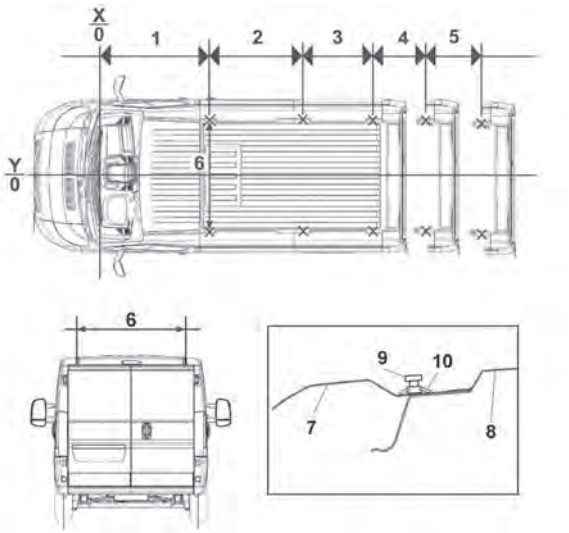
Fitting a roof rack

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.

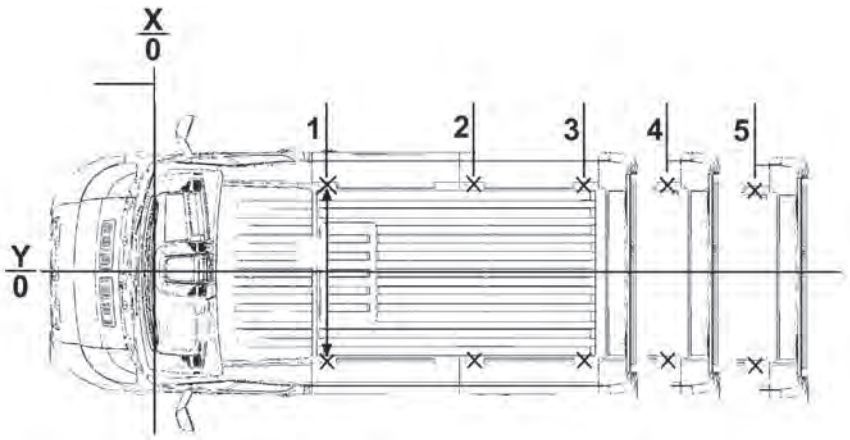
Diagram of roof rack attachment



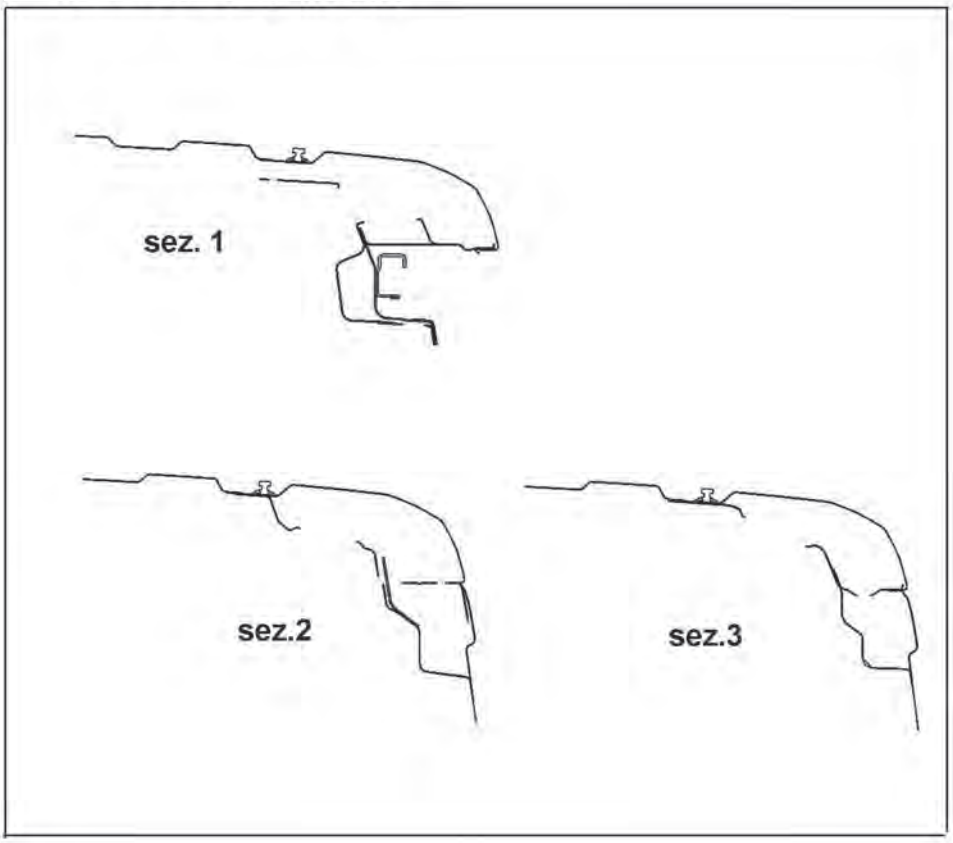
7. Top exterior. – 8. roof – 9. roof rack pin – 10. roof rack attachment reinforcement – X0. front wheel axis

	Anchor point distances (mm)					'Y' distance (mm)(width)
Load anchor point positions	1	2	3	4	5	6
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

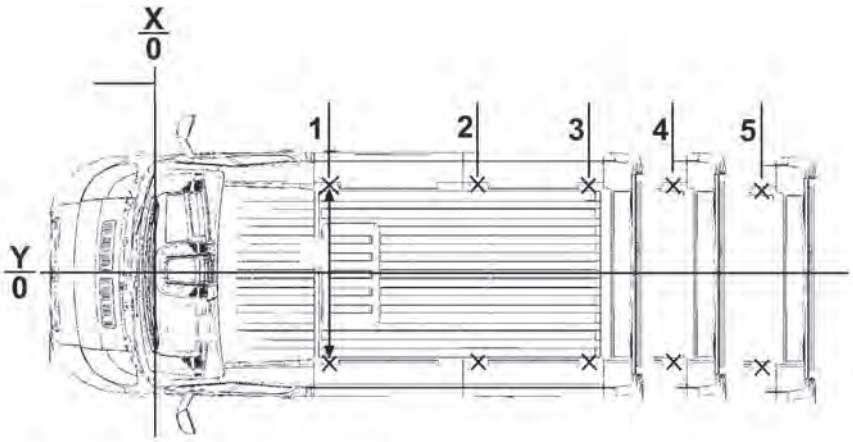
Roof rack attachment point sections



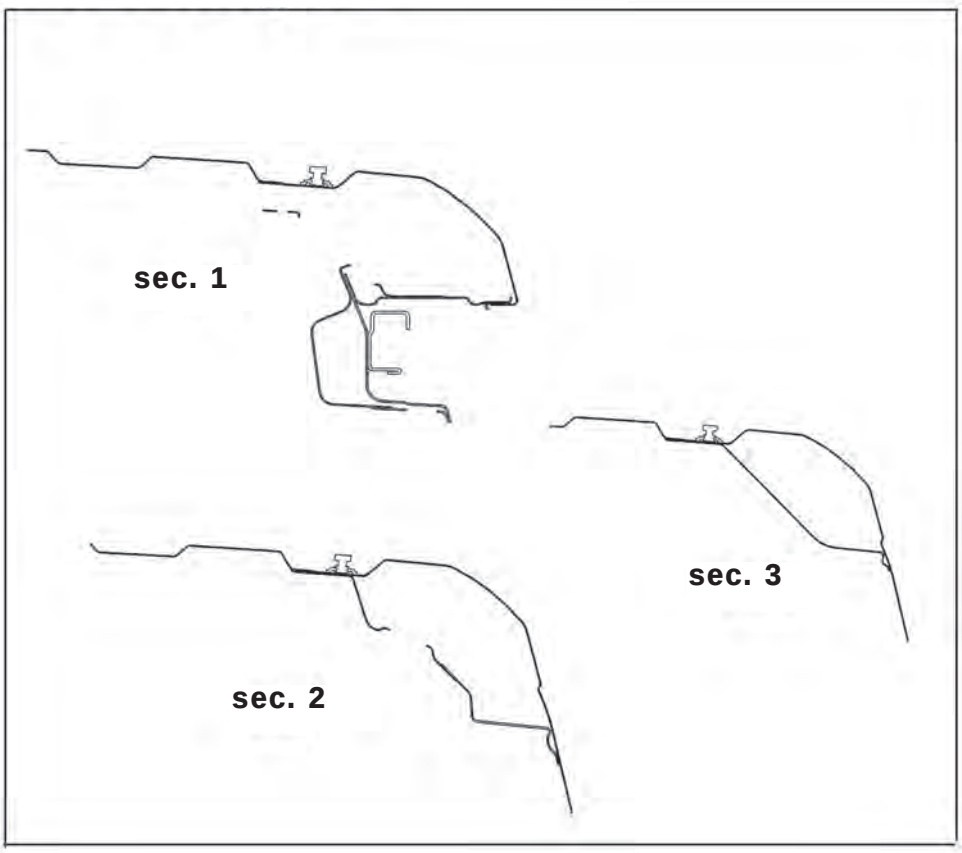
CH1 van sections



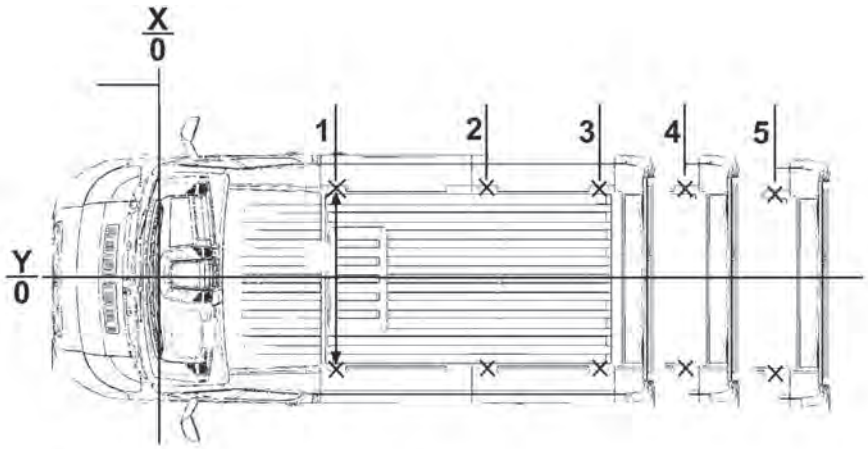
Roof rack attachment point sections



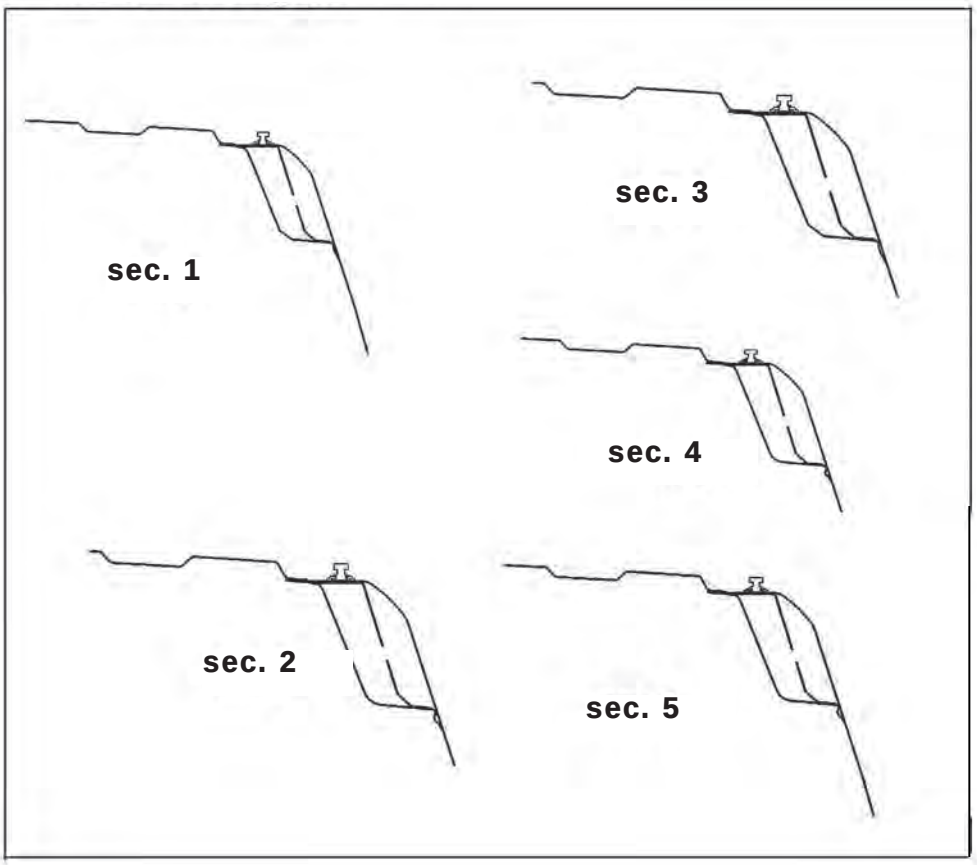
MH2 – LH2 van sections



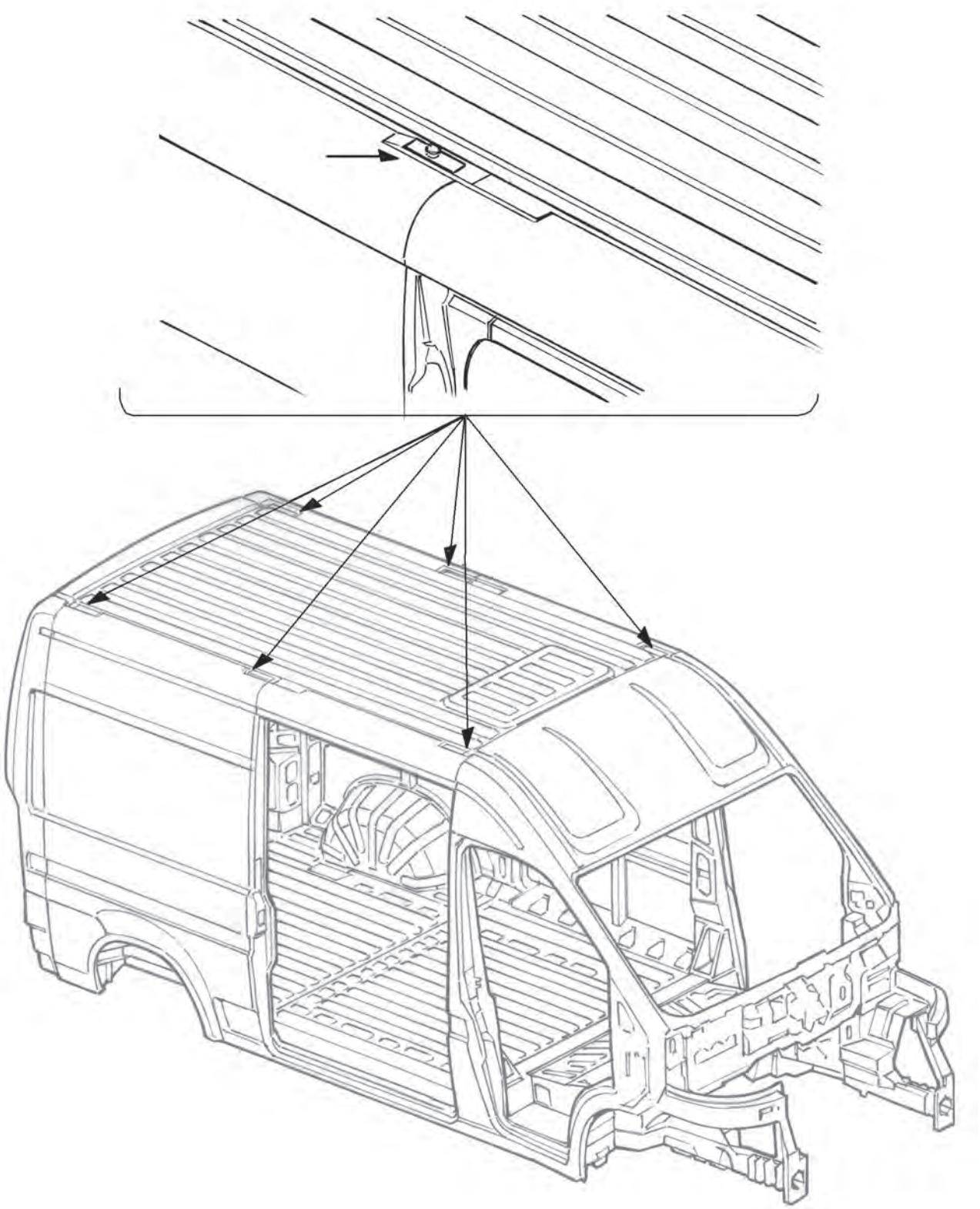
Roof rack attachment point sections



XLH3 – LH3 van sections



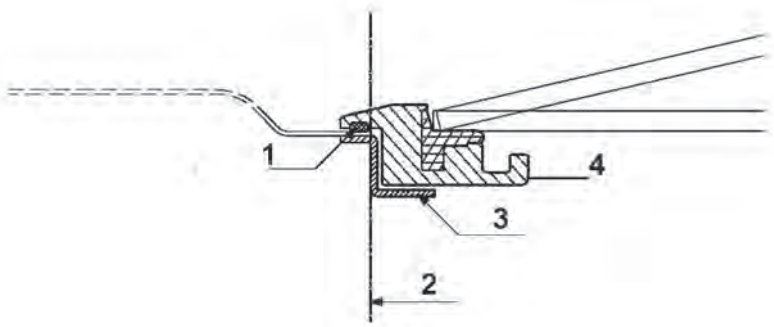
Attachment positioning



Opening a hatch in the roof

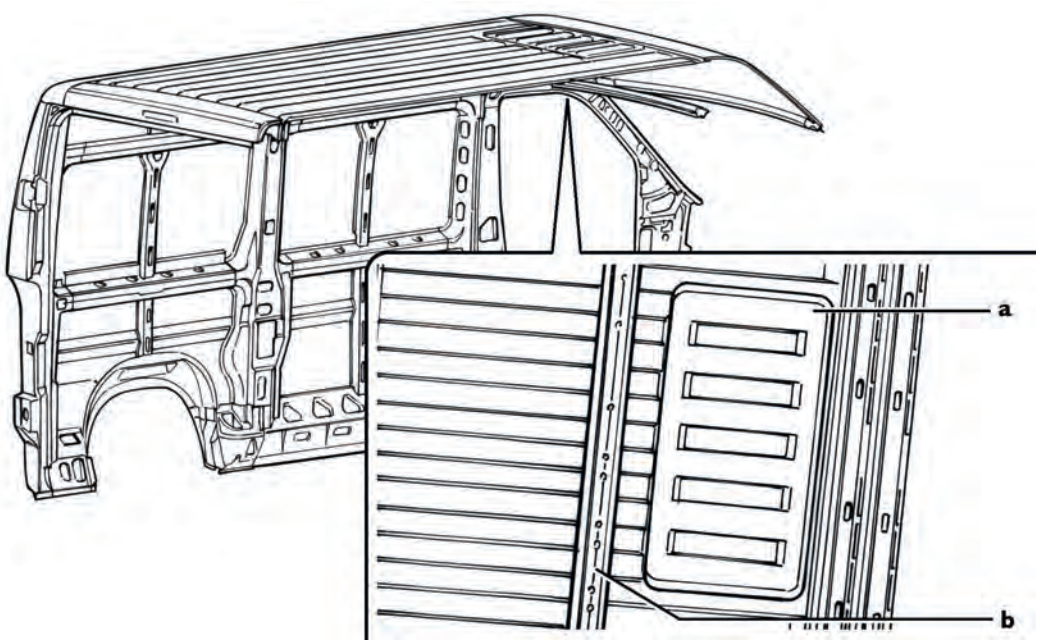
A hatch may be opened in the roof, providing that the works do not involve the ribs and the ensure seal and strength of the modified part.

The figure shows an installation example.



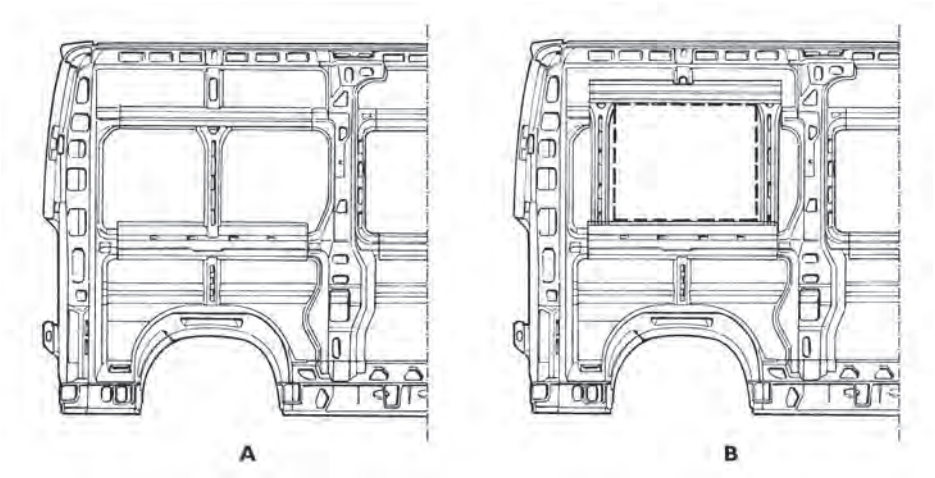
1: Sealant - 2: Cut area - 3: Attachment profile - 4. hatch

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

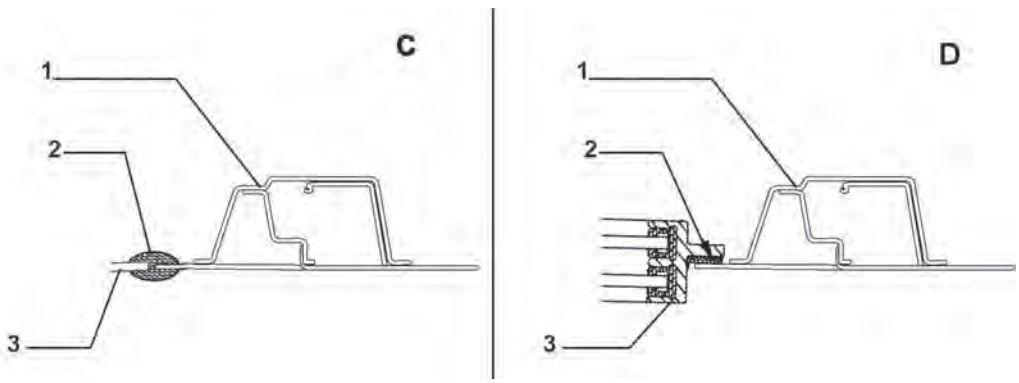
It is permitted to make one or more side windows, provided that they are not on the structural pillars. If it is necessary to make the window at the structure, the opening must comprise a perimetral frame that is connected to the original pillars and longitudinal members (see solution B) in order to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

NOTE: Before cutting or welding, it is necessary to protect the original body work not involved in the conversion with sheets or adequate protective masks in order to prevent damage resulting from the rework activities.

Heater installation

If a supplementary heater is required, it is advisable to use only the types foreseen by FIAT CHRYSLER AUTOMOBILES S.p.A.
For vehicles on which FIAT CHRYSLER 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 CHRYSLER 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.

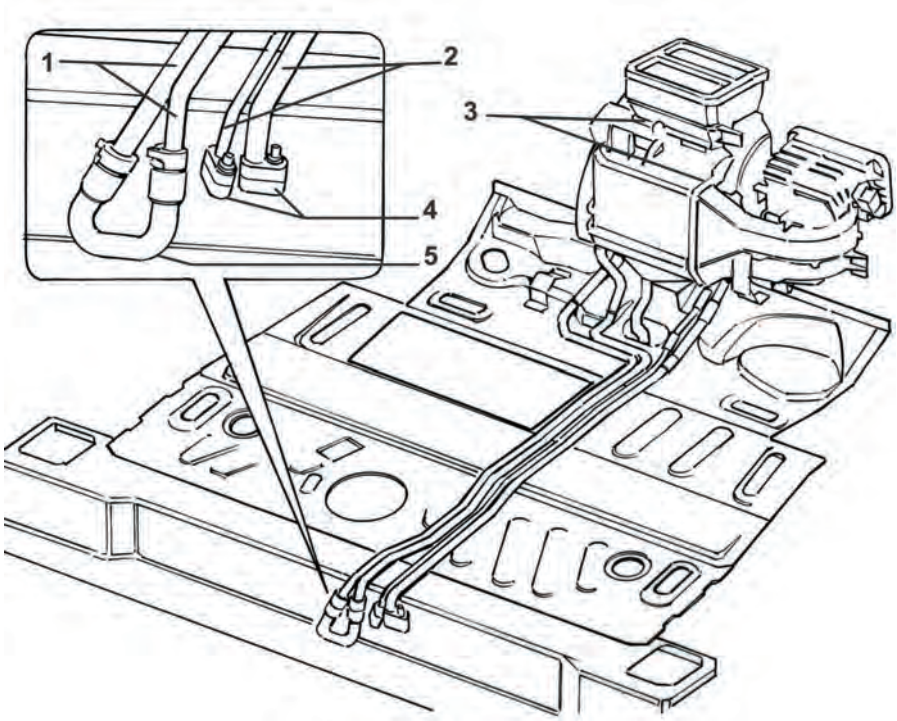
- In air heaters and in cases in which the heater is installed directly in the cabin, special attention must be given to the flu (to prevent combustion gases accumulating in the interior) and the correct distribution of hot air, to avoid direct flows;

- 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 been 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.

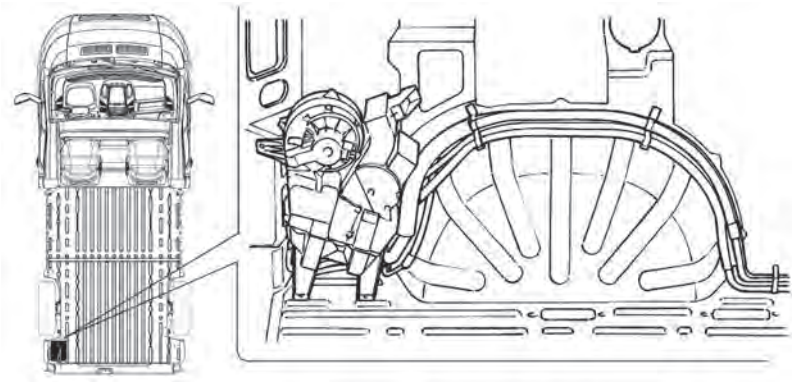
Diagram



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.

Supplementary system



The drawing shows one possible location for the supplementary group.

Technical specifications

Model X2/50	Weight (Kg.)	Air flow-rate (Stdm³/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

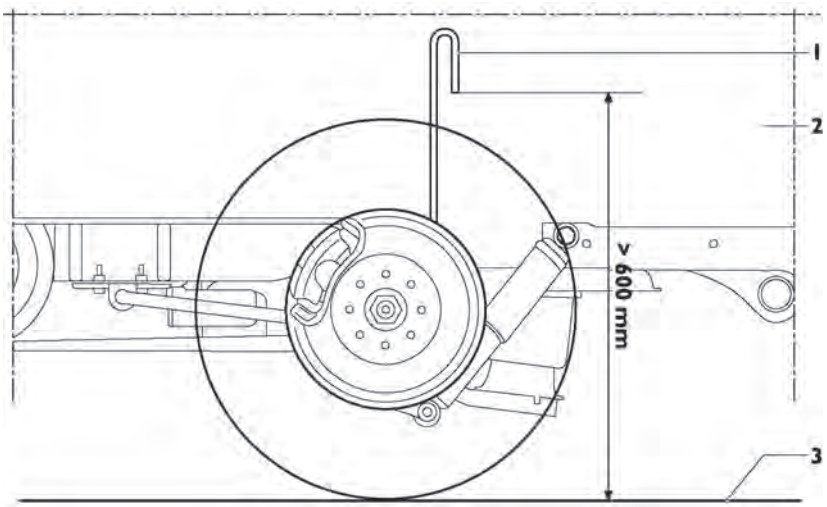
Air flow rate (Stdm³/h)	Engine coolant flow rate (l/h)	Thermal power (BTU/h)	Installed mass thermal power (kW)
Main group radiant mass thermal power			
400	800	37.700	11,00
	500	35.500	10,40
Under seat group radiating mass thermal power			
210	1000	16.400	4,81
Supplementary rear group radiant mass thermal power			
400	800	37.700	11,00
	500	35.500	10,40

Air flow rate (Stdm³/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.

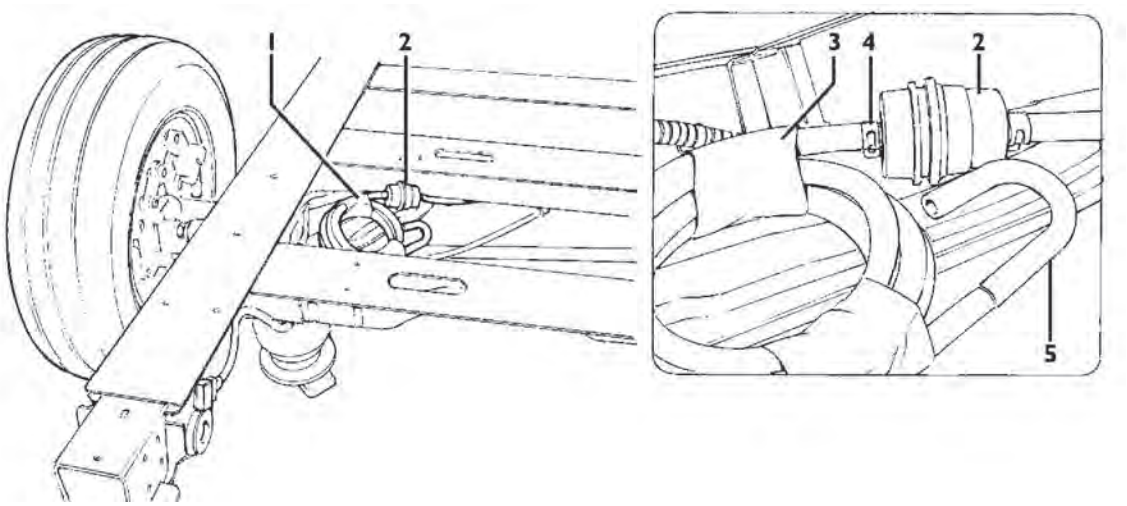
NOTICE! install the air intake opening at a distance from the ground of at least 600mm



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

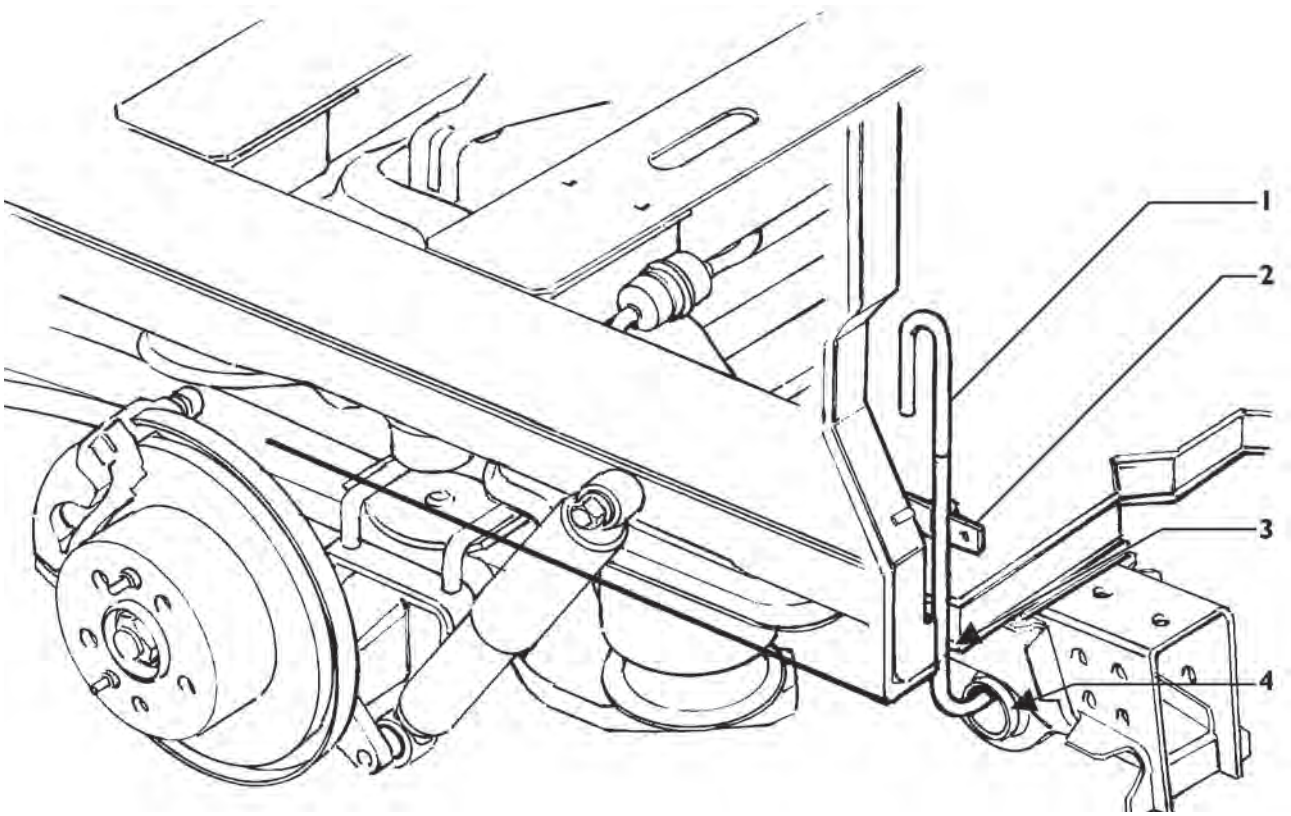
Location and preparation for installation

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.

Installation



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

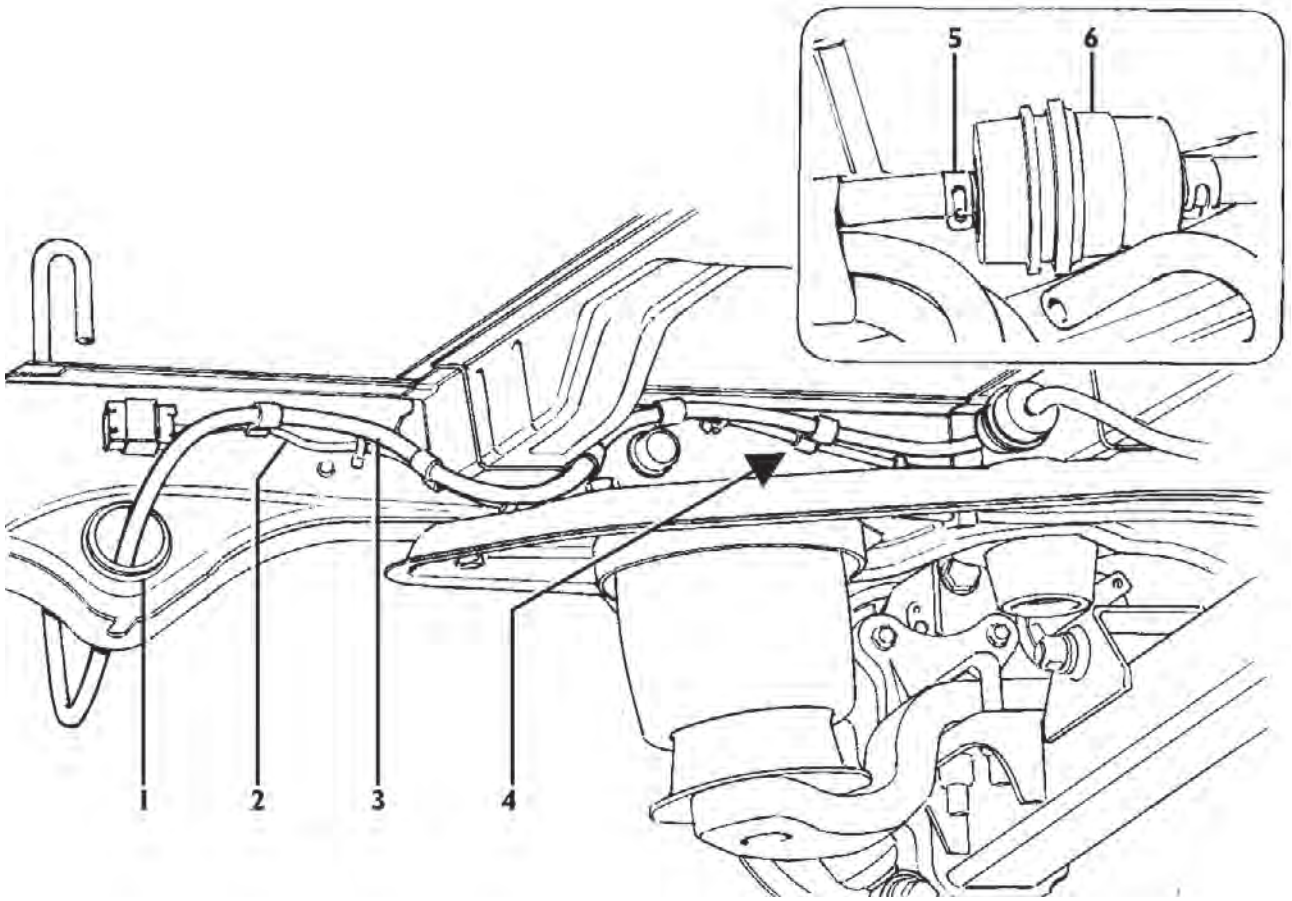
Drill a hole (3), of appropriate size for the passage of the rubber pipe, in the cab floor in the proximity of the left side wall and the rear suspension, as shown in the figure.

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.

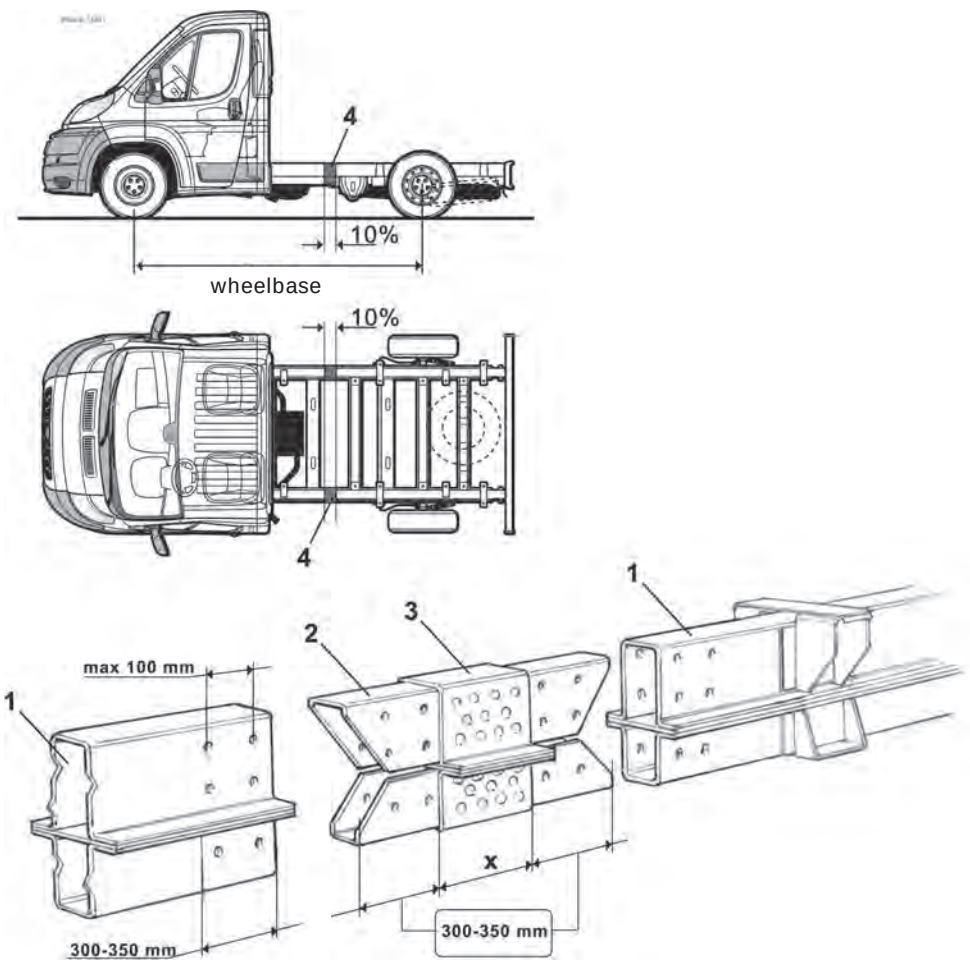
NOTICE:
The flow of air through the pipe must remain the same as it was before the application of the fasteners. A narrower section or a hole, no matter how small, might undermine system operation.

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).

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 CHRYSLER 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 4035 mm and 4300 mm wheelbase.
If you have to change the wheelbase, the length added must never exceed 10% of the original wheelbase for vehicles with ABS and 5% for vehicles with ESC and, in any event, the final length must never exceed 4300 mm.
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 longitudinal. 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.

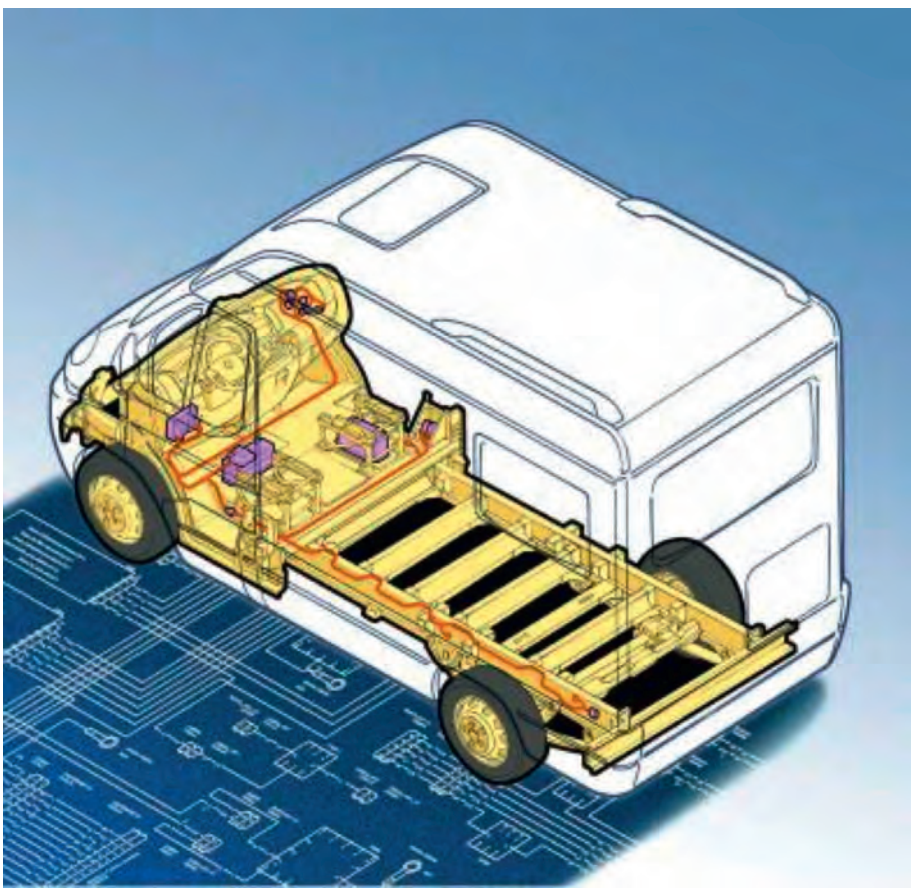


1: Original frame; 2: Reinforcing boxed section; 3: Additional frame;
4: Cutting zone for wheelbase modification;
x: wheelbase lengthening variable dimension
(max. 10% of original wheelbase length for vehicles with ABS, 5% with ESC).

ESC system – Electronic Stability Control

ESC system was developed considering the weight of a completely upfitted vehicle in the respect of the limits indicated in this manual.
When and only if the vehicles does respect the limits indicated at pag. 2.5 for weight distribution and positioning of the centre-of-mass, the full ESC system functionality is ensured, without needing further testing.

ELECTRICAL SYSTEM



Descriptive key

List of acronyms in diagrams

ACM	Automatic Climate Module
AHCU	Additional Heater Control Unit
ASM	Air Suspension Module
ASS	Auxiliary Stack Switches
ASU	Alarm Siren Unit
BCM	Body Computer Module
BSM	Brake System Module
CDC	Co-Driver Door Command
CSM	Column Switch Module
CSS	Central Stack Switches
CTCU	Chrono Tachograph Control Unit
CTM	Convergence Telematic Module
DDC	Driver Door Command
DSHS	Driver Seat Heater System
ECM	Engine Control Module
FCLU	Front Ceiling Light Unit
GPCU	Glow Plug Control Unit
IBS	Intelligent Battery Sensor
IPC	Instrument Panel Cluster
LDWS	Lane Departure Warning System
LSS	Left Stack Switches
MCD	Manual Climate Device
MTA	Manual Transmission Automated
PAM	Parking Aid Module
PSHS	Passenger Seat Heater System
RLS	Rain Light Sensor
RMCD	Rear Manual Climate Device
RRM	Radio Receiver Module
SAS	Steering Angle Sensor
SDM	Sensing and Diagnostic Module
SLU	Shift Lever Unit
SSCU	Servo Steering Control Unit
SWC	Steering Wheel Command
TPMS	Tire Pressure Monitoring System
TUM	Truck Upfitter Module
VPAS	Video Parking Aid System
VSU	Voltage Stabilizer Unit

Key to terminology:

+30: permanent +12V vehicle power supply

+KEY: signal active at +12V vehicle 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

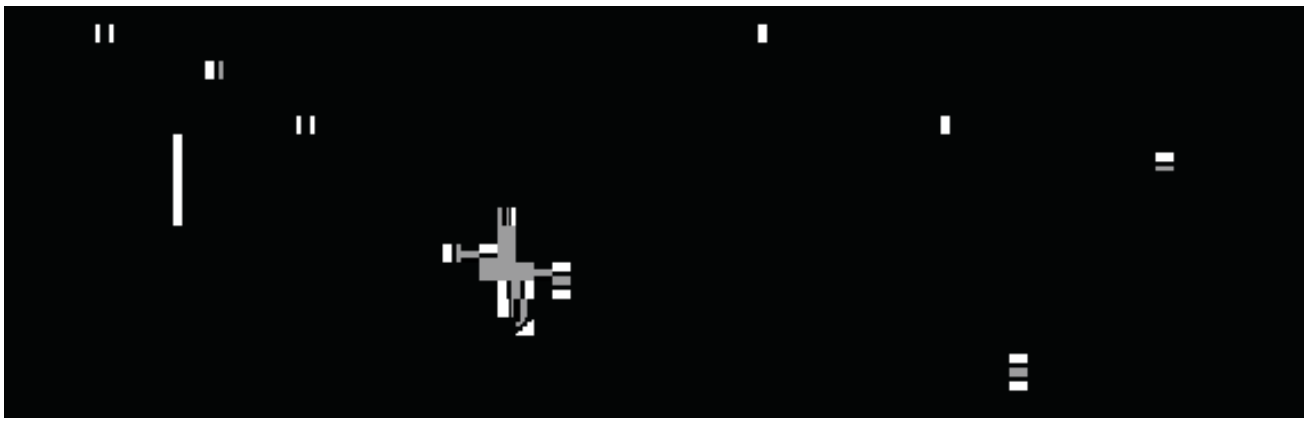
Code	Colour
A	Light blue
B	White
C	Orange
G	Yellow
H	Grey
L	Blue
M	Brown
N	Black
R	Red
S	Pink
V	Green
Z	Purple
W	Light brown

Overview

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 and the same fixation system is used.

Figure 1

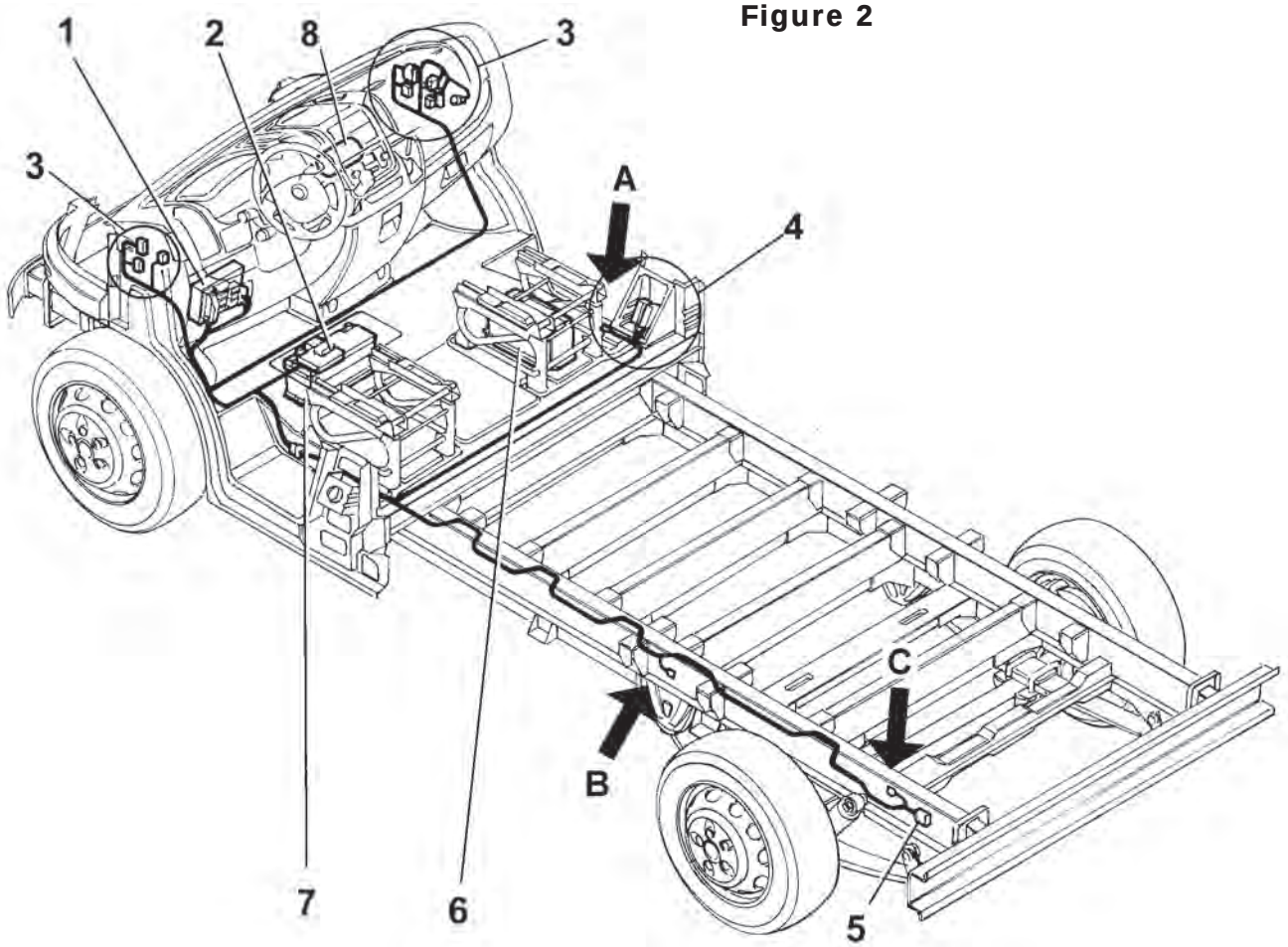


Specifications for coach builders

1.5 Connectors provided for conversions

For the coach-builders to effectively and correctly use the basic system on the NEW DUCATO model, FIAT CHRYSLER 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

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 CHRYSLER AUTOMOBILES S.p.A.

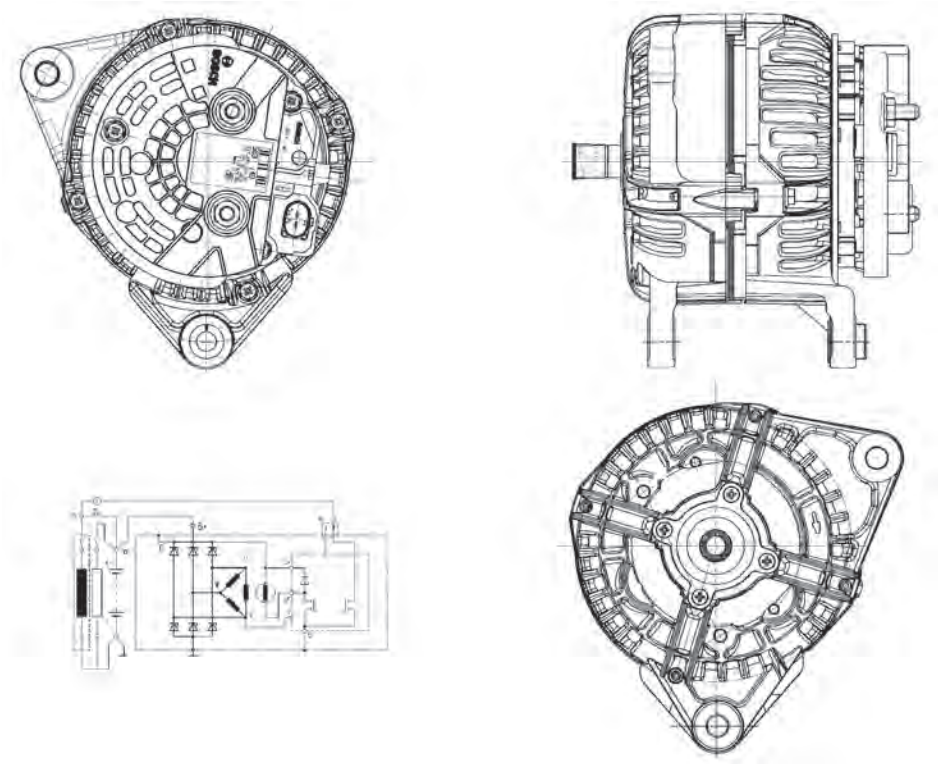
Current take off

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

Available oversized alternator summary table

Engine	Opt	Brand	Model	Size	Regulator	Regulator voltage features
2,0 JTD	065	Denso	SC2	150 A	GL6	Vreg = 14.5 V at 25°C and 6000 rpm Thermal compensation -10 mV/°C
2,3 F1A Euro 4-5	4WP	Valeo	FG18	180 A	YR208	Vreg = 14.55 V at 25°C and 6000 rpm Thermal compensation -10 mV/°C
2,3 F1A Euro 6 LPEGR	7KK	Valeo	FGN20	200 A	YR208	Vreg = 14.55 V at 25°C and 6000 rpm Thermal compensation -10 mV/°C
3,0 F1C-3,0 CNG	4WP	Valeo	FG18	180 A	YR208	Vreg = 14.55 V at 25°C and 6000 rpm Thermal compensation -10 mV/°C

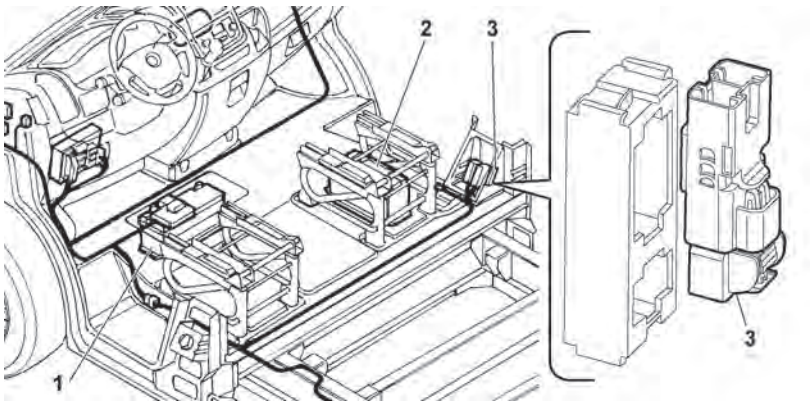
Figure 3



Note: drawings for information only

1.7 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

recombination batteries (AGM or gel) are advised.

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;
- to provide a breather toward the compartment exterior.

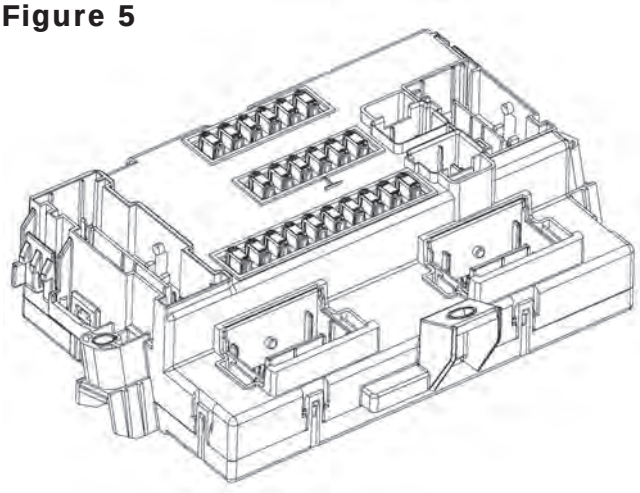
It is also necessary that the gas evacuation system is located as far as possible from any potential sources of spark, and from mechanical/electrical/electronic components, opting for a breather system that prevents vacuum formation in the battery.
There is a two-way connector (3) at the base of the passenger side door, for connecting the auxiliary battery (see Figure 10).

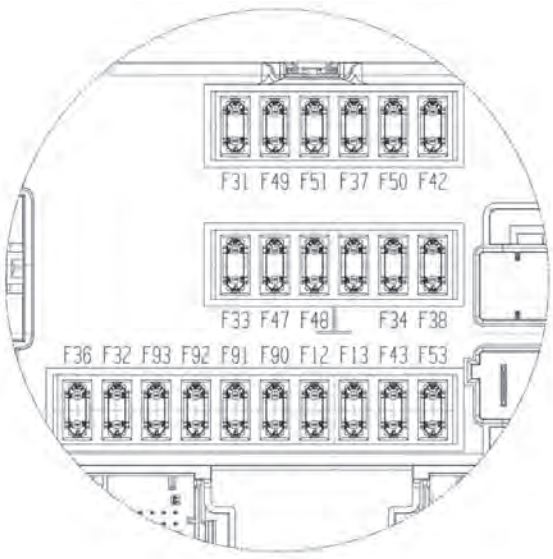
When charging system for the secondary battery are installed, it's also allowed the management of the main battery if compatible with the battery specifications and through a connection properly protected by a fuse.

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).

1.8 Scatola fusibili e relè sottoplancia

Figure 5





Fuse table

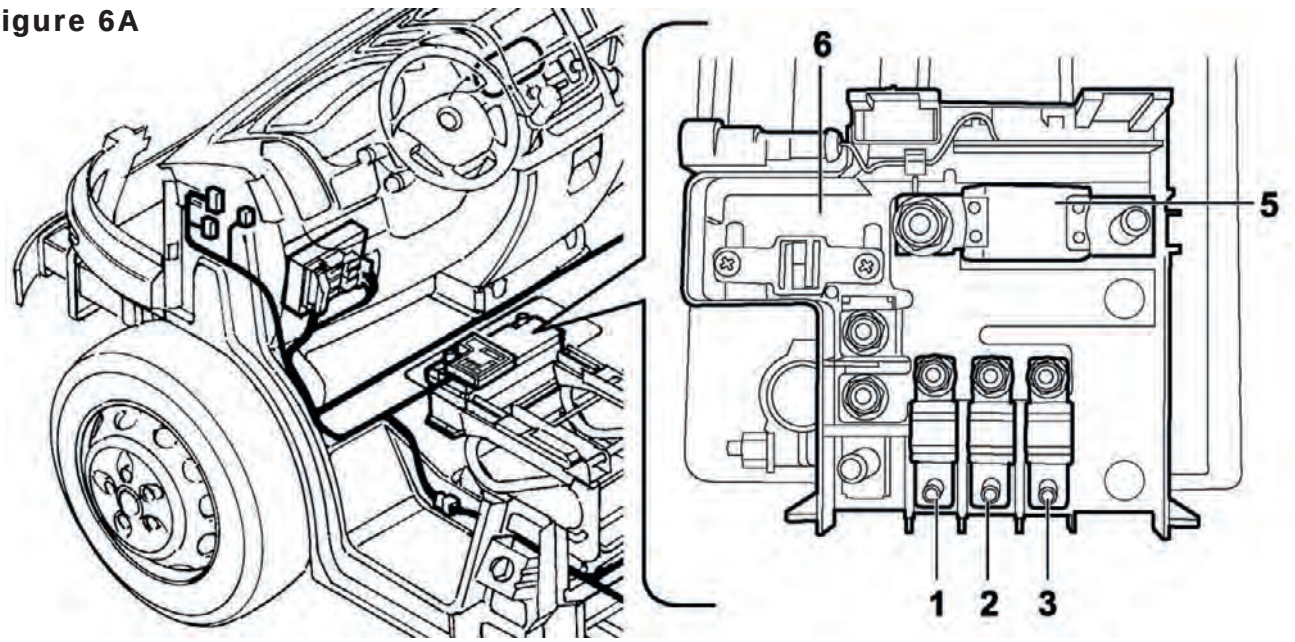
Fuse	Function	Rating
F12	RH DIPPED HEADLIGHT	7,5A
F13	LH DIPPED HEADLIGHT	7,5A
F31	INT/A	5 A
F32	SBMT	7,5 A
F33	START & STOP	7,5 A
F34	MINIBUS	7,5 A
F36	+30 NRR, NCV, CCT, CSA, NCL, WEBASTO TIMER, BATTERY MASTER SWITCH	10 A
F37	INT CLA (NA), NQS	7,5A
F38	DOOR LOCK	20 A
F42	INT NFR, NAS, CLA (NC)	5 A
F43	WINDOW WASHER PUMP	20 A
F47	ELECTRIC WINDOW DRIVER'S SIDE	20 A
F48	ELECTRIC WINDOW PASSENGER'S SIDE	20 A
F49	INT NSP, CAV, RADIO AFTERM. / NCV, STEERING WHEEL CONTROLS, CSS, LSS, CSP, AUX PANEL, 5QD	5 A
F50	INT NAB	7,5 A
F51	INT POWER STEERING ECU, REVERSE, H20 DIESEL FILTER, FLOW METER, NCL, CLUTCH, CCT, NAV. AFTERM.	5 A
F53	+30 NQS	7,5 A
F90	LH MAIN BEAM	7,5 A
F91	RH RIGHT BEAM	7,5 A
F92	LH FOG LIGHT	7,5 A
F93	RH FOG LIGHT	7,5 A

1.9 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).

No Minibus vehicle type

Figure 6A



Connections key and description:

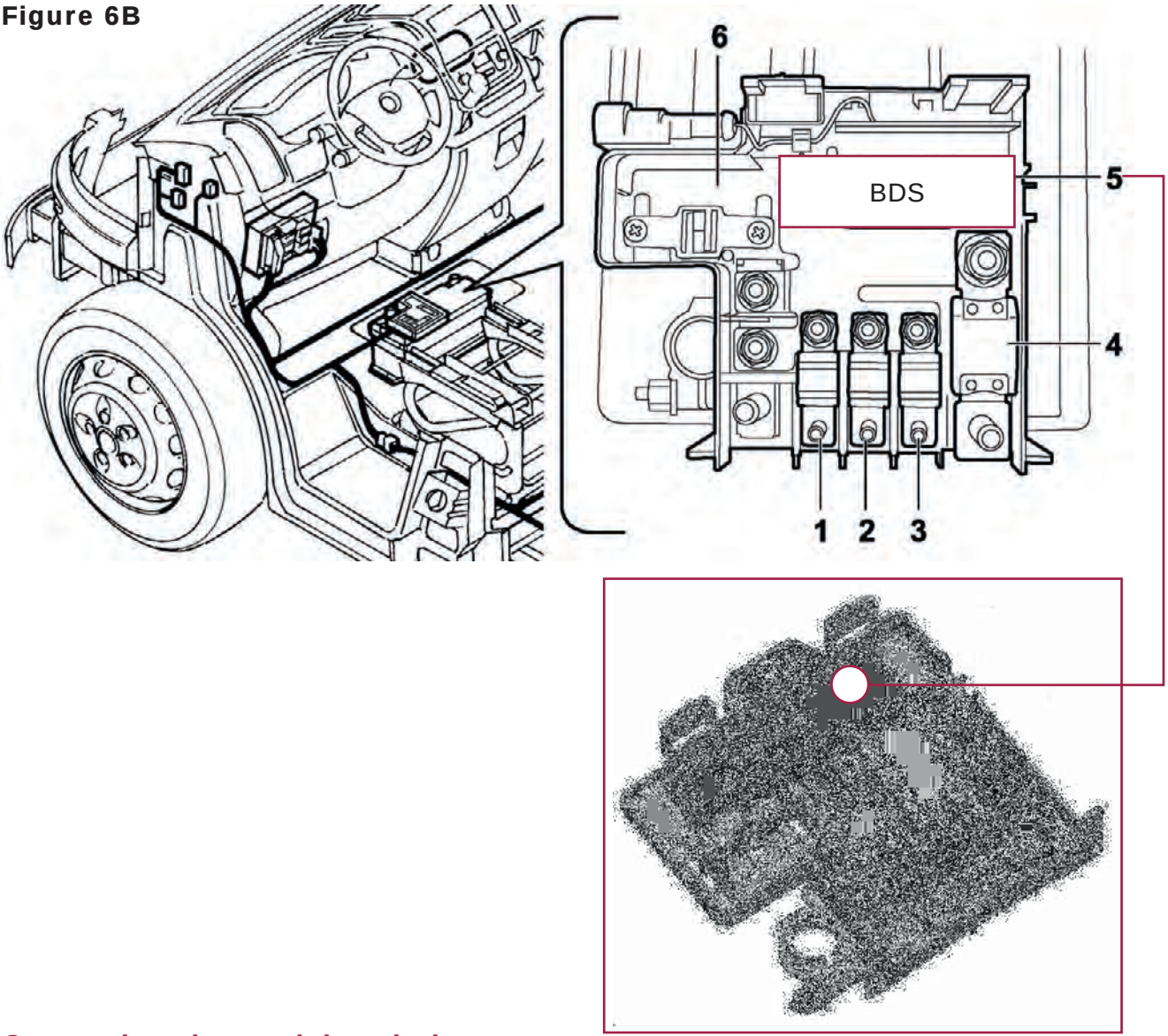
1) auxiliary battery power (50A) via 2-way connector:
2) dashboard fuse and relay box auxiliary power (50 A)
3) main battery under-dashboard fuse and relay box (70 A)

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

5) starter motor and alternator power (MEGA 500);
6) interconnected control unit on battery.

Minibus and CNG vehicle type

Figure 6B



Connections key and description:

1) dashboard fuse and relay box auxiliary power (50 A)
2) main battery under-dashboard fuse and relay box (70 A)
3) auxiliary battery power (50A) via 2-way connector:

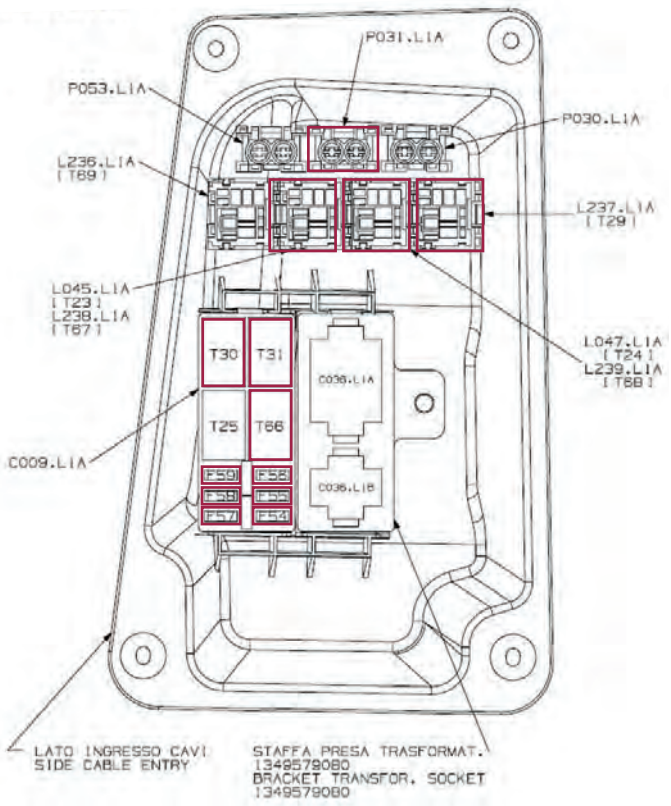
NOTE: install a power relay between the two-way connector and the auxiliary battery positive, so that with the engine off the system added by the coachbuilder is separated from the main vehicle system

4) engine bay fuse and relay box power (150 A);
5) BDS – Battery Distribution System, Emergency Push Button;
6) interconnected control unit on battery.

1.10 Right pillar fuse and relay box

No Minibus, Full OPT vehicle type

Figure 7A

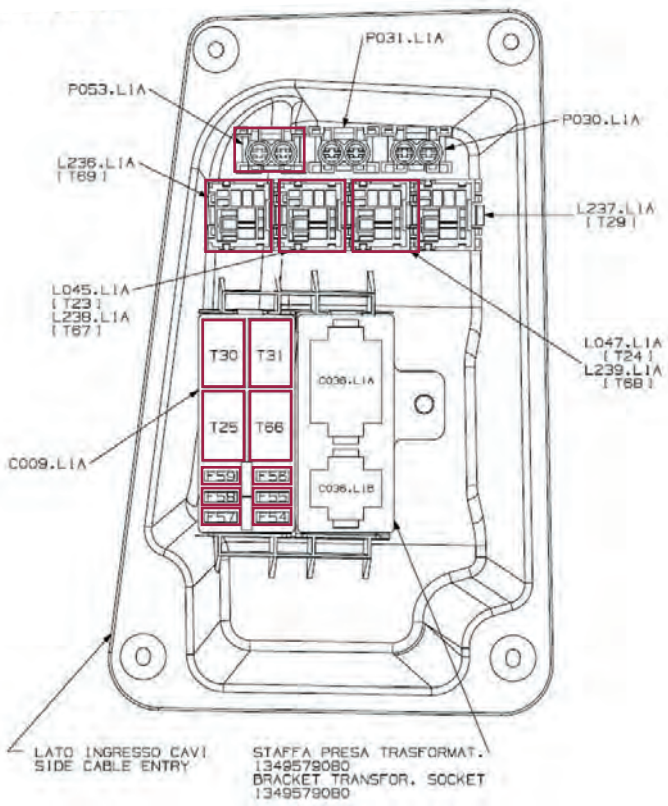


▭ = Relè e fusibili presenti in configurazione full opt.

Cod.	Relè [micro]	In[A]
T23	Elettroventola riscaldatore supplementare	30
T24	Condizionatore supplementare bassa velocità	30
T29	Abilitazione condizionatore supplementare	30
T30	Lunotto termico	30
T31	Riscaldatore supplementare sottosedile	30
T66	+ Chiave sedili riscaldati	30
Cod.	**Fuse [a0]**	**In[A]**
F54	Ventola aspirazione/ventilazione minibus	15
F55	Sedili riscaldati	15
F56	Presa 12v trasporto persone/ trasformatori	15
F57	Risc. Sottosedile/ elettrovalvola/ enable risc. suppl.	10
F58	Lunotto termico sx	15
F59	Lunotto termico dx	15
Cod.	**Fuse [a]**	**In[A]**
P030	Riscaldatore/condizionatore supplementare	10
P031	Riscaldatore/condizionatore supplementare	30

Minibus, Full OPT vehicle type

Figure 7B



▭ = Relè e fusibili presenti in configurazione full opt.

Cod.	Relè [micro]	In[A]
T67	Ventilazione minibus	30
T68	Ventilazione minibus	30
T25	Luci interne minibus	30
Cod.	**Fuse [a0]**	**In[A]**
T69	Sidemarker	30
T30	Lunotto termico	30
T31	Riscaldatore supplementare sottosedile	30
T66	+ Chiave sedili riscaldati	30
Cod.	**Fuse [a]**	**In[A]**
F54	Ventola aspirazione/ventilazione minibus	15
F55	Sedili riscaldati	15
F56	Presa 12v trasporto persone/ trasformatori	15
F57	Risc.Sottosedile/ elettrovalvola/ enable risc. Suppl.	10
F58	Lunotto termico sx	15
F59	Lunotto termico dx	15
Cod.	**Fuse [a]**	**In[A]**
P053	Sidemarker	10

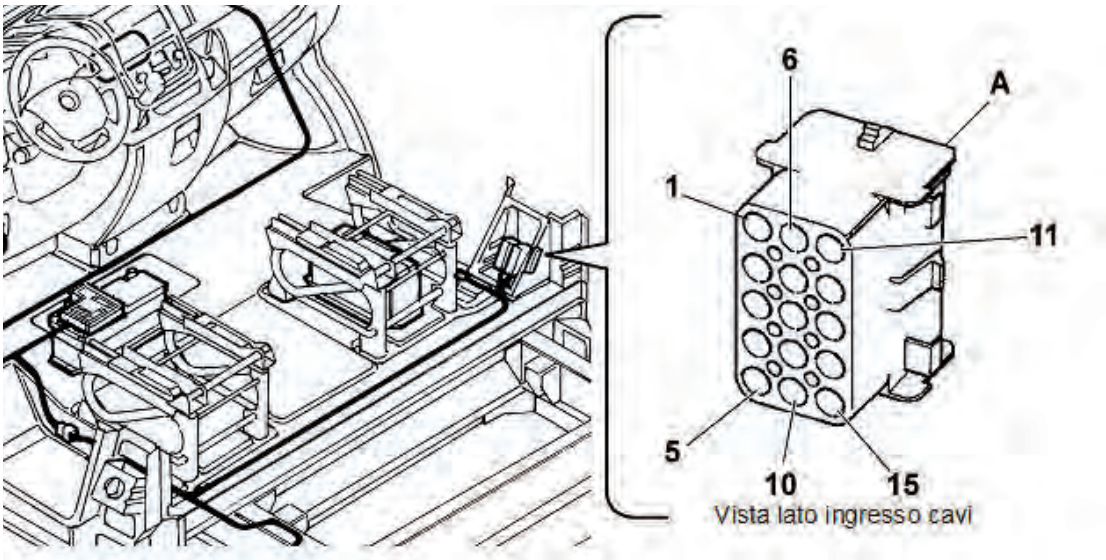
1.11 Ground points

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

Connectors provided

Connector C036 L1A (15-way) – Coach-builder's socket
3D view of connector

Figure 8



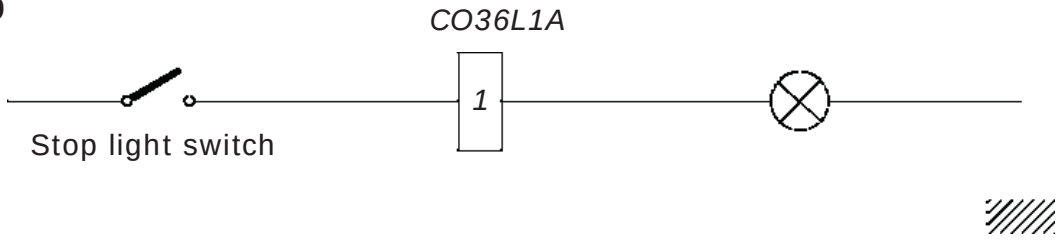
Description of connector functions

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	PM_{AX}= 21W at 12V (in alternative to the one on Y203L4A)
2	D+ (active at ground)	0,35	MN	I_{MAX}= 300mA (1 Fiat Chrysler Automobiles S.p.A. standard relay coil)
3	Vehicle speed repeater (VSO)	0,35	MV	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	0,35	NZ	Use an N.O. to ground switch (minimum clean contact current 10 mA)
7	Driver 20W SBMT#1 timed ceiling light power supply	0,35	RV	Power supply (+) for timed ceiling light, 15' with key-off (PMAX= 20W at 12V)
8	Ceiling light negative control (dimmer)	0,75	BV	Ceiling light control (-) P_{MAX}= 20W at 12V
9	B-CAN Low	0,35	B	Fitting for Fiat Chrysler Automobiles S.p.A. accessory line anti-theft (1)
10	B-CAN High	0,35	L	Fitting for Fiat Chrysler Automobiles S.p.A. accessory line anti-theft (1)
11	Side markers negative control relay	0,5	GR	I_{MAX}= 300 mA (1 Fiat Chrysler 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 Chrysler Automobiles S.p.A. standard relay coil)
13	Key-on power (+KEY) from F49	0,35	LG	I_{MAX}=600 mA (2 Fiat Chrysler Automobiles S.p.A. standard relay coils)
14	Auxiliary heater positive control	0,35	MV	I_{MAX}= 600 mA (2 Fiat Chrysler Automobiles S.p.A. standard relay coils)
15	Not connected	-	-	-

(1) not for use with other applications

Luce di arresto supplementare (3° stop)

Figure 9



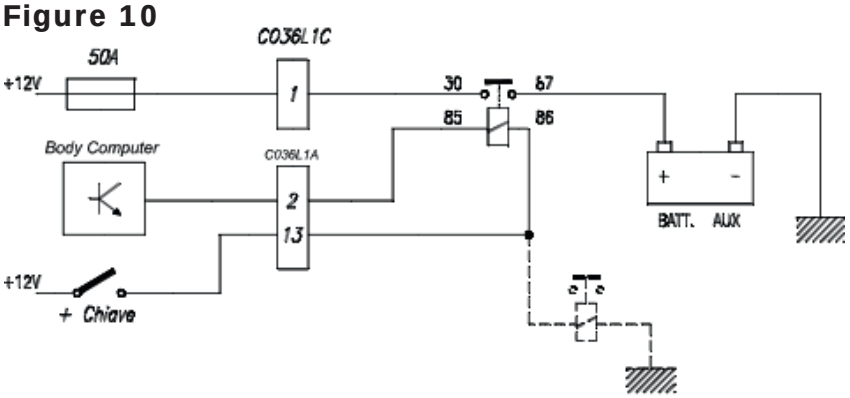
Ground point nearest to component: choice between A, B, C or pin 2 connector C036L1C

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.

Charging in progress signal (D+)

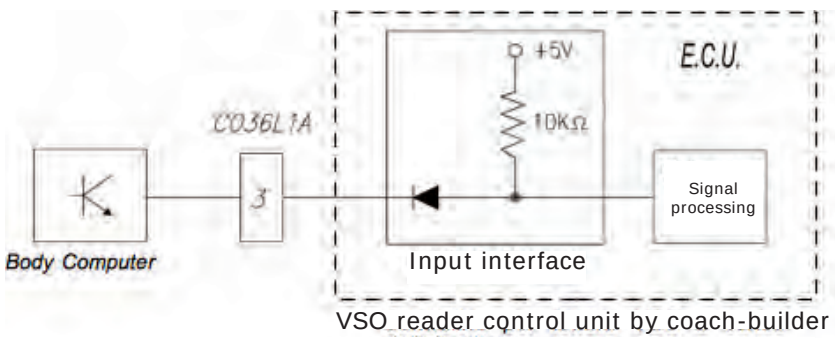
Figure 10



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

Vehicle speed signal (VSO)

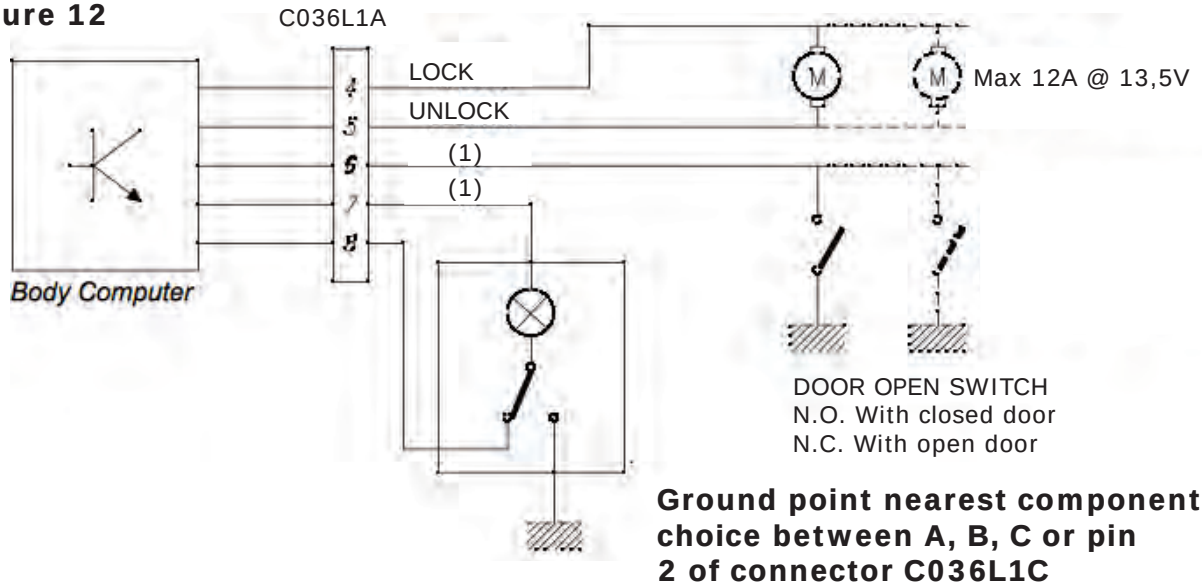
Figure 11



The VSO signal is defined as 275.714 mm/pulse, thus for the receiver, speed is equal to:
V.vehicle [mm/s] = Frequency VSO [Hz] * 275.714 [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.

Rear locks and ceiling light control

Figure 12



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

Note (1): In the absence of door open switch (if original Fiat Chrysler 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.

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

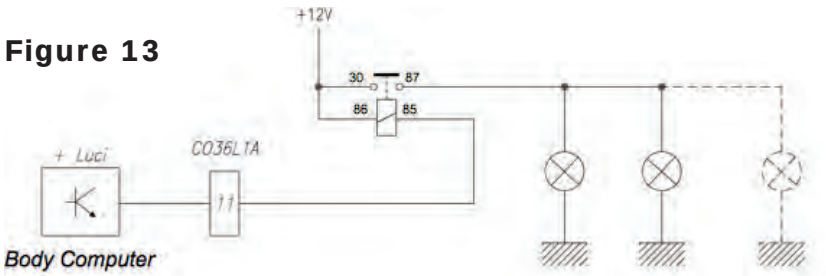
Unlock Front / Rear

Initial State	-	-	-		Any	Any
Confirm Lock Front/Rear	+	+	-	20 + t_2 ms		
Unlock Front/ Rear	-	-	+	400 + t_1 ms		
Final State	-	-	-		Unlocked	Unlocked

Tollerances 0<t1<10%
0<t2<10ms

Side marker lights

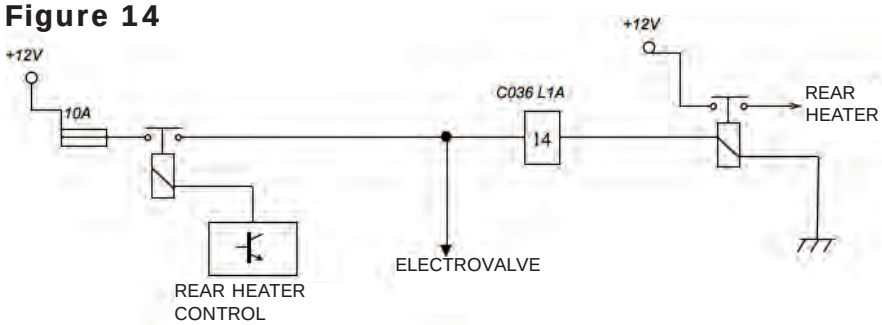
Figure 13



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

Rear heater enable control

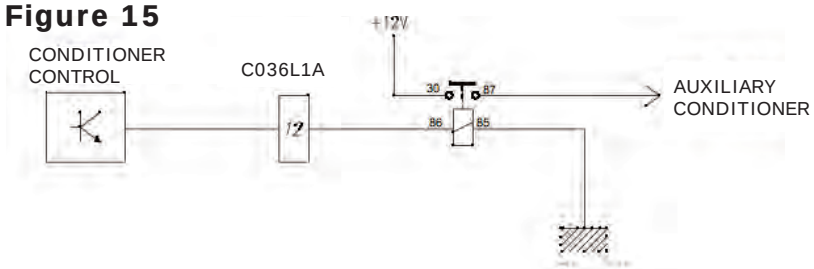
Figure 14



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

Conditioner on signal

Figure 15

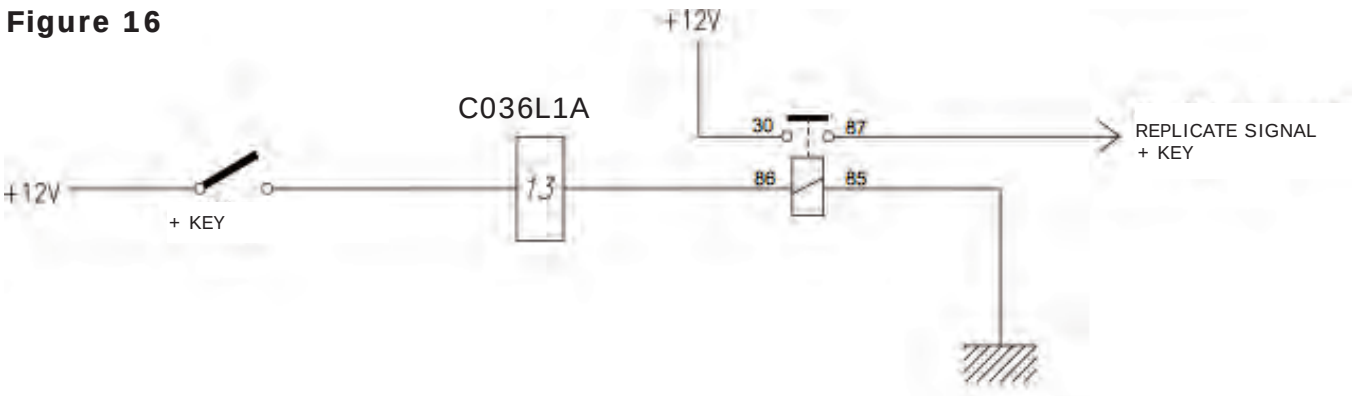


Ground point nearest to component: choice between A, B, C or pin 2 of connector C036L1C

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

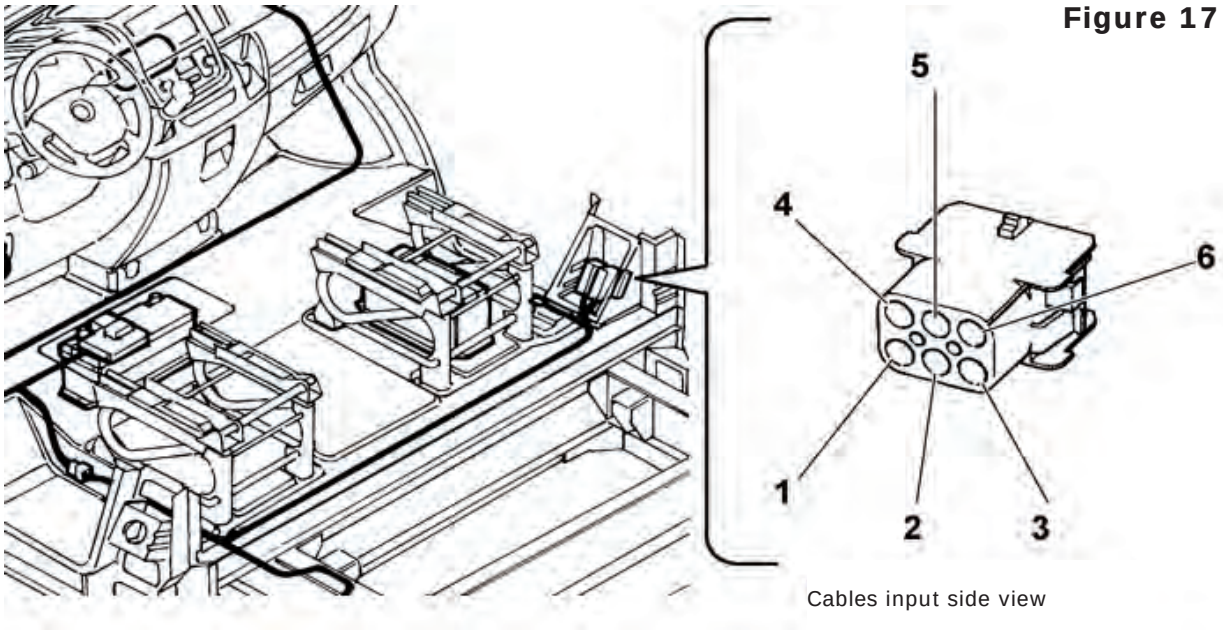


Punto di massa più vicino al componente: a scelta tra A, B, C o pin 2 connettore C036L1C

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

3D view of connector

Figure 17



Cables input side view

Description of connector functions

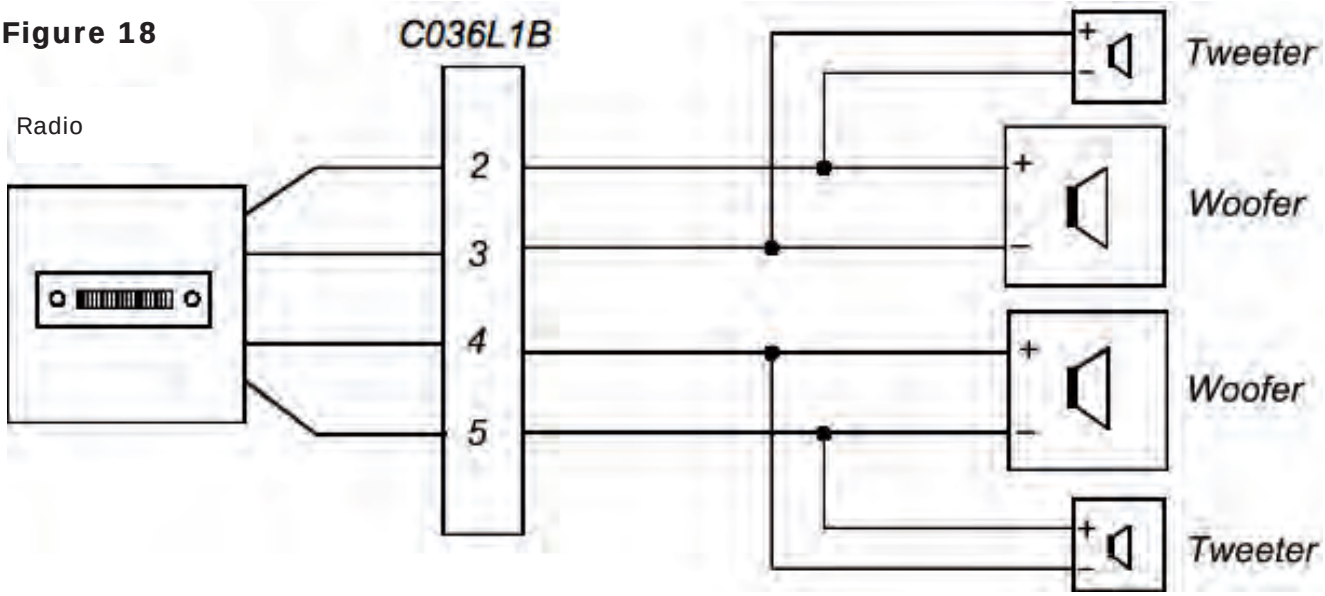
Pin	Function/Connector part number	Minimum cable section [mm²]	cable colour	Notes
	Connector 6-way Tyco p/n 1-480705-0 Counterpart: Tyco p/n 1-480704-0 (by coachbuilder)			Reference to diagram C036-L1B
1	Permanent 12V power supply (+30) for radio	1,5	RG	Permanent supply from auxiliary battery to radio cable present only from C036-L1A to Y028L1A(1)
2	Rear RH loudspeaker +	1	LR	(2)
3	Rear RH loudspeaker -	1	LN	(2)
4	Rear LH loudspeaker +	1	B	(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 Chrysler Automobiles S.p.A. radio power output: 13.4W at 14V
Fiat Chrysler Automobiles S.p.A. radio drivers: 4 ohm equivalent for each channel
Fiat Chrysler Automobiles S.p.A. Tweeters: 15W RMS max
Fiat Chrysler Automobiles S.p.A. Mid-range and Full-range: 20W RMS max

Rear loudspeaker connection

Figure 18

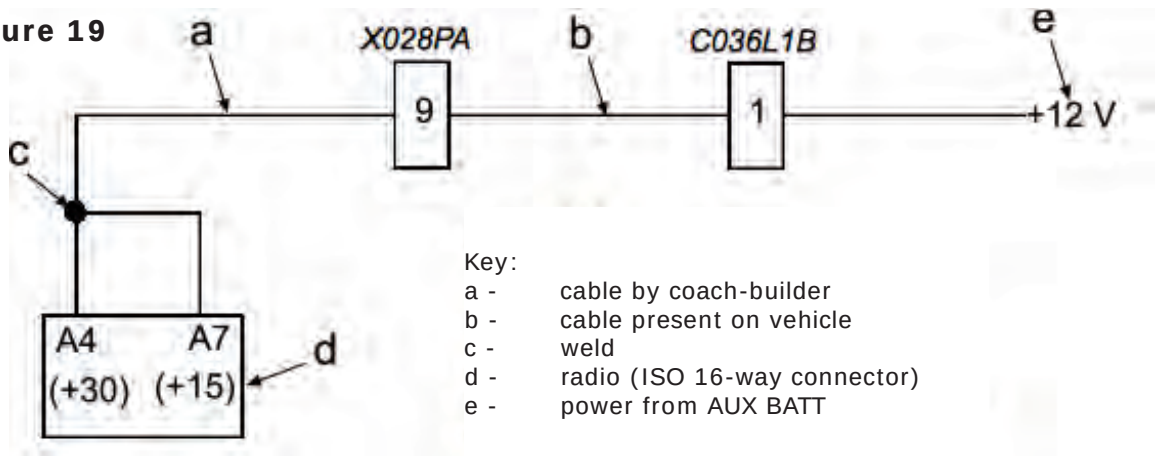


Radio permanent power supply

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

CAUTION: This setting can cause a faster main battery discharge.

Figure 19

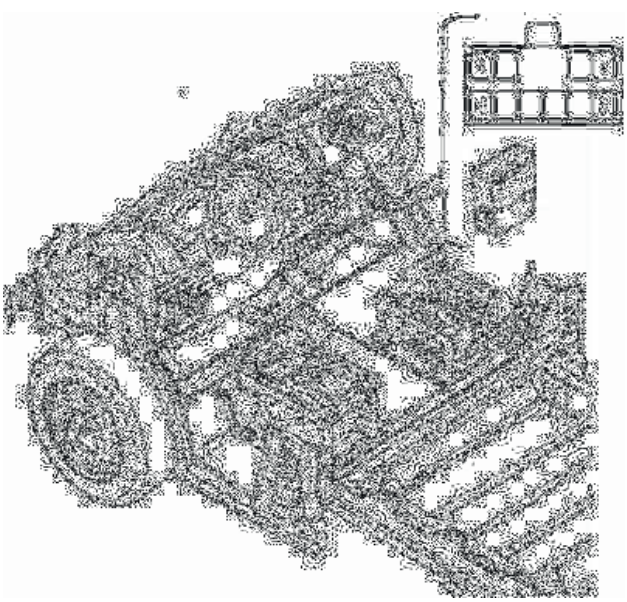


Key:
a - cable by coach-builder
b - cable present on vehicle
c - weld
d - radio (ISO 16-way connector)
e - power from AUX BATT

Terminal for hole 9 of connector X028PA: Tyco p/n 282375-1 (cable 1.5 mm^2)

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.

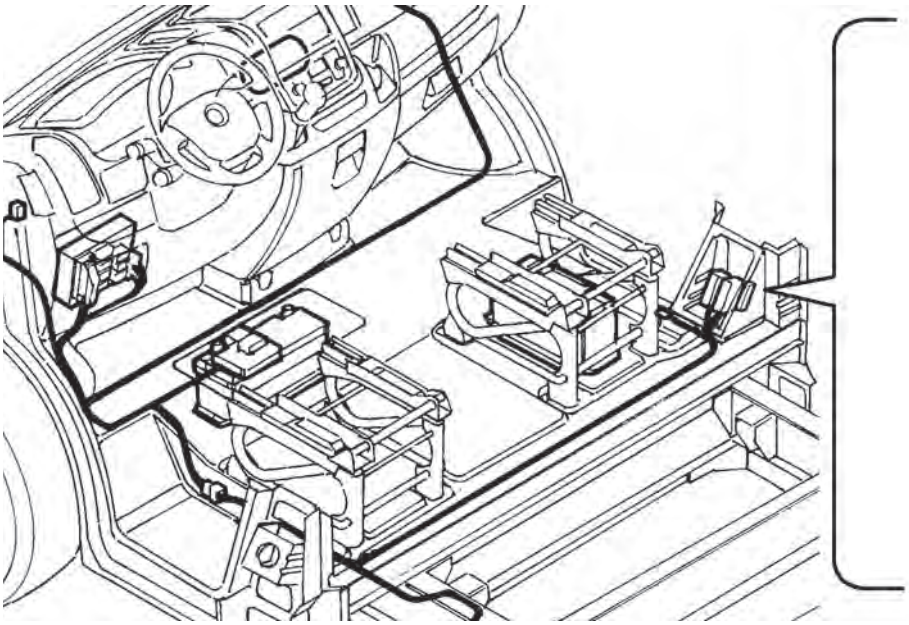
Figure 20



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

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

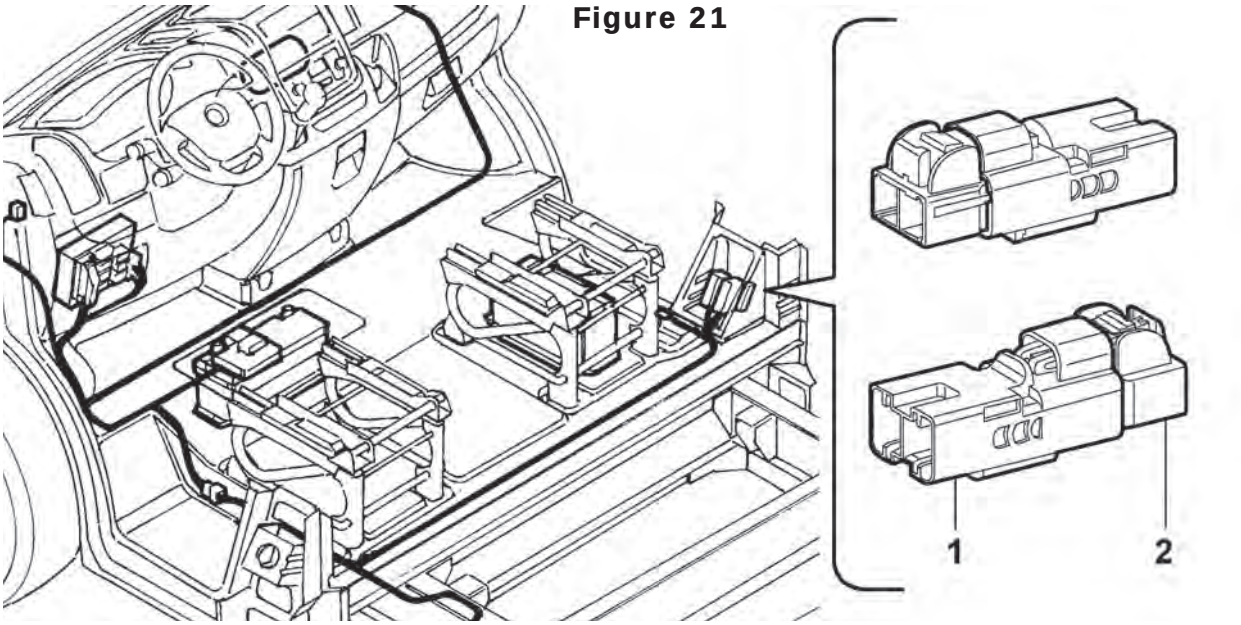
Retrocamera



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

3D view of connector

Figure 21



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

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

+12V power supply from main battery

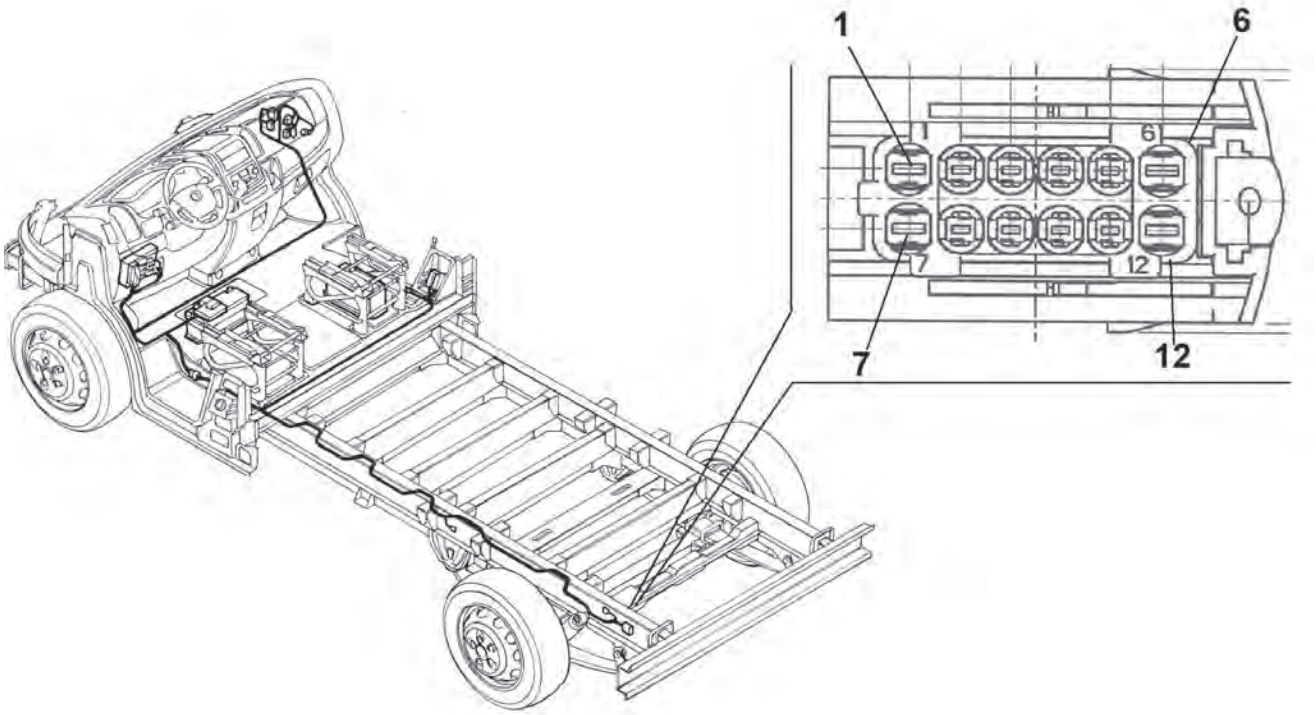
See paragraph 4.1.4

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.

Connector Y203L4A (12-way) – Rear lights
2D view of connector

Figure 22



Description of connector functions

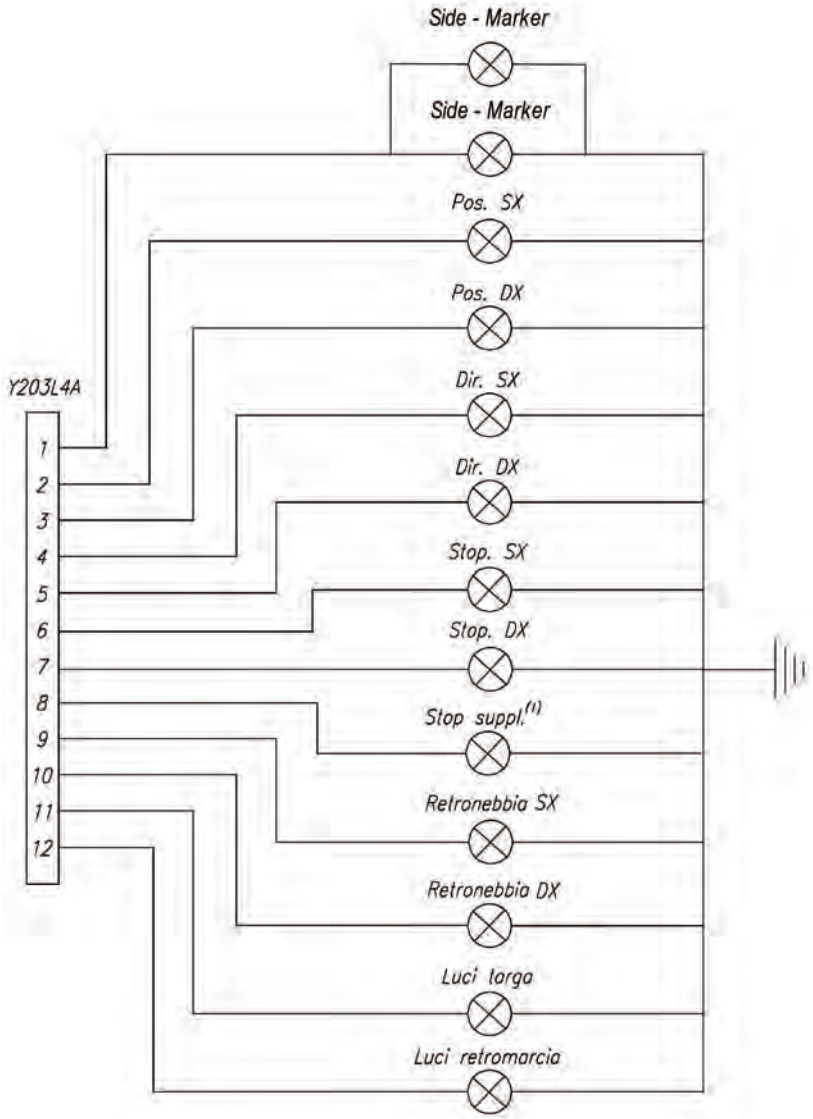
Pin	X2/50 Function / Connector Part number	Minimum cable section [mm^2]	Cable colour	Notes
	Connector 12-way Tyco p/n 284844-1 Counterpart: p/n 284848-3 (by coach-builder)			
1	Side - marker	0.5	GR	2 5W - 12V bulbs
2	LH rear marker light	0.5	GV	2 5W - 12V bulbs
3	RH rear marker light	0.5	G	2 5W - 12V 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	PMAX= 10W at 12V
12	Reversing lights	1,5	BR	PMAX= 42W at 12V

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

NOTE: For coachbuilders willing to use lights with different power absorption (lower power or LED), the failure diagnosis can be deactivated via the WYTECH Plus tool.
On some versiont those diagnosis is already switched off.

Taillights

Figure 23

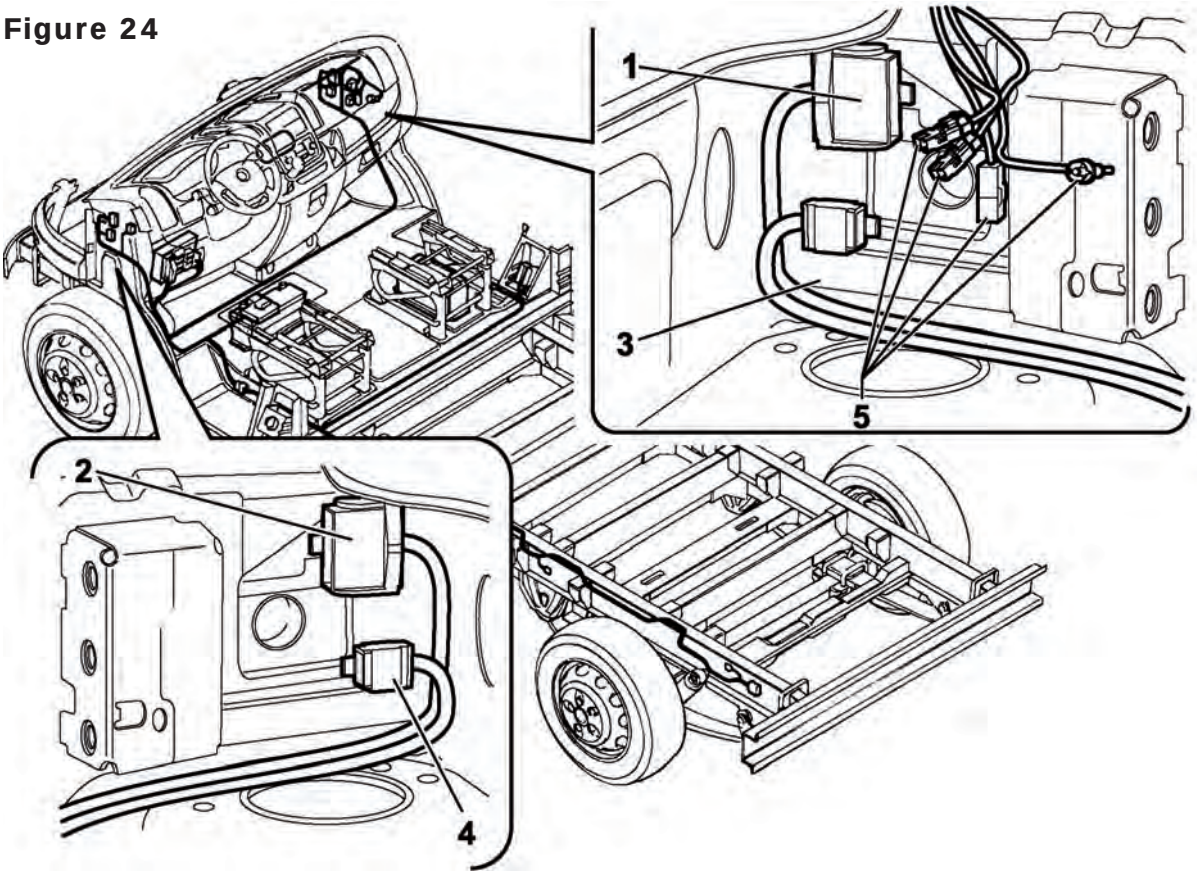


(1) **Alternatively, the third stop can be connected to pin 8 of connector Y203L4A - pin 8.**

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

Front door and aerial connectors

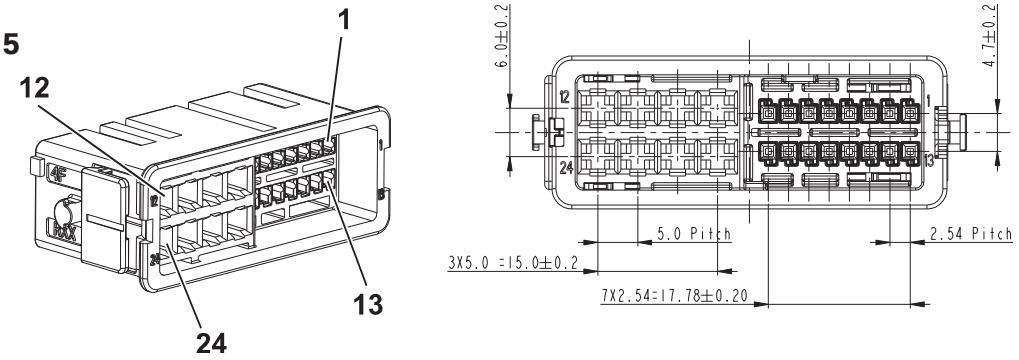
Figure 24



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

Connector Y001LA (24-way) – Driver's side door
3D view of connector

Figure 25



Description of connector functions

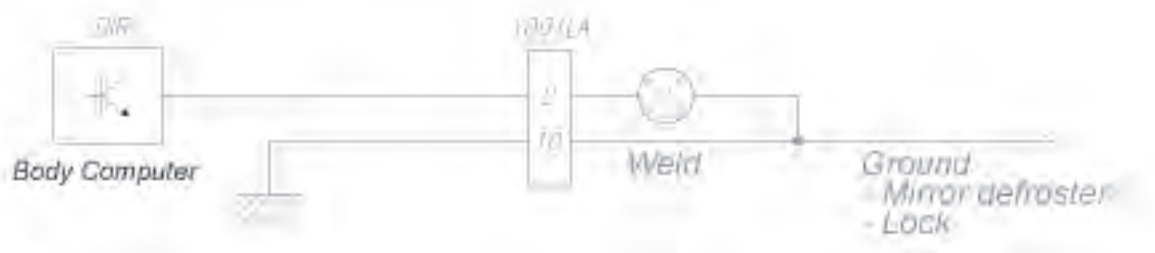
Pin	Operation/Part number Connector	Wire cross-section area (mm²)	Wire colour
	L side: F.C. 24-way FCI p/n 1 721 24 01 (Y001LA) S side: M.C. 24-way FCI p/n 1 721 24 00 (X001SA)		
1	Load compartment door state LED	0,35	BH
2	Driver's side direction indicator	0,35	ZR
3	Door open signal	0,35	BZ
4	Door mirror defroster supply	0,75	RV
5	External temperature sensor - GND	0,35	HR
6	Supply/lighting for DDC and comfort enable mirror controls	0,5	BL
7	Load compartment doors lock/unlock signal	0,35	HB
8	Lock/unlock signal from lock	0,35	LG
9	Electric window motor supply - Up	1,5	RN
10	Earth (direction indicators, lock, mirror defroster) DDC	1	N
11	Electric window motor supply - Down	1,5	NR
12	External temperature sensor - Signal	1,5	H
13	Passenger side electric window up signal from DDC	0,35	HV
14	Passenger side electric window down signal from DDC	0,35	HM
15	Main passenger's side door mirror up/down	0,35	MN
16	Main passenger's side door mirror left/right	0,35	BR
17	Secondary passenger's side door mirror up/down	0,35	BZ
18	Secondary passenger's side door mirror left/right	0,35	BV
19	Passenger's side door mirror motor common	0,35	HN
20	Not Connected		
21	Driver's side speaker (+)	0,5	G
22	Driver's side speaker (-)	0,5	GN
23	Feed for Door Motor Lock	1	BN
24	Feed for Door Motor Unlock	1	CV

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.

Side direction indicator lights

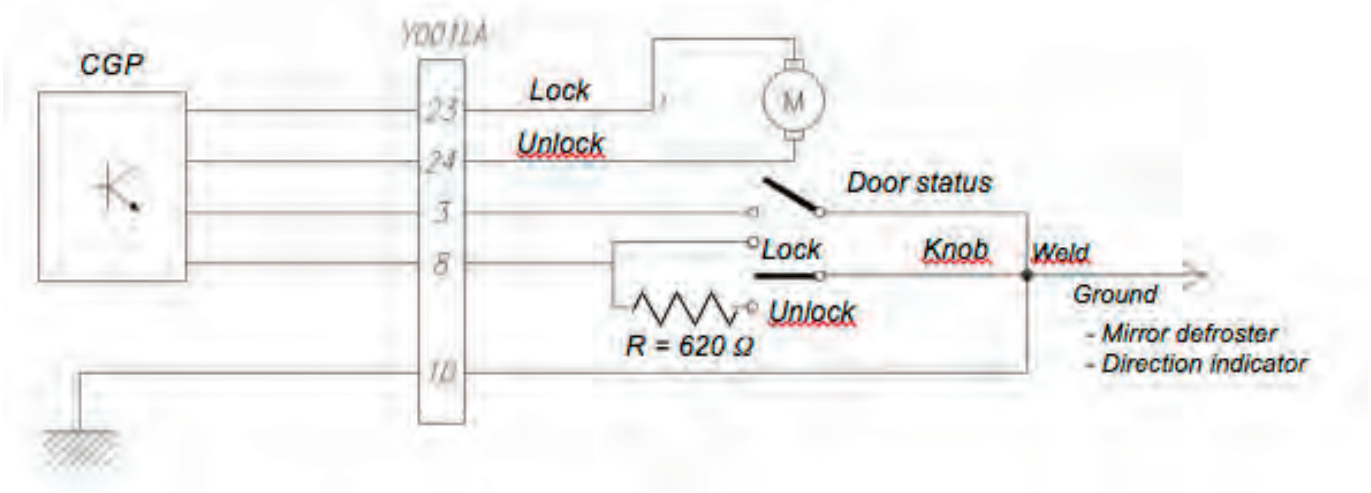
Lampada da 16W - 12V

Figure 26



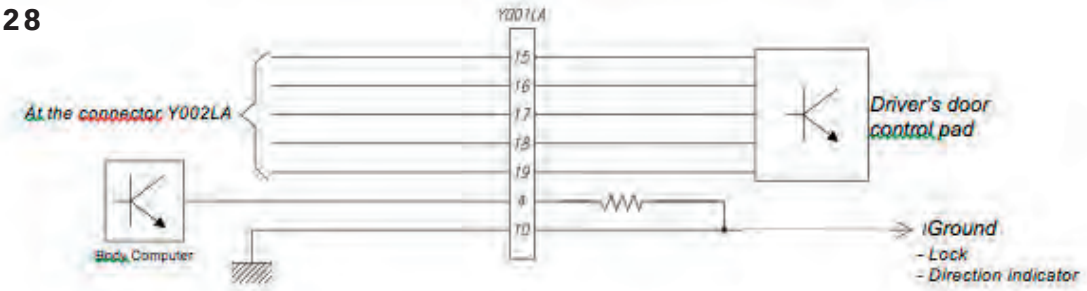
Driver's side lock control

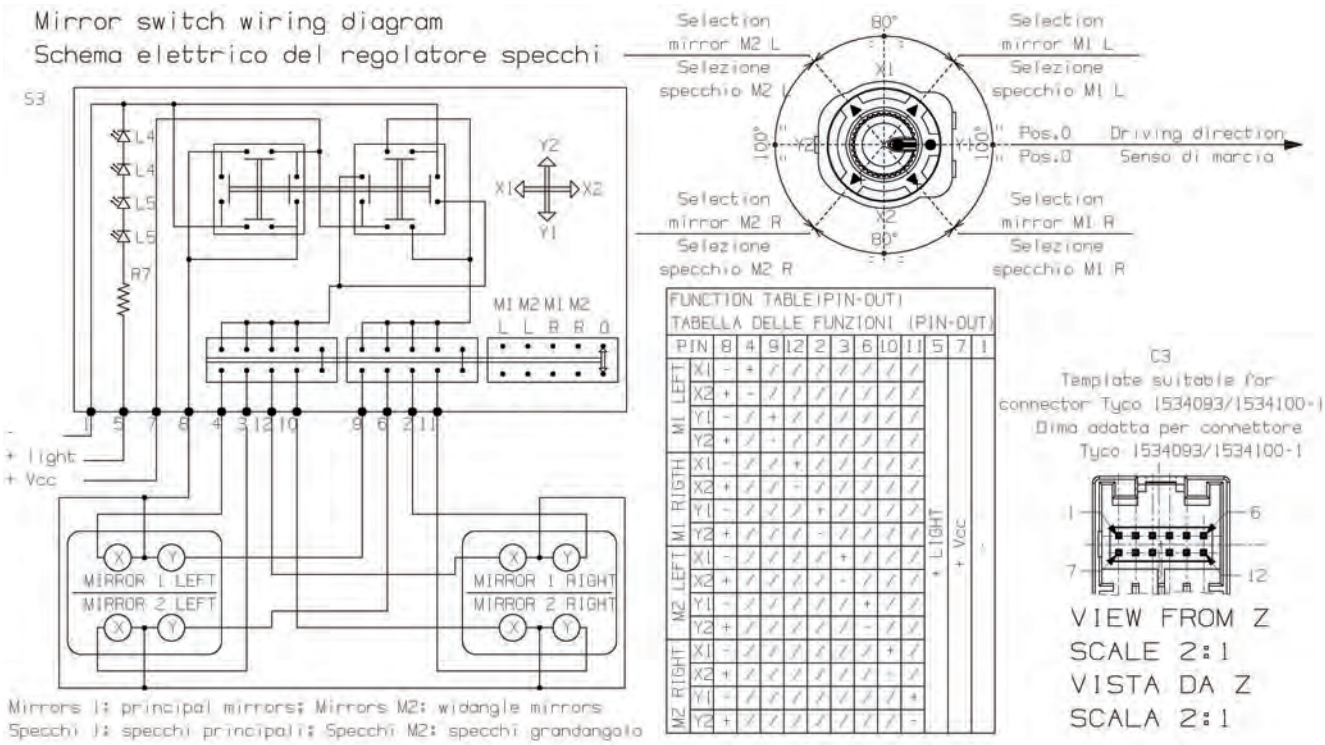
Figure 27



External electric mirror

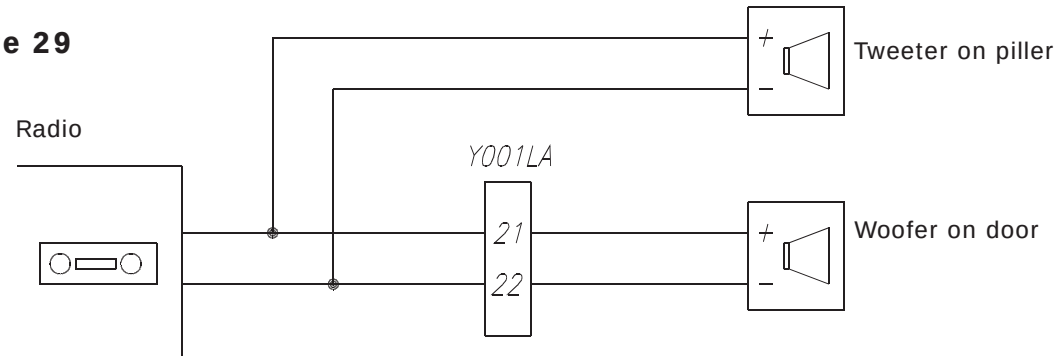
Figure 28





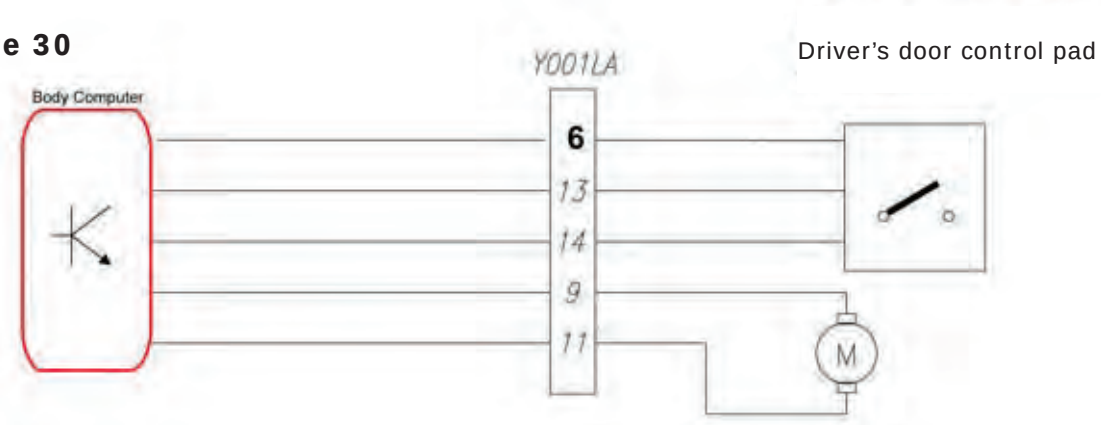
Driver's side loudspeaker

Figure 29

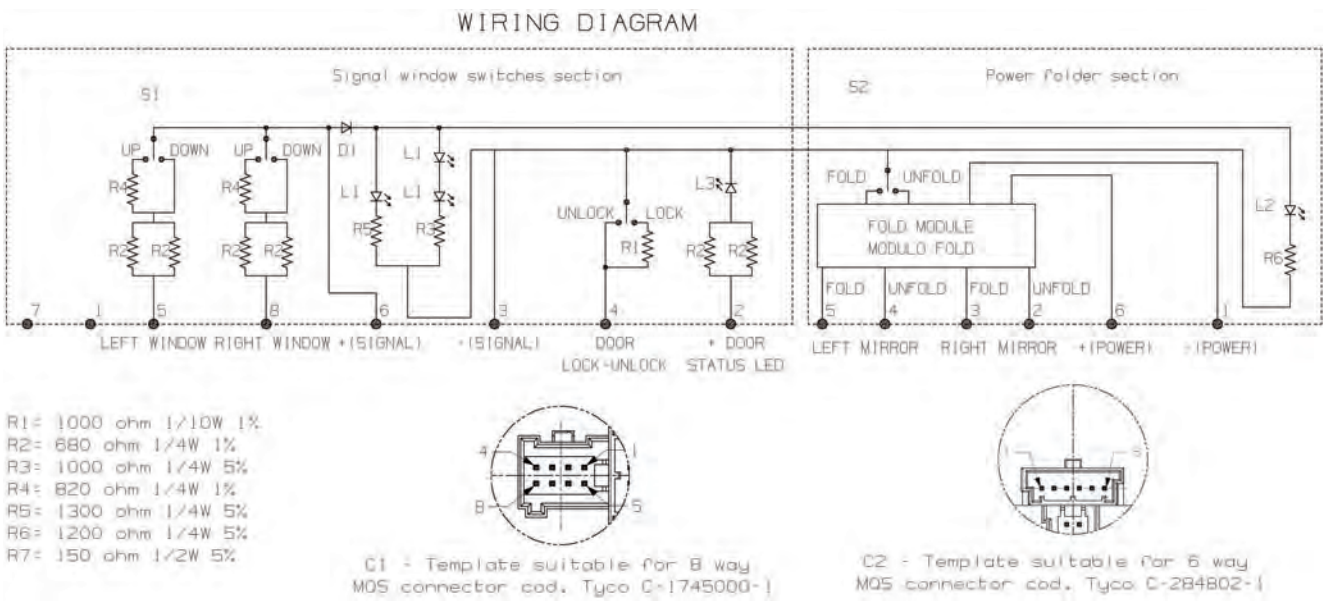


Electric window winder

Figure 30

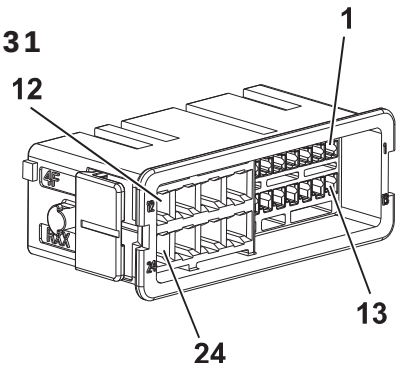


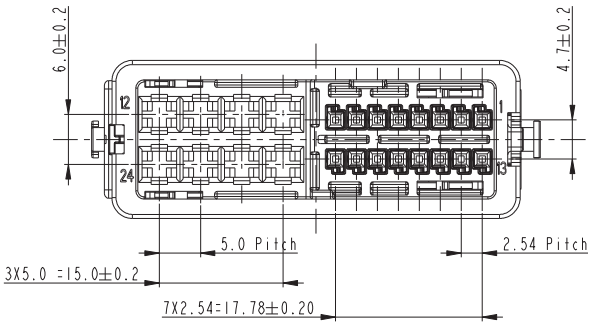
Control cluster – driver side



Connector Y002LA (24-way) – Passenger side door
3D view of connector

Figure 31





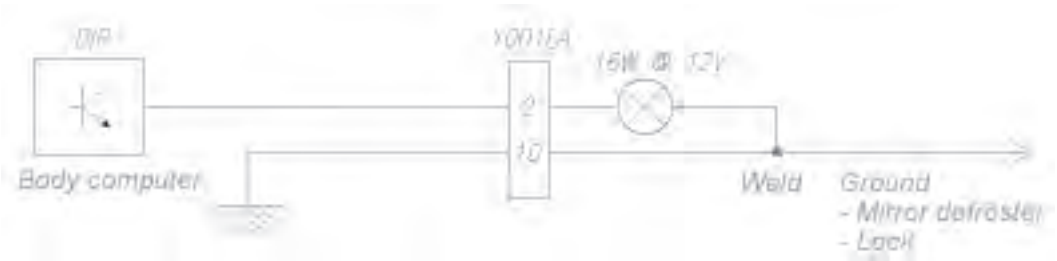
Description of connector functions

Pin	Operation/Part number Connector	Wire cross-section area (mm^2)	Wire colour
	L side: F.C. 24-way FCI p/n 1 721 24 01 (Y002LA) D side: M.C. 24-way FCI p/n 1 721 24 00 (X002DA)		
1	Not connected	-	-
2	Passenger's side direction indicator	0,35	ZB
3	Door open signal (CTRL_GND)	0,35	BN
4	Wing mirror defroster	0,75	RV
5	Not connected	-	-
6	CDC supply/lighting (service 2 T13 relay)	0,5	BL
7	Not connected	-	-
8	Not connected	-	-
9	Passenger's side window winder supply	2,5	R
10	Earth (direction indicators, lock, mirror defroster)	1	N
11	Passenger's side window winder earth	2,5	NZ
12	Not connected	-	-
13	Not connected	-	-
14	Passenger side window winder down signal	0,35	HR
15	Main passenger's side wing mirror up/down	0,35	MN
16	Main passenger's side wing mirror left/right	0,35	BR
17	Secondary passenger's side wing mirror up/down	0,35	BZ
18	Secondary passenger's side wing mirror left/right	0,35	BV
19	Passenger's side wing mirror motor common	0,35	HN
20	Not connected	-	-
21	Passenger's side speaker (+)	0,5	ZC
22	Passenger's side speaker (-)	0,5	ZN
23	Lock/unlock control	1	BN
24	Lock motors common	1	CV

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

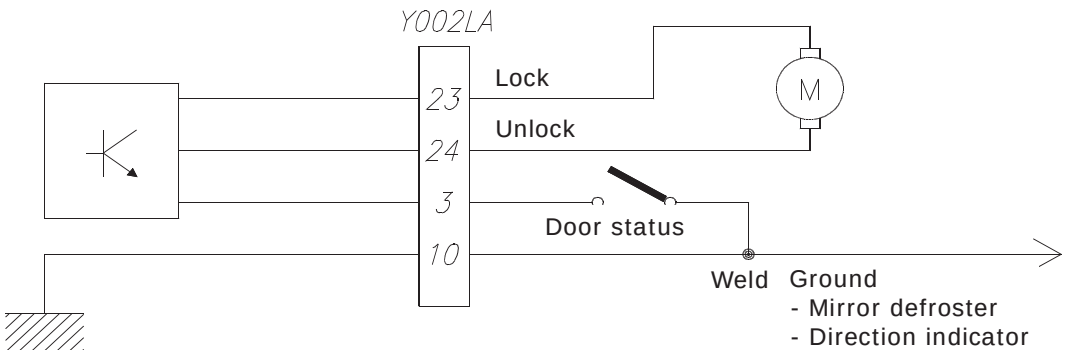
Side direction indicator light

Figure 32



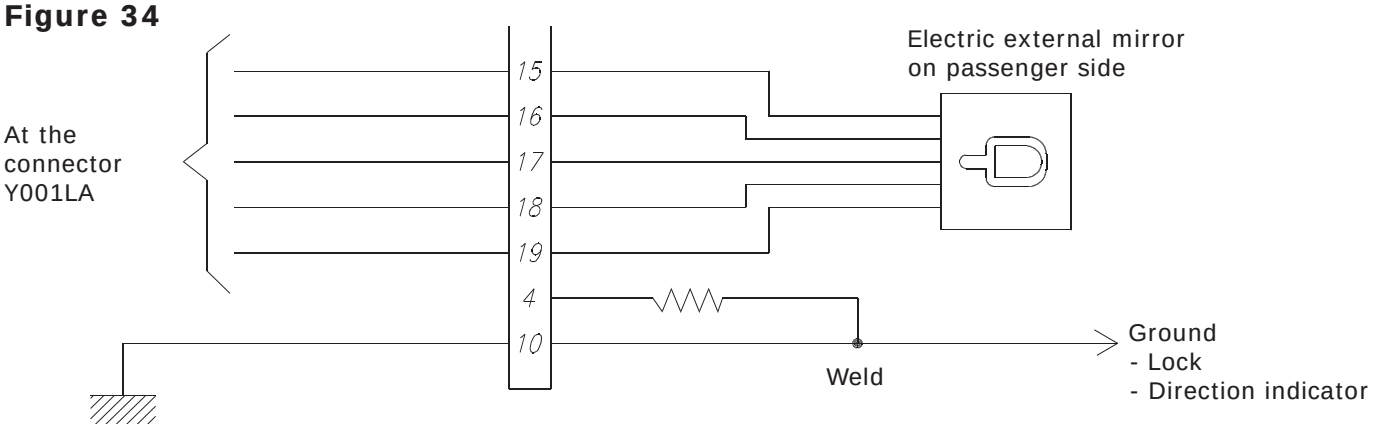
Passenger side door control

Figure 33



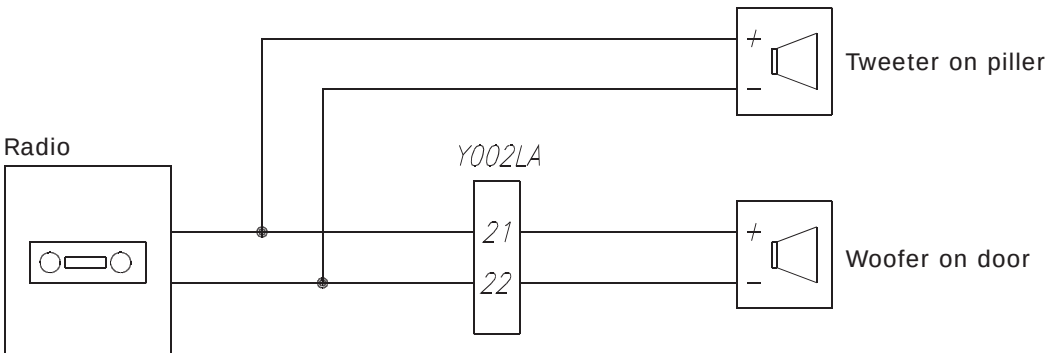
Electric external mirror

Figure 34



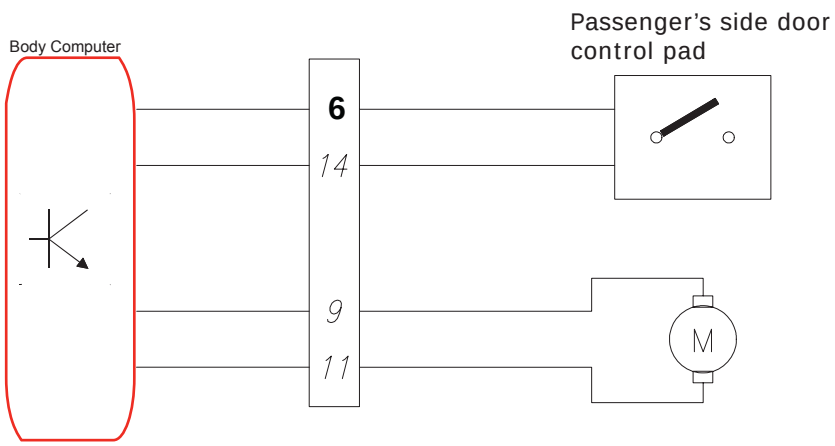
Passenger side loudspeaker

Figure 35



Electric window winder

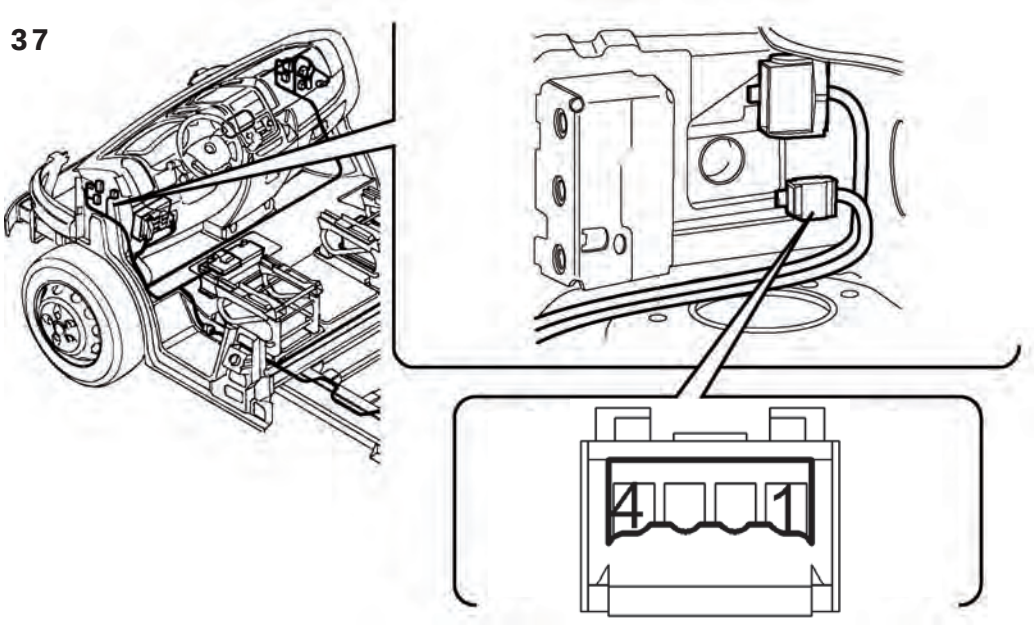
Figure 36



For internal scheme of the control panel refer to Sec. 1.16.7 for the power window winder only.

Connector Y121LA (4-way) – Driver's side door (opt)
2D view of connector

Figure 37

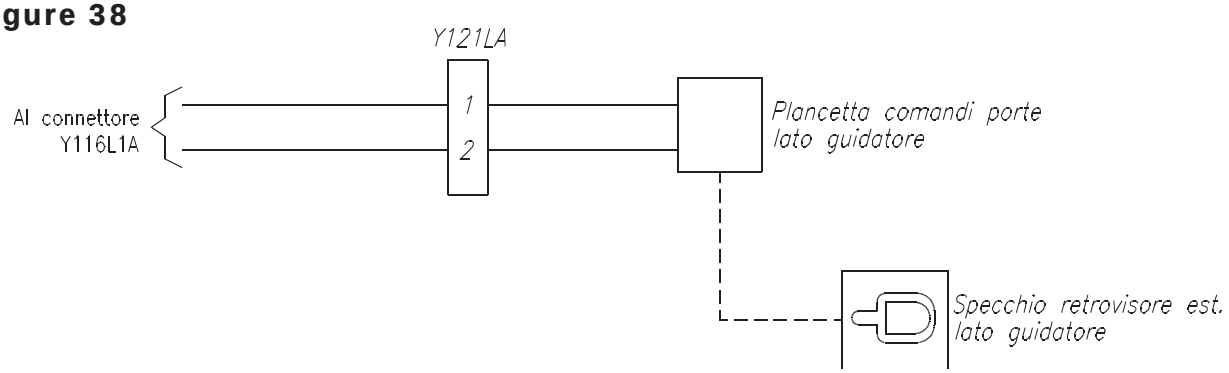


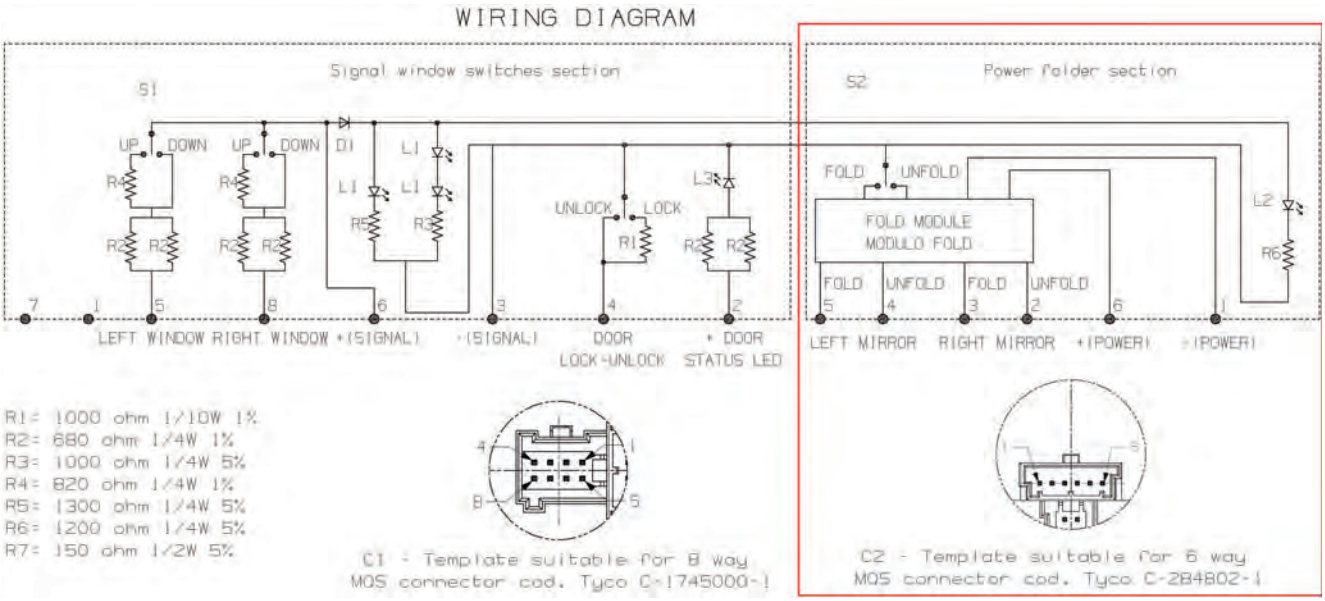
Description of connector functions

Pin	Function/Connector part number	Minimum cable section [mm²]	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	MIRROR FOLDING +KEY	0,35	HR	External mirror electric deflection
4	DEAD LOCK	0,35	HV	Dead-lock control

External rear-view mirror deflection

Figure 38





Highlighted section refers to mirror folding module.

1.17.1.2 Specification of folding module for external rear-view mirrors

- Max Time-Out time: 8 sec (i.e. in the event of a system malfunctioning power to mirror motors is cut after 8 second from activation);
- Reading and memorization of start-up current;
- Current reading during actuation;
- Lock current check (defines as 80% of the start-up current);
- Checks if the lock current is permanent or a spike only and cut the power within 500msec;
- The control can be activated 5-6 times within 2min; after that, the actuation is inhibited for 30sec; if the 5th actuation is to open, the control is inhibited, if the 5th actuation is to close, a further open is still allowed;
- Pin 1 and 6 are respectively Ground and Power Plus (+30);
- Pin 2 and 3 feed RH motor and during actuation (open or close) invert the current in the motor itself;
- Pin 3 and 4 feed LH motor and during actuation (open or close) invert the current in the motor itself;
- Pin 6 of 8-pin connector must be fed by Plus Signal, otherwise the electronics doesn't activate any control
- Button driven functions always activate simultaneously both the motors connected to Pin 2-3 and 4-5
- all the system is developed considering the characteristic current curve of Type 250 folding mirror.

Each folding motor has a rolling current of about 200÷400mA and a lock current of 2÷2,5A.