → [Measurement] → [Demand] → [Measurement].

**DEM P**
Load factor: percentage of the present value against the target value.

- **Present value**
- **Target value**

**DEM G**
Percentage of the predicted value against the target value.

- **Predicted value**
- **Target value**

Audible warning warns when the predicted value exceeds the target value.

- **Target**
- **Prediction**
- **Demand value (present value)**
- **Demand interval**
- **Save point**
- **Inspection cycle**
- **Inspection cycle**
- **Inspection cycle**

**Demand value**
[Displayed on measurement screen.]
Parameters displayed when selecting “ ” (Demand change) on the right row.

- **Measured demand with recorded date**
  Demand value is displayed with recorded date & time info where the cursor is located.

- **Bar graph**
  White bar: Percentage of hidden pages
  Orange bar: Percentage of the present displayed pages

- **Target value**
  30.00kW

- **Demand value**
  (Elapsed time) 07/09 09:29

- **Start of demand**
  Rec. start date & time

- **Max measured demand**
  (Displayed on measurement screen.)

- **End of demand**
  Most recent rec. date & time

- **Cursor**
  Use the right and left Cursor Keys to move the cursor.
6. Vector

Switching screens

Wiring check
Checked results will be displayed.

F1  F2  F3  F4

Wiring diagram
Diagram of the selected wiring is displayed.

F1: toggle the line lengths of voltage vector.
1  2  5  10  * time(s)

F2: toggle the line lengths of current vector.
1  2  5  10  * time(s)
7. Waveform

Switching displayed items
Select the items with up and down Cursor Keys and check for the waveforms.

Measured values per CH

<table>
<thead>
<tr>
<th>F1</th>
<th>: toggle the magnifications of voltage waveform (vertical).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.1  0.5  1  2  5  10 * time(s)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F2</th>
<th>: toggle the magnifications of current waveform (vertical).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.1  0.5  1  2  5  10 * time(s)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F3</th>
<th>: toggle the magnifications of time axis (horizontal).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  5  10 * time(s)</td>
</tr>
</tbody>
</table>

| F4 | Restore all the changed magnification settings and automatically select the appropriate magnification. |

8. Harmonics Analysis

Switching displayed items

Graph

Use the up and down Cursor Keys to toggle the CHs for checking each harmonic.

List

Use the up and down Cursor Keys to scroll the displayed degree of harmonics.
高調波解析

測定値

各CH

電圧、線形、全体表示

電流

電力

周波数

Logarithm

Zoom

Phase angle

RMS value

Current

Power

F1 F2 F3 F4

Graph RMS V/A/P

Graph Rate V/A/P

Graph Rate V/A/P

Graph Rate V/A/P

Graph Rate V/A/P

Graph Rate V/A/P
Parameters displayed on graph

**Overall display**

**Rate of content**
Harmonic content against the 1st basic wave. When selecting “Logarithm”, 10% will be the max percentage of the vertical axis, and the higher content rates will not be displayed.

**Zoom**

**Graph color**
If multiple CHs are used, colors harmonized with each CH will be used and displayed.

**Max value**
Max values of each order will be marked and displayed. To turn on/off this function: [SETUP] → [Measurement] → [Harmonics] → [MAX hold].

**Scroll bar**
White: Overall range up to 50th. Dark orange: Current displayed area. Use the left and right Cursor Keys to scroll and zoom the desirable area.

**Logarithm**

**Exceeding axis value**

**Exceeding threshold**

**Allowable range**
Complied with IEC61000-2-4, Class3. To change the range: [SETUP] → [Measurement] → [Harmonics] → [Edit allowable range].
9. Power Quality

Switching displayed items

Event

<table>
<thead>
<tr>
<th>Event</th>
<th>Flicker</th>
</tr>
</thead>
<tbody>
<tr>
<td>101.0 V 2013/07/18 10:45:43.156</td>
<td>Flicker Detection</td>
</tr>
<tr>
<td>50.4 V 2013/07/18 10:45:43.156</td>
<td></td>
</tr>
<tr>
<td>87.1 V 2013/07/18 10:45:43.156</td>
<td></td>
</tr>
<tr>
<td>128.5 V 2013/07/18 10:45:43.156</td>
<td></td>
</tr>
<tr>
<td>-217.1 V 2013/07/18 10:45:43.156</td>
<td></td>
</tr>
<tr>
<td>50.4 V 2013/07/18 10:45:43.156</td>
<td></td>
</tr>
<tr>
<td>87.1 V 2013/07/18 10:45:43.156</td>
<td></td>
</tr>
<tr>
<td>128.5 V 2013/07/18 10:45:43.156</td>
<td></td>
</tr>
</tbody>
</table>

F1

Flicker: Max value of each order will be marked and displayed. To turn on/off this function: [SETUP]→ [Measurement] → [Harmonics] → [MAX hold].

Harmonic analysis: 15/50th

Scroll bar

White: Overall range up to 50th.

Dark orange: Current displayed area.

Use the left and right Cursor Keys to scroll and zoom the desirable area.

Harmonic analysis: max. 50th

Rate of content

Harmonic content against the 1st basic wave.

When selecting “Logarithm”, 10% will be the max percentage of the vertical axis, and the higher content rates will not be displayed.

Graph color

If multiple CHs are used, colors harmonized with each CH will be used and displayed.

Exceeding axis value

Exceeding threshold

Allowable range

Complied with IEC61000-2-4, Class3.

To change the range: [SETUP]→ [Measurement] → [Harmonics] → [Edit allowable range].

Event

Switching measurement items

Use the up and down Cursor Keys and toggle the occurred events to be displayed on the screen.

Displayed events are toggled in the following sequence.

All events → Swell → Dip → Int → Transient → Inrush current
Measurement method
Swell/ Dip/ Int/ Inrush current

Each event will be detected with the r.m.s. values in one gapless waveform and with a half-wave overlapping. The beginning of the waveform where the first event is detected is regarded as the start of the event. If further events are not detected in the following waveform, the beginning of the waveform is regarded as the end of the event. The detected event is assumed to be continued between the start to the end of event detection.

Example: Dip event detection

ˈInt events are detected in the same method.

Example: Swell event detection

ˈInrush current events are detected in the same method.
Transient

Voltage waveforms will be monitored at approx 40ksps, gapless, to calculate and check for transient event every 200ms. The beginning of the 200ms period where the first transient is detected is regarded as the start of the event. If further events are not detected in the following 200ms period, the beginning of the period is regarded as the end of the event. The detected transient is assumed to be continued between the start to the end of event detection.

Example: Transient event detection

![Diagram of transient event detection]

Saved data

When an event occurs and is detected, KEW6315 records the type of the event, start/ end time and the values. The following data will also be recorded. The event waveform is recorded for 200ms during the 1 sec of the data refresh period.

Event waveform

Waveforms and also event data on all the chs are recorded for approx. 200ms (50Hz: 10-cycle, 60Hz: 12-cycle) at 8192 points in total. When different events occur within 1 sec, only the waveforms which contain the highest-priority events will be recorded. However, if the same type of events occur at the same time, the one containing the highest (deepest) values will be recorded. If the highest (deepest) values are also the same, the one with a longer duration will be recorded. As for the channels, there is no priority order.

Priority order: Voltage transient-> Int-> Dip-> Swell-> Inrush current

RMS variations

Voltage/ current rms value (resolution: half-cycle) variations and event data on all chs are recorded for 1 sec at data refresh.

Example: Dip detection in 800ms period:
Switching displayed items

Use the up and down Cursor Keys and toggle the items.

Parameters displayed when selecting “**V**” on the right row.

- **Pst Calc...**
  Time length required for Pst calculation.

- **V**
  Average voltage

- **Pst(1min)**
  Pst value is displayed and refreshed every minute.

- **Pst**
  Short-term flicker (Pst) is displayed and refreshed every 10 min.
  MAX: the max values detected through the start to the end of measurement, and will be refreshed every time when the max value is exceeded.

- **Plt**
  Long-term flicker (Plt) is displayed and refreshed every 2 hours.
  MAX: the max values detected through the start to the end of measurement, and will be refreshed every time when the max value is exceeded.

- **Frequency**
  The value will be refreshed every second.
Parameters displayed when selecting “Pst(1min)” on the right row.

- **Pst Calc...**
  Time length required for Pst calculation.

- **Pst(1min)**
  Latest measured value.

- **Max.**
  Max values detected through the start to the end of measurement, and will be refreshed every time when the max value is exceeded.

- **Trend graph**
  Change of the latest 120 data Pst(1min.).

Parameters displayed when selecting “Plt” on the right row.

- **Plt**
  Plt value and the recorded date & time info where the cursor is located.

- **Max.**
  Max values detected through the start to the end of measurement, and will be refreshed every time when the max value is exceeded.

- **Bar graph**
  White bar : percentage of whole pages.
  Orange bar : percentage of the present displayed pages.

Press the right and left **Cursor Keys** to move.

**Rec. start time**

**Latest rec. time**
10. Setting

Press the [SETUP] Key to access to any of the following five settings.

Press the [Cursor] Keys to move to each setting.

- **Basic setting** Make settings for the items common to each measurement.
- **Meas. setting** Make settings for each measurement mode.
- **Rec. setting** Make settings for recording.
- **Saved data** Edit the recorded data or alter the instrument setting.
- **Others** Configure the environmental setting.

### Each setting

- **Basic**
  - (Wiring)
  - (Voltage)
  - (Current)
  - (External input DC)
  - (Frequency)

- **Measurement**
  - (Demand)
  - (Harmonics)
  - (Power quality)
  - (Flicker)
  - (Capacitance Calc.)

- **Recording**
  - (REC item)
  - (REC method)
  - (Manual/Constant rec./Time period rec.)

- **Saved data**
  - (REC data)
  - (KEW6315 setting)

- **Others**
  - (Environment)
  - (KEW6315 setting)
Basic setting

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Details of setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiring</td>
<td>①P2W×1</td>
</tr>
<tr>
<td></td>
<td>②P2W×2</td>
</tr>
<tr>
<td></td>
<td>③P2W×3</td>
</tr>
<tr>
<td></td>
<td>④P2W×4</td>
</tr>
<tr>
<td></td>
<td>⑤P3W×1</td>
</tr>
<tr>
<td></td>
<td>⑥P3W×2</td>
</tr>
<tr>
<td></td>
<td>⑦P3W×2</td>
</tr>
<tr>
<td></td>
<td>⑧P3W×3A</td>
</tr>
<tr>
<td></td>
<td>⑨P4W</td>
</tr>
<tr>
<td>* Current terminals that are not used in the selected wiring system can be used to measure rms currents and harmonics.</td>
<td></td>
</tr>
<tr>
<td>Voltage range</td>
<td>600V/1000V</td>
</tr>
<tr>
<td>VT ratio</td>
<td>0.01-9999.99(1.00)</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>50V-600V(100V)</td>
</tr>
<tr>
<td>Clamp/ current range</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8128:5/50A/AUTO</td>
</tr>
<tr>
<td></td>
<td>8127:10/100A/AUTO</td>
</tr>
<tr>
<td></td>
<td>8126:20/200A/AUTO</td>
</tr>
<tr>
<td></td>
<td>8125:50/500A/AUTO</td>
</tr>
<tr>
<td></td>
<td>8124/8130:100/1000A/AUTO</td>
</tr>
<tr>
<td></td>
<td>8129:300/1000/3000A</td>
</tr>
<tr>
<td></td>
<td>8133:300/3000A/AUTO</td>
</tr>
<tr>
<td></td>
<td>8141:</td>
</tr>
<tr>
<td></td>
<td>8142: 500mA/AUTO</td>
</tr>
<tr>
<td></td>
<td>8143:</td>
</tr>
<tr>
<td></td>
<td>8146: 1/10A/AUTO</td>
</tr>
<tr>
<td></td>
<td>8147:</td>
</tr>
<tr>
<td></td>
<td>8148:</td>
</tr>
</tbody>
</table>

| CT ratio         | 0.01-9999.99(1.00) |
| DC range         | 100mV/1.000V/10V   |
| Frequency        | 50Hz/60Hz          |

* Default values are highlighted in gray.
Measurement setting

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Details of setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td></td>
</tr>
<tr>
<td>Interval</td>
<td>Not be used/ 10min/15min/30min</td>
</tr>
<tr>
<td>Inspection cycle</td>
<td></td>
</tr>
<tr>
<td>Interval: 10min/15min</td>
<td>1min/2min/5min</td>
</tr>
<tr>
<td>Interval: 30min</td>
<td>1min/2min/5min/10min/15min</td>
</tr>
<tr>
<td>Target</td>
<td>0.001mW-999.9TW(100.0kW)</td>
</tr>
<tr>
<td>Harmonics</td>
<td></td>
</tr>
<tr>
<td>THD(total harmonic distortion) calc.</td>
<td>THD-F(based on the fundamental waveform)/THD-R(based on all rms values)</td>
</tr>
<tr>
<td>Allowable range</td>
<td>Default/ customize(V/A)</td>
</tr>
<tr>
<td>MAX HOLD</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>Power quality</td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>against nominal V: 1 to 10%(5%)</td>
</tr>
<tr>
<td>Transient</td>
<td>against nominal V: ±50 to ±2200Vpeak(300%)</td>
</tr>
<tr>
<td>Swell</td>
<td>against nominal V: 100 to 200%(110%)</td>
</tr>
<tr>
<td>Dip</td>
<td>against nominal V: 0 to 100%(90%)</td>
</tr>
<tr>
<td>Int</td>
<td>against nominal V: 0 to 100%(10%)</td>
</tr>
<tr>
<td>InrushCurrent</td>
<td>against “A” range: 0 to 110%(100%)</td>
</tr>
<tr>
<td>Flicker</td>
<td>Filter (Ramp)</td>
</tr>
<tr>
<td>Capacitance</td>
<td></td>
</tr>
<tr>
<td>Capacitance calculation</td>
<td>Target PF 0.5-1(1.000)</td>
</tr>
</tbody>
</table>

Recording setting

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Details of setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recording item</td>
<td></td>
</tr>
<tr>
<td>Harmonics</td>
<td>Record/ Do not record</td>
</tr>
<tr>
<td>Power quality (event)</td>
<td>Record/ Do not record</td>
</tr>
<tr>
<td>Recording method</td>
<td></td>
</tr>
<tr>
<td>Interval</td>
<td>1sec/2sec/5sec/10sec/15sec/20sec/30sec/1min/2min/5min/10min/15min/20min/30min/1hour/2hours/150,180 cycles (approx 3sec)</td>
</tr>
<tr>
<td>Start</td>
<td>Manual/Constant rec./Time period rec.</td>
</tr>
<tr>
<td>Constant measurement</td>
<td>Day/ Month/ Year Hour: Minute (00/00/0000 00:00)</td>
</tr>
<tr>
<td>Time period</td>
<td>Day/ Month/ Year (DD/MM/YYYY)- Day/ Month/ Year (DD/MM/YYYY) Hour: Minute (hh:mm)- Hour: Minute (hh:mm)</td>
</tr>
</tbody>
</table>

Save setting

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Details of setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>REC data</td>
<td>Delete data.</td>
</tr>
<tr>
<td></td>
<td>Transfer data.</td>
</tr>
<tr>
<td></td>
<td>Format</td>
</tr>
<tr>
<td>KEW6315 setting</td>
<td>Save setting.</td>
</tr>
<tr>
<td></td>
<td>Read settings.</td>
</tr>
</tbody>
</table>
Other settings

<table>
<thead>
<tr>
<th>Setting item</th>
<th>Details of setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language*</td>
<td>Japanese/ English</td>
</tr>
<tr>
<td>Date format*</td>
<td>YYYY/MM/DD / MM/DD/YYYY / DD/MM/YYYY</td>
</tr>
<tr>
<td>CH color*</td>
<td>white/ yellow/ orange/ red/ gray/ blue/ green</td>
</tr>
<tr>
<td>Time*</td>
<td>dd/mm/yyyy hh:mm:ss</td>
</tr>
<tr>
<td>ID Number</td>
<td>00-001 to 99-999(00-001)</td>
</tr>
<tr>
<td>Buzzer</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>Bluetooth</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>Power</td>
<td>AC power: Power off in 5 min./Disable auto-off</td>
</tr>
<tr>
<td></td>
<td>Battery: Power off in 5 min.</td>
</tr>
<tr>
<td>Backlight</td>
<td>AC power: Power off in 5 min./Disable auto-off</td>
</tr>
<tr>
<td></td>
<td>Battery: Power off in 2 min.</td>
</tr>
<tr>
<td>System reset</td>
<td>Reset the system. Confirmation message appears before resetting the system.</td>
</tr>
</tbody>
</table>

*Items listed with “*” mark will not be restored to default even after the system is reset.

* Default values are highlighted in gray.

11. SD Card/ Saved Data

Possible recording time

When the 2GB of SD is used:

<table>
<thead>
<tr>
<th>Interval</th>
<th>REC item</th>
<th>REC item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Power</td>
<td>+Harmonics</td>
</tr>
<tr>
<td>1sec</td>
<td>13days</td>
<td>3days</td>
</tr>
<tr>
<td>2sec</td>
<td>15days</td>
<td>3days</td>
</tr>
<tr>
<td>5sec</td>
<td>38days</td>
<td>7days</td>
</tr>
<tr>
<td>10sec</td>
<td>2.5months</td>
<td>15days</td>
</tr>
<tr>
<td>15sec</td>
<td>3.5months</td>
<td>23days</td>
</tr>
<tr>
<td>20sec</td>
<td>5months</td>
<td>1month</td>
</tr>
<tr>
<td>30sec</td>
<td>7.5months</td>
<td>1.5months</td>
</tr>
<tr>
<td></td>
<td>1hour</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>150/180-cycle</td>
<td>23days</td>
</tr>
</tbody>
</table>

* Data of power quality events are not considered to estimate the possible recording time.
The max possible time will be shortened by recording such events.

* Please ensure to use the SD cards provided with this instrument or as optional parts.
Saved data

The file name will be assigned automatically. File no. is kept and saved, even after powering off the instrument, until the system is reset. The file number will increase until it exceeds “999”.

**Print screen:** Press the [Print Screen] key to save the screen images as BMP files in the root directory on the SD card.

**File name:** PS- SD- 000 .BMP

- **Dest. code**
  - SD: SD card
  - ME: Internal memory
- **File No.** (000-999)
- **Extension** (BMP file)

*Dest. = Destination

**KEW6315 Setting:** Press the [SETUP] key and move to “Saved data” tab, and then select “Save Settings”.

**File name:** SUP - S - 0000 .PRE

- **Dest. code**
  - S: SD card
  - M: Internal memory
- **File No.** (0000-9999)

**Data folder:** New folder will be created per measurement to save the interval and power quality data.

**Folder name:** / KEW / S - 0000

- **Dest. code**
  - S: SD card
  - M: Internal memory
- **Data No.** (0000-9999)

**Interval data**

<table>
<thead>
<tr>
<th>KEW6315 setting</th>
<th>Measurement setting</th>
<th>Power measurement</th>
<th>Harmonics measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>File name</strong></td>
<td>SUP - S - 0000 .KEW</td>
<td>INI - S - 0000 .KEW</td>
<td>INP - S - 0000 .KEW</td>
</tr>
<tr>
<td><strong>Dest. code</strong></td>
<td></td>
<td>SD: SD card</td>
<td>SD: SD card</td>
</tr>
<tr>
<td><strong>Data No.</strong></td>
<td></td>
<td>(0000-9999)</td>
<td>(0000-9999)</td>
</tr>
</tbody>
</table>

**Power quality data**

<table>
<thead>
<tr>
<th>Event type</th>
<th>Waveform</th>
<th>V/ A change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>File name</strong></td>
<td>EVT - S - 0000 .KEW</td>
<td>WAV - S - 0000 .KEW</td>
</tr>
<tr>
<td><strong>Dest. code</strong></td>
<td></td>
<td>SD: SD card</td>
</tr>
<tr>
<td><strong>Data No.</strong></td>
<td></td>
<td>(0000-9999)</td>
</tr>
</tbody>
</table>
**Saved items**

The following data measured on each CH will be saved according to the selected recording method. Saved items are depending on the selected recording method and wiring system.

<table>
<thead>
<tr>
<th>REC file</th>
<th>REC item</th>
<th>Meas. / Rec. setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power measurement</td>
<td>RMS voltage (line/ phase)</td>
<td>●●●</td>
</tr>
<tr>
<td></td>
<td>RMS current</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Active power</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reactive power</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apparent power</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power factor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neutral current (3P4W)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V/ A phase angle (1st order)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog input voltage, 1CH, 2CH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V/A unbalance ratio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-min Voltage flicker</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Short-term V Flicker (Pst)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long-term V Flicker (Plt)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Capacitance calculation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Active power energy (consumption/ regenerating)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reactive power energy (consumption) lagging/leading</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apparent power energy (consumption/ regenerating)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reactive power energy (regenerating) lagging/leading</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Demand (W/VA)</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Target demand (W/VA)</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Total harmonic distortion of V(F/R)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total harmonic distortion of A(F/R)</td>
<td></td>
</tr>
<tr>
<td>Harmonics measurement</td>
<td>Harmonic V/ A (1-50th order)</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>V/ A phase angle (1-50th order)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V/ A phase difference (1-50th order)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Harmonic power (1-50th order)</td>
<td></td>
</tr>
<tr>
<td>V/ A Change</td>
<td>RMS voltage per half-cycle</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>RMS current per half-cycle</td>
<td></td>
</tr>
<tr>
<td>Event type</td>
<td>Event detected date&amp;time</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Event type</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Measured values at event detection</td>
<td></td>
</tr>
<tr>
<td>Waveform</td>
<td>V/A waveform</td>
<td>●</td>
</tr>
</tbody>
</table>
Data transfer

1. SD card and USB

Data in the SD card or the internal memory can be transferred to PC using USB connection or SD card slot/reader.

<table>
<thead>
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<th>Method of transfer</th>
<th>USB</th>
<th>Card reader</th>
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<tr>
<td>SD card data (file)</td>
<td>Δ”1</td>
<td>O</td>
</tr>
<tr>
<td>Internal memory data (file)</td>
<td>O</td>
<td></td>
</tr>
</tbody>
</table>

Δ”1: It is recommended to transfer the large data by use of SD card since transferring large data files by USB requires more time than using the SD card reader. (transfer time: approx 320MB/hour)

As to the manipulation of SD cards, please refer to the instruction manual attached to the card.

In order to save data without any problem, make sure to delete the files other than the data measured with this instrument from the SD card beforehand.

2. Bluetooth

Measuring data can be checked on android devices in real-time via Bluetooth communication.

It is necessary to enable Bluetooth function prior to using Bluetooth communication.

(Setting No. 26: Bluetooth)

Before starting to use this function, download the special application “KEW Smart” from the Internet site.

The application “KEW Smart” is available on the download site for free. (Internet access is required and charges may be incurred.)
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Data in the SD card or the internal memory can be transferred to PC using USB connection or SD card slot/reader.

**Method of transfer**

- **USB Card reader**
- **SD card data (file)**
- **△**
- **Internal memory data (file)**

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