High-precision, 3-channel power meter with built-in harmonic measurement

Accurately measure devices up to 1000 V/65 A AC/DC with direct input

The PW3336 (2-channel) and PW3337 (3-channel) can measure DC and a variety of power connections ranging from single-phase 2-wire to 3-phase 4-wire*.

- For development and production of motors, inverters, power conditioners, power supplies, and other devices
- Assess and verify the energy-saving performance of industrial equipment such as heavy machinery, air-conditioners as well as household appliances

- Voltage, current, and power basic accuracy
- Measurement frequency bands
- High-current measurement
- Low-loss current input
- Harmonic measurement up to the 50th order
- High-accuracy measurement, even with a low power factor
- Measure up to 5000 A AC

±0.1% **
DC, 0.1 Hz to 100 kHz
Up to 65 A, direct input
Input resistance of 1mΩ or less
IEC 61000-4-7 compliant
Ideal for no-load testing of transformers and motors
Built-in external sensor input terminals

* 3-phase 4-wire measurement: PW3337 series only
** For complete details, please refer to the specifications.
The PW3336 series (2-channel) and PW3337 series (3-channel) are easy-to-use, high-accuracy power meters that deliver current measurement of up to 65 A with direct input as well as built-in harmonic analysis functionality, all with accuracy that exceeds that of previous HIOKI power meters.

**World class performance**

**Measure up to 65 A with direct input**

1. **Measurement accuracy that remains unchanged for high-current measurement**

   Accuracy is guaranteed for currents of up to 65 A with direct input. The power meters can also measure high currents in excess of 65 A with optional current sensors. Direct-input power meters typically exhibit degraded accuracy when inputting high currents due to shunt resistor self-heating. However, the PW3336 and PW3337 reduce input resistance with a DCCT design that virtually eliminates this type of accuracy degradation.

   ![Accuracy Chart](chart)

<table>
<thead>
<tr>
<th>Current Type</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Input</td>
<td>±0.1%</td>
</tr>
<tr>
<td>Sensor Input</td>
<td>±0.1%</td>
</tr>
</tbody>
</table>

   

2. **A 3-channel power meter**

   Enabling you to select the optimal range for each connection

   The advanced engineering of the PW3336 and PW3337 enables you to measure an inverter’s primary-side DC power supply and its secondary-side 3-phase output at the same time. The power meters make a tremendous contribution in applications that need to measure the input/output efficiency of inverters, uninterruptible power supplies, and other power supply equipment.

   ![Multi-range Configuration](multi-range)

3. **Best-in-class accuracy of ±0.1% * **

   Highest basic accuracy and DC accuracy of any instrument in its class

   Thanks to Hioki’s accumulated technology and track record, the PW3336/PW3337 delivers the highest basic accuracy and DC accuracy of any instrument in its class. Reliable measurement accuracy ensures robust performance in customers’ measurement applications.

  ![Best-in-class Accuracy](accuracy)

   ±0.1%*

   * For complete details, please refer to the specifications.
Simultaneously measure power consumption and all harmonic parameters, from single-phase 2-wire to 3-phase 4-wire measurement lines

2ch

3ch

PW3336 series (2-channel models)
Measurement lines: 1P2W/1P3W/3P3W

PW3337 series (3-channel models)
Measurement lines: 1P2W/1P3W/3P3W/3P4W

Simultaneous processing of all data
Voltage RMS value
Voltage mean value
Voltage fundamental wave component
Total harmonic distortion (THD)

World class performance

Simultaneous processing of power data and all harmonic data
All data, including RMS values, mean values, DC components, AC components, fundamental wave components, harmonic measurement, and integration measurement, is processed in parallel internally. There is no need to switch modes depending on whether you wish to acquire power data or harmonic data - simply switch the display to obtain measured values with true simultaneity. Additionally, PC communications software can be used to capture measurement data, including from multiple synchronized instruments.

High-accuracy measurement, even with low-power-factor input
Because power factor has little impact at just ±0.1% f.s., the PW3336/PW3337 can measure active power of low-power-factor input at a high level of accuracy, for example during no-load-loss testing, a technique that is used to evaluate energy-saving performance of transformers.

Even though the high current waveform crest factor that typically accompanies no-load operation causes the power factor to deteriorate, measurements taken with the PW3336/PW3337 series remain accurate under these conditions.

Wide frequency band of DC and 0.1 Hz to 100 kHz
Thanks to a wide-band capability extending from DC and 0.1 Hz to 100 kHz, the PW3336/PW3337 can cover not only inverters’ fundamental frequency band, but also the carrier frequency band.

Integrating fluctuating power values
The power consumption of equipment subject to a fluctuating load, for example refrigerators, heaters, and pumps, varies considerably between rated operation and no-load operation. Thanks to its broad dynamic range, the PW3336/PW3337 can perform integrated power measurement with guaranteed accuracy using a single range, even if the power fluctuates dramatically during integration. Measurements can accommodate waveform peaks of up to 600% of the range rating.
**Advanced functions**

1. **Extensive built-in features including harmonic measurement, current sensor input, synchronized control, and a wide selection of interfaces**

The PW3336/PW3337 ships standard with all the functionality you need for measurement. Choose from a total of eight models depending on whether your application requires support for GP-IB communications and D/A output.

**Standard functionality by model**

<table>
<thead>
<tr>
<th>Model</th>
<th>No. of channels</th>
<th>Harmonic measurement</th>
<th>Current sensor input</th>
<th>Synchronized control</th>
<th>LAN</th>
<th>RS-232C</th>
<th>GP-IB</th>
<th>D/A output</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW3336</td>
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<td>PW3336-03</td>
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<tr>
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<td>PW3337-02</td>
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<td>PW3337-03</td>
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</tbody>
</table>

**IEC61000-4-7 compliant harmonic measurement**

The PW3336/PW3337 supports measurement that complies with IEC 61000-4-7:2002, the international standard governing harmonic measurement.

The power meters can measure voltage, current, and power harmonics up to the 50th order depending on the fundamental frequency, including total harmonic distortion (THD), fundamental wave component, harmonic level, phase difference, content percentage, and other parameters for each order. Since you can cap the number of orders for which harmonic analysis is performed to any order from the 2nd to the 50th, you can make standard-compliant calculations, even if the standard defines an upper limit order for THD calculations.

**About IEC 61000-4-7**

IEC 61000-4-7 is an international standard governing the measurement of harmonic current and harmonic voltage in power supply systems as well as harmonic current emitted from devices. It defines the performance of standard instruments used to make such measurements.

**16-channel D/A output (-02, -03)**

D/A output-equipped instruments can generate voltage output for measured values and integrated power with their 16-bit D/A converter. By connecting an external data logger, HIOKI Memory HiCorder, recorder, or other device, you can simultaneously record data along with temperature and other non-power signals. The PW3336/PW3337 also offers the first active power level output on a cycle-by-cycle basis of any instrument in its class.

**Three types of D/A output (switchable)**

- **Instantaneous waveform output**
  - Output voltage, current, or power instantaneous waveforms. (Sampling speed: Approx. 87.5 kHz)
  - Level output
    - Output voltage, current, power, and other selected parameters with an update cycle of approximately 200 ms.

- **High-speed active power level output**
  - Generate level output for the active power for each cycle of the measurement waveform.

**Synchronized control using up to 8 instruments**

Eight units of PW3336/PW3337 can be connected and their measurements fully synchronized. That means you can have up to 24 channels of simultaneous calculations, display updates, data updates, integration control, display hold timing, and zero-adjustment. In addition, the master-slave configuration allows you to key lock all slave devices with the master unit, mirroring the master unit’s operations and modes on all of the other power meters. The free PC application can be used to calculate efficiency values across multiple units.

**Current sensor connectivity**

The PW3336/PW3337 can also measure devices that exceed 65 A with the use of an optional current sensor. Measurements with guaranteed accuracy can be performed for currents of up to 5000 A AC. Choose from a range of high-accuracy, clamp or pass-through AC/DC current sensors and models specifically designed for 50/60 Hz measurement.
**Applications**

1. **Research, development, and testing of equipment with 3-phase power supplies such as transformers, motors, air-conditioners, and heavy machinery**

   **Key advantages**
   - Measure 3-phase 3-wire and 3-phase 4-wire* lines with a basic measurement accuracy of ±0.1%**
   - Perform high-current measurement of 65 A with direct input without accuracy degradation caused by shunt resistor self-heating.
   - Built-in IEC 61000-4-7 compliant harmonic measurement functionality as well as current sensor input terminals and a LAN interface.
   - Accuracy is guaranteed for active power measurement from 0 W, as well as for measurement of integrated power for loads with large fluctuations.
   - Measure active power at a high level of accuracy even with low power factors, for example during no-load operation testing of transformers.

2. **Measuring the efficiency of power conditioners used in solar power installations**

   **Key advantages**
   - Measure primary-side DC and secondary-side 3-phase output with a single PW3337, using the optimal range for each.
   - Calculate efficiency: Perform output/input calculations and easily identify the resulting efficiency on the power meter’s screen.
   - Ripple rate calculation: Display the ratio of the AC component that is superposed on a DC line.
   - Built-in current sensor input terminals: Measure currents exceeding 65 A with an optional current sensor.
   - Harmonic measurement: Test for harmonic components such as voltage THD, which can be a concern with grid-linked systems.

3. **Measuring power supply devices such as 3-phase/3-phase inverters**

   **Key advantages**
   - Connect multiple instruments to synchronize their operation, including display updates, data updates, and start of integration.
   - Measure all data with simultaneous parallel processing, including RMS values, mean values, fundamental wave components, THD, and harmonic components.
   - Wide frequency band from DC and 0.1 Hz to 100 kHz: Enjoy coverage for the inverter secondary-side frequency band.
   - Built-in current sensor input terminals: Measure currents exceeding 65 A with an optional current sensor.

---

*3-phase 4-wire measurement: PW3337 series only  ** For complete details, please refer to the specifications.
4 Applications

Measuring the primary-side, internal circuitry, and secondary-side power consumption in uninterruptible power supplies (UPS)

Key advantages
- Set individual ranges and measurement types for each channel. Measure power consumption at each stage of the UPS.
- Hold waveform peak values and measured value maximum and minimum values.
- Measure all data with simultaneous parallel processing, including RMS values, mean values, fundamental wave components, THD, and harmonic components.

5 Simultaneous measurement of multiple loads

Key advantages
- Set individual ranges and measurement types for each channel. Measure power consumption at each stage of an uninterruptible power supply.
- Perform integrated measurement of widely fluctuating power signals without changing the range - useful during long-term integrated power evaluation tests.
- Use the synchronized control function to sync measurement timing and start/stop integration across a maximum of 8 power meters.
The PW3336/PW3337 Communicator connects with the power meters via the LAN, RS-232C, or GP-IB (-01, -03) interface, and is available for free download from the HIOKI website. Functionality includes configuring instruments, capturing interval data, performing numerical calculations based on measurement data, calculating efficiency values across multiple units, displaying 10 or more measurement parameters, and displaying waveforms.

LabVIEW Driver

Use LabVIEW* to collect data and integrate the power meter into existing systems. *LabVIEW is a trademark of National Instruments Corporation.

### Specifications

#### Input Specifications

**Measurement line type**

**PW3336 series**
- Single-phase 2-wire (1P2W)
- Single-phase 3-wire (1P3W)
- Three-phase 3-wire (3P3W, 3P3W2M)

**PW3337 series**
- Single-phase 2-wire (1P2W)
- Single-phase 3-wire (1P3W)
- Three-phase 3-wire (3P3W, 3P3W2M, 3V3A, 3P3W3M)
- Three-phase 4-wire (3P4W)

<table>
<thead>
<tr>
<th>Wiring</th>
<th>CH1</th>
<th>CH2</th>
<th>CH3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1P2Wx2</td>
<td>1P2W</td>
<td>1P2W</td>
<td></td>
</tr>
<tr>
<td>1P2W</td>
<td>1P2W</td>
<td>1P2W</td>
<td></td>
</tr>
<tr>
<td>3P3W</td>
<td>3P3W</td>
<td>3P3W</td>
<td></td>
</tr>
<tr>
<td>3P3W2M</td>
<td>3P3W</td>
<td>3P3W</td>
<td></td>
</tr>
<tr>
<td>3V3A</td>
<td>3V3A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3P3W3M</td>
<td>3P3W</td>
<td>3P3W</td>
<td></td>
</tr>
<tr>
<td>3P4W</td>
<td>3P4W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Input methods**

- Voltage: Isolated input, voltage division method
- Current: Direct input, DCCT method

**Voltage measurement ranges**

- PW3336: 15.000 V, 30.000 V, 60.000 V, 150.00 V, 300.00 V, 1000.0 V
- PW3337: 15.000 V, 30.000 V, 60.000 V, 150.00 V, 300.00 V, 1000.0 V

**Current measurement ranges**

- PW3336: 500.00 mA, 1000.00 mA, 2000.00 A
- PW3337: 500.00 mA, 1000.00 mA, 2000.00 A

**Power ranges**

- PW3336: from 3.0000 W to 100.00 kW
- PW3337: from 3.0000 W to 150.00 kW

**Input resistance**

- (50/60 Hz)
- PW3336: 2 MΩ×0.04 MΩ
- PW3337: 2 MΩ×0.04 MΩ

#### Basic Measurement Specifications

**Measurement method**

- Simultaneous voltage and current digital sampling, zero-cross simultaneous calculation

**Sampling frequency**

- Approx. 700 kHz

**A/D converter resolution**

- 16-bit

### Rectifiers

**AC+DC**

- AC+DC measurement
- Display of true RMS values for both voltage and current
- AC+DC Umn : AC+DC measurement
- Display of average value rectified RMS converted values for voltage and true RMS values for current

**DC**

- DC measurement
- Display of simple averages for both voltage and current
- Display of values calculated by (voltage DC value)×(current DC value) for active power

**AC**

- AC measurement
- Display of values calculated by both voltage and current
- Display of values calculated by (AC+DC value)²/(DC value)² for active power

**PMF**

- Extraction and display of the fundamental wave component from harmonic measurement

#### Zero-Crossing Filter

- 500 Hz to 200 kHz
- 500 Hz: 0.1 Hz to 500 kHz, 0.1 Hz to 200 kHz

**Maximum effective peak voltage**

- ±150% of each voltage range
- However, for 300 V, 600 V, and 1000 V ranges, ±1500 Vpeak

**A/D converter**

- ±1000% of each range
- However, for 20 A range and 50 A range, ±100 Apeak
### Frequency Measurement Specifications

- **Number of measurement channels**: 1
- **Measurement source**: Select from U (Hz) or f (Hz) by channel
- **Measurement method**: Calculated from input waveform period (reciprocal method)
- **Measurement range**: 500 Hz to 200 kHz (linked to zero-cross filter)
- **Measurement accuracy**: ±0.1% rdg. ±1 digit (7°C to 40°C)
- **Effective measuring range**: 1 kHz to 100 kHz range for sine waveform input with at least 5% of the measurement source’s measurement range. Measurement lower limit frequency setting: 0.1 sec. 1 sec. 1/10 sec.
- **Display format**: 1000 Hz to 9999.9 Hz, 9999.9 Hz to 99999.9 Hz, 99999.9 Hz to 999999.9 Hz

### Apparent Power / Reactive Power / Power Factor / Phase Angle Measurement Specifications

- **Measurement types**: Rectifiers
- **Apparent Power / Reactive Power / Power Factor**: AC-DC, AC, FND, AC-DC/LM Phase Angle: AC, FND
- **Effective measuring range**: As per voltage, current, and active power effective measuring ranges.

### Voltage Crest Factor / Current Crest Factor Measurement Specifications

- **Power channel and sum value calculation formulas**

### Voltage/Current / Active Power Measurement Specifications

- **Measurement method**: Measures the waveform’s peak value for both positive and negative polarity based on sampled instantaneous voltage values.
- **Sampling frequency**: Approx. 700 Hz
- **Range configuration**:
  - **Voltage peak range**: 15V, 30V, 60V, 150V, 300V, 600V, 1000V
  - **Current peak range**: 200mA, 500mA, 1A, 2A, 5A, 10A, 20A, 50A

### Synchronization Control

- **Functions**: Timing of calculations, display updates, data updates, integration start/stop/reset events, display hold operation, key lock operation, and zero-adjustment operation for the slave PW3336/PW3337.
- **Synchronization control**: As per voltage and waveform peak value or current and current waveform peak values.
### Voltage Ripple Rate / Current Ripple Factor Measurement Specifications

<table>
<thead>
<tr>
<th>Measurement method</th>
<th>Calculates the AC component (peak to peak [width]) as a proportion of the voltage or current DC component.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective</td>
<td>As effective voltage and voltage waveform peak value or current and current waveform peak value effective measurement ranges.</td>
</tr>
<tr>
<td>Display range</td>
<td>0.004 % to 500.00 %</td>
</tr>
</tbody>
</table>

### Efficiency Measurement Specifications

<table>
<thead>
<tr>
<th>Measurement method</th>
<th>Calculates the efficiency η [%] from the ratio of active power values for channels and wires.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiring and calculation equations</td>
<td>Calculated based on the AC+DC rectifier active power PW3336 series.</td>
</tr>
</tbody>
</table>

#### PW3336 series

<table>
<thead>
<tr>
<th>Wiring (WRING)</th>
<th>CH1</th>
<th>CH2</th>
<th>Calculation formulas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1P2W x 2</td>
<td>1P2W</td>
<td>1P2W</td>
<td>η = 100 x</td>
</tr>
<tr>
<td>1P2W</td>
<td>1P2W</td>
<td>1P2W</td>
<td>η = 100 x</td>
</tr>
<tr>
<td>3P2W</td>
<td>3P2W</td>
<td>3P2W</td>
<td>η = 100 x</td>
</tr>
<tr>
<td>3P2W/3P2W</td>
<td>3P2W</td>
<td>3P2W</td>
<td>η = 100 x</td>
</tr>
</tbody>
</table>

#### PW3337 series

<table>
<thead>
<tr>
<th>Wiring (WRING)</th>
<th>CH1</th>
<th>CH2</th>
<th>CH3</th>
<th>Calculation formulas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1P3W x 3</td>
<td>1P3W</td>
<td>1P3W</td>
<td>1P3W</td>
<td>η = 100 x</td>
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<tr>
<td>1P3W</td>
<td>1P3W</td>
<td>1P3W</td>
<td>1P3W</td>
<td>η = 100 x</td>
</tr>
<tr>
<td>3P2W</td>
<td>3P2W</td>
<td>3P2W</td>
<td>3P2W</td>
<td>η = 100 x</td>
</tr>
</tbody>
</table>

### Functional Specifications

#### Auto-range (AUTO)

- Automatically changes the voltage and current range for each wiring mode according to the input range.
- The range is increased when input exceeds 130% of the range or when the peak is exceeded.
- Range down:
  - The range is decreased when input falls below 15% of the range. However, the range is not decreased when the peak is exceeded at the lower range.

#### Averaging (AVG)

- Averages the voltage, current, active power, apparent power, and reactive power.
- The power factor and phase angle are calculated from averaged data.
- Measured values other than peak values, power factor, frequency, integrated values, T.A.V. crest factor, ripple rate, total harmonic distortion, and harmonics are averaged.

#### Scaling (VT, CT)

- Applies user-defined VT and CT ratio settings to measured values. These settings can be configured separately for each wiring mode.
- VT ratio setting range: OFF (1.0), 0.1 to 1000 (setting: 0000).
- CT ratio setting range: OFF (1.0), 0.001 to 1000 (setting: 0000).

#### HOLD (HOLD)

- Stops display updates for all measured values and fixes the display values at that point in time.
- Measurement data acquired by communications is also fixed at that point in time.
- Internal calculations (including integration and integration elapsed time) will continue.
- Analog output and waveform output are not held.

#### Maximum value/minimum value hold (MAX/MIN HOLD)

- Determines maximum and minimum measured values as well as maximum and minimum values for the voltage and current waveform peak and holds them on the display.
- For data with polarity, display of the maximum value and minimum value for the data's absolute values is held (so that both positive and negative polarity values are shown).
- Internal calculations (including integration and integration elapsed time) will continue.
- Analog output and waveform output are not held.

#### Key lock (KEY LOCK)

- Disables key input in the measurement state, except for the SHIFT key and KEY LOCK key.

#### System reset

- Initializes the instrument's settings.
- Communications-related settings (communications speed, address, and LAN-related settings) are not initialized.

### Integration Measurement Specifications

#### Measurement items

- Simultaneous integration of the following 6 parameters for each channel (for 16 channels total):
  - Sum of current integrated values (displayed as Ah on panel display)
  - Positive current integrated value (displayed as +Ah on panel display)
  - Negative current integrated value (displayed as -Ah on panel display)
  - Sum of active power integrated values (displayed as Wh on panel display)
  - Positive active power integrated value (displayed as +Wh on panel display)
  - Negative active power integrated value (displayed as -Wh on panel display)

#### Integration time

- 1 min. to 10000 hr., settable in 1 min. blocks
- Integration time accuracy: ±100 ppm ± 1 dgt. (0°C to 40°C)

#### Integration measurement accuracy

- Current or active power measurement accuracy: ±(±0.01% rdg. ±1 dgt.)

#### Effective measuring range

- Unit PEAK OVER U or PEAK OVER I occurs
- Effective range: As per the current or active power effective measurement range

#### Harmonic Measurement Specifications (built-in function)

- Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode)
- Uniform thinning between zero-cross events after processing with a digital anti-aliasing filter

#### Harmonic measurement accuracy

- Harmonic voltage RMS value: ±0.5% rdg. ±1 dgt.
- Harmonic voltage phase angle: ±0.3° ±0.1° (11th to 50th harmonics)
- Harmonic current RMS value: ±0.5% rdg. ±1 dgt.
- Harmonic current phase angle: ±0.3° ±0.1° (11th to 50th harmonics)
- Harmonic active power: ±3.0% ±1.0% (11th to 50th harmonics)
- Harmonic active power phase angle: ±0.5° ±0.2° (11th to 50th harmonics)
- Harmonic reactive power: ±3.0% ±1.0% (11th to 50th harmonics)
- Harmonic reactive power phase angle: ±0.5° ±0.2° (11th to 50th harmonics)

#### FT processing width

- 32 bits
- Number of FFT points: 4096

#### Synchronization frequency

- 10 Hz to 640 Hz

#### Maximum analysis order

- 100 Hz ≤ f ≤ 66 Hz
- 50 Hz ≤ f ≤ 100 Hz
- 30 Hz ≤ f ≤ 50 Hz
- 15 Hz ≤ f ≤ 30 Hz
- 10 Hz ≤ f ≤ 15 Hz

#### Measurement accuracy

- ±0.4% rdg. ±0.2% f.s.
- ±0.5% rdg. ±0.2% f.s.
- ±0.5% rdg. ±0.2% f.s.
- ±0.5% rdg. ±0.2% f.s.
- ±0.5% rdg. ±0.2% f.s.
- ±0.5% rdg. ±0.2% f.s.
- ±0.5% rdg. ±0.2% f.s.

#### Display Specifications

- Display: 9-digits LED
- Display format: 4
- Display resolution: Other than integrated values: 999999 count
- Display resolution: Integrated values: 999999 count
- Display update rate: 5 updates per sec. (approx.) to 20 s (varies with number of averaging iterations setting)
**External Current Sensor Input Specifications (built-in feature)**

### Terminal
- Isolated BNC terminals, 1 for each channel

### Current sensor type switching
- **DF** / **Type 1** / **Type 2**
  - When set to off, input from the external current sensor input terminal is gained.

### Current sensor options
- **TYPE1 (100 A to 5000 A sensors)**
- **TYPE2 (20 A to 1000 A sensors, Power supply is required to use)**

### Current measurement range
- Auto: ± 10 A / 20 A / 50 A (range noted on panel)

### Power range configuration
- Depends on the combination of voltage and current ranges: from 60.0000W to 15.0000MW (also applies to VA, VAR)

### Measurement accuracy (Current, Active power)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Input &lt; 50Hz</th>
<th>Input ≥ 50Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>±0.1% / ±0.05%</td>
<td>±0.2% / ±0.1%</td>
</tr>
<tr>
<td>1kHz ≤ f &lt; 16Hz</td>
<td>±0.05% / ±0.02%</td>
<td>±0.1% / ±0.05%</td>
</tr>
<tr>
<td>16Hz ≤ f &lt; 40Hz</td>
<td>±0.02% / ±0.01%</td>
<td>±0.05% / ±0.02%</td>
</tr>
<tr>
<td>80Hz ≤ f &lt; 500Hz</td>
<td>±0.02% / ±0.01%</td>
<td>±0.04% / ±0.02%</td>
</tr>
<tr>
<td>500Hz ≤ f &lt; 1kHz</td>
<td>±0.02% / ±0.01%</td>
<td>±0.05% / ±0.02%</td>
</tr>
<tr>
<td>1kHz ≤ f &lt; 4kHz</td>
<td>±0.03% / ±0.01%</td>
<td>±0.06% / ±0.03%</td>
</tr>
<tr>
<td>4kHz ≤ f &lt; 10kHz</td>
<td>±0.04% / ±0.01%</td>
<td>±0.05% / ±0.02%</td>
</tr>
<tr>
<td>10kHz ≤ f &lt; 50kHz</td>
<td>±0.05% / ±0.02%</td>
<td>±0.06% / ±0.03%</td>
</tr>
<tr>
<td>50kHz ≤ f &lt; 100kHz</td>
<td>±0.06% / ±0.02%</td>
<td>±0.07% / ±0.03%</td>
</tr>
</tbody>
</table>

#### Frequency
- f.s.: Each measurement range
  - To obtain the current or active power accuracy, add the current sensor’s accuracy to the above current and active power figures.
  - The effective measurement range and frequency characteristics conform to the current sensor’s specifications.
  - Values for current, and active power for which 0.1 Hz ≤ f < 10 Hz are for reference only.
  - Values for voltage in excess of 220 V active power for which 10 Hz ≤ f < 16 Hz are for reference only.

#### Temperature characteristics
- Current, Active power
  - Data accuracy: ± 0.08% f.s./°C (instrument temperature coefficient; f.s.: instrument measurement range)
  - Add current sensor temperature coefficient to above.

#### Power factor effects
- Instrument: ± 0.15% f.s. or less (45 Hz to 66 Hz with power factor = 0)
- Internal circuit voltage/current phase difference: ± 0.08°
  - Add the current sensor power factor to the internal circuit voltage/current phase difference noted above.

#### Current peak value measurement accuracy
- (External current sensor instrument measurement accuracy) + (± 0.05% f.s.)
  - (Current peak range) Add the current sensor accuracy to the above.

### Harmonic measurement accuracy

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Voltage</th>
<th>Current, Active power</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>±0.05%</td>
<td>±0.1% / ±0.05%</td>
</tr>
<tr>
<td>1kHz ≤ f &lt; 30Hz</td>
<td>±0.04%</td>
<td>±0.1% / ±0.05%</td>
</tr>
<tr>
<td>30Hz ≤ f &lt; 400Hz</td>
<td>±0.03%</td>
<td>±0.1% / ±0.05%</td>
</tr>
<tr>
<td>400Hz ≤ f &lt; 1kHz</td>
<td>±0.04%</td>
<td>±0.2% / ±0.1%</td>
</tr>
<tr>
<td>1kHz ≤ f &lt; 8kHz</td>
<td>±0.03%</td>
<td>±0.1% / ±0.05%</td>
</tr>
<tr>
<td>8kHz ≤ f &lt; 64kHz</td>
<td>±0.04%</td>
<td>±0.2% / ±0.1%</td>
</tr>
<tr>
<td>64kHz ≤ f &lt; 1kHz</td>
<td>±0.04%</td>
<td>±0.2% / ±0.1%</td>
</tr>
<tr>
<td>1kHz ≤ f &lt; 10kHz</td>
<td>±0.05%</td>
<td>±0.2% / ±0.1%</td>
</tr>
<tr>
<td>10kHz ≤ f &lt; 50kHz</td>
<td>±0.06%</td>
<td>±0.2% / ±0.1%</td>
</tr>
<tr>
<td>50kHz ≤ f &lt; 100kHz</td>
<td>±0.07%</td>
<td>±0.2% / ±0.1%</td>
</tr>
</tbody>
</table>

#### Frequency
- f.s.: Each measurement range
  - To obtain the current or active power accuracy, add the current sensor’s accuracy to the above current and active power figures.

### D/A Output Specifications (PW3336-02/03 and PW3337-02/03)

<table>
<thead>
<tr>
<th>Number of output channels</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>16-bit D/A converter (polarity + 16 bits)</td>
</tr>
</tbody>
</table>

### Output parameters
- Output parameters: [0 to 1] (voltage level) or [0 to 2] (instantaneous voltage waveform) (switchable)
- P/U (active power level) or [0 to 2] (instantaneous power waveform) (switchable)
- P/mm and P/u/mm output is not available (0 V) when using the 1262W using 25kHz P/C is output when using 1P3W, 3P5W, or 3P3W, and P123 is output when using 3V3A, 3P3W, or 3P4W.

#### Output accuracy
- Data accuracy: ± 0.02% f.s. / ± 0.05% f.s.
  - (Output parameter measurement accuracy) + (± 0.02% f.s.)
  - Instantaneous waveform accuracy: ± 0.02% f.s. / ± 0.05% f.s.
- Instantaneous voltage, instantaneous current: RMS value accuracy

#### Frequency band
- Frequency accuracy: ± 0.02% f.s. / ± 0.05% f.s.
  - At DC or 10 Hz to 5 kHz, accuracy is as defined above.

### Output voltage
- Level output
  - Voltage, current, active power, apparent power, reactive power, time average current/active power
  - ± 2 V DC for 100% of range
  - Power factor
    - ± 2 V DC at ± 0.0000
    - DM DC at ± 0.0000

#### Frequency
- ± 2 V DC at ± 0.0000
- ± 2 V DC at ± 0.0000

### GP-IB interface (PW3336-01/03, PW3337-01/03)

#### Method
- IEEE488.1 1978 compliant, see IEEE488.2 1987

#### Transmission Method
- IEEE488.1 1978 compliant; see IEEE488.2 1987

#### Interface functions: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0

### LAN interface (PW3337-01/02)

#### Connector
- RJ-45 connector × 1

#### Transmission method
- IEEE802.3 compliant

#### Data bits:
- 8 (fixed), Parity: None

#### Address
- 0x 3D

### RS-232C interface (built-in feature)

#### connector
- 9-pin D-sub connector × 1

#### Communication method
- Full duplex, Start-stop synchronization, Stop bits: 1 (fixed), Data bits: 8, Parity: None

### General Specifications

#### Operating environment
- Indoors, altitude up to 2000 m (5625 ft), pollution degree 2

#### Operating temperature and humidity
- 0 to 40°C (32 to 104°F), 80% RH or less (non-condensation)

#### Storage temperature and humidity
- 10 to 50°C (14 to 122°F), 80% RH or less (non-condensation)

#### Dielectric strength
- 4090 Vrms AC (sensed current: 1 mA)
- Between voltage input terminals and (case, interface, and output terminals)
- Between current input terminals and (case, interface, and output terminals)
- Between voltage input terminals and current direct input terminals

#### Maximum rated voltage to ground
- Voltage input terminal: ± 500V (3000 V peak)

#### Maximum input power
- Between voltage input terminals (excluding protrusions)
- 100VA or less

#### Dimensions
- Approx. 380W (12.01") x 2562W (10.08") mm

#### Mass
- PW3336 series: Approx. 5.2 kg (18.75 lb.)
- PW3337 series: Approx. 5.6 kg (20.00 lb.)

#### Accessories
- User manual × 1, Power cord × 1
# Type 2 Current Sensor Options

## Current Measurement Options [Type 1] Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>CLAMP ON SENSOR</th>
<th>CLAMP ON SENSOR</th>
<th>CLAMP ON SENSOR</th>
<th>FLEXIBLE CLAMP ON SENSOR</th>
<th>FLEXIBLE CLAMP ON SENSOR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CT9665-03</td>
<td>CT9665-05</td>
<td>CT9665-06</td>
<td>CT9687-01</td>
<td>CT9687-02</td>
</tr>
<tr>
<td>Appearance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary current rating</td>
<td>1000 A AC</td>
<td>500 A AC</td>
<td>1000 A AC</td>
<td>500 A/5000 A AC</td>
<td></td>
</tr>
<tr>
<td>Measurable conductor diameter</td>
<td>φ45.5 (0.59&quot;)</td>
<td>φ46.0 (1.8&quot;)</td>
<td>φ45.5 (0.59&quot;)</td>
<td>φ45.0/φ50.0 (0.79&quot;) mm</td>
<td>φ45.0/φ50.0 (0.79&quot;) mm</td>
</tr>
<tr>
<td>Basic accuracy</td>
<td>±0.3% rdg ±0.05% f.s. (amplitude)</td>
<td>±0.3% rdg ±0.01% f.s. (amplitude)</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
</tr>
<tr>
<td>Frequency characteristics</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>SENSOR UNIT CT9555 or CT9557</td>
<td>SENSOR UNIT CT9555 or CT9557</td>
<td>SENSOR UNIT CT9555 or CT9557</td>
<td>SENSOR UNIT CT9555 or CT9557</td>
<td>SENSOR UNIT CT9555 or CT9557</td>
</tr>
</tbody>
</table>

## Current Measurement Options [Type 2] Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>AC/DC CURRENT PROBE</th>
<th>AC/DC CURRENT PROBE</th>
<th>AC/DC CURRENT PROBE</th>
<th>AC/DC CURRENT PROBE</th>
<th>AC/DC CURRENT PROBE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CT6841-05</td>
<td>CT6843-05</td>
<td>CT6844-05</td>
<td>CT6845-05</td>
<td>CT6846-05</td>
</tr>
<tr>
<td>Appearance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated primary current</td>
<td>20 A AC/DC</td>
<td>200 A AC/DC</td>
<td>500 A AC/DC</td>
<td>500 A AC/DC</td>
<td>1000 A AC/DC</td>
</tr>
<tr>
<td>Frequency band</td>
<td>DC to 1 MHz</td>
<td>DC to 200 kHz</td>
<td>DC to 200 kHz</td>
<td>DC to 100 kHz</td>
<td>DC to 20 kHz</td>
</tr>
<tr>
<td>Diameter of measurable conductors</td>
<td>φ50 mm (1.97&quot;)</td>
<td>φ50 mm (1.97&quot;)</td>
<td>φ50 mm (1.97&quot;)</td>
<td>φ50 mm (1.97&quot;)</td>
<td>φ50 mm (1.97&quot;)</td>
</tr>
<tr>
<td>Basic accuracy (AC/DC)</td>
<td>±0.3% rdg ±0.05% f.s. (amplitude)</td>
<td>±0.3% rdg ±0.01% f.s. (amplitude)</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
</tr>
<tr>
<td>Frequency characteristics (Amplitude)</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
<td>±0.5% or less (phase)</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>SENSOR UNIT CT9555 or CT9557</td>
<td>SENSOR UNIT CT9555 or CT9557</td>
<td>SENSOR UNIT CT9555 or CT9557</td>
<td>SENSOR UNIT CT9555 or CT9557</td>
<td>SENSOR UNIT CT9555 or CT9557</td>
</tr>
</tbody>
</table>

## Type 2 Current Sensor Connection Diagram

- **Connection Cord L9217**
  - **Power Supply**
  - **Current Sensor**
  - **Load**

**Schematic Diagram**

- **Appearance**
  - **Number of available sensors**
  - **Compatible current sensors**
  - **Power supply**

**Specifications**

- **Maximum rated voltage to earth**
  - CAT III 300Vrms
  - CAT II 600Vrms
  - CAT IV 1000 Vrms, CAT IV 600 Vrms
- **Electromagnetic field**
  - Effect of external electromagnetic field
  - Effect of conductor position
- **Operating Temperature**
  - 0 to 50°C (32 to 122°F)
  - -25 to 65°C (-13 to 149°F)
  - -10 to 50°C (14 to 122°F)

**Additional Information**

- **Sensor CT9665-03/CT9665-05**
- **Sensor CT9665-06**
- **Sensor CT9667-05**
- **Sensor CT9667-06**
- **Sensor CT9667-07**
- **Sensor CT9667-08**
- **Sensor CT9668-05**
- **Sensor CT9668-06**
- **Sensor CT9668-07**
- **Sensor CT9668-08**
- **Sensor CT9669-05**
- **Sensor CT9669-06**
- **Sensor CT9669-07**
- **Sensor CT9669-08**
- **Sensor CT9670-05**
- **Sensor CT9670-06**
- **Sensor CT9670-07**
- **Sensor CT9670-08**
- **Sensor CT9671-05**
- **Sensor CT9671-06**
- **Sensor CT9671-07**
- **Sensor CT9671-08**
- **Sensor CT9672-05**
- **Sensor CT9672-06**
- **Sensor CT9672-07**
- **Sensor CT9672-08**
- **Sensor CT9695-05**
- **Sensor CT9695-06**
- **Sensor CT9695-07**
- **Sensor CT9695-08**
- **Sensor CT9696-05**
- **Sensor CT9696-06**
- **Sensor CT9696-07**
- **Sensor CT9696-08**
- **Sensor CT9697-05**
- **Sensor CT9697-06**
- **Sensor CT9697-07**
- **Sensor CT9697-08**

**Connection Diagram**

- **CLAMP ON SENSOR**
  - **Diameter of measurable characteristics**
  - **Max.**
  - **φ**
  - **Max.**

**Technical Specifications**

- **Max.**
  - **φ**
  - **Max.**

**Connection Details**

- **Cable length**: 3 m (9.84 ft)
- **Sensor supply**: SENSOR UNIT CT9555 or CT9557

**Electrical Specifications**

- **Power cord**: 1.6 m (5.25 ft)
- **Terminal**: Isolated BNC or isolated BNC

**Physical Specifications**

- **Cable length**: 3 m (9.84 ft)
- **Sensor supply**: SENSOR UNIT CT9555 or CT9557

**Note:**

- LNE available in X2 or.
- Adapter 9445-02/9445-03 (sold separately)

---

### Type 2 Current Sensor Options

- **Sensor CT9555**
- **Sensor CT9557**
- **Sensor CT9687-01**
- **Sensor CT9687-02**

### Type 2 Current Sensor Connection Diagram

- **Connection Cord L9217**
  - **Power Supply**
  - **Current Sensor**
  - **Load**

**Schematic Diagram**

- **Appearance**
  - **Number of available sensors**
  - **Compatible current sensors**
  - **Power supply**

**Specifications**

- **Maximum rated voltage to earth**
  - CAT III 300Vrms
  - CAT II 600Vrms
  - CAT IV 1000 Vrms, CAT IV 600 Vrms
- **Electromagnetic field**
  - Effect of external electromagnetic field
  - Effect of conductor position
- **Operating Temperature**
  - 0 to 50°C (32 to 122°F)
  - -25 to 65°C (-13 to 149°F)
  - -10 to 50°C (14 to 122°F)

**Additional Information**

- **Sensor CT9555**
- **Sensor CT9557**
- **Sensor CT9687-01**
- **Sensor CT9687-02**
- **Sensor CT9687-03**
- **Sensor CT9687-04**
- **Sensor CT9687-05**
- **Sensor CT9687-06**
- **Sensor CT9687-07**
- **Sensor CT9687-08**
- **Sensor CT9695-05**
- **Sensor CT9695-06**
- **Sensor CT9695-07**
- **Sensor CT9695-08**
- **Sensor CT9696-05**
- **Sensor CT9696-06**
- **Sensor CT9696-07**
- **Sensor CT9696-08**
- **Sensor CT9697-05**
- **Sensor CT9697-06**
- **Sensor CT9697-07**
- **Sensor CT9697-08**
- **Sensor CT9698-05**
- **Sensor CT9698-06**
- **Sensor CT9698-07**

**Connection Details**

- **Cable length**: 3 m (9.84 ft)
- **Sensor supply**: SENSOR UNIT CT9555 or CT9557

**Electrical Specifications**

- **Power cord**: 1.6 m (5.25 ft)
- **Terminal**: Isolated BNC or isolated BNC

**Physical Specifications**

- **Cable length**: 3 m (9.84 ft)
- **Sensor supply**: SENSOR UNIT CT9555 or CT9557

**Note:**

- LNE available in X2 or.
- Adapter 9445-02/9445-03 (sold separately)
Model: POWER METER PW3336

Model No. (Order Code) (Note)

PW3336  
(2ch)

PW3336-01  
(2ch, with GP-IB)

PW3336-02  
(2ch, with D/A output)

PW3336-03  
(2ch, with GP-IB, D/A output)

Accessories: Instruction manual ×1, Measurement guide ×1, Power cord ×1

Option

Current measurement options [Type 1]

Can be directly connected to the current sensor input terminals on the PW3336/PW3337 series

- CLAMP ON SENSOR 9660
  100 A AC, 250 mV/0.1%, 40 Hz to 5 kHz
  ±0.3%rdg.±0.02%fs. (Amplitude accuracy 45 Hz to 66 Hz)
  ±1° or less (Phase accuracy 45 Hz to 66 Hz)
  Requires SENSOR UNIT CT9555 or CT9557, and CONNECTION CORD L9217

- CLAMP ON SENSOR 9661
  500 A AC, 486 mV/0.1%, 40 Hz to 5 kHz
  ±0.3%rdg.±0.03%fs. (Amplitude accuracy 45 Hz to 66 Hz)
  ±0.5° or less (Phase accuracy 45 Hz to 66 Hz)

Current measurement options [Type 2]

Requires SENSOR UNIT CT9555 or CT9557, and CONNECTION CORD L9217 to be connected to the current sensor input terminals on the PW3336/PW3337 series

- ACC DC CURRENT SENSOR CT6862-05
  50 A AC/DC, pass-through type, q24 mm(0.94"), DC to 1 MHz
  ±0.05%rdg.±0.01%fs. (Amplitude accuracy 45 Hz to 400 Hz)
  ±0.2° or less (Phase accuracy 45 Hz to 400 Hz)
  Power supply: SENSOR UNIT CT9555 or CT9557 (option)

- ACC DC CURRENT SENSOR CT6863-05
  200 A AC/DC, pass-through type, q24 mm(0.94"), DC to 100 kHz
  ±0.05%rdg.±0.01%fs. (Amplitude accuracy 45 Hz to 400 Hz)
  ±0.2° or less (Phase accuracy 45 Hz to 400 Hz)
  Power supply: SENSOR UNIT CT9556 or CT9557 (option)

- ACC DC CURRENT PROBE CT6841-05
  20 A AC/DC, clamp-on type, q20 mm(0.79"), DC to 1 MHz
  ±0.1%rdg.±0.01%fs. (Amplitude accuracy 45 Hz to 400 Hz)
  ±0.1° or less (Phase accuracy DC ≤ 100 Hz)
  Power supply: SENSOR UNIT CT9555 or CT9557 (option)

- ACC DC CURRENT PROBE CT6843-05
  200 A AC/DC, clamp-on type, q20 mm(0.79"), DC to 500 kHz
  ±0.3%rdg.±0.02%fs. (Amplitude accuracy DC ≤ 100 Hz)
  ±0.1° or less (Phase accuracy DC ≤ 100 Hz)
  Power supply: SENSOR UNIT CT9556 or CT9557 (option)

- CLAMP ON SENSOR CT9272-05 (Scheduled for release in 2017)
  20 A/200 A AC Switchable, clamp-on type, q46 mm(1.81"), 1 Hz to 100 kHz
  ±0.3%rdg.±0.01%fs. (Amplitude accuracy 45 Hz to 60 Hz)
  ±0.2° or less (Phase accuracy 45 Hz to 60 Hz)
  Power supply: SENSOR UNIT CT9555 or CT9557 (option)

Type 2 Current sensor options

- SENSOR UNIT CT9555
  Four Sensors can be used. With additive output function
  Power supply: 100 V to 240 V AC (50Hz/60Hz)

- SENSOR UNIT CT9557
  Isolated BNC to isolated BNC
  Power supply: 100 V to 240 V AC (50Hz/60Hz)

Communications and control options

- RS-232C CABLE 9637
  Cable length: 1.8 m (5.91 ft)
  9pin to 9pin

- RS-232C CABLE 9638
  Cable length: 1.8 m (5.91 ft)
  9pin to 23pin

- GP-IB CONNECTOR CABLE 9511-02
  Cable length: 2.0 m (6.56 ft)

- LAN CABLE 9642
  Cable length: 5 m (16.41 ft)
  Supplied with straight to cross conversion cable

- CONNECTION CORD 9165
  For sensor output
  Cord length: 1.5 m (4.92 ft), metal BNC to metal BNC

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