A·B·R·I·T·E·S
automotive solutions

ABRITES RH850/V850 PROGRAMMER

User manual
version 1.4

Important notes

The Abrites software and hardware products are developed, designed and manufactured by Abrites Ltd. During the production process we comply to all safety and quality regulations and standards, aiming at highest production quality. The Abrites hardware and software products are designed to build a coherent ecosystem, which effectively solves a wide range of vehicle-related tasks, such as:

Diagnostic scanning;
Key programming;
Module replacement,
ECU programming;
Configuration and coding.

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There are certain conditions, upon which the warranty cannot be applied. The warranty shall not apply to damages and defects caused by natural disaster, misuse, improper use, unusual use, negligence, failure to observe the instructions for use issued by Abrites, modifications of the device, repair works performed by unauthorized persons. For example, when the damage of the hardware has occurred due to incompatible electricity supply, mechanical or water damage, as well as fire, flood or thunder storm, the warranty does not apply.

Each warranty claim is inspected individually by our team and the decision is based upon thorough case consideration.

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Abrites assumes no responsibility for any damage resulting from the use, misuse, or negligent use of the hardware or any software application.

Safety information

The Abrites products are to be used by trained and experienced users in diagnostics and reprogramming of vehicles and equipment. The user is assumed to have a good understanding of vehicle electronic systems, as well as potential hazards while working around vehicles. There are numerous safety situations that cannot be foreseen, thus we recommend that the user read and follow all safety messages in the available manual, on all equipment they use, including vehicle manuals, as well as internal shop documents and operating procedures.

Some important points:
Block all wheels of the vehicle when testing. Be cautious when working around electricity.
Do not ignore the risk of shock from vehicle and building-level voltages.
Do not smoke, or allow sparks/flame near any part of the vehicle fuel system or batteries.
Always work in an adequately ventilated area, vehicle exhaust fumes should be directed towards the exit of the shop.
Do not use this product where fuel, fuel vapours, or other combustibles could ignite.

In case any technical difficulties occur, please contact the
Abrites Support Team by email at support@abrites.com.

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List of revisions

Date	Chapter	Description	Revision
20.04.2023	ALL	Document created.	1.0
29.06.2023	ALL	Many general details added Connection diagrams removed	1.1
11.09.2023	ALL	Revision of all sections; 2.5 added	1.2
10.05.2024	2, 3, 4, 5, & 6	2, 3, 4, 5 updated, 6 created	1.3
22.06.2026	9 & 10	Created	1.4

1. Introduction

Congratulations on choosing our wonderful product!

Our new Abrites RH850/V850 programmer is a powerful tool that can read RH850 processors and read/write V850 processors, making it a versatile solution for professionals. As a professional, you know the importance of having the right tools to get the job done right.

In this user manual, we'll walk you through the process of connecting both AVDI and RH850/V850 programmer to your PC, using the software and making the right connections to the electronic units you are working on.

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2. General Information

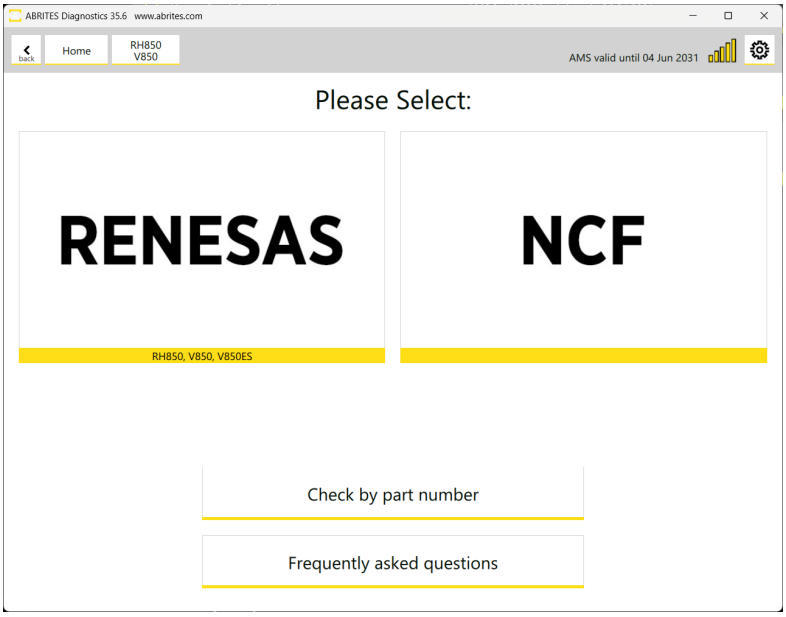
2.1 Requirements

Minimum system requirements – Windows 10 or later, USB port with supply 100 mA / 5V +/- 5%

You should use the device only with the supplied cables and adapters - this is crucial for the proper exploitation and function of the programmer. Please do not use external power supply, especially one that exceeds 5V, as this may result to a damage to the programmer.

2.2 Supported units

The supported units list for reading (electronic units equipped with RH850/V850 processors), writing (electronic units equipped with V850 processor) and NCF is dynamic and constantly updated, as we are adding more units to the supported list constantly. You are able to check if your dashboard is supported in the software by part number. Once you open the software, on the main screen you will see a button "Check by Part Number", you can type the part number and you will get the needed information.



2.3 Additional licenses required for completing the job

- Mileage recalibration, key programming and dashboard exchange procedures for VAG vehicles with RH850 and V850 processors require the VN021 license.
- All Keys Lost key programming procedures for Renault vehicles equipped with a HFM/BCM module require the RR026 license.
- All Keys Lost key programming procedures for Nissan vehicles equipped with a HFM/BCM module require the NN010 license.
- All Keys Lost key programming procedures for Ford vehicles equipped with a BCM with RH850 processor require FR011 license
- Key programming by RH850 dump for FCA vehicles requires the FN024 license.
- Mileage recalibration procedures for VAG MQB Non-ImmoV dashboards (Golf 8 generation) with RH850 processors require the VN022 license.
- Mileage recalibration procedures for VAG MQB Visteon/JCI dashboards with RH850 processors require the VN023 license.

2.4 Additional Important Information

It is **very important** to note the following situation for VAG RH850/V850 dashboards:

Please **do not turn any VAG Dashboard ON while it is still disassembled**, and most important, while the fan is not ON. **Only turn the dashboard ON when it is fully assembled**. Otherwise, the dashboard will set a DTC "Control Module Faulty" and there is no way to fix it.

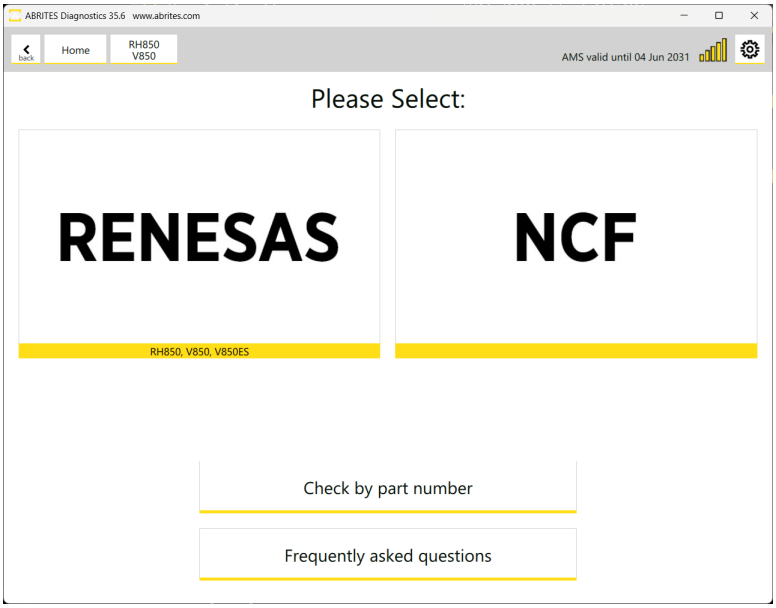
It is very important to keep all the cables and wires in their original state and not put any extensions to any of the wires when soldering.

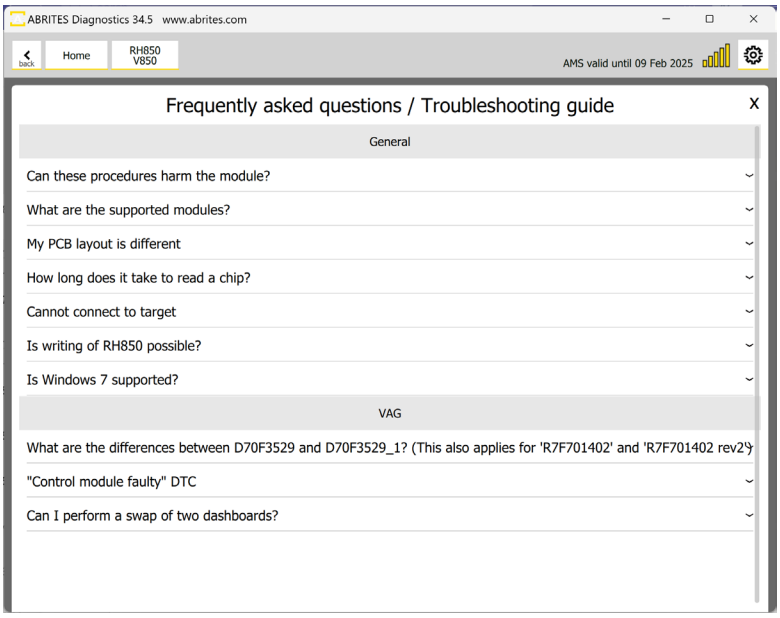
Reading such an MCU is a very difficult task, that involves some risks for the unit. In some cases the reading might not completely finish, and if you find yourself in such a situation, be aware that it is a safety matter. In such cases do not hesitate to contact the Abrites Support Team for assistance.

2.5 Frequently Asked Questions (FAQ)

On the main screen of the software you will see the 2 types of MCUs - V850 and RH850, as well as 2 buttons - “Check by part number” and “Frequently asked questions”

By pressing the “Frequently asked questions” button you will be able to see answers to important topics that concern many of our customers:





3. Hardware

The set consists of:

- ZN085 Abrites programmer for RH850/V850,
- ZN083 - 5V/2A DC Power adapter (also sold separately)
- CB107 - USB A-C Cable (also sold separately)
- CB501 - RH850/V850 connection cable- intended for establishing a connection with the electronic units by soldering. (also sold separately)
- A set of 3.3 Ohm resistors

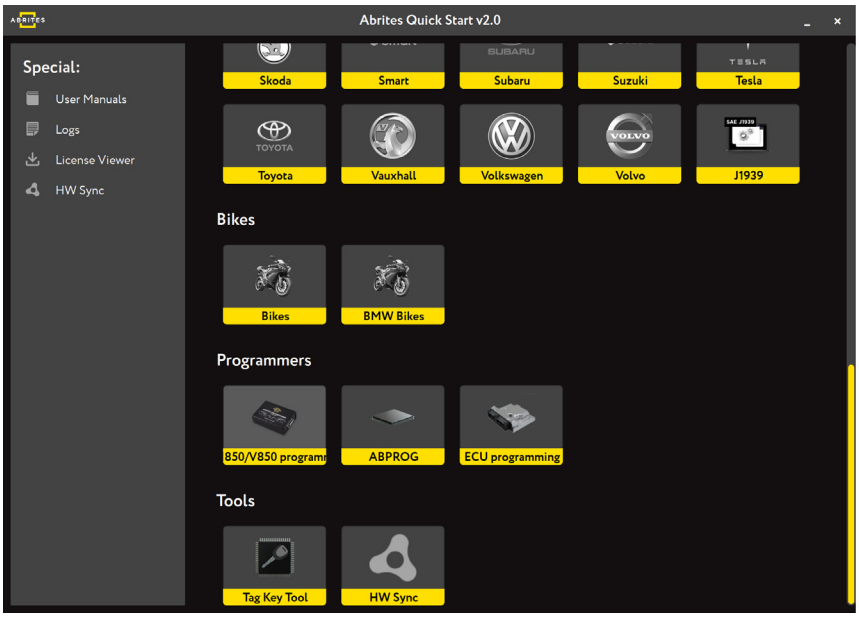
You should use the device only with the supplied cables and adapters - this is crucial for the proper exploitation and function of the programmer. Please do not use external power supply, especially one that exceeds 5V, as this may result to a damage to the programmer.

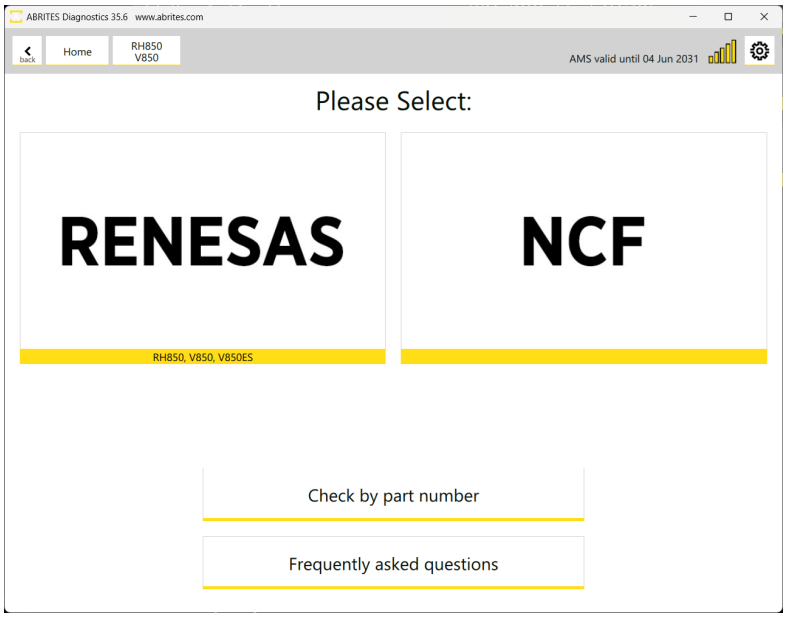
N.B: For the optimal performance of the Abrites RH850/V850 programmer we strongly recommend using only the CB107 - USB A-C Cable and ZN083 - 5V/2A DC Power adapter supplied by Abrites. We have tested our software thoroughly with this specific cable and adapter and can guarantee its compatibility with our product.

If other cables or adapters are used, there may be unexpected behavior of the software, which could lead to errors. Therefore, we advise against using any other cables or adapters to connect our programmer to your PC.

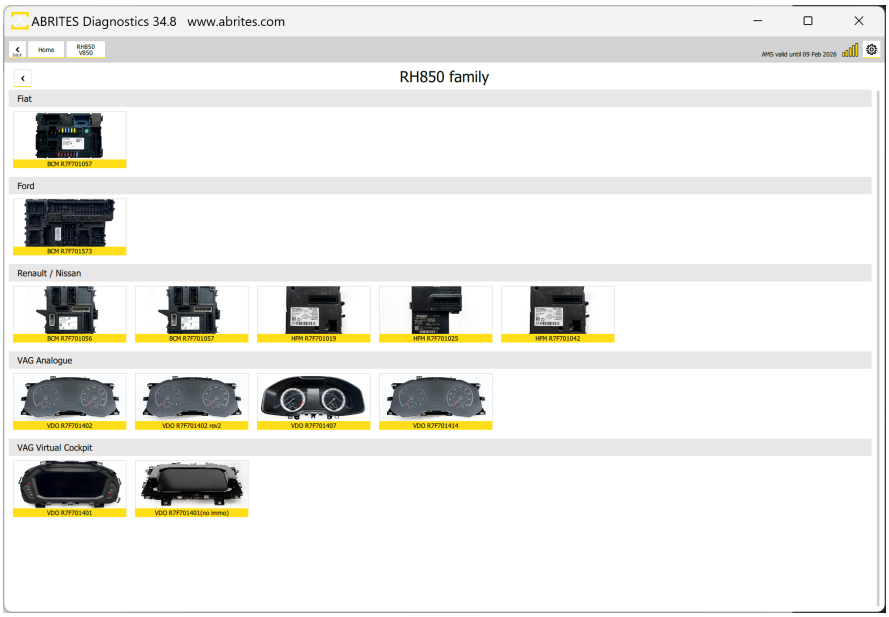
4. Using the software

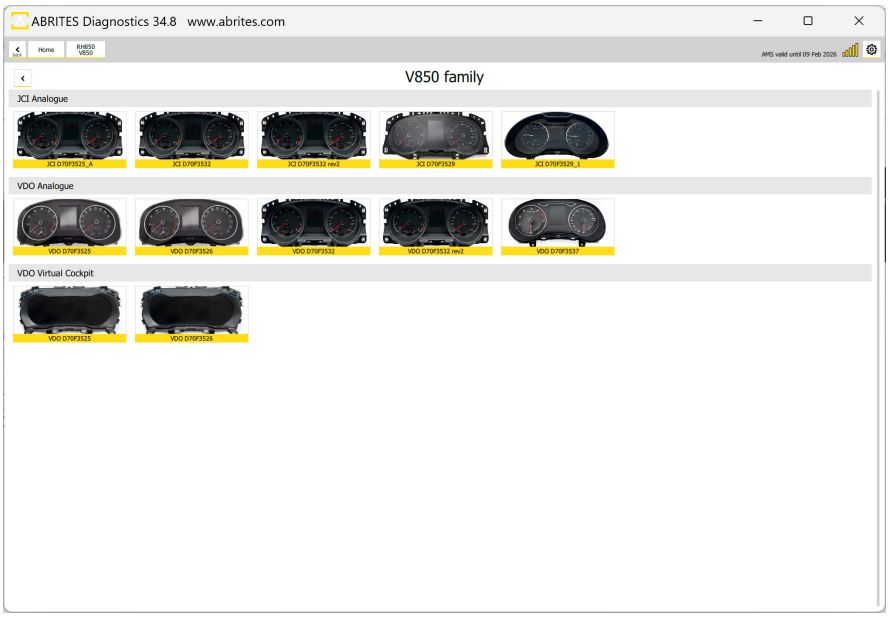
After connecting both the Abrites programmer for RH850/V850 and AVDI to the PC via USB ports, launch the Abrites Quick Start Menu, scroll down until you find the “RH850/V850 programmer” and click on it. Once you open the software you will have the option ti choose the MCU type you are working with - RH850, V850, (Renesas) or NCF. Please select the icon of your choice.



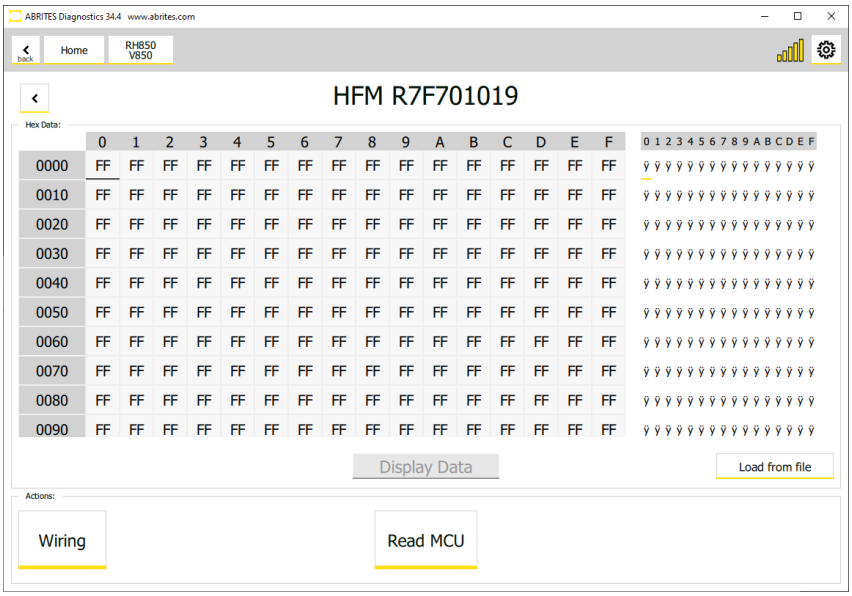


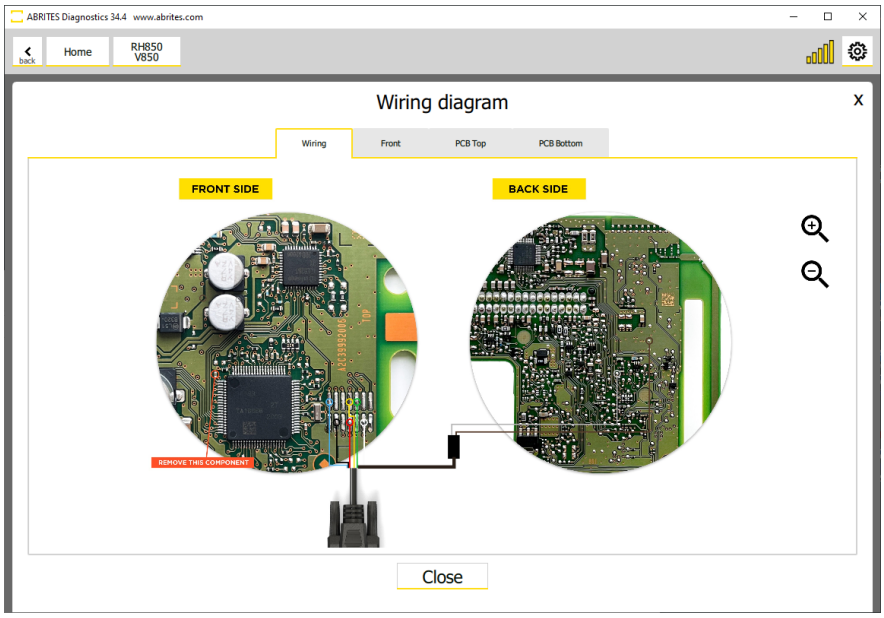
Once you have selected the RH850, V850 mcu type or NCF, you will see the available unit, please make your selection to continue.
Note: The list of supported units is dynamic and constantly updated, and will look similar to the pictures below.





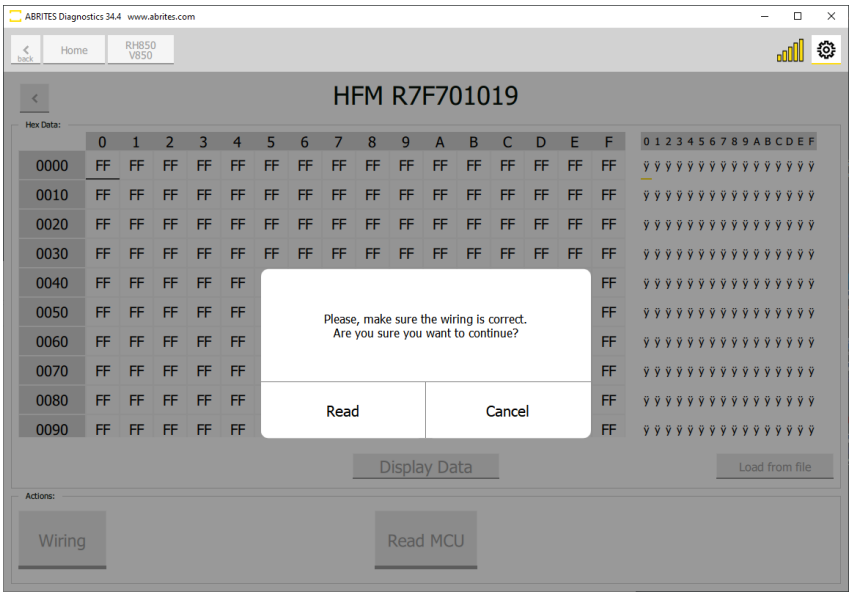
In the example below we use Renault HFM. Once the unit is selected, you will see the main screen, which gives you the option to read to see the connection diagram, read the MCU, or load a file. The button “Wiring” will give you everything that is needed for connection to the selected unit.

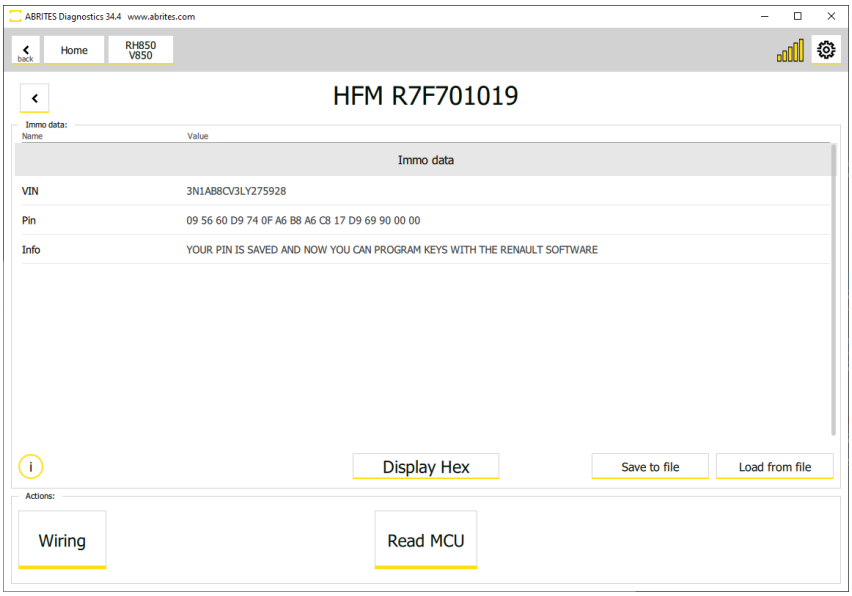




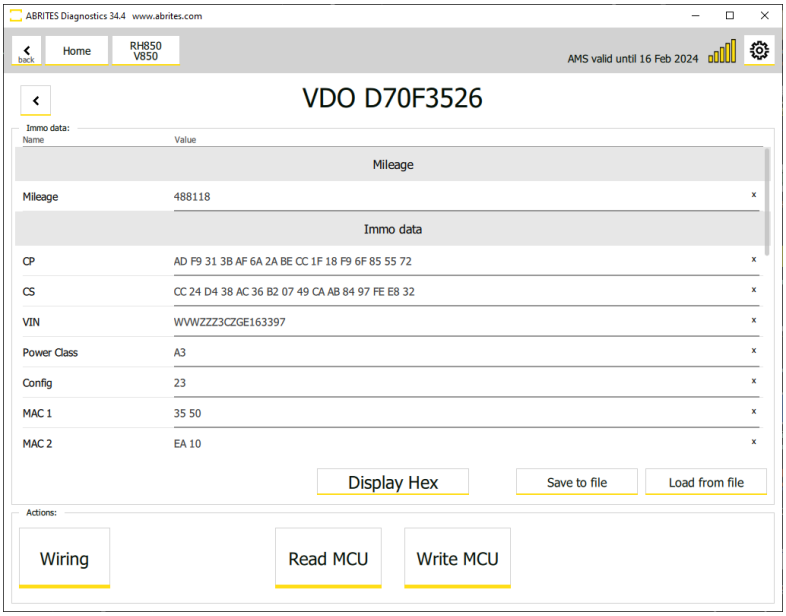
Once ready with the connections you can proceed to reading the unit by pressing the “Read MCU” button. Once the unit is read, the software will display the available information and you will see a screen like the one below (note that in this case we are using Renault HFM; Other units will display different information)

NB! It is recommended to always save a backup before doing any modifications to the data!





Below you may see example of a VAG dashboard read with the programmer.



5. Connection and diagrams

When connecting to the unit, it is crucial to adhere strictly to the connection diagrams provided in the software. Additionally, please take note of the following important statements:

1. It is strongly recommended to verify your connections using a multimeter, specifically checking for any short circuits to ground at the connection point of the gray cable.
2. Exercise caution to avoid inadvertently shorting the capacitors when returning them to their original soldering positions.
3. We recommend connecting the devices directly to a laptop whenever possible. If a direct connection is not feasible, then it is advisable to use a powered USB hub. Standard USB hubs may not have the necessary power capacity to support all the required devices (AVDI, Protag, ZN085 programmer), which could lead to program malfunctions and damage to units.

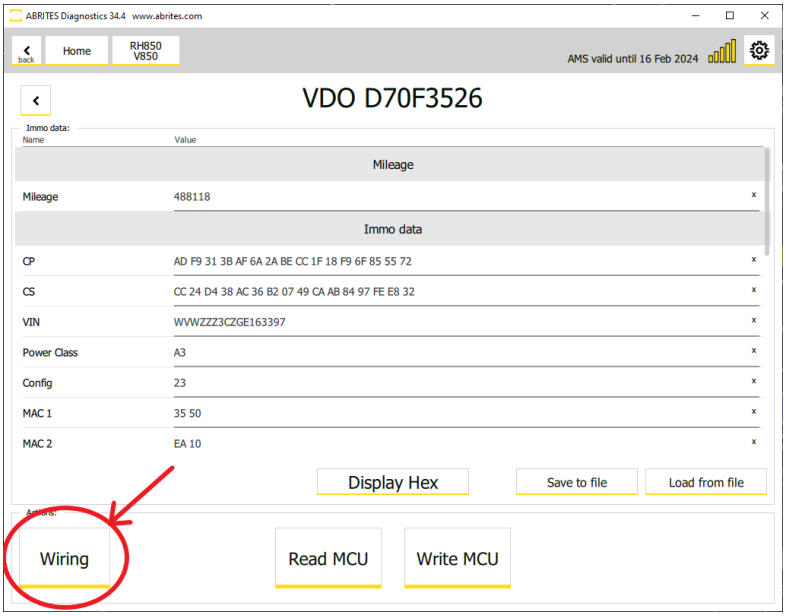
Please ensure that you carefully follow these guidelines to ensure proper and safe operation.

5.1 Connection diagrams

Connection diagram for each supported unit can be found in the software, as mentioned in the previous section of this user manual. In order to access a diagram you should follow the steps below:

- Open the software
- Select the type of MCU - RH850 or V850
- Select the unit you are working with
- Click on the “Wiring” button

This will open a new window where you will be able to see all required details: wiring diagram, front and back side of the unit itself, and both sides of the PCB.



6. Using the ZN085 Programmer

6.1 Reading a VAG unit

You will be able to read and update data such as:

- Component Security (CS) bytes
- Component Protection (CP) bytes
- VIN
- Power Class
- MAC
- Mileage
- Information about keys

And more

You can save everything into a file, which will let you do cluster exchange and retrofitting. This procedure will also require a key learning.

Mileage data can be update by inputting the correct mileage into the dedicated window and pressing update.

IMMO data can later be used for key programming in the VAG Online software. Once you save the .json file in this software, you can upload it into the VAG Online and perform the key programming procedure.

6.2 Reading a Ford (2021+) BCM module with an RH850 mcu

This procedure will let you read the unit. Data will be uploaded to our server. You can then open the Ford Offline software and proceed with the key programming procedure.

6.3 Reading a Nissan HFM/BCM

This procedure will let you read the unit. Data will be uploaded to our server. You can then open the Nissan Online software and proceed with the key programming procedure.

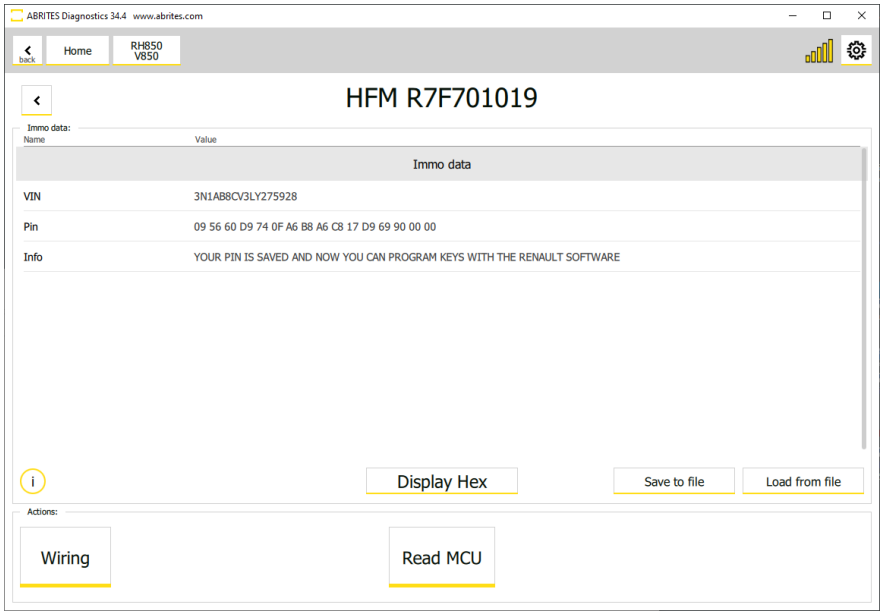
6.4 Reading a Fiat BCM

This procedure will let you read the unit. Data will be uploaded to our server. You can then open the Fiat Online software and proceed with the key programming procedure.

6.5 Reading a Renault HFM/BCM

This procedure will let you read the unit. Data will be uploaded to our server. You can then open the Renault Online software and proceed with the key programming procedure.

Here is an example of a Renault unit read with the programmer:



7. MQB RH850 with Visteon/JCI dashboard mileage changing

With the use of the ZN085 programmer and VN023 license you can change the mileage in Visteon and JCI dashboards, equipped with RH850 processors. This functionality is suitable for VAG MQB vehicles (Volkswagen, Audi, Seat, Skoda and other VAG vehicles on the same platform).

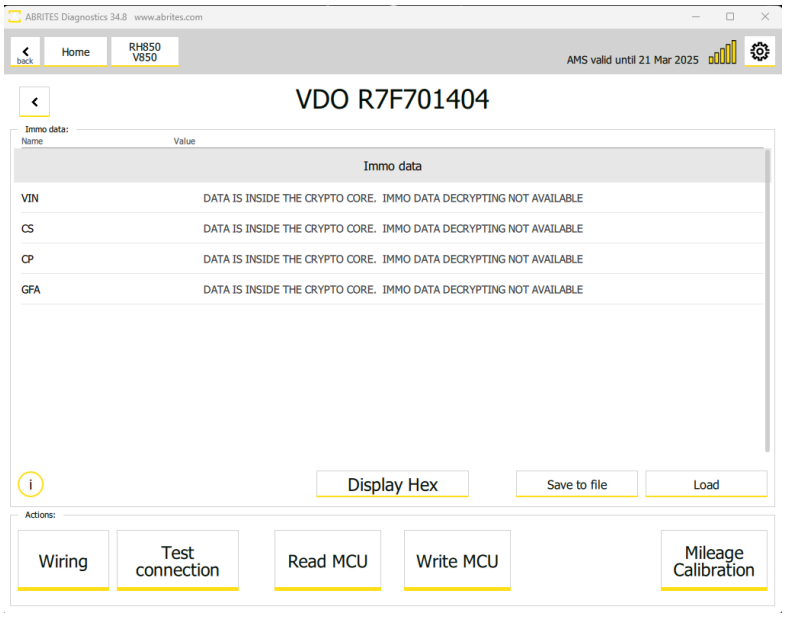
In order to successfully perform this procedure, you need to follow the steps:

1. Read the unit (after the unit is read you will not see the immo data as in other units)
2. Save the file
3. Write the unit
4. After the writing is complete you need to take the programmer off, assemble the dashboard unit and install it in the vehicle.
5. Once the unit is installed in the vehicle, you need to connect AVDI trough the OBDII port, open the RH850/V850 programmer software and select the dashboard type.
6. Load the file you have previously saved
7. Click the "Mileage Calibration" button
8. A pop-up window will appear, letting you "read" and "write" the mileage

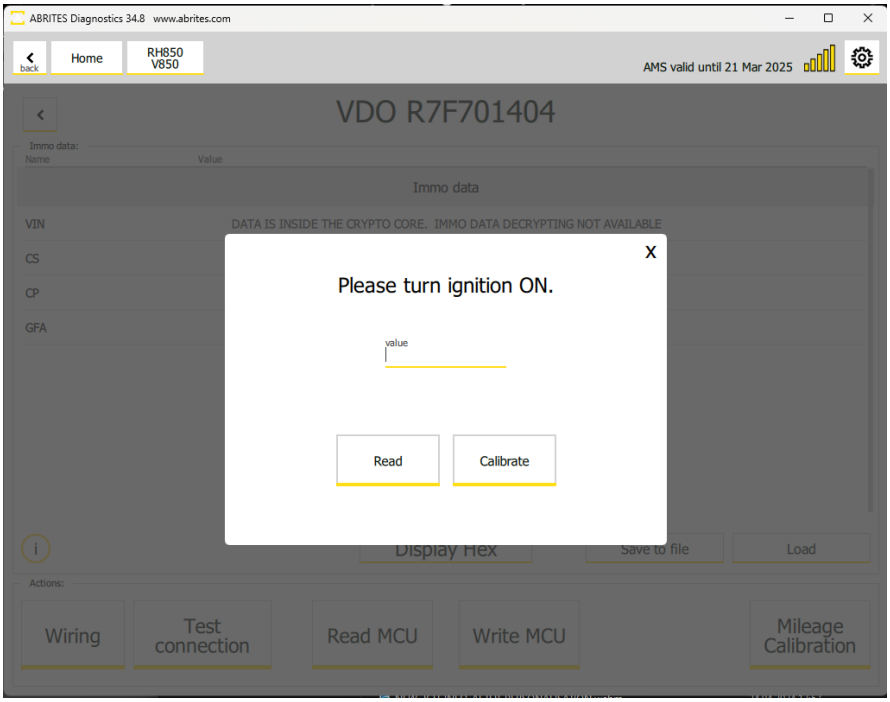
N.B.

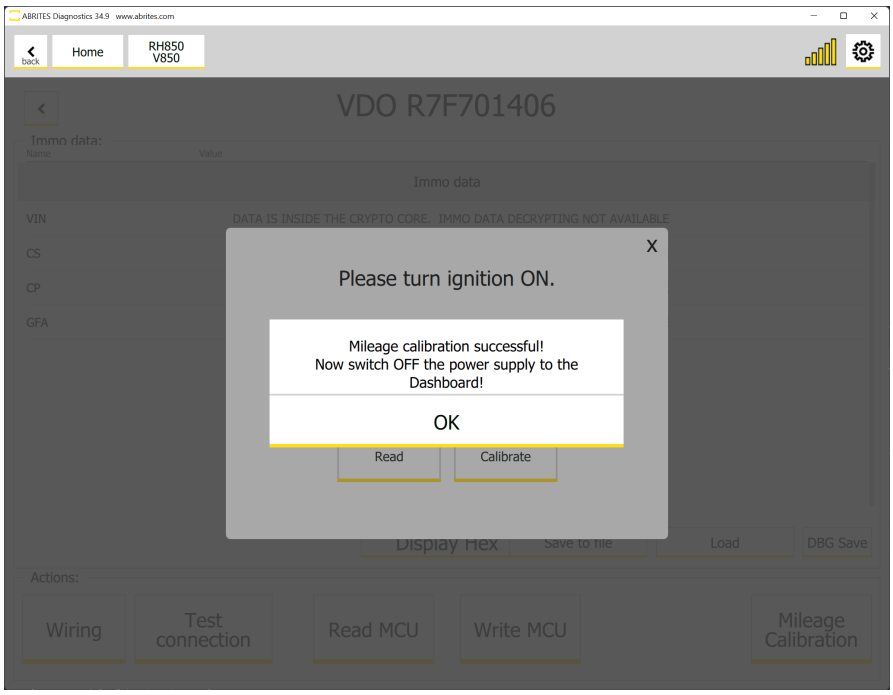
After you write the new mileage data, you will see a message suggesting you need to power off the dashboard unit - this means you will have to disconnect the connector of the dashboard unit and reconnect it again. If you do not execute the power OFF procedure, original mileage information will return on the display.

Below you may see pictures from the procedure:



More pictures from the procedure:





8. Calibration for Instrument Cluster Types IC223/IC177M

To perform the procedure, the IC module must be removed from the vehicle and worked "on Bench", following the wiring instructions in the V850/RH850 Programmer software. The IC223 and IC177M consists of two separate modules: the LED display, which is just the screen, and the control module that stores the mileage value and manages the display's content. The control module location varies depending on the vehicle model—some cars have it under the driver's seat, others under the passenger seat, while in some models, it is positioned above the glove compartment. In certain cases, it can also be found above the pedals, beneath the dashboard.

Requirements:

- V850/RH850 Programmer software
- Soldering iron
- CB501 cable
- EM019 emulator (If blocking the synchronization is required)
- Wiring diagram (provided in the software under the Programmer's menu)
- Capacitors (to be temporarily removed and later restored)

Step-by-Step Procedure

- Remove the instrument cluster module from the vehicle.
- Unsolder the capacitors carefully.
- Solder the CB501 cable's wires according to the provided wiring diagram.
- Verify the cluster revision to ensure correct wiring before proceeding.
- Connect the instrument cluster module to the V850/RH850 Programmer software.
- Proceed with reading the IC Module data.
- Once successfully read, the current mileage value will be displayed.
- Enter the desired mileage value in the software.
- Click the "Write" button to apply the changes.
- At this step, the software will prompt whether to block the synchronization between the EZS and IC Module.

1. If synchronization blocking is not needed:

- Restore the module by soldering back the capacitors and remove the CB501 cable wires.
- Mount the IC Module back into the vehicle.

2. If synchronization blocking is needed:

- Solder the EM019 emulator according to the wiring diagram and revision of the IC Module.
- Ensure the emulator wires are properly soldered and securely fixed inside the IC Module.

Mount the IC Module back into the vehicle.

Important Notes:

- Always double-check the wiring diagrams before making connections.
- Ensure all soldering points are secured to avoid malfunction.
- If blocking synchronization, ensure the EM019 emulator is firmly installed inside the IC Module.

9. BDC2/3 Spare Key Programming on Bench NFC

This solution allows reading the Secret Key directly from a working key, including:

- Key ID
- Secret Key
- Key Information

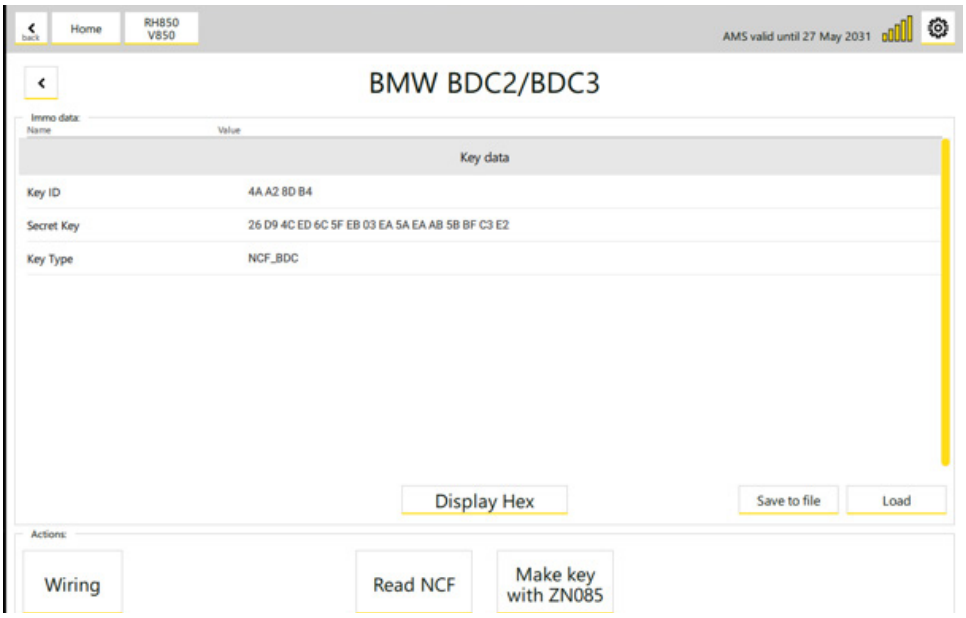
With our software you can add a spare key to the latest generation BDC2 and BDC3 vehicles.. There is no need to read any info from the Immobilizer (BDC module).

Step-by-Step Procedure:

1. Open the working key and solder the CB503 cable to the PCB as shown in the NCF menu of the ZN085 software.
2. Read the NCF MCU to extract the immobilizer data (Secret Key).
3. Open the new key and connect the CB503 cable to its PCB.
4. Click Make Key with ZN085 to write the extracted immobilizer data to the new key.

The new key is now fully operational. No further OBD programming is required.

New OEM and used keys are supported.



10 MQB 5C/5D Immo Data Reading from NCF Processor

10.1 Overview

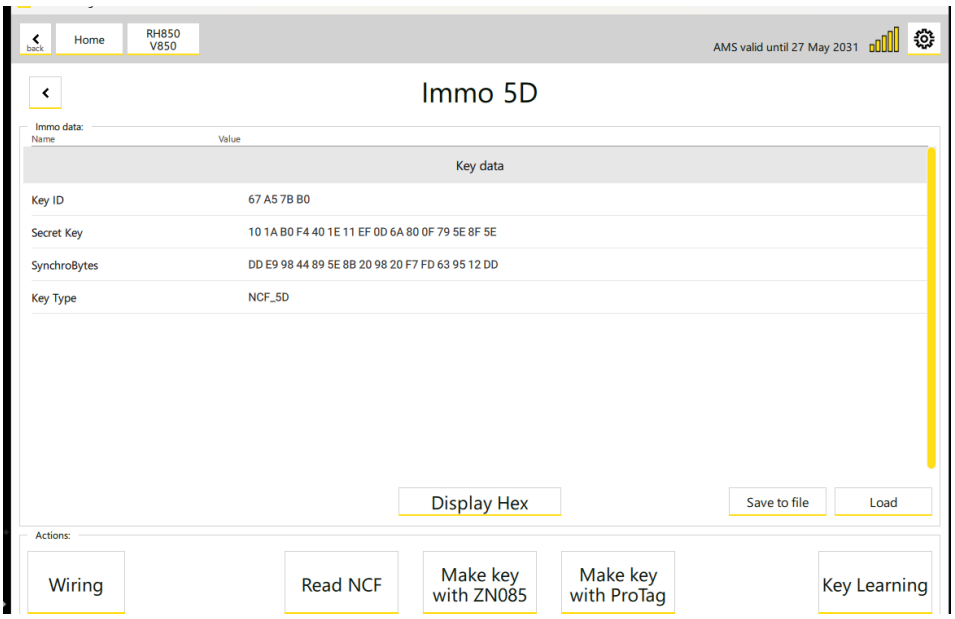
This solution allows reading complete immobilizer data directly from a working key, including:

- Key ID
- Immobilizer Secret Key (CS)
- Synchronization Data (Immo Data)
- Immobilizer Platform Information

No third-party information is required.

With our software you can:

- Add a spare key to MQB Immo 5C and 5D vehicles without reading any info from the Immobilizer (Dashboard or CEM).
- Extract slave modules Immo data for ECU, TCU, or ELV replacement.



10.2 Immo Data Extraction

1. Disassemble the working key shell and access the PCB.
2. Solder the CB503 cable to the connection points on the PCB following the wiring diagram shown in the NCF menu of the ZN085 software.
3. Read the NCF MCU to extract:

- Key ID
- Secret Key (CS)
- Synchronization Data (Immo Data)
- Immo Platform Information

10.3 Key Preparation

1. OEM New or Used Keys

Prepare the key as a Dealer Key using: Make Key with ZN085 Then program it to the vehicle using: Key Learning by CS

2. Aftermarket Virgin Keys

Prepare the key using: Make Key with Protag then perform Key Learning by CS.

10.4 Module Replacement

When a working key from the donor vehicle is available, the extracted Immo data can be used for replacement of: ECU, TCU or ELV

This eliminates the need to read the donor module directly or purchase synchronization data from third-party sources.