CW120

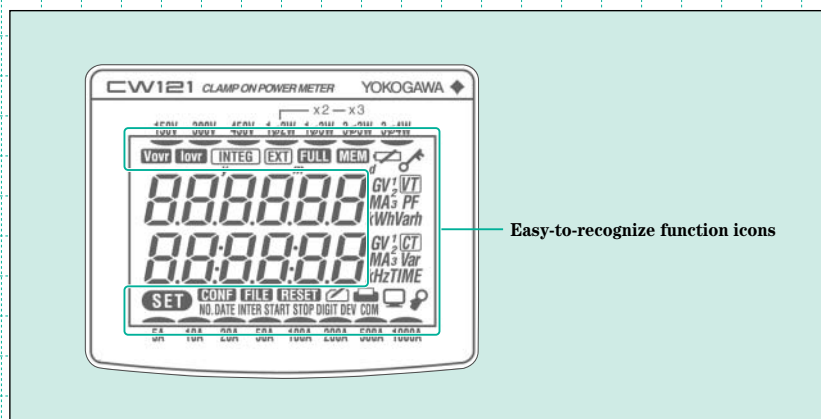# Model CW120 Clamp-on Power Meter

Maintenance and long term monitoring of electrical equipment and electrical system.

Current input (clamp)

Voltage input

External I/O controller port
(integration start/stop signal: function to start/stop multiple units simultaneously)

RS-232 connector (8-pin)

100-240VAC Power connection

PC card slot (flash ATA memory)

Power switch

Model CW121-□-1

Easy-to-recognize function icons

Low-cost tools to support your energy conservation efforts

As energy conservation becomes increasingly important, we are pleased to present low-cost clamp-on power meters designed to meet user needs for simple tools capable of measuring power values and instantaneous values.

Useful features for energy conservation and power measurement

●Periodically save data as often as once a second

Data can be saved as low as 1-second interval. This capability allows the CW120 Series to respond quickly to load fluctuations and measure transient responses in equipment.

●Check equipment operating conditions

The CW120 Series has an instantaneous value filing function (enabling multiple data records to be saved in a single file when multiple measurements are taken) which is useful for determining equipment operating conditions.

●Wiring error check function

This function helps ensure that measurement operations are correct.

●Simultaneous measurement of multiple facilities

Multiple CW120 Series units can start and stop integration simultaneously through externally controlled I/O.

●Works even with small electric energy values

Easily change the decimal position (the number of digits following the decimal point) and display unit (Wh, kWh, MWh, GWh) on the electric energy display.

Details for Models CW120/CW121

| Items		CW120/CW121
Measurement Mode	Input system	Single-phase 2-wire to 3-phase 4-wire
	Instant mode	(Up to 3 phase 3 wire for CW120)
	Electric Energy mode	Available
Display	Screen	Segmented LCD with backlight
Communication	Interface	RS232 or RS485
	Protocol	MODBUS, PC-link, Power-Monitor, Proprietary
	Monitoring by AP240E	Available
Power supply		100 to 240V AC, Supply the power from input.
Size (W×H×D)		117×161×51mm
Weight		600g

Load measurements on multiple systems

●In addition to support for a variety of connection types, The CW120 Series can simultaneously measure the loads* (facilities, equipment) on multiple systems sharing a common power supply.
CW120 (three-phase 3-wire model): 1ø2W×2
CW121 (three-phase 4-wire model): 1ø2W×2, ×3

1ø2W Three current systems (example)

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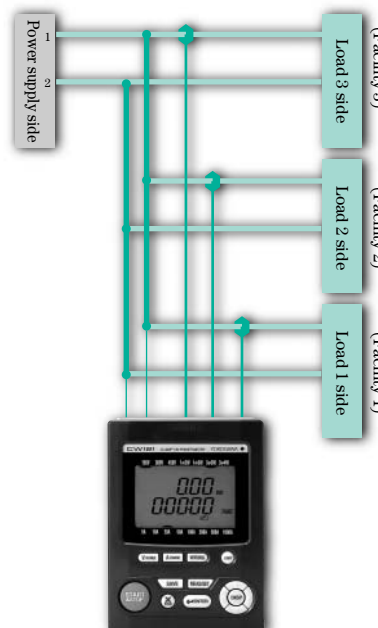
Low-cost tools to support your energy conservation efforts

Compact design

- The CW120 Series is compact in size (117×161×51mm (W×H×D)), making it ideal for installation in cubicles and inside distribution panels. Installation is even easier with the magnetic case (93023).
- Although the CW120 Series is small, it has a large backlit LCD.
- A new addition to the clamp lineup is a small-diameter current clamp (model 96033, capable of measurements in the range of 5–50 A) for measurements in tight spots and locations where many wires are jumbled together.

Current clamp (96033)

Approximately 70 mm

ø18 mm

Magnetic case (93023)

Measurements

- The CW120 Series can be used for voltage measurements up to 495 V.
- A variety of connection types are supported, from single-phase 2-wire to three-phase 4-wire (CW120: three-phase 3-wire model; CW121: three-phase 4-wire model).
- Continuous measurement integration (accurate measurements can be obtained even if there are large load fluctuations)
- Plus/minus signs are shown for reactive power and power factor.
- The data saving interval can be set in the range of one second to one hour.

Parameters setting tool (name: Toolbox)

The setting software allows you to set CW120 Series measurement conditions through a PC and save measurement data on a PC when the unit is connected to the PC through RS-232 or RS-485 port.

● Measurement conditions setting function

This function makes it easy to set basic functions needed for measurement, such as start/stop time and date, wiring method, clamp type, voltage, and current range etc.
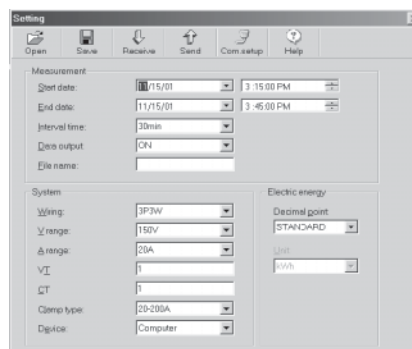
● File transfer function

The data file stored in CF pack can be transfered to PC. Microsoft Excel can read transferred data file.
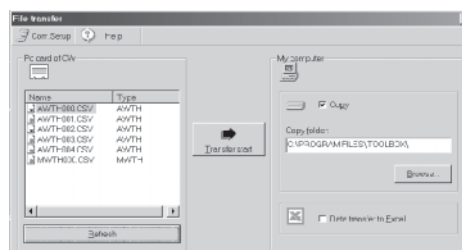
* Toolbox is included as a standard feature (on two floppy disks).

Setting screen

RS-232 comm. cable
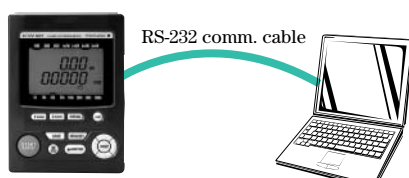
Microsoft, Windows, and Excel are trademarks or registered trademarks of Microsoft Corporation, the United States.
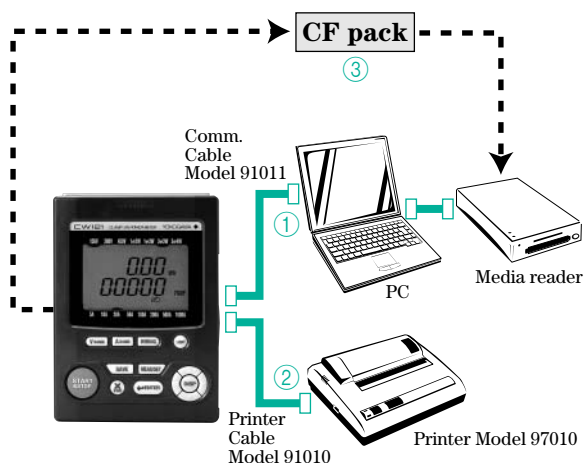
File transfer screen

Advanced data management and communication

Data management and communication

① You can connect CW120 to a PC through dedicated RS-232 cable.
② A printer (sold separately) can be connected through RS-232 cable to print measurement data.
③ If you have a media reader connected to your PC or card slot in notebook PC, measurement data and settings can be uploaded directly to a PC from CF* pack.

Memory Card	Memory capacity	Interval Time 10sec	Interval Time 1sec	Wiring Method
97034	256MB	Approx. 103days	Approx. 70hours	3system 1ø2W
97035	512MB	Approx. 206days	Approx. 140hours	3system 1ø2W
97037	2GB	Approx. 2years	Approx. 560hours	3system 1ø2W

* Compact Flash cards with memory capacity up to 2 GB may be used.

CF pack ③

Comm. Cable Model 91011

① PC

Media reader

② Printer Cable Model 91010

Printer Model 97010

CW120

Network Communication

CW120 In addition to proprietary communication also supports, MODBUS, PC-link and Power Monitor protocols.
PC-link is a protocol for Yokogawa's Temperature controllers and PLCs.
Power Monitor protocol is a protocol for Yokogawa's Power Monitors. (PR201)

* DAQLOGGER is Yokogawa's communication software for Windows

Data Management by DAQLOGGER*

PC

Internet

WEB function: Model MV100/200 can be monitored by Internet Browser on PC.

E-mail Alarm function: The alarms from Model MV100/200 can be sent to PC as an E-mail.

FTP function: Model MV100/200 can send gathering data as a file to PC by using FTP function.

Model MV   Model MV

Yokogawa's Recorder

RS485-MODBUS protocol
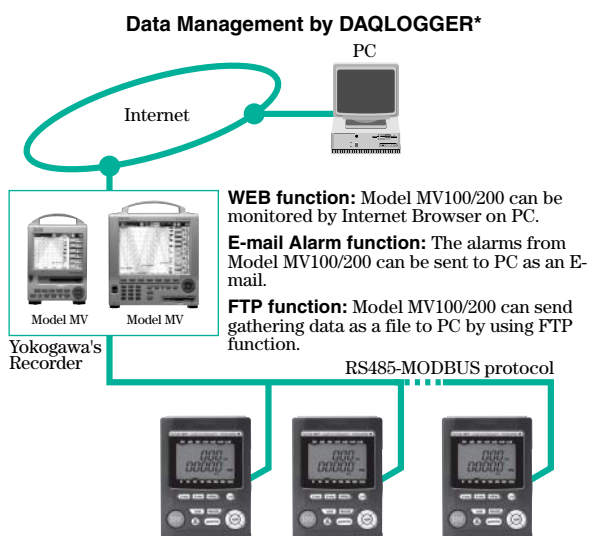
Remote monitoring

The RS-485 allows multiple use to be connected for remote monitoring.

* RS-485/RS-232 converter is required to connect the CW120/CW121-m-2 (RS-485 communication spec) to the RS-232 port on your PC.

Recommended brand and model: Yokogawa's RS-232/RS-485 Converter Model ML2.

PC

Monitoring Software

RS-232

Converter

RS-485   Max 31 units, 1.2km

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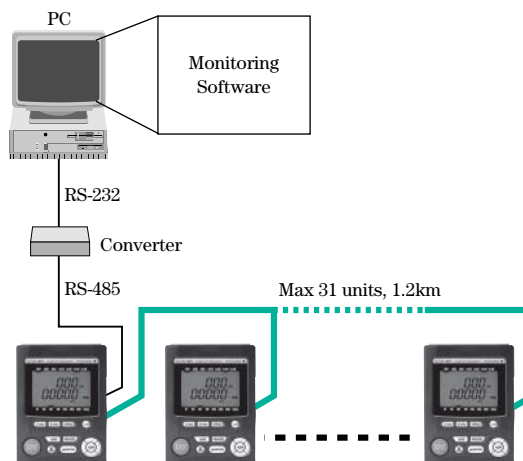
Specifications

■ Inputs

Parameter		Voltage (V)	Current (A)
Input type		Resistive potential division	Clamp detection
Rated value (range)		150/300/450 V	Clamp 96033: 5/10/20/50 A
			Clamp 96030: 20/50/100/200 A
			Clamp 96031: 50/100/200/500 A
			Clamp 96032: 200/500/1000 A
Wiring	CW120	Single-phase 2-wire, single-phase 3-wire, three-phase 3-wire	
	CW121	Single-phase 2-wire, single-phase 3-wire, three-phase 3-wire, three-phase 4-wire	
Input resistance	CW120	Approximately 1.5 MΩ	Approximately 100 kΩ
	CW121	Approximately 1.3 MΩ	
Maximum allowed input		495 Vrms	Clamp 96033: 130 Arms
			Clamp 96030: 250 Arms
			Clamp 96031: 625 Arms
			Clamp 96032: 1000 Arms
A/D converter		Voltage/current input simultaneous conversion, 12-bit resolution	

■ Measurement Input functions

Parameter		Voltage	Current/active power
Method		Digital sampling	
Frequency range		45–65 Hz (reciprocal system), detected from V1	
Crest factor	150/300 V range	Rated input: 2	Rated input: 3
	450 V range	Rated input: 1.56	
Active input range		10–110% of each range	
Display range	Lower limit	All ranges 1.5 V	0.4% of each range
	Upper limit	130% of each range, except 110% for 450 V range	130% of each range
Temperature coefficient		±0.05% rng/°C	±0.07% rng/°C (including clamp)
Display updating interval		Approximately one second	

■ Instantaneous Value Measurement

- Measurement parameters: Voltage rms (V), current rms (A), active power (W), frequency (Hz)
- Measurement accuracy (at power factor 1, including clamp)
  Voltage: ±(0.3% rdg + 0.2% rng)
  Current/active power: ±(0.8% rdg + 0.4% rng) when using clamps 96030, 96031, and 96033
  ±(1.2% rdg + 0.8% rng) when using clamp 96032
  Frequency: ±(0.1% rdg + 1% dgt)
- Computation parameters: Reactive power (Var), power factor
- Computation accuracy: (value calculated from measurement) ±1 dgt
- Power factor influence: ±1.0% rng cosø = ±0.5 (relative to power factor 1) when using clamp 96030
  ±2.0% rng cosø = ±0.5 (relative to power factor 1) when using clamps 96031, 96032, and 96033
- Reactive factor influence: ±1.0% rng sinø = ±0.5 (relative to reactive factor 1) when using clamp 96030
  ±2.0% rng sinø = ±0.5 (relative to reactive factor 1) when using clamps 96031, 96032, and 9603

■ Equations

- Voltage rms
$$Vrms = \sqrt{\frac{1}{T}\int_0^T v(t)^2 dt} = \sqrt{\frac{1}{T}\sum_{t=0}^T v(t)^2}$$

- Current rms
$$Arms = \sqrt{\frac{1}{T}\int_0^T i(t)^2 dt} = \sqrt{\frac{1}{T}\sum_{t=0}^T i(t)^2}$$

- Active power
$$P = \frac{1}{T}\int_0^T v(t) \times i(t)\, dt = \frac{1}{T}\sum_{t=0}^T v(t) \times i(t)$$

Single-phase 3-wire, three-phase 3-wire $\quad \Sigma P = P1 + P2$
Three-phase 4-wire $\quad \Sigma P = P1 + P2 + P3$

$v(t)$, $i(t)$: Input signals
T: One period for input signal

- Reactive power and power factor

	Reactive power (Note 2)	Apparent power	Power factor (Note 2)
Single-phase 2-wire	$Qi = \sqrt{(VA)^2 - P^2}$	$VA = V \times A$	P/VA
Single-phase 3-wire	$Qi = \sqrt{(VAi)^2 - Pi^2}$ i=1,2 $\Sigma Q = Q1 + Q2$	$VAi = Vi \times Ai$ i=1,2 $\Sigma VA = VA1 + VA2$	
Three-phase 3-wire (Note 3)	$Qi = \sqrt{(VAi)^2 - Pi^2}$ i=1,2 $\Sigma Q = Q1 + Q2$	$VAi = Vi \times Ai$ i=1,2 $\Sigma VA = \sqrt{3}/2 (VA1 + VA2)$	$\Sigma P / \Sigma VA$
Three-phase 4-wire	$Qi = \sqrt{(VAi)^2 - Pi^2}$ i=1,2,3 $\Sigma Q = Q1 + Q2 + Q3$	$VAi = Vi \times Ai$ i=1,2,3 $\Sigma VA = VA1 + VA2 + VA3$	
Computation range	Rated value depends on V and A ranges.	Rated value depends on V and A ranges.	-1~+1
Display resolution	Same as for active power.	Internal computation only; data not displayed or saved.	±1.000

Note 1: In the case of distorted waves, there may be differences from other measuring instruments that are based on different measurement principles.
Note 2: The polarity of each phase determined by the reactive power meter method is multiplied and the polarity is displayed.
Note 3: In the case of three-phase 3-wire and unbalanced inputs, there may be differences from other measuring instruments that are based on different measurement principles, or wiring.

■ Electric Energy Measurement

- Measured parameters:
  Active electric energy, regenerative electric energy (regenerative electric energy is not displayed on the screen; it is merely saved)
- Measurement accuracy: Active power measurement accuracy ±1 dgt (with standard settings)
- Integration function settings
  Start/stop settings: Manual, timer, external trigger (control)
  Output intervals: 1/2/5/10/15/30 seconds; 1/2/5/10/15/30 minutes; 1 hour
- Displayed digits:
  This is set automatically based on the rated power, and the minimum resolution can be set

■ Saving items

- Saving items:
  Voltage, current, active power, reactive power, power factor, frequency, active electric energy, regenerative electric energy

■ Display Functions

- Display screen: Backlit segmented LCD
- Maximum number of displayed digits
  Electric energy: 6 digits
  Other parameters: 4 digits
- Range makeup: (rated values)

							Clamp 96032	
						Clamp 96031		
					Clamp 96030			
			Clamp 96033					
Voltage	Wiring	5.000 A	10.00 A	20.00 A	50.00 A	100.0 A	200.0 A	500.0 A	1.000 kA
150.0V	1ø2W	750.0 W	1.500 kW	3.000 kW	7.500 kW	15.00 kW	30.00 kW	75.00 kW	150.0 kW
	1ø3W	1.500 kW	3.000 kW	6.000 kW	15.00 kW	30.00 kW	60.00 kW	150.0 kW	300.0 kW
	3ø3W	1.500 kW	3.000 kW	6.000 kW	15.00 kW	30.00 kW	60.00 kW	150.0 kW	300.0 kW
	3ø4W	2.250 kW	4.500 kW	9.000 kW	22.50 kW	45.00 kW	90.00 kW	225.0 kW	450.0 kW
300.0V	1ø2W	1.500 kW	3.000 kW	6.000 kW	15.00 kW	30.00 kW	60.00 kW	150.0 kW	300.0 kW
	1ø3W	3.000 kW	6.000 kW	12.00 kW	30.00 kW	60.00 kW	120.0 kW	300.0 kW	600.0 kW
	3ø3W	3.000 kW	6.000 kW	12.00 kW	30.00 kW	60.00 kW	120.0 kW	300.0 kW	600.0 kW
	3ø4W	4.500 kW	9.000 kW	18.00 kW	45.00 kW	90.00 kW	180.0 kW	450.0 kW	900.0 kW
450.0V	1ø2W	2.250 kW	4.500 kW	9.000 kW	22.50 kW	45.00 kW	90.00 kW	225.0 kW	450.0 kW
	1ø3W	4.500 kW	9.000 kW	18.00 kW	45.00 kW	90.00 kW	180.0 kW	450.0 kW	900.0 kW
	3ø3W	4.500 kW	9.000 kW	18.00 kW	45.00 kW	90.00 kW	180.0 kW	450.0 kW	900.0 kW
	3ø4W	6.750 kW	13.50 kW	27.00 kW	67.50 kW	135.0 kW	270.0 kW	675.0 kW	1.350 MW

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■ Communication Functions
- Electrical specifications: Conforms to EIA RS-232 or EIA RS-485.
- Protocols: CW120/121 proprietary protocol, Power Monitor protocol (Standard protocol used for YOKOGAWA M&C's Power Monitor)
  PC link communication (Standard protocol used for YOKOGAWA M&C's Temperature Controllers)
  MODBUS communication (ASCII or RTU)
- Synchronization system: Start stop synchronization
- Baud rates: 1200, 2400, 4800, 9600, 19200, 38400 bps

■ PC card interface
- Slot: PC card slot TYPE II
- Compatible card: ATA flash memory card
- Function specifications: Saving measurement data, saving and reading settings data

■ Faulty Wiring Checking Functions
- Check details:
  Presence/absence of power input; check for frequency measurement range; voltage phase sequence;
  presence/absence of power input; whether current clamp is reverse-connected

■ Scaling Function
The VT ratio and CT ratio can be set.
- Settings ranges: VT ratio: 1–10,000
  CT ratio: 1–10,000 (in increments of 0.01)

■ External Control I/O (for RS-232 only; not provided for RS-485)
These input and output can be used as signals for starting and stopping integrating measurement.
- Control input: TTL level or contact
- Control output: TTL level

■ Other Functions
Clock (typical precision: ±100 ppm), key lock, system reset

■ General Specifications
- Environmental requirements: Indoor usage at an altitude of 2000 meters or less.
- Usage temperature and humidity ranges:
  0–50°C, 5–85% RH (no condensation)
  0–40°C, 5–85% RH (no condensation) for UL, C-UL
- Storage temperature and humidity ranges:
  -20–60°C, 90% RH (no condensation)
- Insulating resistance:
  500 V DC, 50 MW or greater
  Between voltage input terminals and case
  Between voltage input terminals and current input terminals, communication terminals, and control I/O terminals
  Between power line and case
  Between power line and current input terminals, communication terminals, and control I/O terminals
- Insulating withstand voltage:
  5550 V AC for one minute
    Between voltage input terminals and case
  3320 V AC for one minute
    Between voltage input terminals and current input terminals, communication terminals, and control I/O terminals
  2300 V AC for one minute
    Between power line and case
    Between power line and current input terminals, communication terminals, and control I/O terminals
- Power supply: 100–240 V AC ±10%, 50/60 Hz
- Consumed power: 8 VA maximum
- External magnetic field effects: Within accuracy levels at 400 A/m
- External dimensions: Approximately 117 × 161 × 51 mm (W × H × D)
- Weight: Approximately 0.6 kg
- Terminals:
  Voltage input CW120: 3 terminals Banana terminals (safety terminals)
                 CW121: 4 terminals Banana terminals (safety terminals)
  Current terminals CW120: 2 pairs Banana terminals (safety terminals)
  (H/L) CW121: 3 pairs Banana terminals (safety terminals)
  External control I/O 3 terminals (H/L/H) Screwless terminals
  terminals RS-485 4 terminals (+/-/SG/TM) M3 screw terminals
- Connectors:
  RS-232: Mini DIN 8-pin
  AC power supply: 2-pin
- Accessories:
  Voltage input probes: 3 for CW120, 4 for CW121
  Power cord, user's manual, operation guide, Toolbox (setting software)
- Safety standards:
  Compliant with EN61010-1, EN61010-2-031, UL3111-1 First Edition, CAN C22.2 No. 1010.1-92
  – Voltage input line
    Measurement (Overvoltage) category III (Max. input voltage : 600 Vrms)
  – Power line
    Installation category II (Max. input voltage : 264 Vrms)
  Pollution degree 2
- EMC (emission):
  Compliant with EN55011, Group1, ClassA; EN61326; EN61000-3-2; EN61000-3-3
- EMC (immunity):
  Compliant with EN61326

CW240 Model and Suffix Code

●Model name and suffix code

Model (Part No.)	Suffix code	Option code	Description
CW240			
	-D		Power Cord (UL/CSA Standard)
	-F		Power Cord (VDE Standard)
	-H		Power Cord (GB Standard)
	-R		Power Cord (SAA Standard)
	-S		Power Cord (BS Standard)

●CW240 selection list for clamps

Aim wiring to measure	Number of clamps	Notes for selecting type of clamp probes
1phase2wire1load	1	
1phase2wire2load	2	
1phase2wire3load	3	Different clamps are selectable.
1phase2wire4load	4	
1phase3wire1load	2	Same clamps must be selected.
1phase3wire2load	4	Same clamps must be selected for each load.
3phase3wire1load	2	Same clamps must be selected.
3phase3wire2load	4	Same clamps must be selected for each load.
3phase3wire1load3currents	3	Same clamps must be selected.
3phase4wire	3	Same clamps must be selected.
Scott wiring	4	Same clamps must be selected.

Standard accessories comes with main unit

91007 Voltage probes, AC adapter ×1, AA size alkaline battery ×6, ToolBox240(CD-ROM)×1, User's Manual ×1/CD-ROM version ×1, Quick Manual ×1/CD-ROM version ×1, Communication function manual(CD-ROM)×1

●Accessories

Carrying case

93020
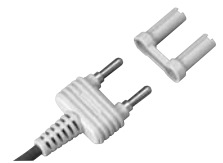
CW240 main unit can be packed in the carrying case with accessories like current clamps and voltage probes, without disconnecting them from the main unit. It also holds the other accessories.

Protective Cover

91022

To prevent error connection of clamp probes.

Name	Model No.	Description
Voltage probes (4 pcs/set)	91007	
NiMH battery pack	94004	
Memory Card (256MB)	97034	256MB CF with PC Card Adapter
Memory Card (512MB)	97035	512MB CF with PC Card Adapter
Memory Card (2GB)	97037	2GB CF with PC Card Adapter
Printer	97010	
AC adapter (for printer, Europe)	94006	Power Supply 200-240 VAC
AC adapter (for printer, USA)	94007	Power Supply 100-120 VAC
Thermal paper for printer (10 rolls)	97080	
AC adapter for 96035	94013	For AC 120V
	B9108WB	For AC 220-240V
CW viewer	AP240E	

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CW120 Models and Suffix code

●Model name and suffix code

Model (Part No.)	Suffix code	Option code	Description
CW120			Three-phase 3-wire
CW121			Three-phase 4-wire
Power cord	-D		AC power cord (UL/CSA Standard)
	-F		AC power cord (VDE Standard)
	-H		AC power cord (GB Standard)
	-R		AC power cord (SAA Standard)
	-S		AC power cord (BS Standard)
Communication		-1	RS-232 communication interface
		-2	RS-485 communication interface

●CW120/CW121 selection list for clamps

Aim wiring to measure	Number of clamps	Notes for selecting type of clamp probes
1phase2wire1load	1	Same clamps must be selected.
1phase2wire2load	2	Same clamps must be selected.
1phase2wire3load	3	Same clamps must be selected for CW121.
1phase3wire1load	2	Same clamps must be selected.
3phase3wire1load	2	Same clamps must be selected.
3phase4wire	3	Same clamps must be selected for CW121.

●Accessories supplied at no extra cost

Product Name	Part No.	Qty
1. Power cord		1
2. Voltage probes (for CW 120)	91018	3
Voltage probes (for CW 121)	91007	4
3. User's Manual	IM CW120-E	1
4. Operation Guide	IM CW-120P-E	1

●Accessories

Carrying case

93022

CW120 main unit can be packed in the carrying case with accessories like the current clamps and voltage probes. It also holds the other accessories.

Main unit case

93023

Includes magnet and stand

Portable case

93024

Power cable

98030

This cable supplies power from a measurement circuit. length 1.5m
*Not applied to CE and UL.

Printer

97010

Name	Model No.	Description
Voltage probe	91007	Four per set
Voltage probe	91018	Three per set
Communication cable	91011	RS232 communication cable for PC (9-pin)
Printer cable	91010	RS232 printer cable, length 1.5 m
Memory Card (256MB)	97034	256MB CF with PC Card Adapter
Memory Card (512MB)	97035	512MB CF with PC Card Adapter
Memory Card (2GB)	97037	2GB CF with PC Card Adapter
Printer	97010	Includes one roll of thermal paper and one battery pack
AC adapter (for printer, Europe)	94006	Power Supply 200-240 VAC
AC adapter (for printer, USA)	94007	Power Supply 100-120 VAC
Printer thermal paper	97080	10 rolls
AC adapter for 96035	94013	For AC 120V
	B9108WB	For AC 220-240V
CW viewer	AP240E	

Effective power supply quality and power saving management for PCs

CWViewer

AP240E

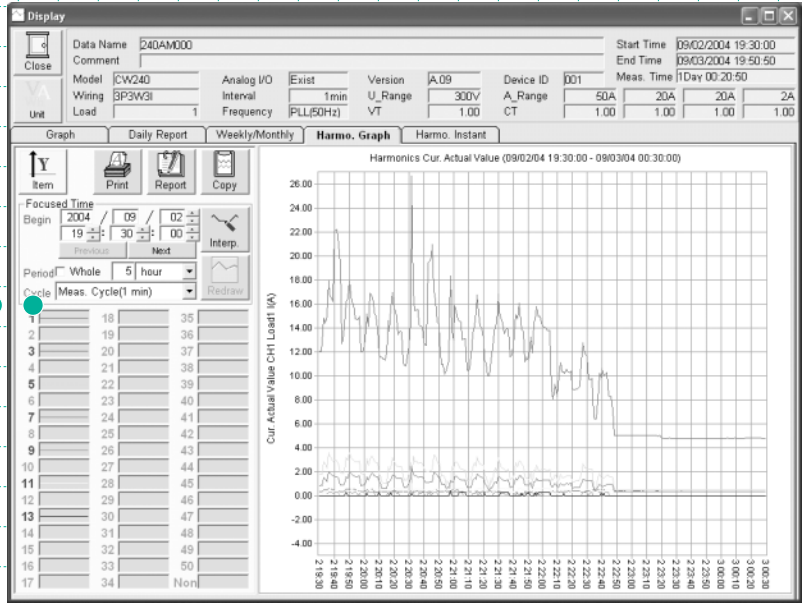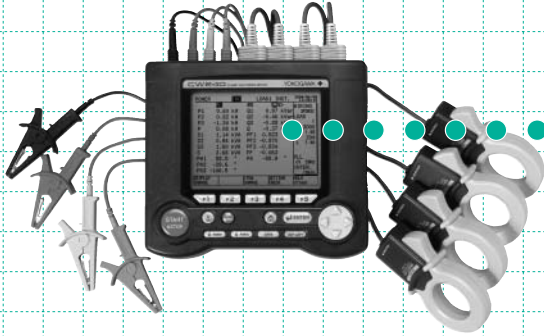### Data Analysis Program for CW240/CW12x
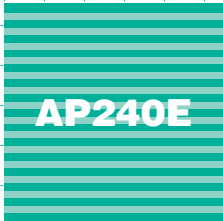
AP240E report creation in line with your objectives.

Powerful & Accurate measurement with the CW240
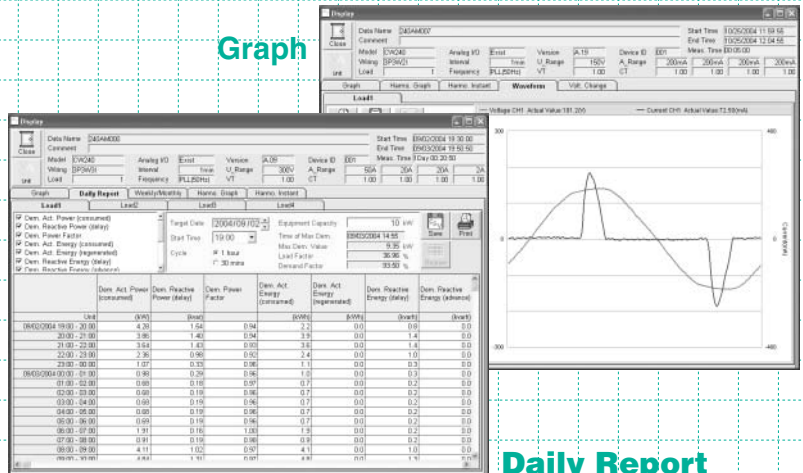

Increased quality and effectiveness of report creation

CW Viewer AP240E is data analyzing software for the CW240 Clamp-on Power Meter. Making full use of the rich measuring functions of the CW240, this efficiently manages the large amounts of measurement data that are required in order to implement power quality management, energy management, and power saving measures. Furthermore, the quality and efficiency of report creation has been improved in order that reports to meet certain purposes can be easily created.

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Report creation in line with objectives

- ●Graph Display
- ●Daily Report Display, Weekly / Monthly Report Display
- ●Harmonic Graph Display
- ●Harmonics Instant Value Display
- ●Waveform Data Display
- ●Voltage Change Display

Graph

Daily Report

Effective power supply quality and power saving management for PCs.

> Power quality and power saving management data measured with the CW240

▼

> AP240E report creation in line with your objectives

▼

> Increased quality and effectiveness of report creation

Bulk Data Management

In order to edit measurement data to create reports that meet objectives, it is necessary to sort the required elements from a broad range of measurement data, and to set both the parameters for display, and items to display. CW Viewer AP240E carries out bulk management of data by registering measurement data and display parameters. Easy data registration, deletion, reference, and analysis means that the program is easy to use immediately, even for beginners.

●Bulk Management of Large Quantities of Measurement Data

Using the AP240E, it is easy to register a large amount of data measured with CW240 in the database, for integrated handling.
① At the time of data registration, only the target files are displayed, and detailed information can be confirmed by selecting these files.
② Measurement data can be searched by measurement date or group name.
③ Automatically links to measurement data such as that for waveforms and voltage changes.
④ Group names and comments can be added and registered.

Registered Data Details dialog

Main screen
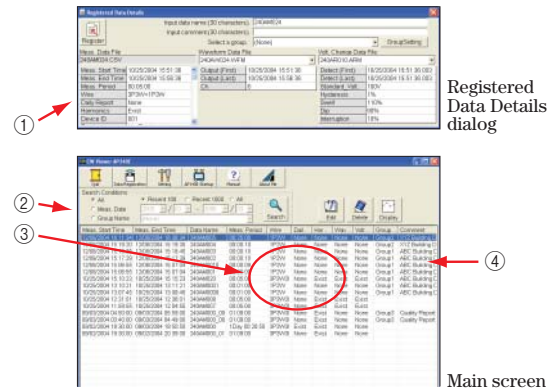
●Fast Reproduction of Past Reports

CW Viewer AP240E links display parameters for graphs and records with measurement data, and saves this in the database, which means that reports that have been created in the past can be swiftly recreated in the same format.

Simple Report Creation

Select measurement data, and click the Data Display button to edit reports. Settings of display items is easy, and items such as graphs and daily reports are easy to create.

> Simple Operation

> Clear Display

●Pick out target elements from large amounts of data.

Items that can be selected when setting display items are displayed in a list, which means that measurement data items that are required for carrying out power management and power quality management can be efficiently selected to meet objectives.
①Up to a maximum of 8 items can be set for both the left and right axes.
② Display items, units, and scale, etc. can be selected from the list.
③ Desired maximum and minimum values for the graph scale can be set. Additionally, the Automatic Settings button can be used to set optimal values.
④ This is also convenient for comparisons with power reduction targets, by setting standard values.

Item Selection dialog
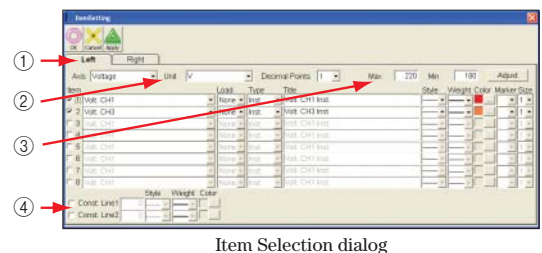
●Easy Setting of Focus Times

Setting the start and period of the focus times enables setting of a range of part (or all) of the measurement data.
①The display start time can be specified from the range of existing measurement data.
② The specified display range can be moved easily using these buttons.
③ The graph display period (the whole period or a desired period) can be specified.
④ A desired range (more than the measurement cycle) can be specified.

Focus Period settings

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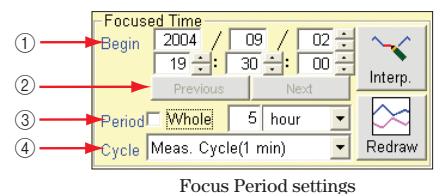
Variety of Presentations in Line with Objectives

Report formats that can be selected as a result of the types of measurement data are displayed on tabs. Report formats in line with objectives can be easily selected with tabs from a variety of report presentations.

●Selection of Report Formats with Tabs

Report formats such as graph display, daily report display, harmonics graph and voltage change can be easily switched by selection with tabs.
Superimposed Display of Multiple Waveforms
A channel, system, and type can be selected for each measurement item such as power, voltage, and current, and up to 8 items can be simultaneously displayed on the graph for each of the left and right vertical axes (a total of 16 items). This enables the comparative display per channel and system of multiple data items.

●Easy-to-see Graph Display

Graph display can be changed (line type, line thickness, and line color, markers, etc.) in line with objectives, and multiple measurement data can be displayed on the report in an easy to see manner.

●Harmonics Data Analysis

Harmonics graphs are displayed by selecting the desired degree from amongst 50. Harmonics trend graphs and harmonics instant value graphs can be selected with tabs, and in the harmonics instant value tab, all harmonics levels, harmonics content ratios, and phase differences can be displayed. Vector display of power phase differences is also possible.

●Waveform Data Display

Displays as a graph waveform data (maximum of 7 for each of four systems) measured with the CW240. Irregularities in voltage and current waveforms for each phase can be viewed at a glance, making for effective management of electrical power quality (current situation and confirmation of measures taken).
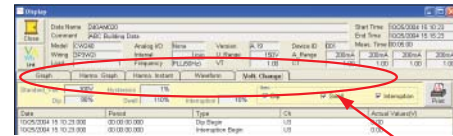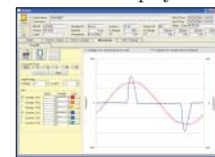
Tab Selection
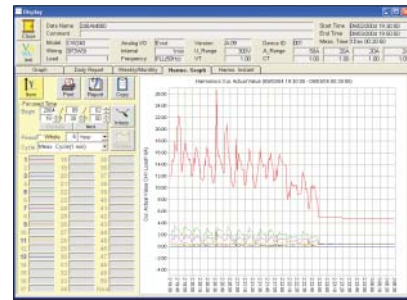
Graph Display

Harmonics Trend Display

Harmonics Instant Value Display

Power Phase Difference Vector Diagram Display

Waveform Display

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One-Touch Selection of Daily and Weekly Reports

●Daily Report Display

Demand measurement values for power consumption are displayed in time units (30 minutes or 1 hour) as daily reports, simply by selecting the desired demand measurement items. Furthermore, load and demand ratio calculations are carried out automatically by setting capacitance values for facilities.

●Weekly and Monthly Report Display

Demand measurement values for power consumption in 1 day units are displayed as weekly and monthly reports. Load and demand ratio calculations are carried out automatically in the same way as with daily reports.

●Voltage Change Display

Displays in a list voltage drops, rises, and momentary power interruption detection data and detection time. This enables confirmation of the start, end, and period of voltage changes.

●Record Display

When the graph display, harmonics trend display, and harmonics instant value display tabs have been selected, numerical data for the displayed graph range can be displayed as a record.

Daily Report Display

Voltage Change Display

Records Display

Effective power supply quality and power saving management for PCs.

Report Creation Customization Functions

●Graph and Record Printing

Print graphs and records by using the Print buttons on the graph display screen and records screen. Additionally, when printing, the preview screen will allow confirmation of output.
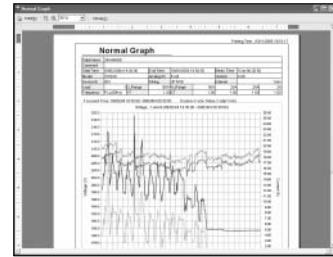
●Selectable Printer Type

Printer configuration is possible in order that either color or monochrome are printed correctly.

Print Preview

AP240E Analysis Data can be Further Edited in MS Excel and Word

●Graph Copy

The portion of the graph on the displayed screen can be copied to the clipboard by using the Graph Copy button on the graph screen. This enables graph images that are created in CW Viewer AP240E to be pasted into Excel or Word documents. Power phase difference vector diagrams and waveform data are also handled in the same way.

●Record Copy

By using the Record Copy button in the same way as with graphs, record data can be copied to the clipboard. Record data is copied as text data.

●Saving Record Data as CSV Format Files

The range of data displayed on the daily report, monthly report, and record screens can be saved as CSV format files. CSV files can be used in spreadsheet software; this is convenient for secondary analysis of measurement data, and creation of original reports.
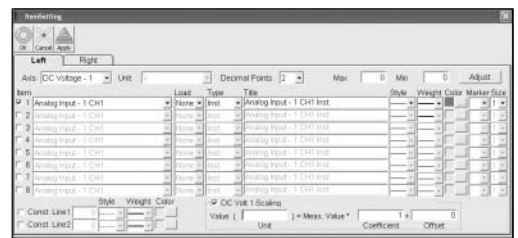
Pasting Records   Pasting Graphs
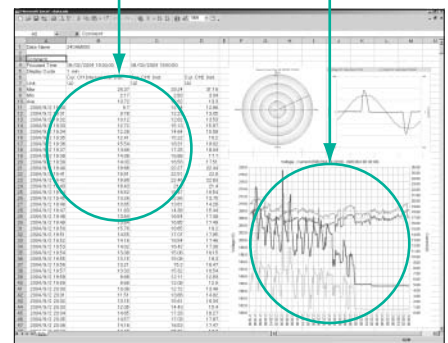
Example of Copying Graphs and Records

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Useful Functions

●Analog Input Data

Scaling for analog input data settings, and unit settings can be carried out. This enables comparison of measurement data such as temperature and lighting density with data such as used energy.

●Voltage Unbalance Ratio Display

Automatically measures voltage unbalance ratios when CH1 ~ CH3 voltage is measured, and can display as a graph in the same way as with other measurement data items.

●Default Settings

Frequently used unit settings, graph display parameter settings, and group name settings, etc. can be registered as defaults in advance.

●Display Settings / Measurement Parameter Display

Settings parameters and measurement intervals, etc. at the time of measurement are displayed on the top of the tabs on the data display screen, enabling constant confirmation by selecting tabs even if the report format is changed.

Scaling Settings

Default Settings

Measurement Parameter Display

CW Viewer
Data Analysis Program
AP240E

AP240E Specifications

Data Management
- Display of measurement parameters when measurement data is registered.
- Registration in the database of measurement date, measurement parameters, group names, and comments added to measurement data possible.
- Bulk management of data such as harmonics data, waveform data, and voltage change data.
- Editing of data names, comments, and group names possible.
- Searching by measurement dates / periods, and group names possible.
- Saving of settings information at the time the report was displayed, and that corresponds to data.
- Setting of defaults for a range of settings data possible.

Data Display Selection
- Always display measurement parameters on the data display screen.
- Selection by the use of tabs to select report displays (graph display, daily report display, weekly / monthly report display, harmonic graph display, harmonics instant value display, waveform data display, voltage change display) possible.

Graph Display
- Graph display of up to 8 items on each of the left and right axes possible.
- Selection of display items an ordered list possible.
- Settings of units, decimal points, minimum values, and maximum values, as well as automatic adjustment for each of the left and right axes possible.
- Graph customization (line type, line thickness marker, color) possible.
- Setting of the graph display period (focused time, period, measurement cycle) possible.
- Movement of the graph display period possible.
- Graph interpolation of non-measured segments possible.

Daily Report Display, Weekly / Monthly Report Display
- Displays the daily report, and weekly / monthly report tabs where there is demand measurement data.
- Displays selected demand measurement values per time (or date).
- Selection of display intervals for daily report display (1 hour / 30 minutes) possible.
- Can set the equipment capacity, and automatically calculate load ratios and demand ratios.

Harmonic Graph Display
- Displays the harmonics graph tab where there is harmonics measurement data.
- Selection of degree data up to a maximum of 50 degrees possible.

Harmonics Instant Value Display
- Displays the harmonics graph tab when there is harmonics measurement data.
- Selection of degrees of up to 50 possible.
- Display of power phase difference vector diagrams possible.

Waveform Data Display
- Displays the waveform data tab when there is waveform data.
- Display of selected waveform data.

Voltage Change Display
- Displays the voltage change data tab when there is voltage change detection data.
- Displays voltage change data per detection time.
- Selection of display items (voltage dip, voltage swell, detected momentary power interruptions) possible.
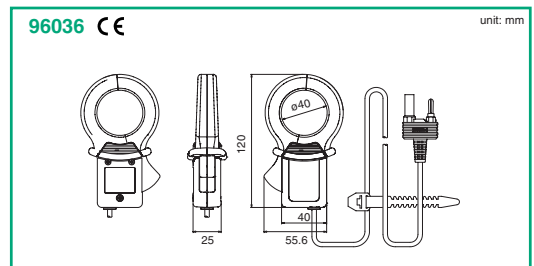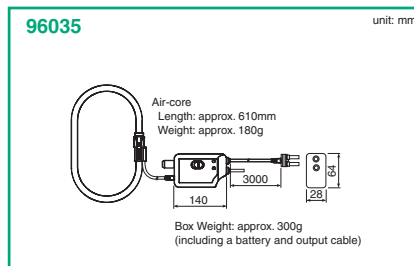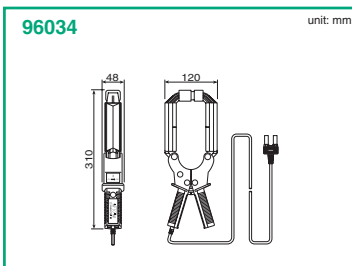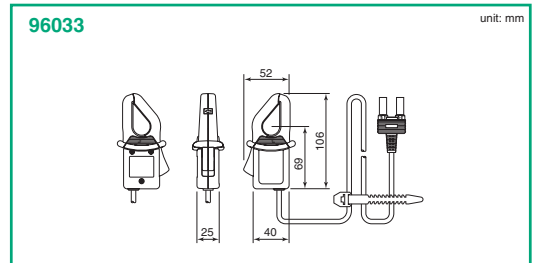
Package contents

Contents	AP240E installation CD	1
	User registration card	1

AP240E

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Common Accessories for CW120/121 and CW240

Item		96030 Clamp-on Current Probe	96031 Clamp-on Current Probe	96032 Clamp-on Current Probe	96033 Clamp-on Current Probe	96036 Clamp-on Current Probe
Measuring range		0–200 Arms AC (300 Apk)	0–500 Arms AC (750 Apk)	0–700 Arms AC (990 Apk)	0–50 Arms AC	0–2Arms AC (20Apk)
Output voltage		0–0.5 Vrms AC (2.5 mV/A)	0–0.5 Vrms AC (1 mV/A)	1000 Arms (1414 Apk) for 5 minutes	0–0.5 Vrms AC (10 mV/A)	0–0mVrms AC (25mV/A)
Accuracy	Amplitude	±1.5% rdg ±0.4 mV (20 Hz to 45 Hz) ±0.5% rdg ±0.1 mV (45 Hz to 66 Hz) ±0.8% rdg ±0.2 mV (66 Hz to 1 kHz) ±2.0% rdg ±0.4 mV (1 kHz to 20 kHz)	±1.5% rdg ±0.4 mV (20 Hz to 45 Hz) ±0.5% rdg ±0.1 mV (45 Hz to 66 Hz) ±0.8% rdg ±0.2 mV (66 Hz to 1 kHz)	0–0.25 Vrms AC (0.25 mV/A) ±1.0% rdg ±0.2 mV (45 Hz to 66 Hz)	±1.0% rdg ±0.3 mV (20 Hz to 45 Hz) ±0.5% rdg ±0.1 mV (45 Hz to 66 Hz) ±0.8% rdg ±0.2 mV (66 Hz to 1 kHz) ±1.0% rdg ±0.3 mV (1 kHz to 5 kHz) ±3% rdg ±0.4 mV (5 kHz to 20 kHz)	±1.5%rdg±0.04mV (20Hz–45Hz) ±0.5%rdg±0.01mV (45Hz–66Hz) ±0.8%rdg±0.02mV (66Hz–1kHz) ±2%rdg±0.04mV (1kHz–5kHz)
	Phase	±0.5° (45 Hz to 1 kHz)	±1.0° (45 Hz to 1 kHz)	±1.0° (50 A or more, 45 Hz to 66 Hz)	±1.0° (45 Hz to 1 kHz)	±2° (45Hz–3.5kHz)
		(for temperature of 23°C ±5°C, relative humidity of 35–75%, and sine wave input)				
Output impedance		Approx. 6 Ω	Approx. 2.4 Ω	Approx. 100 Ω (max.)	Approx. 18 Ω	Approx.70Ω
External magnetic field effects		0.1 A equivalent or less (at 400 A/m, 50/60 Hz)	0.2 A equivalent or less (at 400 A/m, 50/60 Hz)	0.5 A equivalent or less (at 400 A/m, 50/60 Hz)	0.1 A equivalent or less (at 400 A/m, 50/60 Hz)	2mA equivalent or less (at 400A/m, 50/60Hz)
Conductor position effects		±0.5% (at 20–200 A, 45 Hz to 1 kHz)	±0.5% (at 50–500 A, 45 Hz to 1 kHz)	±0.5% (at 200–1000 A, 45 Hz to 66 Hz)	±0.5% (at 1–50 A, 45 Hz to 1 kHz)	±0.5% (at 0.2–2A, 45Hz–1kHz)
Operating circuit voltage		600 Vrms AC max.			300 Vrms AC max.	50Vrms AC max.
External dimensions		Approx. 73 (W) × 130 (H) × 30 (D) mm		Approx. 100 (W) × 172.5 (H) × 32 (D) mm	Approx. 52 (W) × 106 (H) × 25 (D) mm (excluding protrusions)	Approx.70(W)×120(H)×25(D)mm
Weight		Approx. 300 g		Approx. 500 g	Approx. 220 g	Approx.300g
Output cable length		Approx. 3 meters				

External Dimensions

Item		96034 Clamp-on Current Probe			96035 Clamp-on Current Probe	
Range type		1000 A	2000 A	3000 A	3000 A	300 A
Measuring range		0–1000 Arms AC	0–2000 Arms AC	0–3000 Arms AC	0–3000 Arms AC	0–300 Arms AC
Output voltage		0–0.5 Vrms AC (0.5 mV/A)	0–0.5 Vrms AC (0.25 mV/A)	0–0.5 Vrms AC (0.1667 mV/A)	0–0.5 Vrms AC (0.1667 mV/A)	0–0.5 Vrms AC (1.667 mV/A)
Accuracy (for temperature of 23°C ±5°C, relative humidity of 20–70%, and sine wave input)	Amplitude	±1% rdg +0.045 mV (1–20 A) ±1% rdg (20–1200 A)	±1% rdg +0.0225 mV (1–20 A) ±1% rdg (20–2400 A)	±1% rdg +0.015 mV (1–20 A) ±1% rdg (20–3600 A)	±1% rdg (5–3000 A, 45 Hz to 66 Hz) ±3% rdg (100 A, 10 Hz to 10 kHz)	±1% rdg (5–300 A, 45 Hz to 66 Hz) ±5% rdg (100 A, 10 Hz to 10 kHz)
	Phase	Not specified (1–20 A) ±1.0° (20–200 A) ±0.5° (200–1200 A)	Not specified (1–20 A) ±1.0° (20–200 A) ±0.5° (200–2400 A)	Not specified (1–20 A) ±1.0° (20–200 A) ±0.5° (200–3600 A)	±1° (5–3000 A, 45 Hz to 66 Hz) ±4° (200 A, 40 Hz to 1 kHz)	±1° (5–300 A, 45 Hz to 66 Hz) ±7° (200 A, 40 Hz to 1 kHz)
Maximum allowable current (600 Hz or less)		1200 Arms AC (continuous)	2400 Arms AC (continuous)	2400–2800 Arms AC (for 15 minutes) 2800–3600 Arms AC (for 10 minutes)	3600 Arms AC (10 Hz to 1 kHz)	360 Arms AC
Output impedance		2 Ω or less			Approx. 47 Ω	
External magnetic field effects		±0.1% of full scale (at 400 A/m, 50/60 Hz)				
Conductor position effects		1% +0.2 A or less			±2% of full scale	
Operating circuit voltage		600 Vrms AC max.			Main unit: 600 Vrms AC max. Measuring unit: 1000 Vrms AC max.	
Measurable conductor diameter		ø64 × 100 mm, five 125 × 5 mm bus bars, or three 100 × 10 mm bus bars			ø170 mm max.	
External dimensions		Approx. 310 (W) × 120 (H) × 48 (D) mm			Main unit: Approx. 140 (W) × 64 (H) × 28 (D) mm Measuring unit: Approx. 610 mm	
Weight		Approx. 1400 g			Main unit: Approx. 300 g (including battery and output cable) Measuring unit: Approx. 180 g	
Output cable length		Approx. 3 meters				
Output terminal		Banana plug (safety terminal)				
Power supply					9 V alkaline battery (6LF22) AC Adapter	
					Continuous measurement: 150 hours Intermittent measurement: 10,000 times	

96030,31 CE — unit: mm
30 73 86 130 57 60

96032 — unit: mm
24.7 100 66 71 172.5 30

96033 — unit: mm
52 106 69 25 40

96034 — unit: mm
48 120 310

96035 — unit: mm
Air-core
Length: approx. 610mm
Weight: approx. 180g
3000 140 64 28
Box Weight: approx. 300g
(including a battery and output cable)

96036 CE — unit: mm
ø40 120 40 25 55.6
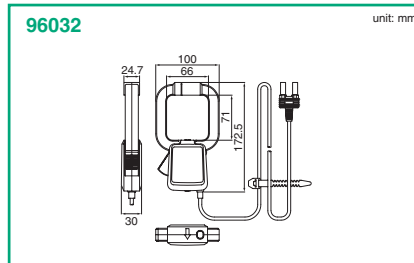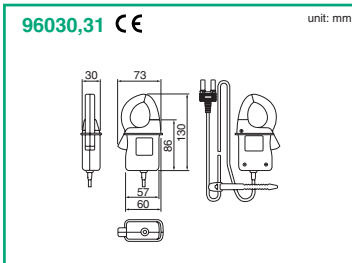
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⚠ NOTICE
● Before using the product, read the instruction manual carefully to ensure proper and safe operation.