Power supply maintenance & troubleshooting:
Record and analyze data with a single instrument
Reliable power supply maintenance, management, troubleshooting, and analysis

The power grid is the single most important piece of infrastructure in our society, and regular maintenance and management are essential in order to prevent problems. When power supply issues are caused by factors such as equipment malfunctions or rapid surges in power demand, personnel are called upon to analyze the underlying causes quickly and precisely. The PQ3100 aids in reliable power analysis by delivering analytical capabilities that reliably captures the full range of power anomalies along with exceptional ease of use that facilitates each step of instrument operation, from connecting it to the circuit to recording data.
Recording power quality data for the grid
The PQ3100 records data including voltage, current, power, harmonics, and flicker* simultaneously along a single time axis, and the included PQ ONE application software makes it easy to create reports.

Analyzing device power supply issues
When you need to resolve issues with a device that unexpectedly malfunctions or suddenly stops, the PQ3100 captures all power anomalies, including instantaneous outages, voltage drops, and frequency fluctuations, while simultaneously recording trend data.

Measuring AC/DC power
Used in combination with an AC/DC auto-zero current sensor, the PQ3100 can accurately measure DC currents over extended periods of time. Since the instrument supplies power to connected sensors, there's no need to use an additional power supply for sensors.
Simultaneously measure all parameters at once

Measuring all parameters at the same time
The PQ3100 makes it easy to verify current conditions by displaying all measurement parameters simply by toggling the screens.

Simultaneously recording trend graphs and event waveforms
The PQ3100 records trend data for all parameters at once. When the PQA detects a power anomaly, the event is immediately recorded. Since maximum, minimum, and average values are recorded during each interval, you’ll never miss peak values.

The PQ3100 also records 1/2 RMS value fluctuations over a period of 30 seconds when a voltage spike, voltage drop, or inrush current occurs. In addition, the instrument can be used to investigate voltage drops caused by inrush current at motor startup.
Easy wiring and configuration. Reliable measurement.

1 **Quick Set:** Easy-to-understand on-screen guide for measurement procedures

Simply launch Quick Set to navigate - from connecting and configuring the instrument to starting recording.

**Setup Flow (example: 3P4W)**

**STEP 1**
Choose the wiring type and connect cables to the instrument.

**STEP 2**
Connect the voltage cables and current sensors to the measurement target.

**STEP 3**
The instrument automatically performs a wiring check and displays the results.

**Example on-screen help:**
If the clamp-on sensor is oriented incorrectly, the instrument won't be able to measure power and power factor accurately.

**STEP 4**
Set the parameters to record and the recording interval.

With Easy Setup, you can choose the parameters to record with one touch.

- **Voltage events**
  - Measure inrush current. Threshold is set at 200% of the current RMS. Input voltage into CH1.
  - Record trend data only. All event items are set to OFF.
  - Measure according to the EN50160 standard. Recording interval is set to 10 minutes.

**STEP 5**
Start recording.

2 **Record 11 seconds of data before and after events**

The PQ3100 can record waveforms for up to 1 second before and 10 seconds after an anomaly occurs. This capability is helpful when you need to analyze data bracketing an anomaly or when you need to verify normal return for a solar power conditioner.

3 **Superior level of safety**

The PQ3100 supports CAT III (1000 V) and CAT IV (600 V) measurements.

4 **High-precision measurement**

- Voltage RMS value accuracy: ±0.2% of nominal voltage
- Swell, dip, outage: ±0.3% of nominal voltage

The PQ3100 complies with the IEC 61000-4-30 Class S standard.
5 Drive sensors without an external power supply

Since the PQA supplies power, there’s no need to use a separate AC adapter for AC/DC sensors or flexible sensors.

6 Easily install in confined spaces

Flexible current sensors are convenient when making measurements in a confined space and when measuring a two- or three-line power circuit.

7 Measure DC power over extended periods of time

Used in combination with an auto-zero current sensor, the PQ3100 can measure DC power over extended periods of time without the need to worry about zero-point drift.

8 Extensive range coverage for use in an array of applications

For example, the CT7136 lets you choose from three measurement ranges (5 A, 50 A, or 500 A), allowing it to be used in a broad range of applications, from the secondary side of a CT to wires carrying large currents.

9 Long-term recording of data on an SD memory card

Choose optional cards with 2 GB or 8 GB of capacity.

| Recording times when using a 2 GB SD memory card |
|---------------------|---------------------|---------------------|
|                      | Without harmonics   | With harmonics       | Event recording |
| 1 sec                | 5 h 7 h             | 7 h                 | Yes             |
| 2 sec                | 10 h 14 h           | 14 h                | Yes             |
| 10 sec               | 50 h 11 h           | 2 h 21 h            | Yes             |
| 10 min               | 1 year              | 17 h 0 d            | Yes             |
| 60 min               | 1 year              | 1 year              | Yes             |

Comparison of PQ3100 and PW3198 specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>PQ3100</th>
<th>PW3198</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Hz input</td>
<td>DC/ 50 Hz/ 60 Hz</td>
<td>DC/ 50 Hz/ 60 Hz/ 400 Hz</td>
</tr>
<tr>
<td>Measurement</td>
<td>Single-phase 2-wire, single-phase 3-wire, three-phase 3-wire, three-phase 4-wire + Ch. 4</td>
<td>Class A</td>
</tr>
<tr>
<td>Voltage</td>
<td>4 (U4: Not isolated)</td>
<td>4 (U4: Isolated from U1 to 3)</td>
</tr>
<tr>
<td>Number of channels</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Voltage input</td>
<td>1000 V (measurement category III)</td>
<td>600 V (measurement category IV)</td>
</tr>
<tr>
<td>Current input</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply for sensors</td>
<td>Yes</td>
<td>n/a</td>
</tr>
<tr>
<td>Voltage @ Power</td>
<td>1/2 RMS value (half-wave offset wave calculation), RMS value, waveform peak, Voltage DC, Unbalance factor (negative-phase, zero-phase), frequency (1 wave/ 200 ms/ 10 sec.)</td>
<td>n/a</td>
</tr>
<tr>
<td>Current @ Power</td>
<td>Inrush current (half-wave), RMS value, waveform peak, Current DC, Unbalance factor (negative-phase, zero-phase), K factor (1/2 RMS value (half-wave offset wave calculation), crest factor)</td>
<td>n/a</td>
</tr>
<tr>
<td>Measurement parameters</td>
<td>Support for flicker measurement planned with a future firmware update.</td>
<td>(simultaneous measurement of 3 channels)</td>
</tr>
<tr>
<td>Harmonics</td>
<td>0th order (DC) to 50th order, Voltage/ Current/ Power/ Phase angle (voltage/ current), Voltage/Current phase difference, Total harmonic distortion ratio (voltage/ current)</td>
<td>n/a</td>
</tr>
<tr>
<td>Time-series measurements</td>
<td>Max. 1 year</td>
<td>Max. 1 year (55 weeks with repeat function on)</td>
</tr>
<tr>
<td>Event measurements</td>
<td>200 ms/600 ms/150 cycles (with 50 Hz input)/1/25/10/15/30 sec. to 2 h</td>
<td>100 events × 55 cycles</td>
</tr>
<tr>
<td>Event statistical processing</td>
<td>Display of the number of events per day by event type</td>
<td>n/a</td>
</tr>
<tr>
<td>Event parameters</td>
<td>Voltage Swell/ Dip/ Interruption/ Frequency fluctuation/ Inrush current/ THD</td>
<td>RMS value/ Voltage waveform peak/ Current waveform peak/ Comparison of voltage waveforms/ Harmonics/ Unbalance factor/ Power</td>
</tr>
<tr>
<td>Setting aid</td>
<td>QuickSet</td>
<td>Simple Setting feature</td>
</tr>
<tr>
<td>Operating temperature and humidity</td>
<td>-20°C to 50°C (4°F to 122°F), 80% RH</td>
<td>0°C to 50°C (32°F to 122°F), 80% RH</td>
</tr>
<tr>
<td>IEC 61000-4-30 standard compliance</td>
<td>Class S</td>
<td>Class A</td>
</tr>
</tbody>
</table>
PQ One: Analyze data and create reports on a PC with a dedicated application

The PQ3100 includes PQ ONE, a power quality analysis application whose latest version can be downloaded free of charge from Hioki’s website.

**Event statistics**
Display statistics on event occurrence by date and time, making it easy to discover anomalies that occur during specific time periods or days of the week.

**Trend graphs**
Display time-series graphs of parameters such as voltage, current, frequency, harmonics, unbalance factor, power, and energy. Configure the display range on screen as desired and create reports by outputting graphs as-is.

**Event list**
Display statistics on event occurrence by date and time, making it easy to discover power supply anomalies that occur during certain time periods or days of the week.

**Event details**
Analyze 200 ms event waveforms, including parameter waveforms, harmonics, vectors, and value displays. You can also display 30 seconds of event trend data and 11 seconds of pre- and post-event waveforms.

**Report creation**
Automatically create reports simply by choosing measurement parameters. If you output the report in Microsoft Word* format, you can also add comments.

Example voltage drop (30-second event trend data)

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*Microsoft Word is a product of Microsoft Corporation.*
Basic specifications

Input channels: Voltage: 4 channels, Current: 4 channels
Input terminal profile: Voltage: Plug-in terminals (safety terminals), Current: Dedicated connector (HIOKI PL14)

Measurement accuracy: ±0.200 Hz or less (for input from 50 V to 1100 V)
Measurement range: ±2.200 kVpeak (Hz) from the sampled waveform.
Detected from waveform obtained by eliminating the fundamental component (50 Hz/60 Hz) from the sampled waveform.

Input resistance: Voltage inputs: 5 MΩ Current inputs: 200 kΩ

Maximum input voltage: Voltage inputs: 1000 V AC/DC, 2200 Vpeak
Maximum rated voltage to earth: 1000 V AC (CAT III), 600 V AC (CAT IV) Anticipated transient overvoltage: 8000 V

Measurement method: Digital sampling and zero-cross synchronous computation
Sampling frequency: 200 kHz
A/D converter resolution: 16bit
Display range: Voltage: 2 V to 1300 V Current: 0.4% to 130% of range Power: 0.0% to 130% of range Measurement parameters other than above: 0% to 130% of range

Effective measurement range: Voltage: AC: 10 V to 1000 V, peak ±2200 V DC: 5 V to 1000 V Current: 5% to 120% of range, peak ±400% of range Power: 5% to 100% of range (with voltage and current that fall within effective measurement range)

Accuracy specifications

Conditions of accuracy guarantee:
Guaranteed accuracy period: 1 year
Post-adjustment accuracy guarantee period: 1 year
Guaranteed accuracy: Temperature and humidity range: 23°C ±5°C, 80% RH or less Warmup time: 30 min or more
Power supply frequency range: 50 Hz/60 Hz ±2 Hz Defined for power factor of 1, common-mode voltage of 0 V, and after zero-adjustment
The following additional conditions apply for AC measurement:
Input of at least 10 Vrms to reference channel (U1) With measurement frequency set to 50 Hz: 40 Hz to 58 Hz With measurement frequency set to 60 Hz: 51 Hz to 70 Hz

Temperature coefficient: 0.1% f.s./°C
Effects of common-mode voltage: 0.2% f.s. or less (1000 Vrms AC, 50 Hz/60 Hz, between voltage input and enclosure)
Effects of external magnetic fields: 1.5% f.s. or less in magnetic field of 400 A rms AC/m, 50 Hz/60 Hz

Measurement items

Transient overvoltage:
RMS voltage refreshed each half-cycle, Voltage waveform peak,
Voltage DC value, Voltage CF value, RMS voltage (phase), RMS voltage (line to line), Swell, Dip, Interruption, RMS current refreshed each half-cycle.
Current waveform peak, Current DC value, Current CF value, RMS current, Inturrh current, Frequency cycle, Frequency (200ms), 10-sec Frequency,
Active power, Active energy, Energy cost, Reactive power, Reactive energy, Apparent power, Apparent energy,
Power factor (Displacement power factor), Voltage unbalance factor (negative-phase, zero-phase), Current unbalance factor (negative-phase, zero-phase),
Harmonic voltage, Harmonic current, Harmonic power, Inter-harmonic voltage, Inter-harmonic current,
Harmonic voltage phase angle, Harmonic current phase angle, Harmonic voltage-current phase angle, Total harmonic voltage distortion factor, Total harmonic current distortion factor, K-Factor

Measurement specifications

Transient overvoltage:
Detected from waveform obtained by eliminating the fundamental component (50 Hz/60 Hz) from the sampled waveform.
Measurement range: ±2.200 V/peak
Measurement bandwidth: 5 kHz (-3dB) to 40 kHz (-3dB)
Measurement accuracy: ±0.5% rdg.±0.1% f.s.
Frequency cycle
Calculated as the reciprocal of the accumulated half-cycle time during one U1 cycle.
Measurement accuracy: ±0.200 Hz or less (for input from 50 V to 1100 V)

RMS voltage/ RMS current refreshed each half-cycle
Calculated as the RMS value of sampling data for 1 waveform overlapped every half-cycle.
Measurement accuracy: Voltage With 10 V to 660 V input: ±0.3% of nominal voltage Other than above: ±0.2% rdg.±0.1% f.s. + current sensor accuracy Current ±0.2% rdg.±0.1% f.s. + current sensor accuracy

Swell, Dip, Interruption
Detected when the RMS voltage refreshed each half-cycle exceeds the threshold.
Measurement accuracy: Same as RMS voltage refreshed each half-cycle
Fluctuation:
Saves RMS voltage and current refreshed each half cycle for 0.5 s before and 29.5 s after the event IN point.
Inurrh current
Calculated as the current RMS value for current waveform data sampled every half-cycle.
Maximum current RMS value from above measurement.
Measurement accuracy: ±0.3% rdg.±0.3% f.s. + current sensor accuracy
Fluctuation:
Saves inurrh current RMS value data for 0.5 s before and 29.5 s after the event IN point.

10-sac frequency
Calculated as the reciprocal of the accumulated whole-cycle time during the specified 10 s U1 (reference channel) period.
Measurement accuracy: ±0.010 Hz or less
Frequency (200ms):
Calculated as the reciprocal of the accumulated whole-cycle time within 200 ms relative to U1.
Measurement accuracy: ±0.020 Hz or less
Voltage waveform peak/ Current waveform peak
Maximum and minimum sampling points in 200 ms aggregation
Measurement range: Voltage ±2200.0 Vpk
Measurement accuracy: Voltage During input of 10% to 150% of nominal voltage:
5% of nominal voltage Other than above: 2% f.s.
Current With at least 50% f.s. input: 5 % rdg. + current sensor accuracy Other than above: 2% f.s. + current sensor accuracy

RMS voltage, RMS current
Measured during 200 ms aggregation in accordance with IEC 61000-4-30.
Measurement range: Voltage With 10 V to 660 V input: ±0.2% of nominal voltage Other than above: ±0.1%rdg.±0.1%f.s.
Current ±0.1%rdg.±0.1%f.s. + current sensor accuracy
Voltage DC value, Current DC value
Average value during 200 ms aggregation
Measurement accuracy: Voltage ±0.3% rdg.±0.1%f.s. + current sensor accuracy Current ±0.5% rdg.±0.5%f.s. + current sensor accuracy
Voltage CF value, Current CF value
Calculated from the voltage RMS value and the voltage waveform peak value.
Measurement range: Voltage 224.001 Current 408.00
Measurement accuracy: No defined accuracy

Active power/ Apparent power/ Reactive power:
Active power:
Measured every 200 ms.
Apparent power:
RMS value calculation: Calculated from the voltage RMS value and current RMS value.
Fundamental wave calculation: Calculated from the fundamental wave active power and fundamental wave reactive power.
Reactive power:
RMS value calculation: Calculated from the apparent power S and active power P.
Fundamental wave calculation: Calculated from the fundamental wave voltage and current.
Measurement accuracy:
Active power DC: ±0.5% rdg.±0.5%f.s. + current sensor accuracy AC: ±0.2% rdg.±0.1%f.s. + current sensor accuracy Power factor effects: 1.0% rdg. or less (40 Hz to 70 Hz with a power factor of 0.5)
Apparent power ±1 dgt. for calculations derived from the various measurement values
Reactive power During RMS value calculation: ±1 dgt. for calculations derived from the various measurement values
During fundamental wave calculation: For fundamental wave frequency of 45 Hz to 66 Hz ±0.3% rdg.±0.1%f.s. + current sensor specifications (reactive factor of 1)
Reactive factor effects: 1.0% rdg. or less (40 Hz to 70 Hz with reactive factor of 0.5)
Measurement range: 0.00° to ±180.00°

In accordance with IEC61000-4-7 Ed2.1:2009

Harmonic voltage, Harmonic current

Uses IEC61000-4-7 Ed2.1:2009. From 1 to 50th order.

<table>
<thead>
<tr>
<th>Measurement range:</th>
<th>Harmonic voltage</th>
<th>Harmonic current</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMS: 600.00 V</td>
<td>Content percentage: 100.00 %</td>
<td></td>
</tr>
</tbody>
</table>

Measurement accuracy:

- Harmonic voltage
  - Order 0: Same as voltage DC value
  - Order 1: Same as voltage RMS value
  - Order 2 to 50th: 1% of nominal input voltage or greater: ±0.1% rdg.

- Harmonic current
  - Order 0: Same as current DC value
  - Order 1 to 20th: ±0.5% rdg. ±0.2% f.s. + current sensor accuracy
  - Order 21 to 30th: ±0.1% rdg. ±0.3% f.s. + current sensor accuracy
  - Order 31 to 40th: ±0.2% rdg. ±0.3% f.s. + current sensor accuracy
  - Order 41 to 50th: ±3.0% rdg. ±0.3% f.s. + current sensor accuracy

Inter-harmonic voltage, Inter-harmonic current

After harmonic analysis, harmonic voltage and current are summed and displayed as inter-harmonic contents with the harmonic contents according to harmonic order from 0.6 to 49.5th order.

Measurement accuracy:

- Inter-harmonic voltage (harmonic input defined for a nominal input voltage of 100 V to 440 V)
  - At least 1% of harmonic input nominal voltage: ±10.0% rdg.
  - <1% of harmonic input nominal voltage: ±0.05% of nominal voltage

Inter-harmonic current

No-defined accuracy

Harmonic voltage phase angle, Harmonic current phase angle

In accordance with IEC61000-4-7 Ed2.1:2009.

Measurement range: 0.00° to ±180.00°

Harmonic voltage current phase angle

In accordance with IEC61000-4-7 Ed2.1:2009.

Measurement range: 0.00° to ±180.00°

Voltage unbalance factor (negative-phase, zero-phase)

Calculated using various components of the three-phase fundamental wave for three-phase 3-wire (3P3W2M, 3P3W3M) and three-phase 4-wire connections

Measurement range: Component is A and unbalance factor is 0.00% to 100.00%

THD:  THD-F or THD-R

Calculated using various components of the three-phase fundamental wave for three-phase 3-wire (3P3W2M, 3P3W3M) and three-phase 4-wire connections

Measurement range: 0.00 to 500.00

RMS value-frequency characteristics

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Voltage</th>
<th>Current</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Hz to 70 Hz</td>
<td>Defined for RMS voltage</td>
<td>Defined for RMS current</td>
<td>Defined for Active power</td>
</tr>
<tr>
<td>70 Hz to 1 kHz</td>
<td>±3% rdg. ±0.2% f.s.</td>
<td>±3% rdg. ±0.2% f.s.</td>
<td>±0.2% f.s.</td>
</tr>
<tr>
<td>1 kHz to 10 kHz</td>
<td>±1% rdg. ±0.2% f.s.</td>
<td>±1% rdg. ±0.2% f.s.</td>
<td>±0.2% f.s.</td>
</tr>
<tr>
<td>40 kHz</td>
<td>-3 dB</td>
<td>-3 dB</td>
<td>-3 dB</td>
</tr>
</tbody>
</table>

Measurement setting specifications

Wiring

Displays wiring diagram and measured values for:

- Ch. 1/2/3: 1P2W, 1P3W, 1P3W1U, 3P3W2M, 3P3W3M, or 3P4W |
- Ch. 4: On or off

Voltage range

1000.0 V

Current sensors and current ranges

- CT7126: 50 A / 5 A / 500 mA
- CT7131: 100 A / 5 A / 5 A
- CT7136: 500 A / 50 A / 5 A
- CT7116: 5 A / 500 mA / 50 mA
- CT7731: 10 A / 10 A
- CT7736: 50 A / 50 A
- CT7742: 2000 A / 1000 A / 500 A
- CT7744/CT7745/CT7746: 500 A / 50 A

(Accuracy guaranteed up to 120% of range)

Power range

(Determined automatically based on current range in use.)

<table>
<thead>
<tr>
<th>Wiring</th>
<th>1P2W</th>
<th>1P3W</th>
<th>1P3W1U</th>
<th>3P3W2M</th>
<th>3P3W3M</th>
<th>3P4W</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.000 mA</td>
<td>500.00 W</td>
<td>1.0000 kW</td>
<td>1.5000 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0000 A</td>
<td>5.0000 W</td>
<td>10.000 kW</td>
<td>15.000 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50.000 A</td>
<td>50.000 kW</td>
<td>100.00 kW</td>
<td>150.00 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500.00 A</td>
<td>500.00 W</td>
<td>1.0000 kW</td>
<td>1.5000 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5000.0 A</td>
<td>5.0000 W</td>
<td>10.000 kW</td>
<td>15.000 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.000 A</td>
<td>10.000 kW</td>
<td>20.000 kW</td>
<td>30.000 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100.00 A</td>
<td>100.00 kW</td>
<td>200.00 kW</td>
<td>300.00 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000.00 A</td>
<td>1.0000 kW</td>
<td>2.0000 kW</td>
<td>3.0000 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000.00 A</td>
<td>2.0000 kW</td>
<td>4.0000 kW</td>
<td>6.0000 kW</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CT ratio

0.01 to 9999.99

VT ratio

0.01 to 9999.99

Declared input voltage


Frequency

50 Hz / 60 Hz

Sensor recognition

Automatic recognition of current sensors

Calculation method selection

- Phase voltage or line voltage
- RMS value calculation or fundamental wave calculation

THD-F: THD-F or THD-R

Phase voltage/line voltage setting changes do not apply to RMS voltage refreshed each half-cycle values or transient measured values on the MONITOR screen.

Energy cost

Unit cost: 0.0000 to 99999.9 (per kWh)

Currency unit: 3 alphanumeric characters

K Factor (multiplication factor)

Calculated using the harmonic RMS current of the 2nd to 50th orders

Measurement range: 0.00 to 500.00

Measurement accuracy:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Voltage</th>
<th>Current</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Hz to 70 Hz</td>
<td>Defined for RMS voltage</td>
<td>Defined for RMS current</td>
<td>Defined for Active power</td>
</tr>
<tr>
<td>70 Hz to 1 kHz</td>
<td>±3% rdg. ±0.2% f.s.</td>
<td>±3% rdg. ±0.2% f.s.</td>
<td>±0.2% f.s.</td>
</tr>
<tr>
<td>1 kHz to 10 kHz</td>
<td>±1% rdg. ±0.2% f.s.</td>
<td>±1% rdg. ±0.2% f.s.</td>
<td>±0.2% f.s.</td>
</tr>
<tr>
<td>40 kHz</td>
<td>-3 dB</td>
<td>-3 dB</td>
<td>-3 dB</td>
</tr>
</tbody>
</table>
### Recording settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage location</td>
<td>SD memory card</td>
</tr>
<tr>
<td>Display of remaining storage space (in time)</td>
<td>Calculates and displays remaining time based on the available space left on the SD memory card and in internal memory, the recording interval, and the recording parameters. This information is also updated during trend measurement.</td>
</tr>
<tr>
<td>Recording interval</td>
<td>200 or 600 ms, 1, 2, 5, 10, 15, or 30 s, 1, 2, 5, 10, 15, or 30 ms; 1 or 2; 150 or 180 cycles</td>
</tr>
<tr>
<td>Recording parameters</td>
<td>With or without harmonics</td>
</tr>
<tr>
<td>Event recording</td>
<td>COPY key operation during recording</td>
</tr>
<tr>
<td>Event waveform</td>
<td>Instantaneous waveform for approx. 200 ms aggregation (12.5 kS/s)</td>
</tr>
<tr>
<td>Event detection method</td>
<td>High interval: At least 100 ms; low interval: at least 100 ms</td>
</tr>
<tr>
<td>Event input</td>
<td>Shorts between the [GND1] and [IN] terminals (active-low) and the falling edge of pulse signals are recognized as event input.</td>
</tr>
<tr>
<td>Event input/output</td>
<td>External event input: [IN], [GND1]</td>
</tr>
<tr>
<td>Interface specifications</td>
<td>SD memory card</td>
</tr>
<tr>
<td>Compatible cards</td>
<td>Z4001, Z4003</td>
</tr>
<tr>
<td>LAN Interface</td>
<td>Connector: RJ-45 connector × 1</td>
</tr>
<tr>
<td>Electrical specifications</td>
<td>IEEE 802.3 compliant</td>
</tr>
<tr>
<td>Transmission method</td>
<td>10Base-TX</td>
</tr>
<tr>
<td>Protocol</td>
<td>TCP/IP (with DHCP function)</td>
</tr>
<tr>
<td>Functionality</td>
<td>Allows remote operation of the instrument from an Internet browser.</td>
</tr>
<tr>
<td>USB interface</td>
<td>Connector: Series B receptacle × 1</td>
</tr>
<tr>
<td>Version/mode</td>
<td>USB 2.0 (Full Speed, High Speed), mass storage class</td>
</tr>
</tbody>
</table>

### Event settings

<table>
<thead>
<tr>
<th>Event settings</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event hysteresis</td>
<td>0% to 10% (for all parameters except frequency)</td>
</tr>
<tr>
<td>Timer event count</td>
<td>Off, 1, 2, 5, 10, 15, or 30 s, 1 or 2 s</td>
</tr>
<tr>
<td>Event waveform</td>
<td>Instantaneous waveform for approx. 200 ms aggregation (12.5 kS/s)</td>
</tr>
<tr>
<td>Pre-event waveform</td>
<td>OFF (0 s), 200 ms, 1 s</td>
</tr>
<tr>
<td>Post-event waveform</td>
<td>OFF (0 s), 200 ms, 400 ms, 1 s, 5 s, 10 s</td>
</tr>
</tbody>
</table>

### Event specifications

<table>
<thead>
<tr>
<th>Event detection method</th>
<th>Events can be detected at a recording interval of 1 s or greater. See the measurement specifications for a description of detection methods for each event type's measured values.</th>
</tr>
</thead>
<tbody>
<tr>
<td>External events</td>
<td>Events are detected by detecting signal input to the EVENT IN terminal.</td>
</tr>
<tr>
<td>Manual events</td>
<td>Events are detected based on MANUAL EVENT key presses.</td>
</tr>
<tr>
<td>Synchronized saving of events</td>
<td>Events are generated at the selected interval.</td>
</tr>
<tr>
<td>Event waveform</td>
<td>The instantaneous waveform when the event occurs is recorded for 200 ms.</td>
</tr>
<tr>
<td>Pre-event waveform</td>
<td>The instantaneous waveform before the event occurs is recorded for up to 1 s.</td>
</tr>
<tr>
<td>Post-event waveform</td>
<td>The instantaneous waveform after the event is recorded for up to 10 s.</td>
</tr>
<tr>
<td>Fluctuation data</td>
<td>RMS value fluctuation data is recorded every half-cycle for the equivalent of 0.5 s before the event and 29.5 s after the event.</td>
</tr>
</tbody>
</table>

### System settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beep tone</td>
<td>On or off</td>
</tr>
<tr>
<td>LCD backlight</td>
<td>Auto-off (2 h) or on</td>
</tr>
<tr>
<td>Display languages</td>
<td>Japanese, English, Chinese (traditional or simplified), Korean, German, French, Italian, Spanish, Turkish</td>
</tr>
<tr>
<td>Phase naming convention</td>
<td>R/S/T, A/B/C, L1/L2/L3, or U/V/W</td>
</tr>
</tbody>
</table>

### Other functionality

<table>
<thead>
<tr>
<th>Functionality</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verification and warning function</td>
<td>Over-range, peak-over, event indicator</td>
</tr>
<tr>
<td>Setting verification function</td>
<td>Allows the user to check the current settings by pressing the [QUICK SET] key during recording.</td>
</tr>
<tr>
<td>Key lock</td>
<td>Disables all key operation except the POWER key.</td>
</tr>
<tr>
<td>SD memory card eject</td>
<td>Pressing the F key on the FILE screen during recording with a recording interval of 2 s or greater displays a confirmation and allows the SD memory card to be ejected.</td>
</tr>
<tr>
<td>System reset</td>
<td>Reverts the instrument's settings to their default values.</td>
</tr>
<tr>
<td>Automatic detection of current sensors</td>
<td>When selected on the settings screen, automatically detects connected Hiioki PL14 connector-compatible sensors.</td>
</tr>
<tr>
<td>Behavior in event of power outage</td>
<td>If a Z1003 Battery Pack with remaining power is installed in the instrument, the instrument automatically switches to battery power and continues recording. If not, measurement operation stops, but settings up to that point are backed up and the instrument will start recording again when power is restored. However, integration values and related data will be reset, and integration will start again when power is restored.</td>
</tr>
</tbody>
</table>

### General specifications

<table>
<thead>
<tr>
<th>Operating environment</th>
<th>Indoors, altitude up to 3000 m Pollution degree 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature and humidity</td>
<td>-20 to 50°C (-4 to 122°F), 80% RH or less (non-condensing)</td>
</tr>
<tr>
<td>Storage temperature and humidity</td>
<td>-30 to 50°C (-22 to 122°F), 80% RH or less (non-condensing)</td>
</tr>
<tr>
<td>Dust and water resistance</td>
<td>IP30 (EN 60529)</td>
</tr>
<tr>
<td>Applicable standards</td>
<td>Safety: EN 61010 EMC: EN 61326 Class A</td>
</tr>
<tr>
<td>Standard compliance</td>
<td>Harmonics: IEC 61000-4-7 IEC 61000-2-4 Class 3 Power quality: IEC 61000-4-30 Class S EN 50160 IEEE 1159</td>
</tr>
<tr>
<td>Power supply</td>
<td>[Z1002 AC Adapter] 100 V to 240 V AC, 50 Hz/60 Hz Anticipated transient overvoltage: 2500 V Maximum rated power: 80 VA (including AC adapter) [Z1003 Battery Pack] Charging time: Max. 5 h 30 m Continuous operating time: Approx. 8 h</td>
</tr>
<tr>
<td>Maximum recording interval</td>
<td>1 year</td>
</tr>
<tr>
<td>Maximum number of recordable events</td>
<td>9999</td>
</tr>
<tr>
<td>Clock functionality</td>
<td>Auto calendar, automatic leap year detection, 24-hour clock</td>
</tr>
<tr>
<td>Real-time clock accuracy</td>
<td>±0.5 s per day (with instrument on and within operating temperature range)</td>
</tr>
<tr>
<td>Display</td>
<td>6.5-inch TFT color LCD Display refresh: 0.5 s</td>
</tr>
<tr>
<td>Dimensions</td>
<td>300 mm (11.81 in) W × 211 mm (8.31 in) H × 68 mm (2.68 in) D (excluding protrusions)</td>
</tr>
<tr>
<td>mass</td>
<td>2.5 kg (88.2 oz) (including battery pack)</td>
</tr>
<tr>
<td>Product warranty</td>
<td>3 year</td>
</tr>
<tr>
<td>Accessories</td>
<td>Instruction manual, Measurement guide, VOLTAGE CORD L1000-05, spiral tubes, AC ADAPTER Z1002, strap, USB cable, BATTERY PACK Z1003, PQ ONE (software, CD)</td>
</tr>
</tbody>
</table>
Current measurement options

Model  | AC CURRENT SENSOR CT7126  | AC CURRENT SENSOR CT7131  | AC CURRENT SENSOR CT7136
--- | --- | --- | ---
Appearance | ![Image](image1.png) | ![Image](image2.png) | ![Image](image3.png)
Rated measurement current | 60 A AC | 100 A AC | 600 A AC
Measurable conductor diameter | Max. φ15 mm (0.59 in) | Max. φ18 mm (0.71 in) | Max. φ24 mm (0.94 in)

- PQ2100 current range and combined amplitude accuracy (45 to 66 Hz)
  - 50,000 A: 0.4° rdg. + 0.11% f.s.
  - 100,000 A: 0.4° rdg. + 0.22% f.s.
  - 500 mA: 0.4° rdg. + 1.3% f.s.
- Phase accuracy (45 to 66 Hz)
  - ±2° or less
- Maximum allowable input (45 to 66 Hz)
  - 60 A continuous
- Maximum rated voltage to earth
  - CAT III 300 V
  - CAT IV 600 V
- Frequency band
  - Accuracy defined to 20 kHz
- Dimensions, mass, cord length
  - 46 mm (1.81 in) W × 135 mm (5.31 in) H × 21 mm (0.83 in) D, 190 g (6.7 oz), 2.5 m (8.2 ft)

Model  | AC FLEXIBLE CURRENT SENSOR CT7044  | AC FLEXIBLE CURRENT SENSOR CT7046  | AC FLEXIBLE CURRENT SENSOR CT7048
--- | --- | --- | ---
Appearance | ![Image](image4.png) | ![Image](image5.png) | ![Image](image6.png)
Rated measurement current | 600 A AC
Measurable conductor diameter | Max. φ100 mm (3.94 in) | Max. φ180 mm (7.09 in) | Max. φ254 mm (10.00 in)

- PQ2100 current range and combined amplitude accuracy (45 to 66 Hz)
  - 50,000 A: 0.4° rdg. + 0.11% f.s.
  - 100,000 A: 0.4° rdg. + 0.4% f.s.
  - 500 A: 0.4° rdg. + 1.3% f.s.
- Phase accuracy (45 to 66 Hz)
  - ±1.0° or less
- Maximum allowable input (45 to 66 Hz)
  - 10,000 A continuous
- Maximum rated voltage to earth
  - 1000 V AC (CAT III), 600 V AC (CAT IV)
- Frequency band
  - 10 Hz to 50 kHz (±3dB)
- Dimensions, mass, cord length
  - Flexible loop cross-sectional diameter φ4.4 mm (0.29 in), 2.5 m (8.2 ft)
  - Mass: 160 g (5.6 oz)
- Output connector
  - HIOKI PL14

Model  | AC/DC AUTO-ZERO CURRENT SENSOR CT7731  | AC/DC AUTO-ZERO CURRENT SENSOR CT7736  | AC/DC AUTO-ZERO CURRENT SENSOR CT7742
--- | --- | --- | ---
Appearance | ![Image](image7.png) | ![Image](image8.png) | ![Image](image9.png)
Rated measurement current | 100 A AC/DC | 600 A AC/DC | 2000 A AC/DC
Measurable conductor diameter | Max. φ33 mm (1.30 in) | Max. φ180 mm (7.09 in) | Max. φ255 mm (10.01 in)

- PQ2100 current range and combined amplitude accuracy (DC)
  - 100,000 A: 1.5% rdg. + 1.0% f.s.
  - 10,000 A: 1.5% rdg. + 5.5% f.s.
- Phase accuracy (45 to 66 Hz)
  - ±1.8° or less
- Offset drift
  - ±0.5% f.s. or less
- Maximum allowable input (45 to 66 Hz)
  - 100 A continuous
- Maximum rated voltage to earth
  - 600 V AC/DC (CAT IV)
  - 1000 V AC/DC (CAT III), 600 V AC/DC (CAT IV)
- Frequency band
  - DC to 5 kHz (±3dB)
- Dimensions, mass, cord length
  - 58 mm (2.28 in) W × 132 mm (5.20 in) H × 18 mm (0.71 in) D, 250 g (8.8 oz), 2.5 m (8.2 ft)
  - 1000.0 A: 2.0% rdg. + 1.7% f.s.
  - 2000.0 A: 2.0% rdg. + 2.5% f.s.
  - Mass: 180 g (6.3 oz)
- Output connector
  - HIOKI PL14

Model  | AC LEAKAGE CURRENT SENSOR CT7116
--- | ---
Appearance | ![Image](image10.png)
Rated measurement current | 6 A AC
Measurable conductor diameter | Max. φ40 mm (1.57 in)

- PQ2100 current range and combined amplitude accuracy (45 to 66 Hz)
  - 5,000 A: 1.1% rdg. + 0.16% f.s.
  - 500 mA: 1.1% rdg. + 0.7% f.s.
- Phase accuracy (45 to 66 Hz)
  - ±3° or less
- Frequency band
  - 40 Hz to 5 kHz (±3.0% rdg. ±0.1% f.s.)
- Residual current characteristics
  - Max. 5 mA (in 100A go and return electric wire)
- Effect of external magnetic fields
  - 400A AC/m corresponds to 5mA, Max. 7.5mA
- Dimensions, mass, cord length
  - 74 mm (2.91 in) W × 145 mm (5.71 in) H × 42 mm (1.65 in) D, 340 g (12.0 oz), 2.5 m (8.2 ft)
- Output connector
  - HIOKI PL14

Conversion Cable L9910

Used to connect the following current sensors to the PQ3100.

- CLAMP ON SENSOR
  - 9694, 9660, 9661, 9669
- AC FLEXIBLE CURRENT SENSOR
  - CT9667-01, CT9667-02, CT9667-03
- CLAMP ON LEAK SENSOR
  - 9657-10, 9675

(Used with the PQ3100 exclusively)

(Used with the PQ3100 exclusively)

(Used with the PQ3100 exclusively)
PQ3100 Lineup

POWER QUALITY ANALYZER KIT

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Model No. (Order Code)</th>
<th>Kit contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER QUALITY ANALYZER KIT</td>
<td>PQ3100-91</td>
<td>POWER QUALITY ANALYZER PQ3100*: 1 AC CURRENT SENSOR CT7126: 1 SD MEMORY CARD 2GB Z4001: 1</td>
</tr>
<tr>
<td>POWER QUALITY ANALYZER KIT</td>
<td>PQ3100-92</td>
<td>POWER QUALITY ANALYZER PQ3100*: 1 AC CURRENT SENSOR CT7136: 4 CARRYING CASE C1009: 1 SD MEMORY CARD 2GB Z4001: 1</td>
</tr>
<tr>
<td>POWER QUALITY ANALYZER KIT</td>
<td>PQ3100-94</td>
<td>POWER QUALITY ANALYZER PQ3100*: 1 AC FLEXIBLE CURRENT SENSOR CT7045: 4 CARRYING CASE C1009: 1 SD MEMORY CARD 2GB Z4001: 1</td>
</tr>
</tbody>
</table>

Current measurement options
- AC CURRENT SENSOR CT7126: 60 A AC, φ15 mm (0.59")
- AC CURRENT SENSOR CT7131: 100 A AC, φ15 mm (0.59")
- AC CURRENT SENSOR CT7136: 600 A AC, φ46 mm (1.81")
- AC FLEXIBLE CURRENT SENSOR CT7044: 6000 A AC, φ100 mm (3.94")
- AC FLEXIBLE CURRENT SENSOR CT7045: 6000 A AC, φ180 mm (7.09")
- AC FLEXIBLE CURRENT SENSOR CT7046: 6000 A AC, φ254 mm (10.0")
- AC LEAKAGE CURRENT SENSOR CT7116: 6 A AC, φ40 mm (1.57")
- AC/DC AUTO-ZERO CURRENT SENSOR CT7731: 600 A AC, φ33 mm (1.30")
- AC/DC AUTO-ZERO CURRENT SENSOR CT7736: 600 A AC, φ33 mm (1.30")

Voltage measurement options
- MAGNETIC ADAPTER 8804-01 (red)
- MAGNETIC ADAPTER 8804-02 (black)

Carrying cases, Water proof boxes
- CARRYING CASE C1009: Bag
- CARRYING CASE C1001: Soft case
- CARRYING CASE C1002: Hard case (413W × 595W × 265Dmm (16.3"W × 23.4"H × 10.4"D), 4.7 Kg (10.4 lbs))

Interfaces
- SD MEMORY CARD 2GB Z4001
- SD MEMORY CARD 8GB Z4003

Important
Use only the SD memory card Z4001 or Z4003 sold by HI OKI.

Bundled accessories
- Voltage Cord L1000-05: 5 cords (1 ea. black, red, yellow, green, and gray) Length: 3 m (9.8 ft)
- AC ADAPTER Z1002: Power supply for the PQ3100 (100V AC to 240V AC)
- BATTERY PACK Z1003: (Ni-MH, 7.2V, 45 Ah)

Model: POWER QUALITY ANALYZER PQ3100

Model No. (Order Code): PQ3100
For more information about accessories, see the specifications table above.

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All information correct as of Oct. 11, 2016. All specifications are subject to change without notice.