3 PHASE DIGITAL POWER CLAMP METER

Safety Precautions

- Read these operation instructions thoroughly and completely before operating your meter. Pay particular attention to WARNING. The instructions in these warnings must be followed.
- You must be careful when working with voltages above 30V AC. Keep fingers behind the probe barriers while measuring.
- Never use the meter to measure voltages that might exceed the maximum allowable input value of any function measurement mode.
- Always inspect your meter and test leads before every use. If any abnormal conditions exist: broken test leads, cracked cases, LCD not reading, etc, do not attempt to take any measurement.
- Using the meter with the equipped test leads is only conform to safety requirements. If you need instead broken test leads, you must replaced with the same as type and electric specification.
- Never touch a voltage source when the test leads are plugged into a current jack.
- Do not expose the instrument to direct sunlight, extreme temperature or moisture.

WARNING

READ THE INSTRUCTIONS BEFORE USING THE INSTRUMENT

Safety Information

Three-phase digital power clamp meter has been designed according to IEC1010-1 and IEC1010-2-032 concerning safety requirements for electrical measuring instruments and handheld clamps with pollution degree 2, overvoltage category (600V CATⅢ).
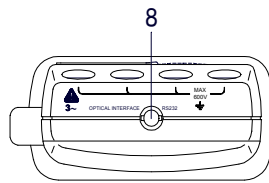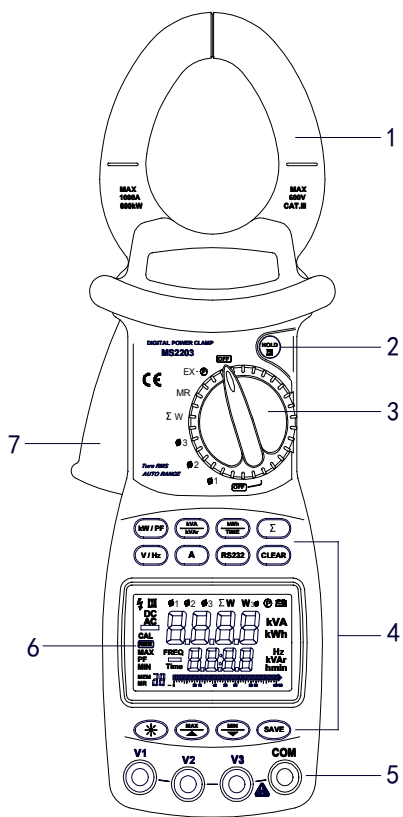
Safety Symbols

⚠ Important safety information, refer to the operating manual

⚠ Dangerous voltage may be present.

⏚ Earth ground

▫ Double insulation (Protection classⅡ)

🔋 Battery

General Description

Three-phase digital power clamp meter is a handheld aptitude meter with power measurement, it is incorporated current meter and power measurement instrument. The meter is composed of three channels: voltage, current, power and single chip Microcontroller. It has powerful measuring and data processing software, and complete to measure, calculate and display of the 8 parameters: Voltage, Current, Active Power, Power Factor, Apparent Power, Reactive Power, Active Energy, Frequency. It has Stable capability, easy operation. It is especially suitable for measurement and overhaul of the electric power equipment and the power-supply circuit on the spot. The structure of the instrument is pincers, it is very small, very light and portable, make measurement easy and fast. To the power measurement user, the digital power clamp meter which is used completely in three-phase system is one of the best instrument.

Feature

1. For power measurement of 3-phase 3-wire circuit, 3-phase 4-wire circuit, single-phase circuit.
2. The instrument can complete the true RMS value measurement. If there is nonsinusoidal AC current input signal, it can accurately measure the active current.
3. Using autorange switch circuit and modulus transducer which has 8000 count and high resolution, the instrument has high accuracy and easy operation.
4. Minimum current of Active Energy measurement is 0.5A, it can measure expending energy per hour of general electrical equipment. Measurement and display five parameters of power: Active Power, Apparent Power, Power Factor, Reactive Power, Active Energy.
5. Double display two parameters on each menu and store 28 groups of measurement parameter.
6. Measure five power parameters of each phase and total power value in three-phase measurement mode respectively.
7. Multifunctional button control, there are double scales analogue bar

DIGITAL POWER CLAMP
MS2203

CE

EX-@
MIR
Σ W
φ3
φ2
φ1

Turn RMS
AUTO RANGE

1

2

3

7

kW / PF   kVA kVAr   MIN TIME   Σ

V / Hz   A   RS232   CLEAR

DC AC
CAL
MAX
PF
MIN

FREQ
Time

kVA
kWh

Hz
kVAr
h·min

6

4

✳   MAX   MIN   SAVE

V1   V2   V3   COM

5

8

3~   OPTICAL INTERFACE   RS232   MAX 600V

V1: The input terminal for the first phase, using the yellow test lead
   to connect.

V2: The input terminal for the second phase, using the green test lead to connect.

V3: The input terminal for the third phase, using the red test lead to
   connect.

COM: Common terminal, the earth input terminal for all measure- -ment modes, using the black
   test lead to connect.

6. LCD Display

   4 digits display, 7 segment LCD to display function mode, measured

   value and symbols.

7. Trigger

   Press the lever to open the transformer. When the lever is released, the jaws will close again.

8. RS232C Data Interface

   Your clamp meter can use a serial interface cable to communicate with a computer. Refer to
   Figure 18 for complete instructions.

Using the Selector

Turn the meter on by rotating the selector to any function as following . **(Table 1. Introducing The Selector）**

ITEM	DESCRIPTION
OFF	**POWER OFF.** Turn the meter off
EX-(P)	**EXTERNAL POWER SUPPLY.** No use battery, select tested voltage signal be power supply for Active Energy measure- -ment for long at one time.
MR	**RECALL DATA.** Recall saved data in the meter memory.
ΣW	**TOTAL POWER.** For display total power value of three phase

(Table 1. Introducing The Selector)

ITEM	DESCRIPTION
Φ3	**THIRD MEASUREMENT CHANNEL.** For V3 input terminal measurement
Φ2	**SECOND MEASUREMENT CHANNEL.** For V2 input terminal measurement
Φ1	**FIRST MEASUREMENT CHANNEL.** For V1 input terminal measurement

Using the buttons

(Table 2. Function Button)

ITEM	DESCRIPTION
(kW / PF)	Active Power, Power Factor Measurement Button.

	RS232	Data Transmit Button
	CLEAR	Clear Memory Button
		Backlight Button
	MAX	Maximum Value Button/ Previous Record Button
	MIN	Minimum Value Button/ Next Record Button
	SAVE	Data Save Button

 kW / PF Active Power, Power Factor Measurement Button

 kW / PF button to measure Active Power and Power Factor in measurement mode. Then the LCD shows Active Power reading in the primary display and Power Factor reading in the secondary display.

 kVA / kVAr Apparent power, Reactive Power measurement button

 kVA / kVAr button to measure Apparent Power and Reactive Power in measurement mode. Then the LCD shows Apparent Power reading in the primary display and Reactive Power reading in the secondary display.

 kWh / TIME Active Energy, Time Measurement Button

 kWh 　　　　　　　　　　　　　　　　　　　　　　　　CD shows

 Σ

 V / Hz

　　　　　　　　　　　　　　　　　　　　　　　　ue in the

(A) Current Measurement Button

(A) button to measure current of the circuit and display the measurement value in the LCD display.

(RS232) Data Transmit Button

(RS232) button to transmit measured data to a computer by special interface cable, you can record current measured value and print reports and data trend curve drawing.

Before (RS232) button to transmittal measured data, you must connect RS232C interface cable to the clamp meter and a computer, the communication function is working.

(CLEAR) Clear Memory Button

(CLEAR) button for three seconds to erase all measured data in the meter memory in the measurement mode.

(☀) Backlight Button

(☀) button to turn the backlight on or off. When the back--light turned on over five seconds, it will turn off automatically.

(MAX) Maximum Value Measurement Button / Previous Record Button

(MAX) button to measure maximum value in measurement mode. The display shows current maximum value in the secondary display.

When you turn the selector to M (MAX) button to recall previous memory location and display the data on the LCD. Once pressing this button, the clamp meter recalls a memory location previous current location.

(MIN) Minimum Value Measurement Button / Next Record Button

(MIN) button to measure minimum value in measurement mode, the display shows current minimum value in the secondary display.
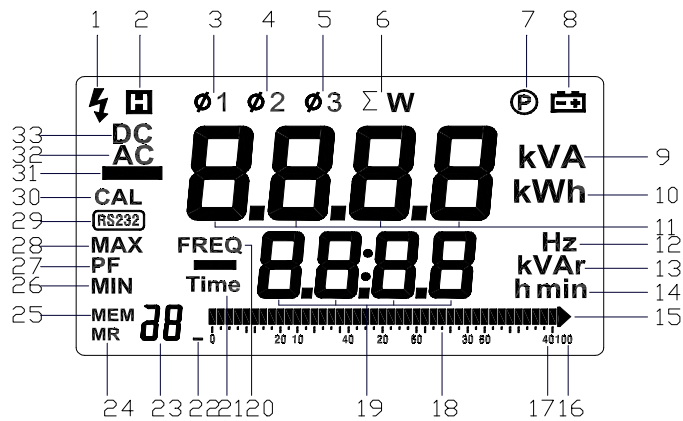
When you turn the selector to M (MIN) button to recall next memory location and display the data on the LCD. Once pressing this button, the clamp meter recalls a memory location next current location.
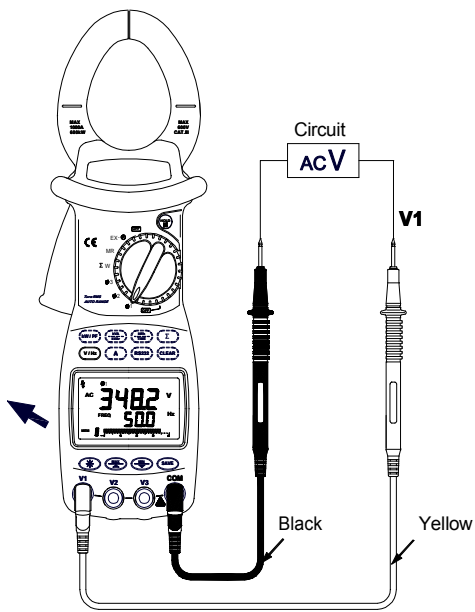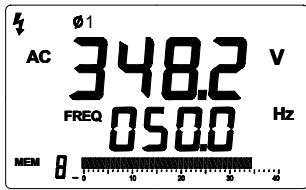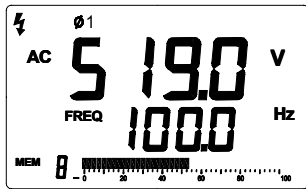
(SAVE) Data Save Button

(SAVE) button to save current measured data to the meter in measured mode. The meter can save 28 groups of measured data into the meter at most.
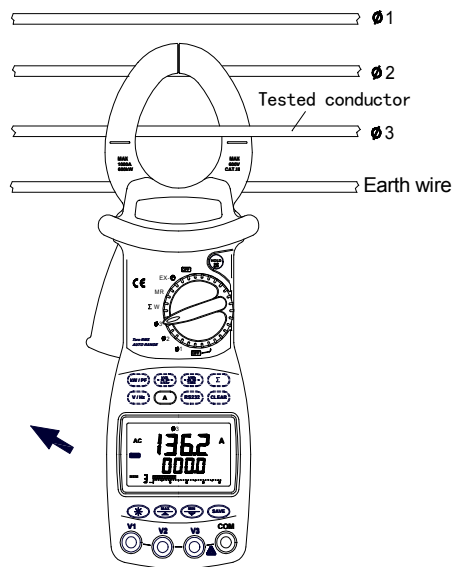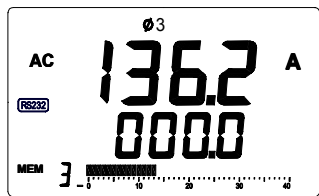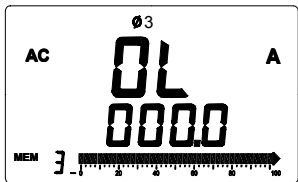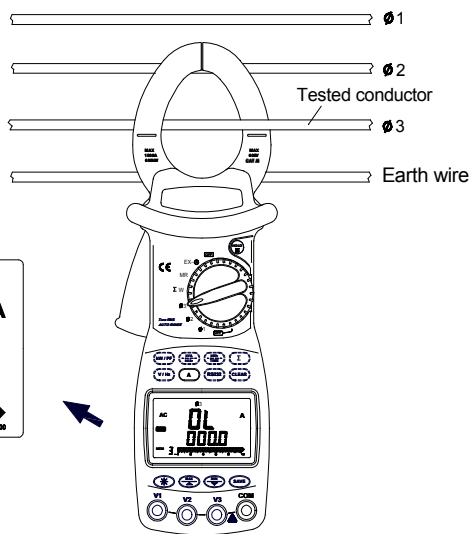
(For primary display)

10. Active power unit (kW)、Active Energy unit (kWh)

11. 4 digit display   (For primary display)

12. Frequency unit

13. Voltage unit (V), current unit (A), Apparent Power unit (kVA),

    Reactive Power unit (kVAr)   (For secondary display)

14. Time unit : hour(h)、 minute(min)

15. Overflow symbol

16. 100 graduate scale

17. 40 graduate scale

18. Bar graph

19. 4 digit display   (For secondary display)

20. Frequency unit

21. Time symbol

22. Negative sign of scale

23. Number of memory location symbol

24. Recall data symbol

25. Save data symbol

Ø1

Ø2

Tested conductor

Ø3

Earth wire

Ø3

AC **136.2** A

RS232

000.0

MEM 3

ø1

ø2

Tested conductor

ø3

Earth wire

ø3

AC   OL   A

000.0

MEM ∃

Tested conductor

Earth wire

Black

Green

ø3

AC 35.70 kVA

20.52 kVAr

MEM 5 ⟨▨▨▨▨▨▨⟩ 0 20 40 60 80 100

Tested conductor

Earth wire

Black   Red

Tested conductor

Earth wire

Black Yellow

AC 437.8 kWh
03:05 h min
MEM 6
ø3
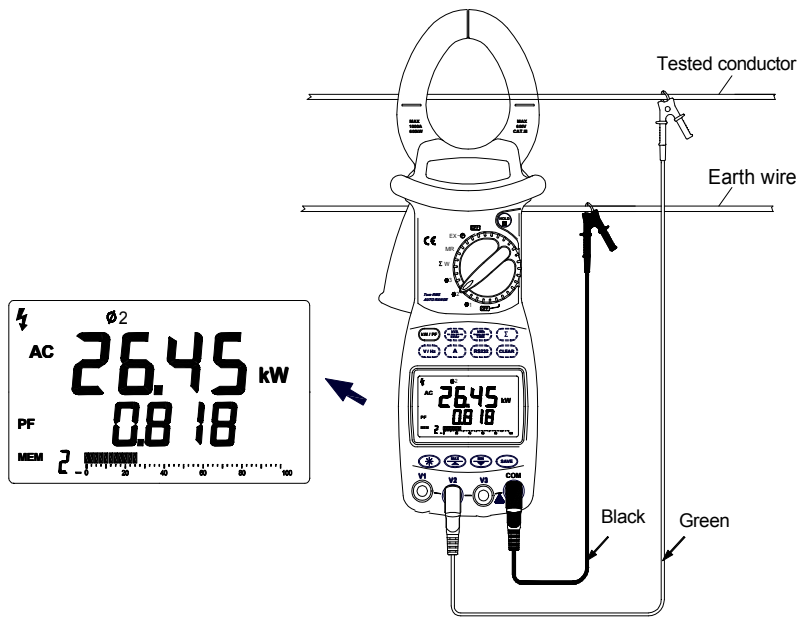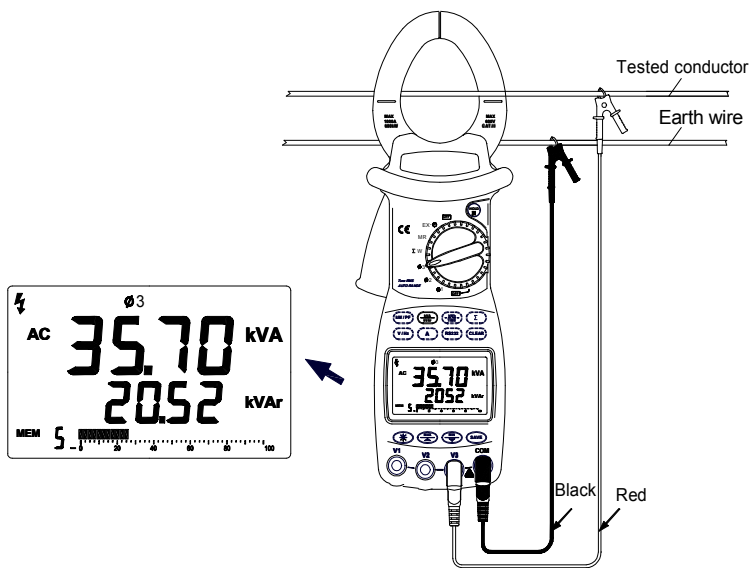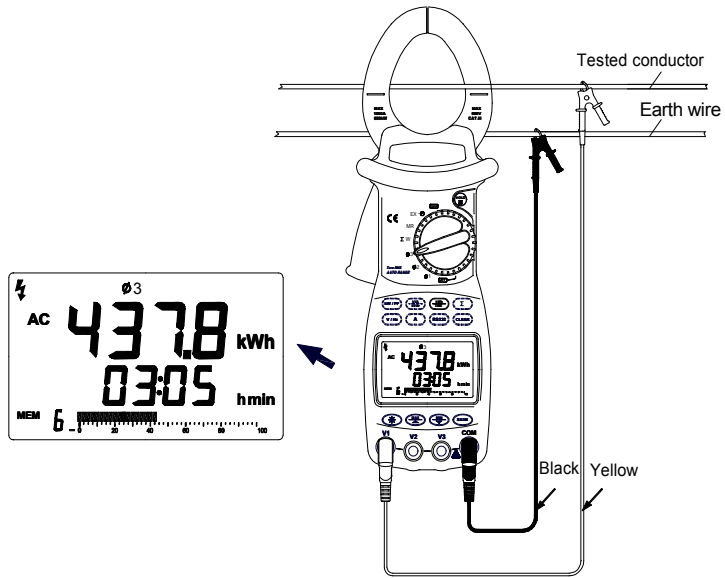
NOTE: When you turn the selector to EX-Ⓟ to measure voltage or power parameter, the

Tested conductor

ø1

ø2

ø3

Earth wire

Black Red Green Yellow

AC 31.16 kW
ø1 Σ
PF 0.785
MEM 2

AC 38.22 kVA
ø1 Σ
26.34 kVAr
MEM 2

Ø1

Ø2

Tested conductor

Ø3

Earth wire

Ø1 Ø2 Ø3 ΣW

AC **135.9** kVA

165.0 kVAr

MEM 2

0   20   40   60   80   100

Black Red Green Yellow

✦

✦

✦

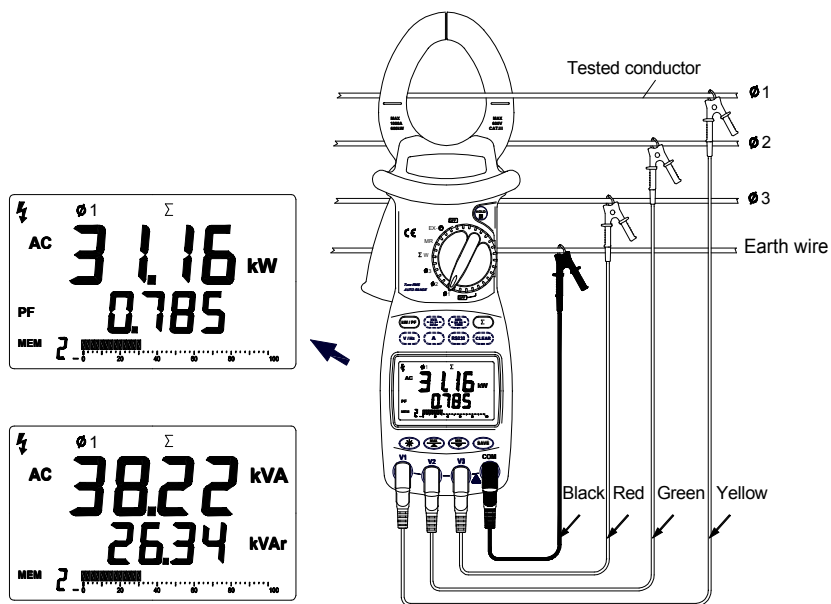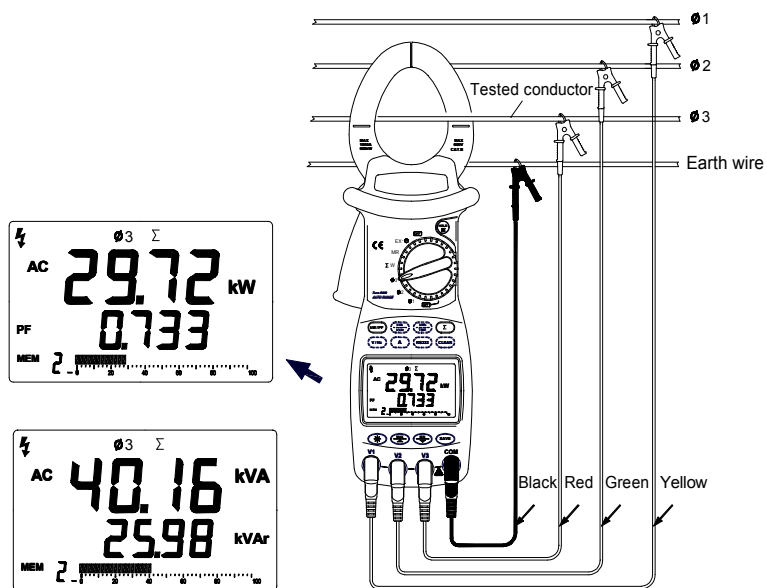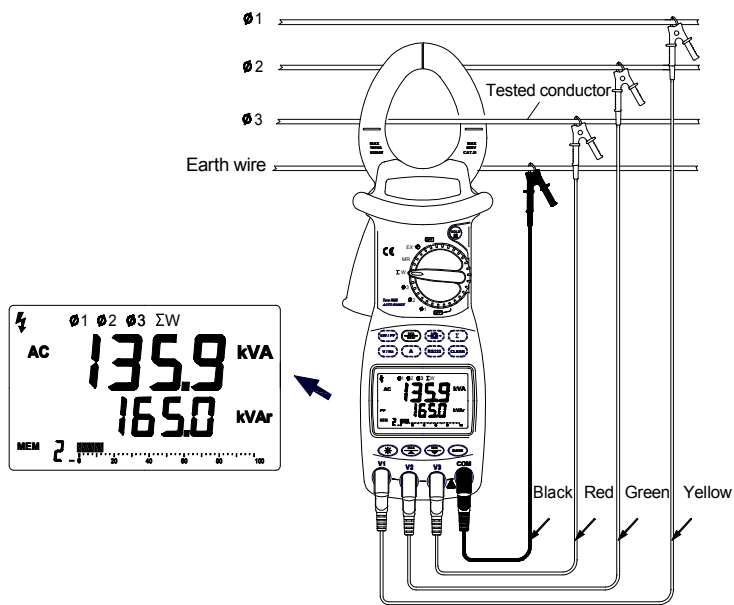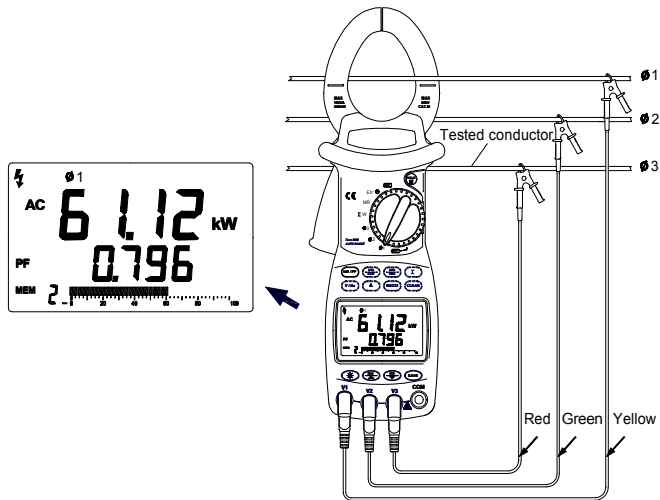Connect RS232C interface cable to the clamp meter as shown in Figure 18, then rotate the interface cable deasil to lock it in the meter. Connect the other plug of the interface cable to a serial port of a computer. Then the meter can transmit measured data to computer by the infrared photoelectricity RS232C interface in real-time mode. If you want to take out the interface cable from the meter, first you must rotate the cable widdershins to unlock it, then you can pull out it .

You will install the special data record software into the computer according to README.TEXT file in SETUP disk. When the meter is in measurement mode RS232 button, you can record and

print the measured data of the meter in real time mode in the WINDOWS. The software can

COMPUTER

2000W
+E
+I
+P
PEAK VALUE OF POWER
$E_{max}=141V$
PEAK VALUE
2000W

1000W
-E
-I
-P
ACTIVE POWER
POWER

90° 180° X 360°

$I_{max}=14A$
PEAK VALUE

+V
+I
+P
V_{max}
P
I_{max}

500W
ACTIVE POWER
$KW=I^2R$

45° 90° 180° 270° 360°
X
225°
θ
45°
PEAK VALUE
-E

+V
+I
+P
P
V_{max}
+V
+i
I_{av}
$KW=I^2R$

180° X
-E
-I
-P
θ θ
-i
-V
360°

Coin
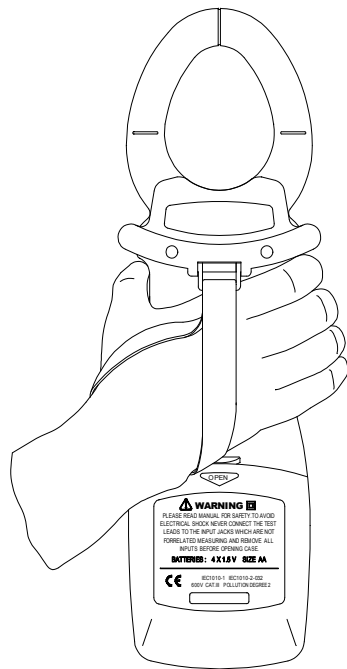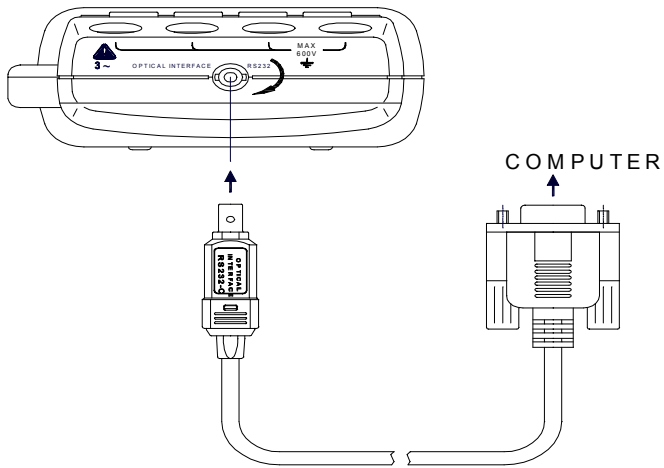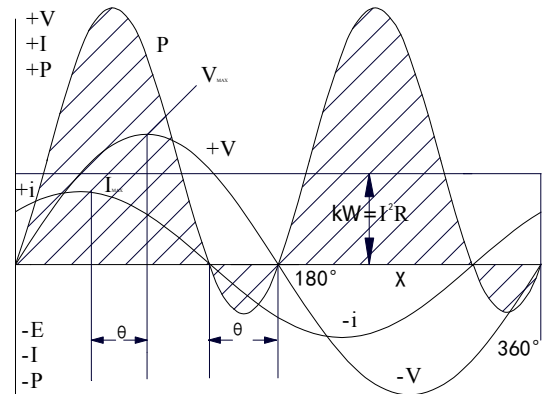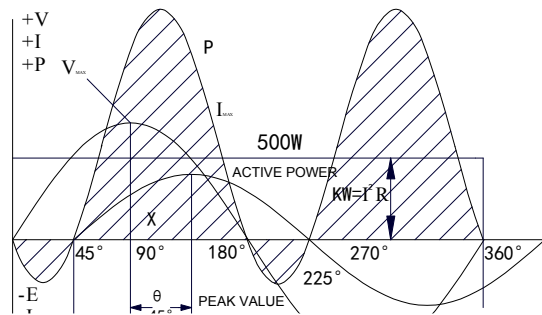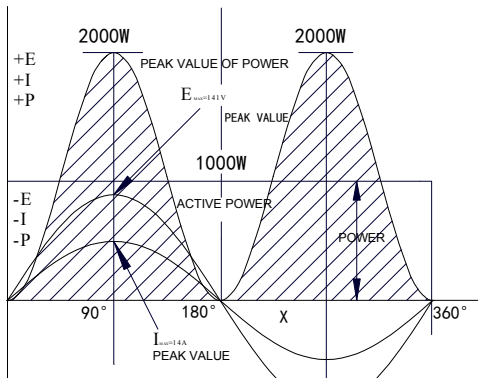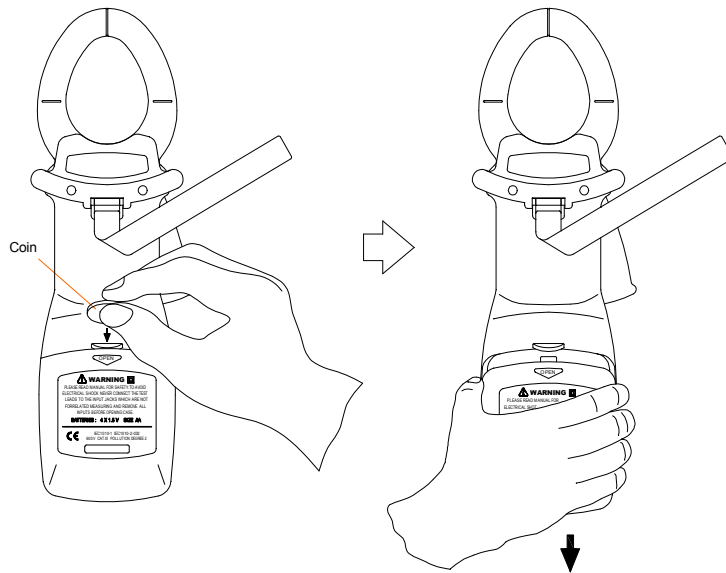
300V	±(1.2%+5)	0.1V	(10Pf SHUNT)
600V	±(1.2%+5)	0.1V	

Max. Overload Voltage：750V (RMS)

AC CURRENT **RMS**

RANGE	ACCURACY	RESOLUTION
40A	±(2%+5)	0.1A
100A	±(2%+5)	0.1A
400A	±(2%+5)	0.1A
1000A	±(2%+5)	0.1A

Max. Overload Current：1500A

ACTIVE POWER **(W)**

RANGE	ACCURACY	RESOLUTION
4kW	±(3%+5)	0.01kW
10kW	±(3%+5)	0.01kW
40kW	±(3%+5)	0.01kW
100kW	±(3%+5)	0.01kW
600kW	±(3%+5)	0.1kW

Minimum measurement current : 5A

Minimum measurement voltage : 20V

APPARENT POWER **（VA）**

RANGE	ACCURACY	RESOLUTION
4kVA	±(3%+5)	0.01kVA
10kVA	±(3%+5)	0.01kVA
40kVA	±(3%+5)	0.01kVA
100kVA	±(3%+5)	0.01kVA
600kVA	±(3%+5)	0.1kVA

Minimum measurement current : 5A

Minimum measurement voltage : 20V

POWER FACTOR **（PF）**

RANGE	ACCURACY	RESOLUTION
0.3～1 Capacitive	±(0.02+2)	0.001
0.3～1 Inductive	±(0.02+2)	0.001

Minimum measurement current : 5A

Minimum measurement voltage : 20V

REACTIVE POWER $(Var)^2 = (VA)^2 + W^2$

RANGE	ACCURACY	RESOLUTION
4kVAr	±(4%+5)	0.01kVAr
10kVAr	±(4%+5)	0.01kVAr
40kVAr	±(4%+5)	0.01kVAr
100kVAr	±(4%+5)	0.01kVAr
600kVAr	±(4%+5)	0.1kVAr

Minimum input current : 5A

Minimum input voltage : 20V

Recording Voltage value、current value、Active Power value to calculate Reactive Power value, The calculating accuracy is 0.01% of the range.

ACTIVE ENERGY （**kWh**）

RANGE	ACCURACY	RESOLUTION
1～9999kWh	±(3%+2)	0.001kWh

Minimum measurement current : 0.5A

Minimum measurement voltage : 10V

FREQUENCY （**Hz** ）

RANGE	ACCURACY	RESOLUTION
20Hz～1kHz	0.5%	0.1Hz

Minimum measurement voltage: 20V

* Accuracy：% of reading + number of digits

   The specification given assume an operating temperature: 18℃～28℃,humidity up to: 80% , the frequency of voltage and current is 45Hz～65Hz

* Maximum common made voltage: 600V AC RMS
* Display : LCD 9999
* Range : autorange
* Overrange indication: Figure "OL" on the display
* Reading Holding: Figure ▣ n the display
* Power supply : 4× 1.5V   AA
* Power consume: 250mW
* Storage temperature: -20℃～70℃
* Operating temperature: 0℃～40℃
* Dimension size: 300mm×103mm×51mm
* Weight: approx. 500g   (include battery)

ACCESSORIES

Users manual   1

Battery	1.5V AA	4
Test Leads	(MS3000)	1
Connect test clamp	(MS3102)	1
RS232C interface cable (MS3403)		1
PC Data Record graph software		1
Carry Case		1