

WT300 SERIES

DIGITAL POWER METER

THE 5TH GENERATION OF THE WORLD'S BEST SELLING POWER METER



High Performance and Reliability

- Basic Accuracy of 0.1% of Reading
- Low Current Measurement down to 50 micro-Amps
- DC, 0.5 Hz to 100 kHz Frequency Range
- Standard USB, and GPIB or RS232 Interfaces

For more information, go to
tmi.yokogawa.com
 Test & Measurement Instruments



 3-Year Warranty 

Bulletin WT300-01EN

Yokogawa's new compact WT300 series for reliable power measurement

The WT300 series is the 5th generation of Yokogawa's compact power meter portfolio. The world's best selling power meter is the power meter of choice in multiple industries from production lines to R&D applications.



WT310(1ch)



WT310HC(1ch, MAX40A)



WT332(2ch)/WT333(3ch)

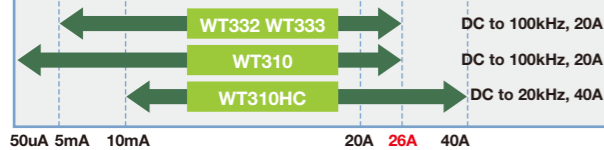
Wide current input range with high performance and reliability

Wide current input ranges

The WT300 series offers customers a wide range of current inputs from a few mA right up to 40Arms. It can measure both AC and DC.

Ranges
15.000 to 600.00V
0.5000A to 20.000A
5.0000mA to 20.000A
1.0000A to 40.000A

Current range by model



Simultaneous measurement of all parameters

A WT300 series can measure all DC and AC parameters. It can also measure harmonics and perform integration simultaneously without changing the measurement mode. The WTViewerFreePlus software is used to monitor and save all these parameters.



Example of WTViewerFreePlus display

Fast display and data update rate

The fast display and 100ms maximum data update rate of the WT300 series offers customers a short tact time in their testing procedures. Consistent Basic Measurement Accuracy for all input ranges.

0.1% of reading + 0.1% of range (50Hz/60Hz)

Convenient measurement functions

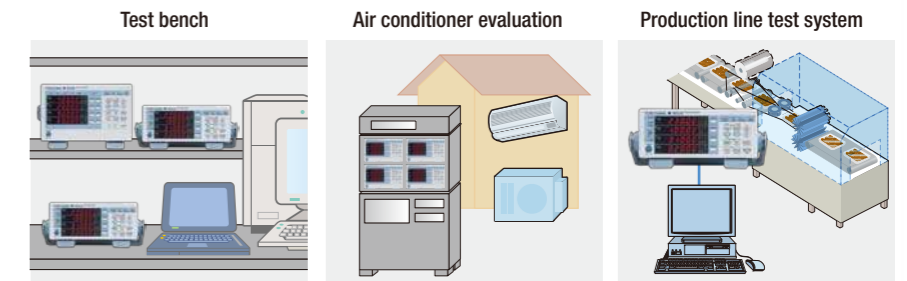
- **MAX hold function**
The maximum values of RMS/PEAK voltage & current active power, reactive power and apparent power can be held.
- **Line filter and frequency filter capability**
These filter functions will cut off unnecessary noise & harmonic components for fundamental waveform measurements.

PC, Data Logger and External Sensors connectivity

The WT300 series offers a wide range of communication interfaces such as USB, GP-IB or RS-232 (Selectable) and Ethernet (Optional).

Customers therefore have the flexibility to choose according to their application needs e.g. from production lines to engineering test benches. Customers can use WTViewerFreePlus software to set up all kinds of measurements. Additionally, the numeric values, waveform display* and trend graphs of the measurement data can be displayed and saved.

* Waveform display requires the /G5 Harmonic option

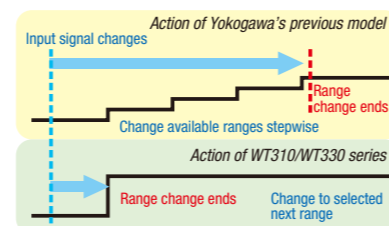


First in Class* and First in Industry*

First in class : Auto ranging function available in selected ranges

The auto-range function is used to select/change the range automatically in specific ranges. This results in shorter range changing times and thus quicker and more efficient testing.

Image of Range skip (configuration) function operation



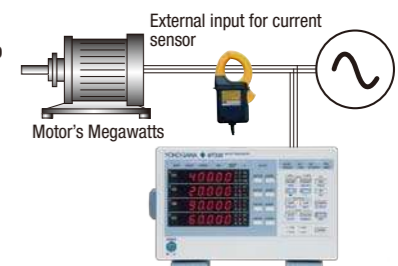
D/A output for measurement recording

The D/A option is used to output Voltage, Current, Power and other measured data for recording to data loggers (+/-5Vdc outputs). (WT310/WT310HC 4CH, WT332/WT333 12CH)



Current sensor input

Customers have the option to select either 2.5V to 10V range (/EX1 option) or 50mV to 2V range (/EX2 option) inputs for measuring large currents using current clamps or current sensors with voltage outputs.



First in industry : Integration measurement auto ranging function

Conventionally, when power meters operate in an integration mode to measure power consumption and standby power, the measuring ranges need to be fixed. However, if the level of the input exceeds the maximum of the selected range, the results will be incorrect and the test will need to be repeated with higher ranges applied.

The WT300 series has a high speed automatic ranging capability in integration mode which removes this need to repeat the test and integration is continuous and accurate.

This function is not only available for +/- Wh but also for Ah and DC current.

* According to YOKOGAWA survey by Dec, 2012

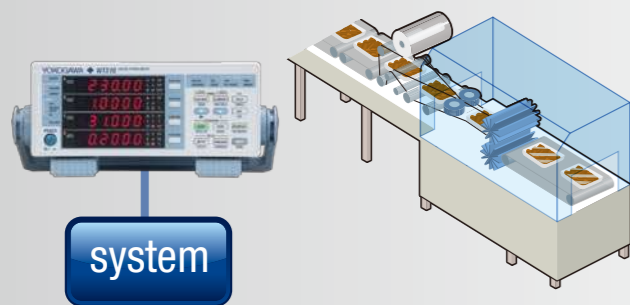
WT300 power meters are easy to use, cost effective and accurate for a wide range of applications in Production, Testing, Evaluation and R&D.

For Home appliances and Office equipment

Production line or QA testing of electric Devices

- Compact half rack mount size helps customers build smaller test systems with a better Return on Investment (ROI).
- D/A output function for data recording
- Multiple communication interfaces. USB, RS-232 or GP-IB and Ethernet capability.

The simultaneous measurement of power consumption parameters such as U, I, P, frequency, Power Factor and Harmonics for production line or QA testing results in reduced tact times. Thus testing is faster and cheaper. The DA output and communication interfaces enable data to be remotely and flexibly captured.

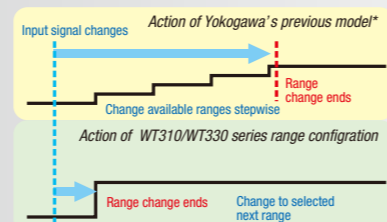


Development and evaluation tool for home appliances

- 5mA range helps small current measurement (WT310)
- Auto ranging function under Integration mode
- Range skip (range configuration) function provides the ability to select the usable ranges in advance. Auto ranging enables the WT300 series to rapidly adapt to changing input conditions.

The range skip function reduces the range change transition period. The WT310 can measure both large and small currents accurately in a single test. This can reduce the total evaluation period or removes the need to use two rather than one power meters for the application, thereby saving capital cost.

Image of range configuration function for WT300 series



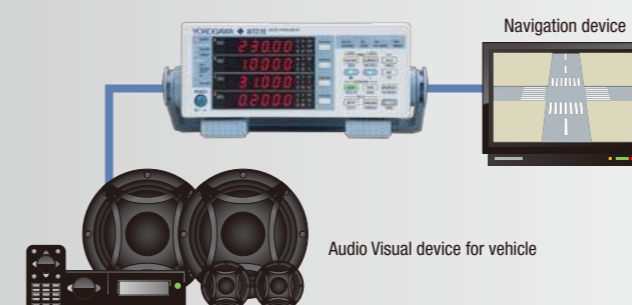
* Comparison with Yokogawa's previous model WT210/WT230

For Industrial equipment and Transportation

Automotive - Battery or DC driven device evaluation

- Accurate DC measurement: 0.3% total (WT310HC: 0.5% total)
- Direct high current measurement up to 40A without any external current sensor (WT310HC).
- Charge/Discharge (+/-Wh, +/-Ah) energy measurement for batteries

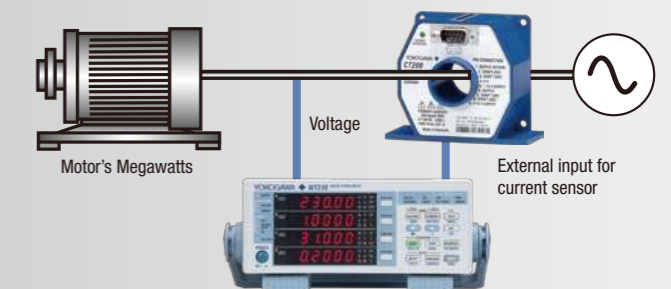
The WT310HC can measure currents up to 40A directly. This provides a cost effective and accurate method for testing DC driven devices in vehicles without having to use extra sensors.



Duration testing and efficiency measurement for industrial motors and rotating machinery

- Integration measurement for long period
- D/A output function for data recording
- DC, 0.5Hz to 100kHz broad bandwidth capability

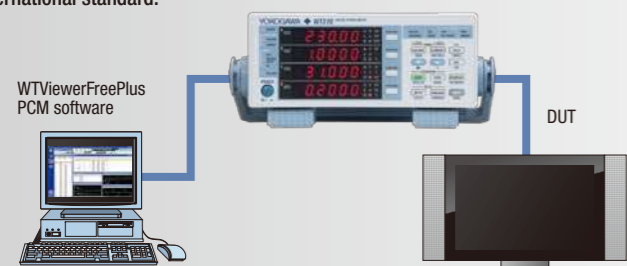
The WT300 series provides reliable current integration (Ah) and Energy (Wh) measurement for up to 10,000 hours (approx. 1 year). The D/A option is used to save and monitor the measurement results (WT310/WT310HC: 4ch, WT332/WT333: 12ch). An external recorder or data logger like, a ScopeCorder, can be used to save this D/A function data along with other parameters such as temperatures, torque and rotation speed.



Testing to international standards, such as IEC62301, Energy Star and SPECpower

- The WT310 has a high measurement resolution of Max. 100µW under the 5mA range setting.
- Simultaneous measurement of normal power parameters, harmonic components and THD.
- Dynamic input capability of crest factor Max 300 (Peak value / minimum effective RMS value)
- Free PCM software for IEC62301 testing

The WT310 together with the power consumption measurement (PCM) software enables users to perform standby power testing according to international standard.



Evaluation of large current equipment such as Induction Heaters/Cookers

- Direct high current measurement up to 40Arms without using external current sensors (WT310HC).
- Auto ranging function for Integration mode

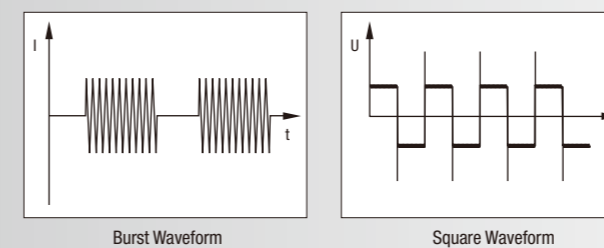
The WT310HC allows 40Arms to be directly inputted without the requirement to use current clamps or current sensors. This not only provides more precise measurement but also saves on investment costs. The wide current ranges are from 1A to 40A and voltage ranges are from 15 V to 600 V. Customers can use it for the evaluation of special waveform driven devices such as IH cookers and heaters.



Evaluation testing of special waveform driven devices and distorted waveforms (including DC component)

- DC, 0.5Hz to 100kHz broad bandwidth capability
- Average active power measurement under integration mode

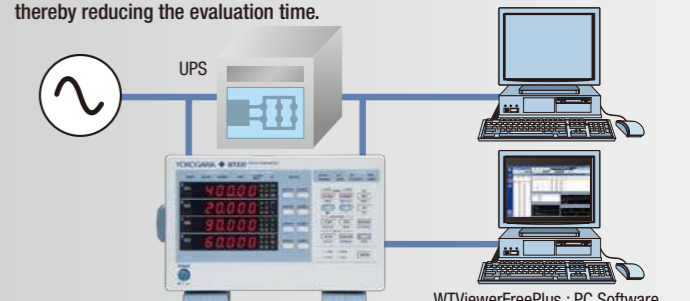
The WT300 series has a broad frequency capability of DC and from 0.5Hz to 100kHz. It can measure the RMS value of distorted waveforms like square waveforms or special waveform driven devices. The average active power measurement function gives accurate power consumption data for fluctuating power devices such as burst waveform operated devices. Therefore the customer can perform accurate distorted waveform measurements without using special mode settings.



Conformance and evaluation testing of uninterruptable power supplies (UPS)

- Maximum order setting for THD calculations
- Efficiency measurements using a single power meter
- Average active power measurement under integration Mode

The WT300 series enables users to conduct conformity tests according to UPS performance testing standards. The WT300 series is used to measure and calculate input & output levels, the efficiency, frequency and THD. The average active power data also provides accurate values of power consumption. The WT300 series along with the WTViewerFreePlus software helps to simultaneously measure all the necessary parameters required to test a UPS thereby reducing the evaluation time.



Please visit the URL below which shows many applications and examples. It will be regularly updated with the latest applications.

<http://tmi.yokogawa.com/technical-library/application-notes/>

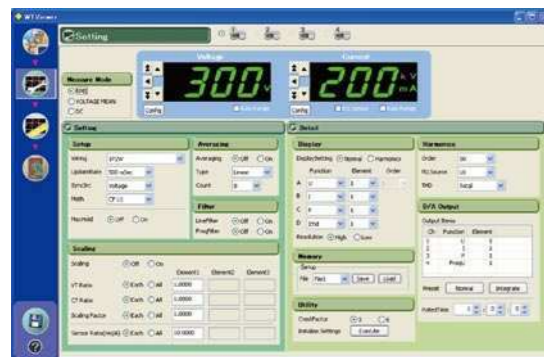
Easy set up and display of Numeric data, Trend graphs and Waveforms using PC application software

WTViewerFreePlus For WT300 Series (included)

The WTViewerFreePlus software can capture measured numeric values, harmonic values and waveform data. The data can be transferred to a PC via a USB, GP-IB/RS-232 or Ethernet communication interface, and it can be displayed* and saved on the PC.

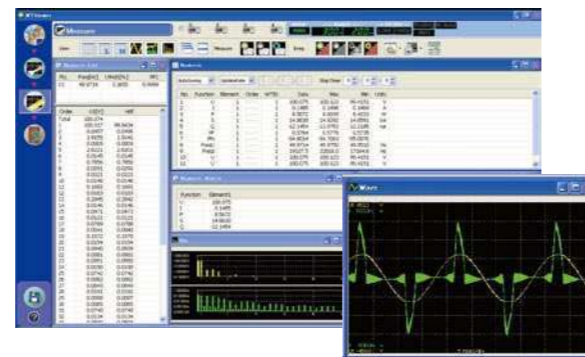
* Waveform display requires /G5 Harmonic option.

Setting Window



As well as using the WT300 series front panel to setup the powermeter, you can use the software to quickly set up your favorite conditions. It also shows all the setting parameters and the status at a glance. In particular, you can set up the range-skip function (range -configuration setting) and specify the maximum order used for the THD calculation.

Measurement Window



The software can display items which cannot be shown on the display of the WT300 series, such as multiple numeric measurement parameters, the harmonics data of each order, bar graphs, trend graphs and voltage & current waveforms. The free software thus adds additional performance to the WT300 series.

* Please check the Instruction manual in the CD for more information.

Standby power measurement conforming to IEC62301 Ed2.0

Power Consumption Measurement Software (Free)

The Power Consumption Measurement Software together with a WT310 (or another WT series instrument) provides a trustworthy power measurement solutions for testing the standby and off mode power of household products and office equipment.

The solution enables testing to be performed according to the IEC62301 Ed1.0 and Ed2.0 standards which specify the use of special algorithms for determining the power stability in the device under test. The software thus gathers all the required measurement data from the WT310, which includes not only voltage/ current/ power/ frequency but also the total harmonic distortion (THD) and the crest factor (CF) of the AC power supply. We therefore also recommend that the WT310 is installed with the harmonic option (/G5) and that a low distortion power supply is used for the test.



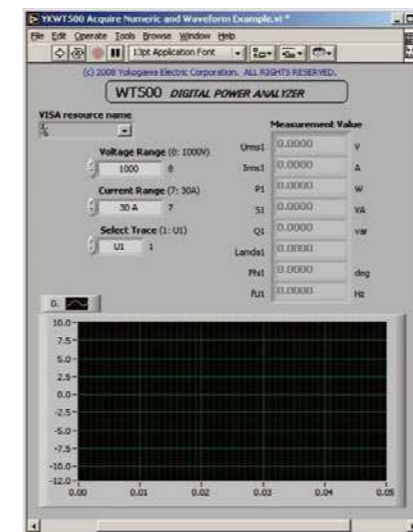
Configuring and Establishing a New Connection between the WT310 and a PC



Test Report

Support tools for creating dedicated programs!

LabVIEW Drivers



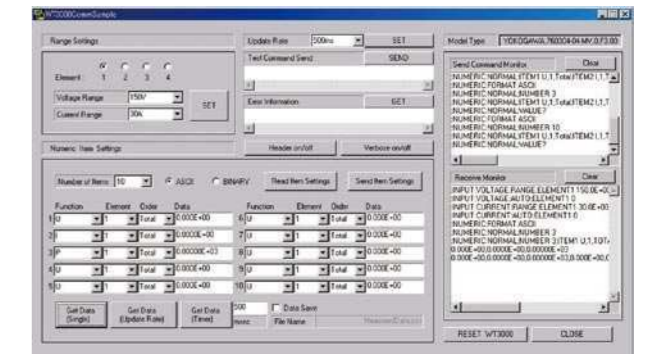
Data acquisition is possible using LabVIEW. LabVIEW drivers can be downloaded from our Web site. (Free of charge)

Coming soon

* LabVIEW is a registered trademark of NATIONAL INSTRUMENTS Corporation in the U.S.A.

Programming tool samples

To help you create dedicated programs for your system, we provide sample programs which support Visual Basic/Visual C++/Visual Basic .NET and Visual C# *. The sample programs support communication via USB, GP-IB/RS-232 or Ethernet interfaces and can be downloaded from our Web site.



* Visual Basic, Visual C++, Visual Basic .NET and Visual C# are registered trademarks of MICROSOFT Corporation in the U.S.A.

Comparison between WT210/230 series and WT310/330 series

	WT310/WT332/WT333	WT310HC	WT210/WT230
DC power measurement accuracy	0.1% of reading+0.2% of range	0.3% of reading+0.2% of range	0.3% of reading+0.2% of range
Current range	5m/10m/20m/50m/100m/200m/0.5/1/2/5/10/20[A] (WT310) 0.5/1/2/5/10/20[A] (WT332/WT333)	1/2/5/10/20[A]	5m/10m/20m/50m/100m/200m/0.5/1/2/5/10/20[A] (WT210) 0.5/1/2/5/10/20[A] (WT230)
External current input	EX1: 2.5/5/10[V] EX2: 50m/100m/200m/500m/1/2[V] (OP)	EX1: 2.5/5/10[V] EX2: 50m/100m/200m/500m/1/2[V] (OP)	EX1: 2.5/5/10[V] EX2: 50m/100m/200m/500m/1/2[V] (OP)
Effective input range for voltage & current (CF=3)	1% to 130%	1% to 100% (40A range only)	1% to 130%
Maximum displaying value for voltage & current (CF=3)	1% to 140%	1% to 110% (40A range only)	1% to 140%
0<PF<1	Power reading x (power reading error + (power range / apparent power reading) + tanθ x (influence when PF = 0)) %	Power reading x (power reading error + (power range / apparent power reading) + tanθ x (influence when PF = 0)) %	Add the power reading x (tanθ x (influence when PF = 0)) %.
Simultaneous measurement of RMS, VoltageMEAN & DC	Yes **	Yes **	No
Frequency measurement	2 channels (voltage and current)	2 channels (voltage and current)	selected voltage or current (one)
Number of display item	4 items	4 items	3 items
Sampling rate	Approximately 100 kS/s	Approximately 100 kS/s	Approximately 50 kS/s
Harmonic measurement	Yes (OP, /G5)	Yes (OP, /G5)	Yes (OP, /HRM)
THD calculation maximum order setting	Yes (OP, 1-50th)	Yes (OP, 1-50th)	No
Auto ranging of integration	Yes	Yes	No
Communication interface	USB GP-IB RS-232 Ethernet	Yes GP-IB or RS-232 Yes GP-IB or RS-232 Yes (OP)	Yes (OP) GP-IB or RS-232C Yes (OP) GP-IB or RS-232C No
IEEE standard for GP-IB	IEEE488.2	IEEE488.2	IEEE488.1 and IEEE488.2
Comparator function	No	No	Yes
Viewer software (setting & data capturing)	Free (included)	Free (included)	Free (download)

**1: Simultaneous, mode independent measurement using the WTViewerFreePlus PC software.

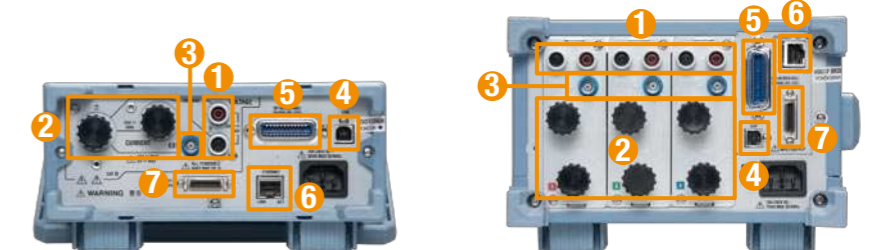
*A command compatible mode for the previous WT200 series is prepared. (IEEE488.2 only)

In that mode, the WT300 series works identically to a WT200 series except for the Store (and recall operation) and the Compare functions.

Superior points
Changed points

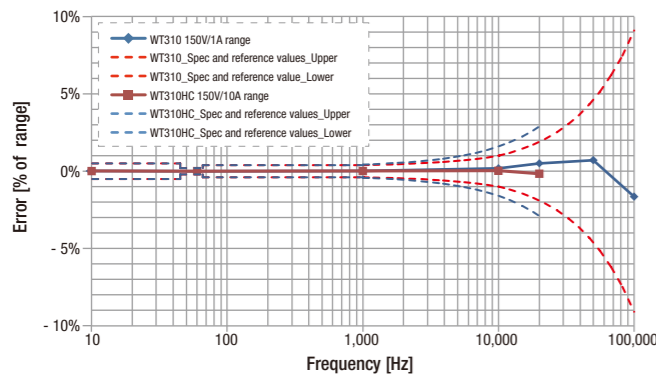
Rear View

- 1 Voltage input terminals
- 2 Current Input terminals
- 3 External current sensor input
- 4 USB communication interface
- 5 GP-IB/RS-232 (Standard)
- 6 Ethernet (Optional)
- 7 D/A output connector

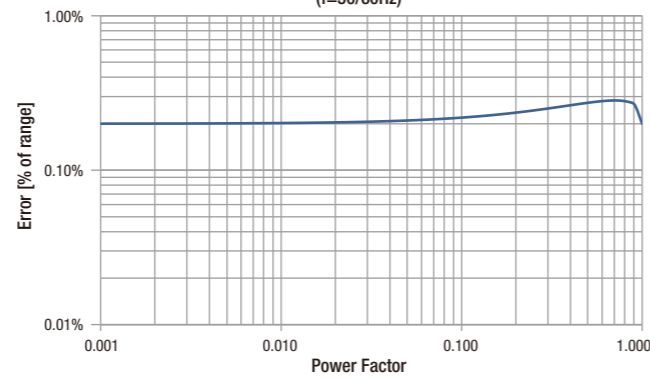


Example of basic characteristics

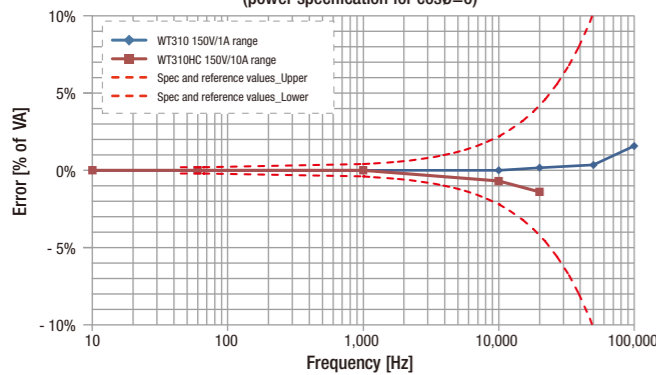
Example of Frequency -power Accuracy Characteristics



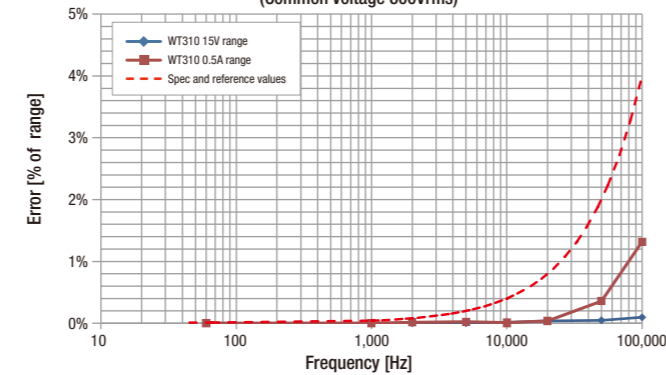
Total power Error with rated range input for an arbitrary power factor (f=50/60Hz)



Example of frequency versus power accuracy characteristic (power specification for cosθ=0)

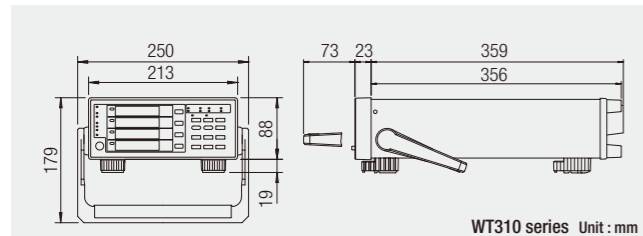


Effect of common mode voltage on reading value (Common Voltage 600Vrms)

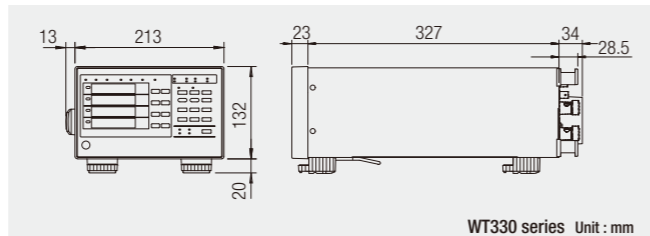


* Performance of WT332/WT333 is same as that of WT310

Exterior View



WT310 series Unit : mm



WT330 series Unit : mm

Specification

Input Item	Specifications
Input terminal type	Voltage Plug-in terminal (safety terminal) Current • Direct input: Large binding post • External current sensor input option: isolated BNC connector
Input format	Voltage Floating input through resistive voltage divider Current Floating input through shunt
Measurement range	Voltage Crest factor 3: 15V/30V/60V/150V/300V/600V Crest factor 6: 7.5V/15V/30V/75V/150V/300V Current • Direct input: Crest factor 3: • WT310: 5mA/10mA/20mA/50mA/100mA/200mA/0.5A/1A/2A/5A/10A/20A • WT310HC: 1A/2A/5A/10A/20A/40A • WT332 and WT333: 0.5A/1A/2A/5A/10A/20A Crest factor 6: • WT310: 2.5mA/5mA/10mA/25mA/50mA/100mA/0.25A/0.5A/1A/2.5A/5A/10A • WT310HC: 0.5A/1A/2.5A/5A/10A/20A • WT332 and WT333: 0.25A/0.5A/1A/2.5A/5A/10A • External current sensor input (/EX1,/EX2):

Input impedance	Voltage Input resistance: Approx. 2 MΩ, input capacitance: Approx. 13 pF in parallel with the resistance Current • Direct input • WT310 Crest factor 3: 5mA/10mA/20mA/50mA/100mA/200mA Crest factor 6: 2.5mA/5mA/10mA/25mA/50mA/100mA at the above range setting, Input resistance: Approx. 500mΩ, Input inductance: Approx. 0.1uH in series with the resistance Crest factor 3: 0.5A/1A/2A/5A/10A/20A Crest factor 6: 0.25A/0.5A/1A/2.5A/5A/10A at the above range setting, Input resistance: Approx. 6 mΩ + 10 mΩ (max)*Factory setting Input inductance: Approx. 0.1uH in series with the resistance • WT310HC Crest factor 3: 1A/2A/5A/10A/20A/40A Crest factor 6: 0.5A/1A/2.5A/5A/10A/20A Input resistance: Approx. 5mΩ, input inductance: Approx. 0.1uH in series with the resistance
Continuous maximum allowable input	Voltage Peak value of 1.5kV or RMS value of 1kV, whichever is less. Current • Direct input • WT310 Crest factor 3: 0.5A/1A/2A/5A/10A/20A Crest factor 6: 0.25A/0.5A/1A/2.5A/5A/10A at the above range setting, Peak value of 100A or RMS value of 30A, whichever is less. • WT310HC Crest factor 3: 1A/2A/5A/10A/20A/40A Crest factor 6: 0.5A/1A/2.5A/5A/10A/20A Peak value of 100A or RMS value of 44A, whichever is less. • WT332/WT333 Crest factor 3: 0.5A/1A/2A/5A/10A/20A Crest factor 6: 0.25A/0.5A/1A/2.5A/5A/10A Peak value of 100A or RMS value of 30A, whichever is less. • External current sensor input Peak value less than or equal to 5 times of the rated range.
Influence of common mode voltage	When 600 Vrms is applied between the input terminal and with the voltage input terminals shorted, current input terminals open and external current sensor input terminals shorted. Double the following values when the crest factor is set to 6. • At 50/60 Hz -80 dB or more (±0.01% of range or less) • Up to 100 kHz (reference value) 0.01% of range or more, f is frequency of input signal in kHz. • 15 V, 30 V, 60 V, 150 V, 300 V, 600 V ranges, 0.5 A, 1 A, 2 A, 5 A, 10 A, 20 A ranges of WT310/WT332/WT333, 1 A, 2 A, 5 A, 10 A, 20 A, 40 A ranges of WT310HC and, external current sensor input (/EX2 Option) Within ± ((Maximum rated range) × 0.001 × f% of range) The maximum rated range is 600 V for the voltage input terminal and 20 A for the current input of WT310/WT332/WT333 and 40 A for the current input terminal of WT310HC and 2 V for option /EX2. • 5mA, 10mA, 20mA, 50mA, 100mA and 200mA range of WT310 Within ± ((Maximum rated range) × 0.0002 × f% of range) The maximum rated range is 10 V • External current sensor input (/EX1 Option) ranges Within ± ((Maximum rated range) × 0.01 × f% of range) The maximum rated range is 10 V
Line filter	Select OFF or ON (cutoff frequency of 500 Hz).
Frequency filter	Select OFF or ON (cutoff frequency of 500 Hz).
A/D converter	Simultaneous conversion of voltage and current inputs. Resolution: 16 bits. Maximum conversion rate: Approx. 10us.

Specification

Item	Specifications
Instantaneous maximum allowable input (1 period, for 20 ms)	Voltage Peak value of 2.8 kV or RMS value of 2.0 kV, whichever is less. Current • Direct input • WT310 Crest factor 3: 5mA/10mA/20mA/50mA/100mA/200mA Crest factor 6: 2.5mA/5mA/10mA/25mA/50mA/100mA at the above range setting, Peak value of 150A or RMS value of 100 A, whichever is less. Crest factor 3: 0.5A/1A/2A/5A/10A/20A Crest factor 6: 0.25A/0.5A/1A/2.5A/5A/10A at the above range setting, Peak value of 450A or RMS value of 300 A, whichever is less. • WT310HC Crest factor 3: 1A/2A/5A/10A/20A/40A Crest factor 6: 0.5A/1A/2.5A/5A/10A/20A Peak value of 450A or RMS value of 300 A, whichever is less. • External current sensor input Peak value less than or equal to 10 times of the rated range. • WT332/WT333 Crest factor 3: 0.5A/1A/2A/5A/10A/20A Crest factor 6: 0.25A/0.5A/1A/2.5A/5A/10A Peak value of 450A or RMS value of 300 A, whichever is less.
Instantaneous maximum allowable input (for 1 s)	Voltage Peak value of 2kV or RMS value of 1.5kV, whichever is less. Current • Direct input • WT310 Crest factor 3: 5mA/10mA/20mA/50mA/100mA/200mA Crest factor 6: 2.5mA/5mA/10mA/25mA/50mA/100mA at the above range setting, Peak value of 30A or RMS value of 20A, whichever is less. Crest factor 3: 0.5A/1A/2A/5A/10A/20A Crest factor 6: 0.25A/0.5A/1A/2.5A/5A/10A at the above range setting, Peak value of 150A or RMS value of 40A, whichever is less. • WT310HC Crest factor 3: 1A/2A/5A/10A/20A/40A Crest factor 6: 0.5A/1A/2.5A/5A/10A/20A Peak value of 150A or RMS value of 44A, whichever is less. • WT332/WT333 Crest factor 3: 0.5A/1A/2A/5A/10A/20A Crest factor 6: 0.25A/0.5A/1A/2.5A/5A/10A Peak value of 150A or RMS value of 40A, whichever is less. • External current sensor input Peak value less than or equal to 10 times of the rated range.
Continuous maximum allowable input	Voltage Peak value of 1.5kV or RMS value of 1kV, whichever is less. Current • Direct input • WT310 Crest factor 3: 0.5A/1A/2A/5A/10A/20A Crest factor 6: 0.25A/0.5A/1A/2.5A/5A/10A at the above range setting, Peak value of 100A or RMS value of 30A, whichever is less. • WT310HC Crest factor 3: 1A/2A/5A/10A/20A/40A Crest factor 6: 0.5A/1A/2.5A/5A/10A/20A Peak value of 100A or RMS value of 44A, whichever is less. • WT332/WT333 Crest factor 3: 0.5A/1A/2A/5A/10A/20A Crest factor 6: 0.25A/0.5A/1A/2.5A/5A/10A Peak value of 100A or RMS value of 30A, whichever is less. • External current sensor input Peak value less than or equal to 5 times of the rated range.
Continuous maximum Common-mode voltage (during 50/60 Hz input)	600Vrms CAT II
Influence of common mode voltage	When 600 Vrms is applied between the input terminal and with the voltage input terminals shorted, current input terminals open and external current sensor input terminals shorted. Double the following values when the crest factor is set to 6. • At 50/60 Hz -80 dB or more (±0.01% of range or less) • Up to 100 kHz (reference value) 0.01% of range or more, f is frequency of input signal in kHz. • 15 V, 30 V, 60 V, 150 V, 300 V, 600 V ranges, 0.5 A, 1 A, 2 A, 5 A, 10 A, 20 A ranges of WT310/WT332/WT333, 1 A, 2 A, 5 A, 10 A, 20 A, 40 A ranges of WT310HC and, external current sensor input (/EX2 Option) Within ± ((Maximum rated range) × 0.001 × f% of range) The maximum rated range is 600 V for the voltage input terminal and 20 A for the current input of WT310/WT332/WT333 and 40 A for the current input terminal of WT310HC and 2 V for option /EX2. • 5mA, 10mA, 20mA, 50mA, 100mA and 200mA range of WT310 Within ± ((Maximum rated range) × 0.0002 × f% of range) The maximum rated range is 10 V • External current sensor input (/EX1 Option) ranges Within ± ((Maximum rated range) × 0.01 × f% of range) The maximum rated range is 10 V
Line filter	Select OFF or ON (cutoff frequency of 500 Hz).
Frequency filter	Select OFF or ON (cutoff frequency of 500 Hz).
A/D converter	Simultaneous conversion of voltage and current inputs. Resolution: 16 bits. Maximum conversion rate: Approx. 10us.

Item	Specifications
Voltage and Current Accuracy	Requirements Temperature: 23±5°C, Humidity: 30 to 75%RH, Input waveform: Sine wave, Crest factor: 3, Common-mode voltage: 0 V Scaling function: OFF, Number of displayed digits: 5 digits Frequency filter: Turn ON to measure voltage or current of 200 Hz or less After warm-up time has passed After zero-level compensation or measurement range is changed. Accuracy (at 12 months) (The accuracy shown below is the sum of reading and range errors.) * f in the read error equation is the input signal frequency in kHz.
Accuracy	Requirements Temperature: 23±5°C, Humidity: 30 to 75%RH, Input waveform: Sine wave, Crest factor: 3, Common-mode voltage: 0 V Scaling function: OFF, Number of displayed digits: 5 digits Frequency filter: Turn ON to measure voltage or current of 200 Hz or less After warm-up time has passed After zero-level compensation or measurement range is changed. Accuracy (at 12 months) (The accuracy shown below is the sum of reading and range errors.) * f in the read error equation is the input signal frequency in kHz.
DC	WT310, WT330 (Voltage/Current) ±(0.1% of reading +0.2% of range) WT310HC (Voltage, Current EXT sensor input) ±(0.1% of reading +0.2% of range) WT310HC (Current Direct input) ±(0.2% of reading +0.2% of range)
0.5Hz ≤ f < 45Hz	WT310, WT330 ±(0.1% of reading +0.2% of range) WT310HC ±(0.1% of reading +0.2% of range) WT310HC ±(0.1% of reading +0.2% of range)
45Hz ≤ f ≤ 66Hz	WT310, WT330 ±(0.1% of reading +0.1% of range) WT310HC ±(0.1% of reading +0.1% of range) WT310HC ±(0.1% of reading +0.1% of range)
66Hz < f ≤ 1kHz	WT310, WT330 ±(0.1% of reading +0.2% of range) WT310HC ±(0.1% of reading +0.2% of range) WT310HC ±(0.1% of reading +0.2% of range)
1kHz < f ≤ 10kHz	WT310, WT330 ±(0.07×f)% of reading +0.3% of range WT310HC ±(0.07×f)% of reading +0.3% of range WT310HC ±(0.13×f)% of reading +0.3% of range
10kHz < f ≤ 20kHz	WT310, WT330 ±(0.5% of reading +0.5% of range) WT310HC ±(0.5% of reading +0.5% of range) WT310HC ±(0.13×f)% of reading +0.5% of range
10kHz < f ≤ 100kHz	WT310, WT330 ±(0.5% of reading +0.5% of range) WT310HC ±(0.5% of reading +0.5% of range) WT310HC ±(0.04×(f-10))% of reading
Influence of temperature changes after zero-level compensation or range change	Add 0.02% of reading to the DC voltage accuracy. Add the following value to the DC current accuracies. WT310 (5mA/10mA/20mA/50mA/100mA/200mA ranges): 5uA/°C WT310 (0.5A/1A/2A/5A/10A/20A ranges) and WT330 direct current input: 500uA/°C WT310HC direct current input: 1mA/°C External current sensor input (/EX1): 1mV/°C External current sensor input (/EX2): 50uV/°C
Accuracy of the waveform display data, Upk and lpk	Add the following value to the above accuracy (reference value). The effective input range is within ±300% of range (within ±600% for crest factor 6) Voltage input: 1.5 × √ (15/range) % of range Direct current input range: WT310 (5mA/10mA/20mA/50mA/100mA/200mA range): 3 × √ (0.005/range) % of range WT310 (0.5A/1A/2A/5A/10A/20A range) and WT330 direct current input: 3 × √ (0.5/range) % of range WT310HC direct current input: 3 × √ (1/range) % of range External current sensor input range: /EX1 Option: 3 × √ (2.5/range) % of range /EX2 Option: 3 × √ (0.05/range) % of range
Influence of self-generated heat caused by voltage input	Add 0.000001 × U ² % of reading to the AC voltage accuracies. Add 0.000001 × U ² % of reading + 0.000001 × U ² % of range to the DC current accuracies. U is the voltage reading (V). Influence of self-generated heat caused by voltage input lasts until falling the temperature of the input resistor even if voltage input decreases.
Influence of self-generated heat caused by current input	WT310: Add 0.00013 × I ² % of reading to the AC current accuracies. Add 0.00013 × I ² % of reading + 0.004 × I ² mA (0.5A/1A/2A/5A/10A/20A range) or 0.00013 × I ² % of reading + 0.00004 × I ² mA (5mA/10mA/20mA/50mA/100mA/200mA range), to the DC current accuracies. I is the current reading (A). WT310HC: Add 0.00006 × I ² % of reading to the AC current accuracies. Add 0.00006 × I ² % of reading + 0.001 × I ² mA to the DC current accuracies. I is the current reading (A). WT332/WT333: Add 0.00013 × I ² % of reading to the AC current accuracies. Add 0.00013 × I ² % of reading + 0.002 × I ² mA to the DC current accuracies. I is the current reading (A). Influence of self-generated heat caused by current input lasts until falling the temperature of the shunt resistor even if current input decreases.
Accuracy changes caused by data update interval	When the data update interval is 100 ms, add 0.05% of reading to the 0.5Hz to 1kHz accuracy.
Guaranteed accuracy ranges for frequency, voltage, and current	All accuracy figures for 0.5 to 10 Hz are reference values The current accuracy figures for DC, 10 Hz to 45 Hz, and 400 Hz to 100 kHz when the current exceeds 20 A are reference values.
Input range	1 to 130% with respect to the rated range of voltage or current. (It displays up to 140%) * WT310HC: 40A Range Only 1 to 100% (display is 110%) (Add the reading error × 0.5 to above accuracies for the range of 110% to 130% of the rated range.)
Measurement frequency range	data update interval 0.1s 0.25s 0.5s 1s 2s 5s Measurement Frequency Range DC, 25Hz ≤ f ≤ 100kHz DC, 10Hz ≤ f ≤ 100kHz DC, 5Hz ≤ f ≤ 100kHz DC, 2.5Hz ≤ f ≤ 100kHz DC, 1.5Hz ≤ f ≤ 100kHz DC, 0.5Hz ≤ f ≤ 100kHz
When the line filter is turned ON	Only for direct current input of WT310HC, the maximum measurement range is 20kHz. 45 to 66 Hz: Add 0.2% of reading. Less than 45 Hz: Add 0.5% of reading.
Temperature coefficient	Add: ±0.03% of reading/°C within the range 5 to 18°C or 28 to 40°C.
Accuracy when the crest factor is set to 6	Accuracy obtained by doubling the measurement range error for the accuracy when the crest factor is set to 3.
Active Power Accuracy	Specifications Requirements Same as the conditions for voltage and current. • Power factor: 1 Accuracy (at 12 months) (The accuracy shown below is the sum of reading and range errors.) * f in the read error equation is the input signal frequency in kHz.
Accuracy	Requirements Same as the conditions for voltage and current. • Power factor: 1 Accuracy (at 12 months) (The accuracy shown below is the sum of reading and range errors.) * f in the read error equation is the input signal frequency in kHz.
DC	WT310, WT332, WT333, WT310HC (Current EXT sensor input) ±(0.3% of reading+0.2% of range) WT310HC (Current Direct input) ±(0.3% of reading+0.2% of range)
0.5Hz ≤ f < 45Hz	WT310, WT332, WT333, WT310HC ±(0.3% of reading+0.2% of range) WT310HC ±(0.3% of reading+0.2% of range)
45Hz ≤ f ≤ 66Hz	WT310, WT332, WT333, WT310HC ±(0.1% of reading+0.1% of range) WT310HC ±(0.1% of reading+0.1% of range)
66Hz < f ≤ 1kHz	WT310, WT332, WT333, WT310HC ±(0.2% of reading+0.2% of range) WT310HC ±(0.2% of reading+0.2% of range)
1kHz < f ≤ 10kHz	WT310, WT332, WT333, WT310HC ±(0.1% of reading+0.3% of range) WT310HC ±(0.13×f)% of reading+0.3% of range
10kHz < f ≤ 20kHz	WT310, WT332, WT333, WT310HC ±(0.5% of reading+0.5% of range) WT310HC ±(0.13×f)% of reading+0.5% of range
10kHz < f ≤ 100kHz	WT310, WT332, WT333, WT310HC ±(0.5% of reading+0.5% of range) WT310HC ±(0.09×(f-10))% of reading

Specification

General Specifications

Item	Specifications
Warm-up time	Approx. 30 minutes
Operating environment	Temperature: 5°C to 40°C
	Humidity: 20%RH to 80%RH (No condensation)
	Elevation: 2000m or less
Installation location	Indoors
	Storage environment
Rated supply voltage	100 VAC to 240 VAC
Permitted supply range voltage	90 VAC to 264 VAC
Rated supply frequency	50/60 Hz
Permitted supply voltage frequency range	48 Hz to 63 Hz
Maximum power consumption	WT310, WT310HC: 50VA, WT332/WT333: 70VA
External dimensions (excluding protrusions.)	WT310, WT310HC: Approx. 213 (W) × 88 (H) × 379 (D) mm
	WT332/WT333: Approx. 213 (W) × 132 (H) × 379 (D) mm
Weight	WT310, WT310HC: Approx. 3 kg WT332/WT333: Approx. 5 kg
Battery backup	Setup parameters are backed up with a lithium battery.

Rack Mount

Model/parts number	Product	Description	Order Q'ty
751533-E2	Rack mounting kit	For WT310 series EIA standalone installation	1
751533-J2	Rack mounting kit	For WT310 series JIS standalone installation	1
751534-E2	Rack mounting kit	For WT310 series EIA connected installation	1
751534-J2	Rack mounting kit	For WT310 series JIS connected installation	1
751533-E3	Rack mounting kit	For WT330 series EIA standalone installation	1
751533-J3	Rack mounting kit	For WT330 series JIS standalone installation	1
751534-E3	Rack mounting kit	For WT330 series EIA connected installation	1
751534-J3	Rack mounting kit	For WT330 series JIS connected installation	1

Ask Yokogawa for information on rack mounts in which WT310 and WT330 str combined.

Accessory (sold separately)

Model/parts number	Product	Description	Order Q'ty
758917	Test lead set	A set of 0.8 m long, red and black test leads	1
758922	Small alligator-clip	Rated at 300 V and used in a pair	1
758929	Large alligator-clip	Rated at 1000 V and used in a pair	1
758923	Safety terminal adapter	(spring-hold type) Two adapters to a set	1
758931	Safety terminal adapter	(screw-fastened type) Two adapters to a set 1.5 mm hex Wrench is attached	1
758924	Conversion adapter	BNC-banana-jack (female) adapter	1
366924	BNC-BNC cable	1 m	1
366925	BNC-BNC cable	2 m	1
758921	Fork terminal adapter	Banana-fork adapter, Two adapters to a set	1
89284LK	External sensor cable	Current sensor input connector, Length 0.5 m	1
705926	Connection Cable	1 m, For DA4, DA12 option	1

▲ Due to the nature of this product, it is possible to touch its metal parts. Therefore, there is a risk of electric shock, so the product must be used with caution.

* Use these products with low-voltage circuits (42 V or less).

AC/DC Current sensor /Clamp on Probe

Model	Product Name	Description
CT1000	AC/DC Current sensor	DC~300 kHz, ±(0.05% of reading +30uA), 1000 Apk
CT200	AC/DC Current sensor	DC~500 kHz, ±(0.05% of reading +30uA), 200 Apk
CT60	AC/DC Current sensor	DC~800 kHz, ±(0.05% of reading +30uA), 60 Apk
751552	Clamp-on probe	30 Hz~5 kHz, 1400 Apeak(1000 Arms)
96030	Clamp-on probe	20 Hz~20 kHz, ±0.5% reading, 200 Arms
751574	AC/DC Current sensor	DC~100 kHz, 600 Apeak(400 Arms)

* CT series do not conform CE Marking.

* For detailed information, see Power Meter Accessory Catalog Bulletin CT1000-00E

Model and Suffix Codes

Model	SuppfixCode	Description	
WT310 Power Cord	-D	1 Input element model UL, CSA standard, PSE	
	-F	VDE standard	
	-R	AS standard	
	-Q	BS standard	
	-H	GB standard	
	-N	NBR standard (for Brazil)	
	-C1	select one	GP- IB
	-C2	select one	RS- 232
	/C7	select one	Ethernet interface
	/EX1	select one	External sensor input 2.5V/5V/10V
/EX2	select one	External sensor input 50mV/100mV/200mV/500mV/1V/2V	
/G5		Harmonics Measurement	
/DA4		D/A- output(4CH)	
WT310HC Power Cord	-D	1 Input element /High current model UL, CSA standard, PSE	
	-F	VDE standard	
	-R	AS standard	
	-Q	BS standard	
	-H	GB standard	
	-N	NBR standard (for Brazil)	
	-C1	select one	GP- IB
	-C2	select one	RS- 232
	/C7	select one	Ethernet interface
	/EX1	select one	External sensor input 2.5V/5V/10V
/EX2	select one	External sensor input 50mV/100mV/200mV/500mV/1V/2V	
/G5		Harmonics Measurement	
/DA4		D/A- output(4CH)	
WT332 Power Cord	-D	2 Input elements model UL, CSA standard, PSE	
	-F	VDE standard	
	-R	AS standard	
	-Q	BS standard	
	-H	GB standard	
	-N	NBR standard (for Brazil)	
	-C1	select one	GP- IB
	-C2	select one	RS- 232
	/C7	select one	Ethernet interface
	/EX1	select one	External sensor input 2.5V/5V/10V
/EX2	select one	External sensor input 50mV/100mV/200mV/500mV/1V/2V	
/G5		Harmonics Measurement	
/DA12		D/A- output(12CH)	

Standard accessories

Power cord(1set), Rubber foot(1set), Current input protective cover(each 1 set), Start up guide(1set), Connector (provided only with /DA4 or /DA12, each 1set), Safety terminal adapter 758931(provided two adapters in a set times input element number), CD (1piece, included the startup guide, user guide, instruction manual and the communication manual by PDF data, and Viewer Software)



758917 Test lead set
Two leads in a set. Use 758917 in combination with 758922 or 758929. Total length: 75 cm
Rating: 1000 V, 32 A



758922 Small alligator adapters
For connection to measurement leads (758917). Two in a set.
Rating: 300 V



758929 Large alligator adapters
For connection to measurement leads (758917). Two in a set.
Rating: 1000 V



758923*
Safety terminal adapter set (spring-hold type) Two adapters in a set.



758931*
Safety terminal adapter set
Screw-fastened adapters. Two adapters in a set. 1.5 mm Allen wrench included for tightening.



89284LK*
External Sensor Cable
For connection the external input of the WT500 to current sensor.
Length: 50 cm



70526
26-pin cable for options DA4 and DA12

Due to the nature of this product, it is possible to touch its metal parts. Therefore, there is a risk of electric shock, so the product must be used with caution.

*1 Maximum diameters of cables that can be connected to the adapters 758923 core diameter: 2.5 mm or less; sheath diameter: 4.8 mm or less 758931 core diameter: 1.8 mm or less; sheath diameter: 3.9 mm or less

*2 The coax cable is simply cut on the current sensor side. Preparation by the user is required.

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Notice
Before operating the product, read the user's manual thoroughly for proper and safe operation.