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
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

- **Wide current input ranges**
  - The WT300 series offers customers a wide range of current inputs from a few mAh right up to 40 Arms. It can measure both AC and DC.

- **First in class** and **First in Industry**
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- **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.

- **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.

- **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).

- **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 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.

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- **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.

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*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 GPIB and Ethernet connectivity.

The simultaneous measurement of power consumption parameters such as UI, 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 D/A 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 WT300 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.

**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 15V to 600V. Customers can use it for the evaluation of special waveform driven devices such as IH cookers and heaters.

**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.

**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.

**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 (JA) 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.

**For Industrial equipment and Transportation**
- Single Phase voltage
- In Cooking Heater
- Rect Monofrom
- Square Waveform

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 15th harmonic option.

Setting Window

Measurement 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.

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.

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)

Comming 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.

Comparision between WT210/230 series and WT310/330 series

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 (15S) and that a low distortion power supply is used for the test.

Comparison between WT210/230 series and WT310/330 series

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

Comparison between WT210/230 series and WT310/330 series

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**Example of basic characteristics**

- **External current sensor input (/EX1, /EX2):**
  - WT332 and WT333: 0.25A/0.5A/1A/2.5A/5A/10A
  - WT310HC: 0.5A/1A/2.5A/5A/10A/20A
  - WT310: 2.5mA/5mA/10mA/25mA/50mA/100mA/0.25A/0.5A/1A/2.5A/5A/10A

- **Current Crest factor 3:** 15V/30V/60V/150V/300V/600V

- **Current Input format Voltage**
  - Direct input: Large binding post

---

**Specification**

- **Error [% of VA]:**
  - WT310/WT330: ±0.075%/±0.015%/±0.005%
  - WT310HC: ±0.075%/±0.015%/±0.005%

- **Error [% of range]:**
  - WT310/WT330: ±0.075%/±0.015%/±0.005%
  - WT310HC: ±0.075%/±0.015%/±0.005%

- **Input resistance:** Approx. 2 MΩ

- **Input inductance:** Approx. 0.1μH in series with the resistance

- **Maximum conversion rate:** Approx. 10μs.

- **Resolution:** 16 bits.

- **A/D converter**
  - Simultaneous conversion of voltage and current inputs.

---

**Error**

- **Error at 50/60 Hz:**
  - WT332/WT333: ±0.075%/±0.015%/±0.005%
  - WT310HC: ±0.075%/±0.015%/±0.005%

- **Crest factor 3:**
  - WT332/WT333: 0.25A/0.5A/1A/2.5A/5A/10A
  - WT310HC: 0.5A/1A/2.5A/5A/10A/20A
  - WT310: 2.5mA/5mA/10mA/25mA/50mA/100mA/0.25A/0.5A/1A/2.5A/5A/10A

- **Crest factor 6:**
  - WT332/WT333: 0.5A/1A/2.5A/5A/10A/20A
  - WT310HC: 1A/2A/5A/10A/20A/40A
  - WT310: 5mA/10mA/20mA/50mA/100mA/200mA/0.5A/1A/2A/5A/10A/20A

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**Example of basic characteristics**

- **Frequency [Hz]:**
  - WT310_Spec and reference value_Lower
  - WT310_Spec and reference values_Upper
  - WT310 150V/1A range
  - WT310HC 150V/10A range
  - (power specification for cosØ=0)

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**Error when the reading error equation is used**

- **Temperature coefficient Add:** ±0.03% of reading/°C within the range 5 to 18°C or 28 to 40°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 voltage reading (V).

- **Influence of self-generated heat caused by current input**
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**Accuracy Requirements**

- **Frequency [Hz]:**
  - WT310, WT332, WT333, WT310HC

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**Applications**

- **Current readings:**
  - Peak value of 100A or RMS value of 30A, whichever is less.
  - Peak value less than or equal to 10 times of the rated range.

- **Voltage readings:**
  - Peak value of 150A or RMS value of 44A, whichever is less.
  - Peak value of 30A or RMS value of 20A, whichever is less.

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**Features**

- **Voltage input:** 1.5 kV or RMS value of 1 kV, whichever is less.

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**Key Features**

- **Applications Software & Tool Comparison**

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**Exterior View**

- **WT310/WT330 series:** Unit: mm

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**Example of basic characteristics**

- **Current Crest factor 6:** 2.5mA/5mA/10mA/25mA/50mA/100mA

- **Input inductance:** Approx. 0.1μH in series with the resistance

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**Example of basic characteristics**

- **Input resistance:** Approx. 2 MΩ

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**Example of basic characteristics**

- **Input inductance:** Approx. 0.1μH in series with the resistance

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**Example of basic characteristics**

- **Input resistance:** Approx. 2 MΩ

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**Example of basic characteristics**

- **Input resistance:** Approx. 2 MΩ

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**Example of basic characteristics**

- **Input resistance:** Approx. 2 MΩ

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**Example of basic characteristics**

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**Example of basic characteristics**

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**Example of basic characteristics**

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**Example of basic characteristics**

- **Input resistance:** Approx. 2 MΩ

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**Example of basic characteristics**

- **Input resistance:** Approx. 2 MΩ

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**Example of basic characteristics**

- **Input resistance:** Approx. 2 MΩ
Add 0.00013 \times I^2\% of reading to the AC power accuracies.

WT310HC:
The power accuracy figures for DC, 10 Hz to 45 Hz, and 400 Hz to 100 kHz when the current exceeds 20 A are

\[ \text{Accuracy of phase} \pm [\lambda - 1.0002] + \sin^{-1} \left( \frac{\text{influence from the power factor when voltage and current are at the measurement range}}{1.0002} \right) \]

\[ \pm \sin^{-1} \left( \frac{\text{influence from the power factor when voltage and current are at the measurement range}}{1.0002} \right) \times 100 \% \text{ of range} \]

When the measurement mode is RMS:

- Current
- Frequency
- Applying the external current sensor, VT, or CT output to the instrument.

When the measured value exceeds 110% of the rated range

- Current
- Frequency
- Applying the external current sensor, VT, or CT output to the instrument. For detailed input specifications, see “Input.”

Remote Control Input/Output

- Synchronization
- For detailed input specifications, see “Input.”

When the measured value exceeds 110% of the rated range

- Current
- Frequency
- Applying the external current sensor, VT, or CT output to the instrument.

The guaranteed accuracy ranges for frequency, voltage, and current, are the same as the guaranteed ranges for

- Frequency
- Voltage
- Current

The guaranteed accuracy ranges for frequency, voltage, and current are as follows:

- Frequency: +/-0.02% of range
- Voltage: +/-0.02% of range
- Current: +/-0.02% of range

Range accuracy

- Frequency: +/-0.02% of range
- Voltage: +/-0.02% of range
- Current: +/-0.02% of range

The accuracy shown below is the sum of reading and range errors.

- Current (I1) at 1P2W
- Frequency
- Phase angle of 2nd harmonics and higher harmonic of voltage with respect to the

- Current (I2) at 1P2W
- Frequency
- Phase angle of 2nd harmonics and higher harmonic of voltage with respect to the

- Current (I3) at 1P2W
- Frequency
- Phase angle of 2nd harmonics and higher harmonic of voltage with respect to the
**General Specifications**
- **Weight**
  - WT332/WT333: Approx. 5 kg (excluding protrusions)
  - WT310, WT310HC: Approx. 3 kg (excluding protrusions)
- **External Dimensions**
  - WT310, WT310HC: Approx. 213 (W) × 88 (H) × 379 (D) mm
  - WT332/WT333: Approx. 213 (W) × 132 (H) × 379 (D) mm
- **Consumption**
  - Rating voltage: 100 VAC to 250 VAC
  - Power factor: 0.95
- **Humidity**
  - 20%RH to 80%RH (No condensation)
- **Operating Environment**
  - Temperature: 5°C to 40°C

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**Model and Suffix Codes**

**Model**
- WT310
- WT310HC
- WT332
- WT333

**Suffix**
- C: select one
- H: select one
- N: select one
- Q: select one
- R: select one
- F: select one
- H: select one
- Q: select one
- R: select one
- F: select one

**Description**
- Input terminal model
- 1 channel model
- 2 channel model
- 3 channel model
- 4 channel model
- Ethernet interface
- External sensor input 2, 3, 4, 5
- External sensor input 2, 3, 4, 5
- Ethernet interface
- External sensor input 2, 3, 4, 5

**Optional function**
- USB connection
- USB connection
- RS-232 connection
- RS-232 connection
- USB connection
- USB connection
- USB connection
- USB connection

**Standard accessories**
- Power cord (UL, CSA standard, PSE)
- CF cable
- USB connection
- CF cable

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**Accessory (sold separately)**

**Model/parts number**
- WT332-J2
- WT332-E2
- WT332-J2
- WT332-E2
- WT332-J2
- WT332-E2
- WT310-J2
- WT310-E2
- WT310-J2
- WT310-E2

**Product Description**
- Rack mounting kit
- Rack mounting kit
- Rack mounting kit
- Rack mounting kit
- Rack mounting kit
- Rack mounting kit
- Rack mounting kit
- Rack mounting kit
- Rack mounting kit
- Rack mounting kit

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**AC/DC Current Sensor / Clamp on Probe**

**Model**
- CT-7800
- CT-7800
- CT-7800
- CT-7800
- CT-7800
- CT-7800
- CT-7800
- CT-7800
- CT-7800
- CT-7800

**Product Name**
- AC/DC Current sensor
- AC/DC Current sensor
- AC/DC Current sensor
- AC/DC Current sensor
- AC/DC Current sensor
- AC/DC Current sensor
- AC/DC Current sensor
- AC/DC Current sensor
- AC/DC Current sensor
- AC/DC Current sensor

**Specifications**
- DC ~ 100 kHz, 600 Apeak (400 Arms)
- DC ~ 800 kHz, ±(0.05% of reading +30uA), 60 Apeak
- DC ~ 300 kHz, ±(0.05% of reading +30uA), 1000 Apeak

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**Model**
- WT332
- WT333

**Model Suppix-Code**
- WT332-DA4
- WT332-DA4
- WT332-DA4
- WT332-DA4
- WT332-DA4
- WT332-DA4
- WT332-DA4
- WT332-DA4
- WT332-DA4
- WT332-DA4

**Description**
- D/A output (4CH)
- D/A output (4CH)
- D/A output (4CH)
- D/A output (4CH)
- D/A output (4CH)
- D/A output (4CH)
- D/A output (4CH)
- D/A output (4CH)
- D/A output (4CH)
- D/A output (4CH)

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**Communication Interface**
- C1: select one
- C1: select one
- C1: select one
- C1: select one
- C1: select one
- C1: select one
- C1: select one
- C1: select one
- C1: select one
- C1: select one

**Optional function**
- USB connection
- USB connection
- USB connection
- USB connection
- USB connection
- USB connection
- USB connection
- USB connection
- USB connection
- USB connection

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**Operating Environment**
- Temperature: 5°C to 40°C

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**Power Supply**
- 100V ± 10% to 240V ± 10%
- Power supply
- 100V ± 10% to 240V ± 10%
- Power supply
- 100V ± 10% to 240V ± 10%
- Power supply
- 100V ± 10% to 240V ± 10%
- Power supply
- 100V ± 10% to 240V ± 10%
- Power supply
- 100V ± 10% to 240V ± 10%
- Power supply

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

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**Subject to change without notice.**

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**YOKOGAWA METERS & INSTRUMENTS CORPORATION**

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**Notice**