



OBD 100



BOSCH

en Original instructions
EOBD & CAN Scan Tool

Content English

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1. Symbols used

1.1 In the documentation

1.1.1 Warning notices -

Structure and meaning

Warning notices warn of dangers to the user or people in the vicinity. Warning notices also indicate the consequences of the hazard as well as preventive action. Warning notices have the following structure:

Warning symbol	<p>KEY WORD – Nature and source of hazard!</p> <p>Consequences of hazard in the event of failure to observe action and information given.</p> <p>➤ Hazard prevention action and information.</p>
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The key word indicates the likelihood of occurrence and the severity of the hazard in the event of non-observance:

Key word	Probability of occurrence	Severity of danger if instructions not observed
DANGER	Immediate impending danger	Death or severe injury
WARNING	Possible impending danger	Death or severe injury
CAUTION	Possible dangerous situation	Minor injury

1.1.2 Symbols in this documentation

Symbol	Designation	Explanation
!	Attention	Warns about possible property damage.
ⓘ	Information	Practical hints and other useful information.
1. 2.	Multi-step operation	Instruction consisting of several steps.
➤	One-step operation	Instruction consisting of one step.
⇨	Intermediate result	An instruction produces a visible intermediate result.
➔	Final result	There is a visible final result on completion of the instruction.

1.2 On the product

! Observe all warning notices on products and ensure they remain legible.

2. User information

These operating instructions describe the functions of the OBD 100 and contain step-by-step directions for use of the OBD 100. Study and observe these operating instructions in full before using the OBD 100. It is also essential to heed all the vehicle manufacturer's safety instructions and information.

2.1 Terms of warranty

The warranty is expressly restricted to the first purchasers of Bosch electronic diagnostic testers (referred to in the following as units). A 2-year (24-month) warranty against material and manufacturing defects applies to Bosch units as of the date of delivery. This warranty does not apply to any units used incorrectly, modified or employed for a purpose for which they are not intended or which deviates from that described in the usage instructions. The sole course of action in the event of a defective unit is repair or replacement by Bosch. Under no circumstances is Bosch liable for direct, indirect, special and exemplary damages or consequential damages (including lost profits) whether this is based on warranty, contract, tort or any other legal theory.

2.2 Exemption from liability

The above warranty supersedes all other guarantees made explicitly or implicitly, including guarantees of marketability or suitability for a particular area of application.

2.3 Data and software

The system software is protected by copyright. Users have no rights or claims to the system software other than a restricted right of use which can be revoked by Bosch. The system software must not be passed on or disclosed without the written consent of Bosch. Copying of the system software is not permissible.

3. Product description

3.1 Intended use

The OBD 100 reads and displays emission-related diagnostic data via the OBD interface of gasoline and diesel passenger vehicles. It is also possible to erase or reset trouble codes and to display additional electronic control unit information. The diagnostic data can help to establish the cause of problems in the vehicle.

! The OBD 100 is only to be used with the vehicle stationary. Use whilst driving is prohibited.

3.2 Prerequisites

OBD interface (OBD-2 or EOBD) in the vehicle to be tested (refer also to Section "4.1 What are OBD, OBD II, OBD-2 and EOBD").

3.3 Scope of delivery

Designation	Order number
OBD 100 diagnostic tester	SP02000002
Original operating instructions	569624 Rev "A"

Tab. 1: Scope of delivery

3.4 Description of device

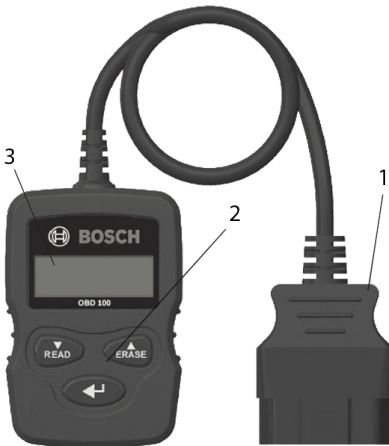


Fig. 1: OBD 100

- 1 OBD diagnostic connector
- 2 Button panel
- 3 LCD (two-line)

3.4.1 Button panel



Fig. 2: OBD 100 buttons

Button	Function
▼READ	<ul style="list-style-type: none"> • Scrolls down through the screen display when ↓ or ↴ appears on the screen. • Reading of electronic control unit diagnostic data (press and hold for 2 seconds).
▲ERASE	<ul style="list-style-type: none"> • Scrolls up through the screen display when ↑ or ↵ appears on the screen. • Erasing of trouble codes in electronic control unit (press and hold for 3 seconds). • Resetting of inspection and maintenance monitors in electronic control unit.
↵	<ul style="list-style-type: none"> • Go to function selected. • Return to main menu.

Tab. 2: Buttons and their functions

3.4.2 OBD diagnostic connector

This connects the OBD 100 to the OBD diagnostic socket in the vehicle.

3.5 Cleaning

! Do not use abrasive cleaning agents and coarse workshop cloths.


➤ The housing is only to be cleaned with a soft cloth and neutral cleaning agents.

4. All you need to know about OBD

4.1 What are OBD, OBD II, OBD-2 and EOBD

OBD (on-board diagnosis) means that

- Emission-related components and systems are monitored by the vehicle whilst driving
- Any malfunctions are recorded and indicated by a warning lamp (MIL)
- This information can be read by a diagnostic tester

 A further purpose of OBD is to protect vulnerable components such as catalytic converters.

In these operating instructions, OBD is always used to refer to the standard OBD-2 (OBD II). OBD-2 has been obligatory in the USA for all new vehicles since 1st January 1996. In the EU, OBD-2 was introduced for new vehicles with gasoline engine in January 2001 with the EURO-3 standard and for diesel vehicles in January 2004. EOBD is the abbreviation for European on-board diagnosis based on OBD-2.

The OBD diagnostic system is integrated into the electronic control unit and constantly monitors defined emission-related components in the vehicle. The malfunction indicator light (MIL) informs the driver of OBD faults reported by the electronic control unit.

A minimum of five monitoring systems are provided:


- Emission-related components
- Missing combustion
- Fuel system
- Upstream and downstream Lambda sensors
- Catalytic converter efficiency
- Exhaust gas recirculation
- Secondary air system

The following are permanently monitored:

- Missing combustion
- Fuel system (injection times)
- Circuits for emission-related components


The following are monitored once per drive cycle:

- Lambda sensor function
- Catalytic converter function

 Speed, temperature and Lambda sensor values can also be read out by way of the OBD diagnostic socket.


4.2 Is my vehicle provided with OBD

In the EU, OBD-2 was introduced for new vehicles with gasoline engine in January 2001 with the EURO-3 standard and for diesel vehicles in January 2003.

 Vehicles manufactured before these dates may however also be provided with OBD.

4.3 Where is the OBD diagnostic socket located

The OBD diagnostic socket is usually situated in the driver's footwell in the area of the center console or in the glove compartment.

 The installation location can also be looked up in the owner's manual of the vehicle concerned or found in the internet.


4.4 Why and when does the malfunction indicator light (MIL) come on

The malfunction indicator light must come on briefly when switching on the ignition. The malfunction indicator light must go out at the latest when the engine is started. The MIL status (malfunction indicator light "On" or "Off") is read from the vehicle electronic control unit. If the vehicle has detected an emission-related fault, the status is set to "faulty". It is then no longer possible to pass the exhaust emission test. In such cases the malfunction indicator light is permanently lit to show the driver that the vehicle should be taken to a workshop.


4.5 What are trouble codes

The OBD trouble codes (DTC) are defined in SAE J2012 and ISO 15031-6. Manufacturer-specific trouble codes can be defined by vehicle manufacturers.

A trouble code is a 5-position code made up of a letter and four digits. A distinction is made between standard trouble codes which may occur with all vehicle makes and manufacturer-specific trouble codes specified by vehicle manufacturers for certain vehicle models.

 A plain language text outlining the cause of the problem can be assigned to each trouble code.

4.5.1 Trouble code structure

 The structure of the trouble codes is shown in the following table. This information facilitates trouble-shooting in situations for which no trouble code description is provided.

Trouble codes are 5-position codes.

Example:


P 0 1 22 Throttle position sensor signal too low

Pos.	Value	Description
1	B C P U	Body Chassis Powertrain Network
2 Example for P	0, 2 1 3	Trouble code defined by ISO / SAE Trouble code defined by manufacturer Trouble code defined by ISO / SAE or by manufacturer
3	0 – F	Grouped by systems
Example for P0	0 – 2 3 4 5 6 7 – 9 A – C D – F	Fuel air metering Ignition system Auxiliary emission controls Vehicle speed and idle control Computer and output signals Transmission Hybrid Reserved for ISO / SAE
4, 5	00 – 99	Identification of individual components

Tab. 3: *Trouble code structure*

4.5.2 Stored trouble codes

Stored trouble codes (DTC) are trouble codes which have been stored in the electronic control unit (ECU). The description of the trouble code and the number of the electronic control unit with the designation of its origin are also displayed.

 If a trouble code has been set which causes the malfunction indicator light (MIL) to come on, the electronic control unit stores the current values of the sensors at the time at which the fault occurred.

4.5.3 Pending code (Pnd)


The first time a fault occurs this is stored as a pending code in the fault memory. If a pending code is confirmed in the second drive cycle, it becomes a confirmed code. A pending code stored in the electronic control unit is automatically erased after 40 drive cycles if the prevailing operating conditions were the same as when the trouble code was set. Otherwise the pending code is erased after 80 engine cycles. Such trouble codes report those faults which have occurred during a drive cycle but which were not sufficient to cause a trouble code to be stored, i.e. not causing the malfunction indicator light to come on.


4.5.4 Confirmed code (Cnf)

If a pending code is confirmed in the second drive cycle, it becomes a confirmed code and the malfunction indicator light comes on.

4.5.5 Permanent code (Prm)

Permanent codes are a special form of confirmed codes. Permanent codes have only been set by vehicles since 2010, which means that they are not supported by all vehicles.

 Permanent codes cannot be erased with a diagnostic tester or by disconnecting the battery voltage. The problem must have been rectified and must not have occurred again for the trouble code to be automatically deleted from the fault memory by the electronic control unit.

 The presence of a permanent code will cause the vehicle to fail an Inspection or exhaust emission test.

4.5.6 Erasing trouble codes

"Erase trouble codes" erases all pending and confirmed codes from the fault memory.

! Before erasing trouble codes it must be remembered that this procedure also resets all the freeze frame data and the status of the on-board monitoring (Readiness codes). As a result, exhaust emission testing performed directly after erasing the trouble codes may not be passed by reading out the OBD diagnostic data, as the vehicle has not yet completed its internal tests. Additional testing (exhaust gas measurement or sensor testing) is required in such cases.

Erasing the trouble codes also deletes the following information stored in the electronic control unit:

- Number of trouble codes
- Freeze frame data
- Status of system monitoring tests
- Engine running time (in minutes) with activated malfunction indicator light since trouble codes were last erased.


5. Operation

5.1 Safety information


- !** The OBD 100 can only read and recognize emission-related diagnostic data and faults. It is not possible to read and display information or faults relating to airbags, the braking system, steering or other important vehicle functions. The vehicle is therefore to be taken to a workshop in the event of any vehicle reports which are not emission-related.
- Pay attention to the warnings, instructions and service procedures of the vehicle manufacturer.
 - The OBD 100 is not intended for use by anyone (including children) with physical, sensory or mental disabilities or without the necessary experience and/or knowledge unless they are supervised by a person responsible for their safety or have received instructions from this person on how to use the OBD 100.
 - Make sure the OBD 100 is always kept in a safe place.
 - Never expose the OBD 100 to direct sunlight.
 - Keep oils, greases, moisture, rainwater and the like away from the OBD 100. Avoid all contact with water or other liquids. Water could cause a short circuit and damage both the vehicle to be tested and the OBD 100.
 - Make sure the OBD 100 and the OBD diagnostic connector are dry before connecting the OBD 100 to the vehicle.
 - Never connect the OBD 100 to a vehicle with wet hands.
 - Secure the vehicle to stop it rolling away.
 - Prior to vehicle testing make sure the transmission is set to PARK (automatic) or NEUTRAL (manual) and that the handbrake is applied.
 - Unless otherwise stated, the ignition is always to be set to OFF on connecting and disconnecting electrical components.
 - The OBD 100 is maintenance-free and has no exchangeable replacement parts. It is thus not necessary to open the OBD 100.
 - Make sure the OBD 100 is not damaged in any way before connecting the OBD 100 to the vehicle.

- Never route the OBD diagnostic cable over sharp edges or hot surfaces.
- Ensure adequate ventilation if the OBD 100 is used with the engine running.
- In Germany and other EU countries it is not permissible to operate the OBD 100 whilst driving.
- Pull the OBD diagnostic connector and not the cable to disconnect the OBD 100 from the vehicle.

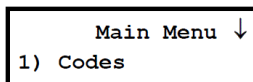
5.2 Connection to vehicle


 The OBD 100 is supplied with power solely by way of the vehicle OBD interface.

1. Locate the OBD diagnostic socket in the vehicle.

 The OBD diagnostic socket is usually situated in the driver's footwell in the area of the center console or in the glove compartment. The installation location can also be looked up in the maintenance manual of the vehicle concerned or found in the internet.

2. Remove the cover over the OBD diagnostic socket if necessary.
 3. Switch on the ignition (position 2).
 - ⚠ Do not start the engine.
 4. Insert the OBD diagnostic connector of the OBD 100 in the OBD diagnostic socket of the vehicle.
 - ⇒ The OBD 100 is switched on.
 - ⇒ The OBD diagnostic data are read out.
- ➔ The main menu appears.



 Use **▼READ** or **▲ERASE** to select the corresponding main menu functions.

5.3 Functions in main menu


Main menu	Description and function	Notes	Read	Erase	Reset
1) Codes	Reading, erasing and resetting of stored vehicle trouble codes.	Different functions are available depending on the trouble code (pending, confirmed and permanent) and the vehicle connected.	x	x	x
2) Live data	Display of emission-related diagnostic data.	The information (PID) displayed depends on the vehicle. Use whilst driving is prohibited.	x	-	-
3) MIL STATUS	Display of stored MIL status of electronic control unit.	The status of the malfunction indicator light (MIL) is read from the electronic control unit in the vehicle and can be compared to the display of the malfunction indicator light in the vehicle.	x	-	-
4) I/M monitor	Display of current status of emission-related Readiness codes.	The Readiness codes are evaluated in the exhaust emission test. This menu item can be used to check whether all emission-related tests have been performed and passed.	x	-	x
5) Freeze frame	Display of PID data if a trouble code has been set.	If a trouble code has been set, the data stored at the time of occurrence and transmitted are displayed.	x	x	-
6) VIN	Display of the vehicle identification number stored in the electronic control unit.	The VIN display can be used to check whether the vehicle identification number stored in the electronic control unit matches the vehicle identification number of the vehicle.	x	-	-


Tab. 4: Functions in main menu

5.4 Codes (trouble codes)

5.4.1 Reading trouble codes

1. Switch on the ignition (position 2).
2. Connect the OBD 100 to the vehicle.
⇒ Data are read.
3. In the main menu select "**1) Codes**" and confirm with ↵.

 Alternatively, press and hold ▼**READ** for 2 seconds.

 If the vehicle does not have any DTCs, "No Codes" will be displayed.

⇒ One or more trouble codes is/are displayed.

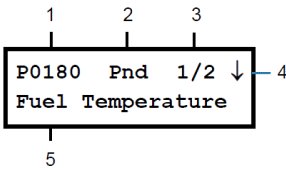


Fig. 3: Trouble code display - description from top left to bottom right

- 1 Trouble code
- 2 Type of trouble code (see Tab. 5)
- 3 Trouble code number, continuously changing display (see Tab. 6)
- 4 Note on scrolling (see Tab. 7)
- 5 Trouble code description (moving message with long descriptions)

Type	Function
Pnd	Pending code
Cnf	Confirmed code
Prm	Permanent code


Tab. 5: Type of trouble code

Number	Function
Mod ##	Indicates the module (electronic control unit) which transmitted the trouble code. ## stands for consecutive numbering of electronic control units
##/##	Indicates the sequence of the trouble code and the number (trouble code x of n). Example: The display 2/9 means the 2nd of 9 trouble codes reported by the electronic control unit.


Tab. 6: Trouble code number


Scroll	Function
↑	Scrolling up possible.
↓	Scrolling down possible.
↕	Scrolling up and down possible.


Tab. 7: Scrolling


 Scroll through trouble codes using ▼**READ** or ▲**ERASE**.


5.4.2 Erasing trouble codes

 The function "**Erase trouble codes**" is not to be performed until the systems have been fully checked and the trouble codes written down.

 Do not erase the trouble codes before establishing whether repair is necessary. Failure to perform essential repairs could prove costly and dangerous. If the malfunction indicator light (MIL) is reset without the underlying problem having been rectified, the indicator light will come on again. If the underlying problem is of a serious nature, further trouble codes may be set or the fault may be aggravated if appropriate action is not taken. It is not sufficient to just erase the trouble codes and reset the warning light. The underlying fault must be rectified.


 Before erasing trouble codes it must be remembered that this procedure also erases all the freeze frame data and the status of the on-board monitoring (status mask). As a result, exhaust emission testing performed immediately after erasing may not be successful if the vehicle has not completed its internal tests by then.

 Once the vehicle has been serviced any trouble codes stored can be erased if so desired. If a trouble code appears again, this means that the problem has not yet been rectified or other faults have occurred.

 All trouble codes are displayed with the corresponding icon.


Implementation of the "Erase trouble code" function results in the following:

- Confirmed and pending codes are erased.


 Permanent codes can only be erased by the vehicle.

- Freeze frame data results are erased.
- I/M monitors are set to "Not ready".


1. Switch on the ignition (position 2).
2. Connect the OBD 100 to the vehicle
⇒ Data are read.

 Do not start the engine. The engine must not be running when erasing the trouble codes.

3. Press **▲ERASE** for 3 seconds.
⇒ A confirmation message appears on the screen.


 Cancel the operation and return to the main menu by pressing **←**.
Cancel the operation and read data again with **▼READ**.


4. Press the **▲ERASE** button for a further 3 seconds to erase trouble codes.

 It may be necessary to drive the vehicle again.


5.5 Live data (PID display)

The Live data function enables parameters (PID) of the vehicle electronic control unit to be displayed in real time. A list of the PIDs supported by the OBD 100 is given in Section 9.

 All values are displayed in metric units.

 Press E to return to the main menu.

1. Switch on the ignition (position 2).
2. Connect the OBD 100 to the vehicle.
⇒ Data are read.
3. In the main menu select **"2) Live data"** with **▼READ** or **▲ERASE** and confirm with **←**.

 If there is more than one electronic control unit in the vehicle, the OBD 100 displays a menu for selecting the electronic control unit for which the Live data are to be displayed.

→ PID data are displayed.

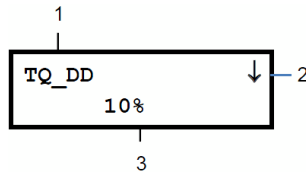




Fig. 4: Live data display - description from top left to bottom right

- 1 PID
- 2 Note on scrolling
- 3 Value, status or note

Symbol	Function
↓	Scroll down to the next PID with ▼READ .
↑	Scroll up to the next PID with ▲ERASE .
↕	Scroll down or up to the next PID with ▼READ or ▲ERASE .

Tab. 8: Scrolling symbols

 Scrolling through PIDs with **▼READ** or **▲ERASE**.

 Section 9 provides an alphabetical list of PIDs and what they mean.

5.6 MIL status (malfunction indicator light)

The status of the malfunction indicator light (MIL status) provides an indication of the status reported ("On" or "Off") by the electronic control unit with the engine running. This information can be used to check correct operation of the malfunction indicator light.

1. Switch on the ignition (position 2).
2. Connect the OBD 100 to the vehicle.
⇒ Data are read.
3. Start the engine.
4. In the main menu select "**3) MIL-Status**" with ▼READ or ▲ERASE.
→ The status **ON** or **OFF** is displayed.

I If the malfunction indicator does not light with the engine running in **MIL ON** status, there is a problem in the malfunction indicator circuit in the vehicle.

5.7 I/M monitors

The I/M monitor function is used for inspection and maintenance monitoring of the emission-related functions.

The OBD 100 supports the following monitoring functions (Readiness codes):

Function	Description
Misfire Monitor	Misfire Monitor
Fuel System	Fuel System Monitor
Comprehen Comp	Comprehensive Components Monitor
Catalyst	Catalyst Monitor
Htd Catalyst	Heated Catalyst Monitor
Evaporative Sys	Evaporative System Monitor
Second Air Sys	Secondary Air System Monitor
A/C Sys Refrig	Air Conditioning Refrigerant Monitor
Oxygen Sensor	Oxygen Sensor Monitor
Htd O2 Sensor	Oxygen Sensor Heater Monitor
EGR/VVT	Exhaust Gas Recirculation or variable valve timing monitor
NMHC Catalyst	Non-Methane Hydrocarbon Catalyst
NOX Treatment	Nitrogen Oxide Treatment
Boost Pressure	Boost Pressure
Exhaust Gas Sen	Exhaust Gas Sensor
PM Filter	Particulate Matter Filter

Tab. 9: I/M monitors

I This is a complete list of the inspection and maintenance monitors supported by the OBD 100. The number of monitors depends on the vehicle. Vehicles with diesel engine have no oxygen sensor monitors for example.

1. Switch on the ignition (position 2).
2. Connect the OBD 100 to the vehicle
⇒ Data are read in.
3. In the main menu select "**4) I/M Monitor**" with ▼READ or ▲ERASE and confirm with ←.
→ Inspection and maintenance monitors for emission-related functions are displayed.

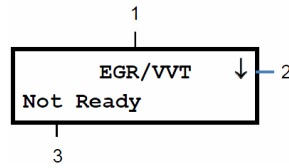


Fig. 5: I/M monitor display - description from top left to bottom right

- 1 I/M monitor (see table 9)
- 2 Note on scrolling (see table 7)
- 3 Report on test performed (see table 10)

Report	Function
Ready	Test has completed
Not ready	Test has not completed
N. A.	Test not possible for this vehicle

Tab. 10: I/M monitor - reports and function

I Display emission-related tests performed with ▼READ or ▲ERASE.

I Taking Germany as an example:
To pass an OBD exhaust emission test, all monitors must be listed as "Ready" or "N. A.".


5.8 Freeze frame (data)

This provides an image of the operating and ambient conditions at the moment in time at which the trouble code was first generated. Freeze frames are not stored and displayed for all PIDs. A list of the PID numbers (parameter IDs) supported by the OBD 100 is given in Section 9.

1. Switch on the ignition (position 2).
2. Connect the OBD 100 to the vehicle
⇒ Data are read in.
3. In the main menu select "**5) Freeze Frame**" with **▼READ** or **▲ERASE** and confirm with **↵**.
⇒ Trouble codes are displayed
4. Select the trouble code and confirm with **↵**.
→ Freeze frame data are displayed.

 Scroll through the corresponding freeze frame data using **▼READ** or **▲ERASE**.

5.9 VIN (vehicle identification number)

 The VIN function is not supported by all vehicles.

1. Switch on the ignition (position 2).
2. Connect the OBD 100 to the vehicle.
⇒ Data is read.
3. In the main menu select "**6) VIN**" with **▼READ** or **▲ERASE** and confirm with **↵**.
→ The vehicle identification number appears as a moving message.

5.10 Faults

Fault	Remedy
LINK ERROR	<p>During reading Turn the ignition key to the OFF position for 10 seconds; then return to the ON position and press the ▼READ button. Make sure the ignition key is set to ON (position 2) and not to ACCESSORIES (position 1).</p> <p>During erasing Turn the ignition key to the OFF position for 10 seconds; then return to the ON position and press one of the following buttons with the ignition key set to ON (position 2) and not to ACCESSORIES (position 1):</p> <ul style="list-style-type: none"> • Continue erasing operation with ▲ERASE. • Cancel erasing operation with ▼READ (read codes again) or ↵ (return to main menu). <p>A trouble code will appear again if the cause of the problem has not yet been rectified.</p>
MIL status	<p>If the MIL status is ON and the warning light does not come on with the engine running, there is a problem in the circuit of the malfunction indicator light. It is then advisable to consult a workshop.</p>

Tab. 11: Faults

6. Decommissioning

6.1 Change of location

- If the OBD 100 is passed on, all the documentation included in the scope of delivery must be handed over together with the unit.

6.2 Disposal and scrapping



The OBD 100 is subject to the European directive 2002/96/EC (WEEE).

Dispose of used electrical and electronic devices, including cables, accessories and batteries, separately from household waste.

- Make use of the local return and collection systems for disposal.
- Proper disposal of the OBD 100 prevents environmental pollution and possible health hazards.

7. Technical data

7.1 Dimensions and weights

Properties	Value/Range
Dimensions (H x W x D)	83 x 56 x 19 mm 3.3 x 2.2 x 0.7 inch
Weight (without accessories)	0,1 kg 0.2 lb

7.2 Temperature and humidity

7.2.1 Ambient temperature

Properties	Value/Range
Storage and transportation	-25 °C – 60 °C -13 °F – 140 °F
Function	0 °C – 45 °C 32 °F – 113 °F

7.2.2 Humidity

Properties	Value/Range
Storage and transportation	20 % – 80 %
Function	20 % – 80 %

7.3 Electromagnetic compatibility (EMC)

The OBD 100 is a class B product as per EN 61 326-1.

8. Glossary

Cnf Confirmed code

If a pending code is confirmed in the second drive cycle, it becomes a confirmed code and the malfunction indicator light (MIL) comes on.

DTC Diagnostic trouble code

A trouble code is a 5-position code made up of a letter and four digits. A distinction is made between standard trouble codes which may occur with all vehicle makes and manufacturer-specific trouble codes specified by vehicle manufacturers for certain vehicle models.

A plain language text outlining the cause of the problem can be assigned to each trouble code.

ECU Electronic control unit

EOBD European On-Board diagnosis

EOBD is not an official term but is often used to refer to OBD-2 in conjunction with EU vehicles. For further information refer to Section 4.1.

Drive cycle

A drive cycle commences on starting the engine (warm or cold) and ends on switching off the engine.

Freeze frame data (FFD)

The following data (freeze frame data) are stored in connection with the first pending code:

- Vehicle speed
- Coolant temperature
- Intake manifold pressure
- Engine load
- Mixture formation adaptation value
- Lambda control status (control loop)
- Time since trouble first recorded

The data represent a sort of snapshot of the prevailing operating and ambient conditions at the moment in time at which the trouble was detected. A freeze frame data set remains stored in the memory even if another emission-related trouble code is stored (this does not however apply to trouble codes resulting from misfiring or faults in the fuel system). Freeze frame data stored for a trouble code arising from misfiring or a fuel system fault overwrite all previously stored data and cannot be overwritten themselves.

I/M monitors

The Readiness code is used in OBD to refer to the testing of emission-related functions. Since the introduction of OBD-2 all electrical components have been continuously checked for proper operation. In addition, complete systems (e.g. exhaust gas recirculation) are checked by way of diagnostic routines which are not constantly active. The Readiness code is set as a means of checking whether these diagnostic routines have been performed.

The Readiness code gives an indication of whether a diagnosis result has been supplied for all individual systems since the fault memory was last erased or the electronic control unit was replaced.

The following are permanently monitored:

- Missing combustion
- Fuel system (injection times)
- Circuits for emission-related components

The following are monitored once per drive cycle:

- Lambda sensor function
- Catalytic converter function


If the functions of systems and components are tied to certain operating conditions, these are only checked on passing the corresponding operating points (speed, load or temperature thresholds).

II The Readiness code was introduced as a means of revealing manipulation. It makes it possible to see whether the fault memory was erased by disconnecting the battery for example.

MIL Malfunction indicator light


The malfunction indicator light (also called malfunction lamp or engine warning lamp) comes on:

- If the ignition key is in position II (bulb check function).
- If a fault occurs during the electronic control unit self-test.
- If an emission-related fault occurs in two consecutive drive cycles.
- If a fault (misfiring) occurs which results in cylinder deactivation, i.e. for catalytic converter protection (the MIL flashes in this case).

 The malfunction indicator light goes out automatically in the fourth drive cycle if the fault has no longer occurred in three consecutive drive cycles.

OBD On-Board diagnosis

In these operating instructions, OBD is always used to refer to the standard OBD-2. In the EU, OBD-2 (EOBD) was introduced for new vehicles with gasoline engine in January 2001 with the EURO-3 standard and for diesel passenger vehicles in January 2003.

 Vehicles marketed before these dates may however also be provided with OBD.

OBD-2 Refer to OBD**PID Parameter identification**

Status information, actual values and electronic control unit values calculated by the system are output by way of PID (refer also to Section 9).

Pnd Pending code

The first time a fault occurs this is stored as a pending code in the fault memory. This fault appeared during a drive cycle but was not sufficient to set the MIL status to ON.

Prm Permanent code

Permanent codes are a special form of confirmed codes. Permanent codes were first set by vehicles around 2010, which means that they are not supported by all vehicles. Whereas confirmed codes can be erased by way of the diagnostic tester, this is not possible in the case of permanent codes. Permanent codes are erased by the vehicle if the electronic control unit has decided that the fault no longer exists.

Readiness code Refer to I/M monitors

VIN Vehicle identification number

The vehicle identification number is the serial number assigned to a vehicle at the factory. The vehicle identification number is marked on the driver side of the dashboard and can be seen from outside the vehicle. The vehicle identification number contains information on the vehicle, as well as the body and engine code numbers for example. Provided that the electronic control unit has not been replaced, the vehicle identification number displayed in the OBD 100 must coincide with the vehicle identification number of the vehicle. Matching numbers ensure that the correct diagnostic data are being displayed. It is advisable to consult a workshop if the vehicle identification numbers do not match.

9. PID definitions

PID	PID description
ABS FRP	Absolute Fuel Rail Pressure
ABS LOAD	Absolute Load Value
ABS TPS B, C	Throttle Position B, C
ABSLT TPS	Absolute Throttle Position
ACC POS D	Accelerator Pedal D, E, F
ACC POS REL	Relative Accelerator Pedal Position
AECD1_TIME1, TIME 2	Total Run Time with EI-AECD #1 Timer 1 Active, #2 Timer Active
AECD10_TIME1, TIME 2	Total Run Time with EI-AECD #10 Timer 1 Active, #2 Timer Active
AECD11_TIME1, TIME 2	Total Run Time with EI-AECD #11 Timer 1 active, #2 Timer Active
AECD12_TIME1, TIME 2	Total Run Time with EI-AECD #12 Timer 1 active, #2 Timer Active
AECD13_TIME1, TIME 2	Total Run Time with EI-AECD #13 Timer 1 active, #2 Timer Active
AECD14_TIME1, TIME 2	Total Run Time with EI-AECD #14 Timer 1 active, #2 Timer Active
AECD15_TIME1, TIME 2	Total Run Time with EI-AECD #15 Timer 1 active, #2 Timer Active
AECD16_TIME1, TIME 2	Total Run Time with EI-AECD #16 Timer 1 active, #2 Timer Active
AECD17_TIME1, TIME 2	Total Run Time with EI-AECD #17 Timer 1 active, #2 Timer Active
AECD18_TIME1, TIME 2	Total Run Time with EI-AECD #18 Timer 1 active, #2 Timer Active
AECD19_TIME1, TIME 2	Total Run Time with EI-AECD #19 Timer 1 active, #2 Timer Active
AECD2_TIME1, TIME 2	Total Run Time with EI-AECD #2 Timer 1 Active, #2 Timer Active
AECD20_TIME1, TIME 2	Total Run Time with EI-AECD #20 Timer 1 active, #2 Timer Active
AECD3_TIME1, TIME 2	Total Run Time with EI-AECD #3 Timer 1 Active, #2 Timer Active
AECD4_TIME1, TIME 2	Total Run Time with EI-AECD #4 Timer 1 Active, #2 Timer Active
AECD5_TIME1, TIME 2	Total Run Time with EI-AECD #5 Timer 1 Active, #2 Timer Active
AECD6_TIME1, TIME 2	Total Run Time with EI-AECD #6 Timer 1 Active, #2 Timer Active
AECD7_TIME1, TIME 2	Total Run Time with EI-AECD #7 Timer 1 Active, #2 Timer Active
AECD8_TIME1, TIME 2	Total Run Time with EI-AECD #8 Timer 1 Active, #2 Timer Active
AECD9_TIME1, TIME 2	Total Run Time with EI-AECD #9 Timer 1 Active, #2 Timer Active
ALCOHOL	Alcohol Fuel Percent
BARO PRS	Barometric Pressure
BAT_PWR	Hybrid Battery Pack Remaining Life

PID	PID description
BP_A_ACT, B_ACT	Boost Pressure Sensor A, Sensor B
BP_A_CMD, B_CMD	Commanded Boost Pressure A, Pressure B
BP_A_STAT, B_STAT	Boost Pressure A Control Status, B Control Status
CACT 11, 12	Charge Air Cooler Temperature Bank 1 Sensor 1 supported, Sensor 2 supported
CACT 21,22	Charge Air Cooler Temperature Bank 2 Sensor 1 supported, Sensor 2 supported
CALC LOAD	Calculated Engine Load
CAT TEMP11, TEMP12	Catalytic Converter Temp Bank1, Temp Bank 3
CAT TEMP21, TEMP22	Catalytic Converter Temp Bank2, Temp Bank 4
CLR DIST	Distance since erase
CLR TIME	Minutes Run since Erase
CLR TRPS	Warmups Since Erase
CMD EQ RAT	Commanded Equivalence Ratio
COOLANT	Engine Coolant Temp
DPF_REG_AVGD	Average Distance Between DPF Regen
DPF_REG_AVGT	Average Time Between DPF Regen
DPF_REG_STAT	Diesel Particulate Filter (DPF) Regen Status
DPF_REG_TYP	Diesel Particulate Filter (DPF) Regen Type
DPF_REGEN_PCT	Normalized Trigger for DPF Regen
DPF1_DP, DPF2_DP	Diesel Particulate Filter (DPF) Bank 1 Delta Pressure, Bank 2 Delta Pressure
DPF1_INP, DPF2_INP	Diesel Particulate Filter (DPF) Bank 1 Inlet Pressure, Bank 2 Inlet Pressure
DPF1_INT, DPF2_INT	DPF Bank 1 Inlet Temperature Sensor, Bank 2 Inlet Temperature Sensor
DPF1_OUTP, DPF2_OUTP	Diesel Particulate Filter (DPF) Bank 1 Outlet Pressure, Bank 2 Outlet Pressure
DPF1_OUTT, DPF2_OUTT	DPF Bank 1 Outlet Temperature Sensor, Bank 2 Outlet Temperature Sensor
ECT 1, 2	Engine Coolant Temperature 1, Temperature 2
EGR CMD	Comanded EGR
EGR ERR	Exhaust Gas Recirculation Error
EGR_A_ACT, B_ACT	Actual EGR A Duty Cycle/Position, B Duty Cycle/Position
EGR_A_CMD, B_CMD	Commanded EGR A Duty Cycle/Position, B Duty Cycle/Position
EGR_A_ERR, B_ERR	EGR A Error, B Error

PID	PID description
EGRT 11, 21	Exhaust Gas Recirculation Temperature Bank 1 Sensor 1, Bank 2 Sensor 1
EGRT 12, 22	Exhaust Gas Recirculation Temperature Bank 1 Sensor 2, Bank 2 Sensor 2
EGT 11, 21	Exhaust Gas Temperature (EGT) Bank 1 Sensor 1, Bank 2 Sensor 1
EGT 12, 22	Exhaust Gas Temperature (EGT) Bank 1 Sensor 2, Bank 2 Sensor 2
EGT 13, 23	Exhaust Gas Temperature (EGT) Bank 1 Sensor 3, Bank 2 Sensor 3
EGT 14, 24	Exhaust Gas Temperature (EGT) Bank 1 Sensor 4, Bank 2 Sensor 4
EMIS_SUP	Emission requirements to which vehicle is designed
ENG RUN	Time Since Engine Start
ENG SPEED	Engine RPM
EOT	Engine Oil Temperature
EP_1, 2	Exhaust Pressure Sensor Bank 1, Bank 2
EQ RATIO	Equivalence Ratio
EVAP PURGE	Commanded EVAP Purge
EVAP VP	EVAP Vapor Pressure
EVAP VPA	Absolute EVAP Vapor Pressure
FRP_A, B	Fuel Rail Pressure A, B
FRP_A_CMD, B_CMD	Commanded Fuel Rail Pressure A, B
FRT_A, B	Fuel Rail Temperature A, B
FUEL LEVEL	Fuel Level Input
FUEL PRES	Fuel Rail Pressure
FUEL SYS 1, 2	Fuel System 1 Loop Status, System 2 Loop Status
FUEL TYPE	Fuel Type
FUEL_RATE	Engine Fuel Rate

PID	PID description
FUEL_TIMING	Fueling Injection Timing
GPL_STAT	Glow Plug Lamp Status
IAF_A_CMD, B_CMD	Commanded Intake Air Flow A Control, B Control
IAF_A_REL, B_REL	Relative Intake Air Flow A Position, B Position
IAT	Intake Air Temp
IAT 11, 21	Intake Air Temperature Sensor Bank 1 Sensor 1, Bank 2 Sensor 1
IAT 12, 22	Intake Air Temperature Sensor Bank 1 Sensor 2, Bank 2 Sensor 2
IAT 13, 23	Intake Air Temperature Sensor Bank 1 Sensor 3, Bank 2 Sensor 3
ICP_A, B	Injection Control Pressure A, B
ICP_A_CMD, B_CMD	Commanded Injection Control Pressure A, B
IDLE_TIME	Total Idle Run Time
IGN ADV	Timing Advance
LAMBDA11, 21	O2 Sensor Lambda Bank 1 Sensor 1, Bank 2 Sensor 1
LAMBDA12, 22	O2 Sensor Lambda Bank 1 Sensor 2, Bank 2 Sensor 2
LT FTRM1	Long Term Fuel Trim 1 or 3
LT FTRM2	Long Term Fuel Trim 2 or 4
LT SEC FT1, 2, 3, 4	Long Term Secondary O2 Sensor Fuel Trim 1, 2, 3, 4
MAF, A, B	Mass Air Flow, A, B
MAP, A, B	Manifold Absolute Pressure, A, B
MIL DIST	MIL_DIST
MIL STATUS	Malfunction Indicator Lamp
MIL TIME	Minutes Run by MIL activated
MST	Manifold Surface Temperature
N/D_STAT	Auto Trans Neutral Drive Status
N/G_STAT	Manual Trans Neutral Gear Status
NNTE_Stat	NOx NTE control area status
NOX 11, 21	NOx Sensor Concentration Bank 1 Sensor 1, Bank 2 Sensor 1
NOX 12,22	NOx Sensor Concentration Bank 1 Sensor 2, Bank 2 Sensor 2

PID	PID description
NOX LEVEL HI, HI1, HI2, HI3, HI4	SCR inducement system actual state 10K history HI1 (0-10000 km), 10K history HI2 (10000-20000 km), 10K history HI3 (20000-30000 km), 10K history HI4 (30000-40000 km): NOx emission too high
NOX_ADS_DESUL	NOx Adsorber Desulfurization Status
NOX_ADS_REGEN	NOx Adsorber Regen Status
NWL_TIME	Total Run Time by the Engine while NOx warning mode is activated
O2S	O2 Voltage or Current indicates Bank/Sensor
O2S11_PCT, O2S21_PCT	O2 Sensor Concentration Bank 1 Sensor 1, Bank 2 Sensor 1
O2S12_PCT, O2S22_PCT	O2 Sensor Concentration Bank 1 Sensor 2, Bank 2 Sensor 2
OBD2_STAT	OBD Status
OUT_TEMP	Ambient Air Temp
PM 11, PM 21	PM Sensor Mass Concentration Bank 1 Sensor 1, Bank 2 Sensor 1
PNTE_Stat	PM NTE control area status
PTO_STATUS	PTO Status
PTO_STAT	Power Take Off (PTO) Status
PTO_TIME	Total Run Time With PTO Active
REAG_DEMD	Average Demanded Reagent Consumption
REAG_LVL	Reagent Tank Level
REAG_RATE	Average Reagent Consumption
REL_FRP	Relative Fuel Rail Pressure
REL_TPS	Relative Throttle Position
RUN_TIME	Total Engine Run Time
SCR REAG DEV, DEV1, DEV2, DEV3, DEV4	SCR inducement system actual state 10K history DEV1 (0 - 10000 km), 10K history DEV2 (10000 - 20000 km), 10K history DEV3 (20000 - 30000 km), 10K history DEV4 (30000 - 40000 km): deviation of reagent consumption
SCR REAG LOW, LOW1, LOW2, LOW3, LOW4	SCR inducement system actual state 10K history LOW1 (0 - 10000 km), 10K history LOW2 (10000 - 20000 km), 10K history LOW3 (20000 - 30000 km), 10K history LOW4 (30000 - 40000 km): reagent level too low

PID	PID description
SCR REAG WRONG, WRONG1, WRONG2, WRONG3, WRONG4	SCR inducement system actual state 10K history WRONG1 (0 - 10000 km), 10K history WRONG2 (10000 - 20000 km), 10K history WRONG3 (20000 - 30000 km), 10K history WRONG4 (30000 - 40000 km): incorrect reagent
SCR_SYS_ACTIVE	SCR inducement system actual state: inducement system active
SCR_DIST_1D	Distance travelled in current 10K block (0 - 10000 km)
SCR_DIST_1N, 2N, 3N, 4N	Distance travelled while inducement system active in current 10K block 1N (0 - 10000 km), 20K block 2N (10 - 20000 km), 30K block 3N (20 - 30000 km), 40K block 4N (30 - 40000 km)
SECOND_AIR	Secondary Air Status
ST_FTRM	Fuel Trim Bank/Sensor
ST_FTRM1, 3	Short Term Fuel Trim1 or 3
ST_FTRM2, 4	Short Term Fuel Trim2 or 4
ST_SEC_FT1, 2, 3, 4	Short Term Secondary O2 Sensor Fuel Trim 1, 2, 3, 4
TAC_A_CMD, B_CMD	Commanded Throttle Actuator A Control, B Control
TAC_A_REL, B_REL	Relative Throttle A Position, B Position
TCA_CINP, TCB_CINP	Turbocharger Compressor Inlet Pressure Sensor A, Pressure Sensor B
TCA_CINT, TCB_CINT	Turbocharger A Compressor Inlet Temperature, Turbocharger B
TCA_COUT, TCB_COUT	Turbocharger A Compressor Outlet Temperature, Turbocharger B
TCA_RPM, TCB_RPM	Turbocharger A RPM, B RPM
TCA_TCOU, TCB_TCOU	Turbocharger A Turbine Outlet Temperature, Turbocharger B
TCA_TINT, TCB_TINT	Turbocharger A Turbine Inlet Temperature, Turbocharger B
THROT_CMD	Commanded Throttle Actuator Control
TP_G	Absolute Throttle Position G
TQ_ACT	Actual Engine - Percent Torque
TQ_DD	Driver's Demand Engine - Percent Torque
TQ_MAX1, 2, 3, 4, 5	Engine Percent Torque At Point 1 (Idle), Point 2, 3, 4, 5
TQ_REF	Engine Reference Torque
TROUB_CODE	Code causing the Freeze Frame
VEH_SPEED	Vehicle Speed

PID	PID description
VGT_A_ACT, B_ACT	Variable Geometry Turbo A Position, Turbo B
VGT_A_CMD, B_CMD	Commanded Variable Geometry Turbo A Position, Turbo B
VGT_A_STAT, B_STAT	Variable Geometry Turbo A Control Status, Turbo B
VPWR	Control Module Voltage
WG_A_ACT, B_ACT	Wastegate A Position, B Position
WG_A_CMD, B_CMD	Commanded Wastegate A Control, B Control
TQ_DD	Driver's demand engine percent torque
TQ_ACT	Actual engine percent torque
TQ_MAX1, MAX2, MAX3, MAX4, MAX5	Engine percent torque at idle point 1, 2, 3, 4, 5
TQ_REF	Engine reference torque
VGT_A_ACT	Variable geometry turbo A position
VGT_A_CMD	Commanded variable geometry turbo A position
VGT_A_STAT	Variable geometry turbo A control status
VGT_B_ACT	Variable geometry turbo B position
VGT_B_CMD	Commanded variable geometry turbo B position
VGT_B_STAT	Variable geometry turbo B control status
VPWR	Control module voltage
WG_A_ACT	Wastegate A position
WG_A_CMD	Commanded wastegate A control
WG_B_ACT	Wastegate B position
WG_B_CMD	Commanded wastegate B control

Tab. 12: PID definitions

Robert Bosch GmbH

Diagnostics

Franz-Oechsle-Straße 4

73207 Plochingen

DEUTSCHLAND

www.bosch.com

bosch.prueftechnik@bosch.com

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