POWER METER Series

ΗΙΟΚΙ

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



CC <u>3year</u>

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.

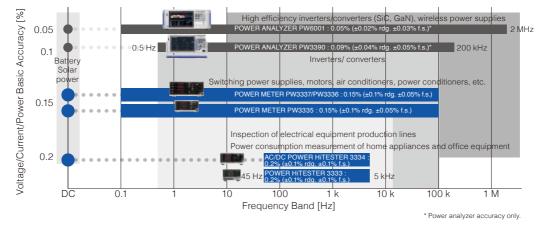


Single-phase Power Meter

 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 μA.
 Designed for power consumption testing, the 3334 and 3333 are guaranteed for accuracy for up to 3 years.

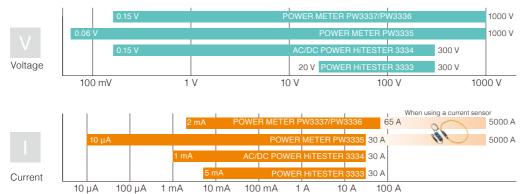


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Basic Accuracy and Frequency Bands

Effective Measurement Range



Comparison Chart

		PW3337	PW3336	PW3335	3334	3333
No. of channels		3	2	1	1	1
Supported conn	ections	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 measurement 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 band		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 accuracy, DC (Voltage, current, power)		±0.1% rdg. ±0.1% f.s.			±0.1% rdg. ±0.2% f.s.	-
Integrated power measurement		Yes			Yes	-
Harmonic measurement		IEC61000-4-7 compliant			-	
Current sensor input		Ye	es	PW3335-03, -04	-	
	LAN		Yes	×	-	
Interface	RS-232C	Ye	es	PW3335, -02, -03, -04	Yes	
Internace	GP-IB	PW3337-01, -03	PW3336-01, -03	PW3335-01, -04	3334-01	3333-01
	D/A output	D\\/2227.02.02	D/M0006 00 00	D/M000E 00 04	Voo	

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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







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)



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

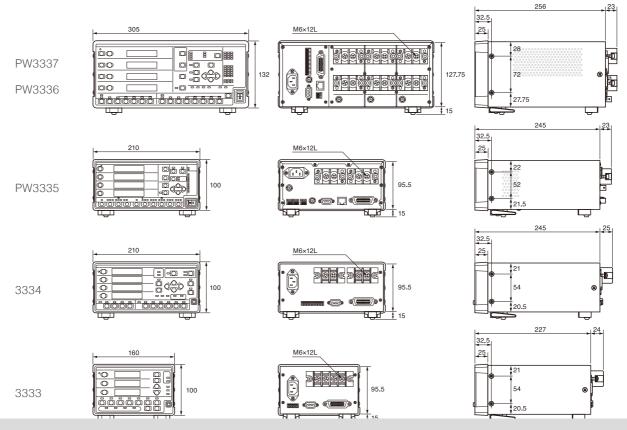


• Compact model for saving space, even when added to a system

Units: mm

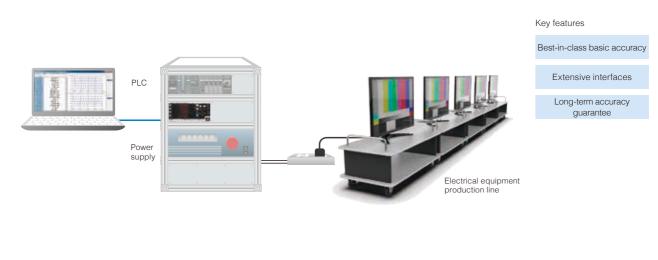
• Accuracy guaranteed up to 3 years

Dimensional Drawings



Applications

Inspection of Electrical Equipment Production Lines



Best-in-class Accuracy ±0.1% * [PW333 7] [PW333 6] [PW333 6]

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)

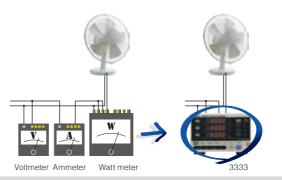


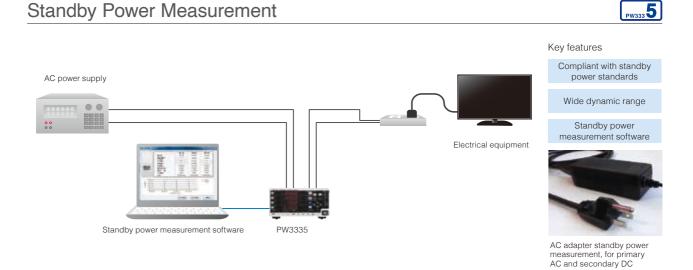
The 3333 and 3334 are guaranteed for accuracy for 3 years. Even after 3 years, they maintain an accuracy of $\pm 0.5\%$ rdg. as required for measurements. This 3-year accuracy guarantee, the longest in the industry, helps to save on calibration expenses.



Replacement for Analog Meters

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)					
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				

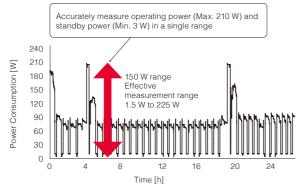
THD (Total Harmonic Distortion): Indicates to what extent harmonic components are present in an AC waveform

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

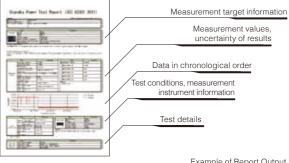
Wide Range of Effective Measurement

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 noload to full operation.



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.

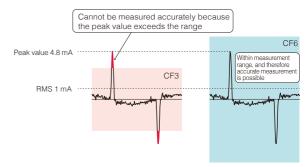


Example of Report Output

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.



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Measurement of Fluctuating Loads and Power Supply Control



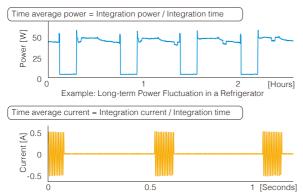
Auto Range Integration with Guaranteed Accuracy when Switching Ranges

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.



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.



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.

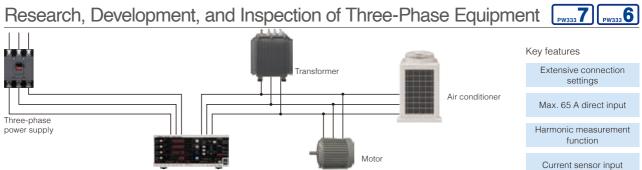
- Half-wave rectified waveforms used for dryers and fans
- Full-wave rectified waveforms used for AC adapters
- Cycle control waveforms used for voltage and temperature adjustment heaters
- DC waveforms with superimposed ripple components

Half-wave Rectified Waveform

Full-wave Rectified Waveform

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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.

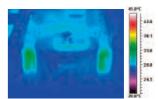
Support for Various Connections

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.



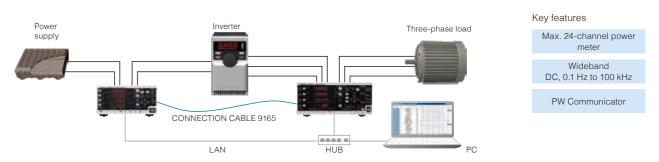
DCCT current sensor (in the PW3337)



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

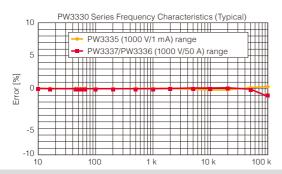
PW333 7 || PW333 6 || PW333 5

Inverter Efficiency Measurement



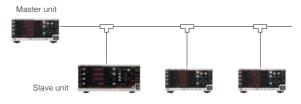
Wide Frequency Band (DC, 0.1 Hz to 100 kHz)

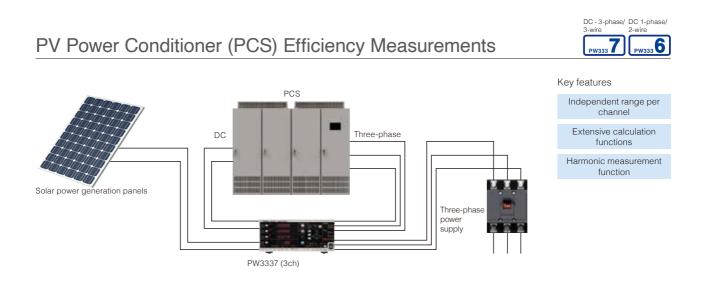
These models cover not only the fundamental frequency bands for inverters, but also carrier frequency bands, in a wide range that includes DC and frequencies from 0.1 Hz to 100 kHz.



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

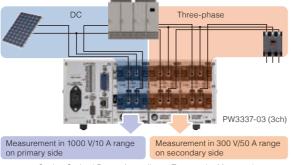
Connect 8 units for synchronous measurement of up to 24 channels. The calculation and control timing for PW3337, PW3336, and PW3335 units that are set as slaves are synchronized with the master unit. Use this feature to measure the I/O efficiency of power supply devices, compare multiple pieces of equipment, 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.





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.

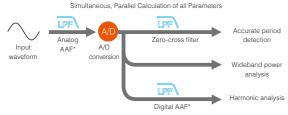


Setting Optimal Range According to Target to be Measured

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.



* AAF (Anti-aliasing filter)

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.

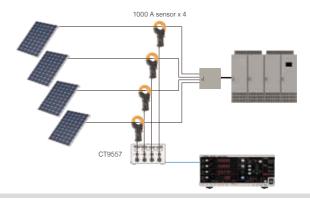
1000 V Range for Evaluation of Large Power Conditioners

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.



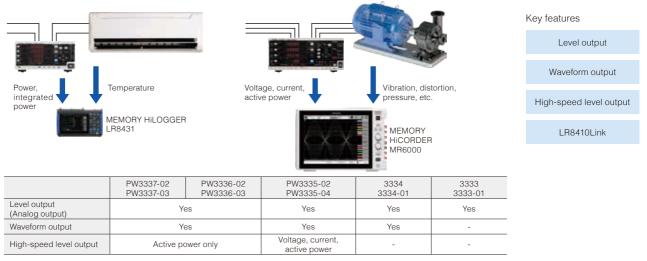
Aggregation of Output from DC Current Sensors (Up to 4000 A)

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.



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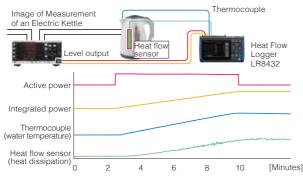
Output Function Linked with Recorder



Display Trends with a Data Logger



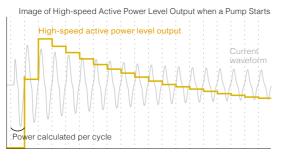
The level output (analog output) function delivers measured values that are displayed on the power meter with an analog voltage that is updated every 200 ms. Connect the unit to a data logger to check trends through synchronization with data such as temperature and heat flow*.



* 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 [PW3337] [PW3356] [PW3355]

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.

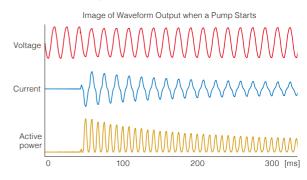


Observe Waveforms with a Memory Hicorder



PW333

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.



Log Data Measured by a Power Meter Wirelessly on a Hioki Logger(LR8410 Link)

Wirelessly transmit measurement parameters from the Power Meter PW3335 (excluding model -01) to a Wireless Logging Station LR8410 via Bluetooth[®] wireless technology*.

- The PW3335-02 and PW3335-04 can transmit 7 D/A output parameters.
- The PW3335, PW3335-03 can transmit 4 parameters: voltage, current, power and power factor.

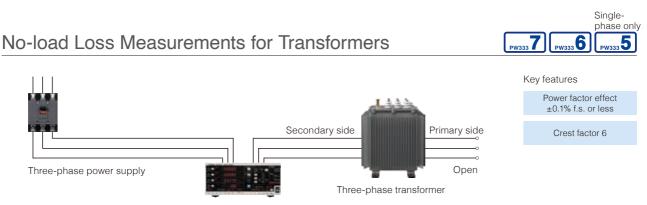
This allows you to combine the voltage and temperature data from the Logger with the current and power from the Power Meter in real time.



* Connection requires the serial - Bluetooth® wireless technology conversion

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

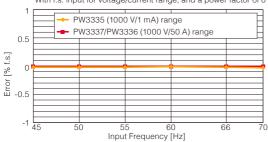
ES France - Département Tests & Mesures - 127 rue de Buzenval BP 26 - 92380 Garches



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

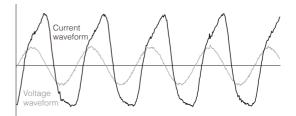
A no-load loss test is one indicator for evaluating energy conservation for transformers and motors. The PW3337 and PW3336 are affected very little by power factor, at $\pm 0.1\%$ f.s. or less, allowing active power to be measured with a high level of accuracy at low power factors.

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



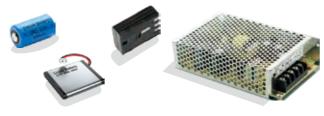
Support for Crest Factor 6

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 improving efficiency and saving energy.







* For complete details, please refer to the specifications



Key features

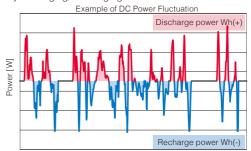
DC power accuracy ±0.2% rdg.

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

TYPE 1 Current Sensor (General Current Measurements)

Connect this unit to the current sensor input terminal (BNC) on the PW3337/PW3336/PW3335. It can be used with a direct connection.

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	φ 15 mm (0.59 in)	±0.3% rdg. ±0.02% f.s. Within ±1°		
	2	CLAMP ON SENSOR 9661	500 A	40 Hz to 5 kHz	φ 46 mm (1.81 in)	±0.3% rdg. ±0.01% f.s. Within ±0.5°		Not used
Clamp	Clamp 9669	CLAMP ON SENSOR 9669	1000 A	40 Hz to 5 kHz	φ 55 mm (2.17 in), 30 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		FLEXIBLE CLAMP ON SENSOR CT9667-01		10 Hz to 20 kHz	φ 100 mm (3.94 in)		(9.04 11)	AA (LR6) Alkaline Batteries x
	%	FLEXIBLE CLAMP ON SENSOR CT9667-02	500 A/ 5000 A			φ 180 mm (7.09 in)	±2.0% rdg. ±0.3% f.s. Within ±1°	
	<i>W</i>	FLEXIBLE CLAMP ON SENSOR CT9667-03			φ 254 mm (10.00 in)			AC ADAPTER 9445-02 (optional)
C	Options for CT	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				

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
		CT6862-05	50 A	DC to 1 MHz	φ 24 mm (0.94 in)	±0.05% rdg. ±0.01% f.s.		
		CT6863-05	200 A	DC to 500 kHz	φ 24 mm (0.94 in)	Within ±0.2° ±0.04% rdg. ±0.008% f.s. Within ±0.1°		
Through method		CT6875	500 A	DC to 2 MHz	φ 36 mm (1.42 in)			
		CT6876	1000 A	DC to 1.5 MHz	φ 36 mm (1.42 in)			
	9	CT6877	2000 A	DC to 1 MHz	φ 80 mm (3.15 in)		3 m CT9555 (9.84 ft) CT9557	n or
	1	CT6841-05	20 A	DC to 1 MHz	φ 20 mm (0.79 in)			
	%	CT6843-05	200 A	DC to 500 kHz	φ 20 mm (0.79 in)			019337
Clamp	۹.	CT6844-05	500 A	DC to 200 kHz	φ 20 mm (0.79 in)	±0.3% rdg. ±0.01% f.s. Within ±0.1°		
method		CT6845-05	500 A	DC to 100 kHz	φ 50 mm (1.97 in)			
		CT6846-05	1000 A	DC to 20 kHz	φ 50 mm (1.97 in)			
		9272-05	20 A/ 200 A	1 Hz to 100 kHz	φ 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	Connection I	اmag
	SENSOR UNIT CT9555	1	For supplying power to the TYPE 2 current sensor	100 V to 240 V AC	-		
THE REAL	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	[
//	CONNECTION CORD L9217	-	For connecting CT9555/CT9557 and PW3330 series units	-	1.6 m (5.25 ft)	561501	

CT9555 or CT9557 ige 9217 ···· jøøçjøøç

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+0,I,+014.82E+0, P.+02.727E+3,5,+02.964E+3.FF,+00.920E+0

CONNECTION CABLE 9444 9-pin - 9-pin, straight, 1.5 m (4.92 ft)





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)

33333

RECORDING PAPER 1196 112 mm (4.41 in) × 25 m (82.03 ft),



PW333 7 PW333 6 PW333 5



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.

Measurement val	ue <pw3335_04 lan:192.168.1.35="" ser140799556=""></pw3335_04>		×
🗖 Auto Update 📃	Update Visplay Waveform(8kHz or more decayed)		
Item Num 16	-		U
Urms INST	100.20 V		11
Irms INST	0.0852 A	50.00	
Prms INST	3.16 W ≥	0.00	
Srms INST	8.54 VA	-50,000	
Qrms INST	– 7.93 var 🕑		
PFrms INST	-0.3707		
FREQ_U INST	60.002 Hz	-150.00V	
FREQ_I INST	6 Numerical value	0.60A Waveform monitoring	
Upk INST			1
Ipk INST	0.4782 Apk	0.40A	
Uthd INST	0.25 %	0.20A	
Ithd INST	202.97 %	┃	
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	

Regist ID Regist A Regist A Regist B	A Communicator Status Host information READY PW3887 LAN 192.188.12 ser1: READY PW3887 LAN 192.188.12 ser1: Screen Screen Settings Save settings Save				
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	· · · · · · · · · · · · · · · · · · ·				
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.



5

PW333 7 PW333 6 PW333

14

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 The consumed power is measured according to the configured power meter. Connect the PC to a power meter, and 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 information to be entered includes manufacturer name, model name, serial number, and operation mode. You can also register an image of the test target. **Function** and orage powe antegration tim CREASINGLY UN Ċ. Sending actual 15 Condition 15 (1947) (1977) HAINTY US 54 BIAINTY D 6.0 Cong ling in 1 0.3 D082304 E4.1 (min. /max.) 0.04010-007-0 100 Low-L 3. Configure the test power supply Enter the information of the test power supply. Information 00.2 to be entered includes rating and frequency. Also, enter the values of uncertainty due to the connection method, wiring, power supply, and temperature. 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. 10555 2014 14 00ms THD(s)



152 154 155 150 19.49 99.49 6464

CSV output example

6 PW3337 and PW3336 Specifications

Input Specifications

PW333

input Specificati	OUS				
Measurement line	PW3336 series				
type	Single-phase 2-wir Three-phase 3-wire			se 3-wire (1P3W),
	Wiring	CH1	CH2		
	1P2W×2	1P2W	1P2W		
	1P3W	1P	3W		
	3P3W	3P	ЗW		
	3P3W2M	3P3	W2M		
	PW3337 series				
	Single-phase 2-wir	e (1P2W), §	Sinale-pha	se 3-wire (1P3W).
	Three-phase 3-wire				
	Three-phase 4-wire	e (3P4W)			
	Wiring	CH1	CH2	CH3	
	1P2W×3	1P2W	1P2W	1P2W	
	1P3W&1P2W		3W	1P2W	
	3P3W&1P2W		3W	1P2W	
	3P3W2M	3P3	W2M		
	3V3A		3V3A		
	3P3W3M		3P3W3M		
	3P4W		3P4W		
Input methods	Voltage Isolated inpu				
Malka a succession and	Current Isolated input,				
Voltage measurement					U V/
ranges	600.00 V/ 1000.0 V (se AUTO/ 200.00 mA/ 50				0000 4/
Current	10.000 A/ 20.000 A/ 5				
measurement	For more information a				
ranges	external current senso			sensor inp	out, see the
Power ranges	Depends on the comb			l current ra	indes:
r ower ranges	PW3336: from 3.00				
	PW3337: from 3.00				
Input resistance	Voltage input terminal		2 MΩ		
(50/60 Hz)	Current direct input ter	rminal : 1	1 mΩ or les	S	

Basic Measurement Specifications

Sampling frequency A/D converter	Simultaneous voltage and current digital sampling, zero-cross				
A/D converter	simultaneous calculati	on			
Frequency hands	16-bit resolution DC, 0.1 Hz to 100 kHz				
Frequency bands Synchronization		C (fixed at 200 ms)			
sources Measurement items	Reactive power · Power factor Efficiency Active power integration Voltage waveform peak value Voltage waveform peak value Voltage current Voltage ripple factor Harmonic parameters: Harmonic voltage RMS value Harmonic current distortion Voltage fundamental waveform Active power Voltage current Voltage current Harmonic current distortion Voltage current fundamental waveform Active power Active power Voltage current State Addition Voltage current State Addition Voltage current State Active power Voltage current State Addition Voltage current State Voltage current State St				
	Interchannel voltage fundamental wave phase difference Interchannel current fundamental wave phase difference Harmonic voltage content % Harmonic active power content % 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				
Rectifiers	 AC+DC: AC+DC measurement Display of true RMS values for both voltage and current AC+DC Umn: AC+DC measurement Display of average value rectified RMS converted values for voltage and true RMS values for current DC: DC measurement Display of simple averages for both voltage and current Display of values calculated by (voltage DC value)× (current DC value) for active power AC: AC measurement Display of values calculated by for both voltage and current Display of values calculated by √(AC+DC value)² - (DC value)² for active power FND Extraction and display of the fundamental wave component 				
Zero-Crossing	from harmonic mea 500 Hz/200 kHz		000 111-		
Filter	500 Hz: 0.1 Hz to 500	nz, zuu knz: U.I Hz to	ZUU KIIZ		
Measurement accuracy					
Voltage	logut - FOO/ f -	E00/f a class to 400011	1000/6		
Frequency (f) DC	Input < 50% f.s.	50%f.s. ≤ Input < 100%f.s.			
0.1Hz ≤ f < 16Hz	±0.1%rdg. ±0.1%f.s. ±0.1%rdg. ±0.2%f.s.	±0.1%rdg. ±0.1%f.s. ±0.3%rdg.	±0.2%rdg. ±0.3%rdg.		
$16Hz \le f < 45Hz$	±0.1%rdg. ±0.2%i.s.	±0.3%rdg.	±0.3%rdg.		
$45Hz \le f \le 66Hz$	±0.1%rdg. ±0.05%f.s.	±0.15%rdg.	±0.15%rdg.		
66Hz < f ≤ 500Hz		±0.13%rdg.	±0.13%rdg.		
500Hz < f ≤ 10kHz		±0.2%rdg.	±0.2%rdg.		
10 kHz < f \leq 50kHz		±0.8%rdg.	±0.3%rdg.		
		±2.4%rdg.	±2.4%rdg.		
	±2.17010g. ±0.0701.8.	±2.7 /01Uy.	±2.7 /0109.		
50kHz < f ≤ 100kHz		E00/6- 10-00/6-			
50kHz < f ≤ 100kHz Current (direct input)			1000/fc < loop +		
50kHz < f ≤ 100kHz Current (direct input) Frequency (f)	Input < 50% f.s.	50%f.s. ≤ Input < 100%f.s.			
50kHz < f ≤ 100kHz Current (direct input) Frequency (f) DC	±0.1%rdg. ±0.1%f.s.	±0.1%rdg. ±0.1%f.s.	±0.2%rdg.		
$ \begin{array}{ c c c c c } \hline 50kHz < f \le 100kHz \\ \hline Current (direct input) \\ \hline Frequency (f) \\ \hline DC \\ \hline 0.1Hz \le f < 16Hz \\ \end{array} $	±0.1%rdg. ±0.1%f.s. ±0.1%rdg. ±0.2%f.s.	±0.1%rdg. ±0.1%f.s. ±0.3%rdg.	±0.2%rdg. ±0.3%rdg.		
	±0.1%rdg. ±0.1%f.s. ±0.1%rdg. ±0.2%f.s. ±0.1%rdg. ±0.1%f.s.	±0.1%rdg. ±0.1%f.s. ±0.3%rdg. ±0.2%rdg.	±0.2%rdg. ±0.3%rdg. ±0.2%rdg.		
	±0.1%rdg. ±0.1%f.s. ±0.1%rdg. ±0.2%f.s. ±0.1%rdg. ±0.1%f.s. ±0.1%rdg. ±0.05%f.s.	±0.1%rdg. ±0.1%f.s. ±0.3%rdg. ±0.2%rdg. ±0.15%rdg.	±0.2%rdg. ±0.3%rdg. ±0.2%rdg. ±0.15%rdg.		
	±0.1%rdg. ±0.1%f.s. ±0.1%rdg. ±0.2%f.s. ±0.1%rdg. ±0.1%f.s.	±0.1%rdg. ±0.1%f.s. ±0.3%rdg. ±0.2%rdg.	±0.2%rdg. ±0.3%rdg. ±0.2%rdg.		
	±0.1%rdg.±0.1%f.s. ±0.1%rdg.±0.2%f.s. ±0.1%rdg.±0.1%f.s. ±0.1%rdg.±0.05%f.s. ±0.1%rdg.±0.1%f.s. ±0.1%rdg.±0.2%f.s.	±0.1%rdg. ±0.1%f.s. ±0.3%rdg. ±0.2%rdg. ±0.15%rdg.	±0.2%rdg. ±0.3%rdg. ±0.2%rdg. ±0.15%rdg.		
$\begin{tabular}{ c c c c c }\hline\hline & $50kHz < f \le 100kHz \\ \hline & $Current$ (direct input) \\\hline & $Prequency$ (f) \\\hline & DC \\\hline & $0.1Hz \le f < 16Hz$ \\\hline & $16Hz \le f < 45Hz$ \\\hline & $45Hz \le f \le 66Hz$ \\\hline & $66Hz < f \le 500Hz$ \\\hline \end{tabular}$	±0.1%rdg.±0.1%f.s. ±0.1%rdg.±0.2%f.s. ±0.1%rdg.±0.1%f.s. ±0.1%rdg.±0.05%f.s. ±0.1%rdg.±0.1%f.s. ±0.1%rdg.±0.2%f.s.	±0.1%rdg. ±0.1%f.s. ±0.3%rdg. ±0.2%rdg. ±0.15%rdg. ±0.2%rdg.	±0.2%rdg. ±0.3%rdg. ±0.2%rdg. ±0.15%rdg. ±0.2%rdg. ±0.3%rdg.		

	ower	Input < 50% fo	Nute clonut - 1000	fe 100% fe cloeut	
	uency (f)		0%f.s. ≤ Input < 100%		
	DC		±0.1%rdg. ±0.1%f		
	≤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.	
	f ≤ 500Hz		±0.2%rdg.	±0.2%rdg.	
	< f ≤ 1kHz		±0.3%rdg.	±0.3%rdg.	
	f ≤ 10kHz		±(0.23+0.07×F)%rc		
	I S TUKI IZ	±0.2%f.s.	c(0.23+0.07X1)/610	ig. [±(0.23+0.07×1)/810	
101/11-	< f ≤ 50kHz		E(0.3+0.07×F)%rc	lg. ±(0.3+0.07×F)%rd	
TUKITZ	CI S JUNIZ	±0.3%f.s.	E(0.3+0.07X1)/810	Ig. = (0.3+0.07×17)/810	
EOULT A	: f ≤ 100kHz		E(0.9+0.07×F)%rc	lg. ±(0.9+0.07×F)%rd	
JOKHZ <	IS IUUKHZ	±0.3%f.s.	E(0.9+0.07XF)%IC	ig. [±(0.9+0.07×F)%iu	
		Values for f.s. depend			
		 "F" in the tables refers 			
		 Add ±1mA to DC measurements 			
		 Add (±1mA) × (voltage read 	value) to DC measure	ement accuracy for active	
		power.	A at 500m A tongo	add 0.19/ rda to	
		When using the 200m/			
		 current and active pow Values for voltage, cur 			
		$0.1Hz \le f < 10Hz$ are fo		ower for which	
		 Values for voltage, cur 		ower in evenes of 220V	
		20A for which $10Hz \le f$			
		 Values for current and 			
		500 Hz < f \le 50kHz are			
		 Values for current and 	active power in or	veges of 15A for which	
		50kHz < f ≤ 100kHz are			
		 Values for voltage and 30kHz < f ≤ 100kHz are 			
Guarante	od			у.	
		1 year			
accuracy Post-adjus		6 months			
		o monuns			
	guaranteed	1600% of each walks are	100000		
		±600% of each voltage		1500 Vasak	
peak volta	effective	However, for 300 V, 600		iges, ±1500 vpeak	
oeak curr		±600% of each current i However, for 20 A range		100 Apook	
Condition					
guarantee		Temperature and humid		J% NH UI less	
		Warm-up time: 30 minutes			
accuracy		Input: Sine wave input, power factor of 1, terminal-to-ground			
		voltage of 0V, after zero adjustment; within range in which the			
Tomporaturo	characteristic	fundamental wave satisfies synchronization source conditions ±0.03% f.s. per °C or less			
	tor effects				
oweride	tor criects	$\pm 0.1\%$ f.s. or less (45 to 66 Hz, at power factor = 0) Internal circuitry voltage/current phase difference: $\pm 0.0573^{\circ}$			
Effect of c	common	±0.02% f.s. or less			
mode voli		(600 V, 50/60 Hz, applied between input terminals and enclosure)			
Effect of e		400 A/m, DC and 50/60 Hz magnetic field			
magnetic		Voltage :±1.5% f.s. or less			
nterferen		Current $\pm 1.5\%$ f.s. or ± 10 mA, whichever is greater, or less			
		Active power :±3.0% f.s.			
			is greater, or less		
Magnetiza	ation	±10 mA equivalent or les			
effect		(after inputting 100 A DC		rect input terminals)	
Adjacent	channel	±10 mA equivalent or les			
nput effe		(when inputting 50 A to a	adjacent channel)	1	
			-		
		t/ Active Power Mea			
Veasurem	ent types	Rectifiers: AC+DC, DC,	AC, FND, AC+DC	Umn	
Effective		Voltage: 1% to 130%	6 of range		
measuring	g range	(However, up	to ±1500 V peak val	ue and 1000 V RMS value)	
		Current: 1% to 130%	6 of range		
		Active power: 0% to 169%	6 of the range		
				voltage and current fall	
		within the e	ffective measurer	nent range.)	
Display ra	inge	Voltage/ Current: 0.5% to 14	0% of range (zero-sup	opression when less than 0.5%	
		Active power: 0% to 19	96% of the range (no zero-suppression)	
Polarity		Voltage/ Current: Displaye	ed when using DC	rectifier	
		Active power: +: Positi	ve: Power consump	otion (no polarity display)	
			nerated power		
	•				
/oltage/	Current/	Active power channel	and sum value	calculation formulas	
	ring	X: U (Voltage) or I (Cu	urrent)	P (Active power)	
Wi	9				
	10014/	V	P(i)		
Wir All channels	1P2W	X (<i>i</i>)		$m = (P_{(1)} + P_{(2)})$	
	1P3W		Pen		
	1P3W 3P3W	$X_{(i)}$ $X_{sum} = \frac{1}{2} (X_{(1)} + X_{(2)})$	Psu	$m = (1 \ (1) \ 1 \ 1 \ (2))$	
All channels	1P3W		Psu	(1 (1) 1 1 (2))	
All channels Sum	1P3W 3P3W	$Xsum = \frac{1}{2}(X_{(1)} + X_{(2)})$			
All channels Sum	1P3W 3P3W 3P3W2M 3V3A			m = (P(1) + P(2) + P(3))	
All channels Sum	1P3W 3P3W 3P3W2M 3V3A 3P3W3M	$Xsum = \frac{1}{2}(X_{(1)} + X_{(2)})$			
All channels Sum	1P3W 3P3W 3P3W2M 3V3A	$Xsum = \frac{1}{2}(X_{(1)} + X_{(2)})$			
All channels Sum values	1P3W 3P3W 3P3W2M 3V3A 3P3W3M 3P4W	$X_{sum} = \frac{1}{2} (X_{(1)} + X_{(2)})$ $X_{sum} = \frac{1}{3} (X_{(1)} + X_{(2)})$			
All channels Sum values i): Measi	1P3W 3P3W2M 3V3A 3P3W3M 3P4W urement ch	$Xsum = \frac{1}{2}(X_{(1)} + X_{(2)})$ $Xsum = \frac{1}{3}(X_{(1)} + X_{(2)})$ annel) + X(3)) Psu	$m = (P_{(1)} + P_{(2)} + P_{(3)})$	
All channels Sum values i): Meast /oltage W a	1P3W 3P3W 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe	$X_{sum} = \frac{1}{2} (X_{(1)} + X_{(2)})$ $X_{sum} = \frac{1}{3} (X_{(1)} + X_{(2)})$ annel ak Value / Current Wavefo	$P_{su} + X_{(3)} = P_{su}$ rm Peak Value Mea	$m = (P_{(1)} + P_{(2)} + P_{(3)})$ asurement Specifications	
All channels Sum values i): Measu (oltage Wa Measurer	1P3W 3P3W 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe	$X_{sum} = \frac{1}{2} (X_{(1)} + X_{(2)})$ $X_{sum} = \frac{1}{3} (X_{(1)} + X_{(2)})$ annel ak Value / Current Waveform'	rm Peak Value Mea s peak value (for l	$m = (P_{(1)} + P_{(2)} + P_{(3)})$ asurement Specifications both positive and	
All channels Sum values i): Measu (oltage Wa Measurer	1P3W 3P3W 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe	$X_{sum} = \frac{1}{2} (X_{(1)} + X_{(2)})$ $X_{sum} = \frac{1}{3} (X_{(1)} + X_{(2)})$ annel ak Value / Current Wavefo	rm Peak Value Mea s peak value (for l	$m = (P_{(1)} + P_{(2)} + P_{(3)})$ asurement Specifications both positive and	
All channels Sum values i): Measu (oltage Wa Measurer method	1P3W 3P3W 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe	$X_{sum} = \frac{1}{2} (X_{(1)} + X_{(2)})$ $X_{sum} = \frac{1}{3} (X_{(1)} + X_{(2)})$ annel ak Value / Current Waveform'	rm Peak Value Mea s peak value (for l	$m = (P_{(1)} + P_{(2)} + P_{(3)})$ asurement Specifications both positive and	
All channels Sum values i): Measur /oltage W a Measurer method Sampling	1P3W 3P3W 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe nent frequency	$X_{sum} = \frac{1}{2} (X_{(1)} + X_{(2)})$ $X_{sum} = \frac{1}{3} (X_{(1)} + X_{(2)})$ annel ak Value / Current Waveform' Measures the waveform' negative polarity) based	rm Peak Value Mea s peak value (for l	$m = (P_{(1)} + P_{(2)} + P_{(3)})$ asurement Specifications both positive and	
All channels Sum values i): Measurer method Sampling Voltage p	1P3W 3P3W 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe nent frequency eak range	$X_{sum} = \frac{1}{2} (X_{(1)} + X_{(2)})$ $X_{sum} = \frac{1}{3} (X_{(1)} + X_{(2)})$ annel ak Value / Current Waveform' negative polarity) based Approx. 700 kHz	m Peak Value Mei s peak value (for l on sampled insta	$m = (P_{(1)} + P_{(2)} + P_{(3)})$ asurement Specifications both positive and intaneous voltage value	
All channels Sum values i): Measurer <u>nethod</u> Sampling Voltage p Voltage p	1P3W 3P3W 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe nent frequency eak range range	$X_{sum} = \frac{1}{2} (X_{(1)} + X_{(2)})$ $X_{sum} = \frac{1}{3} (X_{(1)} + X_{(2)})$ annel ak Value / Current Waveform' negative polarity) based Approx. 700 kHz $15V = 30V = 60$	m Peak Value Mei is peak value (for l on sampled insta	m = (P(1) + P(2) + P(3)) asurement Specifications both positive and intaneous voltage value 300V 600V 1000V	
All channels Sum values i): Measurer method Sampling Voltage p Voltage Voltage	1P3W 3P3W 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe nent frequency eak range peak range	$X_{sum} = \frac{1}{2} (X_{(1)} + X_{(2)})$ $X_{sum} = \frac{1}{3} (X_{(1)} + X_{(2)})$ annel ak Value / Current Waveform' negative polarity) based Approx. 700 kHz $15V = 30V = 60$	m Peak Value Mei is peak value (for l on sampled insta	m = (P(1) + P(z) + P(s)) asurement Specifications both positive and intaneous voltage value 300V 600V 1000V	
All channels Sum values i): Measurer nethod Sampling Voltage p Voltage Current p	1P3W 3P3W2M 3P3W2M 3V3A 3P3W2M 3P3W3M 3P4W urement ch aveform Pe ment frequency eak range peak range eak range	$X_{sum} = \frac{1}{2} (X_{(1)} + X_{(2)})$ $X_{sum} = \frac{1}{3} (X_{(1)} + X_{(2)})$ annel ak Value / Current Waveform' negative polarity) based Approx. 700 kHz $15V 30V 60$ 90.000V 180.00V 360.	y + X(3)) Psui rm Peak Value Mea s peak value (for i on sampled insta v0 150V 3 v00 900.00V 1.8	$m = (P_{(1)} + P_{(2)} + P_{(3)})$ asurement Specifications both positive and intaneous voltage value $\frac{1}{3000V} = \frac{600V}{3.6000kV} = \frac{1000V}{3.6000kV}$	
i): Measi Sum values i): Measi voltage Wa Measurer method Sampling /oltage Voltage Voltage Voltage Current p Current p	1P3W 3P3W3 3P3W2M 3V3A 3P3W3M 3P3W3M 3P4W urement ch aveform Pe nent frequency eak range range peak range range range	$Xsum = \frac{1}{2}(X_{(1)} + X_{(2)})$ $Xsum = \frac{1}{3}(X_{(1)} + X_{(2)})$ annel ak Value / Current Wavefor megative polarity) based Approx. 700 kHz 15V 30V 60 90.000V 180.00V 360. 200mA 500mA 1A	n + X(3)) Psu rm Peak Value Mee s peak value (for loon sampled insta on sampled insta s peak value (for loon sampled insta VV 150V 3 00V 900.00V 1.8 2A 5A	m = (P(1) + P(2) + P(3)) asurement Specifications both positive and intaneous voltage value 300V 600V 1000kV 3.6000kV 100 200A	
All channels Sum values i): Meass voltage Wa Measurer nethod Sampling Voltage Voltage Voltage Current p Current p	1P3W 3P3W3 3P3W2M 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe nent frequency eak range peak range peak range peak range peak range	$Xsum = \frac{1}{2}(X_{(1)} + X_{(2)})$ $Xsum = \frac{1}{3}(X_{(1)} + X_{(2)})$ annel ak Value / Current Waveform megative polarity) based Approx. 700 kHz 15V 30V 90.000V 180.00V 200mA 500mA 1.2000A 3.0000A	p + X(3)) Psu rm Peak Value Mee: s peak value (for 1 on sampled insta 0V 150V 3 000 900.00V 1.8 2A 5A 12.000A	m = (P(1) + P(2) + P(3)) asurement Specifications both positive and intaneous voltage value 300V 600V 1000kV 3.6000kV 10A 20A 50.000A 120.00A	
All channels Sum values i): Measurer nethod Sampling /oltage p Voltage Current p Current Current Current Measurer	1P3W 3P3W3 3P3W2M 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe nent frequency eak range peak range peak range peak range peak range	$Xsum = \frac{1}{2}(X_{(1)} + X_{(2)})$ $Xsum = \frac{1}{3}(X_{(1)} + X_{(2)})$ annel ak Value / Current Waveform negative polarity) based Approx. 700 kHz 15V 30V 90.000V 180.00V 200mA 500mA 1.2000A 6.0000A Same as the voltage or comparison	y + X(3)) Psui rm Peak Value Mea s peak value (for I on sampled insta vv 150v 3 00V 900.00V 1.8 2A 5A 12.000A (30.000A) 12.000A (30.000A) surrent measurem	m = (P(1) + P(2) + P(3)) asurement Specifications both positive and intaneous voltage value 300V 600V 100A 20A 50A 60.000A 120.00A 300.00 ent accuracy at DC ance	
All channels Sum values i): Measurer nethod Sampling /oltage p Voltage Current p Current Current Current Measurer	1P3W 3P3W3 3P3W2M 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe nent frequency eak range peak range peak range peak range peak range	$Xsum = \frac{1}{2}(X_{(1)} + X_{(2)})$ $Xsum = \frac{1}{3}(X_{(1)} + X_{(2)})$ annel ak Value / Current Wavefor megative polarity) based Approx. 700 kHz 15V 30V 90.000V 180.00V 200mA 500mA 1A 1.2000A 3.0000A 6.0000A Same as the voltage or of when 10 Hz ≤ f ≤ 1 kHz 1 kHz	p + X(3)) Psu mm Peak Value Mee s peak value (for 1 on sampled insta on sampled insta 00V 150V 3 00V 150V 2A 5A 12:000A 30.000A cs: voltage peak	m = (P(1) + P(2) + P(3)) asurement Specifications both positive and intaneous voltage value 300V 600V 10A 20A 10A 20A 10A 20A asurement accuracy at DC and accuracy at DC area	
All channels Sum values i): Measurer nethod Sampling /oltage p Voltage Current p Current Current Current Measurer	1P3W 3P3W3 3P3W2M 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe nent frequency eak range peak range peak range peak range peak range	$Xsum = \frac{1}{2}(X_{(1)} + X_{(2)})$ $Xsum = \frac{1}{3}(X_{(1)} + X_{(2)})$ annel ak Value / Current Wavefor measures the waveform negative polarity) based Approx. 700 kHz 15V 30V 90.000V 180.00V 200mA 500mA 1A 1.2000A 3.0000A 6.0000A Same as the voltage or owhen 10 Hz < f 1 kHz (range). Provided as refer	Image: product with the second seco	m = (P(1) + P(2) + P(3)) asurement Specifications both positive and intaneous voltage value 300V 600V 10A 20A 10A 20A 10A 20A asurement accuracy at DC and accuracy at DC area	
All channels Sum values to i): Measurer method Sampling Voltage Voltage Current p Current p Current p	1P3W 3P3W3 3P3W2M 3P3W2M 3V3A 3P3W3M 3P4W urement ch aveform Pe nent frequency eak range peak range peak range peak range peak range	$Xsum = \frac{1}{2}(X_{(1)} + X_{(2)})$ $Xsum = \frac{1}{3}(X_{(1)} + X_{(2)})$ annel ak Value / Current Wavefor megative polarity) based Approx. 700 kHz 15V 30V 90.000V 180.00V 200mA 500mA 1A 1.2000A 3.0000A 6.0000A Same as the voltage or of when 10 Hz ≤ f ≤ 1 kHz 1 kHz	y + X(3)) Psu rm Peak Value Mea s peak value (for I on sampled insta vv 150V 3 vv 150V 3 vv 150V 3 vv 150V 3 vv 1500 3 12.000A (30.000A 30.000A surrent measurem f.s.: voltage peak rence value when .	$m = (P_{(1)} + P_{(2)} + P_{(3)})$ asurement Specifications both positive and intaneous voltage value $300V 600V 1000'$ $3000kV 6000V 1000'$ $10A 20A 50A$ $10A 20A 50A$ $60.000A \mid 120.00A \mid 300.00$ ent accuracy at DC and range or current peak 0.1 Hz < f < 10 Hz and	

 When in excess of 1 kHz.

 Effective
 ±5% to ±100% of voltage peak range (up to ±1500 V) or ±5% to ±100% of voltage peak range (up to ±100 A)

 Display range
 ±0.3% to ±102% of voltage peak range or current peak range (values less than ±0.3% are subject to zero-suppression)

 Voltage Crest Factor/ Current Crest Factor Measurement method
 Calculates values from display values once each display update interval for voltage and voltage waveform peak values or current and current waveform peak values.

 Effective measuring range
 As per voltage and voltage waveform peak value or current and current waveform peak value effective measurement ranges.

Voltage Ripple Rate / Current Ripple Factor Measurement Specifications

Measurement method	Calculates the AC component (peak to peak [peak width]) as a 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

pport of the state		J i i i i i i i i i i			
Measurement	Rectifiers				
types	Apparent Power/ Reactive Powe	r/ Power Factor : AC+DC, AC, FND, AC+DC Umn			
	Phase Angle	: AC, FND			
Effective measuring range	As per voltage, current, and ac	tive 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 Fact	tor/ 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 v	oltage (no polarity display)			
	 When current leads 	voltage			

Power channel and sum value calculation formulas

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

Wiring		λ : Power factor	ϕ : Phase angle
All channels	1P2W	$\lambda(i) = \mathbf{S}\mathbf{i}(i) \left \frac{P_{(i)}}{S_{(i)}} \right $	$\phi_{(i)} = si_{(i)} \cos^{-1}l \lambda_{(i)}l$
Sum values	1P3W 3P3W 3P3W2M 3V3A 3P3W3M 3P4W	$\lambda_{sum} = Si_{sum} \left \frac{P_{um}}{S_{sum}} \right $	$ \begin{array}{l} \text{When } P_{sum} \geq 0 \\ \phi_{sum} = sisum \; cos^{-1} \lambda \; sum \\ (0^{\circ} \; to \; \pm 90^{\circ}) \\ \text{When } P_{sum} \geq 0 \\ \phi_{sum} = sisum \; 180 - 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

Humber of medourement	0 011
channels	
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	0.1 Hz to 100 kHz
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 Calculated based on the AC+DC rectifier active power

and calculation	PW3336				
equations	Wiring	CH1	CH2		Calculation formulas
	1P2W × 2	1P2W	1P2W		η1=100× P2 / P1 η2=100× P1 / P2
	1P3W	1P	ЗW		
	3P3W		ЗW		
	3P3W2M	3P3\	N2M		
	PW3337				
	Wiring	CH1	CH2	CH3	Calculation formulas
	1P2W × 3	1P2W	1P2W	1P2W	η1=100× P3 / P1 η2=100× P1 / P3
	1P3W & 1P2W	1P	3W	1P2W	η1=100× P3 / Psum
	3P3W & 1P2W	3P	ЗW	1P2W	η2=100× Psum / P3
	3P3W2M	3	3P3W2N	Λ	
	3V3A		3V3A		
	3P3W3M	3	3P3W3N	Λ	
	3P4W		3P4W		
Effective measuring range	As per the activ	e powe	r effect	ive mea	surement 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
 ±(Current or active power measurement accuracy) ±(±0.01%rdg. ±1dgt.)

 Effective measuring range
 As per the current or active power effective measurement range

Functional Specifications

i unotional opec	incatione			
Auto-range (AUTO)	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 the range. However, the range is not decreased when the peak			
Averaging (AVG)	is exceeded at the lower range. - Averages the voltage, current, active power, apparent power, and reactive power. - The power factor and phase angle are calculated from averaged data. - Measured values other than peak values, power factor, frequency, integrated values, TAV, crest factor, ripple rate, total harmonic distortion, and harmonics are averaged. Method : Simple averaging Number of averaging iterations and display update interval Number of averaging 10/0FPI 2 5 10 25 50 100			

Scaling (VT, CT)	Applies user-defined VT and CT ratio settings to measured values These settings can be configured separately for each wiring mode VT ratio setting range : OFF (1.0), 0.1 to 1000 (setting: 0000)		
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 elapse		
	time) will continue. · Analog output and waveform output are not held.		
Maximum value/	· Detects maximum and minimum measured values as well as		
minimum value hold	maximum and minimum values for the voltage and current waveform peak and holds them on the display.		
(MAX/MIN HOLD)	For data with polarity, display of the maximum value and minimur		
	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 elapse		
	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 off and if a power outage occurs.		
System Reset	Initializes the instrument's settings. Communications-related settings		
	(communications speed, address, and LAN-related settings) are not initialized		
Integration Meas	surement Specifications		
Measurement items	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 displa		
	Positive active power integrated value (displayed as Wh+ on panel display)		
Maran	Negative active power integrated value (displayed as Wh- on panel displa		
Measurement types	Rectifiers: AC+DC, AC+DC Umn Current:		
	Displays the result of integrating current RMS value data		
	(display values) once every display update interval (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		
Integration time	DC component will not be integrated) 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 dg		
Effective measuring range	Until PEAK OVER U or PEAK OVER I occurs		
Display resolution	999999 (6 digits + decimal point)		
Display resolution	999999 (6 digits + decimal point) · Stopping integration based on integration time setting (timer)		
Display resolution	999999 (6 digits + decimal point) - 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		
Display resolution	999999 (6 digits + decimal point) • Stopping integration based on integration time setting (timer) • Displaying the integration elapsed time (displayed as TIME on panel displayed • Additional integration by repeatedly starting/stopping integration • Backing up integrated values and the integration elapsed time during power outage		
Display resolution Functions External control	999999 (6 digits + decimal point) • 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 • Stopping integration when power returns Stopping integration and resetting integrated values based on external contro		
Display resolution Functions External control Measuring range	999999 (6 digits + decimal point) • 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 • Stopping integration when power returns Stopping/starting integration and resetting integrated values based on external contro Corresponds to the range set for START integretation		
Display resolution Functions External control Measuring range	999999 (6 digits + decimal point) • 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 • Stopping integration when power returns Stopping/starting integration and resetting integrated values based on external contro Corresponds to the range set for START integretation		
Display resolution Functions External control Measuring range Harmonic Meas Measurement	999999 (6 digits + decimal point) - 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 - Stopping integration when power returns Stopping/starting integration and resetting integrated values based on external contro Corresponds to the range set for START integretation urement Specifications (built-in function) - Zero-cross simultaneous calculation method (separate windows		
Display resolution Functions External control Measuring range Harmonic Meas Measurement	999999 (6 digits + decimal point) • 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 outag • Stopping integration when power returns Stopping/starting integrated nearesting integrated values based on external contro Corresponds to the range set for START integretation urement Specifications (built-in function) • Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode)		
Display resolution Functions External control Measuring range Harmonic Meas Measurement	999999 (6 digits + decimal point) • 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 • Stopping/starting integration and resetting integrated values based on external control Corresponds to the range set for START integretation urement Specifications (built-in function) · Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) • Uniform thinning between zero-cross events after processing witl a digital antialiasing filter		
Display resolution Functions External control Measuring range Harmonic Meas Measurement	999999 (6 digits + decimal point) 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 Stopping integration and resetting integrated values based on external contro Corresponds to the range set for START integretation Pactor Specifications (built-in function) Cero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) Uniform thinning between zero-cross events after processing with a digital antialiasing filter Interpolation calculations (Lagrange interpolation)		
Display resolution Functions External control Measuring range Harmonic Meas Measurement	999999 (6 digits + decimal point) 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 outag Stopping/starting integration and resetting integrated values based on external contro Corresponds to the range set for START integretation Urement Specifications (built-in function) Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) Uniform thinning between zero-cross events after processing with a digital antialiasing filter Interpolation calculation frequency falls within the 45 Hz to 66 Hz rang will EG 1000-4-7:2002 compliant		
Display resolution Functions External control Measuring range Harmonic Meas Measurement	999999 (6 digits + decimal point) • 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 • Stopping integration when power returns Stopping/starting integration and resetting integrated values based on external contro Corresponds to the range set for START integretation • Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) • Uniform thinning between zero-cross events after processing with a digital antialiasing filter • Interpolation calculations (Lagrange interpolation) • When the synchronization frequency falls within the 45 Hz to 66 Hz rang » IEC 61000-4-7:2002 compliant • Gaps and overlaps may occur if the measurement frequency is not 50 Hz or 60 Hz		
Display resolution Functions External control Measuring range Harmonic Meas Measurement method	999999 (6 digits + decimal point) 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 outag Stopping integration and resetting integrated values based on external contro Corresponds to the range set for START integretation 2 Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) Uniform thinning between zero-cross events after processing witt a digital antialiasing filter Interpolation calculations (Lagrange interpolation) When the synchronization frequency falls within the 45 Hz to 66 Hz rang w No gaps or overlap will occur		
Display resolution Functions External control Measuring range Harmonic Meas Measurement method Synchronization source	999999 (6 digits + decimal point) • 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 outag • Stopping integration when power returns Stopping/starting integration and resetting integrated values based on external contro Corresponds to the range set for START integretation • Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) • Uniform thinning between zero-cross events after processing with a digital antialiasing filter • Interpolation calculations (Lagrange interpolation) • When the synchronization frequency falls within the 45 Hz to 66 Hz rang » IEC 61000-4-7:2002 compliant • Gaps and overlaps may occur if the measurement frequency is not 50 Hz or 60 H • When the synchronization forquency falls outside the 45 Hz to 66 Hz rang » No gaps or overlap will occur		
Display resolution Functions External control Measuring range Harmonic Measur Measurement method Synchronization source Measurement channels	1999999 (6 digits + decimal point) • 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 integration when power returns Stopping/starting integration and resetting integrated values based on external contro Corresponds to the range set for START integretation urement Specifications (built-in function) • Zero-cross simultaneous calculation method (separate windows by channel according to the wining mode) • Uniform thinning between zero-cross events after processing with a digital antialiasing filter • Interpolation calculation frequency falls within the 45 Hz to 66 Hz rang • Me gaps or overlap will occur Conforms to synchronization frequency falls outside the 45 Hz to 66 Hz rang • No gaps or overlap will occur Conforms to synchronization source (SYNC) for the basic measurement specification		
Display resolution Functions External control Measuring range Harmonic Measur Measurement method Synchronization source Measurement channels	999999 (6 digits + decimal point) Stopping integration based on integration time setting (timer) Displaying the integration elapsed time (displayed as TIME on panel displayed as Integration by repeatedly starting/stopping integration by repeatedly starting/stopping integration when power returns Stopping integration when power returns Topping/starting integration and resetting integrated values based on external contro Corresponds to the range set for START integretation Urement Specifications (built-in function) Cero-cross simultaneous calculation method (separate windows 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 rang as and overlaps may occur if the measurement frequency is not 50 Hz or 60 H. When the synchronization source (SYNC) for the basic measurement specifications and gars or overlap will occur Conforms to synchronization source (SYNC) for the basic measurement specifications a Harmonic voltage PMS value Harmonic voltage phase angle		
Display resolution Functions External control Measuring range Harmonic Measur Measurement method Synchronization source Measurement channels	999999 (6 digits + decimal point) • 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 integration by repeatedly starting/stopping integration • Stopping integration when power returns Stopping/starting integration and resetting integrated values based on external control Corresponds to the range set for START integretation urement Specifications (built-in function) · Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) · Uniform thinning between zero-cross events after processing with a digital antialiasing filter · Interpolation calculations (Lagrange interpolation) · When the synchronization frequency falls within the 45 Hz to 66 Hz rang » IEC 61000-4-7:2002 compliant • Magps or overlap will occur Conforms to synchronization source (SYNC) for the basic measurement specification for a synchronization source (SYNC) for the basic measurement specification for a synchronization source (SYNC) for the basic measurement specification for a synchronization source (SYNC) for the basic measurement specification for the measurement requency is not 50 Hz or 60 H. · Harmonic voltage phase angle · Harmonic voltage content %. · Harmonic voltage phase angle · Harmonic voltage co		
Display resolution Functions External control Measuring range Harmonic Measur Measurement method Synchronization source Measurement channels	999999 (6 digits + decimal point) 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 outag. Stopping integration when power returns Stopping/starting integration and resetting integrated values based on external contro. Corresponds to the range set for START integretation urement Specifications (built-in function) Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) -Uniform thinning between zero-cross events after processing wit a digital antialiasing filter -Interpolation calculations (Lagrange interpolation) When the synchronization frequency falls within the 45 Hz to 66 Hz rang by No gaps or overlap will occur Conforms to synchronization source (SYNC) for the basic measurement specificatior 3 Harmonic voltage RMS value Harmonic current RMS value Harmonic current content % Harmonic current power ontent %		
Display resolution Functions External control Measuring range Harmonic Measur Measurement method Synchronization source Measurement channels	999999 (6 digits + decimal point) 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 integration by repeatedly starting/stopping integration Stopping integration when power returns Stopping/starting integration and resetting integrated values based on external control Corresponds to the range set for START integretation urement Specifications (built-in function) Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) Uniform thinning between zero-cross events after processing wit a digital antialiasing filter Interpolation calculations (Lagrange interpolation) When the synchronization frequency falls within the 45 Hz to 66 Hz rang * No gaps or overlap will occur Conforms to synchronization source (SYNC) for the basic measurement specification 3 Harmonic voltage RMS value Harmonic current content % Harmonic oktage phase angle Harmonic current power Harmonic outlage phase difference Total harmonic current othase difference Total harmonic current other distortion Voltage fundamental waveform		
Display resolution Functions External control Measuring range Harmonic Measur Measurement method Synchronization source Measurement channels	999999 (6 digits + decimal point) Stopping integration based on integration time setting (timer) Displaying the integration elapsed time (displayed as TIME on panel displayed as TIME and panel displayed as TIME on the displayed as TIME on the dis		
Display resolution Functions External control Measuring range Harmonic Measur Measurement method Synchronization source Measurement channels	999999 (6 digits + decimal point) Stopping integration based on integration time setting (timer) Displaying the integration elapsed time (displayed as TIME on panel displa Additional integration by repeatedly starting/stopping integration Backing up integration by repeatedly starting/stopping integration Stopping integration when power returns Stopping/starting integration and resetting integrated values based on external control Corresponds to the range set for START integretation urement Specifications (built-in function) Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) -Uniform thinning between zero-cross events after processing wit a digital antialiasing filter -Interpolation calculations (Lagrange interpolation) When the synchronization frequency falls within the 45 Hz to 66 Hz rang * No gaps or overlap will occur Controms to synchronization source (SYNC) for the basic measurement specification 3 -Harmonic voltage RMS value +Harmonic voltage current phase difference -Total harmonic current ontent % -Harmonic active power -Harmonic active power -Harmonic voltage distortior -Votieg duadamental waveform -Apparent power fundamental waveform -Active power fundamental waveform		
Display resolution Functions External control Measuring range Harmonic Measur Measurement method Synchronization source Measurement channels	999999 (6 digits + decimal point) * 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 integration when power returns Stopping/starting integration and resetting integrated values based on external control Corresponds to the range set for START integretation Urement Specifications (built-in function) * Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) • Uniform thinning between zero-cross events after processing with a digital antialiasing filter • Interpolation calculations (Lagrange interpolation) * When the synchronization frequency falls within the 45 Hz to 66 Hz rang * Bags and overlaps may occur if the measurement frequency is not 50 Hz or 60 H * When the synchronization frequency falls outside the 45 Hz to 66 Hz rang * No gaps or overlap will occur Conforms to synchronization source (SYNC) for the basic measurement specification 3 • Harmonic voltage phase angle • Harmonic current distortion • Harmonic voltage trundamental waveform • Autage fundamental waveform • Autage trundamental waveform • Autage current phase difference		
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Display resolution Functions External control Measuring range Harmonic Measur Measurement method Synchronization source Measurement channels Measurement items	999999 (6 digits + decimal point) 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 integration when power returns Stopping/starting integration and resetting integrated values based on external control Corresponds to the range set for START integretation urement Specifications (built-in function) Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) Uniform thinning between zero-cross events after processing with a digital antialiasing filter Inform the synchronization frequency falls within the 45 Hz to 66 Hz range will concomment of the wave polation) When the synchronization frequency falls outside the 45 Hz to 66 Hz range will a digital antipage phase angle Harmonic voltage RMS value Harmonic voltage content % Harmonic current content % Harmonic current phase difference Harmonic current phase difference Hot harmonic active power Harmonic voltage current phase difference Harmonic voltage distortion Otal harmonic current distortion Voltage fundamental waveform Apparet power fundamental waveform Active power fundamental waveform Power factor fundamental waveform Ac		
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Display resolution Functions External control Measuring range Harmonic Measur Measurement method Synchronization source Measurement channels Measurement items FFT processing word length Number of FFT points Window function Analysis window width Data update rate Synchronization	999999 (6 digits + decimal point) 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 integration when power returns Stopping/starting integration and resetting integrated values based on external control. Corresponds to the range set for START integretation urement Specifications (built-in function) Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) -Uniform thinning between zero-cross events after processing with a digital antialiasing filter -Interpolation calculations (Lagrange interpolation) When the synchronization frequency falls within the 45 Hz to 66 Hz rang. No gaps or overlap will occur Conforms to synchronization frequency falls outside the 45 Hz to 66 Hz rang. No gaps or overlap will occur Conforms to synchronization frequency falls outside the 45 Hz to 66 Hz rang. -Harmonic voltage RMS value -Harmonic voltage trut distortion -Harmonic voltage trut distortion -Vortent fundamental waveform -Active power fundamental waveform -Active power fundamental waveform -Notage current phase difference		
Measurement method Synchronization source. Measurement channels Measurement items FFT processing word length Number of FFT points. Window function Analysis window width Data update rate Synchronization frequency range Maximum	999999 (6 digits + decimal point) Stopping integration based on integration time setting (timer) Displaying the integration by repeatedly starting/stopping integration Backing up integration when power returns Stopping/starting integration and resetting integrated values based on external control Corresponds to the range set for START integretation urement Specifications (built-in function) Zero-cross simultaneous calculation method (separate windows by channel according to the wiring mode) Uniform thinning between zero-cross events after processing with a digital antialiasing filter Interpolation calculation frequency falls within the 45 Hz to 66 Hz range w IEC 61000-4-7:2002 compliant Seas and overlaps may occur Conforms to synchronization frequency falls within the 45 Hz to 66 Hz range w No gaps or overlap will occur Conforms to synchronization source (SYNC) for the basic measurement specification 3 Harmonic voltage PMS value Harmonic voltage phase angle Harmonic current content % Harmonic active power Harmonic current base difference Interchannel voltage fundamental waveform Voltage fundamental waveform Apparent power fundamental waveform Voltage current phase difference fundamental waveform Harmonic voltage fundamental waveform Apparent power fundamental waveform Voltage current phase difference <		
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PW333 7 PW333 6

Analysis order	2nd to 50th			
upper limit setting Measurement	f.a. Maaguramant ran	20		
accuracy	f.s.: Measurement ran Frequency		Voltage, C	Current, Active power
,	DC		±0.4	%rdg.±0.2%f.s.
	10 Hz ≤ f < 30			%rdg.±0.2%f.s.
	30 Hz ≤ f ≤ 40 400 Hz < f ≤ 1			%rdg.±0.1%f.s. %rdg.±0.2%f.s.
	1 kHz < f ≤ 5			%rdg.±0.5%f.s.
	5 kHz < f ≤ 8 kHz			%rdg.±1.0%f.s.
	For DC, add ±1 mA to curre	ent and (±1 mA	A) × (voltage re	ad value) to active power.
Display Specific			/ (
Display Opecific Display	7-segment LED			
Number of display parameters	4			
Display resolution	Other than integrated			
<u> </u>	Integrated values: 99			· · · · · · · · · · · · · · · · · · ·
Display update rate	200 ms to 20 s (varies	s with numb	er of averag	ging iterations setting)
Synchronized C	ontrol			
Functions	Timing of calculations, disp			
	events, display hold operat			
Terminal	BNC terminal × 1 (nor			ne master PW3336/ PW3337.
Terminal name	EXT SYNC	1 10010(00)		
I/O settings	Off: Synchronized cor			
	In : The EXT SYNC te			
	synchronization s Out: The EXT SYNC to	ignal can b arminal is si	e input (slav	/e). and a dedicated
	synchronization s			
Number of units for which	1 master unit and 7 sl			,
synchronized control can				
be performed				
External Current	Sensor Input Speci	fications	(built-in fe	ature)
Terminal	Isolated BNC termina			
Current sensor	Off / Type 1 / Type 2			
type switching				or input terminal is ignored.
Current sensor	TYPE1 (100 A to 5000			
options	9660, 9661, 9669,			to be an endered to see all
	TYPE2 (20 A to 1000) CT6862-05, CT68	A sensors, 63-05 CT6	Power supp 875 CT687	6, CT6877, 9272-05,
	CT6841-05, CT684	3-05, CT684	14-05, CT68	45-05, CT6846-05, etc.
Current	Auto / 10 A / 20 A / 50	A (range n	oted on par	nel)
measurement	User-selectable for ea		node. Can b	be read directly by
range Power range	manually setting the C Depends on the com		oltago and	ourropt ranges: from
Power range configuration	60.000W to 15.000M			
Measurement accuracy				
Current, Active power				
Frequency	Input < 50%f.s.		put < 100%f.s.	100%f.s. ≤ Input
DC	±0.2%rdg. ±0.6%f.s.		g. ±0.6%f.s.	±0.8%rdg.
0.1Hz≤ f <16Hz 16Hz≤ f < 45Hz	±0.2%rdg. ±0.2%f.s. ±0.2%rdg. ±0.2%f.s.		l%rdg. l%rdg.	±0.4%rdg. ±0.4%rdg.
$45Hz \le f \le 66Hz$	±0.2%rdg. ±0.1%f.s.		l%rdg.	±0.3%rdg.
66Hz < f ≤ 500Hz	±0.2%rdg. ±0.2%f.s.		%rdg.	±0.4%rdg.
$\frac{500\text{Hz} < f \le 1\text{kHz}}{1\text{kHz} < f \le 10\text{kHz}}$	±0.2%rdg. ±0.3%f.s. ±5.0%rdg.		i%rdg. I%rdg.	±0.5%rdg. ±5.0%rdg.
10 kHz < f \leq 50kHz	10.0701dg.	10.0	nordg.	10.0 Ardg.
50 kHz < f \leq 100kHz				
	f.s. : Each measurem		or acourses	add the ourrest sesses."-
	accuracy to the above			add the current sensor's accuracy figures.
				quency characteristics
	conform to the curre	nt sensor's	specificatio	ns.
	 Values for current, and 0.1 Hz ≤ f < 10 Hz and 			CII
	•Values for voltage in			power for which
_	10 Hz ≤ f < 16 Hz are	e for referen		-
Temperature	Current, active power		nnorotura -	a officiant:
characteristics	±0.08% f.s./°C (ins		nperature c nt measuren	
	Add current sensor te	mperature	coefficient t	o above.
Power factor Instrument: ±0.15% f.s. or less (45 Hz to 66		Hz to 66 Hz w	vith power factor = 0)	
effects Internal circuit voltage/current phase difference: ±0. Add the current sensor phase accuracy to the intern				
	voltage/current phas			
Current peak value				
measurement	(f.s.:current peak range)			
accuracy	Add the current sense			
Harmonic measurement	Frequency DC ±0	Voltag).4%rdg. ±0		urrent, Active power 0.6%rda, ±0.8%f.s.
accuracy).4%rag. ±0).4%rdg. ±0		D.6%rdg. ±0.8%f.s.
,	30Hz≤ f ≤ 400Hz ±	0.3%rdg. ±0	0.1%f.s. ±(0.5%rdg. ±0.3%f.s.
	400Hz < f ≤ 1kHz ±0).4%rdg. ±().2%f.s. ±(0.6%rdg. ±0.5%f.s.
		1.0%rdg. ±0		1.0%rdg. ±5.5%f.s.
	-	4.0%rdg. ±	1.∪%I.S. ±2	2.0%rdg. ±6.0%f.s.
	f.s.: Each measureme		or accuracy	add the current concerte
	accuracy to the above			add the current sensor's
	,	sanon unu		

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

DIA Output Speci	incations (1 W5550-02/-05 and 1 W5557-02/-05)
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 I3 (current level) or i1 to i3 (instantaneous current waveform) (switchable)
	P1 to P3 (active power level) or p1 to p3 (instantaneous power waveform) (switchable)
	Psum (active power level) or Hi-Psum (high-speed active power level) (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 crest factor, Time
	average current/active power, 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

Ľ	s.: Relative to the output voltage rated value for each output parameter _evel output
H	: (Output parameter measurement accuracy) + (±0.2% f.s.)
	High-speed active power level output
	: (Output parameter measurement accuracy) + (±0.2% f.s.)
1	Instantaneous waveform output
	: (Output parameter measurement accuracy) + (±1.0% f.s.)
	Instantaneous voltage, instantaneous current: RMS value level
Output frequency	Instantaneous power: Average value level Instantaneous waveform output, high-speed active power level output
	At DC or 10 Hz to 5 kHz, accuracy is as defined above.
	Level output
output voltage	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
	Level output
	: 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.
N N	Waveform output
	: Approx. 11.4 µs (approx. 87.5 kHz)
H	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)
	Navetorm output
V	2 ms or less
	: 0.2 ms or less
ŀ	: 0.2 ms or less High-speed active power level output

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	$Lo \rightarrow Hi$	01/11/0101	
	Reset	Lo interval of at least 200 ms	RESET	
	Hold on	$Hi \rightarrow Lo$	HOLD	
	Hold off	Lo → Hi	HULD	

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

LAN interface (built-in feature)

LAIN Interface (b	/
Connector	RJ-45 connector × 1
	IEEE802.3 compliant
Transmission Method	10BASE-T/100BASE-TX (automatic detection)
Protocol	TCP/IP
Functions	HTTP server (remote operation, firmware updates)
	Dedicated ports (command control, data transfer)
	Remote control by controller (REMOTE lamp will light up.)
General Specific	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)
Storage temperature and humidity	-10 to 50°C (14 to 122°F) 80% RH or less (non-condensating)
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) Measurement category II 1000 V (anticipated transient overvoltage 6000 V)
Maximum input voltage	Between voltage input terminals U: 1000 V, ±1500 Vpeak
Maximum input current	Between +/- current direct input terminals I: ±70 A, ±100 Apeak
Applicable Standards	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 × 1, Measurement guide × 1, Power cord × 1

PW3335 Specifications

Input Specifications

Measurement line type		
Input methods	Voltage Isolated input,	resistive voltage divider method
	Current Isolated input,	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/ 1.0000) kV
Current	AUTO/ 1.0000 mA/ 2.0000 r	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/ 5.0000 A/ 10.000 A/ 20.000 A	
Power ranges	Depends on the combination of voltage and current ranges;	
-	From 6.0000 mW to 20.000	kW (also applies to VA, var)
	The details are as below.	
Input resistance	Voltage input terminal: 2	ΜΩ
	Current input terminal: 1	mA to 100 mA range 520 mΩ or less
	. 20	00 mA to 20 A range 15 mO or less

Basic Measurement Specifications

Measurement Simultaneous voltage and current digital sampling, zero-cross

method	simultaneous calculation			
Sampling frequency	Approx. 700 kHz			
A/D converter resolution	16-bit			
	DC, 0.1 Hz to 100 kHz (Va		Hz ≤ f < 10 F	Iz are for reference only)
	U, I, DC (fixed to 200 r			
Measurement items	Voltage Apparent power Phase angle Active power integra Voltage waveform po Voltage crest factor Maximum current ra	eak value (ntegration Current wa Current cre	veform peak value
	Time average active			.9
	Voltage ripple rate Harmonic parameters		Current rip	ple rate
	Harmonic voltage R Harmonic active pov Total harmonic currer Fundamental wave ap Fundamental wave of Fundamental wave v Harmonic voltage or Harmonic current co Harmonic active pov	ver 7 tit distortion F current F parent power F cover factor voltage curre content percer ontent percer	Total harmo Funda,men Fundament Cundament (Displacer nt phase d ntage ntage	tal wave active power al wave reactive power nent power factor) lifference
	(The following parameters	can be downlo	baded as da	ta via PC communication)
	Harmonic voltage pl	hase angle		
	Harmonic current pr			
Destifiers	Harmonic voltage cu		difference	
Rectifiers Zero-cross Filter Measurement accuracy Voltage Frequency (f) DC 0.1Hzs[<16Hz 16Hzs[<45Hz 66Hz<560Hz 66Hz<500Hz 60Hz<500Hz 60Hz 60Hz<500Hz 60Hz 60Hz 60Hz 60Hz 60Hz 60Hz 60Hz	AC : AC measurement Display of values ca \(AC+DC value)* (DC Display of values ca (AC-DC value) (DC FND : Extraction and display 100 Hz: 0.1 Hz to Value) (DC 5 kHz: 0.1 Hz to 5 kHz lnput < 50%f.s. ±0.1rdg.±0.1%f.s. ±0.1%rdg.±0.2%f.s. ±0.1%rdg.±0.05%f.s.	values for bc c measureme ralue rectifier IS values for bc d by (voltage DC iculated by c value) ² for bd for la of the fundamental Hz 500 Hz: 100 kHz 50%f.s. < Input ±0.1%rdg.= ±0.3% ±0.15% ±0.2%	ant d RMS con- current wh voltage- value) × (current volto voltage- value) × (current volto voltage- ctive powe- wave compone- 0.1 Hz to 5 : 0.1 Hz to 7 : 0.1	verted values for and current ent DC value) for active power e and current ar ent from harmonic measurement 00 Hz 100 %f.s. \leq Input ±0.2%rdg. ±0.3%rdg. ±0.3%rdg. ±0.3%rdg. ±0.2%rdg. ±0.2%rdg.
500Hz <f≤10khz< td=""><td>±0.1%rdg.±0.2%f.s.</td><td>±0.3%</td><td></td><td>±0.3%rdg.</td></f≤10khz<>	±0.1%rdg.±0.2%f.s.	±0.3%		±0.3%rdg.
10kHz <f≤50khz< td=""><td>±0.5%rdg.±0.3%f.s.</td><td>±0.8%</td><td></td><td>±0.8%rdg.</td></f≤50khz<>	±0.5%rdg.±0.3%f.s.	±0.8%		±0.8%rdg.
50kHz <f≤100khz< td=""><td>±2.1%rdg.±0.3%f.s.</td><td>±2.4%</td><td></td><td>±2.4%rdg.</td></f≤100khz<>	±2.1%rdg.±0.3%f.s.	±2.4%		±2.4%rdg.
Querrant	-	l	-	,
Current	Innut - FOO/f -	500/fa :1-	1000/6 .	1000/6
Frequency (f)	Input < 50%f.s.	50%f.s. ≤ Input		100%f.s. ≤ Input
DC 0.1Hzcfc16Hz	±0.1%rdg.±0.1%f.s.	±0.1%rdg.=		±0.2%rdg.
0.1Hz≤f<16Hz 16Hz≤f<45Hz	$\pm 0.1\%$ rdg. $\pm 0.2\%$ f.s.	±0.3%		±0.3%rdg. ±0.2%rdg.
	±0.1%rdg.±0.1%f.s.	±0.2%		
45Hz≤f≤66Hz 66Hz <f≤500hz< td=""><td>$\pm 0.1\%$rdg.$\pm 0.05\%$f.s.</td><td>±0.15%</td><td></td><td>±0.15%rdg.</td></f≤500hz<>	$\pm 0.1\%$ rdg. $\pm 0.05\%$ f.s.	±0.15%		±0.15%rdg.
	±0.1%rdg.±0.1%f.s.	±0.2%		±0.2%rdg.
500Hz <f≤1khz 1kHz<f≤10khz< td=""><td>±0.1%rdg.±0.2%f.s. ±(0.03+0.07×F)%rdg. +0.2%f.s.</td><td>±0.3% ±(0.23+0.07</td><td></td><td>±0.3%rdg. ±(0.23+0.07×F)%rdg.</td></f≤10khz<></f≤1khz 	±0.1%rdg.±0.2%f.s. ±(0.03+0.07×F)%rdg. +0.2%f.s.	±0.3% ±(0.23+0.07		±0.3%rdg. ±(0.23+0.07×F)%rdg.
10kHz <f≤100khz< td=""><td></td><td>±(0.6+0.04</td><td>×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.
	±0.2%f.s. ±(0.3+0.04×F)%rdg.	-		. ,

Active power			
Frequency (f)	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s.	100%f.s. ≤ Input
DC 0.1Hz≤f<16Hz	±0.1%rdg.±0.1%f.s. ±0.1%rdg.±0.2%f.s.	±0.1%rdg.±0.1%f.s. ±0.3%rdg.	±0.2%rdg.
16Hz≤f<45Hz	±0.1%rdg.±0.2%r.s. ±0.1%rdg.±0.1%f.s.	±0.3%rdg.	±0.3%rdg. ±0.2%rdg.
45Hz≤f≤66Hz	±0.1%rdg.±0.05%f.s.	±0.15%rdg.	±0.2%rdg.
66Hz <f≤500hz< td=""><td>±0.1%rdg.±0.05%r.s.</td><td>±0.13%rdg. ±0.2%rdg.</td><td>±0.13%rdg. ±0.2%rdg.</td></f≤500hz<>	±0.1%rdg.±0.05%r.s.	±0.13%rdg. ±0.2%rdg.	±0.13%rdg. ±0.2%rdg.
500Hz <f≤1khz< td=""><td>±0.1%rdg.±0.2%f.s.</td><td>±0.2%rdg.</td><td>±0.2%rdg.</td></f≤1khz<>	±0.1%rdg.±0.2%f.s.	±0.2%rdg.	±0.2%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.
	 "F" in the tables refe When using the 1 m/ Add ±1 μA to 0.1 Hz t current. Add (±1 μA) × (voltag measurement accura When using the 2001 Add ±1 mA to DC me Add (±1 mA) × (voltage rea When using the 1 mA/2. Add ±10 μA to DC me Add (±10 μA) × (voltage rea When using the 2001 Add ±(0.02×F)% rdg and active power for The measurement results if Values for voltage, current, add 	o 100 kHz measureme ge read value) to 0.1 Hz	Hz. ht accuracy for to 100 kHz 5 A/10 A/20 A range: or current. t accuracy for active power. 50 mA/100 mA range: or current. ccuracy for current 2 A/10 A/20 A range: ccuracy for current 0 kHz). ered reference values: which 0.1 Hz $\leq 1 \text{ Mz}$. 10 Arcmit matheful Architect
Effective	Values for voltage and active Voltage 1% to 150		
measuring range	Active power 0% to 225% However,	0% of the range 6 of the range (when using 10 valid when the voltage an neasurement range.	
Maximum effective	±600% of each voltag		
peak voltage		00 V, and 1000 V range	s, ±1500 V peak
Maximum effective	±600% of each currer		
peak current	However, for 20 A rang	ge, ±60 A peak	
Guaranteed accuracy	1 year		
period	O an a state a		
Post-adjustment	6 months		
accuracy guaranteed Conditions of	Tanan aratura an dihumidi	ty range: 23°C±5°C (73°F	- 09E) 000/ DLL er lees
guaranteed accuracy	Warm-up time: 30 mi Input: Sine v of 0 V the fu		or of 1, voltage to earth ; within range in which
Temperature	±0.03%f.s. per °C or le		
coefficient		ge, ±0.06%f.s. per °C	
Effect of power		66 Hz, at power factor	
factor Effect of common	±0.01%f.s. or less (60	ge/current phase differe 0 V, 50 Hz/60 Hz, appli	
mode voltage	terminals and enclosu		4
Effect of magnetic field	Voltage	Iz/60 Hz magnetic field	1
	±1.5%f.s. or less		
	200 mA/ 500 mA/ 1	or equal to the following va A/ 2 A/ 5 A/ 10 A/ 20 A 0 mA/ 20 mA/ 50 mA/ 10	range: ±20 mA
	200 mA/ 500 mA/ 1 A/ 2 A/ 5 A 1 mA/ 2 mA/ 5 mA/ 10 mA/ 20 I	or equal to the following va / 10 A/ 20 A range: (Voltage influen mA/ 50 mA/ 100 mA range: (Voltage	ce quantity)x(±20 mA) e influence quantity)x(±200 µA)
Effect of self- heating	Current AC input signal ±(0.025+0.005×(1) DC input signal 200 mA/ 500 mA/ ±(10.025+0.005 1 mA/ 2 mA/ 5 mA ±(10.025+0.005 1: Current read val Active power	1 A/ 2 A/ 5 A/ 10 A/ 20 ×(I-15))% rdg.+(0.5+0. / 10 mA/ 20 mA/ 50 m/ ×(I-15))% rdg.+(5+1×(I-	A range 1x(I-15))mA) or less Δ/ 100 mA range -15))μA) or less
	The effects of self-heati	ng will continue to manil perature 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

PW3335	
Voltage/ Current	t/ Active Power Measurement Specifications
Measurement types	Rectifiers: AC+DC, DC, AC, FND, AC+DC Umn

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

Voltage Waveform Peak Value/ Current Waveform Peak Value Measurement Specifications

method	negative polarity) based on se	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
		0.0000
	Current	
	Current range 1.0000 mA	Current peak range 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 500.00 mA	1.2000 A 3.0000 A
	1.0000 A	6.0000 A
	2.0000 A	12.000 A
	5.0000 A	30.000 A
	10.000 A	60.000 A
	20.000 A	120.00 A
Measurement		\leq f \leq 1 kHz (f.s.: current peak range).
accuracy		$0.1 \text{ Hz} \le f < 10 \text{ Hz}$ and when $1 \text{ kHz} < f$. by is multiplied by 2 for the 1 mA range.
Effective	±5% to ±100% of current peak	
measuring range	±5 % to ±100 % of current pear	Tange, nowever, up to ±00 A
Display range	Up to ±102% of current peak r	ange, however, the value 0 will be
		alue triggers the instrument's zero
	auranzagaiga function	
	suppression function.	
		M
	actor/Current Crest Factor	Measurement Specifications
Measurement	actor/Current Crest Factor	Measurement Specifications
Measurement method	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value.	age waveform peak value to the
Measurement method Effective	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa	age waveform peak value to the aveform peak value, or current and
Measurement method Effective measuring range	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa current waveform peak value e	age waveform peak value to the
Measurement method Effective measuring range	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa	age waveform peak value to the aveform peak value, or current and
Measurement method Effective measuring range Display range	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa current waveform peak value e 1.0000 to 612.00 (no polarity)	age waveform peak value to the aveform peak value, or current and offective measurement ranges.
Measurement method Effective measuring range Display range Voltage Ripple	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa current waveform peak value e 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate	age waveform peak value to the aveform peak value, or current and effective measurement ranges.
Measurement method Effective measuring range Display range	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa current waveform peak value e 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate	age waveform peak value to the aveform peak value, or current and effective measurement ranges. • Measurement Specification (peak to peak [peak width]) as a
Measurement method Effective measuring range Display range Voltage Ripple Measurement method	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage we current waveform peak value of 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate Calculates the AC component proportion of the voltage or cu	age waveform peak value to the aveform peak value, or current and effective measurement ranges. • Measurement Specification (peak to peak [peak width]) as a
Measurement method Effective measuring range Display range Voltage Ripple Measurement method Effective	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa current waveform peak value e 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate Calculates the AC component proportion of the voltage or cu As per voltage and voltage wa current waveform peak value e	age waveform peak value to the aveform peak value, or current and effective measurement ranges. Measurement Specification (peak to peak [peak width]) as a irrent DC component.
Measurement method Effective measuring range Display range Voltage Ripple Measurement method Effective measuring range	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa current waveform peak value e 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate Calculates the AC component proportion of the voltage or cu As per voltage and voltage wa	age waveform peak value to the aveform peak value, or current and affective measurement ranges. Demonstration (peak to peak [peak width]) as a irrent DC component. aveform peak value, or current and
Measurement method Effective measuring range Display range Voltage Ripple Measurement method Effective measuring range Display range	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa current waveform peak value of 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate Calculates the AC component proportion of the voltage or cu As per voltage and voltage wa current waveform peak value of 0.00 to 500.00 (No polarity)	age waveform peak value to the aveform peak value, or current and effective measurement ranges. Measurement Specification (peak to peak [peak width]) as a irrent DC component. aveform peak value, or current and effective measurement ranges.
Measurement method Effective measuring range Display range Voltage Ripple Measurement method Effective measuring range Display range Apparent Powe	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage we current waveform peak value of 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate Calculates the AC component proportion of the voltage or cu As per voltage and voltage we current waveform peak value of 0.00 to 500.00 (No polarity) er/ Reactive Power/ Power	age waveform peak value to the aveform peak value, or current and effective measurement ranges. Measurement Specification (peak to peak [peak width]) as a irrent DC component. aveform peak value, or current and effective measurement ranges.
Measurement method Effective measuring range Display range Voltage Ripple Measurement method Effective measuring range Display range Apparent Powe Measurement	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage we current waveform peak value e 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate Calculates the AC component proportion of the voltage or cu As per voltage and voltage we current waveform peak value e 0.00 to 500.00 (No polarity) er/ Reactive Power/ Powe Specifications	age waveform peak value to the aveform peak value, or current and effective measurement ranges. Measurement Specification (peak to peak [peak width]) as a irrent DC component. aveform peak value, or current and effective measurement ranges.
Measurement method Effective measuring range Display range Voltage Ripple Measurement method Effective measuring range Display range Apparent Powe Measurement Measurement	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa current waveform peak value e 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate Calculates the AC component proportion of the voltage or cu As per voltage and voltage wa current waveform peak value e 0.00 to 500.00 (No polarity) er/ Reactive Power/ Power Specifications Rectifiers	age waveform peak value to the aveform peak value, or current and effective measurement ranges. e Measurement Specification (peak to peak [peak width]) as a irrent DC component. aveform peak value, or current and effective measurement ranges. er Factor/ Phase Angle
Measurement method Effective measuring range Display range Voltage Ripple Measurement method Effective measuring range Display range Apparent Powe Measurement	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa current waveform peak value of 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate Calculates the AC component proportion of the voltage or cu As per voltage and voltage wa current waveform peak value of 0.00 to 500.00 (No polarity) er/ Reactive Power/ Power Specifications Rectifiers Apparent Power/ Reactive Power	age waveform peak value to the aveform peak value, or current and effective measurement ranges. e Measurement Specification (peak to peak [peak width]) as a irrent DC component. aveform peak value, or current and effective measurement ranges. er Factor/ Phase Angle ver/ Power Factor
Measurement method Effective measuring range Display range Voltage Ripple Measurement method Effective measuring range Display range Apparent Powe Measurement Measurement	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage we current waveform peak value of 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate Calculates the AC component proportion of the voltage or cu As per voltage and voltage we current waveform peak value of 0.00 to 500.00 (No polarity) er/ Reactive Power/ Power Specifications Rectifiers Apparent Power/ Reactive Pow AC+DC, AC, FND, AC+DC (age waveform peak value to the aveform peak value, or current and effective measurement ranges. e Measurement Specification (peak to peak [peak width]) as a irrent DC component. aveform peak value, or current and effective measurement ranges. er Factor/ Phase Angle ver/ Power Factor
Measurement method Effective measuring range Display range Voltage Ripple Measurement method Effective measuring range Display range Apparent Powe Measurement Measurement	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa current waveform peak value e 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate Calculates the AC component proportion of the voltage or cu As per voltage and voltage wa current waveform peak value e 0.00 to 500.00 (No polarity) er/ Reactive Power/ Power Specifications Rectifiers Apparent Power/ Reactive Pow AC+DC, AC, FND, AC+DC I Phase Angle	age waveform peak value to the aveform peak value, or current and effective measurement ranges. e Measurement Specification (peak to peak [peak width]) as a irrent DC component. aveform peak value, or current and effective measurement ranges. er Factor/ Phase Angle ver/ Power Factor
Measurement method Effective measuring range Display range Voltage Ripple Measurement method Effective measuring range Display range Apparent Powe Measurement Measurement	actor/Current Crest Factor Calculates the ratio of the volta voltage RMS value. As per voltage and voltage wa current waveform peak value et 1.0000 to 612.00 (no polarity) Rate/ Current Ripple Rate Calculates the AC component proportion of the voltage or cu As per voltage and voltage wa current waveform peak value et 0.00 to 500.00 (No polarity) er/ Reactive Power/ Power Specifications Rectifiers Apparent Power/ Reactive Pow AC+DC, AC, FND, AC+DC to Phase Angle AC, FND	age waveform peak value to the aveform peak value, or current and effective measurement ranges. e Measurement Specification (peak to peak [peak width]) as a irrent DC component. aveform peak value, or current and effective measurement ranges. er Factor/ Phase Angle wer/ Power Factor Jmn
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Phase Angle

Polarity	Reactive Power/ Power Factor/ Phase Angle Polarity is assigned according to the lead/lag relationship of the voltage waveform rising edge and the current waveform rising edge. +: When current lags voltage (no polarity display)
	-: When current leads voltage

Power Calculation Formulas

S : Apparent power	$S = U \times I$		
Q : Reactive power	$Q = si\sqrt{S^2 - P^2}$		
λ : Power factor	$\lambda = si \mid P/S \mid$		
ϕ : Phase angle	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

	isurement opecification	
Number of measurement channels	2 (Voltage, current)	
Measurement method	Calculated from input wavefor	m period (reciprocal method)
Measurement ranges	100 Hz/ 500 Hz/ 5 kHz/ 100 kH	
Measurement accuracy		or 1 mA range, $\pm 0.2\%$ rdg. ± 1 dgt.
Effective	0.1 Hz to 100 kHz	
measuring range		least 20% of the measurement
	source's measurement range	
		uency setting: 0.1 sec. / 1 sec. / 10
Disalassíanast	sec. (linked to synchronizatio	
Display format	0.1000 Hz to 9.9999 Hz, 99.00 Hz to 999.99 Hz,	9.900 Hz to 99.999 Hz, 0.9900 kHz to 9.9999 kHz,
	9.900 kHz to 99.999 kHz,	99.00 kHz to 100.00 kHz
Maximum Curre	ent Ratio Measurement	
Measurement		rent crest factor to the power factor.
method	(MCR) = (Current Crest Factor	
Effective measuring range		nt, active power) and current crest factor lue) effective measurement ranges.
Display range	1.0000 to 6.1200 M (no polarit	
Display range	1.0000 to 0.1200 M (no polari	(y)
Time Average Cur	rent/ Time Average Active Po	ower Measurement Specification
Measurement	Calculates the average by divi	iding the current or active power
method	integrated value by the integra	
Measurement accuracy		ement accuracy) + (±0.01% rdg. ±1 dgt.
		ntegration effective measurement range.
Display range	Time Average Current	
	±0% to ±012% of the range (Has	s polarity when using the DC rectifier.)
	Time Average Active Power	
	±0% to ±3745.4% of the rang	je (Has polarity)
Functional Spe		
Auto-range (AUTO)	Automatically changes the voltage a	and current range according to the input.
	Range up:	
	when the peak is exceeded.	input exceeds 150% of the range of
	when the peak is exceeded.	
	Range down:	
		n input falls below 15% of the range
	at the lower range.	creased when the peak is exceeded
	at the lower range.	
		ne range is switched over multiple ranges
		ble ranges so that they are not selected.
Range select		n on) or disable (turn off) individual
	voltage and current ranges.	
	Enabled (use): Ranges can be selected with	the range keys
	Range switching occurs using	
	Range switching occurs durin	
	Disabled (do not use):	
	Ranges cannot be selected v	vith the range keys.
		cur using auto-range operation.
	Range switching does not oc	
Zoro, orono filtorio	Range switching does not oc Range switching does not oc	cur using auto-range operation. cur during auto-range integration.
Zero-cross filter's	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresho	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges
Zero-cross filter's threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresho	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the
	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresh Set from 1% to 15% (in 1% intervæ percentage level set for each met	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded.
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresh Set from 1% to 15% (in 1% interve percentage level set for each mer Averages the voltage, current, act power. (Other than harmonic mea	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactiv surement parameters.)
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresh Set from 1% to 15% (in 1% interva percentage level set for each mee Averages the voltage, current, ac power. (Other than harmonic mea The power factor and phase angle	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactiv surement parameters.) e are calculated from averaged data.
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interva percentage level set for each me- Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactiv surement parameters.) e are calculated from averaged data.
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interva percentage level set for each mer Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa Method: Simple averaging	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactiv isurement parameters.) e are calculated from averaged data. arameters other than those listed above
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interva percentage level set for each mer Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa Method: Simple averaging Number of averaging iterations	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactiv usurement parameters.) e are calculated from averaged data. trameters other than those listed above s and display update interval
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interve percentage level set for each mer Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa Method: Simple averaging Number of averaging iterations	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactive usurement parameters.) e are calculated from averaged data. arameters other than those listed above s and display update interval Display update interval
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interve percentage level set for each mer Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa Method: Simple averaging Number of averaging iterations 1 (OFF)	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactive usurement parameters.) e are calculated from averaged data. arameters other than those listed above. s and display update interval Display update interval 200 ms
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's threshown Set from 1% to 15% (in 1% interve percentage level set for each merical development of the set of the	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactiv usurement parameters.) e are calculated from averaged data. arameters other than those listed above s and display update interval Display update interval 200 ms 400 ms
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresh Set from 1% to 15% (in 1% interva percentage level set for each mea Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa Mumber of averaging iterations 1 (OFF) 2 5	cur using auto-range operation. .cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactive usurement parameters.) e are calculated from averaged data. arameters other than those listed above. s and display update interval Display update interval 200 ms 400 ms 1 s
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresh Set from 1% to 15% (in 1% interva percentage level set for each mex Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa Method: Simple averaging Number of averaging iterations 1 (OFF) 2 5 10	cur using auto-range operation. .cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactive usurement parameters.) e are calculated from averaged data. arameters other than those listed above s and display update interval Display update interval 200 ms 400 ms 1 s 2 s
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresh Set from 1% to 15% (in 1% interva percentage level set for each mea Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa Mumber of averaging iterations 1 (OFF) 2 5	cur using auto-range operation. .cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactive usurement parameters.) e are calculated from averaged data. arameters other than those listed above. s and display update interval Display update interval 200 ms 400 ms 1 s
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threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interva percentage level set for each mer Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa Method: Simple averaging Number of averaging iterations 1 (OFF) 2 5 10 25 50 100	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactive usurement parameters.) e are calculated from averaged data. arameters other than those listed above s and display update interval Display update interval 200 ms 400 ms 400 ms 2 s 5 s 10 s 20 s
Averaging	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interve percentage level set for each mer Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa 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 25 50 100 25 50 100 25 50 100	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactive usurement parameters.) e are calculated from averaged data. arameters other than those listed above. s and display update interval 200 ms 400 ms 1 s 2 s 5 s 10 s 20 s 20 s 20 ratio settings to measured valuest
threshold level	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresh Set from 1% to 15% (in 1% interva percentage level set for each me: Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa Method: Simple averaging Number of averaging iterations 1 (OFF) 2 5 10 25 50 100 Applies user-defined VT and C VT ratio setting range	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactive usurement parameters.) e are calculated from averaged data. arameters other than those listed above s and display update interval Display update interval 200 ms 400 ms 400 ms 2 s 5 s 10 s 20 s
Averaging	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interve percentage level set for each mer Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa 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 Poplies user-defined VT and C VT ratio setting range OFF • Stops display updates for all	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactive usurement parameters.) e are calculated from averaged data. trameters other than those listed above. s and display update interval 200 ms 400 ms 400 ms 2 s 5 s 10 s 20 s CT ratio settings to measured values c (1.0), 0.001 to 1000 measured values and fixes the
Averaging Scaling (VT, CT)	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresh Set from 1% to 15% (in 1% interva percentage level set for each mei- Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa Method: Simple averaging Number of averaging iterations 1 (OFF) 2 5 10 25 50 100 Applies user-defined VT and O VT ratio setting range OFF • Stops display updates for all display values at that point in	cur using auto-range operation. .cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactive usurement parameters.) arameters other than those listed above arameters other than those listed above s and display update interval Display update interval 200 ms 400 ms 1 s 2 s 5 s 10 s 2 0 s CT ratio settings to measured values c (1.0), 0.001 to 1000 reasured values and fixes the time.
Averaging Scaling (VT, CT)	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresho Set from 1% to 15% (in 1% interva percentage level set for each me- Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa 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 Polies user-defined VT and C VT ratio setting range OFF Stops display updates for all display values at that point ir Measurement data acquired	cur using auto-range operation. cur during auto-range integration. old level for voltage and current ranges als). Synchronization occurs when the asurement range is exceeded. tive power, apparent power, and reactive usurement parameters.) e are calculated from averaged data. trameters other than those listed above. s and display update interval 200 ms 400 ms 400 ms 2 s 5 s 10 s 20 s CT ratio settings to measured values c (1.0), 0.001 to 1000 measured values and fixes the
Averaging Scaling (VT, CT)	Range switching does not oc Range switching does not oc Sets the zero-cross filter's thresh Set from 1% to 15% (in 1% interva percentage level set for each mei- Averages the voltage, current, act power. (Other than harmonic mea The power factor and phase angle Averaging is not performed for pa Method: Simple averaging Number of averaging iterations 1 (OFF) 2 5 10 25 50 100 Applies user-defined VT and O VT ratio setting range OFF • Stops display updates for all display values at that point in	cur using auto-range operation. Icur during auto-range integration. Index of the second of the sec

HOLD) values) as well as waveform peak a the display. For data with pol minimum value fo positive and neg does not apply to waveform peak v Internal calculatic elapsed time) wil The maximum an detected (maxim integration interv	e current, and time average active power maximum and minimum values for the voltage nd current waveform peak and holds them on arity, display of the maximum value and or the data's absolute values is held (so that both ative polarity values are shown). However, this the voltage waveform peak value or the current alue. ons (including integration and integration I continue. Id minimum values during integration are um/minimum value measurement during the
Zero Adjustment Zeroes out the volt	age and current input offset.
Key-lock Disables key input LOCK key.	in the measurement state, except for the KEY
Backup Backs up settings off and if a power of	and integration data if the instrument is turned butage occurs.
System Reset Initializes the instru	iment's settings.

Integration Measurement Specifications

Integration Mea	surement Specifications
Integration	Switchable between fixed-range integration and auto-range integration.
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
Magguranaatitama	the current range (200 mA to 20 A) while integration is stopped.
Measurement items and display	Simultaneous integration of the following 6 parameters: Positive current integrated value (Ah+) Negative current integrated value (Ah-) Sum of current integrated values (Ah) Positive active power integrated value (Wh-) Negative active power integrated value (Wh-) Sum of active power integrated values (Wh)
Measurement	Rectifiers: AC+DC, AC+DC Umn
types	Current: Displays the result of integrating current RMS value data (display values) once every display update interval as an integrated value. Active power: Displays the result of integrating active power values by polarity
	calculated once every cycle for the selected synchronization source as integrated values. Rectifier: DC Displays the result of integrating instantaneous data obtained by sampling both current and active power by polarity as integrated values (these values are not integrated values for the DC component when active power contains both DC and AC components)
Integration time	1 min. to 10000 hr., settable in 1 min. blocks
Integration time	±0.01% rdg. ±1 dgt.
accuracy	
Integration	(Current or active power measurement accuracy) + (±0.01% rdg.
Effective measuring range	±1 dgt.) 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
Hormonio Mooo	urament Specifications
	urement Specifications
Measurement method	Zero-cross simultaneous calculation method Uniform thinning between zero-cross events after processing with a digital antialiasing filter Interpolation calculations (Lagrange interpolation) When the synchronization frequency falls within the 45 Hz to 66 Hz range: IEC 61000-4-7:2002 compliant Gaps and overlaps may occur if the measurement frequency is not 50 Hz or 60 Hz.
	When the synchronization frequency falls outside the 45 Hz to 66 Hz range: No gaps or overlap will occur.
Synchronization source	Conforms to synchronization source (SYNC) for the basic measurement specifications.
Measurement items	Harmonic voltage RMS value Harmonic voltage content percentage Harmonic voltage phase angle Harmonic current RMS value Harmonic current content percentage Harmonic current phase angle Harmonic active power
	Harmonic active power content percentage Harmonic voltage current phase difference Total harmonic voltage distortion Total harmonic current distortion

Detects maximum and minimum measured values (except current integration, active power integration, integration elapsed time, time average current, and time average active power values) as well as maximum and minimum values for the voltage	FFT processing Window function	FFT processing word length : 32 Number of FFT points : 4096 poin Rectangular	
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	Analysis window width	$45 \text{ Hz} \le f < 56 \text{ Hz}$: 178.57 ms to : 56 Hz $\le f < 66 \text{ Hz}$: 181.82 ms to : Frequencies other than the above	214.29 ms (12 cycles)
positive and negative polarity values are shown). However, this does not apply to the voltage waveform peak value or the current waveform peak value.	Data update rate	Depends on window width.	
 Internal calculations (including integration and integration elapsed time) will continue. 	Maximum analysis	Synchronization frequency (f) ra	ange Analysis order
 The maximum and minimum values during integration are 	order	10 Hz ≤ f < 45 Hz	50th
detected (maximum/minimum value measurement during the integration interval).		45 Hz ≤ f < 56 Hz	50th 50th
Analog output and waveform output are not held. Zeroes out the voltage and current input offset.		$56 \text{ Hz} \le f \le 66 \text{ Hz}$ $66 \text{ Hz} < f \le 100 \text{ Hz}$	50th
Disables key input in the measurement state, except for the KEY		100 Hz < f ≤ 200 Hz	40th
LOCK key.		200 Hz < f ≤ 300 Hz	25th
Backs up settings and integration data if the instrument is turned off and if a power outage occurs.		300 Hz < f ≤ 500 Hz 500 Hz < f ≤ 640 Hz	15th 11th
Initializes the instrument's settings.	Analysis order	2nd to 50th	
surement Specifications	upper limit setting		
Switchable between fixed-range integration and auto-range integration.	Measurement accuracy	f.s.: Measurement range Frequency (f)	Voltage, Current, Active power
Fixed-range integration Integration can be performed for all voltage and current ranges.	,	DC	±0.4% rdg. ±0.2%f.s.
The voltage and current ranges are fixed once integration starts.		10 Hz ≤ f < 30 Hz	±0.4% rdg. ±0.2%f.s.
Auto-range integration		$30 \text{ Hz} \le f \le 400 \text{ Hz}$ $400 \text{ Hz} < f \le 1 \text{ kHz}$	±0.3% rdg. ±0.1%f.s. ±0.4% rdg. ±0.2%f.s.
Integration can be performed for all voltage ranges. The current is set to auto-range operation using ranges from 200 mA		$1 \text{ kHz} < f \le 5 \text{ kHz}$	±0.4% rdg. ±0.2%1.s. ±1.0% rdg. ±0.5%f.s.
to 20 A.		5 kHz < f ≤ 8 kHz	±4.0% rdg. ±1.0%f.s.
The integrated value for each range can be displayed by switching the current range (200 mA to 20 A) while integration is stopped. Simultaneous integration of the following 6 parameters: Positive current integrated value (Ah+)		• When using the 1 mA/ 2 mA rar Add ±1 µA to 10 Hz to 8 kHz me Add (±1 µA) × (voltage read valu	asurement accuracy for current. ue) to 10 Hz to 8 kHz
Negative current integrated value (Ah-) Sum of current integrated values (Ah) Positive active power integrated value (Wh+) Negative active power integrated value (Wh-)		Add ±1 mA to DC measurement	A/ 1 A/ 2 A/ 5 A/ 10 A/ 20 A range: accuracy for current.
Sum of active power integrated values (Wh) Rectifiers: AC+DC, AC+DC Umn Current:		for active power.	lue) to DC measurement accuracy 10 mA/ 20 mA/ 50 mA/ 100 mA range:
Displays the result of integrating current RMS value data (display values) once every display update interval as an integrated value.		Add ±10 µA to DC measuremen	
Active power: Displays the result of integrating active power values by polarity calculated once every cycle for the selected synchronization source as integrated values.	Display Specific	ations	
	Display	7-segment LED	
Rectifier: DC Displays the result of integrating instantaneous data obtained	Number of display parameters	4 (display area a, b, c, and d)	
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	Display resolution	Other than integrated values: 99 Integrated values: 999999 count	t (6 digits)
components) 1 min. to 10000 hr., settable in 1 min. blocks	Display update rate	200 ms ±50 ms (approx. 5 updat number of averaging iterations s	
±0.01% rdg. ±1 dgt.	Synchronized c	ontrol	
(Current or active power measurement accuracy) + (±0.01% rdg.	Functions	The timing of calculations; display	updates; data updates; integration
±1 dgt.) Until PEAK OVER U lamp or PEAK OVER I lamp lights up.		start, stop, and reset events; displa operation; and zero-adjustment op is synchronized with the master PV	eration for the slave PW3335 series
999999 (6 digits + decimal point)		the PW3336 series and PW3337 se	
 Stopping integration based on integration time setting (timer) Stopping/starting integration and resetting integrated values 	Terminal	BNC terminal × 1 (non-isolated)	
based on external control	Terminal name	External synchronization terminal	I (EXT.SYNC)
 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 	I/O settings	Off Synchronized control function o synchronization terminal (EXT.S	
during power outages • Stopping integration when power returns		In The external synchronization ter and a dedicated synchronization	minal (EXT.SYNC) is set to input, n signal can be input (slave).
Zero-cross simultaneous calculation method		Out	
Uniform thinning between zero-cross events after processing with a digital antialiasing filter Interpolation calculations (Lagrange interpolation)		The external synchronization term and a dedicated synchronization	
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.	Number of units for which synchronized control can be performed	Up to 7 slaves per master (total of 8 units including the PW3	3336/PW3337 series)
When the synchronization frequency falls outside the 45 Hz to 66 Hz range: No gaps or overlap will occur. Conforms to synchronization source (SYNC) for the basic	-	t Sensor Input Specificatio d PW3335-04)	ns
measurement specifications. Harmonic voltage RMS value Harmonic voltage content percentage	Terminal	Isolated BNC terminals	
Harmonic voltage phase angle Harmonic current RMS value Harmonic current content percentage Harmonic current phase angle Harmonic active power content percentage	Current sensor type switching	Off / TYPE.1 / TYPE.2 When set to off, input from the ex terminal is ignored.	ternal current sensor input
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	1/-02/-03
Fundamental wave active power Fundamental wave apparent power Fundamental wave reactive power Fundamental wave power factor Fundamental wave voltage current phase difference		CT6841-05, CT6843-05, CT684	875, CT6876, CT6877, 9272-05, 44-05, CT6845-05, CT6846-05, etc.
(The following percentation and he downloaded as data with compressionitions)	Current measurement	Auto/ 1 A/ 2 A/ 5 A (range noted of	an nanal)

(The following parameters can be downloaded as data with communications) Harmonic voltage phase angle Harmonic current phase angle

Current measurement Auto/ 1 A/ 2 A/ 5 A (range noted on panel) Can be read directly by manually setting the CT ratio.

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ower range		bination of voltage and	
configuration Measurement	trom 24.000 W to 5.0	0000 MW (also applies	to VA, var)
accuracy			
Current/ Active Po		1	[
Frequency (f)	Input < 50%f.s.	50%f.s. ≤ Input < 100%f.s.	
DC	±0.1%rdg.±0.2%f.s.	±0.1%rdg.±0.2%f.s.	±0.3%rdg.
0.1Hz≤f<16Hz 16Hz≤f<45Hz	±0.1%rdg.±0.2%f.s.	±0.3%rdg.	±0.3%rdg.
45Hz≤f≤66Hz	±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.
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	0		
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></td></f≤10khz<>	±(0.03+0.07×F)%rdg. ±0.2%f.s.	±(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
	±(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.
Values for voltage Values for voltage Values for voltage • When using the C	e and active power in e and active power in e CT684x-05 series, add	oower for which 0.1 Hz excess of 220 V for whi xcess of 750 V for whic	ch 10 Hz ≤ f < 16 Hz. h 30 kHz < f ≤ 100 kHz.)5 series accuracy afte
		ě	inge noted on the pane
	temperature coeffici	er: ±0.08%f.s./°C or les ent; f.s. : instrument me emperature coefficient	s (instrument easurement range)
coefficient Effect of power	temperature coeffici Add current sensor t Instrument: ±0.15%f. Internal circuit voltag Add the current sens	ent; f.s. : instrument me	s (instrument assurement range) to above. with power factor = 0) ance: ±0.0859° he internal circuit
Effect of power factor	temperature coeffici Add current sensor t Instrument: ±0.15%f. Internal circuit voltag Add the current sens voltage/current phas ±2.0% at DC or 10 H	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz ge/current phase differe sor phase accuracy to t	s (instrument basurement range) to above. with power factor = 0) ence: ±0.0859° the internal circuit ivve.
coefficient Effect of power factor Current waveform peak value measurement specifications	temperature coeffici Add current sensor t Instrument: ±0.15%f. Internal circuit voltag Add the current sens voltage/current phas ±2.0% at DC or 10 H Add the current sens	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz - je/current phase differe sor phase accuracy to t e difference noted abc $Iz \le f \le 1$ kHz (f.s.: curre sor accuracy to the abc	s (instrument easurement range) to above. with power factor = 0) ence: ±0.0859° he internal circuit ive.
Effect of power factor Current waveform peak value measurement specifications Harmonic measurement	temperature coeffici Add current sensor t Instrument: ±0.15%f. Internal circuit voltag Add the current sens voltage/current phas ±2.0% at DC or 10 H Add the current sens	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz je/current phase differe sor phase accuracy to t ie difference noted abc $Iz \le f \le 1$ kHz (f.s.: curre sor accuracy to the abc or input instrument mea	s (instrument easurement range) to above. with power factor = 0) ence: ±0.0859° he internal circuit ive.
Effect of power factor Current waveform peak value measurement specifications Harmonic measurement	temperature coeffici Add current sensor t Instrument: ±0.15%f. Internal circuit voltag Add the current sens voltage/current phas ±2.0% at DC or 10 H Add the current sens External current sens Frequency DC	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz je/current phase differe sor phase accuracy to 1 e difference noted abc $lz \le f \le 1$ kHz (f.s.: curre sor accuracy to the abc or input instrument mea (f) Voltage, ± 0.1	s (instrument assurement range) to above. with power factor = 0) ence: ±0.0859° he internal circuit ive. ent peak range) ive. surement accuracy only Current, Active power 4% rdg.±0.2%f.s.
Effect of power factor Current waveform peak value measurement specifications Harmonic measurement	temperature coeffici Add current sensor t Instrument: ±0.15%f. Internal circuit voltag Add the current sens voltage/current phas ±2.0% at DC or 10 H Add the current sens <u>Frequency</u> DC 10 Hz ≤ f < 3	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz ge/current phase differe sor phase accuracy to the e difference noted abc $ z \le f \le 1$ kHz (f.s.: curre sor accuracy to the abc or input instrument mea (f) Voltage, ± 0.4 00 Hz ± 0.4	s (instrument assurement range) to above. with power factor = 0) ence: ±0.0859° the internal circuit we. ent peak range) we. surement accuracy only Current, Active power 4% rdg.±0.2%f.s.
Effect of power factor Current waveform peak value measurement specifications Harmonic measurement	temperature coeffici Add current sensor t Instrument: $\pm 0.15\%$ f. Internal circuit voltag Add the current sens voltage/current phas $\pm 2.0\%$ at DC or 10 H Add the current sens External current sens Frequency DC 10 Hz $\leq 1 < 3$ 30 Hz $\leq 1 \leq 40$	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz ; je/current phase differe sor phase accuracy to 1 e difference noted abc iz $\leq f \leq 1$ kHz (f.s.: curre sor accuracy to the abc or input instrument mea (f) Voltage, ±0.0 0 Hz ±0.3 00 Hz ±0.3	s (instrument assurement range) to above. with power factor = 0) more: ±0.0859° the internal circuit we. ant peak range) we. surement accuracy only Current, Active power 4% rdg.±0.2%f.s. 4% rdg.±0.2%f.s. 3% rdg.±0.1%f.s.
Effect of power factor Current waveform peak value measurement specifications Harmonic measurement	temperature coeffici Add current sensor t Instrument: ±0.15%f. Internal circuit voltag Add the current sens voltage/current phas ±2.0% at DC or 10 H Add the current sens External current sens External current sens External current sens 10 Hz ≤ f < 30 30 Hz ≤ f ≤ 40 400 Hz < f ≤	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz ge/current phase differe sor phase accuracy to the e difference noted abc $z \leq f \leq 1$ kHz (f.s.: curre sor accuracy to the abc or input instrument mea (f) Voltage, ±0.0 0 Hz ±0 0 Hz ±0 1 kHz ±0	s (instrument assurement range) to above. with power factor = 0) mce: ±0.0859° he internal circuit we. surement accuracy only Current, Active power 4% rdg.±0.2%f.s. 4% rdg.±0.2%f.s. 4% rdg.±0.1%f.s. 4% rdg.±0.2%f.s.
Effect of power factor Current waveform peak value measurement specifications Harmonic measurement	temperature coeffici Add current sensor t Instrument: $\pm 0.15\%$ f. Internal circuit voltag Add the current sens voltage/current phas $\pm 2.0\%$ at DC or 10 H Add the current sens Frequency DC 10 Hz $\leq 1 < 3$ 30 Hz $\leq 1 < 40$ 400 Hz $< 1 \leq 5$ 1 kHz $< 1 \leq 5$	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz · ye/current phase difference sor phase accuracy to the e difference noted abcommon of the end of t	s (instrument raasurement range) to above. with power factor = 0) ence: ±0.0859° he internal circuit we. ent peak range) we. surement accuracy only Current, Active power 4% rdg.±0.2%f.s. 4% rdg.±0.2%f.s. 3% rdg.±0.1%f.s. 4% rdg.±0.2%f.s. 5% rdg.±0.5%f.s.
Temperature coefficient Effect of power factor Current waveform peak value measurement specifications Harmonic measurement accuracy	temperature coeffici Add current sensor t Instrument: $\pm 0.15\%$ f. Internal circuit voltag Add the current sens voltage/current phas $\pm 2.0\%$ at DC or 10 H Add the current sens Frequency DC 10 Hz $\leq 1 \leq 3$ 30 Hz $\leq 1 \leq 40$ 400 Hz $< 1 \leq 5$ 5 kHz $< 1 \leq 8$ 1 kHz $< 1 \leq 5$ 5 kHz $< 1 \leq 8$ 10 obtain the curre sensor's accuracy accuracy figures.	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz · je/current phase differe or phase accuracy to the e difference noted abc iz $\leq f \leq 1$ kHz (f.s.: curre sor accuracy to the abc or input instrument mea (f) Voltage, ± 0 0 Hz ± 0 0 Hz ± 0 1 kHz ± 1 kHz ± 1 kHz ± 1 kHz ± 4 end on measurement ra nt or active power accuracy	s (instrument assurement range) to above. with power factor = 0) ence: ±0.0859° the internal circuit we. ent peak range) we. surement accuracy only Current, Active power 4% rdg.±0.2%f.s. 3% rdg.±0.1%f.s. 4% rdg.±0.2%f.s. 3% rdg.±0.1%f.s. 3% rdg.±0.3%f.s. 0% rdg.±0.5%f.s. 0% rdg.±0.5%f.s. 0% rdg.±0.5%f.s. 10% rdg.±0.5%f.s. 10% rdg.±0.6%f.s. 10% rdg.±0.5%f.s. 10% rdg.±0.7%f.s. 10% rdg.±0.7%f.s.10% rdg.±0.7%f.s. 10% rdg.±0.7%f.s.10% rdg.±0.7%f.s. 10% rdg.±0.7%f.s.10% rdg.±0.7%f.s. 10% rdg.±0.7%f.s.10% rdg.±0.7%f.s.10% rdg.±0.7%f.s.10% rdg.±0.7%f.s.10% rdg.±0.7
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coefficient Effect of power factor Current waveform peak value measurement specifications Harmonic measurement accuracy D/A Output Spe PW3335-02 ar	temperature coeffici Add current sensor t Instrument: ±0.15%f. Internal circuit voltag Add the current sens voltage/current phas ±2.0% at DC or 10 H Add the current sens Frequency DC 10 Hz ≤ f < 3 30 Hz ≤ f < 4 400 Hz < f ≤ 5 kHz < f ≤ 8 • Values for f.s. depe • To obtain the curre sensor's accuracy accuracy figures. • When using the CT series accuracy af adjustment using the coeffications	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz · je/current phase differe or phase accuracy to 1 e difference noted about iz $\leq f \leq 1$ kHz (f.s.: curre or accuracy to the about or input instrument mea (f) Voltage, ± 0.0 00 Hz ± 0.0 10 kHz ± 0.0 11 kHz ± 0.0 11 kHz ± 1.0 11 kHz ± 1.0 11 kHz ± 1.0 12 kHz ± 1.0 13 kHz ± 1.0 14 kHz ± 1.0 15 kHz ± 1.0 16 kHz ± 1.0 16 kHz ± 1.0 17 kHz ± 1.0 17 kHz ± 1.0 16 kHz ± 1.0 17 kHz ± 1.0 17 kHz ± 1.0 17 kHz ± 1.0 18 kHz ± 1.0 18 kHz ± 1.0 19 kHz ± 1.0 10 kHz ± 1.0	s (instrument assurement range) to above. with power factor = 0) ence: ±0.0859° the internal circuit we. ent peak range) we. surement accuracy only Current, Active power 4% rdg.±0.2%f.s. 3% rdg.±0.1%f.s. 3% rdg.±0.1%f.s. 3% rdg.±0.2%f.s. 0% rdg.±0.5%f.s. 0% rdg.±0.5%f.s. 0% rdg.±0.5%f.s. 0% rdg.±0.5%f.s. 0% rdg.±0.6%f.s. 10% rdg.±0.6%f.s. 10% rdg.±0.6%f.s. 10% rdg.±0.7%f.s. 10% rdg.±0.7%f.s.10% rdg.±0.7%f.s. 10% rdg.±0.7%f.s.10% rdg.±0.7%f.s. 10% rdg.±0.7%f.s.10% rdg.±0.7%f.s. 10% rdg.±0.7%f.s.10% rdg.±0.7%f.s.10% rdg.±0.7%f.s.10% rdg.±0.7%f.s.10% rdg.±0.7%
Coefficient Effect of power factor Current waveform peak value measurement specifications Harmonic measurement accuracy D/A Output Spe PW3335-02 ar Number of output channels	temperature coeffici Add current sensor t Instrument: ±0.15%f. Internal circuit voltag Add the current sensor voltage/current phas ±2.0% at DC or 10 H Add the current sensor ±2.0% at DC or 10 H Add the current sensor External current sensor Trequency DC 10 Hz ≤ f < 3 30 Hz ≤ f ≤ 40 400 Hz < f ≤ 5 kHz < f ≤ 8 • Values for f.s. depe • To obtain the curre sensor's accuracy af adjustment using the Clifications ad PW3335-04) 7 channels 16-bit D/A converter The output level, our selected. Level output 2 Vf.s. or 5 Vf.s., lif High-speed level ou	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz i je/current phase differe or phase accuracy to the e difference noted abc iz $\leq f \leq 1$ kHz (f.s.: curre sor accuracy to the abc or input instrument mea (f) Voltage, ±0.0 0 Hz ±0.0 10 Hz ±0.0 10 Hz ±0.0 11 kHz ±1.0 11 kHz ±1.0 11 kHz ±1.0 11 kHz ±4.0 11 kHz ±4.0 12 kHz ±4.0 13 kHz ±1.0 14 kHz ±4.0 16 kHz ±1.0 16 kH	s (instrument assurement range) to above. with power factor = 0) ence: ±0.0859° the internal circuit we. surement accuracy only Current, Active power 4% rdg.±0.2%f.s. 3% rdg.±0.2%f.s. 3% rdg.±0.2%f.s. 3% rdg.±0.2%f.s. 3% rdg.±0.5%f.s. 3% rdg.±0.5%f.s.3% rdg.±0.5%f.s. 3% rdg.±0
Coefficient Effect of power factor Current waveform peak value measurement aspecifications Harmonic measurement accuracy D/A Output Spec (PW3335-02 ar Number of output channels Configuration Output voltage	temperature coeffici Add current sensor t Instrument: ±0.15%f. Internal circuit voltag Add the current sensor voltage/current phas ±2.0% at DC or 10 H Add the current sensor ±2.0% at DC or 10 H Add the current sensor External current sensor Trequency DC 10 Hz ≤ f < 3 30 Hz ≤ f ≤ 4t 400 Hz < f ≤ 5 kHz < f ≤ 5 5 kHz < f ≤ 8 • Values for f.s. depe • To obtain the curre sensor's accuracy af adjustment using the CT series accuracy figures. • When using the CT series accuracy af adjustment using the CT series accuracy figures. • When using the CT series accuracy af adjustment using the CT selected. The output level, our selected. Level output 2 Vf.s. or 5 Vf.s., li High-speed level ou 2 Vf.s., for 5 Vf.s., li Hugh-speed level ou 2 Vf.s., linked to si	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz je/current phase differe or phase accuracy to 1 e difference noted abc iz $\leq f \leq 1$ kHz (f.s.: curre or accuracy to the abc or input instrument mea (f) Voltage, ±0.0 00 Hz ±0.0 10 Hz ±0.0 11 kHz ±1.0 is kHz ±	s (instrument assurement range) to above. with power factor = 0) ence: ±0.0859° the internal circuit we. surement accuracy only Current, Active power 4% rdg.±0.2%f.s. 3% rdg.±0.2%f.s. 3% rdg.±0.2%f.s. 3% rdg.±0.5%f.s. 3% rdg.±0.5%f.s.3% rdg.±0.5%f.s. 3% rdg.±0
Coefficient Effect of power factor Current waveform peak value measurement specifications Harmonic measurement accuracy D/A Output Spe (PW3335-02 ar Number of output Channels Configuration	temperature coeffici Add current sensor t Instrument: ±0.15%f. Internal circuit voltag Add the current sensor voltage/current phas ±2.0% at DC or 10 H Add the current sensor ±2.0% at DC or 10 H Add the current sensor External current sensor Trequency DC 10 Hz ≤ f < 3 30 Hz ≤ f < 40 400 Hz < f ≤ 5 kHz < f ≤ 8 • Values for f.s. depe • To obtain the current sensor's accuracy af acjustment using the CT series accuracy aff adjustment using the coeffications d PW3335-04) 7 channels	ent; f.s. : instrument me emperature coefficient s. or less (45 to 66 Hz je/current phase differe or phase accuracy to 1 e difference noted abc iz $\leq f \leq 1$ kHz (f.s.: curre or accuracy to the abc or input instrument mea (f) Voltage, ±0.0 00 Hz ±0.0 10 Hz ±0.0 11 kHz ±1.0 is kHz ±	s (instrument assurement range) to above. with power factor = 0) ence: ±0.0859° the internal circuit we. Int peak range) we. surement accuracy only Current, Active power 4% rdg.±0.2%f.s. 3% rdg.±0.1%f.s. 3% rdg.±0.2%f.s. 3% rdg.±0.2%f.s. 3% rdg.±0.2%f.s. 3% rdg.±0.1%f.s. 3% rdg.±0.2%f.s. 3% rdg.±0.1%f.s. 10% rdg.±0.2%f.s. 3% rdg.±0.1%f.s. 10% rdg.±0.2%f.s. 5% rdg.±0.5%f.s. 5% r

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

Only Level output 5 Vf.s. Frequency, current integration, active power integration

The rectifier can be selected.

Output accuracy	f.s.: Relative to the output voltage rated value for each output
	parameter Level output
	(Output parameter measurement accuracy) + (±0.2%f.s.)
	High-speed level output (Output parameter measurement accuracy) + (±0.2%f.s.)
	Waveform output (Output parameter measurement accuracy) + (±1.0%f.s.)
Output frequency band	Waveform output, high-speed level output At DC or 10 Hz to 30 kHz, accuracy is as defined above.
Maximum output	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
Temperature	0.2 ms or less ±0.05%f.s./°C or less
coefficient	
Output resistance	Approx. 100 Ω
External control Functions	Integration start/stop, integration reset and hold via external
	control
Input signal level	0 to 5 V (high-speed CMOS level) or shorted [Lo]/ open [Hi]
GP-IB interface (PW3335-01 an	d PW3335-04)
Method	Compliant with IEEE488.1 1987, in reference to IEEE488.2 1987
	Interface functions SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0
Address	00 to 30
RS-232C interfa (PW3335 PW33	ace 35-02, PW3335-03, and PW3335-04)
Connector	D-sub 9-pin connector × 1
Communication method	Full duplex, Start-stop synchronization Stop bits: 1 (fixed)
	Data length: 8 (fixed)
Communication	Parity: None 9600 bps/ 38400 bps
speed	
LAN interface Connector	RJ-45 connector x 1
Electrical	Compliant with IEEE802.3
specifications Transmission method	10Base-T/ 100Base-TX (automatic detection)
Protocol	TCP/ IP
Protocol Functions	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer)
Protocol Functions	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller
Protocol Functions General Specific Product warranty	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller
Protocol Functions General Specific Product warranty period	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller Cations
Protocol Functions General Specific Product warranty period Operating environment	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
Protocol Functions General Specific Product warranty period Operating	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller cations 3 year
Protocol Functions General Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and	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
Protocol Functions General Specific Product warranty period Operating environment Operature and humidity Storage temperature and humidity	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller ccations 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)
Protocol Functions General Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and	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
Protocol Functions General Specific Product warranty period Operating environment Operature and humidity Storage temperature and humidity	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller ccations 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
Protocol Functions General Specific Product warranty period Operating environment Operature and humidity Storage temperature and humidity	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
Protocol Functions General Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller ccations 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 a connection consisting Voltage input terminals and current input terminals Voltage input terminal, Current input terminals
Protocol Functions General Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller ccations 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 Voltage input terminal, Current input terminal Measurement category III 600 V (anticipated transient overvoltage: 6000 V)
Protocol Functions General Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller ccations 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 a connection consisting of chassis, interfaces, and output terminals Between the voltage input terminals and current input terminals Voltage input terminal, Current input terminals Voltage input terminal, Current input terminal Measurement category III 600 V (anticipated transient overvoltage: 6000 V) Measurement category II 1000 V (anticipated transient
Protocol Functions General Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth	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 U and ±
Protocol Functions General Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller ccations 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 Woltage input terminal, Current input terminal Measurement category III 600 V (anticipated transient overvoltage: 6000 V)
Protocol Functions General Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth	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 current input terminals and current input terminals Between the voltage input terminals and current input terminals Woltage input terminals current input terminals Between the voltage input terminals used transient overvoltage: 6000 V) 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 ± 220 mA to 20 A range 30 A, ±100 A peak
Protocol Functions General Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth Maximum input current Applicable	HTTP server (remote operation, firmware updates) Dedicated ports (command control, data transfer) Remote control by controller ccations 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 Voltage 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 EN61010
Protocol Functions General 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 current	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 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
Protocol Functions General 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 current Applicable	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) -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) -20°C to 40°C (20°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) -20°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) -20°C to 40°C (20°F to 104°F), 80% RH or less (no condensation) -20°C to 40°C (20°F to 104°F), 80% RH or less (no condensation) -20°C to 40°C (20°F to 104°F), 80% RH or less (no condensation) -20°C to 40°C (20°F to 104°F), 80% RH or less (no condensation) -20°C to 40°C (20°F to 104°F), 80% RH or less (no condensation) -20°C to 40°C (20°F to 104°F), 80% RH or less (no condensation) -20°C to 40°C (20°F to 104°F), 80% RH or less (no condensation) -20°C to 40°C (20°F to 104°F), 80% RH or less (no condensation) -20°C to 40°C (20°F to 104°F), 80% RH or less (no condensation) -20°C to 40°C (20°F to 104°F), 80% RH or less (100°C (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 EN61010 EMC EN61326 Class A
Protocol Functions General 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 current Applicable Standards Rated supply voltage	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 voltage input terminals and current input terminals Between the voltage input terminals and current input terminals Between the voltage input terminals and current input terminals Between the voltage input terminals and current input terminals Voltage input terminals Current input terminals Between the voltage input terminals U and ± 000 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 1 mA to 100 mA range 20 A, ±30 A peak 1 mA to 100 A to 24 C lass A EN61000-3-2 EN61000-3-3 <
Protocol Functions General Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth Maximum input current Applicable Standards Rated supply voltage Maximum rated power	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 Vottage 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 EN61000-3-2 EN61000-3-3 100 V AC to 240 V AC 50 Hz/60 Hz 30 VA or less
Protocol Functions General 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 current Applicable Standards Rated supply voltage Maximum rated	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) -10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation) -290 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 current input terminals and current input terminals Voltage input terminal, Current input terminals Between the voltage input terminals and current input terminals Voltage: 6000 V) Measurement category II 1600 V (anticipated transient overvoltage: 6000 V) Between the voltage 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 1 mA to 100 mA range 20 A
Protocol Functions General Specific Product warranty period Operating environment Operating temperature and humidity Storage temperature and humidity Dielectric strength Maximum rated voltage to earth Maximum input current Applicable Standards Rated supply voltage Maximum rated power	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 Vottage 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 EN61000-3-2 EN61000-3-3 100 V AC to 240 V AC 50 Hz/60 Hz 30 VA or less

3334 Specifications

Basic Specifications

	Measu	rable lines	Single-pha	se, 2-wire (AC/DC)				
Measurement parameters				integrated			er, power fa er, waveforr		
	Measure	ement method	Simultanec	ous digital s	ampling of v	voltage and	current, Tru	ue RMS	
	Samplin	g Frequency	Approx. 74	Approx. 74.4kHz					
	Measure	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	

Frequency bandwidth DC, 45Hz to 5kHz Measurement accuracy

suaranteed at 23°C±5, max. 80%m, sine wave input, power factor=1, in-pnase voltage =0V, accuracy specifications differ depending on usage period of 1 or 3 years						
Warm-up time	3 minutes					
Period of guaranteed accuracy	3 years (better accuracy specifications available for 1-year period)					
Post-adjustment accuracy guarantee	1 year (accuracy specifications available for 1-year period)					
Effective measurement	Voltage, current:1% to 100% (Power: 0% to 100%)					
range	Measurements	below 0.5% of the voltage or curre	nt range will be zero suppressed.			
Effect of power factor (at pf=0.5)	Maximum ±	0.4%±rdg. (45 to 66Hz)				
Temperature Coefficient	Maximum ±	Maximum ±0.03%f.s./°C				
Frequency	Guaranteed Period	Voltage, current and active power (at less than 50% of input range)	Current and active power (at 50% to 100% of input range)			
DC *	1 year	±0.1 %rdg. ±0.2 %f.s.				
DC	3 years	±0.1 %rdg.	±0.35 %f.s.			
45 Hz ≤ f ≤ 66 Hz	1 year	±0.1 %rdg. ±0.1 %f.s.	±0.2 %rdg.			
40 HZ STS 00 HZ	3 years	±0.1 %rdg. ±0.2 %f.s.	±0.3 %rdg.			
66 Hz < f ≤ 1 kHz **	1 year	±0.1 %rdg. ±0.2 %f.s.	±0.3 %rdg.			
	3 years	±0.1 %rdg. ±0.35 %f.s.	±0.45 %rdg.			
1 kHz < f ≤ 5 kHz **	1 year	±3.0 %f.s.	±3.0 %rdg.			
	3 years	±4.5 %f.s.	±4.5 %rdg.			

*Add ±50µA to the accuracy when measuring DC current Add (±50µA x voltage value) to the accuracy when measuring DC active power ** Accuracy not defined for current input exceeding 20A

Input Specifications

-
2.4 MΩ for voltage, 10 mΩ or better (50/ 60 Hz) for current
300 V, ±425 Vpeak
30 A, ±54.0 Apeak
±300% of each voltage range, Within ±425 Vpeak
±300% of each current range, Within ±54.0 Apeak *1
300 V (DC, 50/ 60 Hz)

Display Specifications

	Voltage and current: 0.5% to 105% of range Active power: 0% to 110.25% of range
Displacement power factor	0.000 to 1.000 (no polarity display)
Display refresh rate	approx. 5 times per second
Response time	within 0.5 s (Time to rated accuracy after abrupt change in input [0 to 90% or 100 to 10% of range])

Functional Specifications

i anotional ope	Sincationic				
Integration	No.of displayed digits:	Six digits			
measurement	Current Integration:	From 0.00000mAh, Polarity-independent			
		integration and Sum value			
	Active power Integration:	From 0.00000mWh, Polarity-independent			
		integration and Sum value			
	Integration time:	1 min to 10000 h			
		Measurement accuracy of active power ±1dgt.			
Wave peak		itive and negative waveform of voltage/			
measurement	current (up to 300% of				
		y: ±1.2%f.s. ("f.s." is 300% of each range)			
Rectification method	Switchable between AC+DC(1	rue RMS), DC(simple average display) and AC(True RMS)			
Analog output	Parameter output repre				
(D/A output)		ctive power (3 simultaneous channels)			
		n Current integration, Active power integration,			
	Apparent power, powe				
	Voltage output: ±2 \				
		5% f.s. + individual measurement accuracy			
Waveform output		Parameter output representation:			
		Active power (3 simultaneous channels)			
	Voltage output: 1 VE				
		% f.s. + individual measurement accuracy			
Average function	Simple averaging of specif	ied number of samples: 1, 2, 5, 10, 25, 50 or 100			
VT or CT ratio	VT ratios: 1, 2, 4, 10, 20				
	CT ratios: 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, 25, 30, 40, 50, 60, 75,				
		300, 500, 1000, 2000, 3000, 5000, 10000			
External Interfaces	RS-232C interface: Inc				
	Asynchronous communication method:				
		rate: 9600 bps (fixed)			
	GP-IB interface (Model 3334-01 only)				
	IEEE-488.1 1987 compliant, IEEE-488.2 1987 reference				
Miscellaneous		n value hold, Peak value hold, Key lock,			
	Backup function (prese	erves settings, integration data)			
General Specifi	cations				
Safety	EN61010 Pollution Fac	tor 2,			

Salety	ENGIOTO POILUION FACIOLZ,
	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 \times 100 mm (3.94 in)H \times 245 mm (9.65 in)D

3333 Specifications

Basic specifications

Measurable lines		Single-phase, 2-wire (AC)						
Measurement parameters		Voltage, Current, Active power, Apparent power, Power factor						
Measurement method Sampling frequency		Simultaneous digital sampling of voltage and current, True RMS Approx. 48kHz						
Measurement ranges		Approx. 48	KHZ					
INICASU	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	
	icy bandwidth	45Hz to 5k						
(Guaranteed	at 23°C±5, max. 80%rh, si	CCURACY	factor=1, in-phase vo	ltage =0V, accuracy s	pecifications differ de	pending on usage per	iod of 1 or 3 years)	
Warm-	up time	10 minutes						
	guaranteed accuracy					or 1-year per		
	nent accuracy guarantee					1-year peric	d)	
range	e measurement			er: 10% to 1		will be zero su	nnressed	
	ower factor (at pf=0.5)			. (45 to 66H	0	11.1. 20 2010 00	pprocoda	
	ature Coefficient		±0.03%f.s./		-)			
	equency		eed Period			t and active	nower	
	equency			VOIL	-	g. ±0.1 %f.s	-	
45 Hz	$z \le f \le 66 Hz$		year years			g. ±0.1 %1.8 g. ±0.2 %f.s		
			year			g. ±0.2 %f.s g. ±0.2 %f.s		
66 Hz	$< f \leq$ 1 kHz *		years			g. ±0.2 %1.8 1. ±0.35 %f.		
			year			0 %f.s.	-	
1 kHz	< f ≤ 5 kHz *		years			5 %f.s.		
			,	for current				
Input	specification			for ourient	input exece			
Input i	mpedance			nΩ or bette	r (50/60 Hz)	for current		
	m input voltage	300 Vrms,						
	m input current	30 Arms, 42.5 Apeak						
	effective peak voltage	Within 425			10.54			
	effective peak current			nt range, Wi	thin ±42.5A	реак		
	d voltage to earth	300V (50/6	0082)					
	ay specifica							
Displa range	y indication			% to 152% (31.04% of ra				
	ment power factor			arity display	/)			
	y refresh rate		imes per se				in insut [0	
Respo	nse time		s (11me to ra 100 to 10%		cy atter abr	upt change	in input [U	
Funct	tional Spec	ifications	;					
Rectific	ation method	AC(True RI	MS)					
Analog (D/A of	g output utput)	voltage, ci		active powe		neous chan	nels)	
		Voltage output: +2 VDC f.s. for each range Output accuracy: ±0.5% f.s. + individual measurement accuracy					ccuracv	
Averag	ge function	Simple ave	-			nples: 1, 2, 5		
VT or (CT ratio			0, 30, 60, 1		20 40 50 00	76 00 100	
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					1J, 0U, IUU	
LAGIN	armenaces	RS-232C interface: Included as standard Asynchronous communication method:						
		full-duplex; Baud rate: 9600 bps (fixed)						
		GP-IB interface (Model 3333-01 only)						
Miscel	laneous	IEEE-488.1 1987 compliant, IEEE-488.2 1987 reference Display hold, Key lock, Settings backup (preserves settings)						
				., octangs b	ackup (pres	301 103 30111	193)	
	ral Specific							
Safety			Pollution Fac		(anti-ii	المتناهم الم	~ ~)	
EMC						d overvolta	je)	
	ng environment			-2, EN6100 less, non-c		α		
	environment			or less, nor				
	upply voltage		VAC, 50/60					
Maximu	m rated power	20 VA						
Dimensi	ons and mass					?7 mm (8.94	in)D	
_		l (excinaing	ieei and pr	ojections),	т.эку (67.0	UZ)		

Calculation formulas (3333 & 3334)

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

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
POWER METER PW3337	PW3337	3	AC/ DC	~	~	~	×	×	~	~
	PW3337-01	3	AC/ DC	v	~	v	V	×	~	~
	PW3337-02	3	AC/ DC	v	~	•	×	~	~	~
	PW3337-03	3	AC/ DC	~	~	~	~	~	~	~
POWER METER PW3336	PW3336	2	AC/ DC	~	~	~	×	×	~	~
	PW3336-01	2	AC/ DC	v	~	•	~	×	~	~
	PW3336-02	2	AC/ DC	v	~	•	×	~	~	~
	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
POWER METER PW3335	PW3335	1	AC/ DC	~	~	~	×	×	×	~
	PW3335-01	1	AC/ DC	✓	~	×	~	×	V	~
	PW3335-02	1	AC/ DC	✓	~	~	х	~	×	~
	PW3335-03	1	AC/ DC	✓	~	~	х	×	~	~
	PW3335-04	1	AC/ DC	✓	~	~	~	~	~	~
AC/ DC POWER HITESTER 3334	3334	1	AC/ DC	×	×	~	×	~	×	×
	3334-01	1	AC/ DC	×	×	~	~	~	×	×
POWER HITESTER 3333	3333	1	AC	×	×	~	×	~	×	×
	3333-01	1	AC	×	×	~	~	~	×	×

Communications and control options



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

CABLE 9151-02 Cable length: 2 m (6.56 ft)

DISTRIBUTED BY



LAN CABLE 9642 Cable length: 5 m (16.41 ft) supplied with straight to cross conversion cable Accessories : Instruction manual ×1, Power cord ×1



CONNECTION CORD 9165 For synchronized control Cable length: 1.5 m (4.92 ft), metal BNC to metal BNC

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