

TEKON[®] 960

Battery Quality Analyzer

User Manual



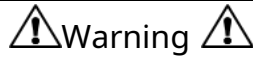
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General



Warning

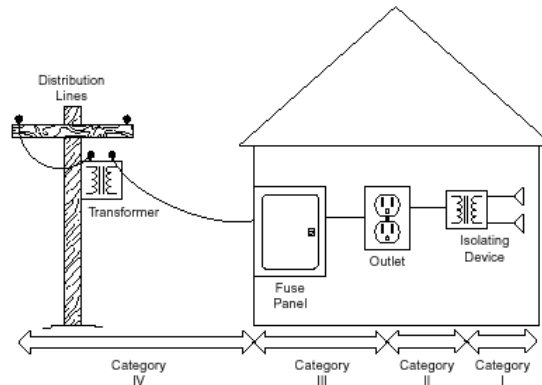
Please use the unit after read Safety Information.
 Use only the designated operation method.
 Do not use environments in combustible gas, steam or humid.
 Do not use damaged unit.
 Do not use any unit with abnormal operation.
 Do not apply over voltage more than rated voltage between Terminal or between respective terminal and Ground.
 Use appropriate Terminal, range, function or Range when measurement.
 Replacement parts should be manufacturer' designated parts.
 Before Battery replacement, be sure to disconnect any Power Code, Test Lead, accessories from the unit.

International Standard Safety Symbol

Symbol	Description
	Double insulated protection
	Warning. User should read marking area in the manual and need pay attention. If user does not follow the Warning –safety information, user may have physical injury and the Unit, system may be damaged
	Pay attention "Electric Shock" Voltage in this symbol may be hazard
	Disposal information

Measurement Range (Over voltage range) definition

Higher Category indicates Higher Over Voltage Electric environment. Tester designed for CAT III environment can withstand higher voltage than the tester designed for CAT II. To avoid any serious accident while measurement, better to use Tester higher category for the testing environment. For example, do not use Tester with CAT at testing environment CAT II, III, or IV



Category	Description
CAT I	2nd electric circuit connecting Transformer example : protected electric circuit
CAT II	Basic circuit of things which electric code is connected to AC consent /Outlet. example : equipments, portable tool, home apparatus etc.
CAT III	Electric circuit of fixed facilities which directly connected to Consent and distribution board / Switching board. example : fixed facility Switch or industrial equipment firmly connected to fixed facility
CAT IV	Electric circuit from Entrance to Overvoltage protection system (Distribution board/Switch board) and Wattage Meter Example : Electric meter and primary Over- current protector

Opening Package

After delivered, check the package whether the packing materials are correct with Order list. If any missing or damaged found, please do not use and report it to the supplier. Be sure to keep the original packing material to support Claim process.

The Battery packed may be drained out during delivery. Please recharge the battery before start use the unit.

1. Description and Specifications

1.1. Product Description

The TEKON960 is a measuring instrument that measures the impedance, voltage, and temperature of lead-acid, NiCD, and lithium-ion batteries, and can diagnose battery deterioration.

Depend on model, can measure Internal Resistance of High Voltage Battery max 200V or 500V.

Using string records designed for battery maintenance, measurement data can be systematically accumulated and stored to analyze deterioration trends and refer to them in predicting replacement timing.

Saved data is transmitted and managed to PC S/W via Bluetooth, and export to Excel file, chart analysis, and report file generation are possible using S/W.

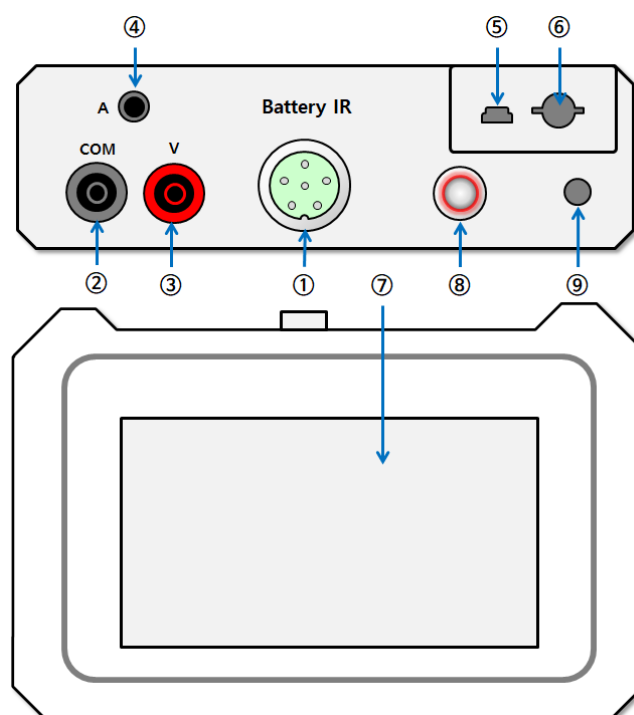
Measurement data can be transmitted remotely using a mobile app.

1.1.1. Main features

- Can measure without stopping UPS system.
High precision AC resistance measurement technology enables to measure UPS system while UPS system in being loaded.
- Precise measurement
AC 4-terminal test lead enables precise measurement of internal Resistance of Battery without affecting Test Probe own resistance and contacting resistance.
- Simultaneous measurement of Resistance, Voltage, Temperature, Currents.
Without changing Function, Resistance-Voltage-Temperature or Voltage-Temperature or Voltage-Currents can be measured simultaneously. Current measurements need to use external Current Adapter.
- LIMIT
LIMIT function can set up Limit of Resistance and Voltage. This enables to determine Battery Deterioration status when measurement
- SD Card
SD card is used to store measurement data. Over 100,000 measurements are stored.
- AutoRec (Auto Record)
Use this mode to record measurement data automatically at designated record post. Can measure many batteries consecutively and conveniently.
- PC S/W
Measured data can be downloaded to PC which saved Data enables to String Edit, Record Erase.
- Pin type test probe
End of Pin of Pin Type test probe may insert into 5 mm diameter hole which can measure battery terminal without Battery Terminal Cover off.
- Ripple Voltage measurement
By measuring the DC circuit of the inverter to charge and measuring the voltage ripple (AC component remaining).
A large ripple voltage is one of the causes for accelerating the battery deterioration

1.2. Description of each part and functions

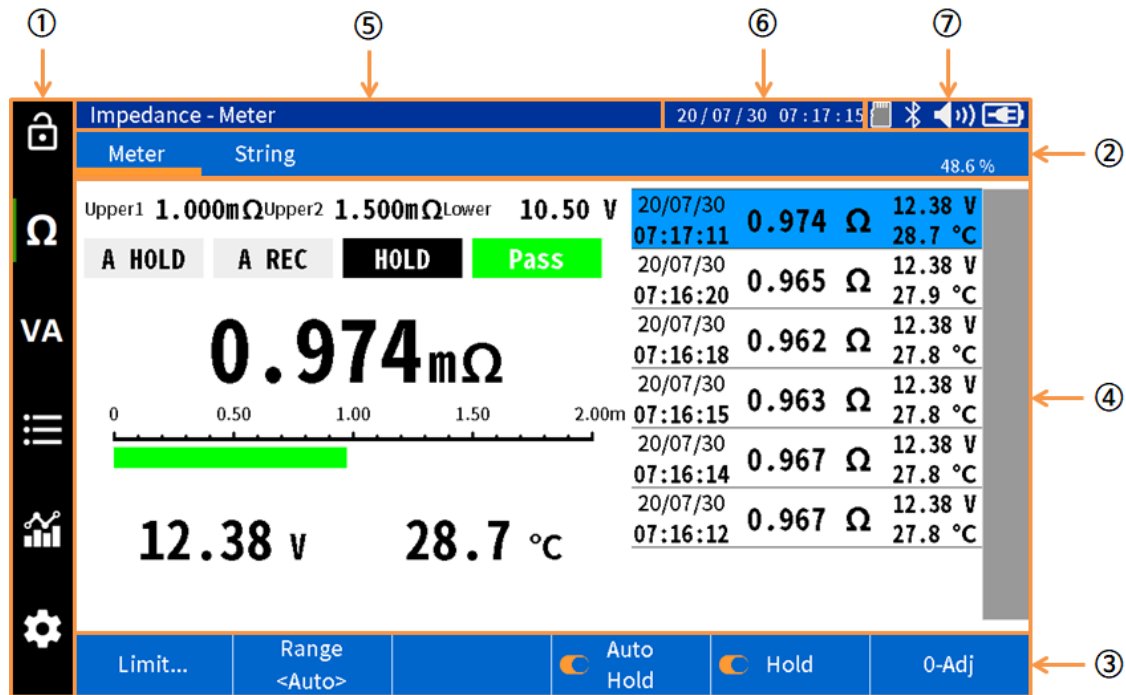
1.2.1. Exterior



No	Function	Decription
①	Impedance Input	This is an impedance measurement input terminal for inserting a 4-terminal probe.
②	VOLTAGE INPUT	V.A voltage measurement input terminal to insert DMM probe
③	Voltage + Input Terminal	V.A voltage measurement input terminal to insert DMM probe
④	Current Input Terminal	This is the current input terminal to connect the current clamp.
⑤	USB Socket	Insert USB cable for communication
⑥	SD Card Slot	Insert the SD card for data storage.
⑦	Display	LCD screen with touch input
⑧	Power S/W	Turns the power on and off.
⑨	Adaptor Socket	Power adapter socket for charging

1.2.2. Display

The unit shows different display by different measurement functions.
Below explains Display Configuration showing on most function displays.



No	Name	Description
①	Main Function	각 아이콘을 터치하여 주 기능을 선택합니다. - Lock or unlock screen touch input. . Switch to impedance measurement function - Switch to voltage and current measurement function. - Switch to record function. - Create strings or check stored records - Delete unnecessary data. - Switch to analysis function. - Use the stored data to analyze the deterioration of the battery. - Switch to setting function. - Change instrument or measurement settings.
②	Function Tap	The functions under the main function are displayed as tabs. Touch to select.
③	Softkey	The name of the function performed when F1~F6 is pressed and the label of the selected item are displayed if selection is possible.
④	Display	The content of the selected function is displayed.

⑤	Display Name	The name of the currently displayed function is displayed.
⑥	Time	The current time of the product is displayed. Used as time information when saving records.

⑦	Status icon	SD Card Icon  SD card slot is empty.  I have an SD card.  SD card is being read or written.  SD card mount failed. USB/Bluetooth icon  Bluetooth connection is possible.  Connected to PC via Bluetooth  USB cable is connected. Bluetooth is disabled. Volume of the Buzzer  Battery remain  Power adapter is on 
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1.3. Ordering information

1.3.1. Accessories and parts

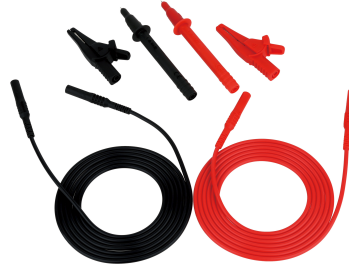
- Impedance Test Lead

TKP01-500



- Test Lead (multimeter)

TP9



- AC Adapter

T25A (DC12V 2.5A)



- Bluetooth Dongle

T400 (BTU400)



- Carry Bag

T50A



- Pouch(TEKON960B)



- "0" Adjust Bar

TP04



- Battery Pack

TB06A



- Current Clamp(TEKON960B)

T130BE



1.4. Specifications

1.4.1. Power Supply

- ☐ AC Charging Adapter

Input : AC 100V ~ 240V @ 50Hz/60Hz

Output : DC 12V 2.5A

- ☐ Battery Pack

Type	Li-Ion Rechargeable Battery Pack > 5.4Ah
Voltage Rating	7.4V
Charging Time	4Hr
Battery Life	> 8 Hr, 300 Charging / Discharging cycle

1.4.2. Mechanical Specifications

Dimensions : 240 X 160 X 65 mm

Weight : 0.9kg

Shock and Vibration : EN 61010-1

Standard : IP 54 EN 60529 (Electric IP2X terminal)

1.4.3. Operating Specifications

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

1.4.4. Safety Specifications

- ☐ Safety

- ☐ Testing Equipment Interchangeability

500V CAT III, Pollution Degree IEN 61326-1:2013

2

EN 55011/A1:2010 (Class A)



EN 61000-3-2:2014

IEC 61010-1:2010(3rd Edi.)

EN 61000-3-3:2013

EN 61010-1:2010(3rd Edi.)

1.4.5. Record Capacity

Internal 8MB Flash Storage

Record	Meter mode	String Mode
Impedance Record < Ω , Volt, Temperature, Time>	Max 1000 record	1 Slot. max 512 cell record. 60 time measurement per string
V.A record <V DC, V ripple>, <V DC, A DC>	Max 1000 record	512 record per string

<V AC, A VC>		
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1.4.6. Electrical Specification

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 ± 1 °C.

Warm up time : about 30 minutes

● Internal Resistance

Range	Resolution	Accuracy
3m Ω	1u Ω	$\pm 1.0\% \text{rdg} \pm 10 \text{dgts}$
30m Ω	10u Ω	$\pm 0.8\% \text{rdg} \pm 10 \text{dgts}$
300m Ω	100u Ω	
3 Ω	1m Ω	
30 Ω	10m Ω	
300 Ω	100m Ω	
3k Ω (model B only)	1 Ω	

When measuring a high-voltage battery of 100V or more, there is a danger of electric shock. After discharging the measurement probe after measurement, proceed to the next measurement.

● Voltage (DC/AC)

Range	Resolution	Accuracy
DC 5V	0.001V	$\pm 0.5\% \text{rdg} \pm 5 \text{dgts}$
DC 50V	0.01V	
DC 500V	0.1V	
DC 1000V	1V	
AC 5V	0.001V	$\pm 0.75\% \text{rdg} \pm 5 \text{dgts}$ (40Hz~100Hz)
AC 50V	0.01V	
AC 500V	0.1V	
AC 600V	1V	

● Currents (DC/AC)

Range	Resolution	Accuracy
DC 4A	0.001A	$\pm 0.5\% \text{rdg} \pm 5 \text{dgts} + \text{CT tolerance}$
DC 40A	0.01A	
DC 400A	0.1A	
DC 1000A	1A	

Range	Resolution	Accuracy
AC 4A	0.001A	$\pm 0.75\% \text{rdg} \pm 10 \text{dgts} + \text{CT Tolerance}$
AC 40A	0.01A	
AC 400A	0.1A	

AC 1000A	1A	
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CT' own tolerance affects to testing accuracy of measurement. Need to check CT' own tolerance before measurement.
Current Adaptor : 1A to 1mV

- Temperature

Range	Resolution	Accuracy
-10℃~100℃	0.1℃	±1℃+2dgts

- Ripple Voltage

Range	Resolution	Accuracy
0~5V	0.001V	±5%rdg±10dgts(40Hz~10kHz)

- Current Probe Accuracy

TEKON130BE

Ratio

0-40A

10mv/A



AC Amps

0-40A

±(1.5%+6digits)

DC Amps

0-40A

±(1.5%+5digits)

1.5. How to hang it around your neck and measure it



[Preparation for measurement]

- ① Connect 4 connecting strings to the hooks at the corners of the product.
- ② Combine the bag straps marked on the bag with 2 hooks each.
- ③ Adjust the length of the bag strap to suit the user and hang it on the neck.

2. Set Up

2.1. Power ON/ OFF

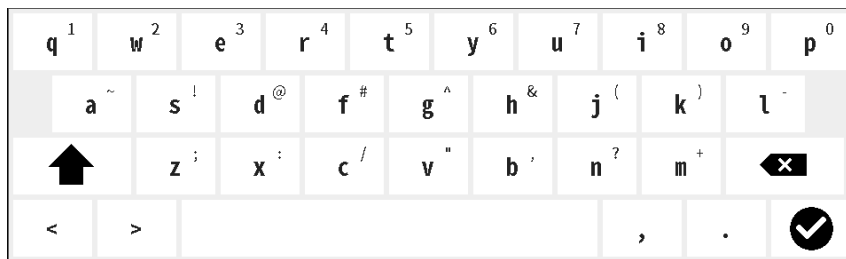
Press longer "POWER" key longer than 2 seconds to activate power ON/OFF

2.2. Keyboard

Use when input Name or Number etc

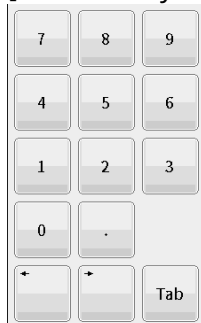
While keyboard is displaying, can input letters with buttons on the unit (except Power button). English only. If prefer Korean, use PC S/W.

[문자열입력]



- Press and hold to enter numbers and special characters.
- Shift  and transfer to Caps lock and un-lock.
- ,  and move the cursor  push or touch the outside of keyboard and finishe the Input mode.

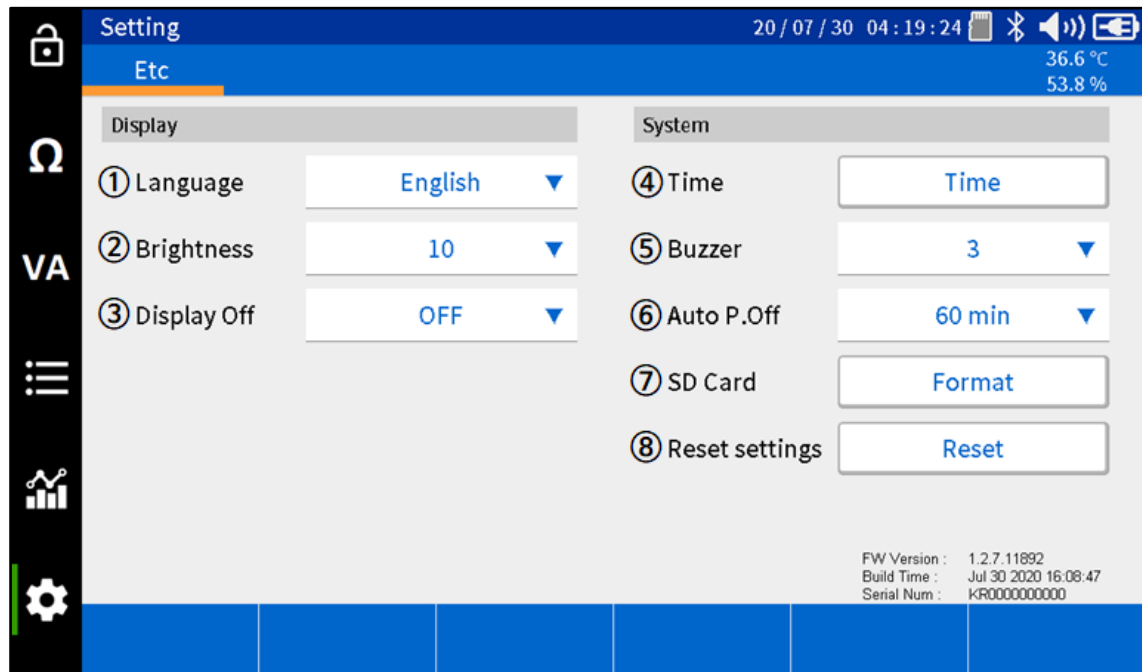
[Numeric key input]



- Touch each number to enter it.
- ,  Press to move the cursor.
Touch outside the keyboard area to finish typing.

2.3. User Set Up

2.3.1. User Set Up display

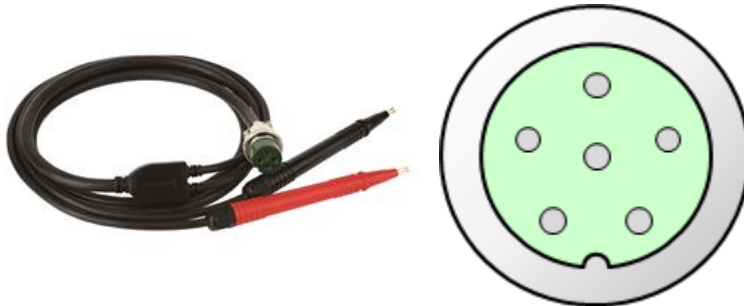


No	Item	Setting scale	Description
①	Language	Korean, <u>English</u>	Set the display language.
②	Brightness	1~ <u>10</u>	Adjust the screen backlight brightness.
③	Screen turns off	<u>OFF</u> , 3, 5, 10, 15, 30, 60(minutes)	The screen turns off automatically if there is no operation for the set time. After it turns off, you can turn it on again by touching the screen or by shortly pressing the power button.
④	Time	-	Set the time.
⑤	Volume	Mute, 1 ~ <u>3</u>	Mute or adjust the volume of the device's buzzer sound.
⑥	Auto power off	<u>Off</u> , 5, 10, 30, 60(minutes)	If there is no button operation for the set time, the power is automatically turned off. It does not operate when AC power is connected or during recording function.
⑦	SD format	-	LCD contrast
⑧	Initialization	-	Initialize the device settings.

3. Impedance Measurement

3.1. Insert Test Probe

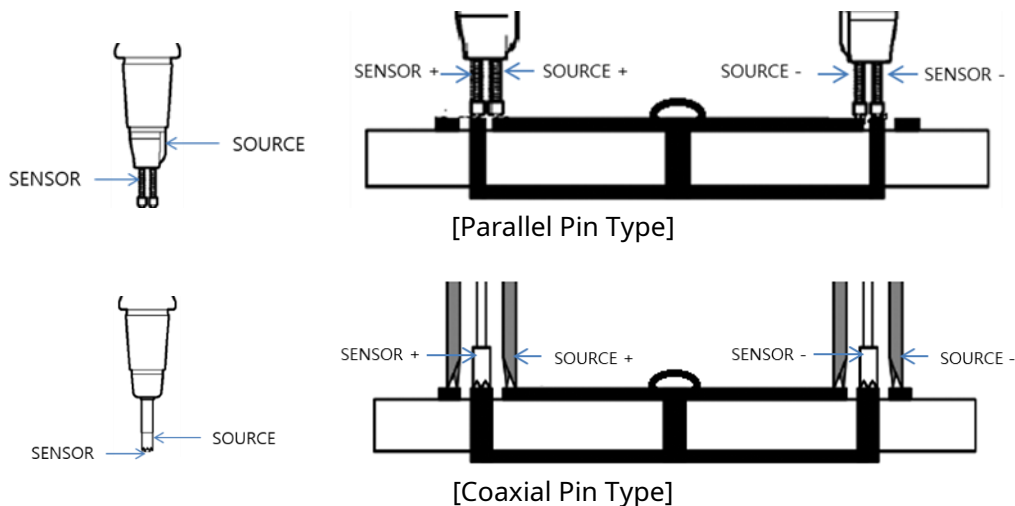
- For safe and accurate measurement, insert precisely the probe provided with unit.
- 4 Terminal Pin type probe provided to measure Impedance
- Insert Probe to Ω -H, Ω -L terminal.



- Be careful any physical injury from the sharp end – Pin type probe
- When measuring a high-voltage battery of 100V or more, there is a danger of electric shock. After discharging the measurement probe after measurement, proceed to the next measurement.

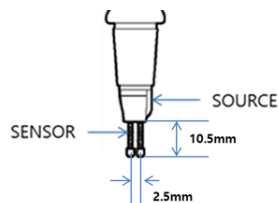
3.2. "O" adjustment

For accurate Ohm measurement, proceed "O" Ohm adjustment when change Probe.

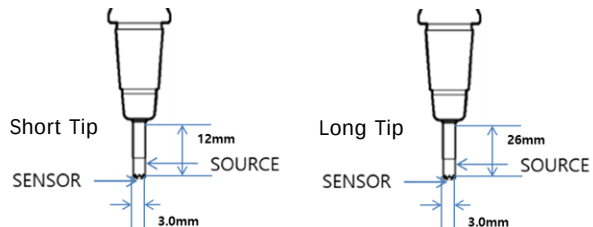


- Parallel Tip Type : The protruding side is the source and the other side is the sensor.
- Coaxial Pin Type : The outside is the source and the inside is the sensor.
- Source Pin is connected to the upper side and Sensor Pin is connected to the metal part below.

1. Duplex Pin Type / Basic probe

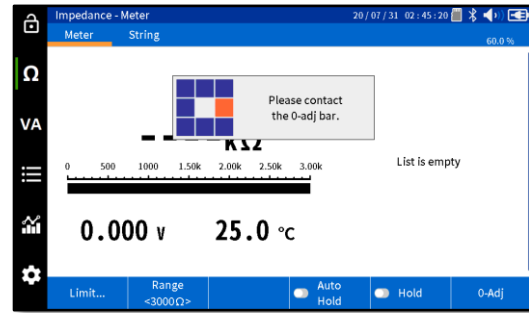
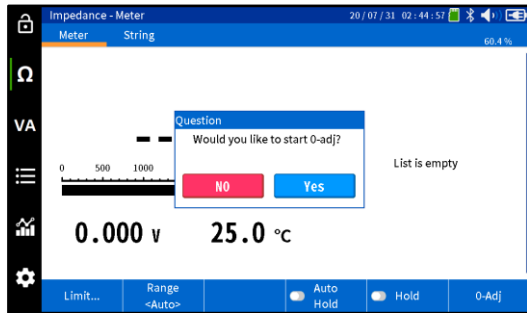


2. Concentric Pin Type / Optional probe

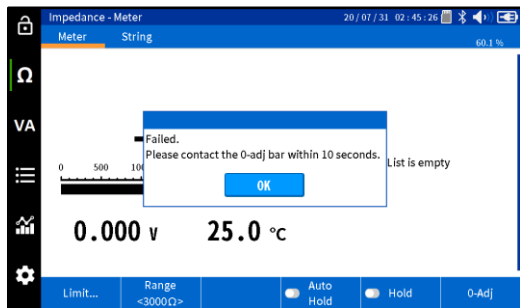


[“0” adjustment]

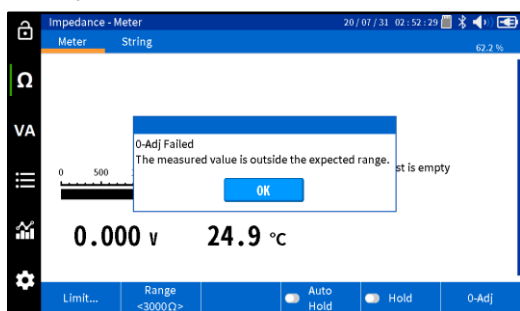
- ①  Press to display the impedance meter screen
- ② Press **0-Adj** and press **Yes**.
- ③ Wait up to 10 seconds until the probe is touched on the zero adjustment bar.



- ④ Insert the pin end of the measuring probe into the hole of the zero point adjustment plate, and press the probe perpendicular to the adjustment plate so that the SOURCE and SENSE terminals of the probe tip are in close contact as shown in the figure below.
 - ⑤ The product performs zero adjustment for all impedance ranges. Make sure that the probe does not disengage from the zero-adjustment plate until the completion message is displayed and calibration is complete.
- If no probe is inserted within 10 seconds after starting zero adjustment, the adjustment is canceled.



- Adjustment is canceled if the probe is abnormal or not properly inserted and is outside the expected value.



3.3. Record Mode

The Unit provide 2 Record Methods by the measurement situation.

‘Meter Record’ perform Simple measurement and measurement data and time can be saved. Saved data displayed in order of measurement time.

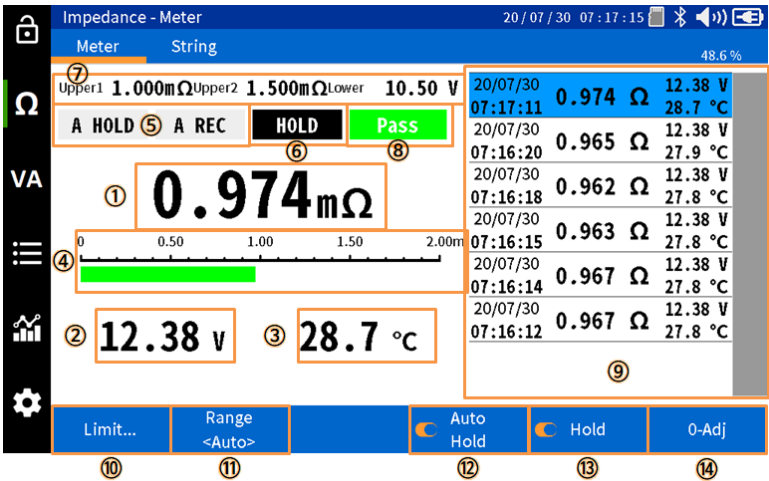
‘String Record’ is designed for continuous Battery management and maintenance Useful to String Information of measurement battery. Measurement data is saved and

accumulated to String which enables to Check, Management and Analysis.

3.4. Meter Record

Meter Record is useful for One Time measurement which measurement record does not need to manage continuously. For Simple measurement and saving.

[Display Layout]



No	Function	Description
①	Impedance	The impedance measurement is displayed.
②	Voltage	The voltage measurement is displayed. In impedance measurement, the voltage range is always an automatic range.
③	Temperature	The temperature reading is displayed.
④	Bar-graph	The current measurement value is displayed as a bar graph. It is displayed in different colors depending on the limit judgment of the string.
⑤	Auto Hold, Auto Record	A HOLD : AutoHold is On A REC : AutoRec is On Both functions are always on and off at the same time.
⑥	Hold	HOLD : Hold is On
⑦	Limit	When the limit function is on, the set value is displayed. It is displayed in the order of upper limit 1 / upper limit 2 / lower limit.
⑧	Judgment	PASS WARNING FAIL : This is the limit judgment result. Displayed when the limit function is on.
⑨	Record	Saved meter-Ω records are displayed in the order of last save.
⑩	Limit	Displays a dialog box for setting limits.
⑪	Range	Select the measurement range. <u>Auto</u> , 3mΩ, 30mΩ, 300mΩ, 3Ω, 30Ω, 300Ω, 3kΩ If you do not know the approximate value of the measurement

		object, set it to Auto.
⑫	Auto Hold	Turns AutoHold, AutoRec on/off.
⑬	Hold	You need an SD card to activate it.
⑭	"0" adjust	Turn Hold on and off.

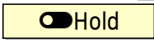
3.4.1. Impedance Measurement (Meter Record)

- ① Press  to display the initial impedance measurement screen.
- ② Touch the battery terminal to measure the measuring probe. Press so that both the inside and outside of the probe pin are in contact for correct 4-terminal measurement.
- ③ The measurements appear on the screen within seconds.

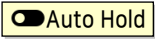
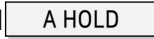
3.4.2. Range Adjustment

- Press  to display the menu.
- You can select auto or manually select one range.
Auto / 3mΩ, 30mΩ, 300mΩ, 3Ω, 30Ω, 300Ω, 3kΩ
- In impedance measurement, voltage measurement always operates in auto range (5V, 50V, 500V).

3.4.3. Hold

This function is used when the measured value is fixed for a moment and you need to view it. If you press  the value currently being measured on the LCD is fixed. Pressing  again releases the hold function and displays the current measurement value.

3.4.4. AutoHold

Press  enable/disable AutoHold and AutoRec. When activated  is displayed on the LCD screen.

The AutoHold function automatically stops the measurement data when the measurement value stabilizes for convenience of measurement and stores the measurement data in the set memory at the same time.

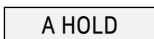
AutoHold restarts automatically by simply measuring the value again without using a specific function key.

3.4.5. AutoRec

AutoRec is a function that operates at the same time as AutoHold function. When activated,  is displayed on the LCD screen.

When AutoHold is activated and the measured value is automatically stopped, this value is automatically saved to the designated storage address.

In the meter record, up to 1,000 impedance, voltage and temperature values and measurement time can be stored.

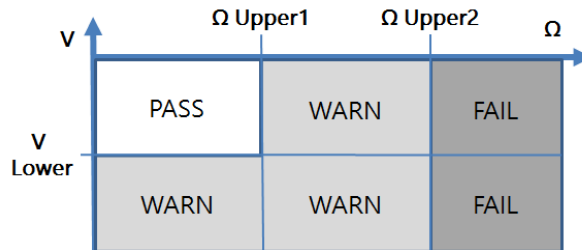
When measuring multiple batteries in a row, by   activating and using, quick continuous measurement is possible simply by touching the measuring probe to the battery terminal without operating any function keys.

Contact with battery terminal -> AutoHold -> AutoRec

3.5. Limit

Limit function decides category PASS, WARNING or FAIL, after comparison Pre Set Limit with measurements of battery

Limit function provides for Resistance - Upper level 1 (WARNING), Upper level 2 (FAIL) and for Voltage – Lower level (WARNING) as below.

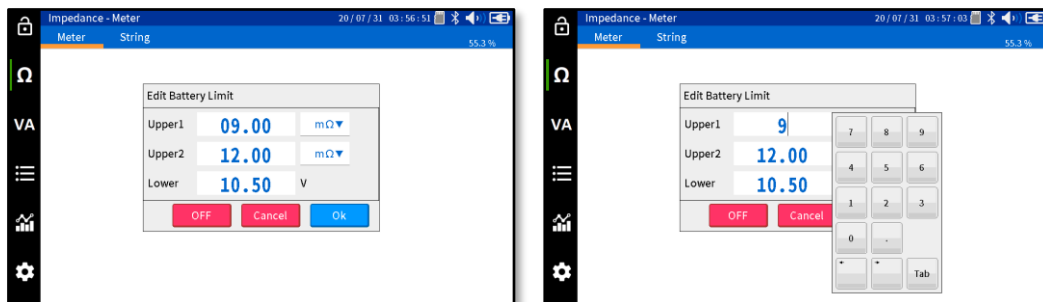


- If Impedance is higher than Upper 2, it is FAIL
- If Voltage is higher than LOWER and Impedance is lower than Upper 1, it is PASS
- Rest cases are WARNING .

Decision of Voltage is based on Absolute value. Therefore decision is available even Test Lead measurement in opposite direction (+ / - lead)

[Using Limit]

- ① Press **Limit...** on the impedance measurement screen.
- ② The limit setting screen appears.
- ③ You can disable the limit by pressing **OFF**.
- ④ If you touch the set limit value (upper limit 2/upper limit 1/lower limit), you can modify it with the numeric keypad.
- ⑤ Press Unit to select m Ω / Ω



- ⑥ Press the **OK** key to apply the modified limit.
If upper limit 1 is greater than upper limit 2, the value is displayed in red and is not applicable.



- ⑦ When the setting is complete, the currently set limit value (upper limit 2/upper limit 1/lower limit) is displayed on the measurement screen

[Note]

When the measured value is saved by AutoRec, a different buzzer sounds depending on the judgment result. [PASS (pass), WARNING (caution), FAIL (fail)]

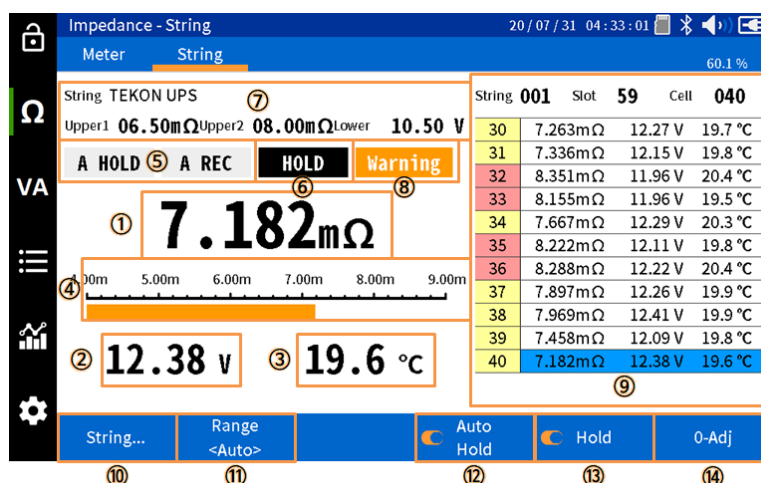
PASS	Short(100ms) 1 time Beep Sound
WARNING	Long(300ms) 2 times Beep Sound
FAIL	Short(100ms) 2 times and long(400ms) 1 time Beep sound(Total 3 times)

3.6. String Record

“String Record” is designed for continuous battery management and maintenance.

- String name, battery model, limit value and number of battery can be set up in the String Record.
- Measurement Data is saved at selected string.
- When whole Battery Series is measured (by Slot), if select String, can manage maximum 60 accumulated data(Slot).
- Can check or erase the measurement data of String.

3.6.1. Screen Measurement



No	Function	Description
①	Impedance	The impedance measurement is displayed.
②	Voltage	The voltage measurement is displayed. In impedance measurement, the voltage range is always an automatic range.
③	Temperature	The temperature reading is displayed.
④	Bar-graph	The current measurement value is displayed as a bar graph. It is displayed in different colors depending on the limit judgment of the string.
⑤	Auto Hold, Auto Record	A HOLD : AutoHold is On A REC : AutoRec is On Both functions are always on and off at the same time.
⑥	Hold	HOLD : Hold is On
⑦	String Limit	limit set value is displayed. It is displayed in the order of upper limit 1 / upper limit 2 / lower limit.
⑧	Judgment	PASS WARNING FAIL : This is the limit judgment result.

⑨	Record	Displays the selected string/slot/cell number. Displays the records stored in the slot in order of the most recent cell number. The background color of the cell number indicates the limit judgment result. <table><tr><td>34</td><td>7.667mΩ</td><td>12.29 V</td><td>20.3 °C</td></tr><tr><td>35</td><td>8.222mΩ</td><td>12.11 V</td><td>19.8 °C</td></tr></table> If you select a record by touching it, the value of the record is displayed on the measurement screen. If there are many items, a scroll bar appears when you touch the record.	34	7.667mΩ	12.29 V	20.3 °C	35	8.222mΩ	12.11 V	19.8 °C																
34	7.667mΩ	12.29 V	20.3 °C																							
35	8.222mΩ	12.11 V	19.8 °C																							
⑩	String Select	Displays a dialog box for selecting the string to be measured. Select Battery String <table><tr><td>Demo String 001</td><td>Lead Acid</td><td>RP-100</td></tr><tr><td></td><td>0 mAh</td><td>40 Cel</td></tr><tr><td>Demo String 002</td><td>Lead Acid</td><td>RP-100</td></tr><tr><td></td><td>0 mAh</td><td>40 Cel</td></tr><tr><td>Demo String 003</td><td>Lead Acid</td><td>RP-100</td></tr><tr><td></td><td>0 mAh</td><td>40 Cel</td></tr><tr><td>TEST</td><td>Lead Acid</td><td>ES7-1</td></tr><tr><td></td><td>1 mAh</td><td>20 Cel</td></tr></table> Cancel Select Slot New Slot	Demo String 001	Lead Acid	RP-100		0 mAh	40 Cel	Demo String 002	Lead Acid	RP-100		0 mAh	40 Cel	Demo String 003	Lead Acid	RP-100		0 mAh	40 Cel	TEST	Lead Acid	ES7-1		1 mAh	20 Cel
Demo String 001	Lead Acid	RP-100																								
	0 mAh	40 Cel																								
Demo String 002	Lead Acid	RP-100																								
	0 mAh	40 Cel																								
Demo String 003	Lead Acid	RP-100																								
	0 mAh	40 Cel																								
TEST	Lead Acid	ES7-1																								
	1 mAh	20 Cel																								
⑪	Range	Select the measurement range. <u>Auto</u>, 3mΩ, 30mΩ, 300mΩ, 3Ω, 30Ω, 300Ω, 3kΩ If you do not know the approximate value of the measurement object, set it to Auto. If you know, setting the range manually will reduce the measurement time required.																								
⑫	Auto Hold	Turns AutoHold, AutoRec on/off.																								
⑬	Hold	You need an SD card to activate it.																								
⑭	"0" adjustment	Turn Hold on and off.																								

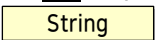
3.6.2. String record measurement

To measure a string record, you need to enter string information for the battery to be measured.

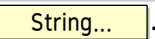
Please refer to the record description for details.

[Measure string records]

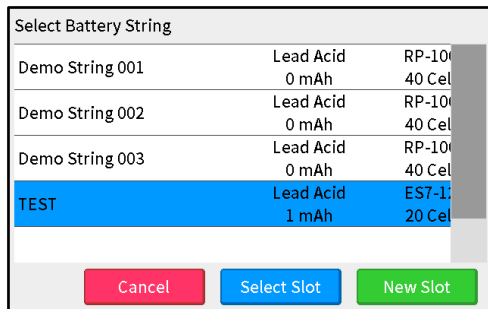
① Press the  to display the impedance measurement screen.

② Select  on the Tap

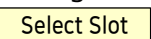


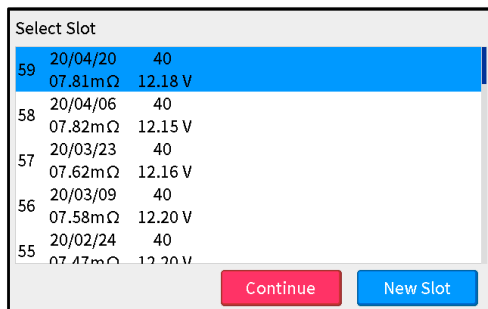
③ Press .

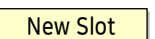
④ A list of saved strings appears. (See the record function description for string generation.)

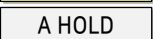


⑤ Select the string.

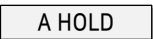
⑥ Pressing  displays a list of slots for the selected string



⑦ Press  to start a new slot or touch an existing slot to select it, Press  to continue the previous measurement.

⑧   is displayed and the measurement is ready. The cell number is set to the earliest empty number. Make sure it matches the battery to be measured.

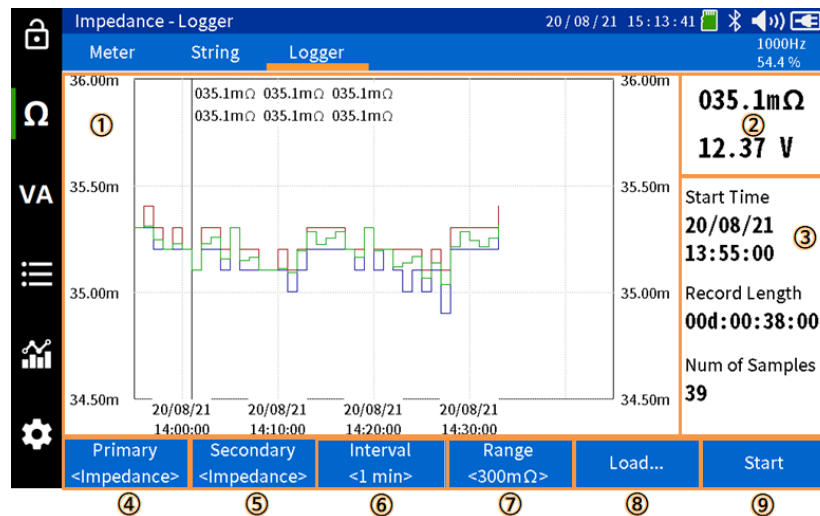
⑨ Touch the battery terminal to measure the Kelvin probe. Press so that both the inside and outside of the probe pin are in contact for correct 4-terminal measurement.

⑩   operates and the measured value is fixed and saved. Repeat the battery measurement for the remaining cells.

3.7. Logger (TEKON960B Only)

The logger function records impedance measurements over a long period of time. Impedance, voltage, temperature, and humidity are measured at set intervals and saved as a CSV file.

Data being recorded or loaded is displayed as a graph on the screen.



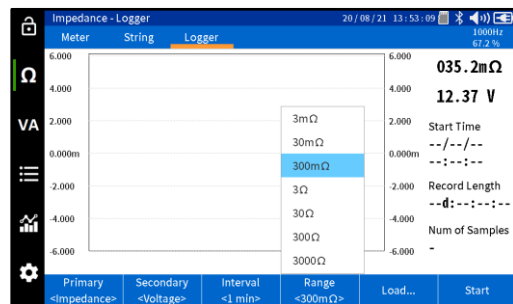
No	Function	Description
①	Graph	The data of the record is displayed in a graph. Select two types of data: impedance, voltage, temperature, and humidity.
②	Value	Displays the value currently being measured.
③	Info	Displays the start time, length, and number of samples of recording.
④	Primary	This is the first data displayed on the graph Use the left Y axis
⑤	Secondary	This is the second data displayed on the graph. Use the right Y axis
⑥	Interval	Select the recording interval.
⑦	Range	Select the impedance measurement range. Auto range cannot be used..
⑧	Load	Select a file to load the record saved on the SD card.
⑨	Start	Finish setting and start recording.

[Start Record]

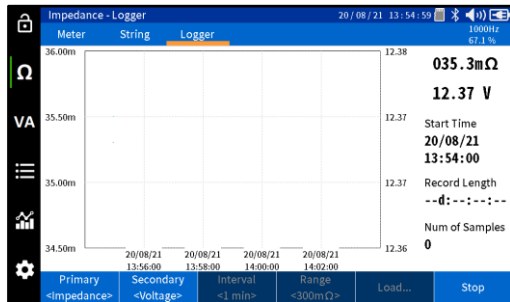
- ① Press the **Ω** display the impedance measurement screen.
- ② Select **Logger** on the Tap



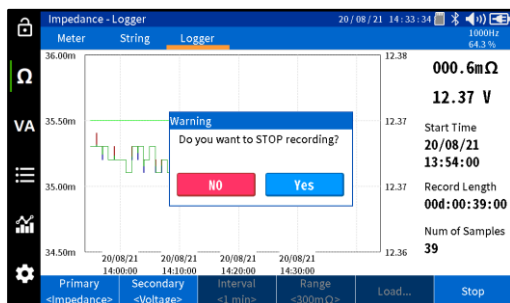
- ③ Press **Interval** to set recording interval and press **Range** to select measurement range. auto range cannot be used for logging.



- ④ Fix the measurement probe to the measurement object. It is convenient to use a clip type probe. When measuring for a long time, connect the adapter to prevent battery discharge.
- ⑤ Press **Start** to start recording.



- ⑥ Stop recording by pressing **Stop**.

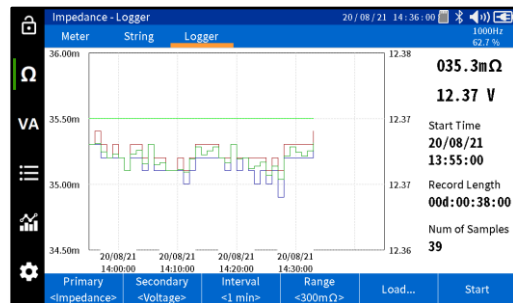
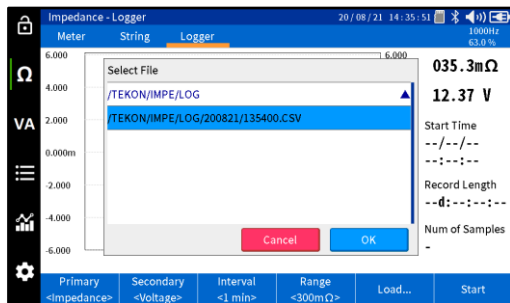
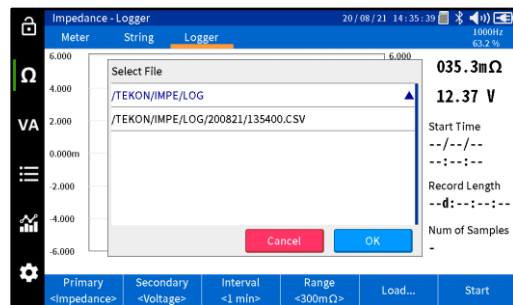
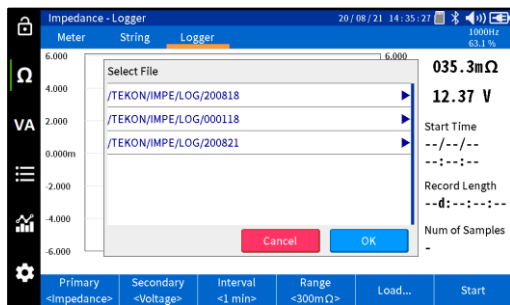


[Load Record]

- ① Press the **Ω** display the impedance measurement screen.
- ② Select **Logger** on the Tap



- ③ Press **Load...** display the file section window.
selecting the file to load, press **OK** to load the record.



- ④ Select the items to be displayed on the graph by pressing **Primary** **Secondary**.



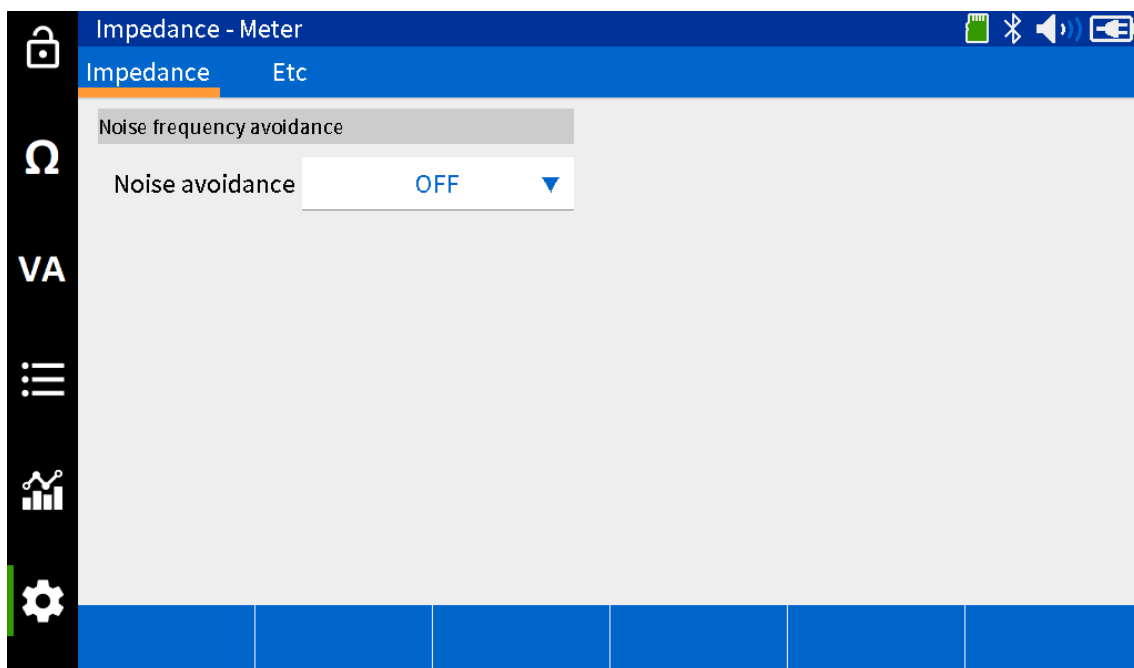
3.8. Noise Avoidance (TEKON960B Only)

If the measured value is unstable due to noise, noise frequency avoidance function can be turned on in the setting screen.

When the noise frequency avoidance function is used, change the measurement frequency to reduce the effect of noise.

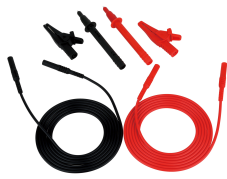
Noise frequency avoidance function will be canceled when the power is switched off and turned on again.

It may not be possible to avoid all noise depending on the type of noise.



4. V.A measurement

4.1. Test Probe Insert



Voltage Test Lead



Voltage Input Terminal



Current Clamp



Current Input

4.2. Measurement Set Selection

The Unit can measure DC Voltage, AC Voltage, DC Currents, AC Currents, AC Voltage Ripple. V.A measurement function consists of the following 3 test sets. Simultaneous 2-measurement available depends on selection.

- DC Voltage & Ripple Voltage
- DC Voltage & DC Current
- AC Voltage & AC Current

Vdc/Vripple
Vdc/Adc
Vac/Aac
Mode
<Vdc/Vripple>

Press **Mode** on V.A measurement screen to select.

Record Saving is available up to 1000 combination 2-measurement sets (3 different type sets as above)

In String Record, each String can save up to 512 including 3 different type measurements.

4.3. VA Meter

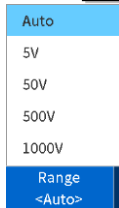


No	Function	Description
①	measurement 1	V DC, V AC measured values are displayed.
②	measurement 2	V ripple, A DC, A AC measurements are displayed.
③	Bar-graph	Displays measured value 1 as a bar graph.
④	Auto hold, Auto record	Displays the activation status of the auto hold and auto save functions. When activated, when the value of measured value 1 is more than 50 counts and the value stabilizes for a certain period of time, it is automatically held and saved in the record.
⑤	Hold	Displayed when the measured value is fixed due to the hold operation.
⑥	record	Displays saved records.
⑦	Voltage range	Set the voltage range. <Auto, 5V, 50V, 500V, 1000V>
⑧	Current clamp	When the current measurement function is selected in the mode, select the clamp to be used. <135BE, 130BE>
⑨	Auto hold	Enables/disables the Auto Hold and Auto Rec functions.
⑩	hold	Enable/disable the Hold function.
⑪	mode	Select measurement mode Vdc/Vripple Vdc/Adc Vac/Aac Mode <Vdc/Vripple> Vdc/Vripple Vdc/Adc Vac/Aac DC Volt / Ripple Volt DC Volt / DC Amps AC Volt / AC Amps

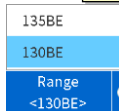
4.3.1. Range Adjustment

- In DC Voltage & DC Currents Testing set

Press **Range** to select range from pop-up menu



- Press **Clamp** to select the clamp to use



- Ripple voltage is 5V single range

4.3.2. Hold

Touching the probe and pressing **Hold** during measurement will hold the displayed measurement value, press again in this state to release Hold and display the current measurement value.

When Hold is activated, **HOLD** is displayed.

4.3.3. AutoHold

Press **Auto Hold** enables/disables auto hold and auto record, and activated, **A HOLD** is displayed on the screen.

AutoHold function is a function to automatically hold and hold when the value of measured value 1 (DC voltage or AC voltage) is more than 50 counts and a stable value is measured for more than 2 seconds.

4.3.4. AutoRec

AutoRec is a function that works at the same time as AutoHold. When activated, **A REC** is displayed on the screen.

When the measured value is held by the AutoHold function, the measured value is automatically saved. In the meter record, up to 1,000 V.A measured values can be saved.

4.4. VA String



No	Function	Description
①	measurement 1	V DC, V AC measured values are displayed.
②	measurement 2	V ripple, A DC, A AC measurements are displayed.
③	Bar-graph	Displays measured value 1 as a bar graph.
④	Auto hold, Auto record	Displays the activation status of the auto hold and auto save functions. When activated, when the value of measured value 1 is more than 50 counts and the value stabilizes for a certain period of time, it is automatically held and saved in the record.
⑤	Hold	Displayed when the measured value is fixed due to the hold operation.
⑥	string	The selected string name is displayed.
⑦	record	Displays saved records.
⑧	Selected string	Select string to record.
⑨	Voltage range	Set the voltage range. <Auto, 5V, 50V, 500V, 1000V>
⑩	Current clamp	When the current measurement function is selected in the mode, select the clamp to be used. <135BE, 130BE>
⑪	Auto hold	Enables/disables the Auto Hold and Auto Rec functions.

⑫	hold	Enable/disable the Hold function.
⑬	mode	Select measurement mode

5. Record

5.1. General

This product uses the following storage space structure.

- **Ω** Measurement record stores impedance, voltage, and temperature and measurement time.
- **VA** Measurement record stores measurement value 1, measurement value 2, and measurement time according to measurement set selection.
- Meter record measurement saves a record **Ω** and **VA** up to 1,000 measurement values each.
- Up to 250 strings can be written in string record measurement.
- The created string is used in **Ω** **VA**.
- One string can have a maximum of 512 cells.
- One string can store up to 60 **Ω** measurements (slot) for each cell.
- Records can store up to 512 **VA** measurement values in each string

[Refer below table]

Meter mode	Ω	max 1000 measurements		
	VA	max 1000 measurements		

String 001 ~250	Ω	String 001	1st measurement (Slot)	Cell 001
				
				Cell 512
				
			60th measurement (Slot)	Cell 001
				
				Cell 512
	VA	String 001	REC 001	
				
			REC 512	

5.2. Meter Record

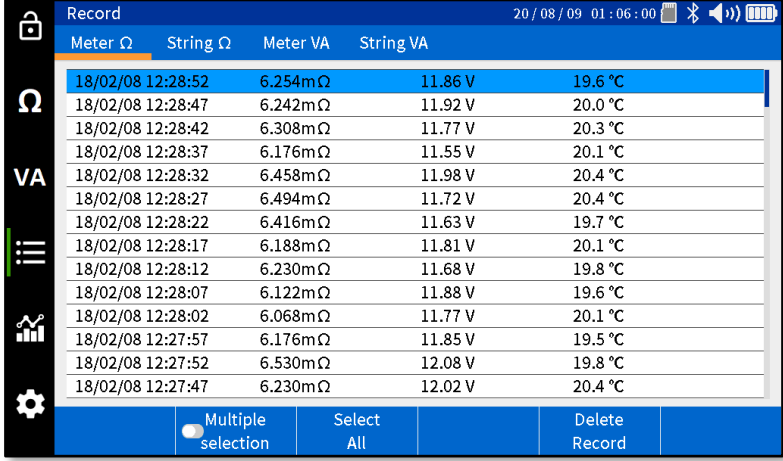
5.2.1. Meter record view

[Usage procedure]

- ① Press  and select **Meter Ω** in the tap.

Meter-impedance records are displayed.

Records are sorted chronologically starting with the most recent data.

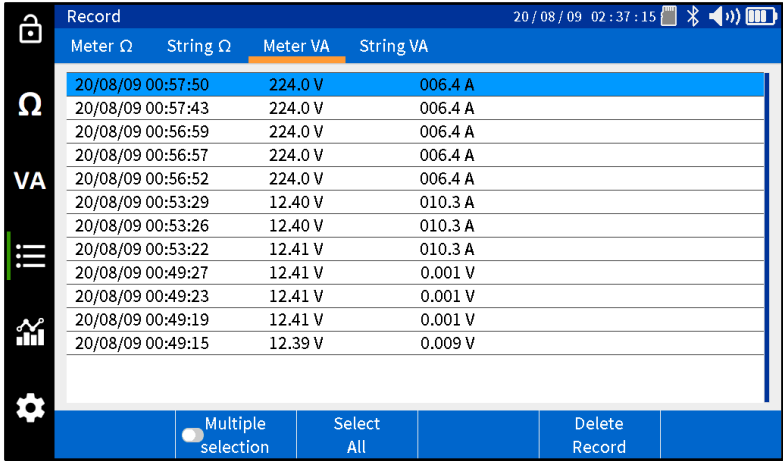


Record	Meter Ω	String Ω	Meter VA	String VA
18/02/08 12:28:52	6.254m Ω	11.86 V	19.6 °C	
18/02/08 12:28:47	6.242m Ω	11.92 V	20.0 °C	
18/02/08 12:28:42	6.308m Ω	11.77 V	20.3 °C	
18/02/08 12:28:37	6.176m Ω	11.55 V	20.1 °C	
18/02/08 12:28:32	6.458m Ω	11.98 V	20.4 °C	
18/02/08 12:28:27	6.494m Ω	11.72 V	20.4 °C	
18/02/08 12:28:22	6.416m Ω	11.63 V	19.7 °C	
18/02/08 12:28:17	6.188m Ω	11.81 V	20.1 °C	
18/02/08 12:28:12	6.230m Ω	11.68 V	19.8 °C	
18/02/08 12:28:07	6.122m Ω	11.88 V	19.6 °C	
18/02/08 12:28:02	6.068m Ω	11.77 V	20.1 °C	
18/02/08 12:27:57	6.176m Ω	11.85 V	19.5 °C	
18/02/08 12:27:52	6.530m Ω	12.08 V	19.8 °C	
18/02/08 12:27:47	6.230m Ω	12.02 V	20.4 °C	

- ② Press  and select **Meter VA** in the tap.

Meter-VA records are displayed.

Records are sorted chronologically starting with the most recent data.

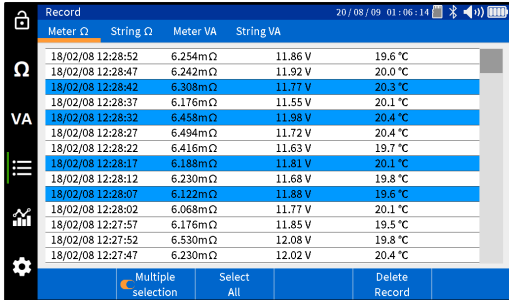


Record	Meter Ω	String Ω	Meter VA	String VA
20/08/09 00:57:50	224.0 V	006.4 A		
20/08/09 00:57:43	224.0 V	006.4 A		
20/08/09 00:56:59	224.0 V	006.4 A		
20/08/09 00:56:57	224.0 V	006.4 A		
20/08/09 00:56:52	224.0 V	006.4 A		
20/08/09 00:53:29	12.40 V	010.3 A		
20/08/09 00:53:26	12.40 V	010.3 A		
20/08/09 00:53:22	12.41 V	010.3 A		
20/08/09 00:49:27	12.41 V	0.001 V		
20/08/09 00:49:23	12.41 V	0.001 V		
20/08/09 00:49:19	12.41 V	0.001 V		
20/08/09 00:49:15	12.39 V	0.009 V		

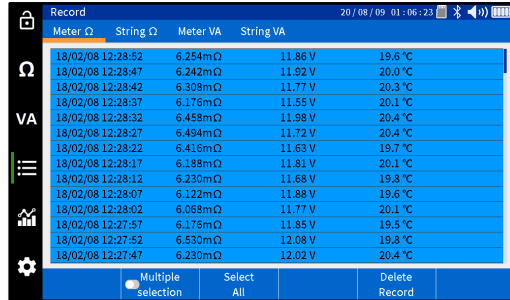
5.2.2. Meter Record Delete

[Usage procedure]

- ① Press  and select **Meter Ω** or **Meter VA** on the record screen
- ② You can select one record by selecting the record item.
- ③ Press  **Multiple Selection** to activate, you can select multiple records.
- ④ Press **Select All** to select all records.

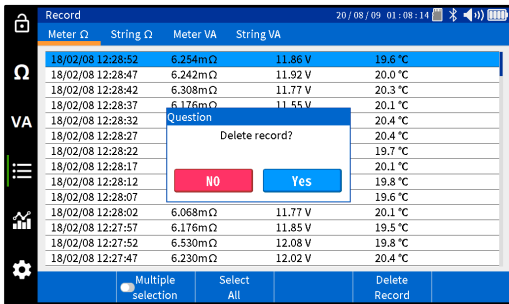


Meter Ω	String Ω	Meter VA	String VA
18/02/08 12:28:52	6.254m Ω	11.86 V	19.6 °C
18/02/08 12:28:47	6.242m Ω	11.92 V	20.0 °C
18/02/08 12:28:42	6.308m Ω	11.77 V	20.3 °C
18/02/08 12:28:37	6.176m Ω	11.55 V	20.1 °C
18/02/08 12:28:32	6.458m Ω	11.98 V	20.4 °C
18/02/08 12:28:27	6.494m Ω	11.72 V	20.4 °C
18/02/08 12:28:22	6.416m Ω	11.63 V	19.7 °C
18/02/08 12:28:17	6.188m Ω	11.81 V	20.1 °C
18/02/08 12:28:12	6.230m Ω	11.68 V	19.8 °C
18/02/08 12:28:07	6.122m Ω	11.88 V	19.6 °C
18/02/08 12:28:02	6.068m Ω	11.77 V	20.1 °C
18/02/08 12:27:57	6.176m Ω	11.85 V	19.5 °C
18/02/08 12:27:52	6.530m Ω	12.08 V	19.8 °C
18/02/08 12:27:47	6.230m Ω	12.02 V	20.4 °C



Meter Ω	String Ω	Meter VA	String VA
18/02/08 12:28:52	6.254m Ω	11.86 V	19.6 °C
18/02/08 12:28:47	6.242m Ω	11.92 V	20.0 °C
18/02/08 12:28:42	6.308m Ω	11.77 V	20.3 °C
18/02/08 12:28:37	6.176m Ω	11.55 V	20.1 °C
18/02/08 12:28:32	6.458m Ω	11.98 V	20.4 °C
18/02/08 12:28:27	6.494m Ω	11.72 V	20.4 °C
18/02/08 12:28:22	6.416m Ω	11.63 V	19.7 °C
18/02/08 12:28:17	6.188m Ω	11.81 V	20.1 °C
18/02/08 12:28:12	6.230m Ω	11.68 V	19.8 °C
18/02/08 12:28:07	6.122m Ω	11.88 V	19.6 °C
18/02/08 12:28:02	6.068m Ω	11.77 V	20.1 °C
18/02/08 12:27:57	6.176m Ω	11.85 V	19.5 °C
18/02/08 12:27:52	6.530m Ω	12.08 V	19.8 °C
18/02/08 12:27:47	6.230m Ω	12.02 V	20.4 °C

- ⑤ Press **Delete Record**, A confirmation dialog box appears.



Meter Ω	String Ω	Meter VA	String VA
18/02/08 12:28:52	6.254m Ω	11.86 V	19.6 °C
18/02/08 12:28:47	6.242m Ω	11.92 V	20.0 °C
18/02/08 12:28:42	6.308m Ω	11.77 V	20.3 °C
18/02/08 12:28:37	6.176m Ω	11.55 V	20.1 °C
18/02/08 12:28:32	6.458m Ω	11.98 V	20.4 °C
18/02/08 12:28:27	6.494m Ω	11.72 V	20.4 °C
18/02/08 12:28:22	6.416m Ω	11.63 V	19.7 °C
18/02/08 12:28:17	6.188m Ω	11.81 V	20.1 °C
18/02/08 12:28:12	6.230m Ω	11.68 V	19.8 °C
18/02/08 12:28:07	6.122m Ω	11.88 V	19.6 °C
18/02/08 12:28:02	6.068m Ω	11.77 V	20.1 °C
18/02/08 12:27:57	6.176m Ω	11.85 V	19.5 °C
18/02/08 12:27:52	6.530m Ω	12.08 V	19.8 °C
18/02/08 12:27:47	6.230m Ω	12.02 V	20.4 °C

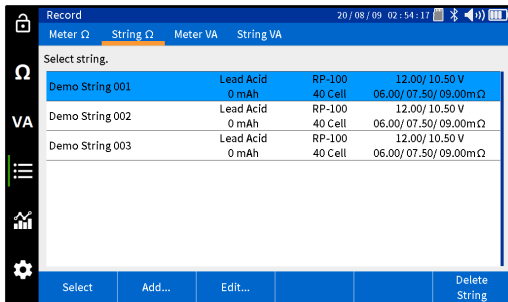
- ⑥ Press **Yes** to delete.

5.3. String Management

5.3.1. String Listing

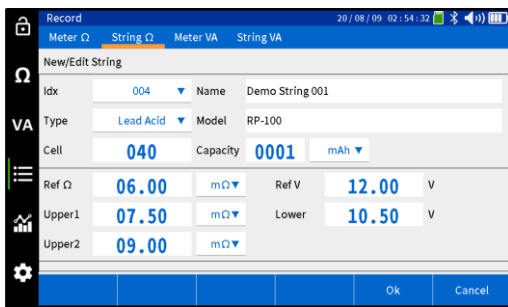
- ① Press  and select **String Ω** on the screen

A list of stored strings is displayed.

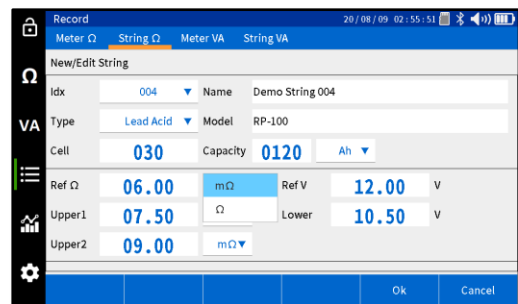
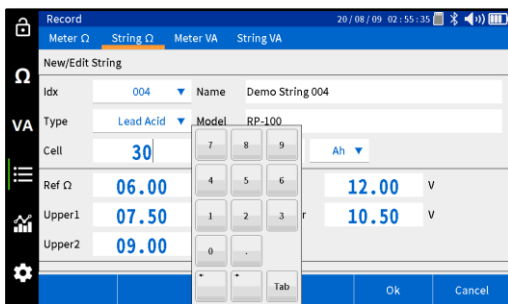
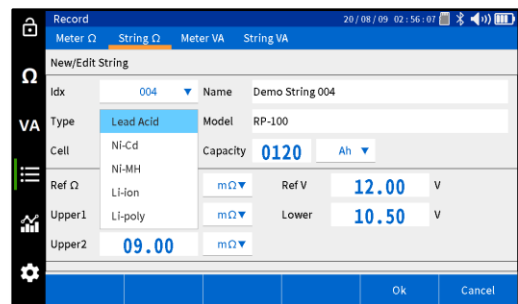
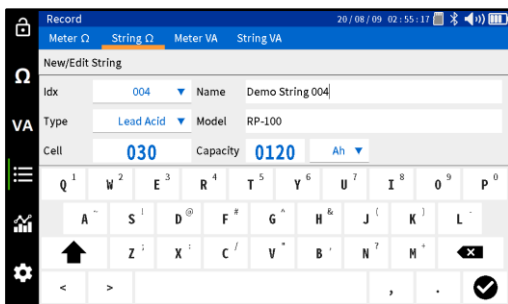


- ② If there is already a string with similar properties, if you touch it, you can start editing by copying the properties of the selected string when editing.
- ③ Press **Add...** to display the string add/edit screen.

The property of string 1 that was previously selected has been copied.



- ④ Touch the item that needs to be edited to modify it.



- ⑤ Press **OK** to finish editing and display the strings added to the list.

Select string.			
Demo String 001	Lead Acid 0 mAh	RP-100 40 Cell	12.00/ 10.50 V 06.00/ 07.50/ 09.00mΩ
Demo String 002	Lead Acid 0 mAh	RP-100 40 Cell	12.00/ 10.50 V 06.00/ 07.50/ 09.00mΩ
Demo String 003	Lead Acid 0 mAh	RP-100 40 Cell	12.00/ 10.50 V 06.00/ 07.50/ 09.00mΩ
Demo String 004	Lead Acid 120 Ah	RP-100 30 Cell	12.00/ 10.50 V 06.00/ 07.50/ 09.00mΩ

Buttons: Select, Add..., Edit..., Delete String

5.3.2. String Edit

- ① Press **≡** and select **String Ω** on the record screen
A list of stored strings is displayed.

Select string.			
Demo String 001	Lead Acid 0 mAh	RP-100 40 Cell	12.00/ 10.50 V 06.00/ 07.50/ 09.00mΩ
Demo String 002	Lead Acid 0 mAh	RP-100 40 Cell	12.00/ 10.50 V 06.00/ 07.50/ 09.00mΩ
Demo String 003	Lead Acid 0 mAh	RP-100 40 Cell	12.00/ 10.50 V 06.00/ 07.50/ 09.00mΩ

Buttons: Select, Add..., Edit..., Delete String

- ② Press **Edit...** to display the string add/edit screen.

Idx: 004 Name: Demo String 004

Type: Lead Acid Model: RP-100

Cell: 030 Capacity: 0120 Ah

Ref Ω: 06.00 mΩ Ref V: 12.00 V

Upper1: 07.50 mΩ Lower: 10.50 V

Upper2: 09.00 mΩ

Buttons: Ok, Cancel

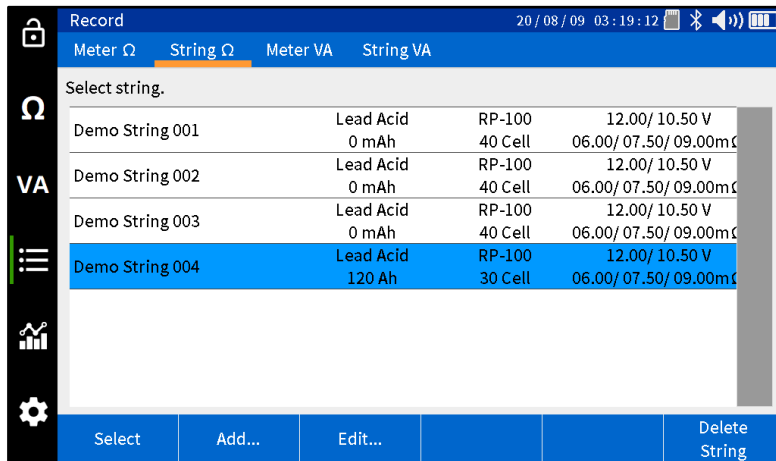
- ③ Edit the properties of a string in the same way as when creating a string.
④ Press **OK** displays the modified string in the string list

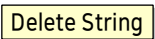
5.3.3. Delete string

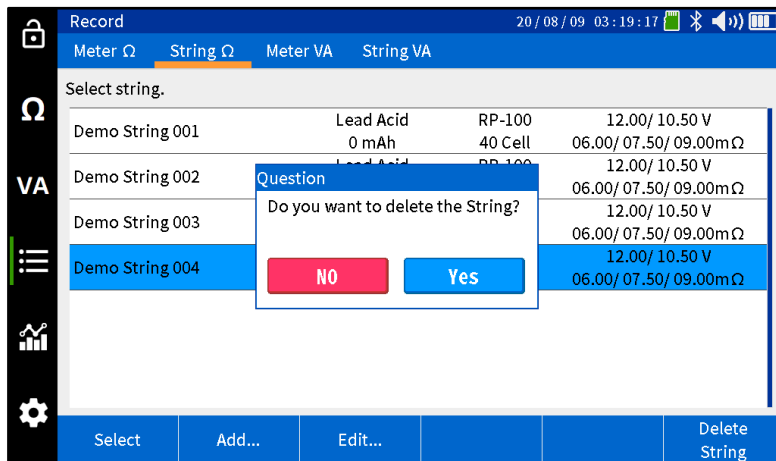
This function is used to delete a string that is no longer needed. Records stored in the deleted string are also deleted.

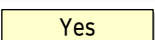
- ① Press  and then press .

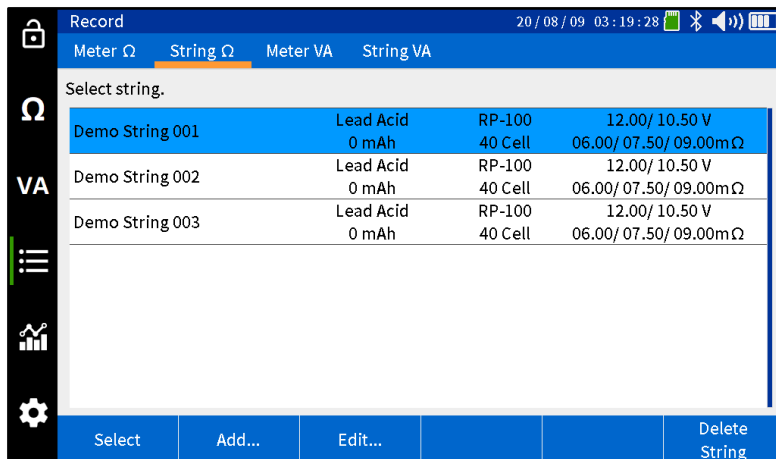
A list of stored strings is displayed.



- ② Press  a confirmation message appears on the screen



- ③ Press  to the complete deletion. If there are many saved records, it takes time to delete them.

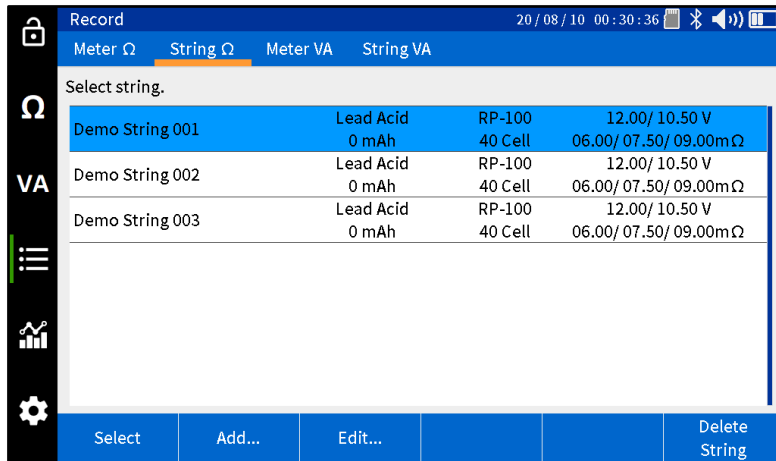


5.4. String record management

5.4.1. Impedance record

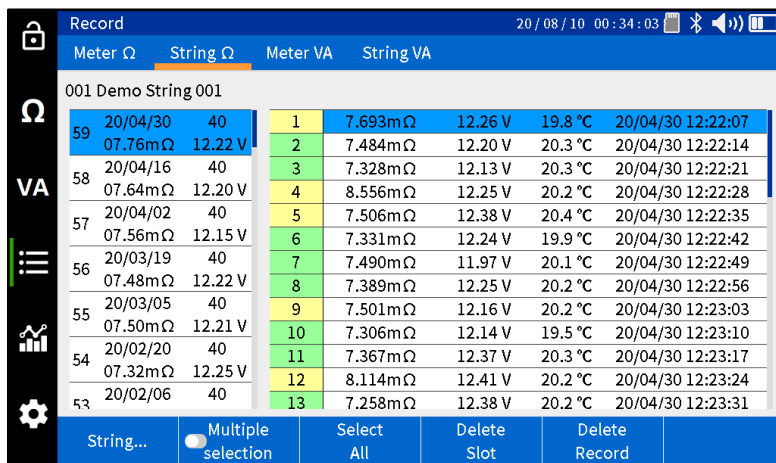
- ① Press  and select **String Ω** on the record screen.

A list of stored strings is displayed.

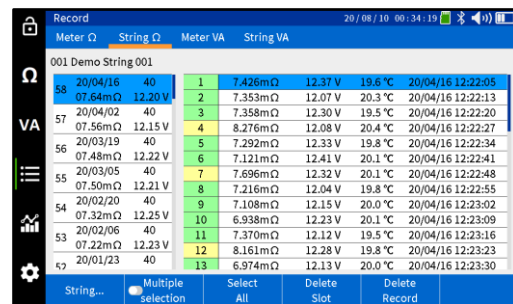
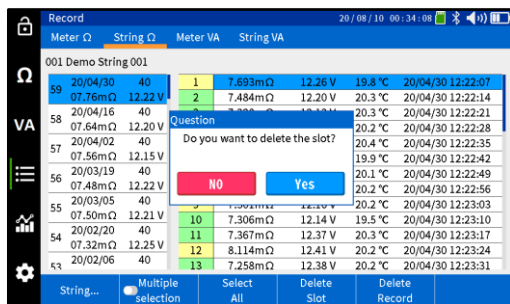


- ② Select the desired string and press **Select**.

- The slot list of the selected string is displayed on the left, and the measurement time, number of records, and average impedance value are displayed. On the right, the records of the selected slot appear.



- If you change the slot by touching it, the record of the selected slot is displayed on the right.
- If you touch a slot to select it and press **Delete Slot**, a confirmation message appears to confirm the deletion. You can delete a slot by pressing **Yes**.



- If you touch a record, you can select one record. If multiple selections are required, press **Multiple Selection** to activate.
- Press **Select All** to select the entire record of the slot.

Record		String Ω		Meter VA		String VA	
001 Demo String 001							
58	20/04/16 40	1	7.426mΩ	12.37 V	19.6 °C	20/04/16 12:22:05	
	07.64mΩ 12.20 V	2	7.353mΩ	12.07 V	20.3 °C	20/04/16 12:22:13	
57	20/04/02 40	3	7.358mΩ	12.30 V	19.5 °C	20/04/16 12:22:20	
	07.56mΩ 12.15 V	4	8.276mΩ	12.08 V	20.4 °C	20/04/16 12:22:27	
56	20/03/19 40	5	7.292mΩ	12.33 V	19.8 °C	20/04/16 12:22:34	
	07.48mΩ 12.22 V	6	7.121mΩ	12.41 V	20.1 °C	20/04/16 12:22:41	
55	20/03/05 40	7	7.696mΩ	12.32 V	20.1 °C	20/04/16 12:22:48	
	07.50mΩ 12.21 V	8	7.216mΩ	12.04 V	19.8 °C	20/04/16 12:22:55	
54	20/02/20 40	9	7.108mΩ	12.15 V	20.0 °C	20/04/16 12:23:02	
	07.32mΩ 12.25 V	10	6.938mΩ	12.23 V	20.1 °C	20/04/16 12:23:09	
53	20/02/06 40	11	7.370mΩ	12.12 V	19.5 °C	20/04/16 12:23:16	
	07.22mΩ 12.23 V	12	8.161mΩ	12.28 V	19.8 °C	20/04/16 12:23:23	
52	20/01/23 40	13	6.974mΩ	12.13 V	20.0 °C	20/04/16 12:23:30	

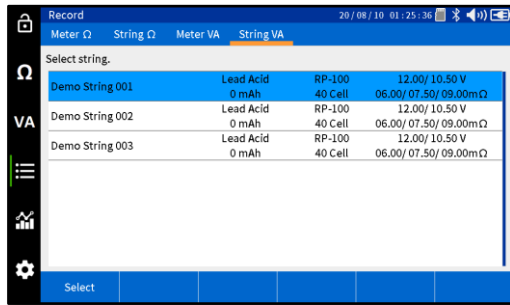
- Press **Delete Record** to delete the selected record. You will be prompted to confirm the deletion. You can delete record **Yes** by pressing.

Record		String Ω		Meter VA		String VA	
001 Demo String 001							
58	20/04/16 40	1	7.426mΩ	12.37 V	19.6 °C	20/04/16 12:22:05	
	07.64mΩ 12.20 V	2	7.353mΩ	12.07 V	20.3 °C	20/04/16 12:22:13	
57	20/04/02 40	3	7.358mΩ	12.30 V	19.5 °C	20/04/16 12:22:20	
	07.56mΩ 12.15 V	4	8.276mΩ	12.08 V	20.4 °C	20/04/16 12:22:27	
56	20/03/19 40	5	7.292mΩ	12.33 V	19.8 °C	20/04/16 12:22:34	
	07.48mΩ 12.22 V	6	7.121mΩ	12.41 V	20.1 °C	20/04/16 12:22:41	
55	20/03/05 40	7	7.696mΩ	12.32 V	20.1 °C	20/04/16 12:22:48	
	07.50mΩ 12.21 V	8	7.216mΩ	12.04 V	19.8 °C	20/04/16 12:22:55	
54	20/02/20 40	9	7.108mΩ	12.15 V	20.0 °C	20/04/16 12:23:02	
	07.32mΩ 12.25 V	10	6.938mΩ	12.23 V	20.1 °C	20/04/16 12:23:09	
53	20/02/06 40	11	7.370mΩ	12.12 V	19.5 °C	20/04/16 12:23:16	
	07.22mΩ 12.23 V	12	8.161mΩ	12.28 V	19.8 °C	20/04/16 12:23:23	
52	20/01/23 40	13	6.974mΩ	12.13 V	20.0 °C	20/04/16 12:23:30	

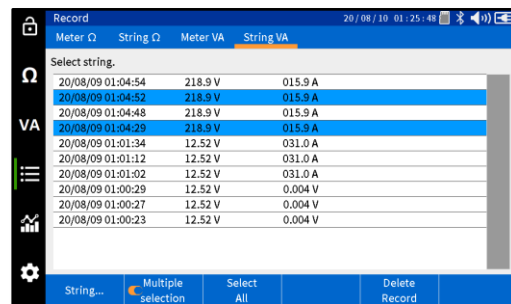
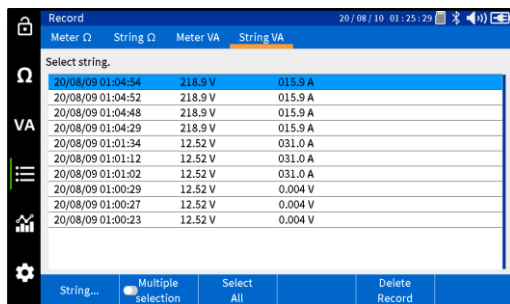
Record		String Ω		Meter VA		String VA	
001 Demo String 001							
58	20/04/16 40	2	7.353mΩ	12.07 V	20.3 °C	20/04/16 12:22:13	
	07.64mΩ 12.20 V	4	8.276mΩ	12.08 V	20.4 °C	20/04/16 12:22:27	
57	20/04/02 40	5	7.292mΩ	12.33 V	19.8 °C	20/04/16 12:22:34	
	07.56mΩ 12.15 V	6	7.121mΩ	12.41 V	20.1 °C	20/04/16 12:22:41	
56	20/03/19 40	7	7.696mΩ	12.32 V	20.1 °C	20/04/16 12:22:48	
	07.48mΩ 12.22 V	8	7.216mΩ	12.04 V	19.8 °C	20/04/16 12:22:55	
55	20/03/05 40	9	7.108mΩ	12.15 V	20.0 °C	20/04/16 12:23:02	
	07.50mΩ 12.21 V	10	6.938mΩ	12.23 V	20.1 °C	20/04/16 12:23:09	
54	20/02/20 40	11	7.370mΩ	12.12 V	19.5 °C	20/04/16 12:23:16	
	07.32mΩ 12.25 V	12	8.161mΩ	12.28 V	19.8 °C	20/04/16 12:23:23	
53	20/02/06 40	13	6.974mΩ	12.13 V	20.0 °C	20/04/16 12:23:30	
	07.22mΩ 12.23 V	14	8.017mΩ	11.95 V	19.5 °C	20/04/16 12:23:37	
52	20/01/23 40	15	7.093mΩ	12.20 V	20.3 °C	20/04/16 12:23:44	

5.5. V.A Record

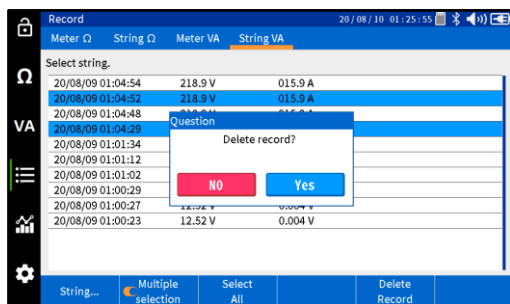
- Press  and select **String VA** on the record screen
A list of stored strings is displayed.



- Select the desired string and press **Select**.
- The VA records of the string are displayed. You can select one record by touching the record. If multiple selections are required, press **Multiple Selection** to activate. Press **Select All** to select all records



- Press **Delete Record** to delete the selected record. You will be prompted to confirm the deletion. You can delete record **Yes** by pressing.



6. Analysis

6.1. General

In the analysis function, the following analysis is possible using the measured data stored in the record.

Check the impedance change over time of a specific cell

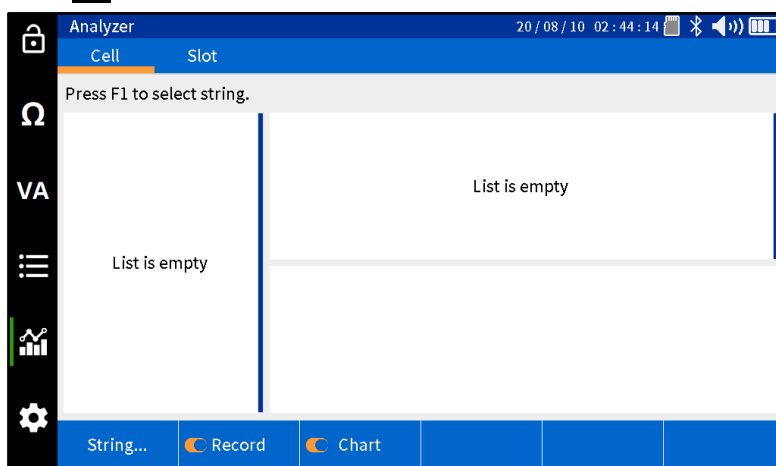
This function is used to predict the degree of deterioration and replacement time of the battery. It can be used as a reference material for the time of cell replacement by checking the trend of the change in impedance of the cell using measured and stored cell data.

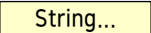
6.2. Use analysis function

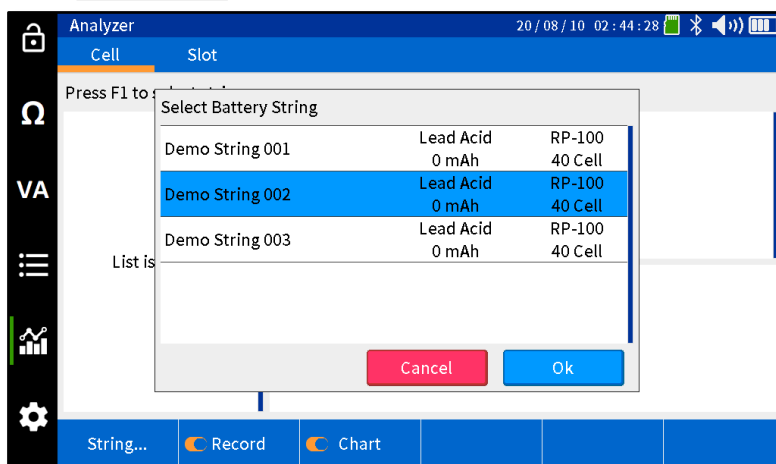
6.2.1. Cell analysis

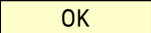
[Usage procedure]

- ① Press  and select a cell in the Tab

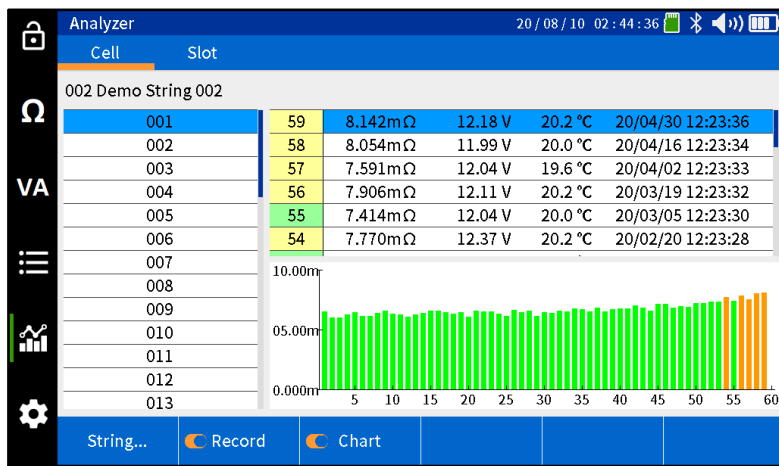


- ② Press  and opens the string selection dialog

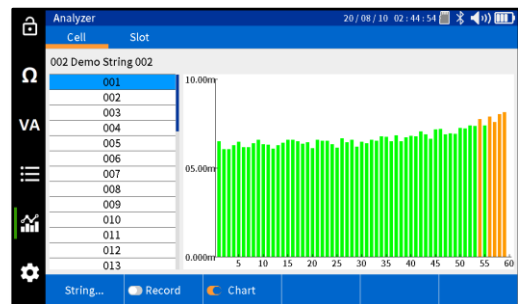
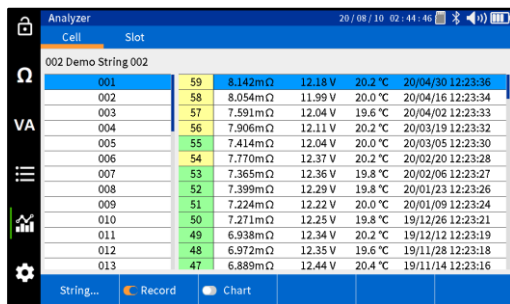


- ③ Select the desired string and press .

Cell numbers are listed on the left, and records and charts of the selected cell are displayed on the right.



- ④ Press ☐ Record ☐ Chart to show or hide records and charts on the screen.
When one is hidden, the other is made larger.

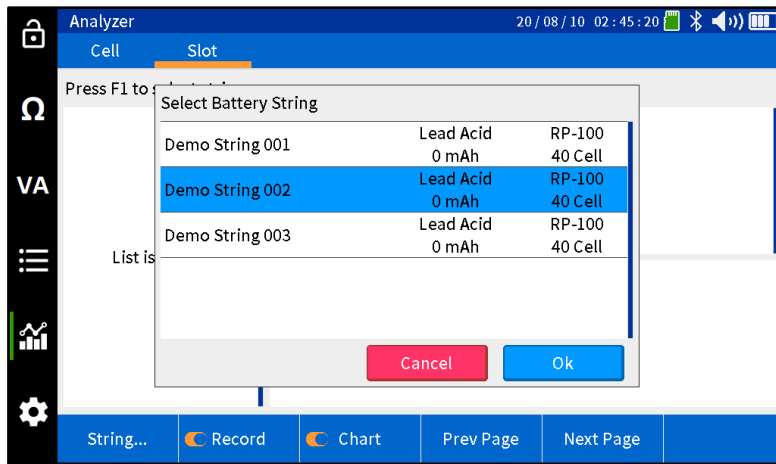


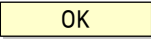
6.2.2. Slot Analyzer

[Usage procedure]

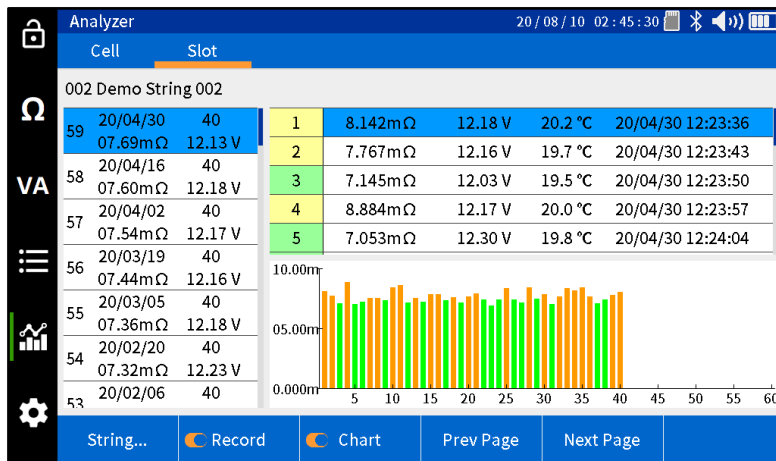
- ① Press  and select a slot from the Tap.

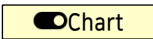
Press  to open the string selection dialog



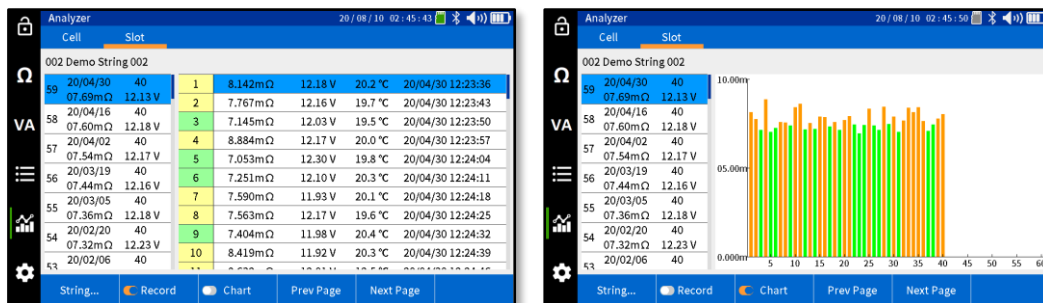
- ② Select the desired string and press .

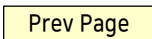
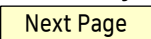
- ③ Cell numbers are listed on the left, and records and charts for the selected slot are displayed on the right.



- ④   Tap to show or hide records and charts on the screen.

When one is hidden, the other is made larger.



- ⑤ If there are more than 60 cells in the slot, they are not displayed in the chart at once. To move the page, press   to switch the display divided by 60

7. PC S/W

7.1. General

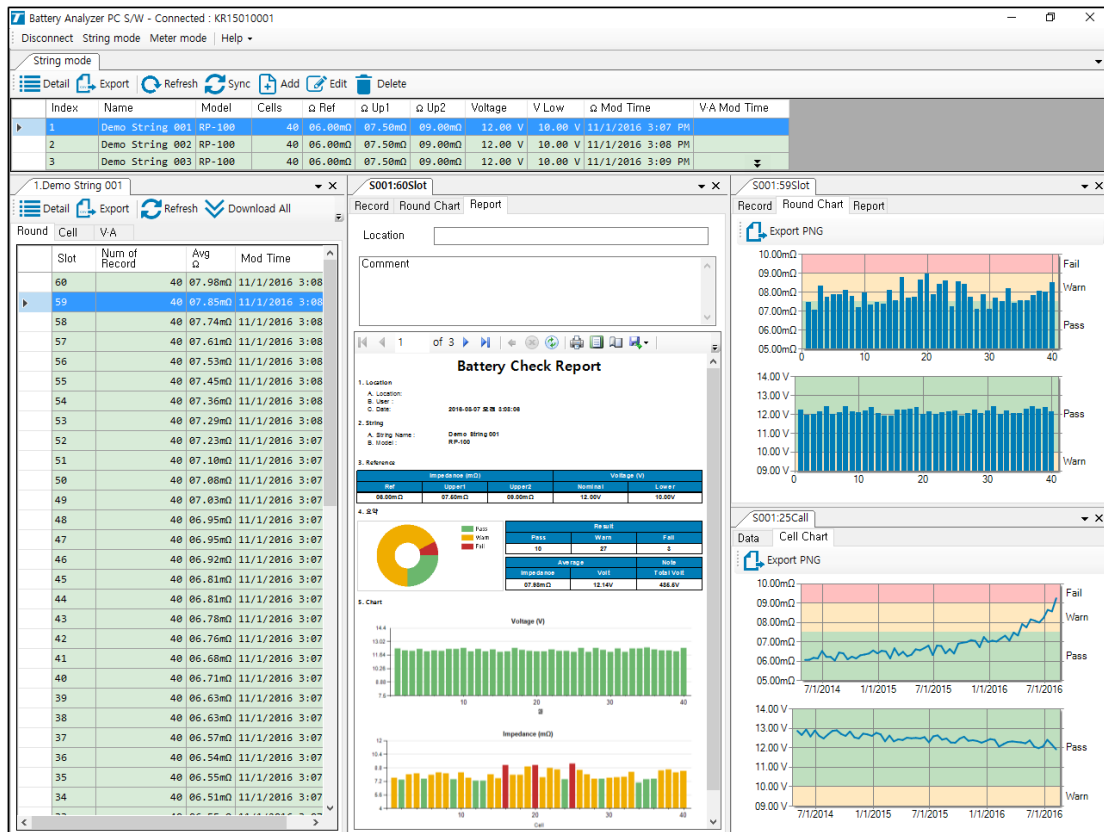
The following functions can be used by using PC S/W.

- Measurement data stored in the record is transferred to the computer.
- Add, edit or delete record strings.
- Delete stored data.
- You can check the data stored in the record in tables and charts.
- The data saved in the record can be saved as an Excel file.
- The data saved in the record can be saved and printed as a report.
- Saved data transmitted from previous connection can be checked without connection to product

7.2. Requirement

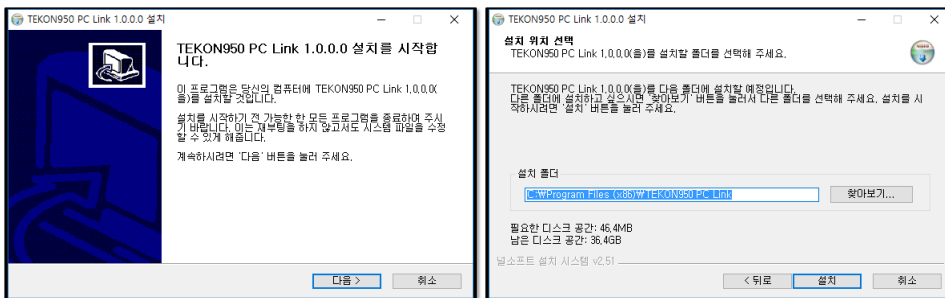
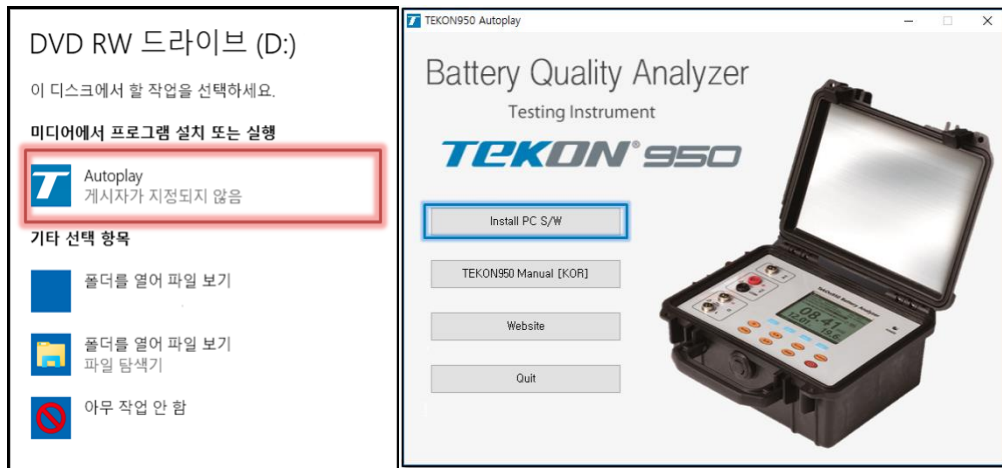
To use S/W, requires following PC specifications

- OS Windows 7, 8, 8.1, 10 (x86/x64)
- 1GB RAM
- 100MB Hard Disk space
- Bluetooth Communications function (If not, use through Bluetooth Dongle)

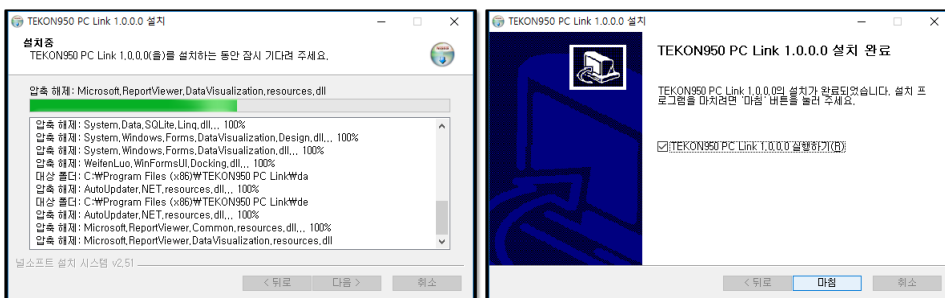


7.3. PC S/W Installation

- Insert Installation CD
- When below display appears, select 'AutoPlay'
- At below menu, select 'Install PC S/W'.



- Click 'Next'. Click 'Install'.



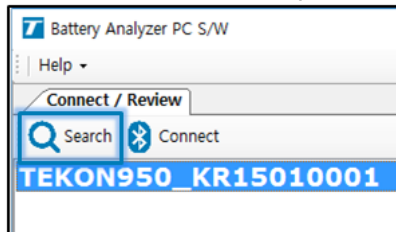
Click 'Next'. Click 'End'.

- After Installation completed, will add PROGRAM Icon on display .

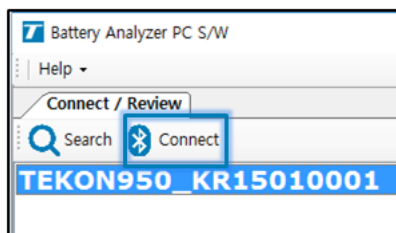
7.4. How to use S/W

7.4.1. Connection

- To connect via USB, connect the device and PC with a USB cable.
When you press the USB button, SW searches for the product and connects.
- Check whether  bluetooth symbol appears on Upper display
When OFF, press "USER" key to move to User Set Up Display and do bluetooth ON
- After PC S/W executed, press "Device search" to search Unit

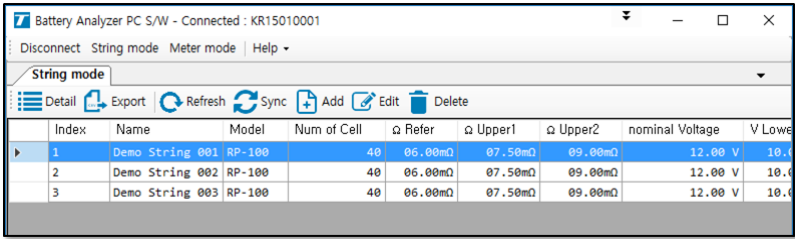


- Unit is on List, click to check serial number and press Connect after selection Then, connected.



- After connected, following proceed automatically.
 - Read the unit information whether Support is available or not.
 - Synchronize Unit time and Computer time.
 - Receive String list .

7.4.2. String list



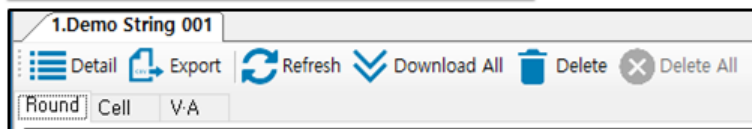
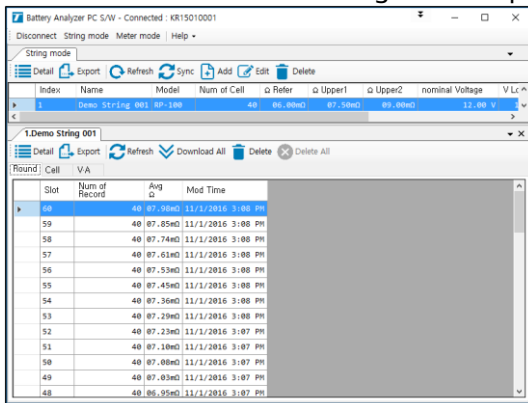
When Unit is connected, String list is automatically displayed.
When closed, click “string mode’ on upper display to appear on display.



Function	Description																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Detail	Indicates slot list of selected string																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Send	save String list to Excel File . 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7.4.3. String

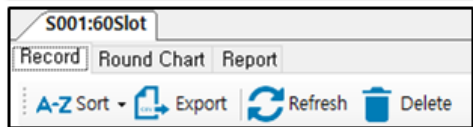
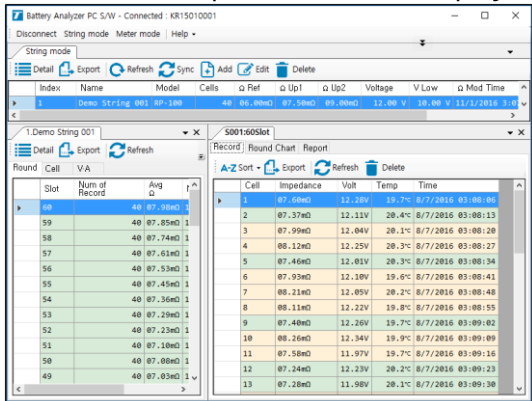
Press 'Detail' button in String list to display information'



Function	설명																																																						
Detail	Slot Tap : display Record of selected slot. Cell Tap : display Record (measurement data change) of selected cell																																																						
Export	Export slot, V.A record into Excel file <table><tr><td colspan="3">Summary</td></tr><tr><td>Slot</td><td>Num of Record</td><td>Avg Ω</td></tr><tr><td>60</td><td>40</td><td>07.98mΩ</td></tr><tr><td>59</td><td>40</td><td>07.85mΩ</td></tr><tr><td>58</td><td>40</td><td>07.74mΩ</td></tr><tr><td>57</td><td>40</td><td>07.61mΩ</td></tr><tr><td>56</td><td>40</td><td>07.53mΩ</td></tr><tr><td>55</td><td>40</td><td>07.45mΩ</td></tr></table> <table><tr><td colspan="6">Slot 60</td></tr><tr><td>Cell #</td><td>Impedance</td><td>Volt</td><td>Temp</td><td>Time</td><td>Result</td></tr><tr><td>1</td><td>07.60mΩ</td><td>12.28V</td><td>19.7℃</td><td>2016-08-07 3:08</td><td>Warn</td></tr><tr><td>2</td><td>07.37mΩ</td><td>12.11V</td><td>20.4℃</td><td>2016-08-07 3:08</td><td>Pass</td></tr><tr><td>3</td><td>07.99mΩ</td><td>12.04V</td><td>20.1℃</td><td>2016-08-07 3:08</td><td>Warn</td></tr></table>	Summary			Slot	Num of Record	Avg Ω	60	40	07.98mΩ	59	40	07.85mΩ	58	40	07.74mΩ	57	40	07.61mΩ	56	40	07.53mΩ	55	40	07.45mΩ	Slot 60						Cell #	Impedance	Volt	Temp	Time	Result	1	07.60mΩ	12.28V	19.7℃	2016-08-07 3:08	Warn	2	07.37mΩ	12.11V	20.4℃	2016-08-07 3:08	Pass	3	07.99mΩ	12.04V	20.1℃	2016-08-07 3:08	Warn
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2	07.37mΩ	12.11V	20.4℃	2016-08-07 3:08	Pass																																																		
3	07.99mΩ	12.04V	20.1℃	2016-08-07 3:08	Warn																																																		
Refresh	refresh slot list																																																						
Download All	Transmit all records in 1 string																																																						
Delete	erase selected slot.																																																						
Slot tap	display slot list																																																						
Cell tap	display String Cell in the order of higher impedance. after select cell and press ' detail ' to display measurement data change according to time.																																																						
V.A Tap	display V.A. Record of string																																																						

7.4.4. Impedance record

After select slot, press 'detail' to display Record of the slot.



Function	Description																																																
Sort	Select Record sort method. Cell Number/Impedance/Voltage																																																
Export	Save Impedance record to Excel file <table><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td colspan="8">Slot 60</td></tr><tr><td>Cell #</td><td>Impedance</td><td>Volt</td><td>Temp</td><td>Time</td><td>Result</td><td></td><td></td></tr><tr><td>1</td><td>07.60mΩ</td><td>12.28V</td><td>19.7℃</td><td>2016-08-07 3:08</td><td>Warn</td><td></td><td></td></tr><tr><td>2</td><td>07.37mΩ</td><td>12.11V</td><td>20.4℃</td><td>2016-08-07 3:08</td><td>Pass</td><td></td><td></td></tr><tr><td>3</td><td>07.99mΩ</td><td>12.04V</td><td>20.1℃</td><td>2016-08-07 3:08</td><td>Warn</td><td></td><td></td></tr></table>									Slot 60								Cell #	Impedance	Volt	Temp	Time	Result			1	07.60mΩ	12.28V	19.7℃	2016-08-07 3:08	Warn			2	07.37mΩ	12.11V	20.4℃	2016-08-07 3:08	Pass			3	07.99mΩ	12.04V	20.1℃	2016-08-07 3:08	Warn		
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Cell #	Impedance	Volt	Temp	Time	Result																																												
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2	07.37mΩ	12.11V	20.4℃	2016-08-07 3:08	Pass																																												
3	07.99mΩ	12.04V	20.1℃	2016-08-07 3:08	Warn																																												
Refresh	Refresh record																																																

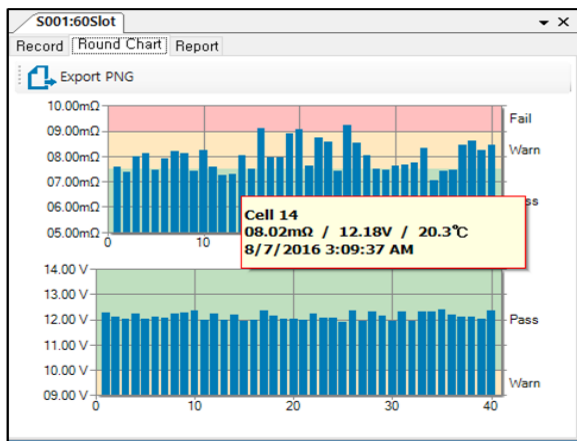
□ Record tap

- display saved measurement data and time.
- Result on Limit displayed in Color
Green [Pass]
Yellow [Warning]
Red [Fail]
- Press Export to save to Excel.

Cell	Impedance	Volt	Temp	Time
1	07.60mΩ	12.28V	19.7℃	8/7/2016 03:08:06
2	07.37mΩ	12.11V	20.4℃	8/7/2016 03:08:13
3	07.99mΩ	12.04V	20.1℃	8/7/2016 03:08:20
4	08.12mΩ	12.25V	20.3℃	8/7/2016 03:08:27
5	07.46mΩ	12.01V	20.3℃	8/7/2016 03:08:34
6	07.93mΩ	12.10V	19.6℃	8/7/2016 03:08:41
7	08.21mΩ	12.05V	20.2℃	8/7/2016 03:08:48
8	08.11mΩ	12.22V	19.8℃	8/7/2016 03:08:55
9	07.40mΩ	12.26V	19.7℃	8/7/2016 03:09:02
10	08.26mΩ	12.34V	19.9℃	8/7/2016 03:09:09
11	07.58mΩ	11.97V	19.7℃	8/7/2016 03:09:16
12	07.24mΩ	12.23V	20.2℃	8/7/2016 03:09:23
13	07.28mΩ	11.98V	20.1℃	8/7/2016 03:09:30

❑ Slot chart tap

- Records displayed in Chart. Locate Cursor on Graph to display measurement data of cell .
- displayed chart can be saved in Image.



❑ Report Tap

- Formulate Report .
- Can input Installed Location, person name who measured, Comment.
- Formulated Report can be printed or saved in File .

S001:60Slot

Record Round Chart Report

Location User

Comment

1 of 3 100% Find Next

Battery Check Report

1. Location
 A. Location:
 B. User :
 C. Date: 2016-08-07 오전 3:08:06

2. String
 A. String Name : Demo String 001
 B. Model : RP-100

3. Reference

Ref	Impedance (mΩ)		Voltage (V)	
	Upper1	Upper2	Nominal	Lower
06.00mΩ	07.50mΩ	09.00mΩ	12.00V	10.00V

4. 요약



Pass
Warn
Fail

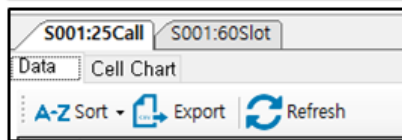
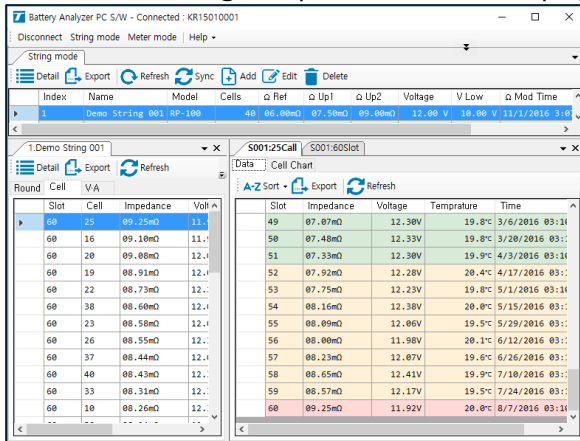
Result		
Pass	Warn	Fail
10	27	3

Average		Note
Impedance	Volt	Total Volt
07.98mΩ	12.14V	485.5V

5. Chart

7.4.5. Cell record

Select cell in string and press “Detail” to display change trend of measurement data.



Function	Description																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Export	save Impedance record to Excel <table><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td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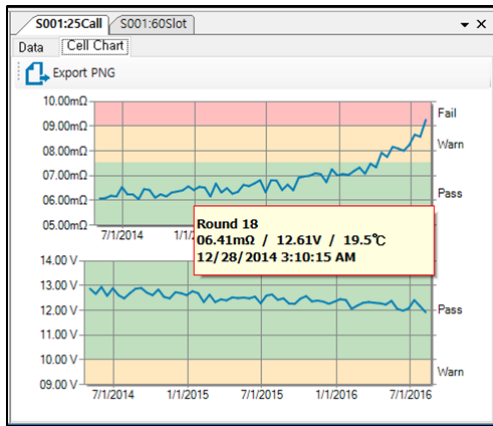
□ Record tap

- display measurement data and time of selected cell.
- can check change of measurement data followed by time.
- Result on Limit displayed in Color (Green [Pass] / Yellow[warning] / Red [Fail])
- Press SEND to save to Excel .

Slot	Impedance	Voltage	Temperature	Time
49	07.07mΩ	12.30V	19.8℃	3/6/2016 03:14
50	07.48mΩ	12.33V	19.8℃	3/20/2016 03:14
51	07.33mΩ	12.30V	19.9℃	4/3/2016 03:14
52	07.92mΩ	12.28V	20.4℃	4/17/2016 03:14
53	07.75mΩ	12.23V	19.8℃	5/11/2016 03:14
54	08.16mΩ	12.38V	20.0℃	5/15/2016 03:14
55	08.09mΩ	12.06V	19.5℃	5/29/2016 03:14
56	08.00mΩ	11.98V	20.1℃	6/12/2016 03:14
57	08.23mΩ	12.07V	19.6℃	6/26/2016 03:14
58	08.65mΩ	12.41V	19.9℃	7/10/2016 03:14
59	08.57mΩ	12.17V	19.5℃	7/24/2016 03:14
60	09.25mΩ	11.92V	20.0℃	8/7/2016 03:14

□ Cell Chart tap

- Cell Record displayed in Chart. Can check change of Impedance and Voltage
- Records displayed in Chart .
- Locate Cursor on Graph to display measurement data of cell.
- Displayed chart can be saved in Image



7.4.6. Replay

- Transmitted data from Unit is saved in PC.
- Recall function enables to use downloaded data without connecting Unit
- Through a full sync when connected to the product receiving and leave all the records, you can use most of the functions except the functions necessary to connect using the View feature.
- When data is no longer necessary, press Cash Data erase button to erase data of selected serial number .

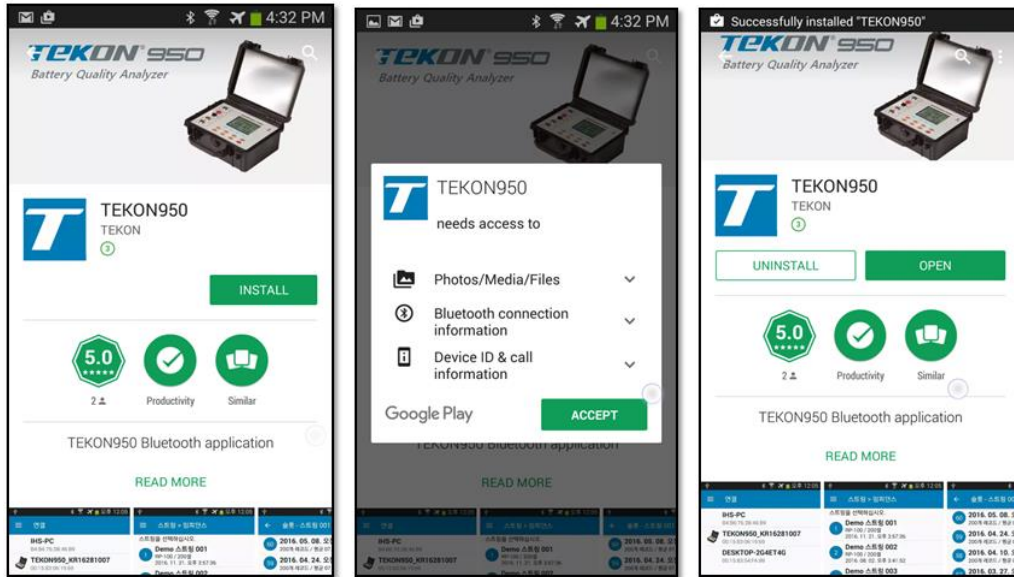
7.4.7. S/W erase

Control panel- Software can be erased from Program and function

8. Android APP

8.1. Install

Search and install 'TEKON Battery Analyzer' on Google Play.



8.2. Connection

Run the application, the connection screen is displayed.

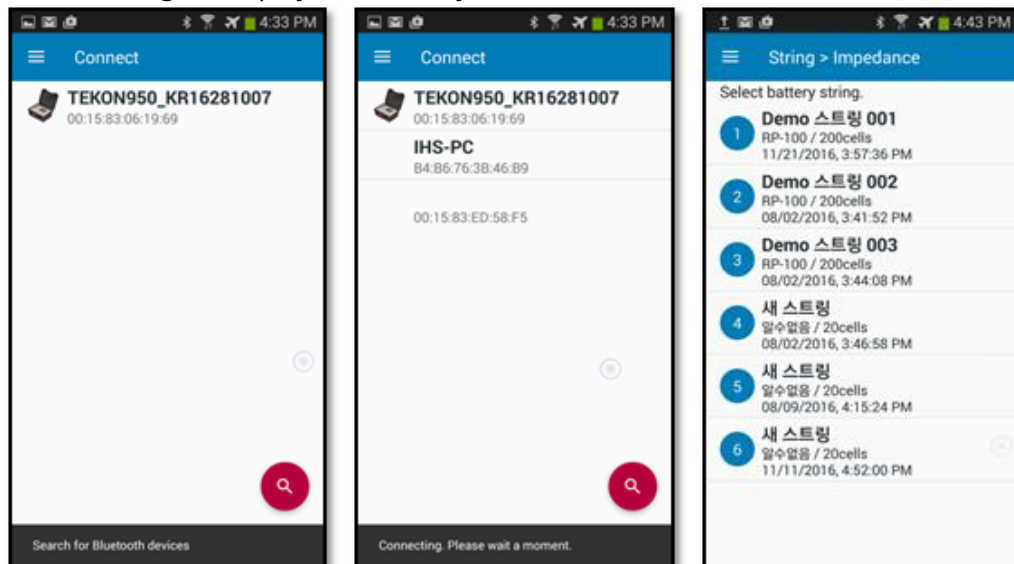
Check the bluetooth status display at the top of device.

If it is off, turn it on in the USER screen.

If you can not find the device you want to connect to the application, press the Search button in the bottom right corner to find the Bluetooth device nearby.

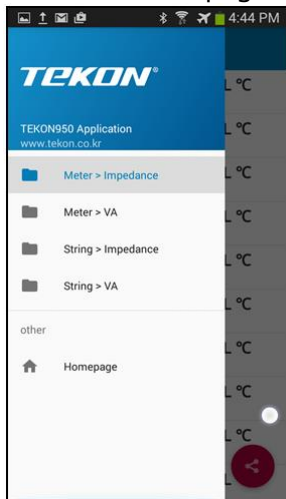
Confirm the serial number and touch to connect.

A list of strings is displayed after they are connected.



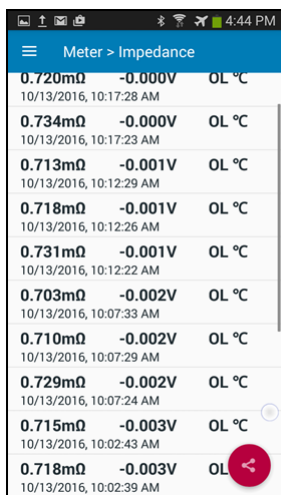
8.3. Using the menu

- press the menu button () on the upper left corner of the application, a menu for selecting the record appears.
 - Meter > Impedance
 - Meter > VA
 - String > Impedance
 - String > VA
- Select the record you want to use.
- Select the homepage the website of TEKON is displayed.



8.3.1. Meter - Impedance record

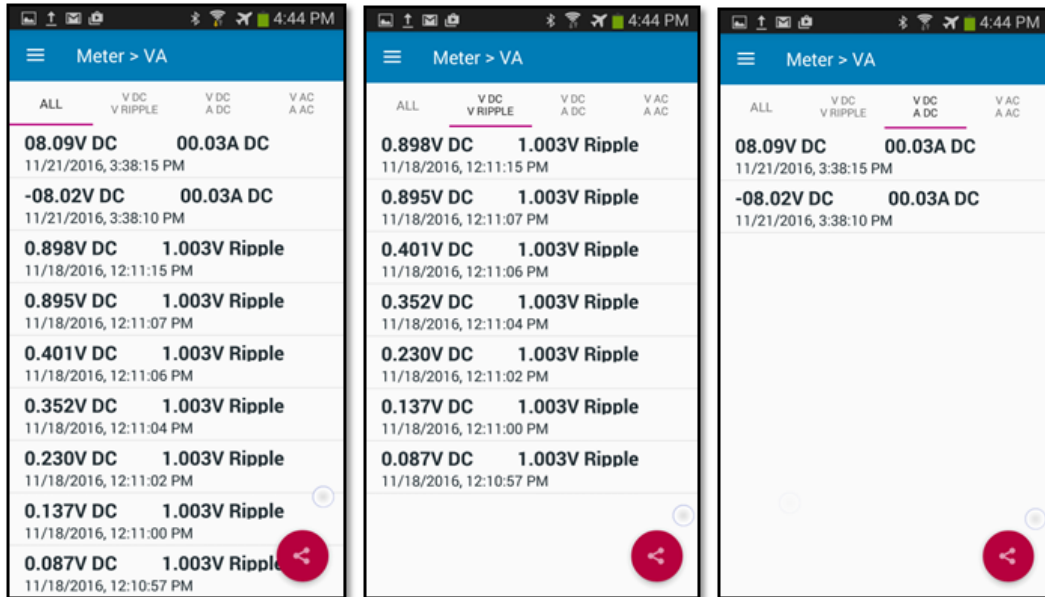
- Select Meter - Impedance from the menu.
- Meter - Impedance records are displayed in reverse order of measurement time.
- Displays the impedance voltage, temperature and time of the record.
- Touch the Share button at the bottom right, share records as a CSV file.



Impedance	Voltage	Temperature	Time
0.720mΩ	-0.000V	OL °C	10/13/2016, 10:17:28 AM
0.734mΩ	-0.000V	OL °C	10/13/2016, 10:17:23 AM
0.713mΩ	-0.001V	OL °C	10/13/2016, 10:12:29 AM
0.718mΩ	-0.001V	OL °C	10/13/2016, 10:12:26 AM
0.731mΩ	-0.001V	OL °C	10/13/2016, 10:12:22 AM
0.703mΩ	-0.002V	OL °C	10/13/2016, 10:07:33 AM
0.710mΩ	-0.002V	OL °C	10/13/2016, 10:07:29 AM
0.729mΩ	-0.002V	OL °C	10/13/2016, 10:07:24 AM
0.715mΩ	-0.003V	OL °C	10/13/2016, 10:02:43 AM
0.718mΩ	-0.003V	OL °C	10/13/2016, 10:02:39 AM

8.3.2. Meter – VA record

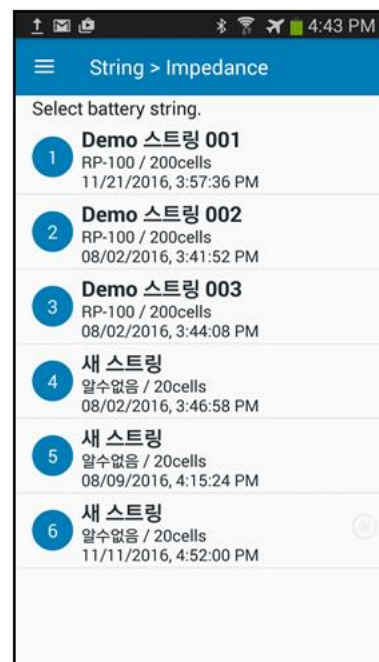
- Select Meter – VA from the menu.
- Meter - VA records are displayed in reverse order of measurement time.
meas value 1, meas value 2, and time are displayed.
- Touch the Share button at the bottom right, share records as a CSV file.



8.3.3. String – Impedance record

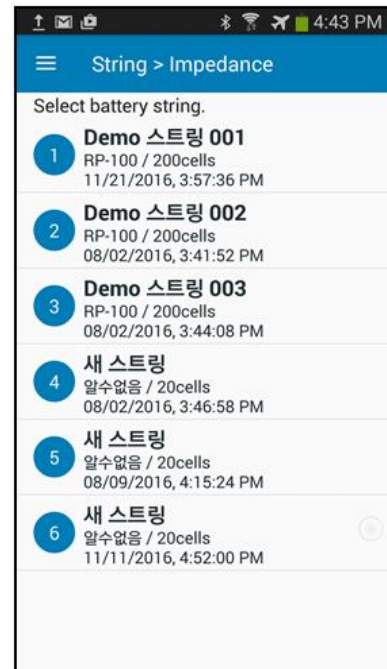
String list

- Select String - Impedance from the menu.
- List of strings displayed.
- Select the string.
- Slot of the string is displayed.



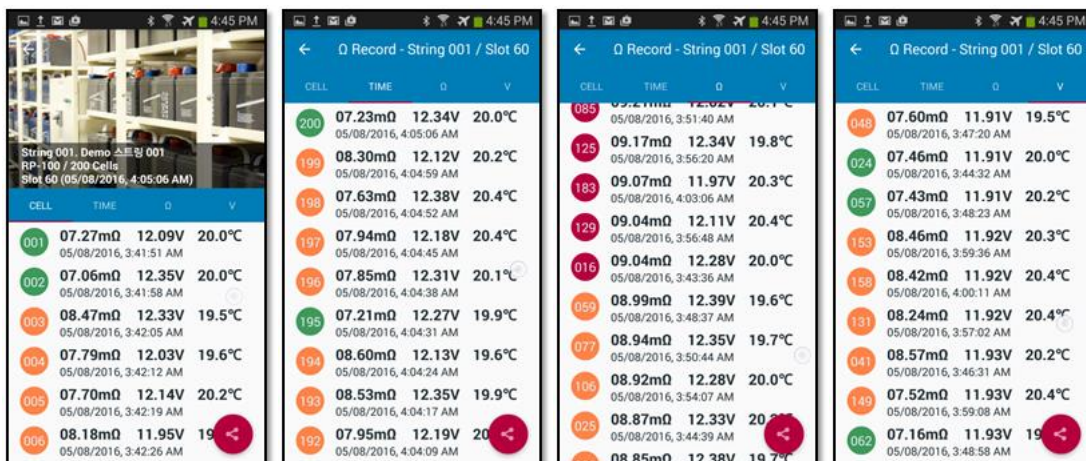
Slot list

- slots of the selected string is displayed.
- Measurement time, number of records, and the average impedance of the slot are displayed.
- Select slot
- Record of the selected slot is displayed.



8.3.4. Record

- Record of the selected slot is displayed.
- Displays cell number, impedance, voltage, temperature and time of the record.
- Change the sort of the records by selecting the tab.
< Cell, time, impedance, voltage >
- Touch the Share button at the bottom right, share records as a CSV file.



8.3.5. String – VA record

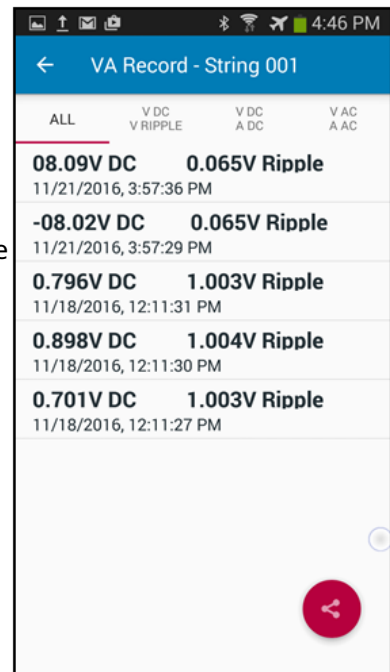
String list

- Select String – VA from the menu.
- List of strings displayed.
- Select the string.
- Record of the string is displayed.



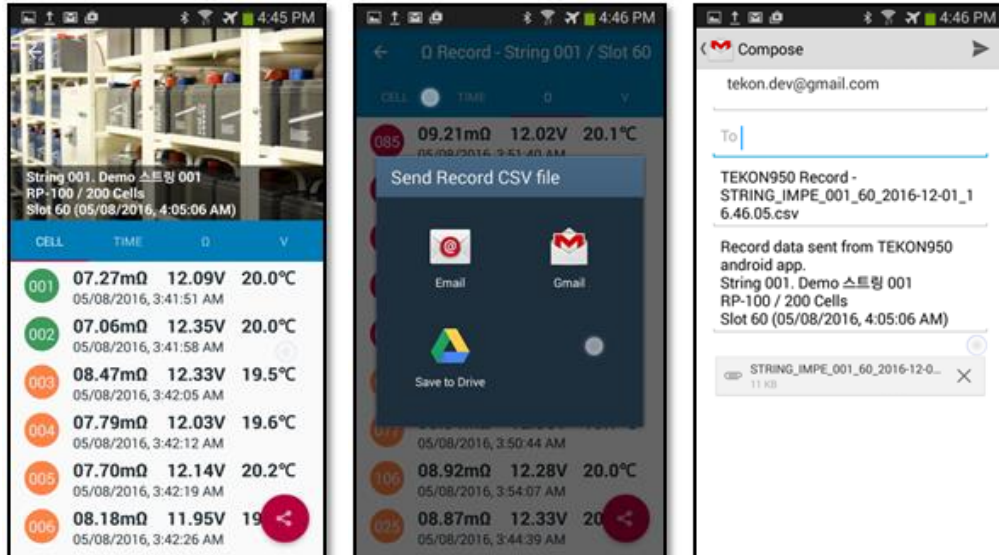
Record

- VA record of the selected string is displayed.
- Displays the value1, value2, and time of the record.
- Change the measurement set by selecting the tab.
- Touch the Share button at the bottom right, share records as a CSV file.



8.4. Share record

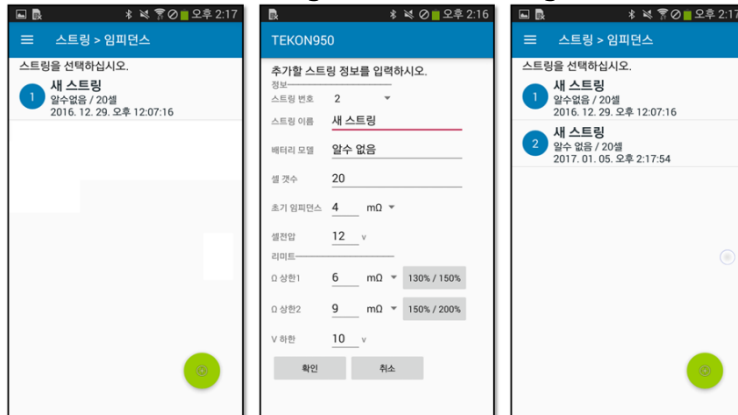
- On the Record screen, press  button.
- Display list of applications that can share files in applications installed on the phone.
- Select the application.
(In the picture below, select Gmail)
- Shared in selected applications.
(Added as attachment of mail)



8.5. String management

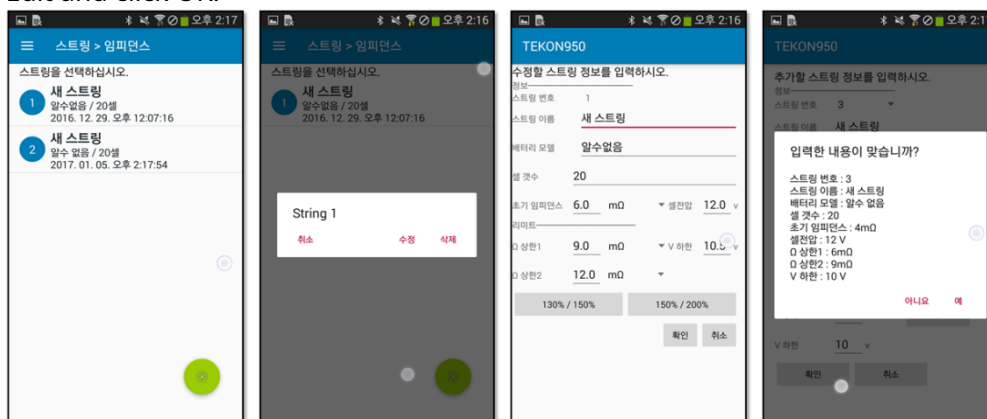
8.5.1. Add string

- Press  button on the string list screen.
- Enter the string information to be added.
Press the '130% / 150%', '150% / 200%' button sets the upper impedance limit to the corresponding magnification of the initial impedance.
- Click OK to add the string to the list of strings and return to the list of strings.



8.5.2. Edit, delete string

- press and hold the string to edit or delete.
- Select edit or delete.
- Press Delete to remove it immediately.
- Press Edit to display a screen for edit the string information.
Edit and click OK.



9. Maintenance

Use replacement part designated by manufacturer . Otherwise Manufacturer is not liable from Safety Accident, Unit Failure . For safety, do not use Unit if Unit or its accessory is damaged or mal function and send to Service center .

9.1. Battery Charging

Unit is installed with Rechargeable Li-Ion battery. Battery Recharge should be only through supplied Power Adapter.

Battery Charging starts once Power Code is connected. Full Charging time from complete drain out battery takes approx. 4 hours. While charging, unit does not use battery and use power through Adapter. If use unit while charging, charging time may take longer

Even though Unit is connected with Charger for a long time, the charging system in the unit turned to streamlet charging mode after complete charging which protect from any damage on unit.

※ To avoid Battery Capacity decrease, minimum 2 time/year charging required.

When adapter is separated, upper right LCD of unit display charging status level as below icon table

Icon	Descriptions
	Battery charging amount more than 85% .
	Battery charging amount more than 70%
	Battery charging amount more than 50%
	Battery charging amount more than 25%
	Battery is fully discharged .After Warning sounds for 30 seconds, Power Circuit will shut off.
	Adapter connected . under charging .

9.2. Cleaning and Storage

 To prevent any Accident, please separate any Test Probe or Testing Zig. Terminal from unit

9.2.1. Unit Cleaning

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

9.2.2. Storage

Even though Unit 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 unit for a long period.

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

9.2.3. 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

Limited Warranty and Limitation of Liability

[Warranty]

TEKON warrants that the product will be free from defects in workmanship and material during the warranty period.

This warranty covers accessories provided with the product and if the product fails during normal use within the warranty period, TEKON will carefully repair or replace the defective part of the product, and are functionally identical to the parts and products originally provided, or Replace it with a new or better part or product.

[Warranty period]

The product warranty period is 1 year from the date of purchase.

If the purchase slip or receipt is lost or cannot be submitted, TEKON will calculate the service period based on the manufacturing year/month/day of the product's S/N.

[Warranty way to do]

TEKON's warranty liability is limited to the purchase price refund, free repair or replacement of defective products at TEKON's decision, only for defective products returned to the service center within the warranty period.

For warranty service, please contact your nearest Authorized Service Center, or return the defective product to the nearest Authorized Service Center, at the cost of shipping and insurance, with a description of the problem.

If the inspection results determine that the failure is due to misuse, modification, accident or operation and handling under abnormal conditions, TEKON will provide the consumer with an estimate of the cost of the repair and will obtain permission prior to repair. After warranty repair, the product will be returned to the consumer at the cost of shipping charges.

[Limit of liability]

TEKON is not responsible for any damage incurred in transit.

TEKON shall not be liable for any special, indirect, incidental or consequential damage or loss, regardless of cause or theory.

The warranty applies only to the purchase of a new product, and the warranty does not apply to used, refurbished or remanufactured products. Please keep the purchase receipt so that you can request service later.

It does not include disposable batteries or damage resulting from misuse, modification, negligence, accident, or operation and handling under abnormal conditions.

[Customer right]

Customers have individual legal rights under this warranty, which does not limit the rights of customers guaranteed by law.

MEMO

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