Digital Multimeter

User Manual

- **B35(T)(+)**
- **D35(T)**
- **B41T(+)**

Note: "T" indicates true RMS (optional)

"+" indicates Multimeter Offline Record function (optional)

www.owon.com

Nov. 2022 edition V1.3.9

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1. Safety Information

Safety Considerations

Before any operations, please read the following safety precautions to avoid any possible bodily injury and prevent damage to this product or any other products connected. To avoid any contingent danger, use this product only as specified.

EC Declaration of Conformity:
Meets intent of Directive 2004/108/EC for Electromagnetic Compatibility.

- Limit operation to the specified measurement category, voltage, or amperage ratings.
- **Do not use the multimeter if it is damaged.** Before you use the multimeter, inspect the case. Look for cracks or missing plastic. Pay particular attention to the insulation surrounding the connectors.
- **Do not use the test leads provided for other products.** Use only the certified test leads specified for this product.
- Inspect the test leads for damaged insulation or exposed metal.
- Before use, verify the multimeter's operation by measuring a known voltage.
- Only the qualified technicians can implement the maintenance.
- **Always use the specified battery type.** The power for the multimeter is supplied with two standard AA 1.5 V batteries. Observe the correct polarity markings before you insert the batteries to ensure proper insertion of the batteries in the multimeter.
- **Check all Terminal Ratings.** To avoid fire or shock hazard, check all ratings and markers of this product. Refer to the user's manual for more information about ratings before connecting to the multimeter.
- Do not operate the multimeter with the cover or portions of the cover removed or loosened.
- **Use Proper Fuse.** Use only the specified type and rating fuse for the multimeter.
- **Do not operate if in any doubt.** If you suspect damage occurs to the multimeter, have it inspected by qualified service personnel before further operations.
- **To avoid electric shock, do not operate this product in wet or damp conditions.**
- **Do not operate in an explosive atmosphere.**
- **Keep product surfaces clean and dry.**
- Do not apply more than the rated voltage (as marked on the multimeter) between terminals, or between terminal and earth ground.
- When measuring current, turn off the circuit power before connecting the multimeter in the circuit. Remember to place the multimeter in series with the circuit.

- When servicing the multimeter, use only the specified replacement parts.
- Use caution when working above 60 V DC, 30 V AC RMS, or 42.4 V peak. Such voltages pose a shock hazard.
- When using the test leads, keep your fingers behind the finger guards on the test leads.
- Remove the test leads from the multimeter before you open the battery cover.
- To avoid false readings, which may lead to possible electric shock or personal injury, replace the battery as soon as the low battery indicator  appears and flashes.
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.
- **Use the proper terminals, function, and range for your measurements.** When the range of the value to be measured is unknown, set the rotary switch position as the highest range, choose the auto ranging mode. To avoid damages to the multimeter, do not exceed the maximum limits of the input values shown in the technical specification tables.
- Connect the common test lead before you connect the live test lead. When you disconnect the leads, disconnect the live test lead first.
- Before changing functions, disconnect the test leads from the circuit under test.

Measurement Category

The multimeter has a safety rating of 1000 V, CAT III.

Measurement category definition

Measurement CAT I applies to measurements performed on circuits not directly connected to the AC mains. Examples are measurements on circuits not derived from the AC mains and specially protected (internal) mains- derived circuits.

Measurement CAT II applies to protect against transients from energy-consuming equipment supplied from the fixed installation, such as TVs, PCs, portable tools, and other household circuits.

Measurement CAT III applies to protect against transients in equipment in fixed equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.

Measurement CAT IV applies to measurements performed at the source of the low-voltage installation. Examples are electricity meters and measurements on primary over current protection devices and ripple control units.

Safety Terms and Symbols

Safety Terms

Terms in this Manual. The following terms may appear in this manual:



Warning: Warning indicates the conditions or practices that could result in personal injury or death.



Caution: Caution indicates the conditions or practices that could result in damage to this product or other property.

Terms on the Product. The following terms may appear on this product:

Danger: It indicates an injury or hazard may immediately happen.

Warning: It indicates an injury or hazard may be accessible potentially.

Caution: It indicates a potential damage to the instrument or other property might occur.

Safety Symbols

Symbols on the Product. The following symbol may appear on the product:

	Direct current (DC)		Fuse
	Alternating current (AC)		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Both direct and alternating current	CAT II	Category II overvoltage protection
	Ground terminal	CAT III	Category III overvoltage protection
	Conforms to European Union directives	CAT IV	Category IV overvoltage protection
	Equipment protected throughout by double insulation or reinforced insulation		

2. Quick Start

General Inspection

After you get a new multimeter, make a check on the instrument according to the following steps:

1. **Check whether there is any damage caused by transportation.**

   If it is found that the packaging carton or the foamed plastic protection cushion has suffered serious damage, do not throw it away first till the complete device and its accessories succeed in the electrical and mechanical property tests.

2. **Check the Accessories**

   The supplied accessories have been already described in the *Appendix A: Enclosure* of this Manual. You can check whether there is any loss of accessories with reference to this description. If it is found that there is any accessory lost or damaged, please get in touch with the distributor of OWON responsible for this service or the OWON's local offices.

3. **Check the Complete Instrument**

   If it is found that there is damage to the appearance of the instrument, or the instrument can not work normally, or fails in the performance test, please get in touch with the OWON's distributor responsible for this business or the OWON's local offices. If there is damage to the instrument caused by the transportation, please keep the package. With the transportation department or the OWON's distributor responsible for this business informed about it, a repairing or replacement of the instrument will be arranged by the OWON.

Install the Batteries

The multimeter is powered by two 1.5 V AA alkaline batteries.

Warning: To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the low battery indicator appears.

Before replacing the battery, turn off the meter, disconnect test leads and any connectors from any circuit under test, remove test leads from the input terminals. Use only the specified battery type.

Use the following procedure to install the batteries.

(1) Ensure that the rotary switch is at the OFF position. Remove test leads and any connectors from the input terminals.

(2) Lift the tilt stand and loosen the screws with a suitable Phillips screwdriver and remove the battery cover.

(3) Observe the battery polarity indicated inside the battery compartment, Insert the batteries.

(4) Place the battery cover back in its original position and tighten the screws.

Caution: To avoid instruments being damage from battery leakage, always remove the batteries and store them separately if the multimeter is not going to be used for a long period.

Adjusting the Tilt Stand

Pull the tilt stand outward to its maximum reach (about 85° to the meter body).

Power On

(1) To power ON the multimeter, turn the rotary switch to any other position except OFF.

(2) To power OFF the multimeter, turn the rotary switch to the OFF position.

Sleep Mode

The multimeter automatically enters the sleep mode if the rotary switch is not moved or a key is not pressed in wait time. The wait time is 15 minutes for B35(T)(+)&D35(T), 30 minutes for B41T(+). (When the Bluetooth is activated, this function is disabled.)

Pressing any key (except △/Bluetooth) will turn the multimeter back to operation mode from the sleep mode.

One minute before Auto Power-off, the buzzer will beep five times to warn. Before shutoff, the buzzer will emit a long beep, and then the multimeter will shut off.

Only for B41T(+): To disable the Auto Power-off function, hold down Range, Hz/Duty, Max/Min or △/Bluetooth while powering on the multimeter, the multimeter will not shut off automatically.

Note: In sleep mode, the multimeter will still consume a little power. If the multimeter is not going to be used for a long period, the power should be turned off.

Backlight Control

To view the display in low-light conditions, you can activate the LCD backlight by pressing  for more than 2 seconds. The backlight will last for one minute.

Selecting the Range

- Auto ranging is set as default when the meter is powered on, AUTO is displayed.
- When auto ranging is enabled, press Range to enter the manual range mode.
- In manual range, each additional press of Range sets the multimeter to the next higher range, unless it is already in the highest range, at which point the range switches to the lowest range.
- When manual range is enabled, press Range for more than 2 seconds to enter the auto ranging mode.

Note: Manual range is not available when measuring capacitance.

Multimeter in Brief

Front panel

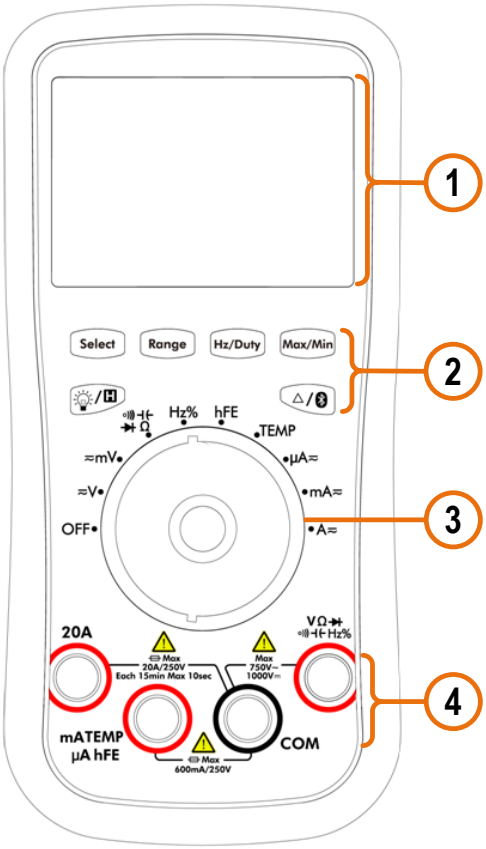


Figure 2-1 Front panel overview (B35 shown)

No.	Description	Details
①	Display screen	Page 10
②	Keypad	Page 9
③	Rotary switch	Page 8
④	Input terminals	Page 11

Rotary switch

Position	Description	Details
OFF	Power off	Page 6
≂V	DC or AC voltage measurement	Page 14

≂mV	DC or AC voltage measurement (up to 600 millivolts)	
•))) ⊣⊢ ⇻ Ω	Continuity test	Page 15
	Capacitance measurement	Page 15
	Diode test	Page 15
	Resistance measurement	Page 14
Hz%	Frequency measurement	Page 16
hFE	Transistor measurement — Not available on B41T(+)	Page 16
TEMP	Temperature measurement	Page 16
μA≂	DC or AC current measurement (up to 600 microamperes)	Page 17
mA≂	DC or AC current measurement (up to 600 milliamperes)	
A≂	DC or AC current measurement	

Keypad

Key	Description	Details
Select	Select function: ● Select DC or AC ● Select ℃ or ℉ during temperature measurements ● Select Resistance/Diode/Continuity/Capacitance Note: Select Resistance/Diode/Continuity on B41T(+).	
Range	Auto/Manual range	Page 7
Hz/Duty	Select frequency/duty cycle	Page 16
Max/Min	Capturing Max. and Min. Values	Page 18
🔆/H	Backlight	Page 7
	Data Hold	Page 18
△/ᛒ	Relative Measurements	Page 18
	Bluetooth (only for the model with Bluetooth)	Page 20

Display screen

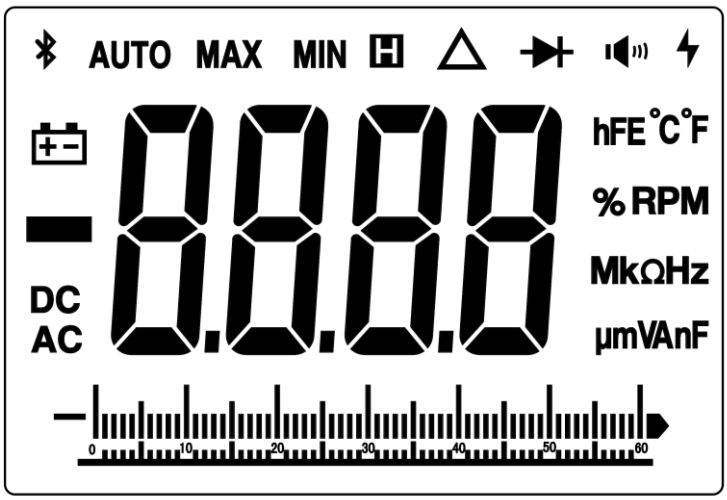


Figure 2-2 Display screen

Symbol	Description	Details
	Bluetooth enabled	Page 20
AUTO	Auto range	Page 7
MAX	Maximum reading	Page 18
MIN	Minimum reading	
H	Data hold enabled	Page 18
△	Relative enabled	Page 18
	Diode test selected	Page 15
	Continuity test selected	Page 15
	Battery is low	Page 5
DC	DC	Page 14 and Page 17
AC	AC	
-8.8.8.8	Measurement display ("OL" is short for overload, indicates the reading exceeds the display range)	

hFE °C °F % RPM MkΩHz µmVAnF	Measuring units	Page 11
	Analog bar graph	

Measurement units

Sign	Description	
M	Mega	1E+06 (1000000)
k	kilo	1E+03 (1000)
m	milli	1E–03 (0.001)
µ	micro	1E–06 (0.000001)
n	nano	1E–09 (0.000000001)

Sign	Description	Measurement type
℃	Degree Celsius	Temperature
℉	Degree Fahrenheit	
V	Voltage	Voltage
A	Ampere	Current
Ω	Ohm	Resistance
Hz	Hertz	Frequency
%	Percent,	Duty cycle
F	Farad	Capacitance
hFE	Current Amplification Factor	Transistor

Input terminals

The terminal connections for the different measurement functions of the multimeter are described in the table below.

Warning: Before starting any measurement, observe the rotary switch position of the multimeter, and then connect the test leads to the correct terminals.

Caution: To avoid damaging the multimeter, do not exceed the rated input limit.

Input terminals on 35 series multimeter

Rotary switch position	Input terminals		Overload protection
≈V	VΩ⊣◀ ◦))⊣⊢Hz%	COM	750 VAC/1000 VDC
≈mV	VΩ⊣◀ ◦))⊣⊢Hz%	COM	250 VDC or Equivalent voltage RMS
•))⊣⊢ ◀⊣ Ω	VΩ⊣◀ ◦))⊣⊢Hz%	COM	
Hz%	VΩ⊣◀ ◦))⊣⊢Hz%	COM	250 VAC or Equivalent voltage RMS
hFE	mATEMP μA hFE	COM	1 A/250 V, fast-acting fuse
TEMP	mATEMP μA hFE	COM	
μA≈	mATEMP μA hFE	COM	
mA≈	mATEMP μA hFE	COM	
A≈	20A	COM	20 A/250 V, fast-acting fuse

Input terminals on B41T(+)

Rotary switch position	Input terminals		Overload protection
≈V	VΩ⊣◀ ◦))⊣⊢Hz%	COM	750 VAC/1000 VDC
≈mV	VΩ⊣◀ ◦))⊣⊢Hz%	COM	250 VDC or Equivalent voltage RMS
◦)) ◀⊣ Ω	VΩ⊣◀ ◦))⊣⊢Hz%	COM	
Hz%	VΩ⊣◀ ◦))⊣⊢Hz%	COM	250 VAC or Equivalent voltage RMS
⊣⊢	VΩ⊣◀ ◦))⊣⊢Hz%	COM	250 VDC or Equivalent voltage RMS
TEMP	mA μA TEMP	COM	1 A/250 V, fast-acting fuse
μA≈	mA μA TEMP	COM	
mA≈	mA μA TEMP	COM	

A≈	**20A**	**COM**	20 A/250 V, fast-acting fuse

3. Making Measurements

Measuring AC or DC Voltage

Warning: Do not measure any voltage of over 1000 Vdc or 750 Vac rms to avoid instrument damage or electric shock.
Do not apply more than 1000 Vdc or 750 Vac rms between the common terminal and the earth ground to avoid instrument damage or electric shock.

This multimeter displays DC voltage values as well as their polarity. Negative DC voltages will display a negative sign on the left of the display.

(1) Rotate the rotary switch to ≂V or ≂mV. Default is DC measurement mode, **DC** will be displayed. Press Select to switch into AC measurement mode, **AC** will be displayed.

(2) Connect the black test lead to the **COM** terminal and the red test lead to the VΩ Hz% terminal.

(3) Probe the test points and read the display. Press Range to enable and cycle through the manual ranges.

Measuring Resistance

Caution: To avoid possible damage to your multimeter or to the equipment under test, disconnect the circuit power and discharge all high-voltage capacitors before measuring resistance.

(1) Rotate the rotary switch to Ω. (Note: To Ω on B41T(+).)

(2) Connect the black test lead to the **COM** terminal and the red test lead to the VΩ Hz% terminal.

(3) Probe the test points and read the display. Press Range to enable and cycle through the manual ranges.

Testing Diodes

Caution: To avoid possible damage to your multimeter or to the equipment under test, disconnect the circuit power and discharge all high-voltage capacitors before testing diodes.

(1) Rotate the rotary switch to . (Note: To on B41T(+).) Press Select once to enter diode testing mode, will be displayed.

(2) Connect the black test lead to the **COM** terminal and the red test lead to the terminal.

(3) Connect the red test lead to the positive terminal (anode) of the diode and the black test lead to the negative terminal (cathode). The cathode of a diode is indicated with a band.

(4) Read the diode forward bias. If the test lead connection is reversed, the multimeter will display "OL".

Testing for Continuity

Caution: To avoid possible damage to your multimeter or to the equipment under test, disconnect the circuit power and discharge all high-voltage capacitors before testing for continuity.

(1) Rotate the rotary switch to . (Note: To on B41T(+).) Press Select twice to enter continuity testing mode, will be displayed.

(2) Connect the black test lead to the **COM** terminal and the red test lead to the terminal.

(3) Probe the test points to measure the resistance in the circuit. If the reading is below 30 Ω, the multimeter will beep continuously.

Measuring Capacitance

Caution: To avoid possible damage to the multimeter or to the equipment under test, disconnect circuit power and discharge all high-voltage capacitors before measuring capacitance. Use the DC voltage function to confirm that the capacitor is fully discharged.

(1) Rotate the rotary switch to . Press Select three times to enter capacitance

measuring mode, the Farad units will be displayed.

Note: On B41T(+), rotate the rotary switch to .

(2) Connect the black test lead to the **COM** terminal and the red test lead to the terminal.

(3) Probe the test points and read the display.

Measuring Frequency

(1) Rotate the rotary switch to Hz%.

(2) Connect the black test lead to the **COM** terminal and the red test lead to the terminal.

(3) Probe the test points and read the display.

(4) Press Hz/Duty to switch between the frequency and duty cycle measurements.

When measuring AC voltage or AC current, press Hz/Duty to cycle through frequency measuring, duty cycle measuring, and original measuring.

Measuring Transistor — Not available on B41T(+)

Warning: To avoid electrical shock or damage to the instrument, do not apply more than 250Vdc or 250Vac rms between the COM terminal and the mATEMP µA hFE terminal.

(1) Rotate the rotary switch to hFE.

(2) Connect the "**+**" plug of the multi-functional test socket to the **mATEMP µA hFE** terminal and the "**COM**" plug to the **COM** terminal).

(3) Determine whether the transistor is NPN or PNP type and locate the Emitter, Base and Collector leads. Insert leads of the transistor into the corresponding holes of the multi-functional test socket.

(4) Read the hFE value.

Measuring Temperature

(1) Rotate the rotary switch to TEMP.

(2) Connect the **red connection** of the K-type thermocouple to the **mATEMP µA hFE** terminal (**mA µA TEMP** on B41T(+)) and the **black connection** to the **COM** terminal.

(3) Probe the test points and read the display. Press Select to change the temperature units between ℃ or ℉.

Measuring DC or AC Current

Warning: Never attempt an in-circuit current measurement where the open-circuit potential to earth is greater than 250 V. Doing so will cause damage to the multimeter and possible electric shock or personal injury.

Caution: To avoid possible damage to the multimeter or to the equipment under test, check the multimeter's fuse before measuring current. Use the proper terminals, function, and range for your measurement. Never place the test leads in parallel with any circuit or component when the leads are plugged into the current terminals.

(1) Turn off the power of the measured circuit. Discharge all high- voltage capacitors.

(2) Connect the black test lead to the **COM** terminal. For currents below 600 mA, connect the red test lead to the **mATEMP μA hFE** terminal (**mA μA TEMP** on B41T(+)); for currents within 600 mA – 20 A, connect the red test lead to the **20A** terminal.

(3) Rotate the rotary switch to the appropriate position according to the measurement range, μA≂, mA≂, or A≂.

(4) Disconnect the circuit path to be tested. Connect the black test lead to one side of the circuit (with a lower voltage); connect the red test lead to the other side (with a higher voltage). Reversing the leads will produce a negative reading, but will not damage the multimeter.

(5) Select DC or AC measurement mode. Default is DC measurement mode, **DC** will be displayed. Press Select to switch into AC measurement mode, **AC** will be displayed.

(6) Turn on the power of the measured circuit, and read the display. Press Range to enable and cycle through the manual ranges. If "OL" is displayed, it indicates the input exceeds the selected range and the rotary switch should be set to the position with higher range.

(7) Turn off the power of the measured circuit and discharge all high-voltage capacitors. Remove the test leads and restore the circuit to the original condition.

4. Multimeter Features

Data Hold Mode

(1) Press  to freeze the display during measurement,  will be shown on the display.

(2) Press  again to exit this mode.

Note: This function is not available when measuring diodes and transistor.

Capturing Max. and Min. Values

In MAX mode, the measured maximum value will be held; In MIN mode, the measured minimum value will be held.

(1) Press  to cycle between the MAX mode and MIN mode.

(2) Press  for more than 2 seconds to exit the mode.

In this mode, the manual range mode will be activated automatically. Analog bar graph is not displayed. Auto power-off function is disabled.

Note: This function is not available when measuring diodes, capacitance, transistor, and frequency.

Making Relative Measurements

When making relative measurements, reading is the difference between a stored reference value and the input signal.

(1) Press  to enter the relative mode.

The measurement value when pressing  is stored as the reference value.

In this mode, REL△ (current reading) = input value - reference value.

(2) Press it again to exit the mode.

In relative measurement, the manual range mode will be activated automatically. (The relative measurement should be carried out under a certain range, that is, this function is only available under the manual range mode.) Analog bar graph is not displayed.

Note: This function is not available when measuring diodes, transistor, and frequency.

Buzzer Feature

- Press the function key, the buzzer emits a short beep.
- One minute before Auto Power-off, the buzzer will beep five times to warn. Before shutoff, the buzzer will emit a long beep, and then the multimeter will shut off.
- The buzzer beeps continuously to warn once the measured DC voltage exceeds 1000 V, AC voltage exceeds 750 V, or the voltage in DC/AC mV mode exceeds 600.0 mV.
- The buzzer emits a long beep when the short circuit resistance is less than about 30Ω during the continuity test.
- When the Bluetooth function is idle for 10 minutes, the Bluetooth will be turned off automatically. Before turning off, the buzzer will beep twice.

5. Bluetooth Function – only for the model with Bluetooth

The model with Bluetooth supports communications with Android or iOS based smart device through Bluetooth. You can use the free application software on the smart devices to monitor the measurements, perform remote control, view trending graphs, etc. The recorded data can be saved as CSV file. The maximum number of record that can be stored depends on the free storage space in your smart device. More than one meters can be connect simultaneously.

Note: Bluetooth connectivity works over a range of about 10 meters. The work range is much longer in open-sided and non-occluded wide range environment, even up to 20 meters. When the Bluetooth function is idle for 10 minutes, the Bluetooth will be turned off automatically. Before turning off, the buzzer will beep twice.

Install the free application software

System Requirements of Mobile Devices

- **Bluetooth 2.0 Android APP**
  Android devices with Bluetooth connectivity.
  Android versions: 4.0 or above
- **Bluetooth 4.0 Android APP**
  Android devices with BLE 4.0 connectivity.
  Android versions: 4.3 or above
- **Bluetooth 4.0 iOS APP**
  iPhone 6s/6s Plus, iPhone 6/6 Plus, iPhone 5c/5s, iPhone 5
  (Support iPhone with BLE 4.0 connectivity, iOS7.0 or above; iPhone 4s or the older devices are not supported.)

For Android device

Based on the system and Bluetooth version of your mobile device, select one from the QR Codes below, scan it with your mobile device, select the app and install it.

Bluetooth 2.0 Android APP

Bluetooth 4.0 Android APP

For iPhone

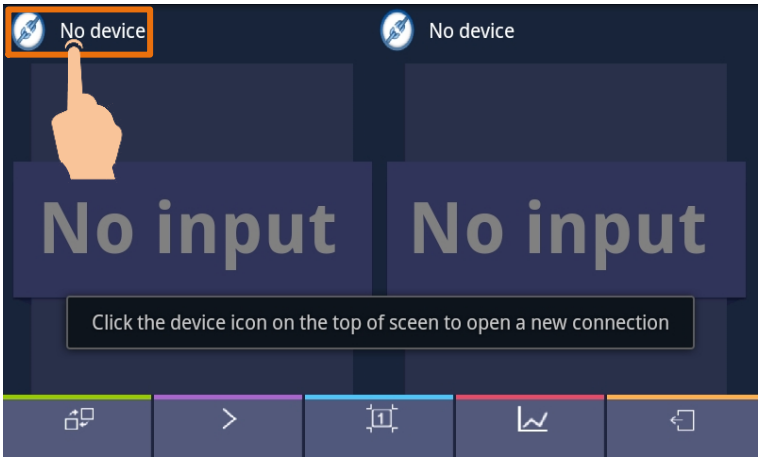
You can search "OWON" in the APP Store, select the APP with the  icon, and then install it.

Note: The help content below may be not completely consistent with the application software, only for reference. Visit www.owon.com.cn to get the latest version of this user manual.

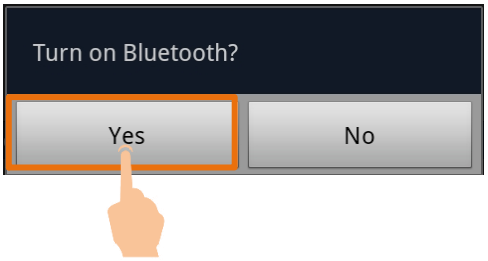
Android App

How to Connect with Android Device

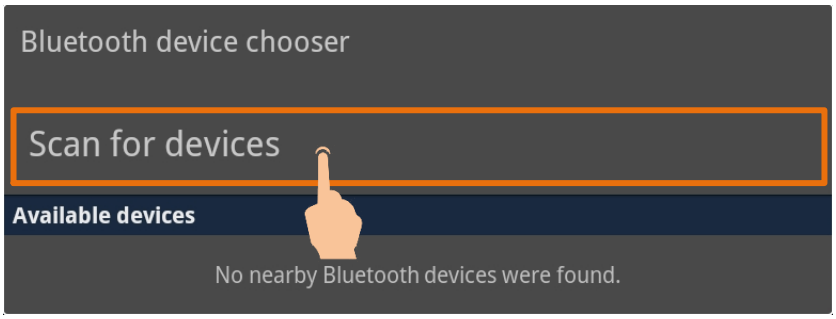
(1) Install the free application software for Android on your Android smart device.
(2) Launch the "Multimeter" application.
(3) Turn on the multimeter, press and hold  until  appear on the display.
(4) Click the icon on the top left of the screen to launch device connection.



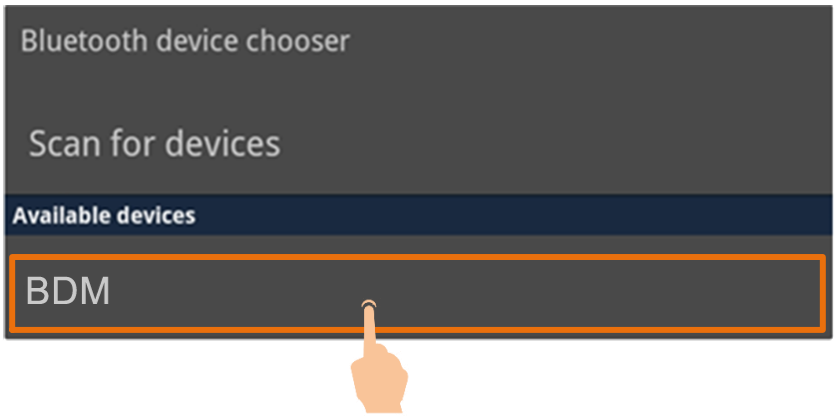
(5) If the Bluetooth function is not activated, a dialog box will ask whether to turn on Bluetooth. Click "Yes".



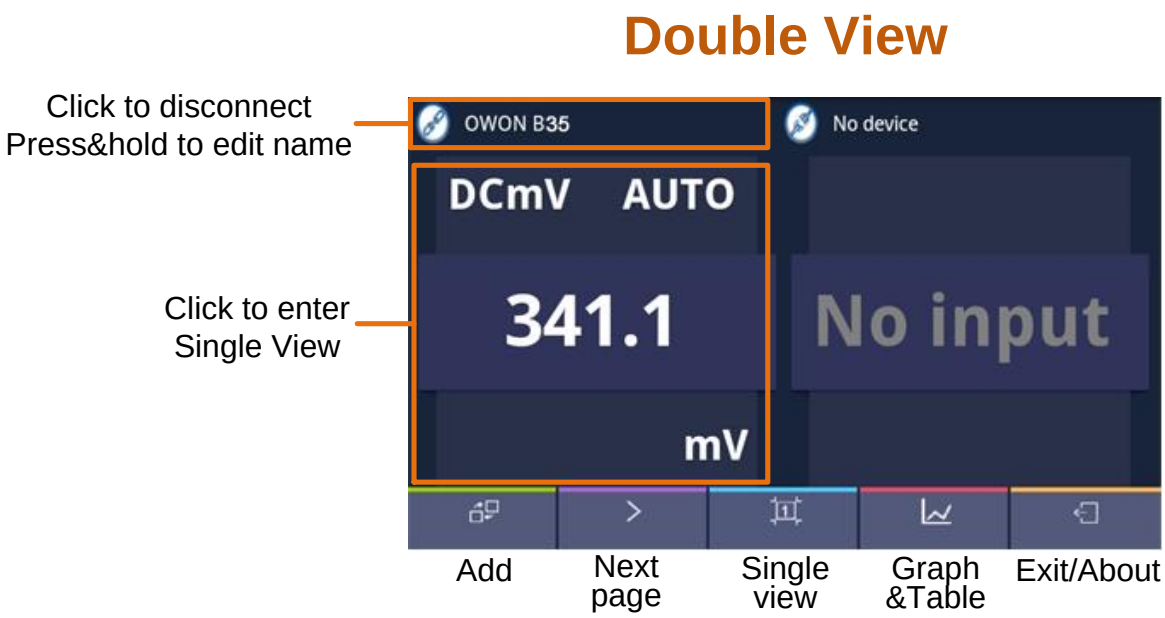
Click to scan for Bluetooth devices.

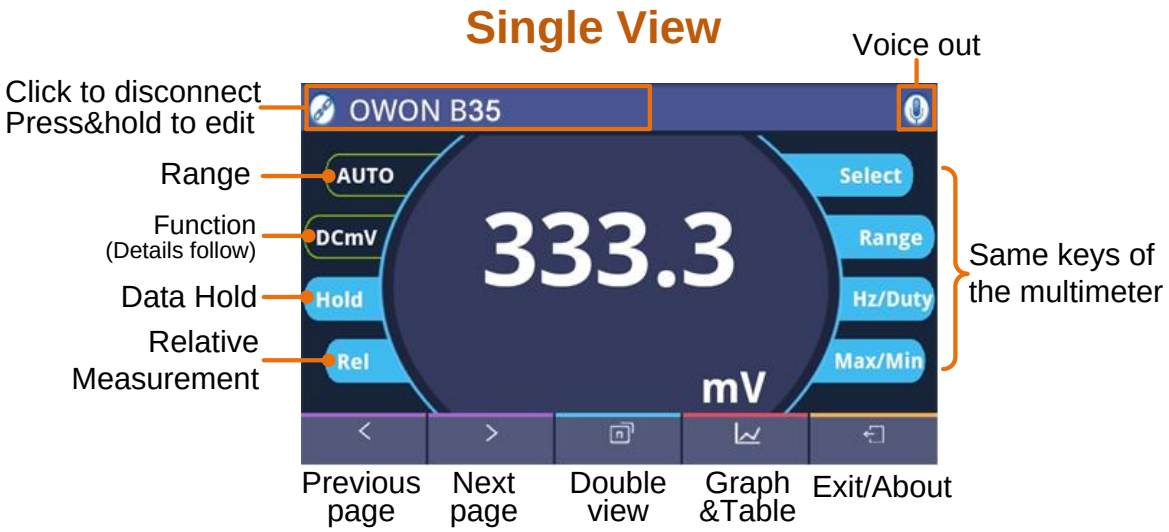


(6) Click "BDM" in the device list to pair.



User Interface in Android App





Function Description Table

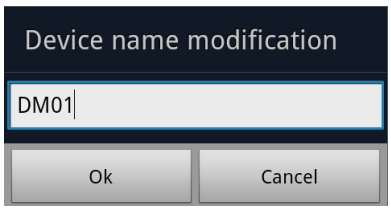
Display	Function
DC	Direct Current
AC	Alternating Current
RES	Measuring Resistance
DIO	Testing Diodes
BEEP	Testing for Continuity

Display	Function
CAP	Measuring Capacitance
Hz	Measuring Frequency
DUT	Measuring Duty Cycle
TEMP	Measuring Temperature

Operations in Android App

- **Customize the meter name**

  The device name of meter can be customized. Press and hold the name on the top left of the screen, a dialog box below will pop up. You can input the customized name, this name will be memorized in the device. If this meter is connected to the same device next time, the customized name will be shown. If this meter is connected to another device, the name is still the default one or the customized name to the connected device.



- **Add meter**: In double view, click  softkey.
- **Select meter**: In single or double view, click  or  softkey.
- **Disconnect meter**: In single or double view, click  or the meter name.
- **Remote Control**: In single view, the control softkeys (blue background softkeys, as

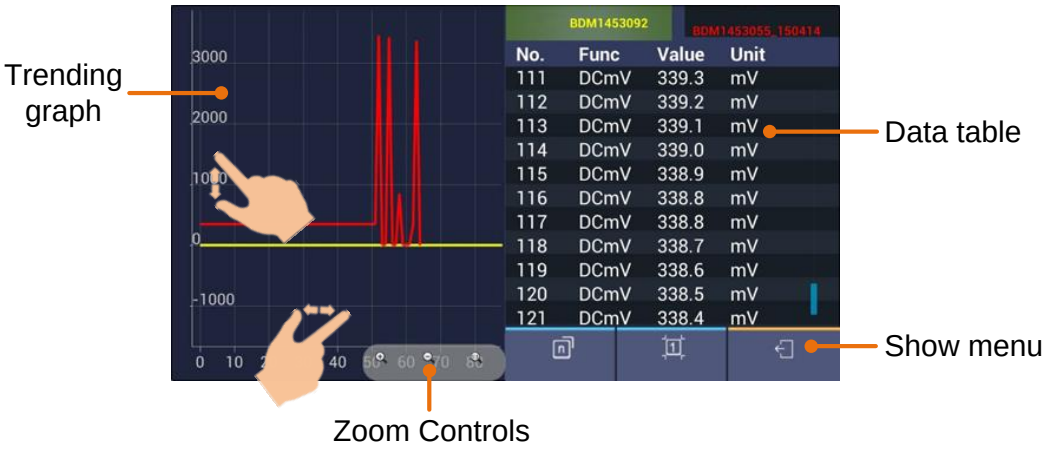
Hold, Rel, Select, etc.) can be short or long pressed to perform control, just as press the corresponding keys of multimeter.

- **Voice out function**

  Provide an audible out of the readings through the text-to-speech (TTS) engine on your Android device. Click the  icon on the top right of the screen to turn on voice out. Click  to turn off. In settings menu on your Android device, you can set the language-specific voice for the spoken text, or speech rate etc.
  You may change to different voices by installing different TTS engines.
  TTS engines can be downloaded by scanning QR Codes or visit www.owon.com.cn .

- **Upgrade Online**: Click  , and click "About". Click "Upgrade".
- **Data Graph and Table**: Click  to view data graph and table. Click  to show setting menu.

Data Graph&Table



Setting menu:

Softkey	Description
Open local file	Read the saved file (.CSV)
Save data	Save the displayed data into .CSV file
Share	Share the measurements via the installed sharing apps
Clear data	Clear the data that is being displayed
Setting	**Record Interval**: Set the record interval in the application software. **Enable Period**: Log data within the defined period. **Record Period**: Define the period time if the period is enabled. **Fill**: Check to fill the area as blue below the data line.
Exit	Exit the APP

Note: In trending graph, you can pinch the screen to zoom. The Y axis (value) can be zoomed by gesturing along the up-down direction, and the X axis (time) can be zoomed by gesturing along the left-right direction.

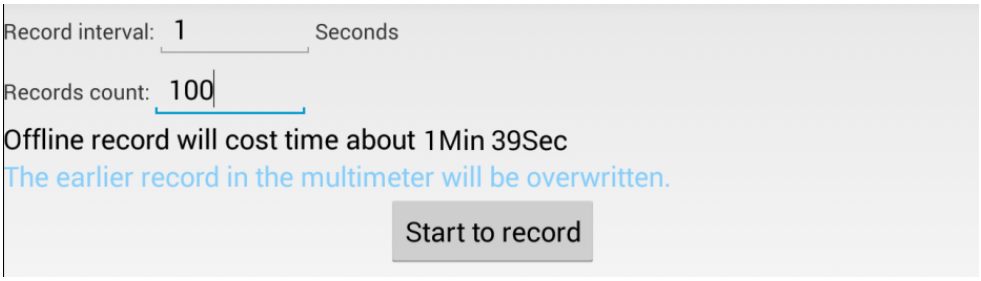
Multimeter Offline Record (Android) – the "+" model only

When measuring using the multimeter with offline record function, you can use Android device APP to send a command, the multimeter will start recording the measurements. After receiving the command, the connection will be disconnected automatically. The multimeter will record the measuring data in its own memory. After completion of the record, use APP to reconnect the multimeter, and then you can read the measuring data into the Android device as a CSV file. You can use this function to record for a long time without staff on duty, while reducing Bluetooth consumption to conserve the battery power of the multimeter.

Note: When the low battery indicator  appears on the meter screen, the offline record function may not work correctly. Please check the batteries of the meter to ensure them in a good state.

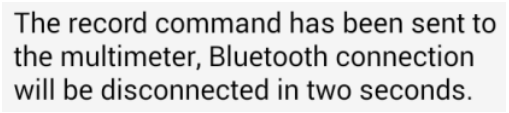
(1) Connect the Android device with the multimeter, see "*How to Connect with Android Device*" on P21.

(2) In APP single view, tap on the  icon on the top right, select Record setting from the pop-up menu.

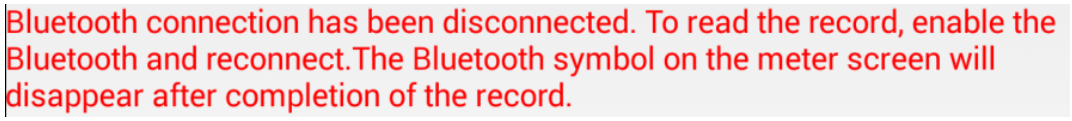


(3) Set "Record interval" and "Records count" (maximum records count is 10,000). Tap on Start to record. The memory in the multimeter can only store the recording data of one time. When start to record, the earlier offline record stored in the multimeter will be overwritten.

(4) After starting, in two seconds, the APP interface will display



The Android device will disconnect with the multimeter in two seconds. After disconnecting, the Bluetooth of the multimeter is in low-power state. The information will be shown on APP:



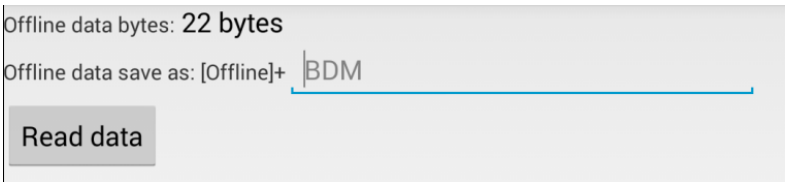
The multimeter will record the current measurements and store in the memory. After completion of the record, the Bluetooth of the multimeter will be disabled automatically, and the Bluetooth symbol on the multimeter screen will disappear.

Note: If the multimeter is in the process of recording data and not finished yet, the

APP can not connect with the multimeter. If you want to interrupt the recording process of the multimeter, press and hold △/ until disappear on the display, or turn the multimeter off.

(5) After completion of the record, to read the measuring data, press and hold △/ until appear on the display. Reconnect the Android device and the multimeter.

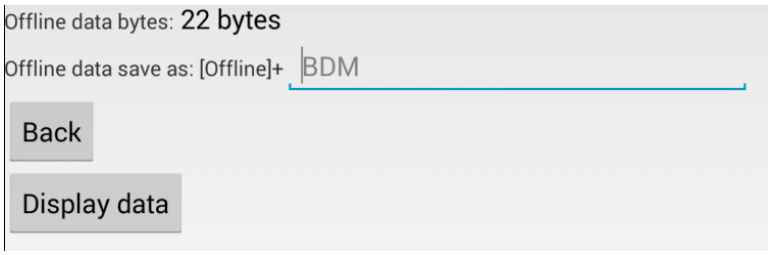
(6) In APP single view, tap on the icon on the top right, select Record read from the pop-up menu.



The file name start with "Offline", the following part can be customized.

(7) Tap on Read data, APP will read the measuring data and save as a CSV file into the Android device.

After reading, display as below:



(8) Tap on Display data, the data will be displayed in Data Graph and Table interface.

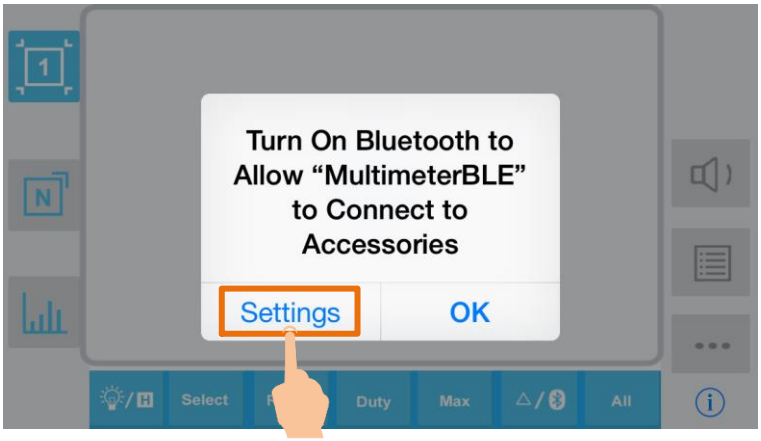
iOS App

How to Connect with iOS Device

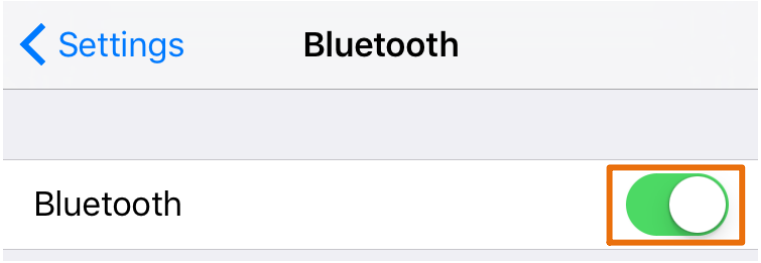
(1) Install the free application software for iOS on your iOS smart device.

(2) Launch the application 

.If the Bluetooth function is not activated, a dialog box will prompt you to turn on Bluetooth. Tap on "Settings".

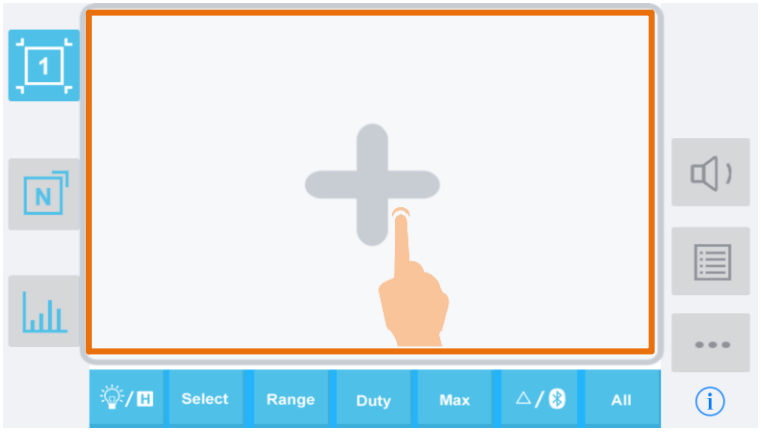


Turn on Bluetooth, and return to the multimeter APP.

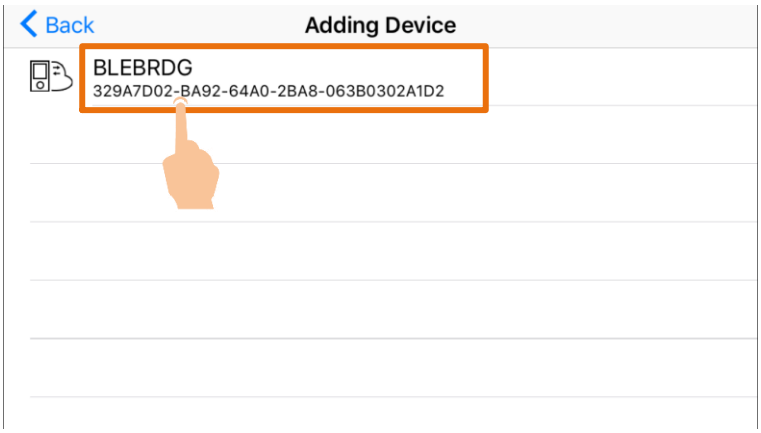


(3) Turn on the multimeter, press and hold △/ until appear on the display.

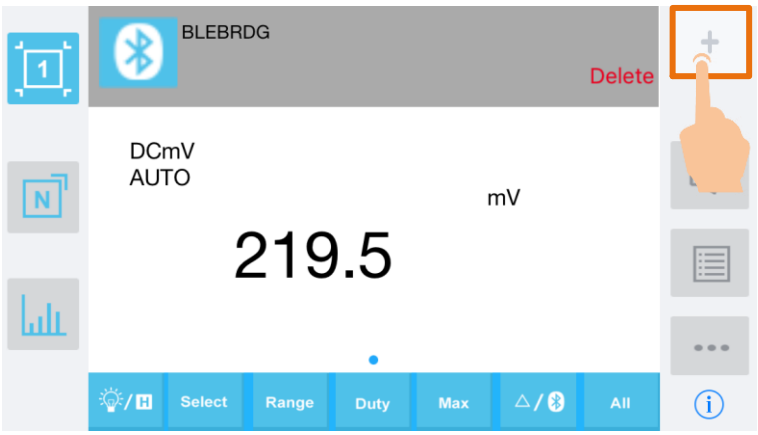
(4) Tap on the center to launch device connection.



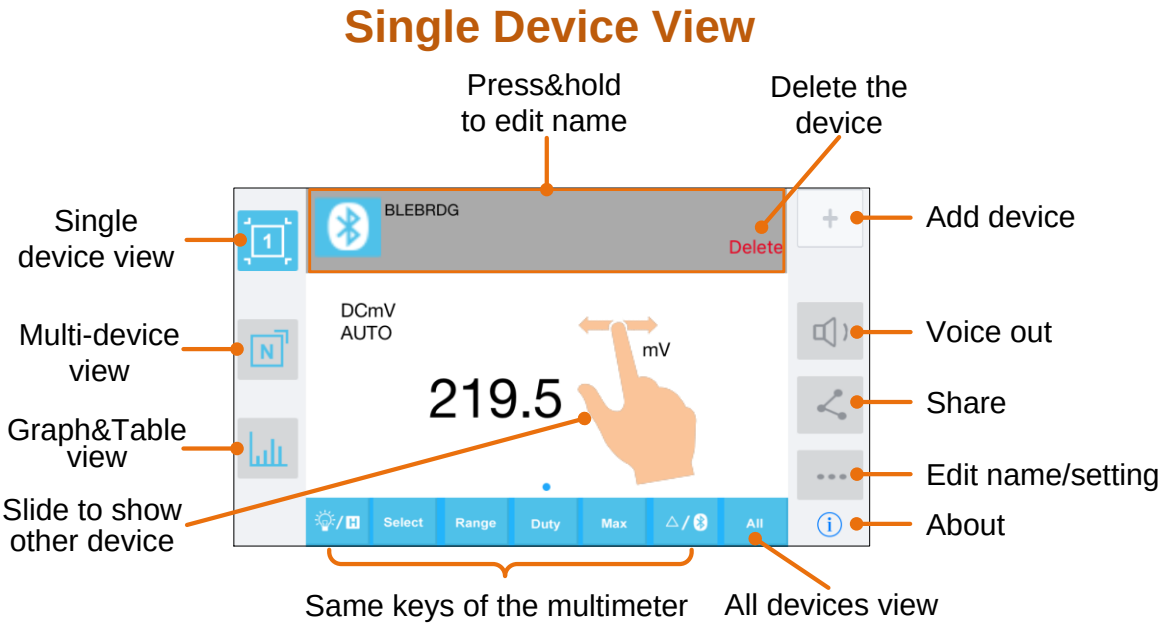
(5) Select the desired multimeter in the device list.



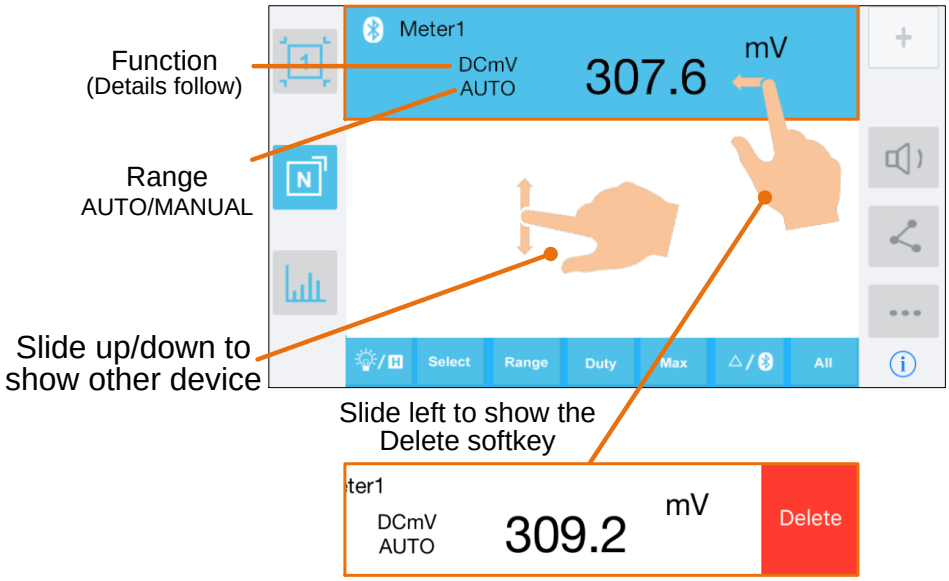
(6) The measurements will be shown if the connection is successful. You can tap on the + softkey on the right to add another multimeter.



User Interface in iOS App



Multi-device View

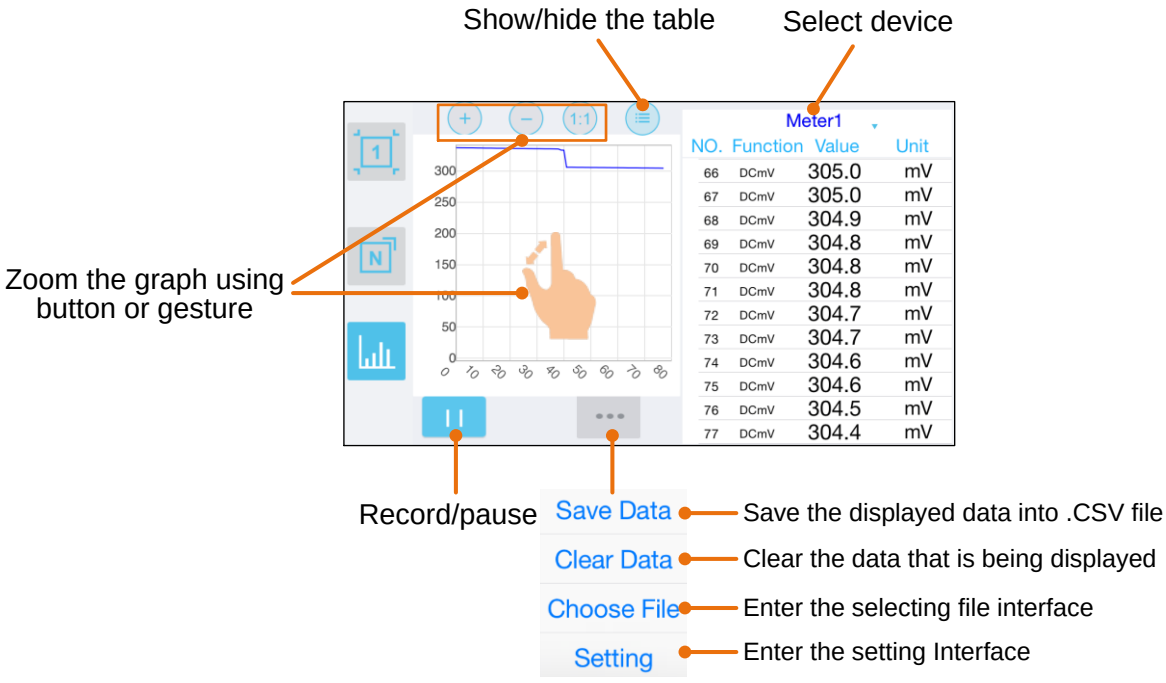


Function Description Table

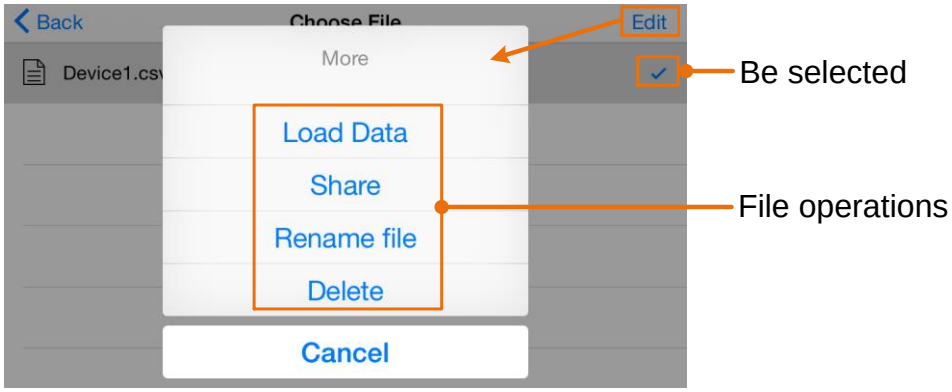
Display	Function
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AC	Alternating Current
RES	Measuring Resistance
DIO	Testing Diodes
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Display	Function
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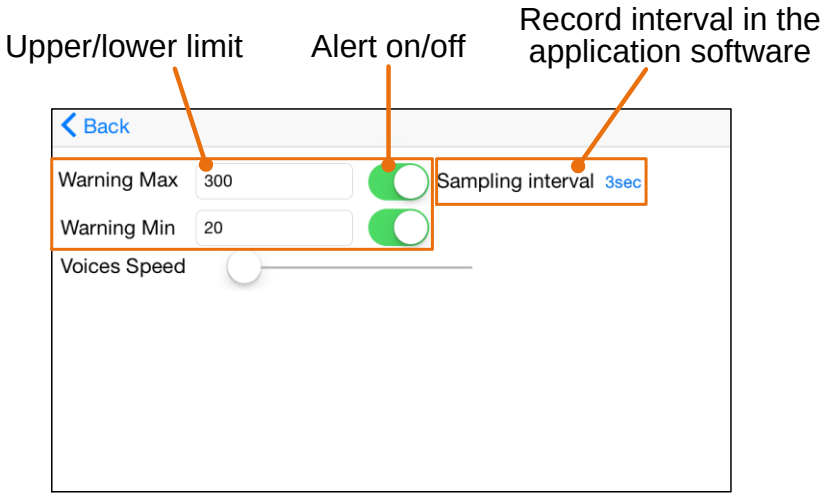
Graph&Table View



Selecting File Interface



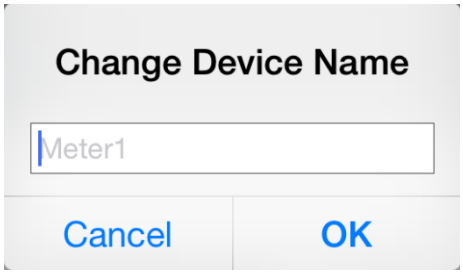
Setting Interface



Operations in iOS App

- **Customize the meter name**

The device name of the meter can be customized. Press and hold the device name (in single device view), or click ··· softkey (in single or multi-device view) and select "Change Device Name", a dialog box below will pop up. You can input the customized name, this name will be memorized in the device. If this meter is connected to the same device next time, the customized name will be shown. If this meter is connected to another device, the name is still the default one or the customized name to the connected device.



- **Add meter**: In single or multi-device view, click  softkey.
- **Select meter**: In single device view, slide left or right to switch the meter view. In multi-device view, click a device item to select it, the background is turned to blue.
- **Disconnect meter**: In single device view, click "Delete". In multi-device view, slide a device item to the left to show the "Delete" softkey, and click it.
- **Voice out function**: In single or multi-device view, click the  icon to turn on voice out. Click  to turn off. In settings interface, you can adjust the reading speed.
- **Share**: In single or multi-device view, click  to share screenshot or file.
- **Alert**: In setting interface, you can enable the alert notification, and set the upper/lower limit. APP will alert for any out-of-limit event.
- **Upgrade Online**: In single or multi-device view, click . If "Latest" is shown, indicates it is the latest version, no need to update. If "Update" is shown, you can click to update the APP.
- **Remote Control**: In single or multi-device view, the control softkeys below 

, can be short or long pressed to perform control, just as press the corresponding keys of the multimeter.

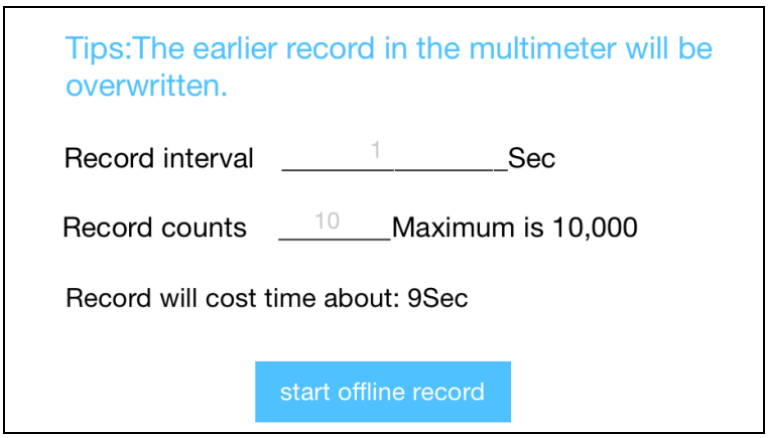
Multimeter Offline Record (iOS) – the "+" model only

When measuring using the multimeter with offline record function, you can use iOS device APP to send a command, the multimeter will start recording the measurements. After receiving the command, the connection will be disconnected automatically. The multimeter will record the measuring data in its own memory. After completion of the record, use APP to reconnect the multimeter, and then you can read the measuring data into the iOS device as a CSV file. You can use this function to record for a long time without staff on duty, while reducing Bluetooth consumption to conserve the battery power of the multimeter.

Note: When the low battery indicator appears on the meter screen, the offline record function may not work correctly. Please check the batteries of the meter to ensure them in a good state.

(1) Connect the iOS device with the multimeter, see "*How to Connect with iOS Device*" on P26.

(2) In APP device view, tap on the softkey on the right, select "**Record setting**" from the pop-up menu.



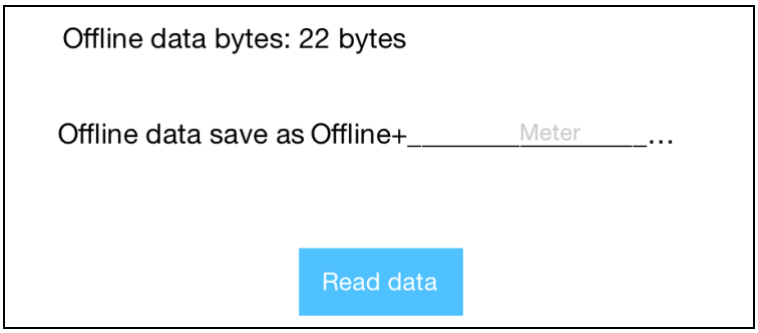
(3) Set "Record interval" and "Records counts" (maximum records count is 10,000). Tap on "**start offline record**". The memory in the multimeter can only store the recording data of one time. When start to record, the earlier offline record stored in the multimeter will be overwritten. After completion of the record, the Bluetooth of the multimeter will be disabled automatically, and the Bluetooth symbol on the multimeter screen will disappear.

Note: If the multimeter is in the process of recording data and not finished yet, the APP can not connect with the multimeter. If you want to interrupt the recording process of the multimeter, press and hold △/ until disappear on the display, or turn the multimeter off.

(4) After completion of the record, to read the measuring data, press and hold △/

until  appear on the display. Reconnect the iOS device and the multimeter.

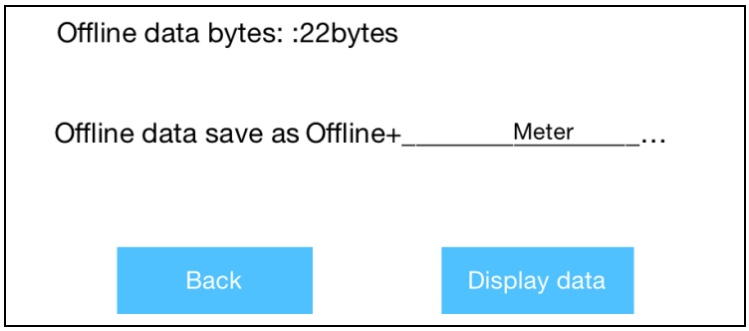
(5) In APP device view, tap on the  softkey on the right, select "**Record read**" from the pop-up menu.



The file name start with "Offline", the following part can be customized.

(6) Tap on "**Read data**", APP will read the measuring data and save as a CSV file into the iOS device.

After reading, display as below:



(7) Tap on "**Display data**", the data will be displayed in Data Graph and Table interface.

6. To Connect With Computer

– only for B35+, B35T+ or B41T+

To connect the multimeter to a computer, a **Bluetooth USB dongle** should be plugged into the USB port of computer.

- Use only the Bluetooth USB dongle (optional) supplied with the product.
- The computer must be running the **Windows** operating system (Windows 10, Windows 8, Windows 7, Windows Vista, Windows XP).

By communications with a computer through Bluetooth, you can use the free multimeterBLE software on computer to monitor the measurements, perform remote control, view trending graphs, etc. The recorded data can be saved as CSV file. The maximum number of record that can be stored depends on the free storage space in your smart device. Up to three multimeters can be connected simultaneously.

Note: Bluetooth connectivity works over a range of about 7 to 8 meters. The work range is much longer in open-sided and non-occluded wide range environment, even up to 20 meters. When the Bluetooth function is idle for 10 minutes, the Bluetooth will be turned off automatically. Before turning off, the buzzer will beep twice.

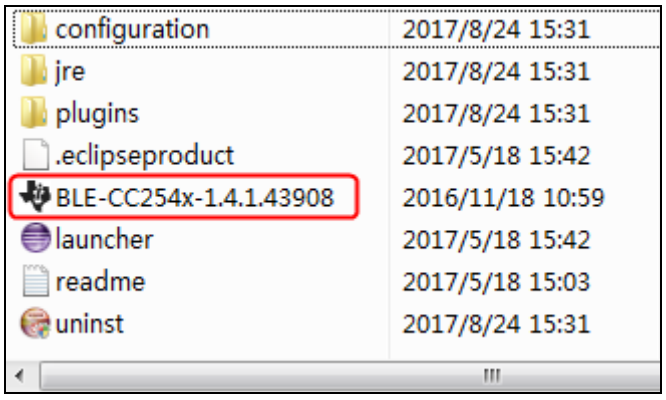
How to Connect with Computer

Step 1: Install multimeterBLE software

Install the multimeterBLE software on your computer.

Step 2: Install driver of Bluetooth USB dongle

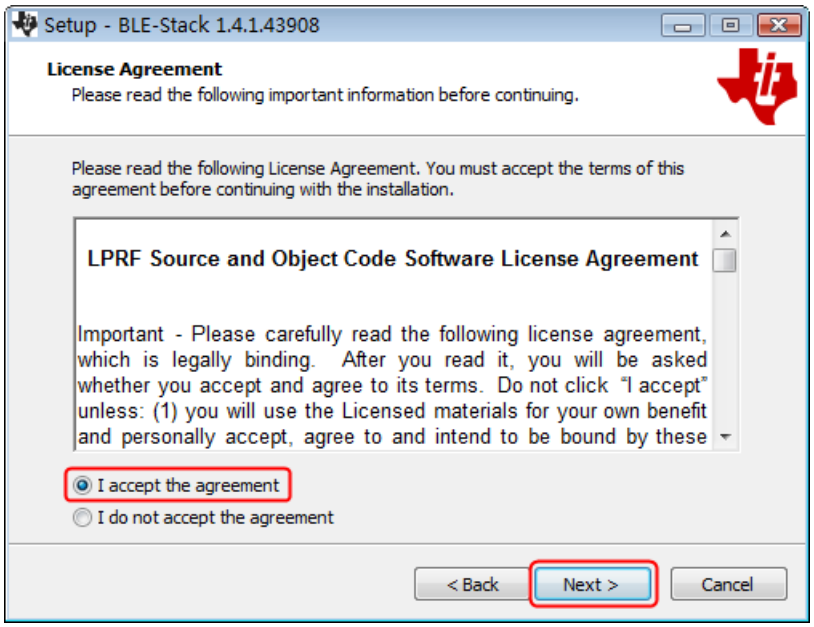
(1) Navigate to the multimeterBLE software installation folder (for example, C:\Program Files\multimeterBLE).
Double-click **BLE-CC254x-1.4.1.43908.exe** in this folder.



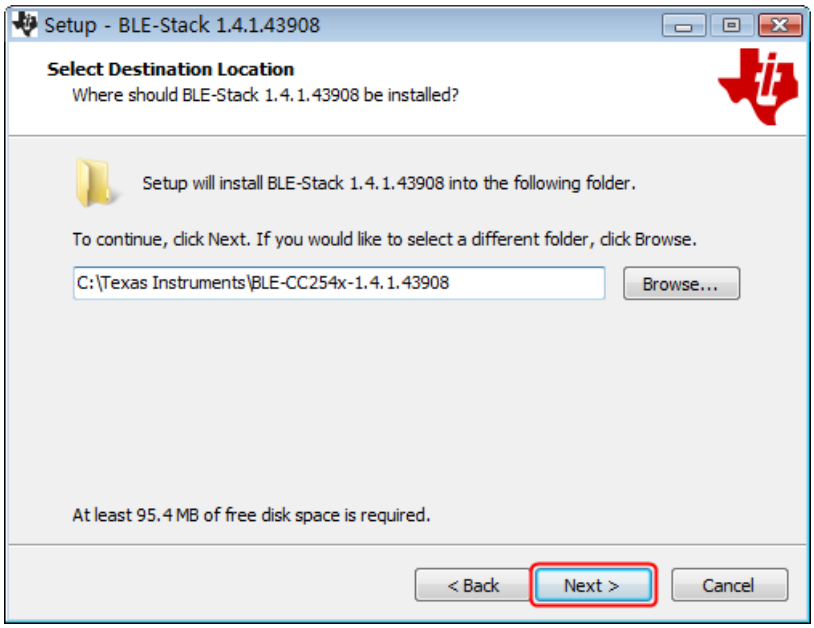
(2) Click "**Next**".



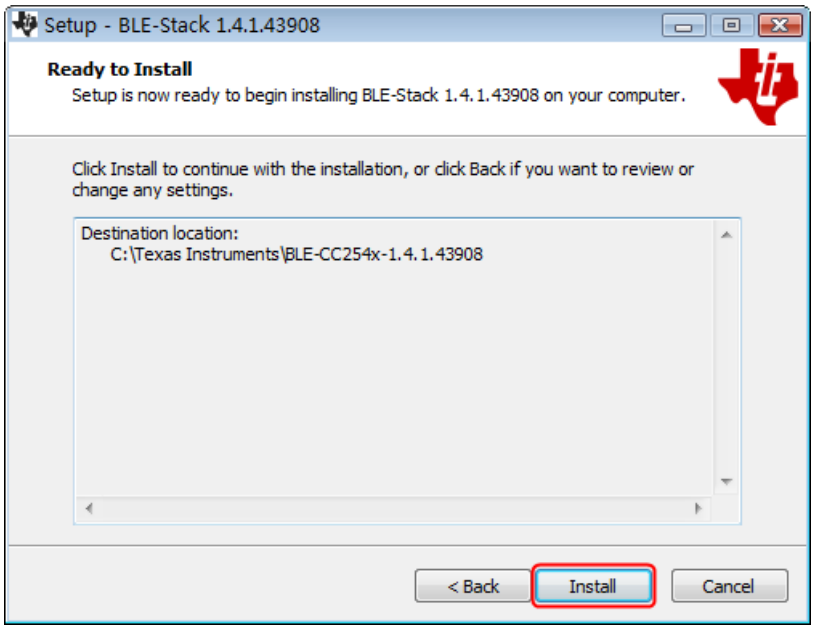
(3) Select "**I accept the agreement**", and then click "**Next**".

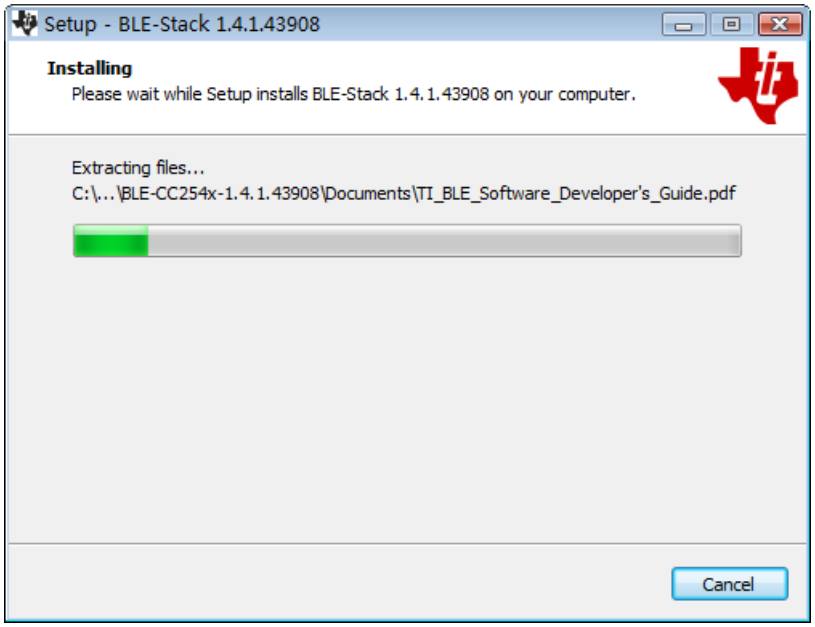


(4) Select the destination folder, and then click "**Next**".



(5) Click "**Install**".

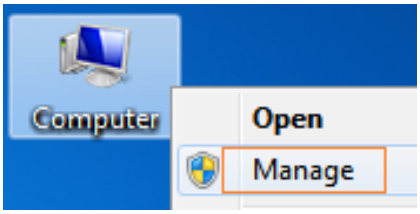




(6) Uncheck "**View the Release Notes**", and click "**Finish**" to exit Setup.

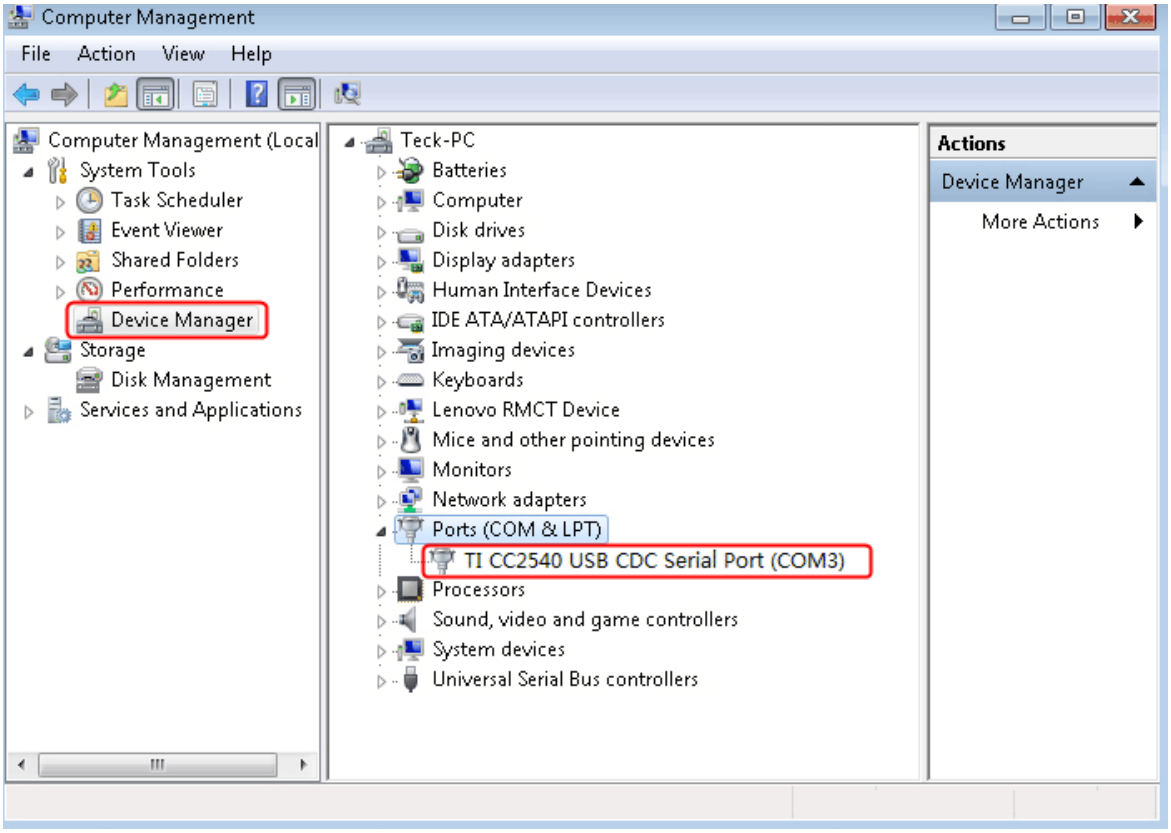


(7) Plug the Bluetooth USB dongle into a USB port on your computer.
Right click [**Computer**], you can find it on the desktop, or in [**Start**] menu. In the drop down menu, click on [**Manage**], the “Computer Management” window opens.



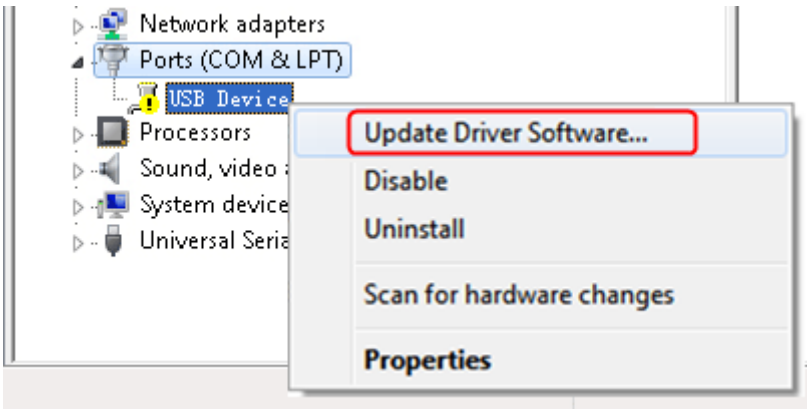
Click on “**Device Manager**” on the left hand side. On the right hand side, double click on “**Ports (COM & LPT)**”.
Under ports, if "**TI CC2540 USB CDC Serial Port (COM#)**" is displayed, that means the driver is installed successfully. Remember the “COM #” because you will need to configure the multimeterBLE software.

Note: If an unknown device is displayed, try to install the driver manually following the steps below.

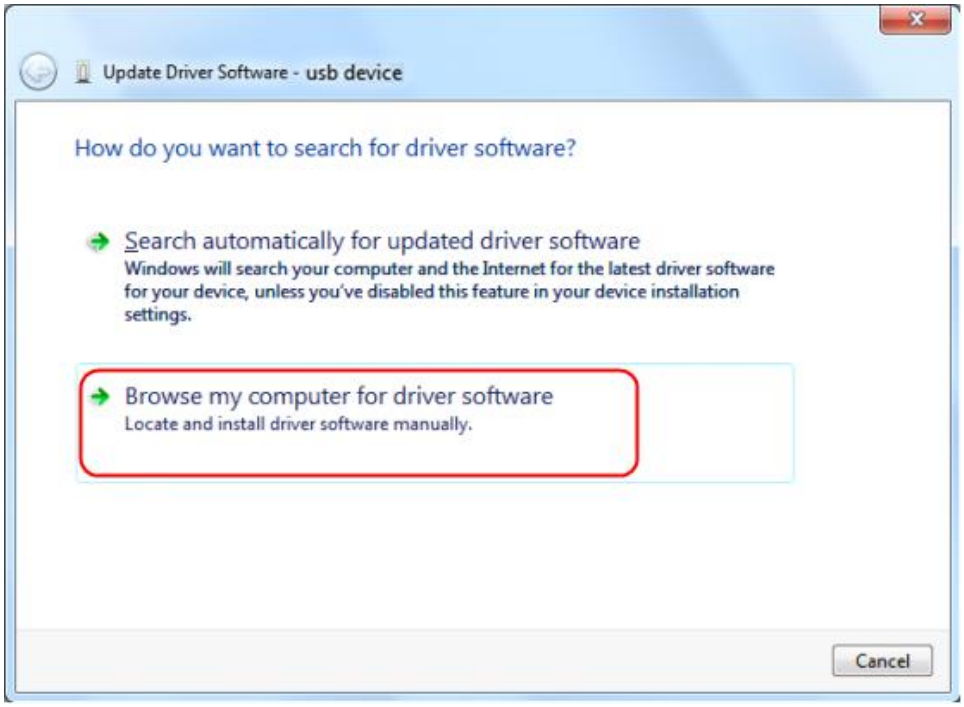


How to install the driver manually

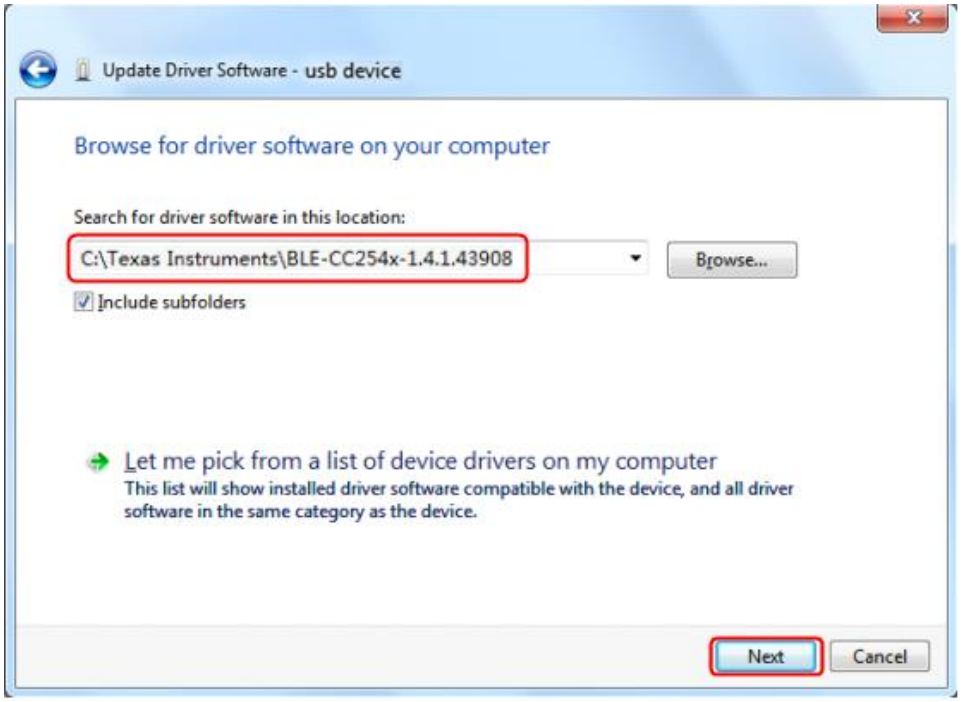
Right click the unknown device icon, in the drop down menu, click "**Update Driver Software...**".



Select "**Browse my computer for driver software**".

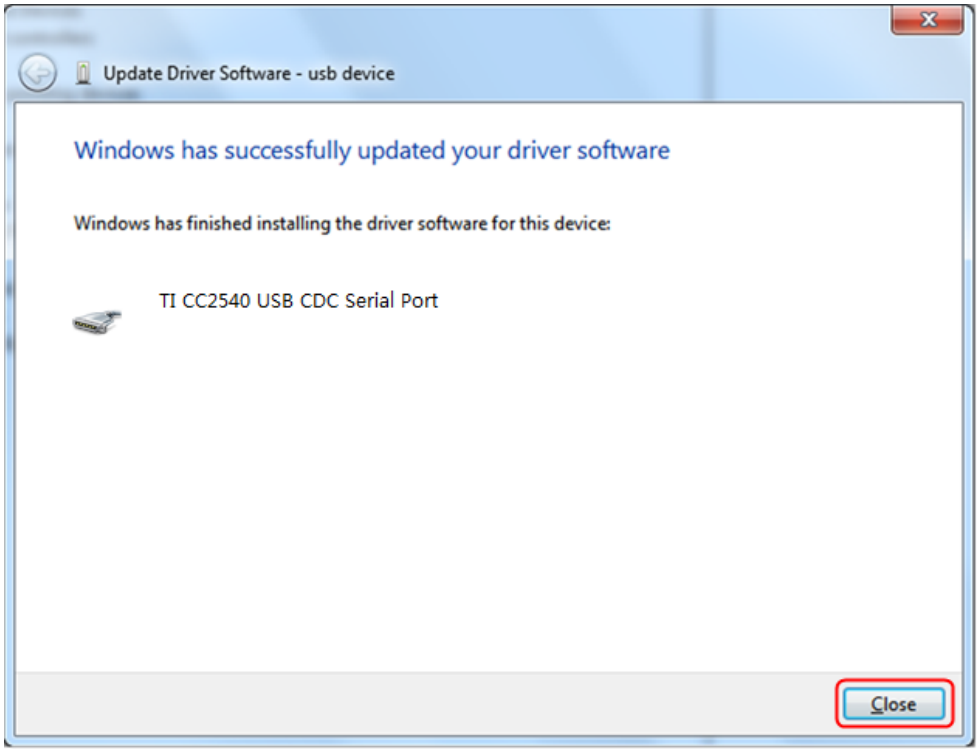


Select a directory path for the driver, and click "**Next**".



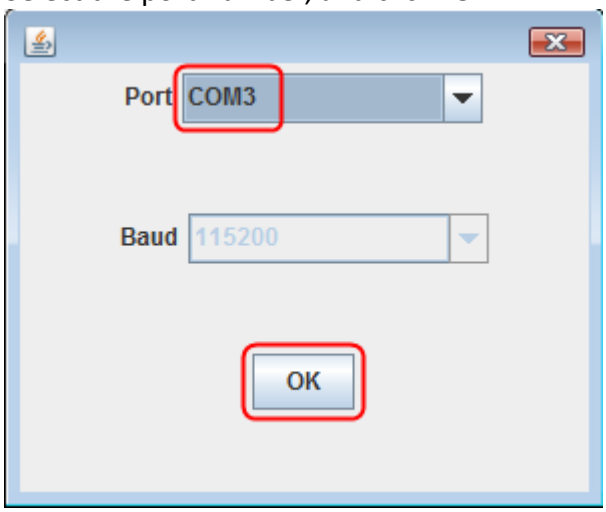
After installing successfully, click "**Close**".

In Device Manager, check if "**TI CC2540 USB CDC Serial Port (COM#)**" is displayed under Ports (COM & LPT).



Step 3: Connect to multimeterBLE software

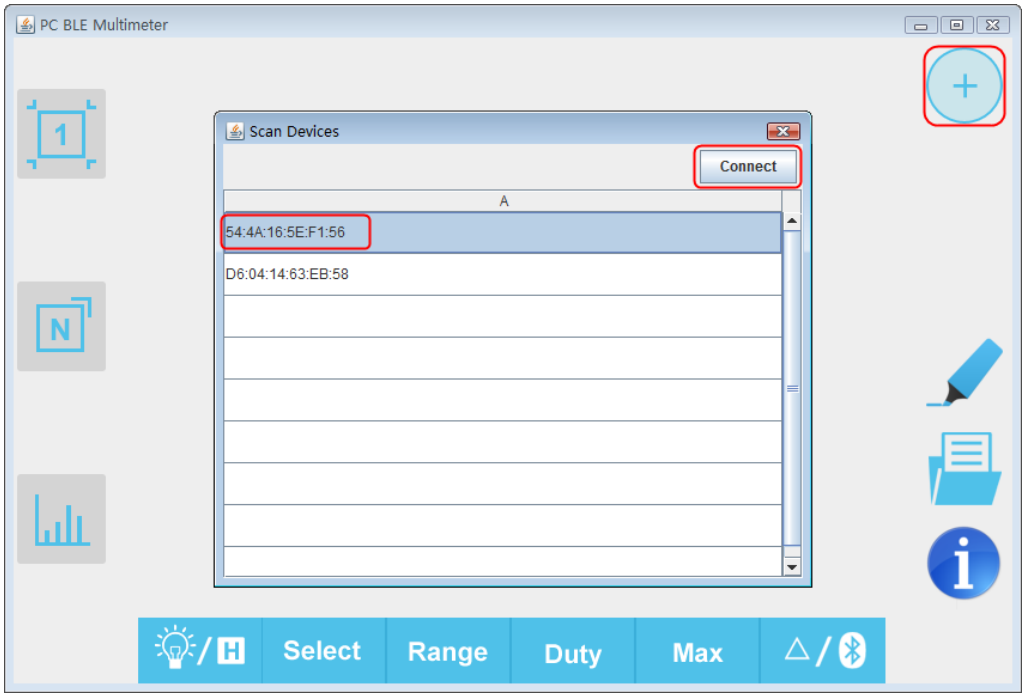
(1) After installing the Bluetooth USB dongle driver successfully, run the multimeterBLE software, the configure dialog box appears.
Make sure that the Bluetooth USB dongle is plugged into the computer.
To find the “Port” (COM #), you will need to look for it under "Ports (COM & LPT)" in Device Manager window.
Select the port number, and click "OK".



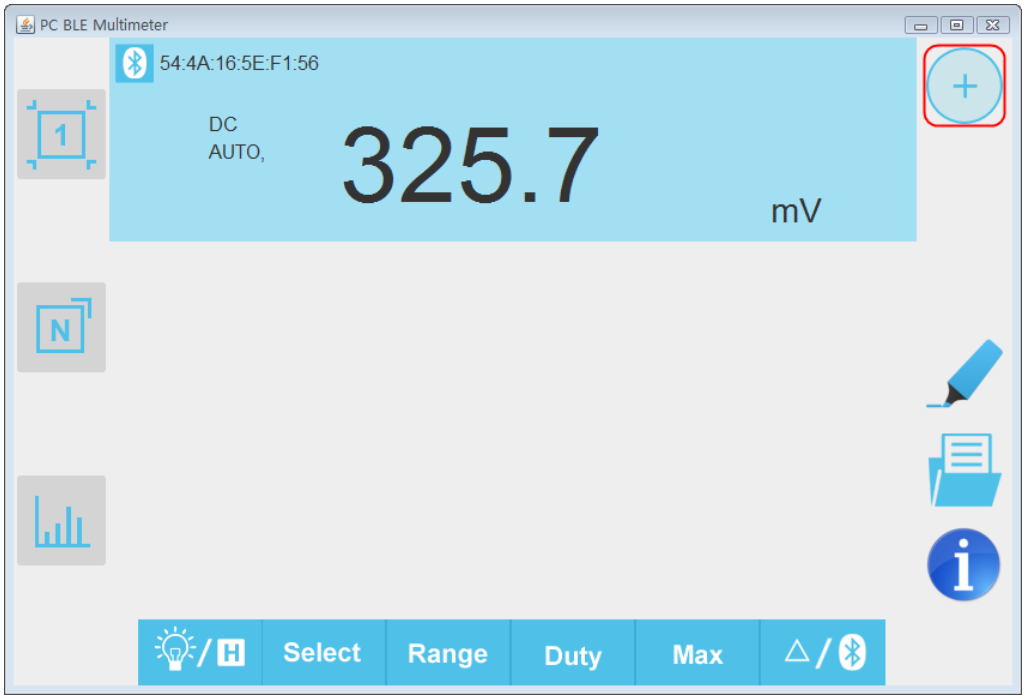
(2) Turn on the multimeter, press and hold △/ until appear on the display.

(3) Click + softkey on the right, a Scan Devices dialog box appears. A progress bar shows the progress of scanning multimeters. It will take a few seconds. When the

scan is finished, select the desired multimeter in the device list. Click the "**Connect**" button.

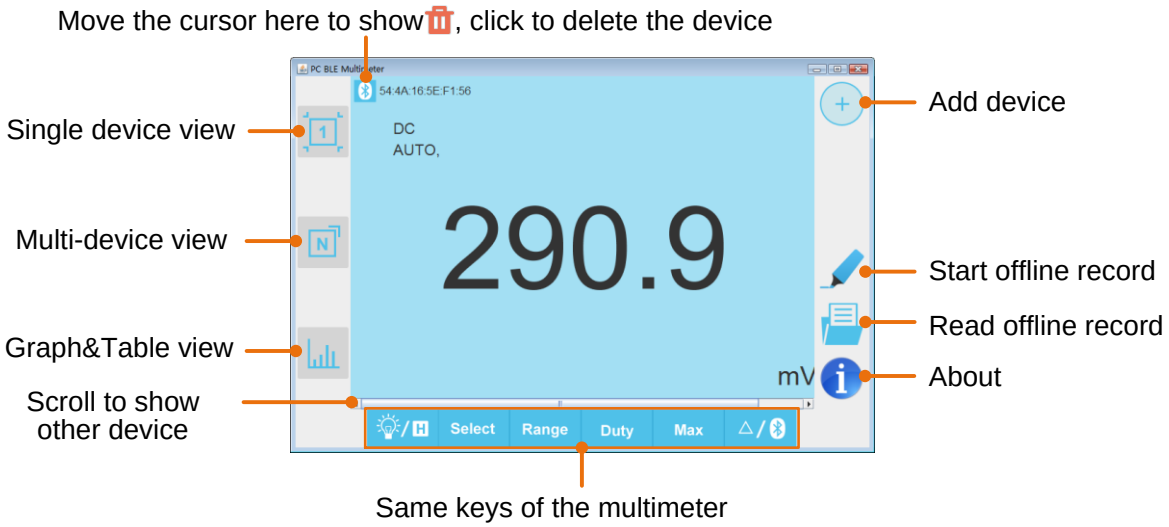


(4) The measurements will be shown if the connection is successful. You can tap on the + softkey on the right to add another multimeter.

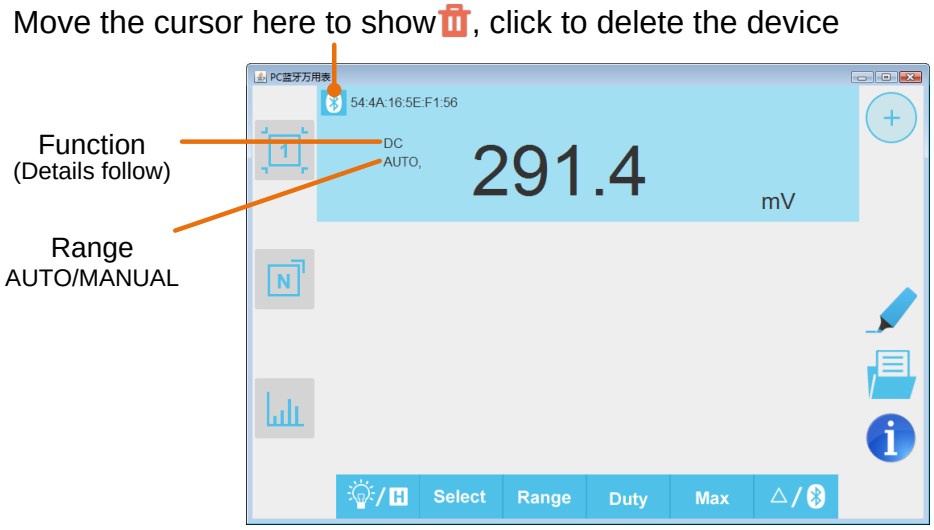


User Interface in multimeterBLE software

Single Device View



Multi-device View

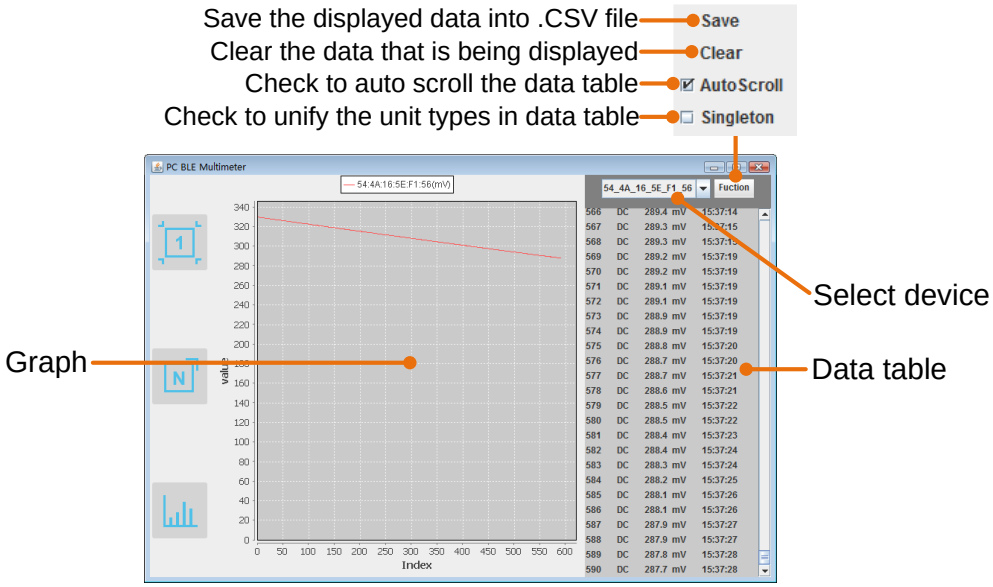


Function Description Table

Display	Function
DC	Direct Current
AC	Alternating Current
RES	Measuring Resistance
DIO	Testing Diodes
BEEP	Testing for Continuity

Display	Function
CAP	Measuring Capacitance
Hz	Measuring Frequency
DUT	Measuring Duty Cycle
TEMP	Measuring Temperature

Graph&Table View



Operations in multimeterBLE software

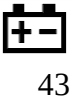
- **Add meter**: In single or multi-device view, click  softkey on the right.
- **Select meter**: In single device view, scroll left or right to switch the meter view. In multi-device view, click a device item to select it, the background is turned to blue.
- **Disconnect meter**: In single or multi-device view, move the cursor over the  icon, it will change to , click it.
- **Remote Control**: In single or multi-device view, the control softkeys

  can be short or long pressed to perform control, just as press the corresponding keys of the multimeter.
- **Unify the unit types**: In Graph&Table view, sometimes the unit type will be changed while recording, for example, V is changed to mV. To unify the unite types, click "**Function**" on the top right, in the drop down menu, check "**Singleton**".

Multimeter Offline Record (PC Software)

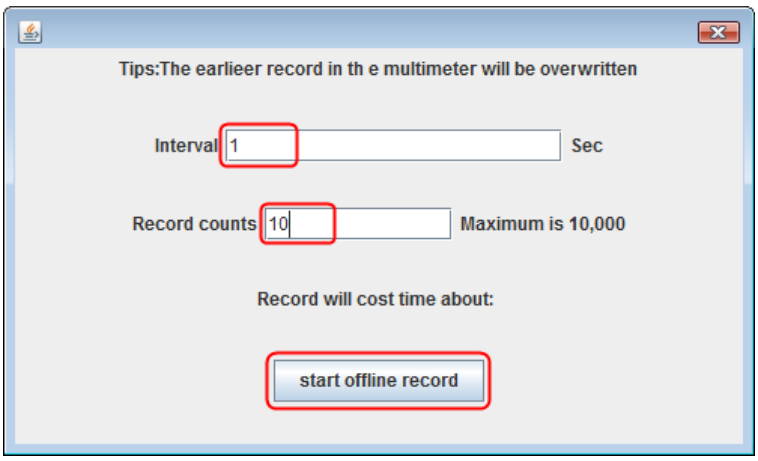
When measuring using the multimeter with offline record function, you can use PC software to send a command, the multimeter will start recording the measurements. After receiving the command, the connection will be disconnected automatically. The multimeter will record the measuring data in its own memory. After completion of the record, use PC software to reconnect the multimeter, and then you can read the measuring data into the Android device as a CSV file. You can use this function to record for a long time without staff on duty, while reducing Bluetooth consumption to conserve the battery power of the multimeter.

Note: When the low battery indicator  appears on the meter screen, the offline

record function may not work correctly. Please check the batteries of the meter to ensure them in a good state.

(1) Connect the multimeterBLE software with the multimeter, see "*How to Connect with Computer*" on P34.

(2) On software interface, click the  softkey on the right, a dialog will show.

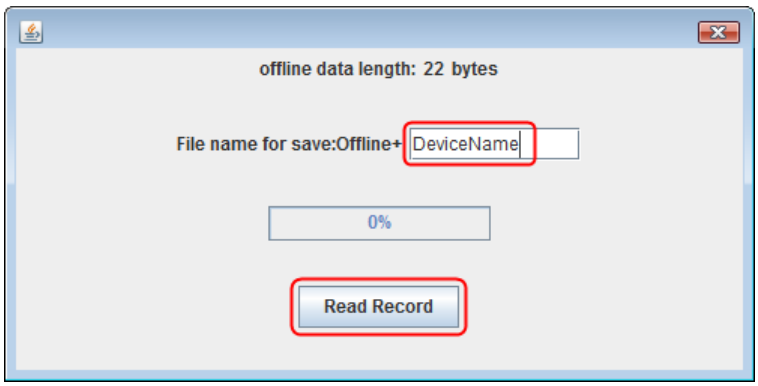


(3) Set "Interval" and "Record counts" (maximum records count is 10,000). Click "**start offline record**". The memory in the multimeter can only store the recording data of one time. When start to record, the earlier offline record stored in the multimeter will be overwritten. After completion of the record, the Bluetooth of the multimeter will be disabled automatically, and the Bluetooth symbol on the multimeter screen will disappear.

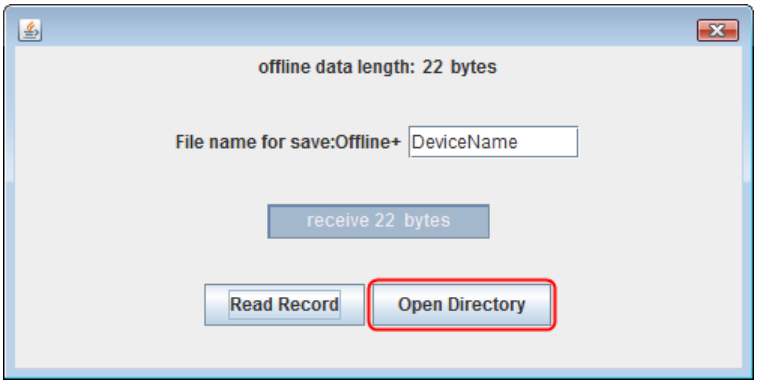
Note: If the multimeter is in the process of recording data and not finished yet, the APP can not connect with the multimeter. If you want to interrupt the recording process of the multimeter, press and hold  until  disappear on the display, or turn the multimeter off.

(4) After completion of the record, to read the measuring data, press and hold  until  appear on the display. Reconnect the software and the multimeter.

(5) On software interface, click  softkey on the right, a dialog will show. The file name start with "Offline", the following part can be customized.



(6) Click "**Read Record**", the software will read the measuring data and save as a CSV file into computer. After reading, the dialog is as below:



(7) Click "**Open Directory**" to open the directory where the CSV files are saved.

7. Technical Specifications

All these specifications apply to the multimeter unless otherwise explanation.

Note: "T" in the model indicates true RMS (optional).

Standard conditions: The environment temperature is 18℃ to 28℃, the relative humidity is less than 80%.

35 series multimeter

Function		Measurement Range	Resolu-tion	Accuracy
DC Voltage (V)	mV	60.00mV/600.0mV	0.01 mV	±(0.5%+2dig)
	V	60.00mV/600.0mV/6.000V/60.00V	0.1 mV	
		600.0V/1000V	0.1 V	
AC Voltage (V)	mV	60.00mV/600.0mV	0.01 mV	±(0.8%+2dig)
	V	60.00mV/600.0mV/6.000V/60.00V	1 mV	±(0.8%+2dig)
		600.0V/750V	0.1 V	±(1%+3dig)
DC Current (A)	μA	600.0μA	0.1 μA	±(0.8%+2dig)
	mA	600.0μA/6.000mA/60.00mA/ 600.0mA/6.000A	0.01 mA	±(0.8%+2dig)
	A	20.00A [1]	1 mA	±(1.2%+3dig)
AC Current (A)	μA	600.0μA	0.1 μA	±(1%+3dig)
	mA	600.0μA/6.000mA/60.00mA/ 600.0mA/6.000A	0.01 mA	±(0.8%+2dig)
	A	20.00A [1]	1 mA	±(2%+3dig)
Resistance (Ω)		600.0Ω/6.000kΩ/60.00kΩ/600.0kΩ/ 6.000MΩ/10.00MΩ	0.1 Ω	±(0.8%+2dig)
		60.00MΩ	0.01 MΩ	±(2%+3dig)
Capacitance (F)		40.00nF	0.01 nF	±(2.5%+3dig)
		400.0nF/4.000μF/40.00μF	0.1 nF	±(2.5%+3dig)
		400.0μF/4000μF [2]	0.1 μF	±(3%+5dig)
Frequency [3] (Hz)		9.999Hz/99.99Hz/999.9Hz/9.999k Hz/99.99kHz/999.9kHz/9.999MHz	1 mHz	±(0.8%+2dig)
Duty Cycle [4] (%)		0.1% - 99.9% (Typical: Vrms=1 V, f=1 kHz)	0.1%	±(1.2%+3dig)
		0.1% - 99.9%(≥1 kHz)		±(2.5%+3dig)
Temperature (°C/°F)		−50 ℃ to 400 ℃	1 ℃	±(2.5%+3dig)
		−58 ℉ to 752 ℉	1 ℉	±(4.5%+5dig)

[1] When measuring current, for 10 A to 15 A, the measuring duration should not be over 2 minutes within 10 minutes, and in this 10 minutes, no other current should flow through except within the measuring duration; for 15 A to 20 A, the measuring duration should not be over 10 seconds within 15 minutes, and in this 15 minutes, no other current should flow through except within the measuring duration.

[2] When measuring capacitance, for the 4000 uF range, the measuring duration should be over 30 seconds.

[3] When measuring frequency, the typical waveform is Square or Sine. The signal meets the following conditions.

Frequency	Amplitude (rms)
1 Hz – 4 MHz	≥ 300 mV
4 MHz – 8 MHz	≥ 600 mV
8 MHz – 10 MHz	≥ 750 mV

[4] When measuring duty cycle, the typical waveform is Square.

B41T(+) multimeter

Function		Measurement Range	Resolution	Accuracy	
DC Voltage (V)	mV	220mV	0.01 mV	±(0.1%+5dig)	
	V	2.2V	0.1 mV	±(0.1%+2dig)	
		22V	1 mV		
		220V	10 mV		
		1000V	0.1 V	±(0.1%+5dig)	
AC Voltage (V)	mV	220mV	0.01 mV	≤1kHz	±(1.0%+10dig)
				>1kHz	±(1.5%+50dig)
	V	2.2V	0.1 mV	≤1kHz	±(0.8%+10dig)
				>1kHz	±(1.2%+50dig)
		22V	1 mV	≤1kHz	±(0.8%+10dig)
				>1kHz	±(1.2%+50dig)
		220V	10 mV	≤1kHz	±(0.8%+10dig)
				>1kHz	±(2.0%+50dig)
		750V	0.1 V	≤1kHz	±(1.2%+10dig)
				>1kHz	±(3.0%+50dig)
DC Current (A)	μA	220μA	0.01 μA	±(0.5%+10dig)	
		2200μA	0.1 μA		
	mA	22mA	1 μA		
		220mA	10 μA	±(0.8%+10dig)	
	A	20.00A [1]	1 mA	±(2%+25dig)	
AC Current (A)	μA	220μA	0.01 μA	≤1kHz	±(0.8%+10dig)
				>1kHz	±(1.2%+50dig)
		2200μA	0.1 μA	≤1kHz	±(0.8%+10dig)
				>1kHz	±(1.2%+50dig)
	mA	22mA	1 μA	≤1kHz	±(1.2%+10dig)
				>1kHz	±(1.5%+50dig)
		220mA	10 μA	≤1kHz	±(1.2%+10dig)
				>1kHz	±(1.5%+50dig)
	A	20.00A [1]	1 mA	≤1kHz	±(1.5%+10dig)
				>1kHz	±(2.0%+50dig)

Resistance [2] (Ω)	220Ω	0.01 Ω	±(0.5%+10dig)
	2.2kΩ	0.1 Ω	
	22kΩ	1 Ω	
	220kΩ	10 Ω	
	2.2MΩ	100 Ω	±(0.8%+10dig)
	22MΩ	1.2 kΩ	±(1.5%+10dig)
	220MΩ	100 kΩ	±(5.0%+10dig)
Capacitance (F)	22nF	1 pF	±(3.0%+5dig)
	220nF	10 pF	
	2.2μF	100 pF	
	22μF	1 nF	
	220μF	10 nF	
	2.2mF	100 nF	±(4.0%+10dig)
	>220mF [3]	Undefined	Undefined
Frequency [4] (Hz)	22.00Hz	0.01 Hz	±(0.1%+4dig)
	220.0Hz	0.1 Hz	
	22.000kHz	1 Hz	
	220.00kHz	10 Hz	
	2.2000MHz	0.1 kHz	
	22.000MHz	1 kHz	
	≤220MHz	0.01MHz	Undefined
Duty Cycle [5] (%)	5.0% - 94.9% (Typical: Vrms=1 V, f=1 kHz)	0.1%	±(1.2%+3dig)
	5.0% - 94.9% (≥1 kHz)		±(2.5%+3dig)
Temperature (°C/°F)	−50 ℃ to 400 ℃	0.1 ℃	±(1.0%+5℃)
	−58 ℉ to 752 ℉	0.1 ℉	±(1.2%+6℉)

[1] When measuring current, for 10 A to 15 A, the measuring duration should not be over 2 minutes within 10 minutes, and in this 10 minutes, no other current should flow through except within the measuring duration; for 15 A to 20 A, the measuring duration should not be over 10 seconds within 15 minutes, and in this 15 minutes, no other current should flow through except within the measuring duration.

[2] Without relative operation, add ±0.50 Ω additional error in resistance function.

[3] When measuring capacitance, for the 220 mF range, the measuring duration should be over 25 seconds.

[4] When measuring frequency, the typical waveform is Square or Sine. The signal meets the following conditions.

Frequency	Amplitude (rms)
1 Hz – 4 MHz	≥ 300 mV
4 MHz – 8 MHz	≥ 600 mV
8 MHz – 10 MHz	≥ 750 mV

[5] When measuring duty cycle, the typical waveform is Square.

Characteristics	Instruction		
Display	35 series	6000	
	B41T(+)	22000	
Frequency Response (Hz)	The model without "T"	(40 - 400) Hz	
	The model with "T"	35 series	(40 - 1000) Hz
		B41T(+)	(40 - 10000) Hz
Sample rate for digital data	35 series	3 times/second	
	B41T(+)	2 times/second	
Sample rate for analog bar graph	35 series	30 times/second	
	B41T(+)	Undefined	
Bluetooth	B35(T)(+) B41T(+)	√	
	D35(T)	Without	
Auto ranging	√		
True RMS	The model with "T" has this function.		
Diodes Test	√		
Measuring Transistor	35 series	√	
	B41T(+)	Without	
Sleep Mode	√		
Continuity Test	√		
Low battery indication	√ (The "" is displayed when the battery is under the proper operation range.)		
Data Hold	√		
Relative Measurement	√		
MAX/MIN Value	√		
LCD Backlight	√		
Analog bar graph	35 series	61 Segments	
	B41T(+)	45 Segments	
Input Protection	√		
Input Impedance	10 MΩ		
Battery	3 V (1.5 V × 2) AA alkaline batteries		
LCD Size	69 mm * 52 mm		
Weight (without package)	0.32 kg		
Dimension	85 mm * 185 mm * 30 mm		
Working temperature	0℃ to 40℃		
Storage temperature	－10℃ to 60℃		
Relative Humidity	≤ 80%		

Altitude	Operating: 3,000 m Non-operating: 15,000 m

Interval Period of Adjustment:
One year is recommended for the calibration interval period.

8. Appendix

Appendix A: Enclosure

(The accessories subject to final delivery.)

Standard Accessories:



Test lead



Crocodile clip



Multi-functional test socket
(Not available for B41T(+))



K-type thermocouple



Quick Guide



Soft Bag

Options:



Thin-tipped test lead



Bluetooth USB dongle

Appendix B: General Care and Cleaning

Warning: To avoid electrical shock or damage to the multimeter, ensure that the insides of the casing stay dry at all times.

Cleaning

To clean the instrument exterior, perform the following steps:

Wipe the dust from the instrument surface with a soft cloth. Do not make any scuffing on the screen when clean the LCD. Clean the instrument with a wet soft cloth not dripping water. It is recommended to scrub with soft detergent or fresh water. To avoid damage to the instrument, do not use any corrosive chemical cleaning agent.

Dirt or moisture in the terminals can distort readings. Follow the steps below to clean your multimeter.

1. Turn the multimeter off and remove the test leads.
2. Turn the multimeter over and shake out the dirt in the terminals.
3. Wipe the contacts in each terminal with a clean swab dipped in alcohol.