F I A T **B R A V O**

L P G

The Fiat Bravo LPG version (Petrol- LPG) is dealt with in this appendix.

For anything not included in this Supplement, refer to the Owner Manual enclosed.

INDEX

KNOWING YOUR CAR

INTRODUCTION

The LPG version of the car features two fuel systems: one for petrol and one for LPG.

Like the petrol system, the LPG system is the phased, sequential multipoint type with special injectors.

WHAT IS LPG?

LPG (the abbreviation of liquefied petroleum gas) is a mixture of gas used as an economical and safe primary energy source.

Its main components are: propane gas and butane gas mixed.

These gases are a product of petroleum refinement and are also present naturally in oil fields and methane-producing deposits.

In its natural state this mixture is in a gaseous state but, as the pressure increases, at ambient temperature, it can easily be turned into a liquid state.

LPG is a fuel with a low environmental impact because it reduces the pollution produced by vehicle exhaust gases.

LPG MULTIPOINT INJECTION SYSTEM

This product is produced in strict collaboration with prestigious suppliers in the LPG sector. The injection system used on the car is an efficient system in terms of engine performance and is based on the injection of LPG in a gaseous state.

In this system with four injectors, one for each intake manifold, the fuel is injected directly into the engine heat transfer ducts thereby metering the LPG very precisely improving combustion and, at the same time, excluding any possibility of flame return.

By adapting the electronic control technology of petrol engines to meet the specifications of LPG, it has been possible to achieve important results in terms of driveability and controlling exhaust emissions.

Engines running on LPG have almost the same torque/power specifications as when running on petrol and, as a result, the performance of the car is also comparable.

The system extreme operating temperatures are between –20°C and 100°C.

SELECTING THE TYPE OF FUEL SUPPLY

The car is configured for running independently on either petrol or LPG.

The engine is always started on petrol with an automatic shift to LPG after about 40 seconds at the first significant acceleration.

This is the time required to reach optimum conditions (engine coolant temperature, minimum revs level) for the switch to LPG. **As far as what has been said is concerned, there must always be some petrol in the tank (at least 1/4 full)** in order not to compromise the operation of the fuel pump.

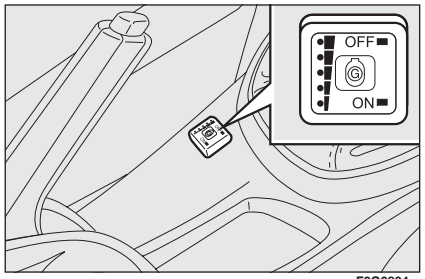


fig. 1 F0Q0804m

In addition, it is advisable to periodically use up the petrol in the tank (until the reserve warning light comes on) in order to ensure that the petrol does not become old and possibly deteriorate.

The petrol/LPG switch **fig. 1**, located on the centre tunnel (next to the gear lever) allows the driver to select petrol or LPG operation at their discretion.

When running on LPG, when the last red LED on gas quantity indicator (visible on the switch) comes on, refuelling is advisable. If the LPG runs out during LPG operation, the system automatically switches to running on petrol shown by: the amber LED coming on constantly and the green LED flashing, the fuel level LEDs going out and a buzzer in the switch.

PASSIVE SAFETY/ ACTIVE SAFETY

Passive safety

The car has the same passive safety specifications as other versions. In particular, the canister mountings (located in the spare wheel housing) have been designed to exceed the Fiat safety standards for impact tests.

When running on LPG, the flow of gas (in a liquid state) leaving the canister, passes through the dedicated pipe to the pressure regulator where there is a safety solenoid valve that stops the flow of LPG when the key is turned off or when a change of fuel is selected by the driver (decision to run on petrol).

Together with the regulator solenoid valve, a second solenoid valve, in the tank, closes the LPG pipe at the tank outlet.

The two solenoid valves are connected to the inertia switch (Fire Protection System).

The LPG tank meets the legal safety standards of the countries in which the version illustrated this Supplement is marketed.

WARNING

It should be pointed out that in some countries (including Italy) there are legal restrictions in force for parking/garaging motor vehicles with gas that has a higher density than air; LPG comes under this category.

Active safety

The car has the same active safety specifications as other versions.

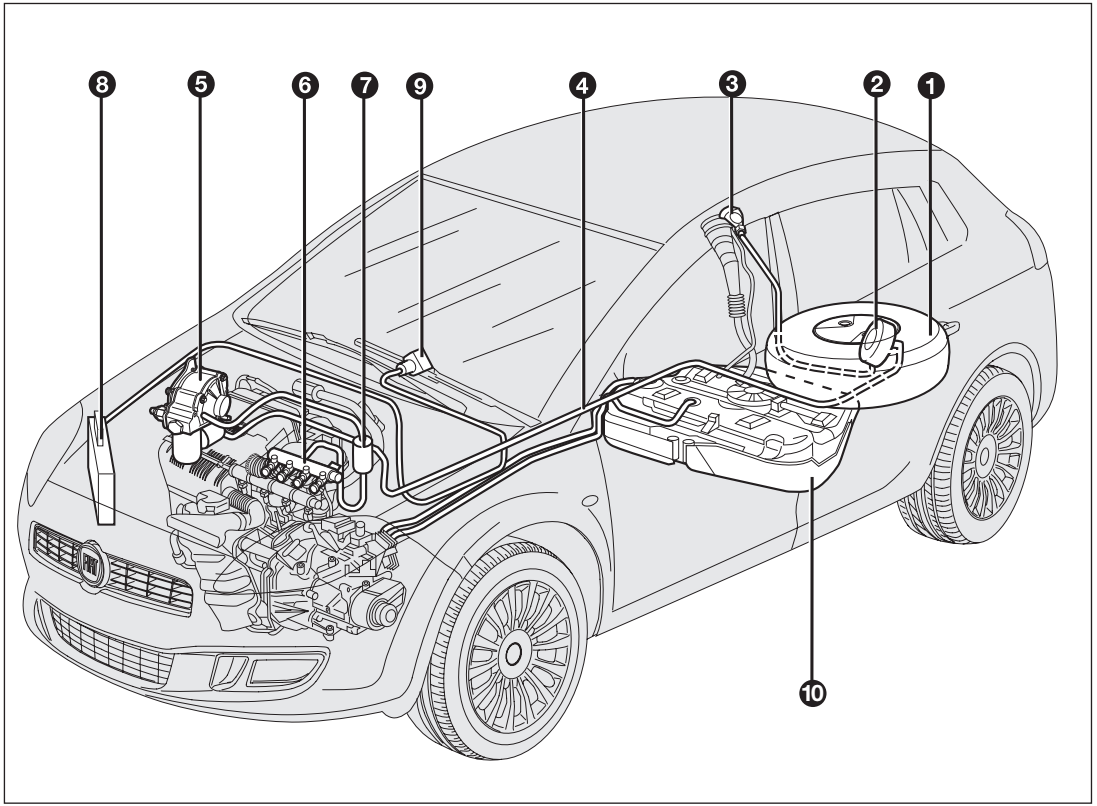
The car is equipped with gaseous LPG injection system designed specifically for the car: it is therefore strictly prohibited to alter the configuration of the system and components. The use of other components or materials could cause malfunctions and lead to a reduction in safety therefore, in the case of problems, go to a Fiat Dealership. When towing or raising the car, to prevent damage to the gas system parts, follow the instructions in the Owner Handbook in the "Towing the car" chapter.

When painting in an oven, the LPG tank should be removed from the car and later carefully refitted by a Fiat Dealership. Although the LPG system has numerous safety features, it is advisable to close the manual tap on the tank every time the car is not in use for a long period, transported on other vehicles or moved in an emergency as a result of a breakdown or accident.

SYSTEM FUNCTIONAL DIAGRAM

DESCRIPTION OF THE SYSTEM FUNCTIONAL DIAGRAM fig. 2

1 LPG tank - **2** Multivalve assembly and safety devices - **3** LPG refuelling filler - **4** LPG piping - **5** Pressure regulator - **6** LPG injectors - **7** LPG in gaseous state filter element - **8** LPG injection system electronic control unit - **9** LPG-petrol switch and LPG gauge **10** Petrol tank.



F0Q0808m

fig. 2

LPG TANK

The vehicle has a (pressurized) tank **A - fig. 3** for LPG in a liquid state that is toroidal in shape and located in the housing for the spare wheel with suitable protection.

The LPG in the tank **A** is always in a liquid and gaseous state, in physical equilibrium conditions.

The liquid, which cannot be compressed, dilates by around 0.25% for each increase in temperature of one degree. For this reason a suitable space allowing the increase in volume of the liquid for all forseeable temperature increases is guaranteed (e.g. car parked in the full sun in summer) without compromising the integrity of the tank.

In effect, there is a safety valve that automatically limits the refilling of the tank (during refuelling) to a maximum level of 80% (liquid) of its total capacity.

Periodically (at least once every six months) it is advisable to let the LPG in the tank run out and, at the first refuelling, check that it does not exceed the maximum capacity of 41 litres (see instructions in "Capacities" paragraph in this Supplement). If the value is above 41 litres, go to a Fiat Dealer immediately.

LPG TANK CERTIFICATION

The LPG tank is certified in accordance with the regulations in force.

In Italy the tank has a life of 10 years from the registration date of the car. If the car has been registered in a different country from Italy, the life of the LPG tank and test/inspection procedures may vary depending on the laws in force in that particular country. In any case, when the time limit in the individual country has run out, go to a Fiat Dealer to have the tank replaced.

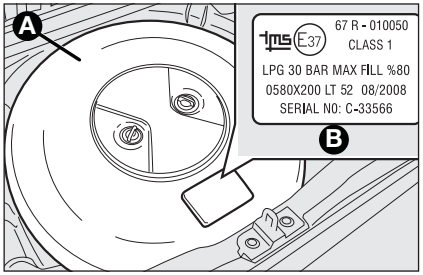


fig. 3 F0Q0801m

There is a plate on the tank **B - fig. 3** containing the following information:

– homologation country identification and homologation number;

– type of gas designed for (LPG);

– name of canister manufacturer;

– canister test pressure (30 bar);

– maximum refilling percentage (80%);

– tank dimensions;

– nominal tank capacity in litres;

– canister manufacture date (month/year);

– canister serial number.

SOLENOID VALVES AND SAFETY DEVICES

The system has a solenoid valve located on the pressure reduction unit and a solenoid valve fitted inside the multivalve assembly on the tank.

The main function of these solenoid valves is to interrupt/allow the flow of LPG to the supply circuit.

The solenoid valves are open when:

– a request to run on LPG has been made;

– the optimum engine running conditions are satisfied (engine coolant temperature, minimum revs level) for running on LPG;

– there is enough LPG in the tank for operation;

– the inertia switch has not been triggered.

The multivalve assembly fitted on the tank includes:

– a valve that automatically stops the supply of LPG when the maximum permitted filling level is reached (80% of the total tank capacity);

– a flow limiter which, if a pipe is broken, prevents the complete and sudden escape of LPG;

– a one-way valve, located on the gas return pipe in the tank, which prevents LPG reflux;

– a safety solenoid valve on the LPG supply, which either gives the go ahead or prevents the escape of gas to the pressure reduction unit;

– a manual tap, upstream of the solenoid valve, that separates the tank from the LPG system to allow maintenance operations;

– a fuse pad which, in the case of overheating (temperature above 120°C), totally eliminates the danger of excess pressure making the LPG in the tank flow out as quickly as possible in a controlled manner;

– an analogue gauge showing the level of LPG in the tank.

PIPING

The piping for the LPG in a liquid state (from the filler to the tank and from the tank to the pressure regulator) is made from copper and coated in plastic.

The piping for the LPG in a gaseous state (from the pressure regulator to the LPG injectors) is made from rubber.

REGULATION UNIT

The regulation unit **fig. 4** includes:

– cut out solenoid valve with gauze filter;

– pressure regulator.

The cut out solenoid valve opens or closes together with the solenoid valve on the tank. It closes each flow of LPG when the engine is not running on gas.

It also acts as a safety device that prevents the flow of LPG if the inertia switch is activated.

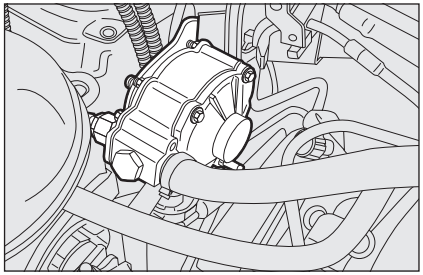


fig. 4 F0Q0802m

The pressure regulator allows the change of the LPG from a liquid state to a gaseous state via a dilation chamber and maintains the pressure required for the operation of the system at a preset value.

PAPER FILTER

The filter **fig. 5**, located on the pressure regulator outlet pipe, has the task of filtering the LPG in a gaseous state during the LPG injectors supply stage.

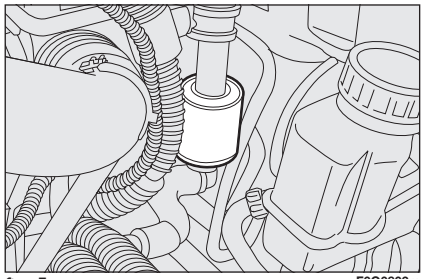


fig. 5 F0Q0803m

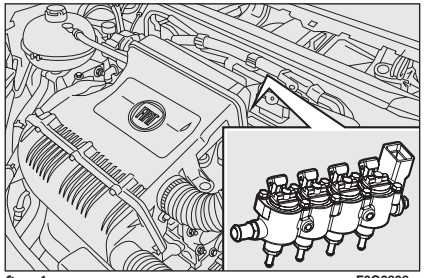


fig. 6 F0Q0806m

LPG INJECTORS

There are four injectors **fig. 6**, specially designed for LPG, mounted on the intake manifold near the cylinder head, one for each inlet duct; they are supplied with LPG in a gaseous state at a constant pressure and are controlled by a specific electronic control unit.

A gas pressure and temperature sensor that sends an appropriate electrical signal in order to determine the LPG injection time is fitted on the injectors.

ELECTRONIC CONTROL UNIT

The vehicle has a dedicted electronic control unit for the LPG system; it uses the incoming signals from the petrol injection control unit and converts them into signals for the injection of the LPG.

The control unit for the injectors has the same strategy as the petrol control unit (phased, sequential, multipoint).

LPG/PETROL SWITCH

The LPG/petrol switch **fig. 7** is located on the centre console near the handbrake lever and includes:

A. LPG/petrol operating mode request button;

B. LPG gauge: 5 LEDs, 4 green and 1 red to indicate the reserve. The red LED only comes on when the last green LED goes out.
The red LED indicates the reserve condition;

ON. LPG operating mode indicator: green LED, located under button **A**, on constantly;

OFF. petrol operating mode indicator: yellow LED, located above button **A**, on constantly.

IMPORTANT When the ignition key is turned to the **MAR** position the LEDs on the ignition switch come on in accordance with the following logic:

– **with the petrol operating mode selected**: yellow **OFF** LED on;

– **with the LPG operating mode selected**: all the LEDs in the switch are on constantly and the green **ON** LED is flashing.

To select the type of fuel system desired (LPG or petrol), press the button **A - fig. 7**.

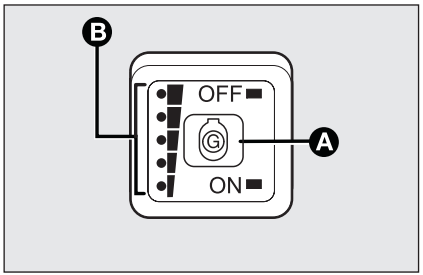


fig. 7 F0Q0805m

To change the type of fuel system, it is advisable to operate the button with the vehicle stationary and the engine running or, whilst driving, after having released the accelerator.

If the switching takes place during acceleration or pick-up, there may be a brief flat spot (fall in power).

Do not switch between the two operating modes whilst starting the engine.

SWITCH FROM PETROL TO LPG

When running on petrol: press the button **A - fig 7**, the switch to LPG will take place automatically at the first significant acceleration.

During switching:

– the LPG gauge **B** comes on;

– the yellow **OFF** LED goes out (petrol operating mode);

– the green **ON** LED comes on switching from intermittent to on constantly (LPG operating mode);

There is a series of 5 LEDs **B** (1 red and 4 green) on the left side of the switch that display the amount of LPG in the tank.

When the amount of LPG remaining goes below about 1/5 of the capacity of the tank, only the red (reserve) LED remains on to signal the need for refuelling.

IMPORTANT In the case of starting at outside temperatures of below -10°C, the switching times from petrol to LPG increase to allow the pressure regulator to become warm enough.

Switching from LPG to petrol

When running on LPG: press the button **A - fig. 7**.

During switching:

– the LPG gauge **B** goes out;

– the yellow **OFF** LED comes on constantly (petrol operating mode);

– the green **ON** LED goes out (LPG operating mode).

LPG used up

If the LPG runs out, switching to petrol takes place automatically with:

– the yellow **OFF** LED on constantly;

– the green **ON** LED flashing;

– an acoustic warning from the switch buzzer (fast frequency).

IMPORTANT The buzzer warns the driver that the engine is running on petrol; therefore they must refuel with LPG before it runs out.

IT IS possible to deactivate the buzzer by pressing switching button **A**.

Do not switch between the two operating modes whilst starting the engine

SYSTEM FAILURE SIGNALLING

The car has an autodiagnostic system capable of signalling any malfunctions in the LPG fuel system through the green **ON LED fig. 7** flashing. In the case of faults that could affect the correct operation of the engine, the LPG control unit will automatically switch from LPG operation to running on petrol.

This condition will be shown by:

– the yellow **OFF** LED on constantly;

– the green **ON** LED flashing;

– an acoustic warning from the switch buzzer (slow frequency).

In this condition it is possible to continue driving running on petrol (excluding the LPG fuel system). To stop the buzzer, press button A: the green ON LED will go out and the yellow OFF LED will remain on constantly. Go to a Fiat Dealer as soon as possible to have the system checked.

FUEL CUT OFF SWITCH

In the case of LPG operation as well, the safety switch is triggered if the car is involved in an impact immediately cutting off the supply (safety solenoid valve closed) and causing the engine to cut out.

For further information, see the "Fuel cut off switch" paragraph in the "Controls" chapter in the Owner Handbook.

STARTING THE ENGINE

The engine is always started on petrol even with the switch in the LPG position (green LED flashing, yellow LED on constantly) and switches automatically soon after.

There must always be some petrol in the tank to protect the petrol pump.

To carry out the starting manoeuvre, see the warnings and advice in the Owner Handbook under the chapter "Starting the engine".

REFUELLING THE CAR

LPG FILLER

The gas filler is located next to the petrol filler cap. It has a one-way valve, located in the actual filler body.

To access the filler **B - fig. 8**, open the access flap **A** and undo the cap **C**.

Observe the following precautions during the refuelling operation:

– switch off the engine;

– apply the handbrake;

– turn the ignition key to the **STOP** position;

– do not smoke;

– hand the special adaptor over to the qualified LPG refuelling personnel.

IMPORTANT Before refuelling with LPG, the qualified personnel should make sure that the adapator is correctly tightened onto the filler fitting.

IMPORTANT Depending on the country, there are two types of adaptors for refuelling pumps. The adaptor that comes with the car in a special case is specifically designed for the country in which the car is sold. If you are in a different country, find out what type of adapator is used there.

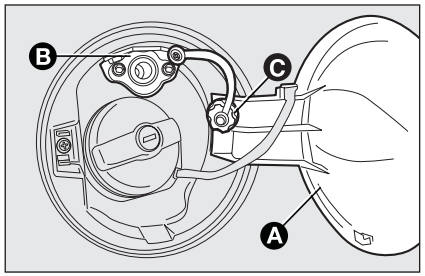


fig. 8 F0Q0807m

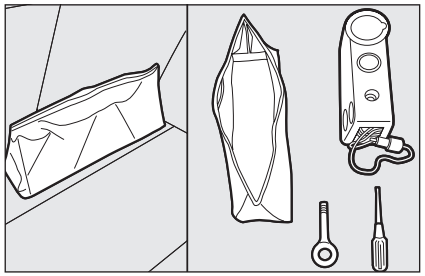


fig. 9 F0Q0281m

IMPORTANT Only use LPG for motor vehicles.

IMPORTANT Look after the LPG adapator carefully so that it does not get damamged.

WHEELS

The car does not have a spare wheel but a tool box that contains the "Fix&Go automatic" quick tyre repair kit, the tow hook and a screwdriver. The box is located in the luggage compartment, behind the rear seat backrest.

To use the "Fix&Go automatic" kit, see the instructions in the Owner Handbook that this supplement is an appendix of.

FUSE REPLACEMENT

The LPG system components are protected by the following fuses:

– Additional 20A fuse located to the outside of the engine compartment junction unit: LPG control unit power supply (battery positive);

– 7.5A F16 fuse located in the engine compartment junction unit: LPG control unit power supply (ignition-controlled positive) and coil relay for gas solenoid valve power supply.

For all the other fuses, consult the Owner Handbook that this supplement comes with.

SCHEDULED SERVICING PLAN

Additional operations to the Servicing Plan in the Owner Handbook.

Thousands of kilometres	30	60	90	120	150	180
Visually inspect the condition of: LPG piping and connectors and LPG tank fastening	●	●	●	●	●	●
Replacement of filter inside the pressure regulator			●			●
Paper filter replacement (LPG in gaseous state)	●	●	●	●	●	●
Check operation and parameters of fuel supply system using autodiagnostic socket	●	●	●	●	●	●
Check mechanical tappet clearance and restore if necessary	●	●	●	●	●	●

ENGINE

ENGINE CODE - BODYWORK VERSIONS

	Engine code	Bodywork version
1.4 16V	192B2000	198AXA1B G00C

IDENTIFICATION PLATE (STAGE 2)

Following the installation of the LPG system components, a plate (Stage 2) is fitted to the engine compartment front cross-member, that contains the following information:

– Name of manufacturer;

– Homologation number (Stage 2);

– Vehicle type identification codes;

– Vehicle weights;

– Engine type;

– Bodywork version code.

INTRODUCTION		1.4 16V	
Engine identification code		192B2000	
Cycle		Otto	
Number of cylinders and position		4 in line	
Piston diameter and stroke	mm	72 x 80.4	
Total capacity	cm	1368	
Compression ratio		11	
		LPG	Petrol
Max power CEE	kW	66	66
	HP	90	90
at a speed of	rpm	5500	5500
Max torque CEE	Nm	128	128
	kgm	13	13
at a speed of	rpm	4500	4500
Spark plugs		NGK DCPR7E-N-10	
Fuel		LPG	Unleaded petrol 95 RON

LPG FUEL SYSTEM

Electronic injection with special LPG injectors.

Type: Phased, sequential, multipoint.

Stoichiometric metering of the air/gas mixture.

Engine idle speed: 750 ± 50 rpm

The LPG injection system is controlled by a dedicated control unit (connected to the petrol one) using the sensors already on the car.

IGNITION

Static advance, electronic, integrated with the injection.

WARNING

Modifications or repairs to the fuel feed system that are not carried out properly or do not take the system's technical specifications into account can cause malfunctions leading to the risk of fire.

WEIGHTS

Weights (kg)	1.4 16V
Unladen weight (with all fluids, fuel tank filled to 90% and without optional equipment):	1205
Payload including the driver (1):	510
Maximum permitted loads (2) – front axle: – rear axle: – total:	 1000 860 1715
Maximum permitted load on the roof (3):	80

(1) If special equipment is fitted (sun roof, trailer towing equipment, etc.) the unladen weight will increase and consequently the payload will decrease in relation to the maximum permitted loads.

(2) Loads not to be exceeded. The user is responsible for arranging goods in the luggage compartment and/on load carrying platform within the maximum permitted loads.

(3) Lineaccessori Fiat range roof racks, maximum capacity: 50 kg.

DIMENSIONS

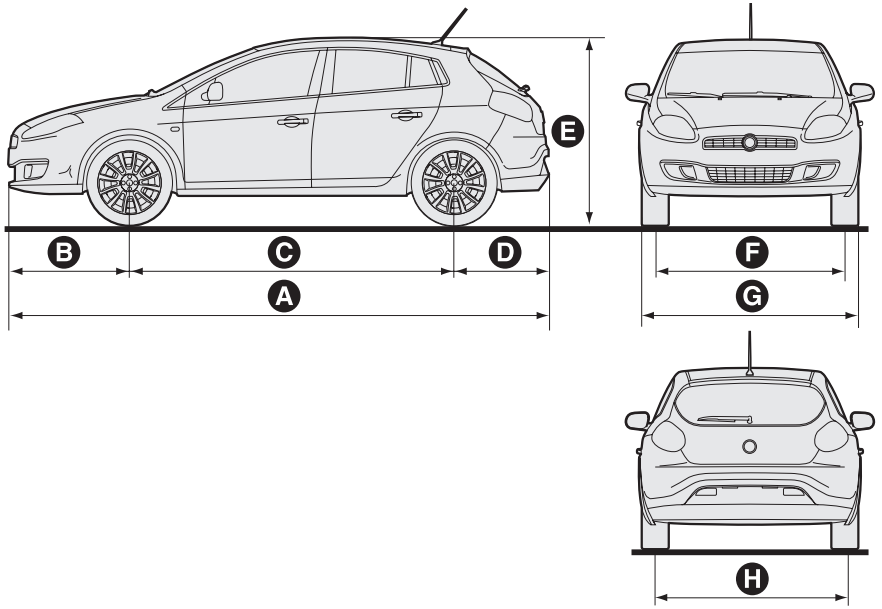


fig. 10

Dimensions are expressed in mm and refer to the vehicle equipped with its original tyres.

Height is measured with vehicle unladen.

Luggage compartment volume

Capacity with vehicle unladen (V.D.A. standards): . . . . . 365 dm^3

Capacity with rear seat backrest folded over: . . . . . 1139 dm^3

A	B	C	D	E	F	G	H
4336	974	2600	762	1498	1538 1530 (●)	1792	1532 1524 (●)

Small variations in size are possible depending on the dimensions of the rims

(●) with optional 18" alloy wheels

CAPACITIES

Petrol

Petrol . . . . . litres 57

– including a reserve of . . . . 8-10 litres

LPG

– maximum refuelling capacity (*) . . . . . litres 41

(*) The figure already takes into account the 80% tank filling limit and the residual fluid required for the pump and the maximum permitted capacity. **There may be slight variations to this figure as a result of: differences between network pump supply pressures, pumps with different supply/stop specifications, tank not completely in reserve conditions**.

It should be remembered that when using a fuel like LPG, the range is very variable because, in addition to the vehicle driving and maintenance conditions, it also depends on the different composition of the gas which may vary, not only seasonally, but also from supplier to supplier. LPG is, in effect, a composition of gas (butane and propane) mixed in a way that may not be standardized.

During LPG operation, the "Instant consumption" and "Average consumption" readings are not significant, but remain valid for all other functions.

IMPORTANT Only use LPG for motor vehicles.

If, when refuelling with LPG, the tank is filled with more than the 41 litres, seek assistance immediately from a Fiat Dealer. Periodically (at least once every six months) it is advisable to let the LPG in the tank run out and, at the first refuelling, check that it does not exceed the maximum capacity of 41 litres.

FUEL CONSUMPTION

The fuel consumption figures given in the table below are determined on the basis of the homologation tests laid down by specific European Directives.

FUEL CONSUMPTION ACCORDING TO DIRECTIVE 2004/3/CE (litres x 100 km)

	Petrol	LPG
Urban	8.6	10.6
Extraurban	5.5	7.0
Combined	6.7	8.3

The range (when running on LPG), referring to combined consumption, is 494 km.

CO_2 EMISSIONS

The CO_2 emission figures refer to combined consumption.

CO_2 EMISSIONS ACCORDING TO 2004/3/CE DIRECTIVE

LPG: 134 g/km

Petrol: 156 g/km

NOTES

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