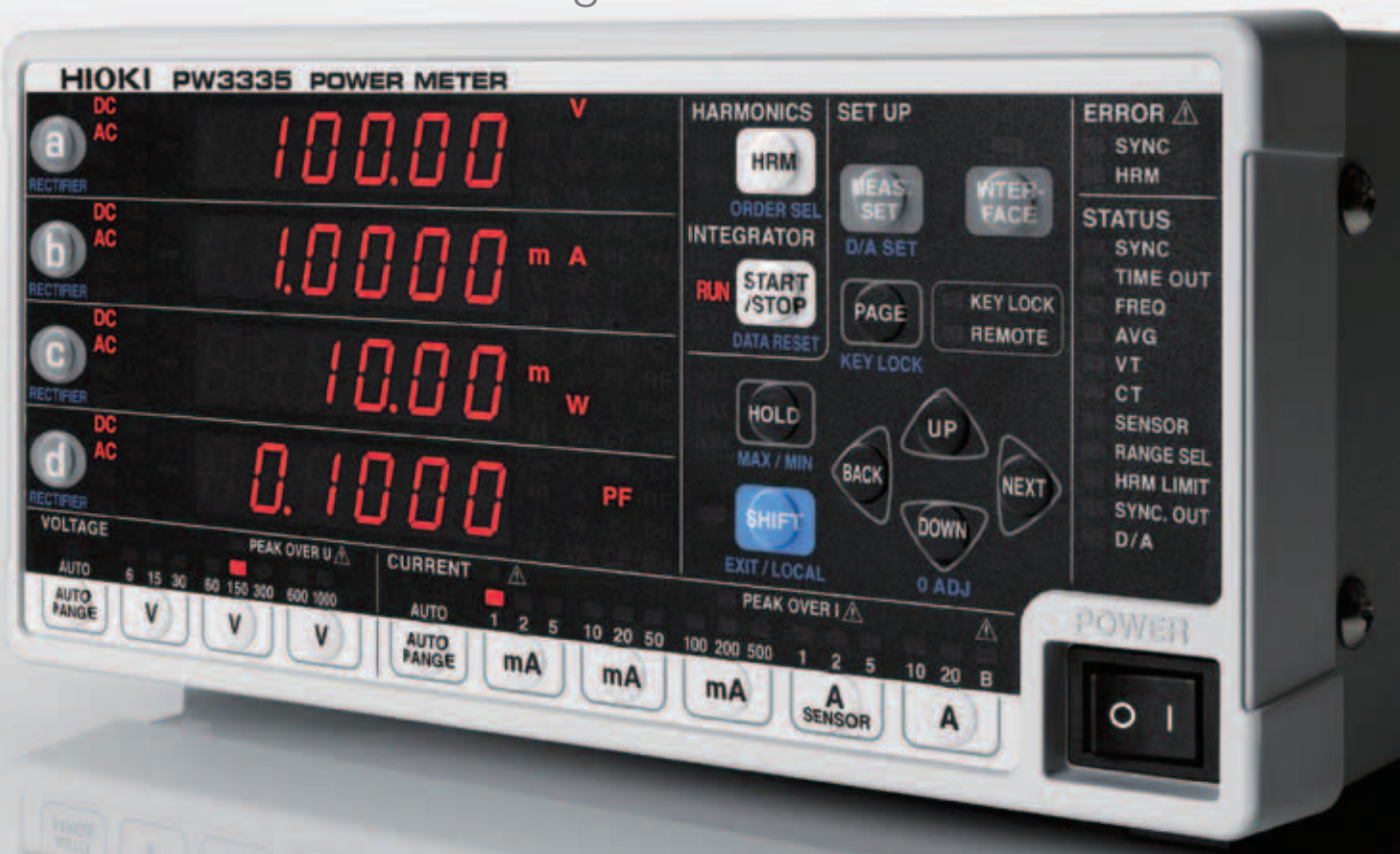
HIOKI

New

POWER METER PW3335

Power Measuring Instruments

Single-Phase AC/DC Power Meter



High-accuracy measurement of standby to operating power

- Wide measurable range : 10 µA to 30 A, 60 mV to 1000 V
- Basic accuracy for voltage, current and power : ±0.1%*
- Frequency bandwidth : DC, 0.1Hz to 100kHz
- High-accuracy measurement even for equipment with low power factors : ±0.1% f.s. power factor effect
- Standby power consumption : Built-in harmonic measurement; IEC62301-compliant
- Measure up to 5000A AC : Built-in external sensor input terminals (PW3335-03, -04)

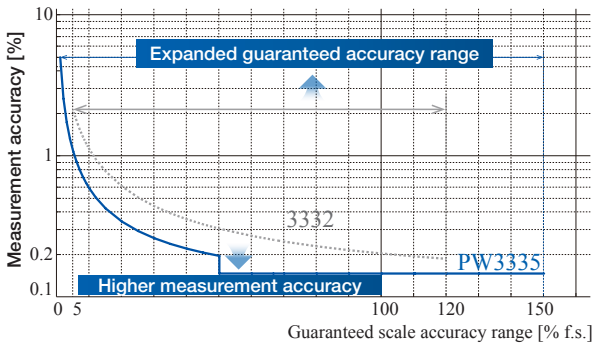
* For complete details, please refer to the specifications.

CE Green Point

Single-Phase Power Meter with All-Round Capability

High accuracy of ±0.1%*1 and guaranteed accuracy range from 1 to 150% f.s.

Measurement accuracy & guaranteed accuracy range*2
(PW3335 compared to legacy Model 3332*3)



*2 : Up to 1000 V with a voltage range of 1000 V.
*3 : For detailed specifications of Model 3332, see the comparison chart on page 6.

Power Meter PW3335: Single-phase AC/DC power meter with built-in harmonic measurement
Voltage range: 6.0000 V to 1.0000 kV
Current range: 1.0000 mA to 20.000 A (30 A maximum)

With an expanded guaranteed accuracy range, the power meter minimizes range switchings even under power fluctuations.

*1 : For complete details, please refer to the specifications.

DC, 0.1Hz to 100kHz frequency bandwidth
With built-in harmonic measurement for detailed analysis

Measure the standby power of AC adapters, both primary-side AC and secondary-side DC

Measure power supply conversion devices such as inverters and thyristors

Measures solar panels and power converters, max. 1000V range

Measured power parameters

Voltage	Current	Effective power	Apparent power
Reactive power	Power factor	Phase angle	Frequency
Integral current	Effective integral power	Waveform peak value	Crest factor
Maximum current ratio	Time-averaged current	Time-averaged effective power	Ripple rate

Harmonic measurement parameters

Harmonic effective value	Harmonic effective power	Total harmonic distortion	Fundamental wave effective value
Fundamental wave effective power	Fundamental wave apparent power	Fundamental wave reactive power	Fundamental wave power factor (displacement power factor)
Fundamental wave voltage/current phase difference	Harmonic wave content		
Harmonic voltage phase angle*	Harmonic current phase angle*	Harmonic voltage/current phase difference*	

*: Only with PC communication

Use in the development and production of solar panels and AC adapters, secondary-side DC equipment and inverters, and power converters such as thyristors. Equipped with multiple functions for computing a wide variety of items, the PW3335 Power Meter can also be used alone for detailed analysis.

from AC/DC Standby to Operating Power

PW3335

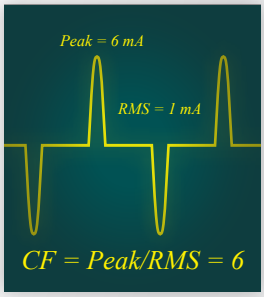
Basic accuracy of ±0.1%*, the highest in its class

Precisely measure power to determine the energy-saving performance of electrical products. Your measurements are underpinned by its reliability and accuracy.

* For complete details, please refer to the specifications.

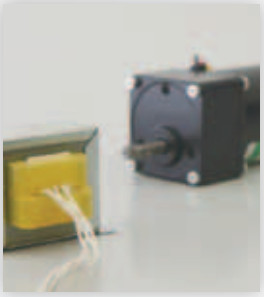
Greater accuracy for standby power

The PW3335 Power Meter delivers a range configuration that lets you measure extremely low power levels with a margin to spare. Accuracy can be set from 10 µA and up for current, and 0 W and up for effective power. Perfect for measurements according to IEC62301 and other standards.



Peak value of up to 600% of the range, supporting crest factor of 6

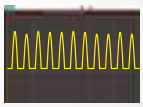
Current waveforms in the switching power supply or at the primary-side of inverters become steep and often exceeds the fundamental range, preventing them from being accurately measured. The PW3335 resolves these issues by offering a crest factor of 6, allowing it to measure accurately even when the waveform peaks are high relative to its range.



Power factor effects of no more than ±0.1% f.s.

The effective power value may be affected in situations with low power factors, such as measurement of standby power or unloaded operation of transformers and motors. The PW3335 reduces the power factor effect to less than a half of that available in legacy models.

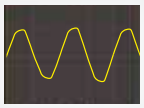
Example of half-wave rectification waveform



Power data and harmonic data — all measured simultaneously

All measurement data are internally processed in parallel simultaneously. Even when waveforms have mixed AC/DC components – half-wave rectification waveforms for example – the individual components can be measured simultaneously. The PC communication application further enables 180 or more measurement parameters to be acquired simultaneously.

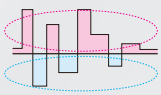
Example of distorted waveform containing harmonic component



Built-in harmonic measurement

The PW3335 measures harmonics up to the 50th order. Use it for evaluation and development of power sources for home appliances and other electrical equipment. Simultaneously display the effective voltage and total harmonic distortion (THD) on the screen. For THD computation, any maximum harmonic order can be specified.

Example of power fluctuation

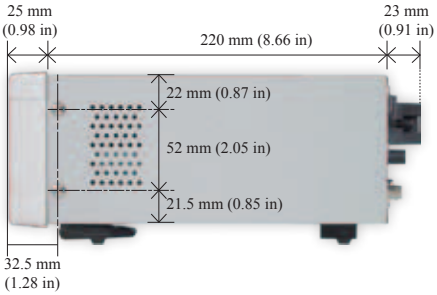


Power consumption and regeneration (recharging) power integrated separately

Use for evaluating the input and output of secondary batteries in EVs, etc., and for measuring the sold power of solar panels. Power consumption and regeneration (recharging) power can each be measured separately.

MAX/MIN hold function for spotting current peaks at a glance

Capture maximum and minimum values such as inrush current waveform peak values and maximum consumed power.



"Half-rack size" – 2 units fit into 1 rack

Diverse and Powerful Functionality

Measure power in accordance with international standards

The PW3335 is engineered to comply with important international standards, including IEC62301 for electrical power consumption in standby mode and the ErP Directive or Energy Star standard. It can also be used to find the special parameters required by the standards – such as THD, CF, and MCR.

THD (total harmonic distortion)

Indicates the total harmonic components in an AC waveform.

CF (crest factor)

Also known as the peak-to-rms ratio, the ratio of the waveform's peak value to its effective value.

MCR (maximum current ratio)

Evaluation index of the current, calculated from the crest factor and the power factor.

Download free software for creating IEC62301-compliant reports from the Hioki website.

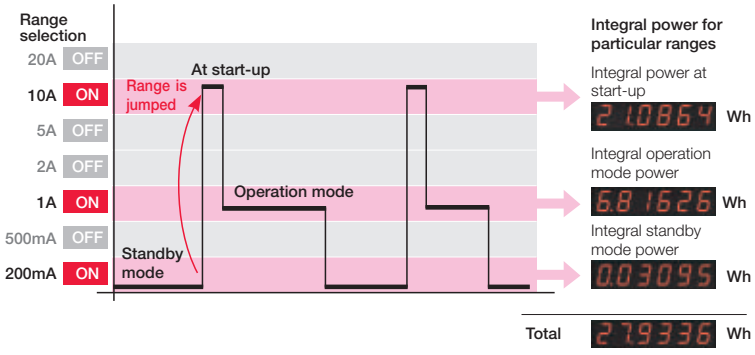
Measure integral power of equipment that operates intermittently or has a large power variation

Time-averaged effective integral power
Use this feature to measure the power of equipment that operates intermittently or is under cycle control. Average power is calculated from the integral value of the fluctuating power.

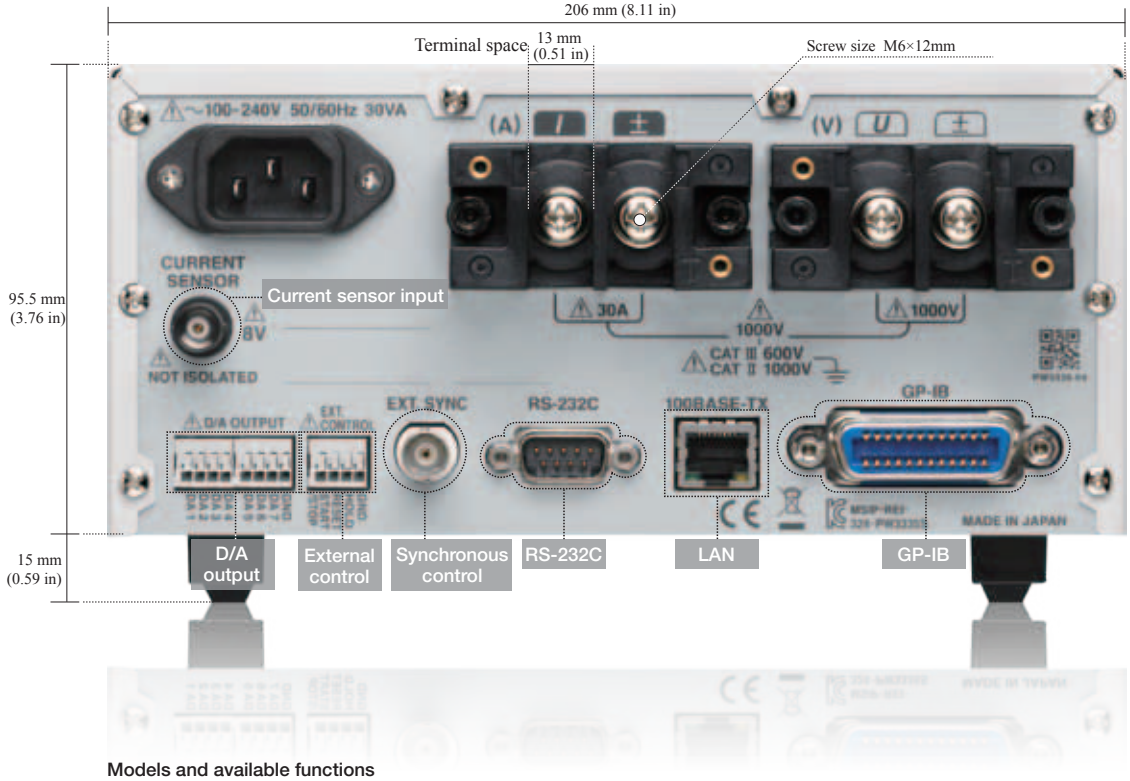
Example of intermittent operation

Example of cycle control

Auto-range integration
A function whereby the device jumps automatically to the optimal current range for the consumed current as it measures and integrates the values. Power integration can be carried out on separate ranges, enabling measurements for individual modes in equipment that has fluctuations in power levels.



Rear view of PW3335-04

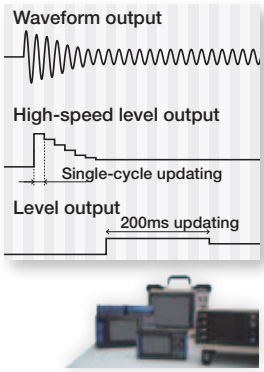


Models and available functions

Model	Harmonics measurement	Synchronous control	LAN	RS-232C	GP-IB	D/A output	Current sensor input
PW3335	✔	✔	✔	✔	—	—	—
PW3335-01	✔	✔	✔	—	✔	—	—
PW3335-02	✔	✔	✔	✔	—	✔	—
PW3335-03	✔	✔	✔	✔	—	—	✔
PW3335-04	✔	✔	✔	✔	✔	✔	✔

✔ : available
— : not available

Rich interfaces and extensibility

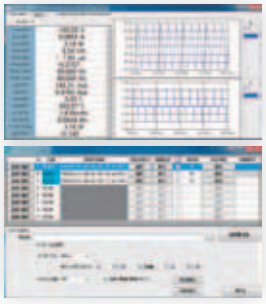


3 D/A output types

(PW3335-02, PW3335-04)

The PW3335 can output measurement values to a data logger, Hioki Memory HiCorder or similar, via voltage signals. The power meter is also built in with functions for outputting the high-speed level of each successive fundamental wave cycle*, in addition to instantaneous waveform output and level output, and provides in-depth analysis of power-consuming equipment such as cutting/grinding tool monitoring equipment.

* For voltage and current, cycle-by-cycle updating is possible only with an input of 45 to 66 Hz.

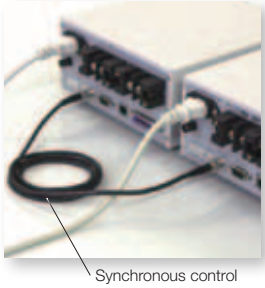


PC communication software

By using the bundled PC application, you can control the power meter from a PC without needing to code your own communication program. The software enables you to save data to the PC, display waveforms, and perform efficiency calculations*, etc.

Compatible with LAN, RS-232C, GP-IB

*Two or more PW3335s are necessary in order to carry out efficiency computation.



Synchronous control cable 9165

Up to 8 units of simultaneous control

Use the simultaneous control feature for measuring input/output efficiency of the power source equipment, for making comparisons between multiple equipment, or for simultaneous parallel testing of production lines and achieve measurement with guaranteed synchronization. Efficiency computation is also possible in conjunction with PC software. Synchronization with both the Hioki PW3336 and PW3337 Power Meters is also supported.

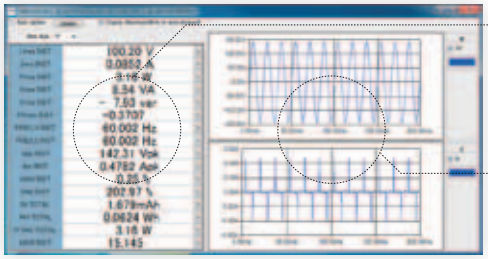
Pair with current sensors delivering a maximum accuracy of ±0.26% to measure 30 A and up

(PW3335-03, PW3335-04)

You can input up to 5000A AC with the use of an optional current sensor. Using Hioki AC/DC high-accuracy pull-through sensors will enable precise measurement with maximum accuracy of ±0.26%.

PC Communication Software – PW Communicator

PW Communicator is an application software for communicating between a PW3335 series power meter and a PC. Free download is available from the Hioki website. The application contains convenient functions for setting the PW3335, monitoring the measurement values, acquiring data via communication, computing efficiency, and many more.

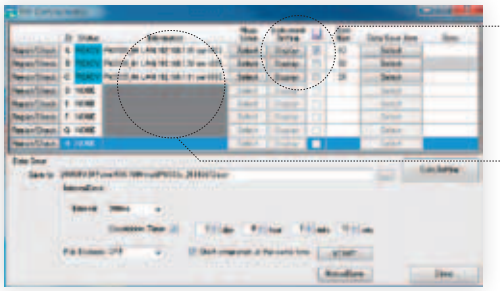


Value monitoring

The Value monitoring function displays the PW3335's measurement values on the PC screen. You can freely select up to 64 values, such as voltage, current, power, and harmonics.

Waveform monitoring

This function enables you to monitor the voltage, current, and waveforms measured by the meter right on the PC screen.

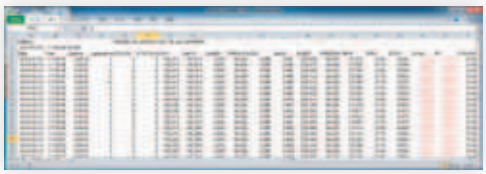


Meter setting

The application also enables you to configure the connected PW3335 from the PC screen.

Synchronous measurement

When using multiple PW3335s, computation of the input/output efficiency of a power converter and similar operations are supported. This feature can be used to synchronously control up to 8 meters – including Hioki PW3336 and PW3337 series units – connected together with synchronous control cables.



Saving data as CSV file

Record 180 or more measurement data to a CSV file at fixed intervals.
The shortest interval between recordings is 200 ms.

PW Communicator Specifications

Availability	Free download from the Hioki website
Operating environment	PC/AT-compatible
OS	Windows 7 (32/64-bit), Windows 8
Memory	2GB or more recommended
Interface	LAN, RS-232C, GP-IB

IEC62301-compliant reporting software

Download free software for creating IEC62301-compliant reports from the Hioki website.

LabVIEW Driver

A LabVIEW driver compatible with the PW3335 will enable you to acquire data and build measurement systems. (Available soon)
(LabVIEW is a registered trademark of National Instruments Corporation.)

Comparison with Hioki legacy Model 3332

	PW3335 series	3332
Frequency bandwidth	DC, 0.1 Hz to 100 kHz	1 Hz to 100 kHz
Sampling	700 kHz digital sampling	Analog computation
Voltage measurement range	6 V to 1000 V	15 V to 600 V
Current measurement range	1 mA to 20 A	1 mA to 50 A
Power measurement range	Determined by combination of voltage and current ranges. 6.0000 mW and up	Determined by combination of voltage and current ranges. 15.000 mW and up
Basic accuracy (DC)	Voltage/current/power: ±0.1% rdg, ±0.1% f.s.	-
Basic accuracy (45 Hz to 66 Hz)	Voltage/current/power: ±0.1% rdg, ±0.05% f.s.	Voltage/current/power: ±0.1% rdg, ±0.1% f.s.
Effect of power factor	±0.1% f.s. with 45 Hz to 66 Hz, PF = 0	±0.23% f.s. with 45 Hz to 66 Hz, PF = 0
Communication interface	LAN RS-232C (PW3335, PW3335-02, PW3335-03, PW3335-04) GP-IB (PW3335-01, PW3335-04)	RS-232C GP-IB
Synchronous control	Up to 8 meters	-
Harmonics measurement	Available on all models Compliant with IEC61000-4-7:2002	-
Current sensor support	PW3335-03, PW3335-04	-
Auto-range integration function	Available	-
D/A output	7 channels (level output, high-speed level output and waveform output selectable)	Level output (fixed voltage, current and effective power) Waveform output (fixed voltage and current) 1-channel D/A level output
Time-averaged effective integral power	Computable	-
Maximum current ratio (MCR)	Computable	-

Specifications

Input Specifications

Measurement line type	Single-phase 2-wire(1P2W)
Input methods	Voltage Isolated input, resistive voltage divider method Current Isolated input, shunt input method
Voltage measurement ranges	AUTO/ 6 .0000 V/ 15.000 V/ 30.000 V/ 60.000 V/ 150.00 V/ 300.00 V/ 600.00 V/ 1.0000 kV
Current measurement ranges	AUTO/ 1.0000 mA/ 2.0000 mA/ 5.0000 mA/ 10.000 mA/ 20.000 mA/ 50.000 mA/ 100.00 mA/ 200.00 mA/ 500.00 mA/ 1.0000 A/ 2.0000 A/ 5.0000 A/ 10.000 A/ 20.000 A
Power ranges	Depends on the combination of voltage and current ranges; From 6.0000 mW to 20.000 kW (also applies to VA, var)
Input resistance	Voltage input terminal: Approx.2 MΩ Current input terminal: 1 mA to 100 mA range 520 mΩ or less 200 mA to 20 A range 15 mΩ or less

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
Frequency bandwidth	DC, 0.1 Hz to 100 kHz (Values within 0.1Hz ≤ f < 10 Hz are for reference only)
Synchronization sources	U, I, DC (fixed to 200 ms)
Measurement items	Voltage / Current / Active power Apparent power / Reactive power / Power factor Phase angle / Frequency / Current integration Active power integration / Integration time Voltage waveform peak value / Current waveform peak value Voltage crest factor / Current crest factor Maximum current ratio / Time average current Time average active power Voltage ripple rate / Current ripple rate Harmonic parameters Harmonic voltage RMS value / Harmonic current RMS value Harmonic active power / Total harmonic voltage distortion Total harmonic current distortion / Fundamental wave voltage Fundamental wave current / Fundamental wave active power Fundamental wave apparent power / Fundamental wave reactive power Fundamental wave power factor (Displacement power factor) Fundamental wave voltage current phase difference Harmonic voltage content percentage Harmonic current content percentage Harmonic active power content percentage (The following parameters can be downloaded as data via PC communication) Harmonic voltage phase angle Harmonic current phase angle Harmonic voltage current phase difference
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 $\sqrt{(\text{AC+DC value})^2 - (\text{DC value})^2}$ for both voltage and current Display of values calculated by (AC+DC value) - (DC value) for active power FND : Extraction and display of the fundamental wave component from harmonic measurement
Zero-cross Filter	100 Hz: 0.1 Hz to 100 Hz 500 Hz: 0.1 Hz to 500 Hz 5 kHz: 0.1 Hz to 5 kHz 100 kHz: 0.1 Hz to 100 kHz

Measurement accuracy

Voltage

Frequency (f)	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s.	100%f.s. ≤ Input
DC	±0.1rdg.±0.1%f.s.	±0.1%rdg.±0.1%f.s.	±0.2%rdg.
0.1Hz≤f<16Hz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
16Hz≤f<45Hz	±0.1%rdg.±0.1%f.s.	±0.2%rdg.	±0.2%rdg.
45Hz≤f≤66Hz	±0.1%rdg.±0.05%f.s.	±0.15%rdg.	±0.15%rdg.
66Hz<f≤500Hz	±0.1%rdg.±0.1%f.s.	±0.2%rdg.	±0.2%rdg.
500Hz<f≤10kHz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
10kHz<f≤50kHz	±0.5%rdg.±0.3%f.s.	±0.8%rdg.	±0.8%rdg.
50kHz<f≤100kHz	±2.1%rdg.±0.3%f.s.	±2.4%rdg.	±2.4%rdg.

Current

Frequency (f)	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s.	100%f.s. ≤ Input
DC	±0.1%rdg.±0.1%f.s.	±0.1%rdg.±0.1%f.s.	±0.2%rdg.
0.1Hz≤f<16Hz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
16Hz≤f<45Hz	±0.1%rdg.±0.1%f.s.	±0.2%rdg.	±0.2%rdg.
45Hz≤f≤66Hz	±0.1%rdg.±0.05%f.s.	±0.15%rdg.	±0.15%rdg.
66Hz<f≤500Hz	±0.1%rdg.±0.1%f.s.	±0.2%rdg.	±0.2%rdg.
500Hz<f≤1kHz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
1kHz<f≤10kHz	±(0.03+0.07×F)%rdg. ±0.2%f.s.	±(0.23+0.07×F)%rdg.	±(0.23+0.07×F)%rdg.
10kHz<f≤100kHz	±(0.3+0.04×F)%rdg. ±0.3%f.s.	±(0.6+0.04×F)%rdg.	±(0.6+0.04×F)%rdg.

Active power

Frequency (f)	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s.	100%f.s. ≤ Input
DC	±0.1%rdg.±0.1%f.s.	±0.1%rdg.±0.1%f.s.	±0.2%rdg.
0.1Hz≤f<16Hz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
16Hz≤f<45Hz	±0.1%rdg.±0.1%f.s.	±0.2%rdg.	±0.2%rdg.
45Hz≤f≤66Hz	±0.1%rdg.±0.05%f.s.	±0.15%rdg.	±0.15%rdg.
66Hz<f≤500Hz	±0.1%rdg.±0.1%f.s.	±0.2%rdg.	±0.2%rdg.
500Hz<f≤1kHz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
1kHz<f≤10kHz	±(0.03+0.07×F)%rdg. ±0.2%f.s.	±(0.23+0.07×F)%rdg.	±(0.23+0.07×F)%rdg.
10kHz<f≤50kHz	±(0.07×F)%rdg. ±0.3%f.s.	±(0.3+0.07×F)%rdg.	±(0.3+0.07×F)%rdg.
50kHz<f≤100kHz	±(0.6+0.07×F)%rdg. ±0.3%f.s.	±(0.9+0.07×F)%rdg.	±(0.9+0.07×F)%rdg.

- Values for f.s. depend on measurement ranges.
- "F" in the tables refers to the frequency in kHz.
- When using the 1 mA/ 2 mA range:
  Add ±1 µA to 0.1 Hz to 100 kHz measurement accuracy for current.
  Add (±1 µA) × (voltage read value) to 0.1 Hz to 100 kHz measurement accuracy for active power.
- When using the 200 mA/ 500 mA/ 1 A/ 2 A/ 5 A/ 10 A/ 20 A range:
  Add ±1 mA to DC measurement accuracy for current.
  Add (±1 mA) × (voltage read value) to DC measurement accuracy for active power.
- When using the 1 mA/ 2 mA/ 5 mA/ 10 mA/ 20 mA/ 50 mA/ 100 mA range:
  Add ±10 µA to DC measurement accuracy for current.
  Add (±10 µA) × (voltage read value) to DC measurement accuracy for active power.
- When using the 200 mA/ 500 mA/ 1 A/ 2 A/ 5 A/ 10 A/ 20 A range:
  Add ±(0.02×F)% rdg. to the measurement accuracy for current and active power for which (10 kHz < f ≤ 100 kHz).
- The measurement results for following input are considered reference values:
  Values for voltage, current, and active power for which 0.1 Hz ≤ f < 10 Hz.
  Values for voltage, current, and active power in excess of 220 V or 20 A for which 10 Hz ≤ f < 16 Hz.
  Values for current and active power in excess of 20 A for which 500 Hz < f ≤ 50 kHz.
  Values for current and active power in excess of 10 A for which 50 kHz < f ≤ 100 kHz.
  Values for voltage and active power in excess of 750 V for which 30 kHz < f ≤ 100 kHz.

Effective measuring range	Voltage 1% to 150% of the range (1000 V range, up to 1000 V) Current 1% to 150% of the range Active power 0% to 225% of the range (when using 1000 V range, up to 150%) However, valid when the voltage and current fall within the effective measurement range.
Maximum effective peak voltage	±600% of each voltage range However, for 300 V, 600 V, and 1000 V ranges, ±1500 V peak
Maximum effective peak current	±600% of each current range However, for 20 A range, ±60 A peak
Guaranteed accuracy period	1 year
Conditions of guaranteed accuracy	Temperature and humidity range: 23°C±5°C (73°F±9°F), 80% RH or less Warm-up time: 30 minutes Input: Sine wave input, power factor of 1, voltage to earth of 0 V, after zero-adjustment; within range in which the fundamental wave satisfies synchronization source conditions
Temperature coefficient	±0.03%f.s. per °C or less. However, for 1 mA range, ±0.06%f.s. per °C or less.

Effect of power factor	±0.1%f.s. or less (45 to 66 Hz, at power factor = 0) Internal circuitry voltage/current phase difference: ±0.0573°
Effect of common mode voltage	±0.01%f.s. or less (600 V, 50 Hz/60 Hz, applied between input terminals and enclosure)
Effect of magnetic field	400 A/m, DC and 50 Hz/60 Hz magnetic field Voltage ±1.5%f.s. or less Current ±1.5%f.s. or less than or equal to the following value, whichever is greater 200 mA/ 500 mA/ 1 A/ 2 A/ 5 A/ 10 A/ 20 A range: ±20 mA 1 mA/ 2 mA/ 5 mA/ 10 mA/ 20 mA/ 50 mA/ 100 mA range: ±200 µA Active power ±3.0%f.s. or less than or equal to the following value, whichever is greater 200 mA/ 500 mA/ 1 A/ 2 A/ 5 A/ 10 A/ 20 A range: (Voltage influence quantity)×(±20 mA) 1 mA/ 2 mA/ 5 mA/ 10 mA/ 20 mA/ 50 mA/ 100 mA range: (Voltage influence quantity)×(±200 µA)
Effect of self-heating	With input of at least 15 A to current input terminals Current AC input signal ±(0.025+0.005×(I-15))%rdg. or less DC input signal 200 mA/ 500 mA/ 1 A/ 2 A/ 5 A/ 10 A/ 20 A range ±((0.025+0.005×(I-15))% rdg.+(0.5+0.1×(I-15))mA) or less 1 mA/ 2 mA/ 5 mA/ 10 mA/ 20 mA/ 50 mA/ 100 mA range ±((0.025+0.005×(I-15))% rdg.+(5+1×(I-15))µA) or less I: Current read value (A) Active power (above current influence quantity) × (voltage read value) or less The effects of self-heating will continue to manifest themselves until the input resistance temperature falls, even if the current value is low.

Voltage/ Current/ Active Power Measurement Specifications

Measurement types	Rectifiers: AC+DC, DC, AC, FND, AC+DC Umn
Effective measuring range	Voltage ±1% to ±150% of the range. However, up to ±1500 V peak value and 1000 V RMS value Current ±1% to ±150% of the range Active Power ±0% to ±225% of the range. However, valid when the voltage and current fall within the effective measurement range.
Display range	Voltage Up to ±152% of the range. However, zero-suppression when less than ±0.5% Current Up to ±152% of the range. However, zero-suppression when less than ±0.5% or less than ±9 µA. Active Power ±0% to ±231.04% of the range (no zero-suppression)
Polarity	Voltage/ Current Displayed when using DC rectifier Active Power Positive : Power consumption (no polarity display) Negative : generation or regenerated power

Frequency Measurement Specifications

Number of measurement channels	2 (Voltage, current)
Measurement method	Calculated from input waveform period (reciprocal method)
Measurement ranges	100 Hz/ 500 Hz/ 5 kHz/ 100 kHz (linked to zero-cross filter)
Measurement accuracy	±0.1% rdg. ±1 dgt. However, for 1 mA range, ±0.2% rdg. ±1 dgt.
Effective measuring range	0.1 Hz to 100 kHz For sine wave input that is at least 20% of the measurement source's measurement range Measurement lower limit frequency setting: 0.1 sec. / 1 sec. / 10 sec. (linked to synchronization timeout setting)
Display format	0.1000 Hz to 9.9999 Hz, 9.900 Hz to 99.999 Hz, 99.00 Hz to 999.99 Hz, 0.9900 kHz to 9.9999 kHz, 9.900 kHz to 99.999 kHz, 99.00 kHz to 100.00 kHz

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 Umn Phase Angle AC, FND
Effective measuring range	As per voltage, current, and active power effective measurement ranges
Display range	Apparent Power/ Reactive Power 0% to 231.04% of the range (no zero-suppression) Power Factor ±0.0000 to ±1.0000 Phase Angle +180.00 to -180.00
Polarity	Reactive Power/ Power Factor/ Phase Angle Polarity is assigned according to the lead/lag relationship of the voltage waveform rising edge and the current waveform rising edge. +: When current lags voltage (no polarity display) -: When current leads voltage

Power Calculation Formulas

S : Apparent power	$S = U \times I$
Q : Reactive power	$Q = si\sqrt{S^2 - P^2}$
λ : Power factor	$\lambda = si \mid P/S \mid$
ϕ : Phase angle	$\phi = si \cos^{-1} \mid \lambda \mid$ (±90° to ±180°) $\phi = si \mid 180 - \cos^{-1} \mid \lambda \mid \mid$ (0° to ±90°)

U: Voltage, *I*: Current, *P*: Active Power, *si*: Polarity symbol (acquired based on voltage waveform and current waveform lead and lag)

Voltage Waveform Peak Value/ Current Waveform Peak Value Measurement Specifications

Measurement method	Measures the voltage waveform's peak value (for both positive and negative polarity) based on sampled instantaneous voltage values.
Range configuration	Voltage

Voltage range	Voltage peak range
6.0000 V	36.000 V
15.000 V	90.000 V
30.000 V	180.00 V
60.000 V	360.00 V
150.00 V	900.00 V
300.00 V	1.8000 kV
600.00 V	3.6000 kV
1.0000 kV	6.0000 kV

Current

Current range	Current peak range
1.0000 mA	6.0000 mA
2.0000 mA	12.000 mA
5.0000 mA	30.000 mA
10.000 mA	60.000 mA
20.000 mA	120.00 mA
50.000 mA	300.00 mA
100.00 mA	600.00 mA
200.00 mA	1.2000 A
500.00 mA	3.0000 A
1.0000 A	6.0000 A
2.0000 A	12.000 A
5.0000 A	30.000 A
10.000 A	60.000 A
20.000 A	120.00 A

Measurement accuracy	±2.0%f.s. at DC and when 10 Hz ≤ f ≤ 1 kHz (f.s.: current peak range). Provided as reference value when 0.1 Hz ≤ f < 10 Hz and when 1 kHz < f. The above measurement accuracy is multiplied by 2 for the 1 mA range.
Effective measuring range	±5% to ±100% of current peak range, however, up to ±60 A
Display range	Up to ±102% of current peak range, however, the value 0 will be displayed if the current RMS value triggers the instrument's zero suppression function.

Voltage Crest Factor/Current Crest Factor Measurement Specifications

Measurement method	Calculates the ratio of the voltage waveform peak value to the voltage RMS value.
Effective measuring range	As per voltage and voltage waveform peak value, or current and current waveform peak value effective measurement ranges.
Display range	1.0000 to 612.00 (no polarity)

Voltage Ripple Rate/ Current Ripple Rate Measurement Specifications

Measurement method	Calculates the AC component (peak to peak [peak width]) as a proportion of the voltage or current DC component.
Effective measuring range	As per voltage and voltage waveform peak value, or current and current waveform peak value effective measurement ranges.
Display range	0.00 to 500.00 (No polarity)

Maximum Current Ratio Measurement Specifications (MCR)

Measurement method	Calculates the ratio of the current crest factor to the power factor. (MCR) = (Current Crest Factor) / (Power Factor)
Effective measuring range	As per power factor (voltage, current, active power) and current crest factor (current, current waveform peak value) effective measurement ranges.
Display range	1.0000 to 6.1200 M (no polarity)

Synchronized control

Functions	The timing of calculations; display updates; data updates; integration start, stop, and reset events; display hold operation; key lock operation; and zero-adjustment operation for the slave PW3335 series is synchronized with the master PW3335 series. Synchronization with the PW3336 series and PW3337 series is also supported.
Terminal	BNC terminal × 1 (non-isolated)
Terminal name	External synchronization terminal (EXT.SYNC)
I/O settings	Off Synchronized control function off (signals input to the external synchronization terminal (EXT.SYNC) are ignored) In The external synchronization terminal (EXT.SYNC) is set to input, and a dedicated synchronization signal can be input (slave). Out The external synchronization terminal (EXT.SYNC) is set to output, and a dedicated synchronization signal can be output (master).
Number of units for which synchronized control can be performed	Up to 7 slaves per master (total of 8 units including the PW3336/PW3337 series)

Functional Specifications

Auto-range (AUTO)	Automatically changes the voltage and current range according to the input. Range up: The range is increased when input exceeds 150% 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. The input level is monitored, and the range is switched over multiple ranges. Range select can be used to disable ranges so that they are not selected.
Range select	Selects whether to enable (turn on) or disable (turn off) individual voltage and current ranges. Enabled (use): Ranges can be selected with the range keys. Range switching occurs using auto-range operation. Range switching occurs during auto-range integration. Disabled (do not use): Ranges cannot be selected with the range keys. Range switching does not occur using auto-range operation. Range switching does not occur during auto-range integration.
Zero-cross filter's threshold level	Sets the zero-cross filter's threshold level for voltage and current ranges. Set from 1% to 15% (in 1% intervals). Synchronization occurs when the percentage level set for each measurement range is exceeded.
Averaging	Averages the voltage, current, active power, apparent power, and reactive power. (Other than harmonic measurement parameters.) The power factor and phase angle are calculated from averaged data. Averaging is not performed for parameters other than those listed above. Method: Simple averaging Number of averaging iterations and display update interval
Scaling (VT, CT)	Applies user-defined VT and CT ratio settings to measured values. VT ratio setting range OFF (1.0), 0.001 to 1000 CT ratio setting range OFF (1.0), 0.001 to 1000
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

Number of averaging iterations	Display update interval
1 (OFF)	200 ms
2	400 ms
5	1 s
10	2 s
25	5 s
50	10 s
100	20 s

Maximum value/ minimum value hold (MAX/MIN HOLD)	• Detects maximum and minimum measured values (except current integration, active power integration, integration elapsed time, time average current, and time average active power values) as well as maximum and minimum values for the voltage waveform peak 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). However, this does not apply to the voltage waveform peak value or the current waveform peak value. • Internal calculations (including integration and integration elapsed time) will continue. • The maximum and minimum values during integration are detected (maximum/minimum value measurement during the integration interval). • Analog output and waveform output are not held.
Zero Adjustment	Zeroes out the voltage and current input offset.
Key-lock	Disables key input in the measurement state, except for the KEY LOCK key.
Backup	Backs up settings and integration data if the instrument is turned off and if a power outage occurs.
System Reset	Initializes the instrument's settings.

Integration Measurement Specifications

Integration operation modes	Switchable between fixed-range integration and auto-range integration. Fixed-range integration Integration can be performed for all voltage and current ranges. The voltage and current ranges are fixed once integration starts. Auto-range integration Integration can be performed for all voltage ranges. The current is set to auto-range operation using ranges from 200 mA to 20 A. The integrated value for each range can be displayed by switching the current range (200 mA to 20 A) while integration is stopped.
Measurement items and display	Simultaneous integration of the following 6 parameters: Positive current integrated value (Ah+) Negative current integrated value (Ah-) Sum of current integrated values (Ah) Positive active power integrated value (Wh+) Negative active power integrated value (Wh-) Sum of active power integrated values (Wh)
Measurement types	Rectifiers: AC+DC, AC+DC Umn Current: Displays the result of integrating current RMS value data (display values) once every display update interval as an integrated value. Active power: Displays the result of integrating active power values by polarity calculated once every cycle for the selected synchronization source as integrated values. Rectifier: DC Displays the result of integrating instantaneous data obtained by sampling both current and active power by polarity as integrated values (these values are not integrated values for the DC component when active power contains both DC and AC components)
Integration time	1 min. to 10000 hr., settable in 1 min. blocks
Integration time accuracy	±0.01% rdg. ±1 dgt.
Integration measurement accuracy	(Current or active power measurement accuracy) + (±0.01% rdg. ±1 dgt.)
Effective measuring range	Until PEAK OVER U lamp or PEAK OVER I lamp lights up.
Display resolution	999999 (6 digits + decimal point)
Functions	• Stopping integration based on integration time setting (timer) • Stopping/starting integration and resetting integrated values based on external control • Displaying the integration elapsed time (displayed as TIME on panel display) • Additional integration by repeatedly starting/stopping integration • Backing up integrated values and the integration elapsed time during power outages • Stopping integration when power returns

Time Average Current/ Time Average Active Power Measurement Specifications

Measurement method	Calculates the average by dividing the current or active power integrated value by the integration time.
Measurement accuracy	(Current or Active power measurement accuracy) + (±0.01% rdg. ±1 dgt.)
Effective measuring range	As per the current or active power integration effective measurement range.
Display range	Time Average Current ±0% to ±612% of the range (Has polarity when using the DC rectifier.) Time Average Active Power ±0% to ±3745.4% of the range (Has polarity)

Harmonic Measurement Specifications

Measurement method	Zero-cross simultaneous calculation method Uniform thinning between zero-cross events after processing with a digital antialiasing filter Interpolation calculations (Lagrange interpolation) When the synchronization frequency falls within the 45 Hz to 66 Hz range: IEC 61000-4-7:2002 compliant Gaps and overlaps may occur if the measurement frequency is not 50 Hz or 60 Hz. When the synchronization frequency falls outside the 45 Hz to 66 Hz range: No gaps or overlap will occur.
Synchronization source	Conforms to synchronization source (SYNC) for the basic measurement specifications.
Measurement items	Harmonic voltage RMS value / Harmonic voltage content percentage Harmonic voltage phase angle / Harmonic current RMS value Harmonic current content percentage / Harmonic current phase angle Harmonic active power Harmonic active power content percentage Harmonic voltage current phase difference Total harmonic voltage distortion / Total harmonic current distortion Fundamental wave voltage / Fundamental wave current Fundamental wave active power / Fundamental wave apparent power Fundamental wave reactive power / Fundamental wave power factor Fundamental wave voltage current phase difference (The following parameters can be downloaded as data with communications) Harmonic voltage phase angle / Harmonic current phase angle Harmonic voltage current phase difference
FFT processing	FFT processing word length : 32 bits Number of FFT points : 4096 points
Window function	Rectangular
Analysis window width	45 Hz ≤ f < 56 Hz : 178.57 ms to 222.22 ms (10 cycles) 56 Hz ≤ f < 66 Hz : 181.82 ms to 214.29 ms (12 cycles) Frequencies other than the above : 185.92 ms to 214.08 ms
Data update rate	Depends on window width.
Maximum analysis order	Synchronization frequency (f) range / Analysis order 10 Hz ≤ f < 45 Hz : 50th 45 Hz ≤ f < 56 Hz : 50th 56 Hz ≤ f ≤ 66 Hz : 50th 66 Hz < f ≤ 100 Hz : 50th 100 Hz < f ≤ 200 Hz : 40th 200 Hz < f ≤ 300 Hz : 25th 300 Hz < f ≤ 500 Hz : 15th 500 Hz < f ≤ 640 Hz : 11th
Analysis order upper limit setting	2nd to 50th
Measurement accuracy	f.s.: Measurement range

Frequency (f)	Voltage, Current, Active power
DC	±0.4% rdg. ±0.2%f.s.
10 Hz ≤ f < 30 Hz	±0.4% rdg. ±0.2%f.s.
30 Hz ≤ f ≤ 400 Hz	±0.3% rdg. ±0.1%f.s.
400 Hz < f ≤ 1 kHz	±0.4% rdg. ±0.2%f.s.
1 kHz < f ≤ 5 kHz	±1.0% rdg. ±0.5%f.s.
5 kHz < f ≤ 8 kHz	±4.0% rdg. ±1.0%f.s.

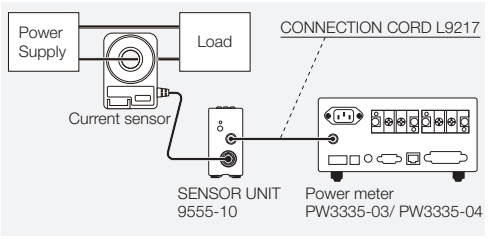
- When using the 1 mA/ 2 mA range:
  Add ±1 µA to 10 Hz to 8 kHz measurement accuracy for current.
  Add (±1 µA) × (voltage read value) to 10 Hz to 8 kHz measurement accuracy for active power.
- When using the 200 mA/ 500 mA/ 1 A/ 2 A/ 5 A/ 10 A/ 20 A range:
  Add ±1 mA to DC measurement accuracy for current.
  Add (±1 mA) × (voltage read value) to DC measurement accuracy for active power.
- When using the 1 mA/ 2 mA/ 5 mA/ 10 mA/ 20 mA/ 50 mA/ 100 mA range:
  Add ±10 µA to DC measurement accuracy for current.
  Add (±10 µA) × (voltage read value) to DC measurement accuracy for active power.

Display Specifications

Display	7-segment LED
Number of display parameters	4 (display area a, b, c, and d)
Display resolution	Other than integrated values: 99999 count (5 digits) Integrated values: 999999 count (6 digits)
Display update rate	200 ms ±50 ms (approx. 5 updates per sec.) to 20 s (varies with number of averaging iterations setting)

External Current Sensor Input Specifications (PW3335-03 and PW3335-04)

Terminal	Isolated BNC terminals
Current sensor type switching	Off / TYPE.1 / TYPE.2 When set to off, input from the external current sensor input terminal is ignored.
Current sensor options	Supported current sensors TYPE.1 (Can be directly connected) 9661 Clamp on Sensor (500 A AC) 9669 Clamp on Sensor (1000 A AC) 9660 Clamp on Sensor (100 A AC) CT9667 Flexible Clamp on Sensor (500 A/ 5000 A AC switchable) TYPE.2 (Requires Sensor Unit 9555-10 and Connection Cable L9217) 9272-10 Clamp on Sensor (20 A/ 200 A AC) 9277 Universal Clamp on CT (20 A AC/DC) 9278 Universal Clamp on CT (200 A AC/DC) 9279 Universal Clamp on CT (500 A AC/DC) 9709 AC/DC Current Sensor (500 A AC/DC) CT6862 AC/DC Current Sensor (50 A AC/DC) CT6863 AC/DC Current Sensor (200 A AC/DC) CT6865 AC/DC Current Sensor (1000 A AC/DC) CT6841 AC/DC Current Probe (20 A AC/DC) CT6843 AC/DC Current Probe (200 A AC/DC)



TYPE2 Current sensor connection diagram

Current measurement range	Auto/ 1 A/ 2 A/ 5 A (range noted on panel) Can be read directly by manually setting the CT ratio.
Constraints	Auto-range integration not supported.
Power range configuration	Depends on the combination of voltage and current ranges; from 24.000 W to 5.0000 MW (also applies to VA, var)
Measurement accuracy	

Current/ Active Power

Frequency (f)	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s.	100%f.s. ≤ Input
DC	±0.1%rdg.±0.2%f.s.	±0.1%rdg.±0.2%f.s.	±0.3%rdg.
0.1Hz≤f<16Hz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
16Hz≤f<45Hz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
45Hz≤f≤66Hz	±0.1%rdg.±0.1%f.s.	±0.2%rdg.	±0.2%rdg.
66Hz<f≤500Hz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
500Hz<f≤1kHz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.

Current

Frequency (f)	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s.	100%f.s. ≤ Input
1kHz<f≤10kHz	±(0.03+0.07×F)%rdg. ±0.2%f.s.	±(0.23+0.07×F)%rdg.	±(0.23+0.07×F)%rdg.
10kHz<f≤100kHz	±(0.3+0.04×F)%rdg. ±0.3%f.s.	±(0.6+0.04×F)%rdg.	±(0.6+0.04×F)%rdg.

Active Power

Frequency (f)	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s.	100%f.s. ≤ Input
1kHz<f≤10kHz	±(0.03+0.07×F)%rdg. ±0.2%f.s.	±(0.23+0.07×F)%rdg.	±(0.23+0.07×F)%rdg.
10kHz<f≤50kHz	±(0.07×F)%rdg. ±0.3%f.s.	±(0.3+0.07×F)%rdg.	±(0.3+0.07×F)%rdg.
50kHz<f≤100kHz	±(0.6+0.07×F)%rdg. ±0.3%f.s.	±(0.9+0.07×F)%rdg.	±(0.9+0.07×F)%rdg.

- Values for f.s. depend on measurement ranges.
- "F" in the tables refers to the frequency in kHz.
- To obtain the current or active power accuracy, add the current sensor's accuracy to the above current and active power accuracy figures.
- The effective measurement range and frequency characteristics conform to the current sensor's specifications.
- The following input are considered reference values:
  Values for voltage, current, and active power for which 0.1 Hz ≤ f < 10 Hz.
  Values for voltage and active power in excess of 220 V for which 10 Hz ≤ f < 16 Hz.
  Values for voltage and active power in excess of 750 V for which 30 kHz < f ≤ 100 kHz.
- When using the CT6841/CT6843, add ±2 mV to the CT6841/ CT6843 accuracy after performing CT6841/CT6843 zero adjustment using the 1 A range noted on the panel.

Temperature coefficient	Current, active power: ±0.08%f.s./°C or less (instrument temperature coefficient; f.s. : instrument measurement range) Add current sensor temperature coefficient to above.
Effect of power factor	Instrument: ±0.15%f.s. or less (45 to 66 Hz with power factor = 0) Internal circuit voltage/current phase difference: ±0.0859° Add the current sensor phase accuracy to the internal circuit voltage/ current phase difference noted above.
Current waveform peak value measurement specifications	±2.0% at DC or 10 Hz ≤ f ≤ 1 kHz (f.s.: current peak range) Add the current sensor accuracy to the above.
Harmonic measurement accuracy	External current sensor input instrument measurement accuracy only

Frequency (f)	Voltage, Current, Active power
DC	±0.4% rdg.±0.2%f.s.
10 Hz ≤ f < 30 Hz	±0.4% rdg.±0.2%f.s.
30 Hz ≤ f ≤ 400 Hz	±0.3% rdg.±0.1%f.s.
400 Hz < f ≤ 1 kHz	±0.4% rdg.±0.2%f.s.
1 kHz < f ≤ 5 kHz	±1.0% rdg.±0.5%f.s.
5 kHz < f ≤ 8 kHz	±4.0% rdg.±1.0%f.s.

- Values for f.s. depend on measurement ranges.
- To obtain the current or active power accuracy, add the current sensor's accuracy to the above current and active power accuracy figures.
- When using the CT6841/CT6843, add ±2 mV to the CT6841/ CT6843 accuracy after performing CT6841/CT6843 zero adjustment using the 1 A range noted on the panel.

D/A Output Specifications (PW3335-02 and PW3335-04)

Number of output channels	7 channels
Configuration	16-bit D/A converter (polarity + 15 bits)
Output voltage	The output level, output speed, and waveform output can be selected. Level output 2 Vf.s. or 5 Vf.s., linked to display updates High-speed level output 2 Vf.s. or 5 Vf.s., linked to synchronization interval Waveform output 1 Vf.s., linked to sampling
Output parameters	Output parameters for all channels Available selections vary with the output parameter. Level output/ High-speed level output/ Waveform output Voltage, current, active power Only Level output Apparent power, reactive power, power factor, phase angle, total harmonic voltage distortion, total harmonic current distortion, voltage ripple rate, current ripple rate, voltage crest factor, current crest factor, time average current, time average active power, maximum current ratio Only Level output 5 Vf.s. Frequency, current integration, active power integration The rectifier can be selected. Harmonic-order output is not supported.
Output accuracy	f.s.: Relative to the output voltage rated value for each output parameter Level output (Output parameter measurement accuracy) + (±0.2%f.s.) High-speed level output (Output parameter measurement accuracy) + (±0.2%f.s.) Waveform output (Output parameter measurement accuracy) + (±1.0%f.s.)
Output frequency band	Waveform output, high-speed level output At DC or 10 Hz to 30 kHz, accuracy is as defined above.
Maximum output voltage	Approx. ±12 V DC
Output update rate	Level output Same as the data update period. High-speed level output AC Updated once every cycle for the input waveform set as the synchronization source. However, voltage and current are only updated once every cycle for input signals from 45 to 66 Hz. Waveform output Approx. 1.43 µs (approx. 700 kHz)
Response time	Level output 0.6 sec. or less High-speed level output 2 ms or less Waveform output 0.2 ms or less
Temperature coefficient	±0.05%f.s./°C or less
Output resistance	Approx. 100 Ω

External control

Functions	Integration start/stop, integration reset and hold via external control
Input signal level	0 to 5 V (high-speed CMOS level) or shorted [Lo]/ open [Hi]

GP-IB interface (PW3335-01 and PW3335-04)

Method	Compliant with IEEE488.1 1987, in reference to IEEE488.2 1987 Interface functions SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0
Address	00 to 30

RS-232C interface (PW3335, PW3335-02, PW3335-03, and PW3335-04)

Connector	D-sub 9-pin connector × 1
Communication method	Full duplex, Start-stop synchronization Stop bits: 1 (fixed) Data length: 8 (fixed) Parity: None
Communication speed	9600 bps/ 38400 bps

LAN interface

Connector	RJ-45 connector × 1
Electrical specifications	Compliant with IEEE802.3
Transmission method	10Base-T/ 100Base-TX (automatic detection)
Protocol	TCP/ IP
Functions	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller

General Specifications

Product warranty period	1 year
Operating environment	Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2
Operating temperature and humidity	0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation)
Storage temperature and humidity	-10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation)
Dielectric strength	4290 V rms AC (current sensitivity: 1 mA) Between the voltage input terminals and a connection consisting of chassis, interfaces, and output terminals Between the current input terminals and a connection consisting of chassis, interfaces, and output terminals Between the voltage input terminals and current input terminals
Maximum rated voltage to earth	Voltage input terminal, Current input terminal Measurement category III 600 V (anticipated transient overvoltage: 6000 V) Measurement category II 1000 V (anticipated transient overvoltage: 6000 V)
Maximum input voltage	Between the voltage input terminals U and ± 1000 V, ±1500 V peak
Maximum input current	Between the current input terminals I and ± 200 mA to 20 A range 30 A, ±100 A peak 1 mA to 100 mA range 20 A, ±30 A peak
Applicable Standards	Safety EN61010 EMC EN61326 Class A EN61000-3-2 EN61000-3-3
Rated supply voltage	100 V AC to 240 V AC 50 Hz/60 Hz
Maximum rated power	30 VA or less
Dimensions	Approx. 210W × 100H × 245D mm (8.27"W × 3.94"H × 9.65"D) (excluding protrusions)
Mass	Approx. 3 kg (105.8 oz.)
Accessories	Instruction manual ×1 Power cord ×1 Voltage and current input terminal safety cover ×2

Instrument

POWER METER PW3335 series Accessories : Instruction manual ×1, Power cord ×1, Voltage and current input terminal safety cover ×2

PW3335	With LAN terminal	and RS-232C terminal	
PW3335-01	With LAN terminal	and GP-IB terminal	
PW3335-02	With LAN terminal	RS-232C terminal	and D/A output terminal
PW3335-03	With LAN terminal	RS-232C terminal	and external current sensor input terminals
PW3335-04	With LAN terminal GP-IB terminal	RS-232C terminal and D/A output terminal	external current sensor input terminals

Options

Current measurement options [Type 1] Can be directly connected to the current sensor input terminals on the PW3335-03/ PW3335-04

CLAMP ON SENSOR 9660
100 A AC, φ15 mm(0.59”), 40 Hz to 5 kHz
±0.3%rdg.±0.02%f.s. (Amplitude accuracy 45 Hz to 66 Hz)
±1° or less (Phase accuracy 45 Hz to 66 Hz)

CLAMP ON SENSOR 9661
500 A AC, φ46 mm(1.81”), 40 Hz to 5 kHz
±0.3%rdg.±0.01%f.s. (Amplitude accuracy 45 Hz to 66 Hz)
±0.5° or less (Phase accuracy 45 Hz to 66 Hz)

CLAMP ON SENSOR 9669
1000 A AC, φ55mm(02.17”), 80 × 20 mm (3.15” × 0.79”) busbar
40 Hz to 5 kHz
±1.0%rdg.±0.01%f.s. (Amplitude accuracy 45 Hz to 66 Hz)
±1° or less (Phase accuracy 45 Hz to 66 Hz)

CLAMP ON SENSOR CT9667
500 A AC/5000 A AC Switchable, φ254 mm(10”), 10 Hz to 20 kHz
±2.0%rdg.±0.3%f.s. (Amplitude accuracy 45 Hz to 66 Hz)
±1° or less (Phase accuracy 45 Hz to 66 Hz)
Power supply : LR6 alkaline battery ×2, or AC Adapter (option)

Option : **AC ADAPTER 9445-02** (universal 100 V to 240 VAC /for USA)
AC ADAPTER 9445-03 (universal 100 V to 240 VAC /for Europe)

Current measurement options [Type 2] Requires Sensor Unit 9555-10 and Connection Cable L9217

CLAMP ON SENSOR 9272-10
20 A AC/ 200 A AC Switchable, φ46 mm(1.81”), 1 Hz to 100 kHz
±0.3%rdg.±0.01%f.s. (Amplitude accuracy 45 Hz to 66 Hz)
±0.2° or less (Phase accuracy 45 Hz to 66 Hz)
Power supply : SENSOR UNIT 9555-10

AC/DC CURRENT PROBE CT6841
20 A AC/DC, φ20 mm(0.79”), DC to 1 MHz
±0.3%rdg.±0.01%f.s. (Amplitude accuracy DC < f ≤ 100 Hz)
±0.1° or less (Phase accuracy DC < f ≤ 100 Hz)
Power supply : SENSOR UNIT 9555-10

AC/DC CURRENT PROBE CT6843
200 A AC/DC, φ20 mm(0.79”), DC to 500 kHz
±0.3%rdg.±0.01%f.s. (Amplitude accuracy DC < f ≤ 100 Hz)
±0.1° or less (Phase accuracy DC < f ≤ 100 Hz)
Power supply : SENSOR UNIT 9555-10

UNIVERSAL CLAMP ON CT 9279
500 A AC, φ40 mm(1.57”), DC to 20 kHz
±0.5%rdg.±0.05%f.s. (Amplitude accuracy 45 Hz to 66 Hz)
±0.2° or less (Phase accuracy 45 Hz to 66 Hz)
Power supply : SENSOR UNIT 9555-10

AC/DC CURRENT SENSOR CT6862
50 A AC/DC, φ24 mm(0.94”), DC to 1 MHz
±0.05%rdg.±0.01%f.s. (Amplitude accuracy 16 Hz to 400 Hz)
±0.2° or less (Phase accuracy 16 Hz to 400 Hz)
Power supply : SENSOR UNIT 9555-10

AC/DC CURRENT SENSOR CT6863
200 A AC/DC, φ24 mm(0.94”), DC to 500 kHz
±0.05%rdg.±0.01%f.s. (Amplitude accuracy 16 Hz to 400 Hz)
±0.2° or less (Phase accuracy 16 Hz to 400 Hz)
Power supply : SENSOR UNIT 9555-10

AC/DC CURRENT SENSOR 9709
500 A AC/DC, φ36 mm(1.42”), DC to 100 kHz
±0.05%rdg.±0.01%f.s. (Amplitude accuracy 45 Hz to 66 Hz)
±0.2° or less (Phase accuracy 45 Hz to 66 Hz)
Power supply : SENSOR UNIT 9555-10

AC/DC CURRENT SENSOR CT6865
1000 A AC/DC, φ36 mm(1.42”), DC to 20 kHz
±0.05%rdg.±0.01%f.s. (Amplitude accuracy 16 Hz to 66 Hz)
±0.2° or less (Phase accuracy 16 Hz to 66 Hz)
Power supply : SENSOR UNIT 9555-10

Type 2 Current sensor options

SENSOR UNIT 9555-10
POWER SUPPLY 100 V to 240 V AC (50Hz/ 60Hz)

CONNECTION CORD L9217
For sensor output, Isolated BNC to isolated BNC
Cord length: 3m

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 25pin

GP-IB CONNECTOR CABLE 9151-02
Cable length: 2 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 synchronized control
Cable length: 1.5 m (4.92 ft),
metal BNC to metal BNC

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All information correct as of Oct. 16, 2014. All specifications are subject to change without notice. PW3335E2-4XM Printed in Japan