POWER METER

INSTRUCTION MANUAL

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1. INTRODUCTION

NOTE

This Power Meter has been designed and tested according to CE Safety Requirements for Electronic Measuring Apparatus, IEC/EN 61010-1 and other safety standards. Follow all warnings to ensure safe operation.

WARNING

READ "SAFETY NOTES" (NEXT PAGE) BEFORE USING THE METER.

CAT Ⅳ – Measurements performed at the source of the low voltage installation.
CAT Ⅲ – Measurements performed in the building installation.
CAT Ⅱ – Measurements performed on circuits directly connected to the low voltage installation.
CAT Ⅰ – Measurements performed on circuits not directly connected to mains.

2. SAFETY NOTES

1. Read the following safety information carefully before attempting to operate or service the meter.
2. Use the meter only as specified in this manual. Otherwise the protection provided by the meter may be impaired.
3. The operating voltage is limited to ±10% of line voltage 100-240 Vac. Do not use it in other voltage rating.
4. Keep drying when using this product.
5. To reduce the risk of electric shock, do not remove cover.
6. Do not use this product while is getting wet.
7. Never give shocks, such as vibration or drop, which may damage the meter.
8. The maximum output current is 15A.
9. Rated environmental conditions :
   (1) Indoor 100V~240V Vac.
   (2) Installation Category II.
   (3) Pollution Degree 2.
   (4) Altitude up to 2000 meter.
   (5) Relative humidity 80% max.
   (6) Ambient temperature 0~40℃.

10. Observe the International Electrical Symbols listed below :


Detector is protected throughout by double insulation or reinforced insulation.


Warning ! Risk of electric shock .


Caution ! Refer to this manual before using the product.


AC; Alternating Current

3. FEATURES

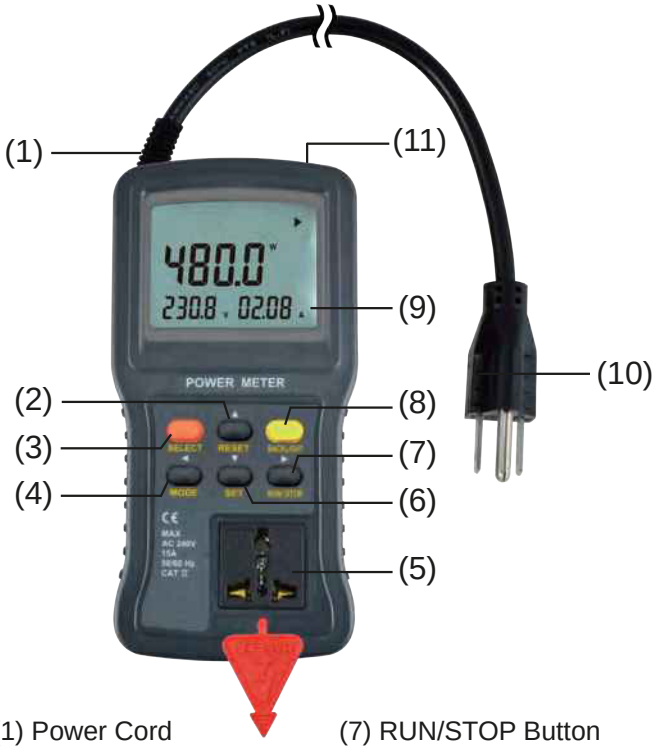
1. Determine the running cost of your appliances.
2. Measure voltage, current, frequency, watt, power factor, and greenhouse gas emissions.
3. Optical USB to RS-232 data transmission.
4. 2 Optical LEDs are built-in for data transfer.
5. Transferring and showing real-time data to a PC.
6. Make informed decisions when purchasing appliances and equipment.
7. Reduce your electricity bill.
8. Calculate electrical expenses by real, hour, month.
9. Can make different kinds of plugs for different countries / areas, such as Type B, C, G, I plugs.....etc.
10. Data communication function.
11. Freely set upper and lower limit for V, A, W and alarm when measured value is out of limit.
12. Backlight function.

4. SPECIFICATIONS

Item	Range	Unit	Accuracy
AC voltage	100-240	V rms	±1%
AC current	15	A rms	±1%
Power	0-3750	W	±1%
Apparent power	0-3750	VA	±1%
Power factor	0.001-1		$\frac{\text{Watt}}{\text{Vrms}*\text{Arms}}$
Frequency	45-65	Hz	±1%
Cost	9999	$	
Energy	9999	kWh	
Gas	9999	kg	
Cost setting	0-9999	kWh	
Gas setting	0-9.999	kg/kWh	
Time duration	23	Hours	
	30	Days	
Run-time measurement	30:23	Days:Hours	
Fuse rating	15A/250V (5×20 mm)		

- Dimensions : 221(L) × 110(W) × 56.8(D)mm
- Weight : Approx. 760g
- Cable length : 150cm
- Safety standards : EN 61010-1
  EN 61326-1

5. INSTRUMENT LAYOUT



(1) Power Cord
(2) RESET Button
(3) SELECT Button
(4) MODE Button
(5) Universal Receptacle
(6) SET Button
(7) RUN/STOP Button
(8) BACKLIGHT Button
(9) Display Screen
(10) Plug
(11) The connection terminal for PC interface

6. MEASURING METHODS

The meter is a multiple measurement function of AC power meter.
Those functions are voltage, current, watt, va, frequency, power factor, power consumption and actual cost of power consumed measurement.

Installation:

1. Turn off the appliance and remove the power cord from the outlet. Connect the meter to the outlet and appliance to the meter.
2. LCD display will show measuring value.

6-1. Main buttons functions of power meter

MODE Button :

You can select different modes by pressing MODE button.
These modes are watts, power factor, apparent power, frequency, AC voltage, AC current, kWh, GAS, cost and time mode.

SELECT Button :

When the main modes are watts, apparent power, AC voltage, AC current modes, press the SELECT button can see the detail of maximum and minimum on the display.
Other main mode like kWh, GAS, COST mode when pressing the SELECT button, you can see the detail of REAL, HOUR, MTH duration on the display.
Under the time mode, press the SELECT button can select different display of time mode, (min/sec) mode, (hours)mode, (days/hours)mode.

SET Button :

1. Alarm function:
   Under the watt, AC voltage and AC current modes press the SET button can set UPPER and LOWER limit alarm functions.
2. Time setting function:
   Under the time setting mode, press the SET button can set run-time or end-time test duration.
3. LOG mode function:
   Press and hold SET button about 3 seconds, the display will show “LOG”on the power meter, and the data is stored 2000 records. The data is stored every second until the memory full. Press the RUN/STOP button to execution.

RESET Button :

Press and hold the RESET button can reset all test data.

RUN/STOP Button :

Press the RUN/STOP button can start or pause process during the measurement period.

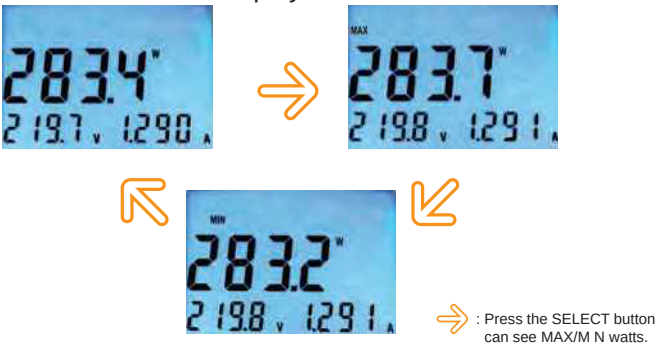
BACKLIGHT Button :

Press the BACKLIGHT button, the LCD will have backlight function.

6-2. Screen mode

6-2-1. WATTS Screen Mode:

- Press the SELECT button can show the detail of MAX/MIN on the display.



- SET Alarm

  Press the SET button can set watt alarm to the upper/lower limit mode.
  Press the SELECT button can change the upper or lower limit.
  Press the MODE button can change flashing number position.
  Press the RESET(▲) button to increase the flashing digit (0→9).
  Press the SET(▼) button to decrease the flashing digit (9→0).
  Press the RUN/STOP button to confirm the setting number.

6-2-2. POWER FACTOR Screen Mode :

6-2-3. Apparent Power Screen Mode :

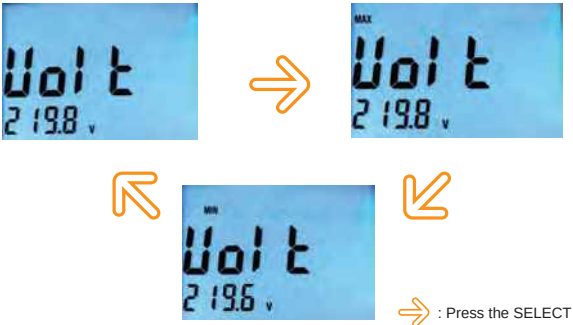
- Press the SELECT button can show the detail of MAX/MIN on the display.

: Press the SELECT button can see MAX/MIN apparent power.

6-2-4. Frequency Screen Mode :

6-2-5. AC Voltage Screen Mode :

- Press the SELECT button can show the detail of MAX/MIN on the display.



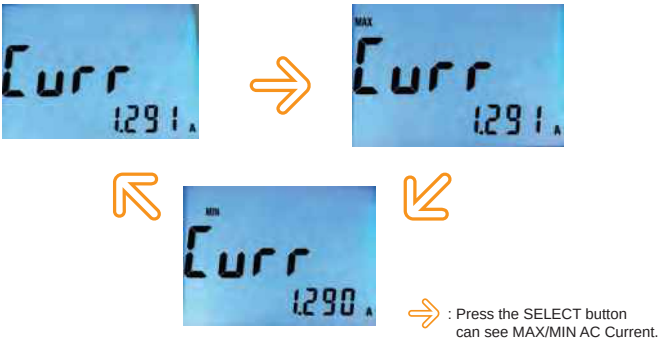
: Press the SELECT button can see MAX/M N AC Voltage.

- SET Alarm

  Press the SET button can set AC voltage alarm to the upper/lower limit mode.
  Press the SELECT button can change the upper or lower limit.
  Press the MODE button can change flashing number position.
  Press the RESET(▲) button to increase the flashing digit (0→9).
  Press the SET(▼) button to decrease the flashing digit (9→0).
  Press the RUN/STOP button to confirm the setting number.

6-2-6. AC Current Screen Mode :

- Press the SELECT button can show the detail of MAX/MIN on the display.



: Press the SELECT button can see MAX/MIN AC Current.

- SET Alarm

  Press the SET button can set AC current alarm to the upper/lower limit mode.
  Press the SELECT button can change the upper or lower limit.
  Press the MODE button can change flashing number position.
  Press the RESET(▲) button to increase the flashing digit (0→9).
  Press the SET(▼) button to decrease the flashing digit (9→0).
  Press the RUN/STOP button to confirm the setting number.

6-2-7. kWh Screen Mode :

- SELECT REAL/HOUR/MTH function

: Press the SELECT button can see REAL/HOUR/MTH kWh.

6-2-8. GAS Screen Mode :

- SELECT REAL/HOUR/MTH function

: Press the SELECT button can see REAL/HOUR/MTH GAS kg.

- SET GAS RATE
  Press the SET button can set GAS rating.

Press the MODE button can flashing number position.
Press the RESET(▲) button to increase the flashing digit (0→9).
Press the SET(▼) button to decrease the flashing digit (9→0).
Press the RUN/STOP button to confirm the setting number.

6-2-9. COST Screen Mode :

- SELECT REAL/HOUR/MTH

- SET COST RATE

  Press the SET button can set COST rating.
  Press the MODE button can flashing number position.

Press the RESET(▲) button to increase the flashing digit (0→9).
Press the SET(▼) button to decrease the flashing digit (9→0).
Press the RUN/STOP button to confirm the setting number.

6-2-10. TIME Screen Mode :

- SELECT TIME MODE

: Press the SELECT button can see minutes and seconds/ HOURS/DAYS HOURS time mode.

- SET TIME MODE
  Press the SET button can set TIME duration.
  Press the MODE button can flashing number position.

Press the RESET(▲) button to increase the flashing digits.
Press the SET(▼) button to decrease the flashing digits.
Press the RUN/STOP button to confirm the setting number.

6-2-11. LOG Screen Mode:

- SELECT LOG MODE

  Connect CA-232 to the power meter and PC all the records can be saved in the memory and recalled to a PC and downloading saved data a PC.
  Press and hold SET button about 3 seconds, the display will show “LOG”on the power meter, and the data is stored 2000 records. The data is stored every second until the memory full.
  Press the RUN/STOP button to execution.
  Reset memory data can “RESET” button clear all memory data.

6-2-12. Other:

- Power Failure

  When the meter is disconnection, the power failure symbol "⏻" will appear on the top right corner of the screen. Although the meter will resume what it was doing automatically without loss of data after a power failure, for best accuracy, if the period of the power failure is not known, the measurement should be taken again. The power failure symbol "⏻" will flash continuously until data is cleared.
  If wants to clear it, press RESET button to clear all data.

- Overload

  When the load current exceeds 15A, the display flashes the massages " OL". Disconnect the excessive load as soon as possible to avoid damaging the meter.

- LCD Back-light

  Press the "backlight" button to enable the back light function. You can press the "backlight" button again to disable the function.

7. CLEANING & STORAGE

Periodically wipe the case with a damp cloth and detergent. Do not use abrasives or solvents.

When the measurement current is between 10~15A, there should be at-least 1 minute intervals, and each measurement has to done within 1 minute. If the measurement current is less than 10A, the measurement can be conducted for a longer time.

8.PC COMMUNICATION METHOD

(a) Power meter is compatible with RS232 communication.

(b) The basic transmission protocol is as follows : Transmission protocols can be confirmed from a hyper terminal.

(1) Communication port : connect to a created port in the case of a serial communication port.

(2) Transmission speed : 9600

(3) Parity : none

(4) Stop bit :1

(5) Flow control : none

(6) Normal mode :

When the english capital letter "C" is transmitted from a PC is pressed, data will be consecutively received and "COMM" will be displayed on the product's screen. When the english capital letter "P" is transmitted, the communication will be cancelled.

N-1108V 00000A 00000W 00000VA PF0000 0599Hz 0000000WH
N-1108V 00000A 00000W 00000VA PF0000 0599Hz 0000000WH
N-1108V 00000A 00000W 00000VA PF0000 0599Hz 0000000WH
⋮

(7) Log mode :

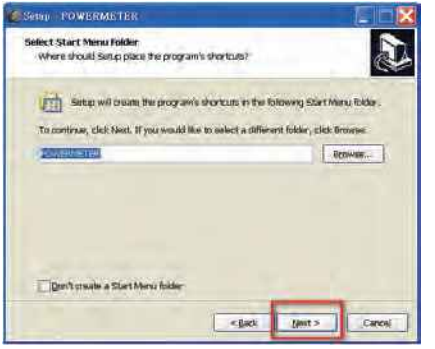
When the english capital letter "L" is transmitted from a PC is pressed, data will be consecutively received and "COMM" will be displayed on the product's screen. When the english capital letter "P" is transmitted, the communication will be cancelled.

L0000-1126V 00000A 00000W 00000VA PF0000 0600Hz 0000000WH
L0001-1126V 00000A 00000W 00000VA PF0000 0600Hz 0000000WH
L0002-1126V 00000A 00000W 00000VA PF0000 0600Hz 0000000WH
L0003-1126V 00000A 00000W 00000VA PF0000 0600Hz 0000000WH
⋮

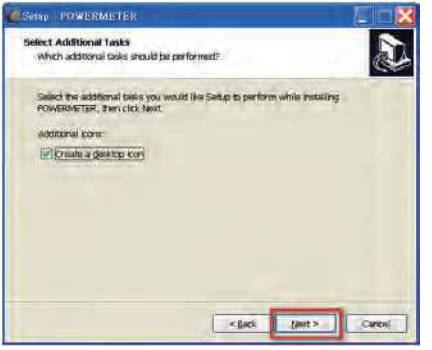
9. INTERFACE CONNECTION AND OPERATION

(a)This power meter program will set up on your computer automatically.

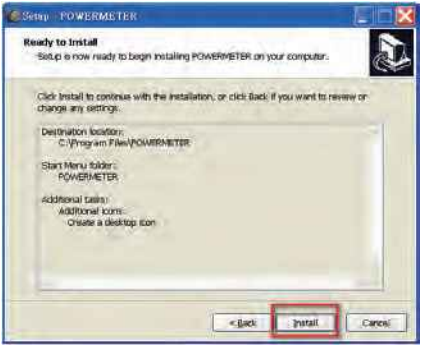
(b) If you want to install a different folder, click Browse, and select another folder.
If it's not necessary, click the "Next" button.



(c) Click the “Next” button.



(d) Click the “Next” button.



(e) It will show the information of power meter has been successfully installed, then click “Finish” button.

※Install the driver on your personal computer. It's very important to install the driver on your computer. Your computer can not communicate with the Power meter without installing the driver. The driver is also in the compact disk (CD). The directory is "E:/USB DRIVER".
(Note: If your computer system is windows7, your computer will get the driver automatically. It's necessary to install the driver if your computer system is not windows7.)

10. RS232 PROGRAM

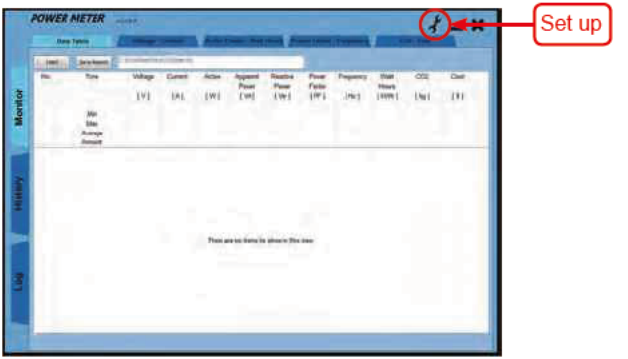
10-1. Initial screen and setting

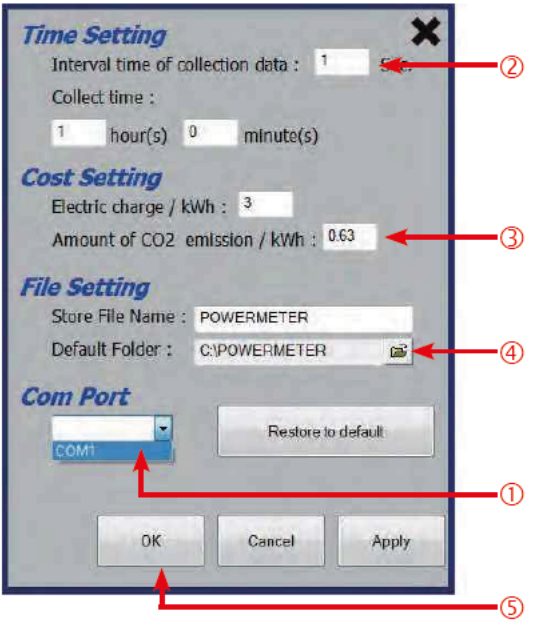
Click on the POWER METER icon,then a program will be run.

10-2. Data collection and data analysis

10-2-1. Data collection on monitor mode

Click on “set up” and enter the appropriate communication and default settings.





①Click on the “Com Port “ and select the RS 232 port number.(select a created port number.)

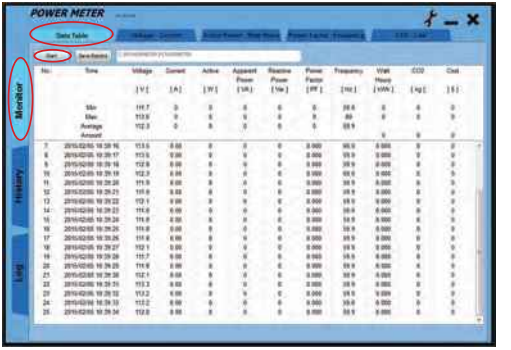
②Select an appropriate interval for data collection. (Range : 1~60sec.) and Set the time for data collection. The maximum is 24 hour.

③Set an electric charge per 1 kWh, and a CO2 emission.

④File Setting.

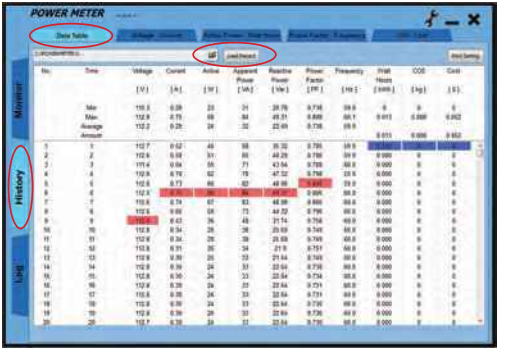
⑤When all setting has done, Press "OK" button.

Select the “Monitor” and “Data Table” and press the “Start” button. If RS 232 link has succeed with POWER METER , then the LCD will show "COMM".



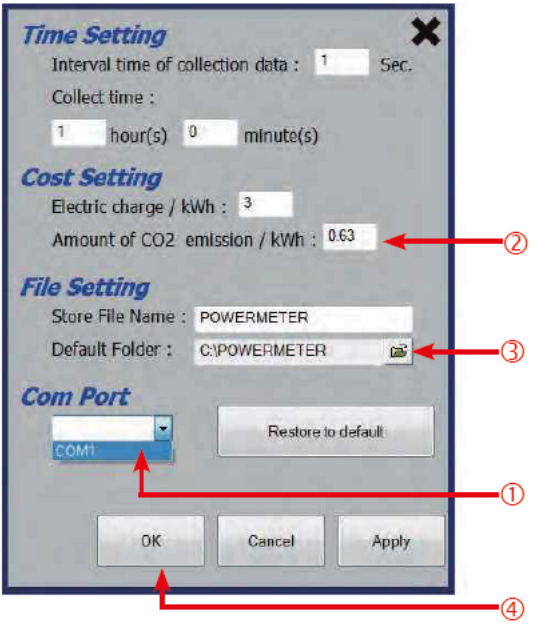
10-2-2. Data Collection on History mode

Select the “History” and “select history test data file on PC disk” and press the “Load Record” button.



10-2-3. Data Collection on Log mode

Click on “tools set up ” and enter the appropriate communication and default settings.



①Click on the “Com Port “ and select the RS 232 port number.(select a created port number.)

②Set an electric charge per 1 kWh, and a CO2 emission.

③File Setting.

④When all setting has done, Press "OK" button.


POWER METER
Monitor
History
Log

10-3. Data analysis(Monitor/History/Log data analysis)

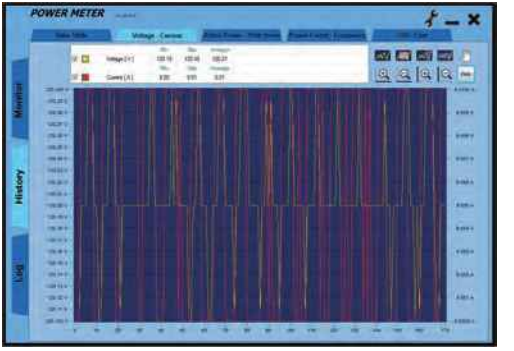
10-3-1. Data collection on monitor mode

When the “Voltage- Current” tab is pressed, the voltage and current analysis and graph will be displayed .

Analysis:

		Min	Max	Average
☑	Voltage [V]	120.10	120.30	120.21
		Min	Max	Average
☑	Current [A]	9.00	9.01	9.01

Graph:



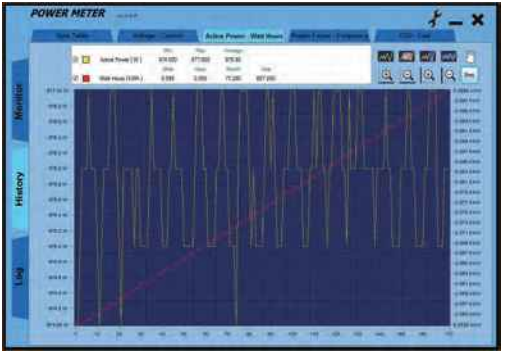
10-3-2. Test data analysis-voltage active power and watt hours mode

When the “Active Power-Watt Hours” tab is pressed, the active power and watt hours analysis and graph will be displayed.

Analysis:

		Min	Max	Average	
☑	Active Power [W]	974.000	977.000	975.90	
		Real	Hour	Month	Year
☑	Watt Hours [kWh]	0.099	0.099	71.280	867.240

Graph:



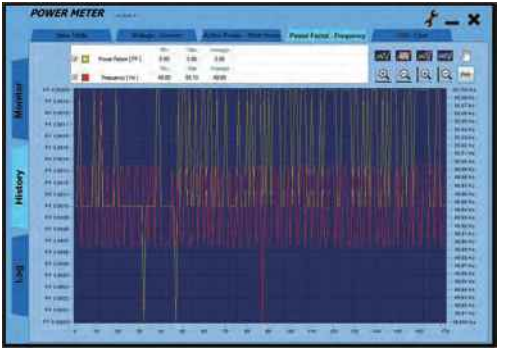
10-3-3. Test data analysis-power factor and frequency mode

When the “Power Factor-Frequency” tab is pressed, the power factor and frequency analysis and graph will be displayed.

Analysis:

		Min	Max	Average
☑	Power Factor [PF]	0.90	0.90	0.90
		Min	Max	Average
☑	Frequency [Hz]	49.80	50.10	49.95

Graph:



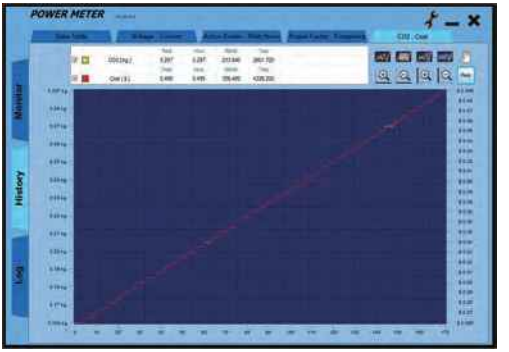
10-3-4. Test data analysis-CO2 and cost

When the “CO2-Cost” tab is pressed, the CO2 and cost analysis and graph will be displayed .

Analysis:

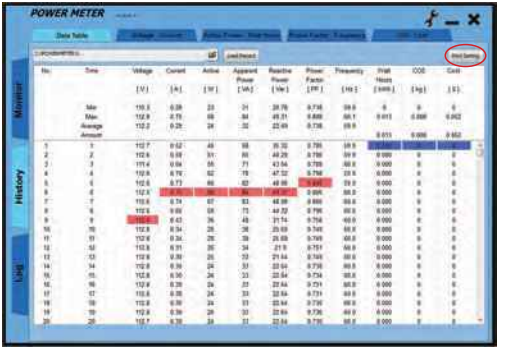
		Real	Hour	Month	Year
☑	CO2 [kg]	0.297	0.297	213.840	2601.720
		Real	Hour	Month	Year
☑	Cost [$]	0.495	0.495	356.400	4336.200

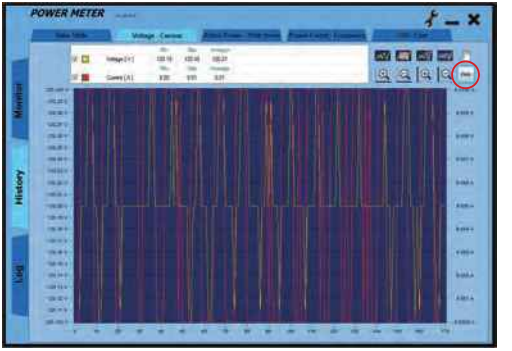
Graph:



10-4. Print Setting(On History Mode)

Press “Print Setting” button can show table print and graph print setting.





Printing set-up: