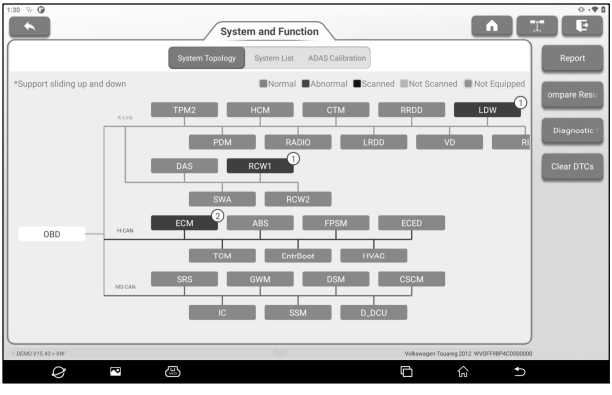
6.2.1 Smart Scan

This function is used to quickly detect the vehicle and output the vehicle health report directly (this will only be displayed for the vehicle testing software supports this function.)

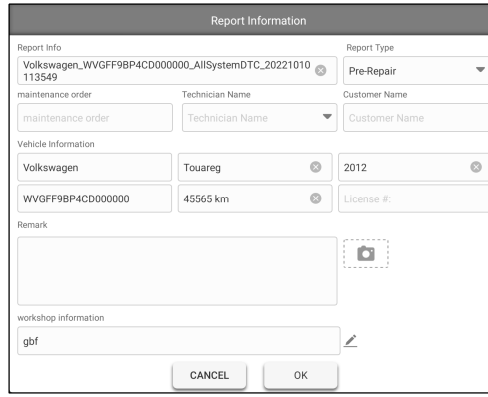
Tap **Smart Scan** on the test option selection interface, and the system starts to scan each system for faults code.



The system with fault codes will be displayed with red background, and the specific number of fault codes will be displayed. Click on a single system to view specific fault information. No fault system will be displayed with green background.

Screen Button Description:

Report	Click to save the current fault report as the detection report.

<table>
<tr>
<td></td>
<td>


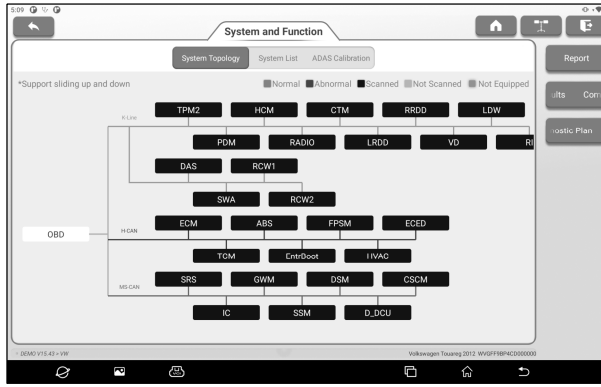
Click▼ to select the report type from the drop-down list, then enter the details and tap OK.
Note: Diagnostic reports can be classified into Pre-Repair Report, Post-Repair Report and Diagnostic Scan (if no comparison is required, you can select Diagnostic Scan). The device has the report comparison function, so you need to select a correct report type when saving reports. By comparison, maintenance technicians can clearly understand whether the fault codes found before diagnosis have been completely cleared after maintenance.
Enter the shop name and then tap OK to enter the report details view page.
On the report details page, tap Save to save the report. All diagnose reports are stored in the Other -> Reports -> Diagnostic tab.
</td>
</tr>
<tr>
<td>Compare</td>
<td>Click to select the report before maintenance.</td>
</tr>
</table>

Results	By comparing the reports before and after maintenance, the maintenance technician can clearly understand whether the fault codes found before maintenance have been completely cleared after maintenance. *Note: Before performing this function, please ensure that:* • *The Pre-Repair inspection report of the current test vehicle has been saved; and* • *Repairs have been carried out on the basis of the inspection report before maintenance, and the code has been cleared. Otherwise there will be no difference between the reports before and after the maintenance*
Diagnostic Plan	Click to view the reason analysis of the fault code.
Clear DTCs	Click to clear all the fault codes. *Note: For general models, please strictly follow the conventional sequence: read the fault code first, then clear the fault code, test run, read the fault code again for verification, repair the vehicle, clear the fault code, test run again to confirm that the fault code does not appear.*

6.2.2 System Scan

This function is used to scan which systems the vehicle is equipped with.

Tap **System Scan** on the test option selection interface, and the system starts to scan the vehicle system. After the scan is completed, the screen will display the scan results.



The user can manually select the vehicle electronic control system to perform the test function operation. Click a single electronic control system (such as "ECM") in the test option selection interface, and then tap **Enter** to go to the test function selection page.

Note: Different models may have different test menus.

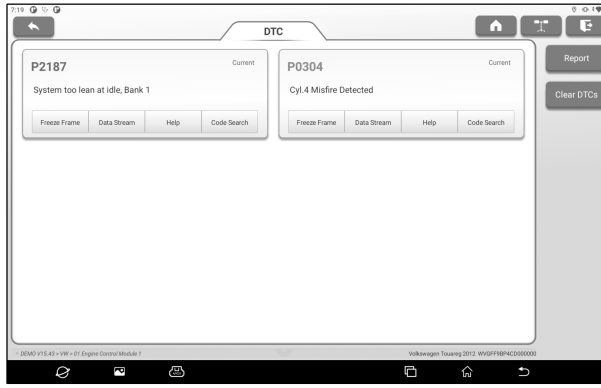
A. Module Information

This function is used to read the ECU version information of the current vehicle.

B. Read DTC

This function is used to read the diagnostic trouble code existing in the current car ECU, and help maintenance personnel quickly understand the cause of vehicle failure.

Tap **Read DTC** on the test function selection page, and the screen will display the following detection results.



⚠ *Warning: Reading a diagnostic trouble code while troubleshooting a vehicle is only a small step in the diagnostic process. The vehicle DTC is only used as a reference, and parts cannot be replaced directly on the basis of the given DTC definition. Each DTC has a set of test procedures, and the maintenance technician must strictly follow the operating instructions and procedures described in the vehicle maintenance manual to confirm the root of the fault.*

Screen Button Description:

Freeze Frame	If the button is highlighted, the frame is frozen. The freezing frame function is to record the values of some specific data streams at the moment when the car breaks down for verification.
Data Stream	Click to read and display the car ECU real-time operation data and parameters.
Help	Click to view the possible cause of the DTC.
Code Search	Click to search for a specific explanation of the DTC online.

Report	Save the current test result as a test report. All test reports are stored in the **Other -> Reports** tab.

C. Clear Fault Code

This function is used to clear fault codes stored in the ECU of the system under test.

In the test function selection page, Tap **Clear Fault Code**, the system will pop up a dialog box of confirming clearing, Tap **Yes** to confirm the clearing of the fault code.

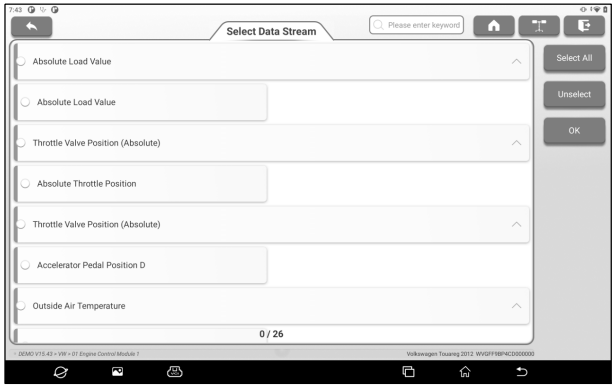
Note: For general models, please operate in strict accordance with the conventional sequence: read the fault code first, then clear the fault code in the test run, read the fault code again for verification, repair the vehicle, clear the fault code, and confirm the fault code does not appear in the test run again.

D. Read Data Stream

This function is mainly used to read and display the real-time operation data and parameters of automobile ECU. By observing these real-time data streams, maintenance technicians can gain insight into the overall performance of the vehicle and provide guidance for vehicle maintenance.

Danger: If you must drive the vehicle while performing troubleshooting, please ask someone else to help you. Driving and operating diagnostic equipment at the same time is dangerous and can cause serious traffic accidents.

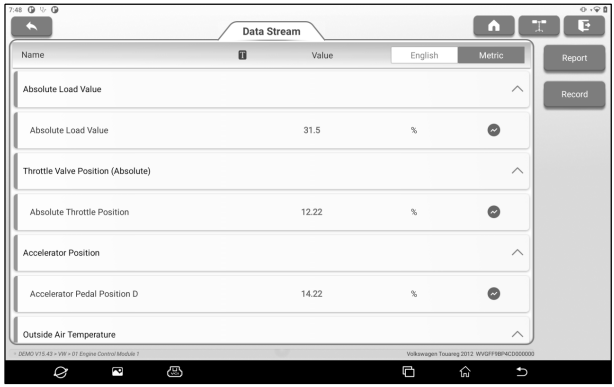
Tap **Read Data Stream** on the test function selection page, and the system enters the data stream selection page.



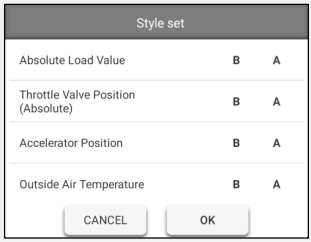
Screen Button Description:

Select All	Select all data stream options.
Unselect	Click to cancel all the selected data stream options.
OK	Confirm the current operation.

Tap **OK**, the system will display the dynamic data of the selection.



Note:



1. Click T, the left popup will appear on the screen:

Users can set different display styles for each data stream option according to personal preferences.

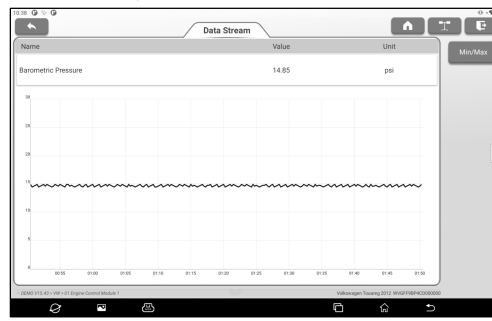
***B** Indicates that the current data stream will be displayed in bold.*

***A** Indicates that the current data stream will be displayed in red.*

*2. Tap **English / Metric** to switch units.*

3. If the read data stream value is out of the standard value range, the data stream is displayed in red.

Screen Button Description:

(Single Graphic)	Click to display the current (single) data stream as a waveform diagram.  *Note: The waveform can be zoomed in or out. Tap the screen with two fingers (thumb and index finger, for example), then slide the fingers to adjust the distance between the fingers to zoom in and*

	out of the screen. • Min/Max Limit: Click to set the maximum/minimum value. Once the running value exceeds the set value, the system will issue a warning.
Report	Click to save the current data stream value as a report. The saved test report is stored in **Other** -> **Reports** -> **Diagnostic**.
Record	Click to start recording test data. The recorded test data can provide an important reference for technicians to troubleshoot vehicle problems. To stop reading, click the button in front of the progress bar. *Note: The saved file is named after vehicle type +VCI device serial number + system time when recording starts. To distinguish file names, please set the correct system time.*

E. Actuation Test

This function is mainly used to test whether the executive component in the electronic control system can work normally.

6.2.3 Choose to Scan

This function is used to select the vehicle electronic control system required by the user for scanning. In the test option selection interface, check the check box in front of the system to be scanned, and then tap **Choose to Scan** to start scanning the selected system.

7. Oscilloscope

This function module is mainly used to measure voltage signals and analyze the form of electronic signals. Automobile repair technicians can quickly judge the fault of automobile electronic equipment and circuits by observing the waveform of the whole signal.

7.1 Technical Parameters

Number of Channels:

2

Bandwidth:

10MHz

Maximum Real-time Sampling Rate:

100Mbps

Time Base Range:

1us/div～10s/div, step by 1 ~ 2 ~ 5 times

Sampling Mode:

Common sampling, peak detection, average value

Storage Depth:

1M

Input Coupling:

DC, AC and Grounding

Input Impedance:

1MΩ±2%

Input Capacitance:

20pF (maximum)

Vertical Sensitivity:

2mV/div～5V/div

Vertical Resolution:

8bits

Maximum Input Voltage:

40V peak (DC + AC peak)

Probe Attenuation Coefficient:

1X, 10X (probe support required)

Trigger Type:

Edge trigger, pulse width trigger

Trigger Mode:

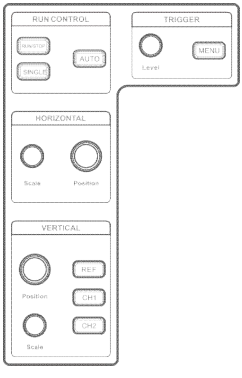
Automatic, normal, single time

Automatic Measurement:

Peak-to-peak, average, maximum, minimum, frequency, period

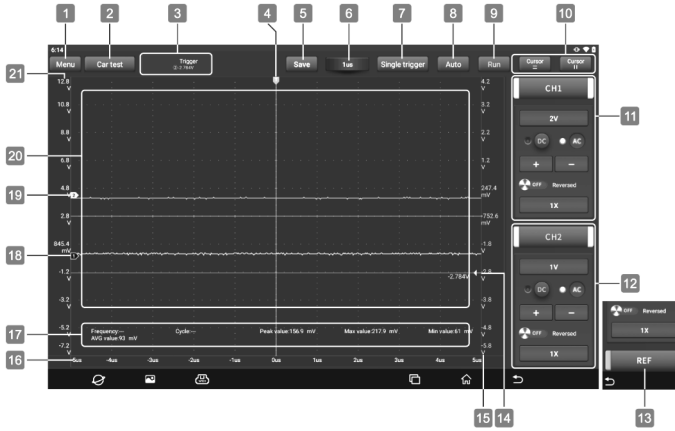
7.2 Initial Use

P03 is equipped with the oscilloscope function button area. In addition to operating through the screen touch button, you can also set and control the oscilloscope function module through the buttons in the function button area.

Button Position	Button Identification	Button Description
	**RUN CONTROL** Running Control	**RUN/STOP** **AUTO:** automatic **SINGLE:** single trigger
	TRIGGER Trigger Level control	**Position** (press to return to zero) **Level:** trigger level setting knob
	HORIZONTAL Horizontal Control	**Position:** horizontal position adjustment knob (press to return to zero) **Scale:** horizontal time base adjustment knob
	VERTICAL Vertical Control	**Position:** vertical position adjustment knob (press to return to zero) **Scale:** voltage range adjustment knob **REF:** reference channel **CH1:** channel 1 **CH2:** channel 2

7.2.1 Getting Started

Tap **Oscilloscope** on the main interface or click the oscilloscope function switching button on the upper right corner of the host to enter the oscilloscope function module page.



No.	Description	Operation Prompt
1	**Menu** Include the following options: • **Measure**: provide 6 parameter measurement items. • **Save**: Set the save format and save path of channel waveform. • **Show**: Set the waveform display style. • **User Settings**: Provide functions such as data clearing, oscilloscope setting and automatic calibration. • **About**: Display the specific information of the program.	Click once to expand the submenu. Click again to retract the submenu. You can also click the "Menu" button in the function button area to expand/retract the submenu.
2	**Car Test** It provides various vehicle related test content (such as circuit, sensor, actuator, commnication test, combined test) and corresponding test connection methods.	Click once to expand the submenu. Click again to retract the submenu.
3	**Trigger** Used to set trigger channel and trigger	Click once to expand the submenu to set channels

	type.	and conditions. Click again to retract the submenu.
4	**Horizontal Trigger Position Mark**	Press and hold and drag left and right or use the "horizontal position adjustment knob" in the function button area to adjust the horizontal trigger position.
5	**Save** It can quickly save the measurement waveform of the currently open channel.	To change the save path and file type, tap **Menu** -> **Save** to set.
6	**Horizontal Setting** Control the horizontal time base.	Click once to expand the horizontal time base option and select the appropriate time base value, or use the "horizontal time base adjustment knob" to adjust to the appropriate time base value.
7	**Single Trigger** Capture a trigger, complete the acquisition, and then stop.	
8	**Automatic** Click to enable the automatic range function. When the automatic range function is enabled, the oscilloscope will automatically set various parameters, including vertical scale, horizontal time base and trigger level. When the signal is connected, these parameters will change automatically, and there is no need to operate again after the signal changes. The oscilloscope will	You can also click the "AUTO" button in the function button area to enable the automatic range function.

	automatically recognize and make corresponding changes.	
9	**Wait/Run/Stop** **Wait**: All pre-triggered data has been obtained, and the oscilloscope is ready to receive the trigger. **Run**: Indicates that the oscilloscope is running. **Stop**: Stop collecting data.	You can also click the "RUN/STOP" button in the function button area to operate.
10	**Cursor Settings** Turn on/off the horizontal measurement cursor switch. When it is turned on, two reference lines named Y1 & Y2 will appear in the waveform display area of the screen; Turn on/off the vertical measurement cursor switch. When it is turned on, two reference lines named X1 & x2 will appear in the waveform display area of the screen.	Click once to enable the cursor measurement function. Click again to disable the function.
11	**Channel 1 Setup Panel** Control the amplitude of the displayed signal. You can set the inversion, coupling mode and probe attenuation coefficient.	When the channel is enabled, click CH1 / CH2 once to disable the channel and hide the channel setting menu. Click it again to enable the channel and expand the channel setting menu. You can also click the "CH1" and "CH2" buttons in the function button area to set the channel.
12	**Channel 2 Setup Panel** Control the amplitude of the displayed signal. You can set the inversion, coupling mode and probe attenuation coefficient.	
13	**REF (Reference) Channel Setting** Set the reference channel.	In the channel setting panel area, press and slide the screen up to call up the

		REF reference channel button, and click this button to call up the reference channel setting menu. You can also click the "REF" button in the function button area to set the reference channel.
14	**Edge Trigger Level Identification**	Press and hold the logo to drag or adjust it through the "LEVEL" knob in the function button area.
15	**Channel 2 Voltage Scale**	Click +/- or adjust the voltage scale of channel 2 through the "voltage range adjustment knob" (need to set channel 2 as the current channel) in the function button area.
16	**Horizontal Time Base**	
17	**Measured Value Display Area**	It can be called up through **Menu** -> **Measure**.
18	**Channel 1 Mark** Indicate the reference point of the displayed waveform. If there is no mark, the channel is disabled and will not be displayed.	
19	**Channel 2 Mark** Indicate the reference point of the displayed waveform. If there is no mark, the channel is disabled and will not be displayed.	
20	**Waveform Display Area**	

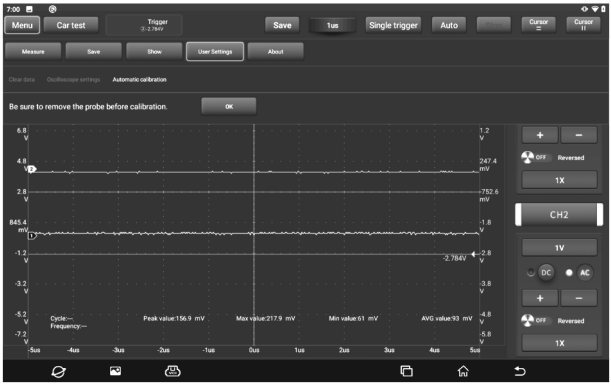
21	**Channel 1 Voltage Scale**	Click +/- or adjust the voltage scale of channel 1 through the "voltage range adjustment knob" (need to set channel 1 as the current channel) in the function button area.

7.2.2 Automatic Calibration

The automatic calibration program can optimize the oscilloscope signal path with maximum measurement accuracy. Users can run this program at any time, but should run this program if the ambient temperature changes more than 10°C or above. In order to calibrate more accurately, the oscilloscope must be powered on and preheated for 20 minutes before automatic calibration. The correction content mainly includes the correction of analog channel, the correction of trigger voltage in trigger circuit and the correction of horizontal baseline shift nonlinearity.

Notes: During automatic calibration, ensure that no signal is input at the input end of CH1/CH2, otherwise the instrument may be damaged.

Choose **Menu** -> **User Settings**, and then tap **Automatic Calibration**.

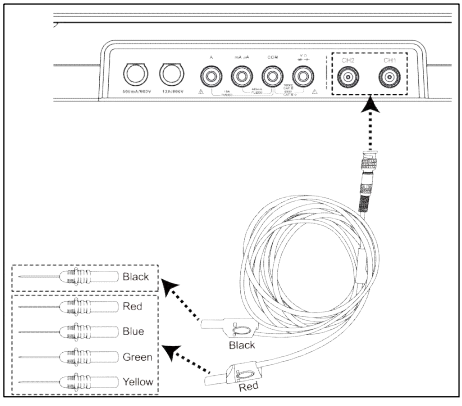


Tap **OK** button on the pop-up window to start calibration. The prompt message "Calibrating...please wait." will appear on the screen. After the calibration is completed, a prompt box of "Calibration success" will pop up on the screen.

7.2.3 Connection

When detecting the sensor:

1. Connect one end of the BNC connector of the oscilloscope test clip to the channels CH1/CH2 (select the channel number and the channel quantity as appropriate), connect the other end of the black connector to the black pin, and connect the red connector to the pins of other colors.



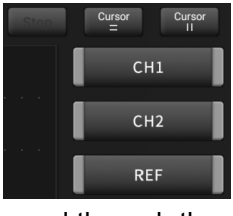
2. Connect the black pin to the ground wire port of the vehicle sensor, and insert the pins of other colors connected to the red connector on the signal terminal of the vehicle sensor.

7.3 How to Operate

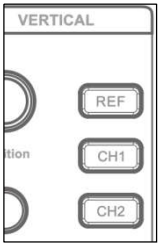
7.3.1 Channel Selection

The system has CH1 (channel 1), CH2 (channel 2) and REF (reference channel). Select the channel as follows:

A. Select the channel through the channel button on the right side of the screen.



B. Select the target channel through the channel button in the function button area.



Notes: In order to facilitate users to better compare and distinguish, all channels and waveforms are marked with different colors.

The oscilloscope can display multiple waveforms at the same time, but only one waveform is allowed to be preferentially displayed on the top layer. The channel preferentially displayed on the top layer is called the current channel, and it will be marked with ▶. The channel without this identifier is not the current channel.

7.3.2 Channel Attributes and Trigger Settings

1. Horizontal time base setting

The horizontal time base setting can be used to set the scale time size (time base value) of the horizontal axis unit. Click "6-horizontal setting" to expand the time base value option and select the appropriate time base value, or use the "horizontal time base adjustment knob" to adjust to the appropriate time base value.

If the waveform capture has been stopped, the waveform can be enlarged or reduced horizontally by adjusting the horizontal time base.

2. Channel setting panel

You can use the channel setting panel to adjust the vertical scale and other settings of the channel. Each channel has a separate

setting panel, and each channel can be set separately.

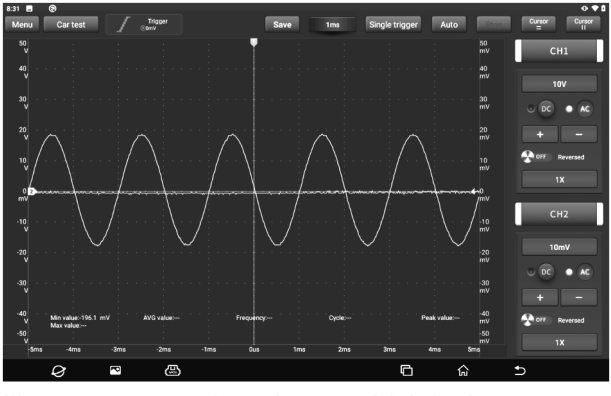
Description of setting options:

Menu Option	Description/Settings
DC/AC Coupling Mode	Trigger coupling is used to define which part of the signal passes through the trigger circuit. Channel coupling includes DC coupling and AC coupling. DC: DC coupling. The DC component and AC component contained in the measured signal can pass through, and can be used to view waveforms as low as 0Hz without large DC offset. AC: AC coupling. The DC signal of the measured signal is blocked and only the AC component is allowed to pass through, which can be used to view the waveform with large DC offset.
Inversion	After the inversion switch is turned on, the voltage value of the displayed waveform is inverted. The inversion will affect the display of the channel. When the basic trigger is used, the trigger level needs to be adjusted to keep the waveform stable.
Probe Type	Select the attenuation coefficient of the probe. The attenuation coefficient changes the vertical scale of the oscilloscope so that the measurement result reflects the true voltage value at the probe.
Vertical Scale	Click +/- to adjust the vertical scale value (voltage

Value	value).

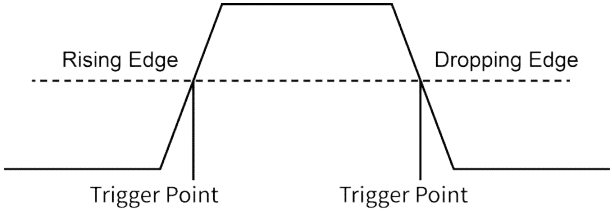
3. Trigger setting

The trigger determines when the oscilloscope starts to acquire data and displays waveforms. If the trigger setting is reasonable, it can convert unstable display content or white screen into meaningful waveform. When the oscilloscope starts to acquire the waveform, it will collect enough data to draw the waveform on the left side of the trigger point. When waiting for trigger conditions to occur, the oscilloscope continues to collect data. After the trigger is detected, the oscilloscope continues to obtain enough data to draw the waveform on the right side of the trigger point. Triggering refers to setting certain triggering conditions according to requirements. When a certain waveform in the waveform flow meets this condition, the oscilloscope will capture the waveform and its adjacent parts in real time and display them on the screen. Click "3-trigger" to access the following page:



This oscilloscope uses edge trigger, which is the most commonly used and effective trigger mode. Most applications use this trigger mode to trigger waveforms. Edge trigger refers to identifying the

trigger by looking for the specified edge (rising edge, falling edge) and voltage level on the waveform. When the voltage change direction of the measured signal is the same as the setting, and its value changes to the same value as the trigger voltage, the oscilloscope is triggered and captures the waveform.



Menu Option	Description/Settings
Source	Select the channel source of the trigger signal.
Trigger	Trigger level: Set the amplitude level that the signal must cross during waveform acquisition. Rising: Triggered at the rising edge. Dropping: Triggered at the dropping edge. Off: Turn off the trigger mode.

In this trigger mode, users can directly drag the edge trigger level icon or use the trigger level setting knob in the function button area to adjust the trigger level.

7.3.3 Automatic Setting

The oscilloscope has the automatic setting function, which can set the oscilloscope to automatically display the waveform in the best way. Tap **Auto**. The system will automatically adjust the horizontal and vertical calibration of the oscilloscope, the triggered coupling, type, position and other settings, so as to obtain stable waveform display.

7.3.4 Menu Operation

1. Measure

The oscilloscope provides 6 types of parameter automatic measurement functions.

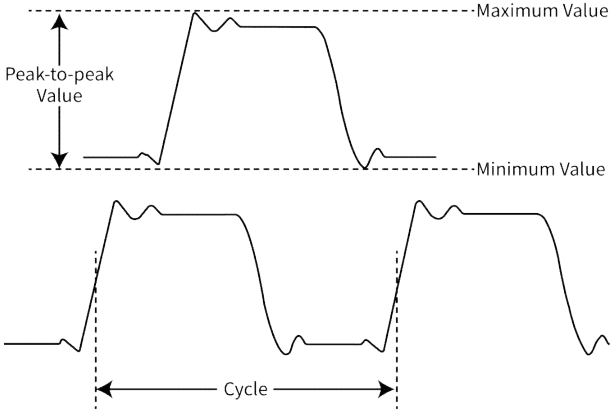
Click to select the measurement function. All selected measurement functions will be displayed on the left side of the "Clear" button. The corresponding values will be displayed at the bottom of the screen.

To remove the measurement function, click again.

Menu Option	Description/Settings
Cycle	The time between the threshold intermediate values of two consecutive, homogeneous edges.
Frequency	The reciprocal of the period.
Peak Value	The voltage value from the peak to the lowest point of the waveform.
Maximum value	The voltage value from the highest point of the waveform to GND (ground).
Minimum value	The voltage value from the lowest point of the waveform to GND (ground).

Average value	The arithmetic average over the entire waveform or selected area.

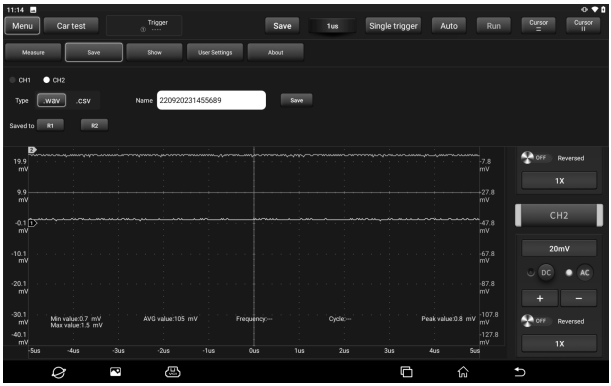
The following figure explains the meaning of some measurement items and is for reference only.



2. Save

The Save option is used to save the waveform of the channel.

Tap **Save** and the screen will display as follows:

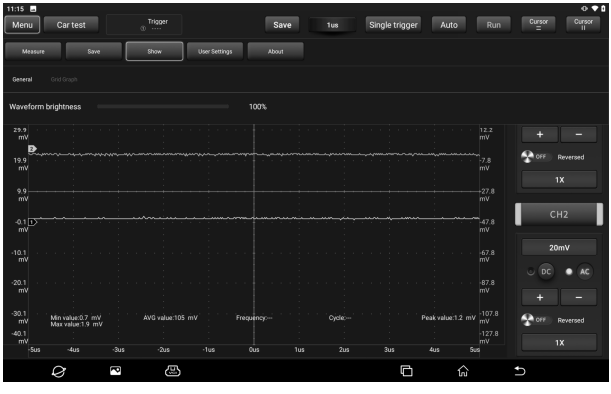


First select the measurement channel, then select the measurement type WAV or CSV, then modify the name and save,

and finally select to save to R1/R2. The saved files can be referenced and played back by calling the "REF" reference channel.

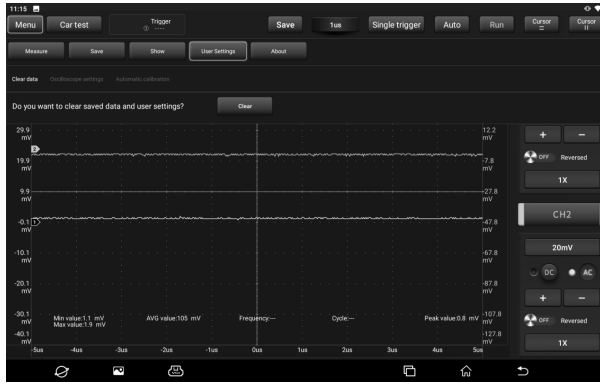
3. Show

Show options are used to set waveform brightness and coordinate axis display intensity. Coordinate types include Full, Grid, Crosshair and Frame.



4. User Settings

The user settings option can be used to set data clearing, automatic calibration of waveform display, storage and recovery of oscilloscope parameters, etc. Tap **User Settings** and the screen will display as follows:



Option Description:

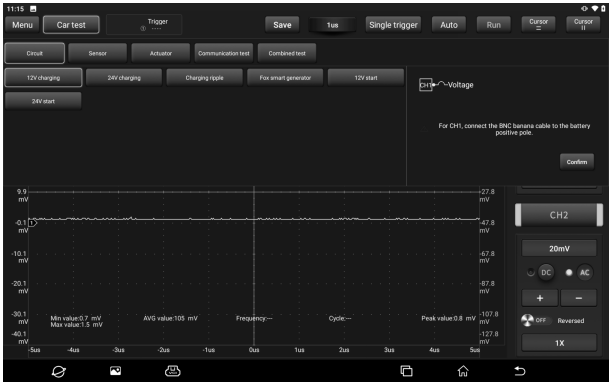
Menu Option	Description/Settings
Clear Data	Clear the saved data and user settings.
Oscilloscope Settings	Users can use the "Save" function to save the system setting parameters. The "Restore" function allows users to call the previously saved system settings to avoid duplicate settings.
Automatic Calibration	Automatic calibration can optimize the oscilloscope signal path with maximum measurement accuracy.

5. About

Display the basic information of the new energy module app.

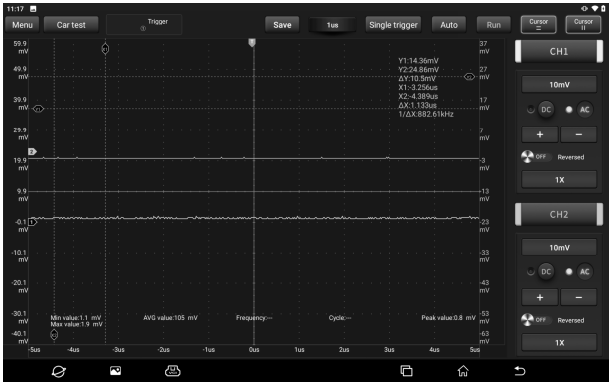
7.3.5 Car Test

There are buttons for various vehicle related test content (including Circuit, Sensor, Actuator, Communication test and Combined test) in the “Car test” option. After the user selects the test content as required, the oscilloscope will automatically set the corresponding parameters to achieve the purpose of rapid setting. After selecting the function, please perform the wiring test according to the prompt in the small box on the right.



7.3.6 Cursor Measurement

The "Cursor" option can be used to aid in the measurement. Open the cursor and place the cursor at the measurement point to read out the waveform measurement value. There are two types of cursors: horizontal cursors and vertical cursors. Horizontal cursors ☰ display horizontal lines to measure vertical parameters, and vertical cursors ▮▮ display vertical lines to measure horizontal parameters. Click cursor option ☰/▮▮, and two horizontal Y1&Y2 / vertical cursor X1&X2 measuring lines will appear on the page. Click the relevant line and drag to move the line position. Click the "Cursor" option again, the function will be disabled and the auxiliary line will disappear.



Notes:

△Reading: Indicates the difference between two cursor positions.

Voltage reading after Y1 and Y2: Indicates the position of the activated cursor relative to the current channel identification point in the horizontal cursor.

Time reading after X1 and X2: Indicates the position of the activated cursor relative to the trigger point in the vertical cursor.

1/△X: frequency.

7.3.7 Quick Save

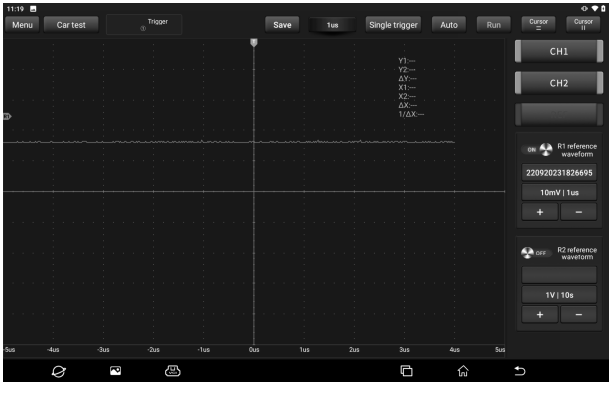
The "Quick save" option can quickly save the measurement waveform of the currently opened channel. The oscilloscope can save the waveform of the analog channel or the mathematical channel locally. The file type can be WAV or CSV. The oscilloscope provides 2 reference channels, which can load WAV type files into the reference channel through calling, and open the reference channel to display the reference waveform. The relevant settings can be found in the “Menu”.

7.3.8 REF (Reference) Waveform

The oscilloscope provides REF channel for displaying reference waveform. Users can load the previously saved waveform file into the reference channel by calling and compare it with the actual waveform to find out the difference.

1. If the previous waveform file is saved in R1, click the button under "R1 reference waveform" as shown in the figure below to call up the saved waveform list (the operation of "R2 reference waveform" is the same as R1).

2. Click the reference waveform to be viewed to display the waveform on the screen. Click the blank area of the screen to hide the reference waveform list.



3. Click the **ON/OFF** button to display/hide the reference waveform.

8. Multimeter

This function module is used to measure voltage, current, resistance, diode and on-off condition. It can judge whether the device is good or bad and whether the circuit is complete only by simple measurement.

8.1 Technical Parameters

DC Voltage:

Automatic range, test range: ±600V

AC Voltage:

Automatic range, test range: ±600V

DC Current:

Automatic range, test range: ±10A (external sensors are required for large range currents).

AC Current:

Automatic range, test range: ±10A. Average value measurement (external sensors are required for large range currents).

Resistance:

Automatic range, test range: 0Ω~6MΩ

Diode:

0~2.0V

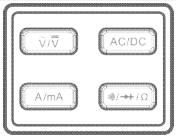
On-off detection:

Sound when it is lower than 30Ω

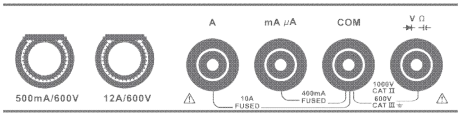
8.2 How to Operate

The P03 host is equipped with a multimeter function button area. In addition to operating through the screen touch button, you can also set and control the multimeter function module through the buttons in the function button area.

Button Position	Button Identification	Button Description

	Ṽ/V̄	AC Voltage/DC Voltage
	AC/DC	AC Current/DC Current
	A/mA	
	))))/→+/Ω	On-off/Diode/Resistor

First, prepare the red and black multimeter test leads needed for measurement, and find the multimeter measurement port on the top of the host at the back.



Different measurement objects have different connection methods. Please refer to the following connection methods for measurement.

8.2.1 Voltage Measurement

The connection method for measuring DC voltage is the same as that for measuring AC voltage.

1. Tap **Multimeter** on the main interface or click the "Multimeter" function switch button in the upper right corner of the host to access the following page.

2. Select "DC Voltage" or "AC Voltage" and the corresponding

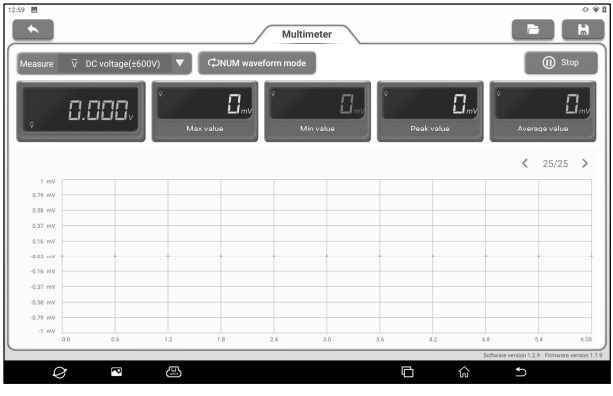
range.

3. Insert one end of the black multimeter test lead into the "COM" end and one end of the red multimeter test lead into the "V/Ω" end.

4. Connect the black and red test leads to the tested point. Keep contact stable.

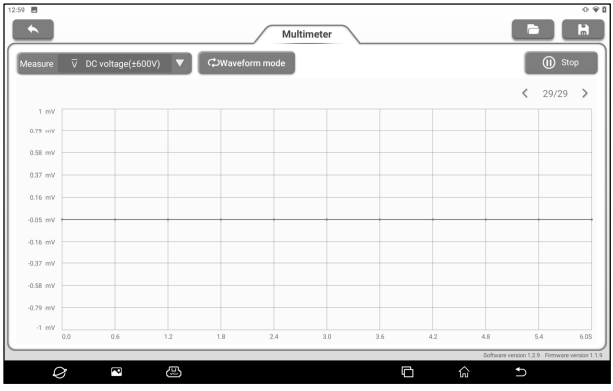
Option Description:

Numerical waveform mode: Display the measurement results in the form of numerical value and waveform.



Numerical mode: Display the measurement results in numerical mode.

Waveform mode: Display the measurement results in waveform mode.



: Open the saved waveform file.

: Save the measurement results of the current screen as a waveform file.

5. Tap **Start**, and the value will be directly displayed on the screen.

⚠ *Warning: The head of the multimeter test lead is metal. During the measurement, do not touch it with hands, otherwise it will not only affect the measurement results, but also may cause electric shock.*

8.2.2 Current Test

The connection methods for measuring DC current and AC current are the same.

1. Tap **Multimeter** on the main interface or click the "Multimeter" function switch button on the upper right corner of the host.
2. Select "DC current" or "AC current" and the corresponding range.

3. Insert one end of the black multimeter test lead into the "COM" end. If the current is greater than 400mA, insert one end of the red multimeter test lead into the "A" end. If the current is less than 400mA, insert one end of the red multimeter test lead into "mA μA" end.
4. Connect the black and red test leads to the tested point. Keep contact stable.
5. Tap **Start**, and the value will be directly displayed on the screen.

8.2.3 Resistance Measurement

1. Tap **Multimeter** on the main interface or click the "Multimeter" function switch button on the upper right corner of the host.
2. Select "Resistance".

3. Insert one end of the black multimeter test lead into the "COM" end and one end of the red multimeter test lead into the "V/Ω" end.
4. Connect the black and red test leads to the metal parts at both ends of the resistance. Keep the contact between the pen and the resistance stable.
5. Tap **Start**, and the value will be directly displayed on the screen.
6. Click button to save the measurement results.

Notes: During the measurement, you can touch the resistance by hand, but do not touch both ends of the resistance at the same time, which will affect the measurement accuracy.

8.2.4 Diode Measurement

The multimeter can also measure light emitting diodes and rectifying diodes. The multimeter pen position is the same as the voltage measurement.

1. Tap **Multimeter** on the main interface or click the "Multimeter" function switch button on the upper right corner of the host.
2. Select "Diode".

3. Insert one end of the black multimeter test lead into the "COM" end and one end of the red multimeter test lead into the "V/Ω" end.
4. Connect the red test lead to the positive electrode of the diode and the black test lead to the negative electrode. Keep the contact between the pen and the diode stable.
5. Tap **Start**, and the forward conduction voltage reading of the diode will be directly displayed on the screen.
6. Click button to save the measurement results.

8.2.5 On-off Measurement

1. Tap **Multimeter** on the main interface or click the "Multimeter" function switch button on the upper right corner of the host.
2. Select “ON/OFF”.

3. Insert one end of the black multimeter test lead into the "COM" end and one end of the red multimeter test lead into the "V/Ω" end.
4. Connect the red and black test leads to the tested point.
5. Tap **Start**, and the reading will be directly displayed on the screen.

8.3 Detection Examples

Detection of knock sensor

(1) Detection of knock sensor resistance

Turn the ignition switch to the "OFF" position, disconnect the lead connector of the knock sensor, and detect the resistance between the knock sensor connecting terminal and the housing via resistance measurement, which should be ∞ (non-conductive). If it is 0Ω (conductive), the knock sensor must be replaced. For magnetostrictive knock sensor, the resistance measurement can also be used to detect the coil resistance. The resistance value shall meet the specified value (Refer to the maintenance manual of the corresponding model for specific data). Otherwise, the knock sensor must be replaced.

(2) Inspection of knock sensor output signal

Unplug the connecting plug of the knock sensor and check the voltage between the knock sensor connecting terminal and the grounding with the "AC voltage" measuring gear when the engine is idling. There should be pulse voltage output. If not, the knock sensor must be replaced.

Detection of cooling water temperature sensor

(1) Resistance detection of cooling water temperature sensor

On-vehicle inspection: Turn the ignition switch to OFF position, remove the cooling water temperature sensor wire connector, and test the resistance value between the two terminals of the sensor via resistance measurement. The resistance value is inversely proportional to the temperature (negative temperature coefficient), and shall be less than 1KΩ when the engine is hot.

Single piece inspection: Unplug the cooling water temperature sensor wire connector, and then remove the sensor from the engine. Place the sensor in the water in the beaker, heat the water in the beaker, and measure the resistance value between the two terminals of the water temperature sensor under different water temperature conditions via resistance measurement. Compare the measured value with the standard value. If it does not meet the standard, the water temperature sensor should be replaced.

(2) Output signal voltage detection of cooling water temperature sensor

Install the cooling water temperature sensor and plug the wire connector of the sensor. When the ignition switch is turned to the ON position, test the sensor output voltage signal from the two terminals of the water temperature sensor wire connector. The measured voltage value shall change inversely with the

cooling water temperature. When the cooling water temperature sensor harness is disconnected and the ignition switch is turned on, the voltage should be about 5V.

8.4 Precautions

1. The head of the multimeter test lead is metal. Do not touch it with hands during measurement, otherwise it will not only affect the measurement results, but also cause electric shock.
2. Before the measurement, calibrate the measuring range and the jack inserted by the test lead, and then carry out the measurement after there is no error.
3. If the measured value cannot be estimated before measurement, the highest range shall be used for measurement first, and then the appropriate range shall be selected according to the measurement results.
4. It is strictly prohibited to switch the range when measuring high voltage or large current to prevent arcing and burning the switch contacts. To shift gears, the metal contacts must be disconnected first.
5. It is strictly prohibited to measure the resistance when the circuit under test is live to avoid damaging the instrument.
6. When measuring DC power, select appropriate gear. For different components, the current is different. You can refer to the marked parameters of components to switch gears. During measurement, it is connected to the circuit in series, and then measured one by one. The voltage of the branch can be disconnected first. In particular, it is forbidden to connect the multimeter in parallel in the circuit, which will not only damage the multimeter but also cause casualties.

9. Insulation Test

This function module is mainly used to measure the insulation resistance of electrical equipment, and help automobile maintenance technicians to check and find the short circuit and electric shock risks that may be caused by the deterioration of insulation performance of automobile electronic equipment and circuits.

Notes: Automobile maintenance technicians must wear insulating gloves during insulation test. Operating insulation test without protection may cause serious electric shock.

9.1 Technical Parameters

Output Voltage:

500V/1000V/2500V/5000V

Insulation Resistance:

500V: 1MΩ ~ 20MΩ

1000V: 1MΩ ~ 40GΩ

2500V: 5MΩ ~ 100GΩ

5000V: 10MΩ~ 1000GΩ

Short Circuit Current:

<3.0mA

DC Voltage:

±30~±600V DC; Resolution 1V; Accuracy: ±2%

AC Voltage:

30~600V AC; Resolution 1V; Accuracy: ±2%

Display Mode:

Segment code display, USB upload data is displayed and recorded on the diagnostic device

9.2 Precautions

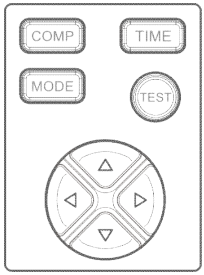
- Before measuring the insulation resistance, please disconnect the power supply of the equipment and discharge all high-voltage capacitors.
- When performing insulation measurement, do not touch the line

to be tested and the conductive part of the test clip.

- Select a suitable range for measurement according to the parameters of the equipment to be tested.
- Release the charge in the circuit to be tested after completing the measurement. Tap **Close the measurement** button on the screen or the TEST button in the function button area, and then remove the test clip after the screen prompts "Measurement closed".

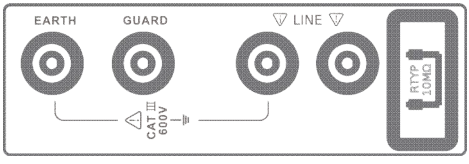
9.3 How to Operate

The P03 main unit is equipped with the insulation test function button area. In addition to operating through the screen touch button, you can also set and control the insulation test function module through the buttons in the function button area.

Button Position	Button Identification	Button Description
	**COMP**	Click to enter the "Comparative measurement" mode.
	TIME	Click to switch between "Timing measurement" and "Continuous measurement".
	MODE	Click to switch between "Resistance measurement", "DC Voltage measurement" and "AC Voltage measurement".
	TEST	Control the start and end of the measurement when "Resistance measurement" is performed.
	△▽ Up And Down Direction Buttons	Adjust the value of "Output voltage".

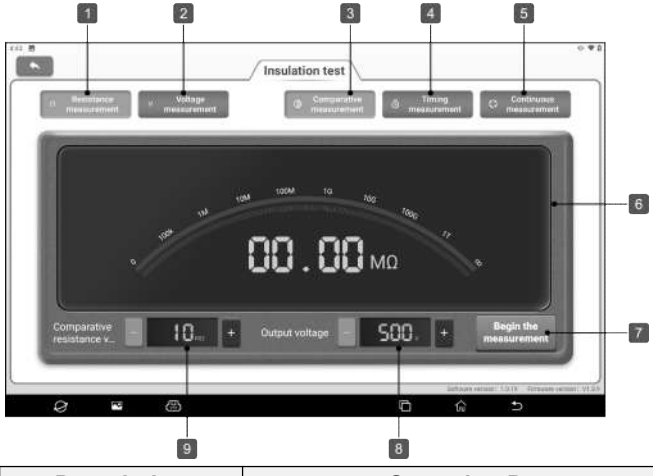
	◁ ▷ **Left And Right Direction Buttons**	**Comparative measurement mode**: Adjust the value of "Comparative resistance value". **Timing measurement mode**: Adjust the value of "Measurement time".

First, prepare the insulation test clip required for measurement, and find the measurement port for insulation test on the right side of the main unit.



9.3.1 Resistance Measurement

1. Tap **Insulation Test** on the main interface or click the "insulation test" function switch button on the upper right corner of the host to access the following page.



No.	Description	Operation Prompt
1	**Resistance**	Click to switch to "Resistance

	measurement	measurement".
2	**Voltage measurement**	Click to switch to "Voltage measurement", and there are two options of "DC voltage" and "AC voltage".
3	**Comparison measurement**	Click to switch to "Comparison measurement".
4	**Timing Measurement**	Click to switch to "Timing measurement".
5	**Continuous Measurement**	Click to switch to "Continuous measurement".
6	**Measurement Result Display Area**	
7	**Begin the Measurement/Close the Measurement**	Click "Begin the measurement" and click "Close the measurement" after the measurement is completed.
8	**Output Voltage Regulation**	Click "-" to reduce the voltage value, and click "+" to increase the voltage value.
9	**Comparison Resistance Adjustment**	Click "-" to reduce the resistance value, and click "+" to increase the resistance value.

2. Tap **Resistance Measurement** or use the MODE button to switch to "Resistance measurement" mode.

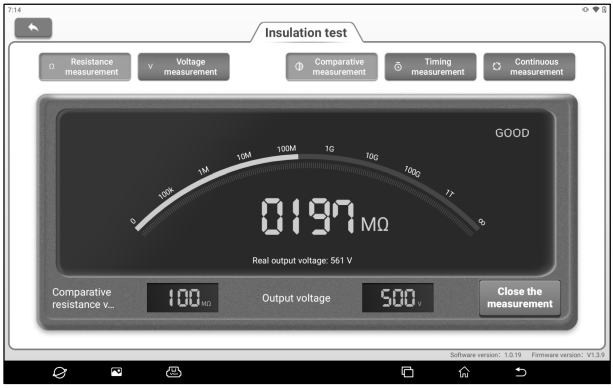
3. Insert one end of the red insulation test clip into the "LINE" port and connect the other end to the high-voltage conductor of the equipment to be detected. Insert one end of the green insulation test clip into the "EARTH" port, and connect the other end to the equipment housing or ground. Insert one end of the black insulation test clip into the "GUARD" port and connect the other end to the high-voltage grommet of the equipment to be detected.

Notes: It is forbidden to short circuit the LINE end and the GUARD end to avoid overload.

4. There are three measurement methods for Resistance measurement: Comparison measurement, Timing measurement and Continuous measurement.

Comparison Measurement

1) Tap **Comparison Measurement** or click the COMP button in the function button area.
2) Click -/+ or the left and right direction buttons in the function button area to set the comparison resistance value, click -/+ or the up and down direction buttons in the function button area to set the output voltage value, and then **tap Begin the Measurement** or long press the TEST button to start measurement.
3) After the measurement is completed, the screen will display the measured resistance value. If the measured resistance value is not less than the set comparison resistance value, the upper right corner of the screen will display "GOOD". If the measured resistance value is less than the set comparison resistance value, the upper right corner of the screen will display "NG".



4) Tap **Close the Measurement** or click TEST again to end