

## 7604 / 7605 Digital Power Meters WT210 / WT230



**WT210 (760401)**  
213 × 88 × 350 mm 3.0kg  
(8-3/8 × 3-1/2 × 13-3/4" 6.6 lbs)



**WT230 (760502, 760503)**  
213 × 132 × 350 mm 5.0kg  
(8-3/8 × 5-3/16 × 13-3/4" 11.0 lbs)



★ Safety Standards; EN61010, CATII, Pollution degree 2  
EMC Standard; EN61326 Class A, EN61000-3-2, 3  
Immunity Standard; EN61326 Annex A

The WT230's advanced specifications and its wide range of functions let you handle all your measurement applications from low-frequency equipment to high frequency inverters using a single power meter.

One unit also handles standby low-power measurements and rated-power measurements (functions available with the WT210 only).

### FEATURES

- Basic accuracy: 0.1%
- DC measurement, 0.5 Hz to 100 kHz frequency range
- Compact design (half-rack size)
- 5 mA range for very low current measurements (model WT210 only)
- Line filter function
- High-speed data update (as fast as 10 readings per second)
- Harmonic measurement function available
- User calibration capability
- Large-current measurement capability using external sensor input

### ● Wide range of 5 mA to 20 A

The built-in 5 mA range lets you measure currents as low as 25  $\mu$ A. This makes it possible to measure very low currents on such things as intermittent control equipment. The wide current range (5 mA to 20 A) means a single power meter can be used for applications such as Energy Star® measurements, to measure everything from standby-power to rated-power.

### FUNCTION

## ● A Wide Frequency Range Lets You Work on a Variety of Different Applications

**NEW** **Low-frequency Equipment**  
Low-frequency measurements starting at 0.5 Hz  
Low-frequency measurements starting at 0.5 Hz can be used with evaluations of cycloconverter and when a motor are started.

**NEW** **Commercial Power Supplies**  
0.1%  
Accuracy is even better than in former WT series.

**NEW** **Inverters**  
100 kHz frequency range  
Now you can obtain more precise measurements on high-frequency equipment such as inverters.

## ● Accuracy Is Assured between 1% and 130%

**WT210: 50  $\mu$ A** ← 1% → 130% → **26A**  
**WT230: 5mA**

\* Conditions apply to accuracy from 110% to 130%.

## ● Capture a Variety of Signal Types

**Surge current and maximum load state**  
MAX hold function for voltage, current, and power<sup>1</sup>

This function lets you keep, on the display, voltage and current peak values, voltage and current rms values, and maximum values for active power, apparent power, and reactive power.

**Half-wave Rectification, Intermittent Control, Distortion Waves**

Measurement of DC components

In addition to using DC inputs, you can obtain precise measurements of signals containing DC components, such as intermittent signals and half-wave rectification signals.

**NEW** **Constantly changing signals**  
Quick response with display updating as fast as every 0.1 second

With measurement intervals as short as 0.1 second, you can capture transient phenomena with a fine level of detail. You can also reduce the time per measurement for increased throughput in production testing.

**NEW** **Noisy Signals**

Line filter function ( $f_c = 500$  Hz)

This function lets you measure fundamental wave rms values for inverter output voltages.

Instead of taking notes, you can use the internal memory to store and recall settings and field measurement data.

# DIGITAL POWER METERS



## WT210 / WT230

### Powerful Tools for Energy Measurement

#### Extended Energy Measurement Applications

Maximum integration time: 10,000 hours<sup>1</sup>

Time can be set between 1 second and 10,000 hours (416 days) in 1-second increments.

#### Battery equipment applications

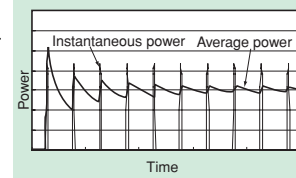
Integrating power measurement by polarity

Power and current values can be integrated separately for positive and negative polarities. Integrated values are shown with the decimal point moving according to the integrated value.

#### Intermittent Control Equipment Applications

Average active power display<sup>1</sup>

The power of intermittent control equipment changes significantly over time. The average active power in intermittent operations can be displayed, which is highly effective for consumed-power measurements.



$$\text{Average active power (W)} = \frac{\text{Integrated power (Wh)}}{\text{Integrated elapsed time (Hours)}}$$

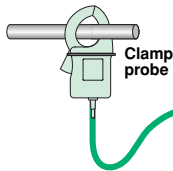
1: Popular functions on the WT200 were incorporated into WT210 and WT230.

### Applications for a Variety of Add-on Options

#### Large-current Measurement Using Current Clamps

External input for current sensor

Select either 50/100/200 mV or 2.5/5/10 V. A current clamp lets you measure currents without needing to disconnect the power supply circuit wiring.



#### Online Power Meter Control and Recording

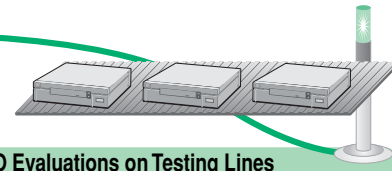
GP-IB/serial interface (RS-232-C)

This option lets you control the power meter through a PC, or save data to a PC.



#### Power Supply Harmonic Measurements

Calculate voltage, current, reactive power, content ratio, and phase angle relative to fundamental frequency for up to 50 orders. This option is well-suited to power supply environment evaluations. Measurement time is approximately 90% shorter than in former models.



#### Recording to a Recorder

D/A output

This option lets you output a variety of measurement data, such as voltage, current, and power measurements, with  $\pm 5$  V rating, for recording on a recorder. The recorder can then be used to check changes in data over time.



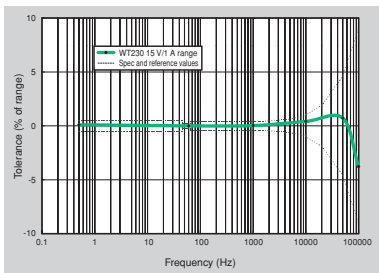
#### GO/NO-GO Evaluations on Testing Lines

4-channel comparator function

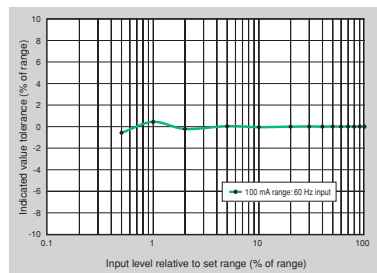
A 4-channel relay contact output (normal-open and normal-close pair) lets you do GO/NO-GO evaluations on production and testing lines.

### Basic Characteristics

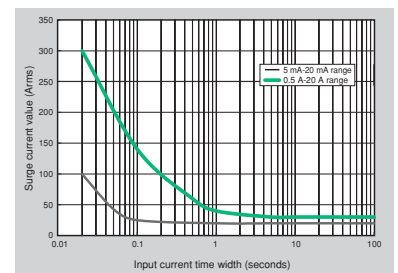
#### Example of Frequency-power Accuracy Characteristics



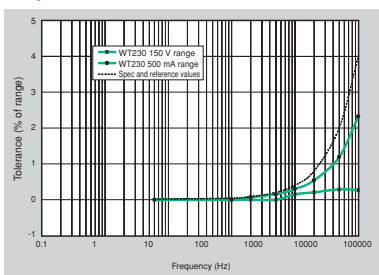
#### Example of WT210 Current Accuracy



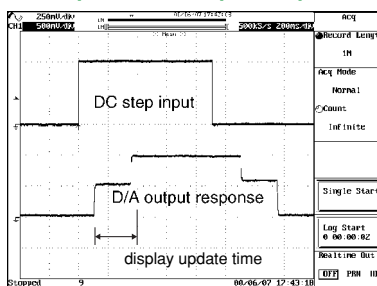
#### Current Input Surge Withstanding Ability



#### Example of Influence of Common Mode Voltage



#### Example of D/A Output Response



#### Comparison with Former Models

	WT200/WT130	WT210/WT230
Voltage input terminal	Binding post	Plug-in terminal (safety terminal)
External input terminal	Plug-in terminal (safety terminal)	BNC
Voltage and current basic accuracy	0.25% of rmg	0.2% of rmg
Power basic accuracy	0.3% of rmg (WT200) 0.35% of rmg (WT130)	0.2% of rmg
Frequency range	DC, 10 Hz to 20 kHz	DC, 0.5 Hz to 100 kHz
Assured accuracy range	10% to 130% of range rating	1% to 130% of range rating
Display updating interval	0.25 second (fixed)	0.1/0.25/0.5/1/2/5 seconds
V, A, W display digits	4 digits (WT130) 5 digits (WT200)	5 digits
Line filter function	No	Yes (fc = 500 Hz)
Frequency filter function	Yes (fc = 300 Hz)	Yes (fc = 500 Hz)
Key lock	No	Yes
Harmonic measurement display updating interval	Approximately 3 seconds	0.25/0.5/1/2/5 seconds
Remote signals when comparator is installed	EXT HOLD and EXT TRIG are added. EXT START, EXT STOP, EXT RESET, and INTEG BUSY are not added.	All six signals listed to the left are added. Pin assign is changed.
Online data format	ASCII	ASCII, binary
Waveform data communications output	No	Yes
Addressable mode B for GP-IB communications	Yes	No
Display digits (factory default)	4 digits	5 digits
Online output data (factory default)	4 digits	5 digits

Functions included with the WT200 (but Not Included with the WT130) and Included with the WT210/WT230

- MAX hold function
- Moving decimal point display based on integrated power value
- 10,000-hour maximum integration time
- Integration with few data omissions
- Average active power display

# DIGITAL POWER METERS



## WT210 / WT230

### SPECIFICATIONS

The latest product information is available at our web site <http://www.yokogawa.com/tm/>. Review the specifications to determine which model is right for you.

Input Specifications		
Parameter	Voltage	Current
Input type	Floating input	
	Resistance voltage divider	Shunt input system
Rated values (ranges)	15/30/60/150/300/600 V	Direct input: 5/10/20/50/100/200 mA (WT210 only) <sup>1</sup> ; 0.5/1/2/5/10/20 A (WT210/WT230) External input (optional): 2.5/5/10 V or 50/100/200 mV
Measuring instrument loss (input resistance)	Input resistance: Approximately 2 M $\Omega$ Input capacitance: Approximately 13 pF	Direct input: Approximately 500 m $\Omega$ + approximately 0.1 $\mu$ H (5-200 mA; WT210) Approximately 6 m $\Omega$ + 10 m $\Omega$ (max) <sup>2</sup> + approximately 0.1 $\mu$ H (0.5-20 A; WT210) Approximately 6 m $\Omega$ approximately 0.1 $\mu$ H (0.5-20 A; WT230) External input: Approximately 100 k $\Omega$ (2.5/5/10 V), approximately 20 k $\Omega$ (50/100/200 mV)
Maximum instantaneous allowed input (1 cycle, 20 ms duration)	Peak voltage of 2.8 kV or rms value of 2.0 kV (whichever is less)	0.5-20 A (WT210/WT230): Peak current of 450 A or rms value of 300 A (whichever is less) 5-200 mA (WT210): Peak current of 150 A or rms value of 100 A (whichever is less) External input: Peak value of 10 times range or less
Maximum instantaneous allowed input (1 second duration)	Peak voltage of 2.0 kV or rms value of 1.5 kV (whichever is less)	0.5-20 A (WT210/WT230): Peak current of 150 A or rms value of 40 A (whichever is less) 5-200 mA (WT210): Peak current of 30 A or rms value of 20 A (whichever is less) External input: Peak value of 10 times range or less
Maximum continuous allowed input	Peak voltage of 1.5 kV or rms value of 1.0 kV (whichever is less)	0.5-20 A (WT210/WT230): Peak current of 100 A or rms value of 30 A (whichever is less) 5-200 mA (WT210): Peak current of 30 A or rms value of 20 A (whichever is less) External input: Peak value of 5 times range or less
Maximum continuous common mode voltage (with 50/60 Hz input)	600 Vrms (with output connector protective cover), CAT II / 400 Vrms (without output connector protective cover) CAT II	
CMRR 600 Vrms across input terminal and case	50/60 Hz, -80 dB or higher ( $\pm 0.01\%$ of range or less) with voltage input terminals shorted and current input terminals open	
Input terminal type	Plug-in terminal (safety terminal)	Direct input: Large binding post External input: BNC
A/D converter	Simultaneous conversion of voltage and current inputs Resolution: 16 bits Maximum conversion speed: Approximately 20 $\mu$ s (approximately 51 kHz)	
Range switching	Ranges can be set manually, automatically, or through online controls. Auto-range function Range raising: When a measurement exceeds 130% of the rating, or when the peak value exceeds approximately 300% of the rating Range lowering: When a measurement falls to 30% or less of the rating, and the peak value falls to approximately 300% or less of the rating for the low range	
Measurement mode switching	Any of the following, selected manually or through online controls: RMS (true rms value measurements for both voltage and current), V MEAN (calibration of average-value-rectified rms value for voltage; true rms value measurement for current), DC (simple averages for both voltage and current)	

Note: Current direct input and external sensor input cannot both be used at the same time. When switching inputs, note that there is a common terminal for both positive and negative polarities.

1. Connect wires that match the size of the measurement current.

2. Factory setting

### Measurement Functions

Parameter	Voltage/current	Active power
System	Digital sampling; sum of averages method	
Frequency range	DC, and 0.5 Hz to 100 kHz	
Crest factor	3 (with rated input)	
Display accuracy Accuracy (three months after calibration) (Conditions) Temperature: 23 $\pm$ 5 $^{\circ}$ C Humidity: 30-75% RH Supply voltage: 100 V $\pm$ 5% Input waveform: Sinewave In-phase voltage: 0 V DC Frequency filter: ON at 200 Hz or less Scaling: OFF Display digits: 5 digits After CAL is executed As per Yokogawa standards	DC: $\pm(0.2\%$ or rdg + 0.2% of rng)* 0.5 Hz $\leq f < 45$ Hz: $\pm(0.1\%$ of rdg + 0.2% of rng) 45 Hz $\leq f \leq 66$ Hz: $\pm(0.1\%$ of rdg + 0.1% of rng) 66 Hz $< f \leq 1$ kHz: $\pm(0.1\%$ of rdg + 0.2% of rng) 1 kHz $< f \leq 10$ kHz: $\pm((0.07 \times f)\%$ of rdg + 0.3% of rng) 10 kHz $< f \leq 100$ kHz: $\pm((0.5\%$ of rdg + 0.5% of rng) $\pm((0.04 \times (f-10))\%$ of rdg)	DC: $\pm(0.3\%$ or rdg + 0.2% of rng)* 0.5 Hz $\leq f < 45$ Hz: $\pm(0.3\%$ of rdg + 0.2% of rng) 45 Hz $\leq f \leq 66$ Hz: $\pm(0.1\%$ of rdg + 0.1% of rng) 66 Hz $< f \leq 1$ kHz: $\pm(0.2\%$ of rdg + 0.2% of rng) 1 kHz $< f \leq 10$ kHz: $\pm(0.1\%$ of rdg + 0.3% of rng) $\pm((0.067 \times (f-1))\%$ of rdg) 10 kHz $< f \leq 100$ kHz: $\pm(0.5\%$ of rdg + 0.5% of rng) $\pm((0.09 \times (f-10))\%$ of rdg)
Note: In the accuracy calculation formula, f is in kHz.	* Add +10 $\mu$ A to the current DC accuracy.	* Add +10 $\mu$ A $\times$ voltage reading to the power DC accuracy.
Power factor effect	_____	For $\cos\phi = 0$ 45 Hz $\leq f \leq 66$ Hz: Add $\pm 0.2\%$ of VA to display accuracy. Reference data (up to 100 kHz): $\pm((0.2 + 0.2 \times f)\%$ of VA) Indicated value tolerance for $0 < \cos\phi < 1$ Add ( $\tan\phi \times$ (effect when power factor = 0))% of power reading to the above power accuracy. Note: $\phi$ is the phase angle between voltage and current.
Note: In the accuracy calculation formula, f is in kHz.		
Effective input range	1-130% of voltage/current range rating (for accuracy at 110-130%, add the reading tolerance $\times 0.5$ to the above accuracy)	
Accuracy (12 months after calibration)	Add the accuracy's reading tolerance (three months after calibration) $\times 0.5$ to the accuracy three months after calibration.	
Line filter function	A low-pass filter can be inserted in the input circuit for measurement. The cutoff frequency (fc) is 500 Hz.	
Accuracy with line filter on	Voltage and current: Add 0.2% of rdg at 45-66 Hz. Add 0.5% of rdg below 45 Hz. Power: Add 0.3% of rdg at 45-66 Hz. Add 1% of rdg below 45 Hz.	
Temperature coefficient	$\pm 0.03\%$ of range/ $^{\circ}$ C at 5-18 $^{\circ}$ C and 28-40 $^{\circ}$ C.	
Display updating intervals	0.1/0.25/0.5/1/2/5 seconds	
Measurement lower limit frequency	Data updating rate	0.1 second    0.25 second    0.5 second    1 second    2 seconds    5 seconds
	Measurement lower limit frequency	25 Hz    10 Hz    5 Hz    2.5 Hz    1.5 Hz    0.5 Hz

rdg: Reading  
rng: Range

### Frequency Measurements

Measurement inputs: V1, V2, V3, A1, A2, or A3 (select one)

Measurement system: Reciprocal system

Measurement frequency ranges

100 ms: 25 Hz  $\leq f \leq 100$  kHz

250 ms: 10 Hz  $\leq f \leq 100$  kHz

500 ms: 5 Hz  $\leq f \leq 100$  kHz

1 sec: 2.5 Hz  $\leq f \leq 100$  kHz

2.5 sec: 1.5 Hz  $\leq f \leq 50$  kHz

5 sec: 0.5 Hz  $\leq f \leq 20$  kHz

$\pm(0.05\%$  of rdg)

Accuracy: Input equal to at least 30% of voltage/current rated range. Frequency equal to at least 20% of frequency measurement range. Frequency filter function ON at 200 Hz and below.

### Communication Functions

GP-IB or serial interface (RS-232-C) (select one)

GP-IB

Electrical and mechanical specifications:

Conform to IEEE Standard 488-1978 (JIS C1901-1987).

Functional specifications:

SH1, AH1, T5, L4, SR1, RL1, PR0, DC1, DT1, C0

Conforms to IEEE Standard 488.2-1992.

Code used: ISO (ASCII) code

Addresses: 0-30 talker/listener addresses can be set.

Serial interface (RS-232-C)

Transmission mode: Asynchronous

Baud rates: 1200, 2400, 4800, 9600 bps

# DIGITAL POWER METERS



## WT210 & WT230

### Calculation Functions

	Single-phase 3-wire (2 voltages, 2 currents)	Three-phase 3-wire (3 voltages, 3 currents)	Three-phase 3-wire (3 voltages, 3 currents)	Three-phase 4-wire
Voltage $\Sigma V$	$(V1 + V3)/2$	$(V1 + V2 + V3)/3$	$(V1 + V2 + V3)/3$	$(V1 + V2 + V3)/3$
Current $\Sigma A$	$(A1 + A3)/2$	$(A1 + A2 + A3)/3$	$(A1 + A2 + A3)/3$	$(A1 + A2 + A3)/3$
Active power $\Sigma W$	$W1 + W3$	$W1 + W2 + W3$	$W1 + W2 + W3$	$W1 + W2 + W3$
Reactive power var, $\Sigma var$	Normal measurement $var_i = \sqrt{VA_i^2 - W_i^2}$	$var1 + var3$	$var1 + var2 + var3$	$var1 + var2 + var3$
Apparent power VA, $\Sigma VA$	Normal measurement $VA_i = V_i \times A_i$	$VA1 + VA3$	$\frac{\sqrt{3}}{2}(VA1 + VA3)$	$\frac{\sqrt{3}}{2}(VA1 + VA2 + VA3)$
Power factor PF, $\Sigma PF$	Power factor PF, $\Sigma PF$ $Pfi = Wi/VAi$	$\Sigma W/\Sigma VA$	$\Sigma W/\Sigma VA$	$\Sigma W/\Sigma VA$
Phase angle deg, $\Sigma deg$	Phase angle deg, $\Sigma deg$ $degi = \cos^{-1}(Wi/VAi)$	$degi = \cos^{-1}(\Sigma W/\Sigma VA)$	$degi = \cos^{-1}(\Sigma W/\Sigma VA)$	$degi = \cos^{-1}(\Sigma W/\Sigma VA)$

#### Notes

- This equipment's apparent power (VA), reactive power (var), power factor (PF), and phase angle (deg) are calculated from voltage, current, and active power. (Therefore, if the input contains a distorted wave, the values may not match those of other measuring instruments based on different measurement principles.)
- If either voltage or current falls to 0.5% of the range rating or less, then the apparent power (VA) and reactive power (var) are displayed as zero, and errors are displayed for power factor (PF) and phase angle (deg).
- Leading and lagging phase detection accuracy is specified for voltage and current inputs equal to 50% of the rating or greater.  
Detection accuracy:  $\pm 5$  deg (20 Hz to 2 kHz)
- In the  $\Sigma var$  calculation, the var value for each phase is calculated with a negative sign if the current input leads the voltage input, and with a positive sign if the current input lags the voltage input.

### Display Functions

Display unit: 7-segment LED (light-emitting diode)  
Display areas: 3

Display area	Displayed information
A	V, A, W, VA, var (for each element), integration elapsed time
B	V, A, W, PF, deg (for each element, percentage (content percentage, THD))
C	V, A, W, V/AHz, Vpk, Apk, $\pm Wh$ , $\pm Ah$ (for each element), MATH

Measurement parameters	Maximum display	Display resolution
V, A, W, VA, var	99999	0.001%
PF	$\pm 1.0000$	0.01%
deg	$\pm 180.0$	0.1°
$\pm Wh$ , $\pm Ah$	999999	0.0001%
VHz, AHz	99999	Input frequency/20,000

Display digits: 4 or 5 digits (selectable by user).  
Factory default setting is 5 digits.

Units: m, k, M, V, A, W, VA, var, Hz, h.s., deg, %  
Display updating intervals: 0.1/0.25/0.5/1/2/5 seconds  
Response time: Maximum 2 times the display updating interval (time required for display value to enter accuracy range of final value with line filter off, when range rating abruptly changes from 0% to 100%, and from 100% to 0%)

Display scaling function  
Effective digits: Selected automatically according to the digits in the voltage and current ranges.  
Setting range: 0.001 to 9999

Averaging function  
There are two averaging methods (selectable by user):  
Exponential average  
Moving average

In cases where response can be set and exponential average is used, the attenuation constant can be selected. In cases where a moving average is used, the number of averages N can be selected from 8, 16, 32, and 64.

Auto-range monitor  
An LED turns on when the input value is outside the range set for the auto-range.  
MAX hold function  
This function can be used to hold V, A, W, VA, var, Vpk, and Apk at maximum values.

MATH functions  
System: When a function key on DISPLAY C is pressed to select the MATH functions, it is possible to perform efficiency (WT230 only) and input crest factor measurements, as well as arithmetic calculations on DISPLAY A and B measurements. In addition, it is possible to display average active power for time-converted integrated power.

### Integration Functions

Display resolution: The minimum display resolution changes together with the integrated value.

Maximum display: -99999 to 999999 MWh/MAh  
Modes: Standard integration mode (timer mode), continuous integration mode (repeat mode), manual integration mode

Timer: Automatic integration start/stop based on timer setting.  
Setting range: 000 h:00 min:00 sec to 10000 h:00 min:00 sec (If the time is set to zero, manual mode is automatically set.)

Count over flow: When the integrated value exceeds 999999 MWh/MAh or falls to at least -99999 MWh/MAh, the elapsed time is saved and the operation is stopped.

Accuracy:  $\pm$ (display accuracy + 0.1% of rdg)  
Timer accuracy:  $\pm 0.02\%$   
Remote control: Starting, stopping, and resetting can be controlled through external contact signals. This function is only available when option /DA4 or /DA12 is installed.

### Internal Memory Functions

#### Measurement data

Stored data	Normal measurement	Harmonic measurement
WT210 (760401)	Data for 600 samples	Data for 30 samples
WT230 (760502)	Data for 300 samples	Data for 30 samples
WT230 (760503)	Data for 200 samples	Data for 30 samples

Store interval: Display updating interval and 1 second to 99 hours, 59 minutes, and 59 seconds  
Recall interval: Display updating interval and 1 second to 99 hours, 59 minutes, and 59 seconds  
(Both can be set in 1-second increments.)  
Panel setting information: Four different patterns of panel setting information can be written/read.

### Harmonic Measurement Function (optional)

System: PLL synchronization  
Measurement frequency range: Fundamental frequency in range of 40-440 Hz  
Display resolution: 9999 or 20000  
Analysis parameters: V, A, W, deg (WT210), V1, V2, V3, A1, A2, A3, W1, W2, W3, deg1, deg2, deg3 (WT230), individual harmonic levels, rms voltage, rms current, active power, fundamental frequency PF, harmonic distortion rate, individual harmonic content  
Note: These parameters can only be analyzed simultaneously for a single specified input module.

Sampling speed, window width, and analysis orders  
The values for these parameters vary according to the input fundamental frequency as shown below.

Fundamental frequency	Sampling speed	Window width	Analysis orders
$40 \leq f < 70$ Hz	$f \times 512$ Hz	2 periods of f	50
$70 \leq f < 130$ Hz	$f \times 256$ Hz	4 periods of f	50
$130 \leq f < 250$ Hz	$f \times 128$ Hz	8 periods of f	50
$250 \leq f \leq 440$ Hz	$f \times 64$ Hz	16 periods of f	30

FFT data length: 1024  
FFT processed word length: 32 bits  
Window function: Rectangular  
Display updating interval: 0.25/0.5/1/2/5 seconds

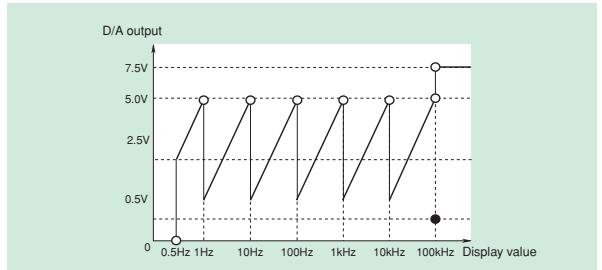
Updating is slower during online output according to the communication speed and the number of parameters transferred.

Accuracy: Add  $\pm 0.2\%$  of range to normal measurement accuracy.  
Note: For nth-order component input, add ((nth order reading)  $\times$  (10/(m+1)))% to the n-mth order and n-mth order.

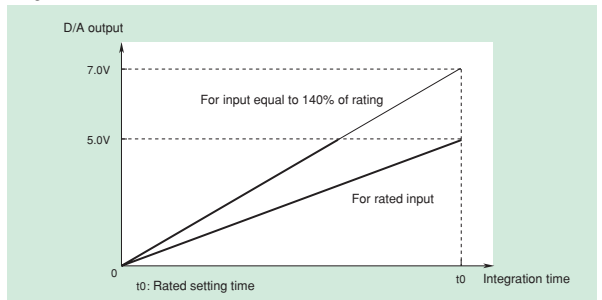
### D/A Output (optional)

Output voltage:  $\pm 5$  V FS (maximum approximately  $\pm 7.5$  V) for each rated value  
Number of outputs: 12 parameters with /DA12 option; 4 parameters with /DA4 option  
Output data selection: Can be set separately for each channel.  
Accuracy:  $\pm$ (equipment accuracy + 0.2% of FS)  
Updating interval: Same as the equipment's display updating interval  
Temperature coefficient:  $\pm 0.05\%$  C of FS  
Output type

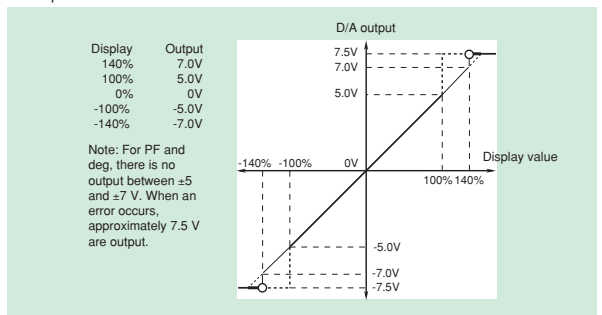
#### Frequency



#### Integration



#### Other parameters



# DIGITAL POWER METERS



## WT210 / WT230

### External Input (Optional)

Select either /EX1 or /EX2 for the voltage output-type current sensor.  
 /EX1: 2.5/5/10 V  
 /EX2: 50/100/200 mV  
 Specifications: See the section on input specifications.

### Comparator Output (Optional)

Output method: Normal-open and normal-close relay contact output (pair)  
 Number of output parameters and settings: Four parameters; can be set separately on each output channel.  
 Contact capacitance: 24 V/0.5 A  
 D/A output (4-channel): See section on D/A output (optional)

### External Control Signal (with D/A or /CMP Option Only)

External control signals: EXT-HOLD, EXT-TRIG, EXT-START, EXT-STOP, EXT-RESET, INTEG-BUSY  
 Input: TTL level negative pulse

### General Specifications

Warmup time: Approximately 30 minutes  
 Operating temperature and humidity ranges: 5-40°C, 20-80% RH (no condensation)  
 Storage temperature: -25-60°C (no condensation)  
 Maximum operating elevation: 2000 meters  
 Insulating resistance: 50 MΩ or higher at 500 V DC across all of the following areas:  
 Voltage input terminals (ganged) and case  
 Current input terminals (ganged) and output terminals (ganged)  
 Voltage input terminals (ganged) and current input terminals (ganged)  
 Voltage input terminals (ganged) of each element  
 Current input terminals (ganged) of each element  
 Voltage input terminals (ganged) and power plug  
 Current input terminals (ganged) and power plug  
 Case and power plug  
 Insulating withstand voltage:  
 3700 V for one minute at 50/60 Hz across all of the following areas:  
 Voltage input terminals (ganged) and case  
 Current input terminals (ganged) and output terminals (ganged)  
 Voltage input terminals (ganged) and current input terminals (ganged)  
 Voltage input terminals (ganged) of each element  
 Current input terminals (ganged) of each element  
 Voltage input terminals (ganged) and power plug  
 Current input terminals (ganged) and power plug  
 1500 V for one minute at 50/60 Hz across case and power plug

Power supply: Free power supply (100-240 V), 50/60 Hz frequency  
 Consumed power: Max 35 VA for WT210, max 55 VA for WT230  
 External dimensions for WT210: Approximately 213 × 88 × 350 mm (WHD) (excluding projections)  
 External dimensions for WT230: Approximately 213 × 132 × 350 mm (WHD) (excluding projections)  
 Weight: Approximately 3 kg for WT210, approximately 5 kg for WT230

### Model Numbers and Suffix Codes

Model number	Suffix code	Description	
760401		WT210 single-input element model	
Power cord	-D	UL/CSA standard	
	-F	VDE standard	
	-R	SAA standard	
	-Q	BS standard	
Options	/C1	GP-IB communication interface	Select one
	/C2	Serial (RS-232-C) communication interface	
	/EX1	External input 2.5/5/10 V	Select one
	/EX2	External input 50/100/200 mV	
	/HRM	Harmonic analysis function	
	/DA4	4-channel DA output	Select one
/CMP	Comparator and D/A, 4 channels each		

Note: The WT210 communication interface cannot be changed or modified after delivery.

Model number	Suffix code	Description	
760502		WT230 2-input element model	
760503		WT230 3-input element model	
Interface	-C1	GP-IB communication interface	Select one
	-C2	Serial (RS-232-C) communication interface	
Power cord	-D	UL/CSA standard	
	-F	VDE standard	
	-R	SAA standard	
	-Q	BS standard	
Options	/EX1	External input 2.5/5/10 V	
	/EX2	External input 50/100/200 mV	Select one
	/HRM	Harmonic analysis function	
	/DA12	12-channel DA output	
/CMP	Comparator and D/A, 4 channels each	Select one	

### Rack mounts

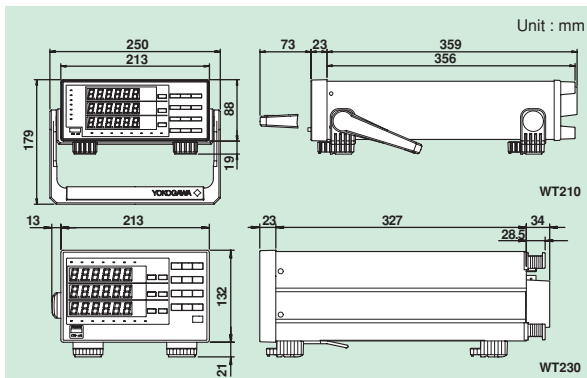
Product	Model or part number	Specification	Order quantity
Rack mounting kit	751533-E2	For WT210 EIA standalone installation	1
Rack mounting kit	751533-J2	For WT210 JIS standalone installation	1
Rack mounting kit	751534-E2	For WT210 EIA connected installation	1
Rack mounting kit	751534-J2	For WT210 JIS connected installation	1
Rack mounting kit	751533-E3	For WT230 EIA standalone installation	1
Rack mounting kit	751533-J3	For WT230 JIS standalone installation	1
Rack mounting kit	751534-E3	For WT230 EIA connected installation	1
Rack mounting kit	751534-J3	For WT230 JIS connected installation	1

Ask Yokogawa for information on rack mounts in which WT210 and WT230 are combined.

### Accessories (sold separately)

Model number	Description	
B9317WD	1.5 mm Allen wrench	For fastening cable on 758931
B9284LK	External sensor cable	For external input; 50 cm

### Exterior View



### Wiring Types and Model Numbers

Wiring	Model	760401	760502	760503
Single-phase 2-wire		✓	✓	✓
Single-phase 3-wire		-	✓	✓
Three-phase 3-wire (2 voltages, 2 currents)		-	✓	✓
Three-phase 3-wire (3 voltages, 3 currents)		-	-	✓
Three-phase 4-wire		-	-	✓

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.

### 758917

**Measurement leads**  
 Two leads (one red and one black) in a set. Alligator adapters are sold separately. Use 758917 in combination with 758922 or 758929.  
 Total length: 75 cm  
 Rating: 1000 V



### 758929

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



### 758922

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



### 758931

**Safety terminal adapter set**  
 Screw-fastened adapters. Two adapters (one red and one black) in a set. 1.5 mm Allen wrench included for tightening.



## WT210 / WT230

### Related Products

- For current measurements with wires connected

#### 751550 Clamp Probe

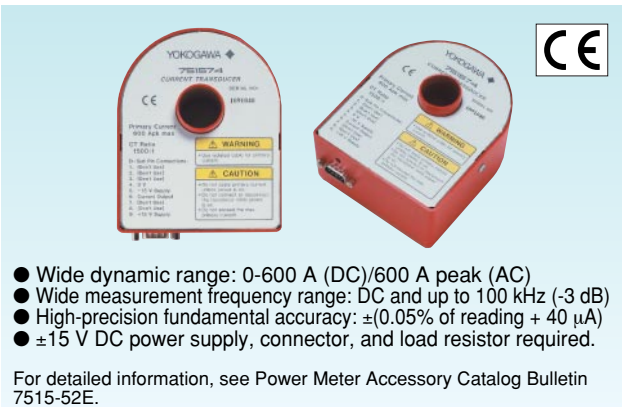


A separately sold adapter (366921) is required for connection to WT210/WT230. For detailed information, see Power Meter Accessory Catalog Bulletin 7515-52E. This model is treated as a special-order product.

<sup>1</sup> Use with low-voltage circuits (42 V or less).

- For high precision (0.05% + 40  $\mu$ A)

#### 751574 Current Transducer



#### Protecting the global environment

Yokogawa's products are developed and produced in facilities that have received ISO14001 approval.

- For high-current measurements up to 1000 Arms

#### 751552 Clamp Probe



A separately sold fork terminal adapter set (758921), measurement leads (758917; see photo above), etc. are required for connection to WT210/WT230. For detailed information, see Power Meter Accessory Catalog Bulletin 7515-52E.

#### CAUTION



- Read the user's manual carefully for correct and safe use of the instrument.