



DUCATO FL (290)



GENERALITÀ - IMPIANTO ELETTRICO



INTRODUCTION - ELECTRICAL EQUIPMENT



ALLGEMEINES - ELEKTRISCHE ANLAGE



GENERALIDADES - INSTALACIÓN ELÉCTRICA



GENERALITES - SYSTEME ELECTRIQUE



OPIS OGÓLNY - UKŁAD ELEKTRYCZNY



COMPACT NETWORK ARCHITECTURE

The electrical system on this vehicle adopts the COMPACT architecture, developed specifically to integrate the most sophisticated electronic functions in the most efficient way.

This structure is the vehicle's "nervous system": it directly controls all the body functions (access control, visibility, on-board information, comfort etc.) and dialogues with the various chassis and power unit subsystems, optimising dimensions, diagnosticability, reliability, weight and cost of the system.

The most important control unit in the architecture is undoubtedly the Body Computer, in which the following converge:

- A **high-speed C-CAN** (500 kbit/s) which connects the control units for dynamic control of the vehicle: Powertrain Control Module, ABS control units and Automatic Transmission, Driving Advisor and Gateway control units when present;
- A **low-speed B-CAN** (50 kbit/s) for the so-called "body-related" functions: connects the control units for the Instrument Panel, Airbag, Parking Sensors, Automatic Climate Control, Radio and/or Navigator, Tyre Pressure Sensors and managing a Trailer, if present
- A **low-speed serial line (LIN)** (20 kbit/s) which connects the Anti-Theft, Rain/Dusk Sensor and Battery Sensor (IBS) control units

The two C-CAN and B-CAN networks are physically separated but both flow into the NBC, which is considered the master node for the two networks; it is also the gateway which allows the transfer of information/data from one network to another.

The diagnosis connector (EOBD) is external to the Body Computer node and joins the two CANs. Therefore, node diagnosis is not performed by means of diagnosis messages sent through the communication networks, except for the Power Steering and Additional (Webasto) Heater control units, which are connected to the diagnosis socket directly via K lines.

The Body Computer also manages all the functions for the user, central door locking and unlocking with or without remote control, external lighting control (headlights, light clusters and direction indicators), internal lighting control (front and rear roof lights), wiping, heated rear window, etc.

The distribution and protection of the power lines is ensured by three fuse/relay boxes:

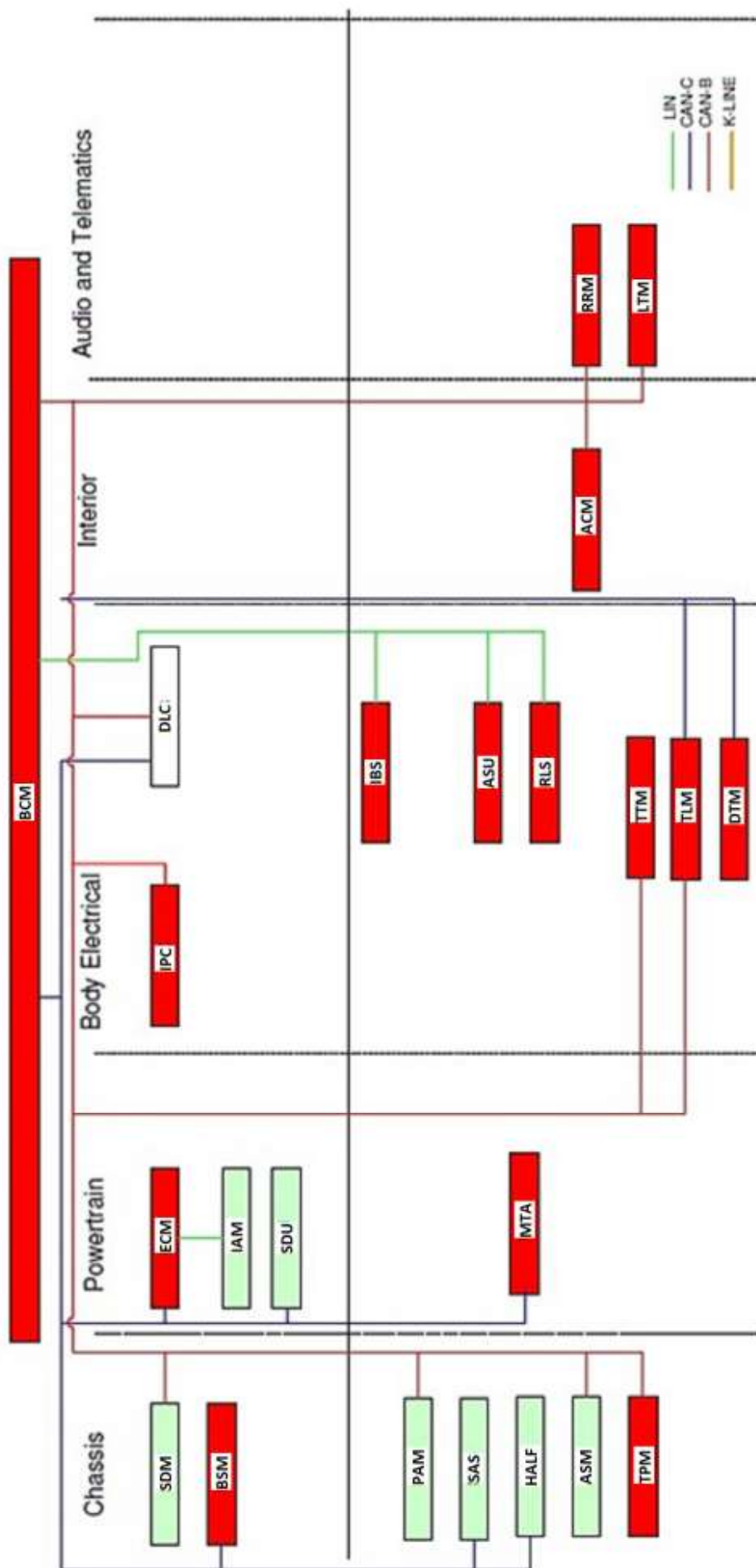
- the primary box, to protect the main power supply section, is located on the battery, fixed directly to the positive terminal;
- the second box is connected directly to the Body Computer to protect all the devices that it manages;
- the third is inside the engine compartment as a protection and junction for all devices for the engine itself (Powertrain Control Module, sensors, actuators, fans, etc.). It also has a terminal to connect to for carrying out emergency starting.

Finally, it is also possible to have a fourth junction unit when the vehicle has the optional electrical setups for vehicles to be converted subsequently by coach work fitters (camping cars, mobile shops, refrigerated vehicles, armoured vehicles, ambulances, etc.).

The main electronic components managed by the electronic architecture are described in the following diagram:



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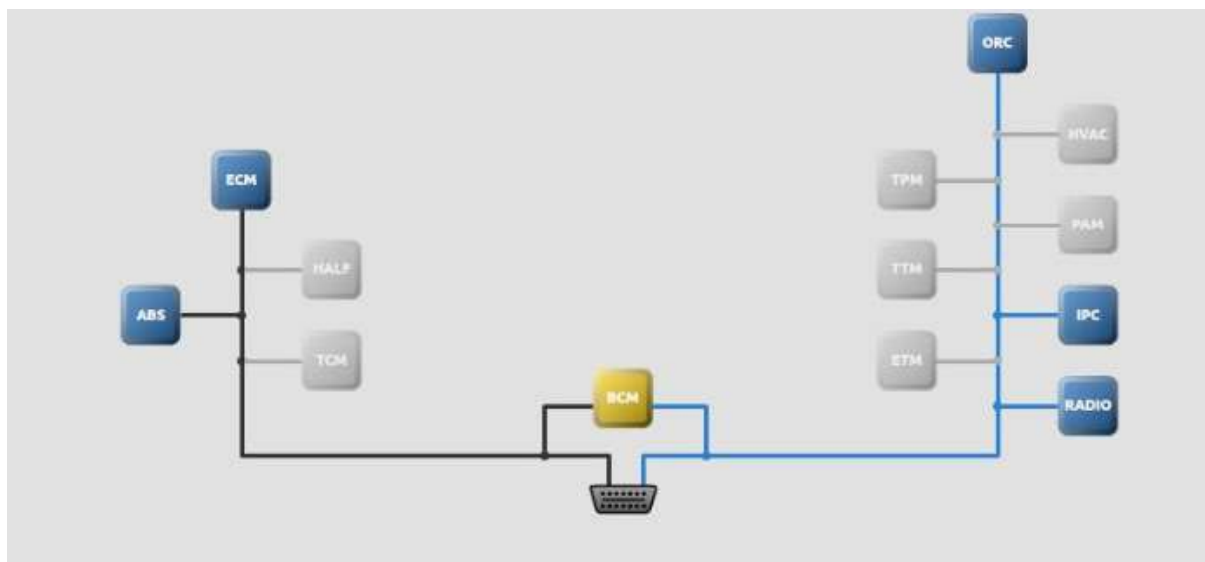


The list of nodes and their position on the CAN is illustrated in the following table:

Acronym	Node		Network
BCM	Body Control Module	Body Computer node	B-CAN / C-CAN
SDM	Sensing and Diagnostic Module	Airbag node	CAN-B
BSM	Brake System Module	Braking System Node	C-CAN
PAM	Parking Assistant Module	Parking sensor node	CAN-B
SAS	Steering Angle Sensor	Steering angle node	C-CAN
HALF	Haptic Lane Feedback	Haptic Lane Feedback	C-CAN
ASM	Air Suspension Module	Air suspension node	CAN-B
TPM	Tyre Pressure Module	Tyre sensor node	CAN-B
ECM	Engine Control Module	Engine management node	C-CAN
IAM	Intelligent Alternator Module	Intelligent alternator module	LIN
SDU	Smart Driver Unit	Smart Driver Unit	C-CAN
MTA	Manual Transmission Automatic	Robotised Gearbox Node	C-CAN
IPC	Instrument Panel Cluster	Instrument panel node	CAN-B
DLC	Diagnosis socket	Diagnosis socket	B-CAN / C-CAN
IBS	Battery sensor	Battery sensor	LIN
ASU	Alarm Siren Unit	Alarm siren	LIN
RLS	Rain Light Sensor	Rain and dusk sensor	LIN
TTM	Trailer Tow Module	Trailer	CAN-B
TUM	Truck Upfitter Module	Gateway	B-CAN / C-CAN
DTM	Digital Tachograph Module	Digital tacograph	C-CAN
ACM	Automatic Climate Module	Automatic climate control system	CAN-B
RRM	Radio Receiver Module	Radio receiver (VP2)	CAN-B
LTM	Low Level Telematic Module	Radio receiver (VP1)	CAN-B

VEHICLE VIEW

The following figure shows the vehicle view which can be displayed with the wiTECHPlus diagnosis equipment



At the moment, to run diagnosis on the Sagem Power Steering, Webasto heater and Continental Air Spring nodes, it is necessary to use the Examiner Emulator environment.

REPLACING AND INITIALIZING NETWORK NODES

Some of the CAN nodes are programmed with default settings which the customer will find on purchasing the vehicle.

The nodes storing this information are:

- BCM: Body Computer;
- IPC: Instrument Panel Node;
- RRM and LTM: Radio Receiver Node;
- ACM: Climate Control Unit Node;
- SDM: Airbag Node.
- PAM: Parking sensor module
- TPM: Tyre pressure sensor module

If the Body Computer is being replaced, an "identical copy" of the Body Computer must be obtained from the Parts Dept. as a V.O.R. order supplying the vehicle chassis number: this copy will contain all the default settings entered on a new vehicle, which are stored in the Spare Parts database for the vehicle chassis number.

If the other nodes described above are being replaced, Spare Parts will send a blank component: once fitted, the initial default data must be transferred to it by carrying out the PROXY ALIGNMENT procedure using Examiner.

LOGISTIC MODE

There is software inside the Body Computer that excludes all the vehicle's electrical loads, except the main functions (vehicle starting, lights). This function makes it possible to save battery energy which is useful when the vehicle is parked in compounds before being sold.

The function must be disabled in the workshop before the vehicle is handed over to the customer

Deactivation procedure

The procedure is as follows:

- Connect the terminal of the diagnosis device to the vehicle's EOBD socket and turn the key to MAR;
- check that the "alternator recharging" warning light is flashing, to indicate that the low consumption "Logistic Mode" is active;
- deactivate the low consumption supply mode by carrying out the procedure using the Body Computer diagnosis equipment;
- the Body Computer and all control units involved in performing this operation, on receiving the CAN message, will restore their full operation and send a confirmation message to the Body Computer node;
- delete the error memory in all control units with a diagnosis function;
- switch off and then on again (keyOFF - keyON);
- check that the "alternator recharging" warning light is on constantly.

BODY COMPUTER NODE

The Body Computer Node (NBC) is an electronic component which manages the vehicle's serial networks and the basic functions of the vehicle (interior and exterior lighting, diagnosis, windscreen wipers, heated rear window, locking/unlocking of doors, fuel level, management and acquisition of ignition key status, etc.)

It houses the communication gateway between the B-CAN and C-CAN and also carries out interconnection functions between cab, front and dashboard wiring.

It is located under the dashboard to the left.

Functions managed by the body computer node

The NBC carries out the following functions:

- receives and transmits information on the B-CAN (e.g. diagnosis, warning lights, controls, data);
- receives and transmits information on the C-CAN;
- houses the gateway for communication between the B-CAN and C-CAN;
- is connected to the cab, front and dashboard wiring, managing numerous functions;
- manages low consumption supply mode (Logistic Mode);
- is connected to the junction units to receive power and control the relay switches.

The following functions are included:

- master for the whole system: management of slave nodes in its direct jurisdiction and monitoring by other master nodes, monitoring and management of protocol errors, timer control;
- diagnosis of the whole system: collection of diagnosis information, management of diagnosis through diagnosis equipment;
- immobilizer: management of key code with possible engine ignition release;
- anti-theft: remote control receiver management and connection with alarm siren system;
- acquisition of on/off signals: reverse gear engaged, brake lights control, INT from ignition switch, (left) front brake pad wear, bonnet button, door opening status switches, driver and passenger side catch signal, FIS (inertia switch) control, handbrake control, hazard warning lights control;
- acquisition of analogue signals: parking lights control, engine coolant level, brake fluid level, alternator voltage (D+), outside temperature signal, fuel level, battery voltage, windscreen wiper intermittent operation, light selector from DEV (steering column stalk), main beam headlights/flasher signal from DEV, direction indicators control from DEV, vehicle door locking/unlocking from PCC (Central Control Panel), windscreen wiper selector signal from DEV, windscreen washer selector signal from DEV, headlight alignment adjustment signal from PCS (Left Control Panel), heated rear window control from PCC, rear fog lights control from PCC, fog lights relay control;
- acquisition and repetition of vehicle speed signal;
- management of the courtesy lights with timer and dimmer function;
- management of ON/OFF outputs on relay: windscreen washer pump, headlight washer pump, fog lights, dipped beam headlights, main beam headlights, starting, windscreen wiper (first and second speeds), services relay;
- ON-OFF management on a relay in LH/RH direction changes and acoustic feedback for hazard warning lights;
- ON/OFF output management directly on loads and light check function: front (left and right) and rear (left and right) side lights, front (left and right), rear (left and right) and side (left and right) direction indicators, number plate lights (left and right), brake lights (left and right), rear fog lights (left and right);
- management of the driver for the ideogram lighting;
- LINE line management for rain/dusk sensor, alarm siren control unit and IBS;
- preparation for possible inclusion of new electrical functions.

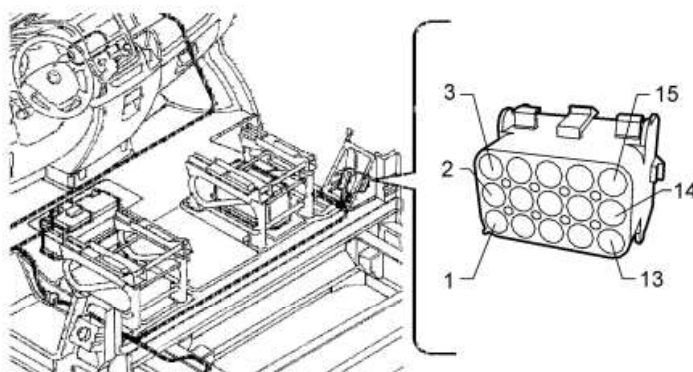
OPTIONAL WIRING CONTROL UNIT (CCO) AND TRANSFORMER SOCKET

The optional wiring control unit CCO is located on the right side of the cab, on the rear post of the front passenger side door.

Depending on the version and the structure of the vehicle for the coach work fitter versions, this control unit may feature one or two modules and an additional socket known as a "transformer socket" (or "bodywork socket") - P125 in the wiring diagrams. In addition, in the compartment where it is housed, there may be additional components (fuses and relays) for specific functions relating to particular versions (people carrier).

TRANSFORMER SOCKET

The transformer socket (or "bodywork socket") is available as an optional component and has the function of facilitating the conversion of the vehicle by coach work fitters for multiple requirements, providing the repetition of various signals, including the two B-CAN cables.



OPTIONAL WIRING MODULE (MCA)

The Optional Wiring Module (MCA) or additional system fuse box is used in vehicle versions with robotised gearbox and for the ambulance and minibus versions.

It incorporates the protective fuses for the additional Webasto heater

CAN (TUM) GATEWAY FOR FITTER/INSTALLER VERSIONS

Fitters/installers needed to fit some electronic devices not compatible with those installed in factory, this resulted in the need to use the CAN (CAN-B and CAN-C) gateways between the applications typical of Fiat Auto (FGA) and the world of FMS (Fleet Management System Interface).

The FMS interface is a standard system, developed by the main European manufacturers of commercial vehicles to make possible computerised applications, independent of the manufacturers. The TUM control unit is therefore an interception and storage device for data and signals (sniffer), used as a gateway between CAN-B and CAN-C of the vehicle and FMS interface.

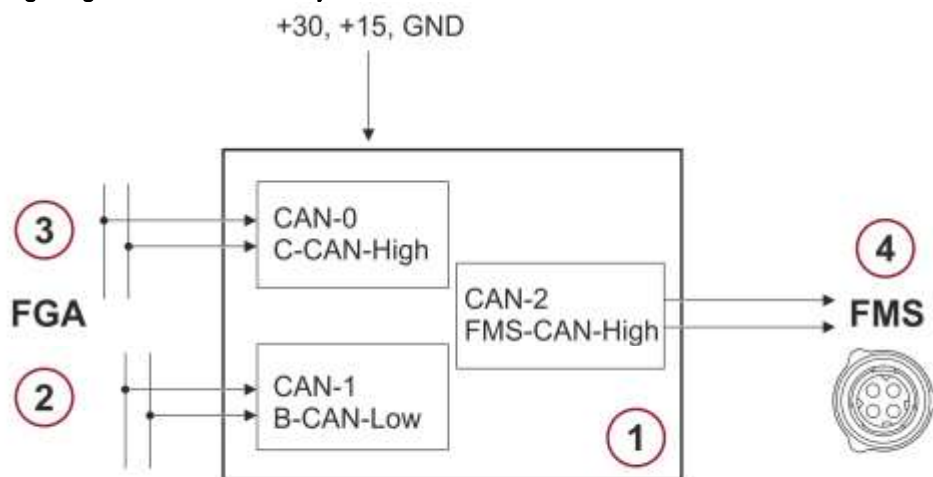


TUM control unit

Operation of the TUM gateway involves:

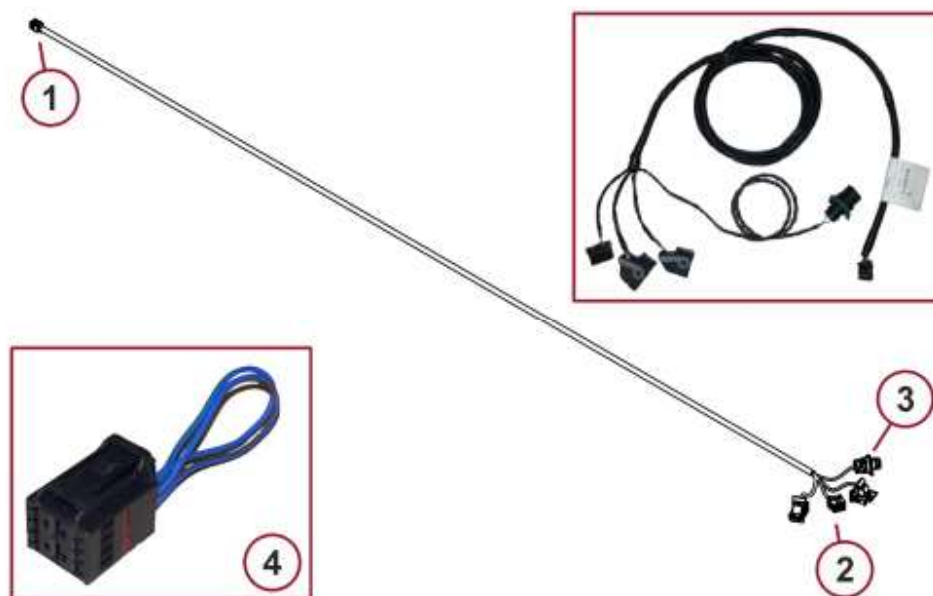
- transformation 1:1 of some signals of the vehicle message map to the FMS standard – Direct Gateway -;
- the use of various vehicle signals to calculate the required FMS signals not present directly on the vehicle network – Indirect Gateway -.

The operating diagram of the Gateway is shown below.



1. TUM control unit
2. CAN-B line (CAN-1) - input -
3. CAN-C line (CAN-0) - input/output -
4. CAN-C line (CAN-2) - CAN-C diagnosis connector (SAE J1939) –

A dedicated connecting harness, about 2 metres long, is provided for this application.



1. Disconnection with vehicle front wiring
2. TUM control unit connectors
3. CAN-C diagnosis connector (SAE J1939)

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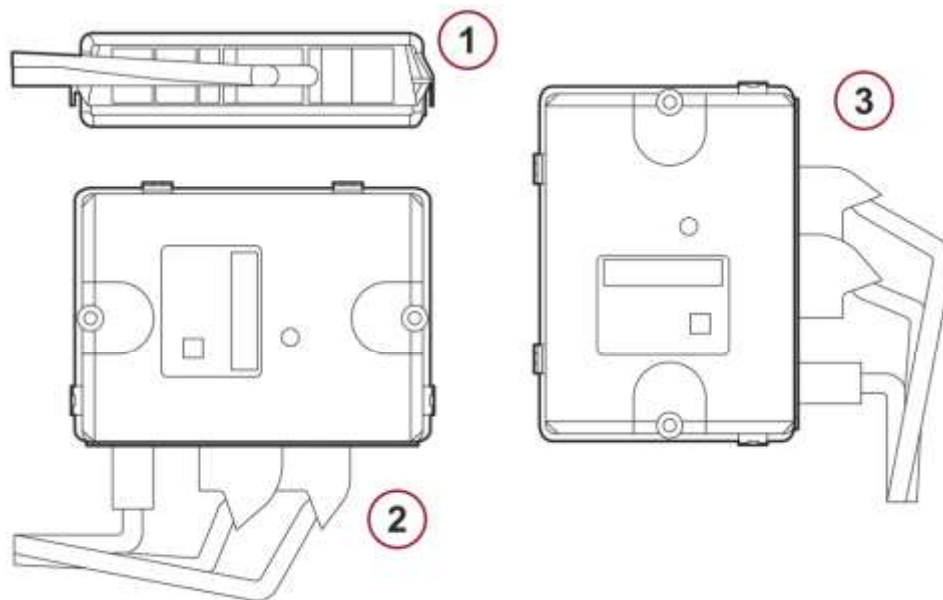
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The position of the harness and control unit on the vehicle is chosen by the fitter/installer; the harness can be connected to the vehicle with disconnection of the front wiring in the area under the dashboard, Body Computer side (on the left for LHD versions and on the right for RHD versions).

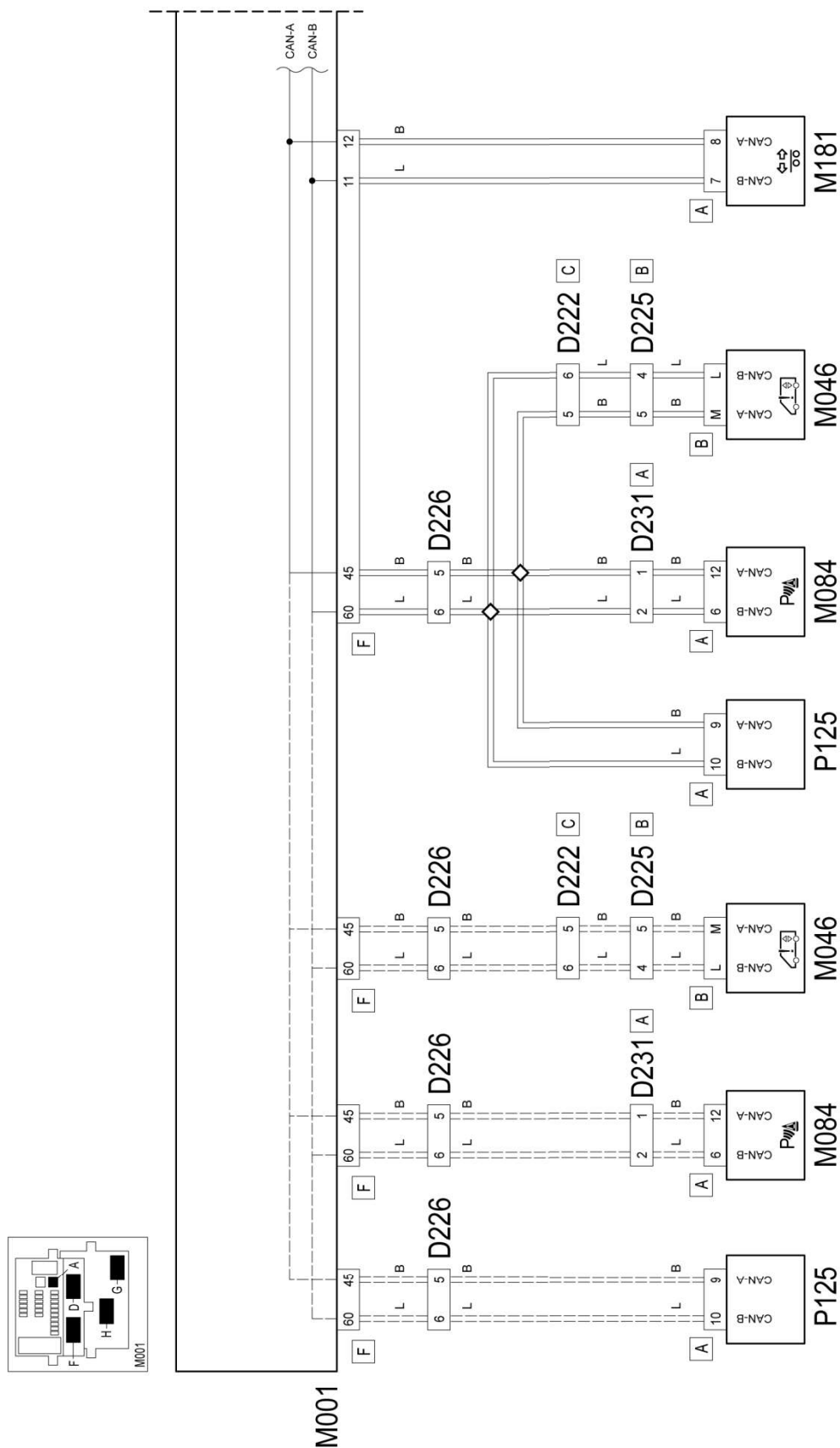
The only restriction for fitters/installers is to place the electronic device in a dry area, because the TUM control unit is not water-proof.

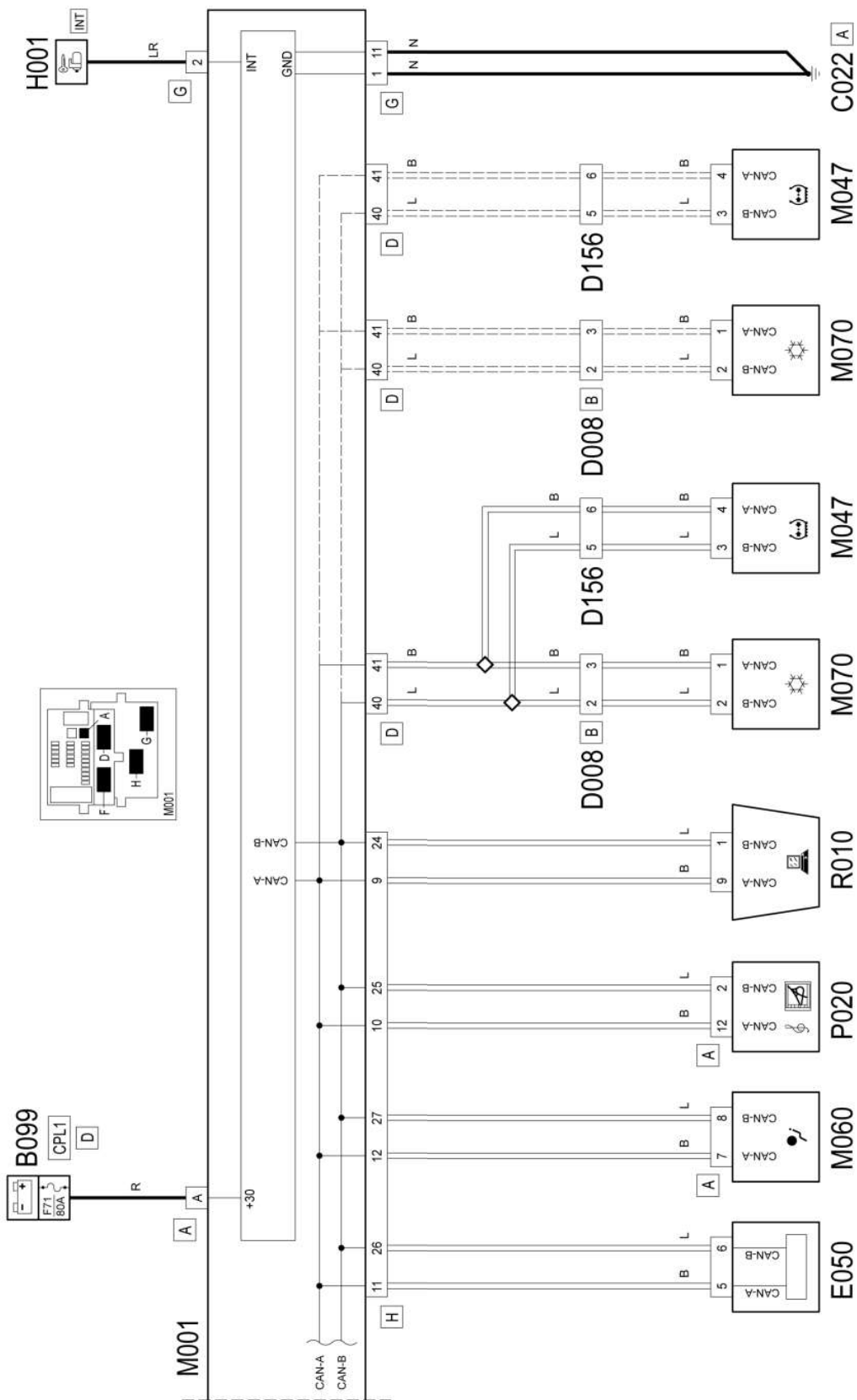
The three possible installation modes are shown below.

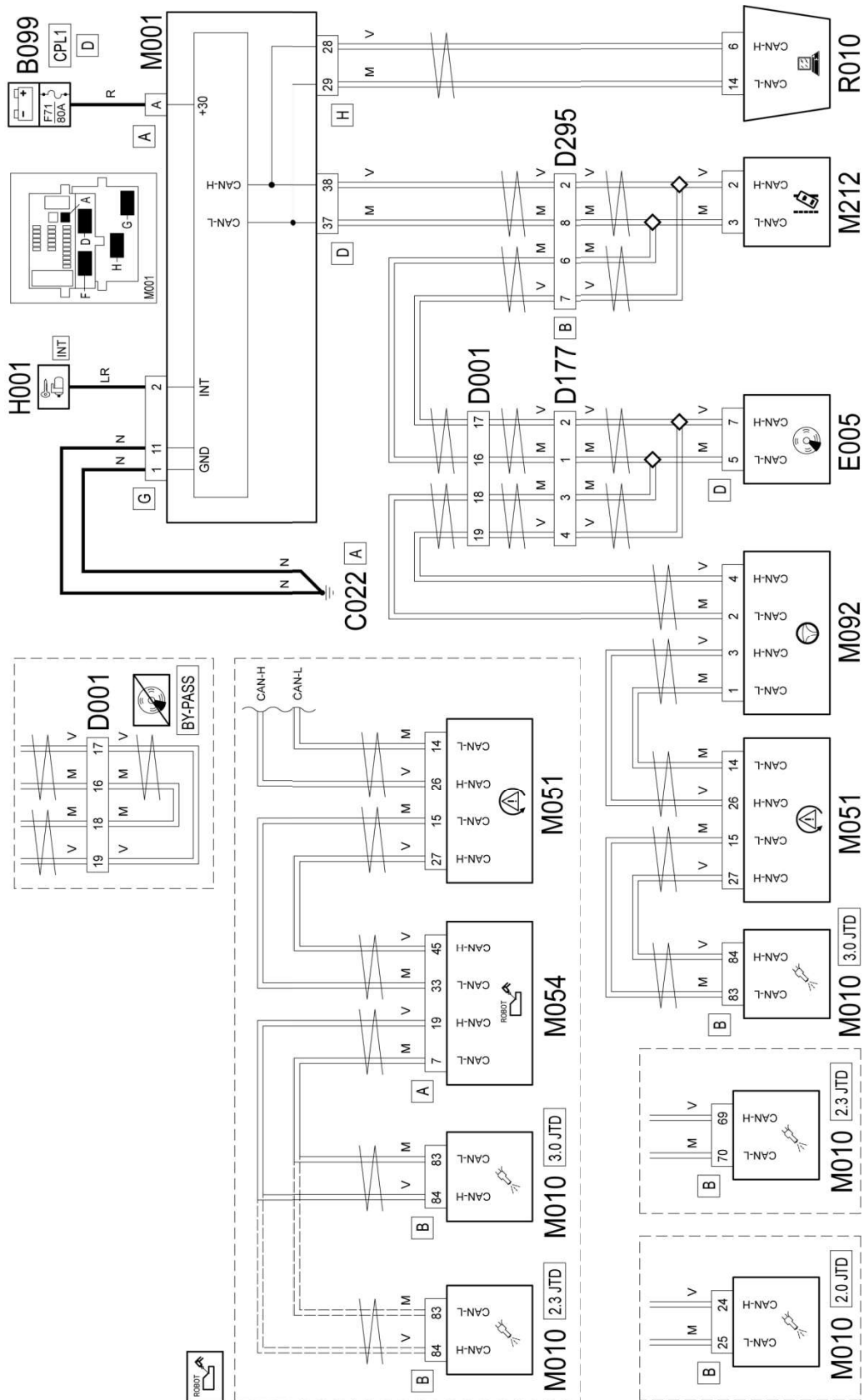


1. Horizontal
2. Vertical (connectors located at the bottom)
3. Vertical (connectors located at the side)

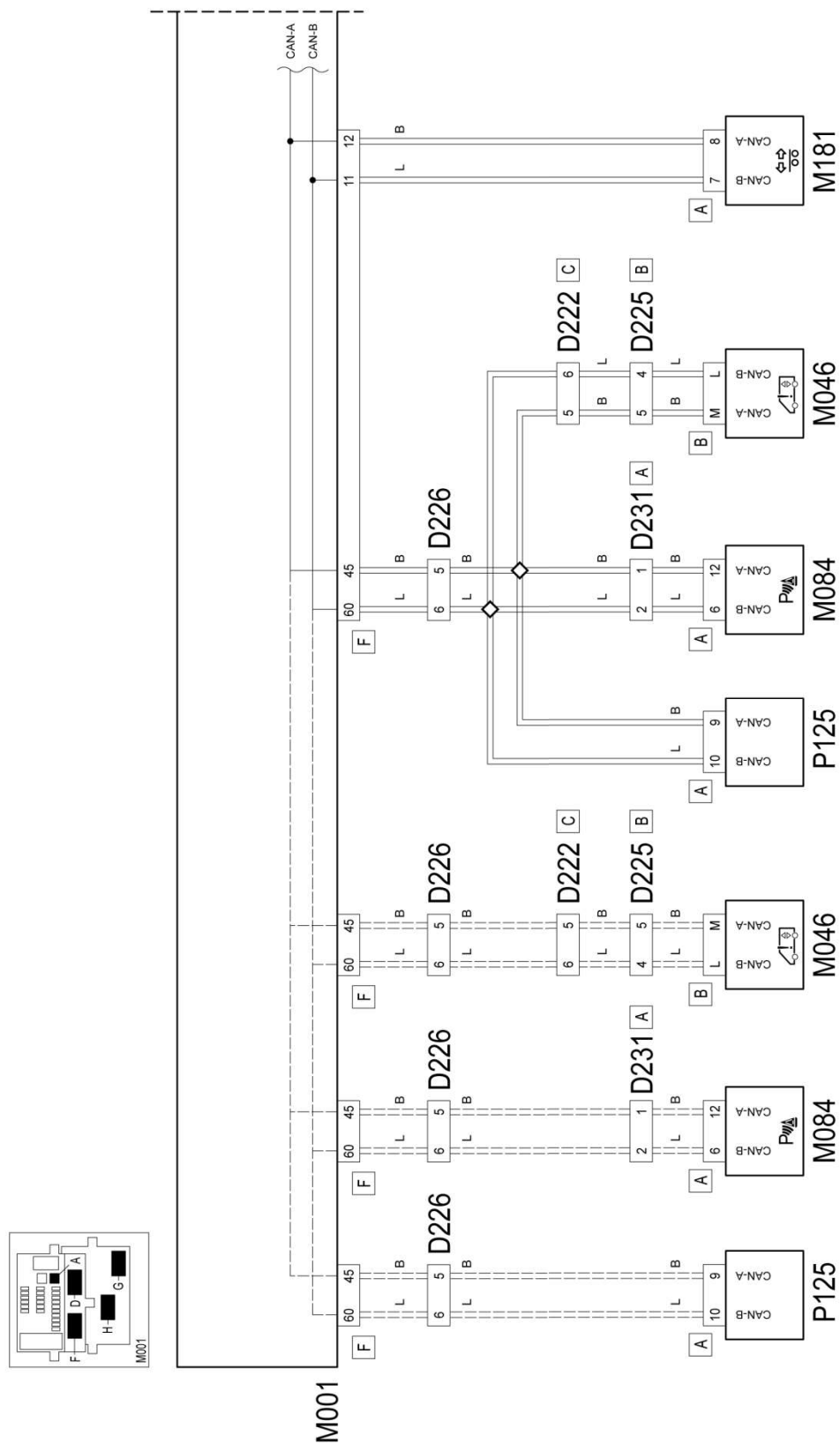
WIRING DIAGRAMS WITHOUT TUM

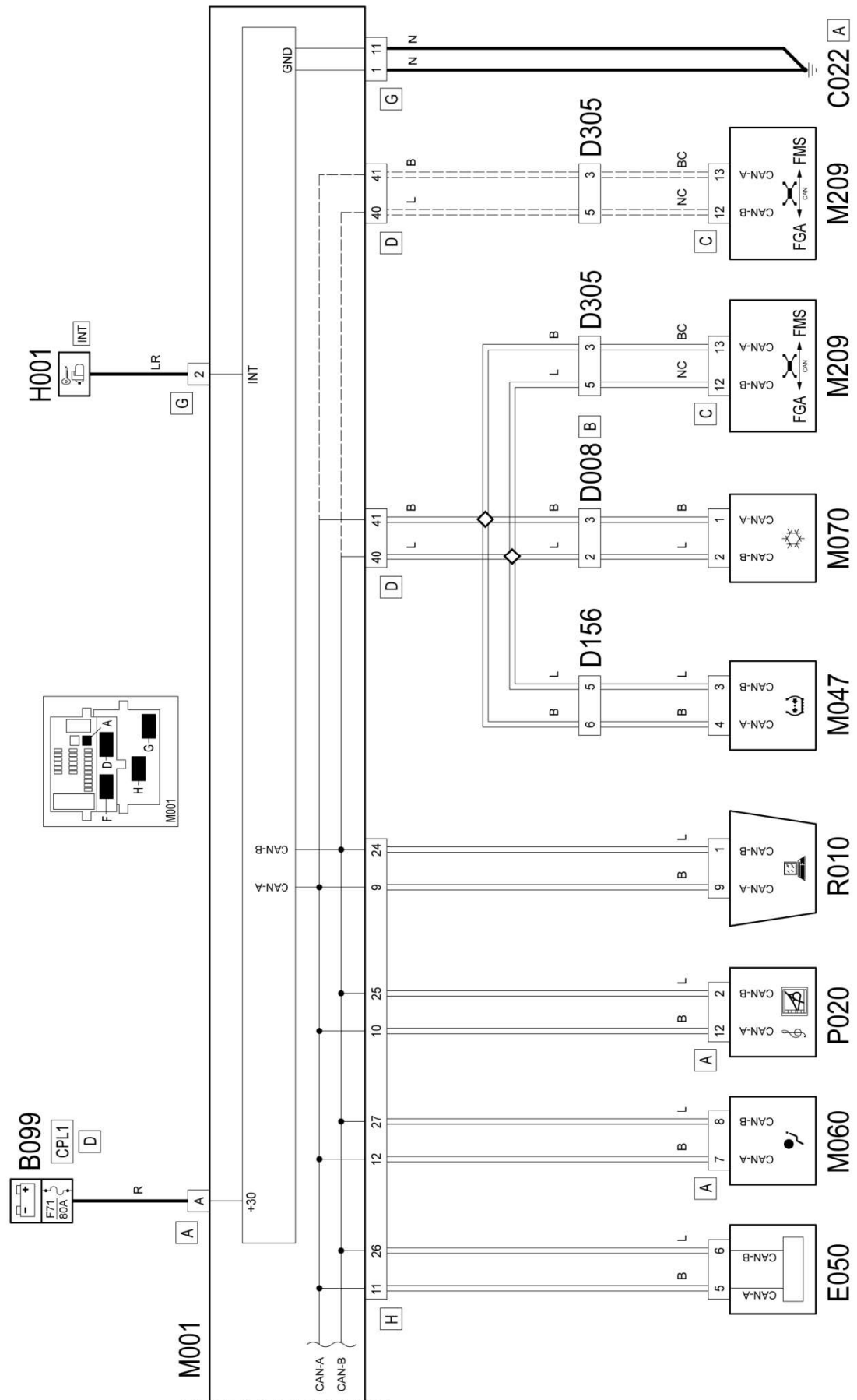


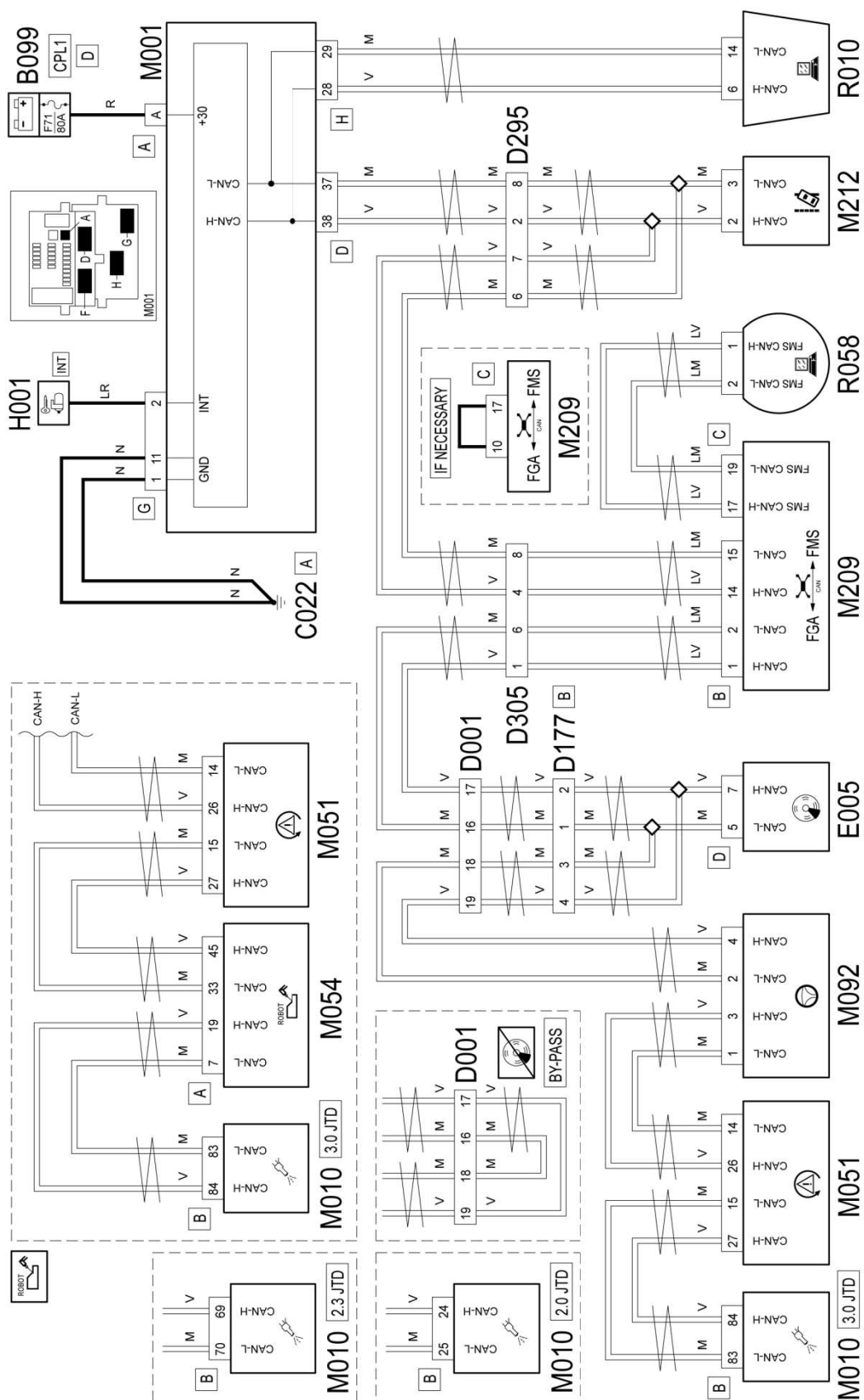




WIRING DIAGRAMS WITH TUM







Key to components

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COMPONENT	NAME
B099	MAXI FUSE BOX ON BATTERY
E005	TACHOGRAPH
E050	INSTRUMENT PANEL
H001	IGNITION SWITCH
M001	BODY COMPUTER
M010	POWERTRAIN CONTROL MODULE
M046	CONTROLLED SUSPENSION CONTROL UNIT
M047	TPMS CONTROL UNIT
M051	BRAKING SYSTEM CONTROL UNIT
M060	AIRBAG CONTROL UNIT
M070	CLIMATE CONTROL SYSTEM CONTROL UNIT
M084	PARKING SENSOR CONTROL UNIT
M092	STEERING ANGLE CONTROL UNIT
M181	TRAILER CONTROL UNIT
M054	ROBOTISED GEARBOX CONTROL UNIT
M209	TUM control unit
P020	RADIO
P125	TRANSFORMER SOCKET
R010	MULTIPLE DIAGNOSIS COUPLING
R058	CAN-C diagnosis connector

START&STOP SYSTEM (OPT.)

The Start&Stop device makes it possible to automatically switch off the engine when traffic conditions mean that the vehicle is stopped and to restart the power unit when the driver is about to set off.

The S&S system improves the efficiency of the vehicle by reducing consumption, the emission of harmful gases and noise pollution. The operating logic is managed, in the main, by the Powertrain Control Module and the Body Computer.

The device is essentially based on a starting system (battery and starter) capable of restarting the engine quickly and quietly. The device can do this a far greater number of times than a normal production system would need to.

The goals of the starting system in terms of driveability, starting responsiveness (when warm), reliability, durability and safety involve the adoption of a more powerful and robust starting system: this is guaranteed by the use of a larger battery and starter.

SYSTEM COMPONENTS

The system contains other components (mainly sensors and control strategies) that manage the stopping and restarting operations without requiring the drivers to change their driving style, ensuring the safety, driveability and energy balance aspects of the vehicle with a minimum impact on climate comfort and the accessibility of the on board services.

IBS (Intelligent Battery Sensor)

The battery charge status sensor IBS, located on the negative battery pole, is connected directly to the body power earth and allows the battery status to be always evaluated correctly, preventing any undesired current consumption.

The actual negative pole (known as "dummy pole") is offset slightly and must be considered as the real earth reference.

The IBS sensor detects the following battery values:

- Battery voltage (V)
- Battery current (A)
- Battery temperature (°C)

Processing these parameters results in the following:

- SOC: Battery state of charge
- SOH: Battery ageing
- SOF: Battery state of function

Determining the SOC, SOH and SOF is essential for correct operation of the system.

When the IBS receives power supply for the first time or after a break in supply, it enters a recalibration stage in which the IBS must recognise the type of battery, its specifications and its status.

Heavy Duty Batteries

On this version the battery is the heavy duty type equipped for greater electrical stress.

Replacing a heavy duty battery with a regular type of battery may lead, in addition to a reduced availability of the Start&Stop system, to the early wear and a much shorter life of the battery.

The battery used on versions with Start&Stop has the following characteristics:

- Rated voltage: 12 V
- Intensity: 850 A
- Capacity: 105 Ah

Alternator

Compared with the alternator fitted on a vehicle without Stop&Start, the alternator on Stop&Start versions has an increased current supply capacity.

Alternator	2.0 MultiJet	2.3 MultiJet	3.0 MultiJet
Voltage (V)	12** 14	14	14
Rated current (A)	100 120* 150**	140	110

* For versions with "Dusty areas KIT" or air conditioning/climate control system

** Panorama version

Starter

Various mechanical and electrical aspects of the starter on versions with Start&Stop have been modified with the following aims in mind:

- to guarantee a vastly superior number of start-ups, by modifying the materials;
- noise reduction during starting, by modifying the materials and geometry;
- to reduce the starting time, by modifying the geometry and increasing the power of the starter.

Warning : The voltage stabiliser is no longer present on Start&Stop versions, since it has been incorporated into the radios of the latest generation

Start&Stop deactivation

On the control panel to the left of the steering wheel, there is a system deactivation button



Left switch panel



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INSTRUMENT PANEL

The instrument panel is installed behind the steering wheel. It is elliptical in shape and has an upper anti-glare lid. The white numbers stand out against the black background. Its dimensions and position guarantee optimum visibility/legibility of the information in all vehicle usage conditions (day/night) without reflections, distortions or double images.

It has two circular elements (speedometer and rev counter), two quarter-circle sections (water temperature and fuel level), an LCD screen (Comfort and Matrix versions described below) and the control and alarm warning lights.

With headlights on, the panel has orange lighting.

The control panel display is available in two versions, depending on the vehicle's trim level and technological contents:



Comfort version



Matrix version

The control panels illustrated above give an indication in "km".

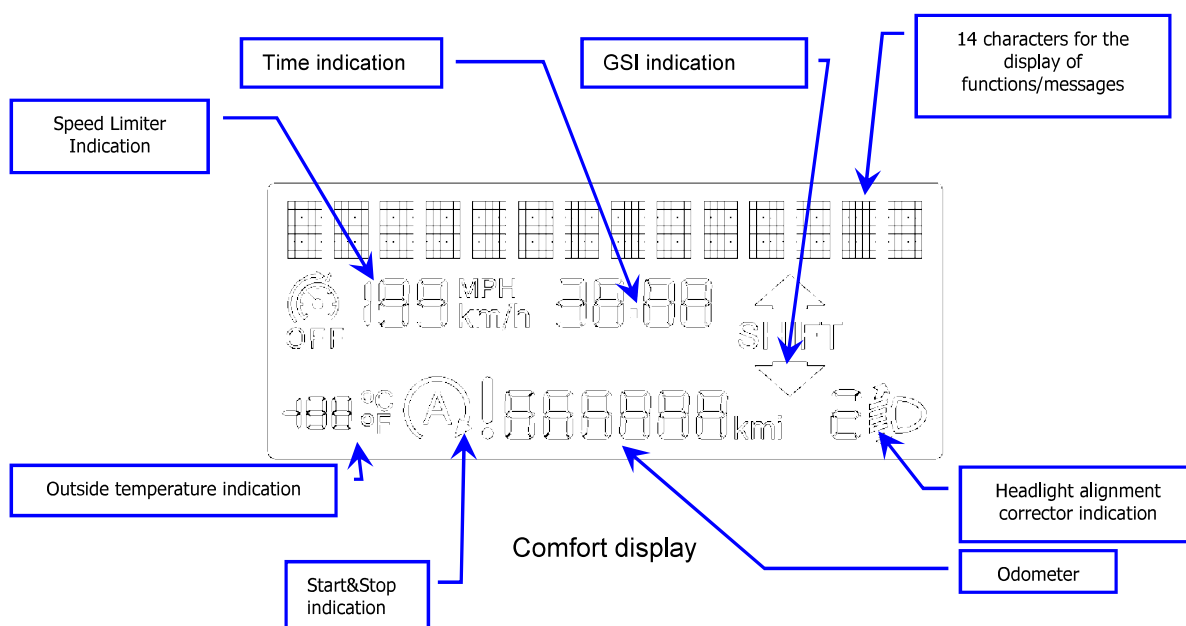
The versions with indication in "mi" have dual speedometer graphics ("km" and "mi").

Comfort version

The Comfort control panel includes:

- 4 indicators for: Electronic speedometer, Electronic rev counter, Fuel level (with insufficient fuel level warning light), Engine coolant temperature (with maximum temperature warning light)
- 31 LED warning lights
- 1 buzzer for the functions: alarm, fault indication, warnings, etc.
- Analogue interface with 3 buttons for "set/esc", "+", and "-" functions
- Interface with a button on steering column stalk for the "Trip computer" function
- 1 three-line display.

Detail of the display:



The 14-character line displays:

- Date
- Trip computer data
- Setup menu with corresponding messages
- Messages for: activation of functions, service, warnings, information, feedback

Matrix version

The Matrix control panel includes:

- 4 indicators for: Electronic speedometer, Electronic rev counter, Fuel level (with insufficient fuel level warning light), Engine coolant temperature (with maximum temperature warning light)
- 27 LED warning lights
- 1 buzzer for the functions: alarm, fault indication, warnings, etc.
- Analogue interface with 3 buttons for "set/esc", "+", and "-" functions
- Interface with a button on steering column stalk for the "Trip computer" function
- 1 matrix display, reconfigurable in accordance with functionality present ("Speed limiter" device, gearbox type - manual, robotised - headlight alignment corrector, GSI, Start&Stop)

Display detail:

The total area is divided into themed areas as in the figure:

A	B	C
D	F	
E		
G	H	I

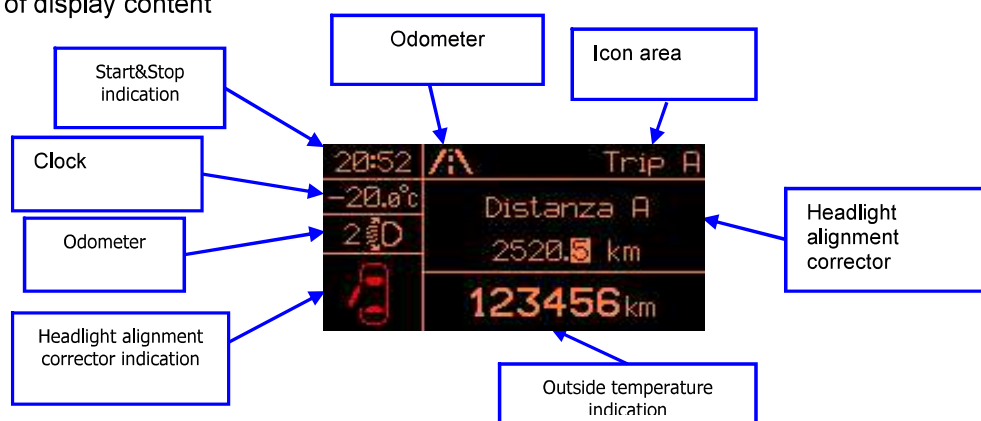
KEY:

- A** clock
- B** symbol of function displayed / outside temperature (if Speed Limiter present)
- C** title of function displayed / clock (if Speed Limiter present)
- D** outside temperature
- E** headlight alignment control
- F** area for displaying messages / information / settings etc. ...
- G** two-tone (red/orange) area for displaying icons
- H** milometer
- I** information for robotised gearbox
- A+D** Speed Limiter (if present)

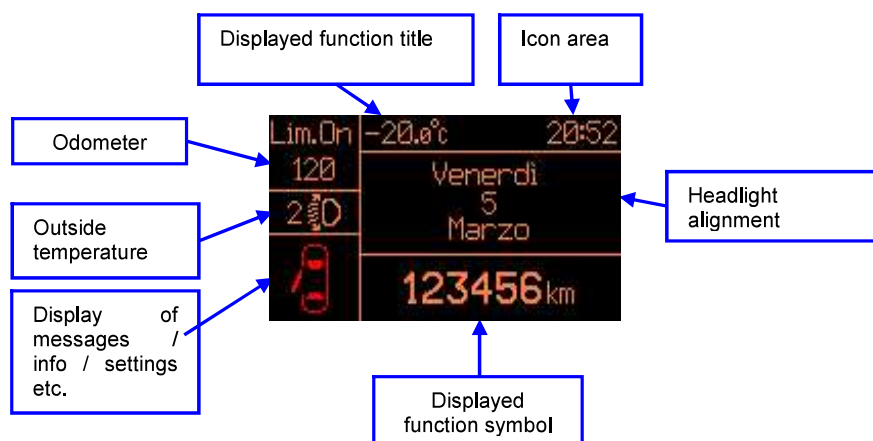
The central area (area F) displays:

- Date
- Trip computer data
- Setup menu with corresponding messages
- Messages for: activation of functions, service, warnings, information, feedback

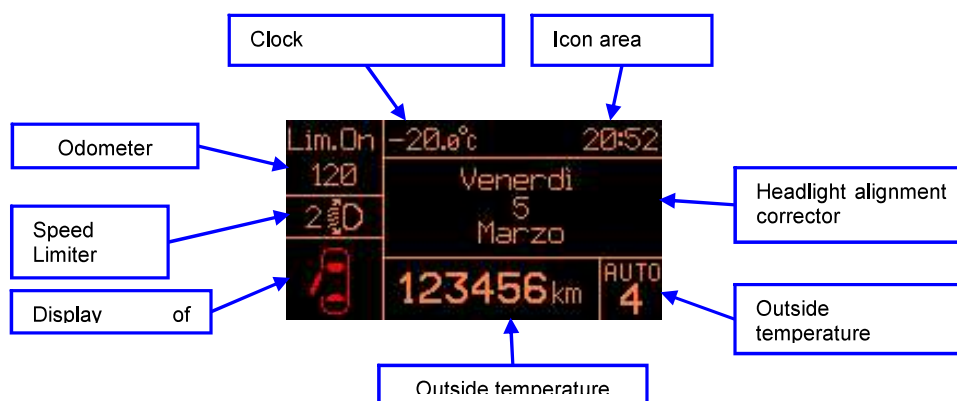
Examples of display content



Matrix display with manual gearbox without Speed Limiter



Matrix display with manual gearbox with Speed Limiter



Matrix display with robotised gearbox with Speed Limiter

Main content for the two reference versions of the panel

Contents	Comfort	Matrix
Speedometer	X	X
Rev counter	X	X
Fuel level gauge	X	X
Engine coolant temperature indicator	X	X
Headlight alignment corrector	X	X
Milometer	X	X
Outside temperature and ice danger	X	X
Setup menu	X	X
Date and Time	X	X
Trip Computer	X	X
Scheduled servicing and engine oil change warnings	X	X
Automatic transmission indications	—	X
Buzzer (failures, parking sensor, SBR)	X	X
Diesel Particulate Filter + Oil life	X	X
Alternator failure	X	X
Minimum engine oil pressure	X	X
Minimum oil level	X	X
EOBD/MIL indication	X	X
Heater plugs / sensor failure	X	X
Water in the diesel filter	X	X
Cruise Control	X	X
Front and rear fog lights	X	X
Direction indicator, side, number plate and check lights	X	X
Main beam headlights	X	X
Dusk sensor failure	X	X
Rain sensor failure	X	X
Airbag	X	X
Passenger airbag deactivation from menu	X	X
Seat Belt Reminder	X	X
ABS indications	X	X
ESC indications	X	X
Handbrake engaged with acoustic alarm with vehicle in motion	X	X
Minimum brake fluid level	X	X
Wear on brake pads	X	X
Power assisted steering	X	X
Immobilizer readings	X	X
Fire Inertial Switch	X	X
Speed Limiter	X	X
Doors / load compartment open	X	X
Parking sensor signalling	X	X
Self-levelling suspension set-up and failure display	X	X
Oil level display	X	X
Gear Shift Indicator	X	X
Start & Stop	X	X
Lane Departure Warning	X	X
Hill Descent Control	X	X
Traffic Sign Recognition	—	X
Tyre Pressure Monitoring System	X	X
Dimmed interior lighting	X	X

DRIVING ADVISOR

The DRIVING ADVISOR is a control unit located inside the vehicle, on the windscreen, behind the interior rear-view mirror.



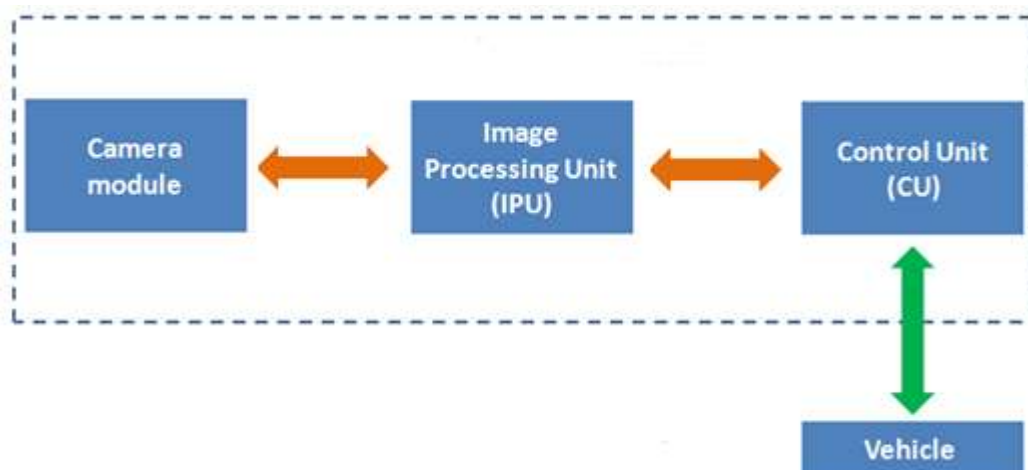
This control unit provides separate management for the following systems:

- Lane Departure Warning (LDW)
- Automatic High Beam Control (AHBC)
- Traffic Sign Recognition (TSR)

The Driving Advisor is connected to the high-speed C-CAN.

The systems based on this system must have a common structure that includes the following modules:

- **Camera** that detects the situation in front.
- **Image processing unit (IPU)**, which processes the images and detects the characteristics of the situation in front. In particular, the IPU needs the vehicle speed, the yaw and the wiper position to analyse the situation.
- **Control unit (CU)**, which receives the information on the situation and, on the basis of the parameters specified by the control unit, implements the activation/deactivation strategies for each system.
- **Vehicle system**, which comprises the other control units that exchange data with the Driving Advisor; generally includes the human-machine interface (HMI) which permits each system to interact with the user



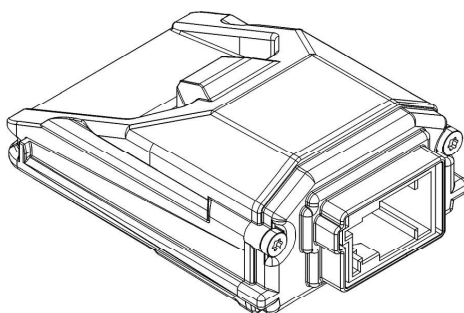
The camera, the IPU and the CU are integrated physically with the Driving Advisor control unit.

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The Driving Advisor connector has 12 pins, but only 4 are connected.



PIN OUT	
2	CAN High
3	CAN Low
6	Supply
7	Earth

The systems based on the Driving Advisor front camera carry out the following common functions:

- Monitoring and processing of the situation in front
- Activation/deactivation of the system in accordance with the driver input
- Exchange of data with other systems
- Processing of activation/deactivation strategies in accordance with the parameters of the system
- Activation/deactivation of feedback warning light for driver
- Status indicator

LANE DEPARTURE WARNING (LDW)

This function recognises the lines that mark out the lanes and, when the edge of the lane is near, warns the driver through an acoustic and visual signal.

Lane Departure Warning is useful for preventing accidents caused by distraction at the wheel and can be activated and deactivated using a specific button on the dashboard.

When enabled by the user, the system intervenes at speeds above 55–60 km/h in the event of manoeuvres considered involuntary, whereas it does not intervene if the direction indicator is activated or during a clear lane exit manoeuvre on the part of the driver.

The visual indication is directional, and provided by the intermittent activation of one of the two specific warning lights in the instrument panel, depending on the side of departure; the acoustic signal is provided through the repetition of a sound from the instrument panel or one of the two front speakers depending on the side of departure.

Operating conditions

- The vehicle speed must exceed 60 km/h and must not drop below 55 km/h.
- The lane markings must be visible
- The direction indicator must not be active
- Lane departure is very rapid

The system must detect the lane that the vehicle is travelling in. According to this information, the LDW warns the driver if the vehicle is nearing the edge of the lane involuntarily.

Lane detection

This system must detect lanes marked by white or yellow, continuous or broken, single or double lines, with standard thickness and configuration.

By way of example, the type-approval requirements for Italy are shown.

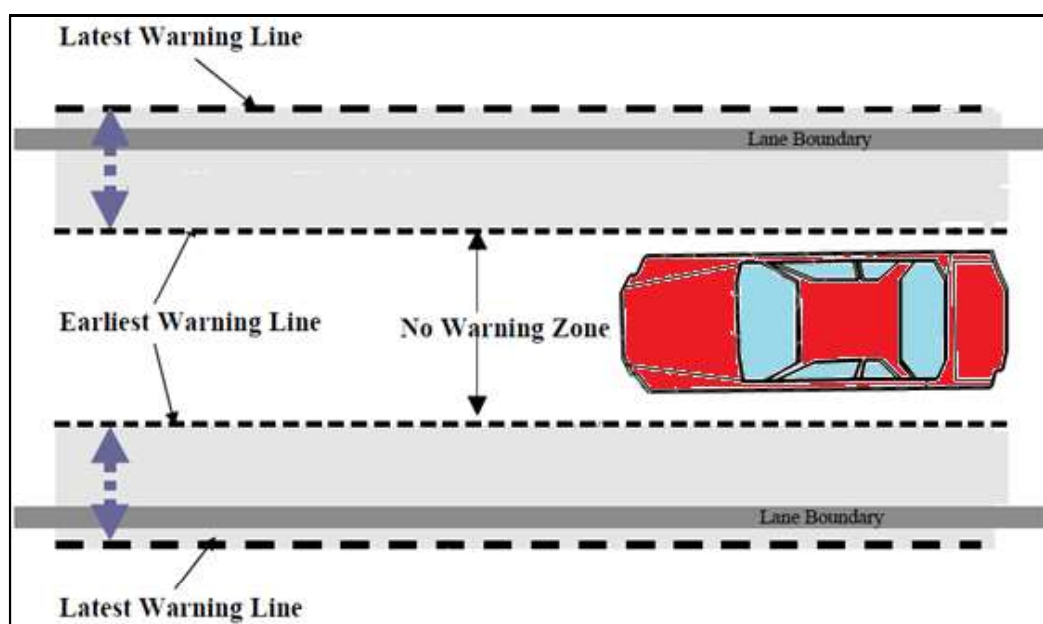
Italy – Motorway		
Italy – Secondary and local		
Italy – Main		

The LDW system detects the lanes when:

- The field of vision is greater than 15 m
- The curvature radius of the road is greater than 125 m
- The absolute value of road inclination is lower than 5°
- The width of the lane is greater than 3 m and lower than 4.5 m

WARNING AREAS

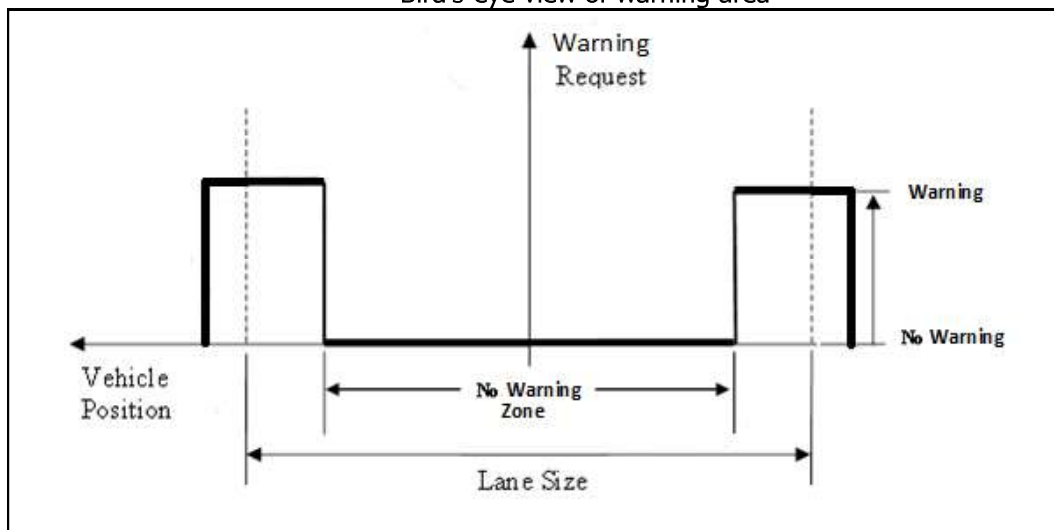
The LDW system warning strategy considers the area around the lane boundaries. Consequently, when the outer part of the vehicle's front wheel enters this area, the system will request the activation of the warning.





PROFESSIONAL

Bird's-eye view of warning area



Frontal view of warning area

LDW activation

This system can be activated or deactivated through a button on the dashboard.



LDW feedback

The system status can be viewed directly on the instrument panel, through the 2 warning lights, which are on in the following image.



Management of the warning lights

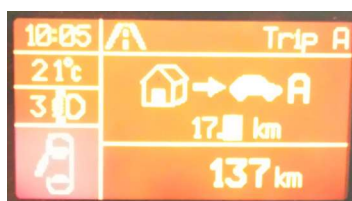
Both warning lights are on : the system can't provide a warning since at least one of the conditions necessary for operation has not been met (e.g. lines not visible).

Both warning lights are off : the system is not active or is active and awaiting indications to provide concerning the proximity of the right or left lane.

Left or right warning light on : left or right warning active

LDW error

- Comfort panel: both warning lights are on constantly
- Matrix panel: red icon on display and message as shown in figure



AUTOMATIC HIGH BEAM

This system operates solely at night, recognising lit areas and other vehicles with headlights on in order to activate and deactivate the main beam headlights automatically.

Automatic High Beam is useful for ensuring maximum visibility when driving in the dark, preventing the possibility of dazzling other drivers; it operates only when the main beam headlights are activated from the steering column stalk and can be activated and deactivated from a menu.

This system operates only at speeds above 25–30 km/h and advises the driver regarding its operation by keeping a specific warning light on the instrument panel active during the whole period that the automatic function is operating.

Automatic operating conditions

- The vehicle speed exceeds 40 km/h and does not drop below 25 km/h
- The road is not lit by street lights
- No car coming
- No car in front
- The vehicle is not on a tight corner

This function can be activated/deactivated from the dedicated radio menu.



In order for the system to operate, the twist switch on the steering column stalk must be in AUTO position.



Feedback on operation is guaranteed by the dedicated warning light on the instrument panel.



TRAFFIC SIGN RECOGNITION

This system, based on the same camera, recognises speed limit and no overtaking signs and provides a corresponding indication for the driver through the instrument panel display.

Through the instrument panel menu, the user can activate and deactivate Traffic Sign Recognition and view the icon for the last traffic sign recognised at any time on a dedicated screen.

TSR recognises signs of all standard dimensions belonging to the following categories:

- **Primary signs** with speed indication that must be observed by the driver (see annex B)
- **Supplementary signs**, (e.g. snow, rain, etc.) which are filtered and not displayed if road conditions do not require this indication (see annex C)

Each supplementary sign detected is linked to its primary sign. If the primary sign is rejected, so too is the associated supplementary sign.

TSR rejects all primary signs recognised that are in the following conditions:

- incorporated into a traffic sign that is not relevant
- cancelled or not valid
- on a lorry
- on a road other than the one on which the vehicle is travelling.

Activating Traffic Sign Recognition

The system can be activated through the dedicated instrument panel menu













System feedback

Recognition of the traffic sign is shown in the instrument panel display.

The signs regarding speed limits are shown on the left and those regarding overtaking restrictions on the right.

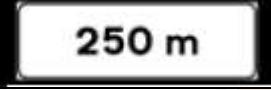
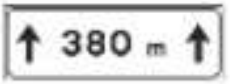

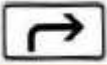




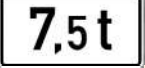

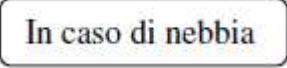




Annex B. Primary Signs

Category	Type	Meaning
110 speed limit		Significant
120 speed limit		Significant
130 speed limit		Significant
140 speed limit		Significant
End of speed limit (for all speeds)		Significant
No overtaking		Significant
No overtaking for lorries		Filtered
End of no overtaking		Significant
End of no overtaking for lorries		Filtered
End of previous limits		Significant

N.B. The system can read all speed limit signs, not only those indicated in this annex.

Annex C (complementary signs and corresponding primary sign filtering)

Category	Type	Meaning
Distance		Significant
Distance with arrow		Significant
Time		Significant
Exit		Not significant
Snow		Filtered
Rain		Filtered
Trailer		Significant
Lorry		Filtered
Weight		Significant
Tractor		Not significant
Fog		Filtered
Reminder		Significant
Area		Significant
Others		Significant

Operating limitations

Systems based on the Driving Advisor are configured to achieve, within their technological limits, the best performance in relation to the following conditions:

- day, night, sunrise, sunset
- low, high traffic
- both vehicle axles laden or unladen, one axle laden and one unladen
- sun, rain, cloud, snow, fog
- clean, dirty, misty, cold windscreen
- urban roads, extra-urban roads, motorways
- all states

Warning : In the event of poor visibility, such as fog or heavy rain, for example, the performance of the system may decrease.

DRIVING ADVISOR CALIBRATION

Calibration must be carried out in two cases:

- 1 – windscreen replacement
- 2 – control unit replacement

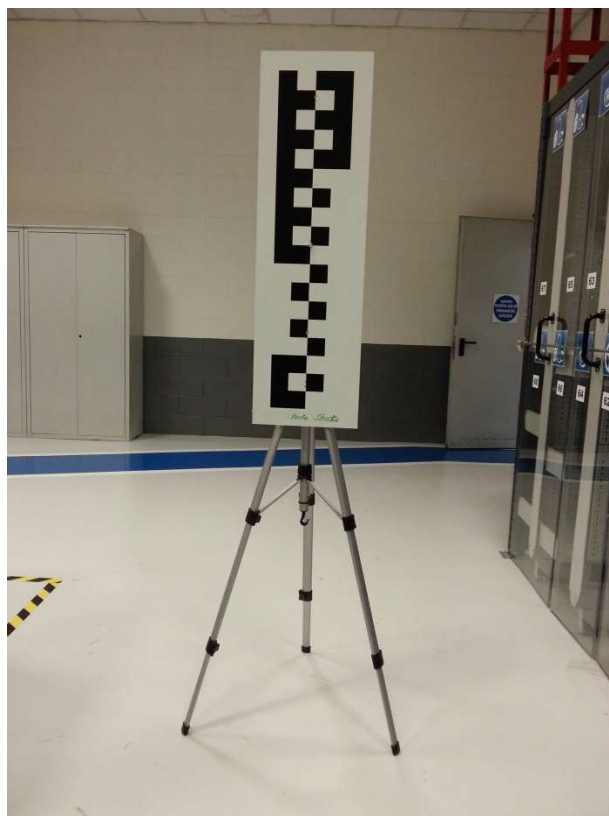
To carry out calibration, it is necessary to acquire a panel (specific equipment with which the network will be provided) and initiate a procedure with the diagnosis equipment.

NOTE: If the control unit is removed/refitted, no action is required, since the calibration is not lost.

Calibration **MUST** be carried out in observance of the following conditions:

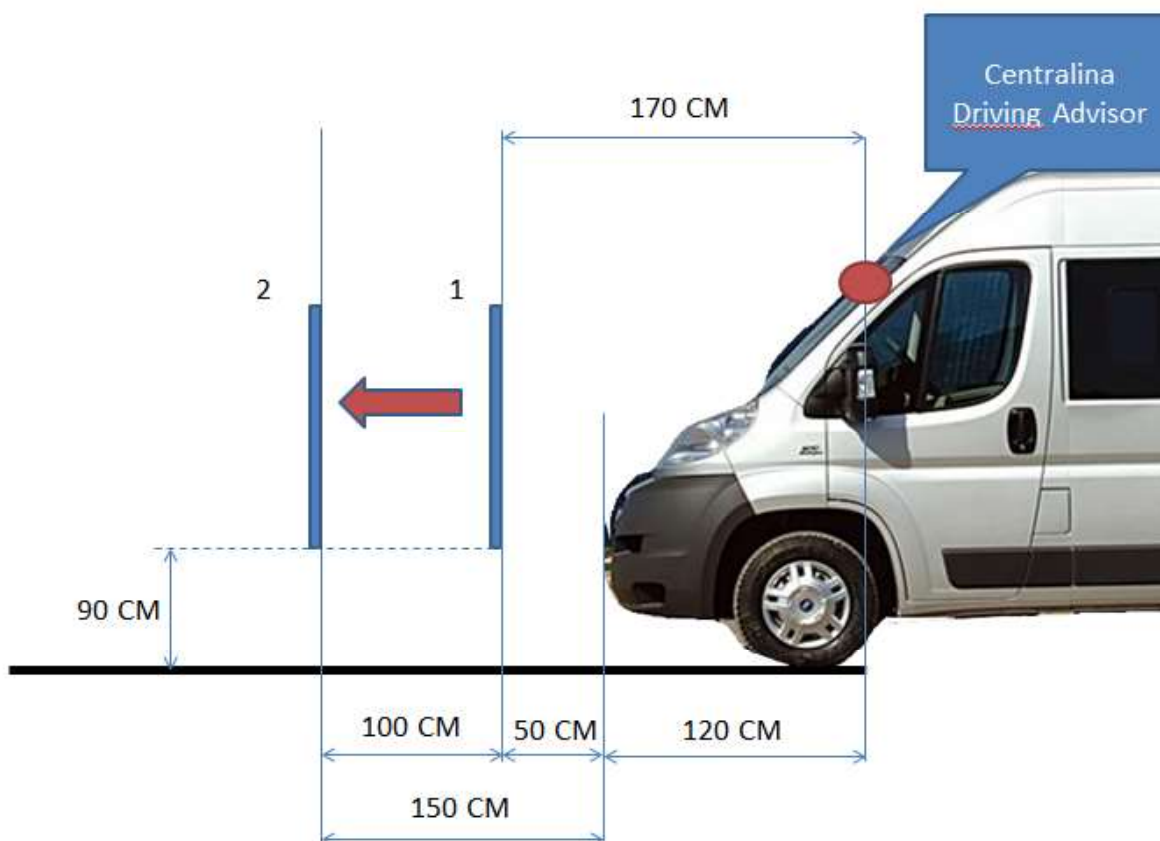
- Vehicle unladen
- Air suspension at level 0 (if present); otherwise, does not operate
- Comply with the distances indicated below
- During the movement of the stand between the first and second distance, make sure that the panel does not move from the stand mounting

The panel shown in the following image is required to carry out calibration.



Once the procedure has been started

- **First STEP:** the panel must be positioned at a distance of 170 cm from the camera, which corresponds to 50 cm from the front bumper. The height of the panel's lower edge **MUST BE** 90 cm.
- **Second STEP:** the front bumper-panel distance must change to 150 cm.
- Wait for the procedure to complete.



NOTE: The diagnosis equipment can complete the calibration even if the distances are not observed, but in this case the system will not operate correctly.

Possible system failures:

- Both Driving Advisor warning lights on
- Failure message on instrument panel when the traffic signs are read
- Incorrect indications, activation of one of the LDW warning lights or failure to indicate due to parallel positioning errors during the calibration procedure.

UCONNECT

The Uconnect infotainment system allows access to radio programmes, personal multimedia content, satellite navigator, traffic information and travel information, as well as a “hands-free” system.

Thanks to the advanced voice recognition system, no voice learning stage is required, and the system displays incoming SMSs and reads them out loud. Among the audio functions is the possibility of listening to your favourite music on your mobile phone, new smartphone, MP3 player, iPod or USB storage device, playing MP3, WMA, WAV, AAC, M4A, M4B and MP4 audio files and the following playlist formats: M3U, PLS and WPL. This is thanks to an interface permitting the connection of USB storage devices, SD cards and AUX input, allowing the connection of any digital device with the appropriate attachment.

The information, such as names in the phonebook, caller IDs and music files divided into genre, album and artist, is visible on the display of the device. The audio of the call is reproduced through the vehicle's speakers.

2 versions of Uconnect may be present:

- ❖ **Uconnect 3" named VP1** (DAB opt.)
- ❖ **5" Uconnect named VP2** (with or without satellite navigator, DAB opt.)

UCONNECT 3"

The characteristics of the VP1 radio are listed below.



	Std. vers.	Vers. with DAB
Dual Tuner AM/FM	✓	✓
DAB receiver		✓
SDARS receiver		
Built-in CD		
Bluetooth	✓	✓
GPS receiver		
NAV (SW & Maps)		
Built-in HVAC controls		
Rear camera		
AUX/USB port	✓	✓
Built-in voltage stabiliser for Stop&Start	✓	✓

DAB (Digital Audio Broadcasting) is an internationally standardised method for broadcasting radio content in a digital format.

SDARS: Satellite Digital Audio Radio Service

UCONNECT 5"

There are 4 possible different configurations for this type of radio.
The various functions of the VP2 radio are listed below.



	Std. vers.	DAB vers.	NAV vers.	NAV DAB vers.
Dual Tuner AM/FM	✓	✓	✓	✓
DAB receiver		✓		✓
SDARS satellite receiver				
Built-in CD	✓	✓	✓	✓
Bluetooth	✓	✓	✓	✓
GPS receiver			✓	✓
Compass function			✓	✓
NAV (SW & Maps)			✓	✓
Built-in HVAC controls				
Rear camera	✓	✓	✓	✓
AUX/USB port	✓	✓		
Built-in voltage stabiliser for Stop&Start	✓	✓	✓	✓

The navigation system, developed in collaboration with TomTom, is incorporated in the radio with pre-loaded maps of major European states.

The navigation system with road maps makes it possible to determine the position of the vehicle on the map at any time (for both urban and extra-urban/motorway road networks) showing it on the radio navigator display.

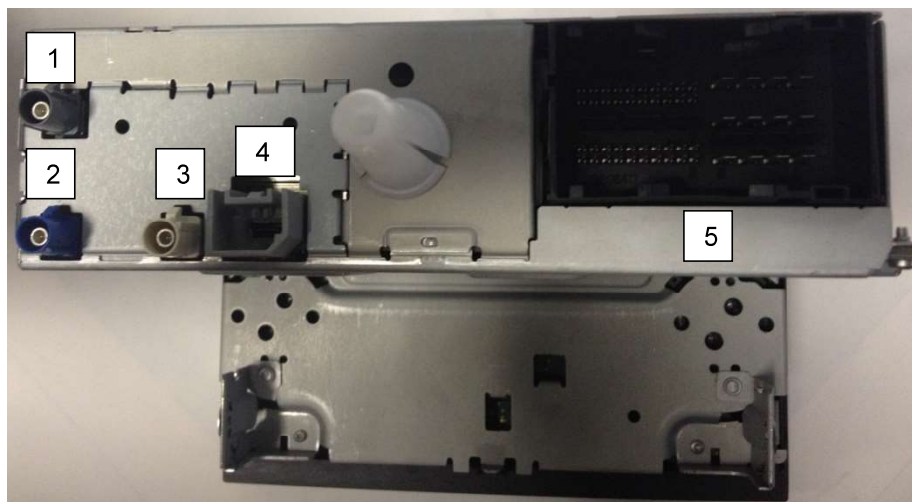
In this way the driver is guided step-by-step to the required destination, by means of voice messages and visual information.

The system also provides additional information for reaching points of interest, such as: hotels, car parks, restaurants, chemists', service stations, hospitals, FIAT workshops, railway stations, airports, etc.

The navigation system uses GPS (Global Positioning System) satellite location technology and is inside the radio navigation unit.

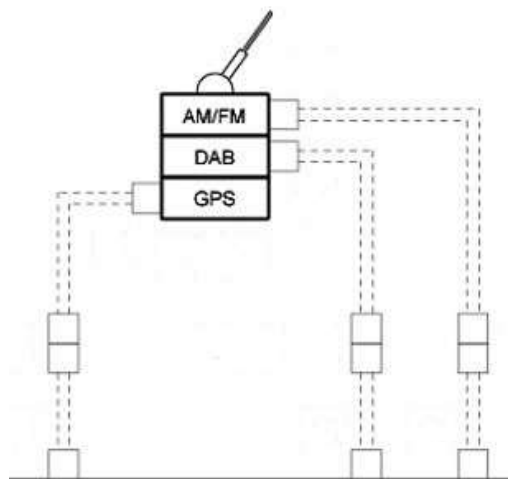
Vehicle position is identified by analysing GPS data together with speedometer and reverse gear signals received from the vehicle.

Rear view of UConnect VP2 NAV DAB



1. DAB aerial
2. GPS Aerial
3. AM/FM aerial
4. Mini-USB connector for the USB-AUX/IN socket
5. Supply connector and audio outputs

The aerial on the DAB and navigator version has three stages, as shown in the following figure:



NOTE

The “**Multifunction Support**” is available for the centre of all the dashboards in the range. It can be used as a support with all devices, such as smartphones and tablets, as well as conventional pads of paper. In the case of tablets or smartphones, there is the possibility of connecting them to the 2.5 A USB port OPT near the cup holder as power supply.

AIRBAG

The airbag system on the New Ducato FL includes:

- Restraint system electronic control unit
- **Front airbag** on driver side with dual stage activation
- **Front airbag** on passenger side (OPT), single-stage
- **Side bags (OPT)**, comprising instantly inflating bags housed in the side section of the seat backrests
- **Window bags (OPT)** located behind the side roof linings and covered by dedicated trims for protecting the head of front occupants in the event of side impact.

Restraint system electronic control unit

This represents the heart of the occupant protection system and is located on the front tunnel. It simultaneously manages all the restraint system detection and activation devices, processing the signals from the various sensors in the vehicle and fitted inside it, and decides which and how many protection devices to activate in the event of an accident.

It can also prevent their activation when the impact is not of sufficient severity, that is, when there is no risk that the occupant comes into contact with other parts of the vehicle, or when it recognises considerable stress on the body that is not due to impact.

A capacitor, which operates as a reserve of energy, ensures the full functionality of the front airbags and pretensioners, even when supply from the electrical system is absent (when, for example, the impact breaks the battery or supply cables). The algorithm used for frontal impact situations is called the "Crash Severity Algorithm", since it can distinguish whether the impact is of medium or high severity, so as to order the activation of the driver's dual-stage front airbag as appropriate. This means that when the impact is of moderate severity, the electronic control unit controls only the first airbag activation stage to avoid emitting unnecessary energy for the occupant's protection. Conversely, in the case of very severe impact, the control unit activates both stages to absorb most of the kinetic energy from the occupant's body before it strikes the steering wheel or dashboard.

Front airbag on driver side with dual stage activation

This consists of an instantly inflating bag contained in a special compartment in the centre of the steering wheel (cover). It has a capacity of 60 litres.

Passenger side front airbag (opt)

This comprises an instantly inflating bag housed in a special compartment in the dashboard with a larger bag than on the driver's side, in order to protect both occupants if the cab has a two-seater bench. It has a capacity of 120 litres.

The side protection system

To increase the protection offered by the body and by the interior trim in side impacts, the front seats may, as an option, feature side bags to ensure chest protection. They are joined by two window bags fitted on the side members under the roof. These too are available as an option.

In this case too, the side impact sensors located on the vehicle's pillars permit the impact to be detected rapidly and the electronic control unit that controls the bags to be activated.

The **side bags** comprise instantly inflating bags housed in the side of the seat backrest and protect the chest of occupants in the event of a side impact of medium–high severity. Their installation on the seat always guarantees maximum efficiency irrespective of the position.

The **window bags** are housed behind the roof side linings and are covered by special trims. Window bags have been designed for protecting the head of front occupants in the event of side impact, thanks to the wide bag inflation surface.

They activate together with the side bags and interpose themselves between the occupant and the rigid interior parts of the vehicle, preventing the head from coming into contact with highly intrusive objects. They extend from the A pillar to the B pillar.

Disabling passenger airbag

The setup menu on the control panel permits the deactivation of the passenger airbag, permitting the possibility of fitting a rearward-facing child restraint system without risk. Deactivation is indicated by the activation of a **dedicated warning light on the central switch panel**.



Driver seat belt not fastened warning light and sound signal (Seat belt reminder)

Should the driver seat belt not be fastened and if one of the following conditions is present:

- 5 seconds passed since vehicle starting with driving speed of more than 10 km/h
- speed of 20 km/h exceeded

the seat belt not fastened warning light is activated and a repetitive sound signal is activated.

The warning light and the buzzer deactivate when the seat belt is fastened or in any case after 96 seconds.

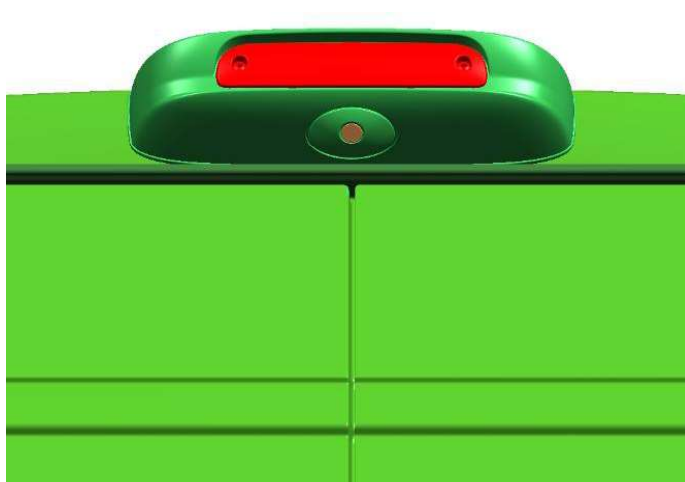
In this case the warning light on the control panel stays on.

CAMERA AND DISPLAY SYSTEM FOR REAR VISIBILITY

The parking camera system allows the driver to see the situation behind the vehicle through the display of the Uconnect 5" located in the passenger compartment.

The system comprises a camera installed in a plastic casing on the rear crossmember for the roof on vans which also includes the third brake light and a display in the radio-telematic system. The brightness of the display will be managed by the radio-telematic system.

The system is activated with the key inserted (vehicle key-on) at a speed lower than 15 km/h when reverse is engaged, or when the tailgate is open without reverse to permit loading and unloading operations. The images from the camera are no longer shown on the radio-telematic display above the speed of 18 km/h. When reverse gear is disengaged, the image is still shown on the display for 5 seconds.



In addition to the images of the camera, 2 coloured lines (red, yellow and green) will be visible on the display. These show the maximum dimensions of the vehicle to facilitate the parking manoeuvres.



Visibility is guaranteed in all vehicle conditions (including full load), for every vehicle specification.

Camera visibility is guaranteed in darkness by the reversing light.

The minimum cover guaranteed by the camera is 6 m length and 3 m width.

