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Installation documentation

for Thermo Top Evo water heater

'Island' coolant circuit without 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]	Displace-ment [cm³]	Engine code
2.0P	Petrol	Euro 6d Temp	6-speed SG	118	1998	PE
2.0P	Petrol	Euro 6d Temp	6-speed AG	118	1998	PE
2.0P	Petrol	Euro 6d Temp	6-speed SG	121	1998	PE
2.0P	Petrol	Euro 6d Temp	6-speed AG	121	1998	PE
2.5P	Petrol	Euro 6d Temp	6-speed AG	143	2488	PY

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

Total installa-tion time	Note
8.0 hours	

Contents

1 List of abbreviations

AG	Automatic transmission
DP	Fuel pump
EFIX	Exhaust end fastener
EPT	Telestart receiver
FF	FuelFix (tank extracting device)
Fig.	Figure
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 4 Petrol	4100-78-807
Installation kit for Mazda CX5 and M6 2018 petrol	4100-78-832
In case of Telestart, control element, as well as indicator lamp in consultation with end customer	MAZDA ACCESSORY BASE

2.3 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

We recommend:

– installing a Thermo Top Evo 4. The heater is integrated into the coolant circuit as an ‘island’ and heats up the vehicle passenger compartment. There is no engine pre-heating.

2.4 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.

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

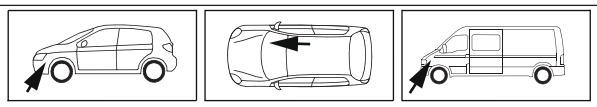
3.4.3 Work step identification marks

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

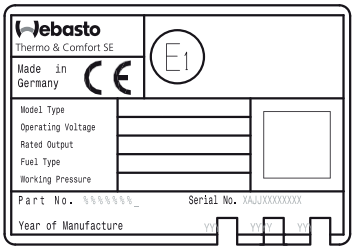
5.1 Heater preparation

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 upper engine cover . See MESI 'ENGINE COVER REMOVAL/ INSTALLATION'
- Completely remove the air filter and housing. See MESI 'INTAKE-AIR SYSTEM REMOVAL/ INSTALLATION'
- Remove the lower engine cover. See MESI 'FRONT UNDER COVER No.2 REMOVAL/ INSTALLATION'
- Remove underbody trim No.1 and 2. See MESI 'FLOOR UNDER COVER REMOVAL/ INSTALLATION'
- Remove the middle underride protection (heat shield plate). See MESI 'EXHAUST SYSTEM 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 'DASHBOARD UNDER COVER REMOVAL/ INSTALLATION'
- Remove the glove box. See MESI 'GLOVE COMPARTMENT REMOVAL/ INSTALLATION'
- Remove the A-pillar trim on the left. See MESI 'REMOVING/INSTALLING THE A-PILLAR TRIM'.
- 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'

6 Installation overview

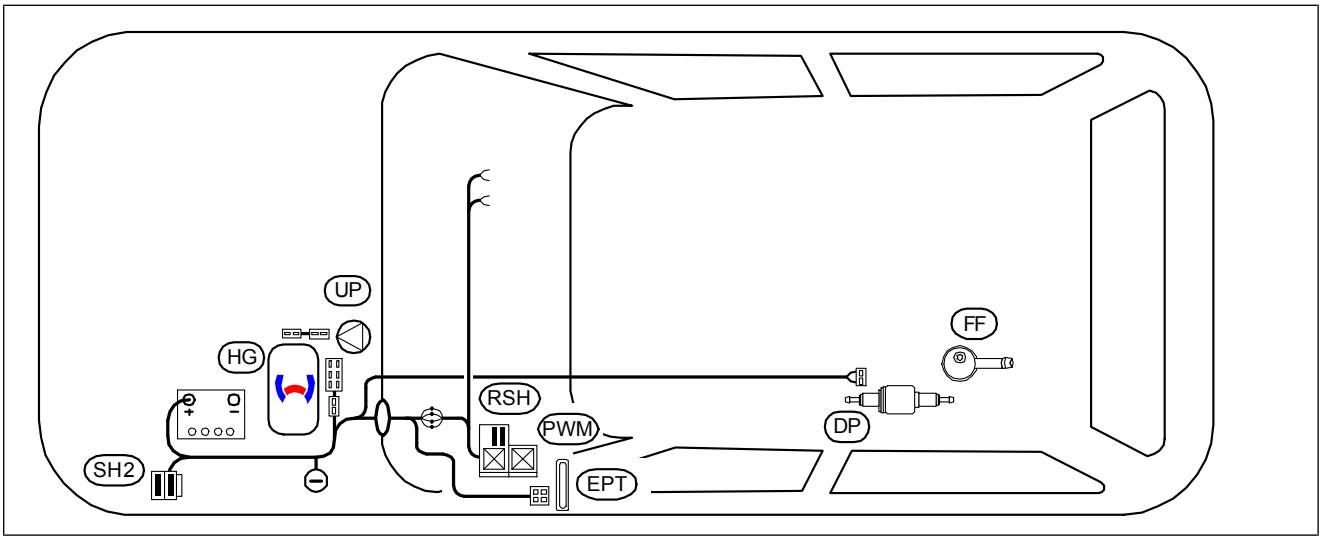


Fig. 3

Legend to installation overview

Abbreviation	Component
DP	Fuel pump
EPT	Telestart receiver
FF	FuelFix
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

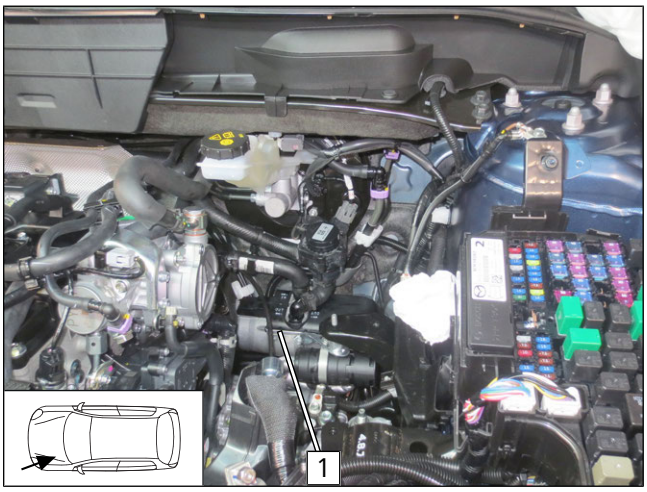


Fig. 4

Fig. shows a vehicle with automatic transmission.

1 Heater

7 Electrical system, general

7.1 Premounting wiring harness

Cutting fuel line to length

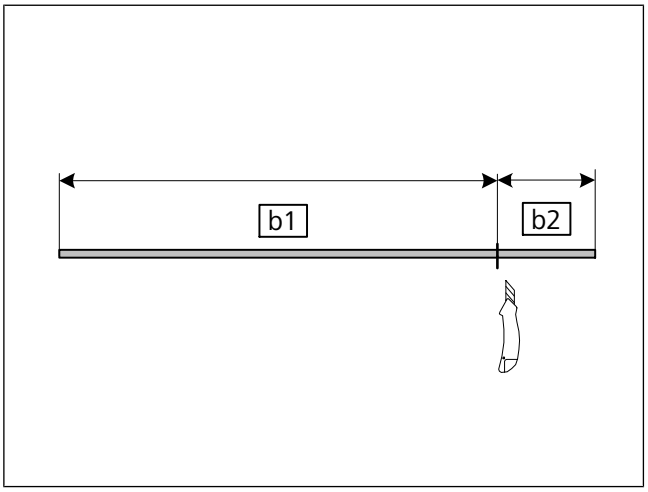


Fig. 5

	Length	Used for
b1	4500	Connection between heater and fuel pump
b2	500	Connection between fuel pump and tank extracting device

Cutting corrugated tubes to length, slitting corrugated tube h5

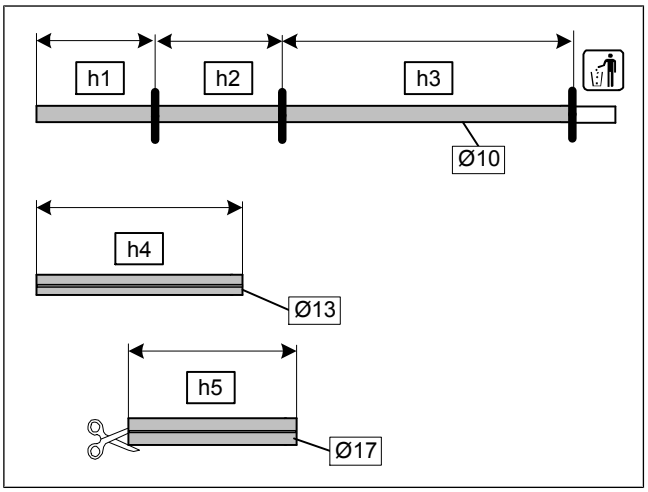


Fig. 6

	Length	Used for
h1	400	Red (rt) wire of battery +
h2	450	Fuel line b2 from tank extracting device to fuel pump
h3	1050	Fuel line b1 from heater, fuel pump wiring harness
h4	500	Heater wiring harness to engine compartment fuse holder
h5	350	Fuel line b1, heater wiring harness and coolant pump

General view of wiring harness and wiring allocation

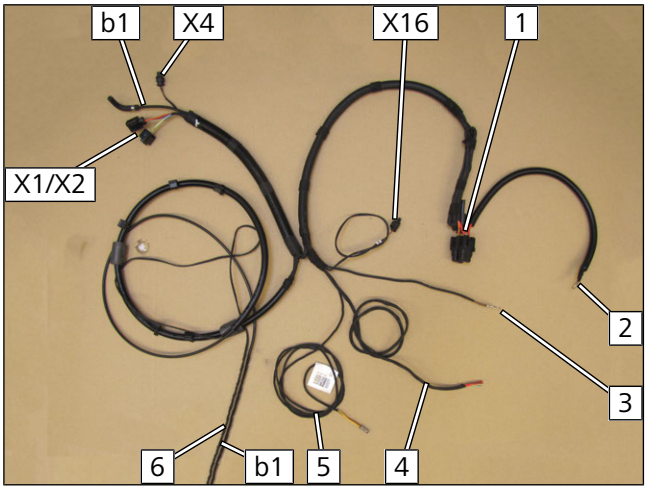


Fig. 7

- 1 Fuse holder of engine compartment
- 2 Red (rt) wire from B+
- 3 Earth wire
- 4 Passenger compartment heater wiring harness
- 5 Control element wiring harness
- 6 Fuel pump wiring harness
- b1 Fuel line
- X1 6-pin connector of heater wiring harness
- X2 2-pin connector of heater wiring harness
- X4 2-pin connector of coolant pump wiring harness
- X16 2-pin connector of coolant pump wiring harness

General view of corrugated tube installation

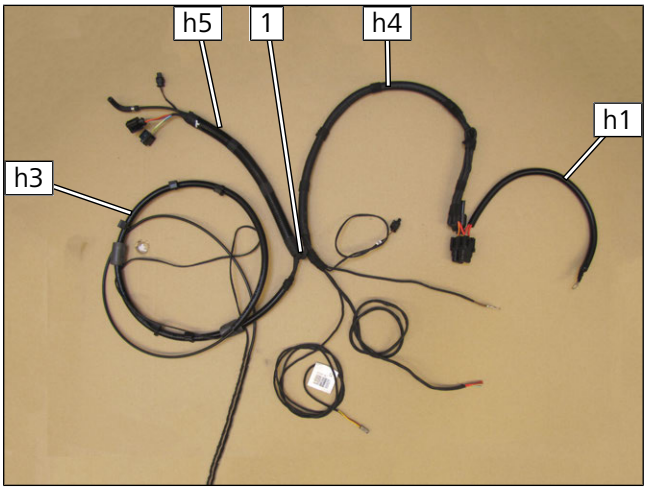


Fig. 8

▶ Node point **1** is the main starting point for wiring harness preparation. Wrap the corrugated tubes at the ends and at the node point with insulating tape.

Preparing wiring harness and fuel line

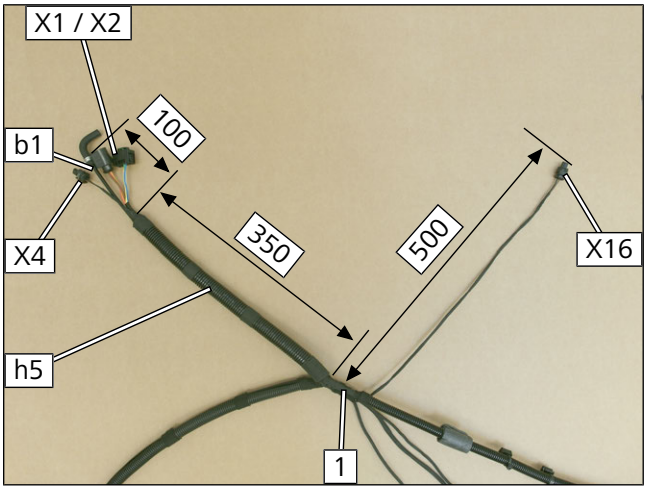


Fig. 9

▶ Draw fuel line **b1** (4500), fuel pump, coolant pump and heater wiring harnesses as well as excess length of the coolant pump wiring harness bundled into Ø17 corrugated tube **h5** (350, slitted).

- **1** Node point
- **X1** 6-pin connector of heater wiring harness
- **X2** 2-pin connector of heater wiring harness
- **X4** Coolant pump wiring harness connector
- **X16** Coolant pump wiring harness connector

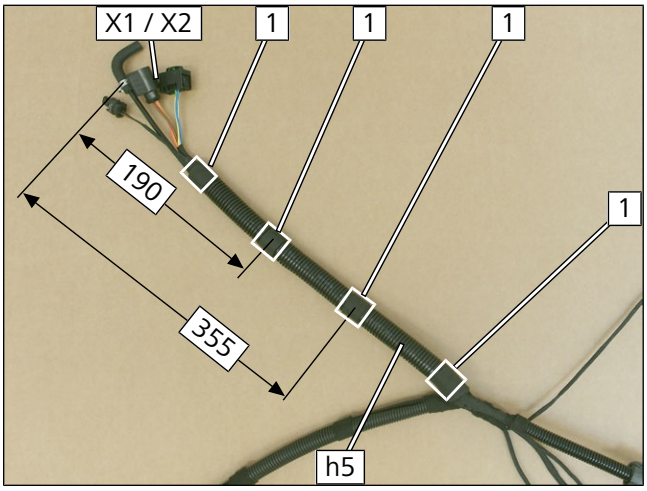


Fig. 10

▶ Wrap insulating tape around Ø17 corrugated tube **h5** (slitted) at position **1** as shown.

- **X1** 6-pin connector of heater wiring harness
- **X2** 2-pin connector of heater wiring harness

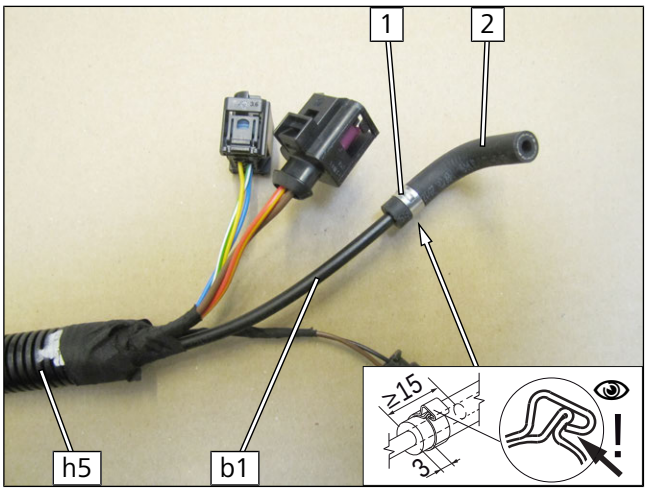


Fig. 11

▶ Mount moulded hose **2**.

1 Ø10 clamp
2 90° moulded hose
b1 Fuel line

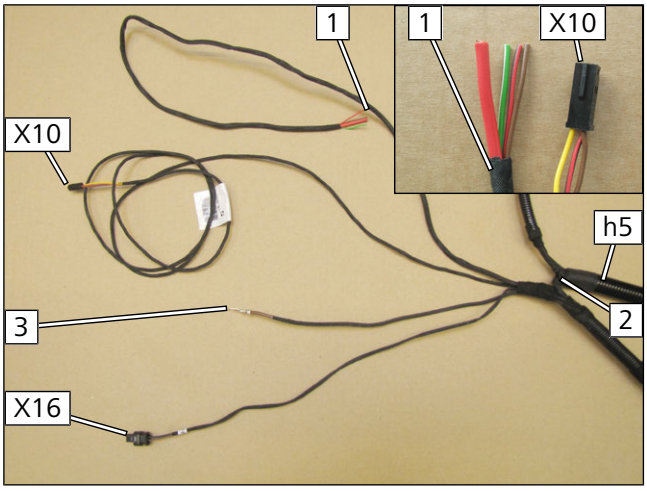


Fig. 12

1 Heater wiring harness to the passenger compartment
2 Node point
3 Earth wire
X10 Control element connector
X16 Coolant pump wiring harness connector

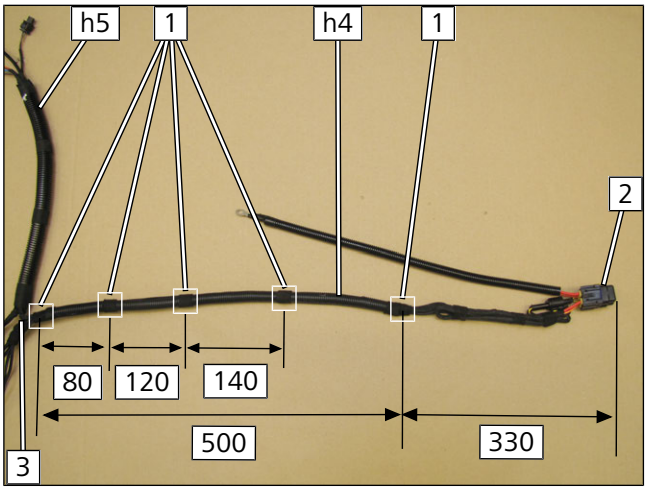


Fig. 13

▶ Draw engine compartment fuse holder wiring harness (see following figure), earth wire, passenger compartment and control element wiring harness into Ø13 corrugated tube **h4** (500).

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

2 Fuse holder of engine compartment
3 Node point

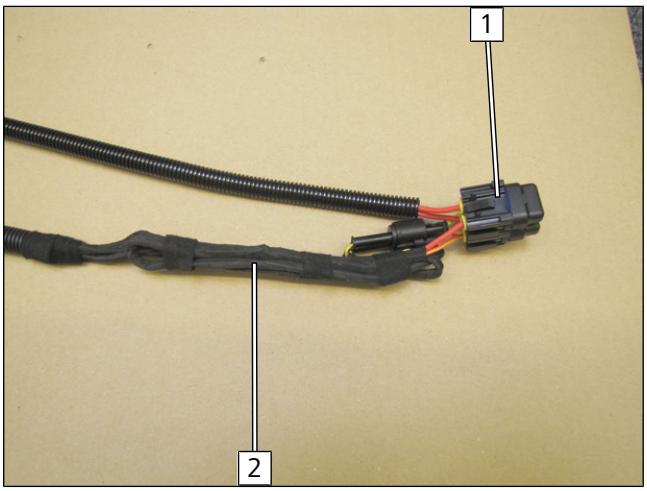


Fig. 14

▶ Tightly attach only the excess wiring harness length for the engine compartment fuse holder [2] as shown using insulating tape.

[1] Fuse holder of engine compartment

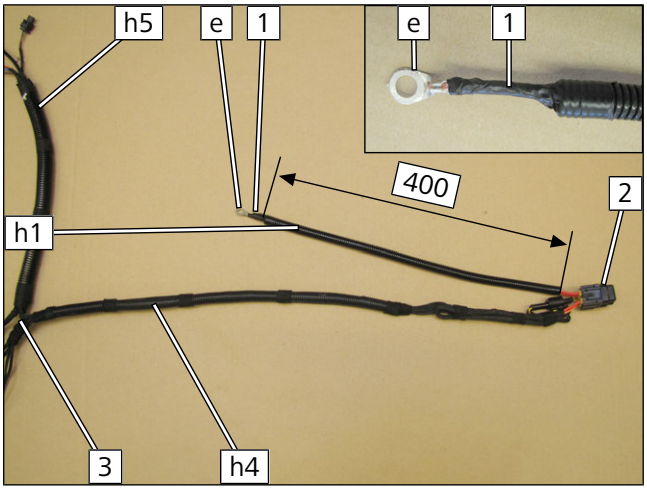


Fig. 15

▶ 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.

[2] Fuse holder of engine compartment

[3] Node point

Cable lug fitting instructions

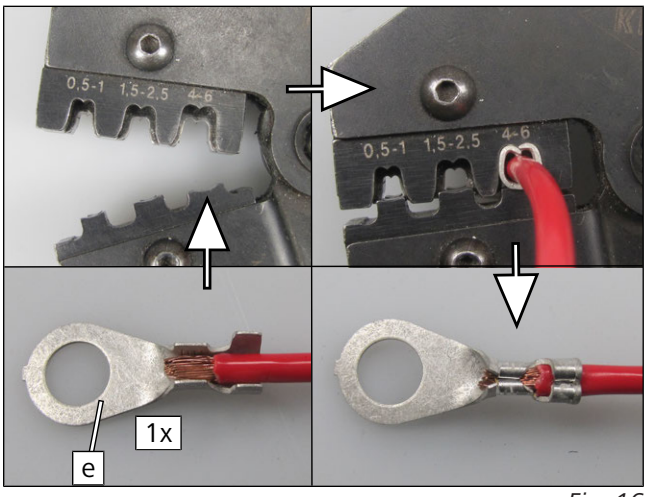


Fig. 16

Observe the next figures

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

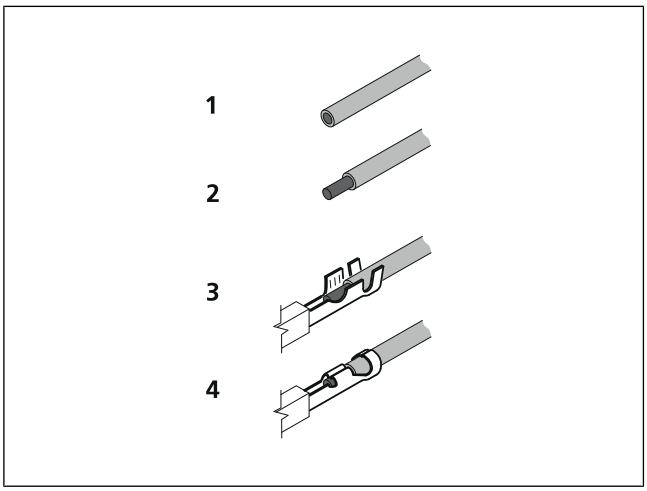


Fig. 17

Dismantling fuel pump connector X7

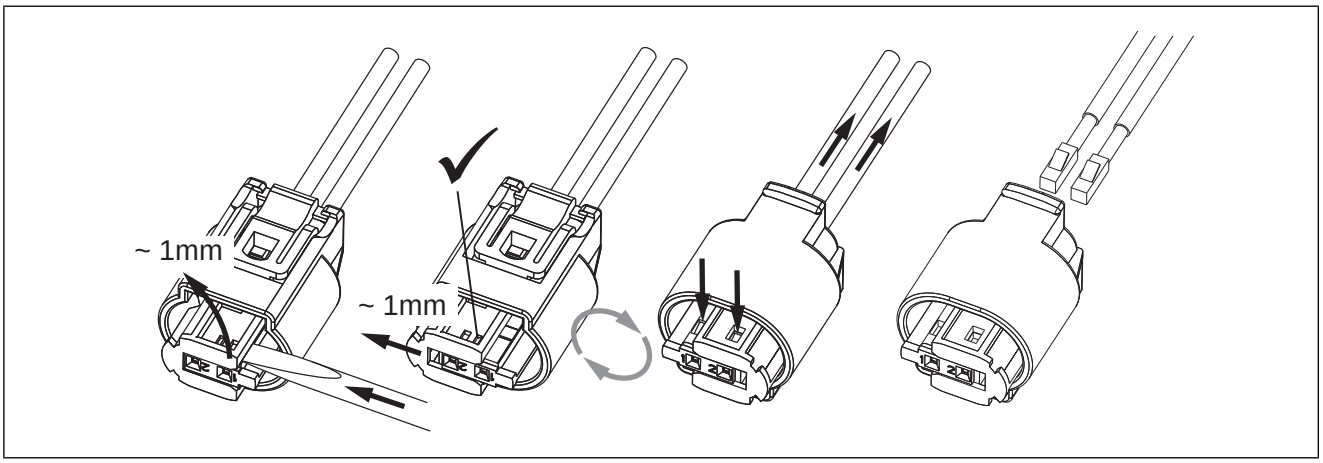


Fig. 18

Preparing wiring harness and fuel line

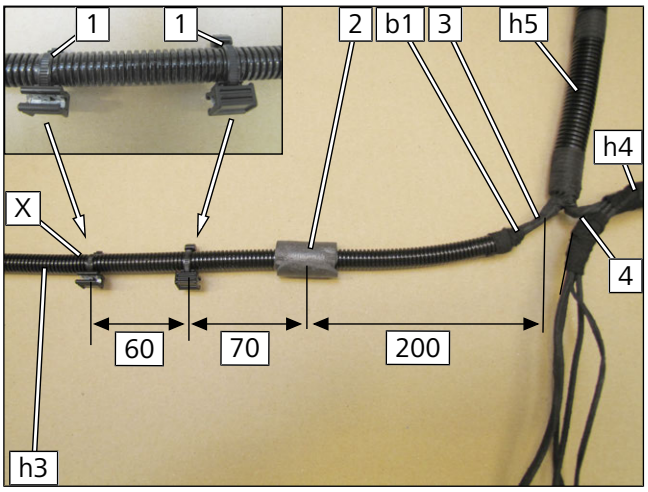


Fig. 19

▶ 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

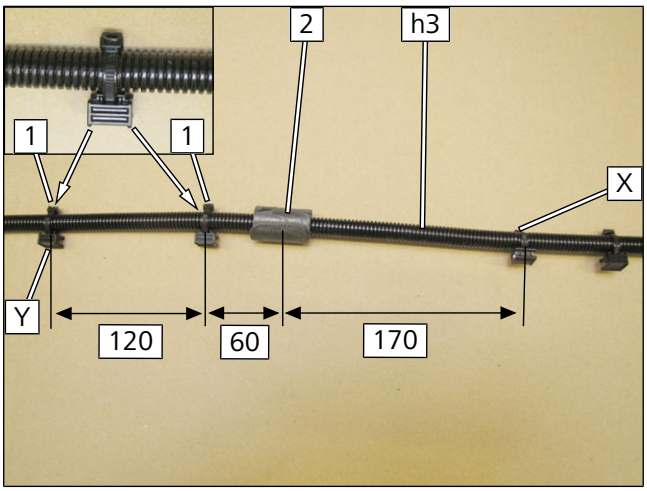


Fig. 20

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

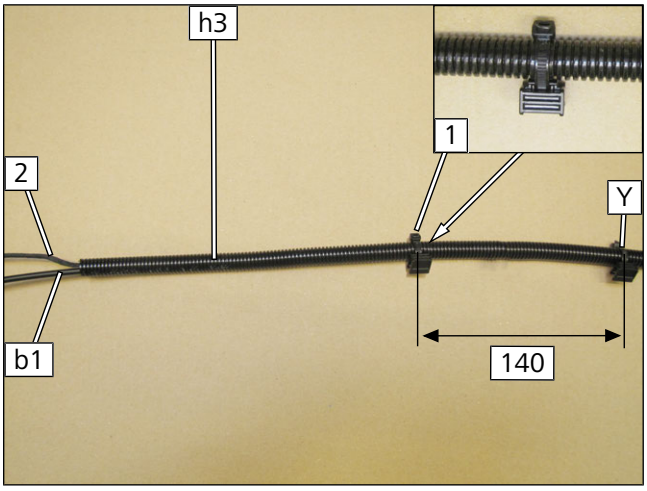


Fig. 21

1 Edge clip cable tie (observe the clamping direction)

2 Fuel pump wiring harness

Y Original position from the previous figure

Preparing retaining plate of fuse holder for F1/F2

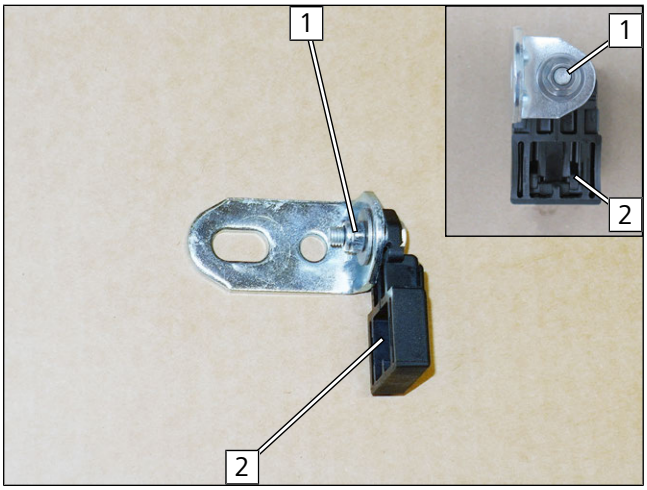


Fig. 22

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

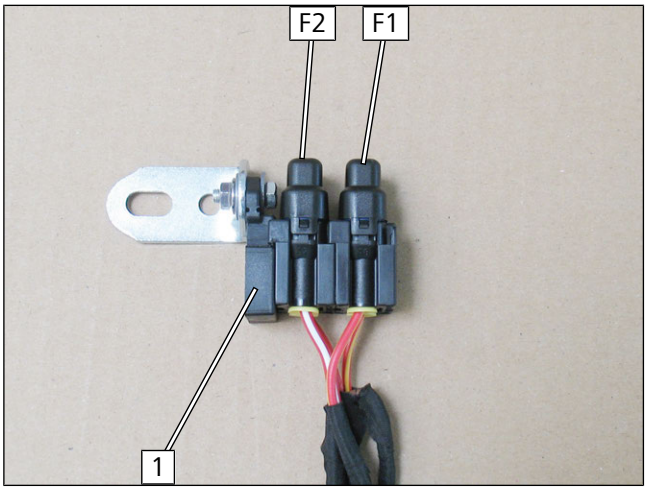


Fig. 23

1 Premounted retaining plate of engine compartment fuse holder

7.2 Electrical system of engine compartment

Mounting engine compartment fuses

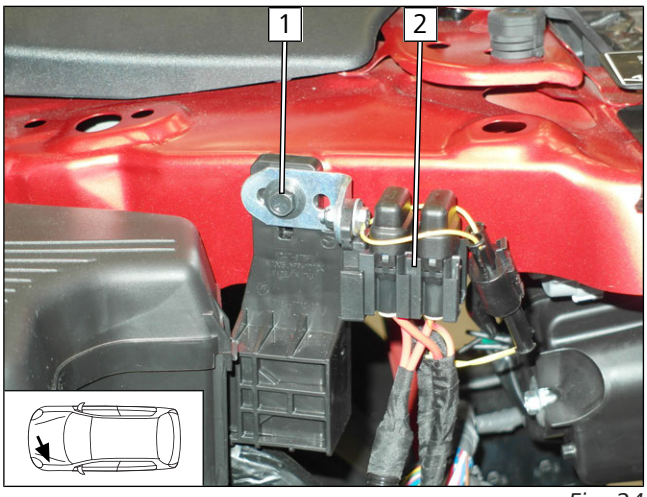


Fig. 24

1 Original vehicle bolt, premounted angle bracket (8-10Nm)

2 Premounted fuses F1/2

Routing wiring harness

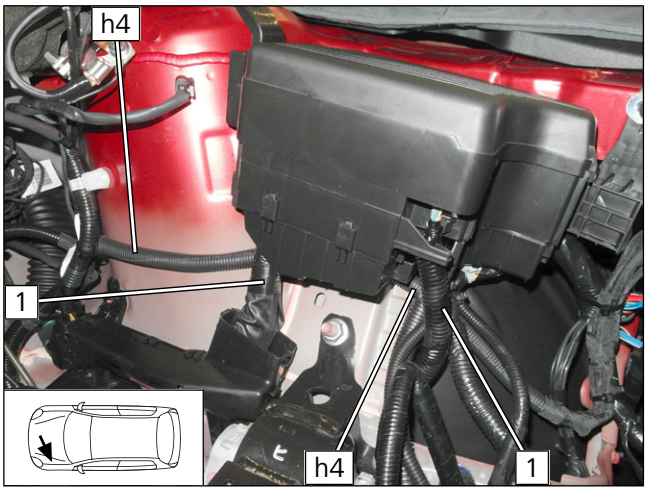


Fig. 25

▶ Route wiring harness section in corrugated tube **h4** underneath original vehicle wiring harnesses **1** to the firewall.

Fastening corrugated tube **h4**

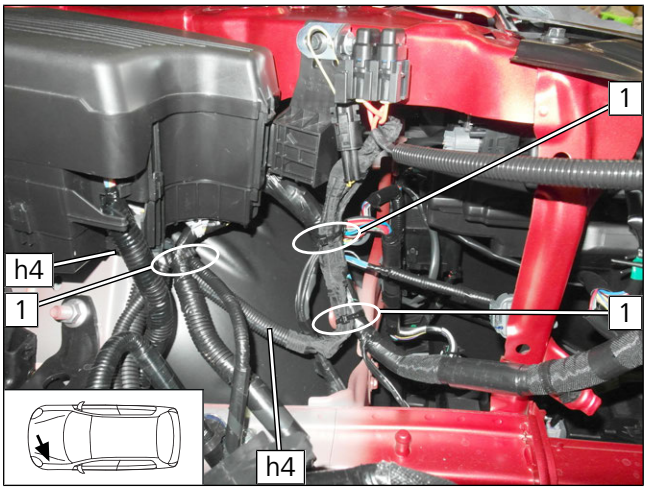


Fig. 26

1 Cable tie

Routing and fastening corrugated tube **h3**

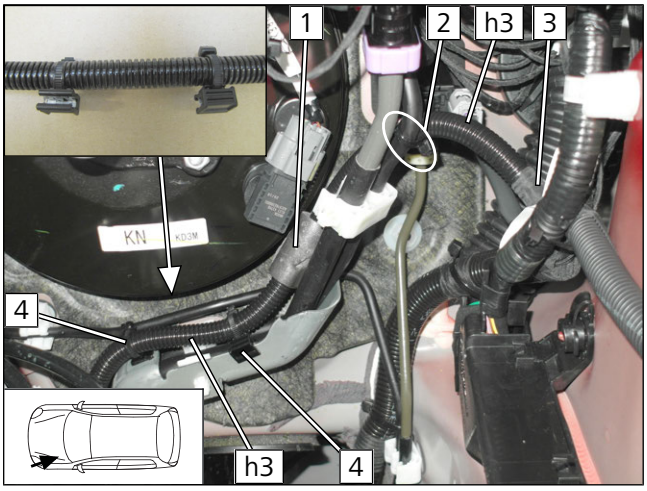


Fig. 27

- ▶ Route corrugated tube **h3** to the underbody as shown.
- ▶ Align premounted foam **1** with line holder as shown.

2 Cable tie
3 Node point
4 Edge clip cable tie

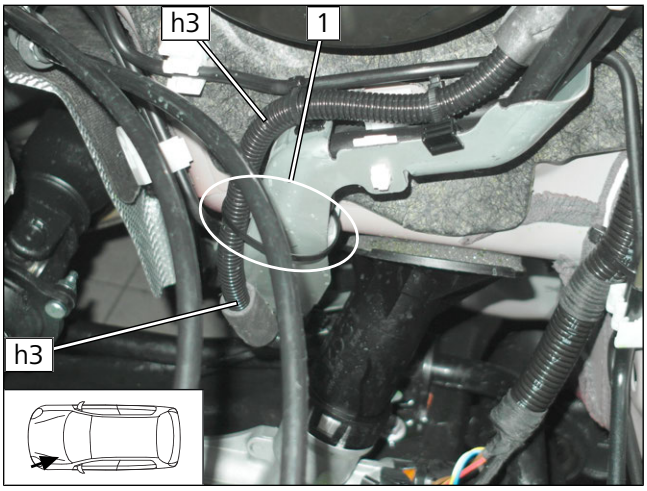


Fig. 28

1 Cable tie

Fastening corrugated tube h4

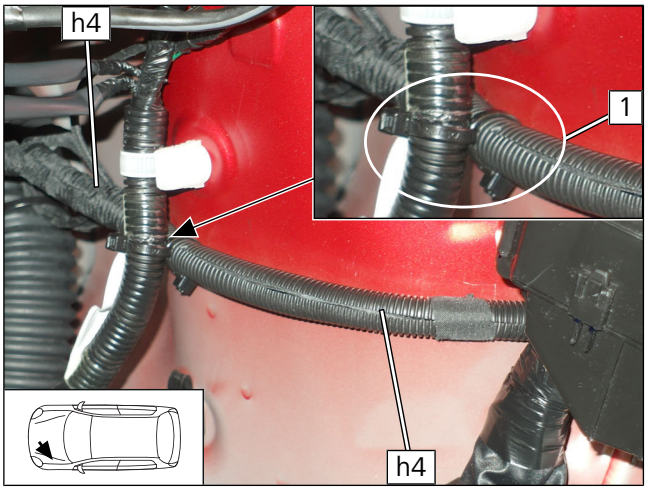


Fig. 29

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

1 Cable tie

Routing and fastening corrugated tube h5

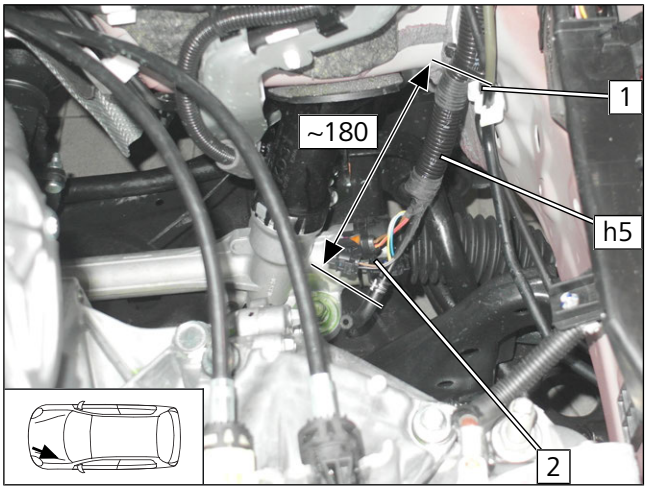


Fig. 30

The fastening takes place as shown in the next fig.

▶ Route corrugated tube **h5** with heater and coolant pump wiring harness as well as fuel line as shown and position with stretched length of 180 on original vehicle brake line retaining clamp **1**.

2 Heater and coolant pump wiring harness connector as well as fuel line with premounted 90° moulded hose

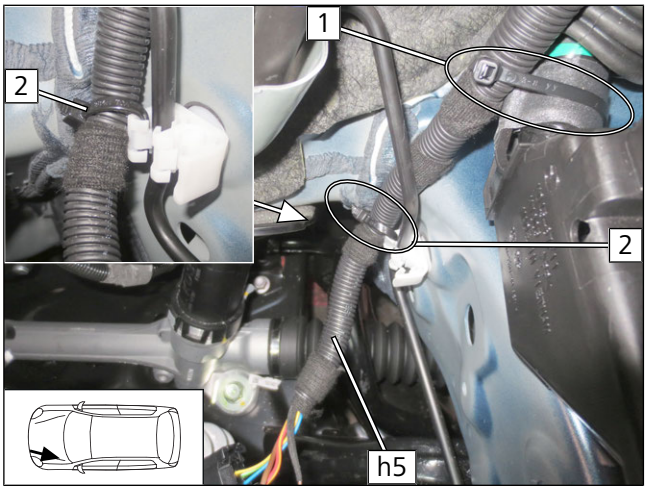


Fig. 31

1 Cable tie around original vehicle wiring harness

2 Cable tie around brake line retaining clamp

Earth wire connection

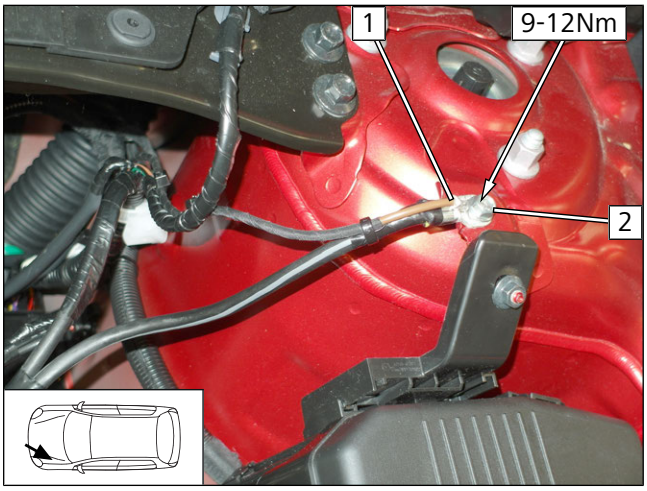


Fig. 32

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

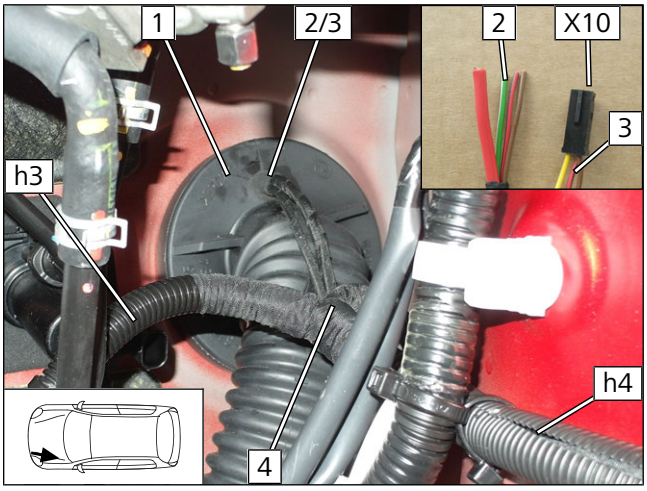


Fig. 33

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 point wiring harness

8 Mechanical system

8.1 Preparing installation location

Removing bracket

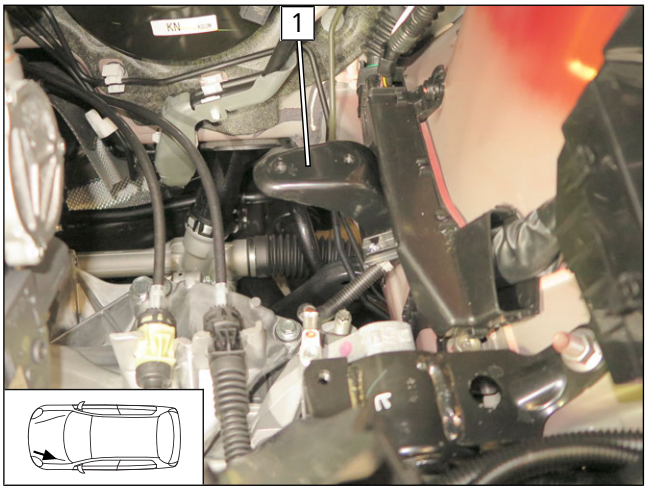


Fig. 34

▶ Remove original vehicle bracket 1.

Bracket 1 and bolts will be reinstalled here later.

8.2 Premounting heater

Preparing heater

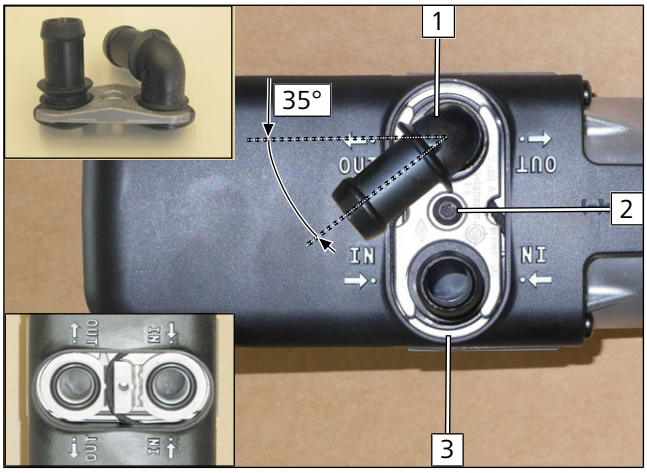


Fig. 35

Observe the general installation instructions of the heater.

1 90° water connection piece, seal
2 5x15 self-tapping bolt, water connection piece retaining plate
3 180° water connection piece, sealing ring

Premounting bolts loosely

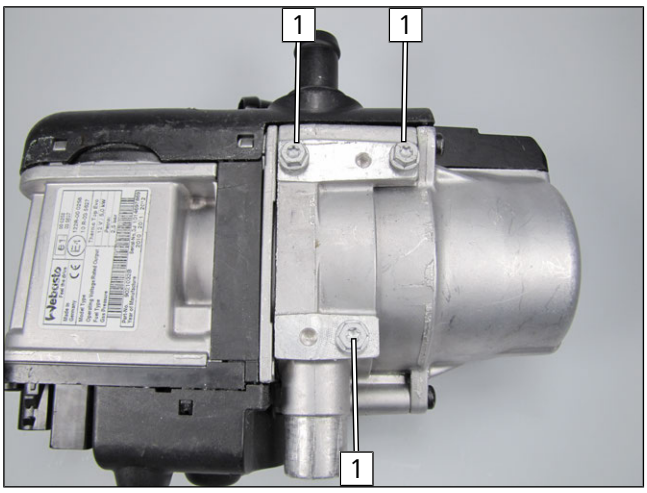


Fig. 36

Screw 5x13 self-tapping bolt 1 in available holes by a max. of 3 thread turns.

Premounting heater

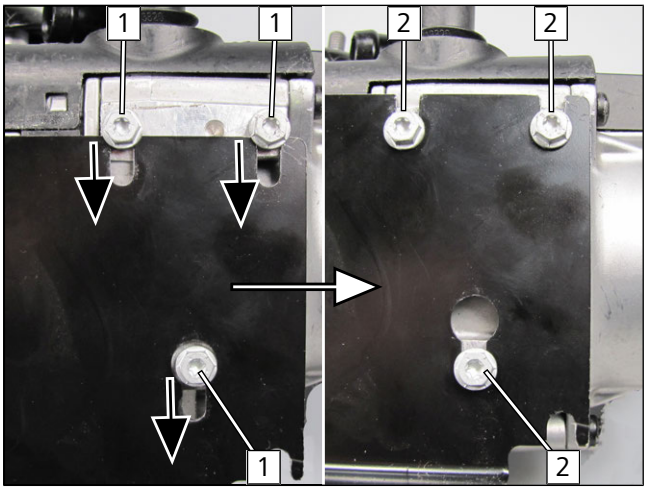


Fig. 37

1 Insert premounted 5x13 self-tapping bolts [3x] in oblong holes of the bracket, part 1

2 Tighten 5x13 self-tapping bolts [3x] (8Nm)

Preparing combustion air intake pipe

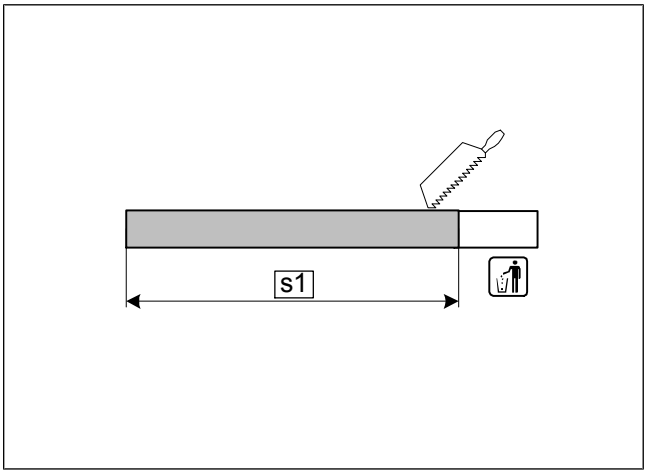


Fig. 38

s1 240

Mounting combustion air intake pipe

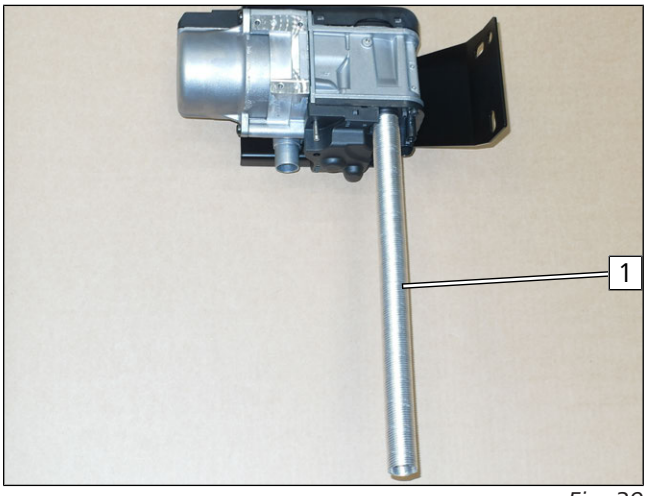


Fig. 39

Observe the installation instructions of the combustion air intake silencer.

1 Combustion air intake line

Premounting bracket part 2

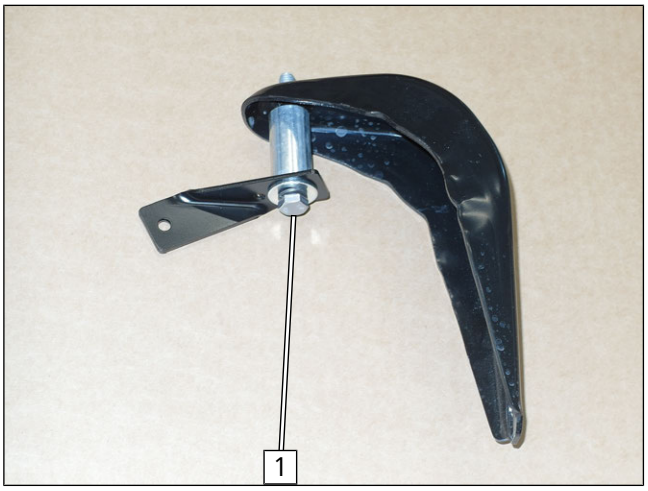


Fig. 40

1 Loosely mount M8x70 bolt, spring lockwasher, large diameter washer, bracket part 2, distance washer 40, original vehicle bracket

Premounting bracket loosely

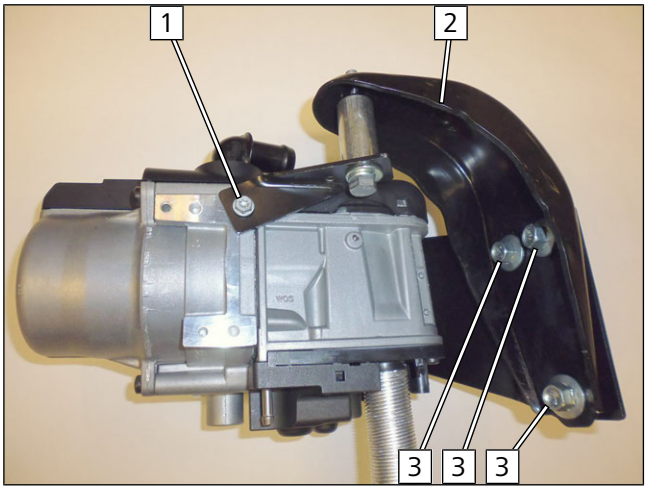


Fig. 41

▶ Insert original vehicle bolts for battery holder 3 as installation aid, remove again after premounting.

1 Loosely mount M5x13 self-tapping bolt loosely, bracket part 2

2 Original vehicle bracket, premounted

Cutting foam strip in half

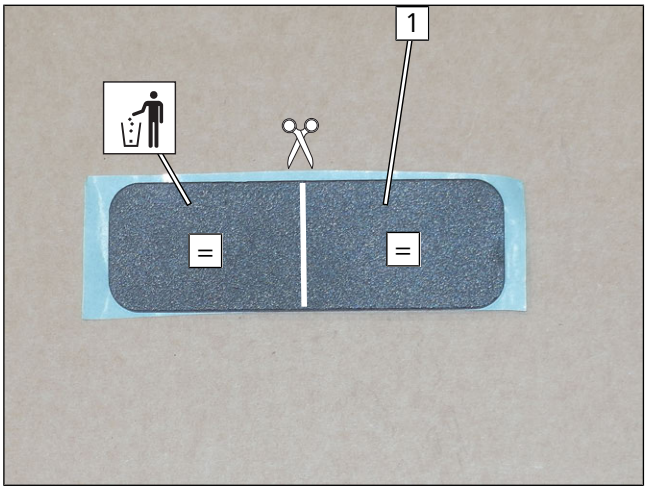


Fig. 42

1 Self-adhesive foam

Gluing foam, bending combustion air intake pipe, mounting edge protection

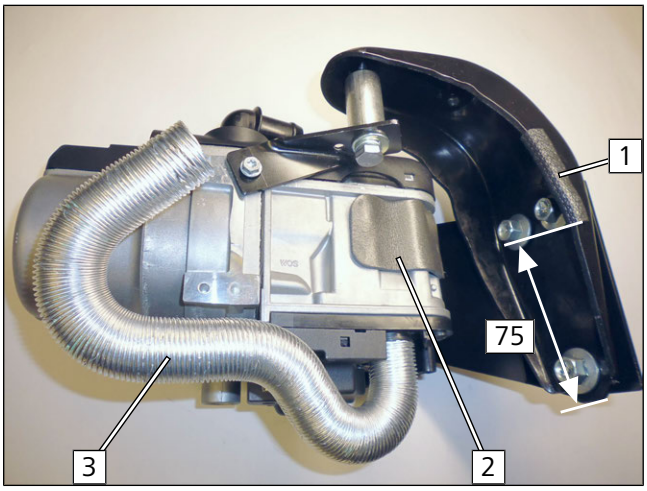


Fig. 43

1 Edge protection 50
2 Foam strips cut in half
3 Combustion air intake line

8.3 Mounting heater

Mounting connectors for wiring harnesses

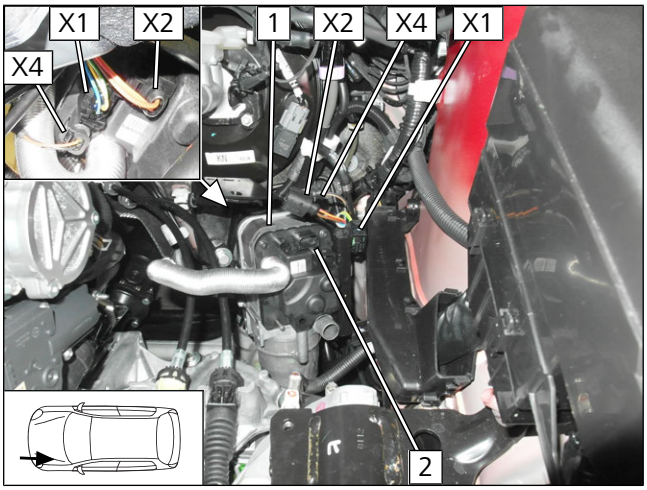


Fig. 44

▶ Place heater 1 with premounted brackets as shown in the engine compartment. Mount connector **X1** / **X2** of heater wiring harness and connector **X4** of coolant pump wiring harness.

2 Heater position receptacles

Mounting fuel line

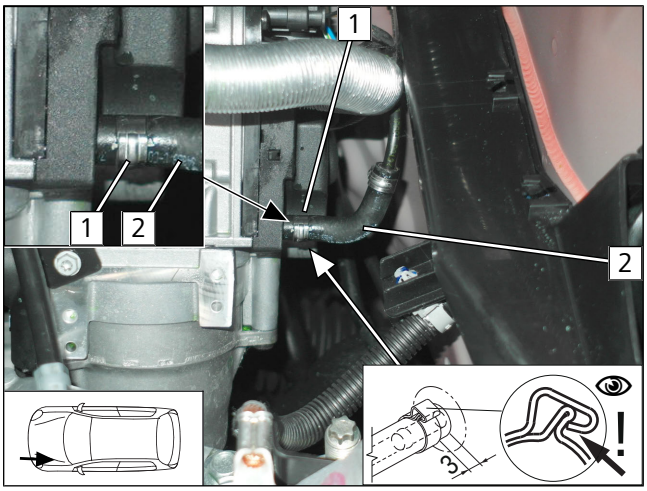


Fig. 45

1 Ø10 clamp
2 90° moulded hose, premounted

Mounting heater

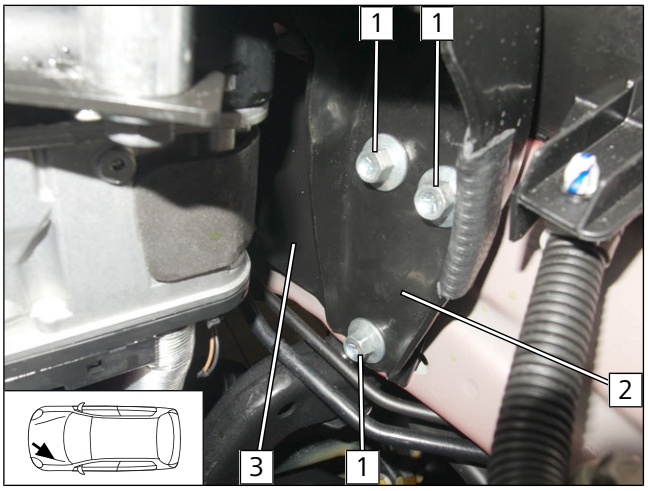


Fig. 46

▶ Move heater into installation position. Align holes of original vehicle bracket [2] and heater bracket part 1 [3] exactly.

[1] Original vehicle bolt (25Nm)

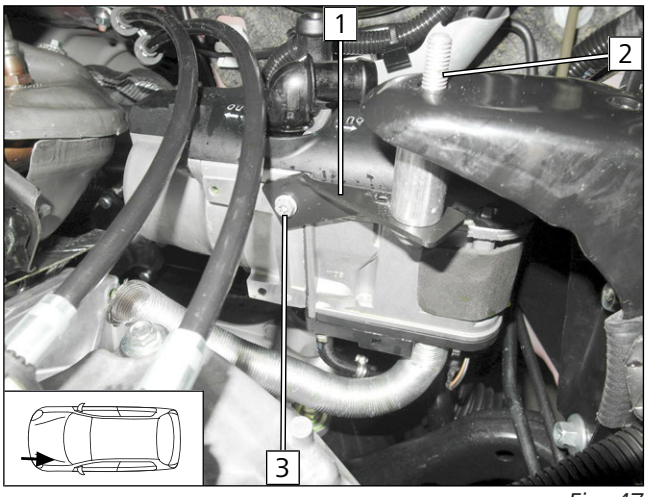


Fig. 47

▶ Align bracket part 2 [1] against original vehicle bracket.

[2] Tighten bolt (20Nm)

[3] 5x13 self-tapping bolt [8Nm]

Checking distance

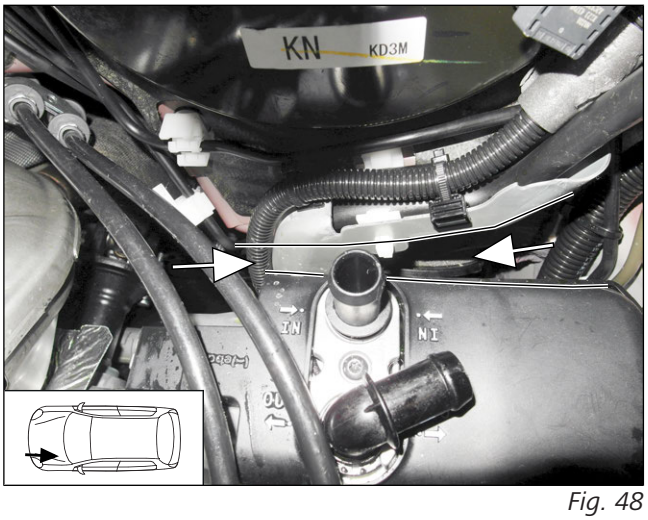


Fig. 48

Ensure sufficient distance from neighbouring components, correct if necessary.

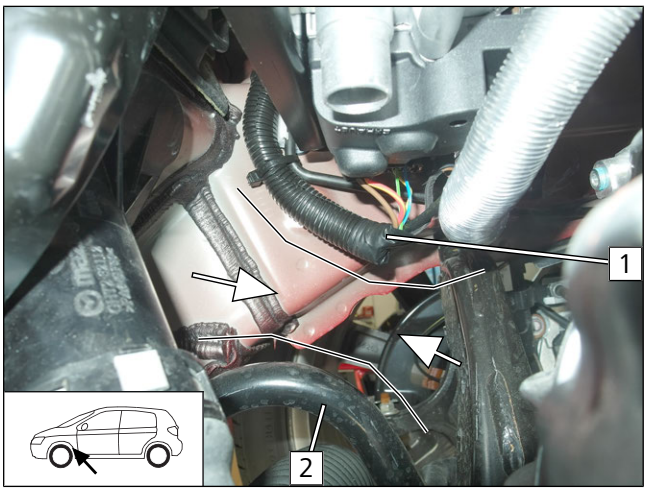


Fig. 49

▶ Ensure sufficient distance between stabiliser bar and wiring harness, fuel line and combustion air line and if necessary, correct as shown below.

1 Heater wiring harness and fuel line

2 Stabiliser bar

View of distance control

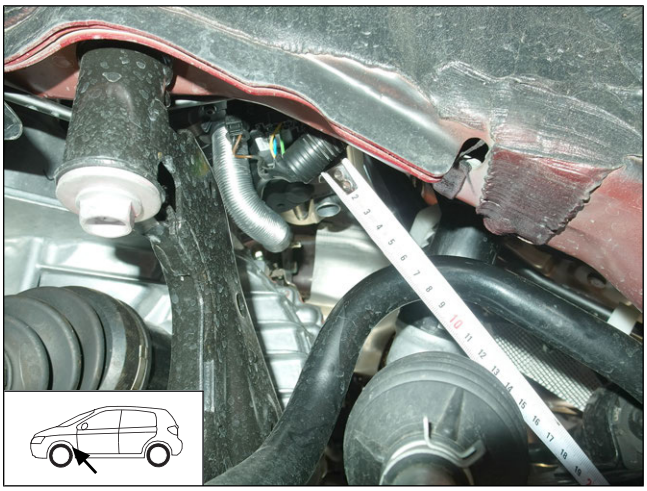
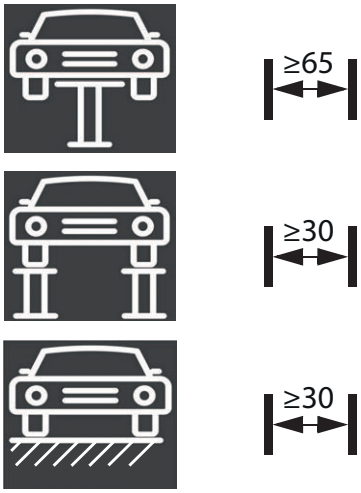


Fig. 50



9 Combustion air

Premounting combustion air intake silencer

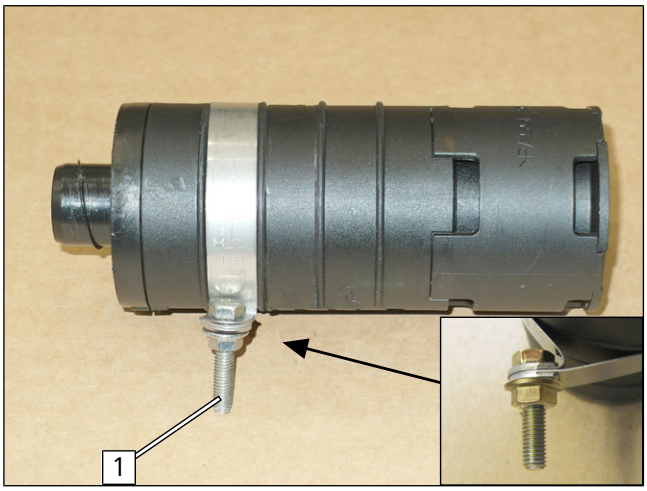


Fig. 51

1 M5x20 bolt, Ø51 clamp (shape as shown), flanged nut (5-6Nm)

Mounting combustion air intake pipe s1 to combustion air intake silencer

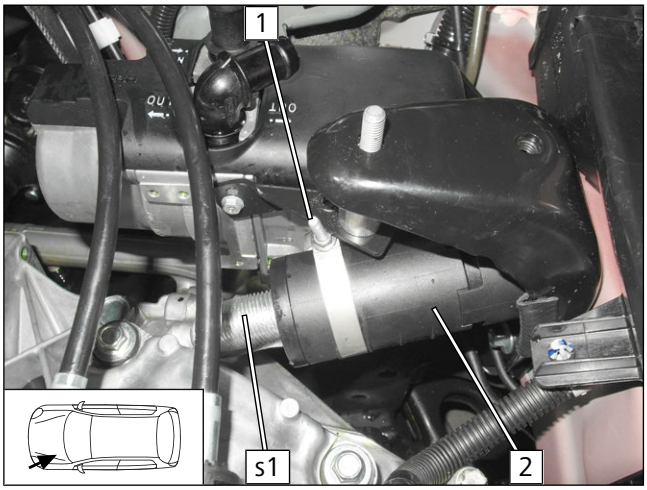


Fig. 52

Observe the installation instructions of the combustion air intake silencer.

1 Position premounted clamp

2 Combustion air intake silencer

Mounting combustion air intake silencer

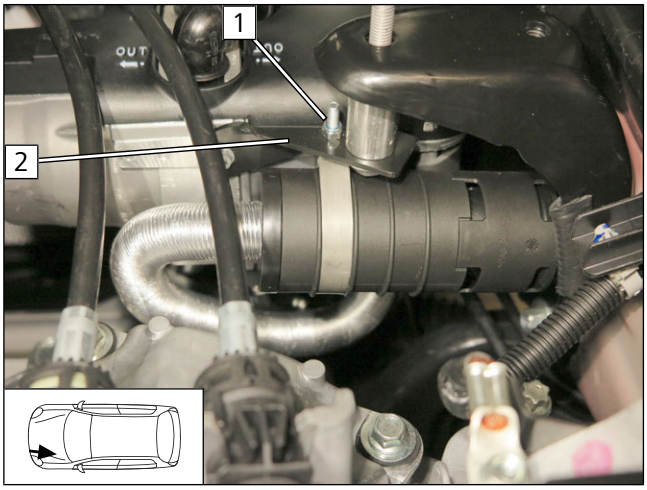


Fig. 53

1 M5x25 bolt, Ø 51 clamp, premounted flanged nut, self-locking nut (5-6Nm)

2 Bracket part 2

Checking distance between combustion air intake silencer and transmission

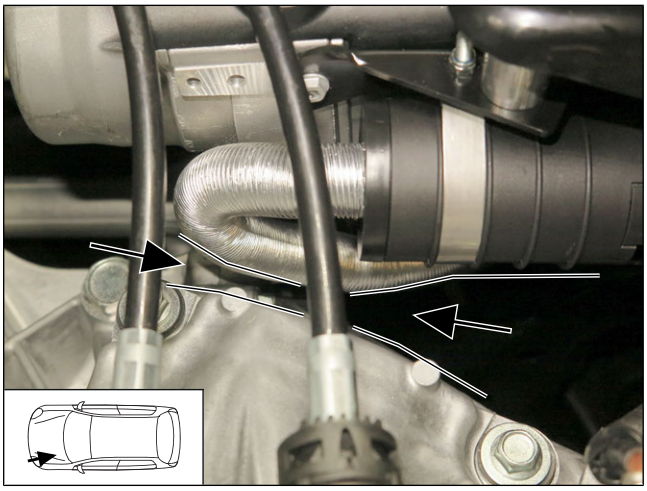


Fig. 54

Ensure sufficient distance from neighbouring components, correct if necessary.

>15

10 Coolant

10.1 Hose routing diagram

'Island' coolant circuit

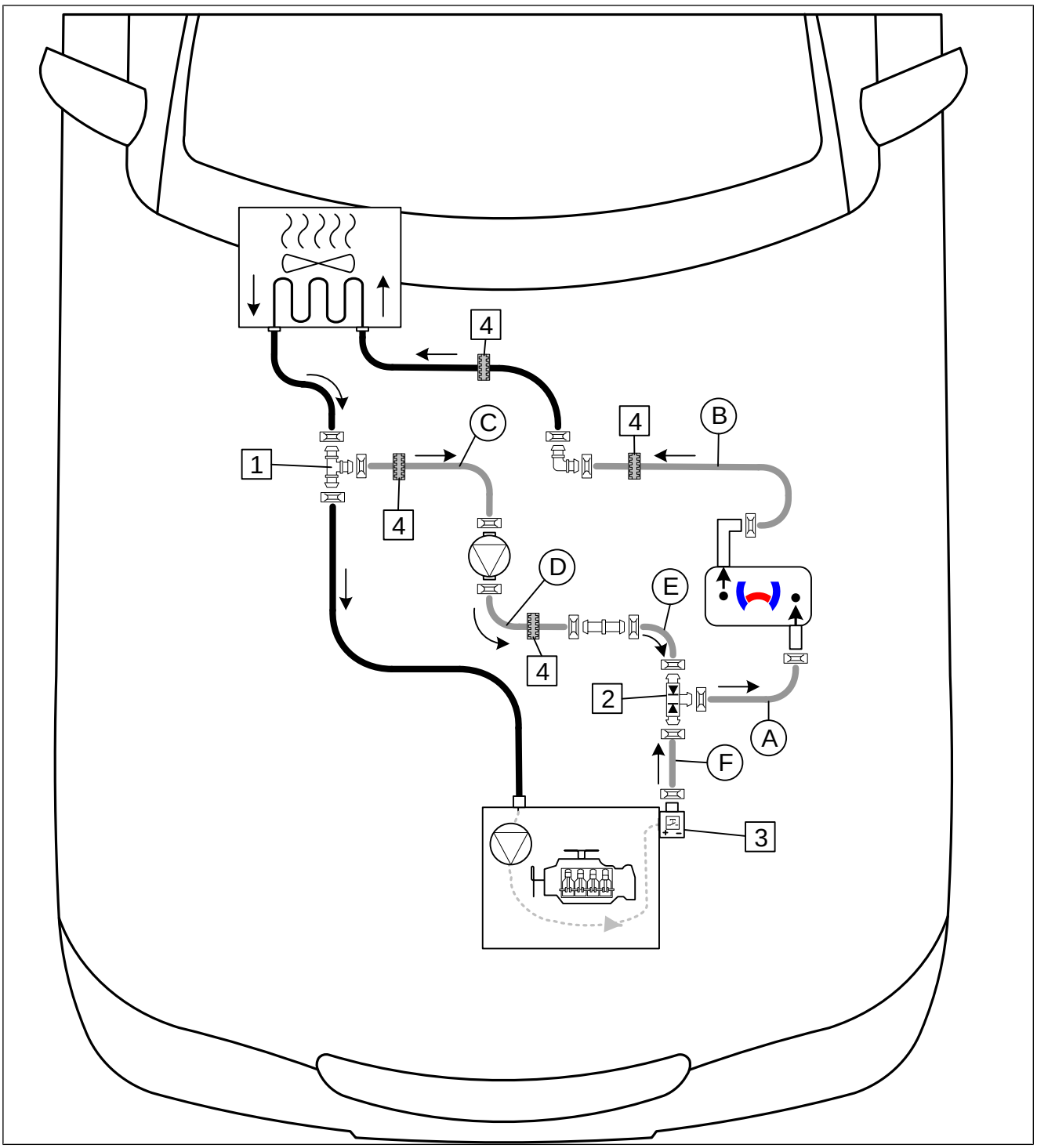


Fig. 55

All spring clips without a specific designation = Ø25; All connecting pipes and = Ø18x18

1 T-piece 3x Ø18; 2 Double non-return valve = 3x Ø18; 3 Original vehicle electrical coolant control valve; 4 Black rubber isolator

10.2 Coolant hoses, vehicle side

Cutting hose sections lengthwise

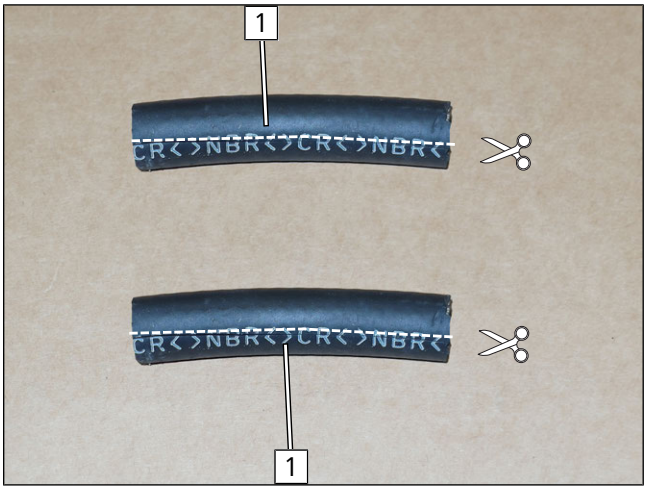


Fig. 56

2x in case of vehicles with manual transmission
1x in case of vehicles with automatic transmission

1 Hose section (70)

Mounting hose sections

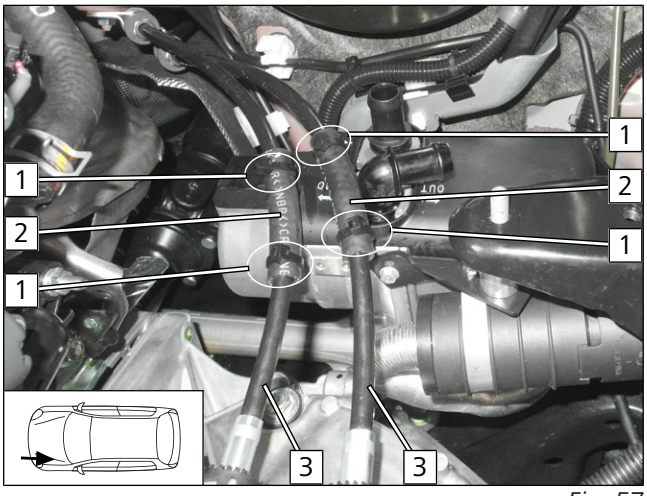


Fig. 57

The figure shows a vehicle with manual transmission, but the instructions apply also to vehicles with automatic transmission.

1 Cable tie
2 Slit hose section
3 Gearshift cable

Adapting original vehicle hose clamp

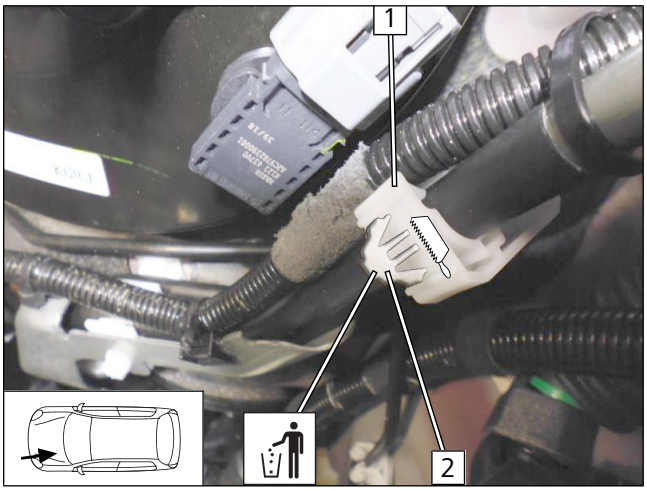


Fig. 58

▶ Cut locking tab **2** from original vehicle hose clamp **1** as shown.

Installation instructions for hose, spring clip and connecting pipe

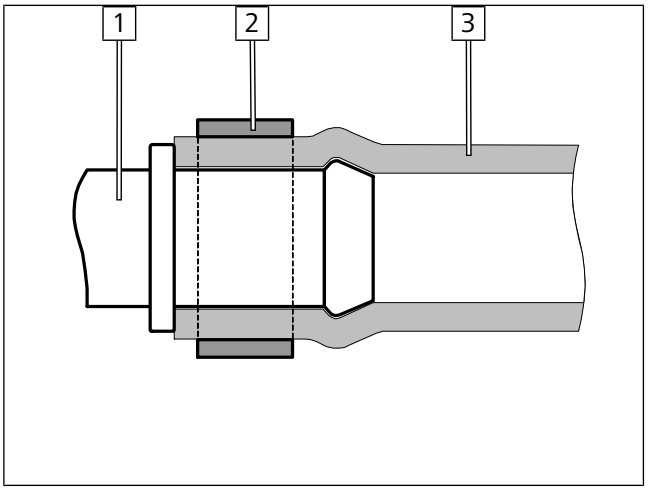


Fig. 59

1 Connecting pipe
2 Spring clip
3 Hose

Cutting point, engine outlet

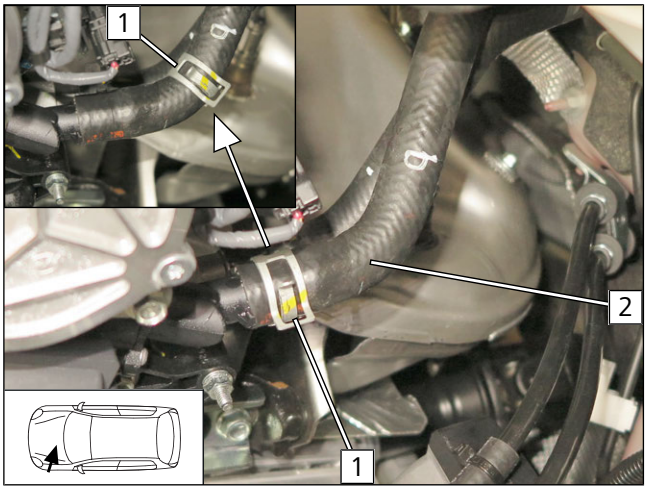


Fig. 60

all vehicles

Further operations for the installation of the coolant circuit are shown on a vehicle with a manual transmission. These instructions apply however equally to all vehicles with an automatic transmission.

▶ Move original vehicle spring clip 1 as shown.

2 Engine outlet / heat exchanger inlet hose

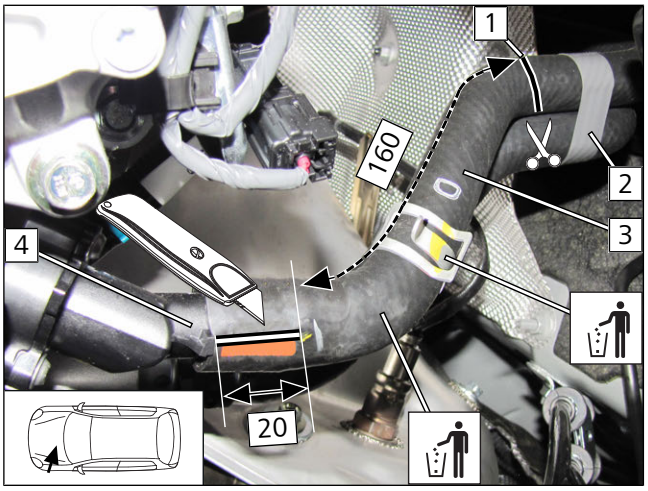


Fig. 61

▶ Remove original vehicle protective hose 2 (if present).

▶ Cut engine outlet/ heat exchanger inlet hose 3 on engine outlet connection piece 4 carefully as shown and sever at position 1.

▶ Discard hose section and original vehicle spring clip.

Mounting black rubber isolator

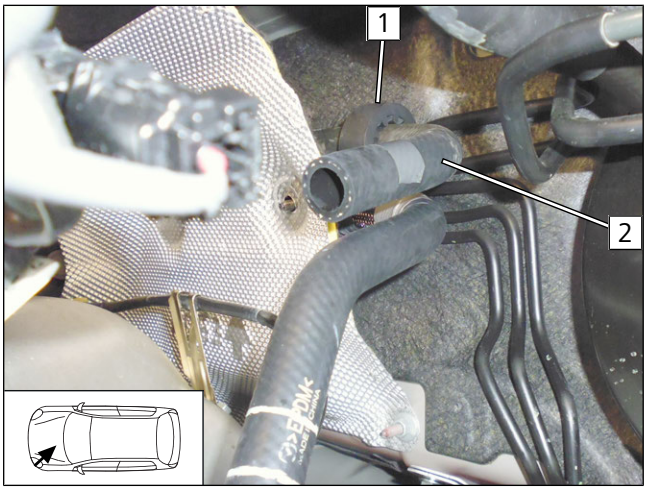


Fig. 62

▶ Position black rubber isolator 1 as shown.

2 Heat exchanger inlet hose section

Cutting point, engine inlet

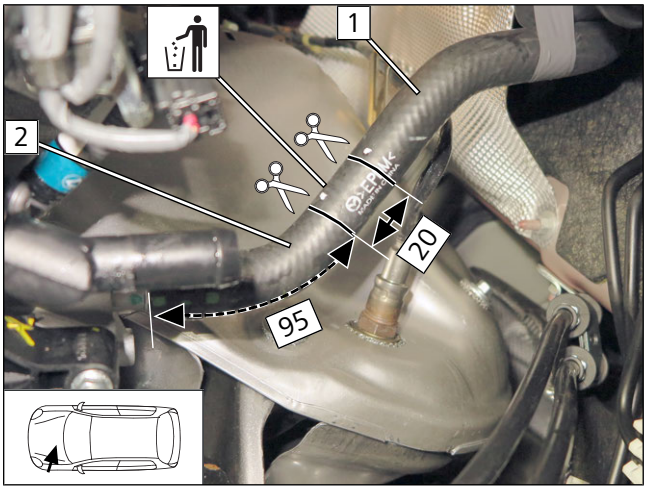


Fig. 63

▶ Cut engine inlet/ heat exchanger outlet hose as shown.

1 Heat exchanger outlet hose section

2 Engine inlet hose section

Cutting fabric heat shrink tubing to length

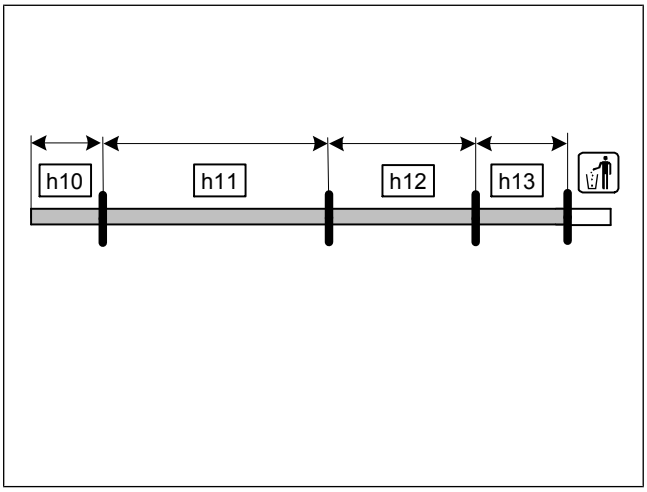


Fig. 64

	Length	Used for
h10	90	Heat exchanger outlet hose section
h11	300	Hose (B)
h12	280	Hose (C)
h13	220	Hose (D)

Mounting fabric heat shrink tubing

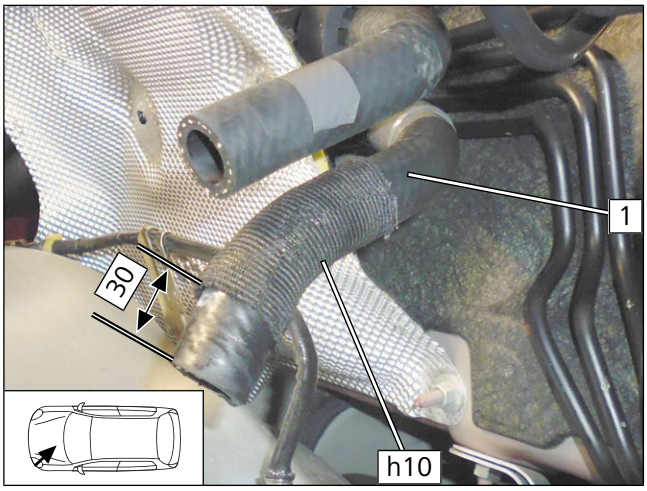


Fig. 65

Slide on fabric heat shrink tubing **h10** as shown and use 230°C at most to shrink it.

1 Heat exchanger outlet hose section

Mounting T-piece

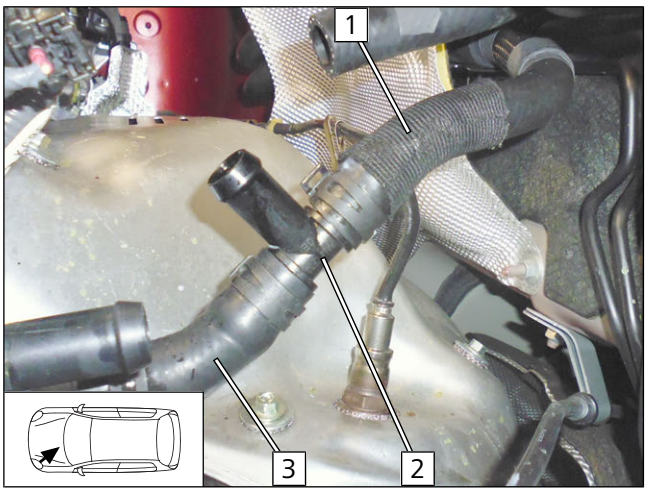


Fig. 66

1 Heat exchanger outlet hose section
2 T piece
3 Engine inlet hose section

10.3 Coolant hose groups

Cutting hoses to length

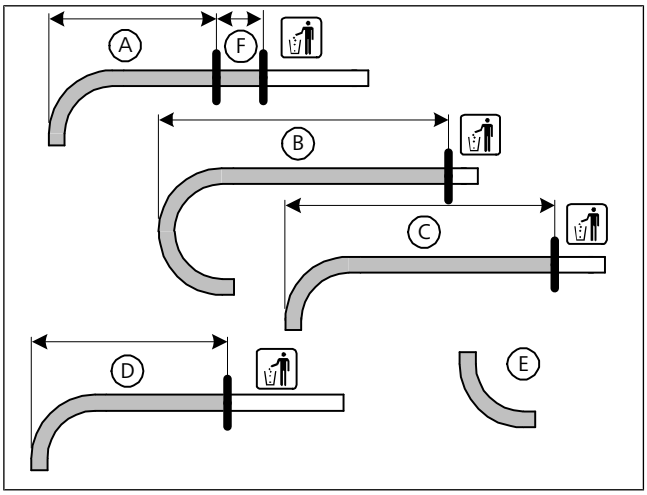


Fig. 67

A 135
B 255
C 280
D 190
E 90°
F 70

Premounting double non-return valve

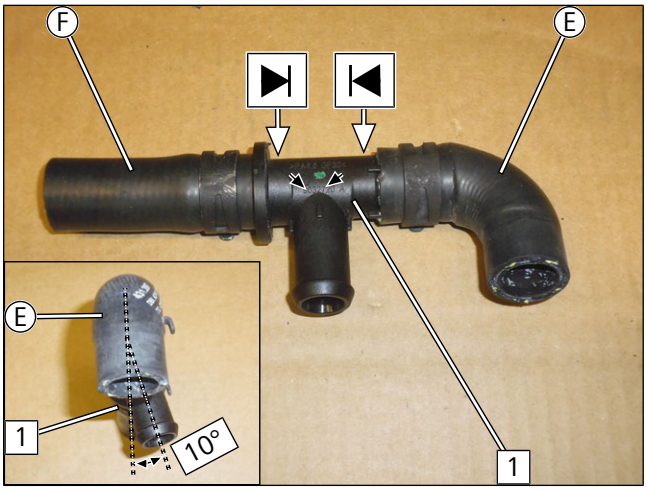


Fig. 68

1 3xØ18 double non-return valve

Premounting hose (D)

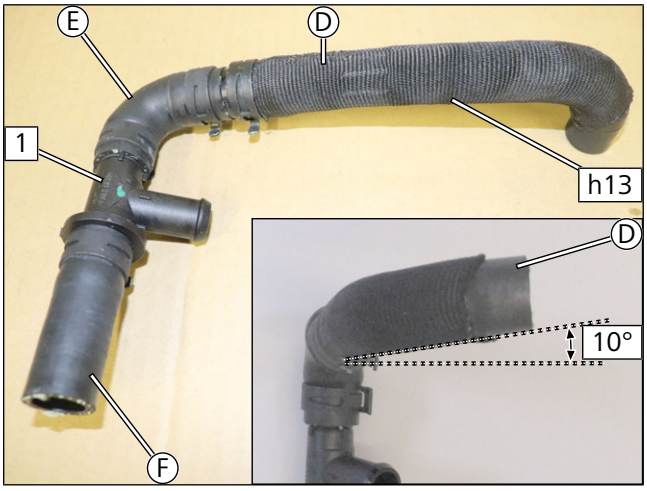


Fig. 69

Slide on fabric heat shrink tubing **h13** (220) as shown and use 230°C at most to shrink it.

1 3xØ18 double non-return valve

Premounting hose (A)

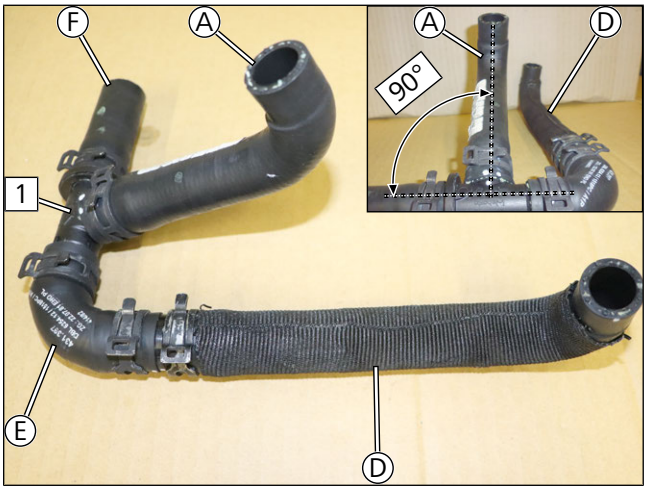


Fig. 70

1 3xØ18 double non-return valve premounted

Mounting rubber isolator

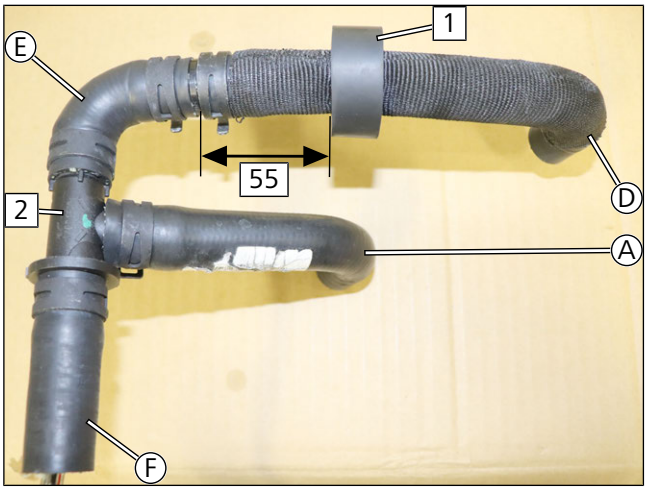


Fig. 71

1 Black rubber isolator
2 3xØ18 double non-return valve

Preparing coolant pump mount/view 1

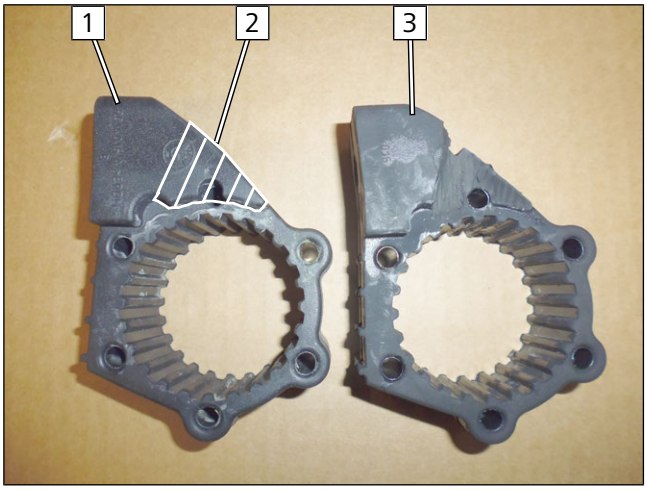


Fig. 72

▶ Cut rubber coolant pump mount 1 at position 2 as shown.

1 View 1: coolant pump mount before adaptation
3 View 1: coolant pump mount after adaptation

Preparing coolant pump mount/view 2

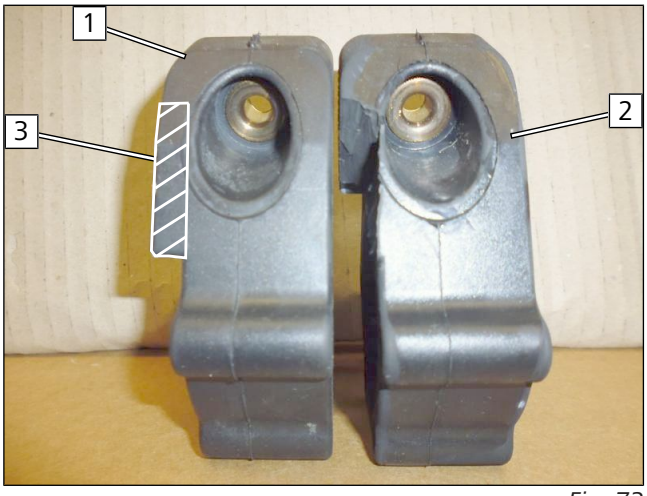


Fig. 73

▶ Cut rubber coolant pump mount 1 at position 3 as shown.

1 View 2: coolant pump mount before adaptation
2 View 2: coolant pump mount after adaptation

Installing coolant pump mount

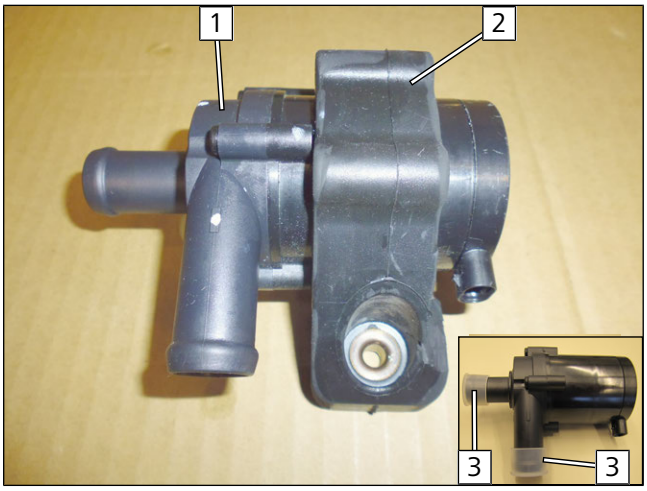


Fig. 74

Respect the installation position as shown in the next figure.

▶ Remove dummy plugs 3, they will be needed later.

1 Coolant pump
2 Coolant pump mount

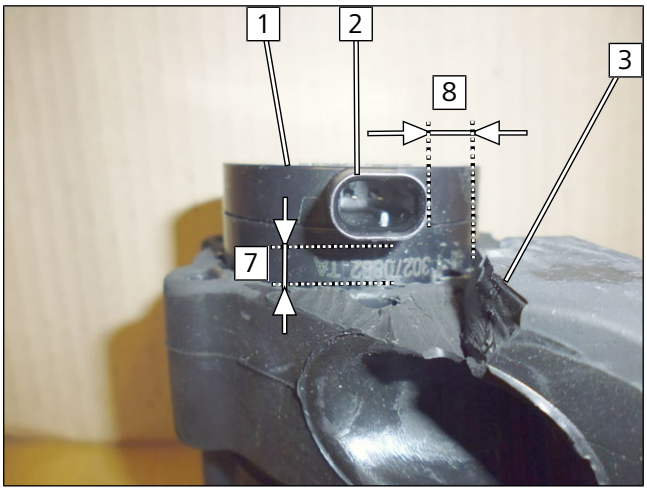


Fig. 75

▶ Align plug socket 2 of coolant pump 1 with respect to mount 3 as shown.

Premounting coolant pump

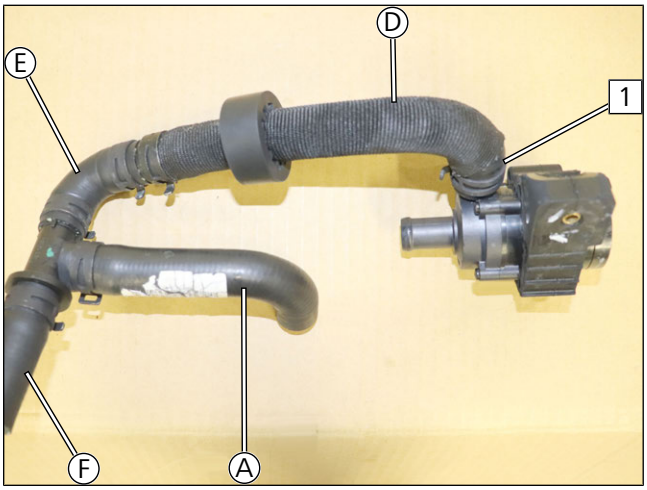


Fig. 76

1 Coolant pump outlet connection piece

Preparing foam strip

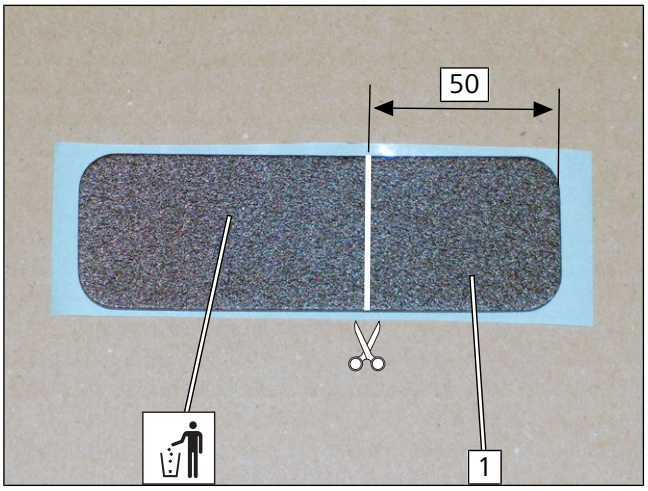


Fig. 77

1 Section of the self-adhesive foam strip

Gluing foam strip

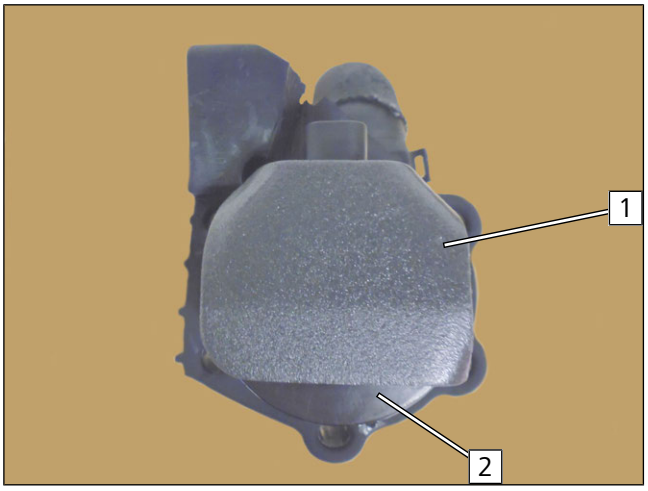


Fig. 78

▶ Glue section of self-adhesive foam 1 onto the front side of coolant pump 2 as shown.

Premounting hose Ⓑ

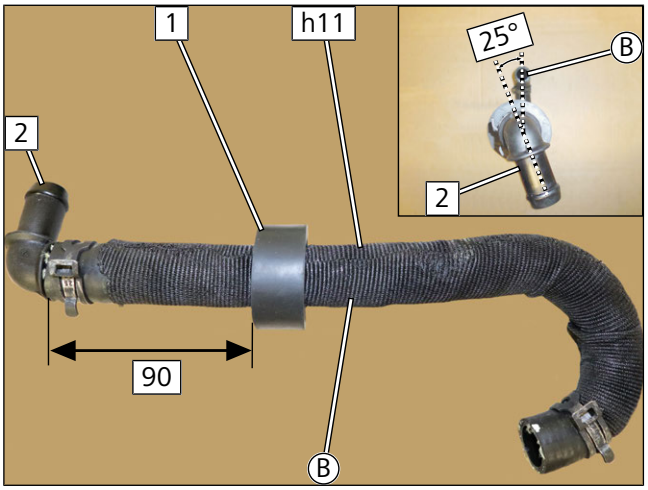


Fig. 79

Slide on fabric heat shrink tubing **h11** (300) as shown and use 230°C at most to shrink it.

1 Black rubber isolator

2 18x18, 90° connecting pipe

Premounting hose Ⓒ

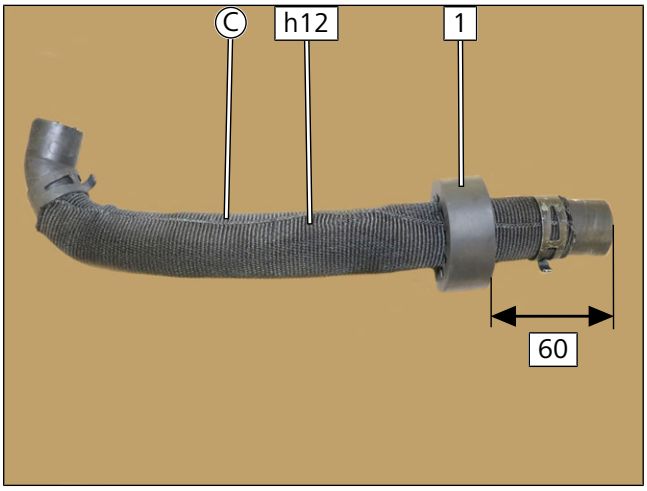


Fig. 80

Slide on fabric heat shrink tubing **h12** (280) as shown and use 230°C at most to shrink it.

1 Black rubber isolator

10.4 Coolant circuit installation

Preparing coolant pump installation location

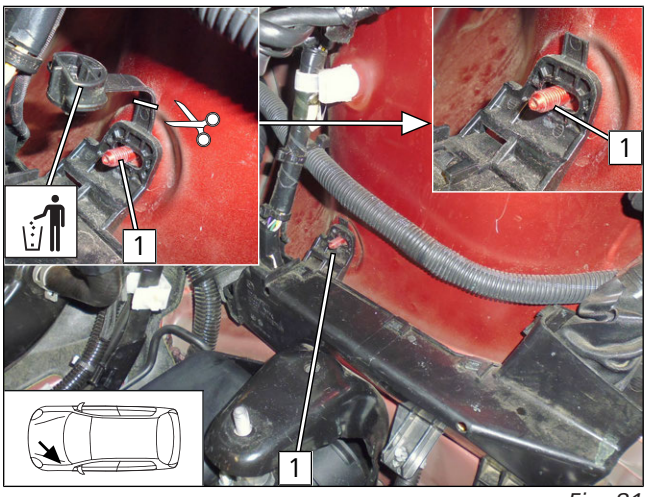


Fig. 81

▶ Cut original vehicle retaining nut from stud bolt 1 as shown and discard.

Mounting angle bracket

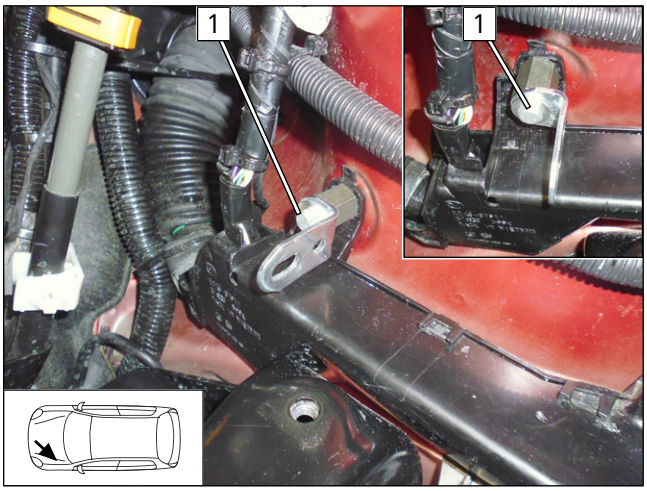


Fig. 82

1 M6x12 bolt, spring lock washer, angle bracket, spacer nut (20) on original vehicle stud bolt (8-10Nm)

Preparing perforated bracket

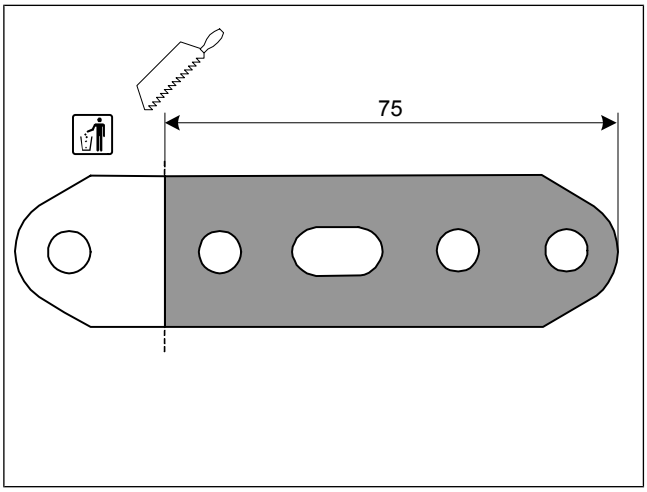


Fig. 83

Installing perforated bracket

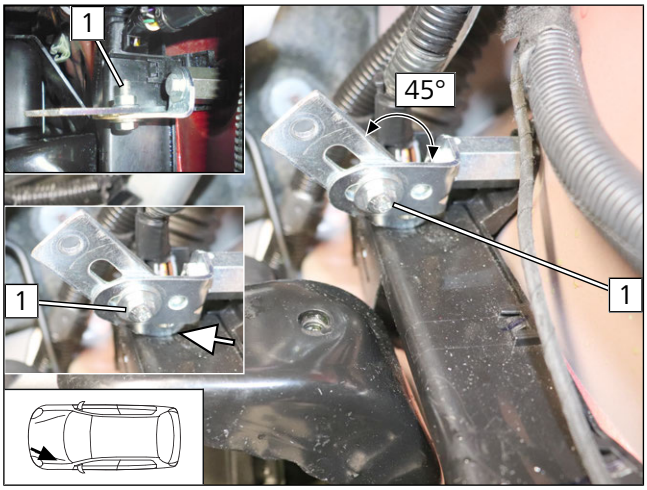


Fig. 84

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

Routing hose group in engine compartment

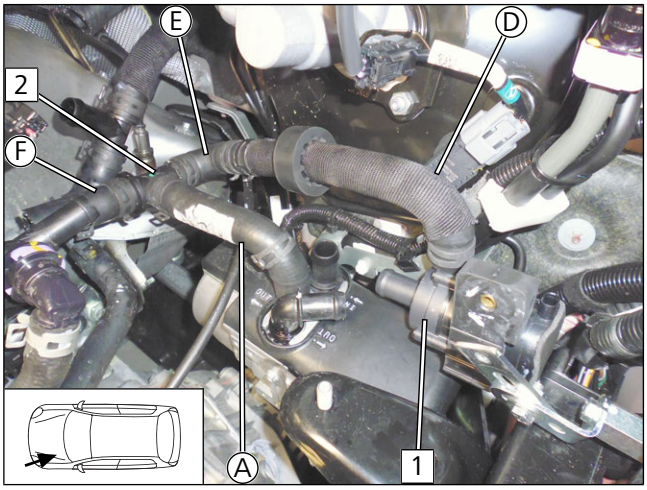


Fig. 85

▶ Relocate coolant pump **1** and hose **D** as shown.

2 Double non-return valve, premounted

Mounting coolant pump

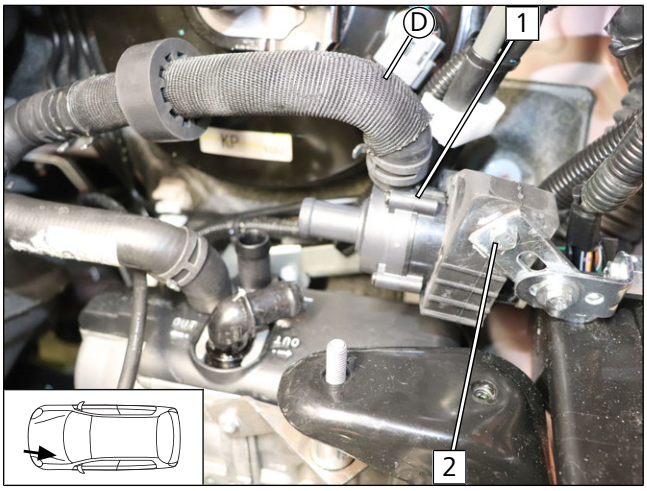


Fig. 86

1 Coolant pump

2 M6x25 bolt, premounted perforated bracket, premounted coolant pump mount, flanged nut (8-10Nm)

Engine outlet and heater inlet connection 'HG/IN'

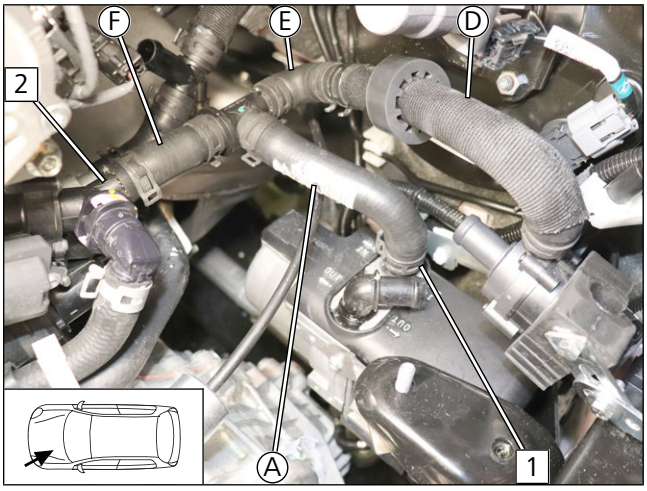


Fig. 87

1 Heater inlet connection piece 'HG/IN'

2 Engine outlet connection piece

Mounting hose (B)

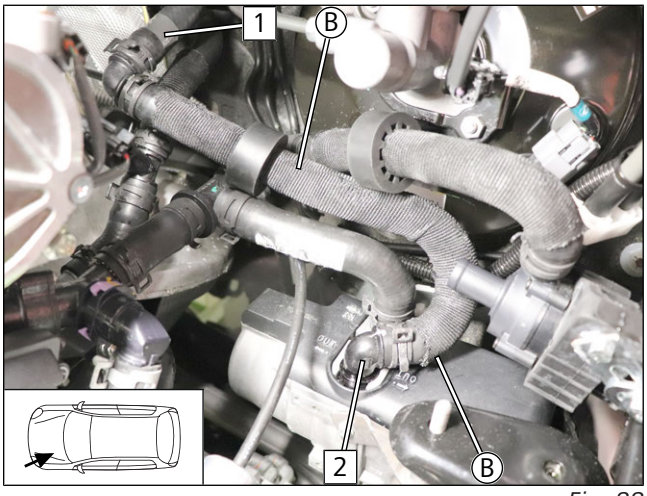


Fig. 88

1 Heat exchanger inlet hose section

2 Heater outlet connection piece 'HG/OUT'

Aligning rubber isolator

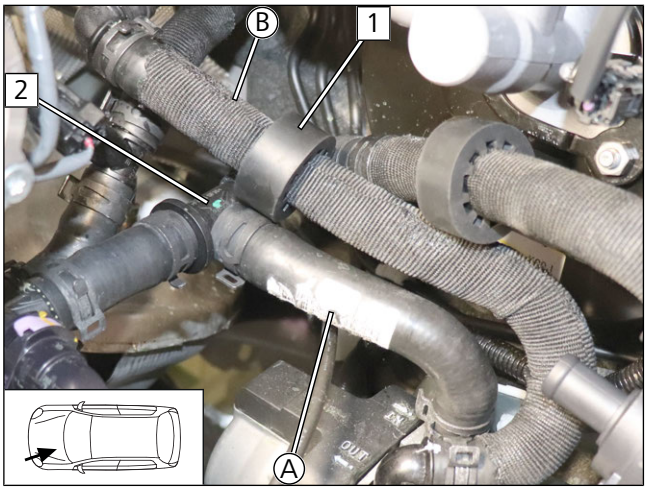


Fig. 89

▶ Align black rubber isolator **1** with double non-return valve **2**.

Mounting hose bracket

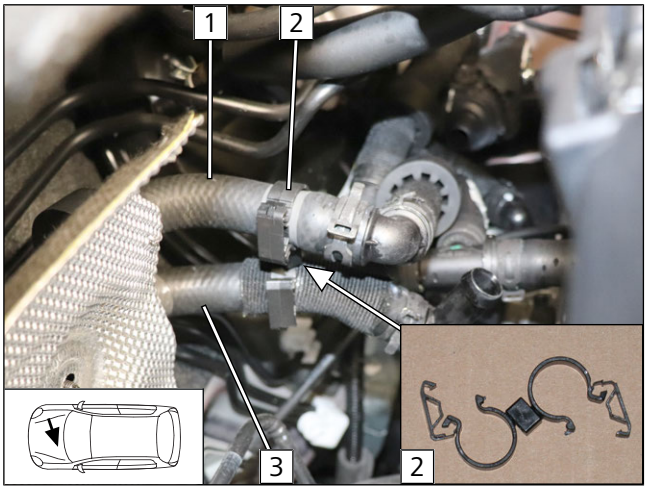


Fig. 90

1 Heat exchanger inlet hose section
2 Hose bracket
3 Heat exchanger outlet hose section

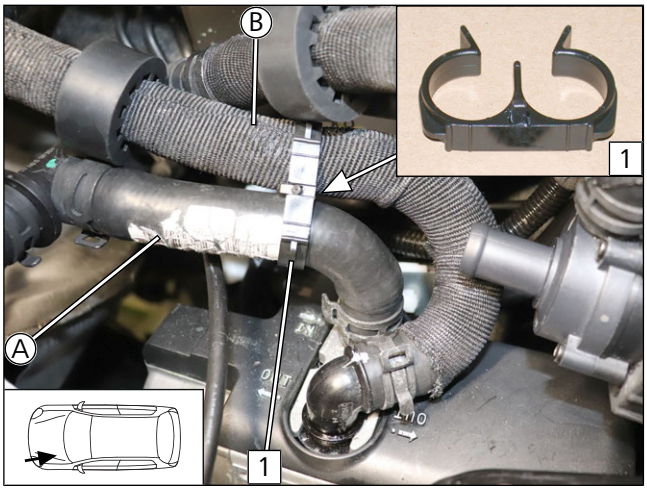


Fig. 91

1 Hose bracket

Mounting hose Ⓒ

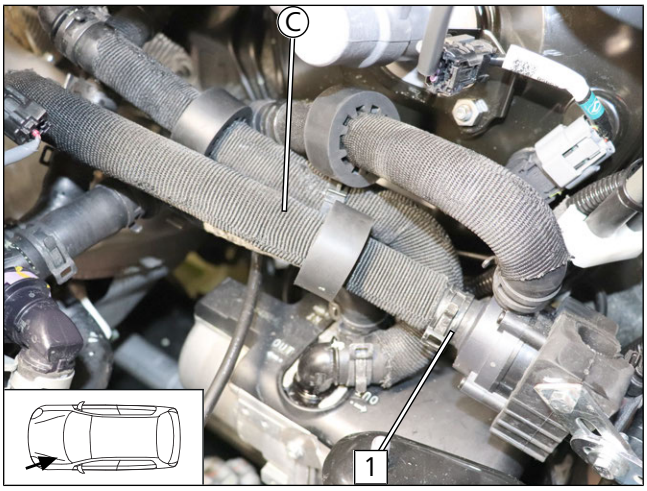


Fig. 92

1 Coolant pump inlet connection piece

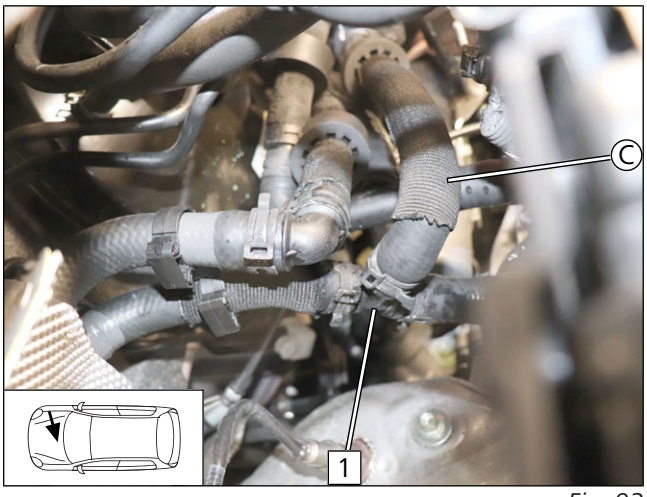


Fig. 93

1 T piece

Mounting coolant pump connector

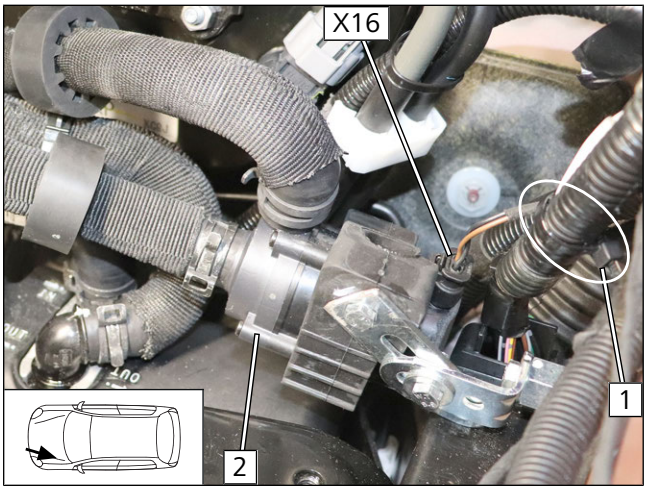


Fig. 94

1 Cable tie
2 Coolant pump
X16 Coolant pump wiring harness connector

Checking distance

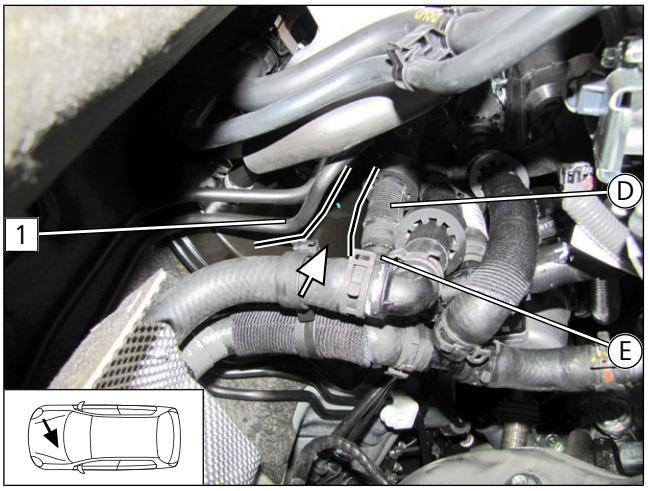
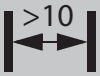


Fig. 95

Ensure sufficient distance between original vehicle lines 1 and hose (D) and (E), correct if necessary.



11 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

11.1 Routing fuel line

Routing and fastening fuel line

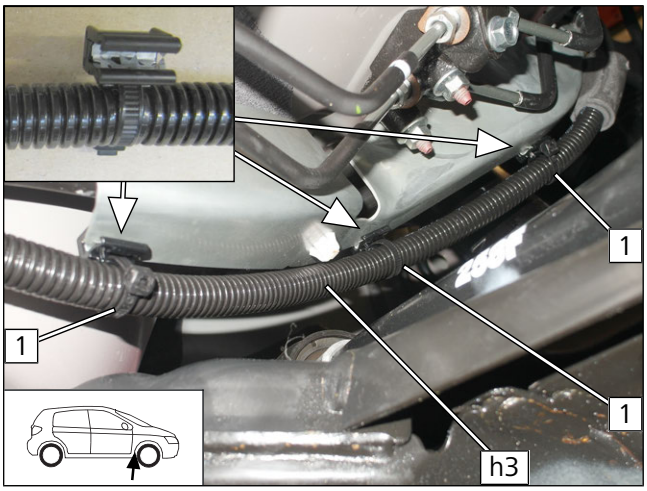


Fig. 96

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

1 Edge clip cable tie

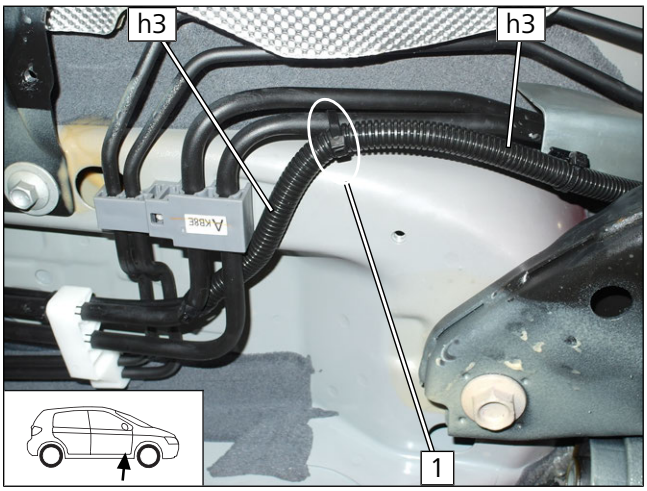


Fig. 97

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

1 Cable tie

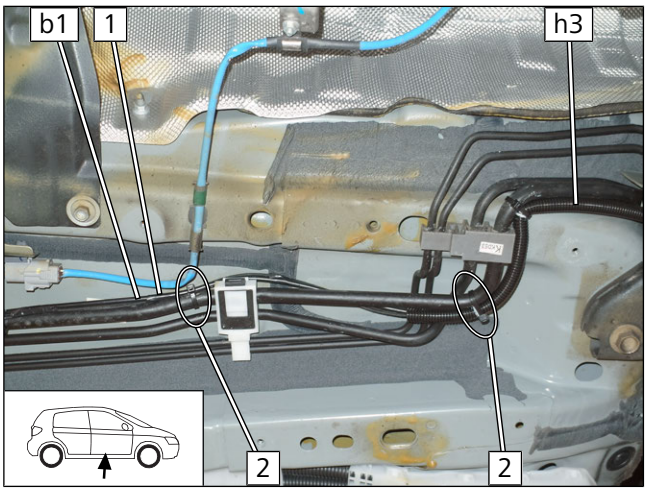


Fig. 98

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

2 Cable tie

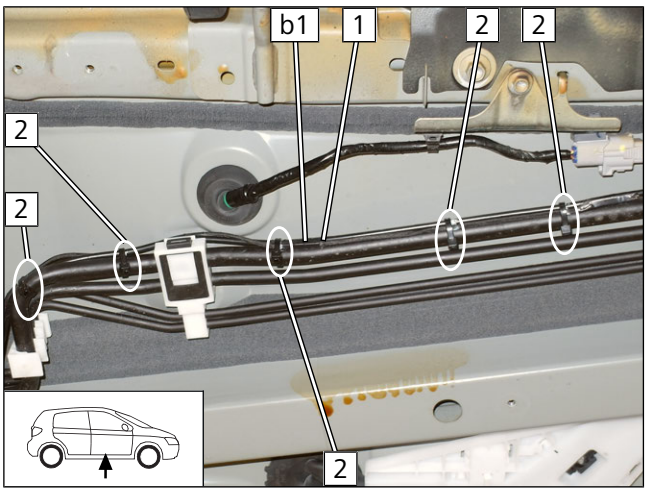


Fig. 99

▶ Route fuel line **b1** and fuel pump wiring harness **1** along original vehicle fuel lines to the installation location of the fuel pump.

2 Cable tie

Premounting fuel pump

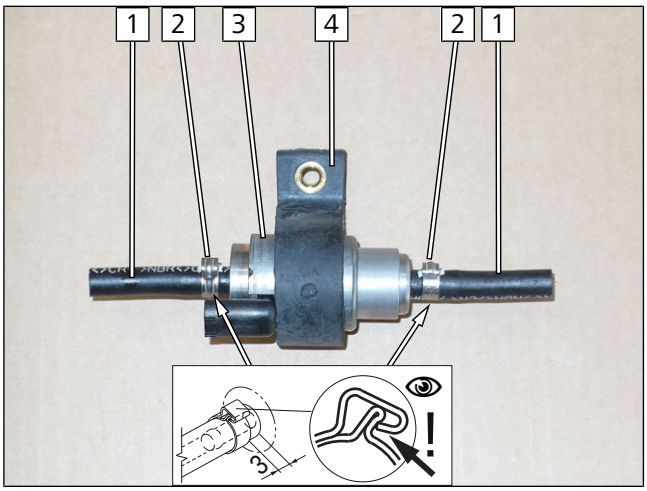


Fig. 100

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

Bending perforated bracket at an angle

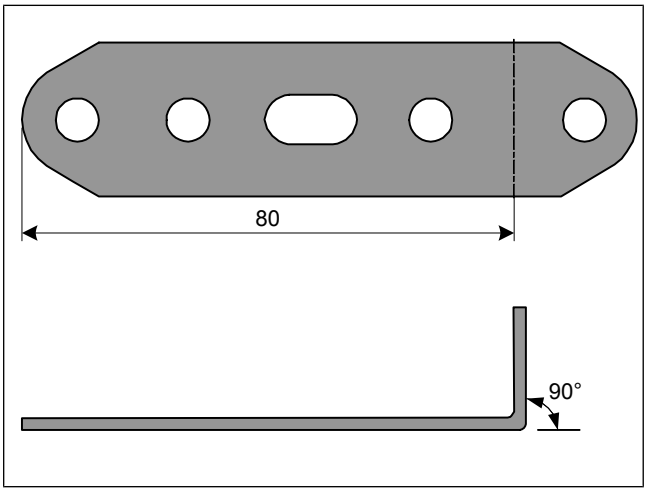


Fig. 101

Installing perforated bracket

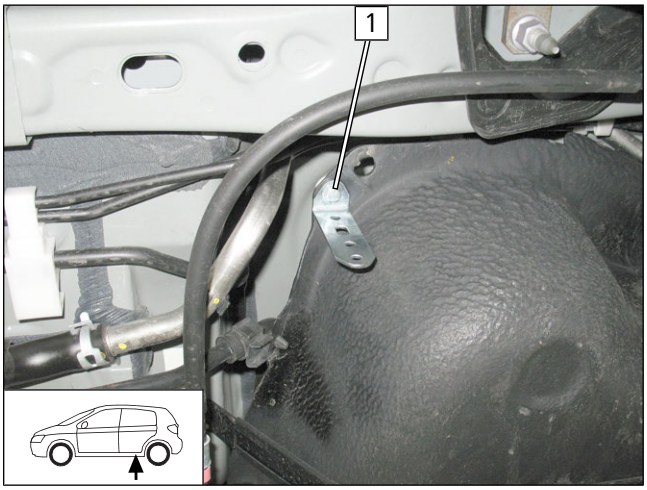


Fig. 102

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

Mounting fuel pump

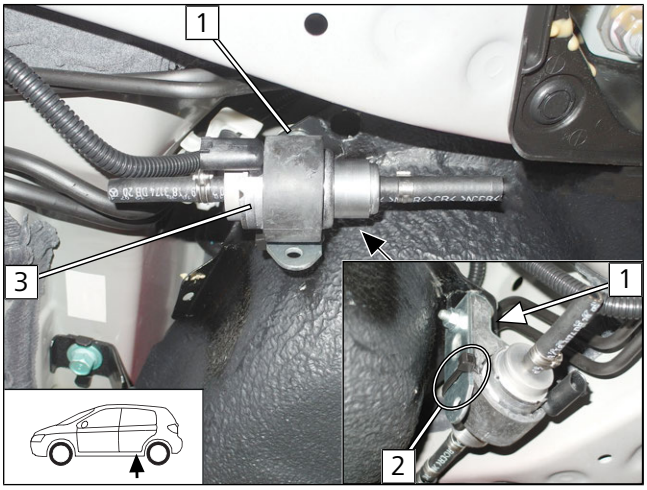


Fig. 103

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

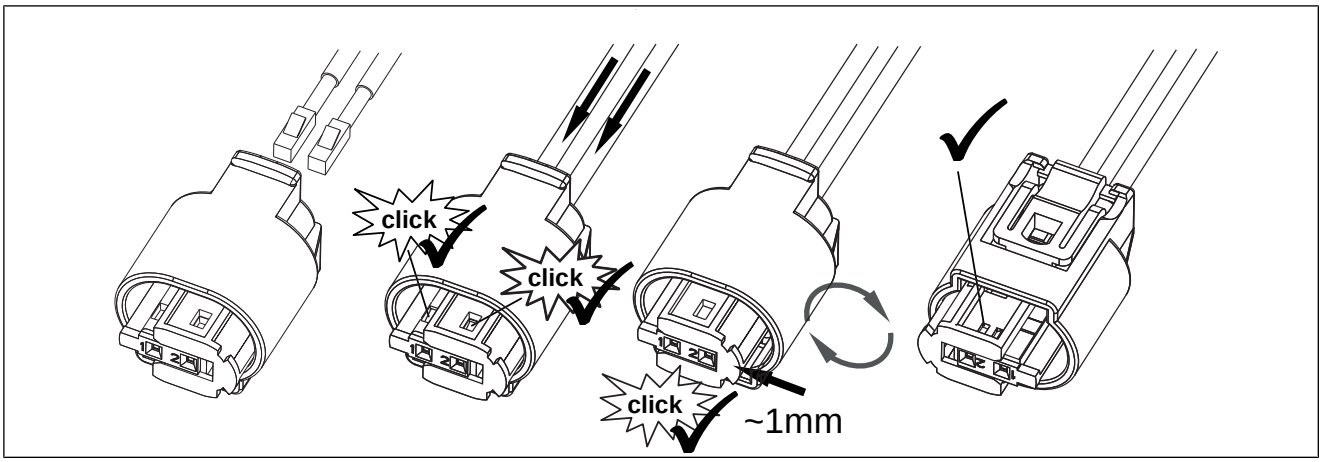


Fig. 104

Fuel pump connection

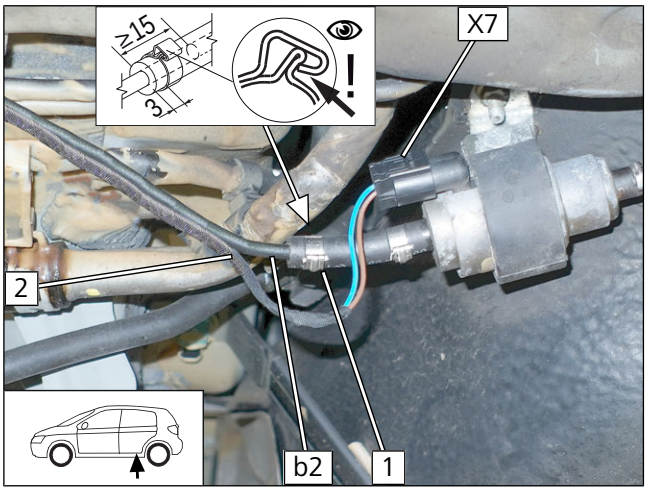


Fig. 105

1 Ø10 clamp
2 Fuel pump wiring harness

b2 Heater fuel line

Fastening fuel line **b2** and fuel pump wiring harness **2**

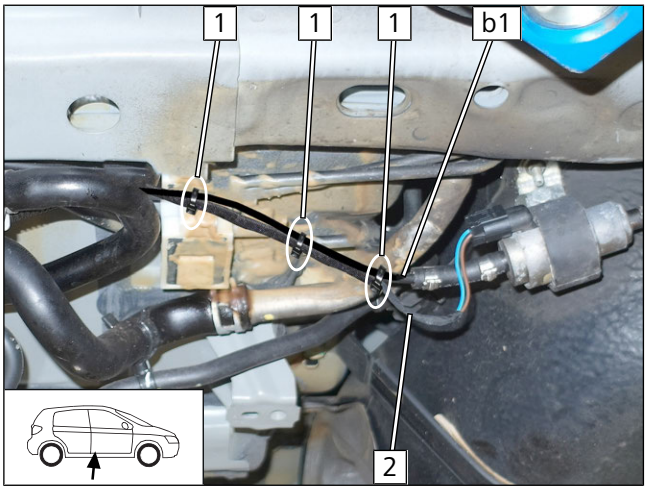


Fig. 106

1 Cable tie

Routing and fastening wiring harness

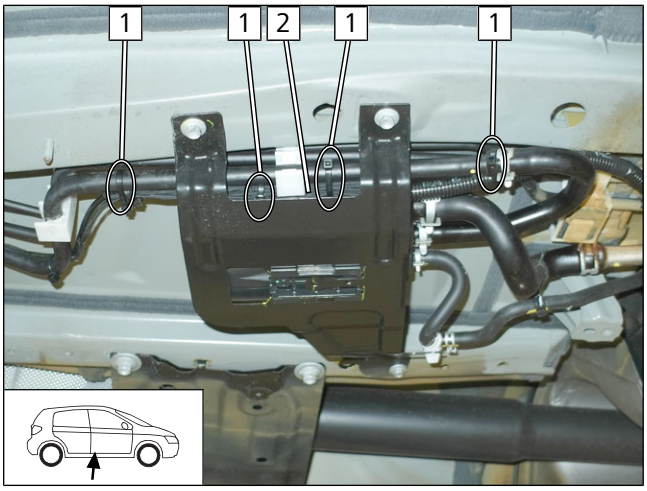


Fig. 107

▶ Attach excess wire length [2] to original vehicle fuel lines.

[1] Cable tie

11.2 Installing FuelFix

Moving label

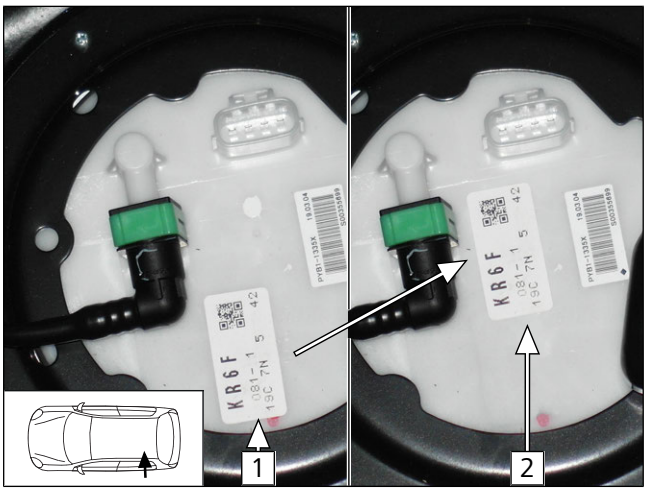


Fig. 108

▶ Move original vehicle label (if present) from pos. [1] to position [2] as shown.

Work steps F1, F2

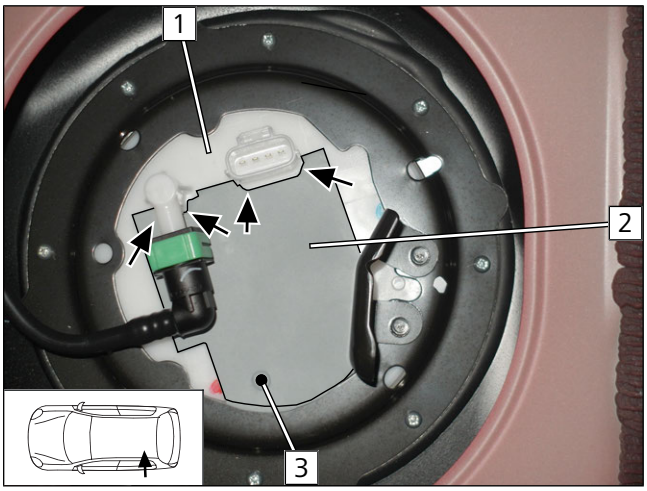


Fig. 109

Observe the installation instructions of the tank extracting device.

▶ Cut out drilling template [2] and position as shown.

▶ Copy hole pattern [3].

[1] Tank fitting

Work step F3

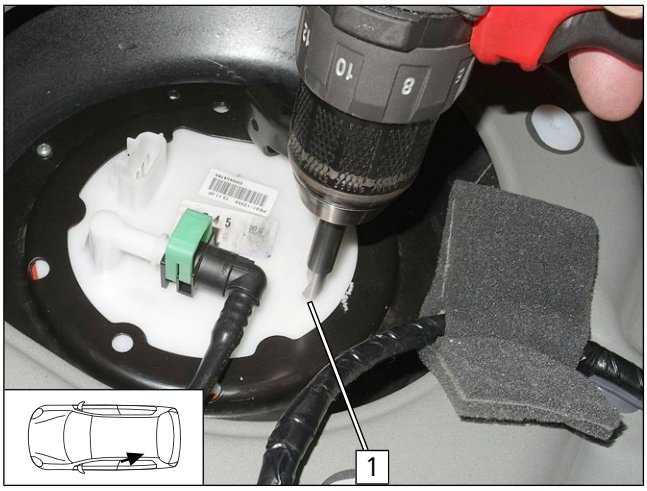


Fig. 110

DANGER

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

[1] Hole made with provided drill

Work steps F4, F5.1, F5.2

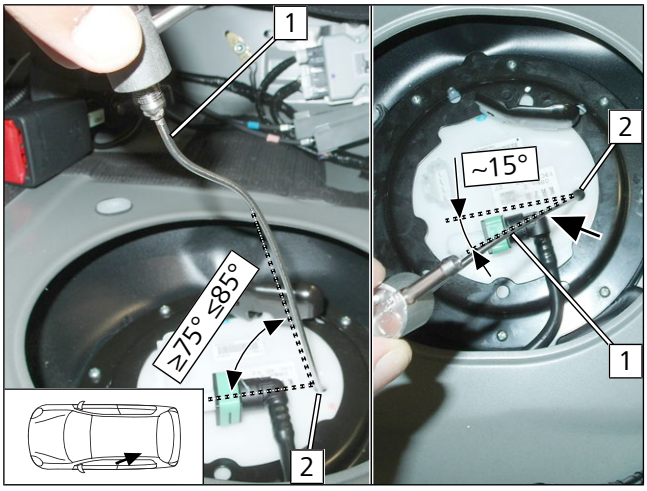


Fig. 111

Be careful not to nick the wires on the inside when inserting the FuelFix. Observe the work angle shown in the figure during the insertion.

- ▶ Bend FuelFix [1] according to template and cut to length.
- ▶ Insert FuelFix in hole [2] as shown.

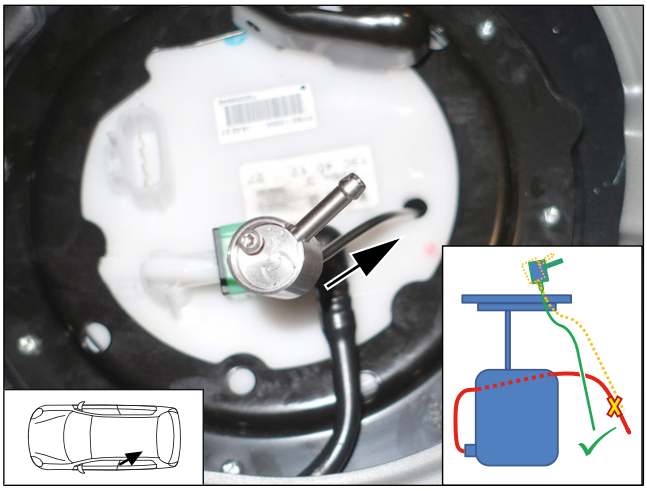


Fig. 112

Maintain the work angle as shown in the previous figure for this step and the rest of the process.

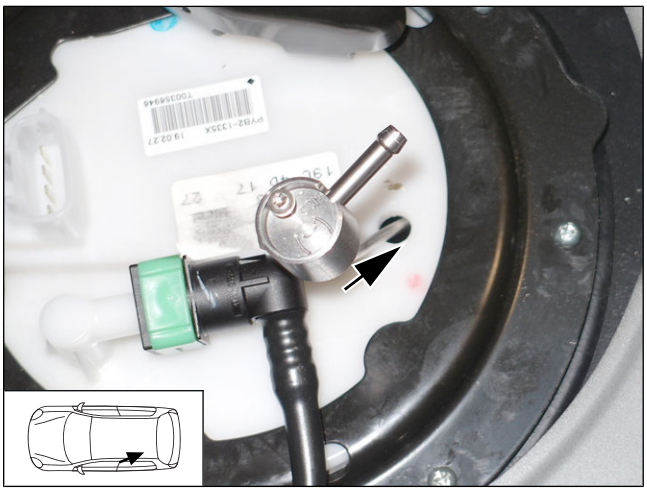


Fig. 113

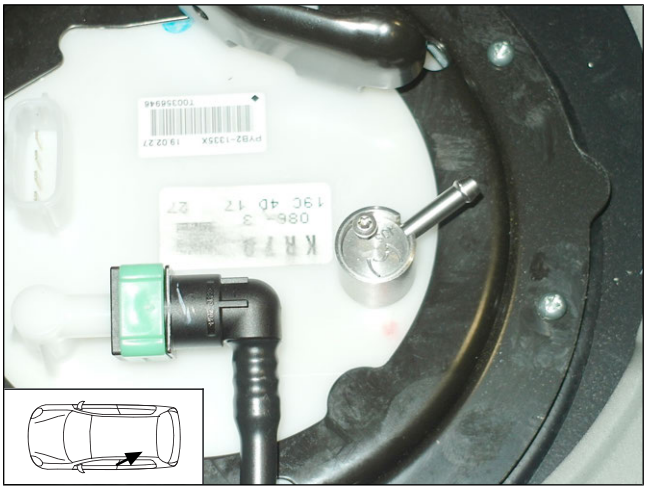


Fig. 114

Work steps F5.3, F5.4

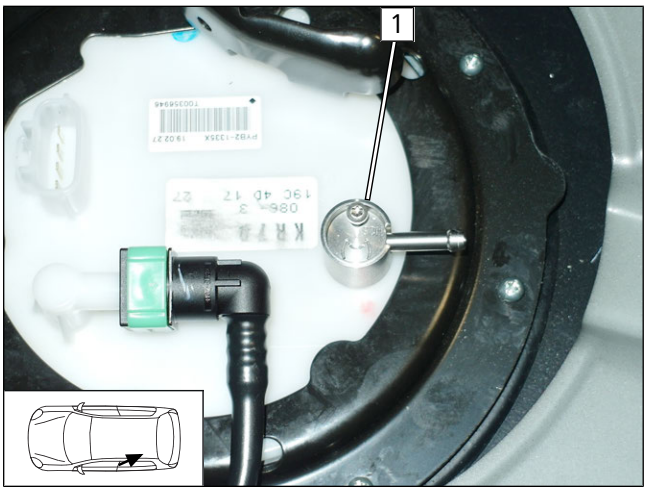


Fig. 115

▶ Align FuelFix as shown.

Work step F6.2

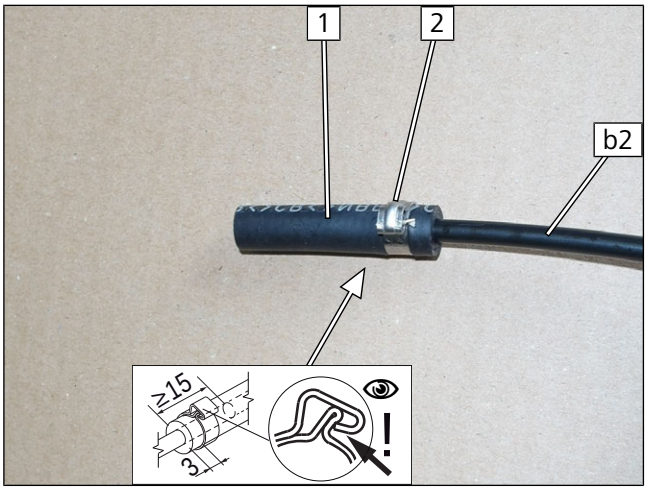


Fig. 116

1 Hose section
2 Ø10 clamp

b2 Fuel line of FuelFix (500)

Routing fuel line

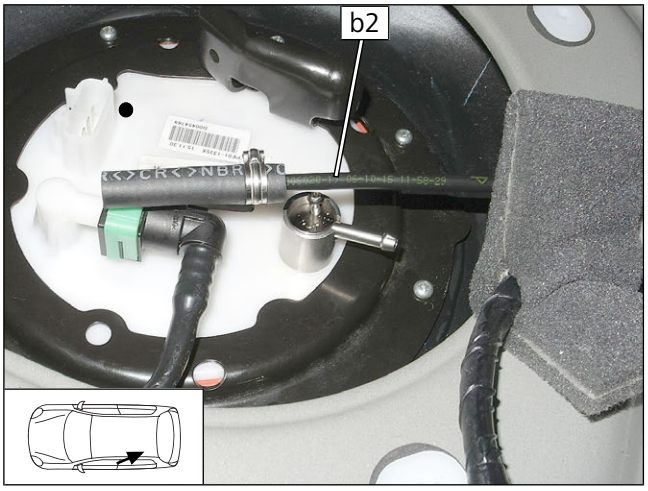


Fig. 117

▶ Route premounted fuel line **b2** to the fuel pump installation location as shown.

Work step F6.1

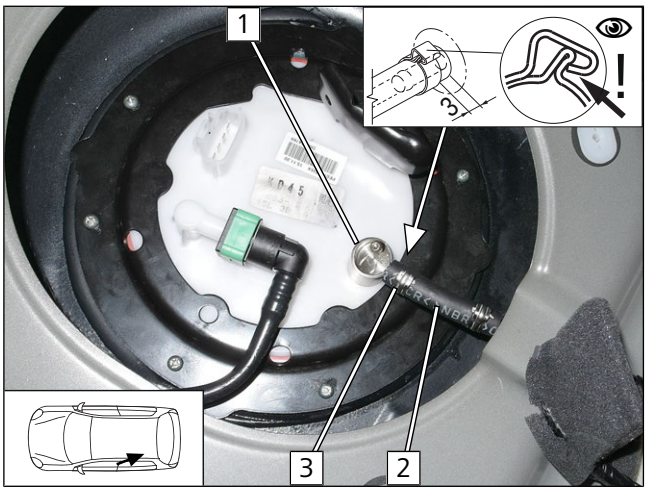


Fig. 118

1 FuelFix
2 Premounted hose section
3 Ø10 clamp

Work step F7

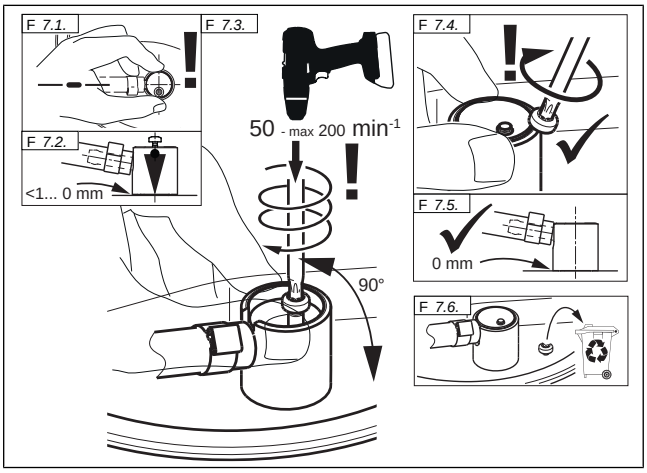


Fig. 119

DANGER

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

▶ Mount FuelFix.

Work step F8

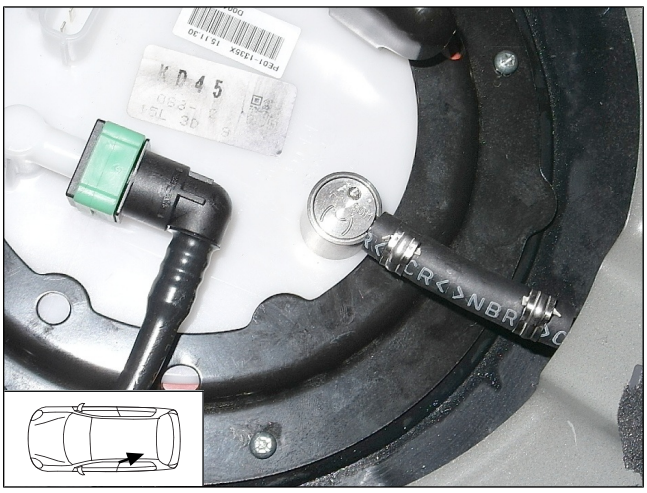


Fig. 120

▶ Ensure firm seating of FuelFix.

Securing fuel line **b2**.

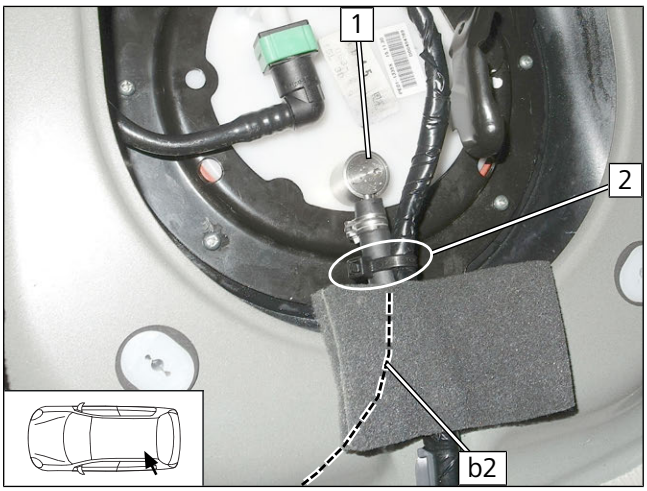


Fig. 121

1 FuelFix
2 Cable tie for tension relief

b2 FuelFix fuel line (covered)

11.3 Fuel pump connection

Connecting fuel line of FuelFix

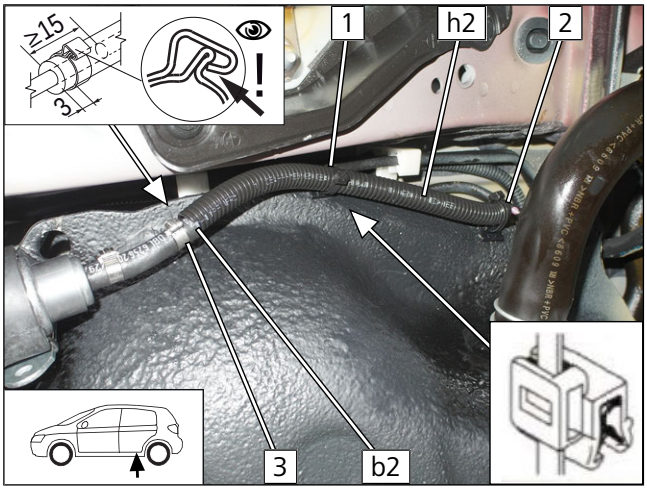


Fig. 122

Danger of damage to components

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

- ▶ Draw fuel line of Fuelfix **b2** into corrugated tube **h2** and fasten as shown in Fig. with edge clip cable tie **1**.
- ▶ Mount edge clip cable tie **2** as shown in next figure.

3 Ø10 clamp

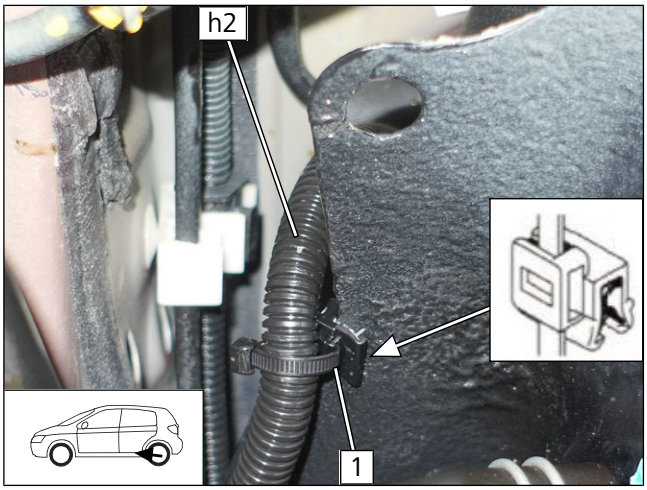


Fig. 123

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

12 Exhaust

Preparing exhaust pipe

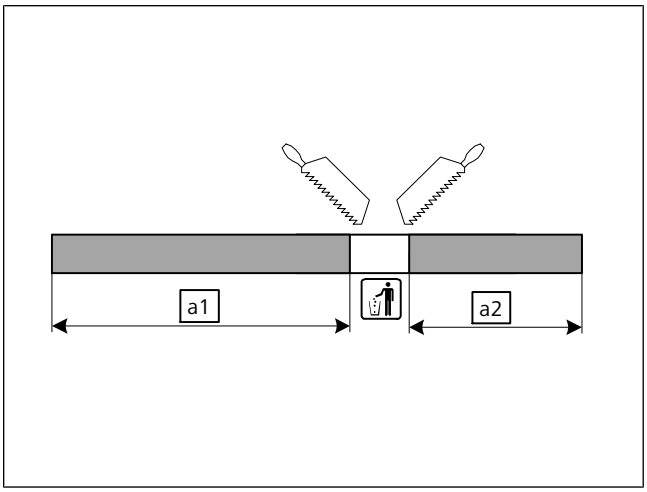


Fig. 124

	2 WD	4 WD
a1	250	250
a2	200	230

Bending perforated bracket

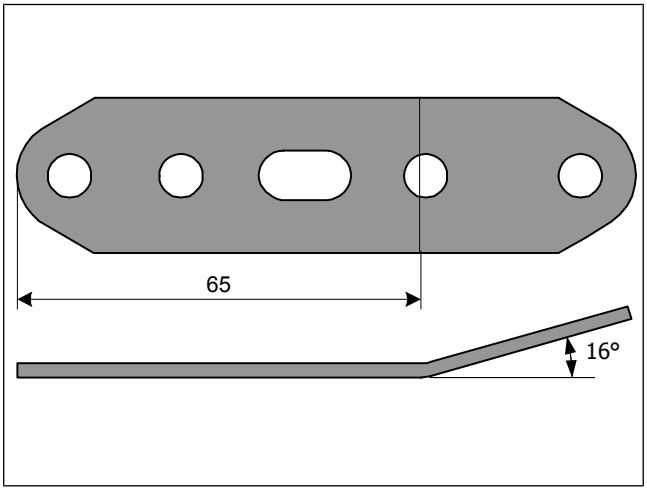


Fig. 125

Premounting exhaust silencer

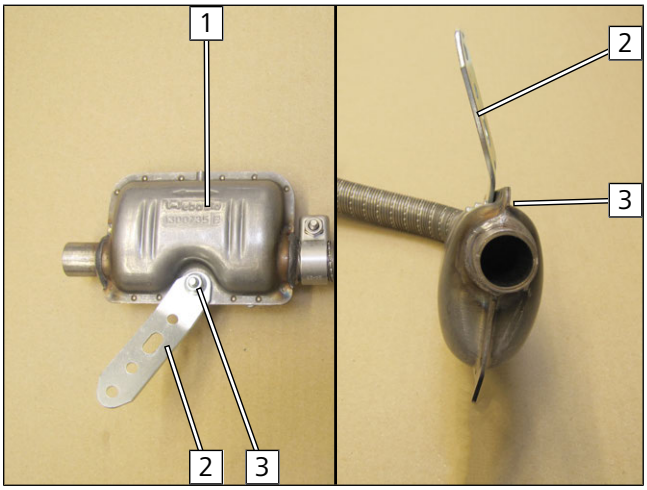


Fig. 126

1 Exhaust silencer

3 M6x16 bolt, large diameter washer, perforated bracket 2, flanged nut (8-10Nm)

Premounting exhaust pipe a1

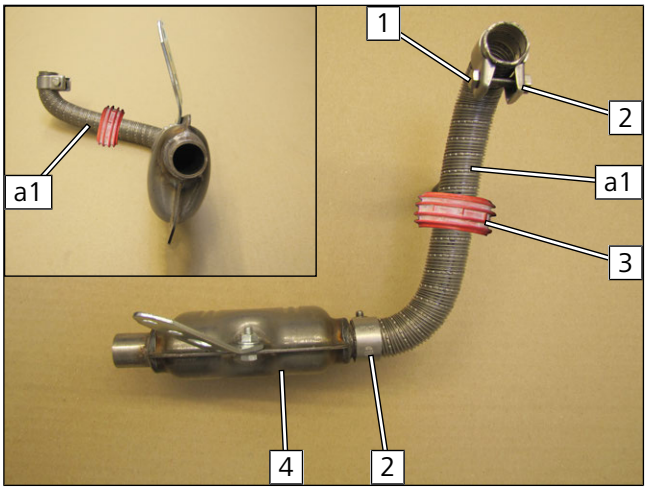


Fig. 127

- ▶ Mount spacer bracket 3 as shown.
- ▶ Position bolt head 1 of hose clamp as shown.
- ▶ Bend exhaust pipe a1 as shown.

1 Mount hose clamp loosely
4 Exhaust silencer

Installing spacer nut

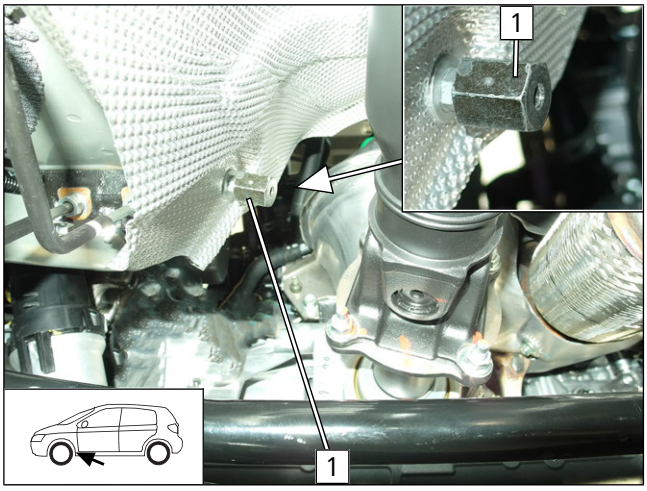


Fig. 128

The following assembly is shown on a 4WD vehicle but the instructions also apply to 2WD vehicles

1 Spacer nut (20), original vehicle stud bolt (8-10Nm)

Mounting exhaust silencer loosely

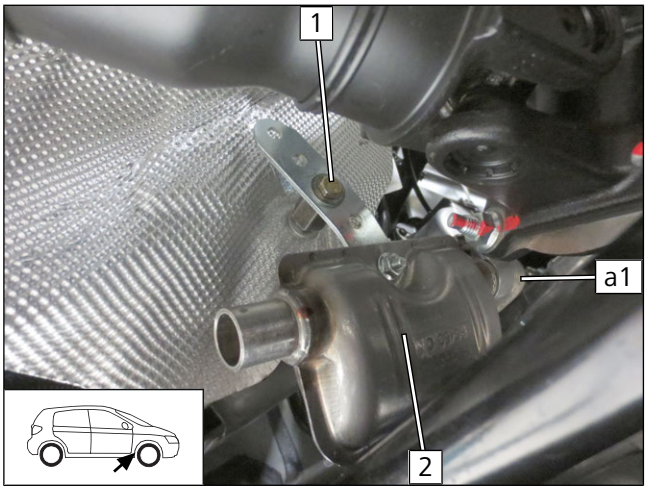


Fig. 129

- ▶ Move exhaust silencer 2 into installation position and mount loosely.

1 M6x12 bolt, spring lock washer, large diameter washer, premounted perforated bracket, pre-mounted spacer nut

Mounting exhaust pipe **a1**

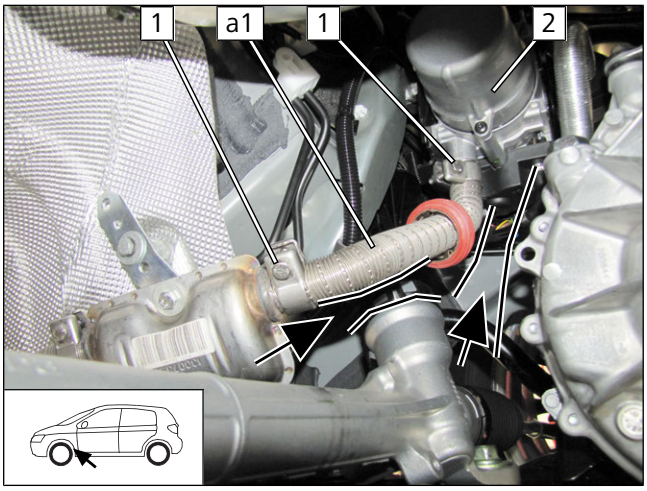


Fig. 130

Ensure sufficient distance between exhaust pipe **a1** transmission and steering, correct if necessary.

1 Tighten hose clamp

2 Heater

Mounting exhaust silencer

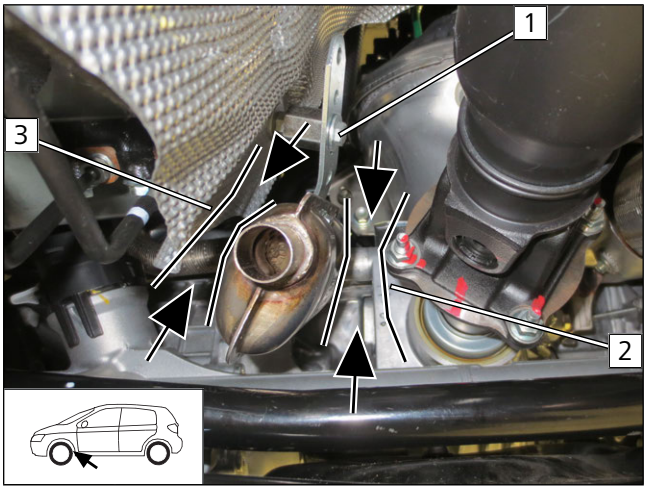
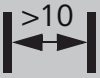


Fig. 131

Ensure sufficient distance around the exhaust silencer, correct if necessary.

2 = 

3 = 

1 Tighten bolt M6x12 (8-10Nm)

Preparing exhaust pipe **a2**

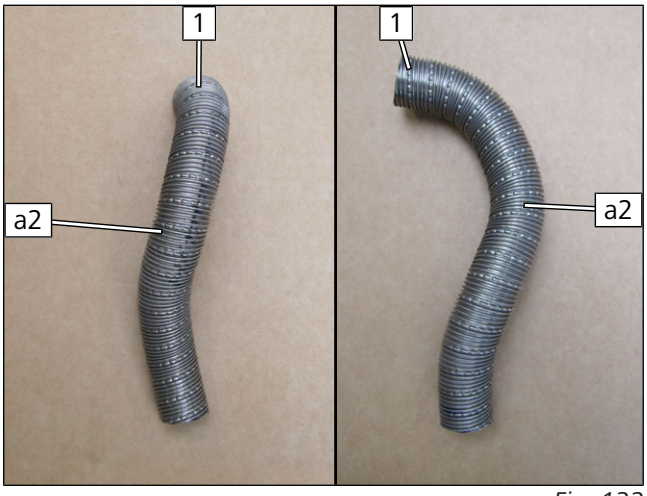


Fig. 132

2 WD

▶ Bend exhaust pipe **a2** as shown.

1 Connection side on exhaust silencer

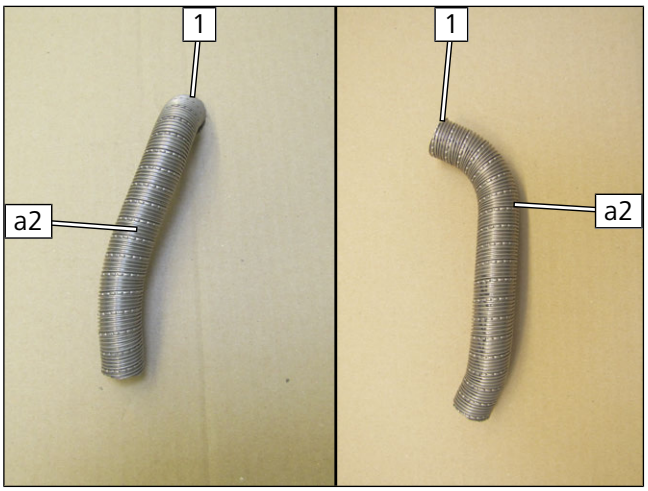


Fig. 133

4 WD

▶ Bend exhaust pipe **a2** as shown.

1 Connection side on exhaust silencer

Mounting exhaust pipe **a2**

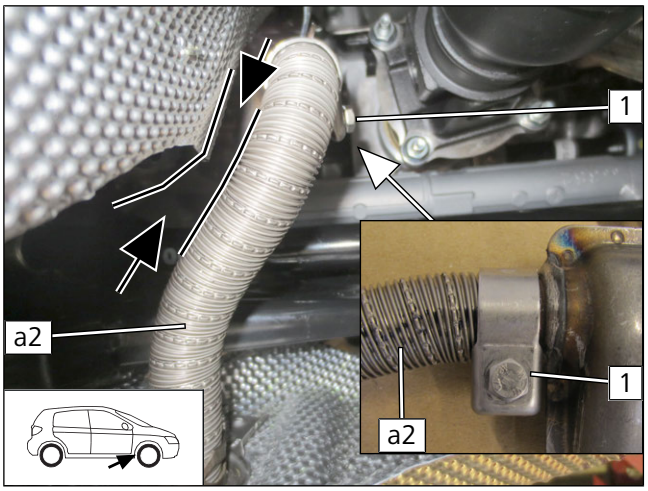


Fig. 134

Ensure sufficient distance around exhaust pipe **a2**, correct if necessary.

>10

The illustration shows a vehicle with 4WD but it applies also to vehicles with 2WD.

1 Hose clamp

12.1 Exhaust end fastener (EFIX) installation, 2WD

Work step E1.1

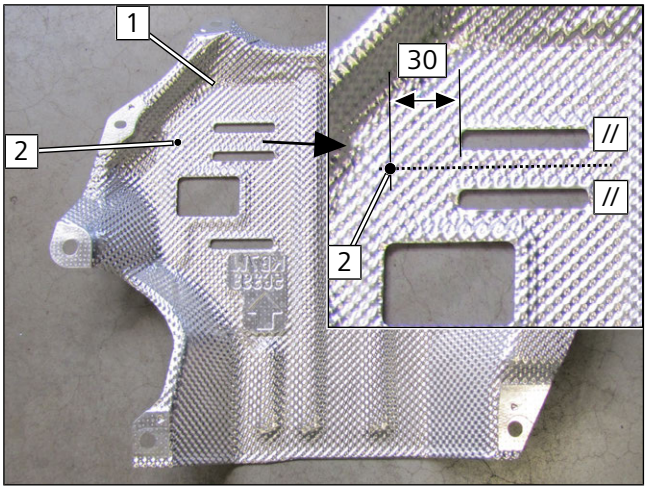


Fig. 135

Observe the EFIX installation instructions.

▶ Copy hole pattern **2**.

1 Heat guard plate

Work step E1.2

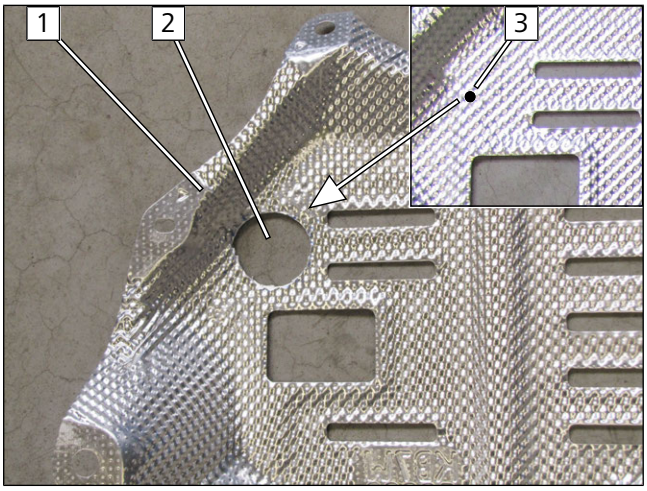


Fig. 136

1 Heat guard plate
2 Ø42 hole
3 Hole pattern from E1.1

Work steps E3 and E4

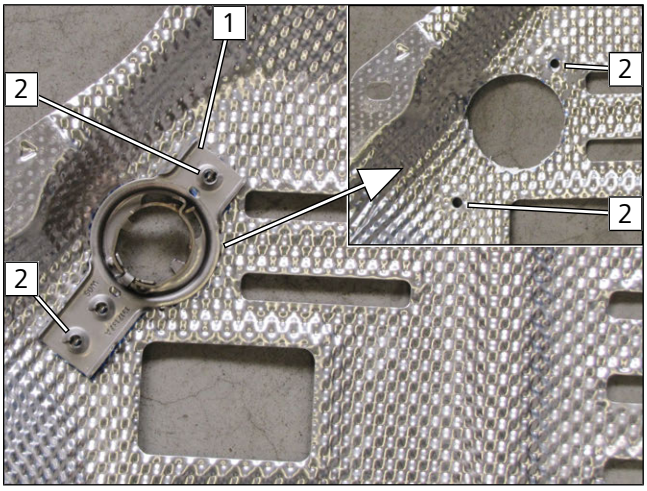


Fig. 137

▶ Position exhaust end fastener 1 as shown.

2 Copy hole pattern, Ø5 hole

Work step E5

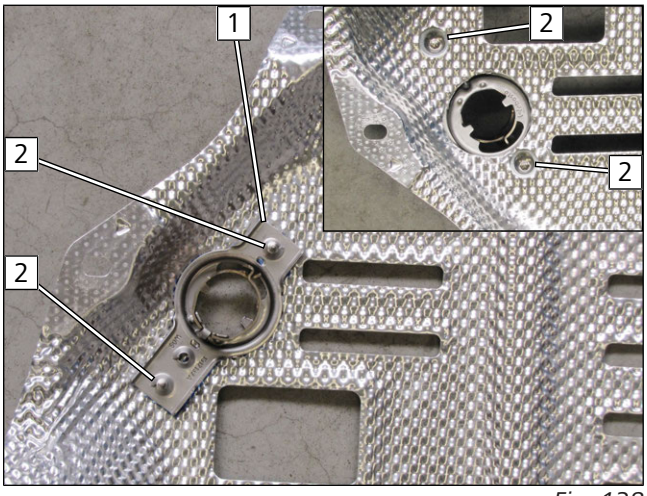


Fig. 138

1 EFIX
2 5x13 self-tapping screw, large diameter washer

Work steps E6-8

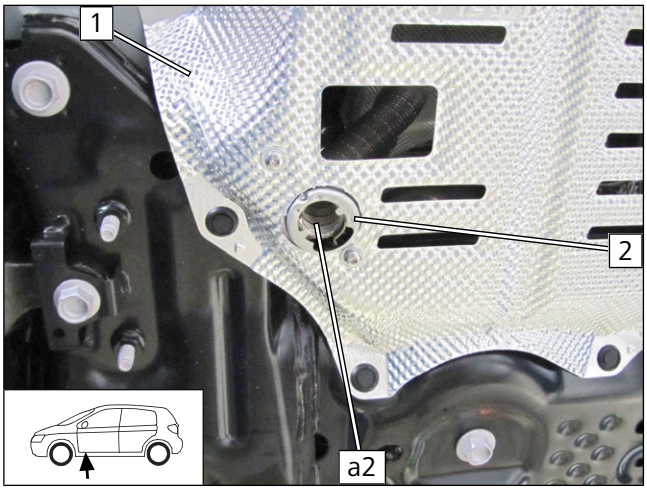


Fig. 139

Ensure sufficient distance around exhaust pipe **a2**, correct if necessary.

- ▶ Mount heat guard plate **1**.
- ▶ Mount exhaust pipe **a2** in premounted EFIX **2**.

12.2 Exhaust end fastener (EFIX) installation, 4WD

Work step E1

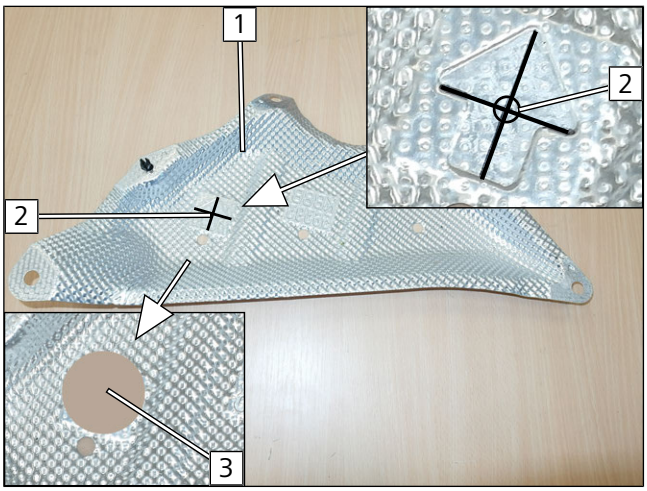


Fig. 140

Observe the EFIX installation instructions.

- ▶ Copy hole pattern **2**.
- ▶ Drill Ø42 hole **3**.

1 Heat guard plate

Work steps E3 and E4

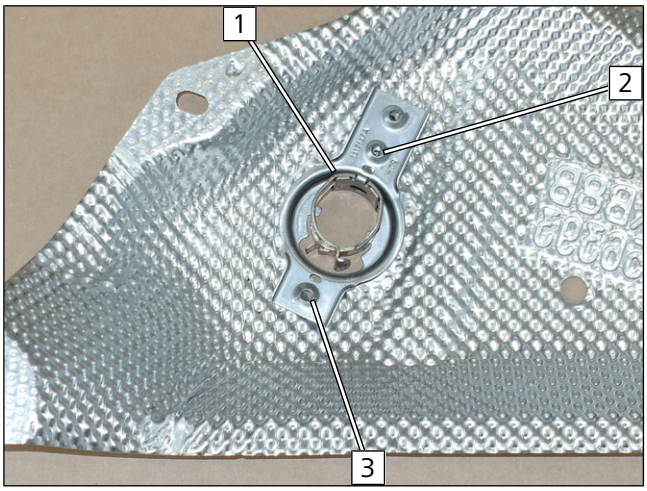


Fig. 141

- ▶ Place exhaust end fastener **1** in position and align exactly with original vehicle hole **3**.

1 Copy hole pattern, Ø5 hole

Work step E5

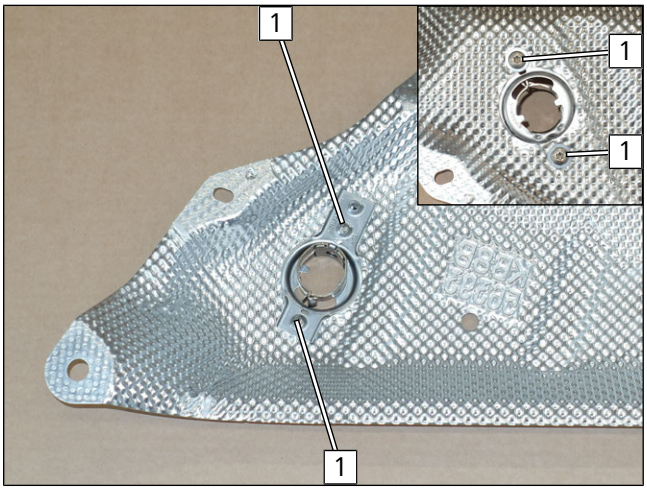


Fig. 142

1 5x13 self-tapping screw, large diameter washer

Work step E6-8

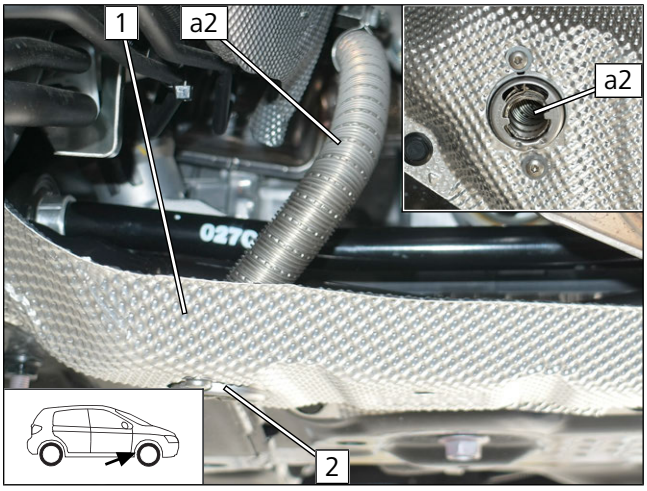


Fig. 143

Ensure sufficient distance around exhaust pipe **a2**, correct if necessary.

>20

- ▶ Mount heat guard plate **1**.
- ▶ Mount exhaust pipe **a2** in premounted EFIX **2**.

13 Electrical system of passenger compartment

13.1 Electrical system preparation

Preparing / assigning wires

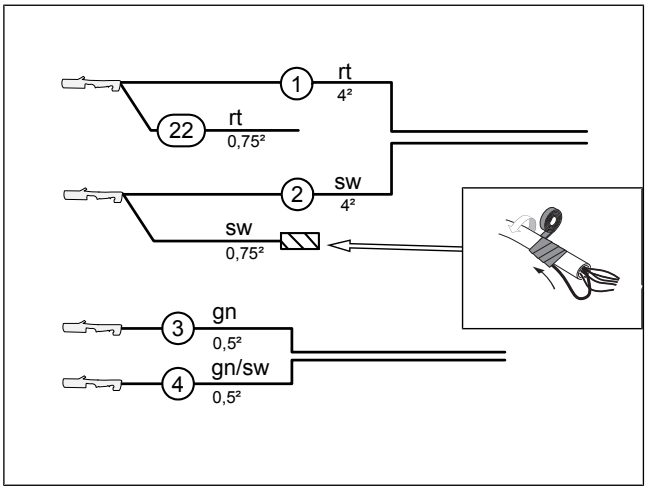


Fig. 144

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

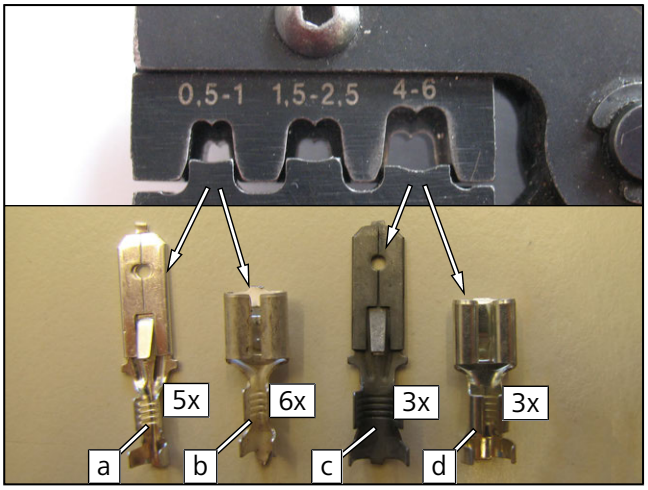


Fig. 145

[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

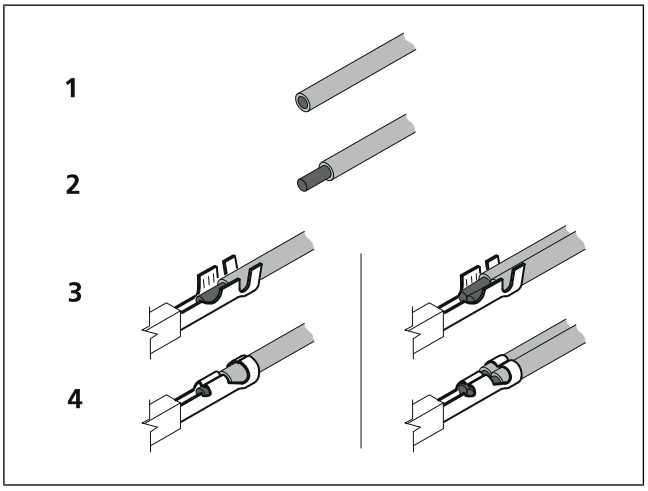


Fig. 146

Preparing fan wiring harness

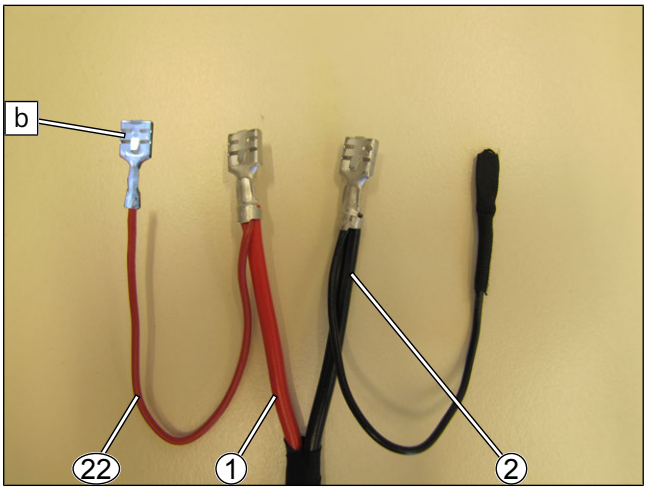


Fig. 147

▶ 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)

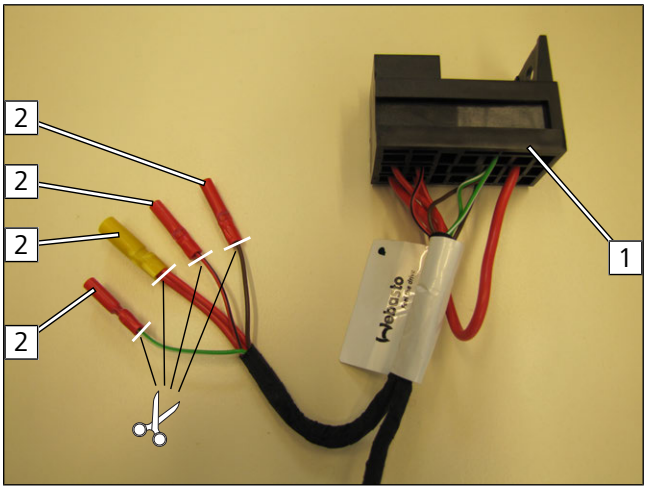


Fig. 148

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

[1] RSH

Installing male connector

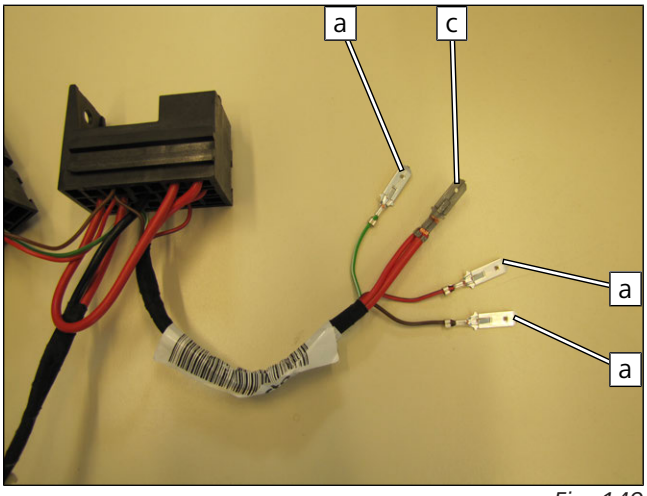


Fig. 149

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

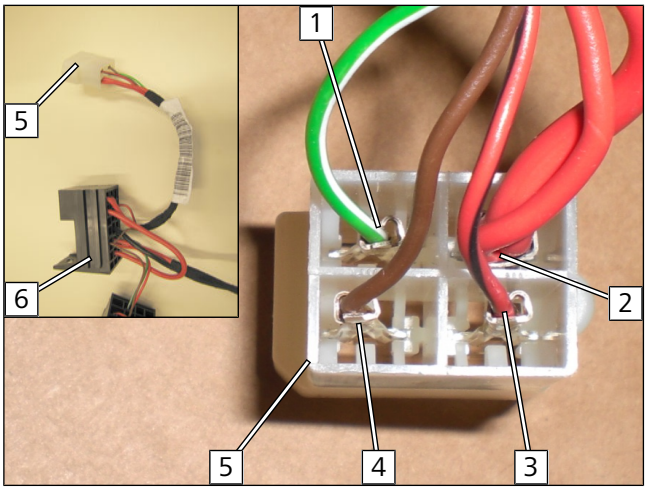
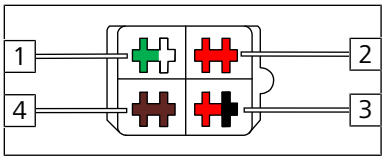


Fig. 150

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)

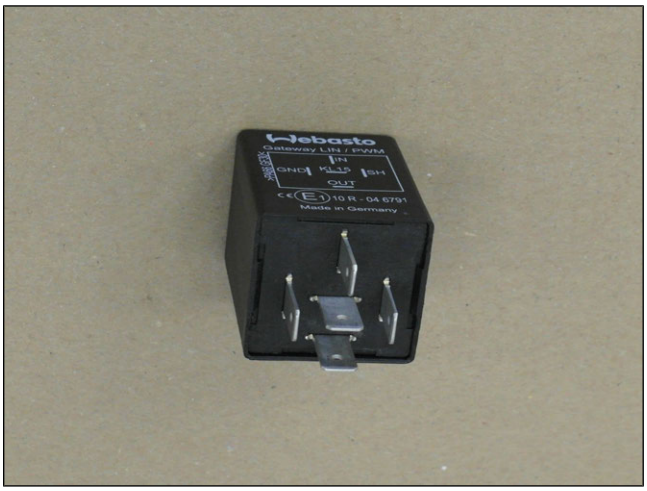


Fig. 151

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

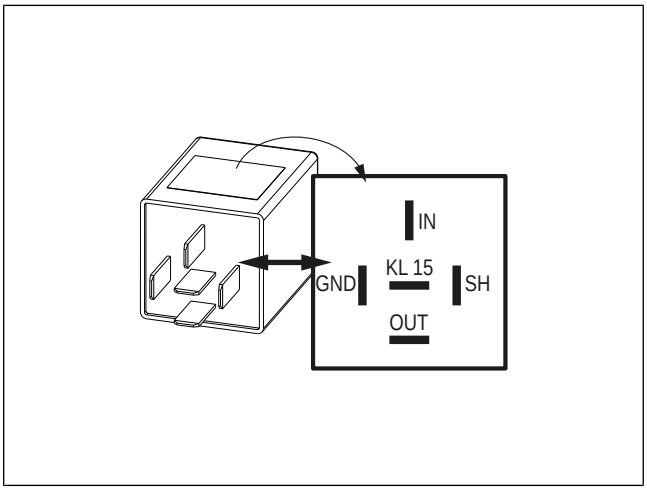


Fig. 152

▶ 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

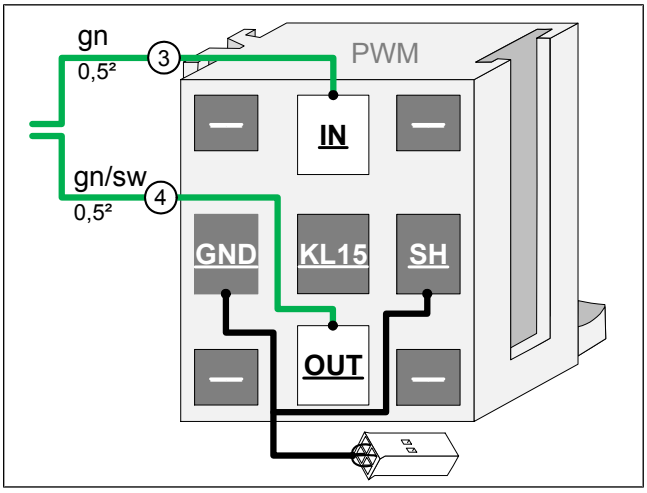


Fig. 153

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

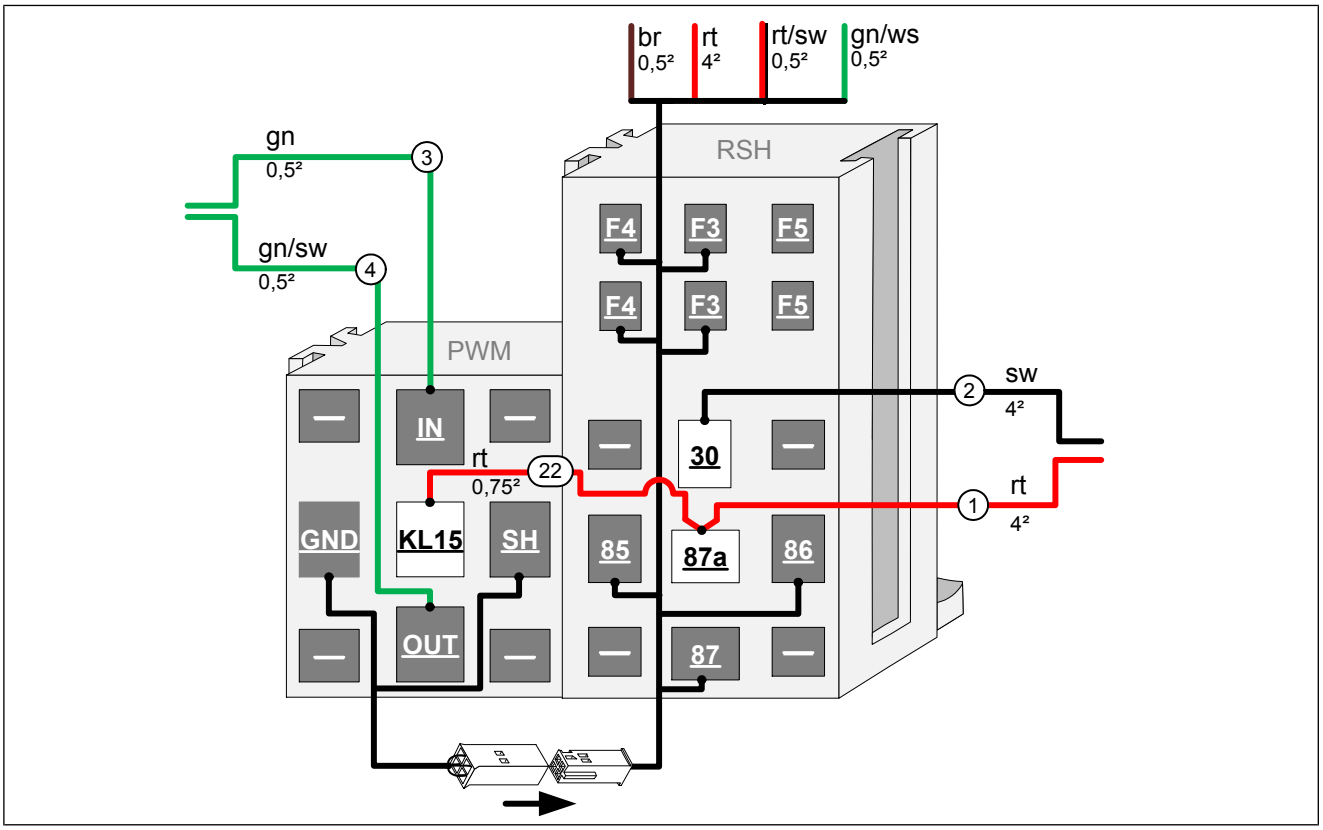


Fig. 154

Premounting RSH and PWM GW socket

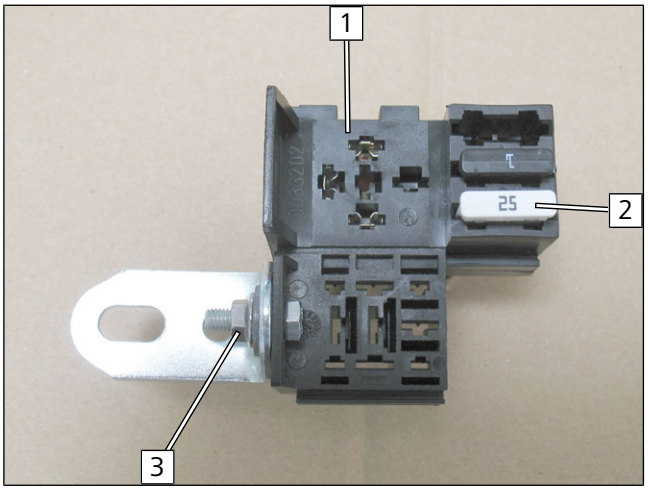


Fig. 155

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

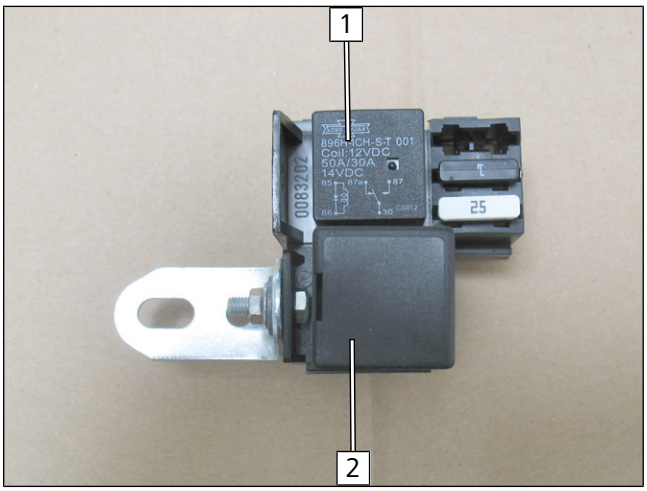


Fig. 156

1 Relay K1
2 PWM GW

13.4 Routing and premounting the wiring harnesses in the passenger compartment

Mounting contacts

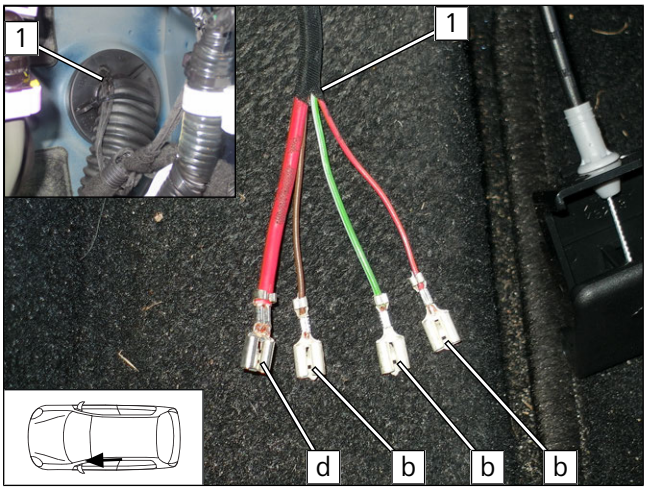


Fig. 157

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

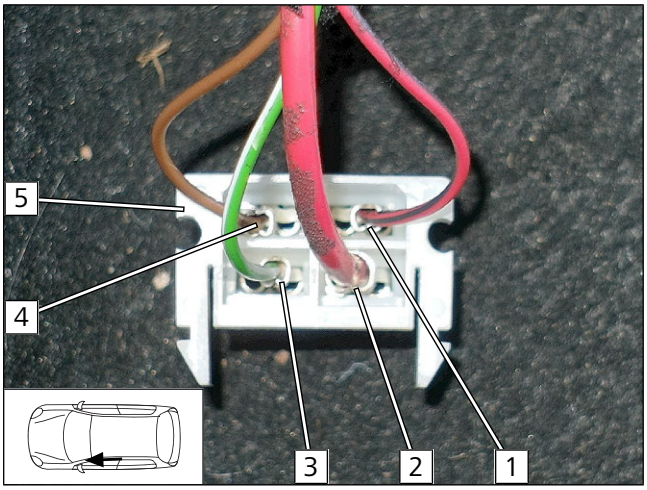
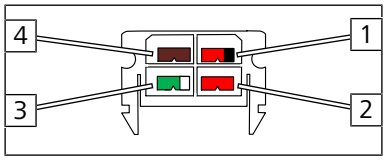


Fig. 158

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

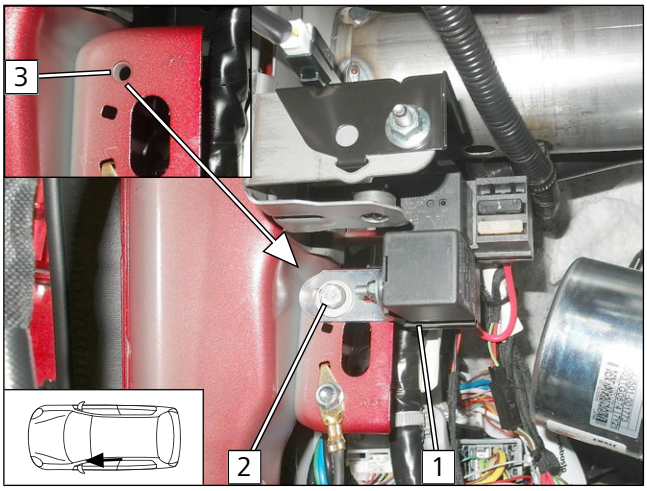


Fig. 159

Vehicles up to MY 2019

1 RSH, premounted

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

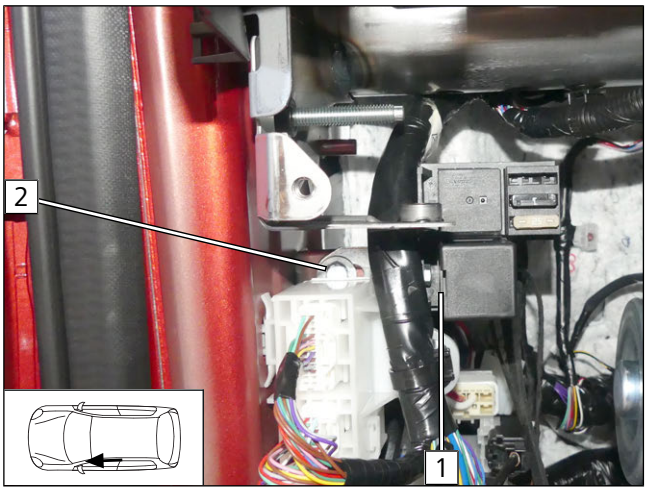


Fig. 160

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

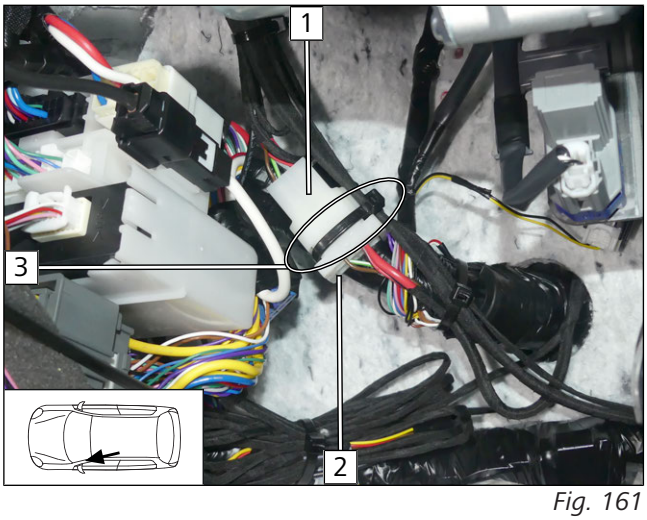


Fig. 161

all vehicles

1 Connector housing of RSH wiring harness

2 Fan controller wiring harness male housing

3 Cable tie

Routing wiring harnesses

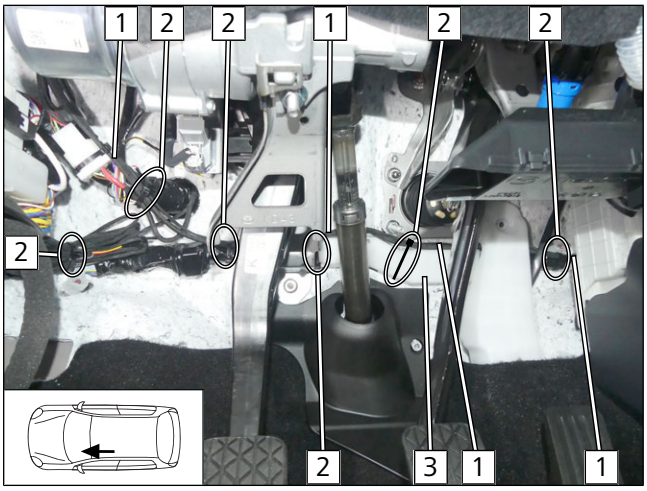


Fig. 162

▶ 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

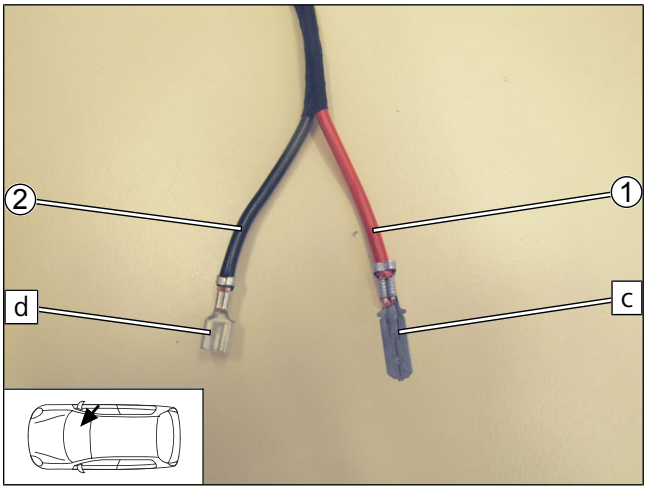


Fig. 163

▶ 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

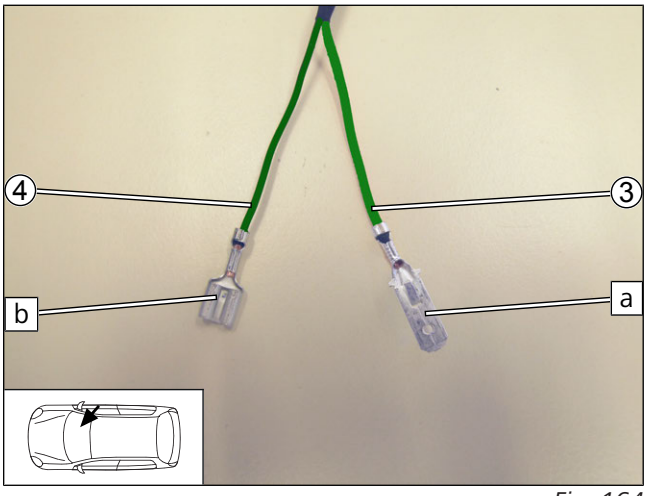


Fig. 164

▶ 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

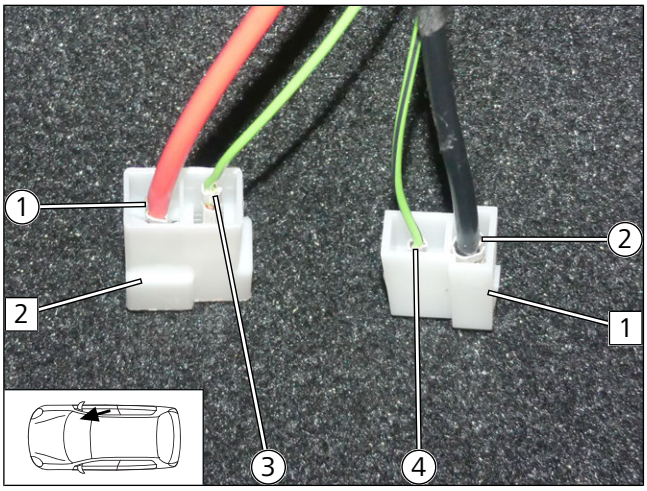


Fig. 165

1 2-pin female connector housing

2 2-pin male connector housing

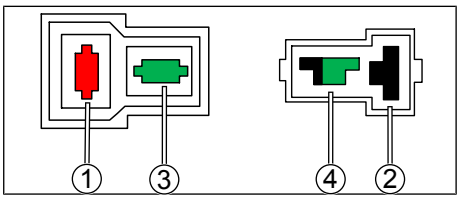
① Red (rt) (4.0mm²) wire of fan wiring harness of K1/87a

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

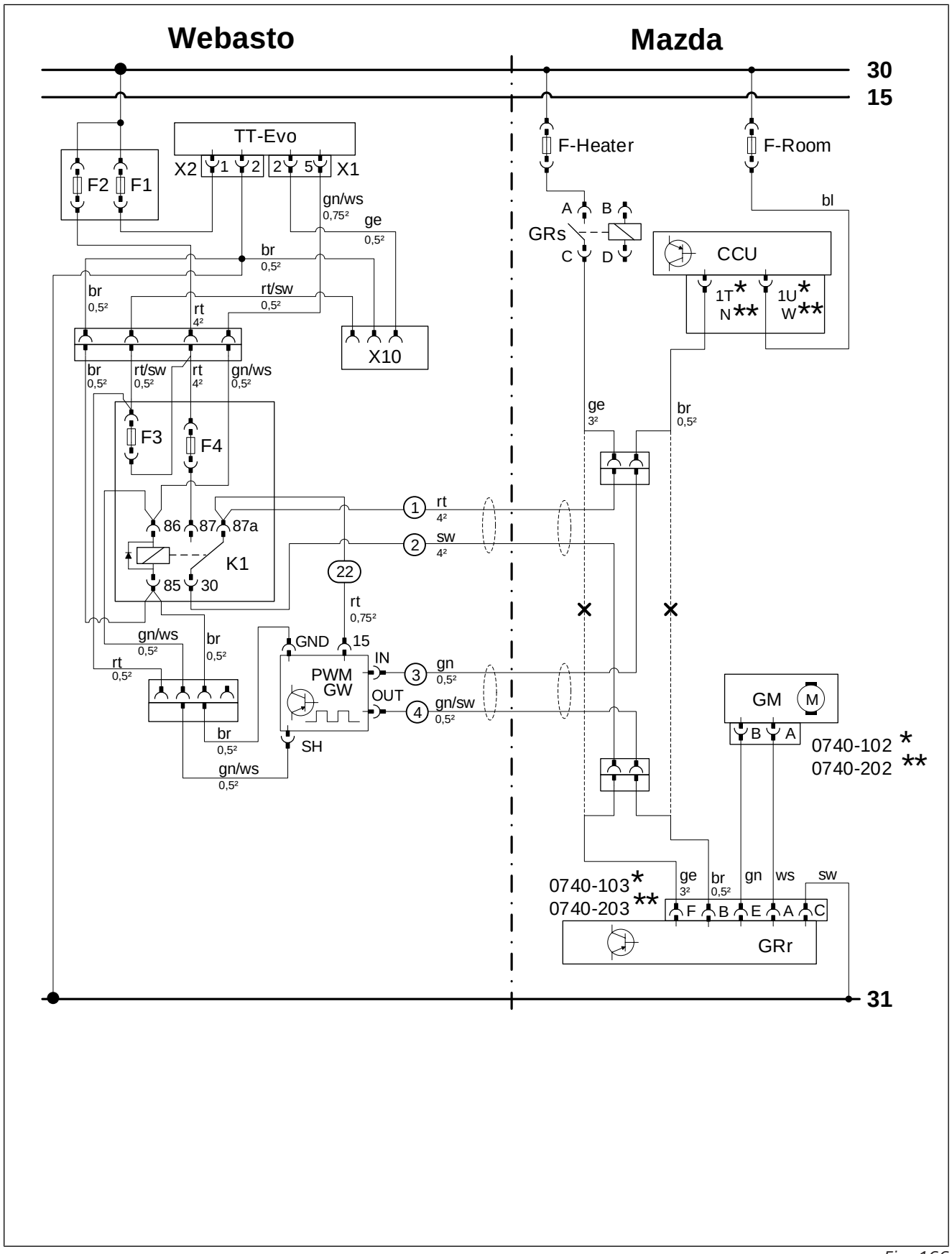


Fig. 166

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.

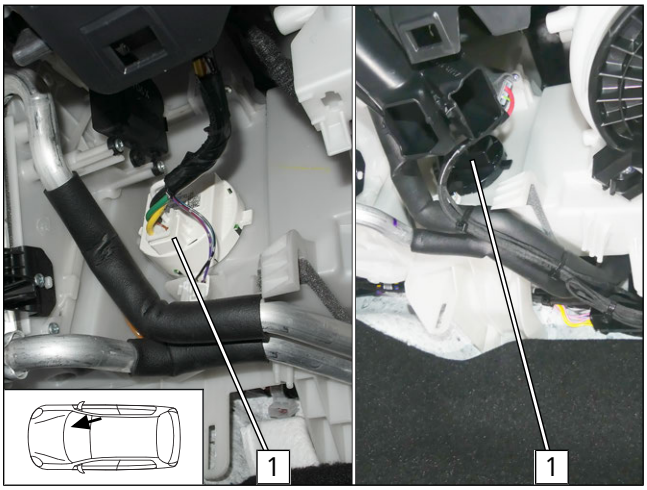
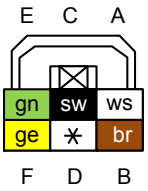


Fig. 167

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

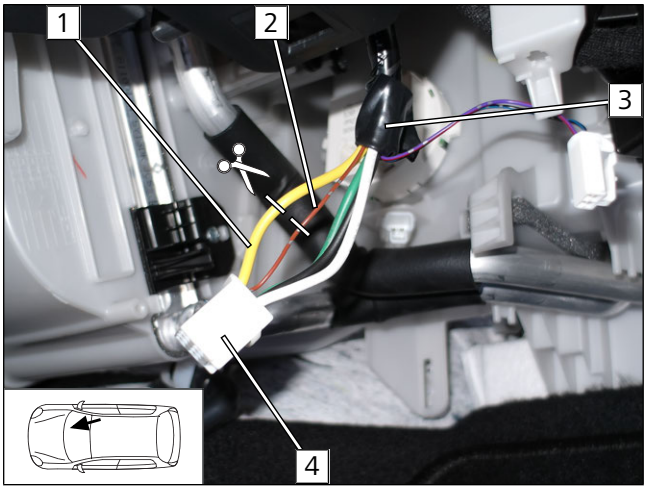


Fig. 168

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

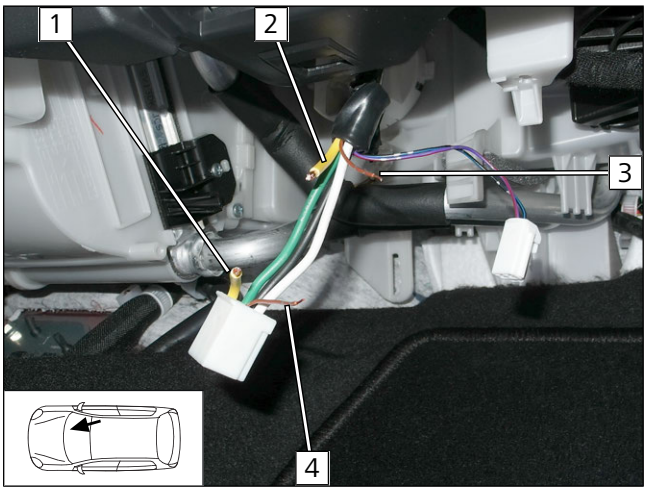


Fig. 169

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

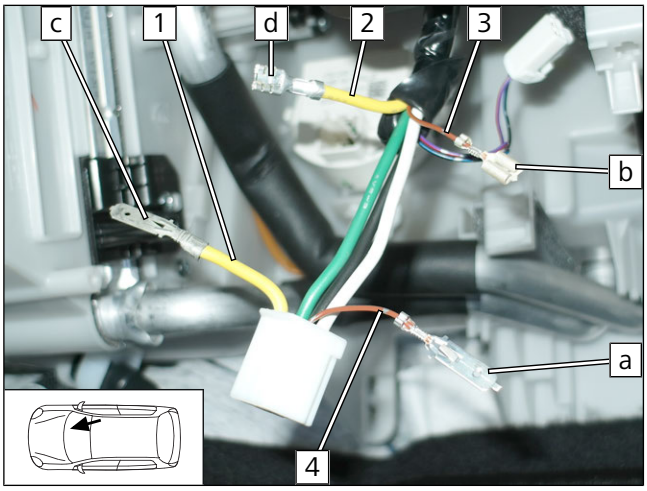


Fig. 170

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

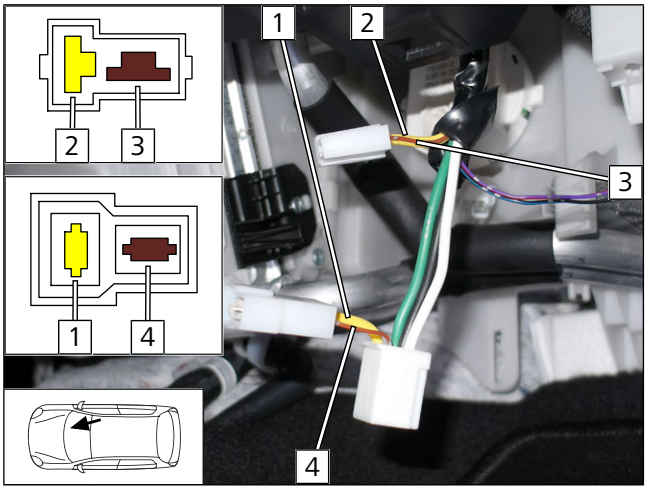


Fig. 171

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

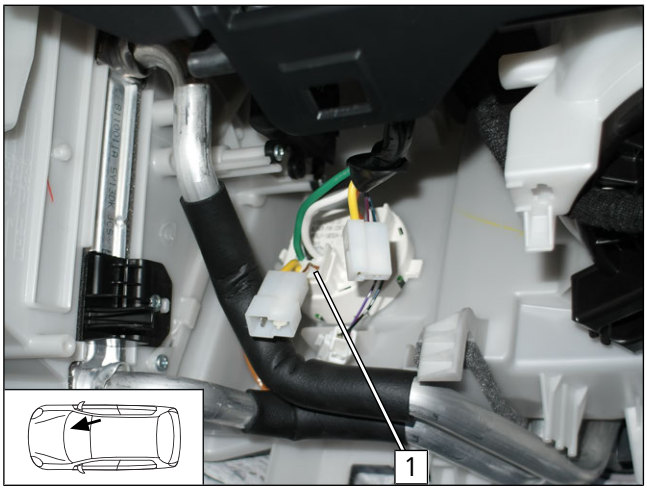


Fig. 172

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

Connecting wiring harnesses

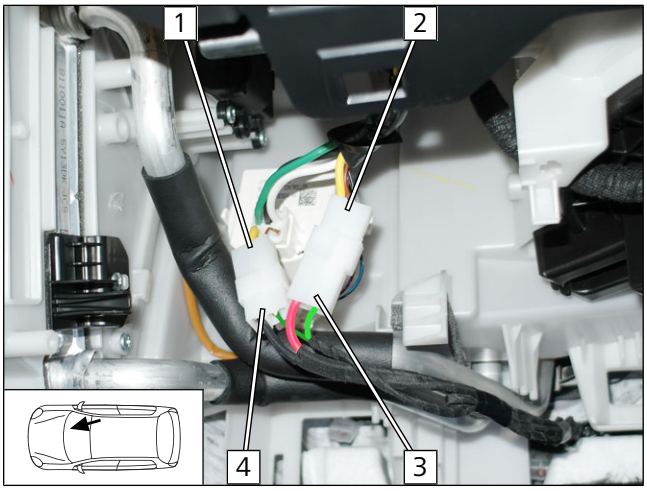


Fig. 173

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

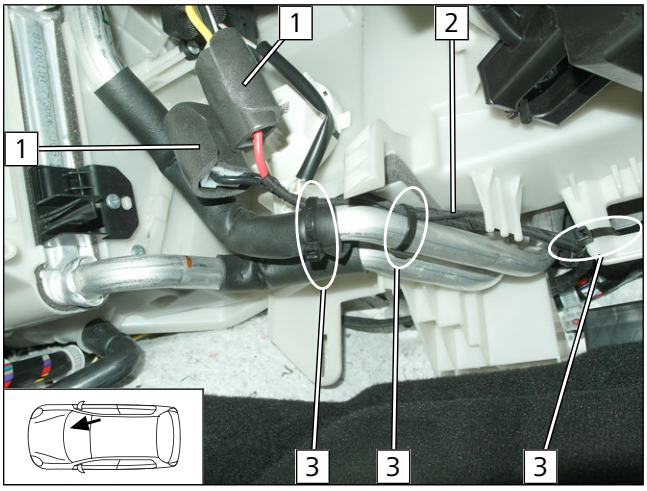


Fig. 174

▶ 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

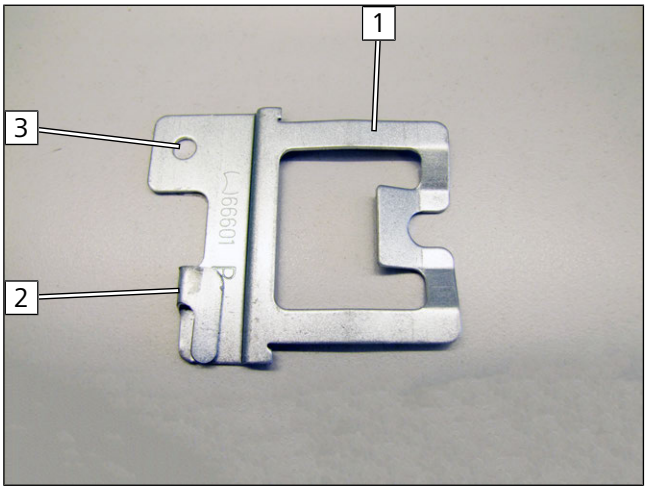


Fig. 175

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

1 Receiver bracket

Mounting receiver

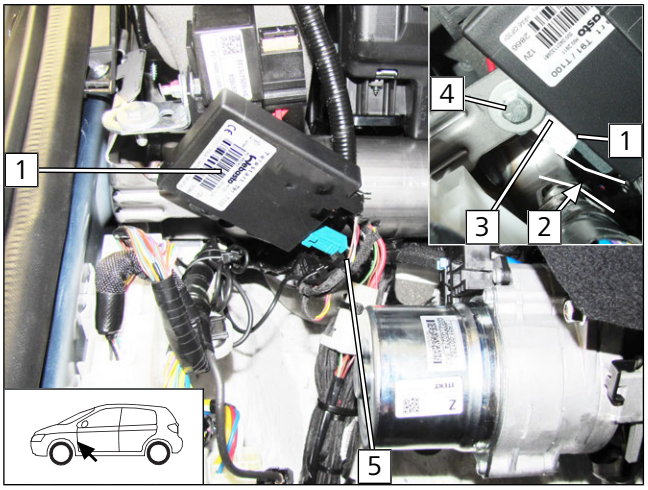


Fig. 176

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

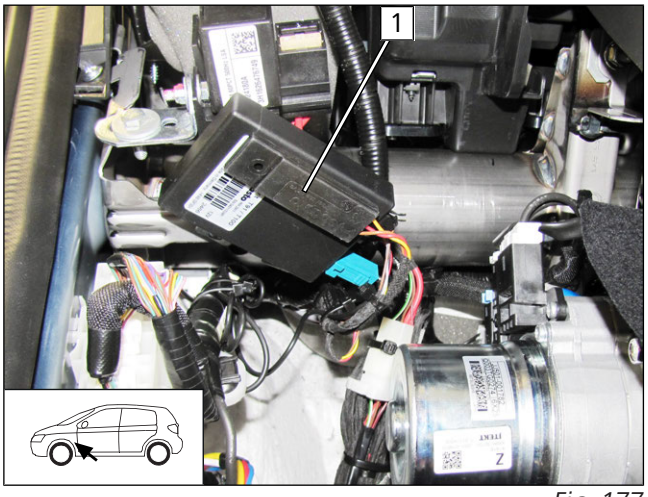


Fig. 177

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

Mounting aerial

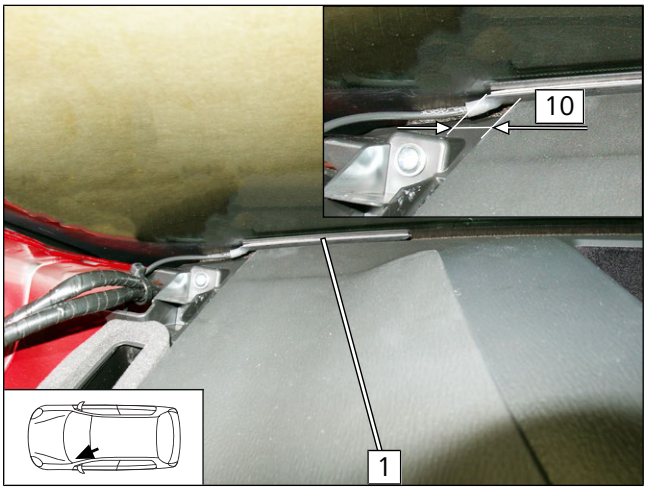


Fig. 178

1 Aerial

14.2 Remote option (Telestart), vehicles from MY 2020

Preparing bracket

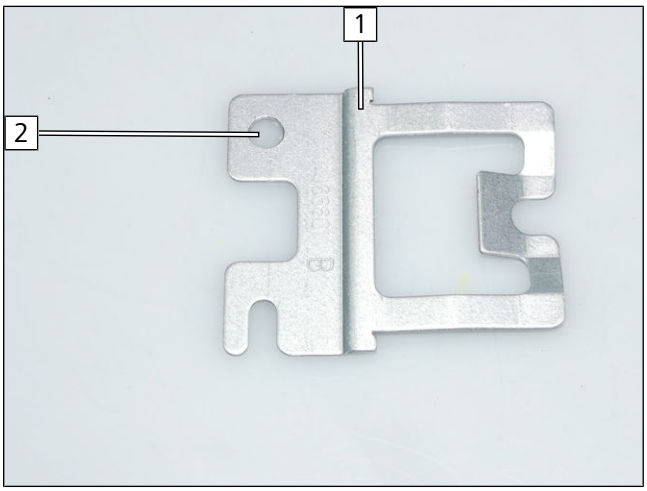


Fig. 179

▶ Drill out hole 2 to Ø 6.5.

1 Receiver bracket

Mounting receiver

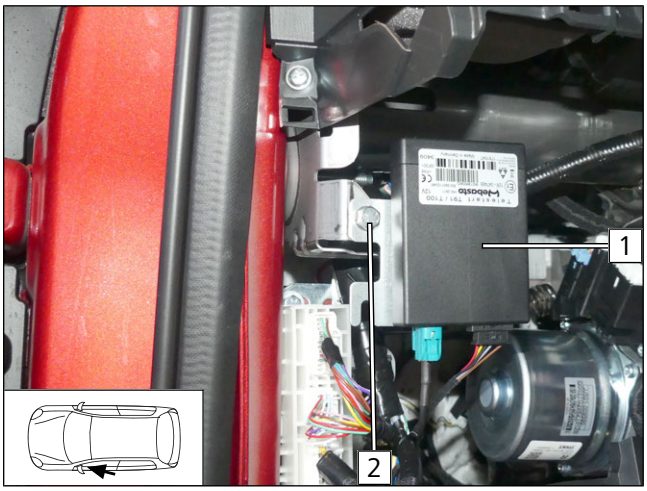


Fig. 180

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

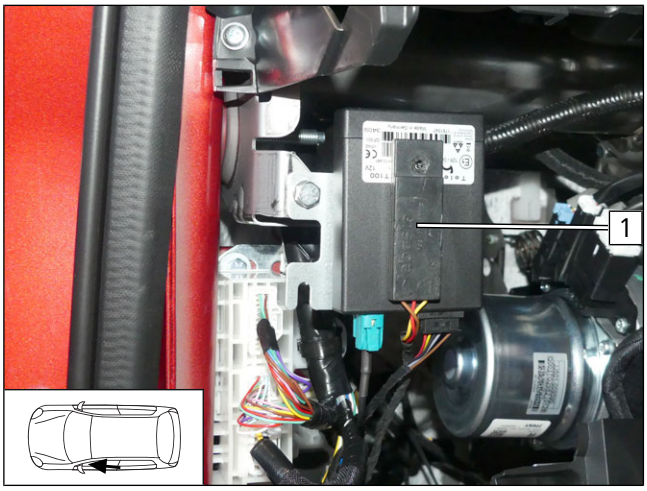


Fig. 181

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

Mounting aerial

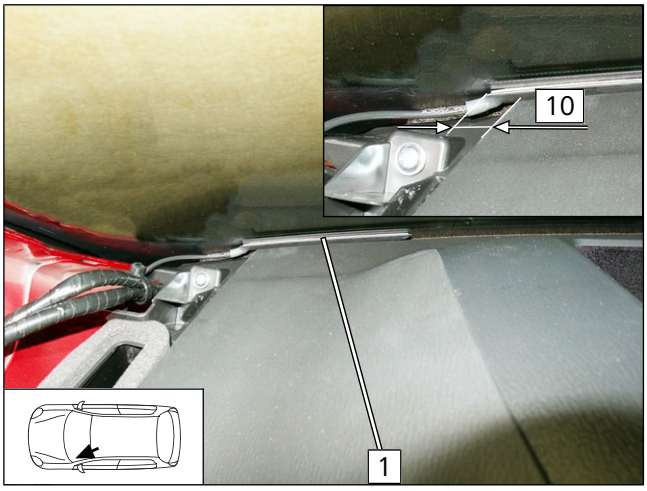


Fig. 182

1 Aerial

14.3 ThermoCall option

Detaching air shaft

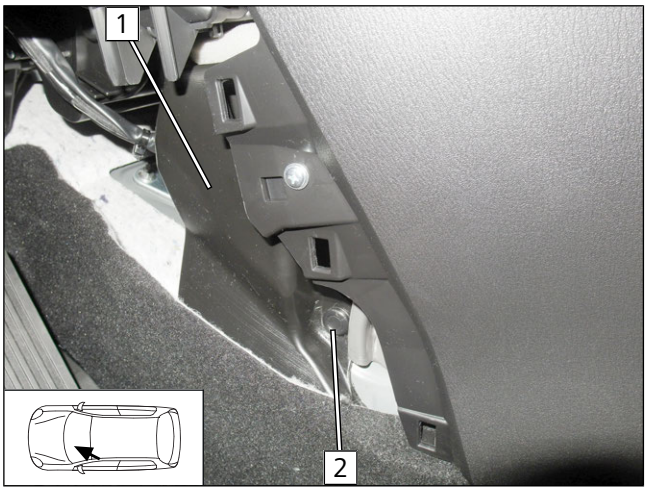


Fig. 183

1 Air shaft
2 Retaining clip

Mounting receiver

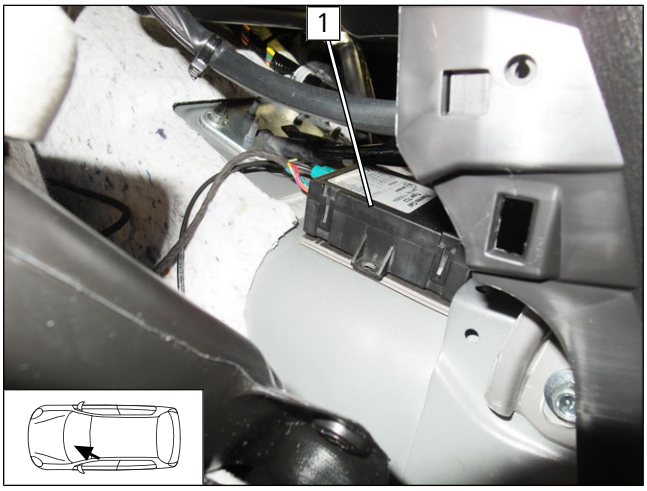


Fig. 184

Observe the ThermoCall installation documentation.

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

Mounting aerial (optional)

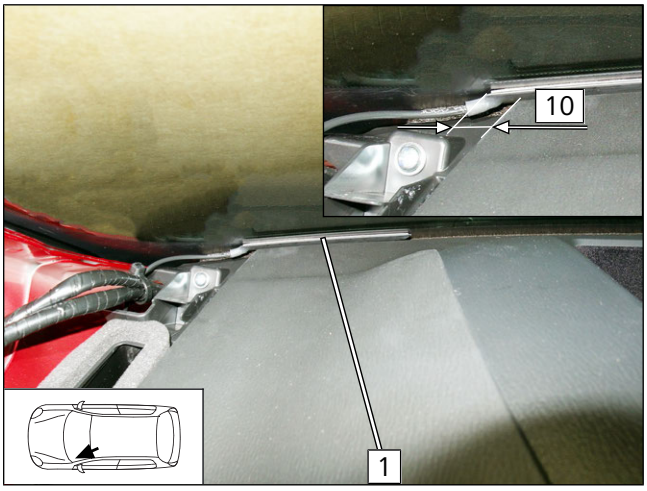


Fig. 185

[1] Aerial

15 Final work in engine compartment

Mounting battery box loosely

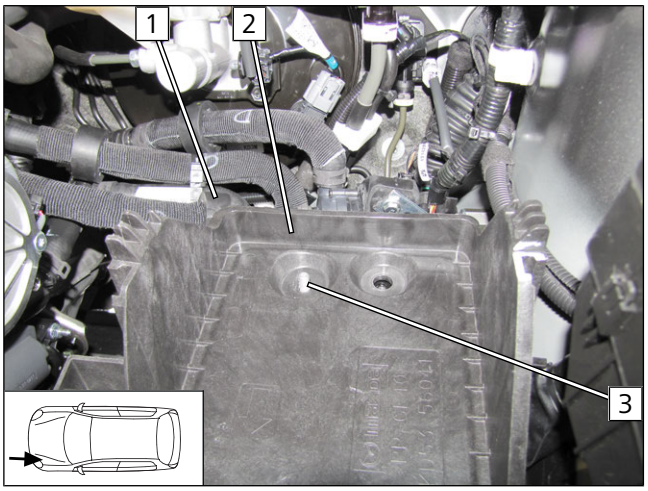


Fig. 186

▶ Position black rubber isolator 1 on battery box 2 as shown.

3 M8x70 bolt, premounted

Checking installation height

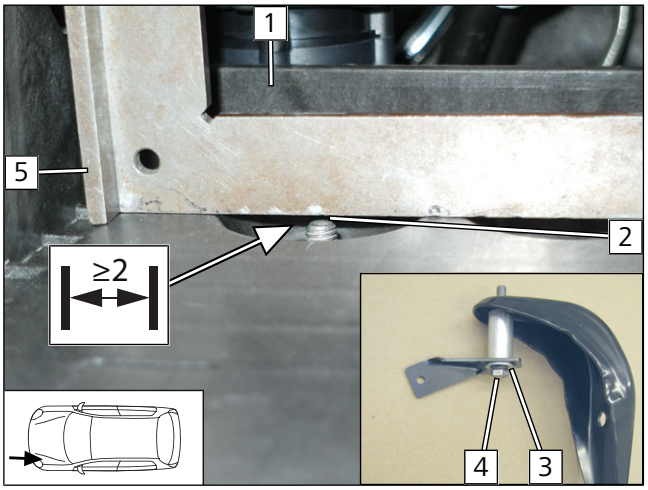


Fig. 187

▶ Check whether sufficient distance has been produced at position 2. Remove battery box, remove fastening bolt 4 and reinstall with additional washers 3 if necessary.

1 Battery box
4 M8x70 bolt, premounted
5 Try square as a checking tool

Installing battery box

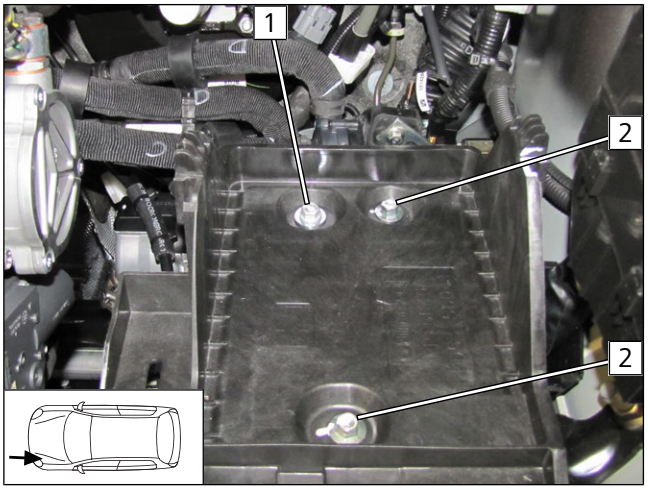


Fig. 188

1 Premounted M8x70 bolt, large diameter washer, flanged nut (25Nm)
2 Original vehicle bolt (25Nm)

Connection to positive battery terminal

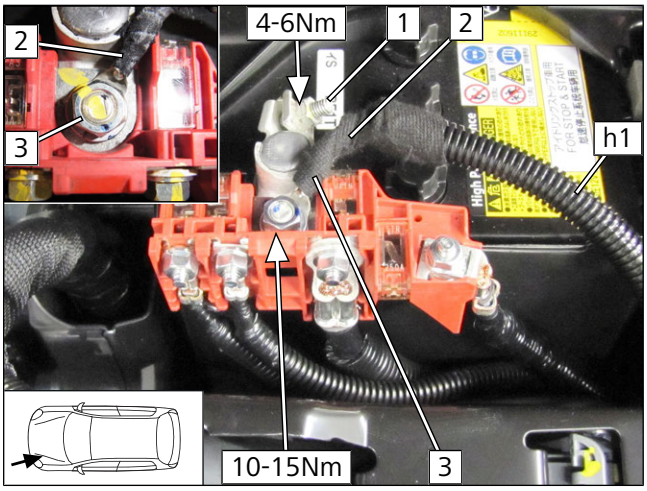


Fig. 189

DANGER

Observe tightening torque

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

▶ Mounting battery.

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

Adapting cover

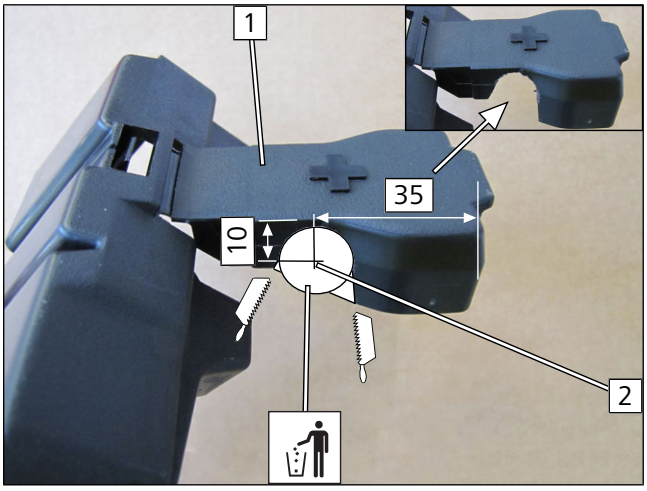


Fig. 190

▶ Drill a Ø12 hole in positive battery terminal cover **1** at position **2**.

▶ In addition, remove the marked section as shown.

Mounting cover

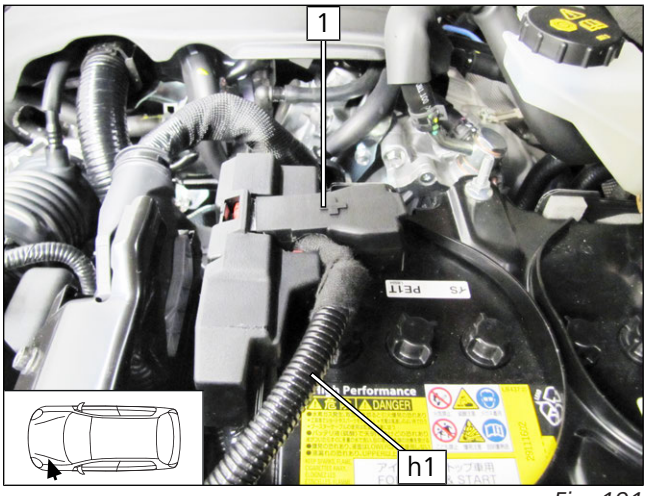
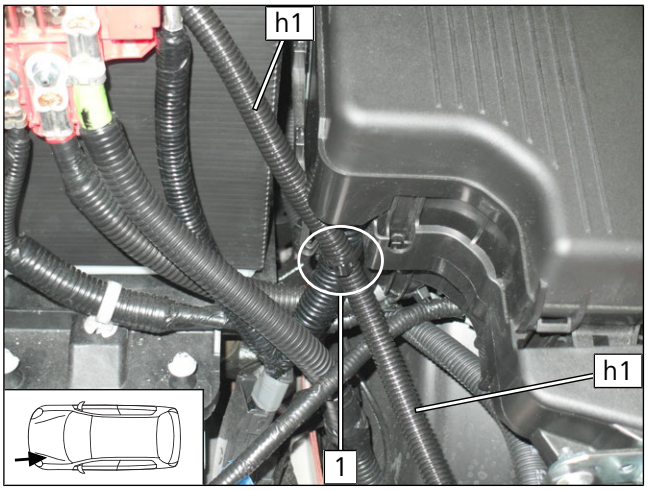


Fig. 191

- **1** Cover of positive battery
- **h1** Positive wire in Ø10 corrugated tube

Securing corrugated tube



1 Cable tie

16 Final work, bleeding the coolant circuit

16.1 Heater side

Detaching hose Ⓒ

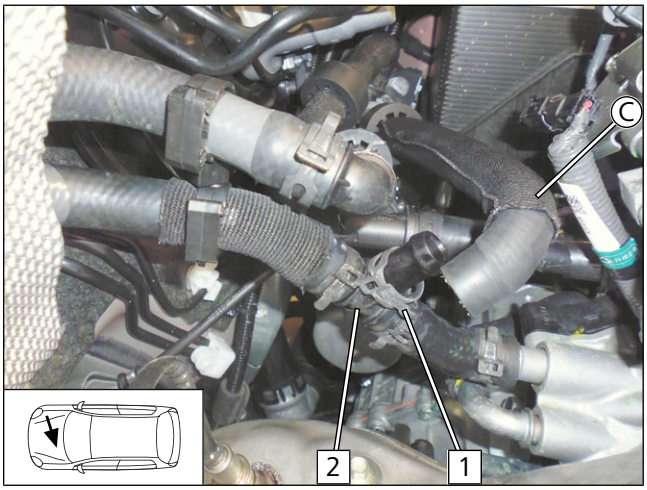


Fig. 192

- ▶ Detach hose Ⓒ and leave spring clip 1 positioned on the open connection piece of T-piece 2.
- ▶ Turn hose Ⓒ upwards in the engine compartment, it will be needed later to add the coolant.

Closing connection piece

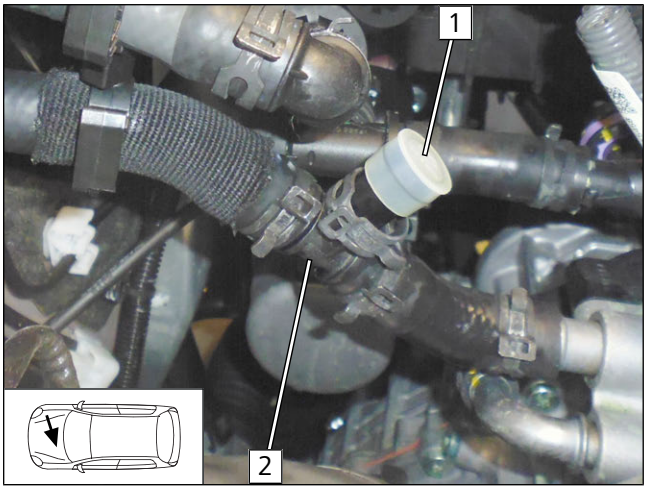


Fig. 193

- ▶ Close connection piece of T-piece 2 with blind plug 1.

Removing radiator cap

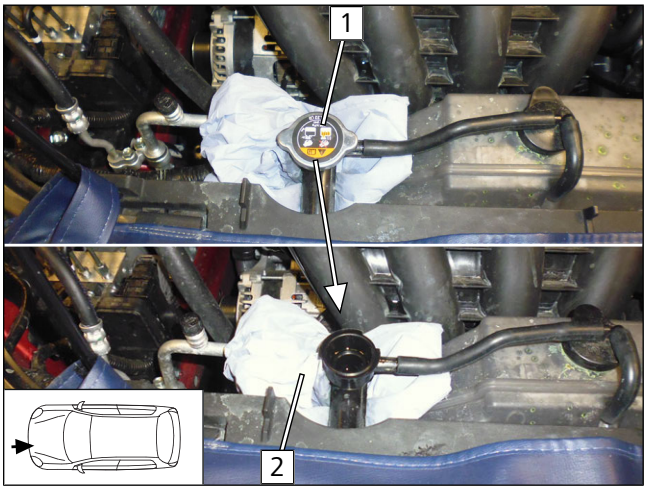


Fig. 194

- ▶ Open radiator cap 1.
- ▶ Install some suitable material in the area surrounding filler point 2 for the collection of liquids.

Attaching funnel

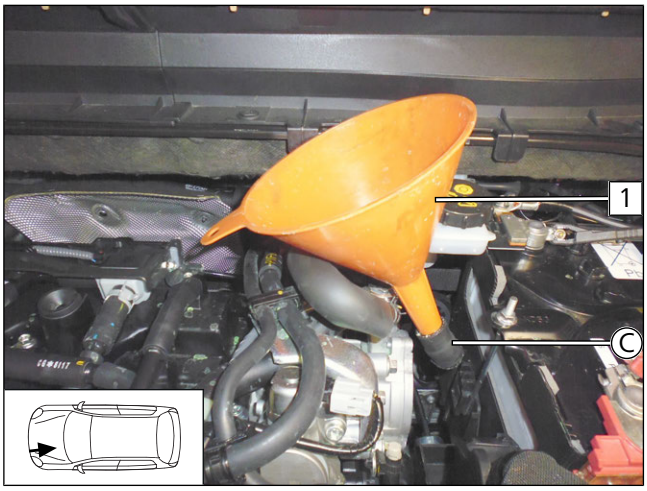


Fig. 195

▶ Route hose Ⓒ into the engine compartment as shown and attach suitable funnel [1].

Filling coolant

Fig. 196

Only use manufacturer-approved coolant.

[1] Funnel

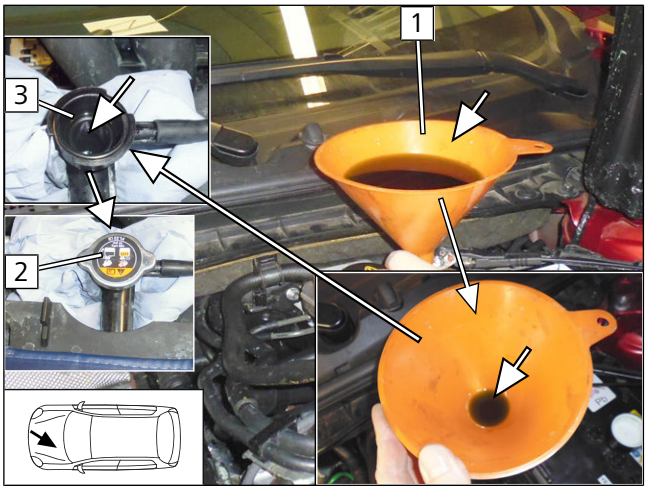


Fig. 197

▶ Carefully fill the coolant into funnel [1] until a visible coolant level is reached in filling tube [3]. Then mount radiator cap [2] again.

▶ If the coolant does not drain automatically from the funnel, activate the coolant pump for 1 second via the Webasto Thermo Test Diagnosis.

Closing hose Ⓒ

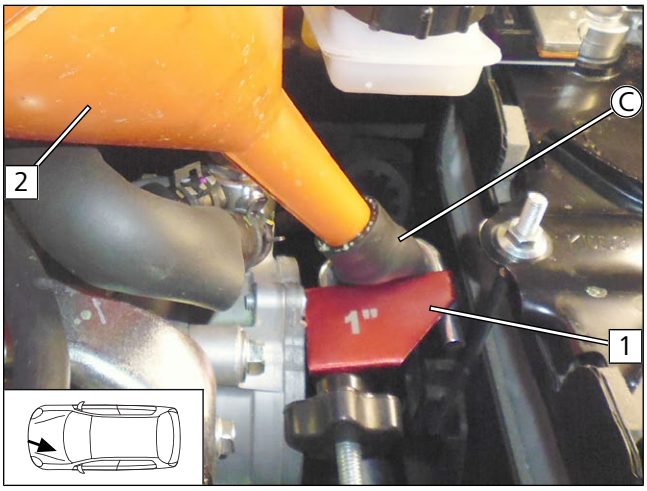


Fig. 198

Do not remove funnel [2] yet.

▶ Close hose Ⓒ with hose clamp [1] as shown. **Attach hose clamp [1] as close to the end of hose Ⓒ as possible.**

Emptying funnel

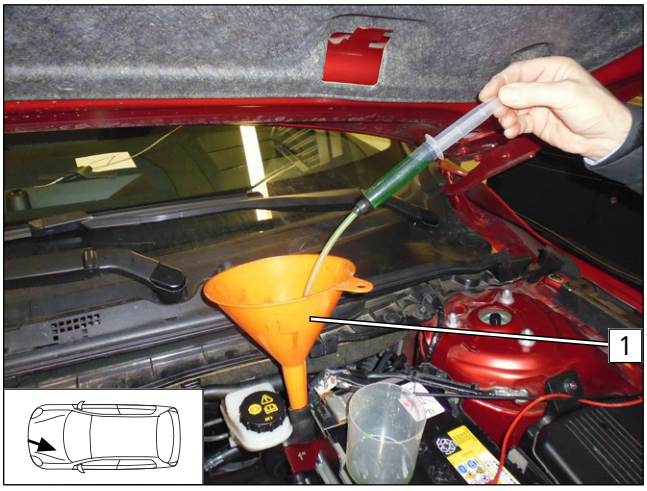


Fig. 199

▶ Empty residual contents from funnel [1] using suitable means and then remove.

Routing hose Ⓒ

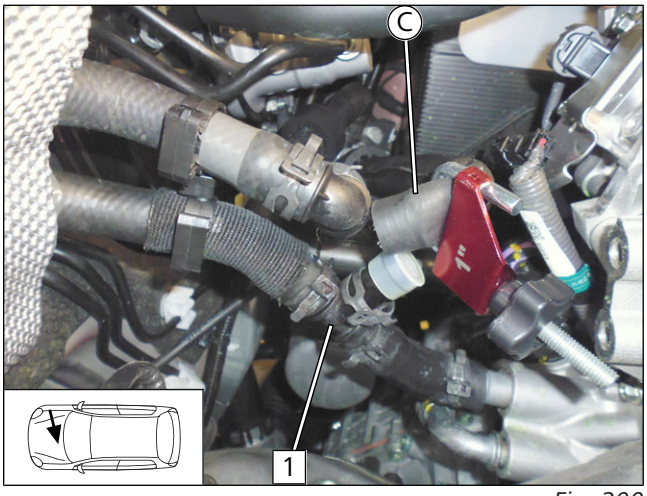


Fig. 200

▶ Route hose Ⓒ back to the free connection piece of T-piece [1].

Mounting hose Ⓒ

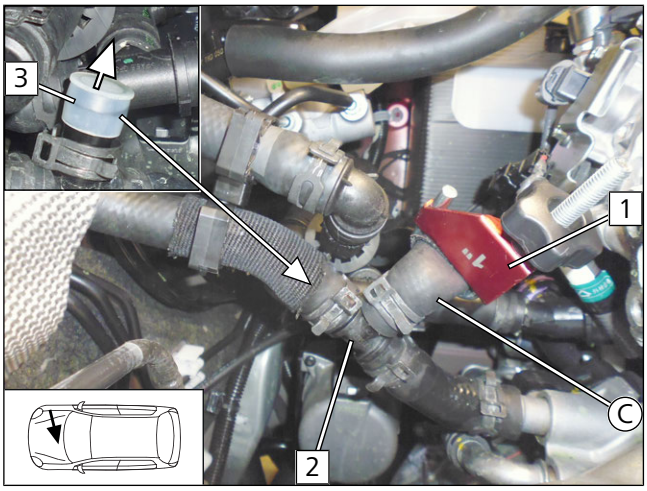


Fig. 201

Do **not** remove hose clamp 1.

▶ Remove blind plug 3 from T-piece 2, briefly close the opening by hand and install hose Ⓒ immediately.

16.2 Engine side

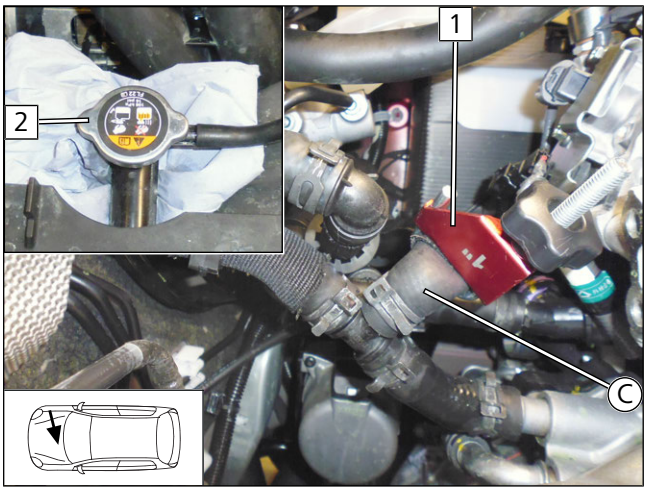


Fig. 202

Hose clamp [1] and radiator cap [2] remain mounted when venting begins.

- ▶ 1. Connect Webasto Thermo Test Diagnosis and start the diagnosis (Mazda order no. 4100-77-725*).
- ▶ 2. To vent the cooling system, warm up the engine according to MESI/MGSS.
- ▶ 3. When the engine is running, ensure that warm air flows out at the ventilation nozzles in the passenger compartment.
- ▶ 4. Switch off the warm engine (temperature in the heater min. 70°C).
- ▶ 5. Check the coolant level according to MESI/MGSS, top up if necessary and close radiator cap [2] again.
- ▶ 6. Now remove hose clamp [1] from hose Ⓒ.
- ▶ 7. Activate the coolant pump of the heater for 99 seconds with Webasto Thermo Test Diagnosis (component test) and restart the engine at the same time. Important: the coolant pump and engine must be running at the same time.
- ▶ 8. Switch between idle and >2000 rpm within 99 seconds. (See diagram).
- ▶ 9. Before switching off the engine, carry out the following vehicle passenger compartment settings for the air conditioning system:
  - ⇨ Thermostat to max. (29°C), fan controller at level 3 and air flow controller at centre nozzles.
- ▶ 10. Engine OFF. Ignition ON.
- ▶ 11. Activate the coolant pump of the heater using the Webasto Thermo Test Diagnosis (component test) for 99 seconds, but DO NOT start the engine.
- ▶ 12. Read and monitor the coolant temperature in the heater using Webasto Thermo Test Diagnosis.
  - ⇨ The coolant temperature in the heater must continuously drop.
  - ⇨ The outlet temperature at the centre nozzles in the instrument panel must remain constantly warm.

⇨ If the passenger compartment temperature becomes noticeably cold and the temperature in the heater does not drop, there is still air in the heating circuit. This means that the work steps from point 6 must be repeated.

- ▶ 13. If point 12 is fulfilled, check the coolant level again according to MESI/MGSS, refill if necessary and attach radiator cap [2] again.

Speed interval diagram

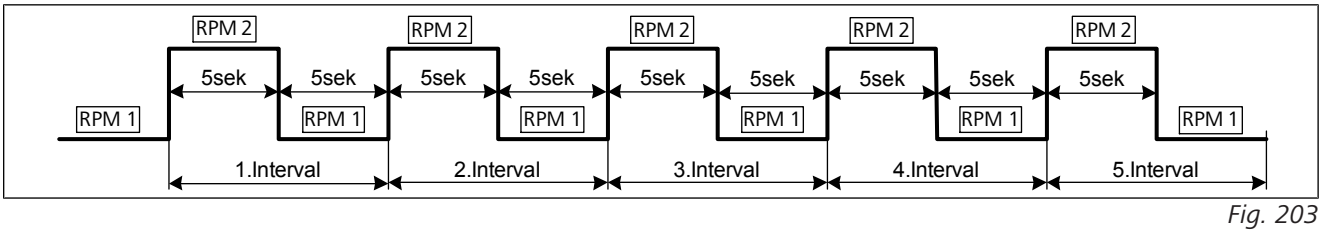


Fig. 203

[RPM 1] = idling speed; **[RPM 2]** = speed >2000 rpm

17 General final work

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

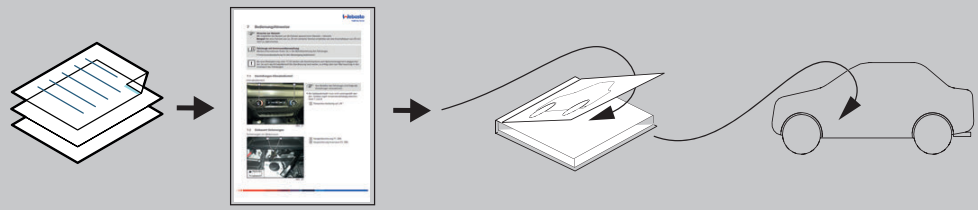
- ▶ Mount removed parts in reverse order
- ▶ Mount instrument panel trim only after checking the PWM GW

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 voltage at fan motor

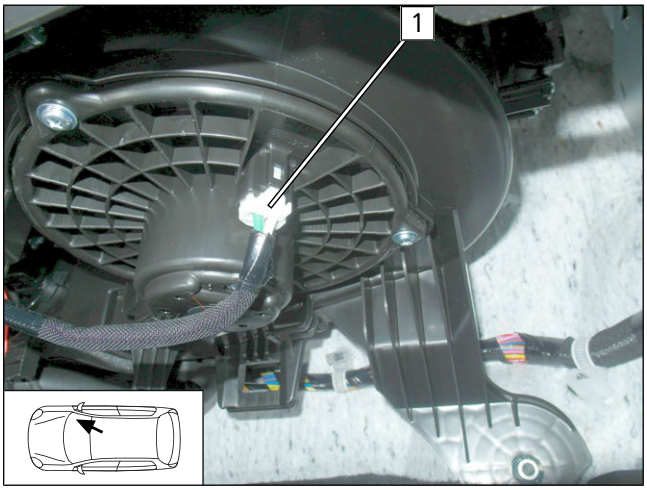
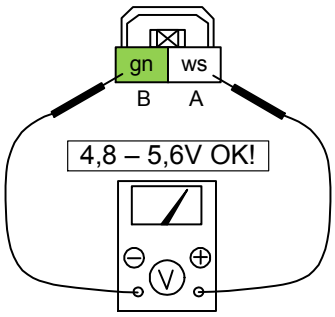


Fig. 204

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').

- ▶ 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- G 2.0 or SKYACTIV- G 2.5]'

18 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;

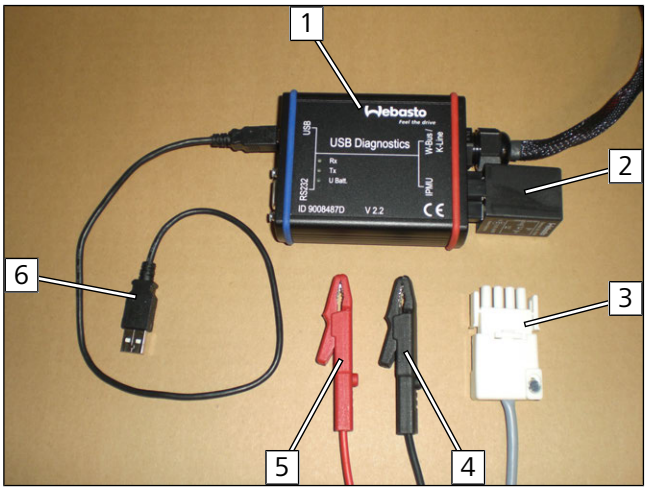


Fig. 205

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

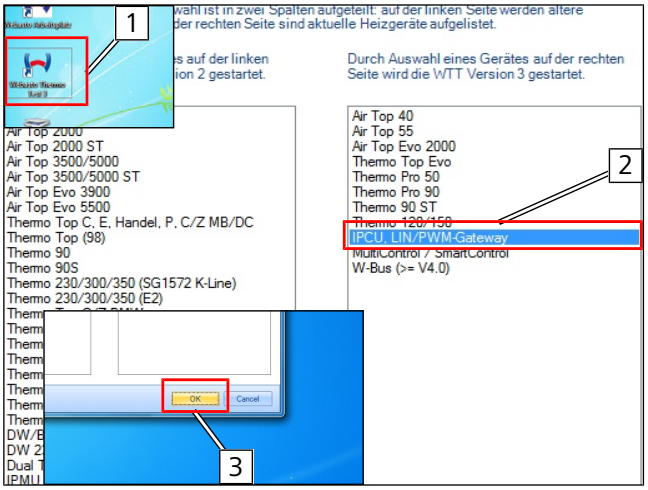


Fig. 206

▶ Establish all connections.

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

Possible error message

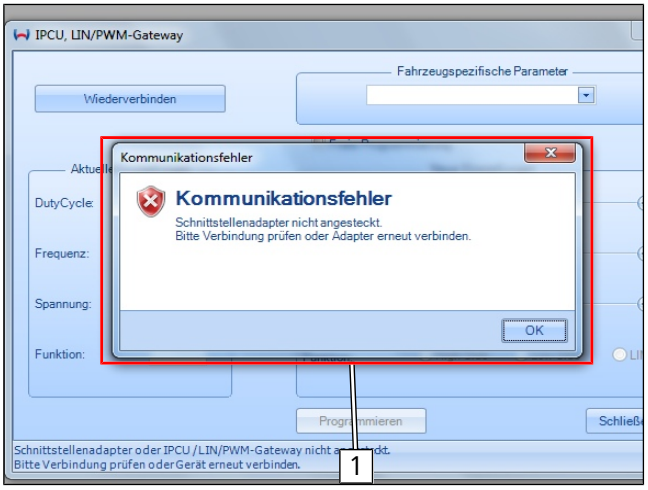


Fig. 207

▶ 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’

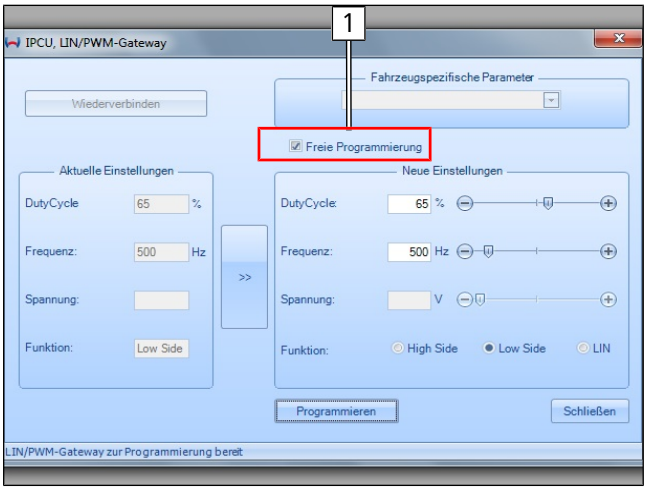


Fig. 208

1 Enable ‘Free programming’

Selecting duty cycle

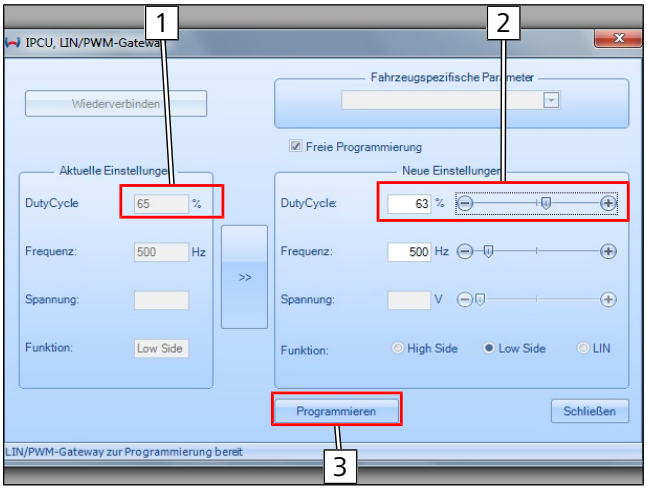


Fig. 209

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

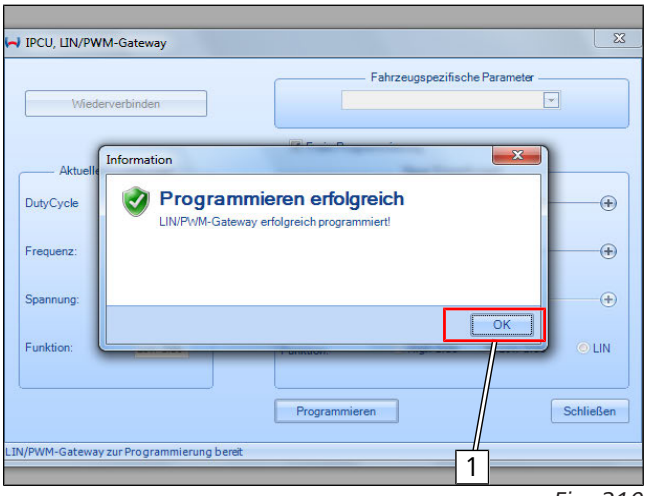


Fig. 210

1 Confirm with ‘OK’

Programming PWM GW

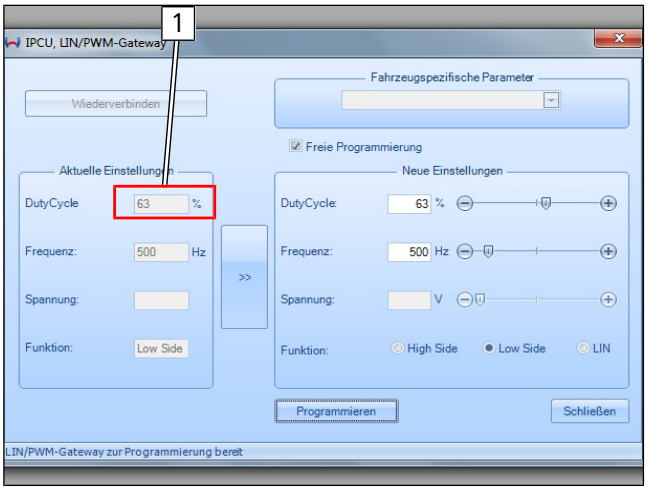


Fig. 211

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

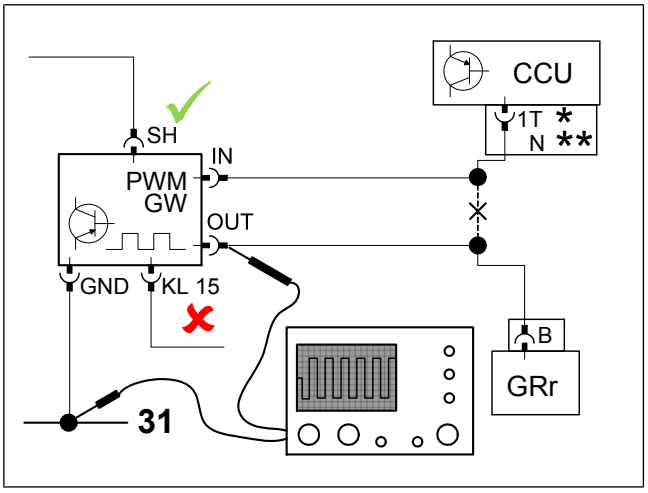
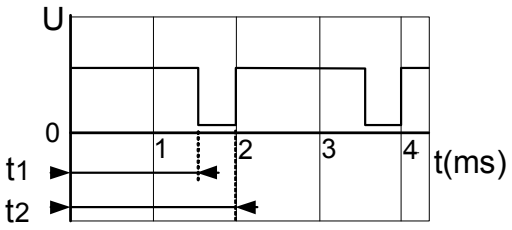


Fig. 212

▶ **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.

Webasto Thermo & Comfort SE
Postfach 1410
82199 Gilching
Germany

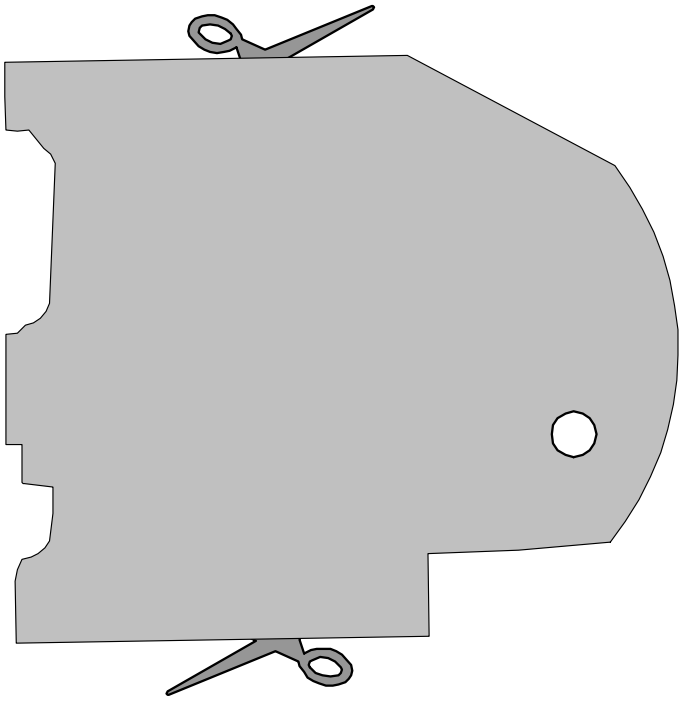
Company address:
Friedrichshafener Str. 9
82205 Gilching
Germany

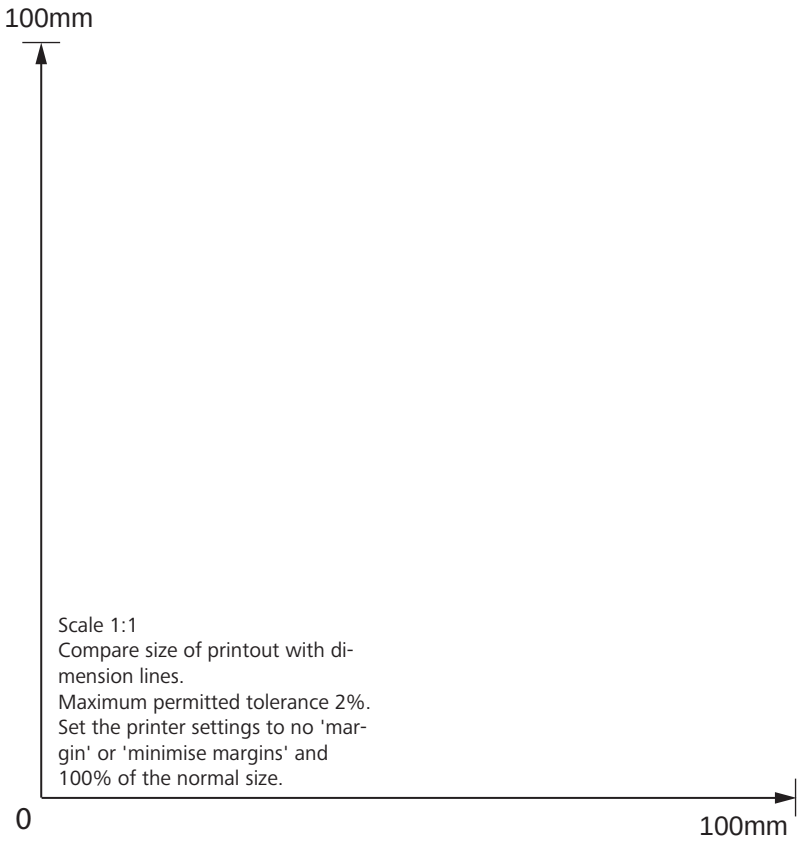
Technical Extranet: https://dealers.webasto.com

CE

WWW.WEBASTO.COM

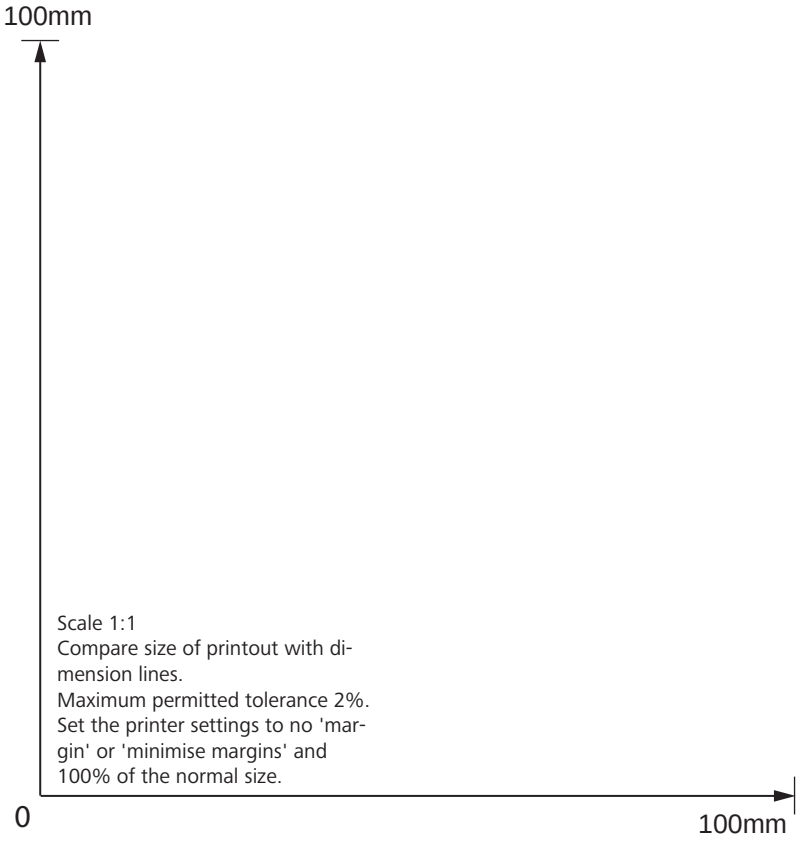
19 Tank fitting drilling template





Scale 1:1
Compare size of printout with dimension lines.
Maximum permitted tolerance 2%.
Set the printer settings to no 'margin' or 'minimise margins' and 100% of the normal size.

20 FuelFix template for 2WD

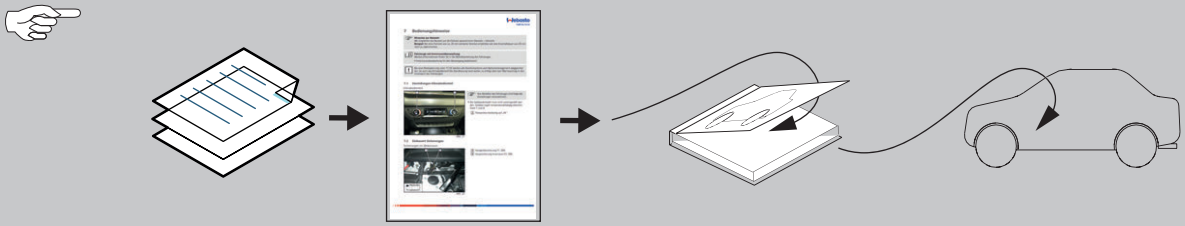


Scale 1:1
Compare size of printout with dimension lines.
Maximum permitted tolerance 2%.
Set the printer settings to no 'margin' or 'minimise margins' and 100% of the normal size.

21 FuelFix template for 4WD

Scale 1:1
Compare size of printout with dimension lines.
Maximum permitted tolerance 2%.
Set the printer settings to no 'margin' or 'minimise margins' and 100% of the normal size.

22 Operating instructions for manual air-conditioning



The heater works independently of the engine in conjunction with the original vehicle heating and ventilation system and should only be used when the engine is switched off and cold. 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 preheating unit. There is **no** engine pre-heating.

22.1 Settings on manual air-conditioning control panel

Manual air-conditioning control panel

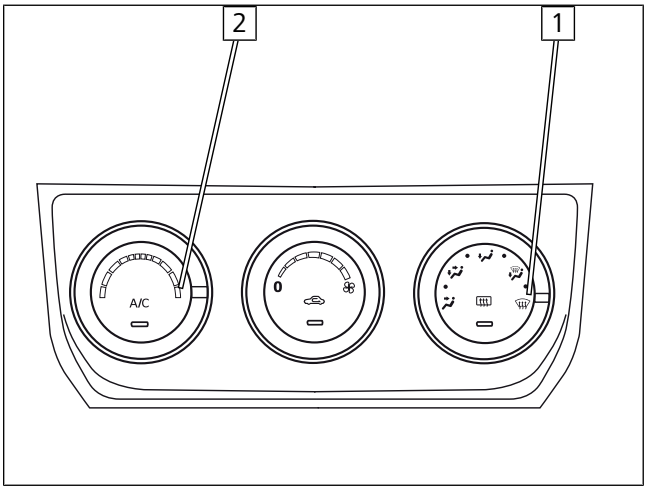


Fig. 216

Use the heater only when the engine is switched off and cold. We do not recommend operating the heater while driving, when the engine is warm.

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.

22.2 Installation location of fuses

Fuses in engine compartment

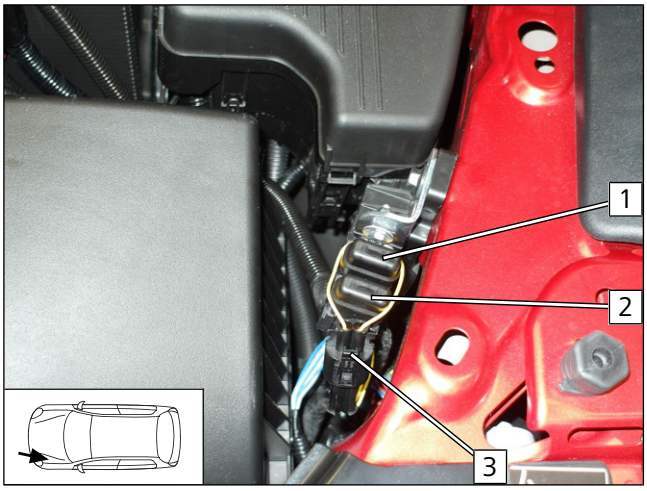


Fig. 217

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

Fuses in passenger compartment

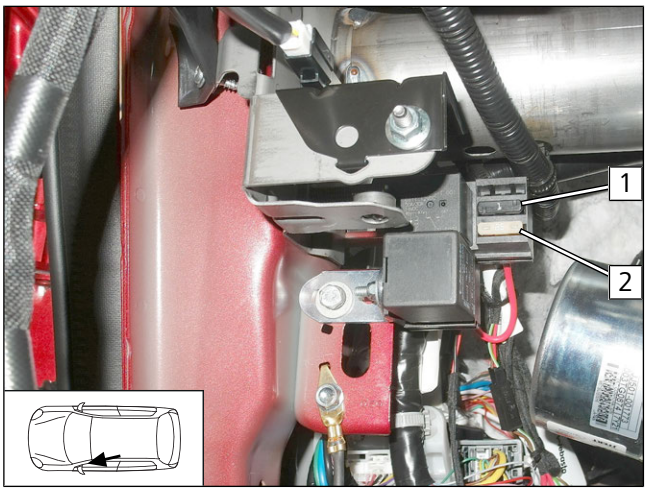


Fig. 218

Vehicles up to MY 2019

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

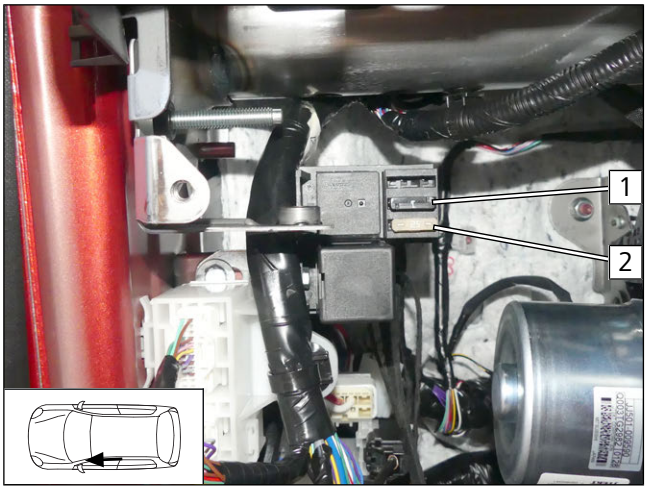
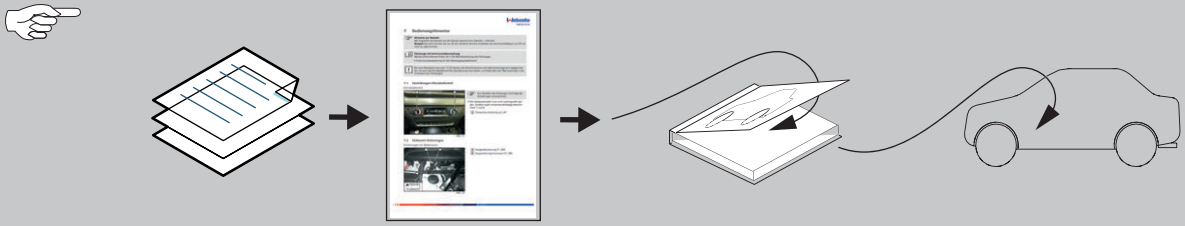


Fig. 219

Vehicles from MY 2020

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

23 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 should only be used when the engine is switched off and cold. 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 preheating unit. There is **no** engine pre-heating.

23.1 Settings on automatic air-conditioning control panel

Automatic A/C control panel

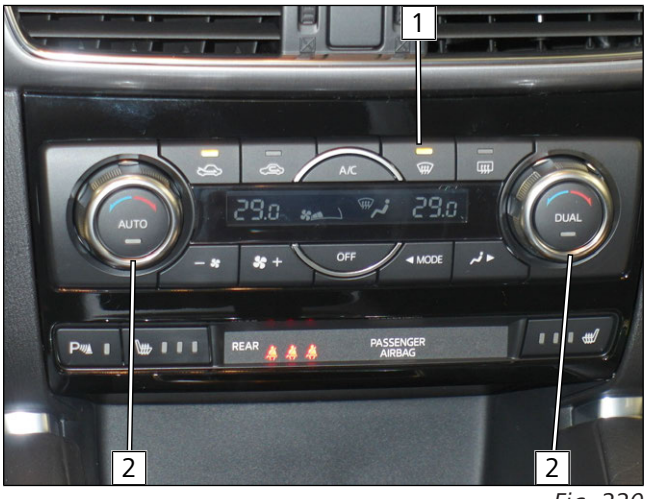


Fig. 220

Use the heater only when the engine is switched off and cold. We do not recommend operating the heater while driving, when the engine is warm.

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.

23.2 Installation location of fuses

Fuses in engine compartment

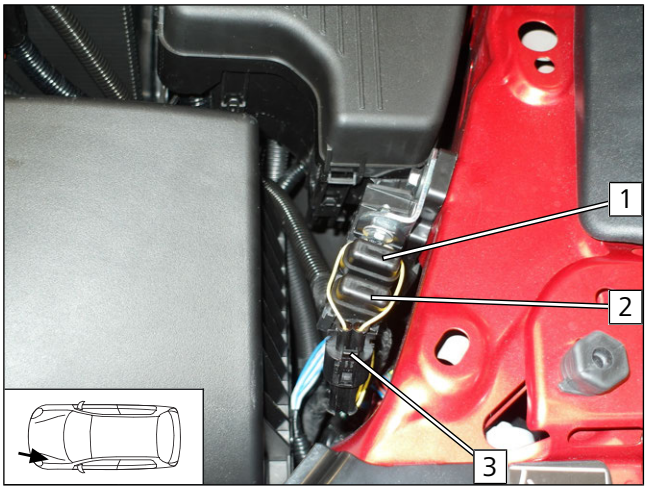


Fig. 221

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

Fuses in passenger compartment

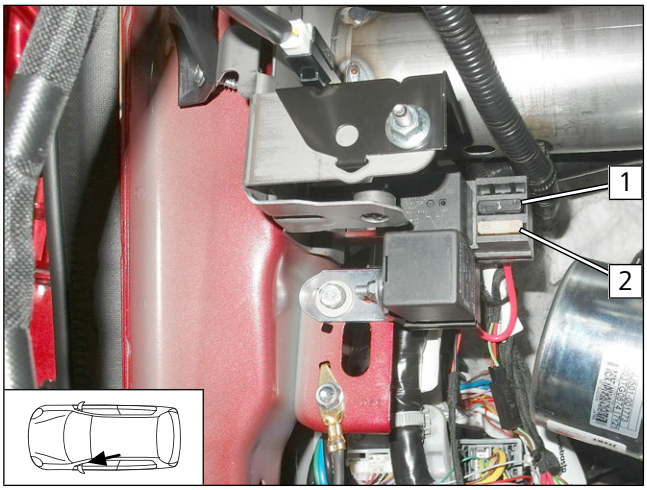
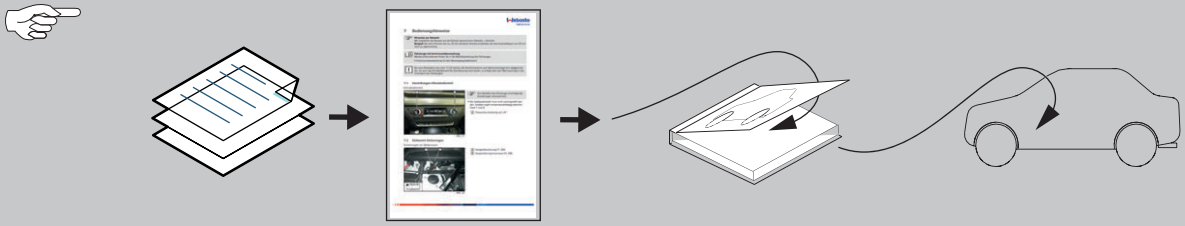


Fig. 222

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

24 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 should only be used when the engine is switched off and cold. 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 preheating unit. There is **no** engine pre-heating.

24.1 Settings on automatic air-conditioning control panel

Automatic A/C control panel

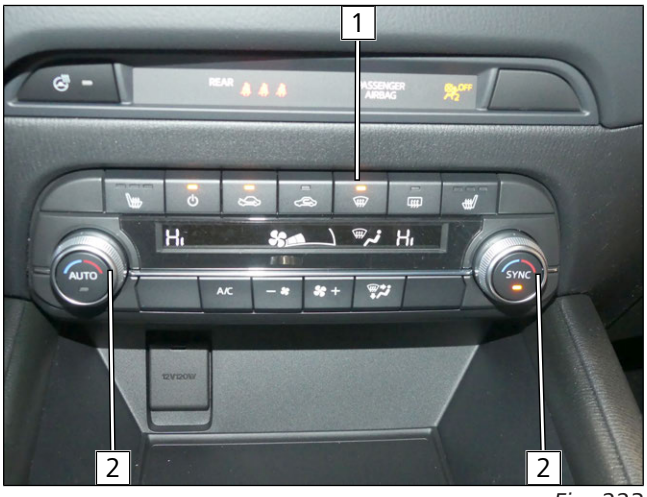


Fig. 223

Use the heater only when the engine is switched off and cold. We do not recommend operating the heater while driving, when the engine is warm.

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.

24.2 Installation location of fuses

Fuses in engine compartment

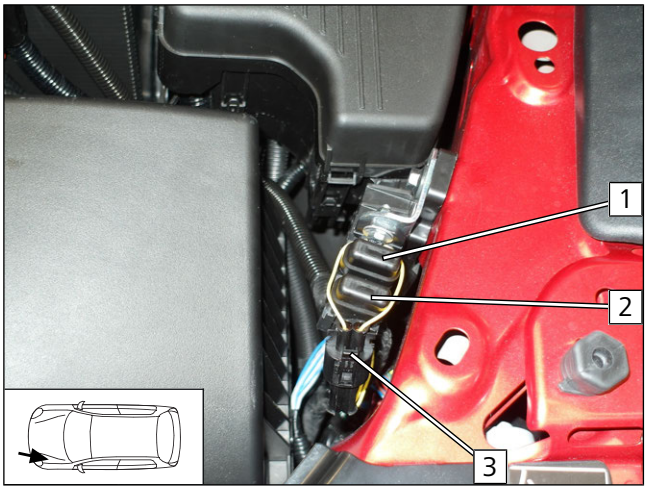


Fig. 224

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

Fuses in passenger compartment

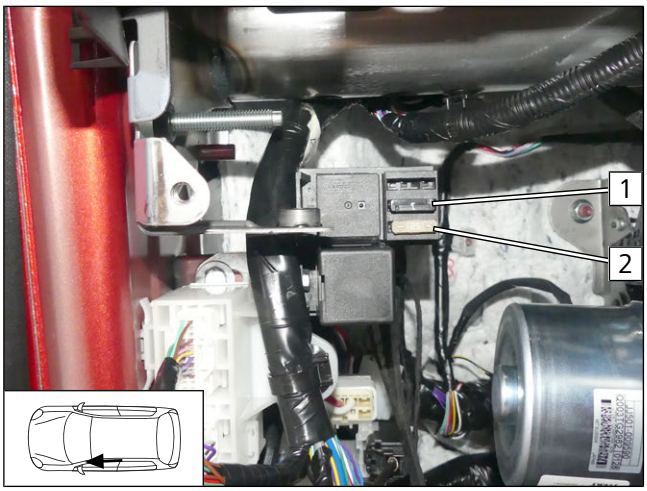


Fig. 225

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