

**TECHNICAL DESCRIPTION, INSTALLATION, OPERATING, TROUBLESHOOTING, REPAIR
AND MAINTENANCE INSTRUCTIONS - HYDRONIC II 5E, HYDRONIC II.**



**THE INFORMATION IN THIS MANUAL IS ONLY VALID FOR
THE FOLLOWING ENGINE-INDEPENDENT WATER HEATERS**

Gasoline

B 5 S – 12 V 20 1904 05 00 00

Diesel

D 5 S – 12 V 25 2526 05 00 00

CONTENTS

CONTENTS

This list of contents gives you precise information about the contents of the Troubleshooting and Repair Instructions.

CHAPTER	TITLE	CONTENT	PAGE
1	Introduction	Foreword	4
		Special text structure, presentation and picture symbols	4
		Special text formats and presentations	4
		Picture symbols	4
		Safety instructions for installation and repair	4
		Liability claim / Guarantee	4
		Accident prevention	5
		Initial start-up of the heater or functional test after a repair	5
		Emergency shutdown – EMERGENCY OFF	5
		Diagnostic compatibility	5
		Heater warnings	5
		Disposal	6
2	Product Information	Cutaway view	7
		Main heater dimensions	8
		Main water pump dimensions	8
3	Technical Data	Hydronic II D 5 S diesel heater (Metric values)	9
		Hydronic II D 5 S diesel heater (US values)	9
		Hydronic II B 5 S diesel heater (Metric values)	10
		Hydronic II electrical consumption	10
		Water pump	11
4	Installation Procedures	Principal dimensions - Boxed version	12
		Heater Location	12
		- Box stud dimensions	12
		- Heater mounting	12
		- Permissible installation positions	13
		- Installation Position with allowable swivel ranges	13
		- Water pump mounting	13
		Water pump location and mounting	14
		- Installation examples	14
		Heater bracket installation	15
		- Installation steps	15
		Heater & Engine Plumbing	17
		Fuel supply	18
		- Preferred fuel extraction	18
		- Installation position of the metering pump	19
		- Maximum suction and pressure head	19
		- Fuel pick-up pipe installation (Drill option)	20
- Fuel quality for diesel heaters	21		
- Operation with biodiesel	21		

CONTENTS

CHAPTER	TITLE	CONTENT	PAGE
4	Installation Procedures continuation...	Exhaust connection	22
		Intake connections	23
		Electrical connections	24
5	Heater Operation	Operating switches	26
		Heater wiring	27
		Parts list for heater circuit diagram	27
		Pin assignment for S1 connector	27
		Heater circuit diagram	28
		Pre-start procedures	29
		Start up / Safety factors	29
		Periodic maintenance	30
6	Maintenance, Troubleshooting & Repairs	Basic troubleshooting / Self Diagnostics	31
		Start the diagnosis query	32
		Fault diagnosis using the control unit	33
		Fault code display / Description / Information	34
		Repair Instructions / Special tool	40
		Assembly drawing and parts list	41
		Repair Steps / Connector Assignment (S1, B2)	42
		Measuring the fuel quantity without EDiTH	52
		Fuel quantity test with EDiTH	53
7	Parts List	Heater Spare parts diagram	54
		Installation, water and combustion air system diagram	59
		Electrical and fuel system diagram	61

1 INTRODUCTION

FOREWORD

These Troubleshooting and Repair Instructions are applicable to the heaters listed on the title page, to the exclusion of all liability claims.

Depending on the version or revised status of the heater, there may be differences between it and these trouble-shooting and repair instructions.

The user must check this before carrying out the repair work and, if necessary, take the differences into account.

SPECIAL TEXT STRUCTURE, PRESENTATION AND PICTURE SYMBOLS

Special text formats and picture symbols are used in these instructions to emphasise different situations and subjects.

Please refer to the following examples for their meanings and appropriate action.

SPECIAL TEXT FORMATS AND PRESENTATIONS

- This dot (•) indicates a list, which is started by a heading.
 - If an indented dash (–) follows a "dot", this list is a subsection of the black dot.

PICTURES SYMBOLS



DANGER!

This information points out a potential serious or fatal danger. Ignoring this information can result in severe injuries.

- ➔ This arrow indicates the appropriate precaution to take to avert the danger.



CAUTION!

This information points out a dangerous situation for a person and / or the product. Failure to comply with these instructions can result in injuries to people and / or damage to machinery.

- ➔ This arrow indicates the appropriate precaution to take to avert the danger.



PLEASE NOTE!

These remarks contain recommendations for use and useful tips for the operation, installation and repair of the heater.

SAFETY INSTRUCTIONS FOR INSTALLATION AND REPAIR



CAUTION!

Improper installation or repair of Espar heaters can cause a fire or toxic exhaust entering the inside of the vehicle.

This can cause serious and even fatal risks.

- ➔ The heater may only be installed according to the specifications in the technical documents or repaired using original spare parts by authorised and trained persons.
- ➔ Installation and repairs by unauthorised and untrained persons, repairs using non-original spare parts and without the technical documents required for installation and repair are dangerous and therefore are not permitted.
- ➔ A repair may only be carried out in connection with the respective unit-related technical description, installation instructions, operating instructions and maintenance instructions.

This document must be carefully read through before / during installation and repair and followed throughout.

Particular attention is to be paid to the official regulations, the safety instructions and the general information.



PLEASE NOTE!

- The relevant rules of sound engineering practice and any information provided by the vehicle manufacturer are to be observed during the installation and repair.
- When carrying out electric welding on the vehicle, the positive cable at the battery should be disconnected and placed at ground to protect the ECU.

LIABILITY CLAIM / GUARANTEE

Espar does not accept any liability for defects and damage, which are due to installation or repair by unauthorised and untrained persons.

Compliance with the official regulations and the safety instructions is prerequisite for liability claims.

Failure to comply with the official regulations and safety instructions leads to exclusion of any liability of the heater manufacturer.

1 INTRODUCTION

ACCIDENT PREVENTION

General accident prevention regulations and the corresponding workshop and operating safety instructions are to be observed.

INITIAL START-UP OF THE HEATER OR FUNCTIONAL TEST AFTER A REPAIR

- After installation or carrying out a repair on the heater, the coolant circuit and the whole fuel supply system must be vented carefully.
- Comply with the instructions issued by the vehicle manufacturer.
- During the heater trial run, all water and fuel connections must be checked for leaks and secure, tight fit.
- If faults occur while the heater is running, use a diagnostic unit to correct the cause of the fault.

EMERGENCY SHUTDOWN — EMERGENCY OFF

If an emergency shutdown – EMERGENCY OFF – is necessary during operation, proceed as follows:

- Switch the heater off at the control element or
- remove the fuse or
- disconnect the heater from the battery.

PLEASE NOTE!

DIAGNOSTIC COMPATIBILITY

Only EDiTH and EasyStart diagnostic products are compatible with Hydronic II heaters. Older diagnostic products like the 7day timer, Digi Diagnostic and “Fault code retrieval device” are not compatible.

WARNING TO INSTALLER!

Correct installation of this heater is necessary to ensure safe and proper operation.

Read and understand this manual before attempting to install the heater. Failure to follow all these instructions could cause serious or fatal injury.

- Disconnect the vehicle battery before starting any kind of work.
- Before working on the heater, switch the heater off and let all hot parts cool down.
- The heater must not be operated in closed areas, e.g. a garage or in a multi-storey parkade.

The heater must not be mounted in the passenger compartment of vehicles. However, a heater in a hermetically sealed enclosure which also complies with the aforementioned conditions may be used.

All appropriate precautions must be taken when arranging the heater to minimize the risk of injuries to people or damage property.

Parts related to the fuel system must not be located in the passenger compartment.

WARNING - EXPLOSION HAZARD!

- Heater must be turned off while re-fueling.
- Do not install heater in enclosed areas where combustible fumes may be present.

A warning sign is to be fixed to the intake connection indicating that the heater must be switched off before refuelling.

WARNING - FIRE HAZARD!

- Install the exhaust system so it will maintain a minimum distance of 50mm (2”) from any flammable or heat sensitive material.
- Ensure that the fuel system is intact and there are no leaks.

The heater must not pose a fire hazard. This requirement is deemed to be fulfilled if adequate clearance is ensured for all parts during installation, sufficient ventilation is provided and fireproof materials or heat shields are used.

1 INTRODUCTION



WARNING - ASPHYSIATION HAZARD!

- Route the heater exhaust so that exhaust fumes cannot enter any passenger compartments.
- If running exhaust components through an enclosed compartment, ensure that it is vented to the outside.

The air for the heater's combustion chamber must not be sucked in from the vehicle's passenger compartment.



WARNING - SAFETY HAZARD ON COOLANT HEATERS USED WITH IMPROPER ANTIFREEZE MIXTURES!

- The use of Espar coolant heaters requires that the coolant in the system to be heated contains a proper mixture of water and antifreeze to prevent coolant from freezing or slushing.
- If the coolant becomes slushy or frozen, the heater's coolant pump cannot move the coolant causing a blockage of the circulating system.
- This situation could cause engine damage and/or personal injury. Extreme care should be taken to ensure a proper mixture of water and antifreeze is used in the coolant system.
- Refer to the engine manufacturer for coolant recommendations requirements.



SAFETY INSTRUCTIONS FOR APPLICATION AND PROPER PURPOSE!

The heater must only be used and operated for the range of application stated by the manufacturer in compliance with the "Operating instructions" included with every heater.

The factory nameplate or duplicate must be affixed so that it can still be easily read when the heater is installed in the vehicle.



ATTENTION!

Operation with bio-diesel

HYDRONIC II D5 is not certified for use with bio-diesel.

Admixtures of bio-diesel up to a magnitude of approx. 10% are allowed



ATTENTION!

Heating at high altitudes.

→ Up to 1500 meters (4920') - unrestricted heating operation is possible.

→ Above 1500 meters (4920') - heating operation is in principle possible for short periods, e.g. when crossing a mountain pass or during a brief stop. In cases of extended stays, the fuel supply at the fuel metering pump has to be adapted to high altitude conditions.

P/N: 22 1000 33 22 00 is the high altitude device used with the Hydronic II.

Disposal

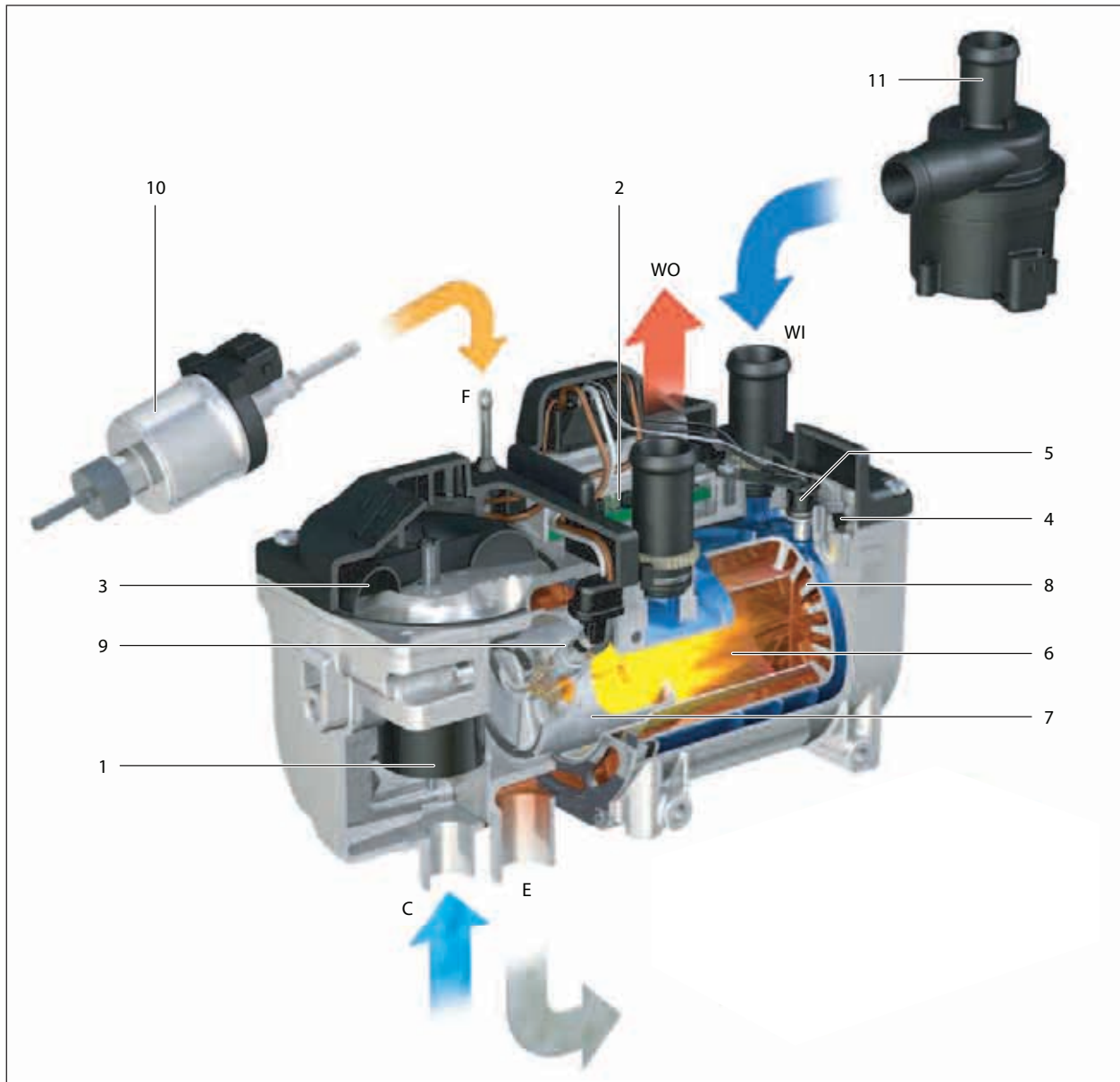
Disposal of materials

Old devices, defective components and packaging material can all be separated and sorted, so that all parts can be disposed of as required in an environmentally friendly manner and recycled when possible.

Electric motors, control boxes and sensors (e.g. temperature sensors) are deemed to be "electronic scrap".

2 PRODUCT INFORMATION

CUTAWAY VIEW



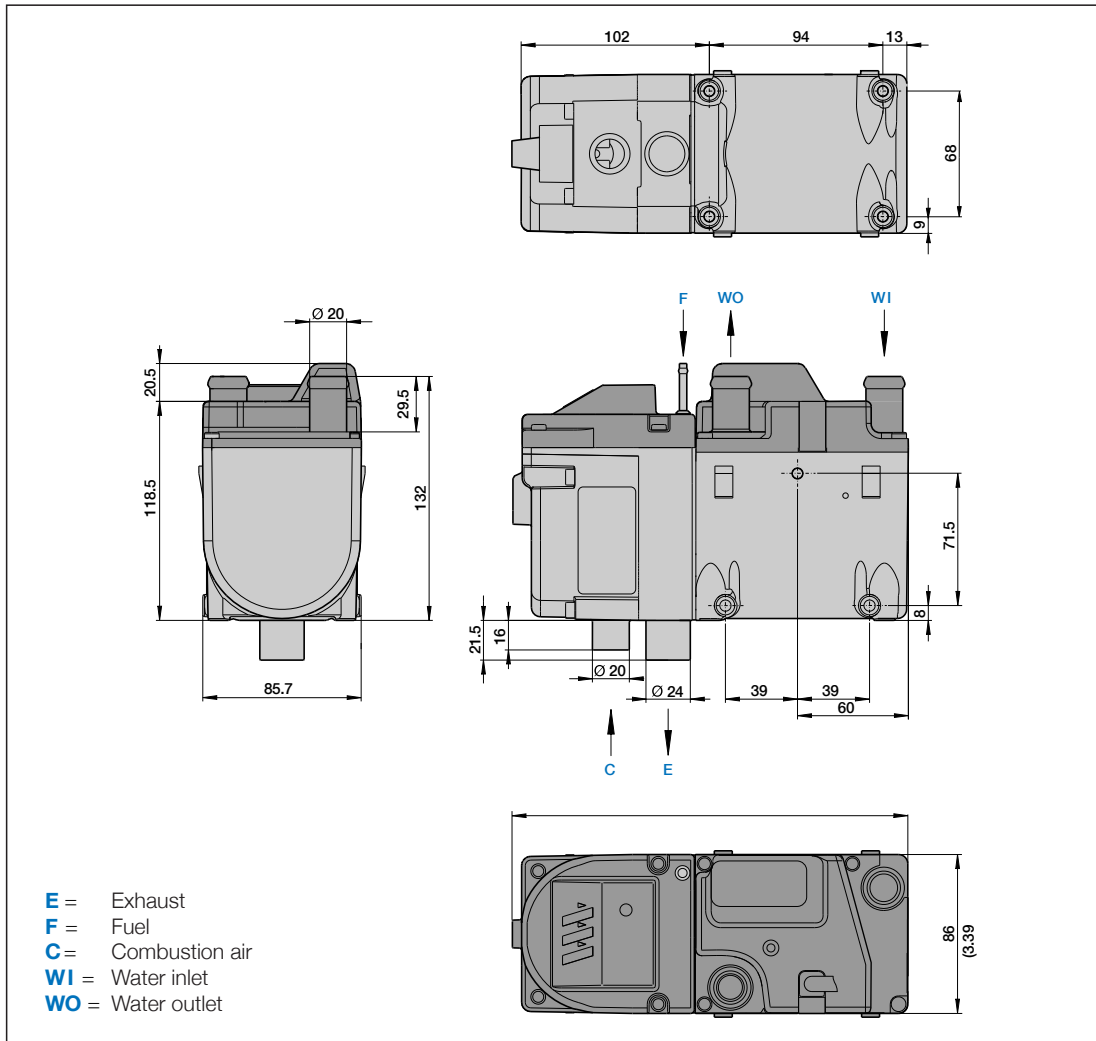
- 1 Blower motor
- 2 ECU
- 3 Blower impeller
- 4 Surface sensor
- 5 Overheat sensor
- 6 Flame sensor
- 7 Combustion chamber
- 8 Heat exchanger
- 9 Glow pin

- 10 Fuel Metering pump
- 11 Water pump

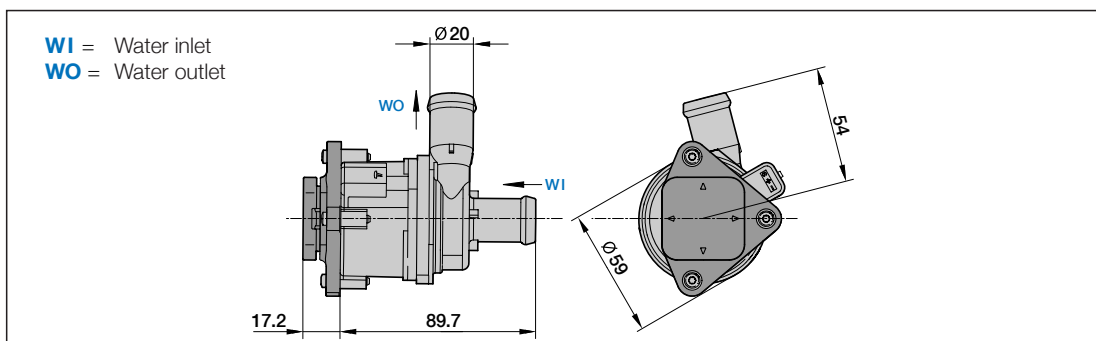
- E = Exhaust
- F = Fuel
- C = Combustion air
- WO = Water outlet
- WI = Water inlet

2 PRODUCT INFORMATION

MAIN HEATER DIMENSIONS



MAIN WATER PUMP DIMENSIONS



3 TECHNICAL DATA

HYDRONIC II D 5 S DIESEL HEATER (METRIC VALUES)

Heater type	Hydronic II		
Heater version	D 5 S		
Heating medium	Mixture of water and coolant (max. 50 % coolant)		
Voltage	12 volt		
Control stage	Power	High	Low
Heat output (watt)	5200	5000	2100
Fuel consumption (l/h)	0.64	0.61	0.26
Allowable operating pressure	up to 2.5 bar overpressure max.		
Minimum water flow rate of the heater	250 l/h		
Allowable ambient temperature	During operation		Without operation
	Heater, continuous	-40 °C to +80 °C	-40 °C to +110 °C
	Heater, short time	- - -	+125 °C (5 x 2 h)
Coolant water temperature	continuous		-40 °C to +120 °C
	short time		- - -
			+125 °C (1 h)
Weight – without coolant and attachments	2.4 Kg		

HYDRONIC II D 5 S DIESEL HEATER (US VALUES)

Heater type	Hydronic II		
Heater version	D 5 S		
Heating medium	Mixture of water and coolant (max. 50 % coolant)		
Voltage	12 volt		
Control stage	Power	High	Low
Heat output (BTU)	17,755	17,072	7,170
Fuel consumption (US gal/h)	0.169	0.161	0.069
Allowable operating pressure	up to 36.26 psi bar overpressure max.		
Minimum water flow rate of the heater	1.1 US gpm		
Allowable ambient temperature	During operation		Without operation
	Heater, continuous	-40 °F to +176 °F	-40 °F to +230 °F
	Heater, short time	- - -	+257 °F
Coolant water temperature	continuous		-40 °F to +248 °F
	short time		- - -
			+257 °F
Weight – without coolant and attachments	5.28 lb		

3 TECHNICAL DATA

HYDRONIC II B 5 S DIESEL HEATER (METRIC VALUES)

Heater type	Hydronic II		
Heater version	B 5 S		
Heating medium	Mixture of water and coolant (max. 50 % coolant)		
Voltage	12 volt		
Control stage	Power	High	Low
Heat output (watt)	5200	5000	2300
Fuel consumption (l/h)	0.72	0.69	0.32
Allowable operating pressure	up to 2.5 bar overpressure max.		
Minimum water flow rate of the heater	250 l/h		
Allowable ambient temperature	During operation		Without operation
	Heater, continuous	-40 °C to +60 °C	-40 °C to +105 °C
	Heater, short time	- - -	+125 °C (5 x 2 h)
Coolant water temperature	continuous		-40 °C to +120 °C
	short time		- - -
Weight – without coolant and attachments	2.4 Kg		

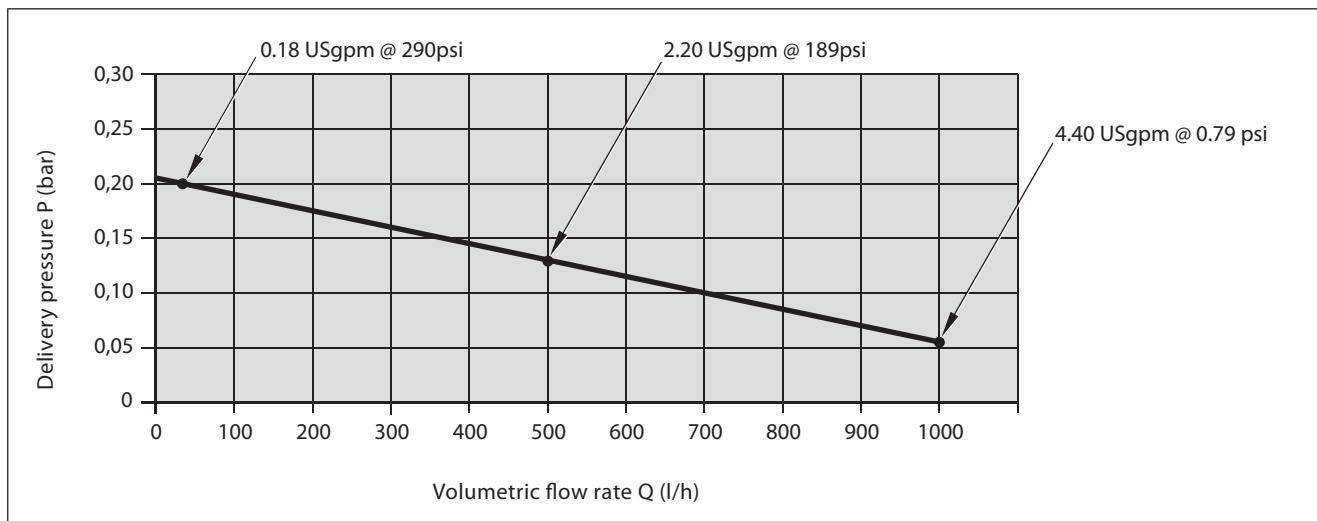
HYDRONIC II ELECTRICAL CONSUMPTION

Heater type	Hydronic II		
Heater version	B 5 S, D 5 S		
Rated voltage	12 volt		
Control stage	Power	High	Low
Average electrical consumption without pump (watts)	Operation	40	37
	Start up		120

3 TECHNICAL DATA

WATER PUMP

Rated voltage	12 volt	
Operating voltage	9 volt to 16 volt	
Electrical power consumption	< 15 watt	
Delivery rate	680 l/h	2.99 US gpm
Delivery pressure difference	0.1 bar	1.5 psi
Operating temperature	-40 °C to +125 °C	(-40°F to 257°F)



CAUTION!

Operating the water pump outside the specified technical data can cause malfunctions.

→ The technical data must be complied with at all times.

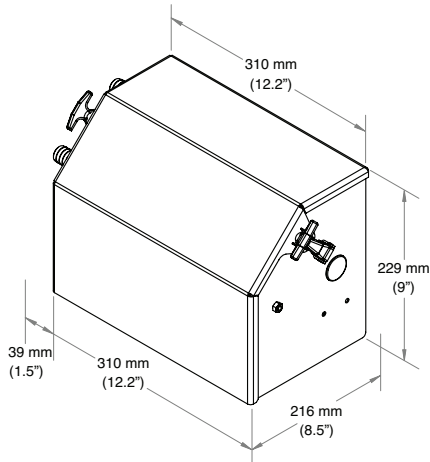


PLEASE NOTE!

If no limit values are given, the technical data listed is with the usual heater tolerances of $\pm 10\%$ at nominal voltage and 800 ft altitude.

4 INSTALLATION PROCEDURES

PRINCIPAL DIMENSIONS - BOXED VERSION



HEATER LOCATION

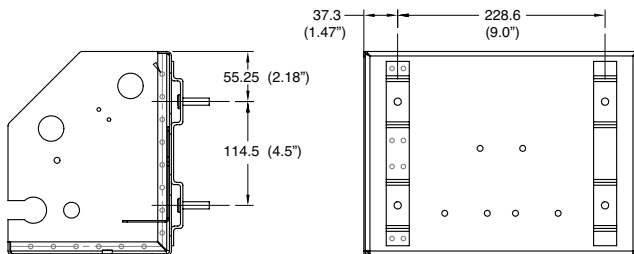
Always mount the heater in a protected area. Eg: storage compartment, engine compartments, step box or battery box.

Espar recommends you use the boxed unit.

When mounting the heater adhere to the following conditions:

- Situate the heater below the normal coolant level of the engine.
- Guard against excessive road spray.
- Keep coolant hoses, fuel lines and electrical wiring as short as possible.

BOX STUD DIMENSIONS



HEATER MOUNTING

If your heater is boxed it must be mounted level with the exhaust pointing towards the ground. If your heater is not boxed follow the mounting instructions for the heater and the water pump on the following pages.

The heater must not pose a fire hazard.

- This requirement is deemed to be fulfilled when adequate clear-

ance to all parts is observed during installation, sufficient ventilation is provided and fireproof materials or heat plates are used. The heater must not be located in the passenger compartment. A unit may however be used in a hermetically sealed housing which also corresponds to the conditions stated above.

The factory nameplate or duplicate must be affixed so that it can still be easily read when the heater is installed in the vehicle.

All appropriate precautions must be taken when arranging the heater to minimise the risk of injuries to people or damage property.

⚠ DANGER — RISK OF INJURIES AND BURNS!

The coolant and components of the coolant circuit get very hot.

- Parts conveying water must be routed and fastened in such a way that they pose no temperature risk to people, animals or material sensitive to temperature from radiation / direct contact.
- Before working on the cooling water circuit, switch the heater off and wait until all the components have cooled down completely, if necessary wear protective gloves.

PLEASE NOTE!

Do not install the water pump at the lowest point in the water circuit, otherwise the particles in the water circuit settle in the water pump. A water filter must be used if the cooling water is highly soiled/contaminated with particles.

⚠ CAUTION!

Protect the heater from excessive road spray to avoid internal corrosion.

PLEASE NOTE!

The installation position of the water pump with the pump head facing downwards is not advantageous for automatic venting.

- The water pump can be installed in any position.
- The water inlet must be designed so that it is always completely filled with water (the water pump is not selfpriming).

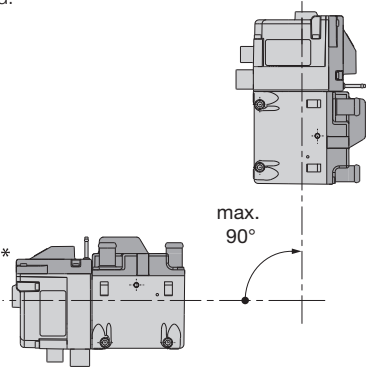
4 INSTALLATION PROCEDURES

PERMISSIBLE INSTALLATION POSITIONS

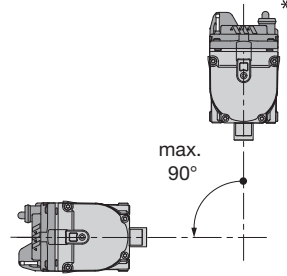
The heater and the water pump should preferably be installed in the normal position. Depending on the installation conditions, the heater can be installed within the permissible ranges shown below.

INSTALLATION POSITION WITH ALLOWABLE SWIVEL RANGES

Heater in horizontal installation position (normal position*) with permissible swivel range up to the vertical installation position.
All installation positions between 0° and 90° are permitted.



Heater upright in horizontal installation position (normal position*) with permissible swivel range up to the horizontal installation position.
All installation positions between 0° and 90° are permitted.



Please note!
If a heater is swivelled out of the normal position, the fuel connections must **always** be at the bottom.

WATER PUMP MOUNTING

Mount the water pump bracket to the heater as shown in the examples below. (torque 6+2 Nm ~ 4.4 ft-lb) or in a suitable position within the vehicle, depending on the installation conditions. Then insert the water pump in the rubber mount and press in until the water pump is locked into position.

4 INSTALLATION PROCEDURES

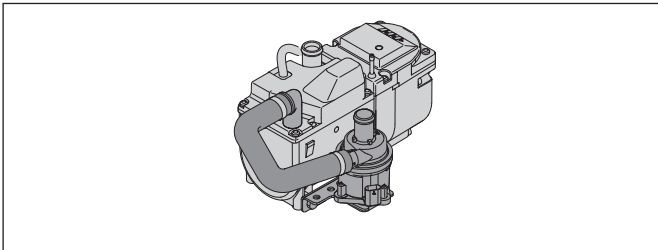
WATER PUMP LOCATION AND MOUNTING

The water pump bracket included in the installation kit must be fixed to the heater (see installation examples below) or in a suitable position in the vehicle, depending on the installation conditions.

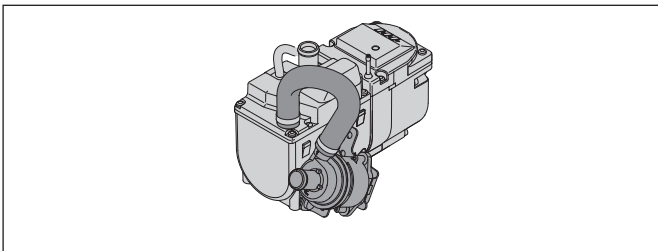
Then insert the water pump in the rubber element and press in until the water pump has latched into position.

INSTALLATION EXAMPLES

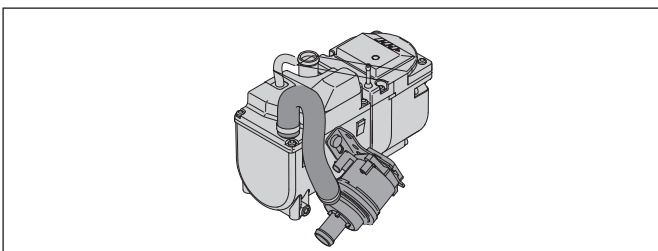
Heater with angled water inlet connection. The water pump is fixed to the bottom of the heater, on the "fuel connection" side. The water discharge connection of the water pump faces to the side.



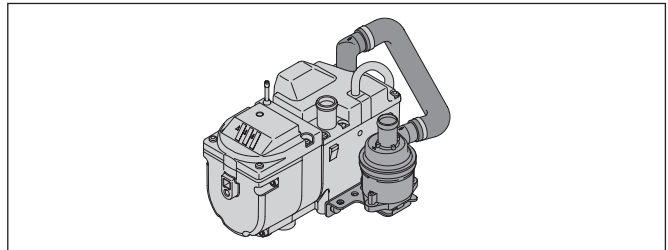
The water pump is fixed to the "fuel connection" side of the heater with rising water inlet connection. The water discharge connection of the water pump faces upwards.



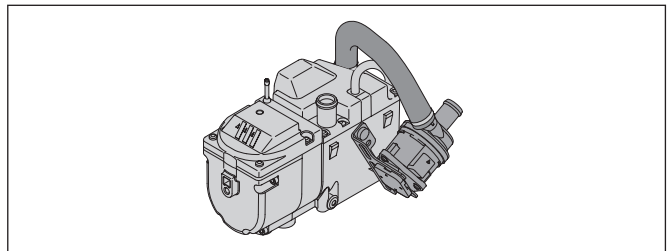
The water pump is fixed to the "fuel connection" side of the heater with the water inlet connection facing downwards. The water discharge connection of the water pump faces upwards.



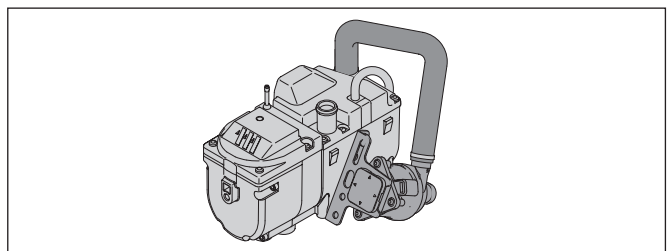
Heater with angled water inlet connection. The water pump is fixed to the bottom of the heater, on the "water outlet connection" side. The water discharge connection of the water pump faces to the side.



The water pump is fixed to the "water outlet connection" side of the heater with rising water inlet connection. The water discharge connection of the water pump faces upwards.



The water pump is fixed to the "water discharge connection" side of the heater with the water inlet connection facing downwards. The water discharge connection of the water pump faces upwards.



4 INSTALLATION PROCEDURES

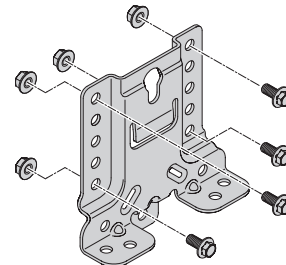
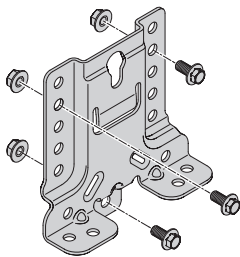
HEATER BRACKET INSTALLATION

Use the bracket included in the installation kit to fix the heater in a suitable position on the vehicle.

INSTALLATION STEPS

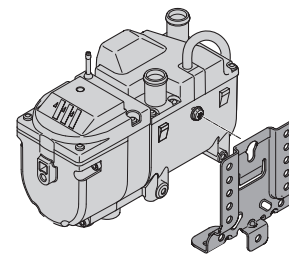
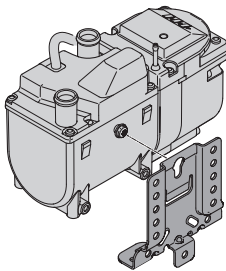
1. Improper installation or repair of Espar heaters can cause a fire or toxic exhaust entering the inside of the vehicle.

Mount with 3 screws or fixing with 4 screws.

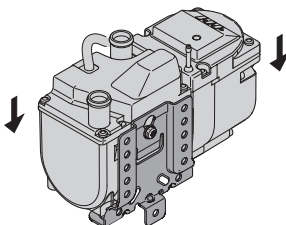


2. Mount special screw M6 x 17 onto the heater.

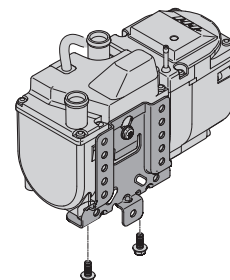
Mount special screw M6 x 17 (with adhesive coating) on heater on the fuel connection side (left-hand Fig.) or on the water discharge connection side (right-hand Fig.) (tightening torque: 6+2 Nm ~ 4.4 ft-lb).



3. Hook heater into the bracket.



4. Use 2 hexagon screws M6 x 12 (with adhesive coating) to fix heater to the bracket (tightening torque 6+2 Nm ~ 4.4 ft-lb).



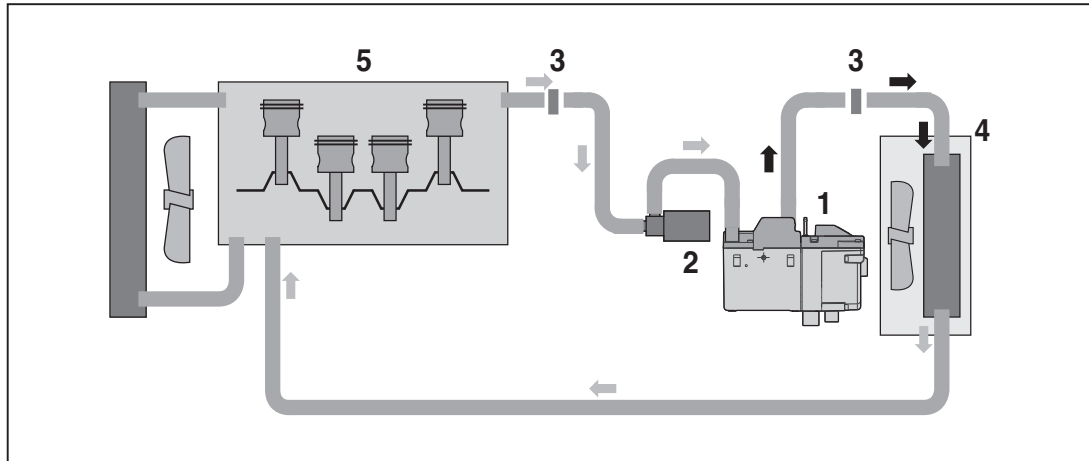
4 INSTALLATION PROCEDURES

PLEASE NOTE!

- When installing the heater and the water pump, please note the direction of flow of the cooling water circuit.
 - Fill the heater and water hose with coolant before connecting to the coolant circuit.
 - Route the water hoses without any kinks, and in a rising position if possible.
 - When routing the water pipes, maintain sufficient clearance from hot vehicle parts.
 - Protect all water hoses / water pipes from chafing and from extreme temperatures.
 - Secure all hose connections with hose clips (tightening torque: 3+0.5 Nm ~ 2.2 ft-lb).
 - Re-tighten the hose clips after the vehicle has been running for 2 hours or has travelled 100 km.
 - The minimum water flow rate is only guaranteed if the temperature difference of the heating medium does not exceed 10°C (18°F) between water inlet and water outlet during heating.
 - Only overpressure valves with an opening pressure of min. 0.4 – max. 2 bar (5.8 - 30 psi) may be used in the cooling water circuit.
 - As corrosion protection the cooling water must contain at least 10 % coolant (anti-freeze).
 - During cold periods the coolant water must contain sufficient coolant (antifreeze).
 - Before commissioning the heater for the first time or after changing the cooling water, the whole cooling water circuit including the heater must be vented without bubbles according to the vehicle manufacturer's instructions.
 - Only top up with coolant approved by the vehicle manufacturer.
-

4 INSTALLATION PROCEDURES

HEATER AND ENGINE PLUMBING



- 1 Heater
- 2 Water pump
- 3 Connector (optional)
- 4 Heat exchanger
- 5 Vehicle engine

Take the coolant from a low point on the engine to reduce aeration in the system.

Ensure proper direction of coolant flow by taking coolant from a high pressure point in the engine and returning it to a low pressure point. (ie. pickup from back of block and return to the suction side of the engine's water pump).

Ensure adequate flow rate through the heater by comparing the incoming and outgoing coolant temperatures while the heater is running. If the rise in temperature exceeds 10°C (18°F), coolant flow must be increased by modifying the plumbing.

If a bunk heat exchanger is incorporated into the system, proper plumbing layouts must be followed.

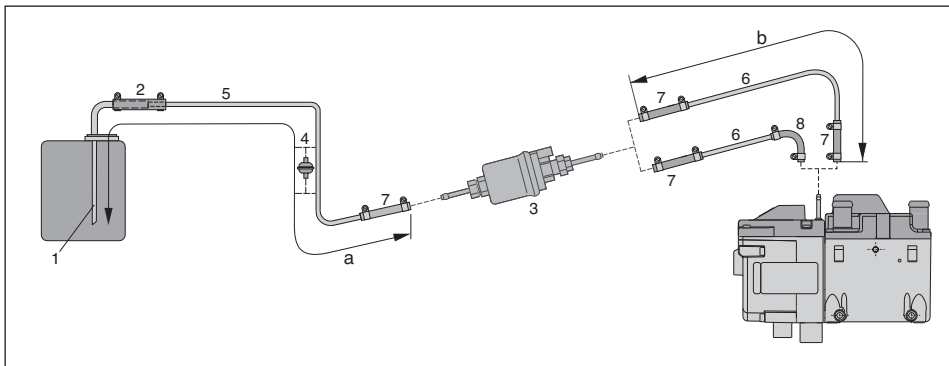
⚠ CAUTION!

It is possible for the coolant and components of the coolant circuit to get very hot.

4 INSTALLATION PROCEDURES

FUEL SUPPLY

PREFERRED FUEL EXTRACTION — IN GASOLINE OR DIESEL VEHICLES



MAXIMUM FUEL LINE LENGTHS

Intake side

a = 2 m (6.5')

Pressure side

b = 6 m (19.5')

- 1 Fuel pick-up pipe = \varnothing 2 mm
- 2 Adapter, \varnothing 5.0 / 3.5 mm
- 3 Fuel metering pump
- 4 Fuel filter – (optional)
- 5 Plastic fuel line, \varnothing 2 mm, Espar black or blue line recommended
- 6 Plastic fuel line, \varnothing 2 mm
- 7 Rubber fuel line \varnothing 3.5 mm
- 8 Elbow, 105°



CAUTION!

Safety instructions for the fuel supply!

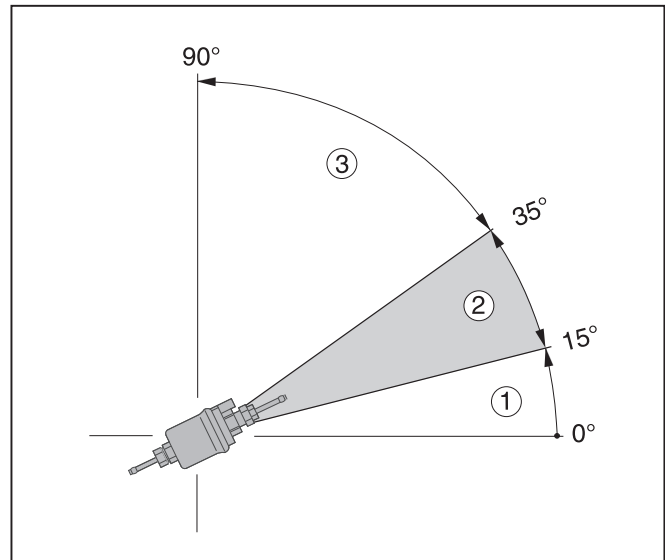
- ➔ The fuel must not be discharged by means of gravity or overpressure in the fuel tank.

4 INSTALLATION PROCEDURES

INSTALLATION POSITION OF THE METERING PUMP

Always install the metering pump with the delivery side rising upwards.

Any mounting position over 15° is allowed, although a mounting position between 15° and 35° is preferable.



- 1 Installation position within range 0° – 15° is not allowed
- 2 Preferred installation position within range 15° – 35°
- 3 Installation position within range 35° – 90° is allowed

MAXIMUM SUCTION AND PRESSURE HEAD OF THE METERING PUMP

Pressure head from fuel tank to metering pump:

a = 3000 mm (9.8')

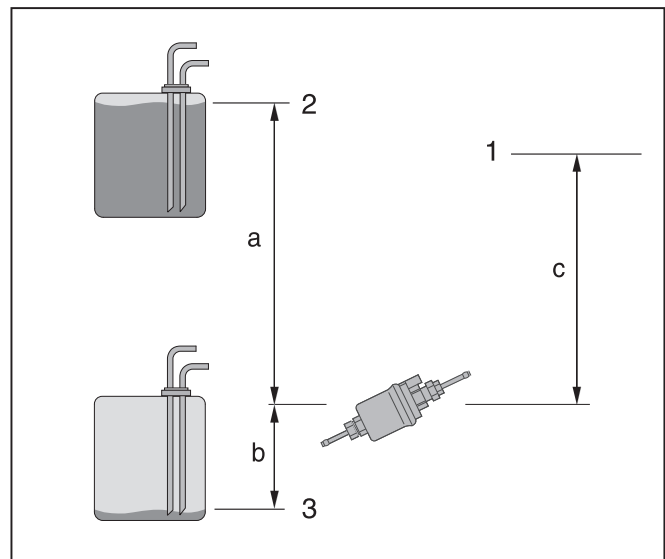
b = 1000 mm (3.2') (gasoline = 500 mm (1.6'))

Suction head in a fuel tank in which negative pressure to 0.03 bar (0.4 psi):

b = 400 mm for diesel (1.3') (gasoline = 150mm (0.5'))

Pressure head from the fuel metering pump to the heater:

c = 2000 mm (6.6')



- 1 Connection at the heater
- 2 Max. fuel level
- 3 Min. fuel level

PLEASE NOTE!

Check tank ventilation.

CAUTION!

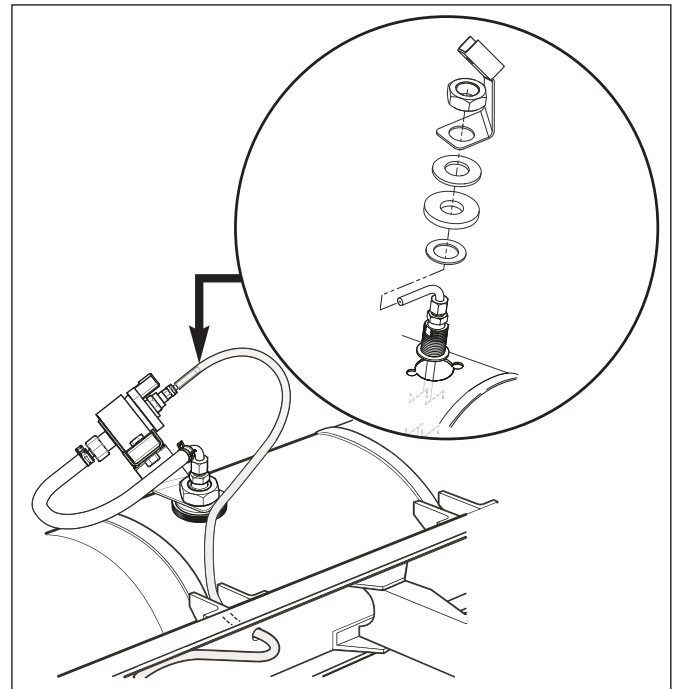
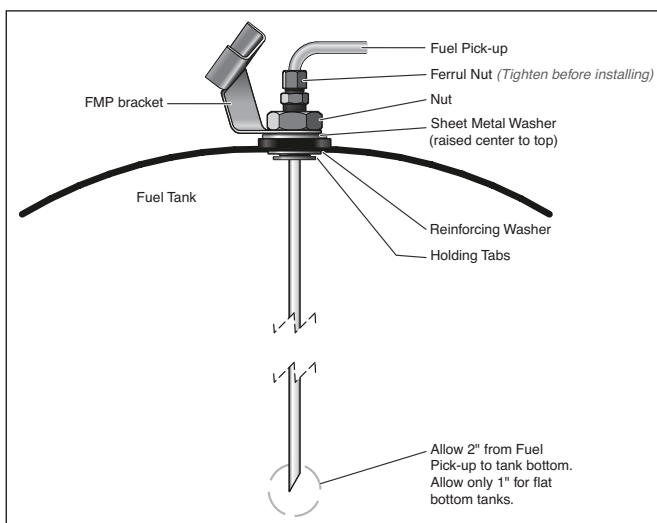
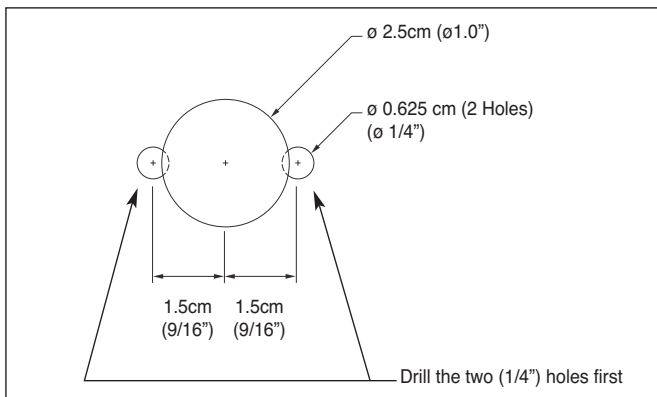
SAFETY INSTRUCTIONS FOR INSTALLING THE METERING PUMP!

- ➔ Always install the metering pump with the delivery side rising upwards – minimum angle 15°.
- Protect the metering pump and filter from impermissible heating, do not install close to silencers and exhaust pipes.

4 INSTALLATION PROCEDURES

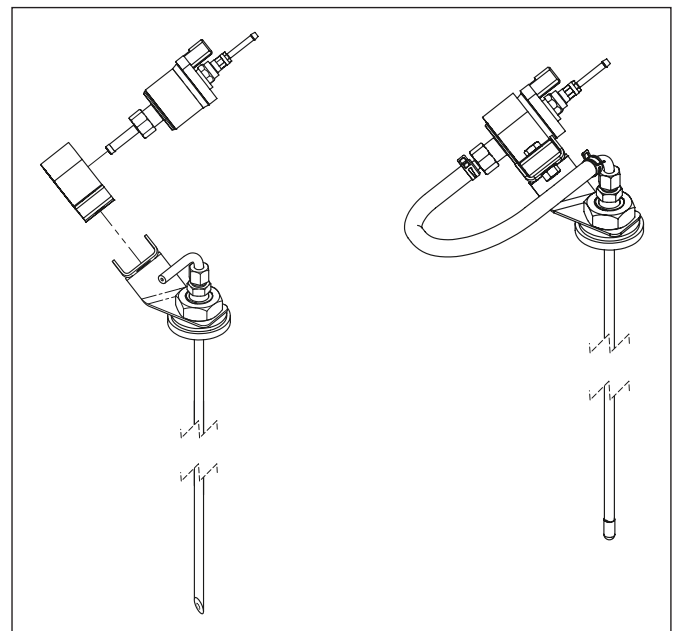
FUEL PICK-UP PIPE INSTALLATION (DRILL OPTION)

- Choose a protected mounting location close to the pump and heater. A spare fuel sender gauge plate provides an ideal mounting location. If one is not available...
- Drill mounting holes in tank to accommodate pick-up pipe as shown.
- Tighten Ferrule nut to pick-up pipe at desired height.
- Cut the fuel pick-up pipe to length. Allow 2-2.5" from bottom of tank.
- Mount the fuel pick-up pipe as shown.
- Lower the fuel pick-up pipe (with reinforcing washer) into the tank using the slot created by the two 0.6cm (1/4") holes.
- Lift the assembly into position through the 2.5cm (1") hole.
- Assemble the rubber washer, metal cup washer and nut.



PLEASE NOTE!

Some pick-up pipes can be installed by either drill or NPT.



4 INSTALLATION PROCEDURES

FUEL SUPPLY

FUEL QUALITY FOR DIESEL HEATERS

- The heater runs problem-free on standard grade diesel fuel.
- Always use fuel that is appropriate for the temperature that the heater is being used in.

At external temperatures of 0 °C to -20 °C, use Winter diesel (32 °F to -4 °F)

At external temperatures of -20 °C to -40 °C, use Arctic diesel or polar diesel (-4 °F to -40 °F).

OPERATION WITH BIODIESEL

HYDRONIC II D5 is not certified for use with bio-diesel.
Admixtures of bio-diesel up to a magnitude of approx. 10%.

PLEASE NOTE!

- Additions of used oil are not allowed!
 - After refuelling with winter or cold diesel, the fuel pipes and the metering pump must be filled with the new fuel by letting the heater run for 15 minutes!
 - Quality of fuel will vary from manufacturer and location.
 - Use of fuel additives may result in adverse effects.
-

4 INSTALLATION PROCEDURES

EXHAUST CONNECTION

The exhaust system consists of a \varnothing 24mm flexible exhaust pipe. An optional exhaust silencer is available.

- Connect the exhaust pipe to the exhaust port on the heater and attach with clamp provided. (tightening torque: $7+0,5$ Nm ~ 5 ft-lb)
- Run exhaust to an open area to the rear or side of the vehicle so that fumes can not build up and enter the passenger compartment or the heater combustion air intake. Insure that the pipe is fastened securely. Observe warnings stated in this section and through out the manual.
- Install exhaust pipe with a slight slope or drill a small hole in the lowest point to allow water to run out. Any restriction in exhaust will cause operational problems.
- Securing the exhaust can be done with "p" clamps like the ones provided in our standard installation kits.

CAUTION!

Run exhaust so that it cannot be plugged by dirt, water or snow. Ensure the outlet does not face into the vehicle slip stream. Lay the exhaust system so that the outflowing exhaust gases are not sucked in as combustion air.

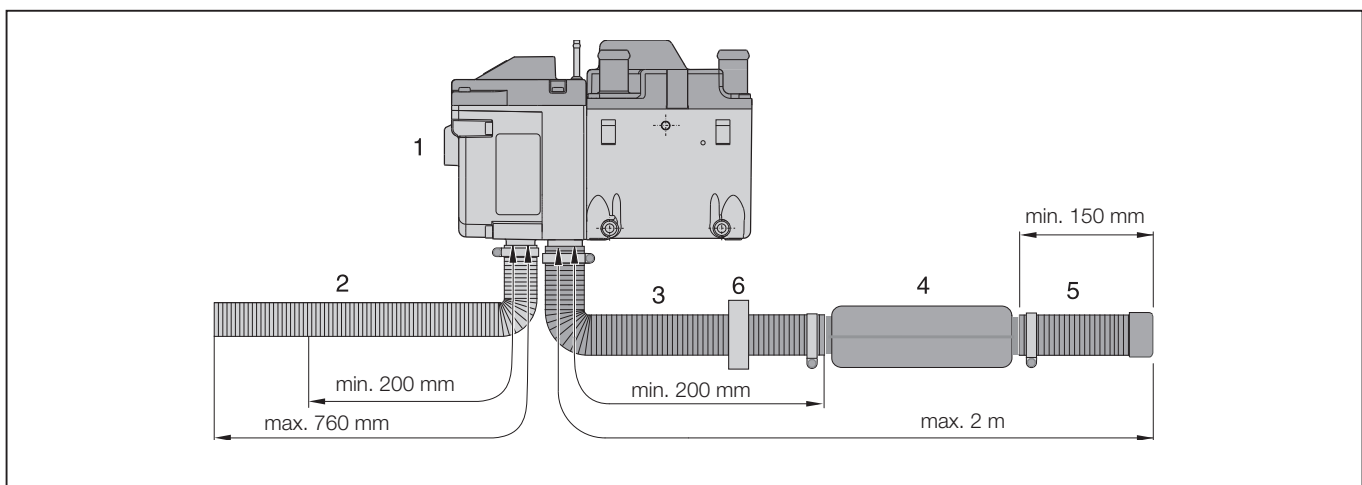
The exhaust is hot, keep a minimum of 5cm (2") clearance from any heat sensitive material.

Route exhaust so that the exhaust fumes cannot enter the passenger compartment.

Every type of combustion produces high temperatures and toxic exhaust fumes. This is why the exhaust system must be routed according to these installation instructions.

- Do not perform any work on the exhaust system while the heater is working.
- Before working on the exhaust system, switch off the heater first and wait until all the parts have completely cooled down, wear safety gloves if necessary.
- Do not inhale exhaust fumes.

Ensure exhaust pipe ends in open air. Mount the exhaust pipe with sufficient clearance to heat-sensitive parts. Pay particular attention to fuel pipes (made of plastic or metal), electrical cables and brake hoses, etc.!



1 Heater

2 Combustion air hose

3 Flexible exhaust pipe

4 Exhaust silencer

5 Exhaust pipe end with end sleeve

6 Spacer ring

4 INSTALLATION PROCEDURES

INTAKE CONNECTION

The combustion air must be drawn out of an area which does not become hotter than 25°C (77°F) and in which neither spray water or dust / dirt are to be expected.

The Ø 20 mm flexible combustion air hose must be secured to the heater with a hose clamp (tightening torque 3+0.5 Nm - 2.2 ft-lb)

CAUTION!

- The combustion air opening must be free at all times.
 - Lay the combustion air intake to ensure that exhaust fumes cannot be sucked in as combustion air.
 - Arrange the combustion air intake so that it is not directed against the slipstream of the vehicle.
 - The combustion air intake must not become clogged with dirt and snow.
 - Install the combustion air intake system sloping slightly downwards. If necessary, make a drain hole approx. Ø 5 mm (3/16") at the lowest point to drain off condensation.
-

4 INSTALLATION PROCEDURES

ELECTRICAL CONNECTIONS

All parts needed are included with all standard installation kits.

A. Main Heater Harness	<ul style="list-style-type: none"> • Connects switch and power harness to the heater harness.
B. Power Harness	<ul style="list-style-type: none"> • 2 core harness (red, brown). • Connect red wire to fuse link and terminal. • Attach ring terminal to vehicle battery (+). • Connect brown wire to vehicle battery (-) using ring terminal provided. • 20 amp fuse - 12V.
C. Switch Harness	<ul style="list-style-type: none"> • 4 core harness (red, brown, yellow, blue/white). • Run to location of control option. Make terminal connections at control option.
D. Fuel Metering Pump Harness	<ul style="list-style-type: none"> • 2 core harness (green, green) or (green, brown). • Connect to fuel metering pump using terminals and protective seals + connector block.
E. Water Pump Harness	<ul style="list-style-type: none"> • 2 core harness (black, brown). • Connect to main harness at heater.

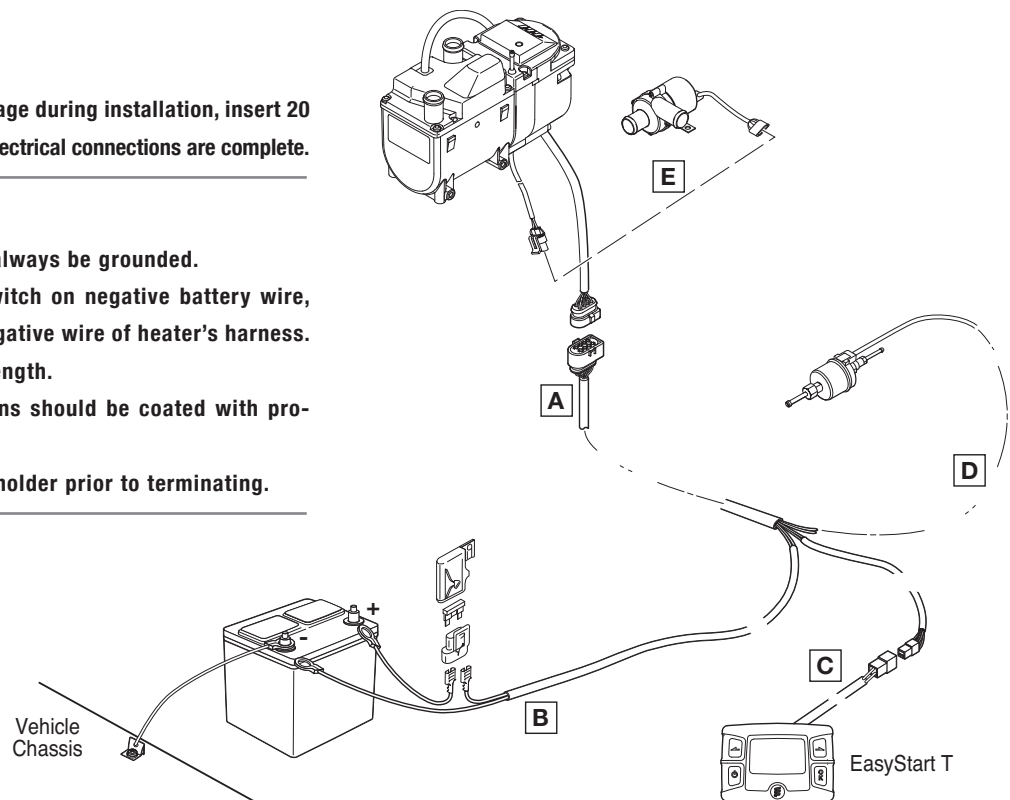
HYDRONIC II HEATER

CAUTION!

To avoid potential short circuit damage during installation, insert 20 amp fuse on power harness after all electrical connections are complete.

PLEASE NOTE!

- Negative battery terminal must always be grounded.
If a vehicle is equipped with switch on negative battery wire, install additional 20 A fuse in negative wire of heater's harness.
- All harnesses should be cut to length.
All exposed electrical connections should be coated with protective grease.
- Wire must be inserted into fuse holder prior to terminating.



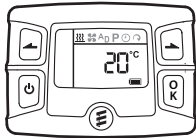
NOTES:



5 HEATER OPERATION

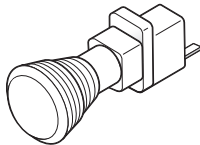
OPERATING SWITCHES

EasyStart T



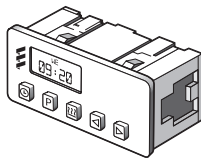
- Manual On / Off of heater.
- Program up to 3 start times, up to 7 days ahead.
- Has ability to read diagnostic fault codes.

Push / Pull Switch



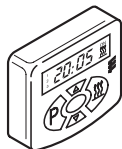
- Manual On / Off of heater.

7-Day Timer



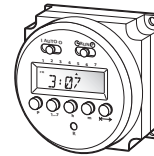
- Manual On / Off of heater.
- Program Start up to 7 days ahead. (not every day of the week)
- Diagnostic not compatible with HII heaters

Mini Timer



- Manual On / Off of heater.
- Program Start up to 24 hours ahead.
- No Diagnostic capability

Progamable Timer



- Manual On / Off of heater.
- Program up to 8 start times per day, multiple days of the week. (eg. Mon – Fri, Mon – Sun...)
- No Diagnostic capability.

PLEASE NOTE!

DIAGNOSTIC COMPATIBILITY

Only EDiTH and EasyStart diagnostic products are compatible with Hydronic II heaters. Older diagnostic products like the 7day timer, Digi Diagnostic and "Fault code retrieval device" are not compatible.

For more information on these and other control options please visit www.espar.com/help.

5 HEATER OPERATION

HEATER WIRING



CAUTION!

SAFETY INSTRUCTIONS FOR WIRING THE HEATER!

The heater is to be connected up electrically according to the local standards.

→ Ensure that the insulation of electrical cables is not damaged.

→ Avoid:

- chafing, kinking, jamming or exposure to heat.
- Seal empty terminal chambers with filler plugs to ensure they are dirt-proof and water-proof.
- Electrical connections and ground connections must be free of corrosion and firmly connected.
- Lubricate connections and ground connections outside the heater interior with contact grease.

PLEASE NOTE!

Comply with the following when wiring the heater and the control unit:

- Electrical leads and components must be positioned in the vehicle so that they can function perfectly under normal operating conditions without impairment (e.g. due to heat exposure, moisture, etc.).
- Ensure that the proper gauge of wire is used for your installation.

PARTS LIST FOR HEATER CIRCUIT DIAGRAM

Parts list for heater circuit diagram

- 1.1 Burner motor
- 1.2 Glow plug
- 1.5 Control - overheating sensor
- 1.12 Flame sensor
- 1.13 Surface sensor
- 2.1 ECU
- 2.2 Fuel metering pump
- 2.5.7 Vehicle blower relay
- 2.7 Main fuse, 20 A
- 2.7.1 Control fuse, 5 A
- 2.7.5 Vehicle blower fuse, 25 A
- 2.12 Water pump
- 5.1 Battery
- b) Vehicle blower connection

PLEASE NOTE!

The relay, 12 volt 2.5.7 (from terminal 30 to terminal 87a) has a maximum power consumption of 40 A; i.e. the value of the vehicle's own blower fuse may not be more than 40 A. For circuit diagram, see page 28.

PIN ASSIGNMENT FOR S1 CONNECTOR

Pin#	Wire color	Function
1	Red (rt)	Battery (+) positive
2	Brown (br)	Battery (-) minus
3	Black / Red (sw/rt)	Vehicle Blower signal
4	Green (gn)	FMP (+) signal
5	Blue / White (bl/wt)	Diagnostic signal
6	Blue / White (bl/wt)	Auxiliary heating input
7	Yellow (ge)	Heater on signal
8	Violet (vi)	Water pump (+)
9	Brown (br)	Water pump (-)
10	Brown / Green (br/gn)	FMP (-)

5 HEATER OPERATION

PRE-START PROCEDURES

- Check all fuel, electrical and plumbing connections.
- Refill the engine coolant.
- Bleed air from the coolant system by running the engine and refilling the antifreeze as needed. Resecure heater hose.
- Run engine to further bleed the system.
- Top up engine coolant.

START UP / SAFETY FACTORS

Once the heater is switched on the following sequence occurs: The water pump starts up, then the combustion air fan, glow plug and metering pump are started.

The time-controlled glow plug is switched off once a stable flame has formed in the combustion chamber.

Depending on the heat requirements, the heater runs at the following levels: Power – High – Low – Standby. The temperature thresholds for these are permanently programmed in the electronic control unit (ECU).

The heater starts in “Power” control stage.

After the coolant temperature has reached approx.

65 °C (149 °F) – depending on the selected blower setting – the heater switches to the “High” control stage.

If the cooling water continues to rise up to 80 °C (176 °F), the heater switches to “Low” control stage.

- If the heat output achieved in “Low” control stage is insufficient, the cooling water temperature drops to 75 °C (167 °F) – the heater switches back to “High” control stage.
- If the heating output in “Low” control stage is inadequate, the cooling water temperature rises to 85 °C (185 °F) .

The heater switches to Standby and is followed by an after-run, 90 seconds.

- If the coolant temperature cools to 75 °C (167 °F) during standby, a controlled start occurs in a high control stage.

Safety checks before starting up the heater.

After a lengthy stoppage (summer months), check all components for secure fit (tighten screws where necessary).

Carry out a visual check of the fuel system for leaks.

- The heater is restarted if it does not ignite within 70 seconds. The heater is automatically shut down if two attempts are made and the heater fails to start within the preset safety period (240 seconds). After an impermissible number of failed start attempts, the ECU is locked.
- If the flame independently goes out during operation, the heater is restarted and if necessary, a maximum of two further start attempts are made within the preset safety time. If the heater does not ignite or ignites but goes out again within 15 minutes, a safety time out occurs. The safety time out can be cancelled by briefly switching off and on again (ignition ON/OFF).
- In the case of overheating (e.g. insufficient coolant flow, air in coolant system), the overheating sensor triggers, the fuel pump is stopped and the heater is automatically shut down. Once the cause of the overheating has been eliminated, the heater can be re-started by switching off and on again (ignition ON/OFF). The coolant temperature needs to be less than 70 °C (158 °F) in order for the heater to restart. After an impermissible number of shut-downs on overheating, the ECU is locked.
- If the lower or upper voltage limit is reached, the heater is automatically shut down.
- The heater does not start up if the glow pin is defective or if the electric cable to the metering pump is interrupted.
- The speed of the blower motor is continuously monitored. If the blower motor does not start up, if it is blocked or if the speed falls below 40 % of the desired speed, the heater is automatically shut down after 60sec.

PLEASE NOTE!

If the heater fails to start the first time it will automatically attempt a second start. If the second attempt is unsuccessful the heater will shut down completely. On initial start up the heater may require several start attempts to prime the fuel system.

EMERGENCY SHUTDOWN — EMERGENCY OFF

If an emergency shutdown – EMERGENCY OFF – is necessary during operation, proceed as follows:

- Switch the heater off at the control unit or
- remove the fuse or
- disconnect the heater from the battery.

5 HEATER OPERATION

 **CAUTION!**

Do not repeat the switching off / on routine more than twice.

 **WARNING!**

The heater must be switched off while any fuel tank on the vehicle is being filled.

The heater must not be operated in garages or enclosed areas.

PERIODIC MAINTENANCE

- Check coolant hoses, clamps, and make sure all valves are open. Maintain the engine manufacturers recommended coolant level and ensure that the heater is properly bled after service on or involving the coolant system.
- Visual check of all fuel lines for leaks. If applicable check fuel filter inserts and replace if necessary.
- Visual check of electrical lines and connections for corrosion.
- Run your heater at least once a month during the year (for a minimum of 15 minutes).
- Maintain your batteries and all electrical connections in good condition. With insufficient power the heater will not start. Low and high voltage cutouts will shut the heater down automatically.
- Use fuel suitable for the climate. Blending used engine oil with diesel fuel is not permitted.
- Replacing the glow pin screen and cleaning ventilation hole before the winter season is recommended, for guaranteed start up.

6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

BASIC TROUBLESHOOTING

In the event of failure there are several items which should be checked first before any major troubleshooting is done.

Check:

- Fuses.
- Electrical lines and connections.
- Interference in Combustion air and Exhaust pipes.
- Fuel in the tank.
- Battery voltage on heater side of harness.
- Coolant flow.

SELF DIAGNOSTICS

The heater is equipped with self diagnostic capability. You can retrieve information on the heaters last 5 faults using the EasyStart diagnostic or ISO adapter and computer (EDiTH).

PLEASE NOTE!

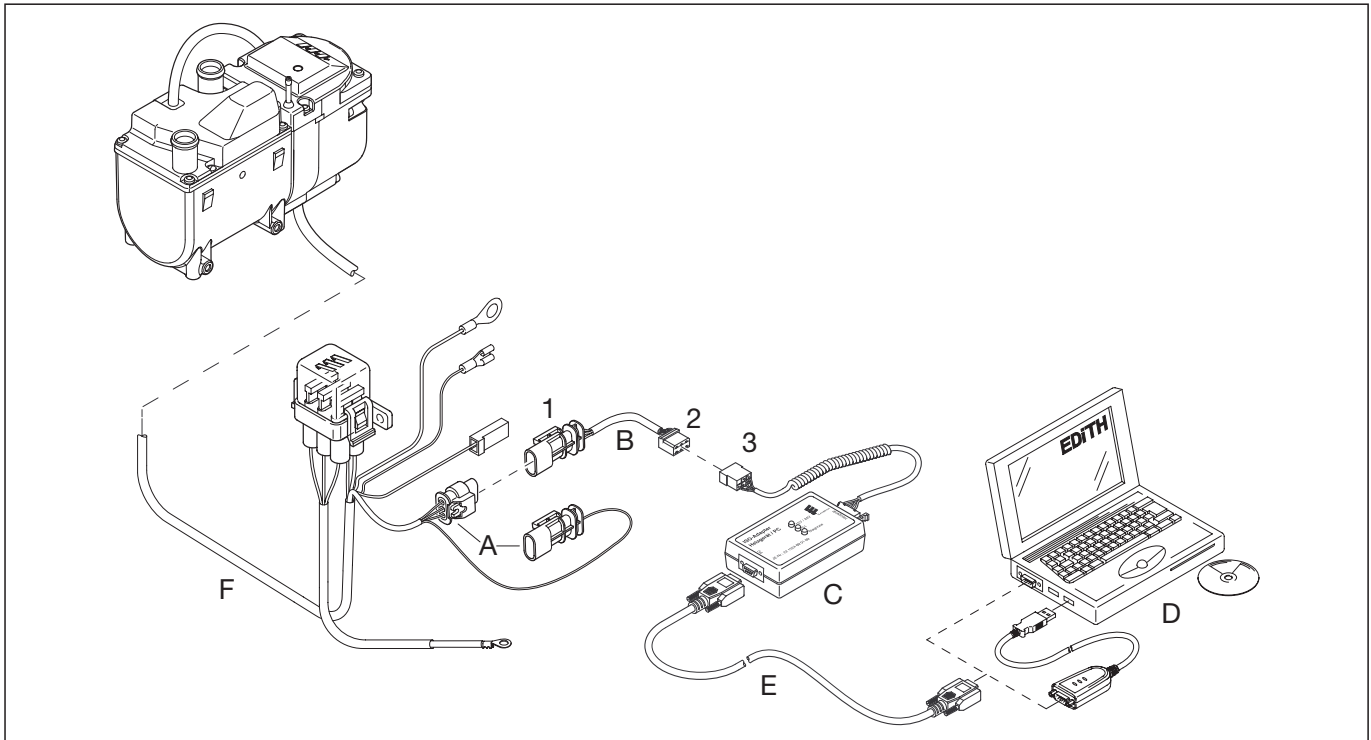
The 7 day timer, FCR and the Digi Diagnostic cannot be used to read diagnostic fault codes from the Hydronic II heaters.

PLEASE NOTE!

Always connect in the given order!

- The plug-in "diagnosis" connection may not be disconnected until the heater has been switched off and the after-running has finished!
- Check whether version S3V10-F (on newer) of the EDiTH software required for the diagnosis has been installed on the PC, if necessary the latest version can be downloaded from: www.espar.com/help
- Follow the operating instructions for EDiTH diagnostics software.

6 MAINTENANCE, TROUBLESHOOTING & REPAIRS



- A Plug-in "diagnosis" connection
- B Adapter cable
- C EDiTH diagnosis tool (ISO Adapter)
- D PC
- E Serial cable
- F Main heater harness
- 1 3 pin connector housing
- 2 6 pin receptacle housing
- 3 6 pin tab connector housing

START THE DIAGNOSIS QUERY.

- Double-click the «EDiTH» icon on the Desktop to start the diagnostic software ⇒ The EDiTH Start window opens.
- Double-click the «flame» button ⇒ «Heaters and test selection» window opens.
 - Select the heater by its «Version No.» or via the «Automatic search».
- In the «Test» window, double-click «General Data +Fault Memory» to open the «Fault memory» window.
 - The fault code of the current fault/error is and the fault code of faults/errors F1 – F5 are displayed.

DELETE THE FAULT MEMORY AND AT THE SAME TIME CANCEL THE CONTROL BOX LOCK

- In the "Fault memory" window, press the "Delete fault memory" button in the menu bar.
 - The whole fault memory is deleted and the control box is unlocked.

6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

FAULT DIAGNOSIS USING THE CONTROL UNIT

DIAGNOSIS CAPABLE CONTROL UNIT

- EasyStart T timer: 22 1000 32 88 00

If faults occur in the heater while it is running, they are displayed with "Err" after the mobile unit or timer has been activated. The current fault and the stored faults "F1" to "F5" can be queried.

PLEASE NOTE!

- The blue/white diagnostics cable must be connected in order to perform the diagnosis.
- Fault code, fault description, cause / remedial action are described from page 34.
- Ensure sufficient battery voltage (min. 10.5 volt).



-  Back button
-  Next button
-  ON / OFF activation button
-  OK button (symbol selection / input confirmation)

QUERY / DELETE FAULT MEMORY AND CANCEL THE HEATER LOCK

Activate mobile unit / timer
(EasyStart T operating instructions)

Confirm symbol  with  .

Heater is switched on.

Confirm operating time with  .

Following activation, the following can be shown in the display (display appears after approx. 20 sec.):

Display if errors/faults exist





Display if no errors/faults exist



The following actions are possible with both displays:

- Display current fault in fault memory.

 and at the same time briefly press  .



- Display fault memory F1 – F5

 or press  .




The current fault is always written in fault memory F1.

- Display fault memory again.



 or, at the same time, briefly press  .

- Delete the fault memory and as a result, at the same time cancel the control box lock.

Confirm current fault or one of the faults F1 – F5 with  .



Confirm dEL display again with  .

The fault memory is deleted and the control box is unlocked.

- Switch off the heater.

 press.



6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

FAULT CODE DISPLAY	FAULT DESCRIPTION	INFORMATION
000	No faults	— —
009	Air pressure sensor - communication error	<p>Communication lost between the ECU and air pressure sensor.</p> <ul style="list-style-type: none"> • Read air pressure sensor fault memory (can only be read with EDiTH diagnostic software). • Check wiring and connections. • If sensor is ok, test ECU.
010	Overvoltage	<p>> 15 volt applied to ECU for at least 20 seconds without interruption</p> <ul style="list-style-type: none"> • Disconnect connectors B1/S1, measure voltage at connector B1 – between pin 1, (red) and pin 2, (brown). <p>⇒ Check power source.</p>
011	Undervoltage	<p>< 10.5 volt applied to ECU for at least 20 seconds without interruption</p> <ul style="list-style-type: none"> • Vehicle engine off, disconnect connector B1/S1, measure voltage in connector B1 – between pin 1 (red), and pin 2, (brown). <p>⇒ Check the fuses, the supply cables, and connections at the battery for voltage drop (corrosion).</p>
012	Overheat - overheat sensor level 1	<p>Temperature at overheating sensor >125 °C</p> <ul style="list-style-type: none"> • Check coolant circuit: <ul style="list-style-type: none"> – Check water circuit for leaks. – Vent water circuit. – If check if all parts in coolant system are directing flow in the correct direction. • Check if flow rate meets specification. • Check overheat sensor: <ul style="list-style-type: none"> – Check wires for continuity, short circuit and damage. – Measure the resistance in connector B2 – between pin 10, (black) and pin 11, (black), see page 46 for measured values. • Check water pump, see Fault code 041 and 042.
013 014	<p>Overheat - threshold temperature difference exceeded. (before FMP starts.)</p> <p>PLEASE NOTE! Fault code 014 is only displayed if the heater is running and the water temperature at the overheating sensor has reached at least 80 °C.</p>	<p>Temperature values of the overheating sensor and the surface sensor is too large.</p> <ul style="list-style-type: none"> • For remedial action see Fault code 012. • Check the surface sensor: <ul style="list-style-type: none"> – Check wiring for continuity, short circuit and damage. – Measure the resistance in connector B2 – between pin 7, (black) and pin 8, (black), see page 47 for measured values.
015	ECU lockout - too many overheats	<p>The ECU is locked due to consecutive overheating (Fault code 012, 013, 014, 016).</p> <ul style="list-style-type: none"> • For remedial action see Fault code 013. • Unlock ECU, see from pages 32 - 33.

6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

FAULT CODE DISPLAY	FAULT DESCRIPTION	INFORMATION
016	<p>Overheat - threshold temperature difference exceeded. (after FMP starts.)</p> <p>PLEASE NOTE!</p> <p>Fault code 016 is only displayed if the heater is running and the water temperature at the overheating sensor has reached at least 80 °C.</p>	<p>Temperature values of the overheating sensor and the surface sensor is too large.</p> <ul style="list-style-type: none"> • For remedial action see Fault code 012. • Check the surface sensor: <ul style="list-style-type: none"> – Check wiring for continuity, short circuit and damage. – Measure the resistance in connector B2 – between pin 7, (black) and pin 8, (black), see page 47 for measured values
017	<p>Overheat - Overheat sensor level 2 threshold exceeded</p>	<p>Temperature at overheating sensor >130 °C</p> <ul style="list-style-type: none"> • For remedial action see Fault code 012. • Check the surface sensor: <ul style="list-style-type: none"> – Check wiring for continuity, short circuit and damage. – Measure the resistance in connector B2 – between pin 7, (black) and pin 8 (black) – see page 47 for measured values.
018	Glow pin – start energy too low	Glow plug energy input is too low.
019	Glow pin – ignition energy too low	<ul style="list-style-type: none"> • Perform functional check on the glow pin, see Fault code 020.
020	Glow pin – open circuit	<ul style="list-style-type: none"> • Check wiring for continuity, short circuit and damage.
021	Glow pin – short circuit	<ul style="list-style-type: none"> – Perform functional check on the glow pin in installed condition.
022	<p>Glow pin – transistor error</p> <p>CAUTION!</p> <p>The glow plug is irreparably damaged if the voltage values are exceeded.</p> <p>→ Perform the functional check with max. 9.5 volt.</p> <p>PLEASE NOTE!</p> <p>Ensure the power pack has adequate short-circuit resistance.</p>	<ul style="list-style-type: none"> – Connector B2 – pin 3, (brown) and pin 6, (black), unclip both cables. – Apply 9.5 V ±0.1 V voltage to the glow pin and after 25 sec measure the current. – If 9.5 A (+1 A / –1.5 A) the glow plug is ok.
025	Diagnostic communication error	<ul style="list-style-type: none"> • Check the diagnostics cable: <ul style="list-style-type: none"> Connector B1 – pin 5 and connector S8 – pin 2, check blue/white wire for continuity, short circuit and damage, if ok ⇒ test ECU, see Fault code 90.

6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

FAULT CODE DISPLAY	FAULT DESCRIPTION	INFORMATION
030	Blower speed out of range	<p>Impeller blocked (frozen, soiled, sluggish, ...)</p> <ul style="list-style-type: none"> • Remove blockage and manually turn the impeller to check if it spins smoothly. • Measure the speed using a non-contact r.p.m. counter, see page 48. <p>Disconnect connector B2 – apply power (+,red) to pin 13 (black) and apply ground (-, brown) to pin 14 (brown), use 8.2 volt (+ 0.2 volt).</p> <ul style="list-style-type: none"> – Speed <10000 rpm ⇒ replace the combustion air fan. – Speed > 10000 rpm ⇒ test the ECU.
031 032 035	<p>Blower – open circuit Blower – short circuit Blower – transistor error</p> <p>⚠ CAUTION! The motor is irreparably damaged if the voltage values are exceeded. ➔ Perform the functional check with max. 8.2 volt.</p> <p>■ PLEASE NOTE!</p> <ul style="list-style-type: none"> • Ensure correct connection of the plus (positive) and minus (negative) cables. • Ensure the power pack has adequate short-circuit resistance. 	<ul style="list-style-type: none"> • Check blower wiring: Check connector B2 – pin 13 (black) and pin 14, (brown) for continuity, short circuit and damage. ⇒ Perform the speed measurement, see Fault code 30.
038 039	<p>Vehicle blower – open circuit Vehicle blower – short circuit</p>	<ul style="list-style-type: none"> • Check vehicle blower harness: Check connector B1 – pin 3, (black/red) and pin 2, (brown) for continuity, short circuit and damage, ⇒ if ok replace relay.
040	Vehicle Blower - transistor error	Remove relay, if fault code 38 is displayed, the relay is defective. ⇒ Replace relay
041 042	<p>Water pump - open circuit Water pump - short circuit</p>	<ul style="list-style-type: none"> • Check water pump harness: Check connector B1 – pin 8, (purple) and pin 9, (brown) for continuity, short circuit and damage.
043	Water pump - transistor error	Disconnect connector at water pump, if fault code 041 is displayed, the water pump is defective. ⇒ Replace water pump.
047 048	<p>Fuel pump - short circuit Fuel pump - open circuit</p>	<ul style="list-style-type: none"> • Check FMP harness: Check connector B1 – pin 4, (green) and pin 10, (brown) for continuity, short circuit and damage.
049	Fuel pump - transistor error	Disconnect harness from FMP, if Fault code 048 is displayed the FMP is defective replace the metering pump.

6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

FAULT CODE DISPLAY	FAULT DESCRIPTION	INFORMATION
050	ECU locked - too many failed start attempts	<p>Too many start attempts, the ECU is locked.</p> <p>Unlock the ECU, see from pages 32 - 33.</p> <p>Check fuel quantity and fuel supply, see from page 52. Refer to additional troubleshooting at www.espar.com</p>
051	Cool down time out	<p>At start-up the flame sensor detects a temperature >70 °C for longer than 240 sec.</p> <ul style="list-style-type: none"> • Check exhaust and combustion air system. • Check flame sensor, see Fault code 064 and 065.
052	Start attempt failed	<ul style="list-style-type: none"> • Check exhaust and combustion air system. • Check fuel quantity and fuel supply, see from page 52. • Renew the gauze fuel filter inserted in the connection socket of the metering pump.
053 054 056 057	<p>Flame cutout - Power</p> <p style="padding-left: 40px;">High</p> <p style="padding-left: 40px;">Low</p> <p style="padding-left: 40px;">While in start process</p> <p>PLEASE NOTE!</p> <p>If start attempts are still allowed, in the event of a flame cutout the heater restarts, if necessary with subsequent repeat start.</p> <p>If the restart or repeated start was successful, the fault code display is deleted.</p>	<ul style="list-style-type: none"> • Check exhaust and combustion air system. • Check fuel quantity and fuel supply, see from page 52. • Check flame sensor, see Fault code 064 and 065. • Refer to www.wspar.com/help for more troubleshooting tips.
060	Overheat sensor - open circuit	<ul style="list-style-type: none"> • Check overheat sensor: <ul style="list-style-type: none"> – Check connector B2 – pin 10, (black) and pin 11, (black) for damage. – Remove the overheat sensor and check, see page 46. – If fault code 060 continues to be displayed, Test the ECU.
061	Overheat sensor - open circuit	<ul style="list-style-type: none"> • Check overheat sensor: <ul style="list-style-type: none"> – Check connector B2 – pin 10, (black) and pin 11, (black) for damage. – Remove the overheat sensor and check, see page 46. – If fault code 061 continues to be displayed, Test the ECU.
062	PCB - open circuit	Teste ECU.
063	PCB - short circuit	
064	Flame sensor - open circuit	<ul style="list-style-type: none"> • Check flame sensor: <ul style="list-style-type: none"> – Check connector B2 – pin 1, (brown) and pin 2, (brown) for damage. – Remove the flame sensor and check, see page 50. – If fault code 064 continues to be displayed, test the ECU.

6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

FAULT CODE DISPLAY	FAULT DESCRIPTION	INFORMATION
065	Flame sensor - short circuit	<ul style="list-style-type: none"> • Check flame sensor: <ul style="list-style-type: none"> – Check connector B2 – pin 1, (brown) and pin 2, (brown) for damage. – Remove the flame sensor and check, see page 50. – If fault code 065 continues to be displayed, test the ECU.
069	Communication error	<ul style="list-style-type: none"> • Check diagnostics cable: <ul style="list-style-type: none"> – Connector B1 – pin 5 and connector S8 – pin 2, check blue/white wire for continuity, short circuit and damage, if ok check the components connected to the diagnostics cable , if ok test the ECU.
071	Surface sensor - open circuit	<ul style="list-style-type: none"> • Check the surface sensor: <ul style="list-style-type: none"> – Check connector B2 – pin 7, (black) and pin 8, (black) for damage. – Remove the surface sensor and check, see page 47. – If fault code 071 continues to be displayed, test the ECU.
072	Surface sensor - short circuit	<ul style="list-style-type: none"> • Check the surface sensor: <ul style="list-style-type: none"> – Check connector B2 – pin 7, (black) and pin 8, (black) for damage. – Remove the surface sensor and check, see page 47. – If fault code 72 continues to be displayed, test the ECU.
074	Overheat sensor - out of range	<ul style="list-style-type: none"> • Check overheat sensor: <ul style="list-style-type: none"> – Check wiring for continuity, short circuit and damage. – Check connector B2 – pin 10 (black), and pin 11(black) for damage. – Remove the overheating sensor and check, see page 46. – If fault code 74 continues to be displayed, test the ECU. • Unlock the ECU, see pages 32 - 33.
090 091 092 - 099	Too many resets	<ul style="list-style-type: none"> • Check voltage supply. • Test ECU.

NOTES:

6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

The permitted repair work to the heater is described in the "Repair Instructions" chapter. The heater must be removed from the vehicle for the repair work to be carried out.

The heater is assembled in the reverse order, note and follow any additional instructions.

PLEASE NOTE!

After completing all the work and installing the heater in the vehicle, perform a functional check on the heater.

BEFORE WORKING ON THE HEATER, ALWAYS FOLLOW THE RELEVANT SAFETY INSTRUCTIONS.

DANGER!

Risk of injury, burns and poisoning!

- Always switch off the heater beforehand and leave it to cool.
- Disconnect the battery.
- The heater must not be operated in closed rooms such as garages or workshops.

Exception:

Exhaust suction available directly at the entry to the exhaust pipe.

CAUTION!

- The seals of dismantled components must be replaced.
- During repair work, check all components for damage and if necessary replace.
- Check connector contacts, plug-in connections and cables for corrosion and damage and if necessary repair.
- Only use original spare parts if replacements are necessary.
- After working on the coolant circuit the level of the coolant must be checked and if necessary topped up according to the vehicle manufacturer's instructions.
- The coolant circuit must then be vented.
- Operation or the after running of the heater may only be stopped in an emergency (see "EMERGENCY SHUT DOWN" Page 5) by interrupting the battery current (risk of heater overheating).

SPECIAL TOOL

AMP RELEASE TOOL

The AMP release tool is used to release plug-in contacts in a connector housing.

This release tool can be ordered directly from AMP.

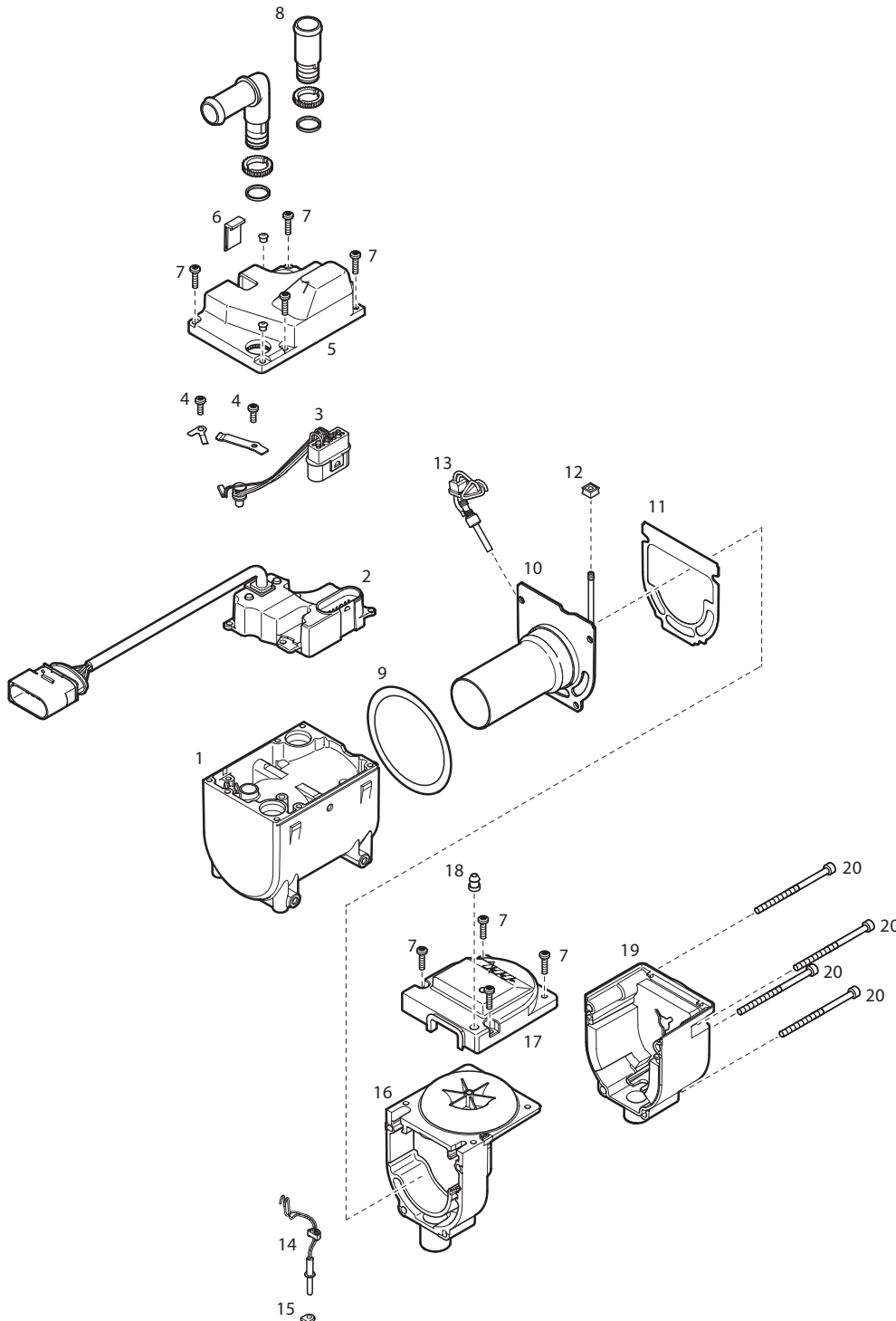


- For standard timer,



6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

ASSEMBLY DRAWING



PARTS LIST

- 1 Jacket with heat exchanger
- 2 ECU
- 3 Heater harness with overheat sensor and surface sensor
- 4 Screw, M4 x 12 (2x)
- 5 Cover, ECU
- 6 Cover, cable, ECU
- 7 Screw, M4 x 16 (8x)
- 8 Connecting socket
- 9 Seal, combustion chamber / heat exchanger
- 10 Combustion chamber
- 11 Seal, combustion chamber / blower
- 12 Grommet, fuel pipe
- 13 Glow pin
- 14 Flame sensor
- 15 Grommet, flame sensor
- 16 Blower
- 17 Cover, blower
- 18 Grommet, fuel pipe
- 19 Cover, electric motor
- 20 Screw, M5 x 80 (4x)

6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

REPAIR STEPS

PLEASE NOTE!

This repair instruction describes how to dismantle the heater in individual repair steps. Reference is made to the necessary preceding steps to be performed at the relevant repair steps.

Repair step 1

Remove "ECU" cover Page 43

Repair step 2

Remove "blower" cover Page 43

Repair step 3

Remove hose fittings from the "ECU" cover Page 44

Repair step 4

Dismantling the "ECU" Page 45

Repair step 5

Remove overheating sensor and surface sensor Page 46

Check overheat sensor Page 46

Check the surface sensor Page 47

Repair step 6

Remove "blower motor" cover and
"Blower assembly with combustion chamber" Page 49

Repair step 7

Measure blower speed Page 49

Repair step 8

Remove flame sensor Page 50

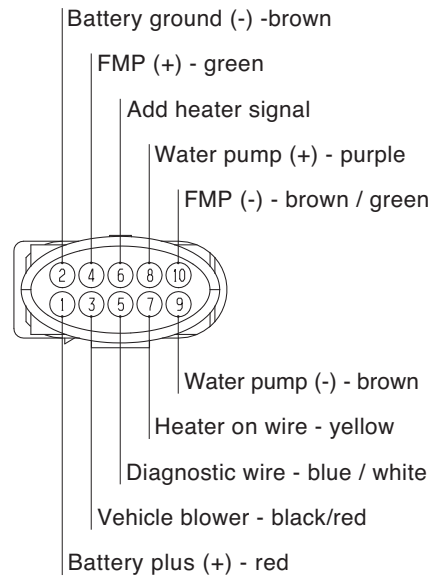
Check flame sensor Page 50

Repair step 9

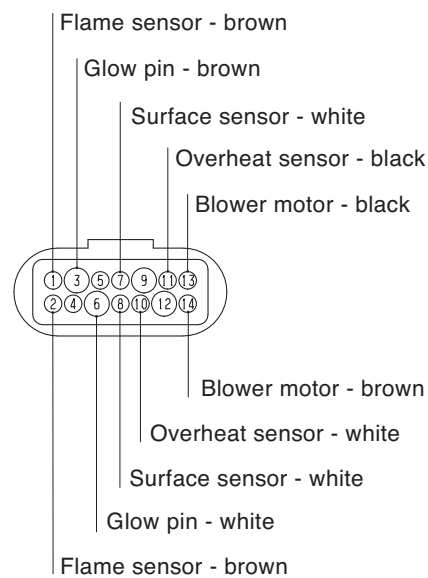
Check glow plug Page 51

Dismantle glow plug Page 51

CONNECTOR ASSIGNMENT – 10-PIN CONNECTOR S1



CONNECTOR ASSIGNMENT – 14-PIN CONNECTOR B2



Connector housings are shown from the cable inlet side.

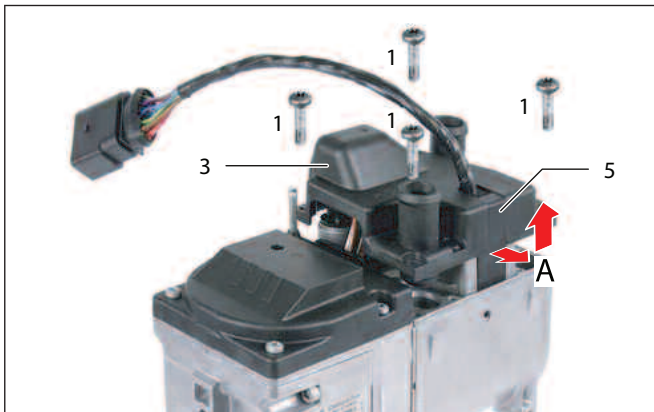
6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

DISMANTLE THE HEATER

STEP 1

REMOVE ECU COVER

- Remove 4 screws M4 x 16 (1) from the ECU cover.
- Unlock cover of ECU cable by turning in direction of arrow (A) pull the ECU cover from the top.
- Keep the ECU cable cover in a safe place for the assembly.
- If an angle connector has been installed, mark the setting.
- Lift ECU cover and carefully pull the water connection socket out of the jacket.
- Remove ECU cover.



- 1 Fixing screws M4 x 16
- 2 ECU cable cover
- 3 ECU cover

PLEASE NOTE!

Notes for the assembly:

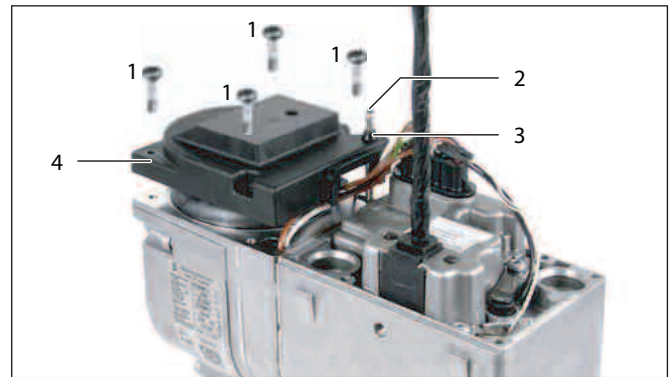
- Before installing the ECU cover, ensure that the toothed rings of both connection sockets are correctly locked in the cover.
- Insert the ECU cable cover in the ECU cover.
- Screw Torque M4 x 16 = 2.9+0.3 Nm ~ 2.1 ft-lb

STEP 2

REMOVE BLOWER COVER

To dismantle the blower cover, perform Step 1 first.

- Remove 4 M4 x 16 (1) from the blower cover.
- Remove the blower cover, taking care not to damage fuel connection.

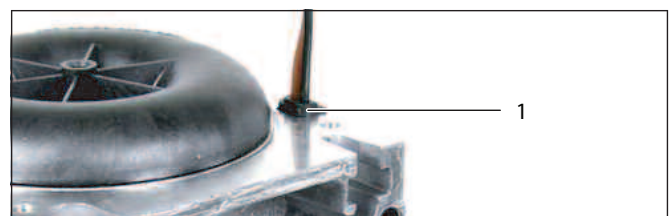


- 1 M4 x 16 screw
- 2 Fuel pipe
- 3 Fuel pipe grommet in the blower cover
- 4 Blower cover

PLEASE NOTE!

NOTES FOR THE ASSEMBLY:

- Replace the fuel grommet in the blower cover.
- Carefully position the blower cover above the fuel connection on the blower housing, do not clamp the cable between the cover and housing.
- Ensure the fuel connection grommet fits correctly in the blower cover.
- Ensure the blower motor cable grommet fits correctly in the blower housing.



- 1 Blower motor cable loom Grommet
- Torque M4 x 16 screws 2.9+0.3 Nm ~ 2.1ft-lb.

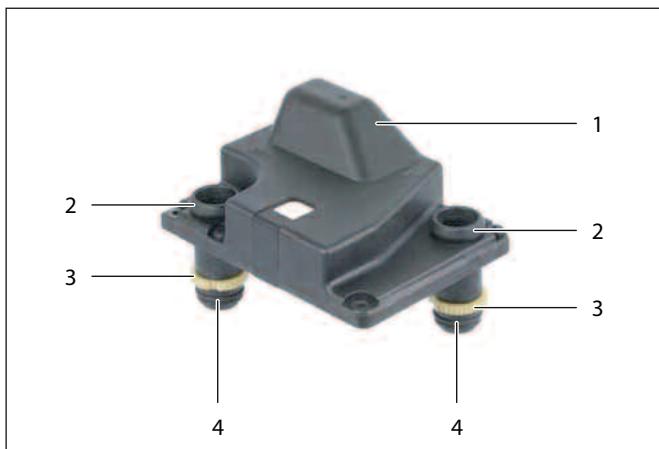
6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

STEP 3

REMOVE COOLANT PORTS FROM THE ECU COVER

To dismantle the coolant ports from the ECU cover, perform Step 1 first.

- Push the coolant port down into the ECU cover.
- Loosen toothed ring.
- Remove O-ring.
- Pull the coolant ports from the ECU cover from above.



- 1 ECU cover
- 2 Coolant port socket
- 3 Toothed ring
- 4 O-ring

PLEASE NOTE!

NOTES FOR THE ASSEMBLY:

- Insert the coolant port in the ECU cover from above.
- Insert O-ring in the groove of the coolant port.
- Fit the toothed ring onto the coolant port and insert in the ring gear of the ECU cover. If an angled connection socket was fitted, the angled coolant port must be aligned according to the installation position or the marking and inserted in the gear ring of the ECU cover.

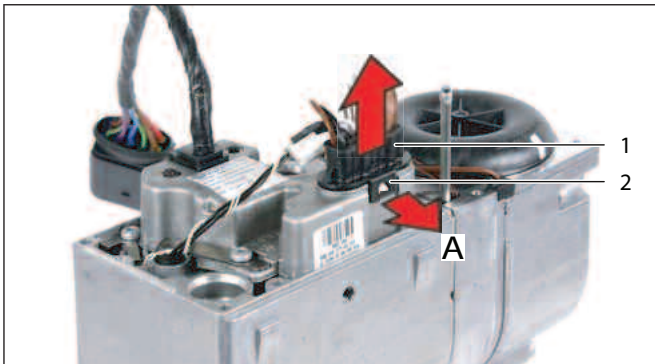
6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

STEP 4

DISMANTLING THE ECU

To dismantle the ECU, perform Step 1 first.

- Unlock the locking tab at the 14-pin connector (B2) by turning in direction of arrow (A).
- Pull off the 14-pin connector (B2) from above.



- 1 14-pin connector (B2)
- 2 Locking tab

- Undo fixing screw M4 x 12 compression spring overheating sensor / control box. Remove the compression spring.



- 1 M4 x 12 screw.

- Undo M4 x 12 screw compression spring surface sensor / ECU. Remove the compression spring.



- 1 M4 x 12 screw

- Remove the ECU.

PLEASE NOTE!

The overheat sensor does not have to be removed.
Torque M4 x 12 screws 3.3+0.3 Nm ~ 2.5 ft-lb.

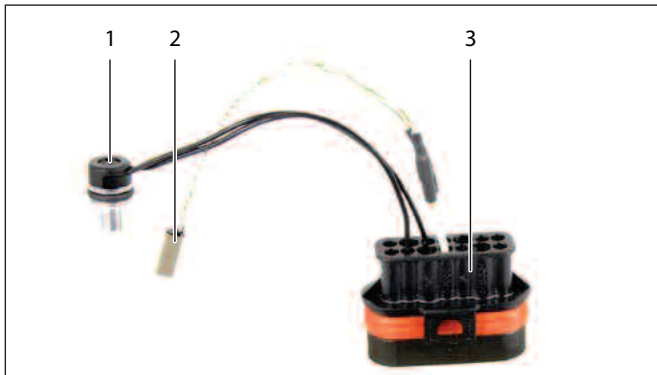
6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

STEP 5

REMOVE OVERHEAT SENSOR AND SURFACE SENSOR

To remove the overheat / Surface sensor, perform Step 1 and Repair Step 4 first.

- Use long nose pliers to pull the overheat sensor out of the locator hole in the jacket. Remove overheat / surface sensor and the 14-pin connector (B2).



- 1 Overheat sensor
- 2 Surface sensor
- 3 14-pin connector (B2)

PLEASE NOTE!

The overheat / surface sensor and 14-pin connector are a sub-assembly and are not available as individual parts.

- If replacing the overheat / surface sensor and 14-pin connector (B2) consult page 42. for proper pinning.

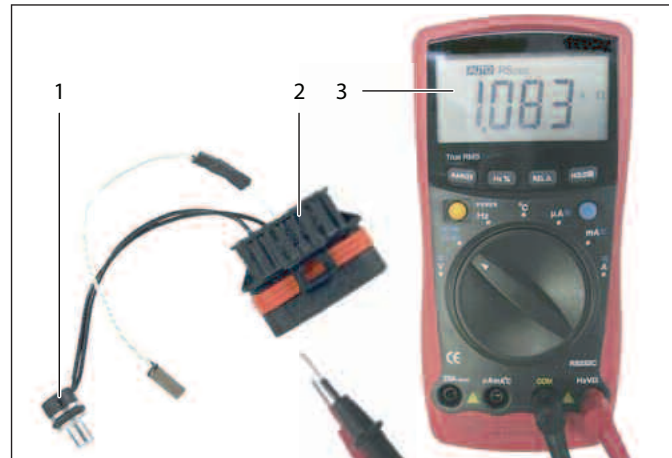
PLEASE NOTE!

Notes for the assembly:

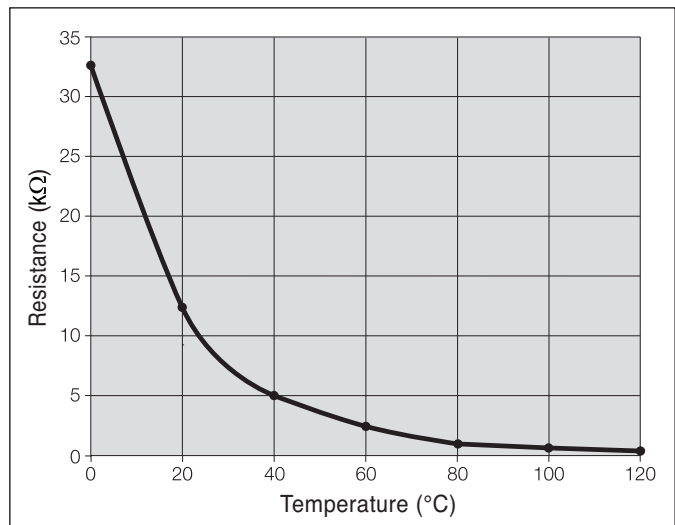
- When installing, twist the overheating sensor lead harness and the surface sensor lead harness.

CHECK OVERHEAT SENSOR

- Check the overheat sensor using a digital multimeter in the 14-pin connector (B2) at pin 10 and 11. If the resistance value lies outside the diagram or the table of values, replace the overheat sensor.



- 1 Overheat sensor
- 2 14-pin connector (B2)
- 3 Digital multimeter



6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

TABLE OF VALUES:

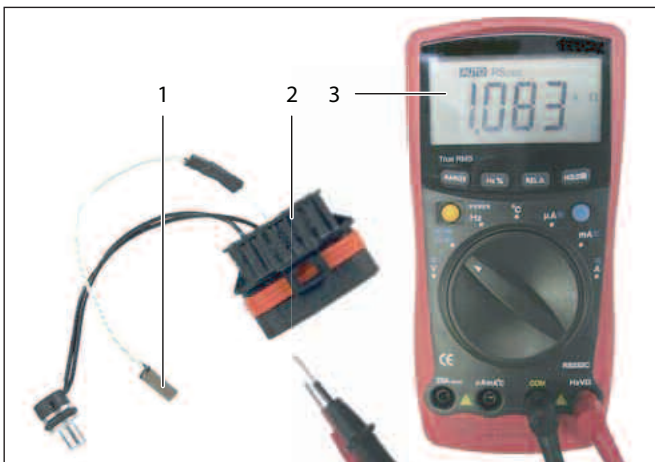
Temp [°C]	R [kΩ]	Temp[°C]	R [kΩ]
0	32.54 ± 2.2	70	1.75 ± 0.13
10	19.87 ± 1.0	80	1.25 ± 0.1
20	12.48 ± 0.5	90	0.91 ± 0.08
30	8.06 ± 0.4	100	0.67 ± 0.06
40	5.33 ± 0.3	110	0.50 ± 0.05
50	3.60 ± 0.25	120	0.38 ± 0.04
60	2.48 ± 0.17		

TABLE OF VALUES

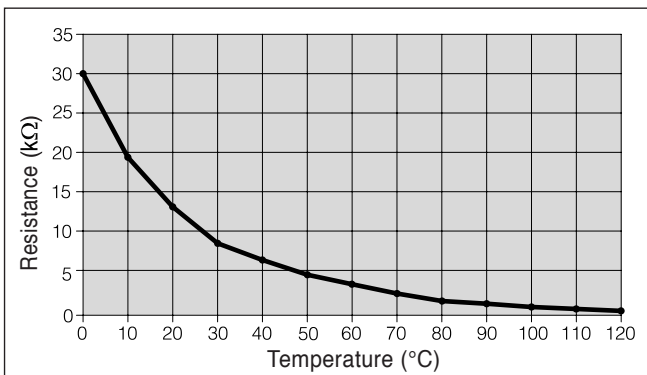
Temp [°C]	R [kΩ]
0	30.00 ±1.50
25	10.74 ±0.78
40	6.20 ±0.52
60	3.19 ±0.32
80	1.75 ±0.20
100	1.02 ±0.13
120	0.62 ±0.08

CHECK THE SURFACE SENSOR

- Check the surface sensor using a digital multimeter in the 14-pin connector (B2) at pin 7 and 8. If the resistance value lies outside the diagram or the table of values, replace the surface sensor.



- 1 Surface sensor
- 2 14-pin connector (B2)
- 3 Digital multimeter



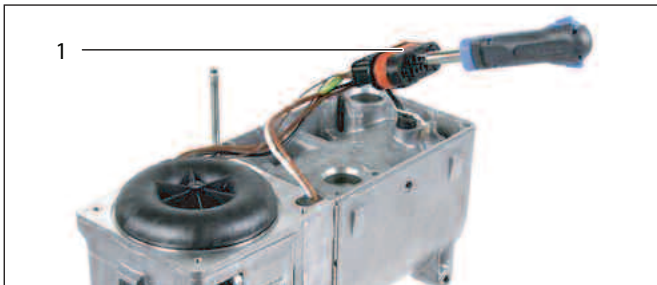
6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

STEP 6

REMOVE THE BLOWER MOTOR COVER AND BLOWER SUB-ASSEMBLY WITH COMBUSTION CHAMBER

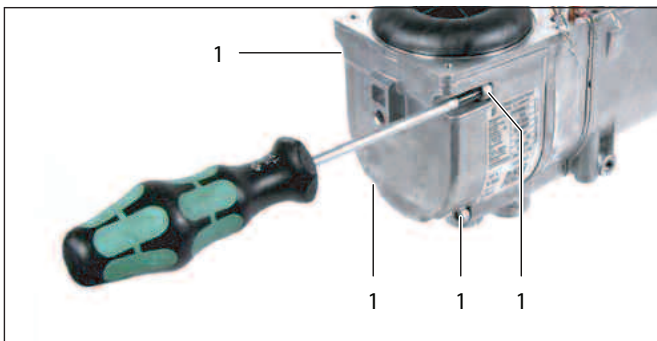
To remove the blower motor cover and blower sub-assembly with combustion chamber, perform Step 1, Step 2 and Step 4 first.

- Remove pins from the blower motor in the 14-pin connector (B2), pin 13 black and pin 14, brown, using the AMP release tool.
- Remove pin from the flame sensor in the 14-pin connector (B2), pin 1, brown and pin 2, brown using the AMP release tool.
- Remove pins from the glow pin in the 14-pin connector (B2), pin 3, brown and pin 6, black using the AMP release tool.



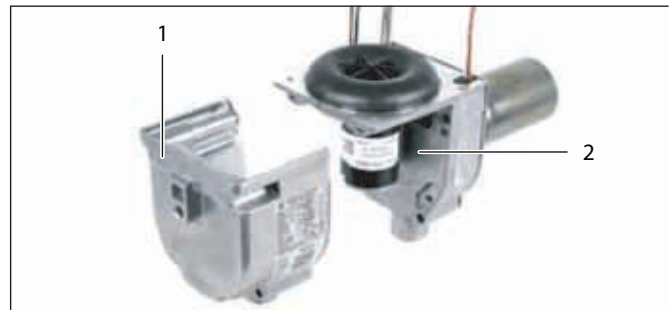
1 14-pin connector (B2)

- Remove 4 x M5 x 80 screws of the blower motor cover and the blower.



1 M5 x 80 screw.

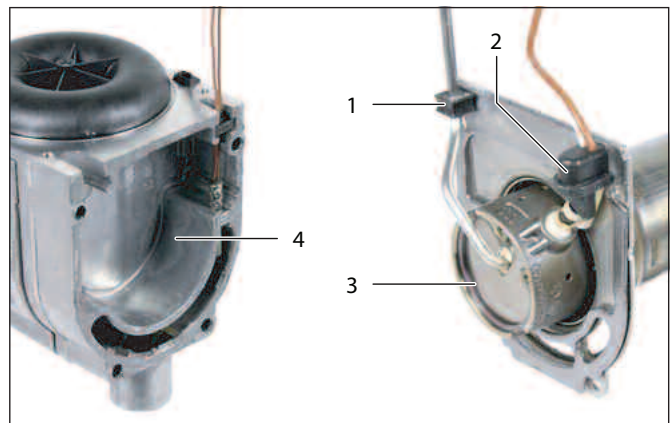
- Remove blower motor cover.
- Pull the Blower with combustion chamber sub-assembly out of the heat exchanger.



1 Blower motor cover

2 Blower with combustion chamber sub-assembly

- Remove the combustion chamber from the blower housing, at the same time pull off the grommet from the glow pin and the grommet from the fuel tube from the blower housing together with the combustion chamber.



1 Fuel pipe grommet

2 Glow pin wiring grommet

3 Combustion chamber

4 Blower housing with flame sensor

6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

REMOVE THE ELECTRIC MOTOR COVER AND BLOWER SUB-ASSEMBLY WITH COMBUSTION CHAMBER

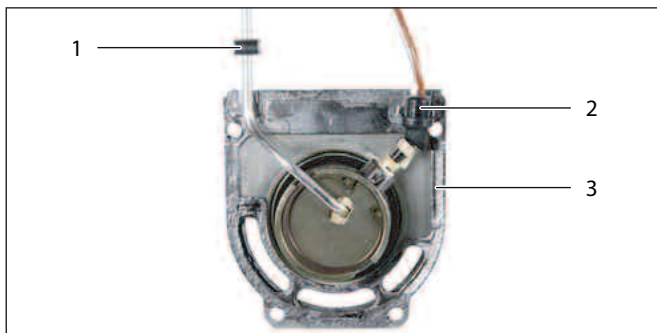
- Remove seal between the combustion chamber flange and the blower housing or between the combustion chamber flange and the heat exchanger, carefully clean all sealing surfaces.
- Pull grommet off the fuel pipe.



CAUTION!

Reusing the dismantled seals and grommets can result in leaks and malfunctions in the heater.

→ Use the specified spare parts kit.



- 1 Grommet, fuel pipe in blower housing
- 2 Grommet, glow plug in blower housing
- 3 Seal, combustion chamber flange / blower housing

PLEASE NOTE!

NOTES FOR THE ASSEMBLY:

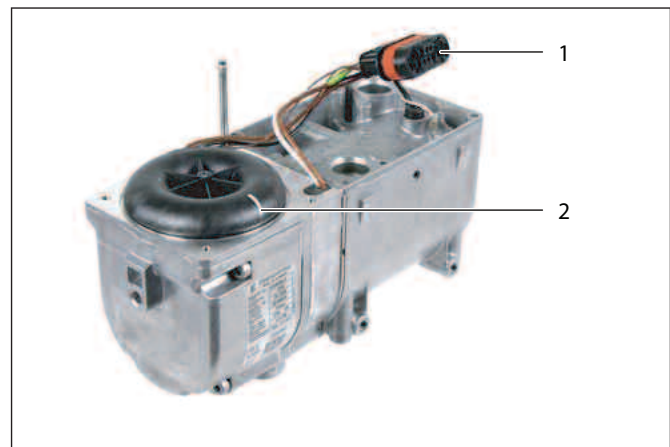
- Position new seal between the blower housing and combustion chamber on the combustion chamber flange, note the different cutouts in the seal.
- Position the glow pin wiring grommet with its flat surface on the seal (combustion chamber flange).
- Push on the grommet for the fuel pipe and position on the seal (combustion chamber flange).
- When assembling the combustion chamber and blower housing, always ensure the grommets sit properly.
- Insert new seal between the combustion chamber and the heat exchanger, in the circular recess of the jacket and heat exchanger.
- Tightening torque of the fixing screws:
M5 x 80 = 6.5+0.5 Nm ~ 4.8 ft-lb.

STEP 7

MEASURE BLOWER SPEED

To measure the blower speed, perform Repair step 1,2 and 4 first.

- Apply a marking (white paint) to the impeller and measure the speed using a non-contact r.p.m. counter.
- Apply max. 8.2 V at the 14-pin connector (B2), pin 13 black and pin 14 brown.
- If the measured speed <10 000 rpm, then replace the blower.
- If the measured speed > 10 000 rpm, then test the ECU.



- 1 14-pin connector (B2)
- 2 Marking

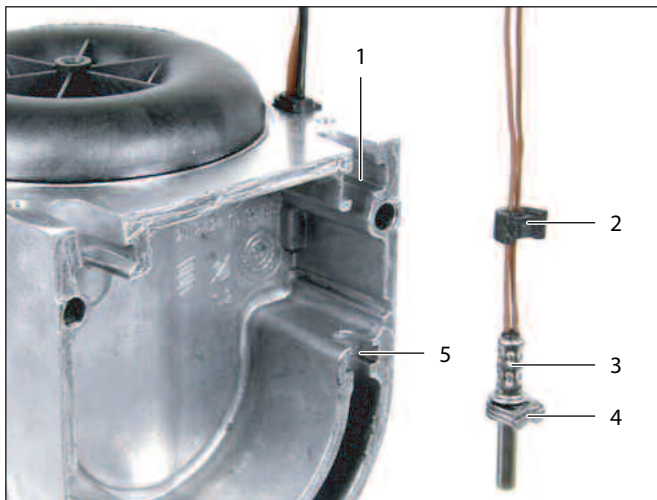
6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

STEP 8

REMOVE FLAME SENSOR

To remove the flame sensor, perform Repair step 1, Repair step 2 and Repair step 4 and Repair step 6 first.

- Pull the flame sensor wiring loom grommet out of the groove.
- Pull out the flame sensor together with the grommet (graphite grommet) from the groove in the blower housing.
- Remove the flame sensor.



- 1 Groove for Flame sensor wiring loom grommet and fuel pipe grommet
- 2 Flame sensor wiring loom, semi-round
- 3 Flame sensor
- 4 Flame sensor grommet (graphite grommet)
- 5 Flame sensor collar grommet and graphite grommet

PLEASE NOTE!

NOTES FOR THE INSTALLATION

- The relevant rules of sound engineering practice and any information provided by the vehicle manufacturer are to be observed during the installation and repair.
- When carrying out electric welding on the vehicle, the positive cable at the battery should be disconnected and placed at ground to protect the ECU.

CHECK FLAME SENSOR

Check the flame sensor using a digital multimeter. If the resistance value of the flame sensor lies outside the diagram or the table of values, replace the flame sensor.

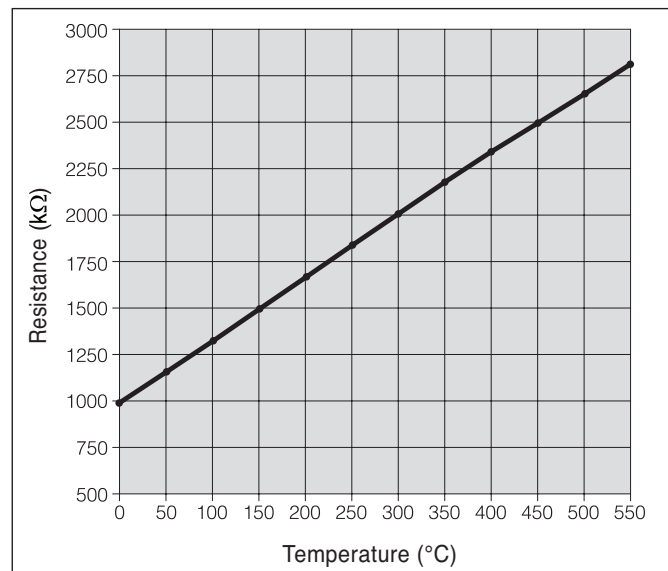


1 Flame sensor

2 Digital multimeter

TABLE OF VALUES

Temp [°C]	R [Ω]	Temp [°C]	R [Ω]
0	1000 ±10	200	1758 ±24
50	1194 ±12	250	1941 ±28
100	1385 ±15	300	2120 ±32
150	1573 ±20	350	2297 ±36



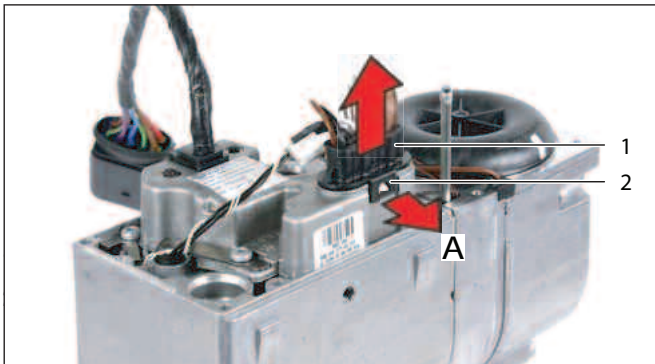
6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

STEP 9

CHECK GLOW PIN

To check the glow pin, perform Repair step 1 and 2 first.

- Unlock the locking tab at the 14-pin connector (B2) by turning in direction of arrow (A).
- Pull off the 14-pin connector (B2) from above.



DISMANTLE GLOW PIN

To remove the glow pin, perform Repair step 1, 2 and 6 first.

- Carefully pull the glow pin out of the combustion chamber and replace.

- 1 Glow pin grommet
- 2 Glow pin

PLEASE NOTE!

NOTES FOR THE ASSEMBLY:

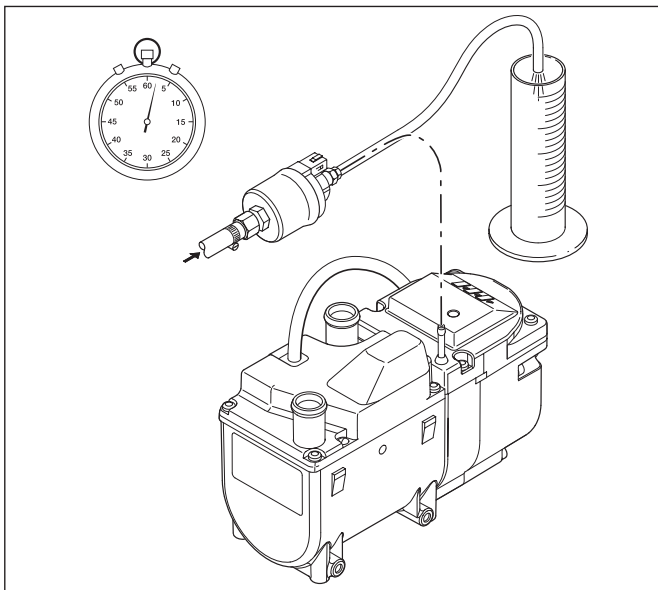
- The following parts are included in the spare parts kit and must be used:
 - Grommet, fuel pipe
 - Grommet, fuel pipe in the "blower" cover
 - Grommet, flame sensor (graphite grommet)
 - Seal, between the combustion chamber flange and the blower housing
 - Seal, between the combustion chamber flange and the heat exchanger

6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

MEASURING THE FUEL QUANTITY WITHOUT EDITH

PREPARING FOR THE MEASUREMENT

- Remove the fuel line from the heater and insert a measuring cylinder (size 25 ml).
- Switch on heater.
- Depending on the heater type, the metering pump starts pumping fuel after 17 to 20 sec. Ensure that the fuel line is filled with fuel and free of bubbles. At this point you are ready to perform the test.
- Switch off heater, empty measuring cylinder and insert the fuel line in to the cylinder.
- Switch on heater.
- Depending on the heater type, the metering pump starts pumping fuel after 17 to 20 sec.
- During the measurement, hold the measuring cylinder at the level of the heater.
- Gasoline heaters
 - For gasoline heaters, because of the delivery rate, it is sufficient to start once to measure the fuel quantity.
- Diesel heaters
 - In the case of diesel heaters, after starting once, two automatic start repeats must take place to obtain sufficient fuel for the measurement.
- After measuring, switch off the heater.
- Read off the quantity of fuel in the measuring cylinder.



6 MAINTENANCE, TROUBLESHOOTING & REPAIRS

EVALUATION

- Compare the measured quantity of fuel with the values in the following table.

If the measured quantity of fuel is above the maximum value or below the minimum value, the metering pump must be replaced.

Heater type	Hydronic II	
Heater version	B 5 S	D 5 S
Delivery period in sec.	80 sec	129 sec.
	(one-off start)	(one start + two repeats)
Fuel quantity – nominal. [ml]	12.4	8.2
Fuel quantity – max. [ml]	13.7	9.0
Fuel quantity – min. [ml]	11.2	7.4

PLEASE NOTE!

Only carry out the fuel measurement if the battery is sufficiently charged. During the measurement at least 12 volt or max. 13 volt should be applied to the heater.

FUEL QUANTITY TEST WITH EDITH

- Remove the fuel line at the heater and insert a measuring into cylinder (size 25 ml).
- Connect heater to EDiTH (ISO adapter) and select "switch on component" function at the PC.
- Select "metering pump" component, click "Run" button and pump fuel into the measuring cylinder.

Retain setting of 30 sec. delivery period with 10 Hz metering pump frequency.

- After 30 sec. the metering pump switches off, empty the measuring cylinder.

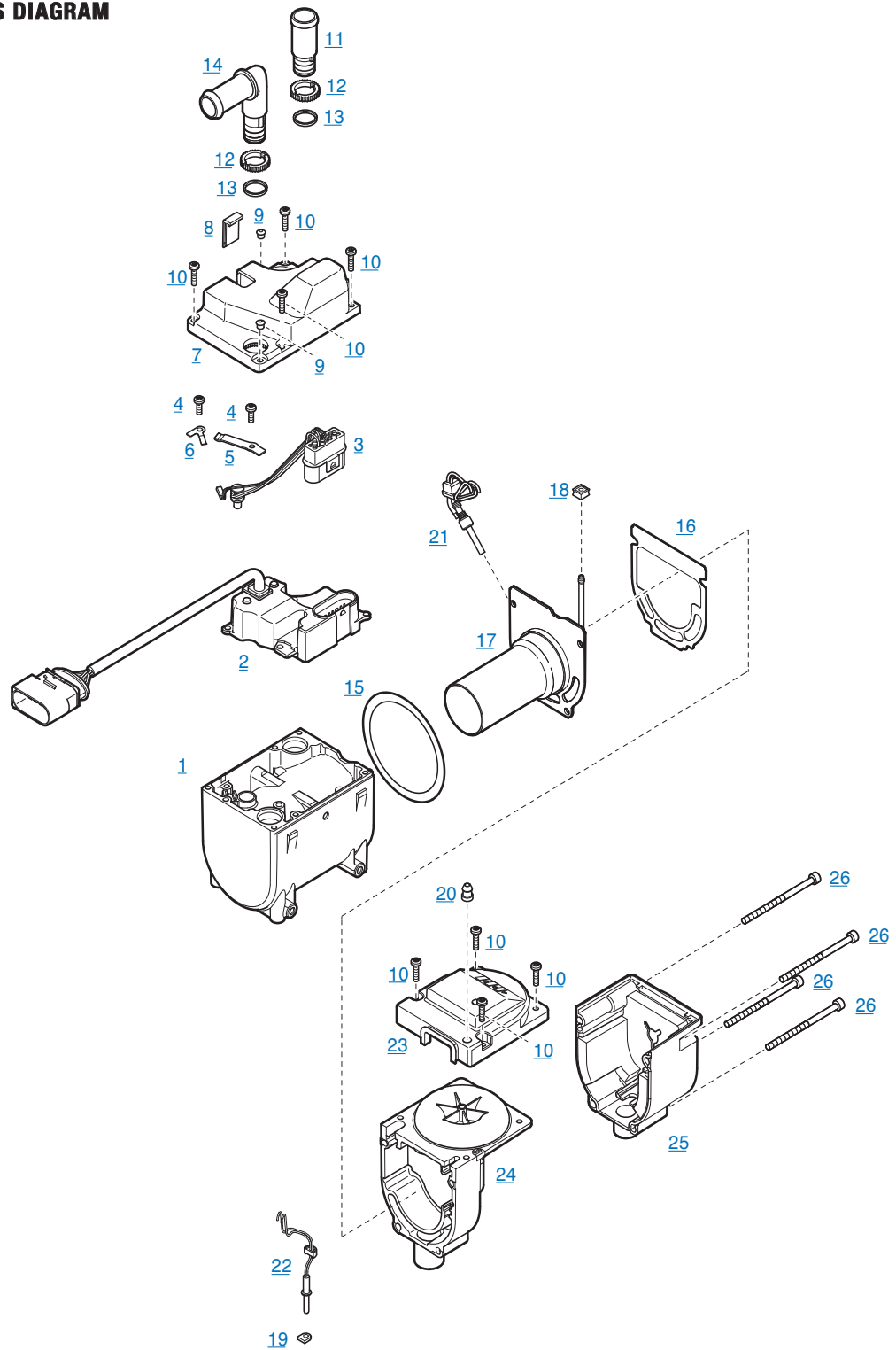
MEASUREMENT / EVALUATION

- Switch on the "metering pump" component again via EDiTH and pump into the measuring cylinder, delivery period 30 sec. with 10 Hz metering pump frequency.
- After 30 sec. the metering pump is switched off, read off the quantity of fuel in the measuring cylinder.

Heater type	Hydronic II	
Heater version	B 5 S	D 5 S
Delivery period in sec.	30	
Fuel quantity – nominal. [ml]	8.2	8.9
Fuel quantity – max. [ml]	9.0	9.8
Fuel quantity – min. [ml]	7.7	8.4
Frequency [hz]	10	

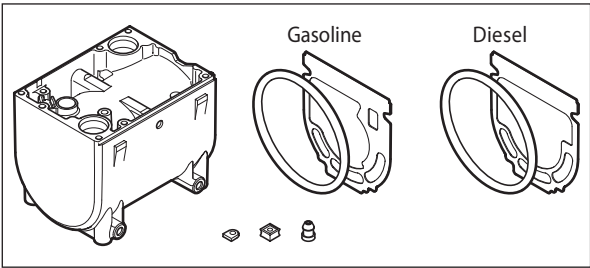
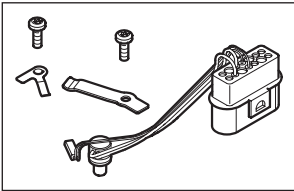
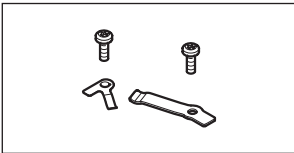
7 PARTS LIST

HEATER SPARE PARTS DIAGRAM



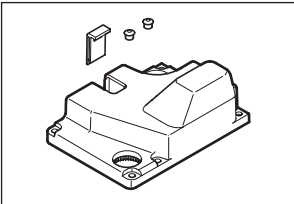
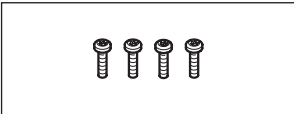
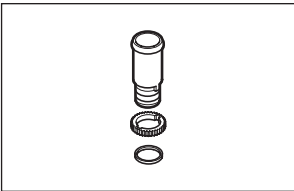
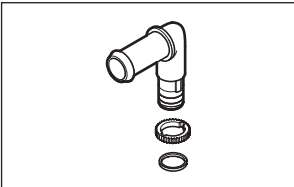
7 PARTS LIST

SPARE PARTS LIST

Ref. No.	Description	Part Number	Model #	
			20 1904 05	25 2526 05
1	Jacket and heat exchanger	See Item 1.1		
1.1	Jacket and heat exchanger kit includes: Item 1 , 15 , 16 , 18 , 19 , 20	25 2526 01 01 00	•	•
				
2	ECU	22 5206 01 00 01 22 5206 01 00 02	•	•
3	Main harness	See Item 3.1		
3.1	Lead harness kit, heater includes: Item 3 , 4 , 5 , 6	25 2526 99 01 21	•	•
				
4	Screw, M4 x 12	See Item 6.1		
5	Compression spring, overheating sensor	See Item 6.1		
6	Compression spring, surface sensor	See Item 6.1		
6.1	Compression spring kit includes: Item 4 , 5 , 6	25 2526 99 01 08	•	•
				

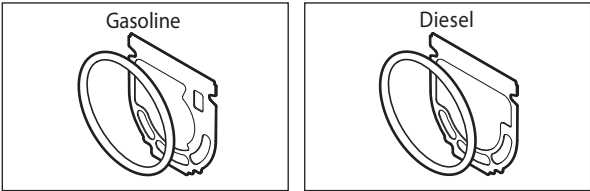
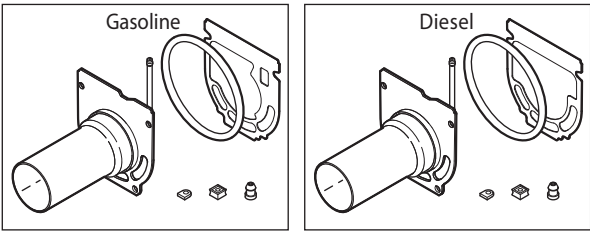
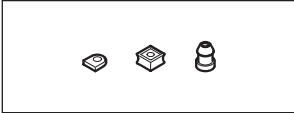
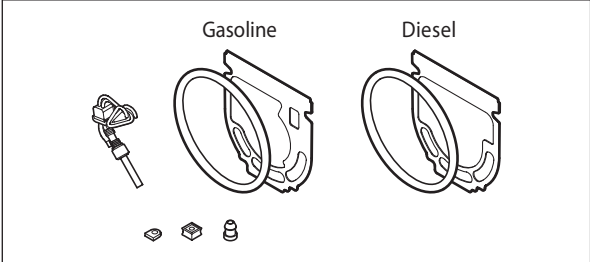
7 PARTS LIST

SPARE PARTS LIST

Ref. No.	Description	Part Number	Model #	20 1904 05	25 2526 05
7	Cover, ECU	See Item 7.1			
7.1	Cover kit, control box includes: Item 7, 8, 9	25 2526 05 00 11		•	•
					
8	Cover, cable, control box	25 2281 01 00 06		•	•
9	Ribbed insert	See Item 7.1			
10	Screw, M4 x 16	See Item 10.1			
10.1	Screw kit, M4 x 16 (4 screws) includes: Item 10	25 2526 99 00 31		•	•
					
11	Water pipe socket, straight, di = ø 20 mm See Item 11.1				
11.1	Water pipe socket kit, straight, di = ø 20 mm includes: Item 11, 12, 13	25 2526 99 01 06		•	•
					
12	Toothed ring	See Item 14.1			
13	O-ring, 16 x 2	22 1000 70 00 19		•	•
14	Water pipe socket, 90°, di = ø 20 mm	See Item 14.1			
14.1	Water pipe socket kit, 90°, di = ø 20 mm includes: Item 12, 13, 14	25 2526 80 03 00		•	•
					

7 PARTS LIST

SPARE PARTS LIST

Ref. No.	Description	Part Number	Model #	
			20 1904 05	25 2526 05
15	Seal, combustion chamber flange / heat exchanger	See Item 16.1		
16	Seal, combustion chamber housing / fan	See Item 16.1		
16.1	Seal kit includes: Item 15, 16	20 1904 99 01 11 25 2526 99 01 10	•	•
				
17	Combustion chamber	See Item 17.1		
17.1	Combustion chamber kit includes: Item 15, 16, 17, 18, 19, 20	20 1904 10 00 00 25 2526 10 00 00	•	•
				
18	Grommet, fuel pipe	See Item 20.1		
19	Grommet, flame sensor	See Item 20.1		
20	Grommet, fuel pipe	See Item 20.1		
20.1	Grommets kit for combustion chamber, includes: Item 18, 19, 20	25 2526 99 01 04	•	•
				
21	Glow plug	See Item 21.1		
21.1	Glow plug kit, includes: Item 15, 16, 18, 19, 20, 21	25 2526 99 01 11	•	•
				

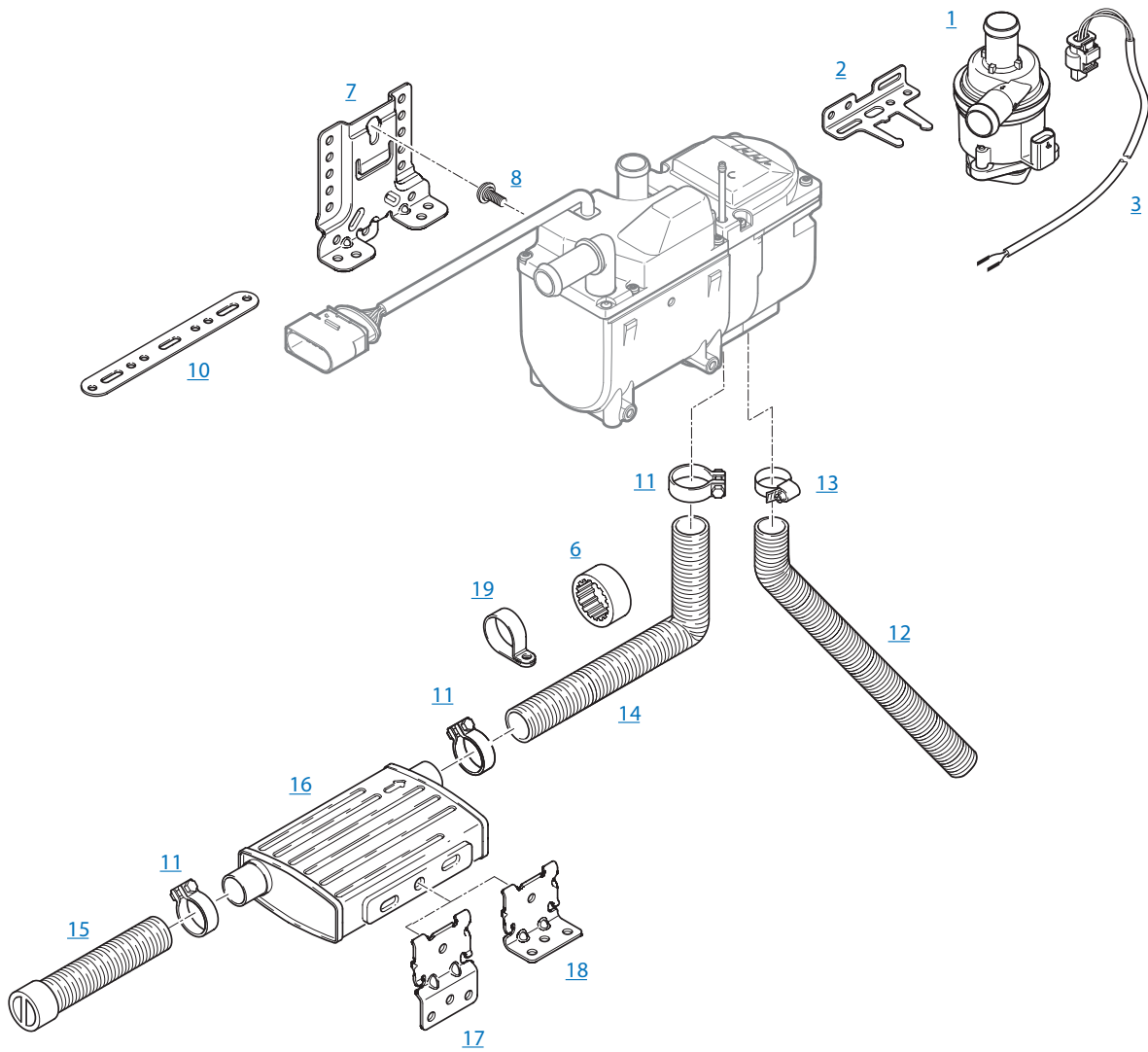
7 PARTS LIST

SPARE PARTS LIST

Ref. No.	Description	Part Number	Model#	
			20 1904 05	25 2526 05
22	Sensor, flame monitoring See Item 22.1			
22.1	Sensor kit, flame monitoring includes: Item 15 , 16 , 18 , 19 , 20 , 22	25 2526 99 36 00	•	•
23	Cover, fan, with seal	25 2424 01 03 00	•	•
24	Fan See Item 24.1			
24.1	Fan kit includes: Item 15 , 16 , 18 , 19 , 20 , 24	25 2526 99 15 00	•	•
25	Cover, electric motor, complete	25 2424 01 04 00	•	•
26	Screw, M5 x 80 See Item 26.1			
26.1	Screw kit, M5 x 80 (4 screws) includes: Item 26	25 2278 01 00 30	•	•

7 PARTS LIST

INSTALLATION, WATER AND COMBUSTION AIR SYSTEM SPARE PARTS DIAGRAM



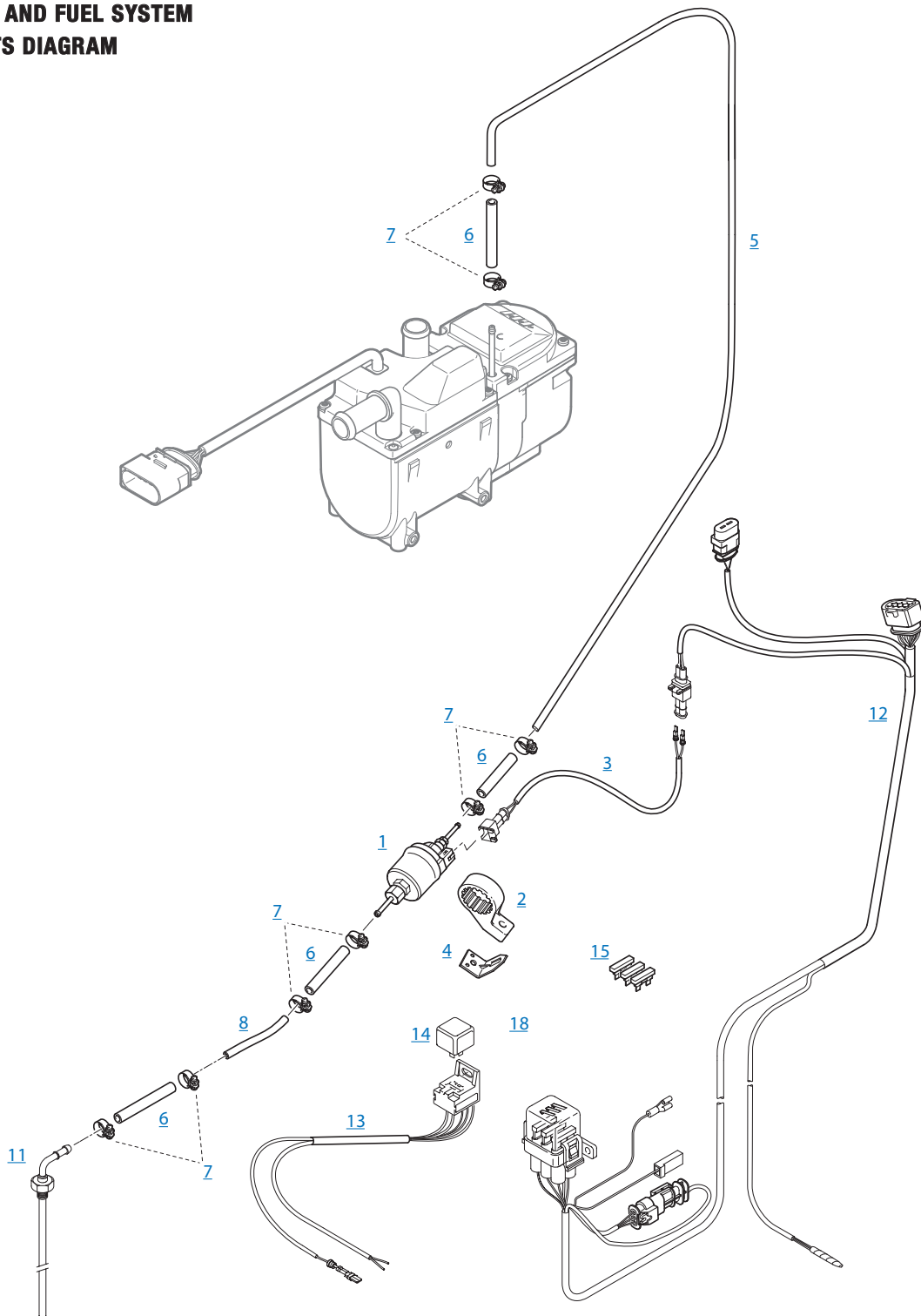
7 PARTS LIST

INSTALLATION, WATER AND COMBUSTION AIR SYSTEM SPARE PARTS LIST

Ref. No.	Description	Part Number	Model#	
			20 1904 05	25 2526 05
1	Water pump, 12 V	25 2526 25 00 00	•	•
2	Bracket, water pump	22 1000 51 39 00	•	•
3	Lead harness, 12 V, L = 2 m	25 2526 80 12 00	•	•
4	Hose, water, di = \varnothing 20 mm	25 1917 80 00 01	•	•
5	Hose clip, 20 - 32 mm	10 2067 02 00 32	•	•
6	Ring, 21 / 40	22 1000 50 10 02	•	•
7	Bracket, heater	22 1000 51 37 00	•	•
8	Special screw	25 2526 80 01 01	•	•
10	Bracket, straight, L = 180 mm	22 9000 50 93 06	•	•
11	Clip	22 1000 50 05 00	•	•
12	Air intake 20 mm L= 1000 mm	360 00 099	•	•
13	Hose clip, 16 - 25 mm	10 2067 01 60 25	•	•
14	Exhaust, \varnothing 24 mm, L = 1300 mm	360 61 557	•	•
15	Exhaust, \varnothing 24 mm, L = 1000 mm with end sleeve	25 1774 80 02 00	•	•
16	Exhaust silencer	22 1000 40 19 00	•	•
17	Bracket, exhaust silencer, Z-shape	22 1000 51 35 00	•	•
18	Bracket, exhaust silencer, L-shape	22 1000 51 34 00	•	•
19	Clip, \varnothing 28 mm	152 09 010	•	•

7 PARTS LIST

ELECTRICAL AND FUEL SYSTEM SPARE PARTS DIAGRAM



7 PARTS LIST

ELECTRICS AND FUEL SYSTEM SPARE PARTS LIST

Ref. No.	Description	Part Number	Model#	
			20 1904 05	25 2526 05
1	Fuel metering pump, 12 V	22 4517 08 00 00	•	•
2	Bracket, fuel metering pump	22 1000 50 04 00	•	•
3	Lead harness, fuel metering pump, L = 6 m	25 2526 80 11 00	•	•
4	Bracket	20 1348 03 00 02	•	•
5	∅ 1.5 mm Fuel line	890 31 118	•	•
6	Hose, 3.5 × 3	360 75 400	•	•
7	Hose clip, ∅ 9 mm	10 2068 00 90 98	•	•
8	∅ 2 mm Fuel line (blue)	890 31 054	•	•
10	Hose clip, ∅ 11 mm	10 2068 01 10 98	•	•
11	Tank connection, di = ∅ 4 mm	22 1000 20 16 00	•	•
12	Cable harness, heater	25 2526 80 10 00	•	•
13	Cable harness, fan	22 1000 33 04 00	•	•
14	Relay, 12 V	203 00 095	•	•
15	Fuse insert, 5 A	204 00 079	•	•
	Fuse insert, 25 A	204 00 089	•	•
	Fuse insert, 20 A	204 00 004	•	•

NOTES:

Espar Products, Inc.
(800) 387-4800
(905) 670-0960
(905) 670-0728 Fax
inquiries@espar.com
www.espar.com

