HIOKI

NEW

PW6001

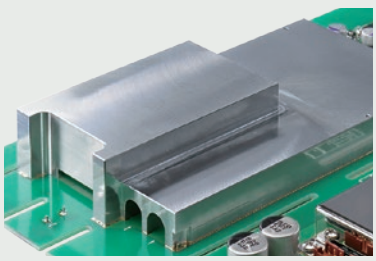
Wattmetro da banco a 6 canali modulare, componibile, con opzione rack

Elevata precisione, ampia banda di frequenza, altissima stabilità.

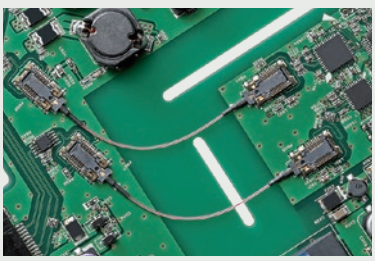
PW6001 combina questi 3 elementi fondamentali, per una misura dei parametri di potenza elettrica ai massimi livelli. Le ottime prestazioni base di PW6001 sono raggiunte utilizzando le più avanzate tecnologie costruttive in termini di componentistica, assemblaggio, elaborazioni matematiche.

Ottima immunità al rumore elettrico e alle variazioni di temperatura

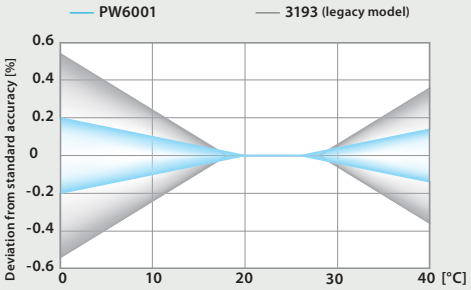
Schermature metalliche customizzate in "materiale pieno", opto-isolatori con connessione in fibra ottica, distanze ottimizzate tra i vari componenti: con questi principi PW6001 raggiunge performance di precisione base dell'ordine del ± 0.02%, un CMRR di 80 dB a 100 kHz, una stabilità in temperatura del ±0.01%/°C.



Solid shield



Optical isolation device



3x improvement in temperature characteristics compared to legacy model

* Unit accuracy only

Banda di Frequenza: CC e da 0.1Hz a 2MHz

PW6001 è ideale per svolgere misure di potenza ad elevata precisione su dispositivi che presentano una rapidissima velocità di commutazione tramite semiconduttori SiC (al carburo di silicio).

12 modelli: da 1 a 6 canali di ingresso, con o senza “opzione motori”

Campionamento a 5MS/s per una vera analisi in frequenza

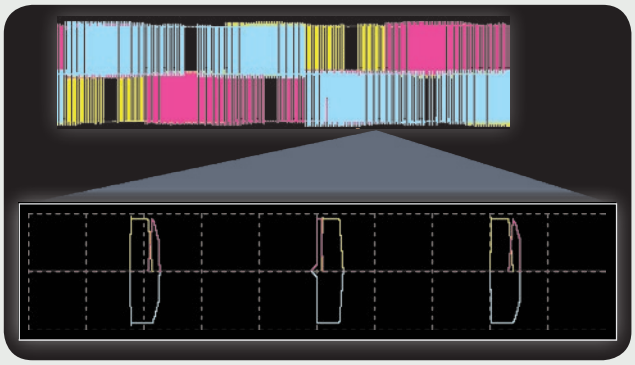
Per ottenere una buona analisi di potenza su apparati con controllo PWM quali inverter e condizionatori di potenza, è opportuno avere una elevata frequenza di campionamento così da intercettare ogni singolo impulso di modulazione e ricostruire perfettamente la forma d’onda risultante.

PW6001 ha un campionamento diretto dei segnali in ingresso di 5MS/s, su una banda di misura di 2 MHz.

Ciò permette di produrre analisi senza errori dovuti agli effetti di aliasing.

Registrazione su lungo periodo

Mantenendo immutata la frequenza di campionamento della forma d’onda a 5MS/s, PW6001 consente di configurare una specifica e diversa cadenza di registrazione delle forme d’onda. Grazie ad una capacità di 2MB per ogni canale tensione-corrente, è possibile registrare segnali per 100 secondi (a 10 KS/s).



Funzione oscilloscopio a display

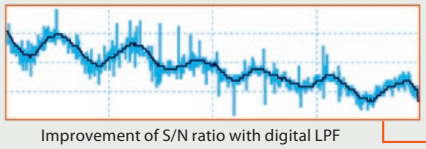
Tramite la funzione “cursore” è possibile scorrere e zoomare la forma d’onda registrata ed intercettare ogni minima variazione, anche dovuta a rumore elettrico.

Convertitore A/D a 18bit

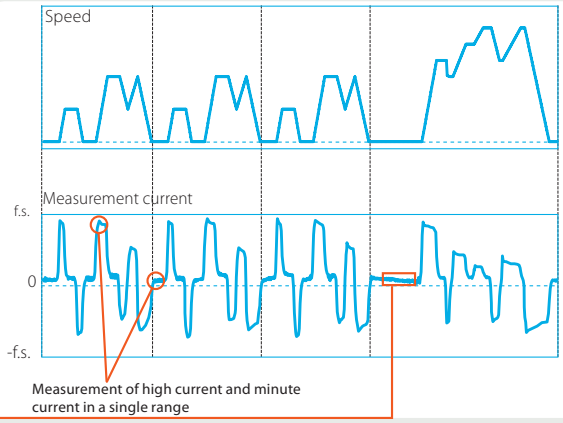
Il convertitore a 18 bit espande la banda dinamica di misura, consentendo misure accurate per bassi segnali in ingresso senza la necessità di cambiare la portata di misura.

PW6001 gestisce inoltre un filtro passa-basso LPF per l'eliminazione dei segnali di disturbo ad alta frequenza.

True HD
18-bit resolution



Improvement of S/N ratio with digital LPF



Funzione di calcolo simultaneo

Ogni segnale in ingresso ed ogni elaborazione di misura viene digitalizzato individualmente, senza alcun effetto reciproco. I processi di calcolo consentono di ottenere una velocità di aggiornamento dei dati di 10 ms, mantenendo la massima accuratezza.

Accuracy guaranteed @ 10ms data update

Fast, simuntaneous processing

Zero-cross filter

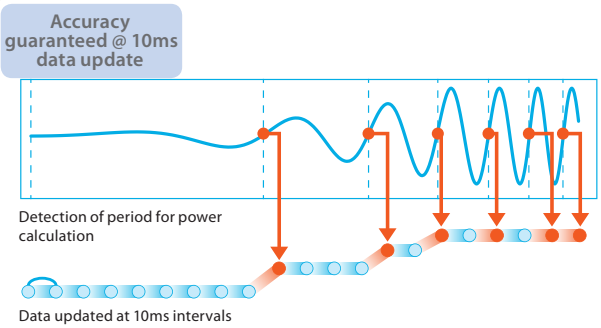
Completely simultaneous digital processing in the PW6001

AAF: Antialiasing filter
Filter for preventing aliasing distortion in harmonic calculations

Calcolo di potenza ogni 10 msec

Misura di potenza in momenti transitori, quali la partenza motori o variazioni di velocità, con aggiornamento dati ogni 10ms.

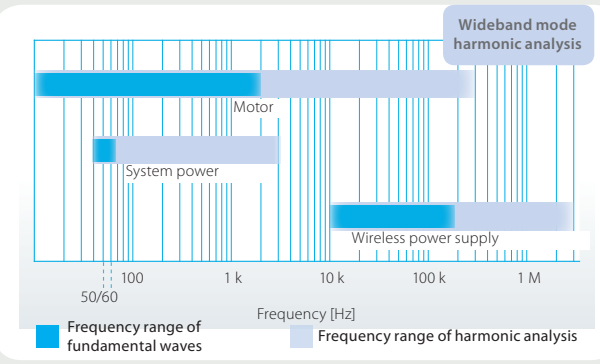
I risultati di misura seguono la forma d'onda fondamentale, anche per importanti variazioni di frequenza, a partire da 0,1 Hz.



Analisi armonica fino a 1.5MHz

PW6001 dispone di una elevata larghezza di banda per l'analisi armonica ed è in grado di elaborare il contenuto armonico fino al 100° ordine, per una frequenza massima di 1.5MHz e con una fondamentale compresa tra 0.1Hz e 300kHz.

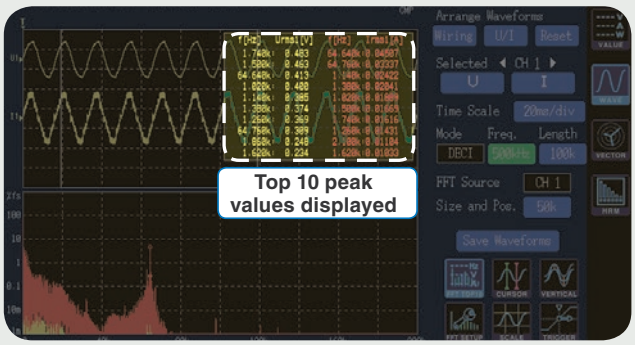
Grazie a queste prestazioni, PW6001 è in grado di monitorare i livelli di distorsione in uscita da alimentatori wireless.



Analisi FFT delle forme d'onda

Analisi in frequenza fino a 2 MHz. Seleziona l'intervallo di frequenza da monitorare ed il display ti mostra i 10 valori di picco più significativi.

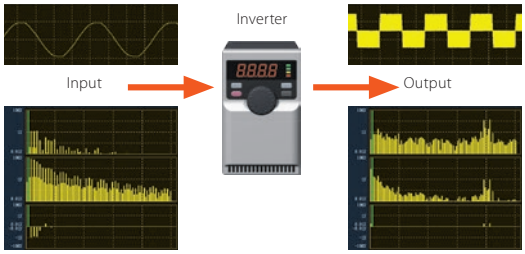
Waveform analysis function



Analisi armonica simultanea input/output

Valutazione delle componenti armoniche in ingresso ed uscita da un inverter, fino a 6 sistemi di misura monofase contemporanei, con 6 distinte sincronizzazioni.

Max 6 systems Symultaneous harmonic analysis



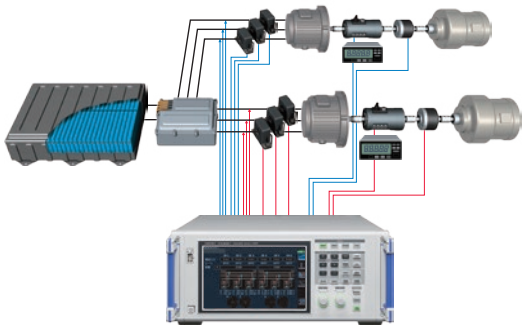
Synchronization with each fundamental wave

2 motori in simultanea

Funzionalità DUAL MODE per l'analisi simultanea di 2 motori elettrici. Sui veicoli ibridi, è possibile testare in contemporanea la potenza del motore elettrico combinata alla potenza del motore termico.

Dual Motor analysis

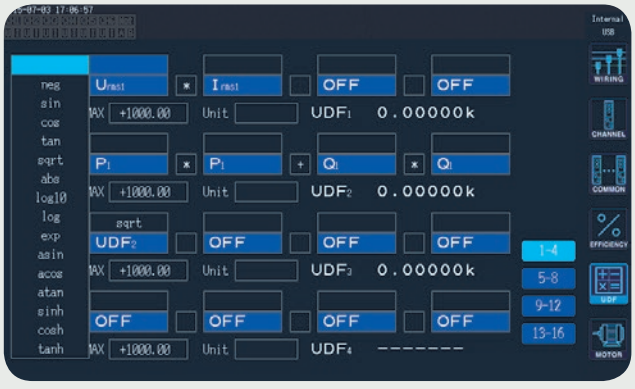
Example of 2 motor measurement



Funzioni matematiche a display

PW6001 consente di impostare fino a 16 equazioni e funzioni di calcolo quali "seno", "coseno", "logaritmo", ecc… I risultati sono visualizzati a display e possono essere inseriti su altre formule di calcolo per analisi più complesse ed approfondite.

Flexible efficiency calculation



Gestione remota LAN/Wi-Fi

Grazie alla funzionalità HTTP server, PW6001 è totalmente gestibile in modalità remota tramite PC, tablet o smartphone in connessione LAN o Wi-Fi.

Easy setup

Operatività semplice e intuitiva

Nessuna perdita di tempo, ogni impostazione e visualizzazione è veloce, chiara ed immediata.

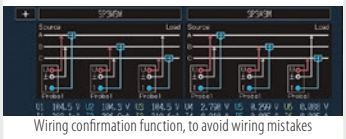
Dual knobs

Connection confirmation screen

Handwritten memo

On-screen keypad

Dual knobs for vertical/horizontal manipulation of waveforms



Wiring confirmation function, to avoid wiring mistakes

Enter handwritten memos on the screen, or use the onscreen keypad

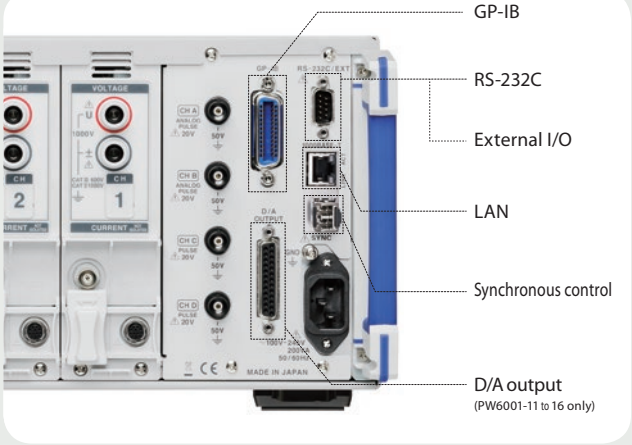
9-inch touch screen with soft keypad

Una interfaccia per ogni esigenza

LAN, USB, GP-IB, RS232C, Ext I/O, ecc…

USB flash drive interface

Internal memory



Applicativo software PW Communicator

PW Communicator è un software applicativo fornito in dotazione, dedicato all'interfacciamento a PC tramite connessione LAN, GP-IB, RS232C. L'applicazione contiene funzioni utili per la configurazione, la visualizzazione dei valori di misura, l'acquisizione dati… e molto altro.

LABVIEW driver

Il driver per Labview consente di acquisire le misurazioni effettuate da PW6001 su software National Labview (marchio registrato di National Instruments Corporation).

Versioni disponibili

CODICE	CANALI DI INGRESSO	OPZIONE "ANALISI MOTORI & D/A OUTPUT"
PW6001/01	01	NO
PW6001/02	02	NO
PW6001/03	03	NO
PW6001/04	04	NO
PW6001/05	05	NO
PW6001/06	06	NO
PW6001/11	01	SI
PW6001/12	02	SI
PW6001/13	03	SI
PW6001/14	04	SI
PW6001/15	05	SI
PW6001/16	06	SI

PW6001-16 (with 6 channels and motor analysis & D/A output)

Il numero di canali e l'opzione "analisi motori & D/A output" devono essere definiti in fase d'ordine. È possibile modificare o integrare queste opzioni in un secondo momento, tramite invio in fabbrica dell'unità completa PW6001.

Basic Specifications

Power measurement

Measurement lines	1-phase/2-wire (1P2W), 1-phase/3-wire (1P3W), 3-phase/3-wire (3P3W2M, 3V3A, 3P3W3M), 3-phase/4-wire (3P4W)

	CH1	CH2	CH3	CH4	CH5	CH6
Pattern 1	1P2W	1P2W	1P2W	1P2W	1P2W	1P2W
Pattern 2	1P3W / 3P3W2M		1P2W	1P2W	1P2W	1P2W
Pattern 3	1P3W / 3P3W2M		1P2W	1P3W / 3P3W2M		1P2W
Pattern 4	1P3W / 3P3W2M		1P3W / 3P3W2M		1P3W / 3P3W2M	
Pattern 5	3P3W3M / 3V3A / 3P4W			1P2W	1P2W	1P2W
Pattern 6	3P3W3M / 3V3A / 3P4W			1P3W / 3P3W2M		1P2W
Pattern 7	3P3W3M / 3V3A / 3P4W			3P3W3M / 3V3A / 3P4W		

For 2-channel combinations, select 1P3W or 3P3W2M.
For 3-channel combinations, select 3P3W3M, 3V3A, or 3P4W.

Number of channels	1	2	3	4	5	6
Pattern 1	✓	✓	✓	✓	✓	✓
Pattern 2	–	✓	✓	✓	✓	✓
Pattern 3	–	–	–	–	–	✓
Pattern 4	–	–	–	✓	–	✓
Pattern 5	–	–	✓	✓	✓	✓
Pattern 6	–	–	–	–	✓	✓
Pattern 7	–	–	–	–	–	✓

Connection patterns that can be selected based on the number of channels:
[✓] Can be selected, [-] Cannot be selected

Number of input channels	Max. 6 channels; each input unit provides 1 channel for simultaneous voltage and current input
Input terminal profile	Voltage: Plug-in terminals (safety terminals) Probe 1: Dedicated connector (ME15W) Probe 2: BNC (metal) + power supply terminal
Probe 2 power supply	+12 V ±0.5 V, -12 V ±0.5 V, max. 600 mA, up to a max. of 700 mA for up to 3 channels
Input method	Voltage measurement unit: Photoisolated input, resistance voltage divider Current measurement unit: Isolated input from current sensor (voltage output)
Voltage range	6 V / 15 V / 30 V / 60 V / 150 V / 300 V / 600 V / 1500 V
Current range (Probe 1)	400 mA / 800 mA / 2 A / 4 A / 8 A / 20 A (with 20 A sensor) 4 A / 8 A / 20 A / 40 A / 80 A / 200 A (with 200 A sensor) 1 A / 2 A / 5 A / 10 A / 20 A / 50 A (with 50 A sensor) 10 A / 20 A / 50 A / 100 A / 200 A / 500 A (with 500 A sensor) 20 A / 40 A / 100 A / 200 A / 400 A / 1 kA (with CT6865)
(Probe 2)	1 kA / 2 kA / 5 kA / 10 kA / 20 kA / 50 kA (with 0.1 mV/A sensor) 100 A / 200 A / 500 A / 1 kA / 2 kA / 5 kA (with 1 mV/A sensor) 10 A / 20 A / 50 A / 100 A / 200 A / 500 A (with 10 mV/A sensor; with 3274 or 3275) 1 A / 2 A / 5 A / 10 A / 20 A / 50 A (with 100 mV/A sensor; with 3273 or 3276) 100 mA / 200 mA / 500 mA / 1 A / 2 A / 5 A (with 1 V/A sensor; with CT6700 or CT6701) (0.1 V / 0.2 V / 0.5 V / 1.0 V / 2.0 V / 5.0 V range)
Power range	2.40000 W to 4.50000 MW (depending on voltage and current combinations)
Crest factor	3 (relative to voltage/current range rating); however, 1.33 for 1500 V range, 1.5 for 5 V Probe 2 range 300 (relative to minimum valid voltage and current input); however, 133 for 1500 V range, 150 for 5 V Probe 2 range
Input resistance (50 Hz / 60 Hz)	Voltage inputs: 4 MΩ ±40 kΩ Probe 1 inputs: 1 MΩ ±50 kΩ Probe 2 inputs: 1 MΩ ±50 kΩ
Maximum input voltage	Voltage inputs: 1000 V, ±2000 Vpeak (10 ms or less) Input voltage frequency of 250 kHz to 1 MHz, (1250 - f) V Input voltage frequency of 1 MHz to 5 MHz, 50 V Unit for f above: kHz Probe 1 inputs: 5 V, ±12 Vpeak (10 ms or less) Probe 2 inputs: 8 V, ±15 Vpeak (10 ms or less)
Maximum rated voltage to earth	Voltage input terminal (50 Hz/60 Hz) CATIII 600V; anticipated transient overvoltage: 6000V CATII 1000V; anticipated transient overvoltage: 6000V
Measurement method	Voltage/current simultaneous digital sampling with zero-cross synchronized calculation
Sampling	5 MHz / 18 bits
Frequency band	DC, 0.1 Hz to 2 MHz
Synchronization frequency range	0.1 Hz to 2 MHz
Synchronization source	U1 to U6, I1 to I6, DC (fixed at data update rate), Ext1 to Ext2 The zero-cross point of the waveform after passing through the zero-cross filter is used as the standard for U or I selection.
Data update rate	10 ms / 50 ms / 200 ms When using simple averaging, the data update rate varies based on the number of averaging iterations.
LPF	500 Hz / 1 kHz / 5 kHz / 10 kHz / 50 kHz / 100 kHz / 500 kHz / OFF Approx. 500 kHz analog LPF + digital IIR filter (Butterworth characteristics equivalent) Except when off, add ±0.1% rdg. to the accuracy. Defined for frequencies that are less than or equal to 1/10 of the set frequency.
Polarity detection voltage	Current zero-cross timing comparison
Measurement parameters	Voltage (U), current (I), active power (P), apparent power (S), reactive power (Q), power factor (λ), phase angle (φ), frequency (f), efficiency (η), loss (Loss), voltage ripple factor (Urf), current ripple factor (Irf), current integration (Ih), power integration (WP), voltage peak (Upk), current peak (Ipk)
Effective measurement range	Voltage, current, power: 1% to 110% of range
Zero-suppression range	Select from OFF / 0.1% f.s. / 0.5% f.s. When set to OFF, a value may be displayed even when receiving zero input.
Zero-adjustment	Zero-adjustment of input offsets that are less than ±10% f.s. for voltage and ±10% f.s. ±4 mV for current

Accuracy	Sine wave input with a power factor of 1 or DC input, terminal-to-ground voltage of 0 V, after zero-adjustment Within the effective measurement range

	Voltage (U)	Current (I)
DC	±0.02% rdg. ±0.03% f.s.	±0.02% rdg. ±0.03% f.s.
0.1 Hz ≤ f < 30 Hz	±0.1% rdg. ±0.2% f.s.	±0.1% rdg. ±0.2% f.s.
30 Hz ≤ f < 45 Hz	±0.03% rdg. ±0.05% f.s.	±0.03% rdg. ±0.05% f.s.
45 Hz ≤ f ≤ 66 Hz	±0.02% rdg. ±0.02% f.s.	±0.02% rdg. ±0.02% f.s.
66 Hz < f ≤ 1 kHz	±0.03% rdg. ±0.04% f.s.	±0.03% rdg. ±0.04% f.s.
1 kHz < f ≤ 50 kHz	±0.1% rdg. ±0.05% f.s.	±0.1% rdg. ±0.05% f.s.
50 kHz < f ≤ 100 kHz	±0.01×f% rdg. ±0.2% f.s.	±0.01×f% rdg. ±0.2% f.s.
100 kHz < f ≤ 500 kHz	±0.008×f% rdg. ±0.5% f.s.	±0.008×f% rdg. ±0.5% f.s.
500 kHz < f ≤ 1 MHz	±(0.021×f-7)% rdg. ±1% f.s.	±(0.021×f-7)% rdg. ±1% f.s.
Frequency band	2 MHz (-3 dB, typical)	2 MHz (-3 dB, typical)

	Active power (P)	Phase difference
DC	±0.02% rdg. ±0.05% f.s.	–
0.1 Hz ≤ f < 30 Hz	±0.1% rdg. ±0.2% f.s.	±0.1°
30 Hz ≤ f < 45 Hz	±0.03% rdg. ±0.05% f.s.	±0.05°
45 Hz ≤ f ≤ 66 Hz	±0.02% rdg. ±0.03% f.s.	±0.05°
66 Hz < f ≤ 1 kHz	±0.04% rdg. ±0.05% f.s.	±0.05°
1 kHz < f ≤ 10 kHz	±0.15% rdg. ±0.1% f.s.	±0.4°
10 kHz < f ≤ 50 kHz	±0.15% rdg. ±0.1% f.s.	±(0.040×f)°
50 kHz < f ≤ 100 kHz	±0.012×f% rdg. ±0.2% f.s.	±(0.050×f)°
100 kHz < f ≤ 500 kHz	±0.009×f% rdg. ±0.5% f.s.	±(0.055×f)°
500 kHz < f ≤ 1 MHz	±(0.047×f-19)% rdg. ±2% f.s.	±(0.055×f)°

- Unit for f above: kHz
- Voltage and current DC values are defined for Udc and Idc, while frequencies other than DC are defined for Urms and Irms.
- When U or I is selected as the synchronization source, accuracy is defined for source input of at least 5% f.s.
- The phase difference is defined for a power factor of zero during f.s. input.
- Add the current sensor accuracy to the above accuracy figures for current, active power, and phase difference.
- For the 6 V range, add ±0.05% f.s. for voltage and active power.
- Add ±20 μV to the DC accuracy for current and active power when using Probe 1 (however, 2 V f.s.).
- Add ±0.05% rdg. ±0.2% f.s. for current and active power when using Probe 2, and add ±0.2° to the phase at or above 10 kHz.
- The accuracy figures for voltage, current, active power, and phase difference for 0.1 Hz to 10 Hz are reference values.
- The accuracy figures for voltage, active power, and phase difference in excess of 220 V from 10 Hz to 16 Hz are reference values.
- The accuracy figures for voltage, active power, and phase difference in excess of 750 V for values of f such that 30 kHz < f ≤ 100 kHz are reference values.
- The accuracy figures for voltage, active power, and phase difference in excess of (22000/f [kHz]) V for values of f such that 100 kHz < f ≤ 1 MHz are reference values.
- Add ±0.02% rdg. for voltage and active power at or above 1000 V (however, figures are reference values).
  Even for input voltages that are less than 1000 V, the effect will persist until the input resistance temperature falls.
- For voltages in excess of 600 V, add the following to the phase difference accuracy:
  - 500 Hz < f ≤ 5 kHz: ±0.3°
  - 5 kHz < f ≤ 20 kHz: ±0.5°
  - 20 Hz < f ≤ 200 kHz: ±1°

Measurement parameters	Accuracy
Apparent power	Voltage accuracy + current accuracy ±10 dgt.
Reactive power	Apparent power accuracy + $(\sqrt{2.69 \times 10^{-4} \times f + 1.0022 - \lambda^2} - \sqrt{1-\lambda^2}) \times 100\%$ f.s.
Power factor	φ of other than ±90°: $\pm\left(1 - \frac{\cos(\phi + \text{phase difference accuracy})}{\cos(\phi)}\right) \times 100\%$ rdg. ± 50 dgt. φ of ±90°: ±cos (φ + phase difference accuracy) × 100% f.s. ±50 dgt.
Waveform peak	Voltage/current RMS accuracy ±1% f.s. (f.s.: apply 300% of range)

f: kHz; φ: Display value for voltage/current phase difference; λ: Display value for power factor

Effects of temperature and humidity	Add the following to the voltage, current, and active power accuracy within the range of 0°C to 20°C or 26°C to 40°C: ±0.01% rdg./°C (add 0.01% f.s./°C for DC measured values) For current and active power when using Probe 2, ±0.02% rdg./°C (add 0.05% f.s./°C for DC measured values) Under conditions of 60% RH or greater: Add ±0.0006 × humidity [%RH] × f [kHz]% rdg. to the voltage and active power accuracy. Add ±0.0006 × humidity [%RH] × f [kHz]° for the phase difference.
Effects of common-mode voltage	50 Hz/60 Hz: 100 dB or greater (when applied between the voltage input terminals and the enclosure) 100 kHz: 80 dB or greater (reference value) Defined for CMRR when the maximum input voltage is applied for all measurement ranges.
Effects of external magnetic fields	±1% f.s. or less (in a magnetic field of 400 A/m, DC or 50 Hz/60 Hz)
Effects of power factor	φ of other than ±90°: $\pm\left(1 - \frac{\cos(\phi + \text{phase difference accuracy})}{\cos(\phi)}\right) \times 100\%$ rdg. φ of ±90°: ±cos (φ + phase difference accuracy) × 100% f.s.

Frequency measurement

Number of measurement channels	Max. 6 channels (f1 to f6), based on the number of input channels
Measurement source	Select from U/I for each connection.
Measurement method	Reciprocal method + zero-cross sampling value correction Calculated from the zero-cross point of waveforms after application of the zero-cross filter.
Measurement range	0.1 Hz to 2 MHz (Display shows 0.00000 Hz or ----- Hz if measurement is not possible.)
Accuracy	±0.05% rdg. ±1 dgt. (with a sine wave that is at least 30% of the measurement source's measurement range)
Display format	0.10000 Hz to 9.99999 Hz, 9.9000 Hz to 99.9999 Hz, 99.000 Hz to 999.999 Hz, 0.99000 kHz to 9.99999 kHz, 9.9000 kHz to 99.9999 kHz, 99.000 kHz to 999.999 kHz, 0.99000 MHz to 2.00000 MHz

Integration measurement

Measurement modes	Select RMS or DC for each connection (DC mode can only be selected when using an AC/DC sensor with a 1P2W connection).
Measurement parameters	Current integration (Ih+, Ih-, Ih), active power integration (WP+, WP-, WP) Ih+ and Ih- are measured only in DC mode. Only Ih is measured in RMS mode.
Measurement method	Digital calculation based on current and active power values DC mode: Every sampling interval, current values and instantaneous power values are integrated separately for each polarity. RMS mode: The current RMS value and active power value are integrated for each measurement interval. Only active power is integrated separately for each polarity.
Display resolution	999999 (6 digits + decimal point), starting from the resolution at which 1% of each range is f.s.
Measurement range	0 to ±9999.99 TAh/TWh
Integration time	10 sec. to 9999 hr. 59 min. 59 sec.
Integration time accuracy	±0.02% rdg. (0°C to 40°C)
Integration accuracy	±(current or active power accuracy) ±integration time accuracy
Backup function	None

Harmonics measurement

Number of measurement channels	Max. 6 channels, based on the number of built-in channels
Synchronization source	Based on the synchronization source setting for each connection.
Measurement modes	Select from IEC standard mode or wideband mode (setting applies to all channels).
Measurement parameters	Harmonic voltage RMS value, harmonic voltage content percentage, harmonic voltage phase angle, harmonic current RMS value, harmonic current content percentage, harmonic current phase angle, harmonic active power, harmonic power content percentage, harmonic voltage/current phase difference, total harmonic voltage distortion, total harmonic current distortion, voltage unbalance rate, current unbalance rate (no intermediate harmonic parameters in IEC standard mode)
FFT processing word length	32 bits
Antialiasing	Digital filter (automatically configured based on synchronization frequency)
Window function	Rectangular
Grouping	OFF / Type 1 (harmonic sub-group) / Type 2 (harmonic group)
THD calculation method	THD_F / THD_R (Setting applies to all connections.) Select calculation order from 2nd order to 100th order (however, limited to the maximum analysis order for each mode).

(1) IEC standard mode

Measurement method	Zero-cross synchronization calculation method (same window for each synchronization source) Fixed sampling interpolation calculation method with average thinning in window IEC 61000-4-7:2002 compliant with gap overlap
Synchronization frequency range	45 Hz to 66 Hz
Data update rate	Fixed at 200 ms.
Analysis orders	0th to 50th
Window wave number	When less than 56 Hz, 10 waves; when 56 Hz or greater, 12 waves
Number of FFT points	4096 points
Accuracy	

Frequency	Harmonic voltage and current	Harmonic power	Phase difference
DC (0th order)	±0.1% rdg. ±0.1% f.s.	±0.1% rdg. ±0.2% f.s.	--
45 Hz ≤ f ≤ 66 Hz	±0.2% rdg. ±0.04% f.s.	±0.4% rdg. ±0.05% f.s.	±0.08°
66 Hz < f ≤ 440 Hz	±0.5% rdg. ±0.05% f.s.	±1.0% rdg. ±0.05% f.s.	±0.08°
440 Hz < f ≤ 1 kHz	±0.8% rdg. ±0.05% f.s.	±1.5% rdg. ±0.05% f.s.	±0.4°
1 kHz < f ≤ 2.5 kHz	±2.4% rdg. ±0.05% f.s.	±4% rdg. ±0.05% f.s.	±0.4°
2.5 kHz < f ≤ 3.3 kHz	±6% rdg. ±0.05% f.s.	±10% rdg. ±0.05% f.s.	±0.8°

Power is defined for a power factor of 1.
Accuracy specifications are defined for fundamental wave input that is greater than or equal to 50% of the range.
Add the current sensor accuracy to the above accuracy figures for current, active power, and phase difference.
Add ±0.02% rdg. for voltage and active power at or above 1000 V (however, figures are reference values).
Even for input voltages that are less than 1000 V, the effect will persist until the input resistance temperature falls.

(2) Wideband mode

Measurement method	Zero-cross synchronization calculation method (same window for each synchronization source) with gaps Fixed sampling interpolation calculation method
Synchronization frequency range	0.1 Hz to 300 kHz
Data update rate	Fixed at 50 ms.
Maximum analysis order and Window wave number	

Frequency	Window wave number	Maximum analysis order
0.1 Hz ≤ f < 80 Hz	1	100th
80 Hz ≤ f < 160 Hz	2	100th
160 Hz ≤ f < 320 Hz	4	60th
320 Hz ≤ f < 640 Hz	2	60th
640 Hz ≤ f < 6 kHz	4	50th
6 kHz ≤ f < 12 kHz	2	50th
12 kHz ≤ f < 25 kHz	4	50th
25 kHz ≤ f < 50 kHz	8	30th
50 kHz ≤ f < 101 kHz	16	15th
101 kHz ≤ f < 201 kHz	32	7th
201 kHz ≤ f < 300 kHz	64	5th

Phase zero-adjustment	The instrument provides phase zero-adjustment functionality using keys or communications commands (only available when the synchronization source is set to Ext).
Accuracy	Add the following to the accuracy figures for voltage (U), current (I), active power (P), and phase difference. (Unit for f in following table: kHz)

Frequency	Harmonic voltage and current	Harmonic power	Phase difference
DC	±0.1% f.s.	±0.2% f.s.	-
0.1 Hz ≤ f < 30 Hz	±0.05% f.s.	±0.05% f.s.	±0.1°
30 Hz ≤ f < 45 Hz	±0.1% f.s.	±0.2% f.s.	±0.1°
45 Hz ≤ f ≤ 66 Hz	±0.05% f.s.	±0.1% f.s.	±0.1°
66 Hz < f ≤ 1 kHz	±0.05% f.s.	±0.1% f.s.	±0.1°
1 kHz < f ≤ 10 kHz	±0.05% f.s.	±0.1% f.s.	±0.6°
10 kHz < f ≤ 50 kHz	±0.2% f.s.	±0.4% f.s.	±(0.020×f)° ±0.5°
50 kHz < f ≤ 100 kHz	±0.4% f.s.	±0.5% f.s.	±(0.020×f)° ±1°
100 kHz < f ≤ 500 kHz	±1% f.s.	±2% f.s.	±(0.030×f)° ±1.5°
500 kHz < f ≤ 900 kHz	±4% f.s.	±5% f.s.	±(0.030×f)° ±2°

The figures for voltage, current, power, and phase difference for frequencies in excess of 300 kHz are reference values.
When the fundamental wave is outside the range of 16 Hz to 850 Hz, the figures for voltage, current, power, and phase difference for frequencies other than the fundamental wave are reference values.
When the fundamental wave is within the range of 16 Hz to 850 Hz, the figures for voltage, current, power, and phase difference in excess of 6 kHz are reference values.
Accuracy values for phase difference are defined for input for which the voltage and current for the same order are at least 10% f.s.

Waveform recording

Number of measurement channels	Voltage and current waveforms	Max. 6 channels (based on the number of installed channels)
	Motor waveforms *	Max. 2 analog DC channels + max. 4 pulse channels
Recording capacity	1 Mword × ((voltage + current) × number of channels + motor waveforms *)	
Waveform resolution	16 bits (Voltage and current waveforms use the upper 16 bits of the 18-bit A/D.)	
Sampling speed	Voltage and current waveforms	Always 5 MS/s
	Motor waveforms *	Always 50 kS/s
	Motor pulse *	Always 5 MS/s
Compression ratio	1/1, 1/2, 1/5, 1/10, 1/20, 1/50, 1/100, 1/200, 1/500 (5 MS/s, 2.5 MS/s, 1 MS/s, 500 kS/s, 250 kS/s, 100 kS/s, 50 kS/s, 25 kS/s, 10 kS/s) However, motor waveforms* are only compressed at 50 kS/s or less.	
Recording length	1 kWord / 5 kWord / 10 kWord / 50 kWord / 100 kWord / 500 kWord / 1 Mword	
Storage mode	Peak-to-peak compression or simple thinning	
Trigger mode	SINGLE or NORMAL (with forcible trigger setting)	
Pre-trigger	0% to 100% of the recording length, in 10% steps	
Trigger source	Voltage and current waveform, waveform after voltage and current zero-cross filter, manual, motor waveform*, motor pulse*	
Trigger slope	Rising edge, falling edge	
Trigger level	±300% of the range for the waveform, in 0.1% steps	

*Motor waveform and motor pulse: Motor analysis and D/A-equipped models only

Motor analysis (PW6001-11 to -16 only)

Number of input channels	4 channels	
	CH A	Analog DC input / Frequency input / Pulse input
	CH B	Analog DC input / Frequency input / Pulse input
	CH C	Pulse input
	CH D	Pulse input
Operating mode	Single, dual, or independent input	
Input terminal profile	Isolated BNC connectors	
Input resistance (DC)	1 MΩ ±50 kΩ	
Input method	Function-isolated input and single-end input	
Measurement parameters	Voltage, torque, rpm, frequency, slip, motor power	
Maximum input voltage	±20 V (analog DC and pulse operation)	
Additional conditions for guaranteed accuracy	Input: Terminal-to-ground voltage of 0 V, after zero-adjustment	

(1) Analog DC input (CH A/CH B)

Measurement range	±1 V / ±5 V / ±10 V
Effective input range	1% to 110% f.s.
Sampling	50 kHz, 16 bits
Response speed	0.2 ms (when LPF is OFF)
Measurement method	Simultaneous digital sampling, zero-cross synchronization calculation method (averaging between zero-crosses)
Measurement accuracy	±0.05% rdg. ±0.05% f.s.
Temperature coefficient	±0.03% f.s./°C
Effects of common-mode voltage	±0.01% f.s. or less with 50 V applied between the input terminals and the enclosure (DC / 50 Hz / 60 Hz)
LPF	OFF (20 kHz) / ON (1 kHz)
Display range	From the range's zero-suppression range setting to ±150%
Zero-adjustment	Voltage ±10% f.s., zero-correction of input offsets that are less

(2) Frequency input (CH A/CH B)

Detection level	Low: 0.5 V or less; high: 2.0 V or more
Measurement frequency band	0.1 Hz to 1 MHz (at 50% duty ratio)
Minimum detection width	0.5 μs or more
Measurement accuracy	±0.05% rdg. ±3 dgt.
Display range	1.000 kHz to 500.000 kHz

(3) Pulse input (CH A / CH B / CH C / CH D)

Detection level	Low: 0.5 V or less; high: 2.0 V or more
Measurement frequency band	0.1 Hz to 1 MHz (at 50% duty ratio)
Minimum detection width	0.5 μs or more
Pulse filter	OFF / Weak / Strong (When using the weak setting, positive and negative pulses of less than 0.5 μs are ignored. When using the strong setting, positive and negative pulses of 5 μs are ignored.)
Measurement accuracy	±0.05% rdg. ±3 dgt.
Display range	0.1 Hz to 800.000 kHz
Unit	Hz / r/min.
Frequency division setting range	1~60000
Rotation direction detection	Can be set in single mode (detected based on lead/lag of CH B and CH C).
Mechanical angle origin detection	Can be set in single mode (CH B frequency division cleared at CH D rising edge).

D/A output (PW6001-11 to -16 only)

Number of output channels	20 channels	
Output terminal profile	D-sub 25-pin connector × 1	
Output details	- Switchable between waveform output and analog output (select from basic measurement parameters). - Waveform output is fixed to CH1 to CH12.	
D/A conversion resolution	16 bits (polarity + 15 bits)	
Output refresh rate	Analog output	10 ms / 50 ms / 200 ms (based on data update rate for the selected parameter)
	Waveform output	1 MHz
Output voltage	Analog output	±5 V DC f.s. (max. approx. ±12 V DC)
	Waveform output	Switchable between ±2 V f.s. and ±1 V f.s., crest factor of 2.5 or greater Setting applies to all channels.
Output resistance	100 Ω ±5 Ω	
Output accuracy	Analog output	Output measurement parameter measurement accuracy ±0.2% f.s. (DC level)
	Waveform output	Measurement accuracy ±0.5% f.s. (at ±2 V f.s.) or ±1.0% f.s. (at ±1 V f.s.) (RMS value level, up to 50 kHz)
Temperature coefficient	±0.05% f.s./°C	

Display section

Display characters	English / Japanese / Chinese (simplified, available soon)	
Display	9" WVGA TFT color LCD (800 × 480 dots) with an LED backlight and analog resistive touch panel	
Display value resolution	999999 count (including integration values)	
Display refresh rate	Measured values	Approx. 200 ms (independent of internal data update rate) When using simple averaging, the data update rate varies based on the number of averaging iterations.
	Waveforms	Based on display settings

External interface

(1) USB flash drive interface

Connector	USB Type A connector × 1
Electrical specifications	USB 2.0 (high-speed)
Power supplied	Max. 500 mA
Supported USB flash drives	USB Mass Storage Class compatible
Recorded data	- Save/load settings files - Save measured values/automatic recorded data (CSV format) - Copy measured values/recorded data (from internal memory) - Save waveform data, save screenshots (compressed BMP format)

(2) LAN interface

Connector	RJ-45 connector × 1
Electrical specifications	IEEE 802.3 compliant
Transmission method	10Base-T / 100Base-TX / 1000Base-T (automatic detection)
Protocol	TCP/IP (with DHCP function)
Functions	dedicated port (data transfers, command control)

(3) GP-IB interface

Communication method	IEEE 488.1 1987 compliant developed with reference to IEEE 488.2 1987 Interface functions: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0
Addresses	00 to 30
Functions	Command control

(4) RS-232C interface

Connector	D-sub 9-pin connector × 1, 9-pin power supply compatible, also used for external control
Communication method	RS-232C, EIA RS-232D, CCITT V.24, and JIS X5101 compliant Full duplex, start stop synchronization, data length of 8, no parity, 1 stop bit
Flow control	Hardware flow control ON/OFF
Communications speed	9,600 bps / 19,200 bps / 38,400 bps / 57,600 bps / 115,200 bps / 230,400 bps
Functions	Command control Used through exclusive switching with external control interface

(5) External control interface

Connector	D-sub 9-pin connector × 1, 9-pin power supply compatible, also used for RS-232C
Power supplied	OFF/ON (voltage of +5 V, max. 200 mA)
Electrical specifications	0/5 V (2.5 V to 5 V) logic signals or contact signal with terminal shorted or open
Functions	Same operation as the [START/STOP] key or the [DATA RESET] key on the control panel Used through exclusive switching with RS-232C

(6) Two-instrument synchronization interface

Connector	SFP optical transceiver, Duplex-LC (2-wire LC)
Optical signal	850 nm VCSEL, 1 Gbps
Laser class	Class 1
Fiber used	50/125 μm multi-mode fiber equivalent, up to 500 m
Functions	Sends data from the connected slave instrument to the master instrument, which performs calculations and displays the results.

Functional Specifications

Auto-range function

Functions	The voltage and current ranges for each connection are automatically changed in response to the input.
Operating mode	OFF/ON (selectable for each connection)
Auto-range breadth	Broad/narrow (applies to all channels) Broad: The range is increased by one if the peak value is exceeded for the connection or if there is an RMS value that is greater than or equal to 110% f.s. The range is lowered by two if all RMS values for the connection are less than or equal to 10% f.s. (However, the range is not lowered if the peak value would be exceeded with the lower range.) Narrow: The range is increased by one if the peak value is exceeded for the connection or if there is an RMS value that is greater than or equal to 105% f.s. The range is lowered by one if all RMS values for the connection are less than or equal to 40% f.s. (However, the range is not lowered if the peak value would be exceeded with the lower range.) When Δ-Y conversion is enabled, the range reduction is determined by multiplying the range by $\frac{1}{\sqrt{3}}$.

Time control function

Timer control	OFF, 10 sec. to 9999 hr. 59 min. 59 sec. (in 1 sec. steps)
Actual time control	OFF, start time/stop time (in 1 min. steps)
Intervals	OFF / 10 ms / 50 ms / 200 ms / 500 ms / 1 sec. / 5 sec. / 10 sec. / 15 sec. / 30 sec. 1 min. / 5 min. / 10 min. / 15 min. / 30 min. / 60 min.

Hold functionality

Hold	Stops updating the display with all measured values and holds the value currently being displayed. Used exclusively with the peak hold function.
Peak hold	Updates the measured value display each time a new maximum value is set. Used exclusively with the hold function.

Calculation functionality

(1) Rectifier

Functions	Selects the voltage and current values used to calculate apparent and reactive power and power factor.
Operating mode	RMS/mean (Can be selected for each connection's voltage and current.)

(2) Scaling

VT (PT) ratio	OFF/ 0.01 to 9999.99
CT ratio	OFF/ 0.01 to 9999.99

(3) Averaging (AVG)

Functions	All instantaneous measured values, including harmonics, are averaged.
Operating mode	OFF / Simple averaging / Exponential averaging
Operation	Simple averaging: Averaging is performed for the number of simple averaging iterations for each data update cycle, and the output data is updated. The data update rate is lengthened by the number of averaging iterations. Exponential averaging: Data is exponentially averaged using a time constant defined by the data update rate and the exponential averaging response rate. During averaging operation, averaged data is used for all analog output and save data.
Number of simple averaging iterations	

Number of averaging iterations		5	10	20	50	100
Data update rate	10 ms	50 ms	100 ms	200 ms	500 ms	1 sec.
	50 ms	250 ms	500 ms	1 sec.	2.5 sec.	5 sec.
	200 ms	1 sec.	2 sec.	4 sec.	10 sec.	20 sec.

Exponential averaging response rate

Setting		FAST	MID	SLOW
Data update rate	10 ms	0.1 sec.	0.8 sec.	5 sec.
	50 ms	0.5 sec.	4 sec.	25 sec.
	200 ms	2.0 sec.	16 sec.	100 sec.

These values indicate the time required for the final stabilized value to converge on ±1% when the input changes from 0% f.s. to 90% f.s.

(4) Efficiency and loss calculations

Calculated items	Active power value (P), fundamental wave active power (Pfnd), and motor power (Pm) (Motor analysis and D/A-equipped models only) for each channel and connection
Number of calculations that can be performed	Four each for efficiency and loss
Formula	Calculated items are specified for Pin(n) and Pout(n) in the following format: Pin = Pin1 + Pin2 + Pin3 + Pin4, Pout = Pout1 + Pout2 + Pout3 + Pout4 $\eta = 100 \times \frac{\lvert Pout \rvert}{\lvert Pin \rvert}$, Loss = |Pin|-|Pout|

(5) Power formula selection

Functions	Selects the reactive power, power factor, and power phase angle formulas.
Formula	TYPE1 / TYPE2 / TYPE3 TYPE1: Compatible with TYPE1 as used by the Hioki 3193 and 3390. TYPE2: Compatible with TYPE2 as used by the Hioki 3192 and 3193. TYPE3: The sign of the TYPE1 power factor and power phase angle are used as the active power signs.

(6) Delta conversion

Functions	Δ-Y: When using a 3P3W3M or 3V3A connection, converts the line voltage waveform to a phase voltage waveform using a virtual neutral point. Y-Δ: When using a 3P4W connection, converts the phase voltage waveform to a line voltage waveform. Voltage RMS values and all voltage parameters, including harmonics, are calculated using the post-conversion voltage.

(7) Current sensor phase shift calculation

Functions	Corrects the current sensor's harmonic phase characteristics using calculations.
Correction value settings	Correction points are set using the frequency and phase difference. Frequency: 0.1 kHz to 999.9 kHz (in 0.1 kHz steps) Phase difference: 0.0 deg. to ±90.0 deg. (in 0.1 deg. steps) However, the time difference calculated from the frequency's phase difference is subject to a maximum value of 50 μs.

Display functionality

(1) Connection confirmation screen

Functions	Displays a connection diagram and voltage and current vectors based on the selected measurement lines. The ranges for a correct connection are displayed on the vector display so that the connection can be checked.
Mode at startup	User can select to display the connection confirmation screen at startup (startup screen setting).
Simple settings	Commercial power supply / Commercial power supply high-resolution HD / DC / DC high-resolution HD / PWM / High-frequency / Other

(2) Vector display screen

Functions	Displays a connection-specific vector graph along with associated level values and phase angles.

(3) Numerical display screen

Functions	Displays power measured values and motor measured values for up to six instrument channels.
Display patterns	Basic by connection: Displays measured values for the measurement lines and motors combined in the connection. There are four measurement line patterns: U, I, P, and Integ. Selection display: Creates a numerical display for the measurement parameters that the user has selected from all basic measurement parameters in the location selected by the user. There are 4-, 8-, 16-, and 32-display patterns.

(4) Harmonic display screen

Functions	Displays harmonic measured values on the instrument's screen.
Display patterns	Display bar graph: Displays harmonic measurement parameters for user-specified channels as a bar graph. Display list: Displays numerical values for user-specified parameters and user-specified channels.

(5) Waveform display screen

Functions	Displays the voltage and current waveforms and motor waveform.
Display patterns	All-waveform display, waveform + numerical display

Automatic save function

Functions	Saves the specified measured values in effect for each interval.
Save destination	OFF / Internal memory / USB flash drive
Saved parameters	User-selected from all measured values, including harmonic measured values
Maximum amount of saved data	Internal memory: 64 MB (data for approx. 1800 measurements) USB flash drive: Approx. 100 MB per file (automatically segmented) × 20 files
Data format	CSV file format

Manual save function

(1) Measurement data

Functions	The [SAVE] key saves specified measured values at the time it is pressed. Comment text can be entered for each saved data point, up to a maximum of 20 alphanumeric characters. *The manual save function for measurement data cannot be used while automatic save is in progress.
Save destination	USB flash drive
Saved parameters	User-selected from all measured values, including harmonic measured values
Data format	CSV file format

(2) Waveform data

Functions	A button on the touch screen saves waveform data at the time it is pressed. Comment text can be entered for each saved data point, up to a maximum of 40 alphanumeric characters. *The manual save function for measurement data cannot be used while automatic saving is in progress.
Save destination	USB flash drive
Data format	CSV file format

(3) Screenshots

Functions	The [COPY] key saves a screenshot to the save destination. *This function can be used at an interval of 1 sec or more while automatic saving is in progress.
Save destination	USB flash drive
Comment entry	OFF / Text / Handwritten When set to [Text], up to 40 alphanumeric characters When set to [Handwritten], hand-drawn images are pasted to the screen.
Data format	Compressed BMP

(4) Settings data

Functions	Saves settings information to the save destination as a settings file via functionality provided on the File screen. In addition, previously saved settings files can be loaded and their settings restored on the File screen. However, language and communications settings are not saved.
Save destination	USB flash drive

Two-instrument synchronization function

Functions	Sends data from the connected slave instrument to the master instrument, which performs calculations and displays the results. In numerical synchronization mode, the master instrument operates as a power meter with up to 12 channels. In waveform synchronization mode, the master instrument operates while synchronizing up to three channels from the slave instrument at the waveform level.	
Operating mode	OFF / Numerical synchronization / Waveform synchronization Numerical synchronization cannot be selected when the data update rate is 10 ms. For both master instruments and slave instruments, waveform synchronization operates only when there are 3 or more channels.	
Synchronized items	Numerical synchronization mode Waveform synchronization mode	Data update timing, start/stop/data reset Voltage/current sampling timing
Synchronization delay	Numerical synchronization mode Waveform synchronization mode	Max. 20 μs Up to 5 samples
Transfer items	Numerical synchronization mode Waveform synchronization mode	Basic measurement parameters for up to six channels (including motor data) Voltage/current sampling waveforms for up to three channels (not including motor data). However, the maximum number of channels is limited to a total of six, including the master instrument's channels.

Other functions

Clock function	Auto-calendar, automatic leap year detection, 24-hour clock
Actual time accuracy	When the instrument is on, ±100 ppm; when the instrument is off, within ±3 sec./day (25°C)
Sensor identification	Current sensors connected to Probe1 are automatically detected.
Zero-adjustment function	After the AC/DC current sensor's DEMAG signal is sent, zero-correction of the voltage and current input offsets is performed.
Touch screen correction	Position calibration is performed for the touch screen.
Key lock	While the key lock is engaged, the key lock icon is displayed on the screen.

General Specifications

Operating environment	Indoors at an elevation of up to 2000 m in a Pollution Level 2 environment
Storage temperature and humidity	-10°C to 50°C, 80% RH or less (no condensation)
Operating temperature and humidity	0°C to 40°C, 80% RH or less (no condensation)
Dielectric strength	50 Hz/60 Hz 5.4 kVrms AC for 1 min. (sensed current of 1 mA) Between voltage input terminals and instrument enclosure, and between current sensor input terminals and interfaces 1 kVrms AC for 1 min. (sensed current of 3 mA) Between motor input terminals (Ch. A, Ch. B, Ch. C, and Ch. D) and the instrument enclosure
Standards	Safety EN61010 EMC EN61326 Class A, EN61000-3-2, EN61000-3-3
Rated supply voltage	100 V AC to 240 V AC, 50 Hz/ 60 Hz
Maximum rated power	200 VA
External dimensions	Approx. 430 (W) × 177 (H) × 450 (D) mm (excluding protruding parts)
Mass	Approx. 14 kg ±0.5 kg (PW6001-16)
Backup battery life	Approx. 10 years (reference value at 23°C) (lithium battery that stores time and setting conditions)
Product warranty period	1 year
Guaranteed accuracy period	6 months (1-year accuracy = 6-month accuracy × 1.5)
Post-adjustment accuracy guaranteed period	6 months
Accuracy guarantee conditions	Accuracy guarantee temperature and humidity range: 23°C ±3°C, 80% RH or less Warm-up time: 30 min. or more
Accessories	Instruction manual x 1, power cord x 1, D-sub 25-pin connector × 1 (PW6001-1x only)

Formulae

Basic formula

Parameter \ Wiring	1P2W	1P3W	3P3W2M	3V3A	3P3W3M	3P4W
Voltage, current RMS value (actual RMS value)	$X_{rms(i)}=\sqrt{\frac{1}{M}\sum_{s=0}^{M-1}(X(i)s)^2}$	$X_{rms(i)(i+1)}=\frac{1}{2}(X_{rms(i)}+X_{rms(i+1)})$		$X_{rms123}=\frac{1}{3}(X_{rms1}+X_{rms2}+X_{rms3})$ $X_{rms456}=\frac{1}{3}(X_{rms4}+X_{rms5}+X_{rms6})$		
Voltage, current Mean value rectification RMS equivalent	$X_{mn(i)}=\frac{\pi}{2\sqrt{2}}\frac{1}{M}\sum_{s=0}^{M-1}\lvert X_{(i)s}\rvert$	$X_{mn(i)(i+1)}=\frac{1}{2}(X_{mn(i)}+X_{mn(i+1)})$		$X_{mn123}=\frac{1}{3}(X_{mn1}+X_{mn2}+X_{mn3})$ $X_{mn456}=\frac{1}{3}(X_{mn4}+X_{mn5}+X_{mn6})$		
Voltage, current AC component	$X_{ac(i)}=\sqrt{(X_{rms(i)})^2-(X_{dc(i)})^2}$					
Voltage, current Average value	$X_{dc(i)}=\frac{1}{M}\sum_{s=0}^{M-1}X_{(i)s}$					
Voltage, current Fundamental wave component	$X1_{(i)}$ for harmonic voltage and current in the harmonic formula					
Voltage and current peak values	$X_{pk+(i)}=X_{(i)s}$ Max. value for M items $X_{pk-(i)}=X_{(i)s}$ Min. value for M items					
Active power	$P_{(i)}=\frac{1}{M}\sum_{s=0}^{M-1}(U_{(i)s}\times I_{(i)s})$	$P_{(i)(i+1)}=P_{(i)}+P_{(i+1)}$		$P_{123}=P_1+P_2$ $P_{456}=P_4+P_5$	$P_{123}=P_1+P_2+P_3$ $P_{456}=P_4+P_5+P_6$	
Apparent power	$S_{(i)}=U_{(i)}\times I_{(i)}$	$S_{(i)(i+1)}=S_{(i)}+S_{(i+1)}$	$S_{(i)(i+1)}=\frac{\sqrt{3}}{2}(S_{(i)}+S_{(i+1)})$	$S_{123}=\frac{\sqrt{3}}{3}(S_1+S_2+S_3)$ $S_{456}=\frac{\sqrt{3}}{3}(S_4+S_5+S_6)$	$S_{123}=S_1+S_2+S_3$ $S_{456}=S_4+S_5+S_6$	
Reactive power	When selecting formula type 1 and type 3					
	$Q_{(i)}=si_{(i)}\sqrt{S_{(i)}^2-P_{(i)}^2}$	$Q_{(i)(i+1)}=Q_{(i)}+Q_{(i+1)}$		$Q_{123}=Q_1+Q_2$ $Q_{456}=Q_4+Q_5$	$Q_{123}=Q_1+Q_2+Q_3$ $Q_{456}=Q_4+Q_5+Q_6$	
	When selecting formula type 2					
	$Q_{(i)}=\sqrt{S_{(i)}^2-P_{(i)}^2}$	$Q_{(i)(i+1)}=\sqrt{S_{(i)(i+1)}^2-P_{(i)(i+1)}^2}$		$Q_{123}=\sqrt{S_{123}^2-P_{123}^2}$, $Q_{456}=\sqrt{S_{456}^2-P_{456}^2}$		
Power factor	When selecting formula type 1					
	$\lambda_{(i)}=si_{(i)}\lvert\frac{P_{(i)}}{S_{(i)}}\rvert$	$\lambda_{(i)(i+1)}=si_{(i)(i+1)}\lvert\frac{P_{(i)(i+1)}}{S_{(i)(i+1)}}\rvert$		$\lambda_{123}=si_{123}\lvert\frac{P_{123}}{S_{123}}\rvert$, $\lambda_{456}=si_{456}\lvert\frac{P_{456}}{S_{456}}\rvert$		
	When selecting formula type 2					
	$\lambda_{(i)}=\lvert\frac{P_{(i)}}{S_{(i)}}\rvert$	$\lambda_{(i)(i+1)}=\lvert\frac{P_{(i)(i+1)}}{S_{(i)(i+1)}}\rvert$		$\lambda_{123}=\lvert\frac{P_{123}}{S_{123}}\rvert$, $\lambda_{456}=\lvert\frac{P_{456}}{S_{456}}\rvert$		
	When selecting formula type 3					
	$\lambda_{(i)}=\frac{P_{(i)}}{S_{(i)}}$	$\lambda_{(i)(i+1)}=\frac{P_{(i)(i+1)}}{S_{(i)(i+1)}}$		$\lambda_{123}=\frac{P_{123}}{S_{123}}$, $\lambda_{456}=\frac{P_{456}}{S_{456}}$		
Power phase angle	When selecting formula type 1					
	$\phi_{(i)}=si_{(i)}\cos^{-1}\lvert\lambda_{(i)}\rvert$	$\phi_{(i)(i+1)}=si_{(i)(i+1)}\cos^{-1}\lvert\lambda_{(i)(i+1)}\rvert$		$\phi_{123}=si_{123}\cos^{-1}\lvert\lambda_{123}\rvert$, $\phi_{456}=si_{456}\cos^{-1}\lvert\lambda_{456}\rvert$		
	When selecting formula type 2					
	$\phi_{(i)}=\cos^{-1}\lvert\lambda_{(i)}\rvert$	$\phi_{(i)(i+1)}=\cos^{-1}\lvert\lambda_{(i)(i+1)}\rvert$		$\phi_{123}=\cos^{-1}\lvert\lambda_{123}\rvert$ $\phi_{456}=\cos^{-1}\lvert\lambda_{456}\rvert$		
	When selecting formula type 3					
	$\phi_{(i)}=\cos^{-1}\lambda_{(i)}$	$\phi_{(i)(i+1)}=\cos^{-1}\lambda_{(i)(i+1)}$		$\phi_{123}=\cos^{-1}\lambda_{123}$, $\phi_{456}=\cos^{-1}\lambda_{456}$		
Voltage and current ripple factor	$\frac{(X_{pk+(i)}-X_{pk-(i)})}{2\times\lvert X_{dc(i)}\rvert}\times 100$					

- When connecting 3P3W3M and 3P4W, use phase voltage for voltage waveform $u(i)s$. 3P3W3M: $u_{1s}=(U_{1s}-U_{3s})/3$, $u_{2s}=(U_{2s}-U_{3s})/3$, $u_{3s}=(U_{3s}-U_{2s})/3$
- When connecting 3V3A, use line-to-line voltage for voltage $U(i)$. (The same formula is used for 3P3W2M and 3V3A.)
- The polarity sign for active power P indicates the direction of current during power consumption ($+P$) and power regeneration ($-P$).

Select rms / mn for $U_{(i)s}$ and $I_{(i)s}$.
When connecting 3P3W3M and 3P4W, use phase voltage for voltage $U_{(i)s}$.
When connecting 3V3A, use line-to-line voltage for voltage $U_{(i)s}$.

- The polarity sign si for reactive power Q for formula type 1 and type 3 indicates leading and lagging polarity, [None] indicates lagging polarity (LAG), and [-] indicates leading polarity (LEAD).
- For polarity sign $si_{(i)}$, lead and lag for voltage waveform $U_{(i)s}$ and current waveform $I_{(i)s}$ are acquired for each measurement channel (i).
- When connecting 3P3W3M and 3P4W, use phase voltage for voltage waveform $U_{(i)s}$. 3P3W3M: $u_{1s}=(U_{1s}-U_{3s})/3$, $u_{2s}=(U_{2s}-U_{3s})/3$, $u_{3s}=(U_{3s}-U_{2s})/3$
- There is no polarity sign when formula type 2 is selected.

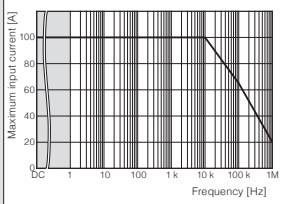
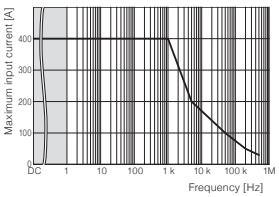
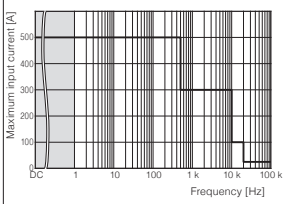
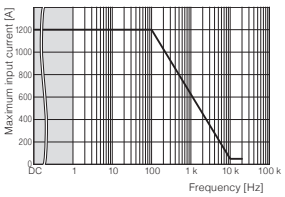
- For formula type 1, the polarity sign si indicates leading and lagging polarity, [None] indicates lagging polarity (LAG), and [-] indicates leading polarity (LEAD).
- For polarity sign $si_{(i)}$, lead and lag for voltage waveform $U_{(i)s}$ and current waveform $I_{(i)s}$ are acquired for each measurement channel (i). $si_{(i)}$, $si_{(i)s}$, and $si_{(i)3}$ are acquired from the signs for $Q_{(i)}$, $Q_{(i)s}$, and $Q_{(i)3}$.
- For formula type 3, the polarity sign for active power P is used.
- When calculating formula type 1 and type2, $\cos^{-1}|\lambda_{(i)}|$ is used when $P \geq 0$; $|180-\cos^{-1}|\lambda_{(i)}||$ is used when $P < 0$.

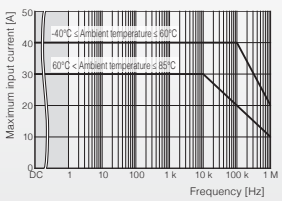
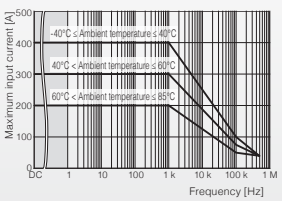
X: Voltage U or Current I,
(i): Measurement channel, M: Number of samples during synchronized timing period, s: Sample point number

Motor analysis formulae

Measurement parameters	Setting	Formula
Voltage	Analog DC	$\frac{1}{M}\sum_{s=0}^{M-1}A_s$ M: Number of samples during synchronized timing period; s: Sample point number
Pulse frequency	Pulse	Pulse frequency
Torque	Analog DC	$\frac{1}{M}\sum_{s=0}^{M-1}A_s\times$ scaling setting M: Number of samples during synchronized timing period; s: Sample point number
	Frequency	$\frac{(\text{Measurement frequency - fc setting})\times\text{rated torque value}}{\text{fd setting}}$
RPM	Analog DC	$\frac{1}{M}\sum_{s=0}^{M-1}A_s\times$ scaling setting M: Number of samples during synchronized timing period; s: Sample point number
	Pulse	$si\frac{60\times\text{pulse frequency}}{\text{Pulse count setting}}$ The polarity sign si is acquired based on the A-phase pulse rising/falling edge and the B-phase pulse logic level (high/low) when direction of rotation detection is enabled in single mode.
Motor power		$\text{Torque}\times\frac{2\times\pi\times\text{RPM}}{60}\times$ unit coefficient The unit coefficient is 1 if the torque unit is N·m, 1/1000 if mN·m, and 1000 if kN·m.
Slip		$100\times\frac{2\times60\times\text{input frequency}-\lvert\text{RPM}\rvert\times\text{pole number setting}}{2\times60\times\text{input frequency}}$ The input frequency is selected from f1 to f6.

High accuracy sensor (connected to input terminal Probe 1)

Model	AC/DC CURRENT SENSOR CT6862-05	AC/DC CURRENT SENSOR CT6863-05	AC/DC CURRENT SENSOR 9709-05	AC/DC CURRENT SENSOR CT6865-05
Appearance				
Rated primary current	50 A AC/DC	200 A AC/DC	500 A AC/DC	1000 A AC/DC
Diameter of measurable conductors	Max.ϕ 24mm (0.94")	Max.ϕ 24 mm (0.94")	Max.ϕ 36 mm (1.42")	Max.ϕ 36 mm (1.42")
Basic accuracy	±0.05 %rdg.±0.01 % f.s. , ±0.2° (DC and 16 Hz to 400 Hz)		±0.05 %rdg.±0.01 % f.s. , ±0.2° (DC and 45 Hz to 66 Hz)	±0.05 %rdg.±0.01 % f.s. , ±0.2° (DC and 16 Hz to 66 Hz)
Frequency characteristics (Amplitude,typical)	DC to 16 Hz : ±0.1%rdg. ±0.02%f.s. 50 kHz to 100 kHz :±2.0%rdg. ±0.05%f.s. 700 kHz to 1 MHz: ±30%rdg. ±0.05%f.s.	DC to 16 Hz : ±0.1%rdg. ±0.02%f.s. 50 kHz to 100 kHz : ±5%rdg. ±0.02%f.s. 300 kHz to 500 kHz: ±30%rdg. ±0.05%f.s.	DC to 45 Hz : ±0.2%rdg. ±0.02%f.s. 5 kHz to 10 kHz : ±2%rdg. ±0.1%f.s. 20 kHz to 100 kHz : ±30%rdg. ±0.1%f.s.	DC to 16 Hz: ±0.1%rdg. ±0.02%f.s. 500 Hz to 5 kHz: ±5%rdg. ±0.05%f.s. 10 kHz to 20 kHz: ±30%rdg. ±0.1%f.s.
Operating Temperature	-30°C to 85°C (-22°F to 185°F)	-30°C to 85°C (-22°F to 185°F)	0°C to 50°C (-32°F to 122°F)	-30°C to 85°C (-22°F to 185°F)
Effect of conductor position	Within ±0.01%rdg. (DC to 100 Hz)	Within ±0.01%rdg. (DC to 100 Hz)	Within ±0.05%rdg. (DC 100 A)	Within ±0.05%rdg. (AC1000 A,50/60 Hz)
Effects of external magnetic fields	10 mA equivalent or lower (400 A/m, 60 Hz and DC)	50 mA equivalent or lower (400 A/m, 60H z and DC)	50 mA equivalent or lower (400 A/m, 60 Hz and DC)	200 mA equivalent or lower (400 A/m, 60 Hz and DC)
Maximum rated voltage to earth	CAT III 1000 Vrms	CAT III 1000 Vrms	CAT III 1000 Vrms	CAT III 1000 Vrms
Dimensions	70W (2.76") × 100H (3.94") × 53D (2.09") mm		160W (6.30") × 112H (4.41") × 50D (1.97") mm	
Mass	Approx. 340 g (12.0 oz.)	Approx. 350 g (12.3 oz.)	Approx. 850 g (30.0 oz.)	Approx. 980 g (35.3 oz)
Derating properties				

Model	AC/DC CURRENT PROBE CT6841-05	AC/DC CURRENT PROBE CT6843-05
Appearance		
Rated primary current	20 A AC/DC	200 A AC/DC
Diameter of measurable conductors	Max.ϕ 20 mm (0.79")	Max.ϕ 20 mm (0.79")
Basic accuracy	±0.3% rdg. ±0.01% f.s., ±0.1° (DC < f ≤ 100 Hz) ±0.3% rdg. ±0.05% f.s., (DC)	±0.3% rdg. ±0.01% f.s., ±0.1° (DC < f ≤ 100 Hz) ±0.3% rdg. ±0.02% f.s., (DC)
Frequency characteristics (Amplitude,typical)	100 Hz to 1 kHz : ±0.5%rdg. ±0.02%f.s. 1 kHz to 10 kHz : ±1.5%rdg. ±0.02%f.s. 10 kHz to 100 kHz : ±5.0%rdg. ±0.05%f.s. 100 kHz to 300 kHz : ±10%rdg. ±0.05%f.s. 300 kHz to 1 MHz : ±30%rdg. ±0.05%f.s.	100 Hz to 1 kHz : ±0.5%rdg. ±0.02%f.s. 1 kHz to 10 kHz : ±1.5%rdg. ±0.02%f.s. 10 kHz to 50 kHz : ±5.0%rdg. ±0.02%f.s. 50 kHz to 300 kHz : ±15%rdg. ±0.05%f.s. 300 kHz to 500 kHz : ±30%rdg. ±0.05%f.s.
Operating Temperature	-40°C to 85°C (-40°F to 185°F)	
Effect of conductor position	Within ±0.1%rdg. (DC to 100 Hz)	
Effects of external magnetic fields	0.05 A equivalent or lower (400 A/m, 60Hz and DC)	
Dimensions	153W (6.02") × 67H (2.64") × 25D (0.98") mm	
Mass	Approx. 350 g (12.3 oz)	Approx. 370 g (13.1 oz)
Derating properties		

Conversion cables

CONVERSION CABLE CT9900 is required to connect the following current sensors to the high accuracy sensor terminal.

For use with CT6862, CT6863, 9709, CT6865, CT6841, CT6843
When using a sensor without "-05" in the model name, Conversion Cable CT9900 must be used to make the connection.

CONVERSION CABLE CT9900

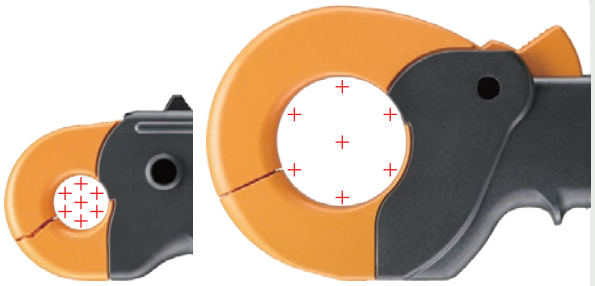
NEW high accuracy AC/DC probes (connected to input terminal Probe 1)

Ideal for thermostatic chambers and engine rooms

The CT6844/CT6845/CT6846 is ideal for operational evaluations of devices inside equipment subject to extreme temperature changes, offering tough, high-accuracy testing.

Resistant to conductor position effects

Conductor position changes within the clamp core have minimum effect on measured values.



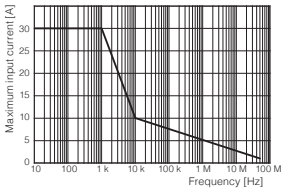
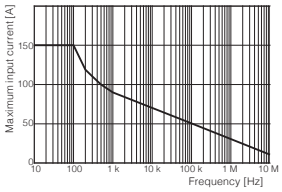
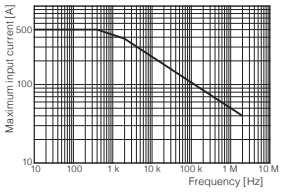
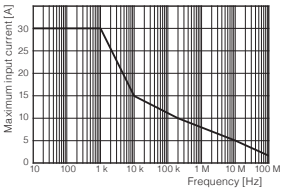
Effect of conductor position (with 50/60Hz DC current)
±0.1% rdg. or less (CT6844-05)
±0.2% rdg. or less (CT6845-05, CT6846-05)

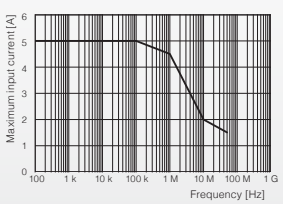
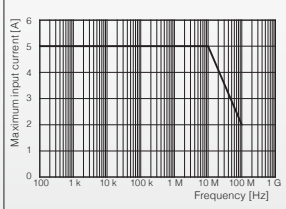
	CT6844-05	CT6845-05	CT6846-05
			
Rated primary current	AC/DC 500 A		AC/DC 1000 A
Frequency characteristics	DC to 200 kHz	DC to 100 kHz	DC to 20 kHz
Diameter of measurable conductors	φ20 mm (0.79 in) or less	φ50 mm (1.97 in) or less	
Output voltage	4 mV/A		2 mV/A
Basic accuracy (50/ 60Hz)	Amplitude accuracy: ±0.3% rdg. ±0.01% f.s. Phase accuracy: ±0.1 deg		
Basic accuracy (DC)	Amplitude accuracy: ±0.3% rdg. ±0.02% f.s.		
Accuracy guarantee temperature and humidity range	0°C to +40°C (32°F to 104°F), 80% rh or less (no condensation)		
Operating temperature and humidity	-40°C to +85°C (-40°F to 185°F), 80% rh or less (no condensation)		
Effect of conductor position	±0.1% rdg. or less	±0.2% rdg. or less	
Effects of external magnetic fields	300 mA or less (Scaled value, in a DC and 60 Hz magnetic field of 400 A/m)		
Magnetic susceptibility	100 mA or less (Scaled value, after 500 A AC/ DC input)		200 mA or less (Scaled value, after 1000 A AC/ DC input)
Effects of common-mode voltage	0.05% f.s. or less (1000 Vrms, 50/ 60Hz DC)		
Accessories	Instruction manual ×1, Mark band ×6, Carrying case ×1		

Versioni disponibili

CODE	CURRENT RANGE	DIAMETER	COMPATIBLE WATTMETER	CONNECTOR
CT6844	500A ac/dc	Ø 20mm	3390	PL23
CT6844/05	500A ac/dc	Ø 20mm	PW6001	ME15W
CT6845	500A ac/dc	Ø 50mm	3390	PL23
CT6845/05	500A ac/dc	Ø 50mm	PW6001	ME15W
CT6846	1000A ac/dc	Ø 50mm	3390	PL23
CT6846/05	1000A ac/dc	Ø 50mm	PW6001	ME15W

Broadband probe (connected to input terminal Probe 2)

Model	CLAMP ON PROBE 3273-50	CLAMP ON PROBE 3274	CLAMP ON PROBE 3275	CLAMP ON PROBE 3276
Appearance				
Frequency band	DC to 50 MHz (-3dB)	DC to 10 MHz (-3dB)	DC to 2 MHz (-3dB)	DC to 100 MHz (-3dB)
Rated primary current	30 A AC/DC	150 A AC/DC	500 A AC/DC	30 A AC/DC
Diameter of measurable conductors	5 mm dia. or less (insulated conductors)	20 mm dia. or less (insulated conductors)	20 mm dia. or less (insulated conductors)	5 mm dia. or less (insulated conductors)
Basic accuracy	0 to 30 A rms ±1.0% rdg. ±1 mV 30 A rms to 50 A peak ±2.0% rdg. (At 45 to 66 Hz, DC)	0 to 150 A rms ±1.0% rdg. ±1 mV 150 A rms to 300 A peak ±2.0% rdg. (At 45 to 66 Hz, DC)	0 to 500 A rms ±1.0% rdg. ±5 mV 500 A rms to 700 A peak ±2.0% rdg. (At 45 to 66 Hz, DC)	0 to 30 A rms ±1.0% rdg. ±1 mV 30 A rms to 50 A peak ±2.0% rdg. (At 45 to 66 Hz, DC)
Operating temperature and humidity	0°C to 40°C (32°F to 104°F) 80% rh or less (no condensation)	0°C to 40°C (32°F to 104°F) 80% rh or less (no condensation)	0°C to 40°C (32°F to 104°F) 80% rh or less (no condensation)	0°C to 40°C (32°F to 104°F) 80% rh or less (no condensation)
Effects of external magnetic fields	Max. 20 mA or equivalent (400 A/m, 60 Hz and DC)	Max. 150 mA or equivalent (400 A/m, 60 Hz and DC)	Max. 800 mA or equivalent (400 A/m, 60 Hz and DC)	Max. 5 mA or equivalent (400 A/m, 60 Hz and DC)
Dimensions	175W (6.89") × 18H(0.71") × 40D (1.57") mm Cable length: 1.5 m	176W (6.93") × 69H (2.72") × 27D(1.06") mm Cable length: 2 m	176W (6.93") × 69H (2.72") × 27D(1.06") mm Cable length: 2 m	175W (6.89") × 18H(0.71") × 40D (1.57") mm Cable length: 1.5 m
Mass	Approx. 230 g (8.1 oz)	Approx. 500 g (17.6 oz)	Approx. 520 g (18.3 oz)	Approx. 240 g (8.5 oz)
Derating properties				

	CURRENT PROBE CT6700	CURRENT PROBE CT6701
Appearance		
Frequency band	DC to 50 MHz (-3dB)	DC to 120 MHz (-3dB)
Rated primary current	5 Arms AC/DC	5 Arms AC/DC
Diameter of measurable conductors	5 mm dia. or less (insulated conductors)	5 mm dia. or less (insulated conductors)
Basic accuracy	typical ±1.0% rdg. ±1 mV ±3.0% rdg. ±1 mV (At 45 to 66 Hz, DC)	typical ±1.0% rdg. ±1 mV ±3.0% rdg. ±1 mV (At 45 to 66 Hz, DC)
Operating temperature and humidity	0°C to 40°C (32°F to 104°F) 80% rh or less (no condensation)	0°C to 40°C (32°F to 104°F) 80% rh or less (no condensation)
Effects of external magnetic fields	Max. 20 mA or equivalent (400 A/m, 60 Hz and DC)	Max. 5 mA or equivalent (400 A/m, 60 Hz and DC)
Dimensions	155W (6.10") × 18H(0.71") × 26D (1.02") mm Cable length: 1.5 m	155W (6.10") × 18H(0.71") × 26D (1.02") mm Cable length: 1.5 m
Mass	Approx. 250 g (8.8 oz)	Approx. 250 g (8.8 oz)
Derating properties		

Sensor switching method

High accuracy sensor terminal: Slide the cover to the left.

When connecting CT6862-05, CT6863-05, 9709-05, CT6865-05, CT6841-05 or CT6843-05

Wideband probe terminal: Slide the cover to the right.

When connecting
3273-50, 3274, 3275, 3276, CT6700 or CT6701

Configurations

Model	Order Code	Number of built-in channels	Motor analysis & D/A output
POWER ANALYZER	PW6001-01	1ch	—
	PW6001-02	2ch	—
	PW6001-03	3ch	—
	PW6001-04	4ch	—
	PW6001-05	5ch	—
	PW6001-06	6ch	—
	PW6001-11	1ch	✓
	PW6001-12	2ch	✓
	PW6001-13	3ch	✓
	PW6001-14	4ch	✓
	PW6001-15	5ch	✓
	PW6001-16	6ch	✓

Accessories: Instruction manual × 1, power cord × 1, D-sub 25-pin connector (PW6001-11 to -16 only) × 1

PW6001-16 (with 6 channels and motor analysis & D/A output)

- The optional voltage cord and current sensor are required for taking measurements.
- Specify the number of built-in channels and inclusion of Motor analysis & D/A output upon order for factory installation. These options cannot be changed or added at a later date.

Current measurement options

Model		Rated primary current
AC/DC CURRENT SENSOR	CT6862-05	50A
AC/DC CURRENT SENSOR	CT6863-05	200A
AC/DC CURRENT SENSOR	9709-05	500A
AC/DC CURRENT SENSOR	CT6865-05	1000A
AC/DC CURRENT PROBE	CT6841-05	20A
AC/DC CURRENT PROBE	CT6843-05	200A
CLAMP ON PROBE	3273-50	30A
CLAMP ON PROBE	3274	150A
CLAMP ON PROBE	3275	500A
CLAMP ON PROBE	3276	30A
CURRENT PROBE	CT6700	5A
CURRENT PROBE	CT6701	5A

CONVERSION CABLE CT9900

For use with CT6862, CT6863, 9709, CT6865, CT6841, CT6843
When using a sensor without "-05" in the model name, Conversion Cable CT9900 must be used to make the connection.

Voltage measurement options

VOLTAGE CORD L9438-50

Red, black: 1 each
1000 V specifications
Cable length: 3 m (9.84 ft)

VOLTAGE CORD L1000

Red, yellow, blue, gray: 1 each; Black: 4
1000 V specifications
Cable length: 3 m (9.84 ft)

GRABBER CLIP 9243

Red, black: 1 each
Change the tip of the
VOLTAGE CORD to use

Connection options

CONNECTION CORD L9217

Length : 1.6 m (5.25 ft)
For motor signal input

LAN CABLE 9642

Length : 5 m (16.41 ft)
supplied with straight to
cross conversion cable

RS-232C CABLE 9637

Length: 1.8 m (5.91 ft)
9pin to 9pin

GP-IB CONNECTOR CABLE 9151-02

Length: 2 m (6.56 ft)

CONNECTION CABLE 9444

Length: 1.5 m (4.92 ft)
For external control interface
straight 9pin to 9pin

OPTICAL CONNECTION CABLE L6000

Length: 10 m (32.8 ft)
For synchronized control

Other

The following made-to-order items are also available. Please contact your Hioki distributor or subsidiary for more information.

- Optical connection cable, Max. 500 m (1640.55 ft) length
- Rackmount fittings (EIA, JIS)
- Carrying case (hard trunk, with casters)

Carrying case

HIOKI

PW9100

NEW

Modulo opzionale per inserzione diretta di corrente, fino a 50Aca/cc

PW9100 è la nuova opzione di misura, compatibile con i wattmetri PW6001 e 3390, per l'inserzione diretta di corrente (senza utilizzo di sensori e trasduttori) con la capacità di misurare corrente fino a 50Aca/cc.

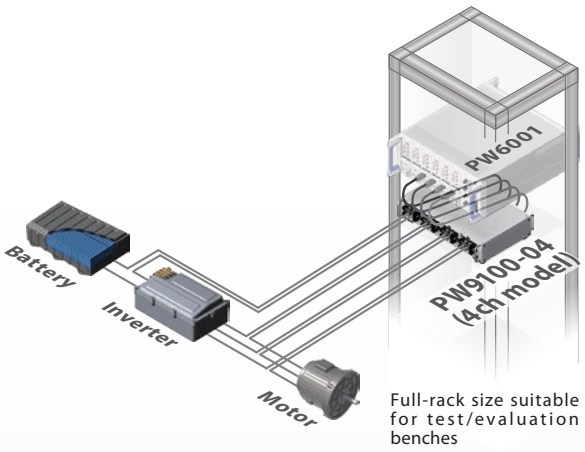
Il modulo PW9100 incorpora i TA interni con tecnologia Hioki DCCT (presenti anche su PW3336 e PW3337) che offrono prestazioni fuori dal comune, in quanto eliminano le problematiche di surriscaldamento e di deriva termica dovute al "classico" shunt di ingresso, garantendo di conseguenza una precisione, una stabilità di misura ed una ripetibilità dei risultati di prova del tutto fuori dal comune.

PORTATA	BANDA DI FREQUENZA	PRECISIONE IN COMBINAZIONE CON PW6001	CMRR (100 KHZ)
50Arms ± 50Acc	da CC a 3.5MHz	± 0.04% * (dettagli alla pagina seguente)	120dB

Versatilità di connessione

PW9100 può essere installato a rack e posizionato in prossimità di PW6001, oppure ad una distanza di 5 metri tramite il cavo compensato di prolunga CT9902.

In questo modo si può ridurre la distanza tra DUT e strumento di misura, riducendo al minimo gli effetti del rumore elettrico durante i test.



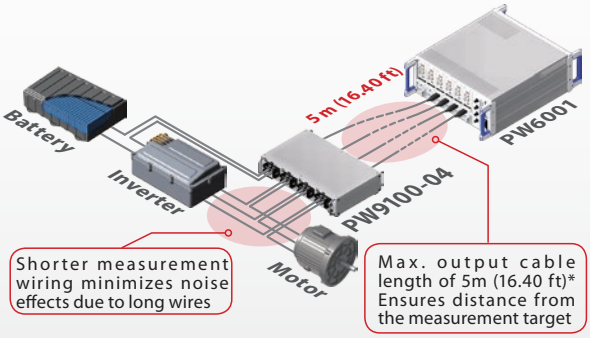
Full-rack size suitable for test/evaluation benches

Eccellente accuratezza sull'angolo di fase

La bassissima impedenza di ingresso dei canali di PW9100 consente di ottenere misure molto precise sia in termini di ampiezza, raggiungendo i 50Aca/cc continuativi e una corrente di picco massimo di 200Aca/cc (entro una durata di 20millisecondi), sia in termini di angolo di fase grazie ad un bassissimo sfasamento indotto.

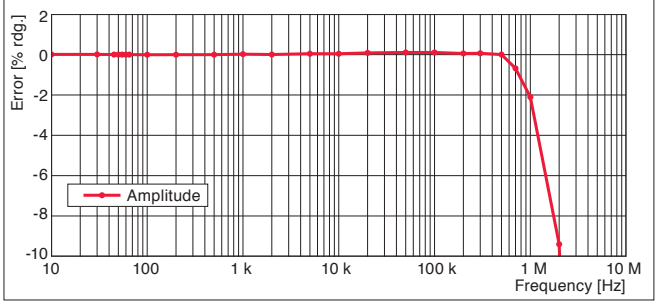
Versioni disponibili

CODICE	DESCRIZIONE
PW9100/03	Modulo con 3 canali di ingresso 50A
PW9100/04	Modulo con 4 canali di ingresso 50A

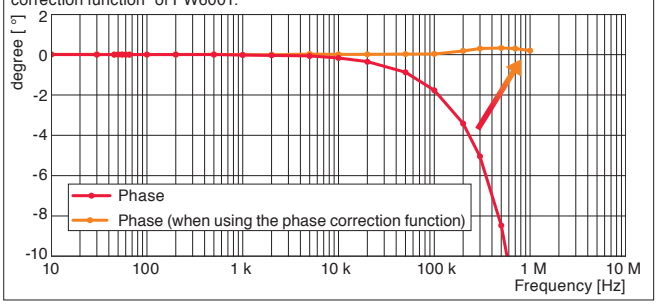


Frequency characteristics

Amplitude accuracy characteristics (Typical)
Characteristics of a wideband flat amplitude. -3 dB in 3.5 MHz



Phase accuracy characteristics (Typical)
To improve the phase characteristics in the high-frequency band, use the phase correction function* of PW6001.



*Special calibration is required when a CT9902 EXTENSION CABLE is used. Contact us for more information.

Specifications

Current and power measurement accuracy

(Combined accuracy of a PW9100 AC/DC CURRENT BOX and a PW6001 POWER ANALYZER)

Frequency	Current measurement accuracy
DC	±0.04% rdg. ±0.037% f.s. (f.s. = PW6001 Range)
45 Hz ≤ f ≤ 65 Hz	±0.04% rdg. ±0.025% f.s. (f.s. = PW6001 Range)
Other bandwidths	PW6001 accuracy + PW9100 accuracy (Consider sensor rating when calculating f.s. error.)

Frequency	Power measurement accuracy	Phase
DC	±0.04% rdg. ±0.057% f.s. (f.s. = PW6001 Range)	–
45 Hz ≤ f ≤ 65 Hz	±0.04% rdg. ±0.035% f.s. (f.s. = PW6001 Range)	PW6001 accuracy + PW9100 accuracy
Other bandwidths	PW6001 accuracy + PW9100 accuracy (Consider sensor rating when calculating f.s. error.)	

- For other measurement parameters, add the PW6001 accuracy and the PW9100 accuracy (and consider the sensor rating when calculating the f.s. error).
- For 1 A Range and 2 A Range, apply ±0.12% f.s. (f.s. = PW6001 Range)
- Accuracy additions defined by the conditions in the PW6001 and PW9100 specifications also apply.

The advantages of combined accuracy	The f.s. accuracy of PW9100 doesn't need to be taken into account for DC measurements and measurements from 45 to 66 Hz.

Current measurement accuracy (standalone PW9100)

Frequency	Amplitude	Phase
DC	±0.02% rdg. ±0.007% f.s.	–
DC < f < 30 Hz	±0.1% rdg. ±0.02% f.s.	±0.3 deg.
30 Hz ≤ f < 45 Hz	±0.1% rdg. ±0.02% f.s.	±0.1 deg.
45 Hz ≤ f ≤ 65 Hz	±0.02% rdg. ±0.005% f.s.	±0.1 deg.
65 Hz < f ≤ 500 Hz	±0.1% rdg. ±0.01% f.s.	±0.12 deg.
500 Hz < f ≤ 1 kHz	±0.1% rdg. ±0.01% f.s.	±0.5 deg.
1 kHz < f ≤ 5 kHz	±0.5% rdg. ±0.02% f.s.	±0.5 deg.
5 kHz < f ≤ 20 kHz	±1% rdg. ±0.02% f.s.	±1 deg.
20 kHz < f ≤ 50 kHz	±1% rdg. ±0.02% f.s.	±(0.05*f) deg.
50 kHz < f ≤ 100 kHz	±2% rdg. ±0.05% f.s.	±(0.06*f) deg.
100 kHz < f ≤ 300 kHz	±5% rdg. ±0.05% f.s.	±(0.06*f) deg.
300 kHz < f ≤ 700 kHz	±5% rdg. ±0.05% f.s.	±(0.07*f) deg.
700 kHz < f ≤ 1 MHz	±10% rdg. ±0.05% f.s.	±(0.07*f) deg.
Frequency band	3.5 MHz (-3 dB typical)	–

- Unit for f in accuracy calculations: kHz
- Amplitude accuracy and phase accuracy are defined within the accuracy guarantee range shown in the derating figure. However, for DC < f < 10 Hz, the above shows the design values.
- Accuracy guarantee conditions: 23°C ±5°C (73°F ±9°F), 80% RH or less, warm-up time: 30 minutes or more, sine wave input, terminal-to-ground voltage of 0 V

Output noise	300 μV rms or less (≤1 MHz)
Effects of temperature	Within the range of 0°C to 18°C (32°F to 64°F) or 28°C to 40°C (82°F to 104°F) Amplitude sensitivity: ±0.005% rdg./°C Offset voltage: ±0.005% f.s./°C Phase: ±0.01 deg./°C
Magnetic susceptibility	5 mA or less (Scaled value, after input of ±50 A)
Effects of common-mode voltage (CMRR)	50 Hz/60 Hz: 120 dB or greater, 100 kHz: 120 dB or greater (Effect on output voltage/common-mode voltage)
Effects of radiated radio frequency electromagnetic field	0.5% f.s. or less at 10 V/m
Effects of external magnetic field	±10 mA or less (for a magnetic field of 400 A/m at DC or 50 Hz/60 Hz)

- Add the following accuracy when using a 5-m (16.40-ft) CT9902 EXTENSION CABLE. The measurement band is 2 MHz (±3 dB typical)

Frequency	Amplitude	Phase
DC ≤ f ≤ 10 kHz	±0.015% rdg.	No addition
10 kHz < f ≤ 50 kHz	±0.015% rdg.	±(0.02*f) deg.
50 kHz < f ≤ 300 kHz	±0.015% rdg.	±(0.03*f) deg.
300 kHz < f ≤ 700 kHz	±2% rdg.	±(0.03*f) deg.
700 kHz < f ≤ 1 MHz	±4% rdg.	±(0.03*f) deg.

Basic specifications

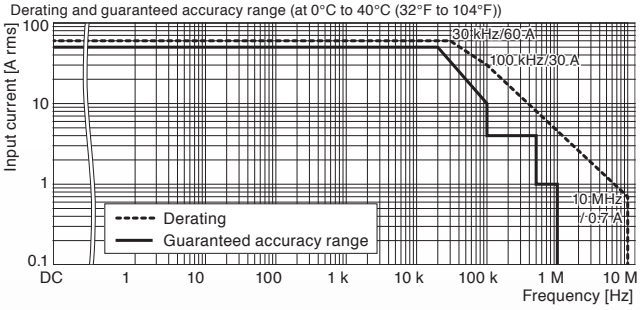
(Accuracy guaranteed for 1 year, Post-adjustment accuracy guaranteed for 1 year)

Input method	Isolated input, DCCT input
Rated primary current	50 A AC/DC
Number of input channels	PW9100-03: 3 channels PW9100-04: 4 channels
Maximum input current	Within derating. However, up to ±200 A peak is allowable if within 20 ms (design value).
Output voltage	2 V/50 A
Maximum rated voltage to ground	1000 V (measurement category II), 600 V (measurement category III), anticipated transient overvoltage: 6000 V
Measurement terminals	Terminal block (with safety cover), M6 screws
Input resistance	1.5 mΩ or less (50 Hz/60 Hz)
Input capacitance	Between measurement terminals and case (secondary side), 40 pF or less, defined at 100 kHz

General specifications

Operating environment	Indoors, pollution degree 2, altitude up to 2000 m (6562.20 ft)
Operating temperature and humidity	Temperature: 0°C to 40°C (32°F to 104°F), Humidity: 80% RH or less (no condensation)
Storage temperature and humidity	Temperature: -10°C to 50°C (14°F to 122°F), Humidity: 80% RH or less (no condensation)
Compliance standard	Safety: EN 61010-2-030:2010 EMC: EN 61326-1:2013 Class A
Dielectric strength	5.4 kV AC (sensed current of 1 mA), 50 Hz/60 Hz, 1 min - Between the input terminal, the cable output terminal and the case - Between channels
Power supply	Power supply from PW6001, 3390, 3390-10
Interface	Dedicated interface (ME15W)
Dimensions	430 mm (16.93 in) W × 88 mm (3.46 in) H × 260 mm (10.24 in) D
Output cable length	0.8 m (2.62 ft)
Mass	PW9100-03: 3.7 kg (130.5 oz), PW9100-04: 4.3 kg (151.7 oz)
Product warranty period	1 year
Accessories	Instruction manual

Derating and guaranteed accuracy range (at 0°C to 40°C (32°F to 104°F))



Options

(Product name)	(Order code)	(No. of channels)
AC/DC CURRENT BOX	PW9100-03	3ch
AC/DC CURRENT BOX	PW9100-04	4ch

EXTENSION CABLE CT9902
2 or more extension cables cannot be combined for use.

Rack mount hardware
Made-to-order, for EIA/JIS
Contact us for more information.

POWER ANALYZERS 3390/3390-10 also support the PW9100.

For connecting to 3390/3390-10

CONVERSION CABLE CT9901

I modelli proposti

Wattmetri di Precisione





	PW6001	3390	PW3337	PW3336	PW3335
Canali di misura V e I	fino a 6 e 6	4 e 4	4 e 3	2 e 2	1 e 1
Misura di tensione	fino a 1500V	fino a 1500V	fino a 1000V	fino a 1000V	fino a 1000V
Misura diretta di corrente	fino a 50A*		fino a 65A	fino a 65A	fino a 30A
Misura indiretta di corrente	fino a 1000A	fino a 1200A	fino a 5000A	fino a 5000A	fino a 5000A
Banda di Frequenza	da DC a 2MHz	da DC a 150kHz	da DC a 100kHz	da DC a 100kHz	da DC a 100kHz
Parametri elettrici (V, I, P, Q, S, PF, FQ, ...)	•	•	•	•	•
Integrazione di Energia	•	•	•	•	•
Distorsione Armonica Totale THD%	•	•	•	•	•
Analisi componenti armoniche V e I	• (fino 50° ordine)	• (fino 100° ordine)	• (fino 50° ordine)	• (fino 50° ordine)	• (fino 50° ordine)
Campionamento	5MHz	500kHz	700kHz	700kHz	700kHz
Cadenza di registrazione	da 200 msec a 60 min	da 50 msec a 60 min	da 200 msec a 60 min	da 200 msec a 60 min	da 200 msec a 60 min
Memorizzazione dati	memoria interna e USB key	CF Card	su PC	su PC	su PC
Display grafico	•	•			
Interfacce	LAN, RS232 (GP-IB)	USB, LAN, CF Card	LAN, RS232 (GP-IB)	LAN, RS232 (GP-IB)	LAN, RS232 (GP-IB)
Alimentazione	Rete	Rete	Rete	Rete	Rete
Analisi FFT sulle forme d'onda	•	•			
Opzione rendimento meccanico dei motori	•	•			

* tramite modulo opzionale