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Installation documentation

for water heater Thermo Top Evo

'Inline' coolant circuit with engine preheating

Mazda CX-5

Left-hand drive vehicle

Manufacturer	Model	Type	Model year	EG-BE-No. / ABE	VIN
Mazda	CX-5	KF	from 2018	e13* 2007/46* 1803*…	JMZKF****0*750.000 -
Mazda	CX-5	KF	from 2020	e13* 2007/46* 1803*…	JMZKF****9*100.001 -

Motorisation	Fuel	Emission standard	Transmission type	Output [kW]	Displacement [cm³]	Engine code
2.2D	Diesel	Euro 6d-Temp / Euro 6d-Temp-EVAP-ISC	6-speed SG	110	2191	SH
2.2D	Diesel	Euro 6d-Temp / Euro 6d-Temp-EVAP-ISC	6-speed AG	110	2191	SH
2.2D	Diesel	Euro 6d-Temp / Euro 6d-Temp-EVAP-ISC	6-speed SG	135	2191	SH
2.2D	Diesel	Euro 6d-Temp / Euro 6d-Temp-EVAP-ISC	6-speed AG	135	2191	SH

Validity	Equipment variants	Model
		CX-5
Verified equipment variants	Manual air-conditioning	x
	2 zone automatic air-conditioning	x
	Matrix LED and LED main headlights	x
	LED front fog lights	x
	Headlight washer system	x
	2 WD / 4WD	x
	Start-Stop (i-Stop)	x
	Parking assistance (PDC) in the front	x
	Electrical Coolant Control Valve	x
	LED- and halogen daytime running lights	x
Exclusion	Alarm system with passenger compartment monitoring (can lead to faults)	x

Total installation time	Note
8.5 hours	

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1 List of abbreviations

AG	Automatic transmission
DP	Fuel pump
EFIX	Exhaust end fastener
EPT	Telestart receiver
HG	Heater
PWM	Pulse width modulator
RSH	Relay and fuse holder of passenger compartment
SG	Manual transmission
SH2	Engine compartment fuse holder for F1/F2
UP	Coolant pump
Veh.	Vehicle

2 Installation notes

2.1 Information on Validity

This installation documentation applies to vehicles listed on page 1, assuming technical modifications to the vehicle do not affect installation, any liability claims excluded. Depending on the vehicle version and equipment, modifications may be necessary during installation with respect to this installation documentation. Vehicle and engine types, equipment variants and other specifications not listed in this installation documentation have not been tested. However, installation according to this installation documentation may be possible.

2.2 Components used

Designation	Order number
Basic delivery scope of Thermo Top Evo 5 diesel	4100-78-774A
Installation kit for Mazda CX-5 2018 diesel	4100-78-835B
In case of Telestart, control element, as well as indicator lamp in consultation with end customer	MAZDA ACCESSORY BASE

2.3 Information on Total Installation Time

The total installation time includes the time needed for mounting and demounting the vehicle-specific components, the heater specific installation time and all other times required for the system integration and initial start-up of the heater.
The total installation time may vary for vehicle equipment other than provided.

2.4 Notes on installation, in coordination with the end customer

▶ Arrange for the vehicle to be delivered with the tank only about ¼ full.

▶ The installation location of the following elements should be chosen in coordination with the end customer:

– the push button in case of the Telestart and/or ThermoCall and/or ThermoConnect options

3 About this document

3.1 Purpose of the document

This installation documentation is part of the product and contains all the information required to ensure professional vehicle specific installation of the:

Thermo Top Evo heater

3.2 Warranty and liability

Webasto shall assume no liability for defects, damage and injuries resulting from a failure to observe the installation, repair and operating instructions of the information contained in them.

This liability exclusion particularly applies to improper installations and repairs by untrained persons or in the case of a failure to use genuine spare parts.

The liability due to culpable disregard to life, limb or health and due to damage or injuries caused by a wilful or reckless breach of duty remain unaffected, as does the obligatory product liability.

Installation should be carried out according to the general, standard rules of technology. Unless specified otherwise, fasten hoses, lines and wiring harnesses to original vehicle lines and wiring harnesses using cable ties. Insulate loose wire ends and tie back. Connectors on electronic components must audibly snap into place during assembly.

Spray unfinished body areas, e.g. drilled holes, with anti-corrosion wax (Tectyl 100K).

Observe the instructions and guidelines of the respective vehicle manufacturer for demounting and mounting vehicle specific components.

The initial start-up is to be executed with the Webasto Thermo Test Diagnosis.

When installing a programmable control module (e.g. a PWM Gateway), the corresponding settings must be checked or adjusted.

3.2.1 Statutory regulations governing installation

The Thermo Top Evo heater has been type-tested and approved in accordance with ECE-R 10 (EMC) and ECE-R 122 (heater). The regulations of these guidelines are binding in the scope of the Directive 70/156/EEC and/or 2007/46/EC (for new vehicle models from 29/04/2009) and should also be observed in countries in which there are no special regulations.

The heater is licensed in accordance with paragraph 19, section 3, No. 2b of the StVZO (German Road Traffic Licensing Authority).

3.3 Safety

Qualifications of installation personnel

The installation personnel must have the following qualifications:

- Successful completion of Webasto training
- Corresponding qualification for working on technical systems

Regulations and legal requirements

The regulations from the heater's general installation and operating instructions must be observed.

3.3.1 Safety information on installation

Danger posed by live parts

▶ Prior to installation, disconnect the vehicle from the voltage supply.

▶ Make sure the electrical system is earthed correctly.

▶ Always comply with legal requirements.

▶ Observe data on type label.

Danger of fire and leaking toxic gases due to improper installation

▶ Vehicle parts in the vicinity of the heater must be protected against excessive heating by the following measures:

  ⇨ Maintain minimum safety distances.

  ⇨ Ensure adequate ventilation.

  ⇨ Use fire-resistant materials or heat shields.

Danger due to sharp edges

- Lacerations
- Short circuit due to electrical wire damage

▶ Fit protectors on sharp edges.

3.4 Using this document

Before installing and operating the heater, read this installation documentation, the installation instructions of the heater, the operating instructions and supplementary sheets provided.

3.4.1 Explanatory Notes on the Document

There is an identification mark near the respective work step to allow you to quickly allocate the other applicable documents to the Webasto components to be installed:

Generally valid Webasto documentation	
Vehicle-specific installation documentation	K
Vehicle-specific installation documentation of the cold start kit	M
Webasto Comfort A/C control	H
Webasto Standard A/C control	G
Tank extracting device (e.g. FuelFix)	F
Exhaust end fastener (EFIX)	E
Combustion air intake silencer	L
Spacer bracket (ASH)	S

3.4.2 Use of symbols

DANGER

Type and source of the risk

Consequences: Failure to follow the instructions can result in death

▶ Actions to protect yourself against risks.

WARNING

Type and source of the risk

Consequences: Failure to follow the instructions can lead to serious or even fatal injuries

▶ Actions to protect yourself against risks.

CAUTION

Type and source of the risk

Consequences: Failure to follow the instructions can lead to minor injuries

▶ Actions to protect yourself against risks.

Type and source of the risk

Consequences: Failure to follow the instructions can lead to material damage

▶ Actions to protect yourself against risks.

Reference to the vehicle manufacturer's specific documents.

Note on a special technical feature

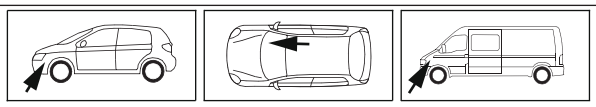
3.4.3 Work step identification marks

The ongoing work step is indicated on the outside top corner of the page:

Mechanical system	Electrical system	High-voltage	Coolant

Combustion air	Fuel	Exhaust	Software

3.4.4 Orientation aid



The arrow indicates the position on the vehicle and the viewing angle

3.4.5 Use of highlighting

Highlight	Explanation
✓	Action
▶	Necessary action
⇨	Result of an action
1 / 12 / a1	Position numbers for the image descriptions
① / ⑫ / Ⓐ	Position numbers for the image descriptions for electrical wires and components as well as coolant hose sections

4 Technical Information

Dimension specifications

- All dimensions specified in mm
- Perforated brackets and mounting angles are shown to scale
- Observe data regarding scale on the templates

Tightening torque specifications

- Tightening torque values of 5x13 heater bolts and 5x11 heater stud bolts = 8Nm
- Tightening torque values of 5x15 retaining plate of water connection piece bolts = 7Nm
- 5x12 bolt tightening torque of 2-part heater bracket = 6Nm
- Tighten other bolt connections in accordance with manufacturer's instructions or in accordance with state-of-the-art-technology

Temperature specification for heat shrink plastic tubings

- Fabric heat shrink tubing: shrink temperature max. 230°C
- Standard heat shrink plastic tubing: shrink temperature max. 300°C

Necessary special tools

- Hose clamp pliers for auto-tightening hose clamps
- Hose clamp pliers for Clic hose clamps of type W
- Hose clamping pliers
- Hose cutter
- Automatic wire stripper 0.2 - 6 mm^2
- Crimping pliers for cable lugs 0.5 – 10 mm^2
- Crimping pliers for male connector 0.14 – 6 mm^2
- Crimping pliers for connector 0.25 – 6 mm^2
- Torque wrench for 2.0 - 10 Nm
- Deep-hole marker
- Metric thread-setter kit
- Webasto Thermo Test Diagnosis with current software

5 Preparations

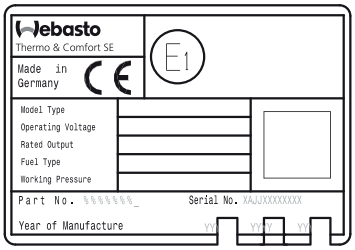
5.1 Heater preparation

Placing duplicate label

Fig. 1

Observe the general installation instructions of the heater.

- ▶ Remove years that do not apply from the type and duplicate label.
- ▶ Attach the duplicate label (type label) [1] in a clearly visible position on the B-pillar of the front passenger's side.



5.2 Applying sticker

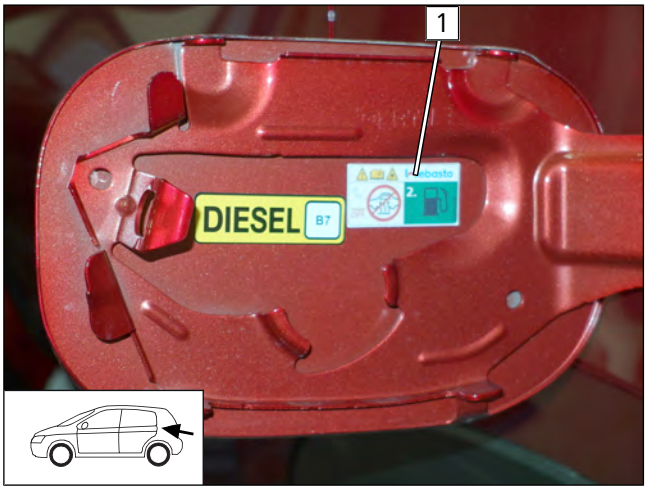


Fig. 2

- ▶ Apply the 'Switch off parking heater before refuelling' sticker [1] to the area of the filler point.

5.3 Before installing the heater

DANGER

The incorrect execution of electrical connections can cause a fire.

Attention

▶ The Mazda CX-5 uses a special battery for the i-Stop system (STOP+START). Check the battery before installing the heater. Check the battery status according to the workshop manual (acid level check for each battery cell). If the battery acid level lies below the specification, replace the battery with an original battery.
Observe the following table:

Battery acid level	Result	Comments
> 1.25 g/cm³	OK	
1.17 - 1.24 g/cm³	Charge battery	If the battery acid level is < 1.25 g/cm³ after charging, replace the battery with an original battery.
< 1.17 g/cm³	Replace battery	Replace the battery with an original battery.

5.4 Vehicle preparation

Further information can be found in the vehicle manufacturer's technical documentation.

▶ Open the fuel tank cap
▶ Ventilate the fuel tank
▶ Close the fuel tank cap again
▶ Depressurise the cooling system. See MESI 'ENGINE COOLANT LEVEL INSPECTION'
▶ Disconnect the battery and remove it completely with the carrier. See MESI 'BATTERY REMOVAL/ INSTALLATION'
▶ Remove the lower engine cover. See MESI 'FRONT UNDER COVER No.2 REMOVAL/ INSTALLATION'
▶ Remove the underbody trim on the left (2 parts). See MESI 'FLOOR UNDER COVER REMOVAL/ INSTALLATION'.
▶ Remove the right wheel well trim. See MESI 'REMOVING/INSTALLING THE SPLASH GUARD'.
▶ Remove the front bumper. See MESI 'REMOVING/INSTALLING THE FRONT BUMPER'.
▶ Detach and fold back the left rear bench seat. See MESI 'REAR SEAT REMOVAL/ INSTALLATION'.
▶ Open the left tank fitting service lid. See MESI 'FUEL TANK SENSOR REMOVAL/ INSTALLATION'.
▶ Remove the front entrance strip on the driver's side. See MESI 'FRONT SCUFF PLATE REMOVAL/ INSTALLATION'.
▶ Remove the front left footwell trim. See MESI 'FRONT SIDE TRIM REMOVAL/ INSTALLATION'.
▶ Detach the instrument panel trim under the steering wheel. See MESI 'LOWER PANEL REMOVAL/ INSTALLATION'.
▶ Remove the trim under the glove box. See MESI 'REMOVING/INSTALLING THE LOWER INSTRUMENT COVER'.
▶ Remove the glove box. See MESI 'GLOVE COMPARTMENT REMOVAL/ INSTALLATION'.
▶ Remove the front left loudspeaker cover. See MESI 'REMOVING/INSTALLING THE LOUDSPEAKER COVER'.
▶ Remove the A-pillar trim on the left. See MESI 'REMOVING/INSTALLING THE A-PILLAR TRIM'.

6 Installation overview

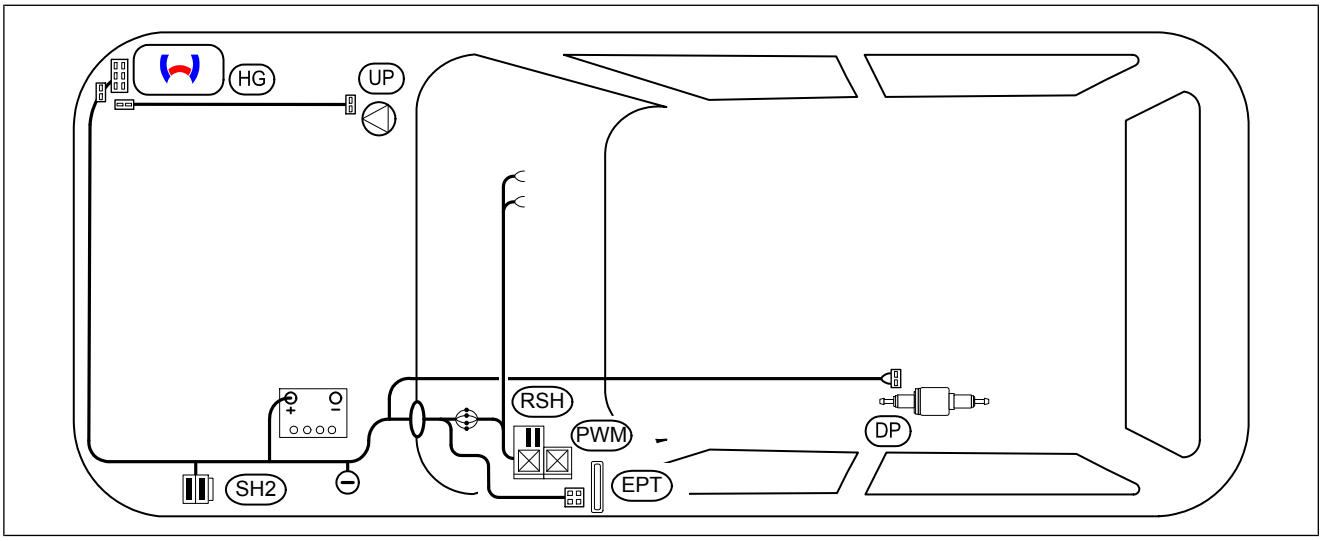


Fig. 3

Legend to installation overview

Abbreviation	Component
DP	Fuel pump
EPT	Telestart receiver
HG	Heater
PWM	PWM Gateway
RSH	Relay and fuse holder of passenger compartment
SH2	Engine compartment fuse holder for F1/F2
UP	Coolant pump

Heater installation location

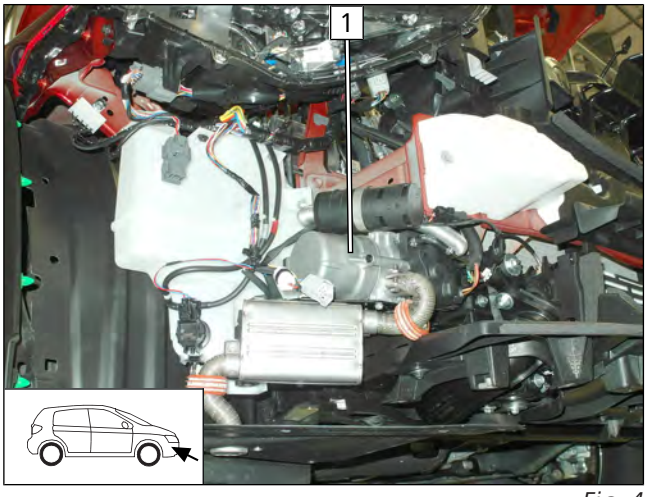


Fig. 4

1 Heater

7 Electrical system, general

7.1 Premounting wiring harness

Preparing retaining plate of fuse holder for F1/F2

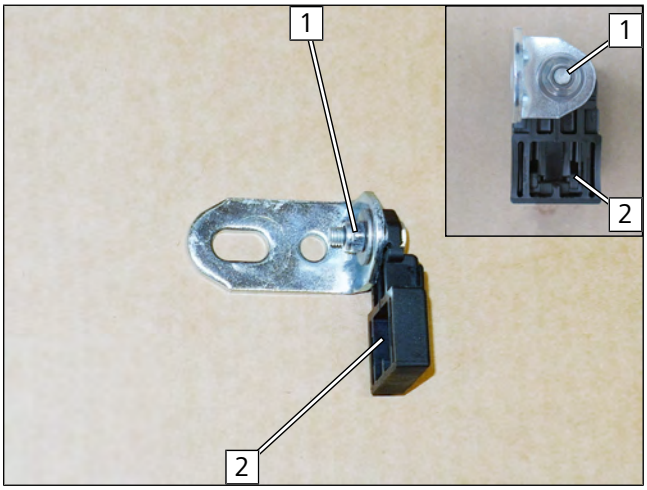


Fig. 5

1 M5x16 bolt, large diameter washer, fuse holder retaining plate 2, angle bracket, large diameter washer, nut (5-6Nm)

Mounting fuse holder for F1/F2

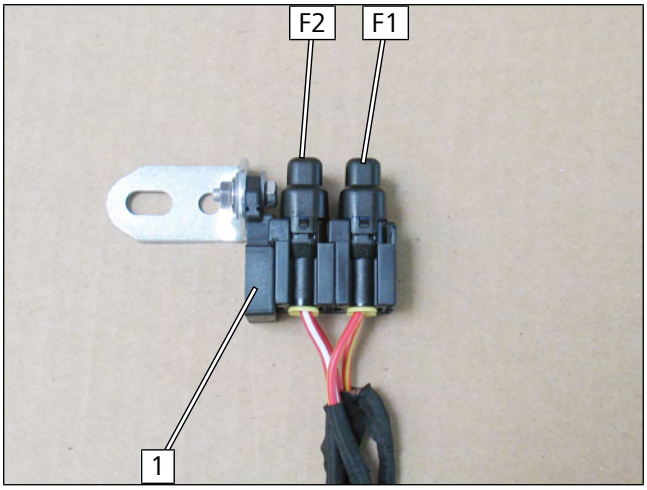


Fig. 6

1 Premounted retaining plate of engine compartment fuse holder

Cutting fuel line to length

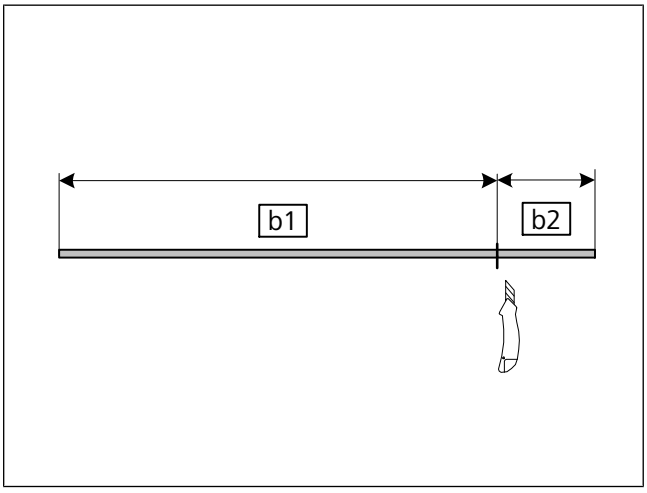


Fig. 7

	Length	Used for
b1	5500	Connection between heater and fuel pump
b2	500	Connection between fuel pump and tank extracting device

Cutting corrugated tube to length

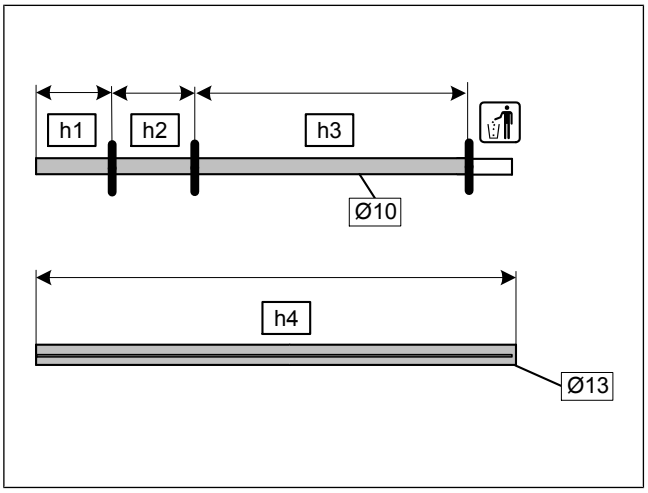


Fig. 8

	Length	Used for
h1	400	Red (rt) wire of battery +
h2	450	Fuel line of tank extracting device
h3	1050	Fuel line, fuel pump wiring harness
h4	2250	Fuel line, fuel pump wiring harness, heater wiring harness via engine compartment fuse holder to node point

General view of wiring harness and wiring allocation

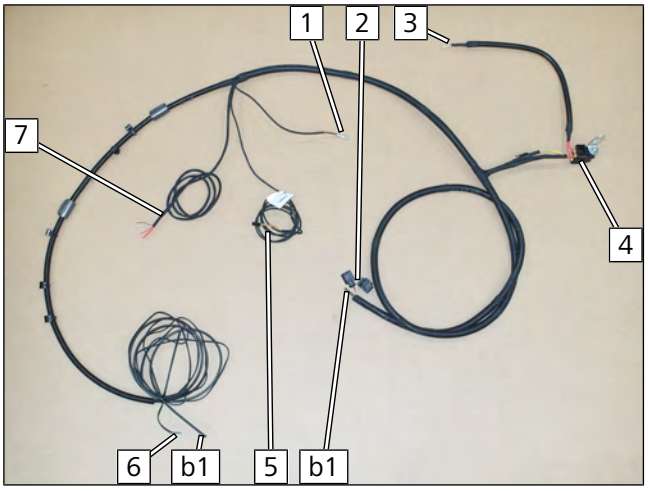


Fig. 9

1. Earth wire
2. Connector X1/X2 of heater wiring harness
3. Red (rt) wire from B+
4. Fuse holder of engine compartment
5. Control element wiring harness
6. Fuel pump wiring harness
7. Passenger compartment heater wiring harness

General view of corrugated tube installation

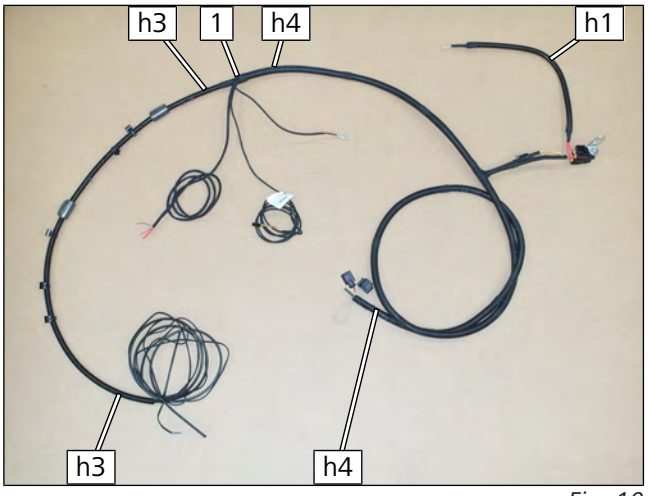


Fig. 10

Node point 1 is the main starting point for wiring harness preparation.

After the pre-assembly, wrap the corrugated tubes at the ends and at the node point with insulating tape as shown in the following figures.

Preparing wiring harness and fuel line

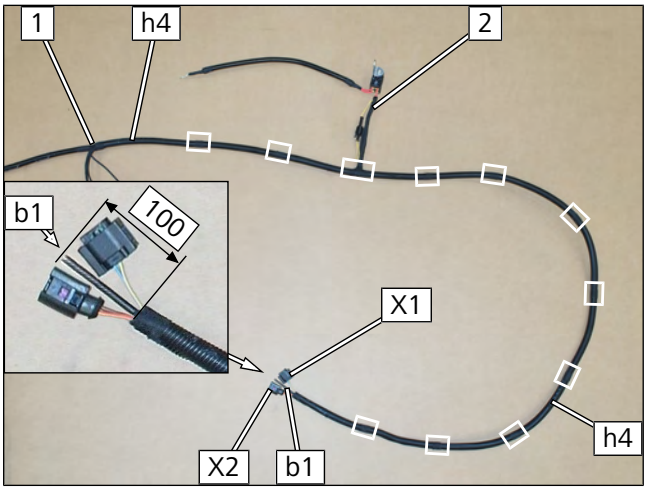


Fig. 11

- ▶ Draw fuel line **b1** (5500), fuel pump and heater wiring harnesses into Ø13 corrugated tube **h4** (2250 slit).
- ▶ Lead wiring harness section **2** with fuses F1/F2 out as shown.
- ▶ Wrap the marked segments of corrugated tube **h4** with insulating tape.

1 Node point

X1 6-pin connector of heater wiring harness

X2 2-pin connector of heater wiring harness

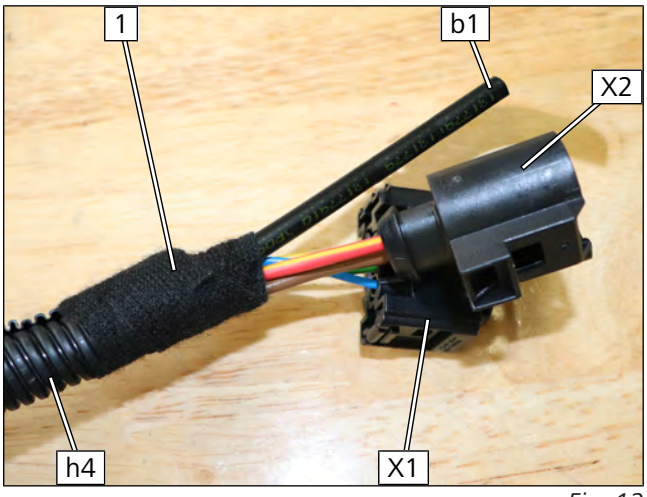


Fig. 12

- ▶ Wrap insulating tape around corrugated tube outlet opening **h4** at position **1** as shown.

Preparing red (rt) wire B+

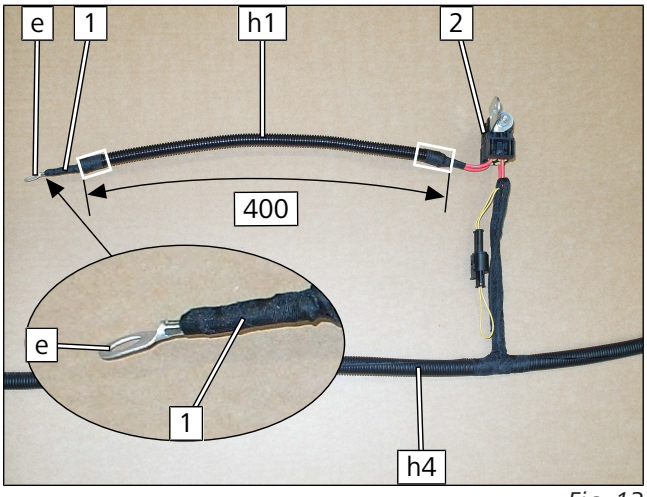


Fig. 13

- ▶ Draw red (rt) wire B+ into Ø10 corrugated tube **h1** (400). Fit cable lug **e** to red (rt) wire B+ **1** as shown in next figure, then insulate from cable lug crimping area to corrugated tube.
- ▶ Wrap the marked segments of corrugated tube **h1** with insulating tape.

2 Engine compartment fuse holder

Cable lug fitting instructions

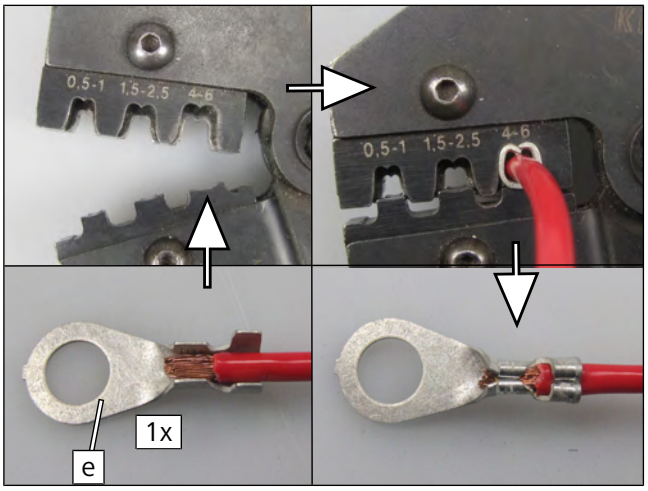


Fig. 14

Observe the next figures

e Ø8 cable lug for
4.0 - 6.0mm² wire cross-section

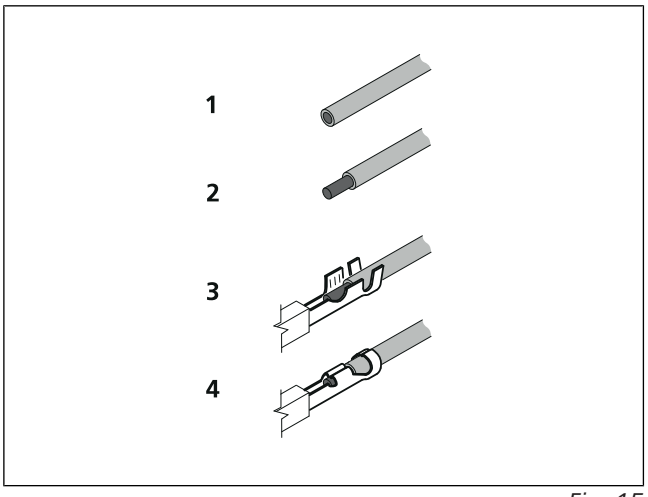


Fig. 15

View of heater wiring harness to passenger compartment and earth wire

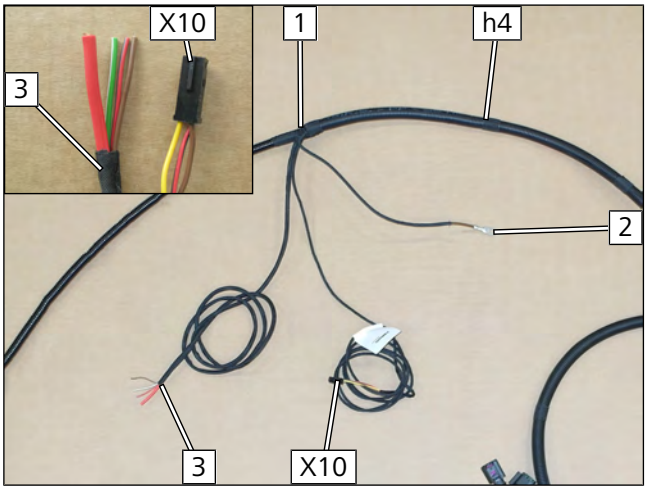


Fig. 16

1 Node point
2 Earth wire
3 Heater wiring harness to the passenger compartment
X10 Control element connector

Dismantling fuel pump connector X7

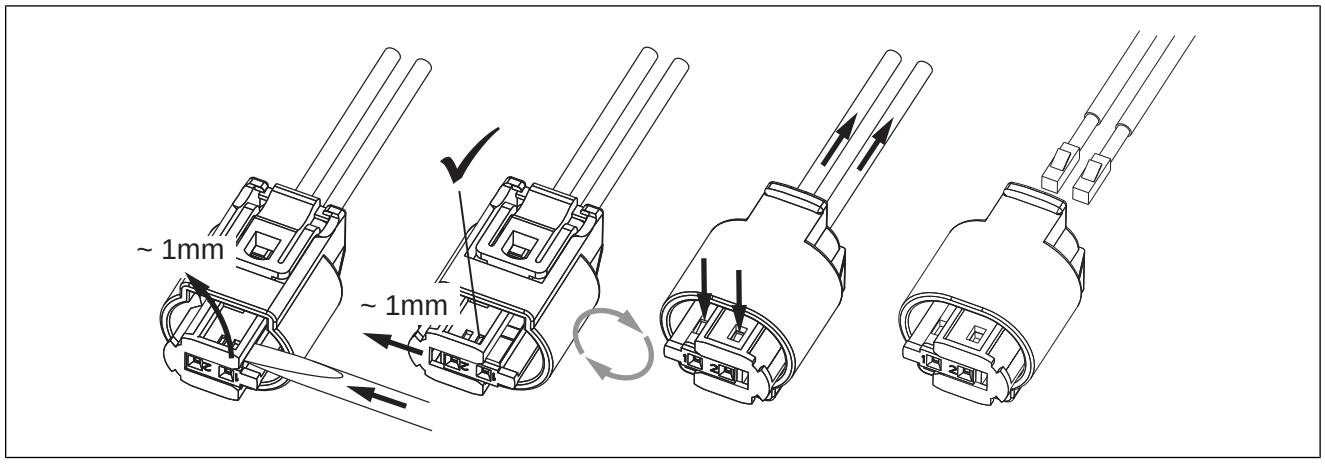


Fig. 17

Preparing wiring harness and fuel line

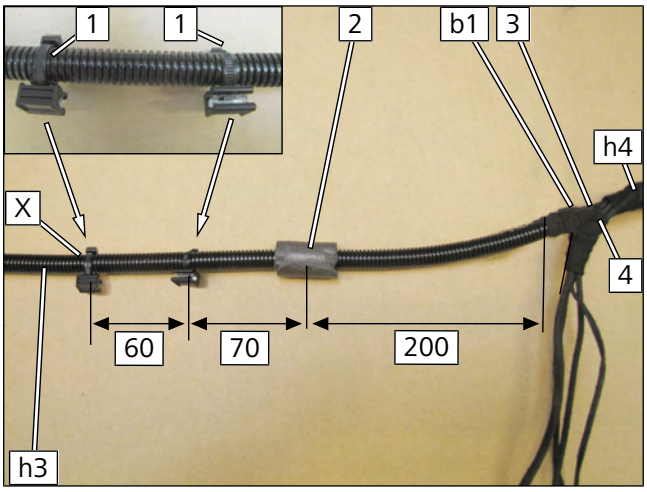


Fig. 18

▶ Draw fuel line **b1** and fuel pump wiring harness **3** into Ø10 corrugated tube **h3** (1050).

1 Edge clip cable tie (observe the clamping direction)
2 Self-adhesive foam strip
4 Node point

X Original position for the figure below

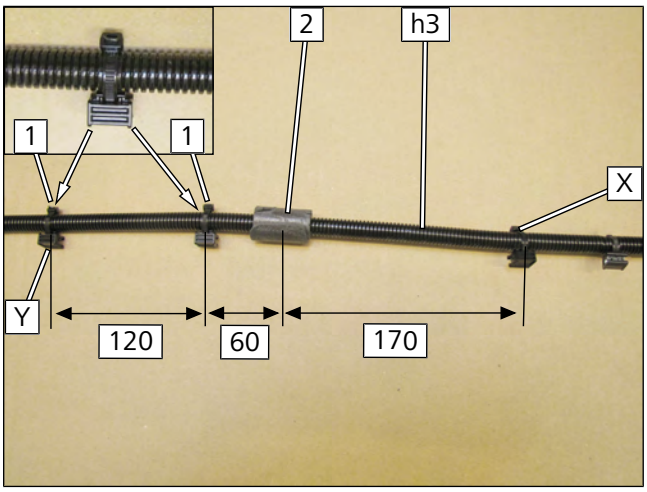


Fig. 19

1 Edge clip cable tie (observe the clamping direction)
2 Self-adhesive foam strip

X Original position from the previous figure
Y Original position for the figure below

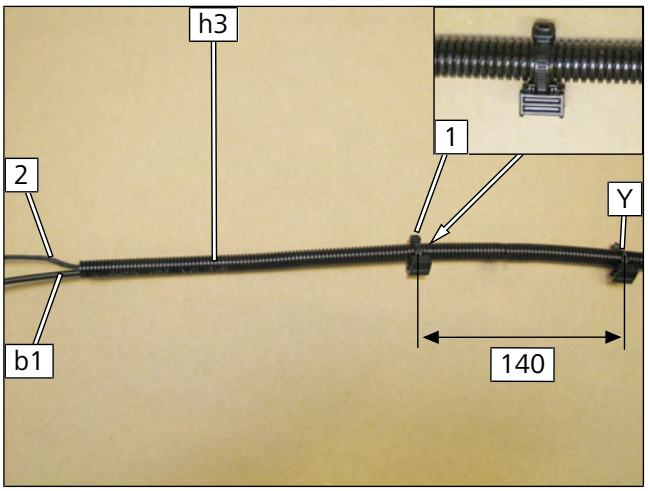


Fig. 20

1 Edge clip cable tie (observe the clamping direction)
2 Fuel pump wiring harness

Y Original position from the previous figure

7.2 Electrical system of engine compartment

Loosening engine compartment fuse box

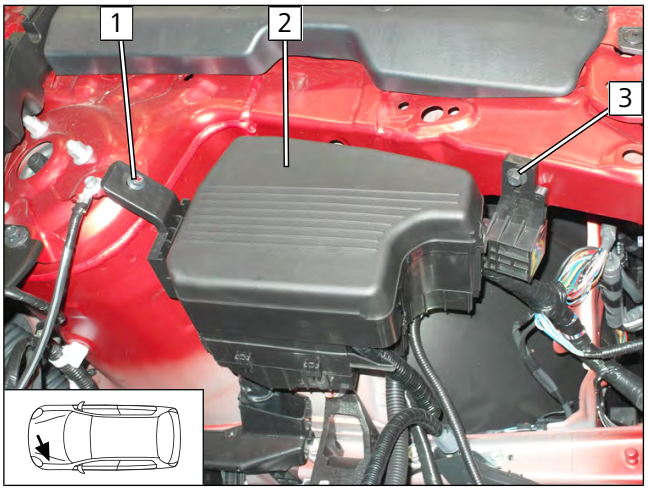


Fig. 21

1 Loosen original vehicle nut, it will be reused
2 Engine compartment fuse box
3 Loosen original vehicle bolt, it will be reused

View of wiring harness routing in engine compartment on driver's side

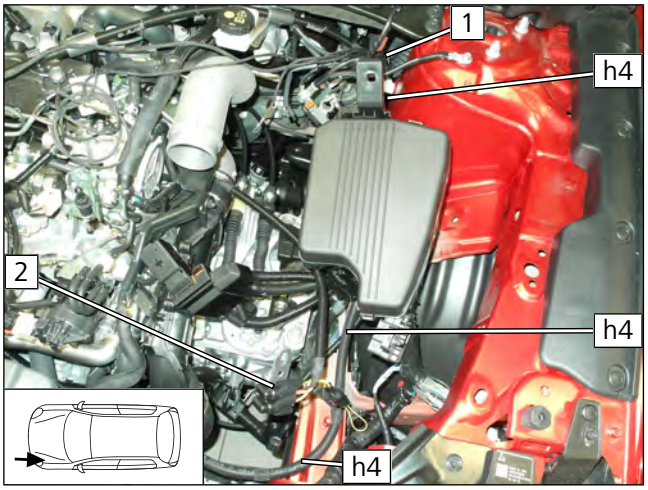


Fig. 22

1 Wiring harness node point
2 F1/F2 fuse holder of engine compartment

Routing wiring harness section in corrugated tube h4 in engine compartment

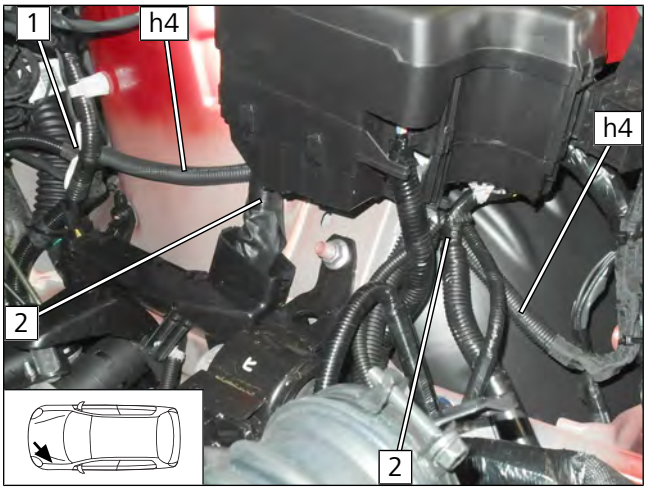


Fig. 23

▶ Route wiring harness section and fuel line in corrugated tube **h4** underneath original vehicle wiring harnesses 2 from the firewall to the front mask.

1 Wiring harness node point

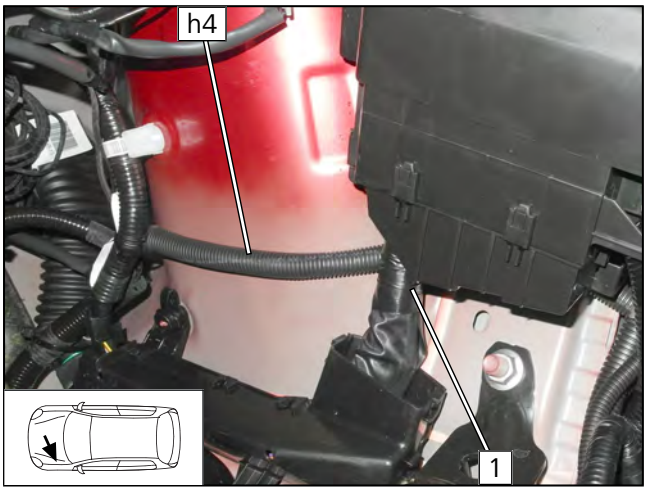


Fig. 24

1 Original vehicle wiring harness

Routing corrugated tube h3

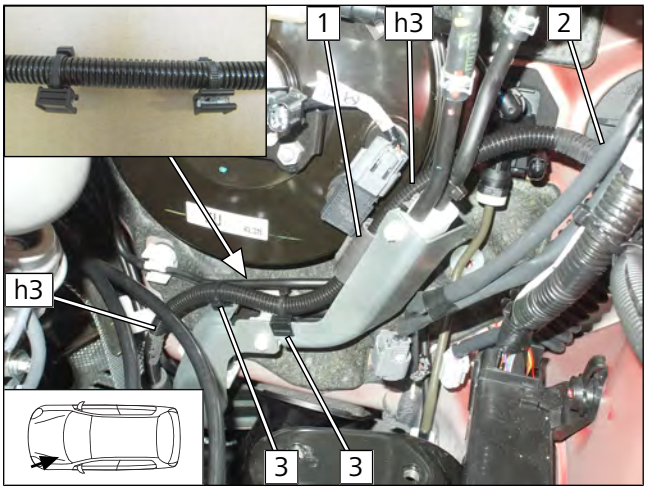


Fig. 25

▶ Route corrugated tube **h3** to the underbody as shown.

▶ Align premounted foam 1 with line holder as shown.

2 Node point

3 Edge clip cable tie

Fastening corrugated tube h4

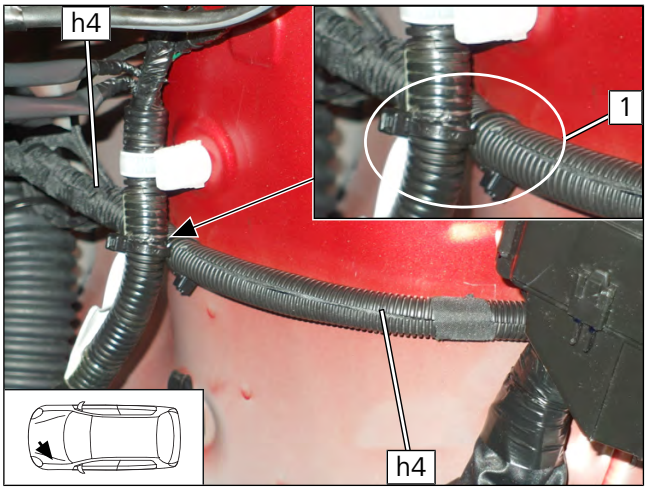


Fig. 26

▶ Attach corrugated tube **h4** to original vehicle wiring harness.

1 Cable tie

Earth wire connection

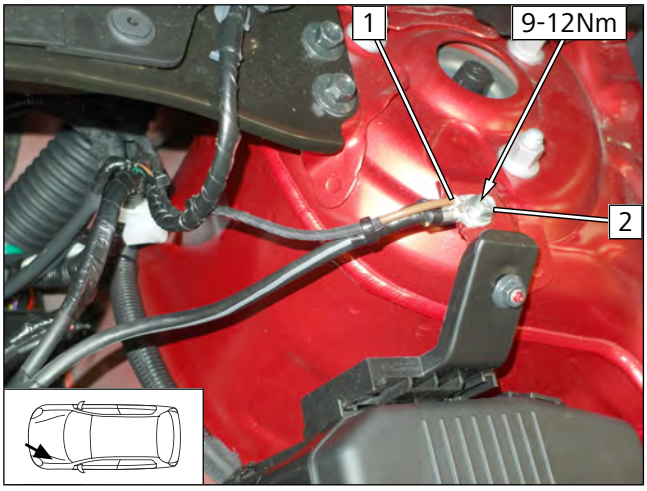


Fig. 27

DANGER

Observe tightening torque

The Fig. shows the installation situation. The battery is connected during the final work phase.

1 Earth wire at earth support point

2 Original vehicle bolt at earth support point

Routing wiring harnesses in passenger compartment

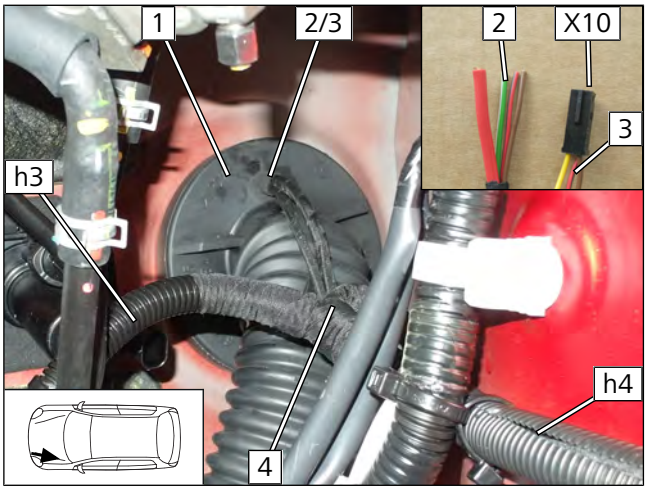


Fig. 28

Afterwards, seal the protective rubber plug with silicone.

▶ Route wires for passenger compartment **2** and wiring harness of control element **3** through protective rubber plug **1** into the passenger compartment.

4 Node Wiring harness node point

Routing corrugated tube **h4** on the front mask

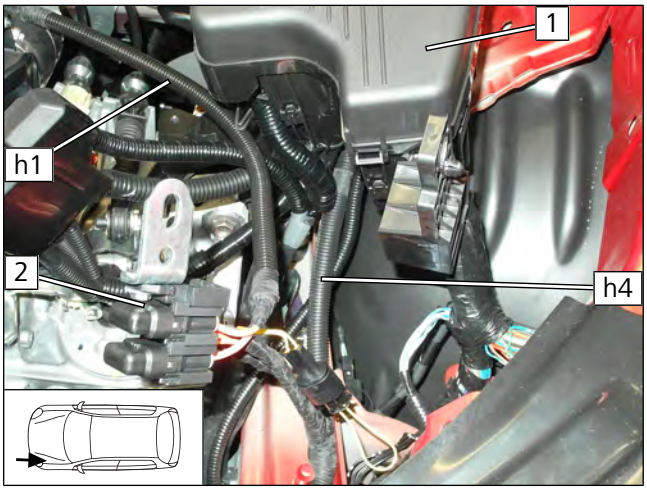


Fig. 29

▶ Position red (rt) wire B+ in Ø10 corrugated tube **h1** as shown.

1 Engine compartment fuse box

2 F1/F2 fuse holder of engine compartment

Mounting fuse holder for F1/F2

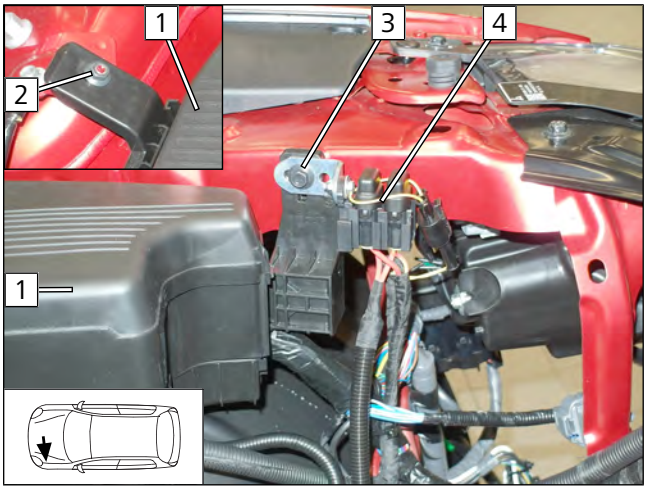


Fig. 30

▶ Mount engine compartment fuse box **1**.

2 Original vehicle nut (8-10Nm)

3 Original vehicle bolt, angle bracket with pre-mounted fuse holder for F1/F2 (8-10Nm)

Routing corrugated tube **h4** to heater installation location

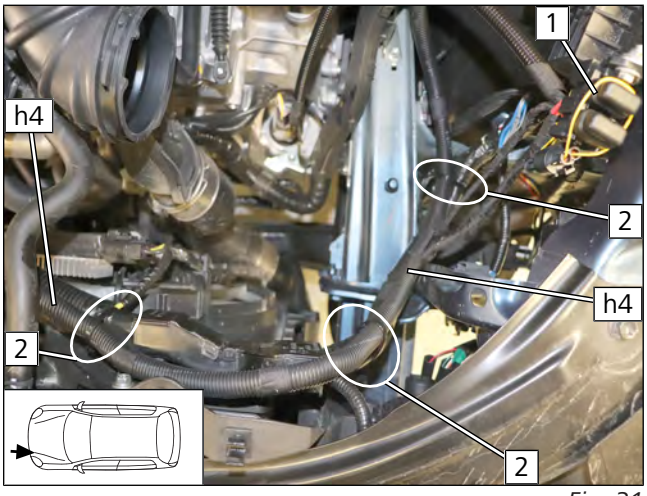


Fig. 31

Route heater wiring harness and fuel line in corrugated tube **h4** on the front mask to the front passenger's side and attach as shown.

1 F1/F2 fuse holder

2 Cable tie

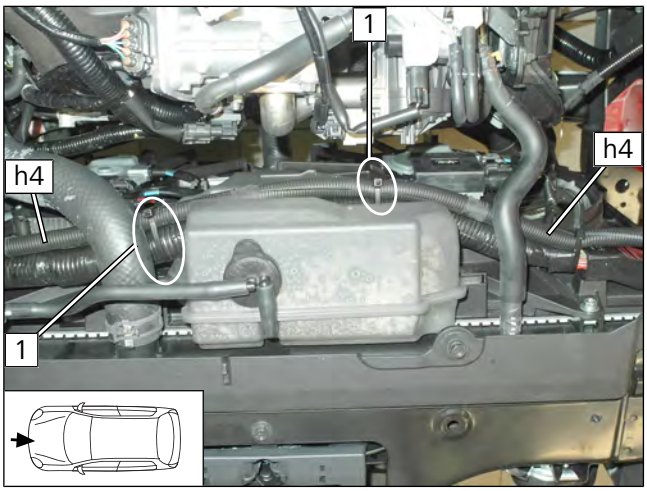


Fig. 32

1 Cable tie

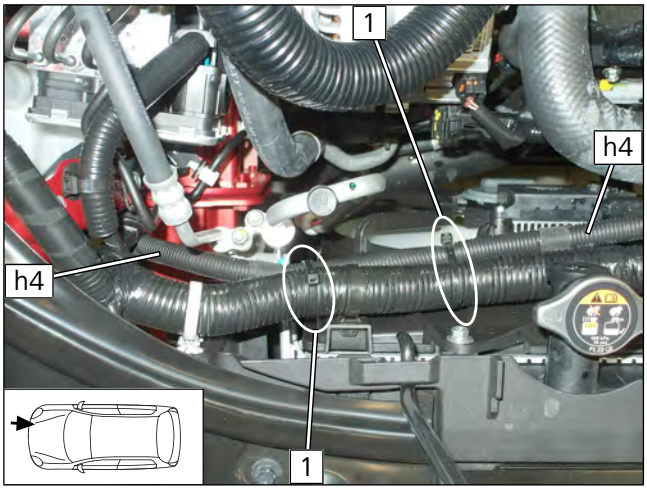


Fig. 33

1 Cable tie

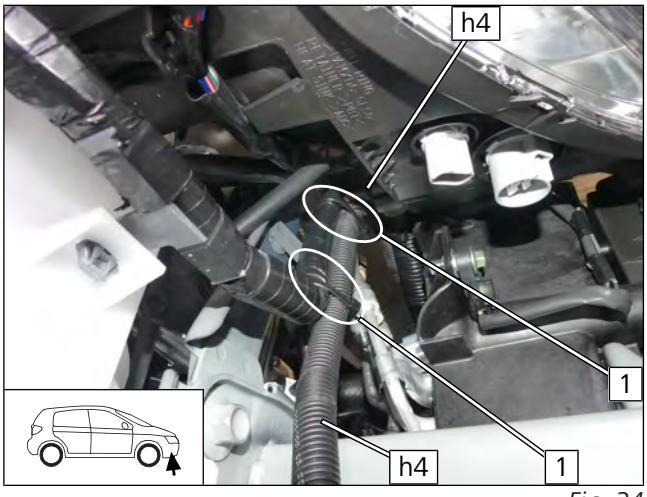


Fig. 34

1 Cable tie

8 Mechanical system installation location

8.1 Preparing installation location

Detaching original vehicle wiring harnesses

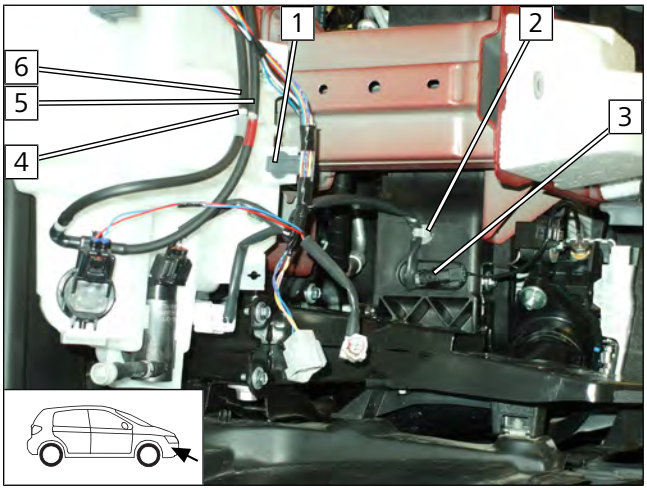


Fig. 35

- ▶ Detach retaining clip 1 as well as eyelet cable tie 2 and connector 3.
- ▶ Detach original vehicle wires 5 and 6 from bracket 4.

Adapting washer reservoir

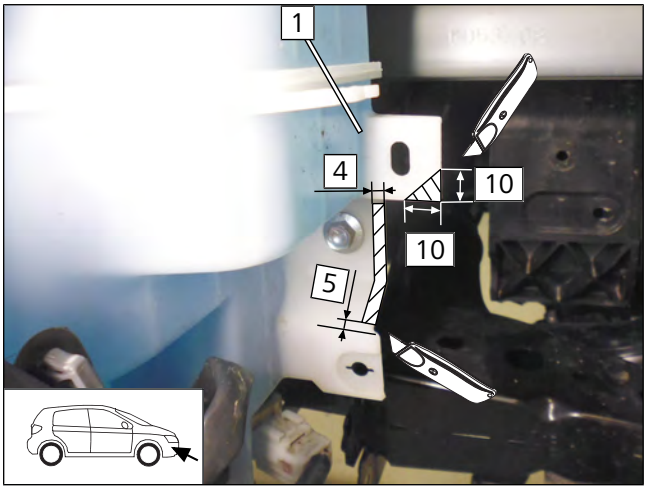


Fig. 36

- ▶ Cut the marked areas on the lugs of washer reservoir 1 as shown.

Shortening retaining clip

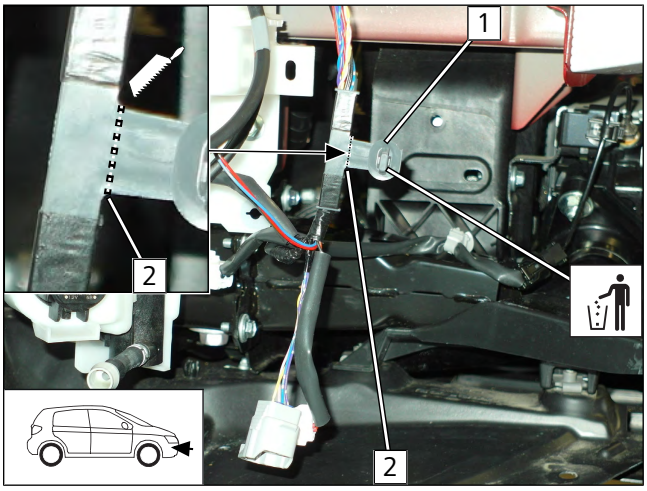


Fig. 37

- ▶ Shorten retaining clip 1 at position 2 as shown.

Drilling hole

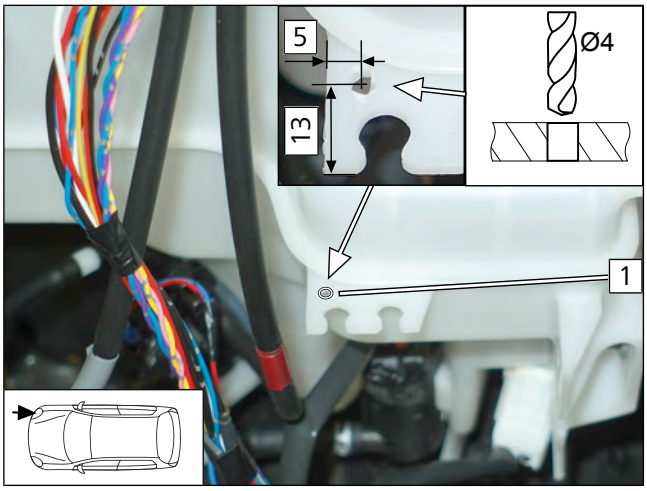


Fig. 38

▶ Drill Ø4 hole **1** in washer reservoir tab as shown.

Premounting cable tie

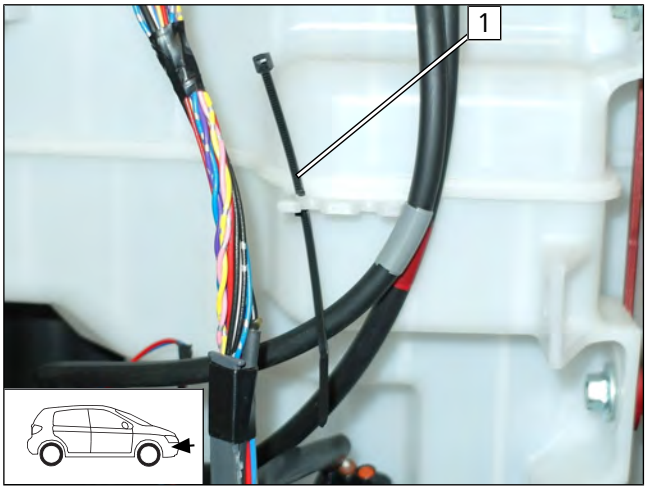


Fig. 39

1 Thin cable tie through hole

Attaching lines

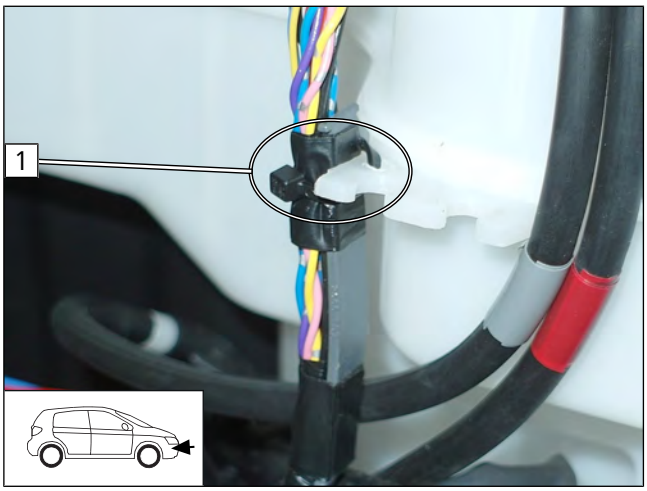


Fig. 40

▶ Secure original vehicle wiring harness at the adapted retaining clip level using cable tie **1**.

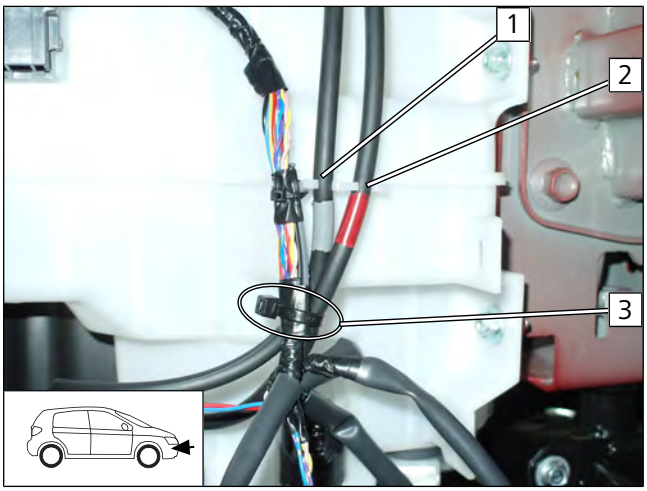


Fig. 41

▶ Snap in original vehicle wires [1] and [2] and secure with cable tie [3].

Installing clip-type cable tie

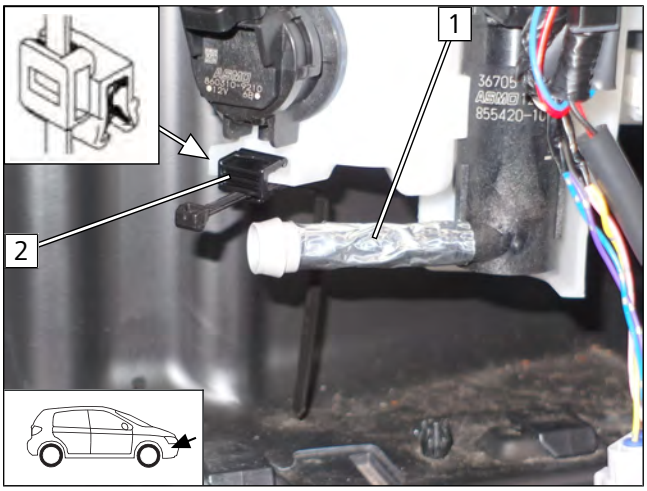


Fig. 42

▶ Stick heat protection film [1] around the hose connection pieces of the headlight washer system pump.

[2] Clip-type cable tie

Premounting cable tie

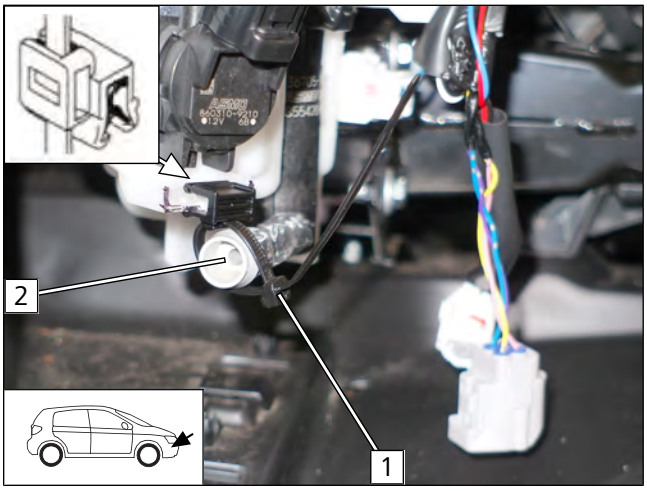


Fig. 43

Do not tighten cable tie [1]

▶ Install cable tie [1] around hose connection piece [2].

Attaching lines

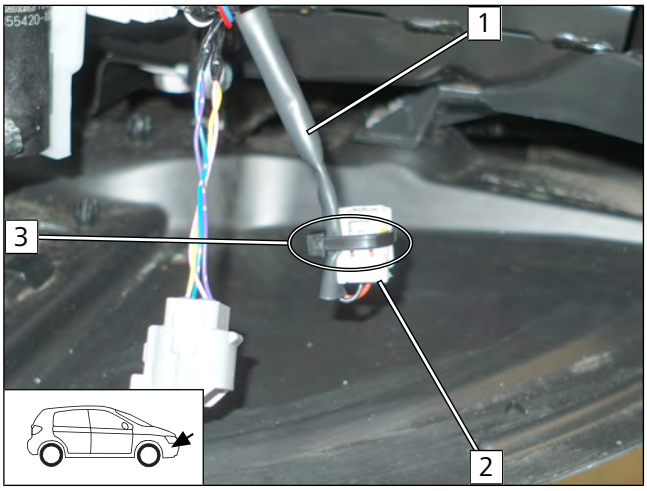


Fig. 44

▶ Attach original vehicle wiring harness [1], using cable tie [3], to white connector [2] of front fog lights as shown.

Preparing self-adhesive foam

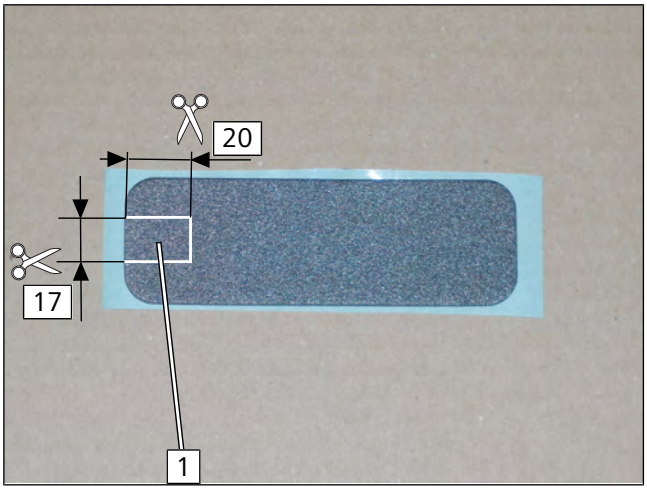


Fig. 45

Vehicle without parking assistance

▶ Cut section [1] out of self-adhesive foam as shown.

Preparing connector

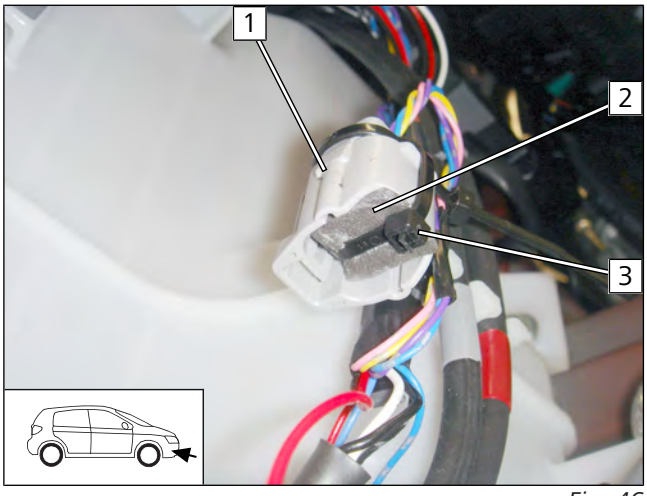


Fig. 46

▶ Position section of self-adhesive foam [2] onto parking assistance connector [1] and secure using cable tie [3].

Attaching lines

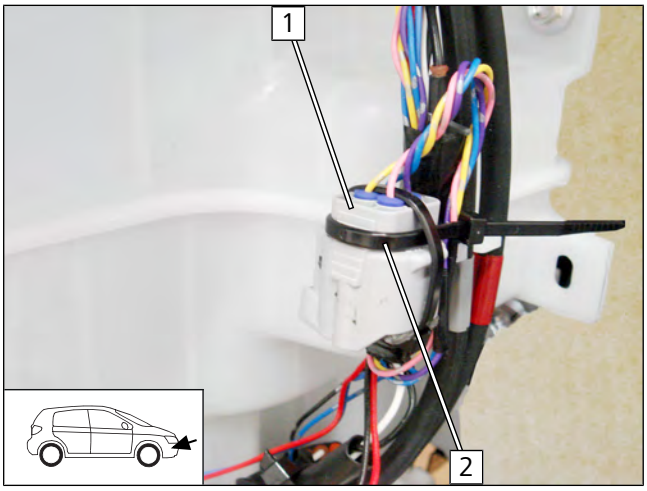


Fig. 47

▶ Attach parking assistance connector **1**, using cable tie **2**, to original vehicle wiring harness as shown.

9 Coolant hoses

9.1 Premounting coolant hoses

Cutting and labelling fabric heat shrink tubings

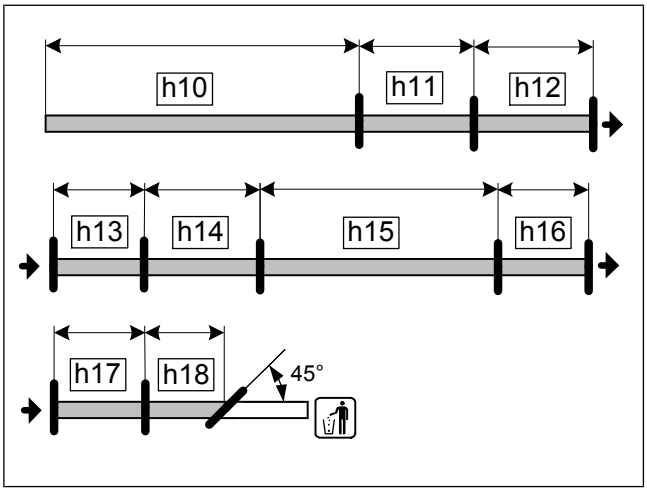


Fig. 48

Label the sections according to future use.

	Length	Used for
h10	870	Hose (D)
h11	230	Hose (G)
h12	220	Hose (G)
h13	100	Hose (C)
h14	160	Hose (C)
h15	850	Hose (G)
h16	70	Hose section (H)
h17	90	Hose section (J)
h18	100 (cut at an angle)	Hose (B)

Cutting water hoses to length

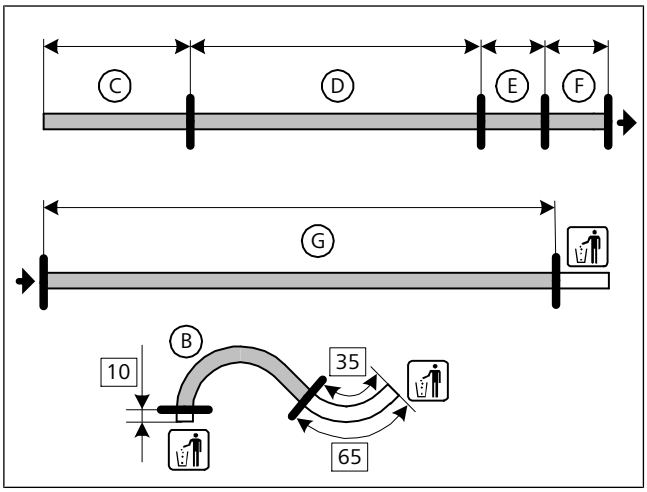


Fig. 49

(B) 135° x 45°
(C) 300
(D) 930
(E) 110
(F) 110
(G) 1280

Drawing markings

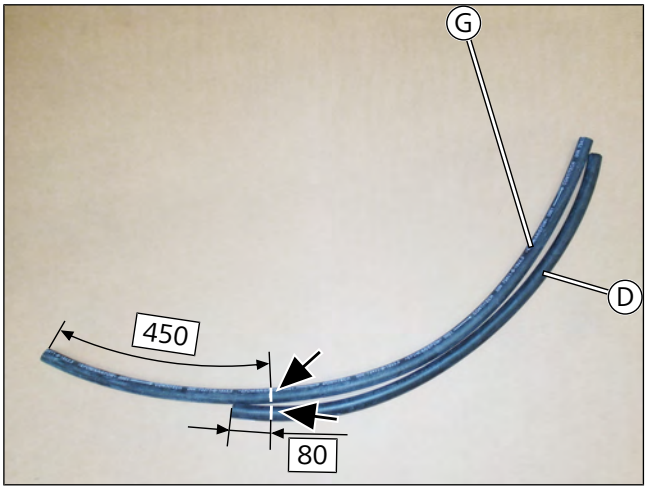


Fig. 50

▶ Draw markings on hose (G) (1250) and (D) (900) as shown.

Mounting hose bracket

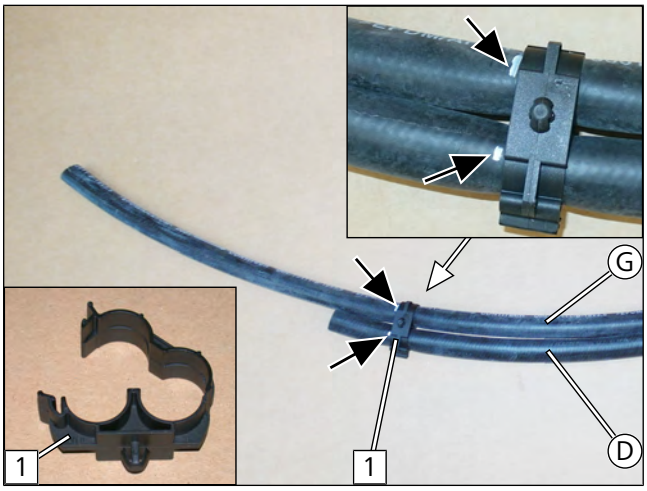


Fig. 51

▶ Mount hose bracket 1 on hoses (G) and (D).

Mounting fabric heat shrink tubing h10

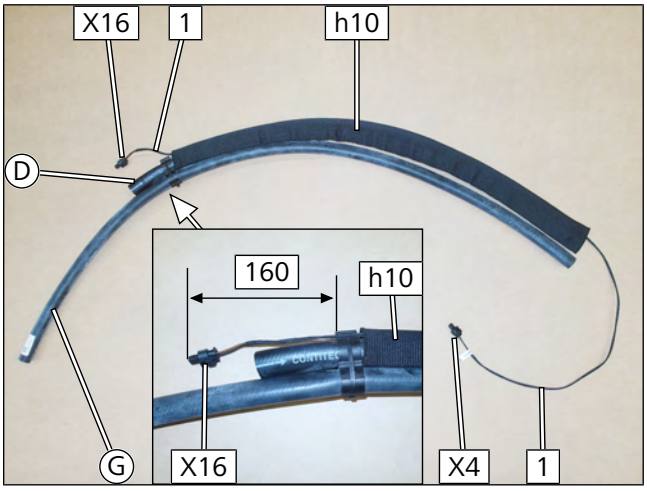


Fig. 52

Use at most 230°C to shrink the fabric heat shrink tubing here and for further work steps.

▶ Draw coolant pump wiring harness 1 into fabric heat shrink tubing h10 (870) and pull these together over hose (D) as shown. Then shrink fabric heat shrink tubing h10.

X4 Coolant pump wiring harness connector, heater connection side

X16 Coolant pump wiring harness connector, coolant pump connection side

Drawing markings

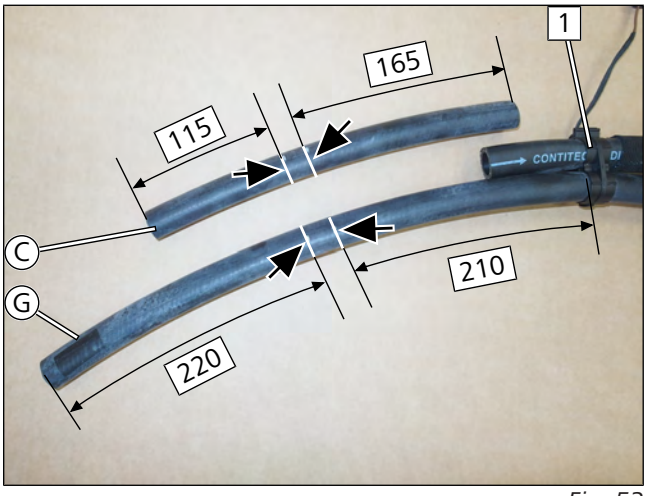


Fig. 53

▶ Draw markings on hoses (G) and (C) (300) as shown.

1 Mounted hose bracket

Installing fabric heat shrink tubing **h11**

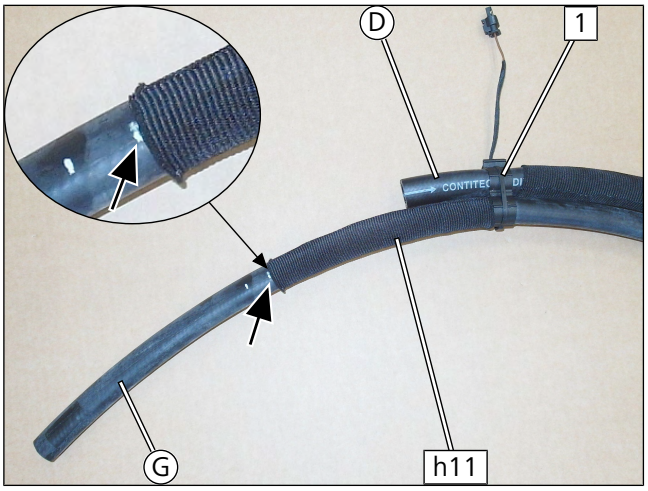


Fig. 54

▶ Slide fabric heat shrink tubing **h11** (230) onto hose G and shrink between hose bracket **1** and marking.

Mounting hose bracket

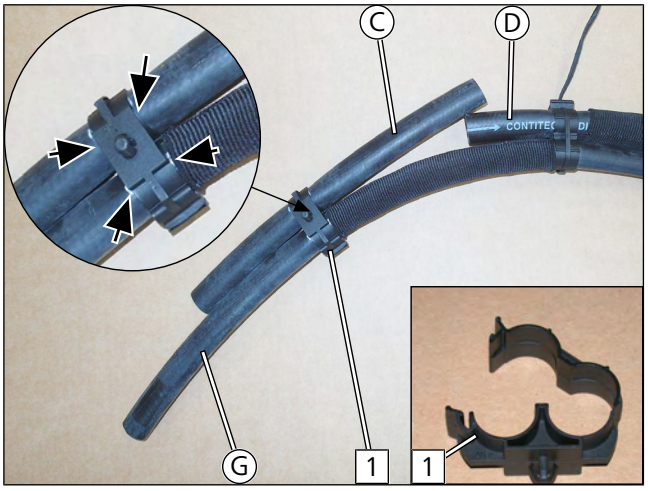


Fig. 55

▶ Mount hose bracket **1** between the markings on hoses G and C as shown.

Mounting fabric heat shrink tubings **h12**, **h13** and **h14**

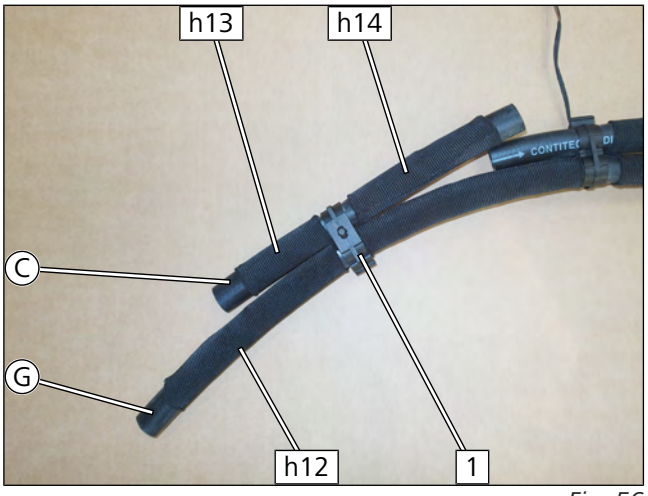


Fig. 56

▶ Slide fabric heat shrink tubing **h12** (220), up to mounted hose bracket **1**, onto hose G and shrink.

▶ Slide fabric heat shrink tubings **h13** (100) and **h14** (160), up to mounted hose bracket **1**, onto hose C and shrink.

Mounting fabric heat shrink tubing **h15**

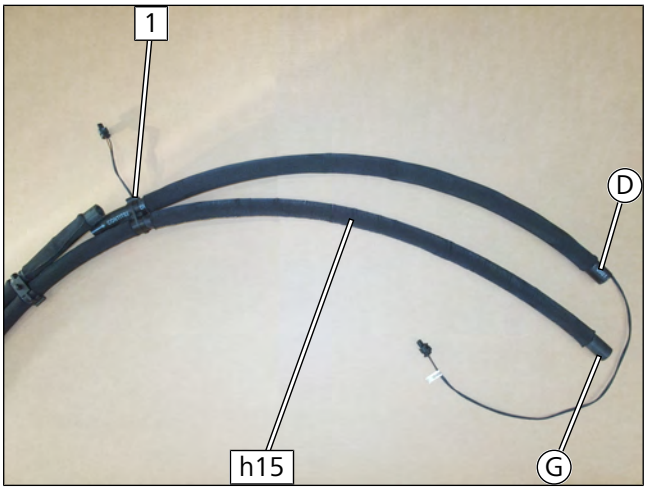


Fig. 57

▶ Slide fabric heat shrink tubing **h15** (850), up to mounted hose bracket **1**, onto hose Ⓖ and shrink.

Premounting coolant pump mount

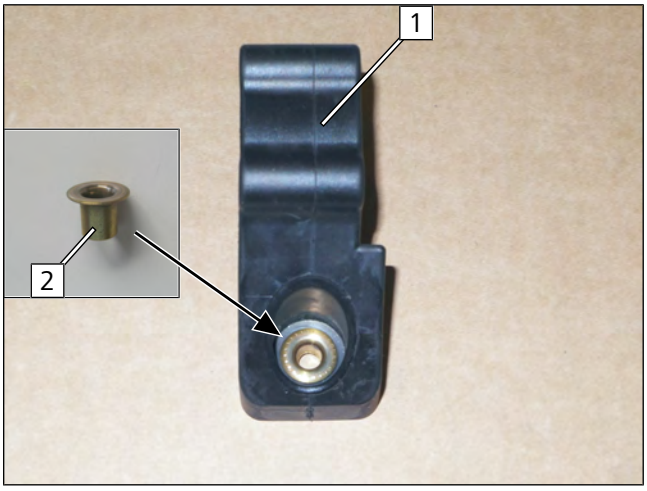


Fig. 58

1 Coolant pump mount
2 Sleeve

Installing coolant pump mount

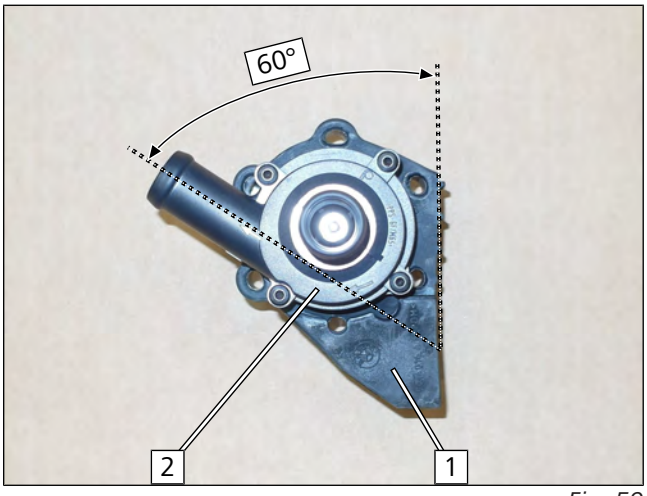


Fig. 59

1 Coolant pump mount
2 Coolant pump

Premounting perforated bracket

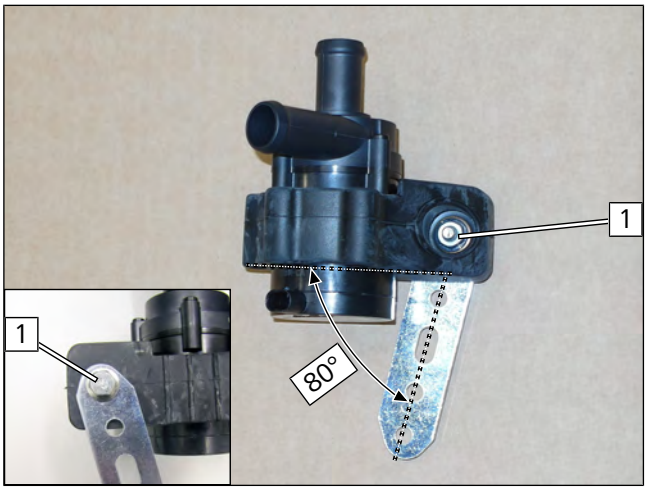


Fig. 60

[1] M6x20 bolt, perforated bracket, coolant pump mount, flanged nut (8-10Nm)

Mounting coolant pump

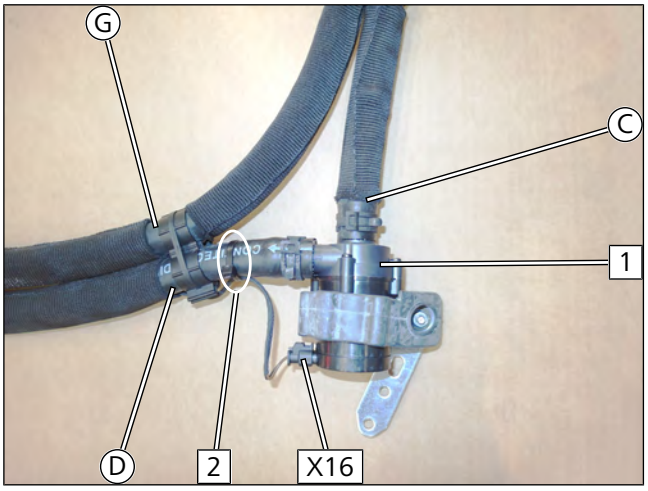


Fig. 61

All spring clips Ø25

[1] Coolant pump

[2] Cable tie around hose (D) and coolant pump wiring harness

Premounting hose (B)

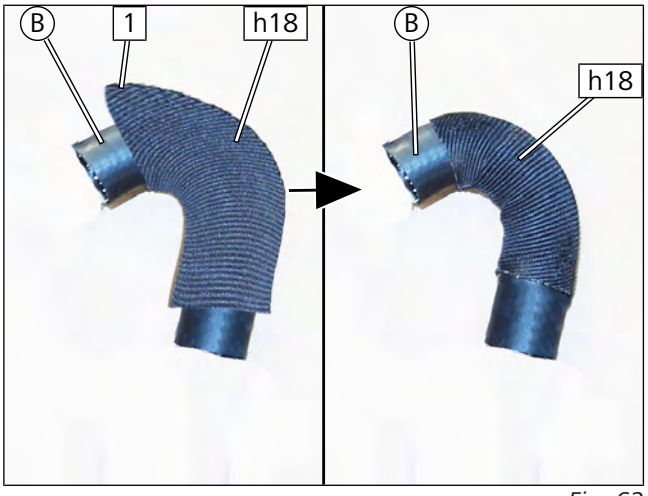


Fig. 62

▶ Slide fabric heat shrink tubing **[h18]** (100) with the side that was cut at an angle [1] onto hose (B) as shown and shrink.

Mounting hose Ⓑ and connecting pipe

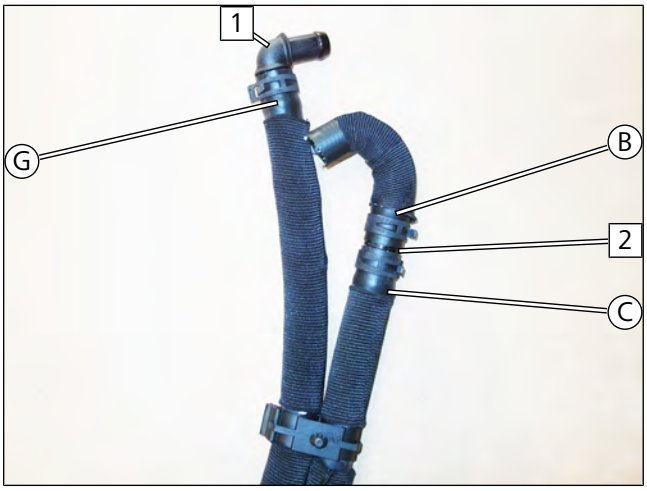


Fig. 63

All spring clips Ø25

1 18x18 / 90° connecting pipe
2 18x18 connecting pipe

Preparing perforated bracket

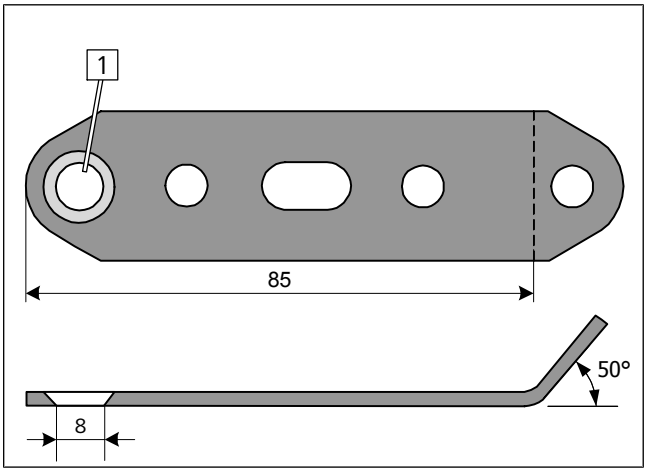


Fig. 64

▶ Drill out perforated bracket hole at position 1 to Ø8 and then drill a counterbore with a Ø12 drill bit.

Installing perforated bracket

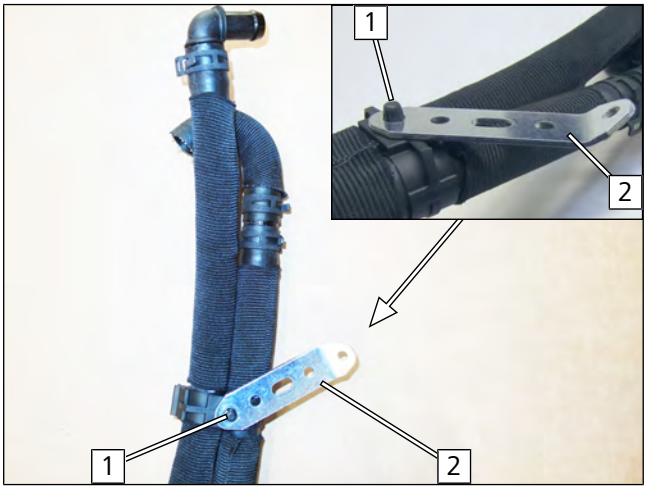


Fig. 65

Ensure correct assembly of the lug on retaining clip 1.

▶ Mount prepared perforated bracket 2 onto retaining clip 1 of the premounted hose bracket.

Premounting Ø25 spring clips

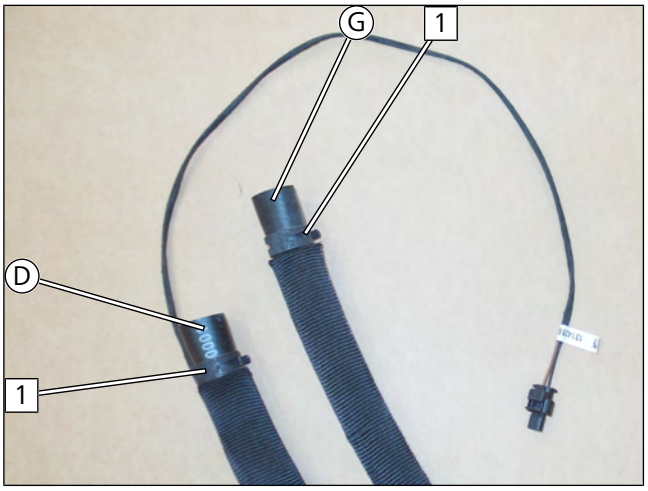


Fig. 66

▶ Premount spring clips [1] as shown.

Premounting rubber-coated p-clamp

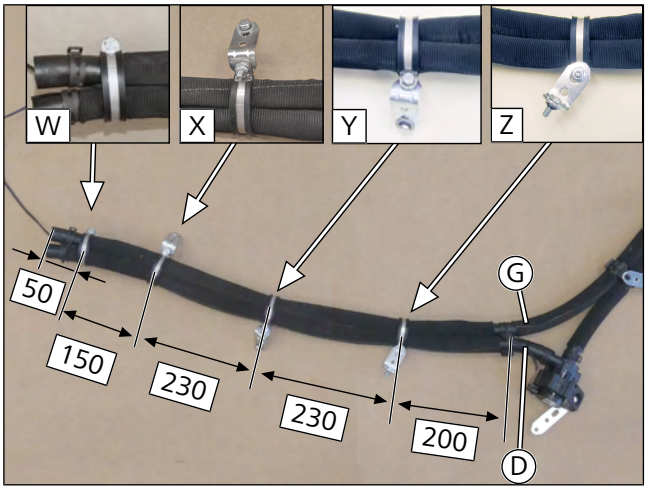


Fig. 67

Premount Ø38 rubber-coated p-clamp onto hoses (D) and (G) as shown in this and the next 4 figures.

Installation of rubber-coated p-clamp at position [W]

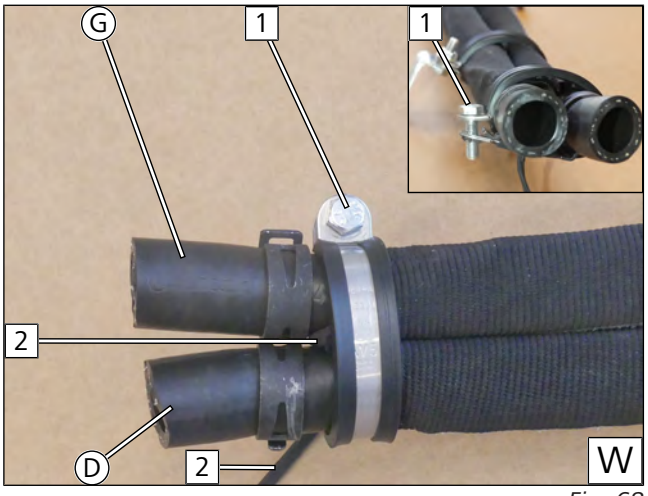


Fig. 68

[1] M6x20 bolt, Ø38 rubber-coated p-clamp, angle bracket, lock washer

[2] Coolant pump wiring harness

Installation of rubber-coated p-clamp at position X

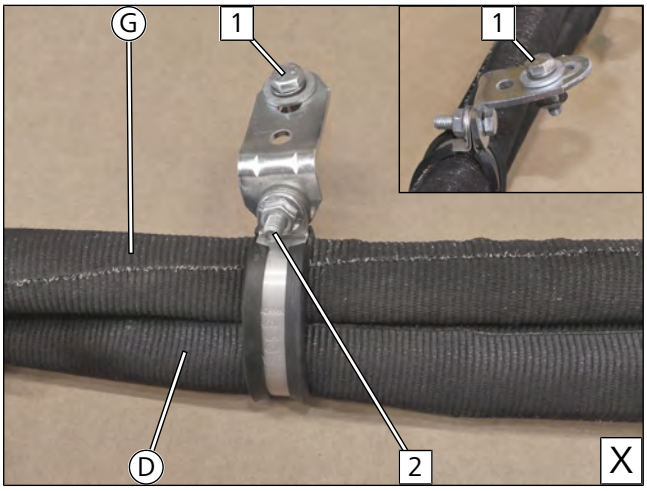


Fig. 69

1 M6x20 bolt, spring lockwasher, large diameter washer, angle bracket, lock washer

2 M6x20 bolt, Ø38 rubber-coated p-clamp, angle bracket, flanged nut (8Nm)

Installation of rubber-coated p-clamp at position Y

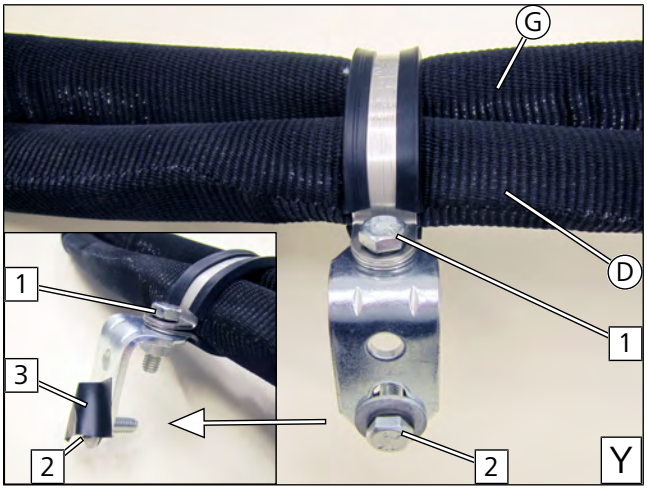


Fig. 70

▶ Secure bolt 2 after pre-assembly with adhesive tape 3 as shown.

1 M6x20 bolt, Ø38 rubber-coated p-clamp, angle bracket, flanged nut (8Nm)

2 M6x20 bolt, spring lockwasher, large diameter washer, angle bracket

Installation of rubber-coated p-clamp at position Z

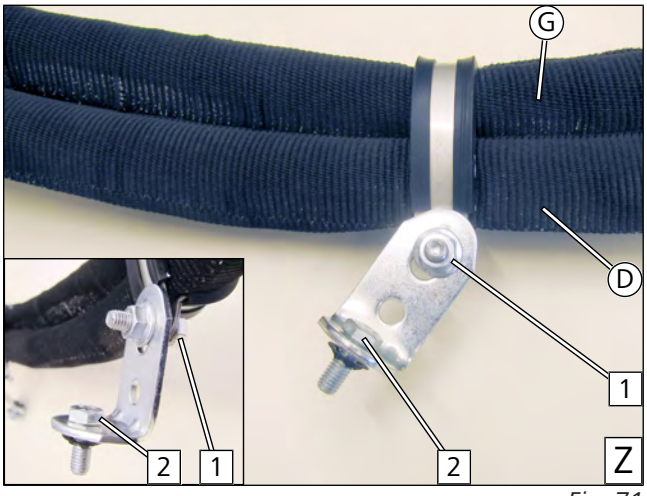


Fig. 71

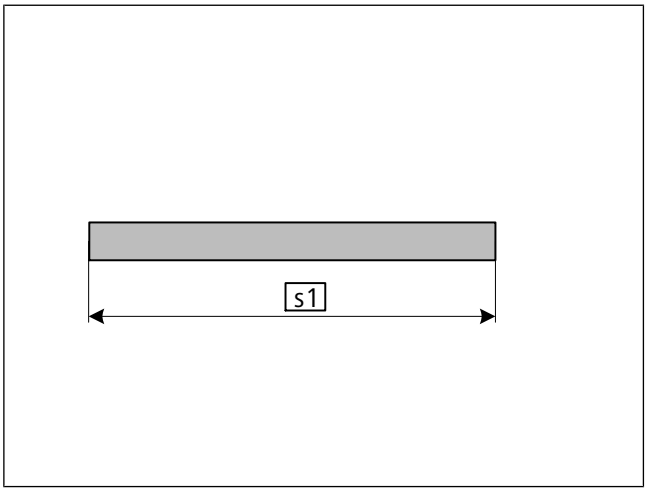
1 M6x20 bolt, Ø38 rubber-coated p-clamp, angle bracket, flanged nut (8Nm)

2 M6x16 bolt, angle bracket, lock washer

10 Mechanical system for heater

10.1 Premounting heater

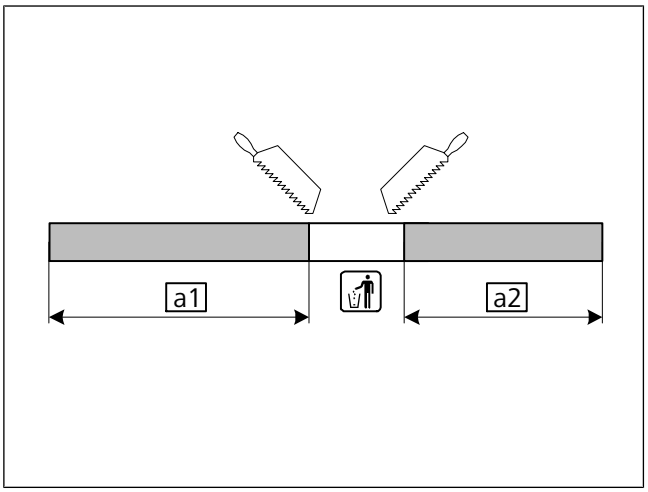
Assigning combustion air intake line



s1 315

Fig. 72

Preparing exhaust pipe



a1 150
a2 140

Fig. 73

Mounting, aligning and fastening with 7Nm water connection piece with sealing ring and retaining plate

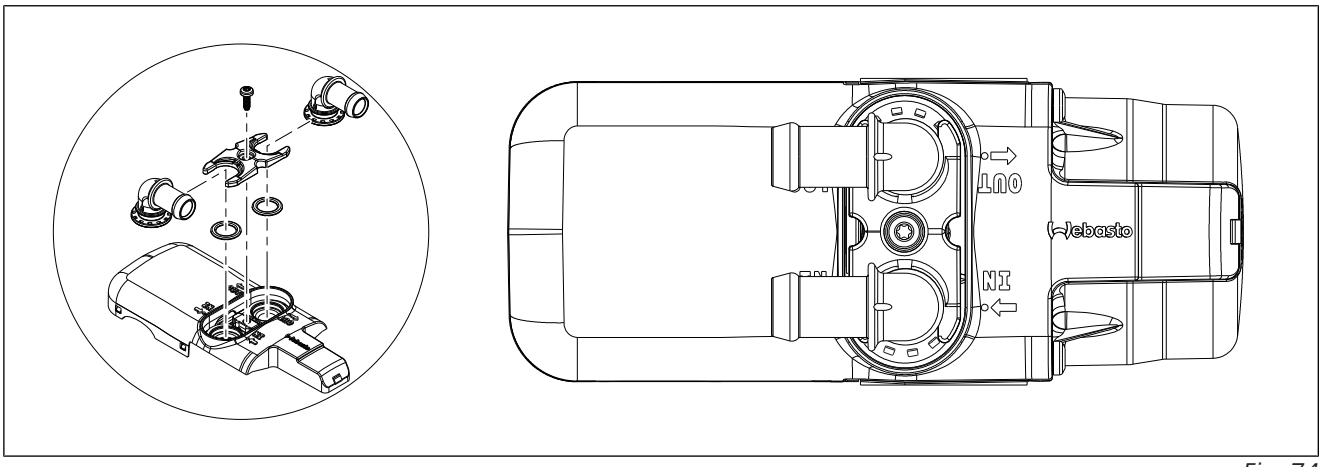


Fig. 74

Installation instructions for hose, spring clip and connecting pipe

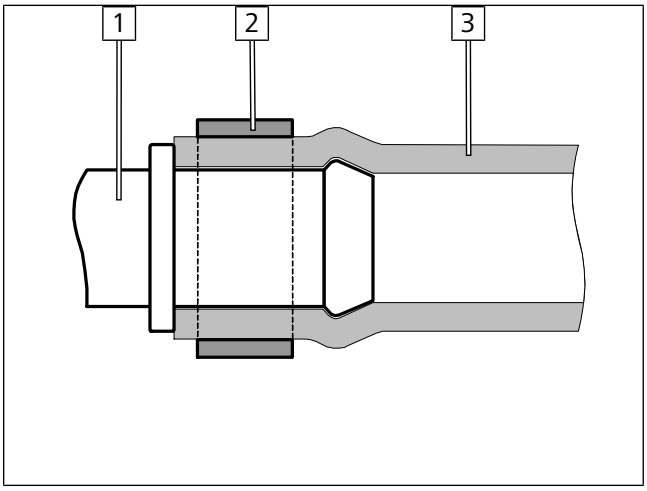


Fig. 75

1 Connecting pipe
2 Spring clip
3 Hose

Premounting hoses

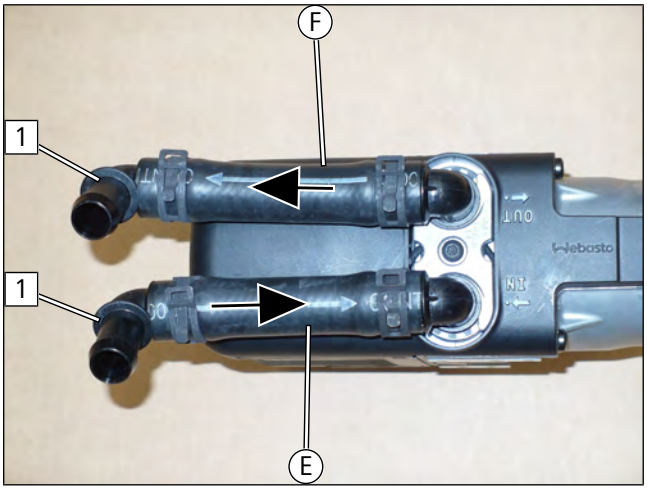


Fig. 76

All spring clips Ø25

Align 90°, Ø18x18 connecting pipe 1 as shown in next figure.

Aligning connecting pipes

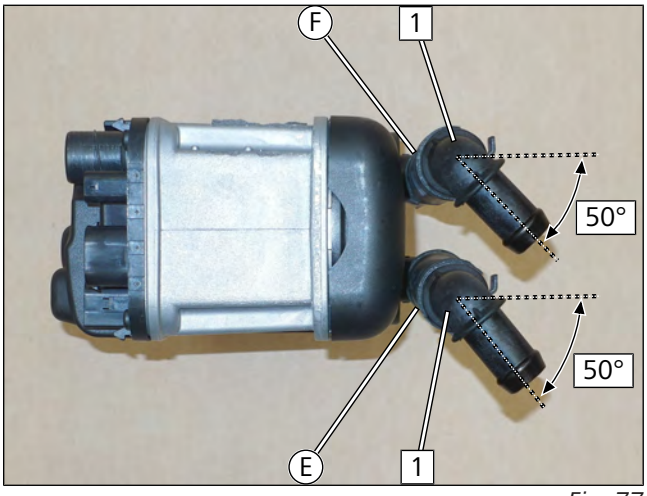


Fig. 77

1 Ø18x18 90° connecting pipe

Premounting bracket

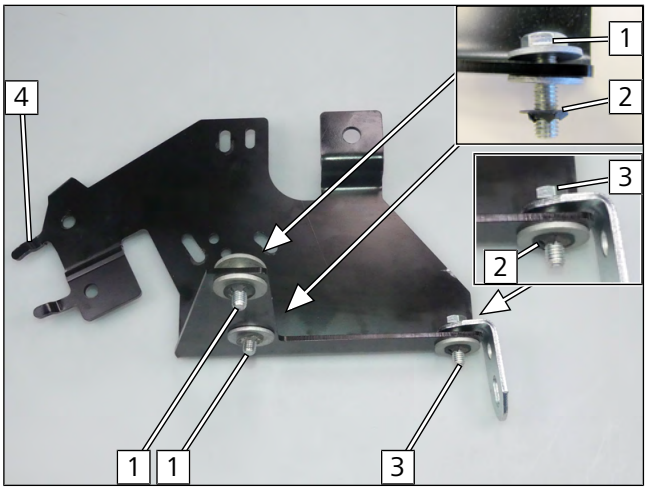


Fig. 78

Push lock washer [2] up to 3 thread turns maximum as shown.

[1] M6x20 bolt, large diameter washer, bracket, large diameter washer, lock washer

[3] M6x20 bolt, angle bracket, bracket, large diameter washer, lock washer

[4] Locking lug for exhaust silencer

Premounting exhaust silencer

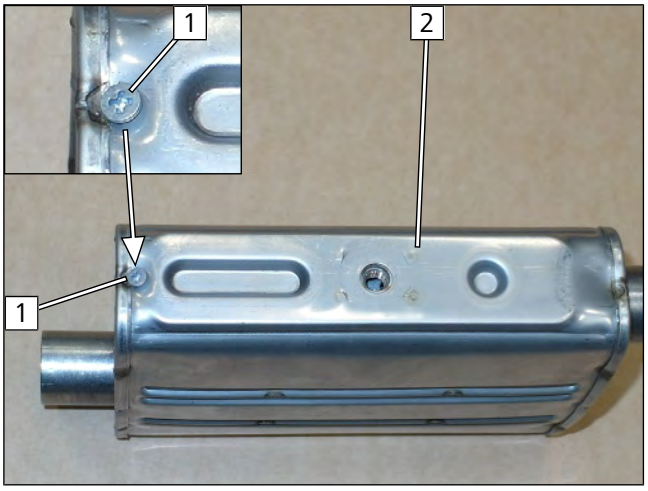


Fig. 79

▶ Screw 3x9 self-tapping screw in existing condensate hole [1].

[2] Exhaust silencer

Mounting exhaust silencer

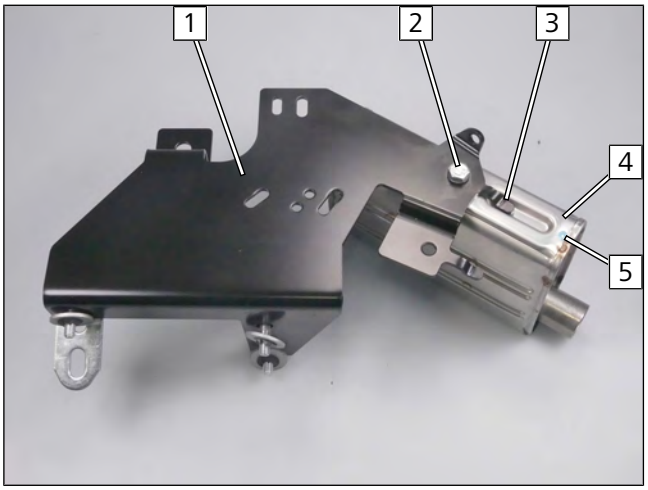


Fig. 80

[1] Bracket

[2] M6x16 bolt, spring lockwasher (8-10Nm)

[3] Locking lug

[4] Exhaust silencer

[5] Premounted self-tapping screw

View of heater bolts in bracket

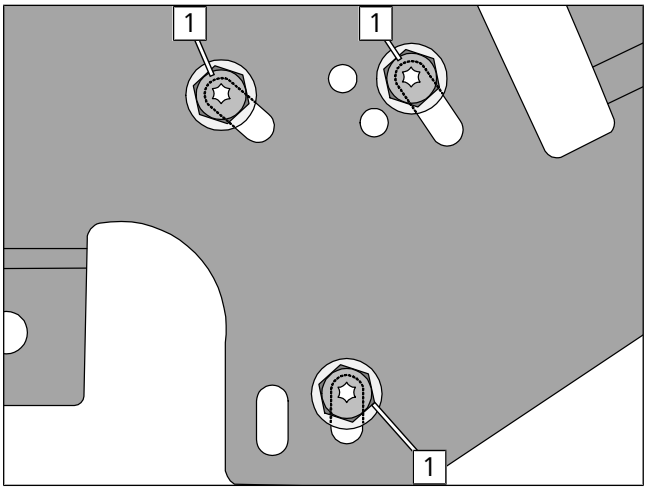


Fig. 81

1 5x13 self-tapping bolt

Mounting bracket on heater

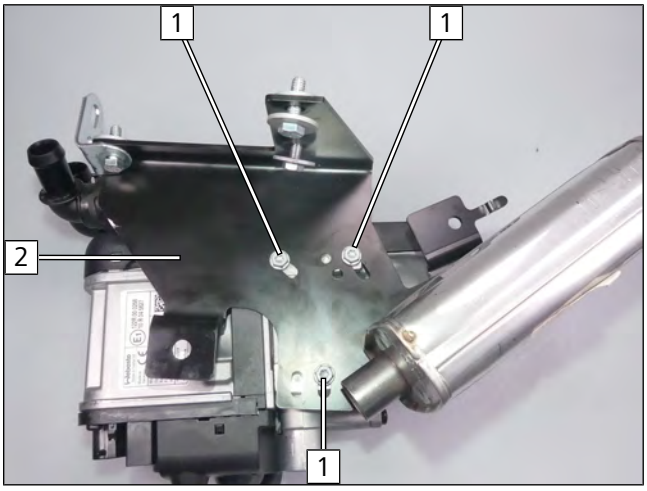


Fig. 82

1 5x13 self-tapping bolt (7Nm)
2 Bracket

Mounting exhaust pipe **a1**

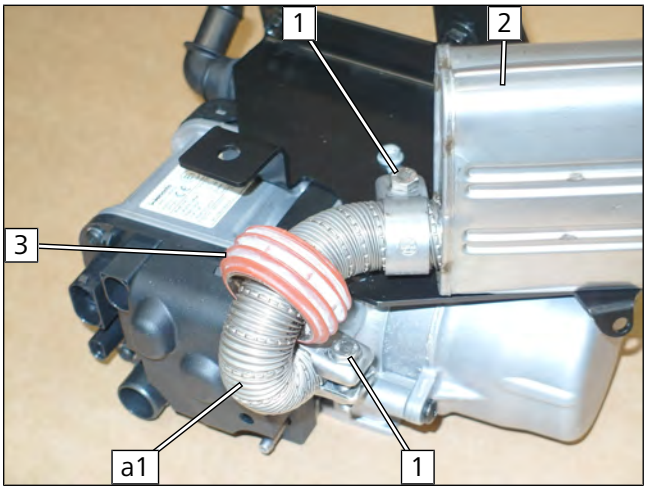


Fig. 83

1 Hose clamp
2 Slide on and align spacer bracket

a1 Exhaust tube (150)

Mounting exhaust pipe a2

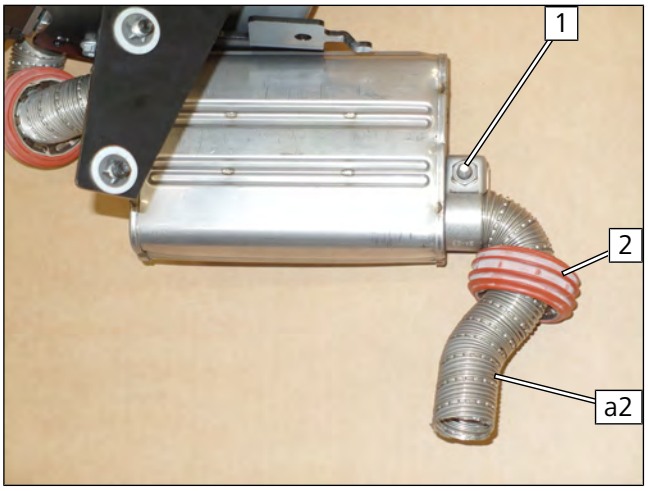


Fig. 84

1 Hose clamp
2 Slide on and align spacer bracket

a2 Exhaust tube (140)

Mounting combustion air intake silencer and tube as well as moulded hose

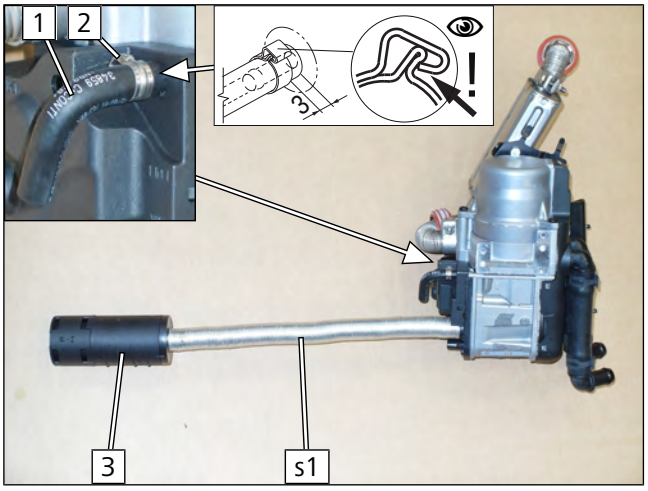


Fig. 85

Observe the general installation instructions of the heater.

Observe the installation instructions of the combustion air intake silencer.

1 90° moulded hose
2 Ø10 clamp
3 Combustion air intake silencer

Fastening combustion air intake silencer

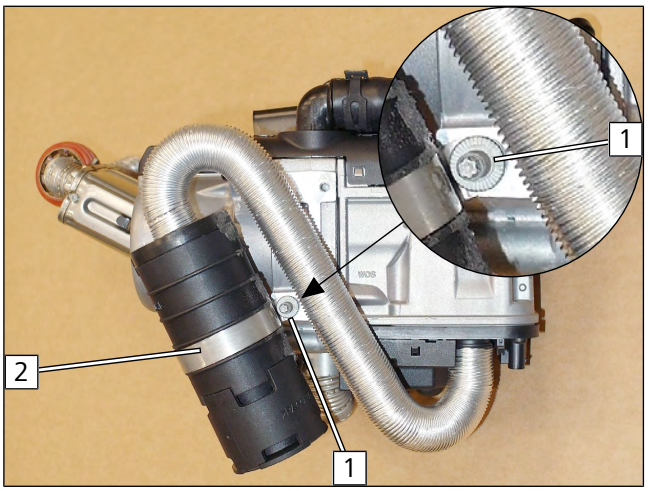


Fig. 86

1 M5/6x14.5 self-tapping stud bolt (7Nm)
2 Ø51 clamp

Fixing combustion air intake pipe **s1**

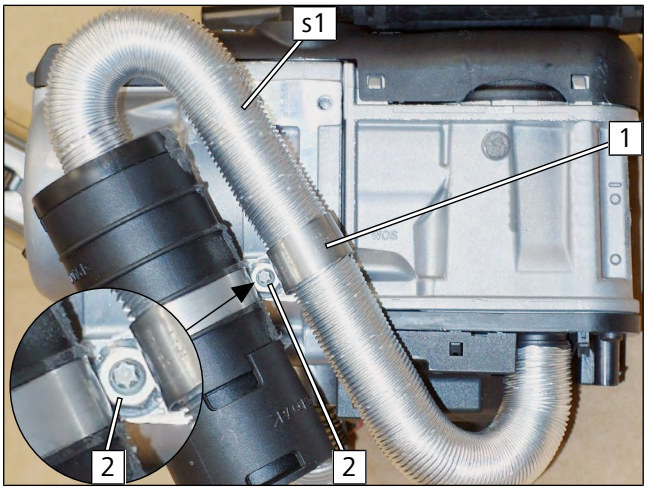


Fig. 87

1 P-clamp on premounted stud bolt
2 Flanged nut (7Nm)

10.2 Mounting heater

Dismantling hoses

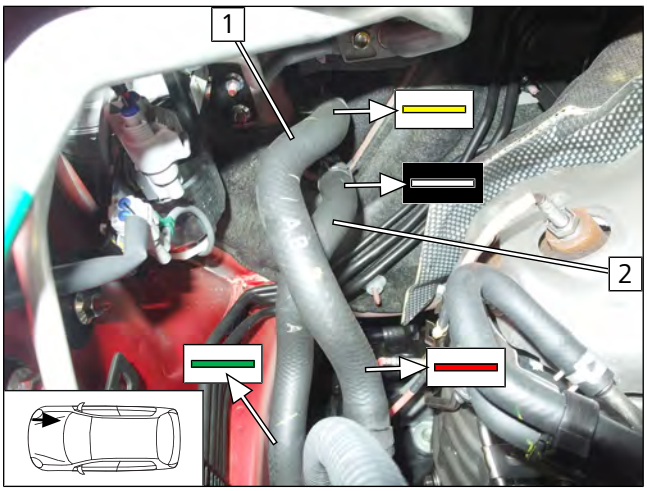


Fig. 88

▶ Please pay attention, during the next installation steps, to the original colour markings on the hoses.
⇨ Yellow for the heat exchanger inlet
⇨ White for the heat exchanger outlet
⇨ Green for the engine inlet
⇨ Red for the engine outlet

1 Engine outlet / heat exchanger inlet hose
2 Engine inlet / heat exchanger outlet hose

Removing bolts

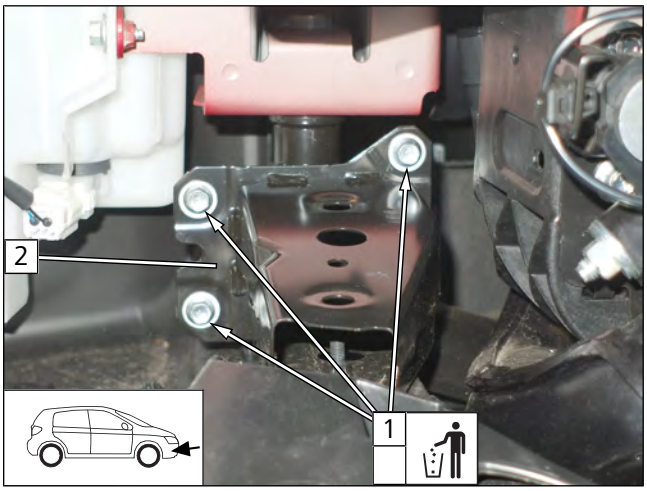


Fig. 89

▶ Remove original vehicle bolt **1**.

2 Bumper bracket carrier

Positioning premounted hose group

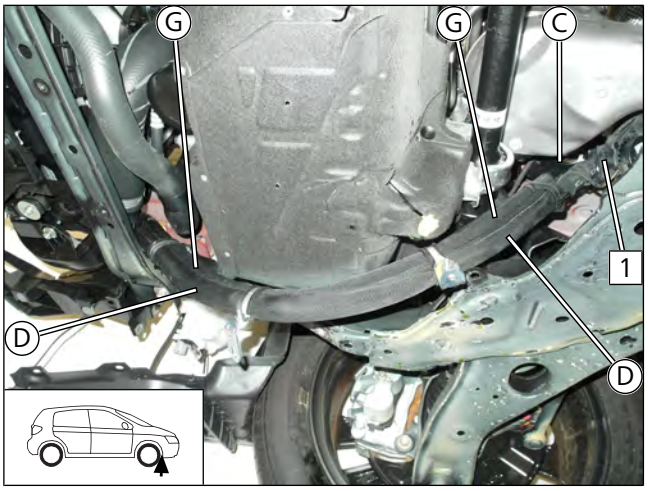


Fig. 90

1 Coolant pump

Routing hoses (D) and (G) as well as coolant pump wiring harness

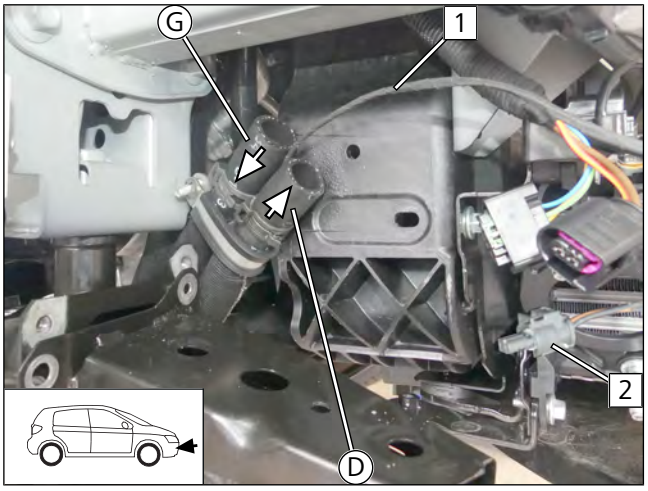


Fig. 91

1 Coolant pump wiring harness
2 Coolant pump wiring harness connector

Mounting hoses (D) and (G)

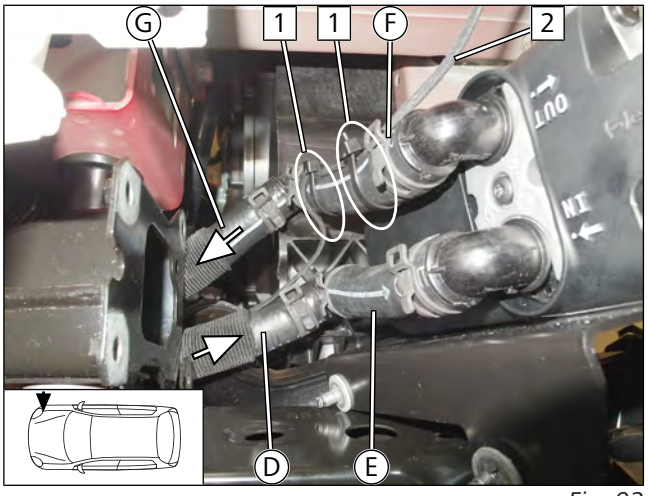


Fig. 92

- ▶ Move the heater to the installation position and connect hose (D) with hose (E) and hose (G) with hose (F).
- ▶ Attach coolant pump wiring harness 2 using cable tie 1.

Mounting heater

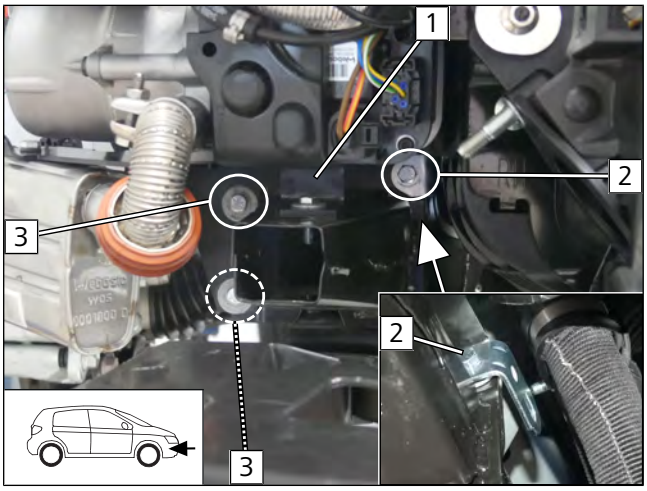


Fig. 93

View of fastening points see next Fig.

▶ Move the heater to its final position and mount.

1 Bracket

2 Premounted bolt with angle bracket (align angle bracket as shown), existing threaded hole (8-10Nm)

3 Premounted bolt, existing threaded hole (8-10Nm)

View of fastening points

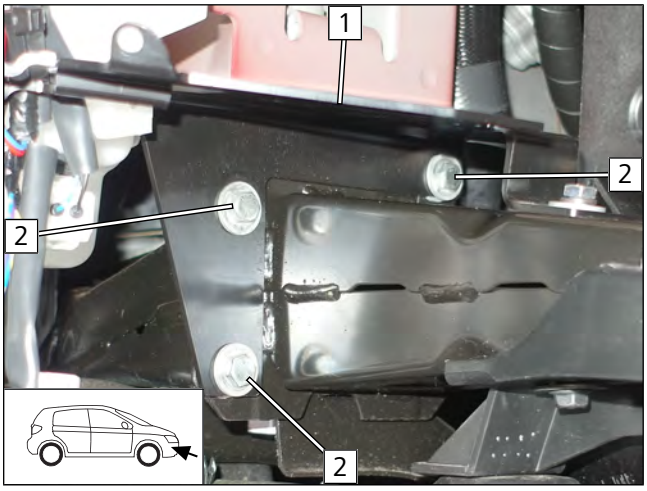


Fig. 94

The premounted heater was removed for a better view.

1 Bracket

2 Premounted original vehicle bolts

Mounting heater

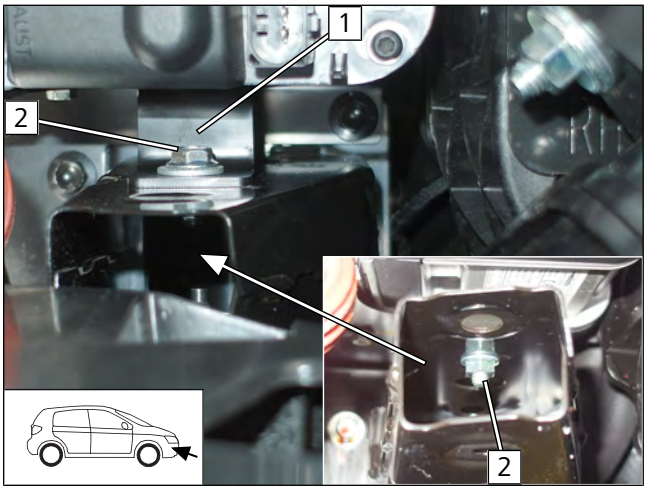


Fig. 95

1 Heater bracket

2 M6x20 bolt, large diameter washer, existing hole, flanged nut (8-10Nm)

Checking distance

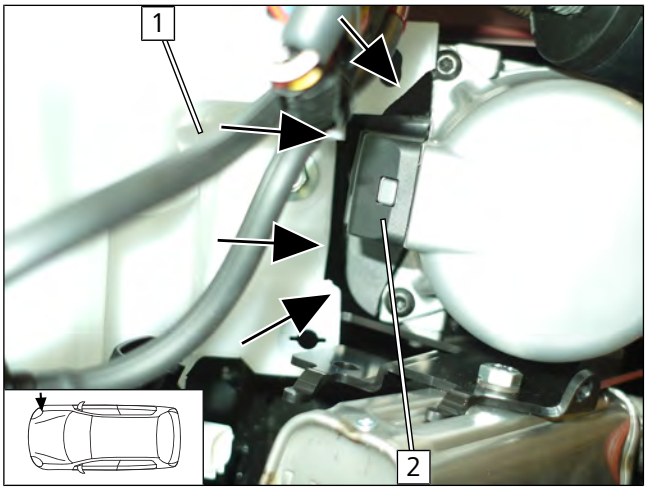


Fig. 96

Ensure sufficient distance from neighbouring components, correct if necessary.

>3

1 Washer reservoir
2 Heater

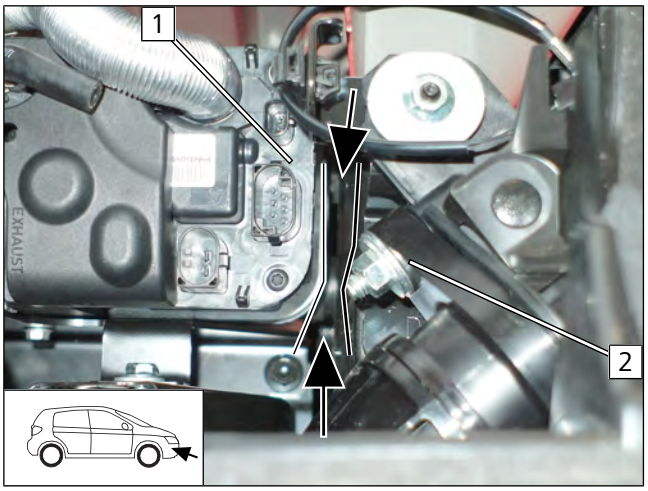


Fig. 97

Ensure sufficient distance from neighbouring components, correct if necessary.

>3

1 Heater
2 Radiator housing

Aligning spacer bracket

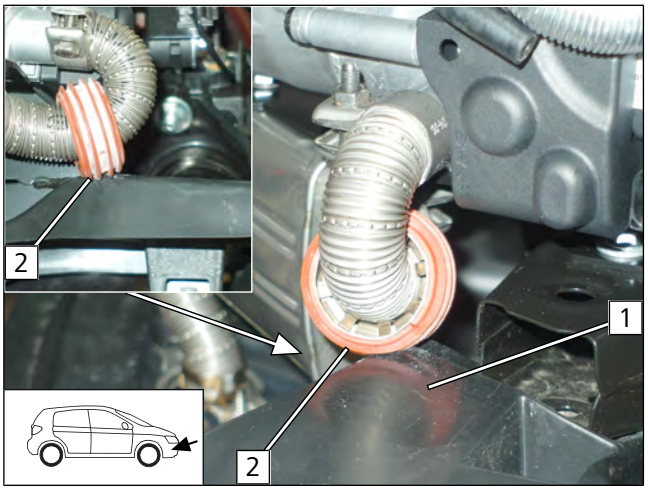


Fig. 98

▶ Align spacer bracket 2 with bumper bracket 1.

Mounting edge clip cable tie

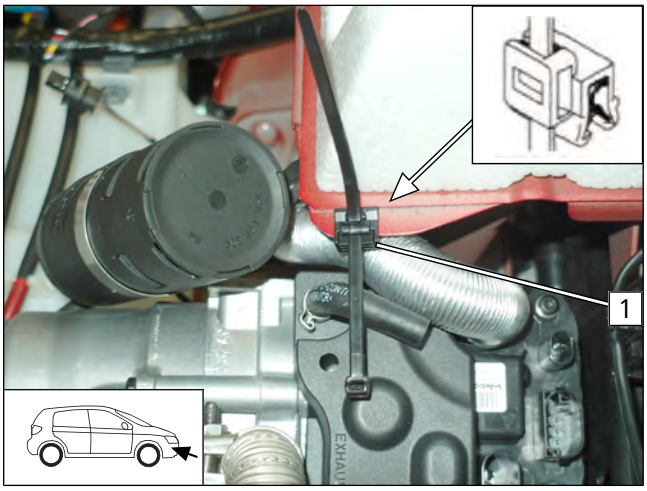


Fig. 99

▶ Mount edge clip cable tie as shown.

Mounting connector

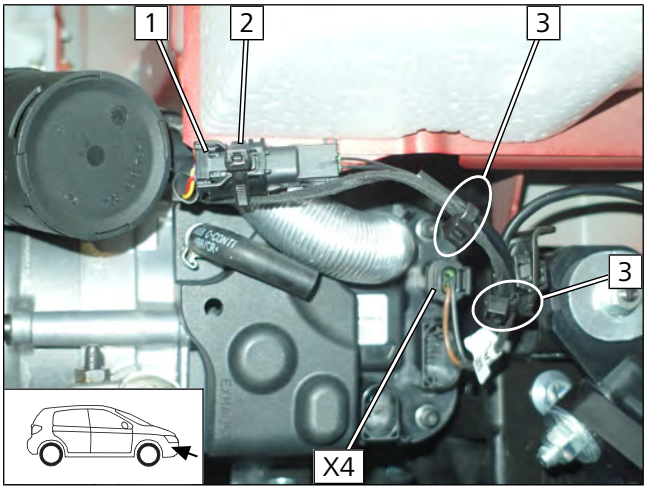


Fig. 100

▶ After installing original vehicle connector [1], close cable tie [2].

- [2] Edge clip cable tie
- [3] Cable tie
- [X4] 2-pin connector of circulating pump wiring harness

Fastening wiring harness

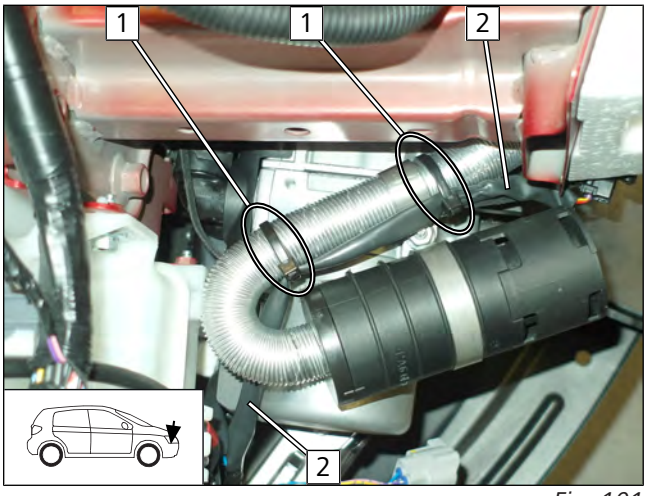


Fig. 101

- [1] Cable tie
- [2] Original vehicle wiring harness and coolant pump wiring harness

Mounting heater connector and fuel line

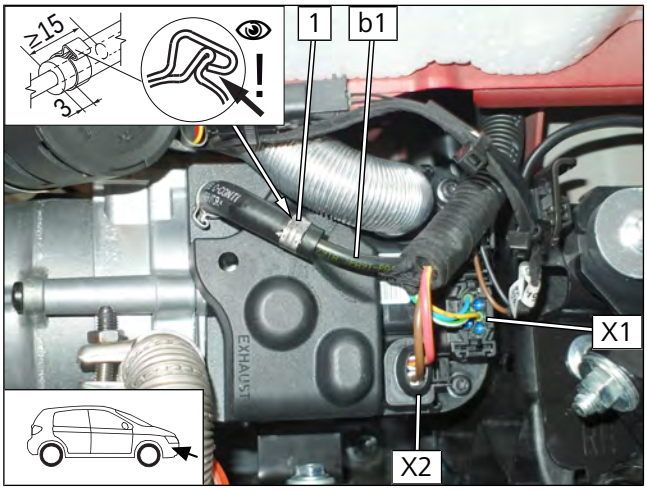


Fig. 102

1 Ø10 clamp
X1 6-pin connector of heater wiring harness
X2 2-pin connector of heater wiring harness

11 Coolant circuit

11.1 Hose routing diagram

'Inline' coolant circuit

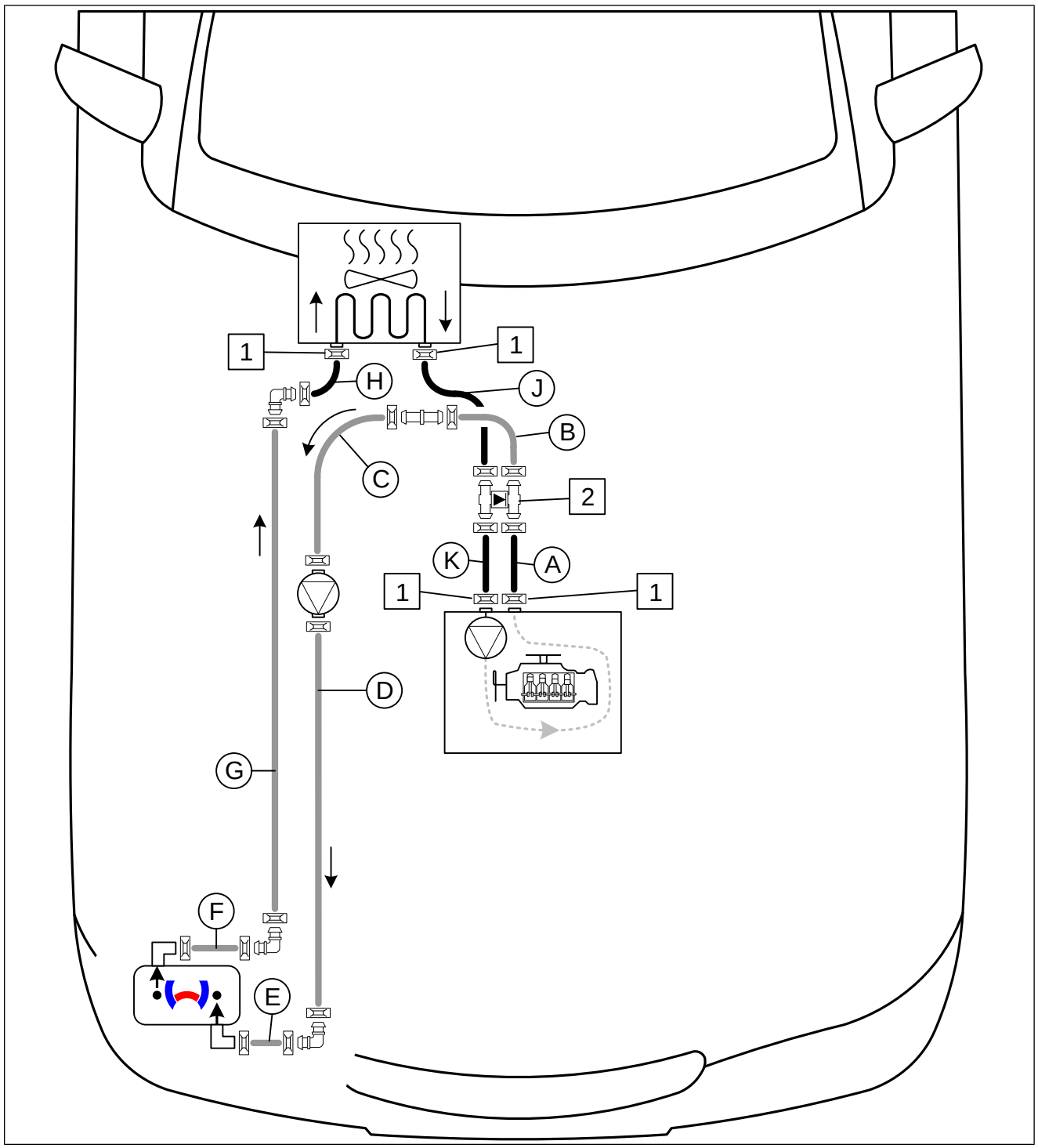


Fig. 103

All spring clips without a specific designation = Ø25

All connecting pipes and = Ø18x18

1 Original vehicle spring clip ; 2 Non-return valve = 4xØ18

11.2 Coolant circuit installation

Mounting coolant pump

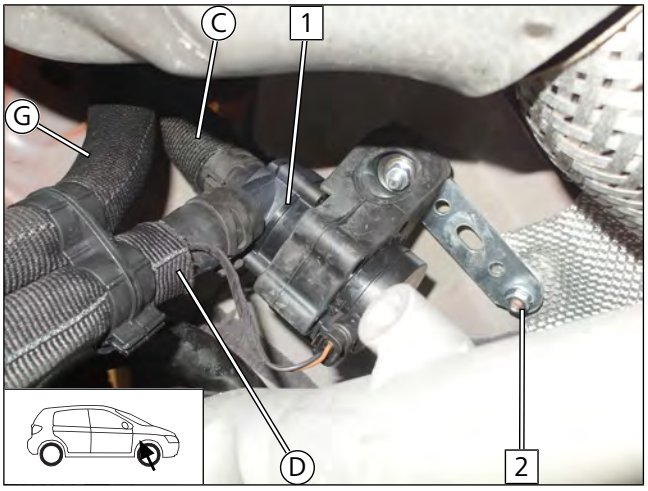


Fig. 104

Original vehicle flanged nut installed at position 2 serves as spacer between body and heat shield plate.

1 Coolant pump

2 Original vehicle stud bolt, M6 flanged nut (8-10Nm)

Checking distance

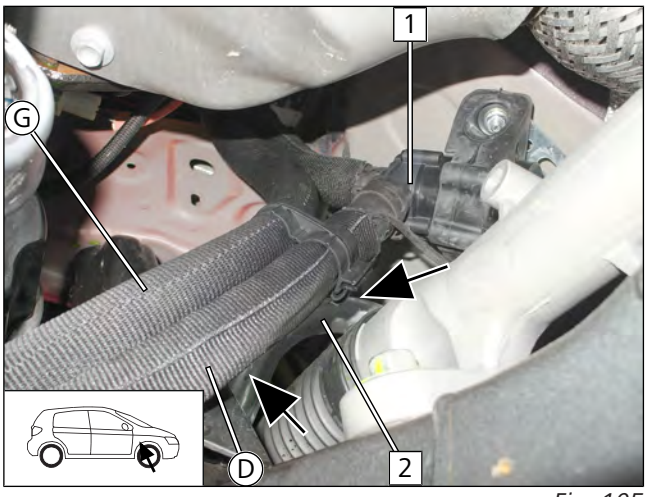


Fig. 105

Ensure sufficient distance between coolant pump 1 and stabiliser bar 2 (covered), correct if necessary.

>40

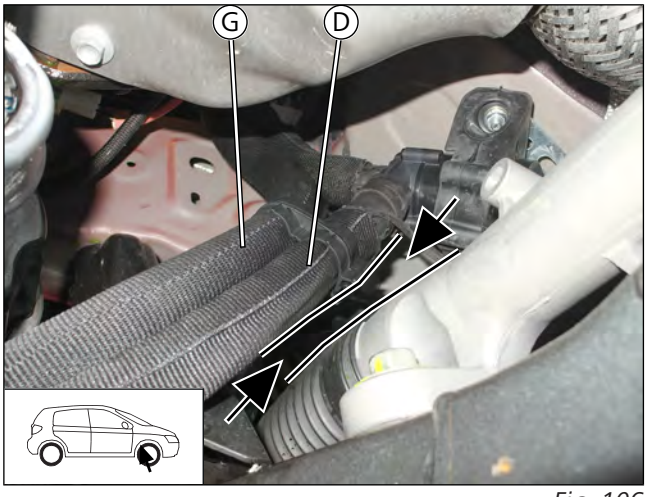


Fig. 106

Ensure sufficient distance between steering gear and hoses G and D, correct if necessary.

>20

Mounting rubber-coated p-clamp

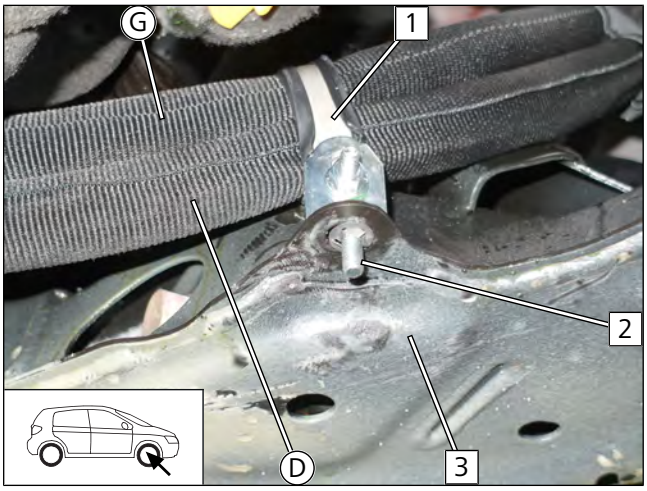


Fig. 107

1 Premounted rubber-coated p-clamp

2 M6x16 bolt, angle bracket, premounted lock washer, existing hole, lock washer

3 Axle bolster

Checking distance

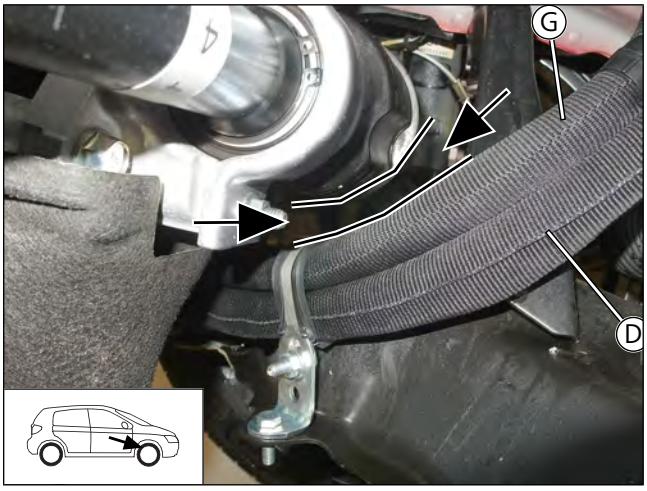


Fig. 108

Ensure sufficient distance between the cardan shaft and hoses (G) and (D), correct if necessary.

>20

Mounting rubber-coated p-clamp

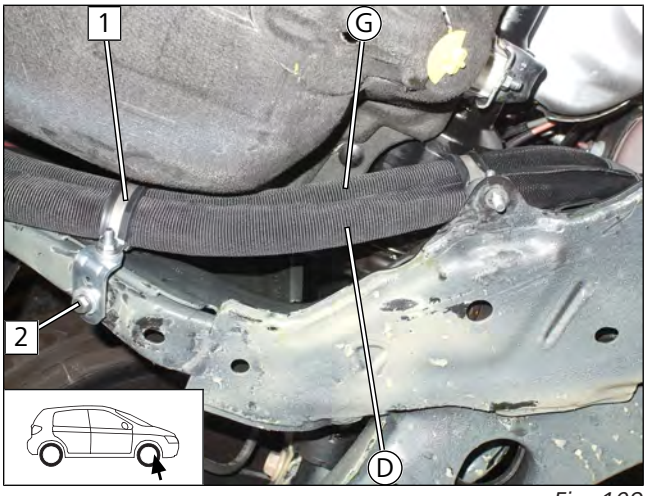


Fig. 109

▶ Insert M6 rivet nut into existing hole at position 2. Install bolt (premounted) 2 loosely, will be tightened later when fastening the engine trim.

1 Premounted rubber-coated p-clamp

2 M6x20 bolt, spring lockwasher, large diameter washer, premounted angle bracket, rivet nut

Inserting rivet nut

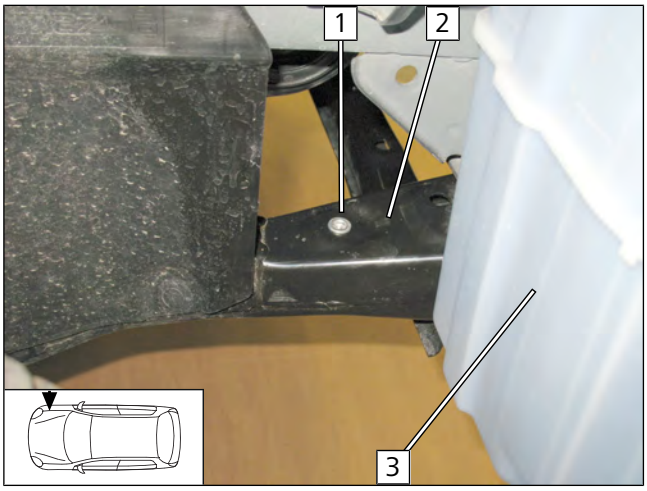


Fig. 110

1 Rivet nut, existing hole
2 Axle bolster
3 Washer reservoir

Mounting rubber-coated p-clamp

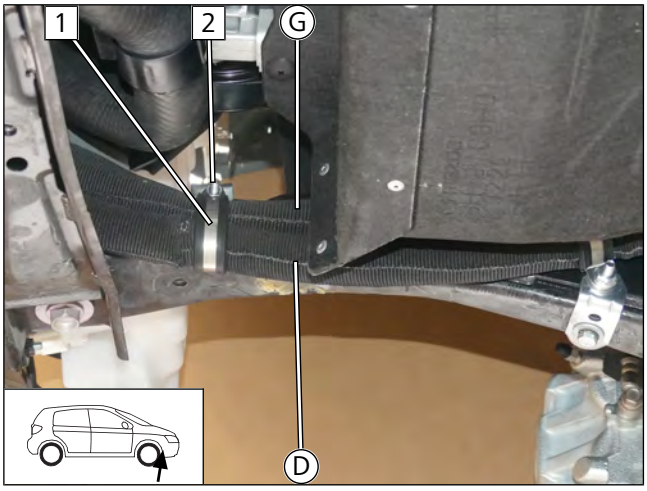


Fig. 111

▶ Mount bolt 2 as shown in next figure.

1 Premounted rubber-coated p-clamp

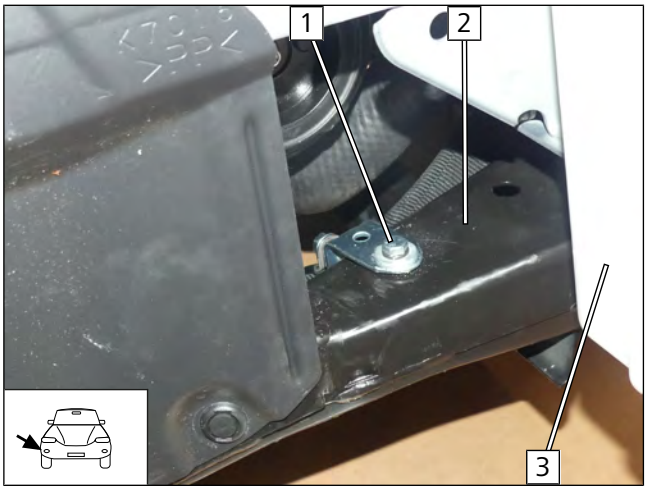


Fig. 112

1 M6x20 bolt, spring lockwasher, large diameter washer, angle bracket, premounted lock washer, rivet nut (8-10Nm)
2 Axle bolster
3 Washer reservoir

Mounting rubber-coated p-clamp

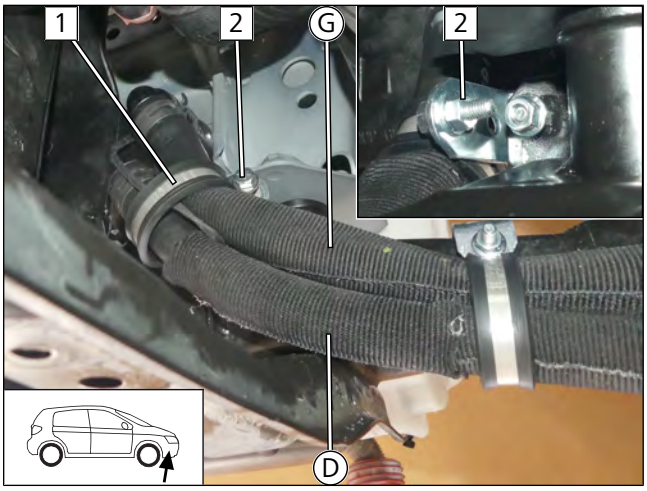


Fig. 113

1 Premounted rubber-coated p-clamp

2 M6x20 bolt, rubber-coated p-clamp, premounted lock washer, premounted angle bracket, flanged nut (8-10Nm)

Checking distances

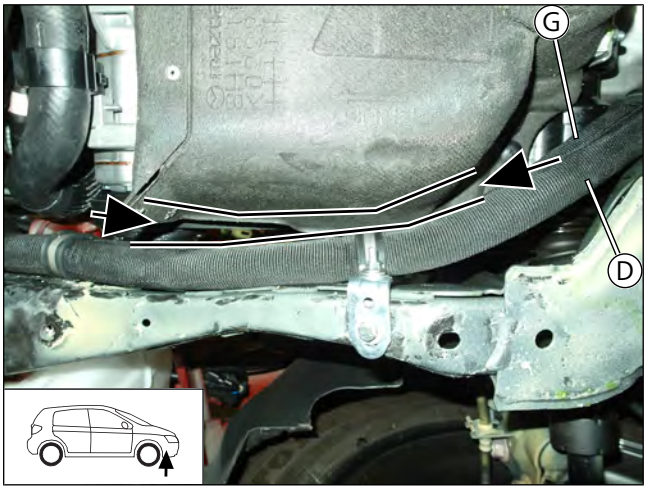


Fig. 114

Ensure sufficient distance between oil pan trim and hoses (G) and (D), correct if necessary.

>20

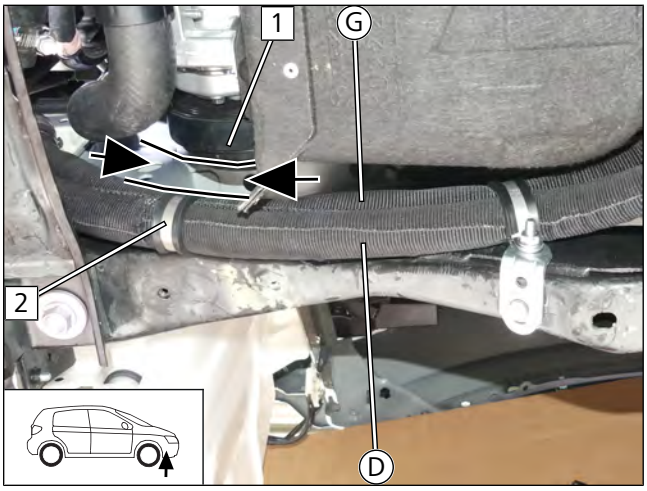


Fig. 115

Ensure sufficient distance between rubber-coated p-clamp 2, hoses (G) and (D) and A/C compressor 1, correct if necessary.

>20

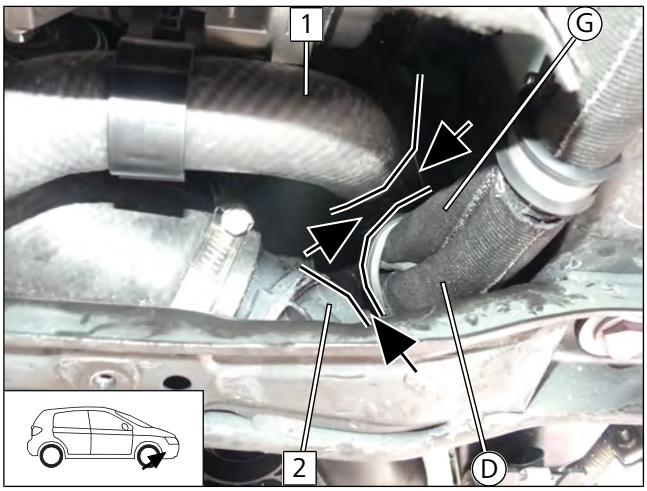
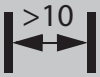


Fig. 116

Ensure sufficient distance between hoses (G) and (D) and original vehicle hose [1] as well as intake hose [2], correct if necessary. (See also next Fig.)



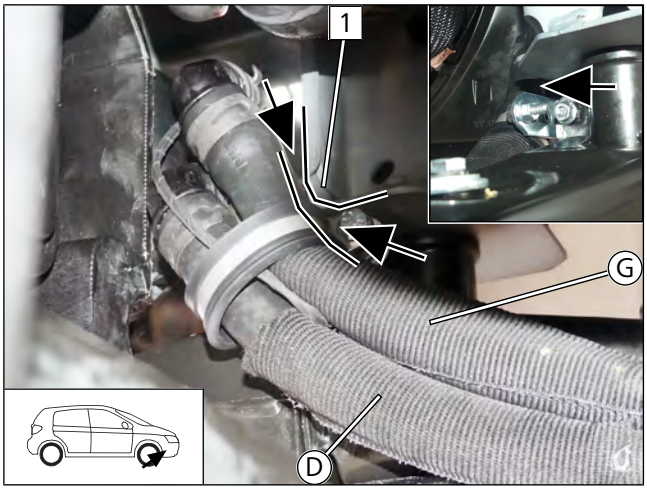
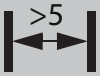


Fig. 117

Ensure sufficient distance between hoses (G) and (D) and original vehicle carrier [1], correct if necessary.



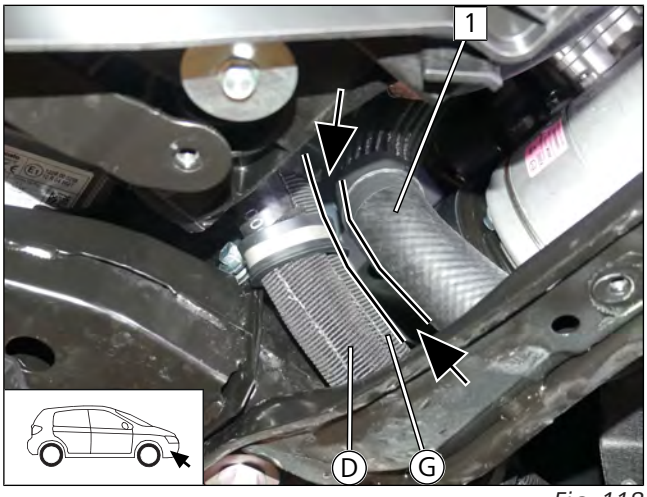


Fig. 118

Ensure sufficient distance between hoses (G) and (D) and original vehicle hose [1], correct if necessary.

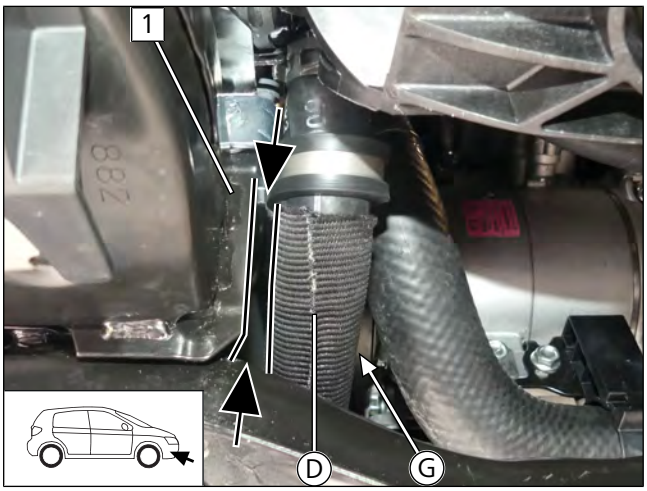


Fig. 119

Ensure sufficient distance between hoses Ⓖ and Ⓓ and original vehicle carrier 1, correct if necessary.

Installing perforated bracket

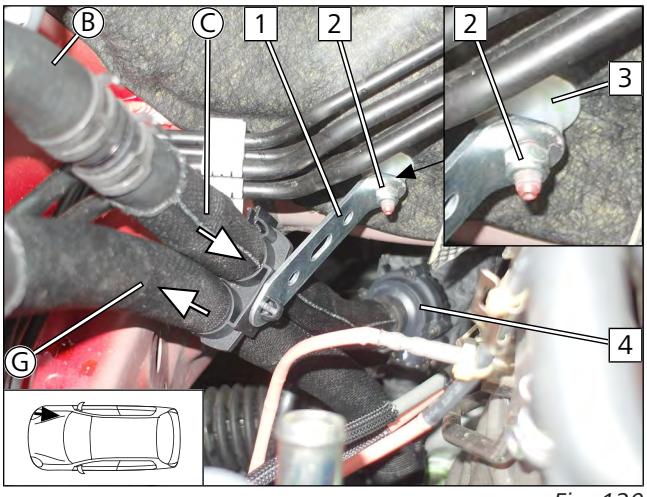


Fig. 120

▶ Mount premounted perforated bracket 1 on original vehicle stud bolt as shown. Original vehicle plastic nut 3 remains attached to serve as spacer.

2 Original vehicle stud bolt, original vehicle plastic nut 3, premounted perforated bracket 1, self-locking nut

4 Mounted coolant pump

Cutting heat exchanger inlet hose to length

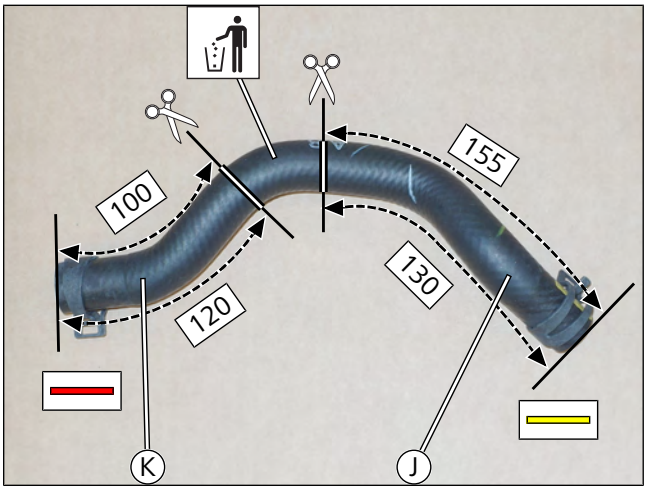


Fig. 121

Ⓙ Will be reused as hose section for heat exchanger outlet – non-return valve

Ⓚ Will be reused as hose section for engine inlet – non-return valve

Cutting heat exchanger outlet hose to length

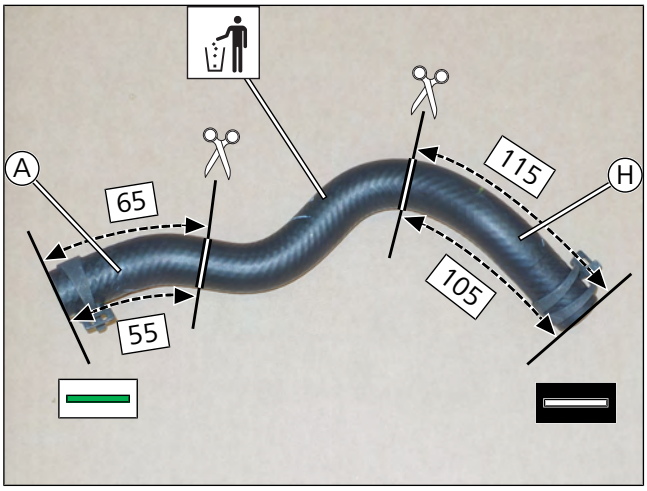


Fig. 122

Ⓐ Will be reused as hose section for engine outlet - non-return valve

Ⓗ Will be reused as hose section for heat exchanger inlet – hose Ⓖ of heater outlet

Mounting fabric heat shrink tubing

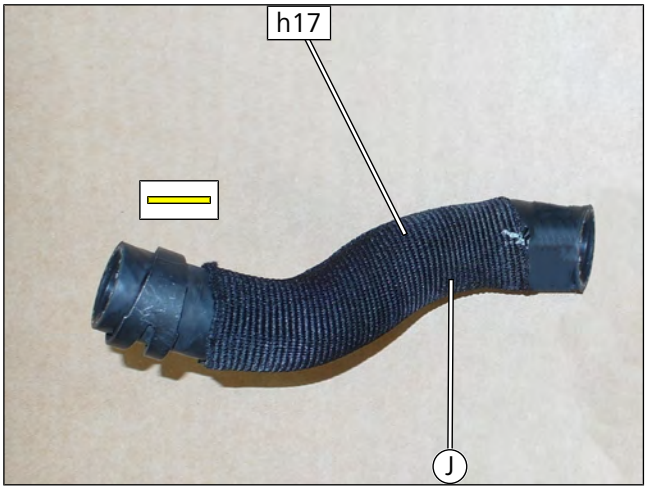


Fig. 123

Slide on fabric heat shrink tubing **h17** (90) as shown and use 230°C at most to shrink it.

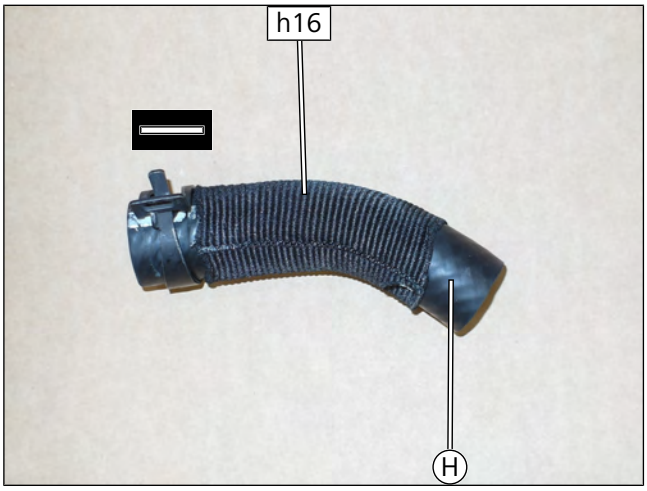


Fig. 124

Slide on fabric heat shrink tubing **h16** (70) as shown and use 230°C at most to shrink it.

Premounting non-return valve

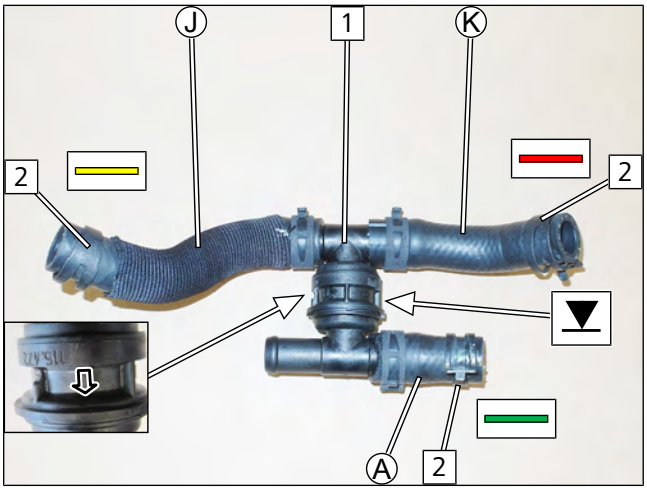


Fig. 125

Ensure correct direction of flow for the non-return valve.

For the alignment of the individual hose sections, see also the next two figures.

All spring clips without a specific designation Ø25

1 Ø4x18 non-return valve
2 Original vehicle spring clip

Partial views of premounted non-return valve hose group

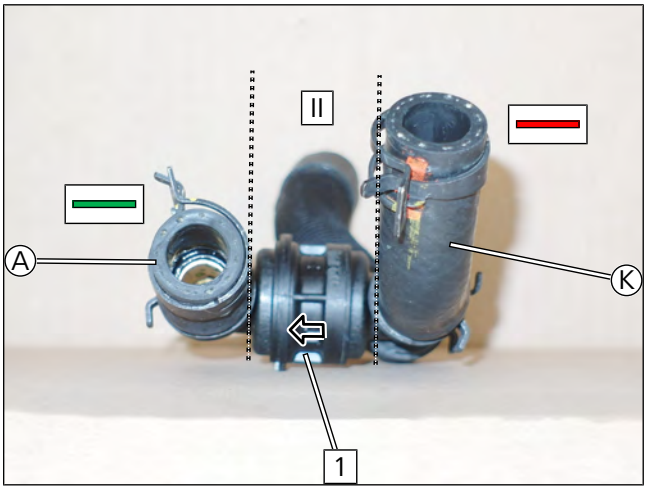


Fig. 126

1 Ø4x18 non-return valve

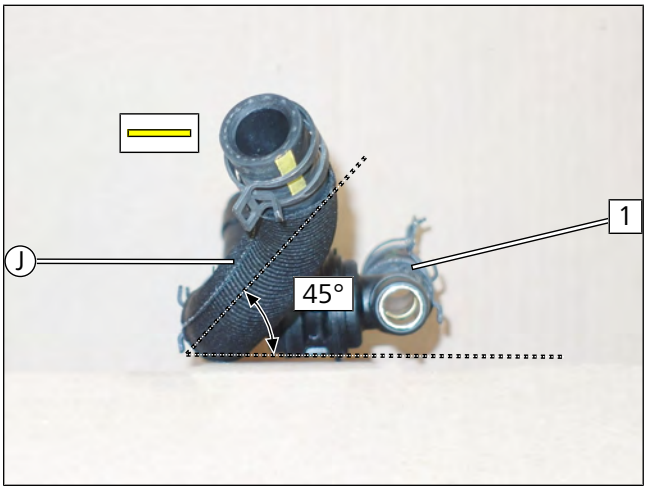


Fig. 127

1 Ø4x18 non-return valve

Pretensioning original vehicle spring clips

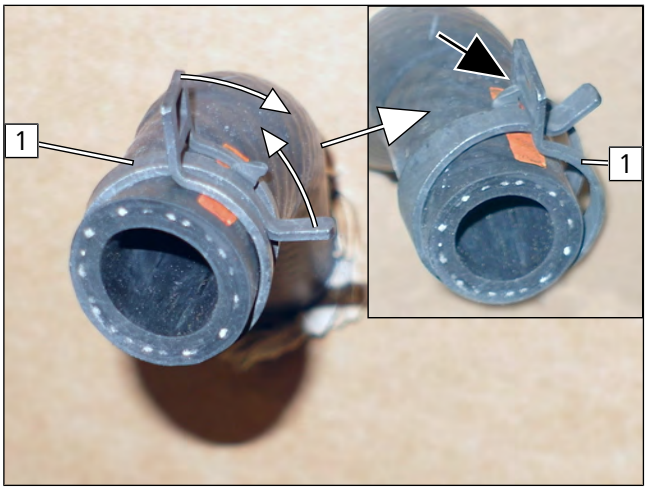


Fig. 128

▶ Pretension all 4 original vehicle spring clips **1** as shown. The locking tab must engage.

Engine inlet and engine outlet connection

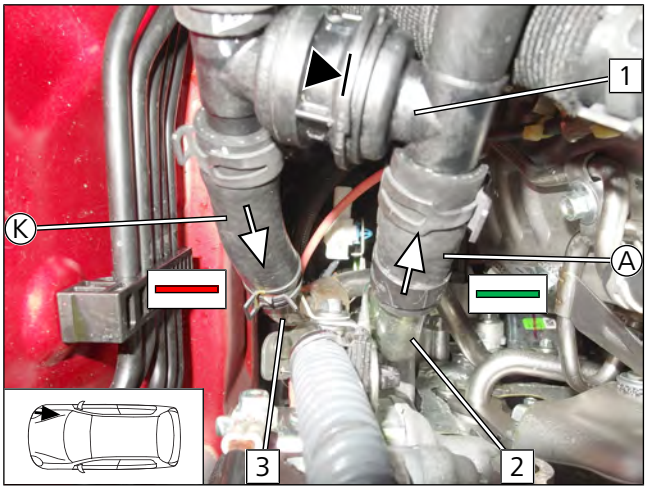


Fig. 129

1 Premounted non-return valve
2 Engine outlet connection piece
3 Engine inlet connection piece

Heat exchanger outlet connection

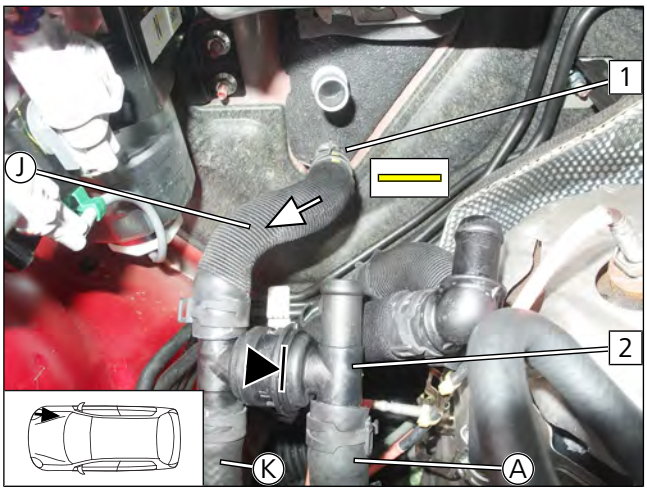


Fig. 130

1 Heat exchanger outlet connection piece
2 Premounted non-return valve

Mounting hose (B)

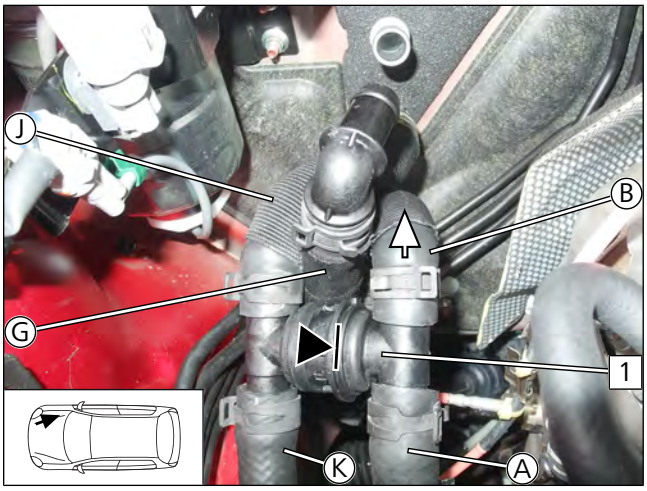


Fig. 131

▶ Position hose (G) as shown

[1] Premounted non-return valve

Refilling coolant

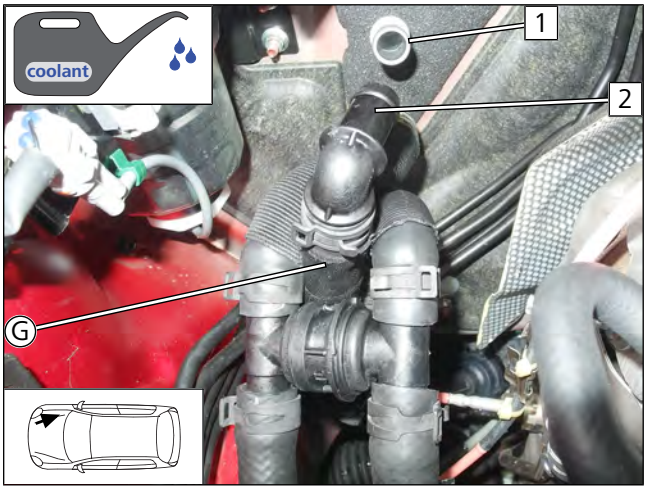


Fig. 132

Only use manufacturer-approved coolant.

▶ Before continuing the installation of the coolant hoses, fill the mounted hose assembly with coolant using the 90°connection piece [2] of hose C (G), until the coolant comes out of connection piece [1].

Heat exchanger inlet connection

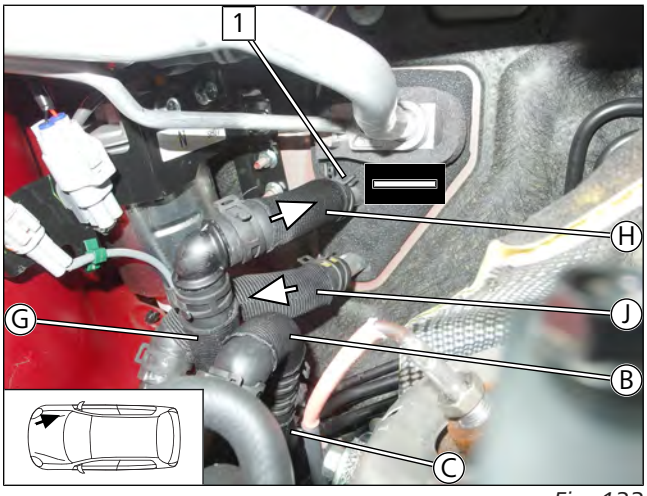


Fig. 133

[1] Heat exchanger inlet connection piece

Loosening pretensioned original vehicle spring clips

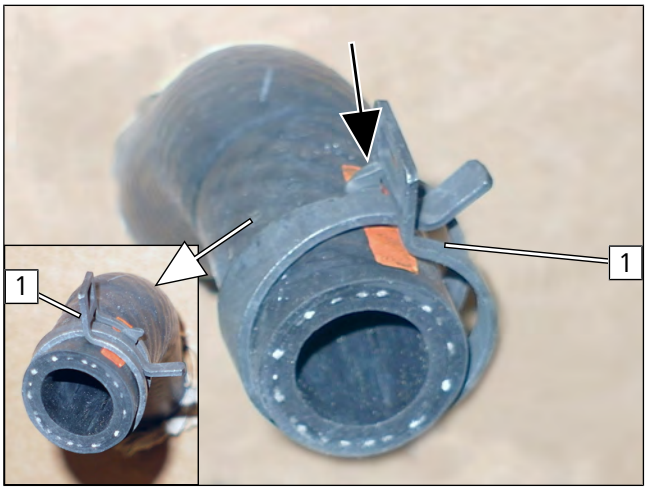


Fig. 134

Danger of overheating due to leaks in coolant circuit

- Ensure correct installation of original vehicle spring clips.

- Loosen all 4 original vehicle spring clips 1 at their respective installation positions as shown.

12 Fuel

DANGER

Risk of fire and explosion due to leaking fuel and escaping fuel vapours.

The incorrect installation of the fuel extractor can cause damage and fire.

- ▶ Avoid electrostatic discharges and open fire
- ▶ When working on the fuel system, ensure sufficient ventilation and bleeding
- ▶ Open the fuel tank cap of the vehicle
- ▶ Ventilate the fuel tank
- ▶ Re-close the tank lock
- ▶ Catch any fuel running off with an appropriate container

Danger of damage to components

- ▶ Install fuel line and fuel pump wiring harness so that they are protected against stone impact
- ▶ Provide rub protection for fuel line and wiring harness in areas where there are sharp edges

12.1 Routing fuel line

Routing and fastening fuel line

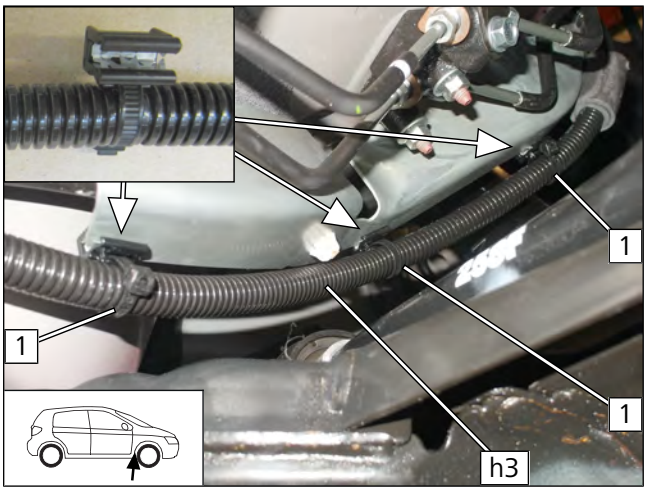


Fig. 135

▶ Route corrugated tube **h3** to the underbody as shown.

1 Edge clip cable tie

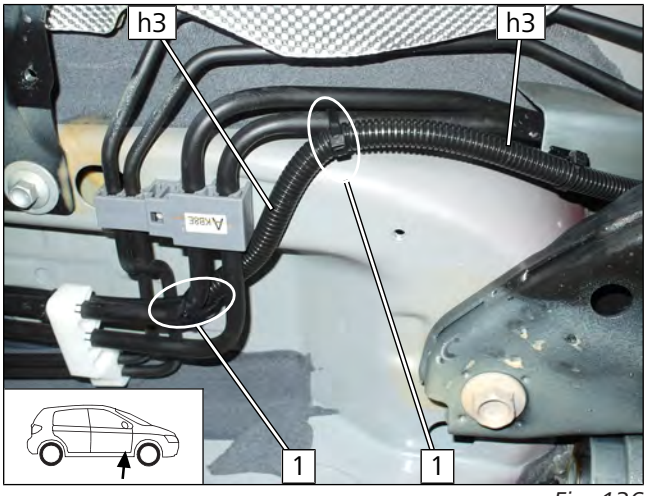


Fig. 136

▶ Route corrugated tube **h3** along original vehicle fuel lines.

1 Cable tie

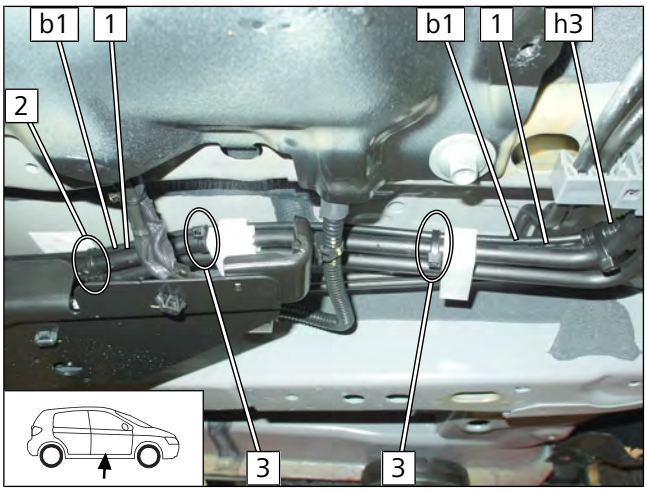


Fig. 137

▶ Route fuel line **b1** and fuel pump wiring harness **1** along original vehicle fuel lines.

2 Cable tie

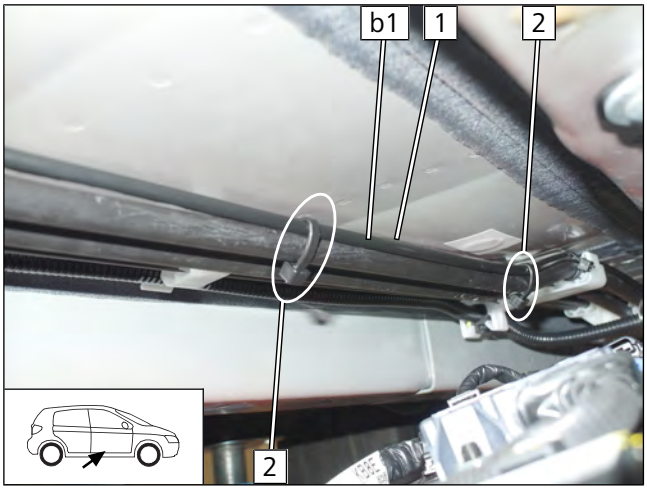


Fig. 138

▶ Route fuel line **b1** and fuel pump wiring harness **1** along original vehicle fuel lines.

2 Cable tie

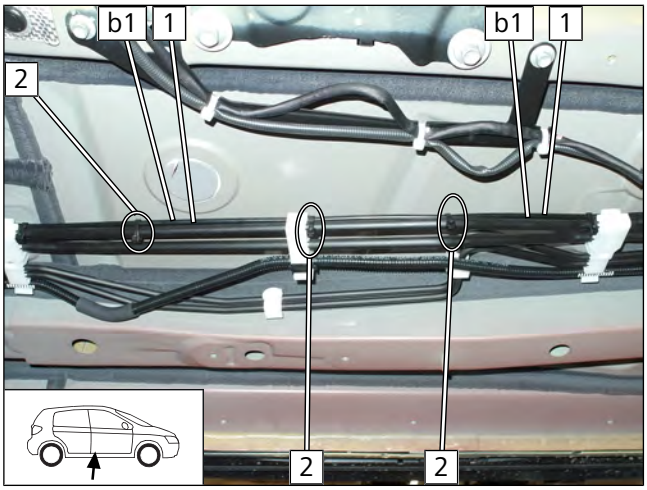


Fig. 139

▶ Route fuel line **b1** and fuel pump wiring harness **1** along original vehicle fuel lines.

2 Cable tie

Premounting fuel pump

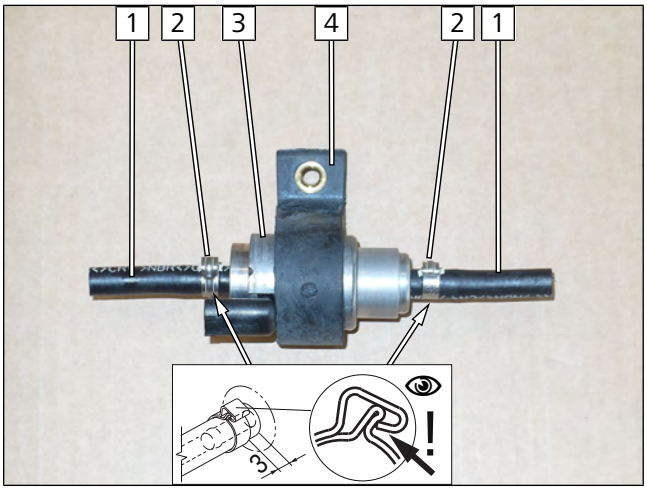


Fig. 140

- **1** Hose section
- **2** Ø10 clamp
- **3** Fuel pump
- **4** Fuel pump mount

Premounting fuel line **b2**

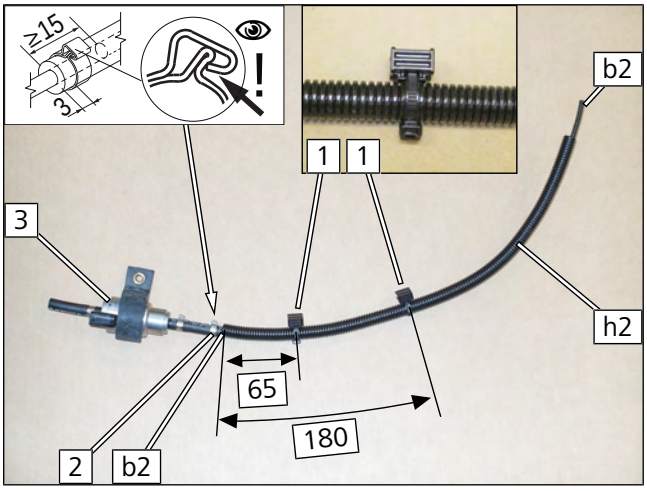


Fig. 141

- ▶ Draw fuel line **b2** (500) into corrugated tube **h2** (450).
- ▶ Clip

  - **1** Edge clip cable tie (observe the clamping direction)
  - **2** Ø10 clamp
  - **3** Fuel pump

Bending perforated bracket at an angle

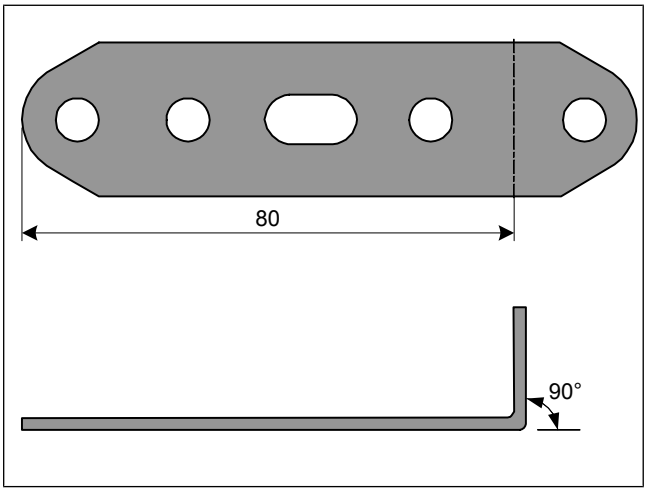


Fig. 142

Installing perforated bracket

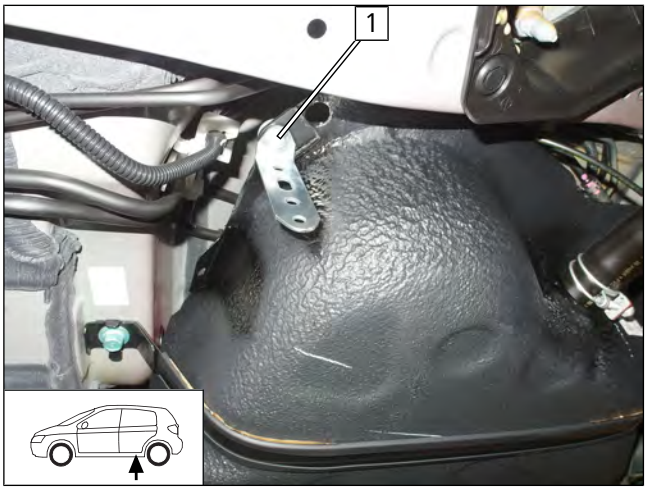


Fig. 143

1 M6x20 bolt, large diameter washer, perforated bracket, existing hole, flanged nut (8-10Nm)

Mounting fuel pump

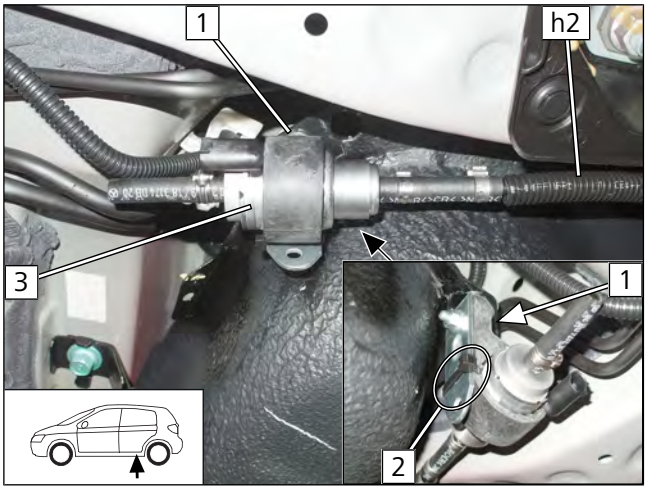


Fig. 144

▶ Route fuel line **b2** in corrugated tube **h2** to tank fitting.

1 M6x25 bolt, support angle bracket, fuel pump mount, premounted perforated bracket, flanged nut (8-10Nm)

2 Cable tie around perforated bracket and fuel pump mount

3 Fuel pump

Assembling fuel pump connector X7

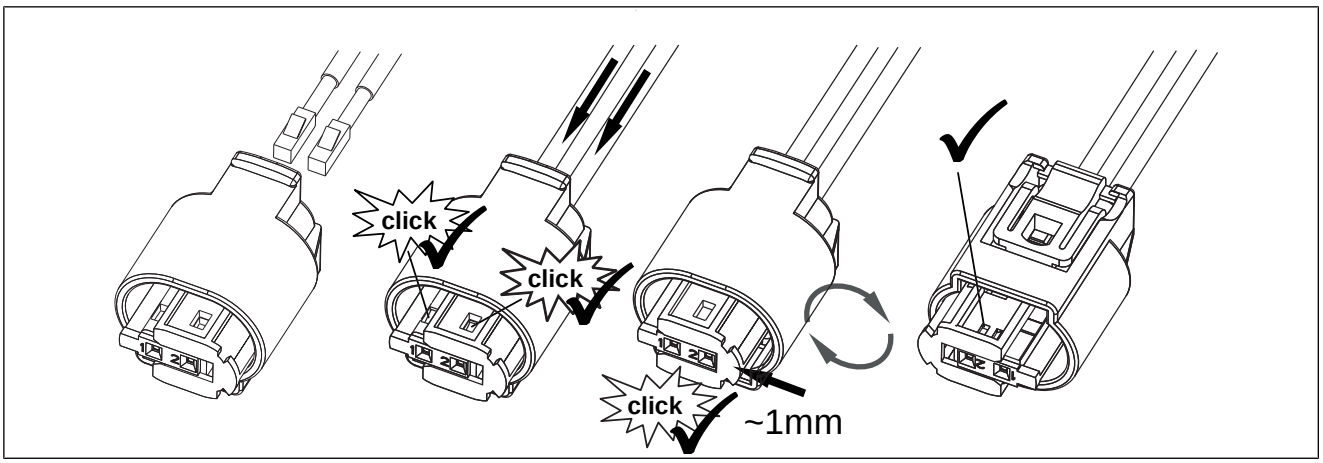


Fig. 145

Fuel pump connection

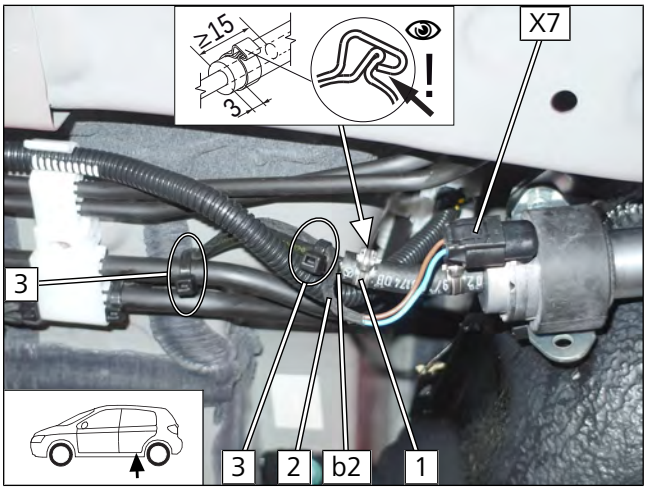


Fig. 146

1 Ø10 clamp
2 Fuel pump wiring harness
3 Cable tie

Routing wiring harness

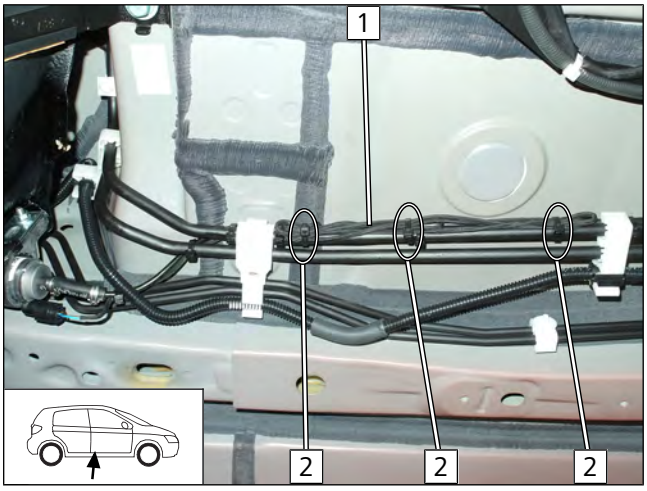


Fig. 147

▶ Attach excess wire length 1 to original vehicle fuel lines.

2 Cable tie

12.2 Installing tank extracting device

Cutting fuel supply line

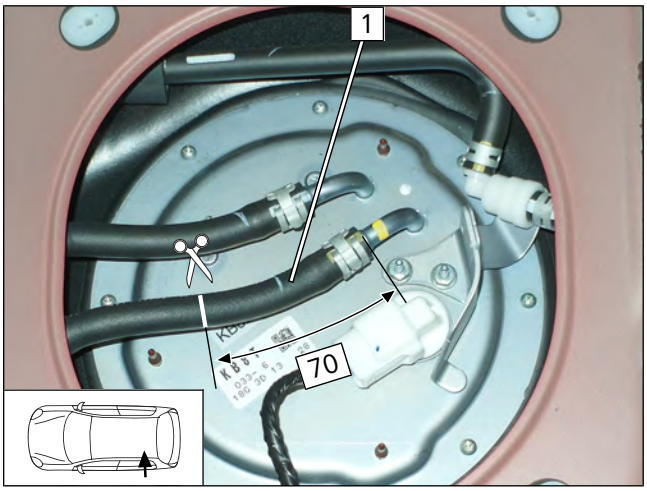


Fig. 148

DANGER
Risk of fire and explosion due to leaking fuel and escaping fuel vapours.

▶ Cut fuel supply line 1 as shown.

Mounting tank extracting device

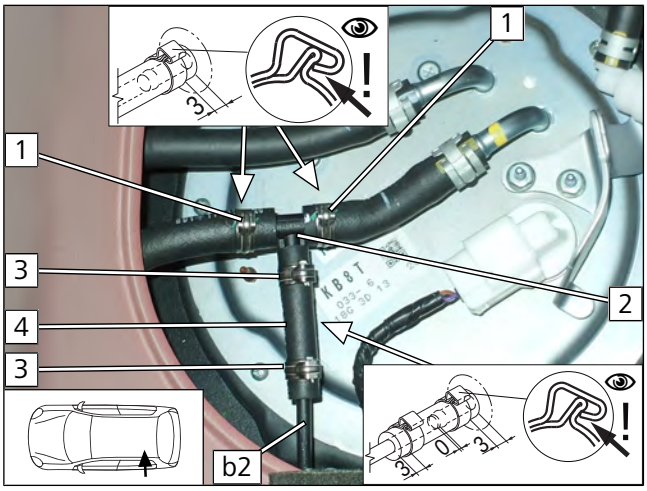


Fig. 149

1 Ø13.5 clamp
2 8x5x8 tank extracting device (T-piece)
3 Ø10 clamp
4 Hose section

12.3 Attaching lines

Fastening corrugated tube h2

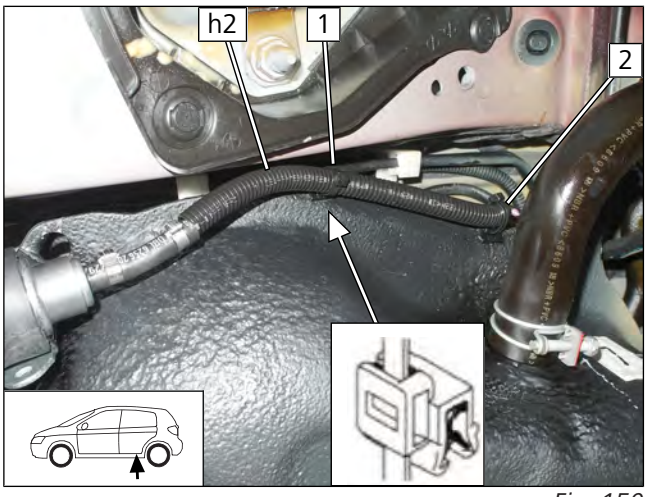


Fig. 150

Danger of damage to components

▶ Ensure sufficient distance from neighbouring components, correct if necessary.

▶ Fasten fuel line b2 in corrugated tube h2 with edge clip cable tie 1 as shown.

▶ Mount edge clip cable tie 2 as shown in next figure.

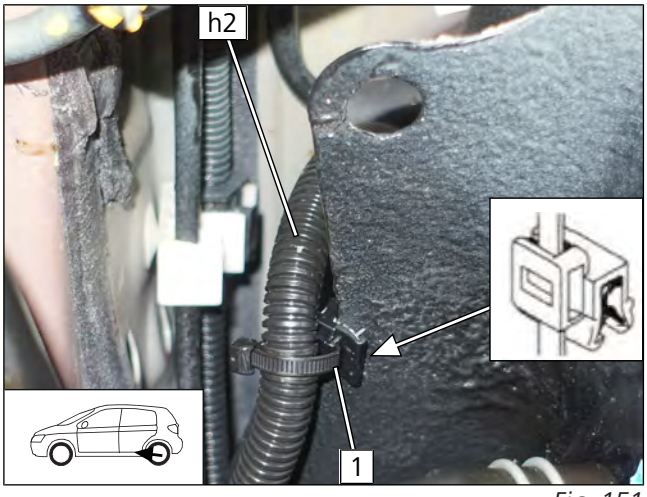


Fig. 151

▶ Fasten fuel line b2 in corrugated tube h2 with edge clip cable tie 1 as shown.

13 Electrical system of passenger compartment

13.1 Electrical system preparation

Preparing / assigning wires

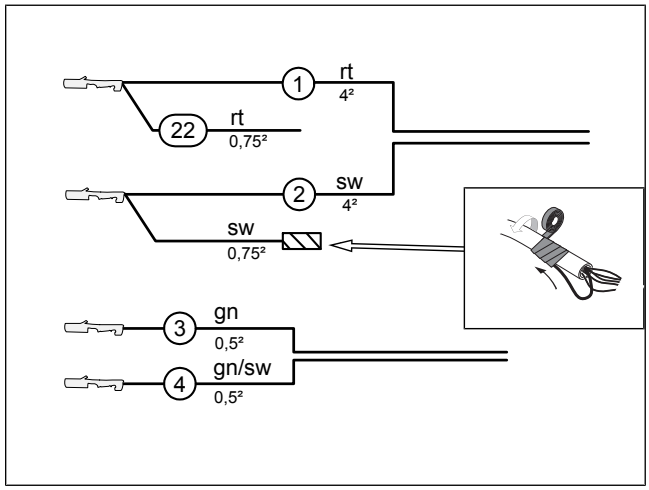


Fig. 152

Wire sections retain their numbering in the entire document.

① Red (rt) wire of fan wiring harness
② Black (sw) wire of fan wiring harness
③ Green (gn) wire from wiring harness of PWM control
④ Green/black (gn/sw) wire from wiring harness of PWM control
㉒ Red (rt) wire of fan wiring harness, connection for PWM GW/KL15

View of male connectors and female connectors

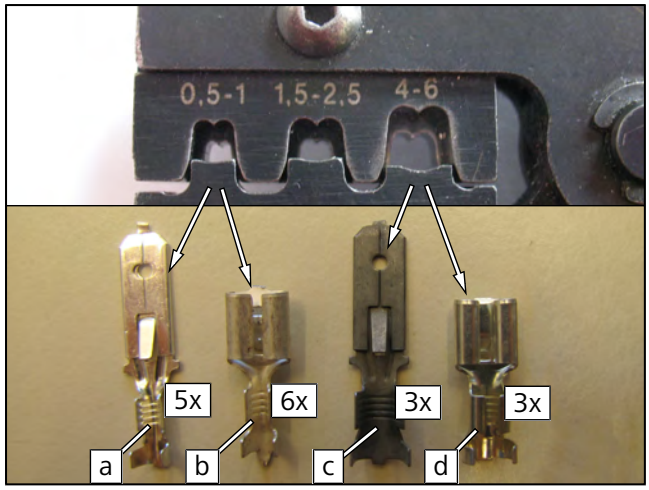


Fig. 153

[a] Male connector 6.3 for 0.5 - 1mm² wire cross-section
[b] Female connector 6.3 for 0.5 - 1mm² wire cross-section
[c] Male connector 6.3 for 4 - 6mm² wire cross-section
[d] Female connector 6.3 for 4 - 6mm² wire cross-section

Instructions for connecting the contacts

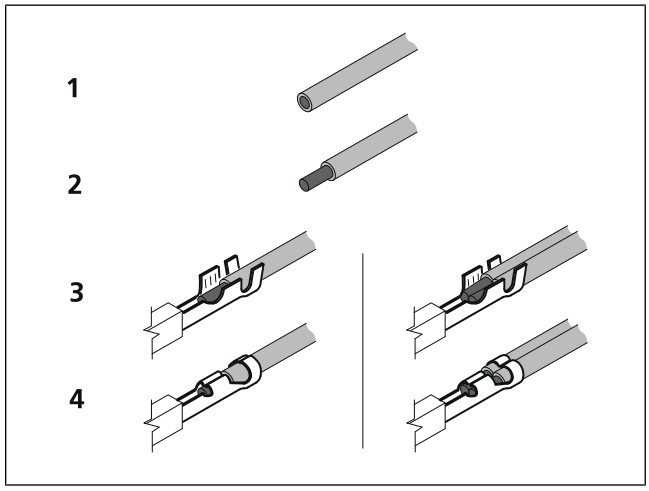


Fig. 154

Preparing fan wiring harness

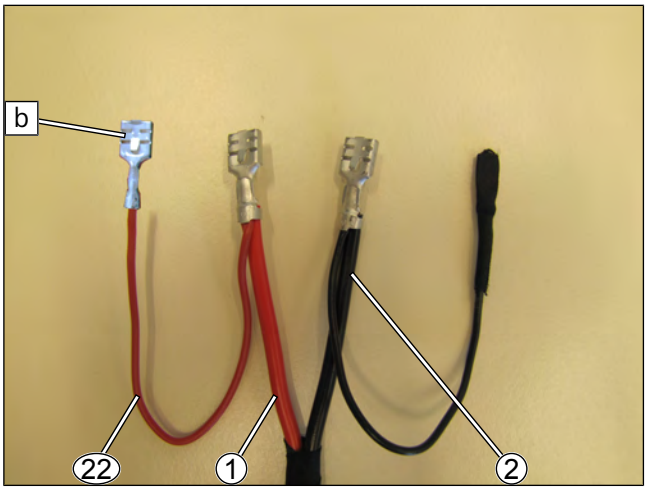


Fig. 155

▶ Install female connector **b**.

- ① 4mm² red (rt) wire from fan wiring harness for K1/87a
- ② 4mm² black (sw) wire from fan wiring harness for K1/30
- ㉒ 0.75mm² red (rt) wire from fan wiring harness for PWM GW/KL15

Preparing passenger compartment relay and fuse holder (RSH)

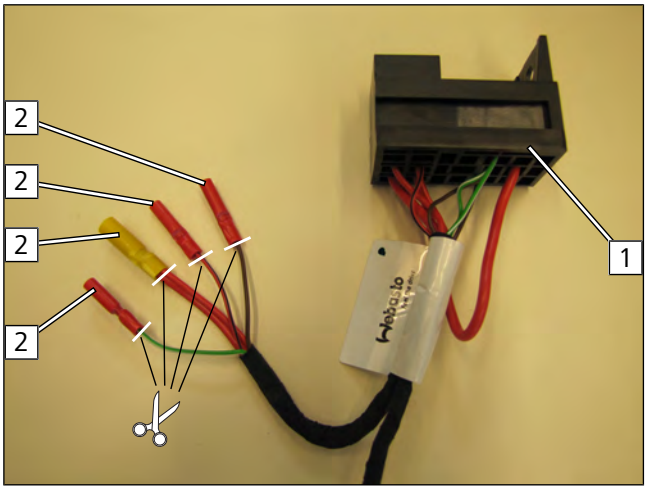


Fig. 156

▶ Cut off butt connector **2** [4x] from wires in accordance with the markings.

- **1** RSH

Installing male connector

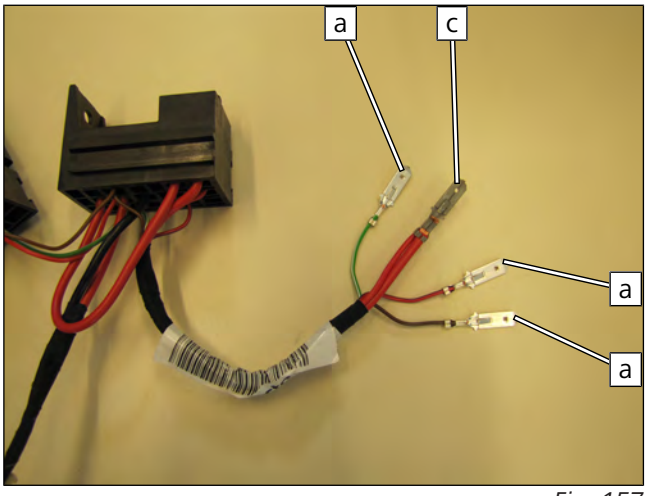


Fig. 157

Install as shown in the next figure

▶ Male connector **a** on:

- ⇨ Red/black (rt/sw) wire (0.5mm²)
- ⇨ Green/white (gn/ws) wire (0.5mm²)
- ⇨ Brown (br) wire (0.5mm²)

▶ Male connector **c** on:

- ⇨ Red (rt) wire (4.0mm²) together with red (rt) wire (1.5mm²)

Installing connector housing

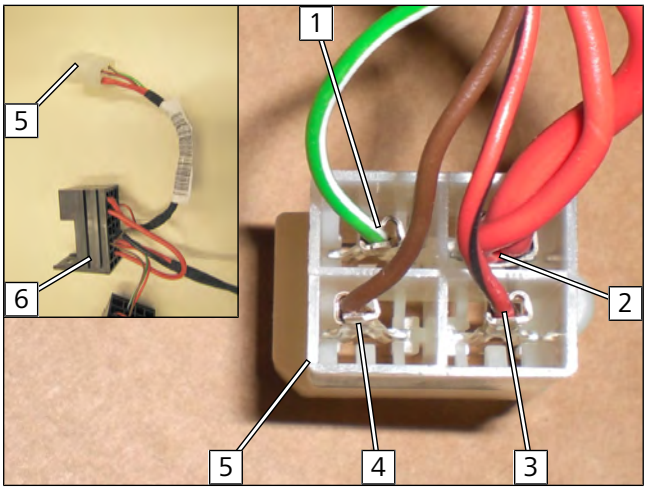
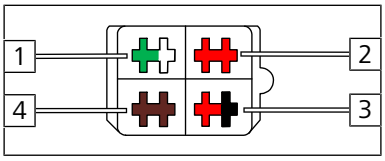


Fig. 158

1 Green/white (gn/ws) wire (0.5mm²)
2 Red (rt) wire (4.0mm²) and red (rt) wire (1.5mm²)
3 Red/black (rt/sw) wire (0.5mm²)
4 Brown (br) wire (0.5mm²)
5 4-pin male connector housing
6 RSH

Wire-side view:



13.2 Preparing the PWM GW (Pulse Width Modulator Gateway)

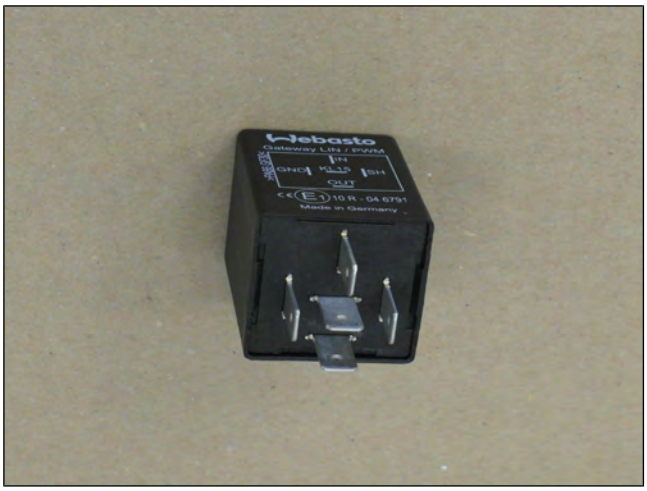


Fig. 159

The PWM GW is preprogrammed for approx. fan level 3. However, the vehicle fan speed can deviate for technical reasons. In case the fan power is too high / too low, the PWM GW can be reprogrammed using the Webasto diagnosis. See section 'Final Work'.

Checking settings

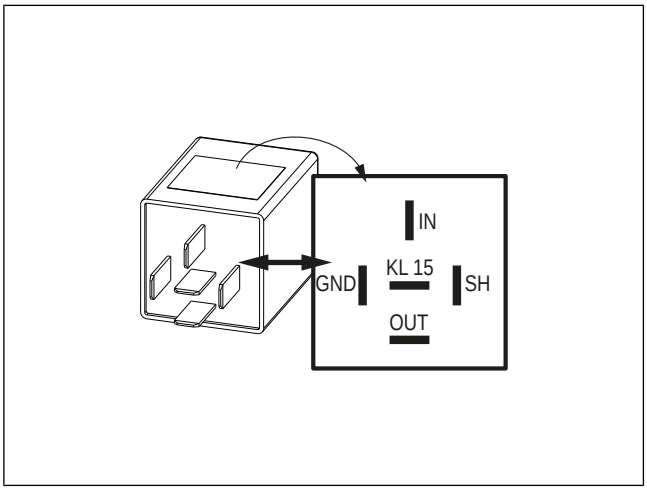


Fig. 160

▶ Check the settings and adjust if necessary under the 'Final Work' section.

Parameters	Setting
Duty cycle	65%
Frequency	500Hz
Voltage	not relevant
Function	Low side

Connecting wires to PWM GW socket

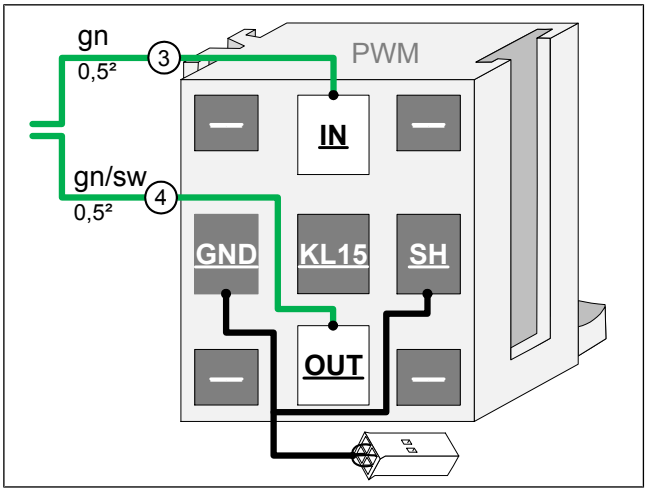


Fig. 161

③ Green (gn) wire from wiring harness of PWM control

④ Green/black (gn/sw) wire from wiring harness of PWM control

13.3 Preparing RSH and PWM GW

Assembling RSH and PWM GW sockets, connecting wire and connecting socket with connector

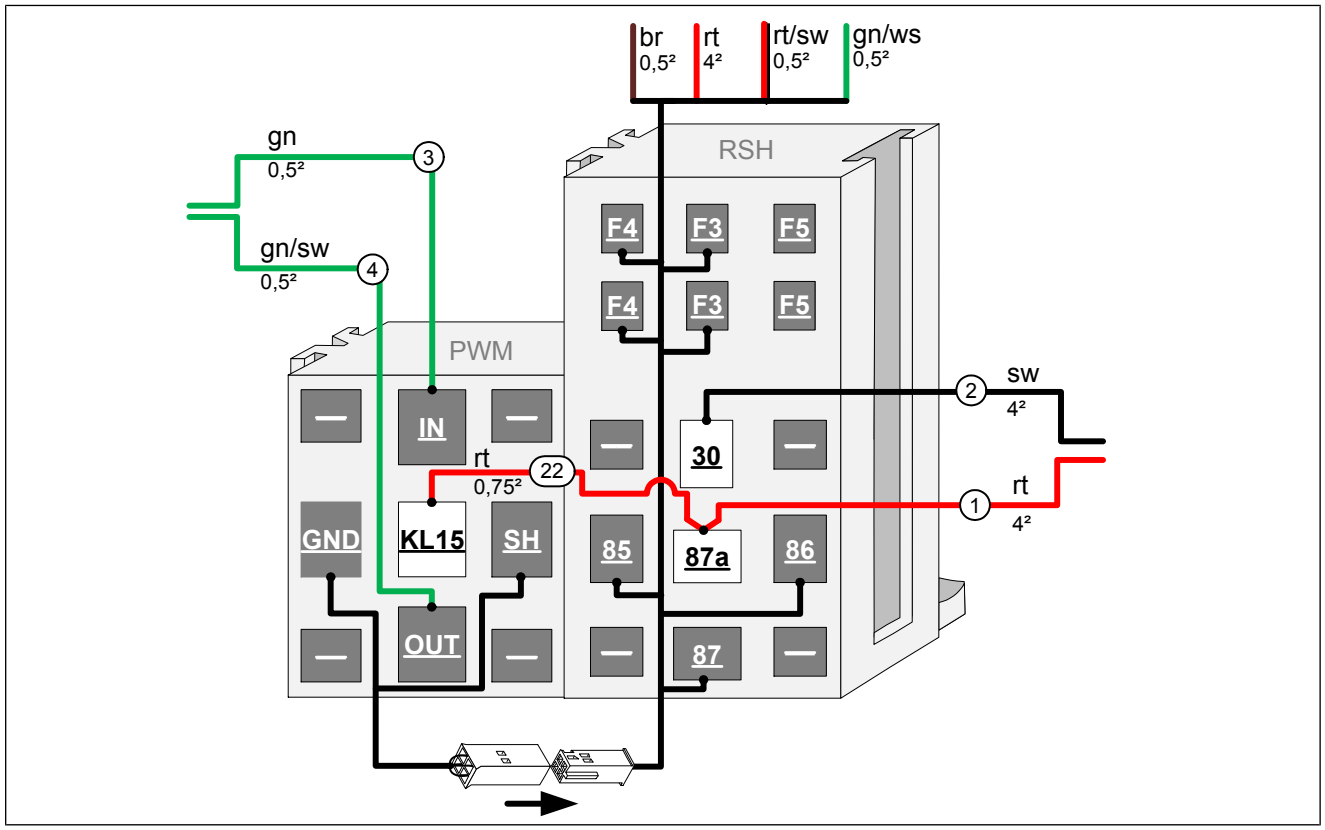


Fig. 162

Premounting RSH and PWM GW socket

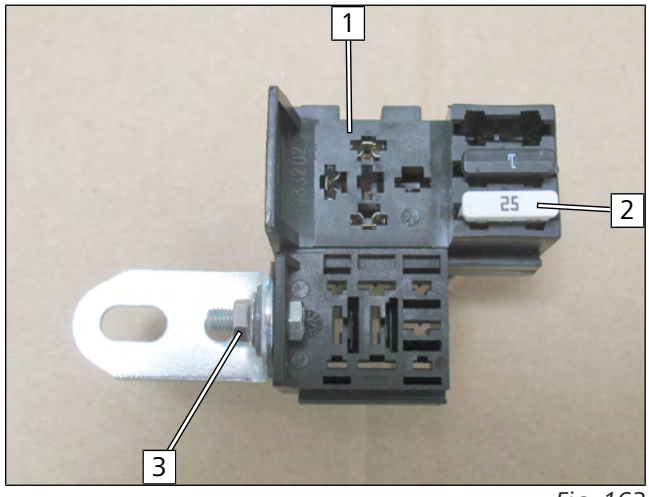


Fig. 163

1 RSH
2 25A fuse F4
3 M5x16 bolt, PWM GW socket, angle bracket, large diameter washer, nut (5-6Nm)

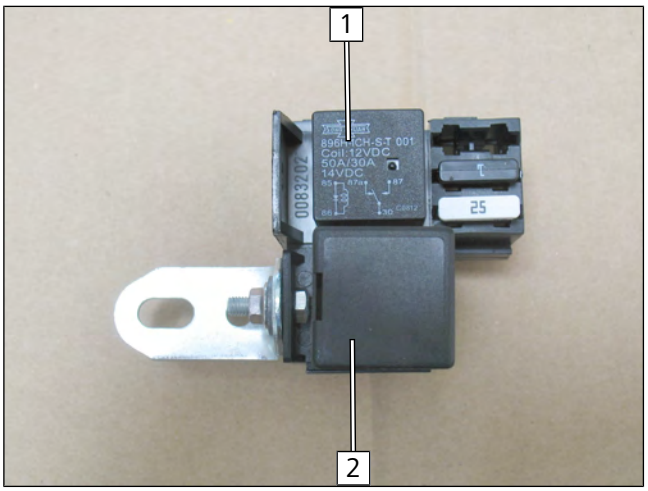


Fig. 164

1 Relay K1
2 PWM GW

13.4 Routing and premounting the wiring harnesses in the passenger compartment

Mounting contacts

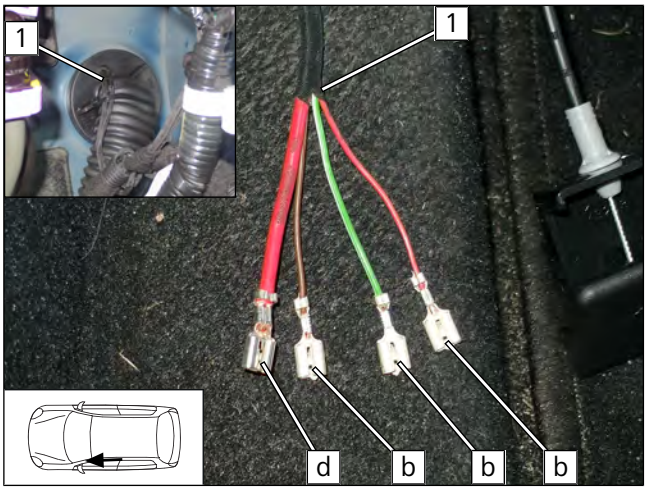


Fig. 165

Install as shown in the next figure

- Female connector **b** to:
  - ⇨ Red/black (rt/sw) wire (0.5mm²)
  - ⇨ Green/white (gn/ws) wire (0.75mm²)
  - ⇨ Brown (br) wire (0.5mm²)
- Female connector **d** to:
  - ⇨ Red (rt) wire (4.0mm²)

1 Fan controller wiring harness coming out of the engine compartment

Mounting male housing to fan controller wiring harness

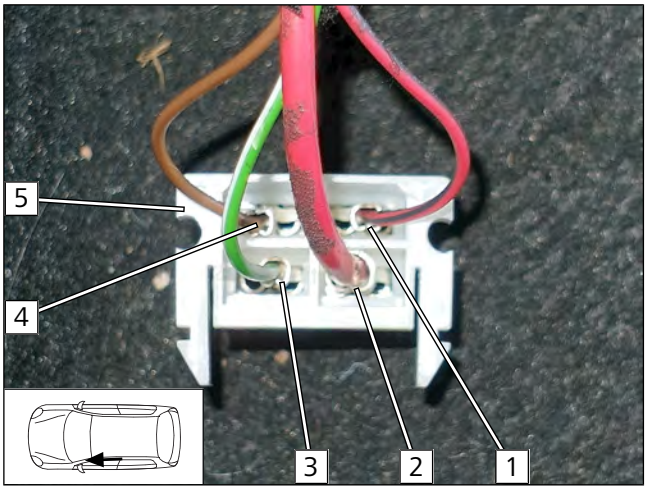
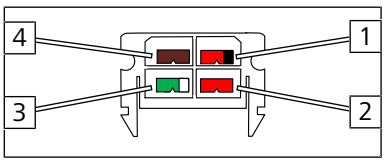


Fig. 166

1 Red/black (rt/sw) wire (0.5mm²)
2 Red (rt) wire (4.0mm²)
3 Green/white (gn/ws) wire (0.75mm²)
4 Brown (br) wire (0.5mm²)
5 4-pin female connector housing

Wire-side view:



Mounting RSH

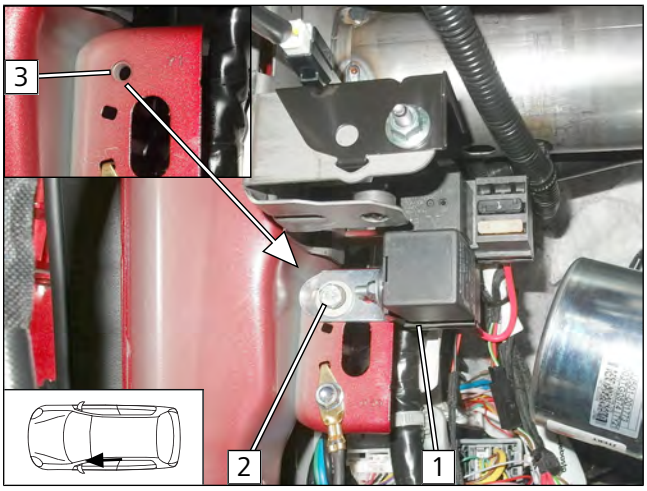


Fig. 167

Vehicles up to MY 2019

1 RSH, premounted

2 M6x20 bolt, large diameter washer, premounted angle bracket (8-10Nm), existing thread 3

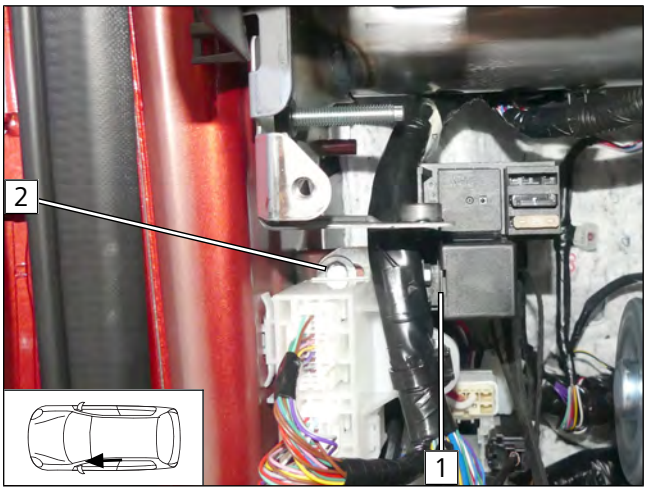


Fig. 168

Vehicles from MY 2020

1 RSH, premounted

2 M6x20 bolt, large diameter washer, premounted angle bracket, original vehicle hole, flanged nut (8-10Nm)

Connecting and fastening wiring harnesses

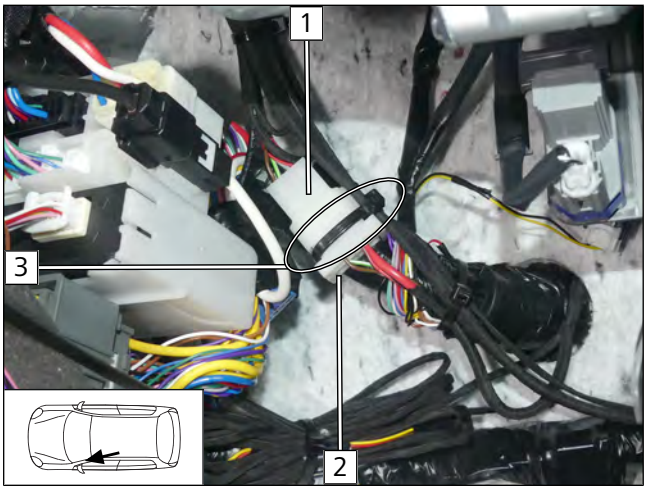


Fig. 169

all vehicles

1 Connector housing of RSH wiring harness

2 Fan controller wiring harness male housing

3 Cable tie

Routing wiring harnesses

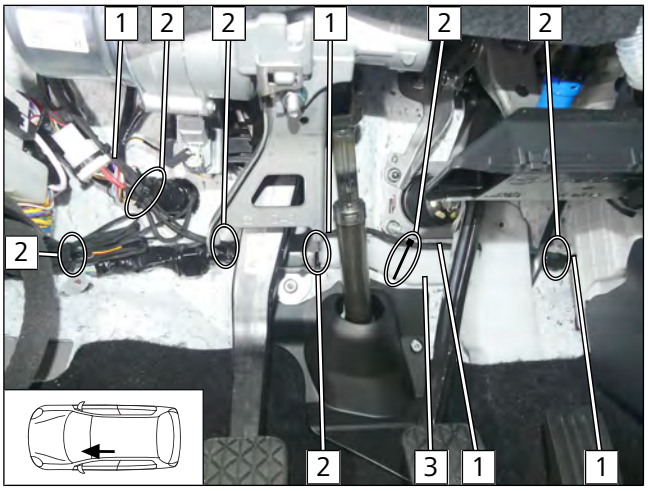


Fig. 170

▶ Route fan wiring harness and PWM control wiring harness [1] along line duct [3] to the front passenger's side.

[2] Cable tie

Mounting male and female connectors

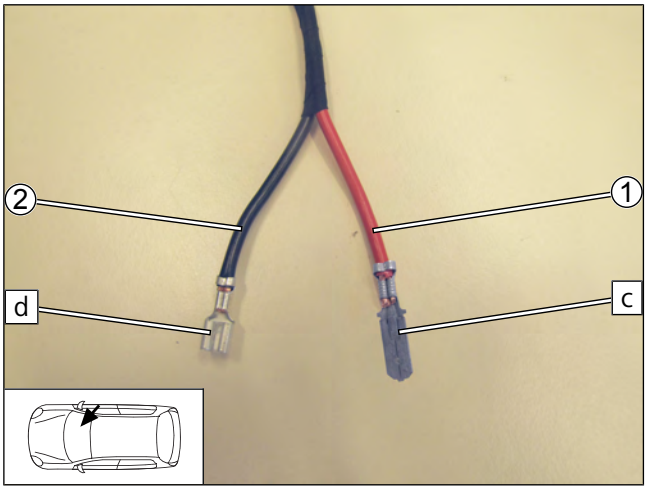


Fig. 171

▶ Male connector [c] to:

⇨ Red (rt) wire (4mm²)

▶ Female connector [d] to:

⇨ Black (sw) wire (4.0mm²)

① Red (rt) wire of fan wiring harness of K1/87a

② Black (sw) wire of fan wiring harness of K1/30

Mounting male and female connectors

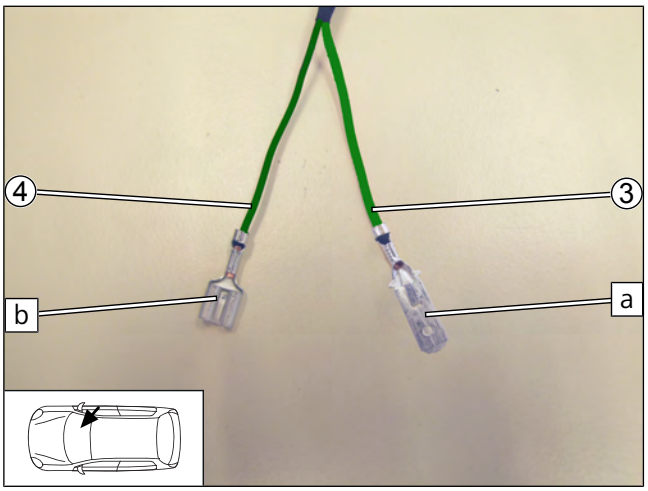


Fig. 172

▶ Male connector [a] to:

⇨ Green (gn) wire (0.5mm²)

▶ Female connector [b] to:

⇨ Green/black (gn/sw) wire (0.5mm²)

③ Green (gn) wire of PWM control wiring harness from PWM GW/ IN

④ Green/black (gn/sw) wire of PWM control wiring harness from PWM GW/OUT

Premounting connector housing

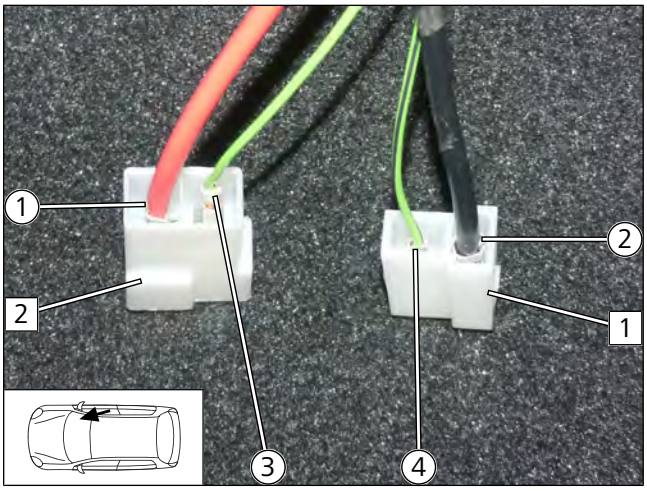


Fig. 173

1 2-pin female connector housing

2 2-pin male connector housing

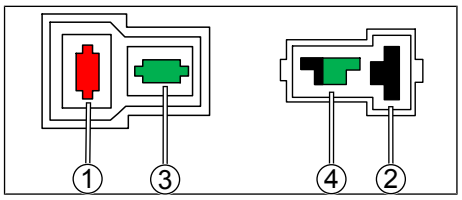
① Red (rt) (4.0mm²) wire of fan wiring harness of K1/87a

② Black (sw) (4.0mm²) wire of fan wiring harness of K1/30

③ Green (gn) (0.5mm²) wire of PWM control wiring harness from PWM GW/ IN

④ Green/black (gn/sw) (0.5mm²) wire of PWM control wiring harness from PWM GW/OUT

Wire-side view:



13.5 Wiring diagram

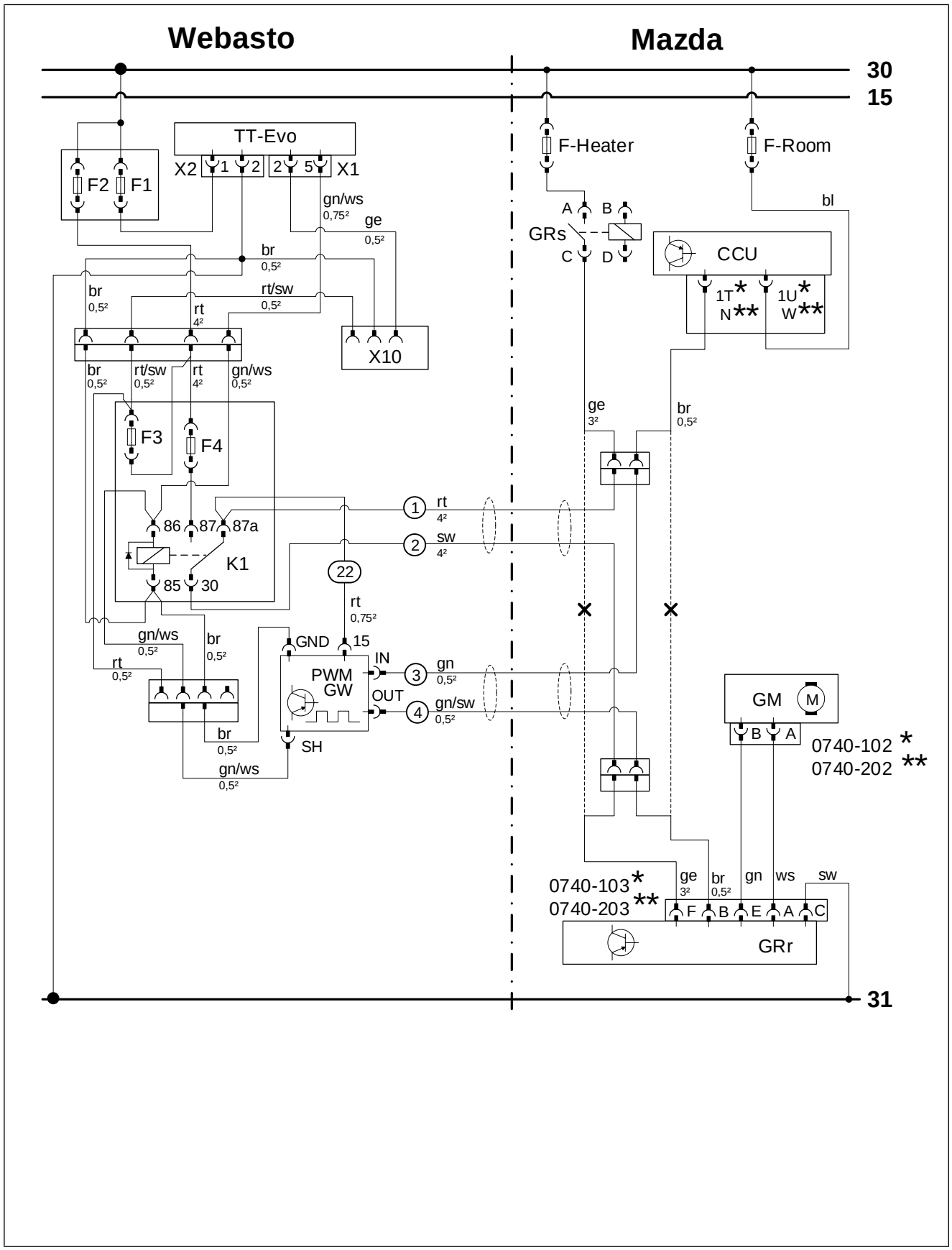


Fig. 174

Legend to wiring diagram

The vehicle connector and component designations are freely chosen by Webasto.
Cable colours may vary.

Vehicle components		Symbols	
Abbreviation	Component	Abbreviation	Designation
F-Heater	Fuse 40A	X	Cutting point
F- Room	Fuse 15A	*	Automatic air-conditioning (AAC)
GRs	Fan relay		
CCU	Air-conditioning control unit	**	Manual air-conditioning (AC)
GM	Fan motor		
0740-102	2-pin connector of GM AAC (2 zones)		
0740-202	2-pin connector of GM AC (7 levels)		
GRr	Fan controller		
0740-103	6-pin connector of GRr AAC (2 zones)		
0740-203	6-pin connector of GRr AC (7 levels)		

Webasto components		Cable colours	
Abbreviation	Component	Abbreviation	Colour
A	Male plug for CLR module wiring harness	bg	beige
B	Female plug for CLR module wiring harness	bl	blue
C	Male plug for adapter wiring harness	br	brown
D	Female plug for adapter wiring harness	dbl	dark blue
E	Male plug for Plug&Play wiring harness	dgn	dark green
F	Female plug for Plug&Play wiring harness	ge	yellow
CCL GW	Micro Gateway CAN CAN LIN	gn	green
CL GW	Micro SPS CAN / WBus (Gateway CAN LIN)	gr	grey
CLR	CAN LIN Rxx (cold start module)	hbl	light blue
D1	Diode	hgn	light green
D2	Diode group	la	salmon
F0	Additional fuse for power supply	or	orange
F1	Heater main fuse	pk	pink
F2	Passenger compartment fan controller main fuse	ro	Pink
F3	Control element fuse	rt	red
F4	Fan controller fuse	sw	black
F5	Additional fuse	vi	violet
HG	Heater TT-Evo	ws	white
K1	Relay K1		
K2	Relay K2		
K3	Relay K3		
LA	Power adapter		
LIN GW	LIN Gateway		
MV	Solenoid valve		
PWM GW	LIN Gateway / PWM (pulse width modulator)		
RSH	Relay and fuse holder of passenger compartment		
RTD	Temperature sensor		
X10	Female plug for control element		

13.6 Fan controller

Removing fan controller connector

The air duct on the passenger site is removed for a better view.

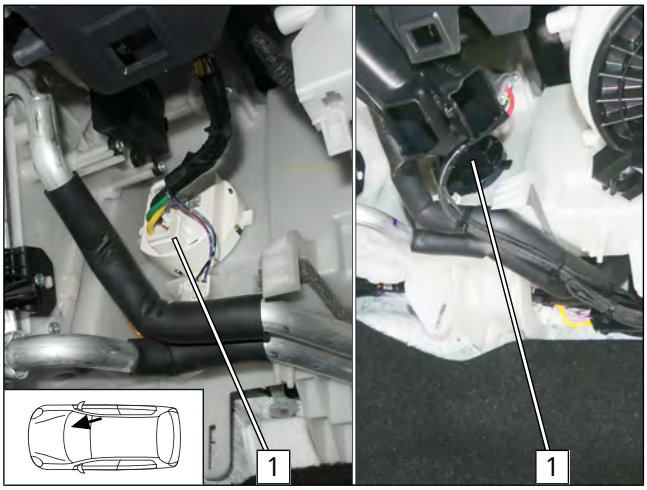
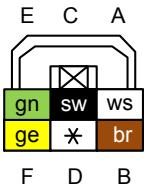


Fig. 175

The controller housing and the connector can be coloured differently. This is not relevant for the connection.

▶ The next steps are shown on a white variant.

1 6-pin connector:
- 0740-103 fan controller for AAC
- 0740-203 fan controller for AC



Locating, exposing and preparing wires

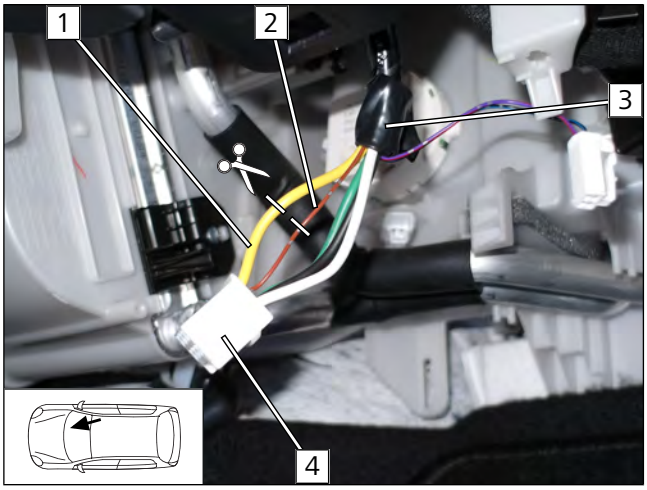


Fig. 176

Produce all following electrical connections as shown in the system wiring diagram.

▶ Remove insulation 3 around original vehicle wiring harness as shown. Cut wires as shown.

1 Yellow (ge) wire to fan controller/ pin F
2 Brown (br) wire to fan controller/ pin B
4 6-pin connector:
- 0740-103 fan controller for AAC
- 0740-203 fan controller for AC

View of wires

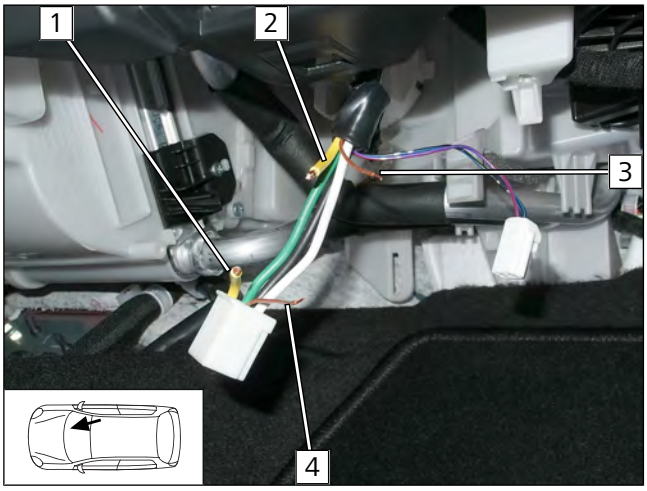


Fig. 177

1 Yellow (ge) wire to fan controller/ pin F
2 Yellow (ge) wire from fan relay/ pin C
3 Brown (br) wire from A/C control unit/ pin 1T/N
4 Brown (br) wire to fan controller/ pin B

Mounting male and female connectors

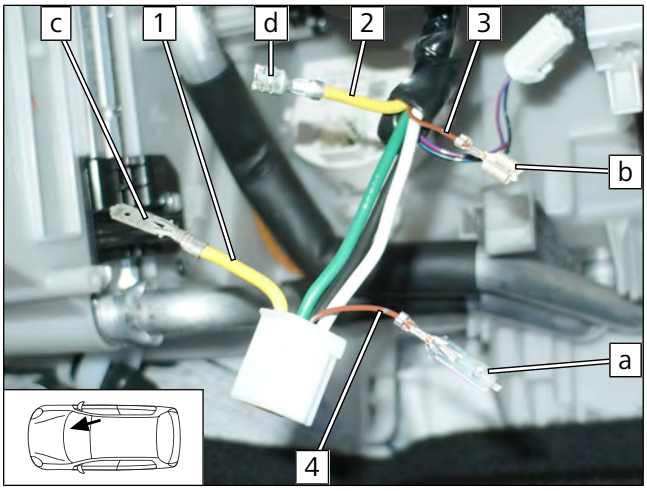


Fig. 178

1 Male connector c on yellow (ge) wire to fan controller/ pin F
2 Female connector d on yellow (ge) wire from fan relay/ pin C
3 Female connector b on brown (br) wire of A/C control unit/ pin 1T/N
4 Male connector a on brown (br) wire to fan controller/ pin B

Mount connector housing

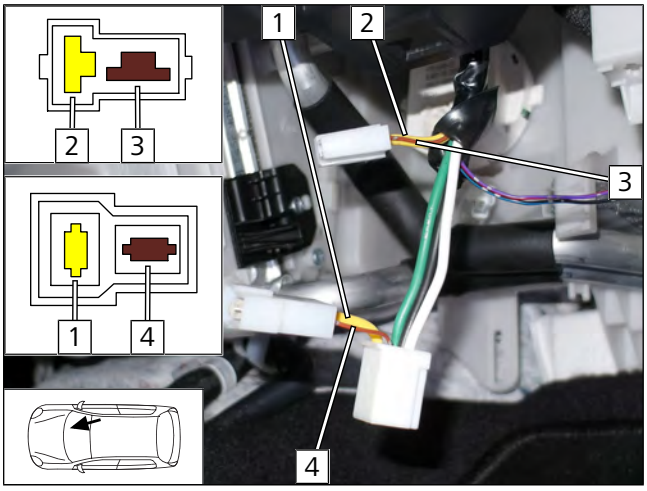


Fig. 179

1 Yellow (ge) wire to fan controller/ pin F
2 Yellow (ge) wire of fan relay/ pin C
3 Brown (br) wire of A/C control unit/ pin 1T/N
4 Brown (br) wire to fan controller/ pin B

Installing fan controller connector

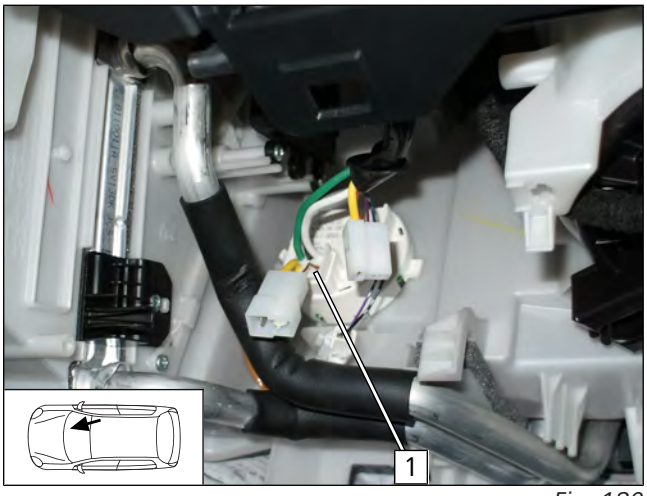


Fig. 180

1 6-pin connector:
- 0740-103 fan controller for AAC
- 0740-203 fan controller for AC

Connecting wiring harnesses

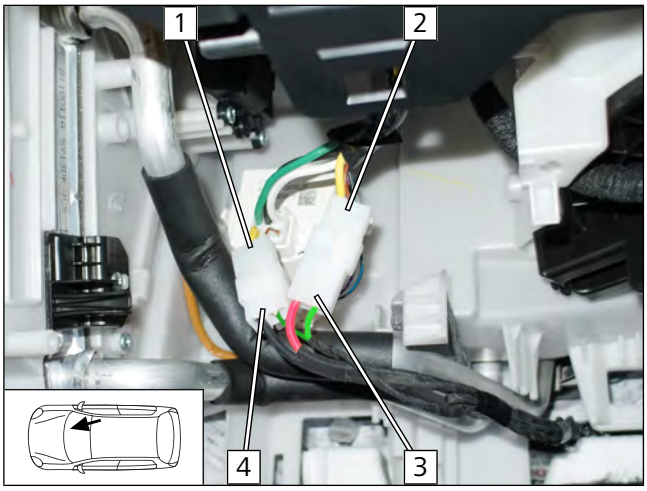


Fig. 181

1 Yellow and brown (ge and br) wire / fan controller

2 Yellow and brown (ge and br) wire / fan relay and A/C control unit

3 Red (rt) wire / K1/87a and green (gn) wire / PWM GW/ IN

4 Black (sw) wire / K1/30 and green/black (gn/sw) wire / PWM GW/ OUT

Routing wiring harnesses

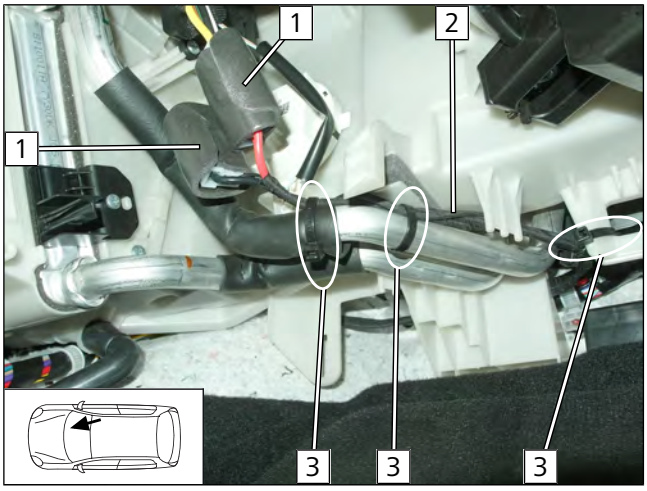


Fig. 182

▶ Wrap connector with self-adhesive foam 1.

2 Fan wiring harness and PWM control wiring harness

3 Cable tie

14 Electrical system of control elements

14.1 Remote option (Telestart), vehicles up to MY 2019

Preparing bracket

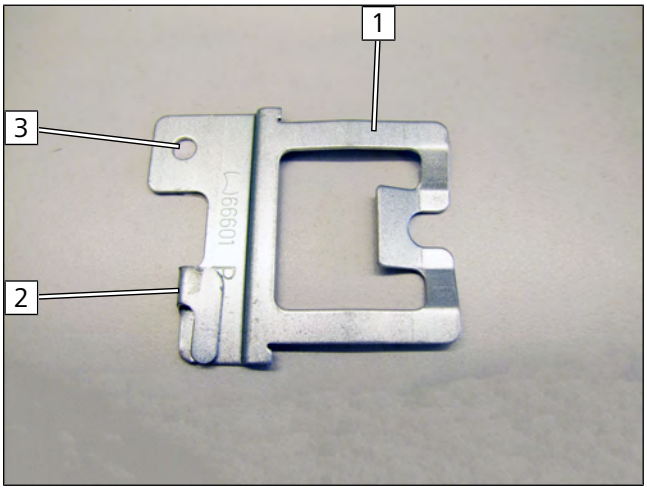


Fig. 183

- ▶ Bend tab 2 as shown.
- ▶ Drill out hole 3 to Ø 6.5.

1 Receiver bracket

Mounting receiver

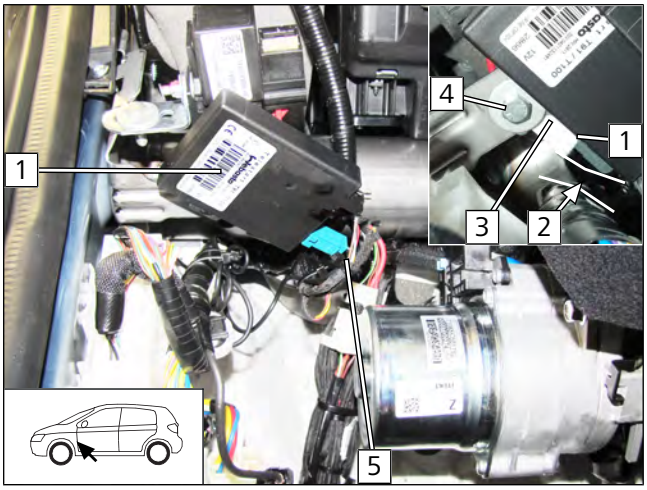


Fig. 184

Observe the Telestart installation documentation.

Ensure sufficient distance between bracket and original vehicle wiring harness at position 2, correct if necessary. Route Telestart wiring harness and aerial line 5 in a loop downwards.

1 Receiver mounted
3 Bracket
4 Original vehicle bolt (8-10Nm)

Mounting temperature sensor, only in case of T100 HTM

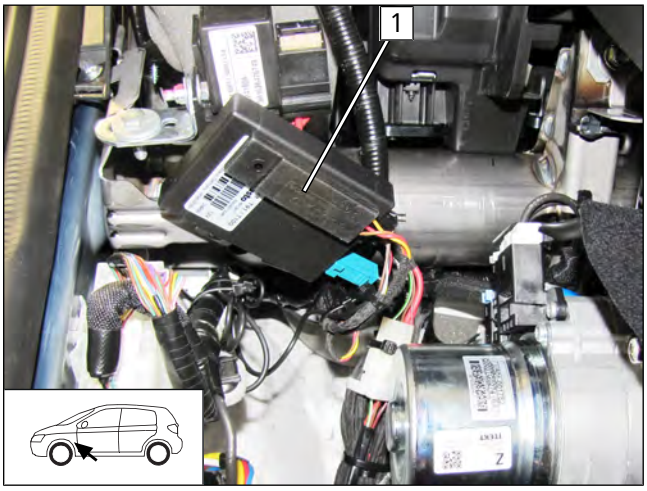


Fig. 185

- ▶ Fasten temperature sensor 1 using double-sided adhesive tape.

Mounting aerial

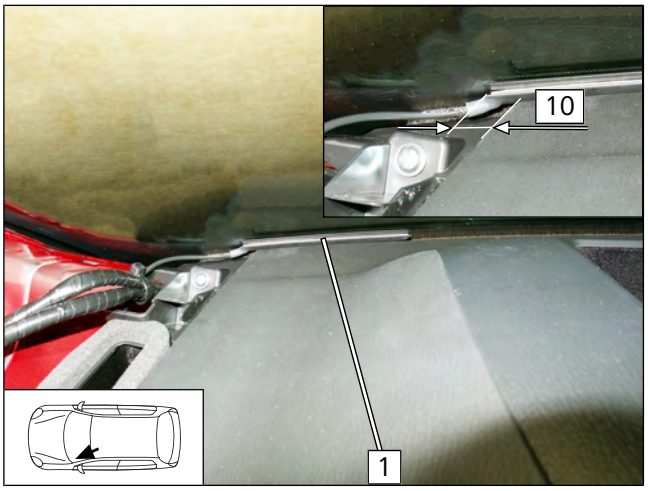


Fig. 186

1 Aerial

14.2 Remote option (Telestart), vehicles from MY 2020

Preparing bracket

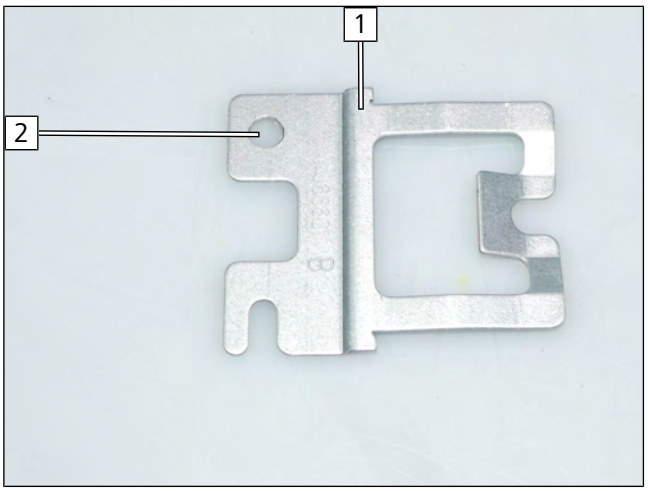


Fig. 187

▶ Drill out hole 2 to Ø 6.5.

1 Receiver bracket

Mounting receiver

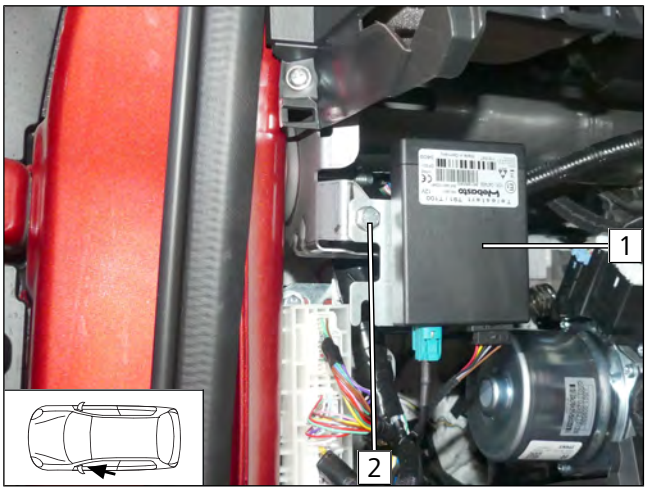


Fig. 188

Observe the Telestart installation documentation.

1 Premounted receiver

2 M6x20 bolt, spring lock washer, premounted bracket, original vehicle thread (8-10Nm)

Mounting temperature sensor, only in case of T100 HTM

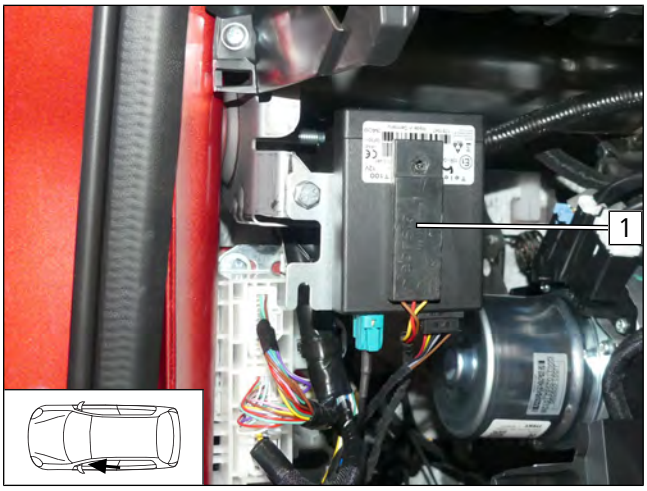


Fig. 189

▶ Fasten temperature sensor 1 using double-sided adhesive tape.

Mounting aerial

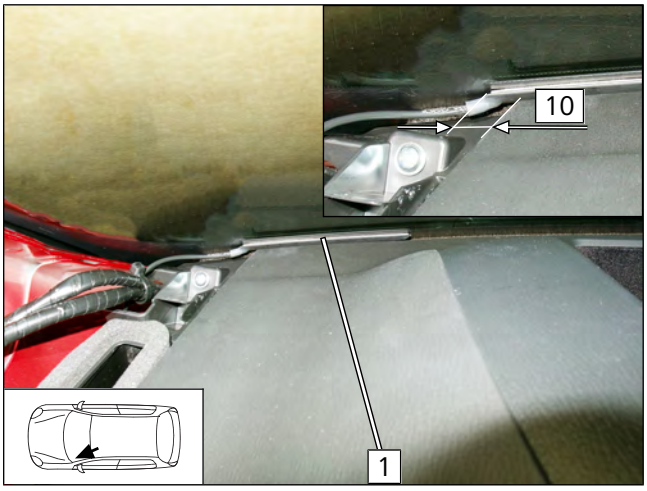


Fig. 190

1 Aerial

14.3 ThermoCall option

Detaching air shaft

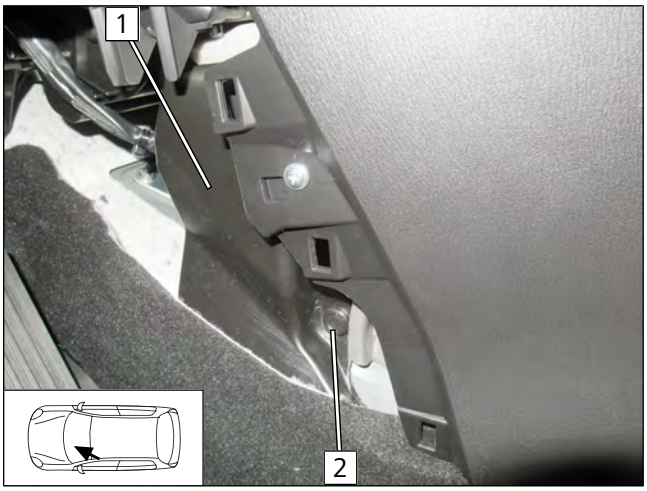


Fig. 191

1 Air shaft
2 Retaining clip

Mounting receiver

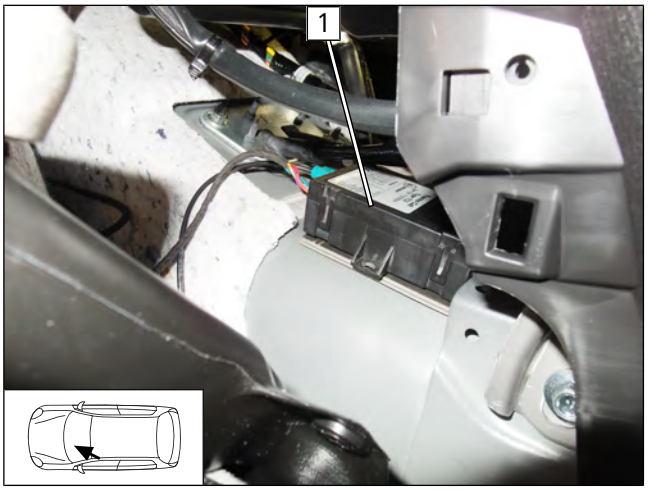


Fig. 192

Observe the ThermoCall installation documentation.

▶ Fasten receiver [1] with double-sided adhesive tape [1].

Mounting aerial (optional)

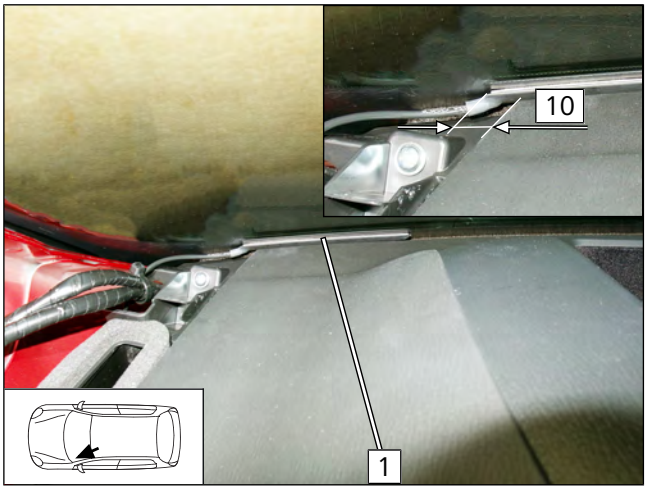


Fig. 193

[1] Aerial

15 Final work

15.1 Preparing Bumper

Detaching grey connector

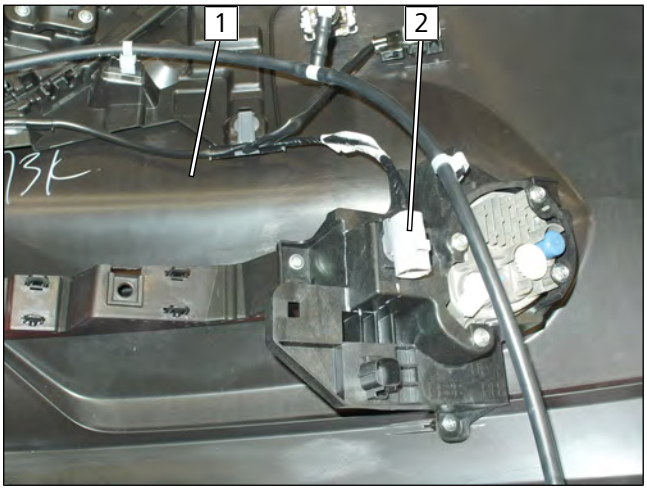


Fig. 194

Vehicles with front fog lights and front parking assistance

1 Bumper, right side

2 Grey connector C12 of parking assistance

Adapting housing

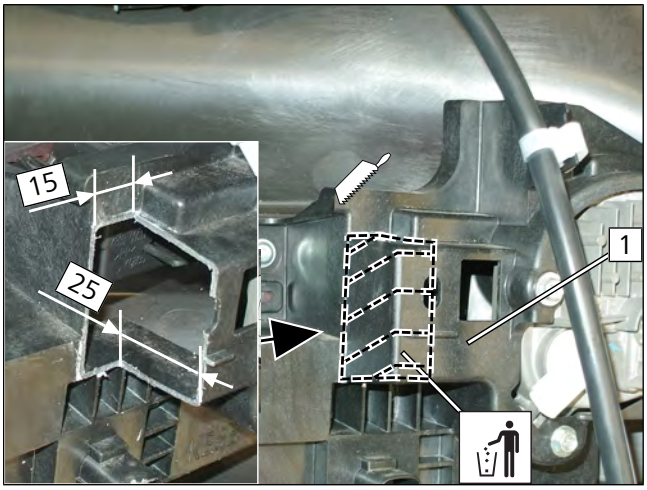


Fig. 195

1 Front fog light housing on the right side

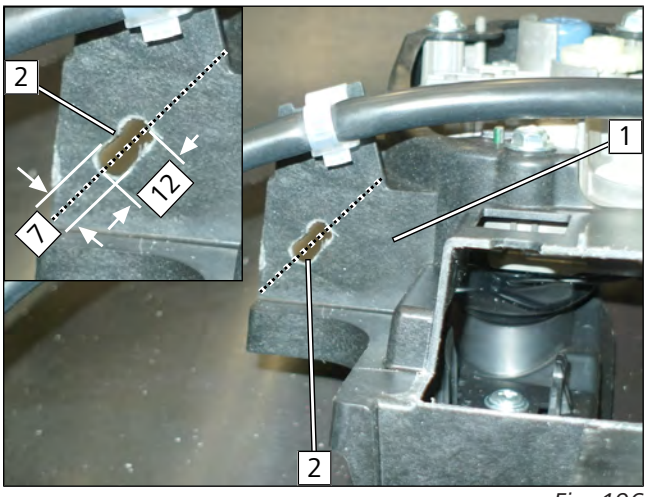


Fig. 196

▶ Drill oblong hole 2 centrally on the diagonal line as shown.

1 Front fog light housing on the right side

Installing grey connector

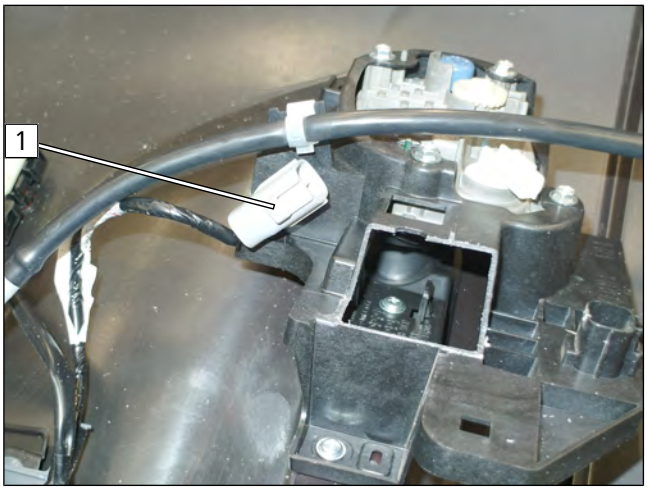


Fig. 197

▶ Install grey connector 1 in drilled oblong hole.

Sticking on heat protection film

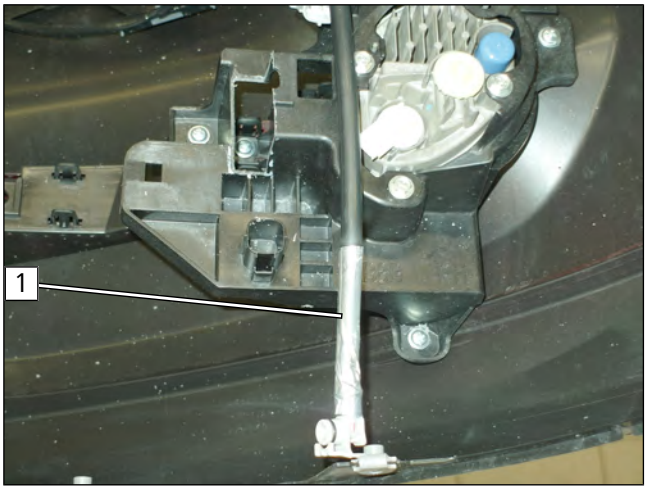


Fig. 198

▶ Stick heat protection film 1 around the hose of the headlight washer system pump.

Gluing foam

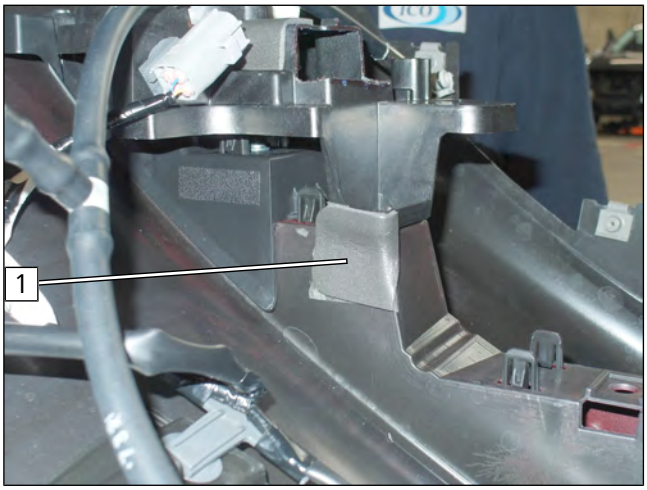


Fig. 199

▶ Glue self-adhesive foam 1 as shown.

Reinstalling connector

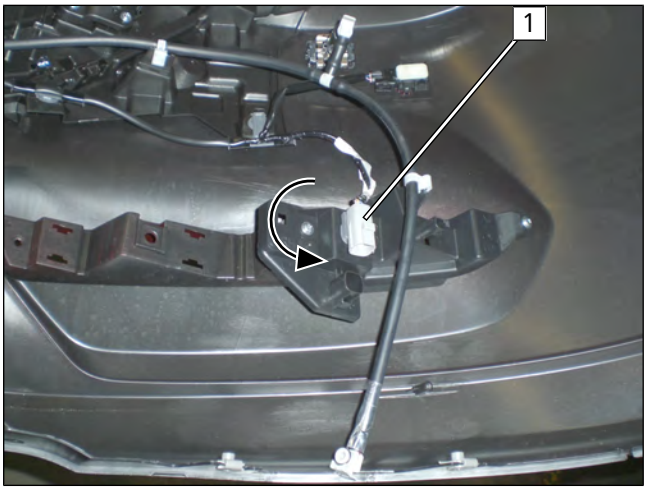


Fig. 200

Vehicles without front fog lights

▶ Detach front parking assistance connector (C-12) 1 (figure shows original position) from bumper, turn by 180° and reinsert.

15.2 Checking distances to exhaust system

Checking distance

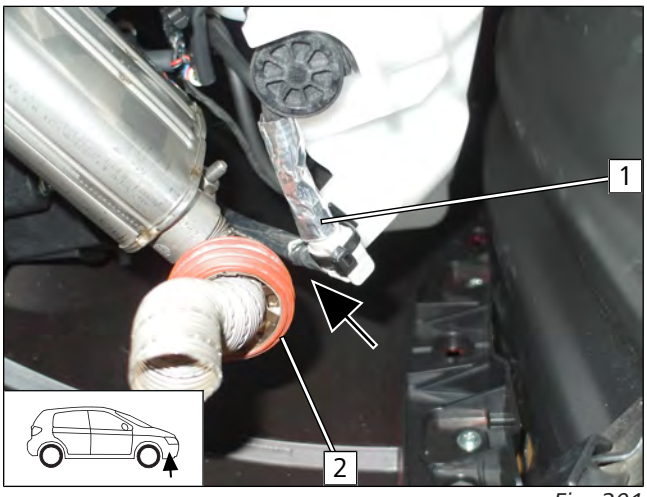


Fig. 201

▶ Install bumper.

▶ Align spacer bracket 2 with headlight washer system hose section 1.

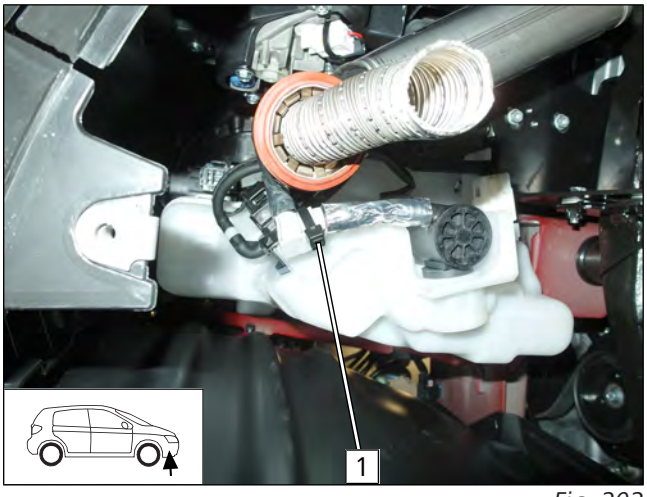


Fig. 202

▶ Tighten premounted clip-type cable tie 1 around hose section of headlight washer system.

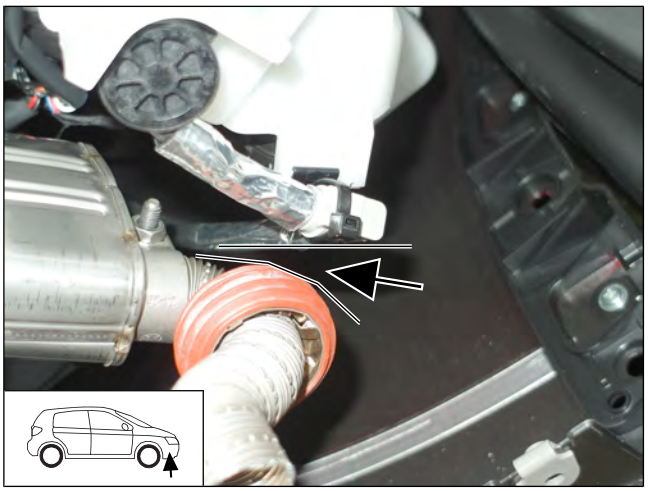


Fig. 203

Ensure sufficient distance from neighbouring components, correct if necessary.

>10

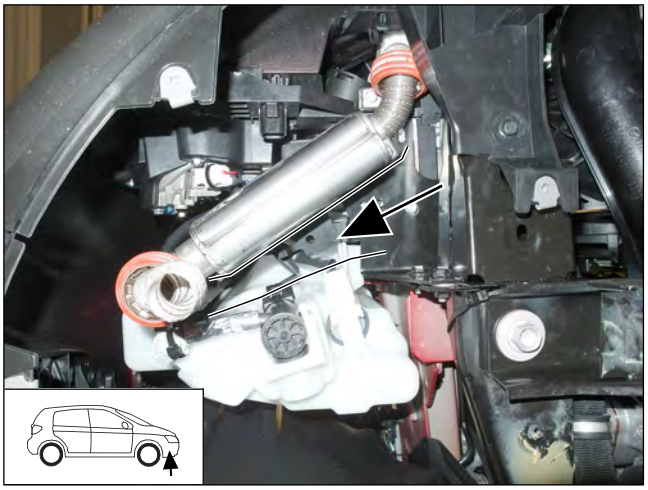


Fig. 204

Ensure sufficient distance between exhaust silencer and neighbouring components, correct if necessary.

>20

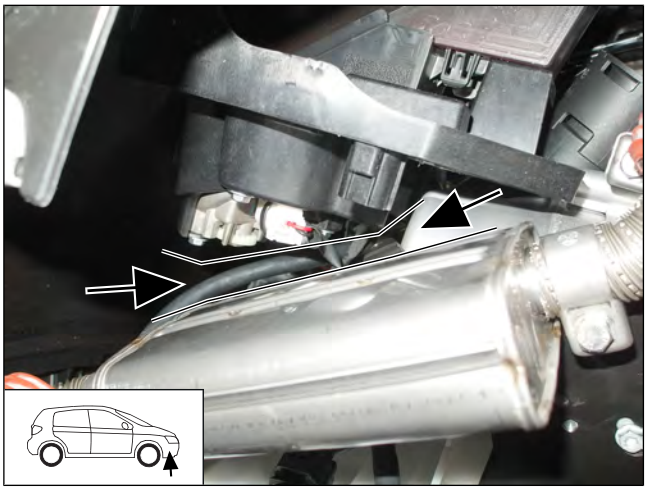


Fig. 205

Ensure sufficient distance between exhaust silencer and neighbouring components, correct if necessary.

>20

▶ Install white connector on front fog light (if present).

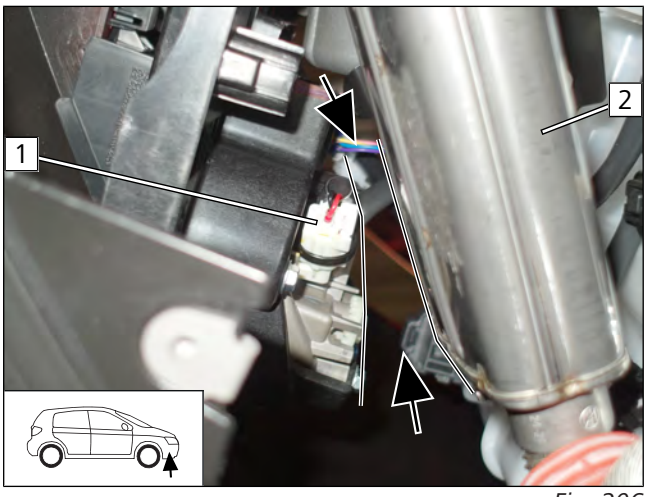


Fig. 206

Ensure sufficient distance between exhaust silencer 2 and neighbouring components, correct if necessary.

>20

1 White connector of front fog light

Mounting connector

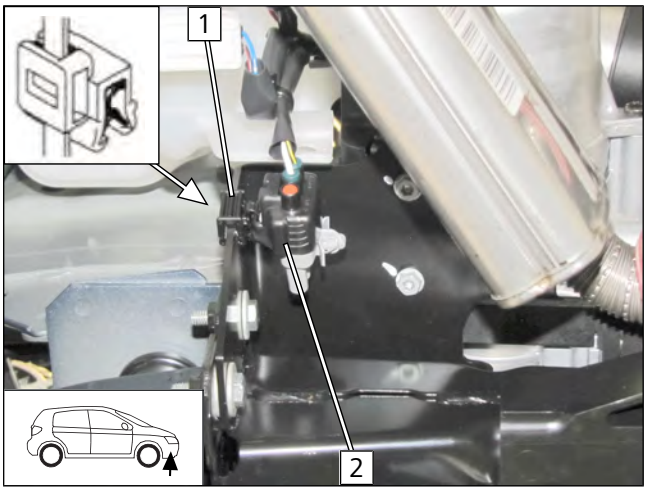


Fig. 207

Vehicles without headlight washer system

▶ Attach headlight washer system dummy plug 2, using clip-type cable tie 1, to heater bracket as shown.

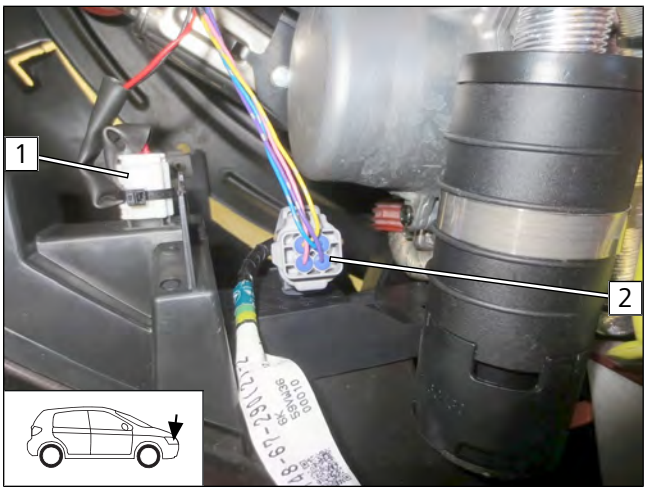


Fig. 208

Only necessary in case of vehicles without front fog lights.

Figure with headlight removed

1 Front fog light connector on dummy plug

2 Parking assistance connector (if present, turned by 180°)

Checking distance

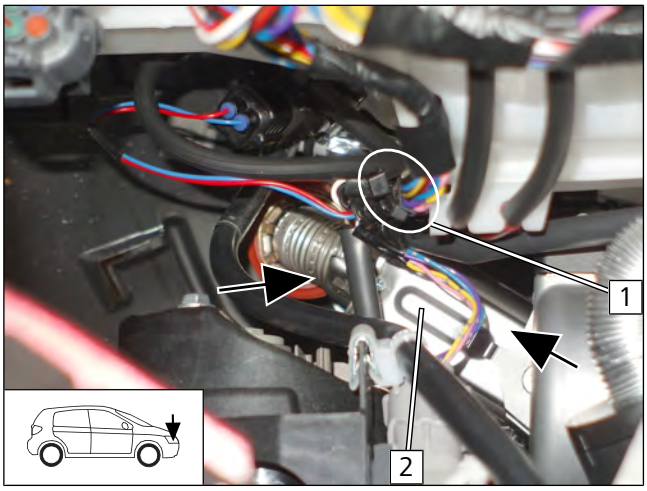


Fig. 209

all vehicles

Figure with headlight removed

Ensure sufficient distance between exhaust silencer 2 and neighbouring components, correct if necessary.

>20

▶ Attach front fog light and parking assistance wiring harnesses to original vehicle lines using cable tie 1.

15.3 Mounting exhaust end fastener

Work steps 1.1 and 3

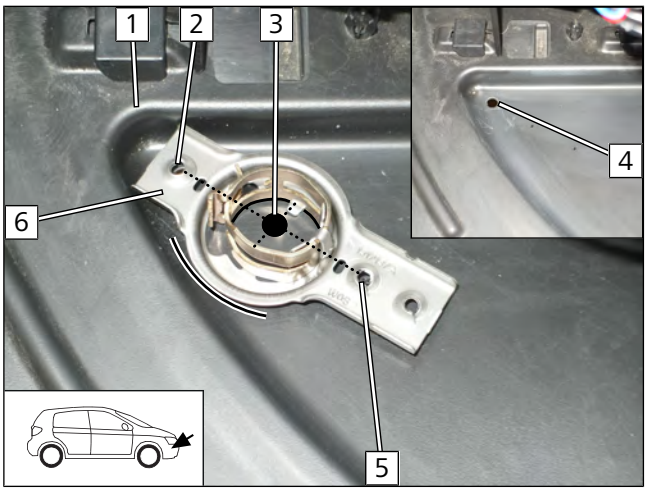


Fig. 210

Observe the EFIX installation instructions.

▶ Position exhaust end fastener 6 so that threaded hole 2 is exactly aligned with original vehicle hole 4 and with the edge of the wheel-well inner panel as shown.

3 Hole pattern for Ø43 hole

5 Hole pattern for Ø5 hole

Work steps 1.2 and 4

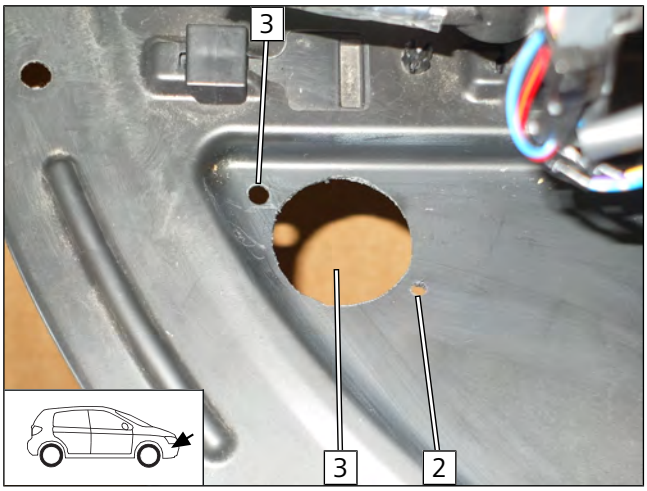


Fig. 211

1 Original vehicle hole

2 Ø5 hole

3 Ø42 hole

Work step 5

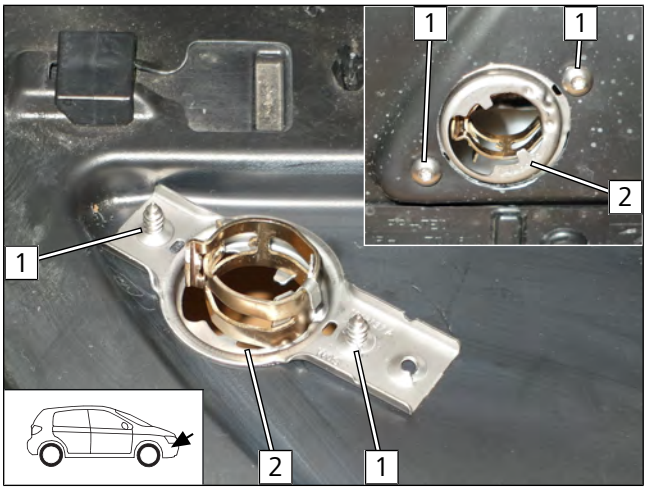


Fig. 212

1 5x13 self-tapping screw
2 Exhaust end fastener

Work steps 6 to 8

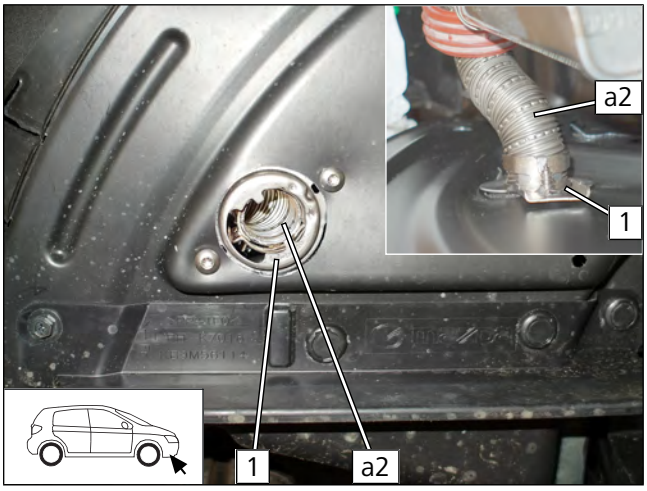


Fig. 213

Observe the EFIX installation instructions.

Ensure sufficient distance between exhaust silencer and neighbouring components, correct if necessary.

▶ Install wheel well trim 1 on the right side.

2 Exhaust end fastener
3 Cowl panel installed

15.4 Installing engine trim

Mounting lower engine trim

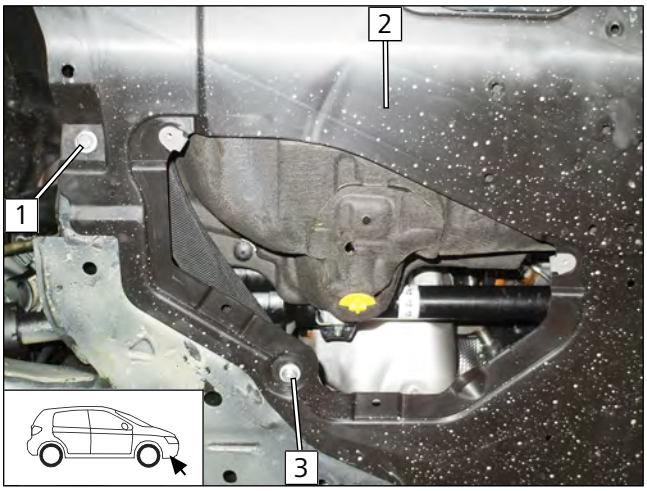


Fig. 214

Ensure sufficient distance as shown in the two following figures.

▶ Install M6x20 bolt, spring lockwasher, large diameter washer and angle bracket (premounted rubber-coated p-clamp) in position 1 (8-10Nm).

▶ Mount M6 flanged nut and large diameter washer on M6 bolt at position 3 (8-10Nm).

2 Engine trim

Checking distances

Fig. 215

Ensure sufficient distance between hoses Ⓖ and Ⓓ and oil pan trim 1, correct if necessary.

>20

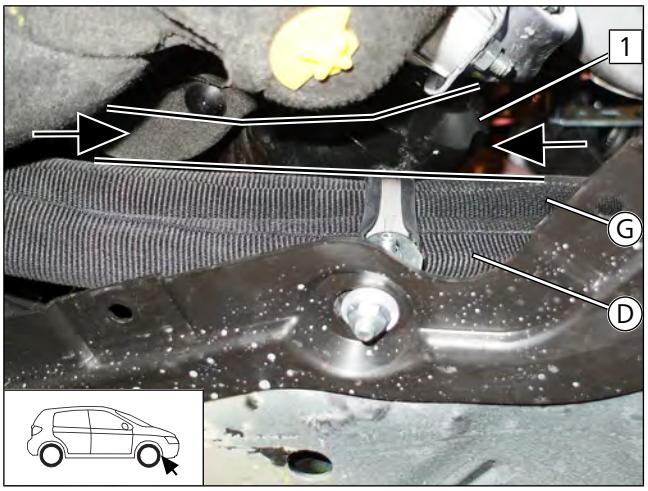


Fig. 216

Ensure sufficient distance between hoses Ⓖ and Ⓓ and cardan shaft 1, correct if necessary.

>20

15.5 Connection to positive battery terminal

Connection to positive battery terminal

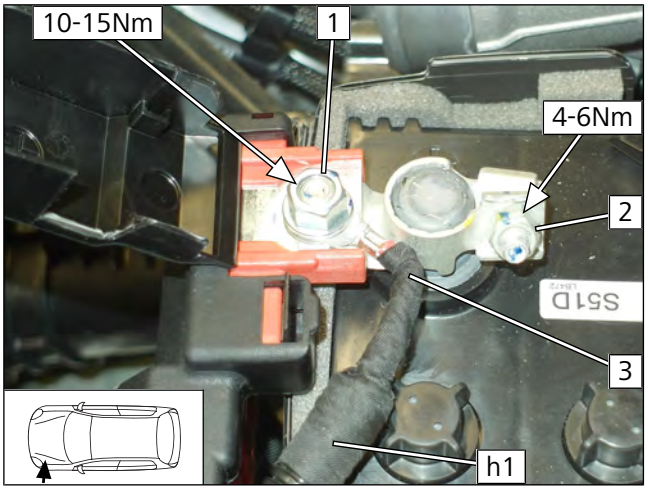


Fig. 217

DANGER

Observe tightening torque

The Fig. shows the installation situation. The battery is connected during the final work phase.

▶ Mounting battery.

1 Original vehicle flanged nut
2 Original vehicle bolt, positive battery terminal
3 Connect red (rt) wire to positive battery terminal, insulate

Adapting cover

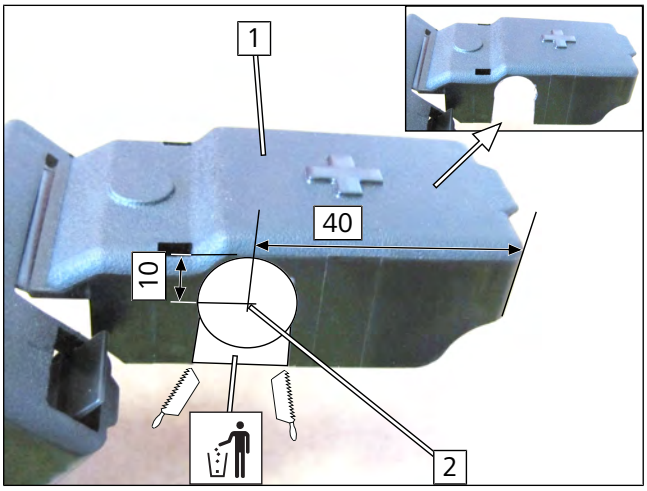


Fig. 218

- ▶ Drill a Ø12 hole in positive battery terminal cover [1] at position [2].
- ▶ In addition, remove the marked section as shown.

Installing cover

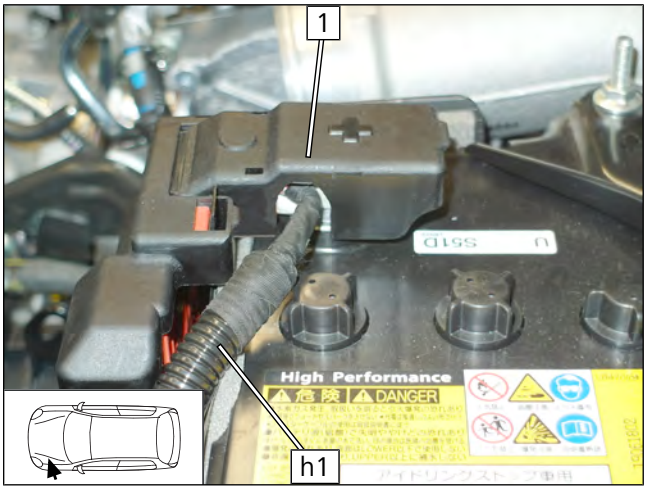
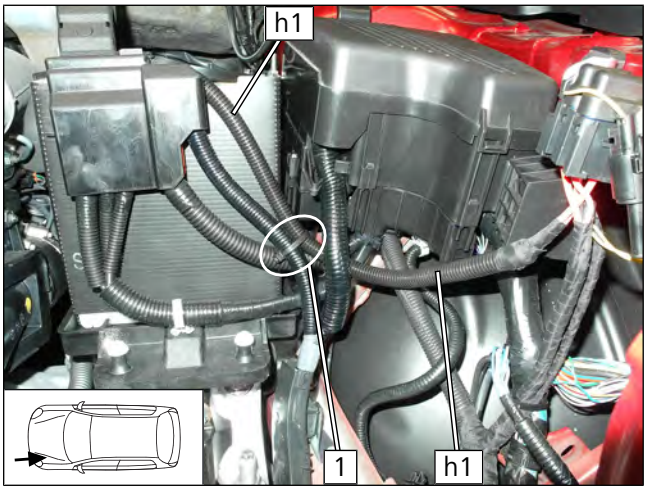


Fig. 219

[1] Cover of positive battery

Fastening corrugated tube [h1]



[1] Cable tie

16 General final work

Further information can be found in the (MESI) vehicle manufacturer's technical documentation.

- ▶ Mount removed parts in reverse order
- ▶ Mount instrument panel trim only after checking the PWM GW

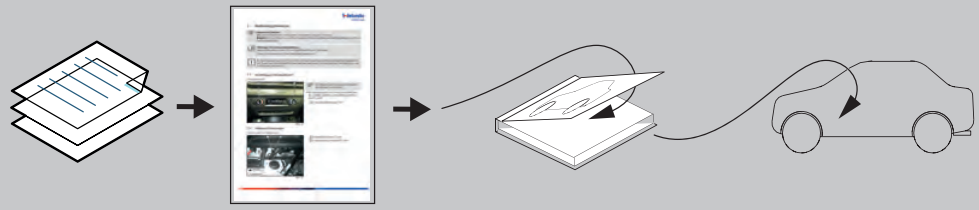
- ▶ Check all hoses, clamps and all electrical connections for firm seating
- ▶ Insulate and tie back loose lines
- ▶ Spray heater and electrical components with anti-corrosion wax (Mazda anti-corrosion wax)
- ▶ Connect the battery by performing/following the specified actions as per 'MESI REMOVING/ INSTALLING THE BATTERY [SKYACTIV-D2.2]'

Only use manufacturer-approved coolant.

- ▶ Fill and bleed the coolant circuit according to the vehicle manufacturer's specifications.

Further information can be found in the general installation and operating instructions of the Webasto components.

- ▶ Teach Telestart transmitter
- ▶ Make settings on A/C control panel according to the 'Operating Instructions'
- ▶ Initial start-up and function check



Check voltage in parking heating mode (see settings for end customers) at fan motor. Target value 4.8 - 5.6V (in driving mode, corresponds to approx. level 3). See the description below:

Measuring the voltage at the fan motor

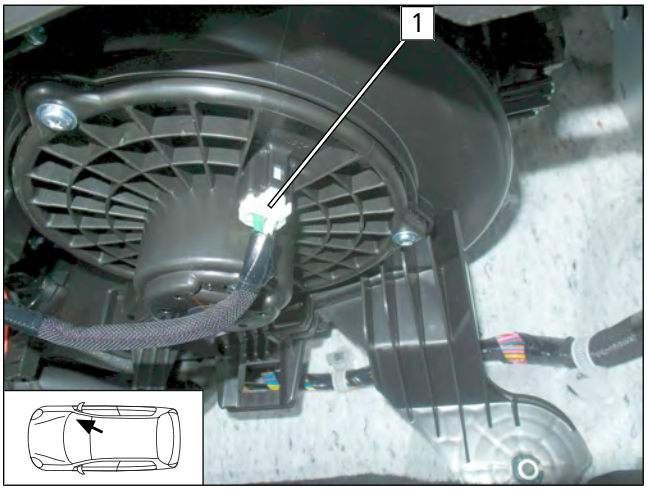
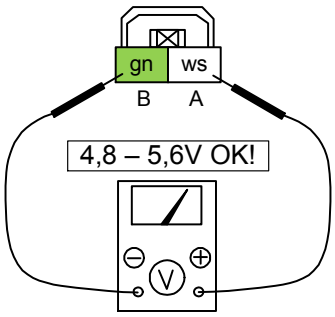


Fig. 220

Measure the voltage between the two pins.

1 2-pin connector:
- 0740-102 fan motor for AAC
- 0740-203 fan motor for AC



Only in case of deviations to the target value:
Adjust the PWM GW value for the duty cycle via the Webasto diagnosis in increments of 2% (see the following section 'Adjusting the Fan Speed').

17 Adjusting the fan speed

Thermo Test Diagnosis overview

Thermo Test Diagnosis, Mazda order no.: 4100-77-725* (software version V3.4 and higher); free update and support via: https://dealers.webasto.com;

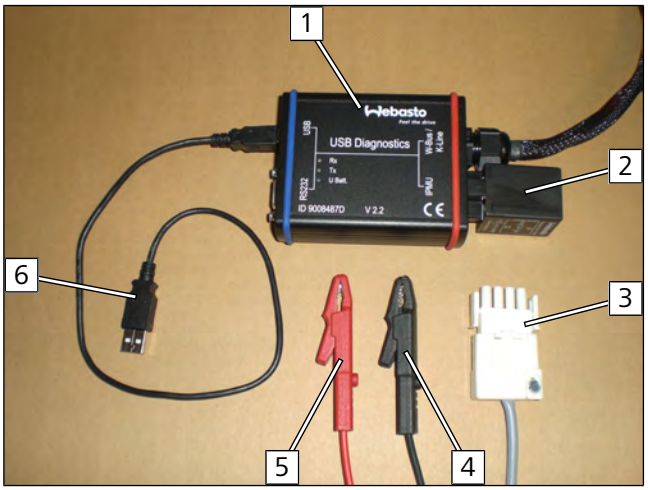


Fig. 221

1 Diagnosis Box
2 PWM GW
3 White (ws) connector not required
4 Connection to positive battery terminal
5 Connection to negative battery terminal
6 USB PC connection

Selecting PWM GW

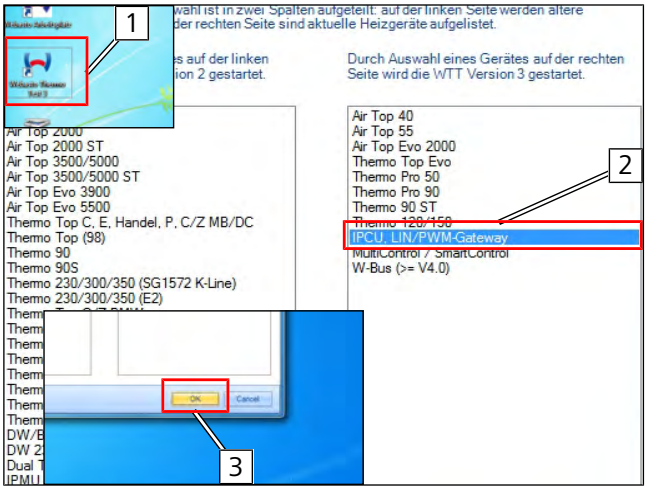


Fig. 222

▶ Establish all connections.

1 Start Webasto Thermo Test
2 'IPCU. LIN/PWM Gateway' selection
3 Confirm with 'OK'

Possible error message

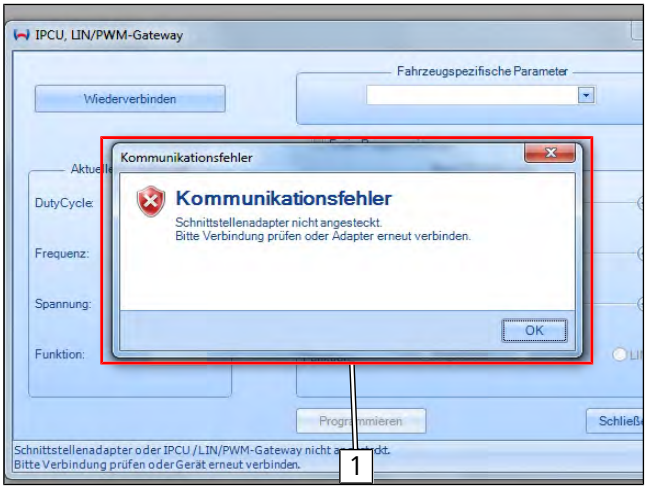


Fig. 223

▶ In the case of error message 'Communication error' 1, briefly interrupt the power supply to the diagnosis adapter and restart programming of the PWM GW.

Selecting ‘Free programming’

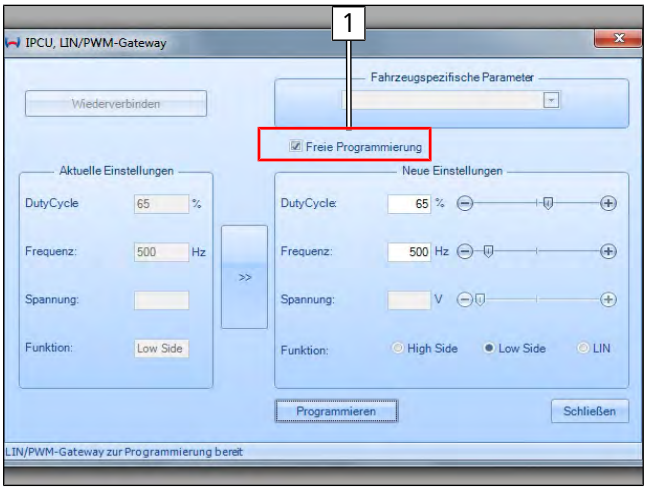


Fig. 224

1 Enable ‘Free programming’

Selecting duty cycle

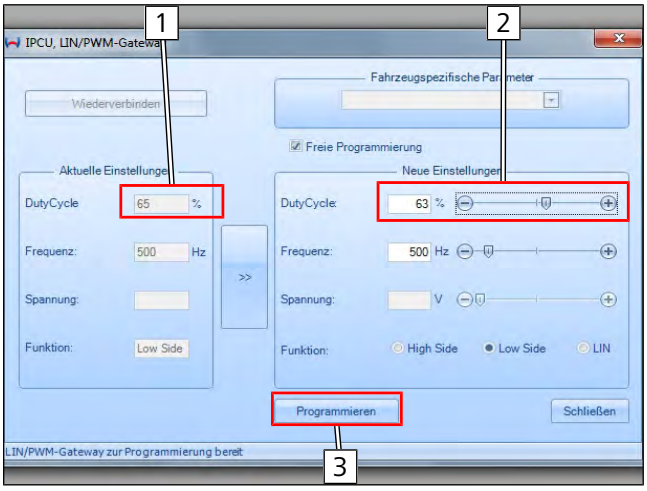


Fig. 225

Factory settings are shown on the left.

- ▶ Change duty cycle by 2%-increments.
  Enter the new value for the duty cycle on the right:
  - for speed increase - 2%
  - for speed reduction + 2%.
- ▶ Do not change the presettings for frequency and function.

1 Duty cycle 65% preset
2 Duty cycle 63% selected
3 Confirm ‘Program’

Programming PWM GW

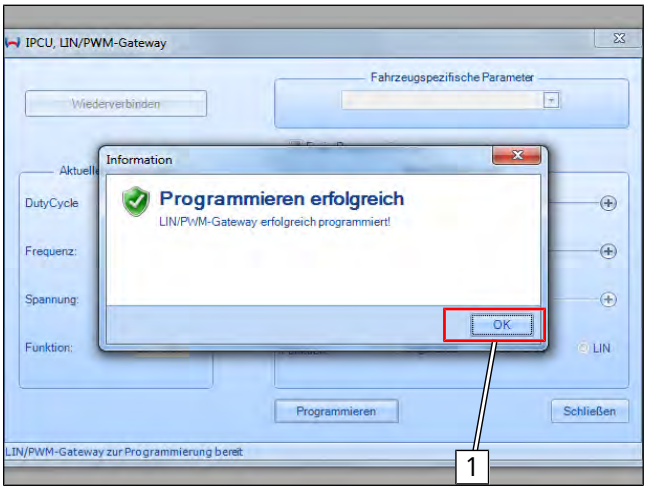


Fig. 226

1 Confirm with ‘OK’

Programming PWM GW

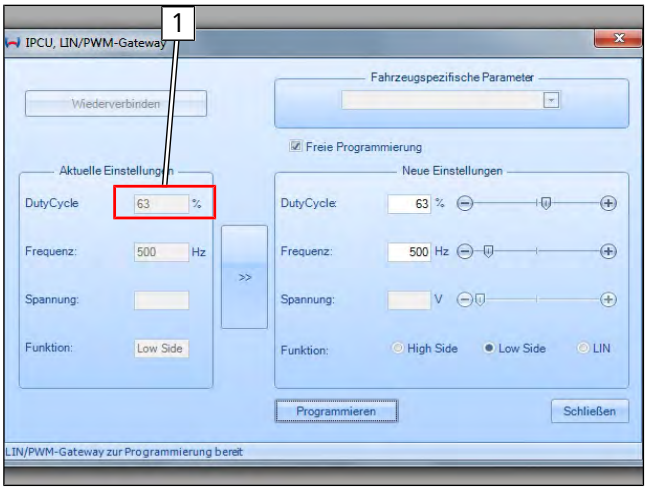


Fig. 227

The new settings are displayed on the left.

▶ Reselect the PWM GM diagnosis.
Install the PWM GW and recheck the voltage (target values 4.8 - 5.6V) via the fan motor connector. If values are different, perform further adjustments.

Performing a function check with the oscilloscope

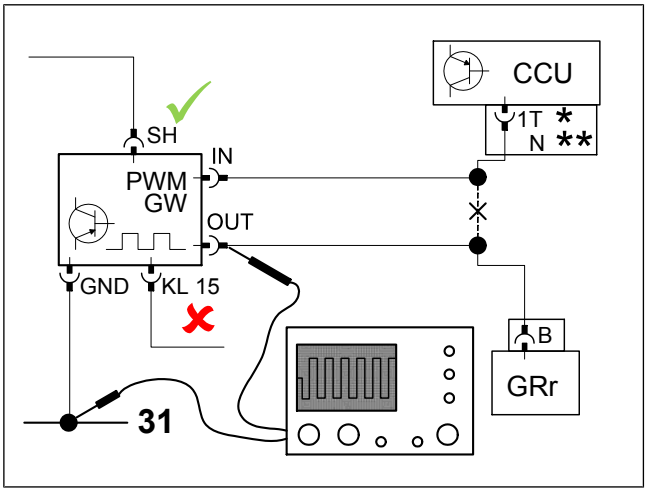
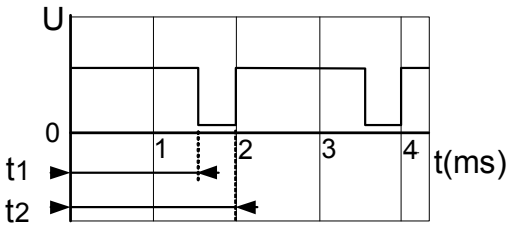


Fig. 228

▶ **Test state**:
- Heating: **ON**
- Coolant temperature: > 55 °C
- Ignition: **OFF**



Duty Cycle = t1 / t2 x 100 = 65% (or adjusted value)

Frequency = 1 / t2 = 500 Hz

These are the original instructions. The German language is binding.
You can request your language if it is missing. The telephone number of each country can be found in the Webasto service centre leaflet or the website of the respective Webasto representative of your country.

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Webasto Thermo & Comfort SE
Postfach 1410
82199 Gilching
Germany

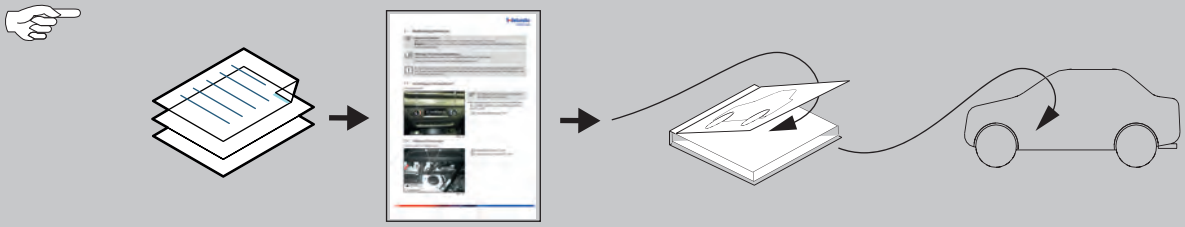
Company address:
Friedrichshafener Str. 9
82205 Gilching
Germany

Technical Extranet: https://dealers.webasto.com

CE

WWW.WEBASTO.COM

18 Operating instructions for manual air-conditioning



The heater works independently of the engine in conjunction with the original vehicle heating and ventilation system and can be operated with the vehicle either parked or in driving mode. The heater is supplied with fuel from the vehicle fuel tank. As a result, the maximum range displayed by the instrument cluster may be different before and after operation of the heater. To protect the vehicle battery, we recommend that the heater is not operated several times in succession without the battery having the opportunity to recharge during driving mode.

Information on i-stop:

The i-stop function is disabled if battery power is low. As a result, the time until automatic switch-off function of the engine may be longer according to parking heater operation. This is not a malfunction. Depending on the vehicle use, it may be necessary to charge the vehicle battery occasionally.

Information regarding the heating time:

We recommend matching the heating time to the driving time (heating time = driving time)
Example: for a driving time of approx. 20 min. (in one direction), we recommend not exceeding a switch-on time of 20 min.

Note for parking heater function

Your vehicle is equipped with a passenger compartment and engine preheating unit.

18.1 Settings on manual air-conditioning control panel

Manual air-conditioning control panel

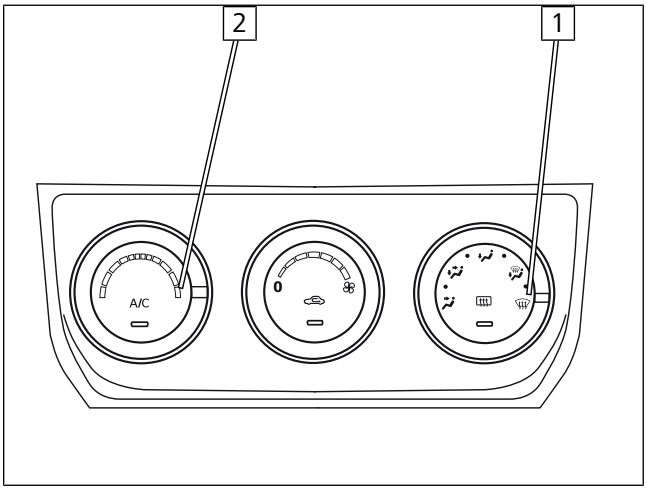


Fig. 229

Before parking the vehicle, make the following settings:

1 Air outlet to windscreen
2 Set temperature to ‘max.’

Setting the fan speed is not required, it will automatically be set to approx. 1/3.

18.2 Installation location of fuses

Fuses in engine compartment

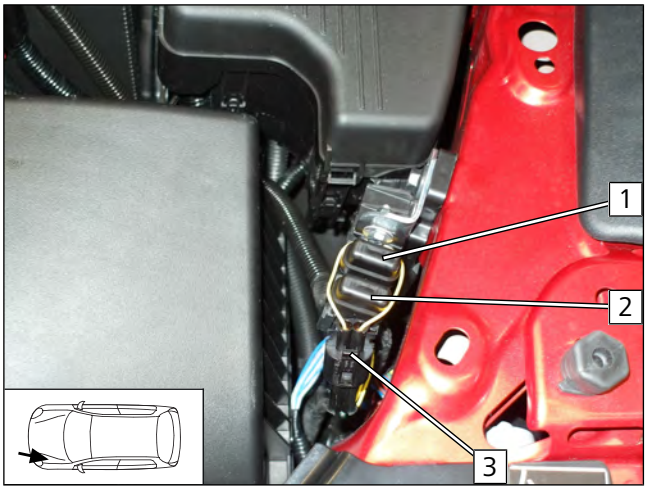


Fig. 230

1 F2 - 30A main fuse of passenger compartment
2 F1 – 20A heater main fuse
3 Heater diagnosis connection

Fuses in passenger compartment

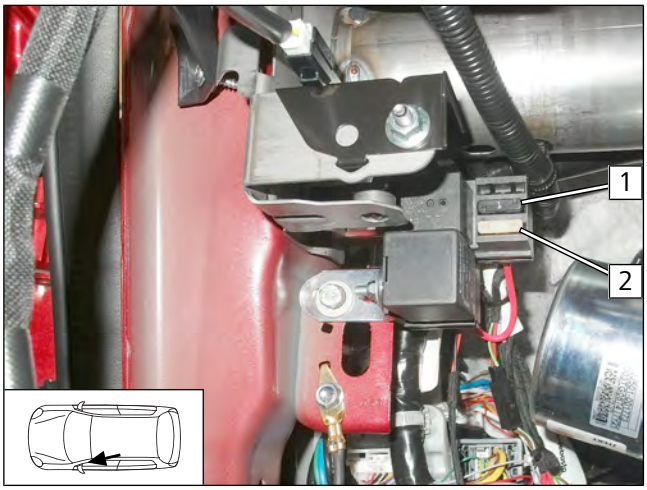


Fig. 231

Vehicles up to MY 2019

1 F3 - 1A control element fuse
2 F4 - 25A fan controller fuse

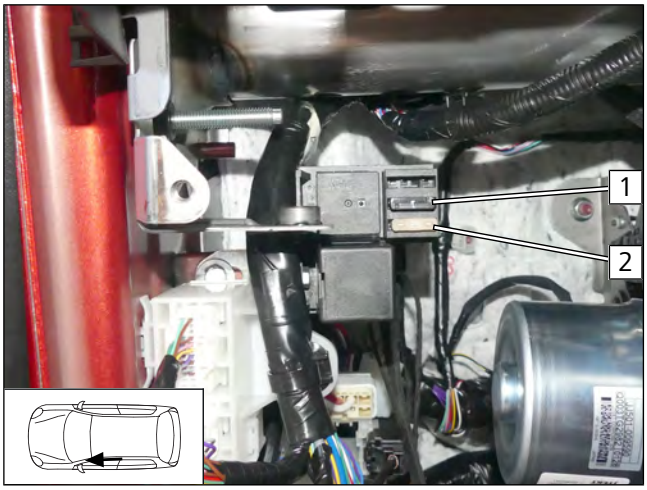
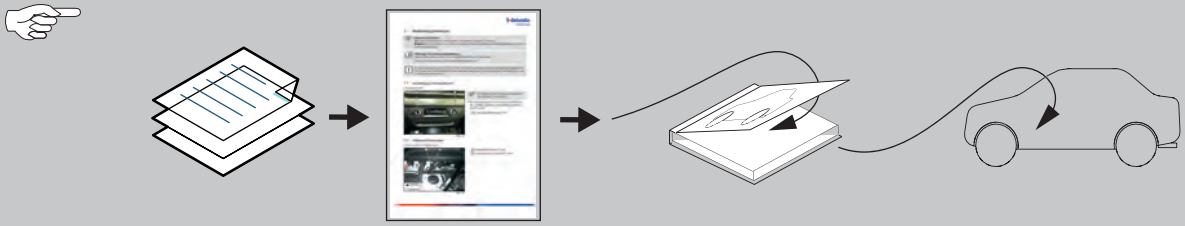


Fig. 232

Vehicles from MY 2020

1 F3 - 1A control element fuse
2 F4 - 25A fan controller fuse

19 Operating instructions for automatic air-conditioning, vehicles up to MY 2019



The heater works independently of the engine in conjunction with the original vehicle heating and ventilation system and can be operated with the vehicle either parked or in driving mode. The heater is supplied with fuel from the vehicle fuel tank. As a result, the maximum range displayed by the instrument cluster may be different before and after operation of the heater. To protect the vehicle battery, we recommend that the heater is not operated several times in succession without the battery having the opportunity to recharge during driving mode.

Information on i-stop:

The i-stop function is disabled if battery power is low. As a result, the time until automatic switch-off function of the engine may be longer according to parking heater operation. This is not a malfunction. Depending on the vehicle use, it may be necessary to charge the vehicle battery occasionally.

Information regarding the heating time:

We recommend matching the heating time to the driving time (heating time = driving time)
Example: for a driving time of approx. 20 min. (in one direction), we recommend not exceeding a switch-on time of 20 min.

Note for parking heater function

Your vehicle is equipped with a passenger compartment and engine preheating unit.

19.1 Settings on automatic air-conditioning control panel

Automatic A/C control panel

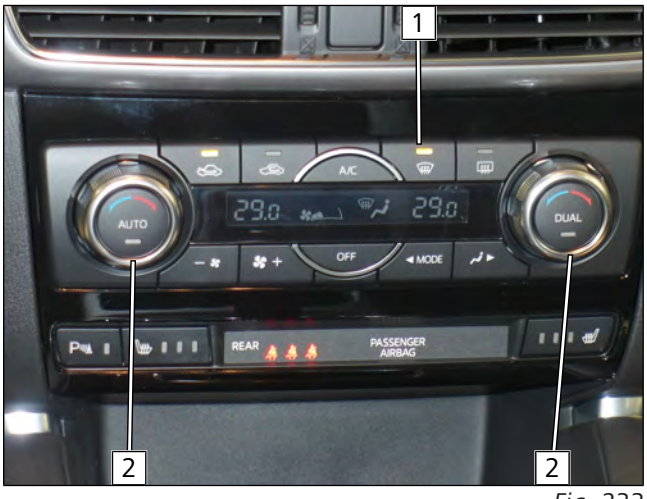


Fig. 233

Before parking the vehicle, make the following settings:

1 Air outlet to windscreen
2 Temperature on both sides to 'max.'

Setting the fan speed is not required, it will automatically be set to approx. 1/3.

19.2 Installation location of fuses

Fuses in engine compartment

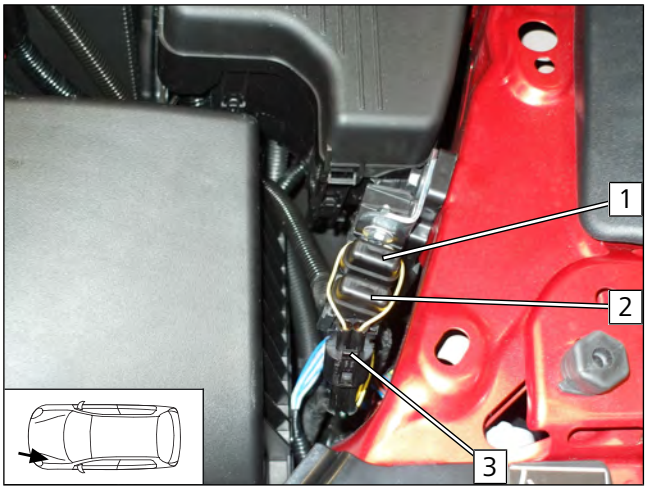


Fig. 234

1 F2 - 30A main fuse of passenger compartment
2 F1 – 20A heater main fuse
3 Heater diagnosis connection

Fuses in passenger compartment

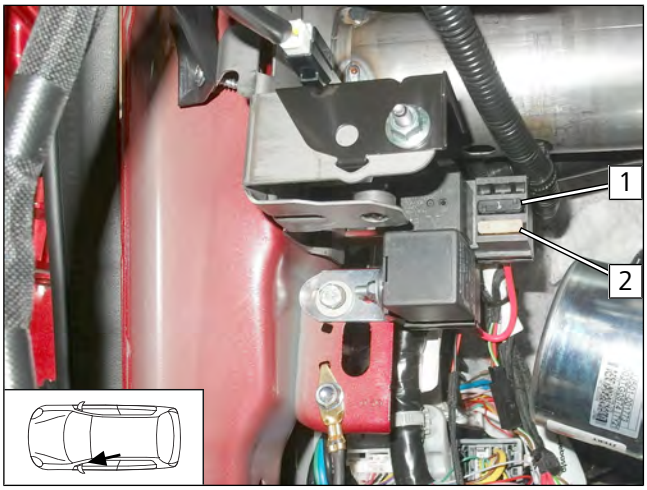
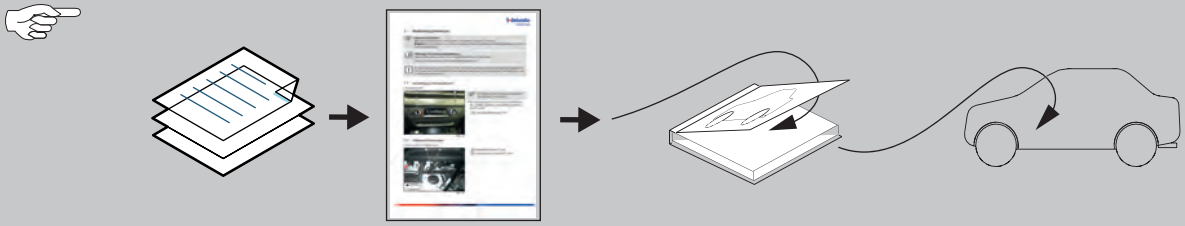


Fig. 235

1 F3 - 1A control element fuse
2 F4 - 25A fan controller fuse

20 Operating instructions for automatic air-conditioning, vehicles from MY 2020



The heater works independently of the engine in conjunction with the original vehicle heating and ventilation system and can be operated with the vehicle either parked or in driving mode. The heater is supplied with fuel from the vehicle fuel tank. As a result, the maximum range displayed by the instrument cluster may be different before and after operation of the heater. To protect the vehicle battery, we recommend that the heater is not operated several times in succession without the battery having the opportunity to recharge during driving mode.

Information on i-stop:

The i-stop function is disabled if battery power is low. As a result, the time until automatic switch-off function of the engine may be longer according to parking heater operation. This is not a malfunction. Depending on the vehicle use, it may be necessary to charge the vehicle battery occasionally.

Information regarding the heating time:

We recommend matching the heating time to the driving time (heating time = driving time)
Example: for a driving time of approx. 20 min. (in one direction), we recommend not exceeding a switch-on time of 20 min.

Note for parking heater function

Your vehicle is equipped with a passenger compartment and engine preheating unit.

20.1 Settings on automatic air-conditioning control panel

Automatic A/C control panel

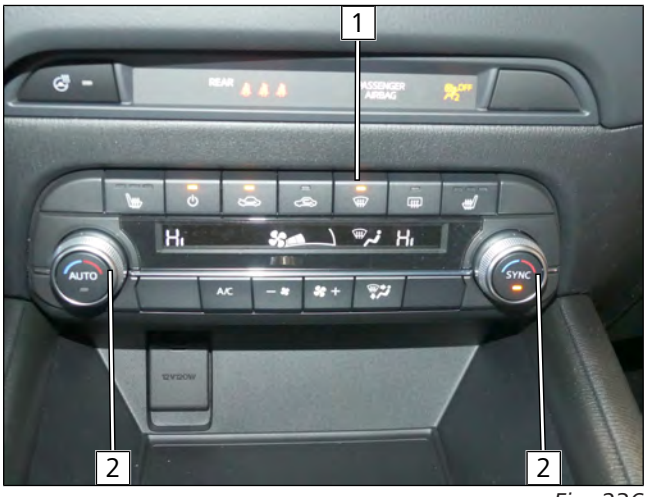


Fig. 236

Before parking the vehicle, make the following settings:

1 Air outlet to windscreen
2 Temperature on both sides to 'max.'

Setting the fan speed is not required, it will automatically be set to approx. 1/3.

20.2 Installation location of fuses

Fuses in engine compartment

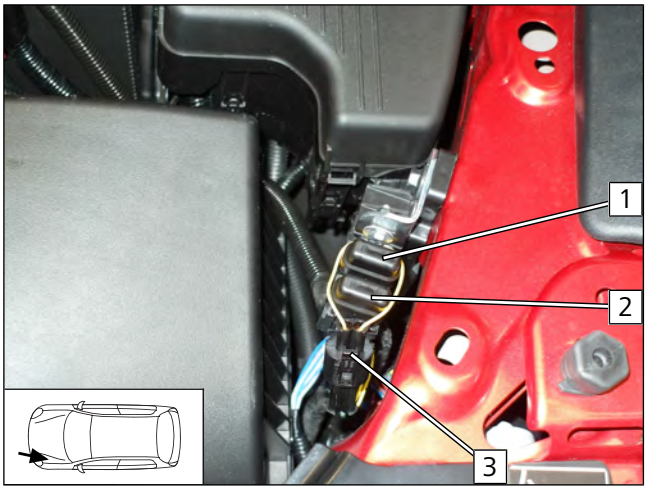


Fig. 237

1 F2 - 30A main fuse of passenger compartment
2 F1 – 20A heater main fuse
3 Heater diagnosis connection

Fuses in passenger compartment

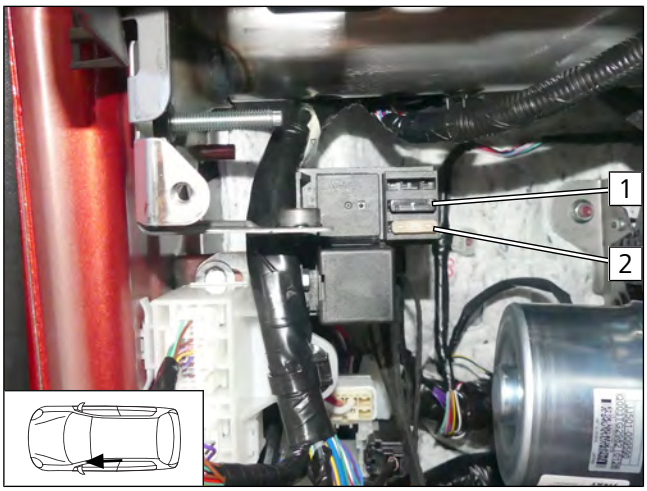


Fig. 238

1 F3 - 1A control element fuse
2 F4 - 25A fan controller fuse