Highest accuracy & precision

WT3000E Series
Precision Power Analyzers

±0.04%

±0.06%

±0.15%

±0.20%
Devices such as solar inverters are already working at overall efficiencies of 90 to 96%. To increase the efficiency, even by few decimal points, is a challenging and important goal for the manufacturers. As the world’s most accurate power analyzer, the WT3000E provides the necessary levels of precision to truly confirm the smallest improvements in efficiency.

R&D engineers in industries and application areas such as motors & drives, semiconductors, lighting and domestic appliances now have an enhanced tool to measure power with higher levels of accuracy and stability.

The WT3000E is not only the benchmark for energy efficiency measurement but also a reference for calibrating power measuring instruments in standards laboratories.

The WT3000E has a robust architecture offering unbeatable performance following the footsteps of its predecessor. The focus on sustainable and renewable energy has raised the importance and need for manufacturers to comply to IEC standards during their product development.

The WT3000E provides the flexibility to mix 30A and 2A input current elements. This enables users to test the compliance of their products to the harmonics, flicker and standby power standards in a single instrument.

The WT3000E delivers

**Accuracy** – The WT3000E is the world’s most trusted power analyzer thanks to its unmatched power accuracy.

**Reliability** – With proven high stability, the WT3000E not only provides the best power measurement accuracy but also the ability to repeat these results time and time again.

**Expertise** – The WT3000E represents 100 years of precision making and Innovation. With the widest variety of quality power measurement solutions, users can be confident that Yokogawa always provides the right solution for their needs.
Features and benefits

World’s highest accuracy
Inverters are already working at very high efficiencies. It is a challenge for manufacturers to further increase the efficiency even by few decimal points (0.1%). To validate small improvements in efficiency, R&D teams need a new level of accuracy & precision in certified power measurement. WT3000E is the world’s most accurate power analyzer with the world’s highest accuracy 0.01% (reading). Along with high accuracy it provides a broad bandwidth from 0.1 Hz to 1 MHz with an improved accuracy from 0.1 Hz to 30 Hz.

Precision compensation functions
The function in the WT3000E compensates for the loss caused by the wiring of each element. The WT3000E provides the following three types of correction functions to measure power and efficiency:

* Wiring Compensation
* Efficiency Compensation
* Compensation for the Two-Wattmeter Method

These compensation functions enable the WT3000E to measure power accurately and precisely.

Cycle by cycle trend analysis
This analysis function enables users to list the measurement parameters such as voltage, current, and active power for each cycle. Input frequencies from 0.1 Hz to 1000 Hz can be measured and up to 3000 data can be saved in .CSV format. Also by using Yokogawa’s PC application software users can graphically display the data by cycle. Additionally by using Yokogawa’s PC application software, users can graphically display the data per cycle.

Fast data update
The WT3000E has a maximum data update rate of 50 ms. The high speed allows users to capture fast changing transient signals with high precision. Once captured, analysis can be performed on the available data. The WT3000E switches between two different calculation algorithms depending on the data updating interval.

Three phase delta calculation
The delta calculation function in the WT3000E allows users to calculate individual phase voltages from the line voltages measured in a three-phase, three-wire (3V3A) system. The R-S line-to-line voltage can be calculated in systems measured from a three-phase, three-wire method (using two input elements). This function becomes very important when users want to determine the phase voltage in applications such as motor testing where there are no neutral lines.

WT3000E should be equipped with at least two input elements with the same current input.

For U–I Wiring
Compensated instantaneous voltage: $u'(n) = u(n) – Ri(n)$
The instantaneous current is $i(n)$.

For I–U Wiring
Compensated instantaneous current: $i'(n) = i(n) – u(n)/Ru$
The instantaneous voltage is $u(n)$.

Measurement data display

Delta calculation display

Image of Delta calculation
Advanced capabilities

Motor evaluation function (/MTR option)
Analog or pulse signals from a rotating sensor and torque meter can be input into the WT3000E using this option. This enables users to calculate the torque, revolution speed, mechanical power, synchronous speed, slip, motor efficiency, and total efficiency in a single unit. This is a powerful tool used in motor/inverter evaluation functions for total efficiency measurement.

FFT (Fast Fourier Transform)
The WT3000E can analyze and display a waveform’s individual frequency components. It can also check signal components other than the integer multiples of the fundamental wave.

Save raw waveform sample data
WT3000E can save sampling raw data of input waveforms, waveform computations, and FFT computations. The saved data can be accessed for any kind of computation by PC software.

Easy PC application software
This application software is a free tool which is used to read numeric, waveform, and harmonic data from the WT3000E Precision Power Analyzer through a communications interface such as GP-IB, Serial (RS-232, /C2), USB(/C12), or Ethernet (/C7).

Numeric data
The voltage, current, power and various other measured parameters can be simultaneously displayed for one to four elements and ΣA and ΣB calculations.

Harmonics measurement
The software can numerically or graphically display the results of measured harmonics up to the 100th order for parameters such as voltage, current, power and phase angle. (Requires the /G6 option in the WT3000E)

Waveform
Voltage and current waveforms can be monitored using the software and be used to confirm such things as phase differences between the voltage and current, and waveform distortion.

Viewing trends
The software can be used to capture and view various data measured using the WT3000E, on the PC in a graphical trend format. This feature enables the users to monitor power supply voltage fluctuations, changes in current consumption and other time-based variations.

Advanced waveform analysis (/G6 option)

Harmonic measurement in normal measurement mode
The WT3000E enables users to measure harmonic data while operating in the normal measurement mode. This is invaluable when both power and harmonic data need to be measured simultaneously.

Wide bandwidth harmonic measurement
The function is useful for ascertaining the distortion factor and harmonic components in measurements of fundamental frequencies from 0.1 Hz to 2.6 kHz. It therefore enables wide bandwidth measurement of signals such as power supplies and the acceleration of motors.

Input signal and FFT data

WTViewerEfree
The WT3000E in detail

Standard features

1. Voltage input terminals
2. External current sensor input terminals
3. Current input terminals
4. GP-IB port
5. BNC connector for two-system synchronized measurement

Optional features

6. Serial (RS-232) port (option/C2) or USB port (PC) (option/C12)
7. Ethernet port (100BASE-TX/10BASE-T) (option/C7)
8. VGA port (option/V1)
9. D/A output (option/DA)
10. Torque and speed input terminals (Motor Evaluation Option)
Two types of input elements

Performance of WT3000E

Basic Power Accuracy: ±(0.01% of reading + 0.03% of range)*1
Measurement Bandwidth: DC, 0.1 Hz to 1 MHz
Low Power Factor Error: Power factor influence when cosø=0
0.03% of S
Ø is phase angle between voltage and current

Current Range
* Direct Input: 0.5/1/2/5/10/20/30 A*2
5/10/20/50/100/200/500 mA, 1/2 A*2
(30 A and 2 A input element can be installed together)
* External Input: 50/100/200/500 mV, 1/2/5/10 V*2
Voltage Range: 15/30/60/100/150/300/600/1000 V*2
Data Update rate: 50 ms to 20 sec
Effective input range: 1% to 130%
*1 Please refer to “specifications” in detail
*2 Voltage range and current range are for crest factor 3

Example of basic characteristics showing the WT3000E’s high precision and excellent stability

Both 2 A and 30 A input elements can be installed in a single unit. This enables engineers to use a single WT3000E for multiple applications such as standby power measurement and the evaluation of various operating modes of the device under test.
Applications

Accurate inverter/motor evaluation

Measuring efficiency with high precision:

Simultaneous input and output measurement
The WT3000E can perform measurements on up to 4 power input elements in a single unit. This enables users to simultaneously measure single-phase input/three-phase output, or three-phase input/three-phase output.

Accurate measurement of fundamental PWM voltage
Motor drive technology has become more complex in recent years, pure sine-wave PWM is less common, and cases in which the mean voltage differs greatly from the fundamental voltage waveform are more frequent. With the harmonic measurement option in the WT3000E, accurate measurements of commonly measured values such as active power and the fundamental or harmonic components can be taken simultaneously without changing the measurement mode. High frequency bandwidth is very important in order to measure PWM voltage and its active power correctly. With a broadband capability from DC to 1MHz, the WT3000E enables users to capture distorted waveforms accurately.

Phase voltage measurement without a neutral line (Delta calculation)
With the delta computation function, the device under test without a neutral line can be measured in a three-phase three-wire (3V3A) configuration, which enables each phase voltage to be calculated.

High frequency and harmonic measurements (/G6 option)
The fundamental frequencies of motors have become higher. The WT3000E allows harmonic measurements of signals with fundamental frequencies as high as 2.6 kHz.

Evaluation of torque speed characteristics (/MTR option, cycle by cycle measurement)
Torque speed can be evaluated based on the torque and revolution speed data measured with the motor evaluation function. Also, the WT3000E enables users to verify the cycle-by-cycle voltage, current, and power fluctuations that occur during the start of a motor.

Power conversion technologies similar to those used in Electric Vehicles (EVs) and power conditioners
High-precision, simultaneous measurements are required in measuring conversion efficiency of a converter while it converts three-phase input to a DC bus, and from an inverter’s DC bus to three-phase output. For measurements exceeding 30 A input, 2 A input elements can be used along with an AC/DC current sensor. When measuring three-phase input/three-phase output with a three-phase four-wire system, the input and output can be measured simultaneously by synchronizing two WT3000E units.
Harmonic and Voltage Fluctuation/ Flicker Measurement

**Harmonic measurement (/G6 option)**

The Harmonic Analysis Software (Model 761922) loads data measured by the WT3000E and performs harmonic analysis that complies with the latest IEC61000-3-2 & IEC61000-3-12 standards. The harmonic measurement software also performs harmonic measurement tests conforming to the latest IEC 61000-4-7 (window width is 10 cycles of 50 Hz and 12 cycles of 60 Hz) with WT3000E.

Communications: GP-IB, Ethernet (/C7)

**Harmonic current measurement value list and bar graph**

Enables PASS/FAIL evaluations of harmonic measurement results in line with standard class divisions (A, B, C, D). It displays lists of measurement values, as well as bar graphs that allows users to compare the measured value and standard limit value for each harmonic component.

**Measurement mode**

Three modes are available for harmonic measurement.

- **Harmonic observation:**
  To view current, voltage, and phase angle for each order in a bar graph.

- **Waveform observation:**
  To view measured signals to confirm the suitability of the range and other factors.

- **Harmonic measurement (standards testing):**
  To conduct standards tests and to make the necessary judgments.

Efficiency is gained by performing tests after checking the waveform in Observation mode.

**Flicker measurement (/FL option)**

This function enables voltage fluctuation and flicker measurements in compliance with the latest IEC61600-3-3 & IEC61000-3-11 standards to be carried out.

*The WT3000E enables user to perform tests for flicker measurement. Also by using the 761922 harmonic/flicker measurement software, it is possible to display trend graphs, Cumulative probability (CPF) graphs, or reports of the dc, dmax, and instantaneous flicker sensation (IFS) values in addition to the WT3000E evaluation results.*

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**Diagram:**

A diagram showing the connections between AC Power Supply, Reference Impedance Network, WT300E, and GP-IB or Ethernet. The Recommended model is WT3001E-2AO-30A1-x/G6/FL.
AC Magnetic material characteristics Testing

The WT3000E can be used to evaluate magnetic materials. Energy loss due to hysteresis characteristics or over currents occurring in iron cores is called core loss or iron loss. Measurements of iron loss using an Epstein device can be taken as-is because power calculated from secondary coil voltage and primary coil current does not include copper loss. The WT3000E can measure it accurately when a drive frequency of the power supply is much higher than commercial frequency. Also, if you input frequency, cross-sectional area, and other parameters, you can calculate the magnetic flux density B and AC magnetic field H using user-defined functions and display the results on screen of the WT3000E.

Core loss = Power value (W) \times \frac{N_1}{N_2}

Measurement items are specified using the user-defined function as follows:

Magnetic Flux Density (B) = \frac{4.44 \times \text{Current frequency} \times N_2 (\text{secondary number of turns}) \times \text{Cross section}}{\text{Voltage (Vmean)}}

Alternating Magnetic Field (H) = \frac{N_1 (\text{primary number of turns}) \times \text{primary coil peak current (Apeak)}}{\text{Effective magnetic path length}}

User-defined function expression setting screen

Up to twenty calculated results (from F1 to F20) can be displayed.

Power calibration

Reference equipment for power calibration

basic power accuracy of 0.01% of reading

The WT3000E can be used as a reference standard for periodic in-house calibration of general-purpose power measurement instruments, such as the WT310E/WT330E series.

Total ±0.04%

±0.06%

±0.15%

±0.20%

WT3000E Series

WT3000

WT1800

WT500

Power Calibration System
11  **Semiconductor testing**

Semiconductors are an integral part of any modern electronic circuit and are used in various applications from LED lighting to motor controls to build an energy efficient system. The WT3000E’s high accuracy and stability along with the capability to perform harmonic and flicker measurements according to IEC standards place it at the heart of the semiconductor test system.

**Accurate & precise power measurement**

In order to achieve higher efficiencies it is important to measure power at higher accuracies. The WT3000E provides basic power accuracy of ± 0.01% (reading) in the guaranteed accuracy range from 1% to 130%.

**Harmonic & flicker measurement**

Semiconductors are used in various products such as high end power supplies, LED lighting, solar panels, motors & drives, Hybrid Electric Vehicle (HEV) / Uninterruptible Power System (UPS). It is important to perform harmonic and flicker analysis tests according to IEC standards. The WT3000E along with the 761922 software provides the option to perform either pre-compliance testing or 100% compliance to the latest IEC61000-3-2, IEC61000-3-3 & IEC61000-4-7, IEC61000-4-15 standards.

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**Lighting evaluation**

**Evaluation of lighting devices**

Testing of high frequency lighting devices often involves measurement of voltage, current, and Total Harmonic Distortion (THD), a parameter that indicates the quality of power. This is because distortion in voltage and current waveforms is becoming more prevalent due to the increasing complexity of control systems.

The WT3000E can simultaneously measure voltage and current with THD, and allows for more accurate and rapid measurements of an instrument’s characteristics and fluctuations.

Currently LEDs are rapidly replacing incandescent light bulbs and compact fluorescents (CFLs). The main reason is because LED lighting is more energy efficient. In case of LED lighting systems it is important to measure small DC currents and the dimmer control circuit needs high frequency measurement capability.

Both 2 A and 30 A input elements can be installed in the same WT3000E and provides up to 1 MHz broadband performance. Thus users are able to fully evaluate their LED systems.

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**Example of fluorescent lamp wire connection**

![Diagram of fluorescent lamp wire connection](image-url)
Specifications

**Inputs**

<table>
<thead>
<tr>
<th>Input terminal type</th>
<th>Voltage</th>
<th>Current</th>
<th>External Current Sensor input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plug-in terminal (safety terminal)</td>
<td>Floating input, resistive potential divider method</td>
<td>Insulated BNC connector</td>
<td></td>
</tr>
</tbody>
</table>

**Measurement range (rated value)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 V</td>
<td>50/60 Hz, 100 V, 150 V, 300 V, 600 V, 1,000 V (for crest factor 3)</td>
</tr>
<tr>
<td>7.5 V</td>
<td>15 V, 30 V, 50 V, 75 V, 150 V, 300 V, 600 V (for crest factor 6)</td>
</tr>
</tbody>
</table>

**Current**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 mA</td>
<td>10 mA, 20 mA, 50 mA, 100 mA, 200 mA, 500 mA, 1 A, 2 A (for crest factor 3)</td>
</tr>
<tr>
<td>2.5 mA</td>
<td>5 mA, 10 mA, 25 mA, 50 mA, 100 mA, 250 mA, 500 mA, 1 A (for crest factor 6)</td>
</tr>
</tbody>
</table>

External Current Sensor input

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 mA</td>
<td>100 mA, 200 mA, 500 mA, 1 V, 2 V, 5 V, and 10 V (for crest factor 3)</td>
</tr>
<tr>
<td>25 mA</td>
<td>50 mA, 100 mA, 250 mA, 500 mA, 1 V, 2 V, 5 V, and 5 V (for crest factor 6)</td>
</tr>
</tbody>
</table>

**Input impedance**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. 10 MΩ</td>
<td>Input resistance: Approx. 10 MΩ, input capacitance: Approx. 5 pF</td>
</tr>
</tbody>
</table>

**Input current terminals**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 Vrms</td>
<td>Current (2 A input element)</td>
</tr>
<tr>
<td>1000 Vrms</td>
<td>Current (30 A input element)</td>
</tr>
</tbody>
</table>

**Continuous maximum allowable input (1 or less)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak value of 2500 V or RMS value of 1500 V, whichever is less.</td>
<td></td>
</tr>
</tbody>
</table>

**Current (2 A input element)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak value of 9 A or RMS value of 3 A, whichever is less.</td>
<td></td>
</tr>
</tbody>
</table>

**Continuous maximum allowable input**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak value of 1600 V or RMS value of 1100 V, whichever is less. Or up to 1500 Vdc. This is a reference value.</td>
<td></td>
</tr>
</tbody>
</table>

**Current (2 A input element)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak value of 6 A or RMS value of 2.2 A, whichever is less.</td>
<td></td>
</tr>
</tbody>
</table>

**Continuous maximum allowable input**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak value of 90 A or RMS value of 33 A, whichever is less.</td>
<td></td>
</tr>
</tbody>
</table>

**Continuous common mode voltage (50/60 Hz)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage input terminals: 1000 Vrms (Maximum allowable voltage that can be measured)</td>
<td></td>
</tr>
</tbody>
</table>

**External current sensor input connector: 600 Vrms**

**Important Safety Note:**

- Do not touch the terminal of the BNC connector of the External Current Sensor input for safety reasons.

**Rated voltage to ground**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage input terminals: 1000 V</td>
<td></td>
</tr>
</tbody>
</table>

**External current sensor input connector: 600 Vrms**

**Important Safety Note:**

- Do not touch the terminal of the BNC connector of the External Current Sensor input for safety reasons.

**Input influence from common mode voltage**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>50/60 Hz: ±0.01% of range or less</td>
<td></td>
</tr>
<tr>
<td>Reference value up to 200 kHz</td>
<td></td>
</tr>
<tr>
<td>Voltage: ±3/range × f% of range or less. However, 3% or less.</td>
<td></td>
</tr>
</tbody>
</table>

**Auto range functions**

- Increasing range value
  - When the measured values of U and I exceed 110% of the range rating
  - When the peak value exceeds approximately 330% of the range rating for approximately 660% for crest factor 6

- Decreasing range value
  - When the measured values of U and I fall to 30% or less of the lower range value (or 600% for crest factor 6)

**Display**

- Total number of pixels*: 640 (horiz.) × 480 (vert.) dots
- Waveform display resolution: 501 (horiz.) × 452 (vert.) dots

**Waveform display resolution**

- Display update: Same as the data update rate.
  - The display update interval of the waveform display is approximately 1 s when the data update rate is 50 ms or 100 ms.
  - The display update interval of numeric display (ALL, Single List, and Dual List) is 500 ms when the data update rate is 50 ms to 250 ms.
  - The display update rate of the trend display, bar graph display, and vector display is 1 s when the data update rate is 50 ms to 500 ms.
  - The display update interval of the waveform display is approximately 1 s when the data update rate is 50 ms to 1 s. However, it may be longer depending on the trigger setting.

**Calculation Function**

- Single-phase: 3 wire, 3 phase: 3 wire, 3 phase, 3 wire (current potential)
- 3 phase, 3 wire (current potential)
- 3 phase, 4 wire

- User-defined functions: P1 to P20
- Create equations combining measurement function symbols, and calculate up to twenty numerical data.

**Waveform Display**

- Voltage and current from elements 1 through 4
- Motor Evaluation option: torque and waveform of revolution speed

**WT3000E**

- A/D converter
  - Simultaneous voltage and current conversion and 16-bit resolution.
  - Conversion speed (sampling rate): Approximately 1 μs.
  - See harmonic measurement items for harmonic display.

- Range switching
  - Can be set for each input element.
  - Auto range functions
    - Increasing range value
      - When the measured values of U and I exceed 110% of the range rating
      - When the peak value exceeds approximately 330% of the range rating for approximately 660% for crest factor 6
    - Decreasing range value
      - When the measured values of U and I fall to 30% or less of the lower range value (or 600% for crest factor 6)

**Note:**

- The instrument’s apparent power (S), reactive power (Q), power factor (P), and phase angle (θ) are calculated using measured values of voltage, current, and active power.
- The apparent power is calculated directly from sampled data when TYPE5 is selected. Therefore, when distorted waveforms are input, these values may be different from those of other measuring instruments based on different measuring principals.
- The value of Q in the Q2 calculation is calculated with a preceding minus sign (−) when the current input leads the voltage input, and a plus sign (+) when it lags the voltage input, so the value of Q2 may be negative.

- p [%] Set a efficiency calculation up to 4
- User-defined functions: P1 to P20
- Create equations combining measurement function symbols, and calculate up to twenty numerical data.

**Waveform display items**

- Voltage and current from elements 1 through 4
- Motor Evaluation option: torque and waveform of revolution speed
### Accuracy

**Conditions:** These conditions are all accuracy condition in this section.

- **Temperature:** 23 ± 5°C, Humidity: 30 to 75%RH, Input waveform: Sine wave, Common mode voltage: 0 V, Crest factor: 3, Line filter: OFF, (a power factor) 1. After warm-up.
- After zero level, compensation range value change within 0.1% (frequency kHz), 6-month period (Reading + Error + Range error)

#### 30 A input element, 2 A input element (50 mA to 2 A range) External Current Sensor Input, Voltage input

<table>
<thead>
<tr>
<th>DC</th>
<th>0.05% of reading + 0.002% of range (30 A, A Sense)</th>
<th>0.05% of reading + 0.01% of range (2 A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 0.002% of range</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
</tbody>
</table>

**Voltage/Current**

- U, Voltage, sensor: External Current Sensor input
- I, Current, sensor: 2 A direct current input
- A, A Sense, sensor: 2 A direct current input

#### 2 A input element (5 mA, 10 mA, and 20 mA range)

<table>
<thead>
<tr>
<th>DC</th>
<th>0.05% of reading + 2 μA (direct)</th>
<th>0.05% of reading + 0.01% of range (direct)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 Hz &lt; f &lt; 30 Hz</td>
<td>0.03% of reading + 2 μA</td>
<td>0.03% of reading + 0.01% of range</td>
</tr>
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<td>0.03% of reading + 0.01% of range</td>
</tr>
</tbody>
</table>

**Voltage/Current**

- U, Voltage, sensor: External Current Sensor input, direct: direct current input

### Total power accuracy with respect to the range for an arbitrary power factor \( \phi \) (exclude \( \phi = 1 \))

- **Power:** When \( 0 < \phi < 1 \) (5 mA to 30 A range)
  - Apparent power reading + 0.03% in the 45 to 66 Hz range
  - All other frequencies are as follows (however, these are only reference values):
    - Apparent power reading + 0.03% in the 45 to 66 Hz range
- When \( \phi = 1 \) (5 mA to 200 mA range)
  - Apparent power reading + 0.1% in the 45 to 66 Hz range
  - All other frequencies are as follows (however, these are only reference values):
    - Apparent power reading + 0.01% in the 45 to 66 Hz range

### Influence of line filter

- **Voltage/Current**
  - When cutoff frequency is 500 Hz
  - When cutoff frequency is 5.5 kHz
  - When cutoff frequency is 50 kHz
  - When cutoff frequency is 500 kHz

### Temperature coefficient

- **Voltage/Current**
  - Effective input range:
    - Voltage/Current and Power
    - Udc and Idc are 0 to ±130%* of the measurement range
    - Urms and Imn are 10 to 130%* of the measurement range
  - Effective input range:
    - Voltage/Current and Power
    - Udc and Idc are 0 to ±130%* of the measurement range
    - Urms and Imn are 10 to 130%* of the measurement range

### Lead/Lag Detection (\( \delta \))

- **Voltage/Current and Power**
  - Phase angle \( \delta \) and symbols for the reactive power \( \varphi \) calculation

### Max. display

- **Voltage/Current and Power**
  - 140% of the voltage and current range reading
  - *140% of the voltage range is 1000 V**
Averaging
Input filter
Scaling
Display
Mode
Select a mode of Manual, Standard, Continuous (repeat), Real Time Control, or Trend display. Number of measurement channels Upp to 26 parameters.

Compensation Functions
• Efficiency Compensation
• Wiring Compensation
• Compensation of instrument loss due to wiring

Scalings
When inputting output from external current sensors, VT, or CT, set the current sensor conversion ratio, VT ratio, CT ratio, and power coefficient in the range from 0.0001 to 99999.9999.

Input filter
Line filter or frequency filter settings can be entered.

Averaging
The average calculations below are performed on the harmonic measurement parameters of voltage U, current I, power P, apparent power S, reactive power Q, and power factor l for the current sensor conversion ratio, VT ratio, CT ratio, and power coefficient in the range from 0.0001 to 99999.9999.

Data update rate
Select 50 ms, 100 ms, 250 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, or 20 s.

Response time
At maximum, two times the data update rate (only during numerical display).

Hold
Holds the display.

Single
Executes a single measurement during measurement hold.

Zero level compensation/Null
Compensates the zero level.

Integration
Mode
Select a mode of Manual, Standard, Continuous (repeat), Real Time Control Standard, or Real Time Control Continuous (Repeat).

Timer
Integration can be stopped automatically using the integration timer setting. 0.000 s to 60.0 s or 1 to 10000 s (±0.01 s).

Count over
If the count over integration time reaches the maximum integration time (10000 h), or if the integration value reaches max/min display integration value (±999999 M), the elapsed time and value is saved and the operation is stopped.

Accuracy
±[(power accuracy (or current accuracy) + time accuracy)

Time accuracy
±0.02% of reading

Remote control
EXT START, EXT STOP, EXT RESET, EXT HOLD, EXT SINGLE, and EXT PRINT (all input signals) /INTEG BUSY (output signal). Requires /DA option.

Display

Numerical display function
Display resolution
600000

Number of display items
Select 4, 8, 16, all, single list, or dual list.

Waveform display items
No. of display rasters
501

Display format
Peak-peak, compressed data

Time axis
Range from 0.05 ms to 2 s/div. However, it must be 1/10 of the data update rate.

Triggers
Trigger Type
Edge type

Trigger Mode
Select Auto, Normal or OFF. Triggers are turned OFF automatically during integration.

WT3000E

Trigger Source
Select from the voltage or current applied to the input element and external clock.

Trigger Slope
Select Rising, Falling, or Rising/Falling.

Trigger Level
When the trigger source is the voltage or current input to the input elements. Set in the range from the center of the screen to a 100% top-bottom edge of the screen. Setting resolution: 0.1%.

Vertical axis Zoom
Voltage and current input to the waveform vertical axis zoom input element can be zoomed along the vertical axis. Set in the range of 0.1 to 100 times.

ON/OFF
ON/OFF can be set for each voltage and current input to the input element.

Format
You can select 1, 2, 3, or 4 splits for the waveform display.

Interpolation
Select on or linear interpolation.

Graph scale
Select grid or cross scale display.

Other data ON/OFF
Upper/lower limit (scale value), and waveform label ON/OFF.

Cursor measurement
When you place the cursor on the waveform, the value of that point is measured.

Zoom function
No time axis zoom function.

Vector Display/Bar Graph Display
[Requires /G6 option]
Vector display
Display vector of the phase difference in the fundamental waves of voltage and current. (without Single Input Element model)

Bar graph display
Displays the size of each harmonic in a bar graph.

Trend display
Number of measurement channels Up to 26 parameters.
Displays trends (transitions) in numerical data of the measurement functions in a sequential line graph.

Simultaneous display
Two windows can be selected from (numerical display, waveform display, bar graph display, or trend display) and displayed in the upper and lower parts of the screen.

Saving and Loading Data
Settings, waveform display data, numerical data, and screen image data can be saved to media. Saved settings can be loaded from a medium.

• PC card, USB memory [Requires /C5 option]

Store function
Internal memory size
Approx. 30 MB

Store interval (waveform OFF)
Maximum 50 msec to 99 hour 59 minutes 59 seconds

Guideline for Storage Time (Waveform Display OFF, Integration Function OFF)

Number of measurement channels
Measured items (Per CH)
Storage Interval
Storageable Amt. of Data
Storageable Amt. of Data
2 ch
3
50 ms
Approx. 10 hr 20 min
2 ch
10
1 sec
Approx. 86 hr
4 ch
10
50 ms
Approx. 2 hr 30 min
4 ch
20
1 sec
Approx. 24 hr

Note: Depending on the user-defined math, integration, and other settings, the actual measurement time may be shorter than stated above.

Store function can't use in combination with auto print function.

Delta Calculation Function

Voltage (V)
difference
±U1: Differential voltage determined by computation u1 and U2

3P3W → 3V3A
±U1: Line voltage that are not measured but can be computed for a three-phase, three-wire system

DELTA → STAR
±U1, U2, U3: Line voltage that can be computed for a three phase, three-wire system

STAR → DELTA
±U1, U2, U3: Neutral line voltage that can be computed for a three phase, four-wire system

Current (A)
difference
±U1: Differential current determined by computation
3P3W → 3V3A
Phase current that are not measured but can be computed

DELTA → STAR
Neutral line current

STAR → DELTA
Neutral line current

Cycle-by-cycle measurement
Measurement items
Freq (synchronous frequency), U, I, P, S, Q, f, Speed, Torque and Pm

Synch source
Select an external source of U1, U2, I1, I2, U3, I3, or I4.

(above the parameters are measured continuously for each of the one sync source signal)

Number of measurements
10 to 3000

Time out time
0.1 to 3600 seconds (set in units of seconds).

(when it is set to 0, it is approx. 24 hours)

Synch source frequency range
1 Hz to 1000 Hz (for U and I) 1 Hz to 1000 Hz (for Ext CH)

Accuracy
±[(0.3 + 2 × f)% of reading + ((0.05 + 0.05 × f)% of range)]

Freq
±[(0.3 + 2 × f)% of reading to the accuracy for normal measurement.

* f Hz
### Motor Evaluation Function (MTX Optional)

**Measurement Function**
- Method of Determination, Equation

#### Rotating speed
- When the input signal from the revolution sensor is DC voltage (analog signal) Input voltage from revolution sensor × Scaling factor Number of revolutions per 1 V input voltage
- When the input signal from the revolution sensor is number of pulses Number of input pulses from revolution sensor per minute × Scaling factor Number of pulses per revolution

#### Torque
- When the type of input signal from the torque meter is DC voltage (analog signal) Input voltage from torque meter × Scaling factor
- When the type of input signal from the torque meter is pulses Enter torque values (N·m) equivalent to upper- and lower-limit frequencies to determine an inclination from these two frequencies, and then multiply the number of pulses.

**SyncSp** 120 × freq. of the freq. meas. source motor’s number of pulses

**Slip [%]**
- SyncSp-Speed / SyncSp

**Motor output Prm**
- 2π × Speed × Torque × scaling factor

#### Revolution signal, torque signal
- When revolution and torque signals are DC voltage (analog input)
  - Connector type: Insulated BNC connector
  - Input range: 1 V, 2 V, 5 V, 10 V, 20 V
  - Effective input range: 0% to ±10% of measurement range
  - Input resistance: Approx. 1 MΩ
  - Continuous maximum allowed input: ±2 V
  - Continuous maximum common mode voltage: ±42 Vpeak or less
  - Accuracy: ±0.1% of reading or ±0.1% of range
  - Temperature coefficient: ±0.03% of range/°C
- When revolution and torque signals are pulse input
  - Connector type: Insulated BNC connector
  - Frequency range: 2 Hz to 200 kHz
  - Amplitude input range: ±12 Vpeak
  - Effective amplitude: 1 Vpeak (peak to peak) or more
  - Input waveform duty ratio: 50%, square wave
  - Input resistance: Approx. 1 MΩ
  - Continuous maximum common mode voltage: ±42 Vpeak or less
  - Accuracy: ±0.05% of reading ± 1 MHz

**Additional Frequency Measurement (F/Q Optional)**
- Device under measurement
  - If the frequency option (F/Q) is installed, the frequencies of the voltages and currents being input to all input elements can be measured.

**Measurement method**
- Reciprocal method

#### Measurement range

<table>
<thead>
<tr>
<th>Measurement range</th>
<th>Data Update Rate</th>
<th>Measuring Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 ms</td>
<td>49 Hz ≤ f ≤ 1 MHz</td>
<td></td>
</tr>
<tr>
<td>100 ms</td>
<td>25 Hz ≤ f ≤ 1 MHz</td>
<td></td>
</tr>
<tr>
<td>250 ms</td>
<td>10 Hz ≤ f ≤ 500 kHz</td>
<td></td>
</tr>
<tr>
<td>500 ms</td>
<td>5 Hz ≤ f ≤ 200 kHz</td>
<td></td>
</tr>
<tr>
<td>1 s</td>
<td>2.5 Hz ≤ f ≤ 100 kHz</td>
<td></td>
</tr>
<tr>
<td>5 s</td>
<td>0.5 Hz ≤ f ≤ 20 kHz</td>
<td></td>
</tr>
<tr>
<td>10 s</td>
<td>0.25 Hz ≤ f ≤ 10 kHz</td>
<td></td>
</tr>
<tr>
<td>20 s</td>
<td>0.15 Hz ≤ f ≤ 5 kHz</td>
<td></td>
</tr>
</tbody>
</table>

**Accuracy**
- ±0.05% of reading
- When the input signal levels are greater than or equal to 25 mV (external current sensor input), 1.5 mA (current direct input of 2 A input element) and 100 mA (current direct input of 30 A input element) respectively, and the signal is greater than or equal to 30% (0.1 Hz to 440 Hz, frequency filter ON), 10% (440 Hz to 500 kHz), or 30% (500 kHz to 1 MHz) of the measurement range. However, when the measuring frequency is smaller or equal to 2 times of above lower frequency, the input signal is greater than or equal to 50%.
- Add 0.05% of reading when external current input is smaller than or equal to 50 mV input level signal for each is double for crest factor 6.

#### D/A Output ([DA Optional])

<table>
<thead>
<tr>
<th>D/A Output ([DA Optional])</th>
<th>D/A Conversion resolution</th>
<th>16 bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>D/A Output voltage</td>
<td>±5 V FS (max. approximately ±7.5 V) for each rated value</td>
<td></td>
</tr>
<tr>
<td>Update rate</td>
<td>Same as the data update rate on the main unit</td>
<td></td>
</tr>
<tr>
<td>Number of outputs</td>
<td>20 channels (each channel can be set separately)</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.5% of full scale for the D/A output</td>
<td></td>
</tr>
<tr>
<td>D/A zoom</td>
<td>Setting maximum and minimum values</td>
<td></td>
</tr>
</tbody>
</table>

**Built-in Printer (B5 Optional)**
- Printing method: Thermal line-dot
- Dot density: 8 dots/mm
- Paper width: 112 mm
- Effective recording width: 104 mm
- Recorded information: Screenshots, list of measured values, harmonic bar graph printouts, settings
- Auto print function: Measured values are printed out automatically. However, auto print function can’t use in combination with store function.

**RGB Video Signal (VGA) Output Section (V1 Optional)**
- Connector type: 15-pin D-Sub (receptacle)
- Output format: VGA compatible

**Advanced Calculation (/G6 optional)**
- Wide Bandwidth Harmonic Measurement
  - Measured source: All installed elements
  - Format:
    - PLL synchronization method
      - When the PLL source is not set to Simp Clk
      - External sampling clock method
      - When the PLL source is set to Simp Clk
  - Frequency range:
    - PLL synchronization method
      - Fundamental frequency of the PLL source is in the range of 10 Hz to 2.6 kHz.
      - External sampling clock method
        - Input a sampling clock signal having a frequency that is 3000 times the fundamental frequency between 0.1 Hz and 66 Hz of the waveform on which to perform harmonic measurement. The input level is TTL. The input waveform is a rectangular wave with a duty ratio of 50%.
  - PLL source:
    - Select the voltage or current of each input element (external current sensor range is greater than or equal to 500 mV) or the external clock (Ext Clk or Simp Clk).
    - Input level
      - Greater than or equal to 50% of the measurement range range when the crest factor is 3
      - Greater than or equal to 100% of the measurement range range when the crest factor is 6
    - Turn the frequency filter ON when the fundamental frequency is less than or equal to 640 Hz.
  - FFT data length: 8000
  - FFT processing word length: 32 bits
  - Window function: Rectangular
  - Anti-aliasing filter: Set using a line filter (OFF, 500 Hz, 5.5 kHz, or 50 kHz).

**Continuous maximum common** ±42 Vpeak or less

**Mode Voltage**

**Minimum load**
- 100 Ω

**Temperature coefficient**
- ±0.05% of FS/°C

**Remote control**
- EXT START, EXT STOP, EXT RESET, EXT HOLD, EXT SINGLE and EXT PRINT (all input signal) / INTEG BUSY (output signal)
- Requires: DA option

**Frequency (Simplified Figure Below)**

- Displayed value
  - D/A output Approx. 7.5 V
  - 0.0 V

**Integrated Value**

- Rated input
  - 0.0 V
  - 5.0 V

**Built-in Printer (B5 Optional)**
- Printing method: Thermal line-dot
- Dot density: 8 dots/mm
- Paper width: 112 mm
- Effective recording width: 104 mm
- Recorded information: Screenshots, list of measured values, harmonic bar graph printouts, settings
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      - External sampling clock method
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  - Frequency range:
    - PLL synchronization method
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        - Input a sampling clock signal having a frequency that is 3000 times the fundamental frequency between 0.1 Hz and 66 Hz of the waveform on which to perform harmonic measurement. The input level is TTL. The input waveform is a rectangular wave with a duty ratio of 50%.
  - PLL source:
    - Select the voltage or current of each input element (external current sensor range is greater than or equal to 500 mV) or the external clock (Ext Clk or Simp Clk).
    - Input level
      - Greater than or equal to 50% of the measurement range range when the crest factor is 3
      - Greater than or equal to 100% of the measurement range range when the crest factor is 6
    - Turn the frequency filter ON when the fundamental frequency is less than or equal to 640 Hz.
  - FFT data length: 8000
  - FFT processing word length: 32 bits
  - Window function: Rectangular
  - Anti-aliasing filter: Set using a line filter (OFF, 500 Hz, 5.5 kHz, or 50 kHz).
### Specifications

#### WT3000E

**Frequency Range:**
- Fundamental frequency of the PLL source is in the range of 45 Hz to 66 Hz.
- Fundamental frequency of the PLL source is in the range of 45 Hz to 66 Hz.
- Frequency range
- Frequency range

**Accuracy**
- Accuracy when the crest factor is 6: The same as when the range is doubled for crest factor 3.
- Accuracy when the crest factor is 6: The same as when the range is doubled for crest factor 3.
- Accuracy when the crest factor is 6: The same as when the range is doubled for crest factor 3.
- Accuracy when the crest factor is 6: The same as when the range is doubled for crest factor 3.

#### External sampling clock method

<table>
<thead>
<tr>
<th>Fundamental Frequency of the PLL Source (Hz)</th>
<th>Sample Rate (S/s)</th>
<th>Window Width against the FFT Data Length (Frequency of the Fundamental Wave)</th>
<th>Upper Limit of the Measured Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>55 to 66</td>
<td>f × 900</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>75 to 150</td>
<td>f × 450</td>
<td>20</td>
<td>62</td>
</tr>
<tr>
<td>150 to 440</td>
<td>f × 360</td>
<td>25</td>
<td>62</td>
</tr>
<tr>
<td>440 to 1100</td>
<td>f × 150</td>
<td>60</td>
<td>62</td>
</tr>
</tbody>
</table>

**Sample Rate (sampling frequency), window width, and upper limit of measured order**

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>Voltage and Current</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 Hz ≤ f ≤ 10 Hz</td>
<td>0.25% of reading + 0.1% of range</td>
<td>0.5% of reading + 0.1% of range</td>
</tr>
<tr>
<td>10 Hz ≤ f ≤ 30 Hz</td>
<td>0.25% of reading + 0.1% of range</td>
<td>0.5% of reading + 0.1% of range</td>
</tr>
<tr>
<td>30 Hz ≤ f ≤ 66 Hz</td>
<td>0.3% of reading + 0.1% of range</td>
<td>0.45% of reading + 0.1% of range</td>
</tr>
<tr>
<td>66 Hz ≤ f ≤ 440 Hz</td>
<td>0.6% of reading + 0.1% of range</td>
<td>1.2% of reading + 0.1% of range</td>
</tr>
<tr>
<td>440 Hz ≤ f ≤ 1 kHz</td>
<td>1% of reading + 0.1% of range</td>
<td>2% of reading + 0.1% of range</td>
</tr>
<tr>
<td>1 kHz ≤ f ≤ 2.5 kHz</td>
<td>1.5% of reading + 0.1% of range</td>
<td>5% of reading + 0.1% of range</td>
</tr>
<tr>
<td>2.5 kHz ≤ f ≤ 3.5 kHz</td>
<td>2% of reading + 0.1% of range</td>
<td>7% of reading + 0.1% of range</td>
</tr>
</tbody>
</table>

**Fundamental Frequency of the PLL Source (Hz)**

<table>
<thead>
<tr>
<th>Sample Rate (S/s)</th>
<th>Window Width against the FFT Data Length (Frequency of the Fundamental Wave)</th>
<th>Upper Limit of the Measured Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 to 55</td>
<td>f × 900</td>
<td>10</td>
</tr>
<tr>
<td>55 to 66</td>
<td>f × 750</td>
<td>12</td>
</tr>
</tbody>
</table>

**FFT data length**
- 9000

**FFT processing word length**
- 32 bits

**Window function**
- Rectangular

**Anti-aliasing filter**
- Set using a line filter (cut off at 5.5 kHz)

**Interharmonic measurement**
- Select OFF, Type1, or Type2

**Sample rate (sampling frequency), window width, and upper limit of measured order**

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>Voltage and Current</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 Hz ≤ f ≤ 10 Hz</td>
<td>0.25% of reading + 0.1% of range</td>
<td>0.5% of reading + 0.1% of range</td>
</tr>
<tr>
<td>10 Hz ≤ f ≤ 30 Hz</td>
<td>0.25% of reading + 0.1% of range</td>
<td>0.5% of reading + 0.1% of range</td>
</tr>
<tr>
<td>30 Hz ≤ f ≤ 66 Hz</td>
<td>0.3% of reading + 0.1% of range</td>
<td>0.45% of reading + 0.1% of range</td>
</tr>
<tr>
<td>66 Hz ≤ f ≤ 440 Hz</td>
<td>0.6% of reading + 0.1% of range</td>
<td>1.2% of reading + 0.1% of range</td>
</tr>
<tr>
<td>440 Hz ≤ f ≤ 1 kHz</td>
<td>1% of reading + 0.1% of range</td>
<td>2% of reading + 0.1% of range</td>
</tr>
<tr>
<td>1 kHz ≤ f ≤ 2.5 kHz</td>
<td>1.5% of reading + 0.1% of range</td>
<td>5% of reading + 0.1% of range</td>
</tr>
<tr>
<td>2.5 kHz ≤ f ≤ 3.5 kHz</td>
<td>2% of reading + 0.1% of range</td>
<td>7% of reading + 0.1% of range</td>
</tr>
</tbody>
</table>

**Power**
- 0.2% of reading + 0.01% of range
- 2% of reading + 0.05% of range
- 15% of reading + 0.1% of range
- 30% of reading + 0.1% of range
- 50% of reading + 0.1% of range
- 60% of reading + 0.1% of range
- 60% of reading + 0.1% of range
- 60% of reading + 0.1% of range
- 60% of reading + 0.1% of range

**Accuracy**
- Accuracy when the crest factor is 6: The same as when the range is doubled for crest factor 3.
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**Fundamental Frequency of the PLL Source (Hz)**

<table>
<thead>
<tr>
<th>Sample Rate (S/s)</th>
<th>Window Width against the FFT Data Length (Frequency of the Fundamental Wave)</th>
<th>Upper Limit of the Measured Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100 to 2600</td>
<td>f × 60</td>
<td>150</td>
</tr>
<tr>
<td>1100 to 2600</td>
<td>f × 60</td>
<td>150</td>
</tr>
</tbody>
</table>

**Waveform Computation Function**
- Waveform calculation function (MATH) cannot be used with FFT calculation at the same time.

<table>
<thead>
<tr>
<th>Operator</th>
<th>+, −, ×, /, ABS (absolute value), SQRT (square root), LOG (common logarithm), EXP (exponent), NEG (negation), AVG2, AVG4, AVG8, AVG16, AVG32, AVG64 (exponential average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equation</td>
<td>Two equations (MATH1 and MATH2)</td>
</tr>
</tbody>
</table>

**Display update**
- Depends on the PLL source
- Depends on the PLL source
- External sampling clock method: 20 s or more

**PLI Timeout value**
- PLL synchronization method: 1 s or more
- PLL synchronization method: 2 s or more
- External sampling clock method: 20 s or more

**IEC Harmonic Measurement (IEC Harmonic/Flicker measurement software 761922 is required)**
- Measured source
- Select an input element or an I wiring unit

**Accuracy**
- Accuracy when the range is less than or equal to 10 kHz.
- Accuracy when the range is less than or equal to 10 kHz.
- Accuracy when the range is less than or equal to 10 kHz.
- Accuracy when the range is less than or equal to 10 kHz.

- Power factor (1) = 1
- Power factors that exceed 440 Hz are reference values.
- For external current sensor range, add 0.02 mA to the current accuracy and add 0.01 mA to the current accuracy.
- For nth order component input, add (n/250)% of reading to the nth component of the voltage and current.
- For nth order component input, add {n/(m+1)}/25% of (the nth order reading) to the n+mth order and n−mth order of the current (only when applying a single frequency).
- For nth order component input, add {n/(m+1)}/25% of (the nth order reading) to the n+mth order and n−mth order of the current (only when applying a single frequency).
- For nth order component input, add {n/(m+1)}/25% of (the nth order reading) to the n+mth order and n−mth order of the current (only when applying a single frequency).
### FFT Function Specifications

**Waveform calculation function (MATH) cannot be used with FFT calculation at the same time.**

- **Computed source**
  - Voltage, current, active power, and reactive power of each input element.
  - Active power and reactive power of all wiring units.
  - Torque and speed signals (analog input) of motor input (option).

- **Type**
  - PS (power spectrum)

- **Number of computations**
  - Two computations (FFT1 and FFT2).

- **Maximum frequency of analysis**
  - 100 kHz

- **Number of points**
  - 20000 points or 200000 points

- **Measurement period for the computation**
  - 100 ms when the number of FFT points is

  - 20 kHz when the frequency resolution is 1 kHz.

- **FFT Function Specifications**

  - **Anti-aliasing filter**
    - Set using a line filter (OFF, 5 kHz, or 50 kHz).

  - **Window function**
    - Rectangular

  - **PLL source**
    - Frequency range: Range in which the fundamental frequency of the PLL source.

  - **Format**
    - PLL synchronization method

  - **Frequency range**
    - Range in which the fundamental frequency of the PLL source

### Harmonic Measurement in Normal Measurement

*(To measure and display harmonic data requires a data update rate of 500 ms or more)*

**FFT Function Specifications**

- **Anti-aliasing filter**
  - Set using a line filter (OFF, 5 kHz, or 50 kHz).

- **Window function**
  - Rectangular, Hanning, or Flattop

- **Sampling clock**
  - Fixed to 200 kHz

- **Display update**
  - Data update interval + computing time

**Harmonic Measurement in Normal Measurement**

*(To measure and display harmonic data requires a data update rate of 500 ms or more)*

- **Anti-aliasing filter**
  - Set using a line filter (OFF, 5 kHz, or 50 kHz).

- **Window function**
  - Rectangular

- **Sampling clock**
  - Fixed to 200 kHz

**Display update**

- Data update rate or (measurement period of the FFT = FFT computing time), whichever is longer

#### Accuracy

- **(Reading error + Range error) is ON**

  - When the line filter (5.5 kHz or 50 Hz) is ON

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Voltage and Current</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz ≤ f ≤ 30 Hz</td>
<td>0.2% of reading + 0.3% of range</td>
<td>0.1% of reading + 0.4% of range</td>
</tr>
<tr>
<td>30 Hz ≤ f ≤ 60 Hz</td>
<td>0.2% of reading + 0.3% of range</td>
<td>0.1% of reading + 0.4% of range</td>
</tr>
<tr>
<td>40 Hz ≤ f ≤ 100 Hz</td>
<td>0.2% of reading + 0.3% of range</td>
<td>0.1% of reading + 0.4% of range</td>
</tr>
<tr>
<td>1 kHz ≤ f ≤ 5 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>25 kHz ≤ f ≤ 35 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>5 kHz ≤ f ≤ 7.8 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>6.5 kHz ≤ f ≤ 7.8 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>6.2 kHz ≤ f ≤ 7.8 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
</tbody>
</table>

#### Power

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Voltage and Current</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz ≤ f ≤ 30 Hz</td>
<td>0.2% of reading + 0.3% of range</td>
<td>0.1% of reading + 0.4% of range</td>
</tr>
<tr>
<td>30 Hz ≤ f ≤ 40 Hz</td>
<td>0.2% of reading + 0.3% of range</td>
<td>0.1% of reading + 0.4% of range</td>
</tr>
<tr>
<td>40 Hz ≤ f ≤ 50 Hz</td>
<td>0.2% of reading + 0.3% of range</td>
<td>0.1% of reading + 0.4% of range</td>
</tr>
<tr>
<td>25 kHz ≤ f ≤ 35 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>5 kHz ≤ f ≤ 7.8 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>6.5 kHz ≤ f ≤ 7.8 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>6.2 kHz ≤ f ≤ 7.8 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
</tbody>
</table>

**When the line filter is OFF**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Voltage and Current</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz ≤ f ≤ 30 Hz</td>
<td>0.25% of reading + 0.3% of range</td>
<td>0.4% of reading + 0.4% of range</td>
</tr>
<tr>
<td>30 Hz ≤ f ≤ 40 Hz</td>
<td>0.2% of reading + 0.3% of range</td>
<td>0.1% of reading + 0.4% of range</td>
</tr>
<tr>
<td>40 Hz ≤ f ≤ 50 Hz</td>
<td>0.2% of reading + 0.3% of range</td>
<td>0.1% of reading + 0.4% of range</td>
</tr>
<tr>
<td>25 kHz ≤ f ≤ 35 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>5 kHz ≤ f ≤ 7.8 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>6.5 kHz ≤ f ≤ 7.8 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
<tr>
<td>6.2 kHz ≤ f ≤ 7.8 kHz</td>
<td>0.1% of reading + 0.1% of range</td>
<td>0.1% of reading + 0.1% of range</td>
</tr>
</tbody>
</table>

**When the fundamental frequency is between 1 kHz and 2.6 kHz, add 0.5% of reading to the voltage and current accuracy and 1% of reading to the power accuracy when the frequency exceeds 1 kHz.**

**However, all the items below apply to all tables.**

- When averaging is ON, the averaging type is EXP, and the attenuation constant is greater than or equal to 2
- When the crest factor is set to 3
- When the power factor = 1
- Power exceeding 440 Hz are reference values.
- For external current sensor range, add 0.2 mA to the current accuracy and add 0.2 mA to the current sensor range rating = 100% of range to the power accuracy.
- For A direct current input range, add 2 μA to the current accuracy and add 2 μA (direct current input range rating) + 100% of range to the power accuracy.
- For n order component input, add (y[n]/100) (of the m order reading) to the n+m order and n−m order of the voltage and current, and add (y[n]/250) (of the m order reading) to the n+m order and n−m order of the power.
- Add (y[n]/100) of the m component of the voltage and current, and add (y[n]/250) of the n 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 frequency and voltage/current is the same as the guaranteed range of normal measurement.

**Waveshape Sampling Data Saving Function**

- **Parameters**
  - Voltage waveform, current waveform, analog input waveform of torque and speed waveform calculation, FFT performing data

### Voltage Fluctuation/Flicker Measurement (FL optional)

- **Flicker meter class**
  - F2

- **Normal Flicker Measurement**
  - **Measurement items**
    - Measurement Functions
      - dc Relative steady-state voltage change
      - dmax Maximum relative voltage change
      - d(t)*1 The time during which the relative voltage change during a voltage fluctuation period exceeds the threshold level
      - Pst Short-term flicker value
      - Pt Long-term flicker value

  - **One observation period**
    - 30 s to 15 min

  - **Observation period count**
    - 1 to 99

- **Measurement of dmax Caused by Manual Switching Mode**
  - **Measurement**
    - Maximum relative voltage change
  - **Measurement Functions**
    - Average of 22 measured dmax values excluding the maximum and minimum values among 24 values

- **Items Common to Measurement Modes**
  - **Target voltage/frequency**
    - 230 V/50 Hz, 120/60 Hz, 230/60 Hz or 120 V/50 Hz
  - **Measured item**
    - All installed elements
  - **Measured source input**
    - Voltage/current measurement function not available
  - **Flicker scale**
    - 0.01 to 6400P.U. (20%) divided logarithmically into 1024 levels
  - **Display update**
    - 2 s (dc, dmax, d(t)*1, Pst, Pt, instantaneous flicker sensation (IFS), and cumulative probability function (CPF))
  - **Communication output**
    - dc, dmax, d(t)*1, Pst, Pt, instantaneous flicker sensation (IFS), and cumulative probability function (CPF)
  - **Printer output**
    - Screen image
  - **External storage output**
    - Screen image
Specifications

Accuracy
dc, dmax: ±4% (at dmax = ±4%)
Pat: ±2% (at Pat = 1)
Conditions for the accuracy above
• Ambient temperature: 23 ±1°C
• Line filter: OFF
• Input voltage range
  220 V to 250 V at the 300 V measuring range
  110 V to 130 V at the 150 V measuring range
1. When E61000-3-3 Ed 3.0 is selected, it is Tmax.
2. Corresponds to E61000-3-3 Ed 2.0.

GP-IB Interface
Use one of the following by NATIONAL INSTRUMENTS:
• GPIB-USB-HS
• PCI-GPIB and PCI-GPIB+
• PCMCIA-GPIB and PCMCIA-GPIB+
Use driver NI-488.2M version 1.60 or later excepting version 2.3.

Conforms electrically and mechanically

Functional specification
SH1, AH1, TH, U4, SR1, RL1, FP0, DC1, DT1, and D3.

Conforms to protocol

Encoding
ISO (ASCII)

Mode
Addressable mode

Address
0 to 30

Clear remote mode
Remote mode can be cleared using the LOCAL key (except during Local Lockout).

External I/O

Serial (RS-232) Interface (/C2 Optional)
Connector type
9-pin D-Sub plug

Electrical specifications
Conforms with EIA-574 (EIA-232 (RS-232) standard for 9-pin)

Connection type
Point-to-point

Communication mode
Full duplex

Synchronization method
Start-stop synchronization

Baud rate
Select from the following.
1200, 2400, 4800, 9600, 19200, 38400 bps

USB port (PC) (/C12 Optional)
Connector type
Type B connector (receptacle)

Electrical and Mechanical Specifications
Conforms to USB Rev.1.1

Speed
Max. 12 Mbps

Number of Ports
1

Supported service
Remote control

Supported Systems
Models with standard USB ports that run Windows Vista, Windows7 or Windows8/8.1 with USB port as a standard.
(A separate device driver is required for connecting to a PC.)

USB port (Peripheral) (/C5 Optional)
Connector type
Type A connector (receptacle)

Electrical and Mechanical Specifications
Conforms to USB Rev.1.1

Speed
Max. 12 Mbps

Number of Ports
2

Supported keyboards
104 keyboard (US) and 109 keyboard (Japanese) conforming to USB HD Class Ver.1.1 devices

Supported USB memory devices
USB (USB memory) flash memory

Power supply
5 V, 500 mA* (per port)

*However, device whose maximum current consumption exceeds 100 mA cannot be connected simultaneously to the two ports.

PC Card Interface

TYPE II (Flash ATA card)

General Specifications

Warm-up time
Approx. thirty minutes.

Operating temperature
+5 to +40°C

Operating humidity
20 to 80% (when printer not used), 35 to 80% RH (when printer is used) (no condensation)

Operating altitude
2000 m or less

Installation location
Indoors

Storage environment
−25 to +60°C

Storage humidity
20 to 80% RH (no condensation)

Rated supply voltage
100 to 240 VAC

Allowed supply voltage fluctuation range
90 to 264 VAC

Rated supply frequency
50/60 Hz

Allowed supply frequency fluctuation
48 to 63 Hz

Maximum power consumption
150 VA (when using built-in printer)

Maximum power consumption
150 VA (when using built-in printer)

Battery backup
Setup information and internal clock are backed up with the lithium battery

WT3000E

External I/O

ID Section for Master/Slave Synchronization Signals
Connector type
BNC connector: Both slave and master

External Clock Input Section
Connector type
BNC connector

Input
Inputting the synchronization source as the Ext Clk of normal measurement.
Frequency range
Same as the measurement range for frequency measurement.
Input waveform
50% duty ratio square wave

Inputting the PLL source as the Ext Clk of harmonic measurement.
Frequency range
10 Hz to 2.6 kHz
Input waveform
50% duty ratio square wave

Inputting the external sampling clock (Sync Clk) of wide bandwidth harmonic measurement.
Frequency range
3000 times the frequency of 0.1 Hz to 66 Hz
Input waveform
50% duty ratio square wave

For Triggers
Minimum pulse width
1 μs
Trigger delay time
Win64 (1 μs + 1 sample rate)

Serial (RS-232) Interface

Connector type
9-pin D-Sub plug

Electrical specifications
Conforms with EIA-574 (EIA-232 (RS-232) standard for 9-pin)

Connection type
Point-to-point

Communication mode
Full duplex

Synchronization method
Start-stop synchronization

Baud rate
Select from the following.
1200, 2400, 4800, 9600, 19200, 38400 bps

USB port (Peripheral) (/C5 Optional)
Connector type
Type A connector (receptacle)

Electrical and Mechanical Specifications
Conforms to USB Rev.1.1

Speed
Max. 12 Mbps

Number of Ports
2

Supported keyboards
104 keyboard (US) and 109 keyboard (Japanese) conforming to USB HD Class Ver.1.1 devices

Supported USB memory devices
USB (USB memory) flash memory

Power supply
5 V, 500 mA* (per port)

*However, device whose maximum current consumption exceeds 100 mA cannot be connected simultaneously to the two ports.
## Accessories

### Related products

#### Current Transducer

**CT60/CT200/CT1000**

**Current Sensors**
- DC to 800 kHz/60 Apk, DC to 500 kHz/200 A pk
- DC to 300 kHz/1000 A pk
- Wide dynamic range: 0 to 1000 A (AC)/500 A peak (AC)
- Wide measurement frequency range: DC and up to 800 kHz
- High-precision fundamental accuracy: ±0.05% of reading + 30 μA
- 15 V DC power supply, connector, and load resistor required. For detailed information, see Current Sensors & Accessories Catalog Bulletin CT1000-00E.

**Current Clamp on Probe**

751522, 751524

**Current Sensor Unit**
- AC to 100 kHz/100 A peak (AC)
- Wide measurement frequency range: DC to 100 kHz (−3 dB)
- High-precision fundamental accuracy: ±(0.05% of rdg + 40 μA)
- Superior noise withstanding ability and CMRR characteristic due to optimized casing design
- 751522/751524 do not conform to CE Marking
- For detailed information, see Power Meter Accessory Catalog 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

**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.

**758921**
- Fork terminal adapter
  - Two adapters (red and black) to a set. Used when attaching banana plug to binding post.
  - Rating: 20 A

**701959**
- Safety mini-clip set
  - (hook Type)
  - 2 pieces (red and black) in one set.
  - Rating 1000 V

**758924**
- Conversion adapter
  - For conversion between male BNC and female banana plug.
  - Rating: 500 V

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

**B9284LK**
- External Sensor Cable
  - For connection the external input of the WT3000E to current sensor.
  - Length: 50 cm

**758917**
- Current clamp on probe

**751522**
- Current sensor unit DC to 100 kHz/100 A peak (AC)

**751552**
- Current clamp on probe
  - AC 1000 Arms (1400 Apk)
  - Measurement frequency range: 30 Hz to 5 kHz
  - Basic accuracy: 0.3% of reading
  - Maximum allowed input: AC 1000 Arms, max 1400 Apk (AC)
  - Current output type: 1 mA/A

**758921**
- Current sensor unit DC to 100 kHz/100 A peak (AC)

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

**758923**
- Safety terminal adapter set

**758924**
- Conversion adapter

**758917**
- Measurement leads

**751522**
- Current sensor unit DC to 100 kHz/100 A peak (AC)

**751552**
- Current clamp on probe

**758921**
- Current sensor unit DC to 100 kHz/100 A peak (AC)

**758931**
- Safety terminal adapter set

**758923**
- Safety terminal adapter set

**758917**
- Measurement leads

**758921**
- Current sensor unit DC to 100 kHz/100 A peak (AC)

**758931**
- Safety terminal adapter set

**758923**
- Safety terminal adapter set

**758921**
- Fork terminal adapter

**758923**
- Fork terminal adapter

**758917**
- Measurement leads

**758921**
- Current sensor unit DC to 100 kHz/100 A peak (AC)

**758931**
- Safety terminal adapter set

**758923**
- Safety terminal adapter set

**758921**
- Fork terminal adapter

**758923**
- Safety terminal adapter set

**758921**
- Fork terminal adapter

---

**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
2. 758931 core diameter: 1.6 mm or less; sheath diameter: 3.9 mm or less
3. 751522/751524 do not conform to CE Marking

---

**Measurement using current sensor**

- **Connection example**

  **Unit whose current is to be measured**

  - **4 load resistors**
    - (B8200JR)
  - **Connected in parallel**
  - **Current input**
  - **Power meter’s input terminal**
  - **Current measurement using direct input terminal**

**Measurement using clamp-on probe**

- **Unit whose current is to be measured**

  - **Current input**
  - **Power meter’s current input terminal**

**Measurement using voltage input terminal**

- **Unit whose voltage is to be measured**

  - **Power meter’s voltage input terminal**

---

*A burden resistor is required for the CT1000, CT200 and CT60.*
## Model and Suffix code

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT3001E</td>
<td></td>
<td>Precision Power Analyzer One Input Element Model</td>
</tr>
<tr>
<td>WT3002E</td>
<td></td>
<td>Precision Power Analyzer Two Input Elements Model</td>
</tr>
<tr>
<td>WT3003E</td>
<td></td>
<td>Precision Power Analyzer Three Input Elements Model</td>
</tr>
<tr>
<td>WT3004E</td>
<td></td>
<td>Precision Power Analyzer Four Input Elements Model</td>
</tr>
</tbody>
</table>

### Accessory (sold separately)

<table>
<thead>
<tr>
<th>Model/ parts number</th>
<th>Product</th>
<th>Description</th>
<th>Order Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>758817</td>
<td>Test lead set</td>
<td>A set of 0.8 m long, red and black test leads</td>
<td>1</td>
</tr>
<tr>
<td>758822</td>
<td>Small alligator-clip</td>
<td>Rated at 300 V and used in a pair</td>
<td>1</td>
</tr>
<tr>
<td>758829</td>
<td>Large alligator-clip</td>
<td>Rated at 1000 V and used in a pair</td>
<td>1</td>
</tr>
<tr>
<td>758823</td>
<td>Safety terminal adapter</td>
<td>Spring type Two adapters to a set</td>
<td>1</td>
</tr>
<tr>
<td>758831</td>
<td>Safety terminal adapter</td>
<td>Screw-fastened type Two adapters to a set, 1.5 mm hex wrench is attached</td>
<td>1</td>
</tr>
<tr>
<td>758821</td>
<td>Fork terminal adapter</td>
<td>Banana-fork adapter. Two adapters to a set</td>
<td>1</td>
</tr>
<tr>
<td>701959</td>
<td>Safety mini-clip</td>
<td>Hook type. Two in a set</td>
<td>1</td>
</tr>
<tr>
<td>758824</td>
<td>Conversion adapter</td>
<td>BNC-bandana-jack (female) adapter</td>
<td>1</td>
</tr>
<tr>
<td>366924</td>
<td>&quot;BNC-BNC cable</td>
<td>1 m</td>
<td>1</td>
</tr>
<tr>
<td>366925</td>
<td>&quot;BNC-BNC cable</td>
<td>2 m</td>
<td>1</td>
</tr>
<tr>
<td>89384LK</td>
<td>External sensor cable</td>
<td>Current sensor input connector: Length 0.5 m</td>
<td>1</td>
</tr>
<tr>
<td>89316FX</td>
<td>Printer roll paper</td>
<td>Thermal paper, 10 meters (1 roll)</td>
<td>10</td>
</tr>
</tbody>
</table>

### Application Software

<table>
<thead>
<tr>
<th>Model</th>
<th>Product</th>
<th>Description</th>
<th>Order Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>760122</td>
<td>WTViewer Software</td>
<td>Data acquisition software</td>
<td>1</td>
</tr>
<tr>
<td>761922</td>
<td>Harmonic/Voltage fluctuation/Flicker Measurement Software</td>
<td>Standard-compliant measurement</td>
<td>1</td>
</tr>
</tbody>
</table>

### Rack Mount

<table>
<thead>
<tr>
<th>Model</th>
<th>Product</th>
<th>Description</th>
<th>Order Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>751535-E4</td>
<td>Rack mounting kit</td>
<td>For EA</td>
<td>1</td>
</tr>
<tr>
<td>751535-J4</td>
<td>Rack mounting kit</td>
<td>For JIS</td>
<td>1</td>
</tr>
</tbody>
</table>

### AC/DC Current sensor /Clamp on Probe

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Name</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT1000</td>
<td>AD/DC Current sensor</td>
<td>DC to 300 kHz, (0.05% of reading +30 µA), 1000 Apk</td>
<td>-0 to 300 For Three-Phase U, V, and W, Basic accuracy: ±(0.05% of rdg + 40 µA)</td>
</tr>
<tr>
<td>CT2000</td>
<td>AD/DC Current sensor</td>
<td>DC to 500 kHz, (0.05% of reading +30 µA), 200 Apk</td>
<td>-0 to 300 For Three-Phase U, V, and W, Basic accuracy: ±(0.05% of rdg + 40 µA)</td>
</tr>
<tr>
<td>CT60</td>
<td>AD/DC Current sensor</td>
<td>DC to 800 kHz, (0.05% of reading +30 µA), 60 Apk</td>
<td>-0 to 60 For Three-Phase U, V, and W, Basic accuracy: ±(0.05% of rdg + 40 µA)</td>
</tr>
</tbody>
</table>

### Current Sensor Unit

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>751522</td>
<td></td>
<td>For Single-Phase</td>
<td>Measurement range: DC to 100 kHz</td>
</tr>
<tr>
<td>751524</td>
<td>-10</td>
<td>For Three-Phase U and V</td>
<td>Basic accuracy: ±(0.05% of rdg + 40 µA)</td>
</tr>
<tr>
<td>751525</td>
<td>-20</td>
<td>For Three-Phase U and W</td>
<td>(0.05% of rdg + 40 µA)</td>
</tr>
<tr>
<td>751526</td>
<td>-30</td>
<td>For Three-Phase U, V, and W</td>
<td>±(0.05% of rdg + 40 µA)</td>
</tr>
</tbody>
</table>

### Standard accessories

| Power cord, Spare power fuse, Rubber feet, current input protective cover, User’s manual, expanded user’s manual, communication interface user’s manual, printer roll paper (provided only with /B5), connector (provided only with /DA) Safety terminal adapter 758931 (provided two adapters in a set times input element number) |

- **Only one can be selected.**

### 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.
- Yokogawa is committed to protecting the global environment, and its electrical products are designed in accordance with Yokogawa’s Environmentally Friendly Product Design Guidelines and Product Design Assessment Criteria.