

New Fiat Ducato.

Conversion and fitting-out manual



FOREWORD

This publication gives the information, features and instructions for vehicle fitting out and conversion and is addressed to qualified, specialist personnel.

The coach builder is responsible for the fitting-out or conversion project and its execution, and must guarantee compliance with standards given in this publication in addition to all other applicable standards.

Before undertaking any works, make certain to have the publication on the vehicle model on which the works are to be done, as well as all the required accident prevention equipment, which, for information, includes goggles, hard hat, safety shoes, etc., in addition to all necessary tools, lifting and transport gear, etc. The equipment and tools must all be available and efficient, and the vehicle itself must be in condition to permit safe execution of the works.

When carrying out the works the coach builder must strictly adhere to the instructions given in the publication, using the components described, and guarantee that the works carried out are technically correct.

➤ **Any modification, conversion or other operation not foreseen in the manual, and not explicitly authorised by FIAT GROUP AUTOMOBILES S.p.A. in writing shall relieve FIAT of any liability, and specifically, if the vehicle is covered by warranty, this shall be immediately forfeit.**

FIAT GROUP AUTOMOBILES S.p.A. is available to provide any clarification necessary for execution of the works, as well as instructions for any cases or situations not specifically foreseen in this publication.

The functional, efficiency and safety conditions foreseen by FIAT GROUP AUTOMOBILES S.p.A. must be restored immediately after any conversion works. Contact the FIAT GROUP AUTOMOBILES S.p.A. network for any necessary vehicle tuning.

FIAT GROUP AUTOMOBILES S.p.A. shall not be held liable for the effective execution of the conversion or fittingout works.

The data and information contained in this publication may not be up to date as a result of the alterations that FIAT GROUP AUTOMOBILES S.p.A. reserves the right to make at any time for technical or commercial reasons, or for the need to adapt the vehicle to the requirements of specific local laws.



In case of discrepancy between the contents of this publication and the effective condition of the vehicle, please contact FIAT GROUP AUTOMOBILES S.p.A. before proceeding with any works.

Symbols - Warnings



Hazard to personal safety



Risk of damage to vehicle



General hazard



Respect the environment

Indicates behaviour code for use of the vehicle in the most environmentally friendly manner possible.

➤ **NOTE** Provides any necessary additional information.



AUTHORISATION

Observance of the instructions contained in this manual does not oblige the manufacturer to grant authorisation.

The conversion coach builder must ask the manufacturer for authorisation by sending the appropriate documentation (see sections below) to the following address:

FIAT GROUP AUTOMOBILES S.p.A.

FIAT LIGHT COMMERCIAL VEHICLES

MERCATO ITALIA - SERVIZIO ALLESTITORI
(Italian Market - Coach-builders Service)

Corso Agnelli 200

1° piano ufficio B56
(1st floor, office B56)

In order to grant authorisation, the manufacturer reserves the right to demand that the conversion coach builder carry out any test or verification considered necessary.



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Purpose of coach builder's instructions

This document provides instructions about how to make modifications and/or fit-out original FIAT GROUP AUTOMOBILES S.p.A. vehicles while maintaining the correct function, safety and reliability of the vehicle itself and its component parts.

FIAT GROUP AUTOMOBILES S.p.A. approval for conversions and fitting-out

Modifications must be made according to the criteria given below.

Liability

The approval given by FIAT GROUP AUTOMOBILES S.p.A. only concerns the technical/ conceptual feasibility of the modification and/or fitting-out to apply to an original FIAT vehicle.

The coach-builder is therefore liable for:

- The design of the modification and/or fitting;
- The choice of specifications of the products/materials used;
- The execution of the modification or fitting-out;
- Compliance of the design and realisation with all instructions provided by FIAT GROUP AUTOMOBILES S.p.A.;
- Compliance of the design and realisation with all standards in force in the country in which the vehicle is registered;
- The function, safety and reliability and, in general, efficient performance of the vehicle, as well as the effects that the modification or fitting-out may have on the performance and characteristics of the vehicle.

Warranty

The coach-builder responsible for building the superstructure or making modifications to the chassis must guarantee that the works have been carried out in a workmanlike manner and in full compliance with the instructions given in this publication. The warranty given by FIAT GROUP AUTOMOBILES S.p.A. on the vehicle shall be forfeit if:

- The instructions given are not followed, or the conversion/fitting-out is not authorised;
- The conversion is carried out on a chassis not suitable for the foreseen use;
- The specifications and instructions that FIAT GROUP AUTOMOBILES S.p.A. makes available for the correct execution of certain kinds of conversion are not followed;
- The original parts and components that FIAT GROUP AUTOMOBILES S.p.A. manufactures for certain types of conversions are not used.

Application for approval

Applications for approval or assistance in the realisation of conversion works must be sent to the pertinent FIAT GROUP AUTOMOBILES S.p.A. market agents.

To obtain approval the coach-builder must provide sufficient documentation illustrating the foreseen conversion, type of use and use conditions for the vehicle. All drawings must clearly show any differences to the instructions provided.

The coach-builder shall be responsible for obtaining approval by the competent Authorities of the conversion and/or fitting-out.

Markings and logos

Factory markings, logos and names must not be altered or moved in relation to their original positions; the validity of the vehicle's image must also be upheld.

The application of conversion or fitting/out trademarks or logos must be authorised by FIAT GROUP AUTOMOBILES S.p.A. These must be placed in the immediate vicinity of the existing FIAT GROUP AUTOMOBILES S.p.A. trademarks and logos.

FIAT GROUP AUTOMOBILES S.p.A. reserves the right to remove its trademark or logo if the fitting-out or conversion has any features not in compliance with its requirements; in such cases the coach-builder shall be totally liable for the entire vehicle.

Legal requirements

With the vehicle completed, the coach-builder must verify that all works done (modifications, structural applications...) comply with all legal requirements of the country in which the vehicle is registered (i.e. weight, dimensions, braking capacity, emissions, noise levels).

The vehicles described in this manual comply with EU Directives. This compliance must be maintained even after conversion and/or fitting-out. Possible exceptions to this requirement may include cases in which it is possible to obtain local approval, different to that of the EU.

Seat belt anchor points

Works undertaken on zones in the vicinity of seat belt anchor points may alter their compliance with EU certification and therefore the coachbuilder must always check compliance with legal standards.

Seats

The seat floor anchors are realised in compliance with legal standards on retainer systems.

If they are moved from the original position, passenger safety may not be assured, nor the quality of the conversion works. It is therefore forbidden.

Interior shelving

These structures must be designed and realised to be self-supporting and sufficiently rigid.

The internal fastening must be to the floor supporting structure (cross and side members) and realised such as to distribute the load evenly.

Anchors to side structures, realised without creating any pre-stress, may be fastened to:

- the boxed pillar structure, where specific holes and anchor points are already provided (see paragraph – LOADS ON SIDES)
- the upper side connector members.

Operations on vehicle structure and floor

Following the instructions and precautions already described in the previous paragraph.

In particular, note that:

- when perforating non-structural box sections, avoid zones where stress is more concentrated
- holes for floor anchors must be protected and sealed against water, gas and dust infiltration.

Ambulanze

Ambulances

We advise special attention in:

- connection of the side panelling and under-roof, using the anchor zones and holes already present on the body shell, both on cross and side members, avoiding any cutting that may weaken the structure.
- checking to verify that the application and use of medical equipment does not interfere with the basic vehicle electrical/electronic systems.

Accident prevention



The structures and systems applied to the vehicles must comply with all accident prevention and safety standards in force in the individual countries to which the vehicles are destined.

All precautions dictated by technical knowledge and common sense must also be taken to prevent breakdowns or functional defects.

The manufacturer of the applied structure or system is obliged to comply with these requirements.

Choice of materials: Environment - Recycling

During the design phase, an increasing amount of attention must be paid to the choice of materials to use, in particular as regards aspects associated with the environment and recycling, and especially in the light of continually changing national and international standards governing waste disposal.

Here are a few guidelines:

- It is forbidden to use materials that are harmful to human health, or that may present a potential hazard, such as those containing asbestos, lead, halogen additives, fluorocarbons, cadmium, mercury, hexavalent chromium, etc.
- Always use materials that produce a minimal amount of waste when processed, and that permit easy recycling after first use.
- With composite type synthetic materials, use components that are compatible with each other, envisaging their possible use even combined with other recovered or recycled materials.

Always apply markings in compliance with standards in force.

Vehicle hand-over

Before handing-over the vehicle, the coach builder must:

- Make certain that the conversion and/or fitting-out has been correctly realised;
- Fully tune the vehicle and/or fitting-out applied;
- Check vehicle and/or fitting-out function and safety;
- Prepare and hand-over to the end user all the necessary instructions for operating and maintaining the vehicle version and any additional systems fitted;
- Include all new data on specific information plates on the vehicle;
- Provide confirmation that the works carried out comply with the instructions given by the vehicle Manufacturer and all legal requirements;
- Issue a warranty for the modifications made to the vehicle.

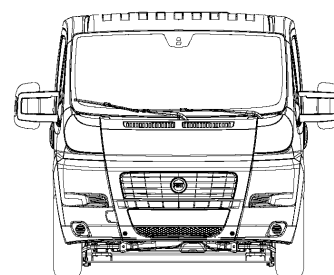
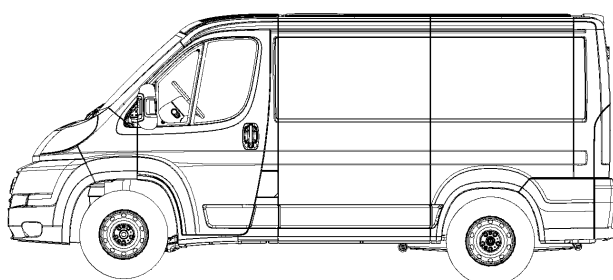
Presentation of the range

The range of vehicles suitable for conversion includes the following versions:

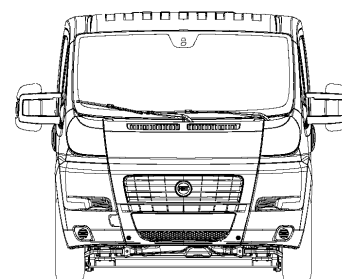
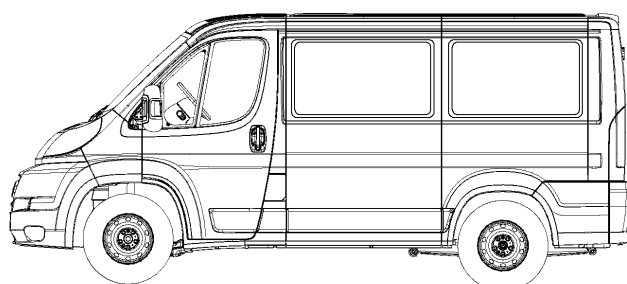
- Van;
- Van with windows;
- Chassis cab;
- Special chassis cab;
- Chassis cab with platform;
- Basic chassis;
- Special basic chassis;
- Double cab;

The drawings listed are for information only. For all the wheelbases and main dimensions, refer to the chapter 'Dimensions' from page 4.1.

Van



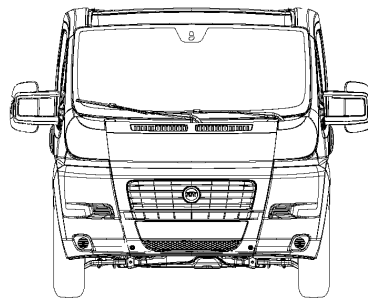
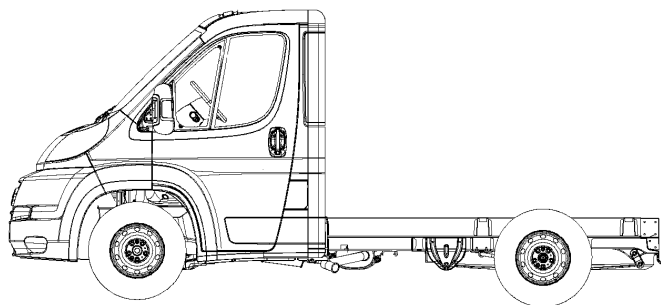
Van with windows



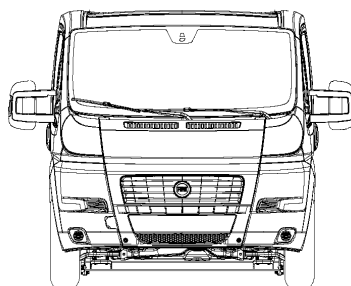
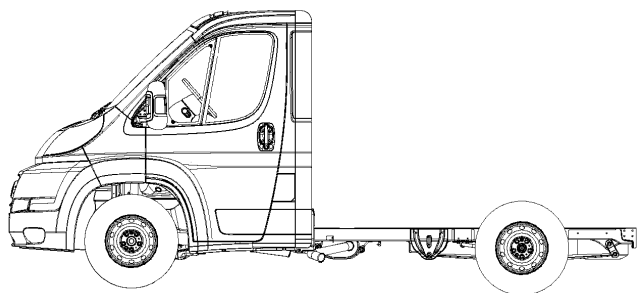


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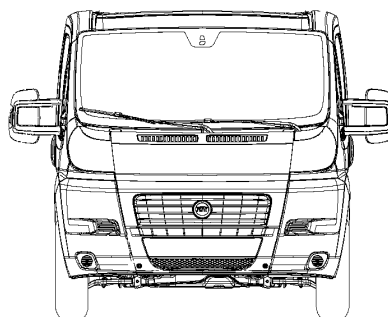
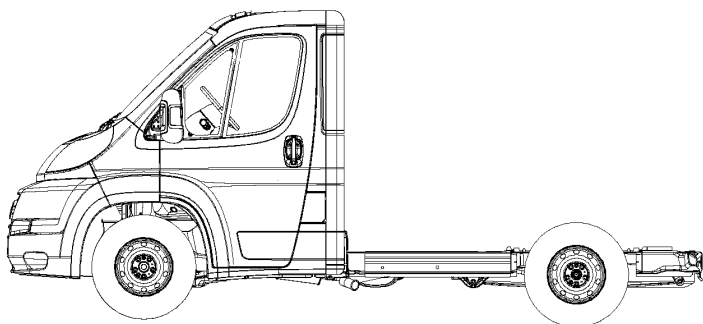
Chassis cab



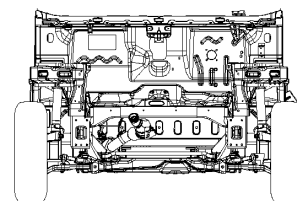
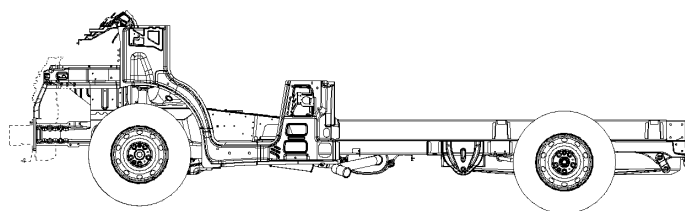
Special chassis cab



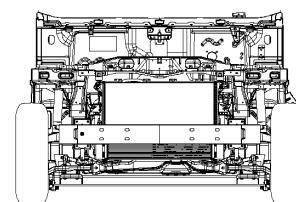
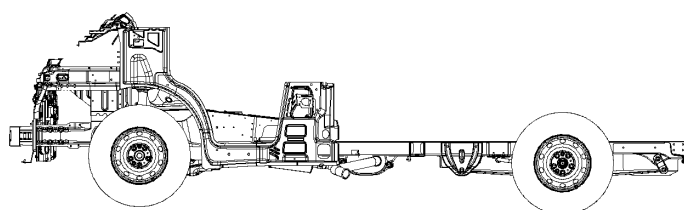
Chassis cab with platform



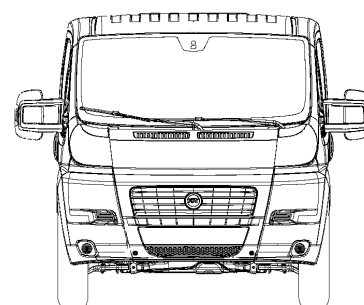
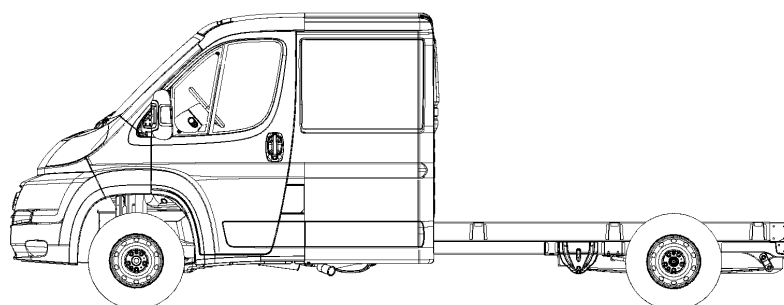
Basic chassis



Special basic chassis



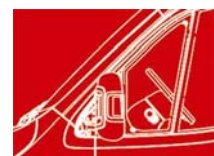
Double cab





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Bodywork and Chassis

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MAXIMUM PERMITTED WEIGHTS

Overall vehicle weights and the maximum admissible weights per axle are given in the table below. The tare weights refer to STDA configuration (unladen weight with 90% of fuel);

Special equipment may cause variations to weight and weight distribution over the axles.

Before carrying out the conversion, check vehicle unladen weight and weight distribution per axle.

To ensure constant and correct set-up and peak capacity, even on low grip road surfaces, safe dynamic behaviour reliability and the required performance, weight distribution must be within the following limits (that must not be exceeded) in all load conditions:

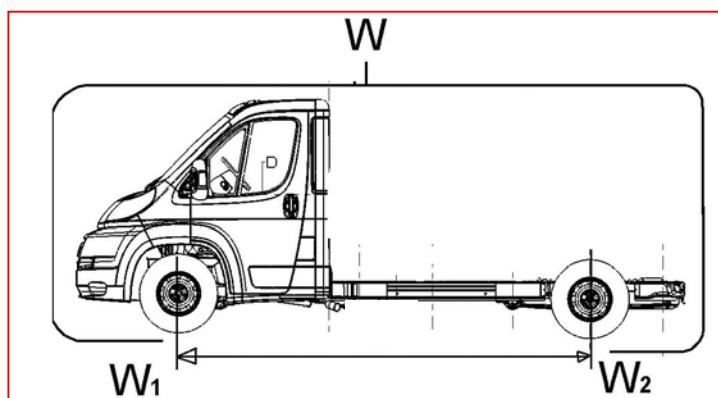
- **Front axle: weight at ground always between 70% and 40% of the total vehicle ground weight**

- **Rear axle: weight at ground always between 30% and 60% of the total vehicle ground weight.**

According to the weight distribution, the total ground weight and/or maximum admissible weights on the axes may not be fully saturated.

Vehicle diagram identification data table

New Ducato "X2/50"	W (Kg)	W1 (kg)	W2 (kg)	R
30	3000	1600	1650	R 15"
33	3300	1750	1900	R 15"
35	3500	1850	2000	R 15"
Maxi 35	3500	2100	2400	R 16"
Maxi 40	4000	2100	2400	R 16"



W: GVW;

L

W1: Max. Load on front axle;

W2: Max. Load on rear axle;

R: Wheels.

TOWING CAPACITY

The limits given in FIAT GROUP AUTOMOBILES S.p.A. documents must be respected.

Special attention must be paid to vehicles with load concentrated on the rear overhang and short wheelbase vehicles with high centre of gravity.

The positioning of auxiliary equipment and superstructures must ensure even transverse load distribution. For each wheel, a variation in the nominal load on the wheel (1/2 the load on the axle) of $\pm 4\%$ with respect to the permitted tyre loading is possible without jeopardising braking capacity and vehicle driving stability.

New Ducato "X2/50"	W (Kg)	Towing Capacity (kg)
30	3000	2000
33	3300	2000
35	3500	2000
Maxi 35	3500	2500
Maxi 40	4000	2500

The rear overhang of the superstructure must be realised considering the maximum permitted axle loading, the minimum load required on the front axle, length limits, the position of the two hook and the underrun protection bar foreseen by various standards.

Special exceptions to the maximum permitted weights may be given for special uses, for which precise use limits will be nevertheless established, along with any reinforcing to apply to vehicle organs.

These exceptions, if they exceed legal limits, must be authorised by the administrative Authorities.

➤ **NOTE:** With the vehicle ready for the road (conversion completed) the difference in weight between the right side and left side must not exceed 100 kg, to prevent problems with vehicle geometry.

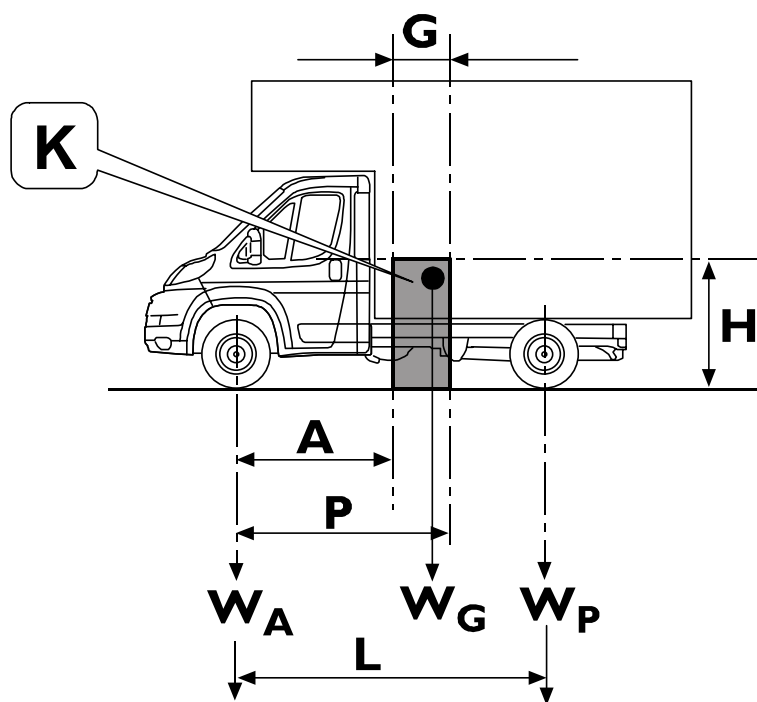


CENTRE OF GRAVITY

The height from ground of the non-converted chassis cab vehicle centre of gravity is given in the specific technical documentation for each model/version.

To test the vehicle complete with superstructure, the coach-builder must check that the height of the equipment centre of gravity (including the payload) or the entire vehicle under full load respects the maximum permitted values.

These limits are defined in compliance with national and international standards (e.g. EU Directives on braking), or are required by FIAT GROUP AUTOMOBILES S.p.A. to assure good vehicle dynamic behaviour (e.g. transverse stability in motion).



- K = Centre of gravity G position in all converted vehicle load conditions
- L = Vehicle wheelbase
- Cm = Gauge (maximum between fr. and rear)
- WG = Total maximum ground weight
- WA = Front axle max admissible weight
- WP = Rear axle max admissible weight
- A = $\frac{WG - WA}{WG} \cdot L$ (minimum distance from front axle)
- P = $\frac{L \cdot WP}{WG}$ (maximum distance from front axle)
- G = P - A (G longitudinal range)
- H = 0,7 * Cm (G vertical range)

In version where the payload can shift sideways (e.g. suspended loads, transport of fluids, etc.), higher dynamic loads may be generated when turning, resulting in reduced vehicle stability. This must be considered in the vehicle operating instructions, or for any reductions to centre of gravity height.

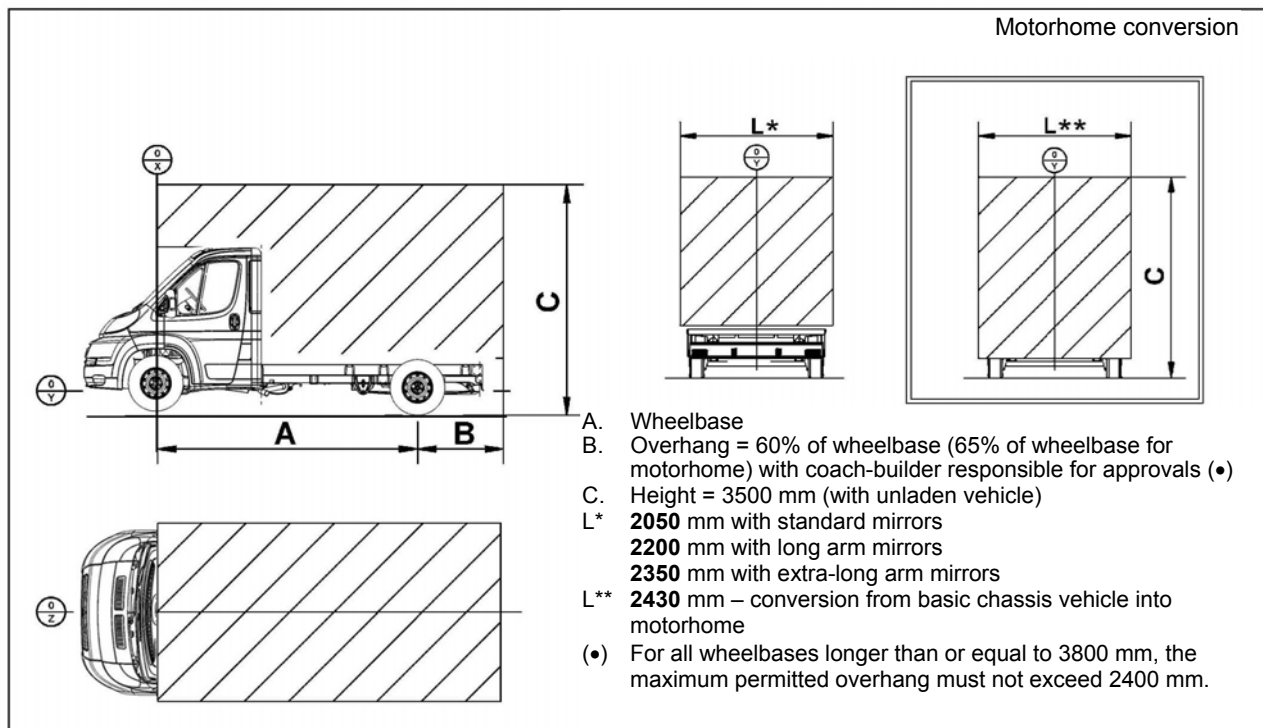
Particular attention must be given to ensuring compliance with the weight limits established for the individual axles and the overall weight limit, also considering the foreseen number of passengers and a sufficient margin for the loads that may be transported with them, such as:

- luggage, tents, sports equipment;
- water tank capacity, toilets;
- gas bottles, etc.

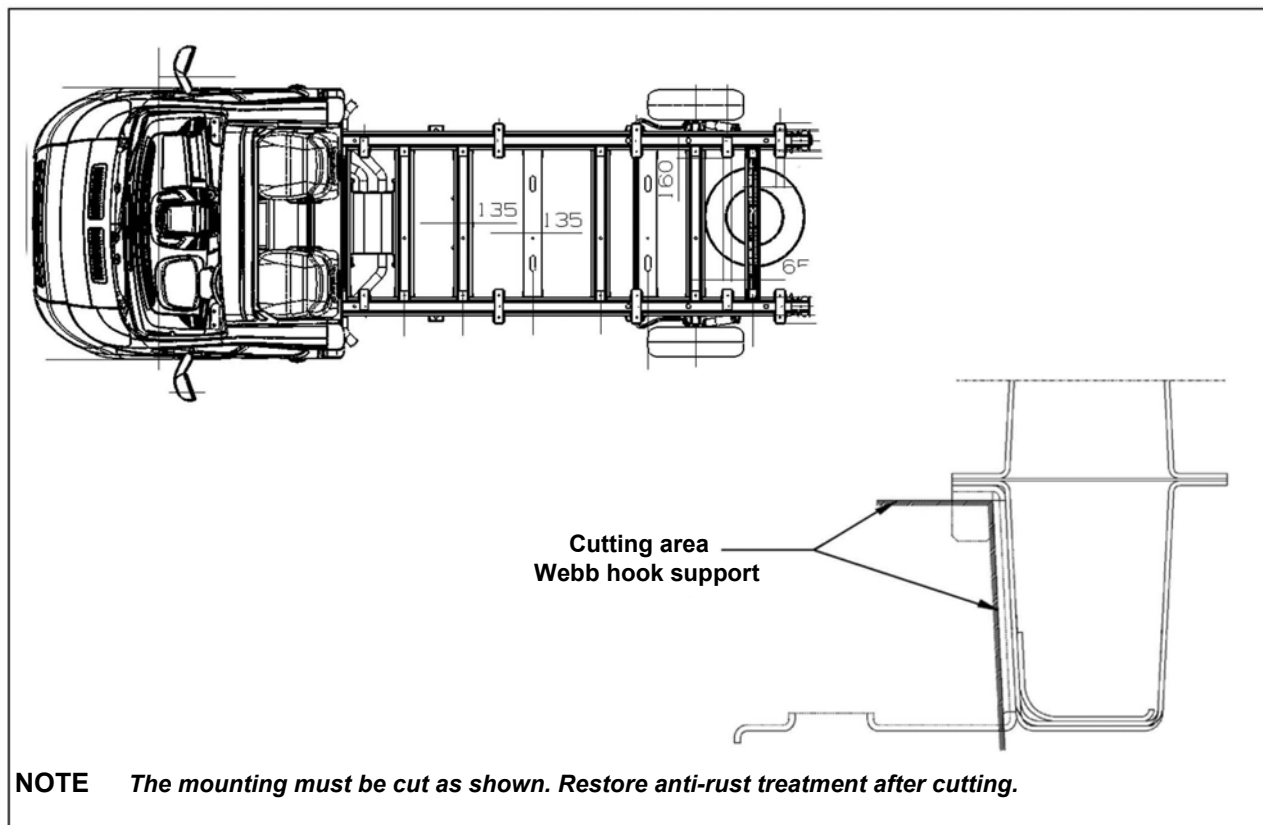


2.6

PROFILE LIMITS (chassis cabs)



Elimination of mounting for Webb hook





MODIFYING REAR OVERHANG

Modifying the rear overhang causes a significant change in the distribution of ground loads on the axles. Lengthening works must take this into account, checking that the values of the maximum loads permitted for each axle are nevertheless observed.

The operation to modify the overhang must be carried out in accordance with the requirements given on the following pages.

In addition, the possible lengthening operations may be deduced from the diagrams (see following page), where the shaded area defines all the possible dimensions of the overhang in relation to the vehicle's wheelbase.

Lengthening the overhang may involve repositioning the underrun protection bar in compliance with regulations in force.

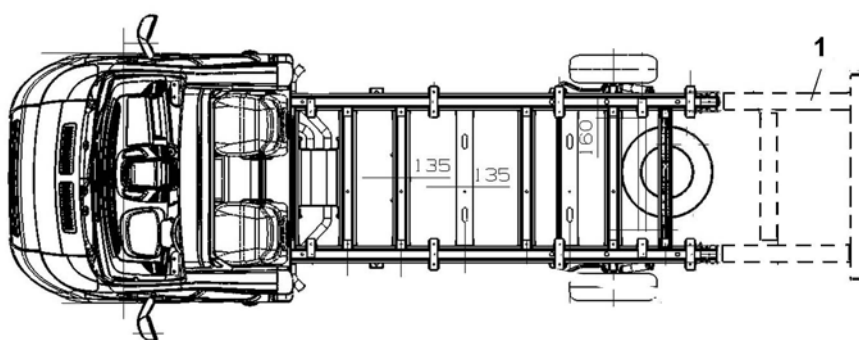
The modification must be made without making welds on chassis box sections, as this procedure would involve destroying the internal treatment obtained by cathaphoresis; in addition, the vehicle is already equipped with holes for fastening overhang extension structures (see following pages).



NOTE: - Do not make cuts in areas where stresses are highly concentrated.

In addition the cutting lines must not affect existing holes on the longitudinal members.

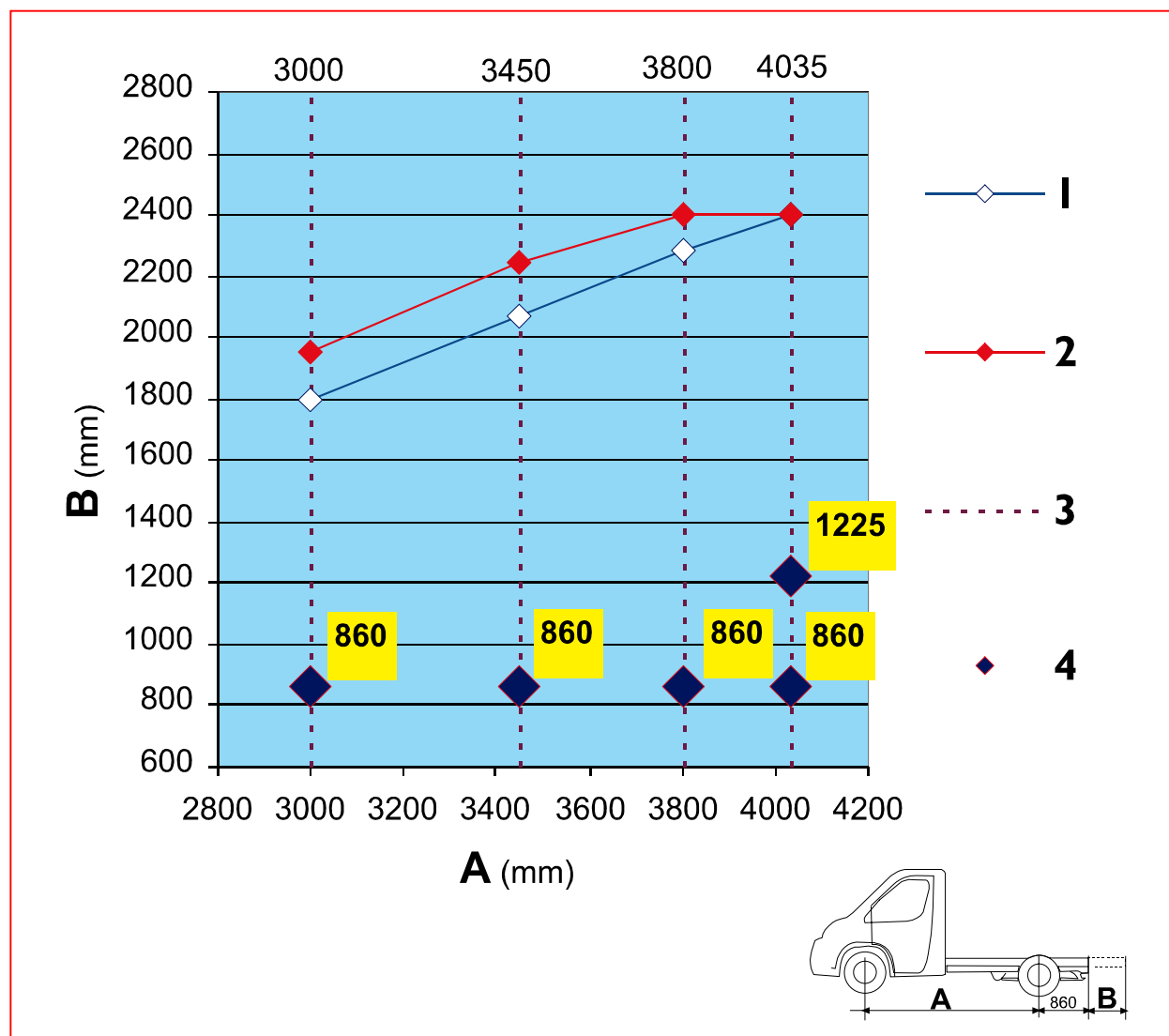
- For materials of the added structures, refer to the specifications of the original longitudinal members.
- For overhang lengthening instructions, see the following pages.



1: indicative outline of structure for lengthening overhang.

**Chassis cab lengthening limits.**

The permitted extensions to the overhang can be deduced from the diagram below.



1. Maximum overhang length according to wheelbase (60% for all versions excluding Camping-car).
2. Maximum overhang limit according to wheelbase (65% for Camping-car versions).
3. Original wheelbase.
4. Original overhangs (*).

For all wheelbases that exceed 3800 mm the maximum length of the projecting part must not exceed 2400 mm.

- (*) - Chassis cabs, chassis cab with platform and standard basic chassis: 860 mm; (extra-long overhang: 1225 mm).
- Special cabs, chassis cab with platform and special basic chassis: 880 mm; (extra-long overhang: 1245 mm).

A: Wheelbase length.

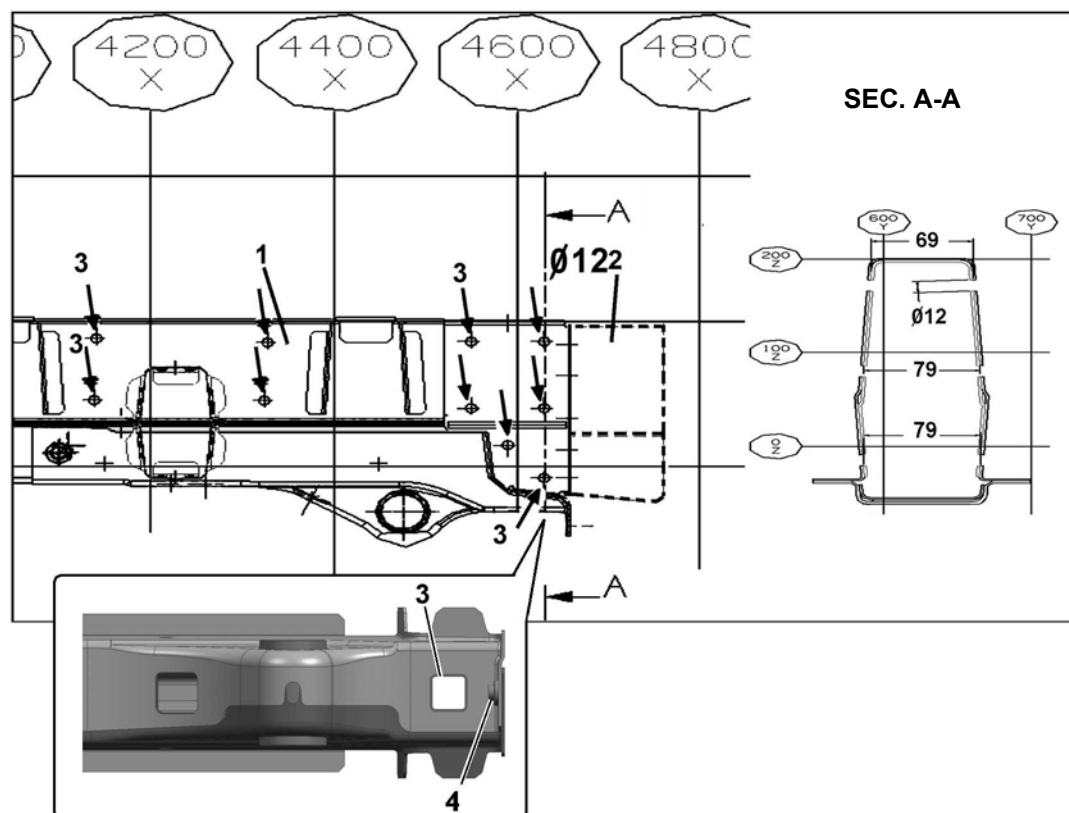
B: Overhang length.



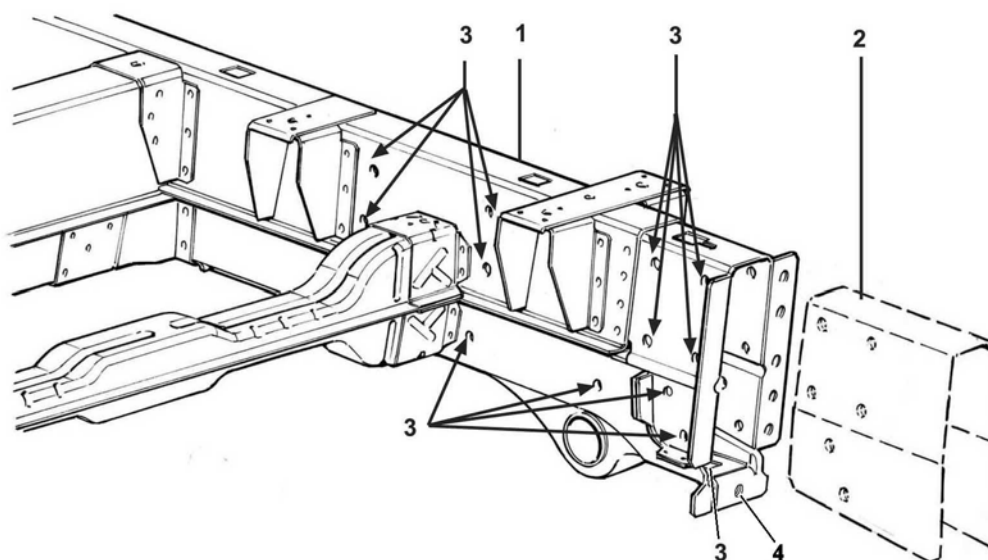
Overhang lengthening methods

Normal chassis cab (with sub-frame)

Sections



Perspective view



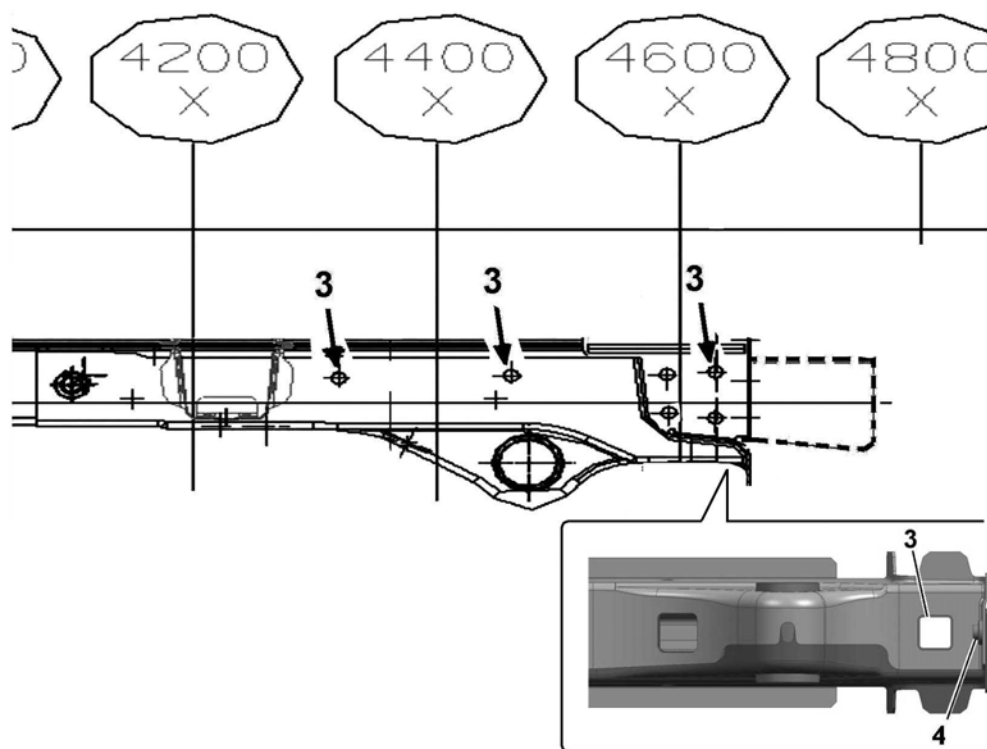
1: longitudinal member; 2: structure by coach-builder; 3: holes for fastening structure, 4: ring nut.



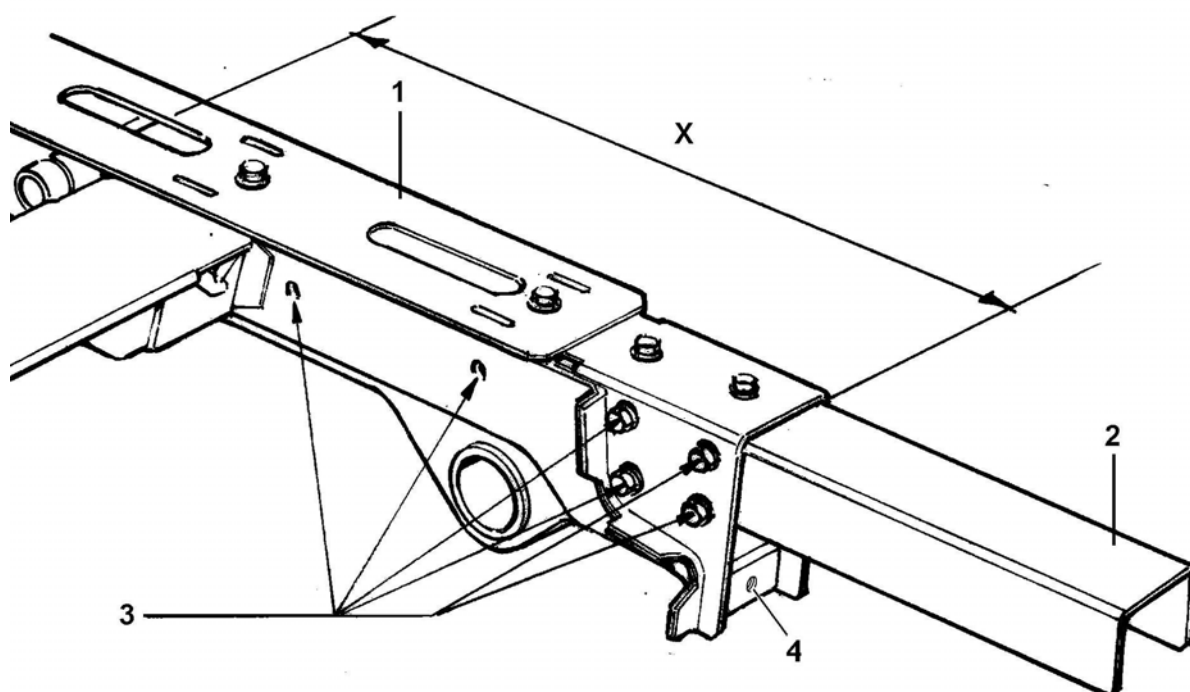
2.10

Special chassis cab (without sub-frame)

Sections



Perspective view



1: longitudinal member; 2: structure by coach-builder; 3: holes for fastening structure; 4: ring nut
x: maximum length of reinforcing: 560 mm.





TOWING HOOK

Overview

A towing hook can be applied without requesting authorisation to FIAT GROUP AUTOMOBILES S.p.A. only on the specific cross-member provided and only on vehicles that FIAT GROUP AUTOMOBILES S.p.A. has declared suitable for towing trailers.

Installation of towing hooks on vehicles for which towing is not originally foreseen must be authorised by FIAT GROUP AUTOMOBILES S.p.A..

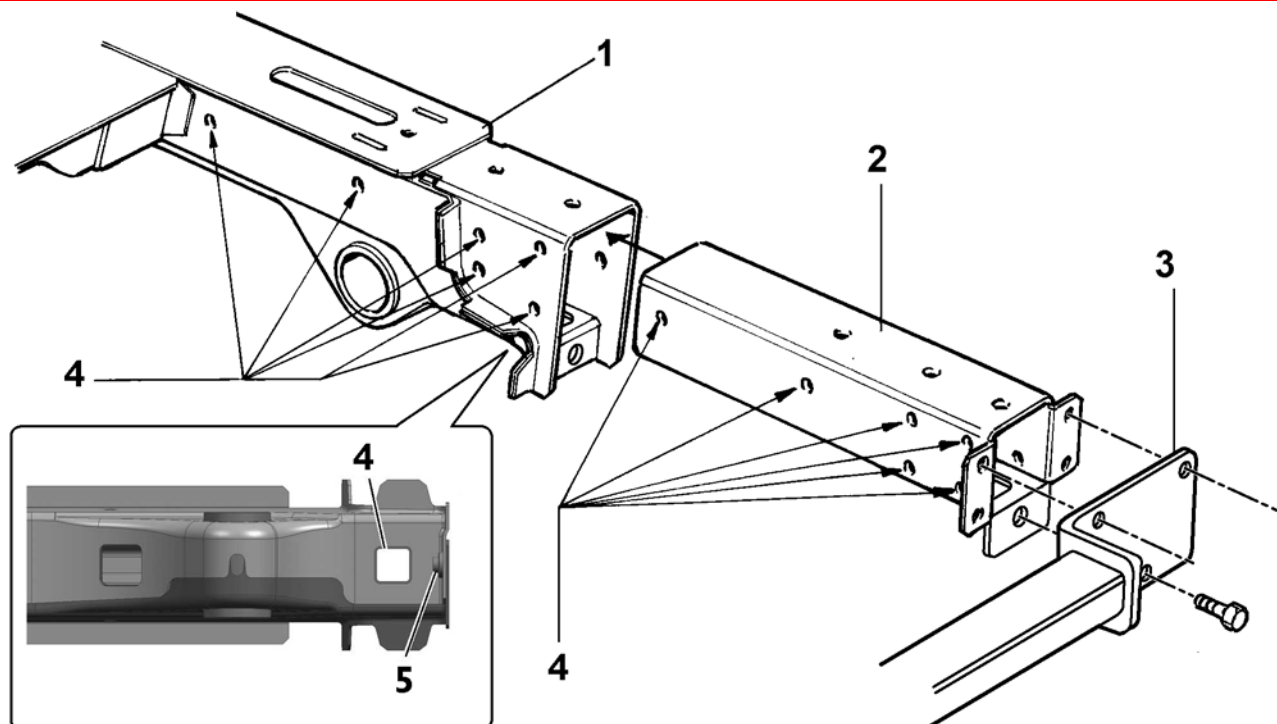
➤ **NOTE:** Since tow bars are an important element for vehicle driving safety, all limitations imposed by standards in force must be respected, such as minimum space for braking and electrical system connections, minimum distance between axles, towing pin and rear edge of superstructure.

In the case the dimension of the hook attachment flange does not coincide with the existing holes on the vehicle transom bar, modifications can be authorised if suitable reinforcing is applied.



Attachment pre-fittings

The drawing shows the pre-fittings for applying the towing hook. The solution is valid for all Camping car.

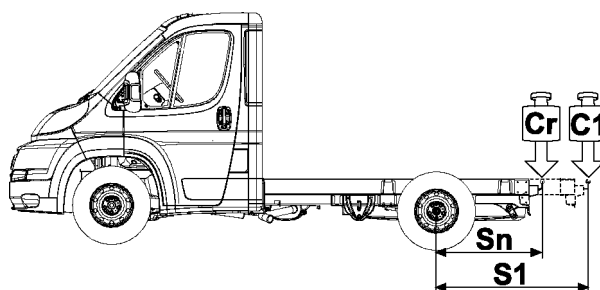


1: structure of the vehicle on which the towing hook transom bar is fastened; 2: tow hook stringer; 3: towing hook attachment flange; 4: holes for fastening assembly to chassis; 5: nut.

Calculation of maximum towable weight after vehicle conversion.

If overhang is lengthened, or the towing hook position changed with respect to the approved position, the towable weight can be calculated by means of the following formula:

$$C_1 = \frac{C_r \times S_n}{S_1}$$



Where: S_1 = Overhang with moved hook
 C_1 = New towable weight
 S_n = Overhang with standard hook
 C_r = Standard towable weight



Finishing elements

If a different mat to the original is used on the floor of the driver's side, it must not interfere with the excursion of the pedals, limiting them (accelerator, brake, clutch).

Engine compartment

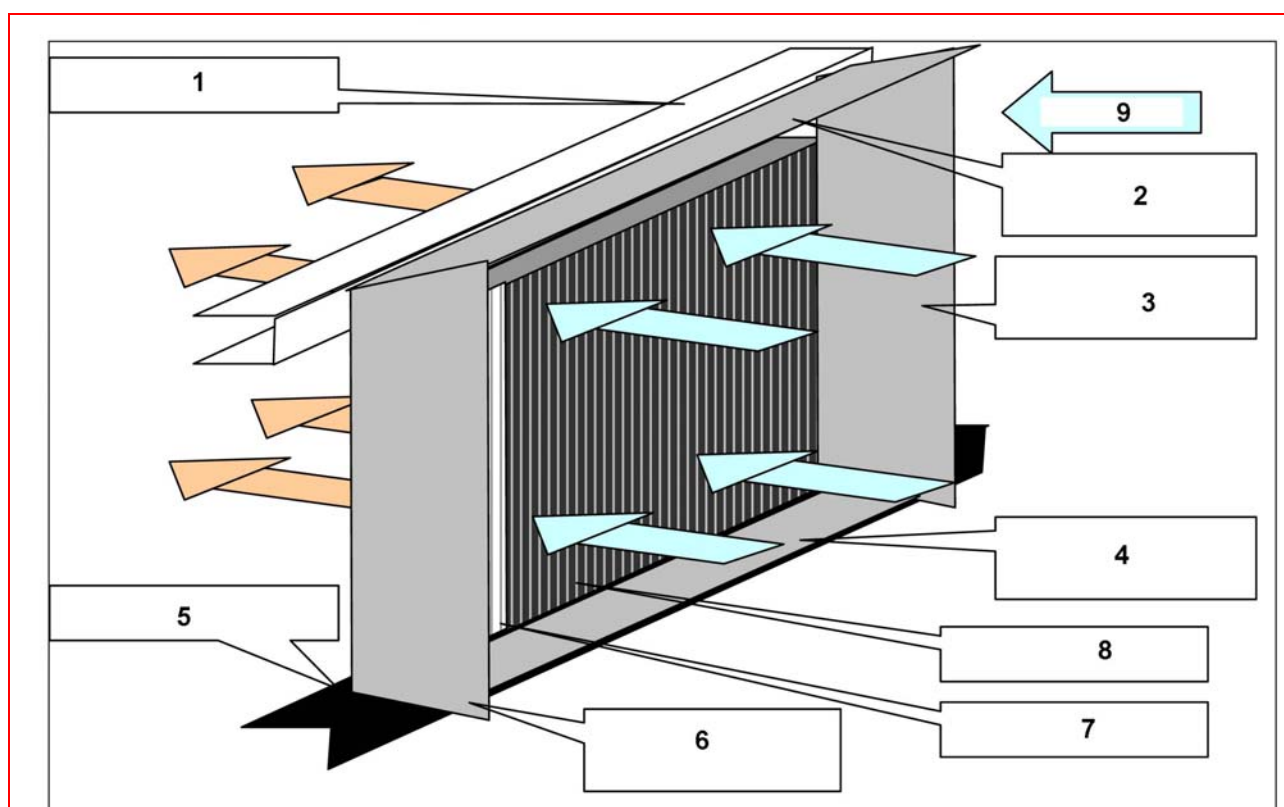
When making the conversion (motor-home), the front radiator grill must be designed to ensure at least the same passage of air as the original, as on the version with the same chassis cab.

Correct engine cooling must also be ensured, as on the original vehicle, making no changes to the inlet air permeability area, which must be no lower than that defined and visible on the version with similar cab.

When necessary, it is also recommended to implement an air flow conveyor, such as, for instance, the one in the attached diagram, in order to allow a regular flow toward the radiator.

No alterations or additional elements must be made to the areas of the engine that emit most heat (e.g. shields).

Dynamic flow WITHOUT conveyance on radiator – intercooler and air inlet cross member



1: Upper cross member
2: Upper conveyance
3: LH lateral conveyance

4: Lower conveyance
5: Lower cross member
6: RH lateral conveyance

7: Intercooler
8: Engine radiator
9: Air flow

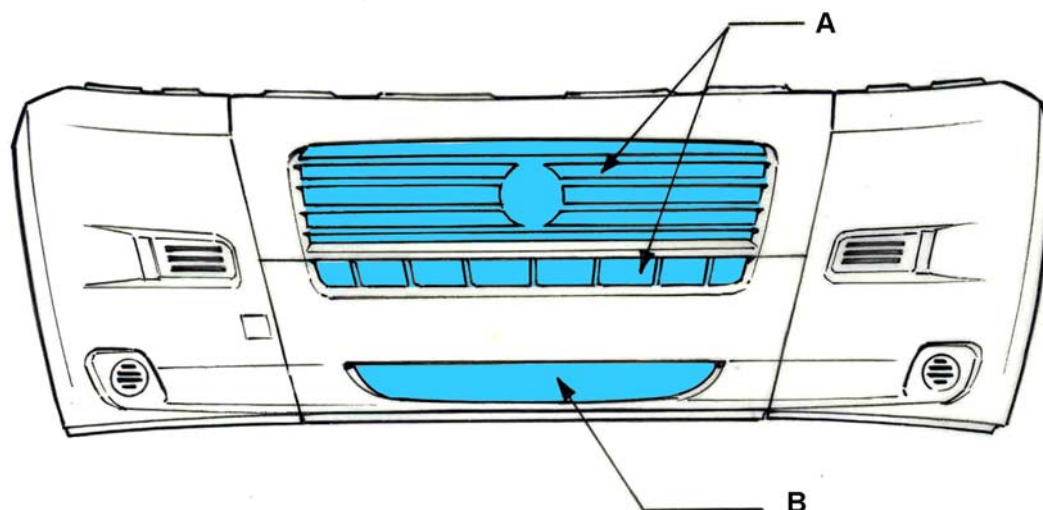


2.14

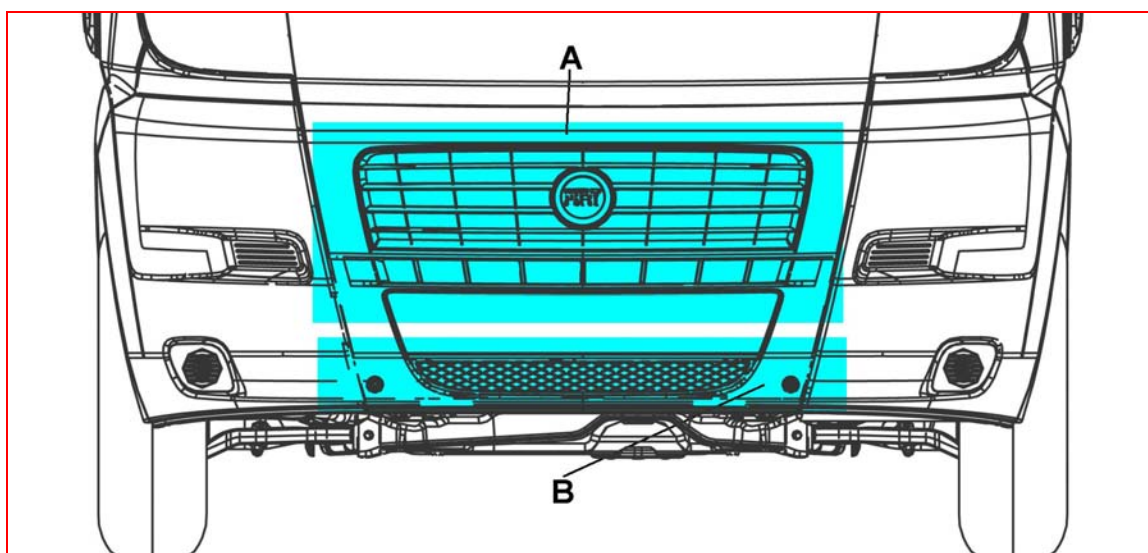
Indications for modifying front.

Technical specifications of intake air permeability surface in engine bay on basic vehicles.

A	14.8 dm²	A: upper air intake
B	3.9 dm²	B: lower air intake
C	18.7 dm²	C: total area

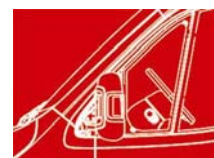


If modifications to the vehicle front are required, the air permeability surface must be uniformly distributed, maintaining the values used on the original version, over the areas corresponding to the radiator (see diagram below).



Warning: failure to observe the indications provided may result in serious engine damage.

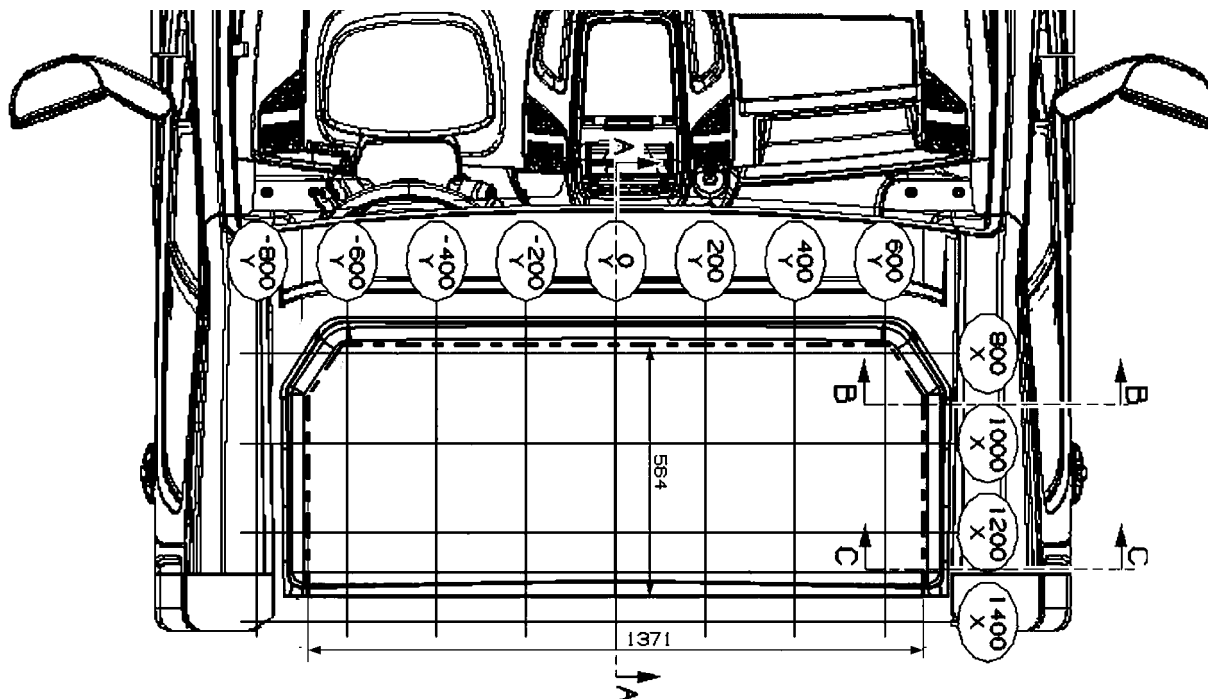




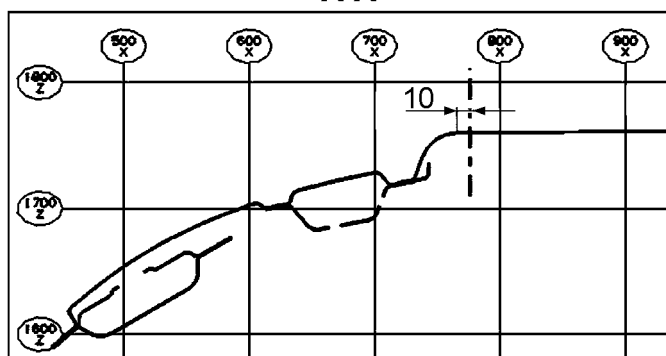
MODIFICATIONS TO THE ROOF

Instructions for cutting roofs of chassis cabs with OPT 59E.

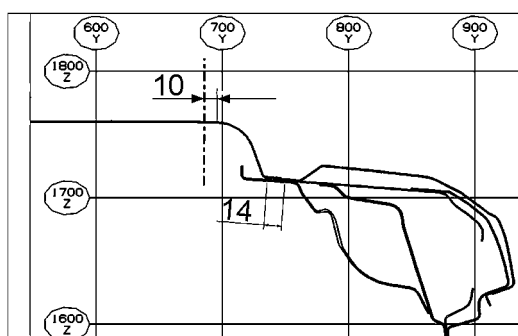
The cab roof can be cut as shown below:



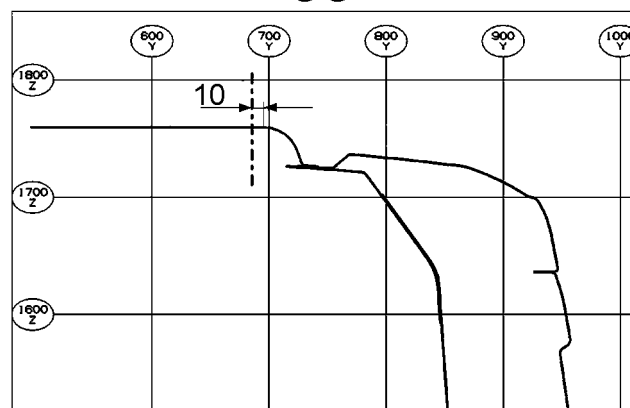
A-A



B-B

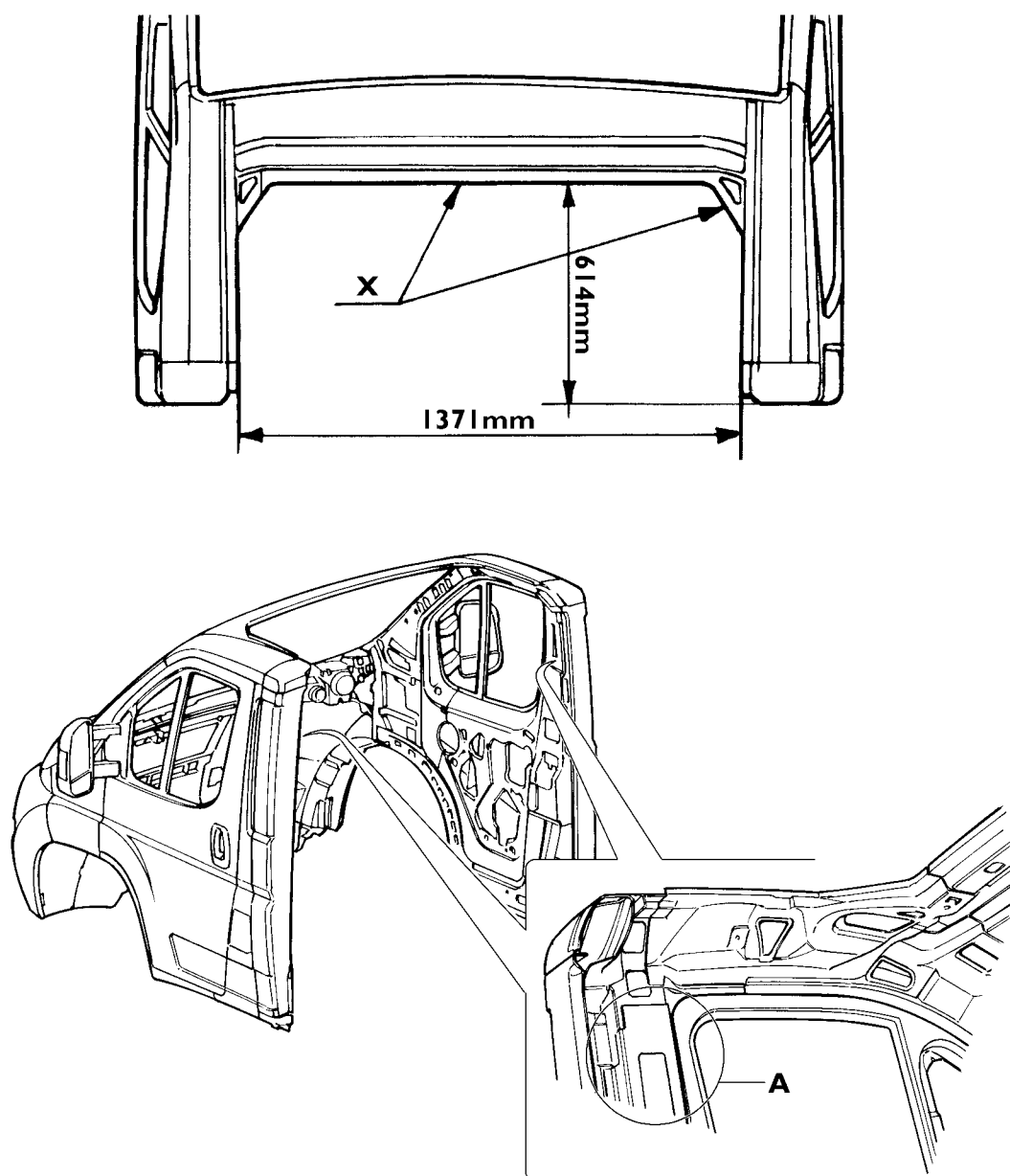


C-C



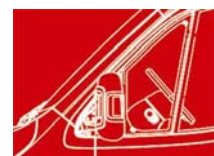


2.16



X: maximum permitted limit cutting roof.

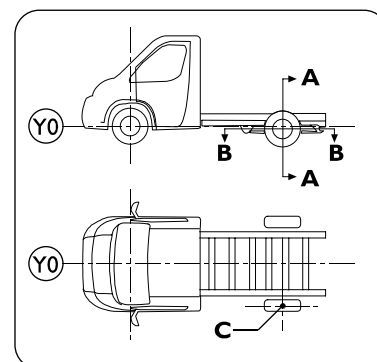
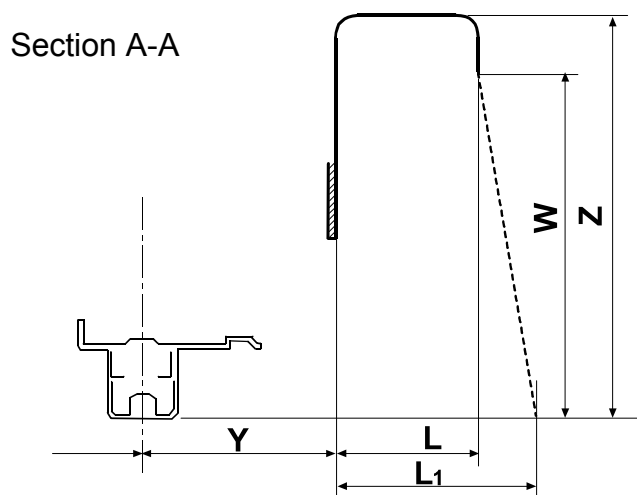
Installations and modifications to realise specific versions must be carefully carried out in order to safeguard structural rigidity and maintain the function and protection offered by the cab, as well as the seat belt top anchor points (see detail A).



Wheelarch dimensions

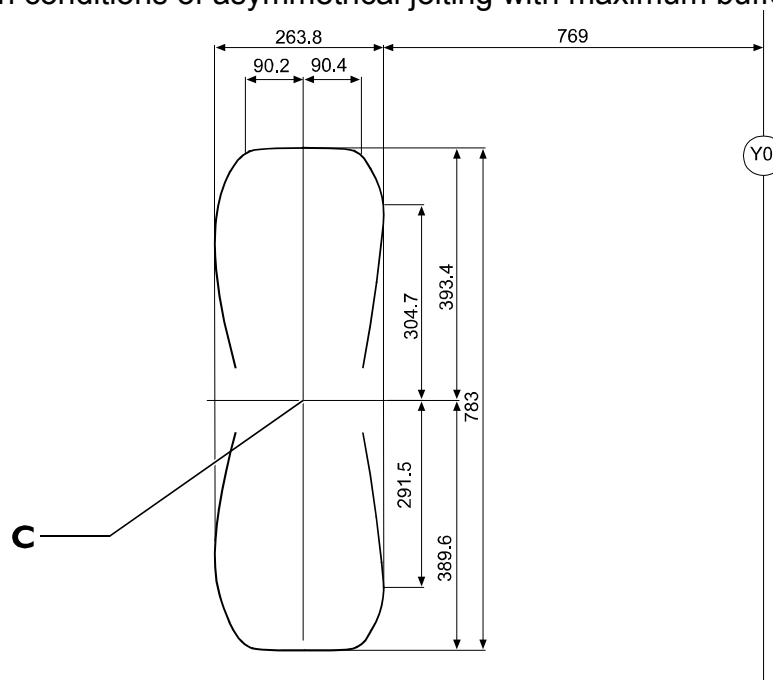
The graphic shows the maximum wheel excursion with the vehicle in use.

Respect the dimensions given when modifying the wheel arch.



Track	Tyres	Y	L	L1	W	Z
Normal	225/70 R15 C	83	290	365	350	400
	225/75 R16 C	83	290	380	370	450
Widened	225/70 R15 C	173	300	365	350	410
	225/75 R16 C	173	300	380	370	460

➤ **NOTE:** The values given in the diagram include maximum play of 10 mm in relation to tyre (without chains) in conditions of asymmetrical jolting with maximum buffering.



Section B-B



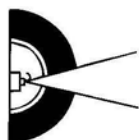


2.18

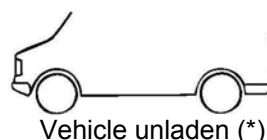
WHEELS AND SUSPENSION

For vehicles converted by coach-builders, a check on toe-in and suspension geometry must be made by the coach-builder/converter, prior to handing the vehicle over to the customer (tractor cabs only).

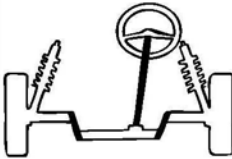
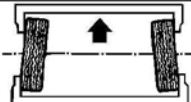
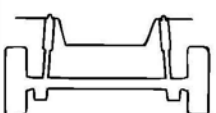
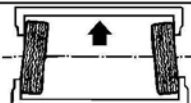
WHEEL TRIM



ALL VERSIONS



Vehicle unladen (*)

 Front suspension	Camber (**)		$0^{\circ} \pm 30'$
	Incidence (**)		$1^{\circ} 30' \pm 30'$
	Toe-in		$-1 \pm 1 \text{ mm}$
 Rear suspension	Camber (**)		$0^{\circ} \pm 30'$
	Toe-in		$0 \pm 1 \text{ mm}$

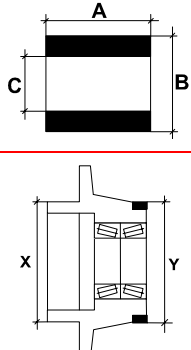
(*) With tyres inflated to required pressure with vehicle ready for road

(**) Angles not adjustable

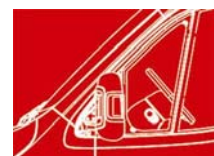
WHEELS AND TYRES

	LIGHT			HEAVY	
	3000	3300	3500	3500	4000
Basic tyre	215/70 R15C 109 S		225/75 R15C 112 S	225/75 R16C 118 R	
Camping Car (OPT 143)	215/70 R15CP 109a CAMPING			225/75 R16CP 116a CAMPING	

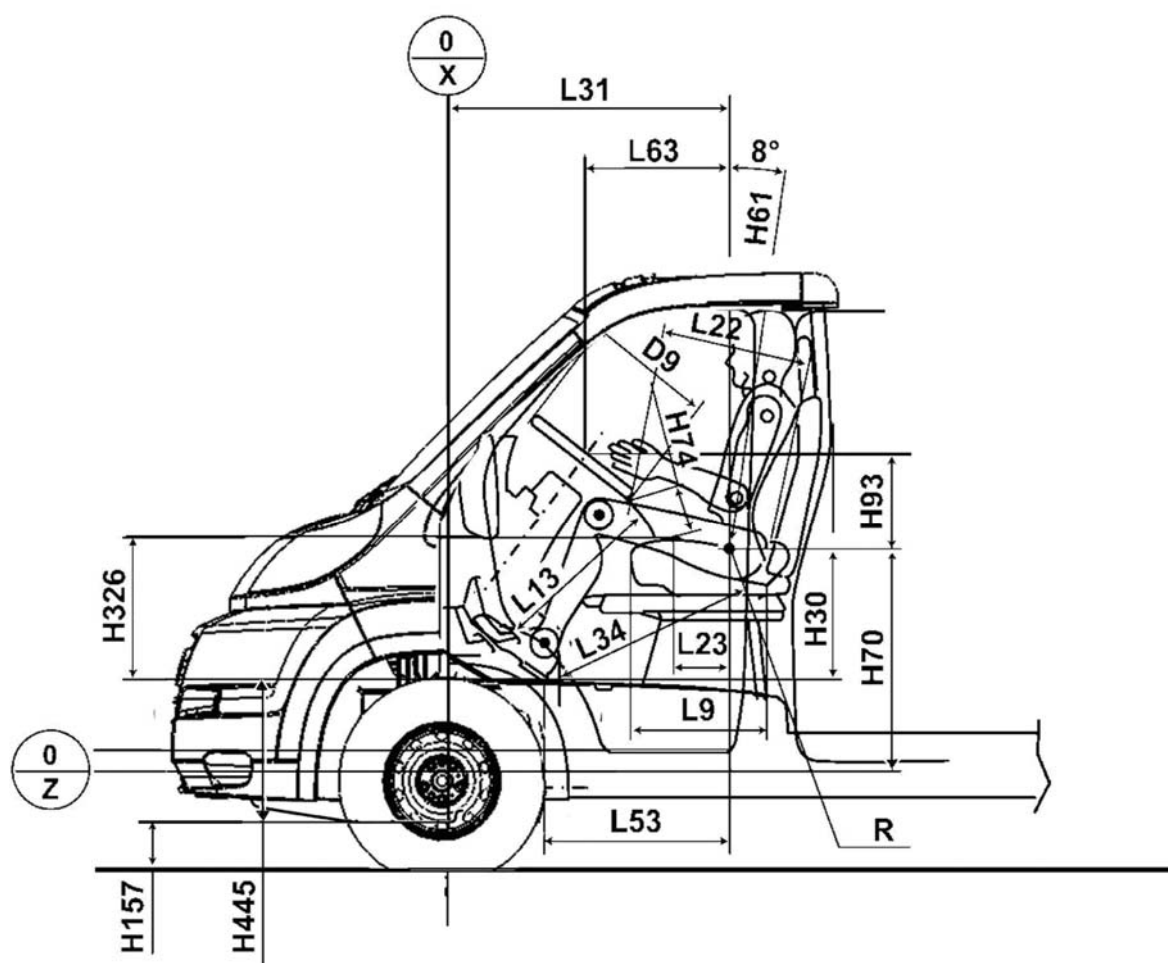
WHEEL BEARINGS

	FRONT	Rear LIGHT	Rear HEAVY	
A	54	76	76	
B	90	X=72 Y=100,950	X=79 Y=100,950	
C	55	42	42	





Cab habitability diagram



Reference	mm
D9	390
H30	435
H61	1081
H70	740
H74	165
H93	330
H157	199
H326	450
H445	257
L9	500
L13	635
L22	523
L23	170
L31	1004
L34	985
L53	670
L63	465



2.20

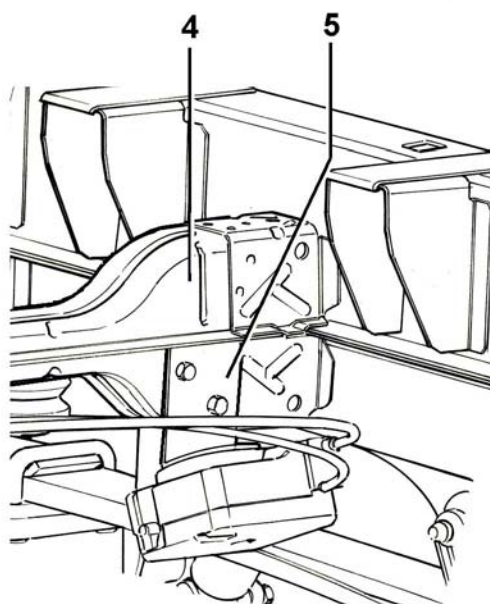
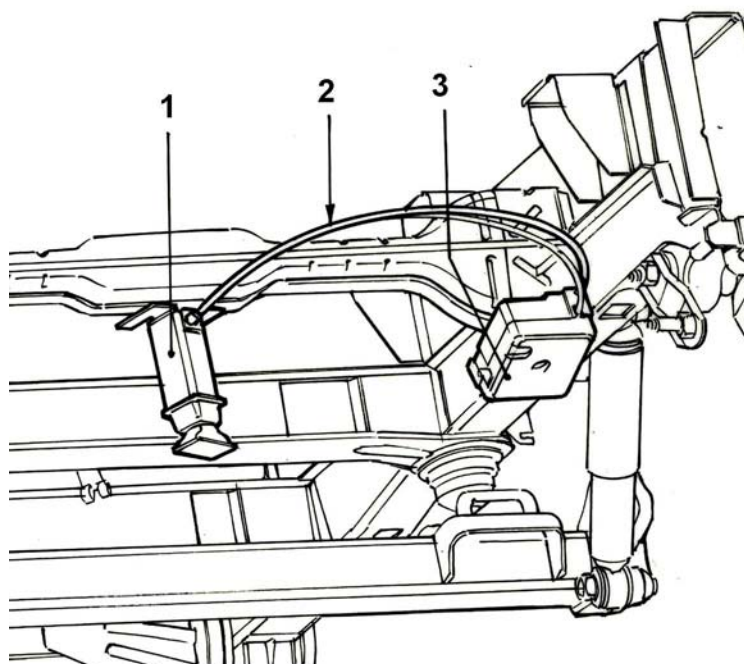
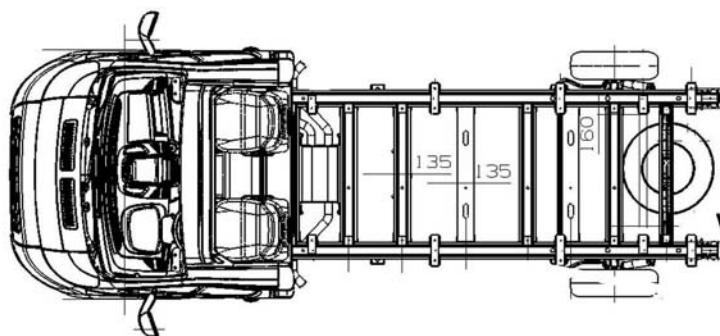
SPARE WHEEL

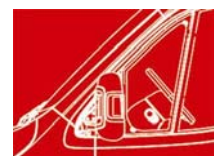
The spare wheel is positioned in the rear part of the vehicle, in the external compartment under the chassis.

The complete device is fastened to the cross-member (4):

- at the centre by the wheel lifting/lowering cylinder (1),
- to the side by the control (3) with cables and brackets (5).

Spare wheel position for chassis cab and basic chassis versions





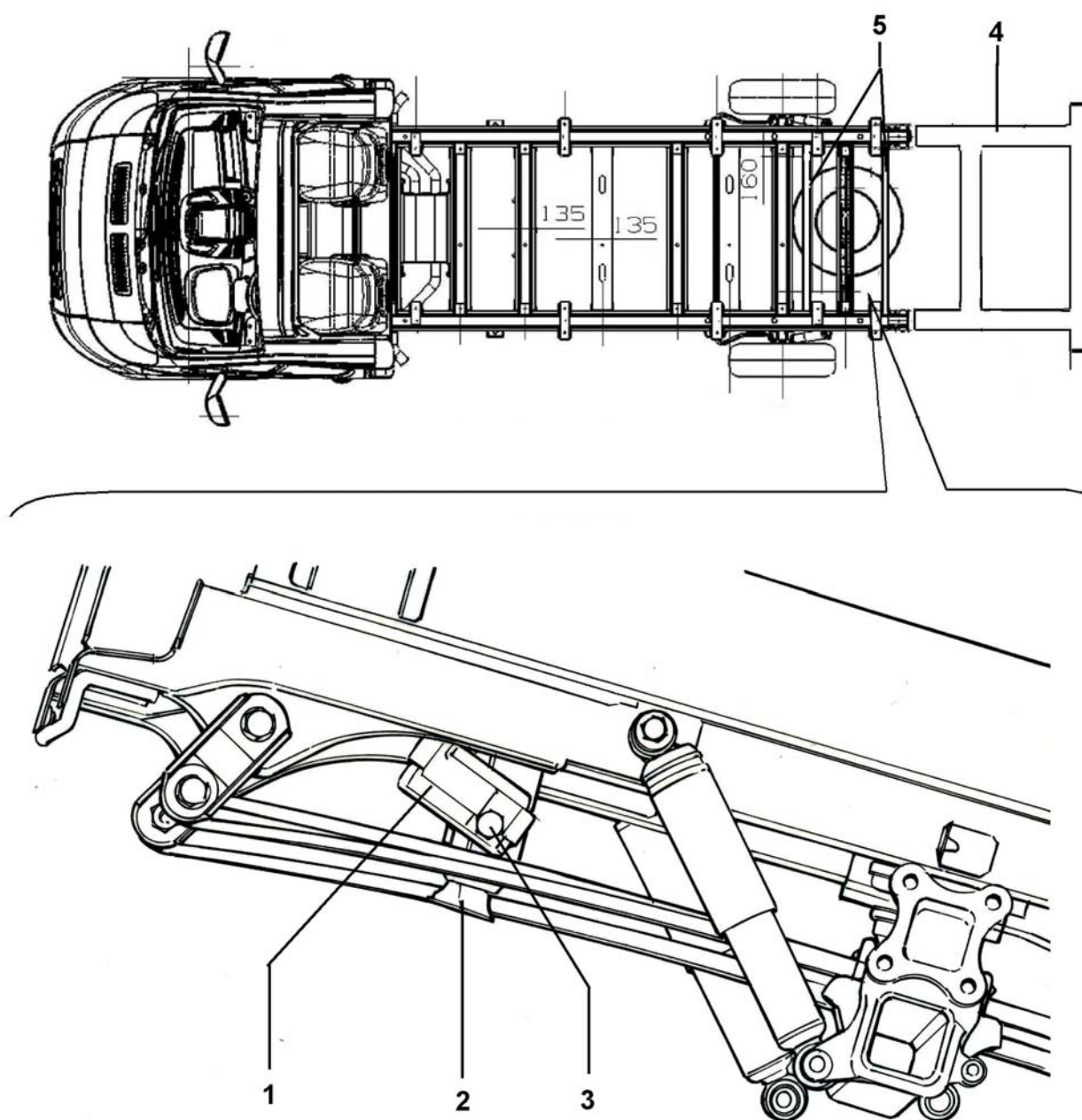
Relocation of spare wheel for chassis cab and basic chassis versions

If the spare wheel mounting (3) and (2) has to be repositioned (for instance for lengthening the overhang, see detail 4), the anchor points must be transferred to the new structure, at the same distances used for its installation on the original vehicle (see drawings on previous page).

In this condition the device will function correctly.

When repositioning, easy access must be maintained not only to the spare wheel, but also to the control must (detail 3 in diagram below).

➤ **NOTE:** restore the wheel upper fastening points by means of two cross members (5).





2.22

INDICATIONS FOR CONNECTING SUPERSTRUCTURES

Drilling holes in the chassis

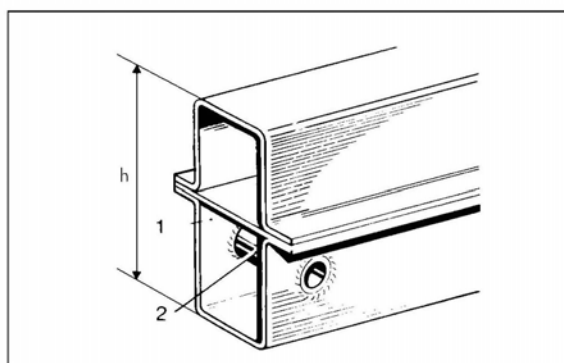
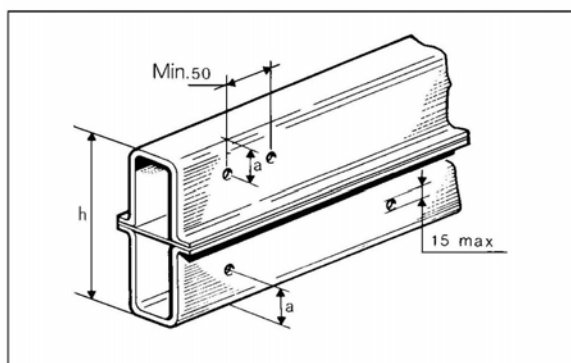
To fit additional assemblies to the chassis or bodyshell, as a general rule existing holes should be used.

If new holes have to be made they should be made on the vertical wall of the longitudinal member and thoroughly de-burred and reamed.

For the drilling, keep to the figure, and so:

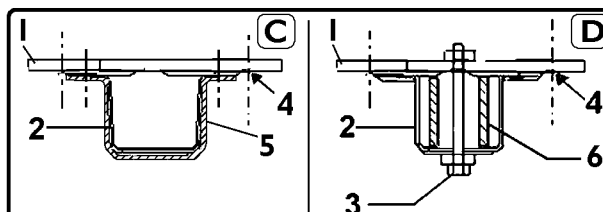
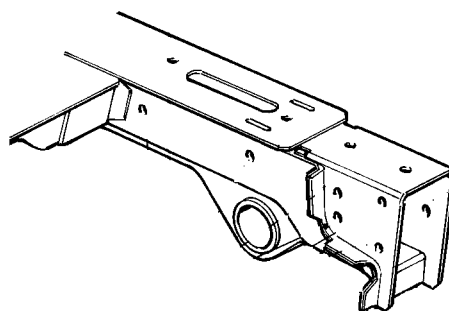
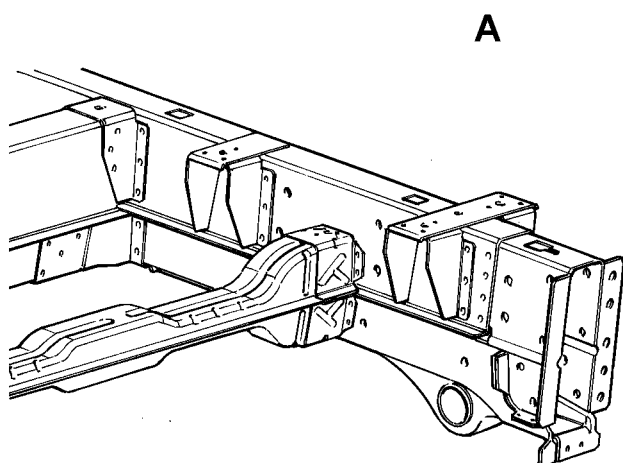
- under no circumstances should the dimension 'a' be less than 30% of the chassis height (h);
- the distance between adjacent holes must never be less than 50 mm;
- the maximum diameter of the holes must not exceed 12 mm;
- the new holes must not be made near areas under greater stress, such as: areas for spring mountings, shock absorbers, brackets, crossmember attachments.

When necessary, fit spacers in the original structures. Make the weld as shown in the diagram and then apply corrosion protection.



1- Chassis; 2 - Spacer bush

For chassis cab versions with sub-frame, superstructures can be mounted on the upper longitudinal member present on the basic version (fig. A). For 'special' versions, holes are provided for use as shown in figure (B).



1: upp. plate - 2: longitudinal member - 3: attachment - 4: reinforcing plate - 5: superstructure fastening holes - 6: box-member reinforcing bush.

C: fastening solution with addition of an external U-bolt.

D: fastening solution with addition of internal bush.

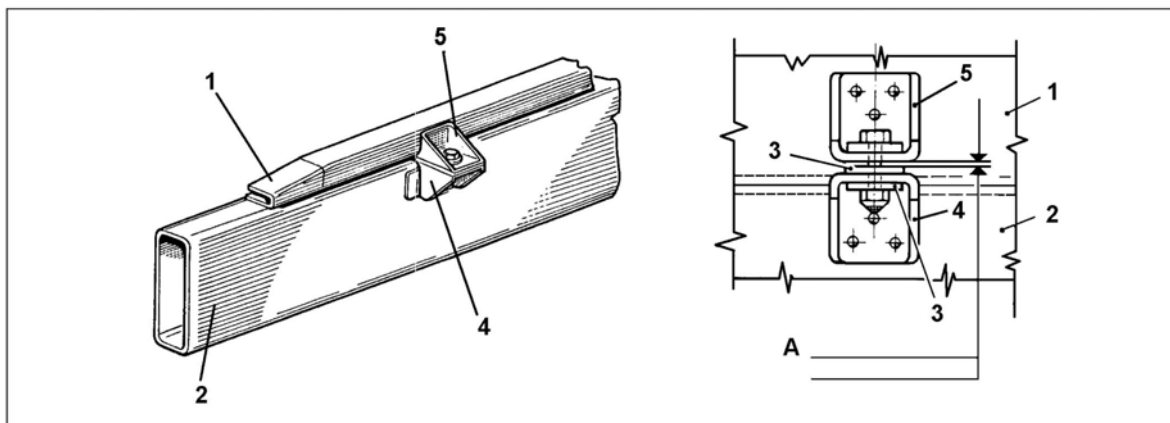


FITTING THE COUNTERFRAME

The purpose of a counterframe is to ensure an even distribution of the loads over the vehicle frame and to contribute to the stiffness of the vehicle as a function of its intended job.

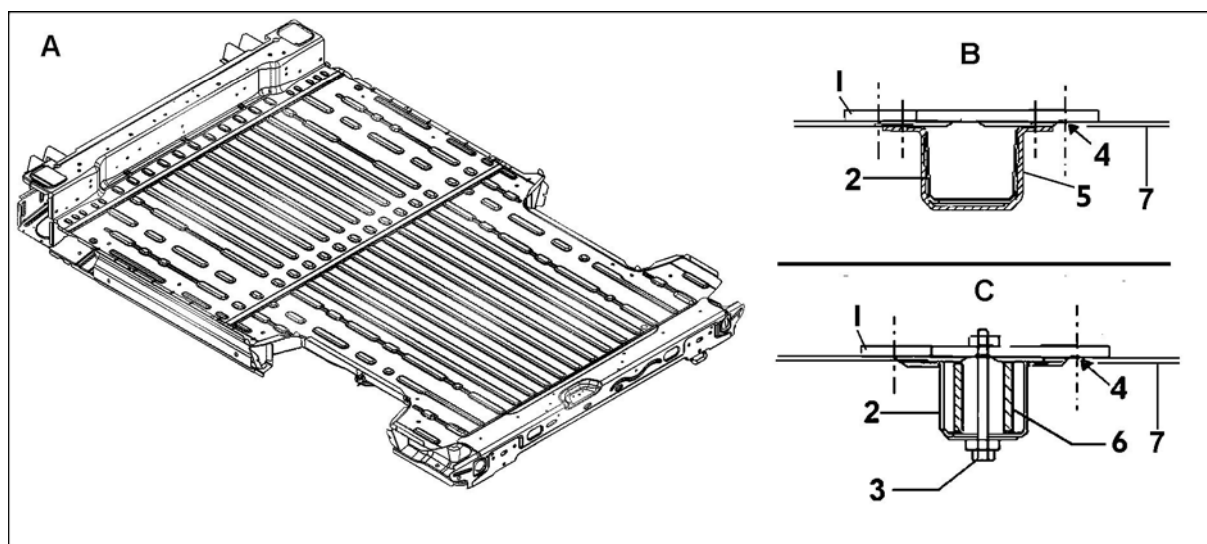
For its construction, keep in mind that the material must have good mechanical weldability properties. The elements anchoring the counterframe to the vehicle frame must be designed to ensure a stable connection under the effects of lengthwise and crosswise thrusts (due to the loads when cornering and when the brakes are applied).

Interpose an elastic block, made of canvas rubber or a similar material with Shore hardness < 70, under the first fastener at the cab end. Interpose rigid spacers under the other connections.



1: Counterframe; 2: Frame; 3: Spacer; A: Gap between the frames: 4-5 mm. 4: Bracket on frame; 5: Bracket on counterframe.

'Special chassis-cab with flatbed' versions come with holes that can be used as shown in figure (A).



1: Upper plate - 2: Longitudinal - 3: Connection - 4: Anchoring screws - 5: Boxed reinforcement U-bolt - 6: Boxed reinforcement bushing - 7: Flatbed.

B: Fastening solution with the aid of an external U-bolt.

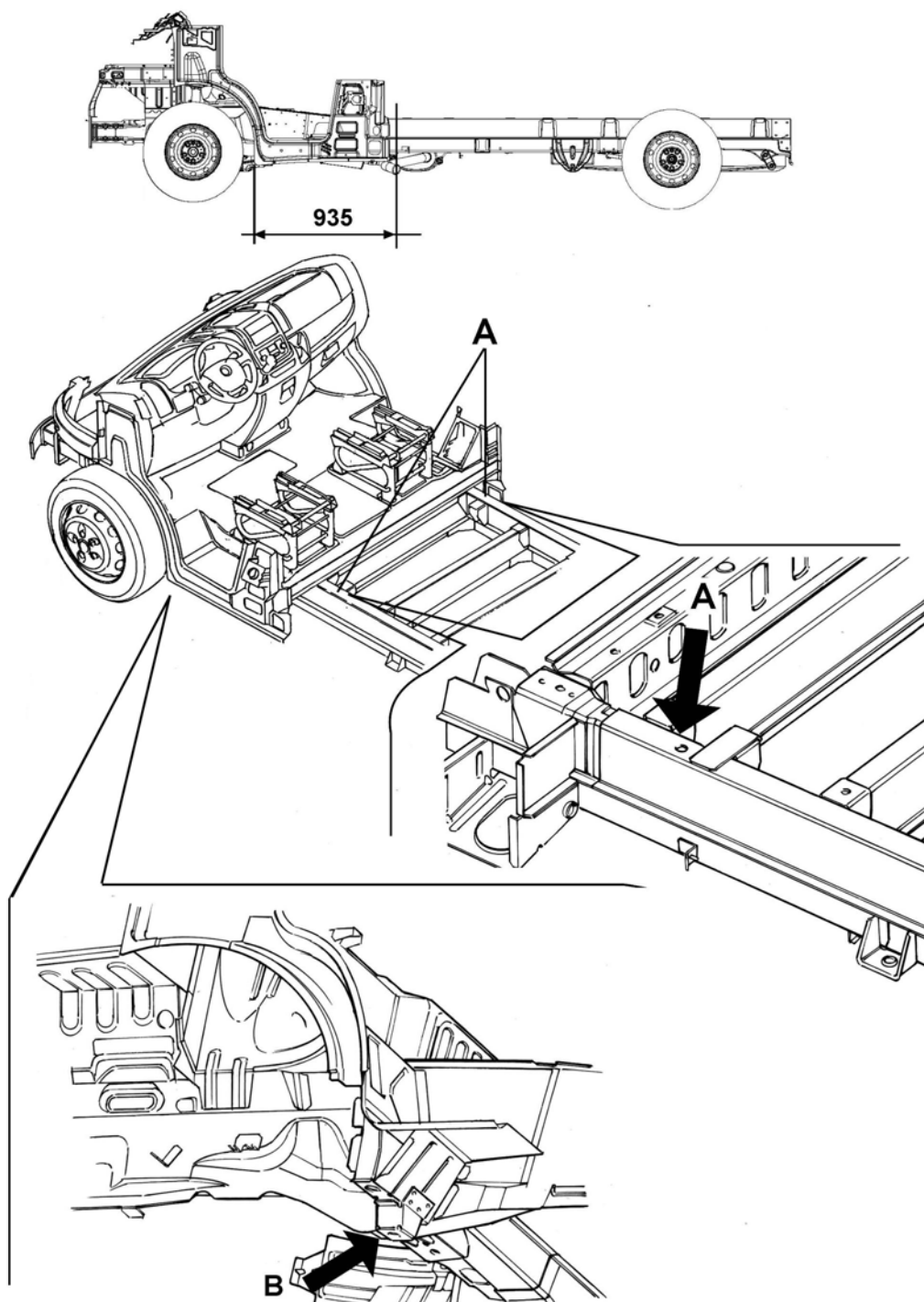
C: Fastening solution with the aid of an internal bushing.



2.24

Plan and reference holes for superstructure application (Camping Car)

Reference holes for superstructures

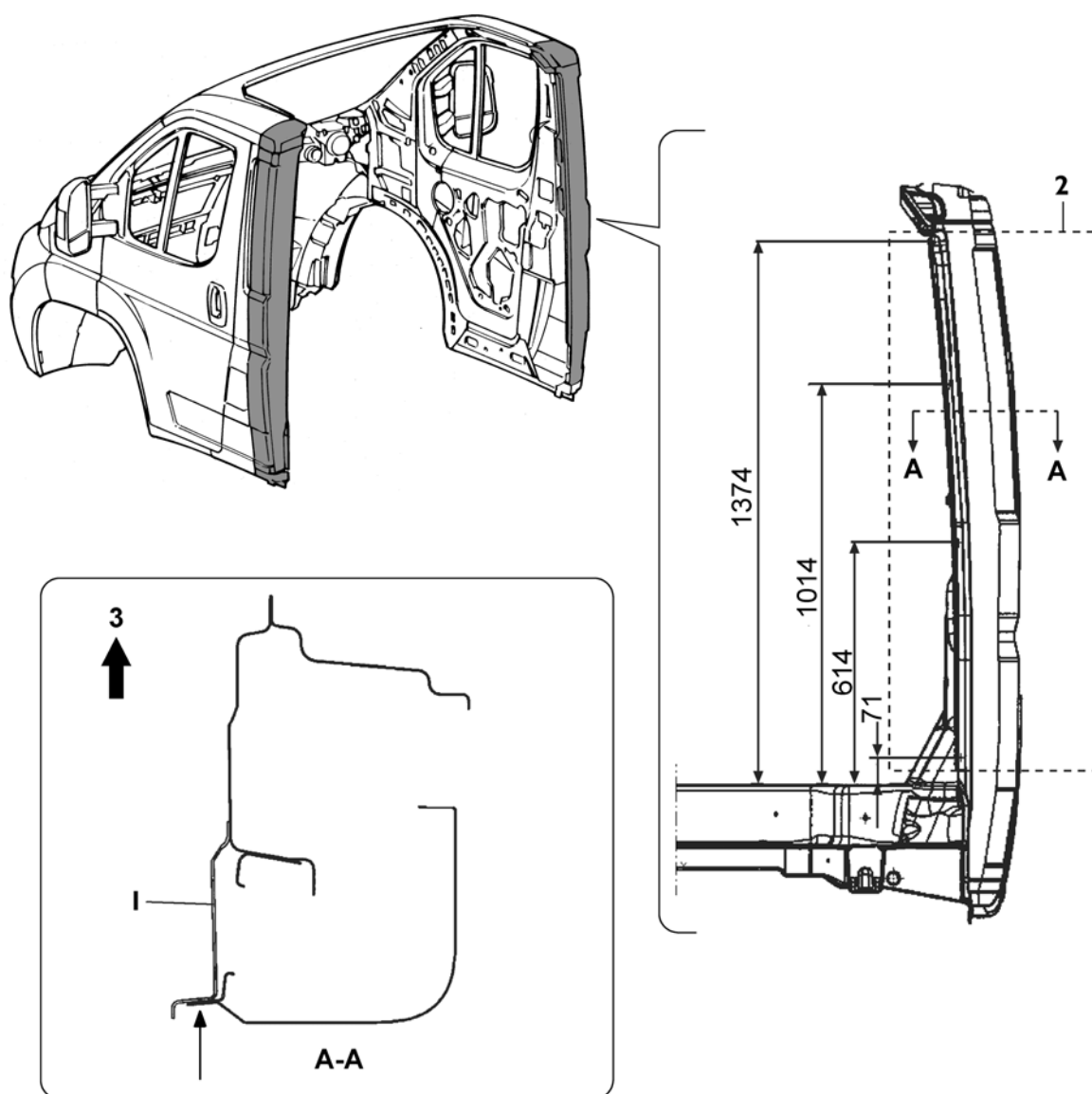


A: reference holes for conversion works by coach-builders;

B: bodyshell reference points.



Cab interface for application of superstructure (Camping Car)



1: structural reinforcement; 2: recommended interface area; 3: direction of travel.

In the 'cut roof' chassis cab version the angular structure of the side/rear wall, has reinforcement (1).

If it is considered necessary to interface a new structure with the cab of the basic vehicle, we recommend using the reinforcement (1) as anchor point in the indicated position (→).

The configuration of the basic vehicle structure, shown in section A-A, is the same along the entire area indicated in the drawing by (2).

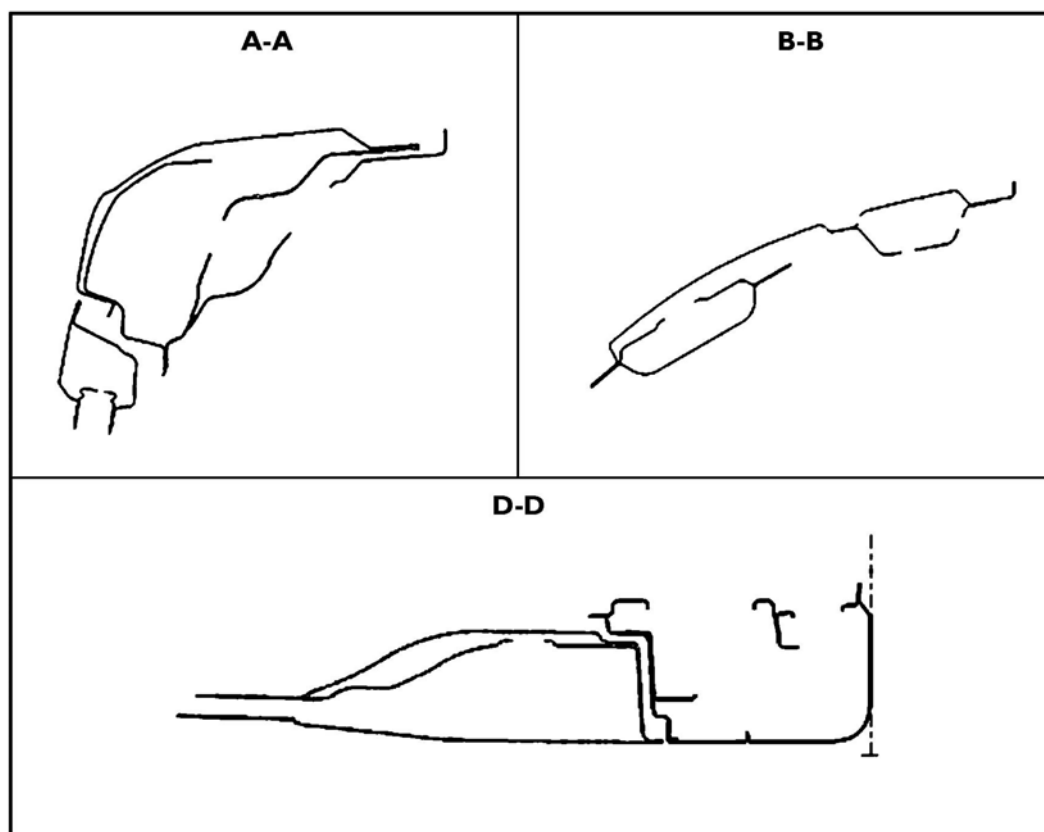
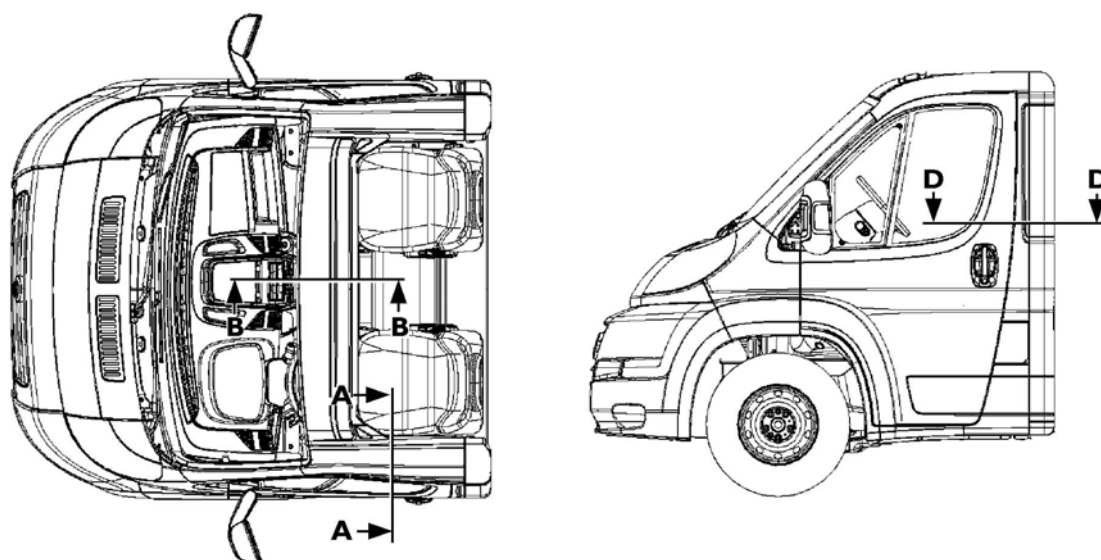
The drawing shows the recommended distances between the various interface points between the structures.

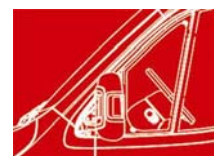


2.26

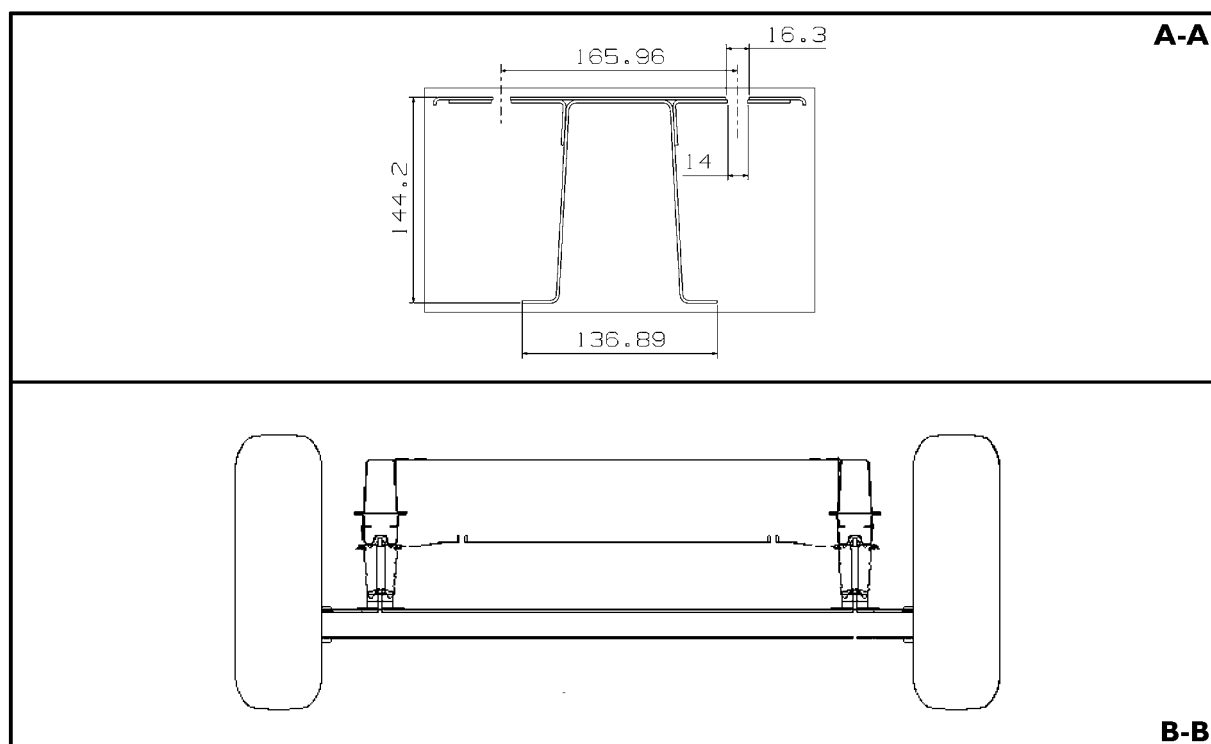
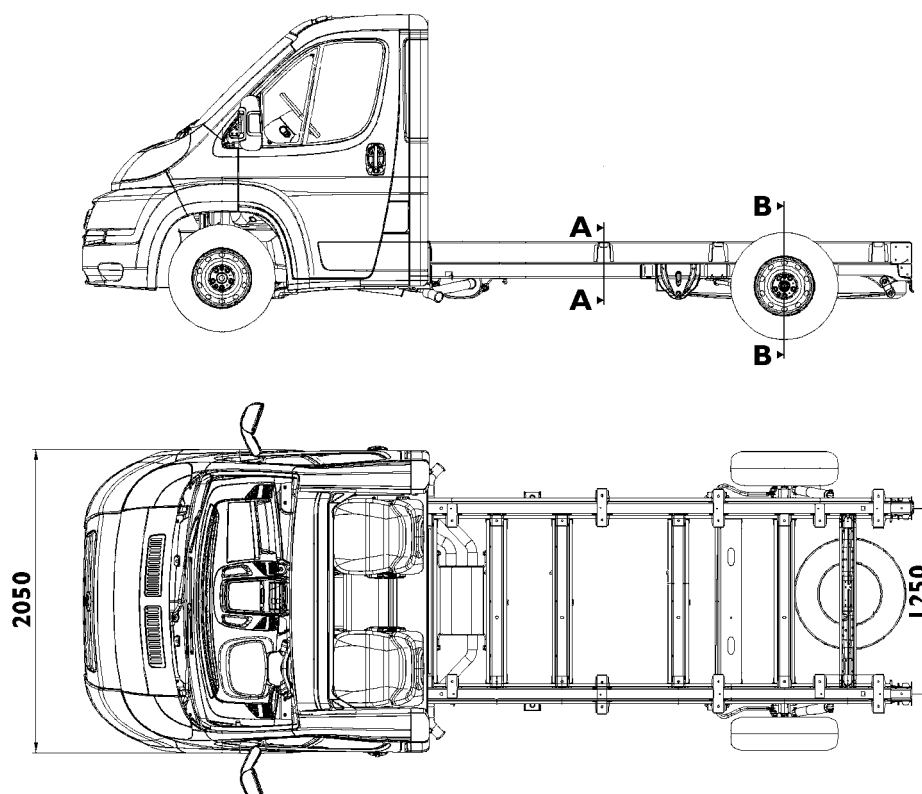
The main sections of all versions are given below. These provide general information on the condition of the structure and are strictly for information only.

Cab sections

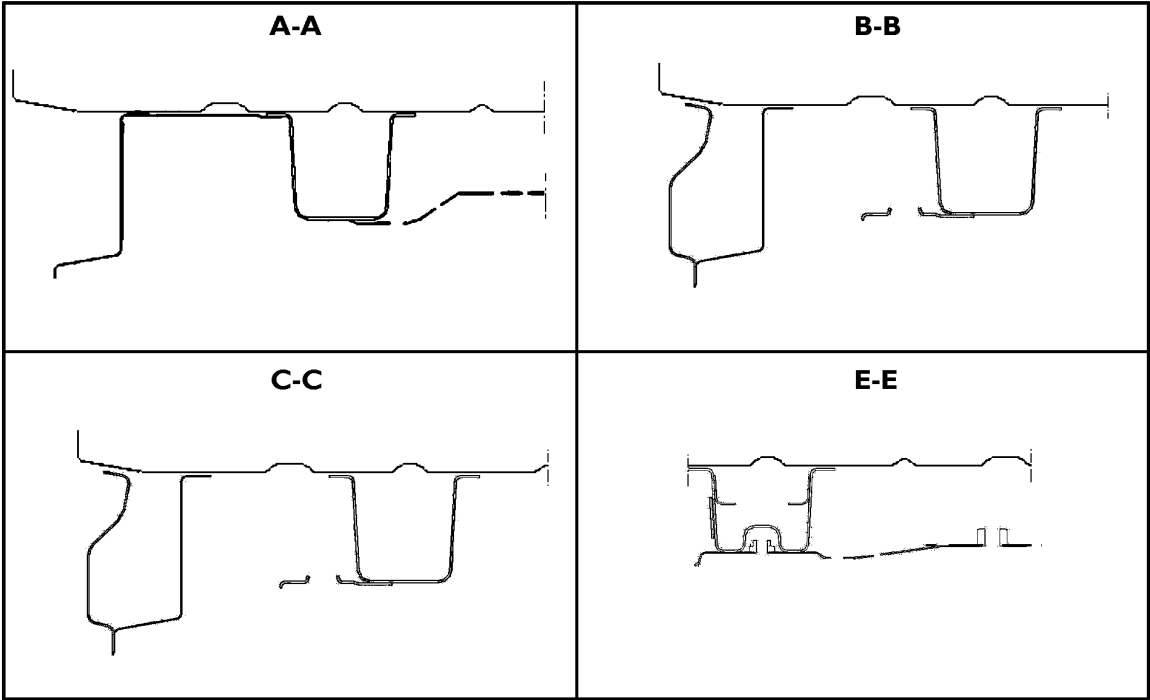
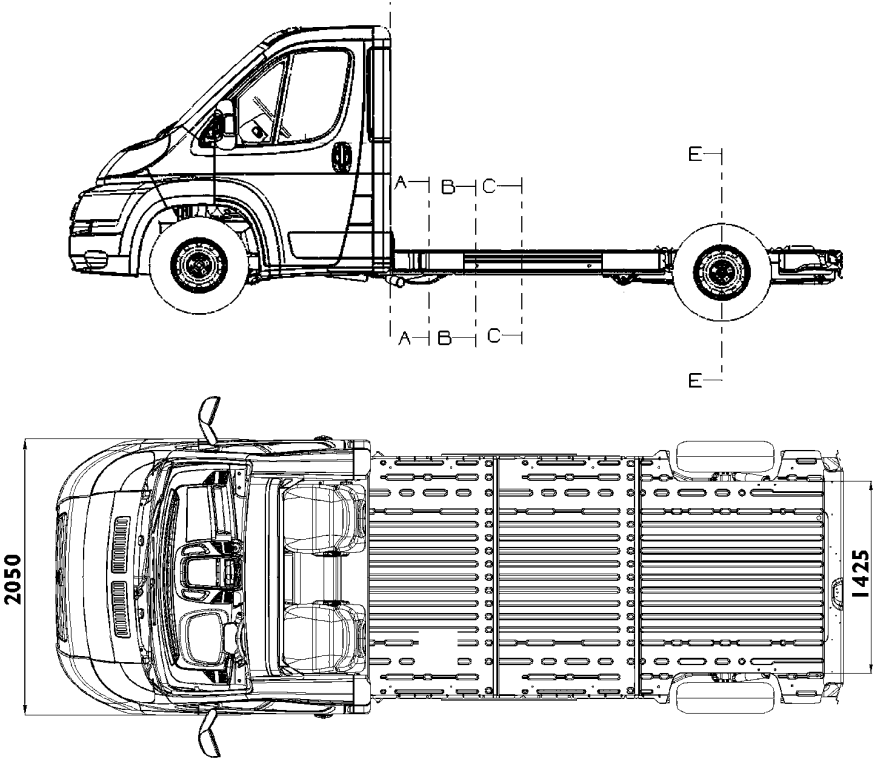




Chassis cab sections



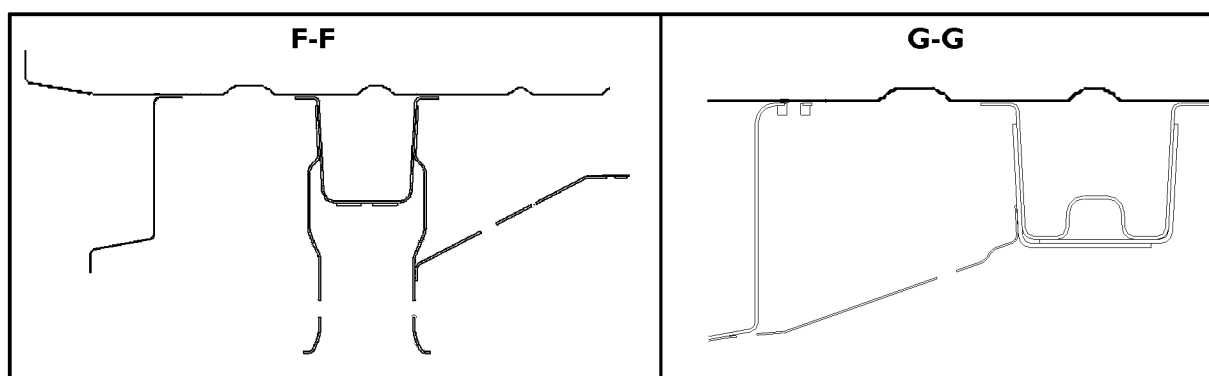
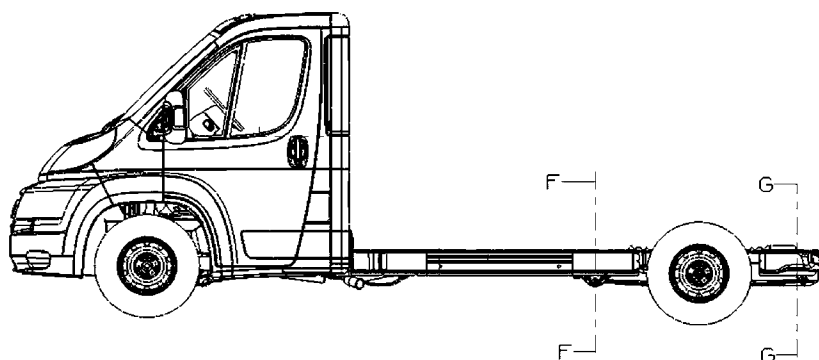
Chassis cab with platform version sections





2.29

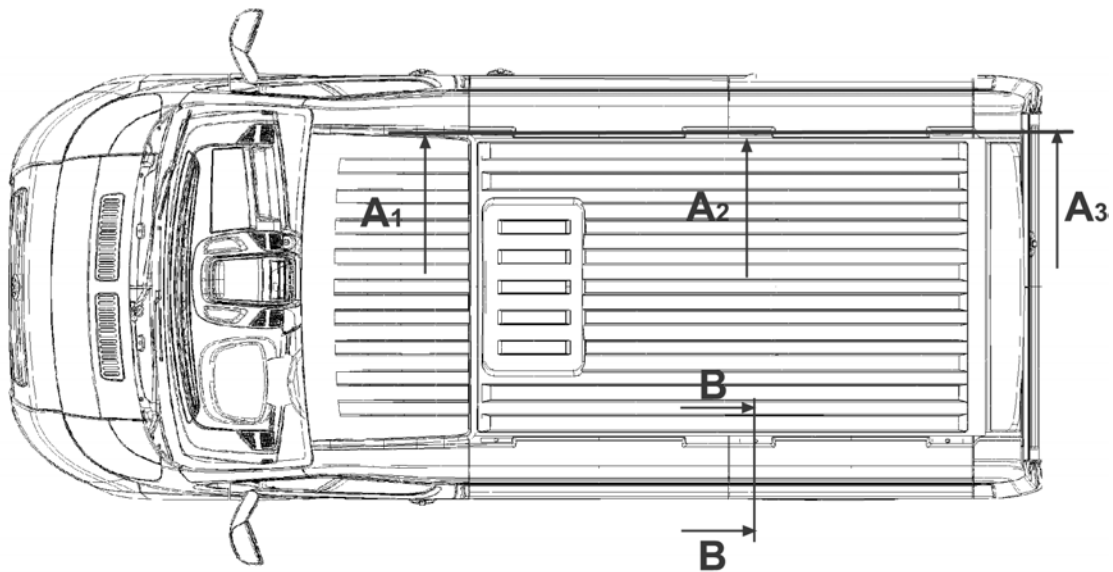
Chassis cab with platform version sections



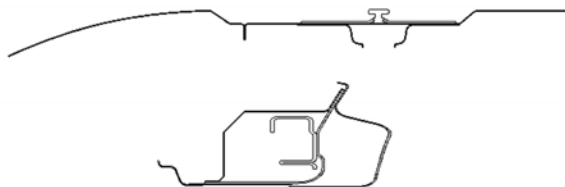


2.30

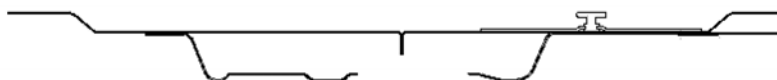
Van roof sections



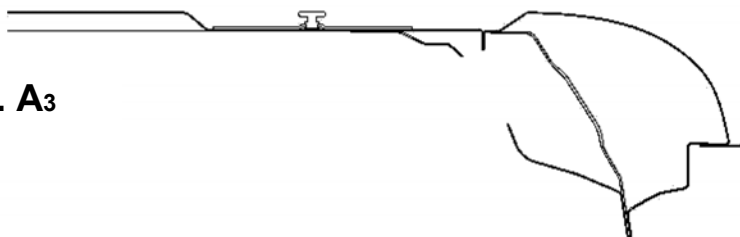
SEC. A₁



SEC. A₂

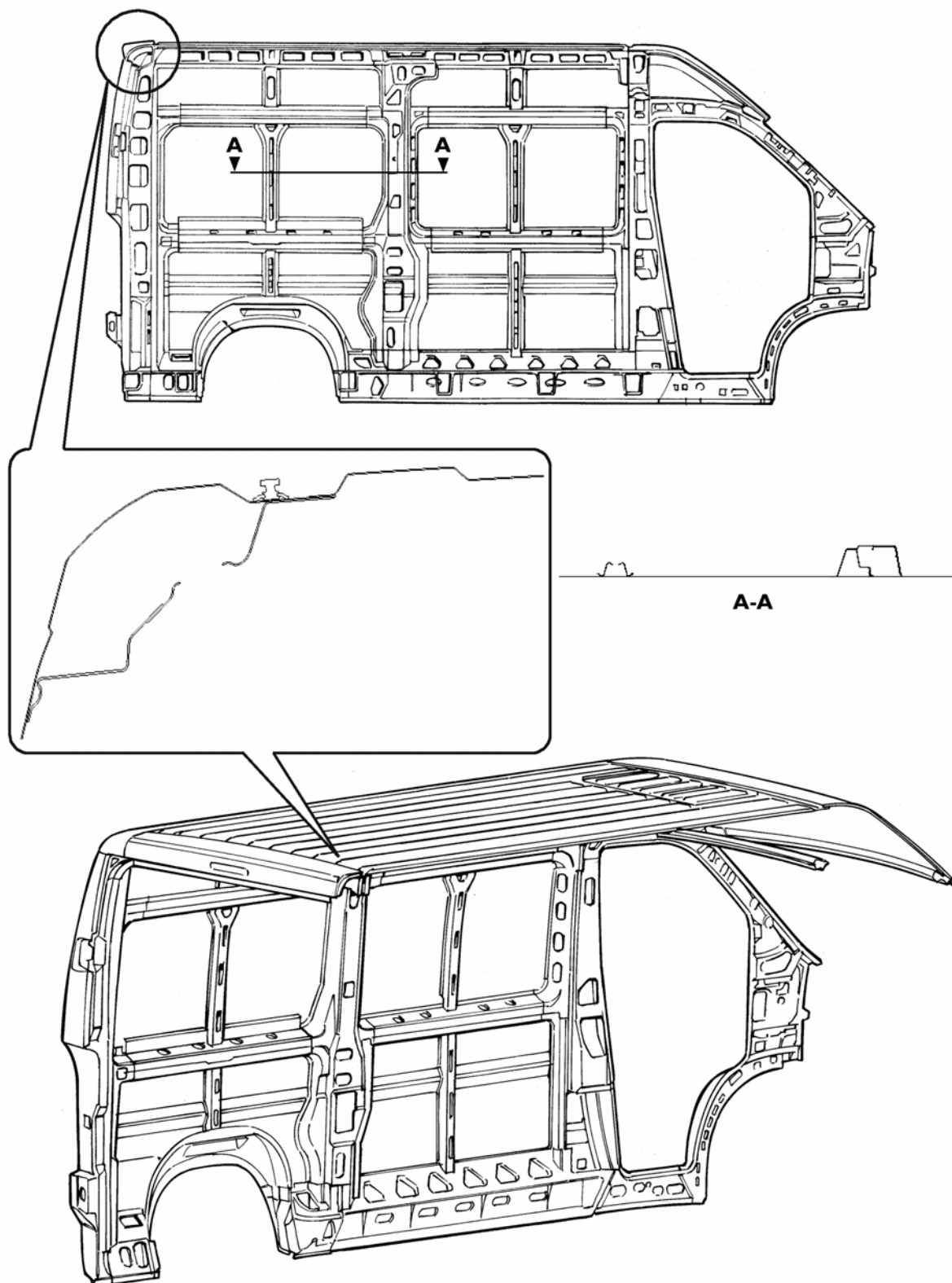


SEC. A₃





Van side sections



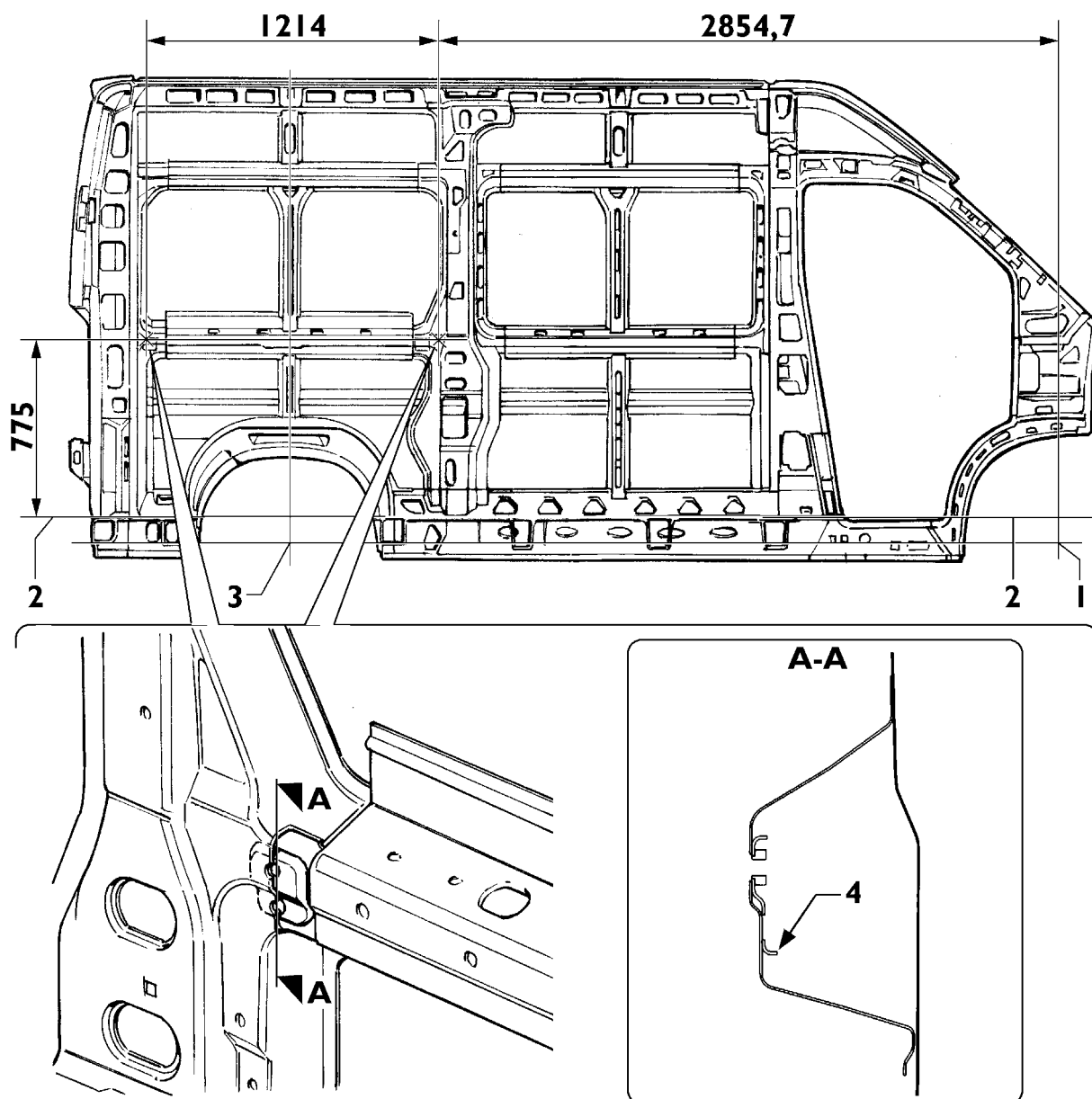


2.32

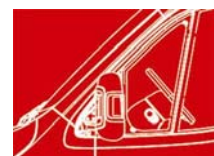
Side Load Retention

The quantity and relative position of the anchor points for loads are the same as those for all 'van' version wheelbases.

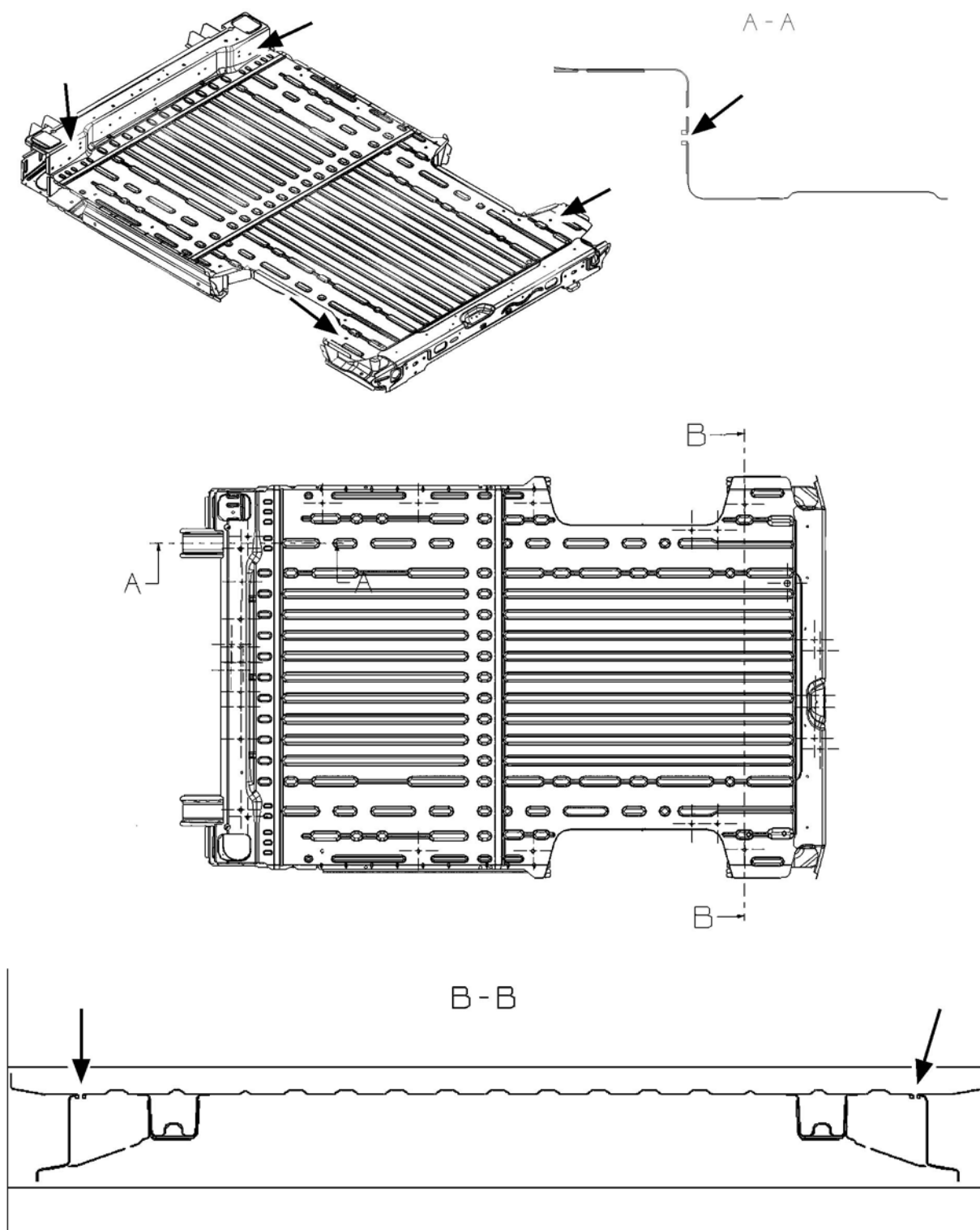
The anchor points are shown below.



- 1: FRONT WHEEL CENTRE;
- 2: UPPER FLOOR PROFILE ALIGNMENT;
- 3: REAR WHEEL CENTRE;
- 4: LOAD ANCHOR REINFORCING.



Load retaining hooks on floor
Short wheelbase

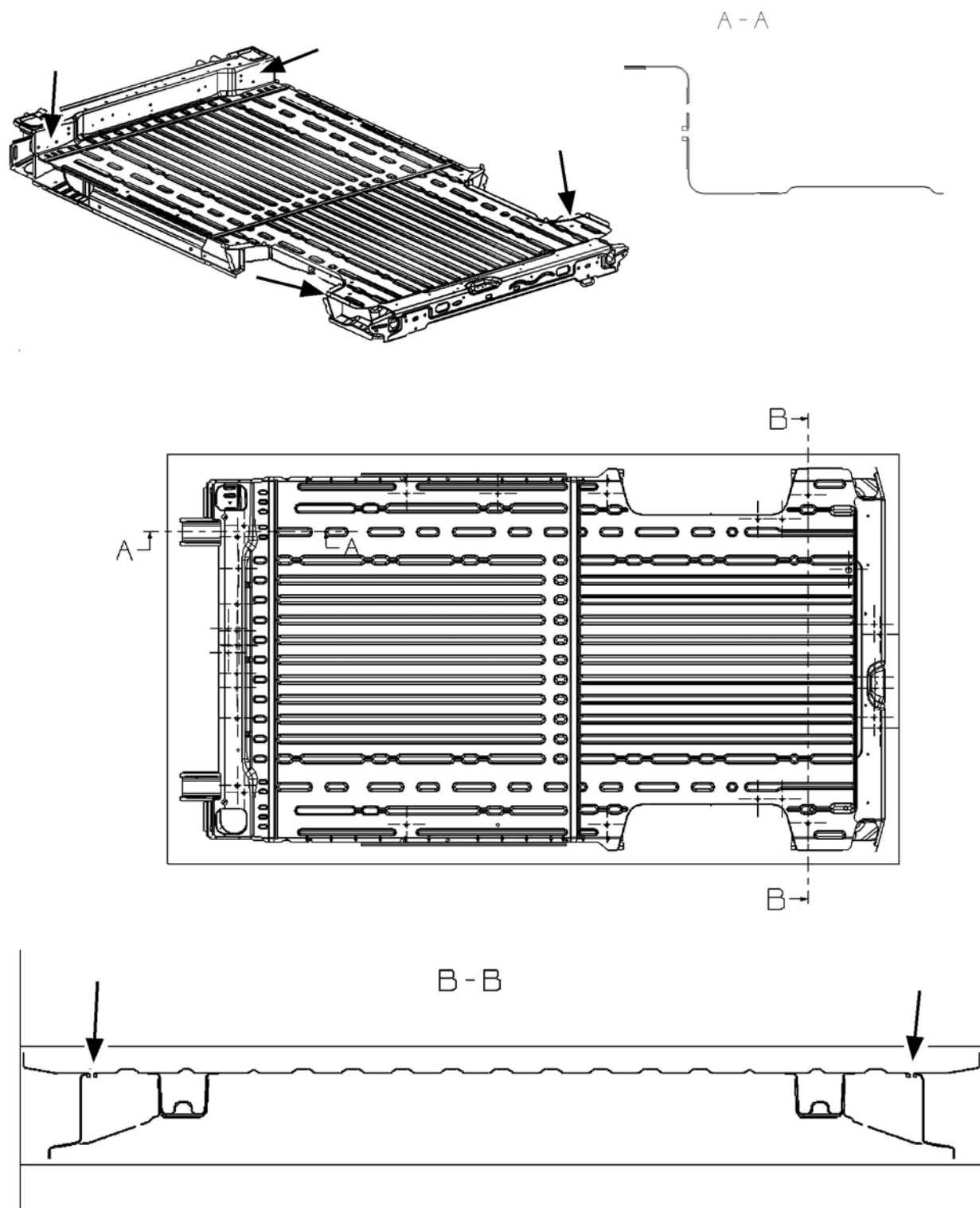


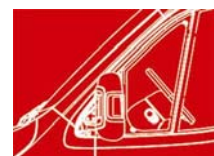


2.34

Load retaining hooks on floor

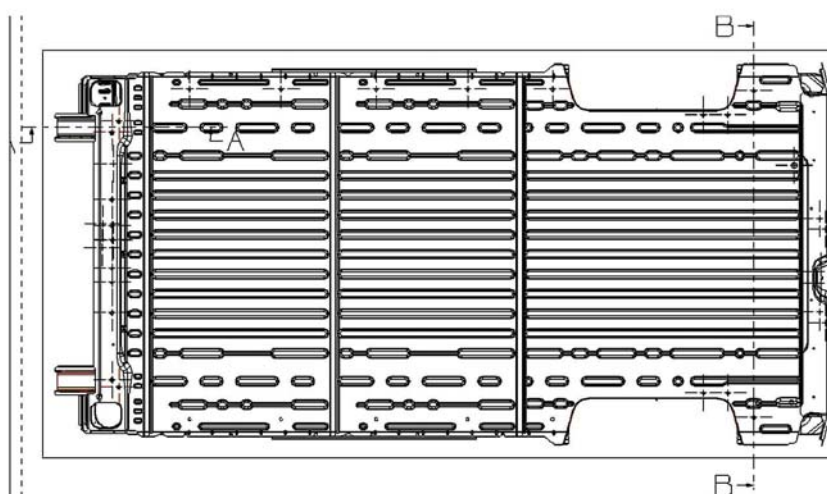
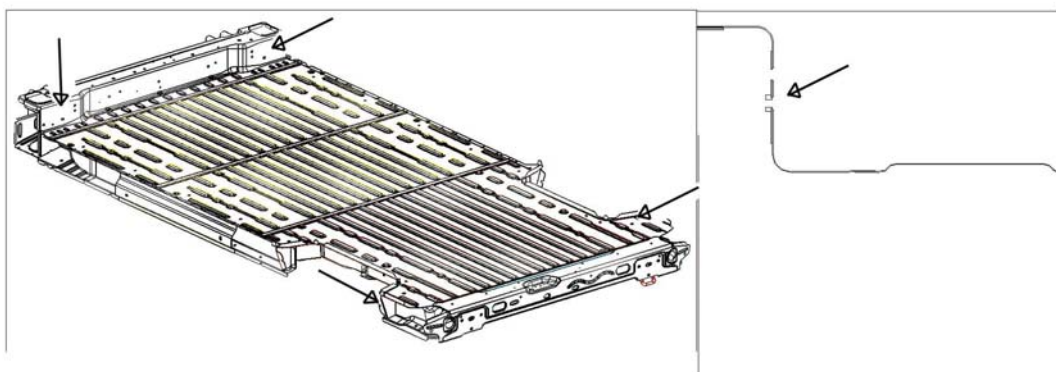
Medium wheelbase



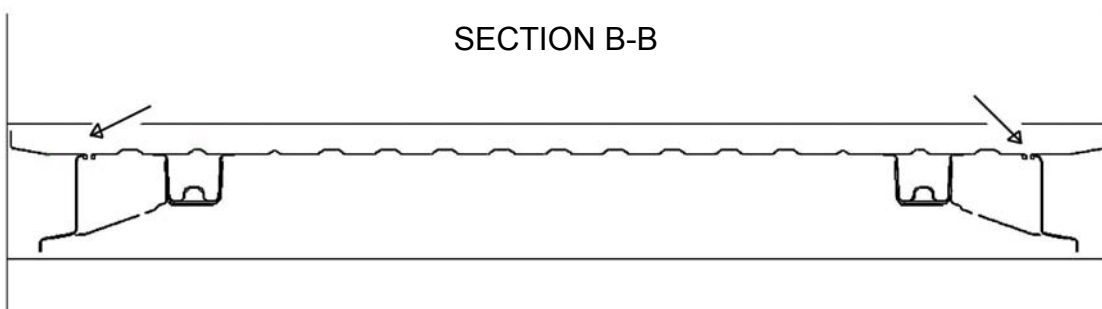


Load retaining hooks on floor
Long wheelbase

SECTION A-A



SECTION B-B





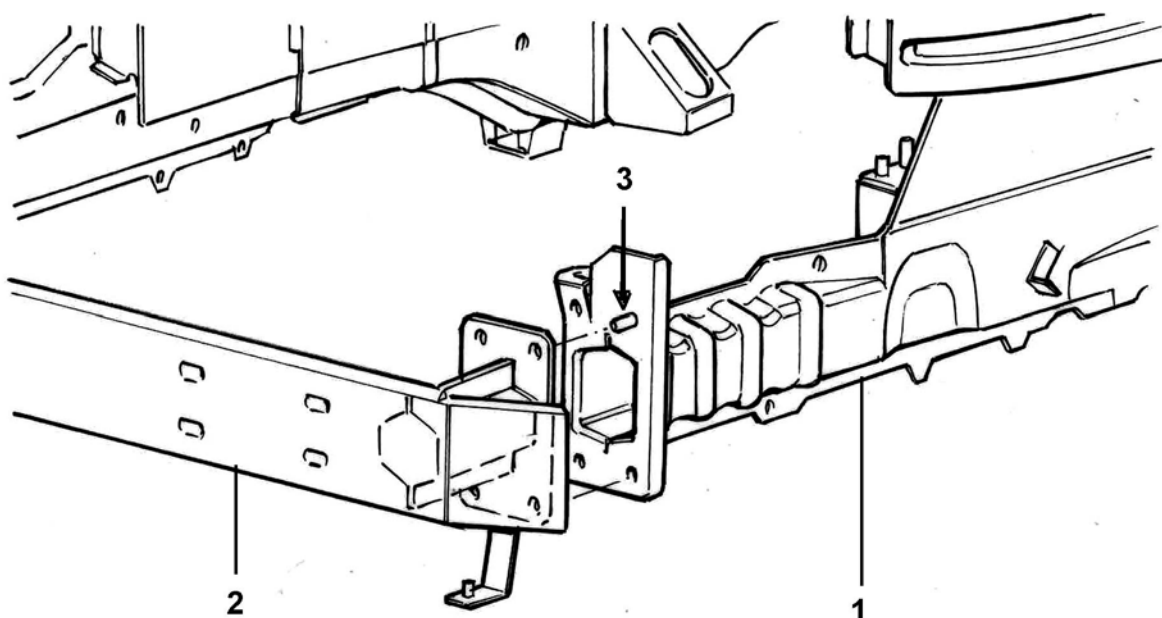
2.36

INSTRUCTIONS FOR ELIMINATING 'CRASH BOX' CROSS MEMBER (ONLY FOR VEHICLES WITHOUT AIR-BAG)

All basic versions are fitted with impact absorbing cross-members.

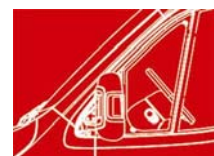
- **Removal of the cross-member is only possible in cases of complete vehicle conversion ('basic chassis' versions).**

Front crash-box for all versions



2: front crash box cross-member - 1: controlled impact absorption strut - 3: centring pin.

- **NOTE: for vehicles fitted with air-bag, restore the structure with technical specifications similar to those removed.**



FUEL SUPPLY SYSTEM

The fuel supply system is identical on all versions (vans, basic chassis vehicles, etc.)

The passage cone for the fuel filler pistol (model VP std. SAE J 1140) is shown on the drawing given below.

The tank capacity is 60 lt (optional), 90 lt (standard) or 125 lt (optional).

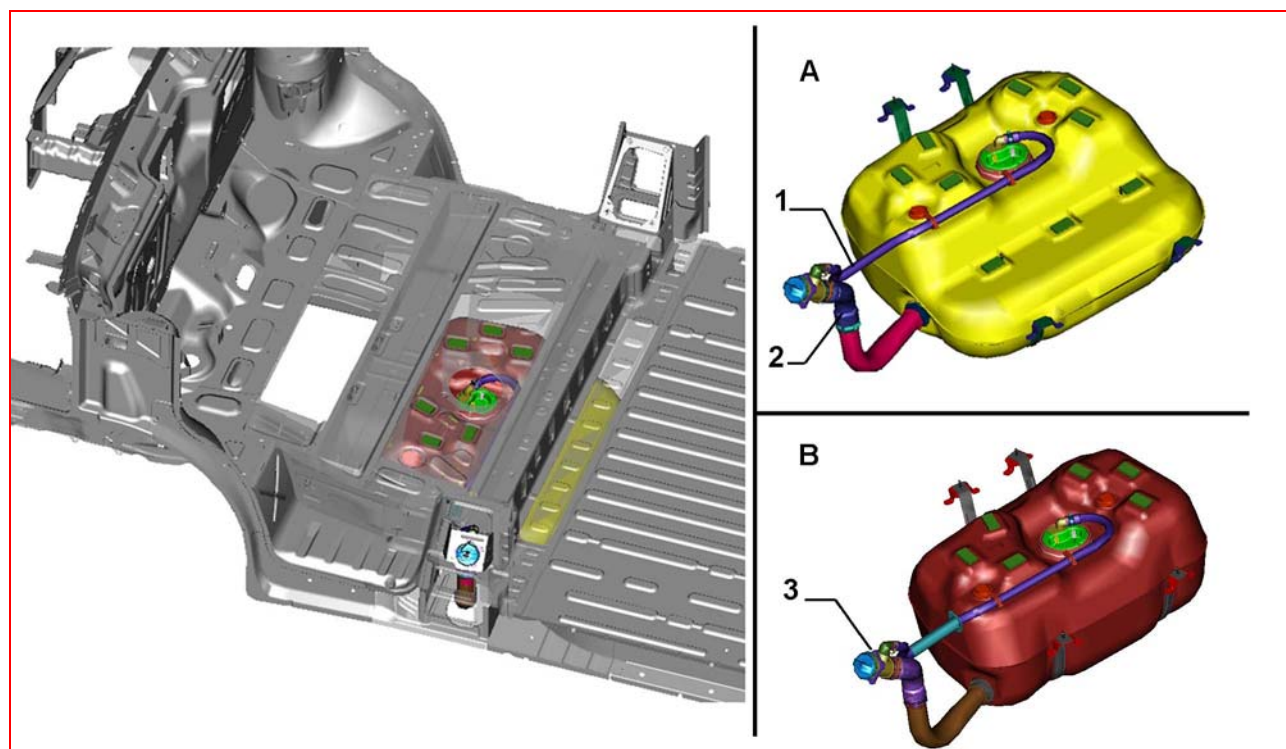
Modifications to fuel filler position.

A corrugated flexible pipe can be fitted between the tank and filler, taking care to comply with regulations in force.



If necessary the corrugated pipe (2) or pipe (1) must be replaced with others with the same technical specifications (materials, cross-section and fastening, see diagram on following page).

Descriptive outline



A: 125 L tank.

B: 90 L tank.

1: breather pipe; 2: corrugated connector pipe; 3: fuel filler



2.38

PIPE TECHNICAL SPECIFICATIONS

Component technical data:

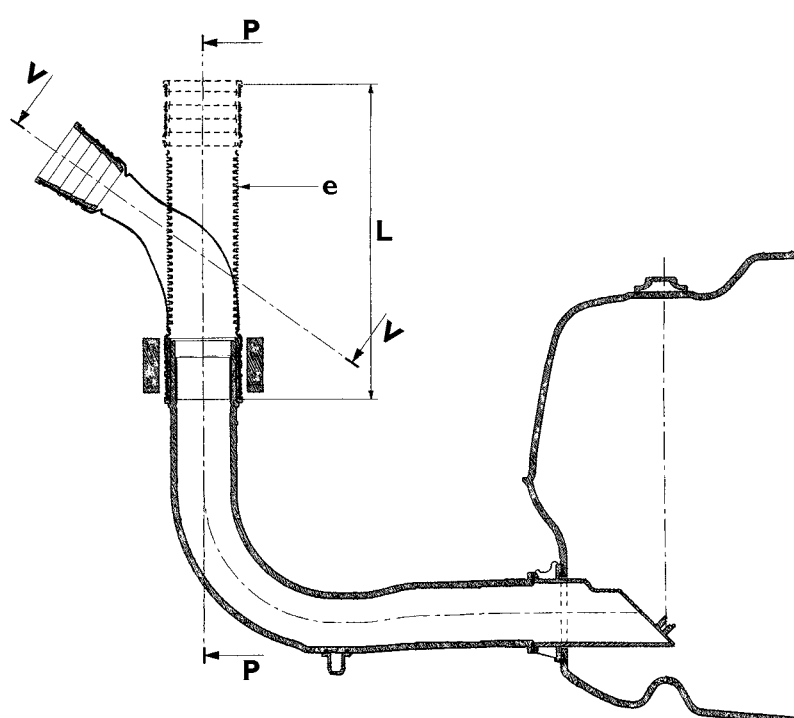
a: letter in relief for correct mounting on vehicle;

c: metal insert with extraction load ≥ 100 N.

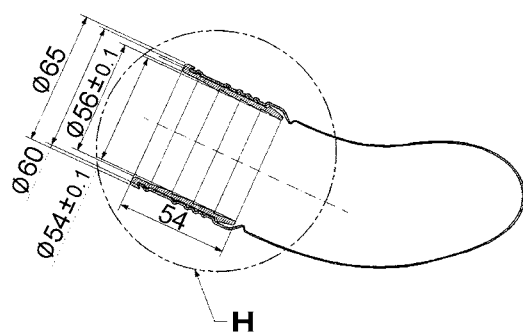
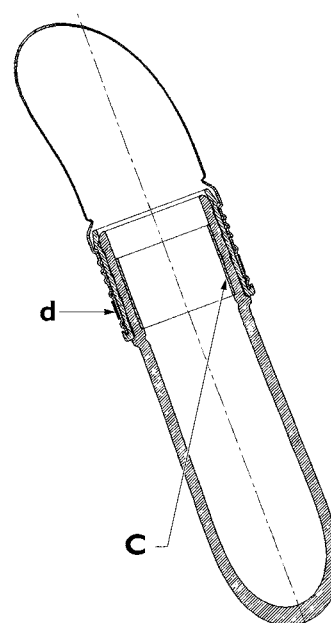
d: flexible collar;

e: nylon corrugated pipe;

L: max. length 261.8 mm.

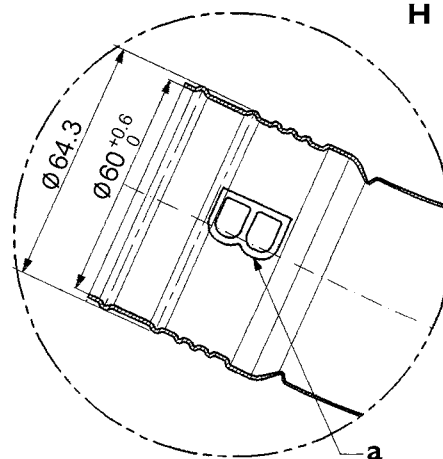


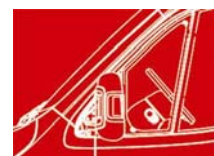
P-P



V-V

H





Fitting a roof rack

The roof rack must be fitted using the attachments on the roof, following the instructions of the roof rack manufacturer; maximum admissible load condition (including roof rack) must in any case be respected.

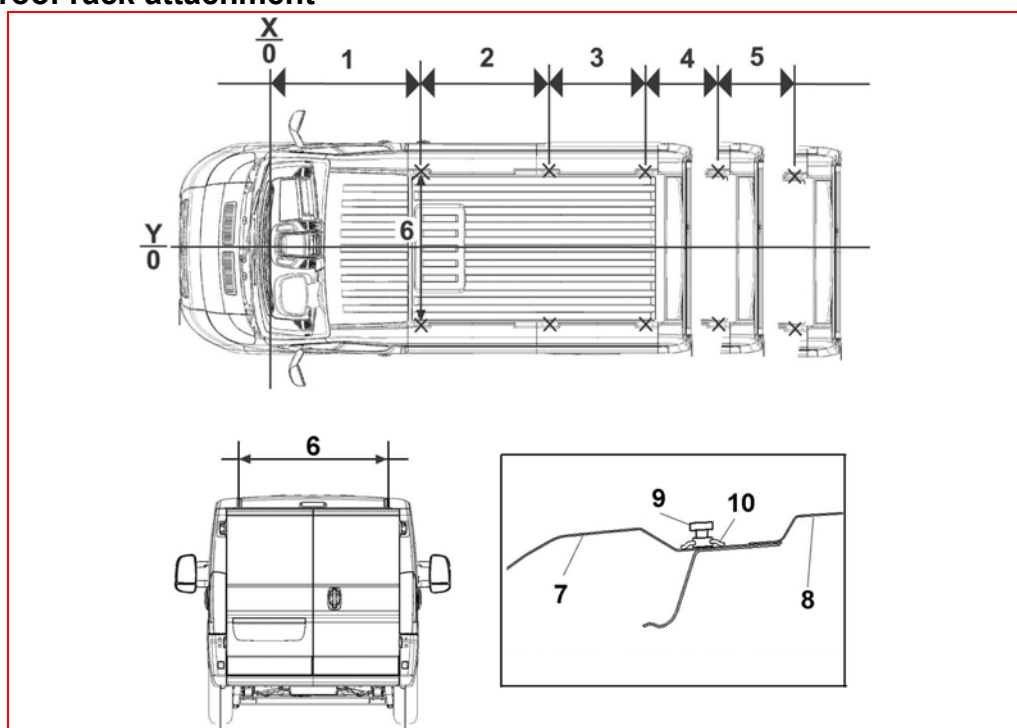
Short wheelbase - 150 Kg

Medium wheelbase - 150 Kg

Long wheelbase - 150 Kg

➤ **NOTE:** The limit of 25 kg for each attachment on the roof must not be exceeded. The maximum permitted weight of 150 kg is an absolute limit, even if the wheelbase is lengthened.

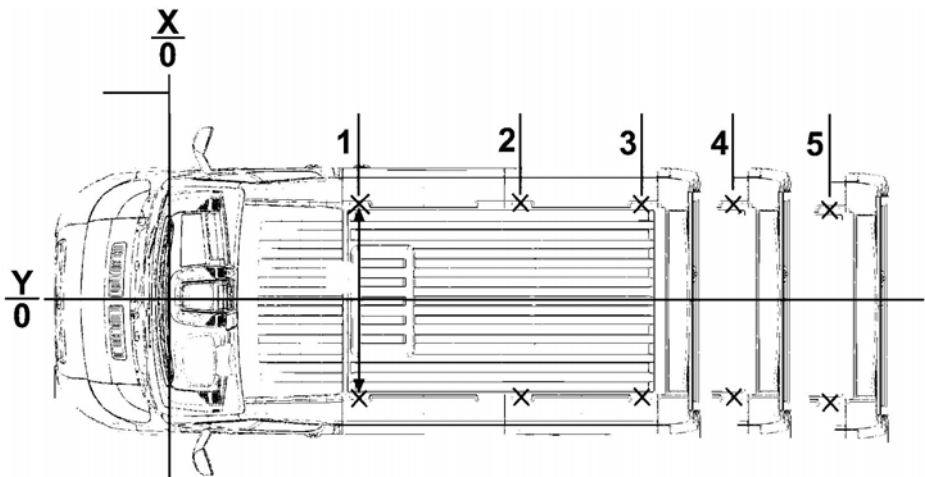
Diagram of roof rack attachment



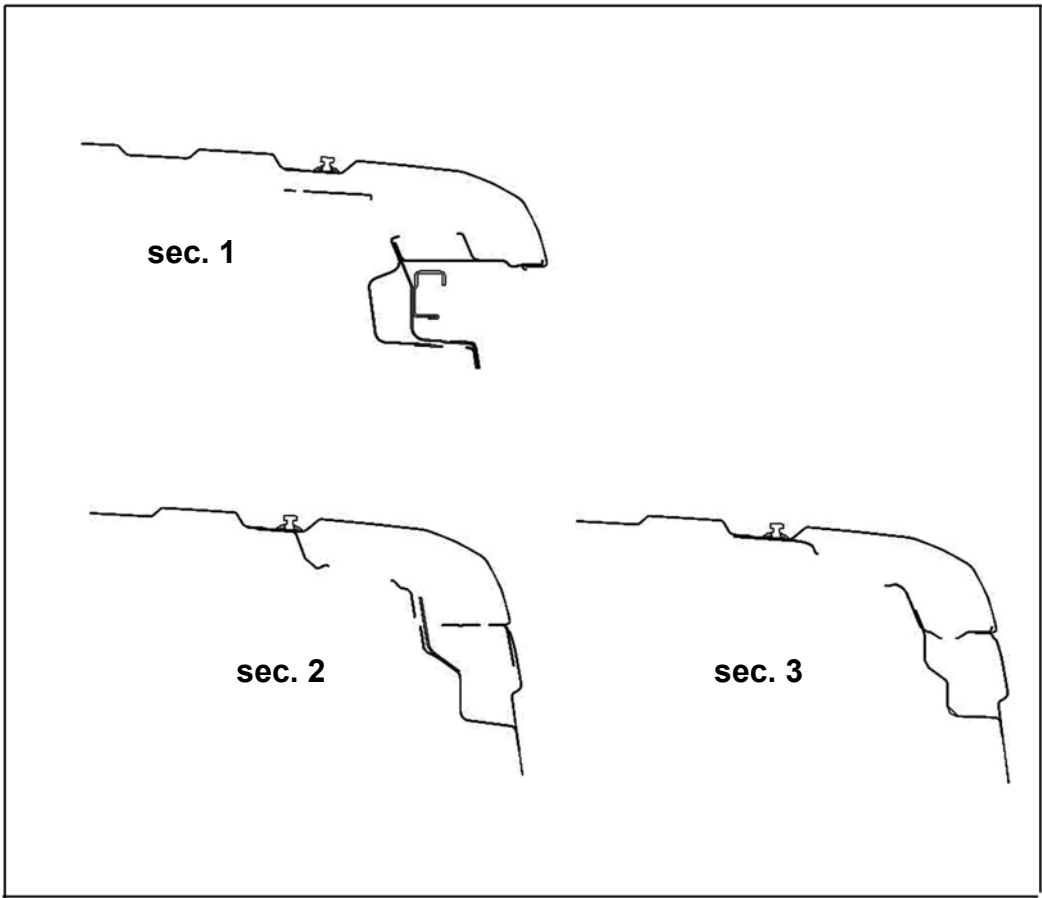
7. Top exterior. – 8. roof – 9. roof rack pin – 10. roof rack attachment reinforcement – X0. front wheel axis

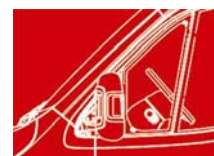
	Anchor point distances (mm)					'Y' distance (mm) (width)
	1	2	3	4	5	6
Load anchor point positions						
Short wheelbase, low roof van (CH1)	1392.8	1244.7	920,5	-	-	740.0
Medium wheelbase, low roof van (MH1)	1392.8	1414.7	1201	-	-	740.0
Medium wheelbase, medium roof van (MH2)	1392.8	1414.7	1193.5		-	740.0
Long wheelbase, medium roof van (LH2)	1392.8	1414.7	713.5	1065	-	740.0
Extra long wheelbase, medium roof van (XLH2)	1392.8	1414.7	713.5	716	714	740.0
Long wheelbase, high roof van (LH3)	1392.8	1619.7	509.0	927	-	747.5
Extra long wheelbase, high roof van (XLH3)	1392.8	1619.7	509.0	716	576	747.5

Roof rack attachment point sections

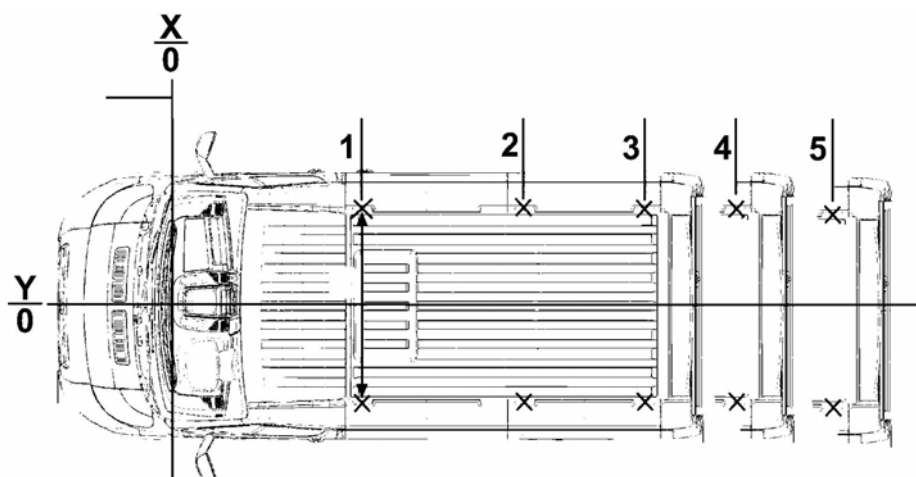


CH1 van sections

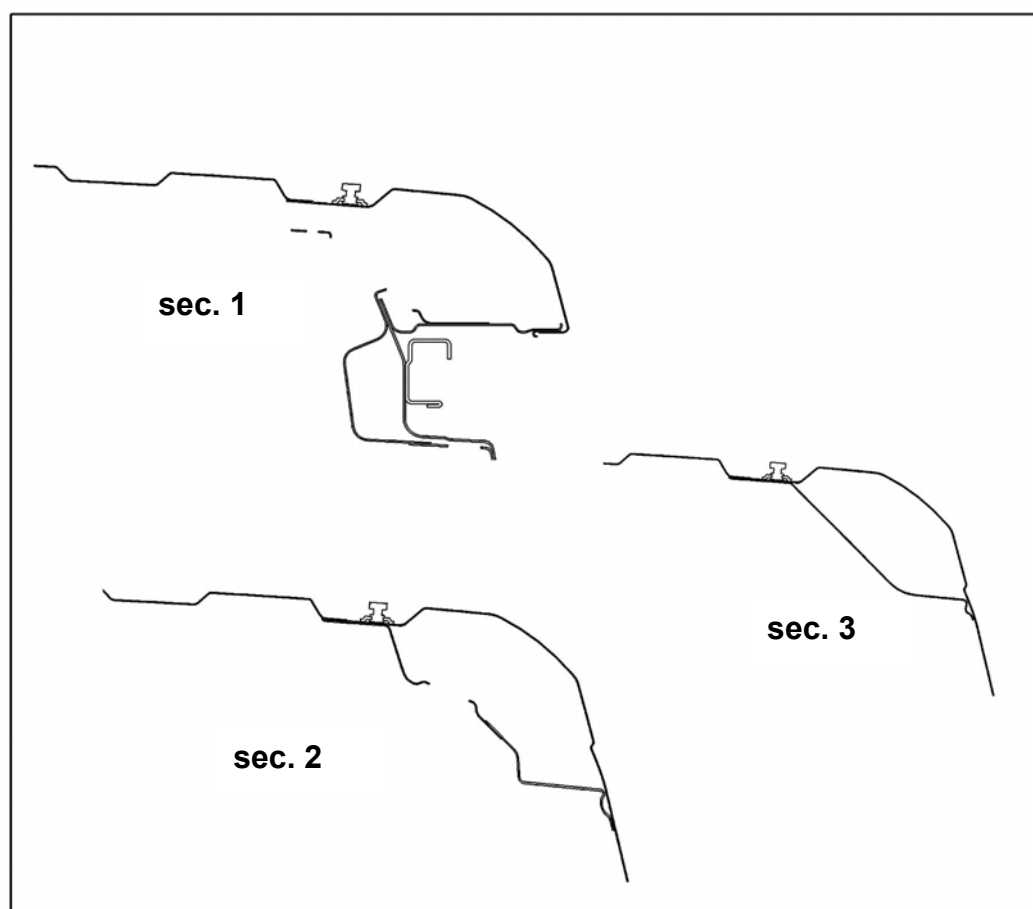




Roof rack attachment point sections



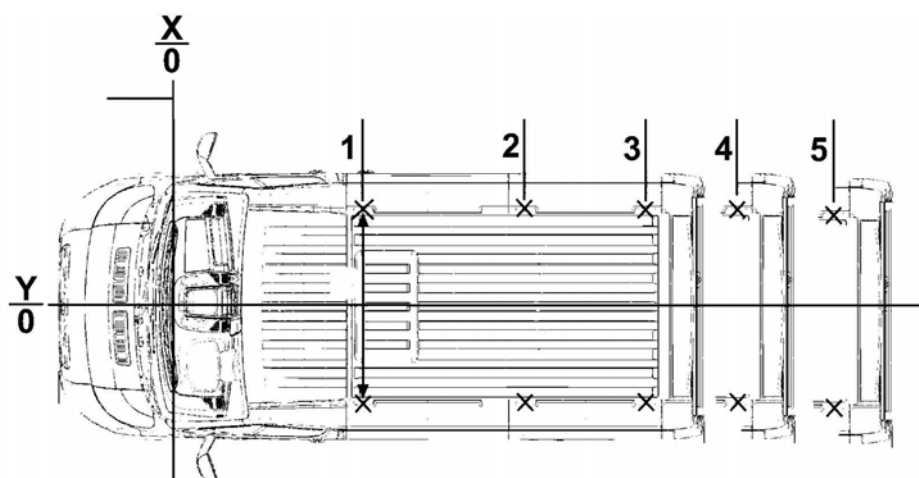
MH2 – LH2 van sections



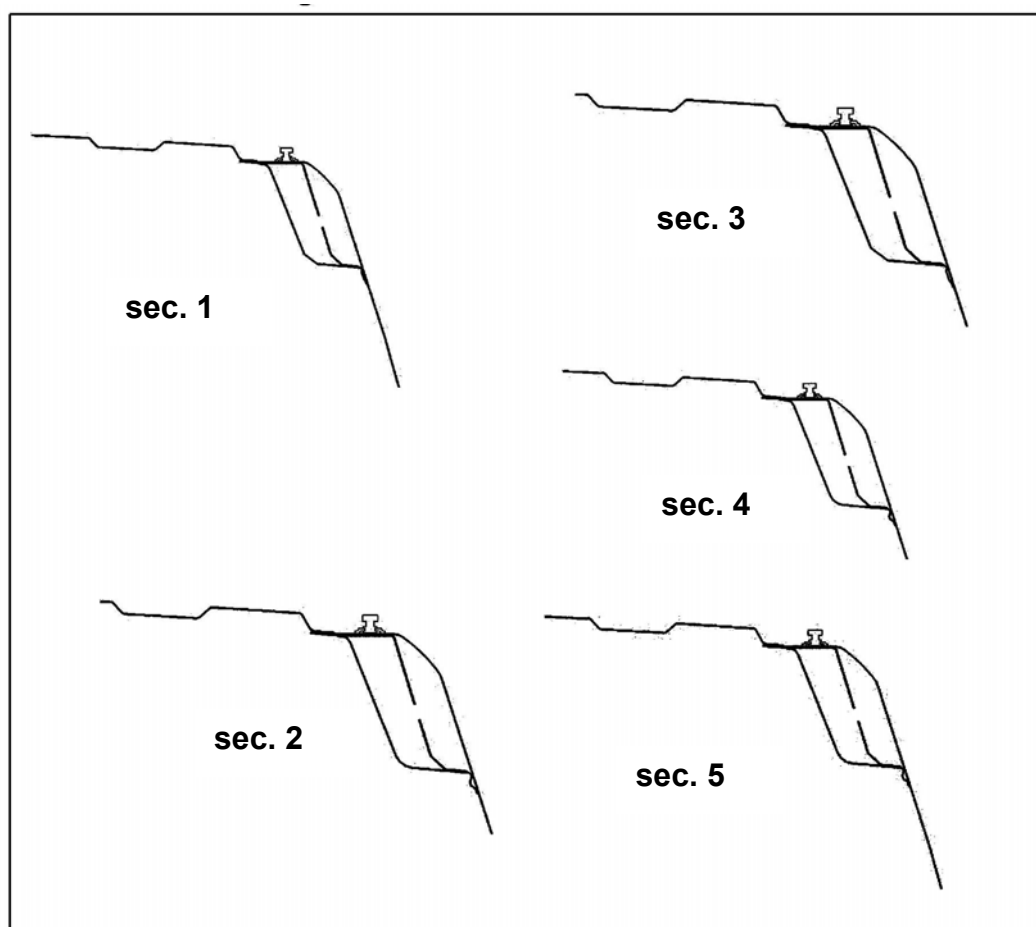


2.42

Roof rack attachment point sections

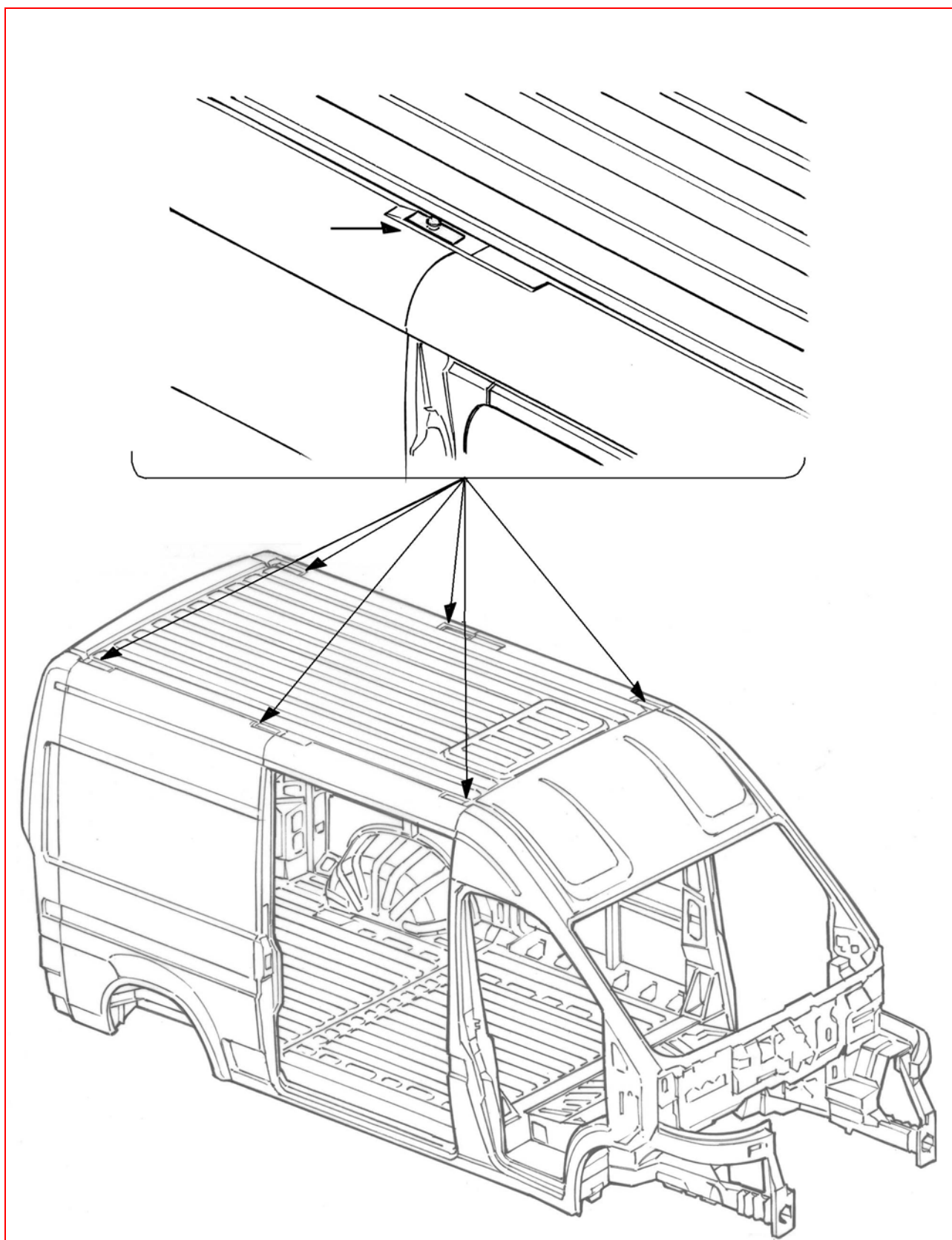


XLH3 – LH3 van sections





Attachment positioning



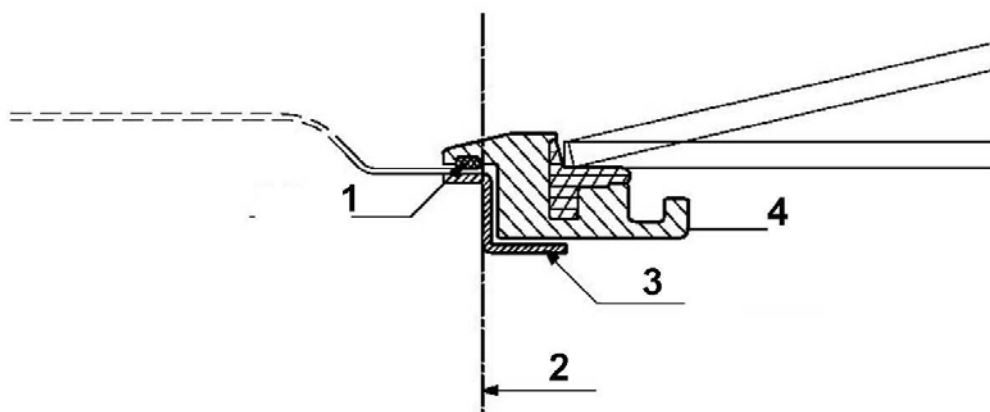


2.44

OPENING A HATCH IN THE ROOF

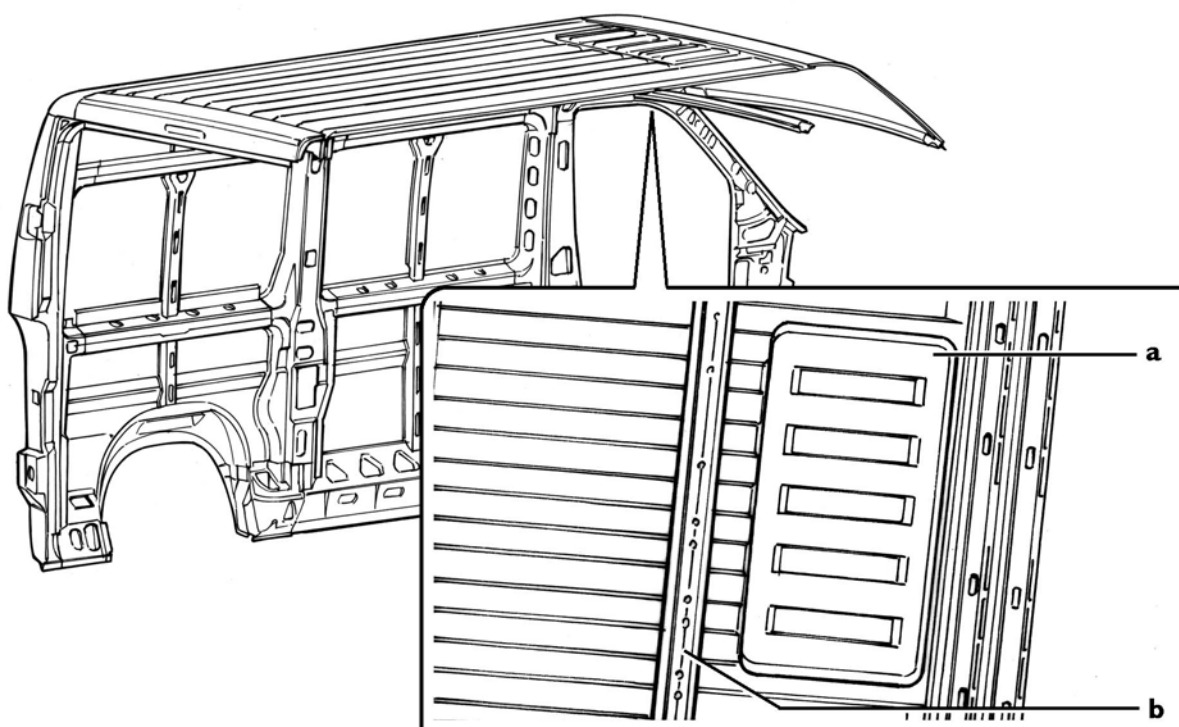
A hatch may be opened in the roof, providing that the works do not involve the ribs and the ensure seal and strength of the modified part.

The figure shows an installation example.



1: Sealant - 2: Cut area - 3: Attachment profile - 4. hatch

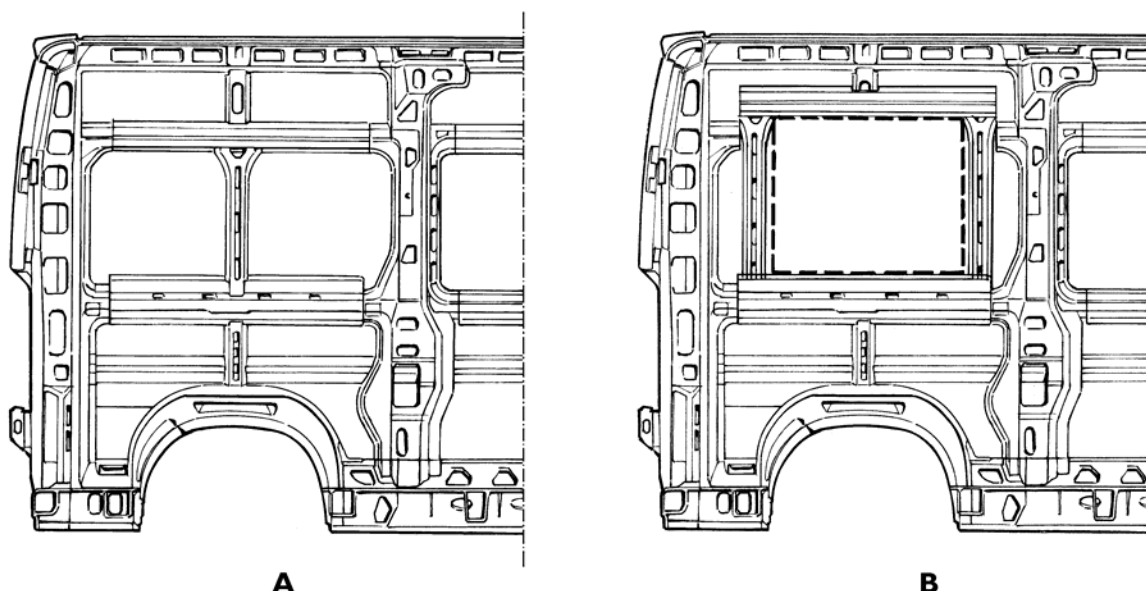
➤ **NOTE:** If the hatch has to be opened in a different area of the roof to (a), cutting of the structural ribs (b) is not permitted. The structure must in all cases be restored to its original conditions of function and rigidity.





MAKING A WINDOW IN THE SIDE

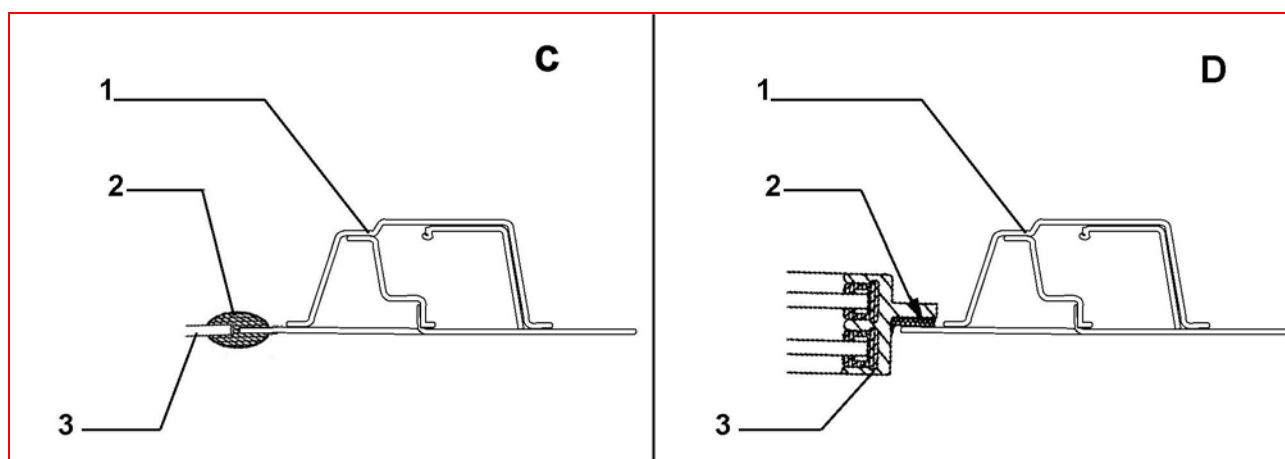
It is permitted to make one or more side windows, provided that they are not on the structural pillars. If it is necessary to make the window at the structure, the opening must comprise a perimetral frame that is connected to the original pillars and longitudinal members (see solution B) in order to restore the structural rigidity of the bodyshell.



A: Original solution; B: solution with added peripheral frame.

Make the cut as shown in the diagram, taking care to maintain a perimeter profile with minimum width of:

- 15 mm for windows fitted with rubber seal (fig. C);
- 20 or 25 mm for bonded windows (fig. D);



1. pillar - 2. seal - 3. glass.

1. pillar - 2. bonding material - 3. glass.



Heater installation

If a supplementary heater is required, it is advisable to use only the types foreseen by FIAT GROUP AUTOMOBILES S.p.A.

For vehicles on which FIAT GROUP AUTOMOBILES S.p.A. has not foreseen supplementary heaters, these must be installed according to the heater Manufacturer's instructions (i.e. boiler, piping, electrical system arrangement etc.) and as per the instructions given below.

All pertinent national regulations must be respected (i.e. testing, special versions for hazardous goods transport, etc.). The supplementary heater must not use vehicle systems subject to homologation, if their use may negatively alter performance.

In addition:

- the correct function of vehicle components and systems must be safeguarded (i.e. engine cooling);
- for the electrical system, check that battery capacity and alternator power are sufficient for the increased power absorption (see ELECTRICAL SYS. SECTION).
Fit the new circuit with a fuse;
- for fuel supply, connect the supply system to an auxiliary fuel tank connected to the return pipe from the engine. Direct connection to the engine fuel tank is only permitted if this is independent to the engine supply lines and the new circuit has a hermetic seal;
- define the routes of pipes and electrical cables, arrangement of brackets and flexible joints, taking into account their dimensions and the affect of heat from the various components on the chassis. Avoid passages and arrangements with exposure that could present a hazard when travelling, adopting covers or guards wherever necessary;
- for water heaters, when the original vehicle heater and engine cooling circuits are involved, in order to obtain correct system function and ensure the original safety level:
 - define the connection points between the supplementary system and the original with special attention, if necessary in agreement with FIAT GROUP AUTOMOBILES S.p.A.;
 - arrange piping rationally, avoiding kinks and siphon sections;
 - apply breather valves to ensure correct system filling;
 - ensure the possibility of complete system drain, fitting any additional plugs required;
 - adopt, where necessary, adequate protection to limit heat loss.
- In air heaters and in cases in which the heater is installed directly in the cabin, special attention must be given to the flu (to prevent combustion gases accumulating in the interior) and the correct distribution of hot air, to avoid direct flows;
- The entire system must be installed to permit good accessibility and ensure rapid maintenance.



Supplementary heater/air-conditioner system pre-fittings

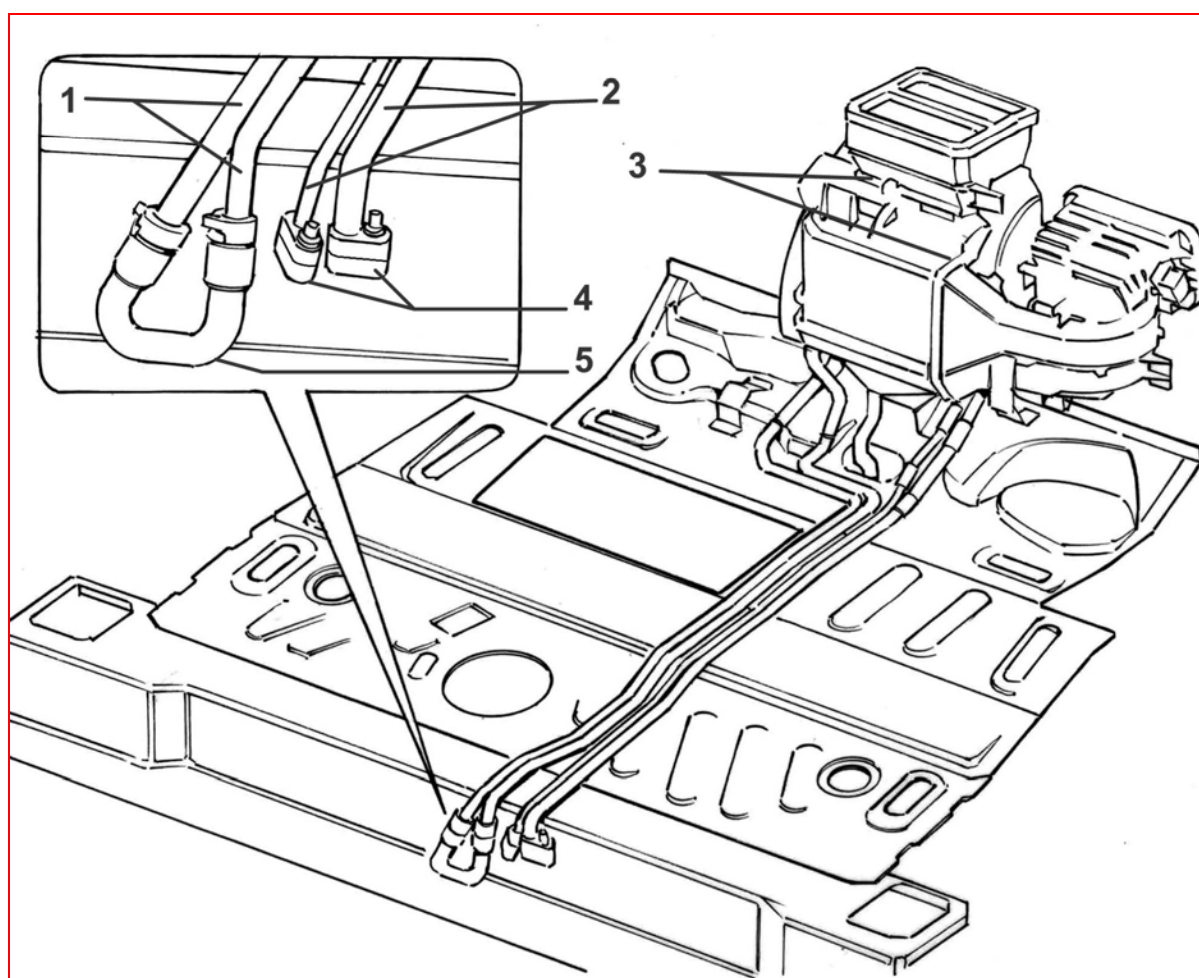
All 'free time' versions can fit air-conditioner and heaters with connections for a supplementary conditioner/heater group.

These pre-fittings obviously concern the rear of the passenger compartment.

As can be seen in the diagram below, the fitting has been realised by means of an extension to the attachments on the cab air-conditioning group.

If a new group is required, it is advisable to use components with similar technical specifications to the existing ones.

Diagram



1: engine coolant delivery and return pipes;

2: coolant fluid delivery and return pipes;

3: cab air-conditioner;

4: freon pipe connections;

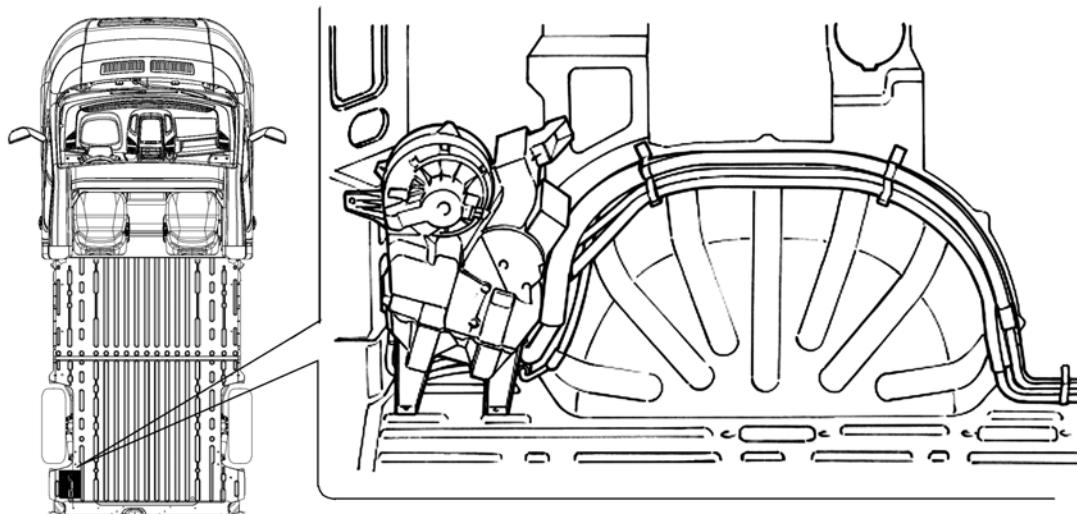
5: heating fluid pipe connection.

➤ **NOTE:** Refer to the Use and Maintenance Handbook for the technical specifications of liquids/freon.



2.48

Supplementary system



The drawing shows one possible location for the supplementary group.

Technical specifications

Model X2/50	Weight (Kg.)	Air flow-rate (Std ^m ³ /h - VENT max cold)	Max.power absorption (A. @12V - VENT max cold)
Main heater group	7.00	420	19
Manual conditioner group	8.50	420	24
Automatic conditioner group	9.50	420	24
Auxiliary heater (under seat)	2.40	210	2,5
Supplementary rear heater group	4.90	380	21

Air flow rate (Std ^m ³ /h)	Engine coolant flow rate (l/h)	Thermal power (BTU/h)	Installed mass thermal power (kW)
Main group radiant mass thermal power			
400	800	37,700	11.00
	500	35,500	10.40
Under seat group radiating mass thermal power			
210	1000	16,400	4.81
Supplementary rear group radiant mass thermal power			
400	800	23,900	7.00
	500	20,500	6.00

Air flow rate (Std ^m ³ /h)	Thermal power (BTU/h)	Evaporator thermal power installed (kW)
Main group evaporator thermal power		
400	22,300	6.50
Auxiliary rear group evaporator thermal power		
350	17,000	5.00



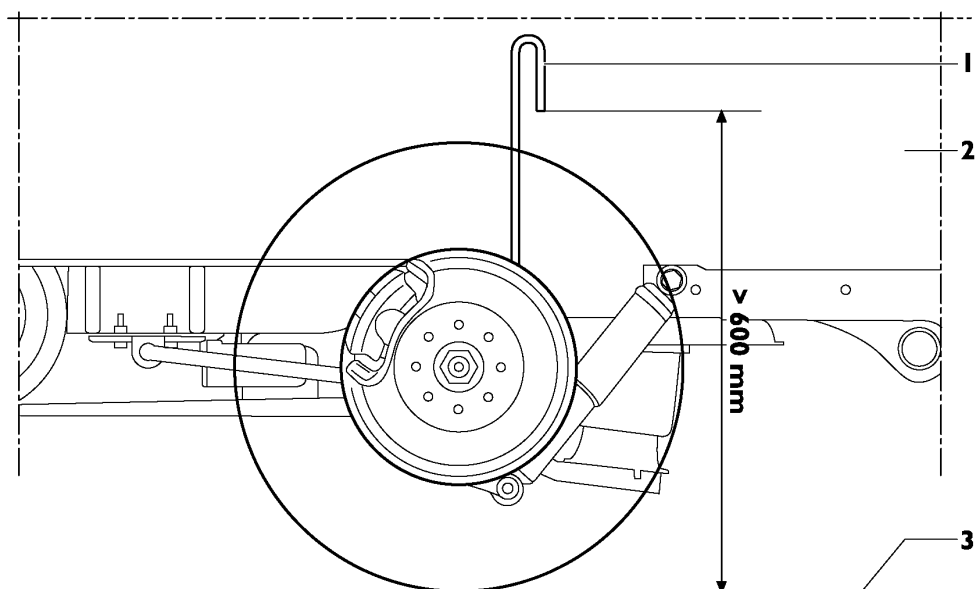


AIR SUSPENSION

Installation of air intake on special chassis-cabs and chassis-cowls with flatbed

NOTICE!: install the air intake in a zone shielded from dust and not exposed to direct water jets.

NOTICE!: install the air intake opening at a distance from the ground of at least 600mm

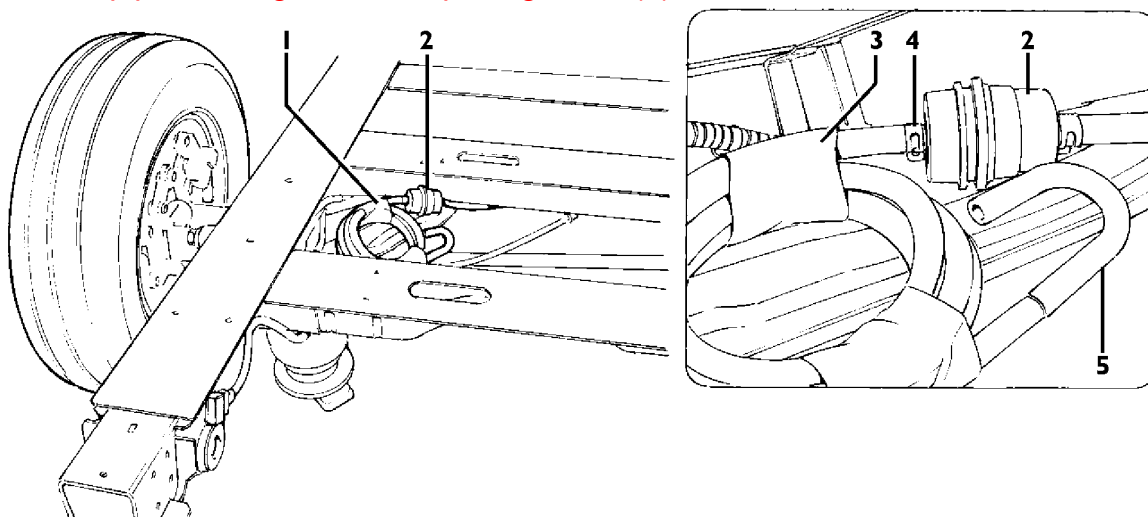


1: Air intake; 2: Motorhome cab; 3: Ground line

Location and preparation for installation

The pipe, complete with filter (2) and air intake (5), is situated above the rear air suspension cross-member and is held together and restrained by clamps or tape (3).

Release the pipe (1) from the clamps or tape (3). To facilitate the installation, separate the filter from the pipe working from the opening collar (4).

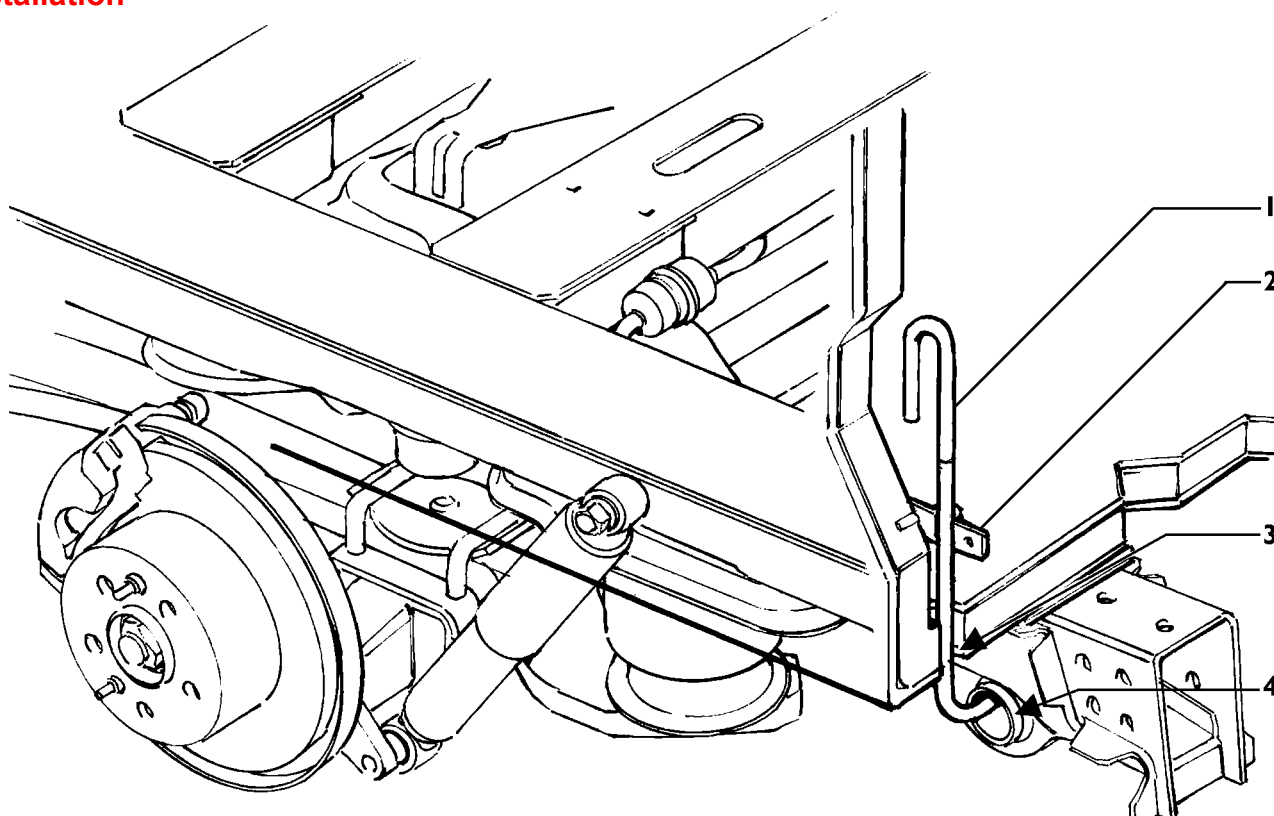


1: Pipe; 2: Air filter; 3: Packaging tape; 4: Opening collar; 5: Reversed-U-shaped air intake.



2.50

Installation



In the figures below you will find the indications on how to fit the rubber pipe.

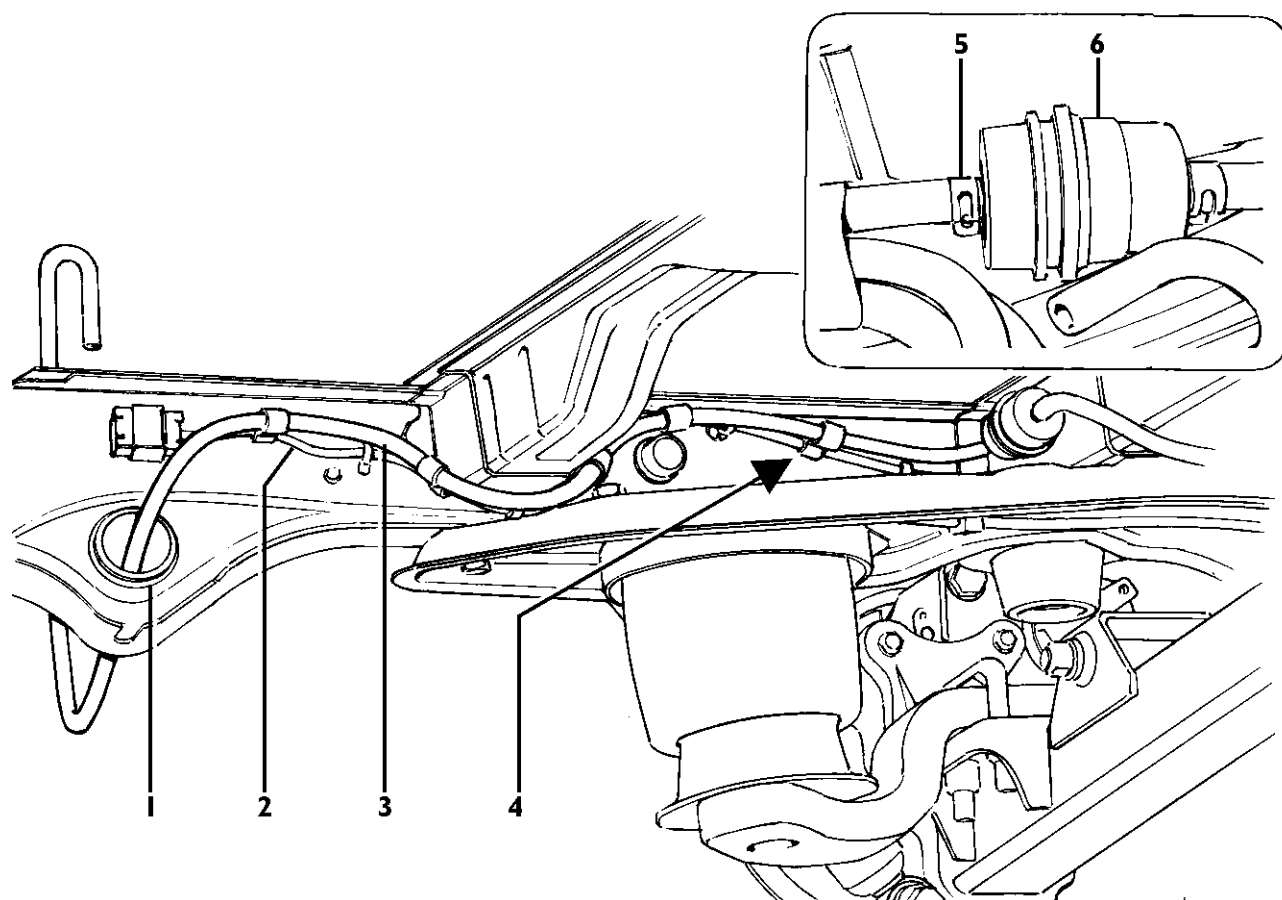
Drill a hole (3), of appropriate size for the passage of the rubber pipe, in the cab floor in the proximity of the left side wall and the rear suspension, as shown in the figure.

Introduce the reversed-U-shaped part (1) through the hole (3). Anchor it to the inner side of the left wall by means of a small bracket (2) and the relative fasteners.

Extend the pipe towards the inner part of the frame through the hole (4) in the longitudinal, which is not used due to the absence of the rear bushing for the connection of the mechanical suspension.

NOTICE! To ensure a sufficient flow of air to the compressor, do not perforate the pipe and do reduce its cross-sectional area; the flow of intake air to the compressor must be in accordance with the specifications.

- It is important that the end part of the pipe (1) retains the reversed U shape in order to prevent the penetration of dust and water. The air intake (1) anchoring point must be positioned at a sufficient distance from the ground, at least 600mm, in a dried, shielded area.



Run the pipe (3) along the left longitudinal. To fasten the rubber pipe to the corrugated sleeve of the electrical system (2) we suggest using commercially available polyamide clamps with double ring or strip (4). If you use fasteners of a different type, make sure that the cross-section of the pipe is not altered.

NOTICE:

The flow of air through the pipe must remain the same as it was before the application of the fasteners. A narrower section or a hole, no matter how small, might undermine system operation.

Make sure there are no loose portions of the pipe and complete the installation as necessary by anchoring to the floor the portions of the pipe not fastened to the corrugated sleeve (2), using small brackets or similar fasteners.

The pipe is ca 2000mm long and is longer than necessary. To shorten it, cut the excess portion on the side of the air filter (6). Then restore the connection between the pipe and the filter and fit back the opening collar (5).



2.52

Changes to the wheelbase

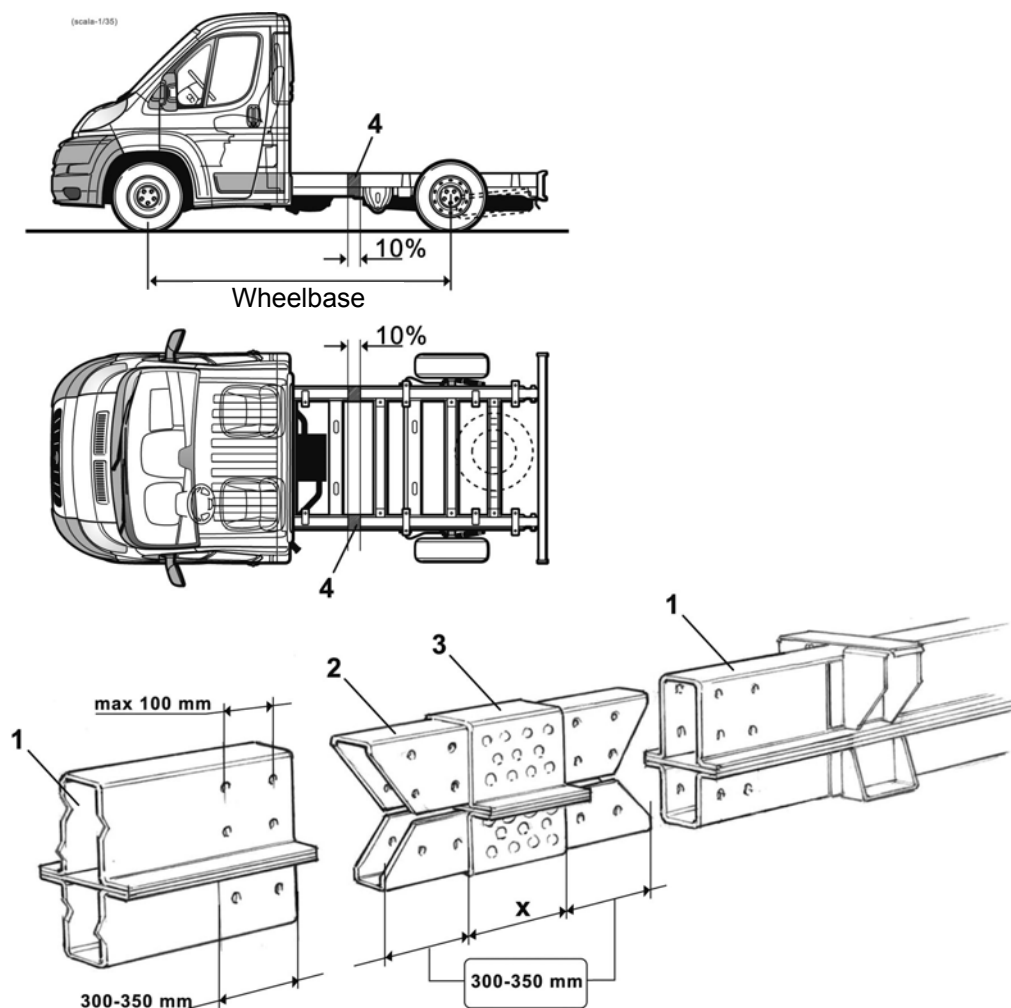
It is not advisable to change the vehicle wheelbase. You should always address any problem by making use of the wheelbase lengths specified by FIAT GROUP AUTOMOBILES S.p.A.

The versions on which it is possible to make the change in question are chassis-cabs and chassis-cowls without option 555 (air suspension).

It is absolutely prohibited to make this change to: all the vans, the chassis-cabs and chassis-cowls with flatbed, and all the vehicles with 4035mm wheelbase.

If you have to change the wheelbase, the length added must never exceed 10% the length of the original wheelbase and, in any event, the final length must never exceed 4035mm.

The figure shows a method for the lengthening of the wheelbase. For the materials of the added portions (parts 2 and 3 in the figure), see the characteristics of the original longitudinals. The quantity and the positions of the connections or welds given in the figure are only indicative. The change must always ensure appropriate bending and torsional stiffness of the structure.



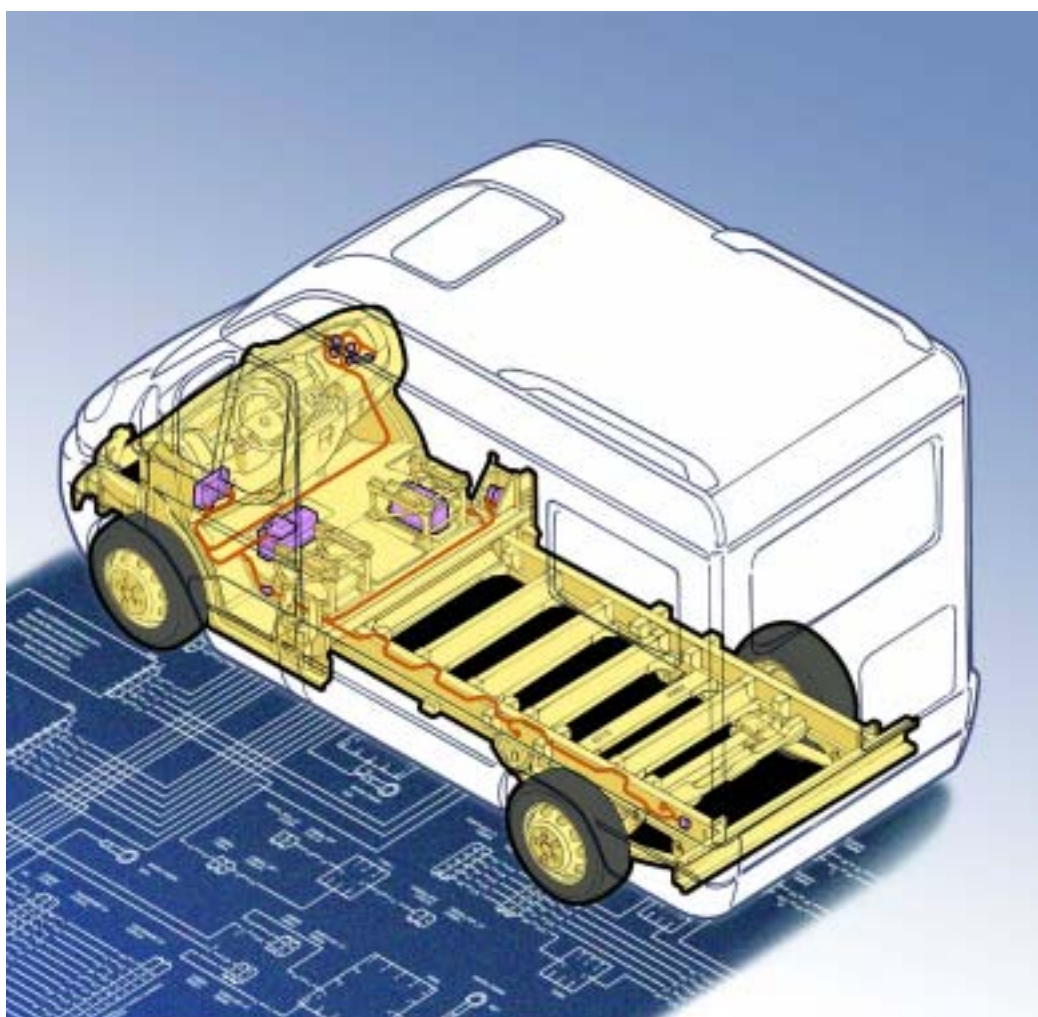
1: Original frame; 2: Reinforcing boxed section; 3: Additional frame; 4: Cutting zone for wheelbase modification;

x: wheelbase lengthening variable dimension (max. 10% of original wheelbase length).





Electrical System





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1 DESCRIPTIVE KEY

1.1 List of acronyms in diagrams

ACRONYM	DESCRIPTION
CCT	Chrono Tachograph Control unit
CDC	Codriver Door Command (passenger door control pad)
CGP	Door Management Control unit (locks)
CRM	Trailer Control Unit
CRS	Auxiliary Heater Control Unit (Webasto)
CSA	Theft Alarm Control Unit
CSG	Steering Servo Control Unit
CSP	Rain / Twilight Sensor Control Unit
CSS	Central Stack Switch (central control pad)
DDC	Driver Door Command (Driver's door control pad)
DEV	Combi Switch
LSS	Left Stack Switch (left hand control pad)
NAB	AirBag Hub
NAS	Steering Angle Hub
NBC	Body Computer Hub
NCA	Automatic Gearbox Hub
NCL	Air-conditioner Hub
NCM	Engine Control Hub
NCV	ConVergence Hub (telematic info system)
NFR	Braking Hub (ABS, ASR, VDC)
NMA	Air-Springs Hub (self-levelling suspension)
NQS	Instrument Panel Hub
NRR	Radio Receiver Hub
NSC	Automatic Gearbox Selector Hub
NSP	Parking Sensor Hub
NYL	Yaw Sensor Hub

1.2 Key to terminology:

+30: permanent +12V power supply

+KEY: signal active at +12V when ignition switch is in position (MAR)

+LIGHTS: signal active at +12V when position lights are on.

BATT. AUX: auxiliary battery installed by coach-builder.

P.M. connector: connector suitable for receiving male terminals

P.F. connector: connector suitable for receiving female terminals



1.3 Cable colour table

Code	Colour
A	Light blue
B	White
C	Orange
G	Yellow
H	Grey
L	Blue
M	Brown
N	Black
R	Red
S	Pink
V	Green
Z	Purple
W	Light brown

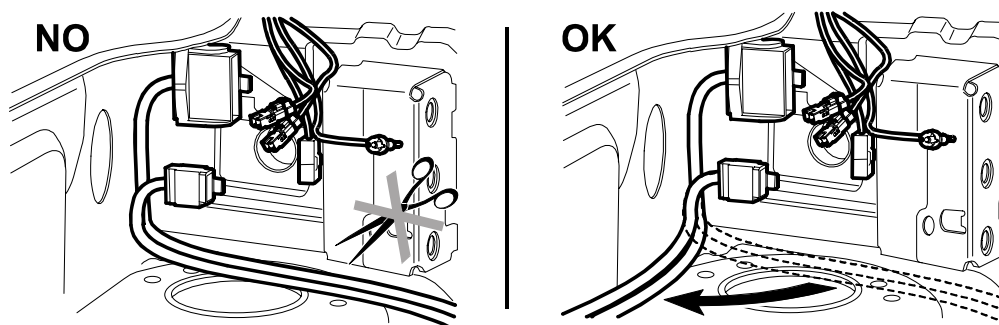
2 OVERVIEW

2.1 Moving supplementary group and equipment components and attachments

If to apply equipment and realise various types of transformation it is necessary to move any existing groups (misc. components, fuel tank, spare wheel, etc.), this is permitted provided that the function of the same is maintained and the original type of connection is maintained, and that their position is not substantially altered in a crosswise direction on the chassis, if heavy.

If an object has to be installed on the route of a cable of the original electrical system, the route may be altered provided that the cable is not cut.

Figure 1



3 SPECIFICATIONS FOR COACH BUILDERS

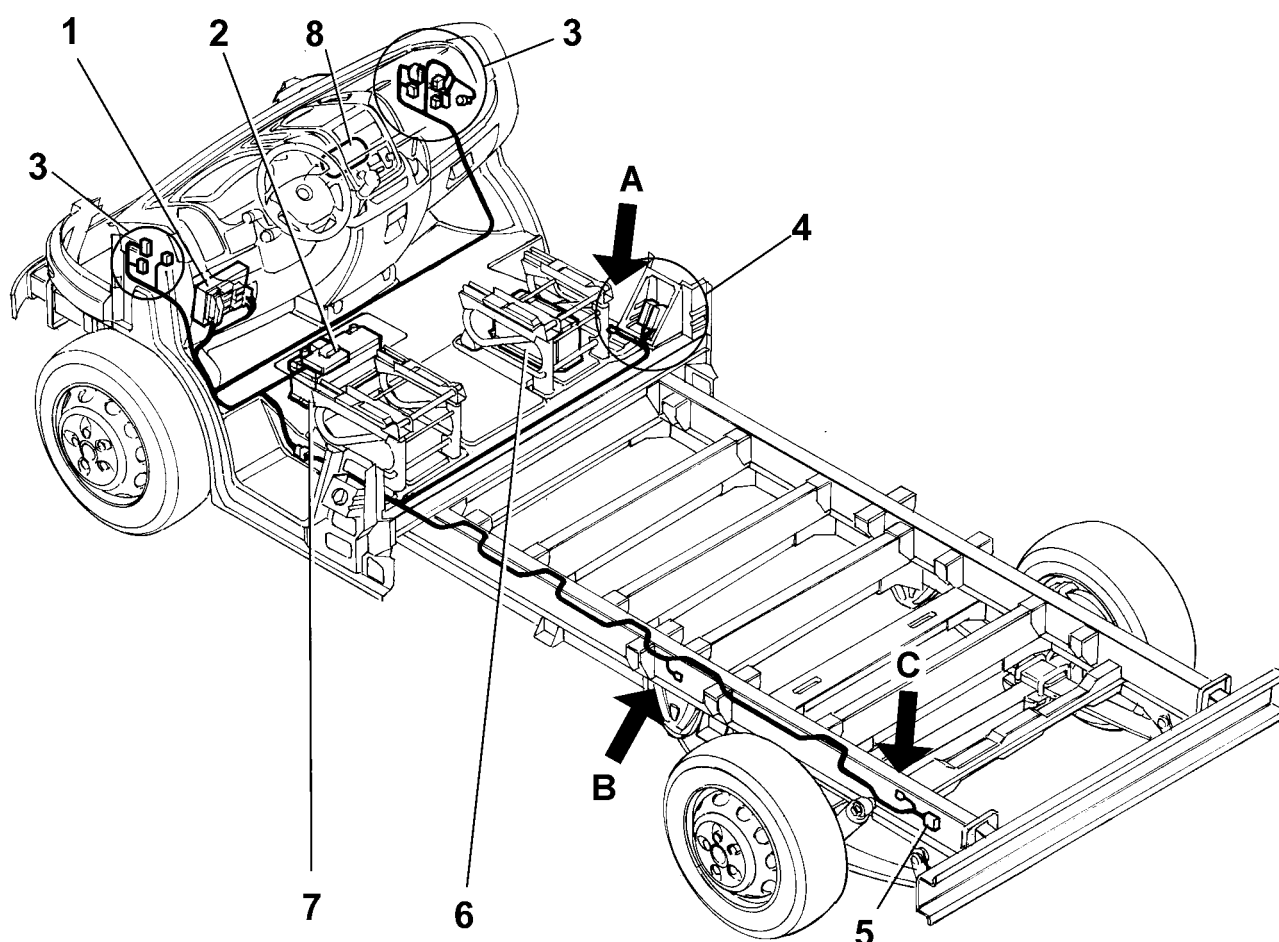
3.1 Connectors provided for conversions

For the coach-builders to effectively and correctly use the basic system on the NEW DUCATO model, FIAT GROUP AUTOMOBILES S.p.A. has provided specific connection points to which supplementary systems can be connected.

This type of provision is necessary to prevent any kind of tampering or manipulation of the basic design, and to ensure function integrity and validity of the vehicle warranty.

In addition to the main interconnection points foreseen for connection to supplementary systems, this section illustrates and describes a number of other subjects (dashboard control unit, battery, etc.) that are the exclusive domain of the basic system, and as such must not be altered in any way by the persons responsible for the conversion.

Figure 2



1. Dashboard fuse control unit – 2. Battery fuse box – 3. Connector group for doors and aerials – 4. Side fuse/relay box with 16, 15 and 2-way connectors for coach-builder interfaces – 5. Rear services connector – 6. Possible location of auxiliary battery – 7. Main system battery – 8. Alternator – A. B. C. ground points

3.2 Auxiliary alternators and batteries

The installation of high power absorption electrical equipment (i.e. frequently used electric motors, or electric motors used less frequently but for long periods without the support of the engine, such as loading platforms for city use), or a large number of supplementary electrical utilities, could demand power levels that the normal vehicle system is not capable of supplying. In these cases supplementary batteries of suitable capacity must be installed.

The vehicle system is sized to supply the power requirements of standard equipment, all of which is provided with specific protection and connected with suitably sized cables.

Applications of supplementary equipment must also foresee adequate protection and must not overload the vehicle system.

If higher capacity batteries are installed, due to the higher current draw, make certain that a suitably oversized alternator is also installed. In no case should the increase in battery exceed 20% of the standard battery capacity, to prevent damage to any component of the system.

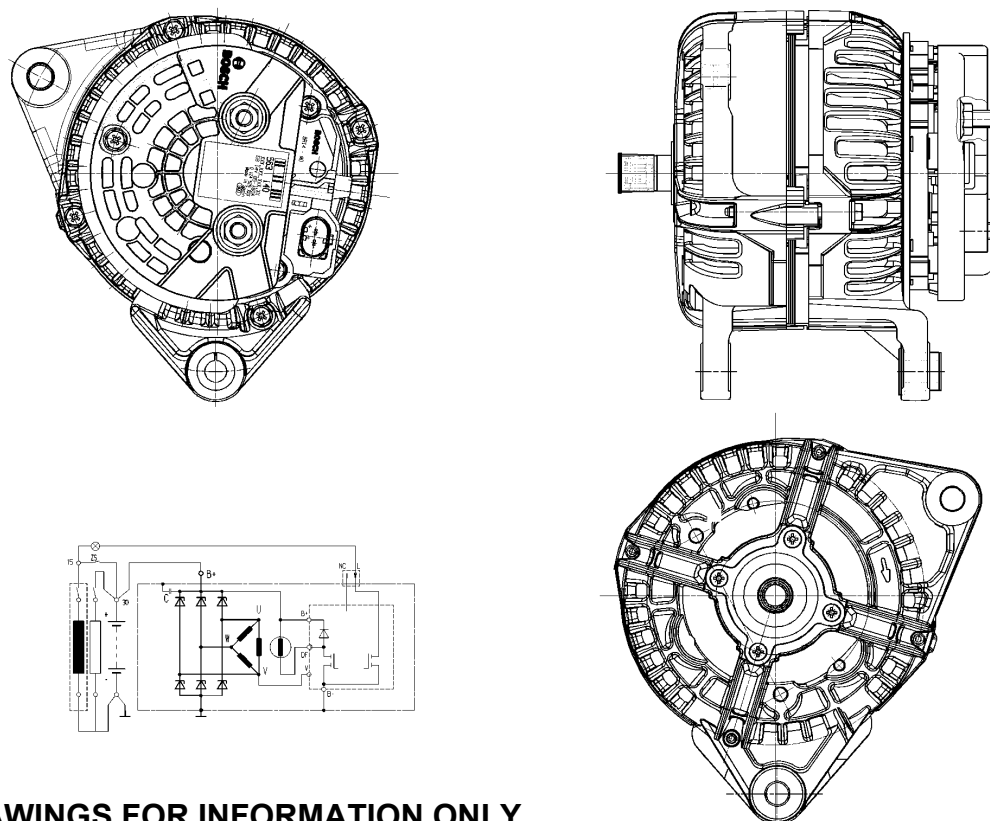
If it is necessary to make alterations to the system other than the ones described in this manual (for example, additional batteries in parallel), the works must be co-ordinated with FIAT GROUP AUTOMOBILES S.p.A..

Current take off

For information on current take off points, see the description on the following page.

Figure 3

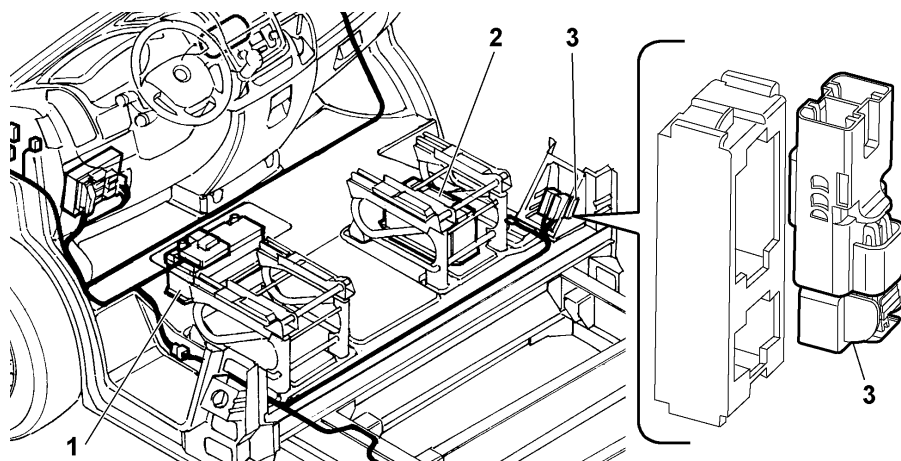
Bigger-sized alternator OPT 4WP 180A.



➤ **NOTE: DRAWINGS FOR INFORMATION ONLY**

3.3 Batteries

Figure 4



1. Main battery – 2. Auxiliary battery – 3. Two-way connector

The above drawing (detail 2) shows one possible location for the auxiliary battery.

If the main battery is removed/replaced, check correct function of the gas/liquid drain pipe.

► **Note:** For auxiliary battery installation:

- in the cargo bay;
- in passenger compartment

it is possible to use:

- A) recombination batteries (AGM or gel)
- B) traditional batteries.

In both cases, adequate separation must be provided between the battery and the passenger compartment, with a suitable container capable of ensuring seal in case of:

- vapour emissions (for example in case of alternator voltage regulator fault);
- battery explosion;
- electrolyte leakage, even in the event of roll (type B batteries only).

In addition, with type A batteries it is necessary:

- to provide a breather toward the compartment exterior.

When installing type **B** batteries, the batteries must have:

- a cover with a gas evacuation system, with a pipe for conveying acid spray externally;
- a flame arrestor system.

It is also necessary that the gas evacuation system is located as far as possible from any potential sources of spark, and from mechanical/electrical/electronic components, opting for a breather system that prevents vacuum formation in the battery.

There is a two-way connector (3) at the base of the passenger side door, for connecting the auxiliary battery (see Figure 10).

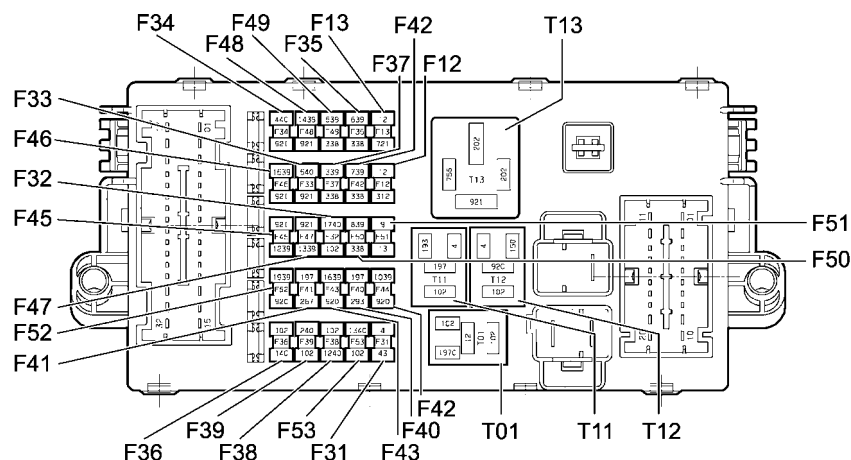


The auxiliary battery ground connection must be made with an adequately sized cable, as short as possible and using the points provided on the vehicle (see Figure 2).



3.4 Fuse and relay box under dashboard

Figure 5



	APPLICATION	A
	FUSES	
F12	RIGHT HEADLIGHT	7.5
F13	LEFT HEADLIGHT/HEADLIGHT ADJUSTER	7.5
F31	+ KEY FOR CVM, NBC RELAY COIL	7.5
F32	MINIBUS INTERIOR LIGHTS (EMERGENCY)	10
F33	REAR POWER SOCKET	15
F34	NOT CONNECTED	-
F35	CRUISE CONTROL, REVERSING LIGHT, DIESEL H2O SENSOR	7.5
F36	+30 DOOR LOCK/UNLOCK CONTROL UNIT	20
F37	CLA (N.C.), THIRD STOP, NQS	10
F38	+30 FOR NBC INTERNAL RELAY	10
F39	NRR, EOBD DIAGNOSTICS SOCKET, CSA, CAV, CCT, COMANDO A/C, WEBASTO TIMER	10
F40	LH HEATED REAR WINDOW, DRIVER'S SIDE MIRROR DEFROSTER	15
F41	RH HEATED REAR WINDOW, PASSENGER SIDE MIRROR DEFROSTER	15
F42	+KEY FOR NFR, NAS, NYL, CLA (N.C.)	7.5
F43	WINDSCREEN WIPER	30
F44	CIGAR LIGHTER, FRONT POWER SOCKET	20
F45	DDC, CDC	7.5
F46	NOT CONNECTED	-
F47	DRIVER SIDE WINDOW WINDER	20
F48	PASSENGER SIDE WINDOW WINDER	20
F49	+KEY FOR NSP, CSP, CSS, LSS, CAV, STEREO, NCV, ILLUM. SEAT HEATER CONTROLS, WINDOW WINDER, DRIVER'S SIDE, AUX CONTROL PAD, PARKING CAMERA	7.5
F50	+KEY NAB	7.5
F51	+KEY CSG, CCT, NBC	7.5
F52	+KEY CCO RELAY COIL	7.5
F53	NQS, REAR FOG	7.5
	RELAYS	
T01	HEADLIGHTS	30
T11	HEATED REAR WINDOW	30
T12	UTILITIES 1	30
T13	UTILITIES 2	50



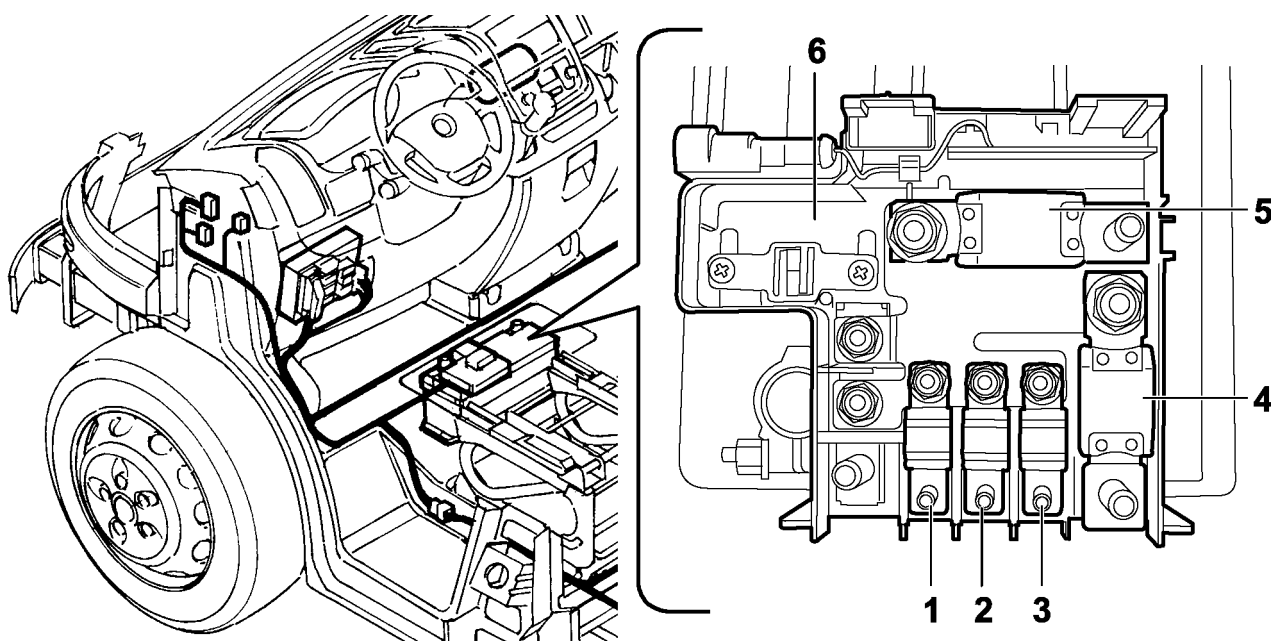
3.5 Fuse box on battery

The vehicle main battery has an interconnection unit which has a socket for an auxiliary battery.

The connection foreseen for coach-builders is the 50A fuse (3).

The cable involved is complete with two-way connector located in the compartment at the base of the passenger side pillar (see Figure 4).

Figure 6

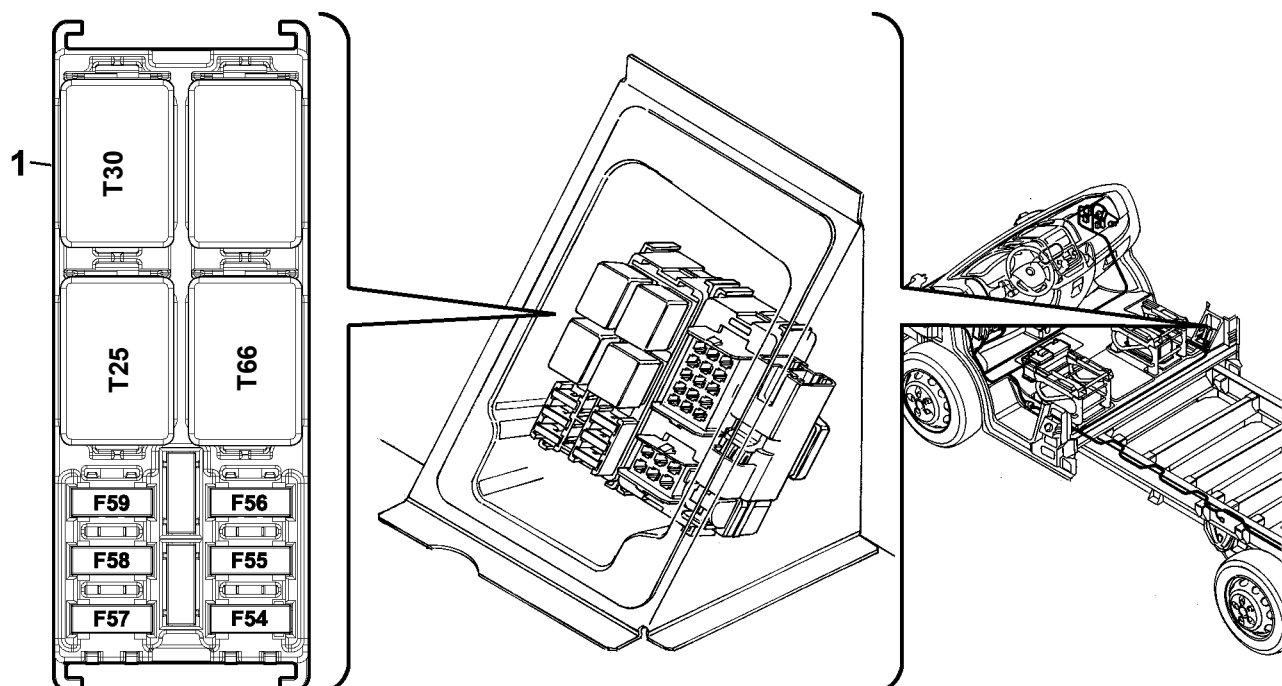


Connections key and description:

- 1) main battery under-dash fuse and relay box (70 A)
- 2) dashboard fuse and relay box auxiliary power (50 A)
- 3) auxiliary battery power (50A) via 2-way connector:
 - **NOTE: install a power relay between the two-way connector and the auxiliary battery positive, so that with the engine off the system added by the coachbuilder is separated from the main vehicle system**
- 4) engine bay fuse and relay box power (150 A);
- 5) starter motor and alternator power;
- 6) interconnective control unit on battery.

3.6 Right pillar fuse and relay box

Figure 7



Code	Application	In [A]
FUSES		
F54	NOT PRESENT	15
F55	SEAT HEATER	15
F56	MINIBUS REAR 12V SOCKET	15
F57	AUXILIARY HEATER UNDER SEAT	10
F58	NOT PRESENT	-
F59	+30 NMA	20
RELAYS		
T25	MINIBUS INTERIOR LIGHTS	30
T30	NOT PRESENT	-
T31	AUXILIARY HEATER UNDER SEAT	30
T66	+KEY FOR HEATED SEATS	30

3.7 Ground points

If ground points A, B or C are used, the fastening nut must be tightened to torque of 8 Nm $\pm$ 10%.



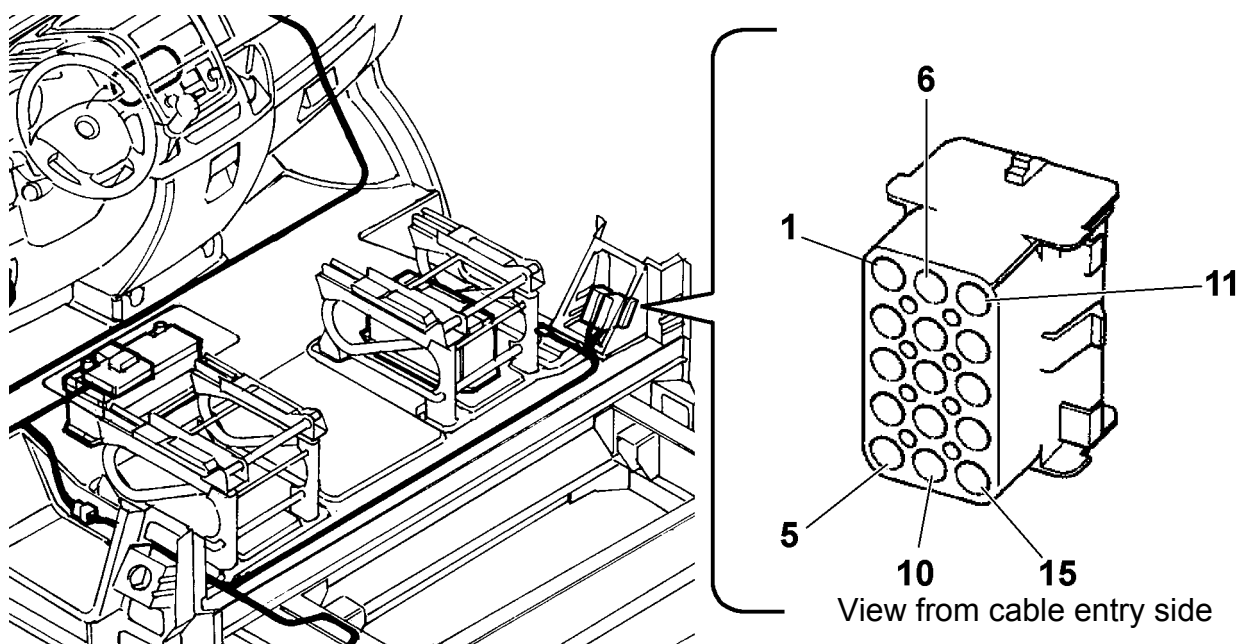
3.12

4 CONNECTORS PROVIDED

4.1 Connector C036 L1A (15-way) – Coach-builder's socket

4.1.1 3D view of connector

Figure 8





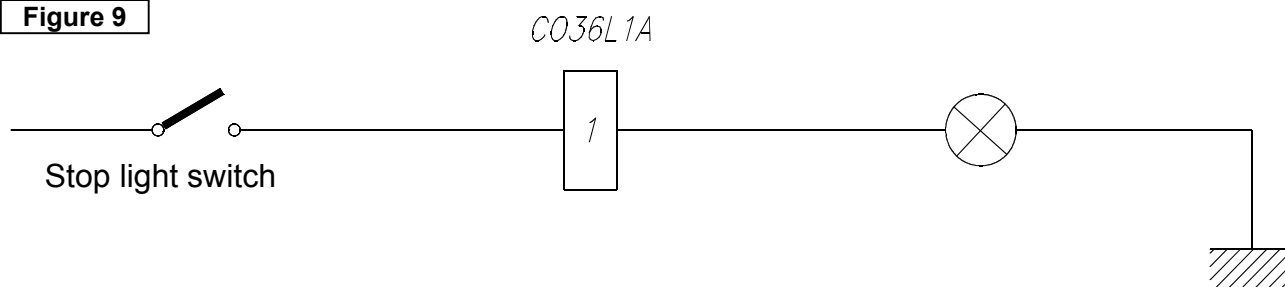
4.1.2 Description of connector functions

Pin	Function/Connector part number	Minimum cable section [mm ²]	cable colour	Notes
	15-way Tyco connector p/n 0-926647-1 Counterpart: Tyco p/n 1-480710-0 (by coach builder)			Reference to diagram C036-L1A
1	Third stop light	0.5	B	P _{MAX} = 21W at 12V (in alternative to the one on Y203L4A)
2	D+ (active at ground)	0.5	MB	I _{MAX} = 300mA (1 Fiat Group Automobiles S.p.A. standard relay coil)
3	Vehicle speed repeater (VSO)	0.5	GR	I _{MAX} = 5mA (see Figure 11)
4	Door lock control	1.5	RN	I _{MAX} = 12A (for actuation times see Table 1)
5	Door unlock control	1.5	NR	I _{MAX} = 12A (for actuation times see Table 1)
6	Side and rear door status signal	0.5	NZ	Use an N.O. to ground switch (minimum clean contact current 10 mA)
7	Driver 20W SBMT timed ceiling light power supply	0.5	RV	Power supply (+) for timed ceiling light, 15' with key-off (P _{MAX} = 20W at 12V)
8	Ceiling light negative control (dimmer)	0.5	BV	Ceiling light control (-) P _{MAX} = 20W at 12V
9	B-CAN Low	0.35	BS	Fitting for Fiat Group Automobiles S.p.A. accessory line anti-theft ⁽¹⁾
10	B-CAN High	0.35	NS	Fitting for Fiat Group Automobiles S.p.A. accessory line anti-theft ⁽¹⁾
11	Side markers negative control relay	0.5	Z	I _{MAX} = 300 mA (1 Fiat Group Automobiles S.p.A. standard relay coil)
12	A/C request	0.5	GV	Air conditioner on positive signal I _{MAX} = 300 mA (1 Fiat Group Automobiles S.p.A. standard relay coil)
13	Key-on power (+KEY)	0.5	L	I _{MAX} =600 mA (2 Fiat Group Automobiles S.p.A. standard relay coils)
14	Auxiliary heater positive control	0.5	H	I _{MAX} = 600 mA (2 Fiat Group Automobiles S.p.A. standard relay coils)
15	Not connected	-	-	-

⁽¹⁾ not for use with other applications

4.1.3 Third stop light (3rd stop)

Figure 9



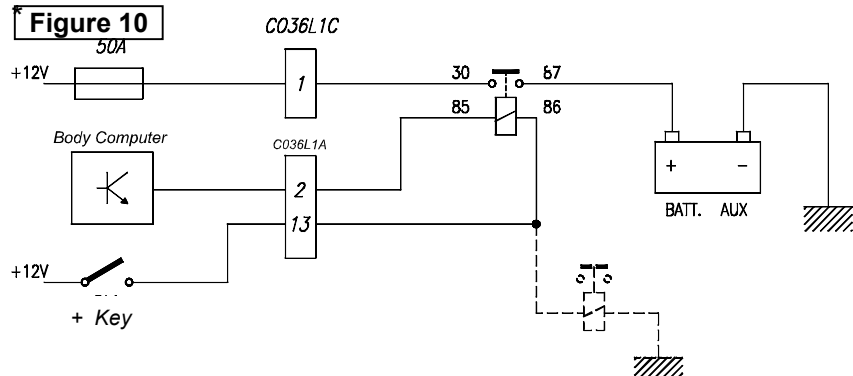
 Ground point nearest to component: choice between A, B, C or pin 2 connector C036L1C

Alternatively the third stop light can be connected to connector Y203L4A - pin 8.

➤ **ATTENTION:** it is forbidden to connect either pin 1 of connector C036L1A, or pin 8 of connector Y203L4A.

4.1.4 Charging in progress signal (D+)

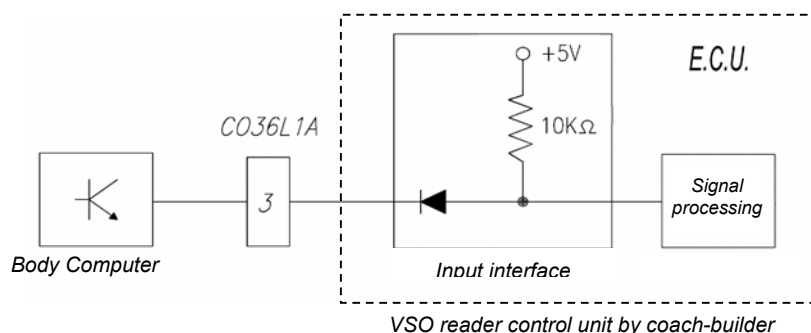
Figure 10



 Ground point nearest to component: choice between A, B, C or pin 2 of connector C036L1C

4.1.5 Vehicle speed signal (VSO)

Figure 11



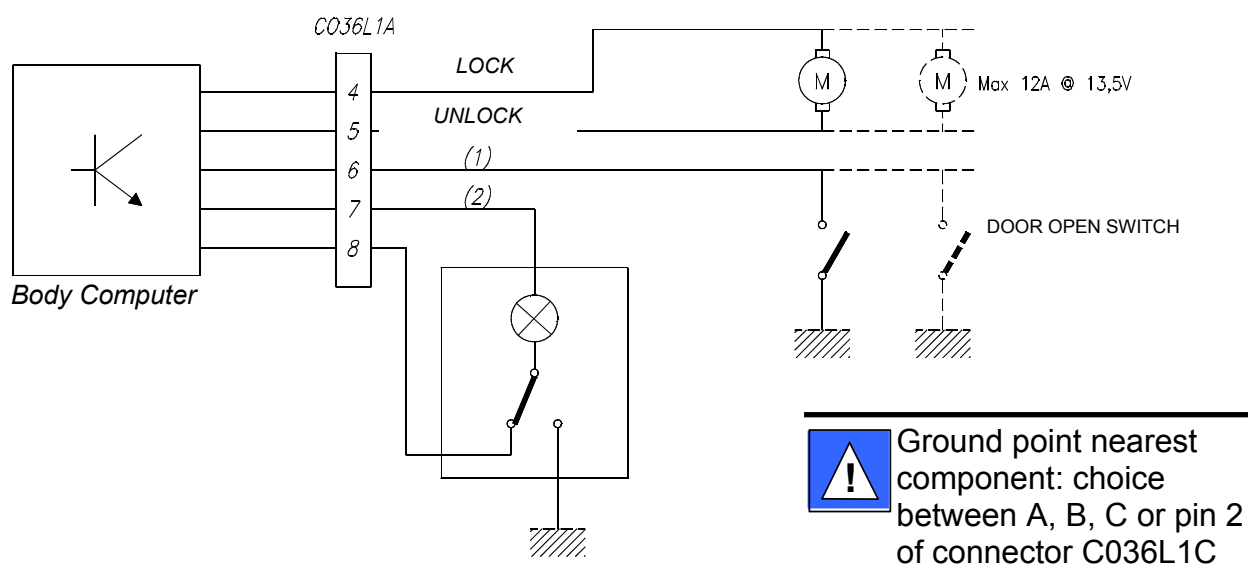
The VSO signal is defined as 275.714 mm/pulse, thus for the receiver, speed is equal to:
 $V_{\text{vehicle}} [\text{mm/s}] = \text{Frequency VSO} [\text{Hz}] * 275.714 [\text{mm/pulse}]$

When vehicle velocity is 0 kph the VSO signal has high digital level and 0 pulse/s, instead, when vehicle velocity is not valid the VSO signal has low digital level.



4.1.6 Rear locks and ceiling light control

Figure 12



- **Note (1):** In the absence of door open switch (if original Fiat Group Automobiles S.p.A. locks are not used, see chapter 6) pin 6 of connector C036L1A can be left disconnected.
Attention: in this case the rear lock/s may be locked even with the door/s open. The instrument panel will not indicate door status and the rear ceiling light/s will not be commanded.
It is therefore the responsibility of the coach builder to illustrate the difference in function to that described in the use and Maintenance Handbook.
- **Note (2):** pin 7 of connector C036L1A provides +12V for 15 minutes after the key is removed (+KEY = off), after which time the rear ceiling light will not be usable until the next rear door open switch status change (where present), otherwise until the door is unlocked or the key turned (+KEY = on).
- **Function with 2 key remote control:** releases the two driver cab locks and turns on the in-cab light fixture.
 - **Function with 3 key remote control:** separate front/rear unlock and separate switch on of corresponding interior lights.



3.16

Table 1

Action	FrontLock	RearLock	UnlockCom	Act. Time	Front State	Rear State
Lock Rear						
Initial State	-	-	-	-	Any	Any
Lock Rear	-	+	-	400 + t ₁ ms		
Final State	-	-	-	-	No Change	Locked
Lock Front						
Initial State	-	-	-	-	Any	Any
Lock Rear	+	-	-	400 + t ₁ ms		
Final State	-	-	-	-	No Change	Locked
Lock Front/Rear						
Initial State	-	-	-	-	Any	Any
Lock Rear	+	+	-	400 + t ₁ ms		
Final State	-	-	-	-	Locked	Locked
Lock Front/Rear						
Initial State	-	-	-	-	Any	Any
Lock Rear	+	+	-	400 + t ₁ ms		
Final State	-	-	-	-	Locked	Locked
Unlock Rear (Front locked)						
Initial State	-	-	-	-	Locked	Any
Confirm Lock Front/Rear	+	+	-	20 + t ₂ ms		
Unlock Rear	+	-	+	400 + t ₁ ms		
Confirm Unlock Front	+	-	-	20 + t ₂ ms		
Final State	-	-	-		Locked	Unlocked
Unlock Rear (Front unlocked)						
Initial State	-	-	-	-	Unlocked	Any
Confirm Lock Front/Rear	-	+	-	20 + t ₂ ms		
Unlock Rear	+	-	+	400 + t ₁ ms		
Confirm Unlock Front	-	-	+	20 + t ₂ ms		
Final State	-	-	-		Unlocked	Unlocked
Unlock Front (Rear locked)						
Initial State	-	-	-		Any	Locked
Confirm Lock Front/Rear	+	+	-	20 + t ₂ ms		
Unlock Front	-	+	+	400 + t ₁ ms		
Confirm Lock Rear	-	+	-	20 + t ₂ ms		
Final State	-	-	-		Unlocked	Locked
Unlock Front (Rear unlocked)						
Initial State	-	-	-		Any	Unlocked
Confirm Lock Front	+	-	-	20 + t ₂ ms		
Unlock Rear	-	+	+	400 + t ₁ ms		
Confirm Unlock Front	-	-	+	20 + t ₂ ms		
Final State	-	-	-		Unlocked	Unlocked
Unlock Front/Rear						
Initial State	-	-	-		Any	Any
Confirm Lock Front/Rear	+	+	-	20 + t ₂ ms		
Unlock Front/Rear	-	-	+	400 + t ₁ ms		
Final State	-	-	-		Unlocked	Unlocked

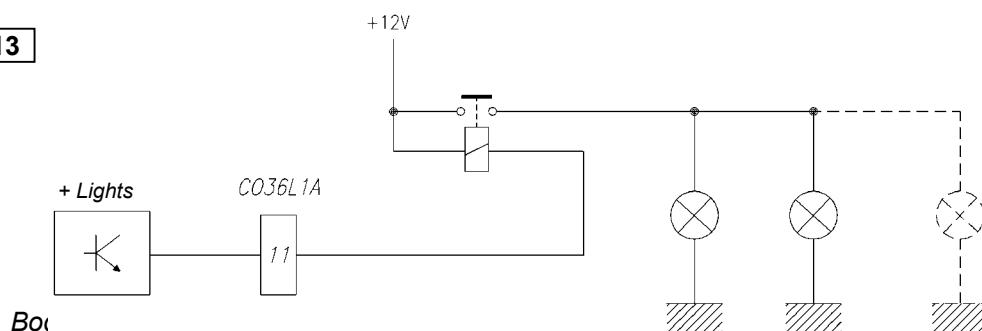
TOLERANCES

0<t₁<10%0<t₂<10ms



4.1.7 Side marker lights

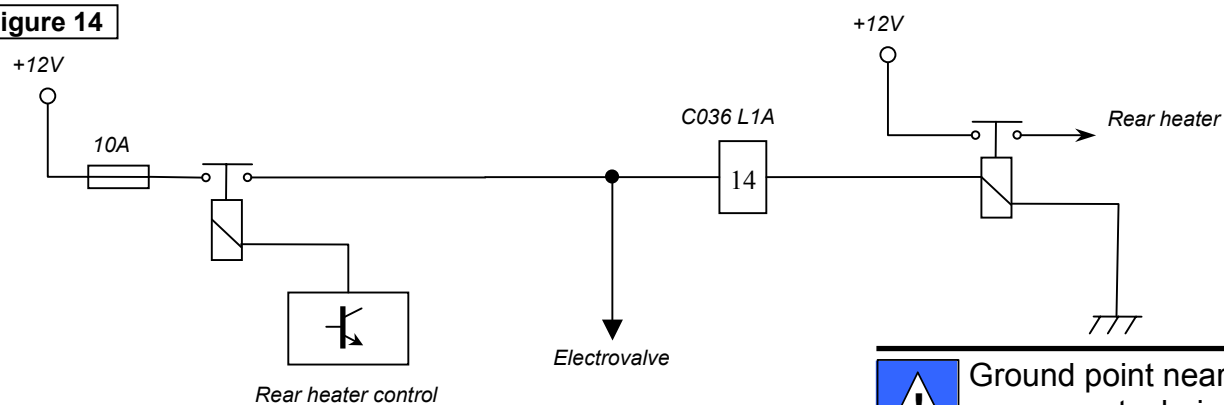
Figure 13



Ground point nearest to component: choice between A, B, C or pin 2 of connector C036L1C

4.1.8 Rear heater enable control

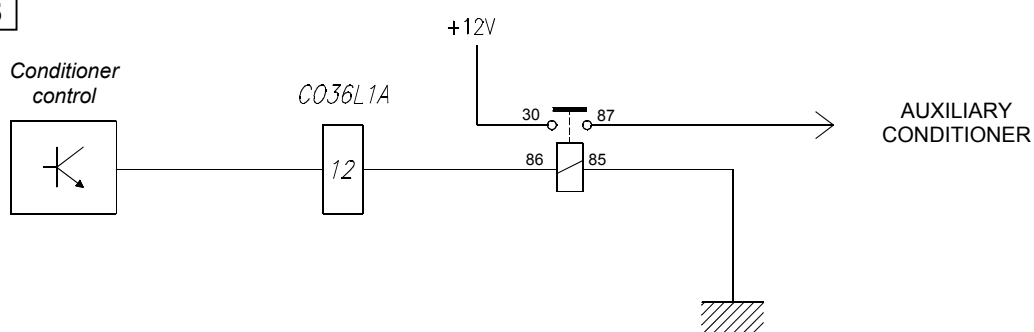
Figure 14



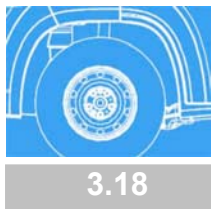
Ground point nearest to component: choice between: A, B, C or pin 2 connector C036L1C

4.1.9 Conditioner on signal

Figure 15



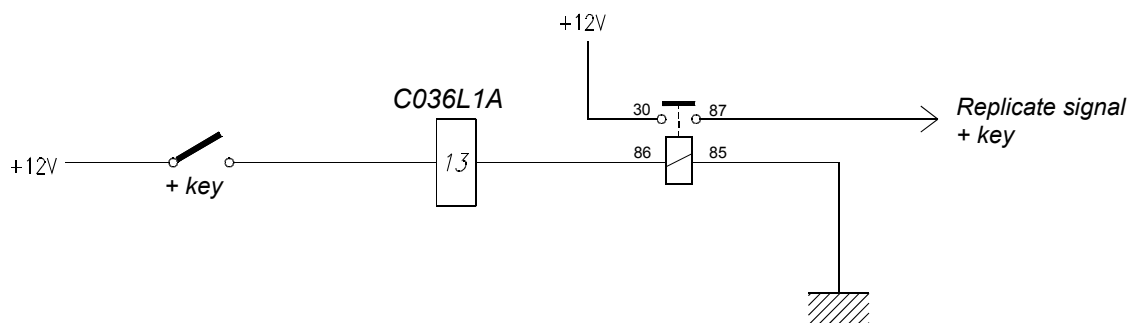
Ground point nearest to component: choice between A, B, C or pin 2 of connector C036L1C



4.1.10 Key ON signal (+KEY)

If it is necessary to replicate the +KEY signal, for example for piloting loads with total current > 600 mA, the following circuit is possible

Figure 16

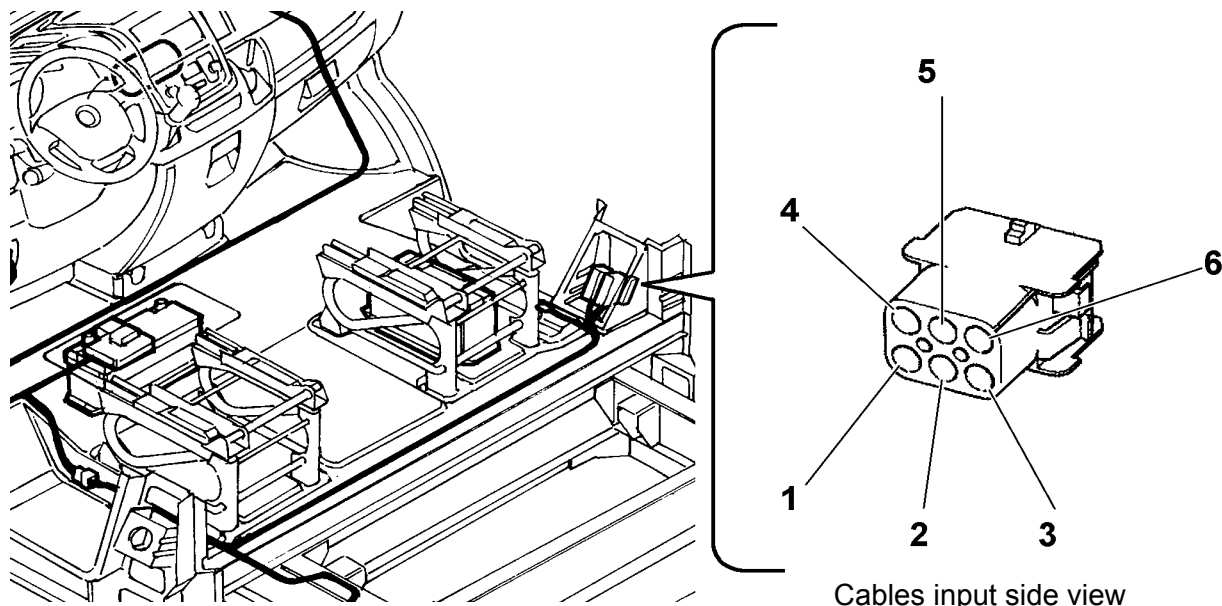


Ground point nearest to component: choice between A, B, C or pin 2 of connector C036L1C

4.2 Connector C036L1B (6-way) – Coach-builder's socket

4.2.1 3D view of connector

Figure 17



4.2.2 Description of connector functions

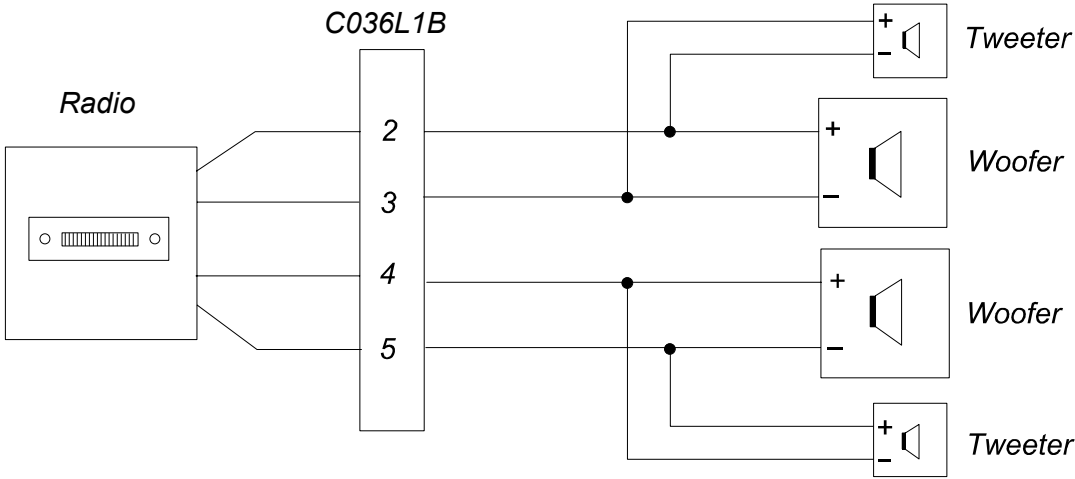
Pin	Function/Connector part number	Minimum cable section [mm ²]	cable colour	Notes
	Connector 6-way Tyco p/n 1-480705-0 Counterpart: Tyco p/n 1-480704-0 (by coachbuilder)			Reference to diagram C036-L1B
1	Permanent 12V power supply (+30) for radio	1.5	RG	Permanent supply from auxiliary battery to radio cable present only from C036-L1A to Y028L1A ⁽¹⁾
2	Rear RH loudspeaker +	1	AR	⁽²⁾
3	Rear RH loudspeaker -	1	AN	⁽²⁾
4	Rear LH loudspeaker +	1	BR	⁽²⁾
5	Rear LH loudspeaker -	1	BV	⁽²⁾
6	Not connected	-		

➤ ⁽¹⁾ **NOTE:** the connection from connector Y028L1A to radio is made by the coach-builder, who must suitably isolate the radio power supply present in the vehicle main system (see description in paragraph 4.2.4 – Figure 19)

⁽²⁾ Fiat Group Automobiles S.p.A. radio power output: 13.4W at 14V
 Fiat Group Automobiles S.p.A. radio drivers: 4 ohm equivalent for each channel
 Fiat Group Automobiles S.p.A. Tweeters: 15W RMS max
 Fiat Group Automobiles S.p.A. Mid-range and Full-range: 20W RMS max

4.2.3 Rear loudspeaker connection

Figure 18

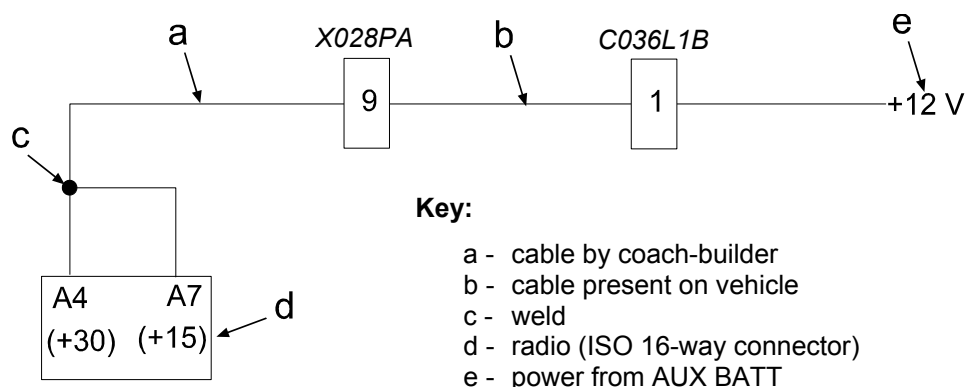




4.2.4 Radio permanent power supply

If the radio requires a permanent power supply even with the key off ⁽¹⁾ (+KEY= off) the following circuit is possible.

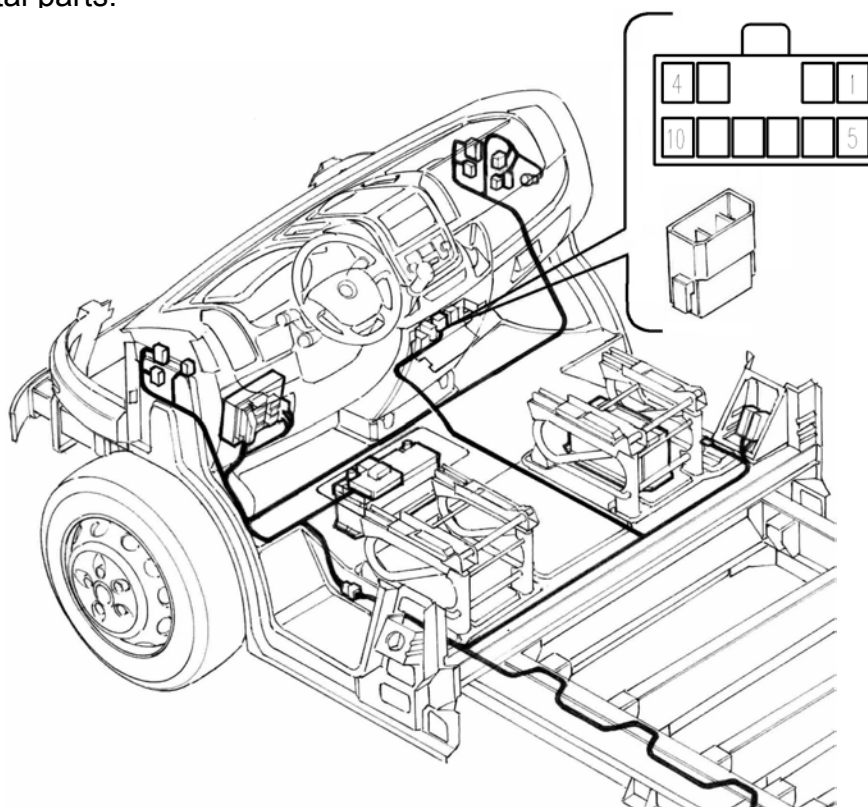
Figure 19



Terminal for hole 9 of connector X028PA: Tyco p/n 282375-1 (cable 1.5 mm²)

After removing the terminals of the original wires from position A4 and A7 on the radio 16-way ISO connector, apply an adequate amount of insulating tape to prevent accidental reciprocal contact or with metal parts.

Figure 20



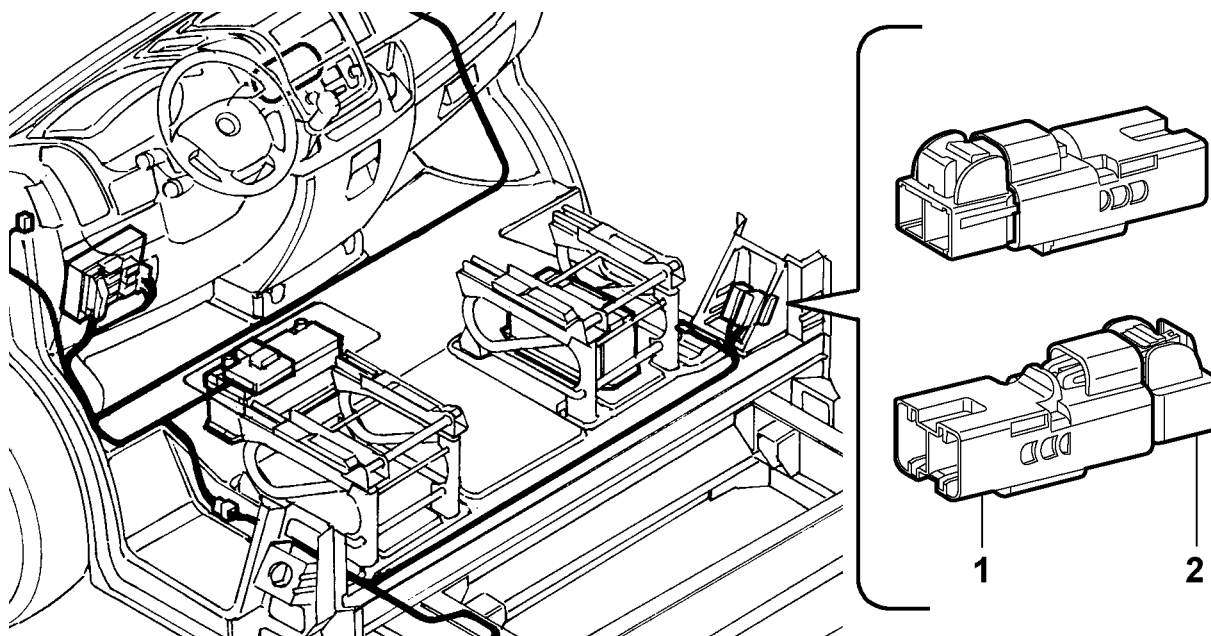
⁽¹⁾ Operation only allowed with radio installed aftermarket (for example Fiat Group Automobiles S.p.A. accessory line).

➤ **ATTENTION:** this modification is not allowed with a Fiat Group Automobiles S.p.A. standard radio.

4.3 Connector C036L1C (2-way) – Coach-builder's socket

4.3.1 3D view of connector

Figure 21



1. Connector C036 L1C, 2-way – 2. Connector provided by Fiat Group Automobiles S.p.A. for wiring by coach-builder.

4.3.2 Description of connector functions

Pin	Function/Connector Part number	Minimum cable section [mm ²]	cable colour	Notes
	Connector, 2-way MTA p/n 45.40300 Counterpart: MTA p/n 45.40400			Reference to diagram C036-L1C
1	+30 power supply	10	R	Fuse nominal current 50A
2	Power ground	10	N	Max. constant current 53A

4.3.3 +12V power supply from main battery

See paragraph 4.1.4

4.3.4 Power ground (pin 2)

Used in alternative to ground points A, B and C on chassis (see Figure 2)



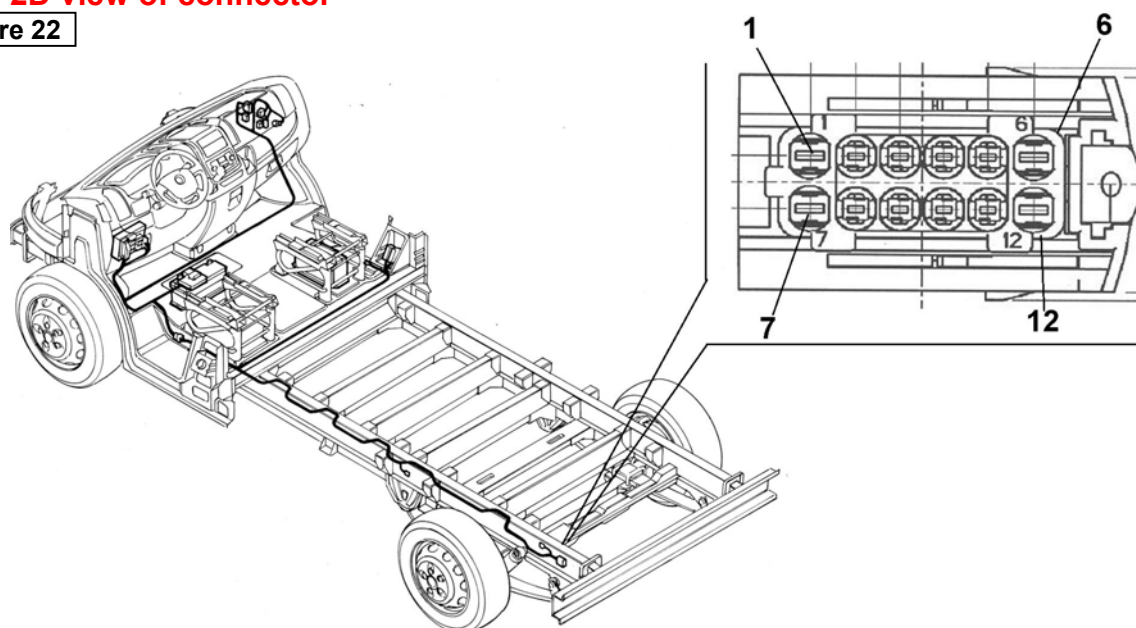
Protect added cables in specific sheathing or corrugated conduits.
Minimum cable section must always be as specified in the description tables.



4.4 Connector Y203L4A (12-way) – Rear lights

4.4.1 2D view of connector

Figure 22



PIN	X2/50 Function / Connector Part number	Minimum cable section [mm ²]	Cable colour	Notes
	Connector 12-way Tyco p/n 284844-1 Counterpart: p/n 284848-3 (by coach-builder)			
1	Rear lights ground	2.5	N	
2	LH rear marker light	0.5	GV	2 5W - 12V bulbs
3	RH rear marker light	0.5	G	2 5W - 12V bulbs
4	LH rear direction indicator	0.5	SN	1 21W - 12V bulb
5	RH rear direction indicator	0.5	S	1 21W - 12V bulb
6	LH stop light	0.5	VN	1 21W - 12V bulb
7	RH stop light	0.5	V	1 21W - 12V bulb
8	Third stop light	0.5	L	P _{MAX} = 21W at 12V alternative to the one on C036L1A
9	LH rear fog warning ⁽¹⁾	0.5	MN	1 21W - 12V bulb
10	RH rear fog warning ⁽¹⁾	0.5	M	1 21W - 12V bulb
11	License plate lights	0.5	GN	P _{MAX} = 10W at 12V
12	Reversing lights	1.5	BR	P _{MAX} = 42W at 12V

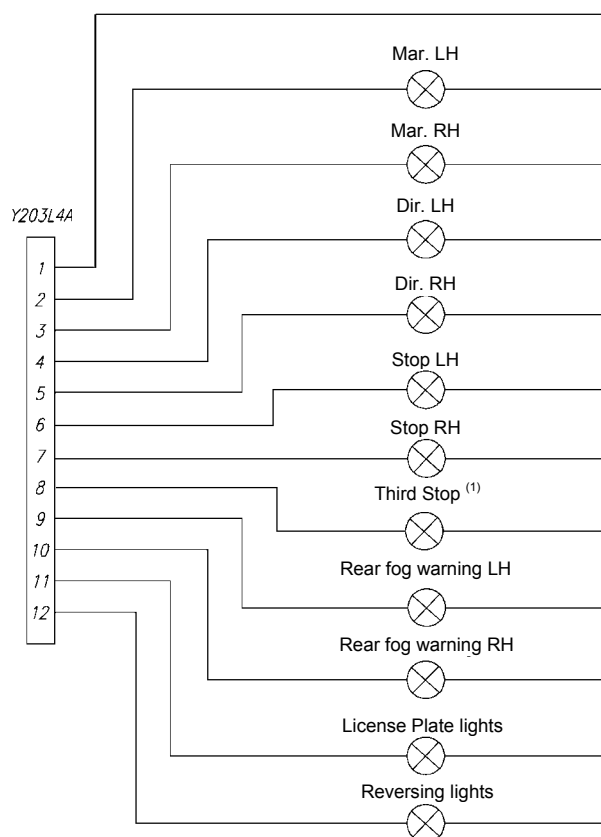
4.4.2 Description of connector functions

⁽¹⁾ It is also possible to install a single 21W – 12V rear fog warning light (for example GSX, left fog light only).

➤ **NOTE:** In the case of modifications to the system that are not described here (for example, installing LED lights), works should be co-ordinated with Fiat Group Automobiles S.p.A..

4.4.3 Rear lights

Figure 23



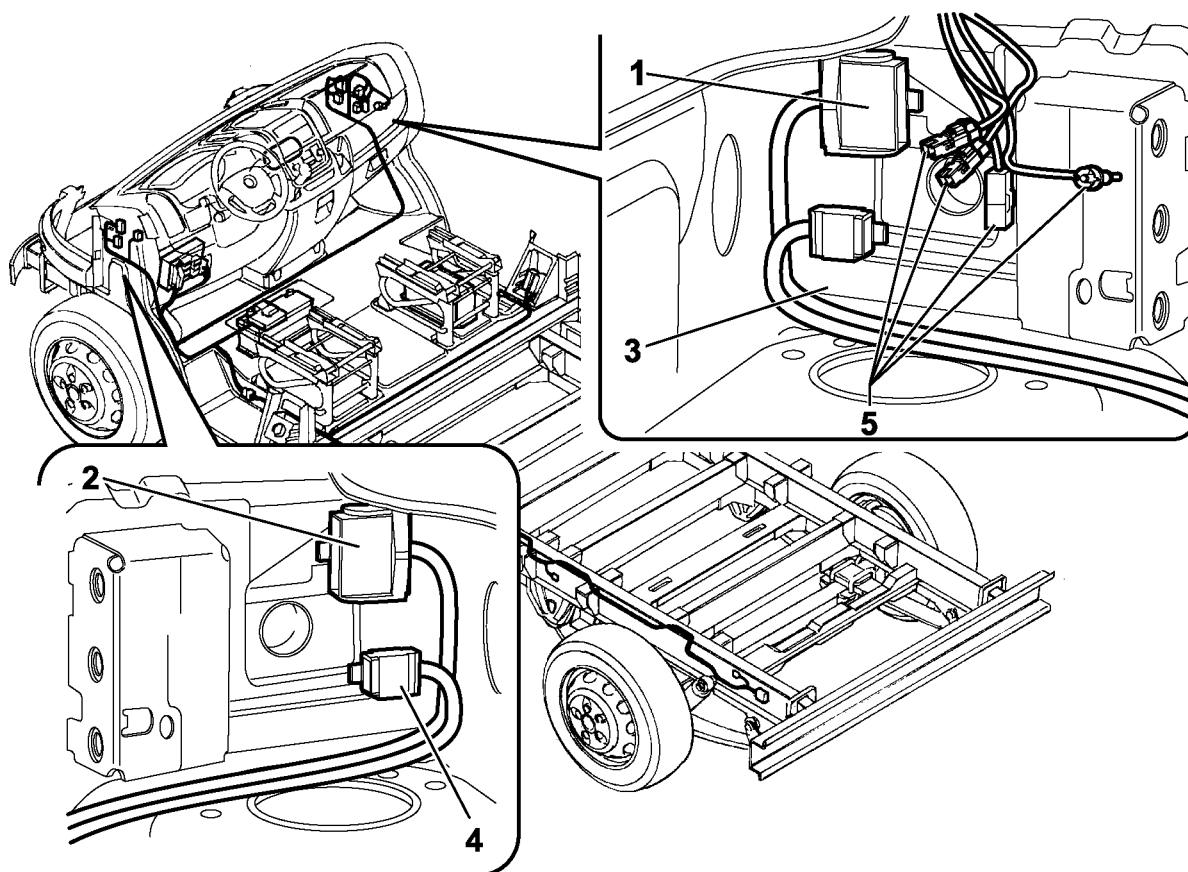
⁽¹⁾ Alternatively, the third stop can be connected to pin 8 of connector Y203L4A - pin 8.

➤ **ATTENTION:** it is forbidden to connect either pin 1 of connector C036L1A, or pin 8 of connector Y203L4A.



5 FRONT DOOR AND AERIAL CONNECTORS

Figure 24



- 1 and 2 – front door connectors (Y001LA and Y002LA)
3 and 4 – front door opt. connectors (Y121L1A and Y116L1A)
5 – AM/FM, GPS and GSM aerial connectors

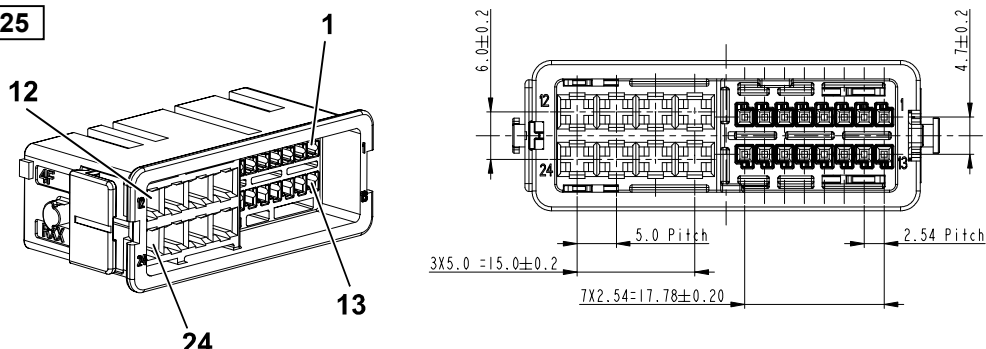


3.26

5.1 Connector Y001LA (24-way) – Driver's side door

5.1.1 3D view of connector

Figure 25



5.1.2 Description of connector functions

PIN	Function/Connector part number	Minimum cable section [mm ²]	Cable colour	Notes
	24-way FCI connector p/n 17212401 Counterpart: FCI p/n 17212400 (by coach-builder)			
1	LED cargo bay door status	0.35	BH	
2	Direction indicators	0.5	AB	1 16W - 12V bulb
3	Door open signal	0.35	BS	N.O. state door closed ⁽¹⁾
4	External mirror defroster power supply	0.5	CL	P _{MAX} = 30W at 13.5V
5	+15 power supply for window winder motor	0.35	HV	Signal power I _{MAX} = 0.5A
6	DDC illumination/power supply	0.35	BL	Driver's door control pad
7	Not connected	-	-	
8	Lock/unlock signal from knob	0.5	LN	
9	Window winder power	2.5	SB	Power supply I _{MAX} = 10A
10	Ground (direction indicator, lock, mirror defroster)	1	N	
11	Window winder ground	2.5	N	
12	Cargo bay lock/unlock signal	0,35	SZ	From driver's door control pad
13	P.S. window up signal from DDC	0,35	HV	From driver's door control pad
14	P.S. window down signal from DDC	0,35	HR	From driver's door control pad
15	P.S. main ext. mirror up/down	0,35	MN	From driver's door control pad
16	P.S. main ext. mirror left/right	0,35	BR	From driver's door control pad
17	P.S. secondary ext. mirror up/down	0,35	BZ	From driver's door control pad
18	P.S. secondary ext. mirror left/right	0,35	BV	From driver's door control pad
19	P.S. ext. mirror common servos	0,35	HN	From driver's door control pad
20	DDC signal ground	0,35	NZ	Driver's door control pad
21	Loudspeaker (+)	0,75	AN	
22	Loudspeaker (-)	0,75	A	
23	Door lock control	1,5	S	
24	Door unlock control	1,5	NG	

➤ **Note:** This connector is supplied as fitting if the original New Ducato doors are not used.

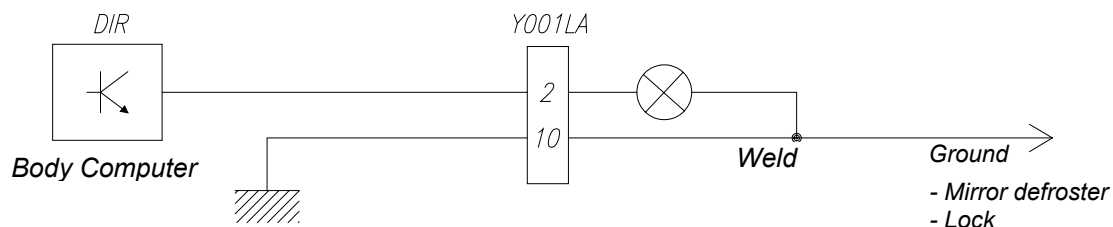
⁽¹⁾ for the versions with robotised gearbox (option 407), the pin must be connected according to the scheme in figure 27.





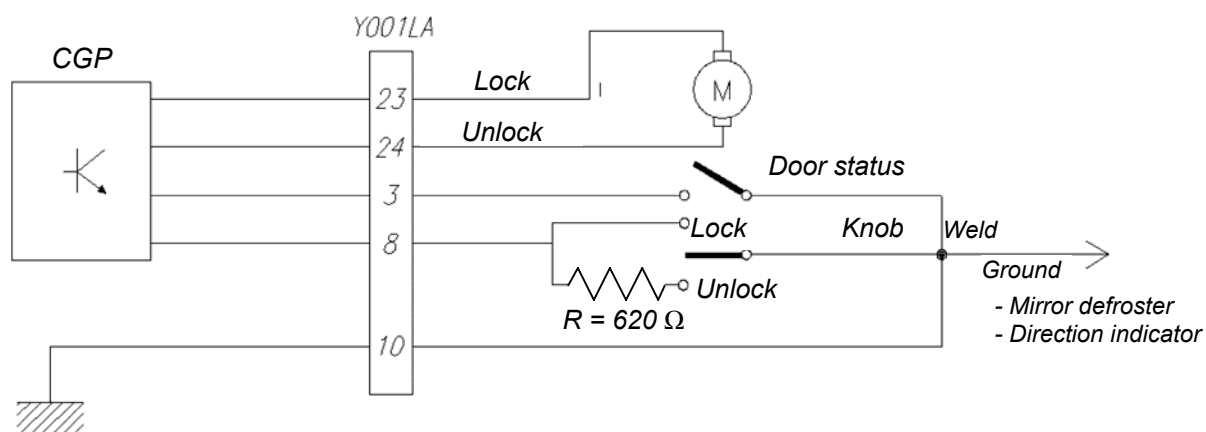
5.1.3 Side direction indicator lights

Figure 26



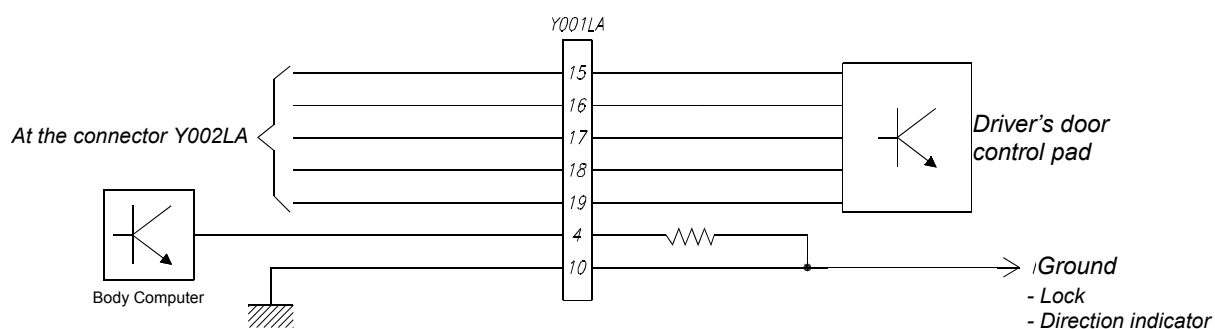
5.1.4 Driver's side lock control

Figure 27



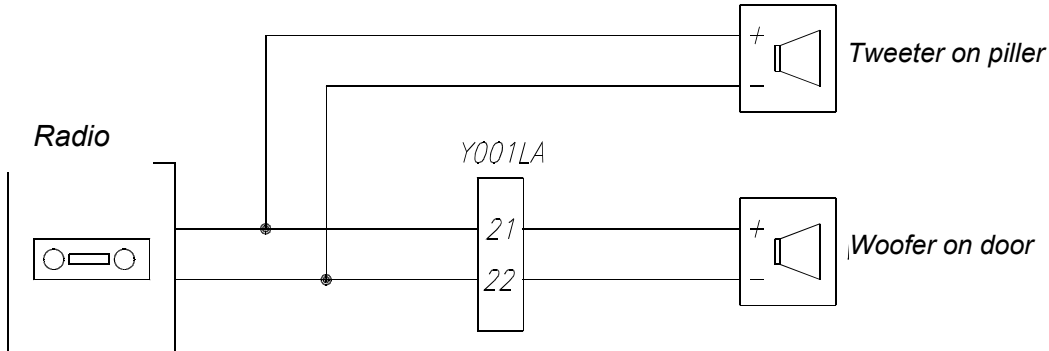
5.1.5 External electric mirror

Figure 28



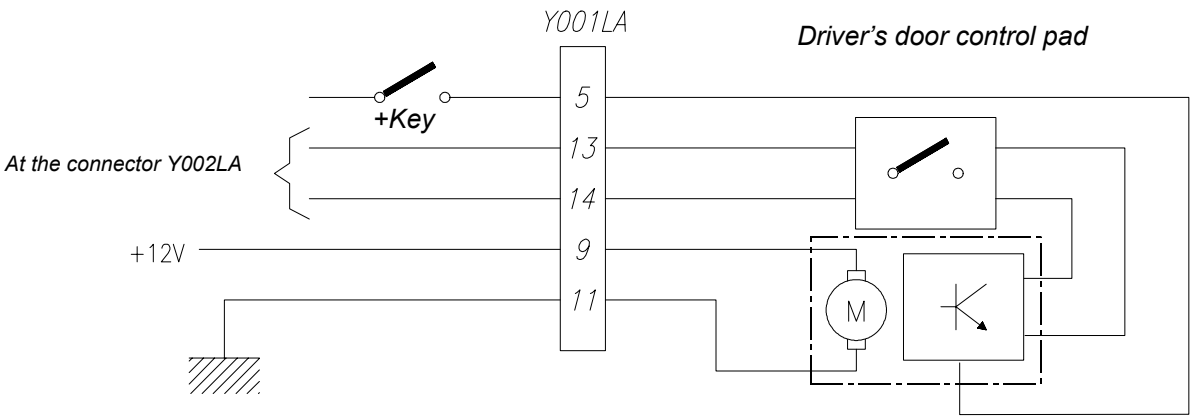
5.1.6 Driver's side loudspeaker

Figure 29



5.1.7 Electric window winder

Figure 30

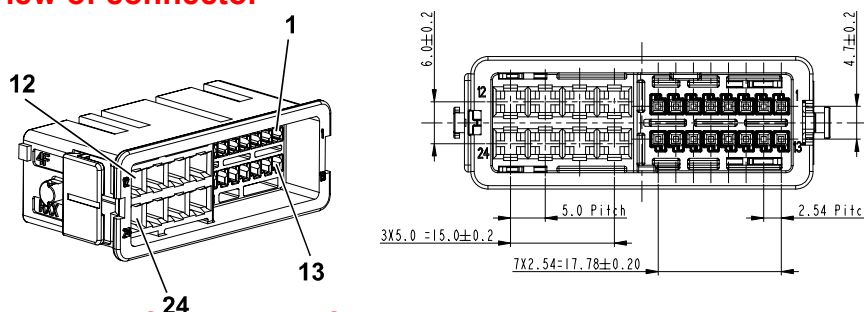




5.2 Connector Y002LA (24-way) – Passenger side door

5.2.1 3D view of connector

Figure 31



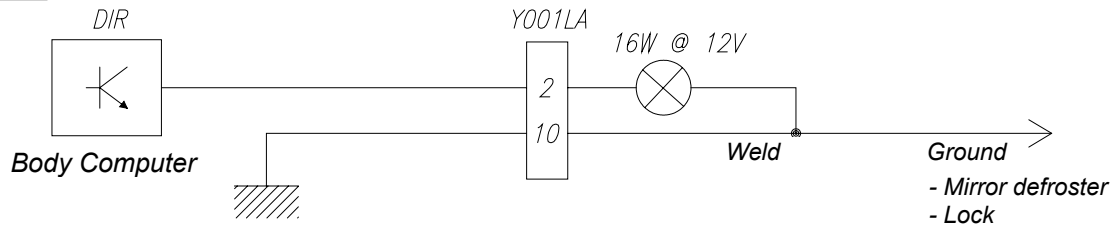
5.2.2 Description of connector functions

PIN	Function/Connector part number	Minimum cable section [mm ²]	Cable colour	Notes
	24-way FCI connector p/n 17212401 Counterpart: FCI p/n 17212400 (by coach-builder)			
1	Not connected	-	-	
2	Direction indicators	0.5	AV	1 16W - 12V bulb
3	Door open signal	0.35	BN	N.O. status door closed ⁽¹⁾
4	External mirror defroster	0.5	CL	P _{MAX} = 30W at 13.5V
5	Not connected	-	-	
6	CDC illumination/power (utilities relay T13)	0.35	BL	Passenger side door control pad
7	Not connected	-	-	
8	Not connected	-	-	
9	Window winder power supply	2.5	S	Power supply I _{MAX} = 10A
10	Ground (direction indicators, lock, mirror defroster)	1	N	
11	Window winder ground	2.5	N	
12	Not connected	-	-	From driver's side door control pad
13	Window up signal from DDC	0.35	HV	From driver's side door control pad
14	Window down signal from DDC	0.35	HR	From driver's side door control pad
15	Main ext. mirror up/down	0.35	MN	From driver's side door control pad
16	Main ext. mirror left/right	0.35	BR	From driver's side door control pad
17	Secondary ext. mirror up/down	0.35	BZ	From driver's side door control pad
18	Secondary ext. mirror left/right	0.35	BV	From driver's side door control pad
19	External mirror common servo	0.35	HN	From driver's side door control pad
20	CDC signal ground	0.35	NZ	Passenger side door control pad
21	Loudspeaker (+)	1.5	CB	
22	Loudspeaker (-)	1.5	C	
23	Lock/lock control	1.5	SG	
24	Lock/unlock control	1.5	NZ	

➤ **Note:** This connector is supplied as pre-fitting if the original New Ducato doors are not present.
⁽¹⁾ if door not present leave unconnected

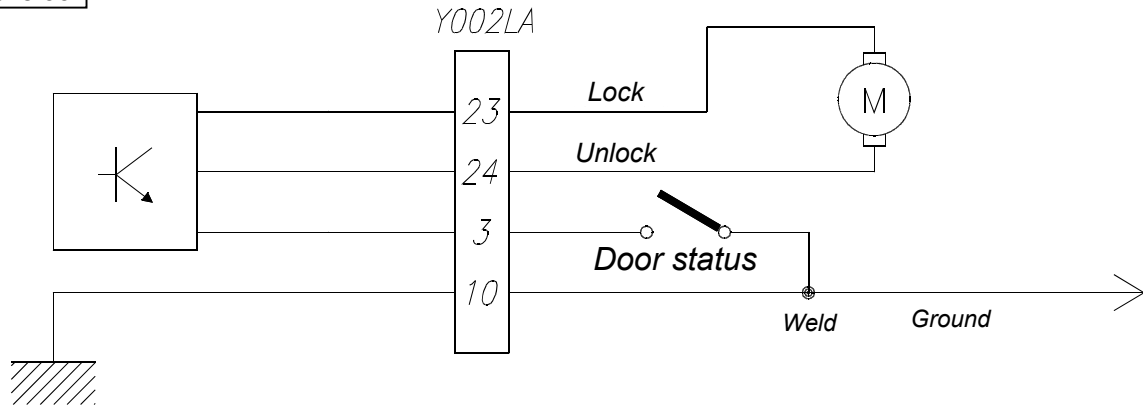
5.2.3 Side direction indicator light

Figure 32



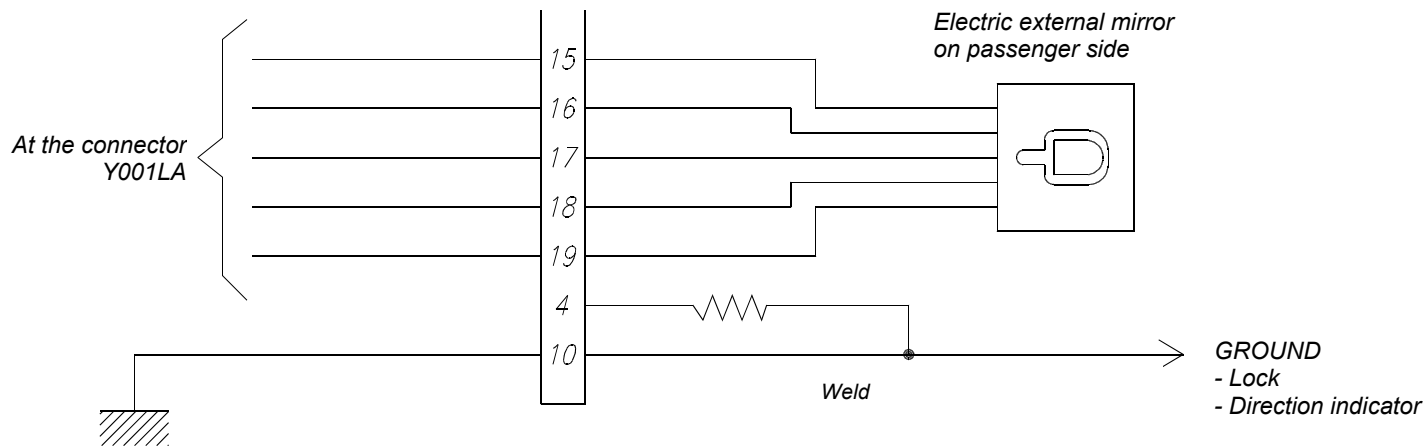
5.2.4 Passenger side door control

Figure 33



5.2.5 Electric external mirror

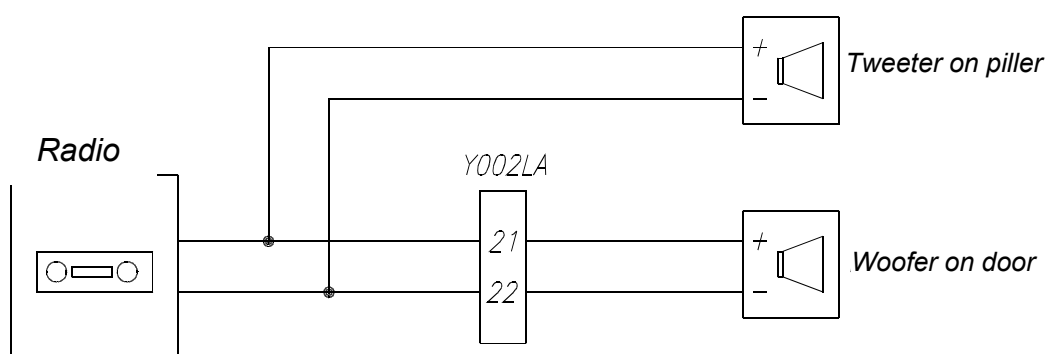
Figure 34





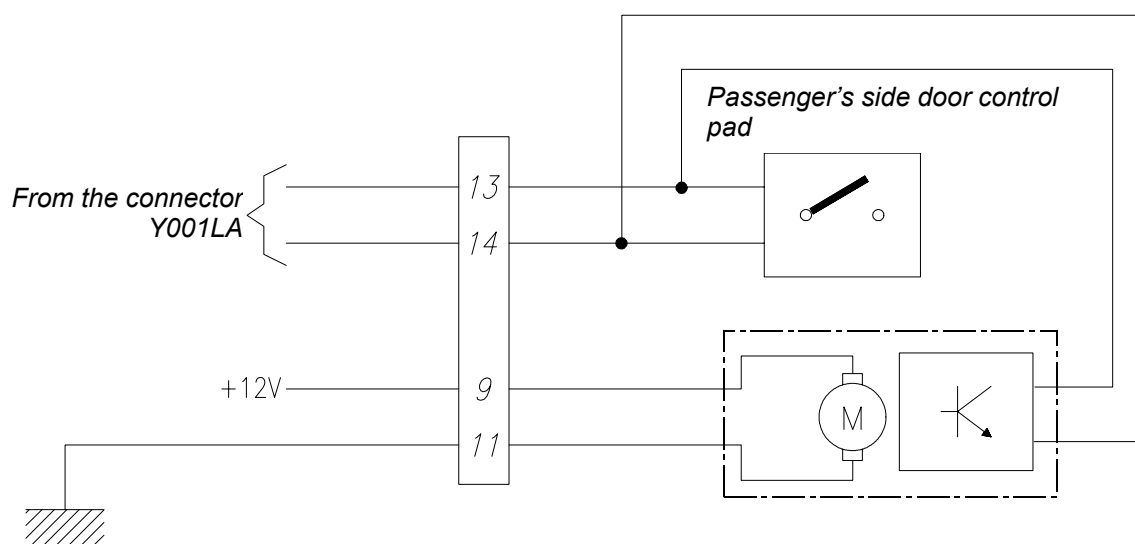
5.2.6 Passenger side loudspeaker

Figure 35



5.2.7 Electric window winder

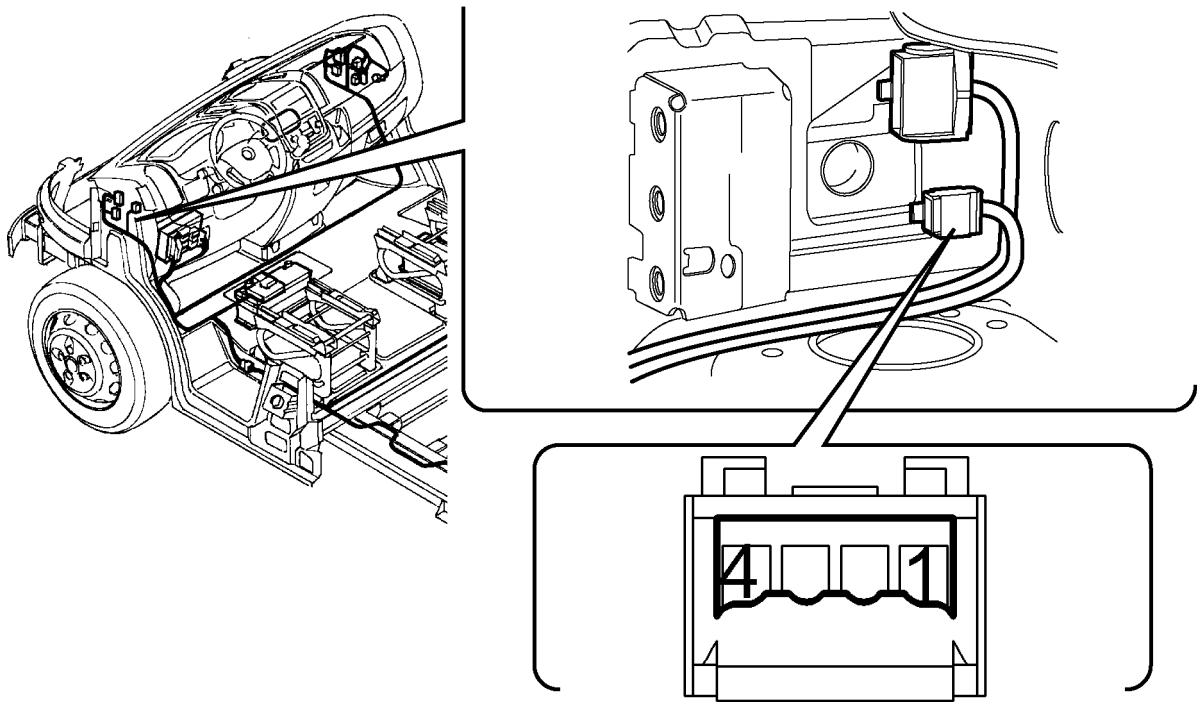
Figure 36



5.3 Connector Y121LA (4-way) – Driver’s side door (opt)

5.3.1 2D view of connector

Figure 37

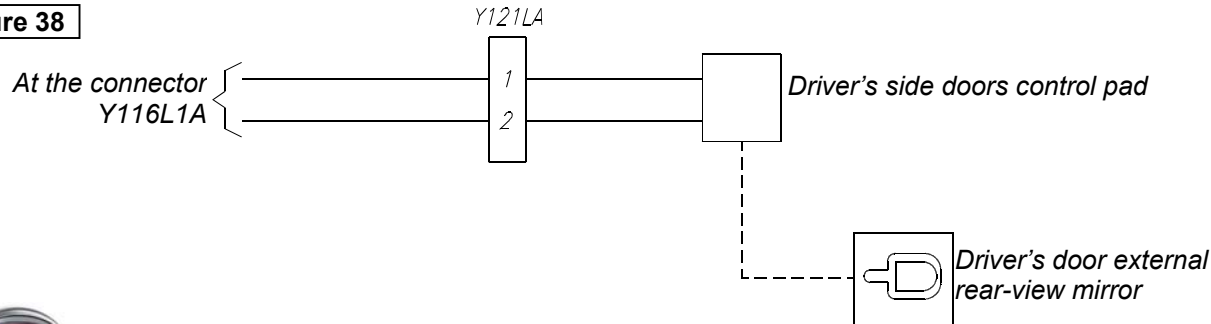


5.3.2 Description of connector functions

PIN	Function/Connector part number	Minimum cable section [mm ²]	Cable colour	Notes
	4-way Tyco connector p/n 174929-1 Counterpart: Tyco p/n 174922-1 (by coach builder)			
1	P.S. ext. mirror deflect	0.5	HM	External mirror electric deflection
2	P.S. ext. mirror restore	0.5	N	External mirror electric deflection
3	External temperature sensor (high)	0.35	HR	Necessary with automatic air-conditioner
4	External temperature sensor (low)	0.35	HV	Necessary with automatic air-conditioner

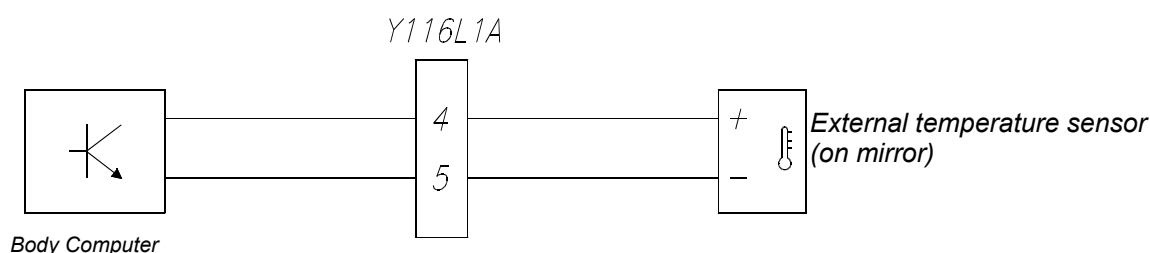
5.3.3 External rear-view mirror deflection

Figure 38



5.3.4 External temperature sensor

Figure 39



If the original New Ducato mirrors are not fitted, it is necessary to use an NTC thermistor with the following specifications:

Parameter	Value
Resistance at 25°C (R ₂₅)	10 kΩ
Tolerance at R ₂₅	±3%
Maximum dissipation	500 mW
Response time	1.2 s
Working temperature range	from -40 to +125 °C
Climatic category	40/125/56

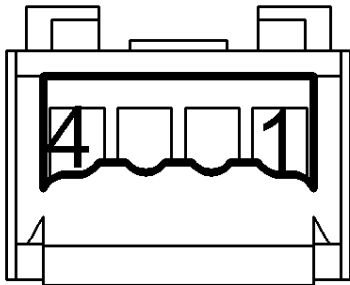
T _{oper} (°C)	R _T /R ₂₅
-40	33.21
-35	23.99
-30	17.52
-25	12.93
-20	9.636
-15	7.250
-10	5.505
-5	4.216
0	3.255
5	2.534
10	1.987
15	1.570
20	1.249
25	1.000
30	0.8059
35	0.6535
40	0.5330
45	0.4372
50	0.3605
55	0.2989
60	0.2490
65	0.2084
70	0.1753
75	0.1481
80	0.1256
85	0.1070
90	0.09154
95	0.07860
100	0.06773
105	0.05858
110	0.05083
115	0.04426
120	0.03866
125	0.03387

➤ **NOTE:** In vehicles fitted with automatic climate control (option 140) and/or robotised gearbox (option 407), it is necessary to fit an exterior temperature sensor.

5.4 Connector Y116LA (4-way) – Passenger side door (opt)

5.4.1 3D view of connector

Figure 40

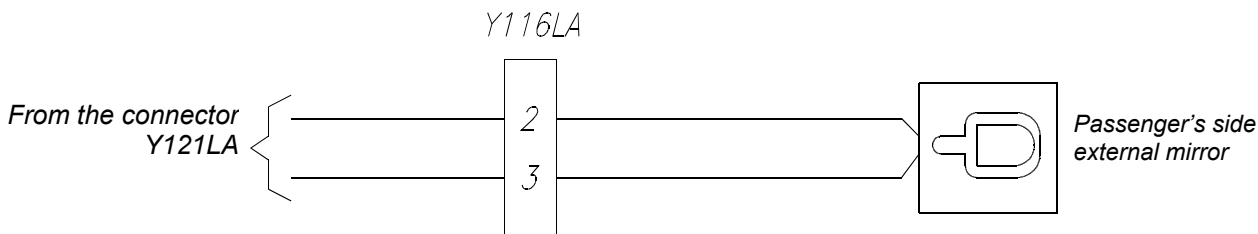


5.4.2 Description of connector functions

PIN	Function/Connector part number	Minimum cable section [mm ²]	Cable colour	Notes
	4-way Tyco connector p/n 174929-1 Counterpart: Tyco p/n 174922-1 (by coach-builder)			
1	Not connected			
2	P.S. ext mirror deflection	0.5	HM	External mirror electric deflection
3	P.S. ext. mirror restore	0.5	N	External mirror electric deflection
4	Not connected	-	-	

5.4.3 External rear view mirror deflection

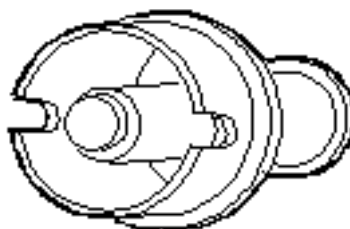
Figure 41



5.5 Connector XO50PA (1-way) – AM/FM radio aerial

5.5.1 3D view of connector

Figure 42



5.5.2 Description of connector functions

PIN	Function/Connector part number	Notes
	Shielded ASK connector p/n COMA Y050PA Counterpart: ASK p/n COFE (by coach-builder)	
1	AM/FM radio aerial signal	AM/FM aerial on roof or in external mirror

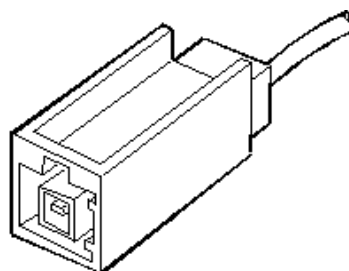


3.36

5.6 Connector Y050PB (2-way) – GSM aerial

5.6.1 3D view of connector

Figure 43



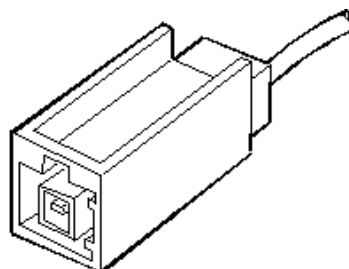
5.6.2 Description of connector functions

PIN	Function/Connector part number	Notes
	Shielded Hirose GT5 connector p/n 755-0040-0 Counterpart: Hirose GT5 p/n 755-0038-9 (by coach-builder)	GREEN colour
1	GSM aerial signal	For telematic info system
2	Shield	

5.7 Connector Y050PC (2-way) – GSM aerial

5.7.1 3D view of connector

Figure 44



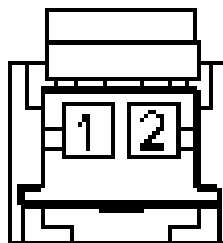
5.7.2 Description of connector functions

PIN	Function/Connector part number	Notes
	Shielded Hirose GT5 connector p/n 755-0005-0 Counterpart: Hirose GT5 p/n 755-0004-7 (by coach-builder)	GREY colour
1	GPS aerial signal	For satellite navigator
2	Shield	

5.8 Connector Y050PD (2-way) – Amplified radio aerial power supply

5.8.1 2D view of connector

Figure 45

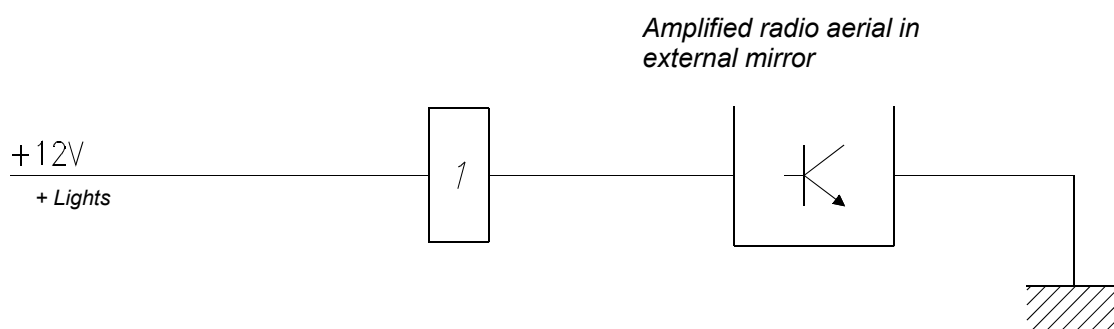


5.8.2 Description of connector functions

PIN	Function/Connector part number	Notes
B	2-way Sumitono connector p/n 6098-0240 (Y050PD) Counterpart: Sumitomo p/n 6098-0239 (by coach-builder)	
1	Power supply from radio for amplified AM/FM radio aerial	Present only for aerial in external mirror
2	Not connected	

5.8.3 Amplifier power supply

Figure 46

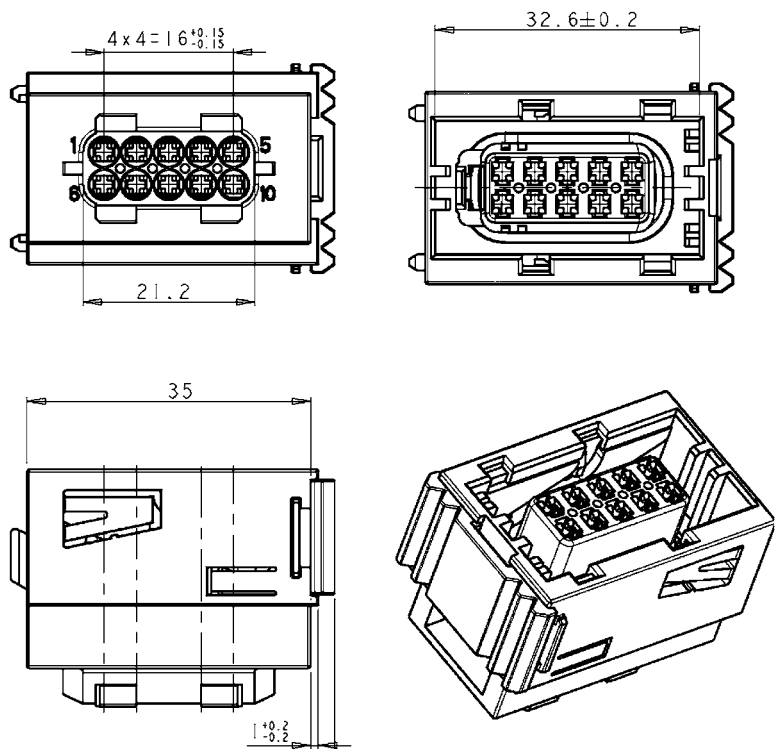


6 GENUINE NEW DUCATO COMPONENTS

6.1 Locks

6.1.1 3D view of connector

Figure 47



Interface connector with genuine New Ducato locks

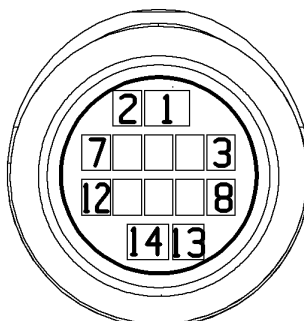
6.1.2 Description of connector functions

Pin	Function/Connector part number	Minimum cable section [mm ²]	Notes
	10-way Tyco connector on wiring p/n 6-1355688-1		
1	Not connected	-	
2	Lock/unlock signal from knob	0.5	Present only on driver's side door
3	Switch ground	0.5	
4	Door open switch	0.5	N.O. to ground (10 mA clean contact)
5	Not connected	-	
6	Door lock control	1.0	Max 15A (For actuation times see tab. page 3.16)
7	Door unlock control	1.0	Max 15A (For actuation times see tab. page 3.16)
8	Not connected	-	
9	Not connected	-	
10	Not connected	-	

6.2 Front lights

6.2.1 2D view of connector

Figure 48



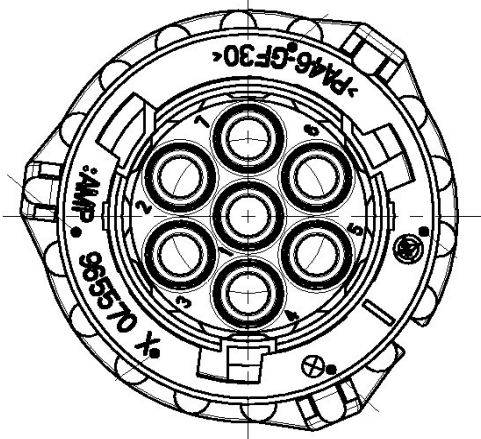
6.2.2 Description of connector functions

PIN	Function/Connector part number	Minimum cable section [mm ²]	Notes
	14-way FCI connector p/n BTBFHPE14BK08A		
1	Headlight	0.5	
2	High beam	1	
3	Blind cavity	-	
4	Side markers	0.35	1 5W - 12V bulb
5	Blind cavity	-	
6	Direction indicator	0.5	1 21W - 12V bulb
7	Closed cavity	-	
8	Closed cavity	-	
9	Headlight levelling signal	0.35	
10	Blind cavity	-	
11	Levelling power supply	0.5	Active with headlights on
12	Bind cavity	-	
13	Headlight levelling ground	0.5	
14	Bulb ground	1.5	

6.3 Rear lights

6.3.1 2D view of connector

Figure 49



6.3.2 Description of connector functions

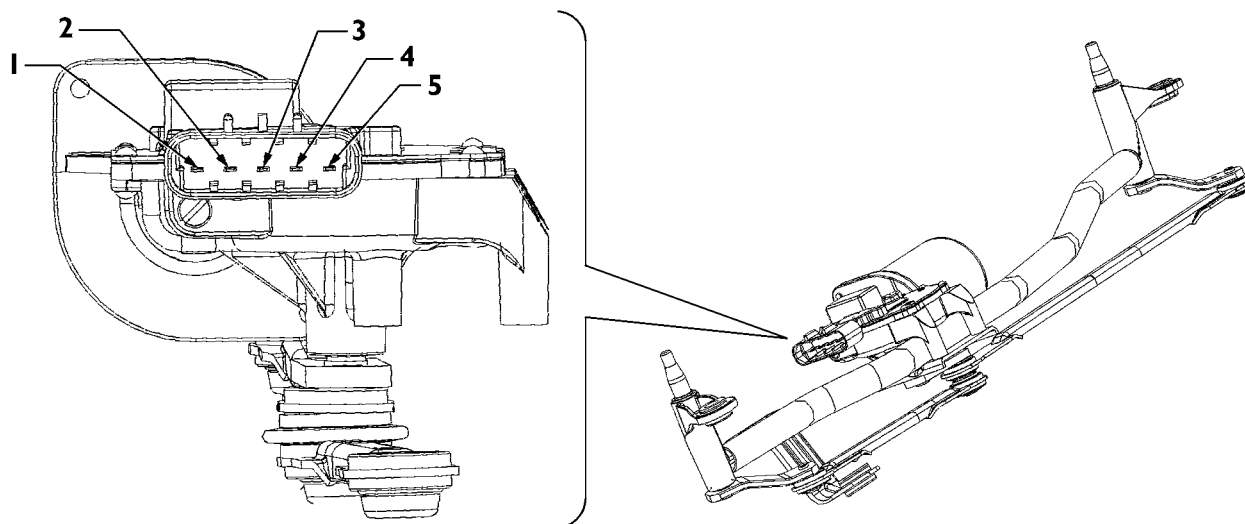
PIN	Function/Connector part number	Minimum cable section [mm ²]	Notes
	LH light – 7-way Tyco connector on wiring p/n 967650-1		
1	Bulb ground	1	
2	Rear fog warning light	0.5	
3	Stop light	0.5	
4	Direction indicator	0.5	
5	Not connected	-	
6	Side marker light	0.5	
7	Not connected	-	
	RH light – 7-way Tyco connector p/n 967650-1		
1	Bulb ground	1	
2	Not connected	-	
3	Stop light	0.5	
4	Direction indicator	0.5	
5	Reversing light	1	
6	Side marker light	0.5	
7	Not connected	-	



6.4 Windscreen wiper

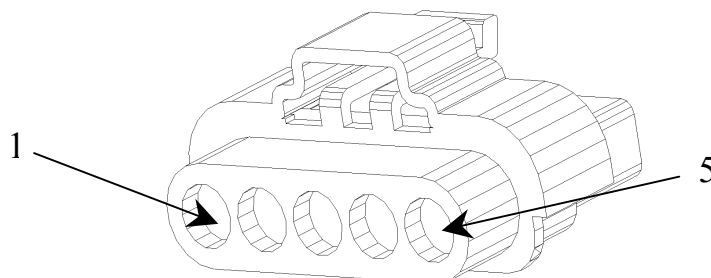
6.4.1 3D view of connector on windshield wiper motor

Figure 50



6.4.2 3D view of connector on wiring

Figure 51



6.4.3 Description of connector functions

PIN	Function/Connector part number	Minimum cable section [mm ²]	Notes
	5-way Delphi connector p/n 15342484	-	Reference to diagram M012AA
1	Ground	2.5	
2	Power supply	2.5	
3	Speed selector	0.5	
4	On/off	0.5	
5	Parking contact	0.5	



3.42

6.4.4 Windscreen wiper motor specifications

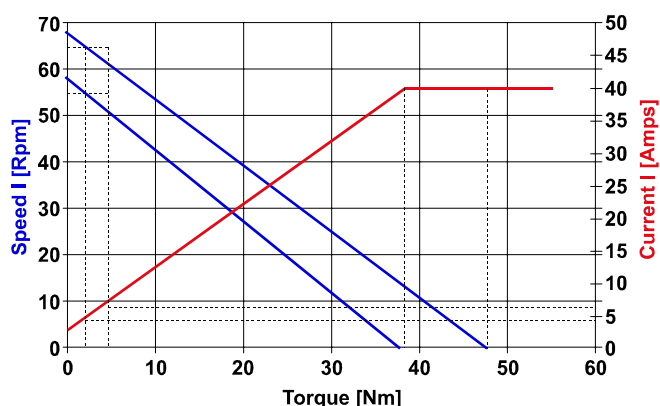
Nominal voltage	12V
Working voltage	9 - 16V
Intermittence	10 - 18
Number of cycles (speed I)	45 ± 5
Number of cycles (speed II)	65 ± 5

➤ **NOTE:** In case of windscreen wiper group installation, the converter has to fit a group with the same electrical specifications as the original Fiat Group Automobiles S.p.A. group.

Figure 52

Low Speed

Voltage Up=13.5V Temperature=23°C

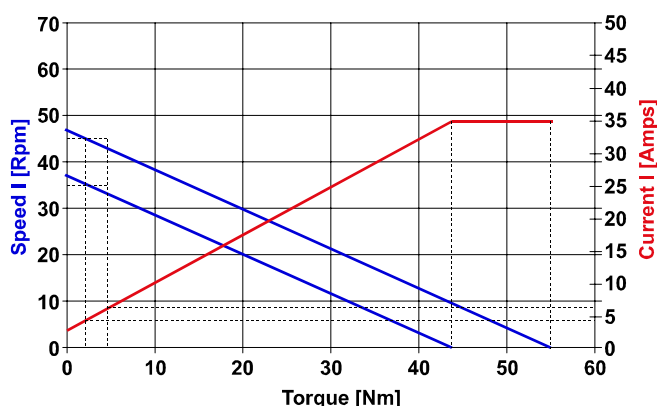


Torque [Nm]	Speed [RPM]	Current [A]
2	60 ± 5	<4.5
5	>50	<6.5
34.7-44.5	5	<40
38-48	0	<40

Figure 53

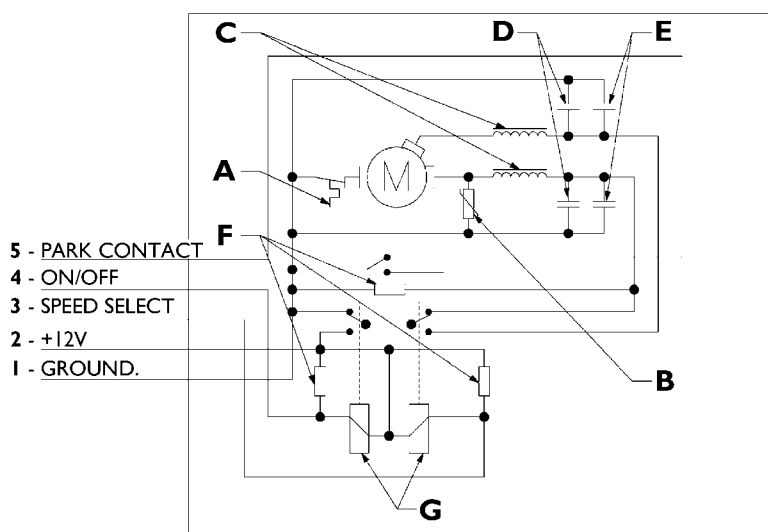
High Speed

Voltage Up=13.5V Temperature=23°C



Torque [Nm]	Speed [RPM]	Current [A]
2	40 ± 5	<3
5	>30	<5
38.9-49.1	5	<35
45-55	0	<35

Figure 54



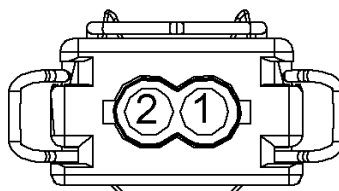
- A - THERMAL PROTECTION
TYPE 6AP00720W
(TEXAS INSTRUMENT)
- B - VARISTOR SEN 270 KD 07
Vac = 17V
Vdc = 22V
V2.5A = 53V
ENERGIE = 1J/1 impulse
C=2200 pF
- C - CHOKE:
NOMINAL VOLTAGE: UP TO 60V
NOMINAL CURRENT: 6A
INDUCTION: $5.7 \pm 10\%$ microH
- D - CAPACITOR CF1,
5 microaF/63V
- E - CERAMIC CAPACITOR
2n2/100V Z5U
- F - RESISTOR
500 Ohm/0.5W
- G - RELAY FBR512ND12W1
NOMINAL VOLTAGE: 12V(DC)
COIL RESISTANCE ($\pm 10\%$ AT 20°C): 240 Ohm
MUST OPERATE VOLTAGE:
7.3V (DC) AT 20°C, 9.2V (DC) AT 85°C
THERMAL RESISTANCE: 73° C/W



6.5 Windscreen washer pump

6.5.1 2D view of connector

Figure 55



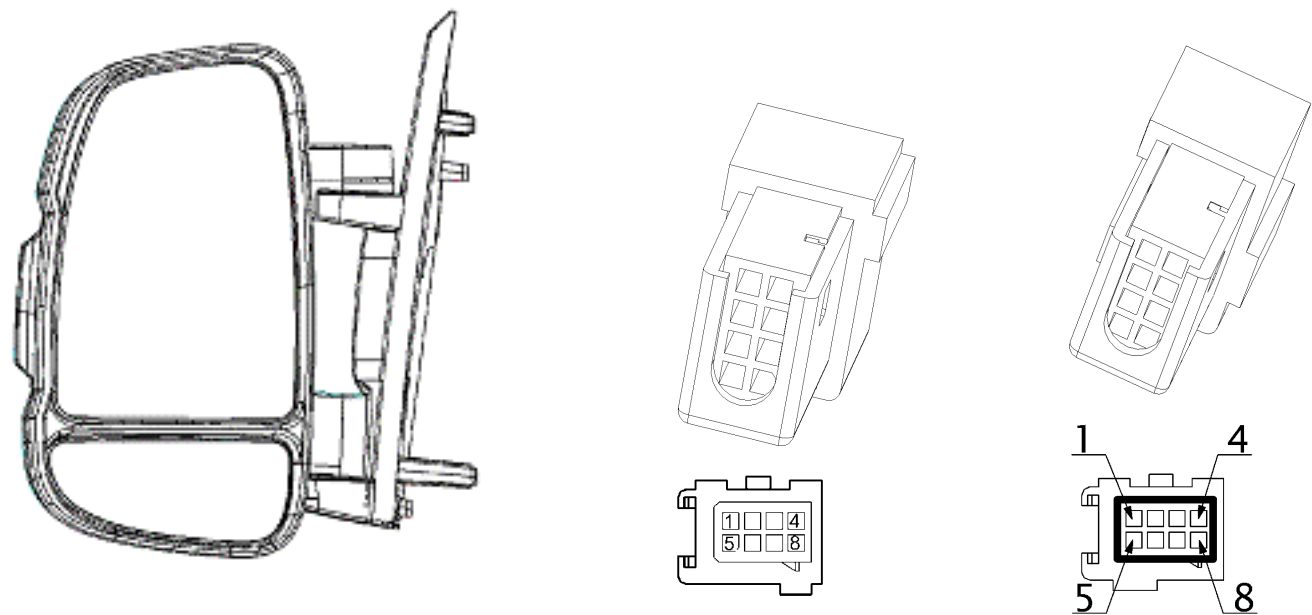
6.5.2 Description of connector functions

PIN	Function/Connector part number	Minimum cable section [mm ²]	Notes
	2-way Delphi connector on wiring p/n 12185025 (401589)		
1	Power supply	1.5	
2	Ground	1.5	

6.6 Left hand external rear view mirror

6.6.1 3D view of connectors

Figure 56



➤ **NOTE:** The figure shows the counter-connectors.

6.6.2 Description of connector functions

PIN	Function / Connector part number	Minimum cable section [mm ²]	Notes
	8-way Tyco connector on mirror p/n 1745000-1 Counterpart: Tyco p/n 284869-1		BLACK colour
1	Direction indicator power supply	0.5	1 16W - 12V bulb
2	Direction indicator and defroster ground	0.75	
3	Main mirror servo right/left control	0.5	
4	Main mirror servo up/down control	0.5	
5	Auxiliary mirror servo right/left control	0.5	
6	Auxiliary mirror servo up/down control	0.5	
7	Mirror servos common connection	0.5	
8	Defroster power supply	0.75	



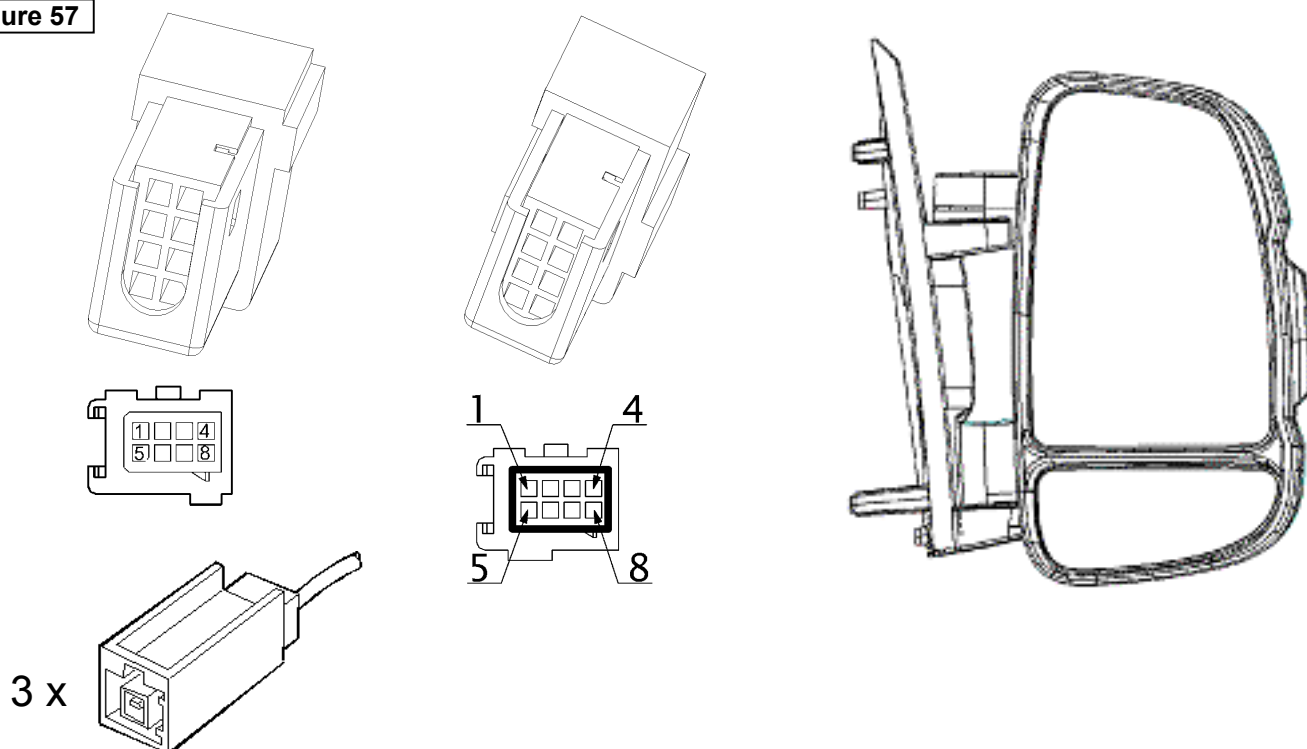
PIN	Function/Connector part number	Minimum cable section [mm ²]	Notes
	8-way Tyco connector on mirror p/n 1745000-2 Counterpart: Tyco p/n 284869-2		GREY colour
1	External temperature sensor (ref)	0.5	
2	External temperature sensor (signal)	0.5	
3	Deflector servo control	0.5	
4	Deflector servo ground	0.5	
5	Not connected	-	
6	Not connected		-
7	Not connected		-
8	Not connected		-

➤ **NOTE:** If Fiat Group Automobiles S.p.A. rear view mirrors are used, refer to the connections described in the preceding paragraphs of this document.

6.7 Right hand external rear-view mirror

6.7.1 3D view of connectors

Figure 57



➤ **NOTE:** The figure shows the connector counterparts.

**6.7.2 Description of connector functions**

PIN	Function/Connector part number	Minimum cable section [mm ²]	Notes
8-way Tyco connector on mirror p/n 1745000-1 Counterpart: Tyco p/n 284869-1			BLACK colour
1	Direction indicator power supply.	0.5	1 16W - 12V bulb
2	Direction indicator and defroster ground	0.75	
3	Main mirror servo left/right control	0.5	
4	Main mirror servo up/down control	0.5	
5	Auxiliary mirror servo left/right control	0.5	
6	Auxiliary mirror servo up/down control	0.5	
7	Mirror servos common connection	0.5	
8	Defroster power supply	0.75	
8-way Tyco connector on mirror p/n 1745000-2 Counterpart: Tyco p/n 284869-2			GREY colour
1	Radio aerial power supply	0.5	
2	Not connected	-	
3	Deflector servo control	0.5	
4	Deflector servo ground	0.5	
5	Not connected	-	
6	Not connected	-	
7	Not connected	-	
8	Not connected	-	
Shielded Hirose GT5 connector p/n 755-0037-6 Counterpart: Hirose p/n 755-0039-1			BROWN colour
1	Radio aerial signal	-	
2	Shield	-	
Shielded Hirose GT5 connector p/n 755-0004-7 Vehicle side connector 2v. Hirose GT5 p/n 755-0005-0			GREY colour
1	GPS signal aerial	-	
2	Shield	-	
Shielded Hirose GT5 connector p/n 755-0038-9 Vehicle side connector 2v. Hirose p/n 755-0040-0			GREEN colour
1	GSM aerial signal	-	
2	Shield	-	

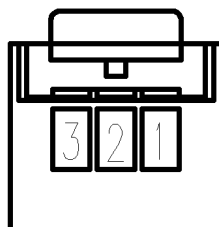
► **NOTE:** If Fiat Group Automobiles S.p.A. rear view mirrors are used, refer to the connections described in the preceding paragraphs of this document.



6.8 Ceiling light

6.8.1 2D view of connector

Figure 58



6.8.2 Description of connector functions

PIN	Function/Connector part number	Minimum cable section [mm ²]	Notes
	3-way Tyco connector on wiring p/n 282627-1	-	
1	Bulb ground	0.5	
2	Power supply +30 (SBMT)	0.5	
3	Negative control	0.5	

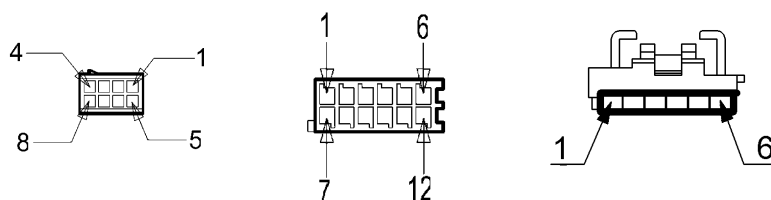


3.48

6.9 Driver's side door control pad

6.9.1 2D view of connectors

Figure 59



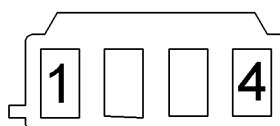
6.9.2 Description of connector functions

PIN	Function / Connector part number	Minimum cable section [mm ²]	Notes
8-way Tyco connector on wiring p/n 1745000-1			
1	LH window up control	0.35	
2	Rear door status LED	0.35	
3	Ground	0.5	
4	Rear comp. lock/unlock	0.35	
5	LH window down control	0.35	
6	Power supply/illumination	0.5	
7	RH window down control	0.35	
8	RH window up control	0.35	
12-way Tyco connector on wiring p/n 1534093-1 + p/n 1534100-1		-	Cap + terminal holder unit
1	Ground	0.5	
2	RH Main mirror up/down	0.35	
3	RH auxiliary mirror left/right	0.35	
4	LH main mirror left/right	0.35	
5	Power supply/illumination	0.5	
6	LH auxiliary mirror up/down	0.35	
7	Power supply	0.5	
8	Mirror servos common	0.35	
9	LH main mirror up/down	0.35	
10	RH auxiliary mirror left/right	0.35	
11	RH auxiliary mirror up/down	0.35	
12	RH main mirror left/right	0.35	
6-way Tyco connector on wiring p/n 284802-1		-	
1	Power supply	0.75	
2	Ground	0.75	
3	LH mirror deflection	0.5	
4	LH mirror restore	0.5	
5	RH mirror deflection	0.5	
6	RH mirror restore	0.5	

6.10 Passenger side door control pad

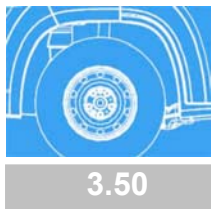
6.10.1 2D view of connector

Figure 60



6.10.2 Description of connector functions

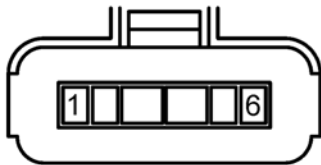
PIN	Function / Connector part number	Minimum cable section [mm ²]	Notes
	4-way Tyco connector on wiring p/n 1-1534150-1 + 1534149-1		Connector + secondary lock
1	P.S window down control	0.35	
2	Power supply/illumination	0.5	
3	Ground	0.5	
4	P.S. window up control.	0.35	



6.11 Electric windows

6.11.1 2D view of connector

Figure 61



6.11.2 Description of connector functions

PIN	Function / Connector part number	Minimum cable section [mm ²]	Notes
	6-way FCI connector on wiring p/n 211PC069S0049		
1	Window up control	0.35	
2	Not connected	-	
3	Power supply +30	2.5	
4	Ground	2.5	
5	+15 from signal	0.5	Present only on driver's side window control
6	Window up control	0.35	



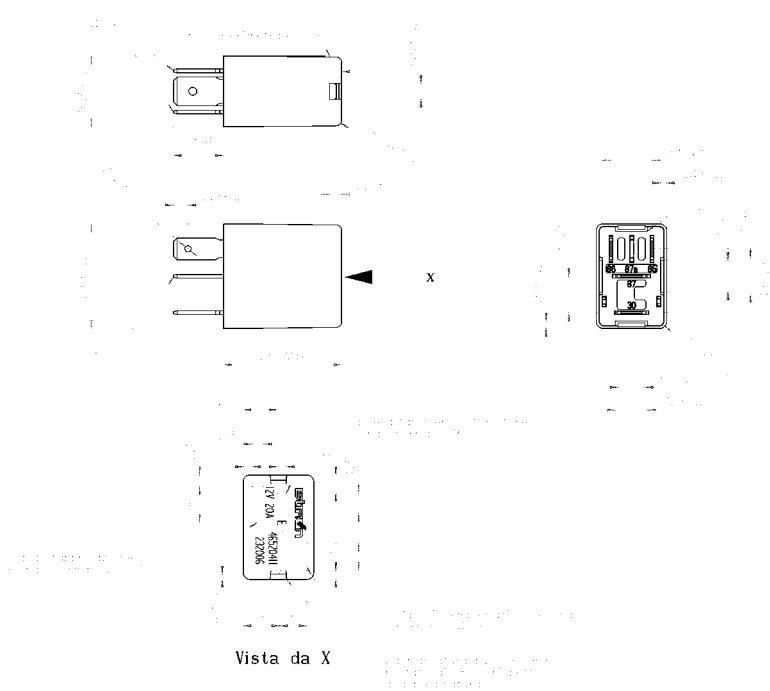


3.51

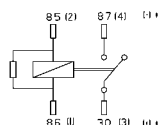
7 STANDARD FIAT GROUP AUTOMOBILES S.P.A. COMPONENT DRAWINGS

7.1 20A micro relay switch

DATI CARATTERISTICI	
TENSIONE NOMINALE	12V
CORRENTE NOMINALE A 80°C	20A
PROTEZIONE AMBIENTALE (IP) NORMA IEC 529	IP 54
TEMPERATURA DI ESERCIZIO TMIN/TMAX	-40°C/125°C
AFFIDABILITA' A 0 KM	20PPM
DISPOSITIVO PARALLELO 85/86	680 Ohm
RESISTENZA EQUIVALENTE 85/86 A 23°C	73±5 Ohm
MAX INDUTTANZA BOBINA	24 mH
MIN TENSIONE DI SCARICA	1000 V/I
MIN RESISTENZA DI ISOLAMENTO	10 M Ohm
CADUTA DI TENSIONE 30/87 A 23°C A NUOVO	MAX 3mV/A
MAX TENSIONE INDUTTIVA RILASCIO	110V
MAX CORRENTE IN CHIUSURA 87	110V
MAX CORRENTE IN APERTURA 87	20A
MAX CORRENTE CONTINUTIVA 87 A 23°C	20A
MAX CORRENTE CONTINUTIVA 87 A TMAX	20A
MAX SOVRATEMPERATURA TERMINALE 30	40°C
MAX TENSIONE CHIUSURA MAGNETICA A 23°C	7.5V
MAX TENSIONE CHIUSURA MAGNETICA A TMAX	9.6V
MIN TENSIONE DI RILASCIO A 23°C	2V
MIN TENSIONE DI RILASCIO A TMAX	2V
MAX TEMPO DI RIMBALZO 87	100 micr. s.
TEMPO DI CHIUSURA MIN/MAX 87	4/6 ms
TEMPO DI APERTURA MIN/MAX 87	6/8 ms



SCHEMA ELETTRICO



*: POLARITA' CONSIGLIATA

TABELLA DEI MATERIALI

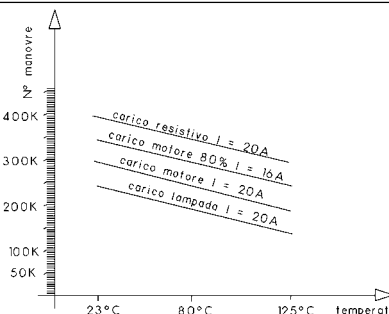
	DENOMINAZIONE	MATERIALE			TRATTAMENTO	
		TABELLA	SIGLA	CLASSE	SIGLA	CAPITOL.
1	COPERCHIO COLORE NERO	55235	PE 60.30	PLASTICI *		
2	BASAMENTO COLORE NERO	55235	PE 60.30	PLASTICI *		
3	SPINE LAMELLARI SECONDO NORMA FIAT 91319 6.3 X 0.8		Cu ETP	LEGHE METALL.	Superf. Ag	
4	SPINE LAMELLARI SECONDO NORMA FIAT 91319 4.8 X 0.8	53441	POT 67 LMT HIO	LEGHE METALL.	Cu/Sn/A	9.57422

*) Raggi non quotati >=0.5

PRESTAZIONI

NUMERO DI MANOVRE
IN FUNZIONE DELLA TEMPERATURA E DEL CARICO

TIPOLOGIA CARICO	I	23°C	80°C	125°C
RESISTIVO	20A	400K	350K	300K
MOTORE : I NOMIN. CONTINUA A 80°C	20A	300K	250K	200K
MOTORE : 80% I NOMIN.	16A	350K	300K	250K
LAMPADA	20A	250K	200K	150K



7.2 30A micro relay switch

DATI CARATTERISTICI	
TENSIONE NOMINALE	12V
CORRENTE NOMINALE A 80°C	30A
PROTEZIONE AMBIENTALE (IP) NORMA IEC 529	IP 54
TEMPERATURA DI ESERCIZIO TMIN/TMAX	-40°C/125°C
AFFIDABILITA' A 0 KM	20PPM
DISPOSITIVO PARALLELO 85/86	680 Ohm
RESISTENZA EQUIVALENTE 85/86 A 23°C	73±5 Ohm
MAX INDUTTANZA BOBINA	24 mH
MIN TENSIONE DI SCARICA	1000 V/T
MIN RESISTENZA DI ISOLAMENTO	10 M Ohm
CADUTA DI TENSIONE 30/87 A 23°C A NUOVO	MAX 3mV/A
MAX TENSIONE INDUTTIVA RILASCIO	110V
MAX CORRENTE IN CHIUSURA 87	165A
MAX CORRENTE IN APERTURA 87	30A
MAX CORRENTE CONTINUATIVA 87 A 23°C	30A
MAX CORRENTE CONTINUATIVA 87 A TMAX	30A
MAX SOVRATEMPERATURA TERMINALE 30	40°C
MAX TENSIONE CHIUSURA MAGNETICA A 23°C	7.5V
MAX TENSIONE CHIUSURA MAGNETICA A TMAX	9.6V
MIN TENSIONE DI RILASCIO A 23°C	2V
MIN TENSIONE DI RILASCIO A TMAX	2V
MAX TEMPO DI RIMBALZO 87	100 micr. s.
TEMPO DI CHIUSURA MIN/MAX 87	4/6 ms
TEMPO DI APERTURA MIN/MAX 87	6/8 ms

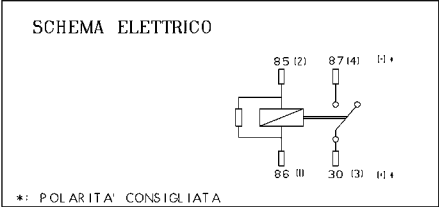
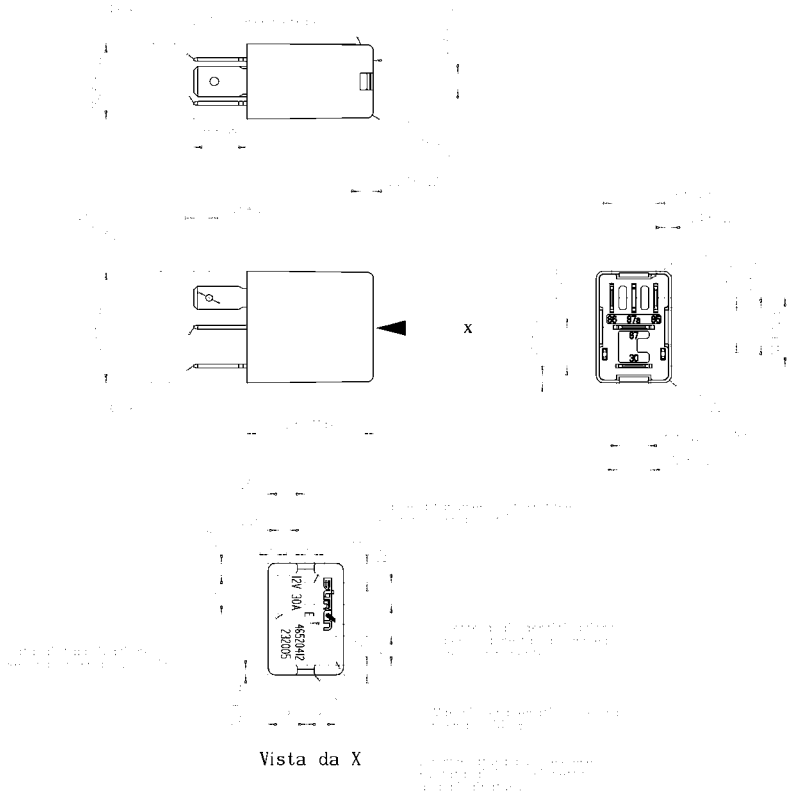
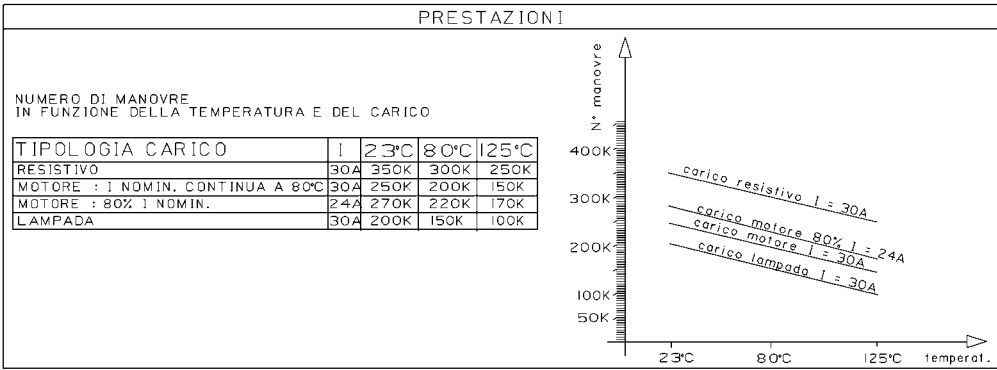


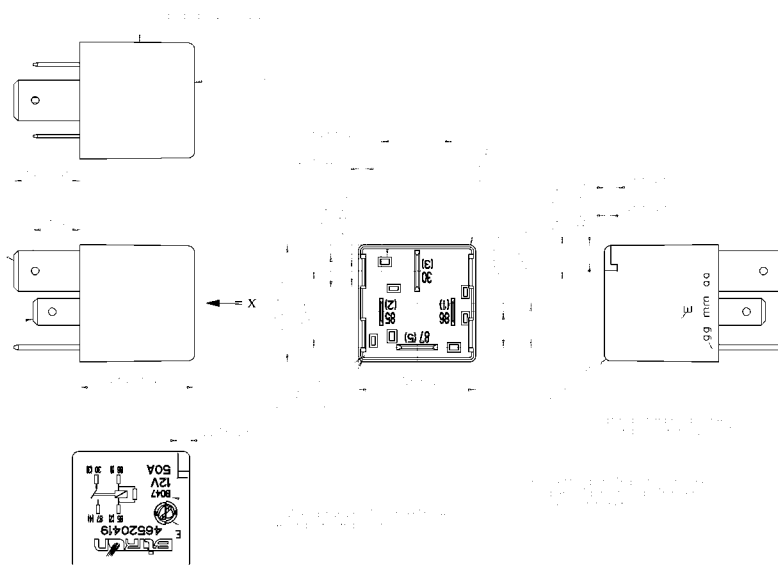
TABELLA DEI MATERIALI					
	DENOMINAZIONE	MATERIALE		TRATTAMENTO	
		TABELLA	SIGLA	CLASSE	SIGLA CAPITOL.
1	COPERCHIO COLORE ROSSO	55235	PE 60.30	PLASTICI *	
2	BASAMENTO COLORE NERO	55235	PE 60.30	PLASTICI *	
3	SPINE LAMELLARI SECONDO NORMA FIAT 91319 6.3 X 0.8		Cu ETP	LEGHE METALL.	Superf. Ag
4	SPINE LAMELLARI SECONDO NORMA FIAT 91319 4.8 X 0.8	53441	POT 67 LMT H10	LEGHE METALL.	Cu/Sn/A 9.57422

*) Raggi non quotati >= 0.5



7.3 50A maxi relay switch

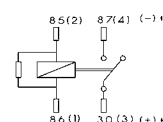
DATI CARATTERISTICI	
TENSIONE NOMINALE	12V
CORRENTE NOMINALE A 80°C	50A
PROTEZIONE AMBIENTALE (IP) NORMA IEC 529	IP 54
TEMPERATURA DI ESERCIZIO TMIN/TMAX	-40°C/125°C
AFFIDABILITA' A 0 KM	20 PPM
DISPOSITIVO PARALLELO 85/86	680 Ohm
RESISTENZA EQUIVALENTE 85/86 A 23°C	75±5 Ohm
MAX INDUTTANZA BOBINA	22 mH
MIN TENSIONE DI SCARICA	1000 V/I
MIN RESISTENZA DI ISOLAMENTO	10 M Ohm
CADUTA DI TENSIONE 30/87 A 23°C A NUOVO	MAX 3mV/A
MAX TENSIONE INDUTTIVA RILASCIO	100V
MAX CORRENTE IN CHIUSURA 87	200 A
MAX CORRENTE IN APERTURA 87	70A
MAX CORRENTE CONTINUATIVA 87 A 23°C	70A
MAX CORRENTE CONTINUATIVA 87 A TMAX	50A
MAX SOVRATEMPERATURA TERMINALE 30	40°C
MAX TENSIONE CHIUSURA MAGNETICA A 23°C	7.5V
MAX TENSIONE CHIUSURA MAGNETICA A TMAX	9.6V
MIN TENSIONE DI RILASCIO A 23°C	2V
MIN TENSIONE DI RILASCIO A TMAX	2V
MAX TEMPO DI RIMBALZO 87	60 micr. s.
TEMPO DI CHIUSURA MIN/MAX 87	4/6 ms
TEMPO DI APERTURA MIN/MAX 87	4/8 ms



Vista da X

TABELLA DEI MATERIALI					
DENOMINAZIONE	MATERIALE			TRATTAMENTO	
	TABELLA	SIGLA	CLASSE	SIGLA	CAPITOL.
A COPERCHIO COLORE NERO	55235	PE 60.30	PLASTICI		
B BASAMENTO COLORE NERO	55235	PE 60.30	PLASTICI		
C SPINE LAMELLARI SECONDO NORMA FIAT 91319 6.3 X 0.8	53441	POT 67 LMT H10	LEGHE METALL.	Cu/Sn/A	9.57422
D SPINE LAMELLARI SECONDO NORMA FIAT 91319 9.5 X 1.2		Cu ETP	LEGHE METALL.	Superf. Ag	

SCHEMA ELETTRICO

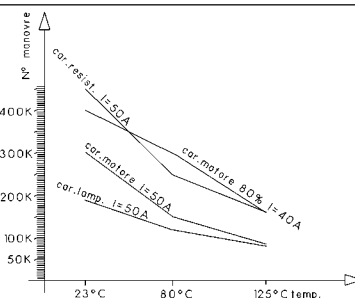


*: POLARITA' CONSIGLIATA

PRESTAZIONI

NUMERO DI MANOVRE
IN FUNZIONE DELLA TEMPERATURA E DEL CARICO

TIPOLOGIA CARICO	I	23°C	80°C	125°C
RESISTIVO	50A	450k	250k	160k
MOTORE : 1 NOMIN. CONTINUA A 80°C	50A	300k	150k	95k
MOTORE : 80% 1 NOMIN.	40A	400k	300k	160k
LAMPADA	50A	180k	120k	80k





3.54

8 TIPS FOR INSTALLATION

8.1 Refrigerator power supply

Having to power the refrigerator in parallel to the auxiliary battery charger circuit, in order to reduce voltage drop, we recommend one of the following solutions:

- a - Double the main power supply (+30) starting from connector C036L1C with an 8mm² (for the battery) and with a 6mm² cable (for the fridge) clamped together.
- b - Use a 16mm² section cable from connector C036L1C and for the entire section of common line.

In both cases it is a good idea to make the fridge negative terminal connection with a high cross-section cable that is as short as possible (using a ground point chosen between A, B, C or pin 2 of connector C036L1C).

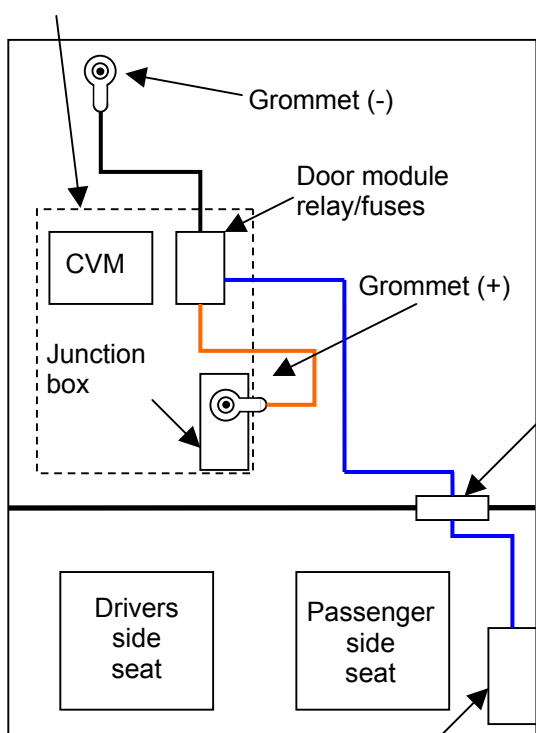
8.2 Coachbuilders socket in engine bay

This paragraph describes the solution for arranging specific power supplies in the engine bay (for example for the Xenon lights control unit). The diagram below shows the correct layout of the additional wiring that has to be installed by the coachbuilder.

GSX vehicle

Engine bay
fuse/relay box

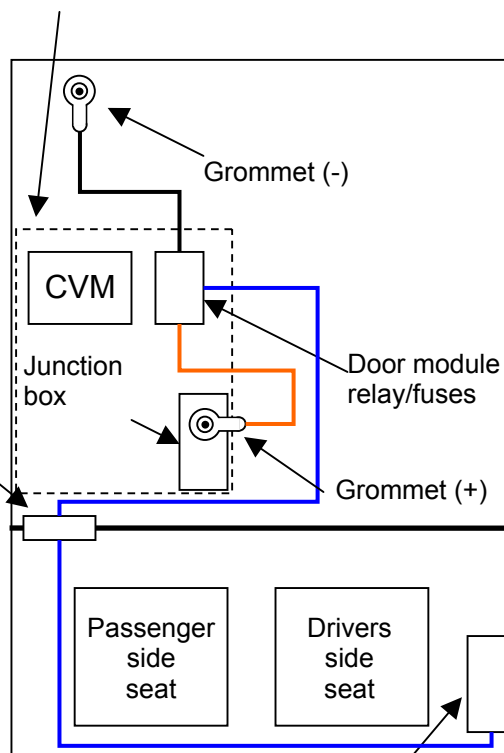
- +12V cable (min. sec. 4mm²)
- Ground cable
- From C036L1A



Coachbuilders
connector C036 L1A

GDX vehicle

Engine bay
fuse/relay box



Coachbuilders
connector C036 L1A

List of materials:

- Door module relay/fuse box: MTA p/n 03.01560
- Module mounting bracket: MTA p/n 03.00475
- Bulkhead passage seal: SUMITOMO drawing number 1334413080
- Grommet (+): MTA p/n 17.06711 (M8 hole)
- Grommet (-): M8 hole (for cable sections from 1 to 2.5 mm² recommended MTA p/n 17.06731)
- M8 nut: M8 hexagonal nut with nylon ring

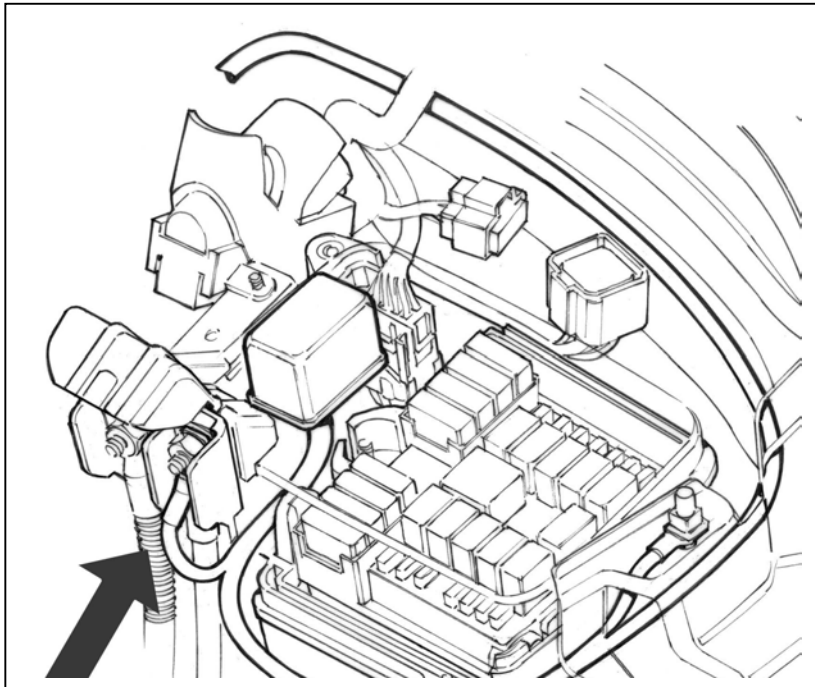
Description of installation procedure:

- Remove the relay/fuse box cover in the engine bay by removing the nuts.
- Unscrew the nut from the junction box pin (see figure 62), overlay the grommet (+) on the one already present (ATTENTION, vice-versa not permitted), then re-tighten the nut to torque of 15Nm $\pm$ 10%.
- Connect the grommet (-) to the ground pin present in the frontal area (see figure 63), after which apply an M8 nut, tightening it to torque of 15Nm $\pm$ 10%.
- Insert the door module relay/fuse box in the seat in the box in the engine bay.
- Replace the box cover paying attention to the correct arrangement of the cables.
- Lay the cables as shown in figure 64 using the retainer clips of the main wiring harness already installed on the vehicle.
- Drill through the flame bulkhead and remove the closing plug of the passage toward the cabin.
- Fit the bulkhead seal paying attention to correctly fasten it to the sheet metal to prevent infiltration into the cabin.
- Lay the cables in the cabin following the route shown in figure 65.



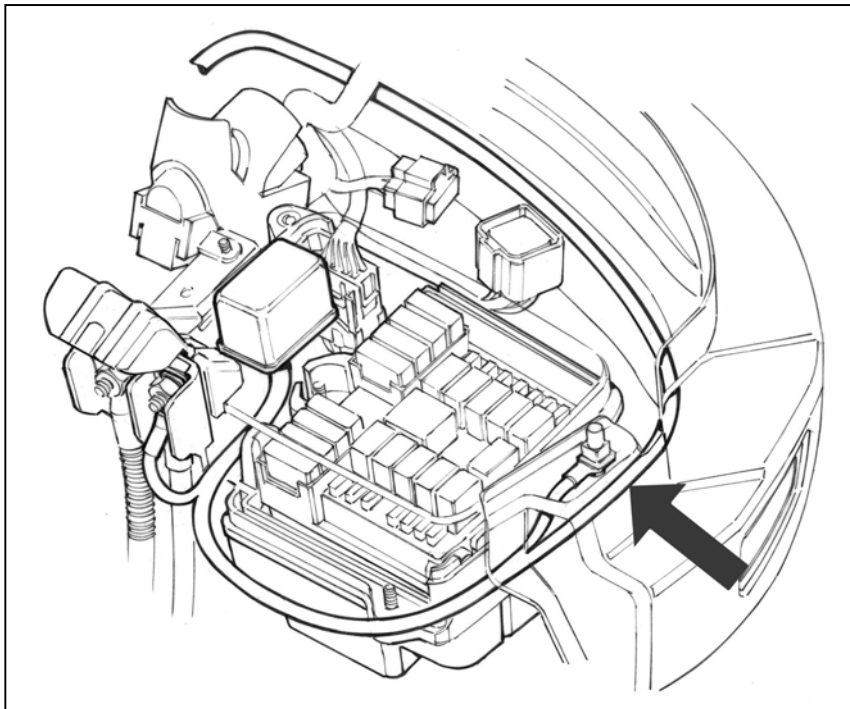
3.56

Figure 62

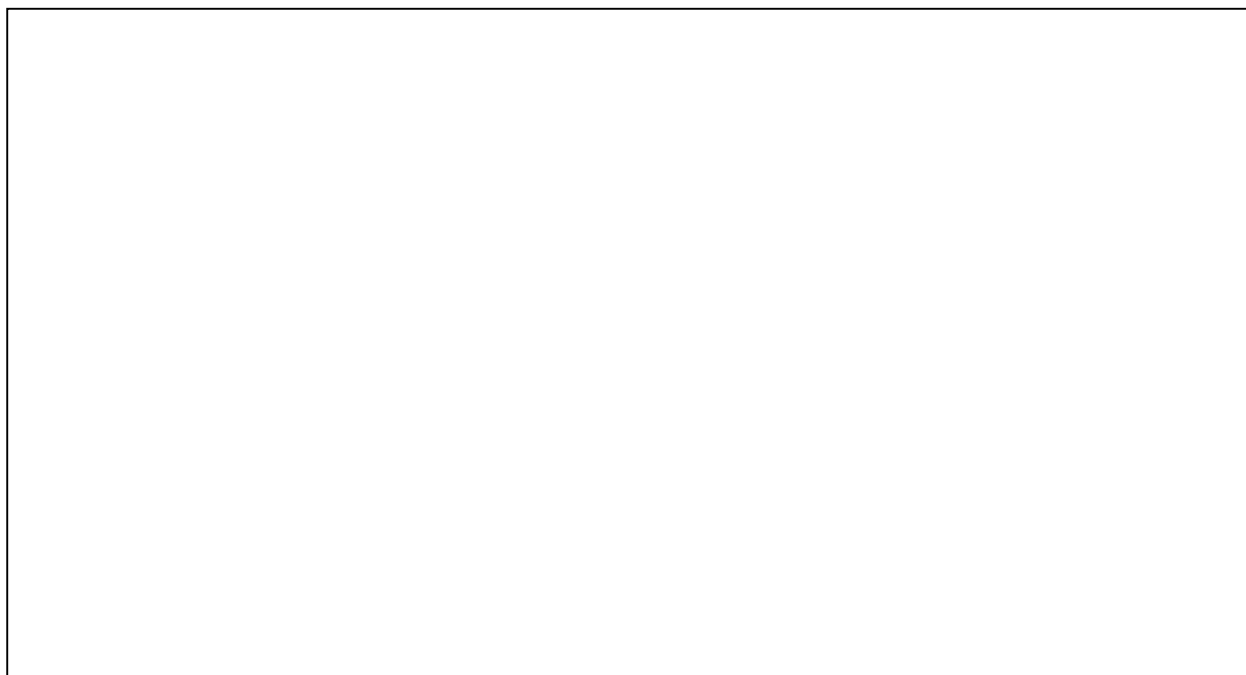
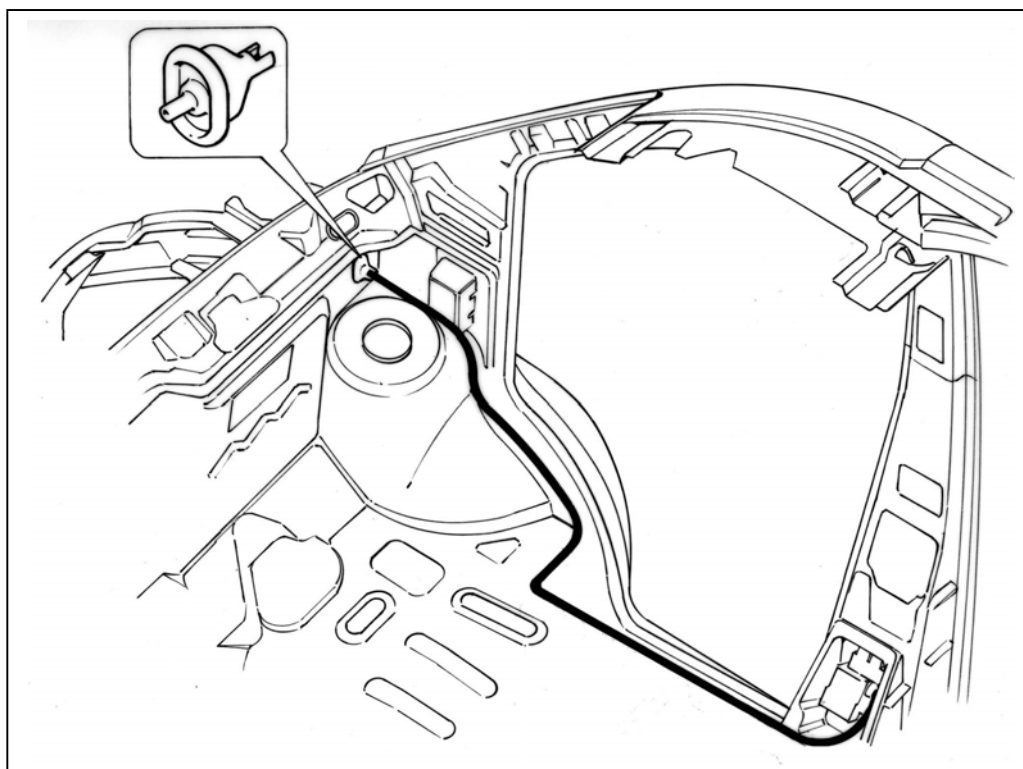


Engine bay – CVM box and view of junction box

Figure 63



Engine bay – view of ground pin

**Figure 64****Engine bay – front view of GSX cable layout****Figure 65****Cabin – view of GSX cable layout**



3.58

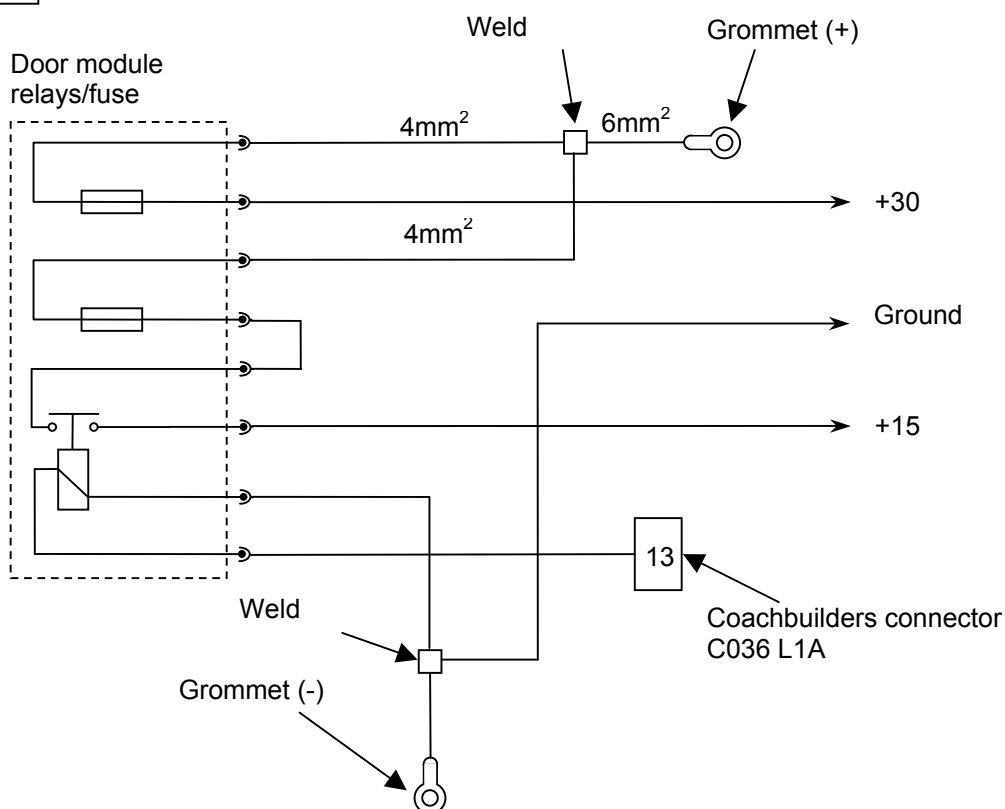
The wiring realised by the coachbuilder must be adequately protected by means of abrasion resistant tape.

► NOTES:

1. The insulating material of the flame bulkhead is predisposed for drilling in the vicinity of the hole.
2. In vehicles equipped with chrono-tachograph, the bulkhead passage is already present. The sealing tape already present has to be removed, the cables passed along with those of the chrono-tachograph and a new sealing tape applied.
3. In vehicles with automatic gearbox, the relay/fuse block is already present in the CVM box, in this case to fit the additional fuses and relays it is possible to use the free positions in the block.

Example of circuit for +30 and +15 power supplies in engine bay:

Figure 66



► NOTES:

1. The fuses must be correctly sized according to the minimum section of the protected wires.
2. The relays must be Fiat Group Automobiles S.p.A. standard type (see chapter 7)

8.3 Anti-theft system

If an anti-theft system has to be installed, we recommend using the original kit of the Accessories Line, made by an official Fiat Group Automobiles S.p.A. supplier:

Metasystem S.p.A.

Via Galimberti, n°8
42100 Reggio Emilia (Italy)

Telephone

Switchboard: +39 0522 364 111

Fax

Switchboard: +39 0522 364 150

Web

Information at: info@metasystem.it
Web site: [www.metasystem .it](http://www.metasystem.it)

8.4 Trailer

Insertion of non-conforming control units into the main circuit of the New Ducato to control additional lights may cause a malfunction in the vehicle electrical/electronic system, for this reason Fiat Group Automobiles S.p.A. recommends using original Accessory Line components. Any customisation can be agreed with the official suppliers of the component (see list below).

8.5 Robotised gearbox

On chassis-cowls or any vehicle without the original cab doors, the use of a robotised gearbox (option 407) requires the installation of an exterior temperature sensor (see par. 5.5.4) and a driver side door status switch (see par. 5.1.4).

Ellebi s.r.l.

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Customer care: +39 0522 834209

Web

Information: info@ellebi.com
Customer service: assistenza@ellebi.com
Web site: www.ellebi.com

Westfalia-Automotive GmbH & Co. KG

Am Sandberg 45
Postfach 26 40
33354 Rheda Wiedenbrück

Telephone

Switchboard: +49 5242 907 0

Fax

Switchboard: +49 5242 907 195

Web

Web site: www.westfalia-automotive.de



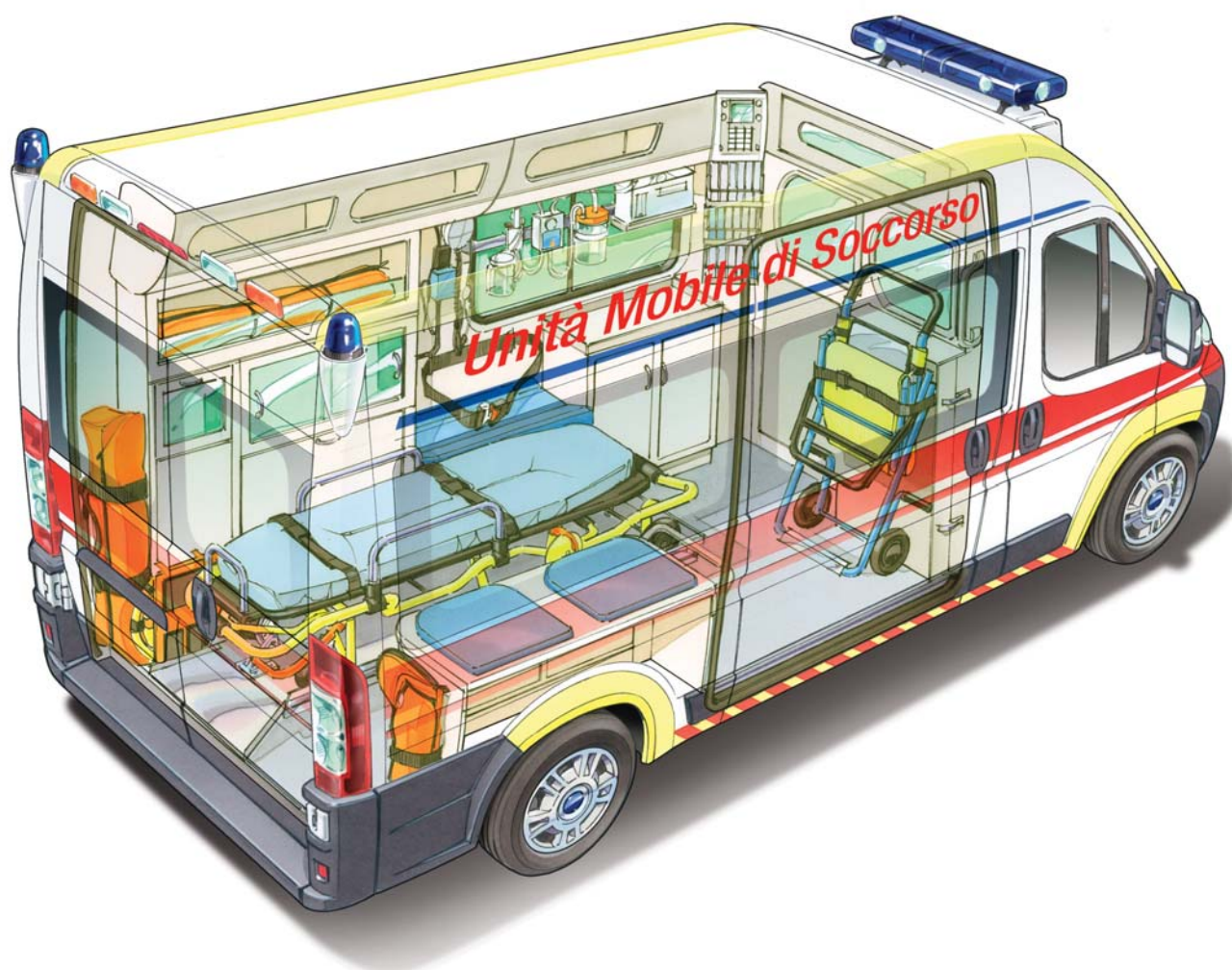
3.60





3.61

Ambulance conversion electrical system components





3.62

1. AMBULANCE CIRCUITRY	3.63
1.1 20-pin connector C036 AD	3.63
1.1.1 <i>View and position of connector</i>	3.63
1.1.2 <i>Functions of the connector</i>	3.64
1.1.3 <i>Engine starting inhibition circuit</i>	3.65
1.1.4 <i>Flasher power supply</i>	3.65
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1.1.8 <i>Reverse gear engaged signal</i>	3.68
1.2 Fiat Group Automobiles S.p.A. Ambulance Control Panel	3.69

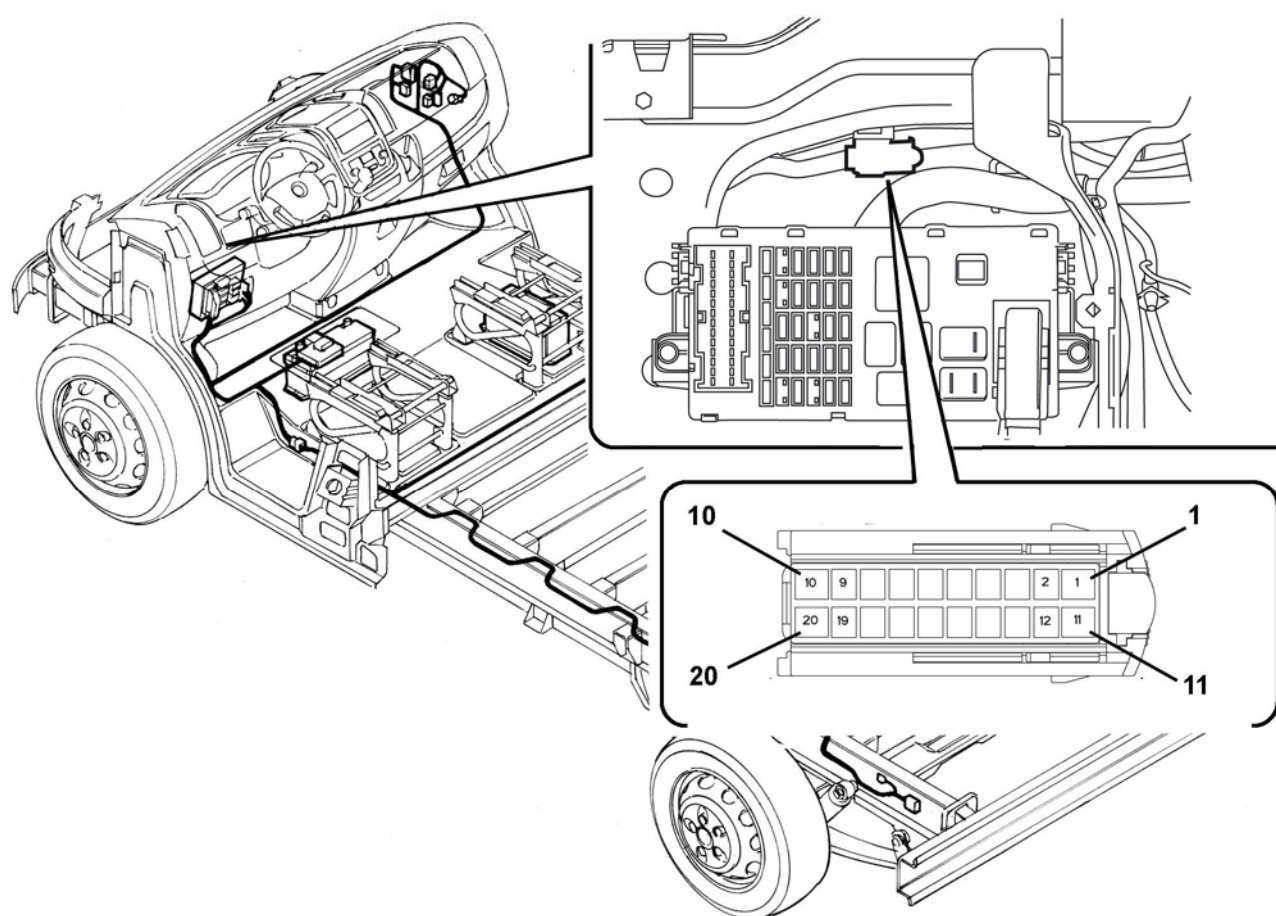


1 AMBULANCE CIRCUITRY

1.1 20-pin connector C036 AD

1.1.1 View and position of connector

Figure 01



➤ **NOTE:** In the detailed view, the connector is seen from the cable entry side



1.1.2 Functions of the connector

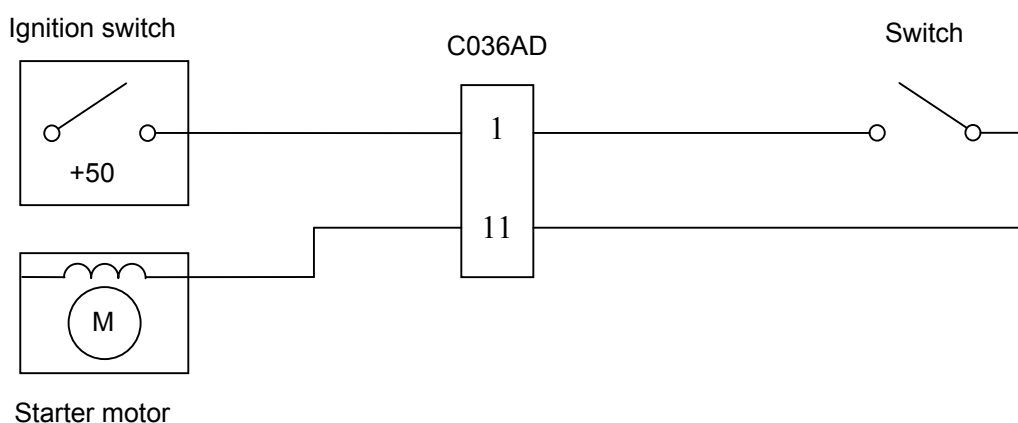
Pin	Connector function/Part number	Minimum cable size [mm ²]	Notes
	Tyco 20-pin connector on vehicle side, p/n 284879-3 Counterpart on conversion side: Tyco p/n 284875-2 (supplied by Fiat Group Automobiles S.p.A.)		See diagram C036-AD
1	Power supply: +50 from ignition switch	2.50	Starter relay coil command (to be short-circuited with pin 11)
2	+ key cut out during starting (Ign/SW)	0.5	Positive command for 1 standard relay (max 300mA)
3	High beam lights on signal	0.5	Positive command for 1 standard relay (max 300mA)
4	Horn control	0.35	INPUT: manages the horn relay by means of a negative signal from switch OUTPUT: negative command for 1 standard relay (max 300mA)
5	GND for ambulance control panel by Fiat Group Automobiles S.p.A.	0.5	Suitable for use on other control panels (max 4A)
6	Power supply + key for backlighting of Fiat Group Automobiles S.p.A. ambulance control panel	0.5	Suitable for use on other control panels (max 300mA)
7	Power supply for ambulance control panel: +30	0.5	Suitable for use on other control panels (max 2A)
8	Reverse gear engaged signal	0.5	Positive command for 1 standard relay (max 300mA)
9	Siren relay positive command (INPUT)	0.5	If the Fiat Group Automobiles S.p.A. ambulance control panel is not used, provide for protection of cable sized 0.5mm ² (max 7.5A fuse)
10	Siren power supply (OUTPUT)	2.50	Max 20A
11	Starter coil power supply	2.50	To be short-circuited with pin 1
12	Not connected		
13	Not connected		
14	Not connected		
15	Not connected		
16	Not connected		
17	Not connected		
18	Not connected		
19	Flasher relay positive command (INPUT)	0.5	If the Fiat Group Automobiles S.p.A. ambulance control panel is not used, provide for protection of cable sized 0.5mm ² (max 7.5A fuse)
20	Flasher power supply (OUTPUT)	2.50	Max 20A

1.1.3 Engine starting inhibition circuit

The ambulance connector contains a short-circuit jumper, between pin 1 and pin 11, which can be removed to cut out the starting command and produce an inhibition circuit as the need arises.

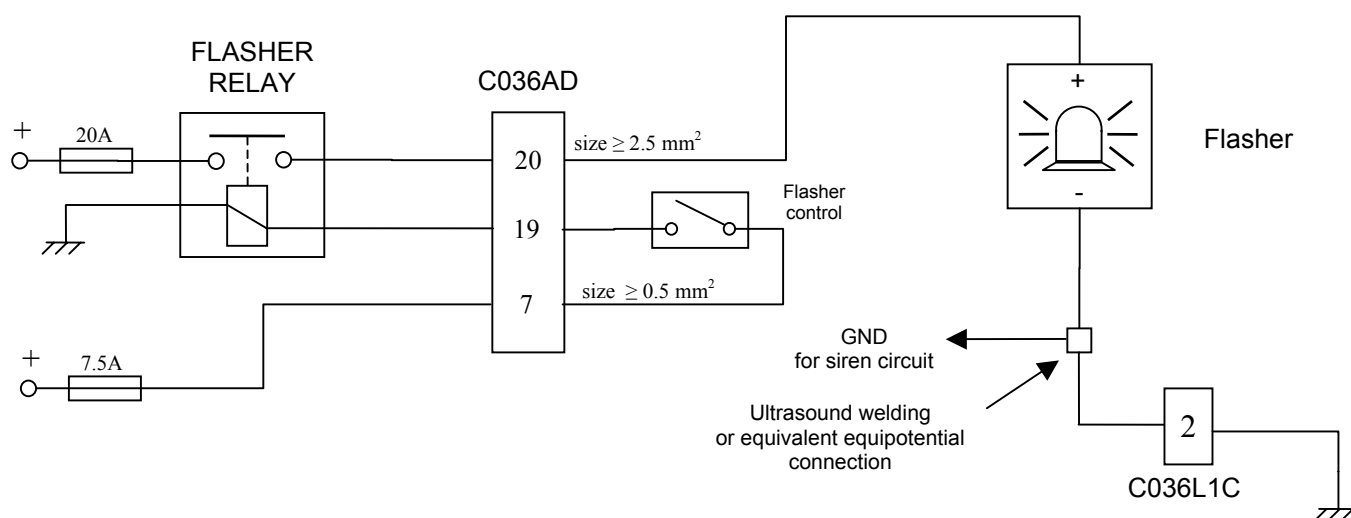
Important: this being a circuit of primary importance, it must be installed with the greatest possible care, paying special attention to cable crimping on the cable lug.

Figure 02



1.1.4 Flasher power supply

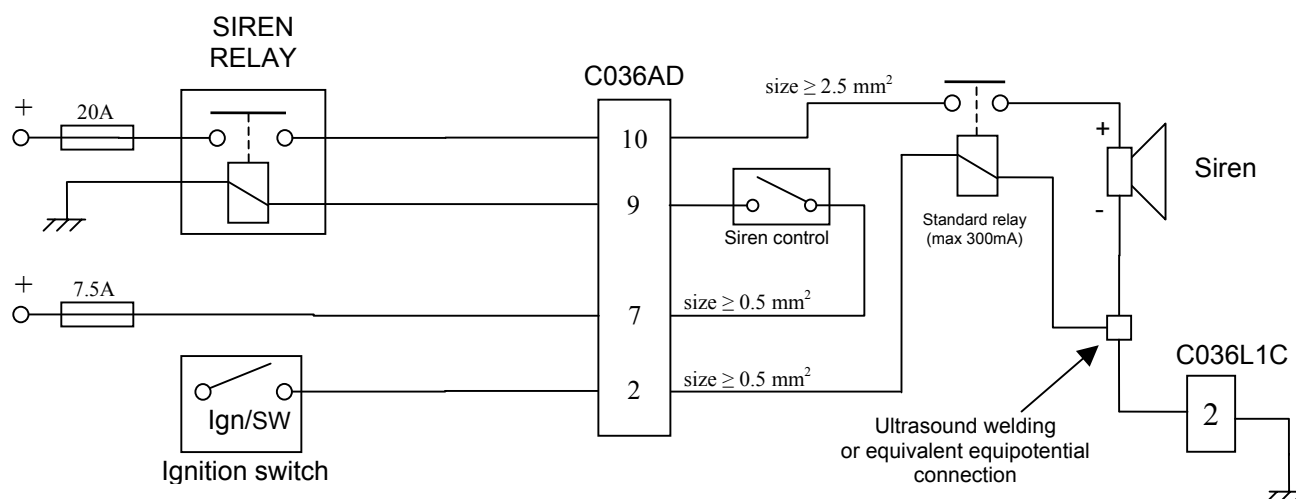
Figure 03



1.1.5 Siren power supply

If the current absorbed by the siren exceeds 5A, it is advisable to set up the power supply circuit described below so as to ensure trouble-free i.c. engine starting in critical conditions.

Figure 04



NOTES:

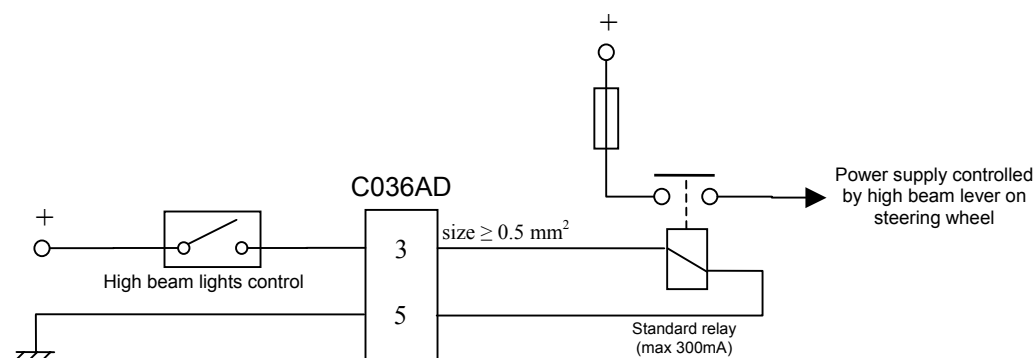
1. If the Fiat Group Automobiles S.p.A. ambulance control panel is used, pins 7, 9 and 19 are already connected.
2. Pin 7 must be used to power both (flasher and siren) controls; if these controls consist of two separate buttons, it is necessary to link them by means of ultrasound welding or make an equivalent equipotential connection on the wiring. We recommend that you do NOT use multiple crimping on the cable lugs.
3. If a power source other than pin 7 is used (e.g., pin 1 of connector C036L1C), the power supply circuits of the relay coils (pin 9 and pin 19) should be protected with fuses with capacity $\leq 7.5A$.

1.1.6 High beam lights On signal

This is a positive command activated when the high beam lights are turned on (including flashing mode).

A wiring diagram for this circuit is exemplified below.

Figure 05



1.1.7 Horn control

Pin 4 of connector C036AD is bidirectional. This notion is illustrated in the two examples given below regarding two different operating modalities.

Figure 06

INPUT mode operation

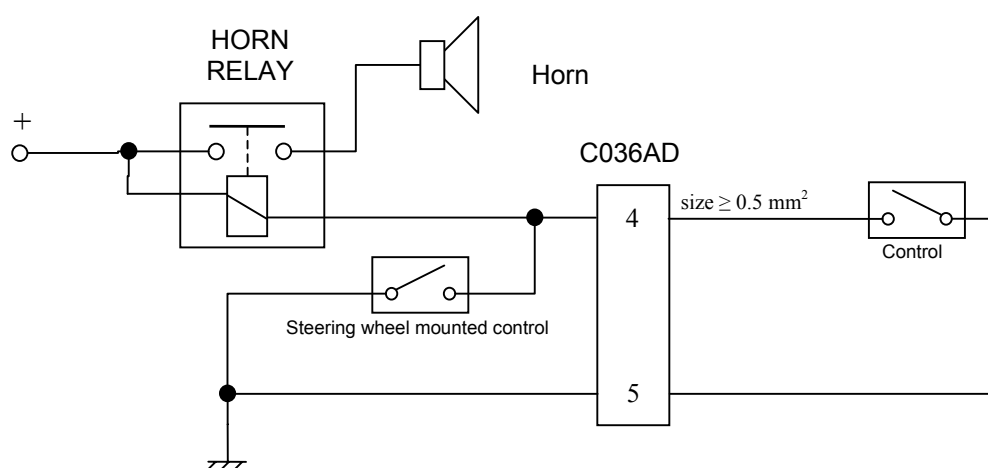
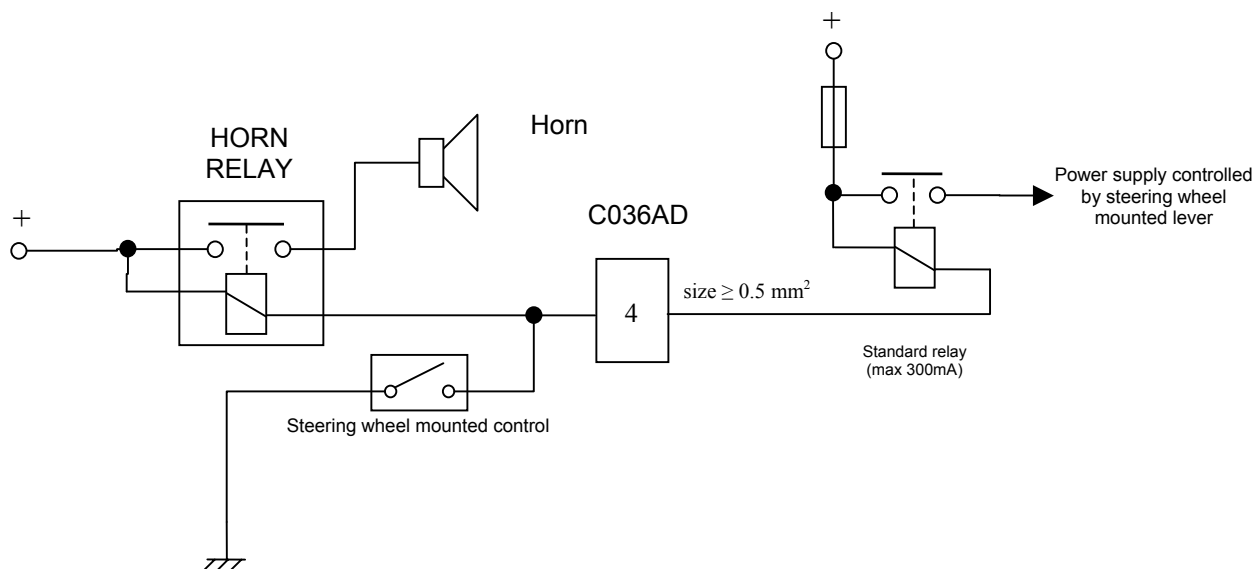


Figure 07

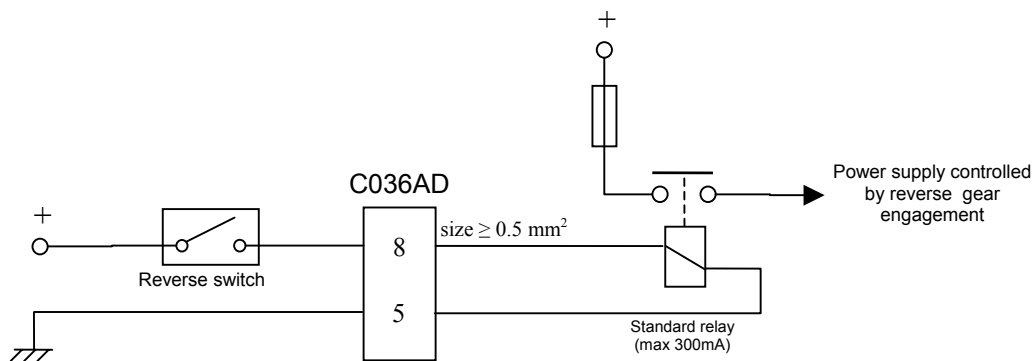
OUTPUT mode operation



1.1.8 Reverse gear engaged signal

If it proves necessary to activate loads that can be powered only with the reverse gear is engaged, this can be done by installing the following circuit.

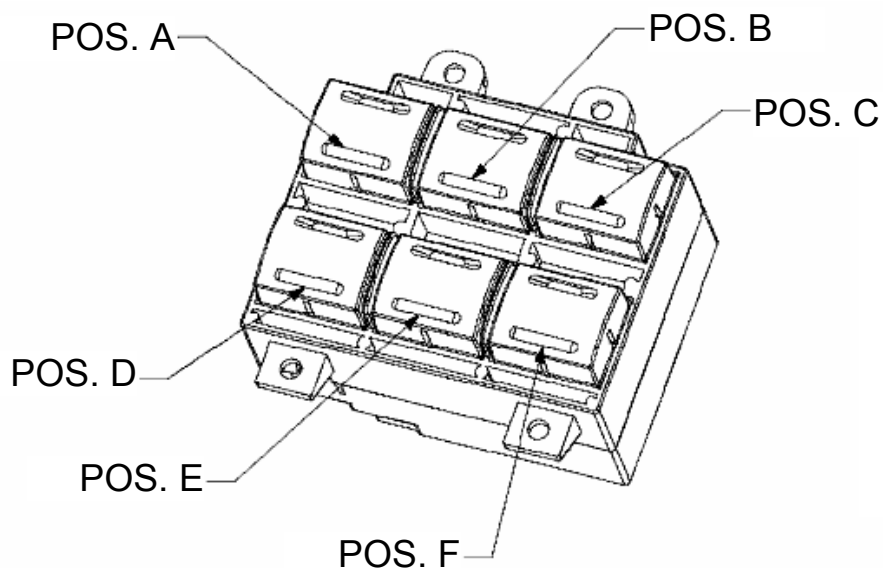
Figure 08

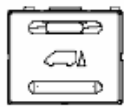
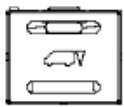
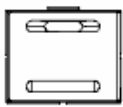
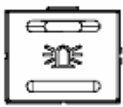
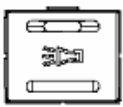


NOTE:

When using pin 5 of connector C036AD (frame GND) for several devices ($\Sigma I \leq 4A$), we recommend resorting to ultrasound welding or an equivalent equipotential connection. We strongly recommend that you do NOT use multiple crimping on the cable lugs.

1.2 Fiat Group Automobiles S.p.A. Ambulance Control Panel



LIST OF BUTTONS				
T1	T2	T3	T5	T6
				
Susp. UP	Susp. DOWN	Plug	Beacon	Siren

STACK COMPOSITION LIST							
CONVERSION	WIRING DIAGRAM	POSITION					
		A	B	C	D	E	F
AMBULANCE	TYPE 1	T3	T5	T6	T3	T3	T3
AMBULANCE + SELF-LEVELLING SUSP.	TYPE 1	T1	T5	T6	T2	T3	T3



3.70

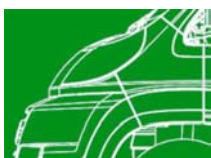


Main dimensions



4.1

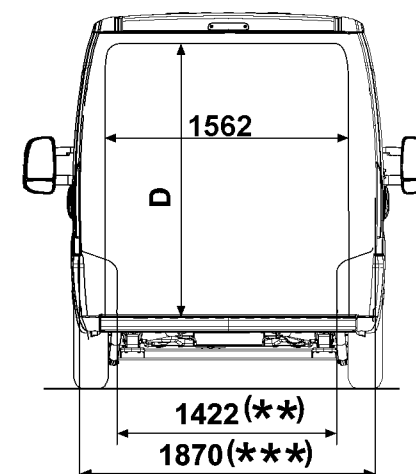
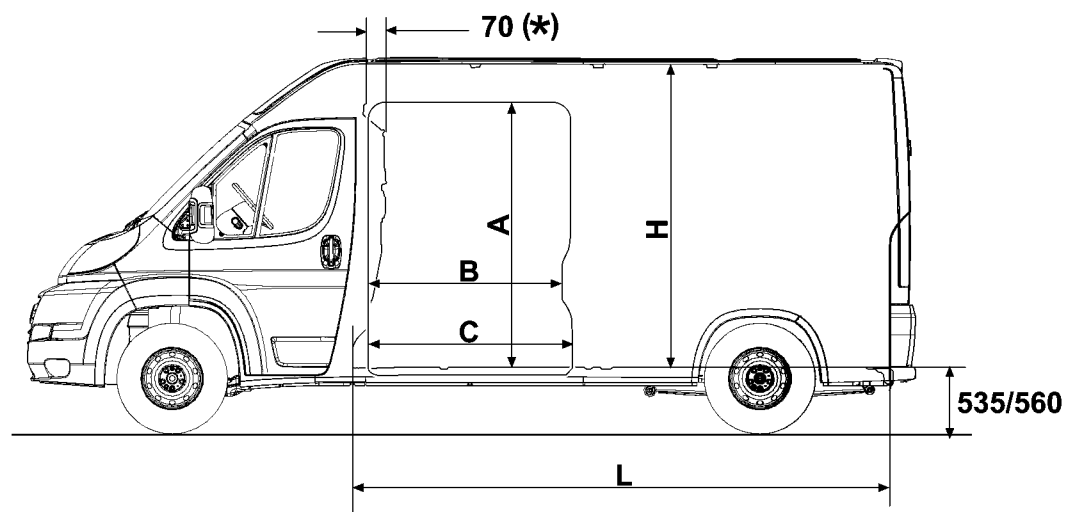




4.2



Sheet metal van – Cargo bay internal dimensions



L	
L1	2670
L2	3120
L3	3705
L4	4070

	A	B
L1 H1	1485	1075
L2 H1	1485	1250
L2 H2	1755	1250

H	
H1	1662
H2	1932
H3	2172

D	
H1	1520
H2	1790
H3	2030

(*) Bulkhead intrusion

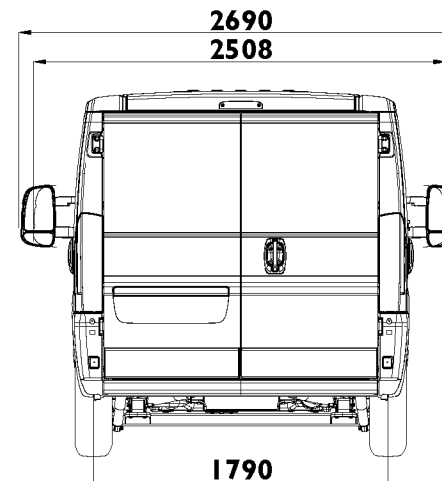
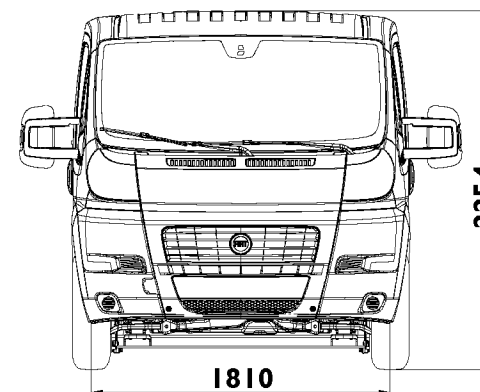
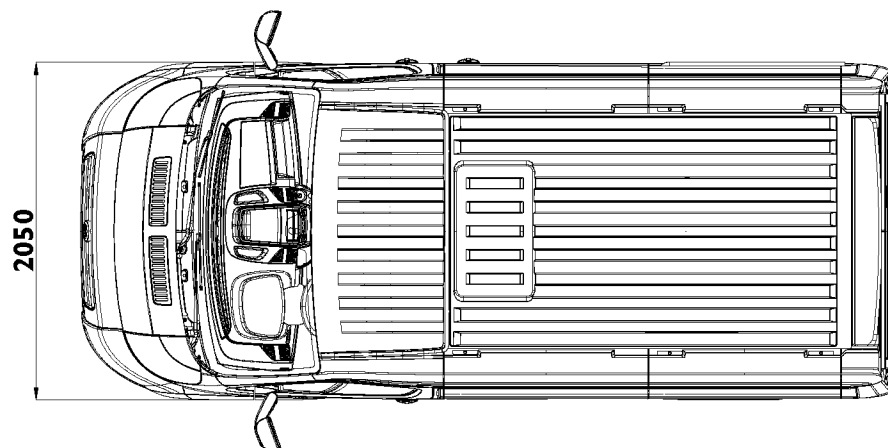
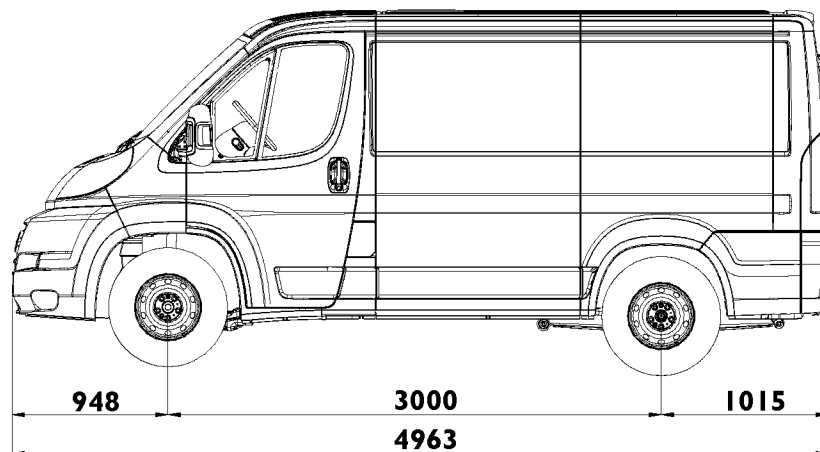
(**) Width between wheelarches

(***) Width between internal sides (against panelling)



4.4

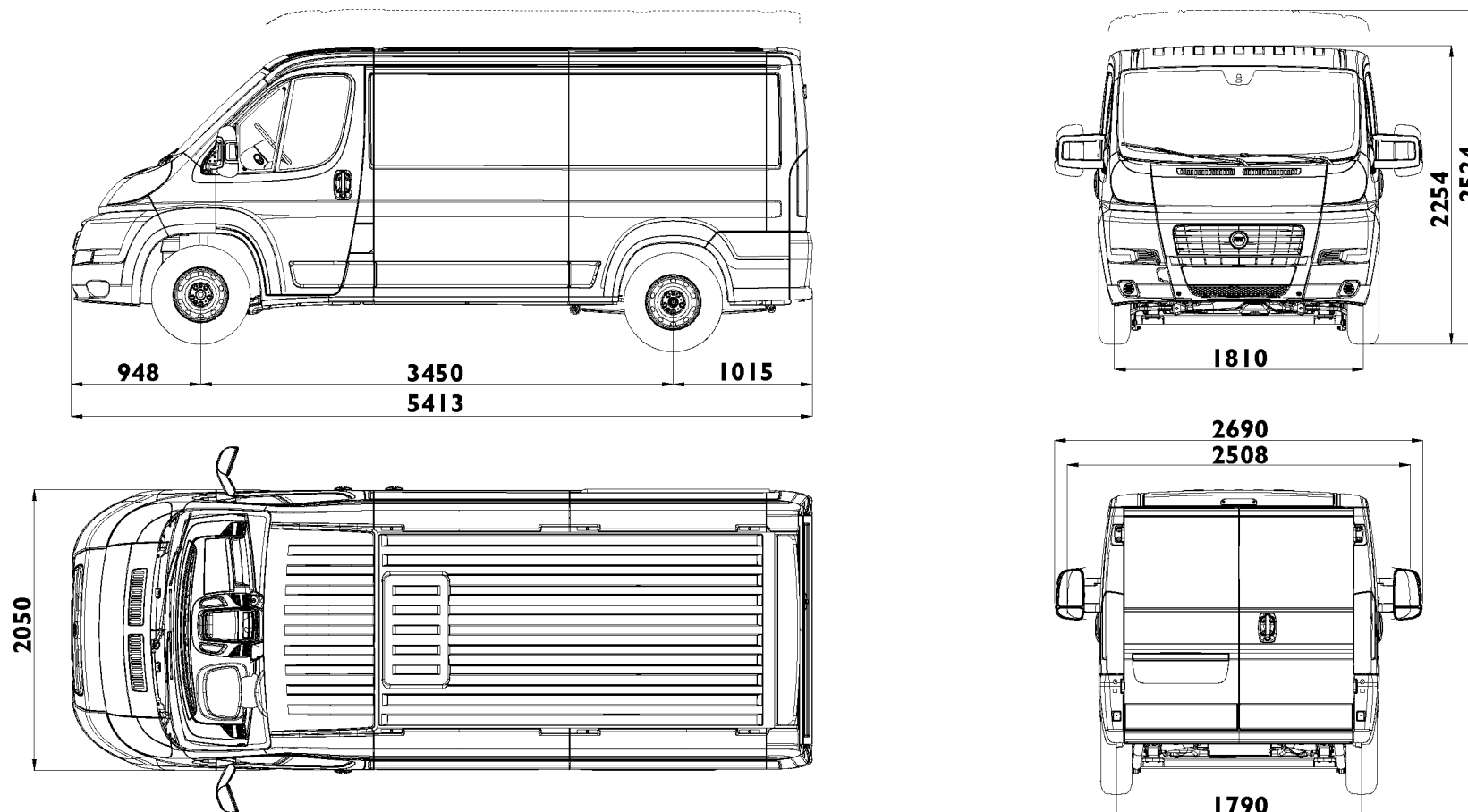
Sheet metal van – Short wheelbase H1





4.5

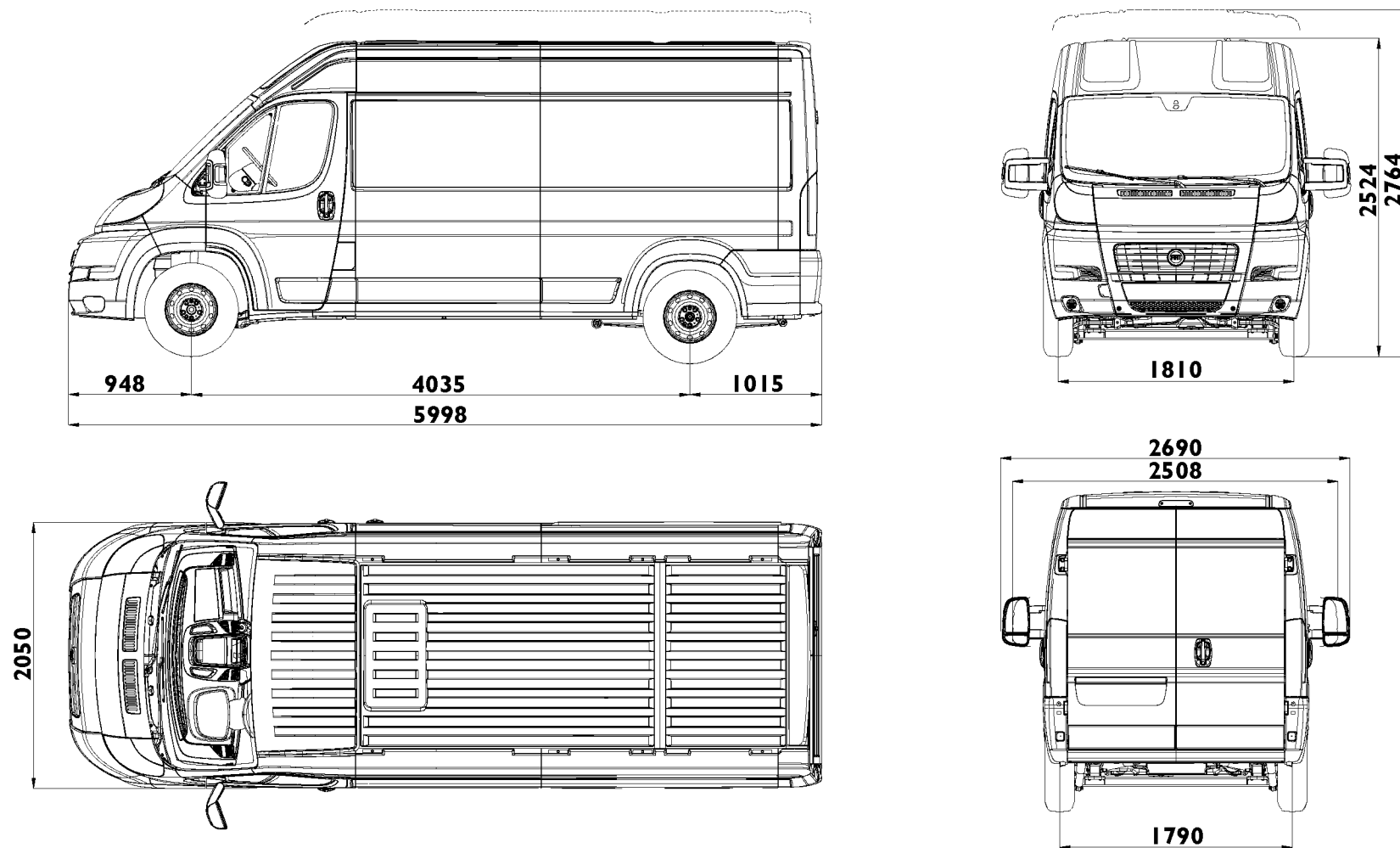
Sheet metal van – Medium wheelbase H1/H2





4.6

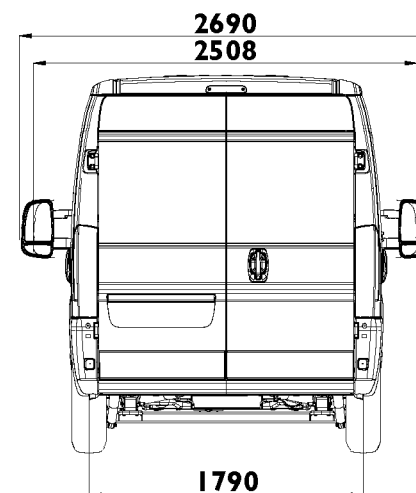
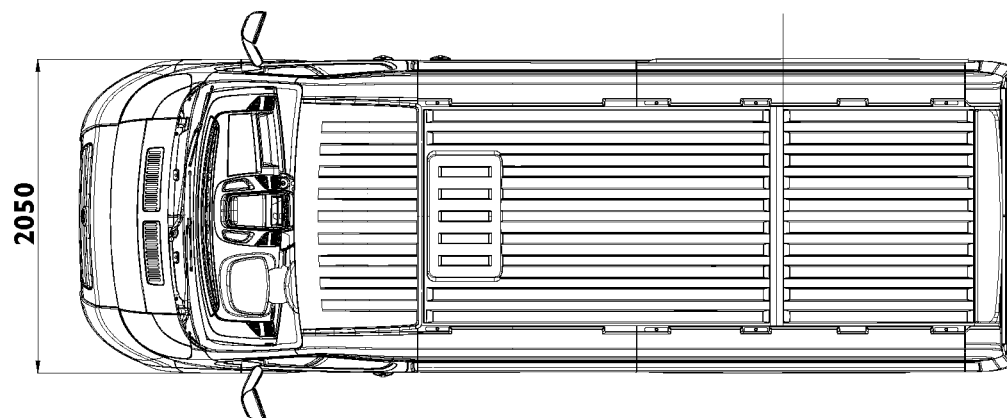
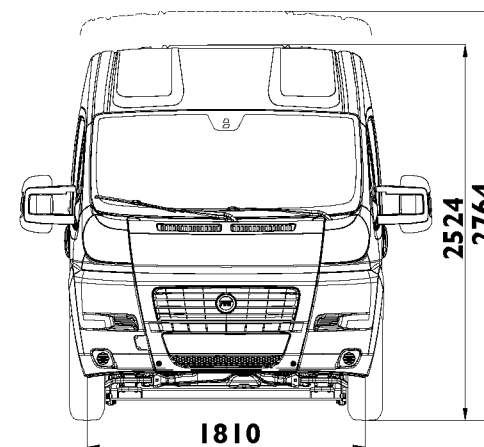
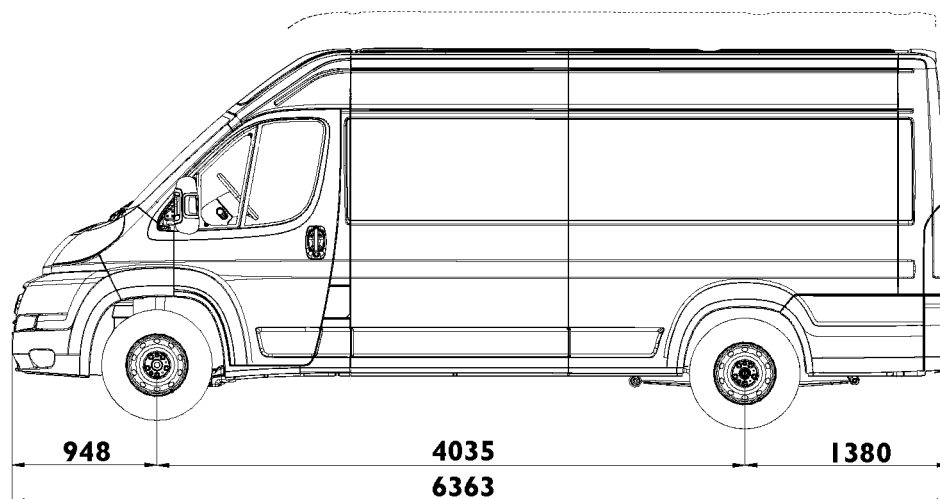
Sheet metal van – Long wheelbase H2/H3





4.7

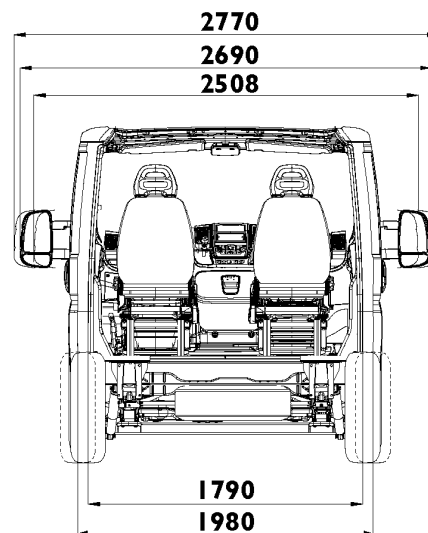
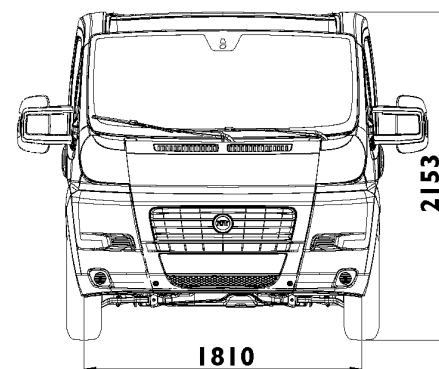
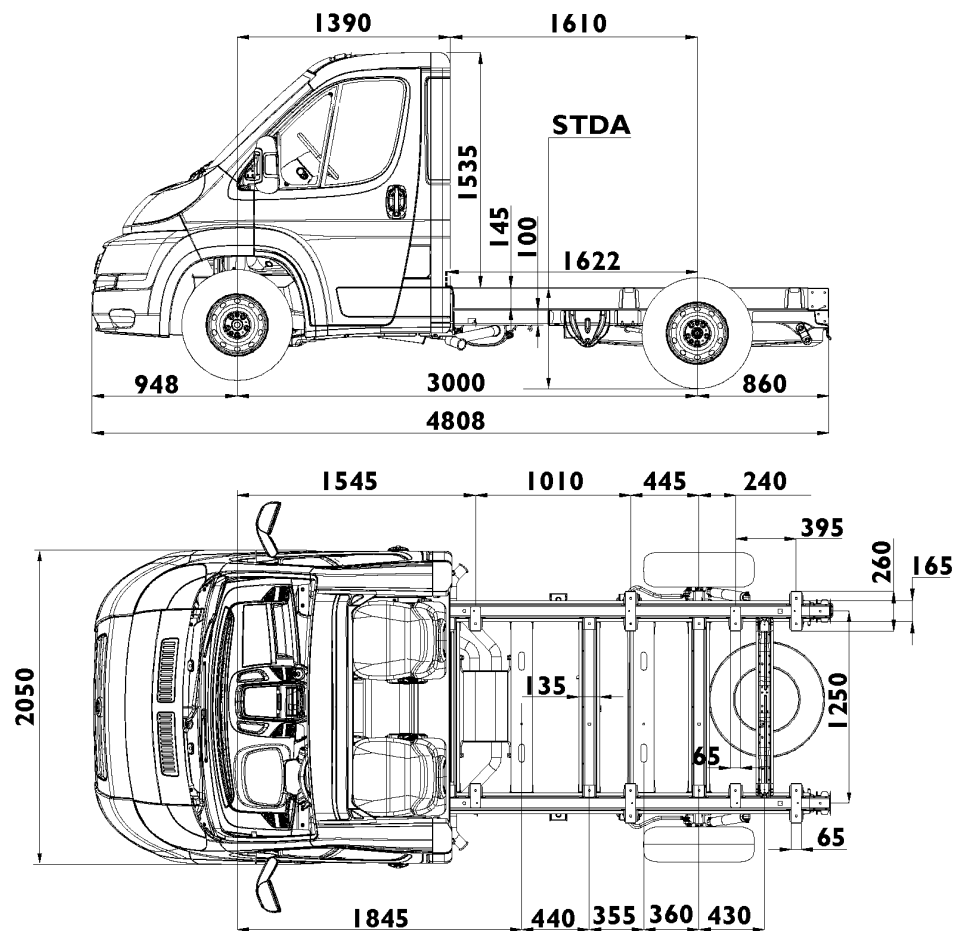
Sheet metal van – Extra-long overhang H2/H3





4.8

Short wheelbase chassis cab



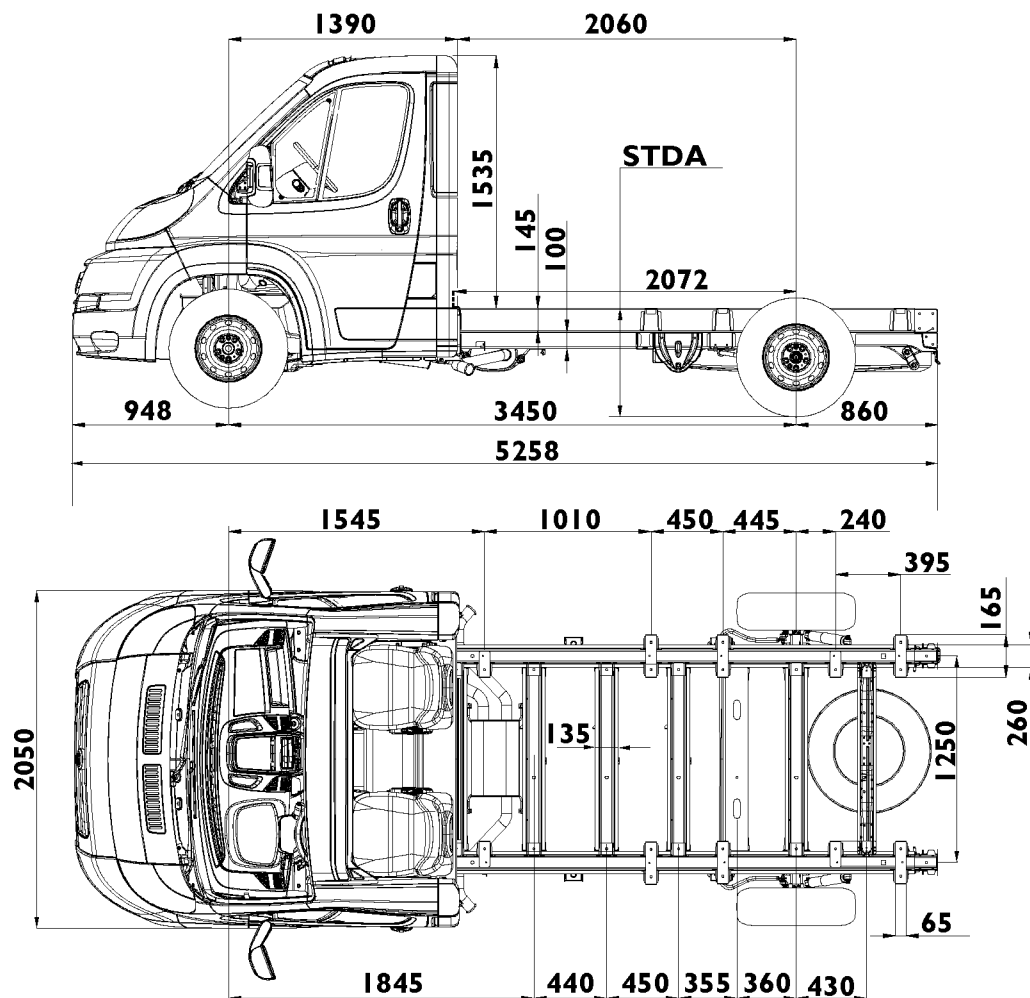
STDA: Height from ground: 650 ± 3 mm



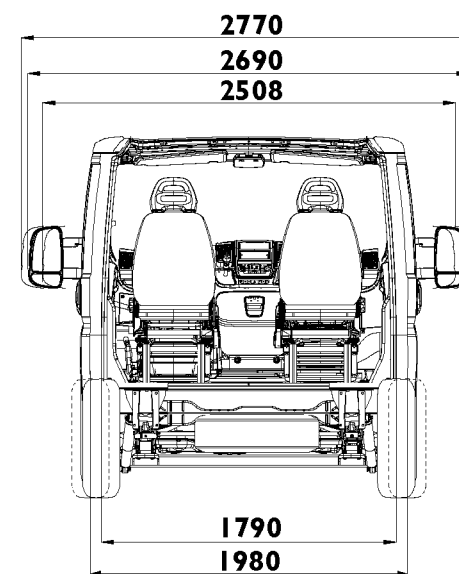
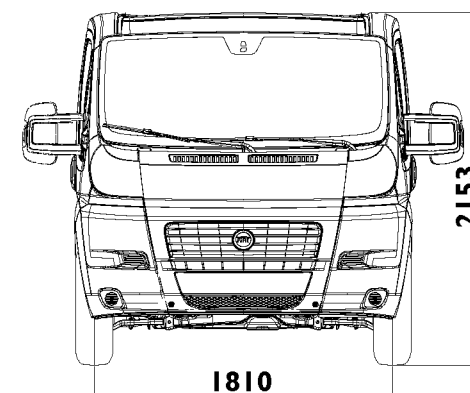


4.9

Medium wheelbase chassis cab



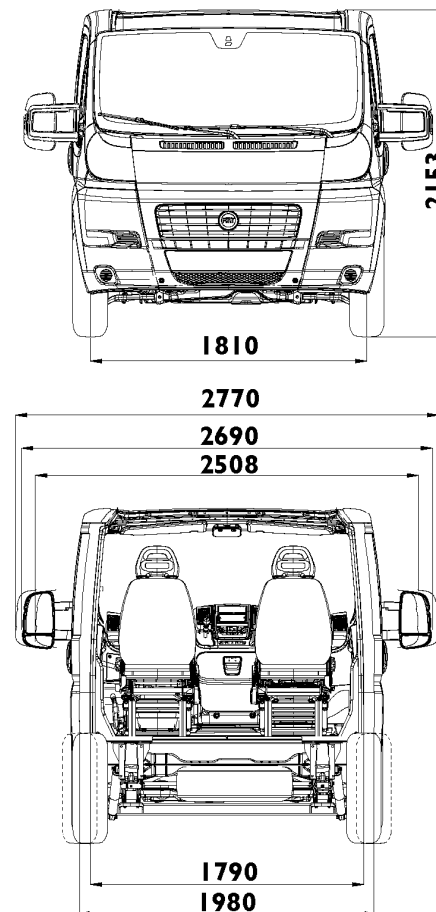
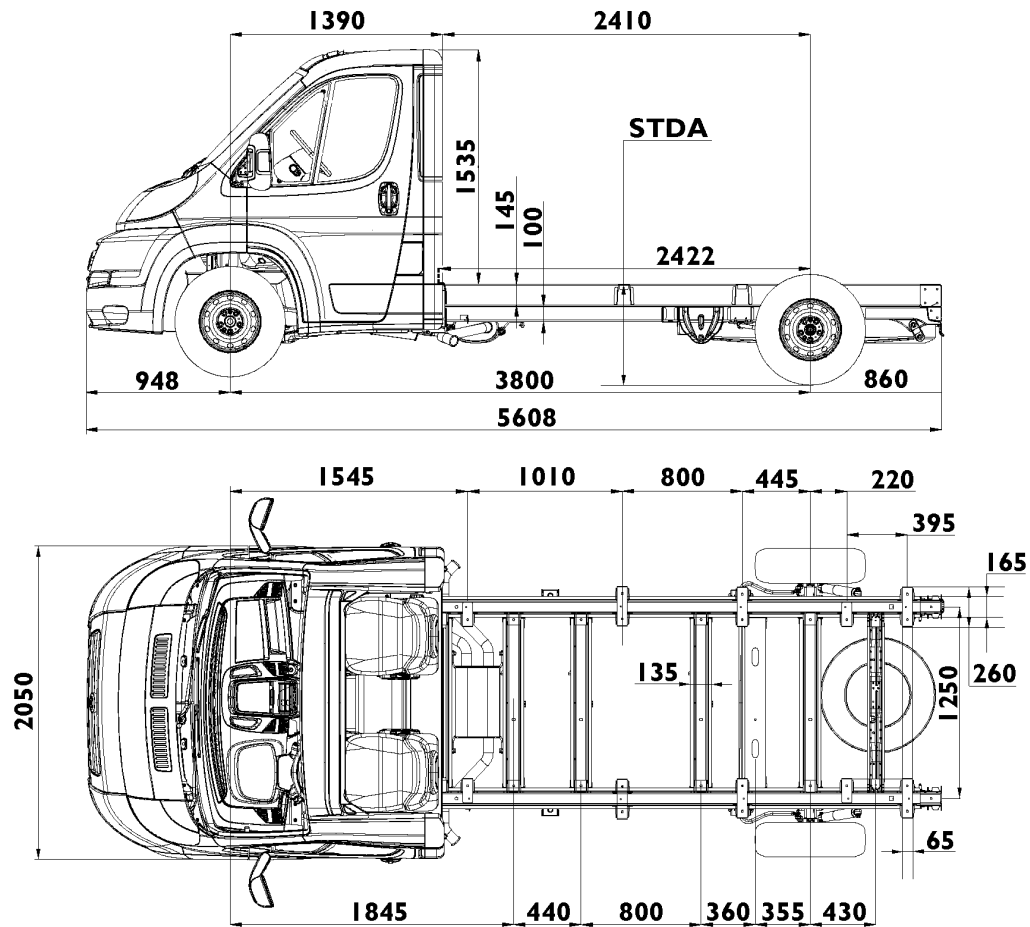
STDA: Height from ground: 646 ± 3 mm





4.10

Medium-long wheelbase chassis cab



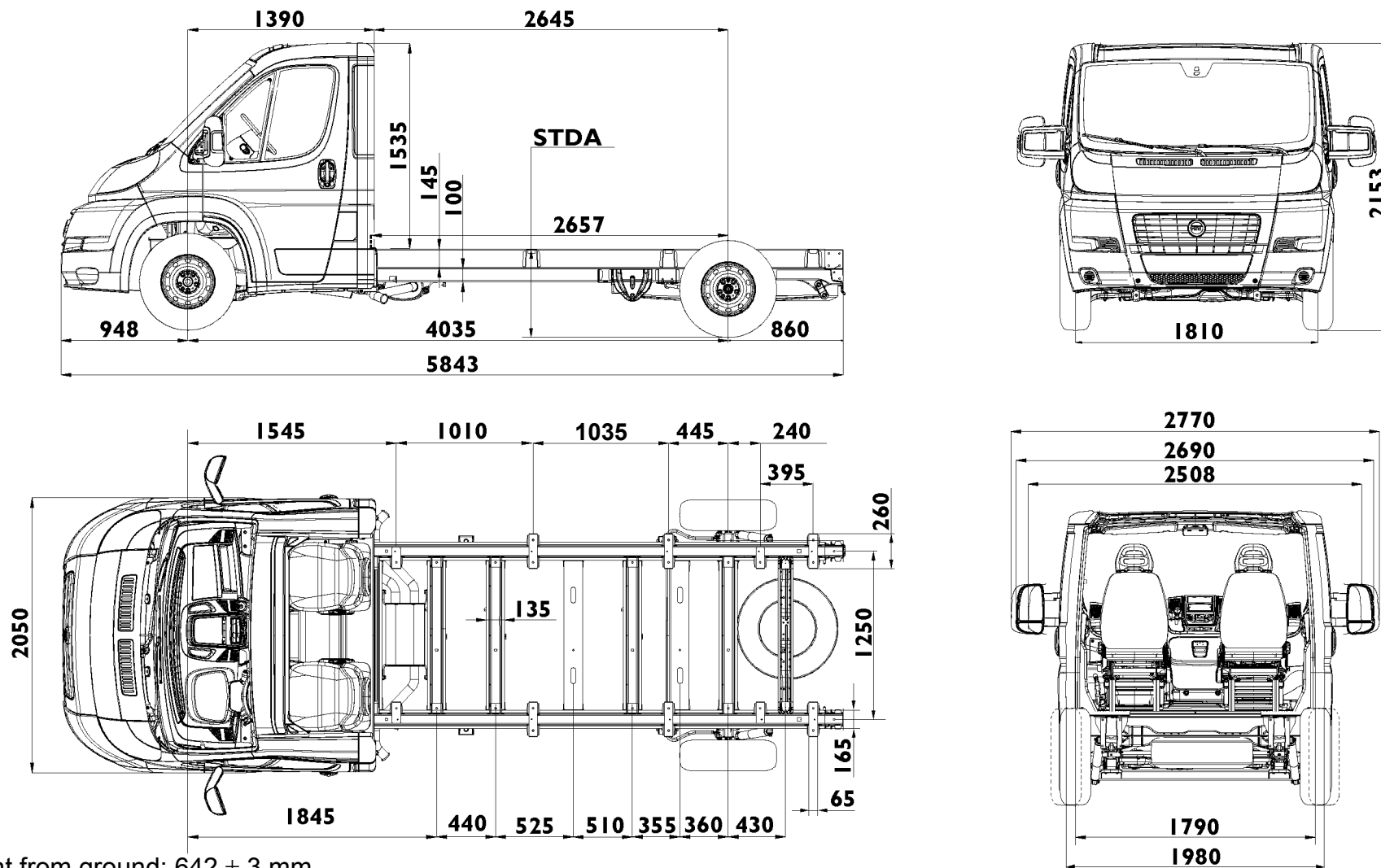
STDA : Height from ground: 650 mm (Payload 3000) – 647 mm (Payload 3300)
645 mm (Payload 3500)





4.11

Long wheelbase chassis cab



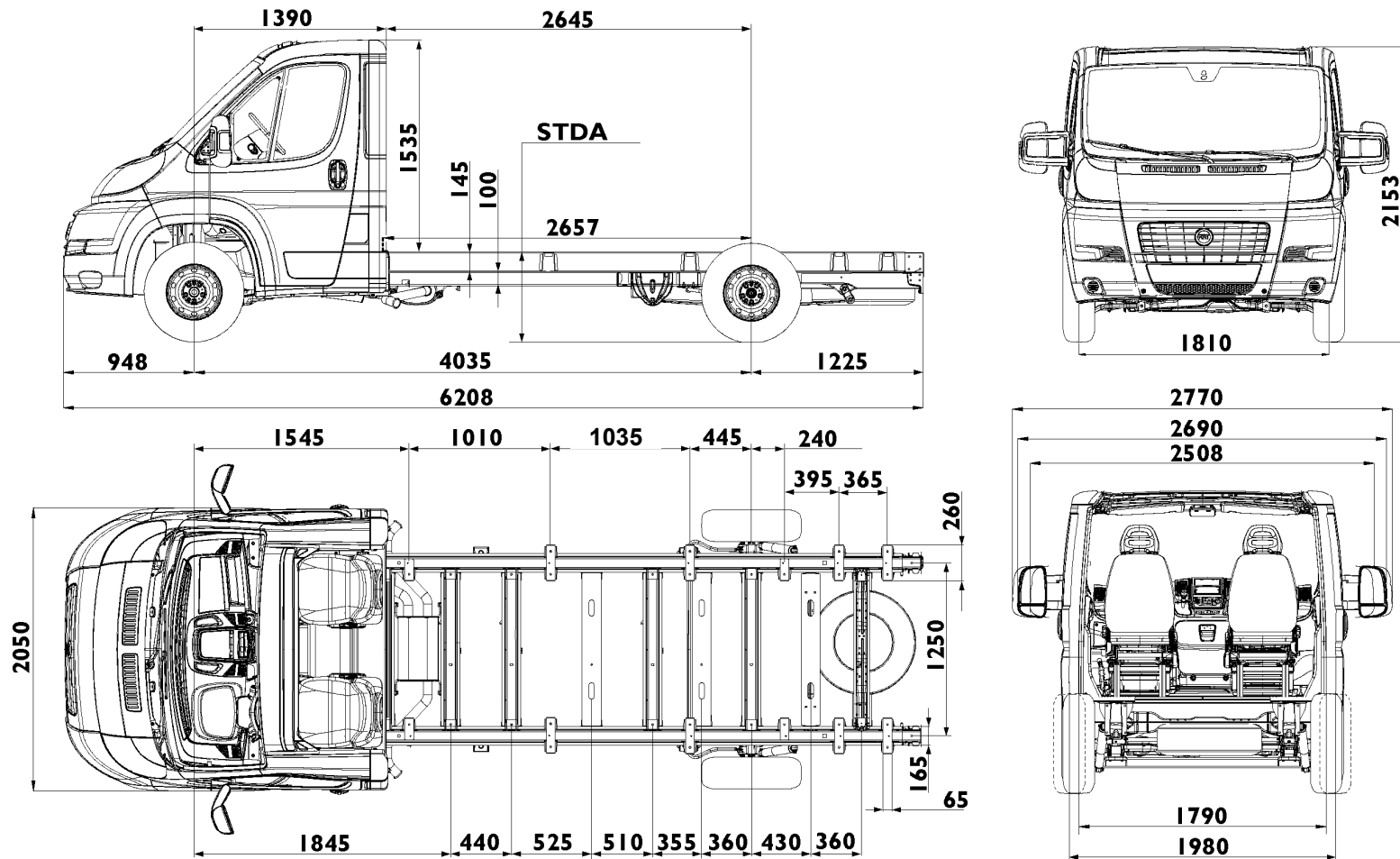
STDA: Height from ground: 642 ± 3 mm





4.12

Extra-long overhang chassis cab



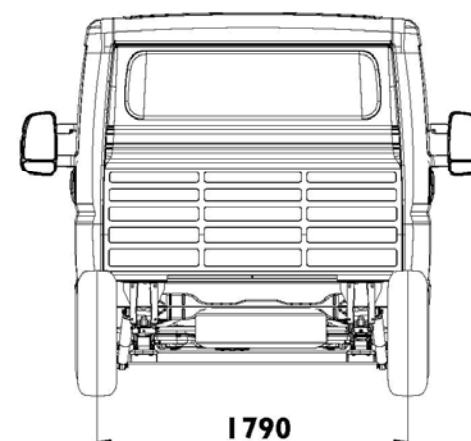
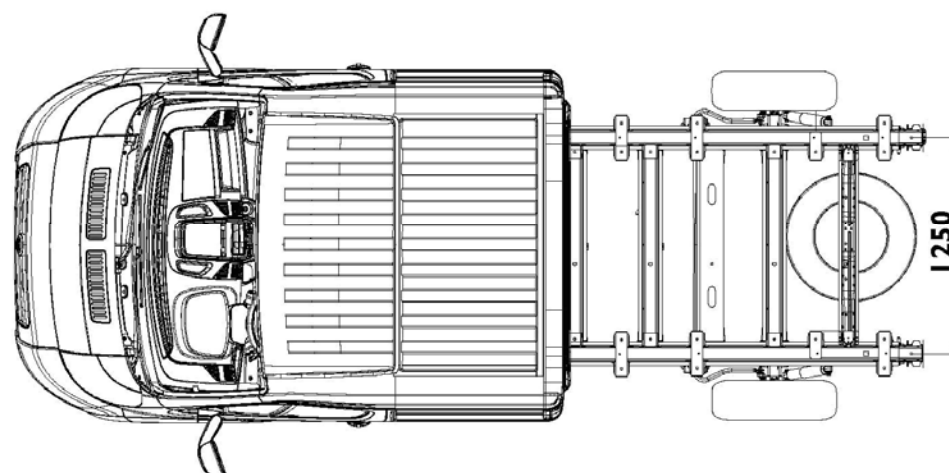
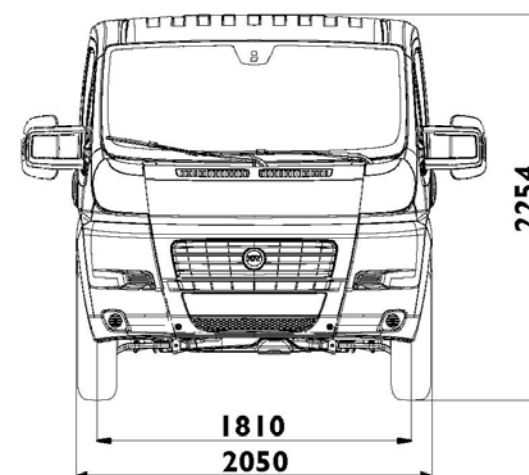
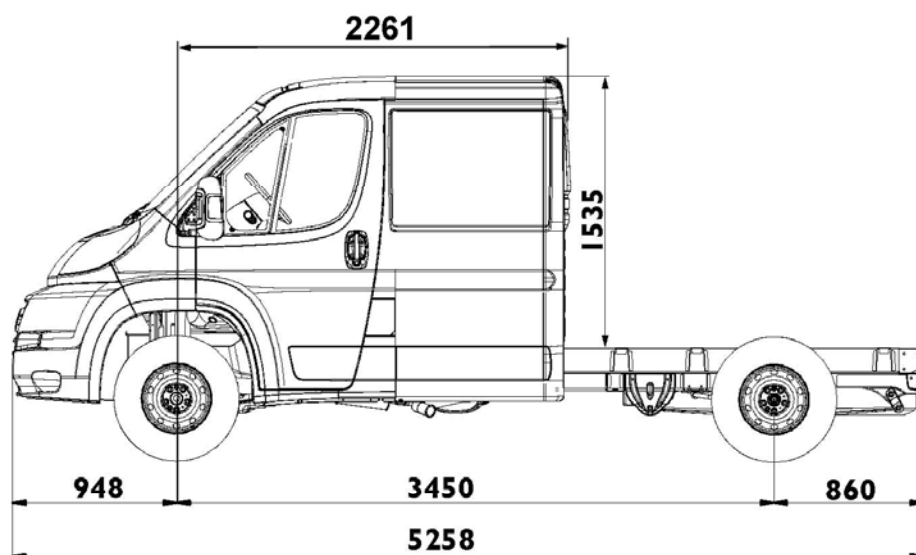
STDA: Height from ground: 640 ± 3 mm





4.13

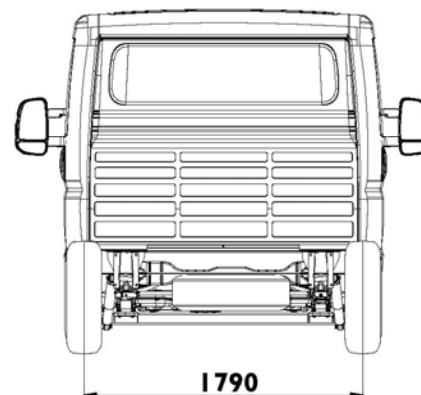
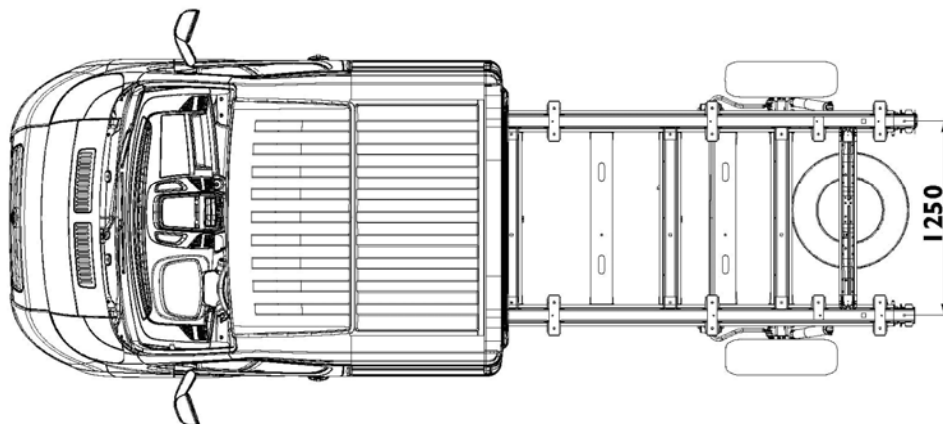
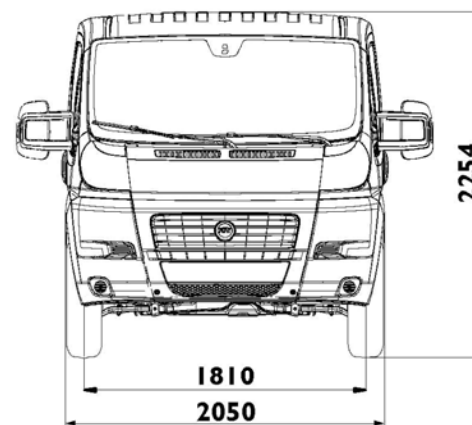
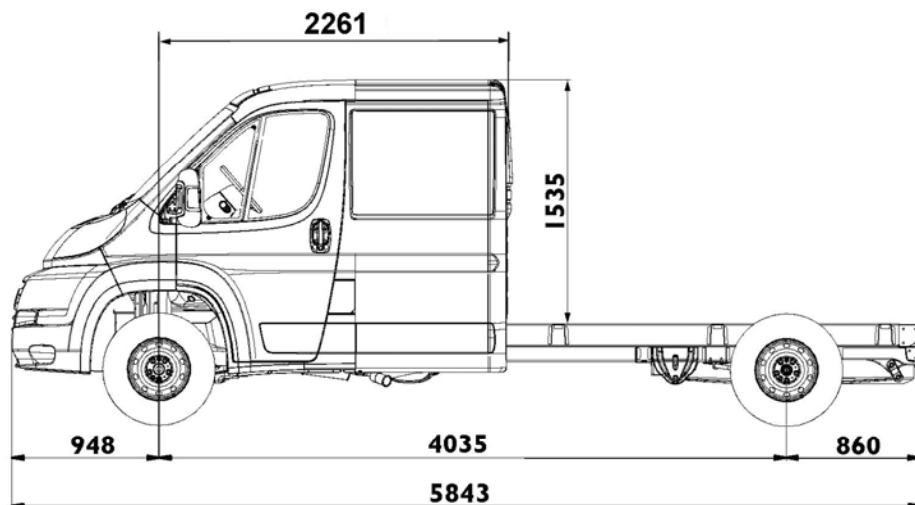
Double cab medium wheelbase chassis cab





4.14

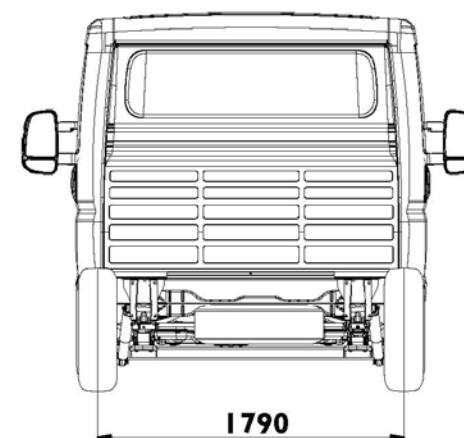
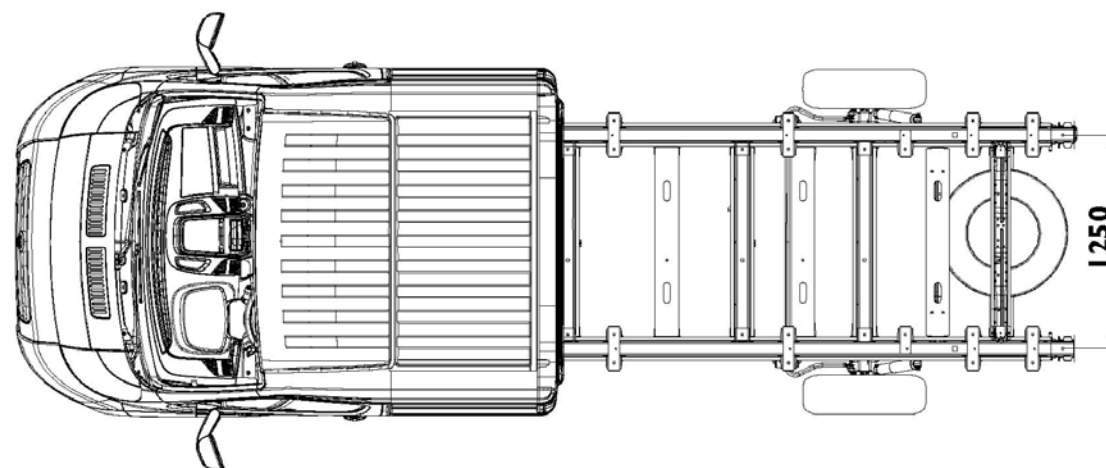
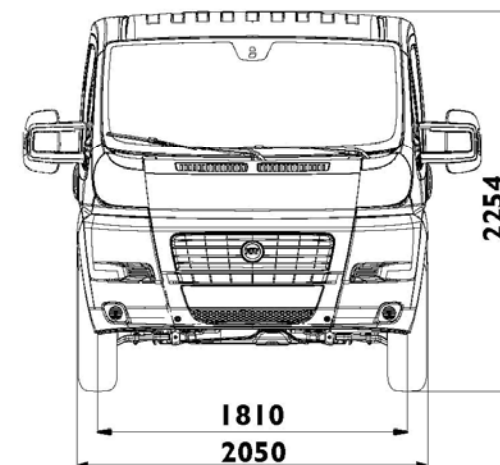
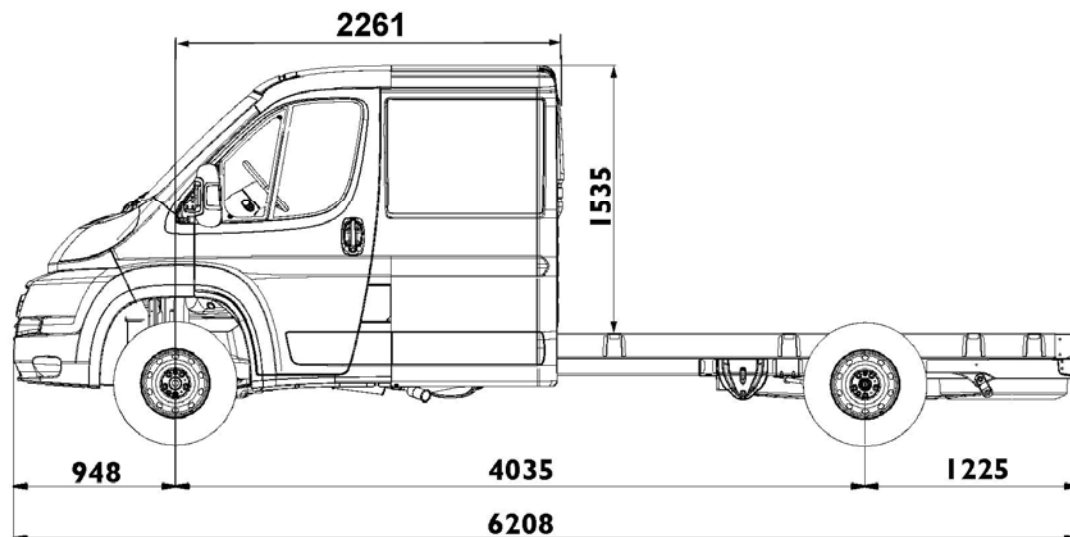
Double cab long wheelbase chassis cab





4.15

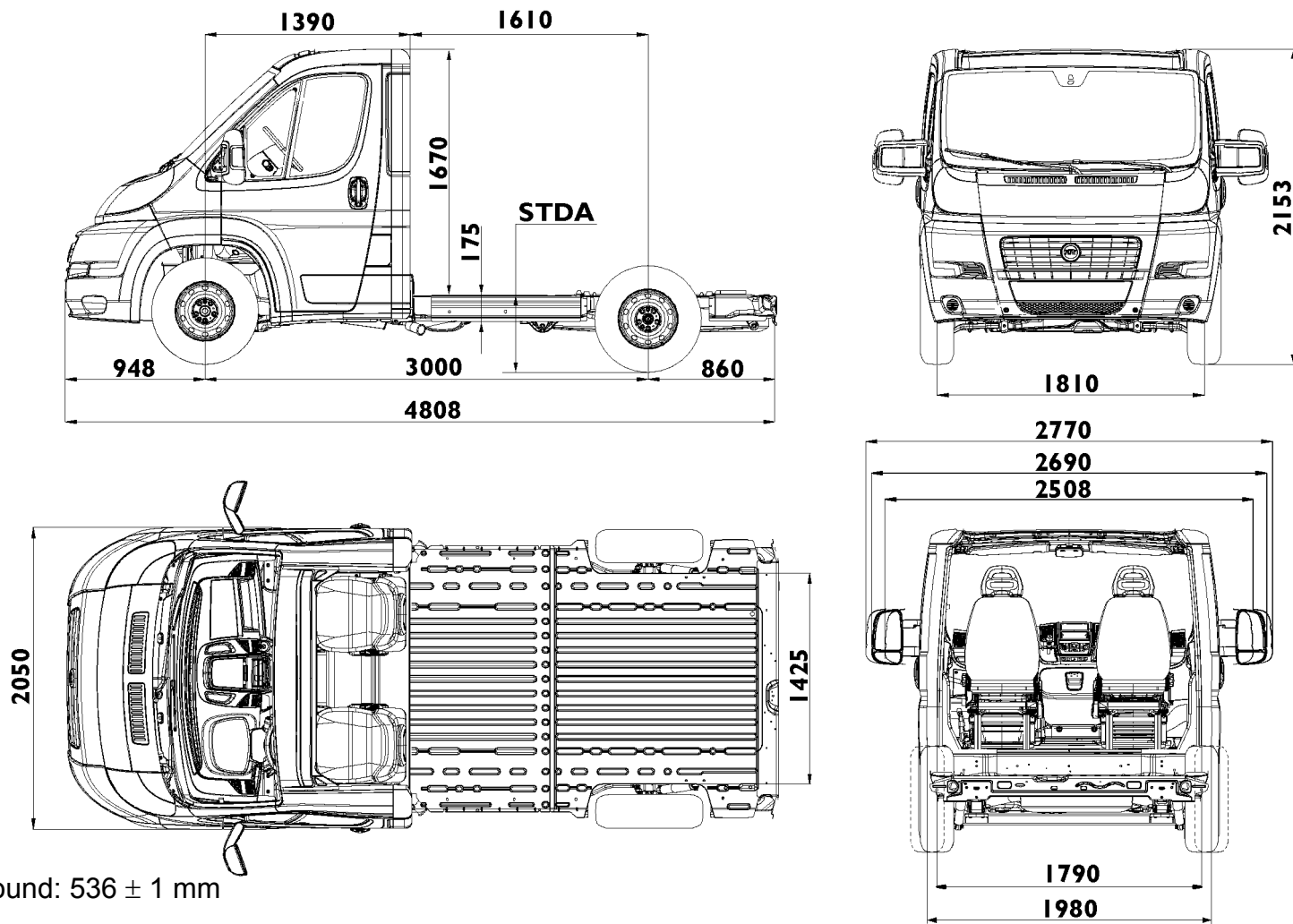
Double cab extra long overhang chassis cab





4.16

Short wheelbase chassis cab with platform



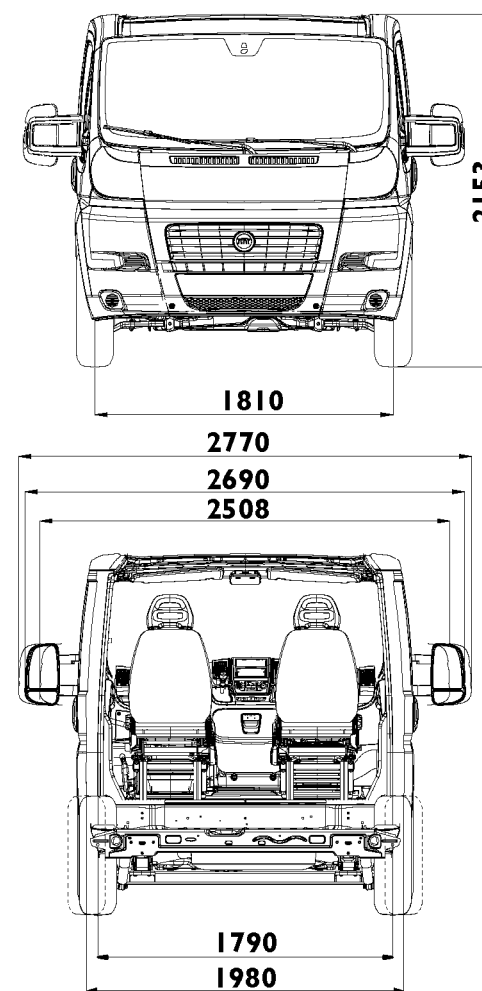
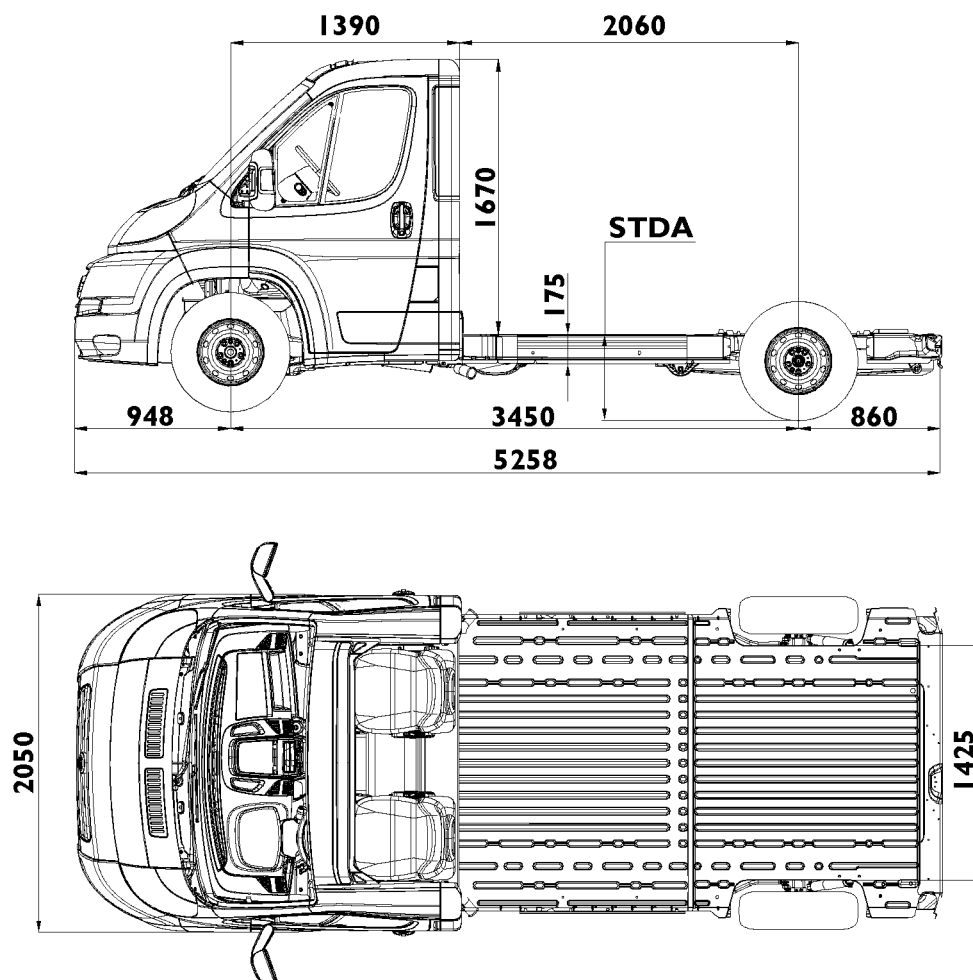
STDA: Height from ground: 536 ± 1 mm





4.17

Medium wheelbase chassis cab with platform



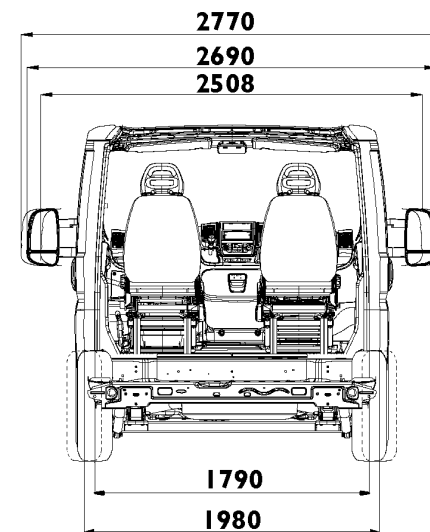
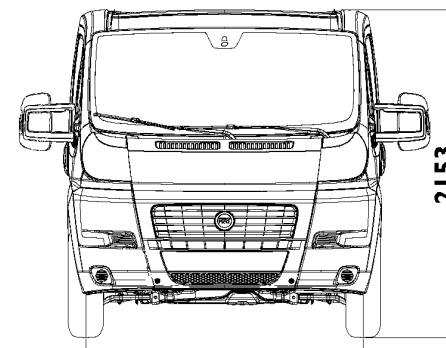
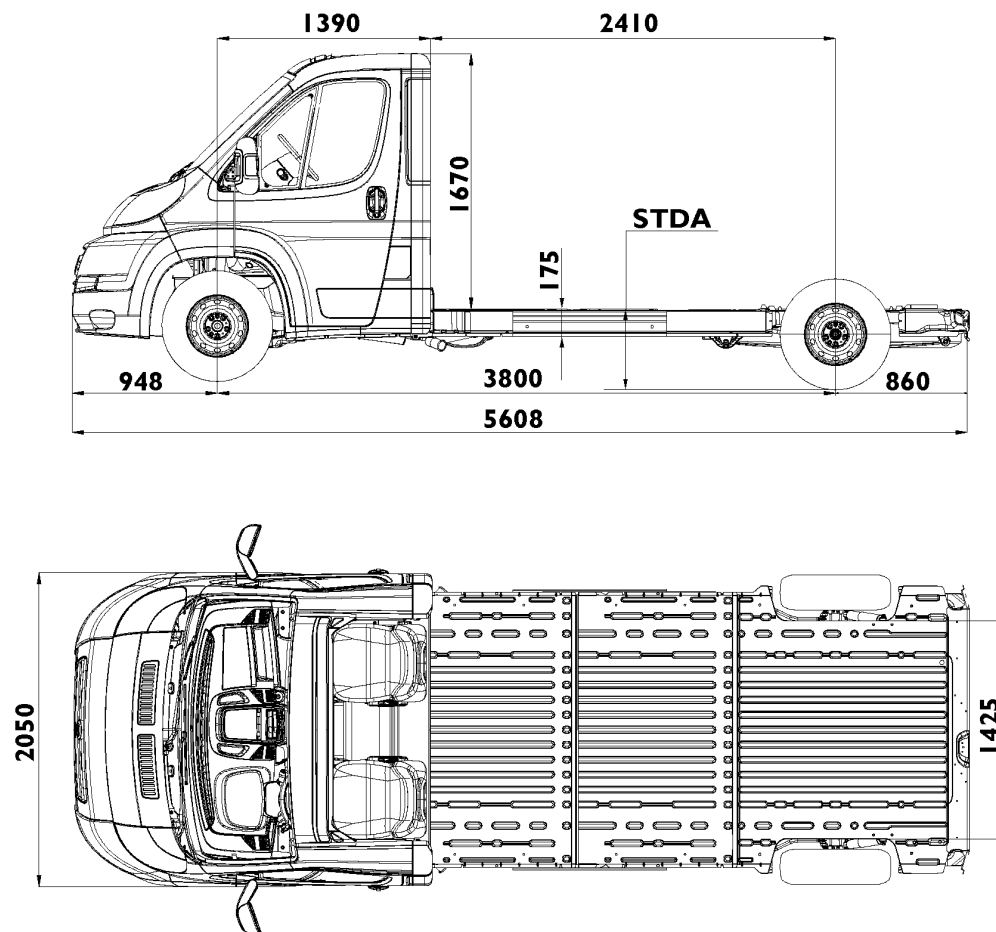
STDA: Height from ground: 545 mm (Payload 3000)





4.18

Medium-long wheelbase chassis cab with platform



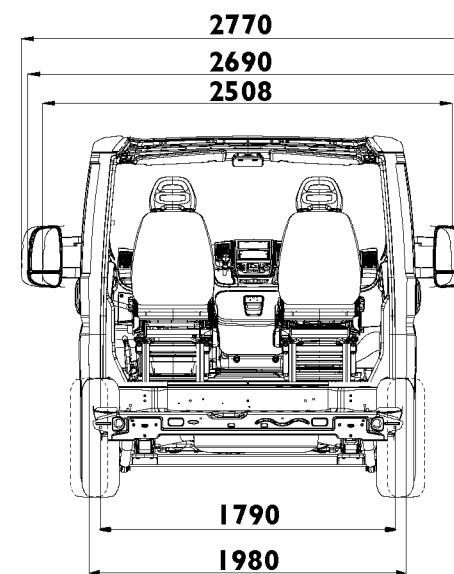
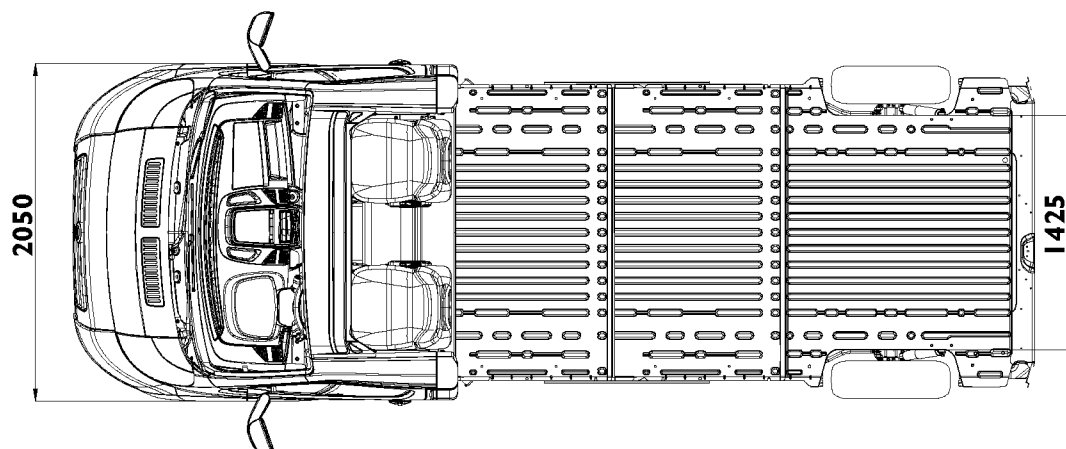
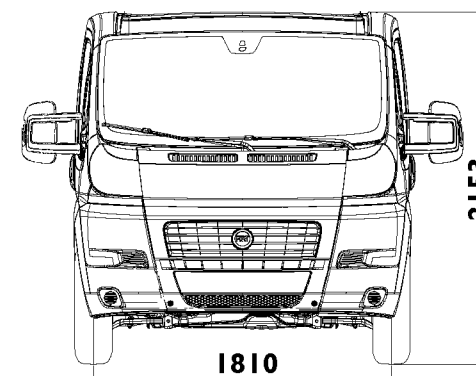
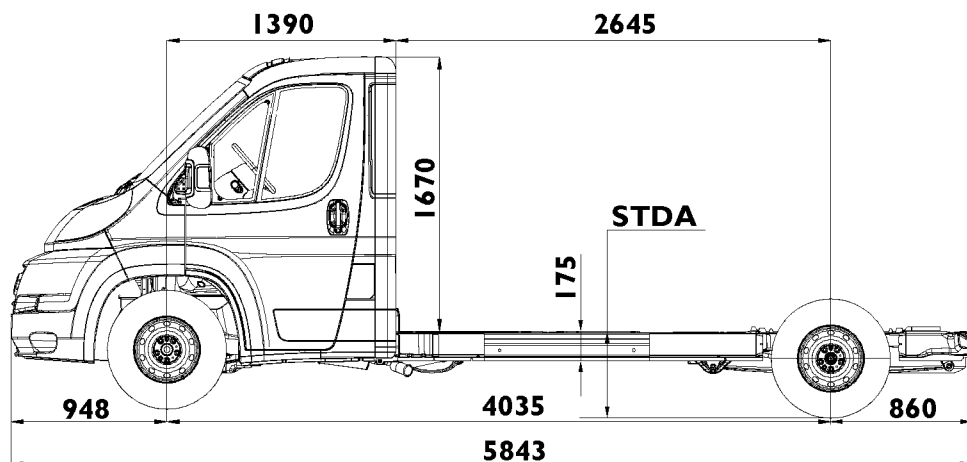
STDA: Height from ground: 550 mm (Payload 3000)
521 ± 1 mm (Payload 3300 and 3500)





4.19

Long wheelbase chassis cab with platform



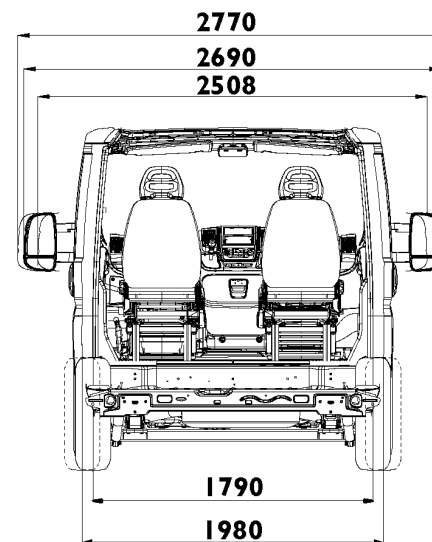
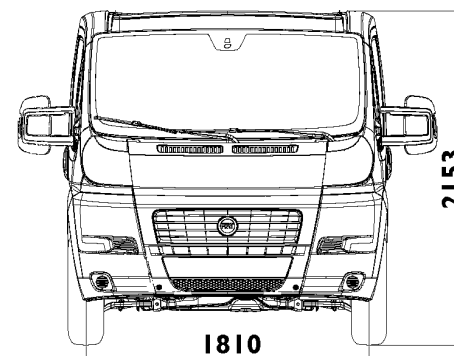
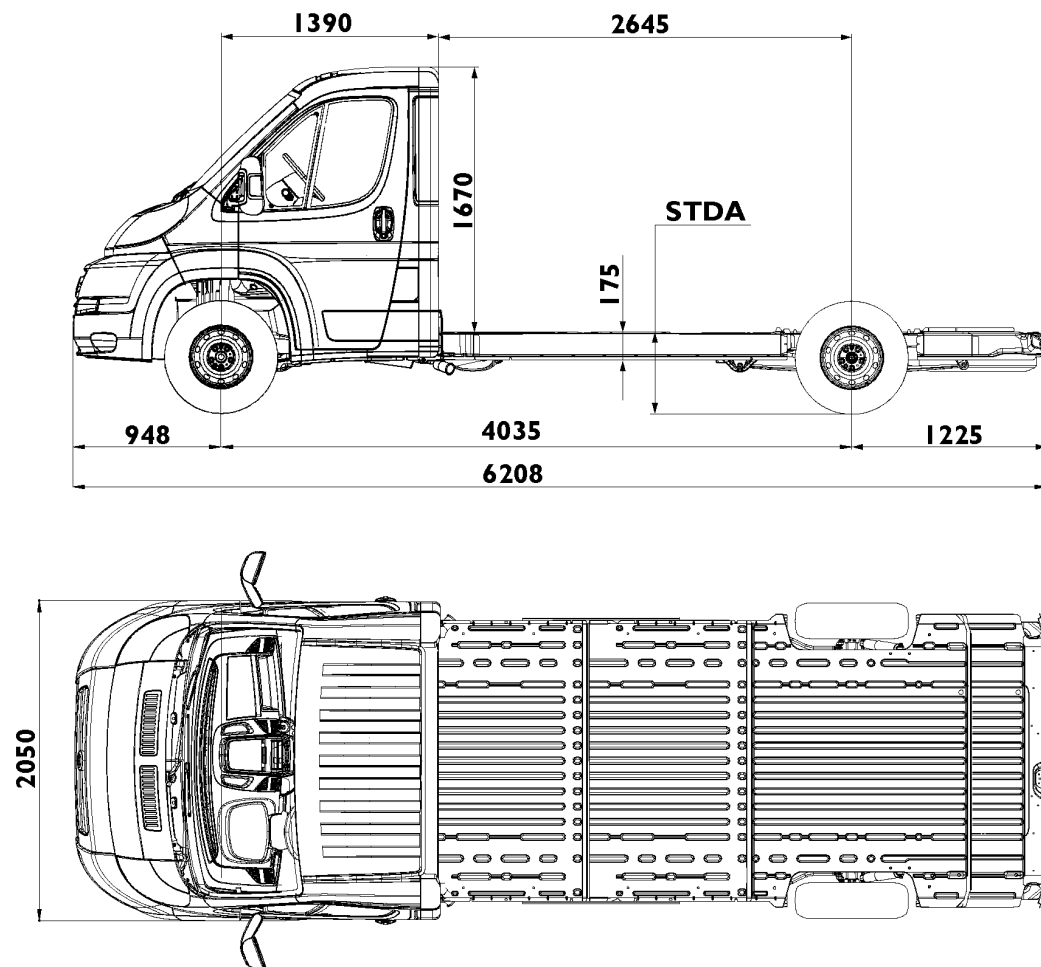
STDA: Height from ground: 518 ± 2 mm





4.20

Extra-long overhang chassis cab with platform



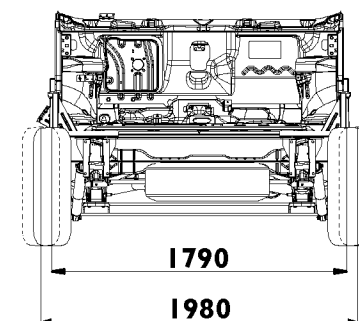
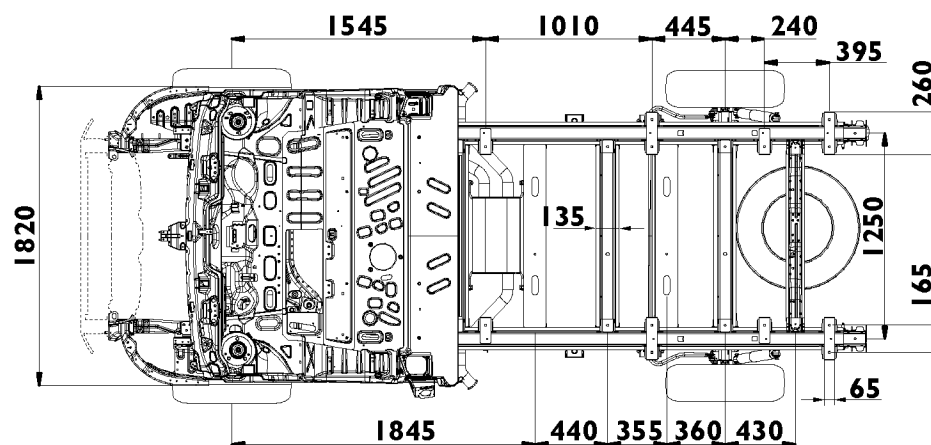
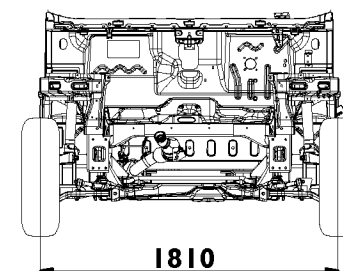
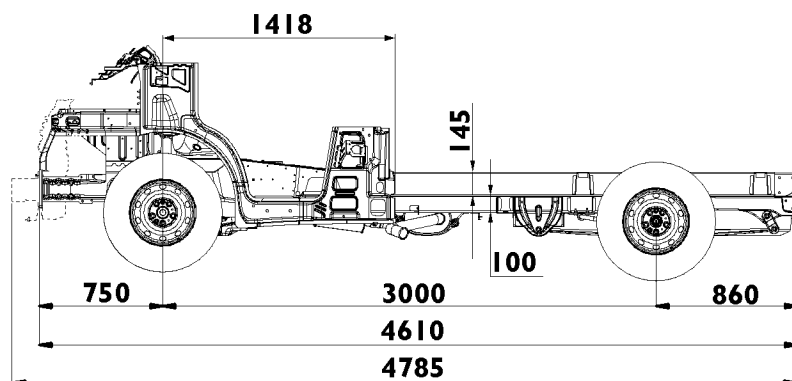
STDA: Height from ground: 521 ± 1 mm





4.21

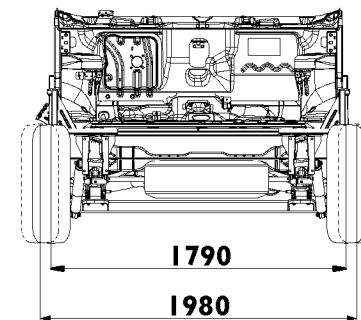
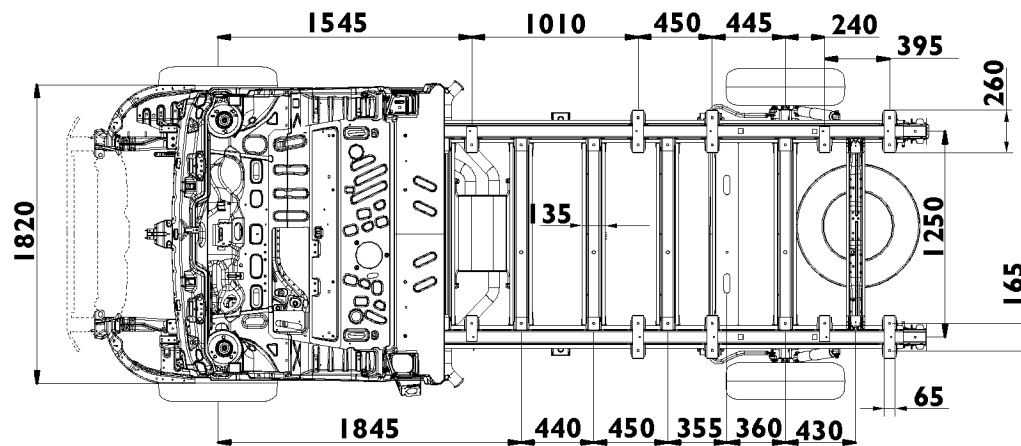
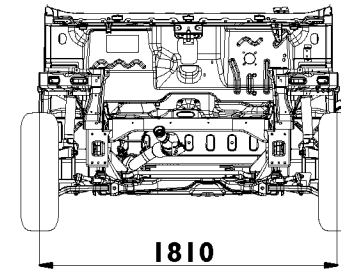
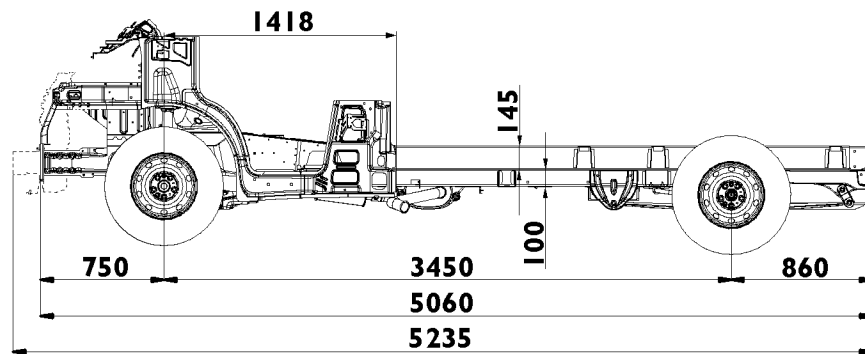
Short wheelbase basic chassis

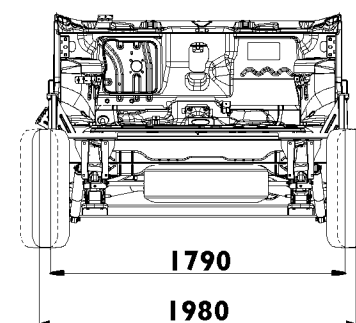
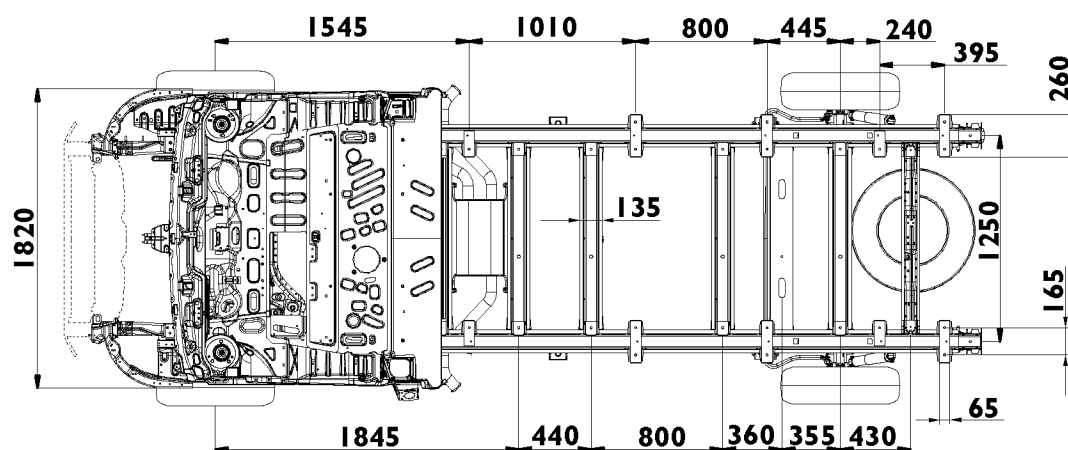
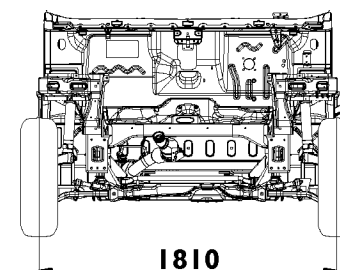




4.22

Medium wheelbase basic chassis

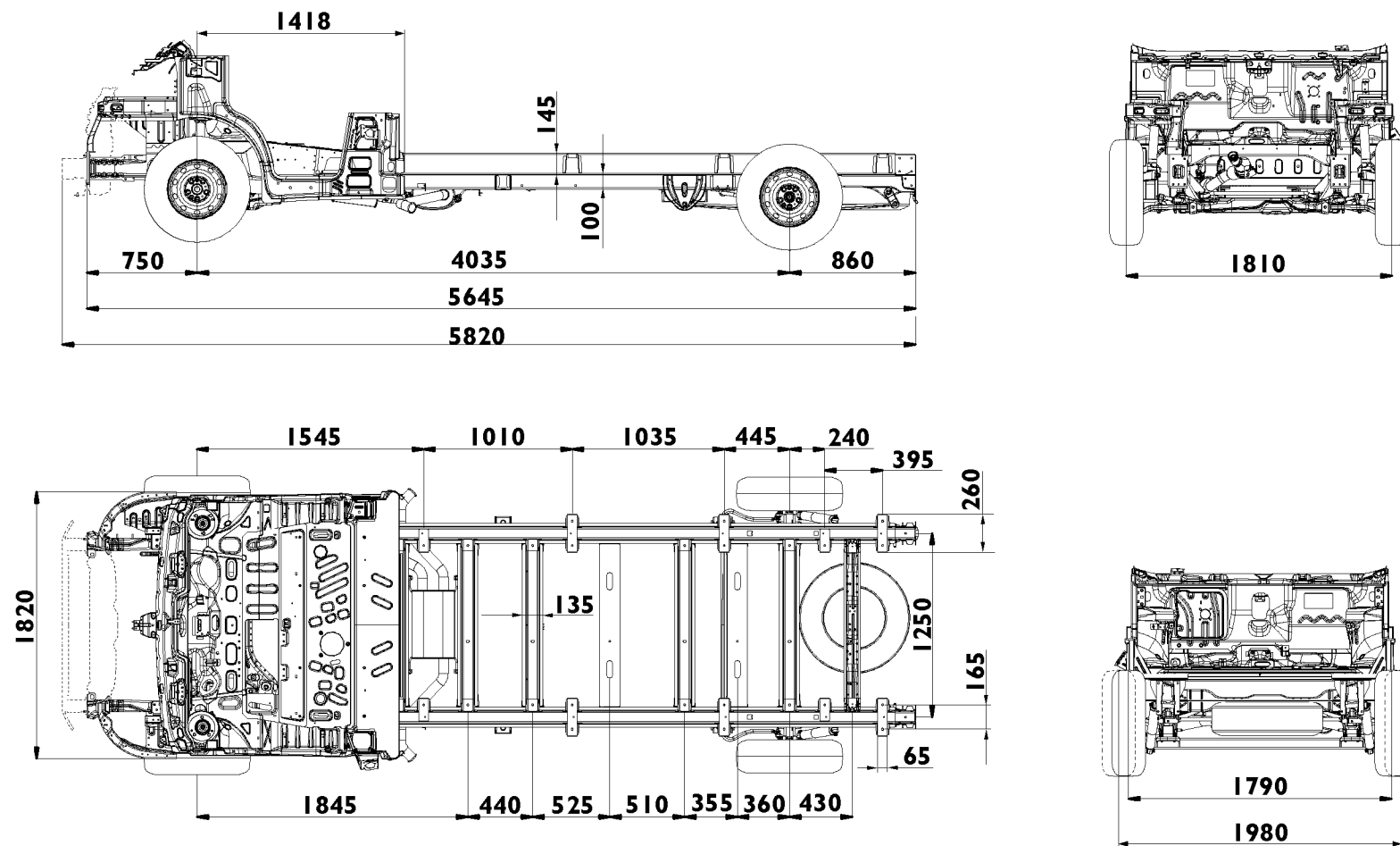






4.24

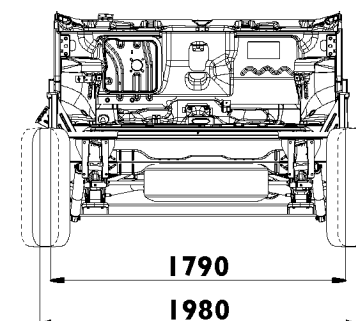
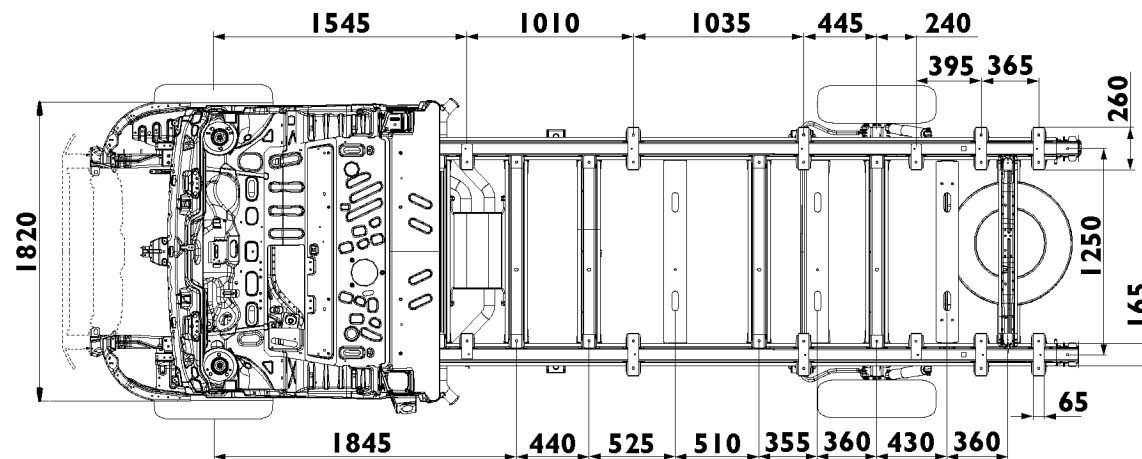
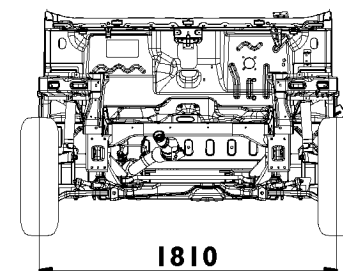
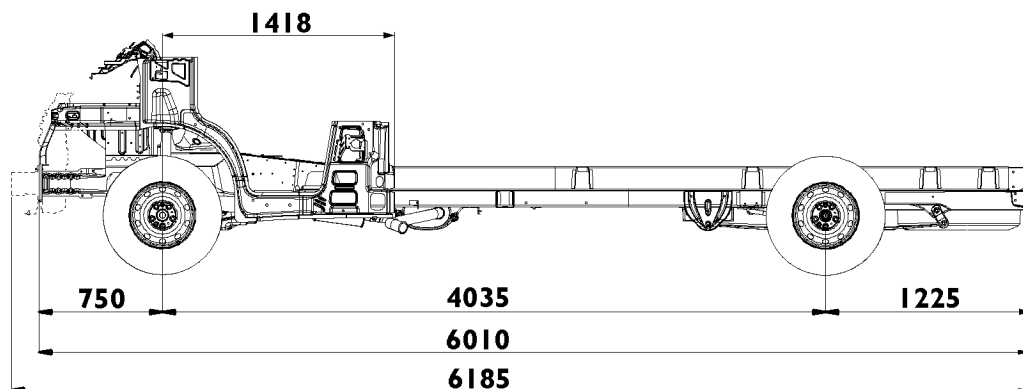
Long wheelbase basic chassis





4.25

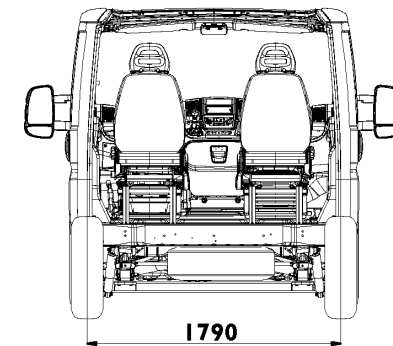
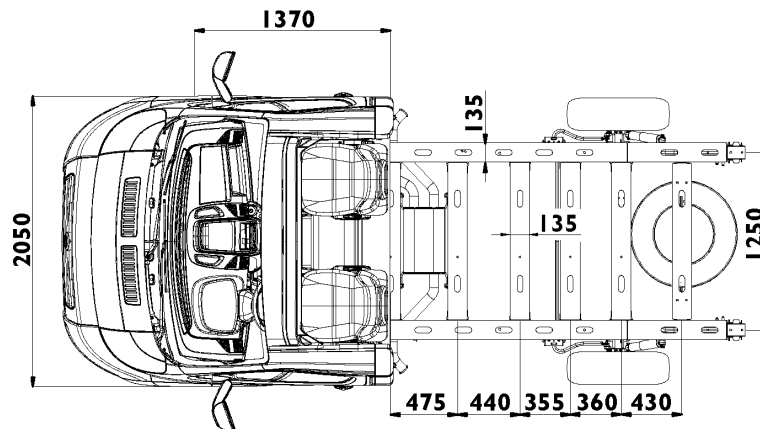
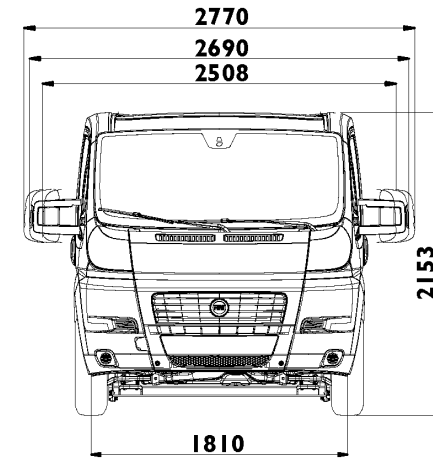
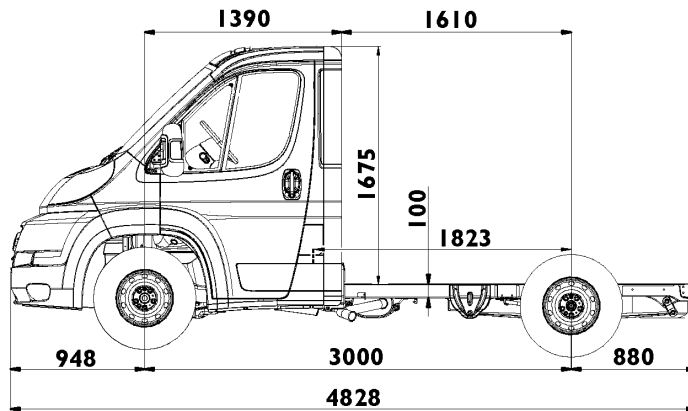
Extra-long overhang basic chassis





4.26

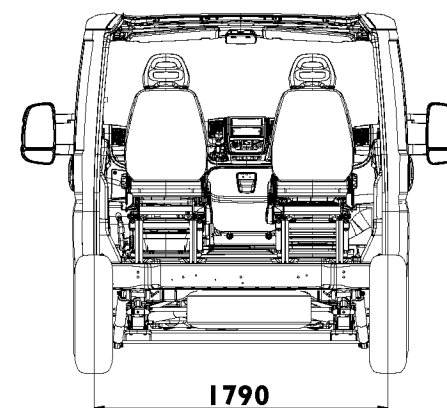
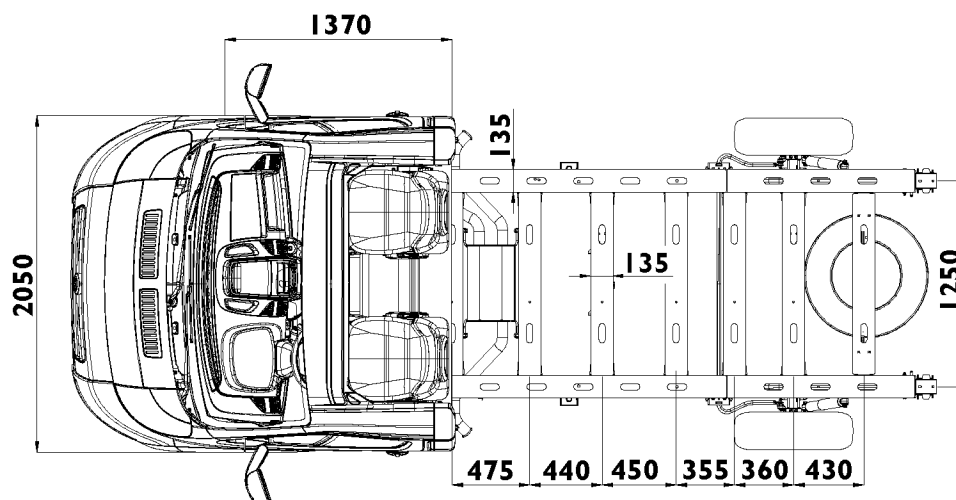
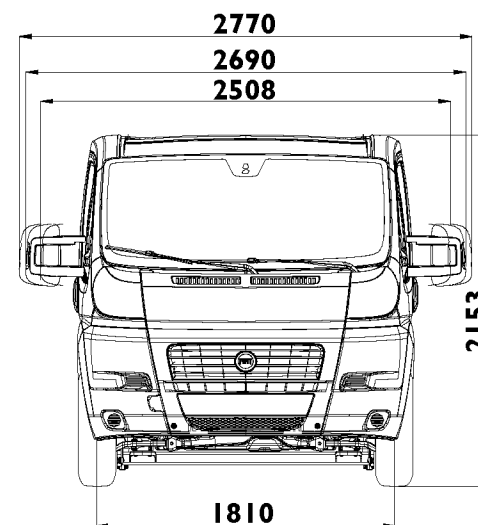
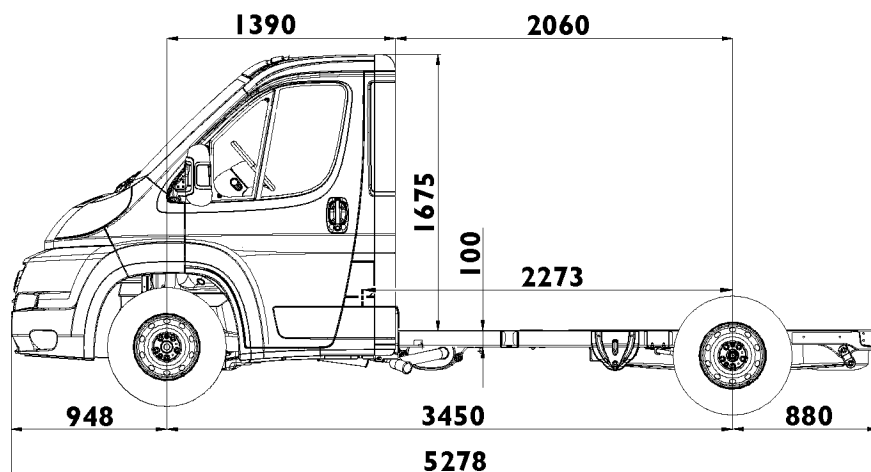
Short wheelbase special chassis cab





4.27

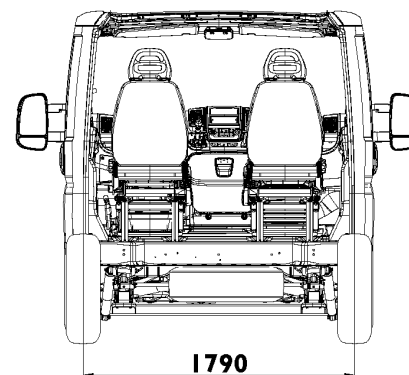
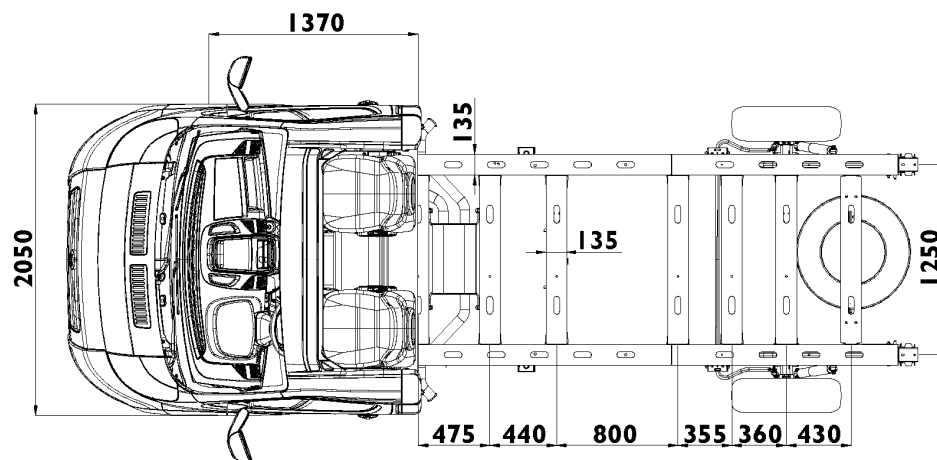
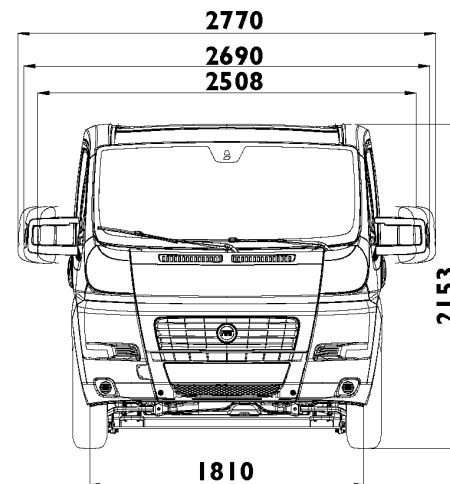
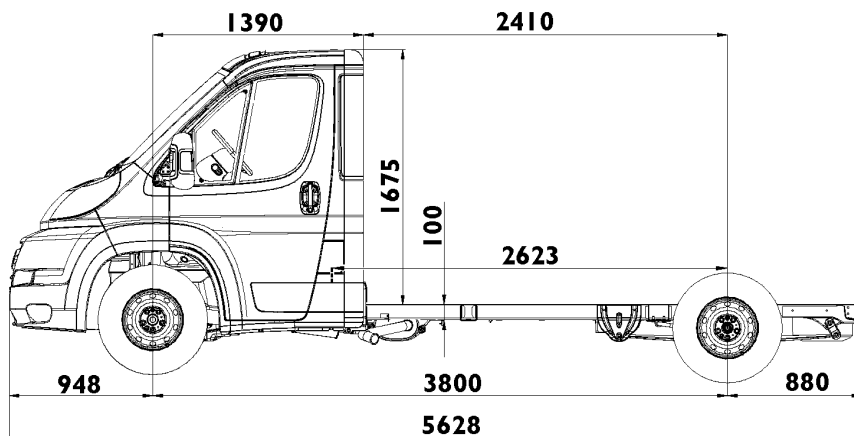
Medium wheelbase special chassis cab





4.28

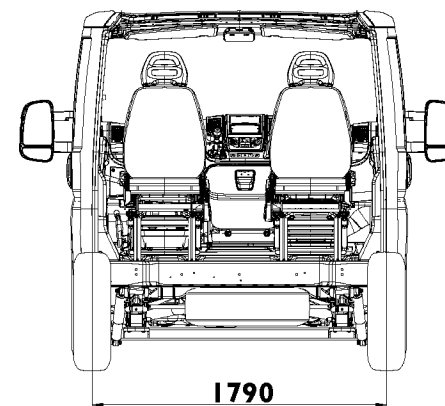
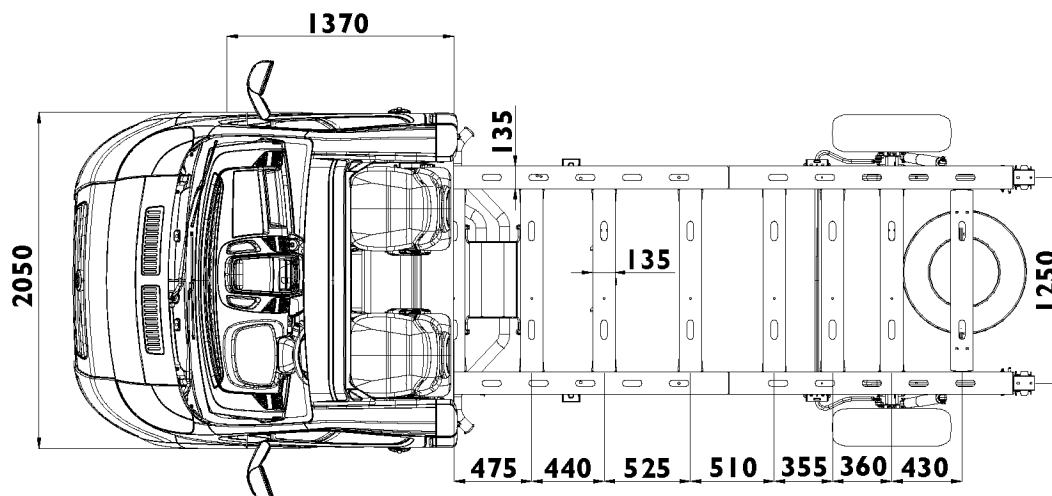
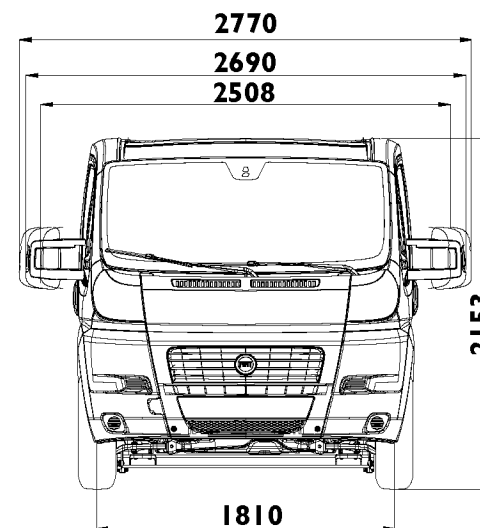
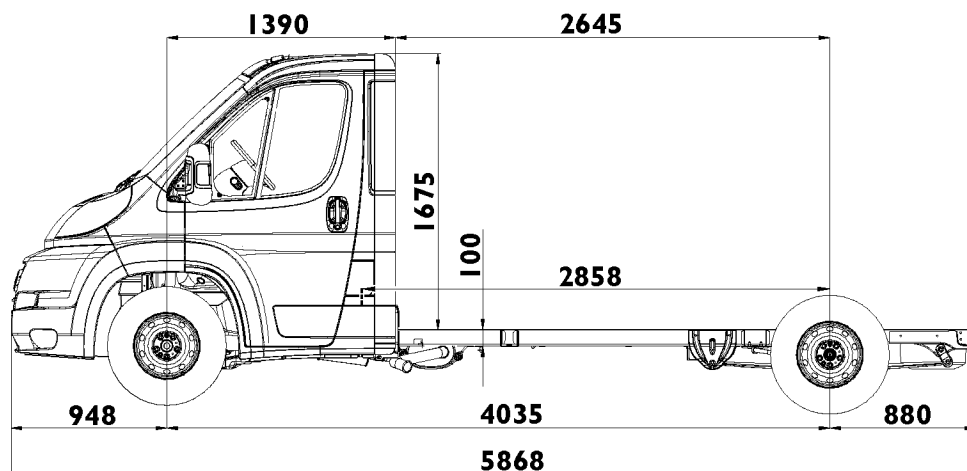
Medium-long wheelbase special chassis cab





4.29

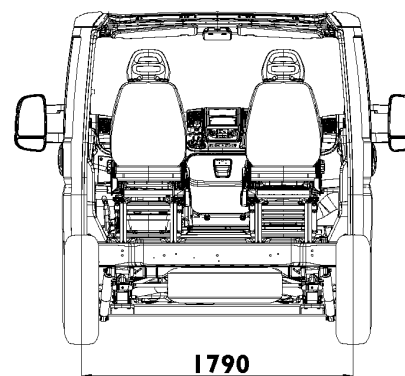
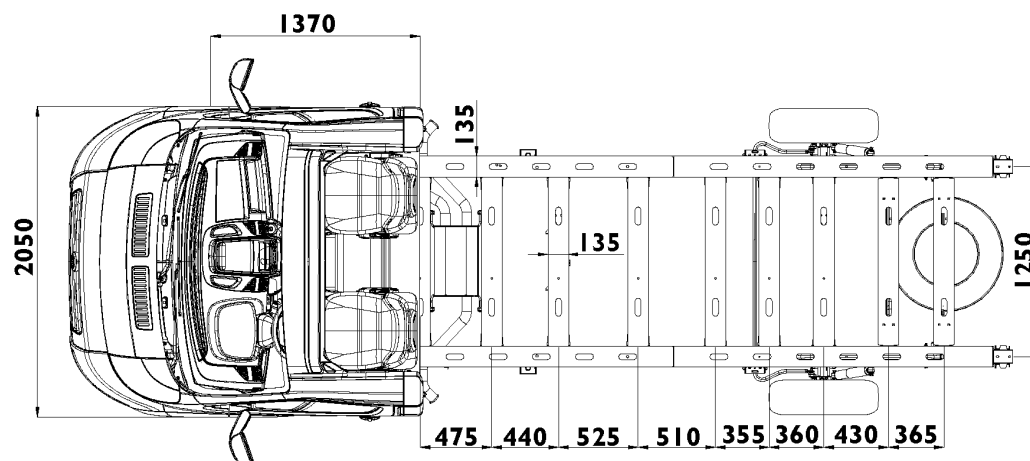
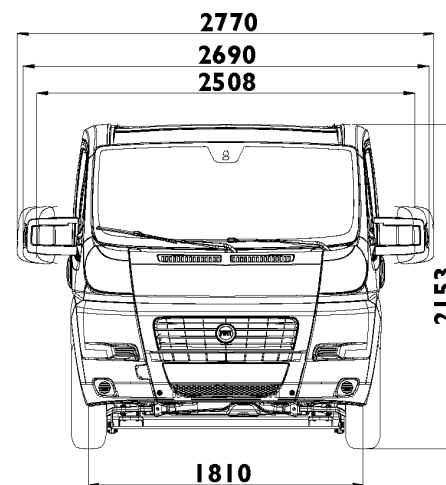
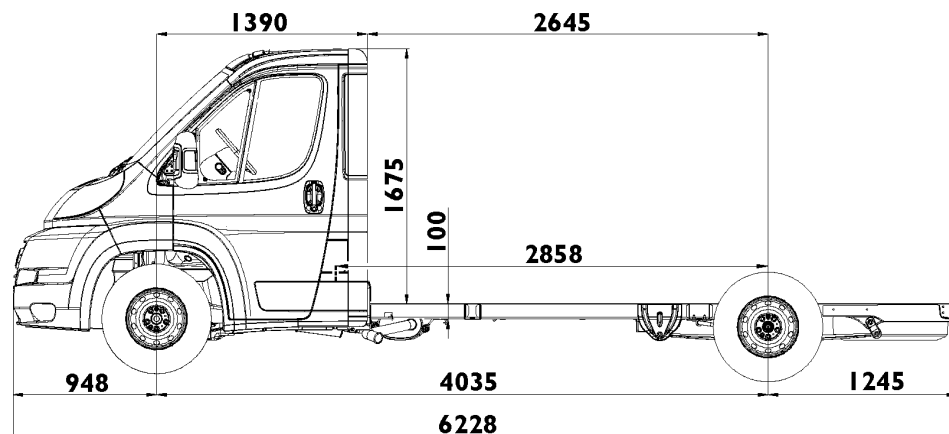
Long wheelbase special chassis cab





4.30

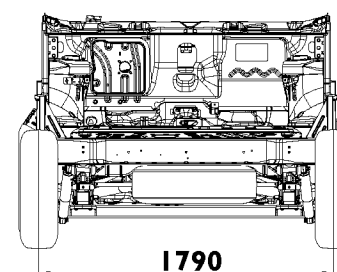
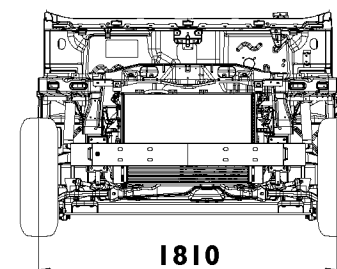
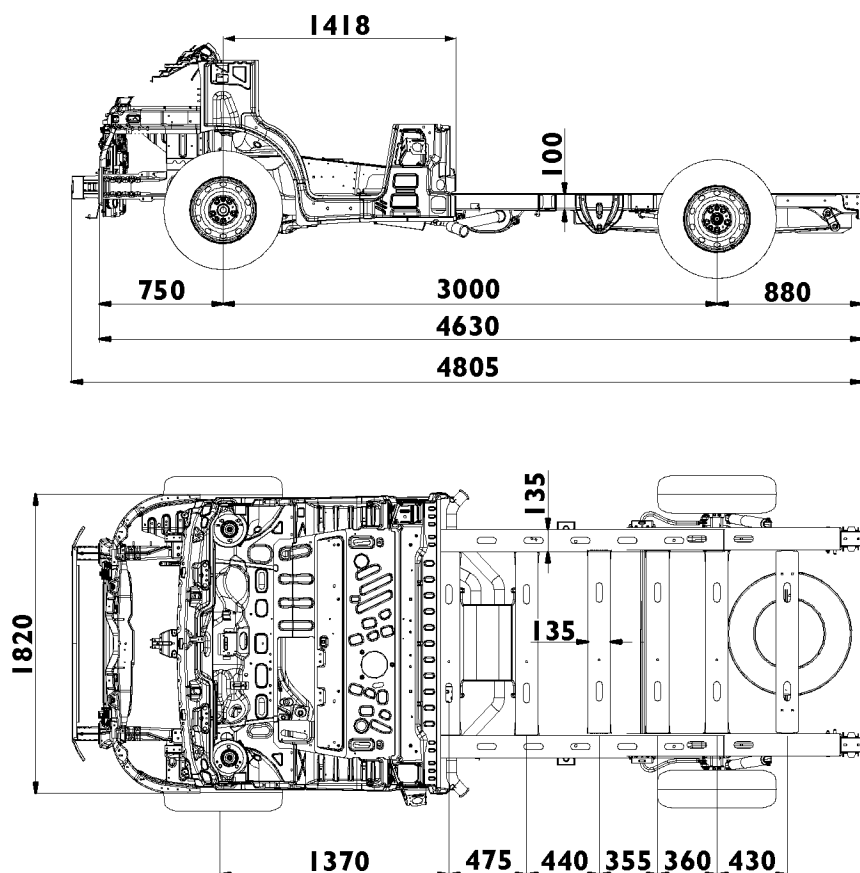
Extra-long overhang special chassis cab





4.31

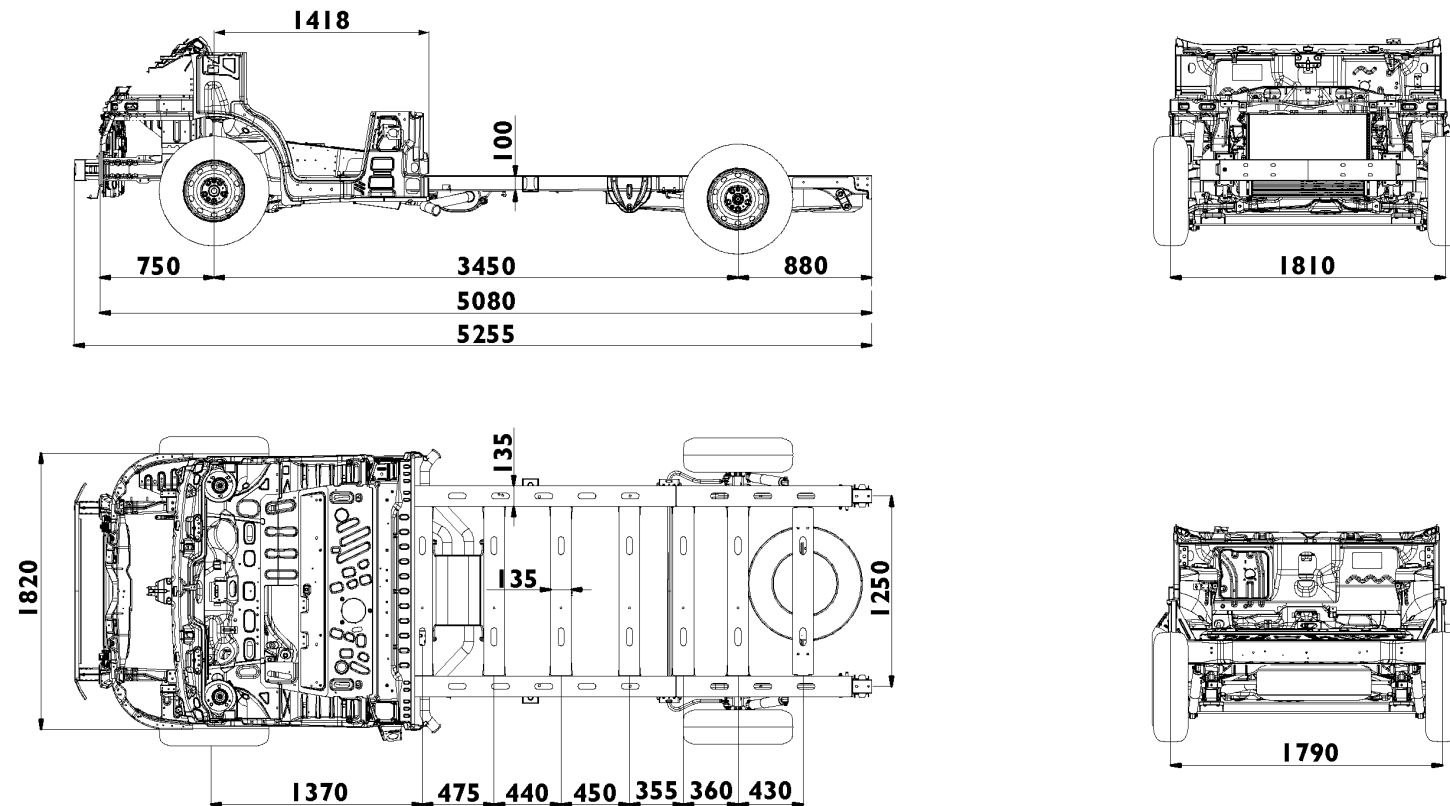
Short wheelbase special basic chassis





4.32

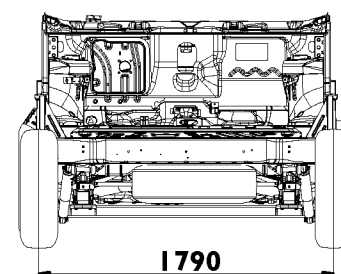
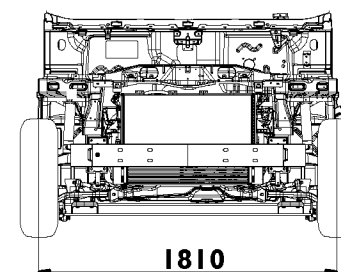
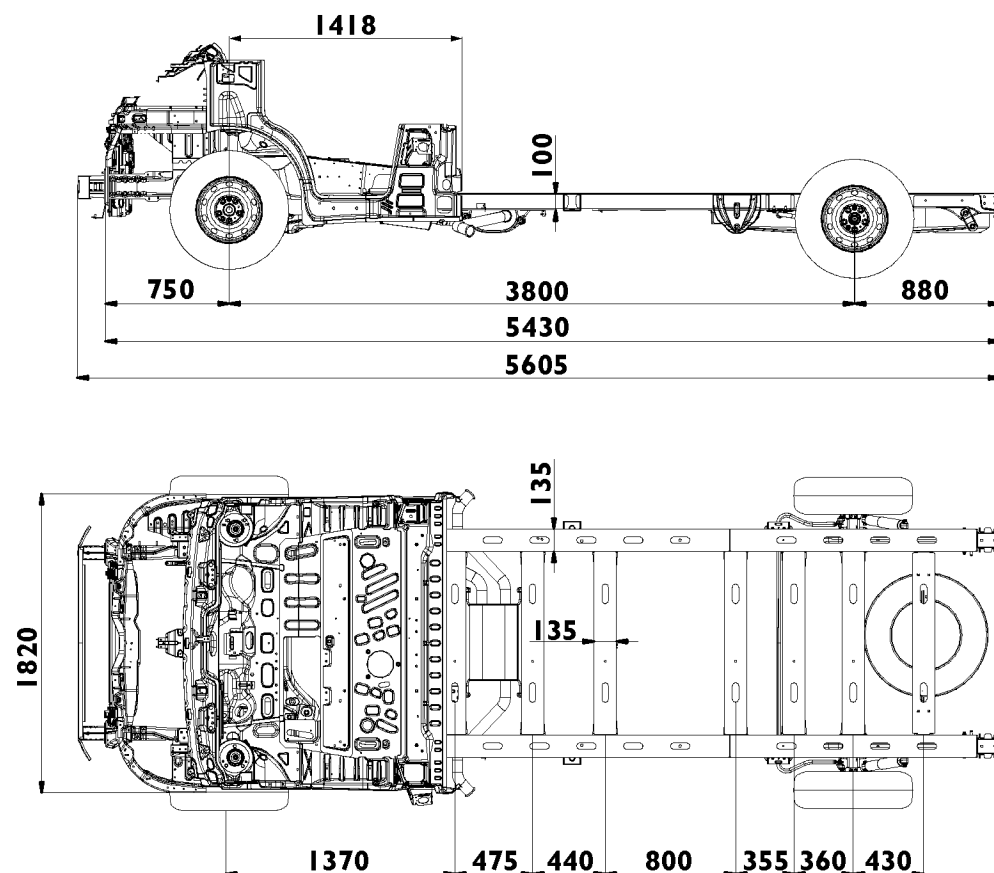
Medium wheelbase special basic chassis





4.33

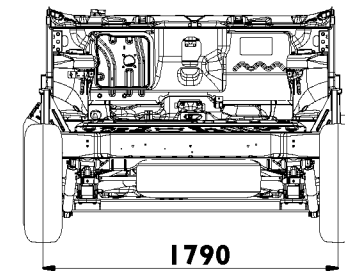
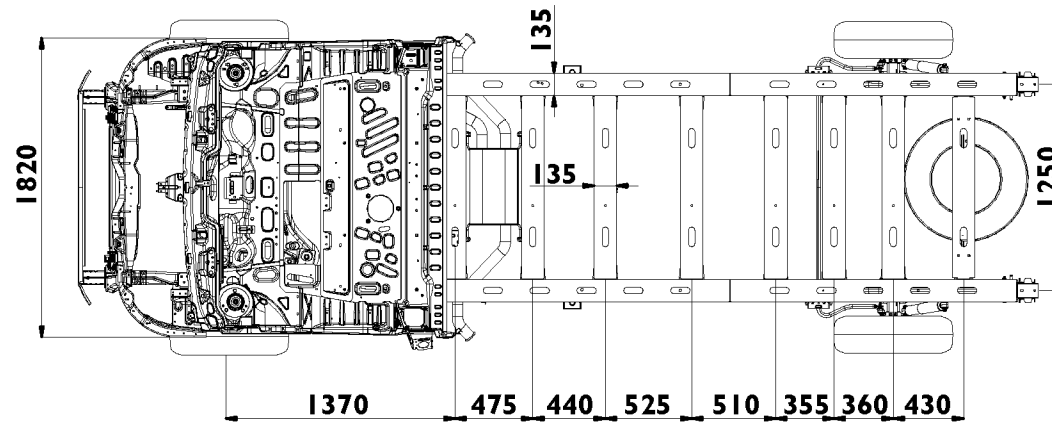
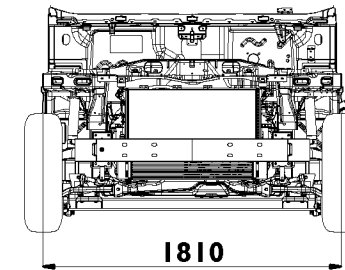
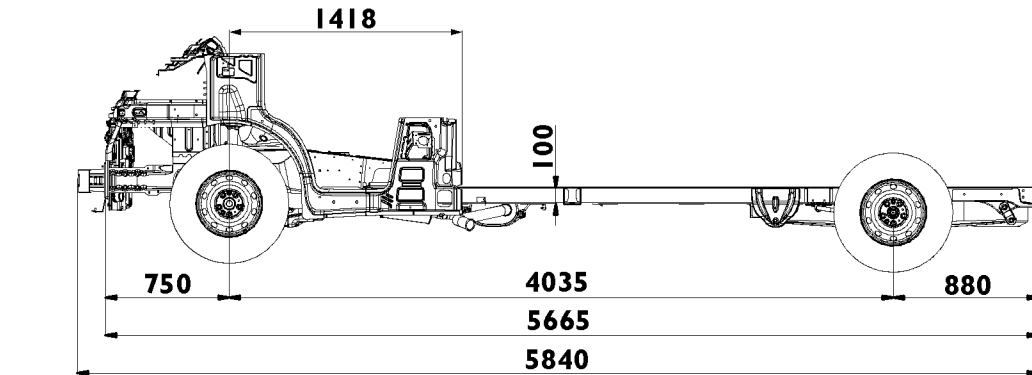
Medium-long wheelbase special basic chassis





4.34

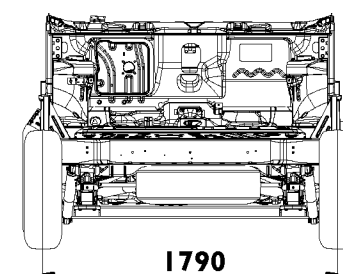
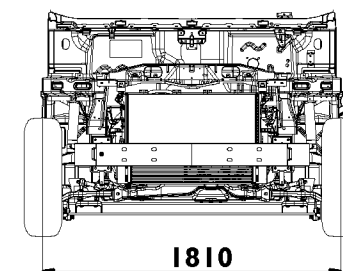
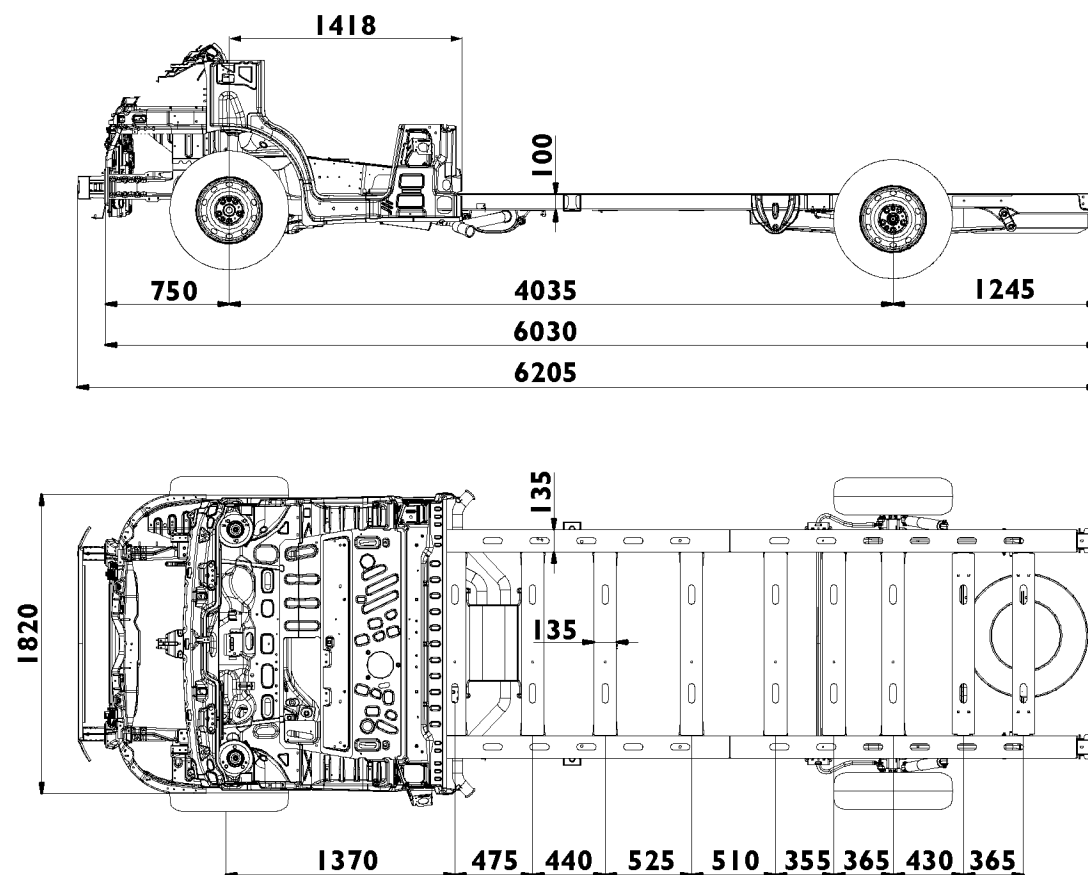
Long wheelbase special basic chassis





4.35

Extra-long overhang special basic chassis





4.36

