



# DiagRA - Limited Edition for Customer Racing Teams

# VOLKSWAGEN

Group Motorsport



## Index

1. Navigation .....	3
1.1. Main Window .....	3
1.2. Self-Diagnosis (Analysis mode).....	3
2. General Functionalities .....	5
2.1. ECU Identification.....	5
2.2. Fault Memory Contents .....	6
2.3. Actuator Test.....	7
2.4. Basic Setting .....	8
2.5. Erase DTC Memory .....	10
2.6. Measured Values.....	11
2.7. Calibration Data.....	13
2.8. Standard diagnostics .....	14
2.9. Flash programming.....	15
3. Technical issues .....	16

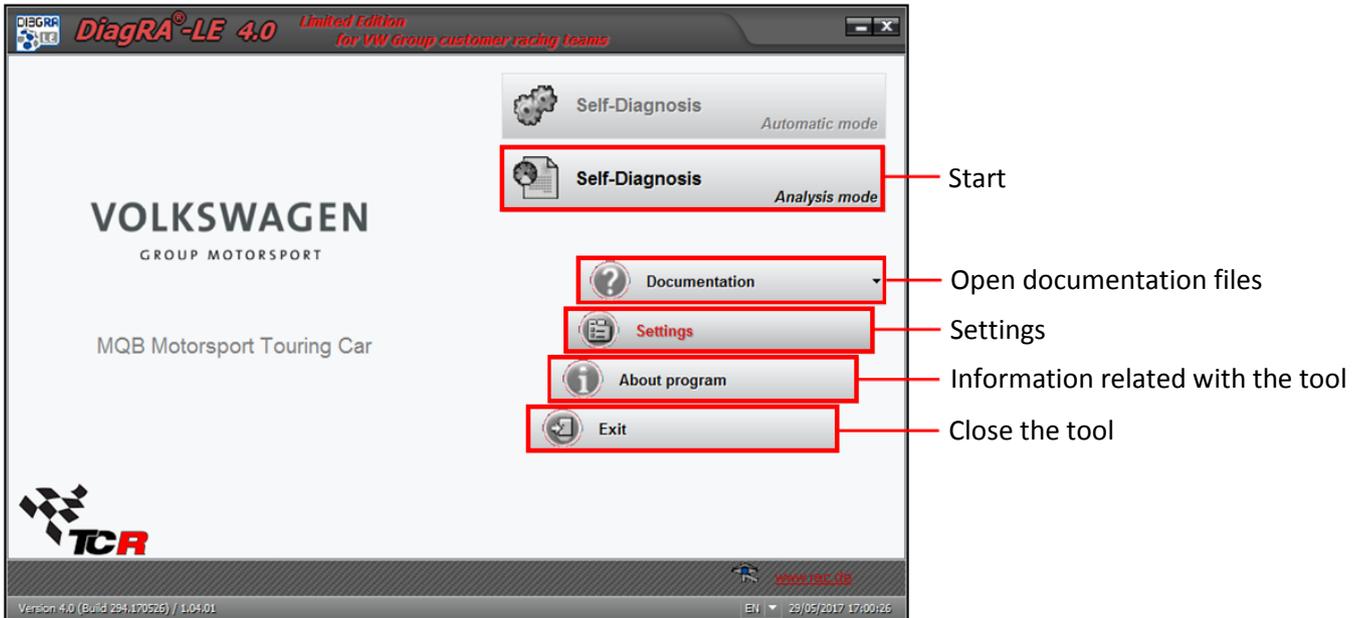


# 1. Navigation

Once the setup process of the software has been done and the license has been installed successfully, the user can start to use the software.

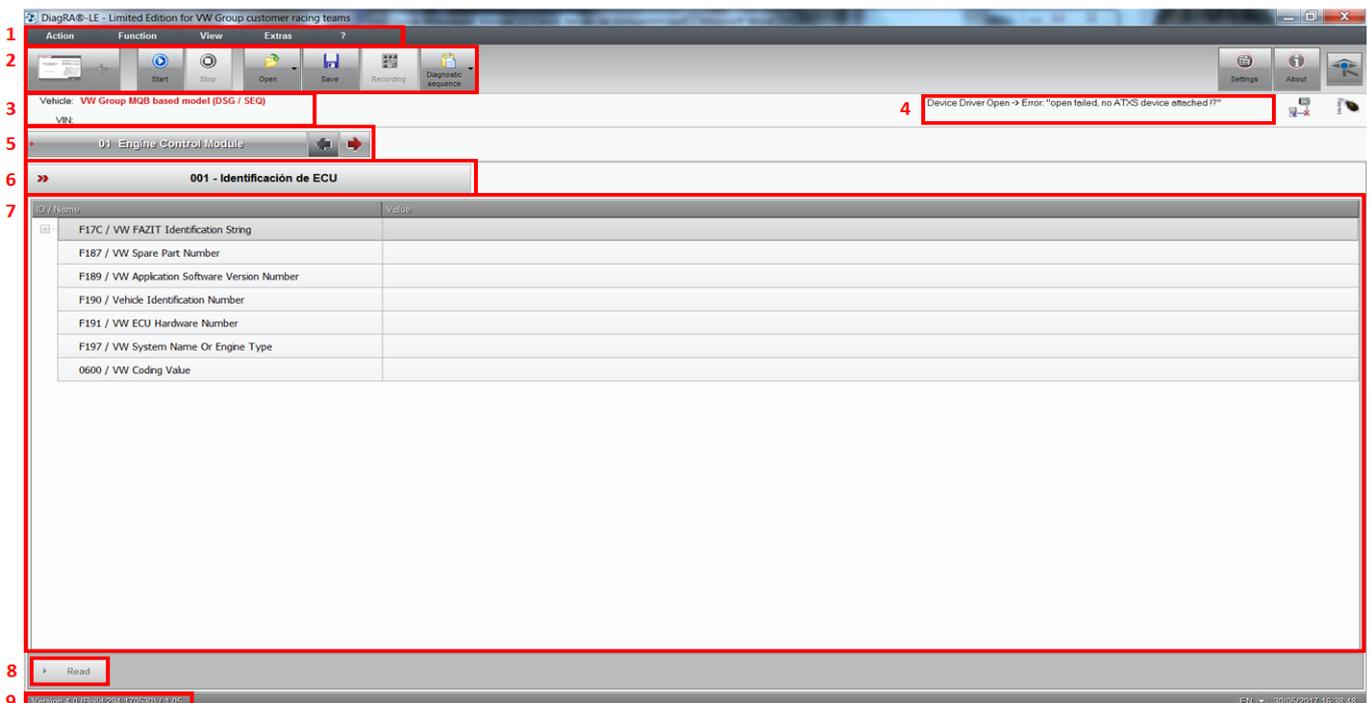
## 1.1. Main Window

Following, the principal options that the user can choose on the main window:



## 1.2. Self-Diagnosis (Analysis mode)

To proceed with the car diagnostics, the user has to select the option Self-Diagnosis on the Main Window. Then, the following window will be shown.



The main fields that can be seen on the Analysis mode are described below:



**1. Menu bar**

On this menu, the user can open, use and tune general functionalities of the tool. All of the tool bar quick buttons, functionalities and settings, that are described following, are also available on this menu.

**2. Tool bar**

On this bar, the user can select the following quick buttons:



Return to the main window.

Start communication with the car.

Stop communication with the car.

Open the output files (Save button) and Recording files (Record button).

Freeze all information shown on the window and create a .txt file.

Make a record on real time with all the measured values shown on the window and create a .csv file.

It allows to create an automatic diagnostic sequence of the desired ECUs.

**3. Vehicle Identification**

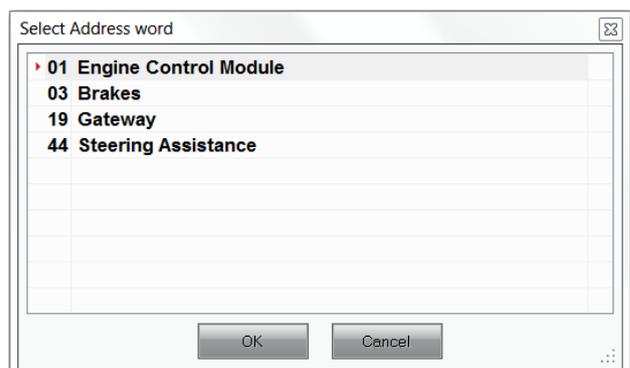
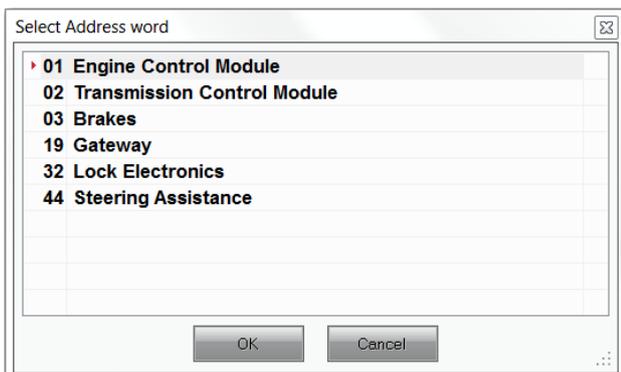
The software will detect automatically the kind of gearbox that is mounted on the car (DSG or SADEV) and the available control units with its functionalities will be authorized. The car model and the VIN number will be also displayed.

**4. Status bar**

This field will show messages and relevant information related with the process that the software is doing on each moment.

**5. Electronic Control Unit selected**

To modify the ECU selected, the user has to make double click on the control unit that is shown or click on the left and right arrows in order to go to the next ECU. Following, it is shown the available ECU on each kind of car.





## 6. Functions menu

Depending on the ECU that is connected with, this menu will show different functions available. The user has to click on the function that is shown and select the one that wants to check. Forward, it is shown the different functions available on the different ECU.

## 7. Values screen

According to the ECU that the user is checking, this field will show different values, settings and information.

## 8. Action buttons

These buttons will change according to the ECU and function that the user is controlling. These buttons will be used to Start/Stop functions and Read/Write or Delete values.

## 9. Software version

This field will show the Software version number, the date and the files package version that are installed on the Software.

# 2. General Functionalities

The following functionalities will be common in every ECU and they will work in the same way in all of them. They can show different options and values according to the ECU that is connected.

## ***2.1. ECU Identification***

It will show information related with the hardware and software that are mounted on the vehicle. The parameters and values can help the user to check if the ECU is programmed with the correct or latest software.

Depending on the car model, this is based on the gearbox that is mounted, (DSG or SEQ) the available ECUs will be different.

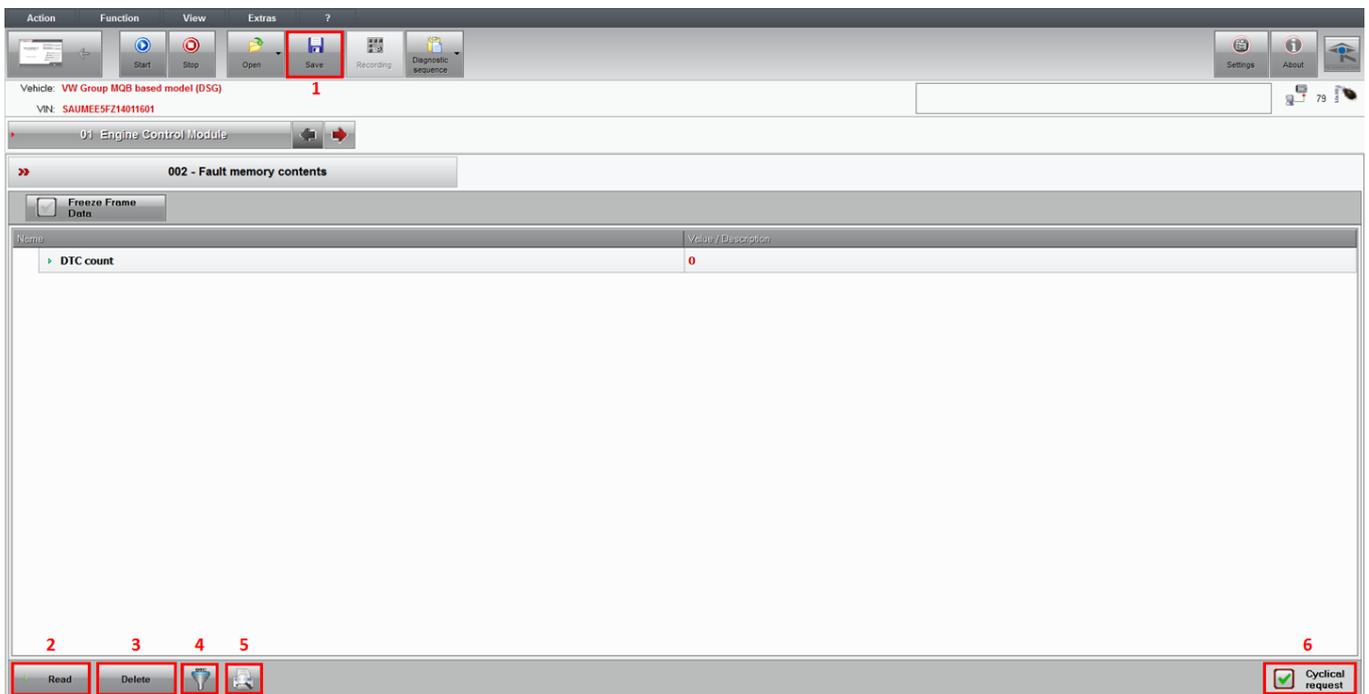
- DSG car model:
  - Engine Control Module
  - Transmission
  - Brakes
  - Gateway
  - Lock Electronics
  - Steering Assistance
- SEQ car model:
  - Engine Control Module
  - Brakes
  - Gateway
  - Steering Assistance

## 2.2. Fault Memory Contents

Whether the electronic control unit has a fault code, the user will see them on this screen.

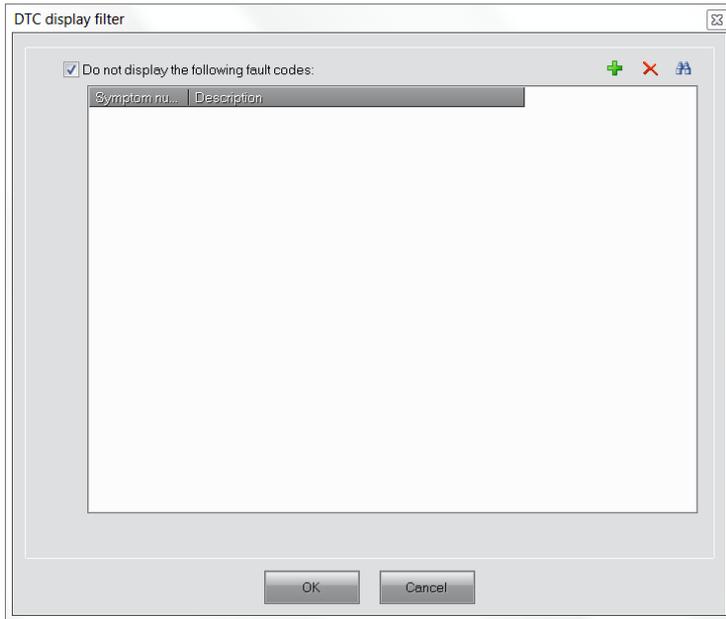
Using this functionality, it can be done the following actions:

- 1) Generate a .txt file with the fault codes, using the Save button on the tool bar.
- 2) Read and update the fault codes on the ECU.
- 3) Delete the fault codes using the action button.
- 4) Hide the fault codes that are not relevant using the Filter option.
- 5) Create a file with all the fault codes within .pdf format pushing the Print button.
- 6) The fault codes shown on the screen will be updated automatically with the cyclical request button.



To perform the screen, it is advisable to switch on the Cyclical Request on the right and below part of the screen. With this option, if the customer deletes the fault memory, the fault codes will be updated continuously and in case that the deleted ones are still active, they will be shown again.

Also the Filter option is advisable to hide the fault codes that are always active and they are not relevant. Due to the use of standard ECUs without many signals from other road car systems, this option is useful because there are some fault codes that cannot be deleted. The fault codes that have been hidden by the manufacturer cannot be removed from the list (they will be counted but the description will not appear), but the customer is able to add the ones that considers as not relevant for the proper operation of the car.

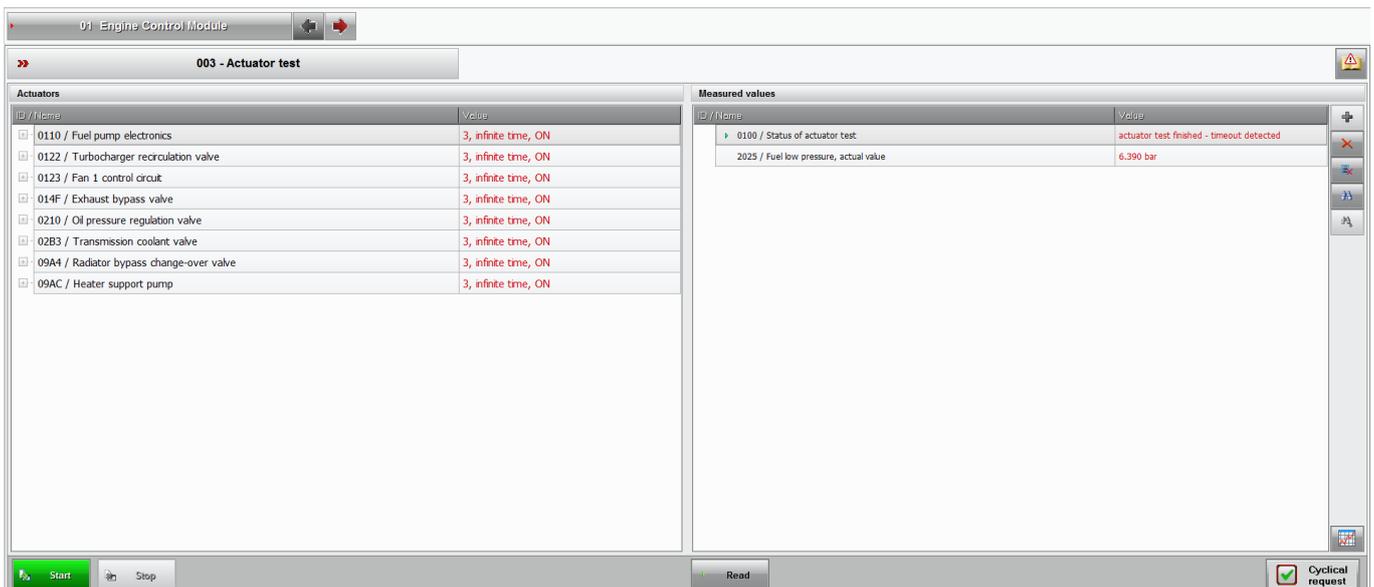


### 2.3. Actuator Test

Using this functionality, the user can activate some actuators independently and check if they work normally or if something does not work properly. It is just available on the *Engine Control Module* ECU. The conditions to make the tests are Main Switch On, Ignition Switch On and Engine not running.

On the left side of the screen, there are the actuator tests available on the ECU. The user can select the one that wants to check and the right side of the screen will change to show the measured values involved on each test. The tests, that have not any measured value, have to be checked visually or acoustically, due to the fact that there is not return of the signals to check if they are working.

The actuation time of each test can be modified in order to stop automatically or it can be stopped by the user when he wants, just press the Start button and the Stop button.



Following, the standard values for each actuator test in order to check if they work properly.

Name	Measured Value	Value Eng. Not running
Fuel Pump electronics	Fuel Low pressure	6,9 bar
Turbocharger recirculation valve	No Value (Check acoustically)	-
Fan 1 Control circuit	Coolant fan 1	87,89%
Exhaust bypass valve	No Value (Check acoustically)	-
Oil pressure valve	Status of oil pressure switches high/low pressure	Open/close
Coolant valve for gearbox	Transmission oil cooler valve	Open/close
Coolant valve radiator	Coolant shut-off valve	Open/close
Heating support pump	Heater support pump	95%

## 2.4. Basic Setting

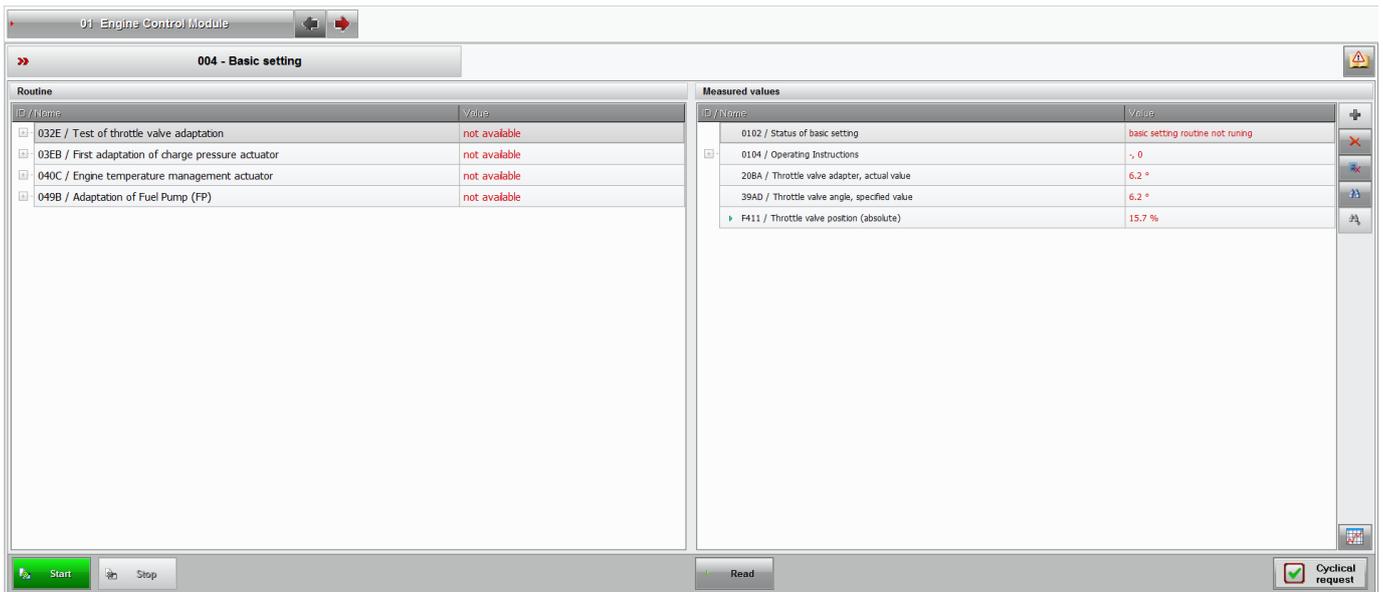
On this functionality, the user can make some adjustments in different actuators in order to adapt them to the whole system. It is advisable just to make a basic setting after replacing any part related with the setting.

On the screen, the user can see the available basic settings on each ECU. When a basic setting is selected, at the right side of the screen, it will appear the Status, Operating instructions and the measured values related with the selected one.

When any basic setting has been finished, the software will show a message on the *Status bar* that will say “*Successfully Completed*”.

The available basic settings and the conditions to do them are the following ones:

- **Engine Control Module:** The conditions are the same for all the settings (Main Switch ON, Ignition Switch ON, Engine not running). The available ones are:
  - *Test of throttle valve adaptation (throttle body):* It detects the maximum and minimum stoppers.
  - *First adaptation of charge pressure actuator (Waste-gate):* It fixes the voltage of the closed position.
  - *Engine water temperature actuator (thermostat):* It will calibrate the position of the actuator.
  - *Adaptation of Fuel pump (Low pressure pump):* It will detect the voltage, electrical current and pressure of the pump.



- **Transmission Control Module “DSG Gearbox” (in case that is mounted):** The conditions are the same for all the settings (Engine running in idle speed and Gearbox lever in P position). The available ones are:
  - *Basic setting of transmission:* It will activate the gear actuators and both clutches inside the gearbox and it will compare the electrical current of the clutches valves with the commanded values. Following, the standard measured values that the user can see when the basic setting is working. Values may differ slightly from one car to another.

Description	Value with Eng. idle speed						
Transmission input speed	760	760	760	760	760	760	760
Transmission input speed (RPM) shaft 1	0	0	500	500	0	0	500
Transmission input speed (RPM) shaft 2	500	500	0	0	500	500	0
Current of valve for clutch 1 specified value (A)	480	480	0	0	480	480	0
Current of valve for clutch 1 actual value (A)	480	480	0	0	480	480	0
Current of valve for clutch 2 specified value (A)	0	0	480	480	0	0	480
Current of valve for clutch 2 actual value (A)	0	0	480	480	0	0	480
Pressure of clutch 2, actual value (bar)	0	0	2.3	2.3	0	0	2.3
Pressure of clutch 1, actual value (bar)	2.3	2.3	0	0	2.3	2.3	0
Engine speed (RPM)	760	760	760	760	760	760	760

- *Double Clutch Fast adaptation:* It will store the electrical current of both clutches valves. This basic setting is included on the previous one.
- *Calibration of Synchro-Points:* It will activate both clutches to be able to move all the gear actuators and detect the synchro-points in all gears. Following, the standard measured values that the user can see when the basic setting is working. Values may differ slightly from one car to another.

Description	Value with Eng. idle speed
Transmission input speed	760
Transmission input speed (RPM) shaft 1	760
Transmission input speed (RPM) shaft 2	770
Current of valve for clutch 1 specified value (mA)	1200



Current of valve for clutch 1 actual value (mA)	1205
Current of valve for clutch 2 specified value (mA)	1250
Current of valve for clutch 2 actual value (mA)	1240
Pressure of clutch 2, actual value (bar)	8.1
Pressure of clutch 1, actual value (bar)	8.1
Engine speed (RPM)	760

- **Lock Electronics “VAQ Differential” (in case that is mounted):** The conditions are Engine running in idle speed and Gearbox lever in P position.
  - *Pump Motor:* It will activate the electrical pump and it can be seen the reached value of the electrical current on the pump. It can help to bleed the VAQ after replacing the pump or the oil. The standard measured value of the electrical current that the pump is:

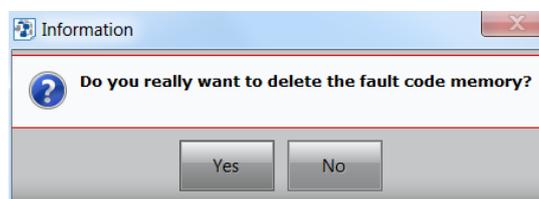
Description	Value with Eng. idle speed
Haldex clutch pump current (A)	15.3

- **Steering Assistance:** The conditions are Main Switch ON, Ignition Switch ON, Engine not running. The system will show a message about how to proceed.
  - *Steering Angle Sensor / Zero calibration:* It will make a new zero position in order to align the steering wheel with the steering angle. To start the process, push the Star button and follow the instructions shown on the screen. It is necessary moving the steering wheel to right and left hand side to detect the four flanks and then put the steering wheel on the center position, checking that the index mark is showing the value 1. If it shows the value 0, it will not be possible. Then push again the Start button to make the new zero.

Description	Value with Eng. not running
Steering angle sensor, angle	Between -280° / 280°
Steering angle sensor, status	Active / Not active
Steering angle sensor, offset straight line running	Between -2° / 2°
Steering angle sensor, slope detection	Detected / Not detected
Steering angle sensor, index mark	0 / 1

## 2.5. Erase DTC Memory

This functionality allows the user to delete quickly the memory faults without look into the codes or descriptions, just enter on the desired ECU, wait to read the parameters and select the functionality. Then, the following message will appear and when the user accepts, the memory faults will be deleted.





## 2.6. Measured Values

On this window, the user can select the values that he wants to see on real time and can be also recorded. The user can choose the values from the available list that can be shown.

Following, the available options on the tool to perform the window are described.

-  **Add values**
-  **Delete one value**
-  **Delete all the values**
-  **Search for a value**
-  **Show the selected values on graphics**

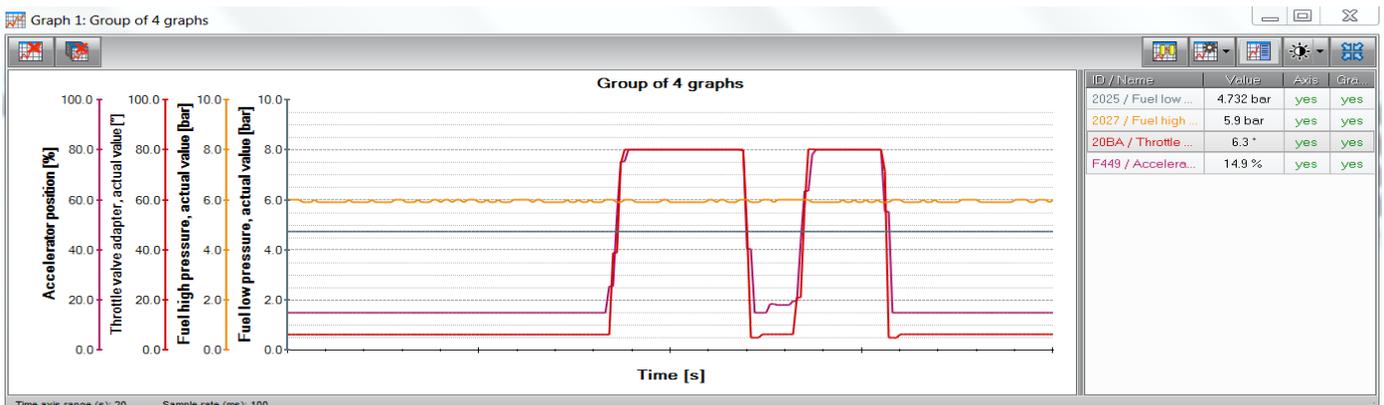
It is also advisable to activate the Cyclical Request on the right and below part of the screen. Using this option, the measured values will be every time updated and the user can check if there is any strange value.

The available values to show are different depending on the ECU that the user has selected.

ID / Label	Description
0281 / VoltaTerm...	Voltage_terminal_15_2_byte
11D6 / RVCAV	RVC_AV
16E0 / ECUSTA...	ECU_STATE
2006 / EnginOilL...	Engine oil level
2025 / FuelLowPr...	Fuel_low_pressure_actual_value
2027 / FuelHighP...	Fuel high pressure actual value
202A / BoostPress	Boost pressure
202B / EnginCool...	Engine coolant temperature cooler outlet
2037 / AirMassR...	Air mass, rated value
203E / FuelTempe	Fuel temperature
204C / FuelConsu	Fuel consumption
2055 / CoolFan1...	Cooling fan 1 rated value
20A3 / StatuOTh...	Status of the oil pressure switches
20BA / ThrotActu...	Throttle actuator actual value
2682 / CoolaShut...	Coolant shut-off valve
394F / AirFlowRa...	Air_flow_rate_at_throttle_valve
3999 / RelayElec...	Relay_electric_coolant_pump_state

Count: 33

Using the Graphics option, it is possible to show the selected values graphically. The user can add more channels in the same graphic. The user can modify the settings of the channels individually or the complete chart.





Following, the approximate standard values of the different ECUs, which can allow the user to control if any sensor or actuator are not working properly. Values may differ slightly from one car to another.

- Engine Control Module

Description	Value Eng. Not running	Value Eng. idle speed	Unit
Relay electric coolant pump state	not_activated	not_activated	-
Heating support pump commanded value	82,79	94,79	%
ECU STATE	ENG_LOCK	SYN_ENG_IGK_ON	ENG_LOCK / PWL / SYN_ENG_IGK_ON
Engine RPM	0	760	1/min
Absolute Throttle Position	15,7	12,2	%
Throttle actuator actual value	6,3	3,0	°
Throttle angle commanded value	6,3	3,0	°
Accelerator Pedal Position D	14,9	14,9	%
Air Flow Rate at Throttle Valve	0	7	kg/h
Air mass, rated value	0	10	kg/h
Barometric Pressure	100	100	kPa
Boost Pressure	1,004	1,008	bar
Boost pressure actuator adaption at limit	3,501	3,438	V
Intake Manifold Absolute Pressure	100	31	kPa
Ambient Air Temperature	25	20	°C
Intake Air Temperature	25	20	°C
Cooling fan 1 rated value	10,16	10,16	%
Engine Coolant Temperature	25	38	°C
Engine Coolant Temperature cooler outlet	25	17	°C
Engine temperature regulation actuator	99,75	99,75	%
RVC_AV	89,25	164,11	°
Coolant shut-off valve	open	open	open/close
Transmission oil cooler valve	open	open	open/close
Engine oil level	94	81	mm
Oil temperature sensor 2	25	20	°C
Status of the oil pressure switches	open	closed	open/close
Fuel/Air Commanded Equivalence Ratio	1,000	0,999	lambda
Fuel Consumption	0,00	1,2	l/h
Fuel Rail Pressure	640	4890	kPa
Fuel high pressure actual value	7,4	52,0	bar
Fuel low pressure actual value	6,63	5,04	bar
Fuel Temperature	25	20	°C
Voltage terminal 15	12,4	13,9	V



- Transmission Control Module “DSG Gearbox”

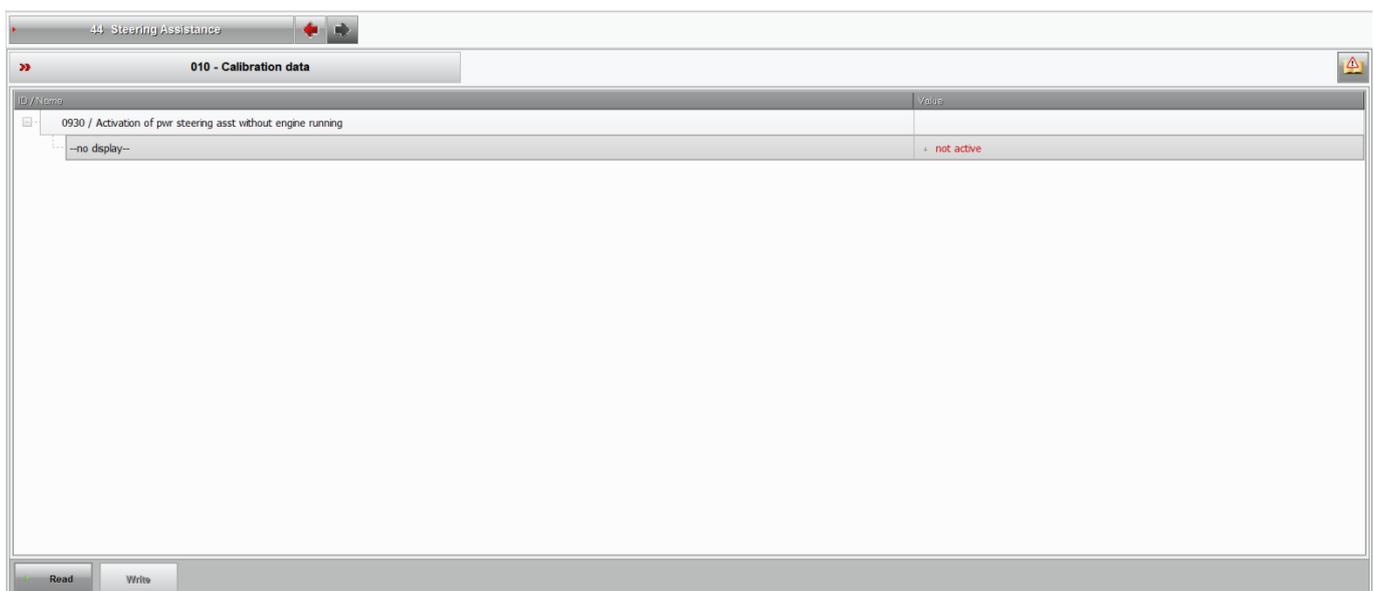
Description	P	R	N	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>
Transmission input speed	760	760	760	760	2000	2000	2000	2000	2000
Transmission input speed (RPM) shaft 1	0	600	0	760	1500	2000	1500	2000	2000
Transmission input speed (RPM) shaft 2	0	500	0	530	2000	1430	2000	1600	2000
Transmission output speed (RPM) shaft 1	0	52	0	55	210	275	380	500	580
Transmission output speed (RPM) shaft 2	0	52	0	55	210	275	380	500	580
Current of valve for clutch 1 specified value (mA)	0.0	455	0.0	455	0.0	490	0.0	490	0.0
Current of valve for clutch 1 actual value (mA)	0.3	460	0.3	460	0.7	495	0.7	495	0.8
Current of valve for clutch 2 specified value (mA)	0.0	0.0	0.0	0.0	485	0.0	485	0.0	485
Current of valve for clutch 2 actual value (mA)	0.3	0.5	0.3	0.6	490	0.6	490	0.6	490
Pressure of clutch 2, actual value (bar)	0.08	0.08	0.08	0.08	2.76	0.08	2.76	0.08	2.75
Pressure of clutch 1, actual value (bar)	0.07	2.50	0.07	2.50	0.07	2.90	0.07	2.88	0.07
Engine speed (RPM)	760	760	760	760	2000	2000	2000	2000	2000

- Lock Electronics “VAQ Differential”

Description	Value Eng. idle speed
Wheel speeds	0.0 km/h
Haldex clutch pump current	1.300 A
Haldex clutch pump PWM signal	14 %
Haldex clutch pump voltage	1.9 V
Clutch temperature	45 °C
Haldex clutch status	2.36 %

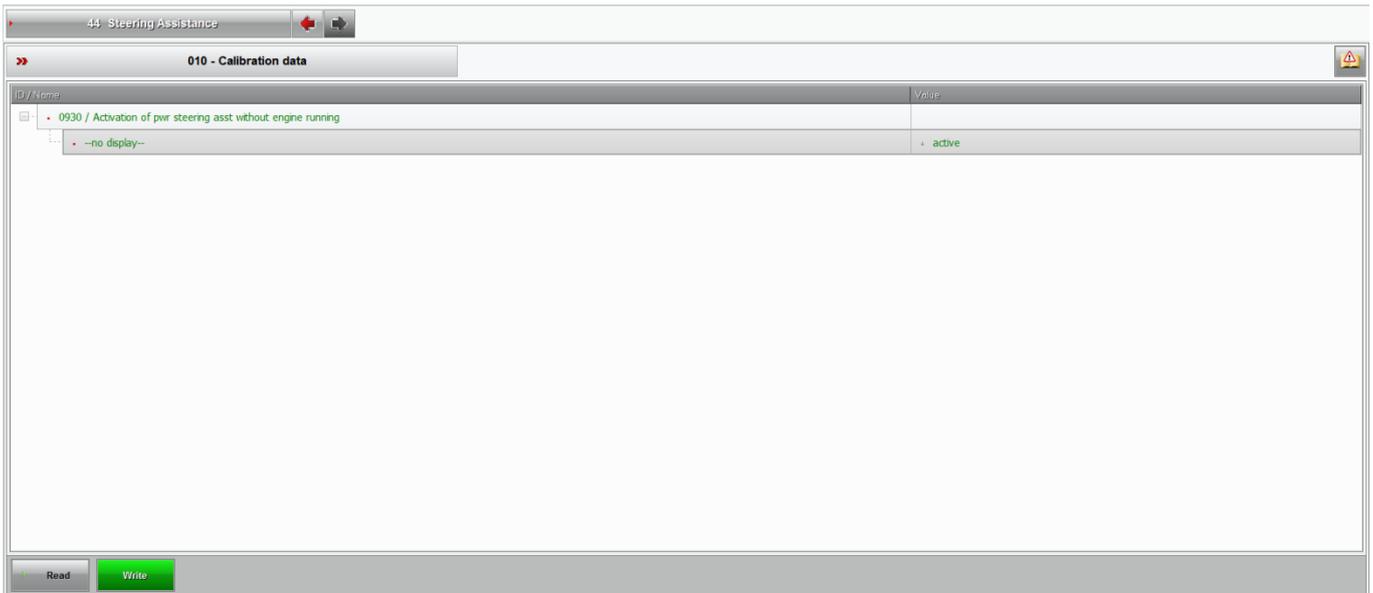
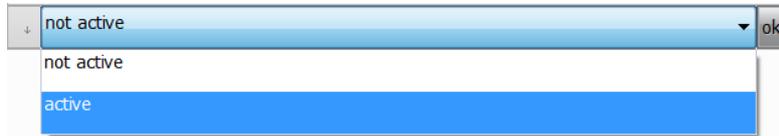
## 2.7. Calibration Data

This functionality is just shown on the *Steering Assistance* ECU and it will allow the user to activate the power steering assistance without engine running. This option cannot be always activated because the battery could be damaged. If the user forgets to switch off the function, as soon as the Main switch is turned off, it will be deactivated.



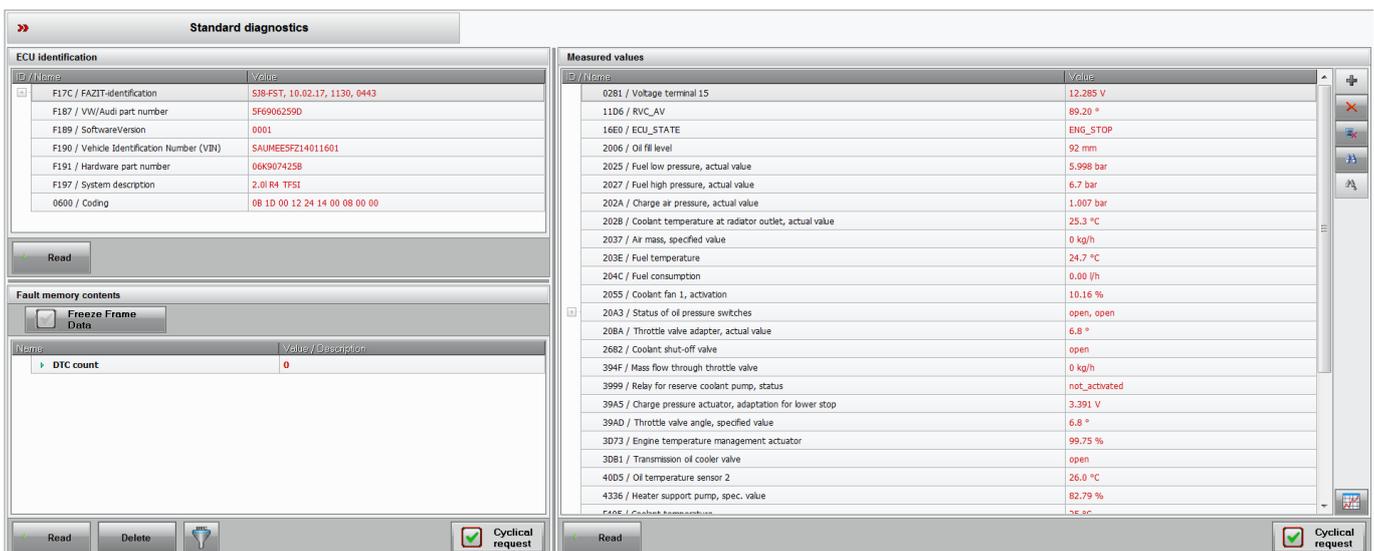


To activate the steering assistance, the user has to pick on the arrow and the drop-down button and select the Active option. Then, the Write button will turn on green and the user has to press on it. To switch off the function, the process is the same but selecting the Not Active option and Write button.



## 2.8. Standard diagnostics

Using this functionality, the user can see all the important information on an ECU on real time. The user can perform the different windows adding the measured values or filtering the fault codes in the same way as in the functionalities alone. Also, the measured values can be seen in graphics as commented before.



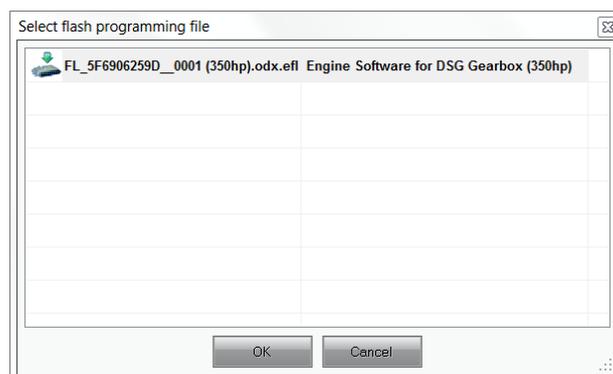
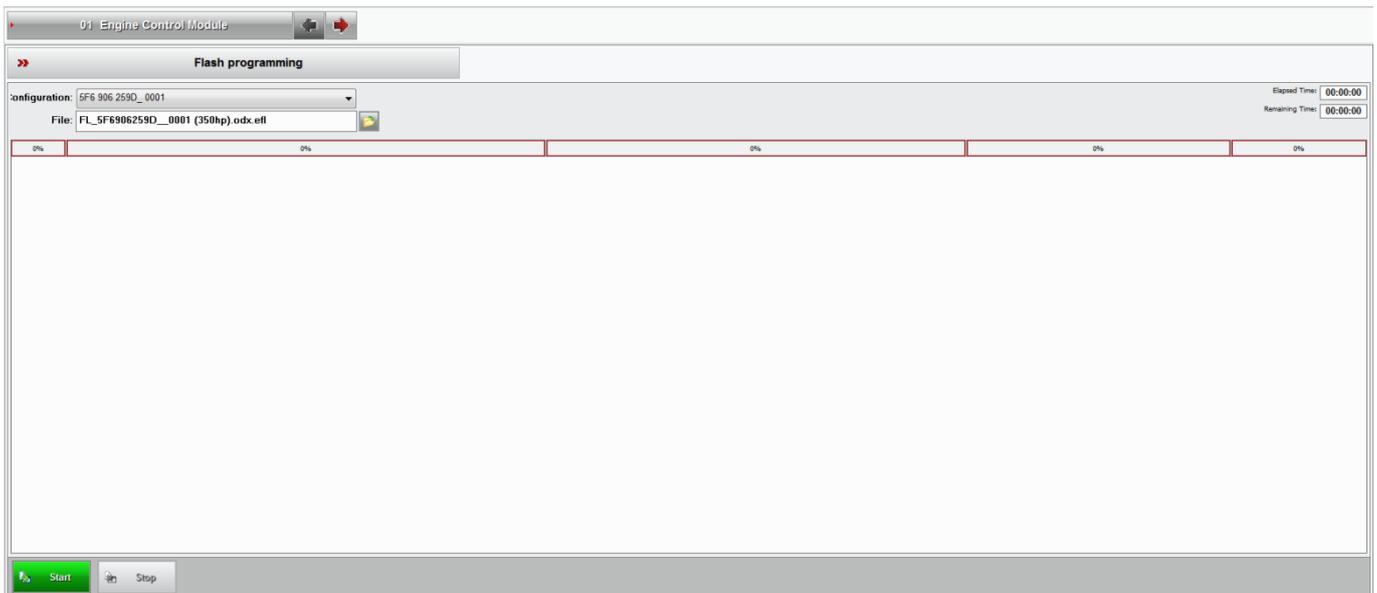


## 2.9. Flash programming

Using this functionality, the user can flash the ECUs with the last available mapping. By this reason, it is very important to have the tool updated. If there is any update of the software or the mappings, all the customers will be informed and in case that the customer had to pay for this update, a new files package will be provided to be able to update the ECU involved and just for one car. In case that the customer wanted to update more than a car, he will have to order according to the number of cars.

Depending on the type of car that is connected, the flash files could be different ones. The ECUs, that have any available flash file, will have this option open and the available mappings. The user has to push on the Configuration drop-down button and select the desirable one. Then, push on the File button and select the available one. When the user has selected everything, he has to push the green Start button. A message with the conditions will be shown on the screen and the user has to check that they are fulfilled and accept to proceed with the flash process. They will be Main Switch On, Ignition Switch On, Engine not running and in case of DSG model, Gearbox lever in P position.

Once the process has started, the different blocks will progress in green according to the percentage completed. When it is finished, a message will be shown with a successful message.





### 3. Technical issues

For technical issues related with the tool, you must contact to:

**Jose Serrano Perez**  
Technical Department  
Tel.: +34 937 733 403  
E-mail: [Jose.Serrano@seat.es](mailto:Jose.Serrano@seat.es)  
SEAT CUPRA S.A.