

TEKON[®] 550

User Manual



Ver9 (20.04)

Index

1. General	5
1.1. International Safety Standard Mark	1
1.2. Measuring Range (Overvoltage range) definition	2
1.3. Ordering Information	3
2. Function	5
2.1. Summary	5
2.2. Major functions	5
2.3. Exterior	6
2.4. Bluetooth connection	7
3. Specifications	8
3.1. Environment	8
3.2. Electrical Specifications	8
3.3. Mechanical Specifications	11
3.4. Environmental Specifications	11
3.5. Safety Specifications	11
4. Operations	12
4.1. Set Up	12
5. Measurement Display	13
5.1. All Informations on Display	13
5.2. Voltage	14
5.3. Ampere	15
5.4. Waveform	17
5.5. Power	18
5.6. Energy	24
5.7. Harmonics	25
5.8. Record	28
5.9. Inrush	29
5.10. Trend	33
6. PC S/W	42
6.1. PC S/W Installation	42
6.2. PC S/W use	44
7. Maintenance	51
7.1. Battery Recharge	51
7.2. Battery Pack replacement	52
7.3. Cleaning and Storage	52

1. General

WARNING

- Do not connect to the Voltage Circuit over 600V or CAT III specified voltage.
- Indoor use only.
- Use Accessories compiled to Safety Standard (IEC 664-1 Ed. 92) CAT III 600V or CAT IV 300V.
- Replacement part should be designated by manufacturer.
- Test Lead should be separated from Analyzer before replace of battery.

1.1. International Safety Standard Mark

Mark	Description
	Double Insulation protection
	WARNING. User need to read and refer the User Manual before start operation of the product. If user does not follow the instruction on manual, could result in injury or loss of life and damage the product and facilities
	Risk on Electric Shock. May dangerous where the Mark shows
	indicates A type Ampere (Current) Sensor. Allow to use or separate the Analyzer close to dangerous current conducting environments
	indicates B type Current (Ampere) Sensor
	Additional Safety : (need to wear Safeguard equipment to protect from Shut Off Electric circuit or High Voltage working on dangerous current conducting environments.
	Disposal

1.2. Measuring Range (Overvoltage range) definition

Higher Category number indicates more higher overvoltage electric environment. Therefore, Tester designed according to CAT III environment can withstand higher overvoltage environment than Tester with CAT II.

To avoid serious accident, suggest to use higher Category tester. For example, do not use Tester with CAT I in CAT II, III, or IV environment.

Measuring range compile to IEC60664 Overvoltage category.

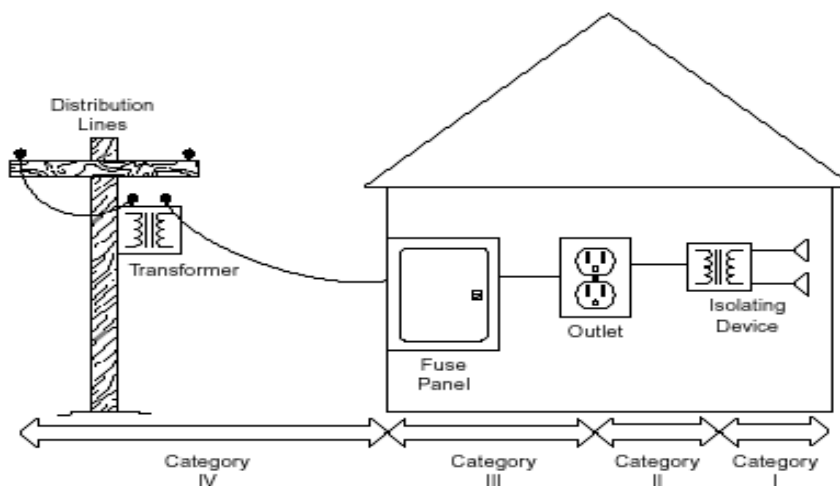


Fig. 1 Measuring Range

Category	Range
CAT I	2ndary electric circuit connecting AC Outlet through Transformer. example : Protected Electric Circuit
CAT II	Primary electric circuit Power code connecting AC Outlet example : Set, Portable tool, Home Appliance electric unit
CAT III	Fixed system electric circuit directly connecting Switchboard Outlet example : Switch on Fixed system and Industrial system connecting permanently to fixed system.
CAT IV	Electric Circuit between Entrance and Wattmeter and primary Overcurrent protection system (switchboard) example : Electric Meter and Primary Overcurrent protection

1.2.1. Unpacking

After delivery, check the delivered contents are same as order. Do not use if any missing item or any damage on the Analyzer and inform to supplier. Keep the package to prove Claims.

For any chance of drain out of battery, suggest to full charge before start to use

1.3. Ordering Information

1.3.1. Accessory and Replaceable Part

■ Test Lead

2001s



■ Alligator Clip connecting to Test Lead
BKRD



■ Battery Pack
Ni-MH 7.2V 2500mA



■ AC Power Adapter
DC12V1A



■ Bluetooth Dongle
BTU400



- Current Clamp
- SCA256AD



Range		
40A	DC/AC	1 mV/A
400A	DC/AC	1 mV/A

- CM-05



Range		
4A	DC/AC	100mV/A
40A	DC/AC	10mV/A
400A D	DC/AC	1 mV/A

- CA-1000A



Range	
1000A AC	1 mV/A

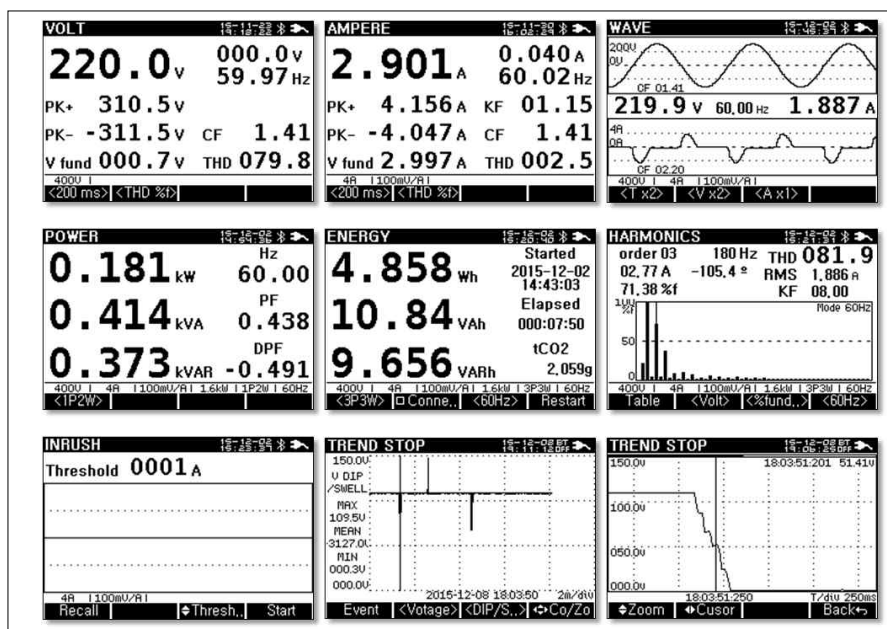
2. Function

2.1. Summary

TEKON 550 is a easy to use, compact size Power Analyzer (Hereafter called “analyzer”. The Analyzer can analyze 1 Phase and Balanced Three-Phase Electric Quality. User can see instant waveform and measurement data monitor for a certain period. The Analyzer can perform various measurement functions, display Waveform and continuous data logging simultaneously, while doing measurement without stopping.

2.2. Major functions

- Single phase and three balanced Three-phase System measurement
- Sequential measurement in Three-phase System
- Easy to use Graphic Display
- Trend recording (Voltage, Ampere-Current, Electricity Power)
- 600V AC True RMS Measurement and Recording.
- 1000A AC True RMS Measurement and Recording.
- Voltage, Ampere (Current) – DC (offset) measurement
- Simultaneous measurement of various Power Quality Parameter
- Detection of Inrush Current and Half-period RMS Recording and Display
- While various measurement data recording is proceeding, Trend– record function is activated.
- User can measure Total Energy and Co2 generation amount from User defined
- Harmonic (~50th) measurement and recording
- PC Software includes Recorded Data download, real time measurement display
- Wireless (Bluetooth) Interface with PC.



2.3. Exterior



Fig. 2 Analyzer Exterior

No	Function	Description
①	Display	240x160 Pixel Monochrome LCD
②	F1 ~ F4 button	Soft key to select soft function on Display.
③	Direction key	Up/Down/Left/Right direction
④	User	User mode – display and select User set up
⑤	Record	Record measurement data on display in Analyzer or recall the recorded data.
⑥	Range	select and set up Voltage/ Current – Range
⑦	Hold	Hold the Displaying measurement data
⑧	Power button	Press long time to ON / OFF of the Analyzer Main Power
⑨	Back Light	On / OFF of Back light Display
⑩	Enter key	Select item or start specific work
⑪	Main Function key	Select main function to measure. If press long time, following display Power Energy Voltage Ampere Waveform Harmonics Inrush Trend
⑫	A (Current) Input terminal	Connect with Clamp Probe to measure Ampere
⑬	Voltage Input terminal	Connect with Voltage Probe to measure Voltage
⑭	Adapter Socket	Connect with Power Adapter to charge Internal Battery inside of Analyzer

2.4. Bluetooth connection

Analyzer can interface with PC through Bluetooth. Isolated Bi-directional Wireless interface. PC Software can check Real time measurement data on Analyzer or can download the Recorded data (Inrush Current, Trend, Snap Shot etc) in Analyzer.

2.4.1. Bluetooth On / Off

- ① Press  key to enter USER mode
- ② Press  key to move the Cursor to 'Bluetooth'.
- ③ Press  key for ON or OFF Bluetooth function.
- ④ When Bluetooth ON,  icon flickering at upper right on Display and proceeds Initialization of PC Interface function. When ready to connecting preparation,  icon keep showing with Message. Then can search and connection of Analyzer. While connected with other device,  icon is displaying.
- ⑤ When OFF Bluetooth,  icon is displaying.
When Bluetooth function is OFF, can save Battery life.
- ⑥ On/Off selection is saved in Analyzer can keep ON/OFF mode when restart Analyzer.

3. Specifications

3.1. Environment

Parameter	Reference Conditions
Ambient temperature	73° ± 5°F (23° ± 3°C)
Humidity	45 to 75%
Atmospheric pressure	25.4" to 31.3" Hg (860 to 1060 hPa)
Phase-to-earth voltage	50 to 600Vrms without DC (< 0.5%)
Clamp current circuit input voltage	30mVrms to 0.4Vrms without DC (<0.5%)
Network frequency	50 and 60Hz ± 0.1Hz
Phase shift	0° active power / 90° reactive power
Harmonics	<0.1%
Balanced three-phase connection	3 ϕ mode OFF

* Specifications subject to change without prior notice.

☞ Accuracy is specified for a period of one year after calibration, at 18°C to 28 °C with relative humidity to 80 %. Accuracy specifications are given as: $\pm$ ([% of reading] + [number of least significant digits]). Accuracy specification assumes ambient temperature stable $\pm 1^\circ\text{C}$.

☞ Warm up time : about 30 minutes

3.2. Electrical Specifications

3.2.1. Voltage Input

Operating Range: Phase-Phase – 0 to 660Vrms AC/DC*

Phase-Neutral – 0 to 600Vrms AC/DC

*Provided that the max with 600Vrms in regards to earth is not exceeded.

Input Impedance: 451k Ω

Overload: 1.33Vn (Vn = nominal voltage)

3.2.2. Ampere (Current) Input

Operating Range: 0 to 1V

Input Impedance: 1M Ω for current probe circuit

Overload: 1.7V

Sample Rate: 10.24kHz

3.2.3. Accuracy Table. excludes Ampere (Current) Probe' own accuracy

Functions	Measurement Range		Resolution	Accuracy
Frequency	40Hz	69Hz	0.01Hz	± 1dgt
TRMS AC Voltage	4V	600V	0.1V	± (0.5%+5dgt)
DC Voltage	4V	600V	0.1V	± (0.5%+5dgt)
TRMS AC Current	40A	1000A	1A	± (0.75%+CT Tolerance)
DC Current	40A	1000A	1A	± (0.5%+CT Tolerance)
Half-period TRMS Voltage	4V	600V	0.1V	± (0.8%+5dgt)
Half-period TRMS Current	40A	1000a	1A	± (0.75%+CT Tolerance)
Peak Voltage	4V	600V	0.1V	± (0.75%+5dgt)
Peak Current	40A	1000A	1A	± (0.75%+5dgt)
Power factor /Crest Factor	1.00	9.99	0.01	± (5%+5dgt)
Active factor	0W	600.0kW	4 digits	± (1%+5dgt), $\cos \geq 0.8$ ± (1.5%+10dgt), $0.2 \leq \cos < 0.8$
Reactive factor	0VAR	600.0kVAR	4 digits	± (1%+5dgt), $\sin \Phi \geq 0.5$ ± (1.5%+10dgt), $0.2 \leq \sin < 0.5$
Apparent factor	0VA	600.0kVA	4 digits	± (1%+5dgt)
Power factor	-1	1	0.001	± (1.5%+5dgt), $\cos \geq 0.5$ ± (1.5%+10dgt), $0.2 \leq \cos < 0.5$
Active Energy	0Wh	9999MWh	4 digits	± (1%+5dgt), $\cos \geq 0.8$ ± (1.5%+10dgt), $0.2 \leq \cos < 0.8$
Reactive Energy	0VARh	9999MVARh	4 digits	± (1%+5dgt), $\sin \Phi \geq 0.5$ ± (1.5%+10dgt), $0.2 \leq \sin < 0.5$
Apparent Energy	0VAh	9999MVAh	4 digits	± (1%+5dgt)
Phase shift	-179°	180°	1°	± (2°)
Displacement factor (DPF)	-1	1	0.001	± (1°) on Φ ± (5dgt) on DPF
Tangent VA $\geq 50VA$	-32.76	32.76	0.001 $\tan \Phi < 10$	± (1°) on Φ
Level of harmonics order (VRMS > 50V)	0%	999.9%	0.10%	± (1%+5dgt)
Angles of harmonics (VRMS > 50V)	-179°	180°	1°	± (3°), $\text{Order} \in [1:25]$ ± (10°), $\text{Order} \in [26:50]$
Global level of harmonics (THD-F)	0%	999.9%	0.10%	± (1%+5dgt)
Distortion factor(THD-R)	0%	999.9%	0.10%	± (1%+10dgt)
K factor	1	99.99	0.01	± (5%+5dgt)

3.2.4. Ampere (Current) Probe Accuracy



SCA256AD

Ratio

0-40A	1mv/A
40A-400A	1mv/A

AC Amps

0-40A	$\pm (1.0\%+6\text{digits})$
40A-400A	$\pm (1.5\%+6\text{digits})$

DC Amps

0-40A	$\pm (1.0\%+5\text{digits})$
40A-400A	$\pm (1.5\%+6\text{digits})$



CM-05

Ratio

4A	100mv/A
40A	10mv/A
400A	1mv/A

AC Amps

0A~4A	$\pm 2.0\% \pm 0.005A$
0A~40A	$\pm 1.0\% \pm 0.02A$
0A~150A	$\pm 1.0\% \pm 0.2A$
150A~200A	$-2.2\% \pm 0.2A$

DC Amps

0A~4A	$\pm 2.0\% \pm 0.005A(40\sim 1\text{kHz})$
0A~40A	$\pm 1.5\% \pm 0.03A(40\sim 1\text{kHz})$
0A~150A	$\pm 1.5\% \pm 0.3A(40\sim 1\text{kHz})$
150A~200A	$-2.2\% \pm 0.3A(40\sim 1\text{kHz})$



CA-1000A

Ratio

1000A	1mv/A
-------	-------

AC Amps

0~400A (50~60Hz)	$\pm (1.5\%+2A)$
0~400A (61~400Hz)	$\pm (3.0\%+2A)$
400~1000A(50~60Hz)	$\pm (2.0\%+3A)$
400~1000A(61~400Hz)	$\pm (3.5\%+3A)$

3.2.5. Power Supply

☐ AC Charging Adapter

Input : AC 100V ~ 240V @ 50Hz/60Hz
Output : DC 12V 1A

☐ Battery

Type	6 x Ni-MH Rechargeable Battery Pack : 1800mAH
Voltage	7.2V
Charging Current	0.8A
Charging Time	4 Hr
Battery Life	> 8 Hr 300 Charging / Recharging

3.3. Mechanical Specifications

Dimensions : 100 X 220 X 54mm / 4.0" x 8.6" x 2.2" inch)

Weight : 800g / 1.8 lbs

Shock & Vibration : EN 61010-1

IP 54 EN 60529 (electric IP2X terminal)

3.4. Environmental Specifications

Operation Temperature	0 ~ 50°C / 32 ~ 122°F
Storage Temperature	-20 ~ 50°C / -4 ~ 122°F (<30 days)
Charging Temperature	(10 ° at 40 ° C) 104 ° F ~ 50 °
Altitude	Operation : 0~2,000m (6,560 ft) Non Operation : 0 ~ 10,000 m (32,800 ft)
Relative Humidity	10~85%

3.5. Safety Specifications

☐ Safety Related

600V CAT III, Pollution Degree 2



EN 61010-31: 2002

EN 61010-1: 2001

EN 61010-2: 1995

☐ Test Instrument

Immunity: EN 61236-1 A2

Emission: EN 61236-1 A2

Electrostatic discharges: IEC 1000-4-2

Radiation field resistance: IEC 1000-4-3

Fast transients resistance: IEC 1000-4-4

Electric shock resistance: IEC 1000-4-5

Conducted RF interference: IEC 1000-4-6

Interruption of Voltage: IEC 1000-4-11

4. Operations

4.1. Set Up

4.1.1. User Mode

Press  key to enter USER mode. Mode Menu displaying

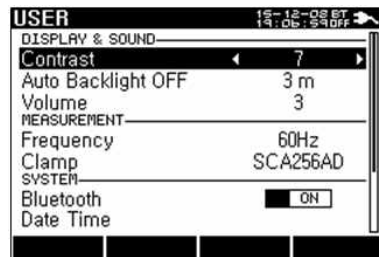


Fig. 3 User Display

Item	Select Range	Description
Contrast	1~15	LCD contrast
Auto Backlight OFF	Off, 1, 3, 5, 10, 20, 30, 60(min)	Automatic Off Back light turn Off automatically if there is no Button operation within the pre-set time
Volume	Mute, 1 ~ 3	Mute or adjust buzzer volume level the Buzzer volume level.
Frequency	50 / 60 Hz	Fundamental Frequency
Clamp	<Support Clamp>	Select Current (Ampere) Clamp. Ampere Range is changed by the selected Ampere Clamp
Bluetooth	On/Off	Bluetooth On / Off
Date Time	Y/M/D h:m:s	set up time Year/Month/Day Hour:Minute:Second
Auto Power OFF	Off, 1, 3, 5, 10, 20, 30, 60(min)	Auto Power Off. Main Power turn Off Automatically if there is no Button operation within the pre-set time. The Function does not activate if Analyzer connected with AC Power outlet or in "Trend recording"
Data Format	–	Delete all Data recorded in Analyzer <Snap Shot, Inrush Current,Trend>
Factory Setting	–	All Set Up in Analyzer return back to Factory Setting
System Info	–	Display Analyzer' system information including HW, FW, Serial Number,etc

5. Measurement Display

5.1. All Informations on Display

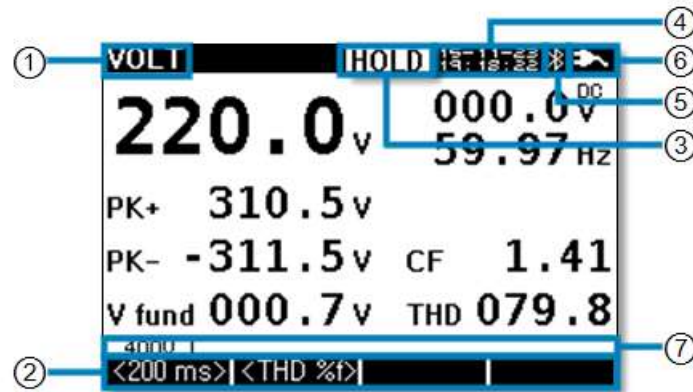


Fig. 4 Basic Display

No	Function	Description
①	Display Name	Present Measurement Name
②	Softkey menu	press F1 F2 F3 F4 to display sub-function or selectable item
③	HOLD	press Hold key to hold the presently displaying data.
④	Time	Present Time or Recoded Time of the Recall Data
⑤	Bluetooth status	different ICON indicates Status BT OFF Interface OFF. BT (blinking) Interface preparing. BT Ready to Interface. BT Can connect with PC. BT Under Interfacing with PC.
⑥	Battery Charging Level Connecting with AC Adapter	5 bars displaying Battery Charging level AC Adapter icon under Charging mode while connected with AC power Adapter
⑦	Status Display Line	presently set up data 400V 4A 100mV/A 1.6kW 1P2W 60Hz Range : Voltage, Current, Power measurement range Current Clamp : 0.1mV/A ~ 100mV/A Single phase, Balanced 3 phase Power measurement : 1P2W, 3P3W Basic Frequency : 50Hz, 60Hz

5.2. Voltage

Press  key to enter Voltage mode.

Voltage mode display True RMS, DC, Peak, Fundamental RMS Crest Factor, THD simultaneously. All data updates every 200ms.

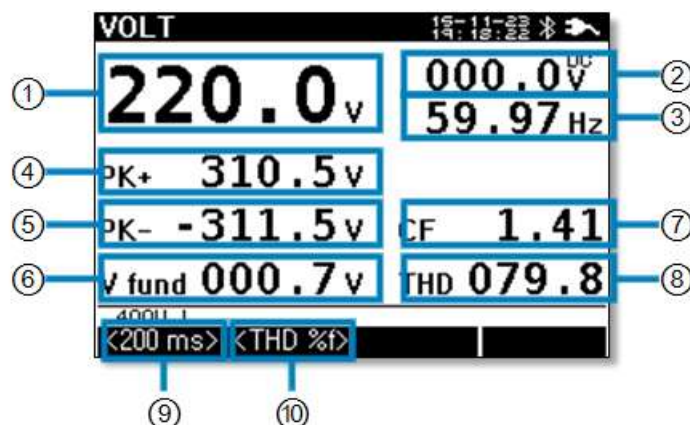


Fig. 5 Voltage measurement display

No	function	Description				
①	True RMS	True RMS measurement data of Voltage 'O.L.' display when out of measurement range				
②	DC	DC(Mean) measurement data of Voltage 'O.L.' display when out of measurement range				
③	Frequency	Frequency of Voltage. ' — ' display when out of measurement range				
④	Peak Max	display Peak Max/Min of Voltage				
⑤	Peak Min	'O.L.' display when out of measurement range				
⑥	fund Voltage	Fundamental Voltage.				
⑦	Crest factor	Crest Factor of Voltage/Ampere				
⑧	THD	display Total Harmonic Distortion of Voltage / Current				
⑨	 RMS window	Set up Calculation Period of True RMS, DC(mean)				
		<table><tr><td>200ms</td><td>fundamental value. 200ms (10/12 cycle) display measurement result</td></tr><tr><td>3s</td><td>Set up Calculation Period with 3 second (150/180 cycle). updates every 200ms.</td></tr></table>	200ms	fundamental value. 200ms (10/12 cycle) display measurement result	3s	Set up Calculation Period with 3 second (150/180 cycle). updates every 200ms.
		200ms	fundamental value. 200ms (10/12 cycle) display measurement result			
3s	Set up Calculation Period with 3 second (150/180 cycle). updates every 200ms.					
⑩	 THD function set up	select THD function				
		<table><tr><td>THD%f</td><td>display THD into % of fundamental Voltage/Ampere</td></tr><tr><td>THD%r</td><td>display THD into % of RMS Voltage /Ampere.</td></tr></table>	THD%f	display THD into % of fundamental Voltage/Ampere	THD%r	display THD into % of RMS Voltage /Ampere.
		THD%f	display THD into % of fundamental Voltage/Ampere			
THD%r	display THD into % of RMS Voltage /Ampere.					

5.3. Ampere

Press  Ampere mode display True RMS, DC, Peak, Fundamental Wave, Crest Factor, THD and K-factor simultaneously. All data updates every 200ms.

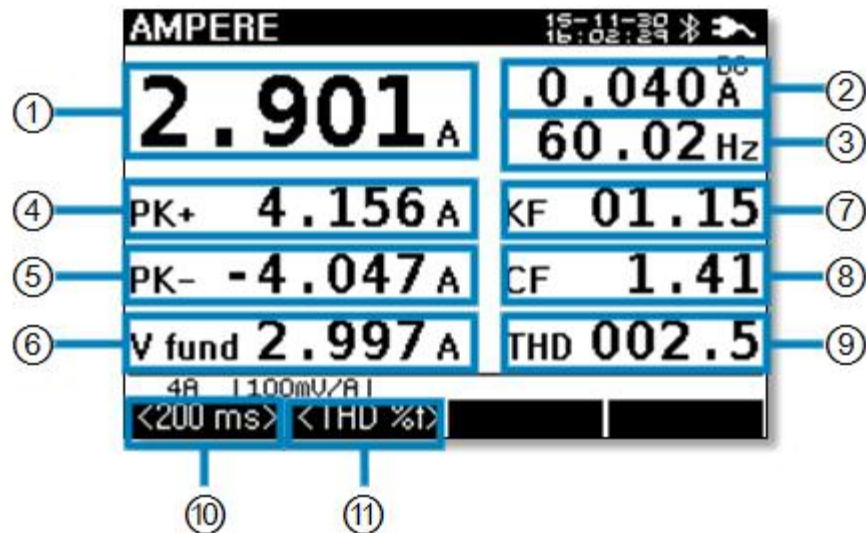


그림 6 Ampere measurement display

No	Function	Description
①	True RMS	True RMS measurement data of Ampere 'O.L.' display when out of measurement range
②	DC	DC(Mean) measurement data of Ampere 'O.L.' display when out of measurement range
③	Frequency	Frequency of Ampere. '—' display when out of measurement range
④	peak Max	display Peak Max/Min of Ampere
⑤	peak Min	'O.L.' display when out of measurement range
⑥	fund voltage	Fundamental Ampere.
⑦	KF	K-factor indicates total Total Harmonics Current. Display only on Ampere (current) measurement mode.
⑧	Crest factor	Power Factor of Voltage / Ampere
⑨	THD	Total Harmonic Distortion of Voltage / Ampere
⑩	F1 RMS	Set up Calculation length of True RMS, DC(mean)
		200ms fundamental value. 200ms(10/12 cycle) display measurement result
		3s Set up Calculation length with 3 second (150/180 cycle). updates every 200ms.
⑪	F2 THD function set up	select THD function
		THD%f display THD into % of fundamental Voltage/Ampere
		THD%r display THD into % of RMS Voltage /Ampere.

5.3.1. Ampere Clamp setting

Ampere range is automatically adjusted to the Clamp specifications selected on User Mode display.

For example, if “ SCA 256AD” is selected, 40A or 400A selectable and other range is not selectable. Ratio is adjusted by Clamp specifications– 40A(1mV/A), 400A(1mV/A)

For Clamp selection, please refer 4.1.1 User Mode setting display

■ Ampere Clamp “O” point Adjustment

- Before measurement, make sure “0” point adjustment was done for precise measurement.
- If use other type Clamp probe besides manufacturer’s suggested optional Clamp, there will be measurement tolerance due to Phase Shift.

Recommend to use the manufacturer supplied Clamp probe.

■ “O” point adjustment method by different Clamp Probe

- SCA256AD : use Zero Adj knob on the Standard Clamp
- CM-05 : “0” point adjustment by touch
- CA-1000A : No “0” point adjustment

■ Ampere Clamp “O” point adjustment procedure

- ① Power on TEKON 550.
- ② select function key Ampere (A).
- ③ press Range key and select 40A
- ④ Insert Clamp Probe to Ampere Input terminal at lower part of TEKON 550
- ⑤ set Clamp Probe SCA256AD at 40A.
- ⑥ (at no input – no load condition) adjust “0” point by rotate ZERO ADJ on SCA256AD.
- ⑦ After “0”point adjusted, start measurement.

■ Current clamp polarity

- Use the clamp, correct polarity for accurate measurement.
- The polarity of the SCA256AD is the same as the photograph.
- The front (button side) to look at the load.



5.4. Waveform

Press  key to enter Waveform mode.

Waveform mode display Waveform of Voltage, Ampere, True RMS, Frequency, and Crest Factor, Can adjust Time and Waveform size by ZOOM function simult

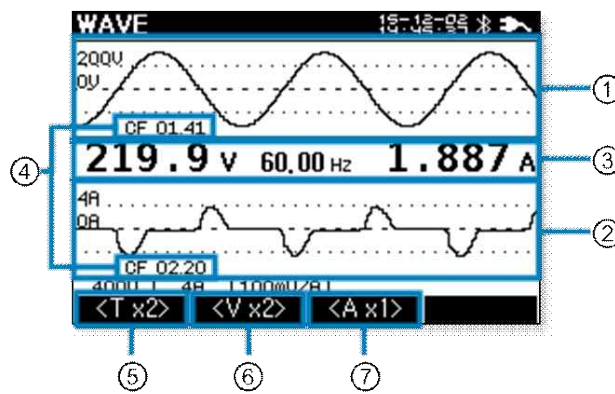


Fig.7 Waveform display

No	Function	Description									
①	Voltage waveform	Voltage waveform Waveform updates every 200ms. Size of Division display on Left side									
②	Ampere (current) waveform	Ampere (Current) waveform Waveform updates every 200ms. Size of Division display on Left side									
③	True RMS Voltage	True RMS of Voltage/Ampere. O.L.' display when out of measurement range Frequency of Voltage display at Central '—' display when out of measurement range									
④	Power Factor	Power Factor of Voltage / Ampere. Value Maximum divided by RMS									
⑤	F1 Time Axe increase / decrease	Change Waveform Time ratio. <table><tr><td>x1</td><td colspan="2">96ms, 4 cycle (50/60Hz)</td></tr><tr><td>x2</td><td colspan="2">48ms, 2 cycle (fundamental)</td></tr><tr><td>x3</td><td colspan="2">24ms, 1 cycle</td></tr></table>	x1	96ms, 4 cycle (50/60Hz)		x2	48ms, 2 cycle (fundamental)		x3	24ms, 1 cycle	
x1	96ms, 4 cycle (50/60Hz)										
x2	48ms, 2 cycle (fundamental)										
x3	24ms, 1 cycle										
⑥	F2 Voltage waveform increase / decrease	Change size of Y- Axle of Voltage Waveform <table><tr><td>x1</td><td>show whole Range</td><td>ex) AC 4V=>± 8V</td></tr><tr><td>x2</td><td>x 2 times increase</td><td>ex) AC 4V=>± 4V</td></tr><tr><td>x3</td><td>x 4 times increase</td><td>ex) AC 4V=>± 2V</td></tr></table>	x1	show whole Range	ex) AC 4V=>± 8V	x2	x 2 times increase	ex) AC 4V=>± 4V	x3	x 4 times increase	ex) AC 4V=>± 2V
x1	show whole Range	ex) AC 4V=>± 8V									
x2	x 2 times increase	ex) AC 4V=>± 4V									
x3	x 4 times increase	ex) AC 4V=>± 2V									
⑦	F3 Ampere waveform Increase / decrease	Change size of Y- Axle of Amper (Current) waveform can select x1, x2, x4									

5.5. Power

Press  key to enter POWER mode.

Power Mode display Active Power, Reactive Power, Apparent Power and Crest Factor.

5.5.1. Power measurement

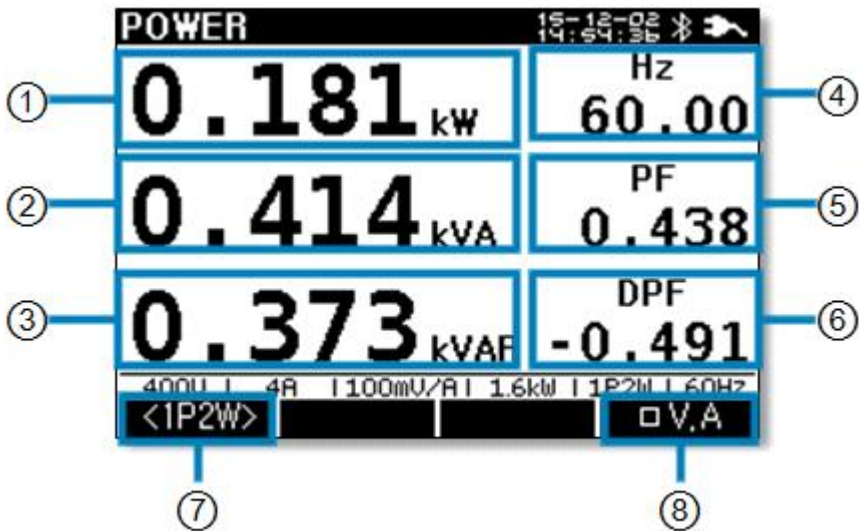


Fig. 8 Single Phase Power measurement

No	Function	Description
①	Active Power	Active Power
②	Reactive Power	Reactive Power
③	Reactive Power	Reactive Power
④	Voltage Frequency	Voltage Frequency When can not measure, display '—'
⑤	Power factor	Power Factor
⑥	DPF	Displacement Power Factor
⑦	 Single Phase/ Three Phase measurement	select 1P2W
⑧	 V, A	Display voltage and current instead of Reactive power, apparent power

5.5.2. Balanced Three phase Power measurement

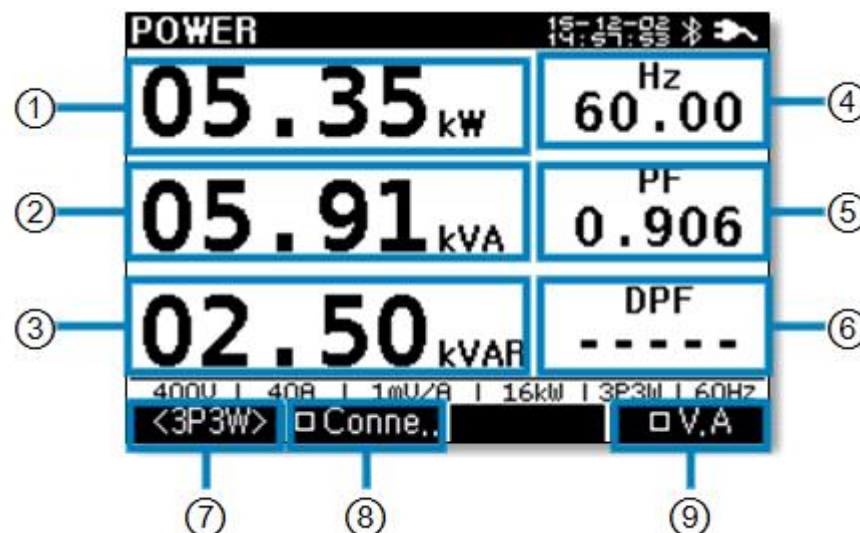


Fig. 9 Balanced Three Phase Power measurement

No	Function	Description
①	Active Power	Active Power
②	Apparent Power	Apparent Power
③	Reactive Power	Reactive Power
④	Voltage Frequency	Voltage Frequency When can not measure, display '—'
⑤	Power Factor	Power Factor
⑥	DPF	Displacement Power Factor
⑦	F1 Single Phase/Balanced Three Phase	select 3P3W.
⑧	F2 Connecting explanation	If activated, display "Wiring Connection method" when measuring Balanced Three Phase
⑨	F4 V, A	Display voltage and current instead of Reactive power, apparent power

※ Power Range is automatically adjusted according to Voltage range and Ampere range.

5.5.3. 3-phase power sequential measurement

3-phase power sequential measurement function measures the total power of 3 phases by measuring in the order specified by one device.

Due to the time difference in measurement of each phase, the power and load should be stable.

■ 3P3W sequential measurement

3P3W sequential measurement function measures 3P3W (RST) with 2 power meter method.

Performing measurements in sequence on the screen, automatically calculates and displays the total power and current unbalance rates.

[측정 방법]

- ① Press the POWER key and press F1 to select 3P3W sequential measurement.
- ② The cursor is positioned on U12 / I1 and updated with the current measured value.
- ③ Connect red on R (1), black on S (2), clamp on R (1) and press F4 'Next' when measured value is stable.

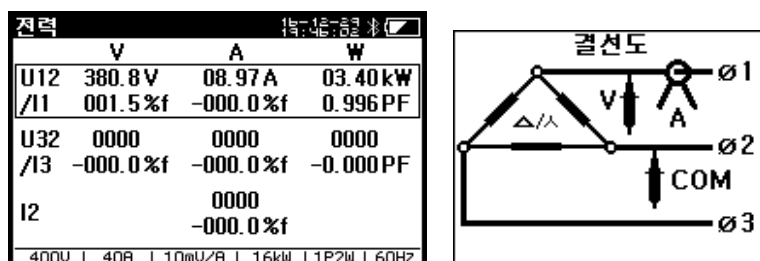


Fig. 10 3P3W measurement 1

- ④ The cursor is positioned on U32 / I3 and updated with the current measurement value.
- ⑤ Connect red on T (3), black on S (2), clamp on T (3) and press F4 'Next' when the measured value is stable.

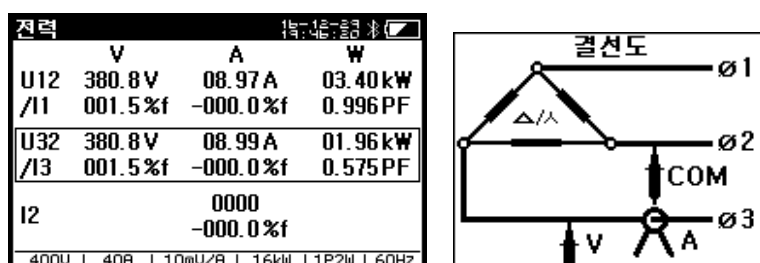


Fig. 11 3P3W measurement 2

- ⑥ The cursor is positioned on I2 and updated with the current measurement value.
- ⑦ Connect the clamp on S (2) to measure the current unbalance rate and press F4 'Next' when the measured value is stable.

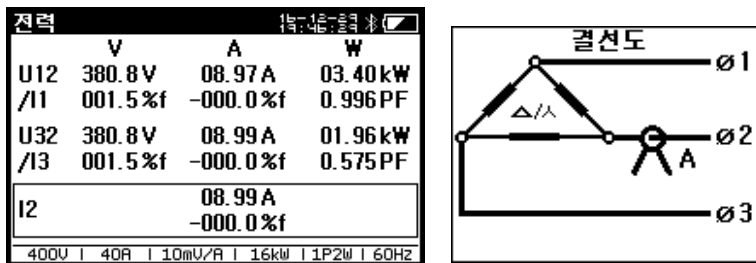


Fig. 12 3P3W measurement 3

- ⑧ F4 Press 'Result' to display the active power, apparent power, power factor and current unbalance ratio

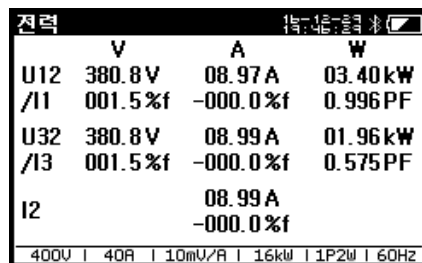


Fig. 13 3P3W measurement 4

Measured line to line voltage, current value and THD are displayed.

Line to line voltage	Ampere	-
-	Ampere THD	-

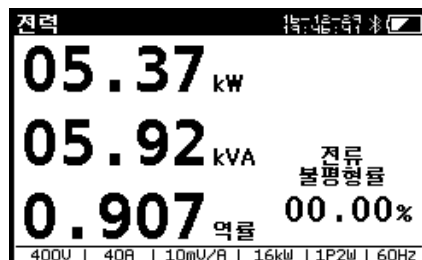


Fig. 14 3P3W measurement 5

Active power, apparent power, and power factor unbalance rate are displayed.

Note, the voltage and THD of each phase can not be measured in 3P3W sequential measurement.

■ 3P4W sequential measurement

3P4W Sequential measurement function measures 3P4W (RSTN).

Use one TEKON550 to measure three times in sequence.

Displays voltage, current, THD, power of each phase and total power, power factor, voltage unbalance ratio, and current unbalance ratio

[How to measure]

- ① Press the POWER key and press F1 to select 3P4W sequential measurement.
- ② The cursor is positioned on U1N / I1 and the current measured value is updated.
- ③ Connect red on R (1), N on black, clamp on R (1), and press F4 'Next' when measured value is stable.

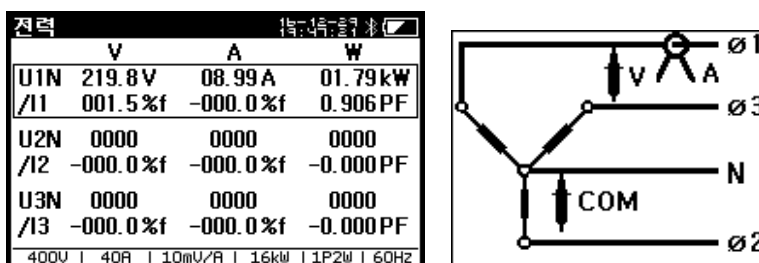


Fig. 15 3P4W measurement 1

- ④ The cursor is positioned on U2N / I2 and updated with the current measured value.
- ⑤ Connect red on S (2), black on N phase, clamp on S (2) and press F4 'Next' when measured value is stable.

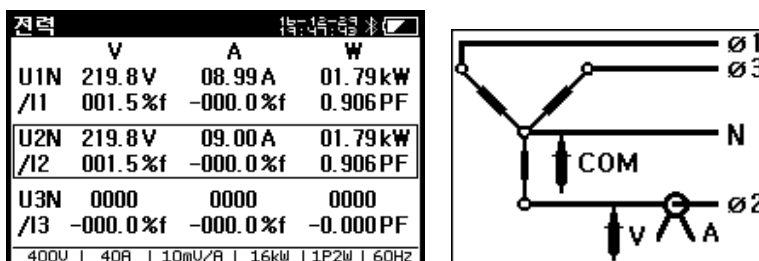


Fig. 16 3P4W measurement 2

- ⑥ The cursor is positioned on U3N / I3 and updated with the current measured value.
- ⑦ Connect red on T (3), N on black, clamp on T (3) and press F4 'Next' when measured value is stable.

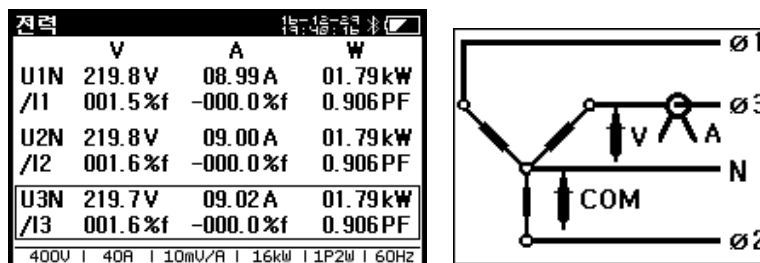
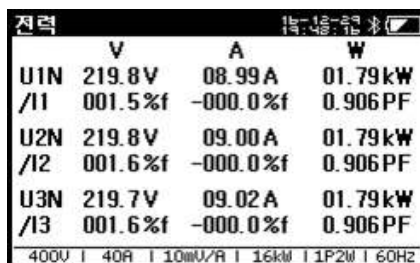


Fig. 17 3P4W measurement 3

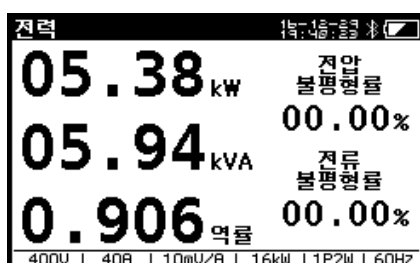
- ⑧ F4 Press 'Result' to display active power, apparent power, power factor, voltage unbalance and current unbalance



Voltage, voltage THD, current, current THD, Power, and power factor of Each phase

Voltage	Current	Power
V THD	A THD	PF

Fig. 18 3P4W measurement 4



Active Power, Apparent Power, Power Factor Voltage Unbalance and Current Unbalance

Fig. 19 3P4W measurement 5

5.6. Energy

Press  key to enter Energy mode

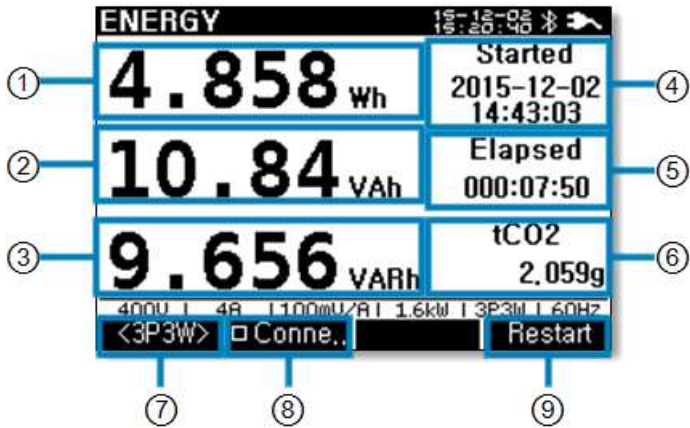


Fig. 20 Energy

No	Function	Description
①	Active Energy	Active Energy
②	Apparent Energy	Apparent Energy
③	Reactive Energy	Reactive Energy
④	Measurement Start Time	measurement start time
⑤	Elapsed Time	Time from the measurement start
⑥	CO2 generation amount	Energy displayed converted from of CO2 generation amount
⑦	 Single/ three phase measurement	select 1P2W/3P3W
⑧	 Wiring Information	When Balanced Three phase power measurement, Wiring information is displayed.
⑨	 Restart of Measurement	Initialize present Energy measurement and start measurement

5.6.1. Start Energy measurement and Finish

When Analyzer Power is ON, start Energy measurement automatically.
User may initialize by pressing F1 key and restart the measurement.

5.7. Harmonics

Press  key to enter HARMONICS mode

Waveform can be combined with Sinewave in different frequency.

Harmonics is periodic distortion phenomenon of Voltage, Ampere (Current) or Power sign wave.

Harmonics often occurs from Non-Linear Loading at Computer, TV, Speed Controlled Motor Drive and DC Power Supply. Harmonics can cause overheat of Transformer, Conductor and Motor

The Analyzer can measure up to max 50th, DC component, THD and K-factor

☐ Reference

HARMONICS

Harmonic number (th) indicates Harmonics Frequency. 1st Harmonic is Fundamental Wave Frequency (60 or 50 Hz), 2nd Harmonics is 2 x times of 1st Harmonic (120 or 100Hz)

The Order of Harmonics can be Positive (+), Negative (-) or 0

Number	1	2	3	4	5	6	...
Frequency	50Hz	100Hz	150Hz	200Hz	250Hz	300Hz	...
	60Hz	120Hz	180Hz	240Hz	300Hz	360Hz	...
Order	+	-	0	+	-	0	...

THD

Current Distortion can occur at Non -Linear Load System like as DC power supply. When THD level of Voltage exceeds 5%, it expects Problem Occurrence

K-factor

It indicates Ampere (Current) amount of Harmonics. It help to select Transformer. When change Transformer, consider K-factor as well as KVA, select Transformer which can deal big Non-linear load with high harmonic level

5.7.1. Graph display

Harmonics Graph displays measured Fundamental RMS or Total RMS of each Harmonics from total signal. Reading value calculates percentage of Fundamental Waveform or percentage of related.

Harmonics (RMS) and result displays in Graph and Text.

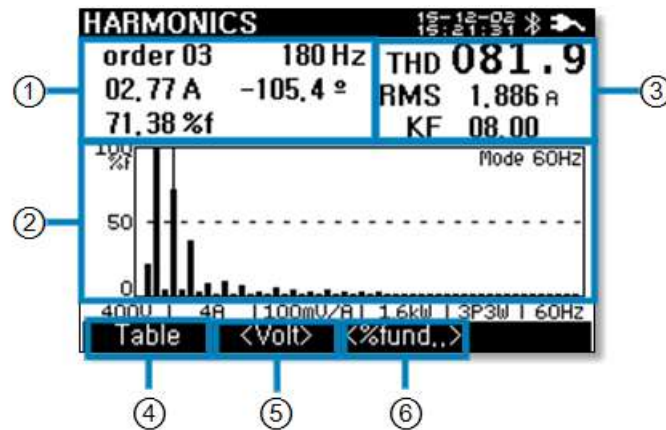


Fig. 21 Harmonics Graph display

No	Function	Description
①	Cursor order number information	Harmonic order number information. • Order Number • Harmonics Frequency • Harmonics Voltage / Ampere / Power level • Harmonics Phase • Fundamental or Percentage with RMS (select by F3 button)
②	Bar-Graph	Size of Harmonics displayed upto 50 th Can select size of Y axis with Fundamental waveform or RMS (select by F3 button)
③	THD information	Voltage/Ampere/Power THD (Total Harmonics Distortion) and RMS. K-factor (display when select Ampere)
④		change to Table mode.
⑤	Voltage/ Ampere/ Power	select Voltage / Ampere / Power.
⑥	%f / %r	Graph and Order number information base selected by size of fundamental wave or RMS.
⑦	Cursor	Change Order number by pressing Left/Right key

5.7.2. Table display

Table display value of respective Harmonics factor. Can see Multiple Order value at one time

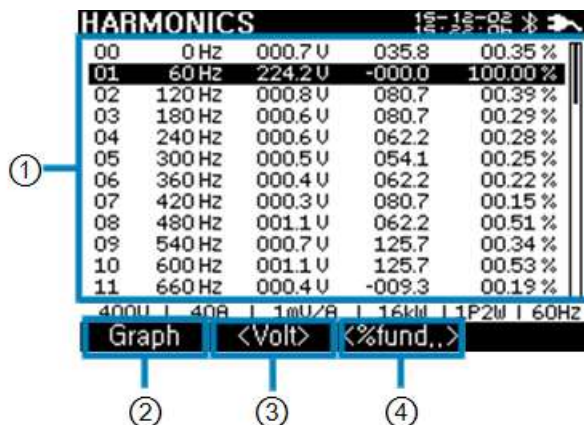


Fig. 22 Harmonic Table Display

No	Function	Description
①	Harmonics Information	Information about Harmonic Order. Order Number goes from top to down • Order number • Harmonics Frequency • Harmonics Voltage / Ampere / Power level • Harmonics Phase • % versus Fundamental Wave or RMS (select by F3 key)
②	 Cursor move menu	Change to Graph mode.
③	 Voltage/Ampere /Power	Select Voltage / Ampere / Power
④	 %f / %r	Graph and Order information selected size of fundamental wave or RMS.
⑤	 Fundamental Frequency	Fundamental Frequency select by 50Hz/60Hz/Auto
⑥	 Cursor Move	Press Up/Down key to move Cursor. Change Order number. Use Scrolling as needed.

5.8. Record

Present displaying information can be recorded. recall to/from Analyzer. And can be sent to PC. Can record max 20 Snapshot.

5.8.1. Recording

While the displaying, press  key to enter following Menu



Fig. 23 Record Menu

No	Function	Description
①	 Record Address	select record address [1~20] to record / recall
②	 Recording	Record at the selected address [1~20]
③	 Recall	Recall the Recorded Address
④	 Back	Back to previous menu

To record present display, select the Record Address with up/down  key and press  [Save] to record.

5.8.2. Recalling of Recorded Data

Select Record Address with  Up/Down key, press  key to display the Recoded Display and Menu changes as below.



Fig. 24 After Recall Menu

No	Function	Description
①	 Back	Return Back to Record Menu

5.9. Inrush

Press  key.

Inrush mode records the Changes of a Half-period RMS of Inrush Current.

Inrush Currents, once occurrence according to User definition, start recording automatically. Based on Event occurrence time, record -0.5 sec ~ 29.5 second
Manual Stop is available as needed.

After Recording is finished, RMS change of Ampere (Current) is displayed in Graph.
User can zoom in/zoom out or can check data of the desired point by moving the Cursor.

Inrush recording is available 1 only and previous record is deleted when new recording starts.

Following Information is available

- Detect time of Inrush Current
- Max Current(Ampere)
- RMS Change Graph – A Half Period (Cycle) of Current (Ampere) for 30 second
- Time of Cursor point
- Max/Min Current (Ampere) of Cursor Point

☐ Calculation Method of Inrush Current detect

Half-period (cycle) RMS calculates individually at a half-period(cycle) of Current Channel. Recoding starts when A half -period (cycle) value becomes bigger than User defined value.

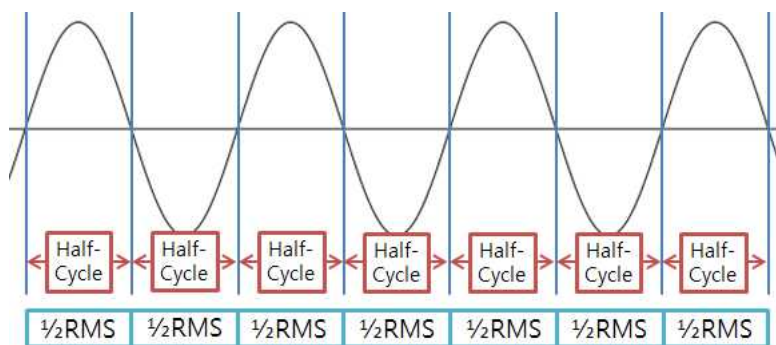


Fig.25 Calculation of Inrush Current Detect

5.9.1. Inrush Current Recording

Press  key to start Inrush Current recording or recall the recorded data as below



Fig.26 Inrush Initial Screen

No	Function	Description
①	User defined Value	Base Value when detect Inrush Current. Detect when a Half-Period RMS becomes bigger than the value
②	Current Wave Graph	Current Wave Graph displays while waiting Occurrence of Inrush Current or recording. When Recoding or Recall is finished, RMS changes for a half-period starts to display
③	 Recall	Recall the Recorded Data in Analyzer
④	 User defined Value input	Press  keys to set up User defined base value
⑤	 Start	Start Recording of Inrush Current Press 'Start' to enter the Detection waiting mode, recording starts once Occurrence. When finish Recording, Half-period RMS record is displayed. Inrush recording is available 1 only and previous record is deleted when new recording starts.

Procedure

- ① Press  key to enter INRUSH display.
- ② Press  key to set User defined value. Recoding starts when A half -period (cycle) value becomes bigger than User defined value.
- ③ If press  [Start], OVERWRITE warning message is displayed. If press  [Yes, Analyzer change to WAITING mode and waiting occurrence of Inrush Current while monitoring a Half period RMS.

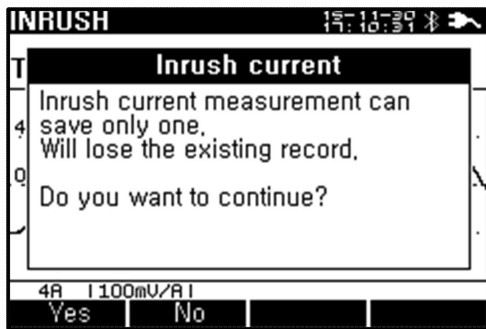


Fig. 27 Inrush Current Overwrite confirmation

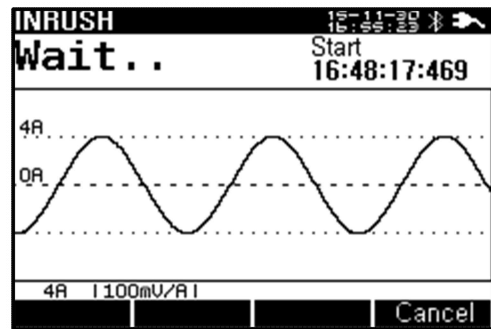


Fig. 28 Inrush Current, WAIT display

- ④ While Waiting, If press  'Cancel', Recoding is cancelled Previous Inrush Current Record may be kept.
- ⑤ When A half -period (cycle) RMS becomes higher than User defined value. Based on Event occurrence time, record -0.5 sec ~ 29.5 second

Inrush Current recording is available 1 only and previous record is deleted when new recording starts.

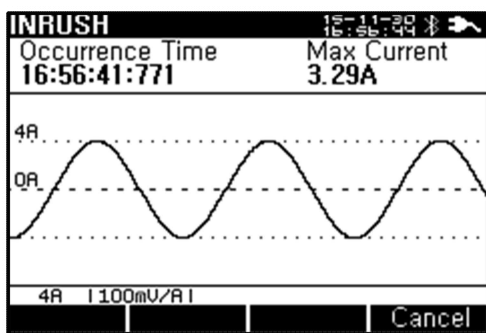


Fig. 29 Inrush Current Recording display

- ⑥ If Recording is finished, recorded data is recalled automatically and displayed in Graph

5.9.2. Recall of Inrush Current

After press **INRUSH** key, press **F1** [Recall...] to recall the recorded data.

When measuring new Inrush Current, after Recording m Recorded Data is recalled automatically.

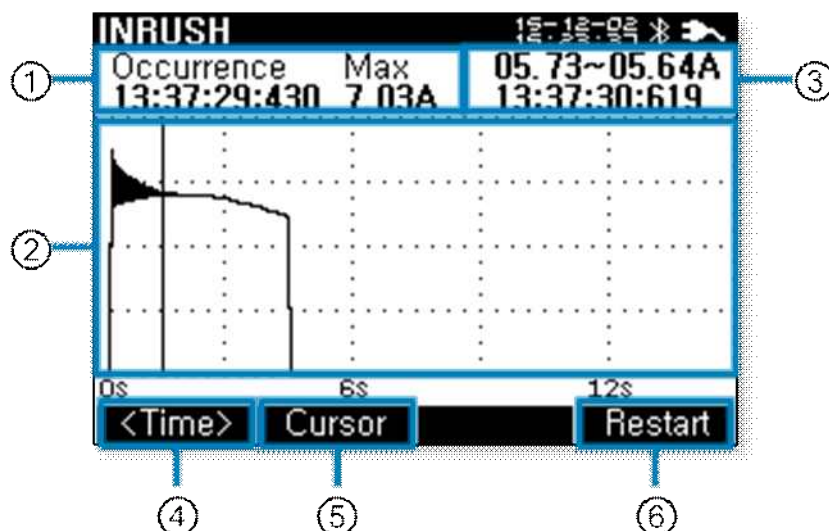


Fig. 30 Inrush Current Recall display

No	Function	Description
①	Measurement Information	Inrush Current Occurrence Time Maximum Current (A)
②	Graph	Inrush Current Recording in Graph. Zoom In/Out by Up, Down key Cursor move with Left, Right key
③	Cursor Information	display Time, min/max Current value of Cursor point.
④	 Zoom In /Out	Zoom Time Amps <Amps> Press F1 key to select Time axis, Ampere axis Press Up/Down key for Zoom In/Out of selected axis.
⑤	 Cursor Move	Cursor move by pressing Left/Right key.
⑥	 Restart	After delete previous Inrush Current Record, start New measurement

5.10. Trend

5.10.1. Summary

Trend function records various measurements and shows the changes by recording time. Can review the recalled data closely by using Zoom and Cursor.

In case of Voltage, detect and record Voltage Down (Dip), Voltage Up (Swell), Momentary blackout (Interrupt) and can check record of half-period RMS and Waveform of event occurrence time.

Total Sample number is 2400 and interval length between sample and sample is automatically adjusted according to recording length

Record Length	~40 min	~80min	~6hr 40min	~20 hr	~40 hr	~200 hr	~25 days	~50 days	~100 days
Interval Length	1sec	2sec	10sec	30sec	60sec	5min	15min	30min	60min

For example, if one hour recording, recorded as 2 seconds interval, one day recording, interval length is 30 seconds.

And each interval sample record following measurements

- Voltage RMS (10 period / 12 period) Maximum, Average, Minimum (RMS)
- Voltage Half Period RMS Max, Min (Dip/Swell)
- Ampere RMS (10 period / 12 period) Max, Ave, Min (RMS)
- Ampere Half-Period RMS Max, Min (Dip/Swell)
- Voltage Frequency
- Active Power
- Apparent Power
- Reactive Power
- Power(Crest) Factor
- THD
- DPF

5.10.2. RMS and Dip/Swell Recording

RMS record RMS value measured every 200ms(10/12 periods) during Interval length.

Using measured RMS per 200ms (10/12 periods) during Interval, Can calculate and record Max. Min, Average RMS during the designated Interval Length

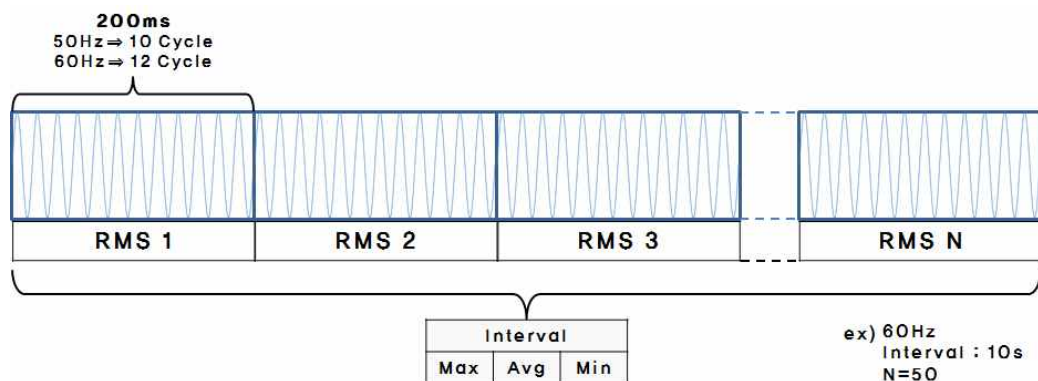


Fig. 31 RMS record

Half-period RMS Voltage can be calculated by A half-Period Wave

For example, if measure 200ms (12 period) at 60Hz, 24 x half-period of RMS value can be calculated.

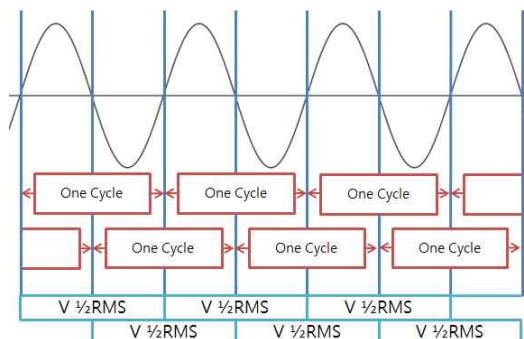


Fig. 32 Voltage Half Period RMS Calculation

Dip/Swell records Half period RMS Max.Min during Total Interval length.

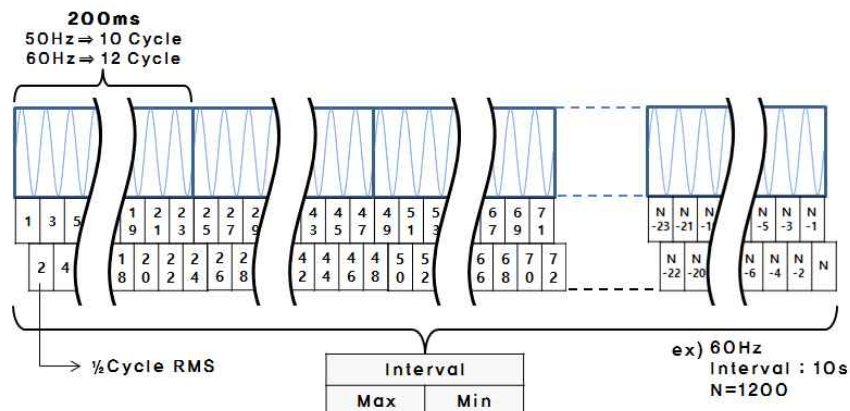


Fig. 33 Dip/Swell record

5.10.3. Event

■ Swell(Voltage Up)

- Detect by Halp Period RMS
- Can set up Base voltage with percentage of Nominal voltage
- Selectable range : 100%~150%, base value : 110%
- Event occurrence if voltage is over set up Base Voltage
- Event stop when Set up standard voltage is below - Hysteresis(2%)
- Top High measurement during Event is recorded.

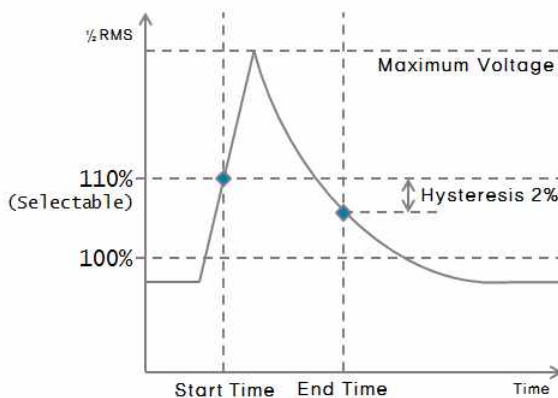


Fig. 34 Swell Event

■ Dip(Voltage Down)

- Detect by Halp Period RMS
- Can set up Base voltage with percentage of Nominal voltage
- Selectable range : 100%~150%, base value : 90%
- Event occurrence if voltage is below Set up Base Voltage
- Event stop when Set up standard voltage is Over + Hysteresis(2%)
- Lowest Measurement during Event is recorded.

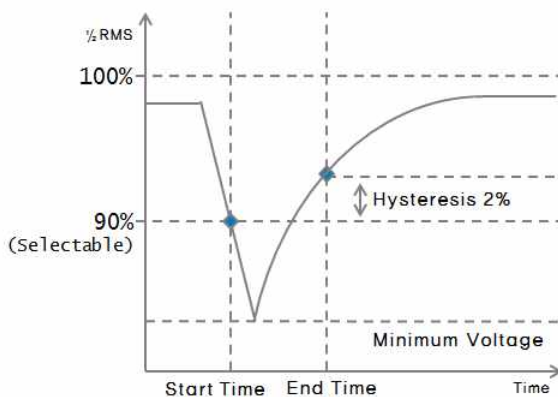


Fig. 35 Dip Event

■ Interrupt

- Detect by Halp Period RMS
- Can set up Base voltage with percentage of Nominal voltage
- Selectable range : 0%~100%, base value : 10%
- Event occurrence if voltage is below Set up Base Voltage
- Event stop when Set up standard voltage is Over + Hysteresis(2%)
- Lowest Measurement during Event is recorded.

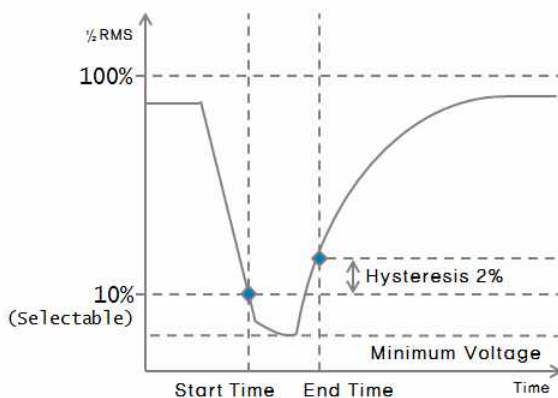


Fig.36 Interrupt

■ Event Recording

Even Occurrence can record following

- Event Type (Dip, Swell, Interrupt)
- Event Start/End
- Event Length (When End)
- Occurrence Time
- Voltage from Start to End : Halp-Period RMS Max (Voltage Up) or Min (Voltage Down, Interrupt)
- RMS record, Waveform record or not

Can save Event max 1000 per 1 recording.

■ Halp-Period RMS record

Based on the Event Occurrence time from -0.5s to +2.5s, record Half-period RMS.

Can recall Data and can analyze precisely with ZOOM, Cursor.

Can record max 20 per 1 recording.

■ Waveform Recording

Based on the Event Occurrence time from -25ms to +175ms, Voltage Waveform is recorded. Can record max 50 per 1 recording

※ RMS record.

Next event waveform can be recorded only after previous Event recording is completed. If next Event occurs within a short interval, the next event may not be recorded.

5.10.4. Trend Recording

Press  Key to enter the following display.

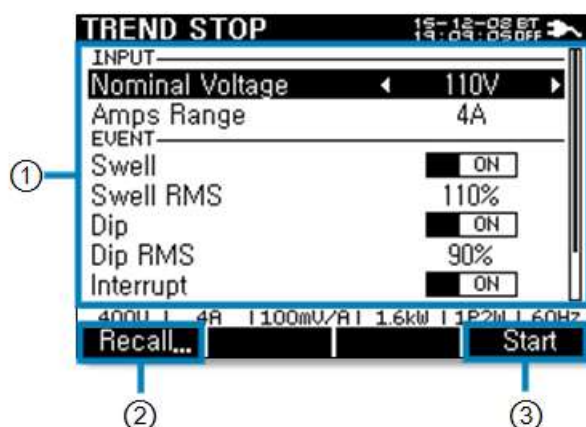


Fig.37 Trend Initial Display

No	Function	Description
①	Trend Record Set Up	Select Input Voltage Record and Even Record or Not. Select with  and  key
②	 Recall	Recall the Trend Record saved in Analyzer.
③	 Recording Start	After Set Up, Record Start

■ Record Set Up item

Item	Description
Nominal Voltage	Select to measure [100V, 101V, 110V, 120V, 127V, 200V, 202V, 208V, 220V, 230V, 240V, 277V, 347V, 380V, 400V, 415V, 480V, 600V]
Amps Range	Select Ampere to measure
Swell	Detect Voltage Up event and select whether record or not
Swell RMS	Swell event occurrence base Range : 100%~150%, Base 110%
Dip	Select whether record SWELL or not
Dip RMS	Dip event occurrence base Range : 0%~100%, base 90%
Interrupt	Select whether detect and record "Interrupt" or not
Interrupt RMS	Interrupt event occurrence base Range : 0%~100%, Base 10%

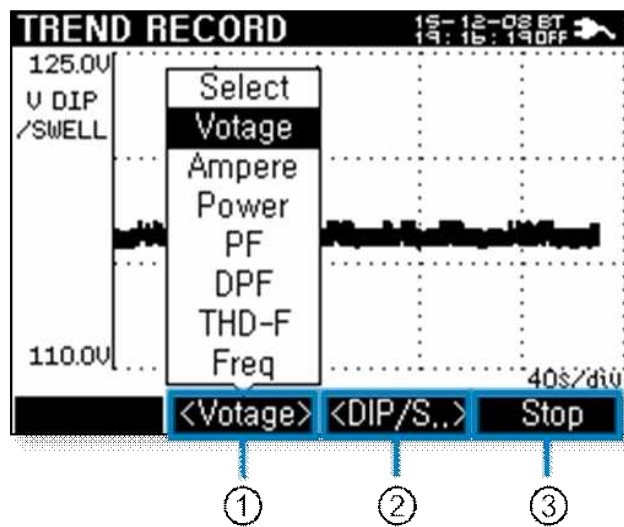


Fig.38 Trend recording

No	Function	Description
①	F2 measurement value select	select measurement value displayed in Graph apply when new Graphing start after change.
②	F2 Additional Selection of Measurements	When Voltage or Ampere in ①, can select RMS and Dip/Swell Graph
③	F4 Stop	Stop Recording

If starts Recording, Graph displayed at Real Time. While Recording, Auto Power Off function is not activated and Keys except Soft Key are not activated.

5.10.5. Recall of Trend Record



Fig. 39 Recall of Trend Record

No	Function	Description
①	Trend Record item 	Trend Record item : /log/Date/Hour/log_ Interval Length [Sec].log
②	 Delete	Delete the Record of Cursor point. Press to Confirm message and delete if press “ Yes ”
③	 Recall	Recall the Record where Cursor points

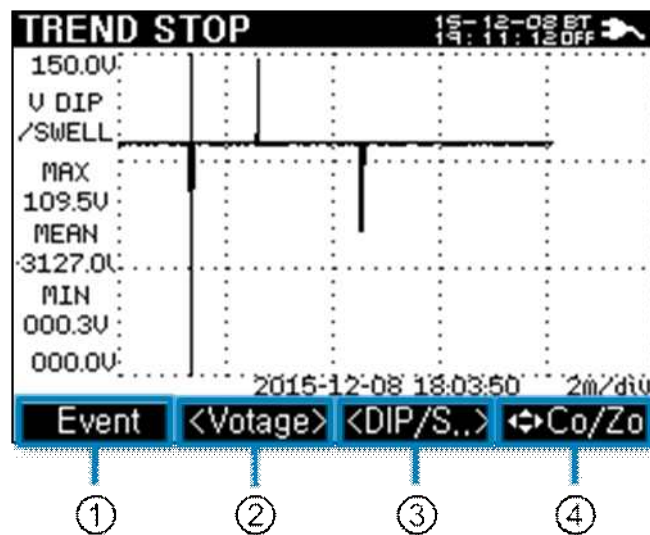


Fig. 40 Trend Graph

No	Function	Description
①	Event	Change to Event item list
②	F2 Measurement Selection	Select Measurement displayed in Graph.
③	F2 Select Additional Measurement	If select Voltage or Amps at ①, can select additionally : RMS, Dip/Swell Graph
④	F4 Cursor Increase /Decrease	Increase / Decrease Time -Axis Y-Axis scale adjusted automatically according to Data. Move cursor with Left/Right key. If Cursor moves, Cursor position at Left of Graph, Max. Min. Ave value is displayed.

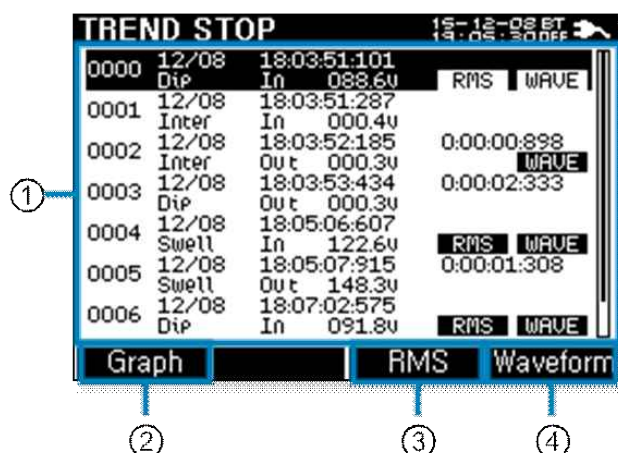


Fig 41. Trend Event item list

No	Function	Description											
①	Event Item 	Event Occurrence Item List. Displayed as below list											
		<table><tr><td rowspan="2">No</td><td colspan="3">Occurrence Time</td><td colspan="2">Length ('Out' only)</td></tr><tr><td>Type</td><td>In/Out</td><td>Value</td><td>RMS Record</td><td>Waveform Record</td></tr></table>	No	Occurrence Time			Length ('Out' only)		Type	In/Out	Value	RMS Record	Waveform Record
		No		Occurrence Time			Length ('Out' only)						
Type	In/Out		Value	RMS Record	Waveform Record								
②	 Graph mode	Change to Graph display											
③	 RMS	Indicate if there is RMS record of the Event which Cursor points.											
④	 Waveform	indicate if there is Waveform record of the Event which Cursor points.											

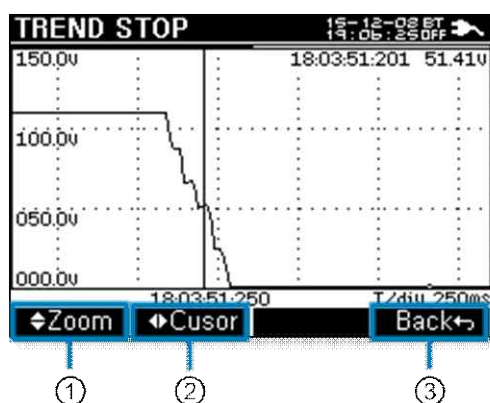


Fig. 42 Event RMS display

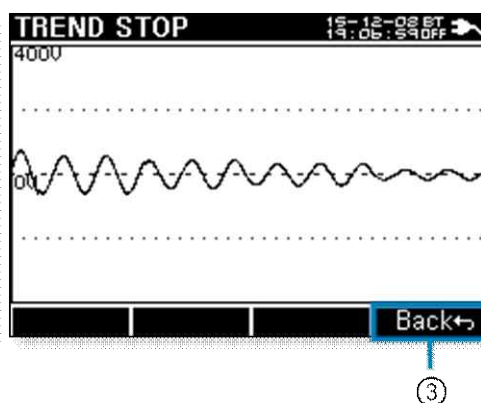


Fig. 43 Event Waveform display

No	Function	Description
①	 Increase / Decrease	Increase/ Decrease of Time-axis and Voltage-axis of Graph
②	 Cursor move	Move Cursor to identify Time and Data of the Point.
③	 Back	Return back to Event Item list display.

6. PC S/W

6.1. PC S/W Installation

6.1.1. Environment Requirements

- OS : Windows 7, 8, 8.1, 10 (x86/x64)
- 1GB RAM
- 100MB Hard disc capacity
- Bluetooth communication
(If not, can use with Bluetooth dongle)

6.1.2. Installation

- Insert Installation CD.
- When below is displayed, select 'AutoPlay'.

PC S/W



Fig. 44 AutoRun

- Select “ Install PC S/W” as on below menu



Fig. 45 Auto Install Program

- Install follow by Installation Program Guide

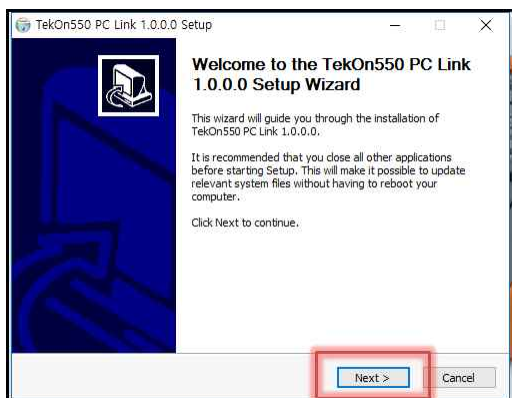


Fig. 46 Install 1

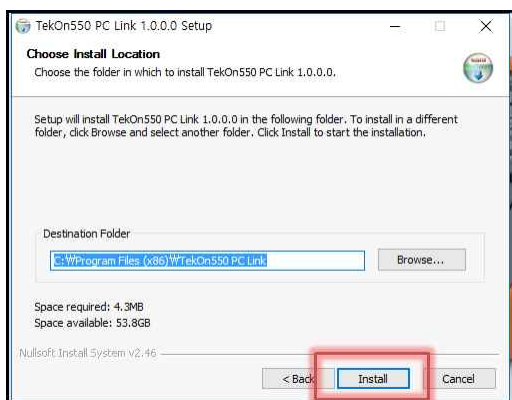


Fig. 47 Install 2

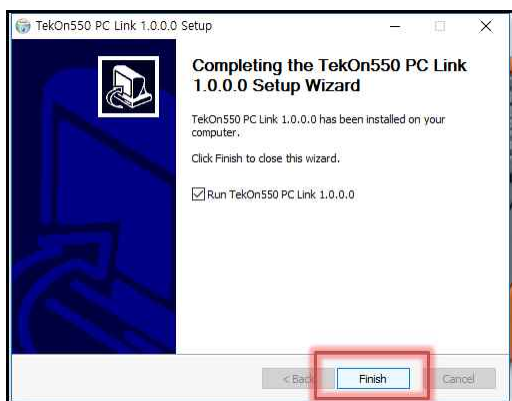


Fig. 48 Install 3

- execute with ICON on Desktop.



6.2. PC S/W use

6.2.1. Connection

- Check  bluetooth symbol is on the unit.
If the symbol is not on, press “USER” key and move to Bluetooth mode is set up it “ON”.
- Execute PC S/W and Search

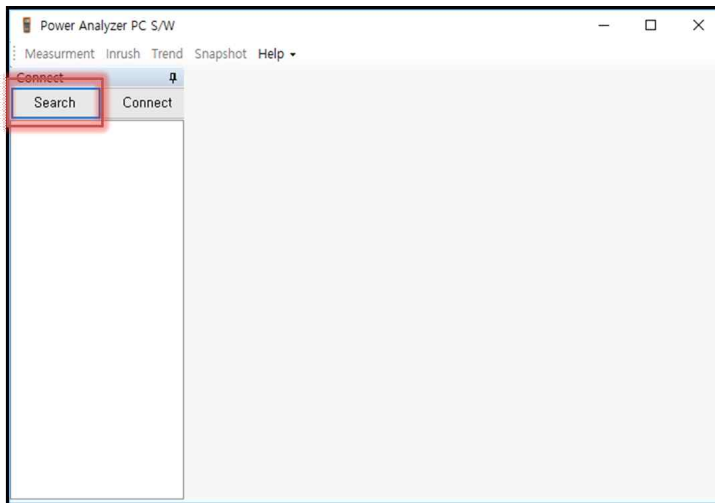


Fig. 49 Search Device

- If Unit show on the List, click to select and press “Connect”

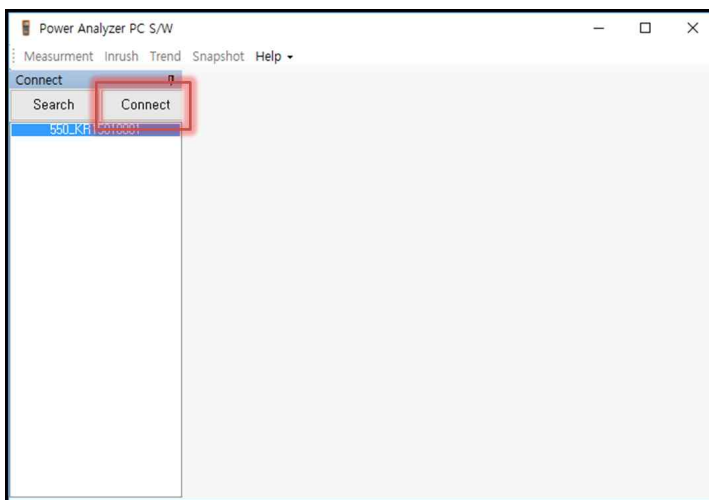


Fig. 50 Connect Device

6.2.2. Real Time Measurement Data

- Real Time measurement data can be transmit

After Unit is connected, press ‘ Measurement ‘ button to see the “Real Tme measurement Tap“.

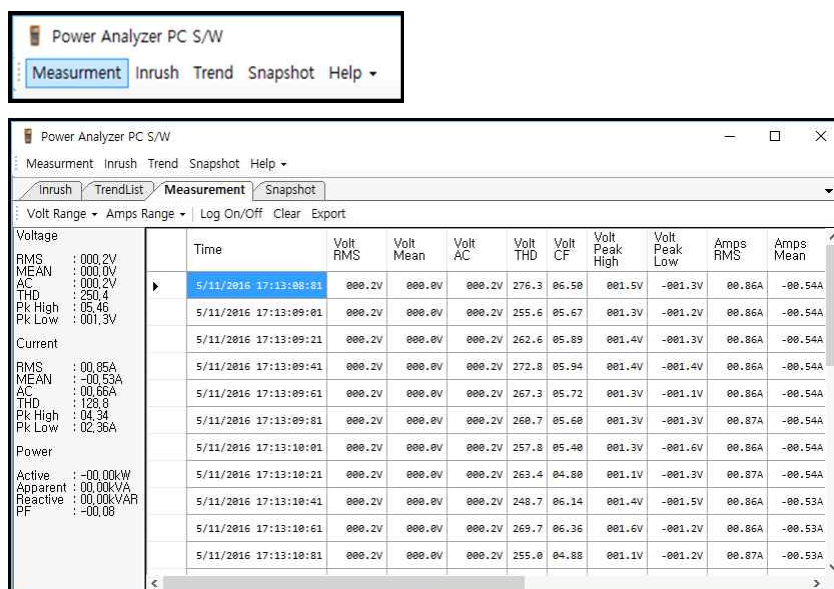
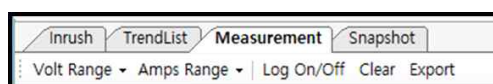


Fig. 51 Real Time Measurement display

- Menu Explanation



Function	Explanation
Voltage range	Select Voltage range
Ampere range	Select Ampere range
Measurement Data Transmit ON/OFF	Real Time measurement data transmit : Toggle (On/Off) ON : Unit' Measurement data /every 200ms transmit to PC and displayed in accumulated formula. If press one more, enter OFF mode which stop transmission
Remove Record	Remove the accumulated measurement data.
Save in File	Accumulated measurement record saved in Excel file.

6.2.3. Inrush Ampere

- Inrush Ampere Record – Transmission function

After connected with unit, press ‘ Inrush ’ button to show off “ Inrush ” tap.

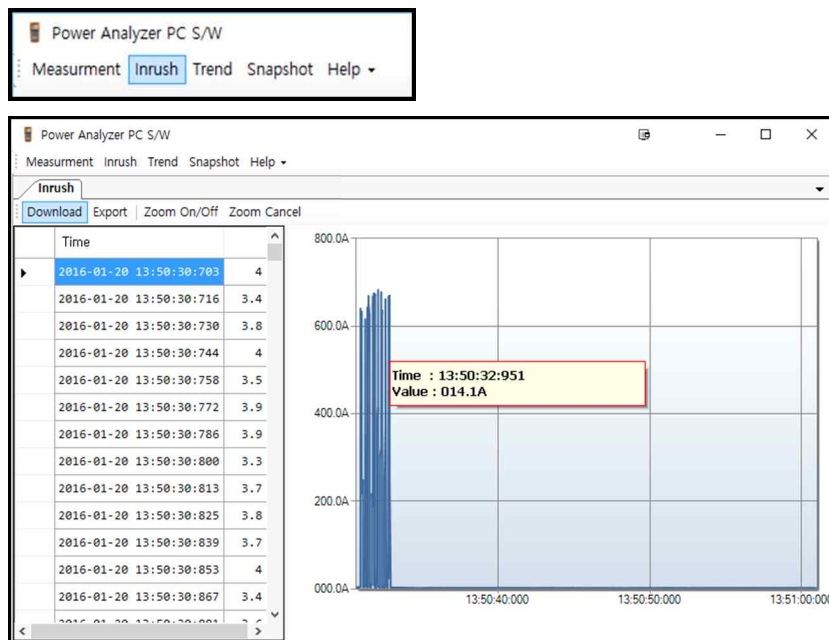


Fig. 52 Inrush display

- Menu explanation



Function	Explanation
Download	Download Inrush record saved in unit
Saved in File	Save the download data in Excel file.
ZOOM On/Off	drag the left chart in display and set the area to zoom on. ZOOM OFF does not activate.
ZOOM Cancel	Cancel the last Zoom done.

6.2.4. Trend list

- Trend List can be transmitted.
After connect with Unit, press ‘ Trend ‘ button to show Trend tap.

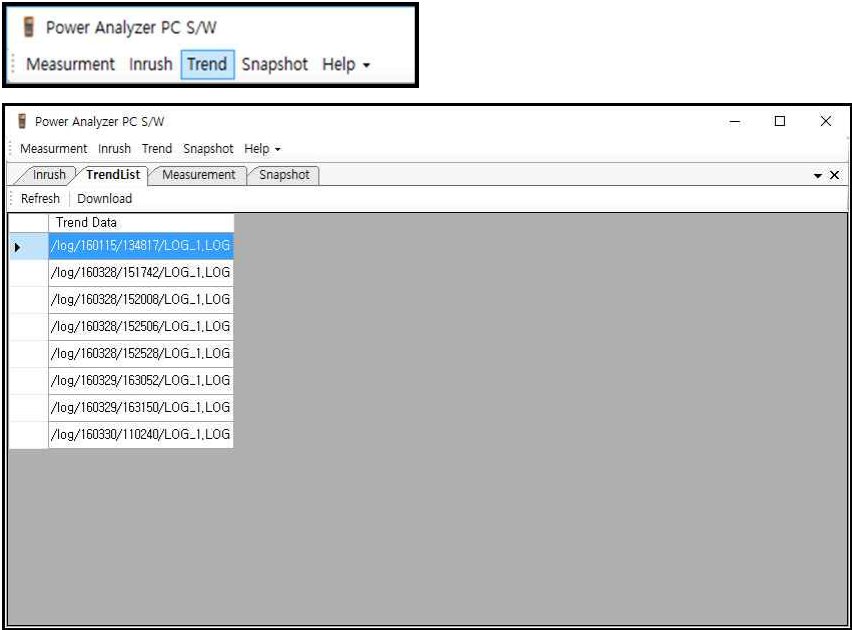
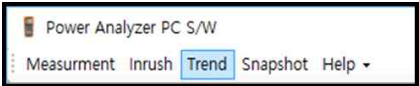


Fig. 53 Trend List

- Menu explanation



Function	Explanation
List correction	Trend List download to unit
Review	download and mark the specific data from Trend list.

6.2.5. Trend data

- Trend Data transmit

After select from Trend list, press review. Then, download the specific Trend record and new tap appears.

– ‘ Data ’ tap shows recorded data in table format.

‘ Press “save” in File. Data can be saved in Excel file

Sec	Time	Freq Meas	Freq Max	Freq Min	Volt Meas	Volt Max	Volt Min	1/2 Volt Max	1/2 Volt Min	Amps Meas	Amps Max	Amps Min	1/2 Amps Max	1/2 Amps Min	Watt Meas	Watt Max	Watt Min
0	1/15/2016 13:48:19	59.99	59.99	59.99	222.9	222.9	222.9	223.6	222.6	4.013	4.014	4.013	4.105	3.935	894	894	89
1	1/15/2016 13:48:20	59.99	60.02	59.99	222.9	222.9	222.9	223.4	222.6	4.013	4.013	4.013	4.104	3.933	894	894	89
2	1/15/2016 13:48:21	59.99	59.99	59.99	222.9	222.9	222.9	223.7	222.6	4.013	4.014	4.013	4.104	3.936	894	894	89
3	1/15/2016 13:48:22	59.99	59.99	59.99	222.9	222.9	222.9	223.6	222.6	4.013	4.014	4.013	4.105	3.935	894	894	89
4	1/15/2016 13:48:23	59.99	59.99	59.99	222.9	222.9	222.9	223.6	222.6	4.013	4.014	4.013	4.106	3.936	894	894	89
5	1/15/2016 13:48:24	59.99	60.02	59.99	222.9	222.9	222.9	223.4	222.6	4.013	4.014	4.013	4.085	3.935	894	894	89
6	1/15/2016 13:48:25	59.99	60.02	59.97	222.9	222.9	222.9	223.4	222.6	4.013	4.014	4.013	4.108	3.931	894	894	89
7	1/15/2016 13:48:26	59.99	59.99	59.99	222.9	222.9	222.9	223.6	222.6	4.014	4.014	4.014	4.103	3.933	894	894	89
8	1/15/2016 13:48:27	59.99	59.99	59.99	222.9	222.9	222.9	223.7	222.6	4.013	4.014	4.013	4.105	3.936	894	894	89
9	1/15/2016 13:48:28	59.99	59.99	59.99	222.9	222.9	222.9	223.6	222.6	4.014	4.014	4.014	4.104	3.937	894	894	89
10	1/15/2016 13:48:29	59.99	60.02	59.97	222.9	222.9	222.9	223.4	222.6	4.014	4.014	4.014	4.111	3.935	894	895	89
11	1/15/2016 13:48:30	59.99	60.02	59.99	222.9	222.9	222.9	223.4	222.6	4.014	4.014	4.014	4.109	3.934	894	894	89
12	1/15/2016 13:48:31	59.99	59.99	59.99	222.9	222.9	222.9	223.7	222.6	4.014	4.015	4.014	4.106	3.936	894	895	89
13	1/15/2016 13:48:32	59.99	59.99	59.99	222.9	222.9	222.9	223.7	222.6	4.014	4.014	4.014	4.108	3.933	894	895	89

Fig. 54 Trend sample data

– Voltage, Ampere RMS, Dip/Swell, Frequency, Power Tab shows in Chart.

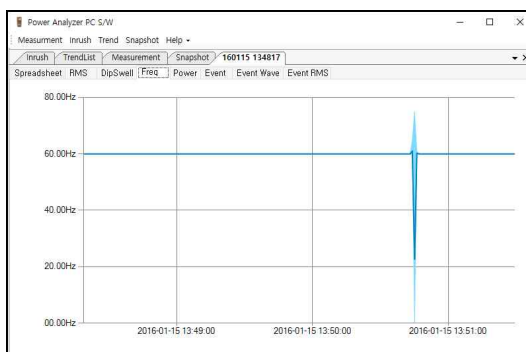


Fig. 55 Volt, Amps RMS chart

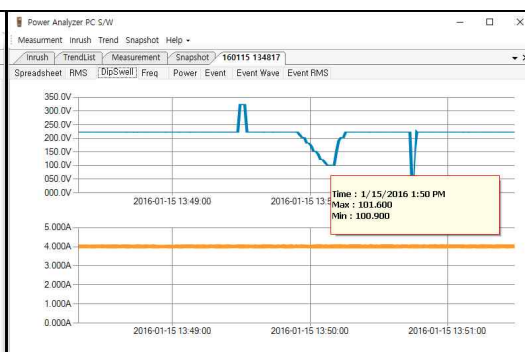


Fig. 56 Volt Dip/Swell chart

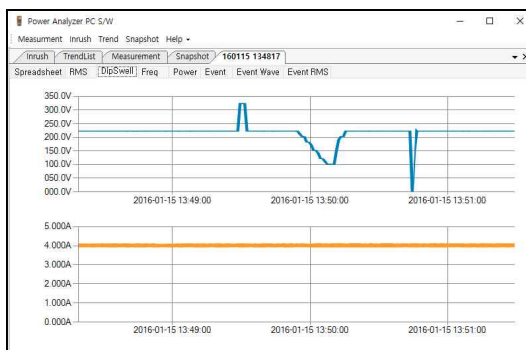


Fig. 57 Frequency chart

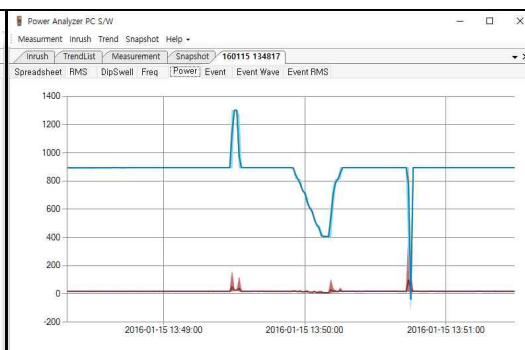
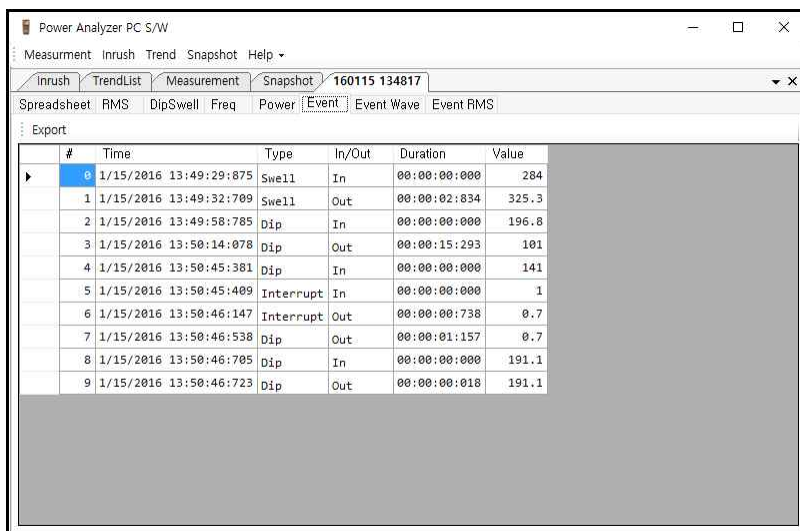


Fig. 58 Power chart

6.2.6. Trend Event

- Event
 - Event Tab shows Voltage Increase/ Drop, momentary blackout event in Table.
 - Press ‘ Save in File “ to save the Data in Excel file.



#	Time	Type	In/Out	Duration	Value
0	1/15/2016 13:49:29:875	Swell	In	00:00:00:000	284
1	1/15/2016 13:49:32:709	Swell	Out	00:00:02:834	325.3
2	1/15/2016 13:49:58:785	Dip	In	00:00:00:000	196.8
3	1/15/2016 13:50:14:078	Dip	Out	00:00:15:293	101
4	1/15/2016 13:50:45:381	Dip	In	00:00:00:000	141
5	1/15/2016 13:50:45:409	Interrupt	In	00:00:00:000	1
6	1/15/2016 13:50:46:147	Interrupt	Out	00:00:00:738	0.7
7	1/15/2016 13:50:46:538	Dip	Out	00:00:01:157	0.7
8	1/15/2016 13:50:46:705	Dip	In	00:00:00:000	191.1
9	1/15/2016 13:50:46:723	Dip	Out	00:00:00:018	191.1

Fig. 59 Trend Event

- ‘Event Waveform“, ‘ Event RMS’ tab can download recorded Waveform at Event occurrence and half-cycle RMS change records and check them in chart.
- Press ‘Save to File“ button to save the Downloaded data in Excel file.

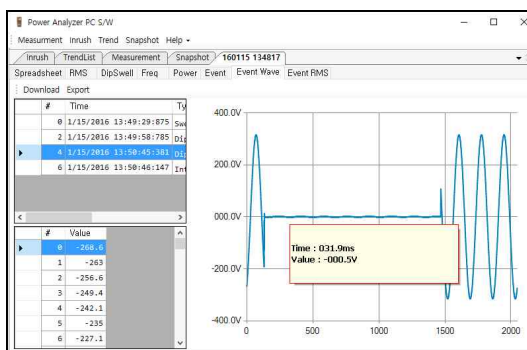


Fig. 60 Event Wave

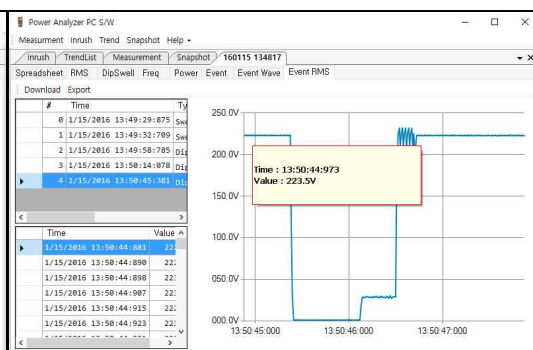


Fig. 61 Event RMS

6.2.7. Snapshot

- Snapshot transmit

After unit connected, press ' Snapshot ' button to show off ' Snapshot' tab.

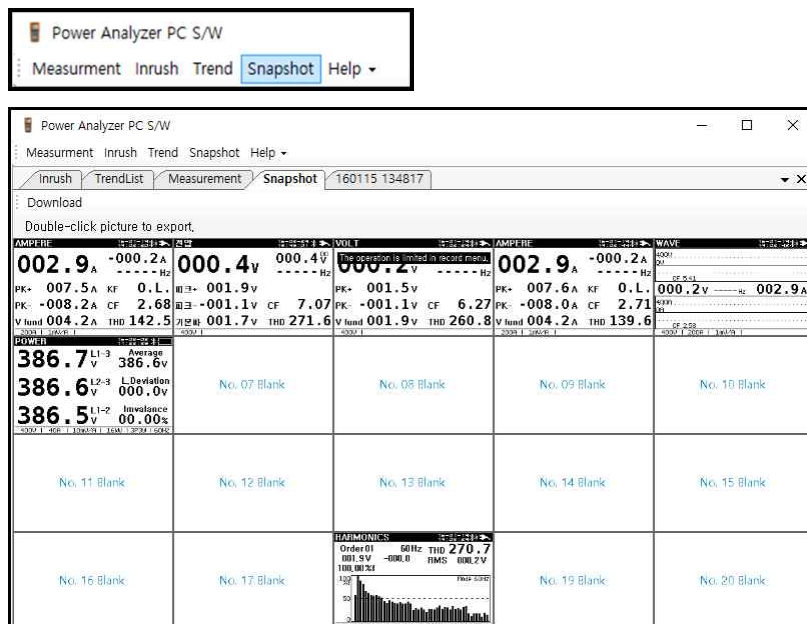


Fig. 62 Snapshot

- Press Download button to download the Snap Shots recorded in the unit.



- After download completed, do double-click the desired image to save in PNG file.

7. Maintenance

Suggest to use designated replacement part by the manufacturer. Otherwise Manufacturer is not responsible for Safety Accident or Default from the Analyzer. For safety purpose, If the Analyzer or its accessory shows mal-function or damaged, please contact the supplier where you purchased.

7.1. Battery Recharge

The Analyzer install Ni-MH Rechargeable Battery Pack inside of Analyzer.

The Battery is rechargeable by ADC Power Adapter supplied with the Analyzer.

Battery Charging starts when ADC Power Adapter connected to Power Outlet. It takes approx. 4 hours to charge full level if the battery is totally drained out. While Charging, Analyzer does not use Battery Power and use Current from Power supply system. If charging while use Analyzer, charging time may need longer.

There is no damage on Analyzer if long time charging because charging circuit converted to streamlet charging after full charged.

※ To protect Battery capacity down, suggest to charge minimum 2 times per year.

When the Adapter is separated, Battery Charging Status displayed as below icon at upper right corner on Display

Icon	Description
	Battery level 85% or more.
	Battery level 70% or more.
	Battery level 50% or more.
	Battery level 25% or more.
	Battery is totally drained out. Warning Sound Warning and after a 30 seconds, Power turned OFF.
	Adapter is Connected – under Charging

7.2. Battery Pack replacement



WARNING

- When change Battery, separate AC Adapter and any other connections to Analyzer and Power OFF
- Do not expose over 100°C (212°F) temp environment.
- Do not short Battery Terminals.

- ① Testing Terminal and Probe are to be separated from Signal Source and Analyzer
- ② Unscrew the Screw on lower Bottom Case with Driver
- ③ Separate Battery Cover.
- ④ Separate Battery Plug from Connector and remove the old battery from Battery Compartment.
- ⑤ Place with New Battery Pack
- ⑥ Place Battery Cover and Screw up.

7.3. Cleaning and Storage



To protect from Accident, separate Testing Terminal and Probe from the Analyzer before Cleaning.

7.3.1. Analyzer Cleaning

Clean with wet cloth and Soft Soap. Do not use Cutter, Organic Solvent or Alcohol. Letter printed on Analyzer can be erased.

7.3.2. Storage

Even though Analyzer needs to store long period, separation of Battery Pack is not required. However, Battery may drain out naturally and gradually and Battery Life can be reduced if store the Analyzer for a long period.

To manage the Battery at best condition, suggest to recharge the battery periodically (1~2 times/ month)

7.3.3. Cleaning of Probe

Clean with wet cloth and Soft Soap. Do not use Cutter, Organic Solvent or Alcohol. Open Clamp and Clean the Pole of Magnet with little bit – oil wet cloth. Be careful not to have Rust or Corrosion on end of magnetic core

