Simultaneous measurement of voltage, current, power, and harmonics
High-speed data updating (100 ms)
Display of numerical values, waveforms and trends
Measurement of bought and sold watt hours
Easy setup and operation

Current Range
0.5 to 40 A

Voltage Range
15 to 1000 V

Basic Power Accuracy
0.2%

Frequency Range
DC 0.5 Hz to 100 kHz
The WT500 Power Analyzer features a color TFT and compact body that enables single-phase and three-phase power measurement, achieving ±0.1% basic accuracy, maximum input of 1000 Vrms, 40 Arms and a measurement bandwidth of 100 kHz.

### Key layout offers intuitive control

- **Cursor Keys**
  Cursor keys can be used to move the on-screen cursor in four different directions. The cursor keys and SET key can also be used for making selections in soft menus. The WT500's menu structure is even more user-friendly than other models.

- **RANGE Keys**
  The RANGE keys can be used to set the voltage and current ranges. Quick intuitive range control is available by using direct keys.

- **DISPLAY Keys**
  DISPLAY keys can be used to switch between numerical values, waveforms, and other displays. The display format can easily be changed.

- **SETUP Key**
  The SETUP key can be used to enter various settings required for power measurement such as the wiring method and filters.

- **FILE, IMAGE, and STORE Keys**
  The keys related to data storage are located in the same area. Data can be easily stored in USB memory.

### Features

- **Simultaneous measurement of DC and AC signals**
  Evaluation of DC/AC signal conversion technology is critical in the renewable energy market. With input from 2 or more elements, the WT500 can measure DC and AC signals simultaneously and calculate input-to-output efficiency.

- **Separate integration functions for charge/discharge and bought/sold power**
  The WT500 is equipped with integration functions that can not only evaluate charge and discharge current such as from secondary cells, but also bought and sold power in photovoltaic power generation systems.

- **Saving measured data directly to USB memory**
  Measured data can be saved in CSV format directly to USB memory.

- **Easy setup with cursor keys**
  Menu-type screen offers intuitive settings.

- **Simultaneous measurement of normal data and harmonic data with the harmonic measurement, /G5 option**
  Voltage RMS, current RMS, power values, and harmonic components up to the 50 order can be measured simultaneously.

- **WT series for power evaluation of energy-saving equipment**
  The WT series have been used as powermeters for Green IT, Energy Star, CO2 reduction and other energy-saving equipment. The WT series—including the WT500—supports your power evaluation needs.
Newly Designed Architecture

Intuitive control by using cursor keys in four different directions.
To reduce setting errors, menus display settings in order of relative importance in order.

Example of voltage range setting

Measured Value Direct Save Function

Two USB ports for peripherals are installed for direct data saving (up to 1 GB) in USB memory at shortest intervals. The saved data can be opened in applications such as Excel.

CSV format

A Variety of Display Formats

In addition to numerical data, the WT500 can display input signal waveforms and trends (time variation of numerical data). Also bar graph display and vector display are available with the harmonic measurement (/G5 option).

Waveform *1

Trend

Vector *2 (/G5 option is required)

Bar graph (/G5 option is required)

*1 Waveforms of up to approximately 5 kHz can be displayed.
*2 Excludes single-phase models.
Split screen display for numerical values and waveforms is not available.

USB Memory Storage Function

Only necessary items within the measured data like voltage, current, and power can be saved in USB memory in binary or CSV format (up to 1 GB).

Files saved in CSV format can be opened in general-purpose applications such as Excel to allow displaying of data in graphs.

A Variety of Integration Functions

In addition to integration functions of active power (WP), current (q), reactive power (WQ), and apparent power (WS), a new feature provides measurement of bought and sold watt hours. Also, average active power can be calculated over an integration interval.

This feature is useful for evaluating the power consumed by intermittent-control instruments in which the power value fluctuates. Average active power is calculated by using user-defined settings.

Average active power = \[ \frac{\text{Integration power (WP)}}{\text{Elapsed time (H)}} \]

Simple Setting and Display of Efficiency

Two efficiency calculations can be set by selecting input elements or output elements from a list.

Example: \[ \eta_1 = \frac{\sum P}{P_1} \times 100\% \]
\[ \eta_2 = \frac{\sum P}{P_2} \times 100\% \]
Power Measurement for Renewable Energy

Photovoltaic power generation systems have been a focus of attention under the backdrop of the prevention of global warming. Thermal power generation and other forms of power based on the limited resources of oil and coal release environmentally harmful CO₂, the main cause of global warming. On the other hand, because photovoltaic power generation does not release CO₂, it is considered to be an important renewable energy resource for the future.

The WT500 is capable of evaluating voltage, current, and power conversion efficiency by measuring DC signals and AC signals generated by photovoltaic power, a renewable energy source.

Measurements of photovoltaic power consumption and power conversion efficiency

Industry is moving ahead with aggressive energy-savings and usage of renewable energy. Japan in particular has been actively developing equipment for photovoltaic power generation systems. The WT500 measures power consumption of “sold power”, which supplies photovoltaically generated power to interconnected systems, and “bought power” (purchases of electricity) and simultaneously displays data of bought/sold power, consumed/regenerated energy, and other data for energy-saving monitoring.

Large Current Measurements for Electrical Appliances

In recent years, the “all-electric lifestyle” of household electronics such as kitchen appliances and hot water heaters has grown in popularity, and there is increased demand for Induction Heating Cookers and other Electrical Appliances that are promoted as being safer than gas-operated stoves.

A large amount of current is applied and converted to heat in order to increase the output of IH cooking heaters. The WT500 can measure voltage, current, power, and total harmonic distortion (THD) by inputting the large current (up to 40 A) flowing to the IH cooking heater, without the need for a current sensor. Measurements can be taken faster, allowing for high speed acquisition of power data on manufacturing lines.

Evaluation and Testing of Home Electronics

Power consumption reduction measures have been adopted in consumer appliances such as air conditioners and washing machines due to implementation of Energy Star. Control methods are used in home electronics in which consumed current is precisely controlled to reduce power consumption.

The WT500 provides measurement of the fluctuating power consumption in these appliances.
Measuring Power Consumption of Various Motor Loads

Various industrial motor & pump and air-conditioning fans are used in factories and other such locations. The revolution speed of these motor & pump has to be controlled in order to save energy, therefore many inverter-driven motor & pump are used. The WT500 not only measures variation of voltage, current and power to evaluate performance of these motor & pump, but also enables you to examine energy efficiency by measuring integrated power.

Power Quality Evaluation and Testing of UPS (Uninterruptable Power Supplies)

Uninterruptible Power Supplies (UPS) are systems that provide stable supplies of power at all times even during power failures such as power outages, instantaneous power failures, voltage fluctuations, and frequency changes. As UPS performance tests, the WT500 can calculate input-to-output efficiency, power output, frequency, and distortion factor.

Note: The standard model can measure up to two frequencies.

SOFTWARE

WTViewerE 761941

WTViewerE is an application software that reads measured numerical, waveform, and harmonic data. Data can be transferred to a personal computer via GP-IB, Ethernet, or USB communications to display and store numeric or waveform data. A communications option can be installed in the WT500 as needed.

Communication Interface: USB, GP-IB (I/C1), Ethernet (I/C7)

LabVIEW Drivers

Data acquisition possible using LabVIEW. LabVIEW drivers can be downloaded from our Web site.

(Free)
GP-IB Communication (/C1)

GP-IB communication enables you to control the WT500 or transfer data from a PC.

Ethernet Communication (/C7)

Data can be transferred via Ethernet* communication. It enables file transfers using an FTP server.

*100BASE-TX

External Current Sensor Input (/EX1, /EX2, /EX3)

Current can be measured by using current clamps without disconnecting power supply wiring (voltage output type). By setting an external current sensor conversion ratio, it can support various types of current clamp-on probes.

VGA Output (/V1)

By connecting to a monitor, you can create large displays of numerical values and waveforms. This function is convenient for simultaneously confirming data on multiple monitors, or to check data remotely.

Harmonic Measurement (/G5)

This function enables simultaneous measurement of normal and harmonic data. Harmonic components of up to the 50th order can be measured. With the WT500 you can simultaneously confirm voltage, current, and the distortion factor (THD) as well as measure the distortion factor without switching modes.

Delta Computation

This function allows you to calculate individual phase voltages and phase currents from the line voltages and phase currents measured in a three-phase, three-wire system. The phase voltage can be calculated from the line voltage measured with the three-phase, three-wire (3V3A) method. This is useful when you want to determine the phase voltage in a DUT with no neutral line by using the three-phase, three-wire (3V3A) method.

Note: This function cannot be installed on products with only one element.

Added Frequency Measurement (/FQ)

In addition to the standard two channels of frequency measurement, an option is available for frequency measurement on all channels. This option provides frequency measurement of voltage and current on all channels with input elements 1 through 3 installed. This is necessary when you want to measure voltage and current frequency from the instrument’s I/O as well as voltage and current frequencies of multiple items under test at the same time.

Note: This function cannot be installed on products with only one input element.
ACCESSORIES

AC/DC Current Sensor

CT60/CT200/CT1000/CT2000A Current Sensors

- DC to 800 kHz/60 Apk, DC to 500 kHz/200 Apk,
- DC to 300 kHz/1000 Apk, DC to 40 kHz/2000 Arms
- Wide dynamic range: 0 to ±100 A (DC)/300 A peak (AC)
- Wide measurement frequency range: DC and up to 800 kHz
- High-precision fundamental accuracy: ±0.05% of reading ±20 μA
- ±15 V DC power supply, connector, and load resistor required.

For detailed information, see Current Sensors & Accessories Brochure Bulletin CT1000-00E.

Clamp on Probe

751552 Current Clamp on Probe AC 1000 Arms (1400 Apeak)

- Measurement frequency range: 30 Hz to 5 kHz
- Basic accuracy: ±0.3% of reading
- Maximum allowed input: AC 1000 Arms, max. 1400 Apeak (AC)
- Current output type: 1 mA/A

A separately sold fork terminal adapter set (758921), measurement leads (758917), etc., are required for connection to WT series. For detailed information, see Power Meter Accessory Brochure Bulletin CT1000-00E.

Adapters and Cables

758917 Measurement leads
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

758923 Large alligator adapters
For connection to measurement leads (758917). Two in a set.
Rating: 1000 V

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

758921*1 Safety terminal adapter set
Screw-fastened adapters. Two adapters in a set. 1.5 mm Allen wrench included for tightening.

758924 Conversion adapter
For conversion between male BNC and female banana plug.

366924/25*2 BNC cable (BNC-BNC 1 m/2 m)
For connection to simultaneously measurement with 2 units, or for input external trigger signal.

89284LK*3 External Sensor Cable
For connection the external input of the WT500 to current sensor. Length: 50 cm

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 Use with a low-voltage circuit (42 V or less)
*3 The coax cable is simply cut on the current sensor side. Preparation by the user is required.

Typical Voltage/Current Connections

Measurement using current sensor

Connection example

Unit whose current is to be measured
CT1000

Connector (B8200JQ)

Four load resistors (B8200JR) connected in parallel

DC power supply ±10 V, 1 A

Power meter’s current input terminals

751552

Measurement using clamp-on probe

Connection example

Unit whose current is to be measured

Power meter’s current direct input terminal

758917

Current measurement using direct input terminal

Connection example

Unit whose current is to be measured

Power meter’s current input terminal

758923

Measurement using voltage input terminal

Connection example

Unit whose voltage is to be measured

Power meter’s voltage input terminal

758921

*A burden resistor is required for the CT1000, CT200, and CT60.
### Comparison among WT series

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>WT500</th>
<th>WT3000E</th>
<th>WT3000E</th>
<th>WT3000E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic power accuracy (50/60 Hz)</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.05% of range</td>
<td>0.05% of reading + 0.05% of range</td>
<td>0.01% of reading + 0.02% of range</td>
</tr>
<tr>
<td>Measurement power bandwidth (input)</td>
<td>DC, 0.1 Hz to 100 kHz</td>
<td>DC, 0.1 Hz to 15 kHz</td>
<td>DC, 5 Hz to 1 MHz</td>
<td>DC, 0.1 Hz to 1 MHz</td>
</tr>
<tr>
<td>Input elements</td>
<td>1, 2, 3</td>
<td>1, 2, 3</td>
<td>1, 2, 3</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Voltage range (Crest factor = 2:1)</td>
<td>10/30/60/100/150/300/600/1000 [V]</td>
<td>10/30/60/100/150/300/600/1000 [V]</td>
<td>1/5/6/10/15/30/60/100 [V]</td>
<td>1/5/6/10/15/30/60/100 [V]</td>
</tr>
<tr>
<td>Current range (Crest factor = 2:1)</td>
<td>0.5/1/2/3/4/6/10/20/40 [A]</td>
<td>0.5/1/2/3/4/6/10/20/40 [A] (WT3000E)</td>
<td>0.5/1/2/3/4/6/10/20/40 [A] (WT3000E)</td>
<td>0.5/1/2/3/4/6/10/20/40 [A] (WT3000E)</td>
</tr>
<tr>
<td>Selectable from external sensor, direct input</td>
<td>5 mV/10 mV/20 mV/50 mV/100 mV/200 mV/500 mV/1V/2V/4V/10V/20V/40V/100V</td>
<td>Select from 10/20/50/100/200/500/1000 [V]</td>
<td>Select from 10/20/50/100/200/500/1000 [V]</td>
<td>Select from 10/20/50/100/200/500/1000 [V]</td>
</tr>
<tr>
<td>Guaranteed accuracy range for voltage, current, reactive power, apparent power</td>
<td>1% of reading + 0.1% of range</td>
<td>1% of reading + 0.1% of range</td>
<td>1% of reading + 0.1% of range</td>
<td>1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>Display</td>
<td>5.7-inch TFT color LCD</td>
<td>5.7-inch TFT color LCD</td>
<td>5.7-inch TFT color LCD</td>
<td>5.7-inch TFT color LCD</td>
</tr>
<tr>
<td>Display format</td>
<td>840 x 480 pixels</td>
<td>840 x 480 pixels</td>
<td>840 x 480 pixels</td>
<td>840 x 480 pixels</td>
</tr>
<tr>
<td>Display text</td>
<td>Numeric (4 Values)</td>
<td>Numeric (4 Values)</td>
<td>Numeric (4 Values)</td>
<td>Numeric (4 Values)</td>
</tr>
<tr>
<td>Sampling frequency</td>
<td>Approximately 100 kS/s</td>
<td>Approximately 100 kS/s</td>
<td>Approximately 100 kS/s</td>
<td>Approximately 100 kS/s</td>
</tr>
<tr>
<td>Data updating interval</td>
<td>Max. 50 samples (WT310E)</td>
<td>Max. 400 samples (WT330E)</td>
<td>Max. 3000 samples (WT333E)</td>
<td>Approximately 32 MB</td>
</tr>
<tr>
<td>Measurement power bandwidth (DC/AC)</td>
<td>0.1% of reading + 0.02% of range</td>
<td>0.1% of reading + 0.02% of range</td>
<td>0.1% of reading + 0.02% of range</td>
<td>0.1% of reading + 0.02% of range</td>
</tr>
<tr>
<td>Guaranteed accuracy range for frequency</td>
<td>1% of reading + 0.1% of range</td>
<td>1% of reading + 0.1% of range</td>
<td>1% of reading + 0.1% of range</td>
<td>1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>Measurement frequency</td>
<td>50 m/100 m/200 m/300 m/600 m/1/2/5/10 [V]</td>
<td>50 m/100 m/200 m/300 m/600 m/1/2/5/10 [V]</td>
<td>50 m/100 m/200 m/300 m/600 m/1/2/5/10 [V]</td>
<td>50 m/100 m/200 m/300 m/600 m/1/2/5/10 [V]</td>
</tr>
<tr>
<td>Measurement parameters</td>
<td>Voltage, current, active power, reactive power, apparent power, power factor, phase angle, peak voltage, peak current, crest factor</td>
<td>Voltage, current, active power, reactive power, apparent power, power factor, phase angle, peak voltage, peak current, crest factor</td>
<td>Voltage, current, active power, reactive power, apparent power, power factor, phase angle, peak voltage, peak current, crest factor</td>
<td>Voltage, current, active power, reactive power, apparent power, power factor, phase angle, peak voltage, peak current, crest factor</td>
</tr>
<tr>
<td>Measurement features</td>
<td>Numerical (4 Values), waveforms, trends, bar graphs, vectors</td>
<td>Numerical (4 Values), waveforms, trends, bar graphs, vectors</td>
<td>Numerical (4 Values), waveforms, trends, bar graphs, vectors</td>
<td>Numerical (4 Values), waveforms, trends, bar graphs, vectors</td>
</tr>
<tr>
<td>Display format</td>
<td>5.7-inch TFT color LCD</td>
<td>5.7-inch TFT color LCD</td>
<td>5.7-inch TFT color LCD</td>
<td>5.7-inch TFT color LCD</td>
</tr>
<tr>
<td>Display text</td>
<td>840 x 480 pixels</td>
<td>840 x 480 pixels</td>
<td>840 x 480 pixels</td>
<td>840 x 480 pixels</td>
</tr>
<tr>
<td>Display format</td>
<td>Numeric (4 Values)</td>
<td>Numeric (4 Values)</td>
<td>Numeric (4 Values)</td>
<td>Numeric (4 Values)</td>
</tr>
<tr>
<td>Display format</td>
<td>Sampling frequency</td>
<td>Approximately 100 kS/s</td>
<td>Approximately 100 kS/s</td>
<td>Approximately 100 kS/s</td>
</tr>
<tr>
<td>Display format</td>
<td>Data updating interval</td>
<td>Max. 50 samples (WT310E)</td>
<td>Max. 400 samples (WT330E)</td>
<td>Max. 3000 samples (WT333E)</td>
</tr>
<tr>
<td>Display format</td>
<td>Storage (internal memory for storing data)</td>
<td>Approximately 20 MB (internal memory)</td>
<td>Max. 3000 samples (WT310E/WT330E)</td>
<td>Max. 4000 samples (WT333E)</td>
</tr>
<tr>
<td>Display format</td>
<td>Other features</td>
<td>Built-in printer (front side)</td>
<td>Built-in printer (front side)</td>
<td>Built-in printer (front side)</td>
</tr>
</tbody>
</table>

There are limitations on some specifications and functions. See the individual product brochure for details.

### Example of basic characteristics showing the WT500’s high precision

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>WT500</th>
<th>WT3000E</th>
<th>WT3000E</th>
<th>WT3000E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example of frequency vs. power accuracy characteristic (power specification for cosØ = 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Example of frequency vs. power accuracy characteristic (power specification for cosØ = 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total power error with rated range input for an arbitrary power factor (50/60 Hz)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effect of common mode voltage on reading value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8
### WT500 Specifications

#### Inputs

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item terminal type</td>
<td>Voltage: Plug-in terminal (safety terminal)</td>
</tr>
<tr>
<td></td>
<td>Current: Direct input – Large binding post</td>
</tr>
<tr>
<td></td>
<td>External sensor input – Insulated BNC connector</td>
</tr>
<tr>
<td>Input type</td>
<td>Voltage input, floating, non-potential method</td>
</tr>
<tr>
<td></td>
<td>Current: Floating input, short input method</td>
</tr>
</tbody>
</table>

#### Measurement

**Range**

- 15 V, 30 V, 60 V, 100 V, 150 V, 200 V, 300 V, 600 V, 1000 V (for crest factor 3)
- 7.5 V, 15 V, 30 V, 75 V, 150 V, 300 V, 500 V (for crest factor 6)

**Current**

- **Direct input**
  - 500 mA, 1 A, 2 A, 5 A, 10 A, 20 A, 40 A (for crest factor 3)
  - 250 mA, 500 mA, 1 A, 2.5 A, 5 A, 10 A, 20 A (for crest factor 6)
- **External sensor input**
  - 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2.5 V, 5 V (for crest factor 3)
  - 25 mV, 50 mV, 100 mV, 250 mV, 500 mV, 1 V, 2.5 V, 5 V (for crest factor 6)

#### Instrument test (input impedance)

**Voltage**

- Approximately 2 MΩ, 13 PΩ

**Current**

- Peak input: Approximately 5 mΩ ± approximately 0.1 µH
- External sensor input: Approximately 100 kΩ

**Instantaneous maximum allowable input**

- Voltage peak of 2.8 kV or RMS of 2 kV, whichever is lower
- Current peak: Peak current of 450 A or RMS of 300 A, whichever is lower

**Instantaneous maximum allowable input (1 second or less)**

- Voltage peak of 2 kV or RMS of 1.5 kV, whichever is lower
- Current peak: Peak current of 150 A or RMS of 45 A, whichever is lower

**Continuous maximum allowed input**

- Voltage peak of 1.5 kV or RMS of 1 kV, whichever is lower
- Current peak: Peak current of 100 A or RMS of 40 A, whichever is lower

**Continuous maximum common mode voltage**

- Voltage input terminals: 1000 Vrms
- Current input terminals (with I/EX option): 1000 Vrms (Maximum allowable voltage that can be measured)
- 600 Vrms (Rated voltage of EN61010-2-030 standard)
- Current input terminals (without I/EX option): 1000 Vrms

**Important Safety Note:** Do not touch the inside of the BNC connector of the External Current Sensor input for safety reasons.

**Rated voltage to ground**

- Voltage input terminals: 1000 V
- Current input terminals (with I/EX option): 1000 V
- Maximum allowable voltage that can be measured
- 600 Vrms (Rated voltage of EN61010-2-030 standard)
- Current input terminals (without I/EX option): 1000 Vrms

**External current sensor input connector:**

- 600 V

**Input waveform resolution**

<table>
<thead>
<tr>
<th>Measurement function</th>
<th>Single-phase</th>
<th>3-phase 3-wire</th>
<th>3-phase 4-wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage U1</td>
<td>0.1% of reading</td>
<td>±1% of range</td>
<td>±3% of range</td>
</tr>
<tr>
<td>Current</td>
<td>0.2% of range</td>
<td>±1% of range</td>
<td>±1% of range</td>
</tr>
<tr>
<td>Power</td>
<td>0.3% of range</td>
<td>±1% of range</td>
<td>±1% of range</td>
</tr>
<tr>
<td>Reactive Power</td>
<td>±2% of range</td>
<td>±2% of range</td>
<td>±2% of range</td>
</tr>
<tr>
<td>Apparent Power</td>
<td>±2% of range</td>
<td>±2% of range</td>
<td>±2% of range</td>
</tr>
<tr>
<td>Active Power</td>
<td>±2% of range</td>
<td>±2% of range</td>
<td>±2% of range</td>
</tr>
<tr>
<td>Frequency</td>
<td>±0.05% of range</td>
<td>±0.05% of range</td>
<td>±0.05% of range</td>
</tr>
<tr>
<td>Time</td>
<td>±3% of range</td>
<td>±3% of range</td>
<td>±3% of range</td>
</tr>
</tbody>
</table>

**Note 1:** The instrument's apparent power (S), reactive power (Q), and power factor (P) are calculated using measured values of voltage, current, and active power. (However, reactive power is calculated directly from sampled data when WPTYPE is selected.) Therefore, when deadband waveforms are input, these values may be different from those of other measuring instruments based on different measuring principles.

**Note 2:** The value of Q for each phase in the Q3 calculation is calculated with a preceding minus sign (-) when the current input leads the voltage input, and a plus sign when the voltage input lags the voltage input, so Q2 may be negative.

#### Calculation Functions

**Type 2 (WT500)**

- Measurement function: Integrated Power
- Calculation: $P = \frac{1}{T} \int_{0}^{T} u(t) i(t) dt$
- where $u(t)$ is the voltage and $i(t)$ is the current

**Type 3 (WT500)**

- Measurement function: Integrated Reactive Power
- Calculation: $Q = \frac{1}{T} \int_{0}^{T} u(t) \sin(\theta(t)) i(t) dt$
- where $\theta(t)$ is the phase angle between $u(t)$ and $i(t)$

**Note 3:** The value is not calculated when Data update interval is set to Auto.

#### Display

- **Display:** 5.7-inch color TFT LCD monitor
- **Total number of pixels:** 640 (horizontal) × 480 (vertical) dots
- **Waveform display resolution:** 501 dots × 432 dots

**Note 4:** Up to 0.02% of the pixels on the LCD may be defective.
### WT500 SPECIFICATION

<table>
<thead>
<tr>
<th>Voltage/current</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement period</td>
<td>Crest factor</td>
</tr>
<tr>
<td>Accuracy of phase</td>
<td>reactive power Q</td>
</tr>
<tr>
<td>Accuracy of apparent limit frequency</td>
<td>Min. display</td>
</tr>
<tr>
<td>Temperature coefficient</td>
<td>Max. display</td>
</tr>
<tr>
<td>Inrush/current filter</td>
<td></td>
</tr>
<tr>
<td>Influence of line filter</td>
<td>Effective input range</td>
</tr>
<tr>
<td>Crest factor</td>
<td>Accuracy of power S</td>
</tr>
<tr>
<td>Accuracy of apparent power S</td>
<td>Accuracy of reactive power Q</td>
</tr>
<tr>
<td>Accuracy of reactive power Q</td>
<td>Accuracy of phase difference Ω</td>
</tr>
<tr>
<td>One-year accuracy</td>
<td>Add the accuracy of reading error (month)</td>
</tr>
</tbody>
</table>

### Functions

- **Measurement method**: Digital multiplication method
- **Crest factor**: 3 or 6 (when inputting rated values of the measurement range), and 300 relative to the minimum valid input.
- **Measurement period**: Interval for determining the measurement function and performing calculations. Period used to determine and compute the measurement function.
  - The measurement period is set by the zero crossing of the reference signal (synchronization source) (excluding watt hour WP as well as ampere hour Q during DC mode).
  - For harmonic measurement (MSG option), the measurement period is from the beginning of the data update interval to 1024 points at the harmonic sampling frequency.
- **Wiring**: You can select one of the following five wiring settings. 1P2W (single phase, two-wire), 1P3W (single phase, three-wire), 3P3W (3 phase, 3 wire), 3P4W (3 phase, 4 wire), 3P3W (3V3A) (3 phase, 3 wire, 3 volt/amp measurement). However, the number of available wiring settings varies depending on the number of installed input elements. Up to four, or only one, two, or three wiring settings may be available.
- **Scaling**: When inputting output from external current sensors, Vr, or CT, set the current sensor conversion ratio, VT ratio, CT ratio, and power coefficient in the range from 0.0001 to 9999.9999.

### Input filter

- **Averaging**: Linear MEAN frequency filter settings can be entered.
  - The average calculations below are performed on the normal measurement parameters of voltage U, current I, power P, apparent power S, reactive power Q, Power factor λ, and phase angle Ω are determined by calculating the average of P and S. Select exponential or moving averaging.
  - **Exponential average**: Select an exponential constant of 2, 4, 8, 16, 32, or 64.
  - **Moving average**: Select the number of averages from 8, 16, 32, or 64.
  - The average calculations below are performed on the harmonic displays of voltage U, current I, power P, apparent power S, reactive power Q. Power factor λ is determined by calculating the average of P and Q. Only exponential averaging is performed. Select an attenuation constant of 2, 4, 8, 16, 32, or 64.

### Data update rate

- **Response time**: When using inputting from external current sensors, Vr, or CT, set the current sensor conversion ratio, VT ratio, CT ratio, and power coefficient in the range from 0.0001 to 9999.9999.

### WT500 SPECIFICATION

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<thead>
<tr>
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<th>Power</th>
</tr>
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- **Response time**: When using inputting from external current sensors, Vr, or CT, set the current sensor conversion ratio, VT ratio, CT ratio, and power coefficient in the range from 0.0001 to 9999.9999.
### WT500 SPECIFICATION

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<table>
<thead>
<tr>
<th>Data Update Rate</th>
<th>Measuring Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 ms</td>
<td>25 Hz &lt; f &lt; 100 kHz</td>
</tr>
<tr>
<td>200 ms</td>
<td>12.5 Hz &lt; f &lt; 100 kHz</td>
</tr>
<tr>
<td>500 ms</td>
<td>6.25 Hz &lt; f &lt; 100 kHz</td>
</tr>
<tr>
<td>1 s</td>
<td>2.5 Hz &lt; f &lt; 100 kHz</td>
</tr>
<tr>
<td>2 s</td>
<td>1.5 Hz &lt; f &lt; 50 kHz</td>
</tr>
<tr>
<td>5 s</td>
<td>0.5 Hz &lt; f &lt; 20 kHz</td>
</tr>
</tbody>
</table>

#### Delta Calculation Function (I/T Optional)

<table>
<thead>
<tr>
<th>Item</th>
<th>Data Calculation Setting</th>
<th>Symbols and Meanings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>difference</td>
<td>U2(U1, U2) - U2/U1</td>
</tr>
<tr>
<td></td>
<td>DELTA−STAR</td>
<td>U1, U2, U3</td>
</tr>
<tr>
<td></td>
<td>STAR−DELTA</td>
<td>U2, U1, U3</td>
</tr>
<tr>
<td>Current</td>
<td>difference</td>
<td>F(10−3)A</td>
</tr>
<tr>
<td></td>
<td>DELTA−STAR</td>
<td>U1, U2, U3</td>
</tr>
<tr>
<td></td>
<td>STAR−DELTA</td>
<td>U2, U1, U3</td>
</tr>
</tbody>
</table>

#### RGB Video Signal (VGA) Output Section (V1 Optional)

**Connector type:** 15-pin D-Sub (receptacle)  
**Output format:** VGA compatible

#### Harmonic Measurement Function (G5 Optional)

**Measurand source:** All installed Elements  
**Method:** Pll-synchronization  
**Frequency range:** PLL source of the fundamental frequency is in the range 10 Hz to 1.2 kHz.  
**PLL source:** Select voltage, current, or external clock for each input element.  
**Data length for FFT:** 512 bits  
**Window function:** Hanning

**Anti-aliasing filter**  
*Not using a line filter (5.5 kHz or OFF)*

**Sample rate:** (sampling frequency), window width, and upper limit of analyzed orders for PLL-synchronization.  
**During Harmonic Display**

#### Calculations

**Accuracy** (reading error + measurement range error)  
*For crest factor 3*  
1. **When Line Filter is ON (5.5 kHz)**  
2. **When Line Filter is OFF**

**Power Supply**

- **3V3A**  
- **STAR**  
- **DELTA**  
- **3P3W**

#### Ethernet Communications (I/C7 Optional)

**Number of communication ports:** 1  
**Connector type:** RJ-45 connector  
**Electrical and mechanical specifications:** Conforms to IEEE 802.3.  
**Transmission system:** Full Duplex / Half Duplex  
**Transmission rate:** Max. 100 Mbps  
**Protocol:** TCP/IP  
**Supported Services:** FTP server, DNS, Remote control (VXI-11)

#### USB port (PC)

**Connector type:** Type B connector (receptacle)  
**Electrical and mechanical specifications:** Conforms to USB Rev. 1.1  
**Speed:** Max. 12 Mbps  
**Number of Ports:** 4  
**Supported services:** Remote control (USB-TMC)

**Supported Systems:** Models with standard USB ports that run Windows 2000, Windows XP, or Windows Vista with USB port as a standard.

#### Power Supply

- **Stabilized Power**

#### USB port (Peripheral)

**Connector type:** Type A connector (receptacle)  
**Electrical and mechanical specifications:** Conforms to USB Rev. 2.0  
**Speed:** Max. 480 Mbps  
**Number of Ports:** 2  
**Supported keyboards:** 104 keyboard (US) and 109 keyboard (Japanese) conforming to USB HID Class Ver. 1.1 devices

**Supported Usb memory devices:** Usb (Usb Mass Storage Class) flash memory

**Power supply:**  
*5 V, 600 mA (per port)*  
*However, devices whose maximum current consumption exceeds 100 mA cannot be connected simultaneously to the two ports.*

#### Master/Slave Synchronization Signal Input/External Clock Input (Select)

**Connector type:** BNC connector  
**Conforms to protocol:** IEEE 488-1978 (JIS C 1901-1987).

**Function template:** SH1, AH1, TL, LI, RLI, P90, D11, DT1, and C0.

**Conforms to protocol:** IEEE 488-2.1992.

**Model:** ISO (ASCII)

**Adaptable model:**

- **Address:** 0 to 31
- **Clear remote mode:** Remote mode can be cleared using the LOCAL key (except during Local Lockout).

#### GP-IB Interface (I/C1 optional)

**Card driver:** Use one of the following by NATIONAL INSTRUMENTS:  
- AT-GPIB  
- PCI-GPIB, PCI-GPIB+, and PCII-GPIB  
- PCMCIA-GPIB and PCMCIA-GPIB+  
- Use driver Ni-488.2.5 version 1.60 or later.

**Conforms electrically and mechanically:**

- ISO (ASCII)

**Function template:** SH1, AH1, TL, LI, RLI, P90, D11, DT1, and C0.

**Conforms to protocol:** IEEE 488-2.1992.

**Model:** ISO (ASCII)

**Adaptable model:**

- **Address:** 0 to 31
- **Clear remote mode:** Remote mode can be cleared using the LOCAL key (except during Local Lockout).

#### General Specifications

**Warm-up time:** Approximately thirty minutes.

**Operating temperature:** 5 to 40°C

**Operating humidity:** 20% to 80% (when printer not used)  
*No condensation may be present*

**Operating altitude:** 0 to 2000 m

**Operating area:** Inside of room

**Storage environment:** -25 to 60°C (no condensation may be present)

**Storage humidity:** 20 to 80% RH (no condensation)

**Rated supply voltage:** 100 to 240 VAC

**Allowed supply voltage fluctuation:** 90 to 264 VAC

**Rated supply frequency:** 50 or 60 Hz

**Allowed supply frequency fluctuation:** 48 to 63 Hz

**Maximum power consumption:** 80 VA (when using built-in printer)

**Weight:** Approximately 6.9 kg (including main unit, 3 input elements, and options)

---

**Note:** All the items below apply to all tables.

- When the crest factor is set to 3
- When the power factor is 1
- Power figures that exceed 440 Hz are reference values.
- For m-order component input, add (n+1)-order of the n-th order reading to the n-m order and order of m-th order of the voltage and current.
- For the n-th order and power, add (n+1)-order of the n-th order reading.
- Add (m/20)% of reading to the n-th component of the voltage and current, and add (m/25)% of reading to the n-th component of the power.
- **Accuracy when the crest factor is 6:** The same as when the range is doubled for crest factor 3.
- **The accuracy guaranteed range by power and voltage/current is the same as the guaranteed range of normal measurement. If the amplitude of the high frequency component is large, influence of approximately 1% may appear in certain orders. The influence depends on the size of the frequency component. Therefore, if the frequency component is small with respect to the range rating, this does not cause a problem.**

---

**Additional Notes:**

**Sampling Frequency Voltage Current Power**

- **10 Hz to 4.5 Hz**
  - 0.1% of reading
  - 0.1% of current
  - 0.1% of reading
- **45 Hz to 144 Hz**
  - 0.7% of reading
  - 0.7% of current
  - 0.7% of reading
- **440 Hz to 1.1 kHz**
  - 1.2% of reading
  - 1.2% of current
  - 1.2% of reading
- **1 kHz to 2.5 kHz**
  - 5% of reading
  - 5% of current
  - 5% of reading

**When Line Filter is OFF**

- **10 Hz to 4.5 Hz**
  - 0.15% of reading
  - 0.15% of current
  - 0.15% of reading
- **45 Hz to 144 Hz**
  - 0.35% of reading
  - 0.35% of current
  - 0.35% of reading
- **440 Hz to 1.1 kHz**
  - 0.4% of reading
  - 0.4% of current
  - 0.4% of reading
- **1 kHz to 2.5 kHz**
  - 0.8% of reading
  - 0.8% of current
  - 0.8% of reading
- **2.5 kHz to 5 kHz**
  - 3% of reading
  - 3% of current
  - 3% of reading
Model and Suffix Codes

Power Analyzer WT500

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Codes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>750201</td>
<td></td>
<td>WT500 1 input element model</td>
</tr>
<tr>
<td>750202</td>
<td></td>
<td>WT500 2 input element model</td>
</tr>
<tr>
<td>750303</td>
<td></td>
<td>WT500 3 input element model</td>
</tr>
</tbody>
</table>

Power cord
- D: UL/CSA standard
- E: VDE standard
- R: IEC standard
- S: BS standard
- T: VDE standard

Options
- CT: GP-80 interface
- EX1: External sensor input for 750201
- EX2: External sensor input for 750202
- EX3: External sensor input for 750303
- LG: Harmonic Measurement
- DST: Delta compensation (750202/03 only)
- IPQ: Ask-on Frequency Measurement (750202/03 only)
- PT1: PT1 Output

Standard accessories
- Power cord, Rubber feet, current input protective cover, User’s manual, Communication interface user’s manual (CD-ROM), Safety terminal adaptor 758931 (provided two adapters in a sets time input current number)

Note: Adding input modules after initial product delivery will require rework at the factory. Please choose your models and configurations carefully, and inquire with your sales representative if you have any questions.

AC/DC Current sensor /Clamp on Probe

Model: CT1000
- AC/DC Current sensor
  - DC to 40 kHz, ±(0.05% of reading + 30 µA), 2000 Arms
  - DC to 300 kHz, ±(0.05% of reading + 30 µA), 1000 Arms

Model: CT60
- AC/DC Current sensor
  - DC to 600 kHz, ±(0.05% of reading + 30 µA), 60 Arms

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

Yokogawa’s Approach to Preserving the Global Environment
- Yokogawa’s electrical products are developed and produced in facilities that have received ISO14001 approval.
- In order to protect the global environment, Yokogawa’s electrical products are designed in accordance with Yokogawa’s Environmentally Friendly Product Design Guidelines and Product Design Assessment Criteria.

This is a Class A instrument based on Emission standards EN61326-1 and EN55011 and is designed for an industrial environment. Operation of this equipment in a residential area may cause radio interference, in which case users will be responsible for any interference which they cause.

AC/DC Current sensor

Model: CT1000
- AC/DC Current sensor
  - DC to 40 kHz, ±(0.05% of reading + 30 µA), 2000 Arms
  - DC to 300 kHz, ±(0.05% of reading + 30 µA), 1000 Arms

Model: CT60
- AC/DC Current sensor
  - DC to 600 kHz, ±(0.05% of reading + 30 µA), 60 Arms

Suffix Codes Description
- D: light blue for external current sensor input is sold separately. Safety terminal adapter 758931 is included with the WT500. Other cables and adapters must be purchased by the user.

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).

Exterior

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Yokogawa Electric KOREA CO., LTD.
Yokogawa Engineering Asia PTE. LTD.
Yokogawa India Ltd.
Yokogawa Electric CIS Ltd.
Yokogawa America Do Sul Ltda.
Yokogawa MIDDLE EAST & AFRICA B.S.C.

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