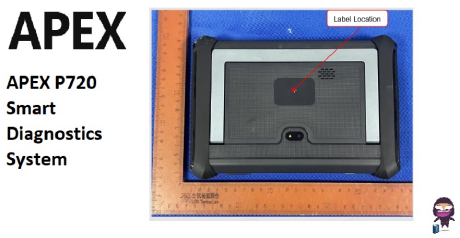


APEX P720 Smart Diagnostics System User Manual

Contents

APEX

APEX P720 Smart Diagnostics System

Product Information

Specifications

- **Model:** Smart Diagnostic System
- **Frequency Band:** 5150 – 5250 MHz
- **Compliance:** Meets government's SAR requirements
- **Indoor Use Only:** Yes
- **Approval:** Industry Canada approved

Product Usage Instructions

SAR Information
The Smart Diagnostic System meets the government's requirements for exposure to radio waves.

Indoor Use
The device is designed for operation in the band 5150 – 5250 MHz and is only intended for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

Antenna Usage
This radio transmitter has been approved by Industry Canada to operate with specific antenna types listed with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum permissible gain indicated for that type, are strictly prohibited for use with this device.

FAQ

- **Q: Can I use this device outdoors?**
  - A: No, the Smart Diagnostic System is designed for indoor use only in the specified frequency band.
- **Q: Are there specific antennas I should use with this device?**
  - A: Yes, make sure to use antennas that are listed with the maximum permissible gain indicated for proper operation.

User Manual
Smart diagnostics system

Version 1.0
Revise date 2024/05

Please read this user manual carefully before using the Smart diagnostics system, referred to as the “Scan Tool” throughout this document. When reading the manual, please pay attention to the words “Note” or “Caution”, and read them carefully for appropriate operation.

OPERATION INSTRUCTIONS

For safe operation, please follow the instructions below

- Keep the device away from heat or fumes when in use.
- If the vehicle battery contains acid, please keep your hands and skin or fire sources away from the battery during testing.
- The exhaust gas of the vehicle contains harmful chemicals. Please ensure adequate ventilation.
- Do not touch the vehicle cooling system components or exhaust manifolds when the engine is running due to the high temperatures reached.
- Make sure the car is securely parked, Neutral is selected or the selector is at the P or N position to prevent the vehicle from moving when the engine starts.
- Make sure the (DLC) Diagnostic Link Connector is functioning properly before starting the test to avoid damage to the Diagnostic Computer.
- Do not switch off the power or unplug the connectors during testing. Doing so may damage the ECU (Electronic Control Unit) and/or the Diagnostic Computer.

CAUTIONS!

- Avoid shaking, dropping or dismantling the scan tool as it may damage the internal components.
- Use only your fingertips to touch the LCD screen. Hard or sharp objects may damage the scan tool.
- Do not use excessive force;
- Do not expose the screen to strong sunlight for a long period.
- Please keep the scan tool away from water and moisture.
- Store and use the scan tool only within the temperature ranges identified in the Technical Specifications section.
- Keep the unit away from strong magnetic fields.

AFTER SALES-SERVICES
Email: support@gearwrenchdiagnostics.com
Official Website: www.gearwreach.com

GENERAL INTRODUCTION

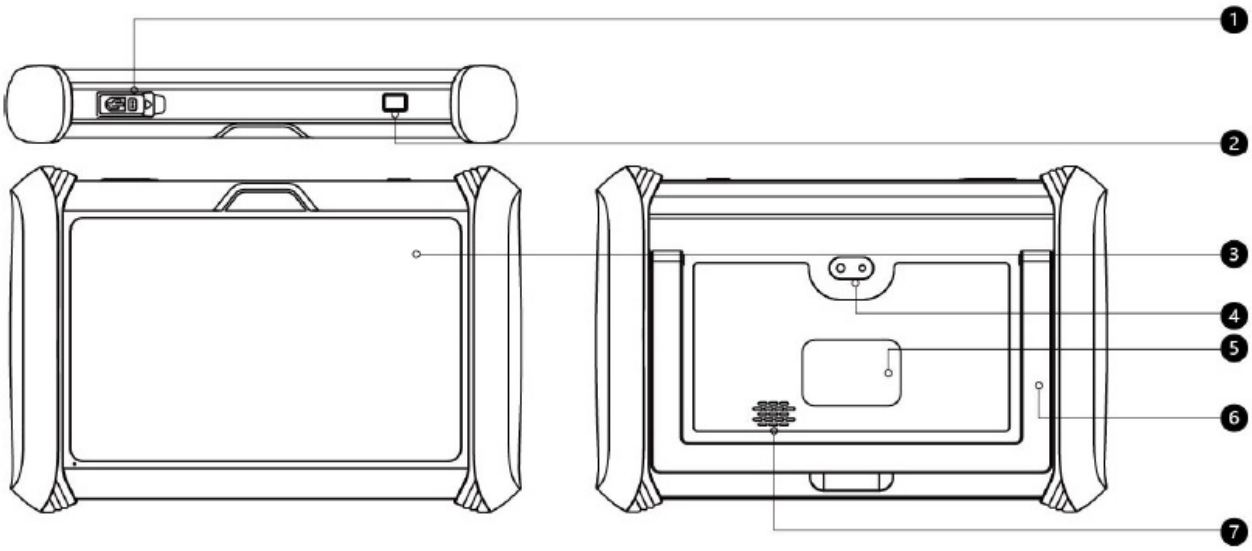
The GEARWRENCH Smart diagnostics system (referred to as the “Scan Tool”) is an advanced scanning tool

based on the Android operating system. It supports multiple languages and is suitable for different countries and regions. The advantage of this OBD-II (On-Board Diagnostics version 2) scanner is its comprehensive functions and its ability to quickly provide the user with more accurate diagnostic information. Some of the diagnostic functions include:

- Full system Diagnostics function
- Full OBD-II functions
- Maintenance /Reset functions: such as ABS (Anti-block system) bleed/ Oil light reset / EPB (Electronic Parking Brake) reset / SAS (Steering Angle Sensors) reset / BMS matching / Injector coding / DPF Regeneration/ TPMS reset, etc.

MAIN UNITS
Tablet

1.

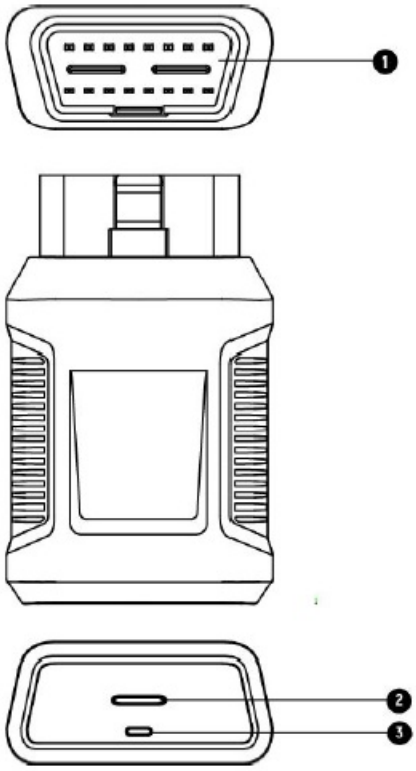


USB Port

2. Power Button
3. 7-inch LCD
4. Camera
5. Nameplate
6. Holder
7. Speaker

VCI (Vehicle Communication Interface) BOX

1. OBD male adapter – Plug into vehicle's DLC port
2. Type-C port – USB communication
3. Indicator

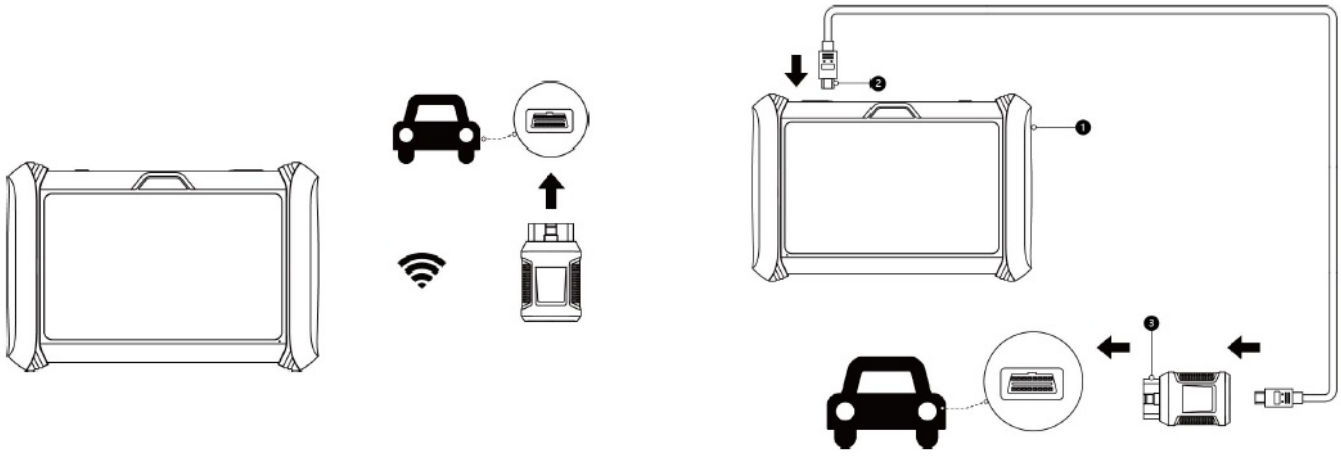


VEHICLE CONNECTION

The scan tool must be connected to the vehicle's OBD-II port so that the tablet can establish correct vehicle communication. Please perform the following steps:

1. Turn on the tablet
2. Plug V102 VCI box into vehicle's OBD port, make sure Power and Wi-Fi indicators light
3. Switch on the ignition and tap on the Diagnostic application to start your diagnosis.

The connection method is shown in the figure below:



WiFi communication

1. Vehicle
2. VCI Box
3. Tablet
4. Tablet

5. TYPE-C to Type-C Cable
6. VCI Box

Precautions for Diagnosis

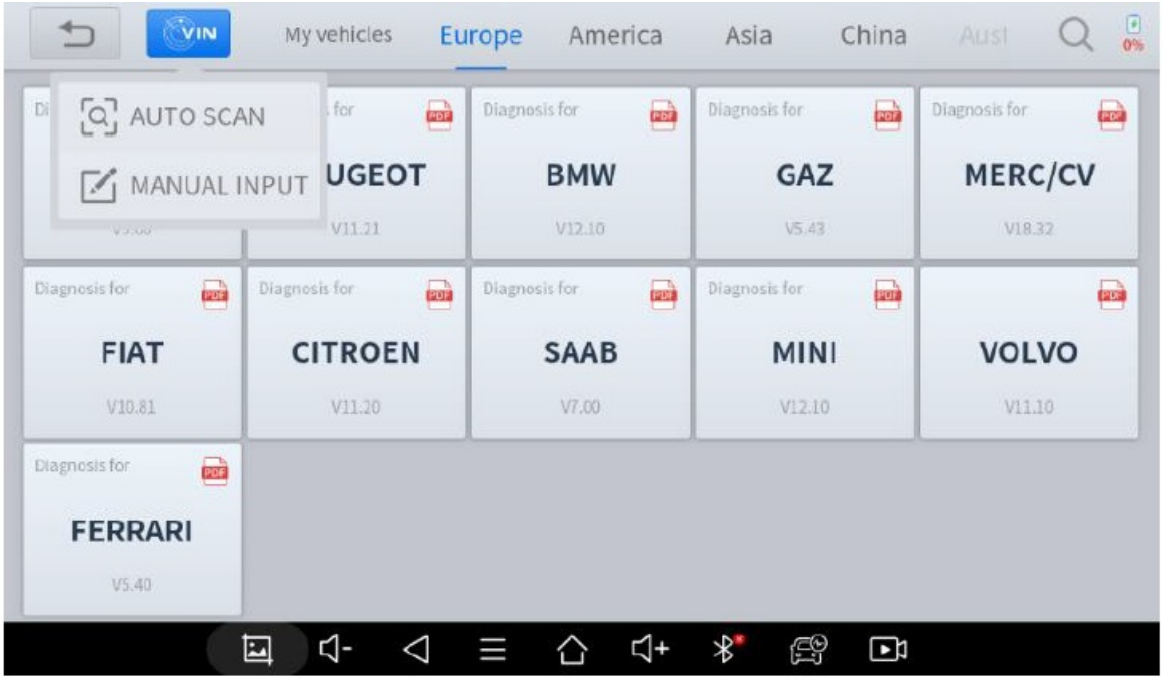
1. The voltage range on the car: +9~+18V DC;
2. When testing some special functions, the operator must operate according to the prompts and meet the test conditions. For some models [special functions], the conditions that need to be met are: engine water temperature 80 ℃~105 ℃, turn off headlights and air conditioners, keep the accelerator pedal in the released position, etc.
3. The electronic control systems of different models are very complicated. If you encounter situations where it is impossible to test or a large amount of test data is abnormal, you can search for the ECU of the vehicle and select the menu for the model on the ECU nameplate
4. If the vehicle type or electronic control system to be tested is not found in the diagnostic function, please upgrade the vehicle diagnostic software to the latest version using the Updates menu or consult the GEARWRENCH technical service department
5. Only wiring harnesses provided by GEARWRENCH and designed for the scan tool are permitted to be used with this scan tool to avoid damage to the vehicle or the scan tool;
6. When running a Diagnostics function, it is forbidden to shut down the scan tool directly. You should cancel the task before returning to the main interface and then shutting down the scan tool.

DIAGNOSTIC
The diagnostic application can read ECU information, read and clear DTC (Diagnostic Trouble Codes) and check live data and freeze frame data. The Diagnostic application can access the ECU of various vehicle control systems, including the Engine, Transmission, Anti-lock Braking System (ABS), Airbag Safety Restraing System (SRS), Electronic Parking Brake system (EPB) and perform many types of actuation tests

BEGINNING DIAGNOSTIC TESTING
After the tablet device is properly connected to the vehicle, you could start the vehicle diagnosis.

VEHICLE SELECTION
The scan tool supports the following 3 ways to access the smart diagnostics system.

- AUTO SCAN
- MANUAL INPUT
- SELECT VEHICLE BY AREA



Click the VIN button in the upper left corner and then choose to enter the vehicle diagnosis through either AUTO SCAN or MANUAL INPUT.

AUTO SCAN: It supports the automatic reading of vehicle VIN code. You also can tap on the button “AUTO SCAN” on the diagnosis system entrance to use this function. Please make sure that the car and the device are well connected before using this function.

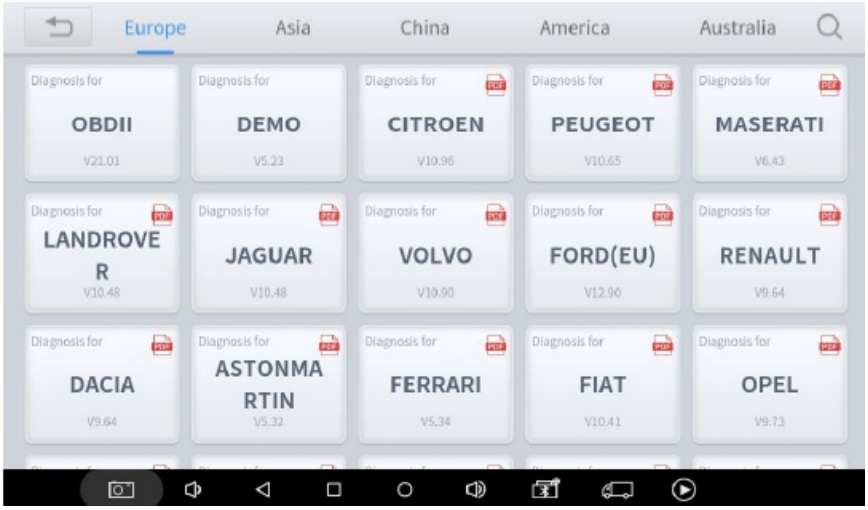
If your model is not recognized, please try the following steps

1. UPNATE all software and check whether the APP is undated in [Settings]
2. Please click Diagnosis on the main menu to enter the selection menu, manually select the engine system to read the ECU information, and confirm whether the VIN can be read.
3. Contact the GEARWRENCH technical team to provide the VIN code to confirm whether the model supports automatic identification of VIN.

MANUAL ENTER: It supports manual input of car VIN code. When entering the VIN code manually, make sure that the 17 characters entered are correct to ensure accurate test results.

SELECT VEHICLE BY AREA

In addition to the above 3 methods, you can also choose a car brand by selecting the appropriate region at the top of the screen. You can select the vehicle model that needs to be diagnosed according to the area, as shown below:



OBD-II supports reading the related fault codes of the Powertrain Control Module (PCM);

DEMO, a demonstration program; Click this button to experience and learn the operation processes of the diagnostic function

Some models provide multiple entry methods in the sub-menu, including

- Automatic Detection
- Manual Selection
- System Selection

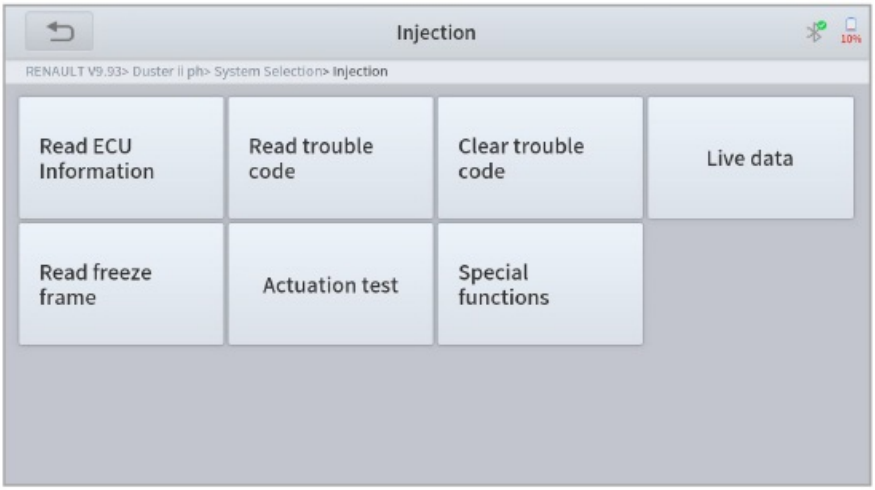
Automatic Detection will automatically identify the vehicle's VIN code, and then read the information of your target diagnostic object. If you choose "Manual selection", then you can continue to select the vehicle brand, year, and model of the vehicle in the sub-menu to diagnose the vehicle. Enter "System Selection", you can also diagnose the vehicle according to the system according to your needs after selecting the model.

DIAGNOSIS FUNCTIONS

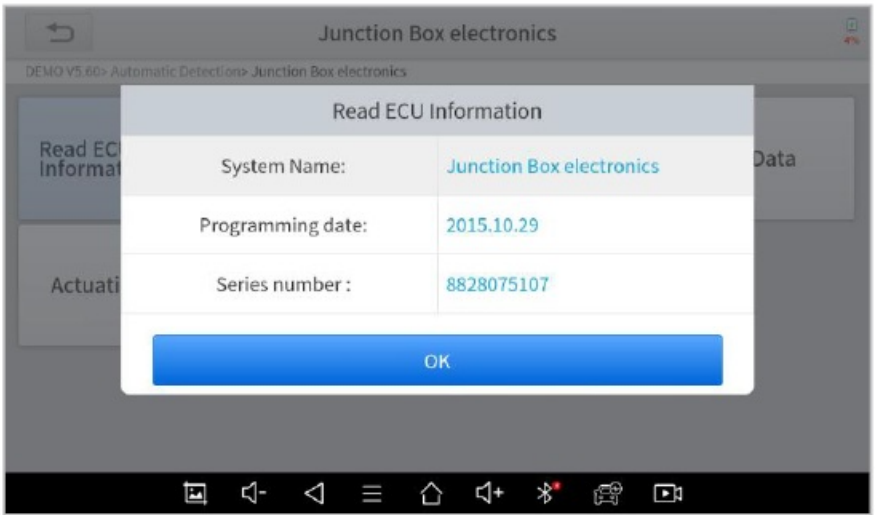
Diagnostics functions supported by the scan tool are listed below

- Read ECU Information

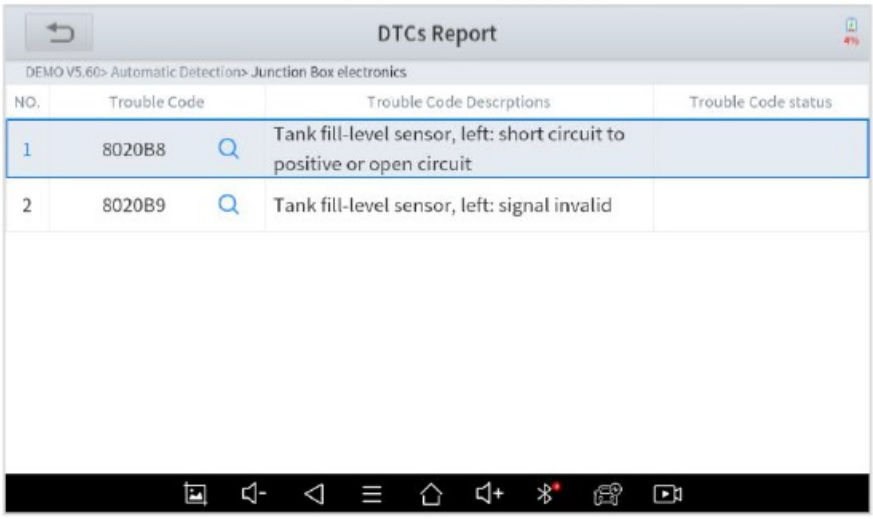
- Read/Clear Trouble Code
- Read Live Data
- Freeze Frame
- Actuation Test (Bi-Directional Control)
- Special functions



READ ECU INFORMATION
This function is to read ECU version information and is the equivalent of “System Identification” or “System Information” in some electronic control systems. These equivalent terms all refer to reading ECU-related software and hardware versions, models and production date of diesel engines, part numbers, etc. This information is helpful when recording maintenance records and ordering new parts



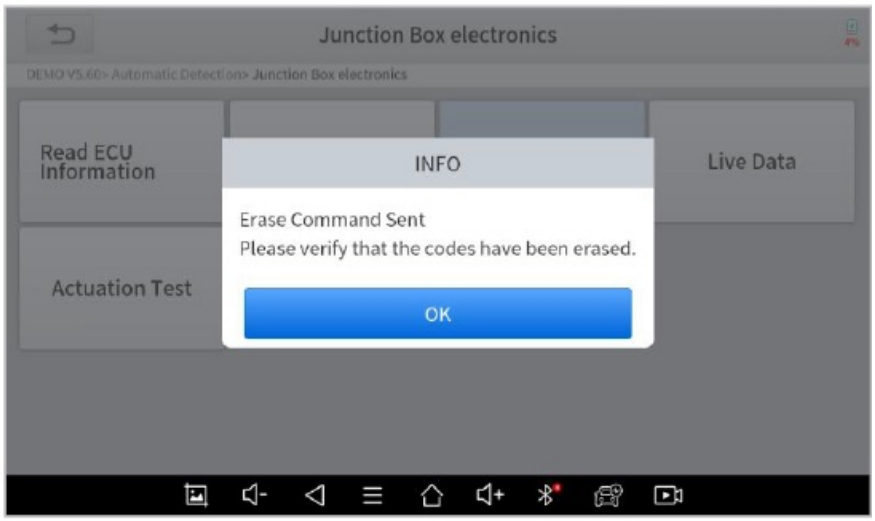
READ TROUBLE CODE



In the process of diagnosis, if the device shows “System is OK” or “No Trouble Code”, it means there is no related trouble code stored in ECU or some troubles are not under the control of ECU. Most troubles are mechanical system troubles or executive circuit troubles. It is also possible that the signal of a sensor may be inaccurate but within limits, which can be examined using Live Data.

CLEAR TROUBLE CODE

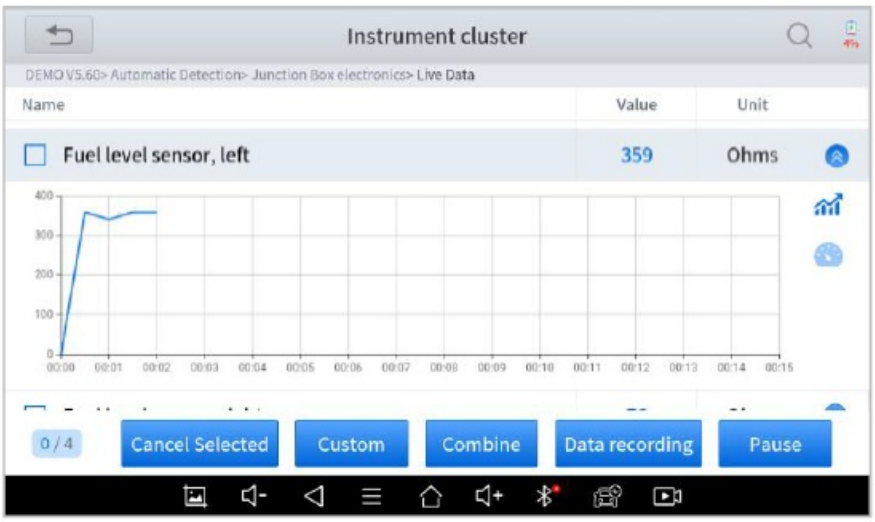
It allows for clearing current and historical trouble codes stored in the ECU memory, under the premise that all the troubles have been resolved.



- Some troubles are immediately detected by the ECU with the key in the run position and without the engine running. Other troubles are not detected until very specific test conditions are met such as engine coolant temperature within a range, speed within a range for a duration of time, throttle percentage within a range, etc.
- If the trouble codes are erased when the trouble remains unresolved, the trouble code will reappear in the ECU the next time the ECU performs the specific diagnostic test for that trouble.
- If the trouble is resolved but there is a stored trouble code, sometimes the ECU will detect the resolution and clear the trouble code or more likely, classify it as “historical” trouble.
- If the trouble is resolved and the user clears the trouble codes, the trouble history will be cleared.
- If the user intends to have another colleague or mechanic investigate the problem, it is not recommended for the user to clear the trouble code since doing so may erase information helpful to others who may investigate the issue.

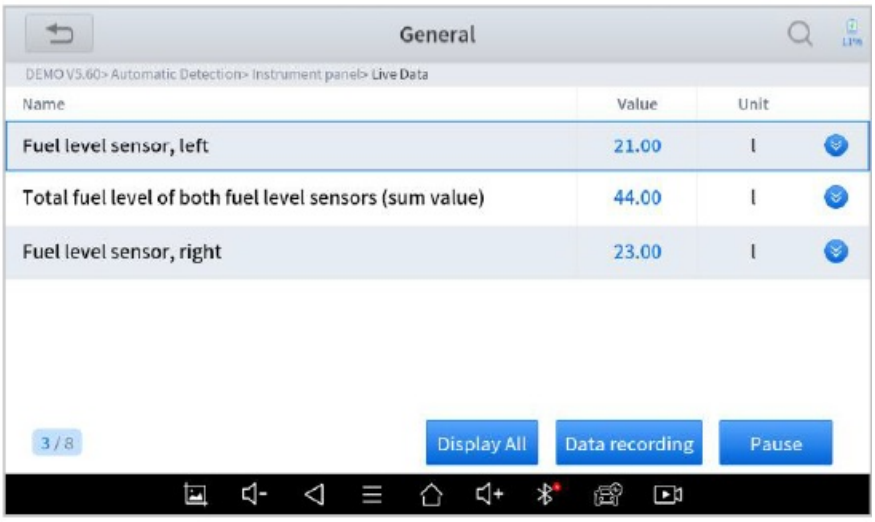
READ LIVE DATA

Real-time information about various sensors is called “Live Data”. Live Data includes parameter identifications (PIDs) of the running engine such as oil pressure, temperature, engine speed, fuel oil temperature, coolant temperature, intake air temperature, etc. Based on these parameters, we can predict directly where the problem lies, which helps to narrow the scope of maintenance. For some vehicles, during their actual operation, the problems such as performance characteristics or sensitivity reduction, can be evaluated using live data.



Click the magnifying glass on the top right, you can search for related PIDs based on keywords

Custom



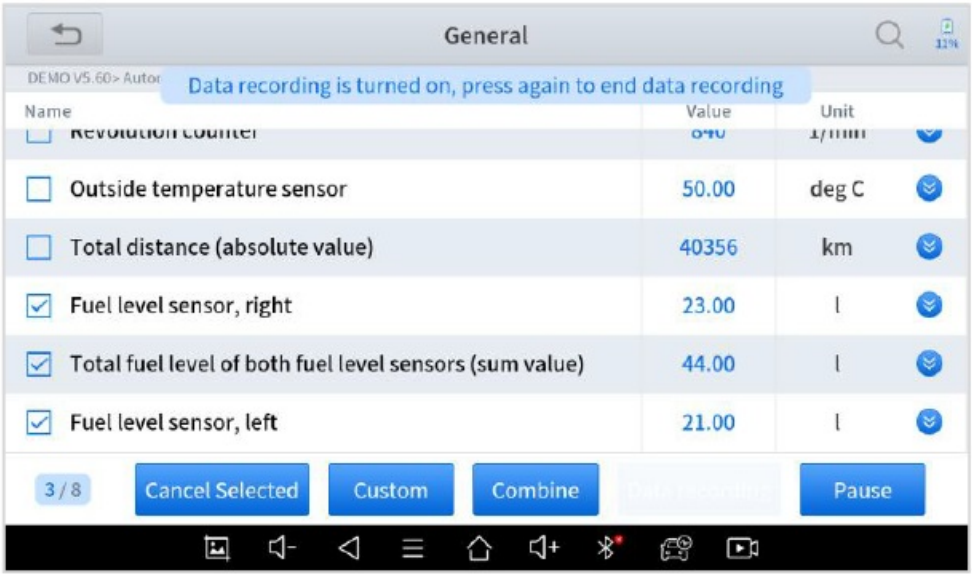
The scan tool includes support to select and show multiple PIDs. Click Display All to display all PIDs

Combine

The scan tool includes support to select multiple PIDs and click Combine to combine different graphs into one chart.

Data recording

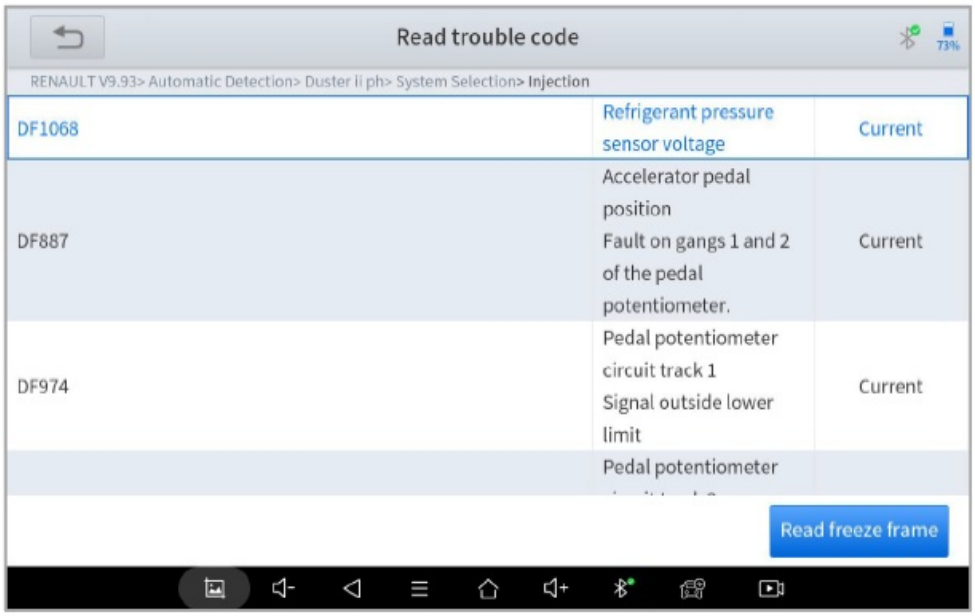
The scan tool supports recording the current data values in the form of text. You can view the recorded files in Reports->Data Replay.



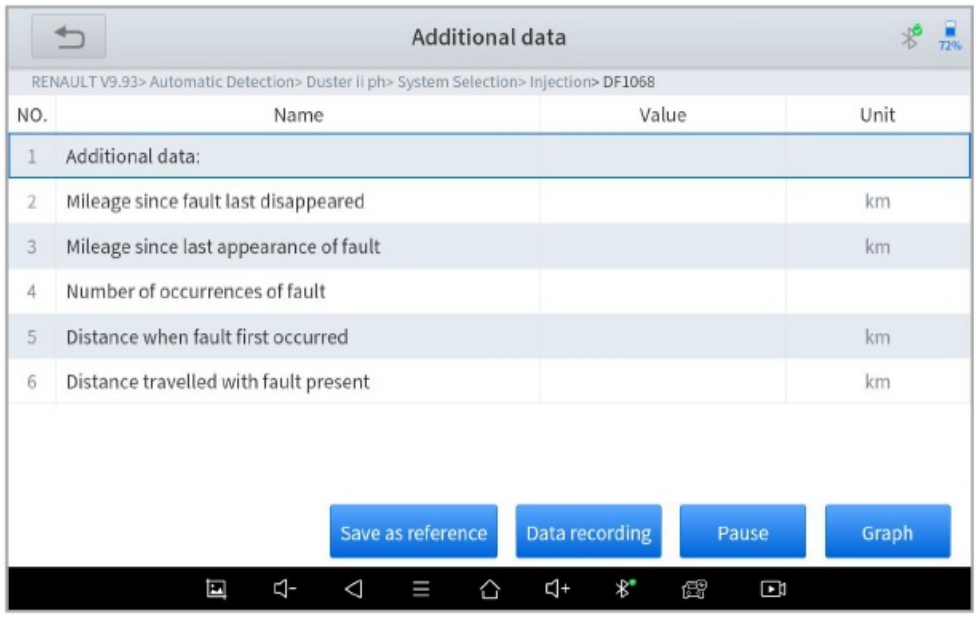
Pause
Click this button to pause the recording timeline

FREEZE FRAME
When the signal of the sensor is abnormal, the ECU will save the data at that moment of failure to form a freeze-frame. It is usually used to analyze the reasons that may lead to component(?) failures.

- The live data items supported by vehicles of different brands are not the same, so the freeze frames displayed when diagnosing vehicles of different brands may also be different. Some vehicles may not have the option of a freeze-frame which means that the model does not support this function.
- Take Renault Duster ii ph as an example. After selecting the system to enter the lower freeze frame menu, the device will list all the fault codes under the system.
- Users can click on a fault code, such as DF1068 to view the freeze frame recorded by the car when the fault code occurs, including context when the fault appeared, and current context and additional data.



- **Context when fault appeared**: record the live data when fault appeared to help the user to know the vehicle status. *Some vehicles don't support this function; users will get a prompt when they click the menu.
- **Current context:** Displays the current live data stream associated with the DTC
- **Additional data:** record other data related to the fault



ACTUATION TEST (BI-DIRECTIONAL CONTROL)

- Actuation test, also known as bidirectional control, is a generic term used to describe sending and receiving information between one device and another. This function is used mainly to judge whether these actuating

components of the engine are working properly.

- The vehicle engineers responsible for designing computer control systems programmed them so a scan tool could request information or command a module to perform specific tests and functions. Some manufacturers refer to bidirectional controls as functional tests, actuator tests, inspection tests, system tests or the like. Reinitialization and reprogramming also can be included in the list of bidirectional controls.
- This function allows the device to send information to and receive information from, vehicle control modules. For example, in the case of OBD II generic information Mode 1 (which relates to data parameters), the scan tool user initiates a request for information from the powertrain control module (PCM), and the PCM responds by sending the information back to the scan tool for display. Most enhanced scan tools also can actuate relays, injectors and coils, perform system tests, etc. Users could check the individual part to see what is working properly by actuation test.

SPECIAL FUNCTIONS

- Usually, special functions provide various reset or re-learning functions menus for most vehicle systems. You can easily and quickly solve some faults through special functions for your car. After some functions are successfully executed, fault codes will be generated, which need to be cleared manually after the car is running for a little while which could include a single start of the engine or multiple warm up cycles.
- And under each system, you can view the special features supported by that system. Different models and systems often have different special functions. Even for the same system of the same model, the years and ECU type may lead to different special functions supported.

COMPLIANCE INFORMATION

FCC Statement

Smart Diagnostic System has been tested and found to comply with the limits for a Class B digital device, pursuant t o part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or medications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

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

Specific Absorption Rate (SAR) information
Smart Diagnostic System meets the government's requirements for exposure to radio waves. The guidelines are based on standards that were developed by independent scientific organizations through periodic and thorough evaluation of scientific studies. The standards include a substantial safety margin designed to assure the safety of all persons regardless of age or health. FCC RF Exposure Information and Statement the SAR limit of USA (FCC) is 1.6 W/kg averaged over one gram of tissue. Device types: Smart Diagnostic System has also been tested against this SAR limit.

This device was tested for typical body-worn operations with the back of the Smart Diagnostic System kept 0mm from the body. To maintain compliance with FCC RF exposure requirements, use accessories that maintain an 0mm separation distance between the user's body and the back of the Smart Diagnostic System. The use of belt clips, holsters and similar accessories should not contain metallic components in its assembly. The use of accessories that do not satisfy these requirements may not comply with FCC RF exposure requirements, and should be avoided.

ISED Statement
This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

- The digital apparatus complies with Canadian CAN ICES-3 (B)/NMB-3(B).
- This device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS 102 RF exposure, users can obtain Canadian information on RF exposure and compliance.
- This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment.
- The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.
- This radio transmitter has been approved by Industry Canada to operate with the antenna types listed with the maximum permissible gain indicated. Antenna types not included in this list, having again greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Specific Absorption Rate (SAR) information
This device meets the government's requirements for exposure to radio waves. The guidelines are based on standards that were developed by independent scientific organizations through periodic and thorough evaluation of scientific studies. The standards include a substantial safety margin designed to assure the safety of all persons regardless of age or health. ISED RF Exposure Information and Statement the SAR limit of Canada(ISED) is 1.6 W/kg averaged over one gram of tissue. Device types: Device has also been tested against this SAR limit. This device was tested for typical body-worn operations with the back of the phone kept 0mm from the body. To maintain compliance with ISED RF exposure requirements, use accessories that maintain an 0mm separation distance between the user's body and the back of the phone. The use of belt clips, holsters and similar accessories should not contain metallic components in its assembly. The use of accessories that do not satisfy these requirements may not comply with ISED RF exposure requirements, and should be avoided.

Documents / Resources

	APEX P720 Smart Diagnostics System [pdf] User Manual P720, 2BGBLP720, P720 Smart Diagnostics System, P720, Smart Diagnostics System, Diagnostics System

References

- **User Manual**