

3166 CLAMP ON POWER HiTESTER

Power measuring instruments



Get the Current Effectiveness of Energy Conservation and Harmonic Wave Measures all in one instrument

New type of clamp on power meter meets the needs of a new generation

9298
CLAMP ON SENSOR



ø 15mm MAX.
100A AC

The 3166 CLAMP ON POWER HiTESTER provides clamp measurement of power lines from single-phase to three-phase four-wire circuits all, in a single unit. In addition to the basic measurements including voltage, current, power, power factor, and integrated values, it is also capable of measuring demand, important for power management, and harmonics (option). Data can be transferred to a computer using the RS-232C interface or optional 3.5-inch floppy disk drive. Save data as text files for easy handling and analysis.

Ideal for factory power supply maintenance, Model 3166 will be invaluable for improving where it is desired to improve energy-saving efficiency.



ISO14001
JQA-E-90091



<http://www.hioki.co.jp/>

HIOKI company overview, new products, environmental considerations and other information are available on our website.

Compact Clamp on Power

3166 CLAMP ON POWER HiTESTER
(Photograph shows the optional 9595 FDD UNIT)



The unit can be operated while still in its case.
(9383 CARRYING CASE is an option.)

⚠ WARNING

Inspect the unit and check that it is operating correctly before use. When carrying out measurement on live lines, wear proper protective gear, including insulating rubber gloves, insulating rubber boots, and safety helmet, and use extreme caution to avoid electric shock accidents.

⚠ DANGER



1. In order to prevent short-circuits and injury, use the clamp product on electrical circuits with a voltage less than the maximum operation circuit voltage.
2. In order to prevent short-circuits and injury when the clamp core tip is open, do not use bare conductors.

9291 CLAMP ON SENSOR (option)

Can measure up to 500 A AC.
Up to three sensors can be connected, depending on the power circuit being measured.



9438 VOLTAGE CABLE (4 supplied as standard)

Alligator clips designed with an emphasis on safety: exposed metal parts are kept to a minimum (complies with IEC 61010)

Features

■ Support for different power circuits

A single unit supports measurement of power lines from single-phase to three-phase four-wire circuits.

■ Wide range of measurement functions

The following can be measured simultaneously: voltage, current, active/reactive/apparent power, integrated power value, power factor, and frequency.

■ Demand measurement

Using the demand measurement mode, daily, weekly, and monthly reports can be generated.

■ Lead/lag discrimination for power factor

Indications of power factor and reactive power are signed to indicate leading or lagging.

■ Separate integration of opposite polarities

For integrated measurements, separate indications of opposite polarities are available: active power consumption/regeneration/sum, reactive power lag/lead/total, and so forth.

■ Support for measurement using personal computer

Efficient measurement, management, and analysis on a personal computer is possible when using the optional floppy disk drive unit and the standard RS-232C interface.

■ Compact unit: B5 book size, weighing 1.6 kg

The compact design makes this unit easy to carry, and ideal for operation in cramped surroundings.

■ Detection function to prevent wrong connections

The connection check screen recognizes disconnected wires, detects the phase, and can distinguish clamp sensors connected backwards, thus reducing measurement errors.

■ Support for reactive power measurement method

For the measurement of reactive power, there is a choice of reactive power measurement by a reactive power meter or by the active power calculation method based on the voltage, current, and active power.

■ High-speed D/A output

When the optional D/A output is installed, four channels of high-speed analog outputs are available.

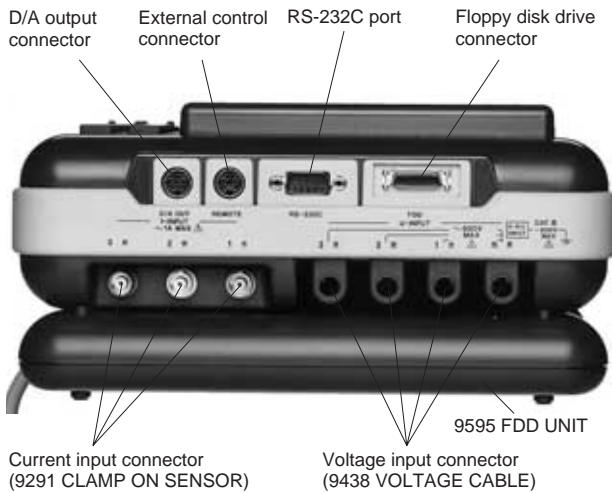
■ Harmonics analysis for 3-phase lines

Harmonic components in the line being measured and their fluctuations can be monitored by using the optional harmonics analysis software.

Meter Packed with Functions

3166 side panel

Photograph shows the optional 9595 FDD UNIT.



D/A output connector pin assignments

Pin number	Signal name	For external connection, use the 9441 CONNECTOR CABLE.
1	D/A OUT ch1	
2	D/A OUT ch2	
3	D/A OUT ch3	
4	D/A OUT ch4	
5 to 8	GND	

Output impedance 100 ohms

External control connector pin assignments

Pin number	Signal name	For external connection, use the 9440 CONNECTOR CABLE.
1	Start/stop	
2	Data reset	
3	Print	
4	Floppy save	
5	GND	

Simple settings

All settings are carried out in conversational style, using the cursor keys and function keys.

Setting screen for demand measurement

DEMAND SETTING 1/2	1997/03/01 15:53
START TIME	: 1997/03/02 08:00
STOP TIME	: 1997/03/03 08:00
DEMAND PERIOD	: 30min.
TRANS. CAPACITY	: 0010.000 kVA
PRINT/SAVE ITEMS	: CHANGE OUTPUT
FD AUTO OUTPUT	: O N
FILE NAMES	: TEST_5
RS-232C AUTO OUT	: O N
D/A OUTPUT ITEMS	: ch1 ch2 ch3 ch4
	: U1 I1 P λ
INTEG. OUT RATE	: 5V / 5kWh
+	- NEXT RETURN

Choose from 2 types of Clamp On Sensors (option)

For input up to AC 500A, select our Model 9291, and for smaller currents of up to AC 100A, select Model 9298.

Both sensors are designed with a safety barrier to protect the user from being in direct contact with live conductors and completely meet all CE marking requirements.

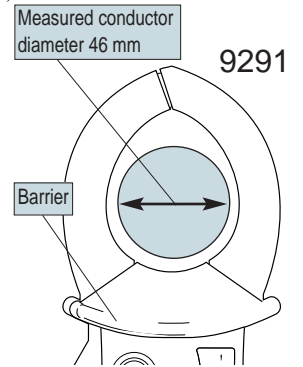


Table of ranges

Ranges indicated in the shaded areas apply to Model 9298.

U	Mode	I				
		20.000A	50.000A	100.00A	200.00A	500.00A
150.00V	1φ2W	3.0000kW	7.5000kW	15.000kW	30.000kW	75.000kW
	1φ3W	6.0000kW	15.000kW	30.000kW	60.000kW	150.00kW
	3φ3W	6.0000kW	15.000kW	30.000kW	60.000kW	150.00kW
	3φ4W	9.0000kW	22.500kW	45.000kW	90.000kW	225.00kW
300.00V	1φ2W	6.0000kW	15.000kW	30.000kW	60.000kW	150.00kW
	1φ3W	12.000kW	30.000kW	60.000kW	120.00kW	300.00kW
	3φ3W	12.000kW	30.000kW	60.000kW	120.00kW	300.00kW
	3φ4W	18.000kW	45.000kW	90.000kW	180.00kW	450.00kW
600.00V	1φ2W	12.000kW	30.000kW	60.000kW	120.00kW	300.00kW
	1φ3W	24.000kW	60.000kW	120.00kW	240.00kW	600.00kW
	3φ3W	24.000kW	60.000kW	120.00kW	240.00kW	600.00kW
	3φ4W	36.000kW	90.000kW	180.00kW	360.00kW	900.00kW

Note 1: The range table shows the full-scale indications for each measurement range.

Note 2: Measurement ranges for apparent power and reactive power have the units shown in the table (W) replaced by VA or var.

Note 3: An input of 0.4% or less of the measurement range produces an indication of zero.

Note 4: The display of measurement values is possible up to 130% of the measurement range, except for the 600 V range, where the limit is 100%.

Note 5: Model 9298 is designed to meet CAT III 300V safety standards for grounding voltage. For safety reasons, do not attempt to measure circuits containing voltage beyond this level.

Power Management to Match a New Era

Measurement screen gives clear indication of power use status

Instantaneous value display screen

Measurement is carried out continuously (if there are no waveform defects) by calculation on samples each equivalent to two AC cycles. The instantaneous value display follows the display update rate, and this data is displayed intermittently.

INST. VALUE	16:05:12
VOLT. U1: 105.79 V	CURR. I1: 0.1231kA
U2: 105.80 V	I2: 0.1228kA
U3: 105.80 V	I3: 0.1226kA
Uave: 105.80 V	Iave: 0.1228kA
ACT. P: 8.42kW	wiring: 3p4w
REACT. Q: 0.03kvar	rangeU: 300V
APP. S: 8.42kVA	rangeI: 100A
P. F. λ: 1.000	Meas. type: PLL
FREQ. f: 50.01 Hz	Source: U1
MIN. / MAX.	RET. HOLD

Min/Max value display screen

Minimum and maximum values are found from the cumulative set of samples obtained so far. This aids in positive identification of transient waveform features such as power spikes.

MIN. / MAX.	16:11:43
U1: 206.4 / 208.5 V	I1: 7.3 / 114.9 A
U2: 206.4 / 208.5 V	I2: 6.0 / 106.5 A
U3: 206.4 / 208.5 V	I3: 0.1 / 95.5 A
P: 1.4k / 5.2kW	
Q+: 3.9k / 28.6kvar	wiring: 3p4w
Q-: 4.2k / -7.4kvar	rangeU: 300V
S: 5.1k / 29.0kVA	rangeI: 100A
λ+: 0.051 / 0.663	Meas. type: PLL
λ-: -0.540 / -0.658	Source: U1
f: 49.93 / 50.06 Hz	Freq.: 50Hz
INSTANT	TIME OCCUR RET. HOLD

First integration value display screen

This shows the active / reactive / apparent power consumption, and average values within a time interval.

INTEG. 1/2	16:24:48
<Integrating>	
[Integration value]	[Ave. Integ.]
ACT. +WP: 7.610kWh	P: 3.81kW
REACT. +WQ: 8.671kvarh	Q: 4.33kvar
APP. +WS: 11.537kVAh	S: 5.77kVA
P. F. λ: 0.660	
[Elapsed time] 0001:54:20	
Now integrating.	
[Start time] 1997-02-04, 14:00:00	
[End time] 1997-02-04, 16:00:00	
SCR KEY	RET. HOLD

Second integration value display screen

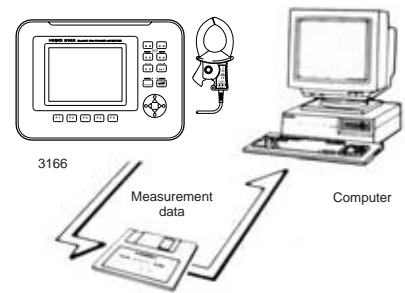
This shows details of the power values, including the consumption / regeneration / sum (lag/lead/total) power values.

INTEG. 2/2	16:29:44
<< Finish >>	
[Active power]	[Apparent power]
CONS: 7.610kWh	DLAY: 11.537kVAh
RGEN: 0.000kWh	LEAD: 0.000kVAh
ADD: 7.610kWh	TOTL: 11.537kVAh
[Reactive power]	[Elapsed time]
8.671kvarh	0002:00:00
Integrated measurement ended.	
[Start time] 1997-03-01, 14:00:00	
[End time] 1997-03-01, 16:00:00	
SCR KEY	RET. HOLD

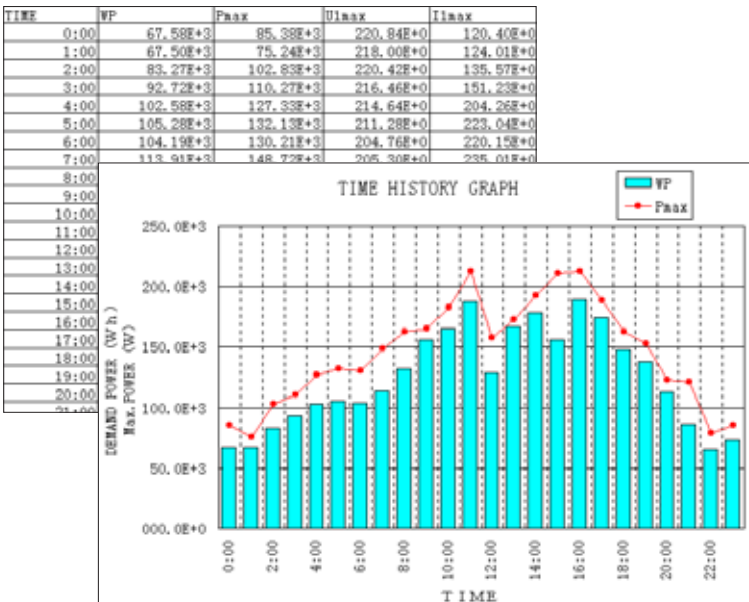
Speedy power measurement and data processing with a personal computer

The data can be transferred to a personal computer, either via the RS-232C interface or by copying the data onto a 3.5-inch floppy disk, using the optional 9595 FDD UNIT. This approach can be expanded to make it possible to measure, tabulate and analyze data on energy conservation measures.

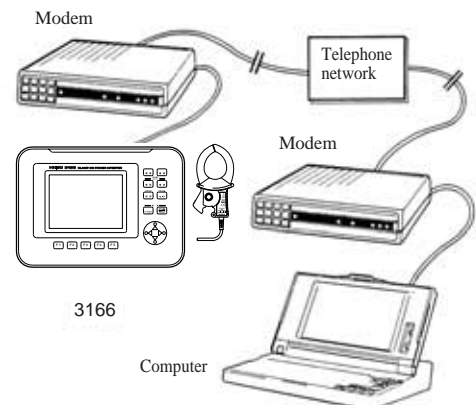
Data transfer to a computer on 3.5-inch floppy disk



Example of data processing by spreadsheet



Example of communications using a modem



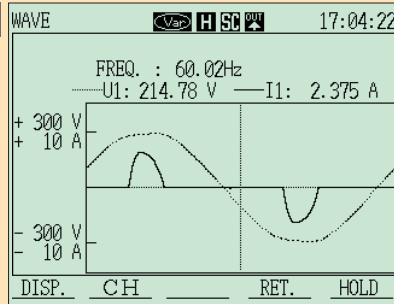
9556 HARMONIC ANALYSIS SOFTWARE, 9619-01 HARMONIC DATA ANALYSIS UTILITY

Analyze Harmonics Through a Power Line!

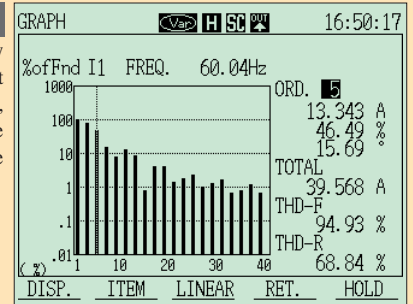


Analyze harmonics from all angles

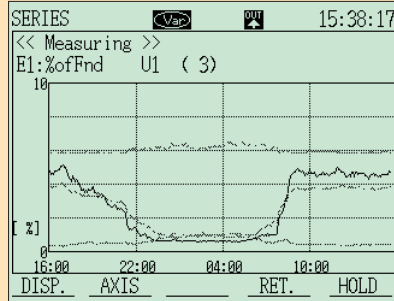
waveform
This screen can display voltage and current waveforms that were sampled at 256 points per cycle.



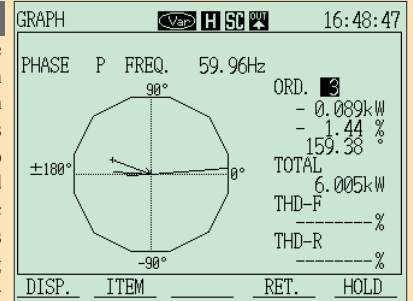
Bar graph
This screen can display the bargraph for the 1st through 40th harmonics, the total sum up to the 40th harmonic, and the total harmonic distortion.



Time series
This screen displays changes over time for up to four specified analysis items, from the beginning of time series measurement. This display clearly shows the fluctuating state of harmonics.



Vector
This screen can display the vectors for the 1st through 40th harmonics, the total sum up to the 40th harmonic. This screen allows the user to understand the inflow and outflow of the harmonic waves of each order, and is useful for determining specific sources of harmonics.



9556 Specifications (option)

9556 is designed to be installed and used in the 3166, with the optional 9595 FDD UNIT connected.

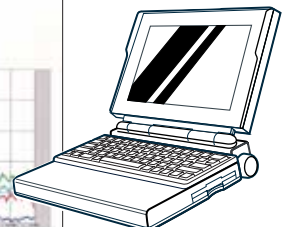
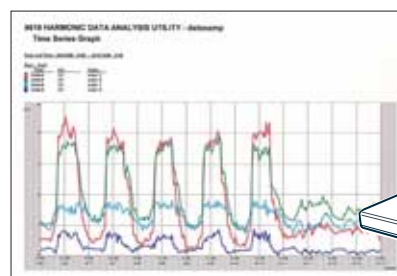
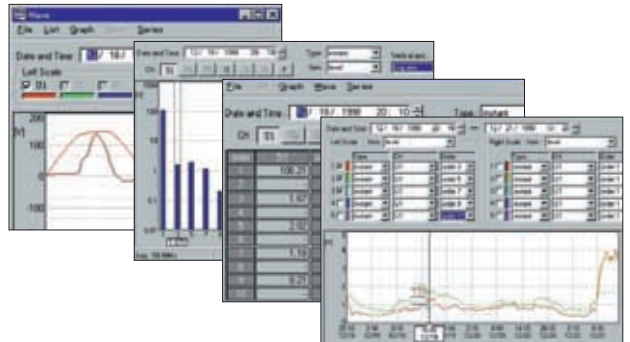
* The optional 9595 FDD UNIT is required in order to be able to install the 9556.

- Media** : One 3.5-inch 2HD floppy disk (The 9595 FDD UNIT is required in order to be able to install the software.)
- Measurement range** : Basic wave frequencies 45Hz to 66Hz, and 360Hz to 440Hz
- Measurement method** : PLL synchronization
- Number of orders analyzed** : Up to 40th harmonic (when base wave is 45Hz to 66Hz)
Up to 13th harmonic (when base wave is 360Hz to 440Hz)
- Window width** : 1 cycle (when base wave is 45Hz to 66Hz)
8 cycles (when base wave is 360Hz to 440Hz)
- Window type** : Rectangular
- Amount of data analyzed** : 256 points
- Accuracy** : **Harmonic levels; at 50/60Hz:**
1st to 20th harmonic: $\pm 1.0\% \text{rdg} \pm 0.2\% \text{ f.s.}$, 21st to 40th: $\pm 1.0\% \text{rdg} \pm 0.3\% \text{ f.s.}$
At 400Hz:
1st to 5th harmonic: $\pm 1.0\% \text{rdg} \pm 0.3\% \text{ f.s.}$, 6th to 13th: $\pm 2.0\% \text{rdg} \pm 0.3\% \text{ f.s.}$
Add on the accuracy of the clamp-on sensor. (current/power)
Harmonic wave power phase angle; at 50/60Hz: 1st to 3rd harmonic: $\pm 2^\circ$, 4th through 40th harmonic: $\pm (0.3^\circ \times k + 1^\circ)$,
At 400Hz: 1st to 13th harmonic: $\pm (2.0^\circ \times k + 1^\circ)$
Harmonic voltage/current level must both be at least 1% of the range; in the case of current/power, the accuracy of the clamp-on sensor is also added on. (k=order of harmonic wave)
Normal measurement: $\pm 0.3\% \text{rdg.} +$ value in spec. for the 3166
- Analysis items** : Level of each order of harmonic, content of each order of harmonic, and phase angle of each order of harmonic for voltage / current/power
Total up to 40th (or 13th, at 400Hz) harmonic for voltage/current/power
Total harmonic distortion for voltage/current (THD-F and THD-R)
Normal measurement of voltage/current/active, reactive, or apparent power/power factor/base frequency
- Update rate** : Approx. 6 seconds (for a 3-phase, 4-wire line)
- Time series display items** : A maximum of four of the analysis items can be selected.
- Output interval** : 5 / 10 / 15 / 30 / 60 minutes / 2 hours / 3 / 4 / 6 / 8 / 12 hours
- D/A output items** : Four of the analysis items can be selected (requires 9594 D/A output)
- Other functions** : Cursor measurement, multiplier change, automatic output to floppy disk, automatic output to RS-232C interface

9619-01 Specifications (option)

9619-01 is computer software for analyzing and printing harmonic data that has been measured by the 9556 and saved on a 3.5-inch floppy disk.

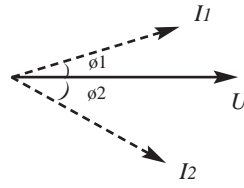
- Supply Media** : Two 3.5-inch 2HD floppy disks
- Operating** : IBM PC/AT or compatible
- Environment** : Windows95 (higher than SP1)/Windows98
- Data Display** : Waveform/List/Graph/Time Series
- Included Functions** : Cursor measurement/Enlargement by time series / Printing



The Analytical Power to Resolve Problems

●Power factor and integration measurement values shown signed

For site diagnosis, lead/lag power factor indications can be shown, and both individual and integrated consumption/regeneration power figures show the selling/buying relationship with the power company.



Leading power factor - (COS ϕ_1)
Lagging power factor + (COS ϕ_2)

Can be used to improve installation efficiency, by for example deriving the capacitance of a leading phase capacitor.

●Reactive power method can also be used for calculation

For reactive power calculation, in addition to the existing calculation method, it is also possible to select the reactive power calculation method, whereby even an unbalanced load can be measured accurately.

Calculation expression (for single-phase two-wire)

$$\text{Voltage } U = \sqrt{\frac{1}{M} \sum_{s=0}^{M-1} (Us)^2}$$

U : Voltage between lines

I : Line current

S_i : Lead/lag sign

M : Number of samples

s : Sample number

m : Number of samples per cycle
(128 for 50/60 Hz)

$$\text{Current } I = \sqrt{\frac{1}{M} \sum_{s=0}^{M-1} (Is)^2}$$

$$\text{Active power } P = \frac{1}{M} \sum_{s=0}^{M-1} (Us \times Is)$$

When using the reactive power calculation method

$$\text{Reactive power } Q = \frac{1}{M} \sum_{s=0}^{M-1} \left\{ Us \times Is \left(s + \frac{m}{4} \right) \right\}$$

$$\text{Apparent power } S = \sqrt{P^2 + Q^2}$$

The calculation for active power is made directly from the instantaneous values of voltage and current.

When not using the reactive power calculation method

$$\text{Reactive power } S_i^2 Q = \sqrt{S^2 - P^2}$$

$$\text{Apparent power } S = U \times I$$

The apparent power is found from the voltage and current values, and then the reactive power is derived.

●High-speed D/A output for every two AC cycles (option, Specify at time order)

When the optional 9594 D/A OUT is connected, any four of voltage, current, active power, reactive power, apparent power, power factor, frequency, and integrated power can be selected, and output as 5 V DC f.s. signals. In the normal measurement mode, the response is rapid, every two AC cycles, so that in combination with a HIOKI MEMORY HiCORDER for example, transient fluctuations can be recorded.

* For integrated values, in the demand measurement mode the output response time is approximately 1 second.

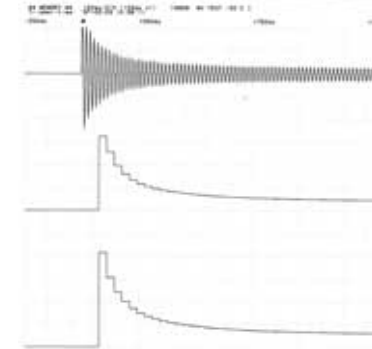
Example of D/A output

Current waveform

3166
Current D/A output

3166
Power D/A output

Example of motor starting waveforms



ISO 14001 international environmental standard

■What is ISO 14001?

Based on international environmental conventions, the International Organization for Standardization (ISO) established this standard for environmental management, promulgating ISO 14001, "Environmental Management System" and ISO 14011, "Environmental Monitoring Procedures" in September 1996. Facing the twenty-first century, industry must review its relation to the earth's resources.

■Principal international conventions

- Ozone layer protection ... Montreal Protocol
- Global warming ... Framework Convention on Climate Change
- Acid rain ... Sofia Protocol
- Oceanic pollution ... OPRC and other conventions
- Shipment of hazardous waste across national frontiers ... Basel Convention
- Biodiversity ... Convention on Biological Diversity

■Why are energy-saving measures required?

One of the current number of environmental treaties is the Framework Convention on Climate Change, which establishes a legal basis for optimization of thermal and electrical energy.

Therefore, in order to obtain ISO 14001 approval, industry must take energy-saving measures, and there will be concern over the method of managing this.

■Clamp on power meters essential for energy-saving measures

A company's power management requires an easy method of determining the pattern of energy use, and it is moreover important that measurements can be taken anywhere. A clamp-on meter allows measurements while lines are live, and in any location, thus being an essential item. The 3166 is of course a clamp-on unit, and also has a wide range of functions for efficient processing of a large quantity of collected data. It will thus be invaluable for attaining ISO 14001 compliance.

Basic specification

Measurement line : Single-phase two-wire, single-phase three-wire, three-phase three-wire, three-phase four-wire

Measurement item : Voltage, current, active power, reactive power, apparent power, integrated value, power factor, frequency

Measurement range : Voltage, current, and active power ranges according to the range table on page 2

Measurement method : Digital sampling method, phase-locked loop(PLL) synchronization, or 50/60/400 Hz fixed clock

Input method : Voltage Insulated input(s), Current Insulated input(s) using clamp-on sensor

Effective input range : 10% to 110% of range (only up to 100% for 600 V range, 2.5% or more for the 20 A range, however)

Display indication range : 0.4% to 130% of range (below 0.4% shown as zero)

Display : 4.7-inch LCD (320 X 240 pixels), with backlighting

Rectification method : RMS (true effective values)

Sampling rate : Approx. once per second (except when using floppy disk or RS-232C interface)

Input impedance : Voltage 1.3 M Ω ±10%, Current 0.8 Ω ±10%(50/60 Hz)

Max permitted voltage : Voltage 600 V AC rms, 850 V peak value

Max permitted current : Current 1 A AC rms, 1.42 A peak value

Max in-phase voltage : 600 V AC rms 50/60 Hz

Crest factor : Voltage 2 or less (f.s. input, except 1.41 or less in 600 V range), Current 3 or less (f.s. input, except 2.84 or less in 500 A range)

[Integrated value measurement]

Measurement range : Active power ±0.000 Wh to ±999999 MWh
Reactive power ±0.000 varh to ±999999 Mvarh
Apparent power 0.000 VAh to 999999 MVAh

Timer setting range : 10 seconds to 1000 hours (settable in 10-second steps)

[Power factor measurement]

Measurement range : -1.000 (lead) to 0.000 to 1.000 (lag)

[Frequency measurement]

Measurement range : 40.00 to 500.00 Hz

Input range : 10% to 110% of range (except to 100% for 600 V range)

Measurement source : Voltage U1 or current I1 (same as PLL synchronization)

[D/A output] 9594 D/A OUT (option) required

Configuration : 12-bit D/A converter (sign + 11 bits) four channels

Output item : Any four from: voltage, current, active power, reactive power, apparent power, power factor, frequency, active power amount (consumption, regeneration, sum)

Output voltage : DC ±5 V/f.s. (for ±o.r. output approx. ±6.6 V)

[Modes]

Normal meas. : Display of instantaneous values and minimum/maximum values

Integ. meas. : Display of instantaneous values, minimum/maximum values, and first and second integrated values, Integration start ... specified time / manual; integration end ... specified time / timer / manual; output interval 2 minutes to 1000 hours

Demand meas. : Display of instantaneous values, minimum/maximum values, first and second integrated values, and demand (result for demand measurement time for one previous to present measurement), display of daily/weekly/monthly reports, demand time (5/10/15/30 minutes, 1/2/3/4/6/8/12 hours), transformer capacity (0.001 to 1000.000 kVA (in 0.001 kVA units))

Harmonic meas. : Display of results of harmonic analysis. Details are as shown in the 9556 harmonic analysis software (option) specification

Setting : Using reactive power calculation method, sampling method, measurement line frequency, phase-locked loop/frequency source, display averaging count (OFF/2/3/4/5/6/7/8/9/10 samples) ... voltage transformed ratio ... 1 to 10000, current transformer ratio ... 0.01 to 10000.00, RS-232C connected device printer/personal computer/modem

FD : 9595 FDD UNIT(option) required, Save/load function for settings, save function for measurement values, measurement value output function (direct connection to printer) ... floppy disk formatting function (MS-DOS format), file renaming and deletion function

[Interfaces]

RS-232C : Interface settings can be made separately according to the connected device (printer/computer/modem), Asynchronous start-stop protocol full duplex

[External control]

Measurement start/stop : Integrated value measurement start/stop control and demand measurement start control

Data reset : Integrated value and minimum/maximum value data reset

Printer control : Manual printing control

Saving to floppy disk : Manual data reset control

Control signal levels : By 0/5 V logic signal or short-/open-circuit connection

[Other functions]

Wrong connection check, Display language selection(English/Japanese), Display hold function, Backup function, Power failure handling, Key lock function

Measurement accuracy (after at least 30 minutes warming up, sine wave inputs, power factor = 1, with PLL synchronized)

Voltage	Current	Active power	9291 / 9298 sensor accuracy
±0.1%rdg.±0.2%f.s.	±0.1%rdg.±0.2%f.s.±Clamp accuracy	±0.1%rdg.±0.2%f.s.±Clamp accuracy	±0.5%rdg.±0.2%f.s. Full scale (f.s.) is the 3166 range value

Apparent power accuracy : From all measurement values, ±1 dgt. for calculation

Reactive power accuracy : When using the reactive power measurement method ±0.1% rdg, ±0.2% f.s. ± clamp on sensor accuracy
When not using the reactive power measurement method From all measurement values, ±1 dgt. for calculation

Integration accuracy : For each of active power, reactive power, and apparent power, measurement accuracy ±1 dgt.

Power factor accuracy : From all measurement values, ±1 dgt. for calculation

Frequency accuracy : ±0.5% rdg. ±1 dgt.

D/A output accuracy : Measurement accuracy ±0.2% f.s.

Temperature coefficient : Within ±0.1% f.s.

Frequency characteristics : With fundamental frequency 45 Hz to 66 Hz, up to 50th harmonic, ±3% f.s. ± measurement accuracy, With fundamental frequency 360 Hz to 440 Hz, up to 7th harmonic, ±3% f.s. ± measurement accuracy

In-phase voltage influence : Within ±0.2% f.s. (600 V rms, 50/60 Hz, between shorted voltage input terminals and case)

External magnetic field influence : Within ±1.5% f.s. (in magnetic field 400 A rms/m, 50/60 Hz)

Power factor influence : ±1.0% rdg. (45 Hz to 66 Hz, power factor = 0.5, using active power measurement)

Reactive power influence : ±1.0% rdg. (45 Hz to 66 Hz, inverse power factor = 0.5, using reactive power measurement)

Real-time accuracy : ±25 ppm ±1 second (at 25°C)

General Specification

Location for use : Indoors, altitude up to 2000 m

Operating temperature and humidity ranges : 0°C to 40°C, 80% rh or less, no condensation

Insulation resistance : At least 100 M Ω at 500 V DC
Voltage input connectors- current input connectors, output connectors, external, interface connectors, casing
At least 50 M Ω at 500 V DC
Power supply- current input connectors, output connectors, external interface connectors, casing

Withstand voltage (50/60 Hz, 1 minute) : 5.55 kV AC Voltage input connectors - casing, 3.25 kV AC Voltage input connectors - current input connectors, output connectors, external interface connectors, 2.3 kV AC Power supply - casing, 1.35 kV AC Power supply - current input connectors, output connectors, external interface connectors

Applicable standards : Safety EN61010-1:1993 + A2:1995
(Voltage measurement unit) Pollution degree 2 overvoltage category III Anticipated transient overvoltage 6000 V
(Power supply) Pollution degree 2 overvoltage category II Anticipated transient overvoltage 2500 V
: EMC EN61326-1:1997+A1:1998, EN61000-3-2:1995+A1:1998+A2:1998, EN61000-3-3:1995

Power supply : 100 to 240 V AC ±10% 50/60 Hz


Maximum rated power : 33 VA max.

Dimensions and mass : Approx. 246W X 86H X 176D mm; approx. 1.6 kg (including 9594 D/A OUT)

Supplied accessories : 9438 VOLTAGE CABLE 1 set (one each black, red, yellow, and blue), voltage cable locking parts (4), stand (1), power cord (1), grounding adapter (3-pin to 2-pin) (1)

Option Specification

9291 / 9298 CLAMP ON SENSOR

CLAMP ON SENSOR	9291	9298
	 Cord length approx. 3m	Cord length approx. 3m
Input current	500 A AC	100 A AC
Accuracy	amplitude	±0.5 %rdg, ±0.2 %f.s.
	phase	±0.5° or less
Frequency characteristics	66 Hz to 5 kHz ±1.0 % or less	
Influence of external fields	Max. 0.1 A equivalent (in 400 A/m alternating field)	
Influence of conductor position	±0.5 % or less	
Maximum circuit voltage	600 Vrms. (insulated conductor)	300 Vrms. (insulated conductor)
Measurable conductor diameter	ø46 mm MAX.	ø15 mm MAX.
Dimensions and mass	77WX151HX42Dmm, 360g	46WX135HX21Dmm, 230g

9595 FDD UNIT



Supported media : 3.5-inch 2HD (1.2/1.44 Mbyte)
 Format : MS-DOS
 Power supply : Supplied from 3166
 Dimensions and mass : Approx. 240W X 33H X 170D mm; approx. 740 g
 (excluding cables and projections)
 Data saved : Settings and measurement data saved
 Operating temperature : 5°C to 40°C, 80% rh or less, no condensation and humidity ranges

9442 PRINTER



Printing method : Thermal serial dot matrix
 Paper width : 112 mm
 Printing speed : 52.5cps
 Power supply : 9443 AC ADAPTER or supplied nickel-hydrate battery (capable of printing about 3000 lines on full charge from 9443)
 Dimensions and mass : Approx. 160W X 66.5H X 170D mm; approx. 580 g

When ordering the 9442 PRINTER, also order the 9444 CONNECTOR CABLE required for connection to the 3166, and 9443 AC ADAPTER.

9383 CARRYING CASE



Holds the main unit and 9291 CLAMP ON SENSOR. Measurement is also possible while still in the carrying case, and screen indications can be checked. This case is handy for protection from dust and oil.

Material : Soft vinyl "leather-style"
 Dimensions : Approx. 445W X 140H X 340D mm; and mass approx. 2.3 kg

9444 CONNECTOR CABLE



Cord length approx. 1.5m

9443 AC ADAPTER



9443-02 (For the EU) 9443-01 (For Japan)

9440 CONNECTOR CABLE



For External control
 Cord length 2 m
 one end left cut

9441 CONNECTOR CABLE



For D/A output (supplied with 9594)
 Cord length 2 m
 one end left cut

3166 CLAMP ON POWER HITESTER

Measurement is not possible with the 3166 alone. Order the 9291 or 9298 CLAMP ON SENSOR required for measurement.

●Example combinations

Single-phase two-wire : 3166 + (9291 or 9298) X1
 Three-phase three-wire : 3166 + (9291 or 9298) X2
 Three-phase four-wire : 3166 + (9291 or 9298) X3

Option

- 9291 CLAMP ON SENSOR (500A AC)
- 9298 CLAMP ON SENSOR (100A AC)
- 9594 D/A OUT (Include 9441 CONNECTOR CABLE) Specify at time order
- 9595 FDD UNIT
- 9556 HARMONIC ANALYSIS SOFTWARE 9595 required
- 9619-01 HARMONIC DATA ANALYSIS UTILITY (For 9556)
- 9383 CARRYING CASE
- 9440 CONNECTOR CABLE (For External control)
- 9441 CONNECTOR CABLE (For D/A out)
- 9442 PRINTER
- 9443-01 AC ADAPTER (For printer, Japan)
- 9443-02 AC ADAPTER (For printer, EU)
- 9443-03 AC ADAPTER (For printer, America)
- 9444 CONNECTOR CABLE (For printer)
- * 9290 CLAMP ON ADAPTER (1500A AC)
- 1196 RECORDING PAPER (For printer, 10 rolls)

*Not conformable with the CE marking.

HIOKI

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