POWER METER Series



Measure Everything from AC, DC and 3-Phase Power Sources to Standby Power

The optimal power meter lineup for all applications



POWER METER PW3337/PW3336

AC/DC POWER HITESTER 3334

POWER HITESTER 3333





Advancing the Standard for Power Measurement

The best performing instruments for power measurement on production lines, in laboratories, and in research facilities. Hioki delivers the optimal power testing solutions based on use case conditions, practical application, and accuracy.

Three-phase Power Meter

The PW3337 and PW3336 are suitable for a wide variety of connections, such as measuring three-phase circuits and single-phase 2-wire multiple circuits. There is little internal resistance for the current input, and large currents up to 65 A can be measured with great accuracy.

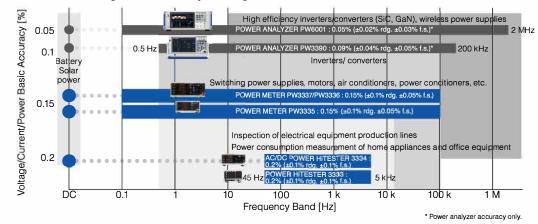


Single-phase Power Meter

The PW3335 provides highly accurate measurements for everything from standby power to operating power. Compliant with the IEC62301 measurement standard for standby power, it is capable of measuring current as low as 10 $\mu\text{A}.$ Designed for power consumption testing, the 3334 and 3333 are guaranteed for accuracy for up to 3 years.

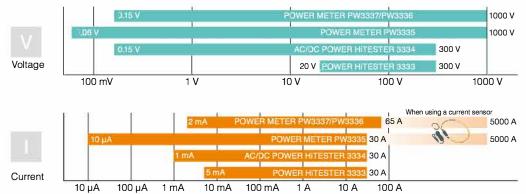






Basic Accuracy and Frequency Bands

Effective Measurement Range



Comparison Chart

		PW3337	PW3336	PW3335	3334	3333	
No. of channe	els	3	2	1	1	1	
Supported connections		Three-phase, three-phase + single-phase, single-phase x 3, DC x 3	Three-phase, single-phase x 2, DC x 2	Single-phase, DC	Single-phase, DC	Single-phase	
Effective mea range, voltage		0.15 V to 1000 V		0.06 V to 1000 V	0.15 V to 300 V	20 V to 300 V	
Effective measurement range, current		2 mA to 65 A		10 µA to 30 A	1 mA to 30 A	5 mA to 30 A	
Frequency ba	Ind	DC, 0.1 Hz to 100 kHz			DC, 45 Hz to 5 kHz	45 Hz to 5 kHz	
Basic accuracy, AC (Voltage, current, power)			±0.1% rdg. ±0.05%	f.s.	±0.1% rdg. ±0.1% f.s.	±0.1% rdg. ±0.2% f.s.	
Basic accurat (Voltage, curr		±0.1% rdg. ±0.1% f.s.			±0.1% rdg. ±0.2% f.s.	-	
Integrated por measurement		Yes			Yes	-	
Harmonic me	asurement	IEC61000-4-7 compliant			-		
Current sensor input		Yes PW3335-03,-04			-		
	LAN		Yes		-		
Interface	RS-232C	Ye	es	PW3335, -02, -03, -04	Yes		
menace	GP-IB	PW3337-01, -03	PW3336-01, -03	PW3335-01, -04	3334-01	3333-01	
	D/A output	PW3337-02, -03	PW3336-02, -03	PW3335-02, -04	Yes		

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POWER METER PW3337/PW3336

Accurate measurement of power for three-phase equipment, through direct input up to 1000 V AC/DC / 65 A.



POWER METER PW3335

Highly accurate AC/DC measurements from standby power to operating power



PW3335-04 Front Panel



PW3335-04 Rear Panel



Half-rack Size to Save Space



For development/production lines for electrical equipment

- Voltage/current/power basic accuracy ±0.1% *
- Highly accurate AC/DC measurements from standby power to operating power
- Accuracy guaranteed throughout a wide range, from 10 µA to 30 A and 60 mV to 1000 V AC/DC
- Harmonic measurement as standard feature, IEC61000-4-7 compliant
- Compliant with the IEC62301 and EN50564 measurement standards for standby power
- Power factor effect of ±0.1% f.s. delivers highly accurate measurements even for no-load testing of transformers with a low power factor
- Accurate measurement of fluctuating electric power thanks to auto range integration with guaranteed accuracy for measurements while range switching
- Measure up to 5000 A AC with optional current sensor (PW3335-03, -04)

Voltage input terminal

Current sensor input terminal

LAN connectorSynchronous control terminal

RS-232C connector
 External control terminal

GP-IB connector

D/A output terminal

AC/DC POWER HITESTER 3334

Measurement of power consumption and integrated power for battery-operated equipment, home appliances, and office equipment



- Accuracy guaranteed up to 3 years
- Compliant with the SPECpower[®] server power evaluation test

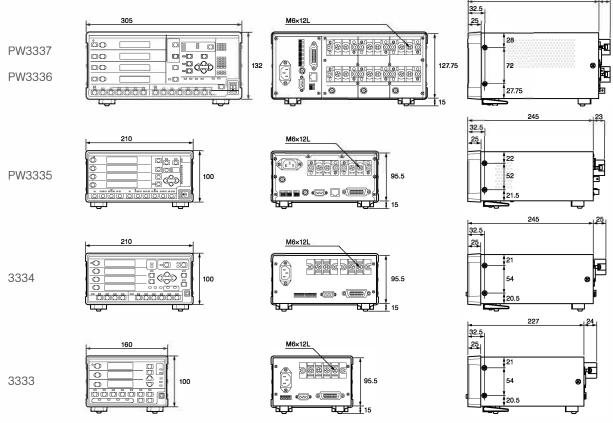
POWER HITESTER 3333

Low-price model for measurement of power consumption on production/inspection lines



- Compact model for saving space, even when added to a system
- Accuracy guaranteed up to 3 years

Dimensional Drawings

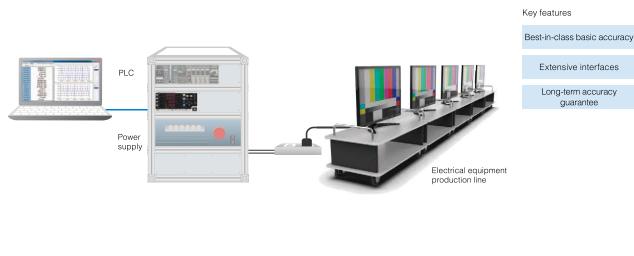


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Units: mm

Applications

Inspection of Electrical Equipment Production Lines



Best-in-class Accuracy ±0.1% * [#333 7] [#333 6] [#333 5]

Our lineup provides reliable accuracy for a variety of measurement scenarios. Accurately measure the power consumption of a variety of household appliances, such as liquid crystal displays, refrigerators, and air conditioners.



* For complete details, please refer to the specifications

Extensive Interfaces



The built-in interfaces are convenient for transferring data to a PC and equipping the unit on automated machines. PC communication software can be downloaded free of charge from the HIOKI website. For details about the built-in interfaces, refer to the specifications for each model.



Accuracy Guaranteed Up to 3 Years (Longest in the Industry)

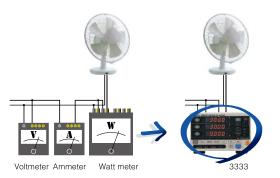


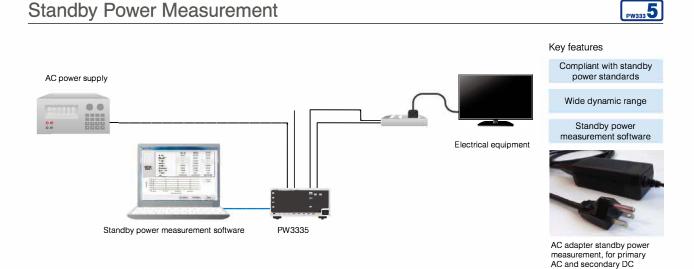
The 3333 and 3334 are guaranteed for accuracy for 3 years. Even after 3 years, they maintain an accuracy of $\pm 0.5\%$ rdg. as required for measurements. This 3-year accuracy guarantee, the longest in the industry, helps to save on calibration expenses.



Replacement for Analog Meters 333 7 PW335 6 PW335 5

These models can be used as replacements for analog voltmeters, ammeters, and watt meters. Up to 4 parameters such as voltage, current, and power can be displayed at the same time, allowing 3 measuring devices to be covered with a single unit. The digital display avoids issues such as parallax due to viewing angle and zero shift of the indicator.





Compliant with IEC62301 and EN50564 Standards

The PW3335 is compliant with measurement standards for standby power, as well as other measurement standards including the ErP Directive and Energy Star. Special parameters required by such standards including THD, CF, and MCR can also be checked with this unit.

Requirements for Measurement Instruments for Standby Power Measurements (excerpt)

Stanuby Fower measurements (excerpt)				
Requirement	PW3335 Performance			
Power resolution of 1 mW or better	 Minimum resolution of 0.01 mW (in the 300 V/1 mA range) 			
Crest factor 3 support	✓ Crest factor 6 support			
Harmonic component measurement of up to at least 50th order	 Harmonic measurement as standard feature 			
Data acquisition via interface	 LAN (standard feature), RS-232C, GP-IB 			

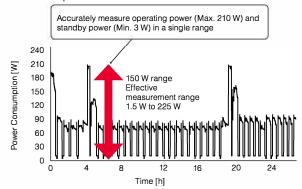
THD (Total Harmonic Distortion): Indicates to what extent harmonic components are present in an AC waveform

CF (Crest Factor): Ratio of the peak value to the effective (RMS) value of an AC waveform MCR (Maximum Current Ratio): Current evaluation index, calculated from

the crest factor and power factor

Wide Range of Effective Measurement

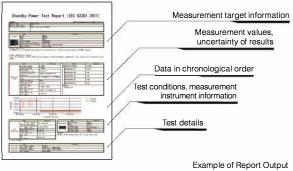
The PW3335 has an effective measurement range of 1% to 150%. Due to this wide range of effective measurement, even equipment with large load fluctuations, such as refrigerators, heaters, and pumps, can be measured accurately under all conditions from no-load to full operation.



Long-term Measurement of Refrigerator Power

Create Reports with Free Software

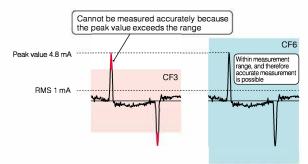
Standby power measurement software can be downloaded free of charge from the HIOKI website. Enter the required information to perform standby power measurements according to standards. Use this software to create reports of measurement results and save test data in CSV format.



Support for CF6 (Crest Factor 6)

When an AC adapter or switching power supply operates with no load, the crest factor of the current waveform increases. The PW3335 can measure waveforms that exceed the range of watt meters that support crest factor 3.

In addition, although the power factor is low during no-load operation, the PW3335 is affected very little by power factor and can therefore achieve accurate measurements.



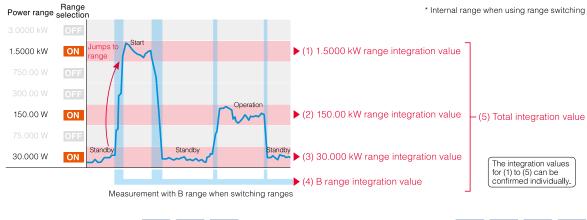
Example of Standby Current Waveform (CF = Peak Value, RMS = 4.8)

Measurement of Fluctuating Loads and Power Supply Control



Auto Range Integration with Guaranteed Accuracy when Switching Ranges

These models automatically jump to the optimal power range according to current consumption when performing integration measurements. When switching ranges, power is integrated using the B range*, and therefore there is no loss of integration data. Achieve seamless power integration with guaranteed accuracy, even with loads that experience frequent and repeated fluctuations. In addition, since power integration can be performed for individual ranges, you can measure integrated power for the various conditions of devices that experience power fluctuations.

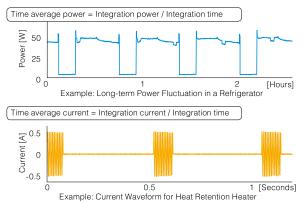


Intermittent Power Supply

PW333 7 PW333 6 PW333 5

Devices that perform intermittent operation and cycle control repeat a cycle of stopped states and operating states. Therefore, with normal power measurement, it is not possible to determine a value for rated power consumption.

Time average active power (current) is a function that allows the measurement of the time average for power (current) that experiences fluctuations.



AC/DC Measurement

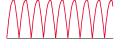
PW333 7 PW333 6 PW333 5 333 4

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For equipment that uses rectifiers and control devices, it might not be possible to accurately measure voltage or current without an AC/DC power meter.

- Half-wave rectified waveforms used for dryers and fans
- Full-wave rectified waveforms used for AC adapters
- Cycle control waveforms used for voltage and temperature adjustment heaters
- · DC waveforms with superimposed ripple components

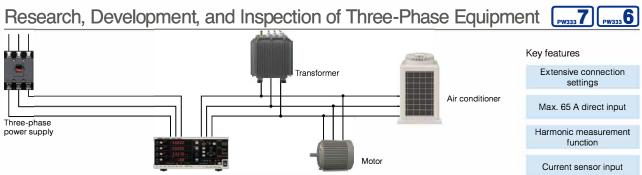
Half-wave Rectified Waveform



Full-wave Rectified Waveform

Cycle Control Waveform

DC Waveform with Superimposed Ripple



Compliant with IEC61000-4-7 Harmonic Measurement Standards

These models are compliant with the IEC61000-4-7 international standard for harmonic measurements. Conduct harmonic analysis up to the 50th order. The upper limit for harmonic analysis can be set from 2nd to 50th, according to the standard used.

IEC61000-4-7 is an international standard for the measurement of harmonic current and harmonic voltage in power supply systems, and the harmonic current emitted from devices. It specifies the performance of standard measurement instruments. Among the series of standards that include specifications for power measurements, it is used as a reference standard for harmonic measurements.

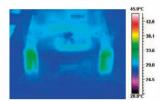
Support for Various Connections

The PW3337 supports not only 3V3A, but also a variety of threephase connections such as 3P4W, 3P3W2M, and 3P3W3M. Accuracy Guaranteed for Currents Up to 65 A

Because DCCT allows a current with an input resistance of 1 m Ω or less, accuracy is guaranteed up to 65 A. No heat is generated even with the input of large currents, so there is no loss of accuracy due to self heating. Even if the current exceeds 65 A, an optional current sensor allows measurements up to 5000 A.



DCCT current sensor (in the PW3337)



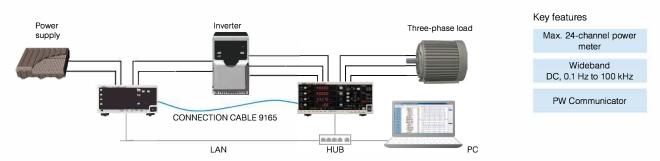
Temperature distribution image at 30 A DC/10-minute input

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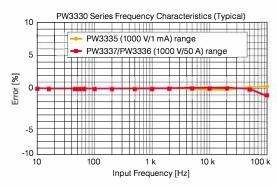
PW333

Inverter Efficiency Measurement



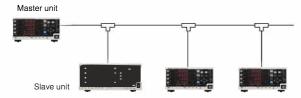
Wide Frequency Band (DC, 0.1 Hz to 100 kHz)

These models cover not only the fundamental frequency bands for inverters, but also carrier frequency bands, in a wide range that includes DC and frequencies from 0.1 Hz to 100 kHz.



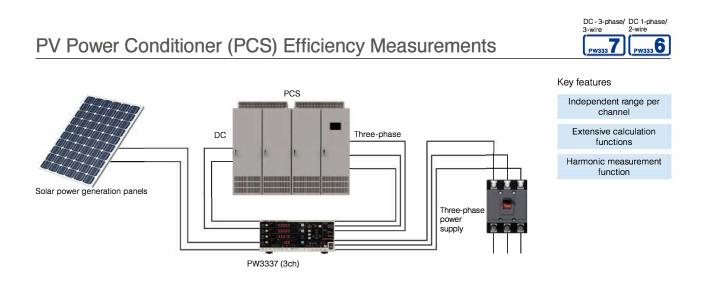
24-channel Power Meter with Synchronous Control for up to 8 Units

Connect 8 units for synchronous measurement of up to 24 channels. The calculation and control timing for PW3337, PW3336, and PW3335 units that are set as slaves are synchronized with the master unit. Use this feature to measure the I/O efficiency of power supply devices, compare multiple pieces of equipment, or to perform simultaneous parallel testing of production lines. Use the free PW COMMUNICATOR* software to calculate the efficiency between multiple units and to acquire data simultaneously from multiple units.



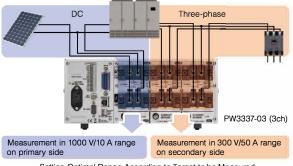
* This software can be downloaded from the HIOKI website.

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Independent Ranges Per Channel for Highly Accurate Measurements

Independent channels allow the selection of the optimal range for each connection. One example is the simultaneous measurement of the primary side (DC) and secondary side (three-phase) of a PCS using a single unit. Selecting the optimal range for each target to be measured enables highly accurate measurements.

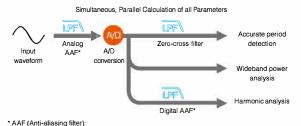


Setting Optimal Range According to Target to be Measured

Simultaneous Measurement of Power Data and Harmonics

In addition to standard measurement items such as voltage, current, and power, all items related to harmonics, such as distortion and content percentage, are calculated internally in parallel at the same time. Items such as RMS value, MEAN value, DC components, AC components, and fundamental wave components can all be confirmed simply by switching the display. Even for DC waveforms with superimposed ripple components, the AC/DC components can be measured separately.

In addition, when using PC software, more than 180 measurement items can be acquired at the same time.



Filter that prevents aliasing errors during sampling

I/O Efficiency Calculation with a Single Unit

Input and output can be measured independently at the optimal ranges, and the PCS efficiency can be calculated and displayed on a single unit. PCS can be evaluated with a simple system configuration.

1000 V Range for Evaluation of Large Power Conditioners

These models support the measurement of large voltages, which is required in order to measure power conditioners for solar power generation. Measure up to 1000 Vrms and 1500 Vpeak.

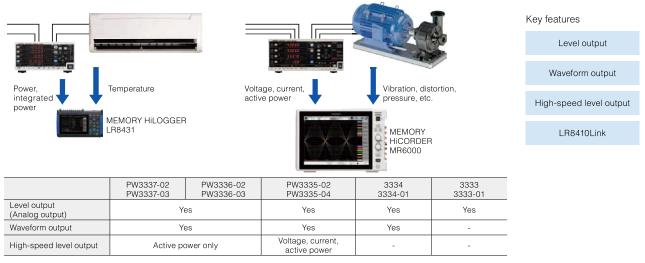


Aggregation of Output from DC Current Sensors (Up to 4000 A)

SENSOR UNIT CT9557 is a power supply for highly accurate current sensors that have a waveform output function. In addition to using it as a 4-channel power supply, it is also equipped with a sum feature for aggregating the input waveforms into a single waveform to be output.



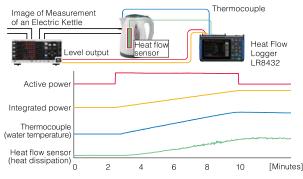
Output Function Linked with Recorder



Display Trends with a Data Logger



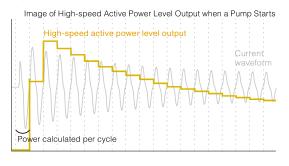
The level output (analog output) function delivers measured values that are displayed on the power meter with an analog voltage that is updated every 200 ms. Connect the unit to a data logger to check trends through synchronization with data such as temperature and heat flow*.



* Heat flow: Parameter for understanding the heat reception and heat dissipation of an object. Can be measured with a heat flow sensor.

Observe Power for Each Cycle [PW33 7] [PW33 6] [PW33 5]

The PW3337, PW3336, and PW3335 feature built-in, high-speed active power level output. Level is output for power per cycle. When used in combination with a memory hicorder, fluctuations in power can be observed in real time. This feature is also useful for analyzing equipment that uses power, such as monitoring cutting and grinding tools.

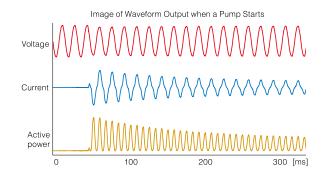


* With the PW3335, high-speed level output is also possible for 45 Hz to 66 Hz voltage and current.

Observe Waveforms with a Memory Hicorder



The waveform output function outputs the voltage/current waveforms captured by a power meter in the form of high-speed analog voltage. Connect to a memory recorder to check behavior when load fluctuates, such as with the inrush current of a motor.



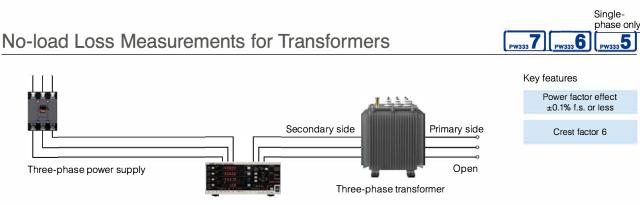
Transfer Information to Data Logger Wirelessly (LR8410Link)



Connect the PW3335 (excluding model -01) and a data logger (with support for LR8410 Link) via Bluetooth[®] wireless technology* to wirelessly transmit 8 measurement parameters from the power meter to the data logger. In addition to the voltage and temperature measured by the multichannel data logger, you can also integrate current and power and observe and record them in real time.



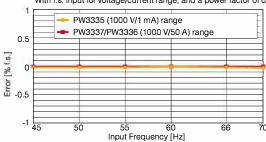
* Connection requires the serial - Bluetooth® wireless technology conversion adapter recommended by Hioki. Please inquire with your Hioki distributor.



Power Factor Effect of 0.1% or Less, Even at Low Power Factors

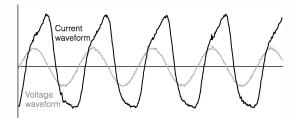
A no-load loss test is one indicator for evaluating energy conservation for transformers and motors. The PW3337 and PW3336 are affected very little by power factor, at $\pm 0.1\%$ f.s. or less, allowing active power to be measured with a high level of accuracy at low power factors.

PW3330 Series Power Factor Effect (Typical) With f.s. input for voltage/current range, and a power factor of 0



Support for Crest Factor 6

The crest factor of a current waveform increases during no-load operation. The PW3337, PW3336, and PW3335 support a crest factor 6. Therefore, even if the waveform peak value is large relative to the range, accurate measurements are possible without exceeding the range.



Example of Transformer Current Waveform during No-load Operation

DC Power Measurement for Batteries and Power Supplies



Best-in-class DC Power Accuracy



These models are best for measuring battery power consumption and output from switching power supplies. Make accurate measurements of DC power, which is an important factor in

measurements of DC power, which is an important factor improving efficiency and saving energy.



* For complete details, please refer to the specifications



Key features

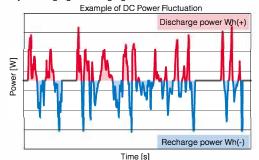
DC power accuracy ±0.2% rdg.

Power integration function by polarity

Current and Power Integration Function by Polarity



For integrated measurements, recharging power and discharging power are integrated by polarity every 200 ms. The amount of power in the positive direction, the amount of power in the negative direction, and the sum of the amounts of power in the positive and negative direction during the integration period are measured. Accurate measurement of recharging power and discharging power is possible even if there is rapid repetition of battery recharging/discharging.



Options

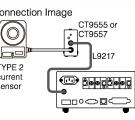
		Sensor (General Cu rrent sensor input terminal (BNC			,	a direct connection.	N333 7	PW3336 PW3335
Wiring method	External appearance	Product name/ model no.	Rated current	Frequency band	Diameter of measurable conductors	Basic accuracy (amplitude) Basic accuracy (phase)	Cord lengths	Power supply
		CLAMP ON SENSOR 9660	100 A	40 Hz to 5 kHz	🛛 15 mm (0.59 in)	±0.3% rdg. ±0.02% f.s. Within ±1°		
	21	CLAMP ON SENSOR 9661	500 A	40 Hz to 5 kHz	⊠46 mm (1.81 in)	±0.3% rdg. ±0.01% f.s. Within ±0.5°		Not used
Clamp method		CLAMP ON SENSOR 9669	1000 A	40 Hz to 5 kHz	⊠ 55 mm (2.17 in), 80 mm (3.15 in) × 20 mm (0.79 in) BUS BAR	±1.0% rdg. ±0.01% f.s. Within ±1°	3 m (9.84 ft)	
metriou	80	FLEXIBLE CL AMP ON SENSOR CT9667-01		⊠ 100 mm (3.94 in)	(3	(9.04 11)	AA (LR6) Alkaline Batteries x	
	80	FLEXIBLE CLAMP ON SENSOR CT9667-02	500 A/ 5000 A	10 Hz to 20 kHz	🛛 180 mm (7.09 in)	±2.0% rdg. ±0.3% f.s. Within ±1°		2 (approx. 7 days) or
	FLEXIBLE CLAMP ON SENSOR CT9667-03				🛛 254 mm (10.00 in)			AC ADAPTER 9445-02 (optional)
C	Options for C1	Г9667-01/-02/-03						
	External appearance	Product name/ model no.	Functions					Power supply
	Ó.	AC ADAPTER 9445-02		For supplying power to CT9667-01/-02/-03 100 to 240 V /				

TYPE 2 Current Sensor (Highly Accurate Current Measurements) Connect this unit to the current sensor input terminal (BNC) on the PW3337/PW3336/PW3335. SENSOR UNIT CT9555 or CT9557 and CONNECTION CABLE L9217 are required.

Wiring method	External appearance	Product name/ model no.	Rated current	Frequency band	Diameter of measurable conductors	Basic accuracy (amplitude) Basic accuracy (phase)	Cord lengths	Power supply
	Ę	CT6862-05	50 A	DC to 1 MHz	⊠ 24 mm (0.94 in)	±0.05% rdg. ±0.01% f.s.		
		CT6863-05	200 A	DC to 500 kHz	⊠ 24 mm (0.94 in)	Within ±0.2°	3 m (9.84 ft)	
Through method		CT6875	500 A	DC to 2 MHz	🛛 36 mm (1.42 in)			
		CT6876	1000 A	DC to 1.5 MHz	🛛 36 mm (1.42 in)	±0.04% rdg. ±0.008% f.s. Within ±0.1°		CT9555 or CT9557
	Q	CT6877	2000 A	DC to 1 MHz	🛿 80 mm (3.15 in)			
		CT6841-05	20 A	DC to 1 MHz	🛛 20 mm (0.79 in)			
		CT6843-05	200 A	DC to 500 kHz	🛛 20 mm (0.79 in)			019557
Clamp		CT6844-05	500 A	DC to 200 kHz	⊠ 20 mm (0.79 in)	±0.3% rdg. ±0.01% f.s. Within ±0.1°		
method		CT6845-05	500 A	DC to 100 kHz	⊠ 50 mm (1.97 in)			
	9	CT6846-05	1000 A	DC to 20 kHz	⊠ 50 mm (1.97 in)			
		9272-05	20 A/ 200 A	1 Hz to 100 kHz	🛛 46 mm (1.81 in)	±0.3% rdg. ±0.01% f.s. Within ±0.2°		

Options for Current Sensor TYPE 2

External appearance	Product name/ model no.	Max. no. of sensors	Functions	Power supply	Cord lengths	Connec
11100	SENSOR UNIT CT9555	1	For supplying power to the TYPE 2 current sensor	100 V to 240 V AC		
	SENSOR UNIT CT9557	4	For supplying power to the TYPE 2 current sensor With addition output function	100 V to 240 V AC	-	TYPE 2 current sensor
11	CONNECTION CORD L9217		For connecting CT9555/CT9557 and PW3330 series units		1.6 m (5.25 ft)	Sensor



Rack Mount Hardware

HIOKI can also manufacture rack mount hardware (EIA, JIS). Please contact your Hioki distributor or subsidiary for more information.

Printing with a Printer

Connect the 3333 to PRINTER 9442* to print out values.

Printing example

STATUS.000000.U.+0200.0E+U.1.+014.82E+0. P.+02.727E+3.8.+02.964E+C.PF.+00.920E+0

9-pin - 9-pin, straight, 1.5 m (4.92 ft)



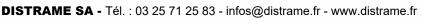
PRINTER 9442 Thermal serial dot method, 112 mm (4.41 in) paper width

Power supply: AC ADAPTER 9443-02, or the included nickel hydride batteries Dimensions, mass: 160 mm W × 67 mm H × 170 mm D (6.30 in W × 2.64 in H × 6.69 in D), 580 g (20.5 oz)

333

RECORDING PAPER 1196 112 mm (4.41 in) × 25 m (82.03 ft), 10-roll set

PW333 6 PW333 5 PW333



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PW Communicator

PW333 7 PW333 6 PW333 5

PW Communicator is an application for communicating between a PW3337/PW3336/PW3335 and a PC. This software can be downloaded free of charge from the HIOKI website. Use this software to configure the power meter, acquire interval data with a PC, perform numerical calculations for measurement data, calculate efficiency between multiple units, display 10 or more measurement items, and display waveforms.

Auto Update U	pdate 🛛 📝 Display Waveform(8kHz or more decayed)		
Item Num 16	•		U
Urms INST	100.20 V		V1
Irms INST	0.0852 A	50.00	
Prms INST	3.16 W	0.00	
Srms INST	8.54 VA	-50.00V	
Qrms INST	- 7.93 var		
PFrms INST	-0.3707	-100.00V	
FREQ_U INST	60.002 Hz	-150.00V	
FREQ_I INST	6 Numerical value	Waveform	
Upk INST		0.60A monitoring	I II
Ipk INST	0.4782 Apk	0.40A	
Uthd INST	0.25 %	0.20A	
Ithd INST	202.97 %	0.00A ┾┺┱┯┺┱┿┺╗┿┺┱┯┺┱┿┺╗┯┺┱╇┺╗┯┺┱┿	
IH TOTAL	1.679mAh 🕑	-0.20A	
WH TOTAL	0.0624 Wh	-0.40A	
P.TAV TOTAL	3.16 W	-0.60A	
MCR INST	15.145	0.00ms 50.00ms 100.00ms 150.00ms 200.00ms	

PW3336/F	PW333	7 Commu	nicator					×
Regist /confirm	ID	Status	Host information	Measured Setting		Save	Save settings	Synchronization settings
Regist	A	READY	PW3337 LAN 192.168.1.2 ser 18	screen	ings		Save settings	
Regist	В	READY	PW3337 LAN: 192.168.1.3 ser 13000	0008 MeasValue	settings		Save settings	1



Numerical value monitoring	Display the PW3337/PW3336/PW3335 measurement values on the PC screen. You can freely select up to 64 values, such as voltage, current, power, and harmonics.
Waveform monitoring	The voltage, current, and waveforms measured by the unit can be monitored on the PC screen.
Meter setting	The configuration of the connected power meter can be changed on the PC screen.
Synchronous measurement	Efficiency calculations, such as input/output of the power supply conversion device, are possible between multiple power meters. Use a sync cable to connect and synchronize the control of up to 8 units.
Save in chronological order	More than 180 pieces of measured data can be recorded to a file in CSV format at regular time intervals. The minimum time interval for recording is 200 ms.

LabVIEW Driver

Obtain data and configure measurement systems with the LabVIEW driver. (LabVIEW is a registered trademark of NATIONAL INSTRUMENTS.)

Sample Software

Sample software for loading data (via RS-232C) can be downloaded from the HIOKI website.

- The 3333/3334 front panel is displayed on the PC screen. Operate the power meter or change settings directly on the PC.
- The measured values for the 3333/3334 are displayed in real time on the PC screen. Save data as a CSV file.



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333**4**

PW333 7 PW333 6 PW333 5

Standby Power Measurement Software

"Standby Power Measurement Software" is an application software exclusively designed for the Power Meter PW3335. This software lets you to view PW3335 measurement data and also save them as reports or in CSV format via a LAN, GP-IB, or RS-232C. Measure standby power consumption in accordance with IEC62301. Download the software free of charge from the HIOKI website.

Workflow for Standby Power Test 1. Connect to power meter 5. Run test Configure the settings for communication with a power meter. Connect the PC to a power meter, and The consumed power is measured according to the configured settings. enter the settings required for the interface used (LAN/RS-232C/GP-IB). Start 6. Create report Create a report of the test results. Output either a PDF report or CSV file. Standby Power Test Report (IEC 62301:2011) 2. Configure the test target Enter the information of the device under test. The sunllied by F information to be entered includes manufacturer name, model name, serial number, and operation mode. You can also register an image of the test target. frequency arating mode function mod 3.112W eld data acquisition recorder built in with 2 analog channels and 2MM of memory Product manufacturer details Since its founding in 1935, HIOKI 8.005VA 8.085A 8.085A 8.416A 8.548 feet Imget:HOE I MREEZE 0. 53971 erale powe (1 6 A11 In 19 ERTAINTY_UE 011# 00:24:47 (Sempling methodi LR) NCERTAINTY U (integration) time Stability detection Condition UNCERTAINTY_US 0.5H 15. 0/smon < 20. Relation UNCERTAINTY_UI 010 ang ing inter ERTAINTY_U Q. 28 14, 878 IEC62301 Ed I 8. 09VA/7. 08Y End Han Anter Facto 1 FAD) 0 39/0 Expand Graph Shrink Graph Clo n (mai) 3 200 Power 3.079 2 958 3. Configure the test power supply 2 594 00.20:00 Enter the information of the test power supply. Information 00.10.00 Time(hh.mm:ss to be entered includes rating and frequency. Also, enter the values of uncertainty due to the connection method, wiring, power supply, and temperature. /max.) peried 00:37:10 99~101 59.4~60.0 1 24~155 B.00 V 99.11 V 109.27 59.566 He 68.883 Hz 80.881 H 1.3888 1.8782 2.8322 58Hz CORPORATION 0.25 % 8.25 8 2.79 4. Configure the test conditions Set the current range, stop conditions, algorithm used to Example of report output judge stability, cycle time, and upper limit for test time. PW0305 ser1 40709556 V0.07 del nial Numbe nmware art Tim 2014 28 14 32 150V 200mA 200ms te Hang SP2 SAF SPI GA [Canditional (LR)] Ship Each. /alid Perini Test frequency(Hz) U THD(%) Orest Factor U Orest Factor ime(Sec

Test Time LimitOn

Ston

60 002 60.002 CSV output example

000

4199

.4199

1 41 9

5.65**8**5 5.6696

5.6484

5.6675

99 -99 -99 -99 -

99 49

99.49

15.k

16.2

PW3337 and PW3336 Specifications

Input Specifications

input Specificati	0115					
Measurement line	PW3336					
type		e-phase 2-wire -phase 3-wire			se 3-wire (1P3W),
		Wirina	CH1	CH2		
		P2W×2	1P2W	1P2W		
		1P3W	1P	3W		
		3P3W	3P	3W		
	3	P3W2M	3P3	W2M		
	PW3337	series				
		e-phase 2-wire				
		-phase 3-wire		P3W2M, 3\	/3A, 3P3W	'3M),
	Three	-phase 4-wire	(3P4W)			
		Wiring	CH1	CH2	CH3	
		P2W×3	1P2W	1P2W	1P2W	
		W&1P2W		3W	1P2W	
		W&1P2W	3P3W		1P2W	
		P3W2M	3P3W2M			
		<u>3V3A</u>		3V3A		
		P3W3M		3P3W3M		
	-	3P4W		3P4W		5
Input methods	Voltage Current	Isolated input	t, resistanc DCCT meth	e voltage o od Isolated	division me input from c	ethod urrent sensors
Voltage measurement	AUTO/1	5.000 V/ 30.00	00 V/ 60.00	0 V/150.0	0 V/ 300.0	0 V/
ranges		// 1000.0 V (se				
Current		00.00 mA/ 50				
measurement		/ 20.000 A/ 50				
ranges		information a			sensor inp	out, see the
		current senso				
Power ranges		s on the comb				
		36: from 3.00				
		337: from 3.00			so applies	to VA, var)
Input resistance		nput terminal		2 MΩ		
(50/60 Hz)	Current of	direct input ter	minal : *	1 mΩ or les	S	

Basic Measurement Specifications

Measurement method	Simultaneous voltage	and current digital sam	pling, zero-cross			
	simultaneous calculation					
Sampling frequency	Approx. 700 kHz					
A/D converter	16-bit resolution					
Frequency bands Synchronization	DC, 0.1 Hz to 100 kHz U1, U2, U3, I1, I2, I3, D					
sources	Can be set separately					
Measurement items	· Voltage · Curr		ver · Apparent power			
	· Reactive power · Pow					
	·Efficiency	· Current in				
	· Active power integrat					
	· Voltage waveform pe	ak value · Current wa	aveform peak value			
	· Voltage crest factor	· Current cr				
	 Time average current 		age active power			
	· Voltage ripple factor	 Current rip 	opie factor			
	Harmonic parameters		current RMS value			
	· Harmonic active pow		onic voltage distortion			
		nt distortion · Voltage fu				
		waveform . Active power				
		ntal waveform · Reactive pow				
		ental waveform (displac				
		e difference fundamen				
		fundamental wave pha				
	·Harmonic voltage co	fundamental wave pha	current content %			
	Harmonic active pow		current content 70			
		ters can be downloade	d as data during PC			
	communication but no	ot displayed:	-			
		ase angle Harmonic	current phase angle			
		rrent phase difference				
Rectifiers	AC+DC: AC+DC meas	surement	a and ourrant			
	AC+DC Umn: AC+DC	S values for both voltag	e and current			
	Display of average	value rectified RMS co	nverted values for			
		VS values for current				
	DC: DC measurement					
	Display of simple a	verages for both voltag				
		alculated by (voltage D	C value)× (current DC			
	value) for active po					
	AC: AC measurement		ltage and surrent			
		alculated by for both vo alculated by (AC+DC				
	for active power		value) - (DC value)			
	FND					
	Extraction and display of the fundamental wave component					
	from harmonic measurement					
Zero-Crossing	500 Hz/200 kHz 500 Hz: 0.1 Hz to 500 Hz, 200 kHz: 0.1 Hz to 200 kHz					
Filter Measurement accuracy	500 HZ: 0.1 HZ to 500	HZ, 200 KHZ: 0.1 HZ to				
Voltage	1	50%f= {l==++ + 100%f=	1000/6- 11			
Frequency (f)	Input < 50% f.s.	50%f.s. ≤ Input < 100%f.s.	100%f.s. ≤ Input			
	±0.1%rdg. ±0.1%f.s.	±0.1%rdg.±0.1%f.s.	±0.2%rdg.			
0.1Hz ≤ f < 16Hz 16Hz ≤ f < 45Hz	±0.1%rdg. ±0.2%f.s.	±0.3%rdg. ±0.2%rdg.	±0.3%rdg. ±0.2%rdg.			
	±0.1%rdg. ±0.1%f.s.		±0.2%rug.			
$45Hz \le f \le 66Hz$	±0.1%rdg. ±0.05%f.s.	±0.15%rdg.	±0.15%rdg.			
$\frac{66\text{Hz} < f \le 500\text{Hz}}{500\text{Hz} < f \le 10\text{kHz}}$	±0.1%rdg. ±0.1%f.s.	±0.2%rdg.	±0.2%rdg.			
		±0.3%rdg.	±0.3%rdg. ±0.8%rdg.			
$\frac{10 \text{kHz} < \text{f} \le 50 \text{kHz}}{50 \text{kHz} < \text{f} \le 100 \text{kHz}}$		±0.8%rdg. ±2.4%rdg.	±0.8%rdg.			
	1.0 /01.5.	±2.4 /01Uy.	±2.4 /orug.			
Current (direct input)	lnput < 50% f.s.	50%f.s. ≤ Input < 100%f.s.	100% fo < loput			
Frequency (f) DC	Input < 50% f.s. ±0.1%rdg. ±0.1%f.s.	±0.1%rdg. ±0.1%f.s.	100%f.s. ≤ Input ±0.2%rdg.			
0.1Hz ≤ f < 16Hz	±0.1%rdg. ±0.2%f.s.	±0.3%rdg.	±0.2%rdg.			
16Hz ≤ f < 45Hz	±0.1%rdg. ±0.1%f.s.	±0.2%rdg.	±0.2%rdg.			
$45Hz \le f \le 66Hz$	±0.1%rdg. ±0.05%f.s.	±0.15%rdg.	±0.15%rdg.			
66Hz < f ≤ 500Hz		±0.2%rdg.	±0.2%rdg.			
500Hz < f ≤ 1kHz	±0.1%rdg. ±0.2%f.s.	±0.3%rdg.	±0.3%rdg.			
$1 \text{ kHz} < f \le 10 \text{ kHz}$	±(0.03+0.07×F)%rdg.		±(0.23+0.07×F)%rdg.			
	±0.2%f.s.					
101/17 2 4 2 1001/1-		10 G 0 0 4. F\9/	1061004. F10/			
10kHz < f ≤ 100kHz		±(0.6+0.04×F)%rdg.	±(0.6+0.04×F)%rdg.			

	uency (f)	Input < 50% f.s.	50%f.s.≤Input < 100%f.s			
	DC	±0.1%rdg. ±0.1%f.s.	±0.1%rdg. ±0.1%f.s.	±0.2%rdg.		
	≤f < 16Hz	±0.1%rdg. ±0.2%f.s.	±0.3%rdg.	±0.3%rdg.		
	≦f < 45Hz ≦f ≤ 66Hz	±0.1%rdg. ±0.1%f.s.	±0.2%rdg. ±0.15%rdg.	±0.2%rdg.		
	$f \le 500Hz$		±0.15%rdg.	±0.15%rdg. ±0.2%rdg.		
500Hz < f ≤ 1kHz			±0.3%rdg.	±0.3%rdg.		
	f ≤ 10kHz	±(0.03+0.07×F)%rdg. ±0.2%f.s.	±(0.23+0.07×F)%rdg.			
	< f ≤ 50kHz	±(0.07×F)%rdg. ±0.3%f.s.	±(0.3+0.07×F)%rdg.			
50kHz <	f≤100kHz	±0.3%f.s.	±(0.9+0.07×F)%rdg.			
		 Values for f.s. depen "F" in the tables refer Add ±1mA to DC me Add (±1mA) x (voltage real 	rs to the frequency in asurement accuracy f	kHz. or current.		
		power. • When using the 200r current and active po • Values for voltage, c 0.1Hz ≤ f < 10Hz are	mA or 500mA range, a wer for which 1kHz < urrent, and active pow	add ±0.1% rdg. to f≤10kHz.		
		 Values for voltage, cr 	urrent, and active pow f < 16Hz are for refer id active power in exci re for reference only. id active power in exci are for reference only.	ence only. ess of 20A for which ess of 15A for which		
Guarante		30 kHz < f ≤ 100 kHz a 1 year				
accuracy Post-adjus	tment	6 months				
accuracy c Maximum peak volta		±600% of each voltag However, for 300 V, 60		es +1500 Vpeak		
Maximum	effective	±600% of each curren	t range	PG 65		
peak curr		However, for 20 A rang Temperature and hum	ge and 50 A range, ±1	00 Apeak		
Condition guarantee		Temperature and hum Warm-up time: 30 min	iaity: 23°C ±5°C, 80% utes	HH OF IESS		
accuracy		Input: Sine wave input, voltage of 0V, af		ithin range in which th		
Temperature of		±0.03% f.s. per °C or I	ess			
Power fac		$\pm 0.1\%$ f.s. or less (45 to 66 Hz, at power factor = 0) Internal circuitry voltage/current phase difference: $\pm 0.0573^{\circ}$				
mode volt	age	±0.02% f.s. or less (600 V, 50/60 Hz, app		minals and enclosure		
Effect of e magnetic		400 A/m, DC and 50/6 Voltage :±1.5% f.				
interferen		Current :±1.5% f.s. or ±10 mA, whichever is greater, or less Active power :±3.0% f.s. or (voltage influence quantity) × (±10 mA) whichever is greater, or less				
Magnetiza effect	ation	±10 mA equivalent or less (after inputting 100 A DC to the current direct input terminals)				
Adjacent	channel	±10 mA equivalent or less				
input effe		(when inputting 50 A to				
Voltage/	Current	/ Active Power Me	easurement Spec	ifications		
Measurem		Rectifiers: AC+DC, DC	C, AC, FND, AC+DC U			
	ent types	Rectifiers: AC+DC, DC Voltage: 1% to 130 (However, Current: 1% to 130	C, AC, FND, AC+DC U D% of range up to ±1500 V peak value D% of range	mn		
Measurem Effective	ent types	Rectifiers: AC+DC, DC Voltage: 1% to 130 (However, 1% Current: 1% to 130 Active power: 0% to 160 (However	C, AC, FND, AC+DC U)% of range up to ±1500 V peak value 0% of range 9% of the range r, defined when the vo	mn and 1000 V RMS value) Itage and current fall		
Measurem Effective	ent types g range	Rectifiers: AC+DC, DC Voltage: 1% to 133 (However, Current: 1% to 133 Active power: 0% to 163 (However within the Voltage/ Current: 0.5% to	2. AC, FND, AC+DC U 2% of range 1500 V peak value 2% of range 3% of the range 3% of the range 40% of range zero-suppr 140% of range zero-suppr	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5		
Measurem Effective measuring	ent types g range	Rectifiers: AC+DC, DC Voltage: 1% to 13 (However, Current: 1% to 130 Active power: 0% to 166 (However within the Voltage/ Current: 0.5% to Active power: 0% to Voltage/ Current: Displa	2, AC, FND, AC+DC U 3% of range 1% of range 3% of the range 3% of the range 46 of the range 46 of the range 40% of range (zero suppr 196% of the range (nc yed when using DC re	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5 zero-suppression) : zero-suppression) : zetifiler		
Measurem Effective measuring Display ra Polarity	ent types g range inge	Rectifiers: AC+DC, DC Voltage: 1% to 13 (However, Current: 1% to 130 (Active power: 0% to 166 (However within the Voltage/Current: 05% to Active power: 0% to Voltage/Current: Displa Active power: +: Pos _: Reç	2, AC, FND, AC+DC U 2% of range up to ±1500 V peak value 2% of the range 2% of the range 2% of the range 140% of range (zero suppr 196% of the range (nc yed when using DC re titve: Power consumption generated power	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5 zero-suppression) cetifier n (no polarity display)		
Measurem Effective measuring Display ra Polarity	ent types g range inge Current/	Rectifiers: AC+DC, DC Voltage: 1% to 130 (However, Current: 1% to 133 Active power: 0% to 166 (However, within the Voltage/Current: 0.5% to Active power: 0% to Voltage/Current: Displa Active power: % to	AC, FND, AC+DC U Xor range You to ±1500 V peak value You to ±1500 V peak value You to ±1500 V peak value You the range You Yo	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5 zero-suppression) cetifier n (no polarity display)		
Measurem Effective measuring Display ra Polarity Voltage/	ent types g range inge Current/	Rectifiers: AC+DC, DC Voltage: 1% to 13 (However, Current: 1% to 130 Active power: 0% to 166 (However within the Voltage/Current: 05% to Active power: 0% to Voltage/Current: Displa Active power: +: Pos -: Reg Active power channe	AC, FND, AC+DC U Xor range You to ±1500 V peak value You to ±1500 V peak value You to ±1500 V peak value You the range You Yo	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5 zero-suppression) cetifier n (no polarity display) alculation formula		
Measurem Effective measuring Display ra Polarity Voltage/ Wir	ent types g range inge Current/ , ing 1P2W 1P3W 3P3W	Rectifiers: AC+DC, DC Voltage: 1% to 13 (However, Current: 1% to 133 Active power: 0% to 165 (However, Within the Voltage/Current: 0.5% to Active power: Active power: 0% to Voltage/Current: Voltage/Current: Displa Active power: + Pos 	AC, FND, AC+DC U Xor (AC, FND, AC+DC U Yo (AC, FND, AC+DC U Yo (AC, FARGE Yo (AC, AC, AC, AC, AC, AC, AC, AC, AC, AC,	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5 zero-suppression) cetifier n (no polarity display) alculation formula		
Measurem Effective measuring Display ra Polarity Voltage/ Wir All channels Sum values	ent types g range inge Current/ ipg 1P2W 1P3W 3P3W 3P3W3 3P3W2M 3P3W3M 3P4W	Rectifiers: AC+DC, DC Voltage: 1% to 13C (However, 1 1% to 13C Active power: 0% to 16C (However, 1 1% to 13C Active power: 0% to 16C (However, 1 1% to 13C Active power: 0% to 16C Active power: 0% to 16C Voltage/Current: Displa Active power: 0% to 16C Voltage/Current: Displa Active power: +: Pos -: Rec Active power channe -: X: U (Voltage) or 1 (0 X(1) Xsum = $\frac{1}{2}(X_{(1)} + X_{(2)})$ Xsum = $\frac{1}{3}(X_{(1)} + X_{(2)})$ Xsum = $\frac{1}{3}(X_{(1)} + X_{(2)})$	C. AC, FND, AC+DC U 2, AC, FND, AC+DC U 1% of range 1% of range 1% of the range 160% of the range (recover) 196% of the range (recover) 197	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5 zero-suppression) citifier n (no polarity display) alculation formula (Active power)		
Measurem Effective measuring Display ra Polarity Voltage/ Wir All channels Sum values i): Measu	ent types g range inge Current/ ipg 1P2W 1P3W 3P3W 3P3W3M 3P3W3M 3P3W3M 3P4W urement ch	Rectifiers: AC+DC, DC Voltage: 1% to 13 (However, 1 Active power: 0% to 168 (However, 1 Voltage/ Current: 0% to 168 (However within the Voltage/ Current: 05% to Active power: 0% to Voltage/ Current: Displa Active power: + Pos -: Rec Active power channe X: U (Voltage) or 1 ((X(t)) Xsum = $\frac{1}{3}(X_{(1)} + X_{(2)})$ annel	C. AC, FND, AC+DC U $2, AC, FND, AC+DC U$ 3% of range 3% of range 3% of the range (no. 140% of range (zero suppr generated power el and sum value c Current) P $P(i)$ $p)$ Psum = $(z) + X(3)$ Psum =	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5 zero-suppression) sotifier n (no polarity display) alculation formula (Active power) = $(P(r_1) + P(z) + P(s))$		
Measurem Effective measuring Display ra Polarity Voltage/ Wir All channels Sum values i): Measu /oltage Wa	ent types g range inge Current/ ing 1P2W 1P3W 3P3W2M 3P3W2M 3V3A 3P3W3M 3P4W arement ch aveform Pe	Rectifiers: AC+DC, DC Voltage: 1% to 13 (However, 1 1% to 130 Active power: 0% to 160 (However, 1 1% to 130 Active power: 0% to 160 Voltage/Current: 05% to 360 Active power: 0% to 160 Voltage/Current: 05% to 360 Active power: 0% to 50% Active power: 0% to 100 Xitup power: 0% to 100 X: U (Voltage) or 100 X: U (Voltage) or 100 X: U (Voltage) or 100 X: Xsum = $\frac{1}{2}(X(t) + X(t))$ Assum = $\frac{1}{3}(X(t) + X(t))$ annel annel	C. AC, FND, AC+DC U 2, AC, FND, AC+DC U 1% of range 1% of range 2% of the range 3% of the range 3% of range 2% of the range (range) 160% of range (zero-suppr 196% of the range (nc, yed when using DC refitive: Power consumption (see resumption (see resumptin (see resumption (see resumption (see resum	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5 sectifier n (no polarity display) alculation formula (Active power) = $(P(1) + P(2) + P(3))$ = urement Specifications		
Measurem Effective measuring Display ra Polarity Voltage/ Wir All channels Sum values i): Measuren Measuren	ent types g range inge Current/ ing 1P2W 1P3W 3P3W2M 3P3W2M 3V3A 3P3W3M 3P4W arement ch aveform Pe	Rectifiers: AC+DC, DC Voltage: 1% to 13C (However, Current: 1% to 13C Active power: 0% to 16C (However within the Voltage/Current: 0.5% to Active power: 0% to Voltage/Current: Displa Active power: 0% to Voltage/Current: Displa Active power: -0% to Voltage/Current: Displa Active power: -0% to Voltage/Current: Displa Active power channe X: U (Voltage) or 1 (C X(1) Xsum = $\frac{1}{2}$ (X(1) + X(2) Assum = $\frac{1}{3}$ (X(1) + X(2) annel ak Value / Current Wave Measures the wavefor	C. AC, FND, AC+DC U 2, AC, FND, AC+DC U 1% of range 1% of range 1% of range 1% of the range (zero-suppr 140% of range (zero-suppr 140% of the range (nor yed when using DC range vero-suppri 196% of the range (nor yed when using DC range (zero-suppr 196% of the range (nor yed when using DC range (zero-suppr 196% of the range (zero-suppr el and sum value C Current) P 10 Psum= (2) + X(3)) Psum= form Peak Value Measing m's peak value (for bo	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5. zero-suppression) citifier n (no polarity display) alculation formula (Active power) = $(P(1) + P(2) + P(3))$ = urement Specification: th positive and		
Measurem Effective measuring Display ra Polarity Voltage/ Wir All chamels Sum values i): Measu /ottage Wa Measuren method Sampling	ent types g range inge Current/ ing 1P2W 1P3W 3P3W 3P3W2M 3P3W2M 3P3W2M 3P3W3M 3P4W arement ch aveform Pe nent frequency	Rectifiers: AC+DC, DC Voltage: 1% to 13 (However, 1 1% to 130 Active power: 0% to 160 (However, 1 1% to 130 Active power: 0% to 160 Voltage/Current: 05% to 360 Active power: 0% to 160 Voltage/Current: 05% to 360 Active power: 0% to 50% Active power: 0% to 100 Xitup power: 0% to 100 X: U (Voltage) or 100 X: U (Voltage) or 100 X: U (Voltage) or 100 X: Xsum = $\frac{1}{2}(X(t) + X(t))$ Assum = $\frac{1}{3}(X(t) + X(t))$ annel annel	C. AC, FND, AC+DC U 2, AC, FND, AC+DC U 1% of range 1% of range 1% of range 1% of the range (zero-suppr 140% of range (zero-suppr 140% of the range (nor yed when using DC range vero-suppri 196% of the range (nor yed when using DC range (zero-suppr 196% of the range (nor yed when using DC range (zero-suppr 196% of the range (zero-suppr el and sum value C Current) P 10 Psum= (2) + X(3)) Psum= form Peak Value Measing m's peak value (for bo	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5. zero-suppression) citifier n (no polarity display) alculation formula (Active power) = $(P(1) + P(2) + P(3))$ = urement Specification: th positive and		
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Measurem Effective measuring Display ra Polarity Voltage/ Wir All channels Sum values i): Measurem method Sampling Voltage Voltage Voltage Voltage Current p Current Current p Measurem accuracy Effective measuring Display ra	ent types g range g range inge Current/, ing 1P2W 1P3W 3P3W 3P3W2M 3P3W3	Rectifiers: AC+DC, DC Voltage: 1% to 13C (However, 1% to 13C Active power: 0% to 13C (However, 1% to 13C Active power: 0% to 13C Active power: 0% to 13C Active power: 0% to Voltage/Current: Displa Active power:	C. AC, FND, AC+DC U $2, AC, FND, AC+DC U$ $2, AC, FND, AC+DC U$ $2, C, FND, AC+DC U$ $2, Crange$ $2, C, Tange$ $2, C, Tange$ $2, C, Tange$ $2, C, C, Tange$ $2, C, C, Tange$ $2, C, C, Tange$ $2, C, C,$	mn and 1000 V RMS value) ltage and current fall nt range.) ession when less than 0.5 zetro-suppression) rotifier n (no polarity display) alculation formula (Active power) = $(P(1) + P(2) + P(3))$ = $(P(1) + P(2) + P(3))$ = $(P(1) + P(2) + P(3))$ urement Specification: th positive and aneous voltage value $P(1) = 600V [1000OkV] 3.6000kV [6.000C]10A 20A 50,00A 120.00A 300,t accuracy at DC am-nge or current peak1 Hz \leq f < 10 Hz and\pm 1500 V) or\pm 100 A)urrent peak rangesuppression)$		
Measurem Effective measuring Display ra Polarity Voltage/ Wir All channels Sum Values i): Measurem Sambling Voltage p Voltage p	ent types g range g range inge Current/, ing 1P2W 1P3W 3P3W 3P3W3M 3P3W3	Rectifiers: AC+DC, DC Voltage: 1% to 13C (However, C 1% to 13C (However, C 1% to 13C Active power: 0% to 13C Active power: + Pos Active power: - Pos Active power: - Pos X: U/voltage) or / ((X: // (Voltage) or / ((Active polarity base Approx. 700 kHz 15V 300V (90.000V1 180.00	C. AC, FND, AC+DC U $2, AC, FND, AC+DC U$ 3% of range 3% of the range 3% of the range 3% of range (zero-supprid) 140% of the range (nc. Current) $P(i)$ 0 $P(i)$ 0 $P(i)$ 0 $P(i)$ 0 $P(i)$ $(2) + X(3)$ $Psum =$ form Peak Value Meassim's peak value (for bo ad on sampled instant $60V$ $150V$ 300 $0.00V$ $900.00V$ 1.800 $(2, 5)$ $5A$ $0A$ $(2, 5)$ $5A$ $0A$ $(2, 5)$ $0A$ $12.000A$ $2A$	mn and 1000 V RMS value) Itage and current fall nt range.) ession when less than 0.5 zero-suppression) ctifier n (no polarity display) alculation formula ((Active power) = $(P(r) + P(z) + P(z))$ = $(P(r) + P(z) + P(z))$ = $(P(r) + P(z) + P(z))$ urement Specification: th positive and aneous voltage value $P(T) = 0.000 \times 1000$ 0kV 6.000V 1000 0kV 3.6000kV 6.000C 10A 20A 50, 0.000A 120.00A 300.0 tt accuracy at DC an nge or current peak 1 Hz ≤ f < 10 Hz and ± 1500 V) or ±100 A) urrent peak range suppression) nent Specification		
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Voltage Ripple Rate / Current Ripple Factor Measurement Specifications

Measurement	Calculates the AC component (peak to peak [peak width]) as a
method	proportion of the voltage or current DC component
	As per voltage and voltage waveform peak value or current and
measuring range	current waveform peak value effective measurement ranges
Display range	0.00[%] to 500.00[%]
Polarity	None

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

Measurement	Rectifiers		
types	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 196% 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 channel and sum value calculation formulas

Wir	ring	S: Apparent power	Q: Reactive power	
All channels	1P2W	$S_{(i)} = U_{(i)} \times I_{(i)}$	$Q(i) = si(i)\sqrt{S(i)^2 - P(i)^2}$	
1P3W	1P3W	$S_{sum} = S_{(1)} + S_{(2)}$		
Sum	3P3W	$S_{sum} = \frac{\sqrt{3}}{2} (S_{(1)} + S_{(2)})$	$Q_{sum} = Q_{(1)} + Q_{(2)}$	
values	3P3W2M 3V3A	$S_{sum} = \frac{\sqrt{3}}{3} (S_{(1)} + S_{(2)} + S_{(3)})$		
	3P3W3M 3P4W	$S_{sum} = S_{(1)} + S_{(2)} + S_{(3)}$	$Q_{sum} = Q_{(1)} + Q_{(2)} + Q_{(3)}$	

(i): Measurement channel

Wir	ring	$oldsymbol{\lambda}$: Power factor	$oldsymbol{\phi}$: Phase angle
Allchannels	1P2W	$\lambda(i) = SI(i) \frac{P_{(i)}}{S_{(i)}}$	$\phi_{(i)} = si_{(i)} \cos^{-1}l \lambda_{(i)}l$
Sum values	1P3W 3P3W 3P3W2M 3V3A 3P3W3M 3P4W	λsum = Sisum <mark>Peum</mark> Sum	$ \begin{array}{l} \label{eq:when Psum \geq 0} \\ \varphi_{sum} = Sisum \ cos^{-1} \lambda \ sum \\ (0^{\circ} \ to \ \pm 90^{\circ}) \\ \ When \ Psum \geq 0 \\ \varphi_{sum} = Sisum \ 1180 - \ cos^{-1} \lambda \ sum \\ (\pm 90^{\circ} \ to \ \pm 180^{\circ}) \\ \end{array} $

(i): Measurement channel ; The polarity symbol sisum is acquired from the Qsum symbol.

Frequency Measurement Specifications

channels	la ch	
Measurement source Select from U (VHz) or I (AHz) by channel		
Measurement method	Calculated from input waveform period (reciprocal method)	
Measurement range	500 Hz/ 200 kHz (linked to zero-cross filter)	
Measurement accuracy	±0.1% rdg. ±1 dgt. (0°C to 40°C)	
Effective measuring		
range	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.	
Display format	0.1000 Hz to 9.9999 Hz, 9.900 Hz to 99.999 Hz, 99.00 Hz to 999.99 Hz,	
	9900 kHz to 9 9999 kHz 9 900 kHz to 99 999 kHz 99 00 kHz to 220 00 kHz	

Efficiency Measurement Specifications

Measurement method	Calculates the efficiency h [%] from the ratio of active power values for channels and wires						
Wiring modes and calculation	Calculated based on the AC+DC rectifier active power PW3336						
equations	Wiring	CH1	CH2	Calculation formulas			
	1P2W × 2	1P2W	1P2W	η1=100× P2 / P1 η2=100× P1 / P2			
	1P3W	1P(3W				
	3P3W	3P3					
	3P3W2M	3P3\	V2M				
	PW3337						
	Wiring	CH1	CH2	CH3	Calculation formulas		
	1P2W × 3	1P2W	1P2W	1P2W	η1=100× P3 / P1 n2=100× P1 / P3		
	1P3W & 1P2W	1P3	3W	1P2W	η1=100× P3 / Psum		
	3P3W & 1P2W	3P3		1P2W	n2=100×IPsum / IP3		
	3P3W2M	3P3W2M					
	3V3A	3V3A					
	3P3W3M	3P3W3M		1			
3P4W 3P4W							
Effective measuring range	As per the active power effective measurement range.						

Display range 0.00[%] to 200.00[%]

Time Average Current / Time Average Active Power Measurement Specifications (T.AV) Measurement method Calculates the average by dividing the integrated value by the integration time Measurement accuracy 1±(Current or active power measurement accuracy) ±(±0.01%rdg. ±1dgt.) Effective measuring range IAs per the current or active power effective measurement range

Functional Specifications

i uncional opecifications							
Automatically changes the voltage and current range for each				٦			
		mpar					
The range is incre					ls 1309	% of th	е
Range down:							
is exceeded at th	e lowei	r range	э.				
Averages the voltage, current, active power, apparent power, an reactive power.			r, and				
 The power factor and ph 	ase an	gle are	calcu	lated fr	rom ave	eraged	data.
Measured values other	than p	5eak v	alues,	power	r facto	r, frequ	Jency,
integrated values, T.AV, crest factor, ripple rate, total harmonic							
distortion, and harmonics are averaged.							
Method : Simple ave	raging		-				
Number of averaging iterations and display update interv			nterva	l			
Number of averaging iterations	1 (OFF)	2	5	10	25	50	100
Display update interval	200ms	400ms	1s	2s	5s	10s	20s
	Automatically changes wiring mode according Range up: The range is incre range or when the Range down: The range is decr range. However, 1 is exceeded at th • Averages the voltage, reactive power. • The power factor and pf • Measured values other integrated values, T.At distortion, and harmon Method : Simple ave Number of averaging Number of averaging	Automatically changes the vol wiring mode according to the Range up: The range is increased range or when the peak Range down: The range is decreased range. However, the ran is exceeded at the lowe - Averages the voltage, curren reactive power. The power factor and phase an Measured values other than n integrated values, T.AV, cress distortion, and harmonics are Method : Simple averaging Number of averaging iterat	Automatically changes the voltage a wiring mode according to the input Range up: The range is increased when i range or when the peak is exc Range down: The range is decreased when range. However, the range is r is exceeded at the lower range • Averages the voltage, current, activ reactive power. The power factor and phase angle are Measured values other than peak v integrated values other than peak v integrated values are avera Method : Simple averaging Number of averaging iterations an Number of averaging iterations an	Automatically changes the voltage and cuiwiring mode according to the input Range up: The range is increased when input erange or when the peak is exceeded and the input range. However, the range is not details exceeded at the lower range. • Averages the voltage, current, active powreactive power. • The cange is decreased when input range. However, the range is not details exceeded at the lower range. • Averages the voltage, current, active powreactive power. • The power factor and phase angle are calcu • Measured values other than peak values, integrated values. T-X, crest factor, ripple distortion, and harmonics are averaged. Method : Simple averaging iterations and distortion of averaging iterations and distortion of averaging iterations and distortion.	Automatically changes the voltage and current ra wiring mode according to the input Range up: The range is increased when input exceed range or when the peak is exceeded. Range down: The range is decreased when input falls bin range. However, the range is not decrease is exceeded at the lower range. Averages the voltage, current, active power, appreactive power. The power factor and phase angle are calculated fi Measured values other than peak values, powe integrated values, T.AV, crest factor, ripple rate, distortion, and harmonics are averaged. Method : Simple averaging Number of averaging iterations and display up Number of averaging iterations [1 (0FF)] 2 5 10	Automatically changes the voltage and current range for wiring mode according to the input Range up: The range is increased when input exceeds 1305 range or when the peak is exceeded. Range down: The range is decreased when input falls below 1: range. However, the range is not decreased when is exceeded at the lower range. •Averages the voltage, current, active power, apparent reactive power. •The power factor and phase angle are calculated from ave Measured values other than peak values, power factor integrated values. TAV, crest factor, ripple rate, total h distortion, and harmonics are averaged. Mumber of averaging iterations and display update i Number of averaging iterations 110[FF]_2 5 10 25	Automatically changes the voltage and current range for each wiring mode according to the input Range up: 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 1 range. However, the range is not decreased when the p is exceeded at the lower range. • Averages the voltage, current, active power, apparent power reactive power. • The power factor and phase angle are calculated from averaged whether than peak values, power factor, frequintegrated values, T-XV, crest factor, ripple rate, total harmori distortion, and harmonics are averaged. Method: Simple averaging Number of averaging iterations and display update interval Number of averaging iterations

Scaling (VT, CT)	Applies user-defined VT and CT ratio settings to measured values. These settings can be configured separately for each wiring mode.			
(*1, 01)	VT ratio setting range $OFE(1.0) = 0.1$ to 1000 (setting 0000)			
HOLD	CT ratio setting range : OFF (1.0), 0.001 to 1000 (setting: 0000) • Stops display updates for all measured values and fixes the			
(HOLD)	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.			
Maximum value/	Analog output and waveform output are not held.			
Maximum value/ minimum value	Detects maximum and minimum measured values as well as maximum and minimum values for the voltage and current			
hold	waveform peak and holds them on the display.			
(MAX/MIN HOLD)	 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.			
Zero Adjustment	Degausses the current input unit DCCT and then zeroes out the			
(0 ADJ) Key-lock	current input offset. Disables key input in the measurement state, except for the SHIFT			
(KEY LOCK)	key and KEY LOCK key.			
Backup	Backs up settings and integration data if the instrument is turned			
System Reset	off and if a power outage occurs. Initializes the instrument's settings. Communications-related settings			
eyetem neeet	(communications speed, address, and LAN-related settings) are not initialized			
Integration Mea	surement Specifications			
	Simultaneous integration of the following 6 parameters for each channel			
	(total of 18 parameters):			
	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)			
Measurement types	Negative active power integrated value (displayed as Wh- on panel display Rectifiers: AC+DC, AC+DC Umn			
model and more types	Current:			
	Displays the result of integrating current RMS value data			
	(display values) once every display update interval (approx. 200 ms) 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 (When the active power contains both AC and DC, the			
	DC component will not be integrated)			
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	Until PEAK OVER U or PEAK OVER I occurs			
Display resolution	999999 (6 digits + decimal point)			
Functions	Stopping integration based on integration time setting (timer) 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 outage			
External control	 Stopping integration when power returns Stopping/starting integration and resetting integrated values based on external control 			
Measuring range	Corresponds to the range set for START integretation			
Harmonic Meas	urement Specifications (built-in function)			
Measurement	· Zero-cross simultaneous calculation method (separate windows			
method	by channel according to the wiring mode)			
	 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			
Synchronization source	 » No gaps or overlap will occur Conforms to synchronization source (SYNC) for the basic measurement specification 			
Measurement channels				
	·Harmonic voltage RMS value ·Harmonic voltage content %			
	Harmonic voltage phase angle Harmonic current RMS value			
	Harmonic current content % Harmonic active power Harmonic active power			
	Harmonic voltage current phase difference Total harmonic voltage distortion Total harmonic current distortion Voltage fundamental waveform			
	Harmonic voltage current phase difference Total harmonic voltage distortion Total harmonic current distortion Voltage fundamental waveform Active power fundamental waveform			
	Harmonic voltage current phase difference - Total harmonic voltage distortion Total harmonic current distortion - Voltage fundamental waveform Current fundamental waveform - Active power fundamental waveform Apparent power fundamental waveform - Reactive power fundamental waveform Power factor fundamental waveform			
	Harmonic voltage current phase difference -Total harmonic voltage distortion Total harmonic current distortion Current fundamental waveform Apparent power fundamental waveform Power factor fundamental waveform Power factor fundamental waveform Pouge current phase difference fundamental waveform			
	Harmonic voltage current phase difference - Total harmonic voltage distortion Total harmonic current distortion - Voltage fundamental waveform Current fundamental waveform - Active power fundamental waveform Poper factor fundamental waveform - Reactive power fundamental waveform Power factor fundamental waveform Voltage current phase difference fundamental waveform Interchannel voltage fundamental wave phase difference			
	Harmonic voltage current phase difference - Total harmonic voltage distortion Total harmonic current distortion - Voltage fundamental waveform Current fundamental waveform - Active power fundamental waveform Power factor fundamental waveform Power factor fundamental waveform Voltage current phase difference fundamental waveform Interchannel voltage fundamental wave phase difference Interchannel current fundamental wave phase difference			
	Harmonic voltage current phase difference - Total harmonic voltage distortion Total harmonic current distortion - Voltage fundamental waveform Current fundamental waveform - Active power fundamental waveform Poper factor fundamental waveform - Reactive power fundamental waveform Power factor fundamental waveform Voltage current phase difference fundamental waveform Interchannel voltage fundamental wave phase difference			
	Harmonic voltage current phase difference - Total harmonic voltage distortion Total harmonic current distortion - Voltage fundamental waveform Current fundamental waveform - Active power fundamental waveform Power factor fundamental waveform - Reactive power fundamental waveform Power factor fundamental waveform Voltage current phase difference fundamental waveform Interchannel voltage fundamental wave phase difference Interchannel current fundamental wave phase difference Interchannel current fundamental wave phase difference The following parameters can be downloaded as data during PC communication but not displayed: Harmonic voltage phase angle - Harmonic current phase angle			
	Harmonic voltage current phase difference -Total harmonic voltage distortion Total harmonic current distortion Voltage fundamental waveform Apparent power fundamental waveform Apparent power fundamental waveform Power factor fundamental waveform Voltage current phase difference fundamental waveform Voltage current phase difference fundamental waveform Voltage current phase difference fundamental waveform Interchannel voltage fundamental wave phase difference The following parameters can be downloaded as data during PC communication but not displayed: Harmonic voltage current phase angle Harmonic voltage current phase difference			
	Harmonic voltage current phase difference -Total harmonic voltage distortion Total harmonic current distortion Current fundamental waveform Apparent power fundamental waveform Power factor fundamental waveform Power factor fundamental waveform Power factor fundamental waveform Power factor fundamental waveform Nottage current phase difference fundamental waveform Interchannel voltage fundamental wave phase difference Interchannel current phase difference Harmonic voltage phase angle Harmonic current phase angle 22 bits			
Number of FFT points	Harmonic voltage current phase difference -Total harmonic voltage distortion Total harmonic current distortion Current fundamental waveform Apparent power fundamental waveform Power factor fundamental waveform Power factor fundamental waveform Power factor fundamental waveform Power factor fundamental waveform Nottage current phase difference fundamental waveform Interchannel voltage fundamental wave phase difference Interchannel current phase difference Harmonic voltage phase angle Harmonic current phase angle 22 bits			
Number of FFT points Window function	 Harmonic voltage current phase difference -Total harmonic voltage distortion Total harmonic current distortion Voltage fundamental waveform Active power fundamental waveform Apparent power fundamental waveform Reactive power fundamental waveform Power factor fundamental waveform Reactive power fundamental waveform Interchannel voltage fundamental waveform Interchannel voltage fundamental wave phase difference Interchannel voltage fundamental wave phase difference Interchannel voltage fundamental wave phase difference Interchannel voltage phase angle Harmonic voltage current phase difference Harmonic voltage current phase difference Harmonic voltage current phase difference Base difference Harmonic voltage current phase difference 4096 Rectangular 45 Hz ≤ f < 56 Hz: 178.57 ms to 222.22 ms (10 cycles) 			
Number of FFT points Window function	$\label{eq:approx_stage_stress} \begin{array}{l} -\text{Harmonic voltage distortion} \\ -\text{Total harmonic current distortion} \\ -\text{Voltage fundamental waveform} \\ -\text{Current fundamental waveform} \\ -\text{Active power fundamental waveform} \\ -\text{Active power fundamental waveform} \\ -\text{Power factor fundamental waveform} \\ -\text{Reactive power fundamental waveform} \\ -\text{Voltage current phase difference fundamental waveform} \\ -\text{Interchannel voltage fundamental waveform} \\ -\text{Interchannel voltage fundamental wave phase difference} \\ -\text{Interchannel voltage fundamental wave phase difference} \\ -\text{Interchannel voltage fundamental wave phase difference} \\ -\text{Interchannel voltage phase angle} \\ -\text{Harmonic voltage urrent phase difference} \\ -\text{Harmonic voltage current phase difference} \\ -\text{Harmonic voltage current phase difference} \\ -\text{Marmonic voltage trend phase trend phase difference} \\ -\text{Marmonic voltage trend phase trend phase} \\ -\text{Marmonic voltage trend phase} \\ -Marmonic volt$			
Number of FFT points Window function Analysis window width	 Harmonic voltage current phase difference -Total harmonic voltage distortion Total harmonic current distortion Voltage fundamental waveform Active power fundamental waveform Apparent power fundamental waveform Reactive power fundamental waveform Voltage current phase difference fundamental waveform Voltage current phase difference fundamental waveform Interchannel voltage fundamental wave phase difference Interchannel voltage fundamental wave phase difference Interchannel current fundamental wave phase difference Hollowing parameters can be downloaded as data during PC communication but not displayed: Harmonic voltage current phase angle Harmonic voltage current phase difference 32 bits 4096 Rectangular 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 			
Number of FFT points Window function Analysis window width Data update rate	 Harmonic voltage current phase difference -Total harmonic voltage distortion Total harmonic current distortion Voltage fundamental waveform Active power fundamental waveform Active power fundamental waveform Power factor fundamental waveform Reactive power fundamental waveform Voltage current phase difference fundamental waveform Interchannel voltage fundamental wave phase difference Interchannel voltage fundamental wave phase difference Interchannel voltage fundamental wave phase difference Interchannel voltage hase angle Harmonic voltage current phase difference Harmonic voltage current phase difference Harmonic voltage current phase difference 32 bits 4096 Rectangular 45 Hz ≤ f < 56 Hz: 178.57 ms to 222.22 ms (10 cycles) 56 Hz ≤ f < 66 Hz: 178.57 ms to 214.29 ms (12 cycles) Frequencies other than the above: 185.92 ms to 214.08 ms Depends on window width 			
Number of FFT points Window function Analysis window width Data update rate Synchronization	 Harmonic voltage current phase difference -Total harmonic voltage distortion -Total harmonic current distortion -Voltage fundamental waveform -Apparent power fundamental waveform -Apparent power fundamental waveform -Power factor fundamental waveform -Voltage current phase difference fundamental waveform -Voltage current phase difference fundamental waveform -Voltage current phase difference fundamental waveform -Voltage current fundamental wave phase difference -Interchannel voltage fundamental wave phase difference -Interchannel current fundamental wave phase difference -Interchannel current fundamental wave phase difference -Harmonic voltage phase angle -Harmonic voltage current phase difference -Harmonic voltage current phase difference			
Number of FFT points Window function Analysis window width Data update rate Synchronization frequency range Maximum	 Harmonic voltage current phase difference -Total harmonic voltage distortion Total harmonic current distortion Voltage fundamental waveform Active power fundamental waveform Active power fundamental waveform Power factor fundamental waveform Netactive power fundamental waveform Voltage current phase difference fundamental waveform Interchannel voltage fundamental wave phase difference Interchannel voltage phase angle Harmonic voltage current phase difference 32 bits Harmonic voltage current phase difference St Hz ≤ f < 56 Hz: 178.57 ms to 222.22 ms (10 cycles) 56 Hz ≤ f < 56 Hz: 178.57 ms to 214.29 ms (12 cycles) Frequencies other than the above: 185.92 ms to 214.08 ms Depends on window width 10 Hz to 640 Hz 			
Number of FFT points Window function Analysis window width Data update rate Synchronization frequency range	Harmonic voltage current phase difference -Total harmonic voltage distortion -Total harmonic current distortion -Current fundamental waveform -Apparent power fundamental waveform -Apparent power fundamental waveform -Power factor fundamental waveform -Nottage current phase difference fundamental waveform -Interchannel voltage fundamental waveform -Interchannel current fundamental wave phase difference -Harmonic voltage phase angle -Harmonic voltage current phase difference 32 bits 4096 Rectangular 45 Hz ≤ f < 56 Hz: 178.57 ms to 222.22 ms (10 cycles)			
Number of FFT points Window function Analysis window width Data update rate Synchronization frequency range Maximum	 Harmonic voltage current phase difference -Total harmonic voltage distortion -Total harmonic current distortion -Voltage fundamental waveform -Apparent power fundamental waveform -Apparent power fundamental waveform -Power factor fundamental waveform -Voltage current phase difference fundamental waveform -Voltage current phase difference fundamental waveform -Voltage current phase difference fundamental waveform -Interchannel voltage fundamental wave phase difference -Interchannel voltage fundamental wave phase difference -Interchannel voltage fundamental wave phase difference -Interchannel voltage phase angle -Harmonic voltage current phase angle -Harmonic voltage current phase difference -Harmonic voltage current phase difference -Harmonic voltage current phase difference -Harmonic voltage current phase angle -Harmonic voltage current phase difference -Harmonic voltage current phase difference -Harmon			
Analysis window width Data update rate Synchronization frequency range Maximum	 Harmonic voltage current phase difference -Total harmonic voltage distortion -Total harmonic current distortion -Outrent fundamental waveform -Apparent power fundamental waveform -Apparent power fundamental waveform -Power factor fundamental waveform -Voltage current phase difference fundamental waveform -Voltage current phase difference fundamental waveform -Voltage current phase difference -Interchannel voltage fundamental wave phase difference -Interchannel current phase angle -Harmonic voltage phase angle -Harmonic voltage current phase difference -Harmonic voltage			
Number of FFT points Window function Analysis window width Data update rate Synchronization frequency range Maximum	$\label{eq:approx_star} \begin{array}{ c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c } \hline \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$			
Number of FFT points Window function Analysis window width Data update rate Synchronization frequency range Maximum	 Harmonic voltage current phase difference - Total harmonic voltage distortion - Total harmonic current distortion - Voltage fundamental waveform - Apparent power fundamental waveform - Apparent power fundamental waveform - Power factor fundamental waveform - Voltage current phase difference fundamental waveform - Voltage current phase difference fundamental waveform - Voltage current phase difference - Interchannel voltage fundamental wave phase difference - Interchannel voltage fundamental wave phase difference - Interchannel current fundamental wave phase difference - Harmonic voltage phase angle - Harmonic voltage current phase angle - Harmonic voltage current phase difference - 10 Hz ≤ f < 56 Hz - 50th - 66 Hz < f 100 Hz - 50th - 66 Hz < f 100 Hz - 50th - 50th - 50th - 50th - 50th - 50th			

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Analysis order 2nd to 50th

upper limit setting				
Measurement	f.s.: Measurement range			
accuracy	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.		
	For DC, add ±1 mA to current and (±1 mA	 x (voltage read value) to active power. 		
Display Specific	ations			
Display	7-segment LED			
Number of display parameters	4			
Display resolution	Other than integrated values: 99999 count			
	Integrated values: 999999 count			
Display update rate	200 ms to 20 s (varies with number of averaging iterations setting)			
Synchronized C	ontrol			
Functions	Timing of calculations, display updates, or events, display hold operation, key lock o	peration, and zero-adjustment operation		
		ronized with the master PW3336/ PW3337.		
Terminal	BNC terminal × 1 (non-isolated)			
Terminal name	EXT SYNC			
I/O settings	Off: Synchronized control functio			
	In : The EXT SYNC terminal is se			
	synchronization signal can be input (slave).			
	Out: The EXT SYNC terminal is set to output, and a dedicated			
	synchronization signal can b			
Number of units for which	1 master unit and 7 slave units (to	otal 8 units)		
synchronized control can				
be performed				

External Current Sensor Input Specifications (built-in feature)

External ourrent	ochool input opeon		aturo)		
Terminal	Isolated BNC terminals, 1 for each channel				
Current sensor	Off / Type 1 / Type 2				
type switching	When set to off, input from the external current sensor input terminal is ignored.				
Current sensor	TYPE1 (100 A to 5000		1 12		
options		CT9667-01/-02/-03			
		TYPE2 (20 A to 1000 A sensors. Power supply is required to use)			
		CT6862-05, CT6863-05, CT6875, CT6876, CT6877, 9272-05, CT6841-05, CT6843-05, CT6843-05, CT6845-05, CT6846-05, etc.			
Course at					
Current		A (range noted on pan			
measurement		ch wiring mode. Can b	e read directly by		
range	manually setting the C	I ratio.			
Power range		ination of voltage and			
configuration	60.000W to 15.000MV	V (also applies to VA, v	ar)		
Measurement accuracy					
Current, Active power					
Frequency	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s.	100%f.s. ≤ Input		
DC	±0.2%rdg. ±0.6%f.s.	±0.2%rdg. ±0.6%f.s.	±0.8%rdg.		
0.1Hz≤ f <16Hz	±0.2%rdg. ±0.2%f.s.	±0.4%rdg.	±0.4%rdg.		
16Hz≤ f < 45Hz	±0.2%rdg. ±0.2%f.s.	±0.4%rdg.	±0.4%rdg.		
45Hz ≤ f ≤ 66Hz	±0.2%rdg. ±0.1%f.s.	±0.3%rdg.	±0.3%rdg.		
66Hz < f ≤ 500Hz	±0.2%rdg. ±0.2%f.s.	±0.4%rdg.	±0.4%rdg.		
500Hz < f ≤ 1kHz	±0.2%rdg. ±0.3%f.s.	±0.5%rdg.	±0.5%rdg.		
1 kHz < f \leq 10kHz	±5.0%rdg.	±5.0%rdg.	±5.0%rdg.		
10kHz < f ≤ 50kHz					
50kHz < f ≤ 100kHz					
	f.s. : Each measureme	ent range			
		active power accuracy,	add the current sensor's		
		current and active power a			
		rement range and free			
	 conform to the current sensor's specifications. Values for current, and active power for which 				
	0.1 Hz \leq f < 10 Hz are for reference only.				
	●Values for voltage in excess of 220 V active power for which				
	10 Hz \leq f $<$ 16 Hz are for reference only.				
Temperature	Current, active power:				
characteristics		trument temperature co	officient:		
una autoristius		: instrument measurem			
		nperature coefficient to			
Devuerfeeter					
Power factor		or less (45 Hz to 66 Hz w			
effects	I) Internal circuit voltage	e/current phase differe	nce: +U U86°		

effects	Internal circuit voltage/current phase difference: ±0.086° Add the current sensor phase accuracy to the internal circuit voltage/current phase difference noted above.				
Current peak value			t accuracy) + (±2.0% f.s.)		
measurement	(f.s.:current peak				
accuracy	 Add the current set 	ensor accuracy to the a	above.		
Harmonic	Frequency	Voltage	Current, Active power		
measurement	DC	±0.4%rdg. ±0.2%f.s.	±0.6%rdg. ±0.8%f.s.		
accuracy	[10Hz≤f < 30Hz	±0.4%rdg. ±0.2%f.s.	±0.6%rdg. ±0.4%f.s.		
	30Hz≤ f ≤ 400Hz	±0.3%rdg. ±0.1%f.s.	±0.5%rdg. ±0.3%f.s.		
	400Hz < f ≤ 1kHz	±0.4%rdg. ±0.2%f.s.	±0.6%rdg. ±0.5%f.s.		
	1kHz < f ≤ 5kHz	±1.0%rdg. ±0.5%f.s.	±1.0%rdg. ±5.5%f.s.		
	5kHz < f ≤ 8kHz	±4.0%rdg. ±1.0%f.s.	±2.0%rdg. ±6.0%f.s.		
	 f.s.: Each measurement range To obtain the current or active power accuracy, add the current sensaccuracy to the above current and active power accuracy figures. 				

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

DIA Output Opeci	
Number of	16
output channels	
Configuration	16-bit D/A converter (polarity + 15 bits)
Output parameters	 U1 to U3 (voltage level) or u1 to u3 (instantaneous voltage waveform) (switchable) I1 to 13 (current level) or i1 to 33 (instantaneous current waveform) (switchable) P1 to P3 (active power level) or p1 to p3 (instantaneous power waveform) (switchable) Psum (active power level) or p1 to p3 (instantaneous power waveform) (switchable) Psum (active power level) or p1 to p3 (instantaneous power waveform) (switchable) Psum and Hi-Psum output is not available (0 V) when using the 1P2W wiring mode.P12 is output when using 1P3W, 3P3W, or 3P3W2M, and P123 is output when using 3V3A, 3P3W3M, or 3P4W. D/A1 to D/A3 : Select any 3 from channel or sum value for Voltage, Current, Active power, Apparent power, Reactive power, Power Factor, Phase angle, Total harmonic voltage/current distortion, Inter-channel voltage/Current fundamental wave phase difference, Voltage/current ripple rate, Frequency, Efficiency, Current integration, Active power integration (Harmonic output is not available for individual orders). Hi-P1 to Hi-P3 and Hi-Psum (high-speed active power level); Fixed to AC+DC For other level output, select AC+DC, AC+DC Umn, DC, AC, or fnd.

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 active power level output
	: (Output parameter measurement accuracy) + (±0.2% f.s.)
	Instantaneous waveform output
	: (Output parameter measurement accuracy) + (±1.0% f.s.)
	Instantaneous voltage, instantaneous current: RMS value level
	Instantaneous power: Average value level
Output frequency	Instantaneous waveform output, high-speed active power level output
band	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, 0 V DC at ±1.0000
	Phase angle
	: 0 V DC at 0.00°, ±2 V DC at ±180.00°
	Voltage/current ripple rate, total harmonic voltage/current distortion
	: + 2 V DC at 100.00%
	Voltage/current crest factor
	: +2 V DC at 10.000
	Frequency
	: Varies with measured value.
	+2 V DC per 100 Hz from 0.1000 Hz to 300.00 Hz
	+2 V DC per 10 kHz from 300.01 Hz to 30.000 kHz
	+2 V DC per 100 kHz from 30.001 kHz to 220.00 kHz
	Efficiency
	: +2 V DC at 200.00% Current integration, active power integration
	: ±5 V DC at (range) × (integration set time)
	Waveform output
	: 1 V f.s. relative to 100% of range
Maximum output voltage	Approx. ±12 V DC
Output update rate	Level output
o alpar apadio raio	: Fixed at 200 ms ±50 ms (approx. 5 times per sec.)
	Update rate is unrelated to number of averaging iterations
	setting and display hold operation.
	Waveform output
	: Approx. 11.4 µs (approx. 87.5 kHz)
	High-speed P level
	: Updated once every cycle for the input waveform set as the synchronization source.
Response time	Level output
	: 0.6 sec. or less (when the input changes abruptly from 0% to 90%, or from
	100% to 10%, the time required in order to satisfy the accuracy range)
	Waveform output : 0.2 ms or less
	High-speed active power level output
	: 1 cycle
Temperature characteristic	±0.05% f.s./°C or less
Output resistance	100 Ω ±5 Ω
Capatrosistande	1.00 11 -0 11

External control (built-in feature)

Functions	Integration start/stop, integration reset and hold via external control			
External control	Input signal level: 0 to 5 V (high-speed CMOS level or shorted [Lo]/open [Hi])			
	Functions	External control signal	External control terminal	
	Start	$Hi \rightarrow Lo$	START/STOP	
	Stop	$Lo \rightarrow Hi$		
	Reset	Lo interval of at least 200 ms	RESET	
	Hold on	$Hi \rightarrow Lo$	HOLD	
	Hold off	Lo → Hi	HOLD	

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

GF-ID IIIteriace	(FW3330-017-03, FW3337-017-03)
Method	IEEE488.1 1978 compliant; see IEEE488.2 1987
	Interface functions: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0
	Remote control by controller
Address	00 to 30
RS-232C interf	ace (built-in feature)
Connector	D-sub 9-pin connector × 1
Communication	Full duplex, Start-stop synchronization, Stop bits: 1 (fixed),
method	Data bits: 8 (fixed), Parity: None
	Remote control by controller

Remote control by controller Communication Speed 9600bps/ 38400bps

LAN interface (built-in feature)

LAN Interface (c	unt-in reature)
Connector	RJ-45 connector × 1
	IEEE802.3 compliant
	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 (REMOTE lamp will light up.)
	cations (product guaranteed for 3 year)
Operating environment	Indoors, altitude up to 2000 m (6562-ft.), pollution degree 2
	0 to 40°C (32 to 104°F), 80% RH or less (non-condensating)
and humidity	
	-10 to 50°C (14 to 122°F) 80% RH or less (non-condensating)
and humidity	
Dielectric strength	4290 Vrms AC (sensed current: 1 mA)
	Between voltage input terminals and (case, interface, and output terminals)
	Between current direct input terminals and (case, interface, and output terminals) Between voltage input terminals and current direct input terminals
Maximum rated	Voltage input terminal, Current direct input terminal
voltage to earth	Measurement category III 600 V (anticipated transient overvoltage 6000 V)
voltage to cartin	Measurement category II 1000 V (anticipated transient overvoltage 6000 V)
Maximum input voltage	Between voltage input terminals U: 1000 V, ±1500 Vpeak
	Between +/- current direct input terminals I: ±70 A, ±100 Apeak
	Safety : EN61010, EMC : EN61326 Class A/ EN61000-3-2/ EN61000-3-3
Rated supply voltage	100 VAC to 240 VAC, Rated power supply frequency : 50/60 Hz
Maximum rated power	40 VA or less
Dimensions	Approx. 305W(12.01") × 132H(5.20") × 256D(10.08") mm
	(excluding protrusions)
Mass	PW3336 series Approx. 5.2 kg (183.4 oz.)
	PW3337 series Approx. 5.6 kg (197.5 oz.)
Accessories	Instruction manual \times 1, Measurement guide \times 1, Power cord \times 1

PW3335 Specifications

Input Specifications

input Specificati	ons	
Measurement line type	Single-phase 2-wire(1P2)	W)
Input methods	Voltage Isolated input	ut, resistive voltage divider method
	Current Isolated input	ut, shunt input method
Voltage measurement	AUTO/ 6 .0000 V/ 15.000	V/ 30.000 V/ 60.000 V/ 150.00 V/
ranges	300.00 V/ 600.00 V/ 1.00	000 kV
Current	AUTO/ 1.0000 mA/ 2.000	0 mA/ 5.0000 mA/ 10.000 mA/
measurement	20.000 mA/ 50.000 mA/	100.00 mA/ 200.00 mA/ 500.00 mA/
ranges	1.0000 A/ 2.0000 A/ 5.00	00 A/ 10.000 A/ 20.000 A
Power ranges	Depends on the combina	tion of voltage and current ranges;
	From 6.0000 mW to 20.04	00 kW (also applies to VA, var)
	The details are as below.	
Input resistance	Voltage input terminal:	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
 Simultaneous voltage and current digital sampling, zero-cross

 method
 simultaneous calculation

method	simultaneous calculat	ion	
Sampling frequency	Approx. 700 kHz		
A/D converter resolution			
Frequency bandwidth	DC: 0.1 Hz to 100 kHz (Va	alues within 0.1Hz≤f< 10	Hz are for reference only)
	U, I, DC (fixed to 200)		
Measurement items	Voltage	Current	Active power
	Apparent power	Reactive power	Power factor
	Phase angle	Frequency	Current integration
	Active power integra		
	Voltage waveform p		aveform peak value
	Voltage crest factor	Current cr	
	Maximum current ra		age current
	Time average active		and a set of
	Voltage ripple rate	Current ri	opie rate
	Harmonic parameters Harmonic voltage R	MS voluo Hormonio	current RMS value
	Harmonic active po	vor Total barr	nonic voltage distortion
	Total harmonic currer		intal wave voltage
	Fundamental wave		ntal wave active power
			ital wave reactive power
		power factor (Displace	
		voltage current phase	
	Harmonic voltage c		
	Harmonic current co		
		wer content percentag	e
	Harmonic voltage p		ata via PC communication)
	Harmonic current pl		
		urrent phase difference	2
Rectifiers	AC+DC : AC+DC mea		5
necliners	Display of true BMS	values for both voltag	e and current
	AC+DC Umn : AC+DC	measurement	
		alue rectified RMS co	overted values for
		IS values for current	
	DC : DC measuremen		
		erages for both voltag	e and current
	Display of values calculate	d by (voltage DC value) x (cur	rent DC value) for active power
	AC : AC measurement		,
	Display of values ca	lculated by	
	(AC+DC value) ² - (DC	value)2 for both voltage	ge and current
	Display of values ca	value) ² for both voltage	
	(AC+DC value) - (DC	C value) for active pow	er
			nent 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			
	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s	. 100%f.s. ≤ Input
Frequency (f) DC			±0.2%rdg.
0.1Hz≤f<16Hz	±0.1rdg.±0.1%f.s.	±0.1%rdg.±0.1%f.s.	
16Hz≤f<45Hz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
	±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< td=""><td>±0.1%rdg.±0.1%f.s.</td><td>±0.2%rdg.</td><td>±0.2%rdg.</td></f≤500hz<>	±0.1%rdg.±0.1%f.s.	±0.2%rdg.	±0.2%rdg.
500Hz <f≤10khz< td=""><td>±0.1%rdg.±0.2%f.s.</td><td>±0.3%rdg.</td><td>±0.3%rdg.</td></f≤10khz<>	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
10kHz <f≤50khz< td=""><td>±0.5%rdg.±0.3%f.s.</td><td>±0.8%rdg.</td><td>±0.8%rdg.</td></f≤50khz<>	±0.5%rdg.±0.3%f.s.	±0.8%rdg.	±0.8%rdg.
50kHz <f≤100khz< td=""><td>±2.1%rdg.±0.3%f.s.</td><td>±2.4%rdg.</td><td>±2.4%rdg.</td></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.	
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< td=""><td>±0.1%rdg.±0.1%f.s.</td><td>±0.2%rdg.</td><td>±0.2%rdg.</td></f≤500hz<>	±0.1%rdg.±0.1%f.s.	±0.2%rdg.	±0.2%rdg.
500Hz <f≤1khz< td=""><td>±0.1%rdg.±0.2%f.s.</td><td>±0.3%rdg.</td><td>±0.3%rdg.</td></f≤1khz<>	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
1kHz <f≤10khz< td=""><td>±(0.03+0.07×F)%rdg.</td><td>±(0.23+0.07×F)%rdg.</td><td>±(0.23+0.07×F)%rdg.</td></f≤10khz<>	±(0.03+0.07×F)%rdg.	±(0.23+0.07×F)%rdg.	±(0.23+0.07×F)%rdg.
	±0.2%f.s.	((
10kHz <f≤100khz< td=""><td></td><td>±(0.6+0.04×F)%rdg.</td><td>±(0.6+0.04×F)%rdg.</td></f≤100khz<>		±(0.6+0.04×F)%rdg.	±(0.6+0.04×F)%rdg.
	±0.3%f.s.	/ Julug.	_(0.010.01X1 / 010g.
	10.0701.3.	I	

Active power			
Frequency (f)	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s.	100%f.s. ≤ Input
DC 0.1Up cf c16Up	±0.1%rdg.±0.1%f.s.	±0.1%rdg.±0.1%f.s.	±0.2%rdg.
0.1Hz≤f<16Hz 16Hz≤f<45Hz	±0.1%rdg.±0.2%f.s. ±0.1%rdg.±0.1%f.s.	±0.3%rdg. ±0.2%rdg.	±0.3%rdg. ±0.2%rdg.
45Hz≤f≤66Hz	±0.1%rdg.±0.05%f.s.	±0.15%rdg.	±0.15%rdg.
66Hz <f≤500hz< td=""><td>±0.1%rdg.±0.1%f.s.</td><td>±0.2%rdg.</td><td>±0.2%rdg.</td></f≤500hz<>	±0.1%rdg.±0.1%f.s.	±0.2%rdg.	±0.2%rdg.
500Hz <f≤1khz< td=""><td>±0.1%rdg.±0.2%f.s.</td><td>±0.3%rdg.</td><td>±0.3%rdg.</td></f≤1khz<>	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
1kHz <f≤10khz< td=""><td>±(0.03+0.07×F)%rdg. ±0.2%f.s.</td><td>±(0.23+0.07×F)%rdg.</td><td>±(0.23+0.07×F)%rdg.</td></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< td=""><td>±(0.07×F)%rdg. ±0.3%f.s.</td><td>±(0.3+0.07×F)%rdg.</td><td>±(0.3+0.07×F)%rdg</td></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< td=""><td>±(0.6+0.07×F)%rdg. ±0.3%f.s.</td><td>±(0.9+0.07×F)%rdg.</td><td>±(0.9+0.07×F)%rdg</td></f≤100khz<>	±(0.6+0.07×F)%rdg. ±0.3%f.s.	±(0.9+0.07×F)%rdg.	±(0.9+0.07×F)%rdg
Effective measuring range	 When using the 1 m/ Add ±1 µA to 0.1 Hz 1 current. Add (±1 µA) × (voltaç measurement accura When using the 2001 Add ±1 mA to DC me Add ±1 mA to DC me Add ±10 µA to DC me Add ±0.02xF)% rdg and active power for The measurement results if Values for voltage, current, and Values for current and active Values for current and active Voltage Voltage Ma to 150 Current Ma to 150 	o 100 kHz measureme ge read value) to 0.1 Hz	nt accuracy for to 100 kHz 5 A/ 10 A/ 20 A range or current. taccuracy for active power 5 M/ 10 M/ ange or current. ccuracy for active power. 5 A/ 10 A/ 20 A range (ccuracy for active power. 5 A/ 10 A/ 20 A range (ccuracy for current 0 kHz). ered reference values: which 0.1 Hz sf < 10 Hz 20 Afor which 10 Hz sf < 10 Hz thich 500 Hz < f \$ 50 kHz. which 30 kHz < f \$ 100 kHz. V range, up to 1000 V
Maximum effective	However,	valid when the voltage an neasurement range.	
peak voltage	However, for 300 V. 60	0 V, and 1000 V range	s. ±1500 V peak
Maximum effective	±600% of each currer		-,
peak current Guaranteed accuracy	However for 20 A rang		
period	. ,		
Post-adjustment	6 months		
accuracy guaranteed			
Conditions of		ty range: 23°C±5°C (73°F	±9°F), 80% RH or less
guaranteed	Warm-up time: 30 mi		
accuracy	of 0 V the fu	wave input, power facto , after zero-adjustment ndamental wave satisfi e conditions	; within range in which
Temperature	±0.03%f.s. per °C or le		
coefficient	However, for 1 mA ran	ge, ±0.06%f.s. per °C (or less.
Effect of power		66 Hz, at power factor	
factor		ge/current phase differe	
Effect of common		0 V, 50 Hz/60 Hz, appli	ed between input
mode voltage Effect of magnetic	terminals and enclosu	re) Iz/60 Hz magnetic field	4
field	Voltage	12/00 Hz magnetic neit	1
	±1.5%f.s. or less		
	200 mA/ 500 mA/ 1 1 mA/ 2 mA/ 5 mA/ 1 Active power ±3.0%f.s. or less than 200 mA/500 mA/ 1 A/ 2 A/ 5 A	or equal to the following va A/ 2 A/ 5 A/ 10 A/ 20 A D mA/ 20 mA/ 50 mA/ 10 or equal to the following va / 10 A/ 20 Arange (Voltage rituen 0.45 mA/ 10 Ar ange (Voltage rituen	range: $\pm 20 \text{ mA}$ 00 mA range: $\pm 200 \mu \text{A}$ alue, whichever is greate ce quantity)x($\pm 20 \text{ mA}$)
Effoot of polf		mA/50 mA/100 mA range:(Voltag	
Effect of self- heating	Current AC input signal	5 A to current input terr -15))%rdg. or less	ninais
	DC input signal 200 mA/ 500 mA/ ±((0.025+0.005	1 A/ 2 A/ 5 A/ 10 A/ 20 ×(I-15))% rdg.+(0.5+0.	1×(I-15))mA) or less
		√ 10 mA/ 20 mA/ 50 m/ ×(I-15))% rdg.+(5+1×(I- ue (A)	
	(above current influe The effects of self-heat	ence quantity) × (voltag ing will continue to manif operature falls, even if th	fest themselves until

Range table (Power ranges)

Current Voltage	6.0000 V	15.000 V	30.000 V	60.000 V	150.00 V	300.00 V	600.00 V	1.0000 kV
1.0000 mA	6.0000 mW	15.000 mW	30.000 mW	60.000 mW	150.00 mW	300.00 mW	600.00 mW	1.0000 W
2.0000 mA	12.000 mW	30.000 mW	60.000 mW	120.00 mW	300.00 mW	600.00 mW	1.2000 W	2.0000 W
5.0000 mA	30.000 mW	75.000 mW	150.00 mW	300.00 mW	750.00 mW	1.5000 W	3.0000 W	5.0000 W
10.000 mA	60.000 mW	150.00 mW	300.00 mW	600.00 mW	1.5000 W	3.0000 W	6.0000 W	10.000 W
20.000 mA	120.00 mW	300.00 mW	600.00 mW	1.2000 W	3.0000 W	6.0000 W	12.000 W	20.000 W
50.000 mA	300.00 mW	750.00 mW	1.5000 W	3.0000 W	7.5000 W	15.000 W	30.000 W	50.000 W
100.00 mA	600.00 mW	1.5000 W	3.0000 W	6.0000 W	15.000 W	30.000 W	60.000 W	100.00 W
200.00 mA	1.2000 W	3.0000 W	6.0000 W	12.000 W	30.000 W	60.000 W	120.00 W	200.00 W
500.00 mA	3.0000 W	7.5000 W	15.000 W	30.000 W	75.000 W	150.00 W	300.00 W	500.00 W
1.0000 A	6.0000 W	15.000 W	30.000 W	60.000 W	150.00 W	300.00 W	600.00 W	1.0000 kW
2.0000 A	12.000 W	30.000 W	60.000 W	120.00 W	300.00 W	600.00 W	1.2000 kW	2.0000 kW
5.0000A	30.000 W	75.000 W	150.00 W	300.00 W	750.00 W	1.5000 kW	3.0000 kW	5.0000 kW
10.000 A	60.000 W	150.00 W	300.00 W	600.00 W	1.5000 kW	3.0000 kW	6.0000 kW	10.000 kW
20.000 A	120.00 W	300.00 W	600.00 W	1.2000 kW	3.0000 kW	6.0000 kW	12.000 kW	20.000 kW

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PW333 🔍	

Measurement types	Rectifiers: AC+DC, DC, AC, FND, AC+DC Umn
Effective measuring range	Voltage $\pm 1\%$ to $\pm 150\%$ of the range. However, up to ± 1500 V peak value and 1000 V RMS value
	Current
	$\pm 1\%$ to $\pm 150\%$ of the range
	Active Power
	$\pm 0\%$ to $\pm 225\%$ of the range.
	However, valid when the voltage and current fall within the effective measurement range.
Display range	Voltage Up to $\pm 152\%$ of the range. However, zero-suppression when less than $\pm 0.5\%$
	Current
	Up to ±152% of the range.
	However, zero-suppression when less than $\pm 0.5\%$ or less than $\pm 9 \ \mu$ A.
	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

Voltage Waveform Peak Value/ Current Waveform Peak Value Measurement Specifications

Measurement		orm's peak value (for both positive and
method		ampled instantaneous voltage values.
Range	Voltage	
configuration	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 20.000 A	60.000 A 120.00 A
	1	
Measurement accuracy	Provided as reference value whe	$z \le f \le 1$ kHz (f.s.: current peak range). en 0.1 Hz \le f < 10 Hz and when 1 kHz < f. acy is multiplied by 2 for the 1 mA range.
Effective		ak range, however, up to ±60 A
measuring range		
Display range		range, however, the value 0 will be value triggers the instrument's zero
Voltage Crest F	actor/Current Crest Facto	r Measurement Specifications
Measurement method	Calculates the ratio of the vol voltage RMS value.	tage waveform peak value to the
Effective		aveform peak value, or current and
measuring range		effective measurement ranges.
Display range	1.0000 to 612.00 (no polarity	
	Rate/Current Ripple Ra	te Measurement Specifications
Measurement	Calculates the AC componer	nt (peak to peak [peak width]) as a
method	proportion of the voltage or c	
Effective	As per voltage and voltage w	vaveform peak value, or current and
measuring range		effective measurement ranges.
Display range	0.00 to 500.00 (No polarity)	0.7T.
Measurement	Specifications	ver Factor/ Phase Angle
Measurement types	Rectifiers Apparent Power/ Reactive Po AC+DC, AC, FND, AC+DC Phase Angle	
Effective		ctive power effective measurement
measuring range Display range	Apparent Power/ Reactive Po 0% to 231.04% of the range	
	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 currentwaveform rising edge. +: When current lags voltage (no polarity display) -: When current leads voltage

Power Calculation Formulas

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

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

Frequency Measurement Specifications

Numberof measurement channels	2 (Voltage, current)	
Measurement method	Calculated from input waveform	n period (reciprocal method)
Measurement ranges	100 Hz/ 500 Hz/ 5 kHz/ 100 kH	
Measurement accuracy		r 1 mA range, $\pm 0.2\%$ rdg. ± 1 dgt.
Effective	0.1 Hz to 100 kHz	i TinAlange, ±0.2 % lug. ±1 ugi.
measuring range	For sine wave input that is at le source's measurement range	ency setting: 0.1 sec. / 1 sec. / 10
Display format	0.1000 Hz to 9.9999 Hz, 99.00 Hz to 999.99 Hz, 9.900 kHz to 99.999 kHz,	9.900 Hz to 99.999 Hz, 0.9900 kHz to 9.9999 kHz, 99.00 kHz to 100.00 kHz
	ent Ratio Measurement S	· · · ·
Measurement		ent crest factor to the power factor.
method Effective	(MCR) = (Current Crest Factor	nt, active power) and current crest factor
measuring range	(current, current waveform peak val	
Display range	1.0000 to 6.1200 M (no polarity	
I ime Average Cur	rent/ Time Average Active Po	ower Measurement Specification
Measurement		ding the current or active power
method	integrated value by the integrat	
Measurement accuracy		ment accuracy) + $(\pm 0.01\% \text{ rdg.} \pm 1 \text{ dgt.})$
Display range	Time Average Current	tegration effective measurement range.
Display fallge		polarity when using the DC rectifier.)
	Time Average Active Power	
	±0% to ±3745.4% of the range	(nas polanty)
Functional Spec	rifications	
		nd current range according to the input.
	Range up: The range is increased when i	input exceeds 150% of the range of
	when the peak is exceeded. Range down:	
	The range is decreased when	input falls below 15% of the range. reased when the peak is exceeded
		e range is switched over multiple ranges
Denne select		e ranges so that they are not selected.
Range select	voltage and current ranges.	on) or disable (turn off) individual
	Enabled (use):	
	Ranges can be selected with	
	Range switching occurs using Range switching occurs durin	
	Disabled (do not use):	
	Ranges cannot be selected w	
	Range switching does not occ	cur using auto-range operation.
	Range switching does not occ Range switching does not occ	cur using auto-range operation. cur during auto-range integration.
Zero-cross filter's threshold level	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the
threshold level	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the Isurement range is exceeded.
	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the surement range is exceeded. ve power, apparent power, and reactive
threshold level	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the <u>isurement range is exceeded.</u> ve power, apparent power, and reactive surement parameters.) are calculated from averaged data.
threshold level	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the Isurement range is exceeded. ve power, apparent power, and reactive urement parameters.)
threshold level	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par Method: Simple averaging	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the Isurement range is exceeded. ve power, apparent power, and reactive surement parameters.) are calculated from averaged data. armeters other than those listed above.
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threshold level	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par Method: Simple averaging	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the Isurement range is exceeded. ve power, apparent power, and reactive surement parameters.) are calculated from averaged data. armeters other than those listed above.
threshold level	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, act power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par Method: Simple averaging Number of averaging iterations	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the Isurement range is exceeded. ve power, apparent power, and reactive surement parameters.) are calculated from averaged data. "ameters other than those listed above." and display update interval
threshold level	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par Method: Simple averaging Number of averaging iterations	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the Isurement range is exceeded. ve power, apparent power, and reactive urement parameters.) are calculated from averaged data. rameters other than those listed above. and display update interval Display update interval
threshold level	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par Method: Simple averaging Number of averaging iterations Number of averaging iterations 1 (OFF)	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the Isurement range is exceeded. ve power, apparent power, and reactive urement parameters.) are calculated from averaged data. rameters other than those listed above. and display update interval Display update interval 200 ms
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threshold level	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par Method: Simple averaging Number of averaging iterations Number of averaging iterations 1 (OFF) 2 5 10 25 50 100 Applies user-defined VT and C VT ratio setting range	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the Isurement range is exceeded. ve power, apparent power, and reactive urement parameters.) are calculated from averaged data. rameters other than those listed above. and display update interval Display update interval 200 ms 400 ms 1 s 2 s 5 s 10 s 20 s T ratio settings to measured values (1.0), 0.001 to 1000
threshold level Averaging Scaling	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par Method: Simple averaging Number of averaging iterations Number of averaging iterations 1 (OFF) 2 5 10 25 50 100 Applies user-defined VT and C VT ratio setting range	cur during auto-range integration. Ind level for voltage and current ranges. s). Synchronization occurs when the Isurement range is exceeded. ve power, apparent power, and reactive urement parameters.) are calculated from averaged data. rameters other than those listed above. and display update interval Display update interval 200 ms 400 ms 1 s 2 s 5 s 10 s 20 s T ratio settings to measured values
threshold level Averaging Scaling	Range switching does not occ Sets the zero-cross filter's threshod Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par Method: Simple averaging Number of averaging iterations 1 (OFF) 2 5 10 25 50 100 25 50 100 25 50 100 25 50 100 25 50 100 25 50 100 27 50 100 26 50 100 27 50 100 28 50 100 27 50 100 <	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the Isurement range is exceeded. ve power, apparent power, and reactive urement parameters.) are calculated from averaged data. rameters other than those listed above. and display update interval Display update interval 200 ms 400 ms 1 s 2 s 5 s 10 s 20 s T ratio settings to measured values (1.0), 0.001 to 1000 measured values and fixes the
Averaging Scaling (VT, CT)	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par Method: Simple averaging Number of averaging iterations Number of averaging iterations 1 (OFF) 2 5 10 25 50 100 Applies user-defined VT and C VT ratio setting range OFF CT ratio setting range OFF • Stops display updates for all display values at that point in	cur during auto-range integration. Id level for voltage and current ranges. s). Synchronization occurs when the Isurement range is exceeded. we power, apparent power, and reactive urement parameters.) are calculated from averaged data. armeters other than those listed above. and display update interval Display update interval 200 ms 400 ms 1 s 2 s 5 s 10 s 20 s T ratio settings to measured values (1.0), 0.001 to 1000 (1.0), 0.001 to 1000 measured values and fixes the time.
Averaging Scaling (VT, CT)	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par Method: Simple averaging Number of averaging iterations Number of averaging iterations 1 (OFF) 2 5 10 25 50 100 Applies user-defined VT and C VT ratio setting range OFF CT ratio setting range OFF CT ratio setting range OFF estops display updates for all display values at that point in • Measurement data acquired I that point in time.	cur during auto-range integration. In during auto-range integration. In diversion of the second of
Averaging Scaling (VT, CT)	Range switching does not occ Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interval percentage level set for each mea Averages the voltage, current, acti power. (Other than harmonic meas The power factor and phase angle Averaging is not performed for par Method: Simple averaging Number of averaging iterations Number of averaging iterations 1 (OFF) 2 5 10 25 50 100 Applies user-defined VT and C VT ratio setting range OFF CT ratio setting range OFF • Stops display updates for all display values at that point in	cur during auto-range integration. In during auto-range integration. In diversion of the second of

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 the average current, and the average current, and the 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 value sduring 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 Mea	surement 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.

operation modes	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	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:			
types	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	±0.01% rdg. ±1 dgt.			
accuracy Integration	(Current or active power measurement accuracy) + (±0.01% rdg.			
measurement accuracy	±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			
	urement Specifications			
Measurement method	Zero-cross simultaneous calculation method			
methou	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:			
Quanahaariti	No gaps or overlap will occur.			
Synchronization	Conforms to synchronization source (SYNC) for the basic			
source	measurement specifications.			

Measurement items

FFT processing	FFT processing word length : 32 bits Number of FFT points : 4096 points				
Window function	Rectangular				
Apolygia window	45 Hz < f < 56 Hz + 179 57 mo to 1	000.00) ma (10 a) (alaa)		
Analysis window width	$\begin{array}{l} 45 \text{ Hz} \leq f < 56 \text{ Hz}: 178.57 \text{ ms to}:\\ 56 \text{ Hz} \leq f < 66 \text{ Hz}: 181.82 \text{ ms to}:\\ \text{Frequencies other than the above } \end{array}$	214.29	ms (12 cycles)		
Data update rate	Depends on window width.				
Maximum analysis order	Synchronization frequency (f) ratio $Hz \le f < 45 Hz$	ange	Analysis order 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 300 Hz < f ≤ 500 Hz		25th 15th		
	500 Hz < f ≤ 640 Hz		11th		
Analysis order	2nd to 50th				
upper limit setting	f a . Management same				
Measurement accuracy	f.s.: Measurement range Frequency (f)	Voltar	ge, Current, Active pow		
,	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 5 kHz < f ≤ 8 kHz		±1.0% rdg. ±0.5%f.s. ±4.0% rdg. ±1.0%f.s.		
	When using the 1 mA/ 2 mA rar		L→.0 /0 TUY. I I.U /01.8.		
	Add $\pm 1 \ \mu$ A to 10 Hz to 8 kHz me Add $\pm 1 \ \mu$ A) × (voltage read value measurement accuracy for activ	asuren Je) to 1	0 Hz to 8 kHz		
	• When using the 200 mA/ 500 m. Add ±1 mA to DC measurement Add (±1 mA) × (voltage read val for active power.	accura	acy for current.		
	• When using the 1 mA/O mA/F mA/				
	• when using the T mA/2 mA/2 mA/3 mA/ Add $\pm 10 \ \mu$ A to DC measuremen Add ($\pm 10 \ \mu$ A) × (voltage read va for active power.	t accur			
Display Specific	Add ±10 μÅ to DC measuremen Add (±10 μA) × (voltage read va for active power.	t accur	racy for current.		
Display	Add ±10 µÅ to DC measuremen Add (±10 µÅ) × (voltage read va for active power. cations 7-segment LED	t accur	racy for current.		
Display Number of display	Add ±10 µÅ to DC measuremen Add (±10 µÅ) × (voltage read va for active power.	t accur	racy for current.		
Display	Add ±10 µÅ to DC measuremen Add (±10 µÅ) × (voltage read va for active power. cations 7-segment LED	t accur lue) to	racy for current. DC measurement accu		
Display Number of display parameters	Add ±10 μÅ to DC measuremen Add (±10 μÅ) × (voltage read va for active power. Sations 7-segment LED 4 (display area a, b, c, and d) Other than integrated values: 99	t accur lue) to 999 cc t (6 dig tes per	racy for current. DC measurement accu nut (5 digits) its)		
Display Number of display parameters Display resolution Display update rate	Add ±10 μÅ to DC measuremen Add (±10 μÅ) × (voltage read va for active power. Sations 7-segment LED 4 (display area a, b, c, and d) Other than integrated values: 99 Integrated values: 999999 count 200 ms ±50 ms (approx. 5 updat number of averaging iterations so	t accur lue) to 999 cc t (6 dig tes per	racy for current. DC measurement accu nut (5 digits) its)		
Display Number of display parameters Display resolution Display update	Add ±10 μÅ to DC measuremen Add (±10 μÅ) × (voltage read va for active power. Sations 7-segment LED 4 (display area a, b, c, and d) Other than integrated values: 99 Integrated values: 999999 count 200 ms ±50 ms (approx. 5 updat number of averaging iterations so	t accur lue) to 999 cc t (6 dig tes per etting) update ay hold eration V3335 s	acy for current. DC measurement accu bunt (5 digits) its) sec.) to 20 s (varies wi s; data updates; integral operation; key lock for the slave PW3335 s series. Synchronization v		
Display Number of display parameters Display resolution Display update rate Synchronized c Functions	Add ±10 μÅ to DC measuremen Add (±10 μÅ) × (voltage read va for active power. :ations 7-segment LED 4 (display area a, b, c, and d) Other than integrated values: 99 Integrated values: 999999 count 200 ms ±50 ms (approx. 5 updat number of averaging iterations s ontrol The timing of calculations; display start, stop, and reset events; display start,	999 cc (6 dig tes per eteting) update eration 2335 s eries is	acy for current. DC measurement accu- bunt (5 digits) its) sec.) to 20 s (varies wi operation; key lock for the slave PW3335 st series. Synchronization v also supported.		
Display Number of display parameters Display resolution Display update rate Synchronized c Functions	Add ±10 µÅ to DC measuremen Add (±10 µÅ) × (voltage read va for active power. 2ations 7-segment LED 4 (display area a, b, c, and d) Other than integrated values: 99 Integrated values: 999999 count 200 ms ±50 ms (approx. 5 updal number of averaging iterations s ontrol The timing of calculations; display start, stop, and reset events; display operation; and zero-adjustment op is synchronized with the master PW the PW3336 series and PW3337 se BNC terminal × 1 (non-isolated) External synchronization terminal Off Synchronized control function o	t acculue) to 9999 ccc : (6 dig tes per testing) update ay hold eration //3335 s rries is	racy for current. DC measurement accu bunt (5 digits) its) sec.) to 20 s (varies wi s; data updates; integral operation; key lock for the slave PW3335 sc series. Synchronization v also supported. SYNC) als input to the externa		
Display Number of display parameters Display resolution Display update rate Synchronized c Functions	Add ±10 μÅ to DC measuremen Add (±10 μÅ) × (voltage read valor (±10 μÅ) × (voltage read v	t acculue) to 9999 ccc ((6 dig tes per etting) update ay hold eration 7/3335 5 ((EXT.: ff (sign YNC) a	racy for current. DC measurement accu bunt (5 digits) its) s; data updates; integral operation; key lock for the slave PW3335 sc series. Synchronization v also supported. SYNC) als input to the externa are ignored)		
Display Number of display parameters Display resolution Display update rate Synchronized c Functions	Add ±10 μÅ to DC measuremen Add (±10 μÅ) × (voltage read va for active power. Sations 7-segment LED 4 (display area a, b, c, and d) Other than integrated values: 99 Integrated values: 999999 count 200 ms ±50 ms (approx. 5 updal number of averaging iterations s Ontrol The timing of calculations; display start, stop, and reset events; display operation; and zero-adjustment op is synchronized with the master PW the PW3336 series and PW3337 set BNC terminal × 1 (non-isolated) External synchronization terminal Off Synchronized control function or synchronization terminal (EXT.S In The external synchronization ter and a dedicated synchronization	t accuiulue) to 9999 ccc ((6 dig tes peretetting) update ay hold (2XT.: ff (sign YNC) a minal (racy for current. DC measurement accu bunt (5 digits) its) sec.) to 20 s (varies wi operation; key lock for the slave PW3335 st series. Synchronization v also supported. SYNC) als input to the externa are ignored)		
Display Number of display parameters Display resolution Display update rate Synchronized c Functions	Add ±10 μÅ to DC measuremen Add (±10 μÅ) × (voltage read va for active power. :ations 7-segment LED 4 (display area a, b, c, and d) Other than integrated values: 99 Integrated values: 999999 count 200 ms ±50 ms (approx. 5 updat number of averaging iterations s ontrol The timing of calculations; display start, stop, and reset events; display synchronized with the master PW the PW3336 series and PW3337 set BNC terminal × 1 (non-isolated) External synchronization terminal Off Synchronized control function of synchronization terminal (EXT.S In The external synchronization terminal (EXT.S)	t accuiulue) to 9999 ccc ((6 dig wpdate ay hold reation (EXT.: ff (sign YNC) a minal (E) minal (E)	acy for current. DC measurement accu- bunt (5 digits) its) sec.) to 20 s (varies wi s: data updates: integrat operation; key lock for the slave PW3335 ss series. Synchronization v also supported. SYNC) als input to the externa are ignored) EXT.SYNC) is set to input (slave). XT.SYNC) is set to outpu		
Display Number of display parameters Display resolution Display update rate Synchronized c Functions	Add ±10 µÅ to DC measuremen Add (±10 µÅ) × (voltage read va for active power. :ations 7-segment LED 4 (display area a, b, c, and d) Other than integrated values: 99 Integrated values: 999999 count 200 ms ±50 ms (approx. 5 updal number of averaging iterations s ontrol The timing of calculations; display start, stop, and reset events; display operation; and zero-adjustment op is synchronized with the master PW the PW3336 series and PW3337 set BNC terminal × 1 (non-isolated) External synchronization terminal Off Synchronized control function or synchronized control function or synchronized control function or synchronization terminal (EXT.S In The external synchronization terminal Out The external synchronization terminal	t accuiulue) to 9999 ccc ((6 dig update ay hold tes per eration yhold (EXT.: ff (sign YNC) a minal (EX signal c	acy for current. DC measurement accu- bunt (5 digits) its) sec.) to 20 s (varies wi s; data updates; integra operation; key lock for the slave PW3325 s series. Synchronization v also supported. SYNC) als input to the externa are ignored) EXT.SYNC) is set to inp al can be input (slave). XT.SYNC) is set to output can be output (master).		
Display Number of display parameters Display resolution Display update rate Synchronized c Functions Terminal Terminal name I/O settings	Add ±10 µÅ to DC measuremen Add (±10 µÅ) × (voltage read va for active power. :ations 7-segment LED 4 (display area a, b, c, and d) Other than integrated values: 99 Integrated values: 999999 count 200 ms ±50 ms (approx. 5 updal number of averaging iterations s :ontrol The timing of calculations; display start, stop, and reset events; display operation; and zero-adjustment op is synchronized with the master PW the PW3336 series and PW3337 sc BNC terminal × 1 (non-isolated) External synchronization terminal Off Synchronized control function of synchronization terminal (EXT.S) In The external synchronization term and a dedicated synchronization Up to 7 slaves per master (total of 8 units including the PW3 the Sensor Input Specificatio	t accuiulue) to 9999 ccc ((6 dig tes per etting) (/3335 i erries is erries is ((EXT.) ff (sign YNC) a minal (E) signal (E) 33336/P	acy for current. DC measurement accu- bunt (5 digits) its) sec.) to 20 s (varies wi s; data updates; integral operation; key lock for the slave PW335 s series. Synchronization v also supported. SYNC) als input to the externa are ignored) EXT.SYNC) is set to inp al can be input (slave). XT.SYNC) is set to output can be output (master).		
Display Number of display parameters Display resolution Display update rate Synchronized c Functions Terminal Terminal name I/O settings	Add ±10 µÅ to DC measuremen Add (±10 µÅ) × (voltage read va for active power. :ations 7-segment LED 4 (display area a, b, c, and d) Other than integrated values: 99 Integrated values: 999999 count 200 ms ±50 ms (approx. 5 updal number of averaging iterations s :ontrol The timing of calculations; display start, stop, and reset events; display operation; and zero-adjustment op is synchronized with the master PW the PW3336 series and PW3337 sc BNC terminal × 1 (non-isolated) External synchronization terminal Off Synchronized control function of synchronization terminal (EXT.S) In The external synchronization term and a dedicated synchronization Up to 7 slaves per master (total of 8 units including the PW3 the Sensor Input Specificatio	t accuiulue) to 9999 ccc ((6 dig tes per etting) (/3335 i erries is erries is ((EXT.) ff (sign YNC) a minal (E) signal (E) 33336/P	acy for current. DC measurement accu- bunt (5 digits) its) sec.) to 20 s (varies wi s; data updates; integral operation; key lock for the slave PW335 s series. Synchronization v also supported. SYNC) als input to the externa are ignored) EXT.SYNC) is set to inp al can be input (slave). XT.SYNC) is set to output can be output (master).		

	measurement specifications.	<u>\</u>	,
-		Terminal	Isolated BNC terminals
s	Harmonic voltage RMS value Harmonic voltage phase angle Harmonic current ontent percentage Harmonic current percentage Harmonic current percentage	type	Off / TYPE.1 / TYPE.2 When set to off, input from the external current sensor input terminal is ignored.
	Harmonic active power content percentage Harmonic voltage current phase difference Total harmonic voltage distortion Total harmonic current distortion Fundamental wave voltage Fundamental wave current	Current sensor options	TYPE1 (100 A to 5000 A sensors) 9660, 9661, 9669, CT9667-01/-02/-03
	Fundamental wave active power Fundamental wave apparent power Fundamental wave reactive power Fundamental wave power factor Fundamental wave voltage current phase difference		TYPE2 (20 A to 1000 A sensors, Power supply is required to use) CT6862-05, CT6863-05, CT6875, CT6876, CT6877, 9272-05, CT6841-05, CT6843-05, CT6844-05, CT6845-05, CT6846-05, etc.
	(The following parameters can be downloaded as data with communications)		Auto/ 1 A/ 2 A/ 5 A (range noted on panel)
	Harmonic voltage phase angle Harmonic current phase angle		Can be read directly by manually setting the CT ratio.
	Harmonic voltage current phase difference	Constraints	Auto-range integration not supported.

ſ	-wasa 5
	F 11000

PW333							
Power range configuration							
Measurement accuracy Current/ Active Po	Jwer						
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< td=""><td>±0.1%rdg.±0.2%f.s.</td><td>±0.3%rdg.</td><td>±0.3%rdg.</td></f≤500hz<>	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.				
500Hz <f≤1khz< td=""><td>±0.1%rdg.±0.2%f.s.</td><td>±0.3%rdg.</td><td>±0.3%rdg.</td></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< td=""><td>±(0.03+0.07×F)%rdg. ±0.2%f.s.</td><td>±(0.23+0.07×F)%rdg.</td><td>±(0.23+0.07×F)%rdg.</td></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< td=""><td>±(0.3+0.04×F)%rdg. ±0.3%f.s.</td><td>±(0.6+0.04×F)%rdg.</td><td>±(0.6+0.04×F)%rdg.</td></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				
11/11-26/10/11-	. (0.02 . 0.07 E)% rda	1 (0 22 1 0 07 vE)% rda	10 22 0 07 EV/rda				

Frequency (f)	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s.	100%f.s. ≤ Input
1kHz <f≤10khz< td=""><td>±(0.03+0.07×F)%rdg.</td><td>±(0.23+0.07×F)%rdg.</td><td>±(0.23+0.07×F)%rdg.</td></f≤10khz<>	±(0.03+0.07×F)%rdg.	±(0.23+0.07×F)%rdg.	±(0.23+0.07×F)%rdg.
	±0.2%f.s.		
10kHz <f≤50khz< td=""><td>±(0.07×F)%rdg.</td><td>±(0.3+0.07×F)%rdg.</td><td>±(0.3+0.07×F)%rdg.</td></f≤50khz<>	±(0.07×F)%rdg.	±(0.3+0.07×F)%rdg.	±(0.3+0.07×F)%rdg.
	±0.3%f.s.	_	
50kHz <f≤100khz< td=""><td>±(0.6+0.07×F)%rdg.</td><td>±(0.9+0.07×F)%rdg.</td><td>±(0.9+0.07×F)%rdg.</td></f≤100khz<>	±(0.6+0.07×F)%rdg.	±(0.9+0.07×F)%rdg.	±(0.9+0.07×F)%rdg.
	±0.3%f.s.		

- ¥0.3%I.S.
 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 in excess of 220 V for which 10 Hz ≤ f < 10 Hz. Values for voltage and active power in excess of 750 V for which 30 kHz < f ≤ 100 kHz.
 When using the CT684x-05 series, add ±2 mV to the CT684x-05 series accuracy after performing CT684x-05 series 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: $\pm 0.15\%$ f.s. or less (45 to 66 Hz with power factor = 0) Internal circuit voltage/current phase difference: $\pm 0.0859^{\circ}$ Add the current sensor phase accuracy to the internal circuit voltage/current phase difference noted above.			
Current waveform peak value measurement specifications	$\pm 2.0\%$ at DC or 10 Hz $\leq f \leq 1$ kHz Add the current sensor accuracy			
Harmonic	External current sensor input instru	ment measurement accuracy only		
measurement	Frequency (f)	Voltage, Current, Active power		
accuracy	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 CT684x-05 series, add ±2 mV to the CT684x-05 series accuracy after performing CT684x-05 series zero adjustment using the 1 A range noted on the panel. 			

(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
	parameter Level output (Output parameter measurement accuracy) + (±0.2%f.s.)
	High-speed level output (Output parameter measurement accuracy) + (±0.2 %i.s.)
	(Output parameter measurement accuracy) + (±0.2 %i.s.) (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	Approx. ±12 V DC
voltage Output update	Level output
rate	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 GP-IB interface	0 to 5 V (high-speed CMOS level) or shorted [Lo]/ open [Hi]
	d PW3335-04)
Method	Compliant with IEEE488.1 1987, in reference to IEEE488.2 1987 Interface functions
Address	SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0 00 to 30
RS-232C interfa	ace
	35-02, PW3335-03, and PW3335-04)
Connector Communication	D-sub 9-pin connector × 1 Full duplex, Start-stop synchronization
method	Stop bits: 1 (fixed) Data length: 8 (fixed)
Communication	Parity: None 9600 bps/ 38400 bps
speed	
ANI interface	
AN interface	RJ-45 connector x 1
Connector Electrical	RJ-45 connector × 1 Compliant with IEEE802.3
Connector Electrical specifications Transmission	
Connector Electrical specifications Transmission method Protocol	Compliant with IEEE802.3
Connector Electrical specifications Transmission method	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection)
Connector Electrical specifications Transmission method Protocol Functions General Specifi	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specifi Product warranty	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specifi Product warranty period Operating	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specifi Product warranty period Operating environment Operating temperature and	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations 3 year
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specifi Product warranty period Operating temperature and humidity Storage temperature and	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations 3 year Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation)
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specifi Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations 3 year Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) 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 voltage input terminals and current input terminals Between the voltage input terminals and current input terminals
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specifi Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations 3 year Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) 4290 V rms AC (current sensitivity: 1 mA) Between the voltage input terminals and a connection consisting of chassis, interfaces, and output terminals
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specific Product warranty period Operating environment Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth Maximum input	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations 3 year Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) 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 cultage input terminals and current input terminals Woltage input terminal, Current input terminals Measurement category III 600 V (anticipated transient overvoltage: 6000 V) Between the voltage input terminals U and ±
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specifi Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller cations 3 year Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) 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 Between the voltage input terminals and current input terminals Measurement category III 600 V (anticipated transient overvoltage: 6000 V)
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specifi Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth Maximum input voltage Maximum input current	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations 3 year Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) 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 current input terminals Between the voltage input terminals and current input terminals Woltage input terminal, Current input terminals Measurement category III 600 V (anticipated transient overvoltage: 6000 V) Between the voltage input terminals U and ± 1000 V, ±1500 V peak Between the torrent 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
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth Maximum input voltage Maximum input	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations 3 year Indoors, allitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) 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 connection consisting of chassis, interfaces, and output terminals Between the current input terminals and connection consisting of chassis, interfaces, and output terminals Between the current input terminals and current input terminals Notage input terminal, Current input terminal Measurement category III 600 V (anticipated transient overvoltage: 6000 V) Between the voltage input terminals U and ± 1000 V, ±1500 V peak 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 Safety EN61326 Class A EN61000-3-2
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specific Product warranty period Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth Maximum input voltage Maximum input current Applicable Standards Rated supply	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations 3 year Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) 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 current input terminals Between the voltage input terminals and current input terminals Woltage input terminal, Current input terminal Measurement category II 1000 V (anticipated transient overvoltage: 6000 V) Between the cultage input terminals U and ± 1000 V, ±1500 V peak 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 Safety EN61010 EMC EN61326 Class A EN61000-3-2 EN61000-3-3 100 V AC to 240 V AC
Connector Electrical specifications Transmission method Protocol Functions General Specifi Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth Maximum input voltage Maximum input current Applicable Standards	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations 3 year Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) 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 a current input terminals Between the voltage input terminals and current input terminals Woltage input terminal, Current input terminal Measurement category III 600 V (anticipated transient overvoltage: 6000 V) Between the voltage input terminals I and ± 1000 V, ±1500 V peak 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 Safety EN61010 EMC EN61326 Class A EN61000-3-2 EN61000-3-3
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage Maximum input voltage Standards Rated supply voltage Maximum rated power	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations 3 year Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) 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 voltage input terminals and a connection consisting of chassis, interfaces, and output terminals Between the voltage input terminals and current input terminals Between the voltage input terminals and current input terminals Weasurement category III 600 V (anticipated transient overvoltage: 6000 V) Between the current input terminals I and ± 1000 V, ±1500 V peak 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 Safety EN61010 EMC EN61326 Class A EN61000-3-2 EN61000-3-3 100 V AC to 240 V AC 50 Hz/60 Hz 30 VA or less
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth Maximum input voltage Maximum input voltage Maximum input voltage Rated supply voltage Maximum rated power Dimensions	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations 3 year Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) 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 current input terminals and current input terminals Watage input terminals and current input terminals Measurement category III 600 V (anticipated transient overvoltage: 6000 V) Between the voltage input terminals U and ± 200 mA to 20 A range 30 A, ±100 A peak 1 mA to 100 mA range 20 A, ±30 A peak Safety EN61000 -3-3 100 V AC to 240 V AC 50 Hz/60 Hz 30 VA or less Approx. 210W × 100H × 245D mm (8.27"W × 3.94"H × 9.65"D) (excluding protrusions)
Connector Electrical specifications Transmission method Protocol Functions Ceneral Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage Maximum input voltage Standards Rated supply voltage Maximum rated power	Compliant with IEEE802.3 10Base-T/ 100Base-TX (automatic detection) TCP/IP HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller cations 3 year Indoors, altitude up to 2000 m (6562 ft.), pollution degree 2 0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) 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 connection consisting of chassis, interfaces, and output terminals Between the current input terminals and connection consisting of chassis, interfaces, and output terminals Between the current input terminals and connection consisting of chassis, interfaces, and output terminals Between the current input terminals and connection consisting of chassis, interfaces, and output terminals Between the current input terminals and connection consisting of chassis, interfaces, and output terminals Between the current input terminals and connection consisting of chassis, interfaces, and output terminals Between the current input terminals and connection consisting of chassis, interfaces, and output terminals Measurement category III 000 V (anticipated transient overvoltage: 6000 V) Between the current input terminals U and ± 1000 V, ±1500 V peak 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 Safety EN61010 EMC EN61326 Class A EN61000-3-3 100 V AC to 240 V AC 50 Hz/60 Hz 30 VA or less Approx. 210W × 100H × 245D mm (8.27"W × 3.94"H × 9.65"D)

3334 Specifications

Basic Specifications

Measu	rable lines	Single-phase, 2-wire (AC/DC)					
Measu param	irement eters	frequency,	Voltage, current, active power, apparent power, power factor, frequency, integrated current and active power, waveform peak (voltage and current)				
Measure	ement method	Simultaneo	ous digital s	ampling of v	voltage and	Current, Tru	ue RMS
Samplin	g Frequency	Approx. 74	.4kHz				
Measur	ement Ranges						
	Currnet Voltage	100.00 mA	300.0 mA	1.0000 A	3.000 A	10.000 A	30.00 A
	15.000 V	1.5000 W	4.500 W	15.000 W	45.00 W	150.00 W	450.0 W
	30.00 V	3.000 W	9.000 W	30.00 W	90.00 W	300.0 W	900.0 W
	150.00 V	15.000 W	45.00 W	150.00 W	450.0 W	1.5000 kW	4.500 kW
	300.0 V	30.00 W	90.00 W	300.0 W	900.0 W	3.000 kW	9.000 kW
Freque	Frequency bandwidth DC, 45Hz to 5kHz						

r=1, in-phase voltage =0V, accuracy specifications differ depending on usage period of 1 or 3 years)

Measurement accuracy

(Guaranteed at 23°C±5, max. 80%/h,	ane wave input, power f	tactor=1, in-phase volt	lage =0V, accuracy specificatio	ns differ depending on usage period of 1 or 3 years		
Warm-up time	3 minutes					
Period of guaranteed accuracy	3 years (bet	ter accurac	y specifications a	available for 1-year period)		
Post-adjustment accuracy guarantee	1 year (accu	uracy specif	ications available	e for 1-year period)		
Effective measurement	Voltage, current:1% to 100% (Power: 0% to 100%)					
range	Measurements below 0.5% of the voltage or current range will be zero suppressed.					
Effect of power factor (at pf=0.5)	Maximum ±0.4%±rdg. (45 to 66Hz)					
Temperature Coefficient	Maximum ±0.03%f.s./°C					
_	Guaranteed	Voltage curre	ent and active power	Current and active power		
Frequency	Period			(at 50% to 100% of input range)		
	1 year		±0.1 %rdg.			
DC *	3 years		±0.1 %rdg.			
	1 year	+0.1 %r	dg. ±0.1 %f.s.	±0.2 %rdg.		
45 Hz ≤ f ≤ 66 Hz	3 years		dg. ±0.2 %f.s.	±0.3 %rdg.		
	1 year		dg. ±0.2 %f.s.	±0.3 %rdg.		
66 Hz < f ≤ 1 kHz **	3 years		g. ±0.35 %f.s.	±0.45 %rdg.		
	1 year		9. 10.33 %1.3. 9.0 %f.s.			
1 kHz < f \leq 5 kHz **	3 years		1.0 %1.s. 1.5 %f.s.	±3.0 %rdg. ±4.5 %rdg.		
				neasuring DC current		
				when measuring DC active power		
		racy not defi	ined for current in	nput exceeding 20A		
Input Specificat	ions					
Input impedance	2.4 MO for v	voltage 10 r	$m\Omega$ or better (50/	60 Hz) for current		
Maximum input voltage	300 V, ±425					
Maximum input current	30 A, ±54.0					
Maximum effective peak voltage			range Within +/	125 Vneak		
Maximum effective peak current						
Max. rated voltage to earth	300 V (DC,		Tange, within ±5	4.0 Apeak		
		30/ 00 112)				
Display Specific	ations					
Display indication	Voltage and	current: 0.5	5% to 105% of ra	nge		
range	Active powe	er: 0% to 110	0.25% of range			
Displacement power factor	0.000 to 1.0	100 (no pola	rity display)			
Display refresh rate	approx. 5 tir	mes per sec	ond			
Response time				input [0 to 90% or 100 to 10% of range]		
Functional Spec						
•			Ois distan			
Integration measurement	No.of display Current Integ		Six digits	n, Polarity-independent		
measurement	Current integ	nation.	integration and Su			
	Active power	Active power Integration: From 0.00000mWh, Polarity-independent				
		0	integration and Su			
	Integration time: 1 min to 10000 h					
	Measurement accuracy: Measurement accuracy of active power ±1dgt.					
Wave peak				waveform of voltage/		
measurement	current (up 1	to 300% of f	full scale range)			
-	Measureme	nt accuracy	<u>/: ±1.2%t.s. ("t.s."</u>	is 300% of each range)		
Rectification method				verage display) and AC(True RMS)		
Analog output	Parameter c					
(D/A output)	Voltage, Current and Active power (3 simultaneous channels)					
	D/A select an item from Current integration, Active power integration,					
	Apparent power, power factor					
	Voltage output: ±2 VDC f.s. for each range Output accuracy: ±0.5% f.s. + individual measurement accuracy					
Waveform output	Parameter c					
waveloini output				simultaneous channels)		
	Voltage out		C f.s. for each ra			
Average function			Output accuracy: ±1.0% f.s. + individual measurement accuracy Simple averaging of specified number of samples: 1, 2, 5, 10, 25, 50 or 100			
VT or CT ratio						
VIOLUTANO				100. 1, 2, 0, 10, 20, 00 01 100		
VIOLUTALIO	VT ratios: 1,	2, 4, 10, 20	, 30, 60, 100	0, 24, 25, 30, 40, 50, 60, 75,		

80, 100, 200, 300, 500, 1000, 2000, 3000, 5000, 10000 External Interfaces RS-232C interface: Included as standard Asynchronous communication method: full-duplex; Baud rate: 9600 bps (fixed) GP-IB interface (Model 3334-01 only) IEEE-488.1 1987 compliant, IEEE-488.2 1987 reference Miscellaneous Display hold, Maximum value hold, Peak value hold, Key lock, Backup function (preserves settings, integration data)

General Specifications

Safety	EN61010 Pollution Factor 2, Measurement Category III (4000 V anticipated overvoltage)
EMC	EN61326, EN61000-3-2, EN61000-3-3
Operating environment	0 to 40 °C, 80% RH or less, non-condensating
Storage environment	-10 to 50 °C, 80% RH or less, non-condensating
Rated supply voltage	100 to 240 VAC, 50/60 Hz
Maximum rated power	20 VA
Dimensions and mass	210 mm (8.27 in)W × 100 mm (3.94 in)H × 245 mm (9.65 in)D (excluding feet and projections), 2.5 kg (88.2 oz)

3333 Specifications

В	asic	specifications	
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Measurable lines		Single-phase, 2-wire (AC)									
	ment parameters	Voltage, Current, Active power, Apparent power, Power factor									
	ement method	Simultaneous digital sampling of voltage and current, True RMS									
	ng frequency	Approx. 48	KHZ								
weasu	rement ranges										
	Currnet Voltage	50.00 mA	200.0 mA	500.0 mA	2.000 A	5.000 A	20.00 A				
200.0 V		10.000 W	40.00 W	100.00 W	400.0 W	1.0000 kW	4.000 kW				
Frequen	icy bandwidth	45Hz to 5kHz									
Meas (Guaranteed	urement a at 23°C±5, max. 80%rh, s	CCURACY	factor=1, in-phase vo	tage =0V, accuracy s	pecifications differ de	pending on usage per	iod of 1 or 3 years)				
Warm-	up time	10 minutes									
Period of g	guaranteed accuracy	3 years (better accuracy specifications available for 1-year period)									
Post-adjustn	nent accuracy guarantee	1 year (accuracy specifications available for 1-year period)									
	e measurement	Voltage, current, power: 10% to 150%									
range	() () (0.0)	Measurements below 1% of the voltage or current range will be zero suppressed. Maximum ±0.4%±rdg. (45 to 66Hz)									
	ower factor (at pf=0.5)		-		Z)						
Tempera	ature Coefficient		±0.03%f.s./	1							
Fr	equency	Guarant	eed Period	Volt	age, curren	t and active	power				
45 Hz	z ≤ f ≤ 66 Hz	1	year		±0.1 %rd	g. ±0.1 %f.s	3.				
			years			g. ±0.2 %f.s					
66 Hz	< f ≤ 1 kHz *	1	year			g. ±0.2 %f.s					
00112	1 3 1 1012		years			g. ±0.35 %f.	S				
1 kHz	< f ≤ 5 kHz *	1	year			0 %f.s.					
T KI IZ		3	years		±4.	5 %f.s.					
Innut	onocificati	* Accuracy	not defined	for current	input excee	ding 20A					
	specificati										
	mpedance	2.4 M Ω for voltage, 7 m Ω or better (50/60 Hz) for current									
	m input voltage	300 Vrms, 425 Vpeak									
	m input current	30 Arms, 42.5 Apeak									
	effective peak voltage	Within 425									
	effective peak current			it range, Wit	thin ±42.5A	peak					
Max. rate	d voltage to earth	300V (50/6	UHZ)								
<u> </u>	ay specific										
range	y indication	active pow	er: 0% to 23	% to 152% (31.04% of ra	ange						
	ment power factor			arity display	/)						
	y refresh rate		imes per se								
Respo	nse time		(I ime to ra		cy after abr	upt change	in input [0				
Funct	ional Spec	ifications									
Rectific	ation method	AC(True RI	VIS)								
Analog (D/A o	g output utput)	voltage, ci Voltage ou	tput: +2 VD	active powe C f.s. for ea	ch range	neous chan asurement a					
Averag	ge function					nples: 1, 2, 5					
VT or (CT ratio	VT ratios: 1		0, 30, 60, 1		30, 40, 50, 60	75, 80, 100				
Extern	al Interfaces	CT ratios: 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, 25, 30, 40, 50, 60, 75, 80, 100 RS-232C interface: Included as standard Asynchronous communication method: full-duplex; Baud rate: 9600 bps (fixed) GP-IB interface (Model 3333-01 only)									
						987 referenc					
	laneous		d, Key lock	, Settings b	ackup (pre:	serves settir	ngs)				
	ral Specific										
Safety		EN61010 Pollution Factor 2, Measurement Category III (4000 V anticipated overvoltage)									
EMC				-2, EN6100							
	ng environment		less, non-c								
	environment	-10 to 50 °C, 80% RH or less, non-condensating									
	upply voltage		VAC, 50/60) Hz							
	m rated power	20 VA	20 VA 160 mm (6.30 in)W × 100 mm (3.94 in)H × 227 mm (8.94 in)D								
Dimensi	ons and mass			ojections),							

Calculation formulas (3333 & 3334)

Measurement Parameters	Formula
Apparent Power (S)	$S = U \times I$
Power Factor (2)	$\lambda = I P / S I$
Integrated Current*	(Sum of I from start of integration)/ (Number of 1 hour data)
Integrated Active Power *	(Sum of P from start of integration)/ (Number of 1 hour data)

* Current and active power integration available only on Model 3334.

3-phase Power Meter

Model & Appearance	Model No. (Order Code)	Number of Channels	AC/ DC	Harmonic Measurement	LAN	RS-232C	GP-IB	D/A output	Current Sensor Input	Synchronized Control
	PW3337	3	AC/ DC	~	~	~	×	×	~	~
POWER METER PW3337	PW3337-01	3	AC/ DC	~	~	~	~	×	~	~
sapag 33370 100	PW3337-02	3	AC/ DC	•	~	~	×	~	~	~
	PW3337-03	3	AC/ DC	•	~	~	~	~	~	~
	PW3336	2	AC/ DC	~	~	~	×	×	~	~
POWER METER PW3336	PW3336-01	2	AC/ DC	•	~	•	~	×	•	~
59005 59005 38316 128	PW3336-02	2	AC/ DC	•	~	~	×	~	~	~
	PW3336-03	2	AC/ DC	✓	~	~	~	~	~	~

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

Single-phase Power Meter

Model & Appearance	Model No. (Order Code)	Number of Channels	AC/ DC	Harmonic Measurement	LAN	RS-232C	GP-IB	D/A output	Current Sensor Input	Synchronized Control
	PW3335	1	AC/ DC	~	•	~	×	×	×	~
POWER METER	PW3335-01	1	AC/ DC	~	~	×	~	×	~	~
PW3335	PW3335-02	1	AC/ DC	✓	~	~	×	~	×	~
	PW3335-03	1	AC/ DC	~	~	~	×	×	~	~
	PW3335-04	1	AC/ DC	~	~	~	~	~	~	~
AC/ DC POWER HITESTER 3334	3334	1	AC/ DC	×	×	~	×	~	×	×
22000 2000 22000 22000	3334-01	1	AC/ DC	×	×	~	~	~	×	×
POWER HITESTER 3333	3333	1	AC	×	×	~	×	~	×	×
apno appo visiona	3333-01	1	AC	×	×	~	~	~	×	×

Communications and control options



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



CABLE 9151-02 5.91 ft) 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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Accessories : Instruction manual ×1, Power cord ×1