

YOKOGAWA

WT1600

The Yokogawa WT1600 is a high-performance, high-precision digital sampling power analyzer capable of measuring up to six phases on a single unit. It serves a wide range of applications, from testing extremely small currents in energy-saving devices to evaluating large-sized inverter-driven loads and motors.

SPECIFICATIONS

General

Interfaces	GP-IB (standard), RS-232 (standard), Ethernet (optional /C10), VGA output (optional /V1)
Display	8.4-inch color TFT LCD, 640 × 480 pixels
Warm-up Time	Approx. 30 minutes

Physical

Power Supply	100 to 240 VAC, 50/60 Hz, maximum 150 VA
Operating Temperature	5 to 40 °C °C
Dimensions (W×H×D)	426 × 177 × 430 mm mm
Weight	Approx. 15 kg kg

Input Channels & Configuration

Number of Input Elements	Up to 6 channels (phases)
Element Configuration Types	5 A element and 30 A element
Phase Configurations	1P2W, 1P3W, 3P3W, 3P3W (3V3A), 3P4W
Voltage Input Coupling	AC or DC
Current Input Coupling	AC or DC
Input Terminals Type	Safety terminal bushings for voltage; Binding posts for current

Measurement Ranges & Input Characteristics

Direct Voltage Range	1.5 V, 3 V, 6 V, 15 V, 30 V, 60 V, 150 V, 300 V, 600 V, 1000 V
Direct Current Range (5 A Element)	10 mA, 20 mA, 50 mA, 100 mA, 200 mA, 500 mA, 1 A, 2 A, 5 A
Direct Current Range (30 A Element)	1 A, 2 A, 5 A, 10 A, 20 A, 30 A
External Current Sensor Input Range	50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V, 5 V, 10 V
Voltage Input Impedance	Approx. 10 M Ω , 12 pF
Current Input Impedance (5 A Element)	Approx. 100 m Ω + 0.05 μ H
Current Input Impedance (30 A Element)	Approx. 6 m Ω + 0.05 μ H
External Current Sensor Input Impedance	Approx. 1 M Ω , 40 pF
Crest Factor Range	Up to 3 (at rated input); up to 6 (at 1/2 rated input)
Maximum Input Voltage	1000 Vrms, 1500 Vpeak
Maximum Input Current (5 A Element)	10 Arms, 15 Apeak
Maximum Input Current (30 A Element)	40 Arms, 100 Apeak

Measurement Performance & Accuracy

Frequency Range	DC, 0.5 Hz to 1 MHz
A/D Converter Resolution	16 bits
Sampling Rate	Approx. 200 kS/s
Basic Voltage Measurement Accuracy	$\pm(0.1\%$ of reading + 0.05% of range) at 50/60 Hz
Basic Current Measurement Accuracy	$\pm(0.1\%$ of reading + 0.05% of range) at 50/60 Hz
Basic Active Power Accuracy	$\pm(0.1\%$ of reading + 0.05% of range) at 50/60 Hz
Voltage Accuracy (DC)	$\pm(0.1\%$ of reading + 0.1% of range)
Current Accuracy (DC)	5 A element: $\pm(0.1\%$ of reading + 0.1% of range); 30 A element: $\pm(0.1\%$ of reading + 0.1% of range) + 10 mA
Active Power Accuracy (DC)	5 A element: $\pm(0.1\%$ of reading + 0.1% of range); 30 A element: $\pm(0.1\%$ of reading + 0.1% of range) + (10 mA $\times$ voltage reading)
Maximum Common Mode Voltage	1000 Vrms
Influence of Common Mode Voltage	$\pm 0.01\%$ of range or less (at 1000 Vrms, 50/60 Hz)

Power & Harmonic Analysis Functions

Measurement Parameters	U, I, P, S, Q, λ (PF), ϕ (phase angle), f (frequency), Upk+, Upk-, Ipk+, Ipk-, Wh, Wh+, Wh-, Ah, Ah+, Ah-, varh, η (efficiency)
Harmonic Measurement Bandwidth	PLL synchronization (10 Hz to 1.2 kHz) or external clock
Harmonic Order Limit	Up to 100th order (frequency dependent)
Harmonic Parameters Measured	Harmonic voltage, current, active power, phase angle, content, THD
Total Harmonic Distortion Modes	THD of fundamental (IEC) or THD of total (DIN)
Integration Modes	Standard, Continuous, Real-time Standard, Real-time Continuous
Efficiency Calculation Capacity	Up to 4 efficiency equations can be defined
Flicker Measurement	IEC61000-3-3 compliant (optional /FL)

DC Source & Stimulus Capabilities

Motor Evaluation Function	Analog or pulse input for speed and torque; calculates motor and total efficiency (optional /MTR)
Speed Sensor Input Type	Analog voltage or pulse
Torque Sensor Input Type	Analog voltage or pulse

Data Logging, Memory & Visualization

Display Modes	Numerical, Waveform, Trend, Vector, Bar graph, Split screen
Display Update Interval	0.05 s, 0.1 s, 0.2 s, 0.5 s, 1 s, 2 s, 5 s
Maximum Logging Rate	Up to 50 ms (20 times per second) into internal memory
Internal Storage Capacity	Approx. 11 MB
External Storage	PC Card slot (Type II PCMCIA), Floppy disk drive

System Interfaces & Connectivity

Standard Ports	VGA output (15-pin D-sub)
GP-IB Interface Option	Standard (IEEE-488 compliant)
Serial Interface Option	Standard (RS-232)
Ethernet Interface Option	100BASE-TX / 10BASE-T (option /C10)
Built-in Printer Option	Thermal line dot method, 112 mm paper width (option /B5)
Analog Outputs (DAC)	30 channels, ± 5 V FS output voltage (option /DA30)
External Synchronization Input	For synchronizing two WT1600 units

Power Supply & Safety Compliance

Mains Input Voltage Range	100 to 240 VAC
Mains Input Frequency	50/60 Hz
Maximum Power Consumption	150 VA
Safety Standards	EN61010-1, EN61010-2-031, CAT II 1000V / CAT III 600V
EMC Directive Standards	EN61326, EN55011 Class A
Withstanding Voltage	1500 VAC for 1 minute (between power terminal and casing)
Insulation Resistance	50 M Ω or more (at 500 VDC, between power terminal and casing)

Physical & Environmental Specifications

Operating Humidity Range	20% to 80% RH (no condensation)
Storage Temperature Range	-25 to 60 °C
Storage Humidity Range	20% to 80% RH (no condensation)
Installation Altitude	2000 m or less
Cooling System Type	Forced air cooling (internal fan)
Rack-Mount Compatibility	Supports 19-inch rack-mount (using optional EIA/JIS kits)

Scaling Function

VT (PT) Ratio Range	0.0001 to 99999.9999
CT Ratio Range	0.0001 to 99999.9999
SF (Scaling Factor) Range	0.0001 to 99999.9999

Filters

Line Filter Cutoff Frequencies	5.5 kHz, 50 kHz, or OFF
Frequency Filter Cutoff Frequencies	500 Hz or OFF

Averaging

Averaging Types	Exponential average (attenuation constant 2 to 64), Moving average (average count 8 to 64)
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Measurement Ranges

Phase Difference Display Range	-180.00° to 180.00°
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Integration

Integration Time Range	0000h00m00s to 10000h00m00s
Integration Time Accuracy	±0.02% of reading

Interfaces & Outputs

Video Output Port	D-sub 15-pin VGA (option /V1)
D/A Output Channels	30 channels (option /DA)
Built-in Printer Paper Width	112 mm (option /B5)

Storage

PCMCIA Card Slot	Type II (standard)
Built-in Floppy Disk Drive	3.5-inch 1.44 MB (standard)

Performance

Phase Angle Accuracy	±0.15° (at 50/60 Hz)
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TECHNOLOGY

Digital Sampling Power Analysis

APPLICATIONS

Efficiency testing of inverters, motors, hybrid/electric vehicles, renewable energy systems, and power quality analysis

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