

# HYDRONIC

Technical description, installation,  
operation and maintenance instructions.



## HEATER MODEL 12V

*HYDRONIC* D4 SC 25 2096 05  
25 2257 05

*HYDRONIC* B4 SC 20 1824 05

*HYDRONIC* D5 SC 25 1920 05  
25 2098 05  
**25 2219 05**

(Similar to 2219) 25 2509 05  
**FMP OUT 25 2325 05**

*HYDRONIC* D5 S 25 2031 05  
**25 2217 05**

*HYDRONIC* B5 SC **20 1820 05**

*HYDRONIC* B5 S 20 1793 05  
**20 1819 05**

## HEATER MODEL 24V

*HYDRONIC* D5 SC **25 2147 05**

*HYDRONIC* D5 S 25 2146 05  
**25 2218 05**

**Water heater for diesel and petrol  
operating independently of the engine.**






**Eberspächer**  
A world of comfort

# 1 Introduction

## HEATER LOCATION

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## PICTURE SYMBOLS AND TEXT STRUCTURES

-  **DANGER:** Indicates that serious or fatal injury may result if specific guidelines are not followed.
-  **CAUTION:** Indicates that personal injury or damage to equipment may occur unless specific guidelines are followed.
-  **WARNING:** Indicates very important heater information that may cause personal injury, heater failures and maintenance costs

**PLEASE NOTE!** : Indicates general heater related notes, clarifications and recommendations, which can be very useful for technician, installer, or owner; and should not be disregarded. (•) A dot indicates a list, which is started with heading; (-) If indented dash follows a “dot”, this list is a sub section of the black dot; (\*) An asterisk symbol describes a further note on it’s associated title, statement or data.

## FOREWORD

- This document is applicable to the heaters listed on the title page, to the exclusion of all liability claims, and aims to support registered dealers, service technicians and end users in North America.. This does not replace documentation produced by J. Eberspächer.
- The installation instructions and standards described in this document are NOT APPLICABLE TO MARINE INSTALLATIONS. Please consult a certified Eberspaecher North America Marine dealer for marine installation.
- There may be some design changes in any OEM installed Eberspaecher heater; therefore it is recommended to service the heater only at OEM approved dealer.
- This publication was correct at the time of going to print. However, Eberspaecher Inc. has a policy of continuous improvement and reserves the right to amend any specifications without prior notice.
- Eberspaecher North America takes regular steps to ensure that any content, illustrations and technical data in its manuals are correct; however errors do occur, and Eberspaecher North America reserves right to correct any such errors, and disclaims liability resulting therefrom.
- Eberspaecher North America is not liable for any negligence and incompetence from dealers, installers and owners thereby causing heater or any related system failures and do reserves rights to nullify the warranty under such conditions.



# 1 Introduction

## CONCEPT OF THIS MANUAL

This manual aims to support the dealer/user during the installation, operation and repair of Hydronic 4/5 heaters as well as to provide the part list of the heater and accessories.

For quick and easy access, the hydronic 4/5 manual is divided into 8 chapters wherein each chapter provides information on specific topic as listed below:

### 1 INTRODUCTION

Here you will find important information related to warnings, caution and safety while working on the heater systems.

### 2 PRODUCT INFORMATION

Here you will find brief information about the heater, its technical data and dimensions.

### 3 INSTALLATION PROCEDURES

Here you will find important information and instructions referring to installation of the heater system.

### 4 OPERATION AND FUNCTION

Here you will find information about the operation and function of the heater.

### 5 CIRCUIT DIAGRAMS

This section contains wiring diagrams for the heaters and their harnesses.

### 6 MAINTENANCE / TROUBLESHOOTING / REPAIRS

This section contains information on possible faults and malfunctions, troubleshooting, maintenance and the service hotline.

### 7 HEATER COMPONENTS

Here you will find the service parts diagrams, parts lists and related descriptions.

### 8 SERVICE

This section contains information on Certification, Types and Disposal.

## HEATER WARNINGS

### 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 a heater.

### DANGER! - EXPLOSION HAZARD

- Heater must be turned off while performing welding or filling up the gas tank.
- Do not install heater in enclosed areas where combustible fluid, dust from grain, coal or wood may be present.
- Do not install heaters in engine compartments of marine vessels.

### DANGER! - FIRE HAZARD

- Install heater so it will maintain a minimum distance of 2" from any flammable or heat sensitive material.
- Install the exhaust system so it will maintain a minimum distance of 2" from any flammable or heat sensitive material.
- Ensure that the fuel system is intact and there are no leaks.
- Failure to follow these instructions could cause fire resulting in serious or fatal injury.
- Installation of the fuel lines under the exit locations of buses, RVs and marine vehicles is not recommended.

### DANGER! - ASPHYXIATION HAZARD

- Route the heater exhaust so that exhaust fumes can not enter any passenger compartments.
- Ensure an air tight seal is maintained between the heater and mounting surface and at any exhaust connection points.
- Ensure that heating air supply is taken from an area where poisonous gases will not be present.
- If running exhaust components through an enclosed compartment, ensure that it is vented to the outside.
- Failure to follow these instructions could cause oxygen depletion resulting in serious or fatal injury.

### DANGER! - ELECTRICAL HAZARD

- Improper procedure for connections to the battery and other electrical equipment leads to severe electrical shock and burns; use extra care while handling the electrical system.
- Ensure that any part of the body or heating system is not wet, while working on the electrical equipment to prevent unwanted events i.e. short circuit, electrical shock and fire hazard
- When heater is grounded to the chassis, the negative terminal of the battery must always be connected to the chassis to prevent overload on heater negative wire (brown).

- Disconnect the heater connections to the battery while performing any electrical work or welding on the vehicle.
- Insert fuse on the main harness of the heater only after the whole installation is completed.
- For specialty vehicles requiring additional safety feature, use master switch on main wire to prevent heater from running under emergency. (Never use master switch to control the heater which could cause catastrophic failure)
- Failure to follow these instructions could cause heater failures, electrical shocks and severe burns.

### CAUTION! SAFETY HAZARD ON COOLANT HEATERS USED WITH IMPROPER ANTIFREEZE MIXTURES

- The use of Eberspaecher coolant heaters requires that the coolant in the system to be heated contain 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. Once this occurs, pressure will build up rapidly in the heater and the coolant hose will either burst or blow off at the connection point to the heater.
- 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's or coolant manufacturer's recommendations for your specific requirements.

### WARNING! OPERATION WITH BIO-DIESEL

*HYDRONIC D4 / D5* is not certified for use with bio-diesel. Usage of more than 10% admixture of bio diesel will increase heater carboning and reduces servicing period.

### WARNING! - HEATING AT HIGH ALTITUDES

- Up to 1500 meters (4920') - unrestricted heating operation is possible. Above 1500 meters (4920') up to 4000 meters (13120') - 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.
- The following high altitude kits are available:
  - P/N: 20 2900 70 00 07 - 12V or 24V (Contains high altitude compensator, no extra fuel pump needed - only for 12/24V Hydronics 4/5 with "non H- kit" type ECU.
  - P/N 22 1000 33 22 00 - High Altitude Sensor for 12V Hydronics 4/5 heaters with "H-kit" type ECU.
  - Only one kit from the listed above is needed.
- Direct questions to Eberspaecher North America (Espar Products, Inc.):  
Canada & U.S.A. 1-800-387-4800

# 1 Introduction

## GENERAL SAFETY INSTRUCTIONS

### SAFETY

In addition to the important warnings and notes, for the safe handling of the heating systems during its installations and repair require proper use of tools, protective equipments and follow the procedure as specified in the heater manuals. List of some mandatory tools and protective equipments are given below:

### REQUIRED TOOLS AND PROTECTIVE EQUIPMENT

Mechanical tools:	Electrical tools:	Other tools:	Protective Equipment:
Screw driver set, plier sets, standard/metric wrenches and sockets, torque drive set, standard drill, bit set and hole saws, vice grips, clamps and clips, utility knife, hose and fuel line cutters, teflon tape, brass glow plug brush, small hammer and light duty, filler gauge, paper clips, pencils and markers, measurement cylinder (10 ml) measurement tools, other tools as required.	Multimeter, thermometer, tachometer, battery power source (DC), wire cutter, wire stripper and crimper, terminal remover tool (AMP), electrical grease and tap, extra wires, Alligator clips test lead and temporary jumper cable (small).	Coolant (as per vehicle manufactures), diesel, kerosene, lock ties and dry rug.	Safety shoes, safety glasses, hand gloves, ear protection (if required). Any additional protection requirement from company or dealer.

### WARNING! SAFETY

- Coolant systems can be hot, use appropriate measures before carry out their installations or repair.
- During the glow pin test, the glow pin can become red hot which could create severe burn to the operator.
- Fuel is explosive material and its system must be handled according to the manufacturer guidelines and heater manual.
- Never keep the heating systems ON while performing the welding in the shop or fueling at the gas station.
- Apply appropriate measures to protect the heater from corrosion, contamination and overheat.
- Regardless of the season, run the heater at least once in a month for period of minimum 15 mins to burn away any residue in combustion chamber, minimize contamination in the water pump, and prevent corrosion in the water jacket or decay of O-rings.
- Use of kerosene must be limited to 30 mins and only after the repair, and can not replace the required repair for excessive carboning issue. At high altitudes and under cold conditions, pre-mixing diesel with kerosene to some limit is allowed; please see fuel section of this manual.
- Frequent overheat conditions could affect heater components i.e. O rings, sensors, water pump, ECU and blower fan; therefore it must be promptly rectified to reduce further maintenance costs.

- Under the new warranty program “EW Plus”, use of EDiTH diagnosis is recommended to reduce the application process time and other possible costs.
- General accident prevention regulations and the cosponsoring work shop and operating safety instructions are to be observed.

### PLEASE NOTE!

- Improper installation and repair could lead to further faults or failures and down time for which Eberspaecher North America is not liable and warranty could effectively become null and void.
- For any difficult repair or customized installation including on marine and specialty vehicles, contact nearby Eberspaecher certified dealer.
- The heater manual provides general guidelines for safe installation, operation and repair under normal conditions; if anything out of the ordinary; use of due diligence is expected or contact near by certified dealer.
- The periodic heater maintenance is the responsibility of the owner and is not covered under Eberspaecher North America (ESPAR) warranty.
- OEM type heating installations are different from after market, therefore contact vehicle manufacturer for the engineering and customer support.

## 2 Product Information



### EBERSPÄECHER'S HYDRONIC D4/D5 HEATER

With growing demand for energy efficient systems and green technologies, the automotive market has been increasingly inclined towards new innovations in vehicular systems that could reduce the overall fuel consumption and cost. For such reasons, the demand for top edge no idle technologies has increased. The hydronic 4/5 is quality engineered by J.Eberpsacher as a low cost, highly efficient and durable means to provide heat to the vehicle engine, cab or heat exchanger. It can be operated as an independent heater as a no idle system or an integrated part of climate control systems. Depending on the heat output, there are two types of Hydronic 4/5 heater as described here:

- Hydronic 4 - 2.4 kW to 4.3 kW/hr (8,200 to 14,781 BTU/hr).
- Hydronic 5 - 2.4 kW to 5 kW/hr (8,200 to 17,100 BTU/hr).

The Hydronic 4/5 is ideal for preheating the engines of trucks, cars, off-road equipment, small trucks and boats. It features automatic heat regulation while being fuel and power efficient. Since the heater runs on fuel and 12 or 24 volt power, it is able to perform this completely independent of the vehicle engine. The unit regulates the coolant temperature between a low of 65°C (149°F) and a high of 75°C (167°F) \* by automatically cycling the heater between heat levels.

The Hydronic 4/5 can be operated from the vehicle cab by an on/off switch, a pre-select timer or a combination of both.

A flame sensor, temperature regulating sensor and overheat sensor are among the safety features which makes the Hydronic D4/D5 a safe and dependable heating system.

\*LOW and HIGH temperature values varies depending on programming of ECU of the heater.

### NON PERMITTED APPLICATIONS:

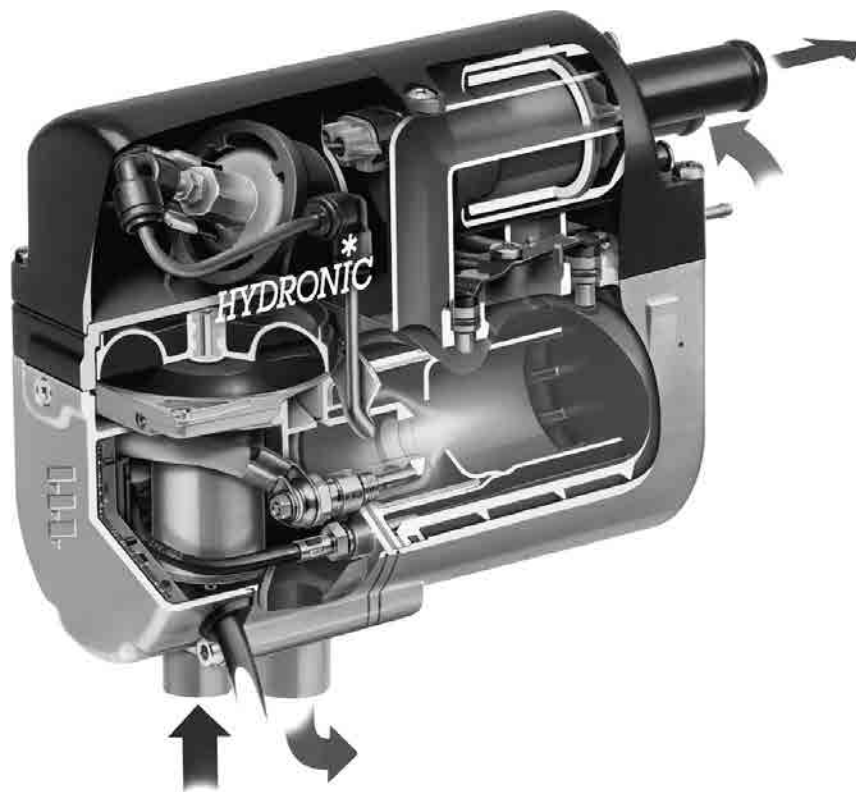
- Long term Continuous operation is not permitted
- Not compatible for pre-heating and heating of:
  - Residential rooms, and garages
  - Weekend homes, and hunting huts
- House boats etc.
- Aircrafts (high altitude) etc.

### HYDRONIC 4/5 HEATER MARKING

- Technical designation:

**B D 4 / 5 S SC**

- B:** Benzine (gasoline)
- D:** Diesel
- 4:** 4KW Heat output
- 5:** 5KW Heat output
- S:** Small heater
- SC:** Small heater (compact version)



## 2 Product Information

### TECHNICAL DATA

#### TECHNICAL DATA: HYDRONIC 4/5

SPECIFICATIONS	HYDRONIC 4		HYDRONIC 5	
Heater voltage rating	12 volt		12 volt	24 volt
Heat output ( $\pm 10\%$ )	D4	4.3 kW (14,781 BTU/hr) - High 2.4 kW (8,200 BTU/hr) - Low	D5	5 kW (17,000 BTU/hr) - High 2.4 kW (8,200 BTU/hr) - Low
	B4	4.3 kW (14,781 BTU/hr) high 1.5 kW (5118 BTU/hr) Low	B5	5.0kW (17,000 BTU/hr)- High 1.5KW (5118 BTU/hr) Low
Operating voltage range	10.2 V		10.2 V	20.4 V
Minimum voltage	16 V		16 V	32.0 V
Maximum voltage				
Current draw ( $\pm 10\%$ )	4.0 amps High 1.91 amps Low		4.16 amps High 1.91 amps Low	2.08 amps High 0.95 amps Low
Interference Suppression Class	5 (DIN 57879/VDE 0879 Part 1)			
Fuel consumption ( $\pm 10\%$ )	D4	0.53 l/hr (0.13 US gal/hr) High 0.27 l/hr (0.07 US gal/hr) Low	D5	0.62 l/hr (0.16 US gal/hr) High 0.27 l/hr (0.08 US gal/hr) Low
	B4	0.6 l/hr (0.15 US gal/hr) High 0.2 l/hr (0.05 US gal/hr) Low	B5	0.69 l/hr (0.18 US gal/hr) High 0.2 l/hr (0.05 gal/hr) Low
Maximum operating pressure	2.5 bar (36 psi)		2.5 bar (36 psi)	
Flow rate of the water pump at 0.1 bar	850L/H (3.7 GPM)		850L/H (3.7 GPM)	
Minimum water flow rate for the heater	250L/H (1.1 GPM)		250L/H (1.1 GPM)	
Ambient operating temperature	-40°C to +80°C (-40°F to 176°F)		-40°C to +80°C (-40°F to 176°F)	
Weight	B4/D4 SC	2.7 kg. (5.94 lb)	B5/D5 SC	2.9kg. (6.4 lb)
	B4/D4 S	2.3 kg (5.07 lb)	B5/D5 S	2.3 Kg (5.07 lb)
Controls available	On/Off switch or 7-day timer (Multi-Function Timer, Easy start timer, Easy start call)		On/Off switch or 7-day timer, (Multi-Function Timer, Easy start timer, Easy start call)	
All technical data $\pm 10\%$				

**PLEASE NOTE!**

The heater is equipped with a high-voltage cutout as well as a low-voltage cutout.

**PLEASE NOTE!**

For specifications of gasoline heaters, please see original manual in heater packaging.

# 2 Product Information

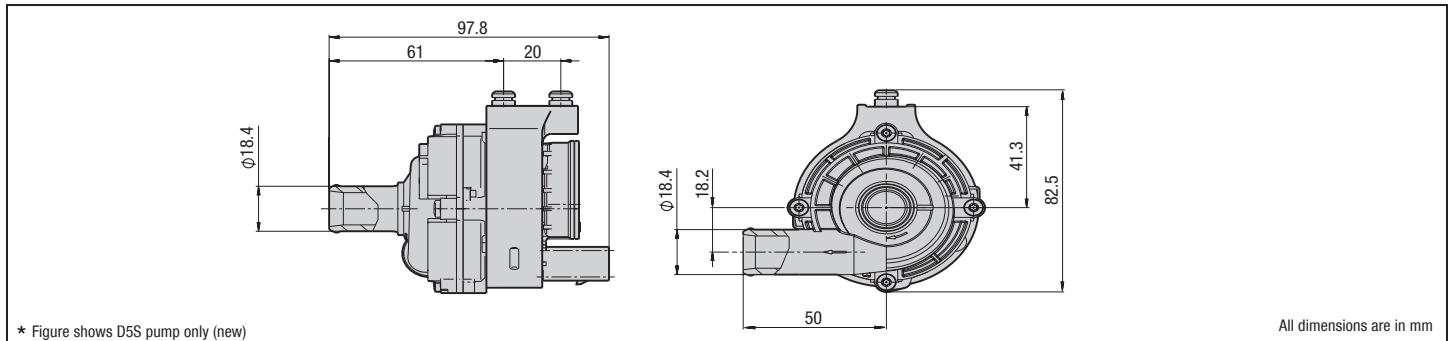


## TECHNICAL DATA

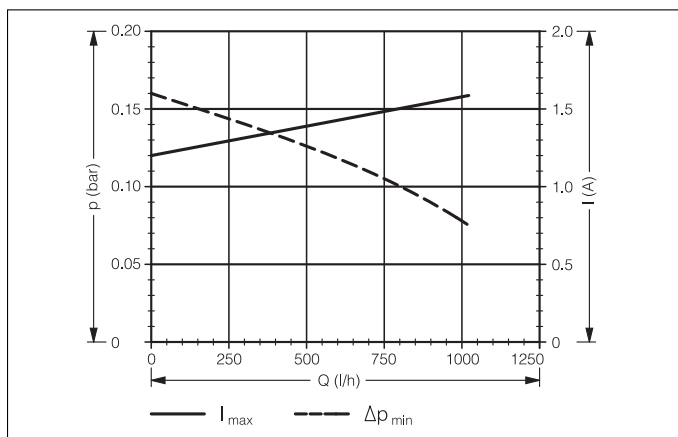
### TECHNICAL DATA - WATER PUMP

Rated voltage 12 volt 24 volt	12V	24V
Operating voltage	9 volt to 15 volt	18 volt to 32 volt
Electrical power consumption	16 watt	12 watt
Pump Type	straight fin, radial type Centrifugal pump (BLDC) *designed to easily pass limited amount of contaminants	
Dry running	- No	
Self priming	- No	
Pumping capacity at BEP	850 l/h (3.7 GPM)	
Duty	Continuous	
Pumping pressure at BEP	0.1 bar	
Operating temperature	-40 °C to +135 °C	
Burst pressure	250 kPa (36 PSI) minimum	
Weight	0.28 Kg / 0.617 Lb	
All technical data ±10 %		

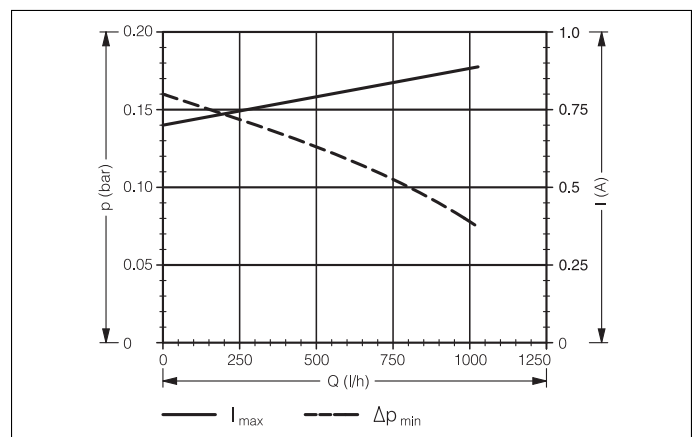
### \* MAIN DIMENSIONS WATER PUMP



PUMP CURVE - HYDRONIC D5/ D4 WATER PUMP - 12 V  
 Order no. 25 2217 27 00 00 (D5S - External)  
 25 2219 25 00 00 (D/B 4/5 SC), 25 1920 25 00 00 (D 4/5 SC)



PUMP CURVE - HYDRONIC D5 WATER PUMP - 24 V  
 Order no. 25 2218 25 00 00 (D5SC)  
 25 2118 25 00 00 (D5S)



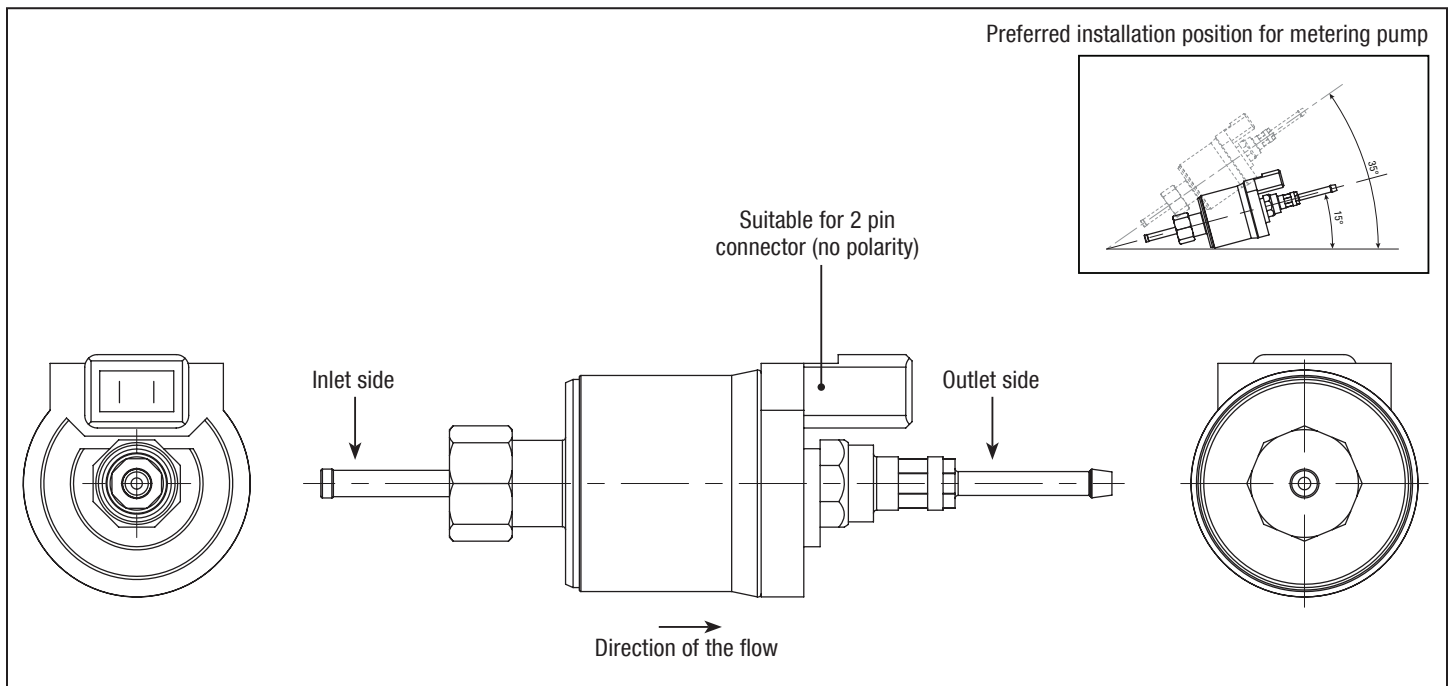
## 2 Product Information

### TECHNICAL DATA

#### TECHNICAL DATA - FUEL METERING PUMP - (B/D5WS/SC only)

Heater Voltage	12V	24V
Pump Operating Voltage (≡)	12V	24V
Operating Current (High mode) (≡)	1.4A (12V) and 0.67A (24V) at 20°C	
Pump Type	Positive Displacement type - piston pump (axial flow)	
Pump Capacity	0.73 l/h +/- 10% @ 7 Hz (on testing stand)*	
Fuel Delivered	Gasoline DIN 51600 and DIN 228 / Diesel DIN EN 590	
Solenoid Resistance	10 Ohms(12V) and 36 Ohms(24V) at 20°C	
Installation Position	15° to 35° (Recommended)	
Weight	0.20 Kg (avg.)	
Operating Temperature	-40° C to +80° C (diesel fuel) / -40° C to +20°C (Gasoline fuel)	

\* For FMP frequency during operation, see technical data for the heater  
 The technical data can vary depending on the installation and operating condition as well as types of the heater.





## 2 Product Information



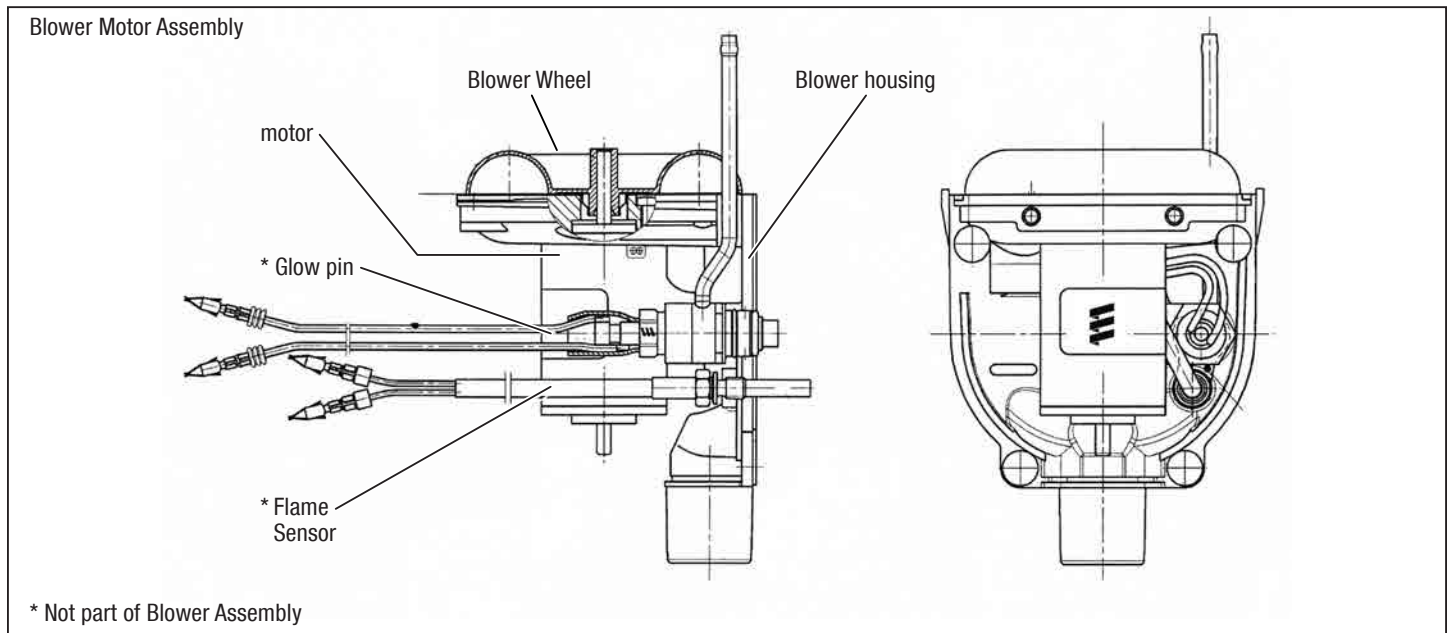
### TECHNICAL DATA

#### TECHNICAL DATA - BLOWER MOTOR - 12/24V D/B 4/5 W S/SC ONLY

Heater voltage (DC)	12 V	24 V
Operating Voltage (DC) - High Mode	8.2 V	16.4 V
Normal Operating Current (at Operating voltage in High Mode)	2.6 A	1.4 A
Maximum operating Current	3.2 A	1.6 A
Blower Type	Side Channel (Centrifugal Vortex **)	
Motor type	PMDC (brushed)	
Housing material	Steel, corrosion protected (with die cast zinc type end shields)	
Bearing	brush end self - aligning bearing, drive end - ball bearing	
Clearance between fan and bracket	0.32 mm +/- 0.04	
Axial Play	<0.018 mm	
Direction of rotation	Bi-directional (Clockwise for the heater)	
Operating Speed (at Operating Voltage in High Mode)	11500 RPM +/- 1000	
Normal Operating Temperature Range	-15 °C to 50 °C	
Maximum Operating Temperature Range	-40 °C to 70 °C	
Operating Torque	2.5 N cm	
Gross Motor weight	0.362 Kg	

\*\* At high speed, the blower wheel with its semi bucket type fins generates a vortex of incoming air while passing through a semi circular annular channel and produces a laminar air flow towards the flame chamber thereby reduces the overall combustion noise and exhaust pulsation.

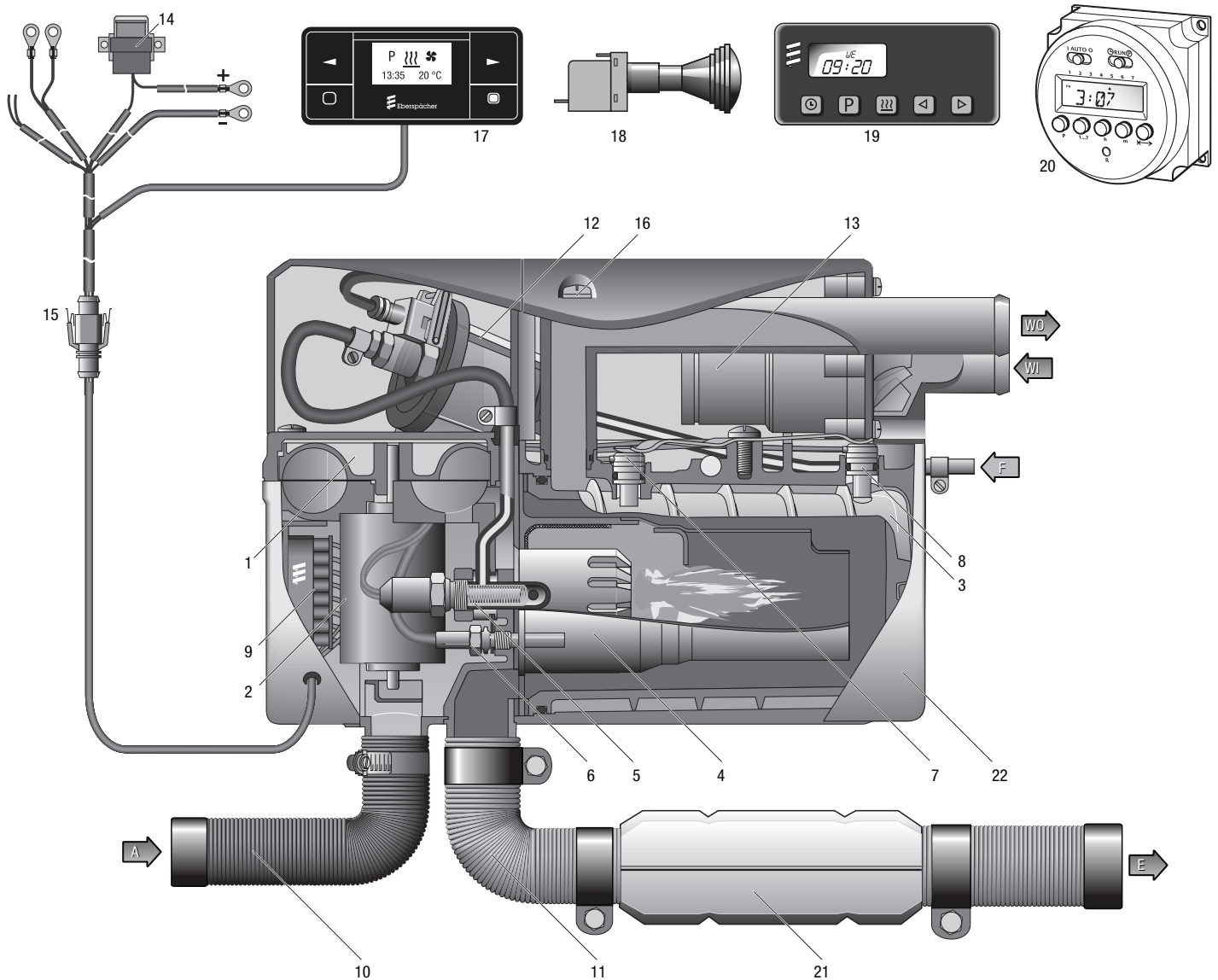
The technical data can vary depending on the installation and operating condition as well as type of the heater.



## 2 Product Information

HEATER COMPONENTS - *HYDRONIC* 4 & 5 SC - 12 & 24 VOLT - DIESEL VERSIONS

25 2219 05  
25 2147 05  
25 2257 05



1 Combustion air blower wheel  
2 Electric motor  
3 Heat exchanger  
4 Combustion / Flame chamber  
5 Glow pin  
6 Flame sensor  
7 Temperature sensor  
8 Overheat temperature sensor

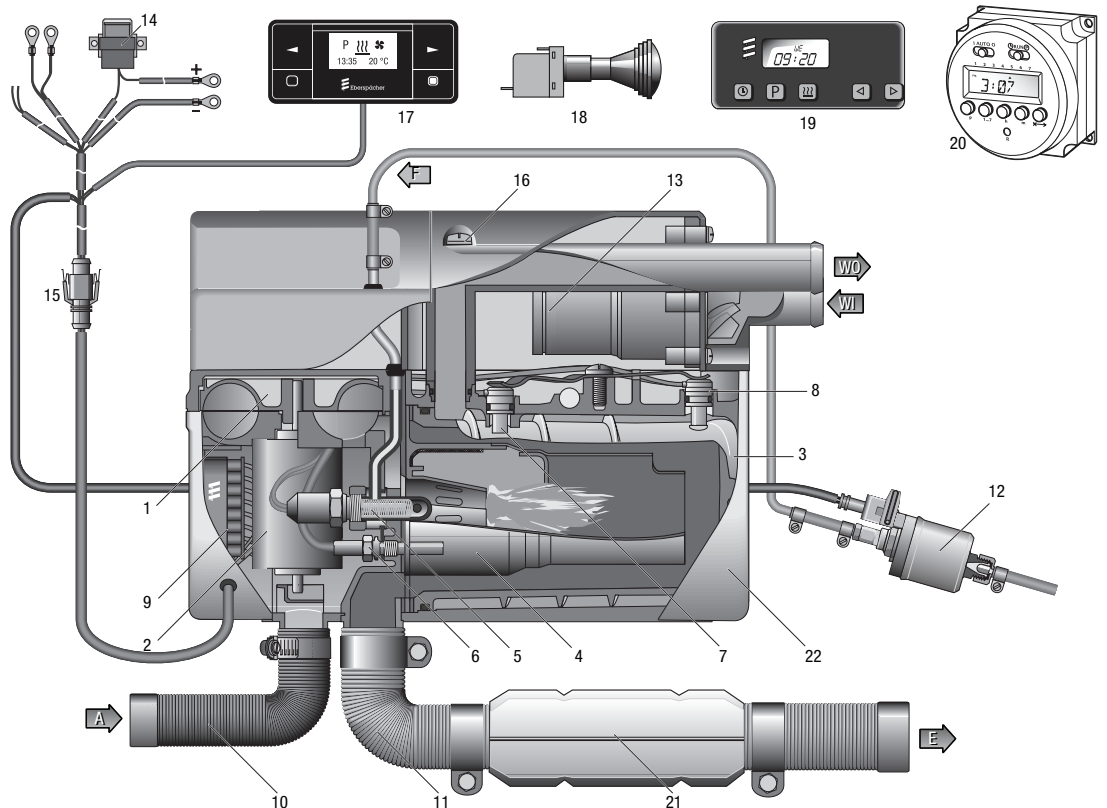
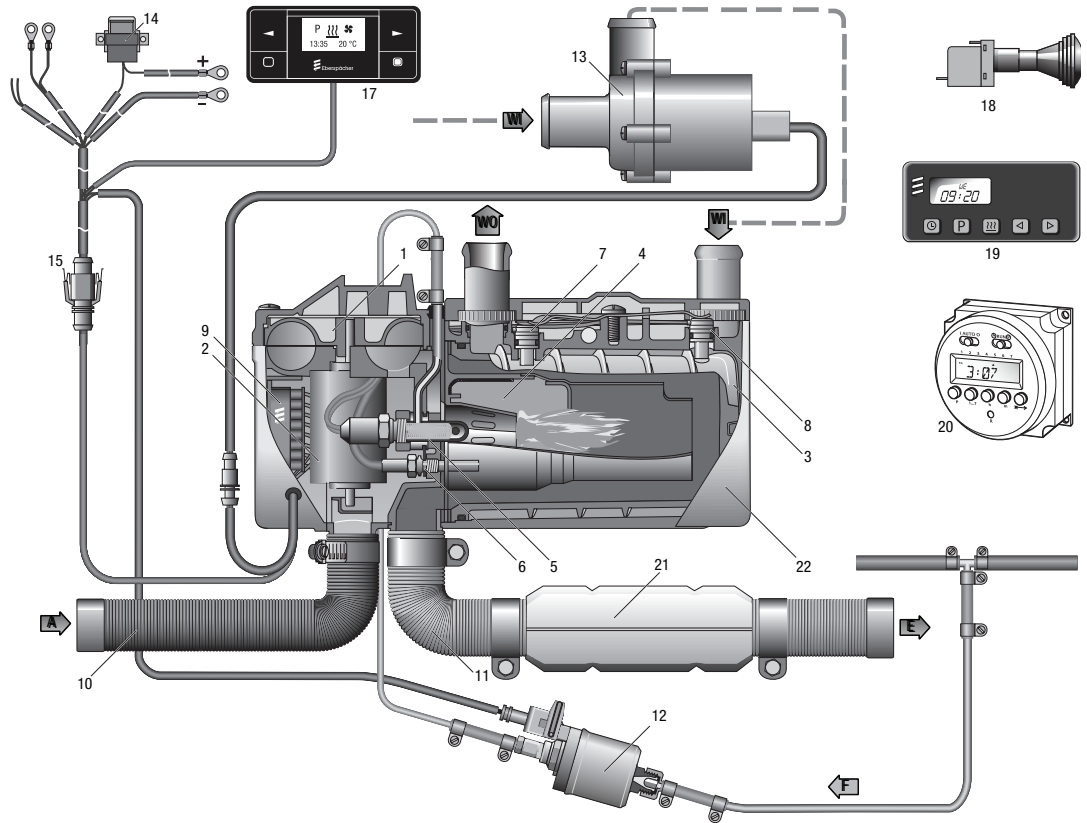
9 Control unit  
10 Combustion air tube  
11 Exhaust tube  
12 Fuel-metering pump  
13 Coolant pump  
14 Main fuse  
15 Interface/8-pin connector  
16 Bleed screw

17 Easy Start Timer  
18 Push/Pull switch  
19 7-day timer  
20 Programmable Timer  
21 Exhaust silencer  
22 Jacket

A = Combustion air  
E = Exhaust  
F = Fuel supply line  
WO = Water Outlet  
WI = Water Inlet

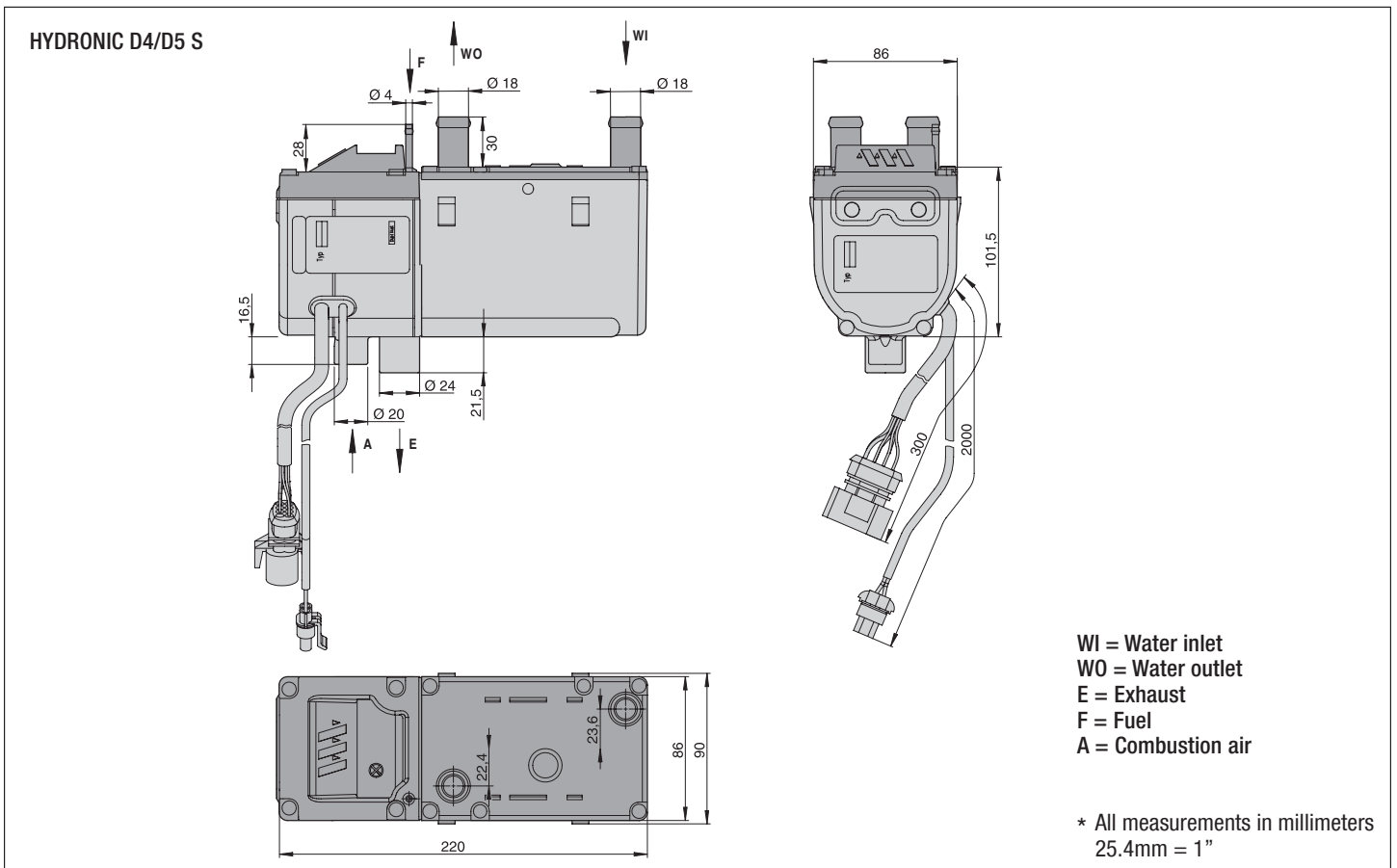
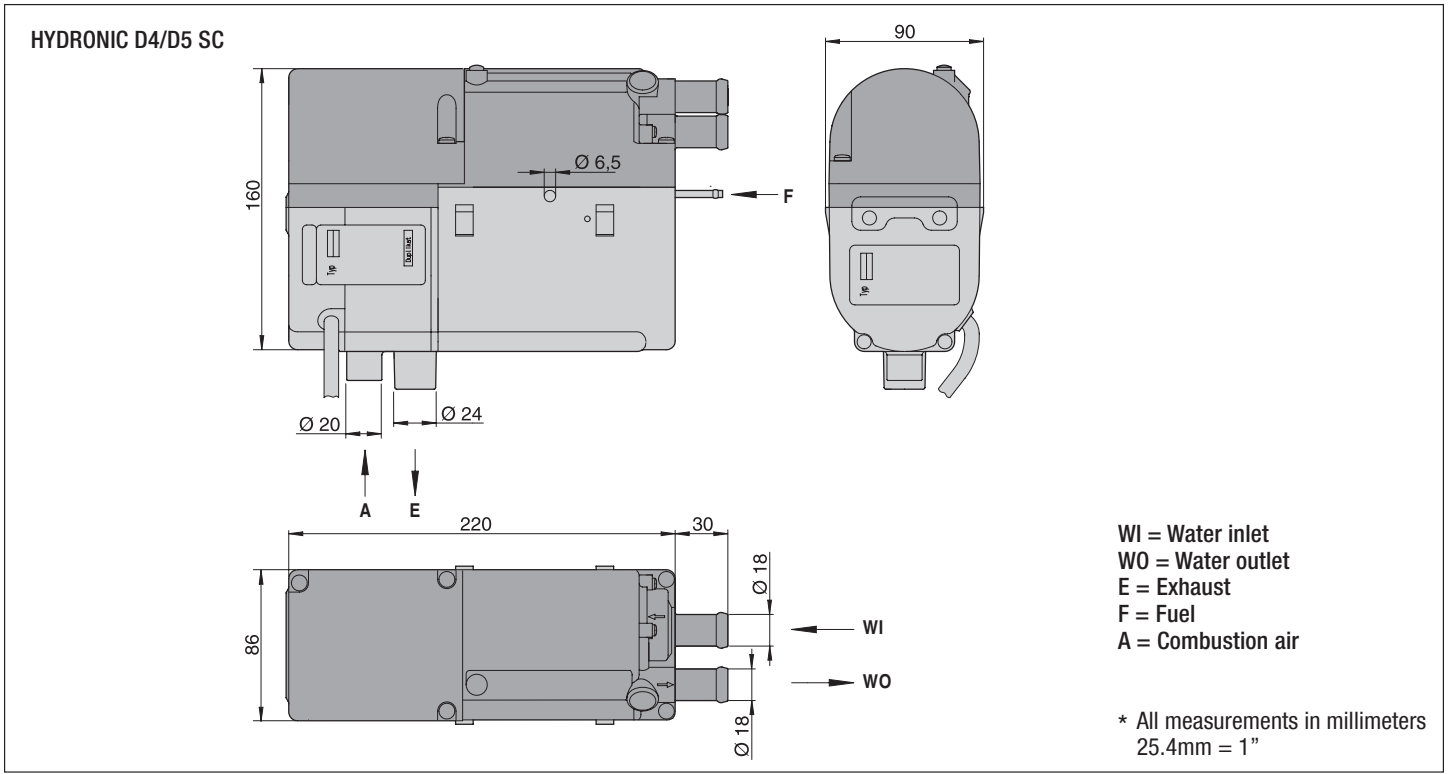
# 2 Product Information

HEATER COMPONENTS - *HYDRONIC 5 S* - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS



# 2 Product Information

## PRINCIPAL DIMENSIONS - HYDRONIC D4/D5 S & SC



# 3 Installation procedures



## HEATER LOCATION

The heater assembly should be securely placed in a protected area (eg: step box, engine or storage compartment). If the heater is located on the mounting rail, then guard the heater against excessive road spray to avoid internal corrosion.

Eberspaecher North America recommends you to use the heater enclosure to ensure proper protection from the extreme weather conditions. Boxed units can be mounted by utilizing one of the existing brackets.

While mounting the heater adhere to the following conditions:

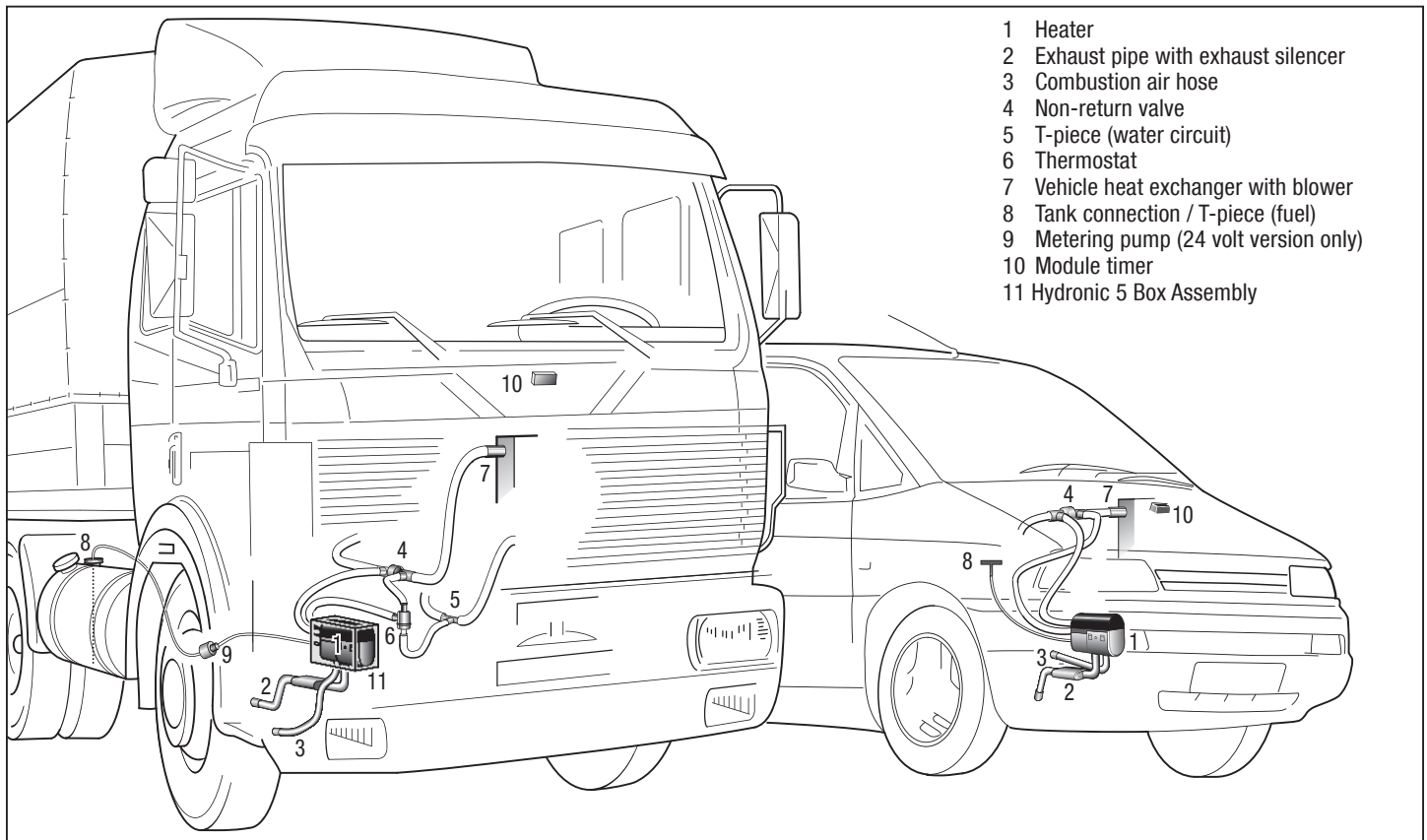
- Situate the heater below the normal coolant level of the engine.
- Guard against excessive road spray.
- Keep coolant hoses, fuel lines and electrical wiring as short as possible.

For proper installation of the heater system, the mounting location and angle of the heater, FMP and coolant pump should be according to the pictures provided on following pages.

**CAUTION:** Guard the heater against excessive road spray to avoid internal corrosion.

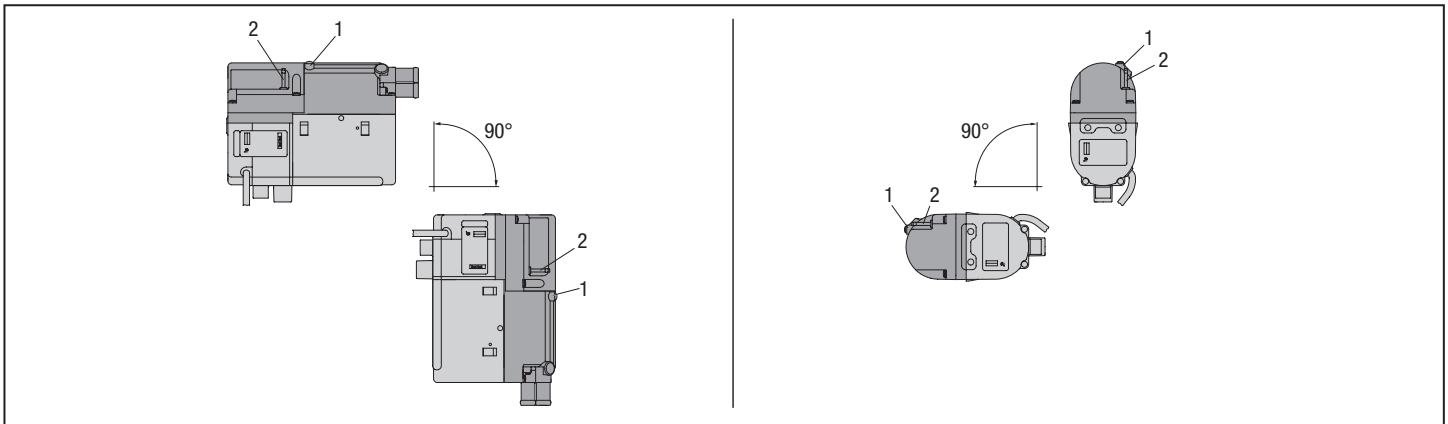
## WARNING TO THE INSTALLER

- It is mandatory to use minimum required tools and protective equipment for the safety of installer as well as heating system. Please see page #4.
- 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 engine 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.
- 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 and at the exit doors of the vehicle. Fuel lines must not be routed on the top of any electrical lines or hot parts.
- Wrong installation could cause physical injury, fire and asphyxiation hazard as well as system failure.
- Installation and repairs by unauthorized 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.



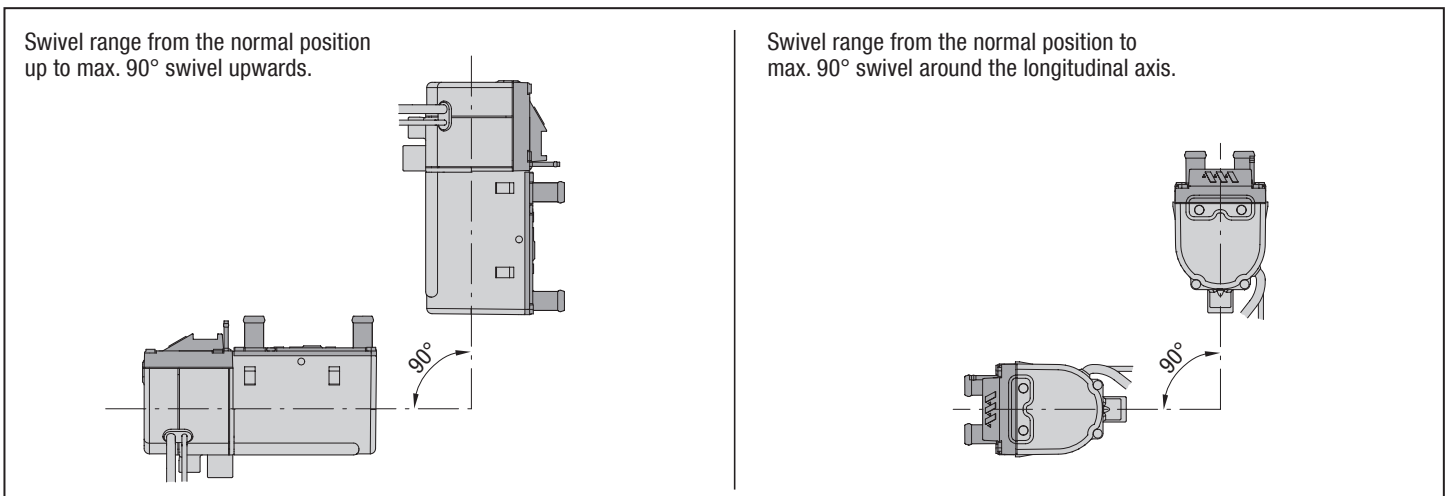
### 3 Installation procedures

#### NORMAL POSITION WITH PERMISSIBLE SWIVEL RANGES OF D5SC HEATER



- 1 Vent screw – must always be at the top
- 2 Fuel connection

#### NORMAL POSITION WITH PERMISSIBLE SWIVEL RANGE OF D5S HEATER

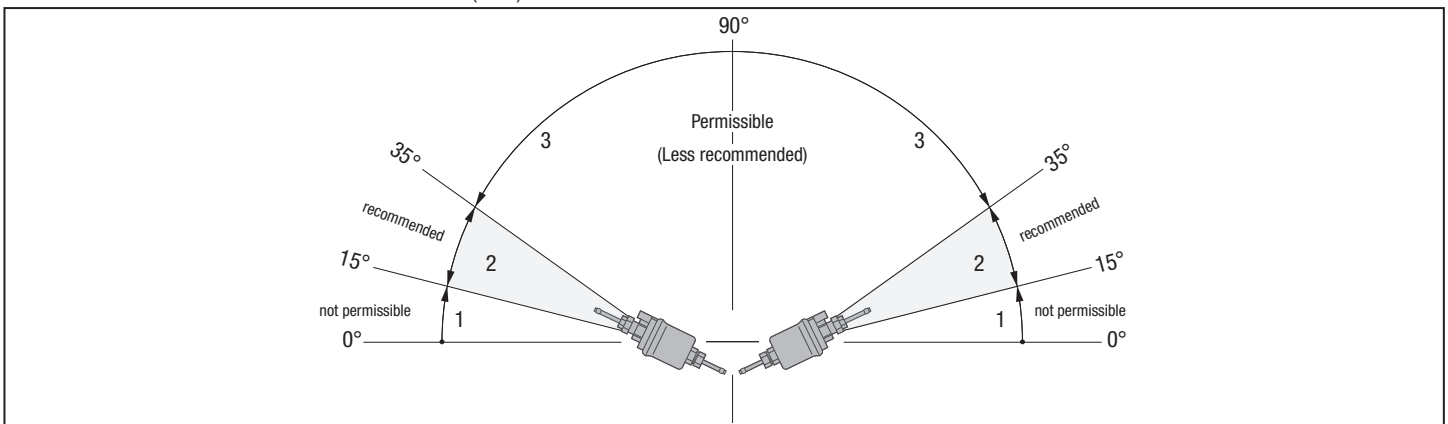


Swivel range from the normal position up to max. 90° swivel upwards.

Swivel range from the normal position to max. 90° swivel around the longitudinal axis.

**PLEASE NOTE!** Improper mounting angle of the heater and FMP could cause unexpected heater faults and component failures; Also, increases the chance of fuel leakage, heater stoppage, or frequent accumulation of carbon in the combustion chamber.

#### MOUNTING ANGLES OF THE FUEL METERING PUMP (FMP)



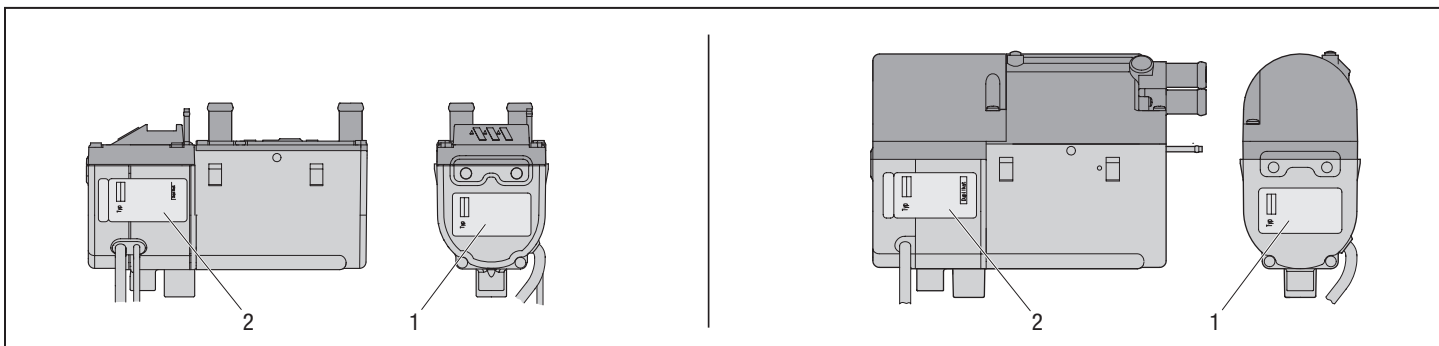


### 3 Installation procedures

#### NAMEPLATE

The nameplate is fastened at the side or to the front of the heater.  
It includes: name of the heater, part number and serial number.

The "H-kit" is written on the name plate that suggests the compatibility of the heater for digital communication with high altitude sensor, and latest controllers i.e. easy start timer, easy start call.



1 Original nameplate  
2 2nd nameplate (duplicate)

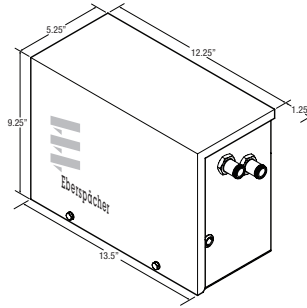
		<b>Eberspächer</b>		Model Name	
MADE IN GERMANY					
Heizgerät Typ Heater	HYDRONIC	03 07		Manufacturing week and year	
Ausführung Version	D5WSC			Technical Designation	
Ausführung-Nr. Reference	25 2325			Model Number	
Fabrik-Nr. N-Serial	73952ZS			Serial Number	
Brennstoff Fuel	Diesel			Fuel Type	
Elektrische Werte Rated voltage	50W 12V	22 5201 01 90 02		ECU Part Number	
Wärmestrom Heat flow	5,0 KW	(H-Kit)		Electrical Power Consumption	
Betriebsüberdruck Working pressure	max. 2,5 bar			(H-Kit)	
				Maximum Heat Output	
				Operating Pressure	
e 1					
00 0023					
e 1				Certication Markings	
03 1075					
Erste Inbetriebnahme	09 10 11				

# 3 Installation procedures

## HEATER MOUNTING HARDWARE

Mount the heater in the heater bracket and secure with hardware provided. If heater is not a boxed unit, mount bracket onto inside frame rail bracket. Boxed unit can also be secured to the inside frame bracket or mounted to the Cross Frame Mounting Tray. Apply special attention to the effects of corrosive environment, vibration, and vehicle motion as well as part movements while mounting the heater.

Hydronic 4/5 box

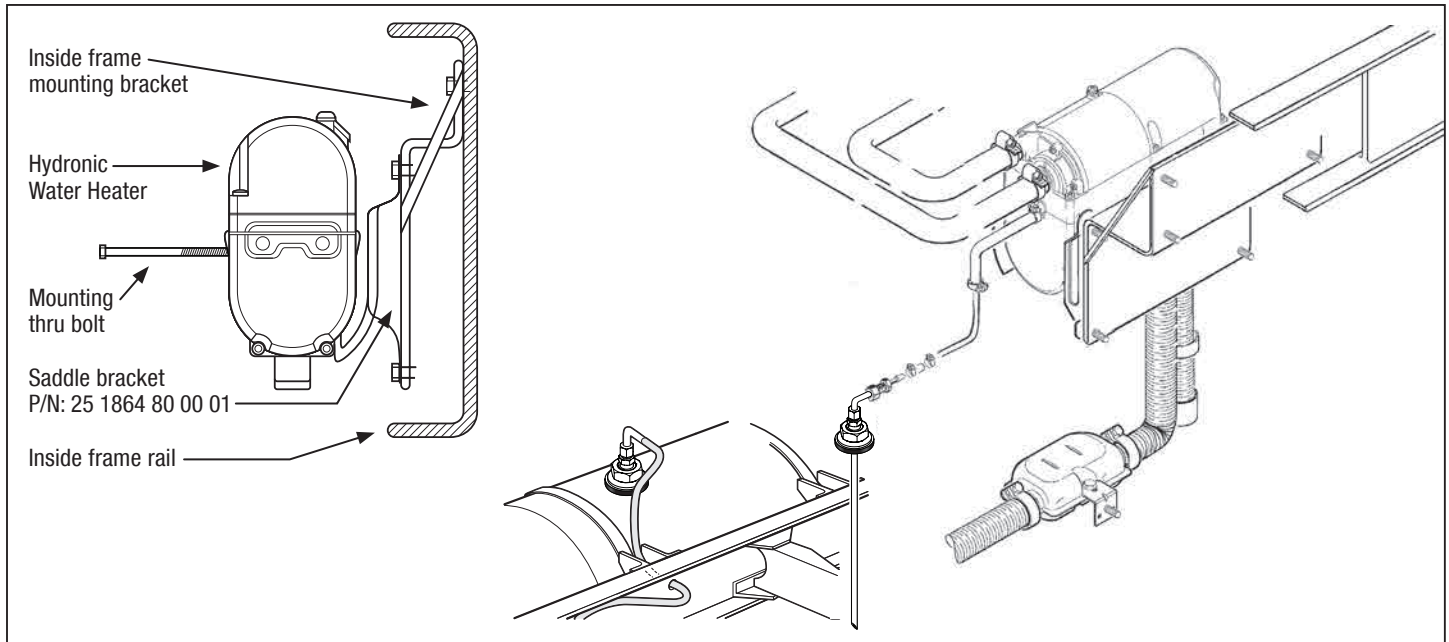
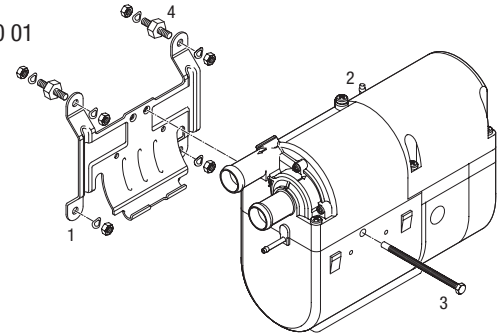


**PLEASE NOTE!**

For Box base, lid and other required components, please see product catalogue page 45.

Hydronic D5 SC boxed unit P/N 25 2822 17 05 45  
 Hydronic D5 SC boxed unit P/N 25 2822 19 05 41  
 (Please refer to product catalogue for more kits)

- 1 Heater bracket  
P/N: 25 2220 80 00 01
- 2 *HYDRONIC*
- 3 Fastening screw
- 4 Sock mounts



## FMP AND PICK UP PIPE MOUNTING HARDWARE

For "S" and gasoline version heaters which have external fuel metering pumps:

- Choose a protected mounting location close to the fuel pick-up pipe and heater.
- Using the bracket and rubber mount provided, install fuel pump as shown.

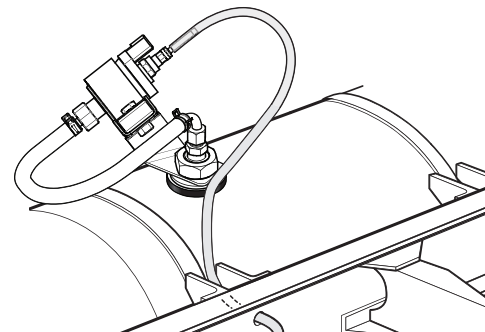
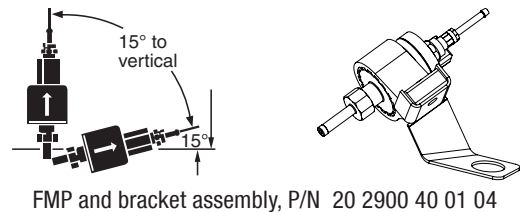
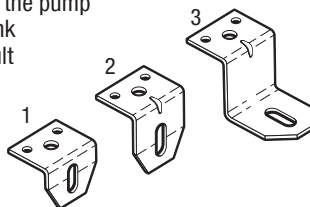
**PLEASE NOTE!**

Proper mounting angle of the fuel pump is necessary to allow any air or vapor in the fuel lines to pass through the pump rather than cause a blockage.

## FMP MOUNTING BRACKET

These FMP mounting brackets are used for the pump installation on the locations far from the tank i.e frame rail, vehicle bracket. Please consult the dealer for additional information.

- 1. P/N: 20 1348 03 00 02
- 2. P/N: 20 1348 03 00 04
- 3. P/N: 20 1533 88 00 07





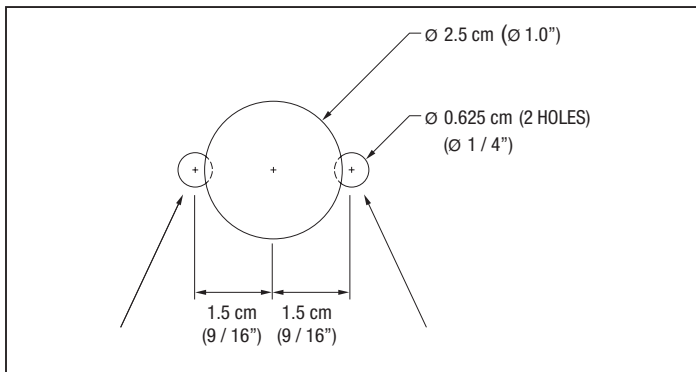
# 3 Installation procedures



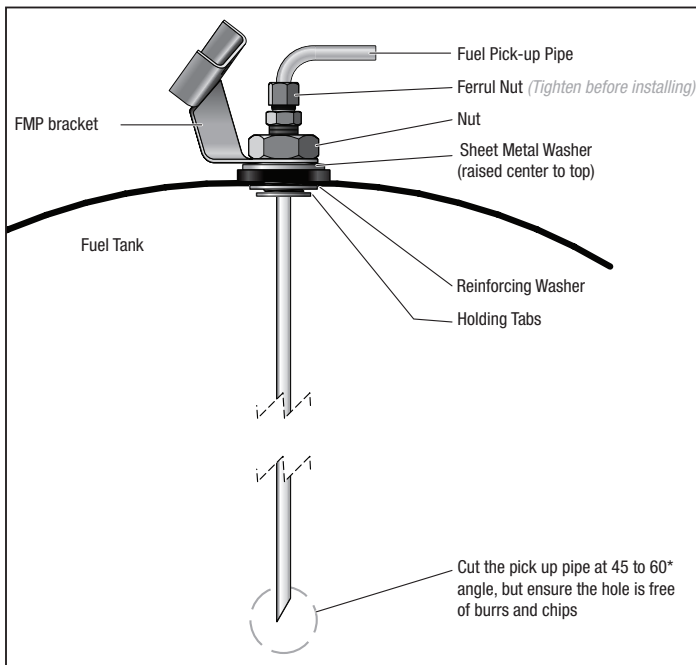
## FUEL PICK UP PIPE INSTALLATION

### CUSTOM PICK-UP PIPE WITH 1/4" NPT FITTING - 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.

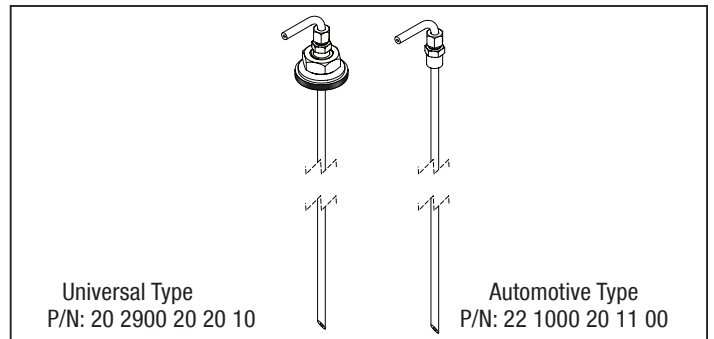
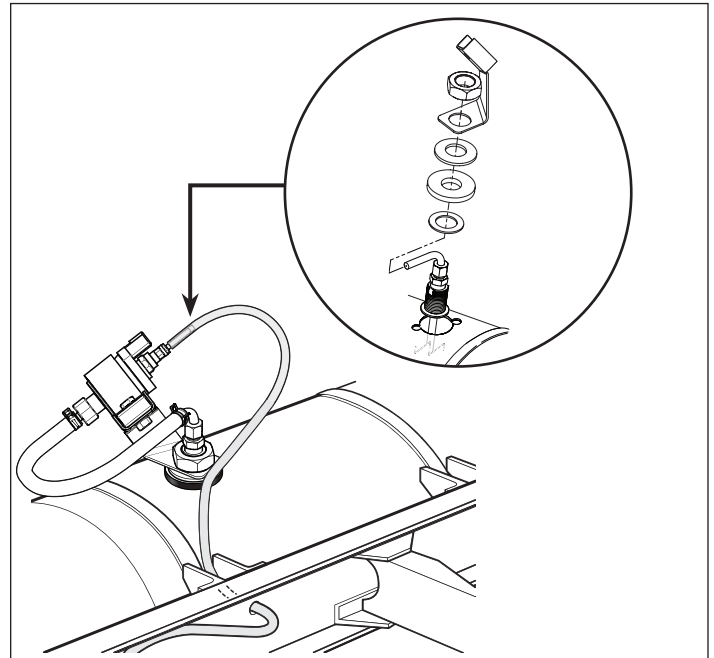


**PLEASE NOTE!** Drill the two (1/4") holes first.

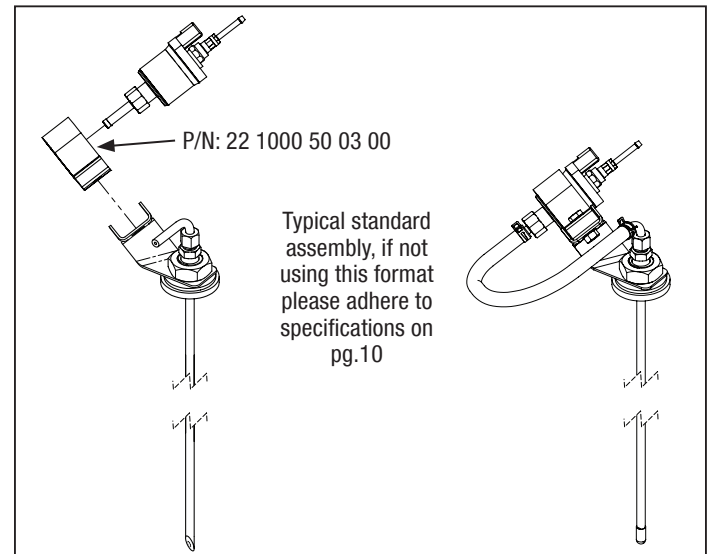


**PLEASE NOTE!**

- Allow 4" from Fuel Pick-up to tank bottom. Allow only 1" for flat bottom tanks.
- Always install the fuel pick up pipe on the top of the tank
- It is recommended to keep the heater's pick up pipe atleast 25 mm shorter than vehicle stand pipe to access clear fuel.



**PLEASE NOTE!** Some pick-up pipes can be installed by either drill or NPT.

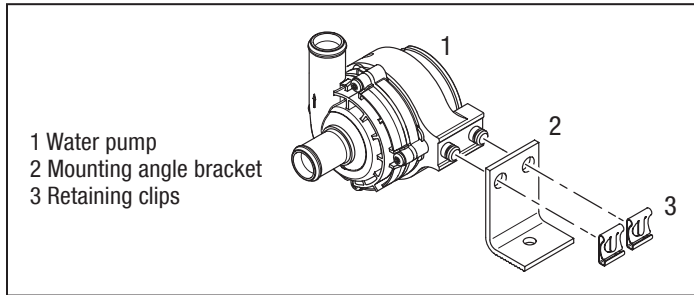


**PLEASE NOTE!** NPT fittings are available in various sizes (Refer to Eberspaecher's North America Product Catalogue).

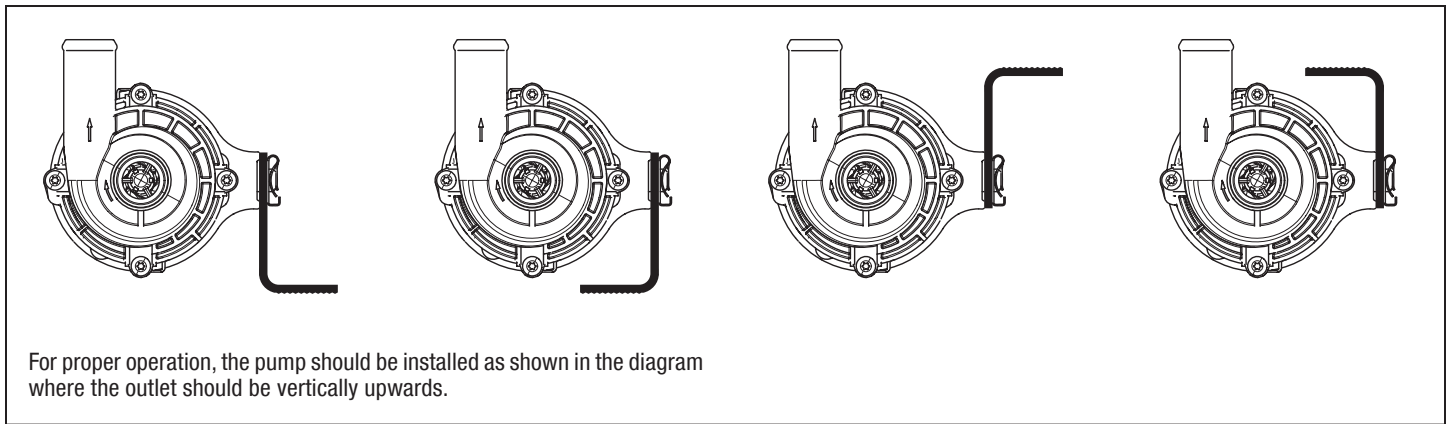
### 3 Installation procedures

#### INSTALLATION AND FIXING OF THE WATER PUMP

Use a hexagon screw size M6 x 12 and a hexagon nut size M6 to install the mounting angle bracket in a suitable position within the vehicle.  
Then fix the water pump to the mounting angle bracket using both retaining clips.



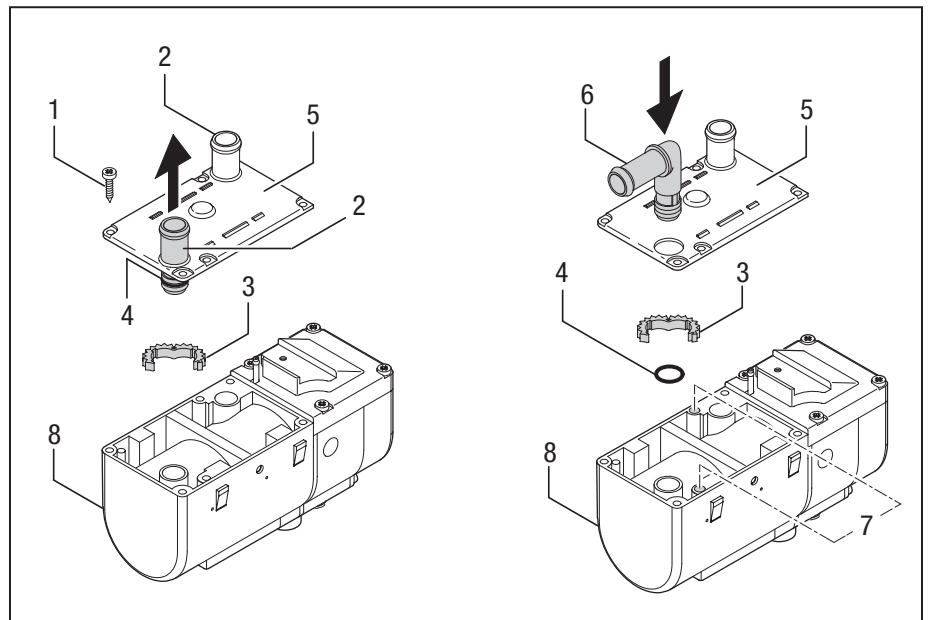
#### POSSIBLE INSTALLATION POSITIONS OF THE MOUNTING ANGLE BRACKET



#### MOUNTING THE ANGLED WATER CONNECTION

The D5S heater is supplied with a straight water connection.  
Depending on the installation conditions, it may be necessary to mount an angled water connection.

- 1 Fastening screws (tightening torque - 4Nm)
- 2 Straight connection
- 3 Indented ring
- 4 O-ring
- 5 Cover
- 6 Angled connection
- 7 Bore holes
- 8 Heater



# 3 Installation procedures



## ENGINE AND HEATER PLUMBING

The heater is incorporated in to the engine's existing coolant system using recommended steps provided in this section of the manual. Before installation, please review the notes and warnings, list of tools and PPEs, as well as installation procedures. Please note that the heater installations with no engine connections in coolant circuit require an additional use of the expansion tank.

### DANGER - RISK OF INJURIES AND BURNS

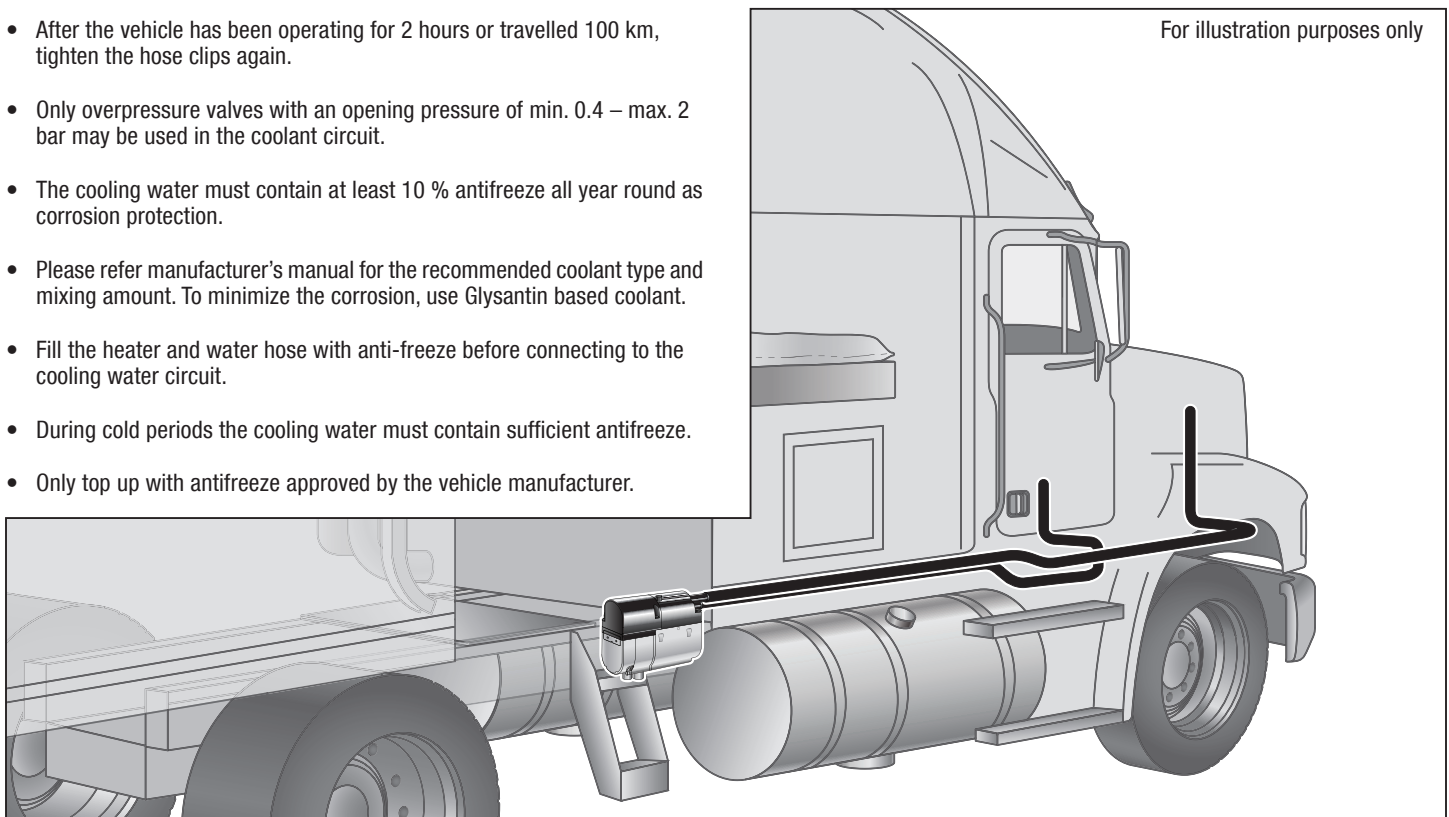
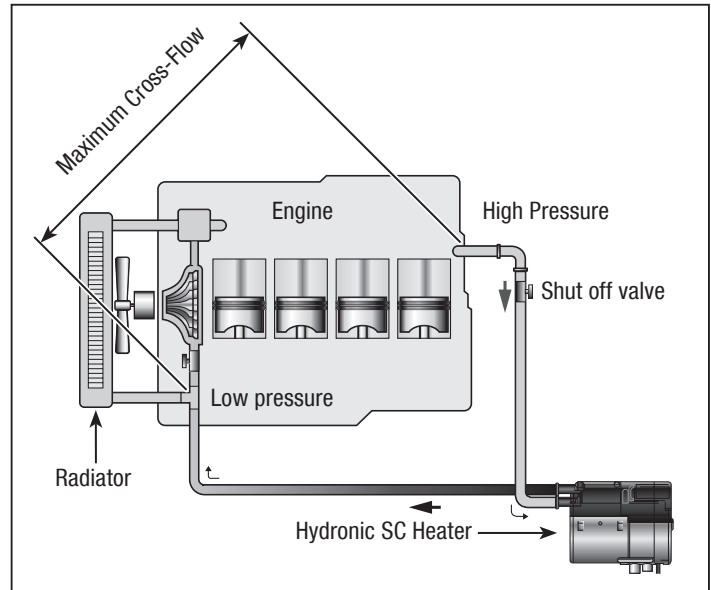
- It is possible for coolant and components in its circuit to get very hot; therefore use proper tools and protective equipment as provided on page 4, before carry out any installation of the heating systems.
- Parts conveying water must be routed and fastened in such a way that they pose no temperature risk to man, animals or material sensitive to temperature from radiation / direct contact.
- Before working on the coolant circuit, switch the engine off and wait until all components have cooled down completely, if necessary where safety gloves.

### PLEASE NOTE!

- Route the water hoses without any kinks, and in a rising position if possible.
- When routing the water pipes, observe a sufficient clearance to hot vehicle parts.
- Protect all water hoses / water pipes from chafing and from extreme temperatures.
- Secure all hose connections with hose clips (tightening torque =  $3+0.5 \text{ Nm}$ ).
- After the vehicle has been operating for 2 hours or travelled 100 km, tighten the hose clips again.
- Only overpressure valves with an opening pressure of min. 0.4 – max. 2 bar may be used in the coolant circuit.
- The cooling water must contain at least 10 % antifreeze all year round as corrosion protection.
- Please refer manufacturer's manual for the recommended coolant type and mixing amount. To minimize the corrosion, use Glysantin based coolant.
- Fill the heater and water hose with anti-freeze before connecting to the cooling water circuit.
- During cold periods the cooling water must contain sufficient antifreeze.
- Only top up with antifreeze approved by the vehicle manufacturer.

### PLEASE NOTE!

- The heater should be located below the water line or engine to prevent air bubble in the circuit. Also, the inlet and outlet connections to the engine should be as far apart as possible to maximize cross flow through the engine. To reduce the heat loss through the radiator, the return line must be connected directly to the engine coolant port as shown in the figure below. Shut off valves are not required at the engine inlet and outlet connections but can be used if required. They must be left open while heater is in operation.



# 3 Installation procedures

## ENGINE PLUMBING - PROCEDURE

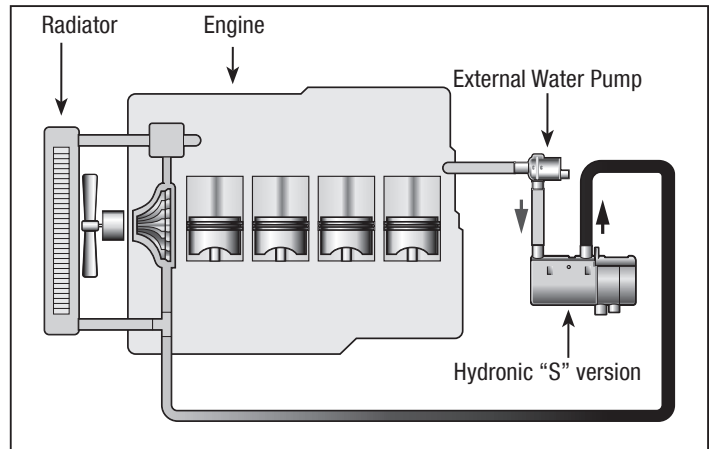
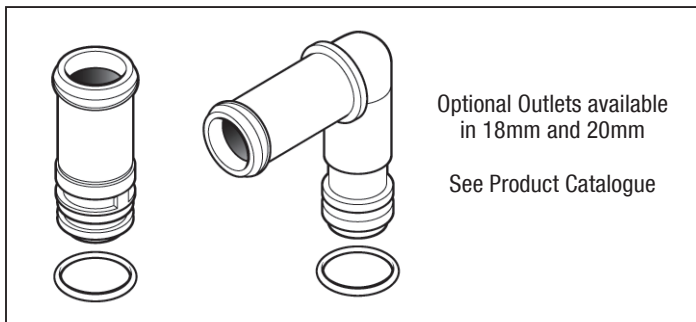
Follow these guidelines and refer to various engine plumbing diagram shown.

- 1 Locate and use the existing holes in the engine block or remove blanking plugs if possible for coolant access. Install fittings into the block for pick up and returns.
- 2 Provide 3/4" hose barbs to connect 3/4" hose for adequate coolant flow.
- 3 For proper heat transfer inside the engine between coolant and the engine block, keep the pick up and return points as far apart as possible.
- 4 If possible, use 5/8" ball shut off valves at pick up and return lines for system isolation from the engine when not in use or under maintenance.
- 5 Ensure the proper direction of the coolant flow in the circuit protect heating system from overheating and leaking i.e pick up from back of the block and return to the suction side at the front. (the flow direction should never be against the vehicle coolant pump.)
- 6 The minimum coolant flow rate can be measured by comparing difference in temperatures of the incoming and outgoing coolant in the system while heater is running. If the temperature difference increases beyond 10°C (18°F), then coolant flow must be increased by modifying plumbing.
- 7 Heater and coolant pump are installed as low as possible to allow the natural purging of air (both as well as any of the coolant lines should never be installed higher than the maximum water line inside the expansion tank.)
- 8 Bleed the air out of the heating circuit via radiator and bleed screw of the heater before commissioning the heater and/or after changing the coolant.
- 9 Follow the vehicle manufacturer's recommendations for further removal of any air in the coolant system.
- 10 For further installation suggestions, please contact Eberspacher North America

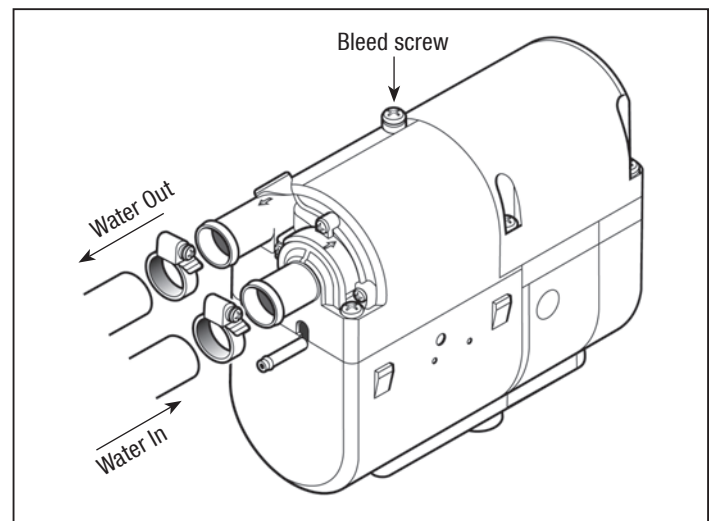
**PLEASE NOTE!**

- Before working on the coolant circuit, switch the heater off and wait until all components have cooled down completely.
- Parts conveying water must be routed and fastened in such a way that they pose no temperature risk to anyone.
- Route the water hoses without any kinks and observe sufficient clearance to movable and hot vehicle parts.

The coolant pump is the heart of the system and must be installed properly to ensure successful heater operation.



D5S Heater installation



**PLEASE NOTE!**

The coolant must contain a minimum of 10% antifreeze at all times as a protection against corrosion. Fresh water will corrode internal heater parts.

# 3 Installation procedures



## HEATER PLUMBING

### TYPES OF HEATER CONNECTION TO THE COOLING WATER CIRCUIT

As discussed earlier, the heater is connected to the cooling water circuit in the water feed pipe from the vehicle engine to the heat exchanger. There are four possible alternative installations available which can be selected based on the heating application and priority i.e cab heat, engine heat or both. The alternatives are described on pages 21 - 23.

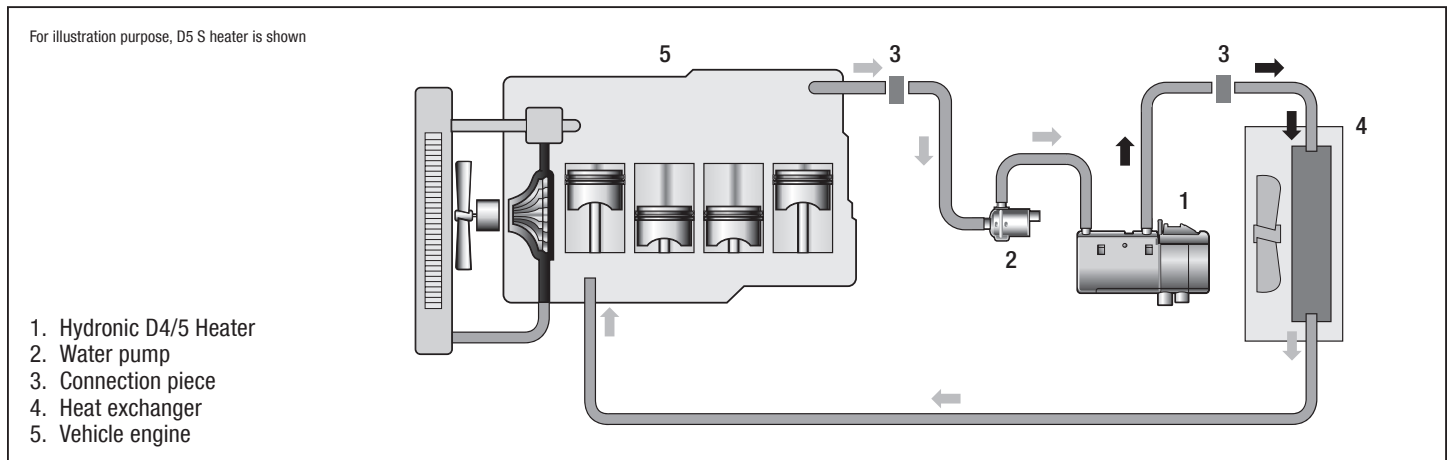
#### 1 INTEGRATE THE HEATER IN THE WATER FEED PIPE FROM THE VEHICLE ENGINE TO THE HEAT EXCHANGER "INLINE CONNECTION"

Disconnect the water feed pipe from the vehicle engine to the vehicle heat exchanger. Connect up the heater with connection pieces and water hoses to the water feed pipe. Route and connect a water hose from the pressure connection of the water pump to the water intake connection of the heater.

#### PLEASE NOTE!

#### HEATING CHARACTERISTICS

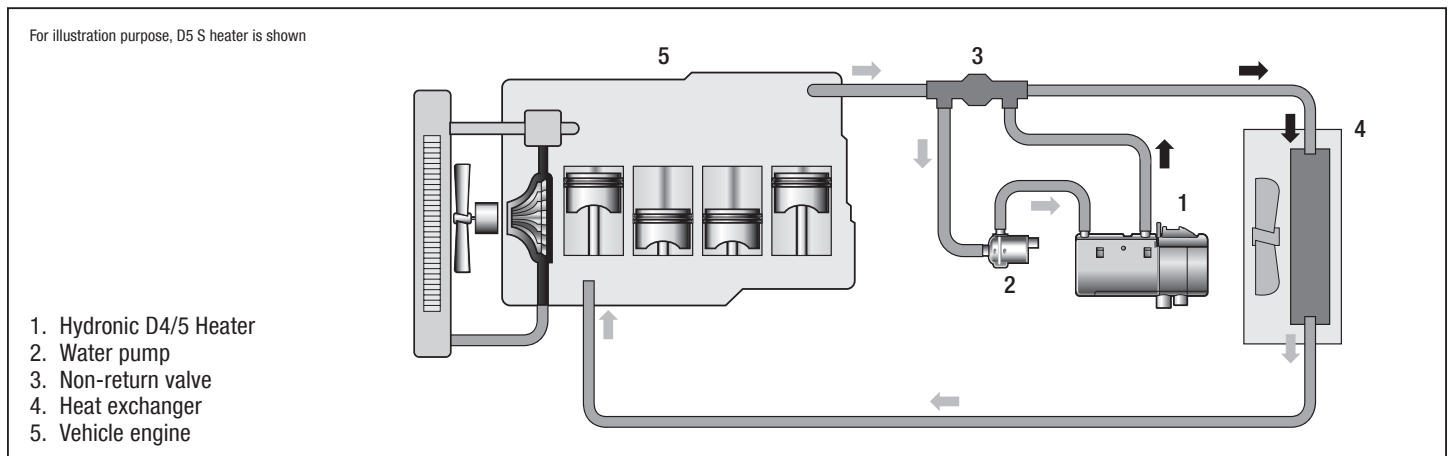
- When the heater is switched on, the heat flows through the vehicle heat exchanger and the vehicle engine.
- Once the cooling water has reached a temperature of approx. 30 °C, depending on the selected fan setting the vehicle fan is switched on and the heat is also conveyed to the passenger compartment.



#### 2 INTEGRATE THE HEATER, WATER PUMP AND NON-RETURN VALVE IN THE COOLING WATER CIRCUIT

#### PLEASE NOTE!

Non-return valve must be ordered separately, see Product Catalogue.



# 3 Installation procedures

## CONNECTION TO THE COOLING WATER CIRCUIT... Continuation

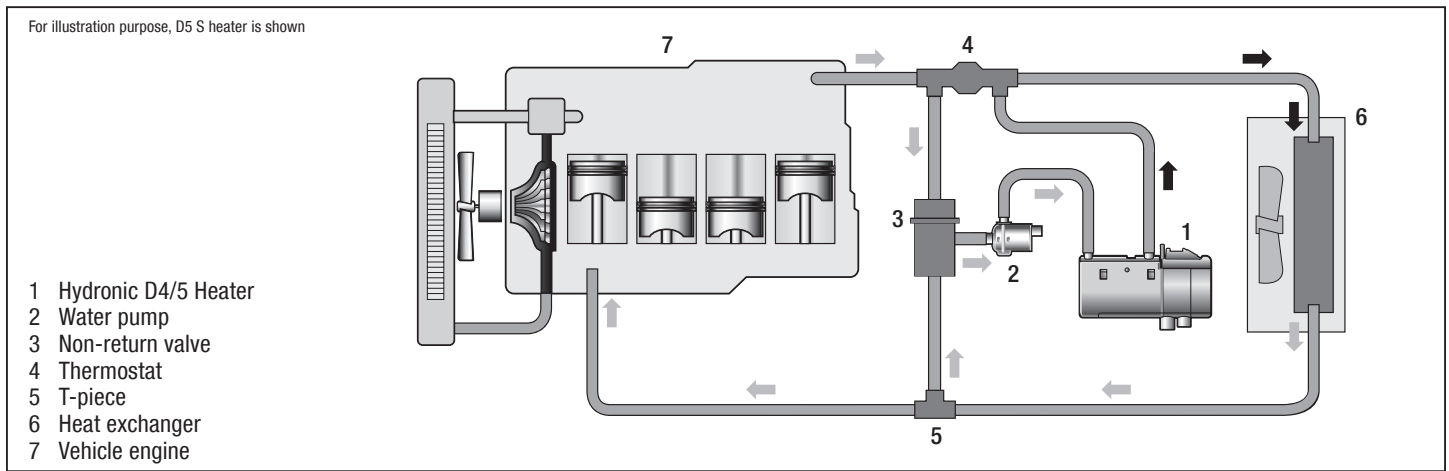
3 INTEGRATE THE HEATER, WATER PUMP, NON-RETURN VALVE, THERMOSTAT AND T-PIECE IN THE COOLING WATER CIRCUIT.

### HEATING CHARACTERISTICS

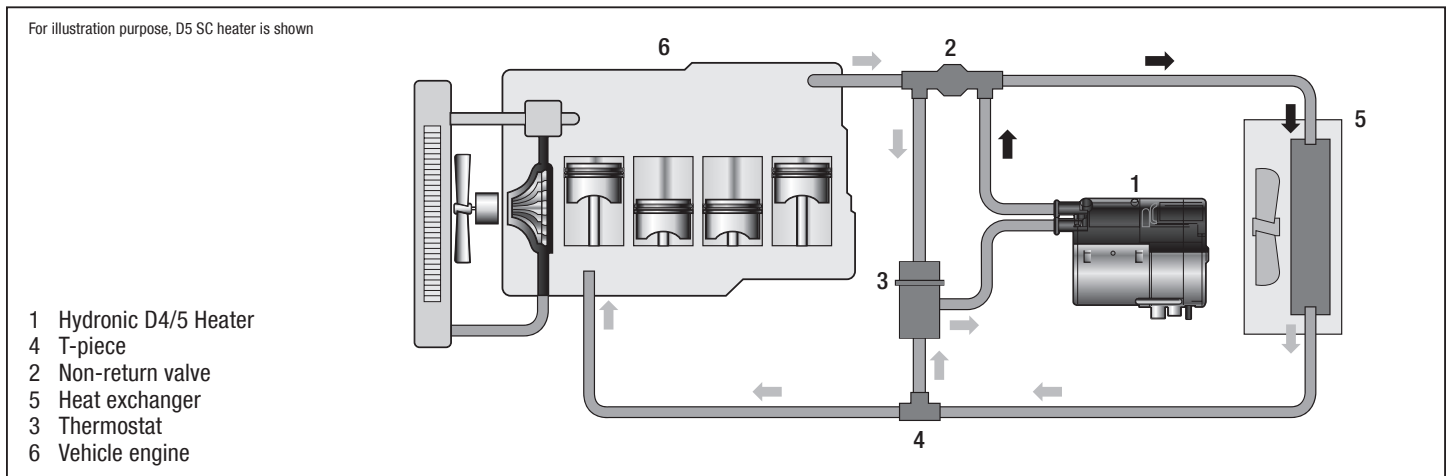
Small cooling water circuit Initially, up to a cooling water temperature of approx. 70 °C, the heater's heat is fed to the heat exchanger only – fast heating of the inside of the vehicle.

Large cooling water circuit If the cooling water temperature continues to rise, the thermostat slowly switches over to the large circuit (full switchover is reached at approx. 75 °C) – heating of the inside of the vehicle and additional engine pre-heating.

(FOR HYDRONIC B 5 W S / D 5 W S ONLY)



(FOR HYDRONIC B 5 W SC / D 5 W SC ONLY)



### PLEASE NOTE!

The thermostat, non-return valve and T-piece must be ordered separately, for part numbers, please refer the Product Catalogue.



### 3 Installation procedures

#### CONNECTION TO THE COOLING CIRCUIT

##### FUNCTION OF THE THERMOSTAT

At a cooling water temperature < 70 °C – small cooling water circuit:

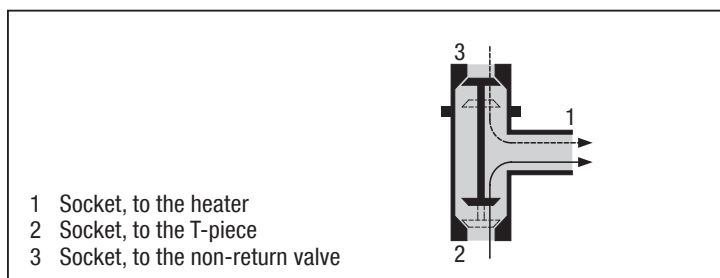
- Socket 1 – open (to the heater)
- Socket 2 – open (to the T-piece)
- Socket 3 – closed (to the non-return valve)

At a cooling water temperature > 75 °C – large cooling water circuit:

- Socket 1 – open (to the heater)
- Socket 2 – closed (to the T-piece)
- Socket 3 – open (to the non-return valve)

##### PLEASE NOTE!

Use the connections Item 1, 2 and 3 – as shown in the sketch – to integrate the thermostat in the water circuit.



#### 4 INTEGRATE THE HEATER, WATER PUMP AND COMBINATION VALVE WITH THERMOSTAT FUNCTION IN THE COOLING WATER CIRCUIT

##### COMBINATION VALVE WITH 5 CONNECTIONS

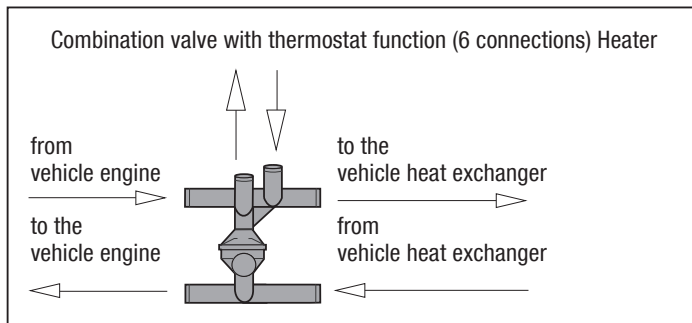
Order no. 25 2014 80 72 00

##### COMBINATION VALVE WITH 6 CONNECTIONS

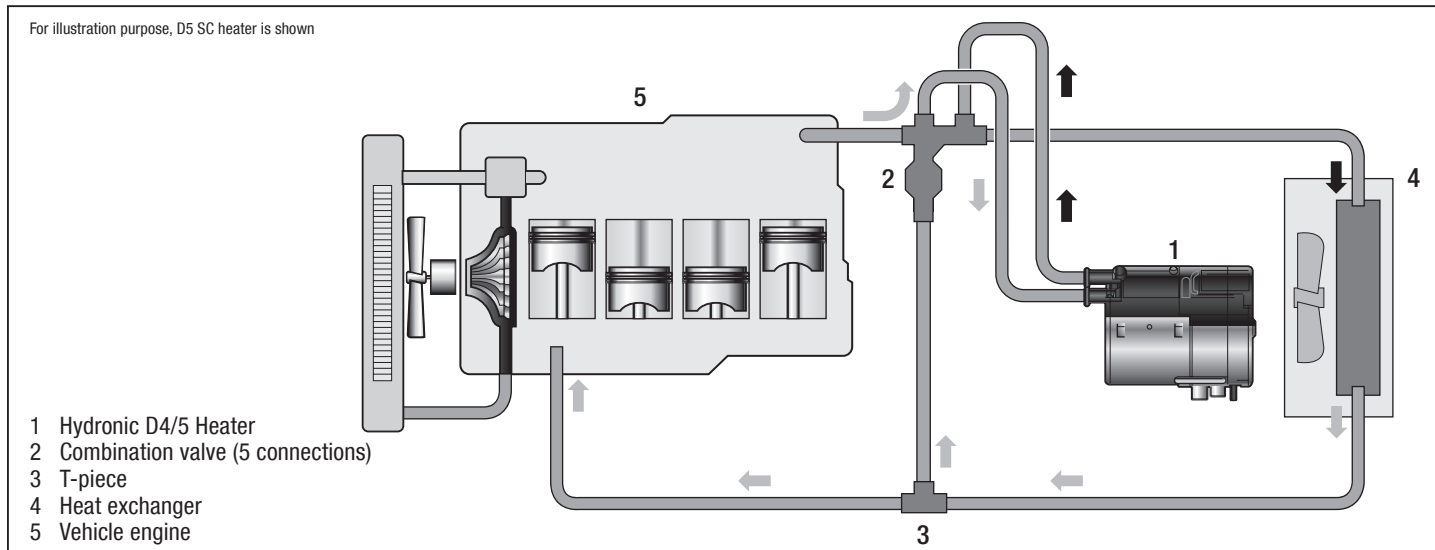
Order no. 25 2014 80 62 00

##### PLEASE NOTE!

- Make sure the direction of the coolant flow during the 5/6 way valve installation.
- During the frequent overheat situations, check the valve for any accumulation of contaminants and clean it.



For illustration purpose, D5 SC heater is shown



# 3 Installation procedures

## FUEL SYSTEM

Based on the design of the heater, the fuel system of the Hydronic 4/5 heaters are divided into two categories:

- D5SC heater with internal FMP (i.e. 25 2219)
- D5S/SC heater with with external FMP (i.e 25 2325, 25 2217)

The D5SC heaters with internal FMP and coolant pump are primarily designed as a compact heater for fast and easy installation; however due to the heater has an internal FMP, the overall of length and height of the fuel line is different from the regular D5S installation with external FMP as shown in image below. Please read all necessary information available in this page before carry out fuel line installation.

### PLEASE NOTE!

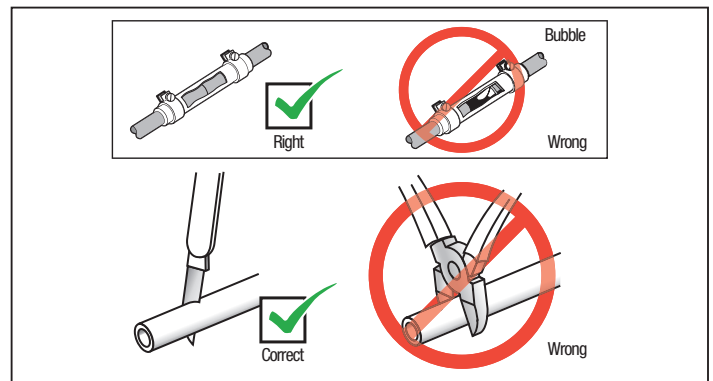
- For all types of D5SC heaters with internal FMP requires shorter fuel lines, should not be longer than 200 cm(6'6") and not be higher than 76 cm (2'6") from the bottom of the pick up pipe. If the above conditions can not be met, use heater with external FMP.
- Do not tap the heater fuel line to the existing fuel line of the vehicle without inspecting line pressure and fuel availability. If the line pressure is higher than 0.2 to 4 bar max, use a pressure reducer 22 1000 20 08 00 or separate fuel tank 22 1000 20 28 00). Use an additional tank and filter 25 1226 89 00 37, if the pressure values are beyond 4 bar. For further information, please contact Eberspäecher)
- For installations where the fuel tank is located higher than FMP, the maximum recommended height from FMP to the top end of the tank should be no more than 3 meter or 10 ft.

- Make sure that all parts related to the fuel system, are not located in the passenger compartment or exit doors. Fuel lines must not be routed on the top of any electrical lines or hot parts.

### FUEL LINE

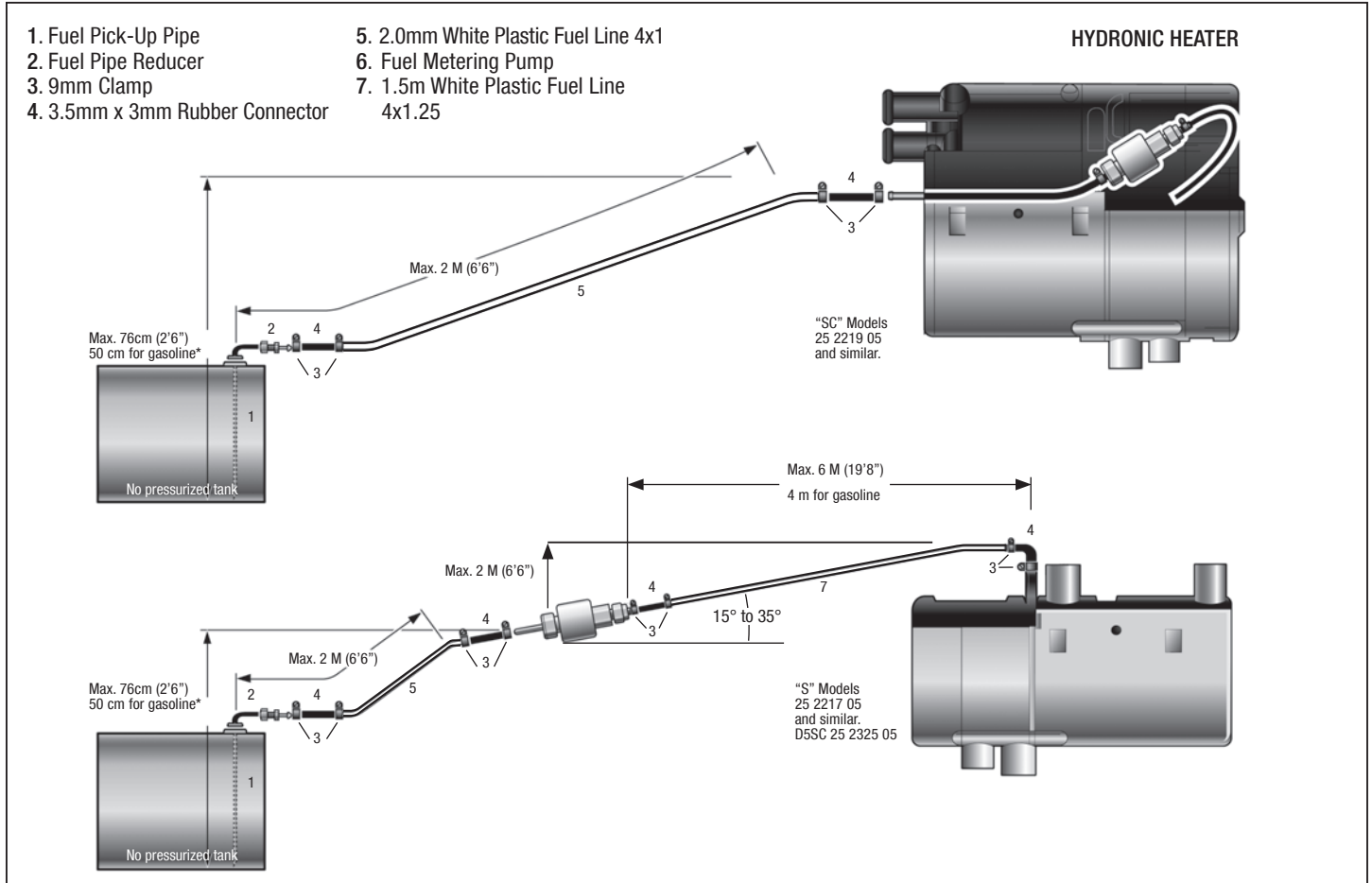
- Route fuel lines from the fuel pick-up pipe to the heater.
- Use only fuel lines provided.
- Other sizes or types of fuel lines may inhibit proper fuel flow.
- Make proper butt joints using clamps and connector pieces as shown.
- Use a sharp utility knife to cut plastic fuel lines to avoid fuel line pinching.

**PLEASE NOTE!** Apply butt joint on the fuel lines connections using an appropriate fuel adapter/hose and clamps.



### FUEL SYSTEM TOLERANCES

1. Fuel Pick-Up Pipe
2. Fuel Pipe Reducer
3. 9mm Clamp
4. 3.5mm x 3mm Rubber Connector
5. 2.0mm White Plastic Fuel Line 4x1
6. Fuel Metering Pump
7. 1.5m White Plastic Fuel Line 4x1.25





# 3 Installation procedures



## FUEL SUPPLY

### FUEL QUALITY FOR PETROL HEATERS

The heater can run on commercially available fuel as per **DIN EN 228** as used in the vehicle tank.

### FUEL QUALITY FOR DIESEL HEATERS

The heater can run on commercially available fuel as per **DIN EN 590**, as used in the vehicle tank.

### FUEL FOR SPECIAL CASES

In special cases (above 0 °C), the heater can also run on fuel oil EL or paraffin for short periods only.

### FUEL FOR LOW TEMPERATURES

Refineries and fuel service stations automatically adjust the fuel to normal winter temperatures (winter diesel). This means that difficulties are only to be expected for extreme drops in temperature, as also apply to the vehicle engine. Please, refer to the vehicle manual.

If the heater gets fuel from a separate tank, please comply with the following rules:

- For temperatures above 0 °C, any kind of diesel fuel as per **DIN EN 590** can be used.
- If no special diesel fuel is available for low temperatures, then paraffin or petrol should be mixed with the fuel according to the following table:

Temperature	Winterdiesel	Addition
0 °C to -25 °C	100 %	-
-25 °C to -40 °C	50 %*	50 % paraffin or petrol

\* or 100 % special cold diesel fuel (Arctic diesel)

### FUEL WARMER FOR EXTREME COLD CONDITIONS:

The fuel quality varies significantly depending on geographic location, altitude, and local climate. Some fuels are modified with additives, which may or may not affect the heater operation. Overall, it has been seen that the chances of fuel to gel or frost inside the line is higher if improper grade or low quality of the fuel is used. Therefore, by adding a fuel warmer would help reduce the effects of winter and fuel can flow in the heater fuel system free of gelling and frosting. (FMP controller/pre heater: 25 2800 70 0019 - Only for D5S and SC with external FMP, for further information please see page number 25.

#### PLEASE NOTE!

- The ideal diesel fuel for the heater should have no additives, high in 'Cetane rating = 52, low in sulfur = %Wt 0.005 (10 ppm is ok), Cloud point should be at minimum: -20°C and Pour point at: -45°C min, low Flash point rating = 67 and low Carbon residue, on 10% water distillation residue, %Wt <0.001 and must not have Lead (or < 0.005 gram/l). (should be equivalent to the fuel grade DIN 590)
- The Gasoline heaters can also run on motor oil as per **DIN 51600**. (however due to higher content of lead, it is less recommended)

#### PLEASE NOTE!

- Mixtures with used oil are not allowed!
- After refuelling with winter diesel or the listed blends, the fuel pipes and the metering pump must be filled with the new fuel by letting the heater run for 15 mins.
- Kerosene can be premixed with diesel during the winter condition or during traveling at high altitudes to reduce the no start event.
- For post maintenance run up, the heater must not be allowed to run on pure kerosene for more than 30 mins.
- Running heater on kerosene can remove soft carbon; however it will certainly not solve the excessive hard carboning issue, which requires in depth maintenance.
- Improperly stored fuel quality tend to degrade into various layers, which also decreases the overall cetane number of the fuel.
- Running heater on untested fuels (other than listed here) may cause unexpected effects on the heater and not recommended.
- Eberspaecher North America is not liable for any damage whatsoever caused by use of unspecified fuel.

### OPERATION WITH BIODIESEL (PME- FAME)

The D5S/SC heater is not certified for running on bio-diesel.

#### WARNING! FUEL HANDLING

Ensure extreme care while handling any type of fuel; Use manufacturer's guidelines for the fuel handling and storage procedures.

### 3 Installation procedures

#### EXHAUST CONNECTION

A flexible exhaust pipe, (24 mm ID) is required for exhaust system, also an additional silencer can be inserted into the system to reduce the exhaust noise level. An exhaust clamp is used to secure the exhaust to the heater.

Connect the exhaust as follows:

- 1 The flexible exhaust pipe must be in between 40 cm to 2 meters max. (including exhaust silencer) with no more than 270° (three 90°) bend (including intake pipe.)
- 2 Connect the exhaust pipe to the exhaust port on the heater and attach with clamp provided.
- 3 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.
- 4 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.
- 5 Route the exhaust pipe from the heater using "p" clamps provided.

#### PLEASE NOTE!

Do not point the exhaust pipe against the ram air or in the vehicle's slip stream. Use appropriate heat resistant sleeve and silencer, if require.

#### DANGER - FIRE HAZARD

Run exhaust so that it cannot be plugged by dirt, water or snow. Ensure the outlet does not face into the vehicle slip stream.

#### INTAKE CONNECTION:

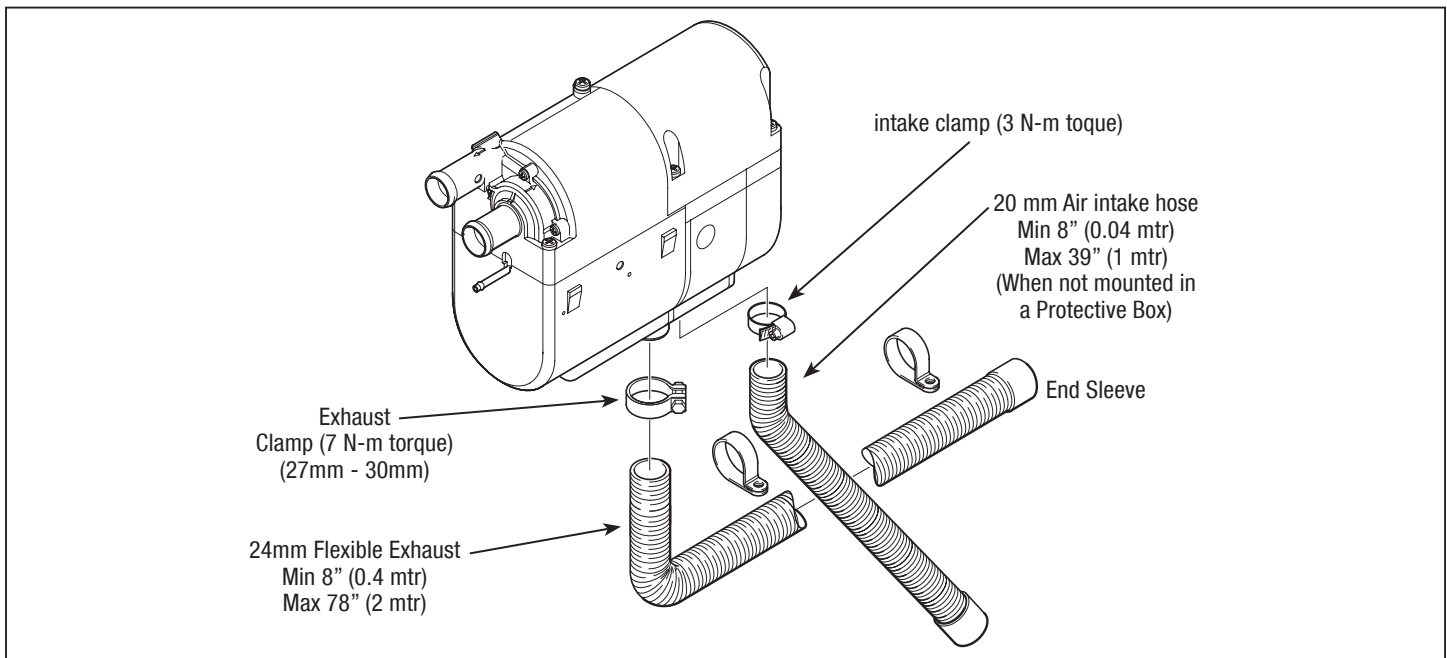
Combustion air must be drawn in from the outside. The combustion air opening must be kept free at all times.

Connect the intake as follows:

- 1 The 20 mm intake pipe length should be in between 0.04 to 1 meters max., which includes the length of the silencer, additional bends or connections as well, if there are any.
- 2 Please ensure that there should be no more than 3 bends or 270° angle from intake to exhaust connection. For every bend, reduce min. 40 cm length of the intake/exhaust pipe.
- 3 Connect the intake pipe to the intake port and attach with a clamp provided.
- 4 Lay out the intake pipe away from the exhaust pipe, wheel splash area and slip stream of the vehicle.
- 5 Install the intake pipe with a slight slope or drill a small hole in the lowest point to drain the water. Any restriction in the intake will cause operational problems.
- 6 Route the intake pipe from the heater using "P" clamps.

#### PLEASE NOTE!

- Do not point the air intake against the the ram air or in the vehicle's slip stream.
- The combustion air intake must not get clogged with dirt or snow.
- Air intake silencer is available to reduce the heater noise level.
- Maximum temperature for intake air should be no more than 25°C; higher inlet temperature changes fuel/air ratio and increases carboning issue.



#### DANGER - FIRE HAZARD

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.

#### DANGER - ASPHYXIATION HAZARD

Route exhaust beyond the skirt of the cab and outside of the frame area. Failure to comply with this warning could result in Carbon Monoxide Poisoning. Every type of combustion produces high temperatures and toxic gases which is the reason why the exhaust system must be installed according to the instructions provided.

Failure to comply with this warning could result in carbon monoxide poisoning.

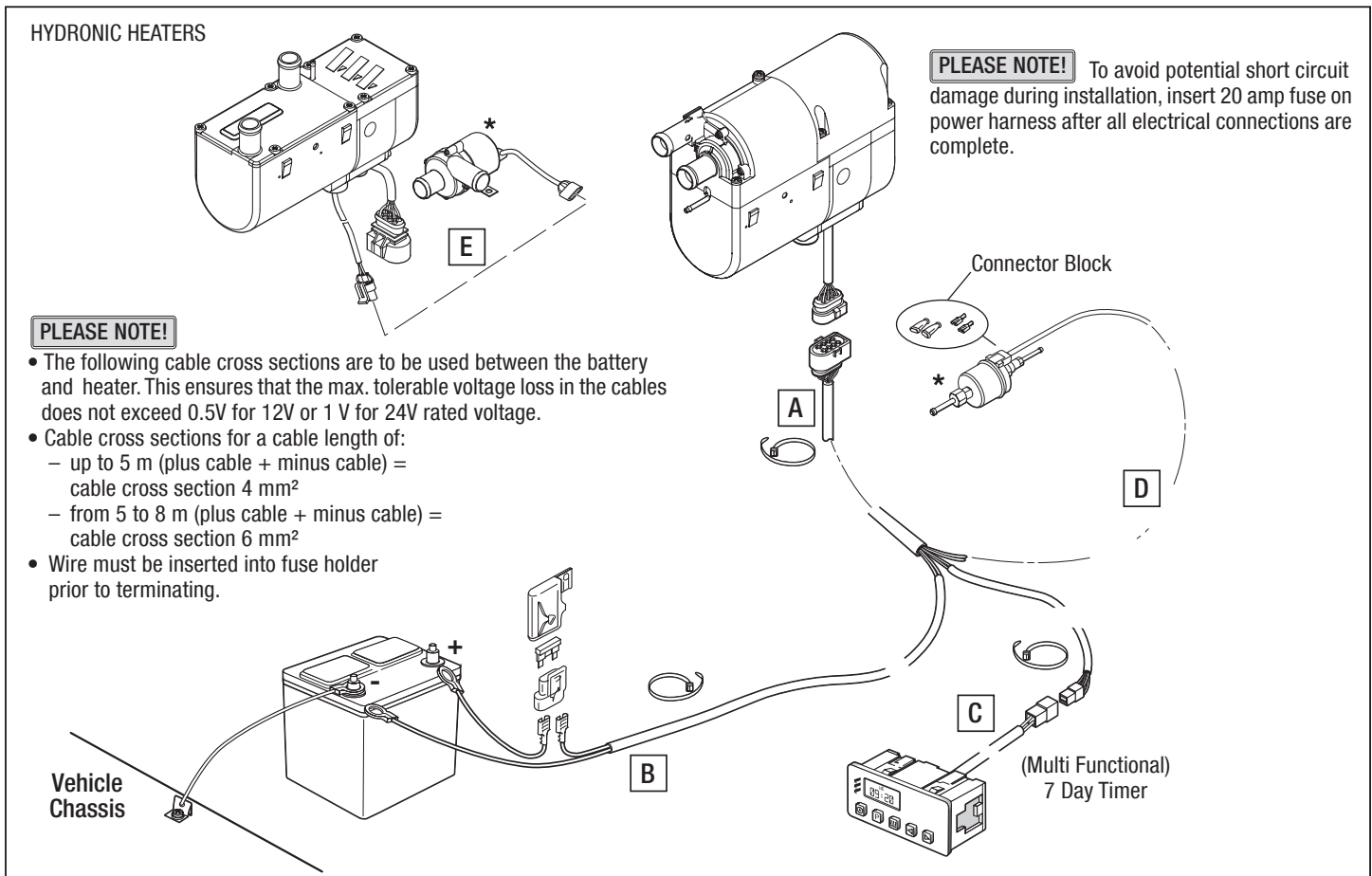
# 3 Installation procedures



## ELECTRICAL SYSTEM

All parts needed are included with the kit. ( \* ) indicates external mounted fuel and or water pump versions of Hydronics.

- A. Main Heater Harness.....
  - Connects switch and power harness to the heater harness. (\* in some cases power to fuel metering pump).
- B. Power Harness.....
  - 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.
  - 15 amp fuse - 24V.
- C. Switch Harness.....
  - 4 core harness (red/yellow, brown, yellow, blue/white).
  - Run to location of control option. Make terminal connections at control option. Eberspaecher has 2 available switches, see control option instructions on following pages. Some switch harness have 5 amp. fuse.
- D. \* Fuel Metering Pump Harness.....
  - 2 core harness (green, green) or (green, brown).
  - Connect to fuel metering pump using terminals and protective seals + connector block (no polarity required).
- E. \* Water Pump Harness.....
  - 2 core harness (black, brown).
  - Connect to main harness at heater.



**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. Never run heater or any other vehicle appliances when the battery connection the ground is removed

**PLEASE NOTE!** All harnesses should be cut to length. All exposed electrical connections should be coated with protective grease.

# 3 Installation procedures

## ELECTRICAL SYSTEM

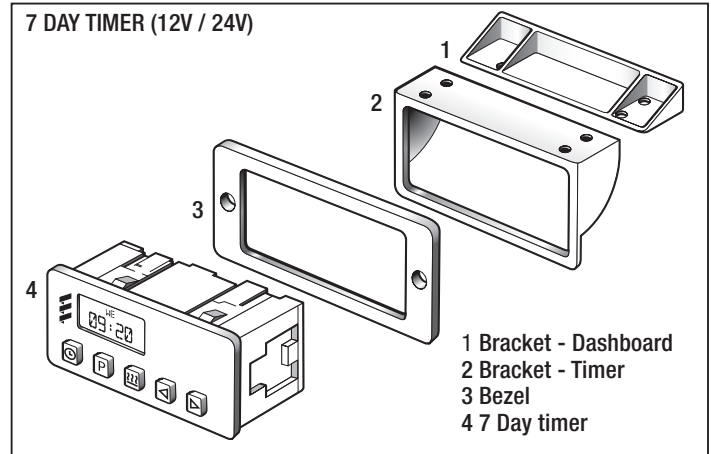
### CONTROL OPTIONS

There are mainly four types of control options available: 7 day timer, Push and Pull Switch, EasyStart timer and EasyStart call.

#### 7 DAY TIMER (12V / 24V)

For many years, the 7 day timer has proven its quality and reliability due to its robust design and universal compatibility with all heaters. It is recommended to use 7 day timer in off road and heavy duty equipments. The 7 day timer is capable of multiple (3 max.) start functions within a 7 day period. Other features include current time display and automatic heater numeric fault code. For diagnostics, please see page 41 or refer the 7 day timer manual.

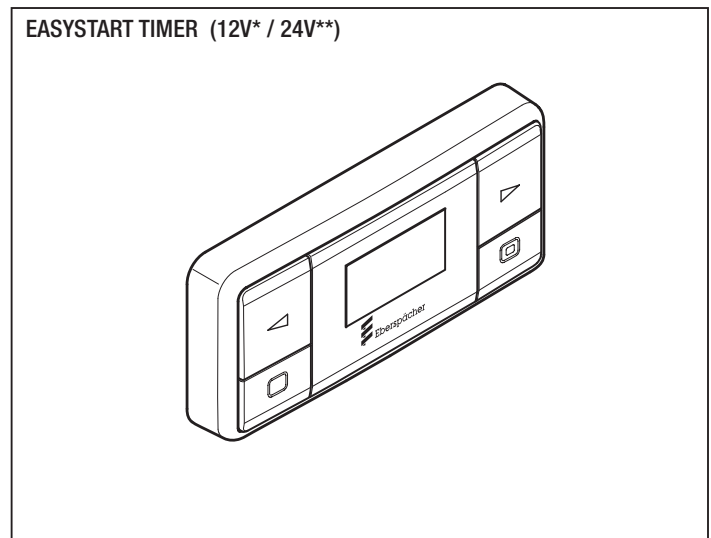
For easy mounting and better accessibility, the 7 day timer kit (part number: 20 2900 70 02 30) can be placed on the dash board or side wall using its bezel and bracket or housing.



#### EASYSTART TIMER (12V\* / 24V\*\*)

EasyStart timer is designed to operate most of the current generation 12V hydronic D5 heaters with H-kit ECU using digital communication through diagnostics (blue/white) cable. The timer is also backward compatible with those heaters having an older ECU versions (no H-kit) on which a switch ON/OFF signal (S+) can be provided via controller's analogue cable (yellow wire). This state of art controller/timer can operate in combination of either two heaters or one heater and one add on device simultaneously (or individually) using its signal wires (JE and DAT type digital cables or yellow wire - analog signal). Its timer function has three programming options, where the selection can be made by individual days or one of three timer periods (mo - fr/ sa - su / mo - su). Other key features include JE Diagnostics (for one or two heaters), LVD, Heating/Ventilation -On/off, Auto calculation for heating time(using temperature sensor), run time changes, read out operating hours counter, temperature unit changes °C/°F, start time (departure/arrival) and language (English/German). For diagnostic procedure using EasyStart timer, please see page 43 or refer its manual.

- EasyStart timer: 22 1000 34 15 00
- EasyStart timer (full kit): 25 2800 70 00 25
- Accessory/ Interior Temperature Sensor: 22 1000 34 22 00
- External Temperature Sensor (display): 25 1774 89 03 00
- Cover Frame from flush mounting: 22 1000 51 41 00
- \* 12V heaters with H-kit ECU
- \*\* 24V heaters (via yellow S+1 and no diagnosis)

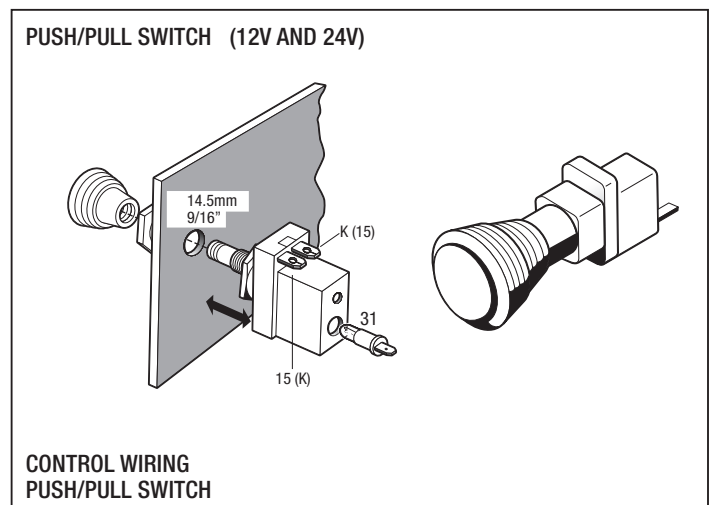


#### PUSH/PULL SWITCH (12V AND 24V)

This simple option is recommended for the harsh environment and industrial applications, where only On/OFF function to control the heater is required. It can be mounted on any location where it is easily accessible. An In built bulb illuminates whenever the yellow wire is powered for turning on the heater. The part number of Push and Pull switch is 5670007 (12V), 5670008 (24V).

**PLEASE NOTE!**

The switch light glows when pulled out and is off when pushed in. Install the Push/Pull Switch on vibration and temperature proof surface.



# 3 Installation procedures



## ELECTRICAL SYSTEMS - CONTROL OPTIONS

### EASYSTART CALL 12V\* / 24V\*\*

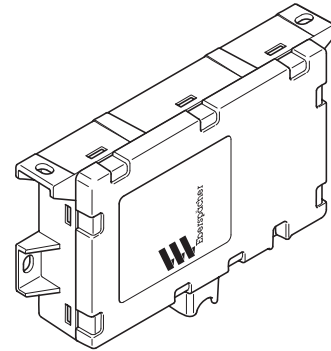
EasyStart Call is a digital sender/receiver module which works on DTMF or GSM based 2G (quad band) cell phone network to transmit and receive heater signals. Using which, the hydronic heaters can be controlled as long as communication occurs within the network range.

Prior to the installation, the phone network and heater compatibility with the EasyStart Call must be checked as this device can only control few selected heaters. The control signal for the heater can be transmitted back and forth using the phone call, SMS and smart phone application (EasyStart Call by Eberspächer). This device covers most of the EasyStart Timer features including date and time, JE diagnosis, timer function, LVD, heat/ventilate, temperature unit changes °C/°F, run time changes, timer reference(departure/arrival time). In addition, The EasyStart Call can also be programmed to provide the weather alert, control multiple heaters as well as activate the heater on/off based on outside temperature. Further details can be found inside the EasyStart Call manual or contact Eberspaecher North America. The part number for EasyStart Call kit is: 22 1000 34 01 00.

\* 12V heaters with H-kit ECU

\*\* 24V heaters (via yellow S+1 and no diagnosis)

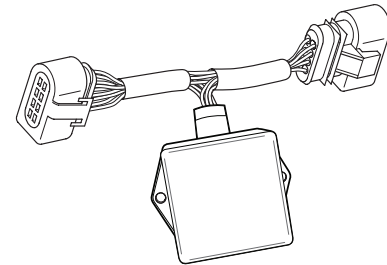
### EASYSTART CALL 12 V\* / 24 V\*\*



### FUEL METERING PUMP CONTROLLER (12V only)

During the frigid winter season, the heater operation is stopped due to lack of fuel as the internal components of the FMP is jammed or frozen because of improper quality of the fuel, wax and ice particulates in the system. Therefore, Eberspaecher North America has developed an advanced fuel warming technology, using which the FMP controller heats up internal components of FMP during the start up procedure so no unexpected delay in turning on the heater. Please note that the FMP controller is not designed to increase temperature of the fuel lines or fuel itself. The controller can be installed simply by using the plug and play connector for D5S or D5SC (with external FMP) versions or modifying the FMP harness according to its manual for the D5SC (internal FMP) version. (part number: 25 2800 70 0019.)

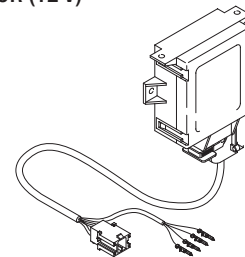
### FUEL METERING PUMP CONTROLLER (12 V only)



### HIGH ALTITUDE SENSOR (12 V)

To reduce the effects of low air density on the heater operation at high altitude locations (from 1500 to 4000 meters), the high altitude sensor is recommended to be connected with the heater, so it can trigger the ECU to adjust the fuel frequency according to the altitude and maintain an optimal fuel/air mixture for efficient combustion process. The overall output of the heater, however, diminishes by 9% per 1,000 meters due to reduction in the fuel output through high altitude sensor adjustments (measurement range: 600 hPa to 1,150 hPa). For further information please contact Eberspaecher North America . The part number for High Altitude sensor is: 22 1000 33 22 00.

### HIGH ALTITUDE SENSOR (12 V)



### HIGH ALTITUDE COMPENSATOR (12 / 24V)

The compensator adjusts the fuel frequency provided by the ECU to the FMP based on the altitude from the sea level. The High Altitude Compensator can work on most of hydronic heaters (especially prior to 2008). For further information, please contact Eberspaecher North America . The part number for the High Altitude Compensator is: 20 2900 70 0007.

### HIGH ALTITUDE COMPENSATOR (12 V / 24 V)



### 3 Installation procedures

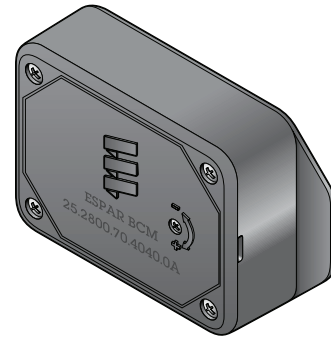
#### ELECTRICAL SYSTEMS - CONTROL OPTIONS

##### BLOWER CONTROL MODULE (12V / 24V)

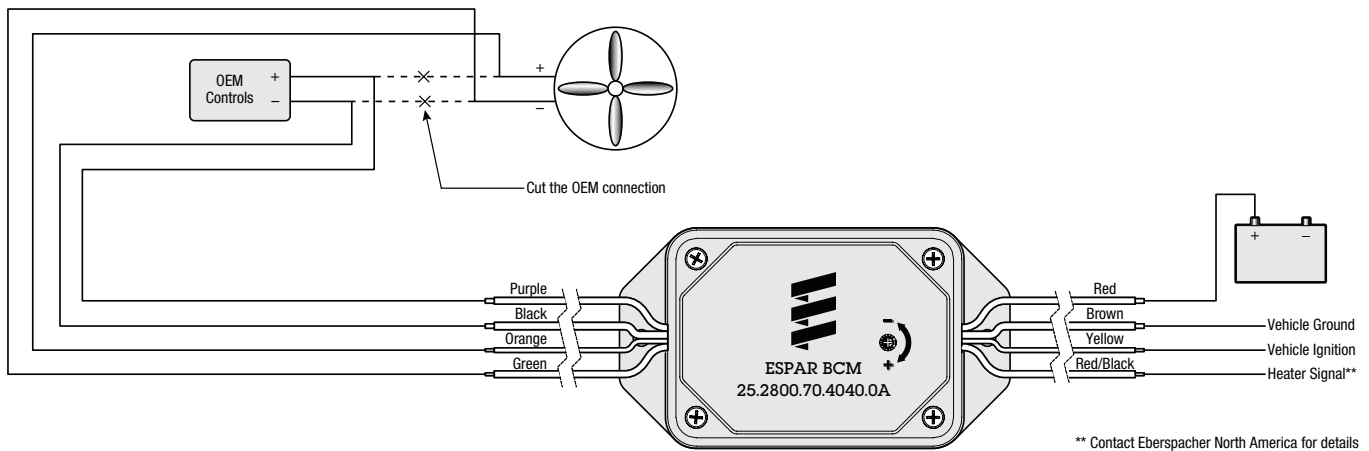
The BCM is used to operate the OEM fan blowers in the vehicle by the use of PWM signal. This allows faster cab heating simultaneously with the vehicle engine heating with low amperage draw on the battery compared to similar systems.

The BCM activates at 86°F (30°C) coolant temperature, when vehicle is turned off and the battery is in good condition. The module is automatically disabled once ignition of the vehicle is sensed, allowing operator to control blower fan normally through the OEM dash controls. The BCM has additional features like built in fan control and LVD, which increases the overall system safety. This module is only capable of activating fan system of the vehicles without the CAN based climate control system; therefore consult with nearby dealer for device compatibility with vehicle before the installation. The part number of Blower Control Module is 25 2800 70 40 40 OA.

##### BLOWER CONTROL MODULE (12V / 24V)



##### BCM (BLOWER CONTROL MODULE) INSTALLATION



##### ELECTRONIC IMPACT SWITCH (12V / 24V)

For specialty applications i.e. E-Guardian kits for school buses, military vehicles where additional fire protection is required either by regulations from the local government or by company itself, The Electronic Impact Switch can be installed to shut down the FMP (thereby the heater) as soon as the heater is subjected to high impact situations, i.e accidents. This sensor works based on the accelerometers on x, y, z directions and under preset G forces, it sends a signal and opens up the FMP wire harness connection which later can be easily reset via reactivating the yellow wire. This Electronic impact switch replaces the old mechanically operated crash sensor which actually does the same job.

The part number of the Electronic Impact Switch is 25 2800 70 50 50 and its adapter cable for D5SC heater is 25 2800 70 05 02.

##### PLEASE NOTE!

The impact switch requires yellow wire signal to be activated otherwise it would keep the fuel connection open; therefore during the EDiTH diagnosis, jump the two FMP wires(green wires) at the impact switch location to stop heater from giving fault code 48 as FMP open circuit.

##### ELECTRONIC IMPACT SWITCH (12V / 24V)



# 4 Operation and Function



## PRE-START PROCEDURES

Upon completion of installation prepare the heater as follows:

- Check all fuel, electrical and plumbing connections.
- Refill the engine coolant.
- Bleed air from the coolant system by loosening the bleed screw on top of the heater to allow air to escape.
- Loosen rad cap and run engine to allow air to be purged.
- Top up engine coolant.

## START UP

Once switched on the following sequence occurs:

- 1 Control unit does a systems check (flame sensor, glow pin, motors, temperature sensor and various other control unit checks).
- 2 Water pump starts circulating coolant.
- 3 Combustion air blower comes on.
- 4 Glow pin begins to preheat 20-50 secs.
- 5 Metering pump starts and combustion air blower speeds up gradually.
- 6 Once fuel passes through the glow pin screen, it starts to get automatized, and vaporized thereafter due to localized heat intensity from the glow pin. Then, the fuel vapor ignites as soon as it mixes with incoming air, which eventually converts into a stable flame.
- 7 Once ignition takes place the flame sensor alerts the control unit and the control unit shuts off the glow pin (ignition time: 1.5 - 2 minutes).

### PLEASE NOTE!

- The liner inside the flame tube's annular chamber absorbs and holds finely automatized fuel during its vaporization process so smooth ignition takes place. The purpose of the liner is to act as a sponge and dampen fluctuations of the fuel pluses, which reduces the overall combustion noise and vibration.
- If the heater fails to start the first time it will automatically attempt a second start. If unsuccessful, the heater will shut down completely.
- On initial start up, the heater may require several start attempts to self prime the fuel system.

## RUNNING

Once ignition is successful the following operations take place:

- 1 Heater runs in high heat mode and the temperature is monitored at the heat exchanger.
  - 2 Once coolant reaches 75°C (167°F) the heater automatically switches to low heat mode and continues to run.
  - 3 If coolant temperature drops to \*65°C (149°F) the heater will automatically switch back to high heat mode.
  - 4 If the coolant temperature continues to rise, the heater will automatically switch off once temperature reaches \*80°C (176°F).
  - 5 The water pump will continue to circulate coolant to allow the heater to monitor engine temperature.
  - 6 The heater will automatically re-start once coolant temperature reaches \*65°C (149 °F).
  - 7 The heater continues to run as described above until it is switched off, either manually, automatically by a timer or heater malfunction shutdown.
- \* LOW and HIGH temperature values vary depending on programming of ECU of the heater

### PLEASE NOTE!

- If the heater should shut down due to flame cut out while in running mode, it will automatically attempt one restart. If successful, it will continue to run. If not, it will shut down completely with a cool-down cycle.
- During operation the heater continually senses the input voltage from the batteries. If the input voltage drops to approximately 10.5 volts (21 V) or rises above 16 volts (30 V) the heater will automatically shut down with a

cool-down cycle, and display a fault code when using a multifunction timer.

### ⚠ 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.

## SWITCHING OFF

Upon completion of installation prepare the heater as follows:

- 1 When the heater is switched off, manually or automatically, it starts a controlled cool down cycle.
- 2 The fuel metering pump stops delivering fuel and the flame goes out.
- 3 The combustion air blower and water pump continue to run for 3 minutes to cool down.
- 4 The heater shuts off.

## SAFETY EQUIPMENT

The control unit, temperature sensor, overheat sensor and flame sensor continually monitor heater functions and will shut down the heater in case of a malfunction.

- The control unit ensures electrical circuits (fuel pump, combustion air blower etc.) are complete prior to starting the heater.
- If the heater fails to ignite within 90 seconds of the fuel pump being started, the starting procedure will be repeated. If the heater again fails to ignite after 90 seconds of fuel being pumped, a “no start safety shutdown” follows. (Fault #52)
- If the heater flames out during operation, the heater automatically attempts to restart. If the heater fails to ignite within 90 seconds of fuel delivery, the heater will turn off the fuel pump and complete a cool down and display a F052 code. After troubleshooting the problem the heater can be started again by switching the heater off and then back on again.
- Overheating due to lack of water, a restriction or a poorly bled coolant system results in the overheat shutdown (F012). Fuel delivery will cease and an “overheat shut down” follows. If heater overheats 3 consecutive times, a lockout on the control unit will occur. To unlock the control unit you will need to use the Fault Code Retrieval Device.
- If at any time the voltage drops below 10.5V (21 V) for 20 seconds, or rises above 16.0V (30 V) for 20 seconds the heater will shut down and display the associated Fault Code.

## PRE-VENTING WITH CHANGEVER SWITCH “HEATING / VENTING”

Pre-venting means triggering the vehicle fan directly by the heater pre-selection timer or, even more appropriate, by a remote control bypassing the heater. In this way in summer months when the insides of a vehicle get heated up when standing in the sunshine, it is possible to allow fresh air to vent the vehicle (separate circuit).

## HEATING AT HIGH ALTITUDES

When using the heater at high altitudes, please note:

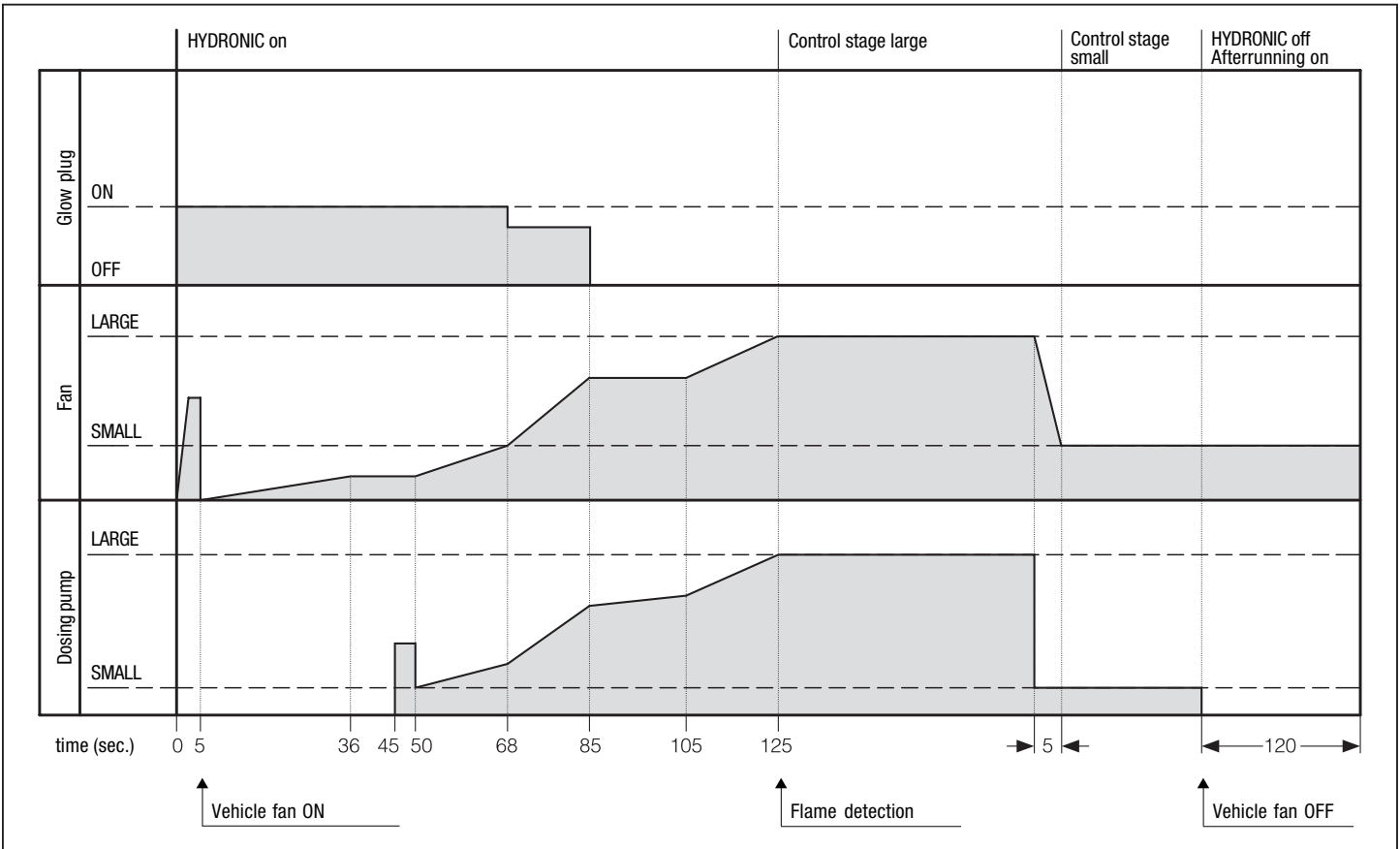
- Heating at altitudes up to 1500 m: – Unlimited heating possible.
- Heating at altitudes over 1500 m to 4000 m: – Heating is possible for short periods at this altitude (e.g. driving over a mountain pass or taking a break in a journey). During longer stays, e.g. winter camping, the fuel supply must be adjusted to the altitude. This can be done by installing an air pressure sensor, P/N 22 1000 33 22 00.

### PLEASE NOTE!

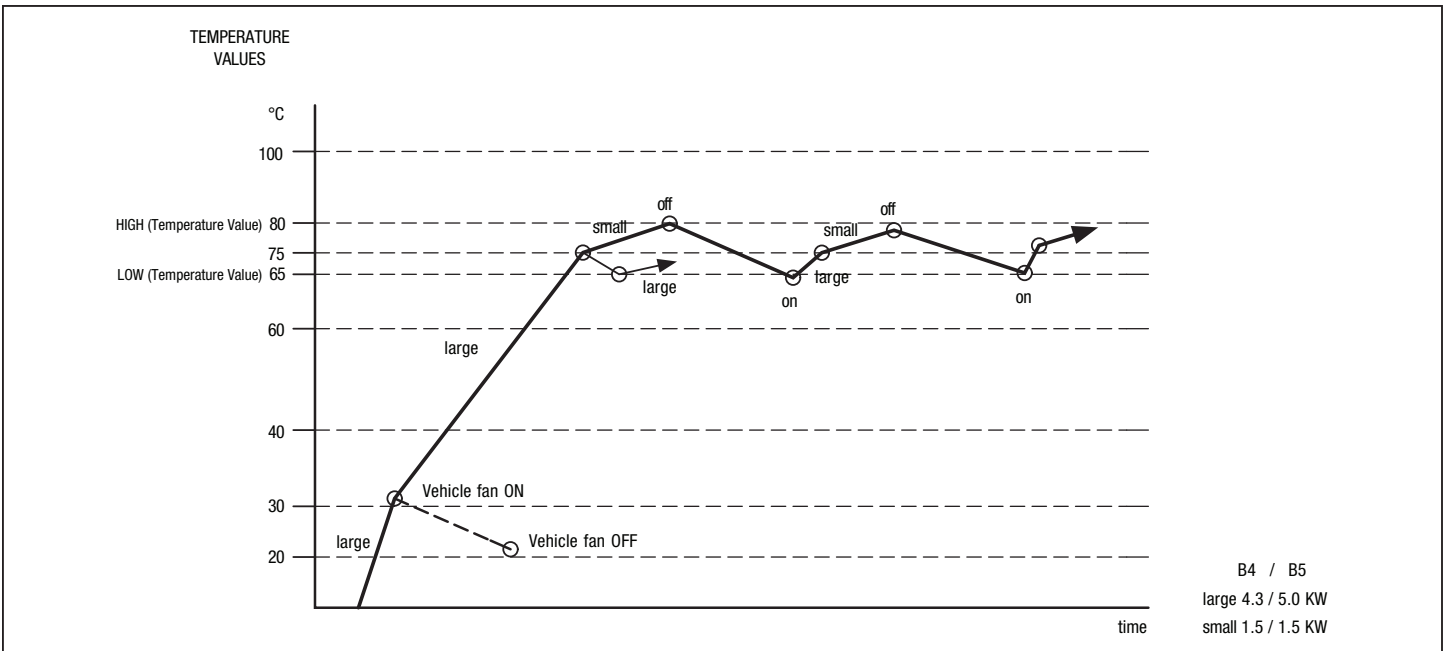
- Heaters suitable for high altitudes are labelled with “H-Kit” on the side nameplate.

# 4 Operation and Function

Function diagram – HYDRONIC B4WS-SC and B5WS-SC



Control Graph – HYDRONIC B4WS-SC and B5WS-SC



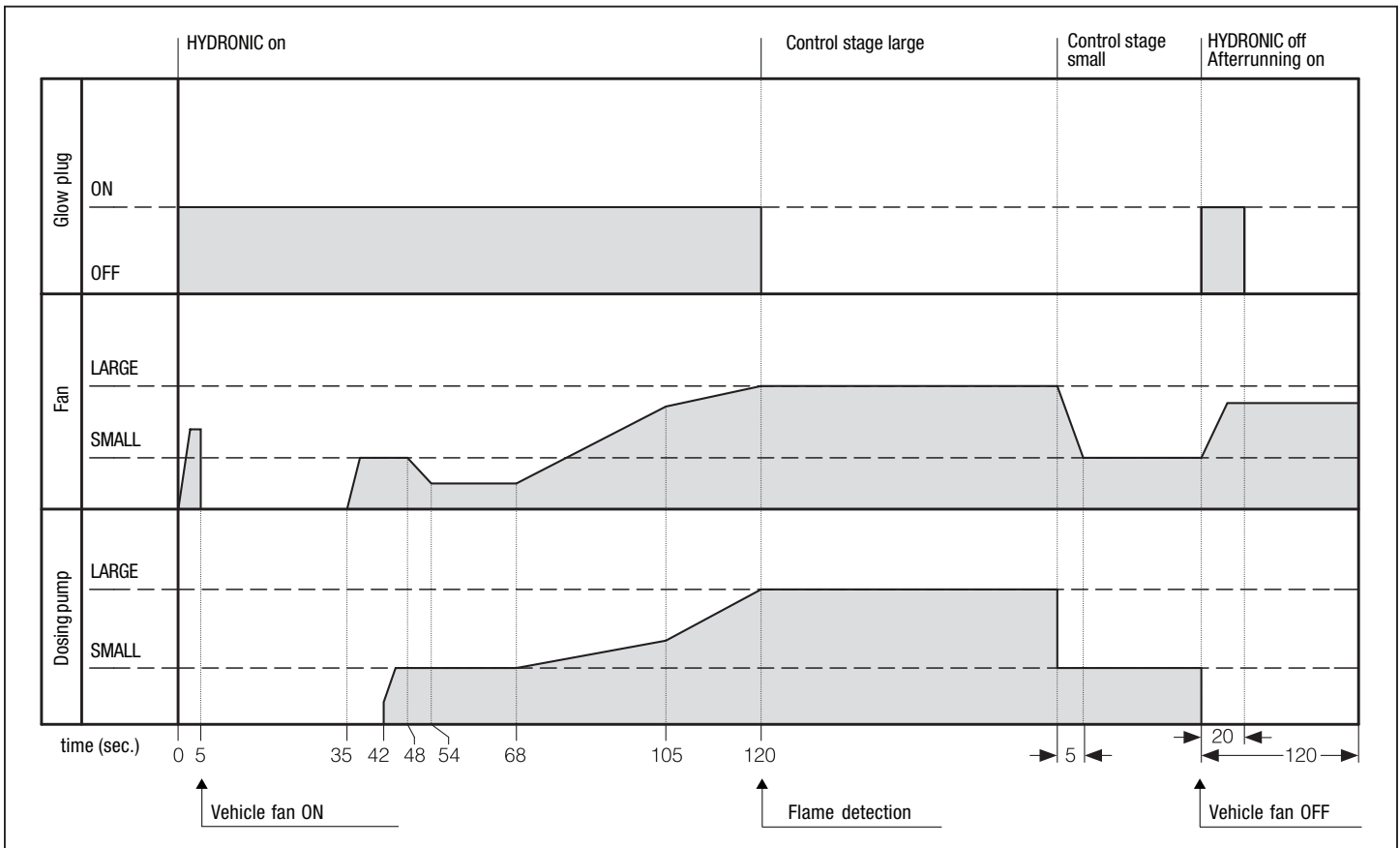
\* LOW and HIGH temperature values vary depending on programming of ECU of the heater.



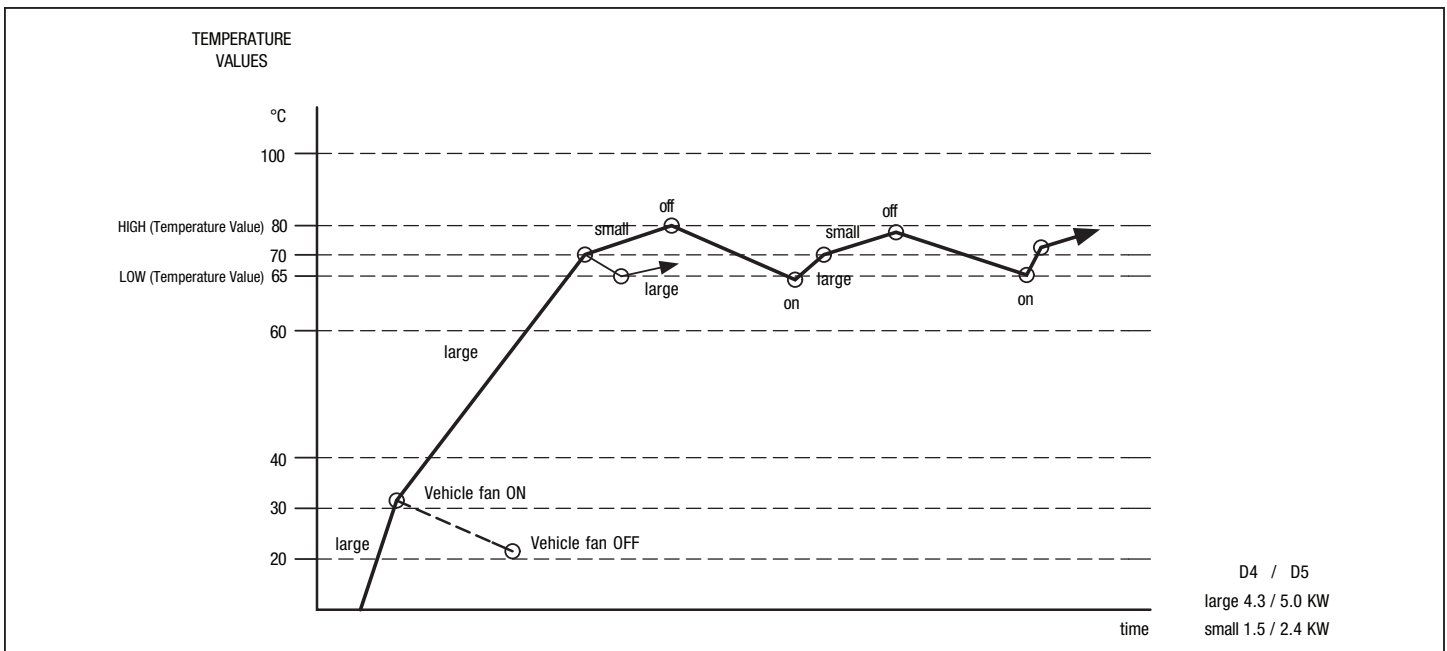
# 4 Operation and Function



Function diagram – HYDRONIC D4WS-SC and D5WS-SC



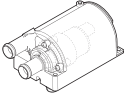
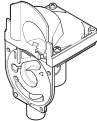



Sectional drawing – HYDRONIC D4WS-SC and D5WS-SC



\* LOW and HIGH temperature values vary depending on programming of ECU of the heater.

# 4 Operation and Function

## FLOW CHART

Operating Mode	STARTING PHASE					RUNNING PHASE	SHUT DOWN PHASE		
	System Check	Pre-heat	Ignition Attempt	Pre-heat 2nd. attempt	Ignition Attempt 2nd. attempt		Controlled Heating	After Glow	Cool Down
 Water Pump	Off	On	On	On	On	On	On	On	Off On: if in stand by
 Blower	On Momentarily	On	On	Off	On	On	On	On	Off
 Glow Pin	Off	On	On	On	On	Off	On	Off	Off
 Fuel Pump	Off	Off	On	Off	On	On	Off	Off	Off
 Time	1 - 3 sec.	40 sec.	Up to 80 sec.	40 sec. If Required	Up to 80 sec.	High/Low Operation until switched off manually or automatically	20 sec.	2.5 min.	

**PLEASE NOTE!** During the controlled heating cycle, if the coolant temperature exceeds 80°C (176°F) the heater will cycle off. Heater will automatically restart in high mode once coolant temperature reaches 65°C (149°F).

\*LOW and HIGH temperature values varies depending on programming of ECU of the heater

# 5 Circuit Diagram

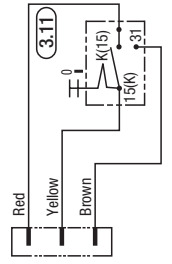
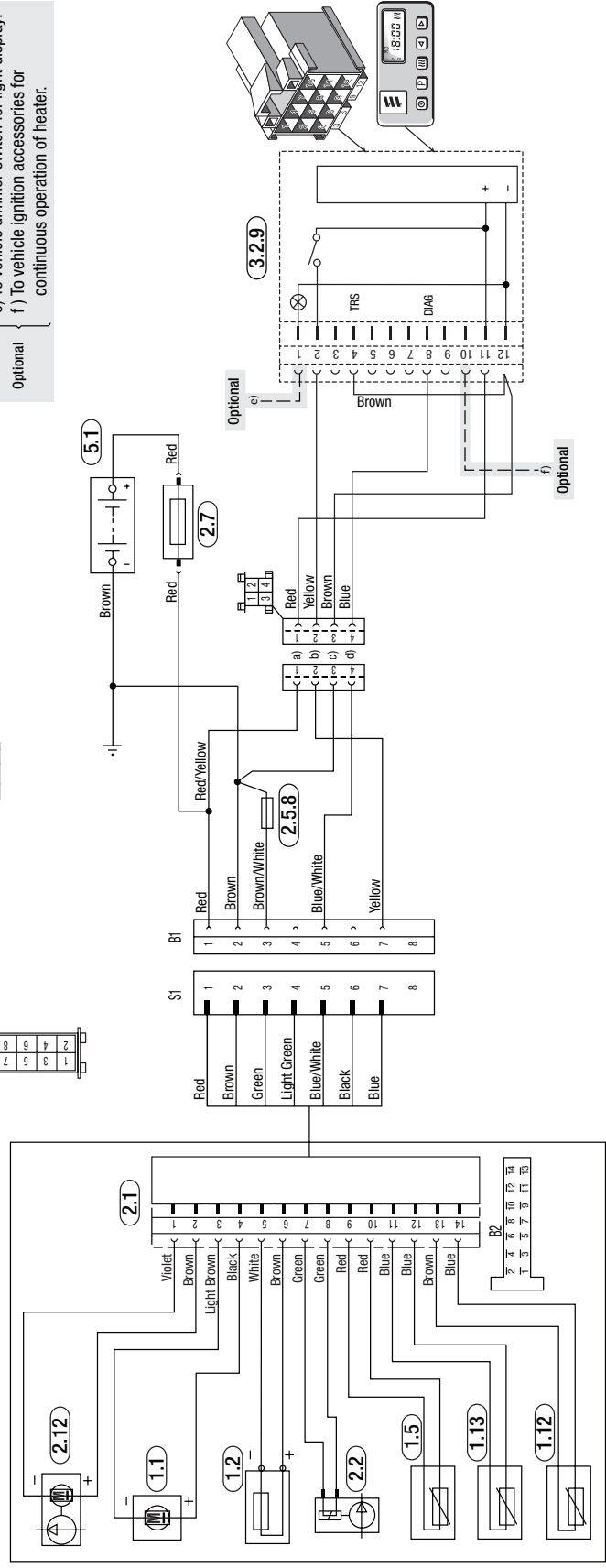
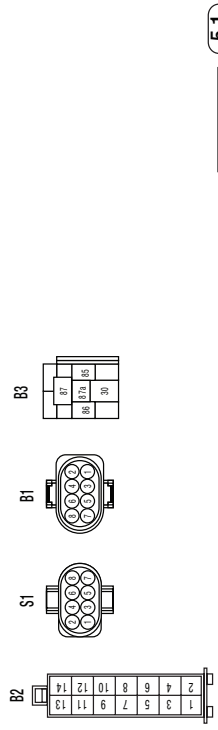


Hydronic D4 SC 12 Volt  
Model 25 1917 01

Wiring Harness P/N:  
20 2900 70 04 01 (CA0 60 401)

- 1.1 Blower motor
- 1.2 Glow pin
- 1.5 Overheat sensor
- 1.12 Flame sensor
- 1.13 Temperature sensor
- 2.1 Control unit
- 2.12 Water Pump
- 2.2 Fuel metering pump
- 2.5.8 Blower lock out resistor (120 Ω/2W)
- 2.7 20 amp main fuse
- 3.11 Push/Pull switch
- 3.2.9 7 day timer
- 5.1 Battery

- a) Power from battery "+".
  - b) Switch control to heater.
  - c) Power from battery "-".
  - d) Diagnostics from heater.
  - e) To vehicle dimmer switch for light display.
  - f) To vehicle ignition accessories for continuous operation of heater.
- Optional



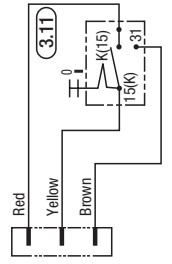
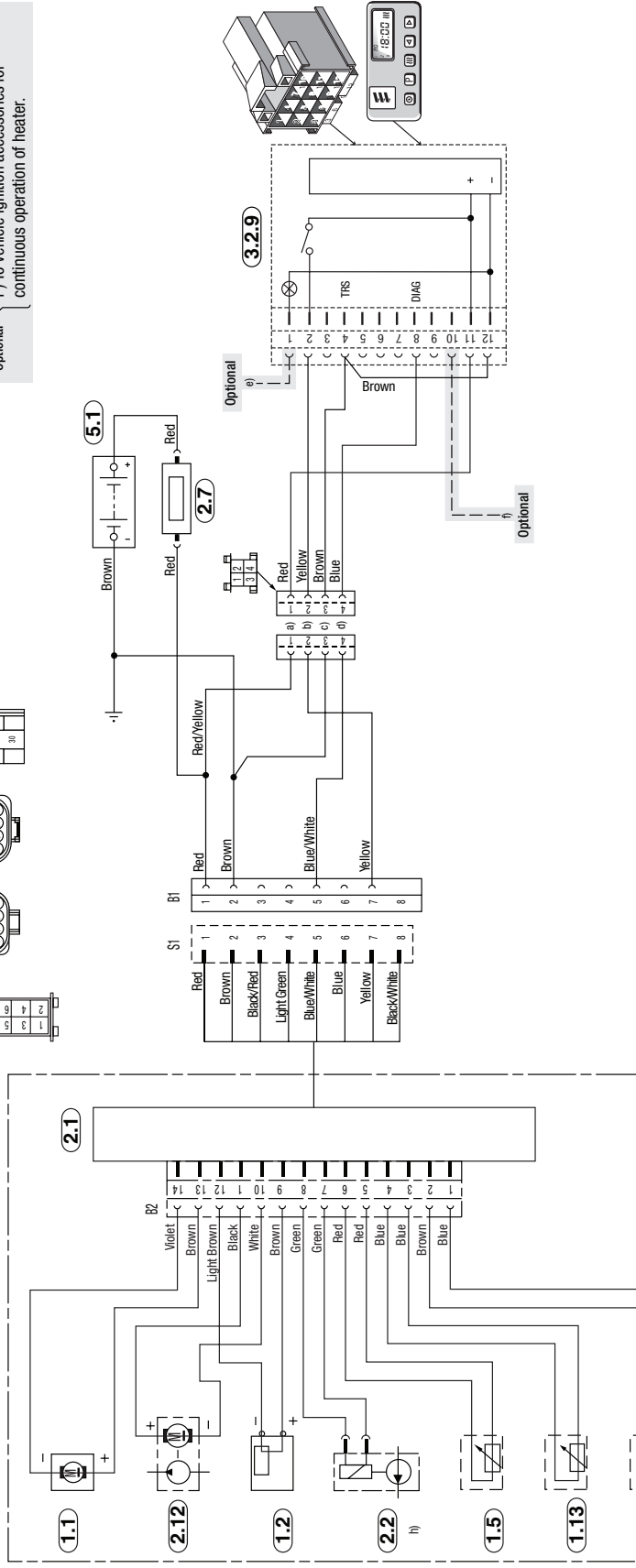
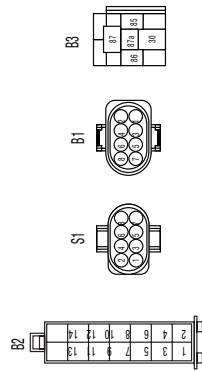
# 5 Circuit Diagram

Hydronic D4 SC 12 Volt  
Model 25 2096 05

Wiring Harness P/N:  
20 2900 70 05 03

- 1.1 Blower motor
- 1.2 Glow pin
- 1.5 Overheat sensor
- 1.12 Flame sensor
- 1.13 Temperature sensor
- 2.1 Control unit
- 2.12 Water Pump
- 2.2 Fuel metering pump
- 2.7 20 amp main fuse
- 3.11 Push/Pull switch
- 3.2.9 7 day timer
- 5.1 Battery

- a) Power from battery "+".
  - b) Switch control to heater.
  - c) Power from battery "-".
  - d) Diagnostics from heater.
  - e) To vehicle dimmer switch for light display.
  - f) To vehicle ignition accessories for continuous operation of heater.
- Optional



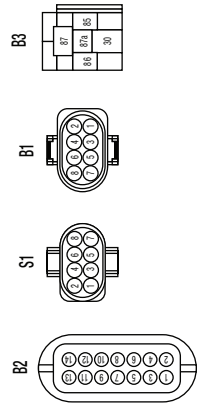
# 5 Circuit Diagram



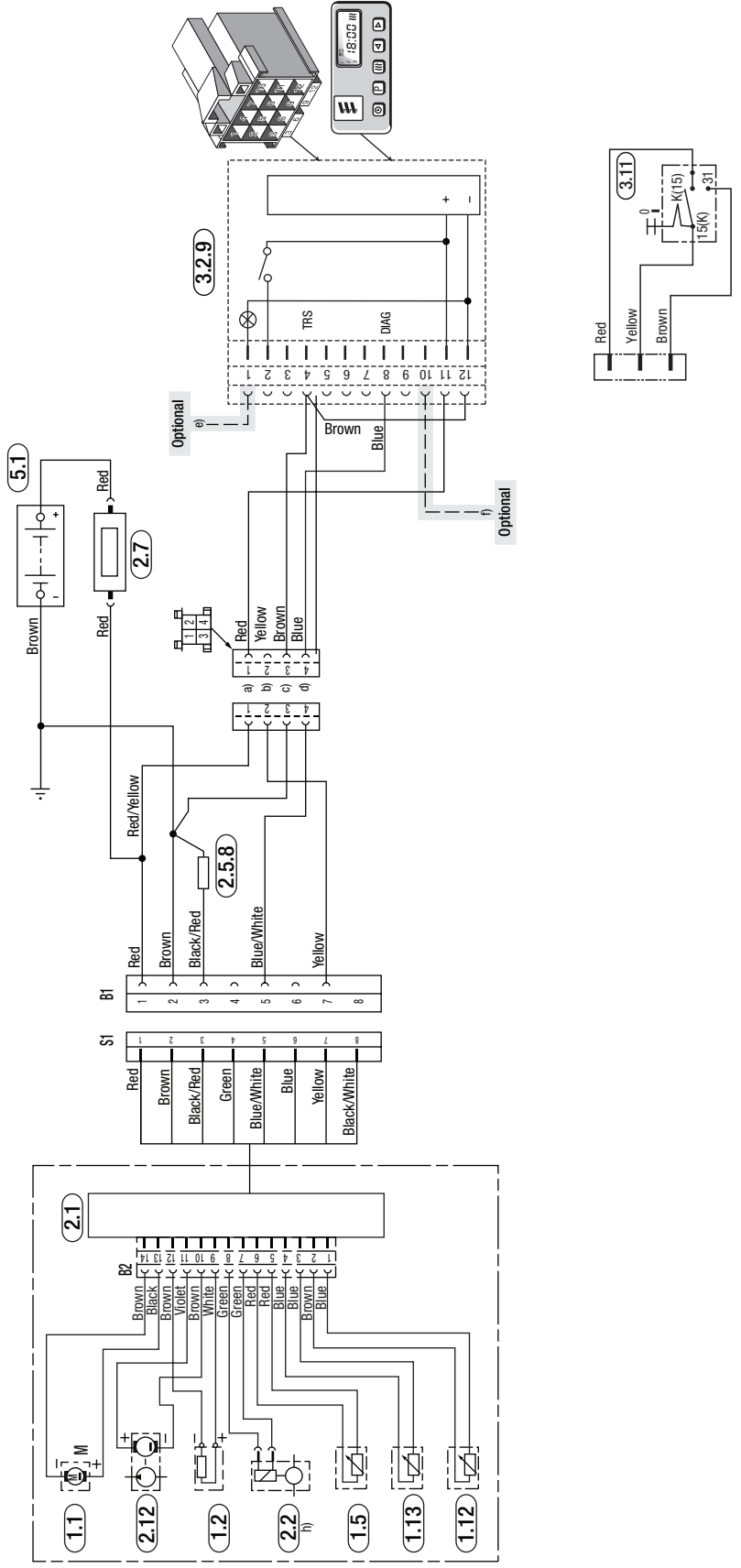
Hydronic D5 SC 12 Volt  
Model 25 1920 05

Wiring Harness P/N:  
20 2900 70 04 01

- 1.1 Blower motor
- 1.2 Glow pin
- 1.5 Overheat sensor
- 1.12 Flame sensor
- 1.13 Temperature sensor
- 2.1 Control unit
- 2.12 Water Pump
- 2.2 Fuel metering pump
- 2.5.8 Blower lock out resistor (120 Ω/2W)
- 2.7 20 amp main fuse
- 3.1.1 Push/Pull switch
- 3.2.9 7 day timer
- 5.1 Battery
- 3.1.1 Push and Pull switch



- a) Power from battery "+".
  - b) Switch control to heater.
  - c) Power from battery "+".
  - d) Diagnostics from heater.
  - e) To vehicle dimmer switch for light display.
  - f) To vehicle ignition accessories for continuous operation of heater.
- Optional

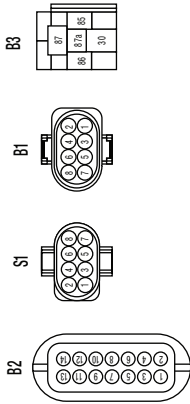


# 5 Circuit Diagram

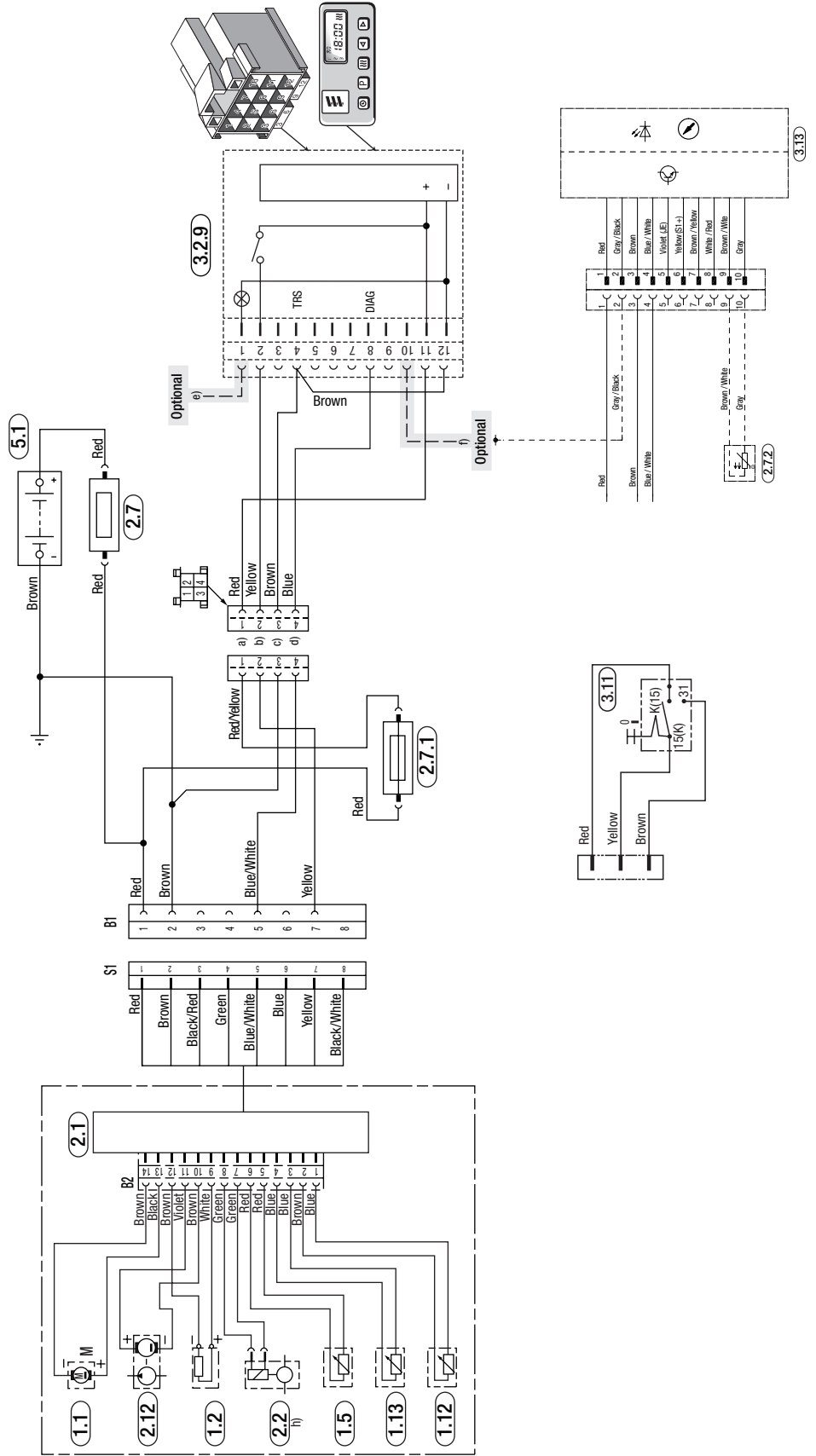
Hydronic D5 SC 12 Volt  
 Model 25 2098 05  
 25 2219 05  
 25 2257 05

Wiring Harness P/N:  
 20 2900 70 05 07  
 Internal FMP  
 No Blower Relay

- 1.1 Blower motor
- 1.2 Glow pin
- 1.5 Overheat sensor
- 1.12 Flame sensor
- 1.13 Temperature sensor
- 2.1 Control unit
- 2.12 Water Pump
- 2.2 Fuel metering pump
- 2.7 20 amp/12V main fuse
- 2.7 15 amp/24V main fuse
- 2.7.1 5 amp fuse
- 2.7.2 Internal Temperature sensor
- 3.11 Push/Pull switch
- 3.13 EasyStart timer
- 3.2.9 7 day timer
- 5.1 Battery



- a) Power from battery "+".
  - b) Switch control to heater.
  - c) Power from battery "+".
  - d) Diagnostics from heater.
  - e) To vehicle dimmer switch for light display.
  - f) To vehicle ignition accessories for continuous operation of heater.
- Optional



# 5 Circuit Diagram



Hydronic D5 SC - 24 Volt  
Diesel & Gasoline versions  
Model 25 2147 05

Wiring Harness P/N:  
20 2900 70 20 13  
External FMP  
No Blower Relay

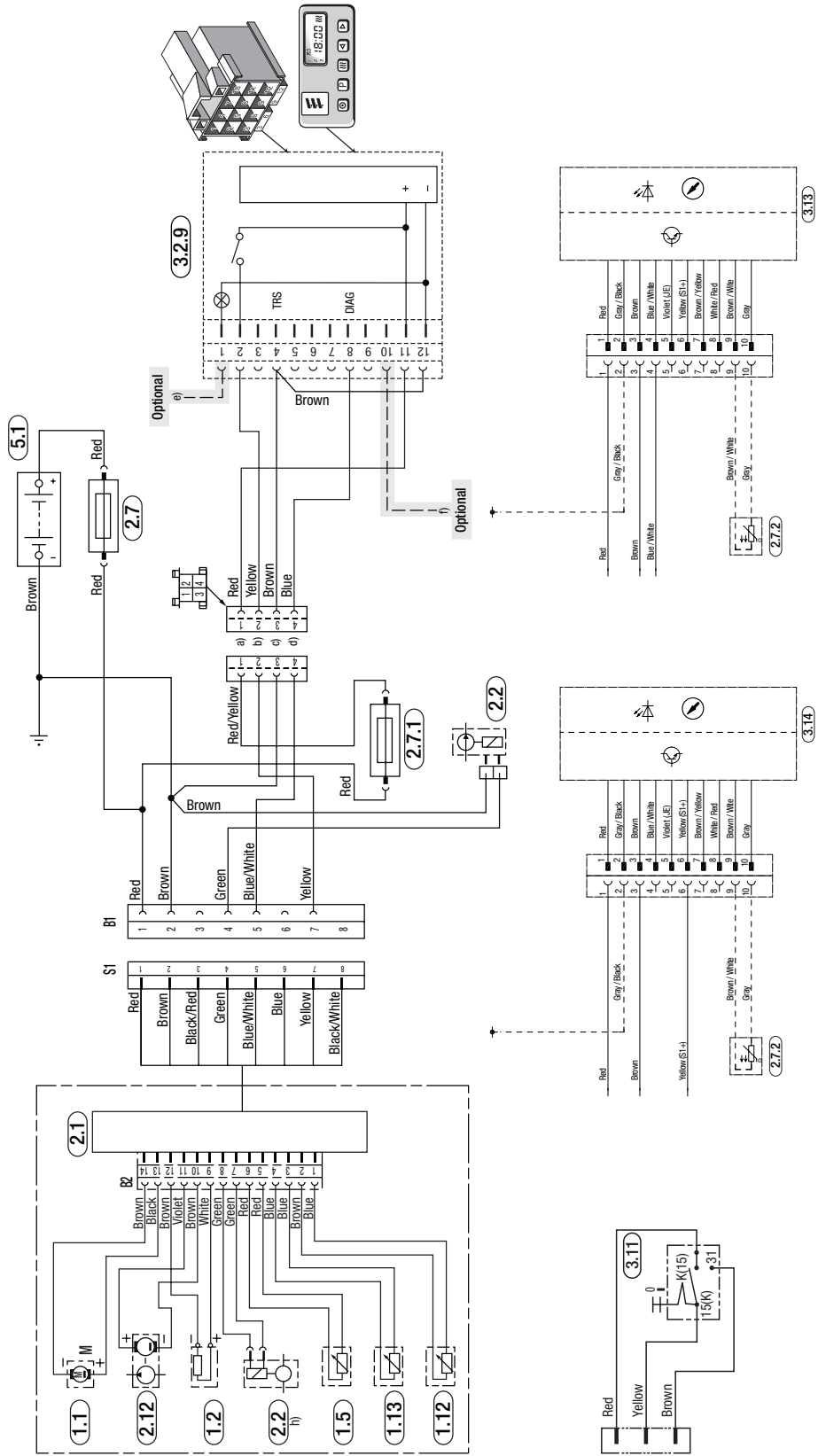
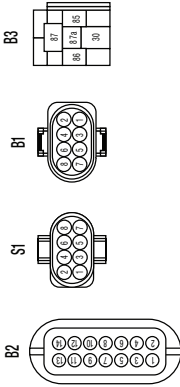
Also applicable to:

Hydronic 4 & 5 SC 12 volt  
Gasoline versions  
Model 20 1820 05  
20 1824 05  
25 2325 05 (External FMP)

- a) Power from battery "+".
- b) Switch control to heater.
- c) Power from battery "+".
- d) Diagnostics from heater.
- e) To vehicle dimmer switch for light display.
- f) To vehicle ignition accessories for continuous operation of heater.

Optional

- 1.1 Blower motor
- 1.2 Glow pin
- 1.5 Overheat sensor
- 1.12 Flame sensor
- 1.13 Temperature sensor
- 2.1 Control unit
- 2.12 Water Pump
- 2.2 Fuel metering pump
- 2.7 20 amp/12V main fuse
- 15 amp/24V main fuse
- 2.7.1 5 amp fuse
- 2.7.2 Internal Temperature sensor
- 3.11 Push/Pull switch
- 3.13 EasyStart timer
- 3.14 EasyStart timer (24V - Hydronic 4/5 Only)
- 3.2.9 7 day timer
- 5.1 Battery

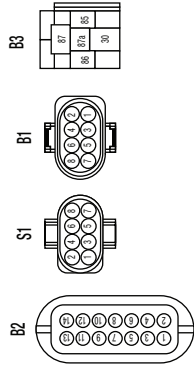


# 5 Circuit Diagram

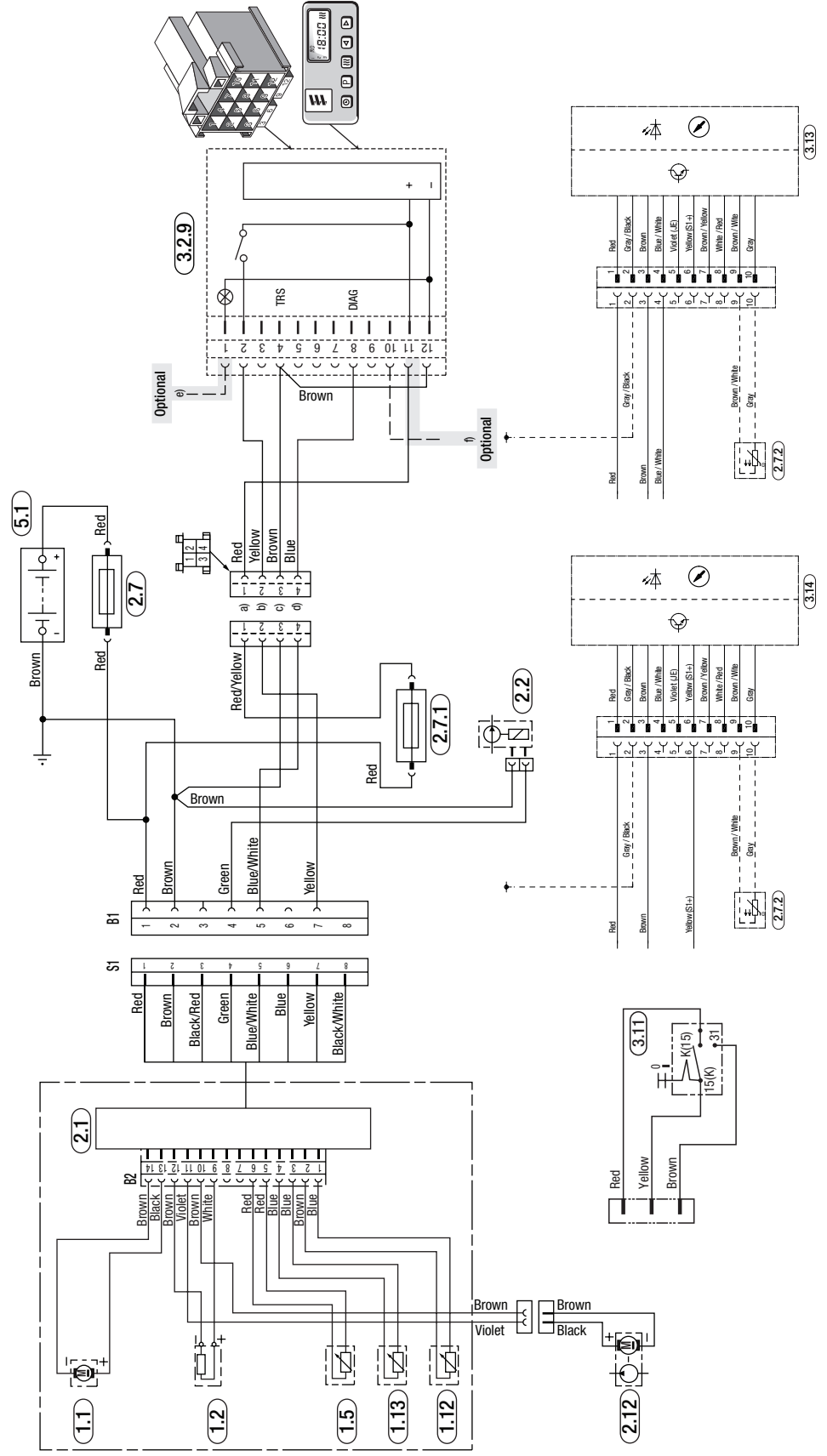
Hydronic 5 S - 12 & 24 volt versions  
 Diesel & Gasoline versions  
 Model 20 1793 05 12 volt  
 Model 20 1819 05 12 volt  
 Model 25 2146 05 24 volt  
 Model 25 2217 05 12 volt  
 Model 25 2218 05 24 volt  
 Model 25 2100 05 12 volt  
 Wiring Harness P/N:

12V 20 2900 70 05 07  
 24V 20 2900 70 05 08

- 1.1 Blower motor
- 1.2 Glow pin
- 1.5 Overheat sensor
- 1.12 Flame sensor
- 1.13 Temperature sensor
- 2.1 Control unit
- 2.12 Water Pump
- 2.2 Fuel metering pump
- 2.7 20 amp/12V main fuse
- 15 amp/24V main fuse
- 2.7.1 5 amp fuse
- 2.7.2 Internal Temperature sensor
- 3.11 Push/Pull switch
- 3.13 EasyStart timer
- 3.14 EasyStart timer (24 V - Hydronic 4/5 Only)
- 3.2.9 7 day timer
- 5.1 Battery



- a) Power from battery "+".
- b) Switch control to heater.
- c) Power from battery "-".
- d) Diagnostics from heater.
- e) To vehicle dimmer switch for light display.
- f) To vehicle ignition accessories for continuous operation of heater.





# 6 Maintenance / Troubleshooting / Repairs



## RECOMMENDED PERIODIC MAINTENANCE

- Use the fuel suitable for the climate (see engine manufacturers recommendations).  
Blending used engine oil with diesel fuel is NOT permitted.
- Maintain your batteries and all electrical connections in good condition.  
With insufficient power the heater will not start.
- Visual check of electrical lines and connections for corrosion.
- Check the battery voltage. Low and high voltage cutouts will shut the heater down automatically.
- Check and if necessary replace fuel filter inserts.
- Visual check of all fuel lines for leaks.
- Check the glow pin and replace if necessary
- Replace the screen, filters and gaskets at least once a year
- Inspect blower motor, coolant pump for any visible signs of damage
- 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.
- Run your heater at least once a month during the year (for a minimum of 15 minutes).

## TROUBLESHOOTING

### BASIC TROUBLESHOOTING

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

Check:

- Circuit breakers and fuses.
- Electrical lines and connections.
- For interference in combustion air and exhaust pipes.
- That there is fuel in the tank.
- Battery voltage (> 10.5V/> 21V)
- Check On/off signal wires (yellow, blue/white wire)
- Carry out visual inspection of the coolant line

### WARNING -SAFETY:

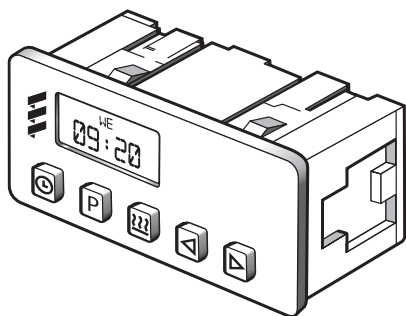
Before performing the troubleshooting and repair on the heater, always have minimum required tools and protective equipments as provided on page 4.

## SELF DIAGNOSTICS

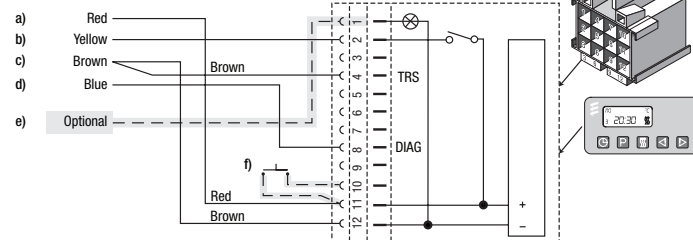
The heater is equipped with self diagnostic capability. You can retrieve information on the heaters last 5 faults using the Eberspaecher's diagnostic tools, i.e. 7 Day Timer, EDiTH, EasyStart timer.

## DIAGNOSTIC TOOLS

### 1. 7 DAY TIMER (12 V / 24 V) - P/N: 20 2900 70 02 30



## 7 DAY TIMER CONNECTIONS - HYDRONIC D5








- a) Power from battery “+”
- b) Switch control to heater
- c) Power from battery “-”
- d) Diagnostic from heater
- e) To vehicle dimmer switch for light display
- f) Temporary switch with jumper cable placed in between terminal #10 and #11 to retrieve the stored faults and unlock the ECU.

## UNLOCKING CONTROL UNITS AND ERASING FAULT MEMORY




### PLEASE NOTE!

The vehicle ignition signal can be provided at pin #10 of 7 Day timer; however, installations with no vehicle ignition connection require a small jumper cable and switch to be placed in between pin #11 (red wire) and pin #10, for diagnostic purposes.

## RETRIEVING THE STORED FAULT CODES

1. Press the  key. The heater is switched on.
2. Press the  key and hold it down and press the key  within two seconds. The current fault code is now displayed (Example: AF:64).
3. The stored fault codes (maximum of 5) can now be retrieved using the arrow keys  and . (Example: F1:64).

## DELETING THE STORED FAULT CODES

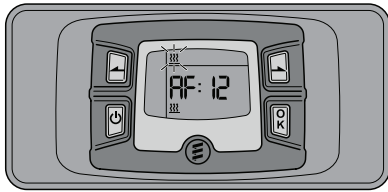
1. Turn on the vehicle ignition to activate timer display (or close the jumper cable circuit).
2. Press the  key. The current fault code (i.e. F15 or F50) is now displayed.
3. Press the  key and hold it down and press the key  within two seconds. The timer is now in the retrieval mode.
4. Turn off the ignition (or open the jumper cable circuit).
5. Press the key and hold it down and press the key within two seconds and hold it down.
6. While holding down keys, turn ignition on (or close the jumper cable circuit) and wait until the following display appears:
7. Press the key to turn the heater off.
8. Press the key to turn the heater on.
9. Repeat step three. The following display appears:
10. The control unit lock is cancelled after three seconds and the heater starts.

# 6 Maintenance / Troubleshooting / Repairs

## DIAGNOSTIC TOOLS

### 2. DIAGNOSTIC UNIT - 12V / 24V

The diagnostic unit is solely used to read out, display and delete faults stored in all types of HYDRONIC D5 heater's electronic control boxes except auxiliary heater D5WZ. The electronic control box can store up to 5 faults. Please refer to user manual at <http://www.eberspaecher-na.com/download-center.html>. (Diagnostic Unit P/N: 20 2900 70 50 60, the HYDRONIC D5 adapter cable P/N: 20 2900 70 5028)



- backwards control button
- forwards control button
- activation button
- confirmation button

#### PERFORM THE DIAGNOSIS

##### HYDRONIC

- Disconnect the plug-in connection in the "Heater / Cable harness" cable loom.
- Connect the adapter cable to the "Heater" cable loom and to the cable harness.
- Select heater type "Parking heater" or "Auxiliary heater" at the changeover switch.
- Plug in the 6-pin connectors of Diagnostic Unit and adapter cable and turn on the heater. Start the vehicle engine also if an auxiliary heater is installed.

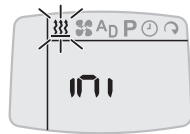
##### AUTOMATIC DETECTION

Five seconds after the diagnostic unit has been connected to the heater using the adapter cable, the automatic detection starts to determine the type of heater to which the diagnostic unit is connected.

#### PLEASE NOTE!

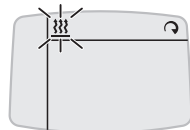
- If the automatic detection was successful, if necessary, the heater is briefly started and then switches off again.

Display until the automatic detection is completed.



##### Display

- If a water heater has been detected



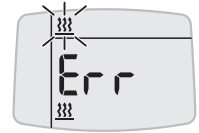
Confirm flashing symbol with

possible displays:

- if no errors/faults exist further action -> display fault memory, delete fault memory.



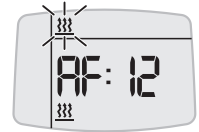
- If errors/faults exist further actions -> display current fault and fault memory, delete fault memory.



#### DISPLAY CURRENT FAULT IN FAULT MEMORY

Simultaneously press and

Display: e.g. AF : 12



#### DISPLAY FAULT MEMORY F1 – F5

press or

Display: e.g. F1 : 20

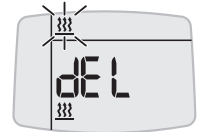


#### DELETE THE FAULT MEMORY AND AS A RESULT, AT THE SAME TIME CANCEL THE CONTROL BOX LOCK

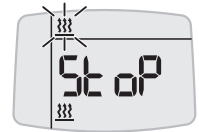
Current fault or fault F1 – F5

confirm with .

Confirm display dEL again with .



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



#### QUIT DIAGNOSIS

Switch off heater

Press , the heater is switched off.

#### PERFORM THE DIAGNOSIS AGAIN

Press , the display is activated.

For further procedure, see left-hand column.

#### UNABLE TO PERFORM THE DIAGNOSIS Automatic detection was unsuccessful

Display if the automatic detection was not successfully completed.



##### Possible causes:

- bl/ws diagnostic cable not connected
- bl/ws diagnostic cable is defective -> check for continuity, short circuit and damage.
- Heater was not detected.

# 6 Maintenance / Troubleshooting / Repairs



## DIAGNOSTIC TOOLS

### 3. EBERSPAECHER UNIVERSAL DIAGNOSTIC TOOL - P/N: 20 2800 70 12 00

Eberspaecher is proud to announce a smaller and lighter version of the current ISO adapter. An advanced computerized heater diagnostic that gives you more detailed information needed for troubleshooting. You have an option to save and send the recorded EDiTH file thru e-mail.

#### TOOLS NEEDED TO DIAGNOSE HEATER

- A PC Desktop or Laptop with Windows OS (XP, Vista, Win 7)  
EDiTH Software Current version of software is EDiTH S4V1-F, please update your software:  
<http://www.eberspaecher-na.com/download-center.html>.

- New Eberspaecher Diagnostic Unit
- Adapters (for specific unit/model heater)
- USB Extension

#### SOFTWARE INSTALLATION

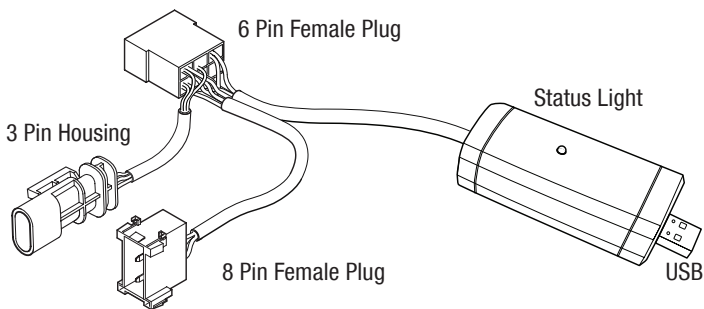
Install EDiTH software on PC. Follow the prompts that appear, saving location and confirmation of installation.

Connect the New Eberspaecher Diagnostic Tool to unused USB in the PC, and connect the necessary adaptor for the specific heater to be diagnosed. See additional information regarding driver installation on page 4. Now you are ready to diagnose the heater, see information above for EDiTH Software.

**PLEASE NOTE!** on USB Drivers:

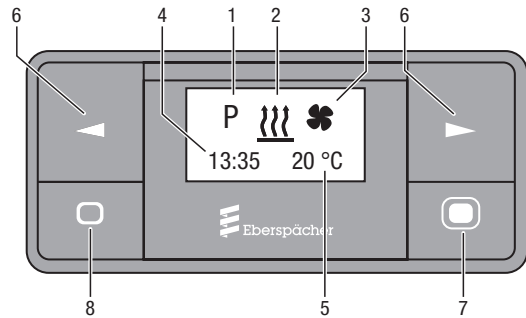
Computers with Win 7 or 8, will automatically search the drivers and install it directly.

For computers with Win XP, please download the driver manually at: <http://www.ftdichip.com/Drivers/VCP.htm> and install it.



For illustration purpose only

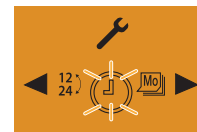
### 4. EASYSTAR TIMER - P/N: 22 1000 34 15 00



- 1 Program symbol
- 2 Heat symbol
- 3 Fan symbol
- 4 Current time
- 5 Temperature (Optional)
- 6 Menu selection button
- 7 Enter / "ON"
- 8 Exit / "OFF"

#### STEPS TO UNLOCK THE ECU

- Use the buttons ◀ ▶ to select the setting 🔧 symbol in the Menu bar and confirm by pressing the ◻ button. The Setting Menu is used to set current time, weekday and local time format selecting ⌚, 📅 and 🕒 symbols respectively, then confirm them by pressing the ◻ button.
- Service/Workshop Menu  
The service/Workshop menu is a part of SETTINGS MENU 🔧, and can be accessed by pressing ◻ for more than 5 seconds while the EasyStar timer screen looks like the image below.



In the Service/ Workshop menu, a number of different parameters of the EasyStart timer can be changed via item selection between 1.1 to 14.6.

The Diagnostic Fault Codes can be found in the menu item # 1.1 of Service/ Workshop Menu.

# 6 Maintenance / Troubleshooting / Repairs

## DIAGNOSTIC TOOLS

### EASYSTART FAULT DISPLAYS

### DESCRIPTION

### REMEDY / WORKSHOP



- Automatic detection is active.
- The timer has been disconnected from the voltage and reconnected.

Wait until the automatic detection has ended, then set the time and weekday.



- The timer has been disconnected from the voltage and reconnected.
- The automatic detection has ended.

Set the time (hours and minutes) and the weekday. Then the Start display appears.



- No communication.
- It means heater can not be recognized by EasyStart timer (please see the manual)
- EasyStart timer can only diagnose 12V (Not 24V) Hydronics D5 heaters with current generation ECUs (H-Kit type).

- Check and if necessary renew the heater fuse.
- Check the voltage supply.
- Check the wiring.



- 1st heater fault.

Perform the heater diagnosis.

- Access service/workshop menu via settings and select service function #1.1.1 to display current fault and #1.2.1 to display fault memory F1 - F5.
- 1.2.1: read out memory fault 1 to 5 by selecting the function using and pressing buttons.
- 1.3.1: Select the delete function by pressing the button, the DEL display (appears flashing), press the to confirm. "no diag" is displayed if no diagnostics cable is connected.



- 2nd heater fault.

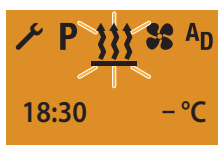
Perform the heater diagnosis.

- Access service/Workshop menu via settings and select service function #1.1.2 to display current fault and #1.2.2 to display fault memory F1 - F5.
- 1.2.2: read out memory fault 1 to 5 by selecting the function using and pressing buttons.
- 1.3.2: Select the delete function by pressing the button, the DEL display (appears flashing), press the to confirm. "no diag" is displayed if no diagnostics cable is connected.



- Voltage too low.

- Charge the battery.
- Check the heater's power supply.



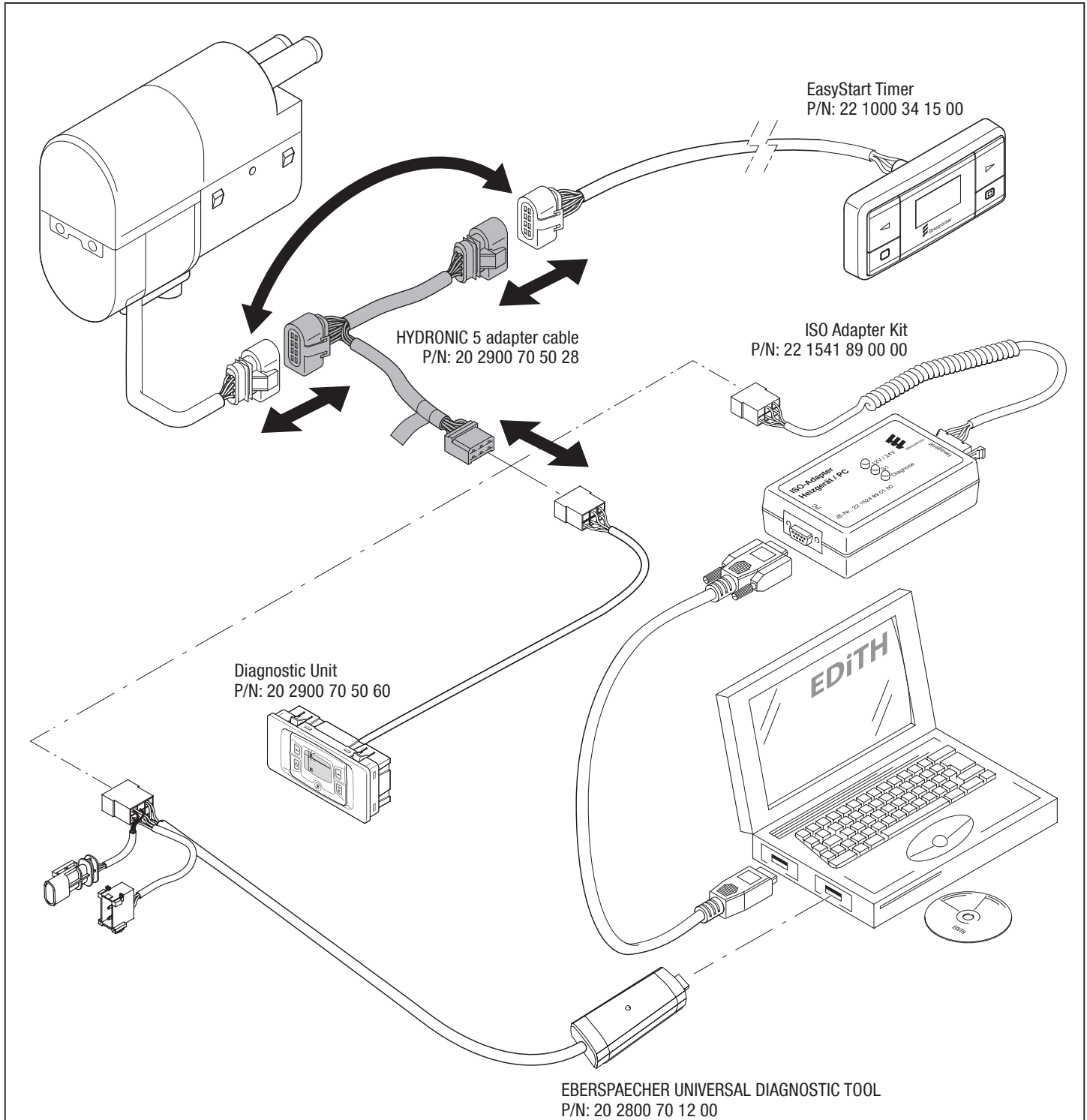
- Temperature sensor is defective.

Check and if necessary renew the temperature sensor.

# 6 Maintenance / Troubleshooting / Repairs



## DIAGNOSTIC TOOLS



### HOOK UP

- Disconnect the main harness from heater and insert adapter cable harness between them.
- Connect adapter cable to the cable loom of the ISO Adapter/Diagnostic unit/Eberspaecher Universal Diagnostic Tool.

# 6 Maintenance / Troubleshooting / Repairs

## DIAGNOSTIC TOOLS

### 5. \* ISO ADAPTER KIT (EDiTH)

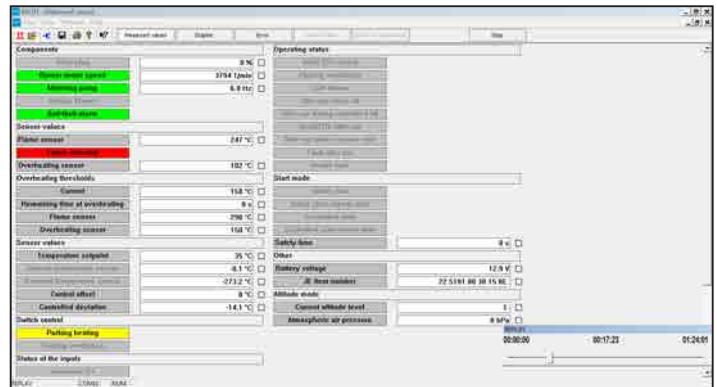
This plug and play type computer aided diagnostic tool, which uses EDiTH software (S4V1-F), is compatible with most versions of Windows OS, including windows 7. This tool allows user to access general data of the heater, delete the fault codes as well as run functional check to see all test data in numerical and graphical version. In addition, it can be used to test different heater components separately.

#### ACTIVATING EDITH DIAGNOSTIC TESTS:

- 1 Double click the EDiTH shortcut on the desktop to launch the EDiTH program
- 2 Click on the "Select Heater" icon from the navigation menu displayed
- 3 Select the heater type from the groups listed in the far left column (example: Hydronic B/D4/5W S/SC etc.)
- 4 Click and select the correct heater model number and the correct ECU version or click and run the "Automatic detection" cycle.
- 5 Select the diagnostic test to be activated in the far right column.
- 6 Click on "Start test" button.
- 7 Select available options depending on type of the heater i.e. General Data, Functional Test, Switch on Component.
- 8 To delete the fault code, just click on the "error" and then "delete".
- 9 Once tests are completed, the EDiTH file can be saved in the computer; click "save" and select appropriate location.
- 10 The saved tests can be replayed at later time and transferred via email for warranty purposes.

#### PLEASE NOTE!

- Before commissioning the EDiTH test, Selection of appropriate COM PORT is critical for proper data communication via USB.
- When connected, the green LED on the ISO adapter conforms a 12/24V power supply and the amber LED (flickering light) indicates an active diagnostic link. A constantly lit red LED may indicate a communication failure between the heater and computer.
- The latest version EDiTH software can be downloaded from the technical site of the Eberspaecher website.



#### PROGRAM ERROR MESSAGES

ERROR MESSAGE	CAUSE REMEDY
No COM port available	There is no COM port in the system or none available (possibly being used by another program). Also, check the USB driver and restart the computer.
Range check	The range check area configured in the database has been breached.
Communication setup error	An error occurred during a test sequence when setting up communication with the control box. Please check the connection with the control box. Check the USB driver and restart the computer
Correct selection error	Parking heater /independent heater selection or item number of the connected control box is wrong. Check the heater type.
Commands from database missing	No request commands stored in the database for the diagnosis.
Switching on heater failed	Heater unable to start
Item number comparison error	The wrong unit was connected.
No item number	Unit does not provide an item number or no unit connected.

#### COMMUNICATION

ERROR MESSAGE	CAUSE REMEDY
Time-out	Check cable connection
Checksum	Faults in the data cable
Wrong log length	Wrong control box selected

# 6 Maintenance / Troubleshooting / Repairs



## TEST VALUES

### RESISTANCE

Metering pump                      Approx. 10  $\Omega$  for 12 volt heater and 36  $\Omega$  for 24 volt heater.  
 Glow Pin                              Approx. 0.9  $\Omega$  for 12 volt heater and 2.2  $\Omega$  for 24 volt heater.

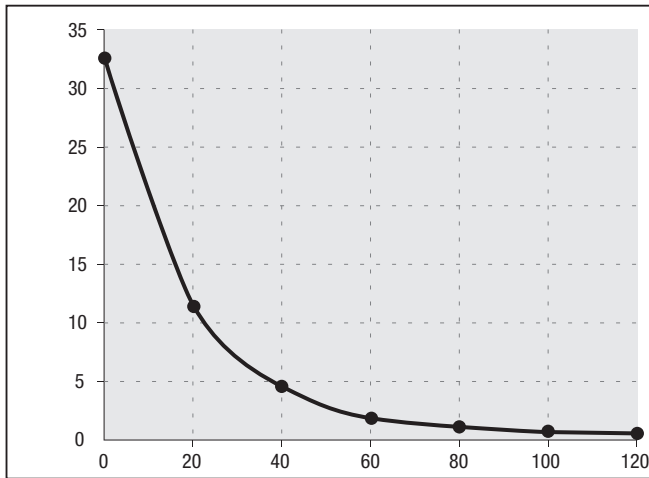
EGT\*: 325°C avg (300 mm from exhaust port in high mode)

\* EGT reading can vary largely depending upon the installation, inlet temperature, coolant temperature and mode of the heater.

### CHECKING THE SENSORS

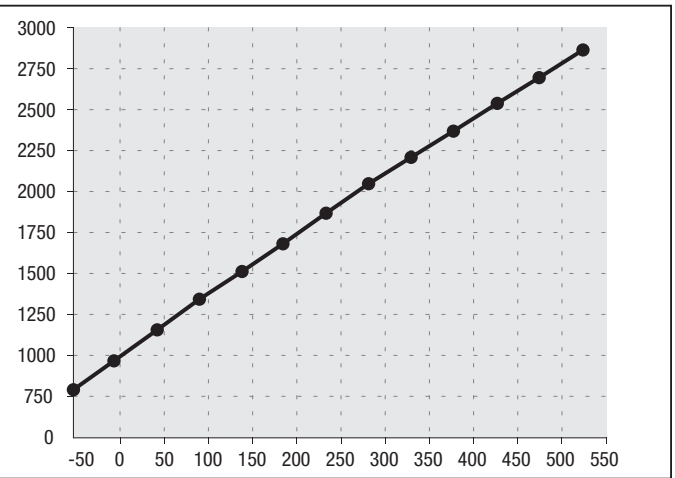
To check the sensors, measure the resistance at current temperature, see following diagrams:

TEMPERATURE SENSOR / OVERHEATING SENSOR (NTC)



R > 2M  $\Omega$  = open circuit  
 R < 50  $\Omega$  = short circuit

FLAME SENSOR (PTC)



R > 3040  $\Omega$  = open circuit  
 R < 780  $\Omega$  = short circuit

### VALUE TABLE (Flame Sensor)







Values table																
Temp [°C]	-50	0	10	20	30	50	80	90	100	130	150	200	250	300	350	400
R [ $\Omega$ ]	803	1000	1022	1062	1097	1194	1309	1347	1385	1498	1573	1758	1941	2120	2297	2470
U [V]	1.407	1.639	1.661	1.719	1.738	1.840	1.948	1.983	2.016	2.111	2.171	2.308	2.432	2.542	2.642	2.732

### VALUE TABLE (Temperature Sensor and Overheating Sensor)

Values table													
Temp [°C]	0	10	20	30	40	50	60	70	80	90	100	110	120
R [k $\Omega$ ]	32.54	19.87	12.48	8.06	5.33	3.60	2.48	1.75	1.25	0.91	0.67	0.50	0.38
U [V]	4.275	3.960	3.561	3.100	2.611	2.135	1.705	1.339	1.041	0.805	0.622	0.483	0.376

# 6 Maintenance / Troubleshooting / Repairs

## FAULT CODES

FAULT CODE	FAULT DESCRIPTION	CAUSES / REPAIR
000	Normal Operation	
010	Overvoltage	Over voltage (>16V or 32V*) at ECU for minimum of 20 seconds without interruption - Heater is not allowed to run. <ul style="list-style-type: none"> <li>Check the voltage between terminals 1 (RED) and 2 (BROWN) at connector (B1). If voltage is &gt;15V or 30V*, check the battery, electrical leads and vehicle charging system. *24V heater only.</li> </ul>
011	Under voltage shut down	Under voltage (<10.2V or 20.4V* at ECU for minimum of 20 seconds without interruption - Heater is not allowed to run. <ul style="list-style-type: none"> <li>Check the voltage between terminals 1(RED) and 2(BROWN) at connector (B1).</li> <li>If voltage is &lt;10.5V or 21V*, check the battery, electrical leads and vehicle charging system. (Or start the heater after shutting down high load appliances) * for 24V heaters only.</li> </ul>
012	Overheating  <b>WARNING:</b> Risk of physical injury and burns.	The coolant temperature at temperature sensor or overheat sensor is greater than 125°C. <ul style="list-style-type: none"> <li>Check for possible causes of overheat (water circuit), Sensor.</li> <li>Check the direction of the coolant flow while working in conjunction with either vehical coolant pump or non return valve.</li> <li>Look for any blockages or restrictions in the water circuit i.e. orifices</li> <li>Check the direction of the coolant flow and sensors.</li> <li>Check overheat switch resistance values.</li> </ul>
014	Possible overheating detected (difference evaluation)  <b>WARNING:</b> Risk of physical injury and burns.	Difference of measured values at temperature sensor >25°C (min. 80°C water temperature and metering pump in operation) <ul style="list-style-type: none"> <li>Check temperature sensor and overheat sensors, replace if necessary (sensor values are available on page 47.</li> <li>Relieve air in coolant system specifically inside the heater.</li> </ul>
015	Too many overheats  <b>WARNING:</b> Risk of physical injury and burns.	Heater is overheated repetitively (code 12 or 14), and ECU is probably locked out for safety reasons. Repetitive overheats are mainly caused by defective water pump, lack of coolant flow and/or defective sensors. <ul style="list-style-type: none"> <li>Unlock the ECU using one of the diagnostic units, see diagnostic procedure on pages 41 to 46.</li> <li>Check the coolant pump for any contamination and component failures, replace if necessary. See disassembly/assembly procedure on page 60.</li> <li>Check the coolant circuit, remove air bubbles, contamination and remove any overall system pressure.</li> <li>Check temperature and overheat sensors at room temperature, see their values on page 47.</li> <li>For additional information on causes of over-heatings, please see page 55.</li> </ul>
017	Overheating detected  <b>WARNING:</b> Risk of physical injury and burns.	Temperature at temperature or overheating sensor > 130°C, emergency OFF if Fault Code 012 or 014 not applicable. <ul style="list-style-type: none"> <li>Follow the step provided in Faults 15.</li> </ul>
020	Open circuit - glow pin  <b>WARNING:</b> Risk of electrical shock, physical injury and burns.	Glow pin resistance is out of the range(very high resistance). To remove a glow pin, please refer the Disassembly/assembly of the heater on page 58. <ul style="list-style-type: none"> <li>Test the glow pin for its amperage draw by applying the separate DC voltage 8V* or 18V** +/- 0.1V and measure the current within 25 seconds. If the current is 8.5A* or 4.2A** +/- 1A then the glow plug is OK.</li> <li>* For 12V Hydronic heaters</li> <li>**For 24V Hydronic heaters</li> <li>Measure the resistance of Glow pin: 0.9 Ohms (for 12V Hydronic heater) and 2.2 Ohms (for 24V Hydronic heater).</li> </ul>
021	Short circuit - glow pin  <b>WARNING:</b> Risk of electrical shock, physical injury and burns.	<ul style="list-style-type: none"> <li>The Glow pin resistance is out of the range (very low resistance, please see test value on page 47). To remove a glow pin, please refer the Disassembly/assembly of the heater on page 58.</li> <li>Check glow pin and electrical leads for continuity, replace if necessary.</li> <li>Remove the glow pin and start the heater, if code 020 appears then replace the glow pin, if code 021 still appears then inspect the electrical connections or replace the ECU if necessary.</li> </ul>



# 6 Maintenance / Troubleshooting / Repairs




## FAULT CODES

FAULT CODE	FAULT DESCRIPTION	CAUSES / REPAIR
030	<p>Combustion air blower motor Speed of combustion fan motor outside tolerance range.</p> <p><b>⚠ WARNING:</b> Risk of electrical shock and physical injury.</p>	<p>Overload at the blower motor due to jammed impeller (due to frost, salt, carbon or improper alignment); fix the jam or replace the motor if necessary. To remove blower motor, please refer the Disassembly/assembly of the heater on pages 57 and 58.</p> <ol style="list-style-type: none"> <li>1 Measure speed of combustion air fan motor with max. 8.2V* or 15.5V** +/-0.2V from external power sources for 60 seconds. * for 12V Hydronic heaters **for 24V Hydronic heaters If the measured speed &lt; 10,000 rpm, then replace the combustion air fan. If the measured speed &gt; 10,000, then replace the controller.</li> <li>2 Measure the air gap between combustion air intake wheel cast iron base using feeler gauge: if gap is &gt;0.32mm+/-0.04 then replace the blower motor assembly.</li> <li>3 High torque required by stiff or jammed blower fan leads to overload at the motor and current draw increases beyond range; therefore sometimes ECU registers code 030 into 032 because of similar root causes.</li> </ol>
031	<p>Combustion air blower motor - interruption</p>	<p>Open circuit or high resistance at blower motor connection:</p> <ul style="list-style-type: none"> <li>• Check the lead and connector to the blower motor for continuity.</li> <li>• Follow the troubleshooting procedure as given in F032</li> <li>• Carry out ECU test (Or contact Eberspaecher NA)</li> </ul>
032	<p>Combustion air blower motor short circuit</p> <p><b>⚠ WARNING:</b> Risk of electrical shock and physical injury.</p>	<p>Overload at the blower motor, or motor has very low resistance value while in operation. Remove and test the blower motor. To remove blower motor, please refer the Disassembly/assembly of the heater on pages 57 and 58.</p> <ol style="list-style-type: none"> <li>1 Measure the current draw and motor speed by applying 8V* or 15.5V** +/-0.2V DC from external power sources for 60 seconds and if current &gt;3.2A*/1.8A** - replace blower motor assembly. If the measured speed &lt; 10,000 rpm, then replace the combustion air fan. If the measured speed &gt; 10,000, then replace the controller. * for 12V Hydronic heaters ** for 24V Hydronic heaters</li> <li>2 Check the overall motor resistance between housing and lead: if the measured Resistance &lt; 2 K Ohms then there is an accidental ground. Replace the combustion air fan. If measured value is &gt; 2 K Ohms, then measure speed of the combustion air fan motor.</li> <li>3 Measure the air gap between combustion air intake wheel cast iron base using feeler gauge: if gap is &gt;0.32mm+/-0.04 then replace the blower motor assembly.</li> <li>4 Due to excessive ice built up or heavy carbon particulates in the blower fan outlet area could increase the resistance and eventually overload the motor. Therefore sometimes by simply cleaning the surface area of the blower motor could also help removing the fault.</li> </ol> <p>For further troubleshooting, follow steps in Fault 30.</p>
038	<p>Vehicle fan relay control break For wiring harness (20 2900 70 0401)</p>	<p>Resistance at Vehicle fan relay connection circuit is out of the range.</p> <ul style="list-style-type: none"> <li>• Check the relay, wire harness and other connections, replace if necessary.</li> <li>• For wire harness (20 2900 70 0401) without relay, replace harness or check the wires at the main connector.</li> <li>• This fault code can not be displayed by some heaters.</li> </ul>
039	<p>Vehicle fan relay control short circuit</p>	<p>Resistance at Vehicle fan relay connection circuit is out of the range.</p> <ul style="list-style-type: none"> <li>• Pull the relay off, if the fault 038 is shown, then relay is defective- replace the relay. If fault code 039 is still there, then check the relay connections, wire or ECU.</li> <li>• For wire harness (20 2900 70 0401) without relay, replace harness or check the wires at the main connector.</li> </ul>
041	<p>Water pump - Interruption</p>	<p>Water pump resistance is high therefore current draw is decreased beyond the ECU range.</p> <ul style="list-style-type: none"> <li>• Check the water pump, inspect internal components (for disassembly/assembly, please see page 60)</li> <li>• Check the supply lead and connector to water pump for short circuit; if OK then check ECU.</li> <li>• If water pump and ECU is OK, then check the coolant circuit for any contamination, or overall system resistance.</li> </ul>
042	<p>Water pump short-circuit</p>	<p>Water pump resistance is low therefore current draw is increased beyond the ECU range.</p> <ul style="list-style-type: none"> <li>• Check the water pump, inspect internal components (for disassembly/assembly, please see page 60)</li> <li>• Disconnect water pump, if code 041 appears, then replace the water pump; if fault code 042 remains, then check the wire harness, connections and ECU.</li> <li>• Check the supply lead and connector to water pump for short circuit; if OK then check ECU.</li> </ul>

# 6 Maintenance / Troubleshooting / Repairs

## FAULT CODES

FAULT CODE	FAULT DESCRIPTION	CAUSES / REPAIR
047	Short circuit - fuel metering pump	The Fuel metering pump resistance value is out of the range (Low resistance); Remove the FMP and carry out test. <ul style="list-style-type: none"> <li>• Disconnect the FMP, if ECU gives fault 048, then check the FMP resistance, or replace if necessary; if the fault 047 persists, then check the wire harness, connector and ECU.</li> <li>• Measure FMP resistance at room temperature for 12V heaters -10 ohms; for 24V heaters - 36 ohms; replace if necessary.</li> <li>• Check the supply lead, connector and wire harness, replace if necessary.</li> <li>• If FMP and harness is OK, check the ECU.</li> </ul>
048	Open circuit - fuel metering pump	The Fuel metering pump resistance value is out of the range (high resistance); Remove the FMP and carry out test. <ul style="list-style-type: none"> <li>• Measure FMP resistance at room temperature for 12V heaters -10 ohms; for 24V heaters - 36 ohms; replace if necessary.</li> <li>• Check the supply lead, connector and wire harness, replace if necessary.</li> <li>• If FMP and harness is OK, check the ECU.</li> </ul>
050	Too many no start attempts	Too may start attempts or overheats triggered ECU to lock the heater, under which heater would not start unless any active and stored faults are deleted. <ul style="list-style-type: none"> <li>• Use one of the diagnostic tools mentioned on pages 41-46 and follow the procedure to retrieve the fault and Unlock the ECU.</li> </ul>
051	Faulty flame recognition	At start, if flame sensor is a above 70°C > 240 seconds; check exhaust gas and combustion air supply. <ul style="list-style-type: none"> <li>• Check flame sensor at room temperature, replace if necessary. For flame sensor values see graph on page 47.</li> <li>• If flame sensor is OK, then check ECU.</li> </ul>
052	No start safety time exceeded	No flame detected on start attempt; number of failed start attempts could lock the ECU under fault 50. <ol style="list-style-type: none"> <li>1 Check the intake and exhaust systems for blockages by dirt, salt, condensation. (maintain the total 90° bends from intake to exhaust pip no more than 3 or 270°)</li> <li>2 Measure fuel quantity test (8.5 to 9.5mm)* and check pump angle (15 to 35°). Check the fuel line for air bubbles or contaminants. For fuel quantity test procedure, please refer page 56. *D5 hydronics heater only</li> <li>3 At high altitudes &lt;1500 m, connect high altitude sensor for proper heater operation</li> <li>4 Remove carbon, dirt or foreign particles from combustion chamber and run the heater using kerosene for 30 mins. max thereafter.</li> <li>5 Check the flame sensor value at room temperature (see page 47).</li> <li>6 For fresh installation and first time heater start up require fuel priming which could cause 52.</li> <li>7 Check the air gap between the blower motor fan and cast iron housing &lt; 0.32mm +/- 0.04</li> <li>8 Check the Glow pin resistance and replace the glow pin screen, also clean the vent hole (a small channel connecting to the blower air inlet to the flame chamber)</li> <li>9 Check the flame chamber and replace if its shape is elongated due to thermal stresses.</li> <li>10 Replace the ECU, if necessary.</li> </ol> For further information on carboning issue, please refer page 54. Also, for disassembly/assembly of the heater, please see pages 57-59.
053	Flame cutout in high mode  <b>WARNING:</b> Risk of Asphyxiation and Fire Hazard	Heater completed its start up procedure successfully before the flame has extinguished. <ul style="list-style-type: none"> <li>• Mainly caused by lack of combustion air or fuel input during the High mode.</li> <li>• Follow the steps provided in fault 052.</li> </ul>
056	Flame cutout in low mode	During the heater operation in LOW mode, the flame has extinguished. <ul style="list-style-type: none"> <li>• Check the air intake and exhaust pipes and replace their location, if required</li> <li>• Carry out further troubleshooting steps as provided in faults 52.</li> </ul>
060	Open circuit - temperature sensor	Temperature sensor detects a value beyond its range (high resistance $R > 2M \Omega$ = open circuit); Remove temperature sensor (For removal procedure of the temperature sensor, please see page 58) and check connections. <ul style="list-style-type: none"> <li>• Measure the sensor at room temperature see test value on page 47, and replace if necessary.</li> <li>• If the value is ok; check the ECU.</li> </ul>
061	Short circuit - external	Temperature sensor detects a value beyond its range (low resistance, $R < 50 \Omega$ = short circuit); Remove the sensor (please see procedure on page 58) and check the connections. <ul style="list-style-type: none"> <li>• Remove the Temperature sensor from connection and turn on the heater, if code 060 appears then check the sensor resistance or replace it if necessary; if code 061 persists, then check the connections, and ECU, replace if necessary.</li> </ul>

# 6 Maintenance / Troubleshooting / Repairs



## FAULT CODES

FAULT CODE	FAULT DESCRIPTION	CAUSES / REPAIR
064	Open circuit - flame sensor	The Flame sensor detects a value beyond its range (high resistance $R > 3040 \Omega$ = open circuit); Remove flame sensor (For removal procedure of the temperature sensor, please see page 58) and check connections. <ul style="list-style-type: none"> <li>• Measure the sensor at room temperature (see test value on page 47) and replace if necessary.</li> <li>• If the value is OK; check the ECU.</li> </ul>
065	Short circuit - flame sensor	The Flame sensor detects a value beyond its range (low resistance, $R < 780 \Omega$ = short circuit); Remove the sensor (please see procedure on page 58) and check the connections. <ul style="list-style-type: none"> <li>• Remove the Flame sensor from connection and turn on the heater, if code 064 appears then check the sensor resistance or replace it if necessary; if code 065 persists, then check the connections, and ECU, replace if necessary.</li> </ul>
071	Open circuit - overheat sensor	The Overheat sensor detects a value beyond its range (high resistance $R > 2M \Omega$ = open circuit); Remove overheat sensor (For removal procedure of the temperature sensor, please see page 58) and check connections. <ul style="list-style-type: none"> <li>• Measure the sensor at room temperature see test value on page 47, and replace if necessary.</li> <li>• If the value is ok; check the ECU.</li> </ul>
072	Short circuit - overheat sensor	The Overheat sensor detects a value beyond its range (low resistance, $R < 50 \Omega$ = short circuit); Remove the sensor (please see procedure on page 58) and check the connections. <ul style="list-style-type: none"> <li>• Remove the Overheat sensor from connection and turn on the heater, if code 071 appears then check the sensor resistance or replace it if necessary; if code 072 persists, then check the connections, and ECU, replace if necessary.</li> </ul>
091	External interference voltage	Error in controller from interference voltage from vehicle network possible causes: poor batteries, poor battery charges, other interference sources; eliminate interference voltages**. ** Disconnect the heater from power for 10 seconds by disconnecting the 8 pin connector at the heater or pull main harness fuse, then reconnect and test it again. If the problem persists test the heater using an external power source other than the vehicle(known good battery only) These faults are common to a bad power supply, attached charger or dead cell in a battery.
090 092 - 103	Controller defect  Faults not shown by the diagnosis system HYDRONIC won't start	Control unit malfunction due to interference voltage from vehicle electrical 092 -103 system; possible causes low batteries, charges, other sources of interference, eliminate interference voltages. Internal faults detected in microprocessor/memory. Replace control unit. Internal failure. Replace control unit. After switching HYDRONIC on, the water pump and vehicle fan start immediately. <ul style="list-style-type: none"> <li>• Remove and check temperature sensor.</li> <li>• After switching HYDRONIC on, the vehicle fan starts, functioning "preventing" is activated.</li> <li>• Changeover venting to heating at "heating/venting changeover switch."</li> </ul>

**PLEASE NOTE!** For codes starting with 9x (e.g.91,93), try to put a good known working battery. Be sure to have the engine off and any equipment as well. Try to restart heater and check for any codes. This has to be done before/prior replacing the ECU.

**⚠ WARNING - SAFETY:**

Before performing the diagnostic and repair on the heater, always have minimum required tools and protective equipments as provided on page ...

### AIR PRESSURE /HIGH ALTITUDE SENSOR FAULT CODE DISPLAY

FAULT CODE	FAULT DESCRIPTION	COMMENTS / REMEDIAL ACTION
00	No faults —	
11	Communication loss	Interruption of the diagnostics cable between the control box (heater) and the air pressure sensor <ul style="list-style-type: none"> <li>• Check wiring and plug-in connections.</li> </ul>
12	No altitude adjustment	Control box (heater) does not support altitude operation with the air pressure sensor. <ul style="list-style-type: none"> <li>• Use a control box (heater) which supports altitude adjustment</li> </ul>
13	Air pressure sensor fault	The air pressure sensor is defective <ul style="list-style-type: none"> <li>• Replace the air pressure sensor</li> </ul>

# 6 Maintenance / Troubleshooting / Repairs

## FAULT CODES

### RECOMMENDED TROUBLESHOOTING STEPS FOR HYDRONIC 4/5 HEATERS

("No Start" and "Heater Stops" conditions) Use these recommendations in conjunction with Fault Code List.

#	DESCRIPTION OF THE PROBLEM	POSSIBLE REASON AND METHOD OF REPAIR*
1	Absolutely nothing happens when the heater is turned on. Coolant pump is not pumping.	<ol style="list-style-type: none"> <li>1 Check voltage on heater's harness on the heater's side (pins 1 and 2 on heater's connector). Turn the heater ON and make sure that the voltage is still OK. Repair harness and connections if necessary.</li> <li>2 If the voltage is OK, then try to start the heater by connecting red and yellow wires together by a wire jumper (chambers 2 and 11 on 7 day timer connector – make sure that you have +12 or +24 volts on the red wire). If the above helps, replace switch or timer.</li> <li>3 If the heater still does not start, then the most likely ECU is locked or the start-up self test fails. Use 7-Day Timer, EDiTH or Diagnostic tool to retrieve fault codes from heater's memory and unlock ECU if it is locked. Follow heater's manual for the fault codes description and repair methods;</li> </ol>
2	Being turned on, heater just pumps coolant, never stops and never performs a start attempt or heater turns on, but goes in to stand by within 5 mins. No fault codes found in memory.	<ol style="list-style-type: none"> <li>1 Check the temperature of the coolant &gt; 80°C.</li> <li>2 If the coolant temperature is &lt;80°C, check the temperature sensor.</li> <li>3 If the sensor is good, then check ECU, replace if necessary.</li> </ol>
3	Heater switches into shut-down phase 20 seconds after being turned on (the most likely, fault code 10 or 11 found in memory).	Check voltage on heater's harness on the heater's side (pins 1 and 2 on Hydronic 4/5 connector). Turn the heater ON and make sure that the voltage is still OK. Repair harness and connections if necessary.
4	Heater makes two attempts to start with no success and then stops completely. No smoke comes from the exhaust pipe, some smoke can be seen between the exhaust pipe and heater. Also, some un burnt fuel may drip from the exhaust pipe.	<ol style="list-style-type: none"> <li>1 Check if exhaust pipe is not plugged with ice. Reroute it if this is the case for not having it to be U-shaped.</li> <li>2 Check combustion air intake pipe. If the exhaust and combustion air intake pipes are OK, see case # 5 below.</li> <li>3 Check the combustion chamber, clean it, if necessary. Unblock air channel between the swirl chamber (combustion air outlet) and glow pin chamber on the blower motor housing.</li> </ol>
5	Heater makes two attempts to start, may smoke for a while and then it stops.	<ol style="list-style-type: none"> <li>1 Do the fuel quantity check, if the amount of fuel is insufficient than check the fuel pick-up pipe, fuel lines and connections, fuel filter on the pump, replace the filter or pump if necessary.</li> <li>2 Check the glow pin and replace atomizing screen. Clean combustion tube (including it's all air ways) and the heat exchanger.</li> </ol>
6	Heater makes two attempts to ignate then stops. Both times no fuel output from the FMP.	<ol style="list-style-type: none"> <li>1 Check the fuel line, see if the fuel is frozen or blocked</li> <li>2 If the fuel is OK, then check the FMP, measure its resistance. See if it is not jammed due to internal contamination or ice built up. (use fuel controller if FMP is jammed in low temperatures) see page 29.</li> </ol>
7	Heater makes two attempts to start, then stops. Both times it sounds like the ignition takes place and then combustion process stops together with the fuel metering pump. Usually no smoke comes from the exhaust pipe just like when the heater starts normally	<ol style="list-style-type: none"> <li>1 The heater ignited but the flame was not detected. Check and replace the flame sensor.</li> <li>2 Replace ECU if flame sensor was good.</li> <li>3 Remove carbon particles out of the flame chamber, specifically nearby the flame sensor area.</li> <li>4 Check the flame chamber, see if it is not bent and doesn't affect the flame sensor reading.</li> </ol>

# 6 Maintenance / Troubleshooting / Repairs



## FAULT CODES

### RECOMMENDED TROUBLESHOOTING STEPS FOR HYDRONIC 4/5 HEATERS

(“No Start” and “Heater Stops” conditions) Use these recommendations in conjunction with Fault Code List.

#	DESCRIPTION OF THE PROBLEM	POSSIBLE REASON AND METHOD OF REPAIR*
8	Heater ignites normally, but often stops (codes 52-56 found in memory)	<ol style="list-style-type: none"> <li>1 Check fuel lines for gaps in connections inside connection pieces. Possible air bubble (&gt;1 cm) in the fuel line; apply steps to remove the air bubble out of the system (see page 24).</li> <li>2 If the heater stops only when the vehicle is in motion, reroute combustion air intake and exhaust pipes, or bend their ends toward to the rear of the vehicle.</li> </ol>
9	Heater overheats and stops soon after being turned on. Temperature of the heat exchanger raises quickly after start.	<ol style="list-style-type: none"> <li>1 Bleed air from the coolant lines and heat exchanger. Check plumbing for no restrictions for coolant flow.</li> <li>2 Check if the coolant pump spins. Unblock and clean it if necessary.</li> <li>3 Check the control and overheat sensor at room temperature.</li> <li>4 Check the amount and quality of coolant/water mixture.</li> </ol>
10	Heater does not provide enough power mostly working on low power level which can be detected by measuring electrical current draw.	<ol style="list-style-type: none"> <li>1 On old installations - check coolant pump.</li> <li>2 On new installations - Too big resistance for coolant flow. Possible too many units like heat exchangers are connected to the heater serially. Check plumbing. Reconnect system's heat exchangers in parallel which reduces resistance for coolant flow.</li> <li>3 Check the quality and amount of the coolant/water mixture.</li> </ol>
11	Ground wire burned out.	<ol style="list-style-type: none"> <li>1 Vehicle's starter was turned on or short circuit happened in vehicle's power circuits while vehicle's power switch in the ground battery wire was turned off. Fix the wire or replace ECU.</li> <li>2 High load appliance is turned on while the batter ground is disconnected and the heater negative wire is overloaded. Check the heater harness, and reattach the battery with ground.</li> </ol>

**PLEASE NOTE!**

\*To avoid inefficient expenses, it is strongly recommended to have the heater diagnosed by specialist before replacing expensive parts.

## 6 Maintenance / Troubleshooting / Repairs

### EXAMPLES / CAUSES OF CARBONING

Carbon is a term used to classify debris in the burner chamber. What you may visually see may not be carbon but still needs to be addressed properly to resolve the root cause of the issue. This is just a guide to the more common things you may encounter.

#### 1 AIR FUEL MIXTURE

- If the air fuel mixture is off it can cause a black soot in the burner chamber and can also be identified by looking through the heater exhaust port.
  - Improper angle of fuel pump.
  - Wrong fuel pump used.
  - Fuel pump out of calibration, perform fuel quantity test found on page 56.
  - Restriction in the flame chamber air slots, and vent holes. Also, in the intake and exhaust pipes.
  - Debris ingested into the combustion air intake fan impeller.
  - Improper length or too many bends of intake and exhaust tube. Combined maximum of 6 5' and 270° of bends.
  - Heater operation at high altitudes without fuel adjustment from altitude sensor.

#### 2 NON-FUEL RELATED BUILDUP

- If all the steps have been covered under the section outlining code 52 and the chamber is clean looking the issue may be in the fuel or chemicals ingested by the intake tube.
  - If the heater intake tube is in a location to pick up road debris like water, salt and sand, it can build up in the burner matting/liner and activates galvanic corrosion internally.
  - Additives are OK to use but if the concentration is in excess of the manufactures recommendations, it can build up in the burner porous liner.
  - Oil related products like ATF or used oil will cause premature chamber failure.
  - Thicker fuel also brakes into various density level, which leads to either low quantity fuel or thin sludge in to the heating system. This practice will not be tolerated by the heater. If oil must be used it is recommended to operate your Eberspaecher heater from a separate fuel source.
- Presence of contaminants like sodium, sulfur, or lead in the fuel or/ and intake air during the combustion process could create some amount of high temperature oxidation, vanadium corrosion and sulfidation in the flame chamber, which could reduce its mechanical and thermal integrity, also durability. Therefore to minimize such unwanted effects, usage of recommended grade fuel and proper heater installation must be ensured.

#### 3 SHORT CYCLING OF HEATER

If the heater is allowed to short cycle it may cause a build-up of Creosote. Minimum runtime on a heater should be 15 minutes.

- Sizing of the heater is important: If it is sized too large or cycled off at too low of a coolant temperature could lead to premature burner chamber failures.
- Electrical connection issues: If the signal wire is sporadic, it will turn the heater on and off.
- Abrupt loss of main power: Can cause burner chamber failure due to loss of its cool down cycle – never use the Master Disconnect Switch to cut heater power.
- Improper system: Coolant circuit connection with heat exchangers and other appliances i.e. calorifier would require system balancing and flow control to prevent coolant short circuiting and heater short cycling.

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Image for information purposes only



Image for information purposes only



# 6 Maintenance / Troubleshooting / Repairs



## EXAMPLES / CAUSES OF OVERHEATING

Frequent overheating of the heater can become a very critical issue as it can eventually cause a permanent damage to the heater. It affects multiple components of the heater to the level of catastrophic failure which can lead to premature maintenance and reduce the durability of the whole heater. There are three major reasons that causes the overheat issue most of the time:

### 1 OVERHEAT DUE TO IMPROPER INSTALLATION:

- The water pump unable to provide minimum required flow due to high restrictions in the coolant circuit i.e wrong hose diameter, orifice or too many heat exchangers in series.
- The amount of coolant in the circuit is less than system requirement as well as low quality of the coolant. (At high temperatures, large amount of water in the coolant can boil and create air bubbles in the system)
- The coolant flow from water pump of the heater is against the direction of the vehicle's coolant pump.
- The heater as well as any of the coolant lines are located higher than the maximum water line of the coolant system i.e. expansion tank, creating collection of air bubbles that restricts the flow.

### 2 OVERHEAT DUE TO THE DAMAGED COOLANT PUMP

- Usually, contamination (sand, sludge, or dirt) in the coolant system tend to accumulate at the pump impeller, which restricts the coolant flow up and eventually overheats the heater. Mostly, the contamination in the pump is the major cause of its failure.
- Dirty coolant in the system holds metallic chips from the engine, which are attracted by the magnet in the pump and reduces the coolant flow or pump failure; in both cases heater may overheat.
- Due to collection of air bubble at the impeller causes the coolant pump to run dry, which would increase its vibration and temperature and creates sudden pump failure as well as overheats the heater.

### 3 OVERHEAT DUE TO FAKE SENSOR READING:

- The normal function of the overheat sensor is to stop the heater when subjected to very high coolant temperatures; however sometimes improper readings from the temperature/overheat sensors would trigger the ECU to shut down the heater.
- Sometimes heater overheats due to collection of the air bubble near the location of sensors, which makes one or both sensors to read wrong coolant temperatures and send incorrect information to the ECU.



### PLEASE NOTE!

- During the event of heater overheat, the high temperature may affect the integrity of the sensor O-rings (EPDM). Some coolant may leak from the O-rings and comes out from the weep holes of the heater.

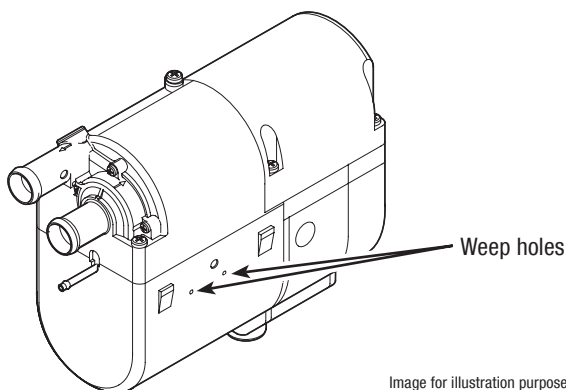


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# 6 Maintenance / Troubleshooting / Repairs

## FUEL QUANTITY TEST

The fuel Quantity should be tested if the heater has difficulty starting or maintaining a flame, using graduated cylinder part # 5520004 10ml.

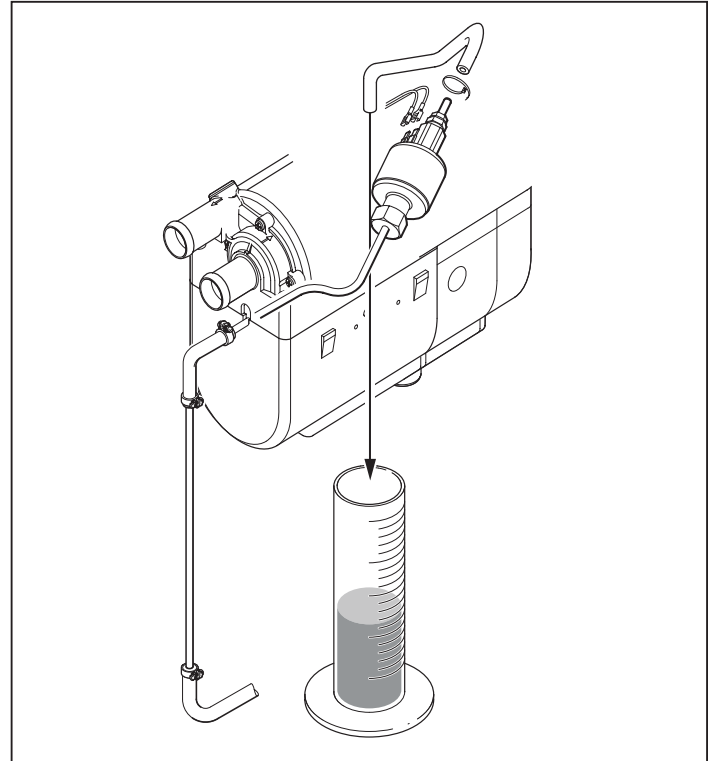
**PLEASE NOTE!** Measure the fuel quantity when the battery is sufficiently charged. At least 11V and at most 13V should be applied at the control unit during measurement.

### PREPARATION

- 1 Remove metering pump cover in the cases of SC versions. See page 57.
- 2 Pull the fuel line off the combustion chamber and insert into a graduated measuring glass.
- 3 Switch the heater on, when fuel delivery is uniform (approximately 40 seconds after switching on), the fuel line is full and bled.
- 4 Switch heater off.
- 5 Empty measuring glass and replace.

### MEASUREMENT

- 1 Switch heater on.
- 2 Fuel delivery starts automatically approximately 40 seconds after switching on.
- 3 Hold the graduated measuring glass at the glow pin height during measurement.
- 4 After 90 seconds of fuel delivery, it will shut off automatically.
- 5 Switch heater off.
- 6 Read off quantity of fuel delivery in the graduated measuring glass.



### EVALUATION

			← DIESEL	GASOLINE →		
Hydronic D4W SC	Hydronic D5W SC	Hydronic D5W S	Hydronic B4W SC	Hydronic B5W SC Hydronic B5W S		
8.4 cm <sup>3</sup> / 90 seconds	9.5 cm <sup>3</sup> / 90 seconds	8.6 cm <sup>3</sup> / 85 seconds	11.3 cm <sup>3</sup> / 90 seconds	11.9 cm <sup>3</sup> / 90 seconds	<b>Max</b>	
7.3 cm <sup>3</sup> / 90 seconds	8.5 cm <sup>3</sup> / 90 seconds	7.6 cm <sup>3</sup> / 85 seconds	10.1 cm <sup>3</sup> / 90 seconds	10.7 cm <sup>3</sup> / 90 seconds	<b>Min</b>	

If measured quantity of fuel is over or under the nominal value, the metering pump must be replaced or fuel restriction eliminated i.e. clogged fuel filter.

### FUEL PUMP FILTER INSPECTION



**PLEASE NOTE!** Fuel pump inlet filter – clean or replace annually, more frequently if fuel contamination is noticed.



# 6 Maintenance / Troubleshooting / Repairs



## DISASSEMBLY / ASSEMBLY

Repair steps covered are for the Hydronic 4 & 5 SC versions - Other models are similar.

### ⚠ WARNING - SAFETY:

Before carry out any maintenance and repair on the heater, ensure minimum required tools and protective equipment as provided on page 4.

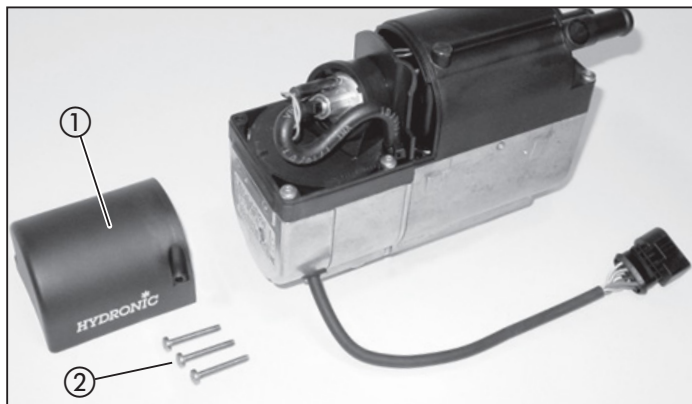
Disconnect the heater harness and remove fuse.

Plug the coolant lines, drain the coolant if necessary; and disconnect the heater.

### Step 1 : FMP Cover

- 1 Remove 3 fastening screws (tightening torque : 4 N m)
- 2 Inspect fuel line for any leakage, carry out FMP tests at room temperature: Fuel quantity measurement, resistance value.

- ① FMP cover
- ② Fastening screw



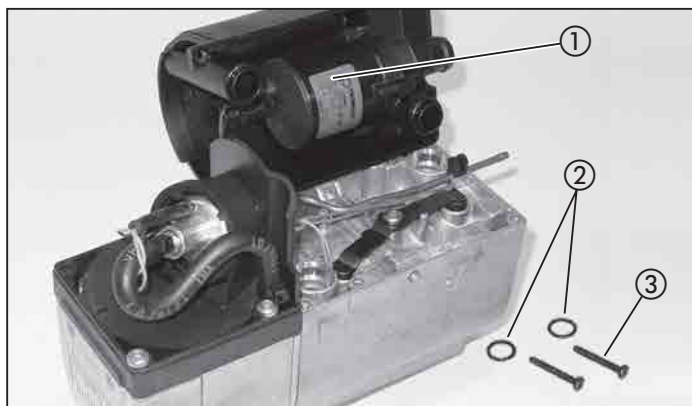
### Step 2: Water pump assembly

- 1 Remove 2 fastening screws (tightening torque: 4 N m) and unplug the water pump harness.
- 2 Inspect water pump for its mechanical and electrical integrity, coolant leakage, O-ring (EPDM) (replace, if necessary).

#### PLEASE NOTE!

Repetitive overheating could cause O-ring failures and leakage issues.

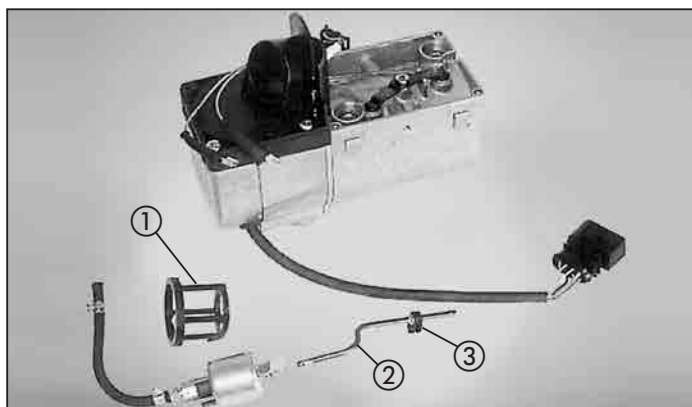
- ① Water pump
- ② O-rings (EPDM)
- ③ Fastening screw



### Step 3: Metering Pump Basket:

- 1 Unscrew the clamp and remove the hose from the hard fuel line
- 2 Pull the FMP out of its holder along with basket; Make sure remove the grommet from the hard inlet fuel line.

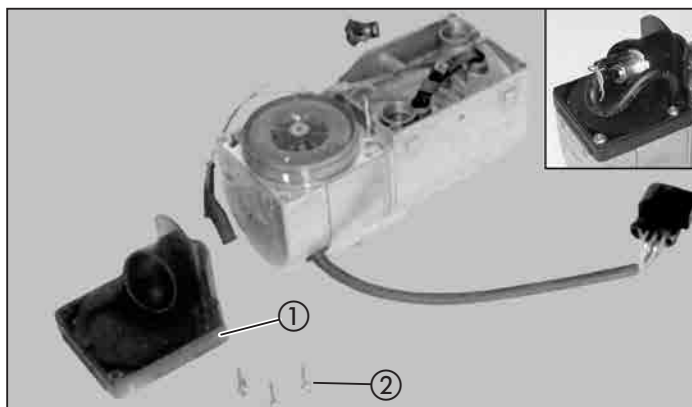
- ① FMP cover
- ② FMP with hard fuel line
- ③ Grommet



### Step 4: Blower Fan Cover

- 1 Remove 3 fastening screws (tightening torque : 4 N m) and open the cover.
- 2 Inspect blower fan for its mechanical and electrical integrity, sign of wear an tear, and thermal stress (replace, if necessary).
- 3 Use filler gauge to measure the air gap between fan and housing. If gap is  $>0.32\text{mm} \pm 0.04$  then replace the blower motor assembly.

- ① Blower fan cover
- ② Fastening screws



## 6 Maintenance / Troubleshooting / Repairs

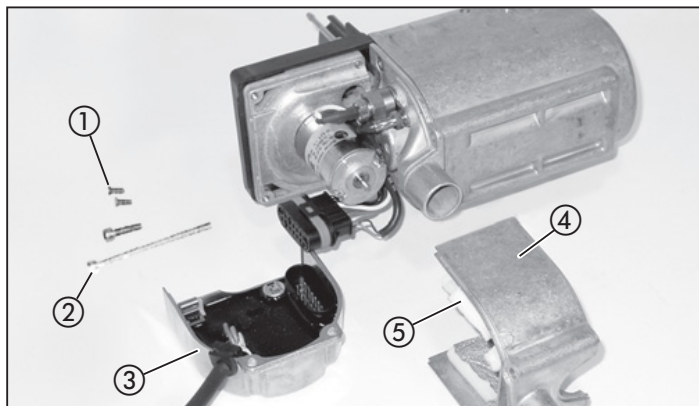
Repair Steps covered are for the Hydronic 4 & 5 SC versions - other models are similar.

### DISASSEMBLY / ASSEMBLY

#### Step 5: Control Unit and Motor Cover

- 1 Remove 4 fastening screws of ECU (tightening torque : Long: 5.5 +0.5 N m; Short: 3.0 +0.5 N m)
- 2 Unplug 14 pin ECU connector
- 3 Inspect ECU for any Electrical and Mechanical damage (wipe any moisture and apply electrical grease on the terminals)
- 4 Inspect Motor Cover and ensure the protective lining is not damaged

- |                          |                     |
|--------------------------|---------------------|
| ① Short fastening screws | ④ Motor cover       |
| ② Long fastening screws  | ⑤ Protective lining |
| ③ ECU connector          |                     |



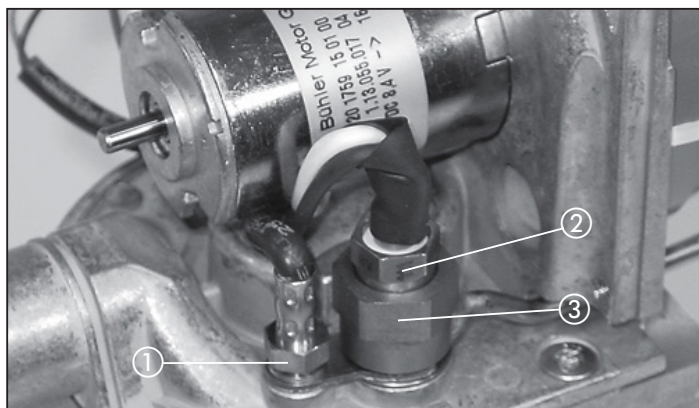
#### PLEASE NOTE!

(Protective lining is made of thermal insulator and sound resistant material, which helps in noise reduction and sound vibration)

#### Step 6: Glow pin

- 1 Unscrew glow pin out of its socket (tightening torque : 6 +0.5 N m).
- 2 Unclip the glow pin terminals from ECU using AMP tool (p/n 206 00 205).
- 3 Inspect glow pin for any visible signs of thermal and mechanical stress, measure its resistance value and amperage draw (see page 48), replace if necessary.

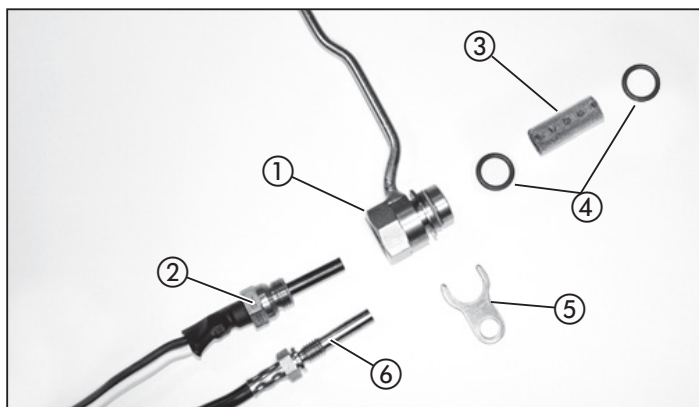
- |                |                    |
|----------------|--------------------|
| ① Flame sensor | ③ Glow plug socket |
| ② Glow plug    |                    |



#### Step 7: Flame sensor

- 1 Unscrew flame sensor from the housing (tightening torque: 2.5 +0.5 N m)
- 2 Unclip the flame sensor terminals from ECU using AMP tool (p/n 206 00 205)
- 3 Inspect the flame sensor for any visible signs of thermal and mechanical stress, measure its resistance value (see page 47), replace if necessary

- |                    |                |
|--------------------|----------------|
| ① Glow plug socket | ④ O-rings      |
| ② Glow plug        | ⑤ Holder       |
| ③ Glow pin screen  | ⑥ Flame sensor |



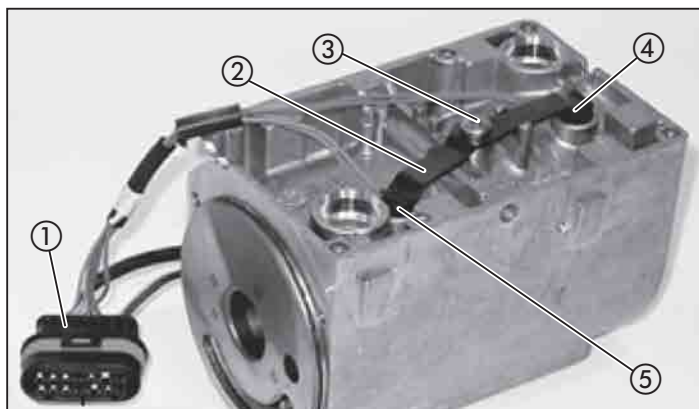
#### Step 8: Overheat and Temperature Sensors

- 1 Loosen fastening screw and remove the pressure spring
- 2 Remove temperature and overheat sensors from the top of heat exchanger using plier( flat and needle)
- 3 Unclip the temperature and overheat sensors terminals from ECU using AMP tool (p/n 206 00 205)
- 4 Inspect the temperature and overheat sensors for any visible signs of thermal and mechanical stress, measure its resistance value (see page 47), replace if necessary.

#### PLEASE NOTE!

Repetitive heater overheat could damage the o-rings and sensors, replace if necessary.

- |                          |                      |
|--------------------------|----------------------|
| ① Main plug with harness | ④ Overheat sensor    |
| ② Pressure pin           | ⑤ Temperature sensor |
| ③ Fastening screw        |                      |



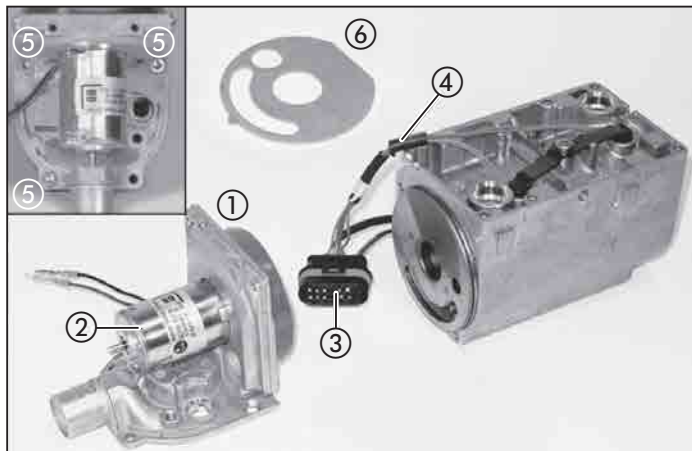
# 6 Maintenance / Troubleshooting / Repairs



## Step 9: Blower Motor Assembly

- 1 Remove the Blower motor terminals from ECU using AMP tool (p/n 206 00 205)
- 2 Remove 3 fastening screws (tightening torque : 4.5 +0.5 N m) from the combustion blower motor and remove it from the water jacket
- 3 Perform blower motor inspection, check for any mechanical and thermal stress as well as electrical damage, Turn the blower fan and check its free rotation.
- 4 Carry out blower motor test as steps provided in Fault 30 ( see page 49), replace if necessary
- 5 Before reassembly, change the gaskets and seals
- 6 Clean up the swirl chamber, air channel and glow pin area, if require

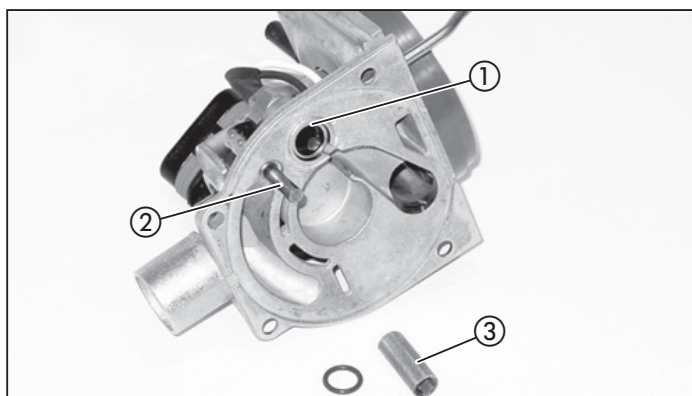
- |                 |                              |
|-----------------|------------------------------|
| ① Blower fan    | ④ Sensor harness             |
| ② Blower motor  | ⑤ Fastening screws           |
| ③ ECU connector | ⑥ Thermal insulator (Gasket) |



## Step 10: Glow pin Screen

- 1 Remove O-ring (EPDM) and pull the screen out of the socket
- 2 Replace the screen and O ring, if necessary (Once a year is recommended)

- |                        |                                |
|------------------------|--------------------------------|
| ① Glow pin chamber     | ③ Glow pin screen with O-rings |
| ② Flame sensor locator |                                |



## Step 11: Glow pin Socket

- 1 Pull socket out of the blower motor housing then swivel the fuel pipe outwards.
- 2 Clean the socket and replace O-ring (EPDM) if necessary.

## Step 12: Combustion Chamber/Flame tube

- 1 Pull the flame tube out of the heat exchanger.
- 2 Before Re assembly, replace the seals if necessary.
- 3 Remove any accumulated carbon or contamination from the combustion chamber, flame tube using dry rung, light brush.

### PLEASE NOTE!

Make sure to clean all vent holes and air slots on the flame tube

- |                    |             |
|--------------------|-------------|
| ① Air intake slots | ③ Vent hole |
| ② Flame chamber    |             |



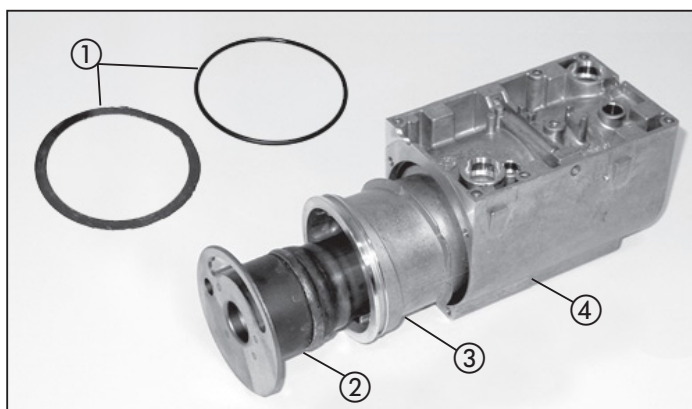
## Step 13: Heat exchanger and jacket

- 1 Pull the heat exchanger out of the jacket (push it through the water inlet port).
- 2 Check the heat exchanger and jacket throughly, inspect for any hair line fracture and remove contamination (improper coolant/water mixture or low grade coolant would create scales and corrosion)
- 3 Clean carbon out of the heat exchanger using dry rug and light brush
- 4 During re assembly, align the groove (in the heat exchanger) and stopper (in the jacket) as shown in the figure
- 5 Press heat exchanger firmly in to jacket
- 6 Apply light grease on O ring (EPDM) before inserting in its place. (replace O ring (EPDM), if necessary).

- |                 |                  |
|-----------------|------------------|
| ① O-rings       | ③ Heat exchanger |
| ② Flame chamber | ④ Jacket         |

### PLEASE NOTE!

Carry out the pressure test of the heat exchanger to detect the hair line fracture or O-ring leakage, if required. (Test pressure: 2.0 bar max)



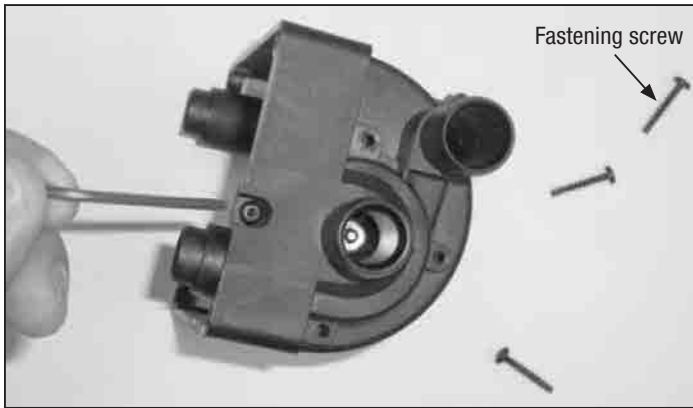
# 6 Maintenance / Troubleshooting / Repairs

## DISASSEMBLY / ASSEMBLY

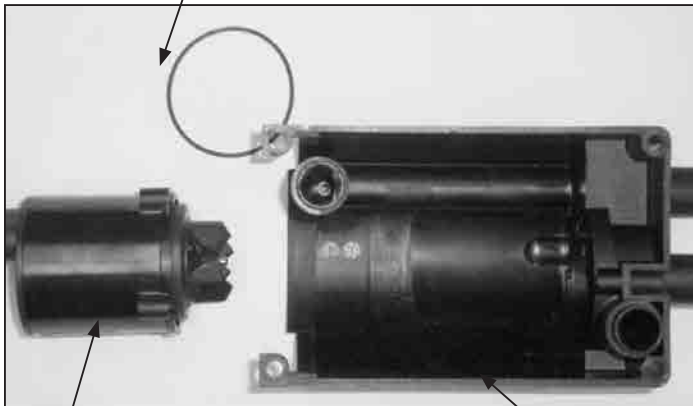
Follow these steps to disassemble the coolant pumps of D5SC and D5S heaters.

### D5 SC COOLANT PUMP

Step 1 Remove the four screws holding the coolant pumps two halves together (tightening torque 4 N-m).



Step 2 Remove O-Ring - 45mm x 1 1/2 m, Part #: 556 00 06



Motor / Impeller Assembly

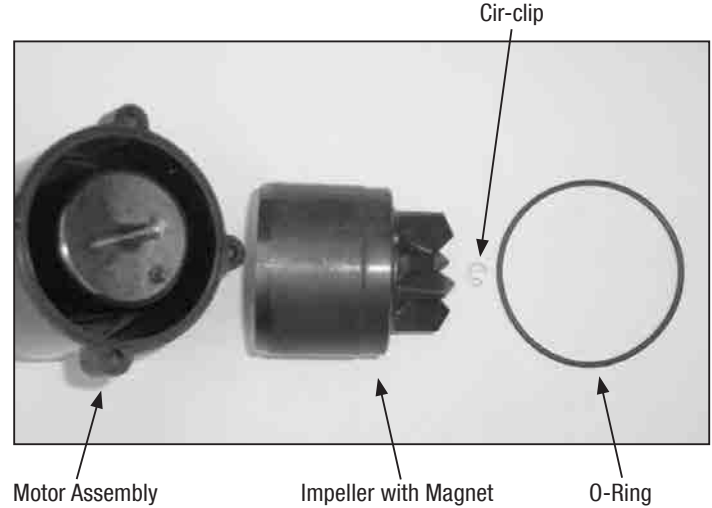
Pump Motor

Step 3 Carefully remove the retainer clip using flat screw driver or cir-clip plier, and pull the magnetic impeller out. Clean up the internal parts.



Step 4 Start coolant pump inspection for any mechanical or electrical damage, replace if necessary.

### COOLANT PUMP D5 SC: INTERNAL PARTS



### D5 S - COOLANT PUMP

Step 1 Remove four fastening screws and washer, then disconnect the impeller housing.

Step 2 Remove magnetic impeller, clean up the internal parts.

Step 3 Start coolant pump inspection for any mechanical or electrical damage.

Step 4 Start coolant pump inspection for any mechanical or electrical damage, replace if necessary.

### COOLANT PUMP D5 S: INTERNAL PARTS



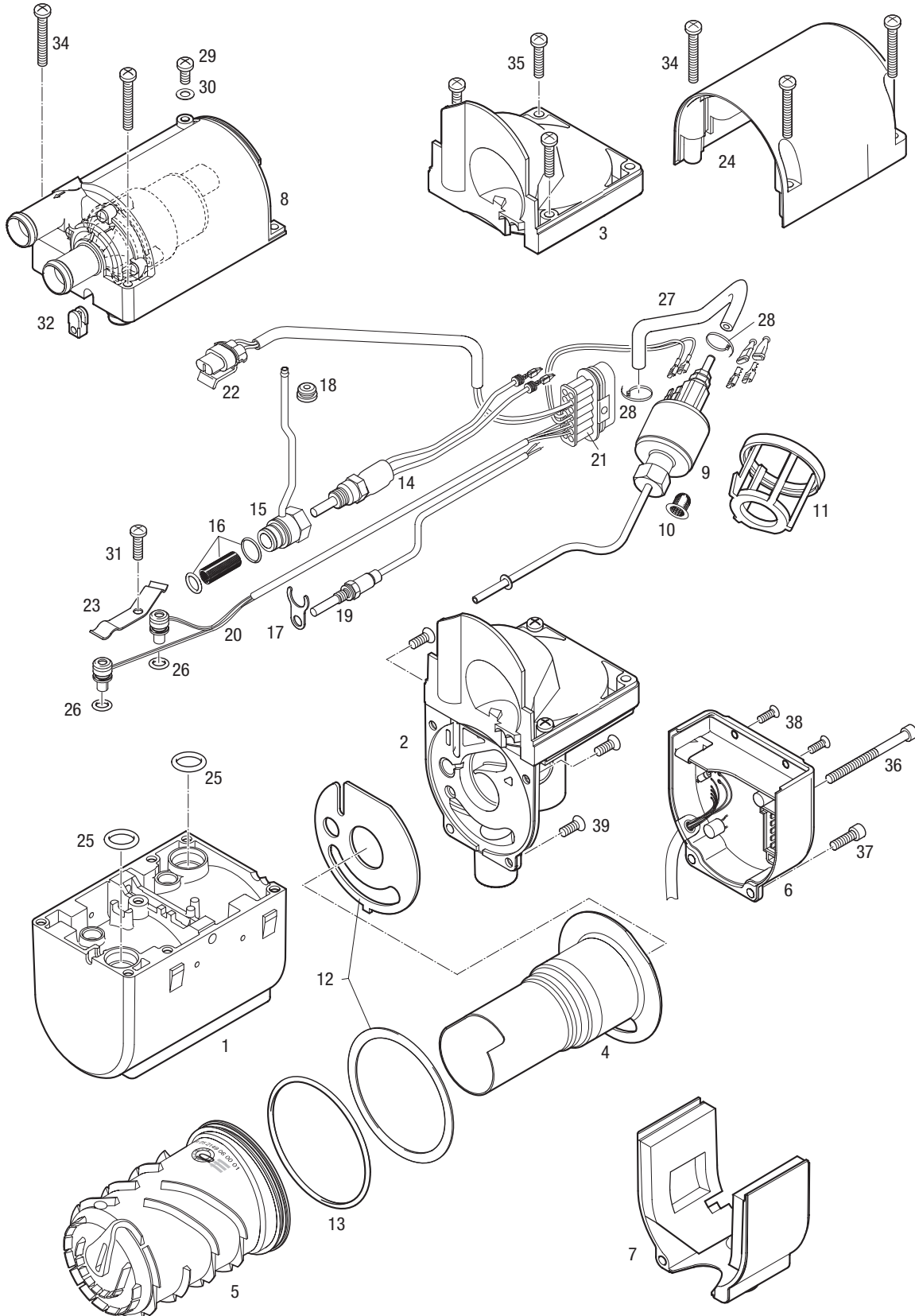


# 7 Heater Components - Parts

HYDRONIC 4 / 5 W SC - FACE LIFT "SC" HEATERS - 12 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 20 1824 05  
Model 25 2257 05  
Model 20 1820 05  
Model 25 2219 05  
Model 25 2325 05  
with external FMP



# 7 Heater Components - Parts

DESCRIPTION & PART #'S			HYDRONIC 4 / 5 W SC - FACE LIFT "SC" HEATERS - 12 VOLT - DIESEL & GASOLINE VERSIONS					
Ref. No.	Description	Part Number	Model #	20 1824 05 12v	25 2257 05 12v	20 1820 05 12v	25 2219 05 12v	25 2325 05 12v
1	Outer casing	25 2149 01 01 01		•	•	•	•	•
2	Combustion air blower	20 1819 99 16 00		•	•	•	•	•
3	Cover	25 1917 01 00 02		•	•	•	•	•
4	Burner	20 1818 11 00 00 25 2216 10 00 00		•	•	•	•	•
5	Heat exchanger	25 2149 06 00 01		•	•	•	•	•
6	Control unit	22 5201 04 00 07 22 5201 04 00 06 22 5201 04 00 01 22 5201 04 00 11		•	•	•	•	•
7	Cover	20 1752 99 01 03		•	•	•	•	•
8	Coolant Pump	25 2219 25 00 00		•	•	•	•	•
9	Fuel metering pump	22 4504 03 00 00		•	•	•	•	•
		Internal fuel pipe						•
		Intermediate piece						•
10	Integrated fuel filter	20 1312 00 00 06		•	•	•	•	•
11	Holder fuel metering pump (FMP basket)	25 1917 01 00 07		•	•	•	•	•
12	Seal	20 1820 99 00 01		•	•	•	•	•
13	O-Ring 74 x 3 mm	22 1000 70 00 18		•	•	•	•	•
14	Glow pin with cable section	25 2106 01 13 00		•	•	•	•	•
15	Plug connection	20 1752 01 10 00 25 2147 01 14 00		•	•	•	•	•
16	Atomizing Screen with O rings	20 1752 99 01 02 25 2121 99 01 13		•	•	•	•	•
17	Holder	20 1752 01 00 04		•	•	•	•	•
18	Groomet	20 1752 01 00 02		•	•	•	•	•

# 7 Heater Components - Parts



HYDRONIC 4 / 5 W SC - FACE LIFT "SC" HEATERS - 12 VOLT - DIESEL & GASOLINE VERSIONS				Model #	20 1824 05 12v	25 2257 05 12v	20 1820 05 12v	25 2219 05 12v	25 2325 05 12v
Ref. No.	Description	Part Number							
19	Flame sensor	25 1920 36 00 00	Old P/N	•	•	•	•	•	
		25 1920 37 00 00	New P/N	•	•	•	•	•	
20	Overheat sensor/temperature with cable section	25 2147 01 23 00		•		•			
		25 2219 01 23 00			•		•		
21	Plug kit 14 pin	22 1000 30 10 10		•	•	•	•	•	
22	Cable section Waterpump	20 1753 01 18 00		•	•	•	•	•	
23	Leaf spring	25 1922 01 00 05		•	•	•	•	•	
24	Fuel metering pump cover	20 1752 01 00 03		•		•			
		25 1917 01 00 03			•		•		
25	O-Ring 14 x 2.6	22 1000 70 00 06		•	•	•	•	•	
26	O-Ring 7 x 2	25 2481 99 01 07		•	•	•	•	•	
27	Hose	25 1917 01 00 11			•		•	•	
28	Cable band	209 31 071			•		•	•	
29	Screw	25 1917 25 00 12		•	•	•	•	•	
30	Washer 5 x 1.5 mm	* H							
31	Screw M5 x 12	109 10 153		•	•	•	•	•	
32	Sleeve	25 1917 01 00 05			•		•	•	
34	Tapite screw M5 x 35 Torx	109 10 154		•	•	•	•	•	
35	Tapite screw M5 x 25 Torx	109 10 152		•	•	•	•	•	
36	Cheese-head screw M5 x 65 Torx	100 10 350		•	•	•	•	•	
37	Tapite screw M5 x 16 Torx	109 10 151		•	•	•	•	•	
38	Tapite screw M4 x 10 Torx	109 10 150		•	•	•	•	•	
39	Counter sunk screw M5 x 12 Torx	102 10 302		•	•	•	•	•	

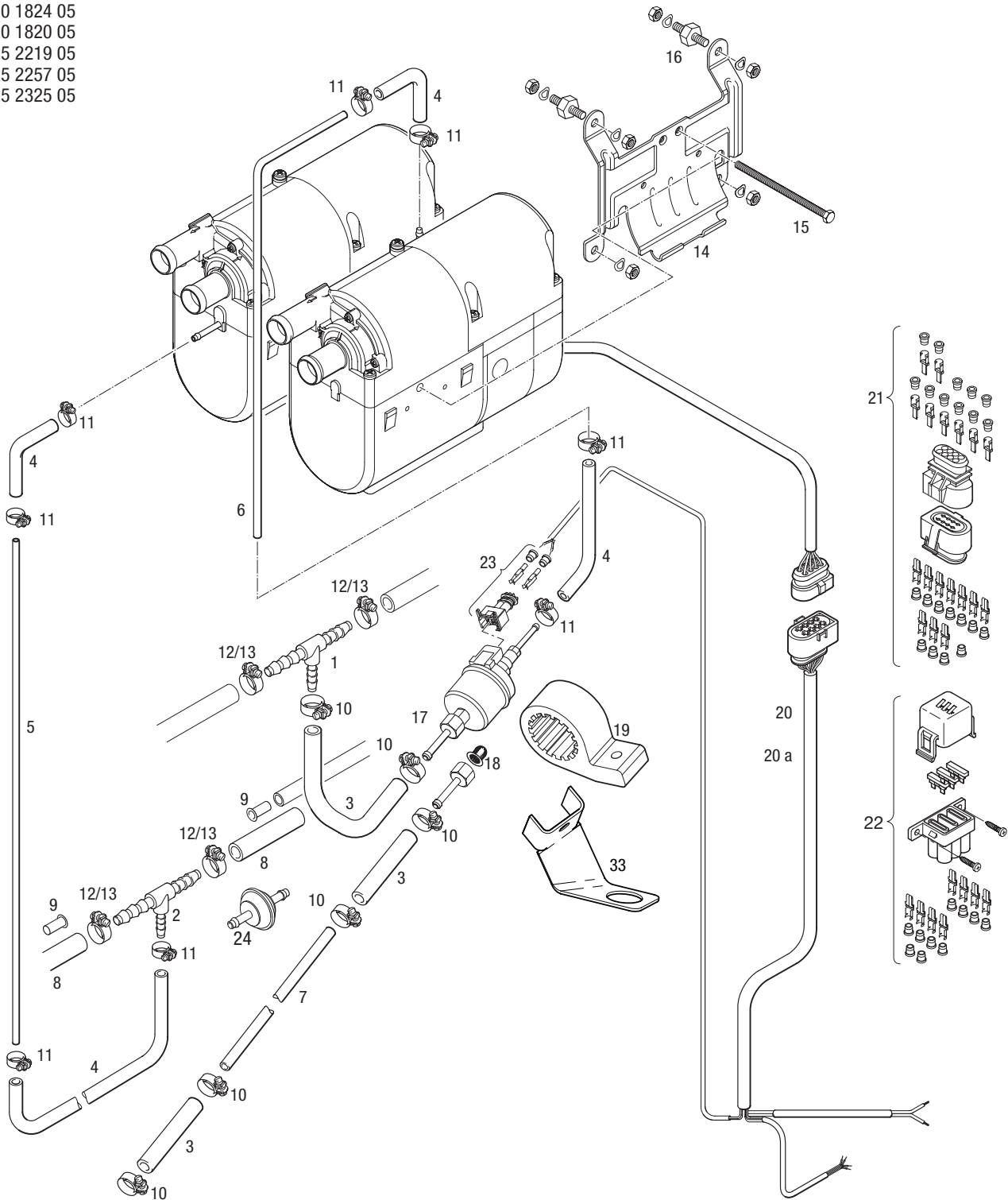
\* H = Available at local hardware store

# 7 Heater Components - Parts

HYDRONIC 4 / 5 W SC - FACE LIFT "SC" HEATERS - 12 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 20 1824 05  
Model 20 1820 05  
Model 25 2219 05  
Model 25 2257 05  
Model 25 2325 05







# 7 Heater Components - Parts

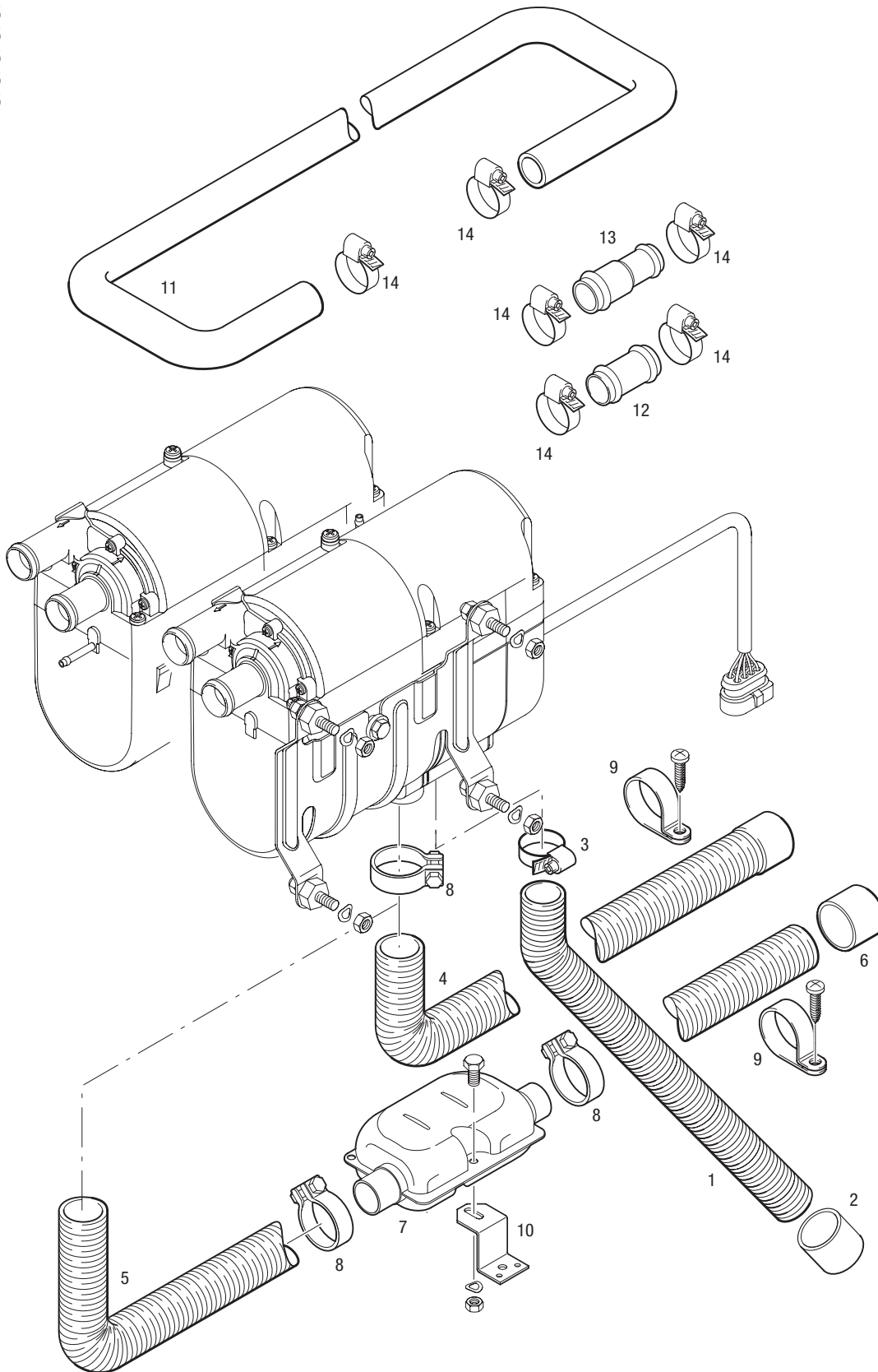
DESCRIPTION & PART #'S			HYDRONIC 4 / 5 W SC - FACE LIFT "SC" HEATERS - 12 VOLT - DIESEL & GASOLINE VERSIONS					
Ref. No.	Description	Part Number	Model #	20 1824 05 12v	25 2257 05 12v	20 1820 05 12v	25 2219 05 12v	25 2325 05 12v
01	T-piece 8 x 6 x 8 mm	262 31 151		•	•	•	•	•
02	T-piece 8 x 4 x 8 mm	262 31 155		•	•	•	•	•
03	Hose 5 x 3	360 75 350		•	•	•	•	•
04	Hose 3.5mm x 3mm	360 75 300		•	•	•	•	•
05	Pipe 2mm	890 31 055		•	•	•	•	•
06	Pipe 1.5mm	890 31 118		•	•	•	•	•
07	Pipe 2mm	890 31 125		•	•	•	•	•
08	Hose 7.5mm	Not available						
09	Supporting sleeve with collar	Not available						
10	Hose clip 11mm	10 2068 01 10 98		•		•		
11	Hose clip 9mm	10 2068 00 90 98		•	•	•	•	
12	Hose clip 14mm	10 2068 01 40 98		•		•		
13	Hose clip 12mm	10 2068 01 20 98		•	•	•	•	
14	Holder	25 2220 80 00 01		•	•	•	•	
15	Central screw	100 10 258		•	•	•	•	
16	Rubber shockmount 6 mm	20 1185 00 00 01		•	•	•	•	
17	Fuel metering pump	22 4517 04 00 00		•		•		•
18	Integrated fuel filter	20 1312 00 00 06		•	•	•	•	•
19	Holder metering pump	22 1000 50 03 00		•		•		•
20	Main harness - J.E - Universal w/relay	25 1917 80 10 00 25 1917 80 11 00		•		•		•
20a	Main harness Eberspaecher NA	20 2900 70 05 03 20 2900 70 05 07			•		•	•
21	Connection Kit	22 1000 30 10 21		•	•	•	•	•
22	Fuse kit including fuse and terminals	22 1000 31 06 00		•	•	•	•	•
23	FMP connector kit including terminals and seals	22 1000 31 87 00		•	•	•	•	•
24	Fuel filter	25 1226 89 00 37		•	•	•	•	•

# 7 Heater Components - Parts

HYDRONIC 4 / 5 W SC - FACE LIFT "SC" HEATERS - 12 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 20 1824 05  
Model 25 2257 05  
Model 20 1820 05  
Model 25 2219 05  
Model 25 2325 05



# 7 Heater Components - Parts



## HYDRONIC 4 / 5 W SC - FACE LIFT "SC" HEATERS - 12 VOLT - DIESEL & GASOLINE VERSIONS

DESCRIPTION & PART #'S

Ref. No. Description

Part Number

Model #

20 1824 05 12v

25 2257 05 12v

20 1820 05 12v

25 2219 05 12v

25 2325 05 12v

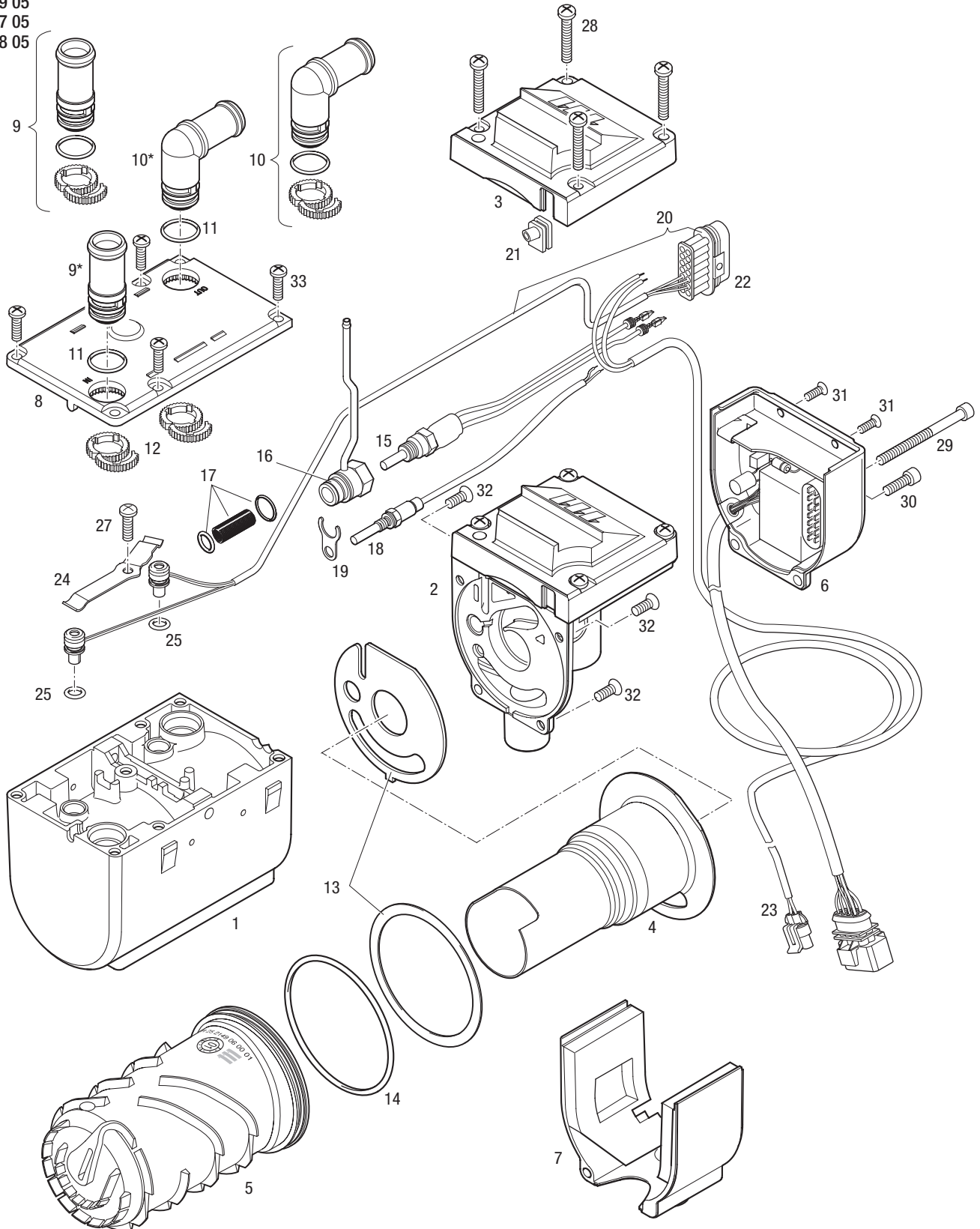
Ref. No.	Description	Part Number	Model #	20 1824 05 12v	25 2257 05 12v	20 1820 05 12v	25 2219 05 12v	25 2325 05 12v
1	Hose - 20 mm APK Comb Air (1 m)	360 00 099		•	•	•	•	•
2	End cap w/bar 20 mm, plastic	25 1688 80 12 01		•	•	•	•	•
3	Hose clamp 16 - 25 mm	10 2067 01 60 25		•	•	•	•	•
4	Exhaust hose - 24 mm x 1 mtr / with cap	25 1774 80 02 00		•	•	•	•	•
5	Exhaust ss flex 2 layer 24 mm id / mtr	360 61 299		•	•	•	•	•
6	Exhaust end cap w/bar	20 2900 30 24 00		•	•	•	•	•
7	Exhaust silencer	25 1864 81 01 00 22 1000 40 09 00		•	•	•	•	•
8	Exhaust clamp	22 1000 50 05 00		•	•	•	•	•
9	Clamp 'C' type 28 mm	152 09 010		•	•	•	•	•
10	Double angle bracket 90°	20 1533 88 00 07		•	•	•	•	•
11	Coolant hose 18 mm 180° x 218 mm	20 1690 81 00 01		•	•	•	•	•
12	Connector 18 mm metal	20 1528 88 00 03		•	•	•	•	•
13	Reducer 18 - 15 mm metal	20 1645 80 02 01		•	•	•	•	•
14	Hose clamp 20 - 32 mm	10 2066 02 00 32		•	•	•	•	•

# 7 Heater Components - Parts

HYDRONIC B5 / D5 - FACE LIFT "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 20 1819 05  
Model 25 2217 05  
Model 25 2218 05





# 7 Heater Components - Parts

## HYDRONIC B5 / D5 - FACE LIFT "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

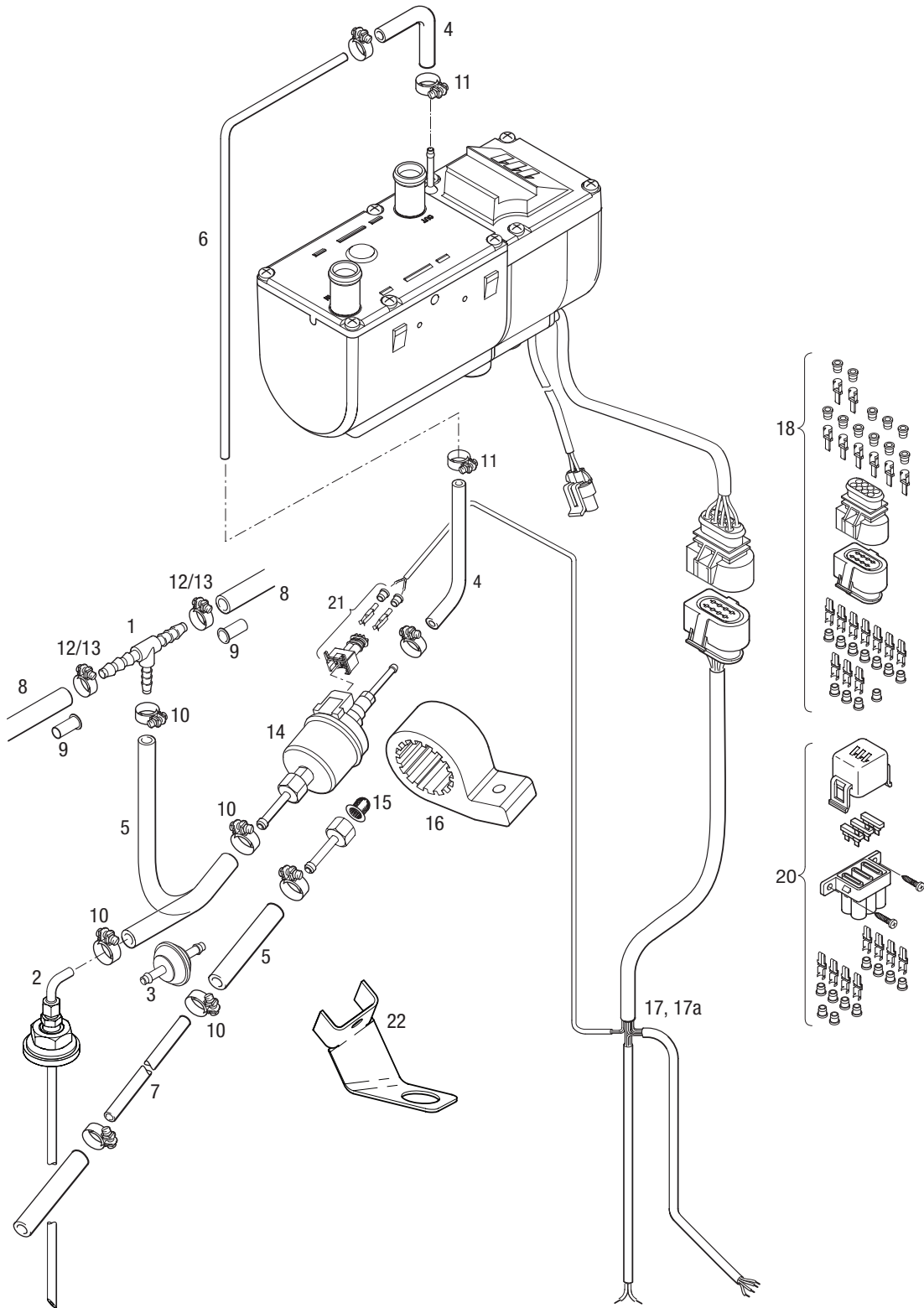
DESCRIPTION & PART #'S		Model #	20 1819 05 12v	25 2217 05 12v	20 2218 05 24v
Ref. No.	Description		Part Number		
1	Casing	25 2149 01 01 01	•	•	•
2	Combustion air blower with cover	20 1819 99 16 00 25 2146 99 17 00	•	•	•
3	Cover	25 2217 01 00 01	•	•	•
4	Burner	20 1818 11 00 00 25 2216 10 00 00 25 2146 10 00 00	•	•	•
5	Heat exchanger	25 2149 06 00 01	•	•	•
6	Control unit	22 5201 04 00 01 22 5201 04 00 11 22 5202 01 10 01	•	•	•
7	Cover - heater base	20 1756 99 01 03	•	•	•
8	Cover	25 2216 01 00 02	•	•	•
9	Connecting piece Hydronic 18 mm 90°	25 2216 99 01 06	•	•	•
10	Connection piece 18 W FL	25 2216 99 01 05	•	•	•
11	O-Ring 16x2	22 1000 70 00 19	•	•	•
12	Hose barb locks	25 2216 01 00 10	•	•	•
13	Gasket / seal set	20 1820 99 00 01	•	•	•
14	O-Ring - 74x3	22 1000 70 00 18	•	•	•
15	Glow pin	25 2106 01 13 00 25 2107 01 10 00	•	•	•
16	Glow plug housing	20 1756 01 10 00 25 2121 01 14 00	•	•	•
17	Glow pin screen and 2 O-rings	20 1752 99 01 02 25 2121 99 01 13	•	•	•
18	Flame sensor	25 1920 36 00 00 25 1920 37 00 00	•	•	•
			Old P/N		
			New P/N		
19	Holder	20 1752 01 00 04	•	•	•
20	Over heat / temperature sensor with cable	25 2150 01 23 00	•	•	•
21	Grommet for cable	25 2216 01 17 01	•	•	•
22	Control unit plug kit	22 1000 30 10 10	•	•	•
23	Water pump harness	25 2009 01 15 00	•	•	•
24	Leaf spring	25 1922 01 00 05	•	•	•
25	O-ring 7 x 2	25 2481 99 00 07	•	•	•
27	Screw M5 x 12 torx	109 10 153	•	•	•
28	Taptite screw M5 x 25 torx	109 10 152	•	•	•
29	Cheese-head screw M5 x 65 torx	100 10 350	•	•	•
30	Taptite screw M5 x 16 torx	109 10 151	•	•	•
31	Taptite Screw M4 x 10 torx	109 10 150	•	•	•
32	Countersunk screw M5 x 12 torx	102 10 302	•	•	•
33	Taptite screw M5 x 18 torx	109 10 108	•	•	•

# 7 Heater Components - Parts

HYDRONIC B5 / D5 - FACE LIFT "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 20 1819 05  
Model 25 2217 05  
Model 25 2218 05



# 7 Heater Components - Parts



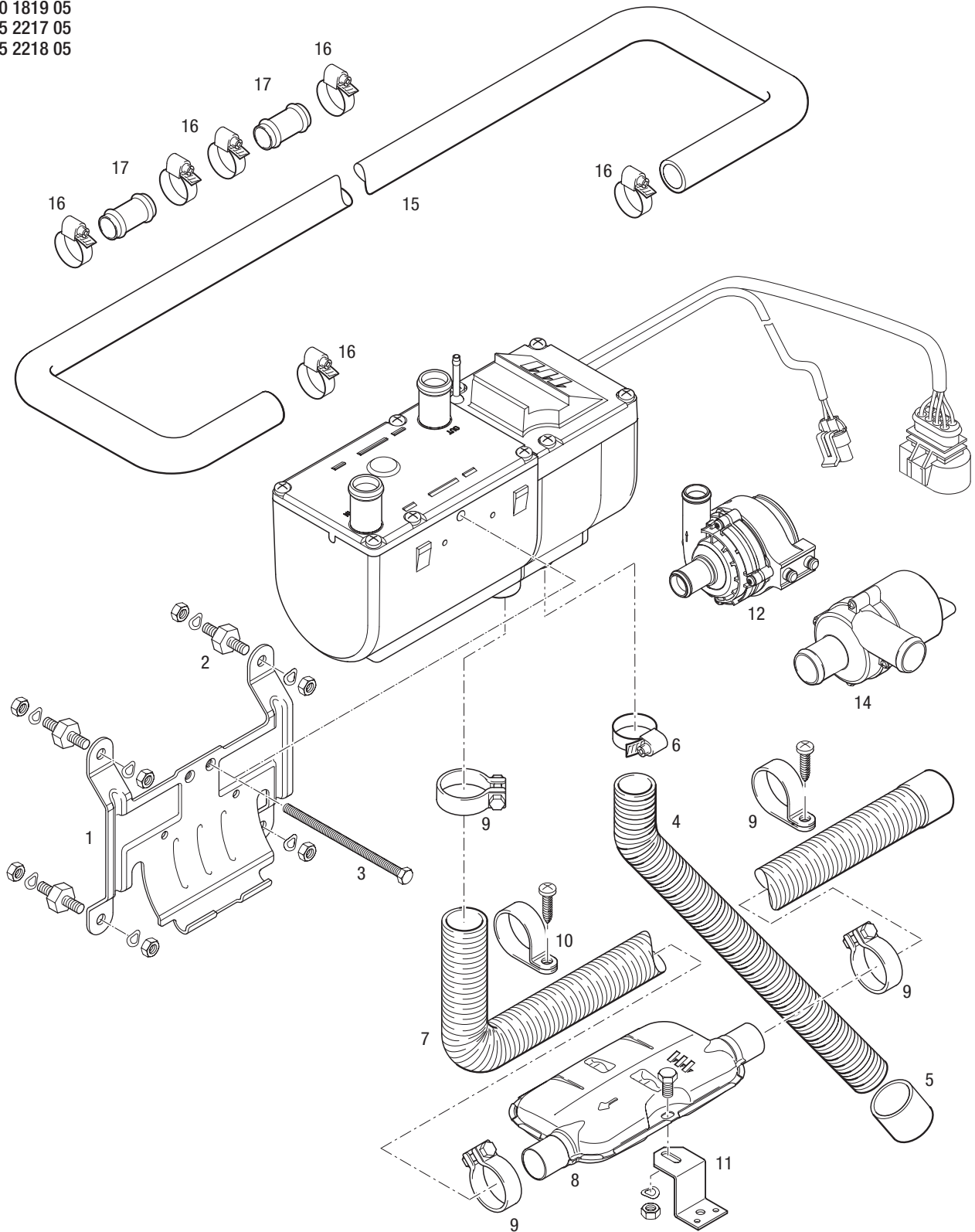
DESCRIPTION & PART #'S				Model #	20 1819 05 12v	25 2217 05 12v	20 2218 05 24v
Ref. No.	Description		Part Number				
1	T-piece	8 x 6 x 8 mm	262 31 151		•	•	•
2	Fuel pick up pipe 2.0mm - Universal		20 2900 20 20 10		•	•	•
3	Fuel filter		25 1226 89 00 37		•	•	•
4	Fuel hose 3.5 x 3mm		360 75 300		•		
5	Hose 5 x 3mm		360 75 350		•	•	•
6	Plastic fuel line 1.5 mm		890 31 118		•	•	•
7	Plastic fuel line 2 mm		890 31 125		•	•	•
8	Hose 7.5mm		Not available				
9	Supporting sleeve with collar		Not available				
10	Fuel line clamp 11mm		10 2068 01 10 98		•	•	•
11	Fuel line clamp 9mm		10 2068 00 90 98		•	•	•
12	Fuel line clamp 14mm		10 2068 01 40 98		•	•	•
13	Fuel line clamp 12mm		10 2068 01 20 98		•	•	•
14	Fuel metering pump	12 V 24 V	22 4517 04 00 00 25 1942 45 00 00		•	•	•
15	Integrated fuel filter		20 1312 00 00 06		•	•	•
16	Holder metering pump		22 1000 50 03 00		•	•	•
17	Main harness - J.E Universal w/relay		25 1917 80 10 00 25 2009 80 10 00		•	•	•
17a	Main harness Eberspaecher NA		20 2900 70 05 03		•	•	•
18	Connector kit		22 1000 30 10 21		•	•	•
20	Fuse kit including fuses and terminals		22 1000 31 06 00		•	•	•
21	FMP connector kit		22 1000 31 87 00		•	•	•
22	Angle bracket		20 2900 40 01 04		•	•	•

# 7 Heater Components - Parts

HYDRONIC B5 / D5 - FACE LIFT "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

SERVICE PARTS DIAGRAM

Model 20 1819 05  
Model 25 2217 05  
Model 25 2218 05





# 7 Heater Components - Parts



## HYDRONIC B5 / D5 - FACE LIFT "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

DESCRIPTION & PART #'S

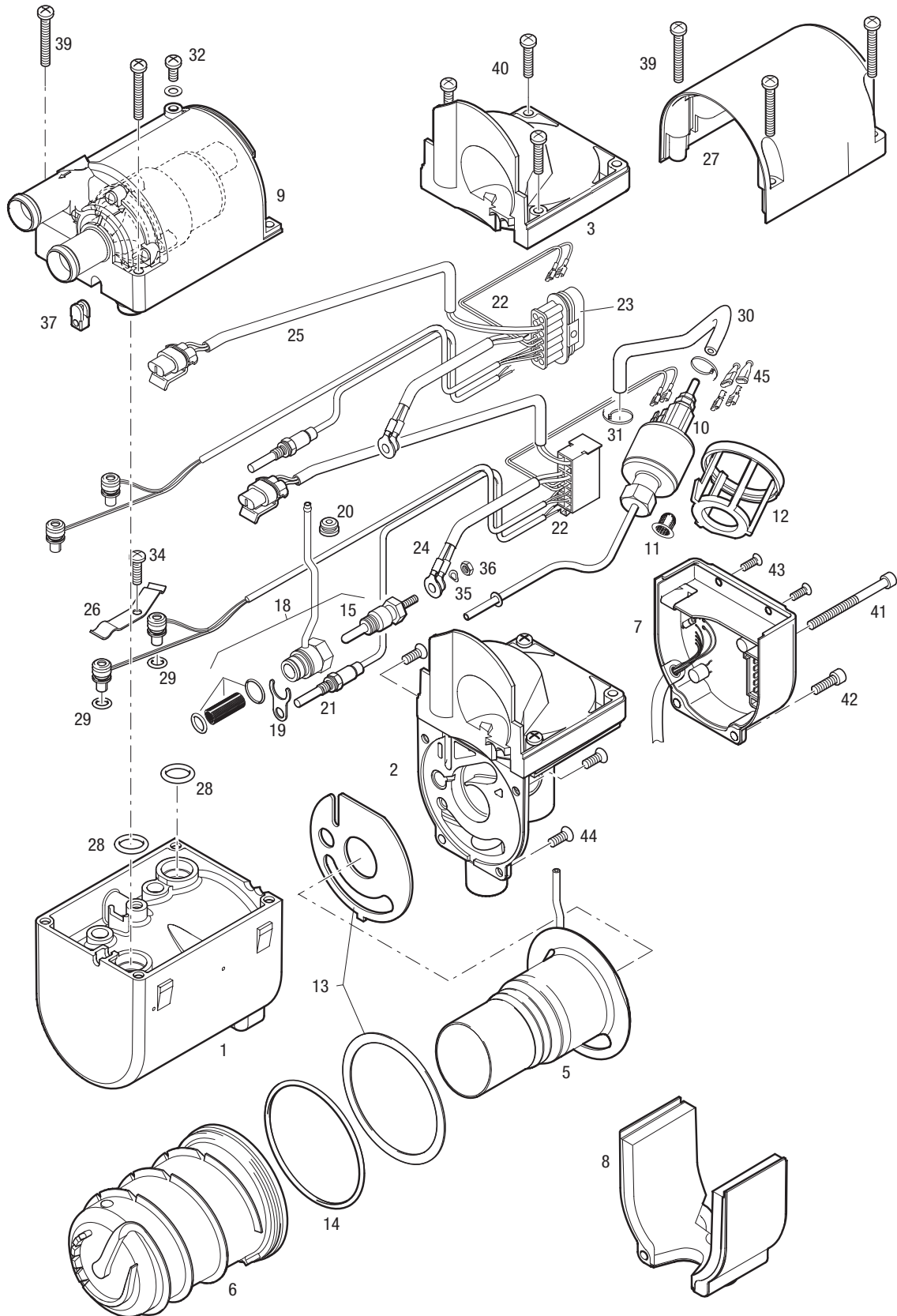
Ref. No.	Description	Part Number	Model #	20 1819 05 12v	25 2217 05 12v	20 2218 05 24v
1	Bracket	25 2220 80 00 01		•	•	•
2	Rubber mount 6 mm	20 1185 00 00 01		•	•	•
3	Central screw, M6 x 97 Hex bolt	100 10 258		•	•	•
4	Flexible air intake hose	360 00 099		•	•	•
5	End cap with bar	25 1688 80 12 01		•	•	•
6	Hose clamp 16 - 25 mm	10 2067 01 60 25		•	•	•
7	Exhaust Hose - 24 mm x 1mtr with cap	25 1774 80 02 00		•	•	•
8	Exhaust silencer 24 mm	22 1000 40 09 00		•	•	•
9	Exhaust clamp	22 1000 50 05 00		•	•	•
10	Clamp 'C' type 28 mm	152 09 010		•	•	•
11	Double angle bracket	20 1533 88 00 07		•	•	•
12	Coolant pump with bracket and harness	12 V 25 2217 27 00 00		•	•	
14	Coolant pump	24 V 25 2218 25 00 00				•
15	Coolant hose 18 mm, 180° x 280 mm	20 1690 81 00 01		•	•	•
16	Hose clip 20 - 32 mm	10 2066 02 00 32		•	•	•
17	Coolant hose union - 18 mm	20 1528 88 00 03		•	•	•

# 7 Heater Components - Parts

HYDRONIC B4 / B5 / D4 / D5 - EARLY "SC" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 25 2096 05  
Model 25 1920 05  
Model 25 2098 05  
Model 25 2147 05 24 V  
with external fuel pump



# 7 Heater Components - Parts



## HYDRONIC B4 / B5 / D4 / D5 - EARLY "SC" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

DESCRIPTION & PART #'S

Ref. No. Description

Part Number

Model #

25 2096 05 12V

25 1920 05 12V

25 2098 05 12V

25 2147 05 24V

Ref. No.	Description	Part Number	Model #	25 2096 05 12V	25 1920 05 12V	25 2098 05 12V	25 2147 05 24V
1	Casing	25 1917 01 01 01		•			
		25 1920 01 01 01			•	•	•
2	Combustion air blower	25 2219 99 16 00			•	•	
		25 2013 99 16 00		•			
		25 2146 99 17 00					•
3	Cover	25 1917 01 00 02		•	•	•	
		25 2137 01 00 02					•
5	Burner	25 1917 19 00 00		•			
		25 1920 10 00 00			•	•	
		25 2146 10 00 00					•
6	Heat exchanger	25 1864 06 00 01		•			
		25 1922 06 00 01			•	•	•
7	Control unit	25 1917 55 00 01			•		
		22 5201 00 10 01		•			
		22 5201 04 00 04				•	
		22 5202 01 10 01					•
8	Cover	20 1752 99 01 03		•	•	•	
9	Coolant pump	25 1920 25 00 00		•	•	•	
		25 2118 25 00 00					•
10	Fuel metering pump	25 1917 45 00 00		•			
		25 1920 45 00 00			•	•	
		25 1942 45 00 00					•
11	Integrated fuel filter	20 1312 00 00 06		•	•	•	
12	Holder Fuel metering pump	25 1917 01 00 07		•	•	•	
13	Seal	20 1820 99 00 01		•	•	•	
14	O-Ring 74 x 33mm	22 1000 70 00 18		•	•	•	
15	Glow pin	25 1864 01 10 00			•		
		25 2107 01 10 00				•	
		25 2106 01 13 00		•		•	
18	Glow pin assembly	25 2147 01 13 00				•	
19	Holder for sensor B4/D5 S 24V	20 1752 01 00 04				•	

# 7 Heater Components - Parts

HYDRONIC B4 / B5 / D4 / D5 - EARLY "SC" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS				Model #	25 2096 05 12V	25 1920 05 12V	25 2098 05 12V	25 2147 05 24V
Ref. No.	Description	Part Number						
20	Sleeve	20 1752 01 00 02						•
21	Flame sensor	25 1920 36 00 00	Old P/N	•	•	•	•	•
		25 1920 37 00 00	New P/N	•	•	•	•	•
22	Overheat sensor with cable	25 1920 01 23 00		•	•	•	•	•
		25 2147 01 23 00					•	•
23	Plug kit 14 pin	22 1000 30 10 10		•	•	•	•	•
24	Glow plug harness	25 1920 01 18 00		•	•	•	•	•
25	Cable section complete assembly	25 2219 01 23 00		•	•	•	•	•
26	Spring	25 1864 01 00 05		•				
		25 1922 01 00 05			•	•	•	•
27	Cover Fuel metering pump	25 1917 01 00 03		•	•	•	•	•
28	O-Ring 14 x 2.6	22 1000 70 00 06		•	•	•	•	•
29	O-Ring 7.0 x 2	25 2481 99 01 07		•	•	•	•	•
30	Hose	25 1917 01 00 11		•	•	•	•	•
31	Cable band	209 31 071		•	•	•	•	•
32	Screw M4 x 10	25 1917 25 00 12		•	•	•	•	•
34	Taptite screw M5 x 12 Torx	109 10 153		•	•	•	•	•
35	Spring washer 4mm	5590087		•	•	•	•	•
36	Hexagon nut 4mm Din 934-5	5590066		•	•	•	•	•
37	Sleeve	25 1917 01 00 05		•	•	•	•	•
39	Taptite screw M5 x 35 Torx	109 10 154		•	•	•	•	•
40	Taptite screw M5 x 25	109 10 152		•	•	•	•	•
41	Cheese-head screw M5 x 65 Torx	100 10 350		•	•	•	•	•
42	Taptite screw M5 x 16 Torx	109 10 151		•	•	•	•	•
43	Taptite screw M4 x 10 Torx	109 10 150		•	•	•	•	•
44	Countersunk screw M5 x 12 Torx	102 10 302		•	•	•	•	•
45	Sleeve	320 31 120		•	•	•	•	•

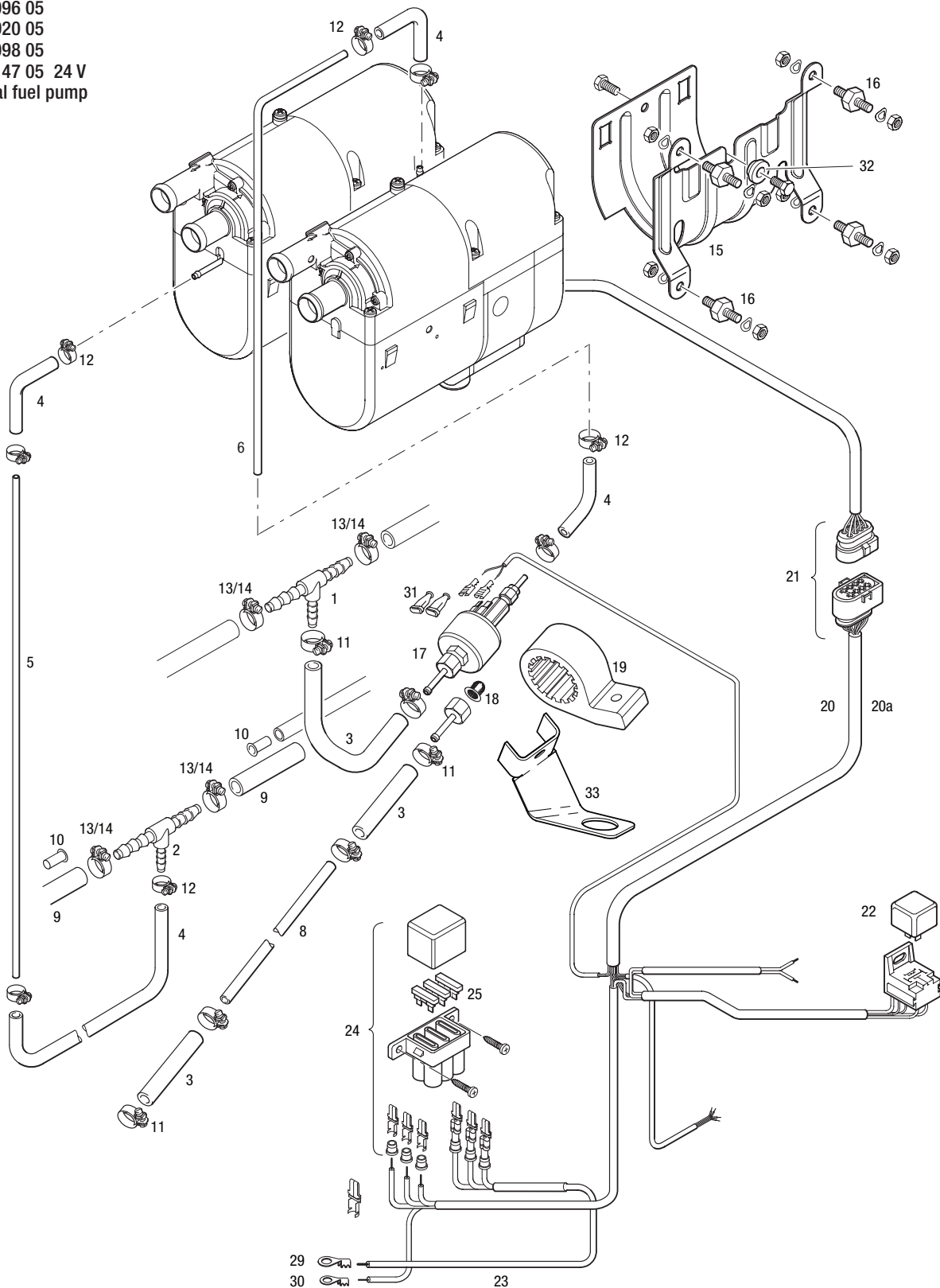


# 7 Heater Components - Parts

HYDRONIC B4 / B5 / D4 / D5 - EARLY "SC" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 25 2096 05  
Model 25 1920 05  
Model 25 2098 05  
Model 25 2147 05 24 V  
with external fuel pump



# 7 Heater Components - Parts

HYDRONIC B4 / B5 / D4 / D5 - EARLY "SC" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS				Model #	25 2096 05 12V	25 1920 05 12V	25 2098 05 12V	25 2147 05 24V
Ref. No.	Description		Part Number					
1	T - piece -8-6-8		262 31 151					•
2	T - piece -8-4-8		262 31 155	•	•	•		
3	Hose 5 x 3mm		360 75 350	•	•	•	•	
4	Hose 3.5 x 3mm		360 75 300	•	•	•	•	
5	Pipe 2.0mm (optional)		890 31 055	•	•	•		
6	Pipe 1.5mm		890 31 118					•
8	Pipe 2mm		890 31 125					•
9	Hose 7.5mm		Not available					
10	Supporting sleeve with collar		Not available					
11	Hose clamp 11mm		10 2068 01 10 98					•
12	Hose clamp 9mm		10 2068 00 90 98	•	•	•	•	
13	Hose clamp 14mm		10 2068 01 40 98					•
14	Hose clamp 12mm		10 2068 01 20 98	•	•	•	•	
15	Holder		25 1864 80 00 01	•	•	•	•	
16	Shock mount 6mm		20 1185 00 00 01	•	•	•	•	
17	Fuel metering pump	24V	25 1942 45 00 00					•
18	Integrated fuel filter		20 1312 00 00 06	•	•	•	•	
19	Holder metering pump		22 1000 50 03 00					•
20	Main harness - J.E. universal w/relay		25 1917 80 11 00 25 2009 80 10 00	•	•	•		•
20a	Main harness Eberspaecher NA		20 2900 70 30 05 20 2900 70 05 03 20 2900 70 05 07	•	•	•		•
21	Connection kit main harness		22 1000 30 10 21	•	•	•	•	
22	Relay		203 00 095	•	•	•	•	
23	Fuse harness		20 1668 80 05 00	•	•	•		
24	Fuse holder Kit		22 1000 31 06 00	•	•	•	•	
25	Fuse	25 A 20 A 5 A	204 00 089 5670055 204 00 079	•	•	•	•	•
29	Eyelet		* H					
30	Eyelet		* H					
31	Insulator		320 31 120	•	•	•	•	
32	Washer		25 1864 80 00 02	•	•	•	•	
33	Angle bracket		20 2900 40 01 04	•	•	•	•	

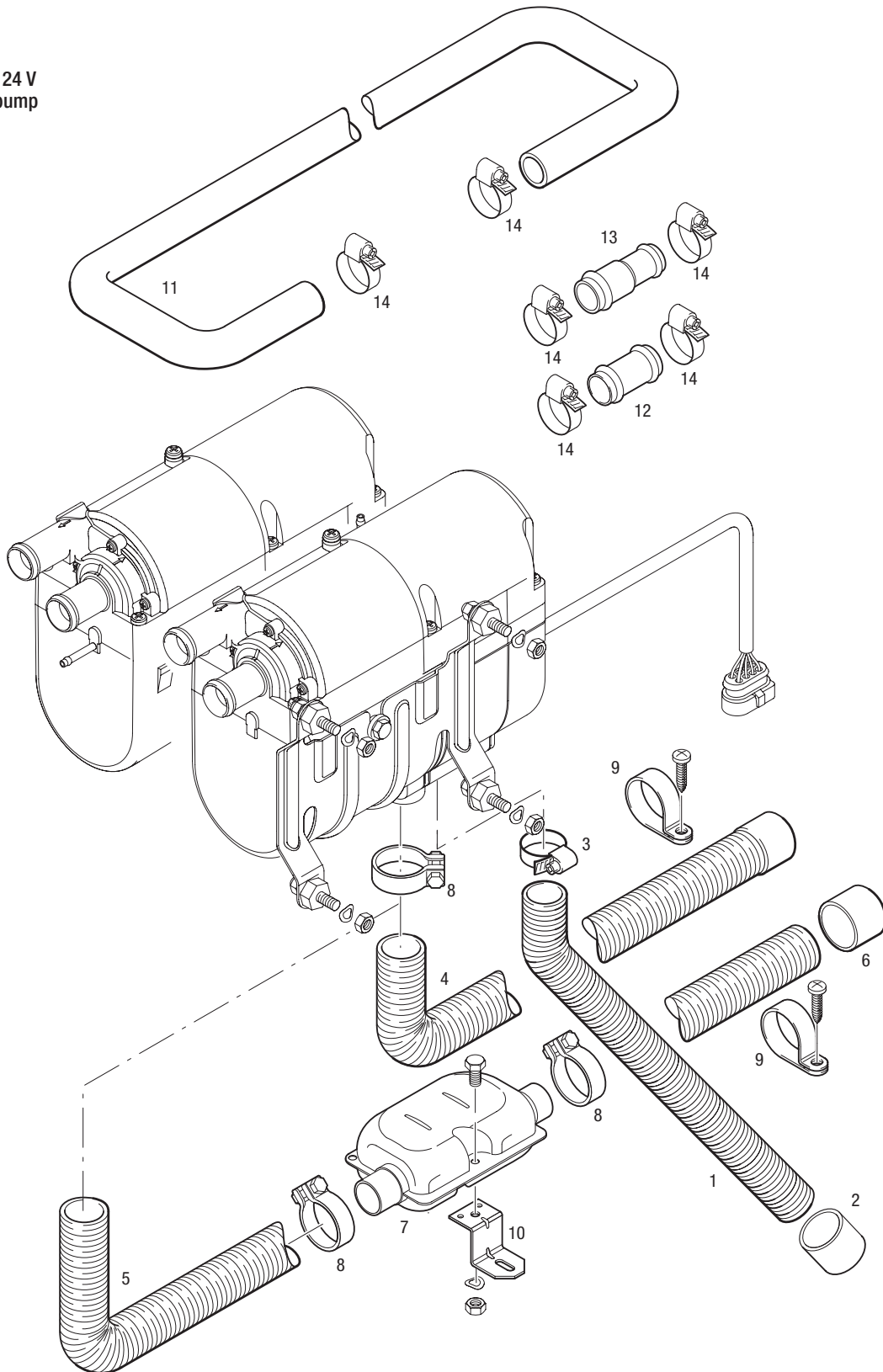


# 7 Heater Components - Parts

HYDRONIC B4 / B5 / D4 / D5 - EARLY "SC" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 25 2096 05  
Model 25 1920 05  
Model 25 2098 05  
Model 25 2147 05 24 V  
with external fuel pump



# 7 Heater Components - Parts

## HYDRONIC B4 / B5 / D4 / D5 - EARLY "SC" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

DESCRIPTION & PART #'S

Ref. No. Description

Part Number

Model #

25 2096 05 12V

25 1920 05 12V

25 2098 05 12V

25 2147 05 24V

1	Flexible air intake hose	360 00 099	•	•	•	•
2	End cap with bar	25 1688 80 12 01	•	•	•	•
3	Hose clamp 16 - 25 mm	10 2067 01 60 25	•	•	•	•
4	Exhaust hose - 24 mm x 1 mtr with cap	25 1774 80 02 00	•	•	•	•
5	Exhaust hose - 24 mm	360 61 299	•	•	•	•
6	End cap with bar	20 2900 30 24 00	•	•	•	•
7	Exhaust silencer	25 1864 81 01 00	•	•	•	•
8	Exhaust clamp 26 mm	152 61 102	•	•	•	•
9	Clamp "C" type 28 mm	152 09 010	•	•	•	•
10	Double angle bracket	20 1533 88 00 07	•	•	•	•
11	Coolant hose 180° x 2, 20 mm	25 1917 80 00 01	•	•	•	•
12	Hose union 20 mm	20 1534 88 00 01	•	•	•	•
13	Hose union reducer 20-18 mm	20 1645 89 00 06	•	•	•	•
14	Hose clamp 20 - 32 mm	10 2066 02 00 32	•	•	•	•



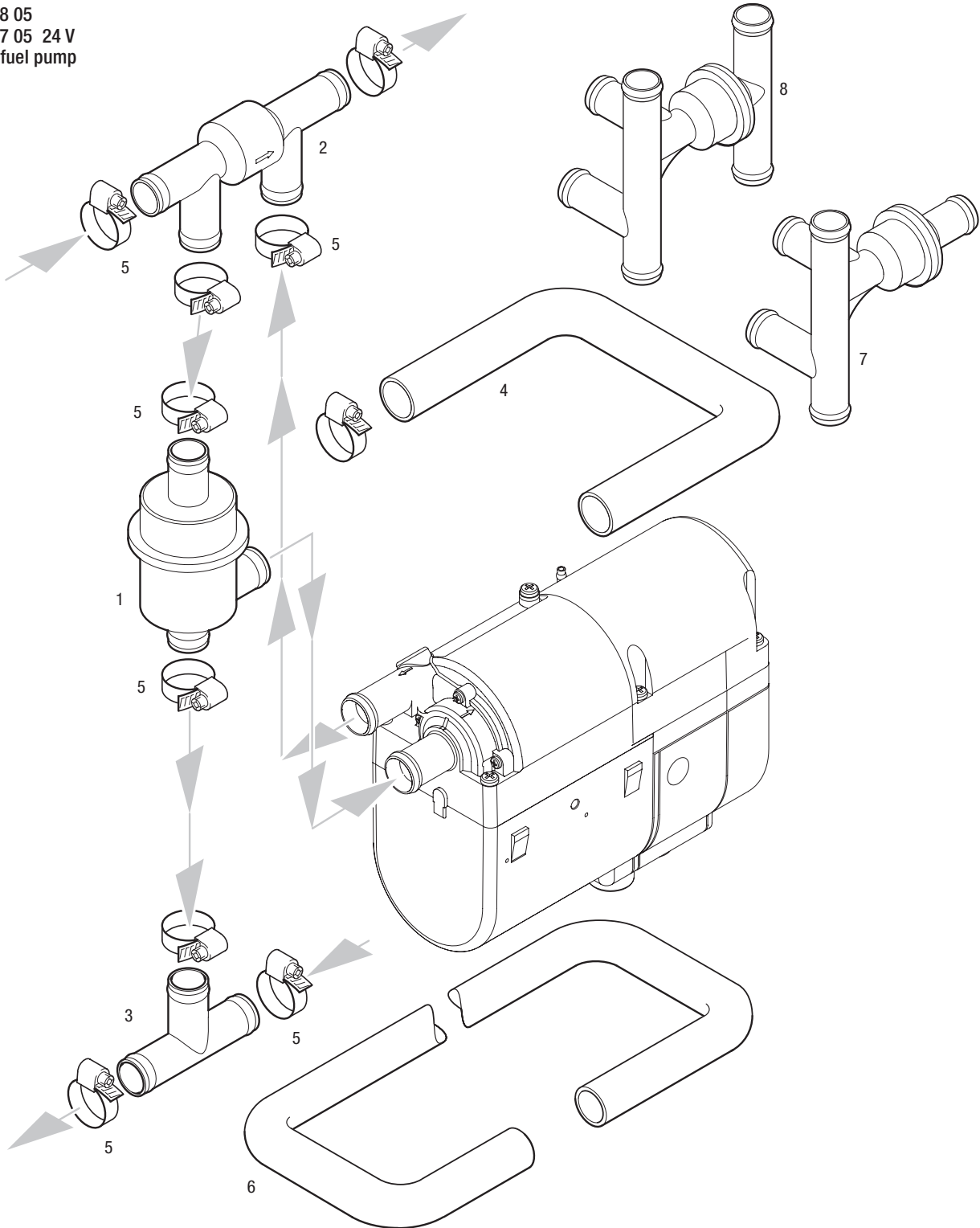


# 7 Heater Components - Parts

HYDRONIC B4 / B5 / D4 / D5 - EARLY "SC" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 25 2096 05  
Model 25 1920 05  
Model 25 2098 05  
Model 25 2147 05 24 V  
with external fuel pump



# 7 Heater Components - Parts

## HYDRONIC B4 / B5 / D4 / D5 - EARLY "SC" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

DESCRIPTION & PART #'S

Ref. No. Description

Part Number

Model #

25 2096 05 12V

25 1920 05 12V

25 2098 05 12V

25 2147 05 24V

1	Valve thermostat 3 port 18 mm 70 - 75°C	330 00 123		•	•	•
	Valve thermostat 3 port 20 mm 70 - 75°C	330 00 124		•	•	•
2	Check Valve - 20 mm 4 way	22 1000 10 10 00	•			
	Valve by pass - 18 mm Equal	254 00 070		•	•	•
3	T - pipe piece Ø 18-18-18	20 1645 89 10 00	•			
	Ø 20-20-20	20 1673 80 11 00		•	•	•
4	Coolant hose 20 mm (180° bend) Short	24 0117 80 00 01	•			
5	Hose clamp 20 - 32 mm	10 2066 02 00 32	•	•	•	•
6	Hose moulded 18 mm	24 0132 00 00 01	•	•	•	•
7	Combination valve (5 way) 20 mm	25 2014 80 72 00	•	•	•	•
8	Combination valve (6 way) 20 mm	25 2014 80 62 00	•	•	•	•

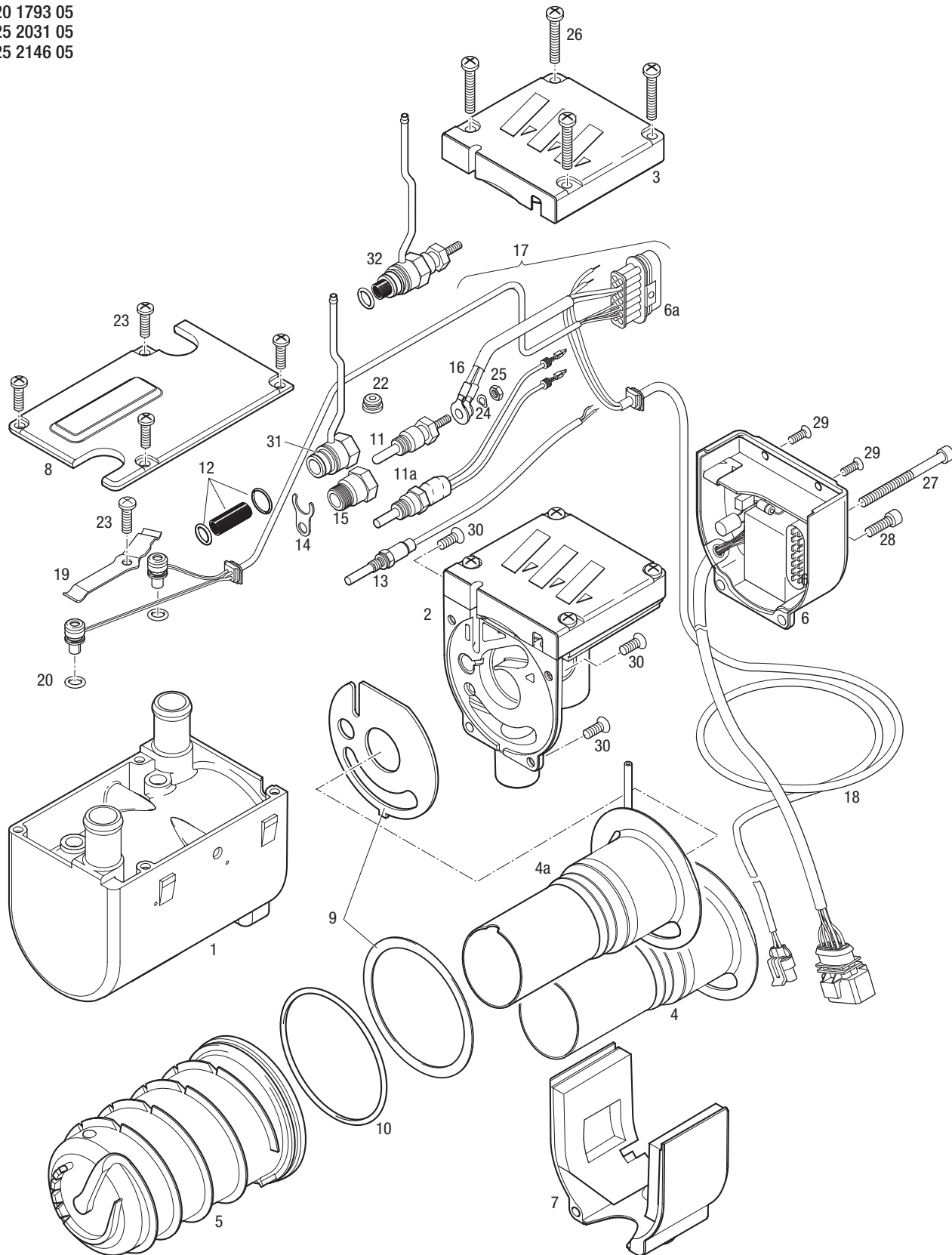


# 7 Heater Components - Parts

HYDRONIC B5 / D5 - EARLY "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 20 1793 05  
Model 25 2031 05  
Model 25 2146 05



# 7 Heater Components - Parts

## HYDRONIC B5 / D5 - EARLY "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

DESCRIPTION & PART #'S

Ref. No. Description

Part Number

Model #

20 1793 05 12V  
25 2031 05 12V  
25 2146 05 24V

Ref. No.	Description	Part Number	Model #	20 1793 05 12V	25 2031 05 12V	25 2146 05 24V
1	Casing	25 1922 01 01 01		•	•	•
2	Combustion air blower with cover	20 1819 99 16 00 25 2219 99 16 00 25 2146 99 17 00		•	•	•
3	Cover	20 1756 01 00 03 25 1864 01 00 04		•	•	•
4	Burner	20 1818 11 00 00		•		
4a		25 2146 10 00 00 25 1922 10 00 00			•	•
5	Heat exchanger	25 1922 06 00 01		•	•	•
6	Control unit	22 5201 04 00 01 22 5201 04 00 01 22 5202 01 10 01		•	•	•
6a	Plug kit	22 1000 30 10 10		•	•	•
7	Cover heater base	20 1756 99 01 03		•	•	•
8	Cover blower	25 1922 01 00 02		•	•	•
9	Gasket / seal set	20 1820 99 00 01		•	•	•
10	O-Ring 74 x 3mm	22 1000 70 00 18		•	•	•
11	Glow pin with cable	12 V 24 V		25 2106 01 13 00 25 2107 01 10 00	•	•
12	Lining and 2 O-Rings	20 1752 99 01 02		•		
13	Flame sensor	25 1920 36 00 00 25 1920 37 00 00	Old P/N New P/N	•	•	•
14	Holder for sensor	20 1752 01 00 04		•		•
17	Over heat / temperature sensors w/cable	25 1942 01 23 00 25 2150 01 23 00		•	•	•
18	Harness, water pump	25 2009 01 15 00		•	•	•

# 7 Heater Components - Parts



## HYDRONIC B5 / D5 - EARLY "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

DESCRIPTION & PART #'S

Ref. No. Description

Part Number

Model #

20 1793 05 12V  
25 2031 05 12V  
25 2146 05 24V

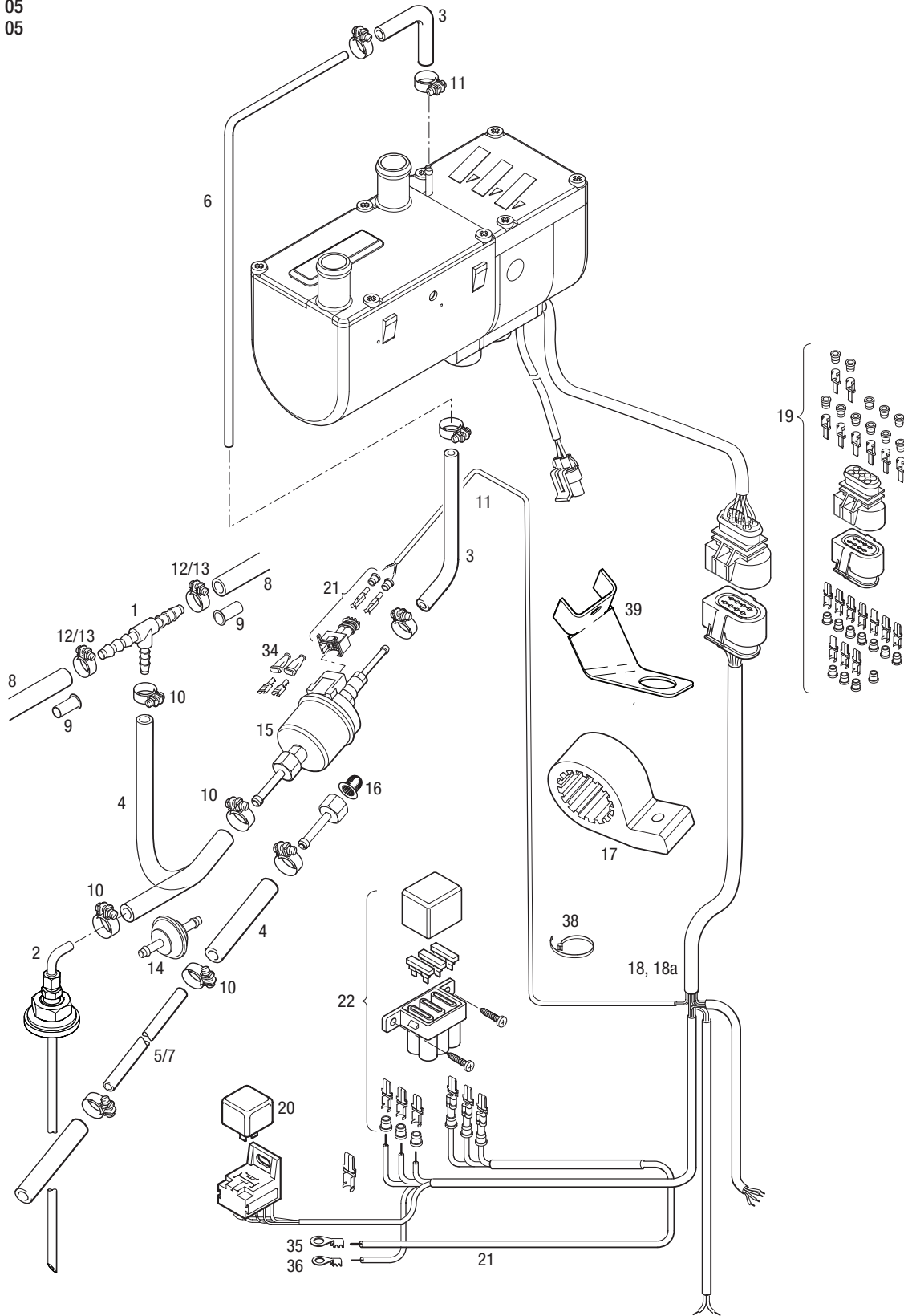
19	Spring overheat sensor	25 1922 01 00 05	•	•	•
20	O-Ring 7 x 2	22 2481 99 01 07	•	•	•
23	Taptite screw M5 x 12 Torx	109 10 153	•	•	•
26	Taptite screw M5 x 25 Torx	109 10 152	•		
27	Cheese-head screw M5 x 65 Torx	100 10 350	•	•	•
25	Taptite screw M5 x 16 Torx	109 10 151	•	•	•
29	Taptite screw M4 x 10 Torx	109 10 150	•	•	•
30	Countersunk screw M5 x 12	102 10 302	•	•	•
31	Plug connection	20 1756 01 10 00	•		
32	Plug connection compl.	25 2146 01 13 00			•

# 7 Heater Components - Parts

HYDRONIC B5 / D5 - EARLY "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 20 1793 05  
 Model 25 2031 05  
 Model 25 2146 05



# 7 Heater Components - Parts



## HYDRONIC B5 / D5 - EARLY "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

DESCRIPTION & PART #'S

Ref. No. Description

Part Number

Model #

20 1793 05 12V

25 2031 05 12V

25 2146 05 24V

Ref. No.	Description	Part Number	Model #	20 1793 05 12V	25 2031 05 12V	25 2146 05 24V
1	T-piece 8 x 6 x 8 mm	262 31 151		•	•	•
2	Fuel pick up pipe 2.0 mm - Universal	20 2900 20 20 10				•
3	Hose 3.5 x 3 mm	360 75 300		•	•	•
4	Hose 5 x 3 mm	360 75 350		•	•	•
5	Plastic fuel line 2 mm / mtr	890 31 055			•	
6	Pipe 1.5 mm	890 31 118		•	•	•
7	Fuel Line - 2mm, Black	890 31 125		•	•	•
8	Hose 7.5 mm	Not available				
9	Supporting sleeve with collar	Not available				
10	Hose clip 11 mm	10 2068 01 10 98		•	•	•
11	Hose clip 9 mm	10 2068 00 90 98		•	•	•
12	Hose clip 14 mm	10 2068 01 40 98		•	•	•
13	Clamp 12 mm	10 2068 01 20 98		•	•	•
14	Fuel filter	25 1226 89 00 37				•
15	Fuel metering pump	12 V 24 V		•	•	•
				20 1645 45 00 00		25 1942 45 00 00
16	Integrated fuel filter	20 1312 00 00 06		•	•	•
17	Holder metering pump	22 1000 50 03 00		•	•	•
18	Main harness - J.E. universal w/relay	25 1917 80 10 00		•	•	
18a	Main harness	20 2900 70 05 07		•	•	•
19	Connector kit main harness	22 1000 30 10 21		•	•	•
20	Relay	12 V 24 V		•	•	•
				203 00 095		203 00 066
21	FMP connector kit	22 1000 31 87 00		•	•	•
22	Fuse holder kit	22 1000 31 06 00		•	•	•
34	Sleeve	320 31 120		•	•	•
35	Eyelet	* H				
36	Eyelet	* H				
38	Cable band	25 1801 80 02 00		•	•	•
39	Angle bracket for fuel pump	20 2900 40 01 04		•	•	•

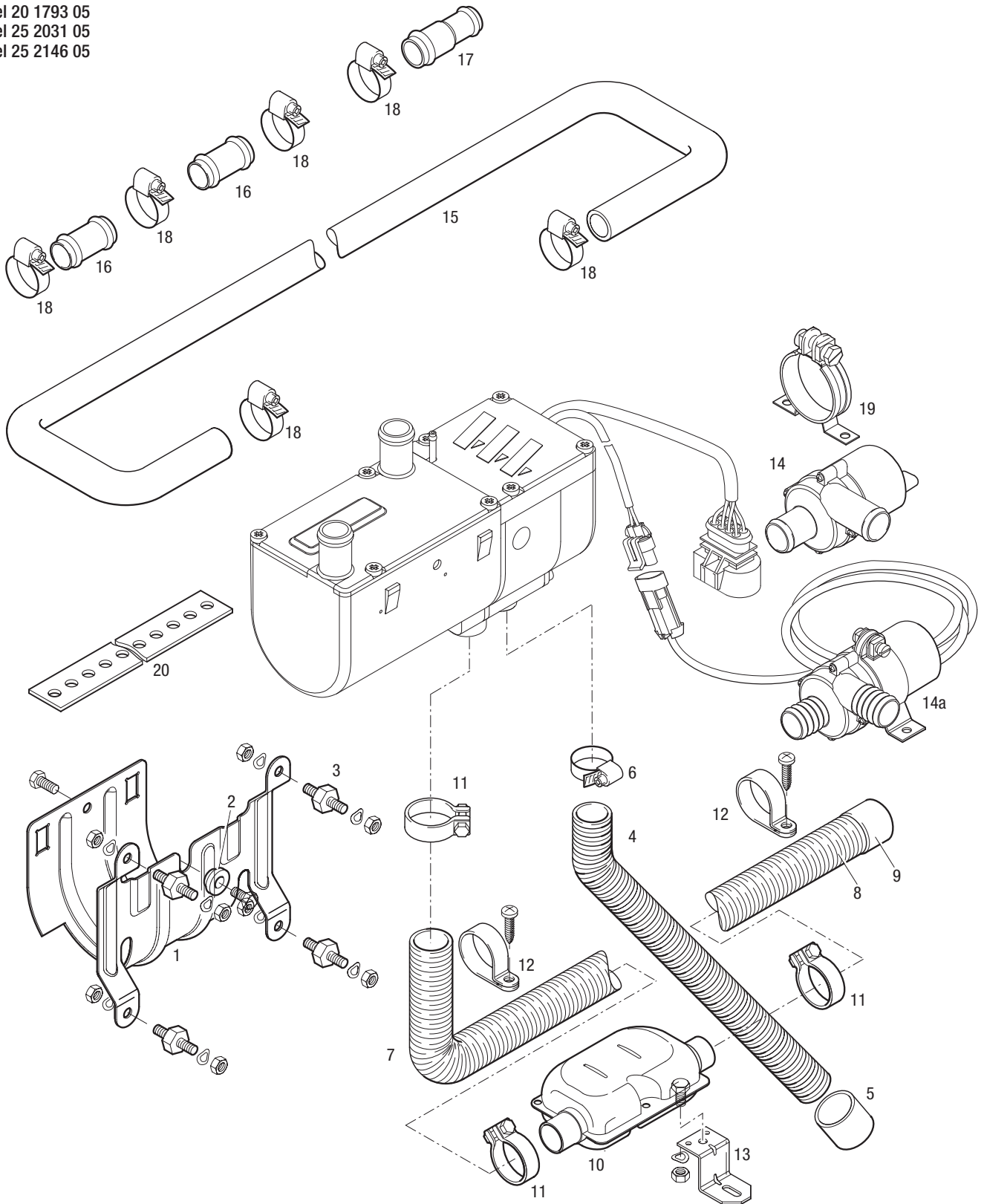
\* H = Available at local hardware store

# 7 Heater Components - Parts

HYDRONIC B5 / D5 - EARLY "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

## SERVICE PARTS DIAGRAM

Model 20 1793 05  
Model 25 2031 05  
Model 25 2146 05





# 7 Heater Components - Parts



## HYDRONIC B5 / D5 - EARLY "S" HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE VERSIONS

DESCRIPTION & PART #'S

Ref. No. Description

Part Number

Model #

20 1793 05 12V

25 2031 05 12V

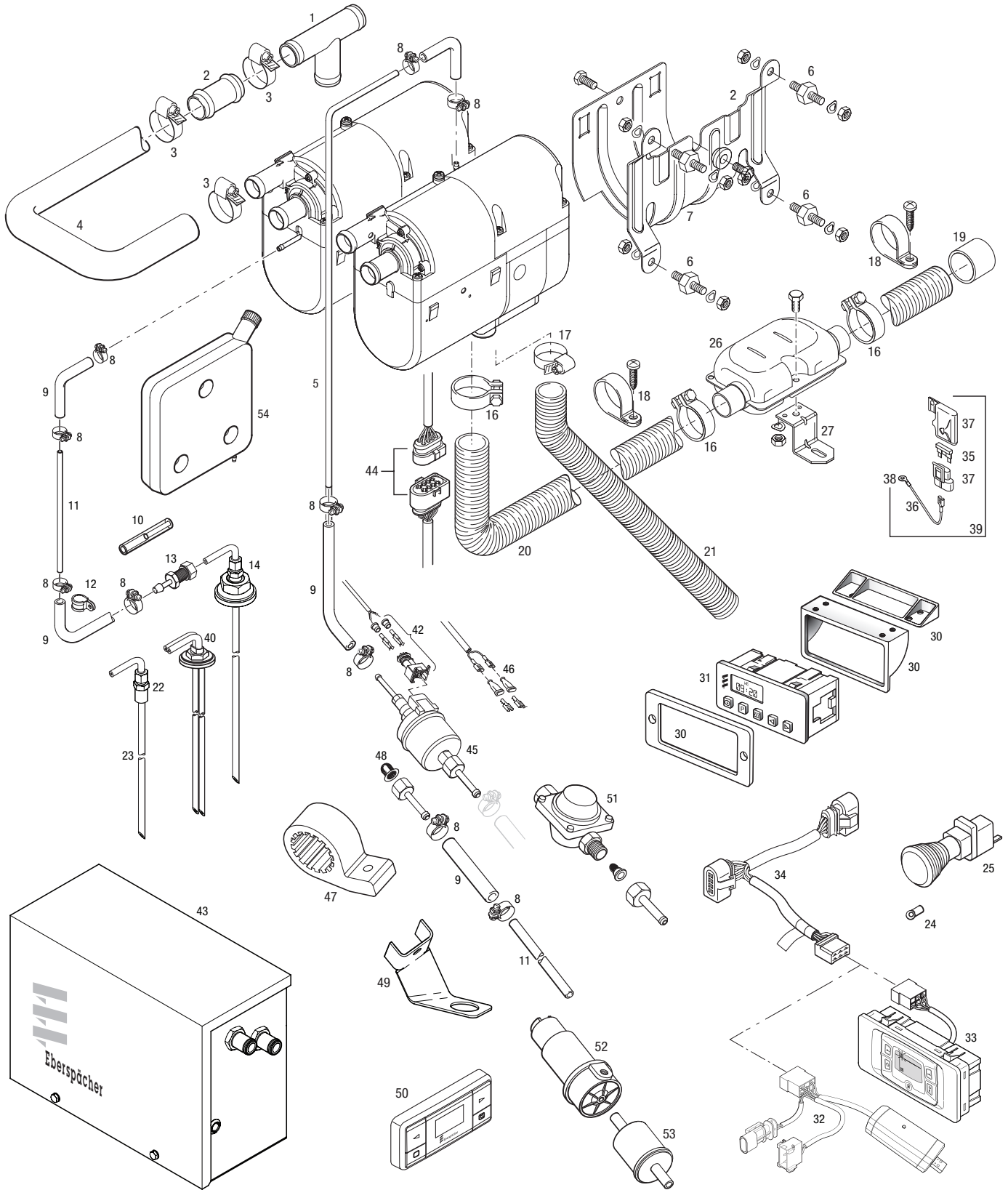
25 2146 05 24V

1	Bracket		25 1864 80 00 01	•	•	•
2	Spacer		25 1864 80 00 02	•	•	•
3	Metal rubber buffer 6 mm		20 1185 00 00 01	•	•	•
4	Hose - 20 mm APK Comb Air (1 m)		360 00 099	•	•	•
5	End cap w/bar 20 mm, plastic		25 1688 80 12 01	•	•	•
6	Hose clamp 16 - 25 mm		10 2067 01 60 25	•	•	•
7	Flexible exhaust w/end cap -1 mtr - 24 mm		25 1774 80 02 00	•	•	•
8	Flexible exhaust 24 mm		360 61 299	•	•	•
9	End cap for 24 mm exhaust w/bar		20 2900 30 24 00	•	•	•
10	Exhaust silencer		25 1864 81 01 00	•	•	•
11	26-28 mm exhaust clamp w/nut		152 61 102	•	•	•
12	Clamp 'C' type 28 mm		152 09 010	•	•	•
13	Double angle bracket 90°		20 1533 88 00 07	•	•	•
14	Coolant pump 20 mm D5 S	12 V	25 2275 25 00 00	•	•	
14a	Coolant pump 20 mm D5 S	24 V	25 2009 25 00 00			•
15	Coolant hose 180° x 2, 20 mm		25 1917 80 00 01	•	•	•
16	Connector 20 mm, metal		20 1534 88 00 01	•	•	•
17	Reducer 20 - 18 mm, metal		20 1645 89 00 06	•	•	•
18	Hose clamp 20 - 32 mm		10 2066 02 00 32	•	•	•
19	Pump clamp		22 1000 50 10 00	•	•	

# 7 Heater Components - Parts

HYDRONIC D4 / D5 - NORTH AMERICAN

SERVICE PARTS DIAGRAM

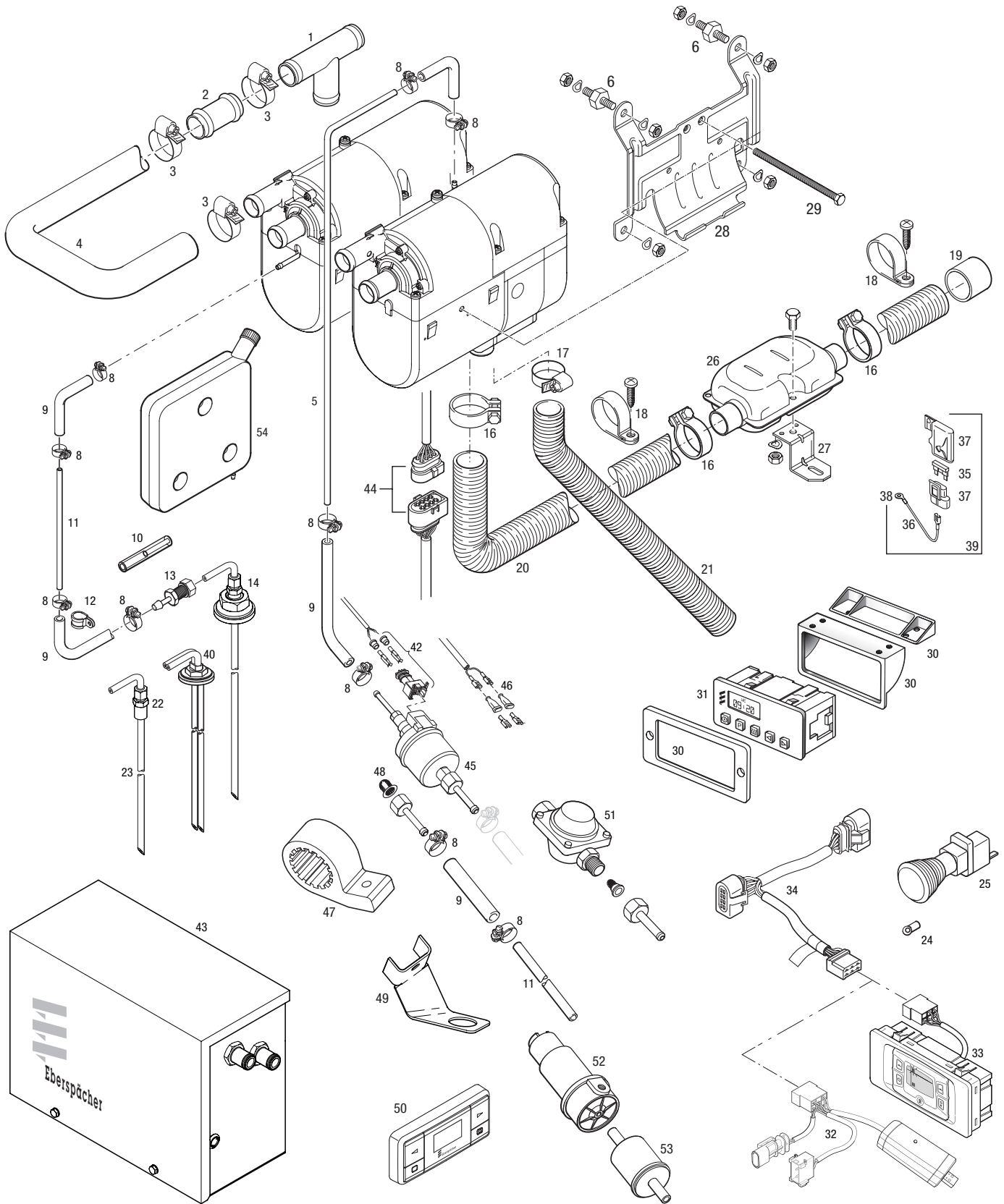


# 7 Heater Components - Parts



HYDRONIC D4 / D5 - NORTH AMERICAN - (INCLUDING FACE LIFT)

SERVICE PARTS DIAGRAM



# 7 Heater Components - Parts

DESCRIPTION & PART #'S			Model #	25 2096 05 12V	25 1920 05 12V	25 2098 05 12V	25 2147 05 24V
Ref. No.	Description	Part Number					
1	T-piece, 20 mm	20 1673 80 11 00		•	•	•	•
2	Connecting pipe 20 mm	20 1534 88 00 01		•	•	•	•
3	Clamp 20 mm-32 mm	10 2066 02 00 32		•	•	•	•
4	Coolant hose 180° x 2, 20 mm	25 1917 80 00 01		•	•	•	•
5	1.5m white plastic fuel line	890 31 118					•
6	Rubber mount 6 mm	20 1185 00 00 01		•	•	•	•
7	Heater bracket	25 1864 80 00 01		•	•	•	•
8	Hose clamp 9 mm	10 2068 00 90 98		•	•	•	•
9	Fuel hose 3.5 mm	360 75 300		•	•	•	•
10	Fuel line adapter 3.5 to 5 mm	25 1888 80 01 02		•	•	•	•
11	Fuel line 2 mm	890 31 055		•	•	•	•
12	Clamp 'C' type 10 mm w/rub	152 00 139		•	•	•	•
13	Fuel pipe reducer 3.5 - 5 mm	25 1888 80 01 02		•	•	•	•
14	Fuel pick up pipe 2.0 mm - Universal	20 2900 20 20 10		•	•	•	•
15	Main heater harness	20 2900 70 05 03 20 2900 70 20 13		•	•	•	•
16	Exhaust clamp 26 mm	152 61 102		•	•	•	•
17	Clamp 20-32 mm	10 2066 02 00 32		•	•	•	•
18	C clamp 28 mm	152 09 010		•	•	•	•
19	End cap for 24 mm exhaust w/bar	20 2900 30 24 00		•	•	•	•
20	Exhaust SS flex 2 layer 24 mm id / mtr	360 61 299		•	•	•	•
21	Hose - 20 mm APK Comb Air (1 m)	360 00 099		•	•	•	•
22	Compression fitting	1/4" NPT 20 2900 20 20 44 3/8" NPT 552 0002 1/2" NPT 552 0006		•	•	•	•
23	Custom straight pick up pipe w/Ferrule 24" length	20 2900 20 20 02		•	•	•	•
24	Replacement bulb	12V 207 00 005 24V 207 00 006		•	•	•	•
25	Push/pull switch	12V 567 0007 24V 567 0008		•	•	•	•
26	Muffler 24mm	25 1864 81 01 00		•	•	•	•



# 7 Heater Components - Parts

## HYDRONIC 4 / 5 - NORTH AMERICAN HEATERS - 12 & 24 VOLT - DIESEL & GASOLINE

DESCRIPTION & PART #'S		Part Number	Model #	25 2096 05 12V	25 1920 05 12V	25 2098 05 12V	25 2147 05 24V
Ref. No.	Description						
27	Double angle bracket	20 1533 88 00 07		•	•	•	•
28	Mounting Bracket (model: 25 2217 / 2218 / 2219 / 2257)	25 2220 80 00 01		•	•	•	•
29	Bolt M6 x 97, Hyd Brkt	100 10 258		•	•	•	•
30	7 day mounting bracket and bezel	25 1482 70 01 00		•	•	•	•
31	7 day timer	22 1000 30 36 00		•	•	•	•
32	Eberspaecher Universal Diagnostic Tool (EUDT)	20 2800 70 1200		•	•	•	•
33	Fault code retrieval device	20 2900 70 50 60		•	•	•	•
34	Retrieval harness for fault code device	20 2900 70 50 28		•	•	•	•
35	Fuse blade	25 A 20 A	204 00 005 5670055	•	•	•	•
36	Wire awg 12 gage red		5670117	•	•	•	•
37	Main fuse holder		5670051	•	•	•	•
38	Ring terminal 3/8" awg 10-12		5670178	•	•	•	•
39	Fuse link power harness	20 2900 70 51 08		•	•	•	•
40	Double pick-up (used with combo kits)	20 2900 20 20 57		•	•	•	•
42	Fuel connector kit	22 1000 31 87 00		•	•	•	•
43	Hydronic box Base	25 2800 40 05 02		•	•	•	•
	Hydronic box Lid	25 2800 40 05 01		•	•	•	•
	Silicon Exhaust	25 1216 88 03 01		•	•	•	•
	Grommet harness	20 2900 60 10 61		•	•	•	•
	Grommet fuel	20 1280 09 01 03		•	•	•	•
44	Plug cables complete main harness	22 1000 30 10 21		•	•	•	•
45	Fuel metering pump	25 1942 45 00 00					•
46	Boot sleeve	320 31 120					•
47	Fuel metering pump holder	22 1000 50 03 00					•
48	Integrated fuel filter	20 1312 00 00 06		•	•	•	•
49	Angle bracket	20 2900 40 01 04		•	•	•	•
50	EasyStart timer (Diagnostics is only for "H kit" ECU)	22 1000 34 15 00		•	•	•	•
51	Pressure reducer	22 1000 20 08 00		•	•	•	•
52	Auxiliary fuel pump 24 V	25 1226 89 83 00		•	•	•	•
53	Plastic fuel filter (in front of auxiliary pump)	25 1156 20 00 09		•	•	•	•
54	Plastic fuel tank (10L or 2.6 gal - blue)	22 1000 20 28 00		•	•	•	•

# 8 Service

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## CERTIFICATION

The high quality of Eberspächer's products is the key to our success. To guarantee this quality, we have organised all work processes in the company along the lines of quality management (QM). Even so, we still pursue a large number of activities for continuous improvement of product quality in order to keep pace with the similarly constantly growing requirements made by our customers. All the steps necessary for quality assurance are stipulated in international standards. This quality is to be considered in a total sense. It affects products, procedures and customer/supplier relationships. Officially approved public experts assess the system and the corresponding certification company awards a certificate.

Eberspächer has already qualified for the following standards:

**Quality management as per  
DIN EN ISO 9001:2000 and ISO/TS 16949:2009**

**Environment management system as per  
DIN EN ISO 14001:2004**

## HEALTH AND SAFETY

Eberspächer North America gives utmost importance to workplace health and safety and abides by highest standards possible:

**Health and Safety  
ISO/TS 16949:2009**

## DISPOSAL

### Disposal of materials

Old devices, defect components and packaging material can all be separated and sorted into puregrade factions so that all parts can be disposed of as required in an environment-friendly manner or recycled where applicable. Electric motors, controllers and sensors (e.g. temperature sensors) are deemed to be "electronic scrap".

### Dismantling the heater

The heater is dismantled according to the repair stages in the current troubleshooting / repair instructions.

### Packaging

The packaging of the heater can be kept in case it has to be sent back.

## CONTACT US:

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