Conversion guideline Movano

PART 4 - 6

Edition: April 2017

GME Engineering
Special Vehicle Development / Light Commercial Vehicles
Rüsselsheim / Germany

4 ELECTRICS/ ELECTRONICS

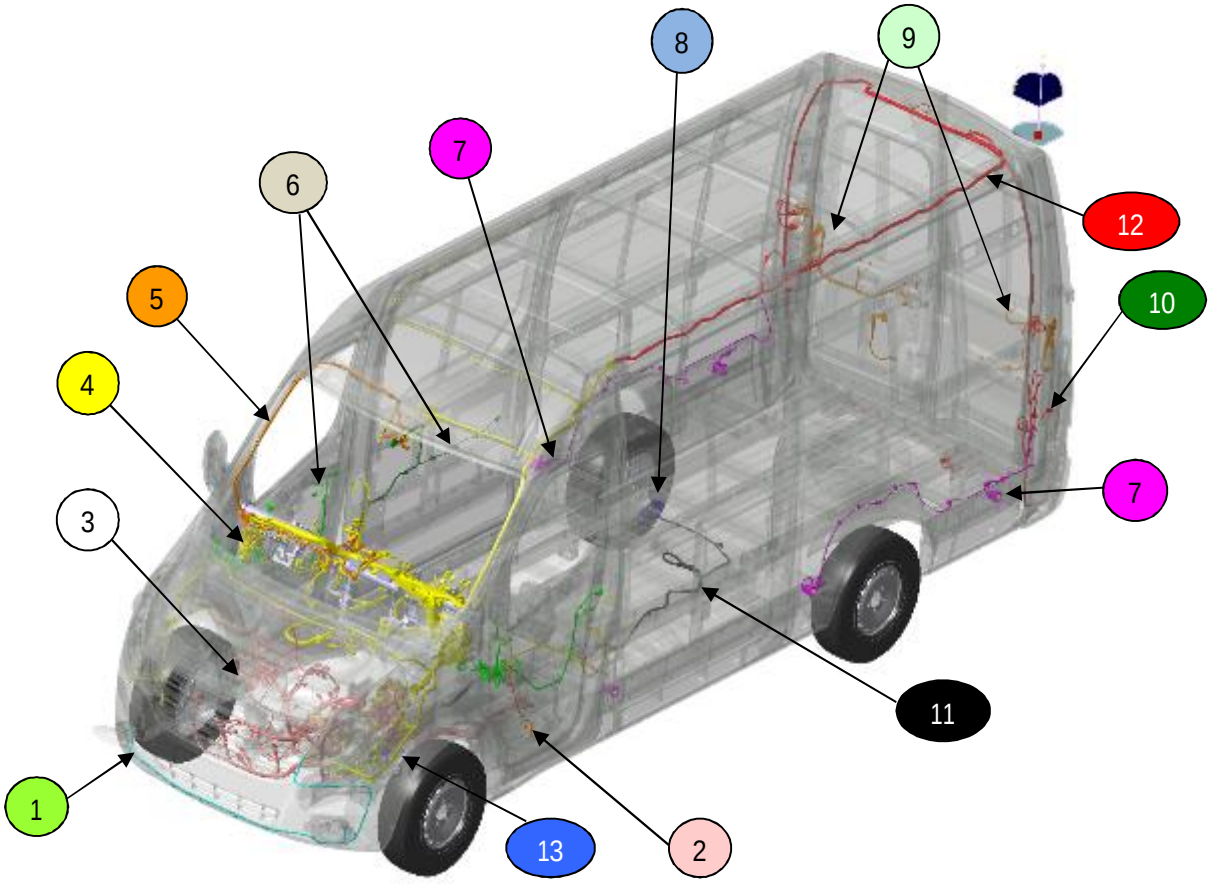
4.1 WIRING INSTALLATION/ ELECTRICAL CONNECTIONS

4.1.1 WIRING LOCATIONS

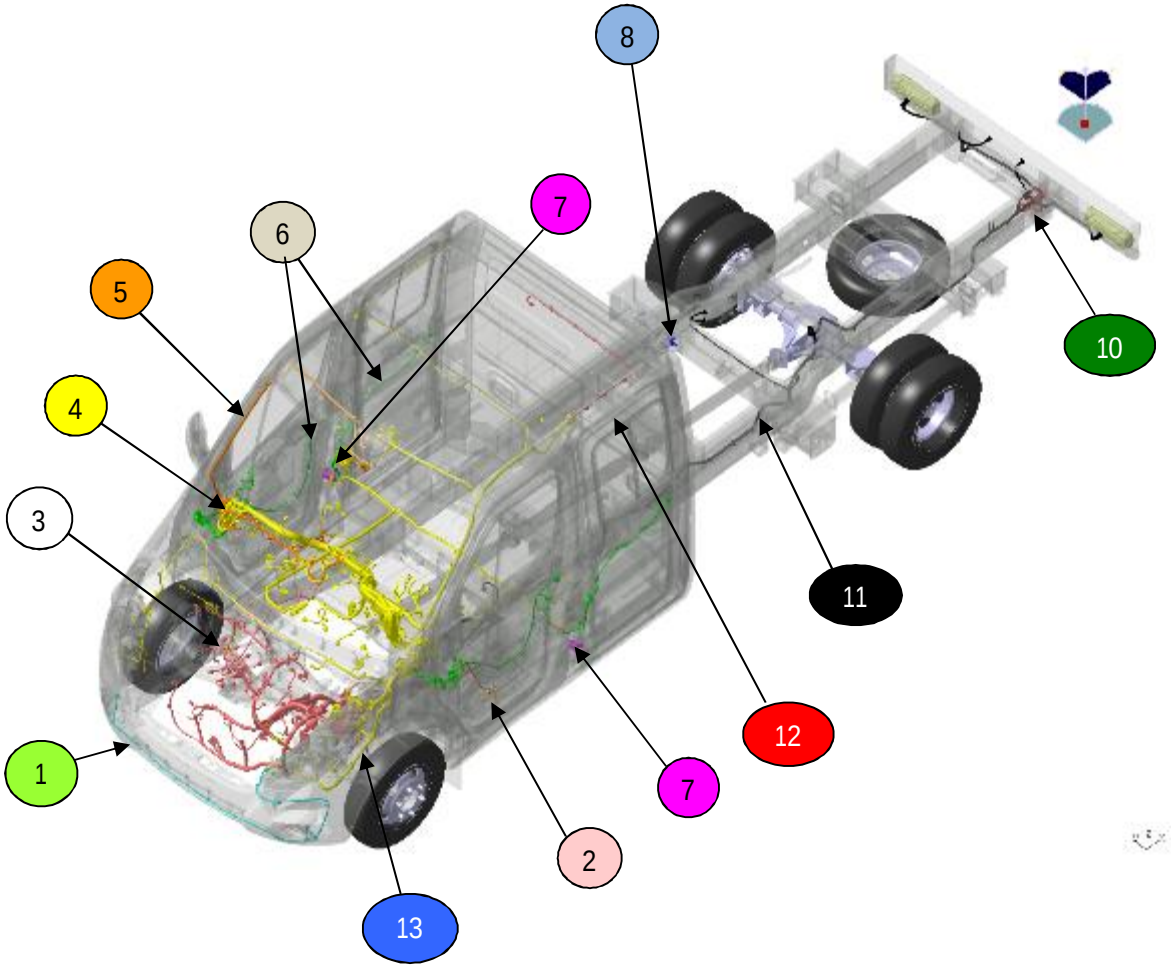
Wiring on Panel Van

Attention:

Before working on the vehicle, refer to chapter 4.5.5.



Wiring on Chassis Cab



Pos.	Description
1	Front bumper wiring
2	Door sill light wiring
3	Engine wiring
4	Dashboard wiring
5	Multimedia wiring
6	Front door, sliding door wiring
7	Additional side light wiring
8	Rear pad wear indicator wiring
9	Right and left hand side swing door wiring
10	Coupling and bumper wiring
11	Under-body wiring
12	Rear wiring
13	Front pad wear indicator wiring

Note:

Wiring locations for platform cabs are similar to those for chassis cabs.

4.1.2 AIRBAG WIRING

Wiring routing of airbags and pre-tensioners

Warning:

No intervention or modification must be made to elements relating to the vehicle's passive safety.

The airbag and seatbelt pre-tensioner wire is an integral part of the vehicle's passive safety system units.

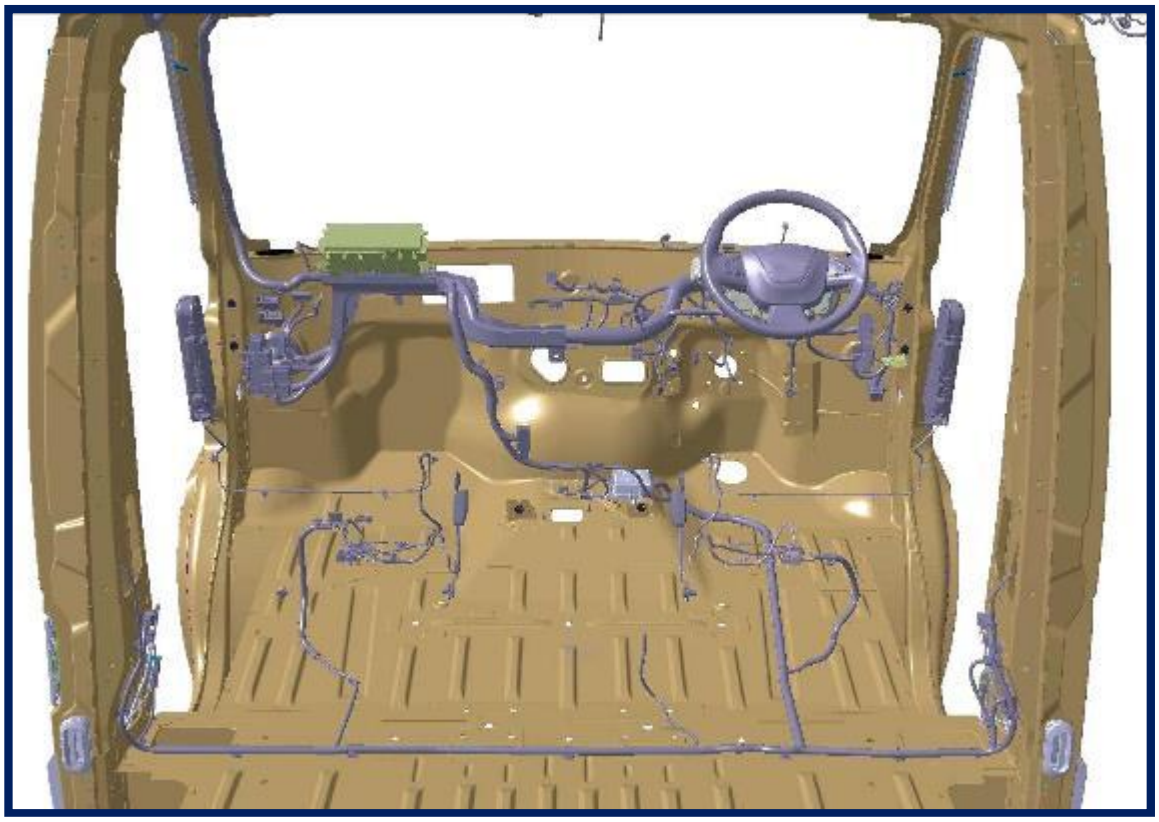
Particular attention must therefore be paid before any transformation which may affect their integrity and generate a customer effect which potentially affects safety (example: unwanted and/or untimely triggering of the airbags, lack of triggering or delayed triggering in the event of an impact (airbags and pre-tensioners), untimely triggering of the pyrotechnic restraint systems with the vehicle moving or at a stop).

The routing for this wiring must be identified on the vehicle. If necessary, before any intervention, install protection on these sensitive units to preserve their integrity under all circumstances.

In blue, the wiring for the sensitive units which make up the vehicle's passive safety system:

Wiring on left-hand drive

Wiring on right-hand drive



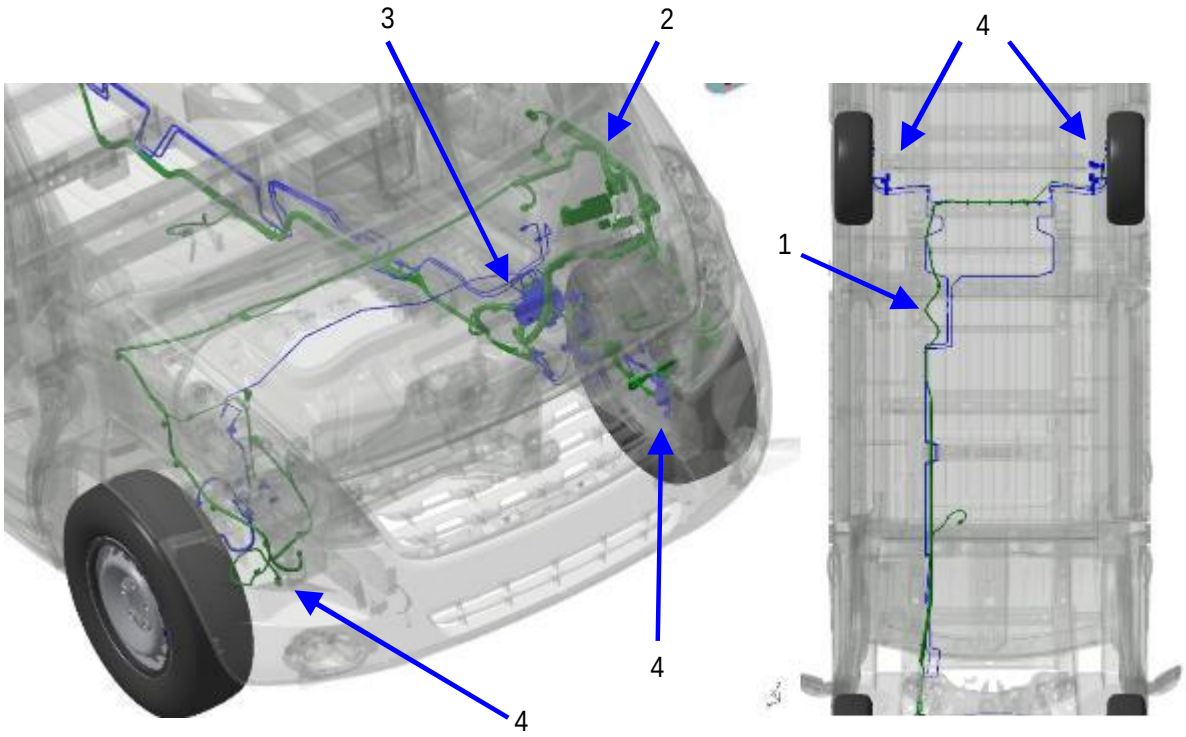
Note:

For more information, also see chapter 3.4.

4.1.3 LOCATION OF THE ABS WIRING

Additional power cables may not be installed less than 100mm from any ABS system components (ECU, wiring and sensors), electronic units or ECUs.

ROUTING OF WIRING AND BRAKE PIPES
(Electricity and wiring in green, hydraulic system in blue)



Pos.	Description
1	Central and rear section ABS wiring (in green)
2	Front section ABS wiring (in green)
3	ABS unit and ECU
4	ABS sensors

Warning:

Modifications are not permitted to ABS wiring. For more information, see also chapter 1.9.2.

4.1.4 EXTENDED REAR WIRING, OPTION “UNF”

For any wiring modification, it is recommended that waterproof connectors be used to create protection against the risks of water spray at high pressure.

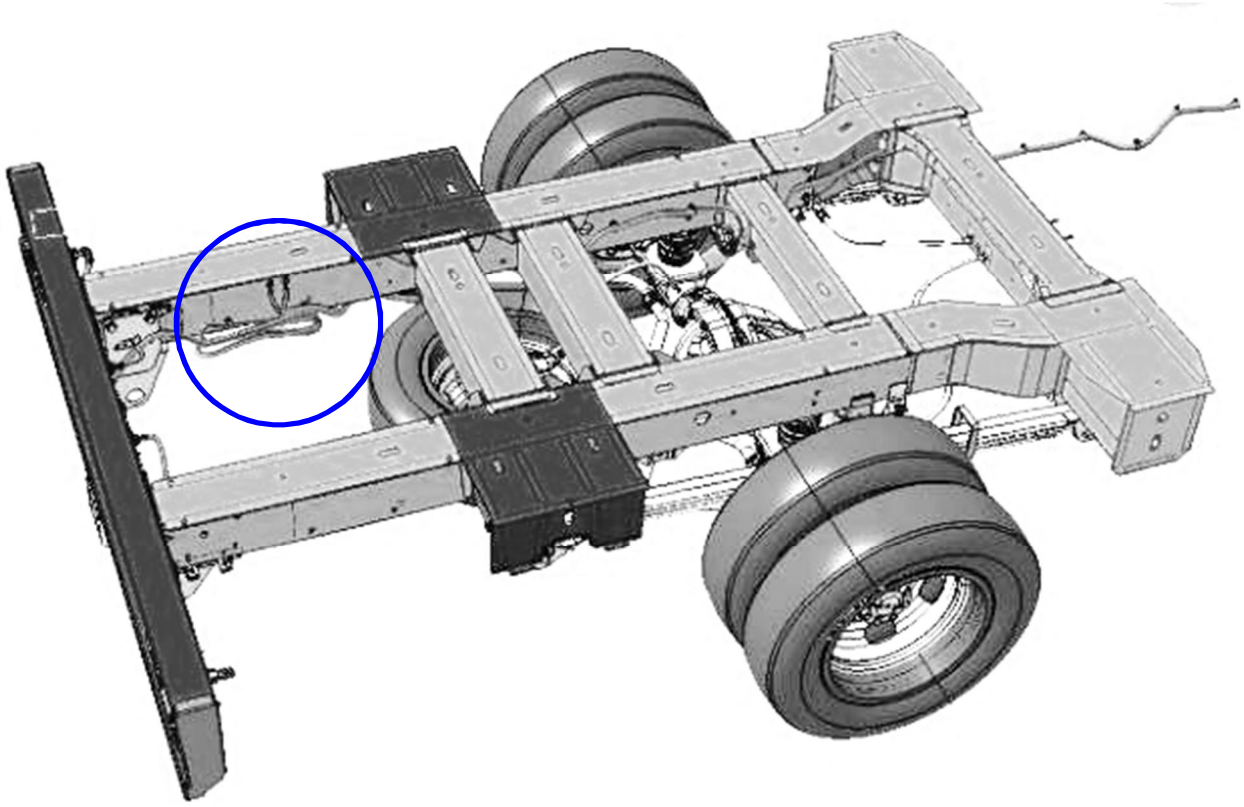
The 2-pin connector of TYCO with P/N 282762-1 is recommended for the rear number plate illumination.

The “UNF” option provides special rear wiring that is 650mm longer, which is necessary for extension of the rear overhang. This excess length is wound on the chassis.

The additional length enables extension of the overhang depending on the version:

- -Platform cab: 1,690mm
- -Single wheel chassis cab: 1,500mm
- -Twin wheel chassis cab: 950mm

Coil location on the chassis



4.1.5 POSITION OF ELECTRICAL GROUNDS

The vehicle has several electrical and electronic grounds.

Before working on the vehicle, refer to chapter „Electrical Connections“. The electricity sheets of the General Technical Conversion Guide must also be consulted before any modifications are made to the vehicle.

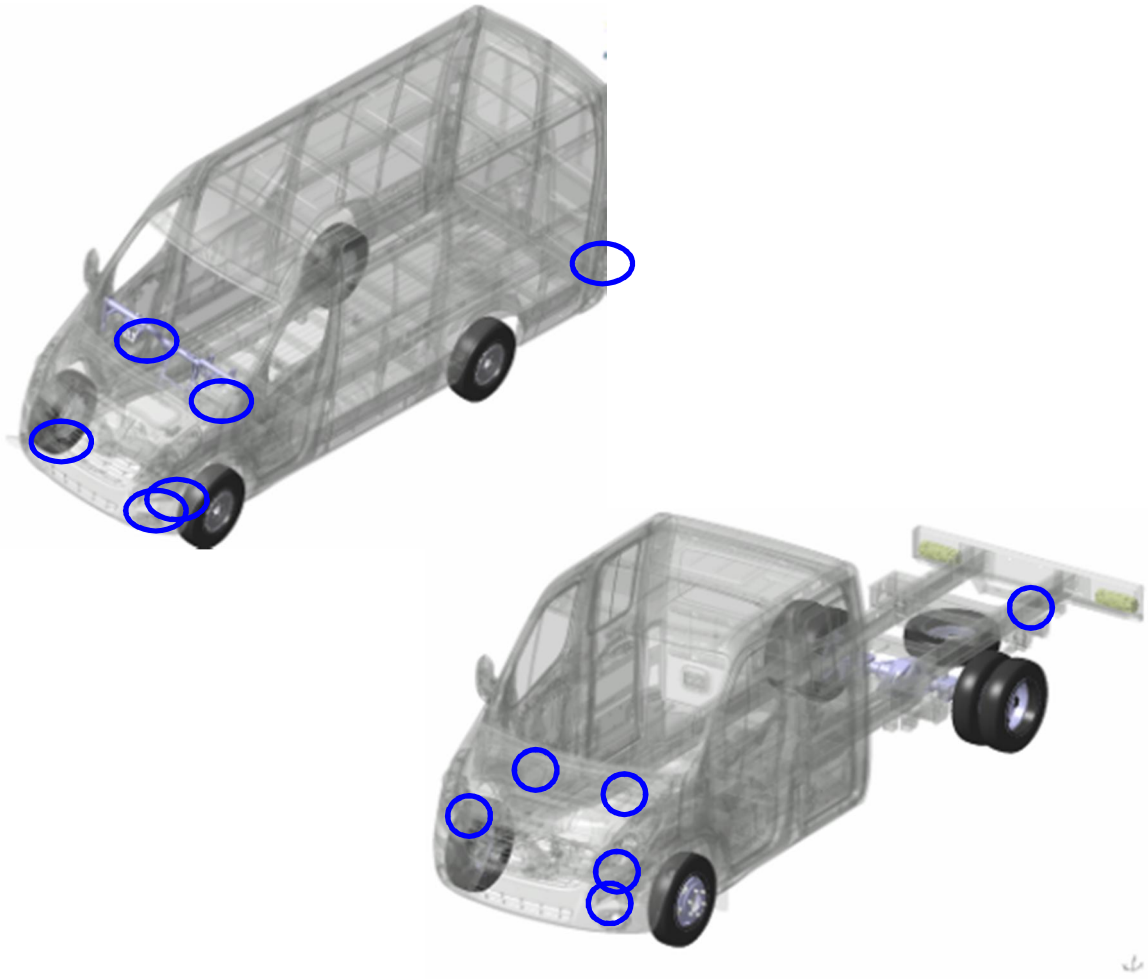
Electrical grounds, on a welded stud, is recommended for additional pieces of electrical equipment.

The tightening torque for the grounding nuts on the M6 studs is 8 Nm ± 15% (use of a calibrated torque wrench is recommended).

Note:

For ground connection on battery, see chapter 4.3.

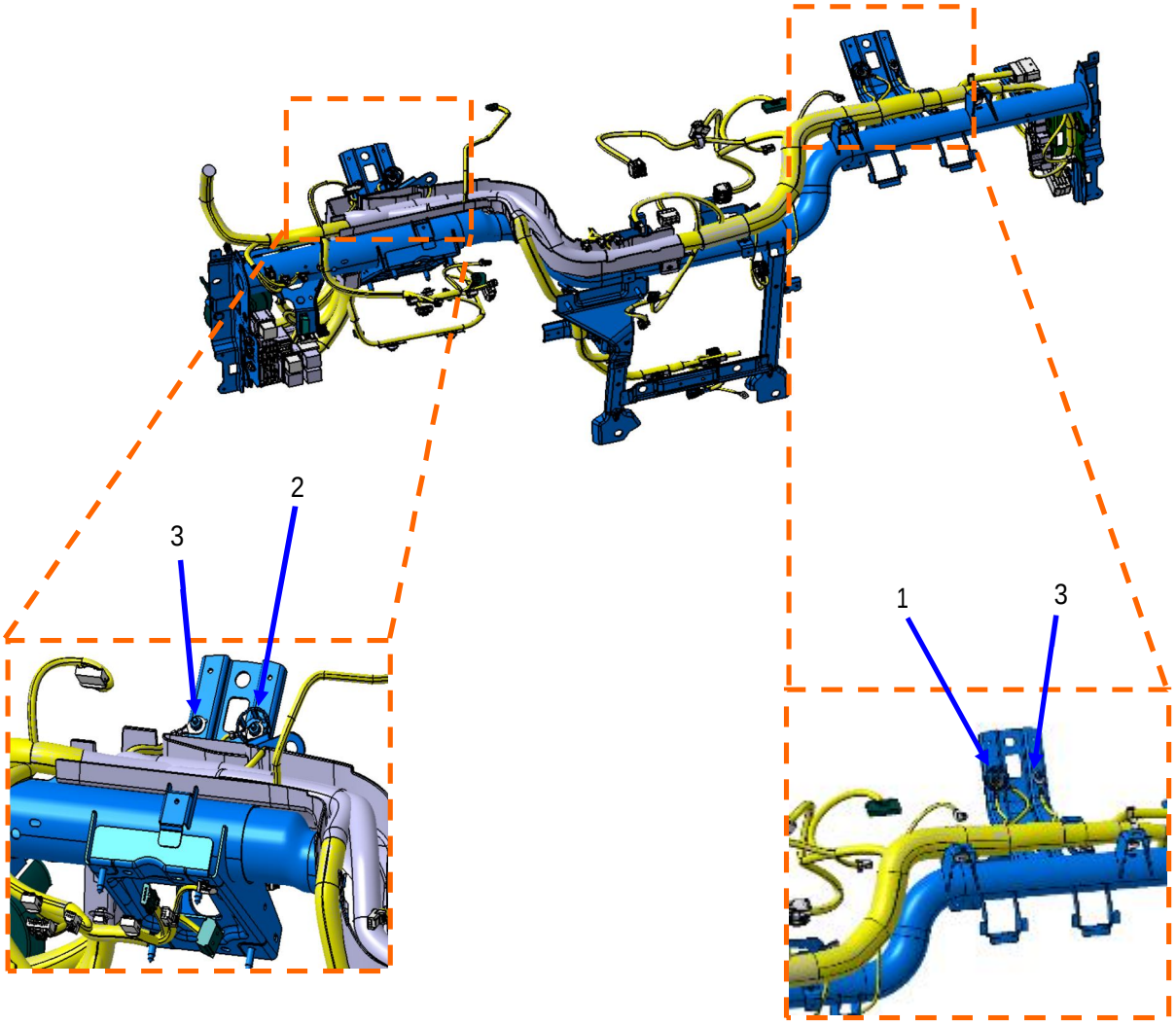
Location of the electrical grounds



Attention:

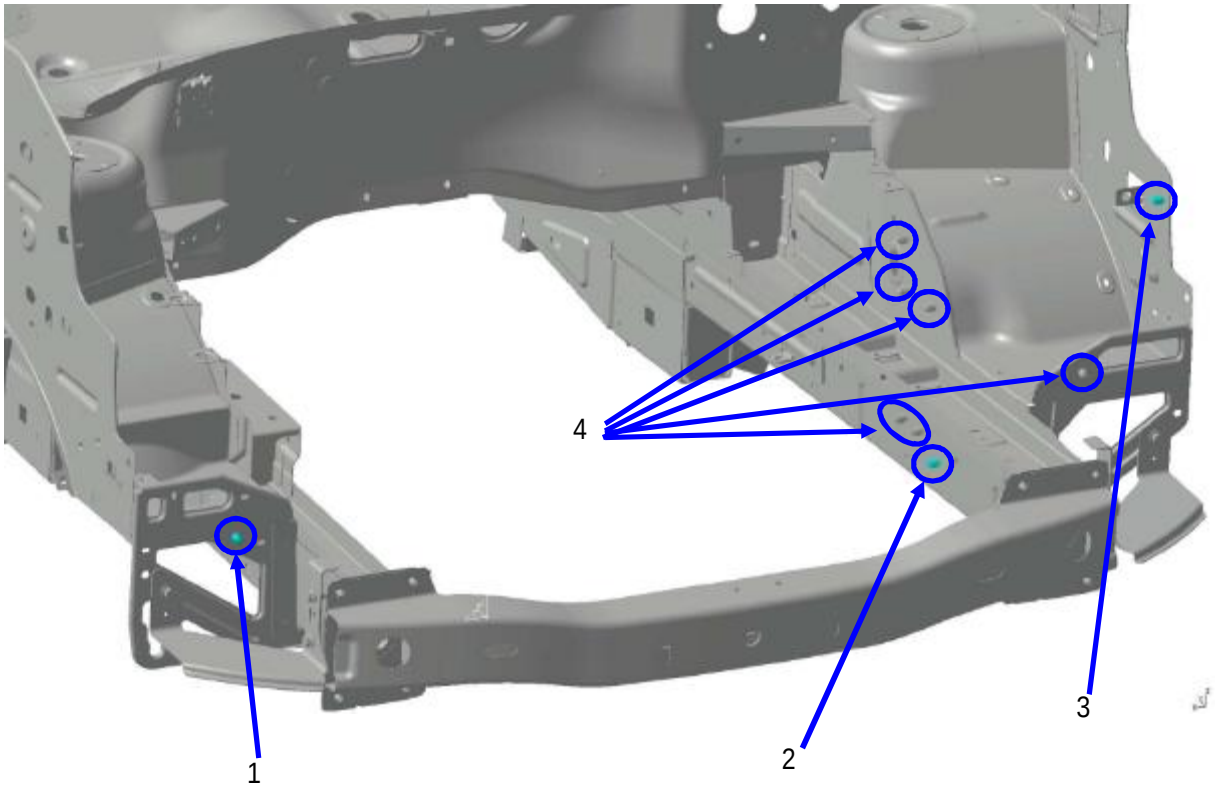
Electronic grounds may not be used.

Electrical grounds on dashboard cross member



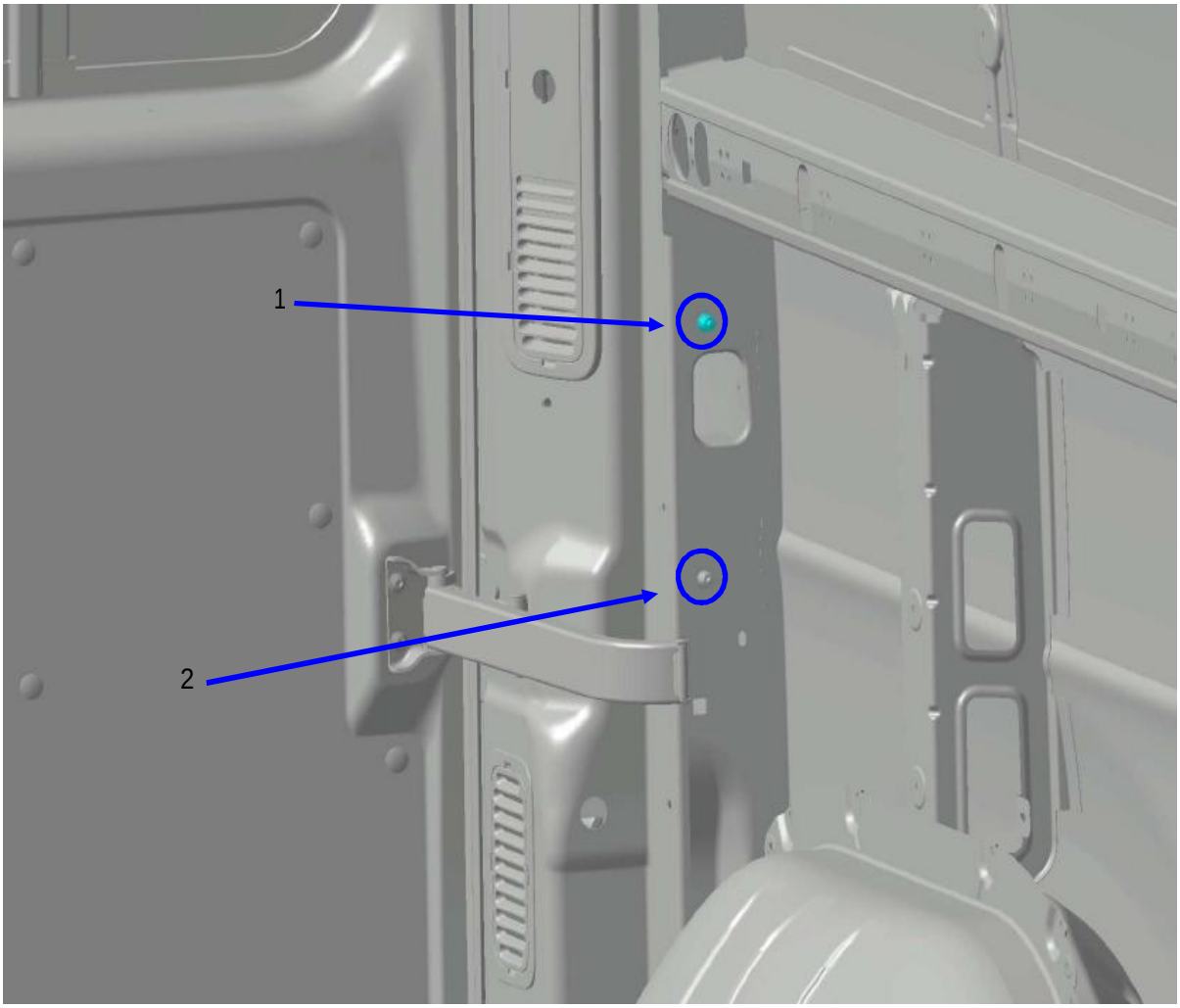
Pos.	Description
1	Ground MAM-32
2	Ground MAN-32
3	Do not use

Electrical grounds in the engine compartment



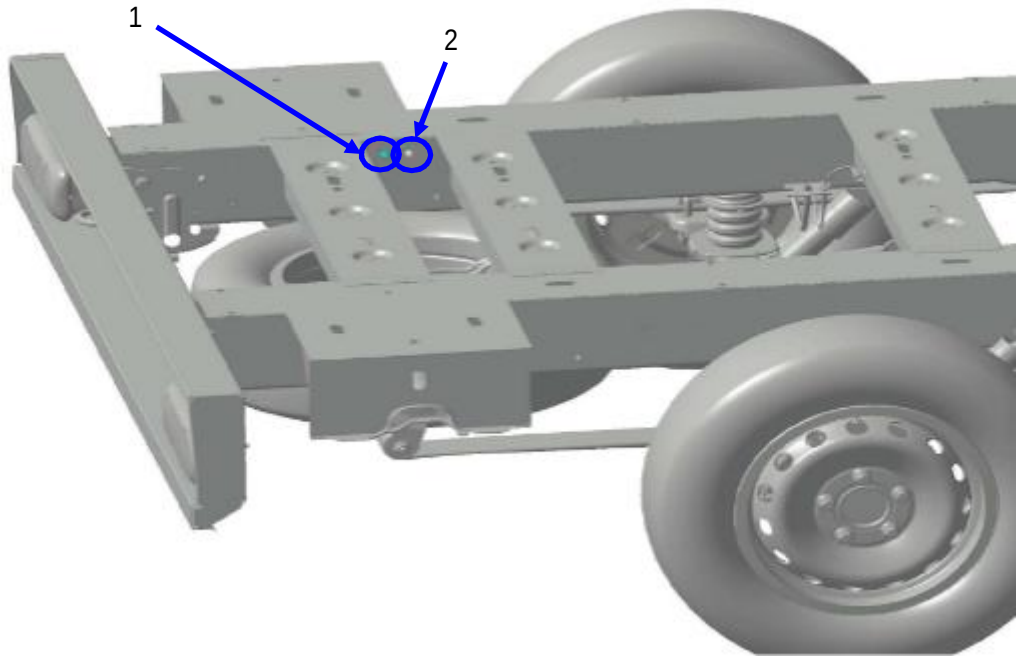
Pos.	Description
1	Ground MW-32
2	Ground MAJ-12
3	Ground MAS-32
4	Do not use

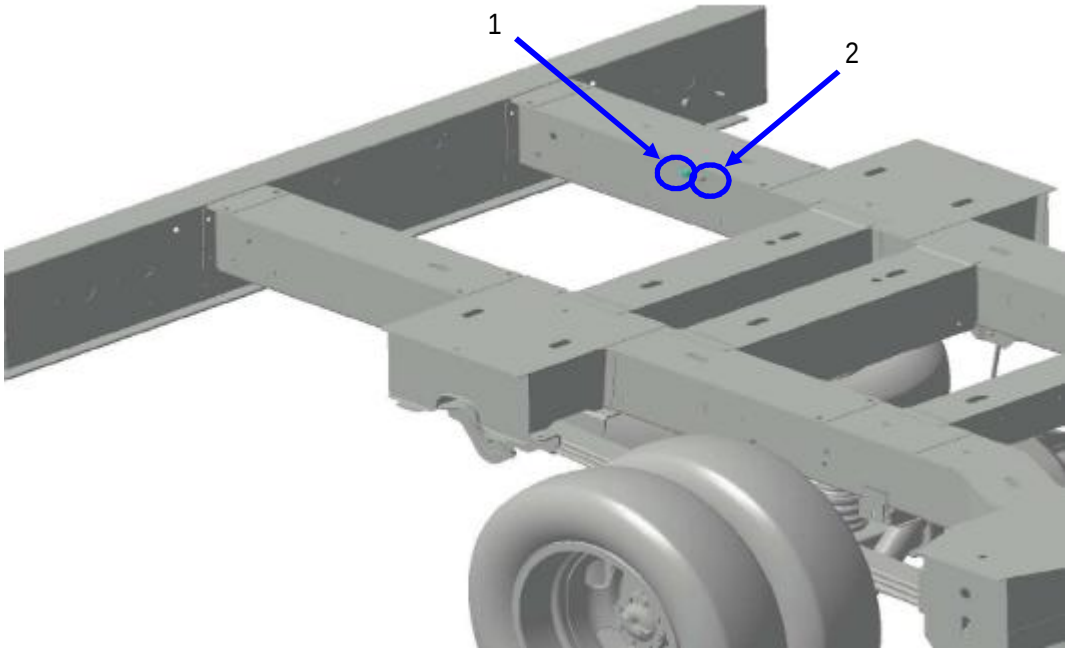
Electrical grounds on the panel van extreme rear pillar



Pos.	Description
1	Ground MGA-7
2	Do not use

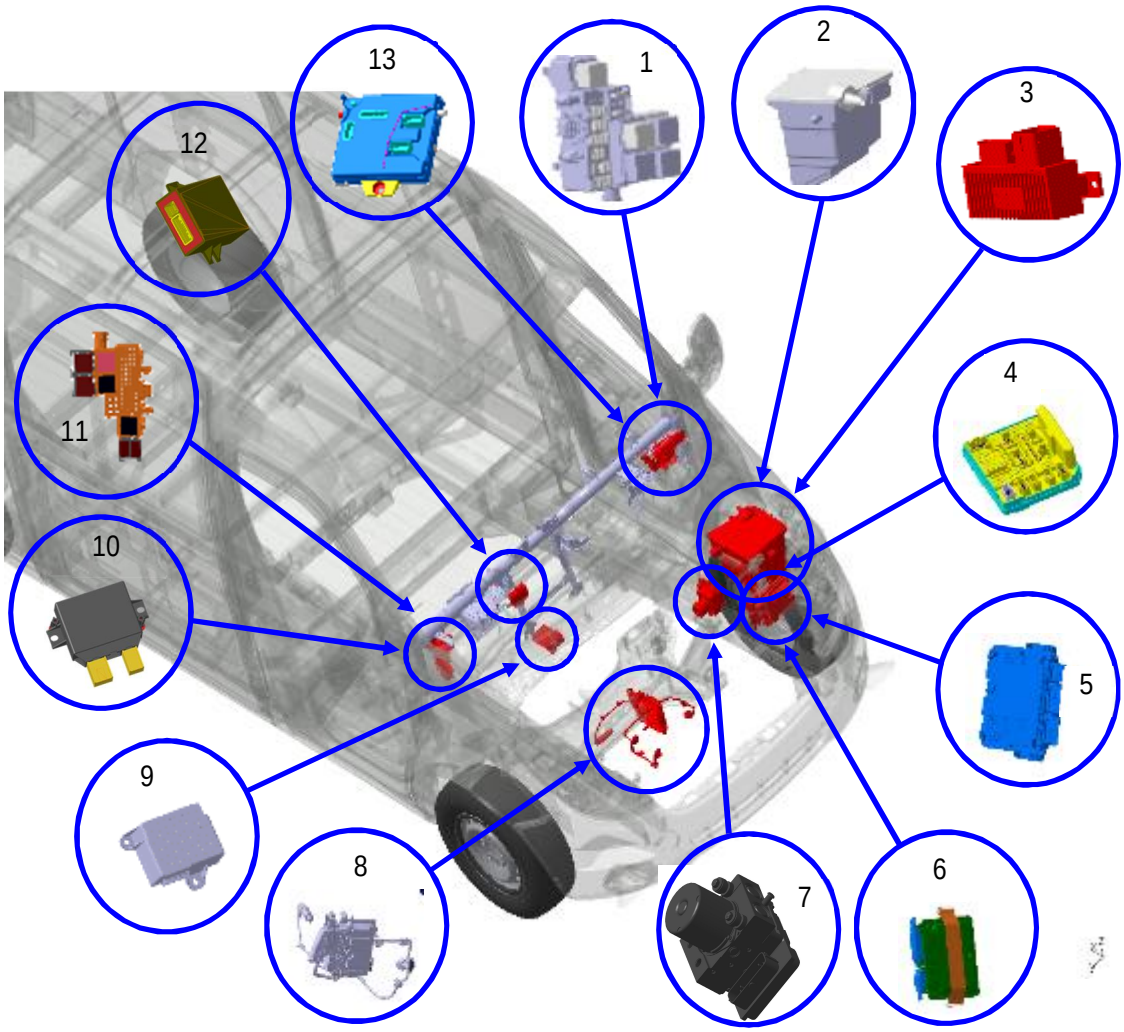
Electrical grounds on the chassis





Pos.	Description
1	Ground MAE
2	Do not use

4.1.6 LOCATION OF THE VARIOUS ELECTRIC COMPONENTS



Pos.	Description
1	BFRH (passenger compartment fuse-relay box)
2	BIM (engine interconnections unit)
3	Thermoplunger unit
4	USM (Undercoat Switching Module) Control unit: voltage power supply control
5	Injection computer
6 (Opt.)	BVR ECU (robotised gearbox) Front wheel drive
7	ABS/ESP hydraulic unit
8 (Opt.)	BVR ECU (robotised gearbox) Rear wheel drive
9	Airbag detection unit
10 (Opt.)	Parking assistance computer
11 (Bus Opt.)	BFRH (passenger compartment fuse-relay box)
12 (Opt.)	KC6 (Conversion Unit)
13	UCH (Passenger Compartment Unit)

4.2 PASSENGER COMPARTMENT FUSE RELAY BOX

Note:

Before working on the vehicle, refer to chapter 4.5.5.

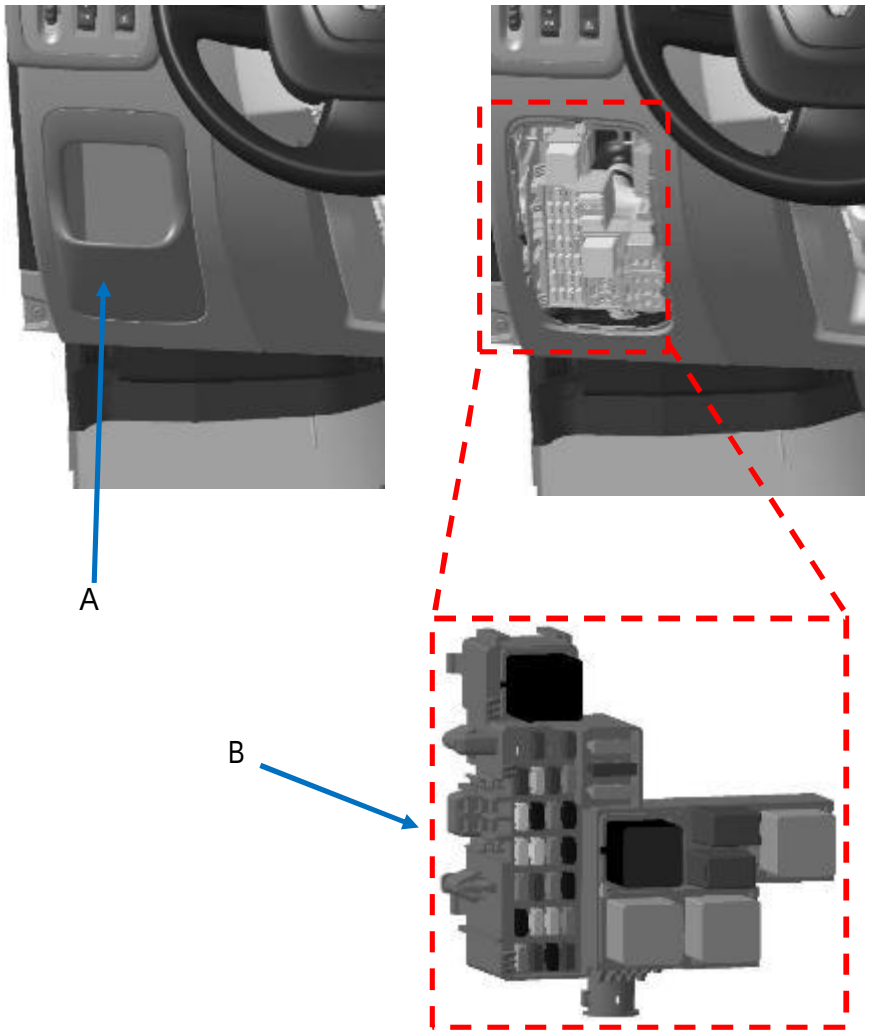
Depending on the versions and options, some fuses or relays may not be included.

4.2.1 PASSENGER COMPARTMENT FUSE BOX AND RELAYS (BFRH)

This fuse-relay box is located under the dashboard, on the left above the driver's feet (left-hand drive vehicles) or above the passenger's feet (right-hand drive vehicles).

Left hand drive, driver's side

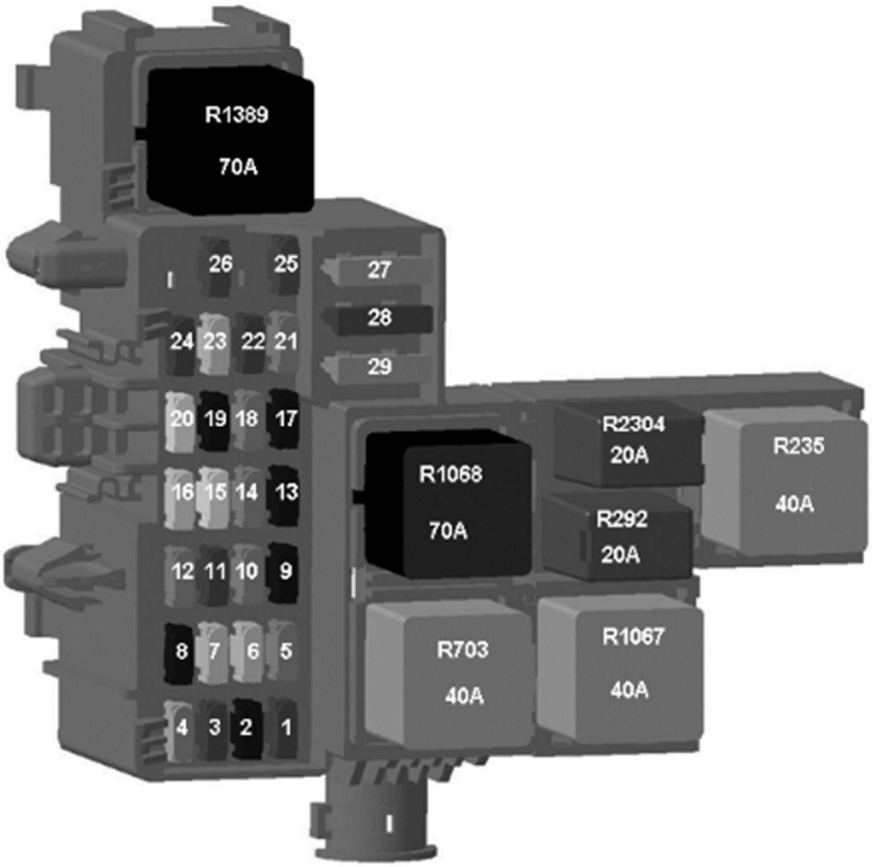
To access the box, elements (A) and (B) must be removed:



Pos.	Description
A	Storage housing (access panel)
B	Passenger compartment fuse relay box (BFRH)

Details of the passenger compartment fuse-relay box (BFRH 1)

All relays are diode relays.



Relay

Relay	Rating	Function
1389 (Nr)	70A	Load shed current distribution
1068 (Nr)	70A	CTP2
2304 (Mn)	20A	Power take-off (PTO)
292 (Mn)	20A	Additional side lights
235 (Rs)	40A	Heated rear screen (LAC)
703 (Rs)	40A	Electric windows
1067 (Rs)	40A	CTP1

Note:

It is necessary to add a supply for the empty fuse location (reserve). Location 25 and 26 can be fitted with a diode in place of a fuse.

Details on the fuses

Fuse	Type	Rating	Function
F1 (Rg)	Mini	10A	Control for: air-conditioning, front and rear heated seats, heated seats relay, radio
F2 (Bu)	Mini	15A	Accessories socket 1st row cigarette lighter
F3 (Rg)	Mini	10A	2nd row accessories socket
F4 (Oc)	Mini	5A	Heated electric door mirrors
F5 (Oc)	Mini	5A	Instrument panel, diagnostic socket
F6 (Bg)	Mini	25A	Locking of doors
F7 (Bg)	Mini	25A	Indicators, Rear fog light
F8 (Bu)	Mini	15A	Additional side lights tow bar replacement + battery feed
F9 (Bu)	Mini	15A	Horn
F10 (Oc)	Mini	5A	Passenger compartment ECU: ABS/ESP filling, yaw sensor
F11 (Rg)	Mini	10A	Air conditioning control panel (without STOSTA) (+) BCM timing battery: Ceiling lights, electric door mirrors, ABS/ESP ECU wake-up
F12 (Oc)	Mini	5A	Starter (BCM info)
F13 (Bu)	Mini	15A	(+) Accessories, STOP switch
F14 (Oc)	Mini	5A	Air conditioning control panel ECO Mode switch Passenger compartment ECU accessories (+) feed: Front & rear window control relay
F15 (Je)	Mini	20A	Heated left-side rear window
F16 (Bg)	Mini	25A	Heated right-side rear window
F17 (Bu)	Mini	15A	Front & rear windscreen washer pump
F18 (Oc)	Mini	5A	Transponder ring + passenger compartment unit + Mercosur tracker unit
F19 (Bu)	Mini	15A	Heated seats
F20 (Je)	Mini	20A	Power take-off control on gearbox (PTO)
F21 (Oc)	Mini	5A	Hands-free accessories ECU
F22 (Rg)	Mini	10A	Radio, multi-function display, radio-telephone ECU, alarm
F23 (Bg)	Mini	25A	Diesel heater
F24 (Rg)	Mini	10A	Tachograph
F25 (Mn)	Mini	7,5A	Additional left side light
F26 (Mn)	Mini	7,5A	Additional right side light
F27 (Oe)	Medium	40A	(+) Air blower load shed accessory
F28 (Rg)	Medium	10A	Current distribution relay for 2 purpose built body conversions: PRCAMP, KPD
F29 (Oe)	Medium	40A	BFRH window control relay + Passenger compartment ECU: Electric window control relay

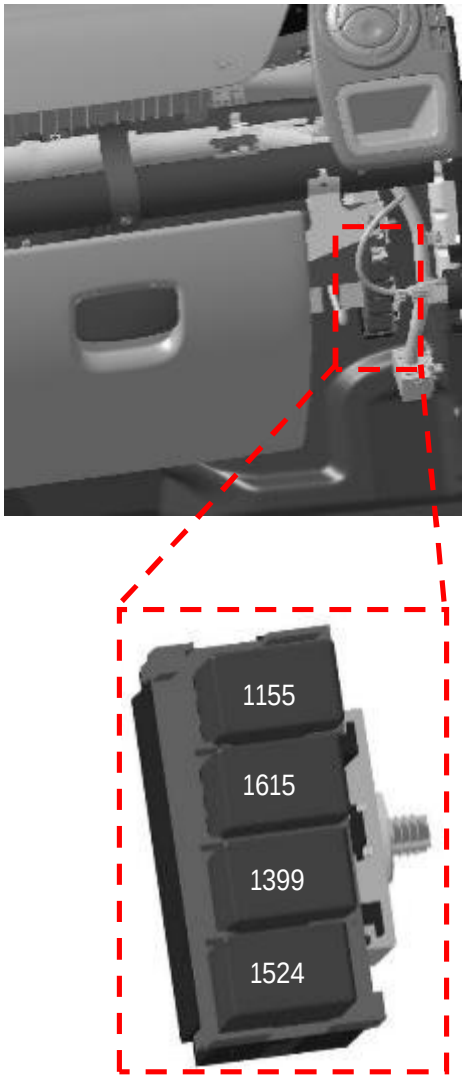
4.2.2 PASSENGER COMPARTMENT FUSE BOXES AND RELAYS (BFRH)

Note:

Specific to the base vehicle (EXCEPT BUS)

Left hand drive passenger side

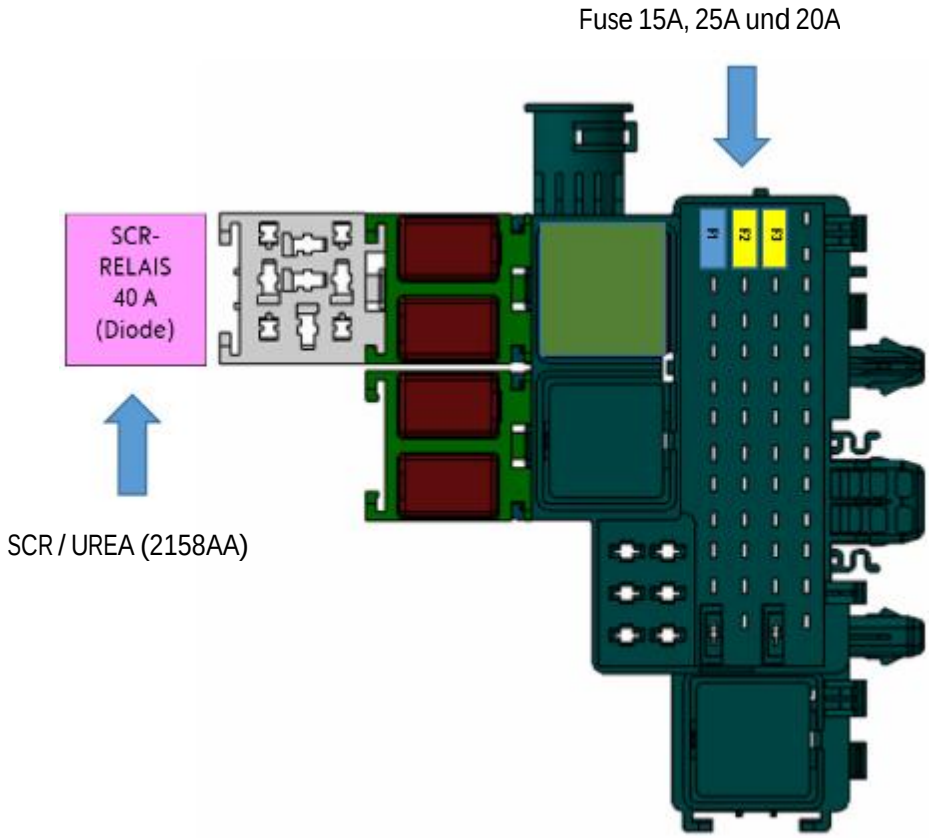
This fuse-relay box is located under the dashboard, on the right above the passenger's feet (left-hand drive vehicles) or above the driver's feet (right-hand drive vehicles). It is accessed behind the storage housing to the right of the glovebox.



Definition of Relay:

Relay	Rating	Function
1155 (Mn)	20A	Load shed accessory relay no.2
1615 (Mn)	20A	Engine running relay
1399 (Mn)	20A	Heated seat
1524 (Mn)	20A	ESP brake light

4.2.3 PASSENGER COMPARTMENT RELAY AND FUSE BOX: CHANGES FOR THE SCR



Fuse changes: F1 – F2 – F3

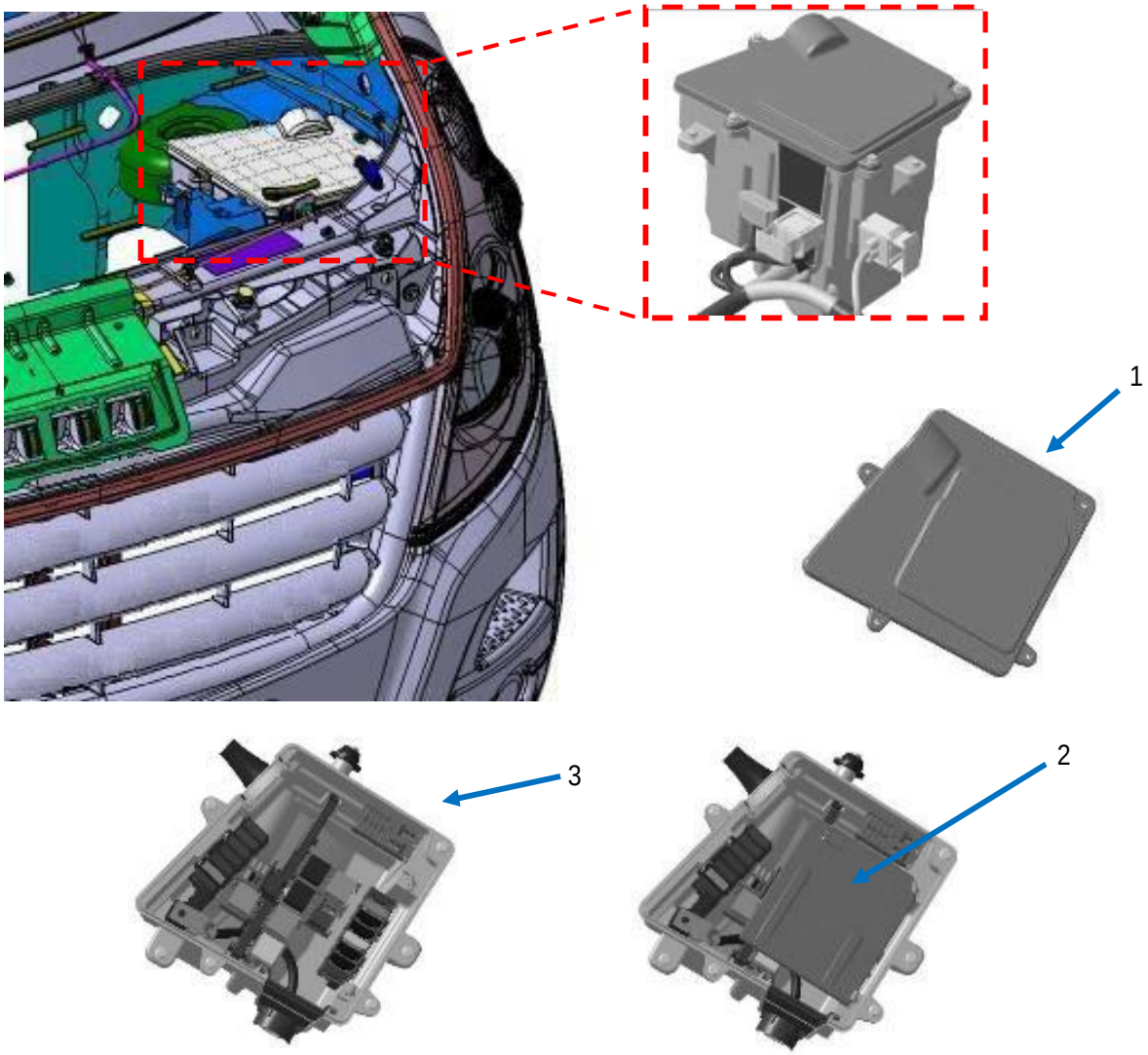
Fuse	Type	Rating	Connection	Function
F1 (Rg)	Mini	15A	BP2V	+ PRTJ BAT/NOX SENSOR
F2 (Bu)	Mini	25A	BP2U	+ PRTJ BAT/UREA 2
F3 (Rg)	Mini	20A	BP2T	+ PRTJ BAT/UREA 1

Additional relay

Relay	Rating	Function
2158 (Nr)	40A	SCR/UREA

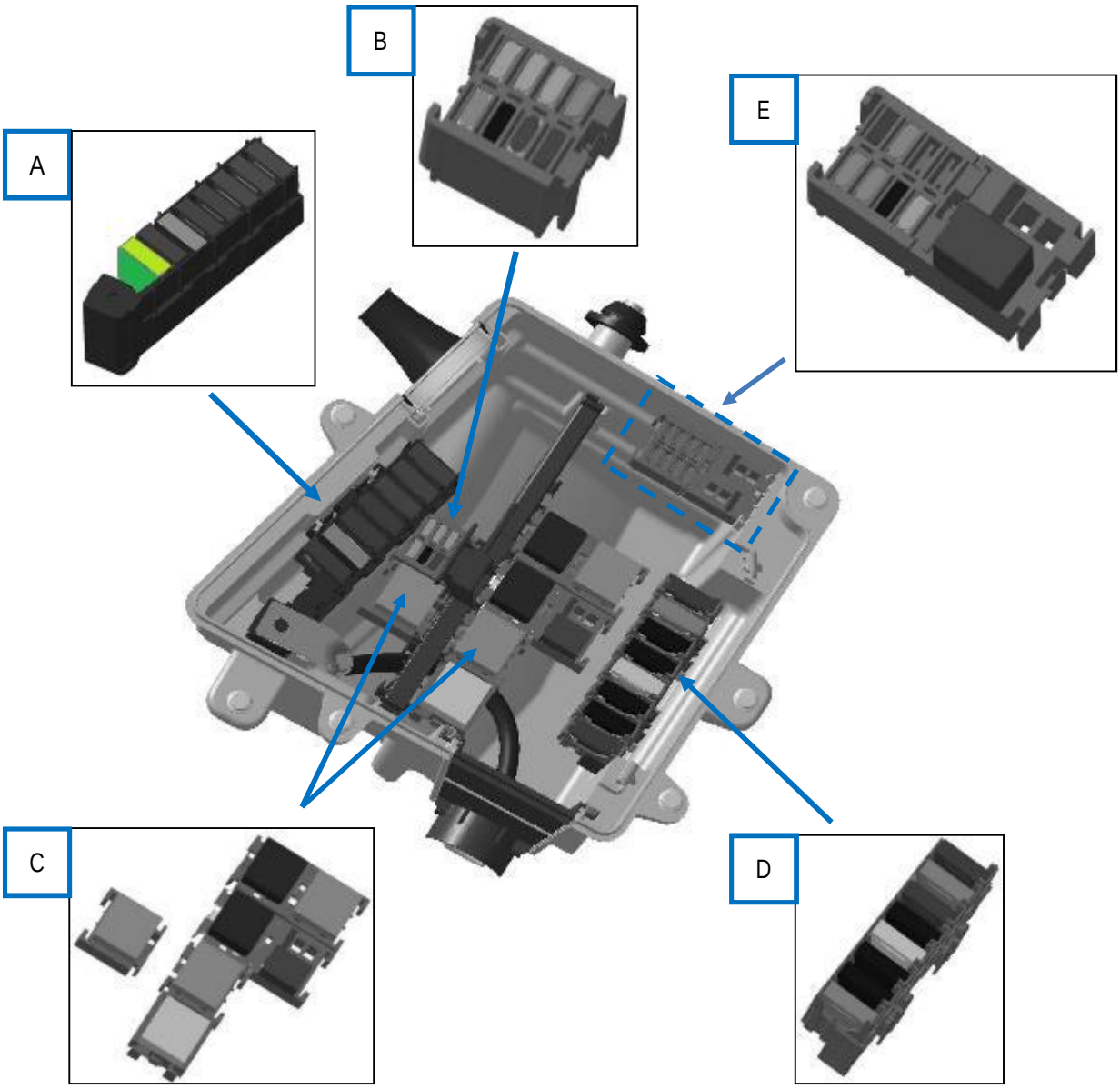
4.2.4 ENGINE INTERCONNECTIONS UNIT (BIM)

The engine interconnections unit can be found to the left of the engine compartment in front of the shock absorber mounting. This unit contains the power supply fuse board and the protection and switching unit (UPC).

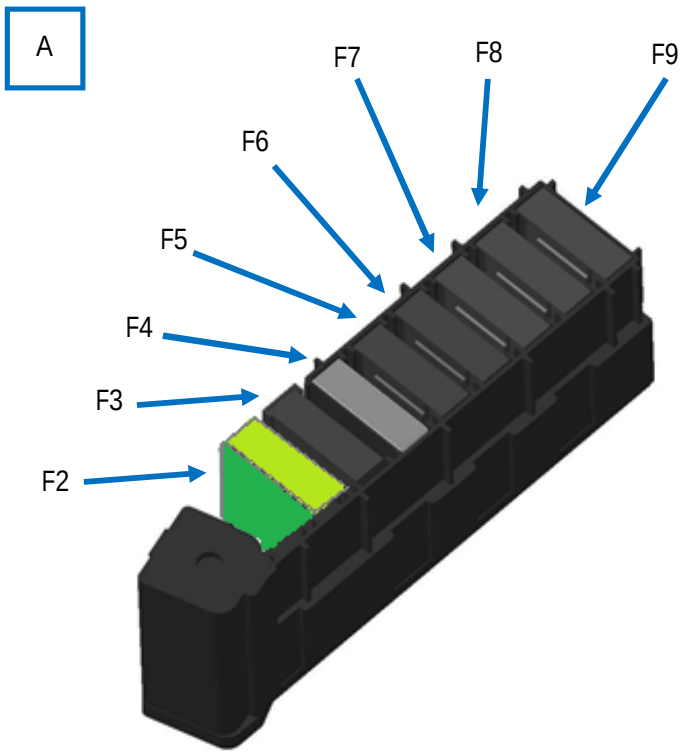


Pos.	Description
1	Connections unit cover
2	Protection and switching unit
3	Engine interconnections unit

BIM unit fuses and relays

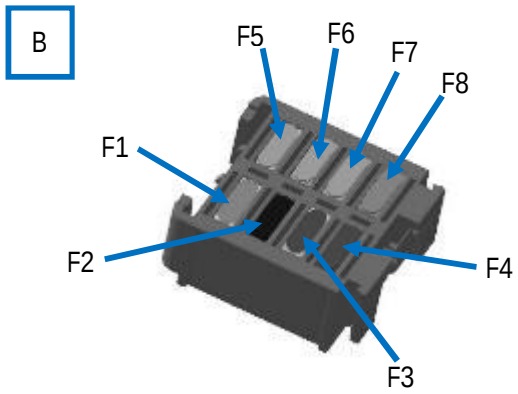


Power supply fuse board 1



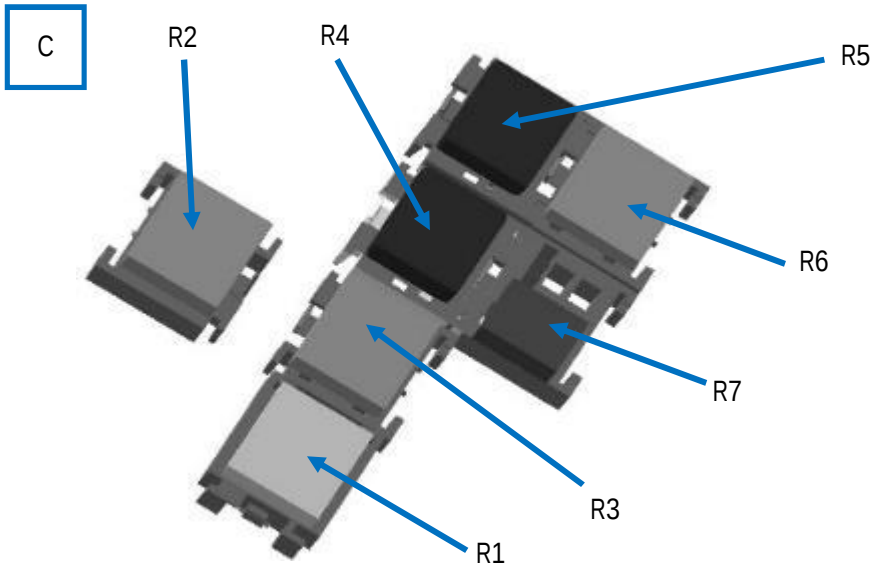
Fuse	Type	Rating	Function
F1			
F2	Maxi	50A	Euro 6 urea injection SCR (AVSCR1)
F3 (Rg)	Maxi	50A	Additional heating relay / BUS
F4 (Og)	Maxi	50A	UCE ABS
F5 (Rg)	Maxi	50A	Additional heating relay 1
F6 (Rg)	Maxi	50A	Additional body conversion/ BUS
F7 (Mn)	Maxi	70A	Additional heating relay 2
F8 (Mn)	Maxi	70A	BFRH, diesel heating resistance, tachograph, additional adaptations, heated seats, power take-off, window control, electric door mirrors, heated rear windscreen (ALL VIA BFRH)
F9 (Mn)	Maxi	70A	Supply of passenger compartment function fuses F1, F2, F3, F9, F10, F11, F22

Engine fuse box



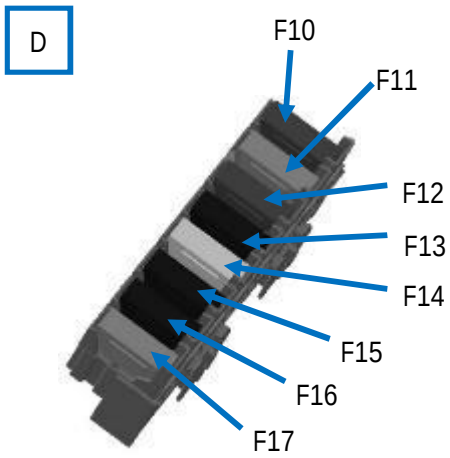
Fuse	Type	Rating	Function
F1 (Bg)	Mini	25A	UCE Injection
F2 (Bu)	Mini	15A	GEN3: - Thermomanagement valve 2214 - Water in diesel sensor 414 (via USM) - Cylinder sensor 746 - Flow meter actuator 1105 - EGR by pass valve 1301 - Air supply flow meter 799 - Injector cut-off valve 5 1890 - Exhaust injection valve 1750 - Upstream Uego probe 1587 - Turbo control valve 1475 - Turbo water pump 369 - EGR water pump 1915 - EGR 2nd water pump 2124 GEN4: - Water in diesel sensor 414 (via USM) - Thermomanagement valve 2214 - High pressure turbine by-pass valve 2310 - High pressure compressor by-pass valve 2311 - Waste Gate valve 436 - Fuel flow actuator 1105 - EGR by-pass valve 1301 - Upstream Uego probe 1587 - Turbo water pump 369 - EGR water pump 1915 - EGR 2nd water pump 2124
F3 (Mn)	Mini	7,5A	Gearbox UCE (RWL/ M67), 2 power relays unit (RWL/ M67 without KL9)
F4 (Mn)	Mini	7,5A	Gearbox UCE (RWL/ M67 without KL9)
F5 (Bg)	Mini	25A	Gearbox UCE (RWL/ M67 without KL9)
F6 (Bg)	Mini	25A	Gearbox UCE (RWL/ M67 without KL9)
F7 (Mn)	Mini	5A	Current sensor
F7 (Bg)	Mini	25A	Gearbox UCE (RWL/ M67 without KL9)
F8 (Mn)	Mini	5A	Voltage reader

Relay unit



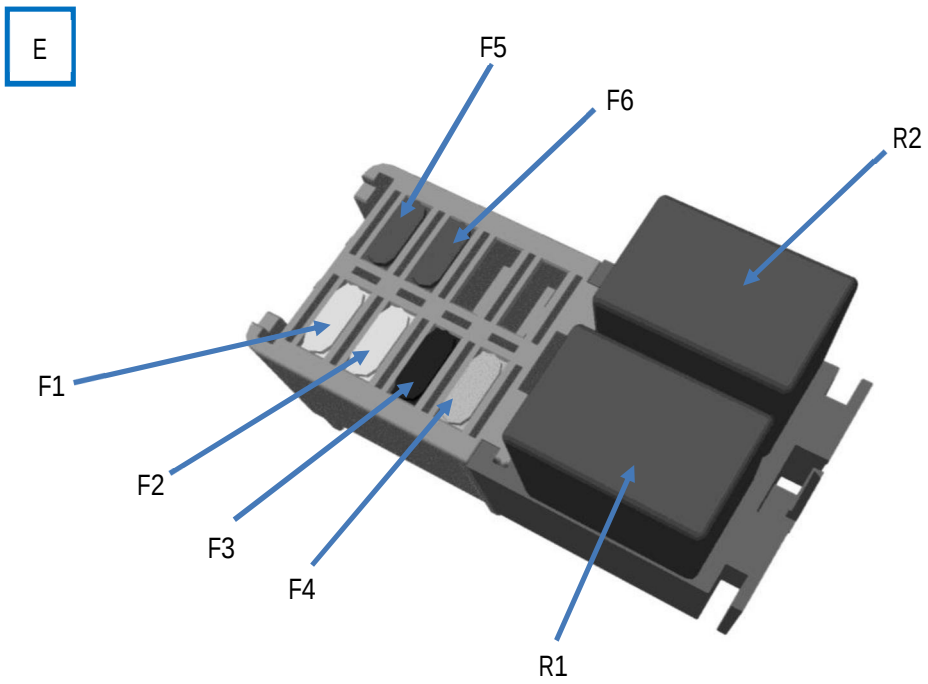
Relay	Type	Rating	Function
R1 (Rs)	336AA	40A	GEN3: RWD/ C61 RWD/ CA/KL9 FWD/ C61, AC, C41 GEN4: RWD/ C61, C41 RWD/ CA/ KL9 FWD/ C61, AC, C41
R2 (Rs)	762AA	40A	Gearbox pump assembly FWD / M67/ without KL9
R3 (Rs)	983AA	40A	Injection UCE power supply
R4 (Nr)	335AA	70A	GMV1 FWD, RWD
R5 (Nr)	337AA	70A	GMV3 GEN3: FWD/ C61, AC, C41/ 678, 880 FWD/ C61, CA/ 870, 872, 876 GEN4: FWD/ C61, AC, C41
R6 (Rs)	234AA	40A	GMV4 FWD/ AC, C61/ 702, 880
R7 (Mr)	783AA	20A	Reversing lights BVR M67/ ohne KL9

Power supply fuse board 2



Fuse	Type	Rating	Function
F10 (Rg)	Maxi	50A	Relay 3 GMV, relay GMV GEN3: FWD/ C61, AC/ 678, 880 GEN4: FWD/ GEN3 C61, AC
F10 (Og)	Maxi	40A	Relay 3 GMV, relay GMV GEN3: FWD/ C41/ 678, 880 FWD/ C61,AC/ 870, 872, 876 GEN4: FWD/ C41
F11 (Og)	Maxi	40A	Motor fan speed relays 1 & 2 GEN3: FWD/ C41/ 678, 880 FWD/ C61, AC/ 870 ,872, 876 GEN4: FWD/ CHA
F11 (Rg)	Maxi	50A	Motor fan speed relays 1 & 2 GEN 3: FWD/ C61, AC/ 678, 880 RWD/ C61, AC GEN 4: FWD/ C61, AC RWD/ C61, AC, C41
F11 (Bu)	Maxi	60A	Motor fan speed relays 1 & 2 FWD/ C41/ 870, 872, 876
F12 (Bu)	Maxi	60A	Water heater interface unit
F13 (Bu)	Maxi	60A	Water heater interface unit
F14 (Je)	Maxi	70A	Diesel spark plug relay unit
F15 (Bu)	Maxi	60A	USM power supply 2010
F16 (Bu)	Maxi	60A	USM power supply 2010
F17 (Og)	Maxi	40A	Gearbox pump assembly relay FWD/ M67/ without KL9
F17 (RG)	Maxi	50A	Fuse box 2 RWL/ M67/ without KL9

Passenger Compartment fuse box



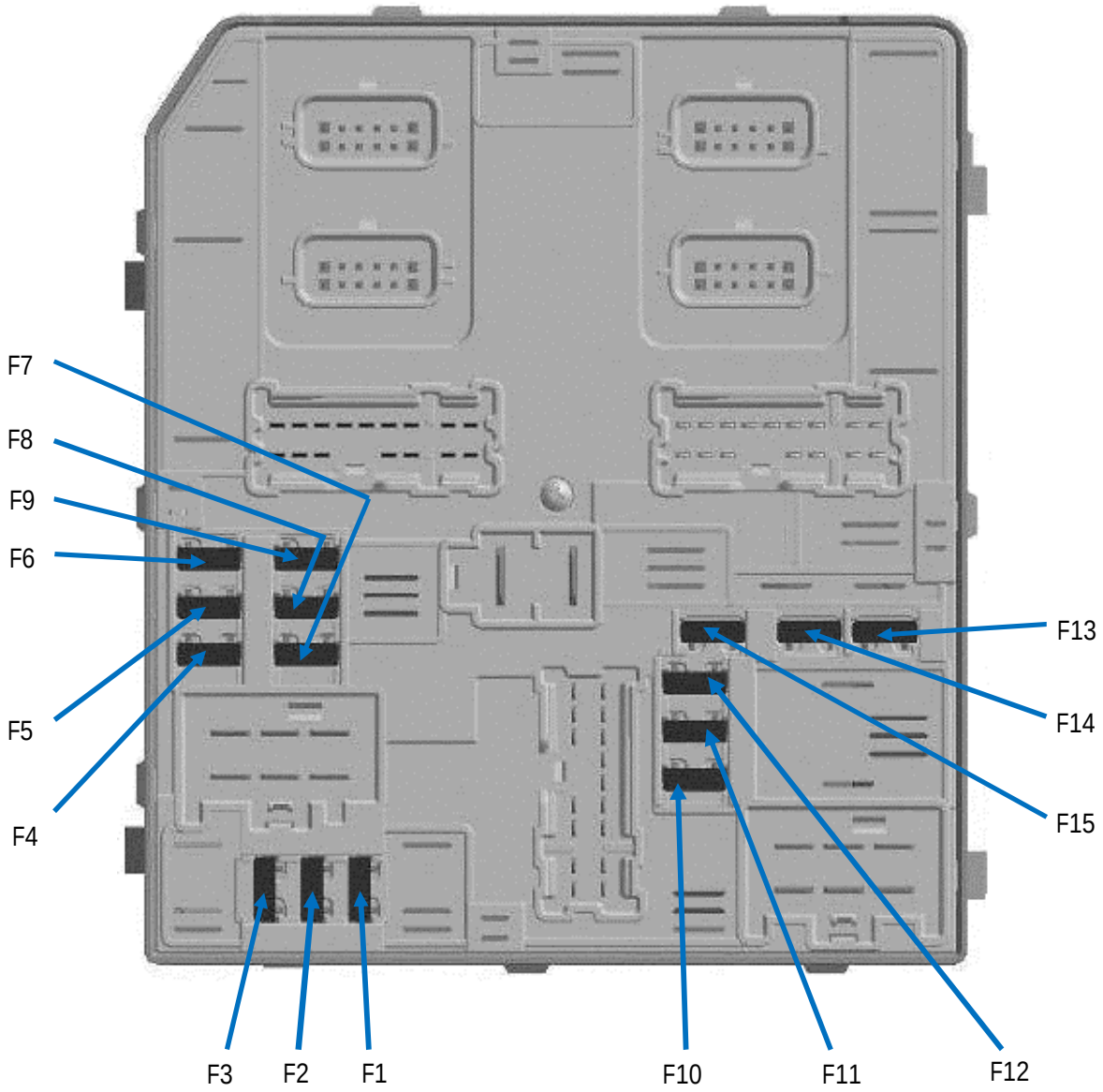
Fuse	Type	Rating	Function
F1 (Je)	Mini	5A	Lighting control relay power supply, Front and rear central lights
F2 (Je)	Mini	5A	Lighting relay power supply Individual lighting
F3 (Bu)	Mini	15A	1155 relay power supply (70A + timed load shed accessory relay)
F4 (Bg)	Mini	25A	1760 relay power supply (70A + BCM battery relay)
F5 (Rg)	Mini	10A	Multimedia display power supply
F6 (Rg)	Mini	5A	Door sill electronic control unit power supply
F7			
F8			

Relay	Type	Rating	Function
R1 (Mr)	1683AA	20A	Horn relay
R2 (Mr)	1683AA	20A	Diesel filter heater relay

4.2.5 PROTECTING AND SWITCHING UNIT (USM-2010)

Attention:

These indications are given for information purposes only. Changing a fuse or connecting electrically to a UPC connection is prohibited..



Fuse functions (for information)

Fuse	Type	Rating	Function
F1 (Vr)	Mini	30A	Windscreen wiper
F2 (Bg)	Mini	25A	ABS/ESP supply
F3			
F4 (Mn)	Mini	5A	Power steering electric pump unit
F5 (Mn)	Mini	7,5A	Passenger compartment APC
F6	Mini	5A	Airbag APC UCE
F7 (Mn)	Mini	5A	APC UCE 6-shift gearbox + switch of control lever
F8			
F9 (Rg)	Mini	10A	Air conditioning (compressor)
F10 (Je)	Mini	20A	Fuel pump power supply
F11			
F12 (Rg)	Mini	10A	Rear running lights APC
F13 (Mn)	Mini	5A	ECM APC (injection UCE, heater relay, PTO, accelerated idle)
F14 (Je)	Mini	20A	UCE power supply 6-shift gearbox FWD/ without KL9
F15 (Vr)	Mini	30A	Starter control

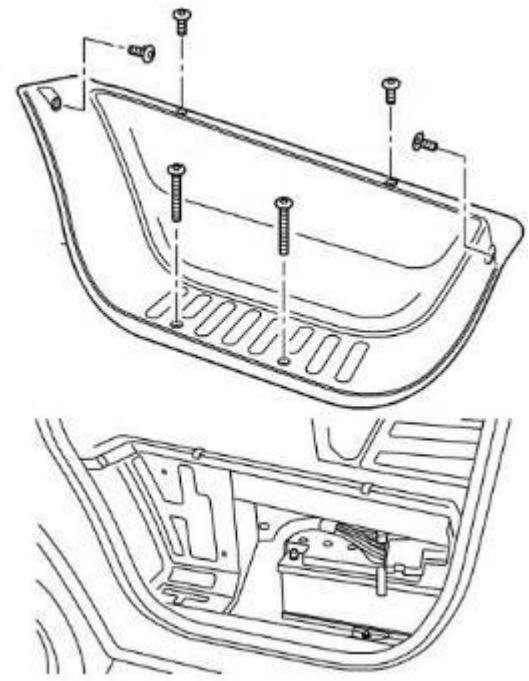
Abbreviation	Meaning
FWD	Front wheel drive
RWD	Rear wheel drive
AC	Air condition
BFRH	Passenger compartment fuse box and relays
C41	Heating system
C60	Air condition manual
C61	Air condition automatic
M67	MTA-Gearbox
678/ 870/ 872/ 876 / 880	Motor suffix

4.3 STANDARD BATTERY/ TERMINALS/ ADDITIONAL BATTERY

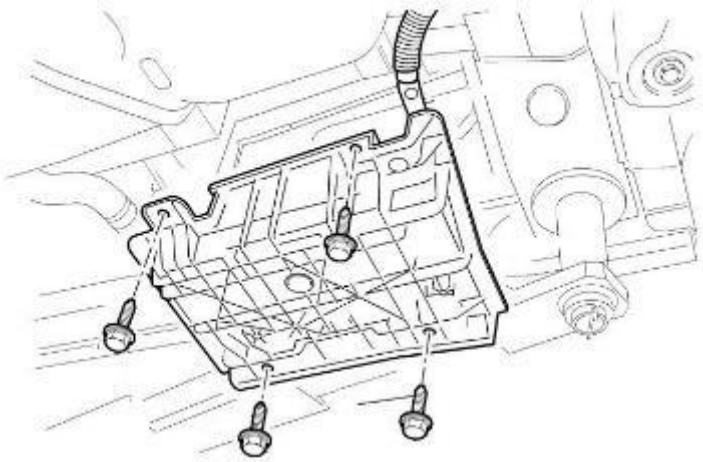
4.3.1 STANDARD BATTERY

The battery is located in the left-hand side door sill. To get to the battery, the plastic door sill trim needs to be removed.

Battery behind left stepboard



The battery box is screwed to the floor and can also extend completely down. Before that, the battery should be removed.



Battery type

Depending on the configuration of the vehicle, there are different types of batteries.

Battery -Type	Characteristics	Start/ Stop	ESM	Temperate	Extreme cold
L5	850 A 95 A/h	without	without	X	
VRLA L5	900 A 90 A/h	with	with	X (Until 1st of July)	X
EFB L5	850 A 95 A/h	with	with	X	
L6	950 A 110 A/h	without	without		X

The L5 EFB battery is the eco version of the VRLA L5 battery and will appear from 01. Sep. 2015.

The L6 battery is not Start/ Stop compatible.

Terminal connection

Depending on the electrical assessment, the electrical power take-off may be conditioned with the engine running information.

The wiring used must allow the positive battery terminal block to be removed (tightening torque 8Nm ± 15%).

The wiring must be red and kept inside the battery tray and as close to the terminal block as possible, in order to prevent any vibration that could lead to damage of a terminal block or loosening of the nut. A red insulating sleeve is required for the terminal.

The wiring must be protected by a fuse which will be sized depending on the cross section of the wire and on the consumer.

There are two options for connecting to the positive battery terminal, depending on the power consumed. Any other connection to the positive terminal is prohibited.

Wiring protection

Use a category 3 resin, lightweight felt or tape-type protection in the engine compartment and on the underbody, and category 1 to 3 for the other sections not subjected to high temperatures (see sheet 4.1).

Since the split annular sheathing type protection is abrasive and may cause corrosion (paint wear) and noise (in hollow bodies), it must be immobilised.

There must be no contact between the wiring and the brake or fuel pipes.

If the original wiring is near to a split-grooved sleeve, a spacer (double adjustment bracket) must be added in order to avoid any contact (risk of wear and short circuit).

Option Start/ Stop

Note:

(+) terminal

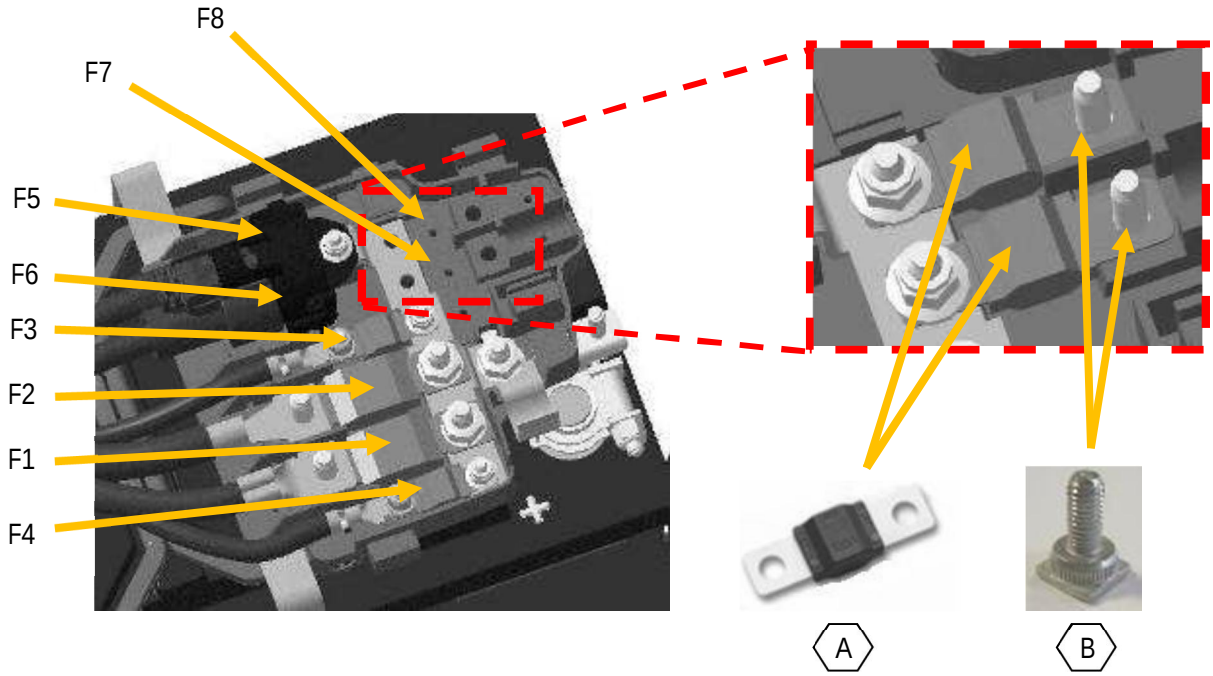
In all usage scenarios, the + terminal is strictly identical, with the exception of the fuse distribution

(–) terminal

Depending on the version, see chapter 4.3.3.

4.3.2 BATTERY – TERMINAL (+)

Type 1 positive terminal



Two locations are provided for midi-type fuses (A). For this, special M5 studs from the supplier MTA must be used (B).

The following fuses may be used: 30A midi fuse; maximum 40A midi fuse.

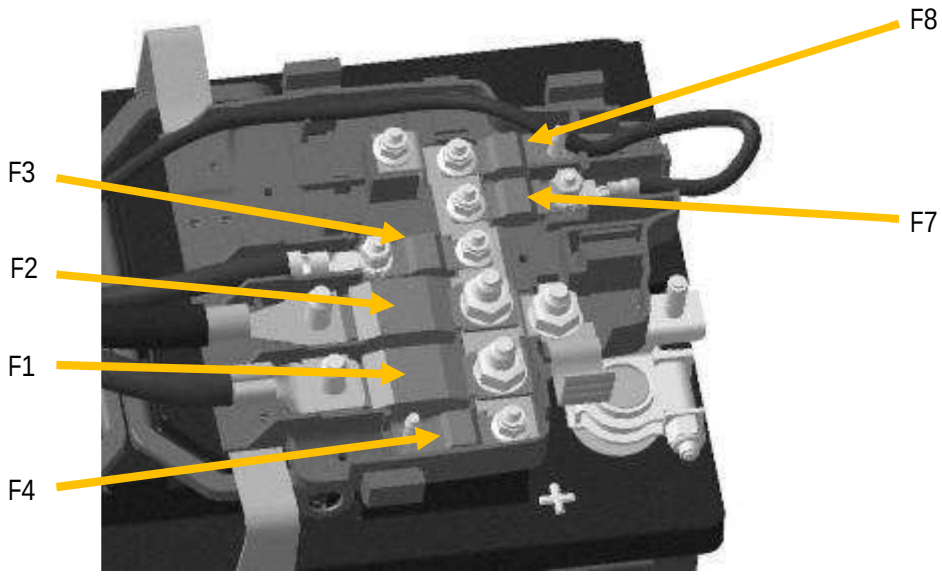
Tighten at the recommended torque of 5Nm ± 15% for the M5 studs and leave at least one spare thread after tightening.

Attention:

Tightening torque for M8 nuts on the positive terminal: 12Nm ± 15%.

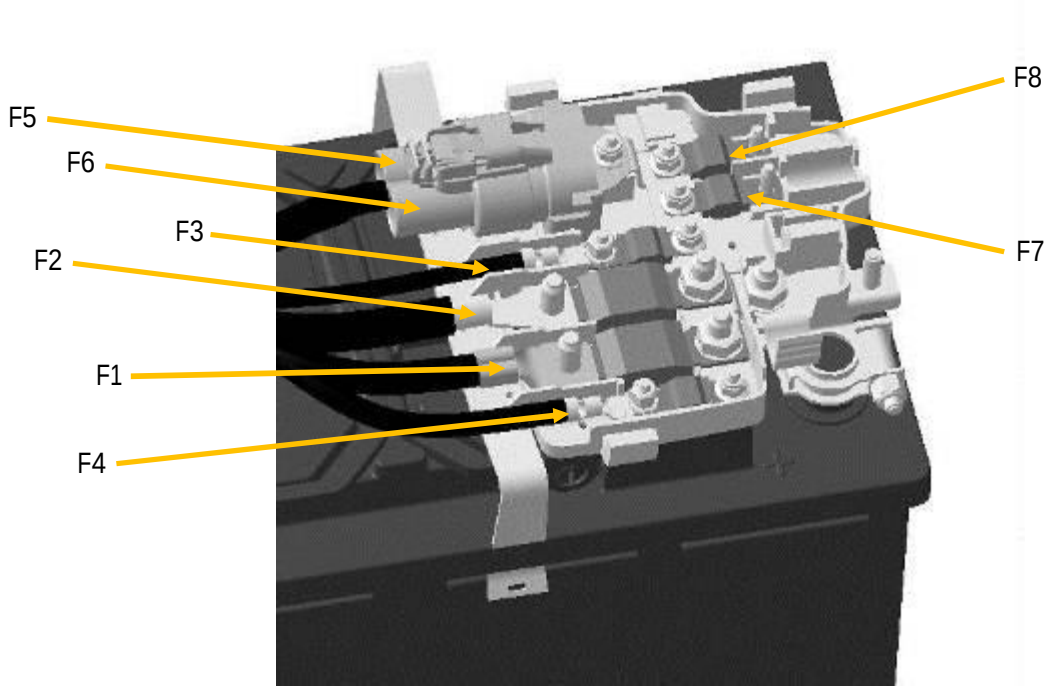
Fuse	Rating	Connection	Function
F1	500A	BPP	Power supply, Jump Start
F2	500A	BNPDA	Starter, Alternator
F3	40A	BP31	Injection and ECM power supply
F4	40A	BPS1	Secure function
F5			
F6			
F7	40A	BPZT	Reserved for additional body conversions
F8	40A		Reserved for additional body conversions

Positive terminal CO2 step 1



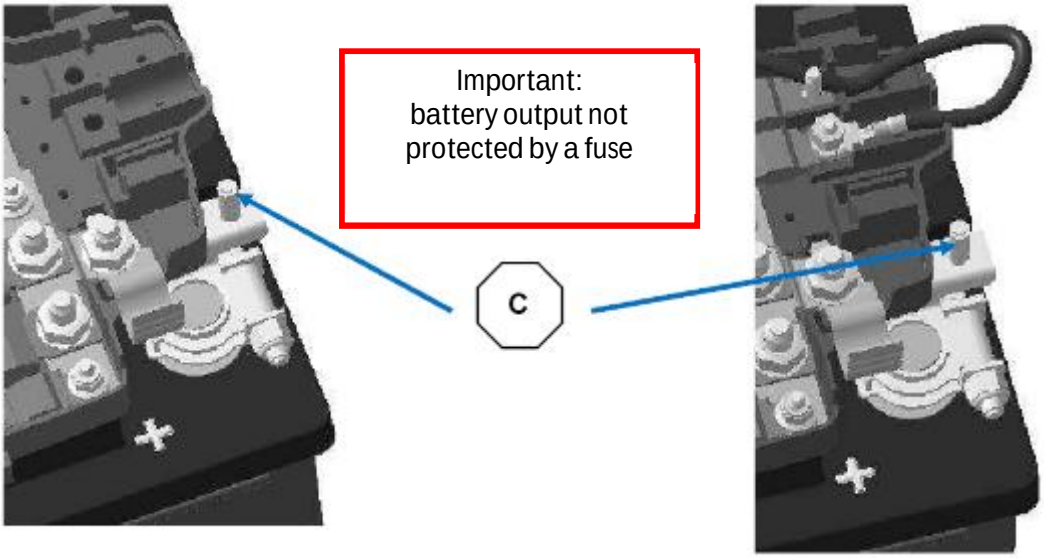
Fuse	Rating	Connection	Function
F1	500A	BPP	Power supply, Jump Start
F2	500A	BNPDA	Starter, Alternator
F3	40A	BP31	Injection and ECM power supply
F4	40A	BPS1	Secure function
F5			
F6			
F7	40A	BPZT	Current sensor, voltage reader
F8	40A		Reserved for additional body conversions

Positive terminal CO2 step 2 (phase 1)



Fuse	Rating	Connection	Function
F1	500A	BPP	Power supply, Jump Start
F2	500A	BPDA	Starter, Alternator
F3	40A	BP31	Injection and ECM power supply
F4	80A	BPS1	Power steering electric pump power supply
F5	40A	BPS1	Secure function
F6	40A	BPS1	Current sensor, voltage reader
F7	40A		Reserved for additional body conversions
F8	40A		Reserved for additional body conversions

Unprotected positive terminal



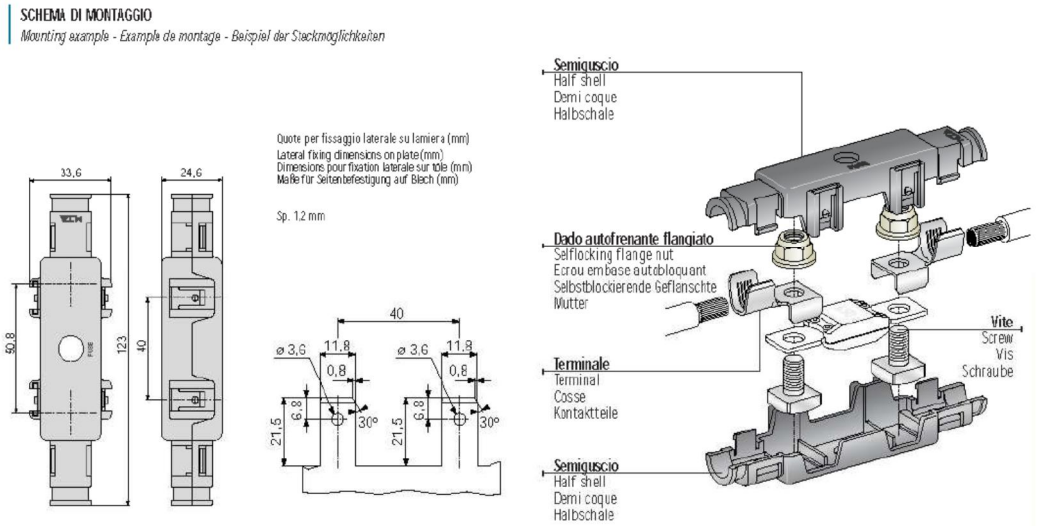
Pos.	Description
C	M6 high power free stud (current above 40A)

Make sure there is good contact (flatness) with the terminal. Crimping must be done in accordance with terminal manufacturer guidelines.

Tighten at the recommended torque of 8Nm ± 15% and leave at least one spare thread after tightening.

The fuse holder should be properly attached to avoid any vibrations and damage to its surroundings (e.g. risk of noise, corrosion).

Example of fuse and fuse holder



4.3.3 BATTERY – TERMINAL (-)

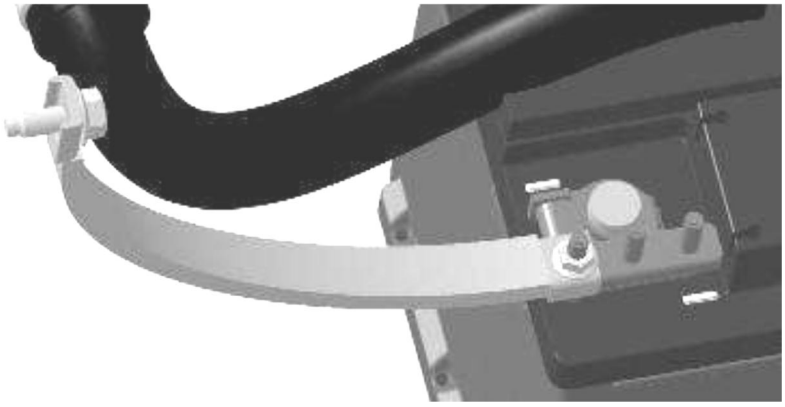
Note:

The wiring used must allow the negative battery terminal block to be removed.

Tighten at the recommended torque of 8 Nm ± 15% and leave at least one spare thread after tightening.

The colour black for wiring is required!

Version CO2 step 1, without Start/ Stop

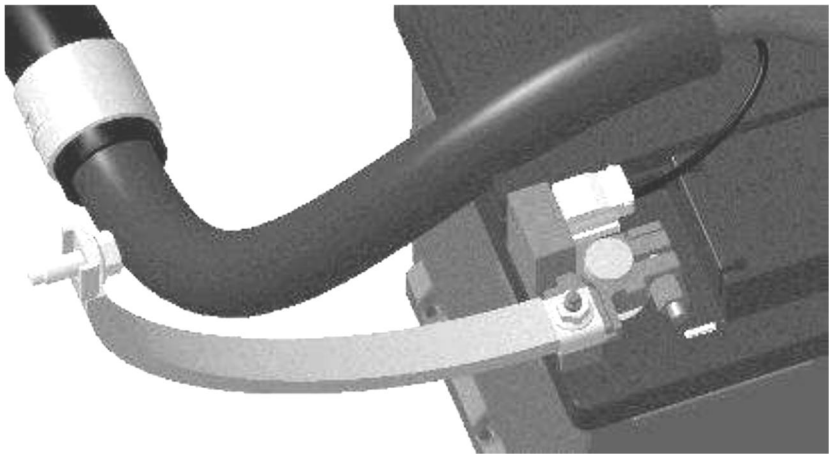


Version CO2 step 2 (phase 1), with Start/ Stop

Attention:

There is no free earth stud on this version, it is forbidden to reuse the earth strap or the tangent screw; use an available earth, see sheet 4.1.

It is forbidden to use the current on the terminal of the battery (vehicle put into fault mode, current sensor present on the terminal).



4.3.4 ADDITIONAL BATTERY

The use of a second battery is recommended when adding large electric equipment and particularly when the engine is off.

For systems that require secure starting, both batteries must be uncoupled and the additional equipment must exclusively receive their power supply from the secondary battery.

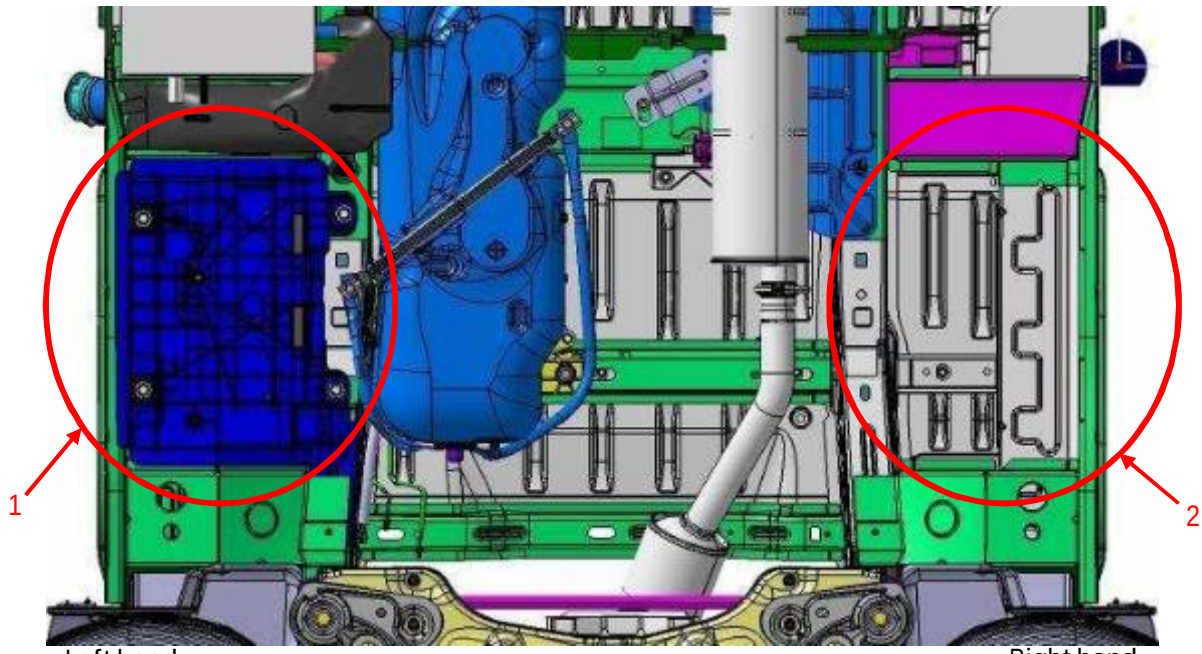
Underbody area

A special battery tray should be used according to the size of the battery. It is to be attached under the body. We recommend that you use the mountings of the main battery tray on the left-hand side as your model. The battery will therefore be fitted from underneath the body.

For installation of an additional battery, space is provided under the right-hand cab door sill, visible in zone 2 in the drawing below.

The right-hand door sill bodywork is different from that of the left-hand sill (see drawing below).

View from below: difference between left and right hand door sills



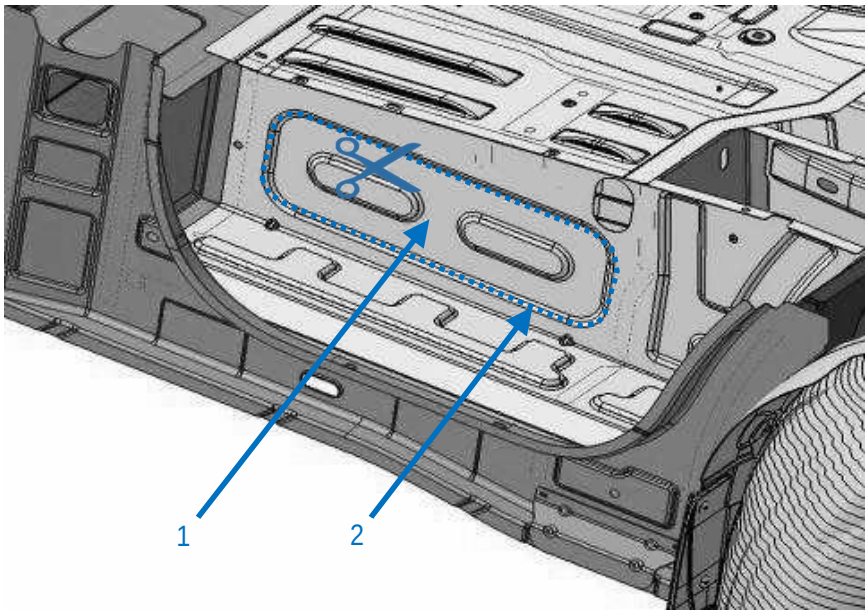
Left hand Right hand

Pos.	Description
1	Location of the original battery in the cab left-hand door sill with the battery bracket (in dark blue)
2	Location of the additional battery in the cab right-hand door sill

Note:

For SCR versions (i.e. with an adblue tank), there is no pre-configured location for an additional battery in the under-body. It is up to the converter to find a location in an appropriate space.

Right side sill cut-out



Pos.	Description
1	Zone to be cut out
2	Maximum authorised cut-out

The side sill panel may be cut out to allow access to the positive and negative terminals.

The side sill cut-out should preferably be sealed (water, air, noise).

The maximum authorised cut-out must not exceed the limit of the stamped part. The cut-out must be made with the radii in the corners.

After cutting out the side sill, the filings or shavings must be vacuumed and a corrosion inhibitor used, referring to the “Specific Corrosion Guidelines”.

Attention:

The additional battery must be disconnected during installation.

The batteries may not be directly coupled in parallel.

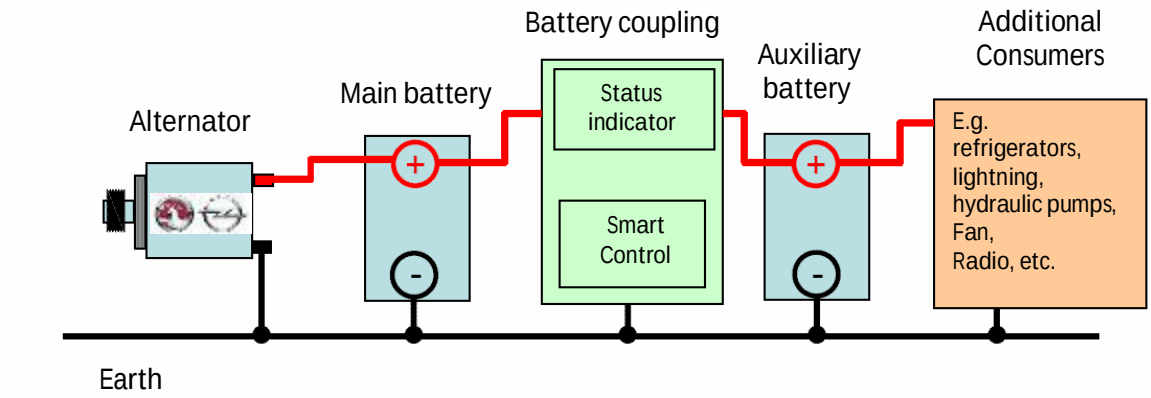
Battery coupling

For systems that require secure starting, both batteries must be uncoupled and the additional equipment must exclusively receive their power supply from the secondary battery. Such systems are available commercially but must however comply with Opel/ Vauxhall requirements.

Attention:

184A alternator highly recommended.

Schematic display of battery coupling



Functions required

The battery's coupling system must perform the following functions:

a) Electric energy transfer from the main battery to the auxiliary battery only.

b) Coupling if the main battery's load status is higher than 90%:

This results in a coupling threshold (main battery voltage):

13.6V < Coupling threshold < 13.7V

c) Uncoupling of the batteries if the main battery's load status decreases. This results in a uncoupling threshold (main battery voltage):

12.6V < Uncoupling threshold < 12.8V

d) Limit the transfer current from the main battery to the secondary battery to 50A.

e) Have an indicator that displays the coupling status.

f) Compatible with all the automotive environmental constraints (operating temperature, resistance to automotive fluids, vibrations, used materials, etc.).

Mechanical installation constraints

The installation of the coupling system must comply with certain rules so as not to interfere with the basic vehicle's integrity:

a) The coupling system must not in any way attack the basic vehicle's components by way of its fastening.

b) The coupling system must not be fastened to the body of the main battery.

Electromagnetic compatibility (EMC)

The coupling system must comply with the European standard (CE marking) and must bear the marking „e".

Electrical connection

Since week in July 2012:

For vehicles without Start/ Stop, a specific energy management strategy lowers the electrical network voltage to 13.5V, see also chapter 4.5.

- Either this management can be inhibited in the Opel/ Vauxhall network, in order to set to a voltage level compatible with conventional coupling devices on the market (=13.8V).
- Or the coupling devices must be adapted for minimum voltage equal to 13.5V to guarantee charging of the additional battery.

For vehicles with Start/ Stop, a specific energy management strategy lowers the electrical network voltage to 12V.

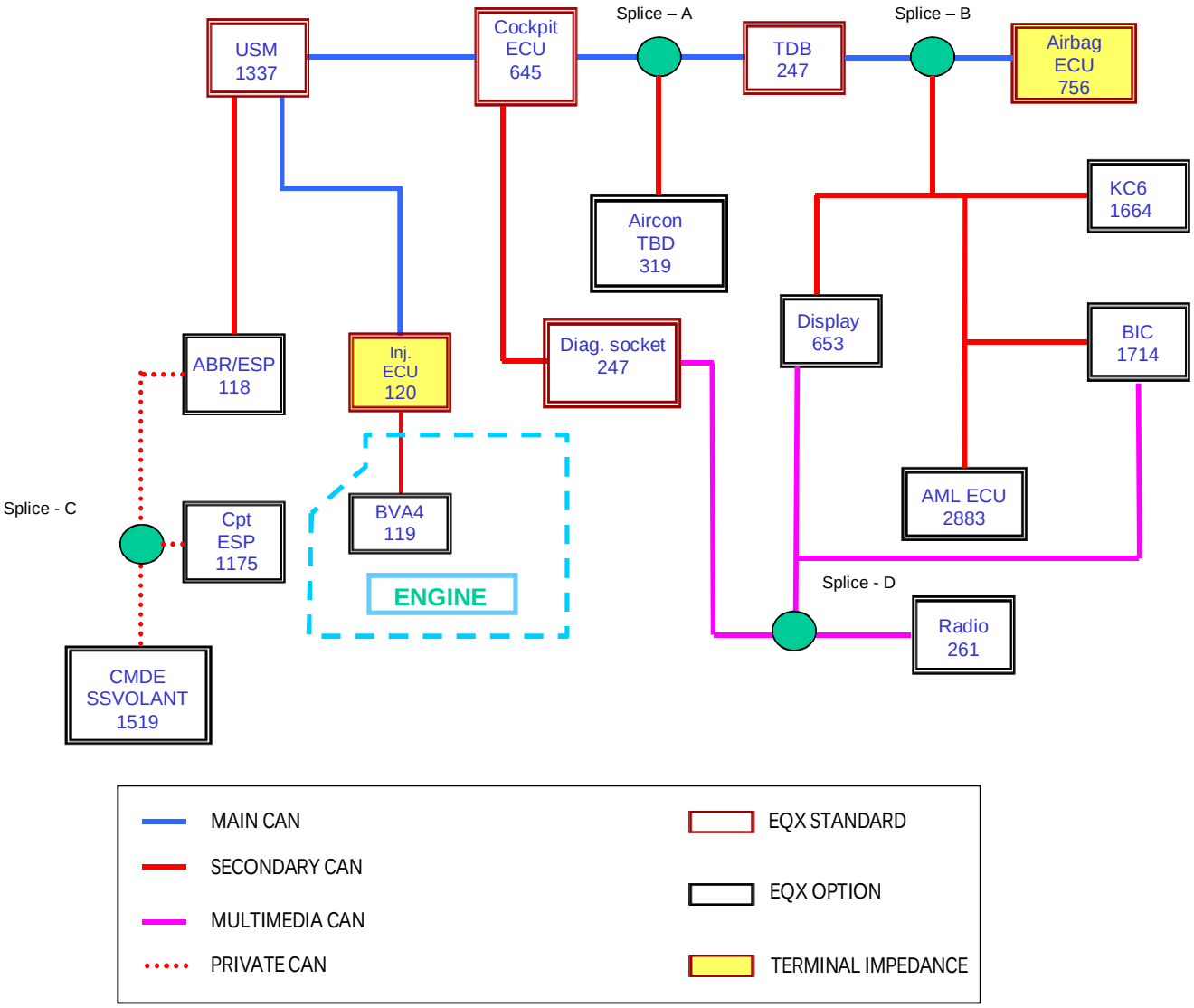
- This energy management cannot be inhibited.
- To protect the main battery, the only solution to couple the batteries is to use a power relay controlled by the engine running information (KPD or KC6 or WRF see chapter 4.12).
- The lead resistance between batteries must enable charging of the main battery as priority.
- A protective fuse must be installed on the wiring between the two batteries.

4.4 CAN (CONTROLLER AREA NETWORK)

4.4.1 CAN ARCHITECTURE

Vehicle CAN (Controller Area Network) architecture: for information purposes only. The CAN allows the various computers to exchange their data. The network is connected to the diagnostic socket and satisfies the CAN protocol.

As an option [KC6] there is a CAN-Interface, which makes it possible to access certain CAN data (see also chapter 4.10.).



Note:

Any modifications to the CAN network are prohibited.

Control of the multiplexed network is only possible using the “Clip” diagnostics tool in the OPEL/ VAUXHALL network.

If one of the ECUs is replaced, configuration needs to be carried out using the “Clip” diagnostics tool in the OPEL/ VAUXHALL network.

4.4.2 MODIFIABLE ECU SETTINGS

Certain ECU settings can be changed using the diagnostics tool (TECH2) in the Opel/ Vauxhall dealer network. Prior to any modification, the ECU in question must be fully reconfigured.

After modification, the vehicle must still comply with the legislation and standards in force in the country of sale.

ECU	Modifiable function	Settings that can be modified using CLIP
Passenger Compartment Control Unit (UCH)	Vehicle locking and unlocking Side doors Rear doors Boot opening 	· 2-button key · 3-button key (boot = rear doors - PAR) · 3-button key (boot = side PL + rear doors PAR)
	Front left door	· Absent · Present
	Front right door	· Absent · Present
	Left side door	· Absent · Swing door · Sliding door
	Right side door	· Absent · Swing door · Sliding door
	Rear door(s)	· Absent · Swing doors · Tailgate
	Automatic locking of doors after 2 minutes of no activity	· Active · Inactive
	Deadlocking (internal and external handles inactive) (In line with legislation)	· Present · Not present
	Front fog lamp	· With · Without
	Vehicle light cut-off (In line with legislation/depending on country)	· Lights go out when the engine stops and when the doors are opened. · Lights go out when the engine stops.
	Rain and light sensor, function presence	· With · Without
	Automatic headlight illumination and rain sensor.	· Function active (as standard) · Function inactive

ECU	Modifiable function	Settings that can be modified using CLIP
Passenger Compartment Control Unit (UCH)	Rain/light sensor detection threshold: - Northern countries and Great Britain - Other countries (In line with legislation in the country of sale)	· North · South
	Emergency Brake Assist with or without warning (In line with legislation)	· No light · Light
	Retrofit alarm	· With · Without
Dashboard	Consumption unit (ADAC) (In line with legislation)	· Litres/100 kilometres · Miles/Gallon · Kilometres/1 litre
	Odometer unit (In line with legislation)	· Kilometres · Miles
	Seat belt unfastened warning	· Active · Inactive
	Language (dashboard display)	· By country
	Vehicle service range	· Without · Configured · Free
	Overspeed warning signal (In line with legislation/depending on country)	· Active · Inactive
Parking assistance	Beep volume	· None · Low · Medium · High · Maximum
	Tone adjustment	· 800 Hz · 1,000 Hz · 2,000 Hz
Engine	Accelerated idle	· From 1,000 to 2,000 rpm · in 100 rpm increments
ABS/ESP	Brake light illumination if ESP operating (In line with legislation)	· Active · Inactive

ECU	Modifiable function	Settings that can be modified using CLIP
Airbags	Passenger-side front airbag	· Active · Inactive
	Side airbag for driver	· Active · Inactive
	Passenger-side side airbag	· Active · Inactive
	Driver's front pretensioner	· Active · Inactive
	Driver's front pretensioner	· Active · Inactive
	Driver's 2nd row pretensioner	· Active · Inactive
	Passenger's 2nd row pretensioner	· Active · Inactive

Note:

For some of the functions, please refer to the relevant sheet.

4.5 AVAILABLE CURRENT

All vehicles that comply with the Euro6 or Euro VI standard (fitted with adblue type emission control system = SCR) are fitted with 185 A alternators. To date, no higher capacity alternator exists.

Corresponding to the versions, the vehicles are equipped with a 150A alternator or a 185A alternator.

Note:

The type of battery is irrespective of the shored alternator, see also chapter 4.3.

4.5.1 ALTERNATORS ARE DEPENDENT ON THE VERSION

a) 150A alternator [Optioncode = KG4]

As standard, only for front-wheel drive vehicles without the following options:

- SCR (=Selective Catalytic Reduction / Euro6)
- BUS16P
- Heated rear screen
- Seat with heating
- Heated driver's seat
- Conversion unit
- Wiring for conversion
- Cabin thermal requirement
- Connection adapter

b) 185A alternator [Optioncode =KW6]

Standard on vehicles with RWD (with and without SCR) and on vehicles with FWD (with SCR).

On certain vehicles with FWD (without SCR) with the following options:

- BUS16P
- Heated rear screen
- Seat with heating
- Heated driver's seat
- Conversion unit
- Wiring for conversion
- Cabin thermal requirement
- Connection adapter

Note:

At after sales, the 150A alternator [KG4] can be replaced with a 185A alternator [KW6].

- The connection of the alternator to the vehicle's electrical systems is multiplexed. Any servicing of electrical connections on the alternator will lead to malfunction of the alternator and/or an electronic ECU, which may result in the destruction of these systems and/or cause the vehicle to break down. As a result, connections are prohibited on the alternator.
- The alternator communicates with the vehicle's electronic ECUs. As such, it is forbidden to fit an alternator other than the 150A or 185A. Failure to follow this rule will lead to malfunction of the alternator and/or an electronic ECU, which may result in the destruction of these systems and/or cause the vehicle to break down.

4.5.2 ENERGY BALANCE

The tables below show the different electrical currents available (in amps) according to whether a 150A or 185A alternator is used.

These values are the same for FWD and RWD with or without SCR (Euro6).

a) Front-wheel drive 150A alternator

Powertrain	Version	Without accelerated idle	With accelerated idle [rpm]			
			900	1000	1100	1300
M9T D1 / D2	Without AC	26A	39A	46A	49A	56A
	AC	17A	30A	37A	40A	47A
M9T D3	Without AC	30A	43A	50A	53A	60A
	AC	0A	13A	20A	23A	30A

b) Rear wheel drive 150A alternator

Powertrain	Version	Without accelerated idle	With accelerated idle [rpm]			
			900	1000	1100	1300
M9T D2 / D3	ohne AC	30A	43A	50A	53A	60A
	AC	22A	35A	42A	45A	52A

c) Front-wheel drive 185A alternator

Powertrain	Version		Without accelerated idle	With accelerated idle [rpm]			
				900	1000	1100	1300
M9T D1 / D2	Without AC	DRL	23A	37A	48A	52A	59A
		Without DRL	35A	49A	60A	64A	71A
	AC	DRL	19A	33A	44A	48A	55A
		Without DRL	32A	46A	57A	61A	68A
M9T D3	Without AC	DRL	24A	38A	49A	53A	60A
		Without DRL	36A	50A	61A	65A	72A
	AC	DRL	0A	14A	25A	29A	36A
		Without DRL	12A	26A	37A	41A	48A

DRL: Daytime Running Lights (Automatic operation of lights)
AC: Air Conditioning

d) Rear wheel drive 185A alternator

Powertrain	Version		Without accelerated idle	With accelerated idle [rpm]			
				900	1000	1100	1300
M9T D1	Without AC	DRL	50A	64A	75A	79A	86A
		Without DRL	62A	76A	87A	91A	98A
	AC	DRL	25A	39A	50A	54A	61A
		Without DRL	37A	51A	62A	66A	73A
M9T D2	Without AC	DRL	50A	64A	75A	79A	86A
		Without DRL	62A	76A	87A	91A	98A
	AC	DRL	25A	39A	50A	54A	61A
		Without DRL	37A	51A	62A	66A	73A
M9T D3	Without AC	DRL	50A	64A	75A	79A	86A
		Without DRL	62A	76A	87A	91A	98A
	AC	DRL	25A	39A	50A	54A	61A
		Without DRL	37A	51A	62A	66A	73A

DRL: Daytime Running Lights (Automatic operation of lights)
AC: Air Conditioning

Note:

- The value given is the average value available when the engine is running and in the worst-case fuel consumption conditions.
- The electrical equipment added is given priority over the vehicle's basic additional electric heating (thermoplunger) and may thus jeopardise the vehicle's comfort level.
- Any electrical equipment added must be fused. These fuses must have a value appropriate to the equipment's consumption and the cross section of the wiring.
- These values are identical in the Front Wheel and Rear Wheel Drive versions and SCR and non-SCR versions.

4.5.3 POWER VOLTAGE MANAGEMENT

Various alternator voltage variation management strategies are applied to ensure optimised fuel consumption:

- Floating Management à without Start/ Stop
- ESM à with Start/ Stop

Attention:

- make sure there is voltage compatibility with the consumers added (including Computers)
- make sure there is voltage compatibility with the coupling of additional batteries (see chapter 126 ADDITIONAL BATTERY)

On vehicles without Start/ Stop

The voltage of the electrical network fluctuates between 13.5V and 14.8V during the engine running phases. This voltage management can be inhibited in the Opel/ Vauxhall network via the clip case.

On vehicles with Start/ Stop

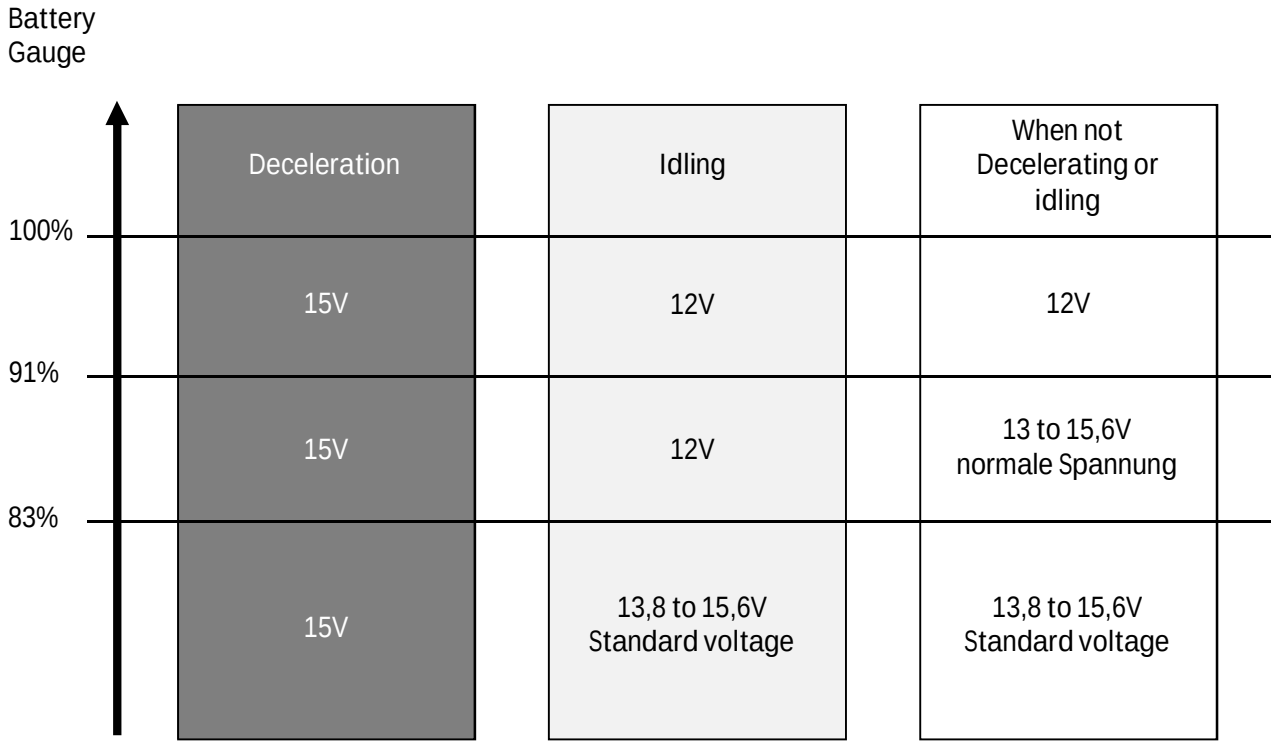
Under normal conditions, the battery voltage can vary from 12V to 15.6V according to the vehicle battery's charge rate. During the deceleration phase, the voltage delivered by the alternator is 15V.

Switching off the energy management system is not possible because its influence on the consumption and its permission relevance. The operation of additional electric devices may require the usage of a voltage stabilizer.

Voltage of computers with Start/ Stop

When the vehicle is started, the voltage can fall to 6.4V. Do not overlook this possibility when adding a computer or computers.

Batterie voltage with ESM



4.5.4 ELECTRICAL CONNECTIONS

General

Before carrying out any operations, it is imperative that the battery's negative terminal be disconnected.

The negative terminal should only be reconnected after ensuring that all the disconnected elements have been reconnected (especially the steering wheel controls).

As the vehicle is multiplexed, any change to the wiring may cause the vehicle to malfunction or to break down. It is therefore strongly advised not to make any changes to the original wiring. Modification of the CAN network wiring is prohibited.

If any devices are added, the power consumption requirements must be compared with the authorised values given in the table in the "Available currents" sheet.

Use of electrical options, such as "KC6", "KPD"" and "KC5", is recommended. Please see the corresponding sheets.

The rating of a fuse is a wiring protection value and not an available energy value. It is therefore forbidden to change the fuse ratings.

The covering protecting the wires must be preserved and maintain its effectiveness after modification.

Failure to follow these recommendations will invalidate the manufacturer's warranty.

Electrical power

Any electrical power greater than 10Ah sampled on the main vehicle battery must be sampled with the engine running (unless there is a multi-battery with coupling device architecture).

With the engine off, up to 10Ah may be sampled on the main battery, e.g. 20A for 30 minutes, 5A for 2 hours, etc.

Note:

The vehicle has an energy management system that alerts the driver if the battery load reaches a too low level. Any electrical sampling that is too big with the engine running is likely to result in misunderstandings and customer complaints (Alert message repeatedly displayed on the dashboard).

Any electrical power sampled on the vehicle battery must be sampled on the battery terminal block. Please refer to the "Connection to battery terminal" sheets.

Attention:

All power supplies and electrical extraction must be fused.

4.5.5 +12V CURRENT DISTRIBUTION

Before working on the vehicle, refer to chapter 4.5.5.

The +12V current distribution power supply is a power supply that can be temporarily unavailable to save the battery. An energy management system constantly checks the battery charge status.

Connecting electrical accessories while the engine is off will discharge the battery. Do not exceed the maximum power consumption.

Electrical accessories that are connected must comply with the electromagnetic compatibility requirements laid down in DIN VDE 40 839.

This +12V current distribution power supply is available on the connectors of the “KPD” and “KC5” options but also through the accessory sockets. Please refer to the sheets dealing with the “KPD” and “KC5” options for further information.

A +12V current distribution fused power supply can be obtained by using the accessory sockets (or cigar lighter).

Two accessory sockets are available on the dashboard.

- Upper accessory socket (10A fuse F2 and F3 in the passenger compartment fuse and relay box)
- Lower accessory socket (10A fuse F4 in the passenger compartment fuse and relay box)

Depending on the version and options, an accessory socket is possible in the panel van’s loading area. The socket is located on the left-hand D pillar.

- Rear accessory socket (10A fuse F4 in the passenger compartment fuse and relay box).

Note:

This +12V current distribution supply is temporarily cut off when the starter motor is activated.

Attention:

Do not connect any current-delivering accessories, e.g. electrical charging devices or batteries.

Location of accessory sockets on the dashboard

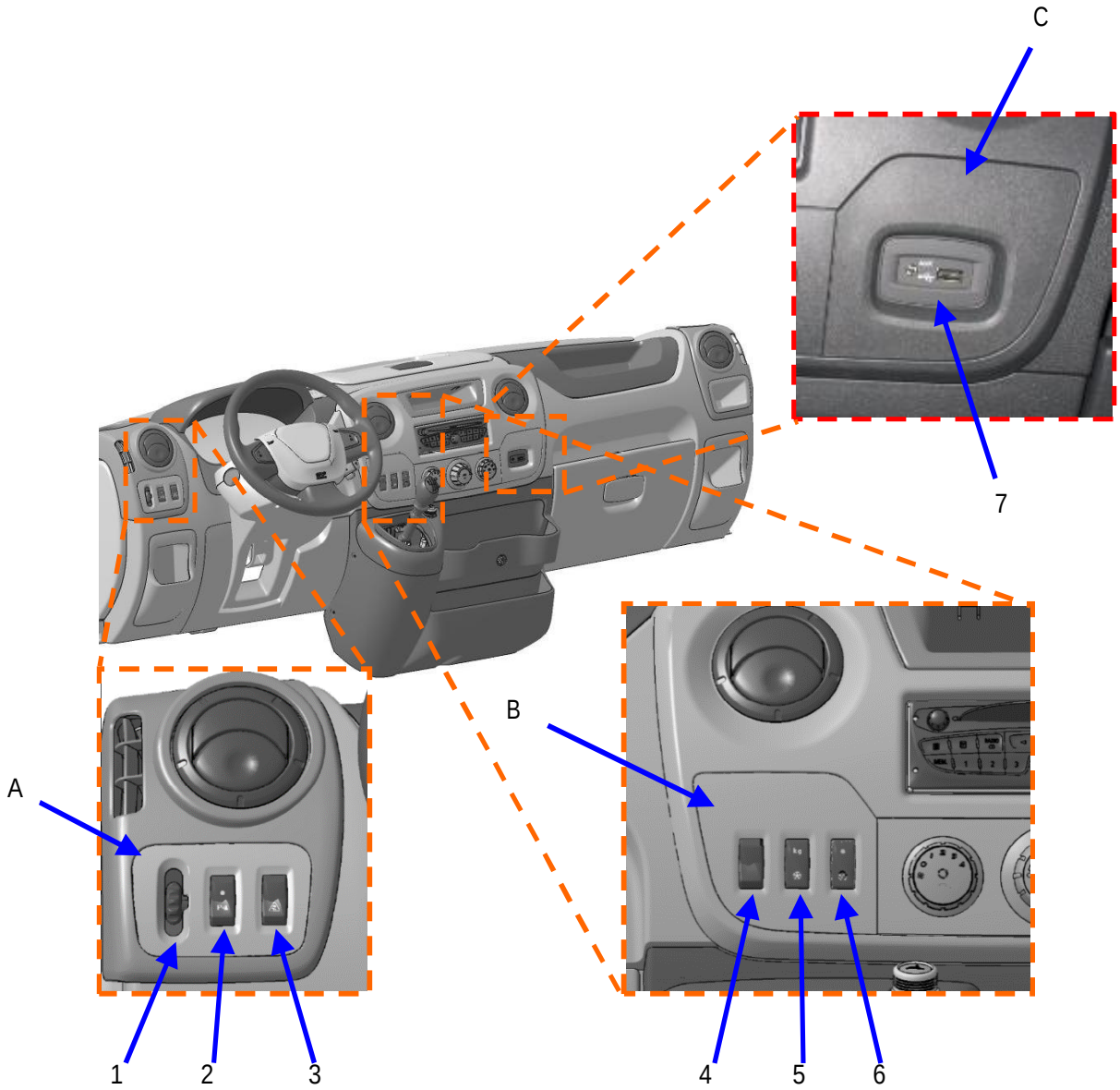
Location of accessory sockets on the load compartment

4.6 DASHBOARD

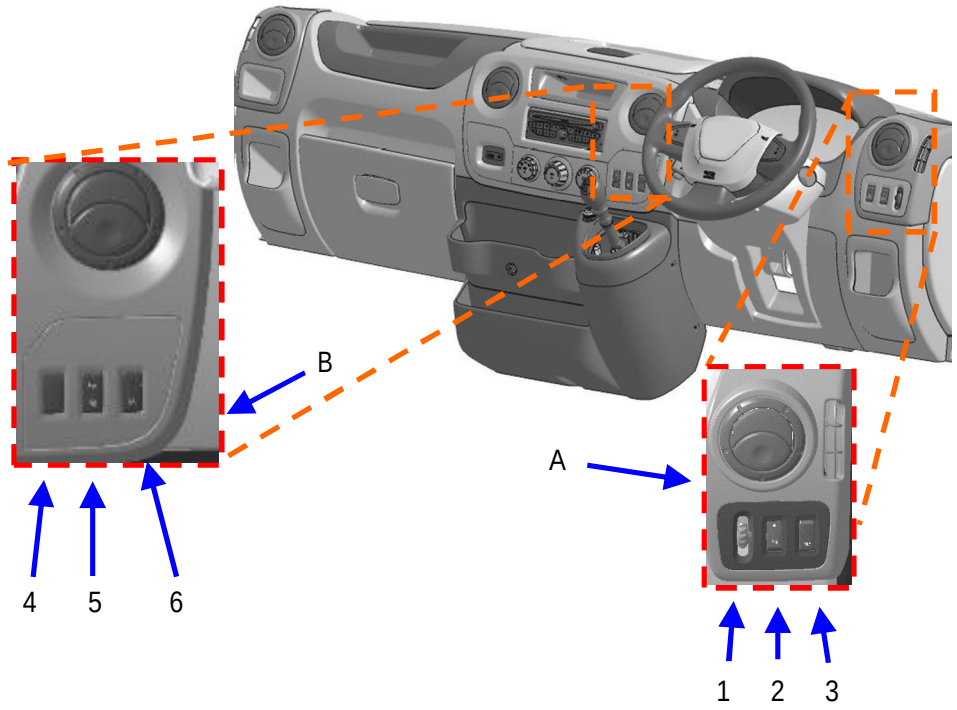
4.6.1 INSTALLATION OF SWITCHES

Depending on the version, one or more spaces for switches may be provided on the side part and/or the centre left of the dashboard.

Left hand drive dashboard



Right hand drive dashboard

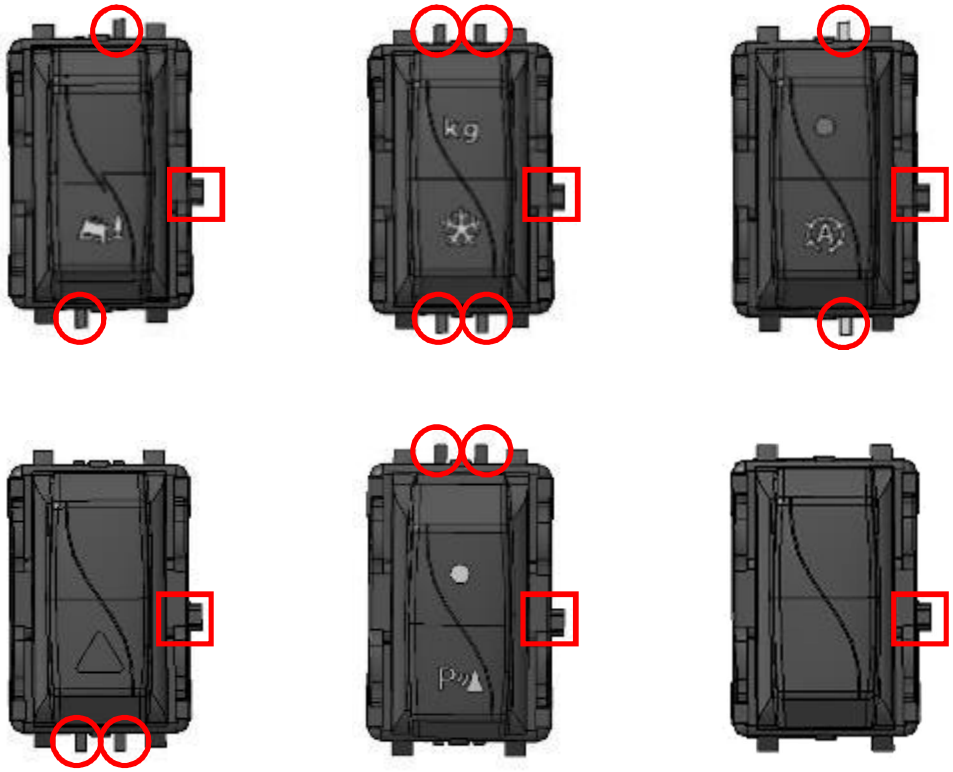


	Screen on Dashboard	Position	Switch type (depending on version)
A:	Left side switch support for LHD Right side switch support for RHD	1	Electric headlamp height adjustment
		2	Parking assistance
			Plug
		3	ESP dynamic driving control
			** Grip Control (New)
			Plug
B:	Center switch support	4	Easytronic-Getriebe
			Cruise control speed limiter
			Plug
		5	Start & Stop
			Easytronic-Gearbox
			Plug
		6	Ecomode (New)
			Fast idle
			Plug
C	Center switch support	7	USB + Aux-Input
			Free shelf

** Grip Control version ESP9 replaces the ESP button of version ESP8.

Coding of the switches

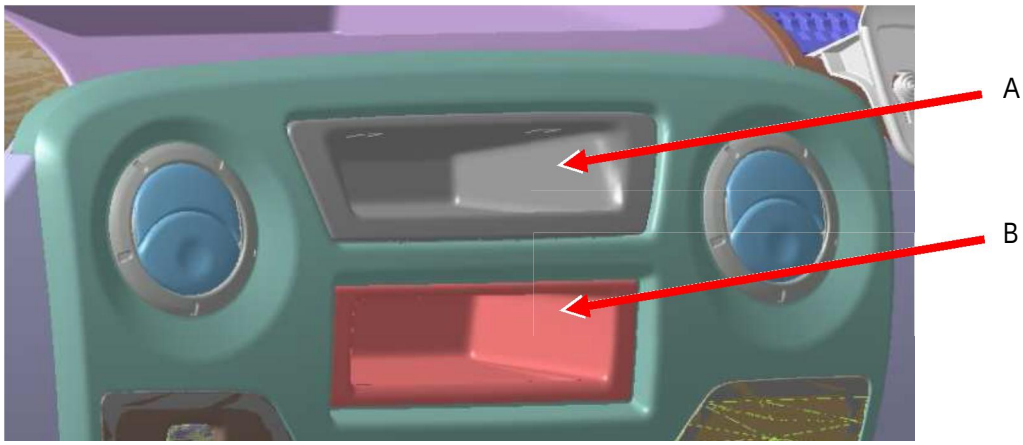
There are 6 types of coding for the various dashboard switches.



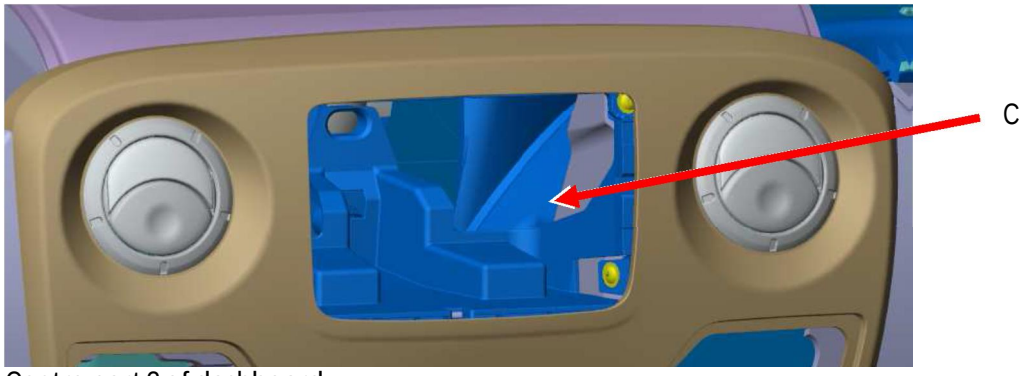
Shelves on dashboard

Depending on the version, one or more components may be available on the central part of the dashboard.

The components are positioned in the same way whether for right-hand (RHD) or left-hand drive (LHD).



Centre part 1 of dashboard



Centre part 2 of dashboard

Versions

[A] Upper shelf	[B] Lower shelf	[C] 2 DIN Mounting
Open shelf	Open shelf	2 DIN-MEDIA NAV
Closed shelf (Only for Bus and Combi in combination with rear AC)	1 DIN-CD/ Radio	
Clipboard		

1 DIN-Radio + Clipboard (closed) +
Upper shelf with lid (closed)

Clipboard open
(Surface appr. 160 x 220mm)

Upper shelf with lid open
(Dimension appr. 290 x390 x50mm)

1 DIN-Radio + closed cover +
Upper shelf without lid

2 DIN- MEDIA NAV +
Upper shelf with lid (closed)

4.7 START/ STOP

4.7.1 GENERAL

The Start/ Stop option controls the automatic stopping of the engine when the vehicle stops and automatic restarting when a deliberate restart is detected, in order to optimise fuel consumption and pollution.

Note:

The Start/ Stop option can be deactivated temporarily via a switch on the dashboard (the function is automatically reactivated each time the engine is switched on). Press this button to restart the engine when it is in auto Stop phase (Key ON).

When an automatic stop occurs, the following pictogram appears on the instrument panel:

Operating conditions

To cause the engine to stop automatically

Clutch pedal released

AND vehicle in neutral

AND speed threshold (~ 4km/h) OR distance threshold (~25m) exceeded since the last automatic stop

AND no parking manoeuvres (reverse gear not engaged)

AND vehicle speed slower than or equal to 3 km/h

AND bonnet closed

AND minimum battery level

AND within external temperature range

AND thermal comfort attained for vehicles with climate control option

AND engine temperature reached

For restarting in automatic mode

Clutch pedal action AND neutral

OR Clutch fully pressed

OR Start/ Stop switch pressed

OR vehicle at speed (case of a slope or vehicle driven hard)

For restarting in downgraded or safety mode

Battery not sufficiently charged

Repeated presses of the brake pedal or need for the braking system

Fault detected on certain components (ABS, neutral, speed, etc.)

Thermal comfort (automatic on time-delay)

Note:

For more details, refer to the Vehicle User Manual.

Information controlling engine Start/ Stop

- Front and rear opening element sensors
- Bonnet sensor
- Battery voltage level (power management)
- Outside temperature sensor
- Braking amplifier depression sensor
- Start/Stop activation button
- Clutch pedal start of travel sensor
- Climate control

Associated risks

Loss of power steering during the automatic engine stop.

If the battery is not sufficiently charged, 'START & STOP' cancels itself out (e.g. after too many frequent stops).

The engine restarts automatically after an auto stop for safety reasons (to maintain brake assist vacuum, battery charge level, etc.) or thermal comfort with climate control.

Great variability in the voltage delivered by the alternator and low level of battery voltage in engine start phase => See Available Current sheet 4.5.

If no driver door opening is detected, Start/ Stop is deactivated after 15 missions (Key on, Key Off), making it necessary to return to the dealership to reactivate the system.

During the auto Stop phase and when restarting after auto Stop, the 12v power supplies are retained.

Special case for fast idle:

When fast idle is activated, the engine no longer stops automatically: auto Stop is deactivated.

Fast idle does not inhibit automatic restarting when pressing the clutch pedal if the engine has stalled.

When the engine is in auto Stop phase, activating fast idle does not restart the engine. à see sheet 4.11.

Specific case of power take-off on the gearbox on rear-drive vehicles (Option M1F)

No automatic restart function when pressing the clutch pedal if the engine has stalled.

- Retro fitting of M1F is forbidden.
- See the M1F option sheet for more details.

Specific case of the WRF Option

On Start/ Stop vehicles with „WRF“, a shunt for earth connection is placed on PIN 87T (see sheet 4.11). This shunt will only be removed to return information on the added opening panel contactor (see paragraph on addition or modification of an opening panel).

4.7.2 RECOMMENDATIONS AND RESTRICTIONS

Vehicle servicing

Before carrying out any servicing on the vehicle, the battery must be disconnected (to avoid the Start/Stop causing the engine to start unexpectedly).

Sensors

It is prohibited to modify the information issued by the sensors connected to the Start/Stop system (particularly for opening elements).

It is permitted to take the information from the bonnet sensor for alarms.

Recommended vehicle versions

Whenever possible, it is recommended to take vehicles without the Start/ Stop option for conversions requiring constant energy (electrical or mechanical) from the vehicle, or for conversions with the addition or modification of opening elements through which the driver may leave the vehicle.

When the base vehicle comes with Start/ Stop, it is recommended to use the fast idle function for conversions requiring the engine to run during intermediate stops (traffic jams, traffic lights, stop signs, etc.).

On vehicles where conversions are only used with the vehicle stopped (e.g. rescue vehicles). Engine restarting will no longer be followed by an automatic Stop for as long as the vehicle remains stationary.

General obligations

Attention:

It is forbidden to make contact between the control unit of the conversion and the base vehicle's Start/ Stop activation/deactivation (button on the dashboard), to restart the engine when required.

Risk of engine automatically restarting while the driver has exited the vehicle during the auto Stop phase.

Prohibition on additional power consumption exceeding 13A during the auto Stop phase (engine not running) (risk of failure of the vehicle computers when higher power consumption during the engine start phase), see also chapter 4.5.

Conversions with modification or addition of opening elements

Attention:

It is prohibited to remove the vehicle's opening element closure switches from the vehicle or to add additional opening elements through which the driver may get out and whose opening would not be recognised by the vehicle. Risk of failure to detect the driver exiting the vehicle and automatic restarting of the engine after an automatic stop.

The driver's door must remain the main way out of the vehicle for the driver so as not to disrupt operation of the Start/ Stop system.

It is forbidden to remove the bonnet sensor (opening detection must remain operational).

Panel van (without partition)

If a side opening which can be used to exit the vehicle is added, it is necessary to take a base vehicle with a sliding side door, so as to maintain the door wiring and switch.

If the opening elements are modified, it is necessary to retain the electrical information of the opening element switch.

Vehicle open (platform cab, chassis cab)

If an opening element which can be used to exit the vehicle is added, it is recommended to use original Opel/ Vauxhall locks.

At the very least, it is necessary to have a door switch connected to PIN 87T of the WRF connector (after having removed the earth connection shunt).

Where several opening elements are added, the related switches must be connected in series on PIN 87T of the WRF connector.

If the driver's door is modified, it is necessary to retain the base vehicle's door contactor information, see the sheet on rebuilding an opening element.

4.8 RECONSTRUCTING OPNENING PANEL FUNCTIONS

4.8.1 OPENING ELEMENT SWITCH AREAS OF USE

Before working on the vehicle, refer to chapter 4.5.5.

On front wheel drive vehicles, the presence of an automatic robotized, or "Easytronic", gearbox imposes the presence of a front driver door. A door switch must provide information on whether the door is open or closed to the UCH (cabin central control unit).

With regard to the door switch (installation of a front door on a chassis cowl version or modification of the front door on the other versions), the recommendations outlined in this chapter must be complied with.

Note:

Please note that on mass production vehicles fitted with a front door, the switch is integrated in the latch.

Easytronic Gearbox (Automatic 6-Gearshift)

For front wheel drive versions, an „Easytronic gearbox“ is composed of the following components:

- Manual gearbox,
- Electro-hydraulic gear selection activator,
- ECU to manage the transmission modes and gear changes,
- Electric pump to generate the hydraulic pressure required by the actuators.

To have an immediate service imperceptible to the driver, the hydraulic reserve is placed under pressure before switching on. When the vehicle is at a stop, opening the front driver door activates the electric pump if the reserve pressure is insufficient.

A significant amount of safety features, both for the system and users, are also planned.

In this context, so that vehicles on chassis cowls can be constructed or for any modification to the mass production switches (latch), the recommendation outlined below must be applied.

Switch related constraints

The door switch on vehicles fitted with an automatic robotized gearbox activates an audible signal to alert the driver under the following conditions:

- A gear is engaged and the engine is running and the driver does not have his/her foot on the brake and the door is open.
- The risk identified is that the driver leaves the vehicle, therefore releasing the brake whilst a gear is engaged à the vehicle therefore starts crawling (it advances at low speed).

The absence of an audible signal would therefore hamper safety.

Attention

The absence of an audible signal would therefore hamper safety.

This problem concerns transformations which affect the switch function (latch on mass production vehicles) or chassis cowl versions which have no front door on delivery.

Without knowing the type of transformation made, Opel/ Vauxhall cannot provide detailed mechanical installation recommendations. Nevertheless, the adapter must comply with the following technical recommendations.

Switch installation and associated transformation

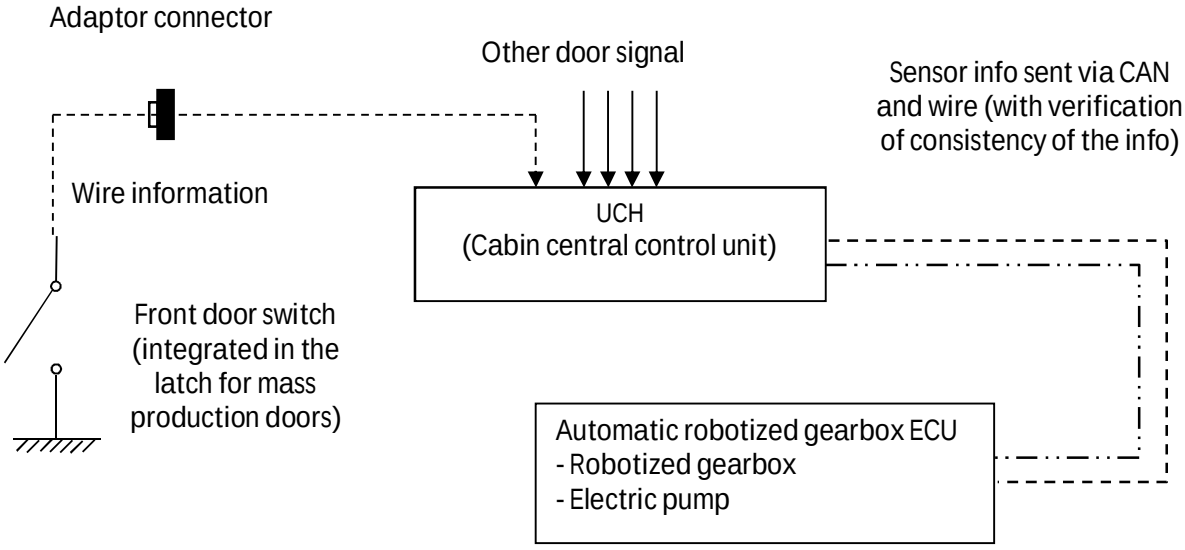
The door switch information must be associated with the automatic robotized gearbox for the driver door.

It must not be associated with the rear cabin doors so as to avoid the activation of the electric pump, causing:

- Noise interference, due to the pump during, the numerous openings and closures of the rear doors (incompatible for example with the relaxing use of the camper van).
- The battery to discharge which may result in it being impossible to start the vehicle.

For camper vans with integral cells which do not have a front door on the driver's side, the automatic robotized gearbox is strongly discouraged.

For information, the switches on the front passenger, side and rear doors of chassis vehicles are linked with the UCH but not connected to the automatic robotized gearbox.



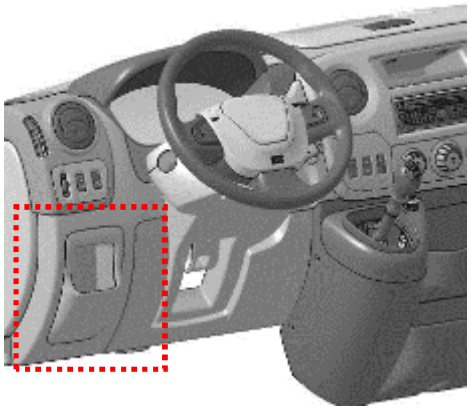
Attention:

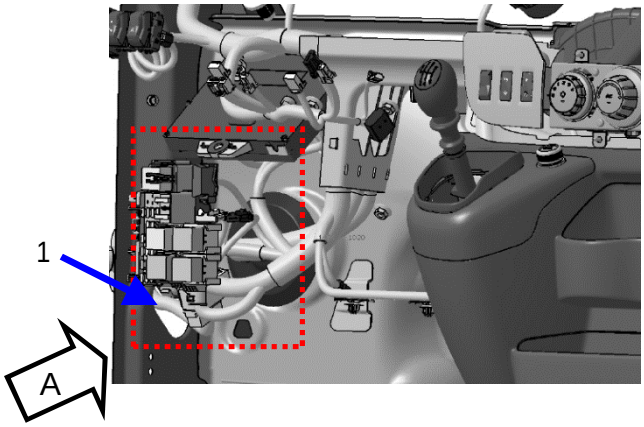
Switch open in door open configuration.

The instrument panel buzzer uses the wire door switch information or CAN information (information redundancy, for safety).

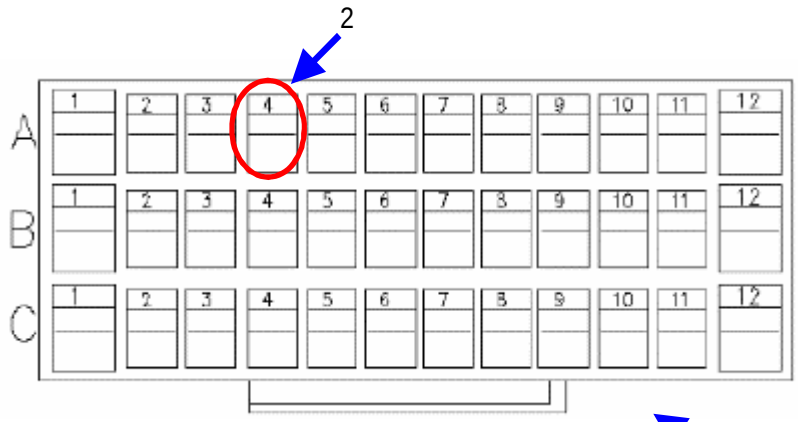
The electric pump only uses the wire door switch information (as it is the only information available with the power off).

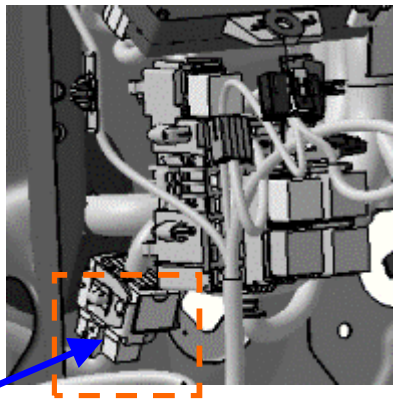
The connection may be made at the adaptor connector (front door latch ó UCH) located under the instrument panel or on the front door wiring (depending on the characteristics of the transformation).





Side view





Pos.	Description
1	Adaptor connector: front door latch ó UCH
2	Door switch signal: way A 4

It will be necessary to reconfigure the UCH in the Opel/ Vauxhall network to indicate the presence of the door to it (using the CLIP diagnostics tool).

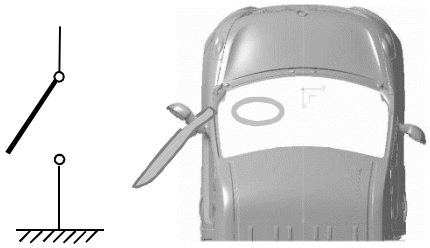
For information, there are five parameters to signal the presence or absence of doors to the UCH:

- Front left door: Absent or present
- Front right door: Absent or present
- Left side door: sliding door, hinged door or no door
- Right side door: sliding door, hinged door or no door
- Rear door: Absent or present

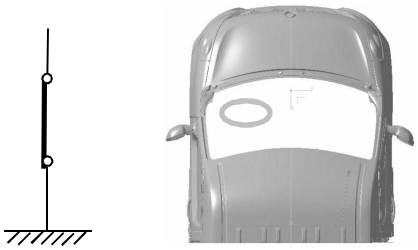
Switch charecteristics

The switch must be:

- "Open" in "driver door open" position



- - "Closed" in "door closed" position

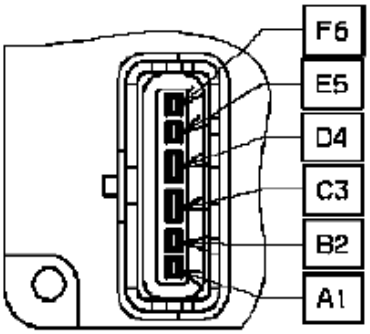


On mass production vehicles fitted with a front door, the switch is integrated in the latch.

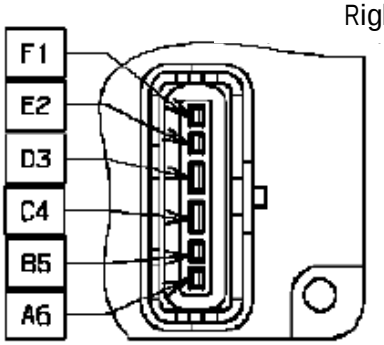
Lock connector

Front view of lock connector

Left



Right



Note:

Letters localize the channels on the latch connector. Figures localize the channels on the harness

MOTORS PATTERNS										SWITCHES PATTERNS			ELECTRICAL CIRCUITS
VEHICLE HARNESS		LATCH PIN	MOTOR	ACTIONS (* means no action)							LATCH STATUS		
LH	RH			SUPER-LOCK M2	*	SET	RELEASE	SET	RELEASE	*	*	*	SW3		
			LOCK M1	LOCK	*	UNLOCK	LOCK	*	UNLOCK	*	*	*	DOOR OPENED	DOOR CLOSED	
6	1	F													F
5	2	E													E
4	3	D													D
3	4	C		+	−	−	+	+	−	+	−				C
2	5	B		−	−	+	−	+	+	+	−				B
1	6	A		−	+	−	+	−	+	+	−				A

Verification procedure

The following procedure is used to check the correct operation of the automatic robotized gearbox and therefore that of the driver door switch assembly.

The service must be verified directly using:

- Triggering of the buzzer noise.
- The electric measurement linked to starting the electric pump.
- The buzzer test alone, using both the CAN info and the wire info, is not sufficient to guarantee that the activation of the electric pump on opening the door with the power off will operate correctly.
- Verification of the activation of the electric pump.

Note:

Use of the buzzer test alone, using both CAN info and wired info, does not guarantee that proper activation of the electric pump unit, on opening of the door with the ignition off, will occur.

Initial vehicle configuration required

- The vehicle must be maintained in the following condition: Driver door closed and ignition key permanently cut for at least 12 hours, to allow the hydraulic fluid of the gearbox control to drop in pressure, which will ensure the electric pump is put into action during the test.
- A battery current measurement instrument must be installed and accessible outside the vehicle to read the current when the driver door is opened (hook-on ammeter or ammeter).

Operator action

Open the driver door

Check

During activation of the electric pump (2 to 10 seconds), check that a consumed battery current greater than 17A is obtained (for information, activation of electric pump emits a characteristic noise during operation).

Verification of the buzzer operation

Initial vehicle configuration required: Engine running, foot on the brake, first gear engaged and driver door open.

Operator action: Take the foot of the brake.

Attention:

As a security, it is recommended to have the handbrake fully applied, to ensure safety during the test; the handbrake does not affect the verification procedure.

Check: Buzzer sounds

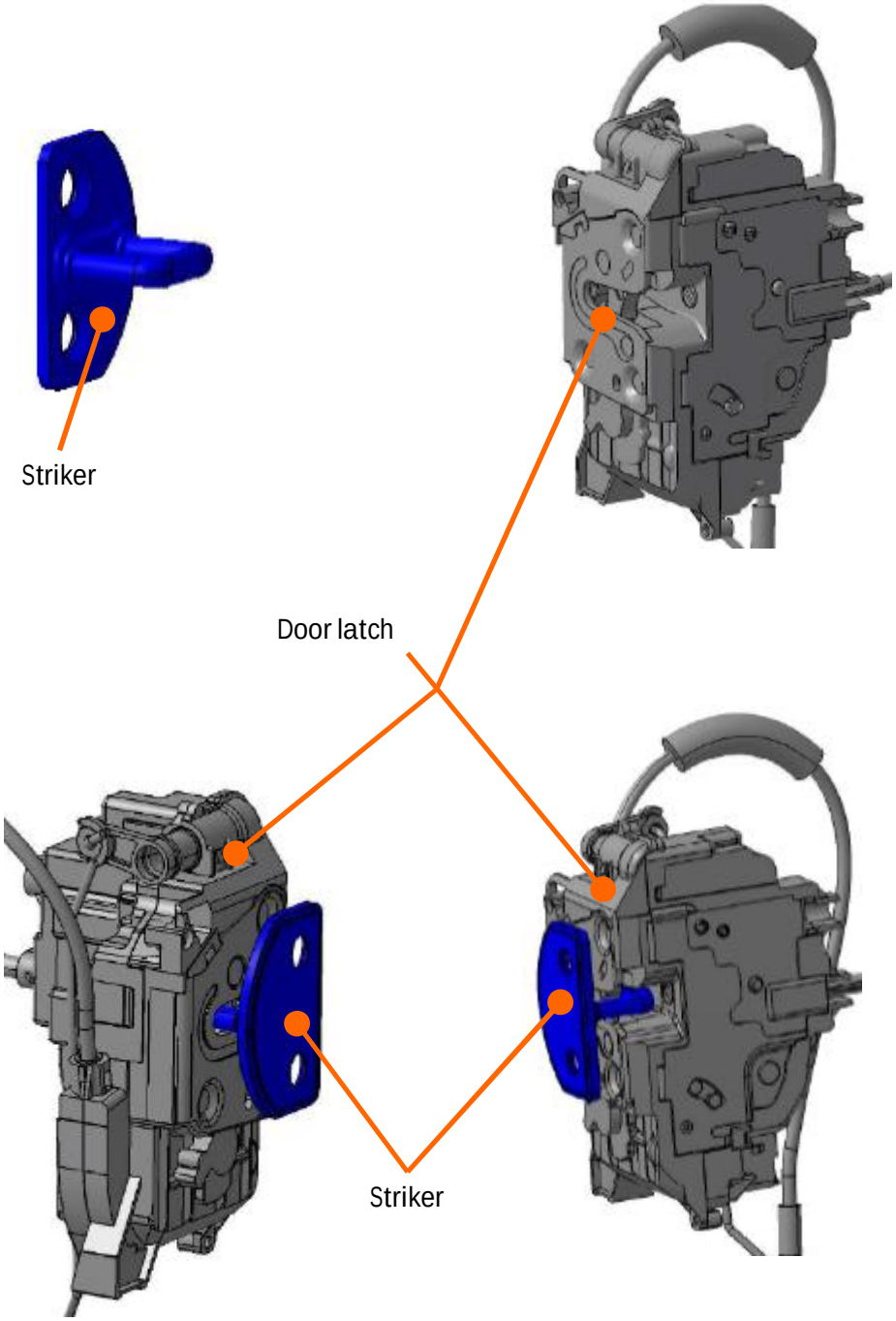
4.8.1.1 Inspection operation traceability

Recourse to the panel switch is a safety essential, as is the inspection of the global operation of the automatic robotized gearbox as described.

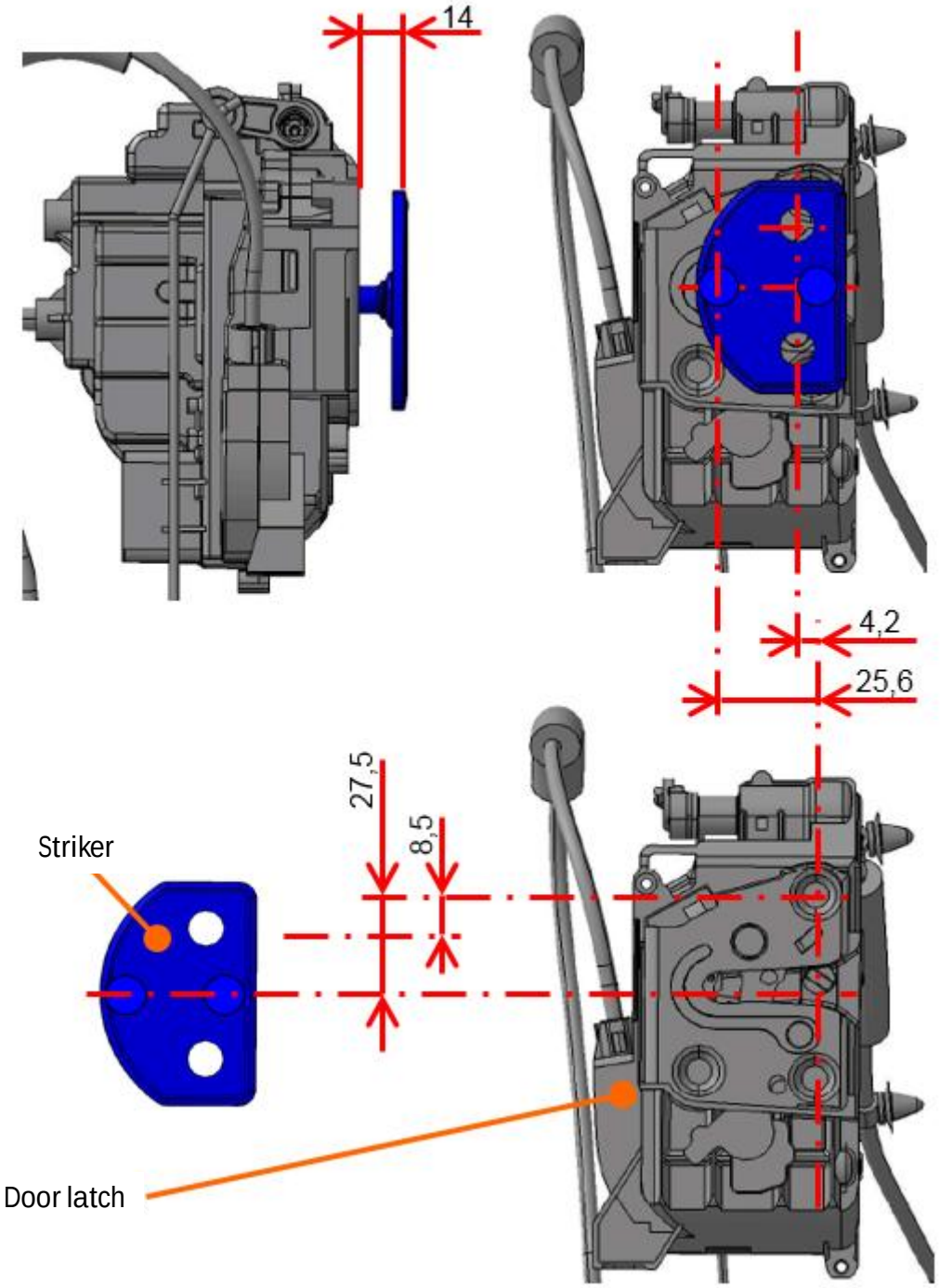
The successful implementation of these inspections must therefore be recorded in a register or other medium and archived.

This is the sole responsibility of the final transformer.

4.8.2 FRONT DOOR LOCKS (ALIGNMENT)



Alignment required

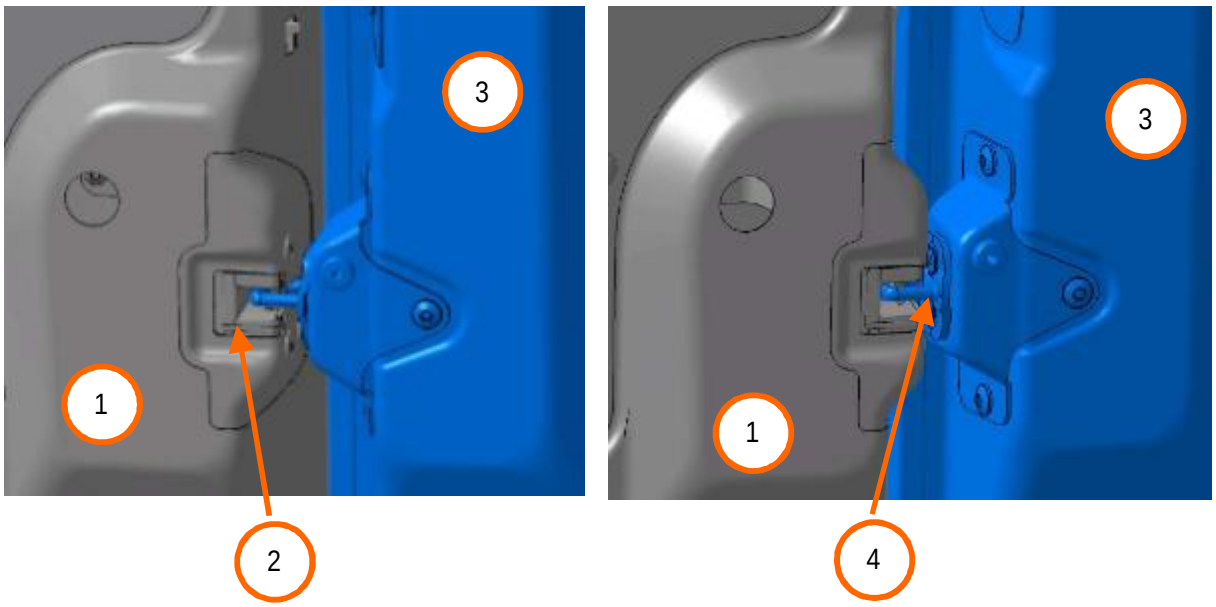


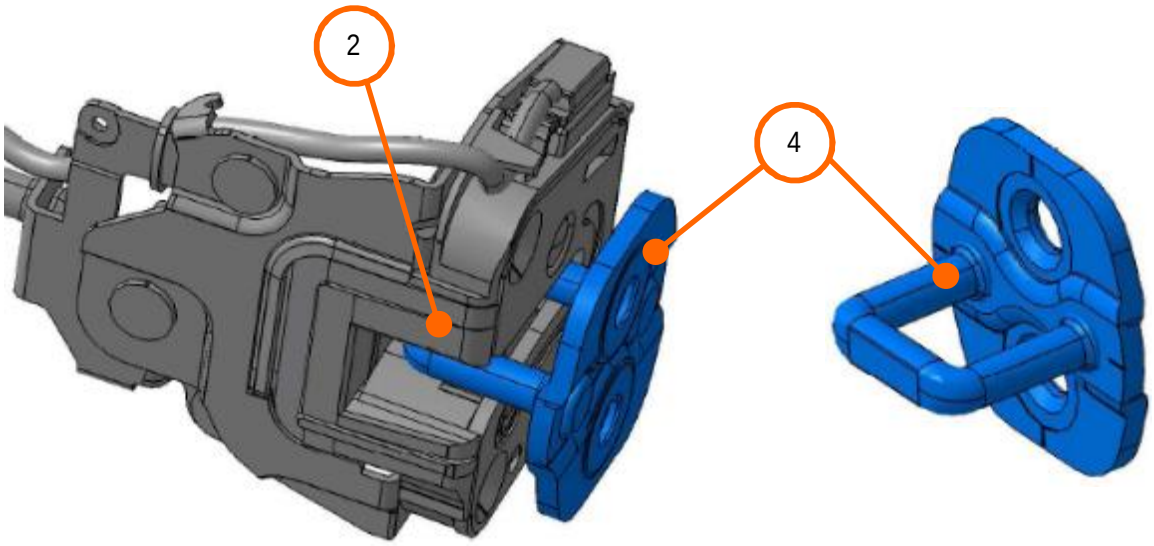
All values in mm

Note:

These are important dimensions to be respected for correct operation of the assembly.

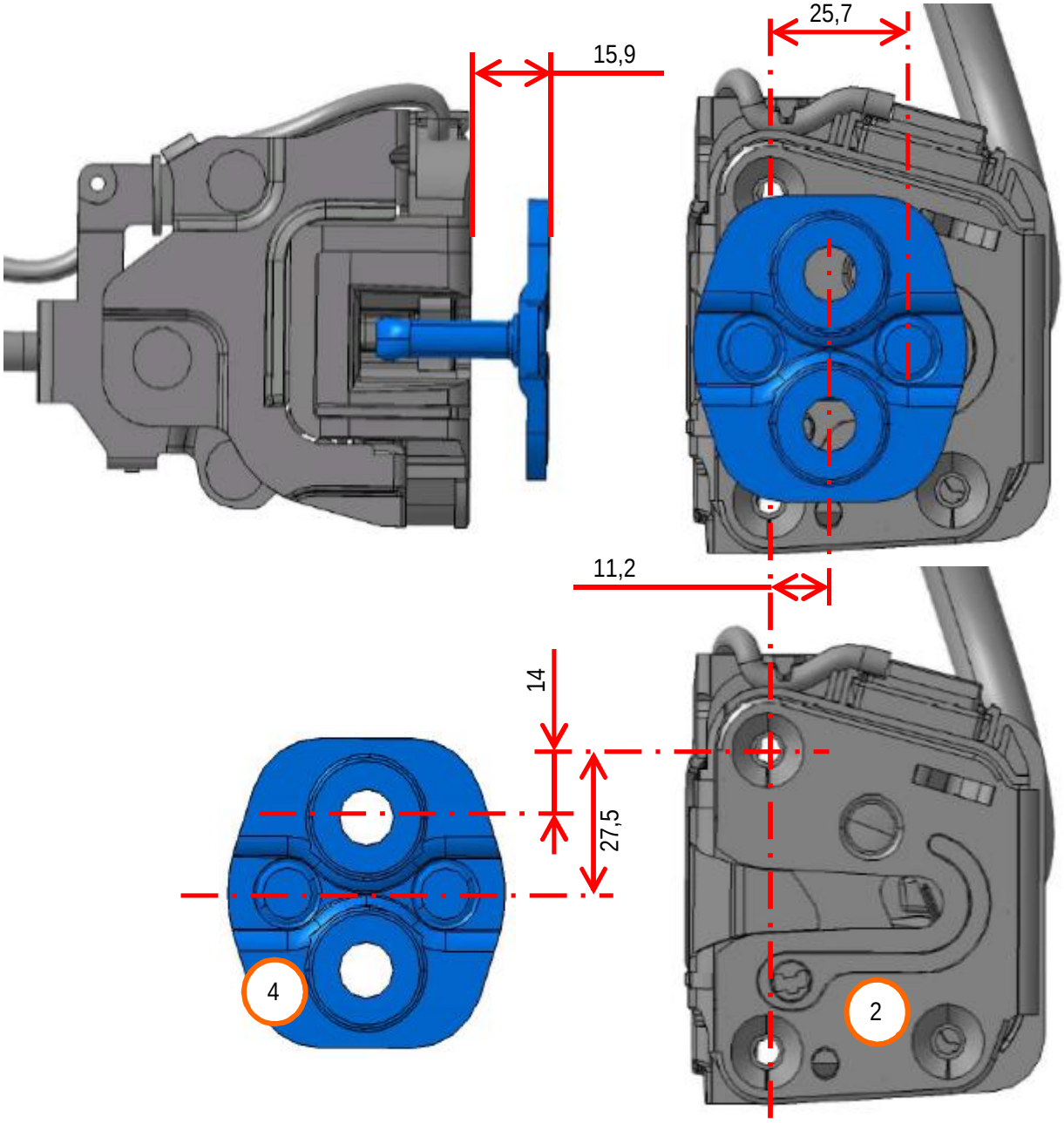
4.8.3 SLIDING DOOR OR REAR DOOR LOCKS (ALIGNMENT)





Pos.	Description
1	Right rear hinged door
2	Door latch
3	Left rear hinged door
4	Striker

Alignment required



All values in mm

Note:

These are important dimensions to be respected for correct operation of the assembly.

It may be necessary to reconfigure the UCH in the Opel/ Vauxhall network to indicate the presence or not of a door to it (using the CLIP diagnostics tool).

For information, there are five parameters to signal to the UCH according to the final configuration of the vehicle:

- - Front left door: Absent or present
- - Front right door: Absent or present
- - Left side door: sliding door, hinged door or no door
- - Right side door: sliding door, hinged door or no door
- - Rear door: Absent or present

4.8.4 SPECIFIC CASE ARE VEHICLES FITTED WITH START/STOP

Panel van (without partition)

If a side opening which can be used to exit the vehicle is added, it is necessary to take a base vehicle with a sliding side door, so as to maintain the door wiring and switch.

If the opening elements are modified, it is necessary to retain the electrical information of the opening element switch.

Vehicle open (platform cab, chassis cab)

If an opening element which can be used to exit the vehicle is added, it is recommended to use original Opel/ Vauxhall locks.

At the very least, it is necessary to have a door switch connected to way 87T of the WRF connector (after having removed the earth connection shunt).

Where several opening elements are added, the related switches must be connected in series on way 87T of the WRF connector.

If the driver's door is modified, it is necessary to retain the base vehicle's door contactor information.

4.8.5 3-BUTTON KEY

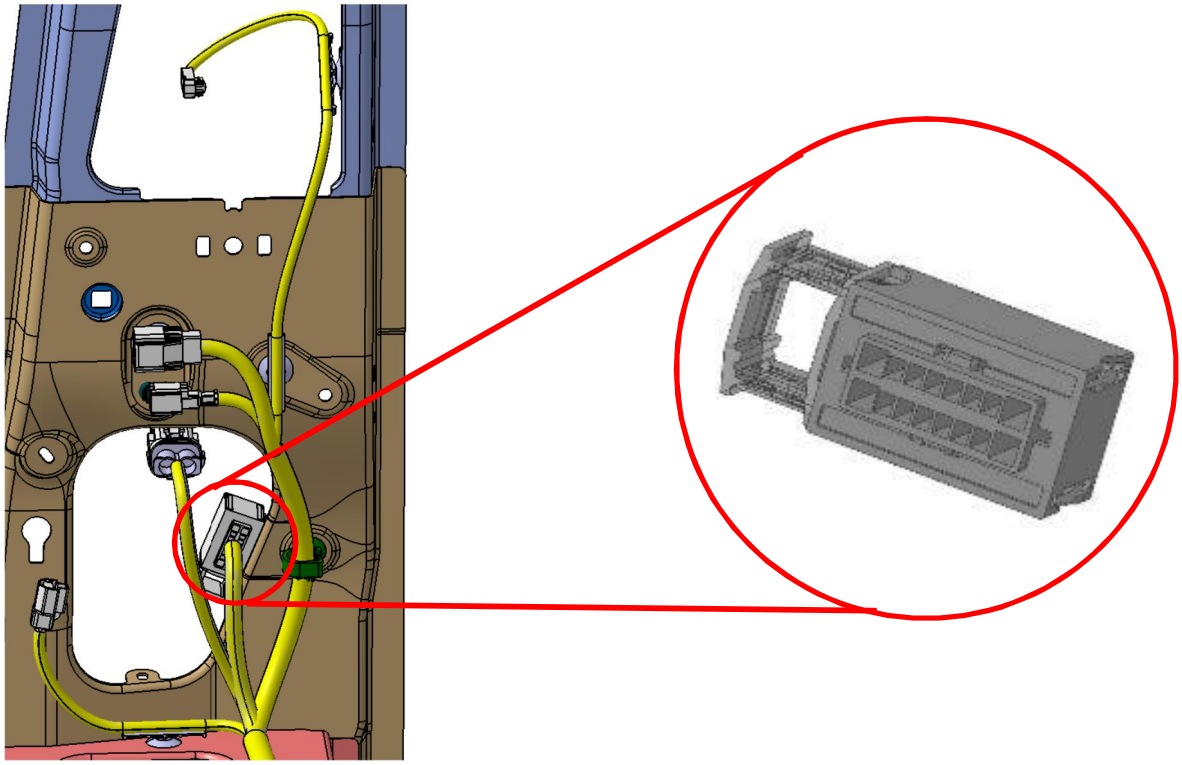
On conversions with an additional opening element in the rear area, it is possible to incorporate an additional electric lock, activated by the Master's original central locking.

To do so, the Movano must be equipped with the 'SOP03' option (3-button door opening system). It may be necessary to modify the configuration of the remote control. For more information, see chapter 4.18.

It is recommended to use a genuine Opel/ Vauxhall additional electric lock.

The electrical information in the 16-way connector (located in the B pillar) is used to supply the additional lock.

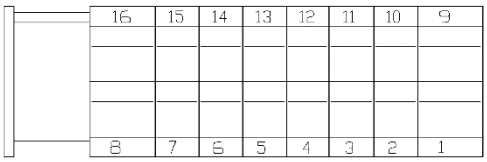
Location of connector in the B pillar



16-Way connector

For a non-Opel/ Vauxhall electric lock, the electrical actuator properties set out in the table below must be complied with.

16-Way connector



PIN	Function
1	Analogue door closing control signal (Wire cross section 2mm²)
2	Logical boot lock switch information signal (Wire cross section 0,35mm²)
3	Delayed +12V 2A power supply for interior lights, controlled by the passenger compartment ECU (UCH) (Wire cross section 0,5mm²)
4	Left lateral side light 3A power supply (Wire cross section 0,5mm²)
5	+ right-side rear speaker feed (Wire cross section 1mm²)
6	- left-side rear speaker feed (Wire cross section 1mm²)
7	'Engine running' information, 10A fuse shared by channels 7 and 8 (Wire cross section 1,5mm²)
8	+ 12V load shed current distribution power supply, 10A fuse shared by channels 7 and 8 (Wire cross section 1,5mm²)
9	Analogue door opening control signal (Wire cross section 2mm²)
10	Third stop light 5A power supply (Wire cross section 0,5mm²)
11	Progressive earth for 2A interior lights, controlled by the passenger compartment ECU (UCH) (UCH) (Wire cross section 0,35mm²)
12	Right lateral side light 3A power supply (Wire cross section 0,5mm²)
13	- right-side rear speaker feed (Wire cross section mm²)
14	+ left-side rear speaker feed (Wire cross section mm²)
15	Reserve
16	Analogue door deadlocking signal (Wire cross section 2mm²)

Channels 1, 9 and 16: the signals can only be used to control standard locks and only have sufficient capacity for three locks.

For more than three locks, a relay must be used.

Note:

The width of the contacts for channels 1, 8, 9 and 16 is 2.8mm; the width for the other pins is 1.5mm.

Electrical actuator properties

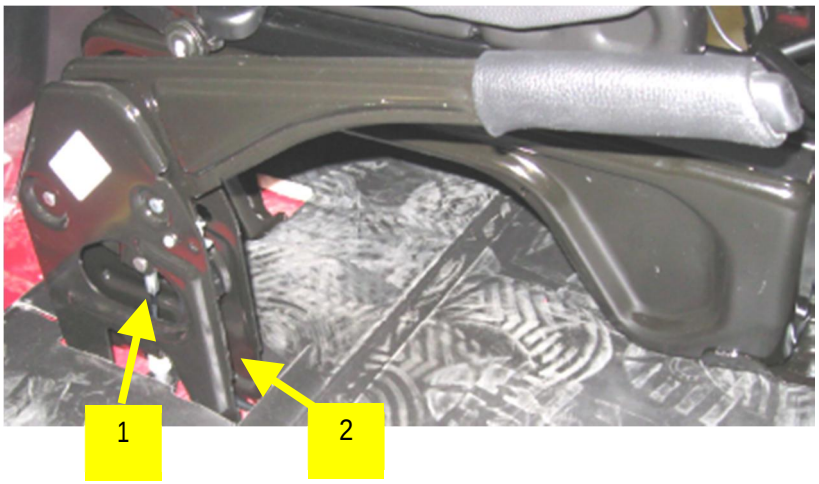
Function	PIN	Nominal I (A) per engine	Peak I (A) per engine	L / output (A)	U (V) / T (°C) Ref.
Rear door unlocking	1	2,7 (x3)	3,5	8,1	11,5 / 23°
Rear door locking	9	2,7 (x3)	3,5	8,1	11,5 / 23°
Locking	16	1,4 (x3)		4,2	11,5 / 23°

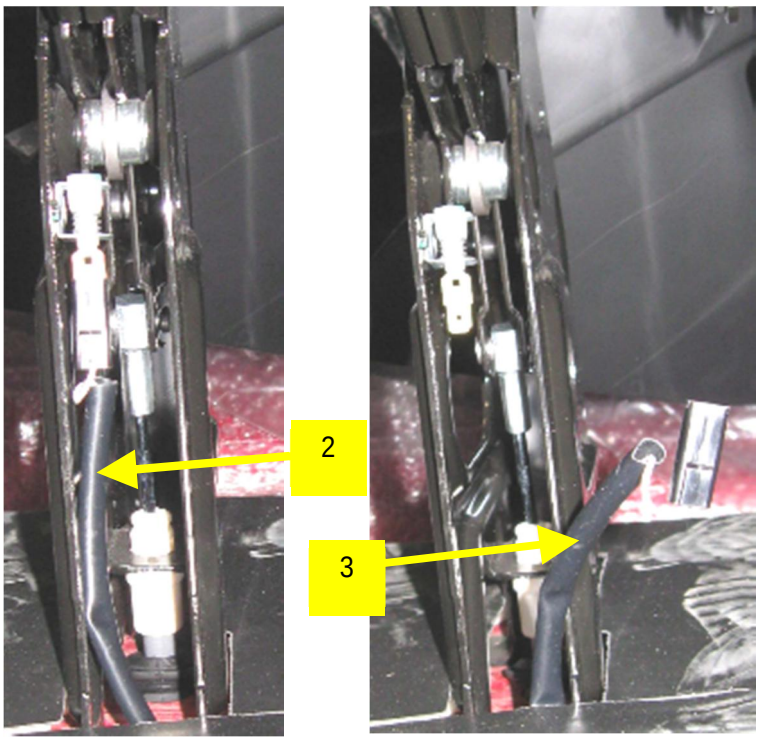
4.9 PARKING BRAKE

Attention:

Before working on the vehicle, refer to chapter 4.5.5.

The parking brake information is grounded when the brake is applied. This connection can be accessed on the handbrake.



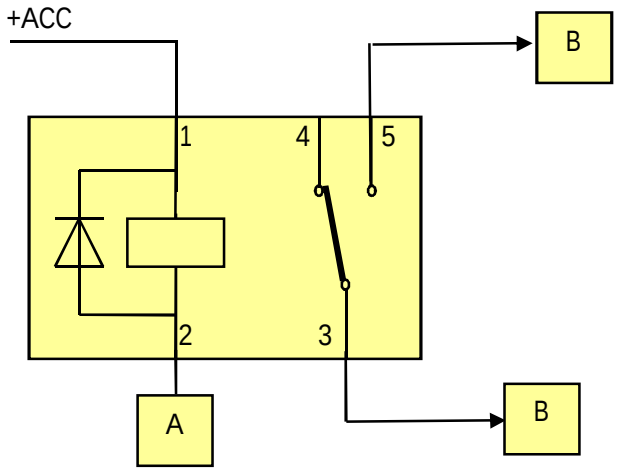


Pos.	Description
1	Handbrake
2	Handbrake cable
3	Handbrake cable (disconnected)

To recover this information, it must be sent using a relay with a free wheel diode. For example, the following Opel/ Vauxhall parts may be used:

- 40 Amp relay, Cartier Reference 20240041
- 20 Amp relay, Cartier Reference 29201041

Connection diagram



Pos.	Description
A	Handbrake information
B	Dry contact to recover handbrake information
+ACC	Accessory power supply, 1st notch on the ignition key

Attention:

The relay's power supply must not be taken directly from the battery +terminal.

4.10 CAN-BUS INTERFACE MODULE FOR CONVERSIONS, OPTION KC6/ OUTPUT AND SIGNAL

4.10.1 CAN-BUS INTERFACE MODULE, OPTION KC6

There is a need for this option mainly on following conversions: Camping-cars, emergency cars, integrated equipment as workshop vans or (nacelle) cranes/aerial platforms, refrigerated or vending vans.

The electronic box transforms the CAN information into many signals useful for equipment which needs this information to work in relation with the car status.

The CAN-Bus interface module for conversion is the only possibility for Converters to use the CAN information properly without interfering with the CAN system. The information read are, for example, vehicle speed, engine status, door status, instant fuel consumption, engine speed, warning signal activation, turn signal activation, etc.

The interface module is available as an option on all versions. This module can be used to recover certain information that is available on the multiplexed network.

Note:

The use of output signals is entirely new.

The unit cannot be fitted at post equipment.

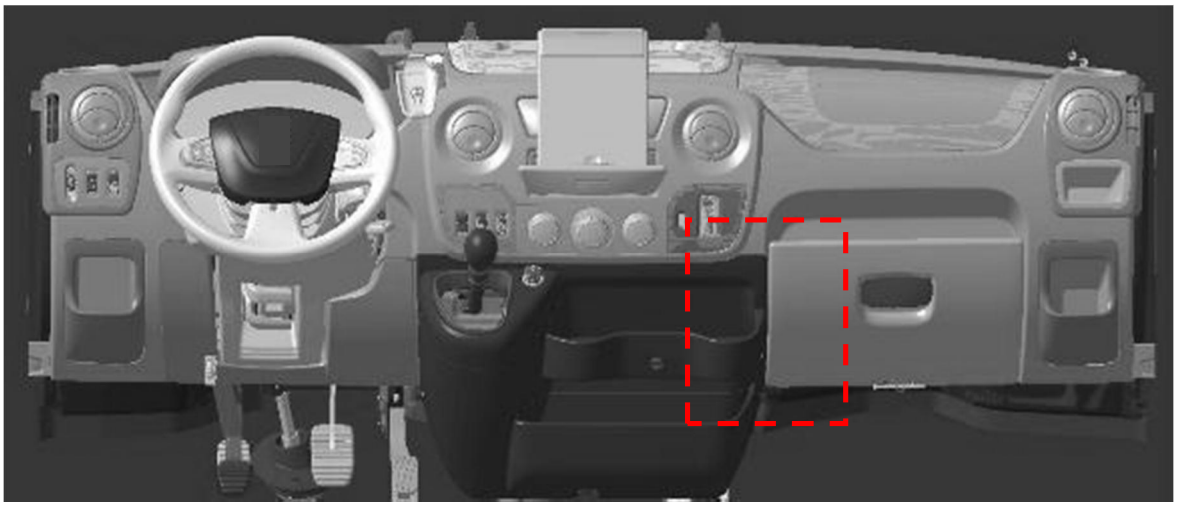
On vehicles with a digital tachograph, the KC6 option is added.

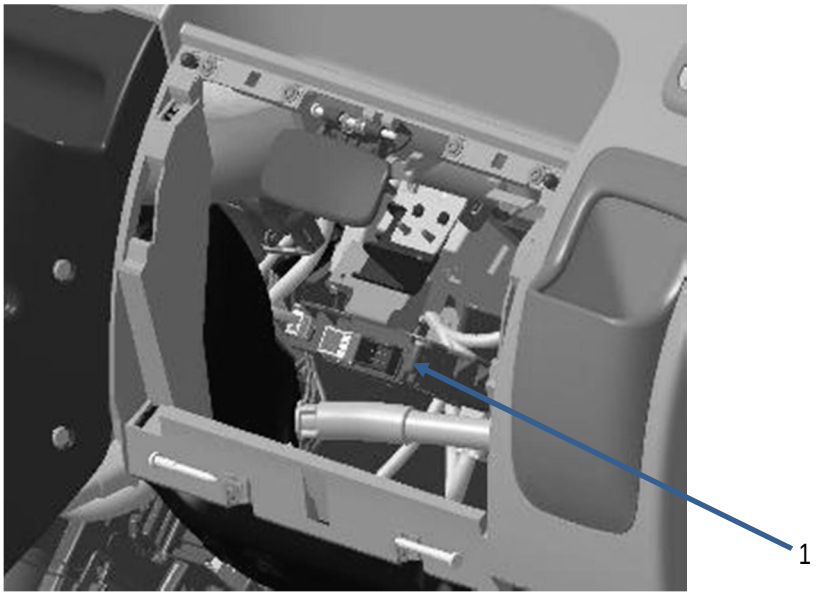
Attention:

As all consumers are networked and internally monitored, no modifications should be made to the CAN Bus (e.g. breaking, extending or tapping). Any modifications to the length, cross-section or resistance of the wiring harness can lead to failure of safety-relevant components or to impaired comfort.

Tampering with and unauthorised installations can cause damage to the vehicle and invalidate the general operating permit.

Location of the CAN-Bus interface





Pos.	Description
1	CAN-Bus interface module

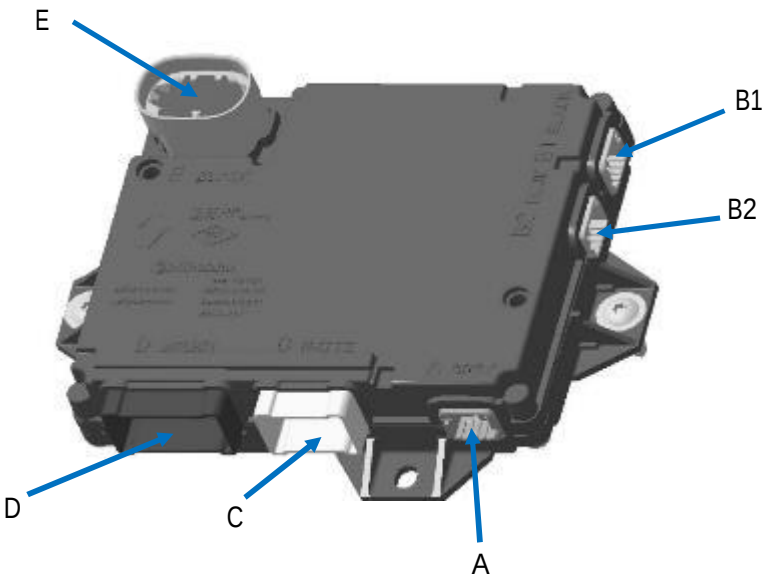
Note:

The CAN-Bus interface module is attached on the right-hand side of the central dashboard console for both left- and right-hand drive vehicles.

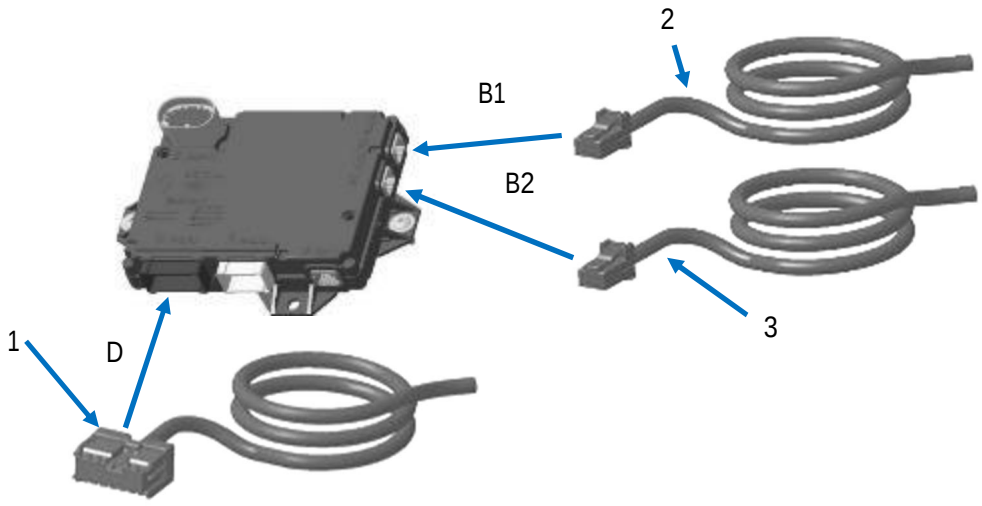
Details of the interface unit

Note:

Connectors "A", "C" and "E" are strictly for Opel/ Vauxhall use.
Connectors "B1" and "B2" are specifically for converters (CAN and logic outputs).
Connector "D" is available for converters (power outputs) except on "TRABUS" versions.

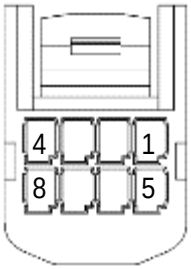


After-sales interface wiring



Pos.	Connector	No. of pins	Connector colour	Opel/ Vauxhall part no.
1	D	12	Brown	
2	B1	8	Black	95519283
3	B2	8	Blue	95519284

Details of black connector B1/ 5 (8-way)



Connector	Part number	Function	Signal	Pins
B1 BLACK	TYCO 0-137-9659-1	CAN ADAP2 500K	CANHS_L3	1
		CAN ADAP2 500K	CANHS_H3	5
		Brake position	O_LOG_1	4
		Engine running	O_LOG_2	7
		Clutch position	O_LOG_3	3
		Door opening/ closing	O_LOG_6	6
		ABS regulation	O_LOG_7	2
		Not connected	NC1	8

Note:

Ways 2, 3, 4, 6 and 7 are able to supply other information via a reprogramming operation carried out within the Opel/ Vauxhall network.

Ways 1 and 5 specific to the CAN for converters (see table at the end of this chapter).

Details of blue connector (8-Way)

Connector	Part number	Function	Signal	Pins
B2 BLUE	TYCO 0-137-9659-3	Ignition key position	O_LOG_4	4
		Door opening signal	O_LOG_5	3
		ESP regulation	O_LOG_8	7
		Neutral signal	O_LOG_9	2
		Hand brake switch	O_LOG_10	6
		Fast idle control	INTCNX_ADAP_VEH	8
		Vehicle speed	O_PWM_1	1
		Engine speed	O_PWM_2	5

Note:

Pins 2, 3, 4, 6, and 7 are able to supply other information via a reprogramming operation carried out within the Opel/ Vauxhall network.

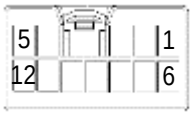
Reprogramming in the Opel/ Vauxhall network

Door switch	Neutral	Active trajectory control
Ignition contact switch	Auto gearbox fault warning light on	Trajectory control fault
Door locking	Side lights	Gear engaged
Direction indicators	Main beam headlights	Ignition key + accessory
Brake check	Marker lights	
Engine status	Front fog lights	
Air conditioning compressor	ESP activation status indicator light	
Start-up	Hand brake switch	
Clutch switch	ABS operation	
Reverse gear	ABS operating fault	

Details of D connector (12-Way)

Note:

The maximum permanent current of these power supplies must not exceed 40A shared with option KPD (sheet 4.11).This line is protected by the 50 A fuse F6 fitted in the electrical distribution unit.



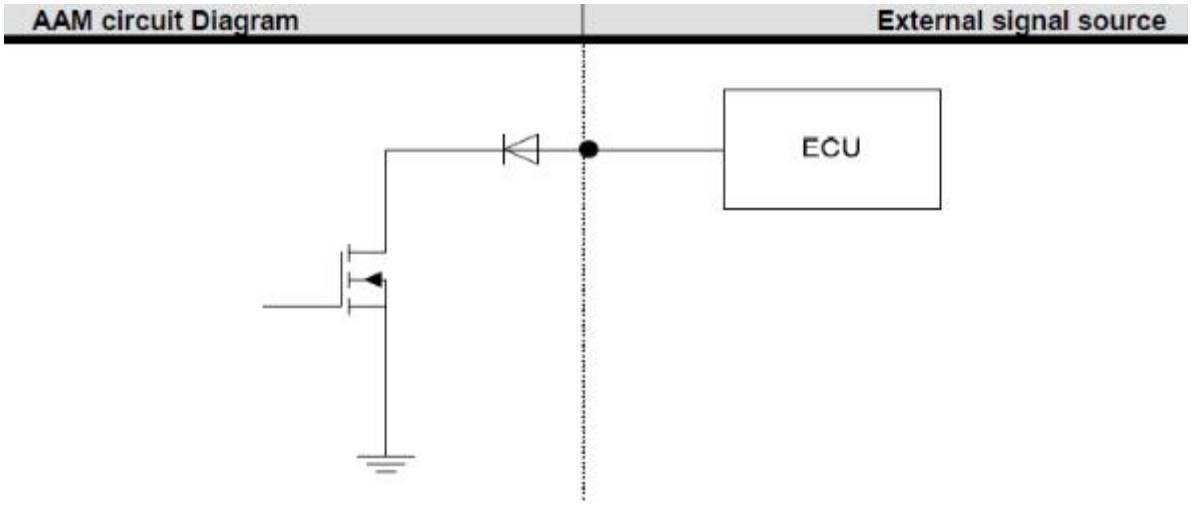
Connector	Part number	O POWER	Input / Output	Pins
D Brown	SUMITOMO 6098-6956	O POWER 6	Output	1
		O POWER 2	Output	2
		O POWER 9	Output	3
		O POWER 11	Output	4
		O POWER 4	Output	5
			Output	6
		O POWER 8	Output	7
		O POWER 5	Output	8
		O POWER 10	Output	9
		O POWER 3	Output	10
		O POWER 7	Output	11
		O POWER 1	Output	12

Note:

In the event of accidental overload on one way, it will be deactivated. To reactivate, the vehicle must be set to standby (APC off/ lights off/ vehicle locked. On standby for 2 min. 20s after locking).

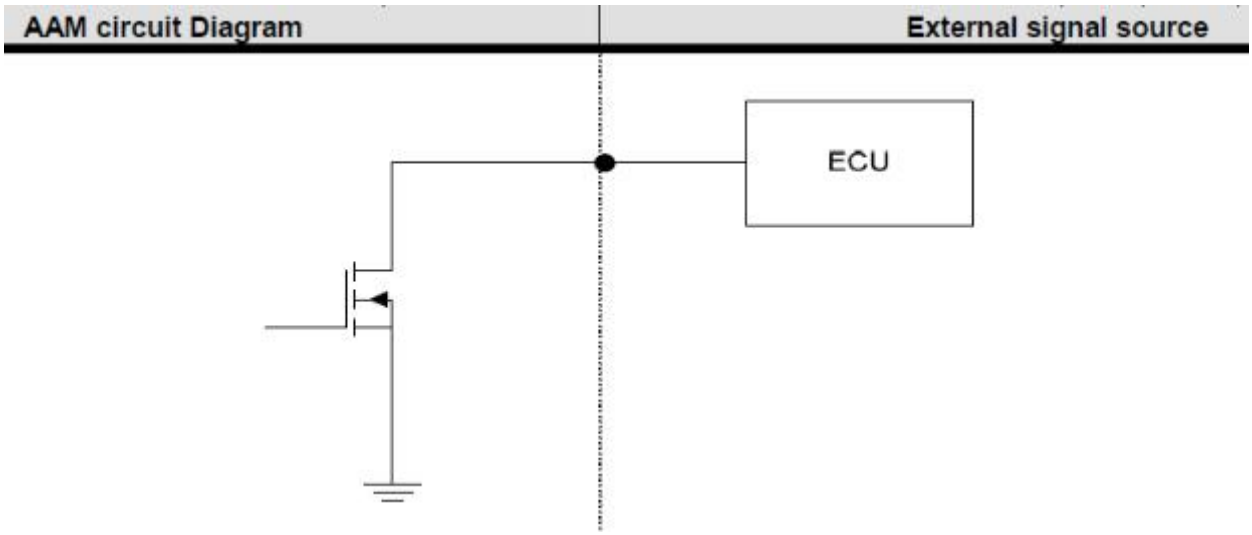
4.10.2 OUTPUTS AND SIGNALS

Logic outputs



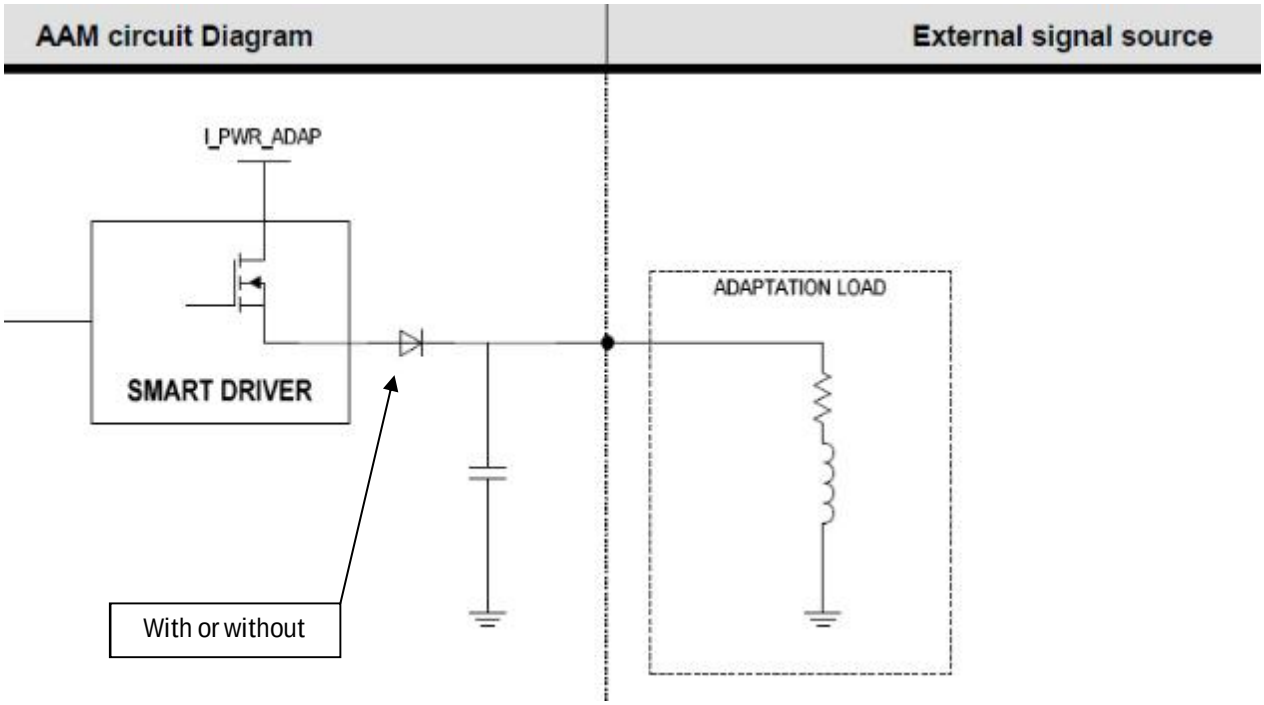
LOGIC OUTPUT					
PARAMETERS		**MIN**	**Type**	**MAX**	**Unit**
Operating supply voltage	Vbat	8		16	V
Low level output voltage	VOL			1,25	V
Output operating current	IOL	500		950	mA
Current limitation	ILIM			950	mA
Open state leakage current	IOZH			0,1	mA
High level input current (ECU Vbat grounded)	IZL			0,1	mA
Low level input current (ECU GND connected to Vbat)	-IZL			0,015	mA
Clamping Voltage	VCUT	41		54	V
Demagnetisation energy	ECUT	13			mJ
Range of output frequency	FSO				Hz
Rise time	tr			100	µs
Fall time	tf			100	µs

PWM outputs



PWM OUTPUT					
PARAMETERS		**MIN**	**Type**	**MAX**	**Unit**
Operating supply voltage	Vbat	6		16	V
Low level output voltage	VOL			0,3	V
Output operating current	IOL	500		950	mA
Current limitation	ILIM			950	mA
Open state leakage current	IOZH			0,015	mA
High level input current (ECU Vbat grounded)	IZL			0,015	mA
Low level input current (ECU GND connected to Vbat)	-IZL			Vbat/Ext Load	mA
Rise time	tr			100	µs
Fall time	tf			100	µs
Output capacitance	Clo		15	20,1	Hz

Power outputs (conversions)



POWER OUTPUT_1, 2, 3, 4, 8, 9, 10					
PARAMETERS		**MIN**	**Type**	**MAX**	**Unit**
Range of battery voltage	Vbat	8		16	V
Dropout voltage	V		0,1		V
Range of output current	Iout	0,1		2	A
Maximum allowable current	LAI			7	A
Pulse rise time	Tr		20		µs
Pulse fall time	Tf		45		µs
Maximum allowable transient current	LAIot			38	A
Surge clamp voltage	Vcut			44	V
Leakage current	Ile			100	µA
Thermal shutdown temp	Tth	150			°C
Inductive load sw off	E			40	mJ

POWER OUTPUT_5, 7					
PARAMETERS		**MIN**	**Type**	**MAX**	**Unit**
Range of battery voltage	Vbat	8		16	V
Dropout voltage	V		0,125		V
Range of output current	Iout	0,14		5	A
Maximum allowable current	LAI			11	A
Pulse rise time	Tr		20		µs
Pulse fall time	Tf		40		µs
Maximum allowable transient current	LAIot			60	A
Surge clamp voltage	Vcut			44	V
Leakage current	Ile			100	µA
Thermal shutdown temp	Tth	150			°C
Inductive load sw off	E			40	mJ

POWER OUTPUT_6					
PARAMETERS		**MIN**	**Type**	**MAX**	**Unit**
Range of battery voltage	Vbat	8		16	V
Dropout voltage	V		1		V
Range of output current	Iout	0,1		2	A
Maximum allowable current	LAI			7	A
Pulse rise time	Tr		20		µs
Pulse fall time	Tf		45		µs
Maximum allowable transient current	LAIot			38	A
Surge clamp voltage	Vcut			44	V
Leakage current	Ile			100	µA
Thermal shutdown temp	Tth	150			°C
Inductive load sw off	E			40	mJ

POWER OUTPUT_11					
PARAMETERS		**MIN**	**Type**	**MAX**	**Unit**
Range of battery voltage	Vbat	8		16	V
Dropout voltage	Vbat		0,08		V
Range of output current	Iout	0,26		8	A
Maximum allowable current	LAI			30	A
Pulse rise time	Tr			500	µs
Pulse fall time	Tf			60	µs
Maximum allowable transient current	LAIot			60	A
Surge clamp voltage	Vcut			40	V
Leakage current	Ile				µA
Thermal shutdown temp	Tth	150			°C
Inductive load sw off	E			40	mJ

Note:

Pin 6 is empty.

4.10.3 TABLE OF CAN-INFOS

Input				Output							Configuration (customization), Logical, Power and PWM Actions
Information Part	**Information Needs**	**By Means of**	CAN V states	**Frame Name**	**Parametres**	**Identifier Can Adapt**	**MSB position**	**LSB position**	**Période CAN**	**Processing gateway from CANV parameters to CAN_ADAP2**	Processing gateway from CANV parameters to logical, PWM and Power outputs parameters
Braking	Speed information	CAN and PWM		ADAP_Base1	VehicleSpeed	0E7	Byte N° 6 - Bit N°7	Byte N° 7 - Bit N° 0	40	copy CANV value into CAN_ADAP2 value	Fmax = 390 Hz F = (5/3,6) x Vitesse in km/h
		CAN		ADAP_Base1	EngineCoolantTemp	'0E7	Byte N° 4 - Bit N° 7	Byte N° 4 - Bit N° 0	40	copy CANV value into CAN_ADAP2 value	
		CAN		ADAP_Base1	FuelConsumption	'0E7	Byte N° 5 - Bit N°7	Byte N° 5 - Bit N°0	40	copy CANV value into CAN_ADAP2 value	
Engine	Engine speed	CAN and PWM		ADAP_Base1	EngineRPM	'0E7	Byte N° 1 - Bit N° 7	Byte N° 2 - Bit N° 0	40	copy CANV value into CAN_ADAP2 value	2 pulses by motor turn 0 < RPM < 7000 turn/min
Foot controls	Accelerator pedal status	CAN		ADAP_Base1	DriverRequest	'0E7	Byte N° 3 - Bit N° 7	Byte N° 3 - Bit N° 0	40	copy CANV value into CAN_ADAP2 value	
Engine	Engine running	CAN, log and Power	00 engine stopped 01 engine stalled 10 engine running 11 engine cranking	ADAP_Base2	EngineStatus	0E8	Byte N° 1 - Bit N° 7		40	If CAN V value = 00 or 01 or 11 Driver value = 0 If CAN V value = 10 then Driver value = 1	

Input				Output							Configuration (customization), Logical, Power and PWM Actions
Information Part	**Information Needs**	**By Means of**	CAN V states	**Frame Name**	**Parametres**	**Identifier Can Adapt**	**MSB position**	**LSB position**	**Période CAN**	**Processing gateway from CANV parameters to CAN_ADAP2**	Processing gateway from CANV parameters to logical, PWM and Power outputs parameters
Lights Foot controls	Brake lights Brake pedal	CAN, log and Power	00 Brake not activated 01 Brake activated 10 not used 11 invalid	ADAP_Base2	BrakeSwitchEngine Control	0E8	Byte N° 1 - Bit N° 6		40	If CAN V value = 00 Driver value = 0 If CAN V value = 01 then Driver value = 1 If a CAN V value = 10 or 11 Value = leave output data in present state	
Air Conditioner	AC aktiv	CAN, log and Power	0 no compressor activation requested 1 compressor activation requested	ADAP_Base2	ACCompressorAuthorized	0E8	Byte N° 1 - Bit N° 5		40	If CAN V value = 0 Value = 0 If CAN V value = 1 then Value = 1	
Pedale	pedal	CAN, log and Power	00 pedal not pressed (clutched) 01 pedal pressed 10 not used 11 invalid	ADAP_Base2	ClutchSwitch	0E8	Byte N° 1 - Bit N° 4		40	If CAN V value = 00 Driver value = 0 If CAN V value = 01 then Driver value = 1 If CAN V value = 10 or 11 leave output data in present state	
Door	Info open door	CAN, log and Power	BCM_GeneralStatus	ADAP_Base2	Doorswitches	0E8	Byte N° 1 – Bit N° 3		40	If CAN V value = 00000 Value = 0 else Value = 1	

Input				Output							Configuration (customization), Logical, Power and PWM Actions
Information Teil	**Information Needs**	**By Means of**	CAN V states	**Frame Name**	**Parametres**	**Identifier Can Adapt**	**MSB position**	**LSB position**	**Période CAN**	**Processing gateway from CANV parameters to CAN_ADAP2**	Processing gateway from CANV parameters to logical, PWM and Power outputs parameters
Vehicle status	ignition key position (ACC, APC)	CAN, log and Power	0 Primary ignition supply off 1 Primary ignition supply on 0 accessory supply off 1 accessory supply on	ADAP_Base2	IgnitionSwitch	0E8	Byte N° 1 - Bit N° 2		40	If one of CAN V value = 1 then Value = 1 Else CAN V value = 0 Value = 0	
Door	Doors locked/unlocked info	CAN, log and Power	x0 boot not locked x1 boot locked 0x doors not locked 1x doors locked	ADAP_Base2	DoorsLocked	0E8	Byte N° 1 - Bit N° 1		40	If CAN V value = 0x Value = 0 If CAN V value = 1x then Value = 1	
Lights	Direction indicator L and R	CAN, log and Power	000 left and right flashing indicators OFF 001 left flashing indicator ON and right flashing indicator OFF 010 left flashing indicator OFF and right flashing indicator ON 011 left flashing indicator ON and right flashing indicator ON 111 Unavailable	ADAP_Base2	FlashingIndicators	0E8	Byte N° 1 - Bit N° 0		40	If CAN V value = 001 or 010 Driver value = 1 else Driver value = 0	
Lights	Warning	CAN	000 left and right flashing indicators OFF 001 left flashing indicator ON and right flashing indicator OFF 010 left flashing indicator OFF and right flashing indicator ON 011 left flashing indicator ON and right flashing indicator ON 111 Unavailable	ADAP_Base2	HazardLight	0E8	Byte N° 2- Bit N° 7		40	If CAN V value = 011 Driver value = 1 else Driver value = 0	
	******	******	******	ADAP_Base2	****** Fixed to zero ******	0E8	Byte N° 2- Bit N° 6	Byte N° 2- Bit N° 0	40	****** Fixed to zero ******	

Input				Output							Configuration (customization), Logical, Power and PWM Actions
Information Part	**Information Needs**	**By Means of**	CAN V states	**Frame Name**	**Parametres**	**Identifier Can Adapt**	**MSB position**	**LSB position**	**Période CAN**	**Processing gateway from CANV parameters to CAN_ADAP2**	Processing gateway from CANV parameters to logical, PWM and Power outputs parameters

Vehicle status	Stop Auto State	CAN, log and Power	00 Not in AUTO Phase
			01 AUTO and RESTART
			10 AUTO Phase
			11 Unavaliable value
				ADAP_Base3	AutoStart	0E9	Byte N° 4 - Bit N° 6		100	If CAN V value = 00
										Value = 0
										If CAN V value = 01 or 10 then
										Value = 1
										If CAN V value = 11 then
										Value = 0	

		CAN		ADAP_Base4	AIRBAGMalfunction_84	0EA	Byte N° 1 - Bit N° 0		100	copy CANV value into CAN_ADAP2 value	
		CAN		ADAP_Base4	DriverSafetyBeltSwitch	0EA	Byte N° 1 - Bit N° 1	Byte N° 1 - Bit N° 2	100	copy CANV value into CAN_ADAP2 value	
Lights	Side lights	CAN, log and Power	0 position lights display not requested 1 position lights display requested	ADAP_Base4	PositionLightsRequest(UCH)	0EA	Byte N° 1 - Bit N° 3		100	If CAN V value = 0 Driver value = 0 If CAN V value = 1 then Driver value = 1	
Lights	lights	CAN, log and Power	0 low beam display not requested 1 low beam display requested	ADAP_Base4	LowBeamRequest(UCH)	0EA	Byte N° 1 - Bit N° 4		100	If CAN V value = 0 Driver value = 0 If CAN V value = 1 then Driver value = 1	
Lights	Main beam headlights	CAN, log and Power	0 High beam display not requested 1 High beam display requested	ADAP_Base4	HighBeamRequest(UCH)	0EA	Byte N° 1 - Bit N° 5		100	If CAN V value = 0 Driver value = 0 If CAN V value = 1 then Driver value = 1	
Vehicle status	VAC/VSC	CAN	0 Keyless vehicle 1 vehicule with key	ADAP_Base4	Key or Keyless Vehicule	0EA	Byte N° 2 - Bit N° 0		100	copy CANV value into CAN_ADAP2 value	
Braking	ABS fault	CAN, log and Power	0 ABS OK 1 ABS malfunction	ADAP_Base4	ABSMalfunction_84	0EA	Byte N° 2 - Bit N° 1		100	If CAN V value = 0 Value = 0 If CAN V value = 1 then Value = 1	
	X62	CAN		ADAP_Base4	ABS_WarningRequest	0EA	Byte N° 2 - Bit N° 2	Byte N° 2 - Bit N° 3	100	copy CANV value into CAN_ADAP2 value	
Braking	ESP active deactivated	CAN, log and Power	0 ESP available 1 ESP disabled by the driver	ADAP_Base4	ESPDeactivated_84	0EA	Byte N° 2 - Bit N° 4		100	If CAN V value = 1 value = 0 If CAN V value = 0 then value = 1	

Input				Output							Configuration (customization), Logical, Power and PWM Actions
Information Part	**Information Needs**	**By Means of**	CAN V states	**Frame Name**	**Parametres**	**Identifier Can Adapt**	**MSB position**	**LSB position**	**Période CAN**	**Processing gateway from CANV parameters to CAN_ADAP2**	Processing gateway from CANV parameters to logical, PWM and Power outputs parameters
		CAN		ADAP_Base4	ASRinRegulation_84	0EA	Byte N° 2 - Bit N° 5		100	copy CANV value into CAN_ADAP2 value	
Braking	ESP regulation	CAN, log and Power	0 No AYC in regulation 1 AYC in regulation	ADAP_Base4	AYCinRegulation_84	0EA	Byte N° 2 - Bit N° 6		100	If CAN V value = 0 Value = 0 If CAN V value = 1 then Value = 1	
		CAN		ADAP_Base4	MSRinRegulation_84	0EA	Byte N° 2 - Bit N° 7		100	copy CANV value into CAN_ADAP2 value	
		CAN		ADAP_Base4	DisplayedOilLevel_84	0EA	Byte N° 3 - Bit N° 1	Byte N° 3 - Bit N° 4	100	copy CANV value into CAN_ADAP2 value	
		CAN		ADAP_Base4	MILLamp_84	0EA	Byte N° 3 - Bit N° 5	Byte N° 3 - Bit N° 6	100	copy CANV value into CAN_ADAP2 value	
		CAN		ADAP_Base4	WarningWaterTemp_84	0EA	Byte N° 3 - Bit N° 7		100	copy CANV value into CAN_ADAP2 value	
		CAN		ADAP_Base4	EngineControlFailureLevel1_84	0EA	Byte N° 4 - Bit N° 0		100	copy CANV value into CAN_ADAP2 value	
		CAN		ADAP_Base4	EngineControlFailureLevel2_84	0EA	Byte N° 4 - Bit N° 1		100	copy CANV value into CAN_ADAP2 value	
Engine	Cruise Control/Speed Limiter cut off	CAN		ADAP_Base4	CruiseControlStatusDisplay	0EA	Byte N° 4 - Bit N° 2	Byte N° 4 - Bit N° 4	100	copy CANV value into CAN_ADAP2 value	
		CAN		ADAP_Base4	DieselFilterWaterDetection	0EA	Byte N° 4 - Bit N° 5		100	copy CANV value into CAN_ADAP2 value	
		CAN		ADAP_Base4	MeanEffectiveTorque_84	0EA	Byte N° 6 - Bit N° 7		100	copy CANV value into CAN_ADAP2 value	
Lights Gearbox	Reversing lights Reverse drive info	CAN, log and Power	00 rear gear not engaged 01 rear gear engaged 10 not used 11 invalid	ADAP_Base4	RearGearEngaged_84_UPC	0EA	Byte N° 5 - Bit N° 0		100	If CAN V value = 00 Driver value = 0 If CAN V value = 01 then Driver value = 1 If CAN V value = 10 or 11 Value = 0	

Input				Output							Configuration (customization), Logical, Power and PWM Actions
Information Part	**Information Needs**	**By Means of**	CAN V states	**Frame Name**	**Parametres**	**Identifier Can Adapt**	**MSB position**	**LSB position**	**Période CAN**	**Processing gateway from CANV parameters to CAN_ADAP2**	Processing gateway from CANV parameters to logical, PWM and Power outputs parameters
Lights	Fog lamps	CAN, log and Power	0 front fog lights off 1 ront fog lights on	ADAP_Base4	FrontFogLightStatus	0EA	Byte N° 5 - Bit N° 2		100	If CAN V value = 0 Value = 0 If CAN V value = 1 then Value = 1	
		CAN		ADAP_Base5	ShortVehicleID	0EB	Byte N° 2 - Bit N° 7	Byte N° 1 - Bit N° 0	100	copy CANV value into CAN_ADAP2 value	
Braking	Odometer	CAN		ADAP_Base5	DistanceTotalizer_84	0EB	Byte N° 5 - Bit N° 7	Byte N° 3 - Bit N° 0	100	copy CANV value into CAN_ADAP2 value	
Foot controls	Parking brake	CAN, log and Power	0 parking brake not applied 1 parking brake applied	ADAP_Base5	HandBrakeSwitch_84	0EB	Byte N° 6 - Bit N° 6		100	If CAN V value = 0 Value = 0 If CAN V value = 1 Value = 1	
		CAN		ADAP_Base5	DriverDoor	0EB	Byte N° 6 - Bit N° 3		100	copy CANV value into CAN_ADAP2 value	
	ACC	CAN, log and Power	0 accessory supply off 1 accessory supply on	ADAP_Base10	IgnitionState(UCH)	0F1	Byte N° 1 - Bit N° 0		100	If CAN V value = 0 Value = 0 If CAN V value = 1 then Value = 1	
Door	Rear CPE lock/unlock control	Log and Power	x0 boot not locked x1 boot locked 0x doors not locked 1x doors locked	ADAP_Base10	DoorLockingState	0F1	Byte N° 1 - Bit N° 1		100	If CAN V value = x0 Value = 0 If CAN V value = x1 then Value = 1	
Gearbox	Neutral (according to vehicle TD)	CAN, log and Power	00 neutral contact not reached 01 neutral contact reached 10 vehicle not equipped 11 invalid	ADAP_Base10	NeutralContact	0F1	Byte N° 1 - Bit N° 3		100	If CAN V value = 00 Driver value = 0 If CAN V value = 01 then Driver value = 1 If CAN V value = 10 or 11 Value = 0	

Input				Output							Configuration (customization), Logical, Power and PWM Actions
Information Part	**Information Needs**	**By Means of**	CAN V states	**Frame Name**	**Parametres**	**Identifier Can Adapt**	**MSB position**	**LSB position**	**Période CAN**	**Processing gateway from CANV parameters to CAN_ADAP2**	Processing gateway from CANV parameters to logical, PWM and Power outputs parameters
Gearbox	Gearbox fault (robotised gearbox)	CAN, log and Power	0x1x AT failure 000x no failure 01xx Oil Temperature warning (BVA) ou clutching overheating (BVR) 1xxx reserved	ADAP_Base10	AT_Faults/States_84	0F1	Byte N° 1 - Bit N° 5		100	If CAN V value = 0x1x then Value = 1 Else Value = 0	
Gearbox	Gear engaged information (robotised gearbox)	CAN, log and Power	0000 declutched at rest 0001 1st range 0010 2nd range 0011 3rd range 0100 4th range 0101 5th range 0110 6th range 1001 reverse 1010 neutral 1111 AT in limphome	ADAP_Base10	TransmRangeEngaged_84	0F1	Byte N° 2 - Bit N° 1		100	**If CAN V value ≥ 0001 and ≤ 0110 or CAN V value = 1001 then Value = 1 Else Value = 0**	
Braking	ESP fault	CAN, log and Power	0 no ESP malfunction 1 ESP malfunction	ADAP_Base10	ESPMalfunction_84	0F1	Byte N° 2 - Bit N° 5		100	If CAN V value = 0 value = 0 If CAN V value = 1 then value = 1	
Braking	ABS regulation	CAN, log and Power	0 no ABS regulation 1 ABS in regulation	ADAP_Base10	ABSinRegulation_84	0F1	Byte N° 2 - Bit N° 6		100	If CAN V value = 0 Value = 0 If CAN V value = 1 then Value = 1	
		CAN		ADAP_Base12	FreeShift	0F3	Byte N° 1 - Bit N° 0	Byte N° 1 - Bit N° 7	10	copy CANV value into CAN_ADAP2 value	
Räder	4x4	CAN		ADAP_Base12	WheelSpeed.F.R	0F3	Byte N° 2 - Bit N° 0	Byte N° 3 - Bit N° 7	10	copy CANV value into CAN_ADAP2 value	
Räder	4x4	CAN		ADAP_Base12	WheelSpeed.F.L	0F3	Byte N° 4 - Bit N° 0	Byte N° 5- Bit N° 7	10	copy CANV value into CAN_ADAP2 value	
Räder	4x4	CAN		ADAP_Base12	WheelSpeed.R.R_84	0F3	Byte N° 6 - Bit N° 0	Byte N° 7 - Bit N° 7	10	copy CANV value into CAN_ADAP2 value	
Räder	4x4	CAN		ADAP_Base13	WheelSpeed.R.L_84	0F4	Byte N° 1 - Bit N° 0	Byte N° 2 - Bit N° 7	10	copy CANV value into CAN_ADAP2 value	
Räder	4x4	CAN		ADAP_Base13	SteeringWheelAngle	0F4	Byte N° 3 - Bit N° 0	Byte N° 4 - Bit N° 7	10	copy CANV value into CAN_ADAP2 value	
Räder	4x4	CAN		ADAP_Base13	SwaSensorInternalStatus	0F4	Byte N° 5 - Bit N° 0	Byte N° 5 - Bit N° 2	10	copy CANV value into CAN_ADAP2 value	
Räder	4x4	CAN		ADAP_Base13	SwaMessageCounter	0F4	Byte N° 5 - Bit N° 3		10	copy CANV value into CAN_ADAP2 value	
Räder	4x4	CAN		ADAP_Base13	Adaptative_StraightAhead_Offset	0F4	Byte N° 6 - Bit N° 0	Byte N° 7 - Bit N° 7	10	copy CANV value into CAN_ADAP2 value	

4.11 OPTIONS KPD, WRF, UF3, UZB, TACHOGRAPH AND TRAILER HITCH

4.11.1 OPTION KPD

This option is used to provide various electrical supply circuits including “engine running” information required for any added component using electrical power.

This Option contains:

Two connectors (6-way and 2-way) are provided for the following accesses:

For the 6-way dashboard area connector:

- “Engine running” information
- Activation of accelerated idle
- +12V load shed current distribution power supply

For the 2-way B pillar area connector:

- 12V power supply with max. current of 40A

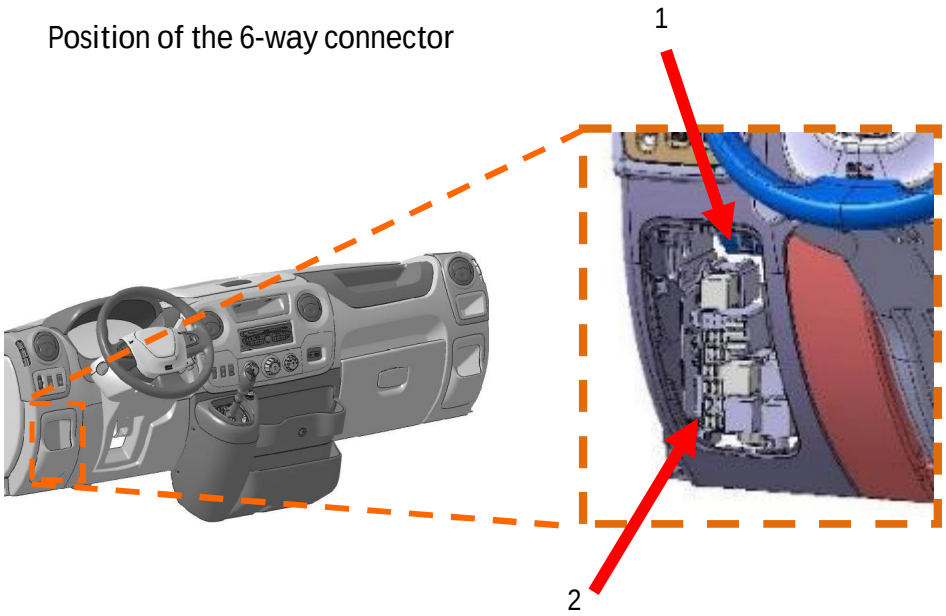
Attention:

Consumption (in auto stop phase) must be limited to 30A.

6-way connector

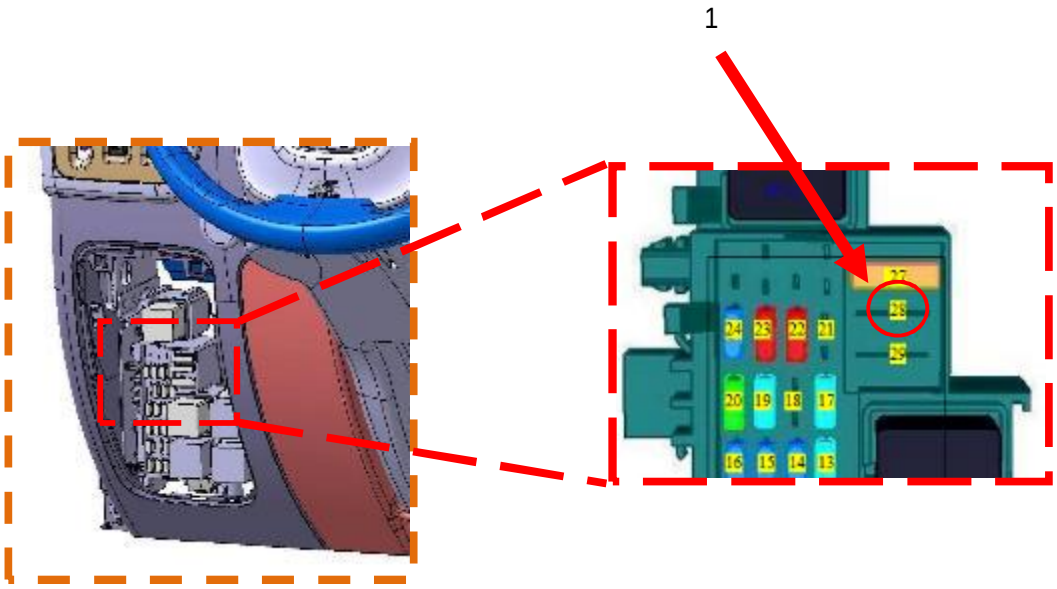
The 6-way connector is located on the left-hand side near to the panel feed-through ring, the passenger compartment fuse and relay box and the bonnet opening lever. The connector is in the same position for both left-hand and right-hand drive vehicles. It is secured on the dashboard wiring using a link. An excess length is provided for the connection.

Position of the 6-way connector



Pos.	Description
1	Position of 6-way connector
2	Passenger compartment relay and fuse box

Fuse position for 6-way connector

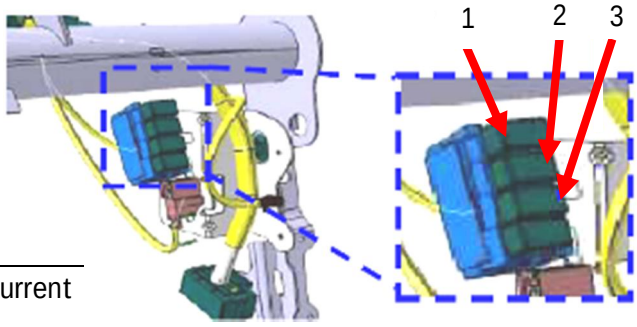


Pos.	Description
1	Fuse F28 (10 Ampere)

Note:

Power fuse F28 for the KPD option is located in the passenger compartment relay and fuse box (BFRH); see also sheet 4.2.

Location of the relays for KPD

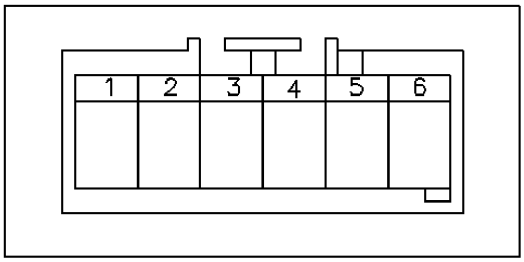


Pos.	Description
1	20A Relay, +12V load shed current distribution power supply
2	20A Relay, engine running information
3	20A Relay, heated seat

Note:

The relay box is located in the right-hand side of the dashboard.

Assignment oft he 6-way connector



Way number	Function	
1 (3ADJ)	Accelerated idle control (wire cross section 0.5mm²) activated by earthing	
2 (BMT1)	"Engine running" information	Shared 10A fuse (wire cross section 1mm²)
3 (SBP4)	Power supply + 12V offloaded current distribution	
4 (MAN32)	Ground (wire cross section 1.5mm² large enough to adapt to the +12V offloaded current distribution)	
5	Reserve	
6	Reserve	

Connection kit

Attention:

The permanent accumulated currents of the following 2 ways must not exceed 8A:

- Way 2: "Engine running" information.
- Way 3: "+ 12 V current distribution". (activated from the +ACC (+ accessory) position, 1st notch on the ignition key). These ways are protected by 10A fuse F28 in the passenger compartment fuse and relay box (BFRH).

For more power, channels 2 and 3 need to be relayed. When the engine is off, the energy management system can load shed these functions to save enough battery power to start the vehicle.

2-way connector

The connector is located in the right-hand B pillar behind the plastic trim.

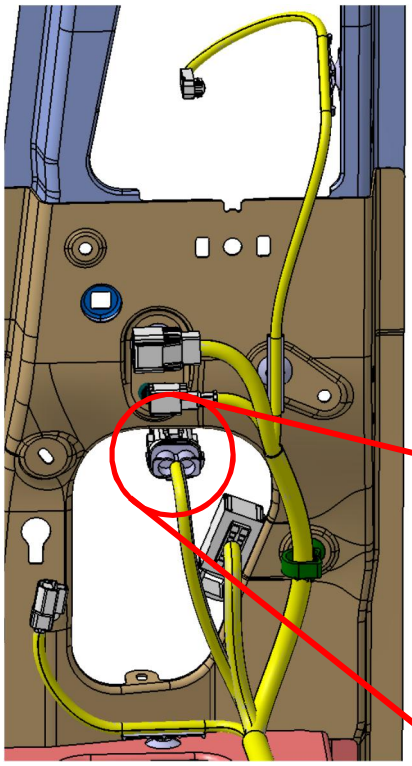
The maximum permanent current of this power supply must not exceed 40 A. This line is protected by 50A fuse F6 in the engine compartment interconnections unit.

Attention:

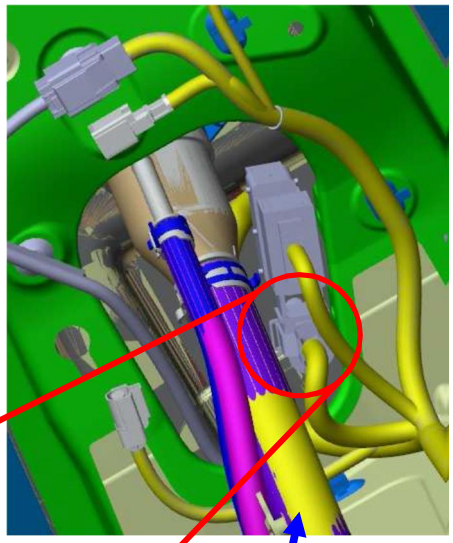
This power supply is connected directly to the battery. The vehicle is therefore not protected by the energy management system. Risk of battery draining.

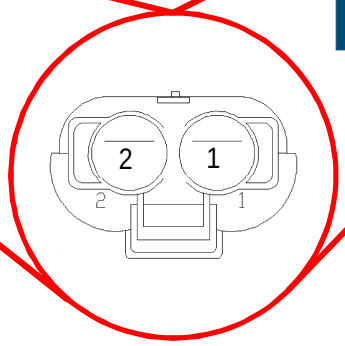
2-way connector in the B pillar

Version vehicle without SCR



Version vehicle with SCR





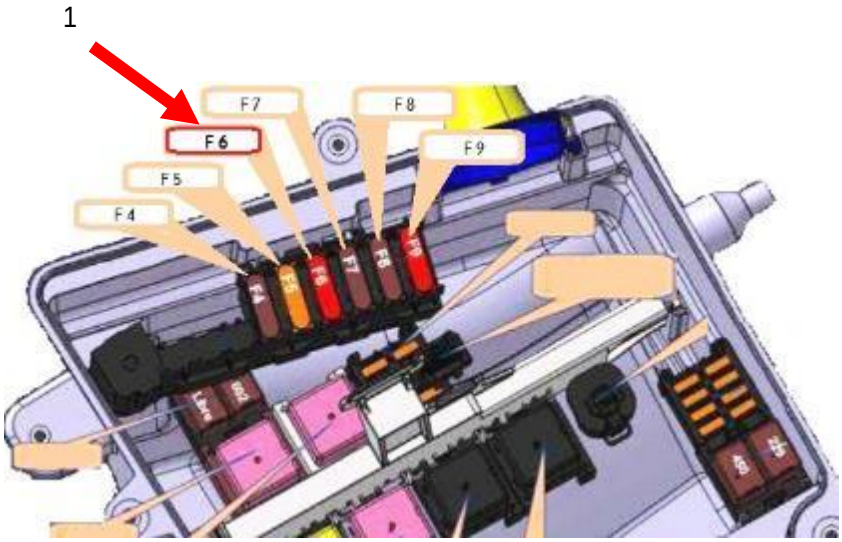
Filler pipe of the urea tank (SCR)

Way number	Function
1 (BP23)	+12V direct battery power supply for maximum consumption of 40A (wire cross section 7mm²). 50A fuse (F6) protection.
2 (MAN32)	Ground (wire cross section 7mm² large enough to adapt to the current of the +12V battery).

The counterpart to this connector is already fitted to the wiring but it is still necessary to obtain the contacts for this connector.

Connector	Wire cross section	Supplier reference	Supplier
0-1544334-3	3 to 6mm²	P790861	TYCO
	7 to 10mm²	P790862	TYCO

Location of the 2-way connector fuse



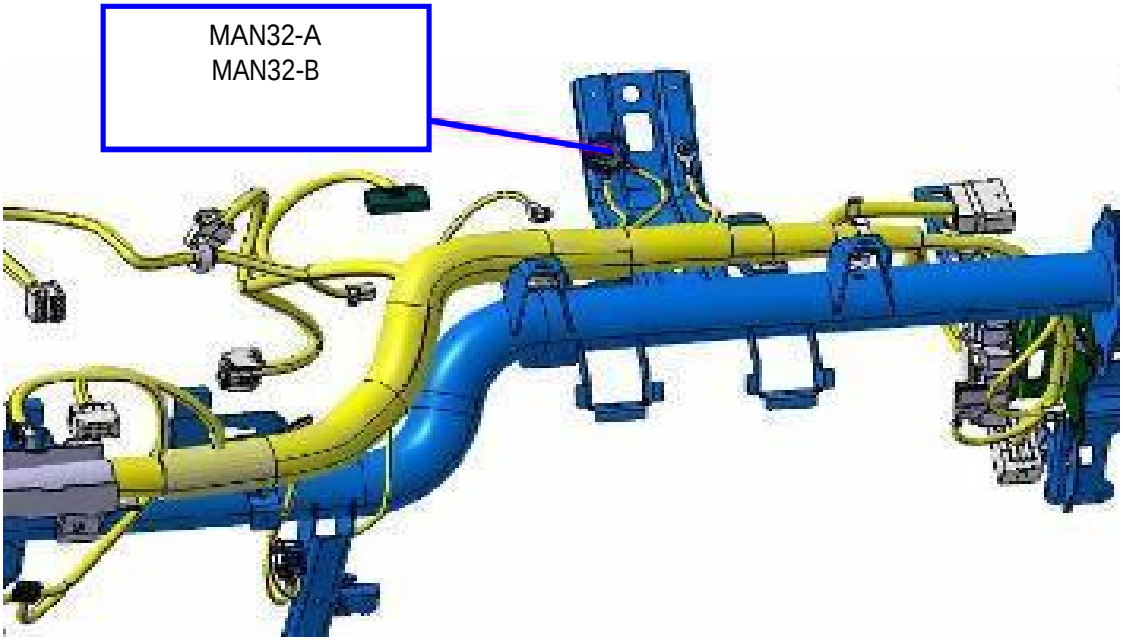
Pos.	Description
1	Fuse F6 (50A)

Note:

For further information see sheet 4.2.

Location of grounds associated with the KPD option

The grounds (MAN32-A and MAN32-B) for the 6-way and 2-way connectors are grouped together on a single stud on the right-hand support of the dashboard cross member.



Access to both connectors on the B pillar

Locally remove the door entry seal on the B pillar side

Lever with a fltt tool to unhook the lower section of the trim

Retrieve the connector from the joint

Check that the clips on the interior trim are in place

If necessary, put the clip back into its housing before reassembly

Reassemble the trim and the door seal

4.11.2 OPTION WRF

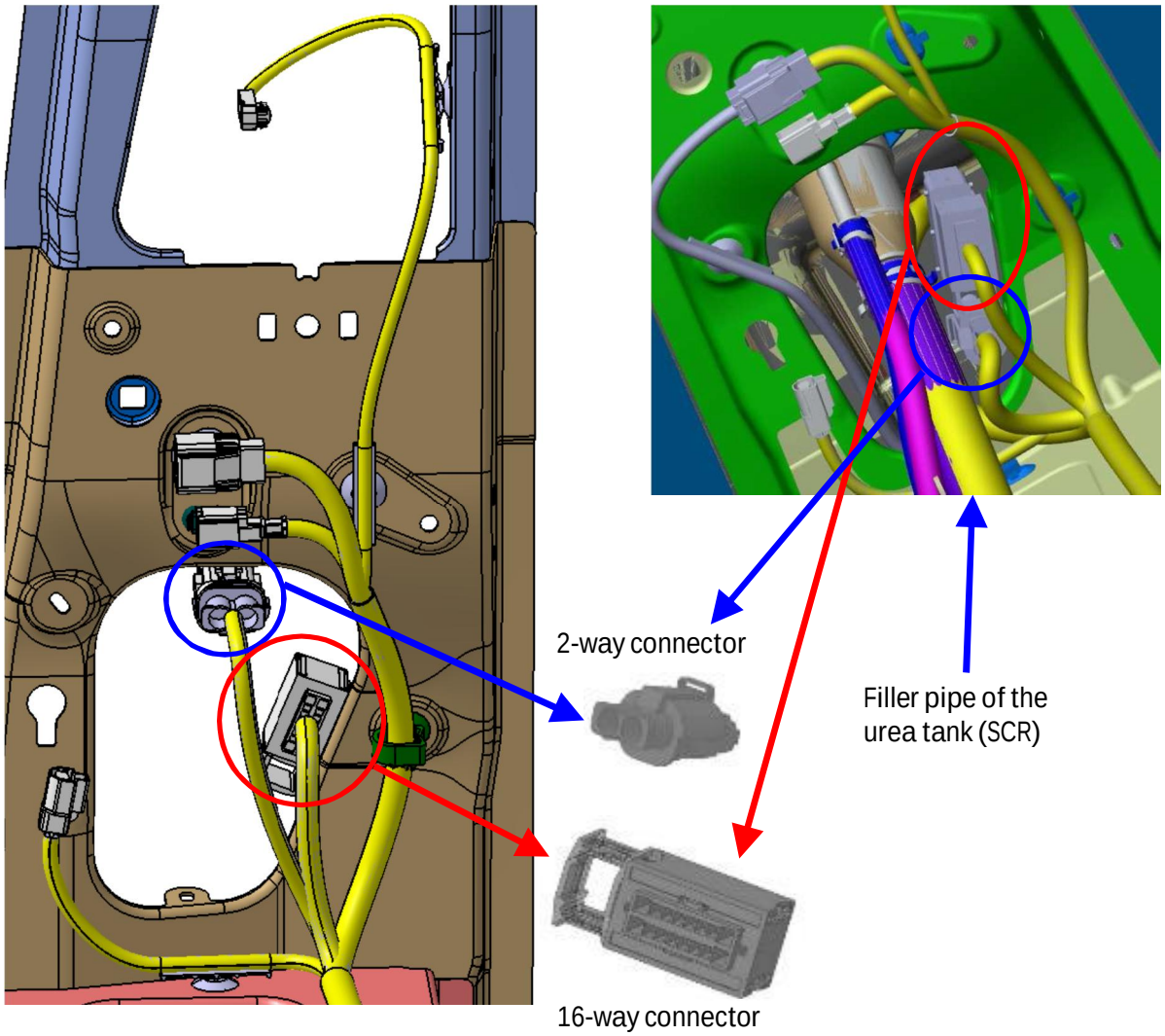
Note:

Before working on the vehicle, refer to chapter 4.5.5.

This option WRF, which is available for the chassis cab and the platform cab, provides 2 stand-by connectors in the right-hand B pillar behind the plastic trim.

- The 16-way connector provides among other things the “Engine running” information.
- The 2-way connector (12V power supply with max. intensity of 40A) may be used for added components and for the connection of other consumers on the panel van. It is identical with the one from chapter 4.11.1.

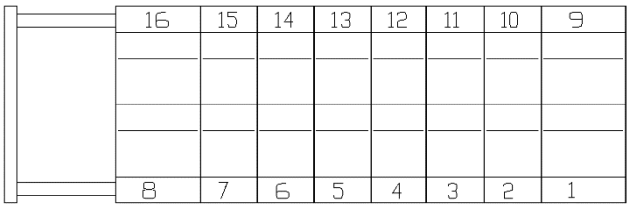
Location in the right B pillar



Assignment of the 16-way connector ways

Note:

The width of the contact for ways 1, 8, 9 and 16 is 2.8mm; the width for the other ways is 1.5mm.



Way number	Function
1 (20BK)	Analogue door closing control signal (wire cross section 2mm²)
2 (87T)	Logical boot lock switch information signal (wire cross section 0.35mm²)
3 (BPT2)	Delayed +12V 2A power supply for courtesy lights, controlled by the passenger compartment ECU (UCH) (wire cross section 0.5mm²)
4 (LPG)	3A left-hand side light power supply (wire cross section 0.5mm²)
5 (34D)	+ right-hand rear speaker (wire cross section 1mm²)
6 (34B)	- left-hand rear speaker (wire cross section 1mm²)
7 (BMT1)	“Engine running” information, 10A fuse shared by ways 7 and 8 (wire cross section 1.5mm²)
8 (SBP4)	“+12V offloaded current distribution power supply”, 10A fuse shared by ways 7 and 8 (wire cross section 1.5mm²)
9 (142K)	Analogue door closing control signal (wire cross section 2mm²)
10 (65A)	5A 3rd brake light power supply (wire cross section 0.5mm²)
11 (13M)	Progressive ground for 2A courtesy lights, controlled by the passenger compartment ECU (UCH) (wire cross section 0.35mm²)
12 (LPD)	3A right-hand side light power supply (wire cross section 0.5mm²)
13 (34C)	- right-hand rear speaker (wire cross section 1mm²)
14 (34A)	+ left-hand rear speaker (wire cross section 1mm²)
15	Reserve
16 (20W)	Analogue door super lock signal (wire cross section 2mm²)

Attention:

The signals for ways 1, 2, 9 and 16 can only be used to control standard locking (panel van locks) and are only suitable for 3 locks. For any other use, a relay has to be used.

For ways 11 and 13, if a relay is used, a panel switch should be added to replace the 13M link. (See courtesy light sheet).

Ways 7 and 8 are protected by a single 10A fuse (F28). The accumulated currents of the 2 lines must not exceed 8A. Above 8A, a relay has to be used. When the engine is off, the energy management system can offload these functions to save enough battery power to start the vehicle.

Counterpart to the 16-way connector

The counterpart to this connector is already fitted to the wiring but it is still necessary to obtain the contacts for this connector.

Connector	Wire cross section	Supplier reference	Supplier
	1.5: 0.35 to 0.75mm²	211CL2S1160	FCI
	1.5: 1 to 2mm²	211CL2S2160	FCI
	2.8: 0.35 to 0.75mm²	211CL3S1160	FCI
	2.8: 1 to 2.5mm²	211CL3S2160	FCI
	2.8: 2.5 to 5mm²	211CL3S3120	FCI

Vehicle open (platform cab, chassis cab)

If an opening element which can be used to exit the vehicle is added, it is recommended to use original Opel/ Vauxhall locks.

At the very least, it is necessary to have a door switch connected to way 87T of the WRF connector (after having removed the earth connection shunt).

Where several opening elements are added, the related switches must be connected in series on way 87T of the WRF connector.

If the driver's door is modified, it is necessary to retain the base vehicle's door contactor information.

4.11.3 OPTION UF3: ACCELERATED IDLE

The accelerated idle function is used to increase the vehicle's idle speed to give more power and/ or electrical energy.

The standard vehicle idle is 800rpm.

As of the first of September 2015 the accelerated idles default value is 1,000rpm. This value may be set to between 1,000 and 2,000rpm in 100rpm increments. This is done using the Clip diagnostics tool in the Opel/ Vauxhall dealer network.

For an idle value between 1,000 and 1,300rpm, the vehicle can be running (except for vehicles with a Easytronic gearbox in which case the vehicle must be stopped). Above this, the vehicle must be stopped.

It is possible to re programme the prohibited UF3 (idle) speed using the "TECH2" diagnostic tool.

Note:

The accelerated idle function is not possible on a vehicle that does not have the UF3 option or the KPD option.

Operation and safety

The driver controls operation of the accelerated idle by pressing a button on the dashboard.

The accelerated idle is activated approximately 4 seconds after engine start-up, even if the button is on when the engine is started.

The function is deactivated if the water temperature warning light or any other warning light highlighting an engine risk comes on.

For vehicles with a mechanical gearbox:

- Activation possible at a vehicle speed of between 0 and 30km/h (idle between 1,000 and 1,300rpm).
- Deactivation at zero vehicle speed (idle greater than 1,300rpm).
- Disengaging the clutch deactivates the accelerated idle.

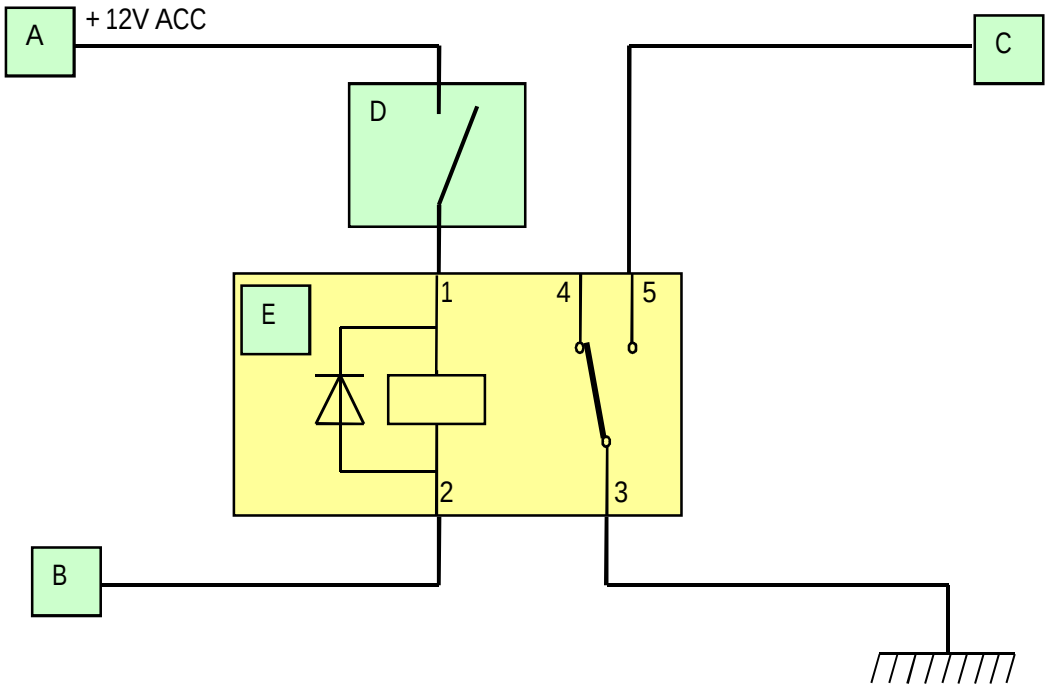
For vehicle with a robotised gearbox (Easytronic):

- Activation in neutral gear.
- Pressing the accelerator pedal deactivates the accelerated idle.
- Deactivation for any speed above zero.

Activation of the accelerated idle

To activate the accelerated idle speed, way 1 of the 6-way connector must be grounded.

Example of connection (accessory control)



Pos.	Description
A	+12V accessory relay power supply
B	Accessory control of the accelerated idle
C	Way 1 of the 6-way connector
D	Switch
E	Relay with a freewheel diode

Note:

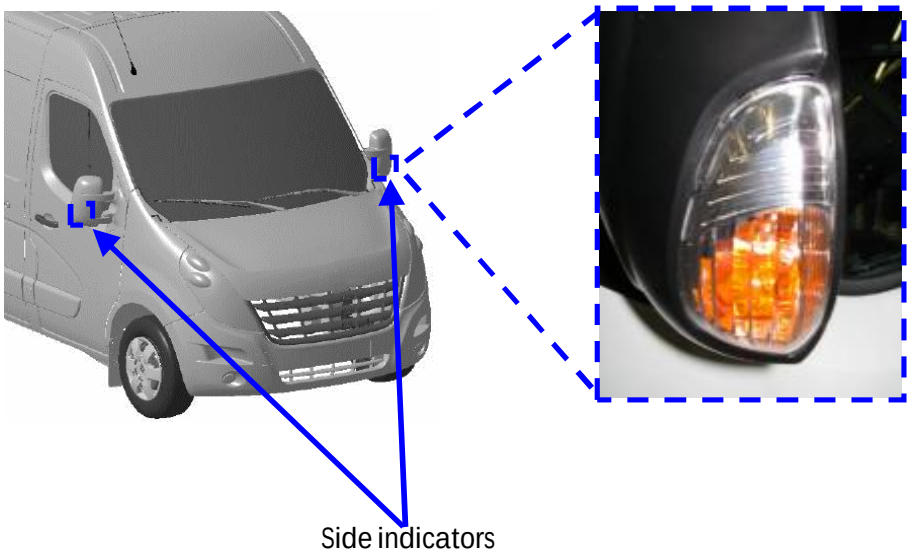
The following 20A relay can be used: (Cartier supplier reference: 29.201.041).

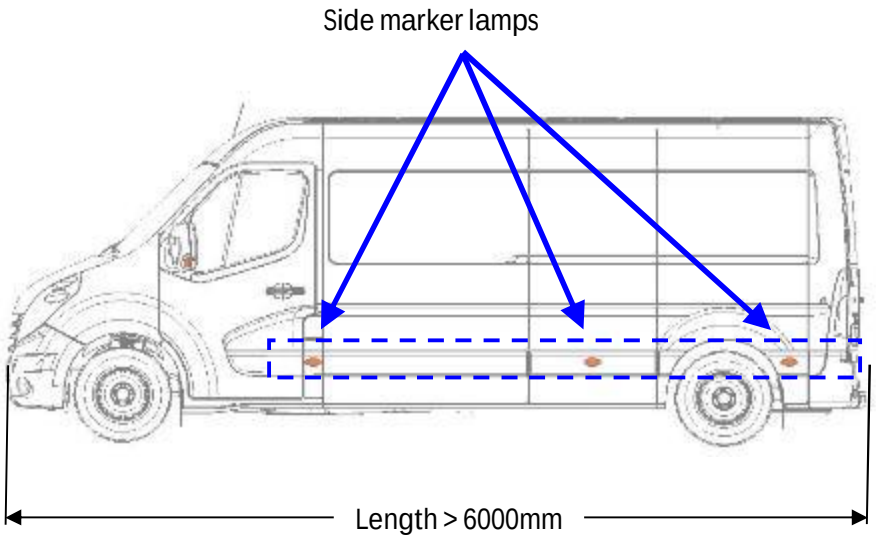
4.11.4 OPTION UZB: SIDE INDICATORS

The side indicators are located at the bottom of the door mirrors.

Vehicles (shorter than 6 metres) are fitted with side indicators with 5W bulbs as standard in the side mirrors.

When the regulations so require, vehicles that are longer than 6 metres must use 16W bulbs in their side indicators. The UZB option meets this requirement.





Attention:

- The indicators are not controlled by a flashing light unit but by the Body Control Unit (UCH).
- No change from 5W to 16W indicators or vice versa may be made without reconfiguring the Body Control Unit. The 5W and 16W side indicators each have a specific configuration in the UCH.
- It is prohibited to fit indicators with more than 16 W power on the door mirrors.

4.11.5 TACHOGRAPH

Depending on the type of vehicle and the country where it is sold, the vehicle may be fitted with a digital tachograph as standard.

It is also possible, on a vehicle not fitted with a tachograph as standard and depending on what the vehicle will be used for, to order the tachograph as an option.

This is particularly the case in Europe for goods vehicles with a gross train weight of more than 3.5t. It is therefore highly recommended to offer the chronotachograph option for vehicles ordered with the trailer coupling option.

If the customer is exempt from the use of a tachograph, it is prudent to get him to mention this on the order stating that he is lawfully exempt from tachograph use.

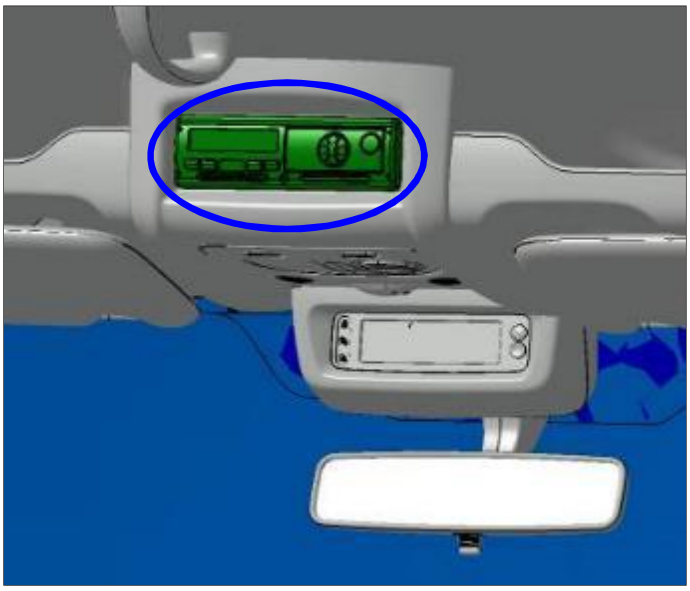
A vehicle fitted with a digital tachograph (standard or optional) is also fitted with a CAN-Bus interface module for reduncancy of vehicle speed information.

Note:

Fitting after manufacture is not possible.

The tachograph has a non-negligible residual consumption (10mA); this can drain the battery when the vehicle is immobilised over a long period. Ex-works, the tachograph fuse is removed and placed in the fuse box flap. If the coach builder receives a vehicle with fuse, this must be removed while work is carried out and replaced before delivery (10A fuse, location F24).

Location of the tachograph in the roof console



4.11.6 PREPARATION FOR TRAILER HITCH

Note:

All information, see chapter 1.7.

4.12 ENGINE RUNNING INFORMATION

Attention:

Before working on the vehicle, refer to chapter 4.5.5.

4.12.1 PROCEDURE

In the event of a lot of electrical power being taken, the electrical assessment may have an adverse effect on the battery charge. The power take-off therefore needs to be conditioned with the engine running information.

This information can be accessed inside the vehicle in four different ways depending on the vehicle's equipment level:

- for all vehicles using a specific electrical wire
- with the "KPD" option (adaptation connector) - see corresponding sheet
- with the "KC5" option (cell connector adaptation) - see corresponding sheet
- with the "KC6" option (conversion unit) - see corresponding sheet

A violet 0.5mm² idle cable is located underneath the dashboard and can be used to recover the engine running information. This cable can be found behind the passenger compartment fuse and relay box in the KPD connector location.

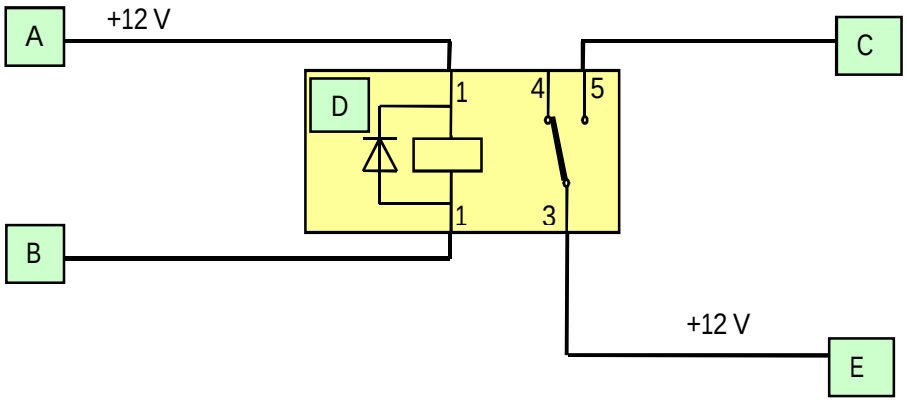
This cable is directly connected to the engine ECU. When the engine is running, it is connected to the ground but otherwise the circuit is open.

Care therefore needs to be taken when connecting this cable:

- Follow the wiring instructions in the General Technical Conversion Guide.
- Never connect a consumer or relay greater than 400mA to this cable.
- Use a relay with a free wheel diode to control the system that has been added.

4.12.2 WIRING DIAGRAM

Connection diagram



Pos.	Description
A	+12V circuit distribution power supply
B	Engine running information available on the idle cable (connection 48D)
C	Additional equipment
D	Relay with a free wheel diode
E	+12V battery power supply

4.13 EXTERIOR LIGHTNING/ DAYTIME RUNNING LIGHT

Attention:

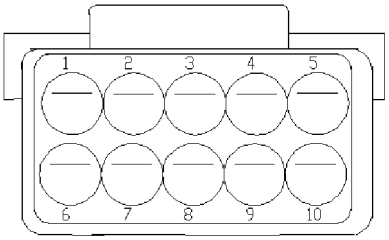
Before working on the vehicle, refer to chapter 4.5.5.

4.13.1 EXTERIOR LIGHTNING

Right or left front lamps

The information is available directly on the front lamp connectors in the engine compartment.

Assignment of connector ways



Way number	Assignment
1	Dipped beam light
2	Main beam light
3	
4	Side light
5	
6	Indicator
7	Fixed bending light
8	
9	Ground for side light, indicator and fixed bending light
10	Ground for main beam and dipped beam lights

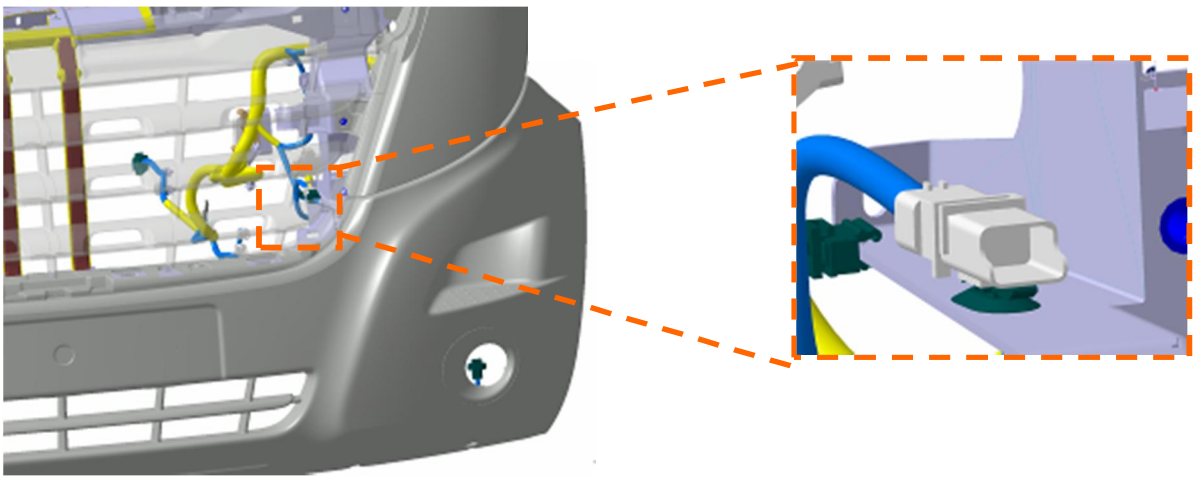
Attention:

Each of these connections must only be used to control one single automotive relay; no power available.

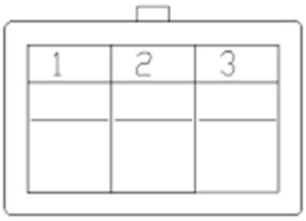
Fog lamps

The information is available on the connection located under the bumper.

Connector position



Assignment



Way number	Assignment
1	Right fog lamp
2	Left fog lamp
3	Ground

Attention:

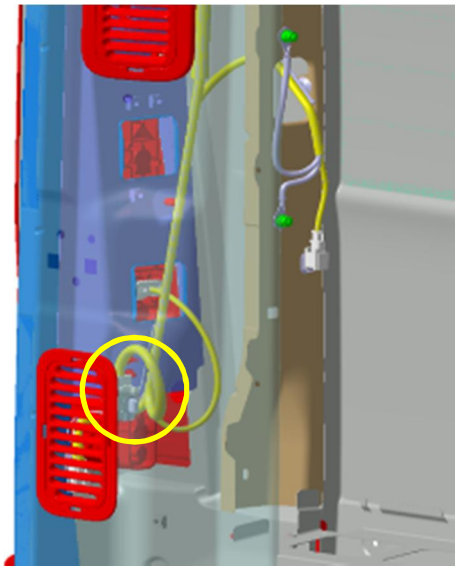
Each of these connections must only be used to control one single automotive relay; no power available.

Right or left tail lights

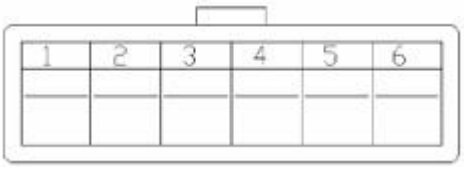
Panel van

The information is available directly on the tail light connectors in the loading area.

Connector position



Assignment



Way number	Assignment
1	Turn signal light
2	Side light
3	Brake lamp
4	Ground
5	Fog lamp
6	Reversing lamp

Note:

A consumer with the same power as the trailer bulbs can be connected to each of the connections.

Chassis cab, chassis double cab and platform cab

The information is available directly on the tail light connectors on the extreme rear cross member.

Connector position

Assignment

Way number	Assignment
1	Ground
2	Side light
3	Reversing lamp
4	Turn signal light
5	Brake lamp
6	Fog lamp

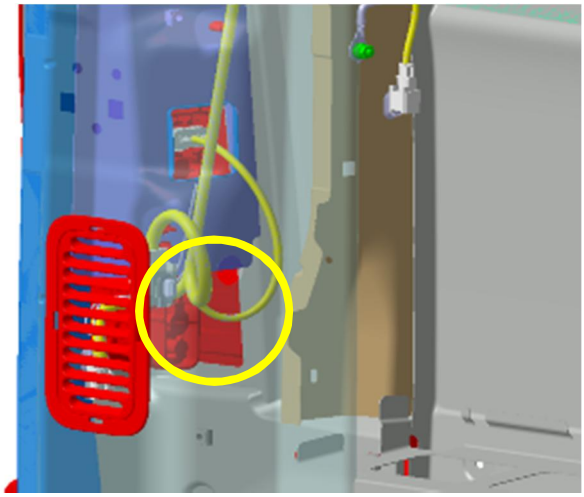
Note:

A consumer with the same power as the trailer bulbs can be connected to each of the connections.

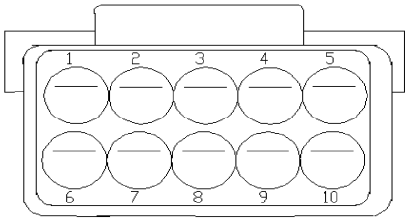
Version with trailer coupling connector

All chassis cabs and panel vans with the trailer coupling option (“VR2” option) have this connector.

Connector position



Assignment

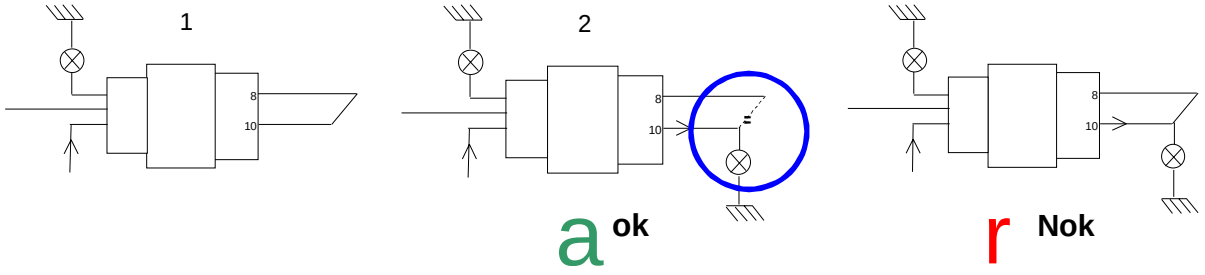


Way number	Assignment
1	Trailer presence information
2	Reverse lamp (21W)
3	Left side light (5W)
4	Left turn signal light (21W)
5	Brake lamp (42W)
6	Right turn signal light (21W)
7	Right side light (5W)
8	Vehicle fog lamp feedback
9	Ground
10	Fog lamp (21W)

Way 1: Detection of a turn signal fault (audible alarm if bulb out). Connect to ground for addition of any consumer on ways 4 and 6.

Way 8: Vehicle fog lamp power supply if vehicle pre-fitted with trailer coupling (“VR2” option). Remove pin 8 on the coupling side if consumer added to way 10.

Way 8 connection diagram



Pos.	Description
1	Original connection diagram with “VR2” option
2	Connection diagram with “VR2” option and addition of a consumer on way 10

Currents available on the trailer coupling connector:

- Vehicle with coupling: Each of these connections must only be used to control one single automotive relay; no power available.
- Vehicle without coupling: A consumer with the same power as the trailer bulbs can be connected to each of the connections.

4.13.2 DAYTIME RUNNING LIGHT, OPTION T3W

Daytime running lights increase visibility of the vehicle during daylight.

The running lights option automatically switches on the dipped beam lights when the vehicle starts up, depending on legislation in the country where the vehicle is sold.

When the ignition is on, the headlights come on and instrument illumination is subdued.

The daytime running lights switch off when the ignition is switched off.

The running lights function can be activated or deactivated using the Opel/ Vauxhall diagnostics tool (TECH2) in the Opel/ Vauxhall dealer network.

4.14 INTERIOR LIGHTNING

Attention:

Before working on the vehicle, refer to sheet 4.5.

Energy recovery conditions

The progressive ground on connectors is a delayed analogue signal. Under no circumstances may this signal be relayed.

Excess consumption of no more than 2A (24W) may be taken from the rear zone and double cab lighting.

No excess consumption is feasible for front and right-hand side courtesy lights (sliding side door). Follow the procedure for consumption greater than 2A.

If consumption is greater than 2A (24W) for the rear and double cab lighting and on the front or right-hand side lighting:

- the delayed power supply should control a relay which will control another power supply.
- a specific ground should be used (the progressive ground will no longer be usable).

If the open door information is required, a panel switch should be added.

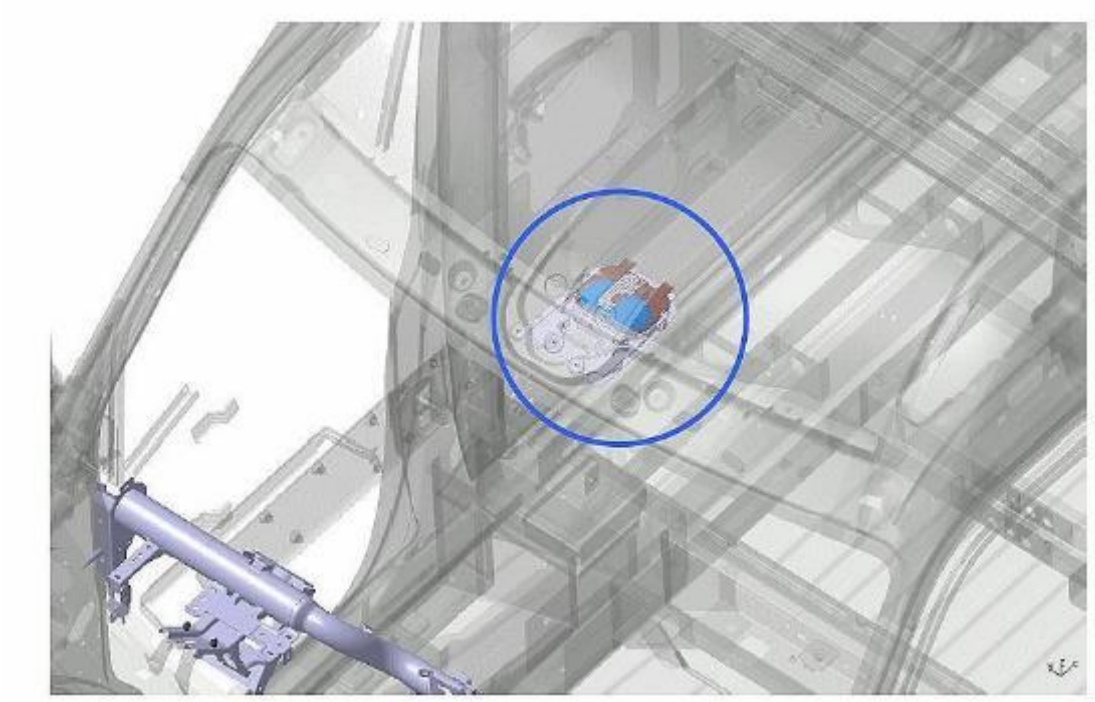
Note:

For wires with a cross section of 0.5mm², it is possible to bypass these wires by using a crimp adaptor.

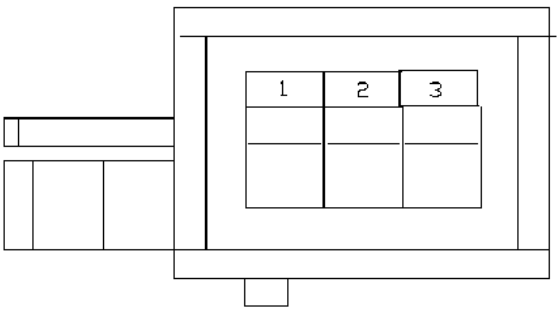
However, for wires with a cross section of 0.35mm², use of the crimp adaptor is very delicate and it is strongly recommended to recover this information on the roof connector.

Location of lightning and connector way assignments

Cockpit lightning



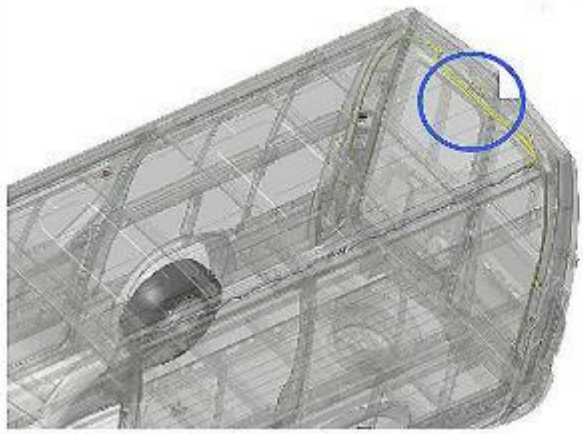
Assignment



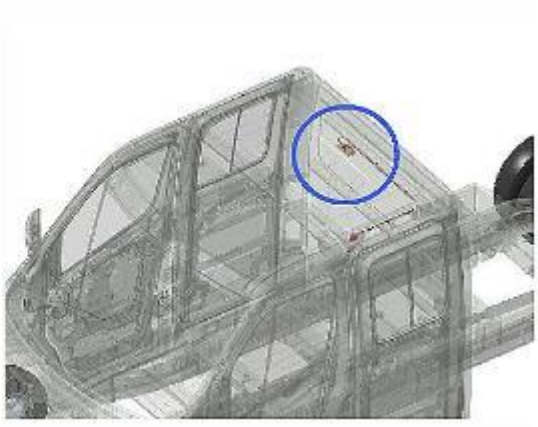
Way number	Assignment
1 (BPT2)	Delayed +12 V power supply (wire cross section 0.5mm²)
2 (13L)	Progressive active ground when door opens and digressive when door closes or +APC (wire cross section 0.5mm²)
3 (NAM)	Ground (wire cross section 0.5mm²)

Rear panel van lightning and double cab lightning

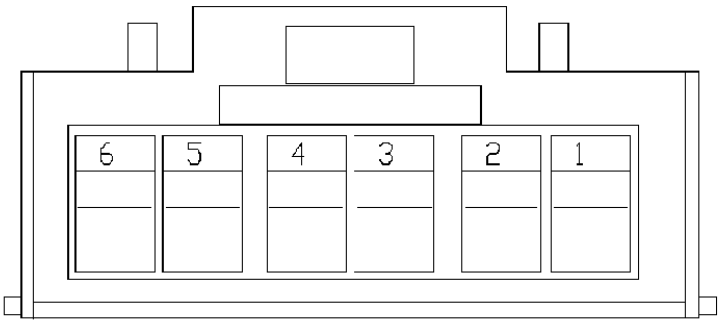
Van



Chassis cab



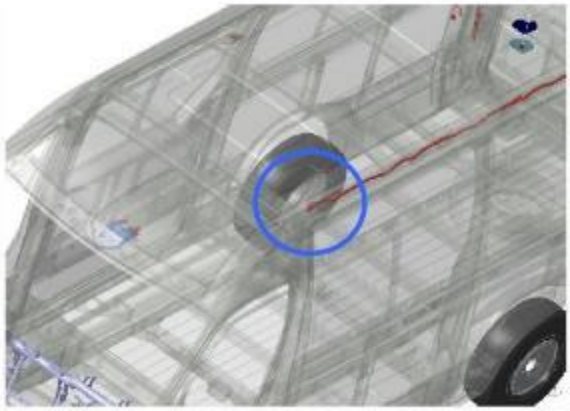
Assignment



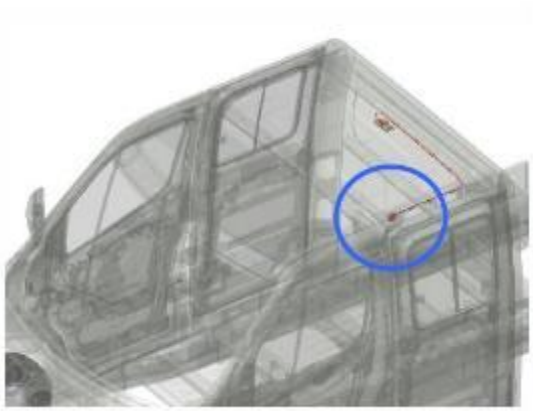
Way number	Assignment
2 (13M)	Progressive active ground when door opens and digressive when door closes or +APC (wire cross section 0.35mm²)
3 (SP8)	Permanent ground (wire cross section 0.35mm²)
4 (BPT2)	Delayed +12V power supply (wire cross section 0.35mm²)

Roof connector

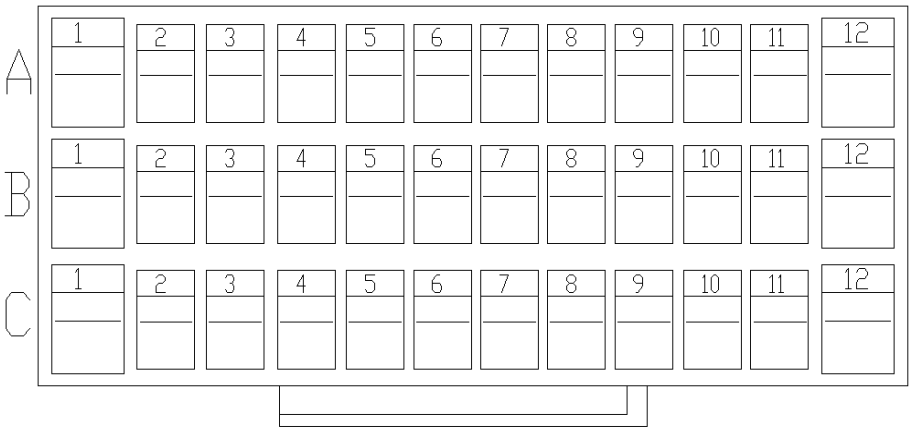
Van



Chassis cab

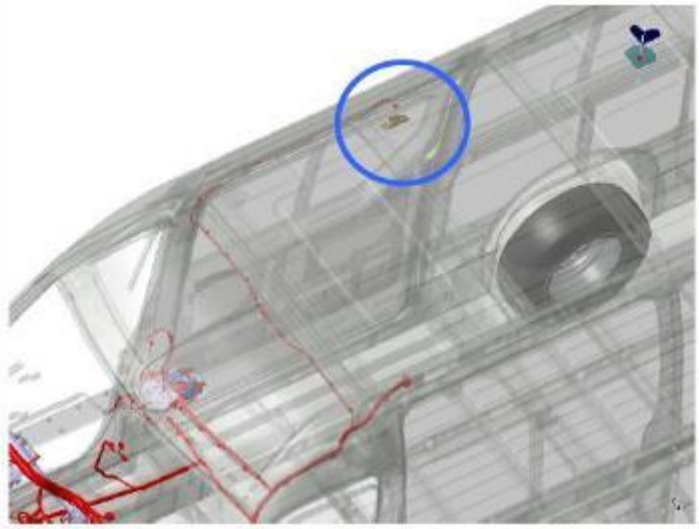


Assignment

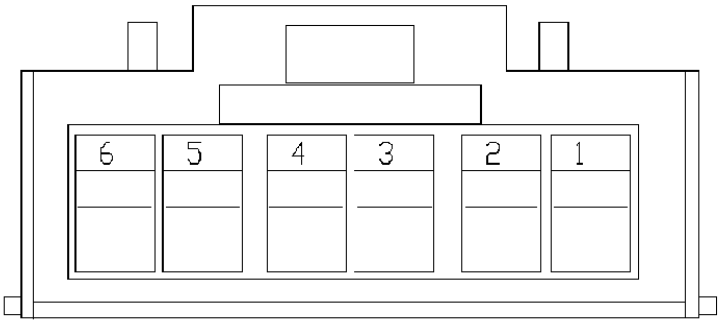


Way number	Assignment
C5 (13M)	Progressive active ground when door opens and digressive when door closes or +APC (wire cross section 0.35mm²)
B7 (BPT2)	Delayed +12V power supply (wire cross section 0.35mm²)

Right hand side door lightning on panel van



Assignment



Way number	Assignment
2 (13M)	Progressive active ground when door opens and digressive when door closes or +APC (wire cross section 0.35mm²)
3 (NAM)	Permanent ground (wire cross section 0.35mm²)
4 (BPT2)	Delayed +12V power supply (wire cross section 0.35mm²)

Attention:

The wires cannot be retrieved in the connector as there is no double exit.

4.15 WIRING PRE FIT FOR TRABUS

General information:

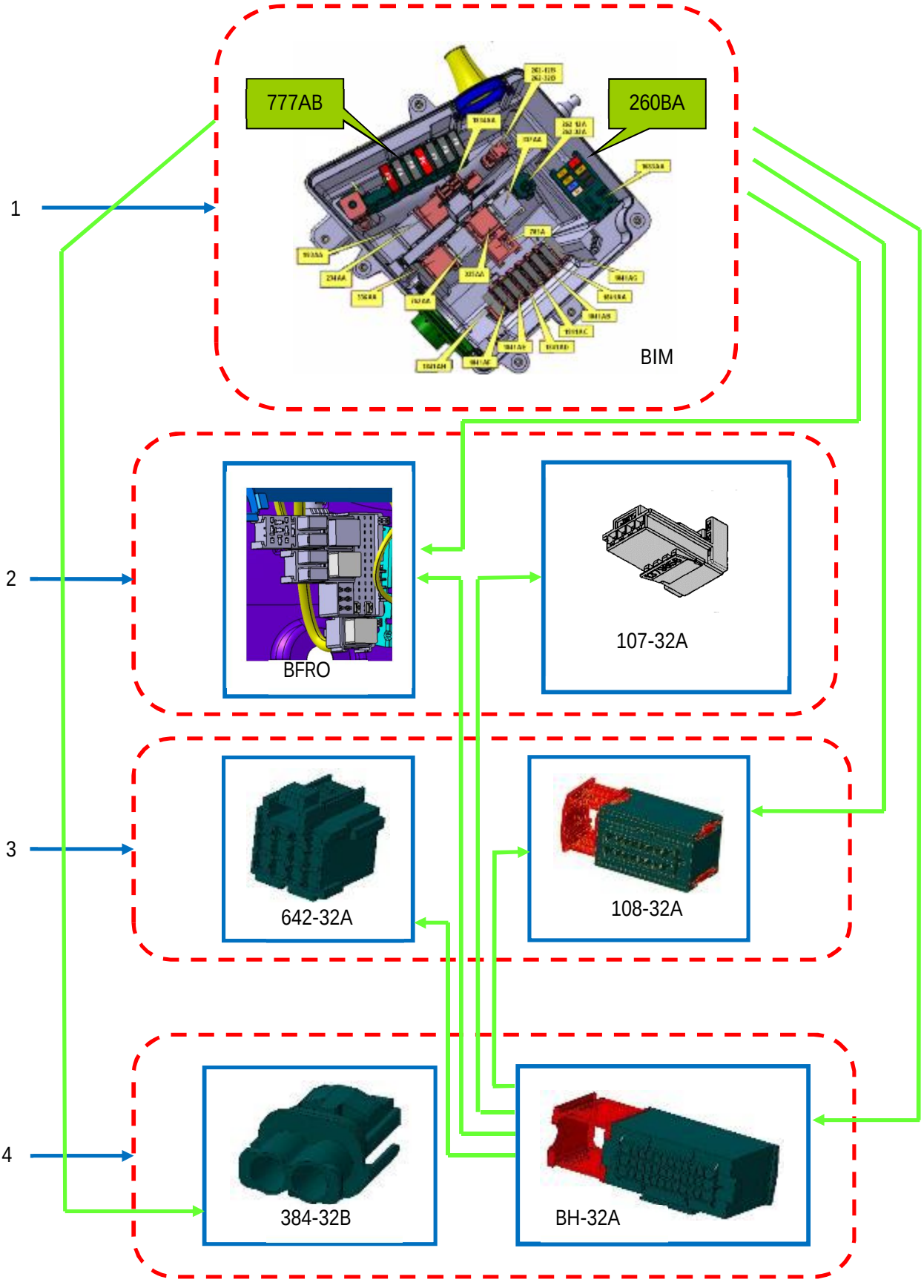
The TRABUS option is used to provide:

1. Engine Interconnection Box (BIM) in engine compartment area
   - 2 power outputs with specific fuses (777AB)
   - 1 fuse box (260BA)
2. Under dashboard cross member right hand area
   - 1 Optional Relay and fuse box (BFRO)
   - 1 standby connector (107-32A)
3. Dashboard central area
   - 2 standby connectors (108-32A et 642-32A)
4. B pillar right hand area
   - 2 standby connectors (BH-32A und 384-32B)

The connectors are connected with the wires available for the transformation up the right-hand B pillar.

The connection codes give the relationship between the wires at the connectors.

Diagram of the various trabus connections



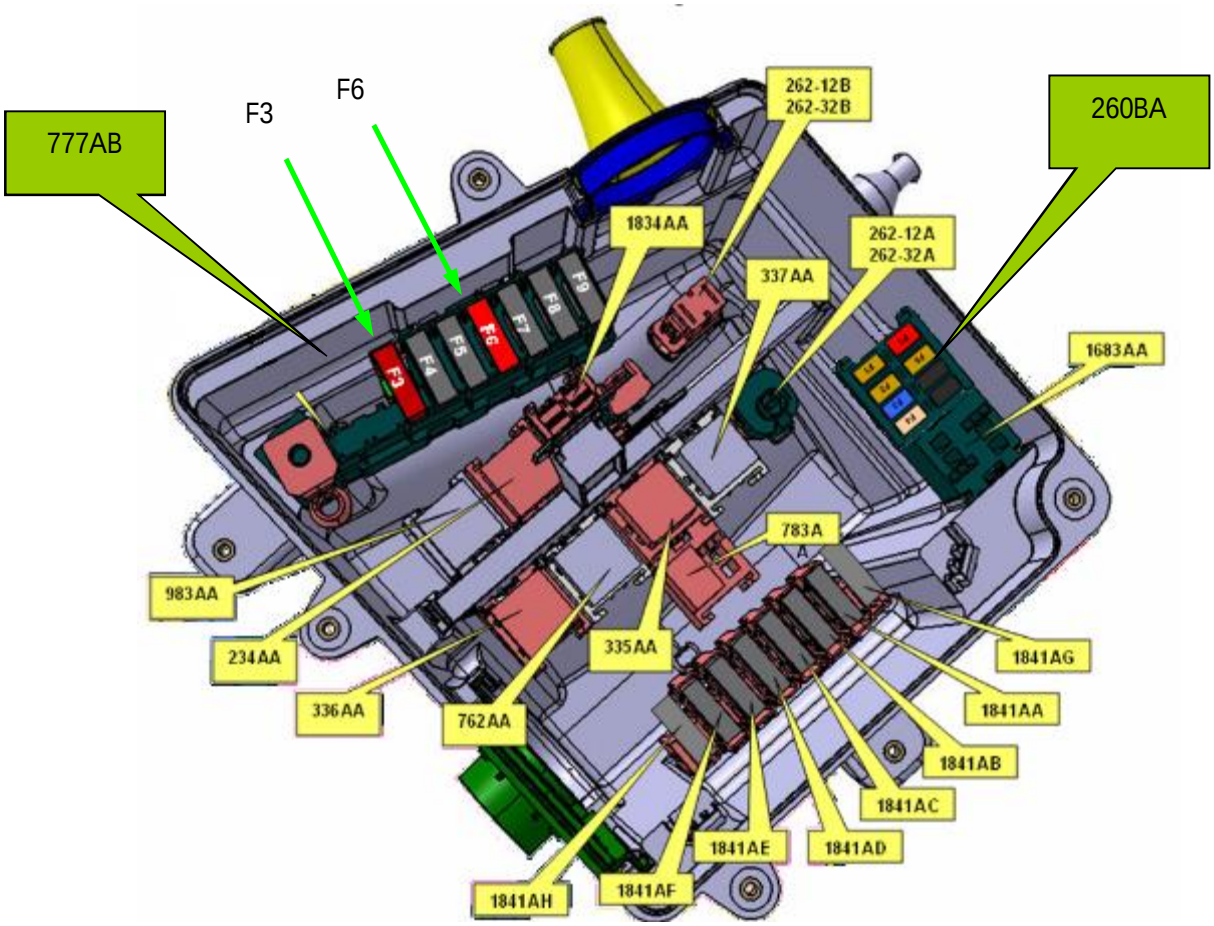
4.15.1 ENGINE COMPARTMENT AREA CONNECTORS

Two fuses dedicated to the TRABUS option (F3 and F6) are located in the power strip 777AB.

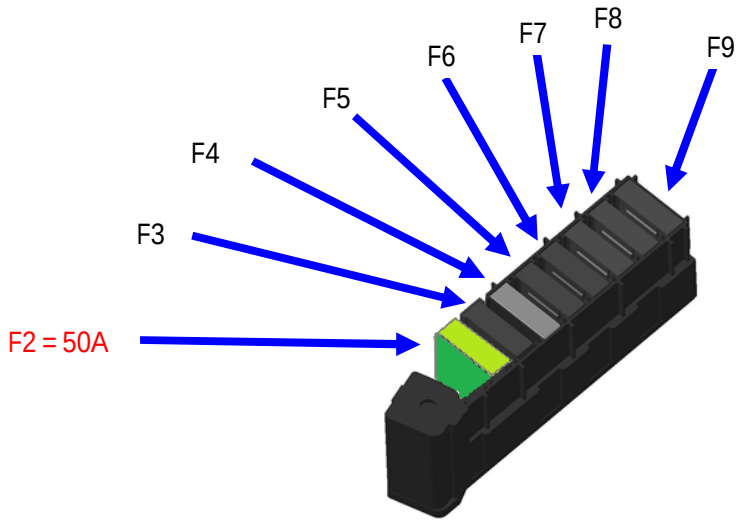
No work is allowed to be carried out on any other fuses!

Six fuses dedicated to the TRABUS option are located in the power strip 260BA.

These fuse boxes are in the engine compartment connections unit (BIM) located in the engine compartment.



Power supply fuse board: SCR



POWER SUPPLY PLATE (777AB)

Fuse	Amperage [A]	Connection	Function
F1			
F2	50	**BP44**	SCR Urea injection **à** as Euro 6 engines
F3	50	BP59	TRABUS X62
F4	40	BP8	UCE ABS
F5	50	BP9	Additional heating relay 1
F6	50	BP23	Purpose built body conversion / TRABUS X62
F7	70	BP91	Additional heating relay
F8	70	BP11	Rear light, passenger compartment relay/ fuse box, Diesel heater resistor
F9	70	BP12	Passenger compartment relay/ fuse box

16-Seater BUS FUSE PLATE (260BA)

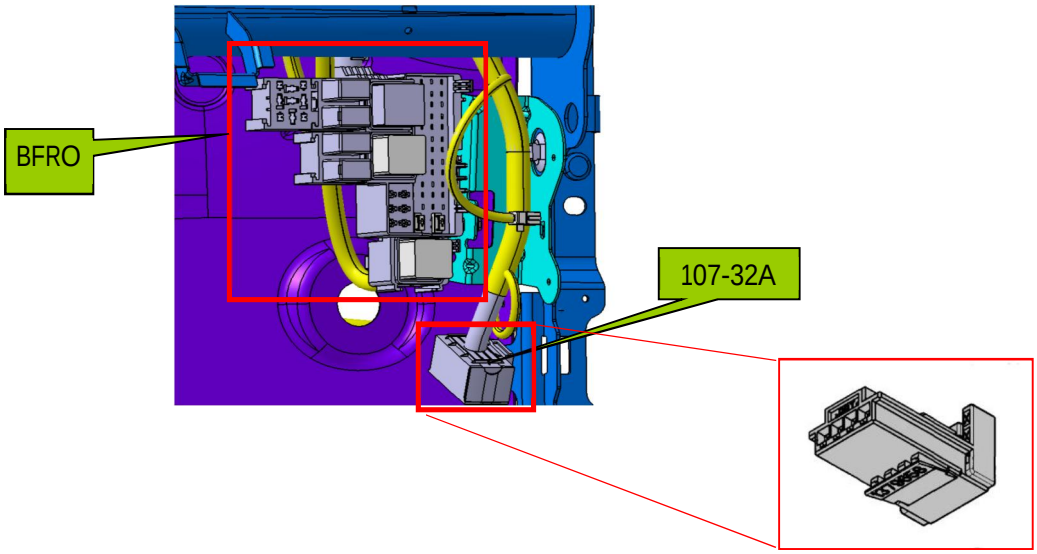
Fuse	Amperage [A]	Connection	Function
F1	5	99K	TRABUS – supply
F2	5	99S	TRABUS – supply
F3	15	BPS2	TRABUS – supply of relay
F4	25	BPS3	TRABUS – supply of relay
F5	10	AP1W	TRABUS – +APC
F6	5	BT1	TRABUS – + timed battery feed (30 minutes)
F7			
F8			

* Value may vary depending on vehicle usage.

4.15.2 RIGHT SIDE DASHBOARD AREA CONNECTORS

The optional relay/fuse box (BFRO) is located on the right-hand side (left- and right-hand drive). It is attached to the right-hand flange of the dashboard beam.

Unit 107-32A is used to connect the dashboard wiring to child transport interconnection wiring. This connector is on standby and coiled in the right-side dashboard wiring.



CONNECTOR 107-32A

PIN	Connection	Æ Cable [mm²]	Function
1	13BP	0.5	Fuse/Interior Lights/Control + timed lighting feed
2	13BQ	0.5	Fuse/Interior Lights/Control - timed lighting feed
3	MAN	0.5	Right-side dashboard cross member electrical earth
4			

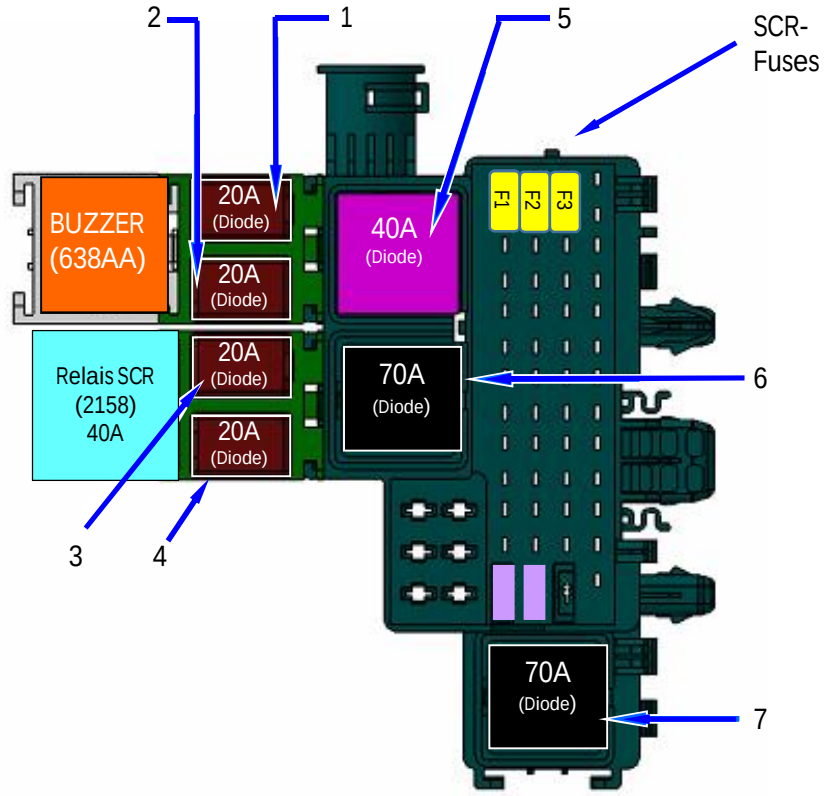
The counterpart to this connector and the following contacts must be obtained:

Connector reference	Æ Cable [mm²]	Contact supplier reference	Supplier
0-1379674-1	0.35 to 0.5	0-1674742-1	TYCO

Note:

The maximum permanent current of these contacts must not exceed 3A.

BFRO = Optional Relay/ Fuse Box



Part	Function	Coil command	CC input	CC output	Connection
1	20 A Relay	Relay 1760 (6)		BH-32A C6	1790
2	20 A Relay	Relay 1760 (6)		BH-32A B8	142
3	20 A Relay	+ load shed accessory feed		642-32A 10	1399
4	ESP Bus	ABS/ ESP, UCE	+ current distribution	Brake lamp	1524
5	40 A Relay	USM		108-32A 1	652
6	BCM + battery feed	+ timed battery feed (30 minutes)	260BA F4 (25A)	Relay 1790 (1) and 142 (2)	1760
7	+ load shed accessory feed	+ load shed accessory feed	260BA F4 (15A)	260BA: F1, F2 and F5	1155

Attention:

Relay 3 is not available if the vehicle is fitted with the Opel/ Vauxhall heated seat option.

Relay 6 and 7 (70A) are respectively fused upstream by fuses F4 of 25A and F3 of 15A of the 260BA.

SCR - Fuses: F1 – F2 – F3

Fuse	Amperage [A]	Connection	Function
F1	15	BP2V	+ BAT PRTJ/ NOX-SENSOR
F2	25	BP2U	+ BAT PRJT/ UREA 2
F3	20	BP2T	+ BAT PRJT/ UREA 1

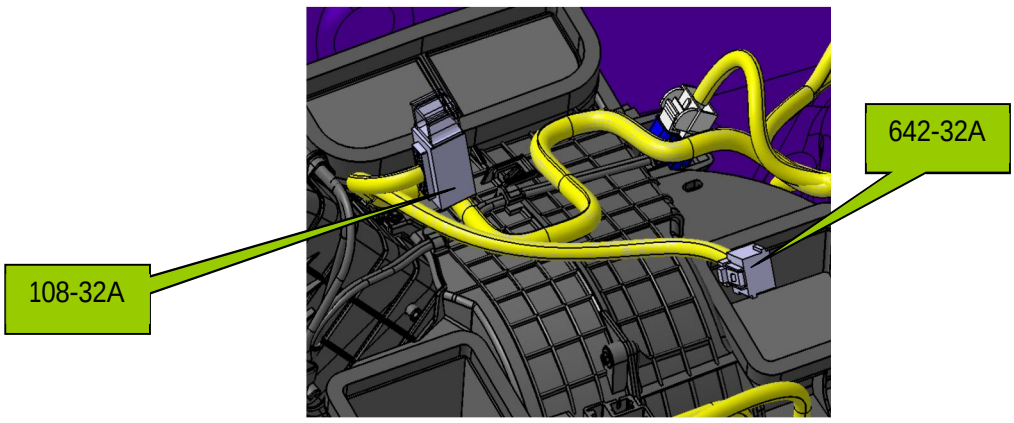
Additional Relay für SCR

Relay	Amperage [A]	Function
2158	40	SCR/ UREA

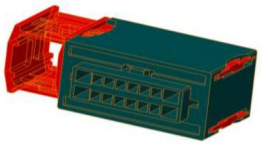
4.15.3 CENTRAL DASHBOARD AREA

The connector 108-32A (16-Way) and 642-32A (12-Way) on the dashboard are provided for additional wiring for coachbuilder.

These two connectors are on standby and coiled in the wiring in the centre of the dashboard above HVAC (Heating Ventilation Air Cooling)



Pins of the Connector 108-32A (16-PIN)



Connector 108-32A (Allocation of channels)

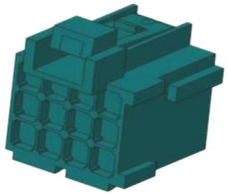
PIN	Connection	Æ Cable [mm²]	Function
1	38AH	2	TRABUS – Relayed wired from the BFRO (652)
2	38MT	0.5	TRABUS – Connection cable
3	38AJ	1	TRABUS – Connection cable
4	38AK	1	TRABUS – Connection cable
5	BT2	0.5	TRABUS + timed battery feed (30 minutes)
6	LPDB	0.5	+ Right-hand side light with relay
7	MAN	0.5	TRABUS - Right-hand dashboard cross member electrical earth
8	99K	1	TRABUS – (+) Load shed accessory
9	AP1D	2	TRABUS – (+) Protected primary ignition feed
10	99KA	1	TRABUS – Connection cable
11	99SA	1	TRABUS – Connection cable
12	133P	0.5	TRABUS – Connection cable
13	62A	0.5	TRABUS – Connection cable
14	62B	0.5	TRABUS – Connection cable
15	62C	0.5	TRABUS – Connection cable
16	99S	1	TRABUS – (+) Load shed accessory

The counterpart to this connector and the following contacts must be obtained:

Black 16-way spline holder connector, supplier TYCO-0-018563-1

PIN	Æ Cable [mm²]	Supplier reference	Supplier
Except PIN 1-8-9-16	0.35 to 0.75	211CL2S1160	FCI
	1 to 2	211CL2S2160	FCI
Only PIN 1-8-9-16	0.35 to 0.75	211CL3S1160	FCI
	1 to 2.5	211CL3S2160	FCI
	2.5 to 5	211CL3S3120	FCI

Connector 642-32A (12-PIN)



Connector 642-32A (Allocation of channels)

PIN	Connection	Æ Cable [mm²]	Function
1	LPDB	0.5	+ Right-hand side light with relay
2	103P	0.5	TRABUS – Connection cable
3			
4	MAN	0.5	TRABUS – Right-hand dashboard cross member electrical earth
5			
6	103R	0.5	TRABUS – Connection cable
7			
8	103N	0.5	TRABUS – Connection cable
9	103Q	0.5	TRABUS – Connection cable
10	SP8	0.5	Engine running signal (shared fuse, 10A available; 5A if heated seat)
11	BP80	0.5	TRABUS – Output available (shared fuse, 2.5A available)
12	MAN	0.5	TRABUS – Right-hand dashboard cross member electrical earth

The counterpart to this connector and the following contacts must be obtained:

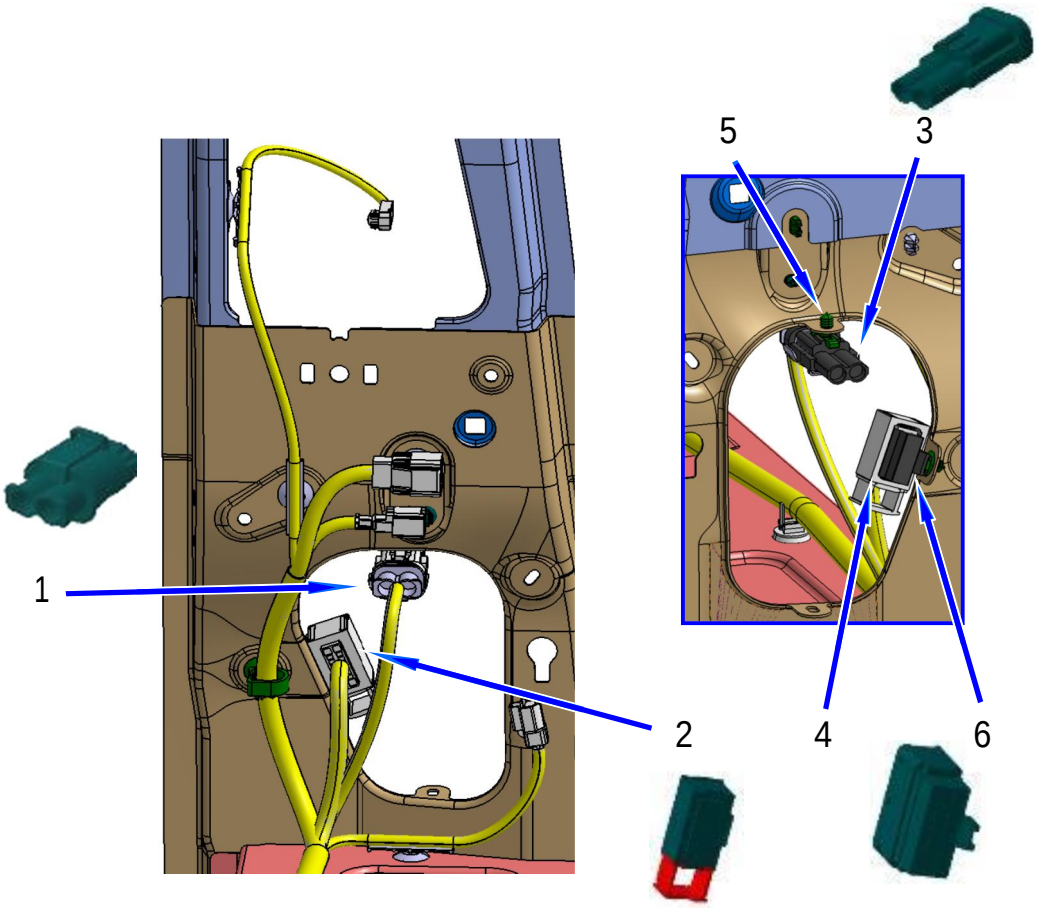
Green 12-way spline holder connector, supplier TYCO-1-967627-1

PIN	Æ Cable [mm²]	Supplier reference	Supplier
PIN 1 to 12	0.35 to 1.0	0-0185021-1	FCI
	1 to 3	0-0185022-1	FCI

4.15.4 CONNECTOR IN B-PILLAR

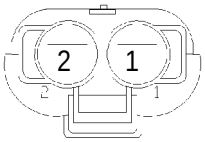
The connectors are located in the right-hand B pillar behind the plastic trim.

This connection operation requires the removal of the B pillar trim, also see chapter 4.11.



Part	Function	Connection	No. of Pins
1	Power connector	384-32B	2
2	Bus pre-fit connector	BH-32A	36
3	Power connector	384-32B	2
4	Bus pre-fit connector	BH-32A	36
5	Wiring-mounted		
6	Wiring-mounted		

Connector 384-32B (Allocation of channels)



PIN	Connection	Æ Cable [mm²]	Function
1	BP23	7	TRABUS – (+)12-V-Battery with fuse
2	BP59	7	TRABUS – (+)12-V-Battery with fuse

Note:

These lines are protected by 50A F6 (BP23) and F3 (BP59) fuses in the engine compartment interconnections unit (777AB).

Attention:

The maximum permanent current of these power supplies must not exceed 40A, in addition:

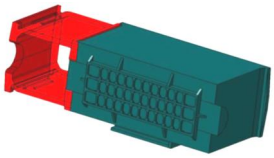
- BP23 is shared with fuse F3 (15A) of 260BA.
- BP59 is shared with fuse F4 (25A) of 260BA.

This power supply is connected directly to the battery. The vehicle is therefore not protected by the energy management system. Risk of battery draining.

The counterpart to this connector is already fitted to the wiring but it is still necessary to obtain its contacts.

PIN	Æ Cable [mm²]	Supplier reference	Supplier
1 and 2	3 to 6	P790861	TYCO
	7 to 10	P790862	TYCO

Pins of the Connector BH-32A



Connector BH-32A (Allocation of channels)

PIN	Connection	Æ Cable [mm²]	Function
A1	BT1	2.5	TRABUS – + timed battery feed (30 minutes)
A2	103P	0.5	TRABUS – Connection cable
A3	103Q	0.5	TRABUS – Connection cable
A4	LPDB	0.5	+ Right-hand side light with relay
A5	38MT	0.5	TRABUS – Connection cable
A6	5GK	0.5	TRABUS – Relay regulated ground
A7	62A	0.5	TRABUS – Connection cable
A8	151R	0.5	TRABUS – buzzer feed, not connected
A9	BT2	1	TRABUS – + timed battery feed (30 minutes)
A10	35N	0.5	TRABUS – output not available
A11	BPT2	0.5	TRABUS - timed battery feed, for relay connection (30 minutes)
A12	38AJ	1	TRABUS – Connection cable
B1	38AH	2	TRABUS – Output available, regulated via AC
B2	103R	0.5	TRABUS – Connection cable
B3	13BP	0.5	TRABUS – Connection cable
B4	47F	0.5	TRABUS - Vehicle speed signal
B5	SP8	0.5	Engine running signal (shared fuse, 10A available; 5A if heated seat)
B6	62B	0.5	TRABUS – Connection cable
B7	62C	0.5	TRABUS – Connection cable
B8	151S	0.5	TRABUS – buzzer ground, not connected
B9	34A	1	Left-side rear speaker + feed signal
B10	34C	1	Right-side rear speaker + feed signal
B11			
B12	38AK	1	TRABUS – Connection cable
C1	AP1W	1	Output +APC
C2	103N	1	TRABUS – Connection cable
C3	13BQ	0.5	TRABUS – Connection cable
C4	27A	0.5	Handbrake light control feed Attention: information shared with instrumental panel

Connector BH-32A (Allocation of channels)

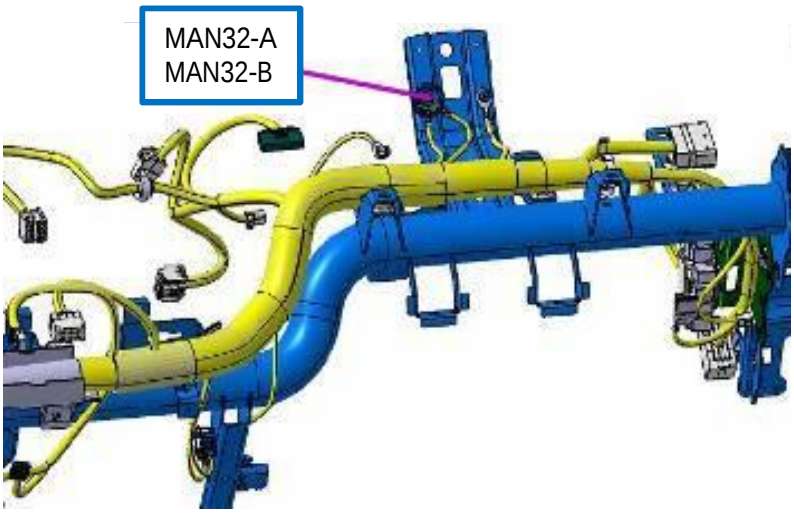
PIN	Connection	Æ Cable [mm²]	Function
C5	BP80	0.5	+Battery protected – Output available (shared fuse, 2.5A available)
C6	5GL	0.5	TRABUS – Relay regulated ground
C7	133P	0.5	TRABUS – Connection cable
C8	13M	0.35	Control – Interior lightning to be relayed
C9	34B	1	– left-side rear speaker feed signal
C10	34D	1	Signal + Right rear speaker
C11	99KA	1	TRABUS – Connection cable
C12	99SA	1	TRABUS – Connection cable

The counterpart to this connector is already fitted to the wiring but it is still necessary to obtain its contacts.

PIN	Æ Cable [mm²]	Supplier reference	Supplier
Except PIN 1A – 12A – B1 – B12 – C1 – C12	0.35 to 0.75	211CL2S1160	FCI
	1 to 2	211CL2S2160	FCI
Only PIN 1A – 12A – B1 – B12 – C1 – C12	0.35 to 0.75	211CL3S1160	FCI
	1 to 2.5	211CL3S2160	FCI
	2.5 to 5	211CL3S3120	FCI

4.15.5 LOCATION OF EARTHS ASSOCIATED WITH THE “TRABUS” OPTION

The earths (MAN32-A and MAN32-B) for the 6-way and 2-way connectors are grouped together on a single stud on the right-hand support of the dashboard cross member.



4.16 CRUISE CONTROL/ SPEED LIMITER

Types

There are various types of restriction:

- Cruise control and speed limiter
- Client speed restriction
- Regulatory speed restriction

Cruise control

The cruise control - speed limiter is a driving aid and is available as an option depending on the equipment level.

Cruise control is a function that maintains the vehicle at a constant speed selected by the driver.

The speed limiter is a function that helps the driver to stay below a certain speed previously selected by the driver.

The speed setting is left up to the driver whose responsibility it is to stay within speed limits and to remain vigilant.

Before use and for any further information on how this function works, please refer to the vehicle's hand book.

Client speed restriction

This option is more specifically aimed at customers, in particular fleets, who want the vehicle's speed to be limited without the driver being able to disable the restriction.

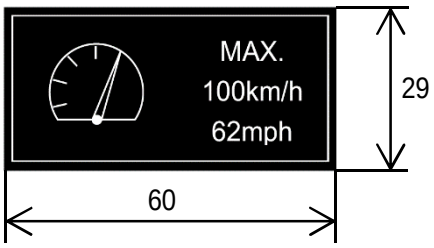
The restriction value is chosen by the customer and is programmed into the engine ECU in the factory. The restriction value can be modified or removed using the "TECH2" diagnostic tool.

The restriction values are as follows: 90, 100, 110, 120 or 130km/h.

The user must be notified of the status and value of the vehicle's speed restriction. This information must be permanently displayed in the cockpit where it can be seen by the driver. A regulatory sticker corresponding to the selected restriction value must therefore be obtained from the Opel/ Vauxhall dealer network.

Option Code	km/h	mph
KYJ	90	56
KYK	100	62
KYL	110	68
KYM	130	80

Example for Sticker



Sticker Position

Note:

A sticker can be affixed to the rear of the vehicle to inform other road users.

Regulatory speed Limiter

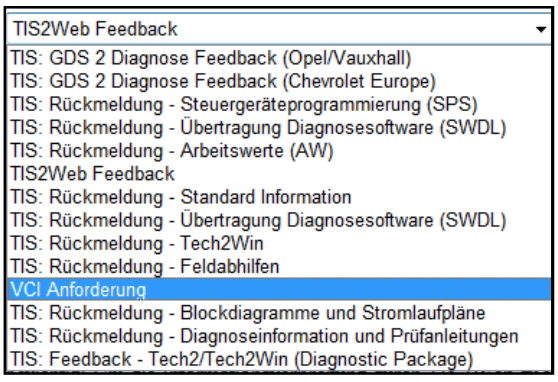
Depending on the category of vehicle and the law in the country where the vehicle is sold, the vehicle's speed can be restricted during manufacture with no option to disable this restriction.

The restriction value is programmed into the engine ECU in the factory.

The restriction value cannot be modified or removed using the "Clip" diagnostic tool or by changing the engine ECU.

The vehicle's maximum speed must be displayed on the rear of the vehicle.

If a vehicle restricted during manufacture is exempt from restriction (for example emergency vehicle, police) or for restriction of a vehicle that was not originally restricted, major vehicle maintenance arranged by the Central Engineering Department can be carried out. Using the TIS an authorized Opel/ Vauxhall dealers is able to create a VCI-request.



4.17 REMOTE ENGINE START/ STOP

It is possible to double the engine Start/ Stop control.

It is the job of the converter to take into account all the aspects associated with safe operation and to ensure:

- The quality of the connections.
- That the wires added have the same cross sections as the original wires; or even larger if called for by the length of the wires added.
- That relays closed at rest are used if the cut-offs in these lines are executed via relays.

Note:

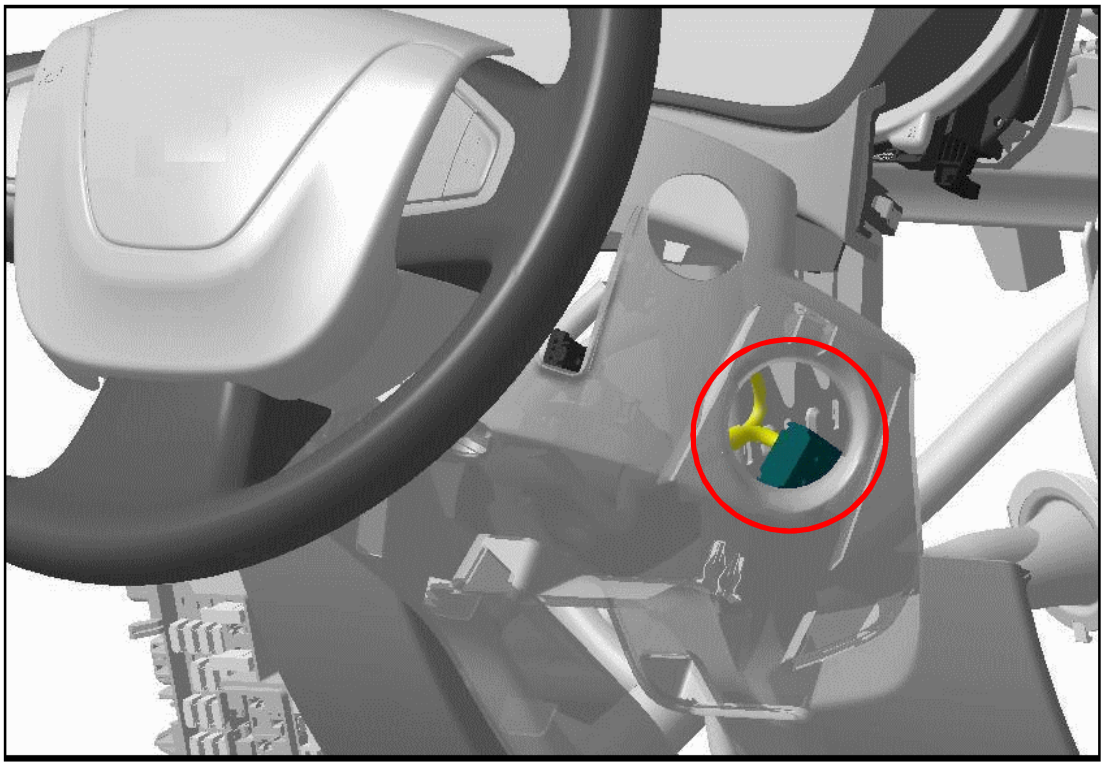
See also “Wiring and Electrical Connections” sheets.

Attention:

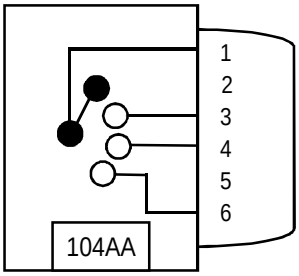
This installation operation must be done with the battery disconnected.

To effect the remote engine stop or start function, the function of the ignition switch on start-up needs to be recreated.

Location of the ignition switch



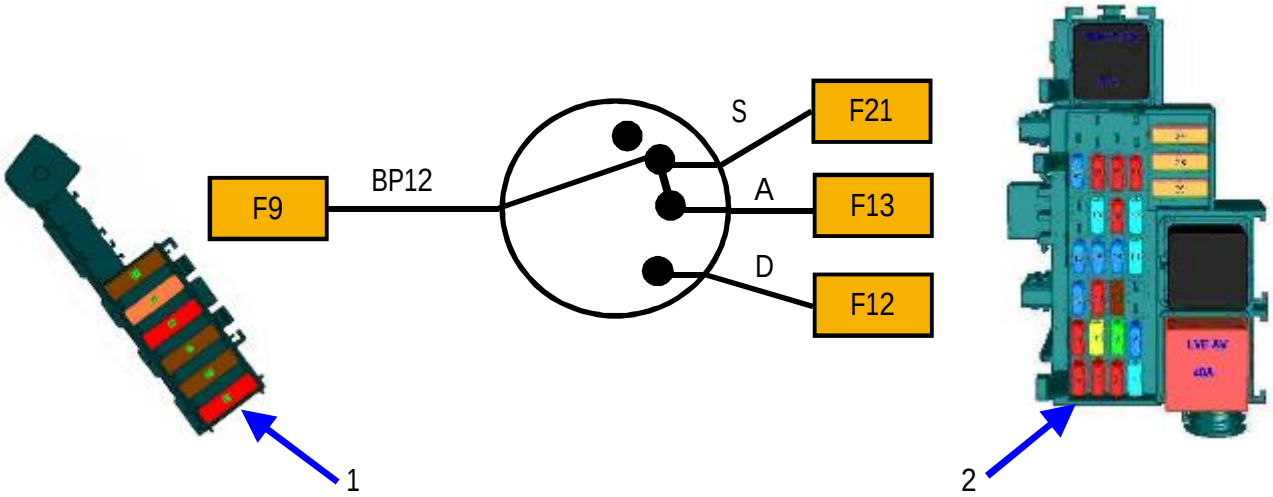
Assignment



Way number	Assignment
1 (BP12)	Protected 12V power supply, red wire with cross section 5mm²
2	-
3 (D)	Start-up, beige wire with cross section 5mm²
4 (A)	Primary ignition supply, yellow wire with cross section 5mm²
5	-
6 (S)	Current distribution power supply, yellow wire with cross section 5mm²

- To start the engine (starter solenoid control), activate way 3 with the protected 12V power supply.
- Way 4 to be activated to start the engine and to be cut off to stop it.
- Way 6 to be cut off momentarily during starter activation.

Location of corresponding fuses



Pos.	Description
1	Engine interconnections unit (BIM) power supply board
2	Passenger compartment fuse-relay box (BFRH)

4.18 DRIVING SUPPORT -System:

The vehicle is (or perhaps, in the case of an option) equipped with 2 different driving support systems, consisting of the following elements:

1. LDW (Lane Departure Warning) SYSTEM is a lane departure detection and alert system. The system consists in a front camera coupled to a buzzer and to an activation indicator (on the dashboard) and a deactivation button (on the roof central console).

   This system is a basic fitting for versions: M2 and N2 (Regulatory on these versions) and optional on the other M1 and N1 versions)

   N.B.: in case of modification, for example of height or vehicle attitude..... to the compatibility of the entire system with current regulations (modification of suspensions; etc.).

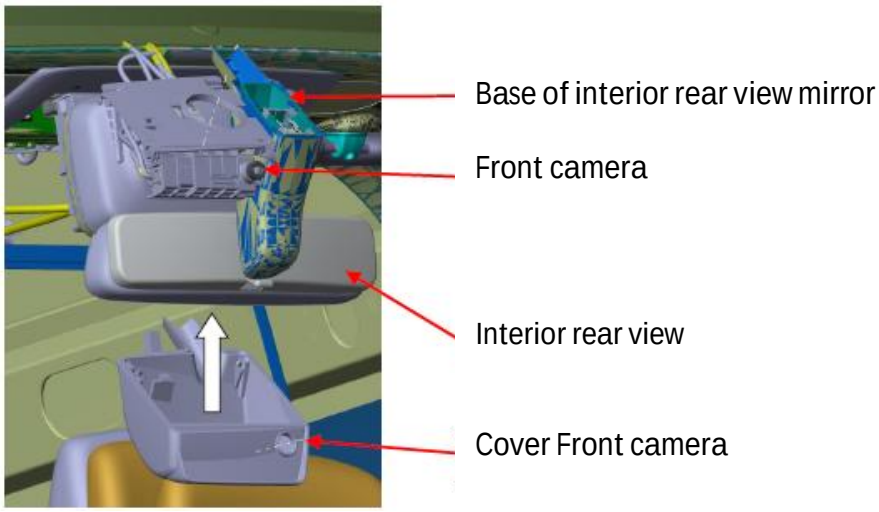
2. RVC (Rear View Camera) SYSTEM consisting in a reversing camera coupled according to cases:
   - to the interior rear view mirror (small viewing window in the rear view mirror).
   - to the RLINK screen in the top roof console.
   - to the MEDIANAV screen on the dashboard.

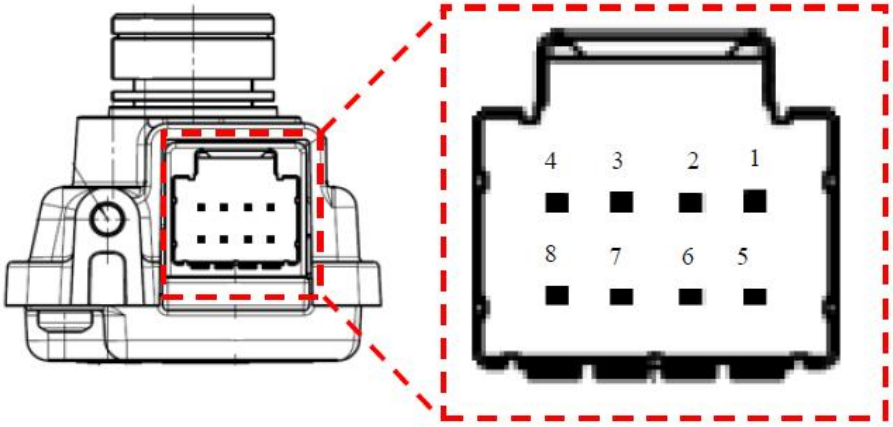
The camera and its system are fitted as an option for VAN and COMBI.

4.18.1: LDW driving support system; FRONT camera

The FRONT camera is designed for the basic M2 and N2 versions

The front camera is located on the interior rear view mirror base and is connected to the passenger compartment wiring coming down from the roof.



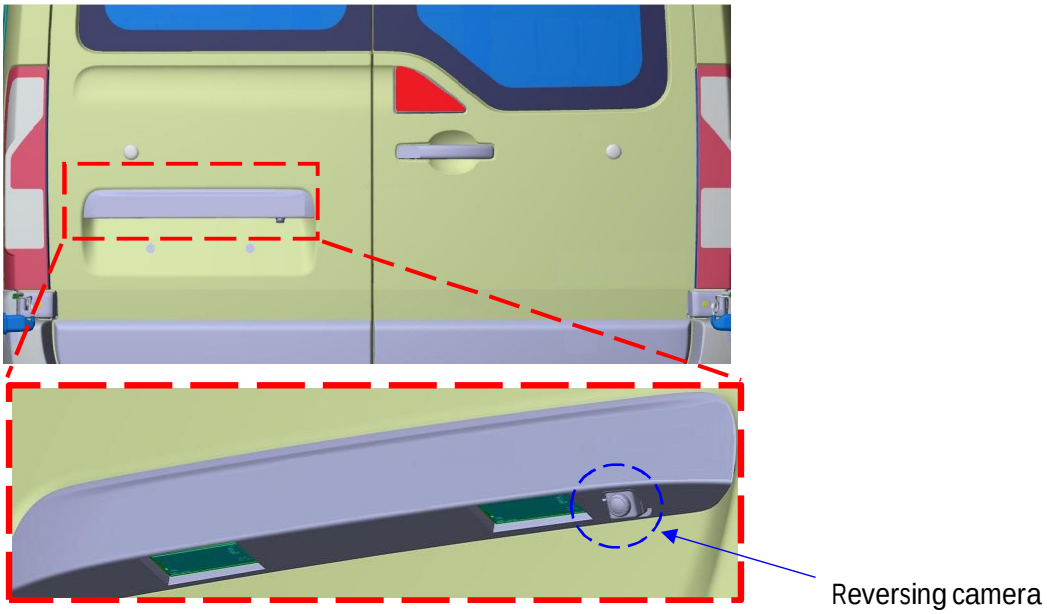


Pin assignment	
1:	CAN earth (Not connected)
2:	LED output
3:	Button entry
4:	CAN High
5:	ECU Earthing
6:	Buzzer output (Not connected)
7:	ECU (+)
8 :	CAN Low

4.18.2: RVC driving support system; REVERSING CAMERA

The reversing camera is designed as an option for the VAN and COMBI vehicles.

The reversing camera is installed on the basic vehicle in the LEFT REAR door beam.



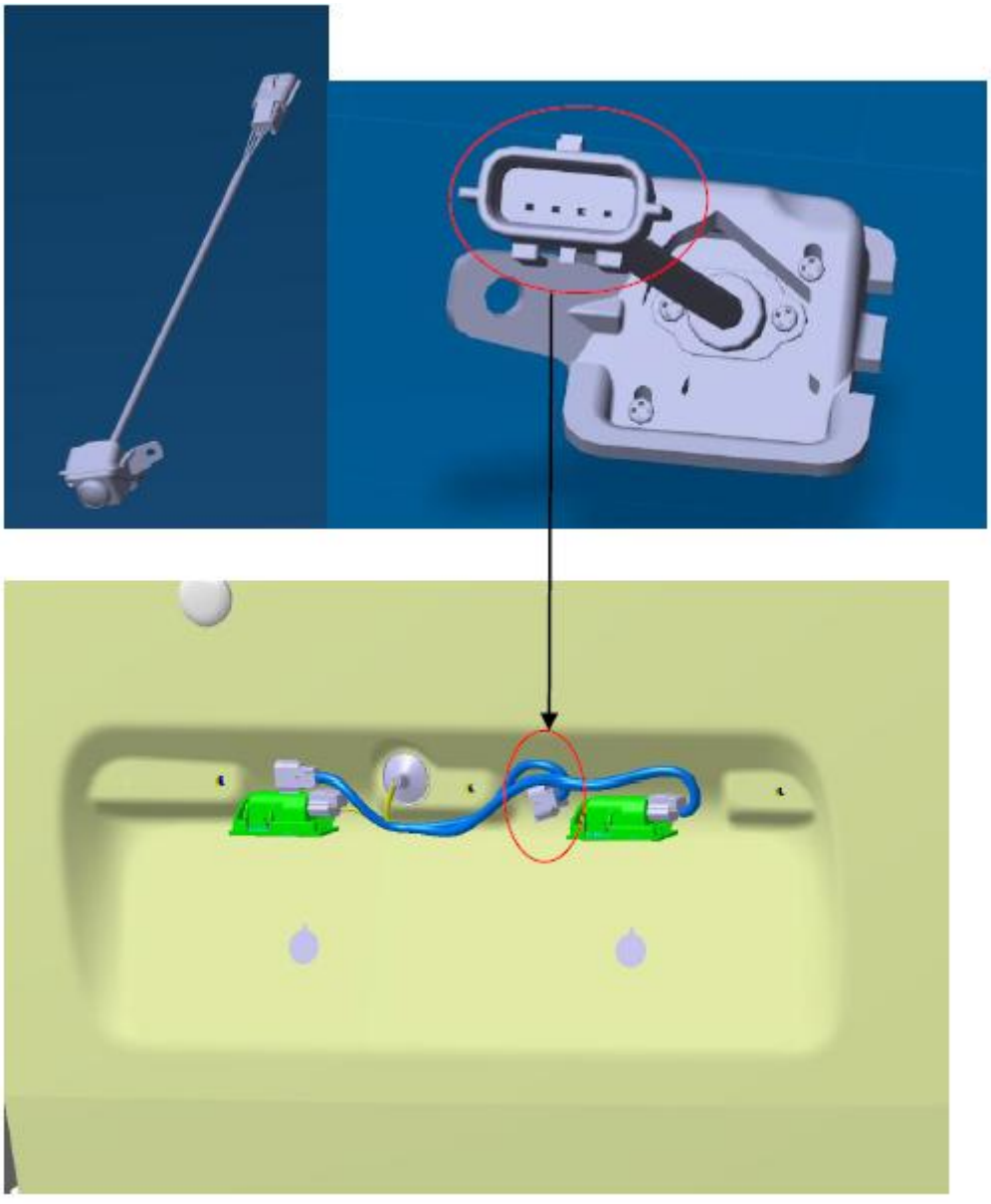
The reversing camera is removable. If this is a new installation, it must be located at a minimum Z/floor of 700 mm and at the Y0 section. There must be a seal between the camera mounting and the body.

Reversing camera connection:

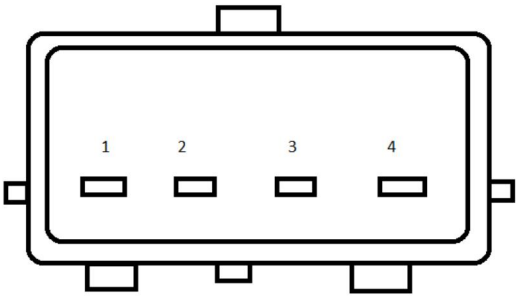
It is possible to add an extension and relocate the rear camera elsewhere on the rear door if required (if the camera is masked, for example). In this case:

- The total length of the wiring between the display and the camera must not exceed 10m.
- The wiring between the display and the camera must not include more than three cuts (electrical connections),

If the installation in the vehicle needs more length or cuts, the coachbuilder must ensure compatibility by EMC tests.



The connection to the LEFT REAR door wiring is made by a 4-way foolproof female connector.



Pin assignment

1:	SUPPLY (+6V)	à red
2:	GROUND	à black
3:	VIDEO (+)	à yellow
4:	VIDEO (-)	à white

5 DESIGN STRUCTURE, GLAZED/ SOLID SIDE PANELS

5.1 DESIGN STRUCTURE

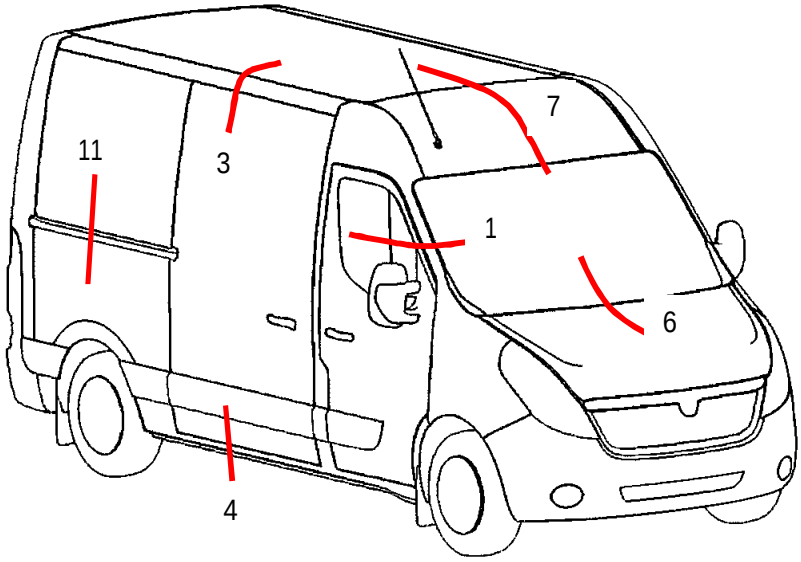
5.1.1 PANEL VAN BODY SECTIONS

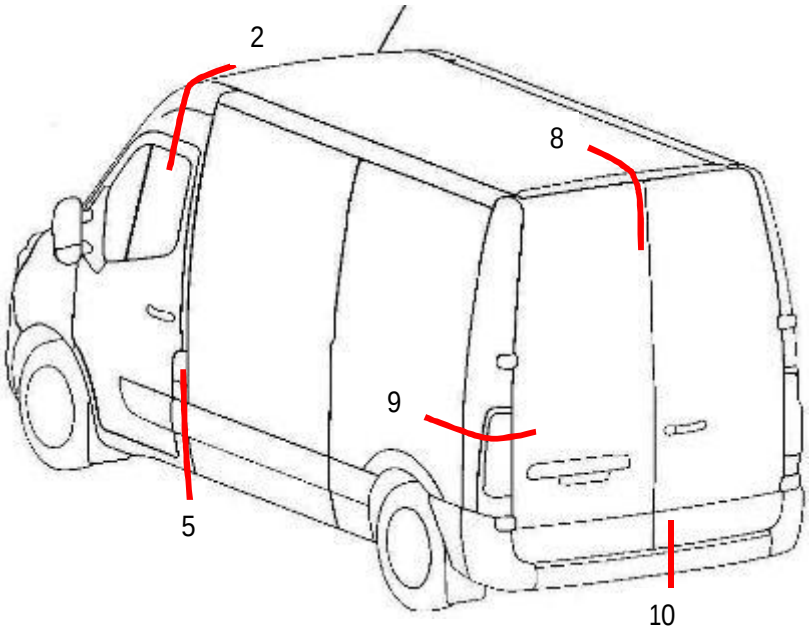
The various standard sections of the van are shown on the diagram below.

Note:

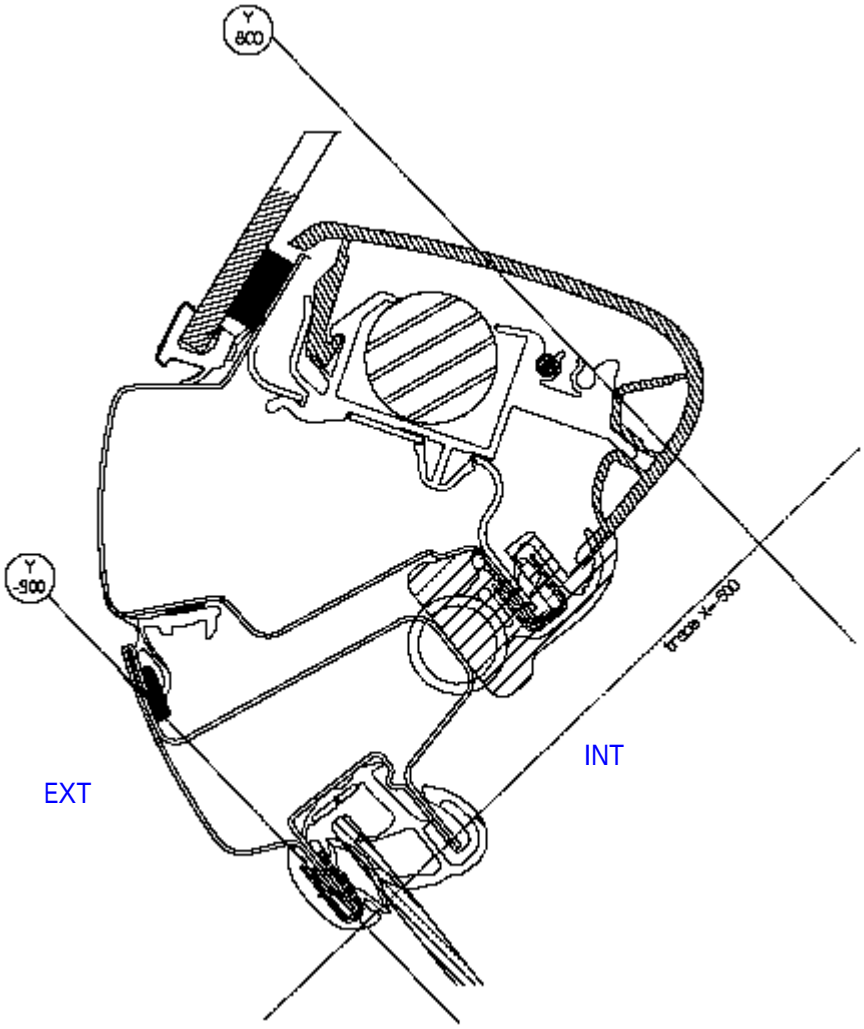
Throughout this document, INT means vehicle interior and EXT means vehicle exterior.

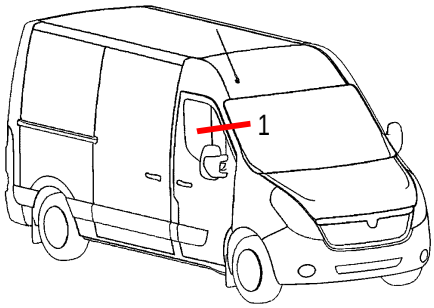
PANEL VAN STANDARD SECTIONS





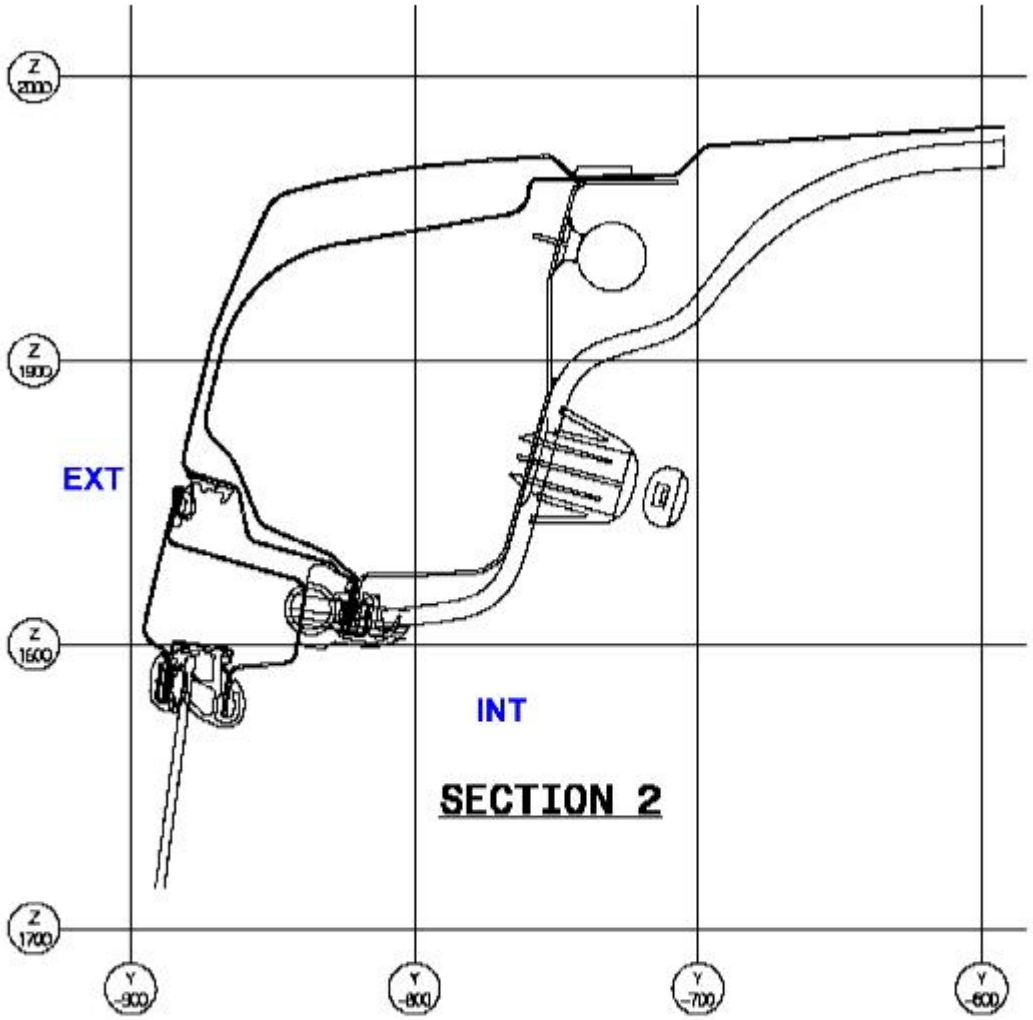
SECTION 1 „DOOR OPENING PILLAR"

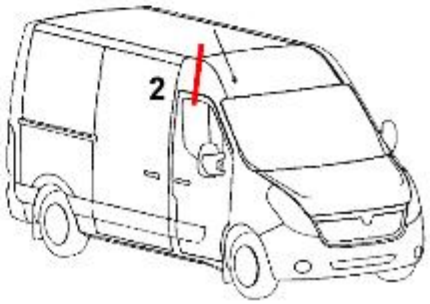




SECTION 2 „FRONT DOOR RAIL"

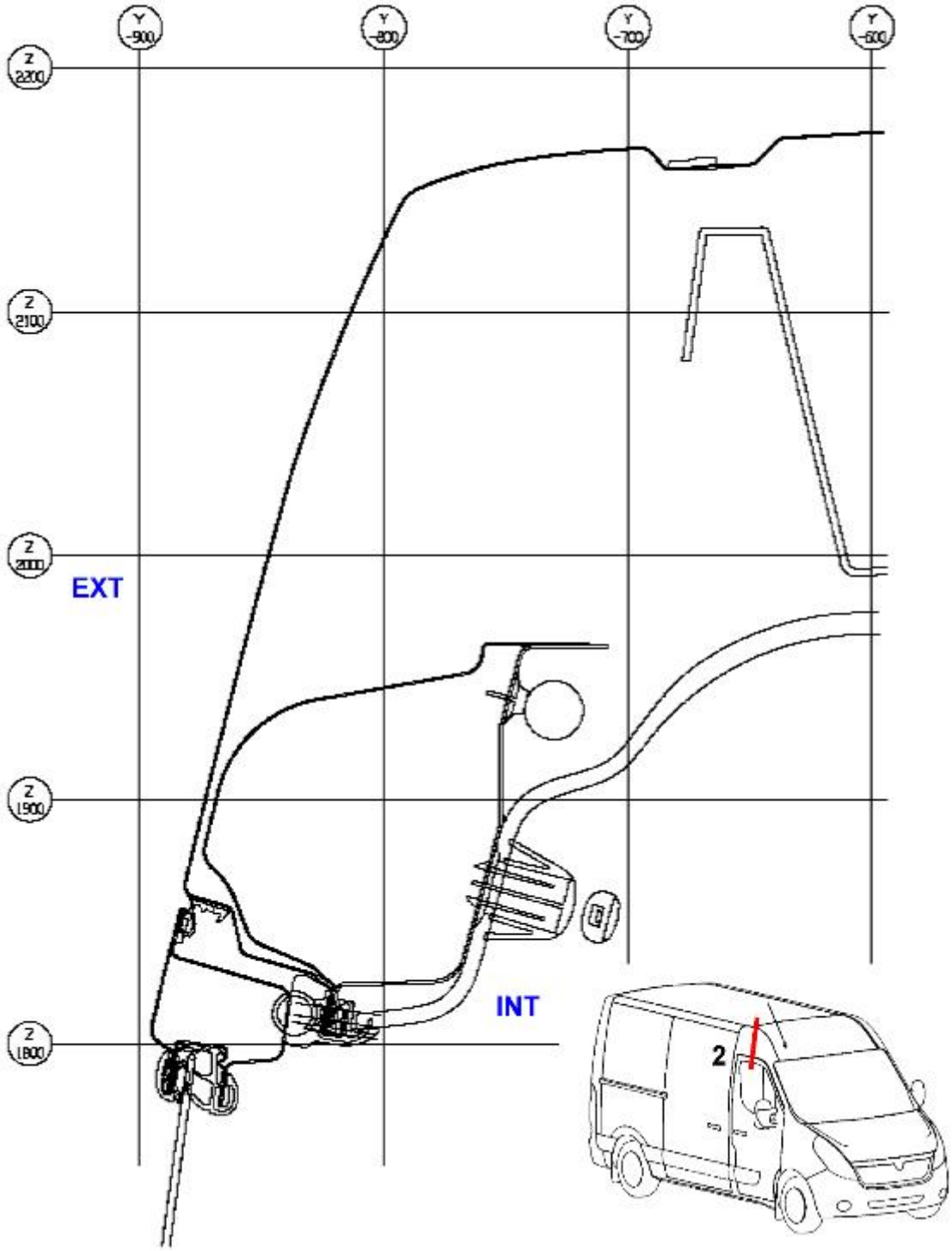
Roof version H1 (X = 1200)





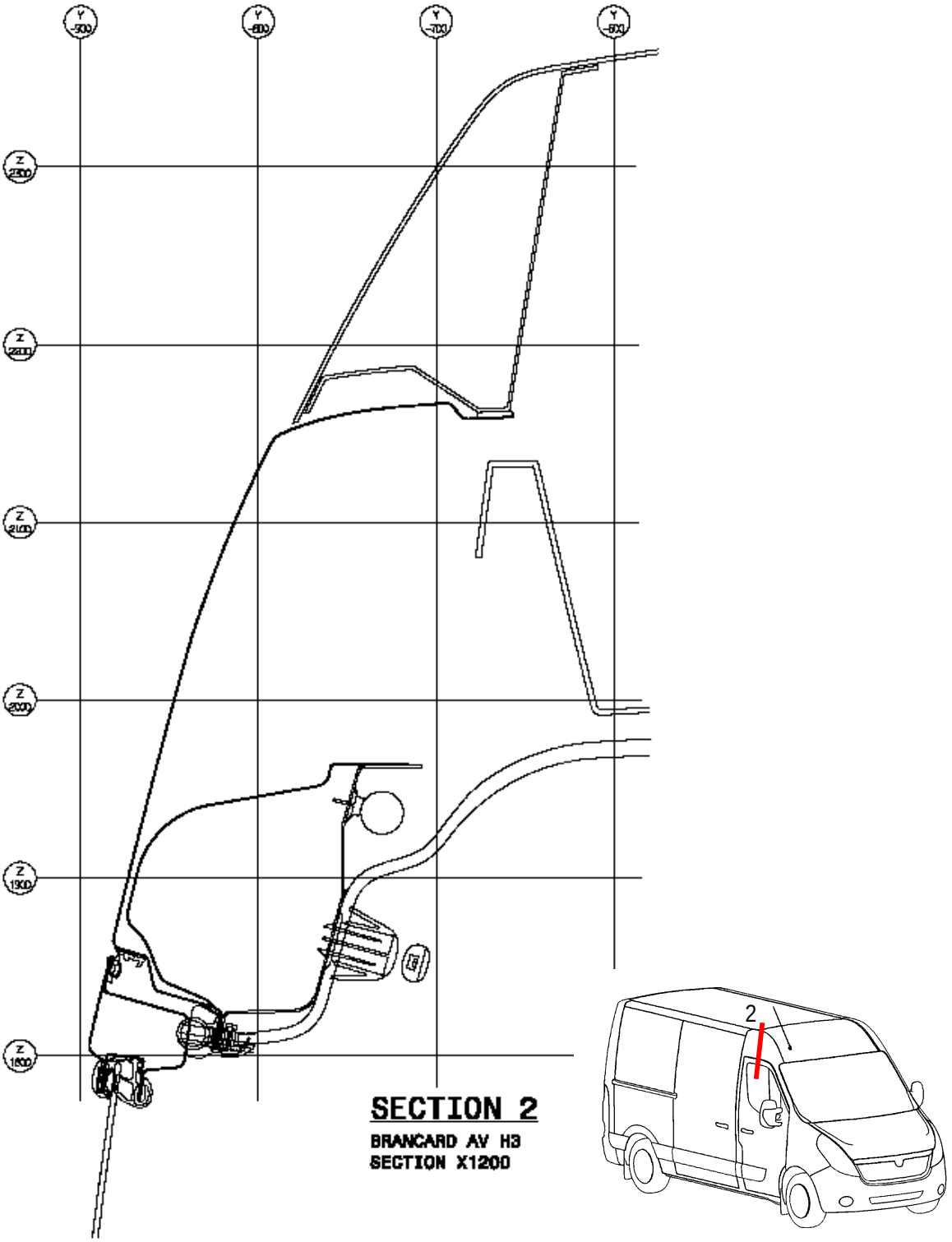
SECTION 2 „FRONT DOOR RAIL"

Roof version H2 (X = 1,200)



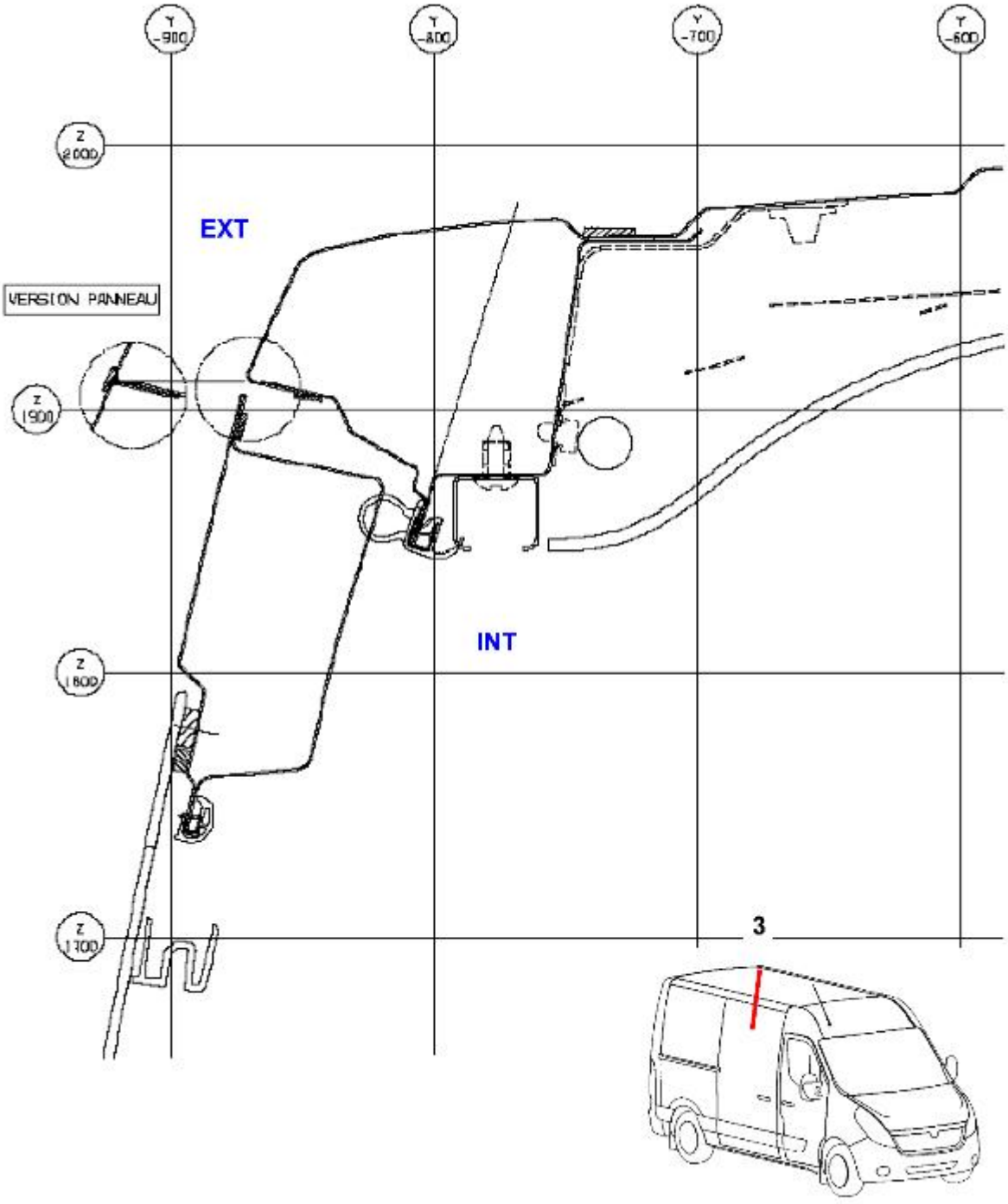
SECTION 2 „FRONT DOOR RAIL"

Roof version H3 (X = 1,200)



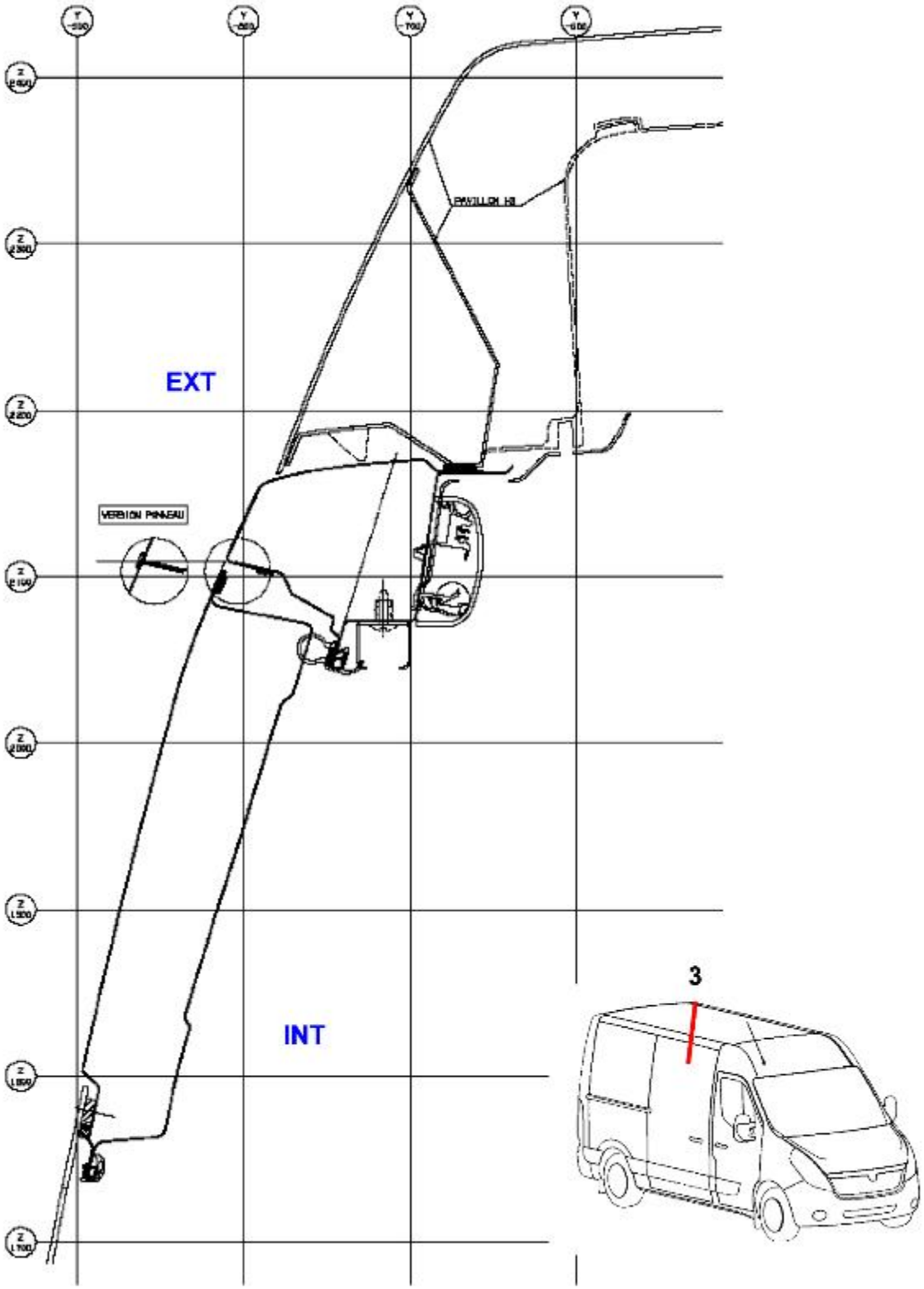
SECTION 3 „REAR CANTRAIL"

Roof version H3 (X = 2,300)



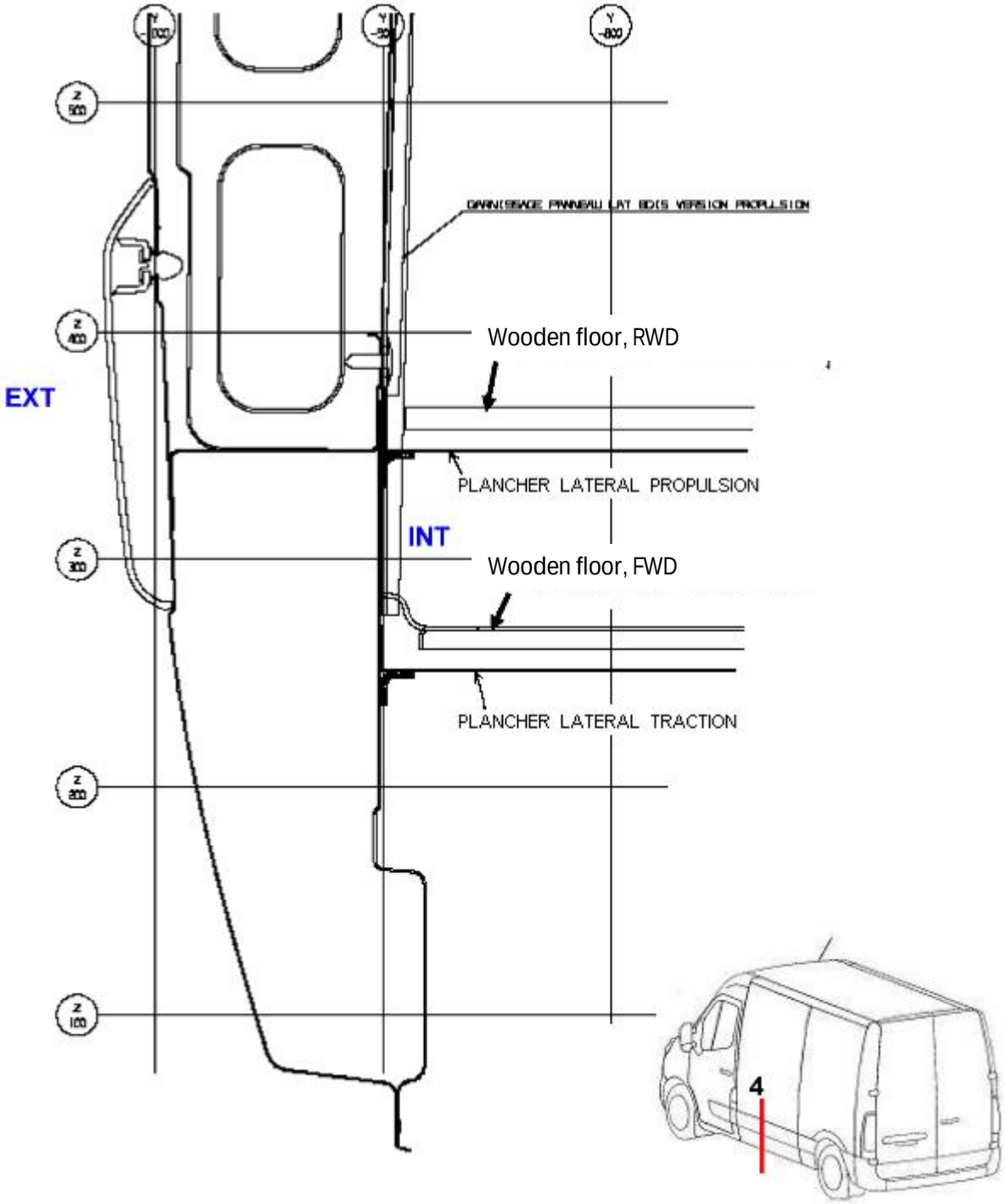
SECTION 3 „REAR CANTRAIL"

Roof versions H2 (X = 2,300)



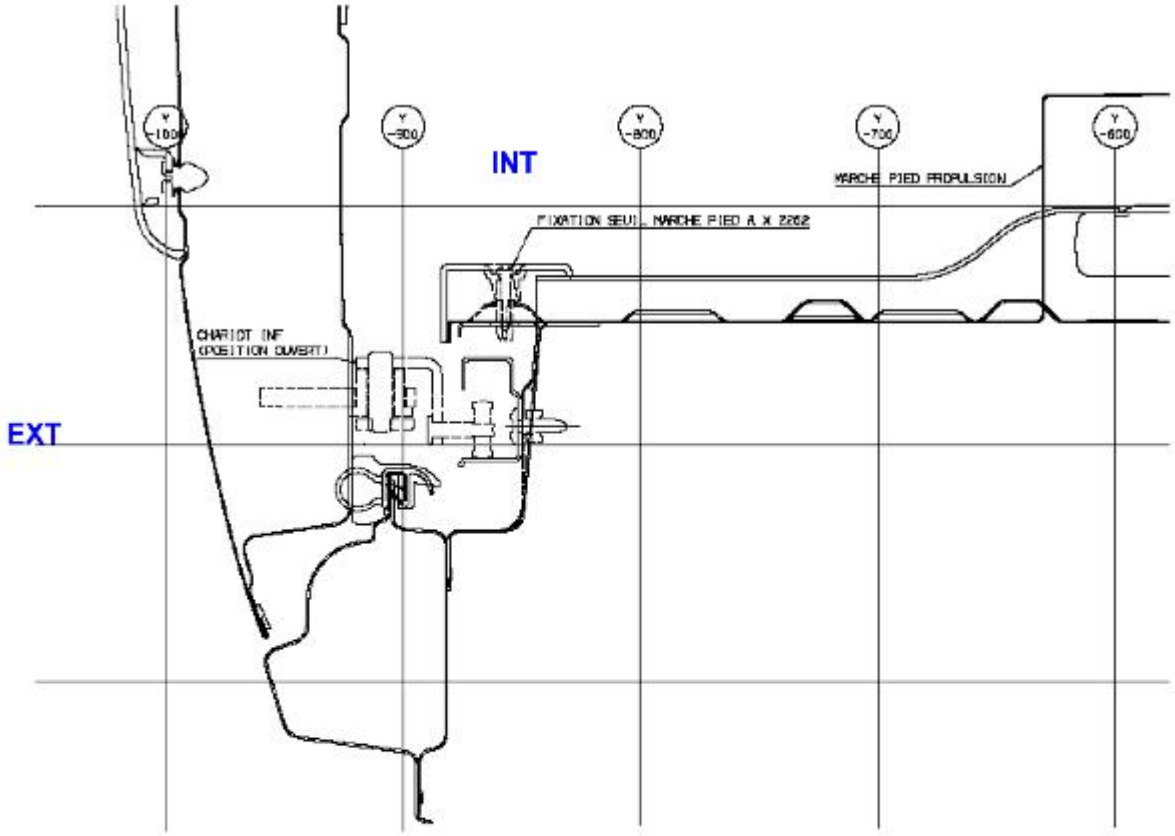
SECTION 4 „LOWER SIDE SILL" (fixed side panel)

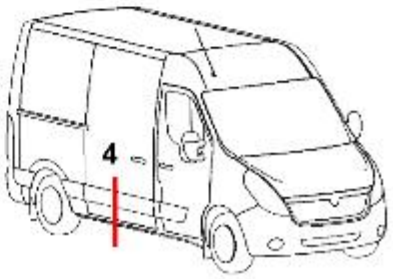
(X = 2,106.9)



SECTION 4 „LOWER SIDE SILL" (sliding side door)

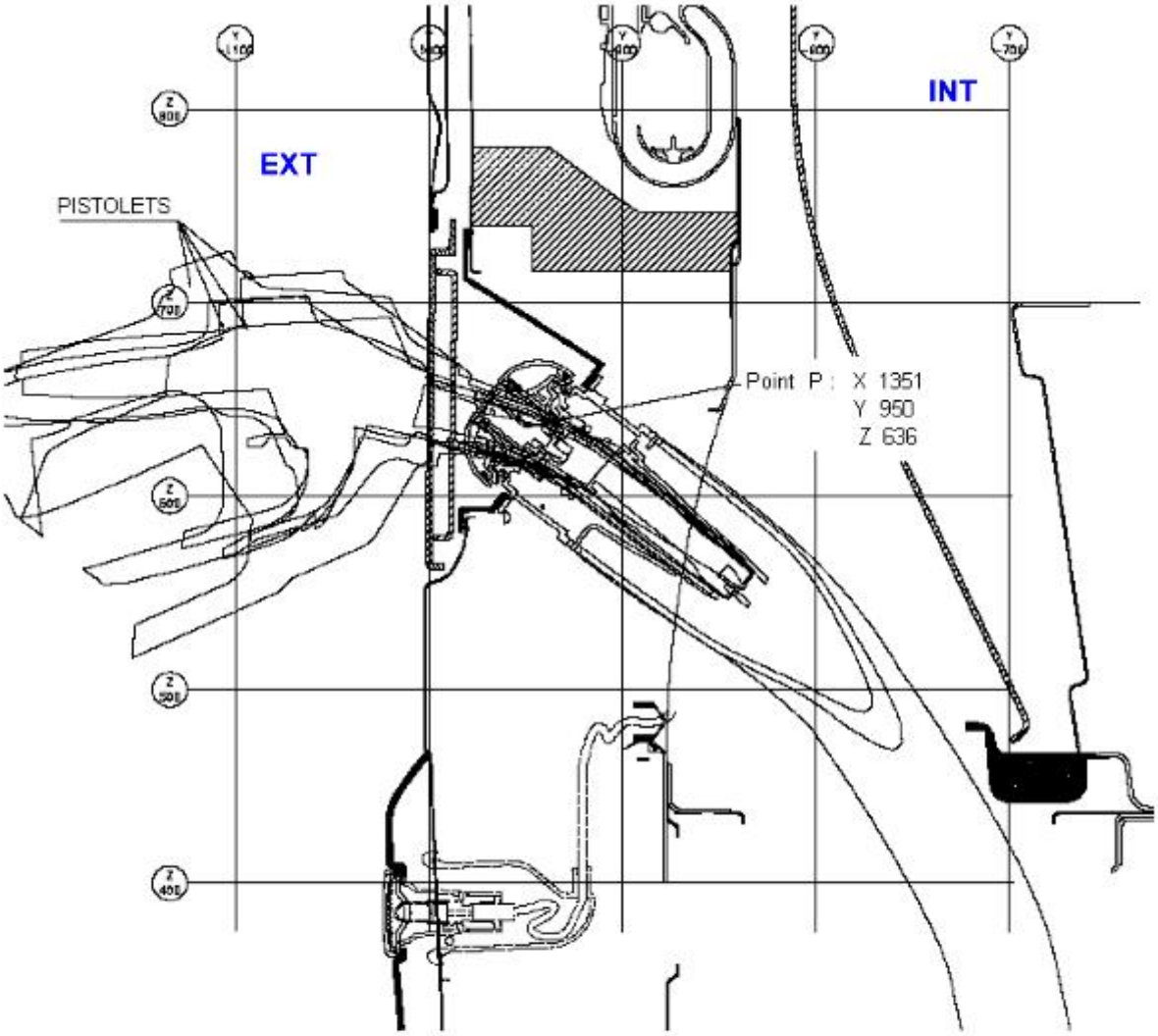
(X = 2,300)

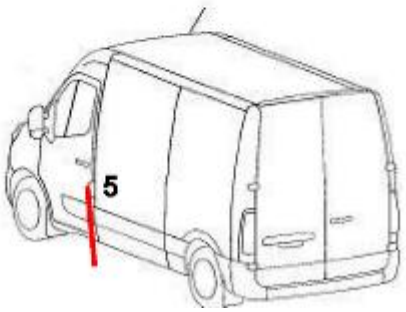




SECTION 5 „FUEL FLAP"

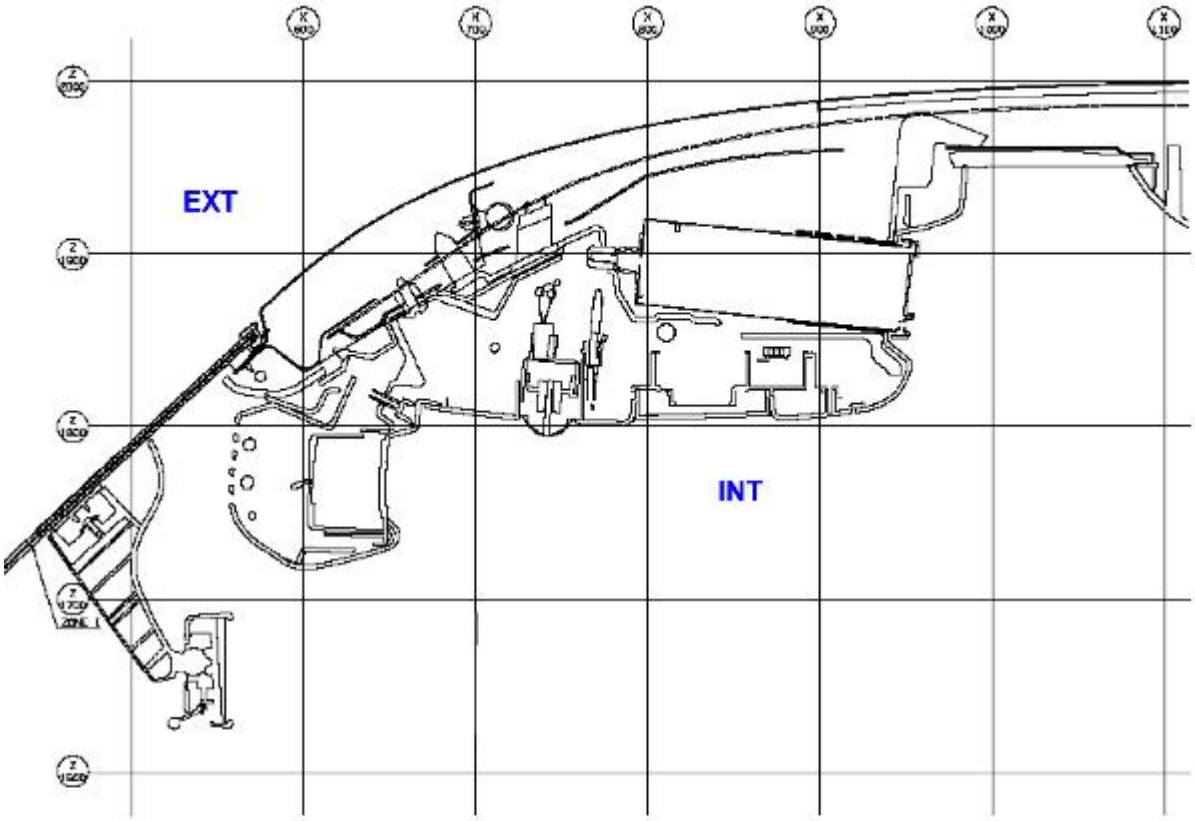
(X = 1,351)

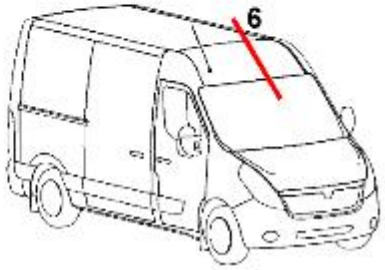




SECTION 6 „ROOF PANEL"

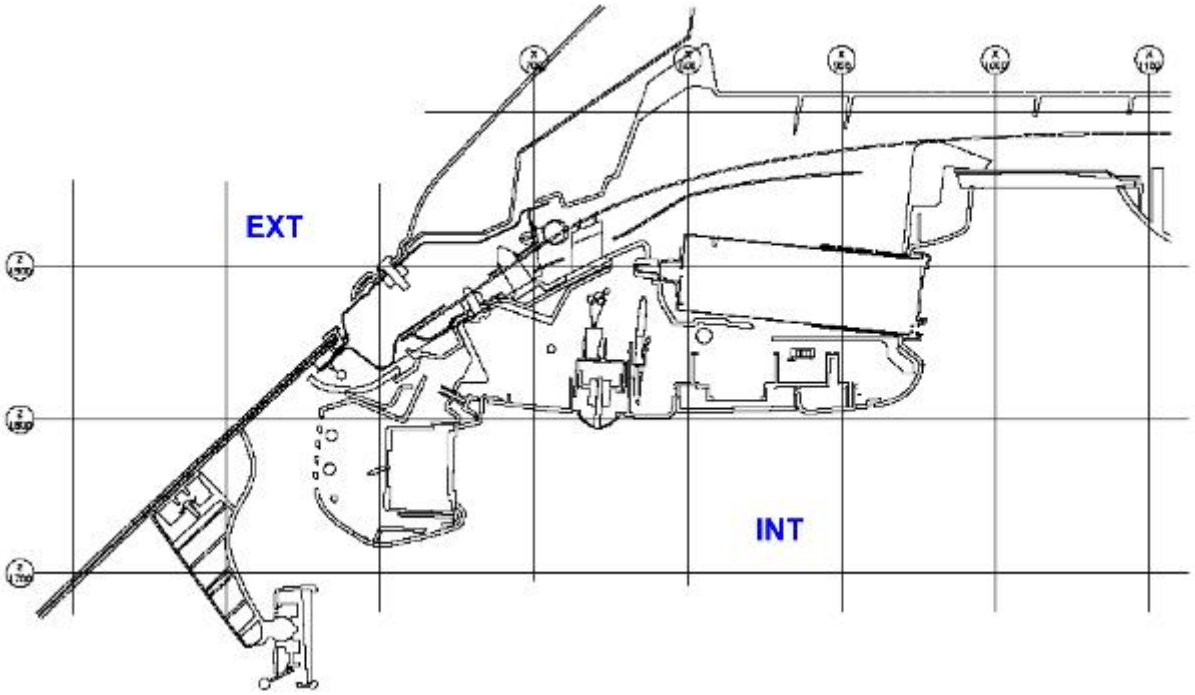
Roof version H1 (Y = 0)

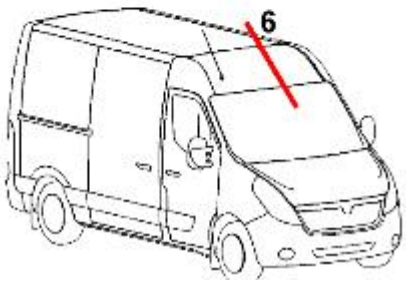




SECTION 6 „ROOF PANEL"

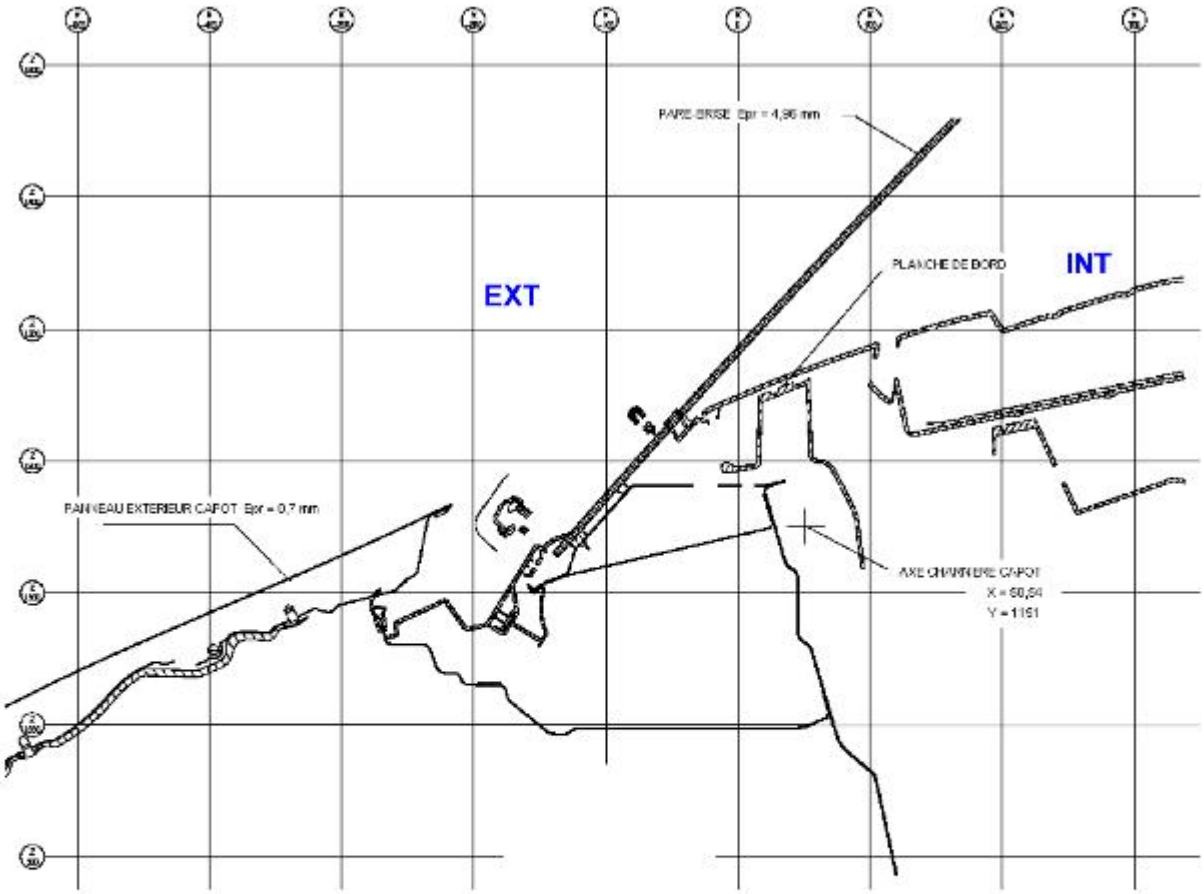
Roof versions H2 and H3 (Y = 0)

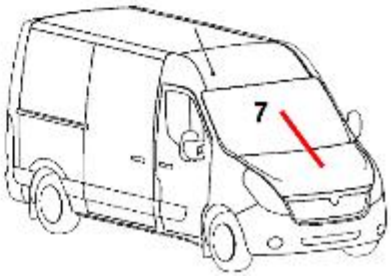




SECTION 7 „AREA UNDER WINDSCREEN"

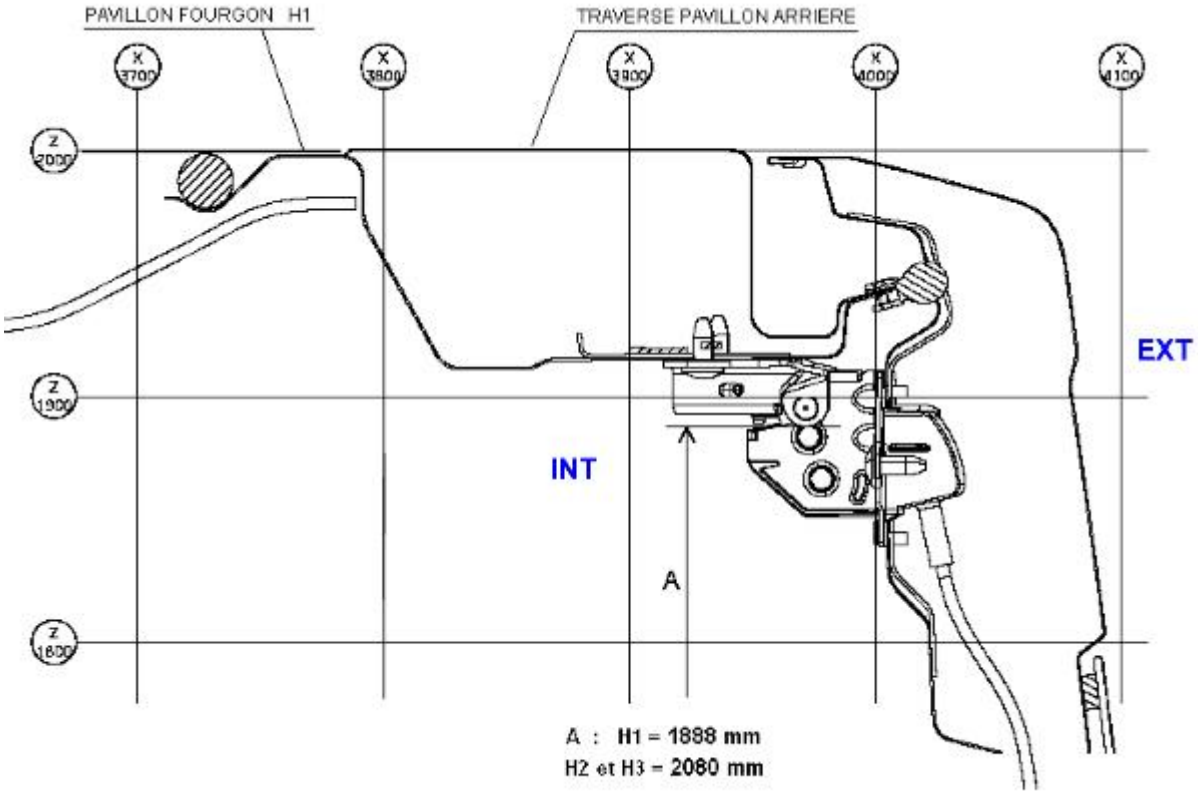
(Y = 0)

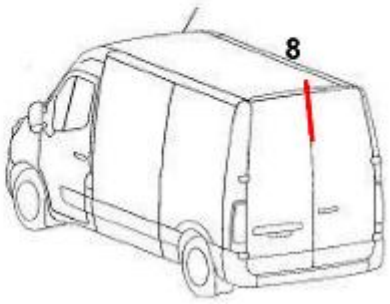




SECTION 8 „REAR UPPER CROSS MEMBER"

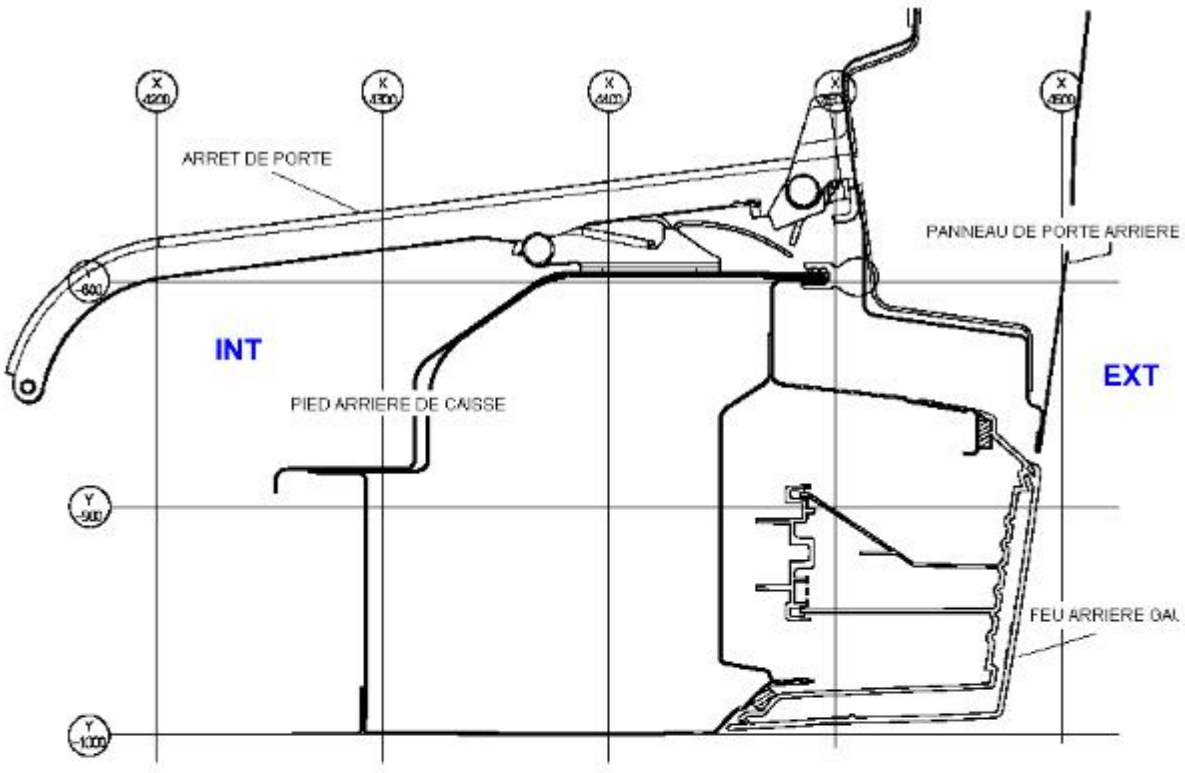
(Y = 122)

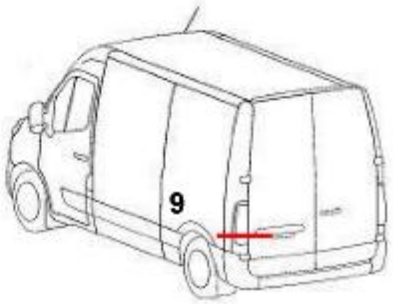




SECTION 9 „REAR LIGHT/ DOOR STOP"

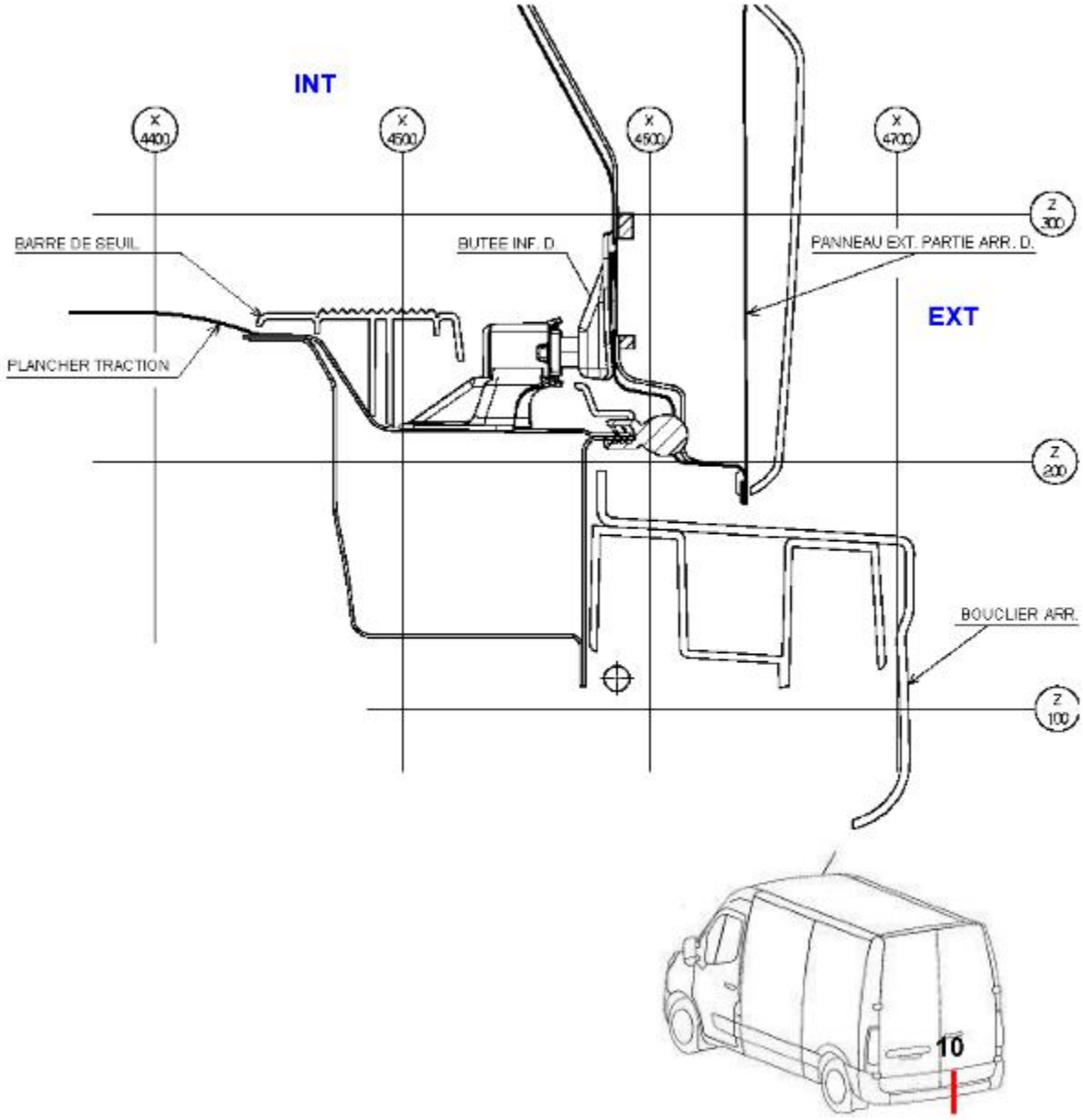
(Z = 740)





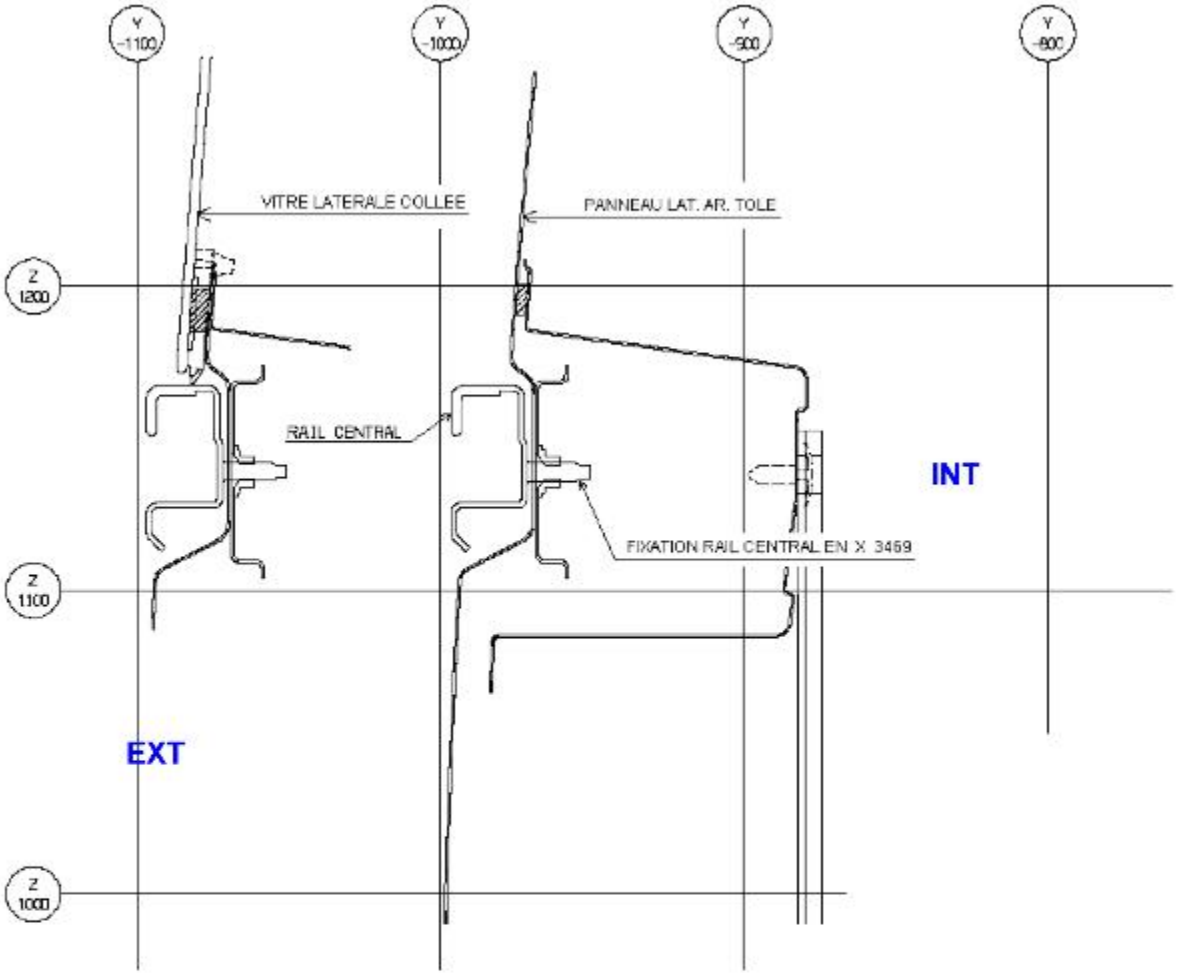
SECTION 10 „LOWER RIGHT-HAND REAR DOOR STOP"

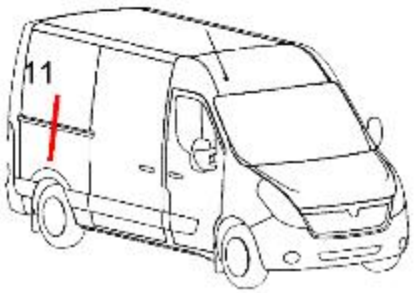
(Y = 114)



SECTION 11 „SLIDING SIDE DOOR CENTRE RAIL"

(X = 3,512)





5.1.2 GLAZING

To add glazing to a panel van, it is recommended that you:

- remove the vertical tensioners,
- cut out an opening in the side panel and get close to the insert shape of the glazed versions of the Movano for bonded windows and the window shape for fitted windows,
- protect the cut-outs from corrosion.

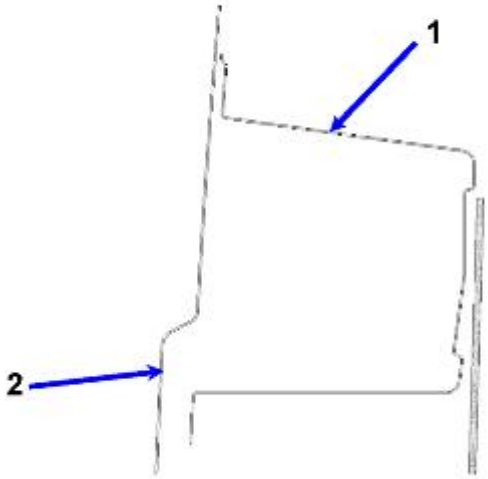
For bonded windows, it is recommended that you:

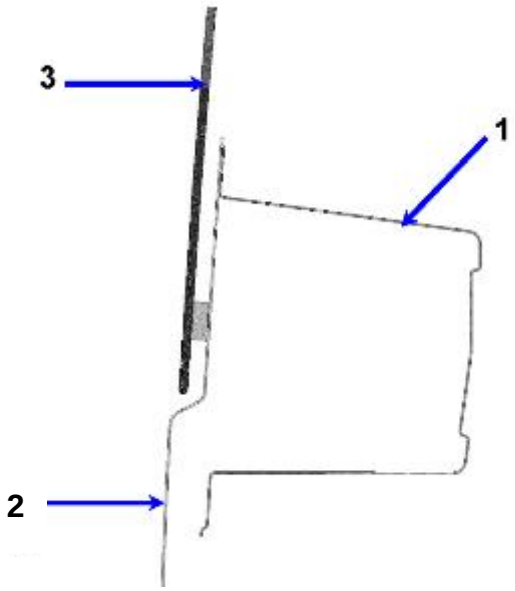
- Separate the horizontal centre strut from the vertical members, turn it around and then weld along the bottom of the cut out insert and on the vertical members.
- Local reinforcement of the frame structure may be required.

Attention:

Under no circumstances must the vertical seal of the side bodywork panels be cut out.

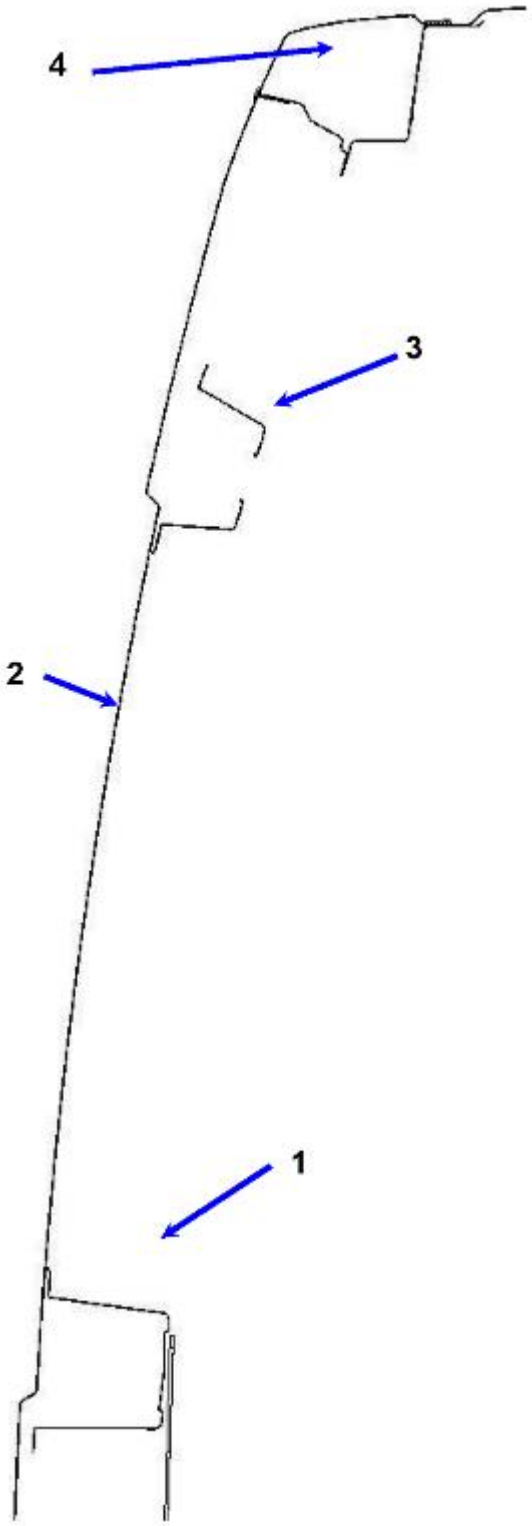
DIFFERENCE BETWEEN PANEL VAN AND GLAZED VAN





Pos.	Description
1	Lower strut
2	Exterior side panel
3	Bonded window

BASIC SECTIONS



Pos.	Description
1	Lower strut
2	Exterior side panel
3	Upper strut
4	Cantrail

5.2 DRILLING AREAS FOR BULKHEAD/ FLOORS

5.2.1 BULKHEAD FEED-THROUGH

Opel/Vauxhall recommends using the existing grommet.

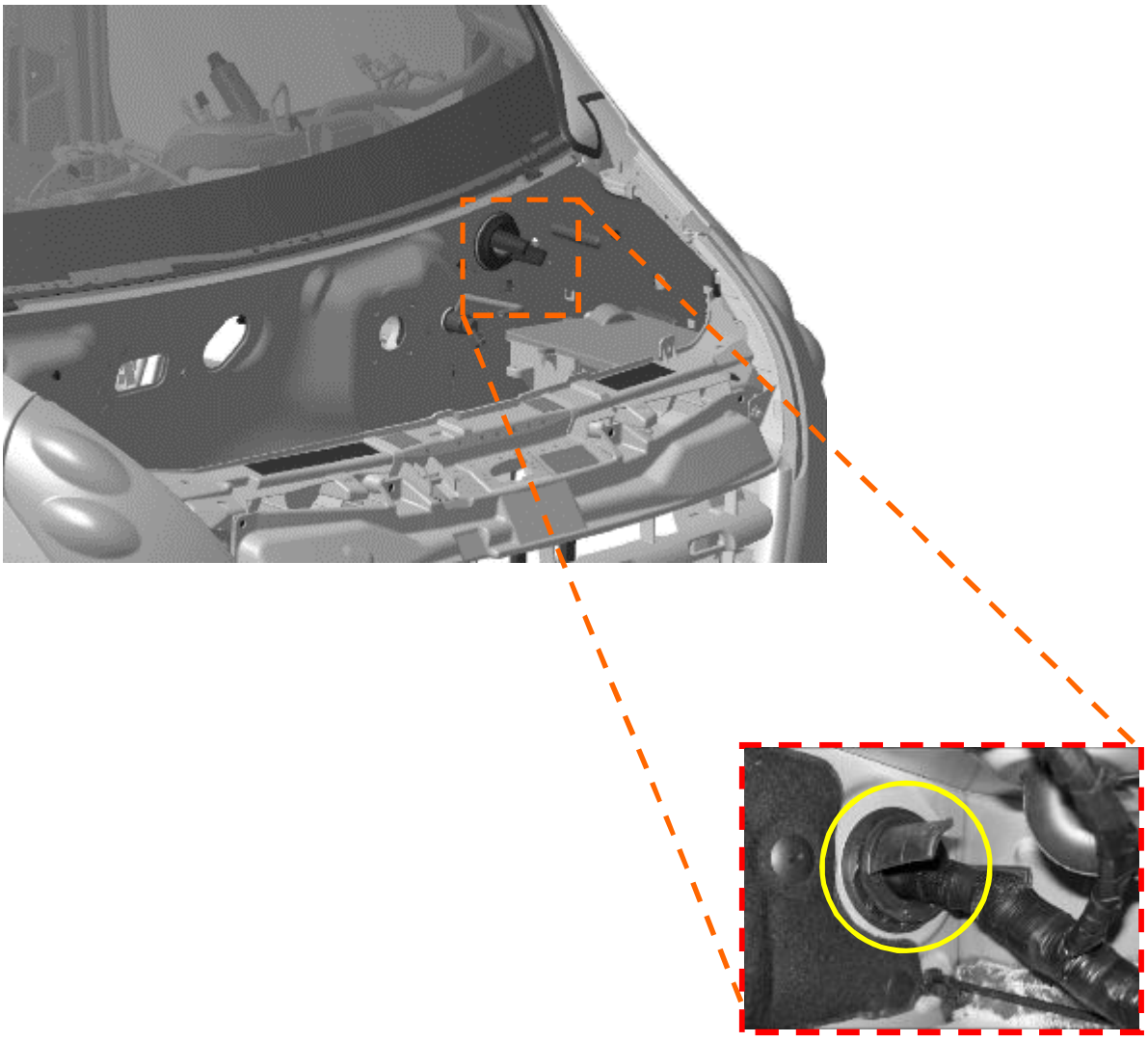
However, if the coachbuilder faces major constraints, another hole may be used, see 5.8.1.2.

Feed-through the existing openings

So as to not adversely affect certain performance levels, only the grommet for the main wiring harness behind the engine interconnection unit may be used.

The plastic clamp on the passenger compartment side must be changed (for identical reassembly). Sealing must not be adversely affected.

Location of the harness grommet



Feed-through outside of the existing opening

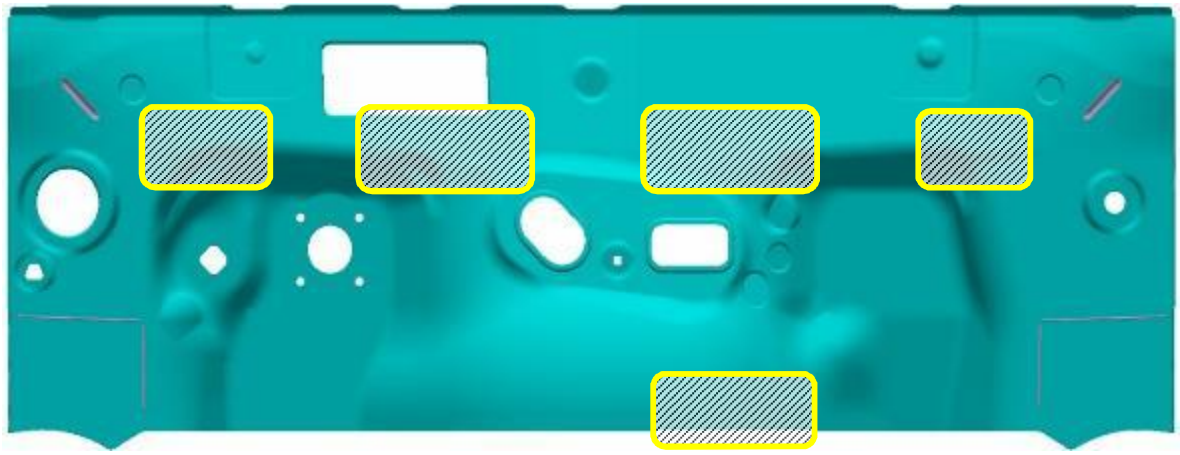
The area in which the hole is made must be chosen in accordance with technical constraints, particularly:

- Proximity to neighbouring parts (depending on the version)
- Travel/clearances (pedals, engine, etc.)
- Proximity to heat sources (exhaust, etc.).

In any case, no holes may be made in the bulkhead:

- In weld areas
- In mating areas
- In the areas with structural constraints specified below:

Location of areas with constraints on the bulkhead (inside the passenger compartment)



Areas with constraints

Note:

Holes adversely affect the following performance levels:

- Acoustics
- Sealing
- Perception of external odours

Perform burring and corrosion prevention treatment (see technical data sheet: Specific guidelines on corrosion) on each edge of the hole created in the bulkhead.

Excluding round holes, all cut-out shapes must have a cut-out radius.

Check that the sealing of the bulkhead feed-through is effective.

5.2.2 DRILLING AREA ON REAR FLOOR OF PANEL VAN

Before any drilling is performed (e.g. for fitting a wooden floor), take note of the various elements such as wiring, brake pipes, hand brake cables, the fuel tank, etc.

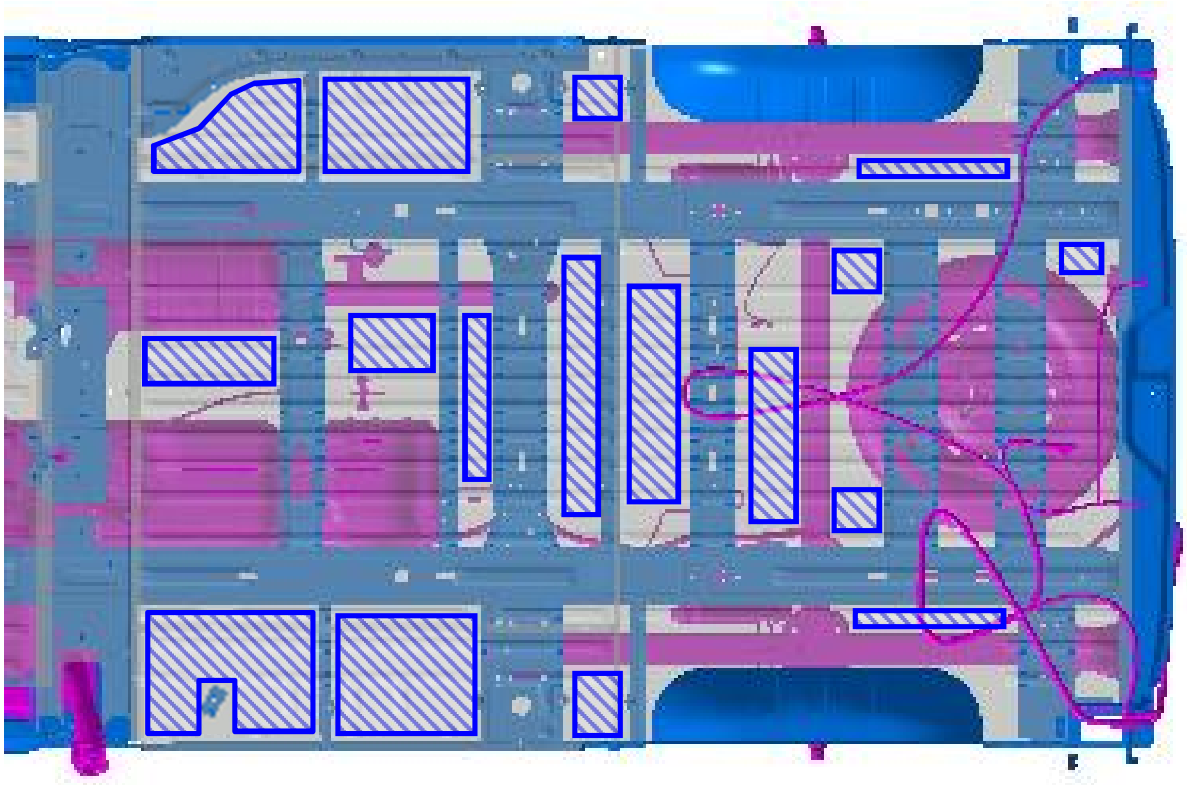
After drilling, the filings or shavings must be vacuumed and a corrosion inhibitor used; please refer to the "Specific Corrosion Guidelines".

Use a grommet for protection and a silicon seal for water tightness.

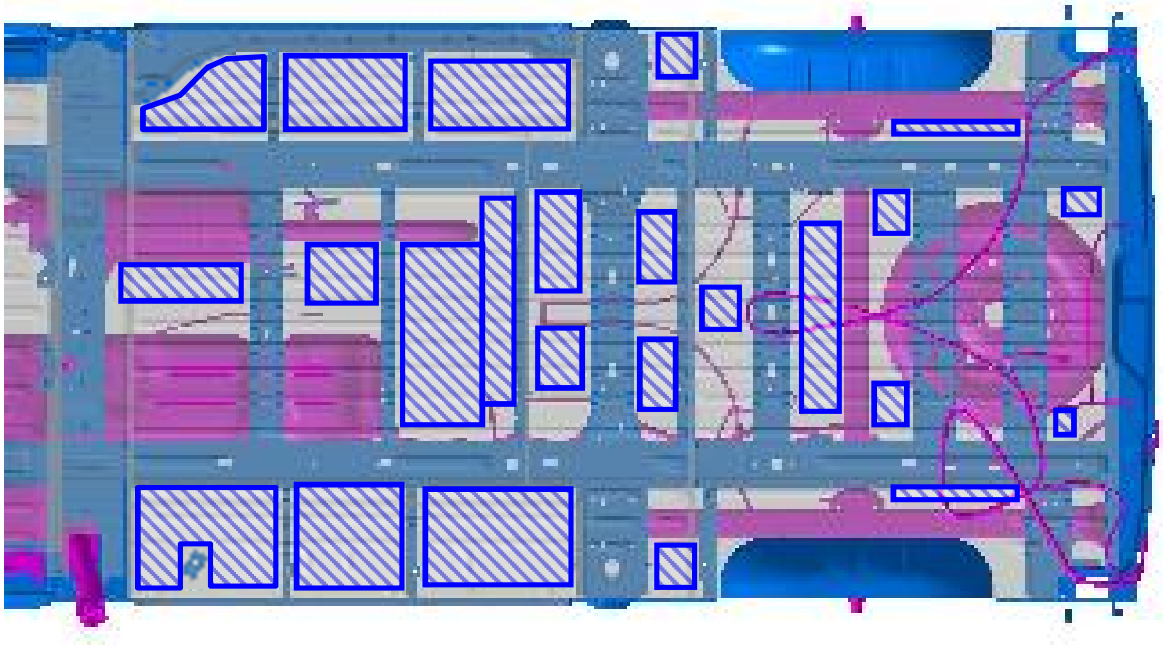
The different views below show the position of the elements below the floor (fuel tank, exhaust line, muffler and screen, etc).

Drilling areas have been identified along with a fastening diagram in case of a location to the right of the under-floor cross member.

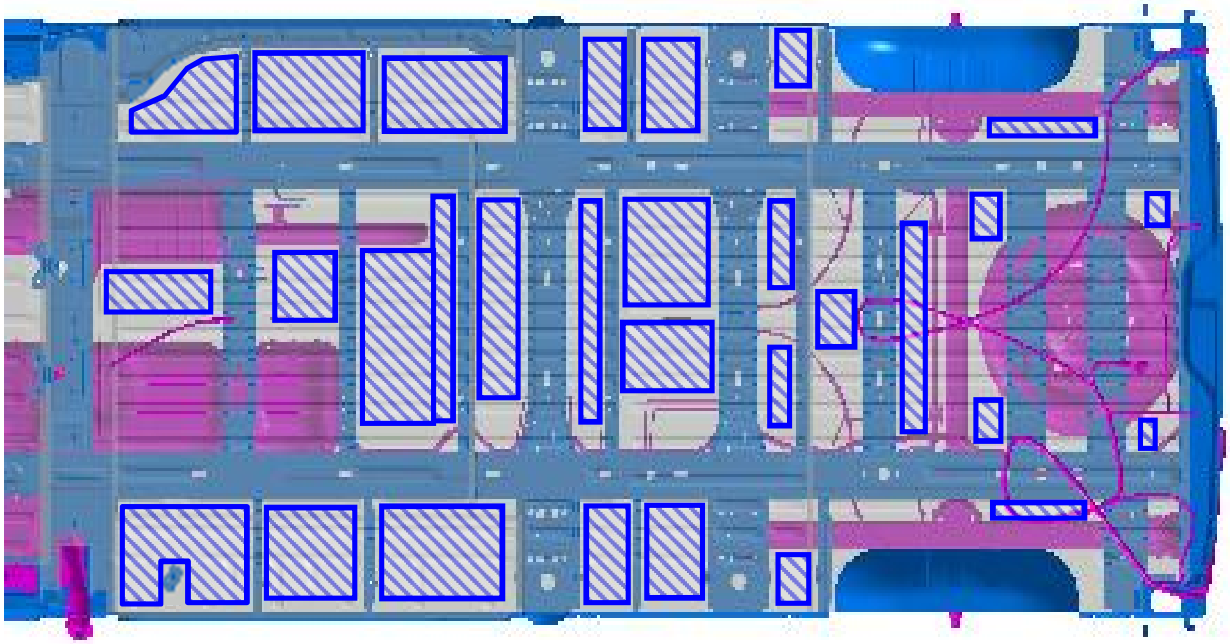
Front wheel drive panel van L1



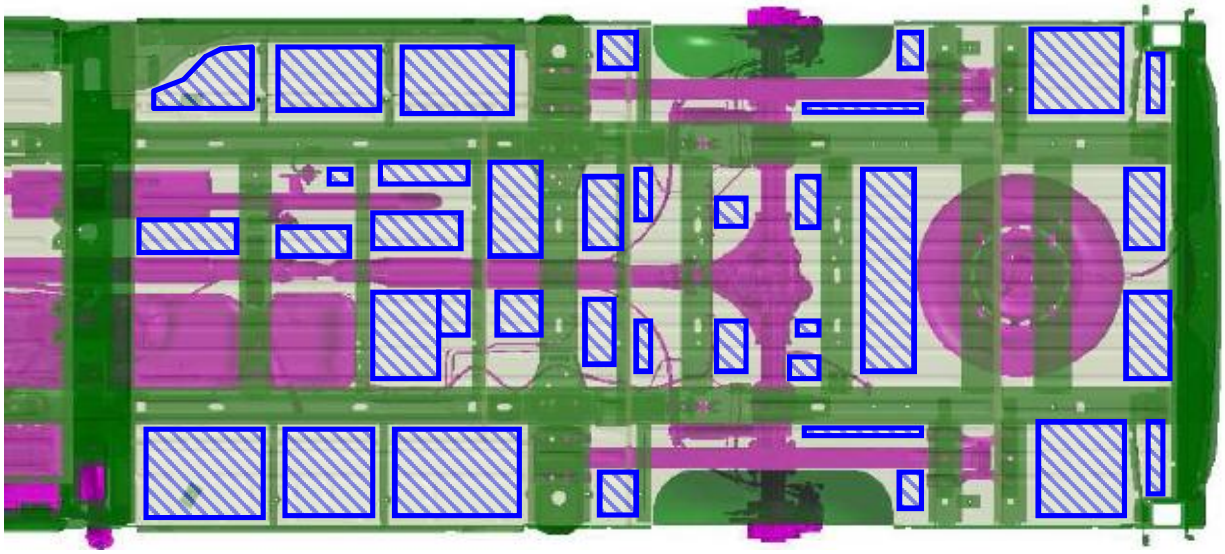
Front wheel drive panel van L2



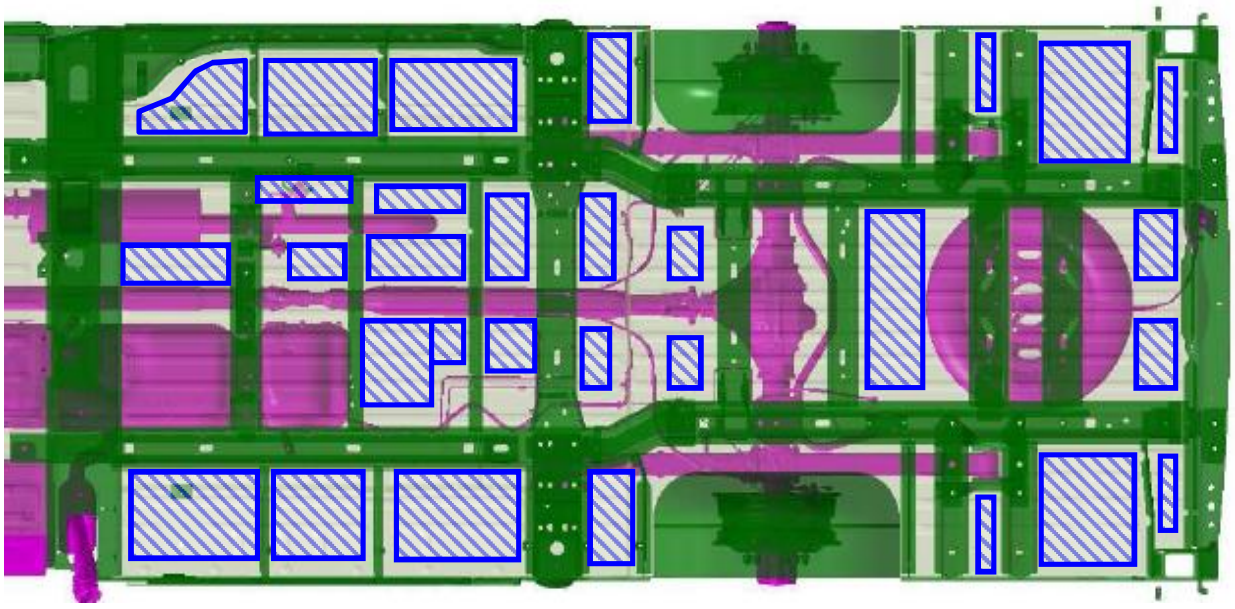
Front wheel drive panel van L3



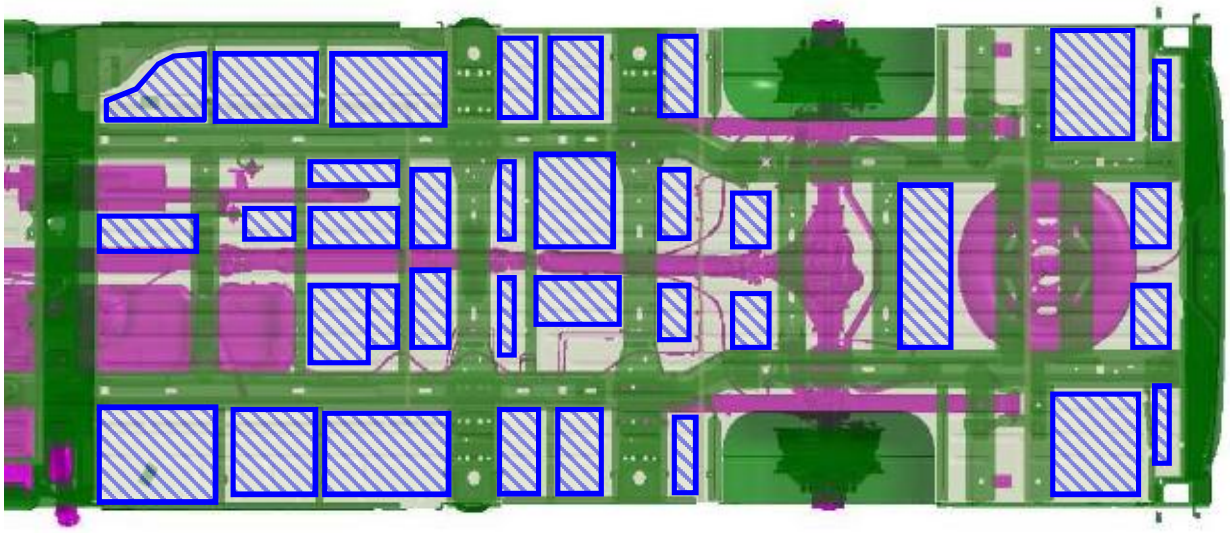
Single wheel rear drive panel van L3



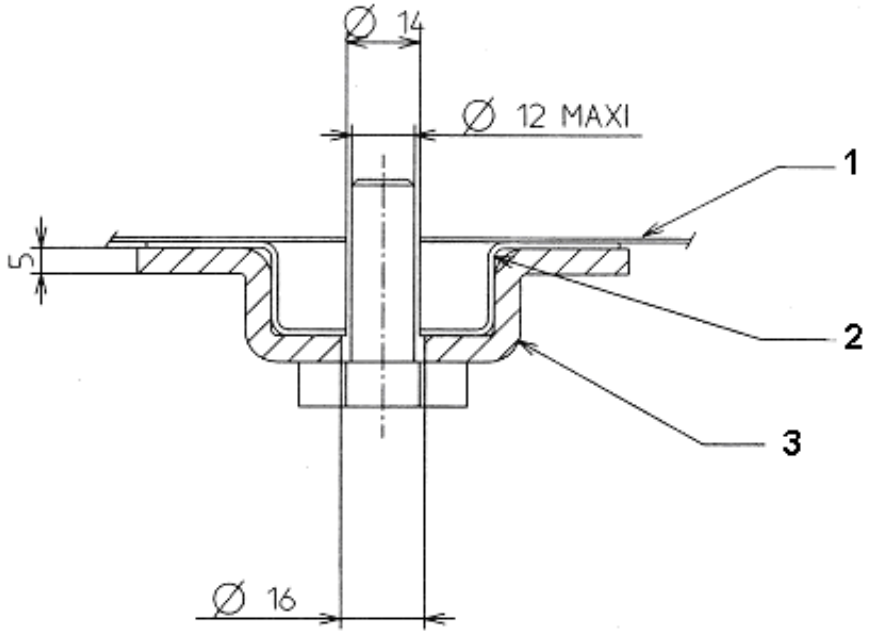
Twin wheel rear drive panel van L3



Twin wheel rear drive panel van L4



CROSS MEMBER FASTENING DIAGRAM



Pos.	Description
1	Loading bed
2	Floor reinforcement cross member
3	Reinforcement flange

5.2.3 DRILLING AREA ON CAB FLOOR

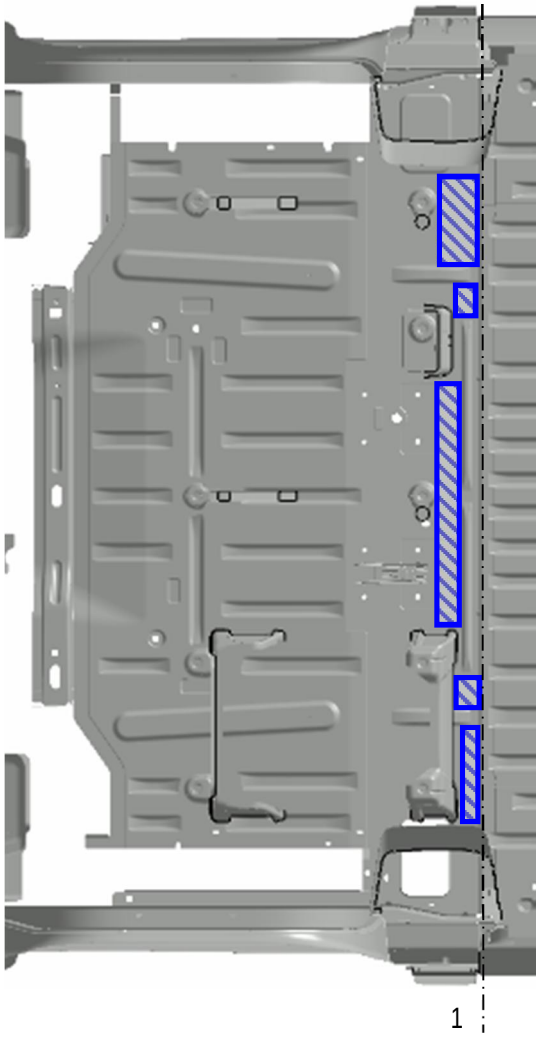
Points between the driver's seat and the cab partition in right- and left-hand drive vehicles have been identified as drilling areas.

The maximum dimension of the hole to be drilled is Æ30mm.

After drilling, the filings or shavings must be vacuumed and a corrosion inhibitor used; please refer to the "Specific Corrosion Guidelines". Use a grommet for protection and a silicon seal for water tightness.

Attention:

Before any drilling is performed, take note of the various elements such as wiring, brake pipes, hand brake cables, the fuel tank, etc.



Pos.	Description
1	Limit between the cab floor and the loading area

5.3 ROOF CUT OUTS

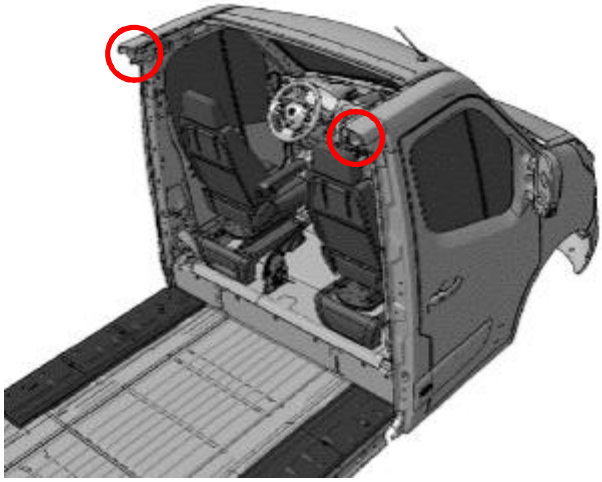
5.3.1 CAB ROOF AND REINFORCEMENTS

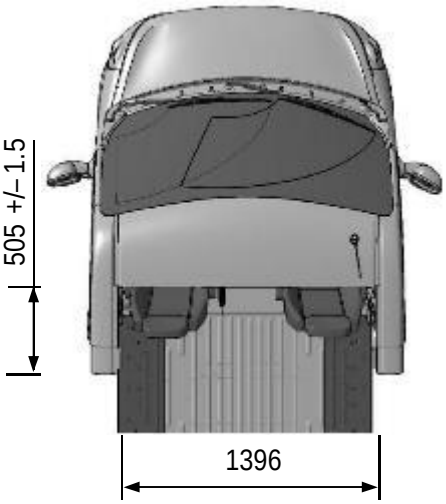
Platform cabs and chassis cabs specific to campervans have a specific rear aspect and roof.

Due to the presence of additional structural reinforcement, these versions meet regulatory requirements on seatbelt anchor points (ECE14).

CAMPER VAN VERSIONS

Platform cab

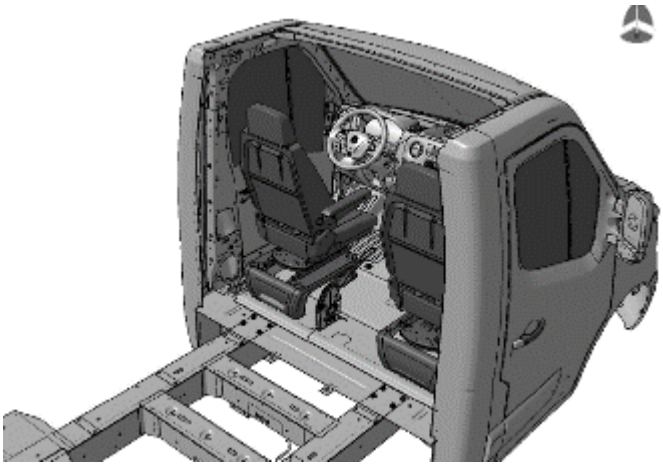


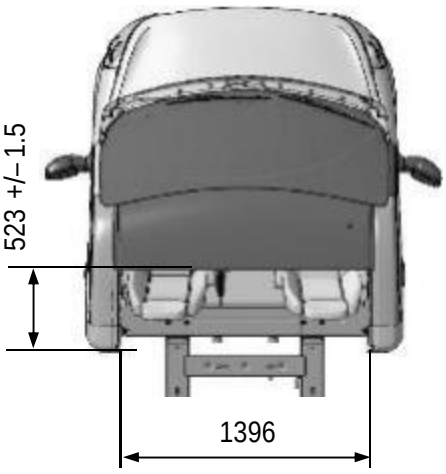


Note:

The rear section of the upper cantrail can be cut down by 156mm on platform cab versions.

Chassis cab



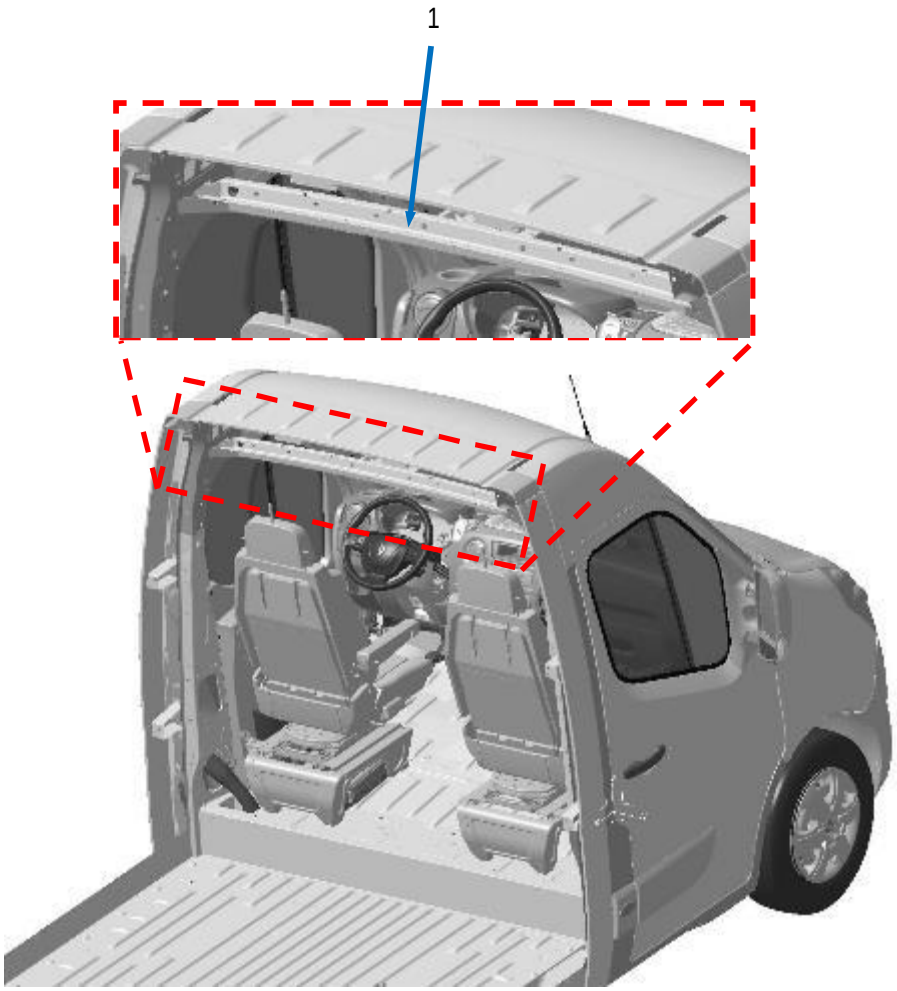


Platform cab versions with roof H2

It is possible to remove the cross member (1) for basic vehicles fitted with:

- 2 individual seats
- 2 suspended seats
- 2 individual campervan seats

It is forbidden to remove the cross member (1) for vehicles fitted with a 2-seater bench.



Panel van versions H2

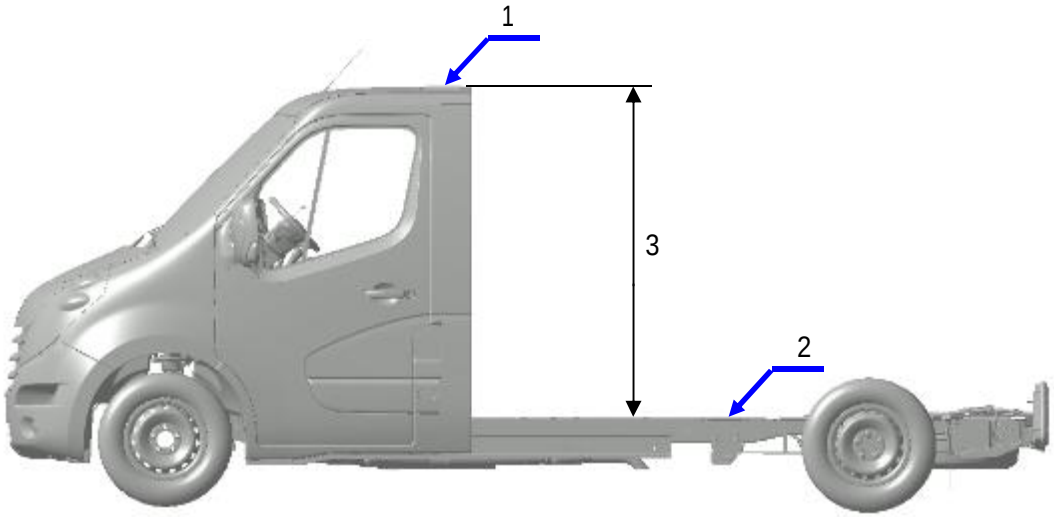
It is possible to remove the cross member (1) for basic vehicles fitted with:

- 2 individual seats
- 2 suspended seats
- 2 individual campervan seats

It is forbidden to remove the cross member (1) for vehicles fitted with a 2-seater bench.

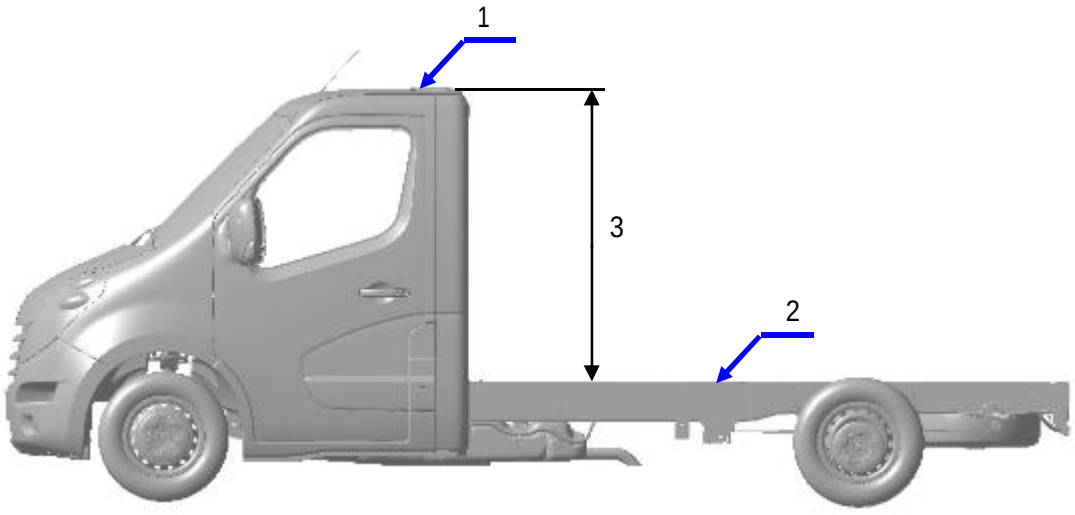
5.3.2 ROOF-HEIGHT ON PLATFORM CAB

Platform cab



Pos.	Description
1	Cab roof
2	Loading bed
3	Roof version H1: 1,747.5mm; Roof version H2: 1,941.7mm

Chassis cab, front or rear wheel drive

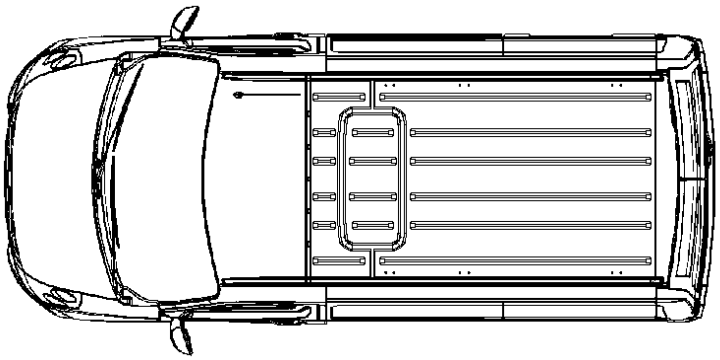


Pos.	Description
1	Cab roof
2	Rear side member
3	Roof version H1: 1,569mm

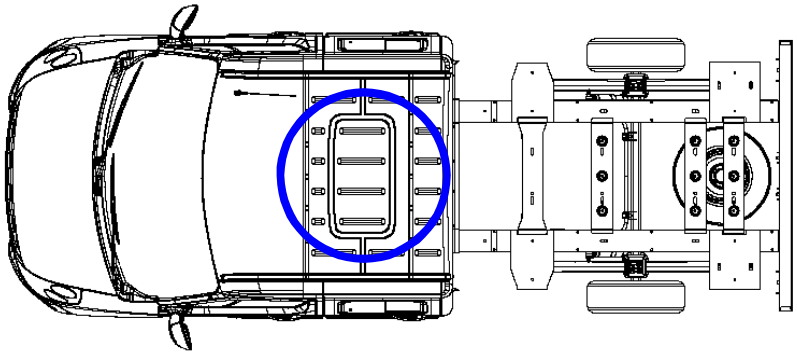
5.3.3 SUNROOF AND EMERGENCY EXIT

The roofs of some bodywork versions are marked out for cutting out and installing a sunroof and/or an emergency exit.

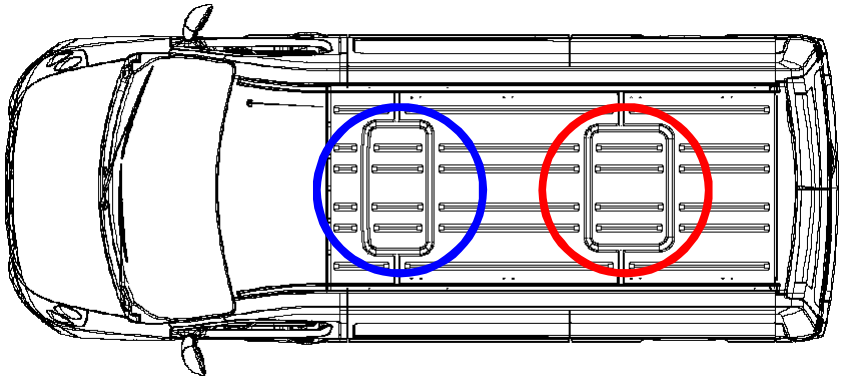
Sunroof Panel vans L1H1



Sunroof chassis double cab L2H2



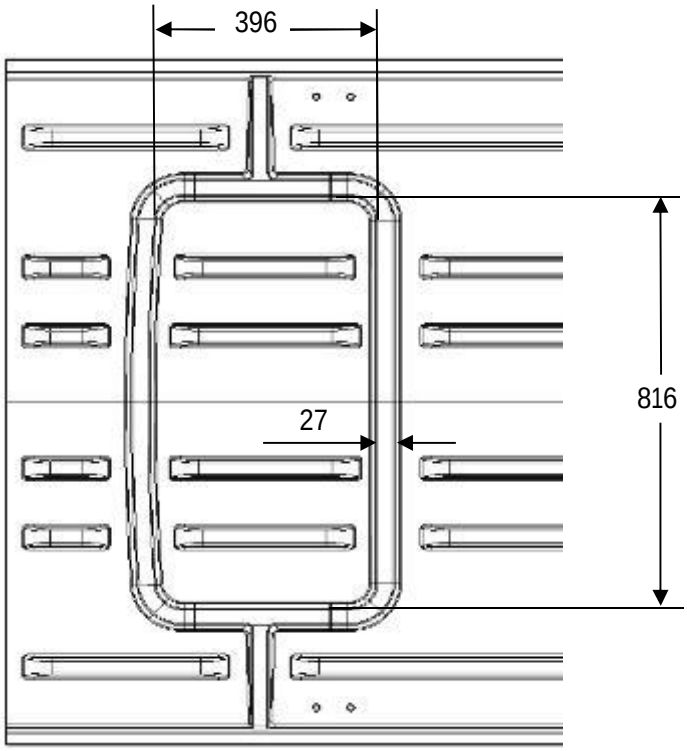
Sunroof and emergency exit panel vans L2H2/L3H2/L4H2



Attention:

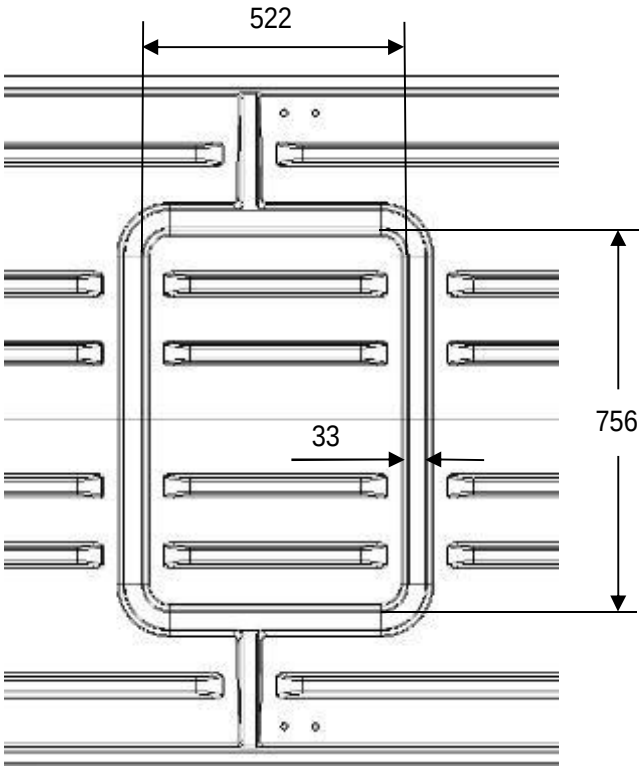
For passenger transport vehicles fitted with emergency exits in the roof, it is forbidden to block or even partially obstruct these openings when installing roof racks or roof bars.

Dimensions of the sunroof cut-out



Values in mm

Dimensions of the emergency exit cut-out



Values in mm

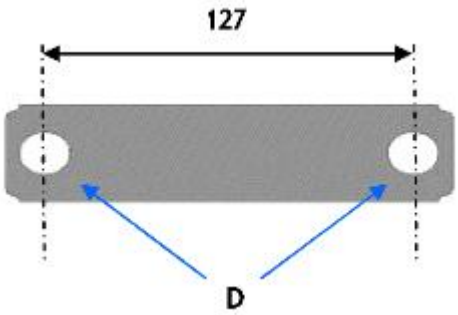
5.4 CHASSIS CAB, INSTALLATION OF A BODY

5.4.1 SETUP FASTENINGS ON THE CHASSIS

All bodies require a continuous mounting frame or a substructure that assumes the function of a continuous mounting frame to ensure a reliable connection between the chassis and the body.

- The subframe must be attached with the vehicle parked on a horizontal surface.
- The mounting frame cross members must be located above the chassis frame cross members.
- The subframe must be rigid enough to support the forces involved in conversion.
- The mounting frame longitudinal members must extend as far towards the front of the vehicle as possible, to reinforce the point behind the cab which is critical with regard to bending stress.
- The subframe must rest on the entire surface of the plates to ensure even load distribution.
- Plan a gradual reduction of the section of the subframe in the front, in order to avoid a breakage zone.
- Use all interior and exterior attachments on the longitudinal frame member of the vehicle.
- First bracket behind the cabin must be with flexible attachment. For the screw connections disc springs are recommended.
- The body must have a torsion-free attachment to the body support brackets on the longitudinal frame member.
- All disassembled parts must be reassembled.

Fixing plate



Angle brackets

The plates are welded to the upper surfaces of the side members.

D = Ø 10 mm all fixing plates, except directly behind the cab.

D = Ø 12 mm directly behind the cab only.

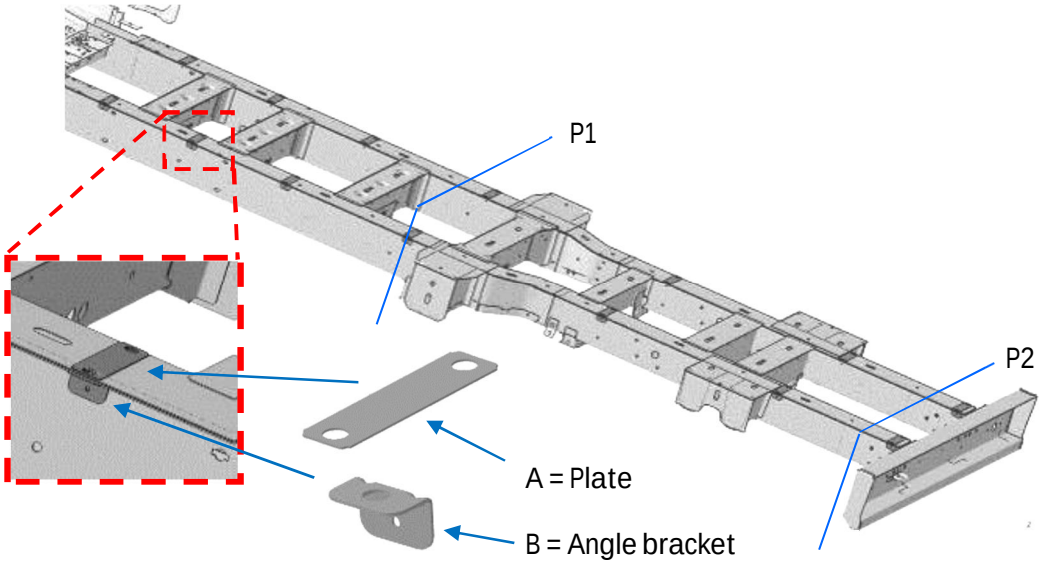
The angle brackets are only present on the exterior wings of the side members, except in front of the rear end cross member (surface P2), where they are also on the interior wings of the side members.

On CHASSIS CAB and DOUBLE CAB MOVANO, there are 2 types of attachment according to the two examples below:

- TWIN-WHEEL vehicles
- SINGLE-WHEEL vehicles

Twin wheel chassis types.

Attachment details

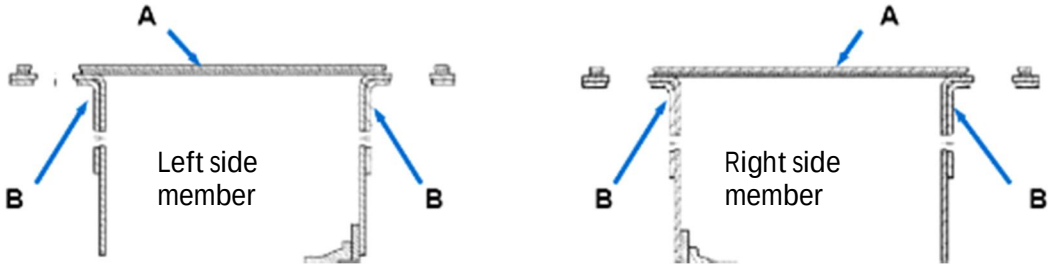


The plates (A) are welded to the upper surfaces of the side members. The angle brackets (B) are only present on the exterior wings of the side members, except in front of the rear end cross member (surface P2), where they are also on the interior wings of the side members.

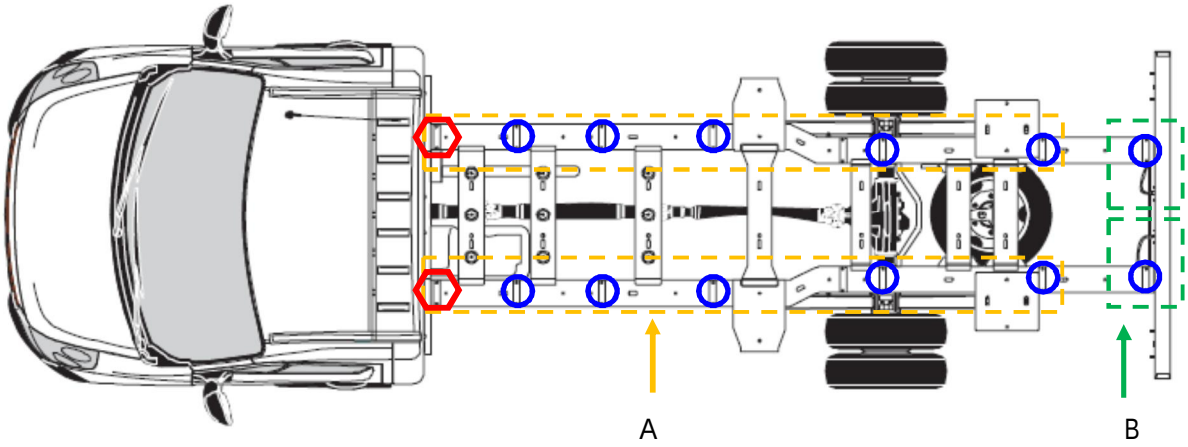
Version	Wheelbase	
	3682 [A / B]	4332 [A / B]
Single cab – rear wheel drive – single wheel	12 / -	14 / -
Single cab – rear wheel drive – twin wheels – short rear overhang	10 / 12	–
Single cab – rear wheel drive – twin wheels – long rear overhang	12 / 14	14 / 16
Double cab – rear wheel drive – single wheel	8 / -	10 / -
Double cab – rear wheel drive – twin wheels – long rear overhang	8 / 10	10 / 12

Section - P1

Section - P2



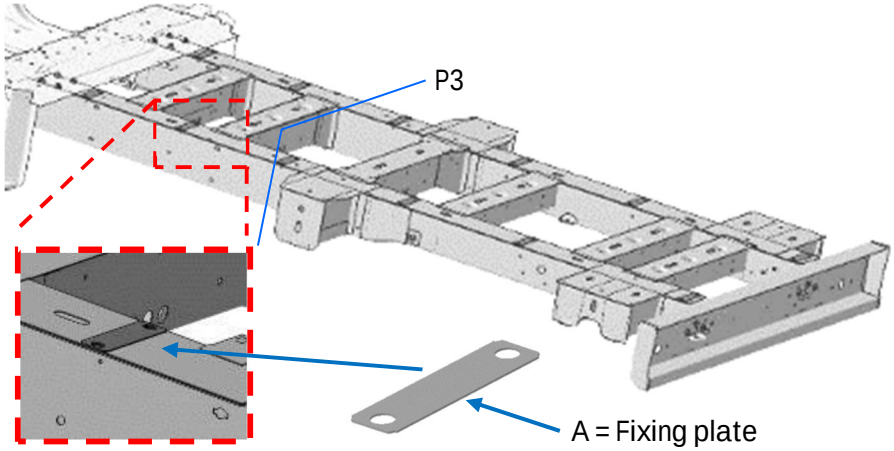
Overview: distribution of brackets and fixing plates



A	Brackets outside the side members
B	Brackets inside & outside the side members
⬡	Flexible assembly (D = Ø 12mm), on the back of the cab
○	Rigid assembly (D = Ø 10mm).

Single wheel chassis types

Attachment details



The plates (A) are welded to the upper surfaces of the side members. These chassis types have no angle brackets (B).

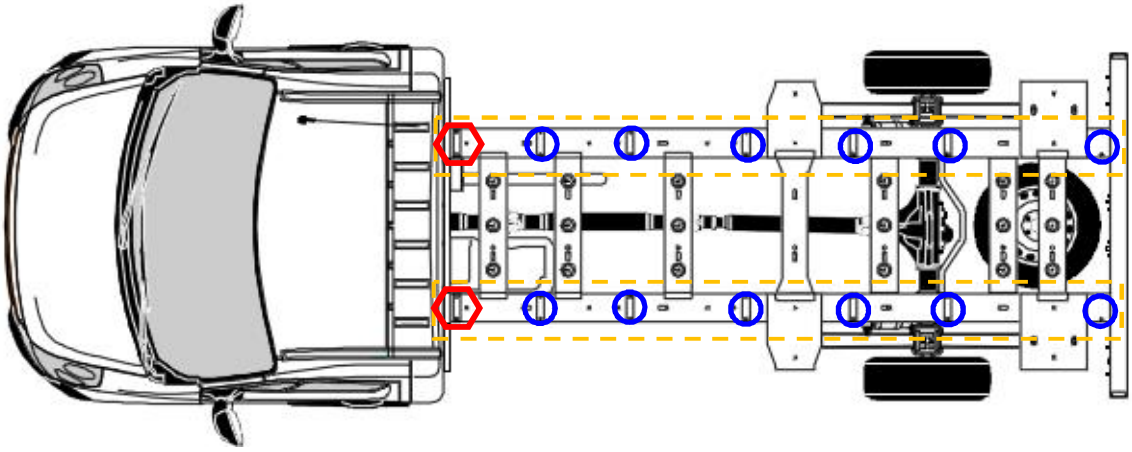
NUMBER OF ATTACHMENTS DEPENDING ON THE VERSION

Version	Wheelbase 3682 [A / B]	Wheelbase 4332 [A / B]
Single cab – front wheel drive	12 / -	14 / -
Double cab – front wheel drive	8 / -	10 / -

Section - P3

Left and right side members

Position of fixing plates



⬡	Flexible assembly (D = Ø12mm), on the back of the cab
○	Rigid assembly (D = Ø10mm)

5.4.2 INSTALLATION OF THE SUBFRAME

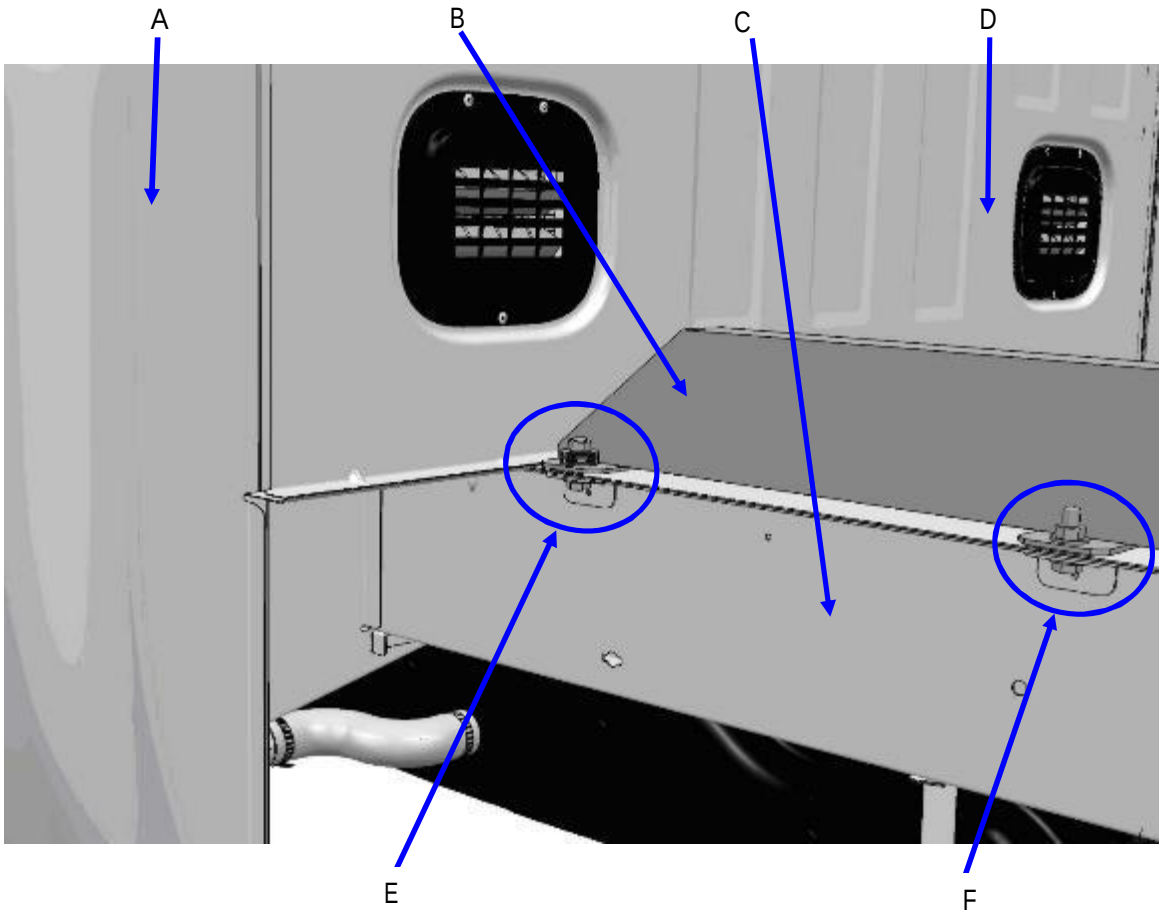
In order to attach the subframe, all positions available on the side members must be used.

The first row (on the back of the cab; point E) with a hole diameter of 12mm must be a flexible assembly.

For all other attachments, it must be rigid (points F) with a hole diameter of 10mm.

The nuts used must be self-locking (radial buckle nuts or nuts with thread locks). The threaded part of the screws must protrude from the nut by at least three threads, regardless of the stack assembly.

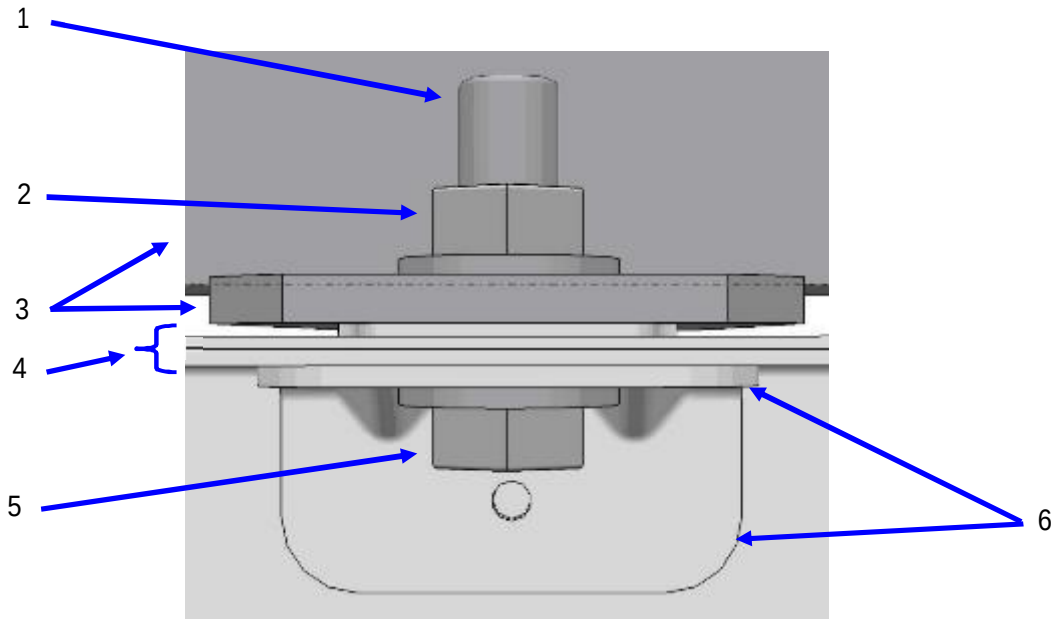
.



Pos.	Description
A	Cab side wall
B	Subframe with gradual reduction of the section
C	Side member
D	Back of the cab
E	First bracket with flexible attachment (stack of spring washers)
F	Bracket with rigid attachment

Installation

Rigid attachment



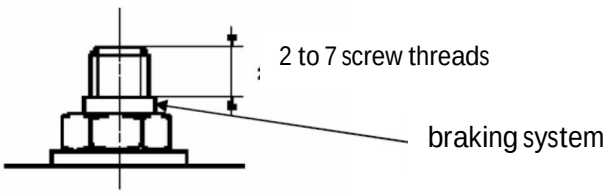
Pos.	Description
1	Screw thread projection
2	Nut H RDL M10 x 125 (150 permitted) grade 10.9
3	Subframe
4	Side member + plate assembly
5	Bracket
6	Angle bracket (rear wheel drive only)

Tightening torque:

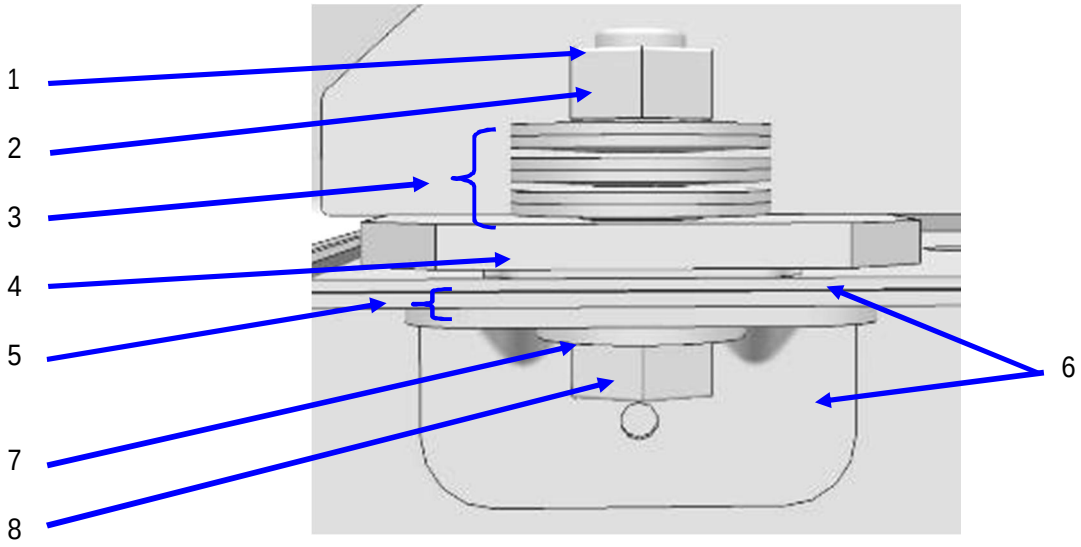
M10x125	54.9Nm if thread lock used on the screw or 62.9Nm with radial buckle nut.
M12x120	94Nm if thread lock used on the screw or 102Nm with radial buckle nut.

Usage recommendation:

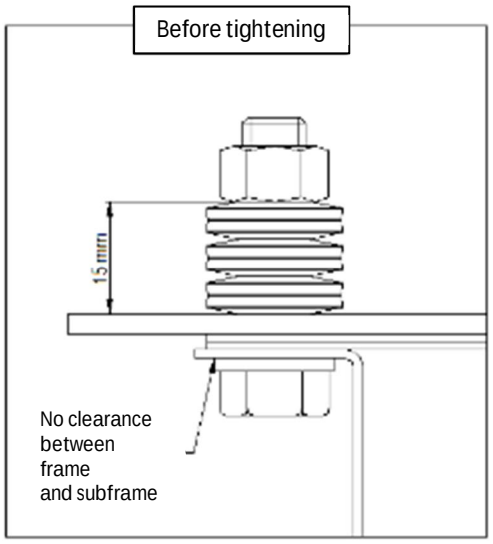
for the braking function to be completely effective, the nut screwed into the actual assembly must allow the screw to protrude min. 2 and max. 7 threads (measured outside the ogival, cylindrical or conical end).



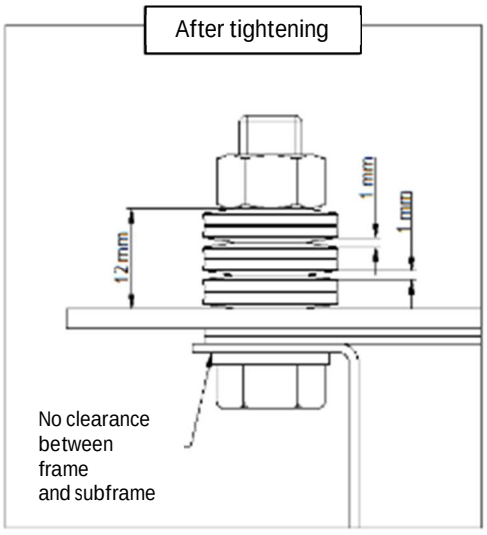
Flexible attachment



Pos.	Description
1	Screw thread projection
2	Nut H M12 x 150 grade 10.9
3	6 spring washers (Belleville) int. Ø 12.3mm ext. Ø 34mm thickness 1.5mm
4	Subframe
5	Side member + plate assembly
6	Angle bracket (rear wheel drive and twin wheels only)
7	Plain washer M12x27x2.5mm
8	Screw H M12 x 150-40 10.9 grade



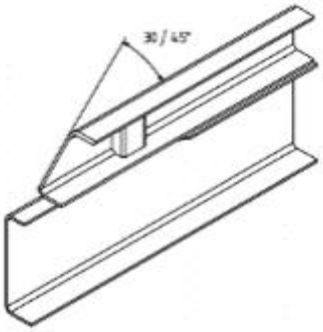
Value is 15mm when the spring washers in the stack are touching and free to rotate.



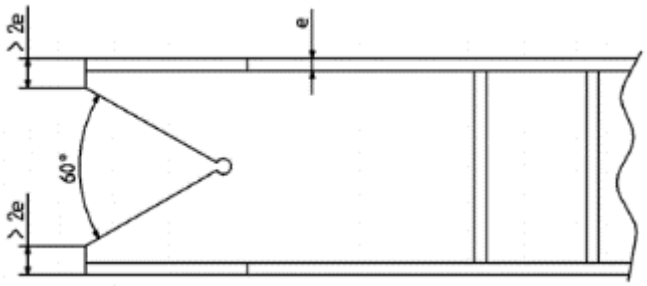
The measure is about 12mm (equivalent to 2 turns of the screw). This results in a spacing of about 1mm between each pair of spring washer.

5.4.3 RECOMMENDATION FOR PRODUCTION OF THE MOUNTING FRAME

The mounting frame longitudinal members must extend as far towards the front of the vehicle as possible, to reinforce the point behind the cab which is critical with regard to bending stress, as well as to prevent vibration problems. To better distribute the forces on the longitudinal members, it is mandatory to provide a front cut (see examples below), as far as possible under the cab. To ensure proper connection between the vehicle chassis and the superstructure (bodywork), you must use, for all conversions, a false chassis or underfloor (self-supporting superstructure), which serves as the false chassis.



Example 1



Example 2

Note:

- The false chassis must rest on all of the plates to ensure even load distribution.
- The false chassis must use all the fastening points (interior and exterior) provided on the side members.
- The false chassis must be rigid enough to support the forces involved in conversion.
- The false chassis must be fastened with the vehicle parked on a horizontal surface.
- The false chassis side members must be reduced gradually; in order to distribute the forces across the vehicle's side members more evenly, a specific cut must be made on the front of the false chassis side members (see examples of built chassis side members below).

1. False chassis side member

Regardless of the shape of the side members on the base vehicle, the false chassis side member may follow the chassis shape (fig1) or be rectilinear (fig 2).

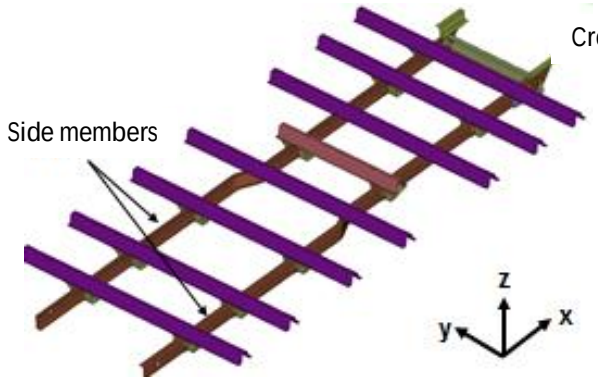


Fig. 1 – False chassis following the chassis shape

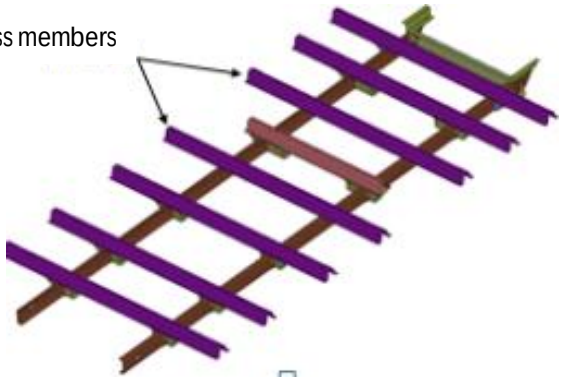
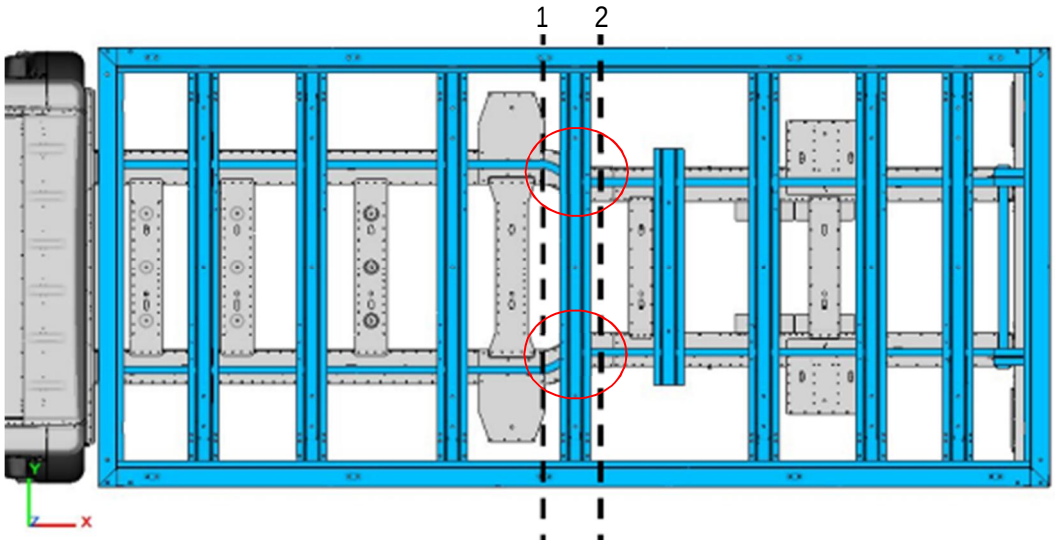


Fig. 2 – Rectilinear false chassis shape

2. Cross members on twin wheel false chassis

A cross member must be located where the „S“ is shown on the base vehicle cross member.

è Cross member to be positioned between markers 1 and 2



3. Link between the side member and the cross member of the false chassis

The side member and cross member connection on the false chassis must fixed against rotation, regardless of the concept: cross members above the side members or cross members on the same "Z" level as the side members;

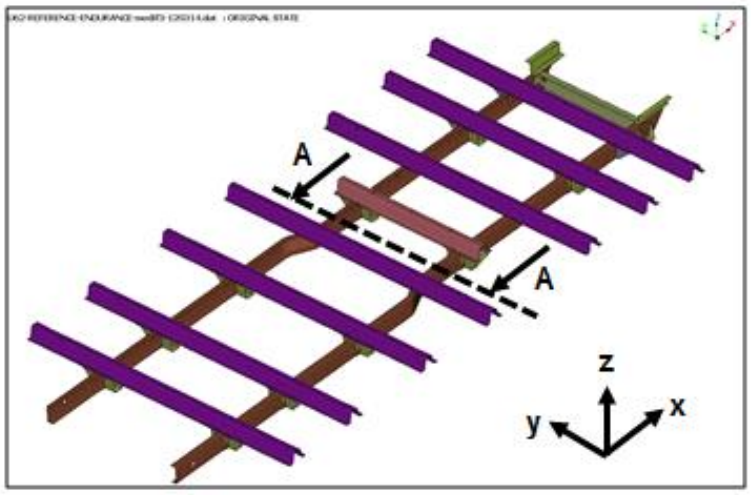
è Every cross member (on the false chassis) must be connected to the side member (on the false chassis using at least 2 „connecting elements" on either side of the cross member.

** Connecting element = screws, welding, riveting.*

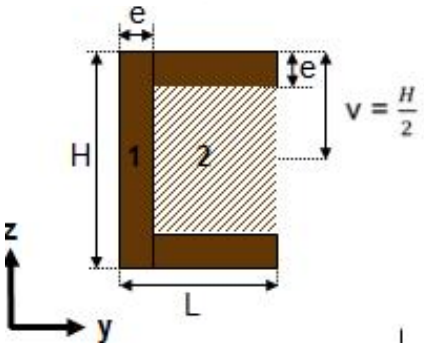
4. Inertia of the false chassis side member

è For a steel structure, the minimum inertia module per side member will be >= 17.000 mm³;

this is valid for tippers, platforms and large volumes.



Section A-A:



$$Iy_1 = \frac{L \cdot H^3}{12} - \frac{(L-e) \cdot (H-2e)^3}{12} \quad et \quad \frac{Iy_1}{v} = \frac{2 \cdot Iy_1}{H}$$

$$\frac{Iy_1}{v} = 17000\ mm^3\ minimum$$

5. Quality of materials for the false chassis

- Steel: recommendation (more specifically for side members) HX220YD (EN standard) or S235JRG2.

Material	Alasticity limit (MPa)	Tensile strength (MPa)
S235JRG2	≥ 235	340-510
HX220YD	220-280	340-420

Attention:

- In place of these two "steels" above, you may use equivalent materials compliant with US (SAE/ASTM J403/J412/J413), Japanese (JIS G3445) or British (BS 970) standards.
- In the case of an aluminium false chassis, its bending strength (E x I) must at least be equal to that of a steel false chassis; refer to the aluminium manufacturer's indications.

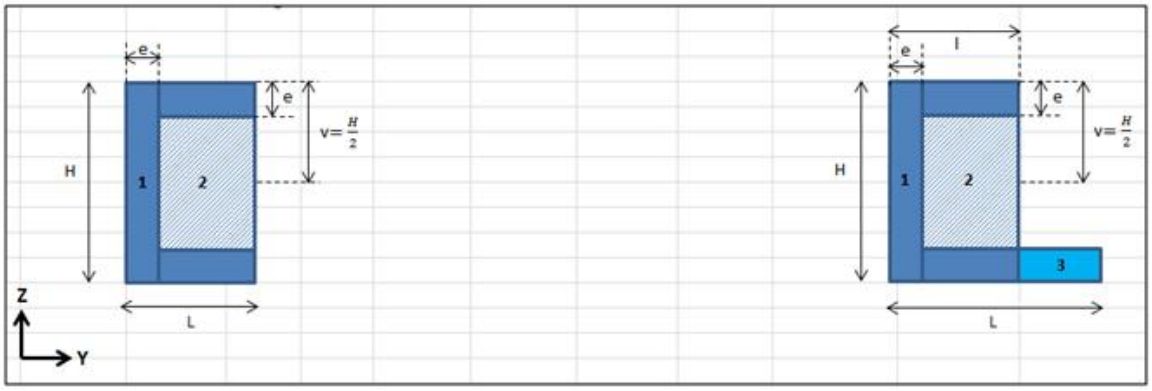
6. Profile dimensions and dimensions of the false chassis side members

For side members may be used:

- U-shaped chamfered profiles
- Profiles available on the market for automotive construction
- Box profiles.

Side member dimensions depend on the inertia module (Iy/v in mm3) required for the superstructure and the chassis.

Examples of false chassis side member inertia:



Cross section (mm)

Cross section (mm)				Iy/v (mm^3)
H	L	I	e	
120	40	40	2.5	16,788
150	52	52	3.5	37,418
190	140	60	2.5	41,643
140	90	50	4	37,386

Calculation and geometry

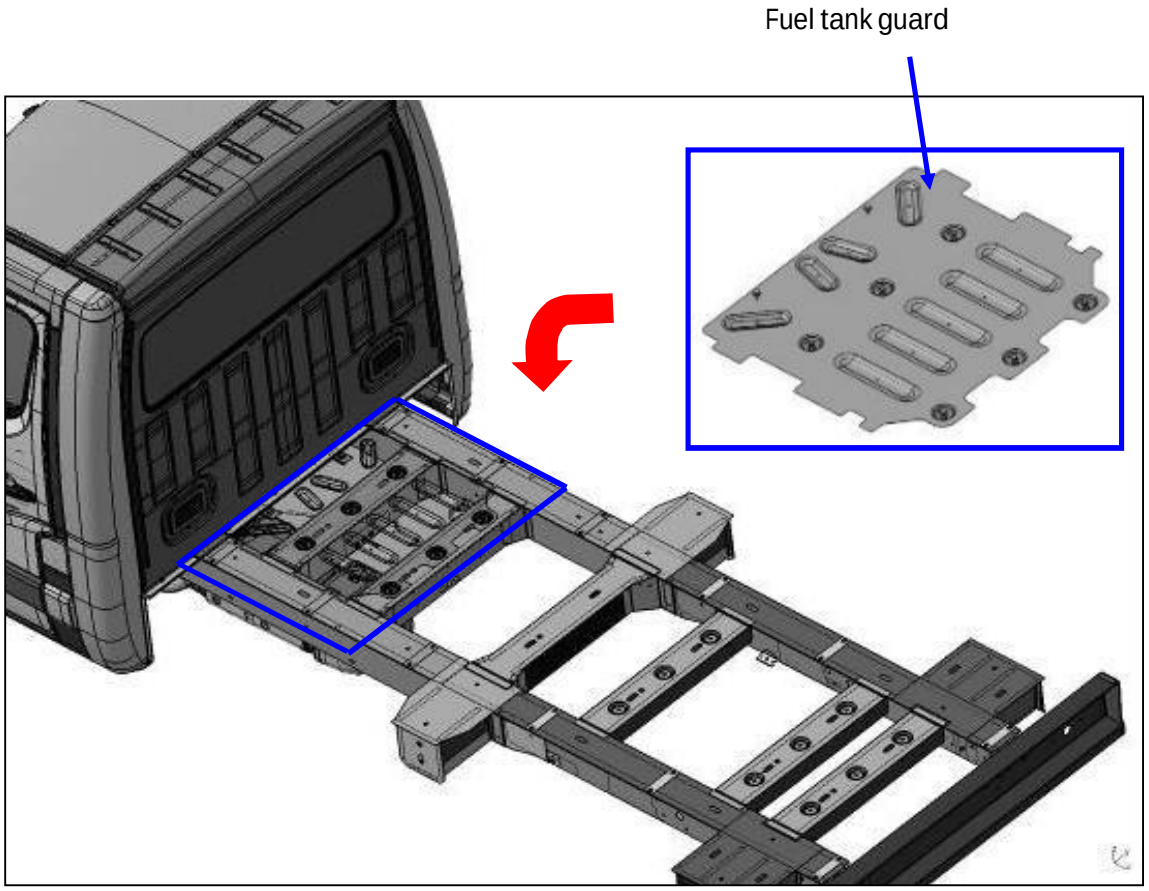
Example of insertable shapes

Dimension/ shape type	Inertia in mm^4	Module/ inertia (I/V in mm^3)
Tube 60x60x3	351 000	11 700
Tube 60x80x5	657 000	21 900
Tube 80x80x3	878 000	21 950
Tube 100x50x3	1 064 000	21 280
U 80x50x5	798 000	19 950
U 100x60x5	1 580 000	31 625
U 120x60x6	2 810 000	46 843
U 140x60x6	4 060 000	58 050
UPN 80x45x6	1 060 000	26 500
UPN 100x50x6	2 060 000	41 200
UPN 120x55x7	3 640 000	60 700
UPN 140x60x7	6 050 000	86 400
UPN 160x65x7.5	9 250 000	116 000
UPN 180x70x8	13 500 000	150 000
UPN 200x75x8.5	19 100 000	191 000
UPN 220x80x9	26 900 000	245 000
UPN 240x80x9.5	36 000 000	300 000
UPN 260x90x10	48 200 000	371 000
UPN 280x95x10	62 760 000	450 000
UPN 300x100x10	80 300 000	535 000

Attention:

On all the CHASSIS CAB vehicles (except of the double cab), the fuel tank guard must be installed.

This measure is identical for TRACTION HEADS when the standard fuel tank is carried over onto a specific chassis developed by a body-builder

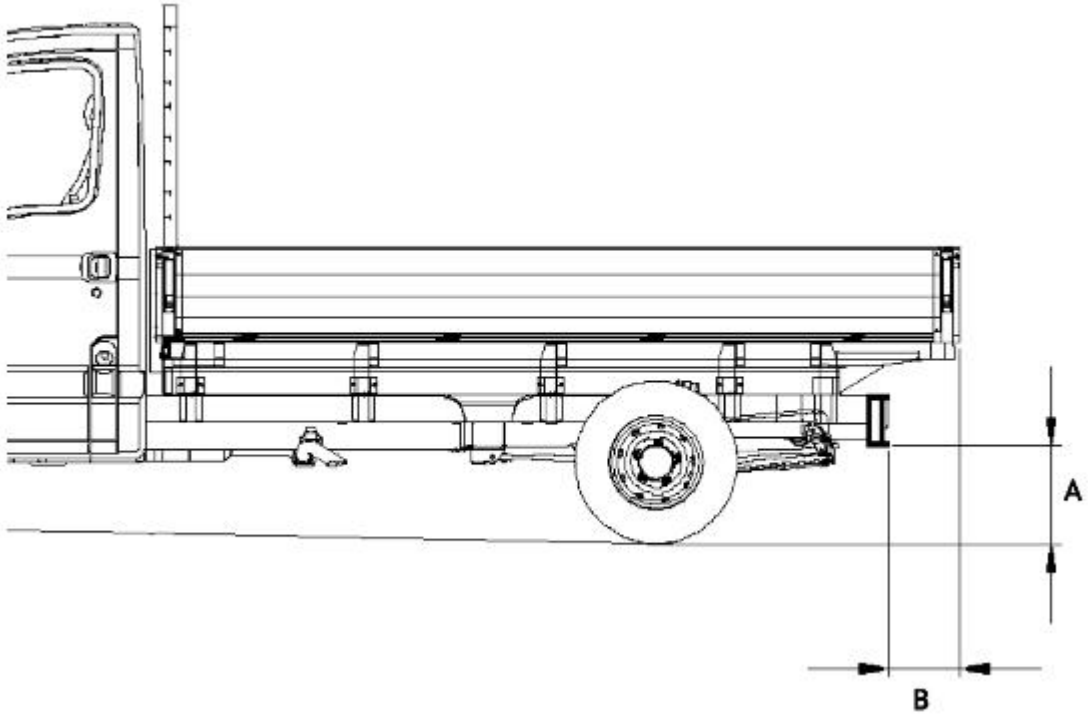


5.4.4 REAR UNDERRIDE PROTECTION

The rear under ride protection on chassis cab versions is explained hereafter in situ on a vehicle fitted with a drop-side flat bed.

The cross member which acts as an under ride protection device is bolted to the end of the side members and has been designed to provide protection to the rear lamps.

Cross member position



A	Max. cross member height: 550mm for N1 and N2
B	Max. cross member recess: 450mm for N1 and 300mm for N2

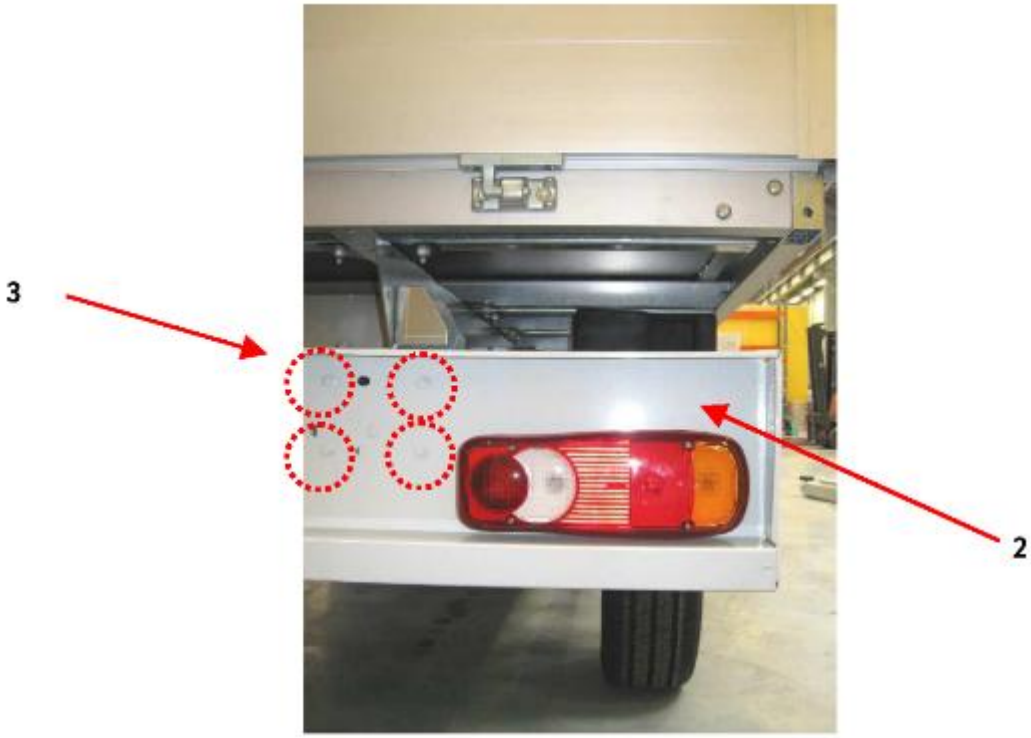
Note:

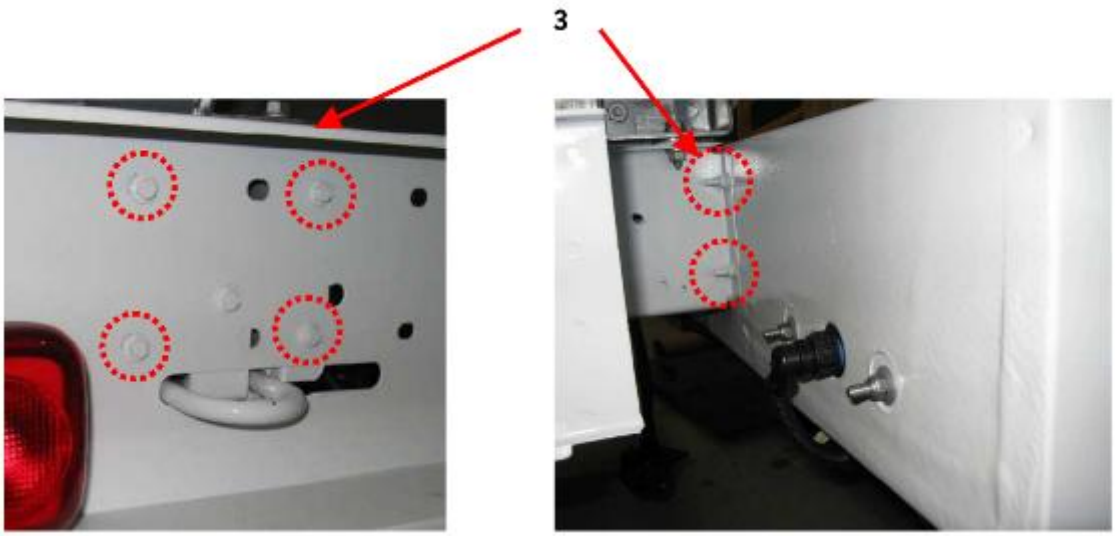
N1: Vehicles for goods traffic; max. permissible weight Up to 3,5t.

N2: Vehicles for goods traffic; max. permissible weight Over 3,5t.

Cross member attachment

(Rear under ride protection)





Pos.	Description
2	Rear under ride protection
3	Bolts attaching the under ride protection to the side members

5.5 PLATFORM CAB, POSITION OF CONNECTIONS ON BODY

5.5.1 POSITIONS OF CONNECTIONS ON CABIN FRAME

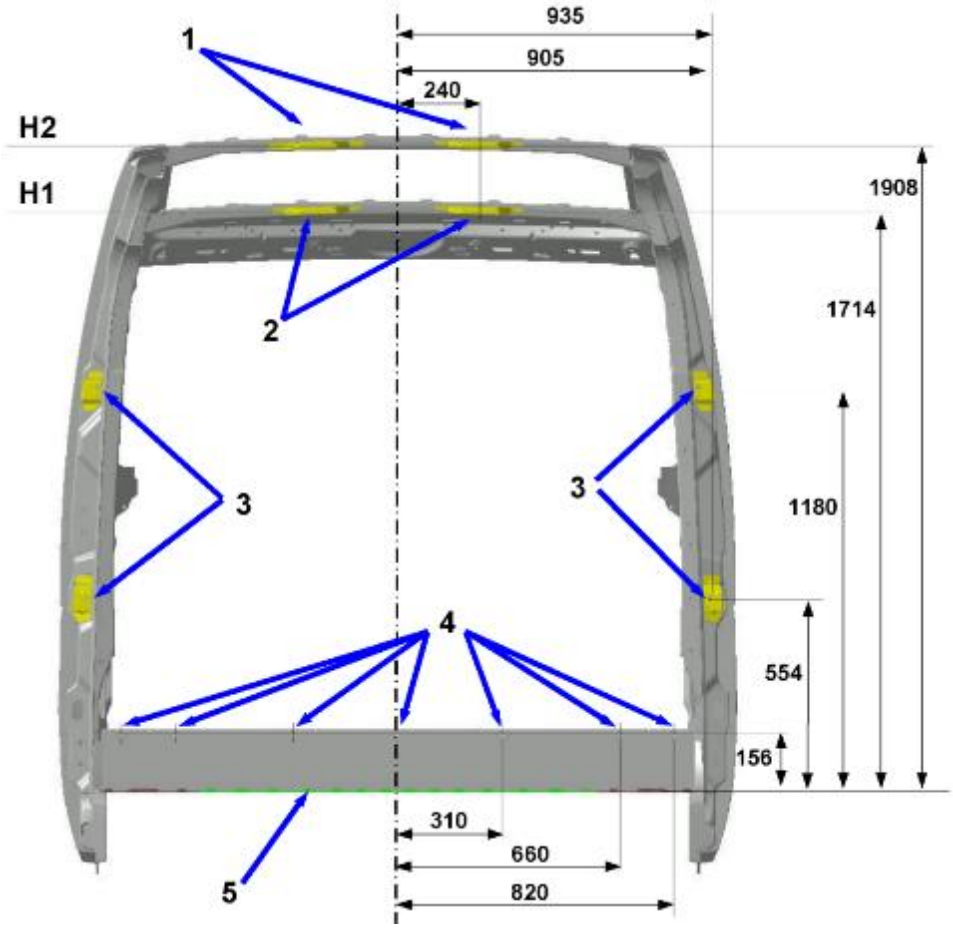
Platform cabs H1 and H2 are fitted with a connection rim as standard. To this rim are added 6 brackets welded to the body.

The start of bodywork dimension is the same for both the H1 and H2 versions.

M8 bolts must be used for attachment to the bodywork. The 6 body brackets must be used. After drilling the body brackets, use a corrosion inhibitor, referring to the “Specific Corrosion Guidelines”.

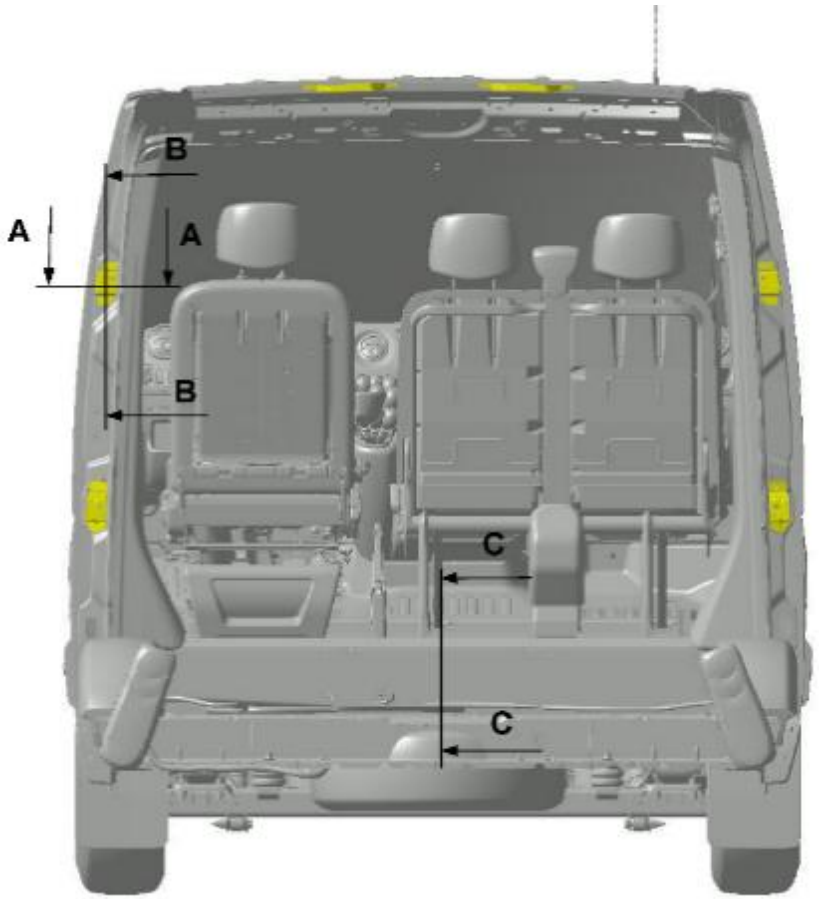
The location of the body brackets is given for both heights (H1 and H2). As the manufacturing variation is ± 3mm along the Y and Z axes, it would be prudent to test out any bodywork attachment in practice.

Platform cab rear ring

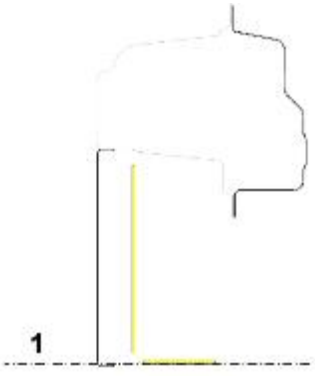


Pos.	Description
1	Upper body brackets H2 (x2)
2	Upper body brackets H1 (x2)
3	Side body brackets H2 or H2 (x2)
4	M8 weld nuts, on rear seat floor cross member (x7)
5	Loading bed

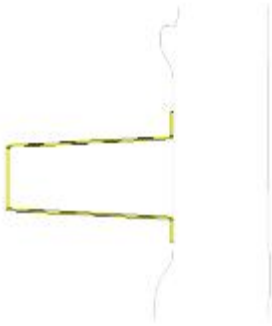
Platform cab H1



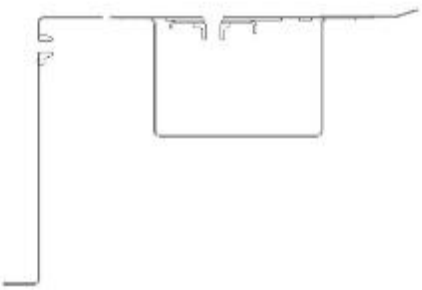
SECTION A-A



SECTION B-B

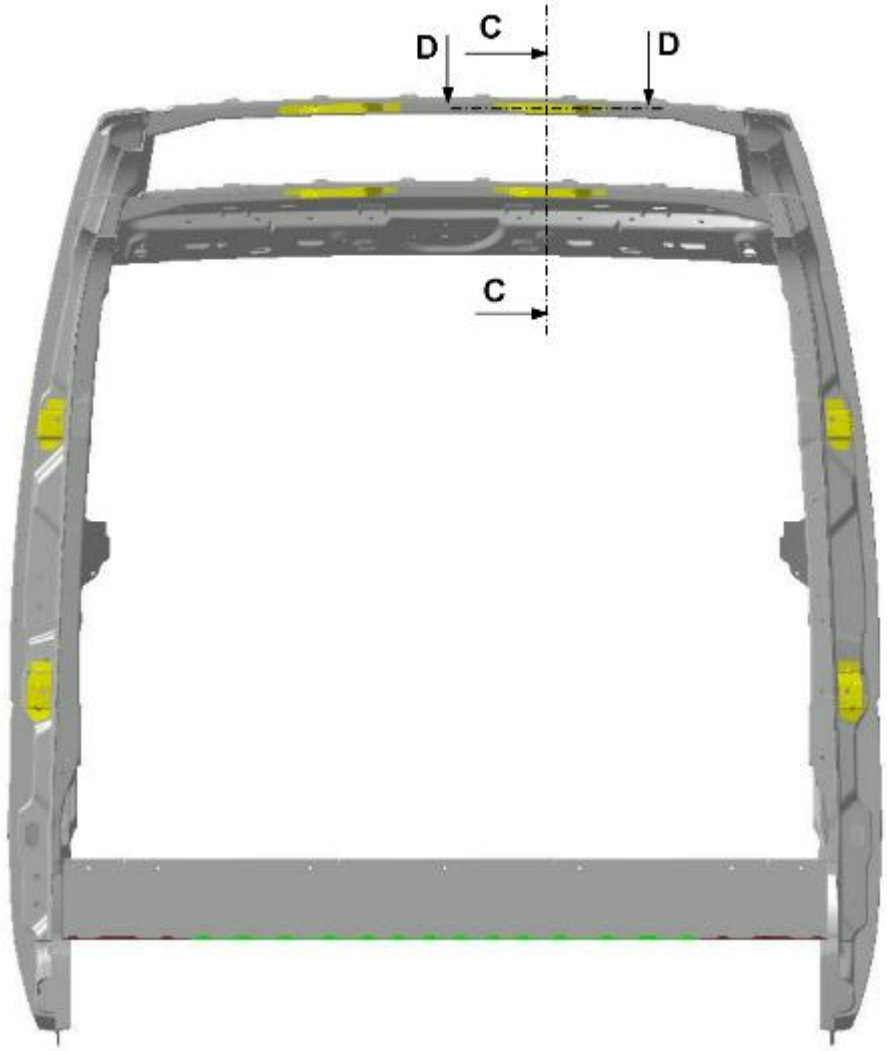


SECTION C-C

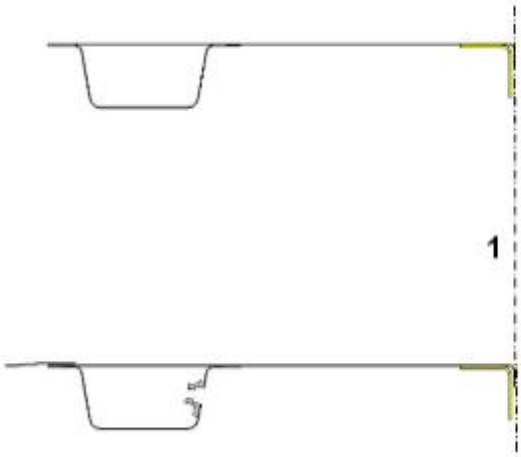


Pos.	Description
1	Start of body work

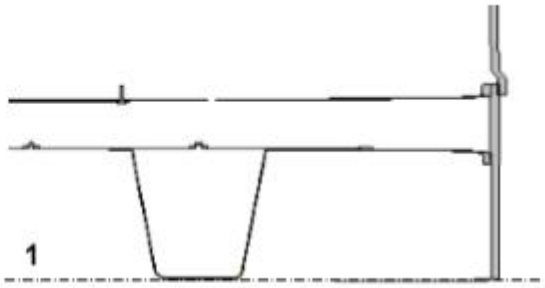
Rear rim H1 and H2



SECTION C-C



SECTION D-D



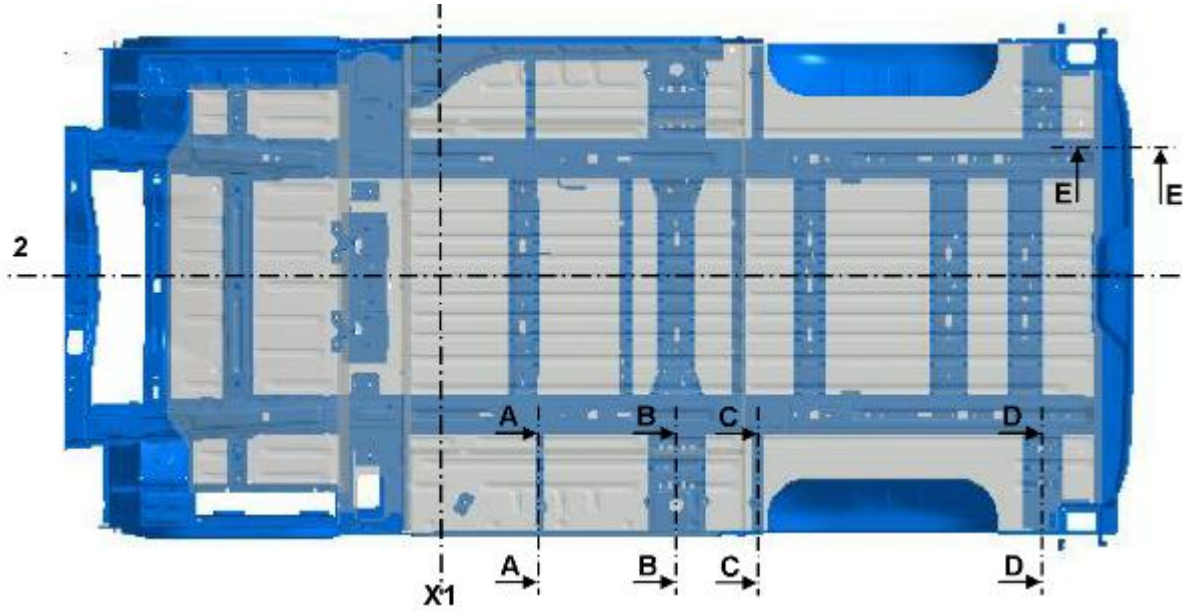
Pos.	Description
1	Start of body work

5.5.2 UNDERFLOOR CROSS SECTIONS

The cross sections of the floor reinforcement are given for the different vehicle wheelbases. A cross section of the rear lower panel is also available for information. For any modifications to the rear lower panel, please refer to the chapter on rear overhang modifications. It should be noted that the rear skirt performs an important structural function.

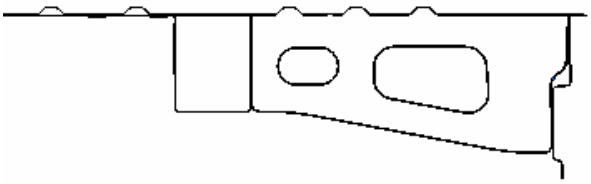
Details of the main under-floor cross sections are given below. Each overview is an aerial view (floor panel transparent). They show the different side members and cross members in the 3 wheelbase configurations. The principle for going from the L1 wheelbase to the L2 wheelbase chosen for the Movano is elongation behind the exhaust outlet zone (or behind the sliding side door for a panel van).

Platform cab L1



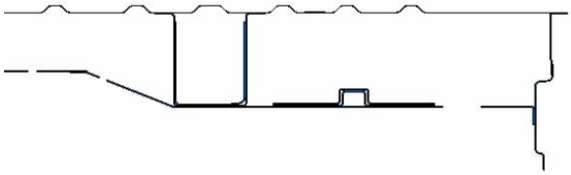
Pos.	Description
X1	Start of bodywork X = 1,598
2	Vehicle axis Y= 0

SECTION A-A



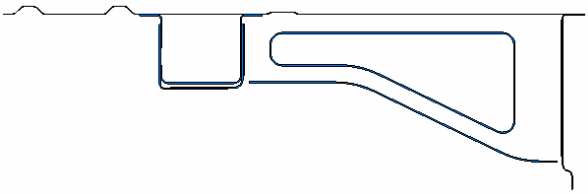
Distance from start of bodywork = 340mm

SECTION B-B



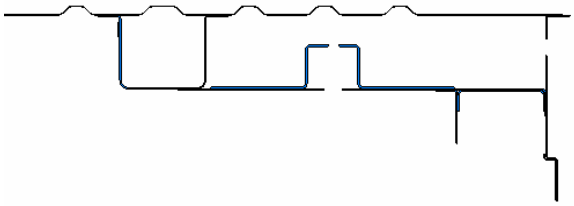
Distance from start of bodywork = 840mm

SECTION C-C



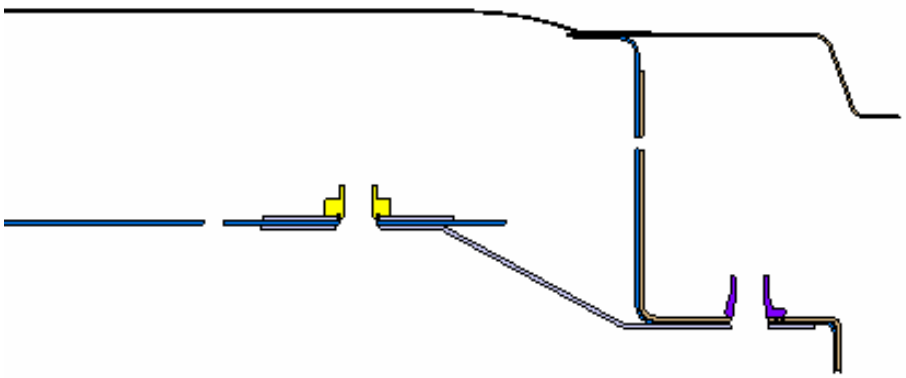
Distance from start of bodywork = 1,140mm

SECTION D-D



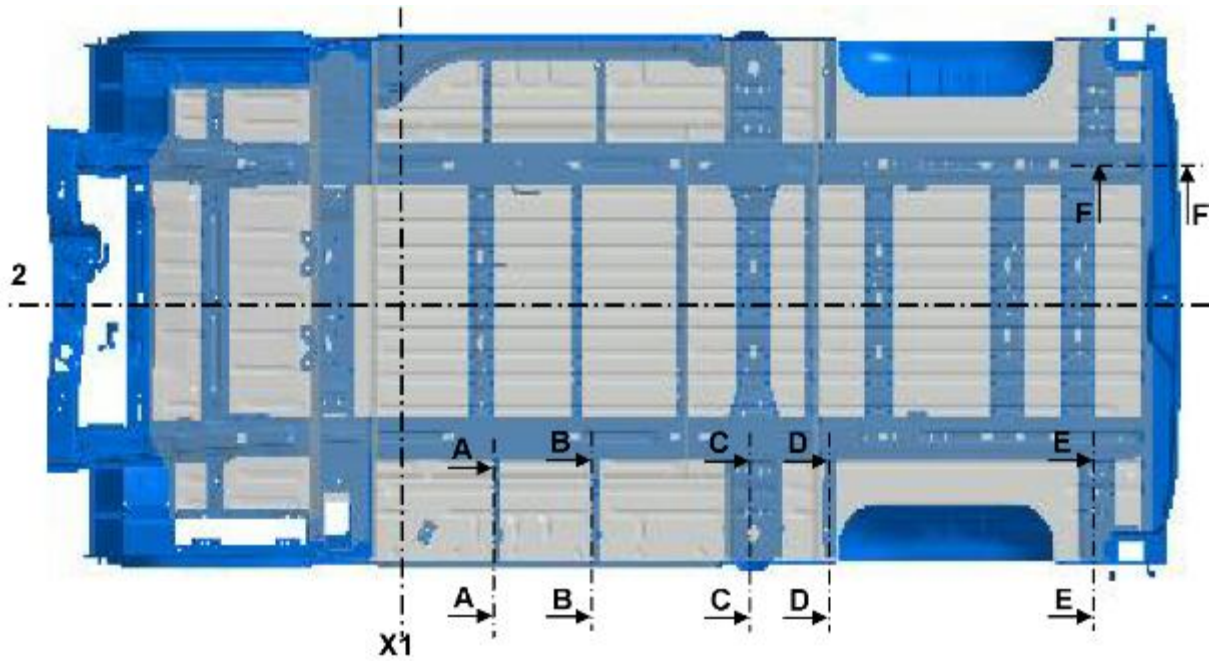
Distance from start of bodywork = 2,165mm

SECTION E-E



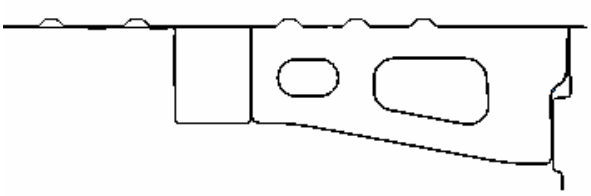
Distance from the vehicle axis Y = 465mm

Platform-cab L2



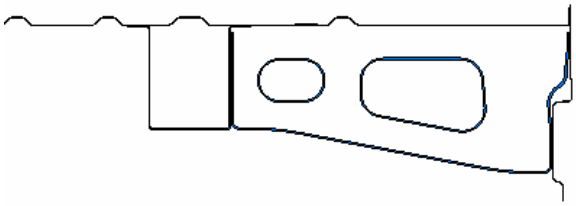
Pos.	Description
X1	Start of bodywork X = 1,598
2	Vehicle axis Y= 0

SECTION A-A



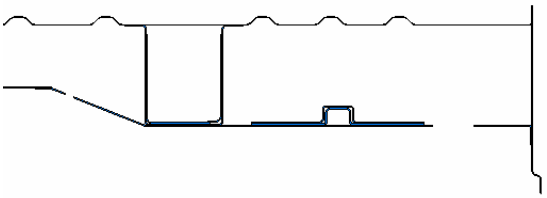
Distance from start of bodywork = 340mm

SECTION B-B



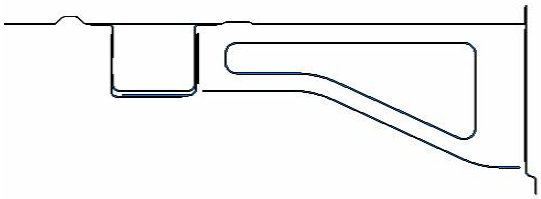
Distance from start of bodywork = 725mm

SECTION C-C



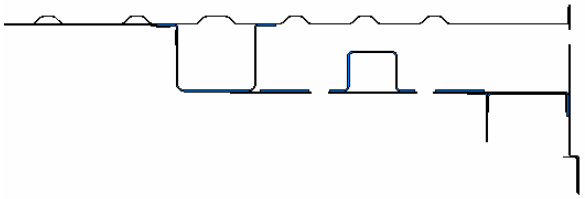
Distance from start of bodywork = 1,340mm

SECTION D-D



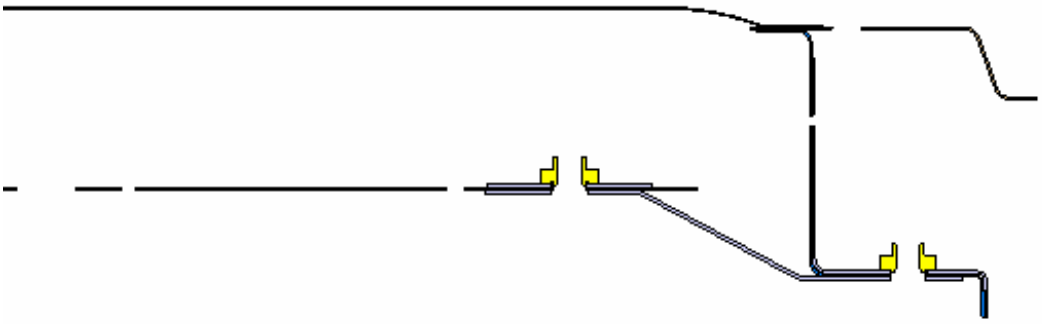
Distance from start of bodywork = 1,640mm

SECTION E-E



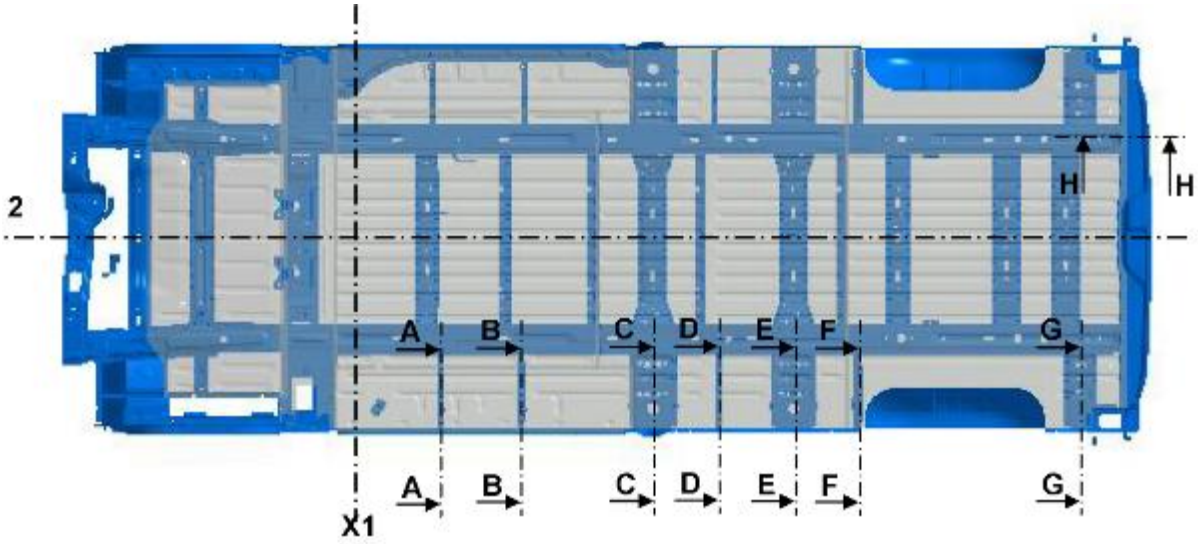
Distance from start of bodywork = 2,665mm

SECTION F-F



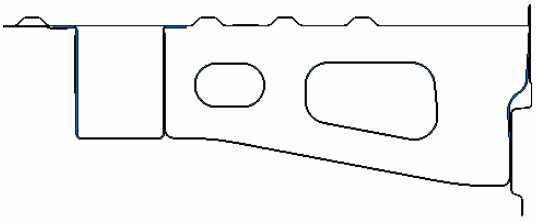
Distance from the vehicle axis Y = 465mm

Platform-cab L3



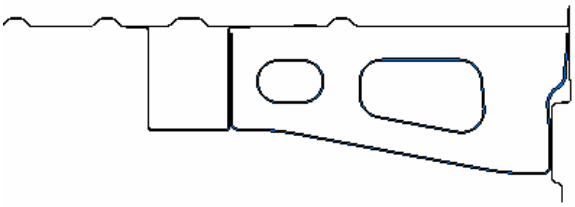
Pos.	Description
X1	Start of bodywork X = 1,598
2	Vehicle axis Y= 0

SECTION A-A



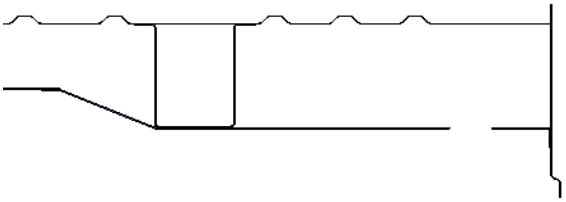
Distance from start of bodywork = 340mm

SECTION B-B



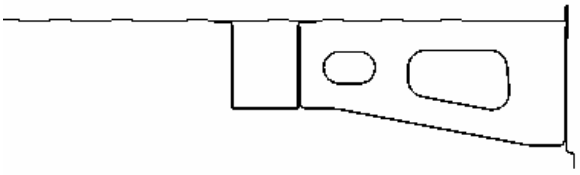
Distance from start of bodywork = 725mm

SECTION C-C



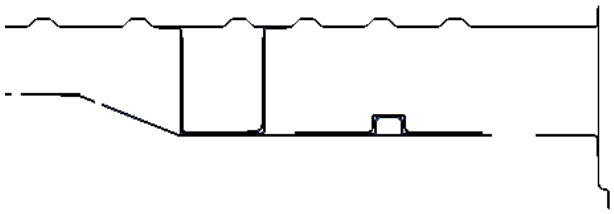
Distance from start of bodywork = 1,340mm

SECTION D-D



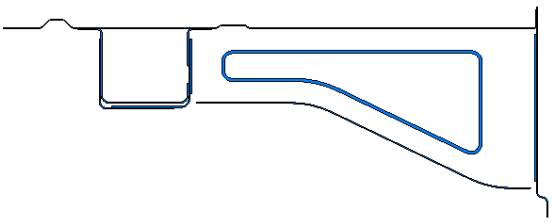
Distance from start of bodywork = 1,640mm

SECTION E-E



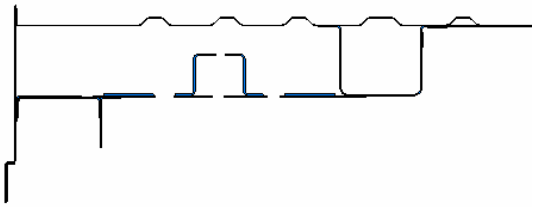
Distance from start of bodywork = 1,990mm

SECTION F-F



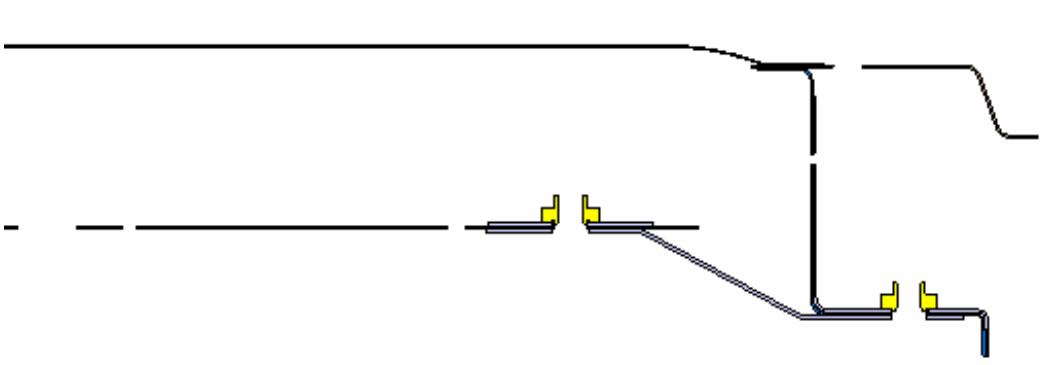
Distance from start of bodywork = 2,290mm

SECTION G-G



Distance from start of bodywork = 3,315mm

SECTION H-H



Distance from the vehicle axis Y = 465mm

5.5.3 POSITION OF CONNECTIONS ON SIDE SILL

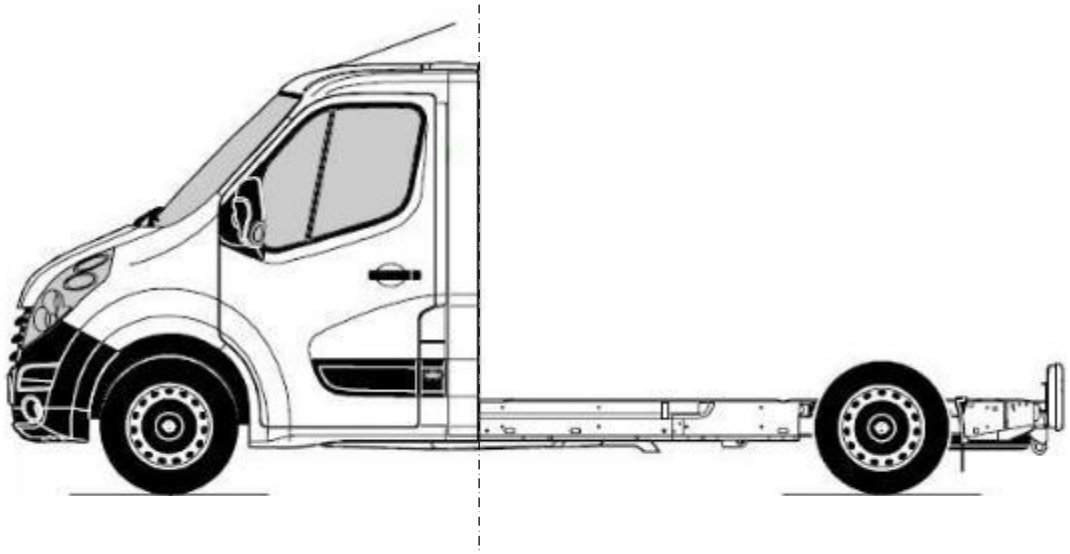
On platform cabs, nuts welded onto the side sill closing can be used to attach bodywork connection supports. A platform cab version should not be used without recreating a structure which gives it inertia and stiffness (in flexing and in torsion... etc.) equivalent to that of a van

The bodywork will be connected to the body in the following order:

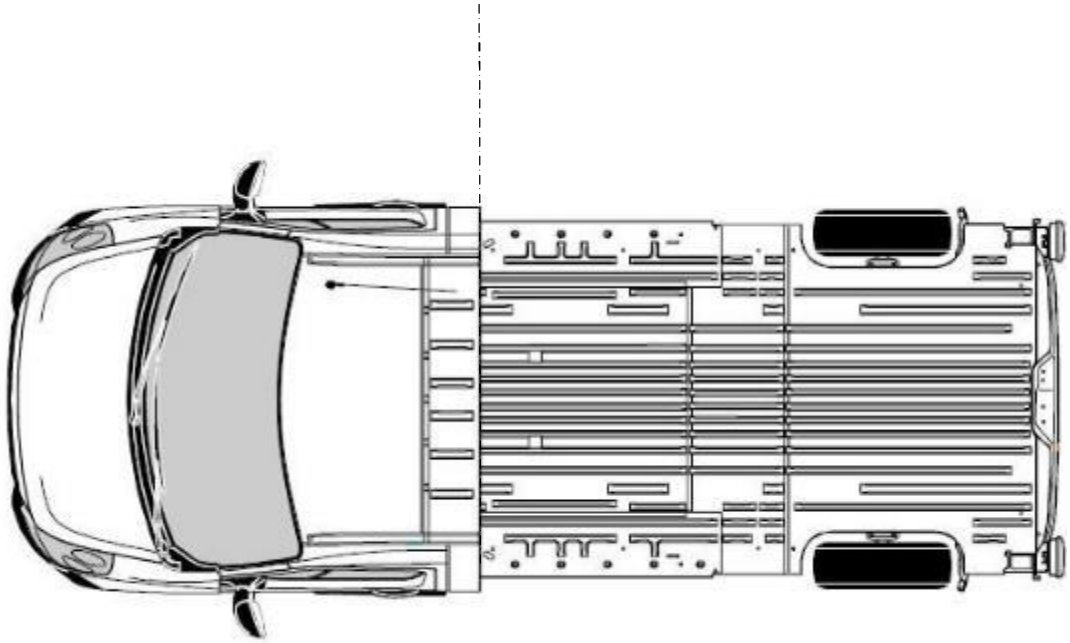
1) Location and mounting of the bodywork on the cab's brackets

2) Location and mounting of the bodywork on the platform

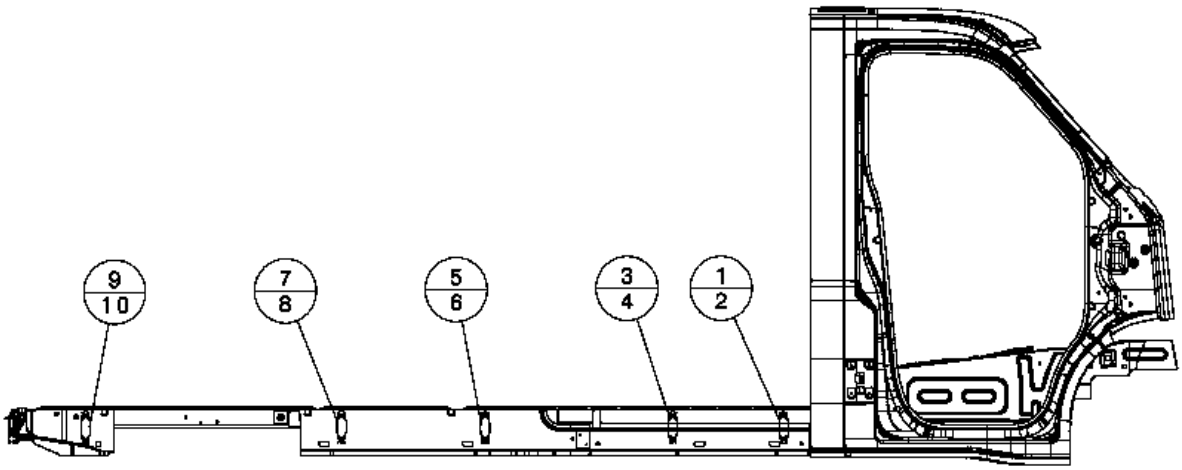
Platform cab



Start of body work



Position of nuts on side sill closing panel



The position of the bolts is given in relation to the vehicle reference system

Vehicle length L3

	1	2	3	4	5	6	7	8	9	10
X	1,720	1,720	2,220	2,220	3,070	3,070	3,720	3,720	4,880	4,880
Y	902	882.2	902	882.2	882.5	882.5	882.5	882.5	882.5	882.5
Z	220	120	220	120	220	120	220	120	220	120

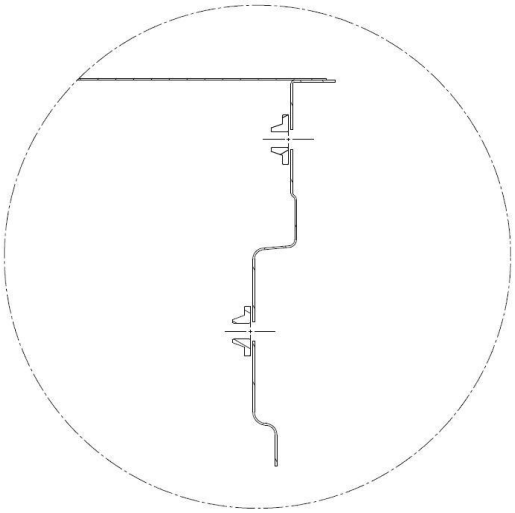
Vehicle length L2

	1	2	3	4	5	6	7	8	9	10
X	1,720	1,720	2,220	2,220	3,070	3,070			4,230	4,230
Y	902	882.2	902	882.2	882.5	882.5			882.5	882.5
Z	220	120	220	120	220	120			220	120

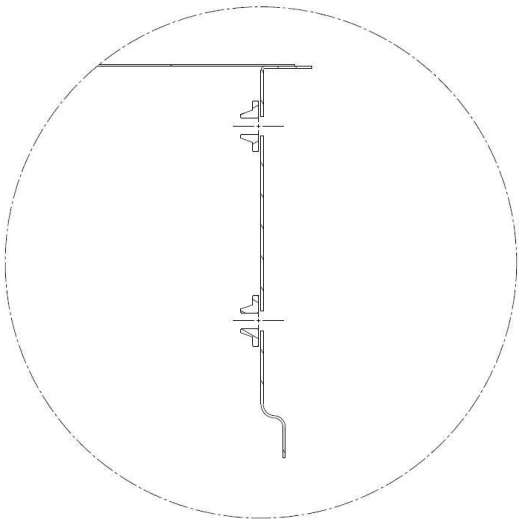
Vehicle length L1

	1	2	3	4	5	6	7	8	9	10
X	1,720	1,720	2,220	2,220					3,730	3,730
Y	902	882.2	902	882.2					882.5	882.5
Z	220	120	220	120					220	120

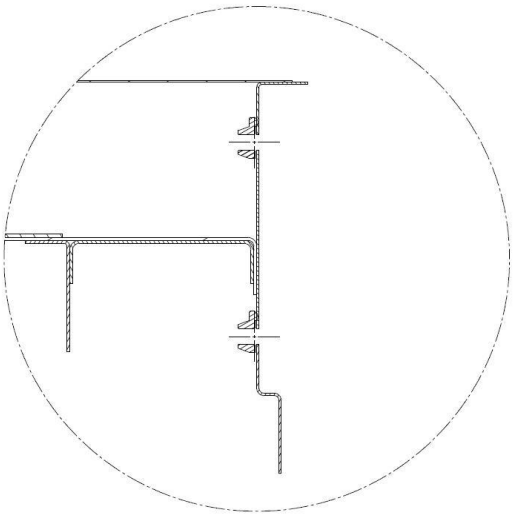
SECTION NUTS 1 and 2



SECTION NUTS 5 and 6



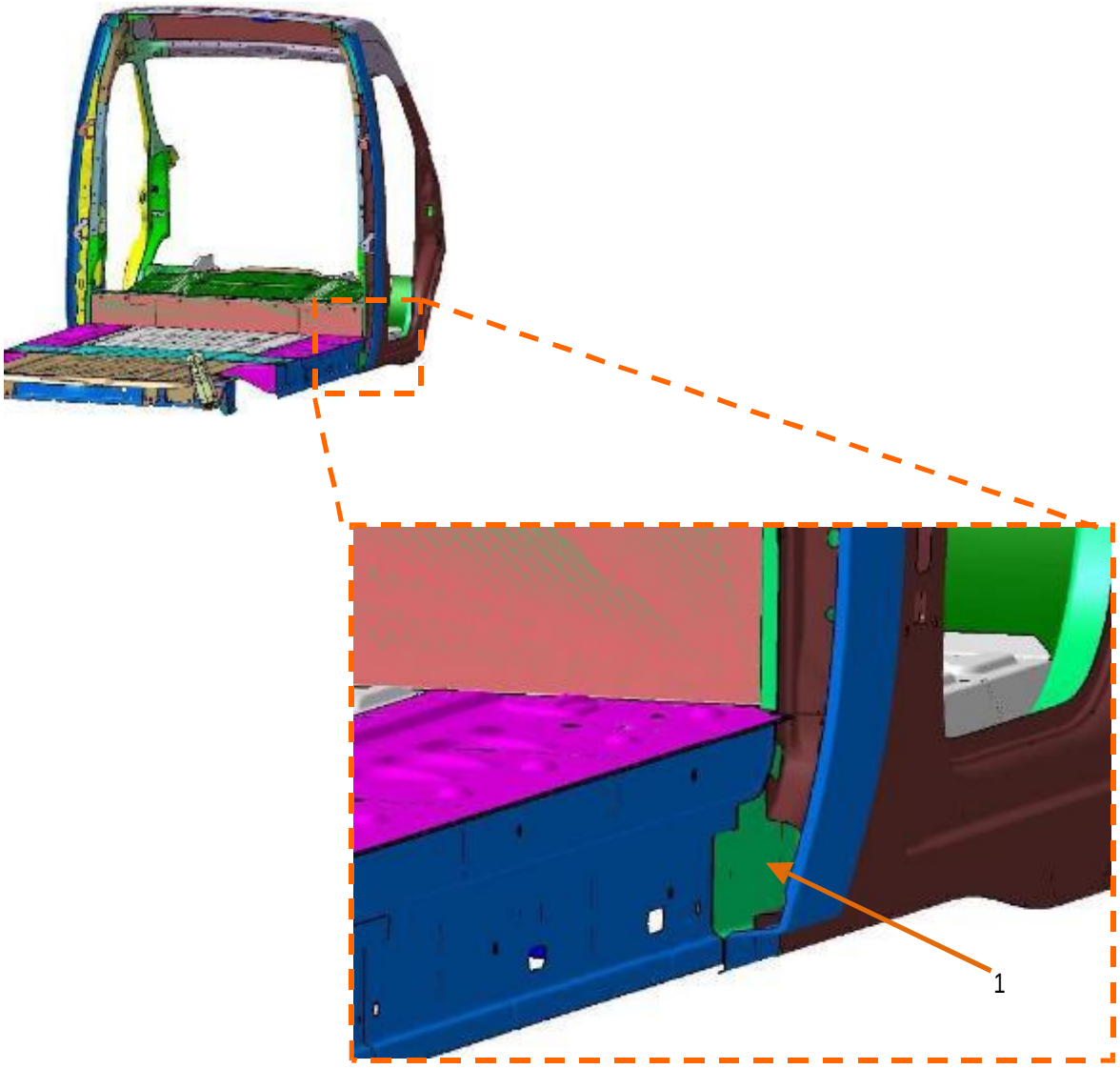
SECTION NUTS 9 and 10



Opening in b pillar

The absence of side sills on the platform cab version means that the hole at the base of the rear pillar needs to be plugged. The aim is to avoid unwanted noise in the passenger compartment and to prevent pollution getting into the hollow sections.

B pillar



Pos.	Description
1	Zone to be plugged

5.6 AIR EXTRACTION IN CABIN AND LOADING AREA

5.6.1 PRINCIPLE OF EXTRACTORS

Air must be extracted from the interior (cab, loading area, etc.) to achieve satisfactory performance when closing doors (front, side, rear), activating the heating and ventilation systems and in airbag deployment.

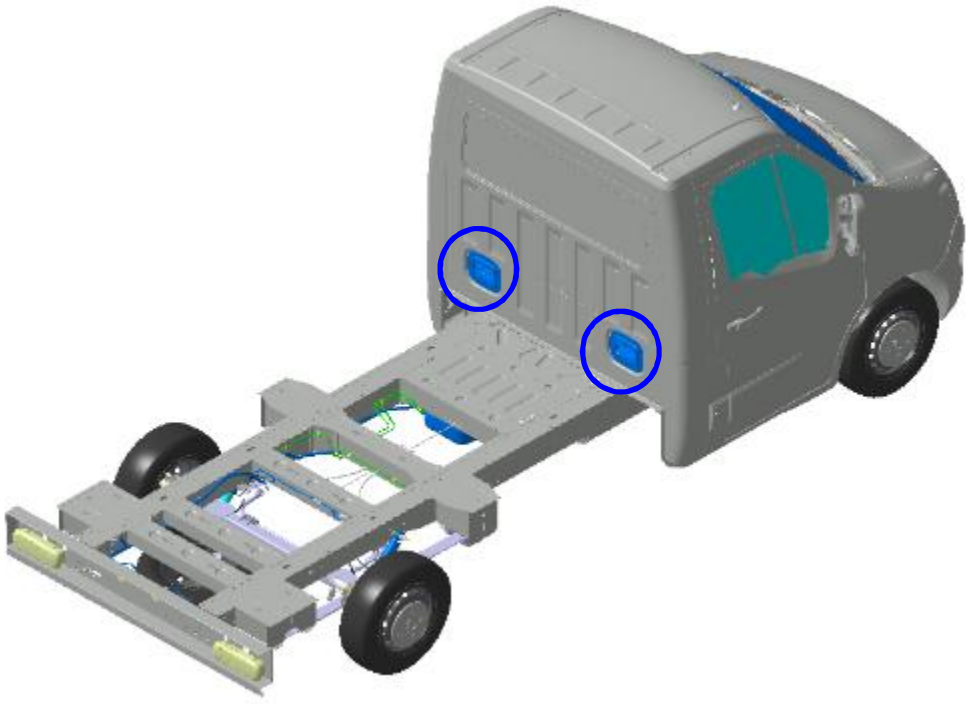
After any modification to the extraction system, the air extraction surface area must be equivalent to the original system. The modified system must not let water, outside air, dust or mud in. It must also reduce noise levels. It must not compromise the integrity of the vehicle (where necessary, fit vent glass to prevent access to the door opening controls, etc.). It must be protected from potential impacts (stones thrown up from the road, etc.).

5.6.2 LOCATION OF EXTRACTORS

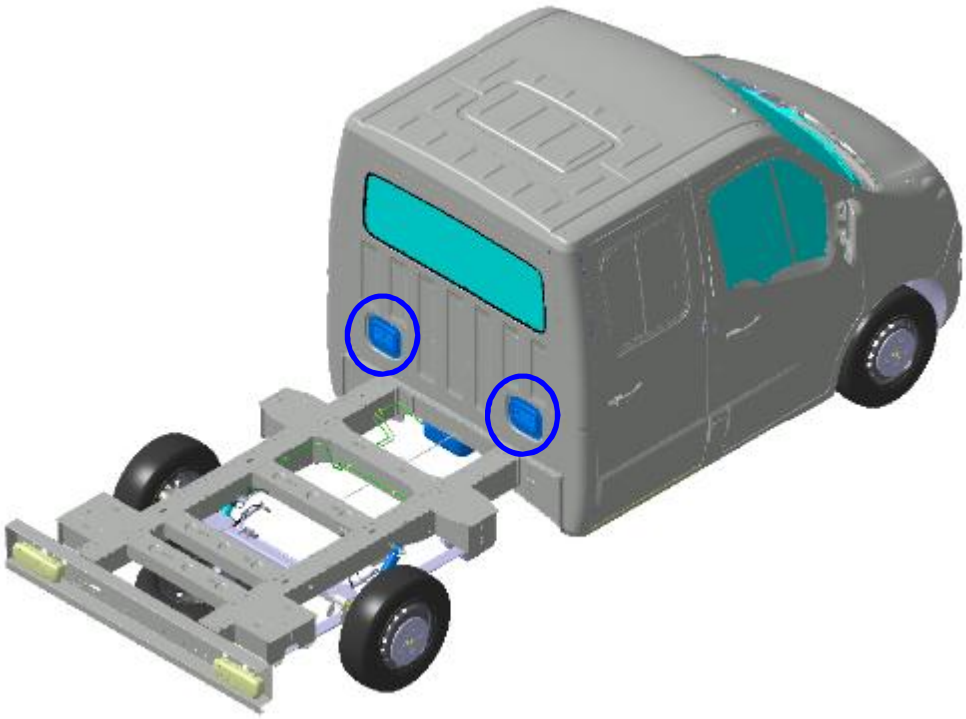
In the chassis cab and the chassis double cab, the air outlets are located on either side of the cab back panel. The surface area of each air outlet is 10,070mm².

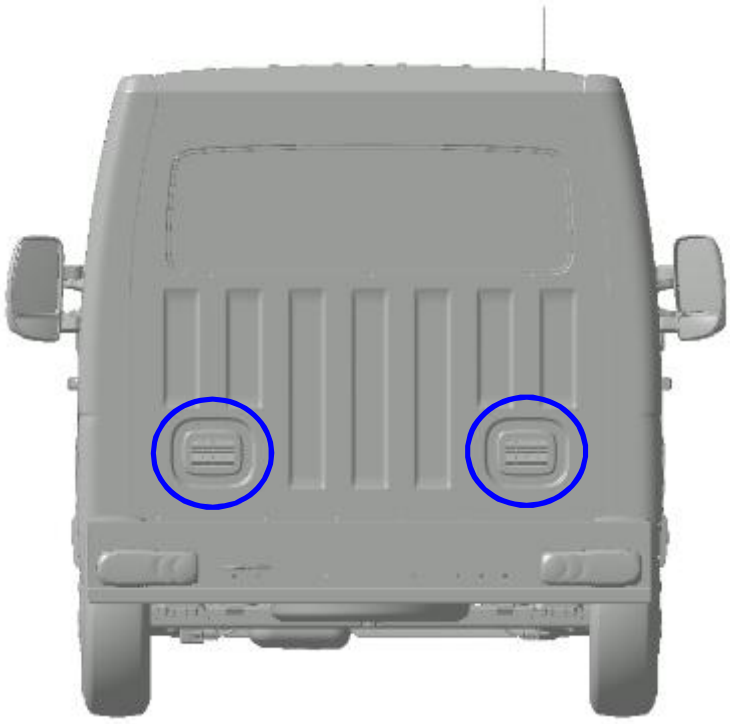
In the panel van, the air outlets are located on either side of the rear bumper. The surface area of each air outlet is 10,679mm².

Chassis cab

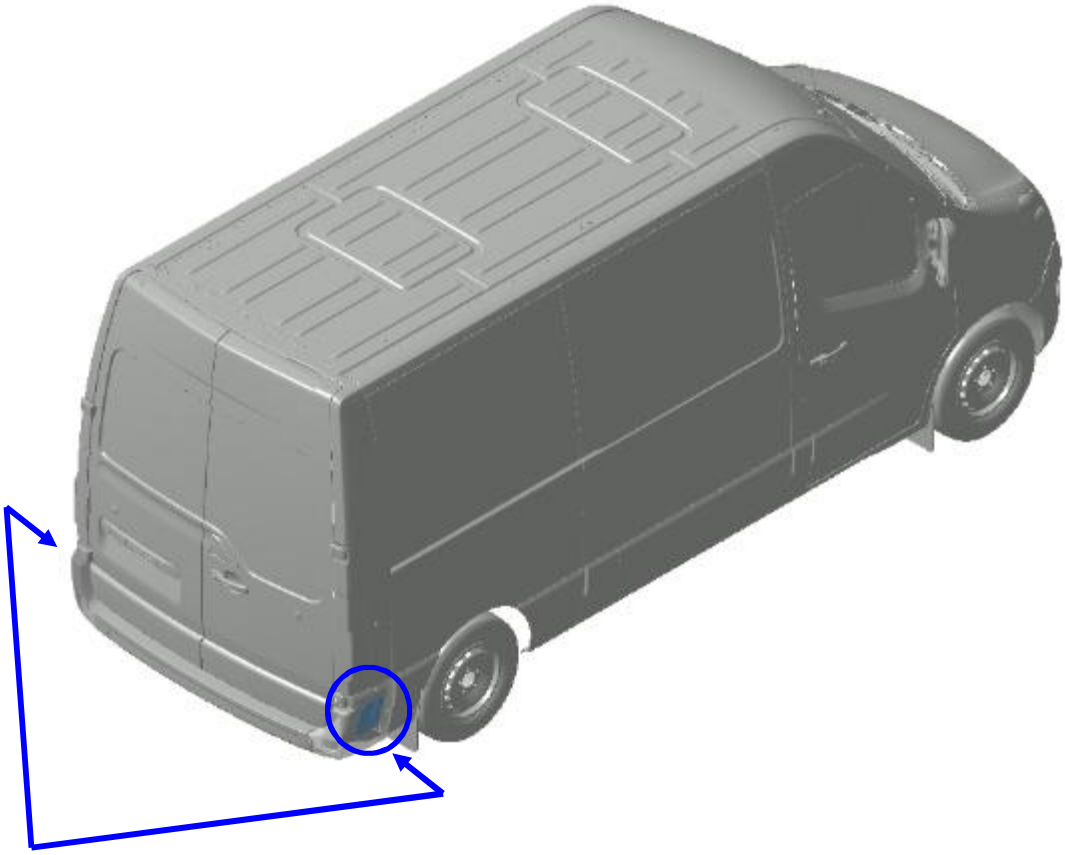


Chassis double cab

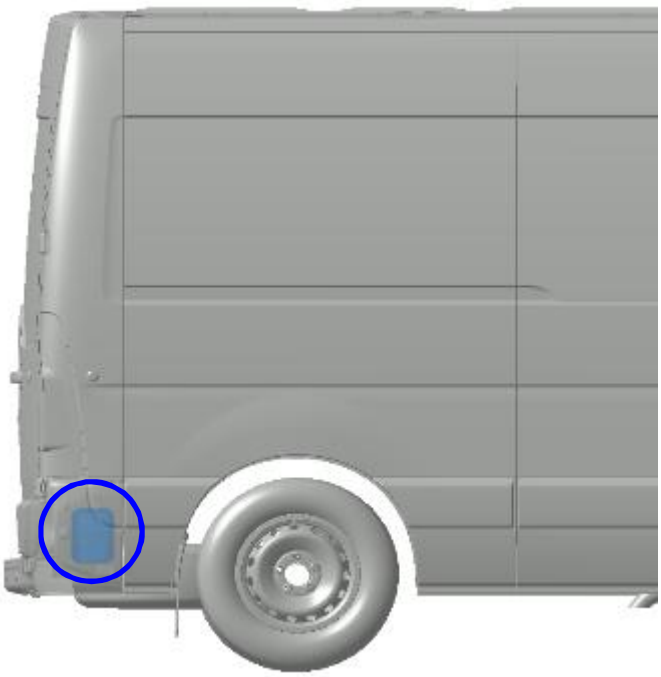




Panel van



Air outlets



5.7 PROHIBITED CONVERSIONS

PLATFORMS

The aerial work platform (cherry picker) conversion with stabilizers on Chassis Cabs and Chassis Crew Cabs with FWD and RWD is not allowed.

For panel van adaption see chapter 6.8. AERIAL WORK PLATFORM (CHERRY PICKER) ON PANEL VAN.

VEHICLE LIFTING

Transformation allowing the lifting of vehicle (load shedding of axles), for the adaption of type: stabilizers and jacks, is prohibited

COOLING COMPONENTS (KINEMATIC CHAIN)

The components are sized for vehicles with a GVW of 3.5t or 4.5t. The authorised GVW cannot be used as a basis for future certification. The Opel/Vauxhall warranty will not apply if the basic vehicle's GVW is exceeded.

ADDITIONAL HEATING ON WATER HEATER UNIT CIRCUIT

The use of branching pipes on the water circuit is prohibited on Start/ Stop-versions. Additional pressure drops affect the engine's temperature, which jeopardises its reliability.

POWER TAKE-OFF ON GEARBOX (PTO)

Retrofitting is prohibited on vehicles with Start/ Stop.

6 MECHANICAL CONVERSIONS

6.1 ENGINE POWER TAKE-OFF: OPTION "V66"

General:

The engine power take-off is available as an option on front- and rear-wheel drive versions.

Note:

The maximum power absorbed by the equipment replacing the engine's free pulley should not exceed 6kW.

The weight of the equipment to be fitted in place of the free pulley must not exceed 7.5kg.

Driving a piece of equipment may call for the use of the fast idle.

The power take-off option is incompatible with the robotized gearbox.

6.1.1 POWER TAKE-OFF, FRONT WHEEL DRIVE

Depending on the engine, two versions are available:

- Single turbo (M9T 870, 876 and 880); only for versions without AC.
- Double turbo (M9T 702); only for versions with AC.
- Please refer to sheet 1.2 - " Engine-gearbox range" for Euro 6 and Euro VI versions
- The surround can change, which will affect the wiring and the cylinder head surround; please refer to the engine cads to check the compatibility of the adaptations.

VERSION ENGINE; SINGLE TURBO

The option consists mainly of a free pulley attached to a support in place of the air-conditioning compressor and an automatic idler pulley. Power take-off on rear wheel drive see also chapter 6.1.2.

The power take-off option is incompatible with the robotized gearbox.

The power take-off option is incompatible with air conditioning.

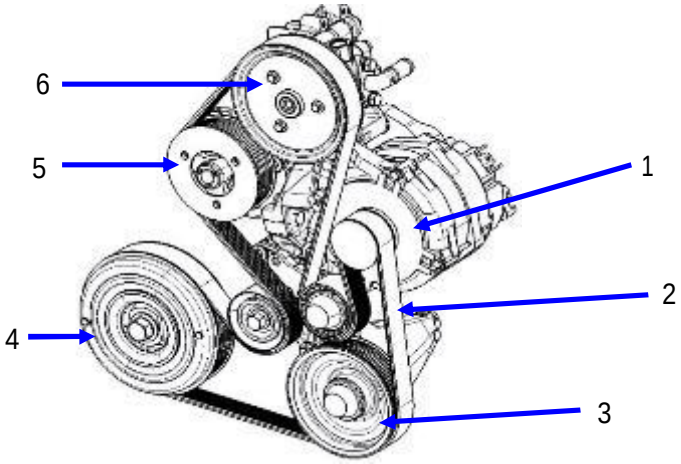
If a piece of equipment is not installed in place of the free pulley immediately, the free pulley can be left as it is. Its operation has been validated for normal use of the vehicle with no change to the belt changing frequencies.

Note:

It is not possible to fit power take-off to the vehicle at a later stage. However, a space is provided at the top of the engine to fit an additional piece of equipment driven by a second belt.

Accessory belt order; engine with power take off

Pos.	Description
1	Alternator
2	Accessory belt
3	Free pulley
4	Crankshaft damper pulley
5	Water pump
6	Power assisted steering pump



Care must be taken to comply with the following points for assembly minimizing the impact on engine reliability.

- The general notes at the top of the chapter must be observed.
- The equipment must use the existing fastening points on the accessory support.
- The pitch diameter of the equipment's drive pulley must be the same as that of the original pulley. The pitch diameter of the engine's free pulley is between 119.88mm and 120.68mm.
- The position of the equipment's drive pulley must match the spatial coordinates of the free pulley.
- The alignment of the belt's grooves must be the same as they were to start with.
- Characteristics of the original belt: Type Poly-V to 7V, width: 21.36 ±0.5mm, length: 1,970 ± 4mm

These criteria allow the use of the original accessory belt. The belt replacement frequency must be re-assessed according to the vehicle's use cycle and may differ from that stated in the vehicle maintenance log book.

Driving a piece of equipment may call for the use of the accelerated idle.

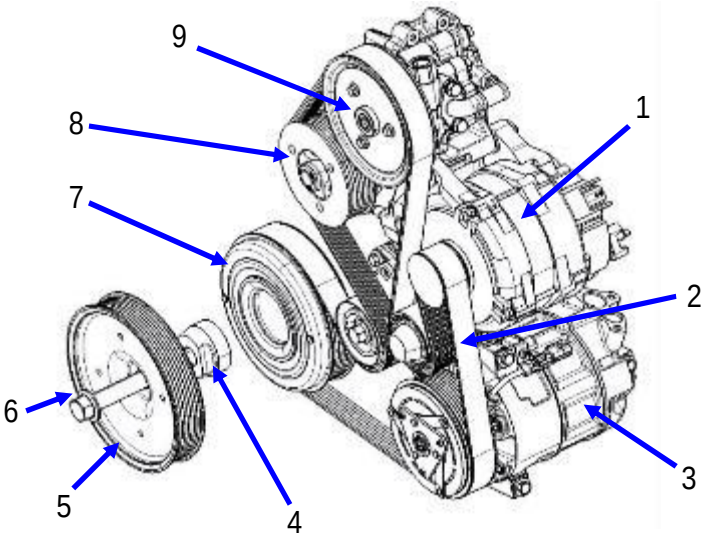
VERSION ENGINE; DOUBLE TURBO

Power take-off is available as an option on versions with front wheel drive. It is comprised only of an additional pulley attached to the crankshaft pulley. This version is identic to the one characterised in chapter 6.1.2.

Assembly of the additional crankshaft pulley is independent of the equipment fitted to the accessory face.

The additional crankshaft pulley may be left as it is without any particular effect.

Pos.	Description
1	Alternator
2	Accessory belt
3	Air-conditioning compressor
4	Strut (to be removed)
5	Additional crankshaft damper pulley
6	Mounting bolt
7	Crankshaft damper pulley
8	Water pump
9	Power-assisted steering pump

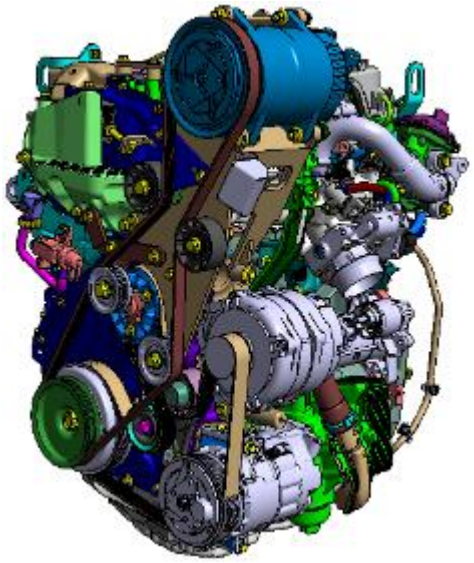


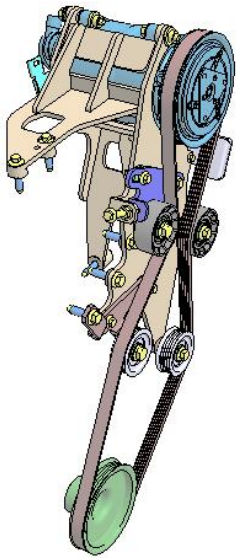
Kits for retrofitting are available in the networks of: CARRIER or THERMOKING.

Care must be taken to comply with the following points for assembly minimising the impact on engine reliability.

- The general notes at the top of the chapter must be observed.
- The equipment must use the existing mounting points on the engine block.
- The additional belt needs checking for replacement every 40.000km.

The full equipment and mount should be tested for vibratory resistance, and the additional belt for slippage, jump and longevity, at the expense of the vehicle converter.





6.1.2 POWER TAKE-OFF, REAR WHEEL DRIVE

The phase 1' version is identical to the phase 1 version.

Power take-off is available as an option for all engines but only with air conditioning.

Please refer to the "Engine-gearbox range" sheet for Euro 6 and Euro VI versions.

The option is only comprised of an additional pulley attached to the crankshaft pulley.

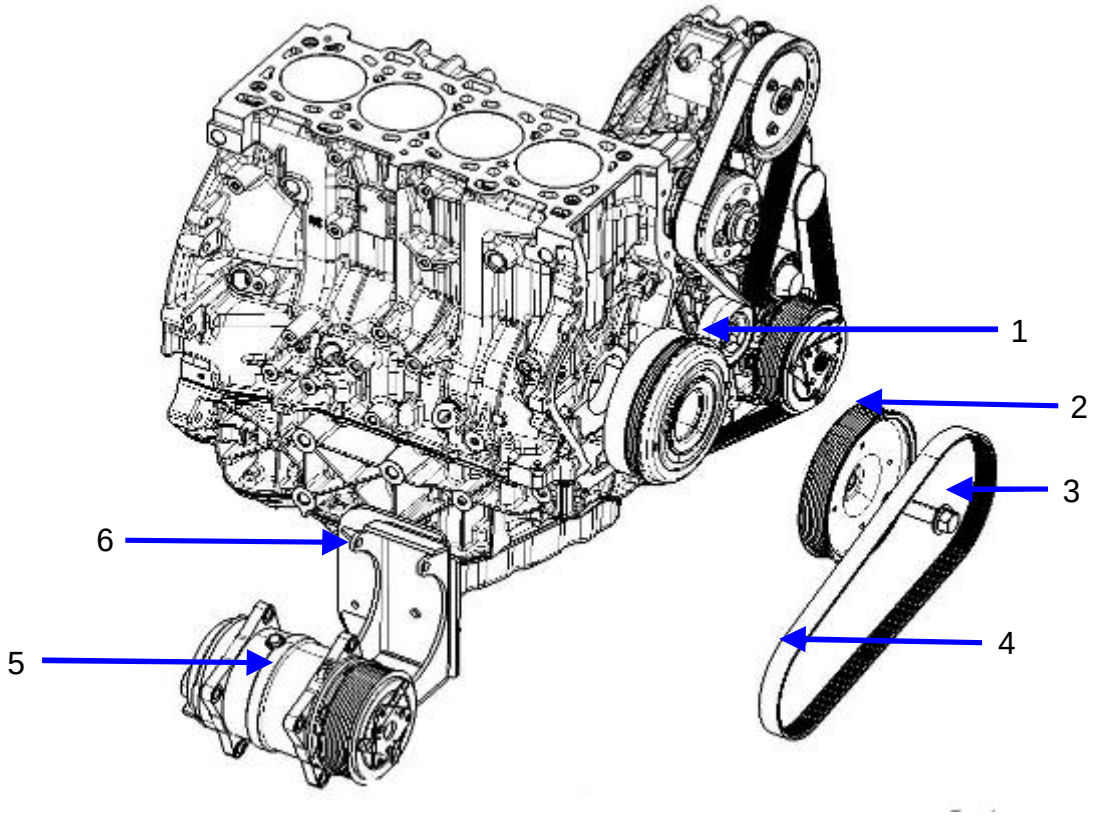
The power take-off option is incompatible with the sequential gearbox.

Assembly of the additional crankshaft pulley is independent of the equipment fitted to the accessory face.

The additional crankshaft pulley may be left as it is without any particular effect.

The surround can change, which will affect the wiring and the cylinder head surround; please refer to the engine cads to check the compatibility of the adaptations.

Assembly example



Pos.	Description
1	Crankshaft pulley
2	Additional crankshaft pulley
3	Mounting bolt
4	Additional belt
5	Cooling compressor
6	Support

The utmost care must be taken to comply with the following points for an assembly minimising the impact on engine reliability.

- The weight of the equipment must not exceed 7.5 kg.
- The equipment must use the existing mounting points on the engine block.
- The equipment pulley and the additional crankshaft pulley must be aligned.
- The maximum power absorbed by the equipment should not exceed 6 kW.
- The additional belt can vary from 5 to 7 V and may be elastic, for which a dynamic tensioner does not need to be used.
- Check that the additional belt is correctly lined up.
- The changing frequency for the additional belt must be assessed and the user must be notified.

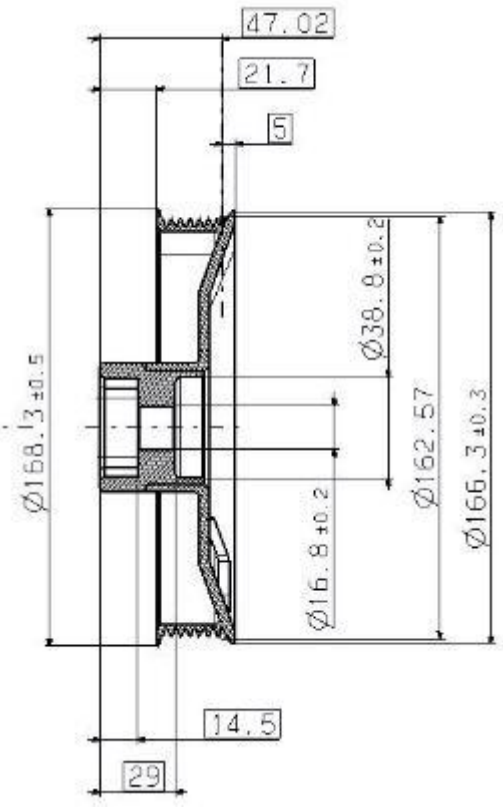
With this type of assembly, the full equipment and mount should be tested for vibratory resistance and the additional belt for slippage, jump and longevity.

Driving a piece of equipment by the engine may call for the use of the fast idle.

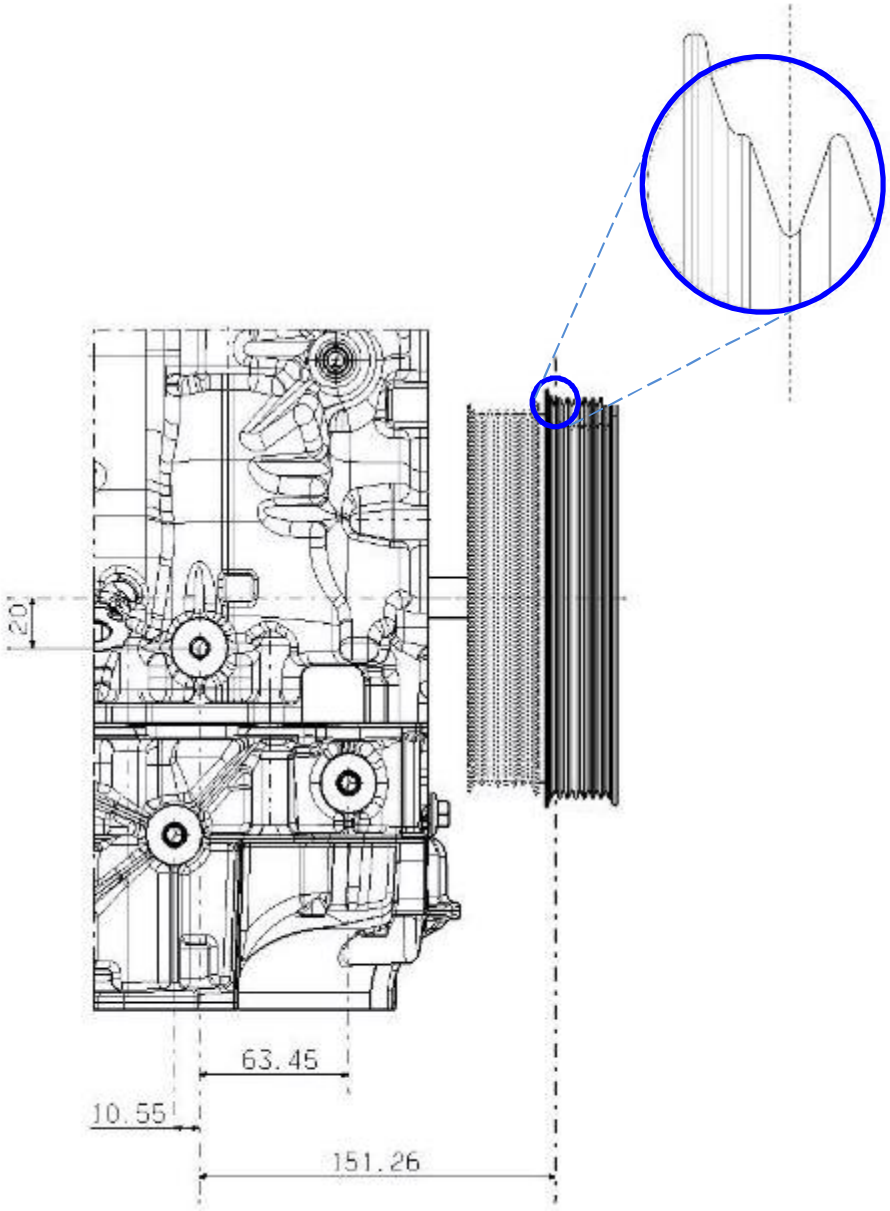
Note:

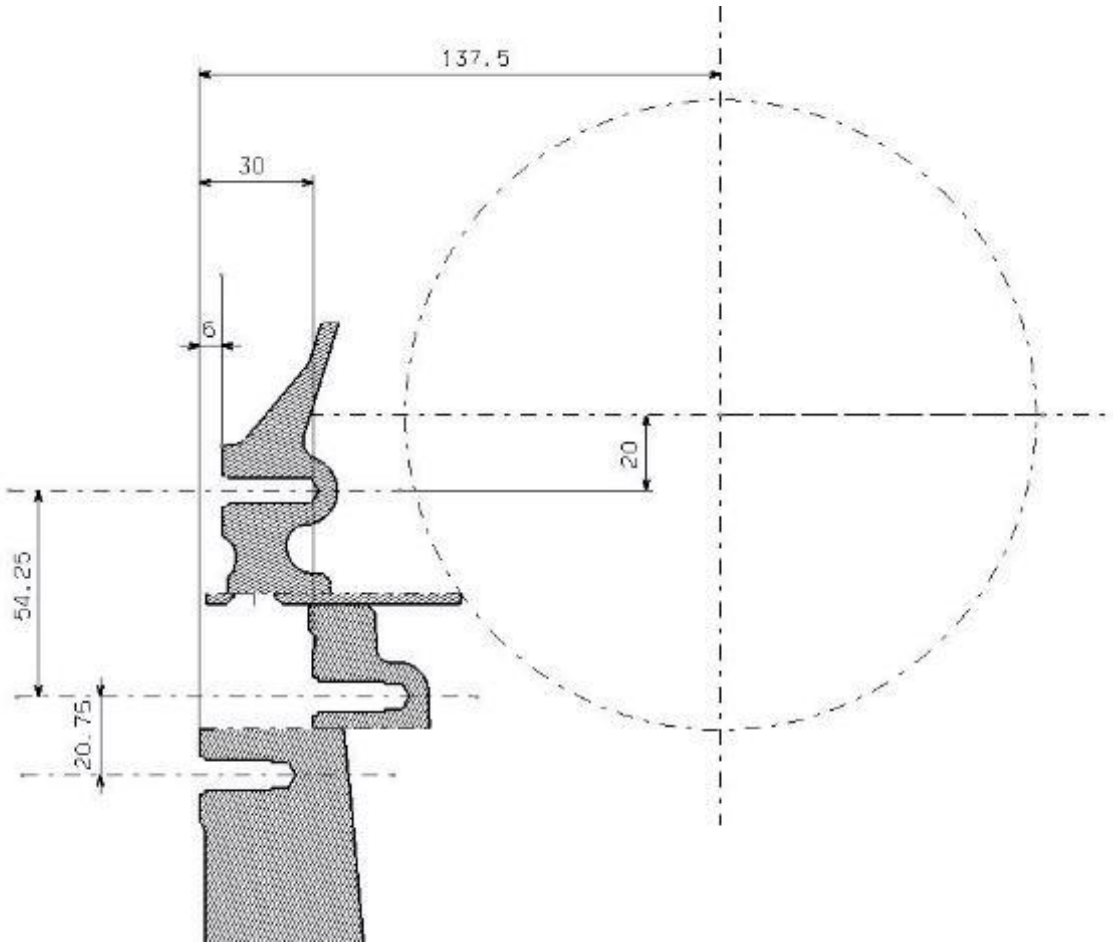
There is no free pulley on rear wheel drive versions.

<u>Detail of the additional crankshaft pulley</u>



Position of the additional crankshaft pulley in relation to the support's mounting points





Note:

The three holes are threaded to a depth of 19mm; M8 x 1.25 tapping

6.2 POWER TAKE-OFF ON GEARBOX: OPTION "M1F"

The option consists of the power take-off, assembled on the gearbox, an activation button on the instrument panel and an ECU. The option must not be activated with the vehicle running with possible gear changes.

Vehicles equipped with option „M1F“ and „Start/ Stop“ do not have any function on restarting the engine by activating the clutch pedal after stalling the engine.

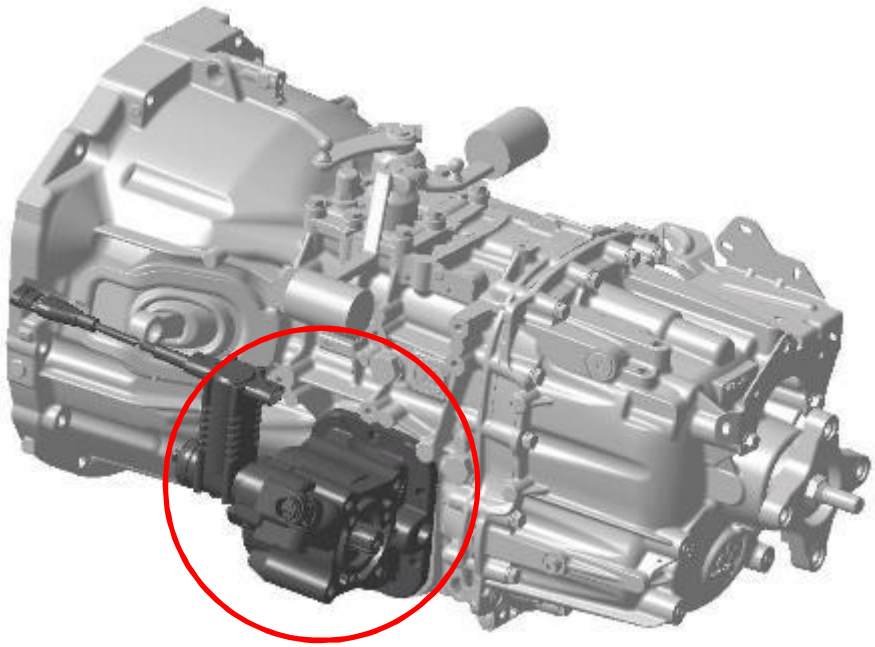
For special features of this function, please refer to chapter 4.7.

Note:

PTO requires a ZF4*001 type gearbox and cannot be ordered with a robotized gearbox (Easytronic).

For Euro 6 versions, use of the vehicle running with the M1F option activated is PROHIBITED with speeds of more than 3 km/h, else there is a risk of the engine stalling.

Power take-off on gearbox



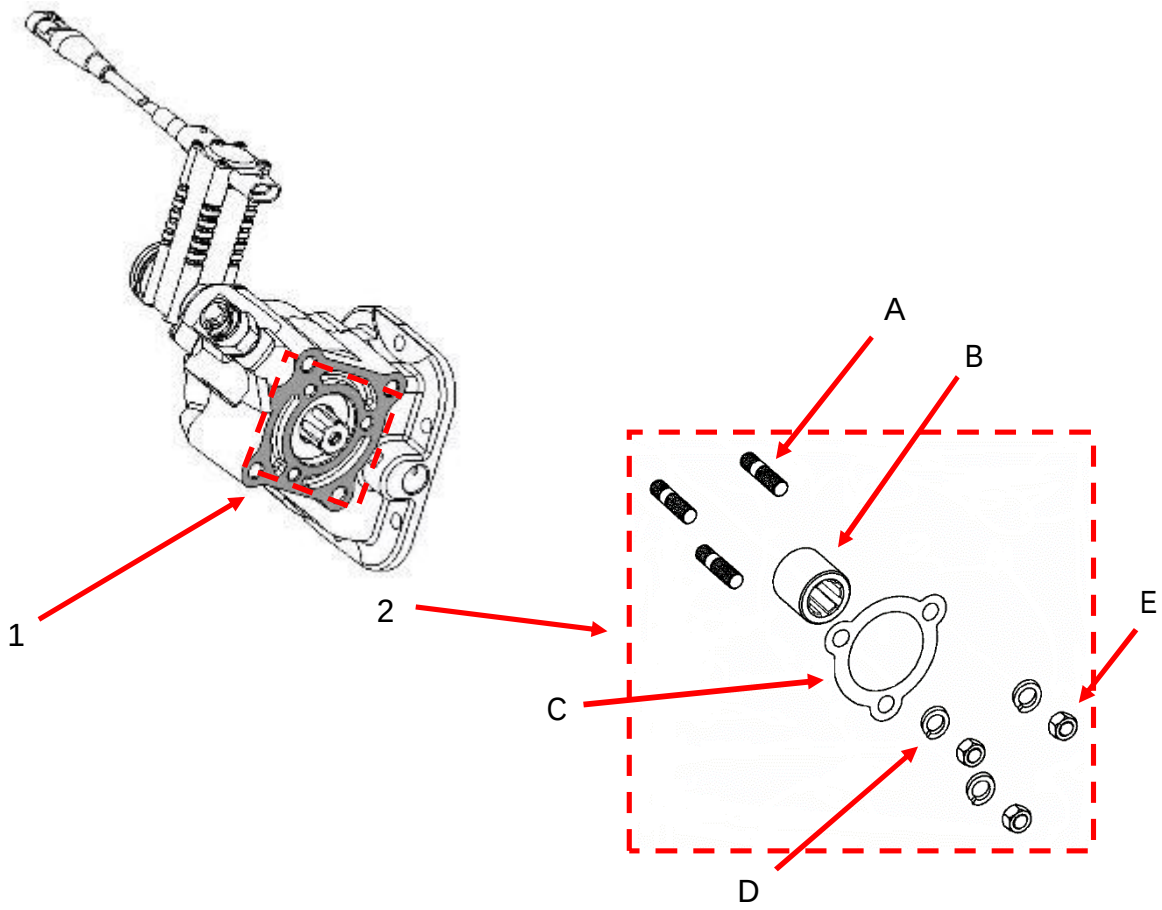
Power take-off (PTO) for M9T engines is a production option which must be specified by the converter when the vehicle is ordered.

Attention:

The refitting of the power take-off is prohibited for vehicles with „Start/ Stop“.

Power take-off/ unit interface

Pos.	Description
1	Power take-off on ZF4 gearbox
2	Kit to mount a unit to the power take-off



Assembly flowchart

- Clean mating surface (1)
- Screw the studs (A) to the power take-off è Tighten to a torque of 20 ± 3Nm
- Put the sleeve into place (B)
- Put into place the joint (C), unit (pump, etc.), washers (D) and nuts (E) M10X150
- Tighten the nuts (E) è Torque of 50 ± 8Nm

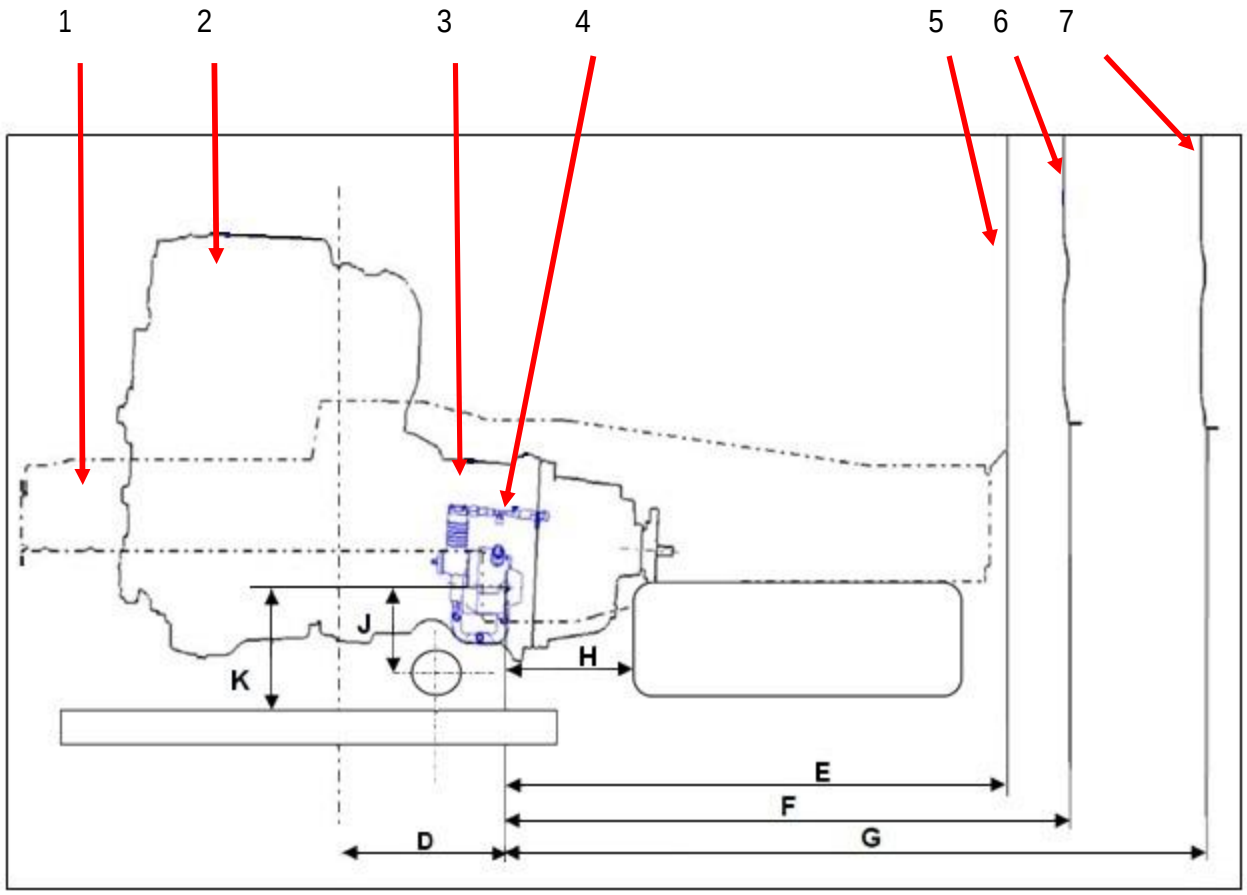
Mechanical properties

- Maximum resulting torque è 180Nm
- PTO weight è 6.3kg
- Drive/ engine rotation speed ratio è 1.1

Position on vehicle (± 2mm)

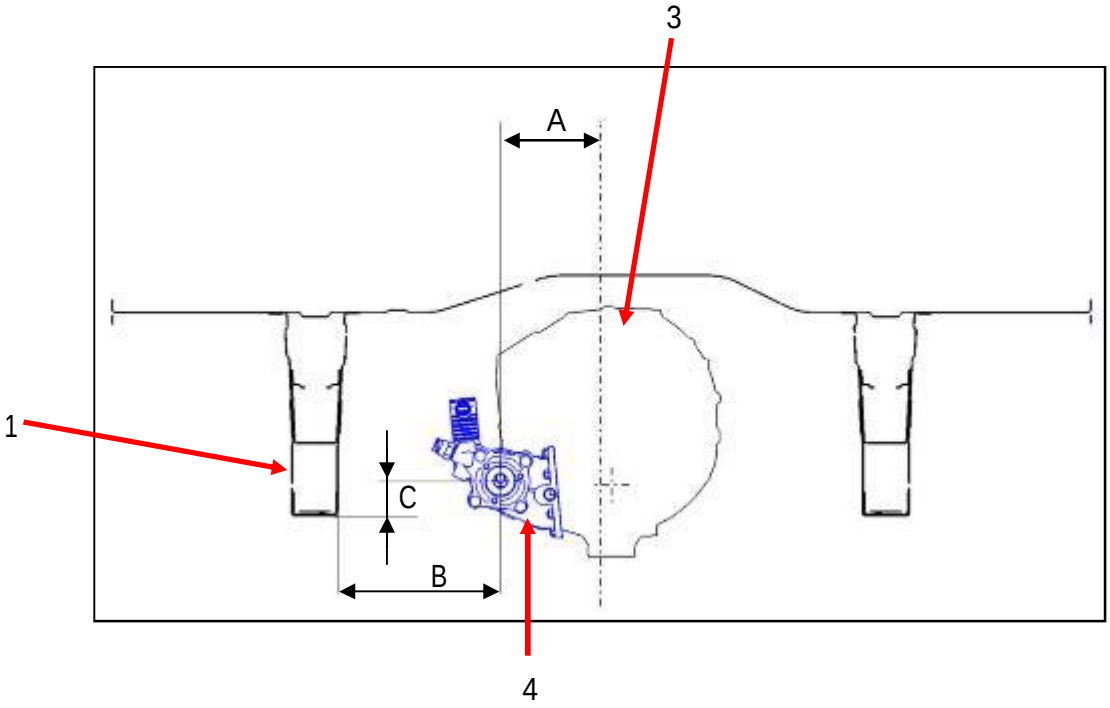
Distance	Description	(mm)
D	PTO mounting face / front axle	369.5
E	PTO mounting face / partition wall of the Panel van	1,482
F	PTO mounting face / rear panel of the Chassis Cab	1,615
G	PTO mounting face / rear panel of the Chassis Crew Cab	2,366
H	PTO mounting face / fuel tank	348.5
J	PTO mounting face / axle power steering	113.6
K	PTO mounting face / upper side	133.3

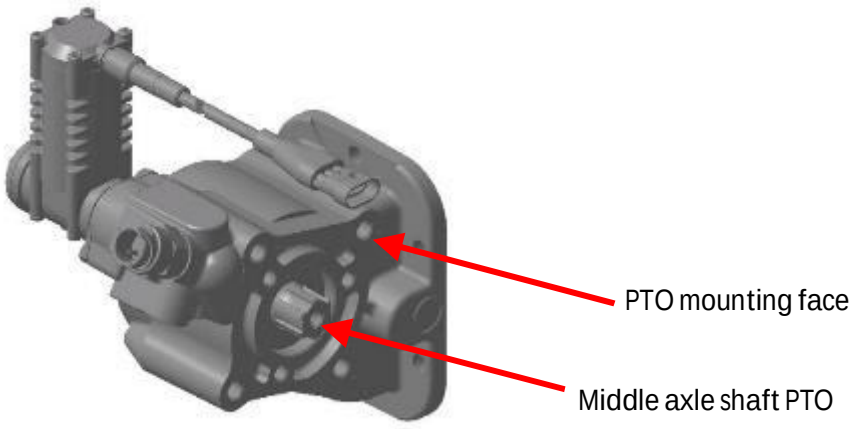
Part	Description	Part	Description
1	Left front side member	5	Partition wall of the Panel van
2	Motor	6	Rear panel of the Chassis Cab
3	Gearbox	7	Rear panel of the Chassis Crew Cab
4	Power take-off		



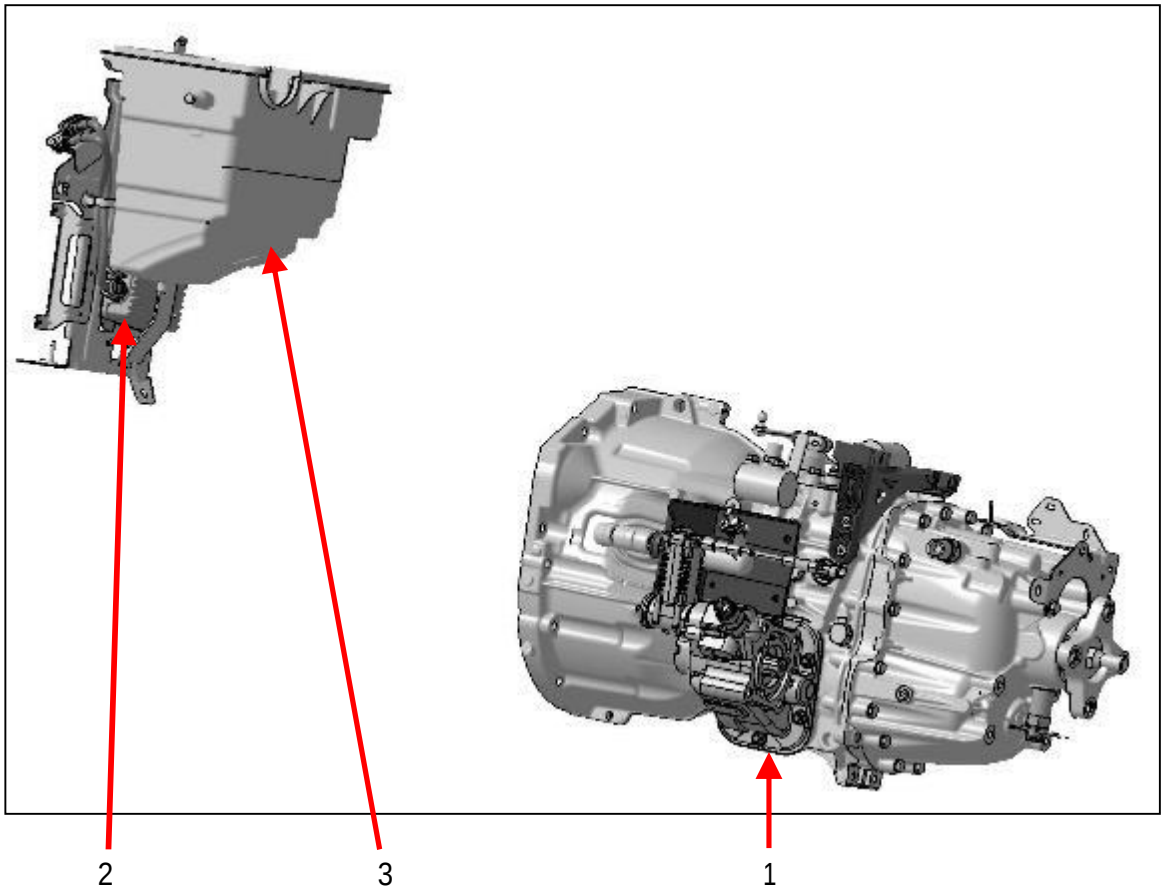
Distance	Description	(mm)
A	Middle axle shaft PTO / vehicle longitudinal axis (X- axis)	176
B	Middle axle shaft PTO / left front side members	285.5
C	Middle axle shaft PTO / left front side members	61.5

Pos.	Description
1	Left front side member
3	Gearbox
4	Power take-off





Position from the PTO and its control unit



Pos.	Description
1	Power take-off
2	Control unit (ECU) of Power take-off
3	Engine interconnections unit (= BIM can be found to the left of the engine compartment)

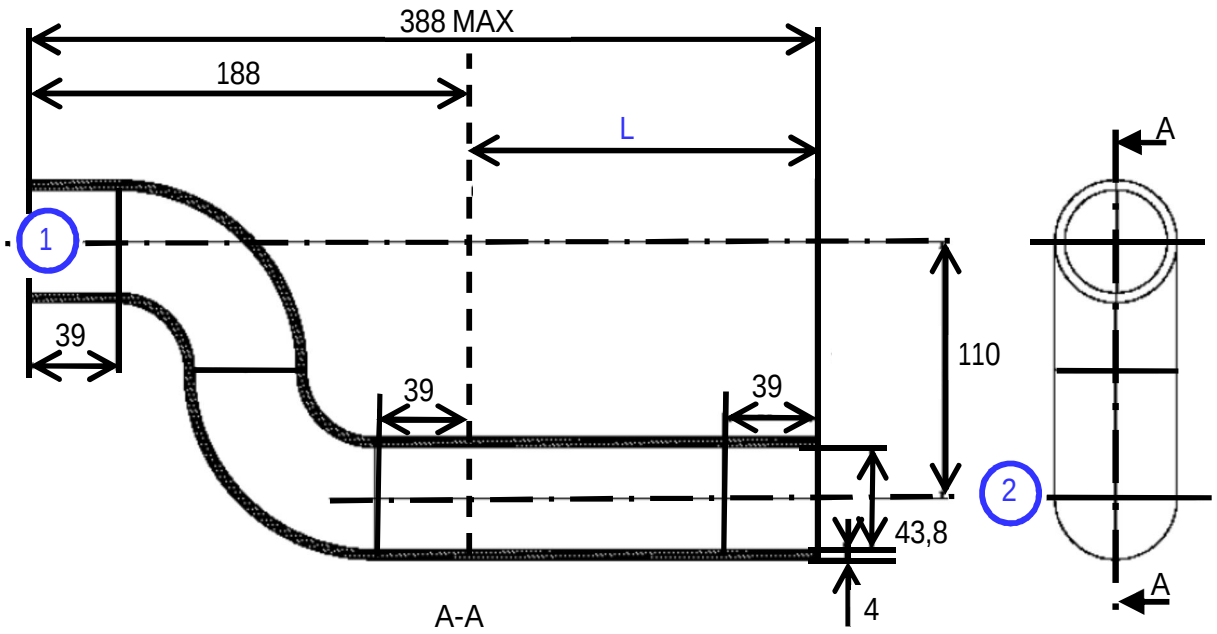
6.3 FUEL TANK FILLER PIPE

Some conversions require the translation of the fuel tank filler pipe.

The following recommendations can be used to offset, by up to 150mm, the position of the filler pipe along the Y axis. However, the position along the X and Z axes cannot be modified.

To carry out the translation, the standard connecting sleeve between the tank and the filler pipe needs to be replaced with a special sleeve.

Example of sleeve



Pos.	Description
1	Fuel tank side
L	From 0 to 150mm
2	Filler pipe side

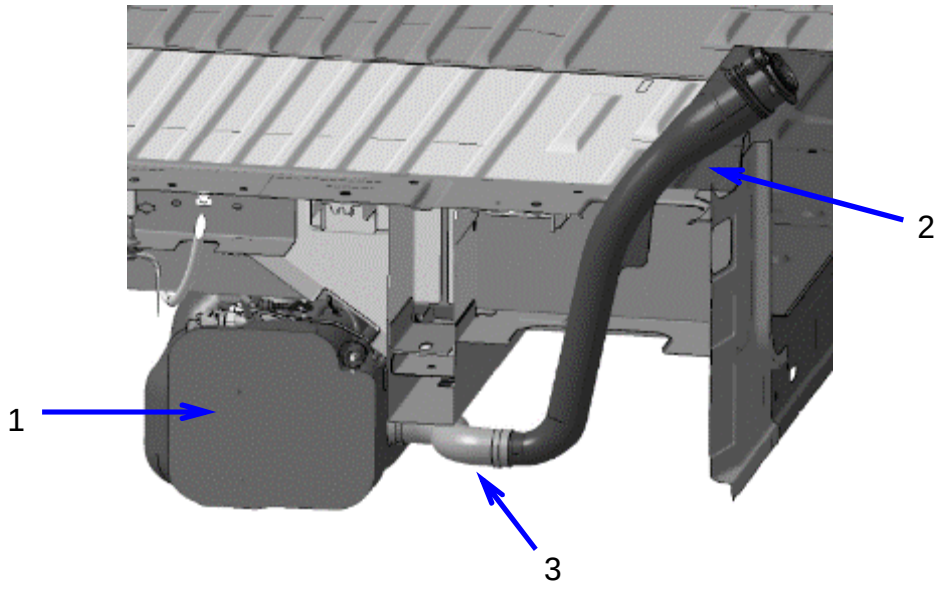
The sleeve material must be compatible with its use. The sleeve must be held in place on the filler pipe and on the fuel tank by elastic reserve clamps.

Assembly must comply with legislation in force, in particular Directive 70/221/EEC and Directive 2000/8/EC for Europe: For two minutes, the fuel system (tank, pipe, sleeve) fixed as on the vehicle, must be exposed to flame. There must be no leakage of fuel. Three tests must be carried out on three different tanks half filled with fuel. It may be possible to thermally protect the filler sleeve to avoid the need for the flame test.

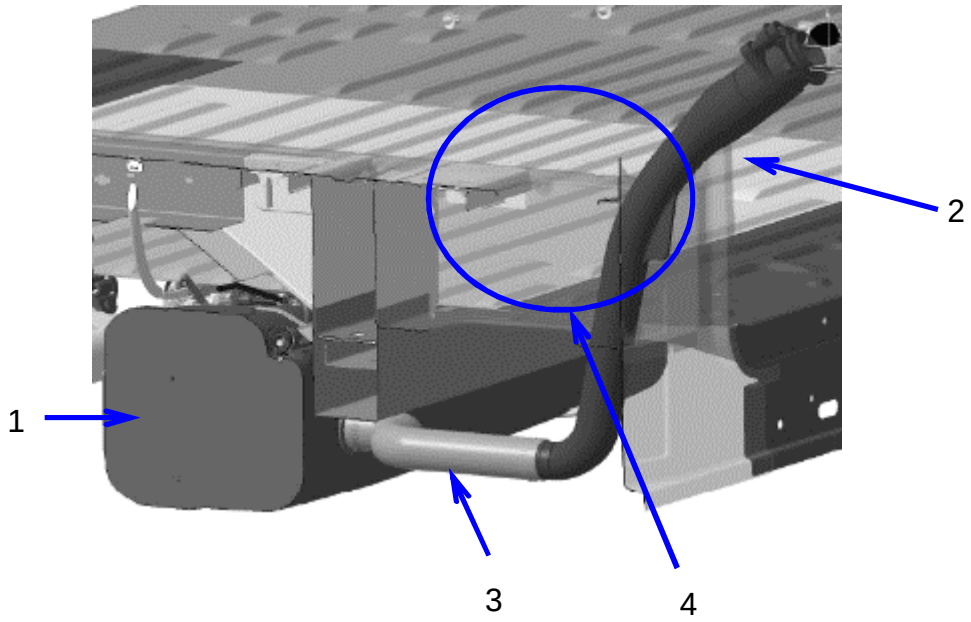
When fitted, the sleeve must not be twisted or trapped in such a way that might hinder filling.

The filler pipe must be held in place and the place where it passes through the floor must be sealed. For translations of more than 60mm, the body needs to be cut. After cutting, the filings or shavings must be vacuumed and a corrosion inhibitor used; please refer to the “Specific Corrosion Guidelines”.

Standard assembly



Translation of the filler pipe



Pos.	Description
1	Fuel tank
2	Filler pipe
3	Sleeve
4	Area of body to be modified

6.4 HEATING/ AIR CONDITION

6.4.1 SINGLE ADDITIONAL BOILER

To improve the heating performance of the water heater unit of the base vehicle

Conditions for fitting:

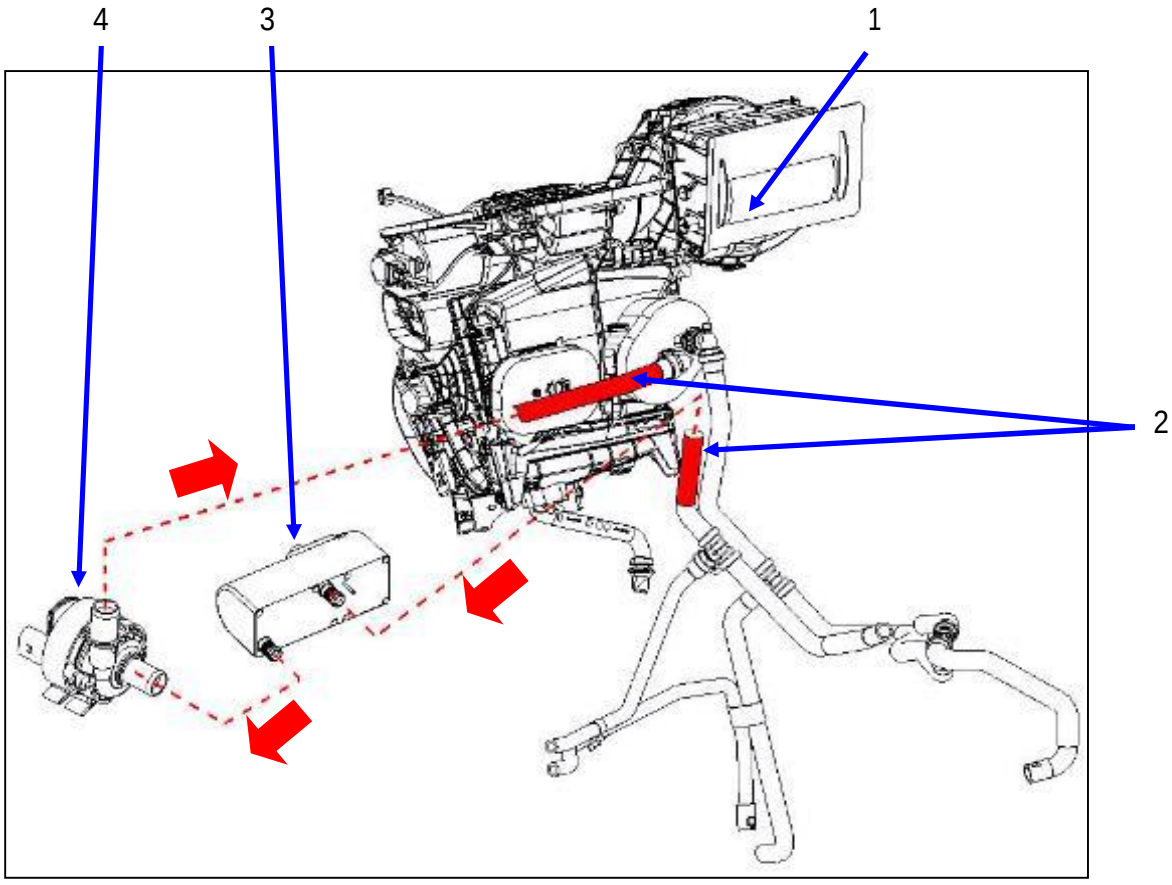
The boiler must be assembled as close as possible to the cabin heater housing's inlet pipe, using branching pipes. An electric water pump is required to ensure a sufficient water flow rate in the main water heater unit, to maintain the heating performance of the cockpit (compensation for load losses of the additional system).

The adaptation must take account of the risk of water boiling, especially when the engine is off, including in the “stop auto” state. (Thermal regulation of the boiler, water circulation maintained when engine is off...etc.)

The water flow rate required for the water heater unit of the base vehicle is: between 600 l/h and 700 l/h.

Cooling system

Diagram showing additional boiler only



Pos.	Description
1	Heater housing
2	Radiator inlet pipe
3	Additional boiler
4	Water pump

6.4.2 SECOND WATER HEATER UNIT

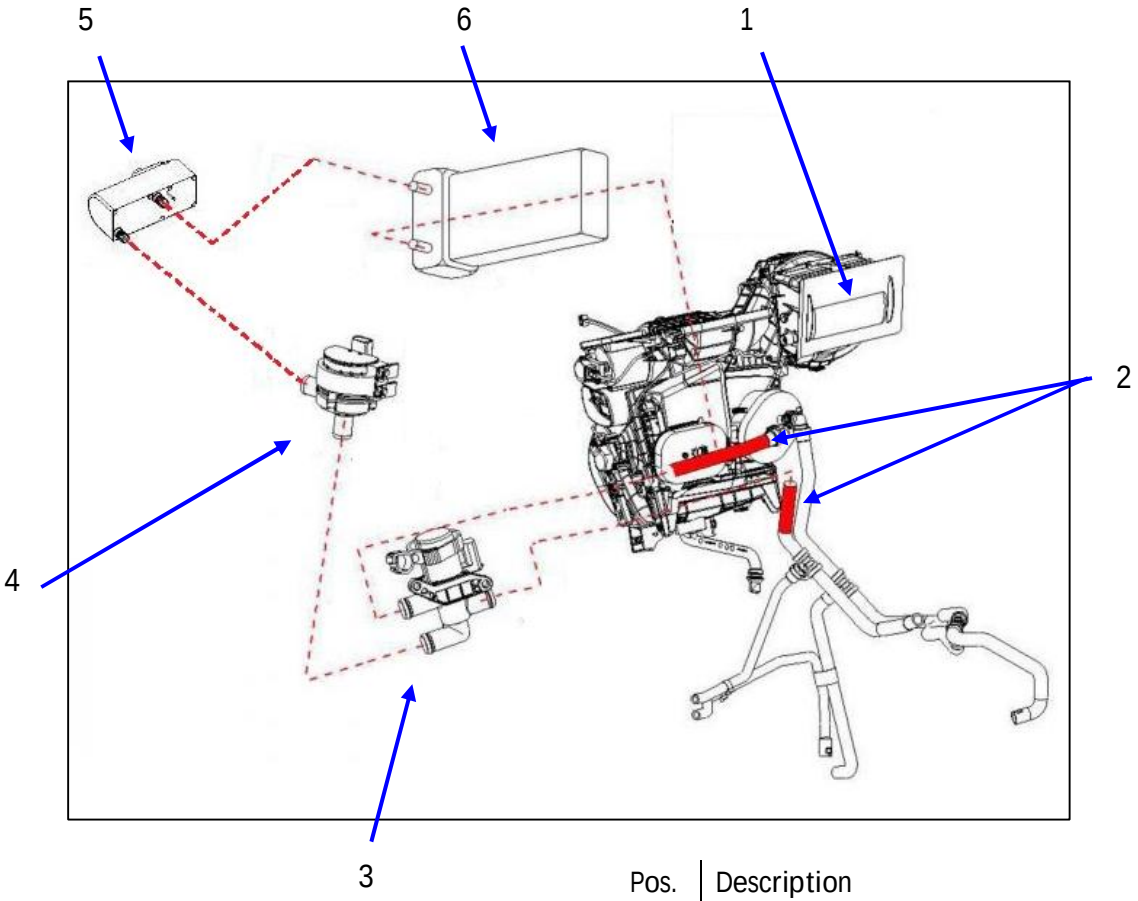
Do not add a single additional water heater unit, as this has too much of a detrimental effect on the cabin heating performance (base vehicle water heater unit).

At a minimum, the boiler must provide as many calories as are consumed by the additional water heater unit, in order to maintain the cabin heating performance.

The adaptation must take account of the risk of water boiling, especially when the engine is off, including in the “stop auto” state. (Thermal regulation of the boiler, water circulation maintained when the engine is off, etc,).

The assembly is performed according to the following diagrams, whereby the boiler reheats the main and additional water heater unit water OR just that of the additional unit. It is supplied with water via the heater housing's inlet tube (2). This supply is provided using branching pipes, a solenoid valve and an electric water pump to ensure a sufficient flow rate to both heater units.

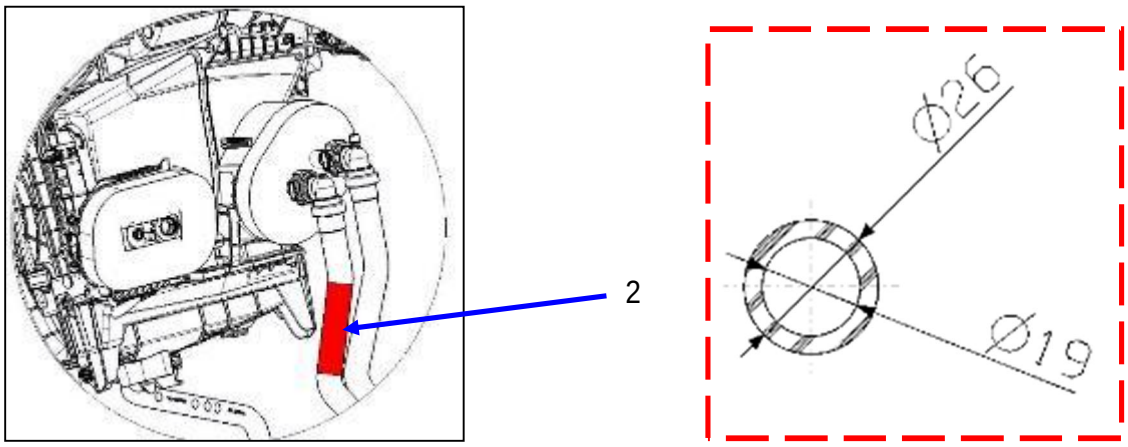
Cooling system



Pos.	Description
1	Heater housing
2	Radiator inlet pipe
3	Solenoid valve
4	Electric water pump
5	Additional boiler
6	Secondary heater unit

CONNECTION TO SUPPLY THE ADDITIONAL CIRCUIT

The recommended zone for applying the two ''T-shaped'' branching pipes to supply the second heater unit with water is on the heater housing's inlet pipe (2).



Recommendations for assembly:

For starting the vehicle, it is recommended to assemble the additional heating unit (5), as close as possible to the main heating unit.

Additional drains must be added to the extra circuit.

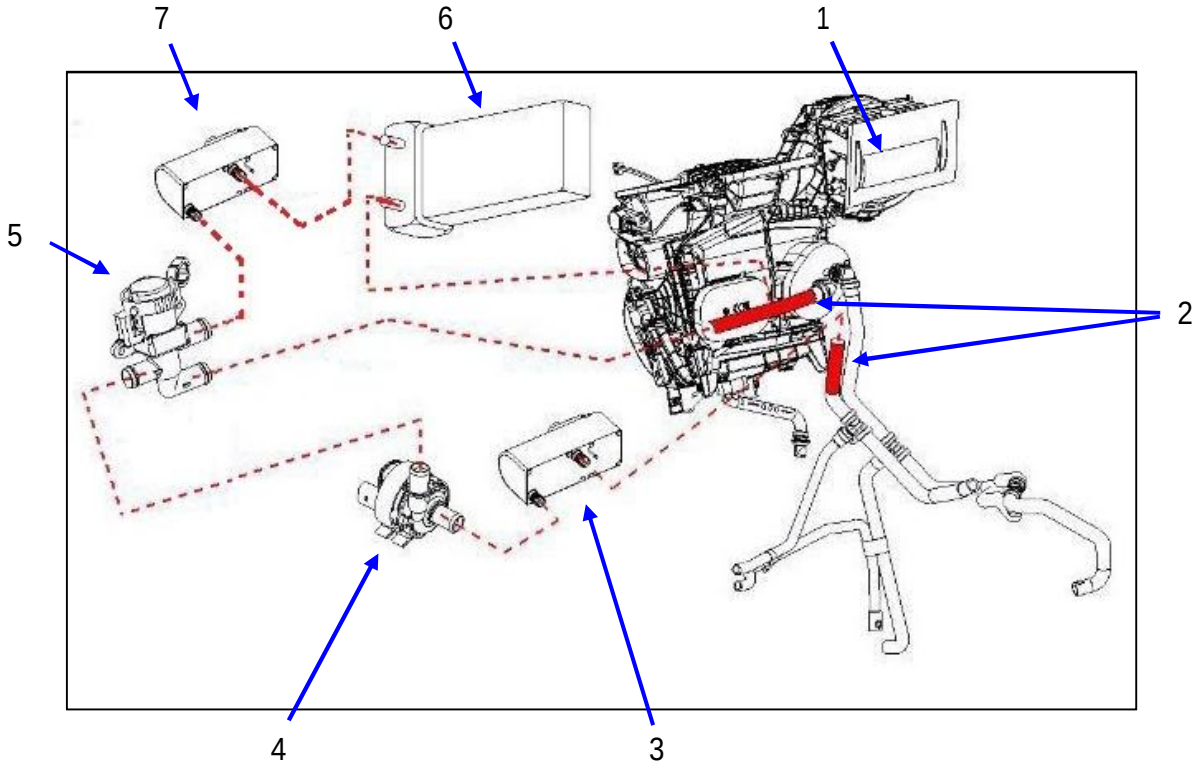
Attention:

If there is poor drainage, there is a risk of engine breakage.

General recommendations

- Disconnect the battery.
- Corrosion-proof the holes each time you drill into the sheet-metal.
- Do not attach anything to the braking circuit or other piping.
- Fill with coolant after the modification to the cooling system, checking the level again after the heater unit has been operated for the first time.
- Leave sufficient clearance for the electric harness and solenoid valve to pass; 10mm from fixed parts, 20mm from mobile parts and 150mm from a source of heat.
- Follow the start-up procedure to drain the air which could form in any of the pipes.
- The water pipes must be held in place on the ends; spring clamps or elastic reserve screw clamps must be used for this.
- Provide anti-gritting protection for the water pipes, either by protecting them or by using special reinforced pipes under the body.
- Provide thermal protection for the water pipes as they pass near to the exhaust.
- Install the water pipes' attachment lugs on existing holes if possible, avoiding contact between the pipes and the sharp corners of the attachment lugs.

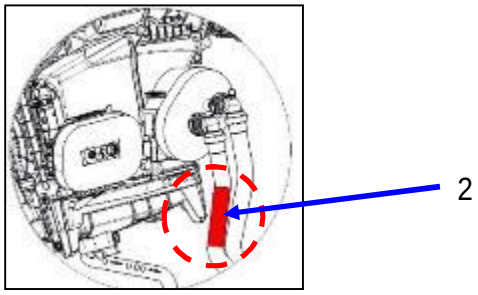
Diagram showing additional boiler + 2. Heat exchanger (without Start/ Stop)

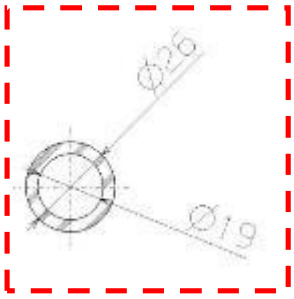


Pos.	Description
1	Heater module
2	Radiator inlet pipe
3	Additional boiler
4	Water pump
5	3-way solenoid valve
6	Secondary heat exchanger
7	Secondary water heater unit boiler

Connection to supply the additional circuit

The recommended zone for creating the connection is the radiator's inlet pipe (2).





Recommendations

Recommendations on the assembly:

- For starting the vehicle, it is recommended to assemble the additional boiler (3) as close as possible to the main heat exchanger.
- Additional drains must be added to the extra circuit.

Attention:

If there is poor drainage, there is a risk of engine breakage.

Recommendations on the cooling system:

- Disconnect the battery.
- Corrosion-proof the holes each time you drill into the sheet-metal.
- Do not attach anything to the braking circuit or other piping.
- After modifying the cooling system, fill with coolant, checking the level again after the heater unit has been operated for the first time.
- Leave sufficient clearance for the electric harness and solenoid valve to pass; 10mm from fixed parts, 20mm from mobile parts and 150mm from a source of heat.
- Follow the start-up procedure to drain the air which could form in any of the pipes.
- The water pipes must be held in place on the ends; spring clamps or elastic reserve screw clamps must be used for this.
- Provide anti-gritting protection for the water pipes, either by protecting them or by using special reinforced pipes under the body.
- Provide thermal protection for the water pipes as they pass near to the exhaust.
- Install the water pipes' attachment lugs on existing holes if possible, avoiding contact between the pipes and the sharp corners of the attachment lugs.

Branching pipes from the fuel system

Fuel systems

Attention:

The fuel is drawn from the bottom of the tank. There is therefore a risk of emptying the tank when stationary and fuel is low (see table 3.1 for repriming).

When the engine is running, the pressure in the pump return circuit is significant (approx. 0.5 bar), which means that it can be necessary to add a pressure reducer to the boiler supply circuit (after the T connection).

- It is prohibited to pierce the fuel tank.
- It is prohibited to remove the tank gauge
- It is essential to mount a connection to the return pipe of the pump.
- For all connector types, the bodyshop technician must check that the conversion withstands pressure of 4 times the working pressure (i.e. around 4 bars).
- The conversion must be able to withstand a temperature of between 70 and 80°.
- Opel/ Vauxhall recommends inserting a 'quick connect' T branching pipe (2) into the red connector (1) of the fuel return system.

If click-fit connectors are not used, an adapted sleeve connection with pipe clips must be used (see photograph below).

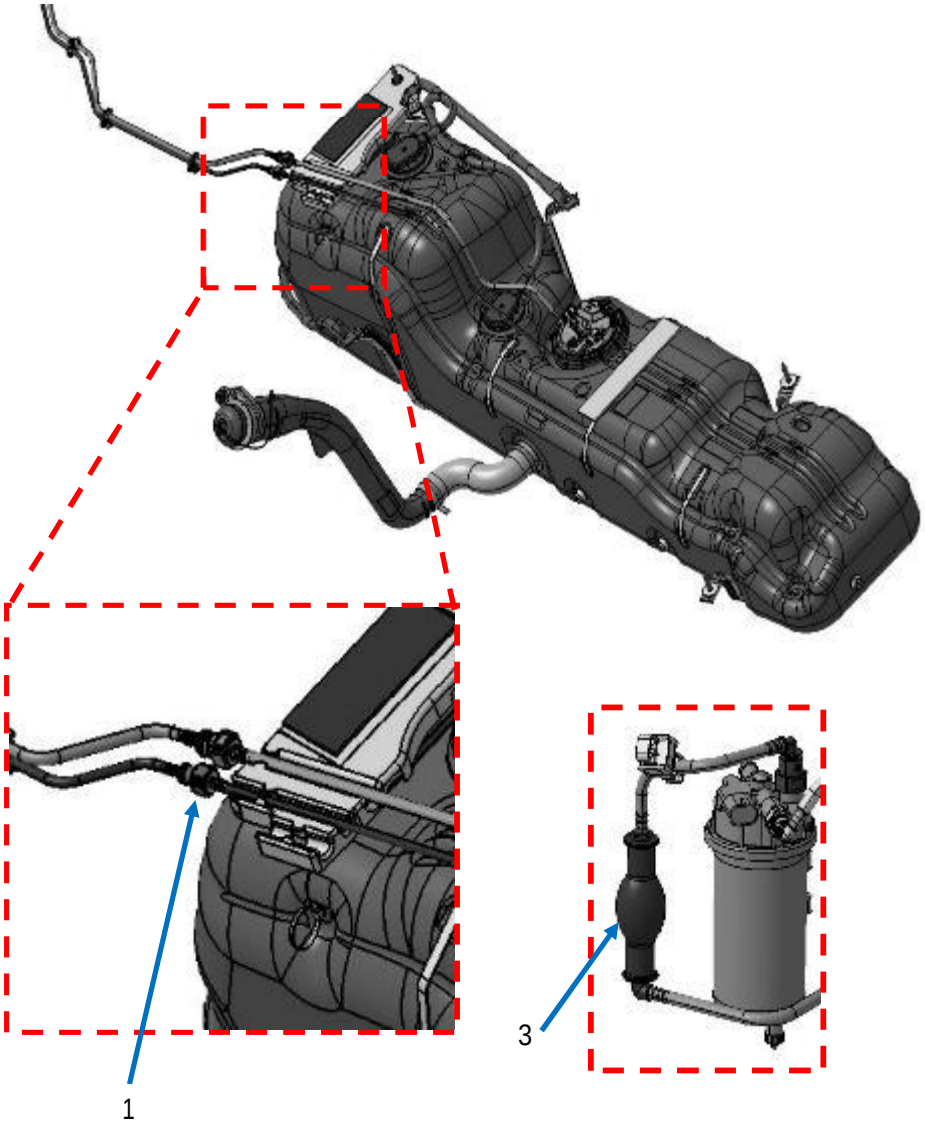
Attention:

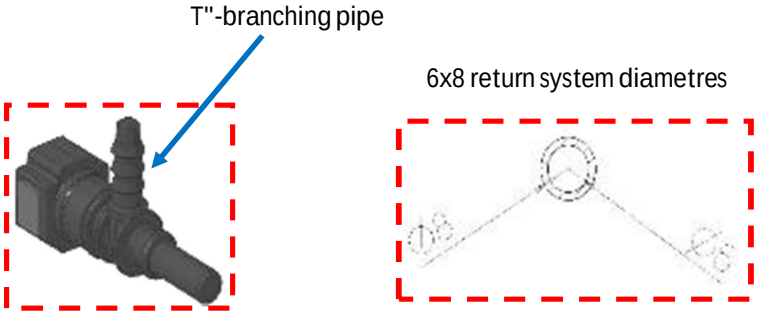
It is essential to add protection in all areas where there is a contact risk.

Fuel system types

	Type 1 Phase1+D3 Euro5		Type 2 CO^2 Step1 (D1 D2)	Type 3 Phase 1
Hand supply pump	With		Without	Without
In tank pump	Without		With	With
PCU (Pump control)	Without		Without	With
Bleed the fuel system (see user manual)	Manuel, using the hand supply pump		When ignition is switched on	When ignition is switched on
Fuel pipe (see pictures)	1x supply 1x return		1x supply 2x return	1x supply 2x return
Return system diameter for branching pipe	6x8		8x10	8x10
Motor M9T engine suffixes	672, 686, 876 892	670, 690, 680, 696, 698, 880, 896, 898	870, 890	700, 702
Emission classification	Euro3b, Euro4	Euro5	Euro5	Euro5

Fuel system type 1

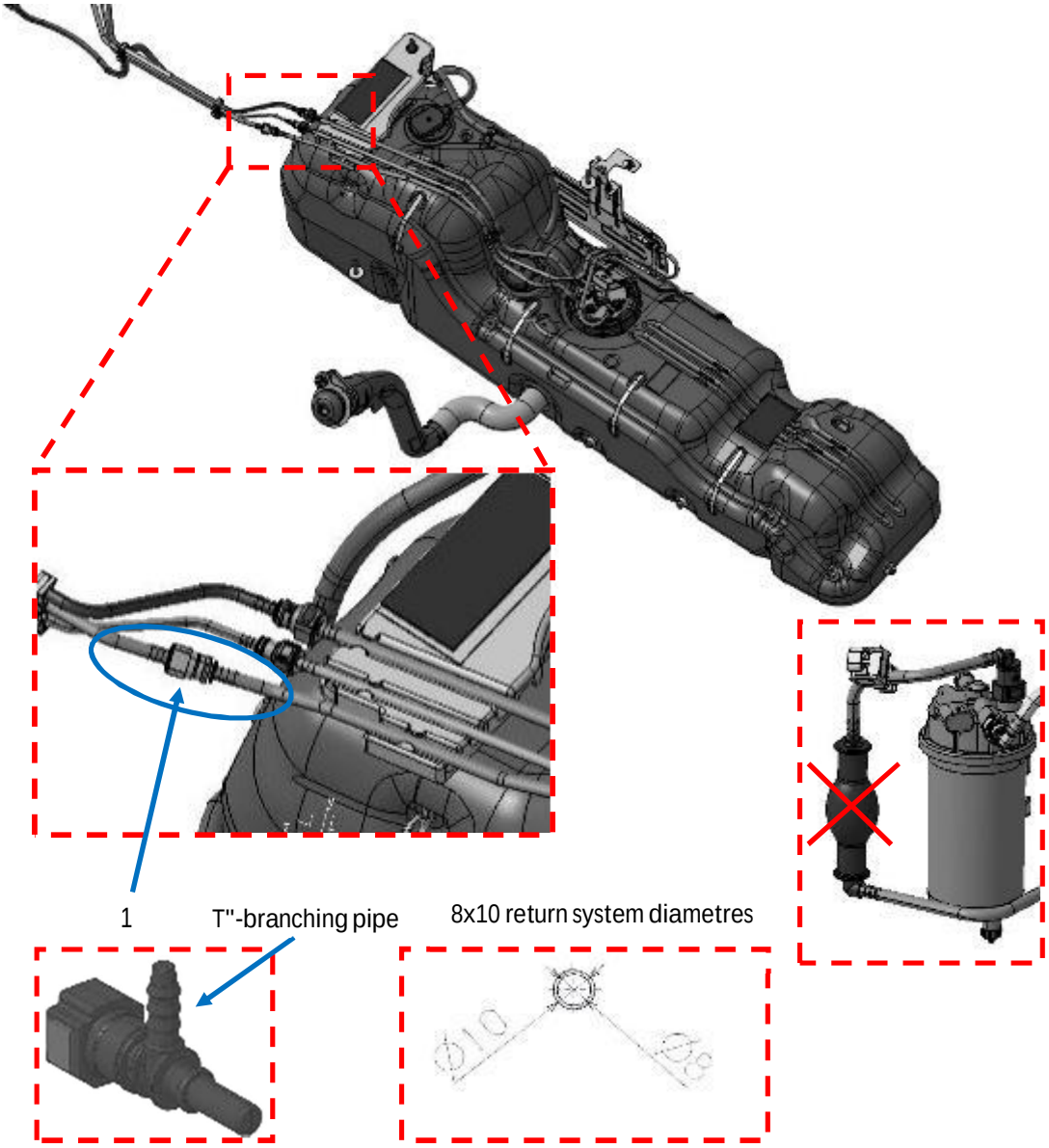




Fuel system characteristics:

- Hand supply pump (3) on supply pipe on right-hand side for left-hand drive vehicles and left-hand side for right-hand drive vehicles
- For the tank, one fuel supply pipe (Ø=8x10) and one fuel return pipe (1) (Ø=6x8)

Fuel system type 2 and 3



Fuel system characteristics:

- Electric priming pump on fuel system
- For the tank, one supply pipe (Ø8x10) and two return pipes.
  - Return pipe (1) from pump (Ø=8x10) and
  - Injector return pipe (Ø6x8)

Boiler exhaust

The boiler exhaust must not pass near to parts sensitive to the heat emitted by this exhaust.

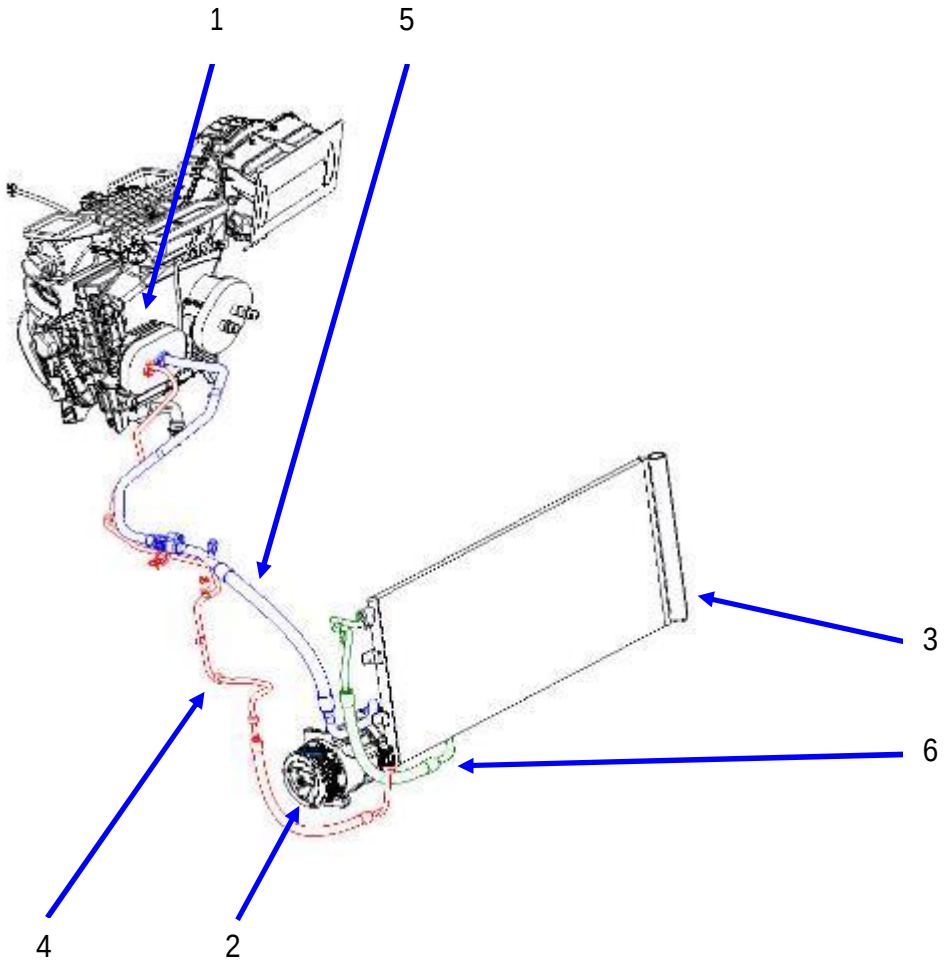
The exhaust gas may not get into the vehicle interior.

6.4.3 INSTALLING OF ADDITIONAL AIR CONDITION

Only the base vehicle fitted with standard air conditioning can receive additional air conditioning. This is compatible with an ancillary 4kW component; beyond this power level, there may be a negative impact on performance.

Standard air conditioning

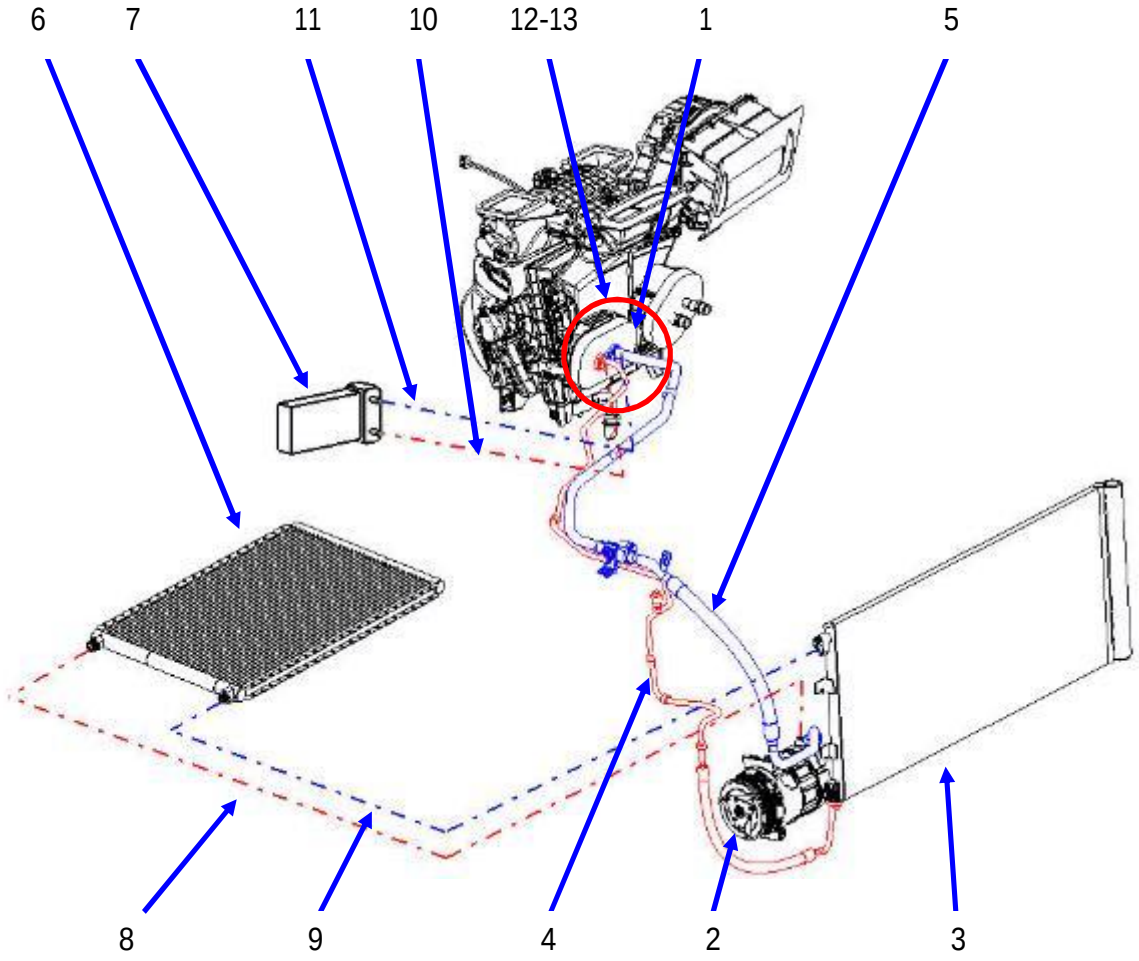
Air conditioning system diagram



Pos.	Description
1	Cabin evaporator
2	Air-conditioning compressor
3	Condenser
4	High pressure line from condenser to relief valve
5	Low pressure line at relief valve outlet
6	Line from compressor to condenser

Additional air condition

Air conditioning system diagram



Pos.		Description	Pos.		Description
1	*	Cabin evaporator	8	**	High pressure line from secondary compressor to condenser
2	*	Air conditioning compressor	9	*	Line from secondary condenser to condenser
3	*	Condenser	10	**	High pressure line from condenser to secondary condenser
4	*	High pressure line from condenser to relief valve	11	**	Low-pressure line from cabin evaporator to secondary evaporator
5	*	Low pressure line at relief valve outlet	12	**	Evaporator strut / compressor high pressure line
6	**	Secondary condenser + ventilator(s)	13	**	Secondary evaporator strut / condenser low pressure line
7	**	Evaporator/ Secondary relief valve			

* = Parts on mass production vehicle;
** = Additional air conditioning parts

6.5 COLD REGIONS

Definition

The vehicle is adapted to extreme cold configuration by modifying or adding the following elements:

- Coolant
- Windscreen wash
- Addition of protective parts

Engine coolant

Drain the circuit and refill with a mixture of 5.5 litres of coolant and 5.5 litres of distilled water.

Windscreen wash

Vehicles manufactured between April 1 and July 31 are delivered with a screen wash composed of 20% washer liquid and 80% distilled water.

Outside of these dates, the vehicles are delivered in extreme cold (-20°C) configuration (45% Antifreeze & clear view liquid and 55% distilled water).

Front brake disc protection

Front brake disc protection must be added for extreme cold vehicles:

The addition of disc protection also protects the steering ball joint cover.

6.6 LIFT TAILGATE

The Movano can be fitted with a lift tailgate.

Fitting a tailgate precludes the fitting of an Opel/Vauxhall towing system. When installing a new coupling, it is necessary to plan for a validation, in compliance with regulatory requirements.

The maximum load + tailgate mass can vary between the vehicles in the range.

The maximum lifting capacity of the tailgate must not exceed 500kg.

It depends on the type of vehicle and the type of tailgate bearing structure.

In all cases, and particularly in the case of vehicles without an additional chassis, the loading gate mounting system must include a structure that allows forces to be distributed over the vehicle's chassis.

Permitted masses

	Lift tailgate maximum lifting capacity	Lift tailgate maximum lifting capacity + Tailgate mass
Panel van	500kg	700kg
Chassis cab	Max. load to be determined by the coachbuilder according to the type of mounting. Mounting on a built-on structure is advised.	
Platform cab	Max. load to be determined by the coachbuilder according to the type of mounting. The absence of an upper structure (rear ring) limits the maximum permissible load on the tailgate.	

Note:

- The converter shall be solely responsible for any changes made.
- For all versions, the converter shall ensure that the lifting tailgate does not adversely affect the integrity or reliability of the basic vehicle.

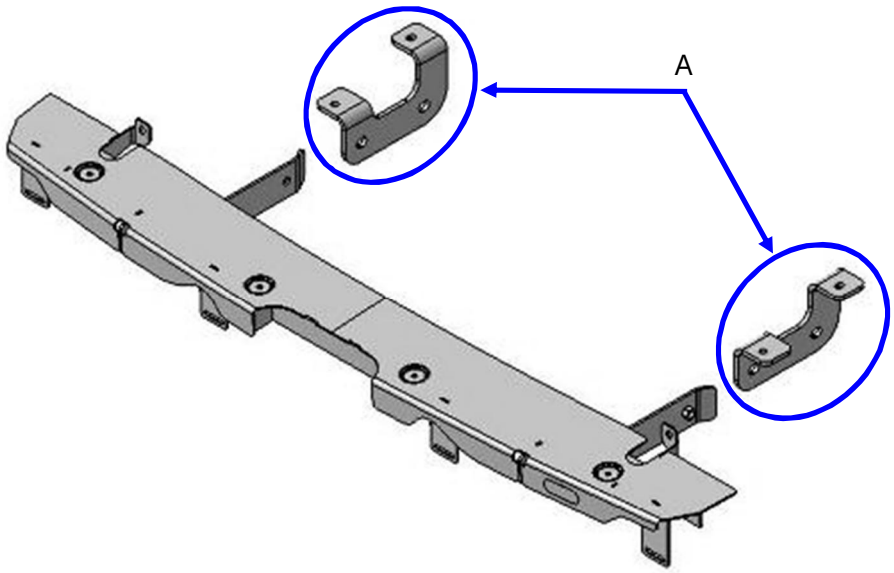
6.7 INTEGRATED STEP ON PANEL VAN ON REAR END

Integrated step in rear bumper for panel vans are available as an option or in after-sales.

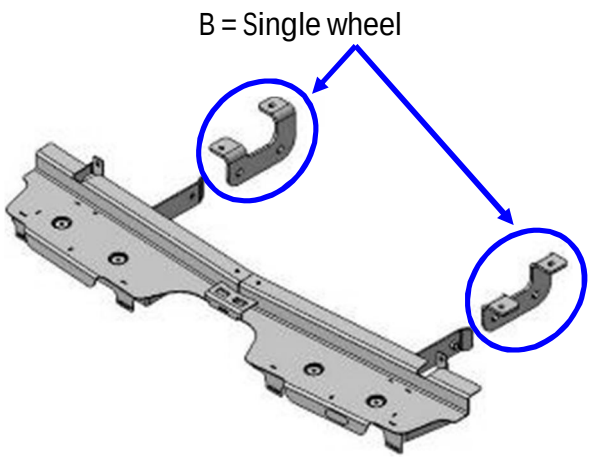
They are compatible with tow bars and/ or rear parking distance sensors.

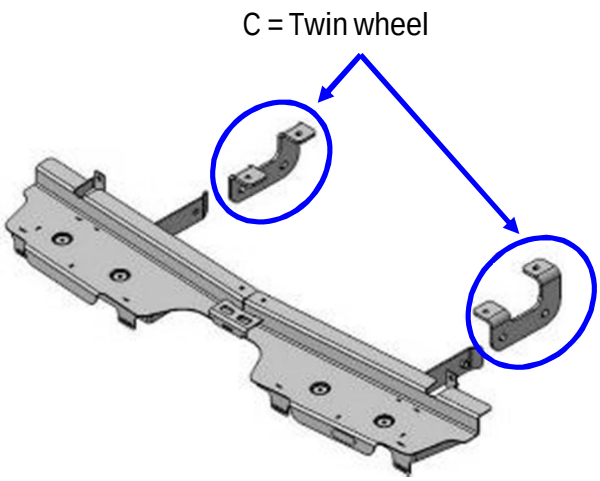
Parts A, B or C must be installed for versions without tow bars.

Front wheel drive version



Rear wheel drive version





Vehicle length	Wheelbase	Drive	Van overall length (mm)	
			Without integrated step	With integrated step
L1	3,182	FWD	5,048	5,095
L2	3,682	FWD	5,548	5,595
L3	4,332	FWD	6,198	6,245
	3,682	RWD	6,198	6,311
L4	4,332	RWD	6,848	6,961

FWD = Front wheel drive;
RWD = Rear wheel drive

Example for integrated step in rear bumper for rear drive version
(rear parking distance sensors are available as an option)

6.8 CHERRY PICKER

Without stabiliser jacks

The conversion of type aerial work platform is permitted without stabilizers on chassis cab and panel van.

With two side stabiliser jacks

For an aerial work platform conversion on panel van, it may be necessary to equip the vehicle with two side stabiliser jacks.

The stabiliser jacks must under no circumstances be able to lift the vehicle with the wheels in suspended position. During the stabilization and horizontal adjustment phase, the relief for the suspension system must be limited to the minimum.

For an aerial work platform conversions on FWD and RWD Chassis Cabs and Chassis Double Cabs, see chapter 5.7.

CHANGE DESCRIPTION

Date	*Section*	*Modifications*
Apr. 17	4.01.4	Information to plug addad.
Apr. 17	4.03	Text to battery versions "The battery L6 is compliant not for version with Start / Stop." added. Added note to additional battery for vehicles in version SCR .
Apr. 17	4.10.3	Added information about the door.
Apr. 17	4.18	New Chapter „DRIVING SUPPORT -System“
Apr. 17	5.05.3	Order for attachment added.
Apr. 17	5.07	Under the heading Platforms the reference to chapter 69 has been changed to chapter 68
Apr. 17	6.01	Added info to EURO 6
Apr. 17	6.02	Added info to EURO 6
Apr. 17	6.04.1	Chapter converted from 6.04.2 to 6.04.1 and Information added
Apr. 17	6.04.2	Chapter converted from 6.04.1 to 6.04.2 Information added and images updated.
Apr. 17	6.04.3	Change in table additional air condition Pos 13 = Secondary evaporator strut / condenser high low pressure line (Low pressure line instead of high pressur line)
Feb. 16	4.02	Fuses/ relays: versions SCR added. à EURO6
Feb. 16	4.03	Version Eco L5 EFB added. Vehicles with Start/ Stop added.
Feb. 16	4.05	Power supply: vehicles with Start/ Stop and EURO 6b added.
Feb. 16	4.06	Dashboard: information about 1 DIN- and 2 DIN-radio cover added.
Feb. 16	4.07	Start/ Stop: vehicles with EURO 6b added.
Feb. 16	4.11	4.11.1 Accelerated idle control activated by earthing (6-way connector) added + page 4 image of B-pillar with SCR added. à EURO6 4.11.2 Image of B-pillar with SCR added. à EURO6 4.11.5 Tachograph: Information about location of fuses on Versions with SCR added. à EURO6
Feb. 16	4.15	TRABUS fuses/ relays: version SCR added. à EURO6
Feb. 16	5.04	Recommendation for subframe installation added.
Feb. 16	6.02	Power take-off on gearbox, additional dimensions H / J / K added.
Feb. 16	6.04	Information about branching pipes on fuel system added.