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Important safety and operation information

To avoid personal injury, property loss, or accidental damage to the product, please read all the information in this section before using the product.

Handle device carefully.

Do not drop, bend, puncture, insert foreign objects, or place heavy objects on the device. The inside fragile components may be damaged.

Do not disassemble or refit the device.

The device is a sealing device and there are no end-user serviceable parts inside. All internal repairs must be carried out by authorized maintenance agencies or authorized technicians. Attempts to disassemble or refit the device will void the warranty.

Do not try to replace the internal battery.

The internal rechargeable battery must be replaced by authorized maintenance agencies or authorized technicians.

Precautions for vehicle ECU operation

When performing diagnostic operations on a vehicle equipped with the ECU, pay attention to the following items:

- When the ignition switch is turned on, the vehicle internal electrical units must not be disconnected. Otherwise, a high instantaneous voltage will be generated due to the self-inductance of the coil, which will cause damage to the sensor and ECU.
- Do not place magnetic objects such as radio speakers close to the computer, because the speaker magnets can damage the circuits and components in the ECU.
- Do disconnect the ECU system power supply when welding on the vehicle.
- When performing repair work near a computer or sensor, pay more attention to avoiding damage to the ECU and sensor.

- Ground yourself when you disassemble the programmable ROM. Otherwise, ECU circuits can be damaged by static electricity.
- Unless otherwise specified in the test procedure, the ECU and sensor should not be tested with a pointer ohmmeter, but with a high-impendence digital meter.
- Do not use test lamps to test ECU related electrical units in order to prevent ECU or sensor damage, unless otherwise noted.
- When people enter or exit the vehicle, the electrostatic discharge of human body can generate a high voltage of up to 10000V. Therefore, when performing maintenance operations on the digital meter controlled by the ECU or near this meter, be sure to wear a grounded metal strap with one end around the wrist and the other end clamped on the vehicle body.
- Reliably connect the ECU harness connector to avoid damage to the electronic components such as the integrated circuits inside the ECU.

FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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1. Introduction

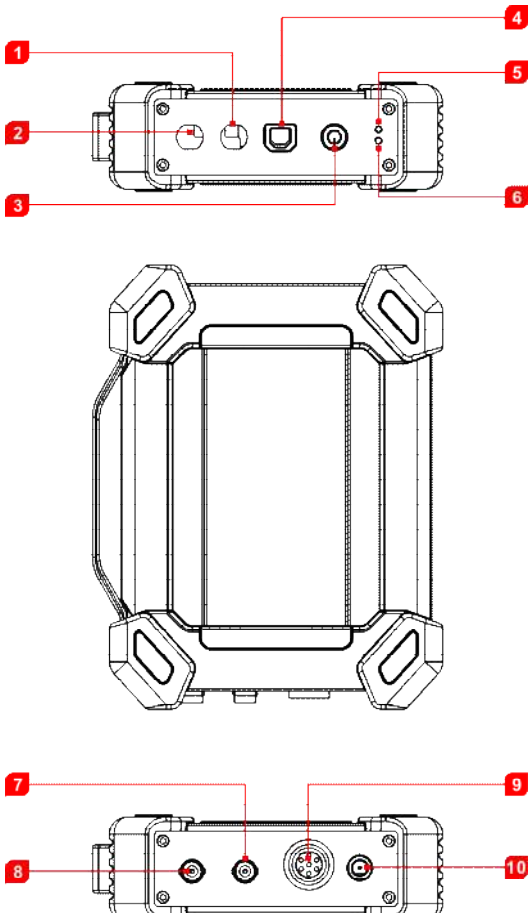
1.1 Product Description

This module is specially developed for diagnosing/simulating sensor faults. It mainly includes "Sensor", "Actuator", "Defined/Drawn", and "Timing Waveform". Users can easily and quickly diagnose and simulate the sensor. The sensor is the signal input device of the vehicle ECU. It converts vehicle operating parameters such as vehicle speed, coolant temperature, engine speed, air flow, and throttle opening into electrical signals and sends them to the vehicle ECU. Then, the vehicle ECU adjusts the engine running status to maintain the engine in optimal condition.

At the same time, the module also supports the vehicle multimeter function. Through this function, users can test voltage, resistance, and capacitance. The function uses the same hardware device as the sensor module.

The module cannot be used separately, and must be used together with Launch-specific diagnostic tools compatible with this module.

1.2 Components & Controls



No.	Name	Description
1	COM	Multimeter common

2	V/Ω/C	Multimeter measuring terminal
3	Power button	Press this button to start up and shut down.
4	USB Type-B interface	• Connect it to a diagnostic tool for sending data via the USB cable. • Connect it to an AC outlet for charging via the USB cable & power adaptor.
5	Battery status LED (green)	If the green lamp is steady on, the battery volume is normal. If the green lamp is flashing at an intermediate speed, the battery volume is low (regardless of whether the red lamp flashes). If the green lamp is flashing at a low speed, charging is in progress.
6	Connection status LED (red)	• If the red lamp is steady on, the diagnostic tool is connected. If the red lamp is flashing, the diagnostic tool is disconnected. • It will enter the charging status only when the red lamp is flashing. The green lamp is flashing at a low speed during charging (if the battery volume is full, it will stay on).
7	CH2	Channel 2
8	CH1	Channel 1
9	7-pin interface	Used to connect 7-pin interface (to six 4mm safety banana head lines) to measure the actuator. When measuring the actuator, it is necessary

		to connect the module to the car battery to supply power.
10	Power interface	Power the module through the battery clamps cable. **Caution: Users cannot charge this module via this interface directly. It is used to connect the battery clamps cable when performing the Actuator function.**

1.3 Performance Parameters

Sensor module:

Parameter	Range
Number of channels	2
Precision	1%
Amplitude range	0~20V
Max output current	20mA
Predefined frequency range	0~20KHz
Square wave signal pulse frequency	0~15KHz
Square wave signal duty cycle	0~100%
Power supply	Simulator sensor output/max current 20mA (output is powered by battery)
	Drive solenoid, ignition coil/output current 2A (external power supply)

USB	USB2.0 (with charging and power supply function/5V)
DC voltage simulation	Support
Fixed frequency simulation	Support
Predefined waveform simulation	Support
Hand-drawn waveform simulation	Support
Signal generator interface	2
External power supply port	1
Solenoid interface	1
Multimeter interface	2
Working temperature	0℃~50℃
Storage temperature	-30℃~70℃

Multimeter:

Parameter	**Range**
DC voltage	0V~700V
AC voltage	0V~700V
Resistance	0Ω~40MΩ
Capacitance	0F~100uF(maximum 30s measurement time)
Diode	0V~1.5V

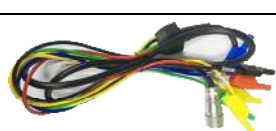
Continuity detection	Sounds below 30Ω

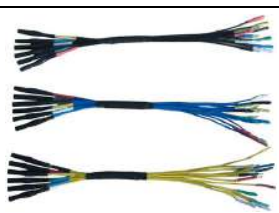
1.4 Packing List

Sensor module accessories include sensor test cables, probes, etc.

Due to different product configurations, the accessories included in the product may be different from those listed in this manual. For the specific accessories included in the product, refer to the packing list attached to the product.

The following is the appearance diagram of each test line and related accessories.

No.	Name	Description	Qt.
1	Sensor module		1
2	HT30 test leads	 A kind of special line used to connect sensors and test various types of signals. Wide-range probes, clamps, and hooks can be inserted into the 4mm connector at the end of the line.	2
3	7-pin interface adapter cable		1

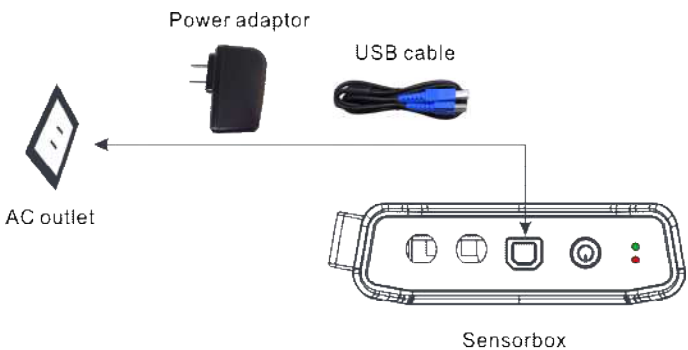
		Used to connect the sensor module and actuator to test the actuator. When testing the actuator, do connect the sensor module to the car battery for power.	
4	Battery clamps cable	 Used to connect the sensor module to the car battery **only using the Actuator module**.	1
5	USB cable	 Used to connect the sensor module and diagnostic tool, and send the signal collected by the sensor module to the diagnostic tool for waveform display.	1
6	6-way breakout lead	 The 6-way lead is available in 3 joint sizes: 1.0mm, 1.6mm, 2.8mm The lead can be easily connected to the existing car harness interface, which is convenient for reading sensor signals. The output signal is connected to the CH1/CH2 input port of the sensor module through the HT30 test leads from the 4mm banana connector at the other end of the lead.	3

7	Multimeter test pen (black + red)	 During a multimeter function test, it must be connected to the COM and V/Ω/C terminals of the sensor module.	2
8	Back Probe Pins Suite	 They are mainly used for piercing the insulation of wires to allow for automotive electrical measurements without causing damage to the wires. Additionally they can be used as pin-tip probes while working with small circuit boards.	1
9	Power adaptor	 To charge the sensor module together with the included USB cable.	1

2. Initial Use

2.1 Charging

1) Insert one end (B-type terminal) of the USB cable into the Type-B USB port of the sensor module host, and then insert the other end into the USB port of the power adaptor.



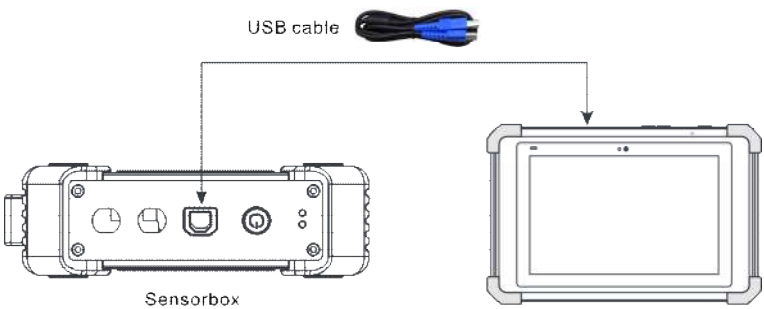
2) Plug the power adaptor into the AC outlet to start charging. The green lamp flashes at a low speed. After the charging is complete, the green lamp will keep steady on.

Caution: Please use the included power adaptor to charge your tool. No responsibility can be assumed for any damage or loss caused as a result of using power adaptors other than the one supplied.

Note: If the battery remains unused for a long period of time or the battery is completely discharged, it is normal that the Sensorbox will not power on while being charged. Please charge it for a period of 10 minutes and then turn it on.

2.2 Connection

1) Insert one end (B-type terminal) of the USB cable into the B-type USB port of the sensor module host, and then insert the other end into the USB port of the diagnostic tool.



2) Press and hold the power button for over 3s to start the sensor module. If the battery volume is normal, the green lamp is steady on.

Indicator lamp status description:

Green lamp	• Steady on: normal battery volume. • Flashing at an intermediate speed: low battery volume (regardless of whether red lamp flashes). • Flashing at a low speed: charging in progress.
Red lamp	• Steady on: diagnostic tool connected • Flashing: diagnostic tool disconnected. It will enter the charging status only when the red lamp is flashing. The green lamp is flashing at a low speed during charging.

3) Start the diagnostic tool and access the toolbox. Tap **Sensor Simulator** to access the job menu of sensor.

2.3 Job Menu

The sensor module is mainly divided into five function modules.



1) **Sensor**: Use output voltage or waveform to simulate the working status of the on-board sensor, so as to accurately judge the quality of the sensor and reduce blind replacement of accessories.
2) **Actuator**: Used to output PWM signal to drive the on-board coil actuator.
3) **Defined/Drawn**: Users can customize sensor waveforms to facilitate future sensor signal simulation.
4) **Timing waveform**: Customize timing waveform to match the engine (crankshaft + camshaft), and output in the same phase.
5) **Multimeter**: Universal multimeter functions.

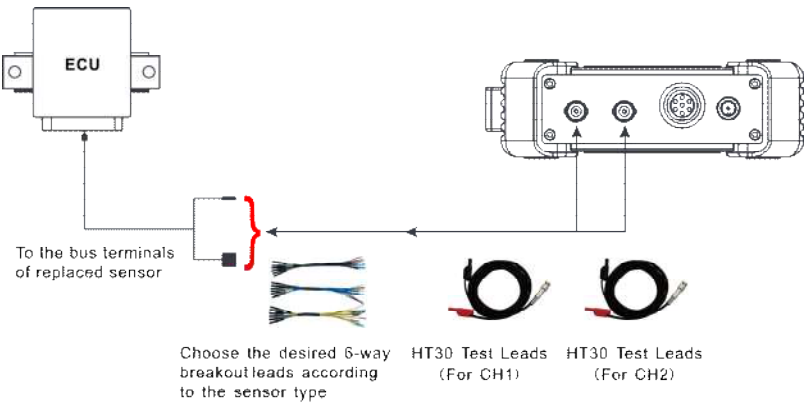
3. Sensor

3.1 Connection

The sensor simulation function can accurately judge the quality of the sensor and reduce blind replacement of accessories. For example, the DTC shows that the water temperature sensor is faulty, but whether it is the fault of the water temperature sensor itself, or the wiring between the sensor and ECU, or the fault of the ECU itself still needs further diagnosis. At this time, the signal of the water temperature sensor can be simulated by the simulation function instead of the water temperature sensor and inputted to the microcomputer. If the engine working condition is improved and the fault symptom disappears, it can be judged as a fault of the water temperature sensor. If the fault symptom persists, directly input the signal at the corresponding terminal of the ECU. If the fault symptom disappears, it is the wiring fault between the water temperature sensor and ECU. If the fault symptom persists, it can be judged as a fault of the ECU itself.

The following connections are required for detecting sensors:

1) Connect the sensor module to the diagnostic tool via the USB cable (refer to Chapter 2.2).
2) Remove the sensor connected to the ECU.
3) According to the specific application and bus terminal types, make the following connections (note: when performing the sensor functions, the hardware output ports of the sensor module are CH1 and CH2).



(1) The BNC connector of the HT30 test line is connected to CH1 or CH2 (can be connected to both CH1 and CH2 as required), and the other end (divided into two ways, red is signal line, black is ground line) is connected to any two ways of the 6-way lead.

Note: When connecting the BNC connector, pay attention to the insertion direction and rotate the connector after insertion to prevent accidental drop.

(2) Insert the other ends (same color) of the connected two leads into the bus terminal of the replaced sensor (select according to the male and female type of the bus terminal).

4) Start the diagnostic tool and access the corresponding sensor module. Tap **Sensor** in the job menu.



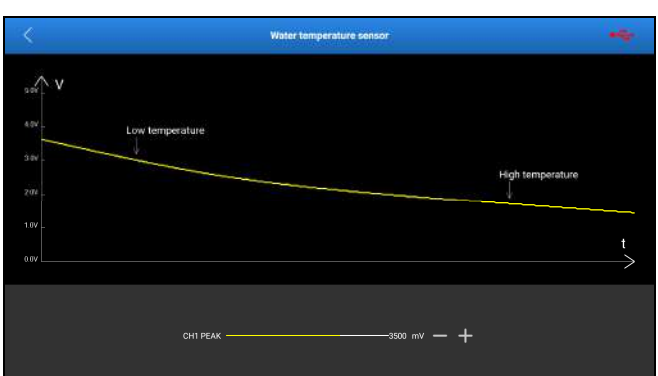
3.2 How to Operate

There are three types of sensors: DC, AC and frequency modulation PFM.

3.2.1 DC Sensor

Note: The following waveform is a sample waveform, not the actual output waveform. Users can refer to it to change the voltage to achieve the function.

1) Water temperature sensor



Output port: CH1

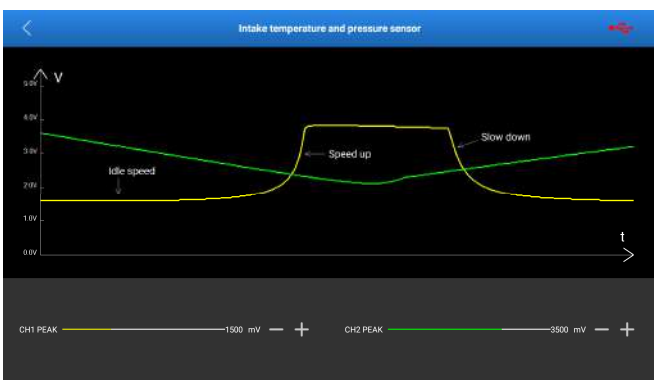
Output type: DC voltage

Drag the yellow slider to change the output voltage value of CH1 PEAK to simulate the water temperature change.

Note: 3v~5v in cold; after warm-up, it goes down to 1v; Negative temperature coefficient sensor.

A simple confirmation method is that the water temperature sensor will link the temperature-controlled fan, and when the voltage is adjusted to a certain threshold, the rotation of the temperature-controlled fan will be started or stopped.

2) Intake temperature and pressure sensor



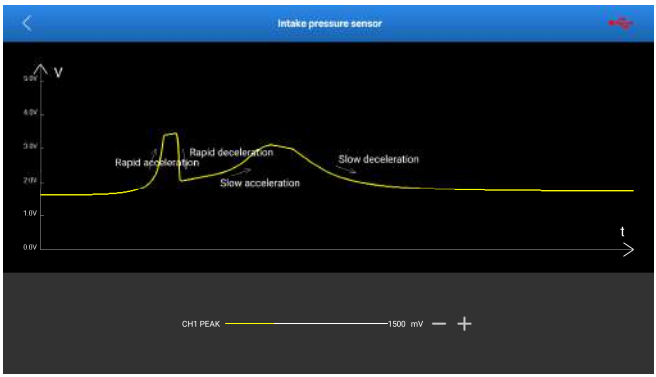
Output channel: CH1, CH2

Output type: DC voltage

CH1 PEAK: intake air temperature. Drag the yellow slider to change the output voltage value of CH1 to simulate the intake air temperature change.

CH2 PEAK: intake air pressure. Drag the green slider to change the output voltage value of CH2 to simulate the intake air pressure change.

3) Intake pressure sensor

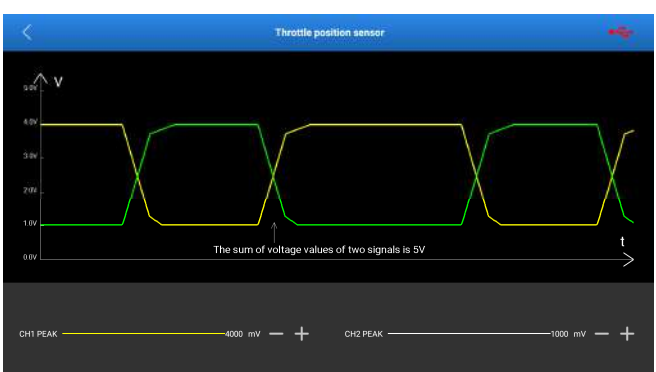


Output channel: CH1

Output type: DC voltage

Drag the yellow slider to change the output voltage value of CH1 to simulate the intake air pressure change.

4) Throttle position sensor



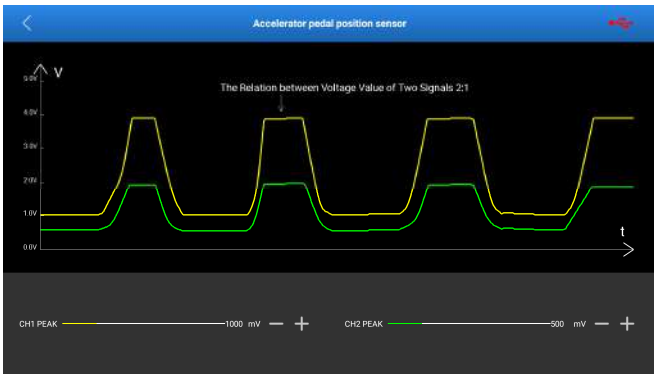
Output channel: CH1, CH2

Output type: DC voltage

Drag the yellow slider to change the output voltage value of CH1.
Drag the green slider to change the output voltage value of CH2.

Note: CH1 and CH2 output voltage at the same time, and the sum of output voltage is 5V. If the voltage of CH1 or CH2 is adjusted separately, the other channel will be linked.

5) Accelerator pedal position sensor



Output channel: CH1, CH2 (changes on either of the two channels will cause the other channel to output the corresponding signal)

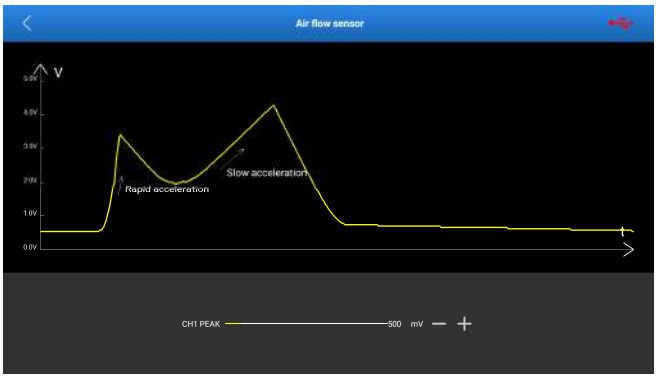
Output type: DC voltage

Drag the yellow slider to change the output voltage value of CH1.

Drag the green slider to change the output voltage value of CH2.

Note: CH1 and CH2 output voltage at the same time, and the ratio of CH1 output voltage to CH2 output voltage is 2:1. If the voltage of CH1 or CH2 is adjusted separately, the other channel will be linked.

6) Air flow sensor

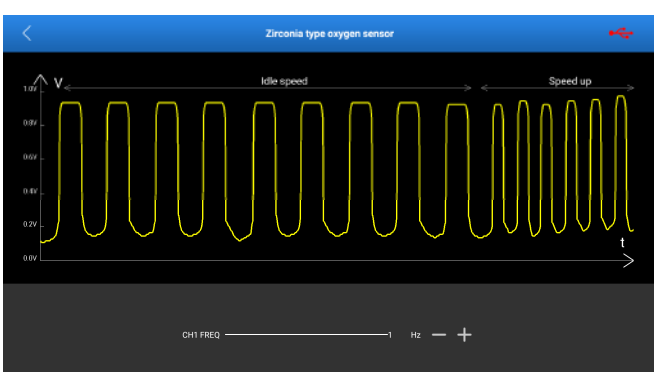


Output channel: CH1

Output type: DC voltage

Drag the yellow slider to change the output voltage value of CH1 to simulate the air flow.

7) Zirconia type oxygen sensor



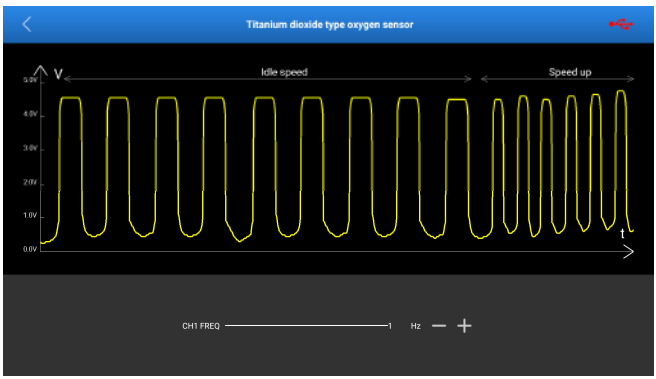
Output channel: CH1

Output type: square wave

Drag the yellow slider to change the output frequency of CH1 to simulate the

acceleration and deceleration status.

8) Titanium dioxide type oxygen sensor



Output channel: CH1

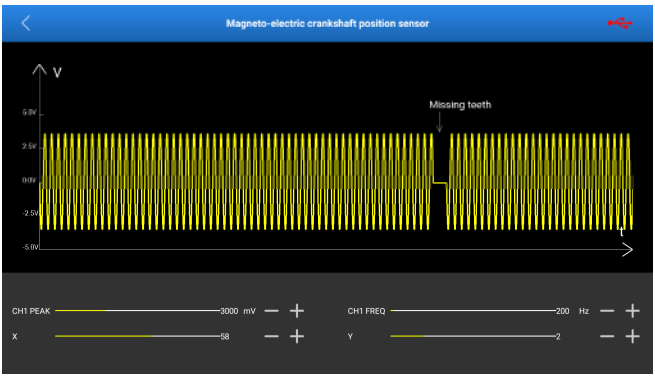
Output type: square wave

Drag the yellow slider to change the output frequency of CH1 to simulate the acceleration and deceleration status.

3.2.2 AC Sensor

Note: The following waveform is a sample waveform, not the actual output waveform. Users can refer to it to change the parameter to achieve the function.

1) Magneto-electric crankshaft position sensor



Output channel: CH1

Output type: sine wave

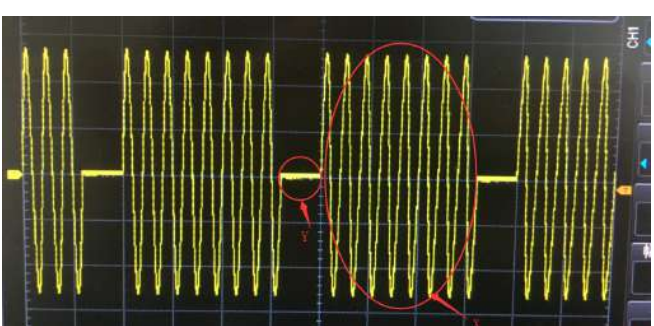
Drag the CH1 amplitude slider to change the output amplitude.

Drag the CH1 frequency slider to change the output frequency.

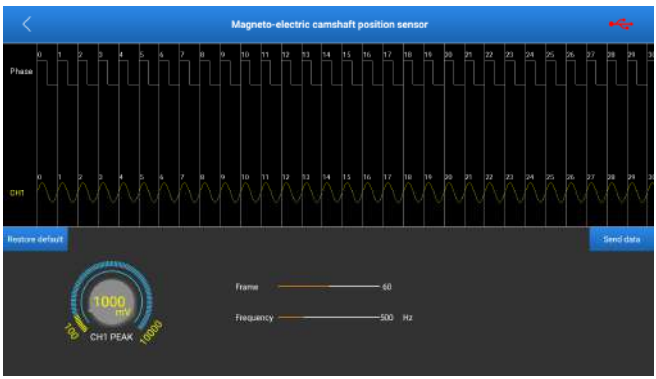
X is used to change the output quantity of sine wave x. Y is used to change the output quantity of the straight line y.

Note: X indicates how many sine waves are output at a time. Y indicates how many linear voltages are output after the output of X (the period of X sine wave is 1). The values of X and Y are determined by the actual hardware parameters.

Take X=8 and Y=2 as an example, as shown in the following figure.



2) Magneto-electric camshaft position sensor



Output channel: CH1

Output type: sine wave

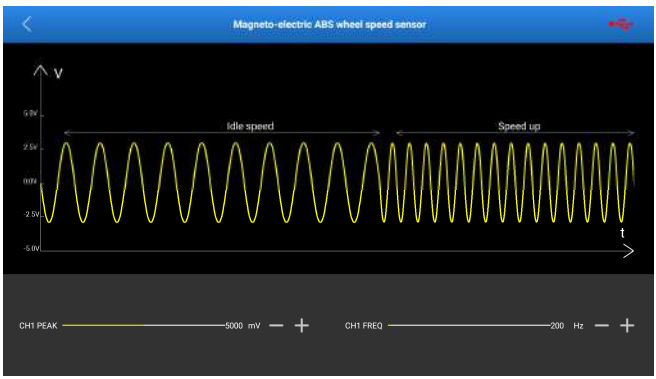
Drag the frame slider to change the total number of frames that is output at a time.

Drag the frequency slider to change the output frequency.

Turn the knob of CH1 PEAK to change the amplitude value.

Note: Phase is the clock. The frame number indicates how many clock-corresponding waveforms are output at a time (for example, for 50 frames, 50 waveforms will be output cyclically). The waveform corresponding to the upper CH1 is compatible (there are positive sine wave, reverse sine wave, linear voltage). Users can edit them as required (the specific parameters are determined by hardware parameters). For details, see **Timing waveform**.

3) Magneto-electric ABS wheel speed sensor



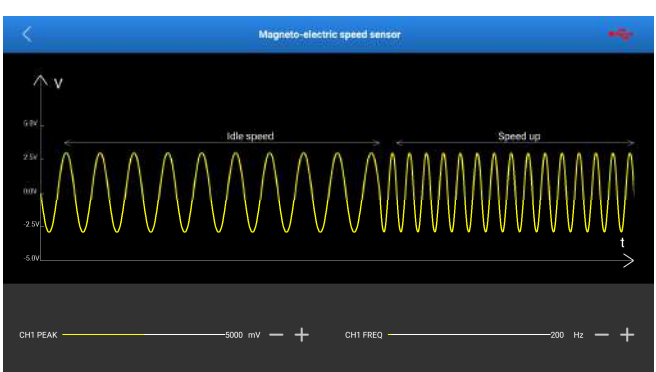
Output channel: CH1

Output type: sine wave

Drag the CH1 amplitude slider to change the output waveform amplitude.

Drag the CH1 frequency slider to change the output waveform frequency to simulate idle speed and acceleration status.

4) Magneto-electric speed sensor



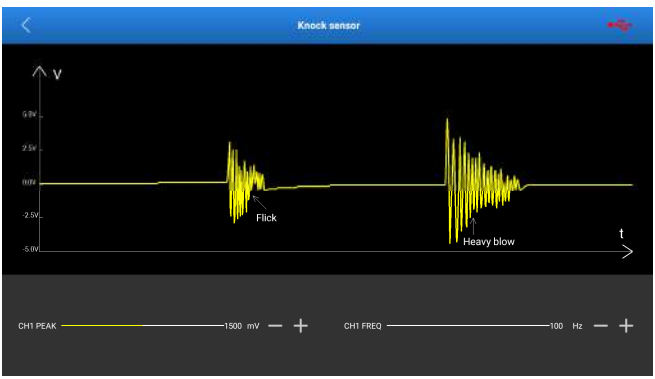
Output channel: CH1

Output type: sine wave

Drag the CH1 amplitude slider to change the output waveform amplitude.

Drag the CH1 frequency slider to change the output waveform frequency to simulate idle speed and acceleration status.

5) Knock sensor



Output channel: CH1

Output type: shockwave

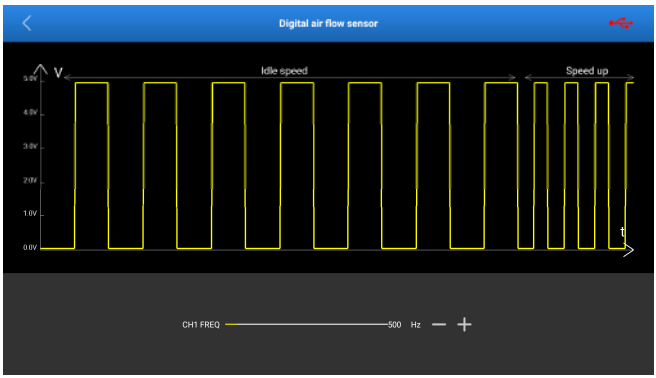
Drag the CH1 PEAK slider to change the output waveform amplitude to simulate the magnitude of vibration.

Drag the CH1 FREQ slider to change the output waveform frequency to simulate the speed of vibration.

3.2.3 Frequency Modulation

Note: The following waveform is a sample waveform, not the actual output waveform. Users can refer to it to change the frequency to achieve the function.

1) Digital air flow sensor



Output channel: CH1

Output type: square wave

Drag the yellow slider to change the output frequency of CH1 to simulate the acceleration and deceleration status.

2) Reluctance ABS wheel speed sensor



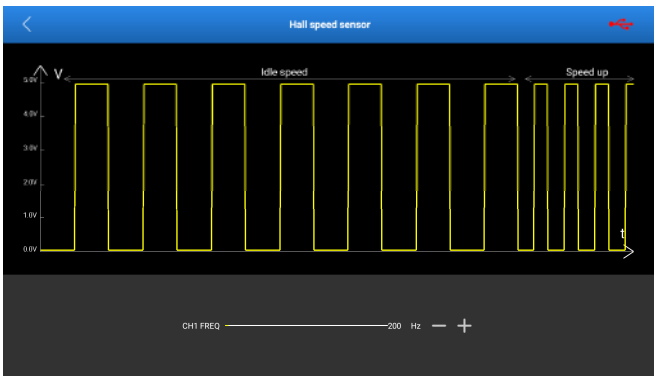
Output channel: CH1

Output type: square wave

Drag the yellow slider to change the output frequency of CH1 to simulate the

acceleration and deceleration status.

3) Hall speed sensor

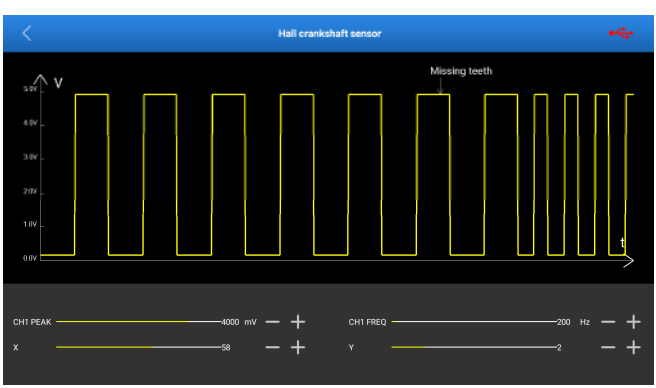


Output channel: CH1

Output type: square wave

Drag the yellow slider to change the output frequency of CH1 to simulate the acceleration and deceleration status.

4) Hall crankshaft sensor



Output channel: CH1

Output type: square wave

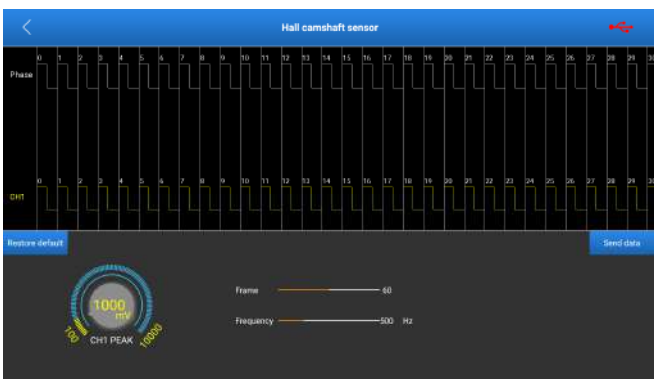
Drag the CH1 PEAK slider to change the output amplitude.

Drag the CH1 FREQ slider to change the output frequency.

X is used to change the output quantity of square wave x. Y is used to change the output quantity of the straight line y.

Note: X indicates how many square waves are output at a time. Y indicates how many linear voltages are output after the output of X (the period of X square wave is 1). The values of X and Y are determined by the actual hardware parameters.

5) Hall camshaft sensor



Output channel: CH1

Output type: square wave

Drag the frame slider to change the total number of frames that is output at a time.

Drag the frequency slider to change the output frequency.

Turn the knob of CH1 PEAK to change the amplitude value.

Note: Phase is the clock. The frame number indicates how many clock-corresponding waveforms are output at a time (for example, for 50 frames, 50 waveforms will be output cyclically). The waveform corresponding to the upper CH1 is compatible (there are positive square wave, reverse square wave, linear voltage). Users can edit them as required (the specific parameters are determined by hardware parameters). For details, see **Timing waveform**.

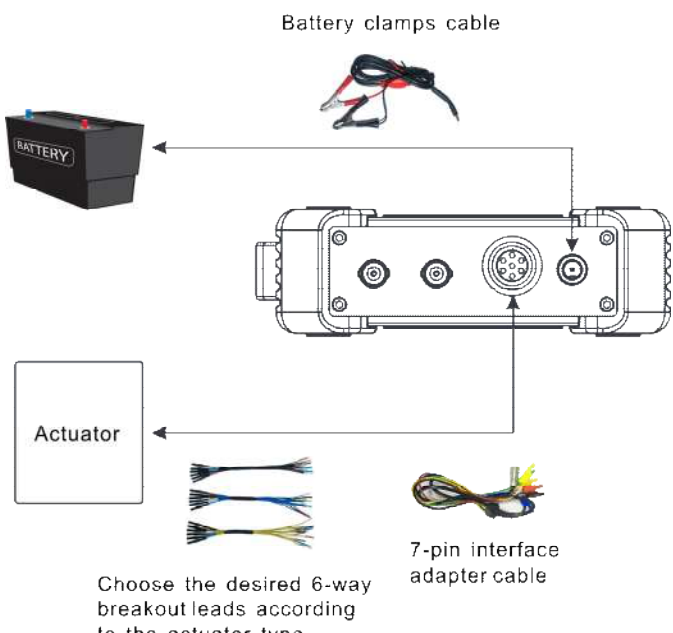
4. Actuator

4.1 Connection

This function is used to output PWM signals to drive the vehicle-mounted coil actuator to work, and check the working status to confirm the quality of the actuator.

The following connections are required for detecting the function:

1) Connect the sensor module to the diagnostic tool via the USB cable (refer to Chapter 2.2).
2) According to the specific application and actuator type, connect as follows (Note: when performing the actuator function, ensure that the hardware output channel of the sensor module is 7-pin interface.)



1) Connect one end of the 7-pin interface adapter cable to the 7-pin interface, and connect the other end (there are 6 safety banana head lines, each safety banana head line is numbered and with positive and negative terminals, which must be noted during use) to the 6-way breakout leads as required.

   Note: When connecting the 7-pin interface adapter cable to the 7-pin interface on the sensor module, pay attention to the alignment of the two red dots and then insert the adapter cable. After successful insertion, you will hear a beep. When you pull out the adapter cable, do not pull it directly by force. First, press and hold the cover marked with red dots with your fingers, slowly dial outward, and then gently pull out the cable.

2) Insert the other ends (same colors) of the leads into the corresponding jacks of the actuator (for the specific connection method, see Chapter 4.1).

3) Start the diagnostic tool and access the corresponding sensor module. Tap **Actuator** in the job menu.



4.2 How to Operate

The actuators are classified as follows: independent ignition module (COP), idle speed motor, EGR valve, carbon can solenoid valve, turbocharged solenoid valve, fuel spray nozzle, VVT solenoid valve, electronic throttle valve assembly, air conditioning fan.

Note: The types of actuators are not limited to those given above, but their working principles are the same. You can drive an actuator on any page under the condition of knowing the working parameters of the actuator. For example, actuator A is not listed above, but its working parameters are similar to the fan, you can drive actuator A on the page of "Electronic throttle valve assembly, air conditioning fan".

The following waveform is a sample waveform, not the actual output waveform.

4.2.1 Independent Ignition Module (COP)

Wiring mode:

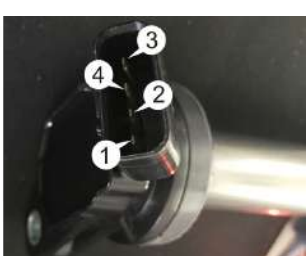
Line 1: Solenoid -

Line 2: CH1\2 grounded

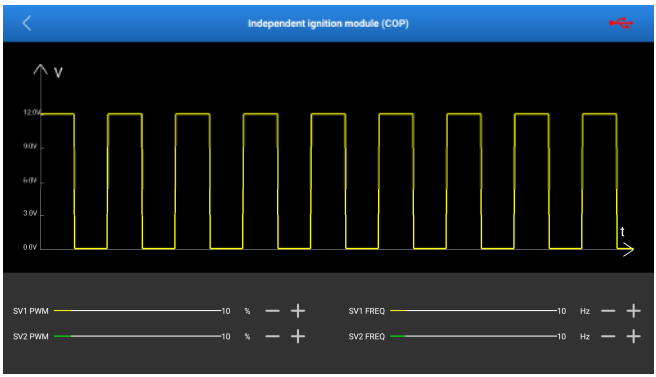
Line 3: Solenoid +

Line 4: CH1\2 output





Operation method:



Output ports: solenoid 1 (SV1) and solenoid 2 (SV2)

Output type: adjustable duty cycle square wave

Drag the SV1 PWM slider to change the output duty cycle of SV1. Drag the SV1 FREQ slider to change the output frequency of SV1.

Drag the SV2 PWM slider to change the output duty cycle of SV2. Drag the SV2 FREQ slider to change the output frequency of SV2.

Note: In the menu, adjust the duty cycle of SV1/SV2 to 100%. Select the waveform of the corresponding channel as square wave in the customization, set the frequency to 10HZ, duty cycle to 10%, and amplitude to 5V. (The independent ignition module is a modular actuator, which requires the solenoid port and the sensor port to be used at the same time. Other modular actuators can refer to it.)

4.2.2 Idle Speed Motor

Wiring mode:

Line 1: SV1 +

Line 2: SV2 +

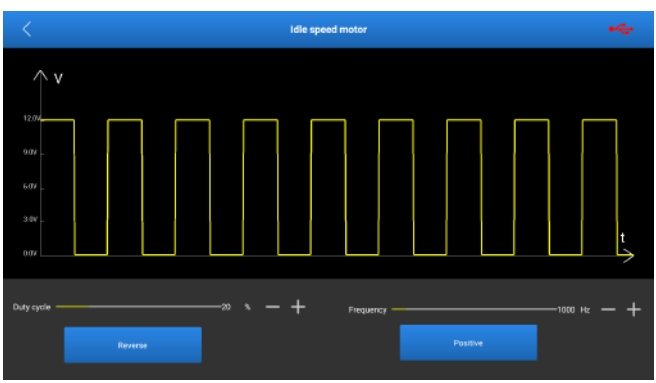
Line 3: SV2 -

Line 4: SV1 -

Note: This is a coil actuator.



Operation method:



Output ports: solenoid 1 (SV1) and solenoid 2 (SV2)
Output type: adjustable duty cycle square wave

Drag the duty cycle sliders to change the output duty cycles of SV1 and SV2. Drag the frequency sliders to change the output frequencies of SV1 and SV2.

If you press **Reverse**, the stepper motor will rotate one step in reverse according to the hardware connection. If you press **Positive**, the stepper motor will rotate one step in the forward direction according to the hardware connection.

Note: Changing the duty cycle and frequency does not directly drive the stepper

motor. The stepper motor can react only by tapping the **Reverse** or **Positive** button. (The so-called forward and reverse directions are not fixed, and are determined by the hardware connection.)

4.2.3 EGR Valve

Wiring mode:

Line 1: SV1\2 +

Line 2: Not connected

Line 3: Not connected

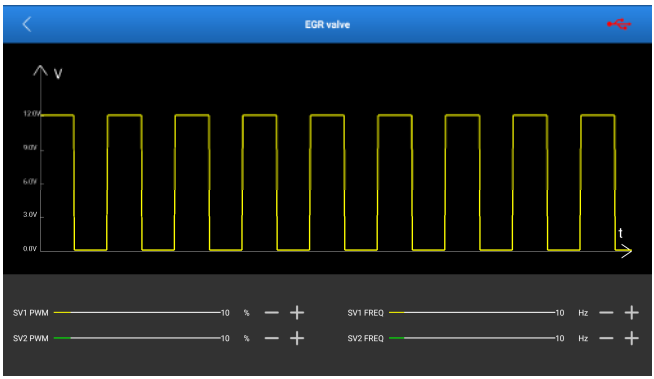
Line 4: Not connected

Line 5: SV1\2 -

Note: This is a coil actuator.



Operation method:



Output ports: solenoid 1 (SV1) and solenoid 2 (SV2)

Output type: adjustable duty cycle square wave

Drag the PWM sliders to change the output duty cycles of SV1 and SV1. Drag the FREQ sliders to change the output frequencies of SV1 and SV2.

4.2.4 Carbon can solenoid valve

Wiring mode:

Line 1: SV1\2 +

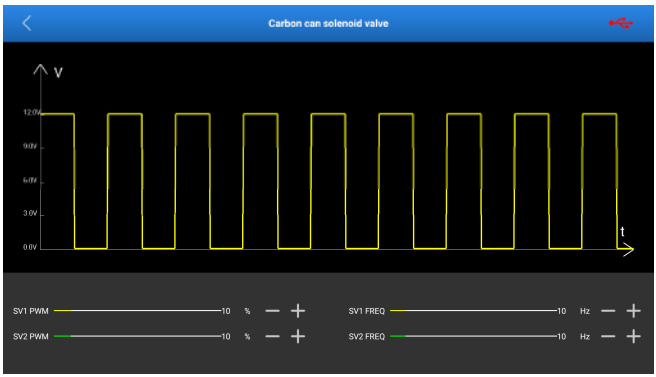
Line 2: SV1\2 -

Note: This is a coil actuator.





Operation method:



Output ports: solenoid 1 (SV1) and solenoid 2 (SV2)

Output type: adjustable duty cycle square wave

Drag the SV1 PWM slider to change the output duty cycle of SV1. Drag the SV1 FREQ slider to change the output frequency of SV1.

Drag the SV2 PWM slider to change the output duty cycle of SV2. Drag the SV2 FREQ slider to change the output frequency of SV2.

4.2.5 Turbocharged solenoid valve

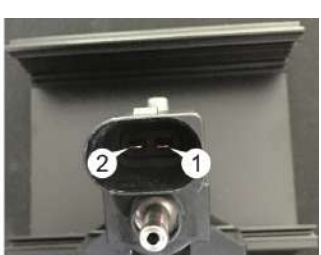
Wiring mode:

Line 1: SV1\2 +

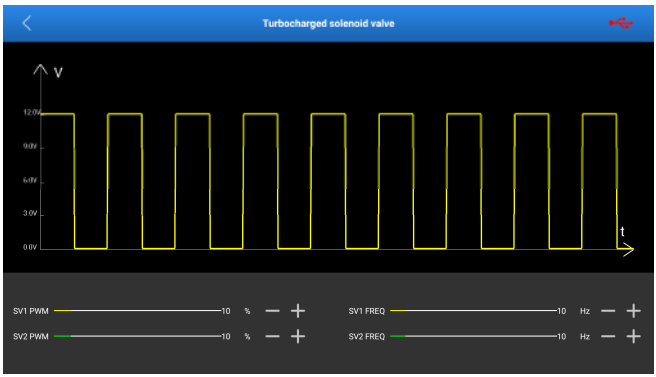
Line 2: SV1\2 -

Note: This is a coil actuator.





Operation method:



Output ports: solenoid 1 (SV1) and solenoid 2 (SV2)

Output type: adjustable duty cycle square wave

Drag the SV1 PWM slider to change the output duty cycle of SV1. Drag the SV1 FREQ slider to change the output frequency of SV1.

Drag the SV2 PWM slider to change the output duty cycle of SV2. Drag the SV2 FREQ slider to change the output frequency of SV2.

4.2.6 Fuel spray nozzle

Wiring mode:

Line 1: SV1\2 +

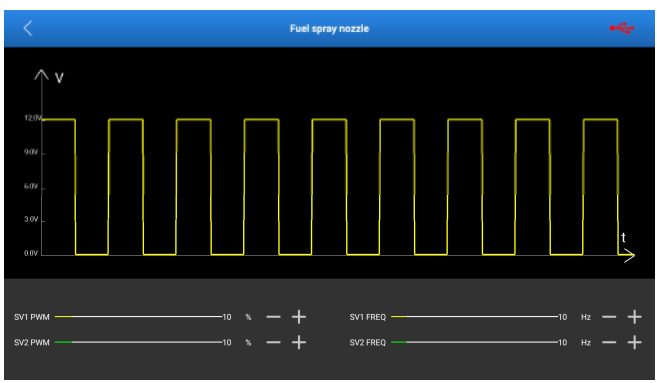
Line 2: SV1\2 -

Note: This is a coil actuator.





Operation method:



Output ports: solenoid 1 (SV1) and solenoid 2 (SV2)

Output type: adjustable duty cycle square wave

Drag the SV1 PWM slider to change the output duty cycle of SV1. Drag the SV1 FREQ slider to change the output frequency of SV1.

Drag the SV2 PWM slider to change the output duty cycle of SV2. Drag the SV2 FREQ slider to change the output frequency of SV2.

4.2.7 VVT solenoid valve

Wiring mode:

Camshaft exhaust valve

Line 1: SV1\2 +

Line 2: SV1\2 -

Camshaft intake valve

Line 3: SV1\2 +

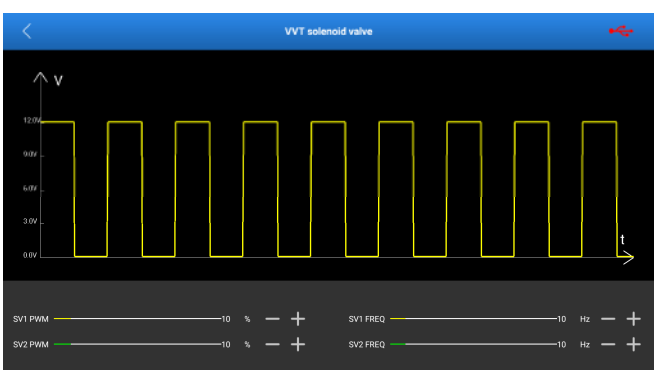
Line 4: SV1\2 -

Note: This is a coil actuator.





Operation method:



Output ports: solenoid 1 (SV1) and solenoid 2 (SV2)

Output type: adjustable duty cycle square wave

Drag the SV1 PWM slider to change the output duty cycle of SV1. Drag the SV1 FREQ slider to change the output frequency of SV1.

Drag the SV2 PWM slider to change the output duty cycle of SV2. Drag the SV2 FREQ slider to change the output frequency of SV2.

4.2.8 Electronic throttle valve assembly, air conditioning fan

Wiring mode:

Electronic throttle assembly:

Line 1: SV1\2 +

Line 2: SV1\2 -

Note: This is a coil actuator.



A/C fan:

Line 1: SV1\2 +

Line 2: SV1\2 -

Note: This is a coil actuator.





Operation method:



Output ports: solenoid 1 (SV1) and solenoid 2 (SV2)

Output type: adjustable duty cycle square wave

Drag the SV1 PWM slider to change the output duty cycle of SV1. Drag the SV1 FREQ slider to change the output frequency of SV1.

Drag the SV2 PWM slider to change the output duty cycle of SV2. Drag the SV2 FREQ slider to change the output frequency of SV2.

5. Defined/Drawn

Defined means that users operate by themselves with no special restriction and various defined waveforms can be switched and output at any time. In addition to customization, it also supports hand-drawing, which has a great degree of freedom.

5.1 Defined

Refer to Chapter 3.1 for connection methods.

Tap **Defined/Drawn** on the sensor module function main page to access the following page.



The output channels corresponding to customization are CH1 and CH2.

The parameters can be set as follows:

- **Waveform**: There are 9 waveforms to choose. Forward sine wave, reverse sine wave, forward square wave, reverse square wave, medium voltage straight line, high voltage straight line, low voltage straight line, triangle wave, and trapezoidal wave.
- **Frequency**: set the frequency of the selected waveform.
- **Amplitude**: set the amplitude of the selected waveform.
- **Offset**: set the offset of the selected waveform.

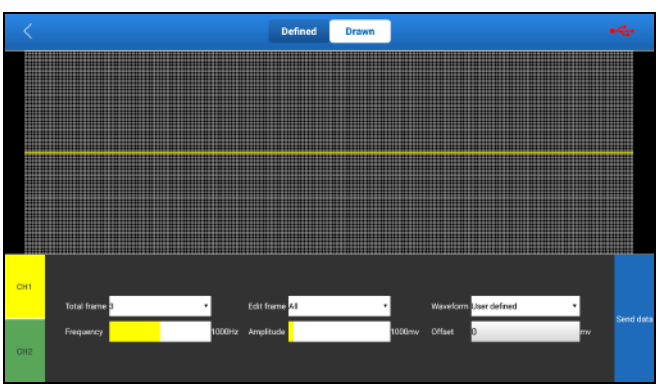
- **Phase**: set the phase of the selected waveform.
- **Duty cycle**: set the duty cycle of the selected waveform.

Signal sync can cause CH1 and CH2 to output signals at the same time.

5.2 Hand-drawn

The hand-drawing function facilitates users to simulate special waveforms or fault waves. Users only need to draw the shape of the simulated waveform in the upper drawing area, and set the waveform, frequency, and amplitude in the parameter setting area.

Tap **Drawn** to switch to the drawing mode.



The corresponding output channels are CH1 and CH2.

The upper area on the page is the drawing area. Select CH1 and CH2 manually.

The parameters can be set as follows:

- **Total frame**: 1-3 (optional). Indicate the total number of output points. Generally, one waveform is composed of 100 points. The values 1-3 indicate that you can select 100, 200, or 300 points to form a waveform.
- **Edit frame**: You can edit a single frame or edit all.
- **Waveform**: You can select a preset waveform and place it in the hand-drawing area.
- **Frequency**: Frequency of a single frame (for 3-frame output, the total frequency is the set frequency/3).

- **Amplitude**: Amplitude of the output waveform.
- **Offset**: Offset of the output waveform.

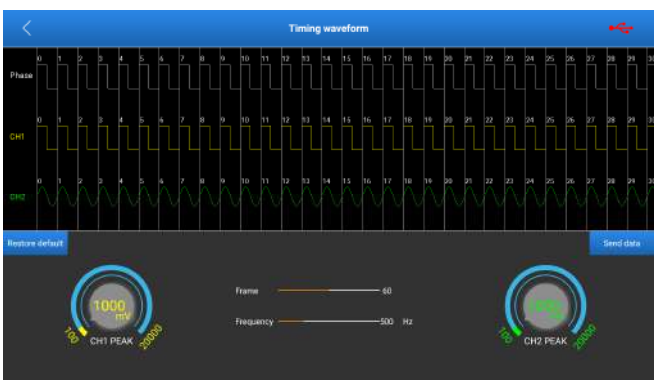
When drawing a waveform, if you lift the finger at the edge, the drawn waveform will be sent out automatically.

6. Timing Waveform

The function is used to match the timing waveform (crankshaft + camshaft) of the engine.

Refer to Chapter 3.1 for connection methods.

Tap **Timing Waveform** on the sensor module function main page to access the following page.

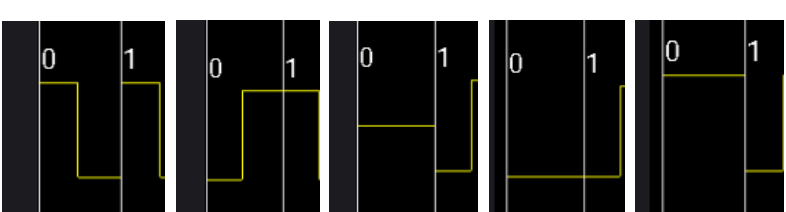


The corresponding output channels are CH1 and CH2.

CH1 simulates camshaft signals.

CH2 simulates crankshaft signals.

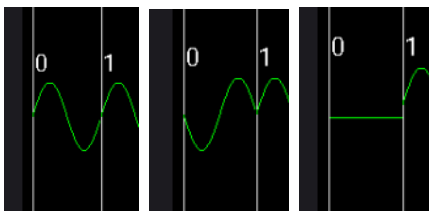
CH1 waveforms in each cycle are adjustable, and the options are as follows (take cycle 0 as an example).



As shown, five waveforms can be selected in cycle 0. They are forward square

wave, reverse square wave, medium straight line level, low straight line level, and high straight line level.

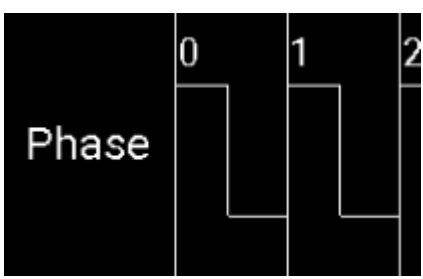
CH2 waveforms in each cycle are adjustable, and the options are as follows (take cycle 0 as an example).



As shown, three waveforms can be selected in cycle 0. They are forward sine wave, reverse sine wave, and medium straight line level.

The specific waveform editing of CH1 and CH2 should be determined according to different engines.

Frame: Number of editing waveforms that are output at a time (it is cyclic output for 50 frames, 50 editing waveforms are output at a time.)



Indicate that the editing waveforms of CH1 and CH2 in the same cycle are in the same phase.

Frequency: Frequencies of CH1 and CH2 will be changed at the same time.

Amplitude: Amplitudes of CH1 and CH2 are separately set.

7. Multimeter

7.1 How to Connect

1) First, power on the sensor module.
2) Connect the B-type terminal of the USB cable to the B-type interface, and the other end to the USB interface of the diagnostic tool.
3) Connect one end of the multimeter test line (black) to the COM interface of the sensor module.
4) Connect one end of the multimeter test line (red) to the V/Ω/C interface of the sensor module.

7.2 How to Operate

Note: All multimeters are A/T multimeters. There is no M/T multimeter.

Tap **Multimeter** on the sensor module function main page to access the following page.



Multimeter functions include:

V⎓: DC voltage

V~: AC voltage

: On-off

: Capacitance

: Resistance

: Diode

7.3 Detection Example

Knock sensor detection

(1) Detect knock sensor resistance

Turn off the ignition switch, disconnect the knock sensor wire connector, and use "resistance measurement " to detect the resistance between the knock sensor wire terminal and the housing. The resistance should be ∞ (non-conducting). If the resistance is 0Ω (conducting), the knock sensor must be replaced. For the magnetostrictive knock sensor, "resistance measurement " can also be used to detect the coil resistance. The resistance should meet the specified value (for the specific data, see the service manual). Otherwise, the knock sensor must be replaced.

(2) Check knock sensor output signal

Remove the knock sensor plug. Use "voltage test" to check the voltage between the knock sensor wire terminal and ground when the engine is idling. There should be a pulse voltage output. If not, the knock sensor must be replaced.

Coolant temperature sensor detection

(1) Detect coolant temperature sensor resistance

Check on the vehicle: Turn off the ignition switch, disconnect the coolant temperature sensor wire connector, and use "resistance measurement " to test the resistance between the two terminals of the sensor. Its resistance value is inversely proportional to the temperature (negative temperature coefficient) and should be less than 1kΩ during warm-up.

Single piece check: disconnect the coolant temperature sensor wire connector, remove the sensor from the engine, place the sensor into the water in the beaker, heat the water in the beaker, and use "resistance measurement " to test the resistance between the two terminals of the sensor under different water

temperature conditions. Compare the measured value with the standard value. If the standard value is not met, the coolant temperature sensor should be replaced.

(2) Detect coolant temperature sensor output signal voltage

Install the coolant temperature sensor, insert the sensor wire connector, turn on the ignition switch, and test the sensor output voltage signal between the two terminals of the coolant temperature sensor wire connector. The measured voltage value should vary inversely with the coolant temperature. When the coolant temperature sensor harness is disconnected and the ignition switch is on, the voltage should be about 5V.

Warranty

THIS WARRANTY IS EXPRESSLY LIMITED TO PERSONS WHO PURCHASE LAUNCH PRODUCTS FOR PURPOSES OF RESALE OR USE IN THE ORDINARY COURSE OF THE BUYER'S BUSINESS.

LAUNCH electronic product is warranted against defects in materials and workmanship for one year from date of delivery to the user.

This warranty does not cover any part that has been abused, altered, used for a purpose other than for which it was intended, or used in a manner inconsistent with instructions regarding use. The exclusive remedy for any automotive meter found to be defective is repair or replacement, and LAUNCH shall not be liable for any consequential or incidental damages.

Final determination of defects shall be made by LAUNCH in accordance with procedures established by LAUNCH. No agent, employee, or representative of LAUNCH has any authority to bind LAUNCH to any affirmation, representation, or warranty concerning LAUNCH automotive meters, except as stated herein.

Disclaimer

The above warranty is in lieu of any other warranty, expressed or implied, including any warranty of merchantability or fitness for a particular purpose.

Purchase Order

Replaceable and optional parts can be ordered directly from your LAUNCH authorized tool supplier. Your order should include the following information:

Order quantity
Part number
Part name

Statement: Launch reserves the rights to change the product design and specifications without prior notice. The appearance and color of the actual product may be different from those shown in the manual. Please refer to the actual product. We have tried our best to make all the descriptions in the manual accurate, but it is still inevitable that there are inadequacies. If you have any questions, please contact the dealer or Launch after-sales service center. We will not bear any consequences arising from misunderstandings.