

**Integrated heater**

**Workshop Manual**

**Dual Top RHA-100**  
**Dual Top RHA-101/102**

**10/2009**  
**9019782B**



Improper installation or repair of Webasto heating and cooling systems can cause fire or the leakage of deadly carbon monoxide leading to serious injury or death.



To install and repair Webasto heating and cooling systems you need to have completed a Webasto training course and have the appropriate technical documentation, special tools and special equipment.

NEVER try to install or repair Webasto heating or cooling systems if you have not completed a Webasto training course, you do not have the necessary technical skills and you do not have the technical documentation, tools and equipment available to ensure that you can complete the installation and repair work properly.

ALWAYS carefully follow Webasto installation and repair instructions and heed all WARNINGS.

Webasto rejects any liability for problems and damage caused by the system being installed by untrained personnel.

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## 1 Introduction

### 1.1 Contents and purpose

This workshop manual is designed to assist trained personnel with repairing the Dual Top integrated heaters.

#### 1.1.1 Use of the integrated heaters

The Webasto Dual Top integrated air / water heaters are designed to heat and to provide hot water in motor homes and similar vehicles.

The heaters operate independently of the engine and are connected to the fuel tanks and the service battery of the vehicle.

The heaters are not designed for heating vehicles transporting hazardous substances.

### 1.2 Meaning of signal words

Throughout this manual, the signal words WARNING, IMPORTANT and NOTE have the following meanings:

#### WARNING

This heading is used to highlight operating instructions or procedures which, if not or not correctly followed, may result in personal injury or fatal accidents.

#### IMPORTANT

This heading is used to highlight operating instructions or procedures which, if not or not correctly followed, may result in damage to the equipment or its components.

#### NOTE

This heading is used to direct your attention to a special feature deemed essential to highlight.

### 1.3 Additional documentation to be used

This workshop manual contains most of the information and instructions required for repairing the Dual Top integrated heaters.

However, it is necessary to read additional documentation. The operating / installation instructions and the installation suggestion for the specific vehicle (if available) shall also be used.

### 1.4 Statutory regulations and safety instructions

In principle, the general accident prevention regulations and current works safety instructions are applicable. The "General safety regulations" that go beyond the scope of the above regulations are stated below.

Any special safety regulations relevant to this instruction manual will be highlighted in the relevant sections or text passages of the procedures.

#### 1.4.1 Statutory regulations governing installation

The Dual Top heaters have been type-tested and approved in accordance with EC Directives 72/245/EEC (EMC) and 2001/56/EC (heater) with the following EC permit numbers:

e1 03 5000  
e1 00 0195.

Installation is governed above all by the provisions in Annex VII of Directive 2001/56/EC and the regulations in the installation instructions.

#### NOTE

***The provisions of these Directives are binding within the territory governed by EU Directive 70/156/EEC and/or 2007/46/EC should similarly be observed in countries without specific regulations!***

Installation of the Dual Top RHA 101/102 heater and related components must be in accordance with IEC 60364 ("Electrical installations in caravan parks and caravans").

#### IMPORTANT

*Dual Top RHA 101/102: you have to be certified to work on 230 V electric systems. Installation and all other jobs carried out by none certified persons can cause personal injury to you, the Dual Top and the vehicle. In that case, Webasto will refuse all liability.*

#### IMPORTANT

*Failure to follow the installation instructions and the notes contained therein will lead to all liability being refused by Webasto. The same applies if repairs are carried out incorrectly or with the use of parts other than genuine spare parts. This will result in the invalidation of the type approval for the heater and therefore of its **homologation / EC type licence**.*

#### NOTE

*For vehicles with an EU permit, no entry in accordance with § 19 Sub-Section 4 of Annex VIII b to the Road Traffic Act is required.*

#### 1.4.2 General safety information

Follow all the safety information described in the additional documentation thoroughly.

**BUTLER TECHNIK**

## 2 Technical data

Except where limit values are specified, the technical data refer to the usual heater tolerances of  $\pm 10\%$  at an ambient temperature of  $+20\text{ °C}$  and at the rated voltage and in rated conditions.

### Fuel for Dual Top

The diesel fuel specified by the manufacturer must be used. Class EL heating oil, L heating oil or PME (bio-diesel) must not be used.

Fuel additives have no negative influences on the heater. If fuel is extracted from the vehicle's tank, follow the additive instructions issued by the vehicle manufacturer.

After changing to low-temperature fuel, the heater must be operated for approx. 15 minutes so that the fuel system is filled with the new fuel.

**Table 201: Technical data RHA 100**

Heater	Operation	Dual Top RHA 100
Type approval heater: EMC:		e1 00 0195 e1 03 5000
Model		Air heater with evaporator burner
Heat output	Control range	1.5 - 6.0 kW
Fuel		Diesel, DIN/EN 590
Fuel consumption	Control range	0.17 - 0.65 l/h
Rated voltage		12 V
Operating voltage range		10.5 - 15 V
Current input at 12V	Summer mode Winter mode, heat and hot water Stand-by	< 1 A 0.5 ~ 7 A 0.001 A
Rated power consumption	Control range	15 - 65 W (EN 1646)
Max. ambient temperature: Heater: - Operation - Storage Control Panel: - Operation - Storage		-30 ~ +50 °C -40 ~ +85 °C -30 ~ +75 °C -40 ~ +85 °C
Max. altitude (guaranteed function)		2,200 m
Adjustment range for interior temperature	Control range	+5 ~ +35 °C
Delivery rate for hot air (free blowing without warm-air duct)	Maximum	200 m <sup>3</sup> /h
CO <sub>2</sub> in exhaust gas (permitted function range)	2 kW 6 kW	5.0 ~ 8.0 9.0 ~ 13
Water capacity		11 l
Water system pressure		max. 3,5 bar
Overpressure valve		4.0 bar
Pressure water pump, central water supply	Maximum	2.5 bar
Heater dimensions		Length: 530 ± 2 mm Width: 352 ± 1 mm Height: 256 ± 1 mm
Weight (w/o water contents)		20 kg

## 2 Technical data

## Dual Top

Table 202: Technical data RHA 101/102

Heater	Operation	Dual Top RHA 101	Dual Top RHA 102
Type approval heater: EMC:		e1 00 0195 e1 03 5000	e1 00 0195 e1 03 5000
Model		Air heater with evaporator burner and electric heating device	Air heater with evaporator burner and electric heating device
Heat output diesel electric	Control range	1.5 - 6.0 kW 0.6 - 1.2 kW	1.5 - 6.0 kW 1.0 - 2.0 kW
Fuel		Diesel, DIN/EN 590	Diesel, DIN/EN 590
Fuel consumption	Control range	0.17 - 0.65 l/h	0.17 - 0.65 l/h
Rated voltage		12 V	12 V
Operating voltage range		10.5 - 15 V	10.5 - 15 V
Current input at 12V	Summer mode Winter mode, heat and hot water Stand-by	< 1 A  0.5 ~ 7 A 0.001 A	< 1 A  0.5 ~ 7 A 0.001 A
Rated power consumption	Control range	15 - 65 W (EN 1646)	15 - 65 W (EN 1646)
Max. ambient temperature: Heater: - Operation - Storage Control Panel: - Operation - Storage		-30 ~ +50 °C -40 ~ +85 °C  -25 ~ +50 °C -40 ~ +85 °C	-30 ~ +50 °C -40 ~ +85 °C  -25 ~ +50 °C -40 ~ +85 °C
Max. altitude (guaranteed function)		2,200 m	2,200 m
Adjustment range for interior temperature	Control range	+5 ~ +35 °C	+5 ~ +35 °C
Delivery rate for hot air (free blowing without warm-air duct)	Maximum	> 200 m <sup>3</sup> /h	> 200 m <sup>3</sup> /h
CO <sub>2</sub> in exhaust gas (permitted function range)	2 kW 6 kW	5.0 ~ 8.0 9.0 ~ 13	5.0 ~ 8.0 9.0 ~ 13
Water capacity		11 l	11 l
Water system pressure		max. 3,5 bar	max. 3,5 bar
Overpressure valve		4.0 bar	4.0 bar
Pressure water pump, central water supply	Maximum	2.5 bar	2.5 bar
Heater dimensions		Length: 530 ± 2 mm Width: 352 ± 1 mm Height: 256 ± 1 mm	Length: 530 ± 2 mm Width: 352 ± 1 mm Height: 256 ± 1 mm
Weight (w/o water contents)		21 kg	21 kg



### 3 Fault code output

#### NOTE

This chapter describes the fault codes given out by the manual and programmable Control Panels.

Replacement of parts, dismantling and assembly (e.g. for inspection and cleaning) is described in chapter 7: "Repair".

#### 3.1 Manual Control Panel



Abb. 301 Manual Control Panel

The manual Control Panel is used for RHA 100 heaters only.

The heater is able to identify faults on individual components and during the operation.

The Control Panel gives out the fault code in a flashing mode.

After a series of 5 fast GREEN flashes, the fault code output will be a repeated sequence of long RED flashes. After that, again there will be 5 fast GREEN flashes. This process is repeated until the heater is switched off. The meaning of the number of red flashes is shown in: Table 301: "Fault messages manual Control Panel".

Rectify the cause of the fault.

To reset the fault, switch the heater off (at least 5 seconds) and then turn back on.

If serious malfunctions such as overheating or failure to start reoccur, the heater is locked and can be put back into service by deleting the failures.

Do this by disconnecting the power supply (e.g. by removing all 3 fuses in this sequence: 5A, 10A, 15A; inserting the fuses in reversed order), while the appliance is switched on (see Operating Instructions, mode selector knob in position 1, 2, 3, 4 or 5), but the heater is not running (to be judged by the sound of the heater).

Deleting failures can also be done with the Webasto Thermo Test PC-Diagnosis.

If a fault occurs, the heater stops. In case of electrical safety/drain valve fault (17 red flashes), heating of the interior is still possible.

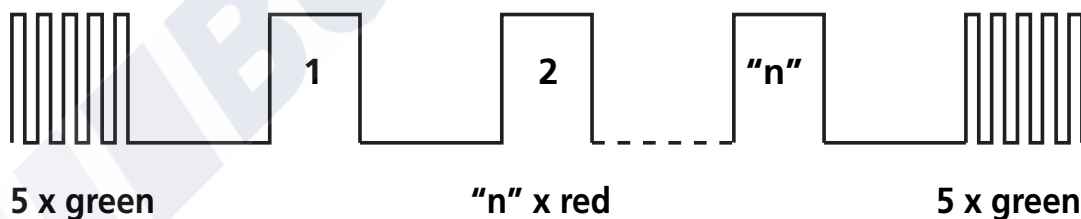


Fig. 302 Example of fault code

### 3 Fault code output

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Table 301: Fault messages manual Control Panel

Number of RED flashes	Meaning	Remedy
00	No communication between Control Panel and heater, or error Control Panel	<ol style="list-style-type: none"> <li>1 First, remove fuses 15A and 5A. Then put in fuse 15A, followed by fuse 5A.</li> <li>2 Check connections of Control Panel.</li> <li>3 Check fuse 15A.</li> <li>4 Check wiring harness.</li> <li>5 Replace Control Panel (see chapter 6: "Servicing work").</li> <li>6 Replace control unit.</li> </ol>
01	No start (after 2 attempts to start)	<ol style="list-style-type: none"> <li>1 Check fuel supply (enough fuel, at least 8 ltr.; check fuel connection and tubes), reset heater (by switching off for at least <b>30</b> sec.).</li> <li>2 Clean burner insert.</li> </ol>
02	Flame failure (at least > 3)	<ol style="list-style-type: none"> <li>1 Check fuel supply (enough fuel, at least 8 ltr.; check fuel connection and tubes), reset heater (by switching off for at least <b>30</b> sec.).</li> <li>2 Clean burner insert.</li> </ol>
03	Under voltage or over voltage	Charge battery or connect to another power source (DC, 12V or charger 230V), reset heater (by switching off for at least 5 sec.)
04	Fuel pump disconnection / short circuit / overheating	<ol style="list-style-type: none"> <li>1 Check fuel pump cable and connectors.</li> <li>2 Check internal wiring harness connections Y9, Y10.</li> </ol>
05	Hot air motor fault: disconnection / short circuit / fan speed out of range / fan blocked	<ol style="list-style-type: none"> <li>1 Let heater cool down. Check power supply: Fuse correct (fuse not damaged, 10A fuse used for PWM module) and functioning. All contacts are correct (no corrosion). Voltage correct (&gt;12V). Restart heater.</li> <li>2 Start blower: component test in diagnostic mode. Run blower 5 minutes at 80%. Listen if there is any unusual noise (grinding, etc.). Restart heater.</li> <li>3 Dismount application parts until the fan is visible. Check if dirt, screws, objects or deformations block the fan. Check fan clearance with your finger (no high force!). Remove all matters that block the fan. Restart heater.</li> <li>4 Remove service cap. Check all electrical connectors. Moisture in connectors (2-pin connector and 4-pin connector)? Moisture in connectors or on PWM module? PWM module dark or burned? 12V power supply permanently available at PWM module? (measure voltage between brown and red/blue cable contacts of 4-pin connector) If not, check external wiring harness: routing wiring harness and pins of 12 pin connector. In case there is a bad connector, bad wiring harness or defect PWM module: replace defect part.</li> <li>5 If heating air blower assy and wiring harness have been checked and Dual Top still doesn't run: replace complete Dual Top.</li> </ol>
06	Overheating or exceeding gradient water temperature sensor	<ol style="list-style-type: none"> <li>1 Check water level, reset heater (by switching off for at least 5 sec.) or select winter mode without hot water production.</li> <li>2 Check fuel pump cable and connectors.</li> <li>3 Check if hot and cold water pipes have been connected correctly.</li> <li>4 Check internal wiring harness connections Y9, Y10.</li> </ol>

Table 301: Fault messages manual Control Panel

Number of RED flashes	Meaning	Remedy
07	Overheating or exceeding gradient hot air temperature sensor	<ol style="list-style-type: none"> <li>1 Ensure that hot air can flow freely, air intake and outlets are not blocked. Reset heater (by switching off for at least 5 sec.)</li> <li>2 Check fuel pump cable and connectors.</li> <li>3 Check internal wiring harness connections Y9, Y10.</li> <li>4 Check correct assembly of hot air temperature sensor.</li> </ol>
08	Overheating of heaters' control unit	Ensure that cooling air can flow freely, reset heater (by switching off for at least 5 sec.)
09	Combustion air motor fault: disconnection / short circuit / overload / blocked	<ol style="list-style-type: none"> <li>1 Ensure that cooling fan can freely rotate, remove possible blocking objects.</li> <li>2 Check fuse 15 A.</li> <li>3 Check connector Y1 at control unit.</li> <li>4 Change Drive Assy.</li> </ol>
10	Control unit fault / heater locked	<ol style="list-style-type: none"> <li>1 Put heater back into service (see beginning of this section) and restart heater.</li> <li>2 Replace control unit.</li> </ol>
11	Interior temperature sensor disconnection or short circuit	<ol style="list-style-type: none"> <li>1 Check routing of cable, ensure that it is not pinched or crushed, check the connector behind the control panel. Reset heater (by switching off for at least 5 sec.)</li> <li>2 Replace interior temperature sensor.</li> </ol>
12	Hot air temperature sensor disconnection / short circuit	<ol style="list-style-type: none"> <li>1 Check routing of cable, ensure that it is not pinched or crushed, check the connectors.</li> <li>2 Check resistance of hot air temperature sensor.</li> <li>3 Reset heater (by switching off for at least 5 sec.)</li> <li>4 Replace sensor wiring harness.</li> </ol>
13	Water temperature sensor disconnection / short circuit	<ol style="list-style-type: none"> <li>1 Check routing of cable, ensure that it is not pinched or crushed, check the connectors.</li> <li>2 Check resistance of water temperature sensor.</li> <li>3 Reset heater (by switching off for at least 5 sec.)</li> <li>4 Replace sensor wiring harness.</li> </ol>
14	Glow plug / flame detector disconnection / short circuit	<ol style="list-style-type: none"> <li>1 Check routing of cable, ensure that it is not pinched or crushed, check the connectors.</li> <li>2 Check resistance of glowplug.</li> <li>3 Reset heater (by switching off for at least 5 sec.)</li> <li>4 Replace burner (incl. glowplug and evaporator housing assy).</li> </ol>
15	Early flame detection	See fault message 14.
16	n/a	n/a
17	Electrical safety/drain valve disconnection / short circuit	<ol style="list-style-type: none"> <li>1 Check routing of cable, ensure that it is not pinched or crushed, check the connectors.</li> <li>2 Check function of solenoid valve with separate 12V DC power supply.</li> <li>3 Reset heater (by switching off for at least 5 sec.)</li> <li>4 Replace solenoid valve.</li> </ol>

Note:

n/a = not available

### 3 Fault code output

### Dual Top

#### 3.2 Programmable Control Panel



Fig. 303 Programmable Control Panel

The programmable Control Panel can be used with all types Dual Top heaters.

The heater is able to identify faults on individual components and during the operation.

The Control Panel gives out the fault message.

Rectify the cause of the fault.

**Table 302: Fault messages programmable Control Panel**

Message	Meaning	Remedy
Message 01 No data connection	No communication between Control Panel and heater, or error Control Panel.	<ol style="list-style-type: none"> <li>1 First, remove fuses 15A and 5A. Then put in fuse 15A, followed by fuse 5A.</li> <li>2 Check connections of Control Panel.</li> <li>3 Check fuse 15A.</li> <li>4 Check wiring harness.</li> <li>5 Replace Control Panel (see chapter 6: "Servicing work").</li> <li>6 Replace control unit.</li> </ol>
Message 02 No start of combustion	No start (after 2 attempts to start)	<ol style="list-style-type: none"> <li>1 Check fuel supply (enough fuel, at least 8 ltr.; check fuel connection and tubes), reset heater (by switching off for at least <b>30</b> sec.).</li> <li>2 Clean burner insert.</li> </ol>
Message 03 Combustion interrupted	Flame failure. Restart not successful	See message 02.
Message 04 High battery voltage	Operation voltage is above permitted value	Reset heater (by pressing OK or switching off for at least 5 sec.)
Message 05 Low battery voltage	Operation voltage is below permitted value	Charge battery or connect to main power supply (230V), reset heater (by pressing OK or switching off for at least 5 sec.)
Message 06 Fuel pump disconnected or system overheated	Fuel pump disconnection / one of the three overheating switches detects too high temperature OR relaybox, cable or connection relaybox is defective	<ol style="list-style-type: none"> <li>1 Check fuel pump cable and connectors.</li> <li>2 Check internal wiring harness connections Y9, Y10.</li> </ol> RHA 101/102 additionally: <ol style="list-style-type: none"> <li>1 Check wiring harness relaybox to heater.</li> <li>2 Check relaybox and connections relaybox.</li> </ol>
Message 07 Fuel pump short circuit	Fuel pump short circuit to ground OR relaybox, cable or connection relaybox is defective	See message 06.

To reset the fault, confirm message by pressing OK (if provided) or switch off the Dual Top for at least 5 seconds.

If serious malfunctions such as overheating or failure to start reoccur, the heater is locked and can be put back into service by deleting the failures.

Do this by disconnecting the power supply:

Ensure that the heater/ventilator is not running (to be established by the sound of the heater operating).

If necessary wait until ventilators stop running.

Switch off Dual Top by pressing on/off button.

Remove all 3 fuses in this sequence: 5A, 10A, 15A; insert the fuses in reversed order after at least 5 seconds.

Now the heater is reset.

Deleting failures can also be done with the Webasto Thermo Test PC-Diagnosis.

If a fault occurs, the heater stops. Failure of drainage valve (message 28 and 29) will not abort heater operation and will not be shown during heater operation.

Table 302: Fault messages programmable Control Panel

Message	Meaning	Remedy
Message 08 Failure heating air ventilator	Hot air motor fault: disconnection / short circuit / fan speed out of range / fan blocked	<ol style="list-style-type: none"> <li>1 Check power supply: Fuse correct (fuse not damaged, 10A fuse used for PWM module) and functioning. All contacts are correct (no corrosion). Voltage correct (&gt;12V). Restart heater.</li> <li>2 Start blower: component test in diagnostic mode. Run blower 5 minutes at 80%. Listen if there is any unusual noise (grinding, etc.). Restart heater.</li> <li>3 Dismount application parts until the fan is visible. Check if dirt, screws, objects or deformations block the fan. Check fan clearance with your finger (no high force!). Remove all matters that block the fan. Restart heater.</li> <li>4 Remove service cap. Check all electrical connectors. Moisture in connectors (2-pin connector and 4-pin connector)? Moisture in connectors or on PWM module? PWM module dark or burned? 12V power supply permanently available at PWM module? (measure voltage between brown and red/blue cable contacts of 4-pin connector) If not, check external wiring harness: routing wiring harness and pins of 12 pin connector. In case there is a bad connector, bad wiring harness or defect PWM module: replace defect part.</li> <li>5 If heating air blower assy and wiring harness have been checked and Dual Top still doesn't run: replace complete Dual Top.</li> </ol>
Message 09 Failure ventilator amplifier	No communication between amplifier of heating air ventilator and heaters control unit	<ol style="list-style-type: none"> <li>1 Check internal cable routing (4-pins) from control unit to PWM module.</li> <li>2 Replace heating air blower assy.</li> <li>3 Replace thermo unit.</li> </ol>
Message 10 High temperature sanitary water	Overheating water temperature sensor	<ol style="list-style-type: none"> <li>1 Check water level, reset heater (by pressing OK or switching off for at least 5 sec.) or select winter mode without hot water production.</li> <li>2 Check fuel pump cable and connectors.</li> <li>3 Check internal wiring harness connections Y9, Y10.</li> </ol>
Message 11 High temperature sanitary water	Exceeding gradient water temperature sensor	<ol style="list-style-type: none"> <li>1 See message 10.</li> <li>2 Check if hot and cold water pipes have been connected correctly.</li> </ol>
Message 12 High temperature heating air	Overheating hot air temperature sensor	<ol style="list-style-type: none"> <li>1 Ensure that hot air can flow freely, air intake and outlets are not blocked. Reset heater (by pressing OK or switching off for at least 5 sec.)</li> <li>2 Check fuel pump cable and connectors.</li> <li>3 Check internal wiring harness connections Y9, Y10.</li> <li>4 Check correct assembly of hot air temperature sensor.</li> </ol>
Message 13 High temperature heating air	Exceeding gradient hot air temperature sensor	See message 12.
Message 14 Failure cooling air ventilation	Overheating of heaters' control unit	Ensure that cooling air can flow freely, reset heater (by pressing OK or switching off for at least 5 sec.)
Message 15 Failure combustion air motor	Combustion air motor interrupted	<ol style="list-style-type: none"> <li>1 Ensure that cooling fan can freely rotate, remove possible blocking objects.</li> <li>2 Check fuse 15 A.</li> <li>3 Check connector Y1 at control unit.</li> <li>4 Change Drive Assy.</li> </ol>
Message 16 Failure combustion air motor	Combustion air motor fault: disconnection / short circuit / overload / blocked	See message 15.

### 3 Fault code output

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Table 302: Fault messages programmable Control Panel

Message	Meaning	Remedy
Message 17 Failure control unit	Control unit (heater) fault / heater locked	<ol style="list-style-type: none"> <li>1 Put heater back into service (see above this table) and restart heater.</li> <li>2 Replace control unit.</li> </ol>
Message 18 Failure cabin temperature sensor	Interior temperature sensor disconnection / short circuit	<ol style="list-style-type: none"> <li>1 Check routing of cable, ensure that it is not pinched or crushed, check the connector behind the control panel. Reset heater (by pressing OK or switching off for at least 5 sec.)</li> <li>2 Replace interior temperature sensor.</li> </ol>
Message 19	n/a	n/a
Message 20 Failure heating air temperature sensor	Hot air temperature sensor disconnection	<ol style="list-style-type: none"> <li>1 Check routing of cable, ensure that it is not pinched or crushed, check the connectors.</li> <li>2 Check resistance of hot air temperature sensor.</li> <li>3 Reset heater (by pressing OK or switching off for at least 5 sec.)</li> <li>4 Replace sensor wiring harness.</li> </ol>
Message 21 Failure heating air temperature sensor	Hot air temperature sensor short circuit	See message 20.
Message 22 Failure sanitary water temperature sensor	Water temperature sensor disconnection	<ol style="list-style-type: none"> <li>1 Check routing of cable, ensure that it is not pinched or crushed, check the connectors.</li> <li>2 Check resistance of water temperature sensor.</li> <li>3 Reset heater (by pressing OK or switching off for at least 5 sec.)</li> <li>4 Replace sensor wiring harness.</li> </ol>
Message 23 Failure sanitary water temperature sensor	Water temperature sensor short circuit	See message 22.
Message 24 Failure glow plug	Glow plug / flame detector disconnection	<ol style="list-style-type: none"> <li>1 Check routing of cable, ensure that it is not pinched or crushed, check the connectors.</li> <li>2 Check resistance of glowplug.</li> <li>3 Reset heater (by pressing OK or switching off for at least 5 sec.)</li> <li>4 Replace burner (incl. glowplug and evaporator housing assy).</li> </ol>
Message 25 Failure glow plug	Glow plug / flame detector short circuit	See message 24.
Message 26 Failure flame detection	Early flame detection	See message 24.
Message 27 Failure relay box	Short circuit of 230V indication signal from relay box to heater	<ol style="list-style-type: none"> <li>1 Check wiring harness relaybox to heater.</li> <li>2 Check the relay box and wiring connections.</li> <li>3 Check Control Panel and connections Control Panel.</li> <li>4 Check internal wiring harness connections Y9, Y10.</li> </ol>
Message 28 Failure drain valve	Electrical drainage valve disconnection	<ol style="list-style-type: none"> <li>1 Check routing of cable, ensure that it is not pinched or crushed, check the connectors.</li> <li>2 Check function of valve with separate 12V DC power supply.</li> <li>3 Reset heater (by pressing OK or switching off for at least 5 sec.)</li> <li>4 Replace solenoid valve.</li> </ol>
Message 29 Failure drain valve	Electrical drainage valve short circuit	See message 28.
Message 30 Failure relay	230V high or low power relay circuit interrupted / short circuit	See message 27.
Message 31, 32, 33	n/a	n/a



**Table 302: Fault messages programmable Control Panel**

Message	Meaning	Remedy
Message 34 System overheated or relay circuit disconnected	One of the three overheating switches detects too high temperatures / overheating relay circuit interrupted	RHA 101/102: 1 Check wiring harness relaybox to heater. 2 Check the relay box and wiring connections. 3 Check Control Panel and connections Control Panel. 4 Check internal wiring harness connections Y9, Y10.  All: 1 Check for overheating (see messages 10, 11, 12, 13 and 14). 2 Reset heater (by pressing OK or switching off for at least 5 sec.)
Message 35 Failure relay box	230V overheating relay short circuit	See message 27.
Message 36, 37, 38, 39, 40, 41	n/a	n/a
Message 42 Failure 230V heating element	Electric heating device 230V defect. No relevant temperature increase detected.	1 Check water system for a permanent open hot water tap OR heavy leakages. 2 Check cable 230V from relaybox to heater and corresponding connectors. 3 Check electrical element heaters.

Note:

n/a = not available





## 4 Function tests

### 4.1 General

This section describes the tests conducted on the heater when it is installed and not installed to verify that it is in working order.

#### WARNING

The heater must not be operated in enclosed areas such as garages and workshops without an emissions extraction system.

### 4.2 Repair Shop Level Testing

#### 4.2.1 Testing individual components

#### IMPORTANT

For function tests always break the connection between the control unit and the component you wish to test.

##### 4.2.1.1 Glowplug resistance test

#### NOTE

The resistance test must be carried out with an ohmmeter suitable for small resistance values or Webasto Thermo Test Diagnosis.

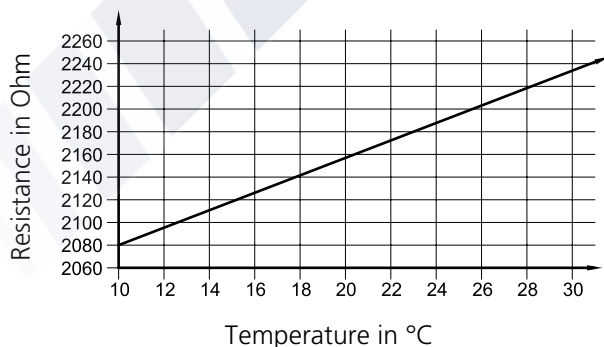
A resistance test with a simple digital multimeter is too inaccurate to find the precise values. A new glow plug can be measured to act as a reference.

The glow plug should have the following values in the test:

Glow plug: 12 V (red)  
Resistance at 25 °C: 0.190 ... 0.250 Ω  
Test current: < 5 mA

##### 4.2.1.2 Air temperature sensor resistance test

If you conduct this test with a digital multimeter the air temperature sensor must have the values shown in the following diagram:



Characteristic resistance values of a PT 2000 overheating sensor within a temperature range of 10 °C to 30 °C.

##### 4.2.1.3 Water temperature sensor resistance test

A: Resistance in kΩ  
B: Temperature of water temperature sensor -G18- in °C  
C: Resistance as a function of temperature

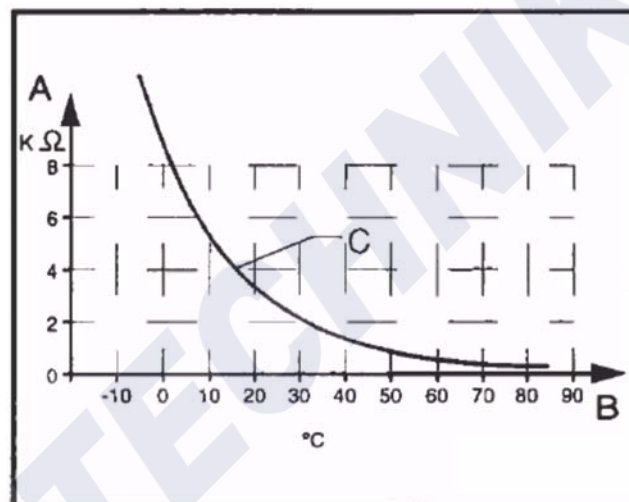


Table 401: Technical data water temperature sensor

Temperature [°C]	Resistance nominal [Ohm]	Resistance min. [Ohm]	Resistance max. [Ohm]
-10	14.939,00	14.351,00	15.528,00
-5	11.425,00	10.991,00	11.859,00
0	8.816,00	8.493,00	9.138,00
5	6.855,00	6.613,00	7.097,00
10	5.373,00	5.190,00	5.556,00
15	4.241,00	4.102,00	4.379,00
20	3.372,00	3.266,00	3.479,00
25	2.700,00	2.619,00	2.781,00
30	2.175,00	2.107,00	2.244,00
35	1.763,00	1.706,00	1.821,00
40	1.438,00	1.390,00	1.487,00
45	1.180,00	1.139,00	1.220,00
50	972,80	938,10	1.008,00
55	806,30	776,80	835,80
60	671,80	646,60	697,00
65	562,40	540,80	584,00
70	473,00	454,50	491,60
75	400,00	383,90	416,00
80	339,70	325,80	353,60
85	289,50	277,50	301,60
90	247,80	237,30	258,30

## 4 Function tests

### 4.2.1.4 Air temperature switch

The air temperature switch opens at  $145 \pm 5$  °C.

### 4.2.1.5 Water temperature switch

The water temperature switch opens at  $90 \pm 5$  °C.

### 4.2.1.6 Overheating protector

The overheating protector (temperature switch heat exchanger) opens at  $352 \pm 15$  °C and closes at 240 °C.

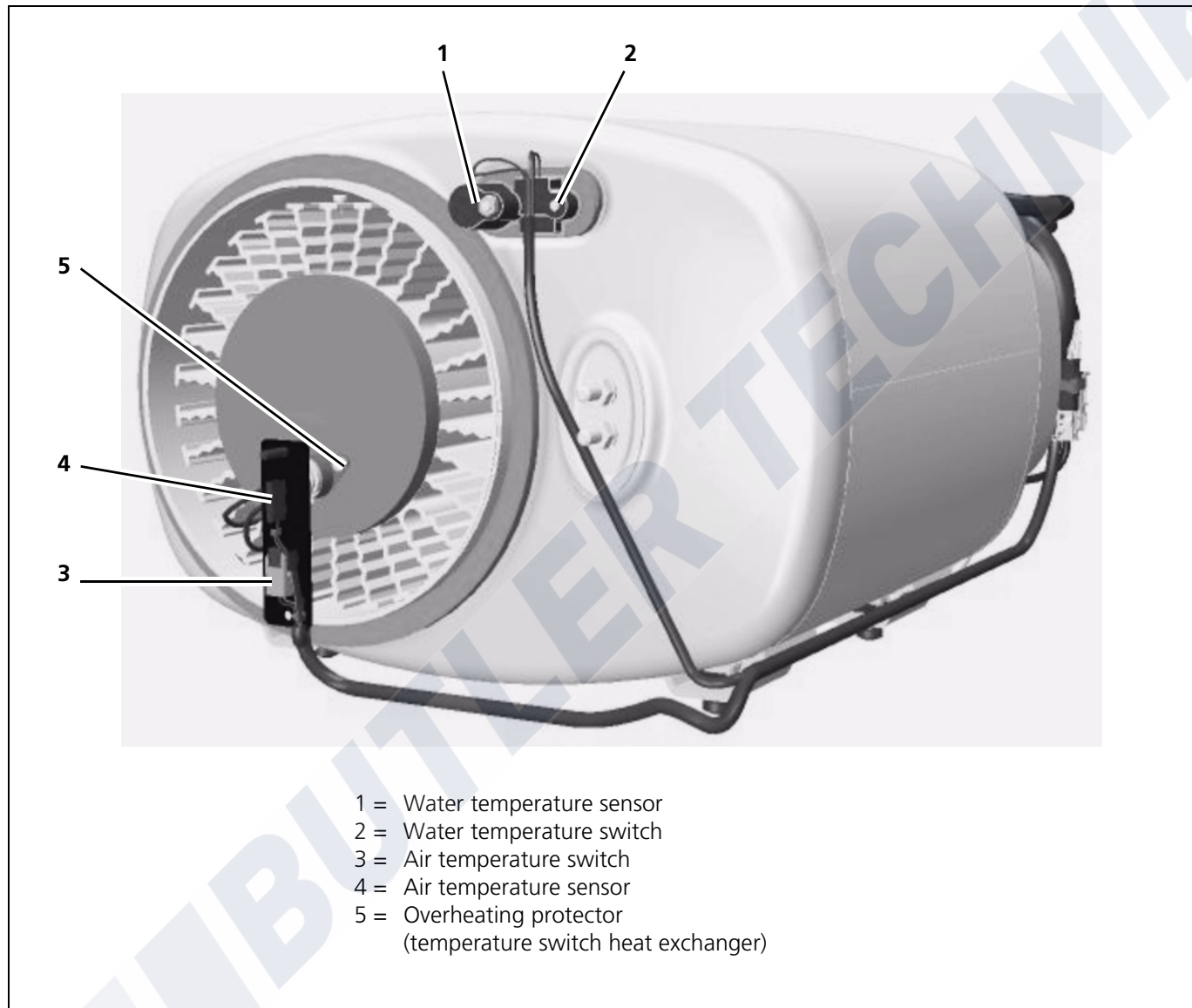


Fig. 401 Sensor positions

## 5 Circuit diagrams

### 5.1 General

Fig. 501 shows the heaters' control unit.

See Paragraph 5.2 for the legend of the circuit diagrams.

How the electrical connections are to be made:

Fig. 502 for RHA 100,

Fig. 503 for RHA 101/102.

Electrical connections Control Panel:

Fig. 504 for manual version,

Fig. 505 for programmable version.

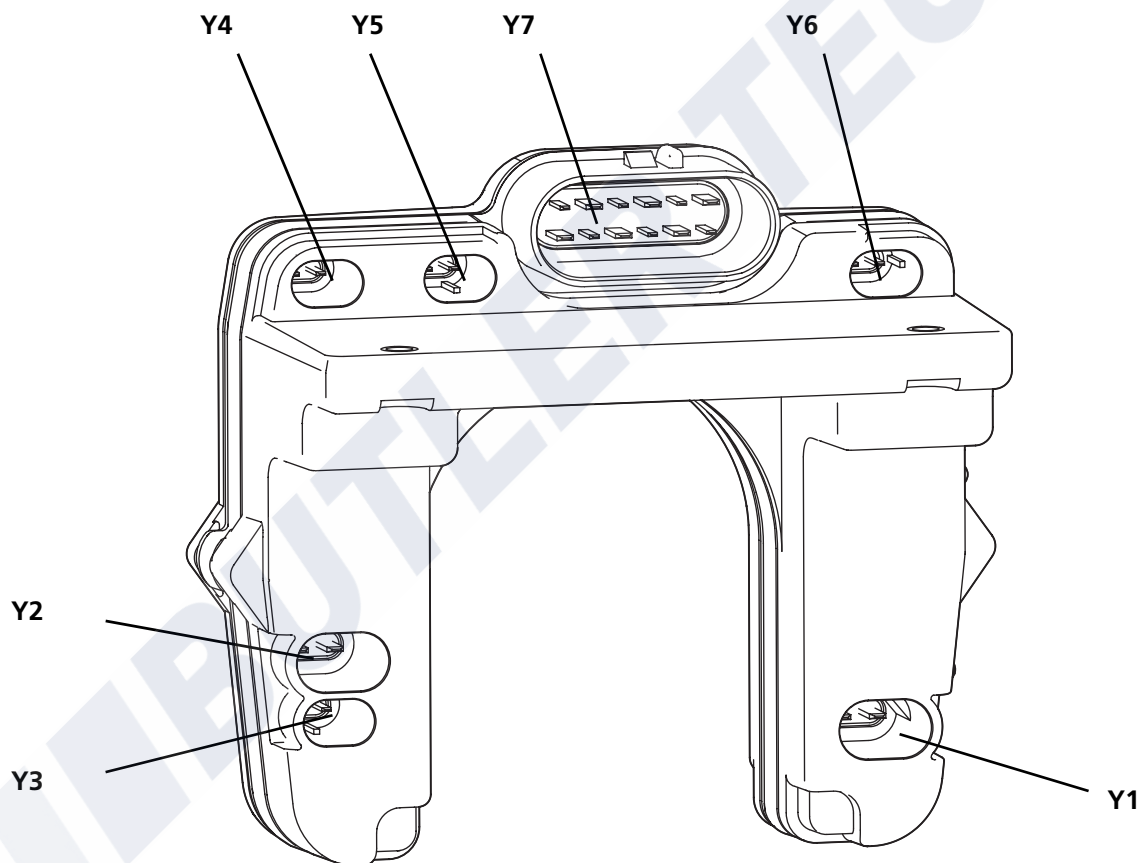
Circuit diagrams:

Fig. 506 for wiring harness RHA 100, older type,

Fig. 507 for external wiring harness RHA 100, newer type,

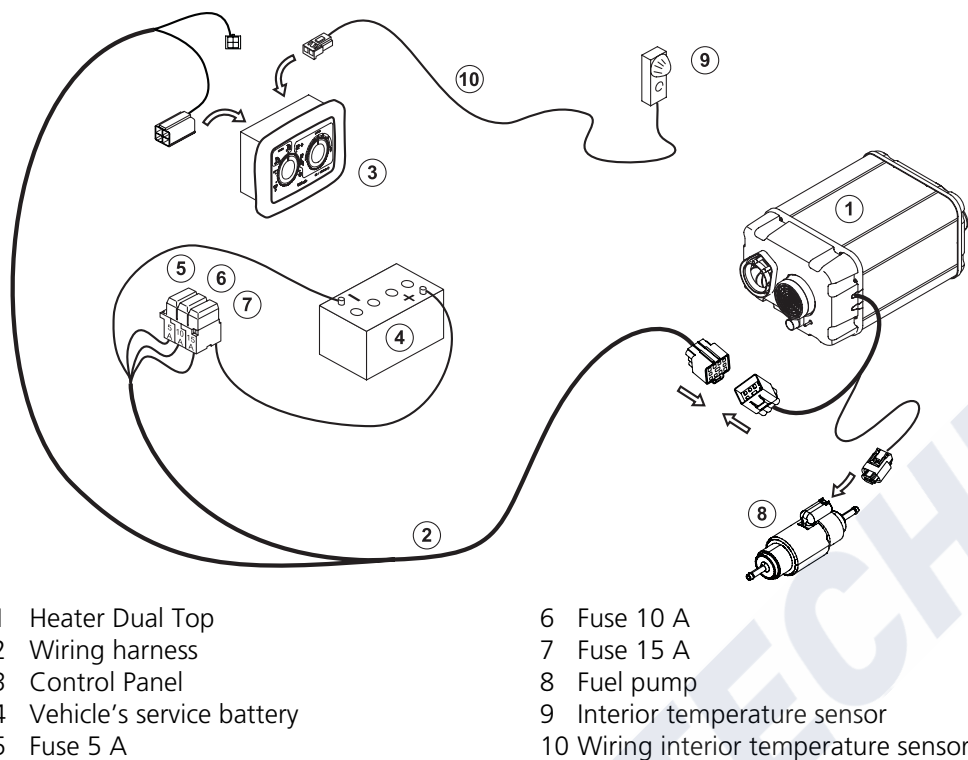
Fig. 508 for external wiring harness RHA 101/102,

Fig. 509 for internal wiring harness.



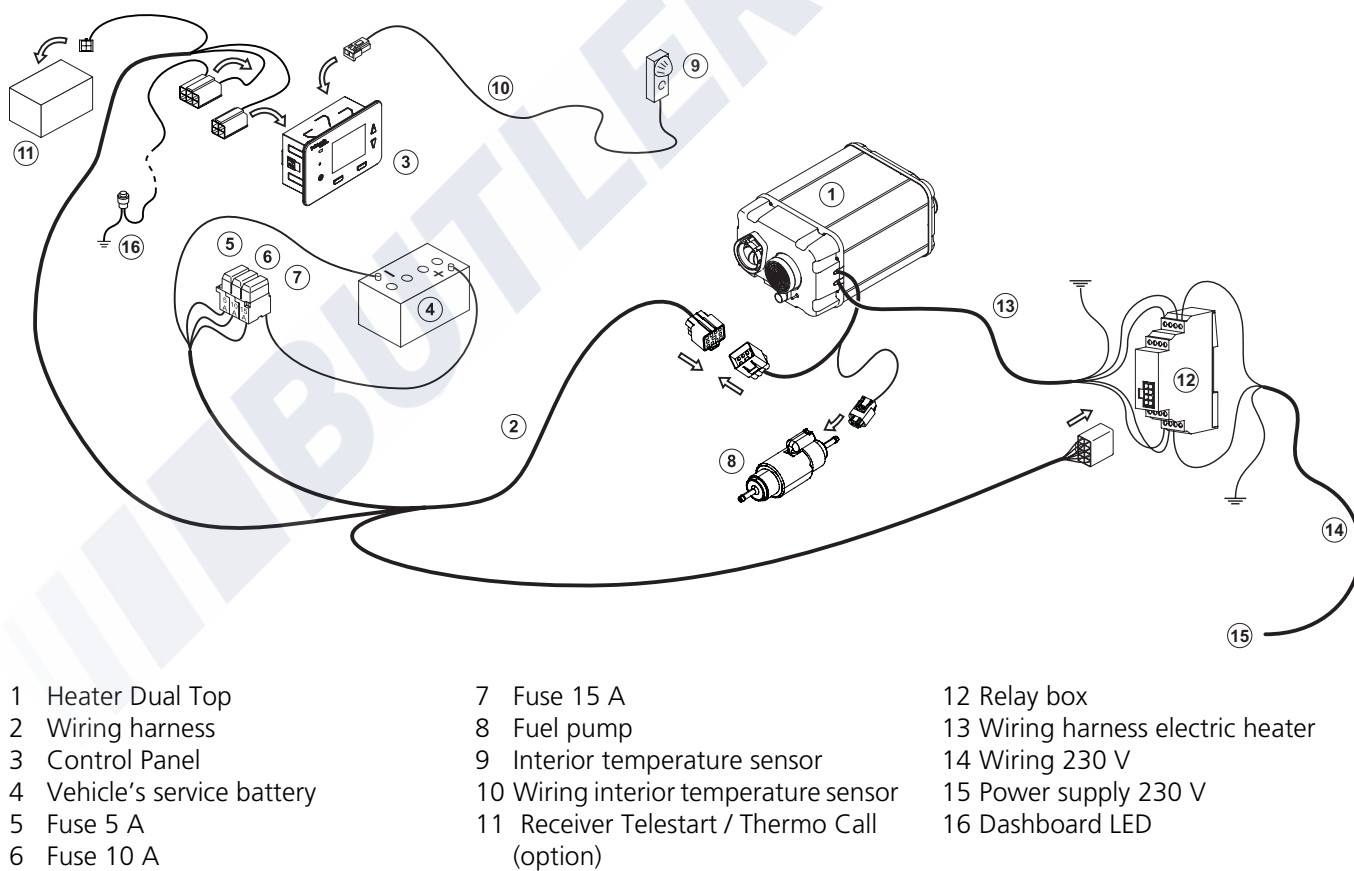
- Y1 = Combustion and cooling air blower connection
- Y2 = Glowplug connection
- Y3 = Air temperature switch connection
- Y4 = Fuel pump connection
- Y5 = Water temperature switch connection
- Y6 = Status PWM (D+) connection
- Y7 = Heater wiring harness connection

Fig. 501 Control unit Dual Top



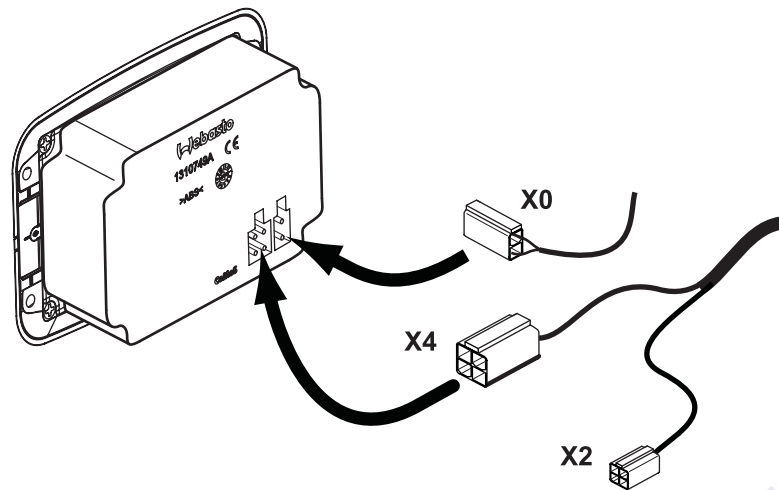
- |                             |                                       |
|-----------------------------|---------------------------------------|
| 1 Heater Dual Top           | 6 Fuse 10 A                           |
| 2 Wiring harness            | 7 Fuse 15 A                           |
| 3 Control Panel             | 8 Fuel pump                           |
| 4 Vehicle's service battery | 9 Interior temperature sensor         |
| 5 Fuse 5 A                  | 10 Wiring interior temperature sensor |

Fig. 502 Schematical electrical connection Dual Top RHA 100



- |                             |                                       |                                   |
|-----------------------------|---------------------------------------|-----------------------------------|
| 1 Heater Dual Top           | 7 Fuse 15 A                           | 12 Relay box                      |
| 2 Wiring harness            | 8 Fuel pump                           | 13 Wiring harness electric heater |
| 3 Control Panel             | 9 Interior temperature sensor         | 14 Wiring 230 V                   |
| 4 Vehicle's service battery | 10 Wiring interior temperature sensor | 15 Power supply 230 V             |
| 5 Fuse 5 A                  | 11 Receiver Telestart / Thermo Call   | 16 Dashboard LED                  |
| 6 Fuse 10 A                 | (option)                              |                                   |

Fig. 503 Schematical electrical connection Dual Top RHA 101/102



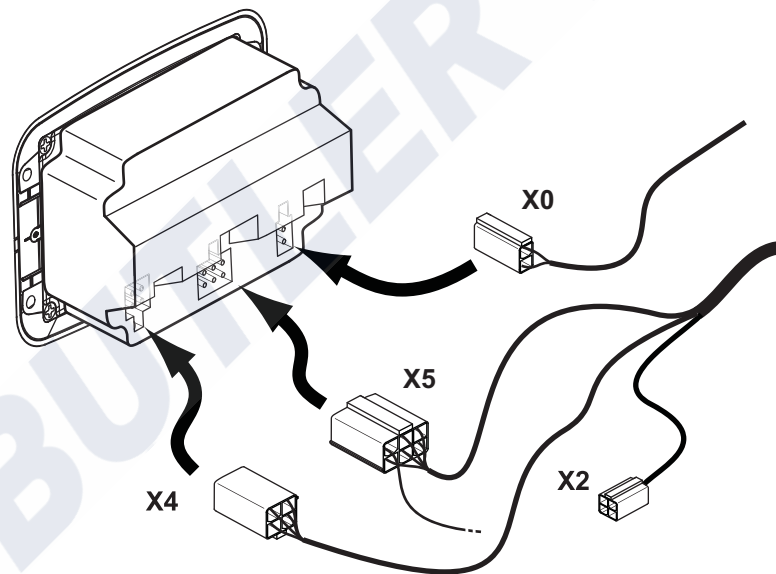
X0 (2 poles) of interior temperature sensor to Control Panel

X2 is for:

- Webasto Thermo Test PC-diagnosis and
- Webasto Telestart / Thermo Call (for optional programmable Control Panel).

X4 (4 poles) of wiring harness to Control Panel

Fig. 504 Electrical connections Manual Control Panel



X0 (2 poles) of interior temperature sensor to Control Panel

X2 is for:

- Webasto Thermo Test PC-diagnosis and
- Webasto Telestart / Thermo Call

X4 (4 poles) of wiring harness to Control Panel

X5 (6 poles) of wiring harness to Control Panel, 1 wire to dashboard LED

Fig. 505 Electrical connections Programmable Control Panel

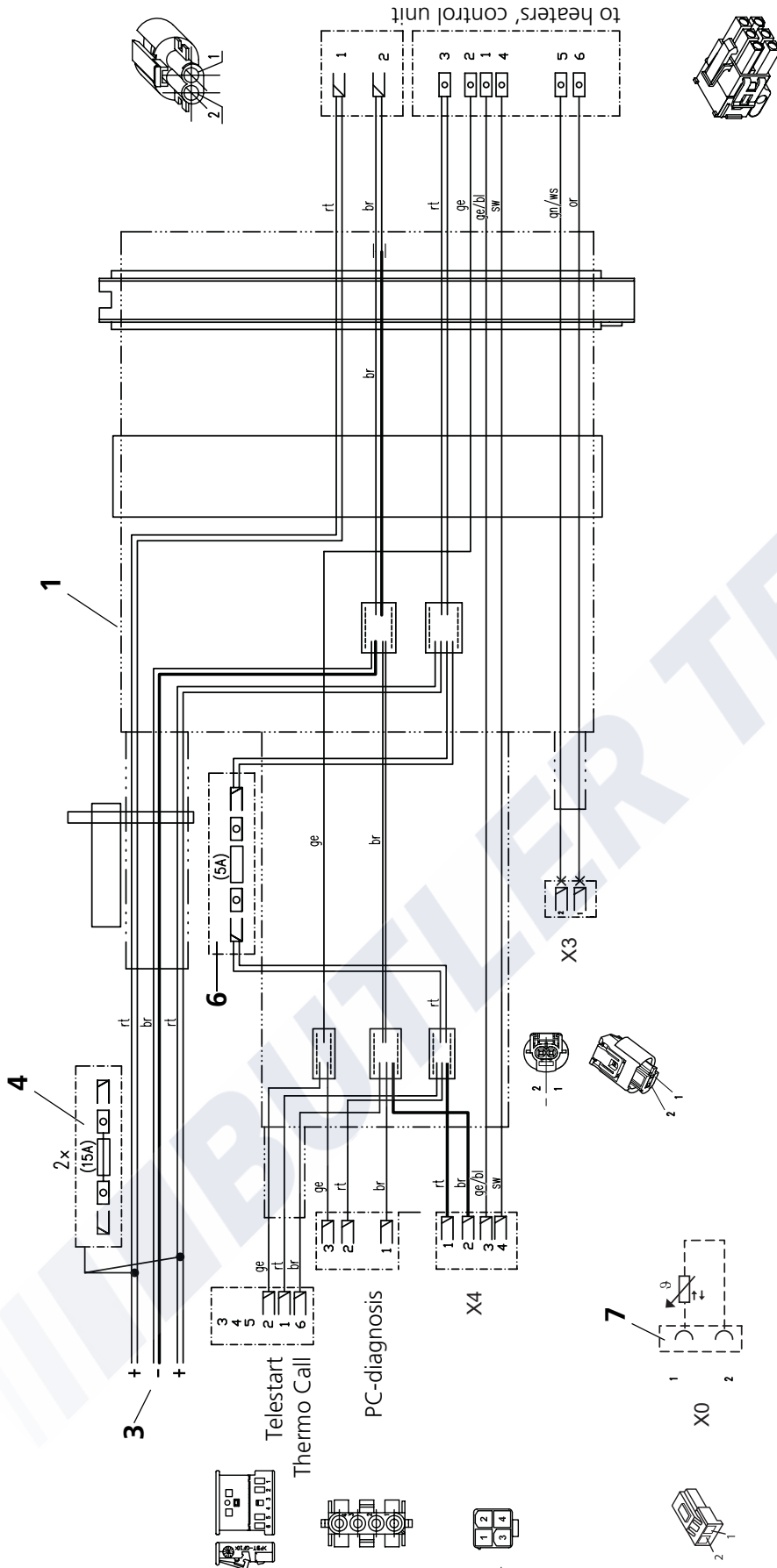


Fig. 506 Wiring harness for Dual Top RHA 100 (older type, heater Ident. No. 9015314A and 9015314B)

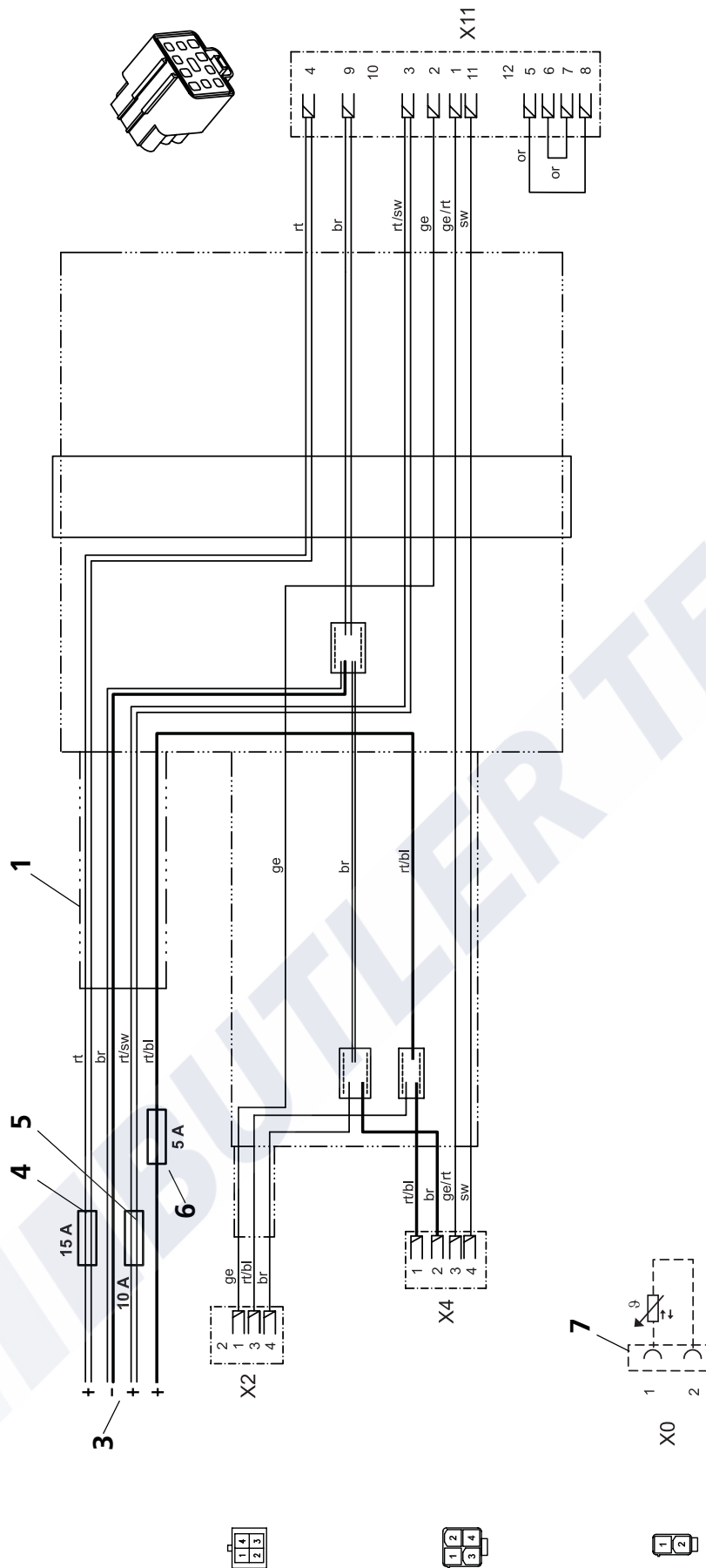


Fig. 507 External wiring harness for Dual Top RHA 100 (newer type, heater Ident. No. 9015314C)





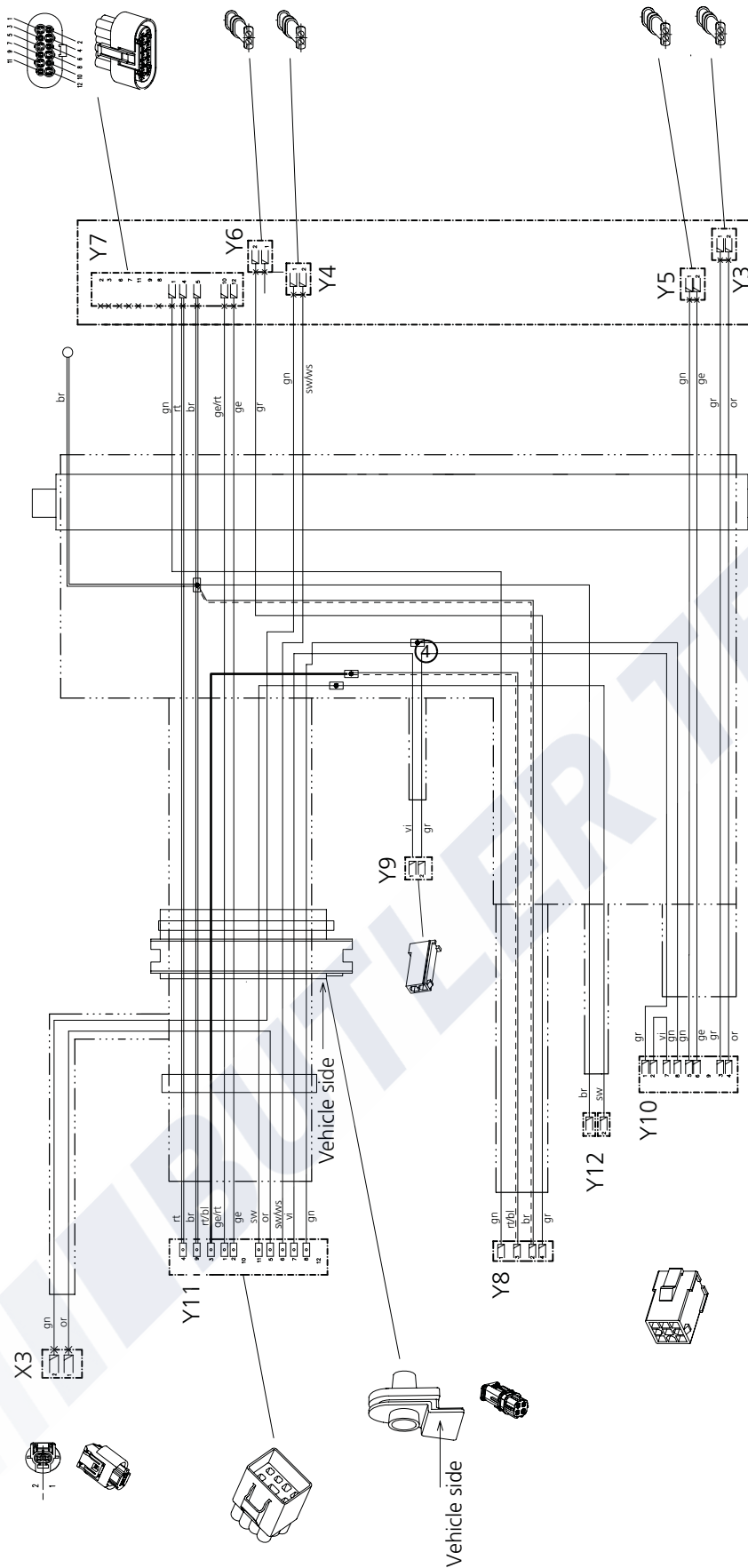
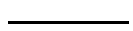


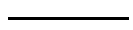



Fig. 509 Internal wiring harness for Dual Top RHA 100/101/102

## 5 Circuit diagrams

### 5.2 Legend for circuit diagram

- 1 Wiring harness vehicle
- 2 Wiring harness electric heater (not for RHA 100)
- 3 Vehicle's service battery
- 4 Fuse 15 A
- 5 Fuse 10 A
- 6 Fuse 5 A
- 7 Interior temperature sensor
- 8 Dashboard LED (not for RHA 100)

Cable cross-sections		
	< 7.5 m	7,5 - 15 m
	0.75 mm <sup>2</sup>	1.0 mm <sup>2</sup>
	1.0 mm <sup>2</sup>	1.5 mm <sup>2</sup>
	1.5 mm <sup>2</sup>	2.5 mm <sup>2</sup>
	2.5 mm <sup>2</sup>	4.0 mm <sup>2</sup>
	4.0 mm <sup>2</sup>	6.0 mm <sup>2</sup>

Cable colours	
bl	blue
br	brown
ge	yellow
gn	green
gr	grey
or	orange
rt	red
sw	black
vi	violet
ws	white

Item	Description	Comment
X0	Plug connector, 2-pin	To Control Panel (interior temperature sensor)
X1	Plug connector, 2-pin	2 pcs, to electric heater inside Dual Top (not for RHA 100)
X2	Plug connector, 4-pin	To PC-diagnosis / Telestart / Thermo Call
X3	Plug connector, 2-pin	To fuel pump
X4	Plug connector, 4-pin	To Control Panel
X5	Plug connector, 6-pin	To Control Panel, 1 wire to dashboard LED (not for RHA 100)
X6	Plug connector, 8-pin	To relay box (not for RHA 100)
X11	Plug connector, 12-pin	To heater Dual Top
X12	Wire end	4 pcs to relay box, 1 to ground (not for RHA 100)
Y3	Plug connector, 2-pin	Air temperature switch; to control unit; marking "A" (blue)
Y4	Plug connector, 2-pin	Fuel pump; to control unit; marking "C"
Y5	Plug connector, 2-pin	Water temperature switch; to control unit; marking "B"
Y6	Plug connector, 2-pin	Status PWM (D+) connection; to control unit; marking "A"
Y7	Plug connector, 12-pin	To external wiring harness; to control unit
Y8	Plug connector, 4-pin	To PWM module
Y9	Plug connector, 1-pin	To temperature switch heat exchanger
Y10	Plug connector, 9-pin	To water temperature switch, air temperature switch, water temperature sensor, air temperature sensor
Y11	Plug connector, 12-pin	To external wiring harness
Y12	Plug connector, 1-pin	2 pcs, to solenoid valve

## 6 Servicing work

### 6.1 General

This section describes the servicing work that can be carried out on the heater when it is installed.

#### WARNING

*There is a potential danger of burns as the heater and its components may be very hot.*

### 6.2 Work on the heater

Disconnect the main power cable from the service battery before carrying out any work on the heater. The battery power must not be disconnected whilst the heater is operating or slowing down as a result of the risk of the heater overheating and the overheating guard thus being tripped. If you wish to carry out extensive repair work on the heater, it may be a good idea to remove it completely. Refer to the relevant installation instructions for repairs that necessitate the installation position being changed.

### 6.3 Work on the vehicle

#### IMPORTANT

*A temperature of 85 °C must not be exceeded in the vicinity of the heater in any circumstances (for example when competing painting work on the vehicle).*

### 6.4 Heater test run

#### WARNING

*The heater must not be operated in enclosed areas such as garages and workshops without an emissions extraction system.*

### 6.5 Servicing work

To ensure functional reliability of the heater the following servicing must be performed in regular intervals:

- the heater must be switched "OFF" before cleaning.
- clean heater exterior (do not use high-pressure water or air hoses, prevent the ingress of water).
- examine electrical connections for corrosion of contacts and to ensure that they are secure.

- check the following lines for signs of damage, to ensure that they are secure and clear:
  - exhaust,
  - combustion air,
  - cooling air,
  - heating air intake and
  - hot air distribution.

#### IMPORTANT

*Some parts of the system, especially the exhaust, may have a shorter life than the heater itself. Especially if the vehicle is used in areas with salty conditions, like near seas and oceans. Pay extra attention to these parts and replace them if necessary.*

- inspect fuel lines for leaks.
- check cold and hot water lines for signs of damage and to ensure that they are secure.
- inspect hoses for cracks.
- check the manual drainage function with the Control Panel.

### 6.6 Visual inspections and installation instructions

Check if the whole application is installed in accordance with the Installation Instructions.

### 6.7 Removal and installation

#### IMPORTANT

*When the heater is installed it must not be dismantled.*

#### 6.7.1 Heater, removal and installation

##### 6.7.1.1 Removal

1. Drain water contents.
2. Disconnect the battery.
3. Disconnect the wiring harness plug X11.
4. Disconnect the cable to the fuel pump at plug X3.
5. Disconnect from the heater:
  - hot air hoses,
  - exhaust pipe,
  - combustion air line,
  - cooling air hose,
  - heating air intake line,
  - fuel line (close with suitable plug or any other means),
  - hot and cold water lines.
6. Remove four M8 nuts from the hammerhead bolts.
7. Remove the heater.

## 6.7.1.2 Installation

See Installation Instructions.

## 6.7.2 Control Panel, removal and installation

## 6.7.2.1 Manual version (for RHA 100)

1. Disconnect the battery.
2. Remove Control Panel as shown (see Fig. 601).
3. Disconnect the wiring harness plug X11.
4. Disconnect plug X0 of the interior temperature sensor.

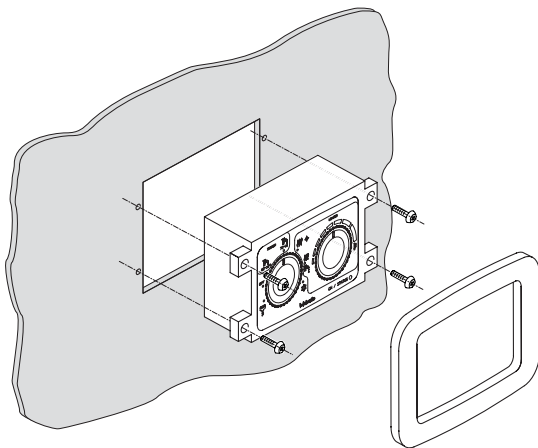


Fig. 601 Manual Control Panel (dis)assembly

## 6.7.2.2 Programmable version (for RHA 100/101/102)

1. Disconnect the battery.
2. Remove Control Panel:  
Place 1 or 2 suction cups on the Control Panel.  
Alternatively, slide flat, smooth material (e.g. plastic card) under the control panel at the left and right hand side.  
Pull to remove the Control Panel out of the adapter.  
Careful: do not damage Control Panel or furniture.  
See Fig. 602.
3. Disconnect the wiring harness plugs X4 and X5.
4. Disconnect plug X0 of the interior temperature sensor.

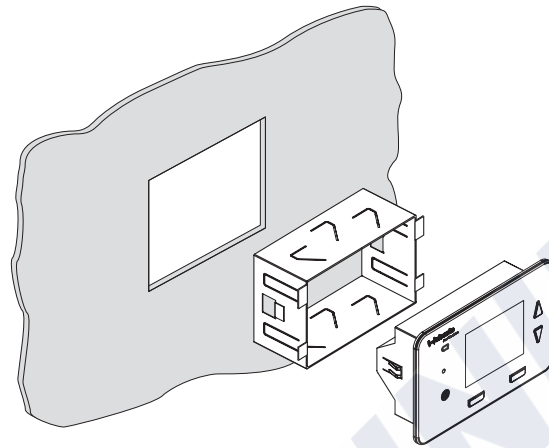


Fig. 602 Programmable Control Panel (dis)assembly

## 6.7.2.3 Installation

See Installation Instructions.

## 6.8 Start-up

After each heater disassembly, follow the procedure "Starting the heater for the first time", as described in the Installation Instructions.

## 7 Repair

### 7.1 General

This section describes the repair work that may be carried out on the Dual Top heater after it has been removed from the vehicle.

Any further disassembly will void the warranty.

Only use the spare parts from the appropriate spare parts kits for assembling the heater.

After repairs a functional test shall be performed.

#### 7.1.1 Work on dismantled components

##### IMPORTANT

*All sealing elements between the stripped down components and the seal on the exhaust outlet shall always be discarded and replaced.*

##### 7.1.1.1 Cleaning

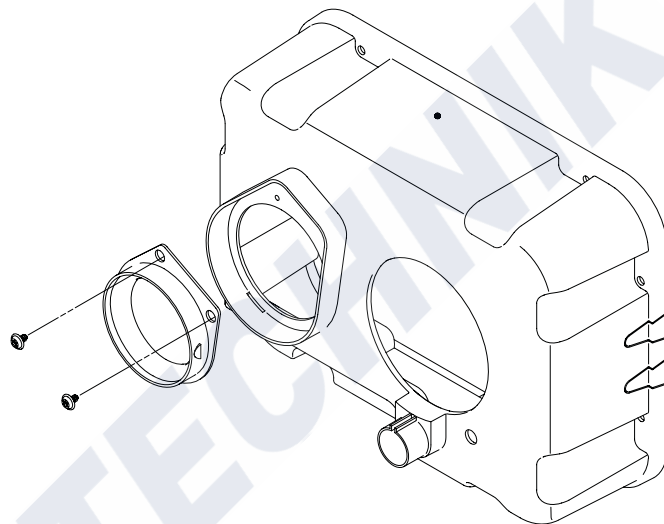
- All components disassembled shall be cleaned.
- Sealing compound on components must be carefully and completely removed using suitable means.

##### 7.1.1.2 Visual inspection

- Check all components for damage (cracks, deformation, wear, etc.) and fit new ones if necessary.
- Inspect the plugs and cables for corrosion, loose contacts, crimping faults, etc. and repair them if necessary.
- Check plug strips for signs of corrosion and contacts to ensure they are secure. Repair them if necessary.

### 7.2 Dismantling

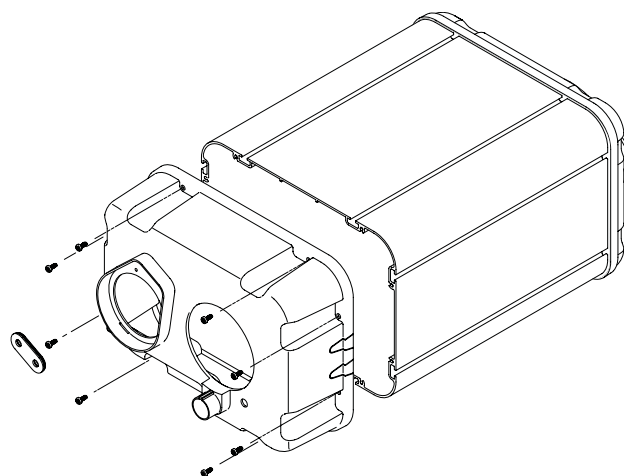
Loosen 2 screws T20 below hot and cold water connectors 1 ~ 2 turns (just enough to move cover heating air blower).



Loosen 8 screws T25 to remove service cap.

##### NOTE

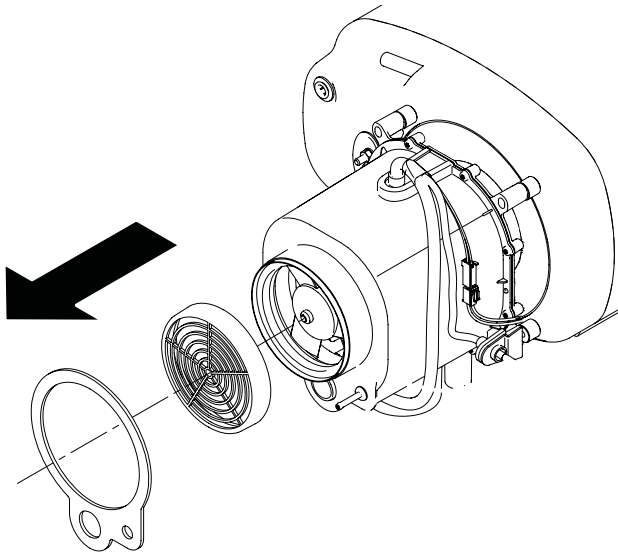
*When removing service cap, friction is caused by the grommet on the two water pipes.*



## 7 Repair

## Dual Top

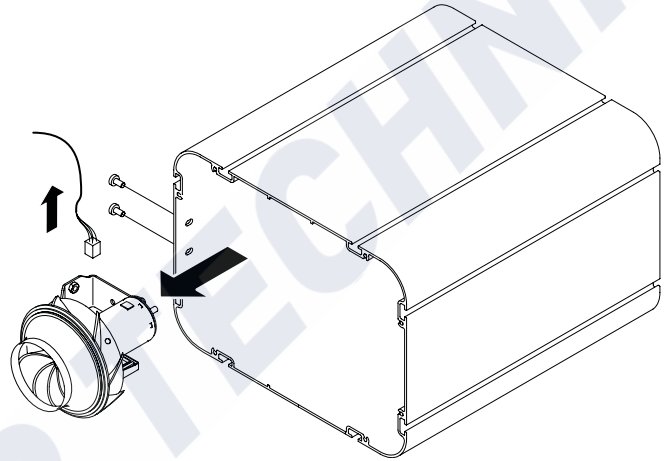
Remove foam gasket cooling shell and air intake grill.



Loosen 2 screws T30 of heating air blower assy with PWM module.  
Pull plug 4 poles of wiring harness out of PWM module (at side of motor heating air blower assy).  
Remove heating air blower assy.

### NOTE

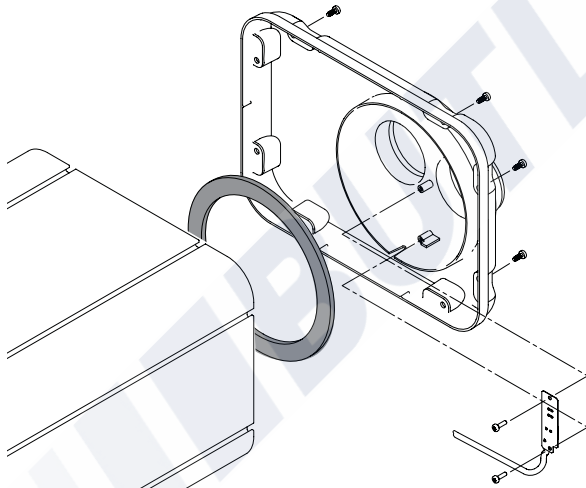
*Do NOT take air blower assy / PWM module apart!  
Once disassembled, distance between speed sensor and magnet on blower cannot be guaranteed.  
Air blower assy is sold as complete unit.*



Loosen 8 screws T25 to remove end cap incl. seal end cap boiler.

### NOTE

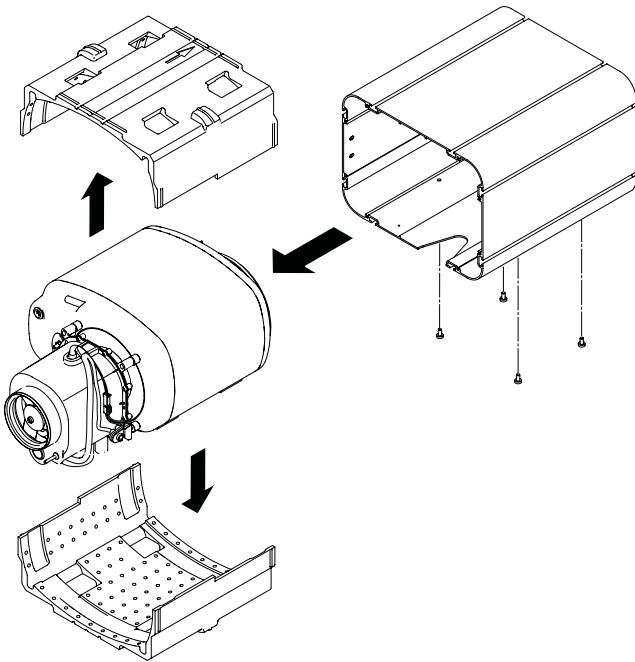
*Loosen 2 screws T20 that hold metal plate (with air temperature sensor and air temperature switch) of sensor wiring harness to end cap.*



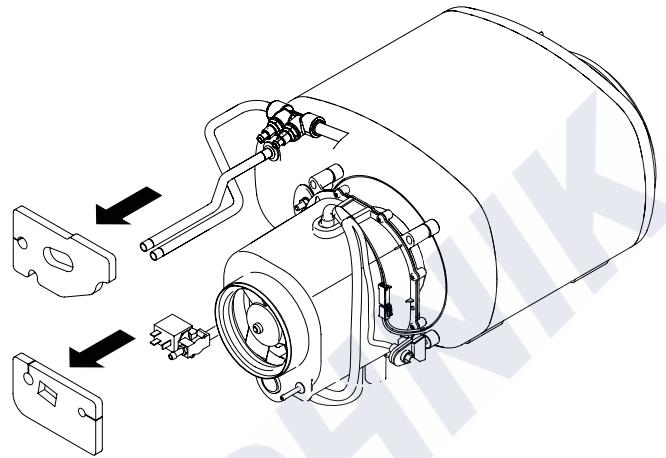
### For RHA 101/102 only:

Loosen screw T30 and hex nut SW 10 mm to remove green/yellow ground wire from housing.

Loosen 4 screws T30 on bottom of Dual Top.  
Push boiler incl. insulation out of housing.  
Remove 2 parts insulation.



Remove insulation combi-valve (top) and solenoid valve (bottom).

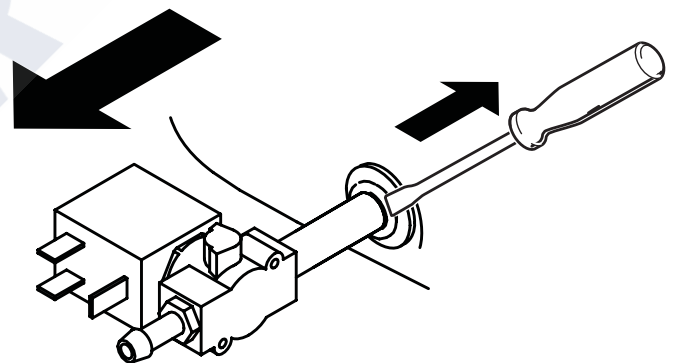
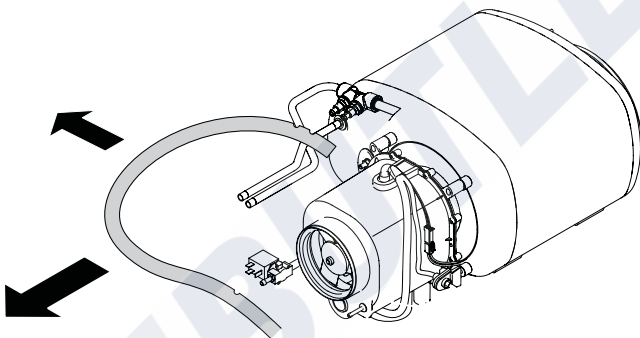


Use flat (-) screwdriver to push down ring below solenoid valve and pull valve up to remove it from boiler.

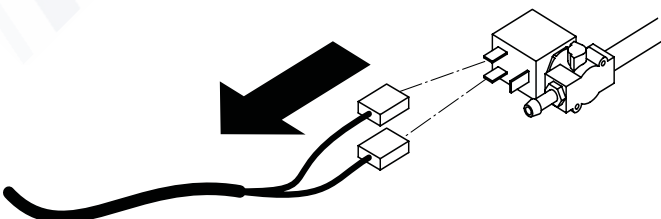
**IMPORTANT**

Avoid that screwdriver makes scratches on tube.  
Scratches will cause leakage. Alternative: use plastic tool.

Remove drain tube from air ventilation/overpressure valve,  
solenoid valve and cooling air outlet.



Pull 2 plugs 1 pole out of solenoid valve.





## 7 Repair

## Dual Top

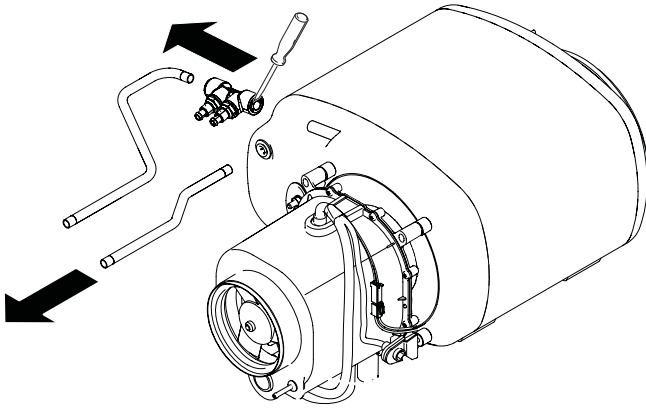
Use flat (-) screwdriver to push down ring of connector hot and cold water pipes and pull pipes up to remove them from boiler.

In the same way, remove air ventilation/overpressure valve.

### IMPORTANT

*Avoid that screwdriver makes scratches on tubes.*

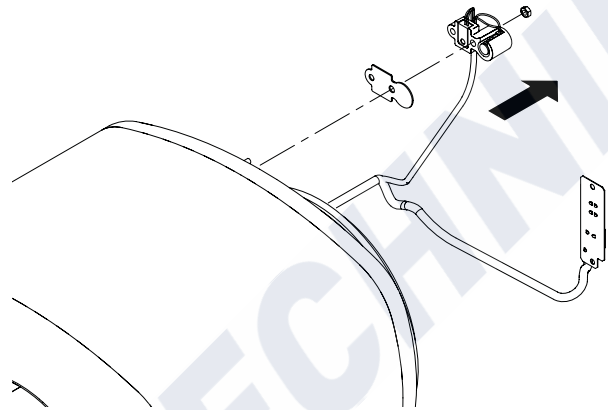
*Scratches will cause leakage. Alternative: use plastic tool.*



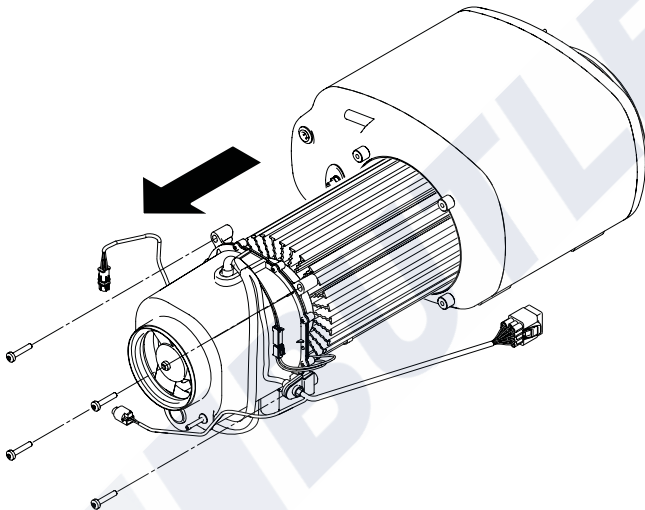
Backside boiler: loosen hex nut SW 7mm that attaches water temperature switch and water temperature sensor of sensor wiring harness to backside boiler.

Remove sensor wiring harness and pink coloured silicon pad.

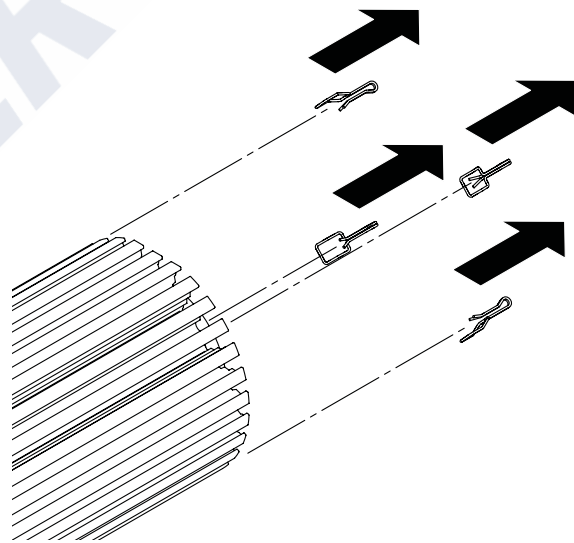
Disconnect plug 8 poles of sensor wiring harness from internal wiring harness.



Loosen 4 screws T30 that attach thermo unit to boiler. Remove thermo unit incl. heat exchanger.

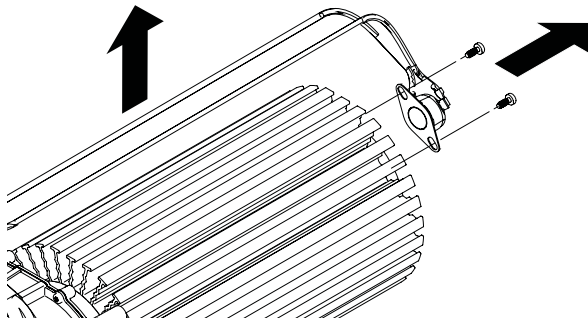


Remove 4 springs from backside of the heat exchanger.

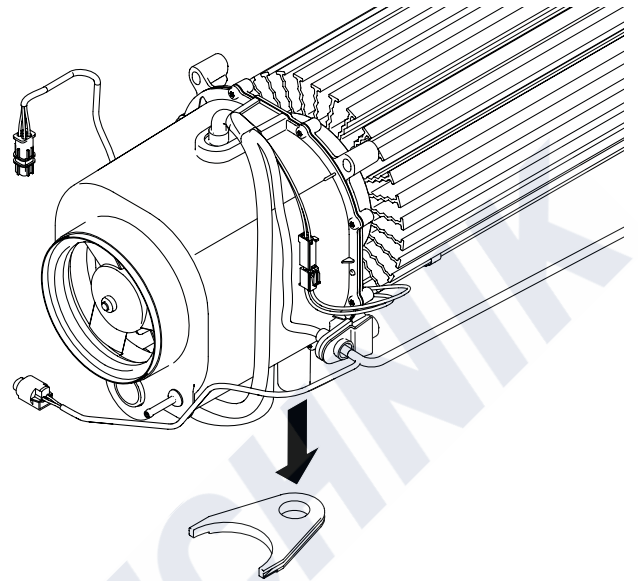




Loosen 2 screws T10 that hold overheate switch to backside heat exchanger.  
Remove wires and cable fasteners from the ribs on the heat exchanger.  
Disconnect plug 2 poles of wiring overheating protector from internal wiring harness.



Remove exhaust gasket from exhaust and cooling air outlet.



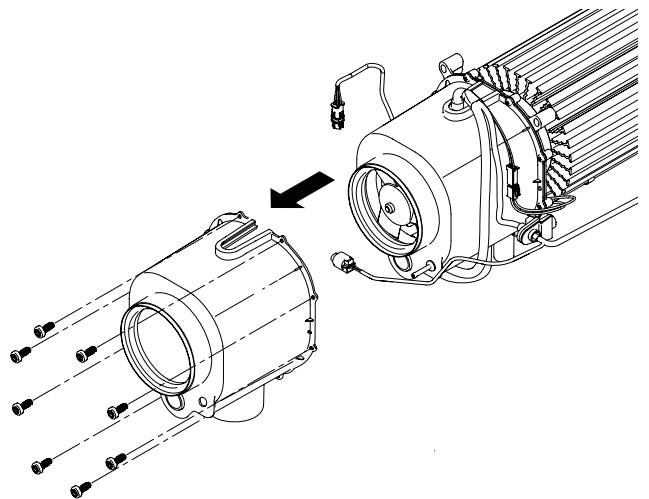
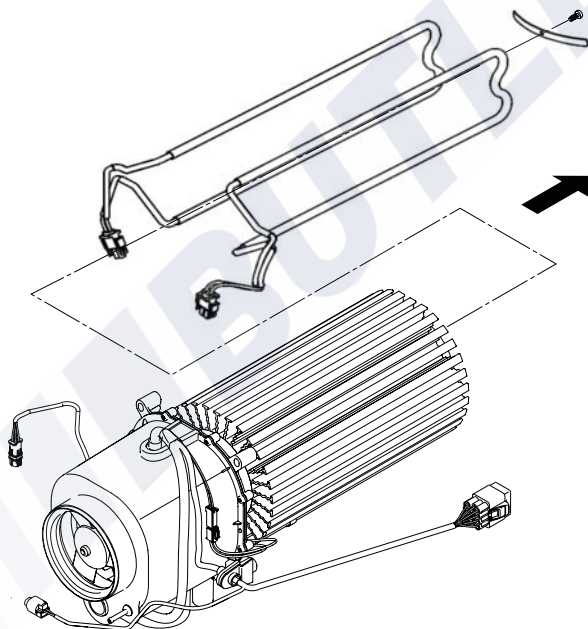
**For RHA 101/102 only:**

Disconnect 2 plugs X1 (2 poles, 1x grey and black, 1x brown and blue) of wiring from relay box to tubular heaters.  
Loosen screw T10 at backside of heat exchanger to remove holding plate coil.  
Pull tubular heaters backwards to take them out of heat exchanger.

Loosen 8 screws T20 to remove cooling shell.

**NOTE**

- small rubber: fuel line
- large rubber: wiring harness



## 7 Repair

## Dual Top

Disconnect 5 plugs of internal wiring harness from control unit.

Loosen screw T20 that attaches brown wire to control unit.

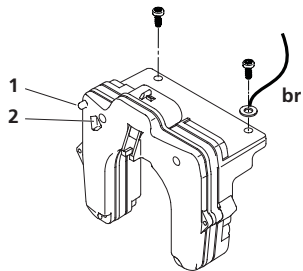
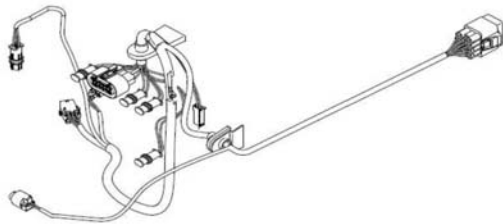
Remove internal wiring harness.

Disconnect 2 remaining plugs 2 poles and loosen second screw T20 to remove control unit from thermo unit.

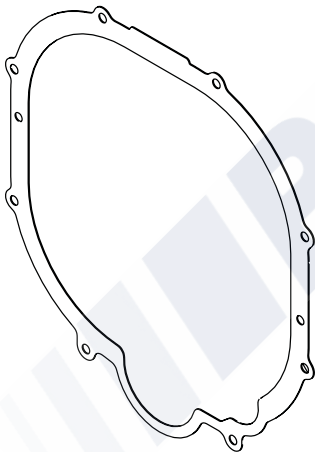
Control unit:

1 = Temperature sensor control unit

2 = Hall sensor for cooling/combustion air fan speed

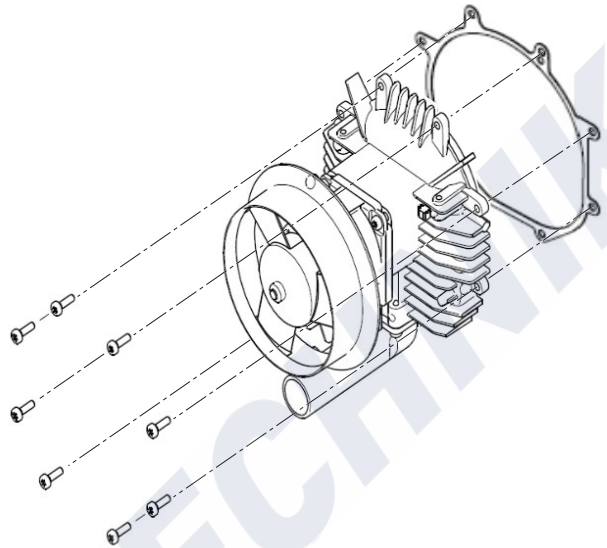


Remove gasket cooling shell.

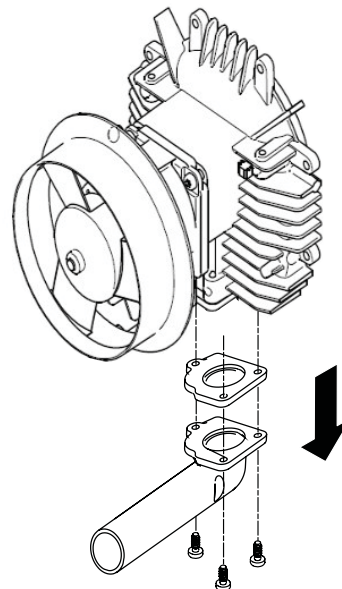


Loosen 8 screws T20 to remove drive assy from heat exchanger.

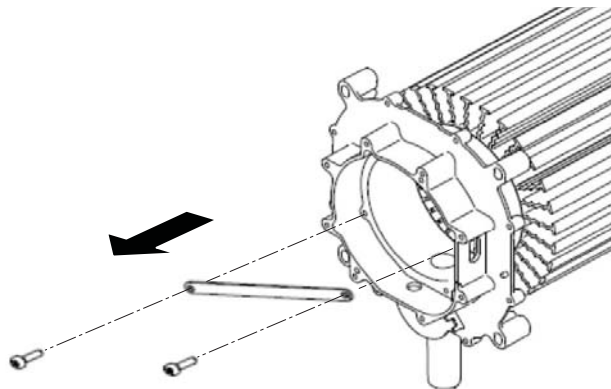
Remove flat gasket heat exchanger.



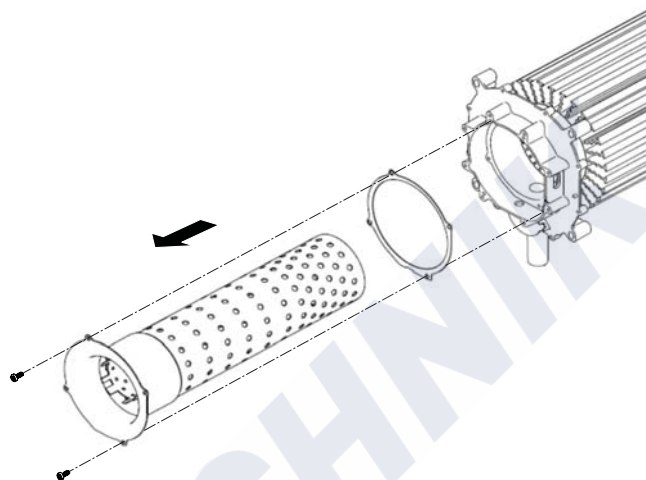
Loosen 3 screws T20 to remove combustion air intake incl. connection gasket from drive assy.



Loosen 2 screws T20 to remove clamping yoke from heat exchanger.



Loosen 2 screws T20 to remove burner tube assy and metal crimp sealing from heat exchanger.

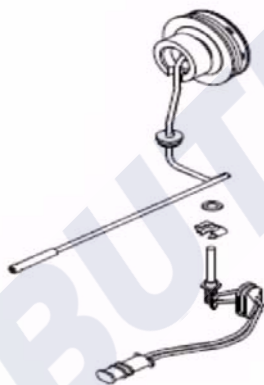


Press grommet of wire glowplug inwards and guide plug through hole heat exchanger.

Press grommet of fuel line inwards.

Remove evaporator housing assy with fuel line and glow-plug from heat exchanger.

Pull holding spring glowplug to remove glowplug from evaporator housing assy.



7.3 Assembling

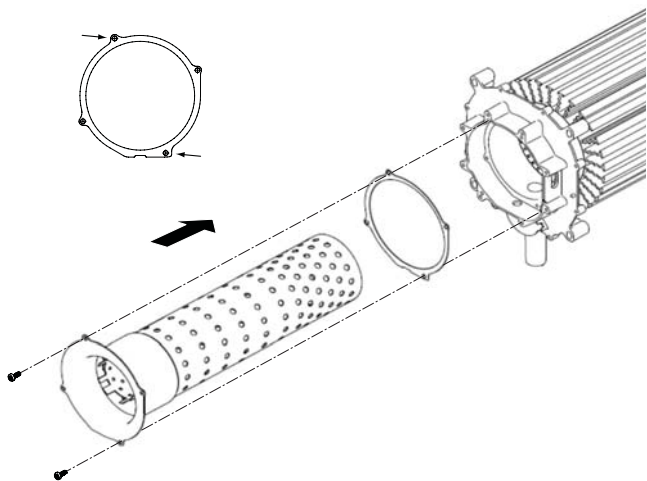
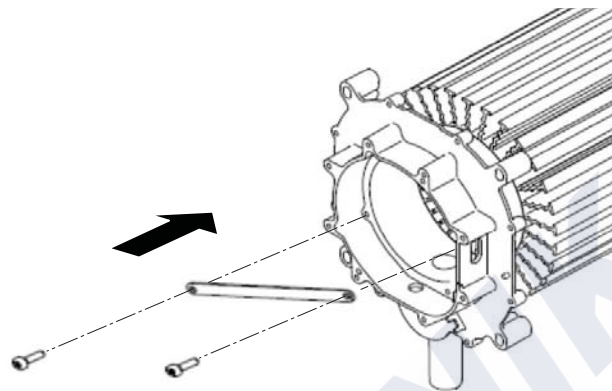
Align straight sides of burner tube assy and metal crimp sealing with bottom of heat exchanger.  
Fix with 2 screws T20.

**NOTE**

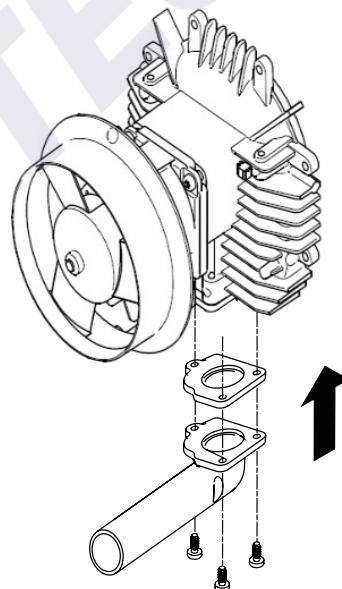
Position screws see drawing.

**NOTE**

Gaskets must always be renewed.



Fix combustion air intake incl. connection gasket to drive assy with 3 screws T20.



Guide glowplug into evaporator housing assy and fix with holding spring.

Guide fuel line from inside to outside through large hole in bottom of heat exchanger.  
Place evaporator housing assy in of burner tube assy.

Press grommet fuel line in hole heat exchanger.

Guide wiring glowplug from inside to outside through small hole in side of heat exchanger.  
Press grommet of wire glowplug in hole heat exchanger.

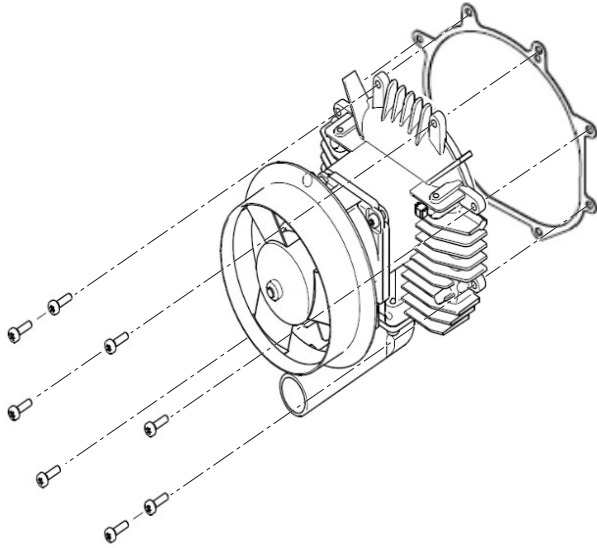


Fix evaporator housing assy to heat exchanger with clamping yoke and 2 screws T20.

Attach flat gasket heat exchanger and drive assy to heat exchanger and fix with 8 screws T20.

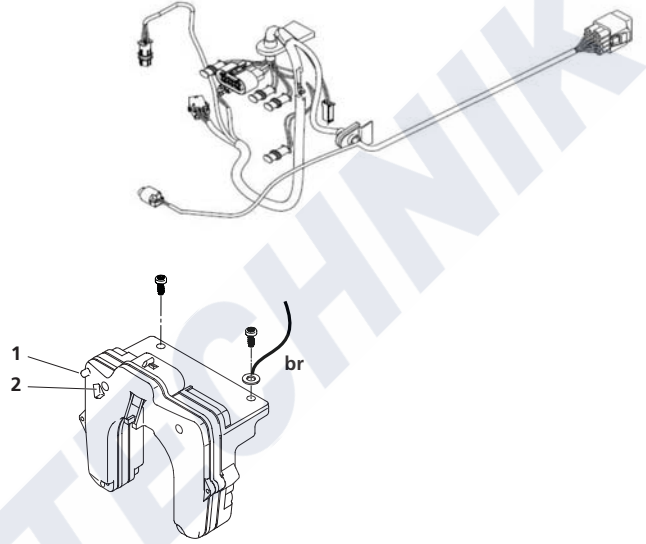
**NOTE**

Align 2 holes in gasket with protrusions on the heat exchanger.



Connect 2 plugs from thermo unit (Y1 and Y2, see Fig. 501) and 5 plugs of internal wiring harness (Y3, Y4, Y5, Y6 and Y7, see Fig. 501) to control unit.

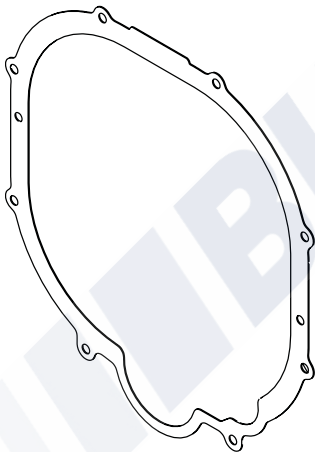
Put control unit on drive assy and fix with 2 screw T20. Use 1 of these screws to fix brown wire.



Put gasket cooling shell on the heat exchanger.

**NOTE**

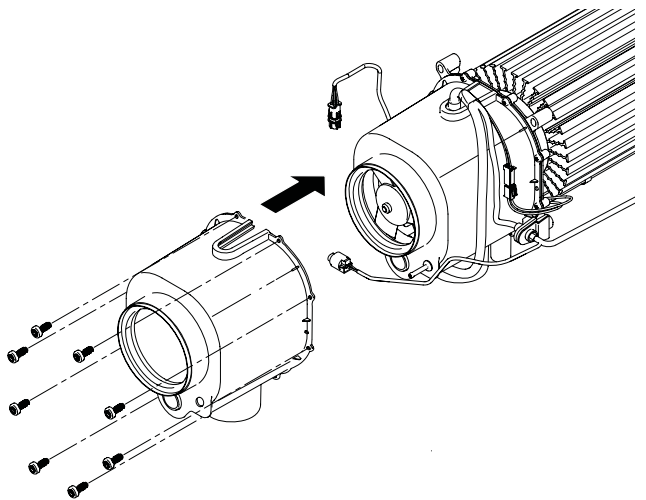
Align 2 holes in gasket with protrusions on the heat exchanger.



Attach cooling shell to heat exchanger with 8 screws T20.

**Note:**

- small rubber between cooling shell and fuel line
- large rubber between cooling shell and wiring harness

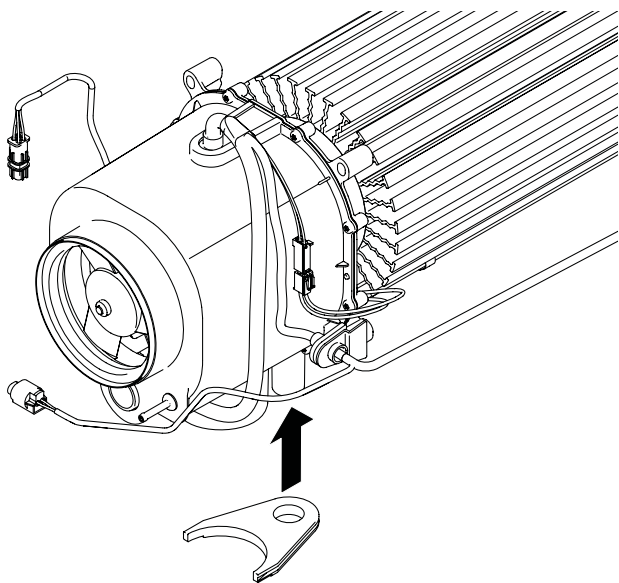




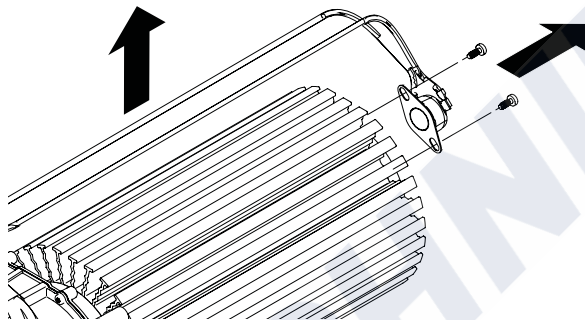
## 7 Repair

## Dual Top

Put gasket exhaust on exhaust and cooling air outlet.



Fix overheating protector to backside heat exchanger with 2 screws T10.  
Connect plug 2 poles of wiring overheating protector to internal wiring harness.  
Fix wires to ribs heat exchanger using cable fasteners.



### For RHA 101/102 only:

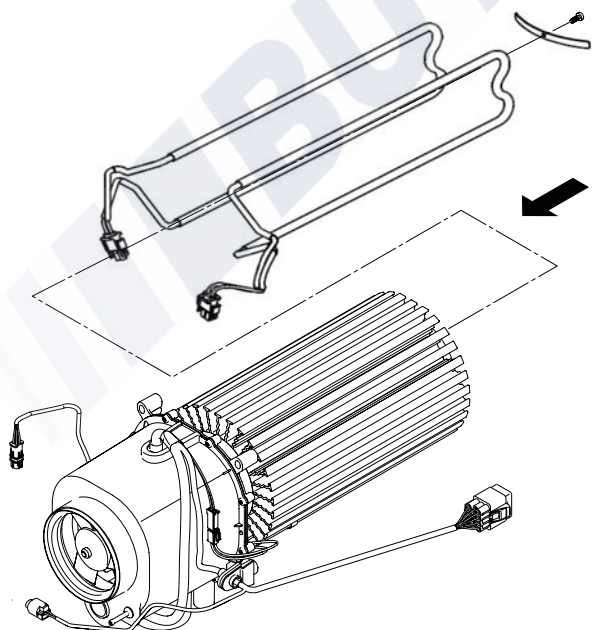
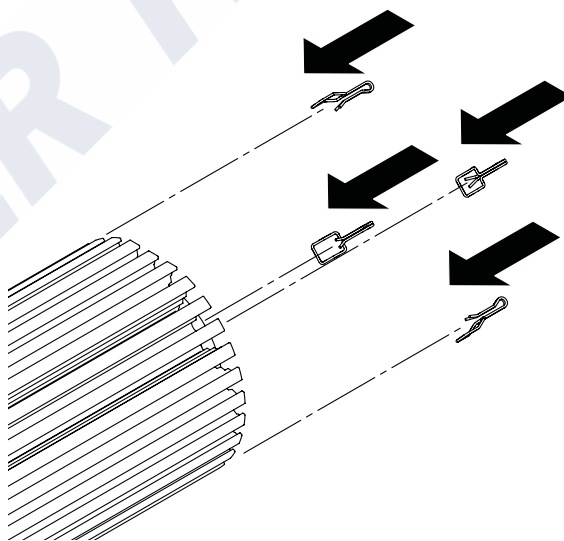
Slide electrical element from backside into the heat exchanger.

#### NOTE

Correct position of the electrical element.

Fix tubular heaters to heat exchanger with holding plate coil and screw T10.  
Connect 2 plugs X1 (2 poles, 1x grey and black, 1x brown and blue) of wiring elements to wiring from relay box.

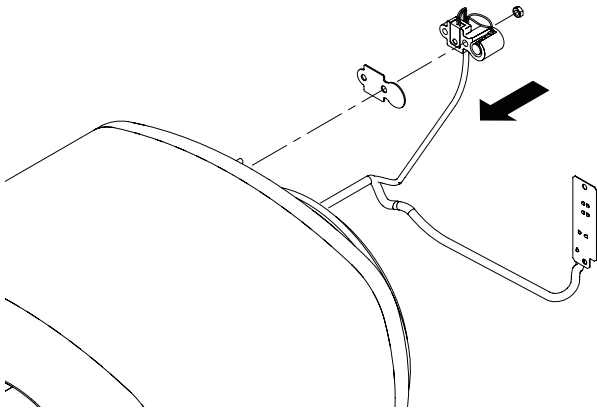
Put 4 springs on heat exchanger to assure that clearance between heat exchanger and boiler is spread evenly.



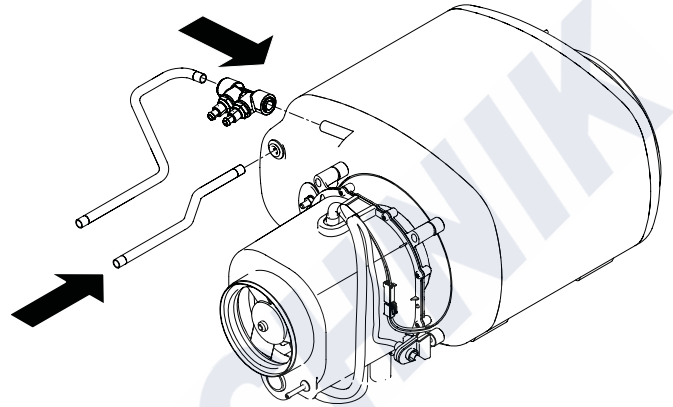
Connect plug 8 poles of sensor wiring harness to internal wiring harness.  
Put pink coloured silicon pad on 2 threaded studs M4 at backside boiler and fix water temperature switch and water temperature sensor of sensor wiring harness with hex nut SW 7mm.

**NOTE**

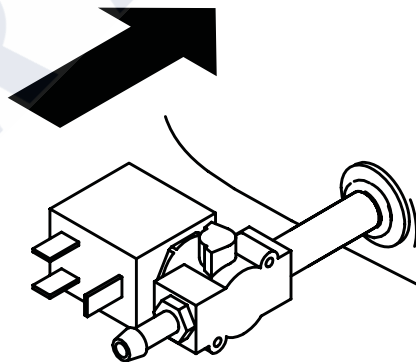
*Renew pink coloured silicon pad every time you replace the sensor wiring harness. This is important for good heat conduction.*



Push air ventilation/overpressure valve as far as possible on connection of boiler.  
Push hot water pipe as far as possible into air ventilation/overpressure valve and cold water pipe into connection of boiler.



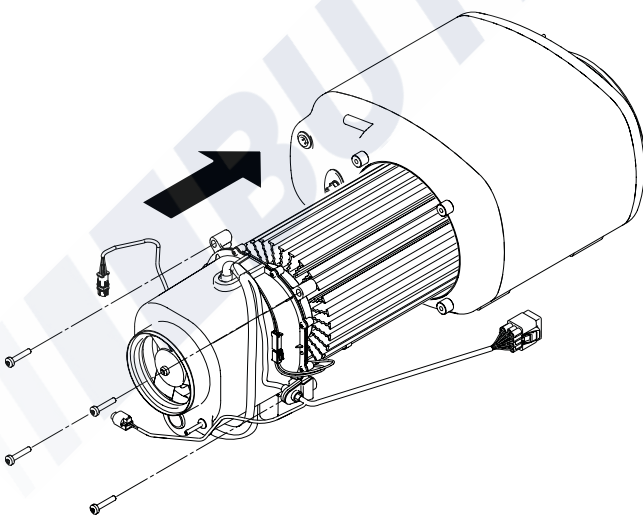
Push solenoid valve as far as possible into connection of boiler.



Put thermo unit into boiler and fix with 4 screws T30.

**NOTE**

*Make sure that clearance between heat exchanger and boiler is spread evenly. For this purpose, the thermo unit has large holes.*



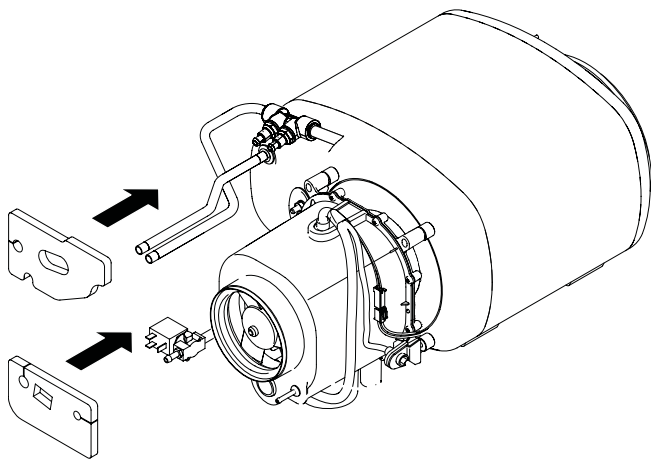
## 7 Repair

## Dual Top

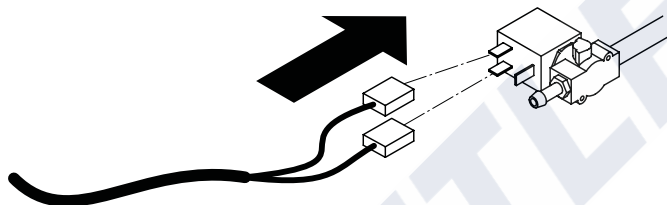
Attach self-adhesive insulation combi-valve (top) and solenoid valve (bottom).

**NOTE**

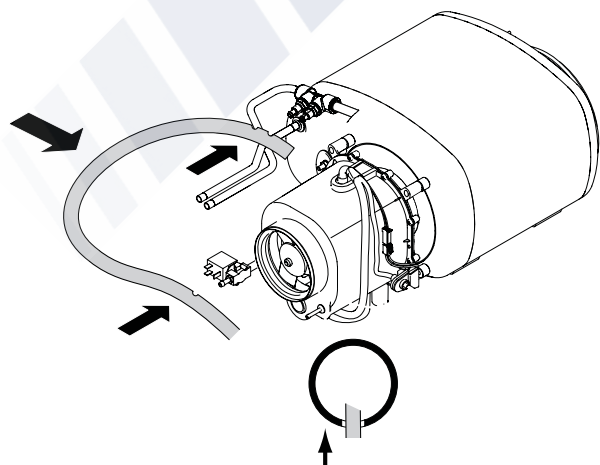
Make sure that it's possible to connect drain tube and wiring to valves.



Connect 2 plugs 1 pole with solenoid valve. Use 2 parallel poles of valve. Doesn't matter which wire colour is connected to which pole (upper or lower).



Connect drain tube to air ventilation/overpressure valve and solenoid valve. Put open end in cooling air outlet.



Put 2 parts insulation on top and bottom of Dual Top (parts are identical).

**NOTE**

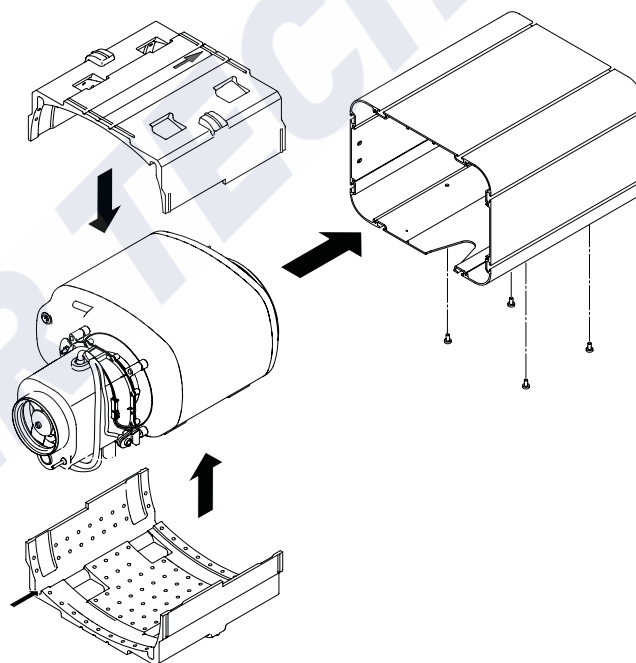
- Arrows on insulation have to point backwards.
- Put sensor wiring harness between bottom of boiler and lower part insulation (groove in insulation).

Carefully push Dual Top incl. insulation into housing.

**NOTE**

Housing Dual Top shall fit into groove of gasket exhaust.

Fix boiler to housing with 4 screws T30 on bottom of Dual Top.



**For RHA 101/102 only:**

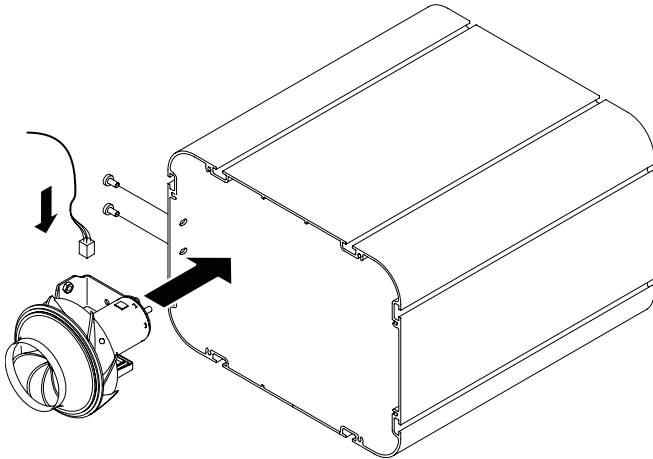
Fix green/yellow ground wire to housing with screw T30 and hex nut SW 10 mm. Tightening torque:  $9 \pm 0.9$  Nm.



Connect plug 4 poles of internal wiring harness to PWM module.  
Attach heating air blower assy to housing Dual Top with 2 screws T30.

**NOTE**

- Do not tighten screws yet!
- Make sure that wires don't touch rotating parts.



Fix hold metal plate (with air temperature sensor and air temperature switch) of sensor wiring harness to end cap with 2 screws T20.

**NOTE**

*Sensor and switch shall face towards end cap, not towards heat exchanger.*

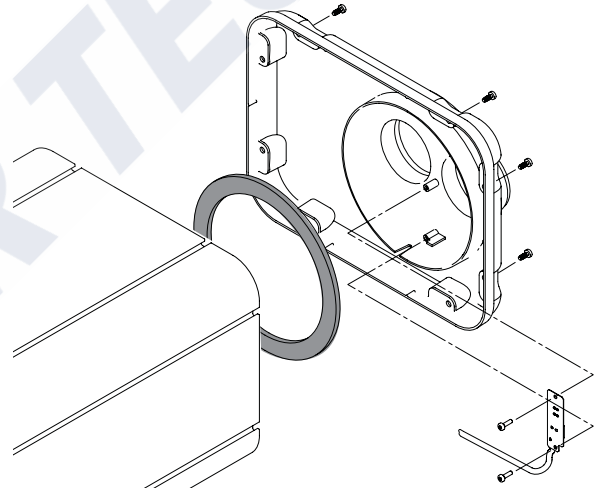
**NOTE**

*Overheating protector on heat exchanger shall not touch metal plate (with air temperature sensor and air temperature switch) of sensor wiring harness.  
Distance  $\geq 2$  mm.*

**NOTE**

*Put seal end cap around flange at backside of boiler.  
Seal end cap is important to avoid air leakages.  
Place this part correctly!*

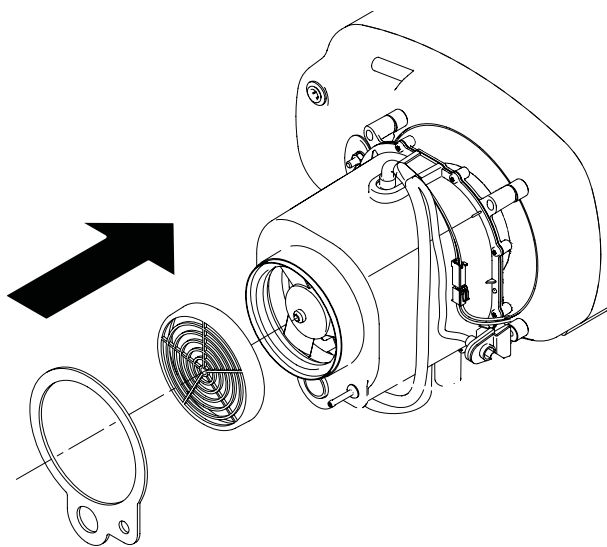
Fix end cap to housing Dual Top with 8 screws T25.  
Tightening torque: 6 Nm.



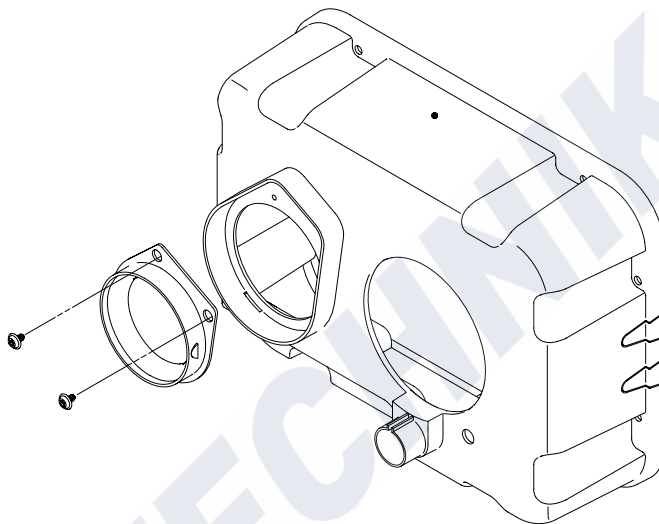
## 7 Repair

## Dual Top

Place foam gasket cooling shell and air intake fence.



Position cover heating air blower and heating air blower assy in such a way that heating air blower can rotate freely. Then tighten 2 screws T20 (2 Nm) of cover heating air blower and 2 screws T30 (9 Nm) that fix heating air blower assy to Dual Top housing.



Push spout water expiration into service cap.  
Service cap shall fit into groove of spout.

Guide connectors water pipes through spout.  
Fix service cap to Dual Top with 8 screws T25.  
Tightening torque: 6 Nm.

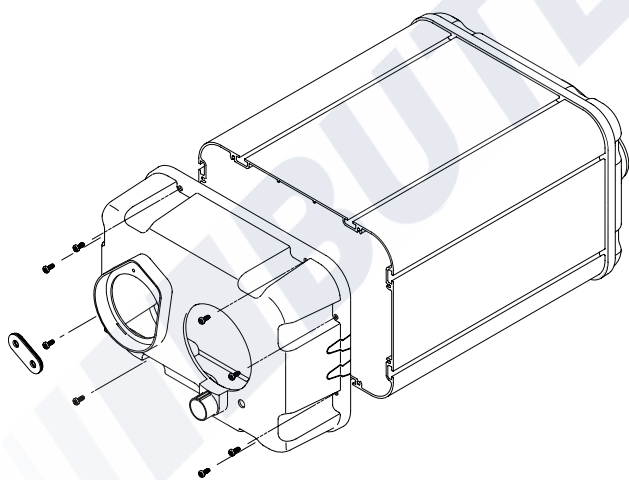
### NOTE

Service cap shall fit into grooves of grommets for wiring harnesses (1 pcs for RHA 100).

### NOTE

Check that the heating air blower rotates freely before placing heater back into vehicle.

Use Webasto Thermo Test's component test to run heating air blower with at 30, 60 and 90% for at least 30 seconds in each level.



### 7.4 Replacement of older to newer type Dual Top RHA 100

Webasto recommends the following procedure when older types heaters Dual Top RHA 100 are completely replaced by newer types.

Because the external wiring harnesses are not compatible, a new type harness has to be used.

Older type Dual Top RHA 100 heaters have the following Ident. No. (see model plate on heater): 9015314A and 9015314B.

Newer type Dual Top RHA 100 heaters (produced after June 2008) have Ident. No. 9015314C

**Procedure:**

- 1 Disconnect heater's 12V power supply from battery.
- 2 Disconnect wiring harness from fuel pump.
- 3 Cut old wiring harness as close as possible to heat exchanger of Dual Top.
- 4 Cut new external wiring harness at approx. 25 cm distance from 12-pin plug. See Fig. 701.

- 5 Connect 25 cm of new external wiring harness with 12-pin plug to old wiring harness (see Table 701 and Fig. 702).

Use watertight connectors.

- 6 Secure cables for fuel pump of old wiring harness (orange and green/white cables).
- 7 Connect new internal wiring harness to fuel pump.

**Table 701 Connecting cables**

Old wiring harness	New wiring harness
Red 2.5 mm <sup>2</sup>	Red 2.5 mm <sup>2</sup>
Red 1.5 mm <sup>2</sup>	Red/black 2.5 mm <sup>2</sup>
Brown 2.5 mm <sup>2</sup>	Brown 2.5 mm <sup>2</sup>
Yellow 0.75 mm <sup>2</sup>	Yellow 0.75 mm <sup>2</sup>
Black 0.75 mm <sup>2</sup>	Black 0.75 mm <sup>2</sup>
Yellow/blue 0.75 mm <sup>2</sup> (or yellow/grey)	Yellow/red 0.75 mm <sup>2</sup>

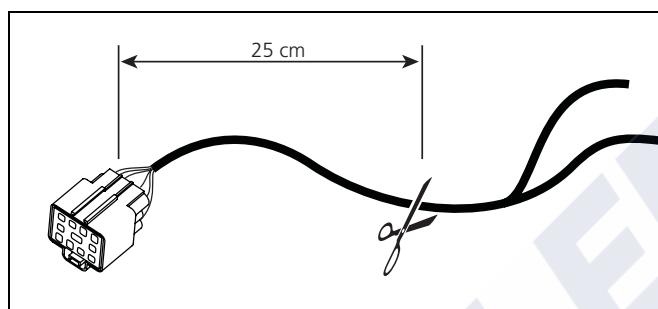


Fig. 701 Cut new external wiring harness

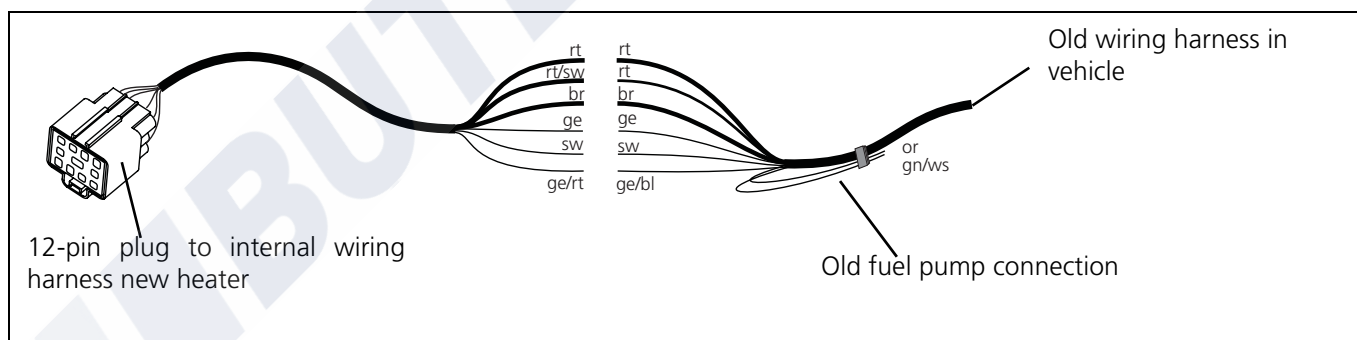


Fig. 702 Connect new 12-pin plug with old wiring harness

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## **8 Packaging, storage and shipping**

### **8.1 General**

If the heater or its components are sent to Webasto AG for testing or repair, it must be cleaned and packed in such a way that it is protected against damage during handling, transport and storage.

An ambient temperature of +85 °C or -40 °C must not be exceeded for storage.

#### **IMPORTANT**

*Fully drain a complete heater before sending it back.  
Make sure that no fuel or other liquid can leak out during packing and/or shipment.  
Seal the ports with dummy plugs.*



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