

Reptame Equipment Inc.  
[www.reptame.com](http://www.reptame.com)  
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**HIOKI**

2004

# 3286-20 CLAMP ON POWER HiTESTER

Power measuring instruments



## All Powerful

Effective input current level  
**1.00 A to 1000 A**



600.0KW max.(1 $\phi$ )



$\pm 1.000$  ( $\pm 90.0^\circ$ )



Up to 20th



CAT III 600V



ISO14001  
JQA-E-90091



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

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

# Actual size

80 mm x 20 mm  
busbar max.

∅ 55 mm  
max.

Voltage

**AC V**  
RMS  
600 Vrms max.

Current

**AC A**  
RMS  
1000 Arms max.

Power

**W**  
VA var  
600.0kW max.(1∅)

Phase detection

**RST**  
Normal/ Reverse/ Missing

Power factor

**COS**  
∠ φ  
±1.000 (±90.0°)

Peak

**Peak value**  
1700 A peak max.

Frequency

**Hz**  
1000 Hz max.

Harmonics

**Harmonics**  
Up to 20th

1000A ~  
CAT III  
600V ~

CE  
RMS

POWER Watt RANGE HOLD

LINE /HARM U/∇ I/▲ MAX /MIN MODE

RANGE SET 2 SET 1

HIOKI 3286-20

~ 3.000 kW  
1500 V 2000 A

CLAMP ON POWER HITESTER

DATA OUTPUT

VOLTAGE

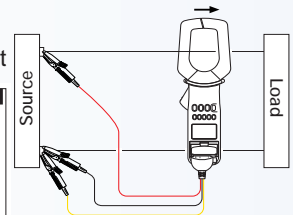
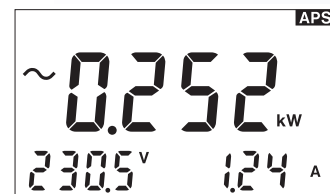
# Functionality and Safety

## Applications

### Use as a single-phase power meter

1∅ Power meter mode

Effective power/ voltage/ current



This displays the result of vector calculations on single-phase power.

Apparent/ reactive power



Power factor (effective value power factor)

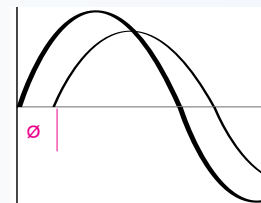
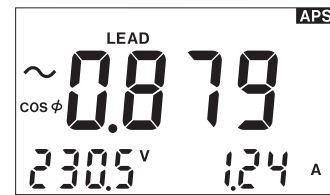


### Measure phase on a single-phase line

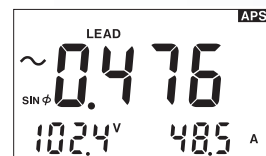
1∅ Power Factor meter mode

The phase angle between the voltage waveform and the current waveform is found, and the power factor (cos φ) and reactivity (sin φ) are calculated and displayed.

Power factor (cos φ)



Reactivity (sin φ)



Phase angle (φ)



The 3286-20 provides the following 2 types of power factor measurement. If the waveform includes harmonic distortion, there will be a difference between the two measurement values, and the method must be selected accordingly.

- Power factor derived by phase discrimination (cos φ):  
1∅ Power Factor meter and 3∅ Power Factor meter mode  
From the phase information for the fundamental frequency component, cos φ is calculated. This is suitable for assessing the quality of a power supply.
  - Power factor (effective value power factor) derived from effective power ÷ apparent power: 1∅ Power meter mode  
This is calculated from the power value including harmonic components (effective power ÷ apparent power). This is suitable for evaluating the performance of standalone load equipment and similar cases.
- \* It is not possible to calculate the effective power factor of a three-phase line.

# Packed into a Handheld Unit

### Helpful battery capacity check

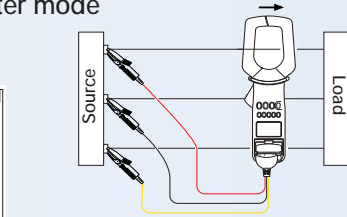
Whenever the unit is powered on, and while the record function is operating, the battery capacity can be checked to avoid battery exhaustion during measurement.

BATT 70%

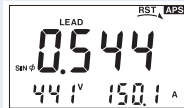
### Simple checking of three-phase lines

3 $\phi$  Power Factor meter mode

Power factor (cos  $\phi$ )

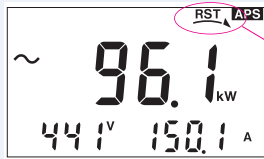


Phase angle ( $\phi$ )    Reactivity (sin  $\phi$ )



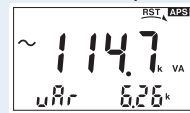
Balanced three-phase power can also be displayed

Effective power/ voltage/ current



Phase detection check

Apparent/ reactive power



The 3286-20's three-phase power measurement method calculates and displays the power values for a sine wave input at 50/60 Hz, assuming it is balanced and there is no distortion. Accurate measurement is not possible on a three-phase line if it is not balanced, for example when controlled by an inverter or thyristor.

Since there is no integration function, it is not possible to measure total energy consumed (Wh).

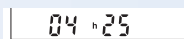
### Check power supply fluctuations

Max. and min. value displays



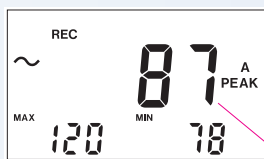
Using the record function, it is possible to check the amplitude of fluctuations.

Record elapsed time  
Example: 4 h 25 m



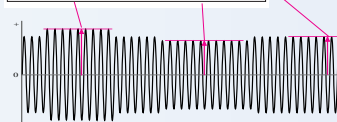
Waveform display is not available  
Care must be taken with regard to battery life

Record peak value fluctuations



Easily check peak value fluctuations.

Please note that waveforms with amplitudes at or less than 250ms cannot be detected accurately

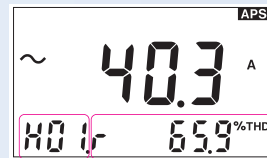


Waveform display is not available

### For harmonic suppression

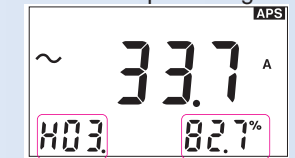
Harmonic measurement function

Harmonics effective value/  
total harmonic distortion



Harmonic coefficients    Total harmonic distortion  
Ex. Fundamental    Ex. THD-R is 65.9%

Harmonics effective value/  
harmonic percentage



Harmonic coefficients    Harmonic percentage  
Ex. 3rd order is 33.7 A    Ratio to case in which  
fundamental component is  
100%

The analysis values for coefficients for each of the harmonics from 1 to 20 of voltage or current can be displayed.

### External output of data

Output to PC

(Optional 9636-01 required)

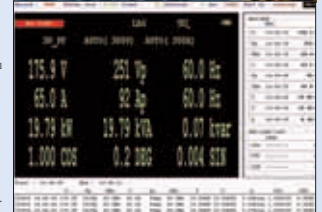


Data output connector RS-232C interface by optical insulating coupler

- OS: Windows 95, 98, NT4.0, 2000, Me\*1
- Connector: D-sub 9 pin
- Fetch interval: 6s/30s/1m/5m/10m.
- Buffer size: 32,700 max.

Care must be taken with regard to battery life

\*1. Windows is a registered trademark of Microsoft Corporation.



### Printer output to 9442 (optional)



The output is sent to the printer each time the 3286-20 HOLD key is pressed.  
(For about 1 sec.)

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

100.0 V	150.6 Vp	50.0 Hz
100.0 A	149.5 Ap	50.0 Hz
10.00kW	10.00kVA	0.00kvar
1.000 (COS)	0.000 (SIN)	0.0 deg
---- PHASE		

	0.0 % (THD-R)	0.0 % (THD-F)
1	100.0 A	100.0 %
2	0.0 A	0.0 %
3	0.0 A	0.0 %
4	0.0 A	0.0 %

- 9636 RS-232C CABLE
- 9443-02 AC ADAPTER (For the EU)
- 9443-03 (For the America)



Cord length approx 1.3m

Not for use with Model 3286-20

## Basic specifications

Measurement items : Voltage, current, voltage/current peak, effective/ reactive / apparent power(Single-phase or 3-phase), power factor, reactivity, phase angle, frequency, phase detection(3-phase), voltage/current harmonic levels(up to 20th) conductor diameter :  $\phi$ 55mm (2.16"), 80 mm X 20 mm busbar max.  
 Display : LCD, digital (6000 counts)  
 Rectification method : RMS (true root mean square value)  
 Display update rate : NORMAL approx. 1 time/ sec, SLOW 1 time/ 3-sec at HARM meas. approx. 1 time/ 2-sec  
 Analog response time : 4.0 seconds or less (when input is changed from 0% to 90% of range.)

### [Voltage/ Current/ Power measurement]

Range Table		AC Current			
		20.00 A	200.0 A	1000 A	
AC Voltage	150.0 V	Single-phase	3.000 kW	30.00 kW	150.0 kW
		*3-phase (balanced load)	6.000 kW	60.00 kW	300.0 kW
	300.0 V	Single phase	6.000 kW	60.00 kW	300.0 kW
		*3-phase (balanced load)	6.000/12.00 kW	60.00/120.0 kW	600.0 kW
	600 V	Single phase	12.00 kW	120.0 kW	600.0 kW
		*3-phase (balanced load)	24.00 kW	240.0 kW	600.0/1200 kW

\*3-phase power is calculated and displayed on the basis of a balanced, 50/60 Hz, sine wave input. For apparent power and reactive power, the unit of watts in the above table is replaced by VA and var respectively.

Effective value P.F. : 0.000 (lead) to 1.000 to 0.000 (lag); 1 $\phi$  only  
 Max. allowable current : 1000 Arms cont.  
 Max. usable circuit voltage : 600 Vrms (insulated conductor)  
 Effective input range : Voltage: 10 V to 600 V, Current: 1 A to 1000A, Power: 80 V to 600 V and 1 A to 1000 A  
 Min. Display value : Voltage: 0.6 Vrms, Current: 0.06 Arms  
 Display indication range : 5 or less are zero-suppressed, and the upper limit is to 125% (RMS value) of the range setting (to 100% for the 1000 A range)  
 Circuit dynamic : 2.5 or less (1000 A and 600 V range is 1.7 or less)

## Measurement accuracy (23 °C $\pm$ 5 °C (73°F $\pm$ 9°F), Less than 80%rh., sine wave input, power factor = 1)

### [Voltage/ Current/ Power measurement]

	30 Hz to 45 Hz	45 Hz to 66 Hz	66 Hz to 1 kHz
Voltage	$\pm 1.5$ %rdg. $\pm 5$ dgt.	$\pm 1.0$ %rdg. $\pm 3$ dgt.	$\pm 1.5$ %rdg. $\pm 5$ dgt.
Current	not rated	$\pm 1.3$ %rdg. $\pm 3$ dgt.	$\pm 2.0$ %rdg. $\pm 5$ dgt.
Power	Accuracy guaranteed only for 50/60 Hz (COS $\phi$ =1) Single-phase: $\pm 2.3$ %rdg. $\pm 5$ dgt. 3-phase: $\pm 3.0$ %rdg. $\pm 10$ dgt.(at balanced load)		

Phase angle :  $\pm 3^\circ$   
 Power factor (cos  $\phi$ ) :  $\pm 3^\circ \pm 2$  dgt.

## General Specifications

Applicable standards : Safety  
 EN61010-1:1992+A2:1995 CAT III 600V  
 EN61010-2-031:1996, EN61010-2-032:1995  
 EN60529:1991 IP40  
 EMC  
 EN61326-1:1997+A1:1998+A2:2001  
 Withstand voltage : 5.55 kV AC between clamp and frame, between clamp and circuitry (50/60 Hz, 1 minute)

### [Power factor/ Phase angle/ Reactivity measurement]

Detection method : Phase discrimination by phase detection (zero crossing)  
 Power factor (cos  $\phi$ ) : 0.000 (lead) to 1.000 to 0.000 (lag)  
 Phase angle : 90.0°(lead) to 0.0° to 90.0°(lag)  
 Reactivity (sin  $\phi$ ) : 0.000 (lead) to 1.000 to 0.000 (lag)

### [Frequency measurement] Effective in the voltage and current functions

Measurement range : 30.0 Hz to 100 Hz (at 100.0 Hz range)  
 100 Hz to 1000Hz (at 1000 Hz range)  
 Min. input level : Voltage 10 Vrms-sine wave, Current 1 Arms-sine wave

### [Wave peak measurement] Effective in the voltage and current functions

Measurement range : 150 (375 peak) / 300 (750 peak) / 600 (1020 peak) V  
 20 (50 peak) / 200 (500 peak) / 1000 (1700 peak) A  
 Effective Input Range : Effective value of sine wave is within effective input permissible in the range and within circuit dynamic

### [Harmonic measurement] Effective in the voltage and current functions

Measurement items : Level of each order, percentage of each order and total harmonic distortion (THD-F and THD-R)  
 Measurement range : Fundamental frequency 50 / 60 Hz  
 Window width : 1 cycle (50 / 60 Hz), Data points: 256 points  
 Window type : Rectangular  
 Orders analyzed : Up to 20th

### [Other functions]

Phase detection : Normal/ reverse/ missing (at 3-phase balanced load)  
 Record : MAX. value and MIN. value (Effective in the voltage, current and effective / apparent power functions)  
 Battery capacity : Displayed in % when the unit is powered on  
 Data hold : Holds display  
 Auto power off : Approx. 10 minutes, buzzer sounds just before power is turned off, can be extended or cancelled  
 Data output : RS-232C interface by optical insulating coupler

Frequency	$\pm 0.3$ % rdg. $\pm 1$ dgt. (at 100.0Hz range)	$\pm 1.0$ % rdg. $\pm 1$ dgt. (at 1000Hz range)
Wave peak	$\pm 3.0$ %rdg. $\pm 5$ dgt. (45 Hz to 1 kHz)	
Thermal coefficient	Voltage and current: within $\pm 0.1$ XAccuracy/ °C (0 to 40°C) Phase: within $\pm 2^\circ$ (0 to 40°C)	
Conductor position	Within $\pm 0.7$ % in any direction from the center of sensor	
External magnetic field	400A/m corresponds to 1.00 A max.	
Power factor influence	$\pm 10.0$ % f.s. (cos $\phi$ =0.5)	
Harmonics	Order	Accuracy
	1	$\pm 3.0$ %rdg. $\pm 10$ dgt.
	2 to 6	$\pm 3.5$ %rdg. $\pm 10$ dgt.
	7, 8	$\pm 4.5$ %rdg. $\pm 10$ dgt.
	9, 10	$\pm 5.0$ %rdg. $\pm 10$ dgt.
	11 to 15	$\pm 7.0$ %rdg. $\pm 10$ dgt.
	16 to 20	$\pm 10.0$ %rdg. $\pm 10$ dgt.

Measurement method : Digital sampling method  
 Operating temperature : 0°C to 40°C, 80%rh or less, no condensation  
 Storage temperature : -10°C to 50°C, no condensation  
 Power supply : 6LR61 alkaline batteryX1 (continuous operation max. 25 hours)  
 (9V battery) 6F22 manganese batteryX1 (continuous operation max. 10 hours)  
 Dimensions, mass : Approx 100 W X 287 H X 39 D mm, Approx 650g (Approx 3.94"(W) 11.3"(H) 1.54"(D), Approx 22.6 oz.)

## 3286-20 CLAMP ON POWER HiTESTER

(Includes 9635 VOLTAGE CORD, 9245 CARRYING CASE, HAND STRAP)



### Options

9635-01 VOLTAGE CORD  
 9636-01 RS-232C PACKAGE  
 9442 PRINTER  
 9636 RS-232C CABLE (For 9442 printer)  
 9443-02 AC ADAPTER (For 9442 printer, EU)  
 9443-03 AC ADAPTER (For 9442 printer, America)  
 1196 RECORDING PAPER (For printer, 10 rolls)



When ordering the 9442 PRINTER, also order the 9636 RS-232C CABLE required for connection to the 3286-20, and 9443 AC ADAPTER.

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