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
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.

Wide current input range with high performance and reliability

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

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.

Fast display and data update rate

The fast display and 100ms maximum data update rate of the WT300 series offers customers a short test 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.

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.

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.

PC, Data Logger and External Sensors connectivity

The WT300 series offers a wide range of communication interfaces such as USB, GPIB 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.

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.

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).

Example of WTViewerFreePlus display

- MAX hold function
- Line filter and frequency filter capability

Image of WTViewerFreePlus display

* According to YOKOGAWA survey by Dec, 2012

First in industry : Integration measurement auto ranging function

Cycle by cycle measurement

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 may 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.
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, F, frequency, Power Factor and Harmonics for production line or QA testing results in reduced test times. Thus testing is faster and cheaper. The QA output and communication interfaces enable data to be remotely and flexibly captured.

Testing to international standards, such as IEC62301, Energy Star and SPECTpower
- 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 steady 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 15V to 600V. Customers can use it for the evaluation of special waveform driven devices such as IR cookers and heaters.

For Industrial equipment and Transportation

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.

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.

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 (IA) 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.

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, GPIB/RS-232 or Ethernet communication interface, and it can be displayed* and saved on the PC.

* Waveform display requires IG5 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**

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 (IGS) and that a low distortion power supply is used for the test.

**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)

**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, GPIB/RS-232 or Ethernet interfaces and can be downloaded from our Web site.

**Comparison between WT210/230 series and WT310/330 series**

<table>
<thead>
<tr>
<th>Feature</th>
<th>WT210/230</th>
<th>WT310/330</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current range</td>
<td>0.5/1/2/5/10/A</td>
<td>0.5/1/2/5/10/20/A</td>
</tr>
<tr>
<td>Apparent power range</td>
<td>1% to 140%</td>
<td>1% to 130%</td>
</tr>
<tr>
<td>Voltage range</td>
<td>5m/10m/20m/50m/100m/200m/V</td>
<td>50m/100m/200m/V</td>
</tr>
<tr>
<td>Current range</td>
<td>0.5/1/2/5/10/20/A</td>
<td>1/2/5/10/20/40/A</td>
</tr>
<tr>
<td>Crest factor range</td>
<td>1% to 110% (40A range only)</td>
<td>1% to 130%</td>
</tr>
<tr>
<td>Communication Interface</td>
<td>GPIB/RS-232</td>
<td>Ethernet</td>
</tr>
</tbody>
</table>

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

**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
Add 0.00006 × I^2% of reading + 0.001 × I^2 mA to the DC power accuracies. I is the current reading (A).

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 + External current sensor input (/EX2): 50uV/°C.

• Influence of self-generated heat caused by current input
  Influence of self-generated heat caused by voltage input lasts until falling the temperature of the input resistor even if current input does not change.

Add 0.00006 × I^2% of reading to the AC power accuracies.

Add 0.0000001 × U^2% of reading + 0.0000001 × U^2% of range to the DC power accuracies. U is the voltage reading (V).

Factor
λ = 0(S: apparent power) = 0%/100%

Accuracy of power ±[(λΣ[S] – λΣ[Q])/S] = 0% / ±1 digit

When the line filter 45 to 66 Hz: Add 0.3% of reading.

For details on range switching, see section of Voltage, Current, and Active Power.

Display
When the measurement mode is VOLTAGE MEAN:
• 1.0000 to – 1.0000
• For the direct current range, add 10uA to the current accuracy and (10uA/direct current range)×100% of range to the current accuracy.
• For the direct current range, add 10uA to the current accuracy and (10uA/direct current range)×100% of range to the current accuracy.

When the measurement mode is RMS:
• 1.000 to – 1.000
• When the crest factor is set to 3.

• Significance: Selected automatically according to significant digits in the voltage
• Significant digits: Selected automatically according to significant digits in the voltage

• For the direct current range, add 10uA to the current accuracy and (10uA/direct current range)×100% of range to the current accuracy.
• For the direct current range, add 10uA to the current accuracy and (10uA/direct current range)×100% of range to the current accuracy.

• For the direct current range, add 10uA to the current accuracy and (10uA/direct current range)×100% of range to the current accuracy.
• For the direct current range, add 10uA to the current accuracy and (10uA/direct current range)×100% of range to the current accuracy.
Battery backup: Setup parameters are backed up with a lithium battery.

WT332/WT333: Approx. 5 kg
Weight WT310, WT310HC: Approx. 3 kg (excluding protrusions.)

External dimensions
WT310, WT310HC: Approx. 213 (W) × 132 (H) × 379 (D) mm

Consumption
Maximum power
WT310, WT310HC: 50VA
WT332/WT333: 70VA

Frequency range
Permitted supply voltage
48 Hz to 63 Hz
Rated supply frequency 50/60 Hz
Permitted supply 90 VAC to 264 VAC

Storage environment
Temperature: −25°C to 60°C
Installation location Indoors

Warm-up time
Approx. 30 minutes

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

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**Model and Suffix Codes**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT310</td>
<td>1. Input element model</td>
</tr>
<tr>
<td>WT310-01</td>
<td>1. Power Cord</td>
</tr>
<tr>
<td>WT310-1M</td>
<td>1. External sensor input 50mV/100mV/200mV/500mV/1V/2V</td>
</tr>
<tr>
<td>WT310-EX2</td>
<td>2. External sensor input</td>
</tr>
<tr>
<td>CT1000-00E</td>
<td>3. Instruction Manual</td>
</tr>
</tbody>
</table>

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**Model**

**WT332**

**Model**

**WT332/EX2**

**Model**

**Optional function**

- select one
- select one
- select one
- select one
- select one

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**Notice**

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