Record and Analyze Power Supply Problems Simultaneously with a Single Unit

The New World Standard for Power Quality Analysis

- Never Miss the Moment
  - Detect power supply problems and perform onsite troubleshooting
  - Do preventive maintenance to avert accidents by managing the power quality

- CAT IV-600V Safety Standard
  - Meets the CAT IV safety rating required to check an incoming power line
  - Safe enough to measure up to 6,000Vpeak of transient overvoltage

- Easy Setup Function with PRESETS
  - Just select the measurement course, wiring, and clamps
  - Automatic one-step setup based on measurement conditions

- Compliant with International Standards
  - International power quality measurement standard IEC 61000-4-30 Edition 2 Class A
  - High precision with a basic voltage measurement accuracy of 0.1%

AC FLEXIBLE CURRENT SENSOR
Introducing 2 new variations with a thinner cable!

Cable diameter φ13 mm (0.51”)
CT9667-01, -02
Cable diameter φ7.4 mm (0.29”)
CT9667-01, -02

Easy to loop around, even in confined spaces

CE
The number of power supply problems is increasing as power systems are becoming more and more complicated - all due to the rising use of power electronics devices plus a growing installed base of large systems and distributed power supplies. The quickest way to approach these problems is to understand the situation quickly and accurately. The PW3198 Power Quality Analyzer is ready to effectively solve your power supply problems.

Troubleshooting

✔ Understand the actual power situation at the site where the problem is occurring (e.g., the equipment malfunction, failure, reset, overheating, or burning damage).

✔ Ideal for troubleshooting solar and wind power generation systems, EV charge stations, smart grids, tooling machines, OA equipment (e.g., computers, printers, and UPS), medical equipment, server rooms, and electrical equipment (e.g., transformers and phase-advancing capacitors).

Field Survey and Preventive Maintenance

✔ Perform long-term measurements of the power quality and study problems that are difficult to detect or that occur intermittently.

✔ Maintain electrical equipment and check the operation of solar and wind power generation systems.

✔ Manage the parameters with a control set point, such as a voltage fluctuation, flicker, and harmonic voltage.

Power (Load) Survey

✔ Study the power consumption and confirm system capacity before adding load.
Class A is defined in the international standard IEC61000-4-30, which specifies compatibility with power quality parameters, accuracy, and standards to enable comparison and discussion of the measurement results of different measuring instruments. The PW3198 is compliant with IEC61000-4-30 Edition 2 Class A standard. The instrument can perform measurements in accordance with the standard, including continuous gapless calculation, methods to detect events such as dip, swell, and instantaneous power failure, and time synchronization using the optional GPS box.

The PW3198 is compliant with the measurement category CAT IV - 600V and can also safely test the incoming lines for both single-phase and three-phase power supplies.

Class A

1. International Standard IEC61000-4-30 Edition 2 Class A
2. CAT IV-600V Safety

Simply choose the course based on the measurement objective and the necessary configurations will be set automatically.

- **U Events**: Record voltage and frequency and detect errors simultaneously.
- **Standard Power Quality**: Record voltage, current, frequency, and harmonic, and detect errors simultaneously.
- **Inrush Current**: Measure the inrush current.
- **Recording**: Record only the TIME PLOT Data but do not detect errors.
- **EN50160**: Perform measurements in accordance with EN50160.

### Easy to set up - Just select the measurement course and the PW3198 will do the rest

### Highly Accurate, Broadband, Wide Dynamic Range Makes for Reliable Measurements

#### Voltage Measurement Range

- **Line-to-line voltage (3P4W)**
  - 780V
  - 1300V
  - 6000V peak

- **Line-to-line voltage (1P2W, 1P3W, 3P3W)**
- **Phase voltage (1P2W, 1P3W, 3P4W)**

- **Transient overvoltage**

Both low and high voltages can be measured in a single range.

#### Voltage Frequency Range

- **DC**
- **3kHz**
- **80kHz**
- **700kHz**

- **Wide range from DC voltage to 700 kHz**

#### Basic Measurement Accuracy (50/60 Hz)

- **Voltage**: ±0.1% of nominal voltage
- **Current**: ±0.2% rdg. ±0.1% f.s. + Clamp-on sensor accuracy
- **Power**: ±0.2% rdg. ±0.1% f.s. + Clamp-on sensor accuracy

- **World's highest level of basic measurement accuracy. Extremely accurate voltage measurement without the need to switch ranges.**

#### Transient Overvoltage

- Transient overvoltage can also be measured in a range between the maximum 6,000 V and minimum 0.5 µs (2 MS/s).

#### High-order Harmonic

- The PW3198 is the first power quality analyzer that can measure the high-order harmonic component of up to 80 kHz.
The PW3198 can measure all waveforms of power, harmonic, and error events simultaneously. When a problem occurs with the equipment or system on your site, the PW3198 will help you detect the cause of the problem early and solve it quickly. You can depend on the PW3198 to monitor all aspects of your power supplies.

**Measure All Parameters at the Same Time**

Just connect to the measurement line, and the PW3198 will simultaneously measure all parameters, such as power and harmonic. You can then switch pages to view the needed information immediately.

**Acquire the Information You Need Quickly by Switching Pages (RMS Value)**

To detect power supply failures, measurement does not need to be performed multiple times under different conditions. The PW3198 can always monitor and reliably detect all power supply failures for which detection is enabled.

**Reliably Detect Power Supply Failures (Event)**

A transient overvoltage is generated by a lightning strike or a contact fault or closed contact of a circuit breaker and relay, and often causes a steep voltage change and a high voltage peak.

**PW3198 Never Misses the Moment a Power Supply Failure Occurs**

Display parameters such as voltage, current, power, power factor, and integral power in a single window.

**Switch windows with one touch**

**DMM Display**

Voltage, Current, Power, Power Factor, K-Factor

**Waveform Display**

Voltage and current waveforms on channels 1 to 4 one above the other in a single window.

**Vector Display**

Display the measured value and vector of the voltage and current of each order harmonic.

**4-channel Waveform Display**

Display the voltage and current waveforms on channels 1 to 4 individually.

**Harmonic Bar Graph Display**

Display the RMS value and phase angle of harmonics from the 0th order to the 50th either in a graph or as numerical values.

**Voltage Dip (Voltage Drop)**

Voltage drops for a short time as a result of large inrush current generated in the load by, for example, a starting motor.

**Voltage Swell (Voltage Rise)**

A voltage swell is generated by a lightning strike or a heavily loaded power line being opened or closed, causing the voltage to rise instantaneously.

**Interruption**

A large current flows instantaneously at the moment electrical equipment, a motor, or similar devices are powered on.

**High-order Harmonic**

Voltage and current waveforms are distorted by noise components generated by a semiconductor control device or the like installed in the power supply of electronic equipment.

**Unbalance**

An increase or decrease in the load connected to each phase of the three-phase power supply or an unbalanced operation of equipment and devices causes the load of a particular phase to become heavy so their voltage and current waveforms are distorted, voltage drops, or negative phase sequence voltage is generated.

**Frequency Fluctuations**

An excessive increase or decrease of the load causes the operation of a generator to become unstable, resulting in frequency fluctuations.

**Inrush Current**

The power supply stops instantaneously or for a short or long time because electrical power transmission is stopped as a result of a lightning strike, or because the circuit breaker is tripped by a power supply short circuit.

**Harmonic**

Harmonic is generated by a semiconductor control device installed in the power supply of equipment, causing distortion of voltage and current waveforms.
The PW3198 can simultaneously record 8,000 or more parameters, such as voltage, current, power, power factor, frequency, integral power, harmonic, and flicker, at the specified recording interval. The PW3198 never fails to capture the peak because it performs calculations continuously and records the maximum, minimum, and average values within the recording interval.

**TIME PLOT Recording of All Parameters**

The PW3198 lets you view the instantaneous waveform (200 ms) of a power supply failure in the window.

**Capture up to 55,000 Instantaneous Waveforms of Power Supply Failures**

This list records instantaneous waveforms of power supply failures (events), such as a voltage drop or inrush current, along with the time or other information. Events are always monitored, regardless of the recording interval of the TIME PLOT recording.

**Event Recording of Waveforms**

When a voltage drop or inrush current occurs, RMS value changes are recorded over 30 seconds simultaneously. This function can also be used to check the voltage drop caused by inrush current generated by the start of the motor.
Use Model 9624-50 PQA-HiVIEW PRO (version 2.00 or later) with a PC to analyze the data collected by the PW3198.

**Viewer Function**

Display and analyze the data recorded by the PW3198 POWER QUALITY ANALYZER.

- **Event List Window**: Display a list of power supply failures (events) that occurred.
- **TIME PLOT Window**: Display the TIME PLOT (recorded trend) data as well as changes in the voltage/current RMS values, harmonic, and many other parameters.
- **Event Waveform Window**: Display the waveform of an event that occurred, plus the vector, harmonic, DMM, and instantaneous harmonic values.
- **ITIC Curve Display Window**: Analyze the ITIC (CBEMA) curve (tolerance curve) used in the power quality standards in the United States.

**Report Creation Function**

Automatically and effortlessly create rich reports for compliance and record management.

- **Report output items**: Voltage/current RMS value fluctuation graph, harmonic fluctuation graph, inter-harmonics fluctuation graph, flicker graph, integral power graph, demand graph, total harmonic voltage/current distortion rate list, EN50160 window (Overview, Harmonic, Measurement Results Category), worst case, transient waveform, maximum/minimum value list, all event waveforms/detailed list, and setup list

**Print Examples**

- RMS Value Voltage Fluctuations
- All Event Detailed List
- TIME PLOT Recording of Parameters
- EN50160

**Other Functions**

**CSV Conversion of Measurement Data**

Convert data in the range specified in the TIME PLOT window into CSV format and then save for further processing. The 9624-50 can also convert event waveforms into CSV format. Open CSV data using any commercially available spreadsheet software for advanced data management and analysis.

**Even Analyze Data Recorded with Models 3196 and 3197 PQAs**

Data recorded with the HIOKI 3196 and 3197 Power Quality Analyzers can also be analyzed.

**Download Measurement Data via USB/LAN**

Data in the SD memory card inserted in the PW3198 can be downloaded to a PC via USB or LAN.

**ENS0160 Display Function**

ENS0160 is a power quality standard for the EU. In this mode, evaluate and analyze power quality in accordance with the standard. You can display the Overview, Harmonic, and Measurement Results Category windows.

**9624-50 Specifications**

- **Delivery media**: CD-R
- **Operating environment**: AT-compatible PC
- **OS**: Windows10, Windows8.1, Windows7
- **Memory**: 512 MB or more
Useful Functions for a Wide Variety of Applications

Large Capacity Recording with SD memory card

Data is recorded to a large capacity SD memory card. The data can be transferred to a PC and analyzed using dedicated application software. If your PC is not equipped with an SD memory card slot, simply connect a USB cable between the PW3198 and the PC. The PC will then recognize the SD memory card as removable media.

<table>
<thead>
<tr>
<th>Repeat record</th>
<th>Recording period</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Max. 35 days</td>
</tr>
<tr>
<td></td>
<td>Reference value: ALL DATA (all items recorded), repeat recording OFF, and TIME PLOT interval 1 minute or longer</td>
</tr>
<tr>
<td>ON</td>
<td>Max. 55 weeks (about 1 year)</td>
</tr>
<tr>
<td></td>
<td>Reference value: ALL DATA (all items recorded), repeat recording ON (1 week x 55 times), and TIME PLOT interval 10 minutes or longer</td>
</tr>
</tbody>
</table>

Remote Measurement Using HTTP Server Function

You can use any Internet browser to remotely operate the PW3198, plus download the data stored in the SD memory card using dedicated software (LAN access required).

GPS Time Synchronization

The PW9005 GPS BOX lets you synchronize the clock on the PW3198 to the UTC standard time. Eliminate time differences between multiple PQAs and correctly analyze measurement data taken by several instruments.

Simultaneously Measure Three-phase Lines and Grounding Wire

Apart from the main measurement line, you can also measure the AC/DC voltage on another line using Channel 4.

Yes! Simultaneously!

- Measure the primary and secondary sides of UPS
- Two-line voltage analysis
- Measure three-phase lines and grounding wire
- Measure neutral lines to detect short circuits
- Measure the input and output of a DC-AC converter for solar power generation

Backup and Recovery from Power Failure

The PW3198 uses the new large capacity BATTERY PACK Z1003, enabling continuous measurement for three hours even if a power failure occurs. In addition, a power failure processing function restarts measurement automatically even if the power is cut off completely during measurement.

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Other Measurement Applications

Flicker measurement

Measure flicker in conformance with IEC 61000-4-15 Ed2.

Phase voltage check for Δ connection

Use the Δ-Y and Y-Δ conversion function to measure phase voltage using a virtual neutral point.

400 Hz line measurement

Measure at a power line frequency of 50/60 Hz as well as 400 Hz.
The power supply of the office equipment sometimes shuts down even though it is not operated. Equipment other than the printer can also sometimes perform a reset unexpectedly.

**Survey Objective**
Surveying a Solar Power Generation System

- Maintain a solar power generation system and check its operation (verify the power quality)
- Troubleshoot (impact on the peripheral equipment, operation shutdown, etc.)

**Measurement Method**
Set up the PW3198 on the site and measure the voltage, current, and power. To survey the power quality, select the "Standard power quality measurement" course in the PRESETS menu. To measure the DC voltage, connect channel 4 to the primary side of the solar panel.

**Analysis Report**
All parameters can be recorded simultaneously with a single measurement.
- Identify changes in the output voltage of the power conditioner
- Presence or absence of the occurrence of a transient overvoltage
- Frequency fluctuation important for system interconnection
- Identify changes in the harmonic voltage and current included in the output
- Power (AC), integral power (AC), etc.
**PW3198 Specifications**

**Basic specifications**

- **Input specifications**
  - **Input voltages**
    - Isolated and differential inputs (channels not isolated between U1, U2 and U3; channels isolated between U1 to U3 and U4)
  - **Input resistance**
    - Voltage: 4MΩ

- **Measurement items**
  - **Voltage measurement items**
    - **(TIME PLOT Recording)**
      - RMS voltage
      - Frequency
      - DC voltage
      - Harmonic voltage (0 to 50th order)
      - Inter-harmonic voltage (0.5 to 49.5th)
      - Total harmonic voltage distortion factor
    - **(EVENT Recording)**
      - RMS voltage
      - Frequency
      - DC voltage
      - Harmonic voltage (0 to 50th order)
      - Inter-harmonic voltage (0.5 to 49.5th)

- **Current measurement items**
  - **(TIME PLOT Recording)**
    - RMS current
    - Waveform current peak
    - Harmonic current (0 to 50th)
    - Inter-harmonic current (0.5 to 49.5th)
  - **(EVENT Recording)**
    - Harmonic current power (0 to 50th)

- **Power measurement items**
  - **(TIME PLOT Recording)**
    - Active power
    - Reactive power
    - Apparent power
    - Power factor
  - **(EVENT Recording)**
    - Voltage waveform comparison
    - Voltage dip
    - Timer

- **EVENT measurement items**
  - **(EVENT Recording)**
    - Transient overvoltage
    - Voltage swell
    - Voltage dip
    - Interruption
    - Inrush current
    - Frequency fluctuations

- **Measurement circuits**
  - Single-phase 2-wire (1P2W), single-phase 3-wire (1P3W), three-phase 3-wire (3P3W2M, 3P3W3M) or three-phase 4-wire (3P4W, 3P4W2.5E) plus one extra input channel (must be synchronized to reference channel during AC/DC measurement)

- **Fundamental frequency of measurement circuit**
  - 50Hz, 60Hz, 400Hz

- **Input channels**
  - Voltage: 4 channels (U1 to U4), Current: 4 channels (I1 to I4)

- **Input methods**
  - Voltage: Isolated and differential inputs (channels not isolated between U1, U2 and U3, channels isolated between U1 to U3 and U4)
  - Current: Insulated clamp-on sensors (voltage output)

- **Input resistance**
  - Voltage: 4MΩ ±80kΩ
  - Current: ±10kΩ

- **Compatible clamp sensors**
  - Units with f.s.=0.5V output at rated current input (f.s.=0.5V recommended)
  - Units with rate of 0.1mV/A, 1mV/A, 10mV/A, or 100mV/A

- **Measurement items**
  - **(TIME PLOT Recording)**
    - Power (Small): Recording basic parameters
    - REkHz (Normal): Recording basic parameters and harmonics
  - **(EVENT Recording)**
    - Event detection using upper and lower thresholds available with other voltage, current, and power measurement parameters (excluding Integrated power, Unbalance, Inter-harmonic, Harmonic phase angle, IEC Flicker)

- **Memory data capacity**
  - SD memory card/SDHC memory card 2G to 32GB

**PW3198 Power ranges**

- **(automatically configured based on current range)**
  - Current range: Power range (W / VA / var)
    - 6.0000kVA: 6000.00 / 6000.00
    - 5.0000kVA: 5000.00 / 5000.00
    - 4.0000kVA: 4000.00 / 4000.00
    - 3.0000kVA: 3000.00 / 3000.00
    - 2.0000kVA: 2000.00 / 2000.00
    - 1.0000kVA: 1000.00 / 1000.00

- **Current sensor**
  - CT7731 (60A): 60.0000 / 60.0000
  - CT7731 (100A): 100.0000 / 100.0000
  - CT7735 (600A): 600.0000 / 600.0000
  - CT7742 (2kA): 2000.0000 / 2000.0000

- **Voltage measurement ranges**
  - **(TIME PLOT Recording)**
    - Volts: 600.00V
  - **(EVENT Recording)**
    - Volts: 6.0000kV peak

**Contact your HIOKI representative for special order larger capacity cards that offer the HIOKI guarantee.**
PRESETS function

U Events : Record and monitor voltage elements and frequency, plus detect events
Standard Power Quality : Record and monitor voltage and current elements, frequency, and harmonics, plus detect events
Inrush Current : Measure inrush current (basic voltage measurement required)
Recording : Record only trend data, no event detection

EN50160 : Measure according to EN50160 standards

Real-Time Clock function

Auto-calender, leap-year correcting 24-hour clock

Display Language

English, Simplified Chinese, Japanese.

Real-time clock accuracy

±0.3 s per day (with instrument on, 23°C±5°C (73°F±9°F)

Power supply

AC ADAPTER Z1002 (12 VDC, Rated power supply 100VAC to 240VAC, 1.7Amax, 50/60Hz)
BATTERY PACK Z1003 (Ni-MH 7.2VDC 4500 mAh)

Maximum rated power

15VA (when not charging, except AC adapter), 35VA (when charging, except AC adapter)

Continuous battery operation time

Approx. 160 min. (23°C (73.4°F), when using BATTERY PACK Z1003)

Recharge function

BATTERY PACK Z1003 charges regardless of whether the instrument is on or off; charge time: max. 5 hr. 30 min. @23°C (73°F)

Power outage processing

In the event of a power outage during recording, instrument resumes recording once the power is back on (integral power starts from 0).

Power supply quality measure -

Power outage processing

In the event of a power outage during recording, instrument resumes recording once the power is back on (integral power starts from 0).

Continuous battery operation time

Approx. 180 min. @23°C (@73.4°F), when using

Real-Time Clock function

Auto-calendar, leap-year correcting 24-hour clock

Display Language

English, Simplified Chinese, Japanese.

Operating temperature and humidity

0 to 50°C (32 to 122°F) 80% RH or less (non-condensating)

Operating environment

Indoors, altitude up to 3000 m (measurement category is lowered to 600 V CAT III when above 2000m), Pollution degree 2

Storage temperature and humidity

-20 to 50°C (4 to 122°F) 80% RH or less (non-condensating)

If the instrument will not be used for an extended period of time, remove the battery pack and store in a cool location (from -20 to 30°C (-4 to 86°F)).

Operating temperature and humidity

0 to 50°C (32 to 122°F) 80% RH or less (non-condensating)

Dust and water resistance

IP30 (EN60529)

Dust and water resistance

IP30 (EN60529)

Minimum input voltage

Voltage input section 1000 VAC, DC±600 V, max. peak voltage ±6000 Vpeak
Current input section 3VAC, DC±4.24V

Maximum input voltage

Voltage input section 1000 V (Measurement Categories IV, anticipated transient overvoltage 8000 V)

Dielectric strength

6.88 kVrms (850/60 Hz, 1 mA sense current)
Between voltage measurement terminals (U1 to U3) and voltage measurement terminals (U4)
4.30 kVrms (1 mA@50/60 Hz, 1 mA sense current)
Between voltage input terminal (U1 to U3) and current input terminals/interfaces

Applicable standards

Safety EN61010
EMC EN61326 Class A, EN61000-3-2, EN61000-3-3
Measurement Specifications

(For specifications when measuring 400Hz circuits, please inquire with your HIOKI distributor.)

- **TIME PLOT**
  - The MAX/MIN/AVG of each recording interval for each parameter are recorded.
- **EVENT**
  - When a power anomaly occurs, approx. 200ms instantaneous waveform is recorded.
- **TRANSIENT**
  - When a transient overvoltage is detected, the 2ms instantaneous waveforms before and after the occurrence (total 4ms) are recorded.
- **FLUCTUATION**
  - The RMS fluctuation 0.5s before and 29.5s after an event has occurred are recorded.
- **HIGH-ORDER HARM**
  - When a high order harmonic event occurs, the 40ms instantaneous waveform is recorded.

**Transient overvoltage**

- **DISPLAY ITEMS**
  - Event detection only
  - Positive peak value and negative peak value

- **TIME PLOT**
  - Measured every 10 cycles (50 Hz) or 12 cycles (60 Hz)
  - Maximum and minimum points sampled during approx. 200 ms aggregation

- **EVENT**
  - Display method
  - Measurement method
  - Range and accuracy

**Voltage waveform peak/Current waveform peak**

- **DISPLAY ITEMS**
  - Event detection only

- **TIME PLOT**
  - Measured as the reciprocal of the accumulated whole-cycle time during one U1 (reference channel) cycle

- **EVENT**
  - Measured as the reciprocal of the accumulated whole-cycle time during the specified 10s period for U1 (reference channel) as per IEC61000-4-30

- **MEASUREMENT METHOD**
  - Frequency
  - Measurement accuracy
  - Measurement range, resolution
  - Measurement bandwidth

**RMS voltage/ RMS current refreshed each half-cycle**

- **DISPLAY ITEMS**
  - True RMS type, RMS voltage values are calculated using sample data for 1 waveform derived by overlapping the voltage waveform every half-cycle

- **TIME PLOT**
  - RMS current refreshed each half-cycle

- **EVENT**
  - RMS current is calculated using current waveform data sampled every half-cycle

- **MEASUREMENT METHOD**
  - RMS current refreshed each half-cycle
  - RMS current refreshed each half-cycle

- **RANGE AND ACCURACY**
  - RMS current: ±0.2% rdg. ±0.1%f.s. + clamp-on sensor accuracy

**Swell/ Dip/ Interruption**

- **DISPLAY ITEMS**
  - Swell : Swell height, Swell duration
  - Dip : Dip depth, Dip duration
  - Interruption : Interruption depth, Interruption duration

- **TIME PLOT**
  - A swell is detected when the RMS voltage refreshed each half-cycle exceeds the threshold in the positive direction

- **EVENT**
  - A dip is detected when the RMS voltage refreshed each half-cycle exceeds the threshold in the negative direction

**Measurement method**

- **RMS current refreshed each half-cycle**

**Display items**

- For single transient incidents and continuous transient incidents
- Transient voltage value, Transient width
- For continuous transient incidents
- Transient period (Period from transient IN to transient OUT)
- Max. transient voltage value (Max. peak value during the period)
- Transient count during period

**Measurement method**

- Detected from waveform obtained by eliminating the fundamental component (50/60/400 Hz) from the sampled waveform

**Measurement accuracy**

- ±0.2% of nominal voltage (With 1.666% f.s. to 110% f.s. input and a nominal input voltage of at least 100 V)
- ±0.3% rdg. ±0.5%f.s.
### Voltage DC value (ch4 only)

<table>
<thead>
<tr>
<th>Measurement method</th>
<th>Average value during approx. 20ms aggregation synchronized with the reference channel (CH4 only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling frequency</td>
<td>200kHz</td>
</tr>
<tr>
<td>Measurement range, resolution</td>
<td>600.00V, 0.01V</td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>±0.3%rdg. ±0.08%f.s.</td>
</tr>
</tbody>
</table>

### Current DC value (ch4 only; when using compatible sensor)

<table>
<thead>
<tr>
<th>Measurement method</th>
<th>Average value during approx. 200ms aggregation synchronized to reference channel (CH4 only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling frequency</td>
<td>200kHz</td>
</tr>
<tr>
<td>Measurement range, resolution</td>
<td>Based on clamp-on sensor in use (when using compatible sensor)</td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>±0.5% rdg. ±0.5% f.s. + clamp-on sensor accuracy</td>
</tr>
</tbody>
</table>

### Active power/ Apparent power/ Reactive power

<table>
<thead>
<tr>
<th>Display items</th>
<th>Active power: Active power for each channel and sum value for multiple channels. Sink (consumption) and Source (regeneration)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apparent power: Apparent power of each channel and its sum for multiple channels No polarity</td>
</tr>
<tr>
<td></td>
<td>Reactive power: Reactive power of each channel and its sum for multiple channels</td>
</tr>
<tr>
<td></td>
<td>Lag phase (LAG: current lags voltage) and Lead phase (LEAD: current leads voltage)</td>
</tr>
</tbody>
</table>

### Measurement method

- Active power: Measured every 10 cycles (50 Hz) or 12 cycles (60 Hz)
- Apparent power: Calculated from RMS voltage U and RMS current I
- Reactive power: Calculated using apparent power S and active power P

### Sampling frequency

- 200kHz

### Measurement range, resolution

- Depends on the voltage x current range combination; see Input specifications

### Measurement accuracy

- Active power: ±0.2% rdg. ±0.1% f.s. + clamp-on sensor accuracy
- Reactive power: ±1 dgt. for calculations derived from the various measurement values

### Active energy /Reactive energy

<table>
<thead>
<tr>
<th>Display items</th>
<th>Active energy: WP+ (consumption), WP- (regeneration); Sum of multiple channels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reactive energy: WQLAG (lag), WQLEAD (lead); Sum for multiple channels Elapsed time</td>
</tr>
</tbody>
</table>

### Measurement method

- Measured every 10 cycles (50 Hz) or 12 cycles (60 Hz)
- Integrated separately by consumption and regeneration from active power
- Integrated separately by lag and lead from reactive power
- Integration starts at the same time as recording
- Recorded at the specified TIMEPLOT interval

### Sampling frequency

- 200kHz

### Measurement range, resolution

- Depends on the voltage x current range combination; see Input specifications

### Measurement accuracy

- Active energy: Active energy measurement accuracy ±10 dgt.
- Reactive energy: Reactive power measurement accuracy ±10 dgt.
- Cumulative time accuracy: ±10 ppm ±1s (23°C [73°F])

### Power factor/Displacement power factor

| Display items | Displacement power factor of each channel and its sum for multiple channels |

### Measurement method

- Power factor: Calculated from RMS voltage U, RMS current I, and active power P
- Displacement power factor: Calculated from the phase difference between the fundamental voltage wave and the fundamental current wave
- Lag phase (LAG: current lags voltage) and Lead phase (LEAD: current leads voltage)

### Sampling frequency

- 200kHz

### Measurement range, resolution

- Depends on the voltage x current range combination; see Input specifications

### Measurement accuracy

- Voltage unbalance factor: ±0.15%
- Current unbalance factor: —

### Voltage unbalance factor/ Current unbalance factor (negative-phase, zero-phase)

<table>
<thead>
<tr>
<th>Display items</th>
<th>Voltage unbalance factor: Negative-phase unbalance factor, zero-phase unbalance factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current unbalance factor</td>
<td>Negative-phase unbalance factor, zero-phase unbalance factor</td>
</tr>
</tbody>
</table>

### Measurement method

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

### Sampling frequency

- 200kHz

### Measurement range

- Depends on the voltage x current range combination; see Input specifications

### Measurement accuracy

- Voltage unbalance factor: ±0.15%
- Current unbalance factor: —

### High-order harmonic voltage component/ High-order harmonic current component

<table>
<thead>
<tr>
<th>Display items</th>
<th>For single incidents and continuous transient incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High-order harmonic voltage component value</td>
</tr>
<tr>
<td></td>
<td>High-order harmonic current component value</td>
</tr>
<tr>
<td></td>
<td>For continuous incidents</td>
</tr>
<tr>
<td></td>
<td>High-order harmonic voltage component maximum value</td>
</tr>
<tr>
<td></td>
<td>High-order harmonic current component maximum value</td>
</tr>
<tr>
<td></td>
<td>High-order harmonic voltage component period</td>
</tr>
<tr>
<td></td>
<td>High-order harmonic current component period</td>
</tr>
</tbody>
</table>

### Measurement method

- The waveform obtained by eliminating the fundamental component is calculated using the true RMS method during 10 cycles (50 Hz) or 12 cycles (60 Hz) of the fundamental wave

### Sampling frequency

- 200kHz

### Measurement range, resolution

- Depends on the voltage x current range combination; see Input specifications

### Measurement accuracy

- Voltage unbalance factor: ±0.5% rdg. ±0.5% f.s. + clamp-on sensor accuracy

### Harmonic voltage/ Harmonic current (including fundamental component)

| Display items | Select either RMS or content percentage; From 0 to 50th order |

### Measurement method

- Uses IEC61000-4-7:2002.

### Comparison window width

- 10 cycles (50 Hz), 12 cycles (60 Hz)

### No. of window points

- 4096 points synchronized with harmonic calculations

### Measurement range, resolution

- Depends on the voltage x current range combination; see Input specifications

### Measurement accuracy

- Voltage unbalance factor: ±0.15%
- Current unbalance factor: —
### Total harmonic voltage/ Total harmonic current distortion factor

<table>
<thead>
<tr>
<th>Display items</th>
<th>TIME PLOT</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>THD-F (total harmonic distortion factor for the fundamental wave)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THD-R (total harmonic distortion factor for the total harmonic including the fundamental wave)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurement method</th>
<th>Based on IEC61000-4-7:2002. Max. order: 50th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparison window width</td>
<td>10 cycles (50 Hz), 12 cycles (60 Hz)</td>
</tr>
<tr>
<td>No. of window points</td>
<td>4096 points synchronized with harmonic calculations</td>
</tr>
<tr>
<td>Measurement range, resolution</td>
<td>0.00 to 100.00%(Voltage), 0.00 to 500.00%(Current)</td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>—</td>
</tr>
</tbody>
</table>

### Harmonic power (including fundamental component)

<table>
<thead>
<tr>
<th>Display item</th>
<th>TIME PLOT</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select either RMS or content percentage, From 0 to 50th order</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison window width</td>
<td>10 cycles (50 Hz), 12 cycles (60 Hz)</td>
<td></td>
</tr>
<tr>
<td>No. of window points</td>
<td>4096 points synchronized with harmonic calculations</td>
<td></td>
</tr>
<tr>
<td>Measurement range, resolution</td>
<td>Depends on the voltage × current range combination; See Input specifications</td>
<td></td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>See measurement accuracy with a fundamental wave of 50/60 Hz When using an AC-only clamp sensor, order 0 is not specified for current and power</td>
<td></td>
</tr>
</tbody>
</table>

#### Harmonic voltage phase angle/ Harmonic current phase angle (including fundamental component)

<table>
<thead>
<tr>
<th>Display item</th>
<th>TIME PLOT</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmonic phase angle components for whole orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison window width</td>
<td>10 cycles (50 Hz), 12 cycles (60 Hz)</td>
<td></td>
</tr>
<tr>
<td>No. of window points</td>
<td>4096 points synchronized with harmonic calculations</td>
<td></td>
</tr>
<tr>
<td>Measurement range, resolution</td>
<td>-180.00° to 0.00° to 180.00°</td>
<td></td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display item</th>
<th>TIME PLOT</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates the difference between the harmonic voltage phase angle and the harmonic current phase angle. Harmonic voltage-current phase difference for each channel and sum (total) value for multiple channels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison window width</td>
<td>10 cycles (50 Hz), 12 cycles (60 Hz)</td>
<td></td>
</tr>
<tr>
<td>No. of window points</td>
<td>4096 points synchronized with harmonic calculations</td>
<td></td>
</tr>
<tr>
<td>Measurement range, resolution</td>
<td>-180.00° to 0.00° to 180.00°</td>
<td></td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>1st to 3rd orders : ± 2° +clamp-on sensor accuracy 4th to 50th orders : ±(0.05° × k+2°) +clamp-on sensor accuracy; (k: harmonic orders) Specified with a harmonic voltage of 1 V for each order and a current level of at 1% f.s. or greater</td>
<td></td>
</tr>
</tbody>
</table>

### Harmonic voltage-current and inter-harmonic current

<table>
<thead>
<tr>
<th>Display item</th>
<th>TIME PLOT</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select either RMS or content percentage, 0.5 to 49.5th orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison window width</td>
<td>10 cycles (50 Hz), 12 cycles (60 Hz)</td>
<td></td>
</tr>
<tr>
<td>No. of window points</td>
<td>4096 points synchronized with harmonic calculations</td>
<td></td>
</tr>
<tr>
<td>Measurement range, resolution</td>
<td>Inter-harmonic voltage : 600.00V, 0.01V Inter-harmonic current : Due to using clamp-on sensor; See Input specifications</td>
<td></td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>Inter-harmonic voltage: ±5.00% rdg. ±0.05% of nominal voltage Inter-harmonic current: ±5.00% rdg. ±0.05% of nominal voltage</td>
<td></td>
</tr>
</tbody>
</table>

### K Factor (multiplication factor)

<table>
<thead>
<tr>
<th>Display item</th>
<th>TIME PLOT</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculated using the harmonic RMS current of the 2nd to 50th orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement method</td>
<td>Calculated using the harmonic RMS current of the 2nd to 50th orders</td>
<td></td>
</tr>
<tr>
<td>Comparison window width</td>
<td>10 cycles (50 Hz), 12 cycles (60 Hz)</td>
<td></td>
</tr>
<tr>
<td>No. of window points</td>
<td>4096 points synchronized with harmonic calculations</td>
<td></td>
</tr>
<tr>
<td>Measurement range, resolution</td>
<td>0.00 to 500.00</td>
<td></td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

### Instantaneous flicker value

<table>
<thead>
<tr>
<th>Display item</th>
<th>TIME PLOT</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>As per IEC61000-4-15 User-selectable from 230 Vlamp/120 Vlamp (when Pist and Plt are selected for flicker measurement)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement method</td>
<td>As per IEC61000-4-15 User-selectable from 230 Vlamp/120 Vlamp (when Pist and Plt are selected for flicker measurement)</td>
<td></td>
</tr>
<tr>
<td>Comparison window width</td>
<td>10 cycles (50 Hz), 12 cycles (60 Hz)</td>
<td></td>
</tr>
<tr>
<td>No. of window points</td>
<td>4096 points synchronized with harmonic calculations</td>
<td></td>
</tr>
<tr>
<td>Measurement range, resolution</td>
<td>99.999, 0.001</td>
<td></td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

### ΔV10 Flicker

<table>
<thead>
<tr>
<th>Display item</th>
<th>TIME PLOT</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔV10 measured at one minute intervals, average value for one hour, maximum value for one hour, fourth largest value for one hour, total (within the measurement interval) maximum value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement method</td>
<td>Calculated using the harmonic RMS current of the 2nd to 50th orders</td>
<td></td>
</tr>
<tr>
<td>Comparison window width</td>
<td>10 cycles (50 Hz), 12 cycles (60 Hz)</td>
<td></td>
</tr>
<tr>
<td>No. of window points</td>
<td>4096 points synchronized with harmonic calculations</td>
<td></td>
</tr>
<tr>
<td>Measurement range, resolution</td>
<td>0.000 to 99.999</td>
<td></td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>±2% rdg. ±0.01 V (with a fundamental wave of 100 Vms [50/60 Hz], a fluctuation voltage of 1 Vms, and a fluctuation frequency of 10 Hz)</td>
<td></td>
</tr>
<tr>
<td>Threshold</td>
<td>0.00 to 9.99V alarm output is generated when the reading for each minute is compared to the threshold and found to be greater</td>
<td></td>
</tr>
</tbody>
</table>

### IEC Flicker

<table>
<thead>
<tr>
<th>Display item</th>
<th>TIME PLOT</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short interval flicker Pist, long interval flicker Plt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement range</td>
<td>0.001 to 10000 P.U., broken into 1,024 segments with a logarithm</td>
<td></td>
</tr>
<tr>
<td>Measurement accuracy</td>
<td>Pist: ±5% rdg. (Specified with a nominal voltage of at least 100 V) Plt: ±5% rdg. (Specified with a nominal voltage of at least 100 V)</td>
<td></td>
</tr>
<tr>
<td>Flicker filter</td>
<td>Select 230 V lamp Ed1, 120 V lamp Ed1, 230 V lamp Ed2, or 120 V lamp Ed2.</td>
<td></td>
</tr>
</tbody>
</table>
## Clamp-on Sensors Specifications (Options)

### Clamp-On Sensor

<table>
<thead>
<tr>
<th>Model</th>
<th>Clamp-on Sensor 9694</th>
<th>Clamp-on Sensor 9660</th>
<th>Clamp-on Sensor 9661</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td><strong>Primary Current Rating</strong></td>
<td>5A AC</td>
<td>100A AC</td>
<td>500A AC</td>
</tr>
<tr>
<td><strong>Output Voltage</strong></td>
<td>10mV/A AC</td>
<td>AC, 1mA/A AC</td>
<td>AC, 1mA/A AC</td>
</tr>
<tr>
<td><strong>Measurement Range</strong></td>
<td>See Input Specifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Amplitude Accuracy</strong></td>
<td>±0.3%rdg, ±0.02% f.s.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Phase Accuracy</strong></td>
<td>±2° or less</td>
<td></td>
<td>±0.5° or less</td>
</tr>
<tr>
<td><strong>Maximum Allowable Input</strong></td>
<td>50 A continuous</td>
<td></td>
<td>550 A continuous</td>
</tr>
<tr>
<td><strong>Maximum Rated Voltage to Earth</strong></td>
<td>CAT III 300Vrms</td>
<td></td>
<td>CAT III 600Vrms</td>
</tr>
<tr>
<td><strong>Frequency Characteristics</strong></td>
<td>±1.0% or less for 66Hz to 5kHz (deviation from specified accuracy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cord Length</strong></td>
<td>3m (9.84ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Measurable Conductor Diameter</strong></td>
<td>Max. φ15mm (0.59&quot;)</td>
<td>Max. φ46mm (1.81&quot;)</td>
<td></td>
</tr>
<tr>
<td><strong>Dimensions, Mass</strong></td>
<td>46W (1.8&quot;) x 135H (5.3&quot;) x 21D (0.8&quot;) mm, 230g (8.1oz.)</td>
<td>78W (3.0&quot;) x 152H (5.9&quot;) x 42D (1.6&quot;) mm, 380g (13.4oz.)</td>
<td></td>
</tr>
<tr>
<td><strong>Power Supply</strong></td>
<td>LRL alkaline battery ±2, AC Adapter (option), or external 5 to 15 V DC power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Options (sold separately)</strong></td>
<td>AC ADAPTER 9445-02 (universal 100 to 240VAC, 9V/1A output for USA)</td>
<td></td>
<td>AC ADAPTER 9445-03 (universal 100 to 240VAC, 9V/1A output for Europe)</td>
</tr>
</tbody>
</table>

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### Clamp-On Sensor

<table>
<thead>
<tr>
<th>Model</th>
<th>Clamp-on Sensor 9669</th>
<th>Clamp-on Sensor 9695-02</th>
<th>Clamp-on Sensor 9695-03</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
<tr>
<td><strong>Primary Current Rating</strong></td>
<td>1000 A AC</td>
<td>50A AC</td>
<td>100A AC</td>
</tr>
<tr>
<td><strong>Output Voltage</strong></td>
<td>0.5mA/A AC</td>
<td>10mA/A AC</td>
<td>1mA/A AC</td>
</tr>
<tr>
<td><strong>Measurement Range</strong></td>
<td>See Input Specifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Amplitude Accuracy</strong></td>
<td>±1.0%rdg, ±0.01% f.s.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Phase Accuracy</strong></td>
<td>±1° or less</td>
<td></td>
<td>±1° or less</td>
</tr>
<tr>
<td><strong>Maximum Allowable Input</strong></td>
<td>1000 A continuous</td>
<td></td>
<td>130 A continuous</td>
</tr>
<tr>
<td><strong>Maximum Rated Voltage to Earth</strong></td>
<td>CAT III 600Vrms</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency Characteristics</strong></td>
<td>Within ±2% at 40Hz to 5kHz (deviation from accuracy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cord Length</strong></td>
<td>3m (9.84ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Measurable Conductor Diameter</strong></td>
<td>Max. φ55 mm (2.17&quot;) x 80 (3.1&quot;) x 20 (0.79&quot;) mm busbar</td>
<td>Max. φ15mm (0.59&quot;)</td>
<td></td>
</tr>
<tr>
<td><strong>Dimensions, Mass</strong></td>
<td>99.5W (3.9&quot;) x 188H (7.4&quot;) x 42D (1.6&quot;) mm, 590g (20.8oz.)</td>
<td>51W (2.0&quot;) x 58H (2.2&quot;) x 19D (0.7&quot;) mm, 50g (1.8oz.)</td>
<td></td>
</tr>
<tr>
<td><strong>Options (sold separately)</strong></td>
<td>CONNECTION CORD 9219 (sold separately)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Clamp-On Sensor

<table>
<thead>
<tr>
<th>Model</th>
<th>AC Flexible Current Sensor CT9667-01</th>
<th>AC Flexible Current Sensor CT9667-02</th>
<th>AC Flexible Current Sensor CT9667-03</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
<td><img src="image9.png" alt="Image" /></td>
</tr>
<tr>
<td><strong>Primary Current Rating</strong></td>
<td>500A AC, 5000A AC (selectable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Output Voltage</strong></td>
<td>500 mV AC ±1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Measurement Range</strong></td>
<td>See Input Specifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Amplitude Accuracy</strong></td>
<td>±2.0%rdg, ±0.3% f.s.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Phase Accuracy</strong></td>
<td>±1° or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum Allowable Input</strong></td>
<td>10000 A continuous</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum Rated Voltage to Earth</strong></td>
<td>CAT III 600Vrms</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency Characteristics</strong></td>
<td>±3dB or less for 10 Hz to 20kHz (within ±3dB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cord Length</strong></td>
<td>Sensor to Circuit: 2m (6.5ft), Circuit to Connector: 1m (3.28ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Measurable Conductor Diameter</strong></td>
<td>Max. φ100mm (3.94&quot;)</td>
<td>Max. φ180mm (7.09&quot;)</td>
<td>Max. φ254mm (10.0&quot;)</td>
</tr>
<tr>
<td><strong>Dimensions, Mass</strong></td>
<td>Circuit Box: 35W (1.38&quot;) x 120H (4.7&quot;) x 34D (1.34&quot;) mm, Sensor Cable Diameter: φ7.4 mm (0.29&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power Supply</strong></td>
<td>LRL alkaline battery ±2, AC Adapter (option), or external 5 to 15 V DC power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Options (sold separately)</strong></td>
<td>AC ADAPTER 9445-02 (universal 100 to 240VAC, 9V/1A output for USA)</td>
<td></td>
<td>AC ADAPTER 9445-03 (universal 100 to 240VAC, 9V/1A output for Europe)</td>
</tr>
</tbody>
</table>

---

*Note: CONNECTION CORD 9219 (sold separately) is required.*
### Clamp-on sensor

**CLAMP ON LEAK SENSOR 9657-10**

**CLAMP ON LEAK SENSOR 9675**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>AC/DC AUTO-ZERO CURRENT SENSOR CT7731</th>
<th>AC/DC AUTO-ZERO CURRENT SENSOR CT7736</th>
<th>AC/DC AUTO-ZERO CURRENT SENSOR CT7742</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary current rating</td>
<td>100A AC/DC</td>
<td>600A AC/DC</td>
<td>2000A AC/DC</td>
</tr>
<tr>
<td>Output voltage</td>
<td>60A range : 10mA/A</td>
<td>60A range : 10mA/A</td>
<td>600A range : 1mA/A</td>
</tr>
<tr>
<td>Amplitude accuracy *</td>
<td>±1.0%rdg. ±0.5%f.s. *</td>
<td>±2.0%rdg. ±0.5%f.s. *</td>
<td>±1.5%rdg. ±0.5%f.s. *</td>
</tr>
<tr>
<td>Phase accuracy **</td>
<td>±1.8° or less</td>
<td>±1.8° or less</td>
<td>±2.3° or less</td>
</tr>
<tr>
<td>Maximum allowable input **</td>
<td>100 A continuous</td>
<td>600 A continuous</td>
<td>2000 A continuous</td>
</tr>
<tr>
<td>Maximum rated voltage to earth</td>
<td>CAT I/AC/DC 600Vrms</td>
<td>CAT II/AC/DC 1000Vrms</td>
<td>CAT III/AC/DC 6000Vrms</td>
</tr>
<tr>
<td>Frequency characteristics</td>
<td>DC to 5kHz (-3dB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cord length</td>
<td>2.5m (8.20ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurable conductor diameter</td>
<td>Max. φ33mm (1.30&quot;)</td>
<td>Max. φ33mm (1.30&quot;)</td>
<td>Max. φ55mm (2.17&quot;)</td>
</tr>
<tr>
<td>Dimensions, Mass</td>
<td>58W(2.28&quot;)×132H(5.20&quot;)×18D(0.71&quot;)mm, 250g(8.8oz.)</td>
<td>64W(2.52&quot;)×160H(6.30&quot;)×34D(1.34&quot;)mm, 320g(11.3oz.)</td>
<td>64W(2.52&quot;)×195H(7.68&quot;)×34D(1.34&quot;)mm, 510g(18.0oz.)</td>
</tr>
<tr>
<td>Power supply</td>
<td>DISPLAY UNIT CM7290</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* : DC, 45 to 66Hz   ** :  to 66Hz

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### Clamp-on leak sensor

<table>
<thead>
<tr>
<th>Appearance</th>
<th>CLAMP ON LEAK SENSOR 9657-10</th>
<th>CLAMP ON LEAK SENSOR 9675</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary current rating</td>
<td>10A AC (Up to 5A on Model PW3198)</td>
<td></td>
</tr>
<tr>
<td>Output voltage</td>
<td>100 mVA AC</td>
<td></td>
</tr>
<tr>
<td>Measurement range</td>
<td>See input specifications (Cannot be used to measure power)</td>
<td></td>
</tr>
<tr>
<td>Amplitude accuracy *</td>
<td>±1.0%rdg. ±0.05%f.s. *</td>
<td>±1.0%rdg. ±0.05%f.s. *</td>
</tr>
<tr>
<td>Residual current characteristics</td>
<td>Max. 5mA (in 100A go and return electric wire)</td>
<td>Max. 1mA (in 100A go and return electric wire)</td>
</tr>
<tr>
<td>Effect of external magnetic fields</td>
<td>400A AC/m corresponds to 5mA, Max. 7.5mA</td>
<td></td>
</tr>
<tr>
<td>Measurable conductor</td>
<td>Insulated conductor</td>
<td></td>
</tr>
<tr>
<td>Cord length</td>
<td>3m (9.84ft)</td>
<td></td>
</tr>
<tr>
<td>Measurable conductor diameter</td>
<td>Max. φ40mm(1.57&quot;)</td>
<td>Max. φ30mm(1.18oz&quot;)</td>
</tr>
<tr>
<td>Dimensions, Mass</td>
<td>74W(2.91&quot;)×145H(5.71&quot;)×42D(1.65)mm, 380g(13.4oz.)</td>
<td>60W(2.36&quot;)×112.5H(4.43&quot;)×23.6D(0.93)mm, 160g(5.6oz.)</td>
</tr>
</tbody>
</table>

* : 45 to 66Hz
**Options**

### Current Measurement

**CLAMP ON SENSOR (Load current, AC)**

- **PW3198-90**
  - 9669-90 AC, e15mm (0.59”)
  - 9670-90 100A AC, e15mm (0.59”)
  - 9671-03 500A AC, e46mm (1.81”)
  - 9669-03 100A AC, e55mm (2.17”)
  - 9290-10 CT ratio 10:1, AC1000A, φ10mm (0.4”) (black)
- **CT7731**
  - 100A AC/DC, φ33mm (1.3”)
- **CT7736**
  - 600A AC/DC, φ33mm (1.3”)
- **CT7742**
  - 2000A AC/DC, φ55mm (2.17”)

*The AC/DC Auto-zero Current Sensor CT7731/CT7736/CT7742 cannot be used on its own with the PW3198. Be sure to use a set that includes the Display Unit CMT9290, Output Cord L9095, and AC Adapter 9445-02 or 9445-03.*

### Voltage Measurement

**APPLICATION SOFTWARE**

- **POQA-HiVIEW PRO 9624-50**
  - Use Model 9624-50 POQA-HiVIEW PRO (version 2.50 or later) with a PC to analyze the data collected by the PW3198.

### Bundled Accessories

- **AC ADAPTER 9445-02**
  - For USA, 100V AC to 240V AC
- **AC ADAPTER 9445-03**
  - For EU, 100 to 240 V AC, 9 W/1 A
- **BATTERY PACK Z1003**
  - (Ni-MH, 7.2 V/4500 mAh)

### Combination example: For three-phase 4-wire circuits containing leak current

- **PW3198-90**
- **9661 x 3**
- **9675**
- **PW9001**
- **C1001**

Use Model POQA-HiVIEW PRO 9624-50 (version 2.00 or later) with a PC to analyze the data collected by the PW3198.

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