1. Configuring connection to interface

Currently there are three types of interfaces supported:

1. OBDKey Bluetooth/USB/ WLAN http://www.obdkey.com/vehiclediagnostics.asp. This interface is a universal one supporting all listed ECUs, both K-Line and CAN-based. An additional advantage of the interface is that a firmware upgrade can be provided by the producer if necessary.

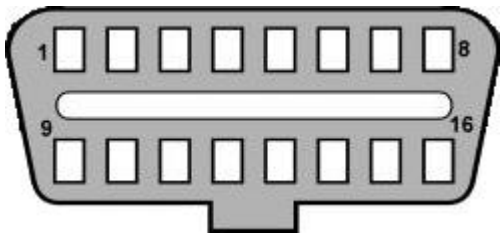
2. ELM327-based Bluetooth/USB/ WLAN interface. There are many suppliers of such interfaces, make sure the version is 1.3 and above. The interface supports all CAN and most of the K-Line units. A rule of thumb is that the K-Line units with connection baud rate less than 10400 bps is not supported. Because the quality of ELM327 clones is not stable, it is recommended to use tested interfaces (see www.alfaobd.com for details).

3. OBDLink SX/MX Bluetooth/USB https://www.scantool.net . The same limitations as the ones of ELM327 interface apply. The advantage of OBDLink is high communication rate of 115200 bps with the Android device.

Note: The interfaces have only pin 7 of the OBD plug internally connected to K-line converter. Fiat uses pin 7 for connections to engine and automatic gearbox controls only. The K lines from other units are connected to other pins of the car OBD plug. To be able to diagnose those units you need to modify your interface. A simple solution is to weld all the K line pins inside the interface together to pin 7. DO NOT CONNECT AN INTERFACE MODIFIED THIS WAY to Alfa Mito/ Giulietta, Fiat 500/500L/ Grande Punto/Punto Evo/Ducato 250 (see an explanation below)!

Alternatively, you can purchase Airbag, ABS, P/S & CAN adaptor cables at http://electronic-fuchs.de/shop/category_12/Adapter.html?shop_param=cid%3D%26 or http://www.gendan.co.uk/product_FESCBL.html , the kit is fully compatible with AlfaOBD.

The OBD plug as you see it in the car (usually to the left of the driving wheel under the cover) looks like:



Fiat typical pin out. The K-line pins are marked red:

Connection	Pin #
ABS K Line	1
BUS +	2
Airbag K Line	3
Engine ground	4
Signal ground	5
CAN +	6
Engine/Automatic gearbox K Lines	7
Code (Electronic key) K Line	8

Dashboard/Climate Control K Lines	9
BUS -	10
Alarm + Central Locking K Lines	11
K Lines engine compartment (Cruise ECU, Xenon headlamp ECU)	12
K Lines rear (Parking ECU, Tire pressure control ECU)	13
CAN -	14
L line	15
Battery + 12V	16

Older cars (approximately before 2002) use K-line diagnostic only. A mix of K-line and CAN diagnostic is used on newer cars like Alfa 159, Stilo, Delta, etc.

The newer cars have only CAN bus diagnostic (with the exception of Mito having also a K-line for xenon lights). The high-speed CAN bus or C-CAN is connected to pins 6 and 14 of the OBD plug and the low-speed CAN bus or B-CAN is connected to the pins 1 and 9 of the car OBD plug. This setup is implemented on Punto EVO, Punto 2012, Grande Punto, Doblo (263), Fiorino (225), Fiat 500/500L/500X, Alfa Mito, Alfa Giulietta, Ducato (255):

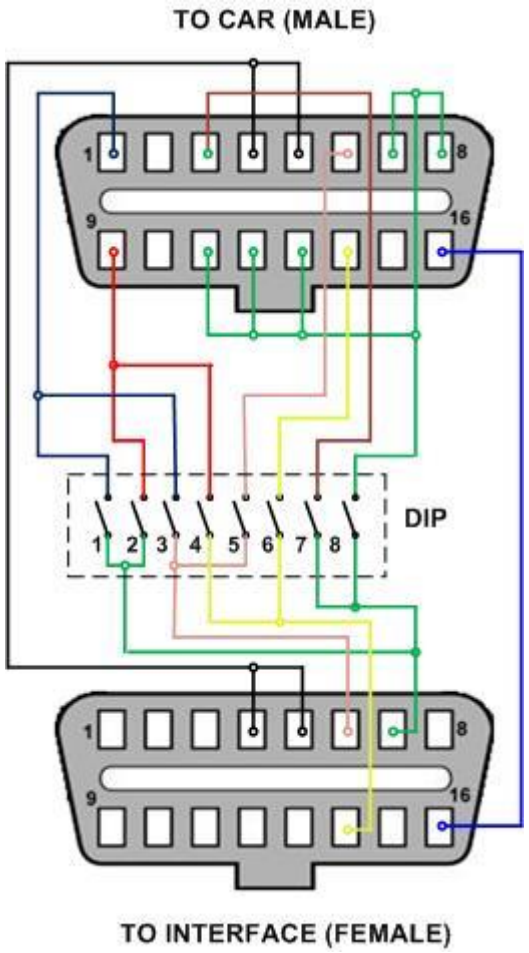
Connection	**Pin #**
B-CAN +	1
	2
	3
Engine ground	4
Signal ground	5
C-CAN +	6
	7
	8
B-CAN -	9
	10
	11
K Line engine compartment (Xenon headlamp ECU)	12
	13
C-CAN -	14
	15
Battery + 12V	16

There is one more pin out used in cars based on the new FGA CUSW architecture (examples: Fiat Viaggio, Dodge Dart), which uses different pins for the middle-speed CAN bus. The same pin out is used in Freemont and Thema (Chrysler 300):

Connection	Pin #
	1
	2
CAN Middle speed +	3
Engine ground	4
Signal ground	5
CAN High speed +	6
	7
	8
	9
	10
CAN Middle speed -	11
	12
	13
CAN High speed -	14
	15
Battery + 12V	16

By default OBDKey and ELM327 interfaces have pins 6 and 14 connected to CAN lines so they should work with most of CAN units “out of the box”. But if you have a car with the B-CAN lines connected to pins 1 and 9 or 3 and 11 you will have to modify your interface correspondingly. Alternatively, get a “Yellow” (for pins 1 and 9) or “Blue” (for pins 3 and 11) adapter from http://electronic-fuchs.de/shop/category_12/Adapter.html?shop_param=cid%3D%26 (both yellow and blue adapters) or http://www.gendan.co.uk/product_FESCBL.html (yellow adapter only)

If you do not want to make any changes to the interface itself, here is a drawing of a universal adapter cable. You will need a male and a female OBD plugs, a cable and an 8-position DIP switch. Note: this design does not include Viaggio, Dart, Freemont, Thema.



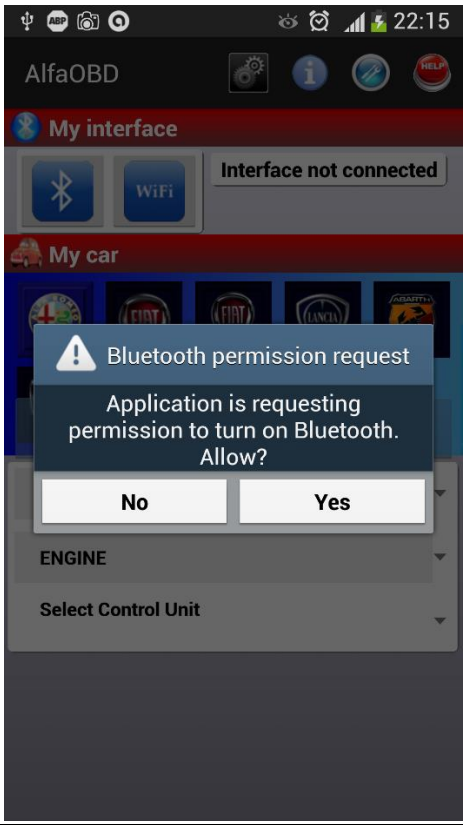
DIP switch positions:

	1	2	3	4	5	6	7	8
K-Lines on pins 1&9 (except airbag)	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF	**ON**
Airbag on K-Line pin 3	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
CAN on pins 6&14	OFF	OFF	OFF	OFF	**ON**	**ON**	OFF	OFF
CAN on pins 1&9	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF

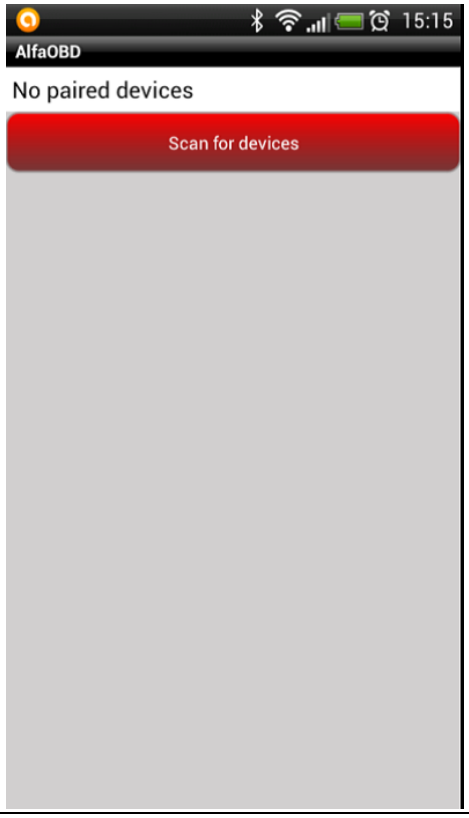
Note: The switches 1, 2 and 5, 6 can be ON together, but 3 and 4 MUST be OFF!
If 3 and 4 are ON, all other switches MUST be OFF!
Switch 7 controls connection of airbag unit to the interface K line, it is recommended to set switches 1, 2, 3, 4, 8 OFF when 7 is ON. Switches 5 and 6 can be ON or OFF.

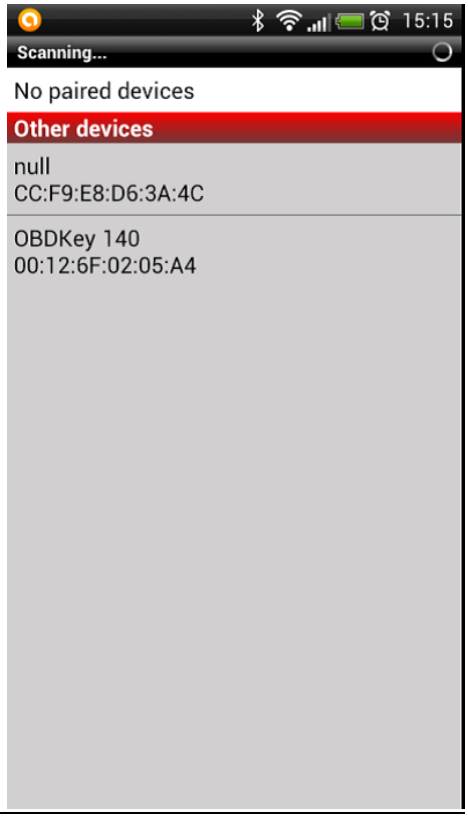
- **Using Bluetooth connection**

Push button to open configuration screen, if BT is disabled answer “Yes” to the request to enable BT:

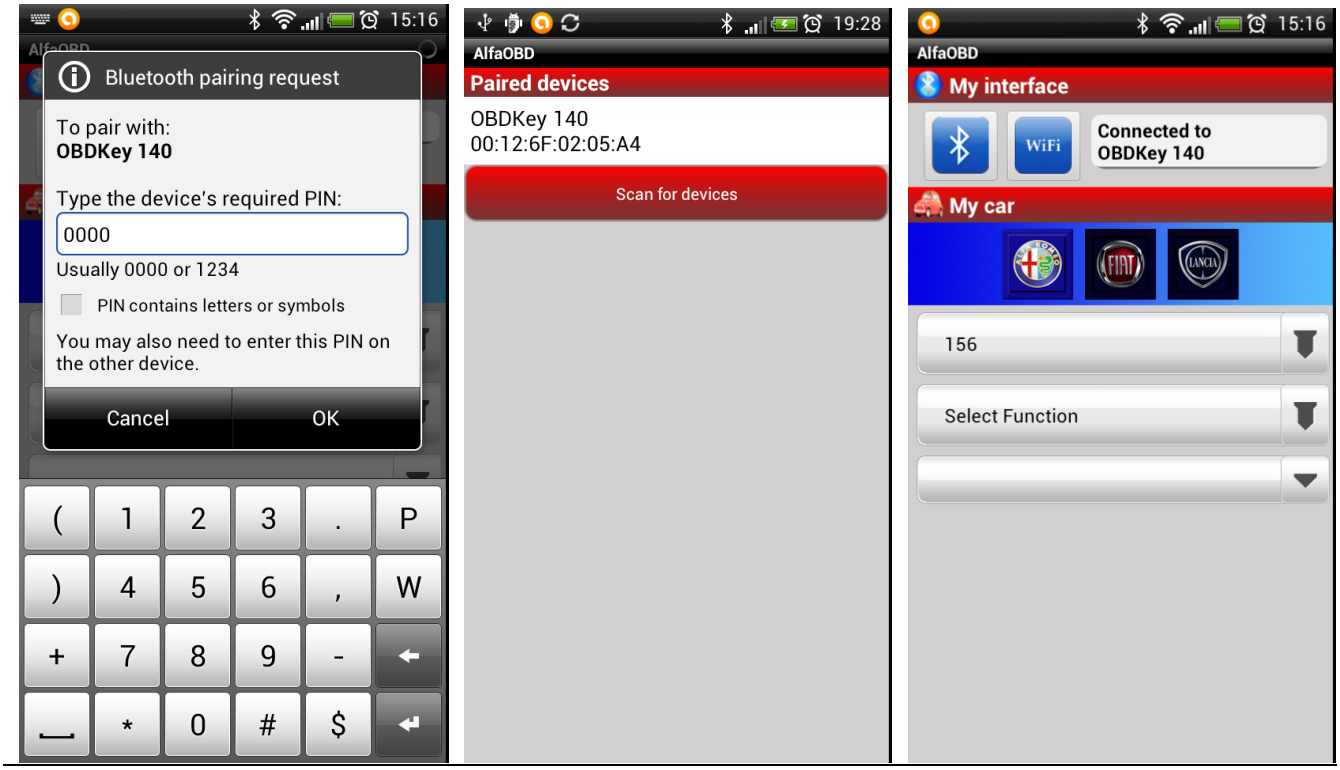


If you did not configure the BT interface beforehand, push “Scan for devices” button and wait until scanning is complete. You should see the interface in the list of discovered devices.





Complete pairing with the interface and select it in the list, AlfaOBD will return to the first screen and automatically set connection to the selected interface.



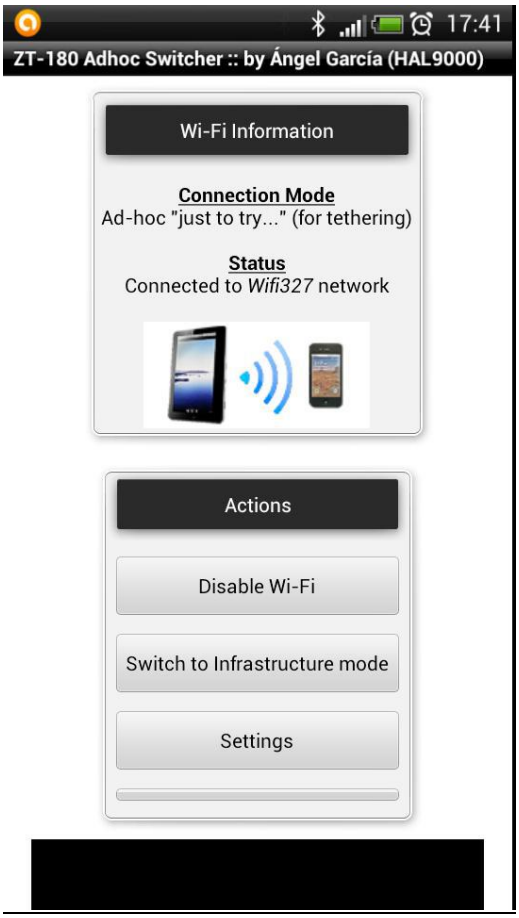
- Using WLAN

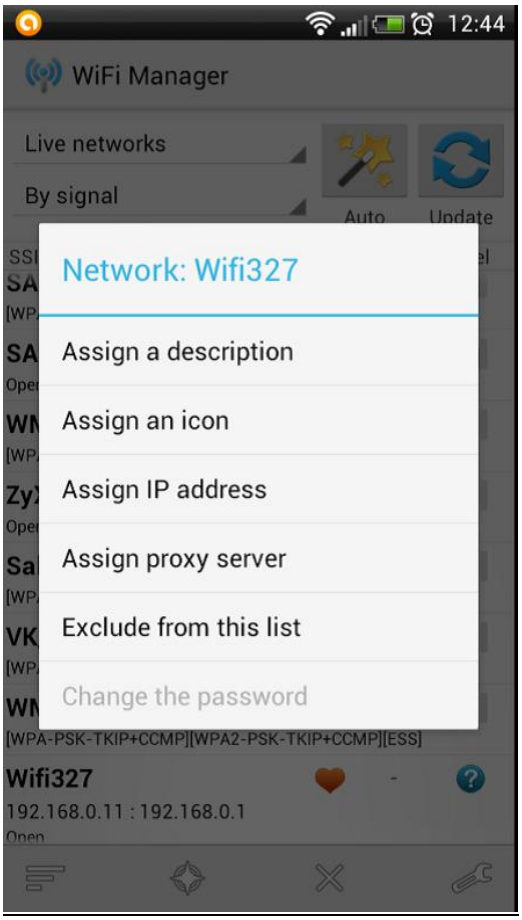
At present Android OS does not support ad-hoc WiFi network connections. This means your Android device out of the box will not "see" the WLAN interface's WiFi node. To be able to use a WLAN interface you need to:

- Get root access to your Android device
- Enable ad-hoc WiFi network connection

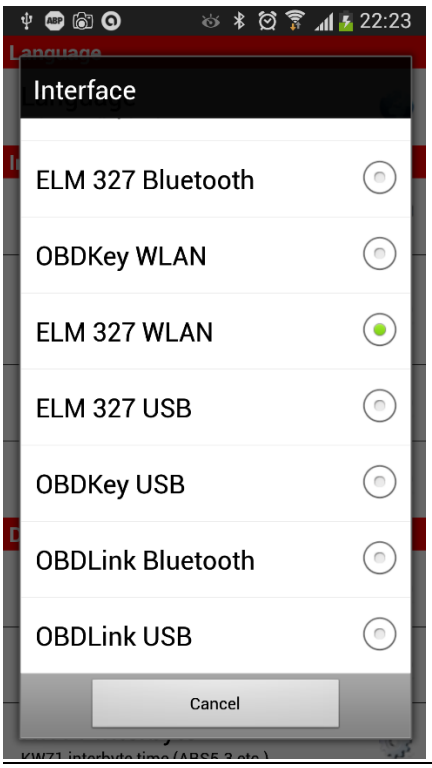
It is not possible to provide a universal guidance for these two steps because of differences in Android OS versions and Android-based devices. Search Google for guidance for your particular model.
After successfully configuring connection to the WiFi interface node you need to set a static IP address for the configured WiFi network on the Android device. The IP address has to be different from the IP address used by the interface, but it has to belong to the same network. For example if the interface IP address is 192.168.1.10 with subnet mask of 255.255.255.0, you can set IP address for the configured WiFi connection as 192.168.1.11 with the subnet 255.255.255.0. See WLAN interface manual for details on IP address and port number used by the interface.

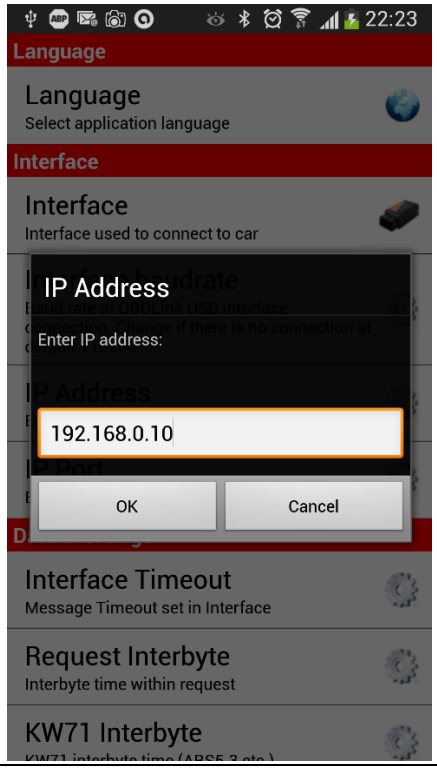
There are freely available utilities for enabling ad-hoc connections and configuring IP address of the connection. Here on the screenshots Wifi327 is the configured ad-hoc connection to WLAN interface:

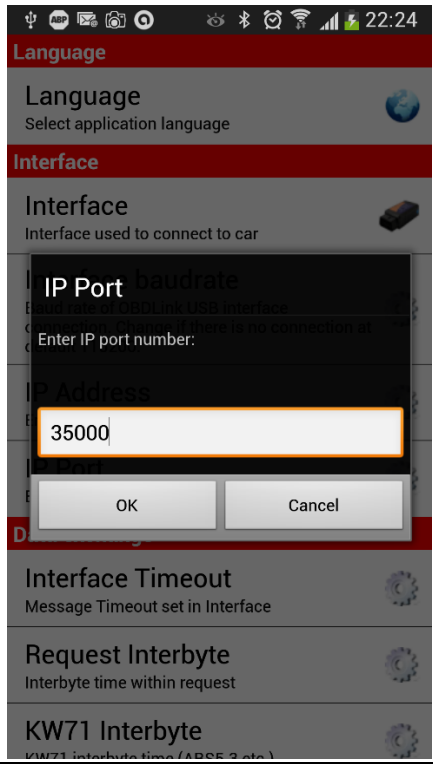




After the connection is successfully configured open Menu -> Preferences and select a corresponding WLAN interface and enter its IP address and port number:

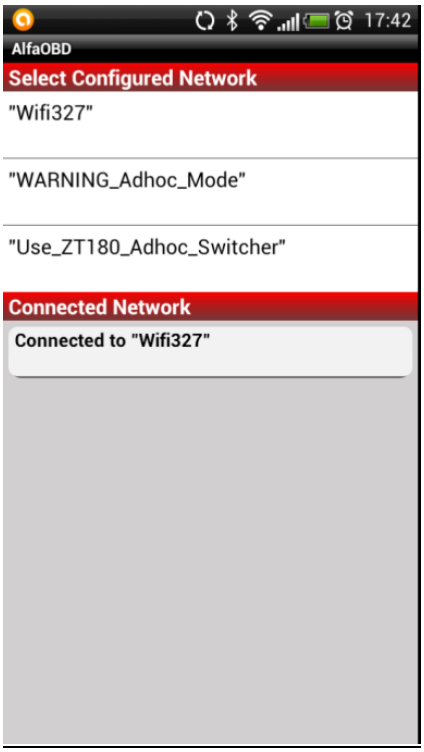




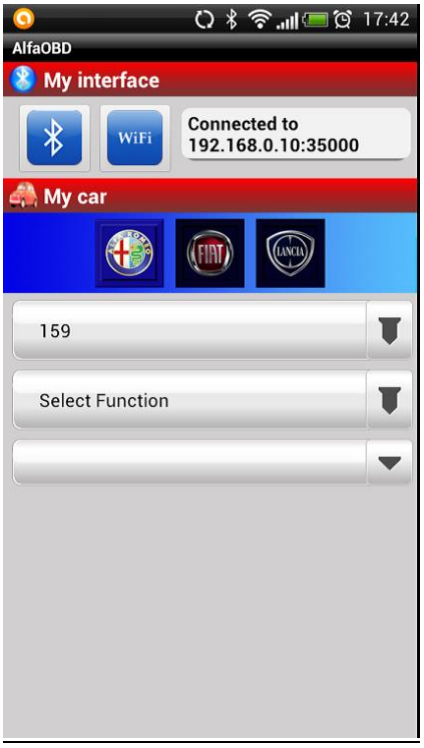


To connect to the interface start WLAN connection from the first screen. Push 

button and select configured WiFi connection:



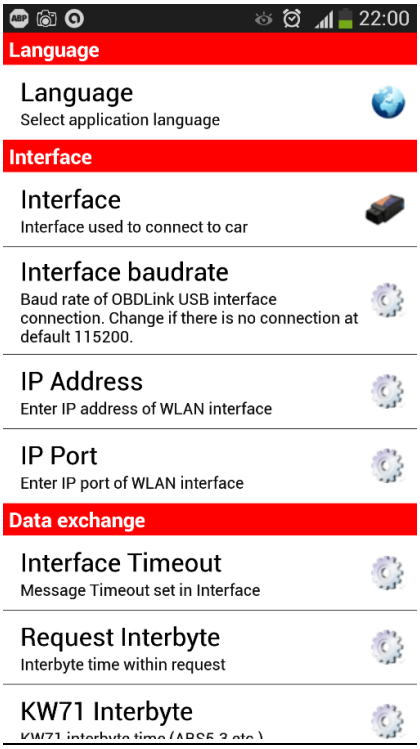
If WiFi is not enabled it will be automatically switched on. When selecting a network in the “Select configured networks” list, wait until the connection to the network is fully established. That means, for example, that even if the connected network status is “Connected”, wait until the WiFi icon in the top bar becomes white. Push “back” to return to the first screen, AlfaOBD will automatically try to connect to the WLAN interface on the selected network using configured IP address and port. If connection is successful, it is reflected in the interface status:



2. Using AlfaOBD

- Configuring Preferences

Push  to open the screen.



The OBD interface used is selected in the "Interface" list. AlfaOBD verifies the type of the interface connected during connection to a car ECU. If a wrong interface selected in the preferences, AlfaOBD can correct the selection.

"Control Unit Timeout" determines for how long AlfaOBD waits for a ECU response after sending request before timing out the connection.

“Interface Timeout” determines for how long the interface waits for additional data after receiving a part of it. In general, you should keep this parameter as low as possible to speed up communication. For the most of the ECUs the default 100 ms is OK. If after the connection has been established there is a message that it is impossible to verify the connected unit, try to increase/decrease this parameter and reconnect. Sometimes adjusting the parameter helps to improve connection stability.

"Request Interbyte" is the time between bytes in a request. The parameter is relevant for OBDKey interface only, and it is not applicable for ABS5.3 and Bosch ME3.7.1, M1.7/2.7, MA 1.7 control units. The default setting should be OK in most cases, but if the connection is unstable try to adjust this parameter.

"Inter Request time" is logically connected with the "Response-Request time". The communication between AlfaOBD and ECU is serial, that means it proceeds by series of request - response cycles. After sending a request for data or action, AlfaOBD waits for a response from the ECU. Only after receiving the response within the timeout limit, AlfaOBD can send the next request. Even if no requests for data or action is made by AlfaOBD, still it has to keep sending "Tester present" (or "Keep alive") requests, otherwise the connection will be terminated by the ECU. Typical time of complete request-response cycle is about 200 ms. So the "Response-Request" parameter determines time between the end of ECU response and the next request ("keep alive" or a request for data). Normally you can set this parameter to zero, but

sometimes to improve stability of communication it is recommended to increase the value. "Inter Request time" is the time between consecutive requests, it varies from 200 ms to 60 sec. A longer period might be of use when scanning for slow changing data, like engine coolant or passenger compartment temperature. If high Inter Request time is selected, AlfaOBD automatically sends "keep alive" messages to ECU between the requests for data to prevent communication breakdown. If total "Response-Request time" value and request-response cycle time are higher than "Inter Request" value selected, AlfaOBD built-in algorithm optimizes communication timing considering also the timeout defined in the data exchange protocol specifications.

"KW71-Interbyte" is only applicable for ABS5.3 and Bosch ME3.7.1, M1.7/2.7, MA 1.7 ECUs. The parameter is relevant for OBDKey interface only. The data exchange is different from the one described above, the communication proceeds byte-by-byte. The parameter defines the time between the moment AlfaOBD receives a byte from ECU and the moment it sends a byte to ECU. The default setting is usually fine, try to adjust it if connection is unstable.

To save the faults and system status data, check the "Log recording" checkbox. AlfaOBD will save all the data obtained in a text file which can be found in the /sdcard/Android/data/com.android.AlfaOBD/files/logs folder. The name of the file is <ECU_name>_Info.log, the file can be opened with a text editor.
Note: Only the data received after the "Log recording" checkbox has been checked is saved.

To keep the scanned data between the sessions activate “Keep session data” checkbox (see below for more information).

To store the scanned data in a csv-file check “Gauges data recording”. The file is stored as /sdcard/Android/data/com.android.AlfaOBD/files/logs/Gauges_Data.log. The data is stored in the file in the form: each line correspond to one measurement cycle, a line consists of time of the first measurement in the cycle and values of each measurement in the cycle. The data is appended to the file each time you are scanning gauges, so the file can consist of many "chapters" and it will grow large over time. To manage the gauge log use Tools screen (see below).

“Decimal separator” and “CSV separator” parameters set the relevant symbols used in the logs as decimal and csv separators. If the same symbol is selected for both decimal and csv separators, AlfaOBD will automatically adjust the symbols to be different.

"Debug Data recording" checkbox is for support and debugging purposes only, it should be checked when AlfaOBD Software needs data for troubleshooting. AlfaOBD creates AlfaOBD_Debug.bin file in the /sdcard/Android/data/com.android.AlfaOBD/files/logs folder. You are advised to send this file to AlfaOBD Software for debugging if requested. The file contains data exchange between AlfaOBD and ECU. Normally the check box should be unchecked, because recording of the debug data creates substantial overhead.

- About screen. Activating the full version (only for non-Google Play purchase).

Push  to open the screen.

There are two versions of AlfaOBD available: demo and full.
The limitations of the demo version are:
- Application run time limit of 15 minutes. Application returns to the first screen after 15 minutes of connection to a control unit.
- No active diagnostic procedures available
- The number of scanned gauges is limited by four
- The number of monitored parameters is limited by four

All other features are operational. No time limit is imposed on the application in demo mode.

Activation of the full version purchased from Google Play is automatic, just make sure your device is connected to Internet and Google Play can be connected to.

If you purchased the full version from an AlfaOBD dealer you'll need to activate it before use. Activation is device-specific. Push "Send activation request" and adjust the address in the activation mail if necessary. After receiving of an activation code paste it to the "Activation code" field and push "Activate".

- Connecting and running diagnostics

Select a make, model, function, and electronic control unit (ECU) to diagnose. **Pay attention to the notification of the adaptor you need to connect between the car OBD plug and the interface**. The needed adaptor is displayed in the ECU list. The use of the adaptor (or corresponding modification of the interface) is absolutely necessary, no connection to ECU can be done without it.
From the other side, **do not connect any adaptor if the notified adaptor is empty for the selected ECU in the ECU list**!

It is recommended to check if any adaptor is needed BEFORE establishing connection to the interface and BEFORE actually selecting ECU to diagnose (open the ECU list but do not push on the desired ECU, just check if any adaptor is suggested for it). If you need to connect an adaptor, the connection to the interface will be lost anyways because you will have to disconnect it from the car OBD plug, thus turning the interface power off.

After connecting of an adaptor (if needed) and establishing connection to the interface, select ECU to diagnose. AlfaOBD will switch to the connect screen.

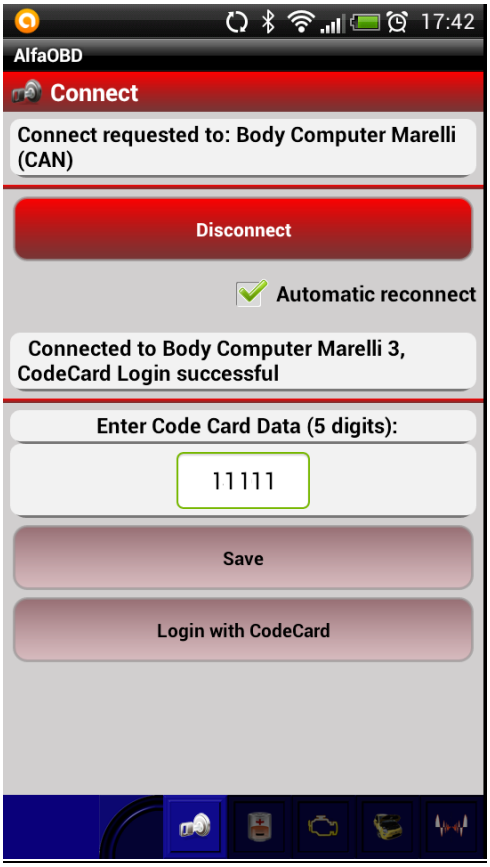
Connect screen
The name of the control unit selected for connection is displayed in the text box at the top of the screen.

Make sure that the ignition key is in MAR before activating connection. There are several exceptions to the “key in MAR” rule, some units can be also connected to with the key in Stop, see on-screen guidance.

Push “Connect” button to connect to the selected control unit.

AlfaOBD will automatically detect the type and modification of the connected ECU. Success of the connection and the name of the connected unit are reported in the status box under the “Connect” button. It can happen that the connected ECU is different from the one selected on the first screen. AlfaOBD automatically adjusts available parameters, graphs and diagnostic lists for the actually connected unit.

If connection fails, a message is displayed with the information about possible reasons of the failure.



The following connection algorithm is used by AlfaOBD:
- for a KWP2000-based ECU three attempts with "fast init" are done. If unsuccessful, the application switches to "Idle" mode and a failure message is displayed.
- for a ISO9141 or a KW71-based ECU two attempts are done with "slow init" (OBDKey only). If unsuccessful, the application switches to "Idle" mode and a failure message is displayed.
- for a CAN-based ECU three attempts are done. If unsuccessful, the application switches to "Idle" mode and a failure message is displayed.

Hint: if communication cannot be established, turn the ignition key to Stop, wait 30 sec then turn key to MAR and retry connect. Try to reset the interface by taking it out of the OBD plug and inserting it back.

If "Automatic reconnect" is active, AlfaOBD automatically tries to re-connect if communication breaks.

The status of communication is reflected in the status box. When communication has been established and the connected ECU has been verified, you can proceed with reading fault codes, running active diagnostics, or scanning sensor data at the next tabs. If AlfaOBD can not verify the connected ECU, it displays a warning message and asks whether you want to continue or terminate the connection, because the diagnostic can be unreliable or not relevant.

AlfaOBD verifies the connected ECU by the Fiat ISO code. If the ISO code is not known to AlfaOBD, you will see the warning. You have an option to continue diagnostic (with unpredictable result) or terminate the connection. Please use the option to email the unknown ISO code to AlfaOBD to include the code into the next AlfaOBD database update.

"Login with code card" is enabled for certain units only (engine control units, Body computer, Steering lock, TEG reader, Code control, Central Lock RF receiver). You have to login with Code Card when running some active diagnostic or configuration procedures on these units. Login with Code Card might be of use when, for example, there is a problem with immobilizer which prevents engine from starting. Connect to the corresponding engine control unit, enter 5-digit code from the Code Card supplied with your car and push "Login with code card". Engine control unit does not provide any information whether login is successful or not. Just try to start your car with the ignition key, but do not turn the key to Stop while starting the engine. If you turn key to Stop, login has to be repeated after turning the key to MAR.
Units other than engine ECU mostly provide information about success of the login, it is displayed by the software in the status box.
Note: the Steering lock unit (Alfa 159/Brera, Fiat Croma) accepts the login only when the key is in ‘Stop’.
Note: if your Code Card has been lost, contact your Fiat dealer for replacement.

For the Central Lock RF receiver unit you need to login with a password before running some diagnostic procedures. The password is not the same as the code from the Code Card and the password is not supplied with the car. You can try to obtain the password from your Fiat dealer. The Central Lock RF receiver does not provide any information whether login is successful or not, so AlfaOBD just displays a message about the status of the login attempt (accepted or rejected). If the entered password is incorrect, the corresponding configuration procedures will be rejected by the Central Lock RF receiver.

You can save the code and the password to enter automatically into the box. Only one code and one password can be saved. Be aware of the security risk, because the procedure of logging with code card can be used to bypass the immobilizer.

Note: Connection to the ABS5.3 control unit can be established only if the car is stationary. The ECU terminates connection when the car speed exceeds 20 km/h.

Status screen

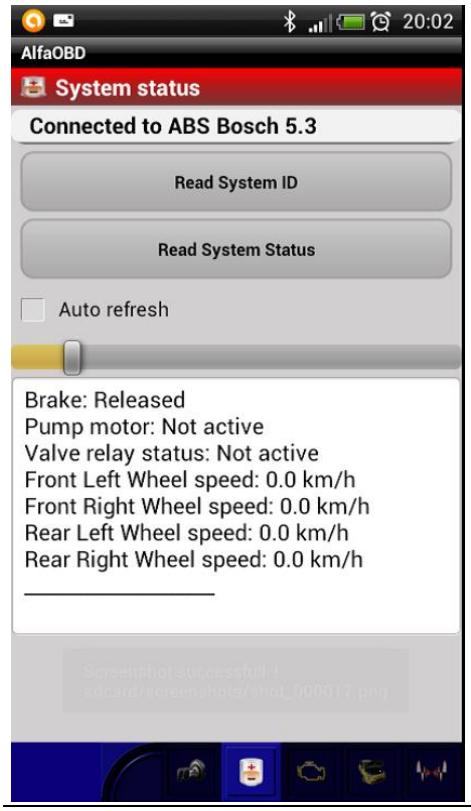
Here you can read and monitor information reported by ECU which is more-or-less "static".

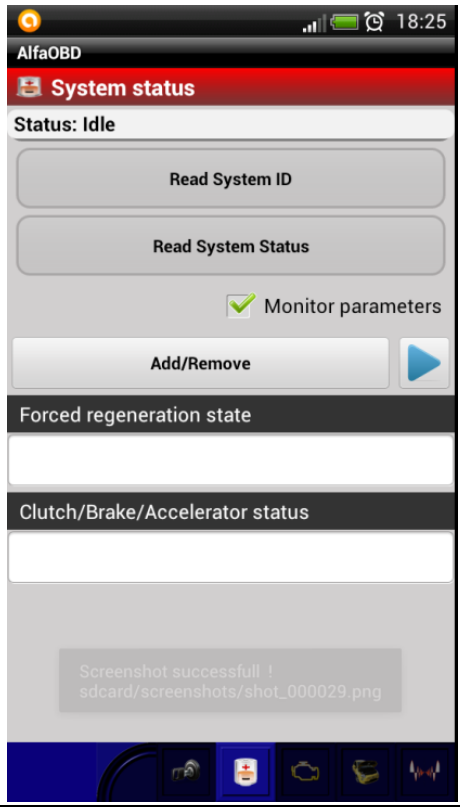
Push “Read System ID” to display control unit identification data (drawing, hardware and software numbers, ISO code, programming date etc.)

Push "Read system status" to get static information from the ECU, the information reported is ECU-type dependent.

Check “Auto refresh” check box and push "Read system status" to auto update the data displayed. The auto-update rate is controlled by the slider under the “Auto refresh” box. To stop monitoring the parameters uncheck “Auto refresh”.

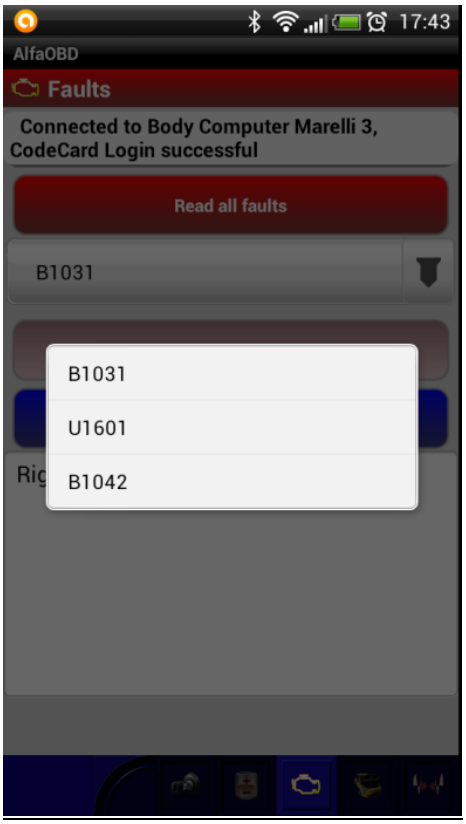
For particular ECUs it is possible to monitor selected parameters. Check “Monitor parameters” check box, select the parameters you wish to monitor and push  . To stop monitoring push  . The maximum number of selected parameters is eight in the full version and four in the demo.
Note: some parameters may not be relevant depending on the car configuration. In this case “No data” will be displayed.



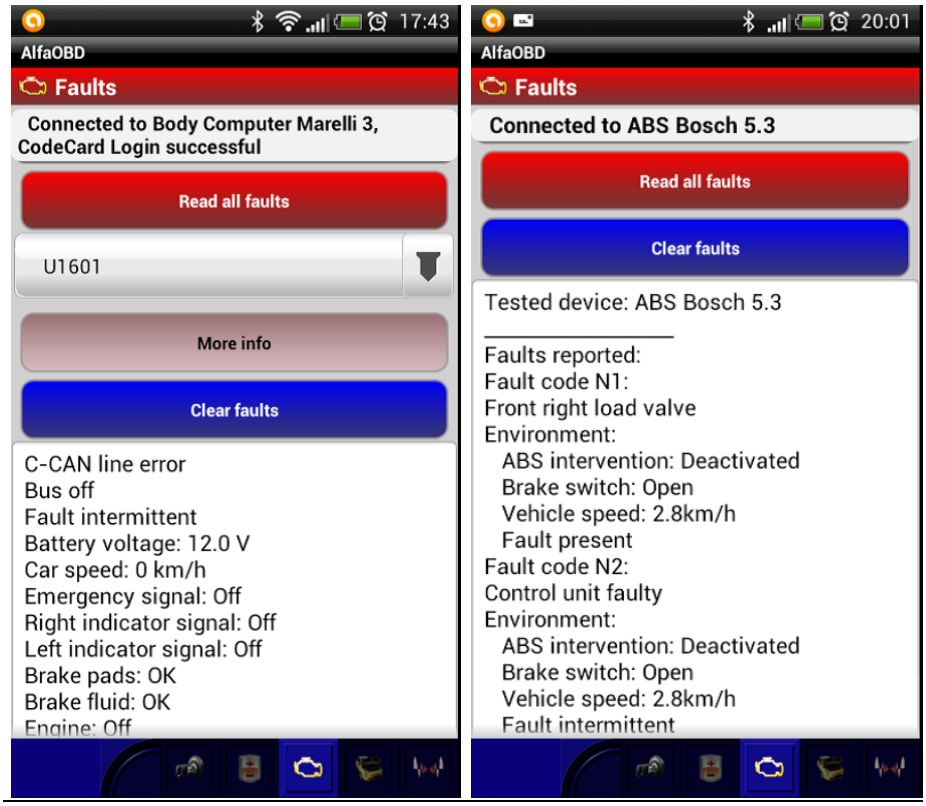


Faults screen

Push "Read All Faults" to fill the list of faults located below the button.
To view error description select the fault in the list:



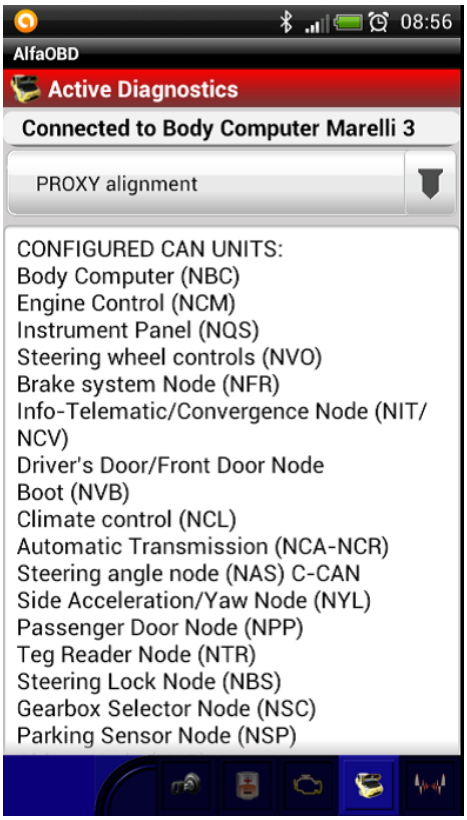
To view the environmental data accompanying the particular fault push "More info". Some units do not provide this additional data so the "More info" button is disabled.
For some units (airbags, Code Control, etc.) the list of fault codes is not displayed and all the available data is displayed in the "Fault description" window.



Push "Clear faults" to erase the stored faults. Confirm or cancel your action in the additional dialog displayed.

Active diagnostic screen

Active diagnostics of various devices installed in the car can be performed here. PLEASE READ CAREFULLY any on-screen instructions before running any procedure, some of the procedures have irreversible effect! For example, if you delete keys from the Code Unit memory, the deleted keys cannot be stored again. You will need different keys or a new (expensive, of course!) Code Unit.



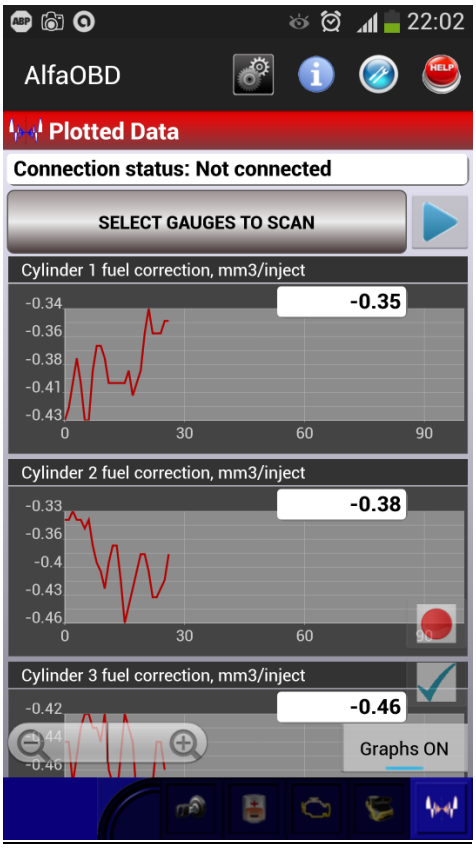
For most of the procedures it is important that engine is NOT running (but the key is in MAR), this is expected by default. For the procedures for which it is essential that the engine IS running, it is specifically noted in the on-screen guidance. Follow the on-screen instructions to perform procedures. For some of the procedures certain conditions, additional checks, steps, or data entry are necessary, just follow the guidance.

To start a procedure select it in the list and push "Start". Usually an active diagnostic procedure lasts 5 - 10 seconds and involves activation of certain devices (lamps blinking, valves and relays ticking, fans rotating etc.). You can stop the procedure by pushing "Stop". Although, some procedures once started cannot be stopped. AlfaOBD displays corresponding messages related to the procedure state.

Some procedures require certain preconditions (coolant temperature, engine rpm, etc.) to be met. In some (most important) cases AlfaOBD checks the preconditions and prevents the procedure from starting if the preconditions are not met. But in any case you should always check the preconditions yourself!

The results of the procedure is displayed by AlfaOBD on the "Active Diagnostics" screen. Sometimes you will have to switch to the "Status" or "Plots" screen to control the parameter(s) affected by the procedure just performed.

Plots screen



Here the "dynamic" data can be scanned and viewed in a graphical form. To select the gauges to monitor push “Select gauges to scan” and select the desired gauges. The sequence of the gauges displayed on the Plots screen depends on the sequence in which they are selected on the dialog displayed. This feature can be used for arrangement of the selected gauges in certain order. For example, to move a gauge to the bottom of the Plots screen push “Select gauges to scan” and uncheck and re-check the gauge. If you want to save the set of selected gauges in their arranged state, use “Save selected gauges as template” option from context menu (see below).

To start scanning the data push  . To stop scanning push  . Because the communication is serial, the more gauges are activated the longer is the period between two successive measurements for each gauge. Scan rate also depends on the "Inter Request time" parameter value. Currently the maximal number of scanned gauges is 16 in the full version and 4 in the demo.

To change the graph size push  .

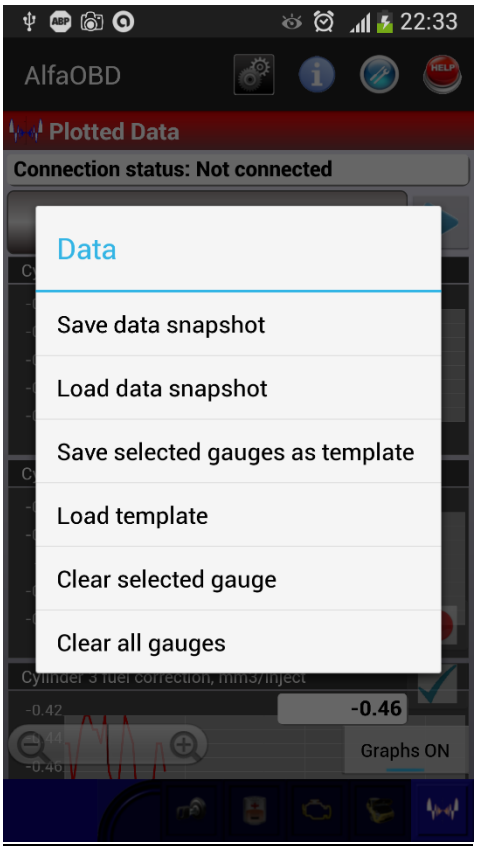
You can choose between graph and digital mode with the Graph ON/OFF button. If you turn graph display OFF, only the last acquired value is displayed for each gauge but the data is still collected and it can be displayed in the graphical mode by turning graphs back ON.

The number of last measurements stored is determined by used device screen width in pixels. Thus, the older data is deleted and only the latest one is stored and displayed. If the “Keep session data” parameter is activated in the program settings, the data is automatically saved in /sdcard/Android/data/com.android.AlfaOBD/files/Data folder to persist between the sessions.

If you want to keep all the data acquired during the session(s), activate recording of gauge log. To record gauge log push  . The symbol changes to  and flashes when the recording is active. To stop recording push  . If gauge log recording is activated in the program settings it will be started/stopped automatically with start/stop of scanning the data.

To put a bookmark in the gauge log push  . The note “bookmark” will be added to the current record in the gauge log. This can be helpful if you need to bookmark any particular event while monitoring the car performance.

Use long touch on the graphs to call a context menu to access additional options. The context menu is available when one or more graphs displayed:



To save a data snapshot permanently, select “Save data”, “Data saved” message is displayed if successful.

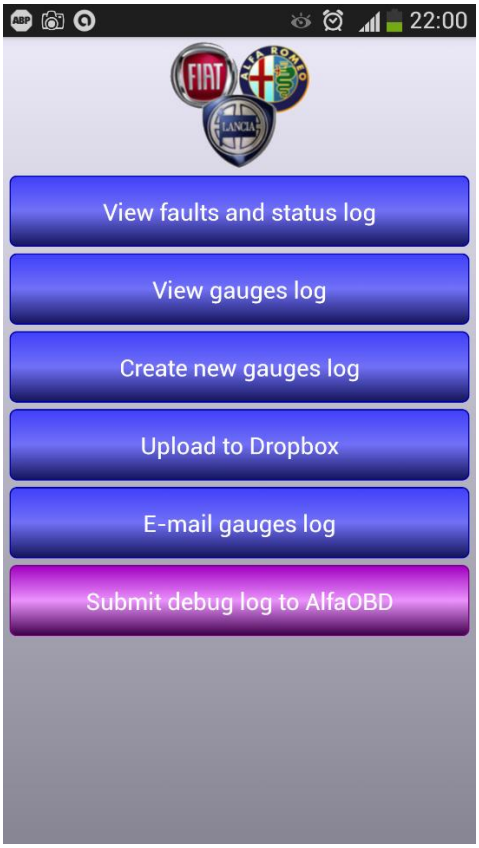
To load previously saved data, select "Load data". A dialog window is displayed with all the saved snapshots available for current ECU. The names of the snapshots reflect the date/time when the data was saved (be aware that if you are saving data collected yesterday or earlier, the snapshot name will still have today's attributes): DD.MM.YYYY_hh.mm.ss.ms, where MM - month, DD - day, YYYY - year, hh - hour, mm - minutes, ms - milliseconds. Select a snapshot from the list to load the data. Warning: current data is deleted. If you wish to keep it, save it as a snapshot before loading another set.

You can save selected gauges set as a template. No current data is saved, just the gauges and their sequence. This feature can be useful for fast switching of the monitored parameter set. Saved templates are only relevant for the particular ECU. Pushing “Load template” calls a list of all the saved templates for the particular ECU.

Tools screen

Here you can view and manage the recorded data.

Push  to open the screen.



"View faults and status log" behaves differently depending on the initial screen from which Tools screen is opened.
If Tools screen is open from the first AlfaOBD screen, a push on the "View faults and status log" displays a list of all available logs recorded earlier. Select a log to view, the log will be opened with a text editor.
If Tools screen is open from the AlfaOBD second screen, a push on the "View faults and status log" displays the log for the selected or connected ECU.

You can open gauge log for viewing with an Excel-like editor with "View gauges log".

"Create new gauges log" renames the active gauge log by adding current timestamp to the log file name. The new log is not created at this moment, it will be created the next time gauge data recording is activated. This way you can create as many gauge logs as you need to separate data recorded. All gauge logs are stored I the same folder as the active log: \sdcard\Android\data\com.android.AlfaOBD\files\logs
You can email the current gauge log or upload active gauge log or faults and status log to Dropbox. You need to select active Dropbox user account for the upload, the device has to be connected to Internet.

Submitting debug log to AlfaOBD can be helpful for solution of data exchange related problems. If you have a specific problem with the program, record debug log:
- turn on "Record debug data" in the program settings
- connect to ECU
- perform the actions causing error

Contact AlfaOBD support at info@alfaobd.com and use "Submit debug log to AlfaOBD" to send the debug data.

MEASURED PARAMETERS DESCRIPTION

ABS

ENGINE TORQUE: driving torque applied to the vehicle wheels
BRAKE CONTACT 2: position of the brake pedal determined from the secondary brake contact
LATERAL ACCELERATION: lateral acceleration of the vehicle in m/sec^2

YAW: alterations in the vehicle position

AIRBAG

Notes to the errors reported :
- Errors cannot be deleted with the data written in the crash memory
- If the error is 'Control unit - Internal errors', replace the airbag control unit
- If the error is 'Control unit – Pretensioners and Airbag impact data', replace the airbag control unit
- Replace the airbag control unit if the error is 'Control unit - Pretensioner impact data' and the 'Pretensioner intervention' parameter shows a value equal to or greater than 3, if less replace the pretensioner explosive charges
- Replace the airbag control unit if the error is 'Control unit - Side Airbag impact data' and the 'Driver's Side Airbag or Right or Left Passenger Side Airbag intervention' parameter shows a value equal to or greater than 3

AUTOMATIC GEARBOX

BRAKE SWITCH: brake pedal contact used to handle the engine speed during slow-down
CALCULATED GEARBOX OIL PRESSURE: hydraulic pressure on automatic gearbox clutches and brakes determined by the control unit
CLUTCH SOLENOID CURRENT: current in mA consumed by the clutch pressure control solenoid.
GEARBOX INPUT REVS: phonic wheel rpm at the gearbox input
GEARBOX OUTPUT REVS: phonic wheel rpm at the gearbox output
E/G SOLENOID COMMAND: ON means that E/G solenoid activation is requested
E/G SOLENOID STATUS: status of the E/G solenoid received by the automatic gearbox control unit
ENGINE TORQUE: driving torque applied to vehicle wheels
GEARBOX OIL PRESSURE: oil pressure inside the automatic transmission torque converter
GEARBOX OIL TEMPERATURE: temperature of the oil in the electro-hydraulic unit
HYDRAULIC CIRCUIT SOLENOID CURRENT: current in mA consumed by the solenoid controlling the gearbox hydraulic circuit throttle
KEY LOCK SOLENOID: can have the status 'Driven' or 'Not driven', when 'Driven' the key cannot be taken out
KICK-DOWN FUNCTION: if requested, gear speed engagement will take place at maximum engine speed and gear reduction strategy will be activated to give extra acceleration
LEVER RELEASE SOLENOID: can have the status 'Driven' or 'Not driven', when 'Driven' it permits gear lever release
LEVER SIGNAL: actual position of the gearshift lever: PA and A ON = P; A and B ON = R; B and PA ON = N; B and C ON = D
LOCK-UP SOLENOID VALVE: status of the Lock-up Solenoid valve, 'Driven' or 'Not driven'.
LOCK-UP SOLENOID CURRENT: current consumed by the lock-up clutch control solenoid in mA.
LOCK-UP SOLENOID COMMAND: ON means the request has been made to activate the Lock-up solenoid to lock the torque converter
PRESSURE REGULATORS 1 - 4: intensity of the current in the regulator, it may vary between 159 mA (regulator rest position) and 768 mA
SEQUENCE EV 1...6: status of the sequence electrovalves altering the speed ratio.
SOLENOID VALVE 1-2/3-4 COMMAND: ON means solenoid 1-2/3-4 activation has been requested
SOLENOID 1-2/3-4 STATUS: the status of the solenoid 1-2/3-4 received by the automatic gearbox control unit
TORQUE CONVERTER: it hydraulically transmits the power from the engine to the gearbox. It can be 'Closed' (lock-up clutch engaged) eliminating sliding between pump and turbine, and 'Regulated' (lock-up clutch modulated) when slipping between pump and turbine is controlled during gear changes
TORQUE TO APPLY: torque set by the electronic control unit
TORQUE REDUCTION: reduces the engine torque to a suitable level during gear changes to make the gear change smooth

CLIMATE

SUNSHINE SENSOR: thermal energy on the windscreen
TREATED TEMPERATURE 1: temperature of the air coming out of the front foot well vents
TREATED TEMPERATURE 2: temperature of the air coming out of the front, centre and side outlets

ALARM VAS97
TILT SENSOR SIGNAL: the input status of this sensor
EXTERNAL VOLUMETRIC SENSORS SIGNAL: the input status of the sensors
LAST ALARM: the cause of the last alarm indication (siren) that occurred with the system in the surveillance mode
EMERGENCY KEY ALARMS: the number of alarms caused by the cutting of the cables connecting the emergency key and the control unit when the system is in the surveillance mode
KEY IN MAR ALARMS: the number of alarms caused by the key being positioned on MAR with the system in the surveillance mode
+30 AND CABLES CUT ALARMS: the number of alarms caused by the alarm control unit power supply cables being cut when the system is in the surveillance mode
ENABLINGS MADE: the number of times the system has been enabled in the surveillance mode
VOLUMETRIC SENSORS ENABLE: shows whether the volumetric sensors have been disabled by turning the ignition key
TILT SENSOR: shows whether the tilt sensor is present in the system, or whether it is connected directly to the control unit, or located in the ceiling lamp
VOLUMETRIC SENSORS: shows whether the volumetric sensors are present in the system, or whether they are connected directly to the control unit, or located in the ceiling lamp
TILT SENSOR ENABLE: shows whether the tilt sensor has been disabled by turning the ignition key
NUMBER OF ALARMS: the number of alarms caused by the corresponding unit when the system is in the surveillance mode

DOOR LOCK VAS 97

HAZARD LIGHTS CONTROL: shows whether the blinker lights control in the receiver is activated
SYSTEM STATUS: shows whether the system is in the "alarm" or the "door lock only" configuration
RECEIVER STATUS: shows whether the receiver is virgin or has already been programmed (at least one remote control code stored)
COMMUNICATION WITH ALARM CONTROL UNIT: shows whether an alarm control unit responds to the command during the receiver configuration phase
VOLUMETRIC SENSORS: shows whether the volumetric sensors are present in the receiver
TILT SENSORS: shows whether the tilt sensor is present in the receiver

ELECTRONIC KEY CODE 2 BOSCH/MARELLI/DELPHI

KEY DELETED: the key inserted in the ignition switch has been deleted from the control unit memory and cannot be stored again
KEY FAULTY OR ABSENT: the key inserted in the ignition switch contains faulty transponder or has no transponder, or the aerial is not positioned correctly
KEY NOT STORED: the key inserted in the ignition switch has valid transponder but not stored in unit memory
KEY NOT VALID: the key inserted in the ignition switch does not have a transponder or the transponder is not valid, or the aerial is not positioned correctly on the ignition switch, or aerial is faulty
KEY STORED: the key inserted in the ignition switch is stored in the control unit and allows engine startup
NO KEY: the key inserted in the ignition switch has no transponder or the transponder is not valid, or the aerial is not positioned correctly on the ignition switch

KEY STATUS: can have the following statuses:
- *stored* - the key is recognized by the electronic key control unit and engine start-up is allowed
- *not stored* - the key is NOT recognized by the electronic key control unit and engine start-up is NOT allowed
- *not valid* - faulty transponder in the key in the ignition switch; the connection between the electronic key control unit and the aerial is faulty; the aerial is not positioned correctly on the ignition switch; the aerial is faulty
- *not available* - no data available because the key is positioned on Stop, or the keys have not been stored yet
SERIAL LINE CODE REQUEST NOT RECEIVED: the engine control unit has not made the code request. Wiring between Code Control Unit and Engine Control Unit is in open circuit or Engine Control Unit faulty.

ENGINE (PETROL)

ABSOLUTE THROTTLE VALVE POSITION: throttle valve real position
ACCELERATOR DIGITAL SIGNAL: digital decoding of the analog level of the control unit input signal
ADVANCE REDUCTION FOR KNOCK: reduction of the spark advance actuated after measuring of the knock
AIR PRESSURE CALCULATED: air pressure in the intake manifold calculated basing on the engine revs and throttle angle data
AIR FLOW METER VOLTAGE: air flow meter voltage in Volts.
AIR FLOW RATE: amount of air consumed by the engine
AIR FLOW - THROTTLE CLOSED: the air flow through the air flow meter when the throttle is closed
ATMOSPHERIC PRESSURE: the atmospheric pressure read by the pressure sensor
CLIMATE CONTROL IDLE OPENING: the value of the throttle opening at idle due to engine self-adaptation with the climate control operating
COIL CHARGE TIME: the time setting made by the control unit (in milliseconds), which is necessary to charge the high tension coils in relation to the variations in the engine parameters when moving.
CRUISE SWITCH: can be 'On' or 'Off', when 'On' the cruise speed set by the driver will be maintained automatically
CRUISE RESTORE BUTTON (RCL): when pressed it will return the vehicle to the last speed stored by the Cruise Control
CONDITIONER ACTIVATION REQUEST: the conditioner compressor activation request
CUT-OFF STATUS: shows whether Cut-off is in progress
DTV FACTOR 1 and 2: addition factor to correct the amount of petrol injected. Compensates for the production tolerances in the air flow meter/lambda sensor/injectors when the engine is idling
ENGINE LOAD ms: basic injection time (without corrections relating to temperature and engine parameters)
ENGINE LOAD %: the quantity of air in the cylinders in relation to maximum filling (unitary displacement) given in percentage; it is calculated on the basis of the signal coming from the air flow meter (kg/h of air) and the engine revs signal. The parameter is only relevant when the engine is running.
EVAPORATION CONTROL VALVE: can be 'Active' or 'Not active'. When 'Active' can recover the hydrocarbon vapors emitted by the tank
EVAPORATION CONTROL VALVE OPENING: percentage of the evaporation control valve opening
FRA SELF-ADAPTION PARAMETER: self-adaption level of the control unit shown as a percentage of the injection time
FUEL PRESSURE CALCULATED: the pressure calculated for the high pressure circuit by the control unit
FUEL PRESSURE MEASURED: the pressure read inside the high pressure circuit
FUEL PRESSURE SENSOR VOLTAGE: the voltage on the fuel pressure sensor in the high pressure circuit read by the control unit (about 0.49 Volt at 0 bar, 4.50 Volt at 140 bar)
IDLE POSITION LEARNT: position of the throttle potentiometer recognized by the control unit as 'IDLE' .
IDLE ADJUSTMENT: 'ACTIVE' means the throttle is fully closed and the idle step motor has to be driven by the control unit
IDLE CONTROL LOWER LIMIT: lower limit value recognized by the control unit as the idle opening minimum

IDLE CONTROL SELF-ADAPTION: throttle opening value caused by the engine self-adaption
IDLE RECOGNITION TEST: automatic calibration operation of the idle actuator performed by the control unit
IDLE RECOGNITION SIGNALS: synchronization between the two tracks of the idle actuator potentiometer
INJECTION TIME: injector or injectors opening time
INTAKE PRESSURE: the pressure in the intake manifold
IRREV. CRUISE ERROR STATUS: lists the causes of the cruise inhibition. To re-enable the cruise function turn the key to 'stop', wait 30 sec, turn key to MAR and enable the cruise function
LAMBDA SENSOR 1 UPSTREAM: lambda sensor can have the following statuses:
- *open loop* (for example with key ON, or in CUT-OFF)
- *closed loop* (operating at idle or choked)
- *semi-closed loop* (operating in the transients or at full load)
LAMBDA 1 UPSTREAM/DOWNSTREAM DIAGNOSIS: the lambda sensor diagnosis can have the following statuses:
- *sensor not operating* (e.g. at key ON)
- *lean* (at normal operation in cut-off or the sensor is in open circuit or grounded)
- *rich* (at normal operation or the sensor is in short circuit to the '+' battery)
- *abnormally lean* (the sensor is in open circuit or grounded and the sensor status is OPEN LOOOP)
- *abnormally rich* (the sensor is in short circuit to '+' battery and the sensor status is OPEN LOOP)
LAMBDA SENSOR CONTROL: shows whether the minimum and maximum signal voltage of the lambda sensor(s) upstream of the catalyser are within the pre-determined limits
LAMBDA SENSOR CORRECTION: the percentage of the injection time correction to keep the strength at the correct level
LAMBDA SENSOR HEATER: operating status of the lambda sensor heater
LAMBDA SENSOR INTEGRATOR: correction to the amount of fuel made by the control unit to obtain the correct air/fuel ratio.
LAMBDA SENSOR STATUS: shows whether the sensor is working (closed loop) or not (open loop)
LAMBDA SENSOR VOLTAGE: voltage applied to the lambda heater to keep the sensor at the temperature of about 780C. The voltage range is 0 to 12 Volts and it varies to keep the sensor temperature
LAMBDA THRESHOLD: shows whether the mixture strength is rich or lean
MAX SPEED TIME COUNTER: total time in seconds the engine has been run at maximal speed
MINIMUM THROTTLE LIMIT: lower limit value recognized by the control unit as the minimum one
MIXTURE PREPARATION MODE: the engine can run in two mixture modes:
- Homogeneous. There is stoichiometric air/petrol mixture in the cylinder at the moment of ignition (14.6), which homogenously surrounds the spark plug.
- Stratified. There is rich mixture near the spark plug electrodes which becomes increasingly leaner when measured from the centre to the edge of the combustion chamber. The charge (air/petrol ratio between 17.5 and 21.5) is stratified by injecting the fuel during the compression stroke with the valves closed. The stratified mixture preparation mode is used at idle and below 1200 rpm under low engine load, and it is advantageous in terms of consumption and combustion stability. The change from homogenous to stratified mode can only be made if the engine coolant temperature is >-10C and 5-25 sec after startup. If startup takes place when the engine coolant temperature is between 15 and 30C (emissions test), the engine works in the homogeneous mode for about 60 sec. The stoichiometric combustion ensures more rapid and efficient warm-up of the catalytic body
OIL PRESSURE SWITCH: 'ON' means that the oil pressure sufficient for engine operation has been reached
OVERBOOST PRESSURE MEASURED: the pressure measured in the overboost circuit
PHASE VARIATOR: operating status of the phase variator
PHONIC WHEEL LEARNING: shows whether the phonic wheel learning is in progress, has been performed, or whether the engine is off
PRESSURE REGULATOR OPENING: the percentage of the fuel pressure regulator opening relating to the high pressure circuit
PRESSURE SWITCH (TRINARY): shows activation of the air conditioner pressure switch activating the fan (or fans) at speed 1
PRESSURE SWITCH (QUADRINARY): shows activation of the air conditioner pressure switch activating the

fan (or fans) at speed 2
QUADRINARY 1st LEVEL: shows activation of the air conditioner pressure switch that activates the fans at the 1st speed
QUADRINARY 2nd LEVEL: shows activation of the air conditioner pressure switch that activates the fans at the 2nd speed
RECOVERY (THROTTLE ERROR): shows whether recovery resulting from a throttle error is in progress, and specifies whether it is a torque limiting or a rev limiting recovery, or whether the DCMOTOR (motorized throttle) is off
RELATIVE THROTTLE VALVE POSITION: throttle valve position minus the basic (minimum) opening value
SET CRUISE ACCELER.(+): can be 'Requested' or 'Not requested', when 'Requested' the vehicle speed set in the Cruise Control can be increased
SET CRUISE DECELER.(-): can be 'Requested' or 'Not requested', when 'Requested' the vehicle speed set in the Cruise Control can be decreased
SPARK ADVANCE: advance value assigned by the control unit without considering the value of precise mechanical fitting
STRENGTH ADAPTATION: strength adaptation percentage relatively to the engine coolant temperature.
SYNCHRONISATION STATUS: when the key is turned from 'off' to 'on' the 'initialization' status is maintained shortly, then it changes to the 'awaiting revs' and eventually to the 'awaiting revs/timing' (no crank); if the engine is started correctly the status is synchronized engine
TARGET OVERBOOST PRESSURE: the overboost pressure calculated by the control unit
TARGET IDLE SPEED: theoretical value set by the control unit for the idle rpm
THEORETICAL LAMBDA TEMPERATURE: temperature of the lambda sensor calculated by the control unit
THROTTLE ANGLE: angular position of the motorized throttle
THROTTLE LEARN: with 'Activated' or 'Deactivated' it shows whether the motorized throttle lower limit has been learned or not. 'In progress' or 'Not active' shows whether the system is performing self-learning
THROTTLE LEARN PHASE: stage reached in the throttle lower limit value learning procedure. The value varies between 0 and 3 with the new control unit, and the value varies between 3 and 9 if the lower limit has already been learnt
THROTTLE LEARNING RESULTS: shows whether the self-learning of the lower limit of the motorized throttle has been completed correctly
THROTTLE LEARN INHIBIT: shows whether the self-learning of the lower limit of the motorized throttle is inhibited
THROTTLE LEARN STAGE: shows the stage reached by the throttle lower limit value learn procedure. The value varies between 0 and 11 for the new control unit. If the lower limit has already been learnt this value is between 3 and 11.
THROTTLE LEARN STORAGE: shows whether the self-learning of the lower limit of the motorized throttle has been stored
THROTTLE LOWER LIMIT SELF-LEARN: stage reached in the throttle opening lower limit learning procedure
THROTTLE POSITION TRACK 1: percentage value of the motorized throttle signal track 1
THROTTLE OPENING IDLE: shows whether the control unit has recognized the idle position correctly
THROTTLE POSITION TRACK 1: percentage value of the motorized throttle signal track 1
THROTTLE POSITION TRACK 2: percentage value of the motorized throttle signal track 2
THROTTLE VALVE POSITION: angular position of the throttle valve
TARGET THROTTLE POSITION (CRUISE): the position the throttle has to keep to maintain the speed set by the cruise control
TARGET THROTTLE OPENING: value of the throttle opening referred by the control unit for correct engine management
TRA SELF-ADAPTION PARAMETER: injection time of self-adaption level of the control unit in microseconds
TURBO ACTUATOR CONTROL: value in % of the duty cycle of the waste gate valve control

WATER TEMPERATURE RECOVERY: default value used by the control unit if the coolant temperature sensor is faulty

ENGINE (DIESEL)

AD/C ACCELERATOR POSITION 1: the voltage read on track 1 of the accelerator potentiometer
AD/C ACCELERATOR POSITION 2: the voltage read on track 2 of the accelerator potentiometer
AD/C AIR FLOW METER VOLTAGE: the voltage read directly on the sensor
AD/C AIR MASS: the voltage on the air mass meter (air flow meter)
AD/C BATTERY VOLTAGE: battery voltage read directly on the control unit power supply
AD/C DIESEL PRESSURE: the voltage read directly on the sensor
AD/C DIESEL TEMPERATURE: the voltage read directly on the diesel temperature sensor
AD/C THROTTLE POSITION: throttle position read directly on the sensor
AD/C OVERBOOST PRESSURE: the voltage read directly on the sensor
AD/C WATER TEMPERATURE: the voltage read directly on the water temperature sensor
AIR CONTROL INHIBIT: the causes for the air control inhibition by the EGR (Exhaust Gas Recirculation)
AIR MASS MEASURED: amount of air measured by the air flow meter
AIR TEMPERATURE: the temperature of the air taken into the intake manifold
AIR TEMPERATURE (AIR FLOW METER): the air temperature measured by the digital air flow meter
AIR TEMPERATURE (TURBO): the air temperature read inside the turbo sensor
ASYNCHRONOUS INJECTION: injection occurs without considering the top dead centre synchronization
AVERAGE DISTANCE BETWEEN LAST REGENERATIONS: the average distance travelled by the vehicle between consecutive DPF regenerations
AVERAGE DURATION OF LAST REGENERATIONS: the average time spent for the last regenerations of the particulate filter
AVERAGE TEMPERATURE OF LAST REGENERATIONS: the average temperature of the last regenerations of the particulate filter
BRAKE BOOSTER VACCUUM SWITCH: the state of the brake booster vacuum contact used to manage the Stop&Start to ensure safe vehicle braking (CLOSED: 470mbar, OPEN 300mbar)
BRAKE CONTACT 2: the position of the brake pedal picked up from the secondary brake contact
CALCULATED ADVANCE: diesel injection advance with respect to the top dead centre calculated by the control unit on the basis of the available information acquired
CAPACITOR 1 VOLTAGE: charge voltage of capacitor 1 driving the injectors
CAPACITOR 2 VOLTAGE: charge voltage of capacitor 2 driving the injectors
CLUTCH PEDAL EXTENDED: 'PRESSED' means that the clutch pedal has reached the end of stroke
CONDITIONER ACTIVATION REQUEST: the conditioner compressor activation request
CONDITIONER RELAY COMMAND: the status of the conditioner relay command coming from the control unit
CRUISE SWITCH: can be 'On' or 'Off', when 'On' the cruise speed set by the driver is maintained automatically
CYLINDER 1/2/3/4 INJECTOR CODES: codes written in EEPROM. They are obtained at the factory by testing at specific operating points related to particular conditions of fuel pressure and injection time
DIESEL PRESSURE MEASURED: pressure read inside the diesel high pressure circuit
DIESEL QUANTITY: main quantity of diesel injected for the engine load (the quantities relating to the pilot injector phase and the pre-main injection phase are not included)
DIFFERENTIAL SENSOR PRESSURE: the value of the pressure (in bar) in the particulate filter obtained by the corresponding sensor
DISTANCE NEXT 'OIL CHANGE': the distance in kilometers to travel till the next oil change
EGR EXCHANGER CUT-OUT VALVE: when ACTIVE it facilitates the engine warm-up as it prevents recirculation of exhaust gases in the intercooler
EGR MEASURED POSITION: the position assumed by the EGR (Exhaust Gas Recirculation) compared to the

EGR TARGET POSITION. The parameters tend to follow each other, i.e. they should have similar values
EGR TARGET POSITION: the value the EGR actuator must take calculated on the basis of the engine conditions, i.e. the opening/closing position to obtain lesser or greater recirculation of the exhaust gases
EGR THROTTLE OPENING: throttle control voltage in %
EGR VALVE LEARN: 'ENABLED' means that there are no errors in the EGR system and the learn procedure will be carried out during the Power latch at the next Key-OFF. If 'DISABLED' the conditions for proceeding with the learn procedure do not exist as errors could be present in the EGR system
EGR VALVE OPENING: percentage with which the EGR valve is operated
FLOW CHOKE OPENING: the closing percentage of the intake valves (SWIRL)
FUEL CORRECTION CYLINDER 1/2/3/4/5: once any engine malfunctioning has been corrected it indicates the amount of fuel added/removed to/from each injector to make the various cylinder behave in the same way
FUEL CONSUMPTION: gives the calculated consumption in l/100 km or l/hour
FUEL PUMP RELAY CONTROL: the status of the diesel low pressure fuel pump relay control
GLOW PLUG PREHEATING: 'ACTIVE' means the glow plugs are controlled with the preheating control unit
INJECTION ADVANCE: angular advance of the injector measured by the sensor
INJECTION ADVANCE CORRECTION: correction to the injection advance value set by the control unit
INJECTION PUMP POTENTIOMETER: voltage measured on the accelerator potentiometer in Volts
INJECTION TIME CORRECTION: correction made by the control unit to the basic injection time calculation
IRREV. CRUISE ERROR STATUS: lists all the causes for the cruise function inhibition. To re-enable the cruise function, turn the key to stop, wait 30 sec, turn it to MAR and enable the cruise function
KM WITH WATER TEMPERATURE WARNING LAMP ON: the total distance travelled since the water temperature warning lamp has been lit up
KM WITH WATER IN DIESEL WARNING LAMP ON: the total distance travelled since the Water in diesel warning lamp has been lit up
LAMBDA OXYGEN CONCENTRATION: the value of the lambda sensor strength, ranges between 0% and 21%
LAST DPF REPLACEMENT ODOMETER: distance in km travelled since the last replacement of the particulate filter. When the 'particulate filter replacement' procedure has been performed this parameter is set to 0 km. If the engine control unit has been replaced the contents of the parameter are updated with the same value as the LAST ECU REPLACEMENT ODOMETER parameter
LAST ECU REPLACEMENT ODOMETER: distance in km travelled by the vehicle. If the engine control unit is being replaced the parameter is manually set with the corresponding configuration procedure, and it is being updated from that moment on. To find out the km when the engine control unit was replaced calculate the difference between this parameter and the Odometer parameter
LAST OIL CHANGE ODOMETER: the odometer value when the oil change procedure has been performed. At the end of the procedure the number of km travelled by the vehicle is copied into this parameter with the help of corresponding diagnostic procedure. The value must only be updated after the next procedure is performed
LAST OVERREV ODOMETER: the odometer value when over-revving occurs. This value is overwritten when over-revving occurs again and it always gives the odometer value relating to the last over-revving. It is stored in the EEPROM memory and it is handled the same way as the other parameters relating to over-revving.
LAST REGENERATION ODOMETER: this parameter indicates the number of km travelled since the last particulate filter regeneration (forced and/or spontaneous) and it is set to zero at the end of the last regeneration completed successfully (spontaneous and/or automatic) or when the particulate filter is replaced. If the engine control unit is replaced the contents of the parameter are updated with the same value as the LAST ECU REPLACEMENT ODOMETER.
MAIN INJECTION ADVANCE: degrees of advance with respect to the top dead centre at which the amount of diesel calculated to keep the needed engine load is injected
MAIN INJECTION START: shows the advance (in degrees) with respect to the top dead centre with which the amount of diesel calculated for the engine load is injected
MAIN INJECTION TIME: shows the opening time of the injectors according to the amount of diesel calculated for the engine load
MAX SPEED TIME COUNTER: total time in seconds the engine has been run at maximal speed

NUMBER OF REGENERATIONS INTERRUPTED BY KEY-OFF: shows the number of consecutive particulate filter regenerations interrupted by the driver with engine switch-off
NUMBER PROGRAMMINGS: the number of times the control unit has been programmed
NUMBER REGENERATIONS SINCE LAST OIL CHANGE: the overall number of particulate filter regenerations activated by high flow resistance since last oil change
ODOMETER AT LAST PROGRAMMING: mileage in km when control unit has been programmed the last time
'OIL CHANGE' PROCEDURES NUMBER: increased by one every time the relative oil change procedure is performed
OIL CHANGE REQUEST ODOMETER: the odometer value at the oil change request done with the corresponding diagnostic procedure
OIL DEGRADATION INDICATOR: shows how long the engine oil will last. 100% means that the oil change procedure has been just carried out. This value decreases with the distance travelled by the vehicle, particulate filter regenerations, etc.
OVERBOOST ADJUSTMENT INHIBIT: recovery values set by the control unit in case the over-boost pressure control is inhibited
OVERBOOST COUNTER: refers to the time in overpressure on values that are too high. Minimum and maximum thresholds are related to the turbo. Once the minimum threshold is exceeded the turbo cuts in and the counter does not increase. Although, once the maximum threshold is exceeded the counter increases. If OVERBOOST lasts too long (beyond the max. threshold) the diagnostic strategies related to the turbo cut in.
OVERBOOST PRESSURE MEASURED: pressure read in the overboost circuit
OVERBOOST VALVE OPENING: percentage of the overboost pressure modulating valve opening
PARTICULATE FILTER CLOGGING: the calculation of the particulate mass expressed in % according to the DPF pressure picked up by the sensor connected to the engine control unit. The clogging levels and the corresponding particulate filter statuses are:
- between 0% and 30% (Particulate filter status: NOT CLOGGED)
- between 30% and 120% (NORMAL CLOGGING)
- between 120% and 200% (FILTER CLOGGED)
- > 200% (TO BE REGENERATED)

PARTICULATE FILTER STATE: the level of clogging of the particulate filter under all conditions.
PARTICULATE FILTER TEMPERATURE: the exhaust gas temperature picked up by the sensor in the particulate filter input
PILOT INJECTION TIME: opening time of the injectors which is necessary to reduce knock according to the amount of diesel
PILOT INJECTION START: advance (in degrees) with respect to the top dead centre with which the amount of diesel necessary to reduce knock is injected
PREHEATING CONTROL UNIT DIAGN: if 'ON' indicates that the glow plug preheating control unit has been activated
PRE-INJECTION ADVANCE: degrees of advance with respect to the top dead centre at which the amount of diesel calculated to reduce knock is injected
PRESSURE REGULATOR (IF PRESENT): percentage opening of the diesel pressure regulator relating to the high pressure circuit
PRESSURE REGULATOR OPENING (DRV): percentage opening of the pressure regulator mounted on the high pressure pump on the high pressure circuit side or on rail (DRV). The diesel pressure regulator is mounted on the rail (injector support) only for Fiat Croma & Alfa 159, in the other cars it is mounted on the high pressure pump (high pressure circuit side)
PRESSURE REGULATOR OPENING (MPROP): the opening percentage of the pressure regulator mounted on the high pressure pump on the low pressure circuit side
QUANTITY DIESEL FOR CRUISE: quantity of diesel used to keep the vehicle speed set by the cruise control
QUANTITY DIESEL PILOT INJECTION: quantity of diesel injected during the pilot injection
REAL ADVANCE: diesel injection advance with respect to the top dead centre that has been set effectively
REQUEST FROM CRUISE LEVER: the request on the cruise lever (No request, Cruise restore button (RCL),

Set Cruise deceleration (-), Set Cruise acceleration (+)
RESISTANCE TO FLOW IN THE DPF: the momentary value of the resistance to the exhaust gases flow in the particulate filter
SPEED LIMIT (FROM PROXI): displays the legal speed limit factory-set in the control unit. If the value is 255 km/h the vehicle has no legal speed limit and it can be limited with the corresponding configuration procedure. If the value is not 255 km/h it can not be modified as the vehicle is limited in compliance with the legal requirements
SPEED LIMIT: displays the vehicle speed limit set in the control unit
STARTER MOTOR SIGNAL: 'HIGH' means that the injection control unit requests starter motor activation.
STOP&START ENABLE FROM NBC: the state of the command from the body computer control unit. 'OFF' summarizes all the conditions that cause failure to stop the engine when the vehicle is stationary
STOP&START FUNCTION: 'not permitted' means that engine startup has been requested but it is not allowed due to wrong conditions
STOP&START FUNCTION REQUEST: the Stop&Start function enable/disable has been requested from the body computer control unit by pushing the pushbutton.
STOP&START TEMPORARILY DISABLED STATE: the causes for the Stop&Start function to be temporarily inhibited.
TARGET AIR MASS: the amount of air calculated by the control unit according to the parameters read by the sensors
TARGET CRUISE SPEED: the value the cruise control refers to for keeping the cruise speed
TARGET DIESEL PRESSURE: pressure calculated by the control unit and estimated inside the diesel high pressure circuit
TARGET OVERBOOST PRESSURE: pressure calculated by the control unit
THROTTLE SOLENOID VALVE OPENING: shows the opening percentage of the throttle on the intake duct (5% = throttle open, 95% = throttle closed)
TOTAL NUMBER OF REGENERATIONS: the overall number of particulate filter regenerations activated for any reason
TOTAL QUANTITY DIESEL: the total amount of diesel injected
TRAVELLED WITH DPF WARNING LAMP ON: the total distance travelled since the particulate filter warning lamp has been lit up
TURBO 1 COMMAND: the % of the duty cycle of the VGT (Variable Geometry Turbocharger) valve command, or the waste gate valve, or the small low-speeds turbo (version with double turbo)
TURBO 2 COMMAND: the % of the duty cycle of the large high-speeds turbo (version with double turbo)
TURBO MEASURED POSITION: shows the position taken by the variable geometry turbo compared to the TURBO TARGET POSITION. The parameters should have similar values
TURBO TARGET POSITION: the value the turbo actuator must assume on the basis of the torque request conditions, i.e. the position of the blades to obtain supercharging pressure
TYPE OF GEARBOX PRESENT: shows the type of the gearbox installed in the vehicle. The state 'Not feasible' should only occur if the engine control unit has been exchanged on vehicles with a different type of transmission, manual and automatic

SELESPEED

BRAKE NODE (NFR): the presence of ABS/VDC/ASR (only if connected to CAN) is 'LEARNT' when at least one message is received on CAN
BRAKE PEDAL: shows whether the brake pedal is 'Pressed', 'Released' or gives 'Error on switch' if there is a malfunction
CITY REQUEST (IF PRESENT): shows the 'Pressed' or 'Released' status of the 'City' button (automatic mode, in which the gears are changed by the selespeed)
CLUTCH DEGRADATION INDEX: The degradation index indicates how much torque the clutch can transmit. It varies from -4000 to +14000:
- *Negative value*: the clutch can transmit more torque if the material of that particular clutch disc is subjected to

special thermal conditions
- *Positive value very high* : the clutch transmits less than the normal torque. The clutch is worn, or overheated, or the clutch surface is dirty (oil, etc.)
CLUTCH DISK SPEED: rotation speed of the clutch disk
CLUTCH PRESSURE PLATE STROKE: position of the clutch actuator as mm of piston stroke
CLUTCH PRESSURE PLATE REFERENCE: position of the clutch actuator set by the electronic control unit (has no meaning if the clutch is not driven)
CLUTCH SOLENOID CURRENT: current in mA consumed by the clutch pressure control solenoid
CLUTCH SOLENOID VALVE CURRENT: current passing through the solenoid valve controlling the clutch pressure plate
CLUTCH SV CURRENT: the current passing through the solenoid valve controlling the clutch pressure plate
CLUTCH TEMPERATURE: temperature reached by the clutch disk
ECO/SPORT REQUEST: the 'Pressed' or 'Released' status of the 'ECO' button (Economy mode, consumption optimization function) or the 'SPORT' button, the function making the gear changes more 'sporty'
EFFECTIVE TORQUE: the torque applied to the clutch disk
ENGAGEMENT POSITION: position of the gearbox engagement fork in mm
EVEN SPEED CURRENT: current passing through the solenoid valve for even speed engagement
GEARBOX/CLUTCH SELF-CALIBRATION: results of the last 'self-calibration end of line/service' procedure performed. It can be: Correct, Error selection 1st-2nd, Error selection 5th-R, Error selection 3rd-4th, Error engaging 1st, Error engaging 2nd, Error engaging 3rd, Error engaging 4th, Error engaging 5th, Error engaging R, Error positioning of gear engaging actuator, clutch closed operation interrupted, operation interrupted due to absence of general conditions, Error clutch plunger adjustment, Error clutch valve self-calibration
GEARBOX OIL TEMPERATURE: the temperature of the gearbox oil. It is calculated by the selespeed control unit on the basis of the water temperature parameter received from the CAN line
GEARSHIFT LEVER POSITION: the position of the gearshift lever: 'No request', 'Lever forwards', 'Lever back', 'Lever in neutral', 'Lever in reverse' and Autom./City req. (AUTOM.: the gears are changed directly by selespeed and not by the driver, CITY REQ.: Economy mode, consumption optimization function)
HIGH SPEED SELECTION: a high speed has been requested
HYDRAULIC CIRCUIT PRESSURE: pressure in the hydraulic circuit inside the actuator group
HYDRAULIC CIRCUIT SOLENOID CURRENT: current in mA consumed by the solenoid controlling the gearbox hydraulic circuit throttle
LH BUTTON: the 'Pressed' or 'Released' status of the left button on the steering wheel
ODD SPEED CURRENT: current passing through the solenoid valve for odd speed engagement
OVERTEMPERATURE TIME: total time the clutch was in over-temperature
RETRY COUNTER: the total number of times (for all gears) the gearbox has tried to reengage a gear (e.g. in case of sticking)
RH BUTTON: the 'Pressed' or 'Released' status of the right button on the steering wheel
SELECTION POSITION: position of the gearbox shaft in mm
SELF-CALIBRATED CLUTCH CLOSED POSITION: position of the clutch actuator in mm self-calibrated by the electronic control unit
SELF-CALIBRATED CLUTCH SLIP START POSITION DELTA: the difference (in mm) between the self-calibrated clutch closed position and the clutch position at which torque is being transmitted (connects engine and wheels)
SOLENOID VALVE ON/OFF: ON activates the Lock-up clutch, OFF activates the hydraulic unit forwards-backwards
SOLENOID VALVE NO FLOW CURRENT: current corresponding to 'No flow' in the clutch solenoid valve
SPEED ENGAGED: the speed engaged by the system
SPEED REQUESTED: the speed requested by the driver
STARTUP ENABLE RELAY: shows whether all the conditions necessary to enable vehicle startup are present
SV NO FLOW CURRENT: current corresponding to 'No flow' in the clutch solenoid valve
TORQUE TO APPLY: the torque set by the electronic control unit

BODY COMPUTER

CODE TYPE: shows whether code has been 'Programmed by FIAT' or 'Programmed by Spare Parts' if it has already been replaced. If it is 'Programmed by Supplier' the tables of the Code codes and/or RF codes may not have been unloaded (Body control unit programming incomplete), this is only valid for vehicles with Passive Entry (Easy-Go).
ENGINE CONTROL UNIT: can have the statuses 'Programmed' or 'Virgin'. If virgin, the Body control unit must also be virgin, otherwise there will be an error on the transponder message line.
CODE: it can have the statuses of 'Programmed' or 'Virgin'. If virgin the Engine Control unit must also be virgin otherwise it means that the Body Control unit has not received the 'end of transmission' from the engine control unit.
CODE REQUEST FROM ENGINE ECU: shows whether the Immo-code request has been made by the engine control unit to the body computer after the Key-on.
CODE STATUS BYTE: hexadecimal numbers which should be provided to the Fiat help desk if some keys have not been programmed correctly.
ALARM MODE: if the alarm is present, the parameter shows what Country mode the alarm operates in, if only the RF receiver is present it shows 'Alarm inhibited' . The mode can be changed for the preselected country only if alarm is present.
LAST CAUSE FOR SHUTDOWN INHIBITION FROM STOP&START: shows the last cause or causes that have not allowed the engine shutdown by the Stop&Start system. The parameter is associated with the 'Shutdown inhibition from Stop&Start counters' parameter.
LAST CAUSE FOR FORCED STARTUP FROM STOP&START: shows the last cause or causes that forced engine startup by the Stop&Start system. The parameter is associated with the 'Forced startup from Stop&Start counters' parameter.
LAST CAUSE FOR STARTUP INHIBITION FROM STOP&START: shows the last cause or causes that have not allowed engine startup by the Stop&Start system. The parameter is associated with the 'Startup inhibition from Stop&Start counters' parameter.
SHUTDOWN INHIBITION FROM STOP&START STATES: shows if there are states currently that do not allow the engine shutdown by the Stop&Start system.
FORCED STARTUP FROM STOP&START STATES: shows if there are states currently that force engine startup by the Stop&Start system.
STARTUP INHIBITION FROM STOP&START STATES: shows if there are states currently that do not allow the engine startup by the Stop&Start system.

TEG CONTROL

BODY COMPUTER FROM CAN: if 'Virgin' it means that the Body Computer control unit has not been programmed correctly. If it is not possible to obtain the 'Key on Mar' state it might mean that the Body control unit needs to be replaced with a correctly programmed one.
MINICRYPT FROM STEERING LOCK (NBS): if 'Not valid' there is a Minicrypt error in the Steering Lock control unit. If it is not possible to obtain the 'Key on Mar' state it might be necessary to replace this control unit.
MINICRYPT RECEIVED FROM BODY: if 'Not valid' there may be an alignment problem with the Body control unit.
TRANSPONDER PROGRAMMED/PROGRAMMABLE/DISABLED: shows whether the TEG has been programmed, or whether it is suitable for the control unit but it has not been programmed yet, or whether it has been previously deleted from memory.
TEG IDENTIFICATION: shows whether the TEG belongs to this control unit (e.g.: a disabled or programmable TEG)
TEG AUTHENTICATION: shows whether the TEG has a secret code that is suitable for this control unit (e.g.: a programmed or programmable TEG).