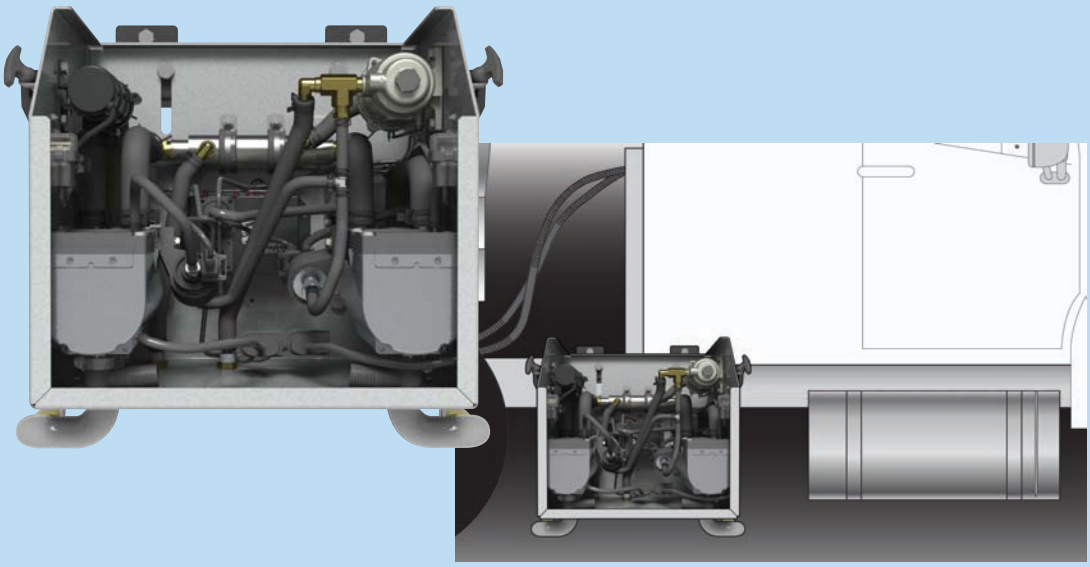
HYbernator

Installation Instructions

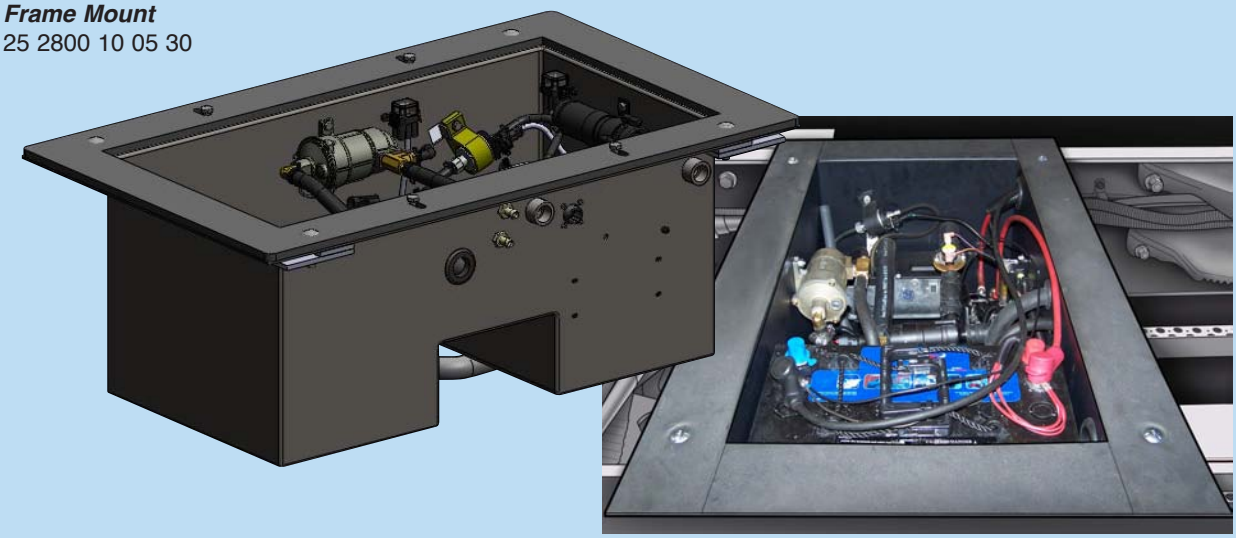
Espar Heater Systems

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

Rail Mount
25 2800 10 05 15



Frame Mount
25 2800 10 05 30



P/N 25 2800 80 5004 0A 10.2011 Subject to Change Web Edition

Table of contents

Introduction	Table of contents	2
	Heater warnings	3
Installation Instructions	Hybernator specifications	4
	Installation procedure	4
	Operational cycle	4
	Flow diagram	5
	Installation Instructions	6
Maintenance, Troubleshooting & Repairs	Trouble shooting guide for the Espar Hybernator controller	7
	Recommended maintenance	8
	When faults occur, first check...	8
	Controller lock / Cancel controller lock	8
	Heater diagnostics	8
	Testing equipment	9
	EDiTH diagnostic tool with ISO adapter	12
	Fuel Quantity Test	13
	Test values	13
	Fault code list	14
	Hybernator Components	16
	Spare Parts List for Hybernator	16
	Hybernator specification tables	17
	Aux. Fuel Pump Technical Info	18
	Heat exchanger Technical Info	18
	Water Pump Technical Info	19
	Recommended Battery Separator Technical Info	19
	Technical data for diesel heaters	20
	Main dimensions	21
Heater Components	Hydronic D5 W Z Parts Diagram	22
	Hydronic D5 W Z Parts List	23

Special Notes

Note: Highlight areas requiring special attention or clarification.

Caution: *Indicates that personal injury or damage to equipment may occur unless specific guidelines are followed.*

Warning: Indicates that serious or fatal injury may result if specific guidelines are not followed.

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 the heater. Failure to follow all these instructions could cause serious or fatal injury.

Warning - Explosion Hazard

- Heater must be turned off while re-fueling.
- Do not install heater in enclosed areas where combustible fumes may be present.
- Do not install heaters in engine compartments of gasoline powered boats.

Warning - Fire Hazard

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

Warning - Asphyxiation Hazard

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

Warning - Safety Hazard on Coolant Heaters Used With Improper Antifreeze Mixtures

- The use of Espar coolant heaters requires that the coolant in the system to be heated 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.

Caution: *During electrical welding work on the vehicle disconnect the power to the heater in order to protect the control unit.*

Note: All measurements contained in this manual contain metric and approximate SAE equivalents in brackets eg 25mm (1”).

Direct questions to Espar Heater Systems:

Canada & U.S.A. **1-800-387-4800**

This publication was correct at the time of print. However, Espar has a policy of continuous improvement and reserves the right to amend any specifications without prior notice.

Description	Specification
Type	12 Volt Diesel
Heat Output	1,7000 BTU
Coolant temperature output range	105°F - 155°F
Current draw	10 amps approx (Including blower)
Fuel consumption	0.62 1/hr (0.16 gal/hr)
Tolerable operating pressure	2.5 bar (36 psi)
Minimun flow rate	250 L/h
Ambient operating temperature	-40°F to + 176°F
Overall weight	Hybernator II: 89 lbs.
	Compact: 43 lbs. (single heater) 49 lbs. (dual heater)
Overall dimensions W x H x D	Hybernator II: 380mm x 610mm x 255mm 15” x 24” x 10” approx.
	Compact: 350mm x 330mm x 320mm 13.75” x 13” x 12.5” approx.

Installation procedure

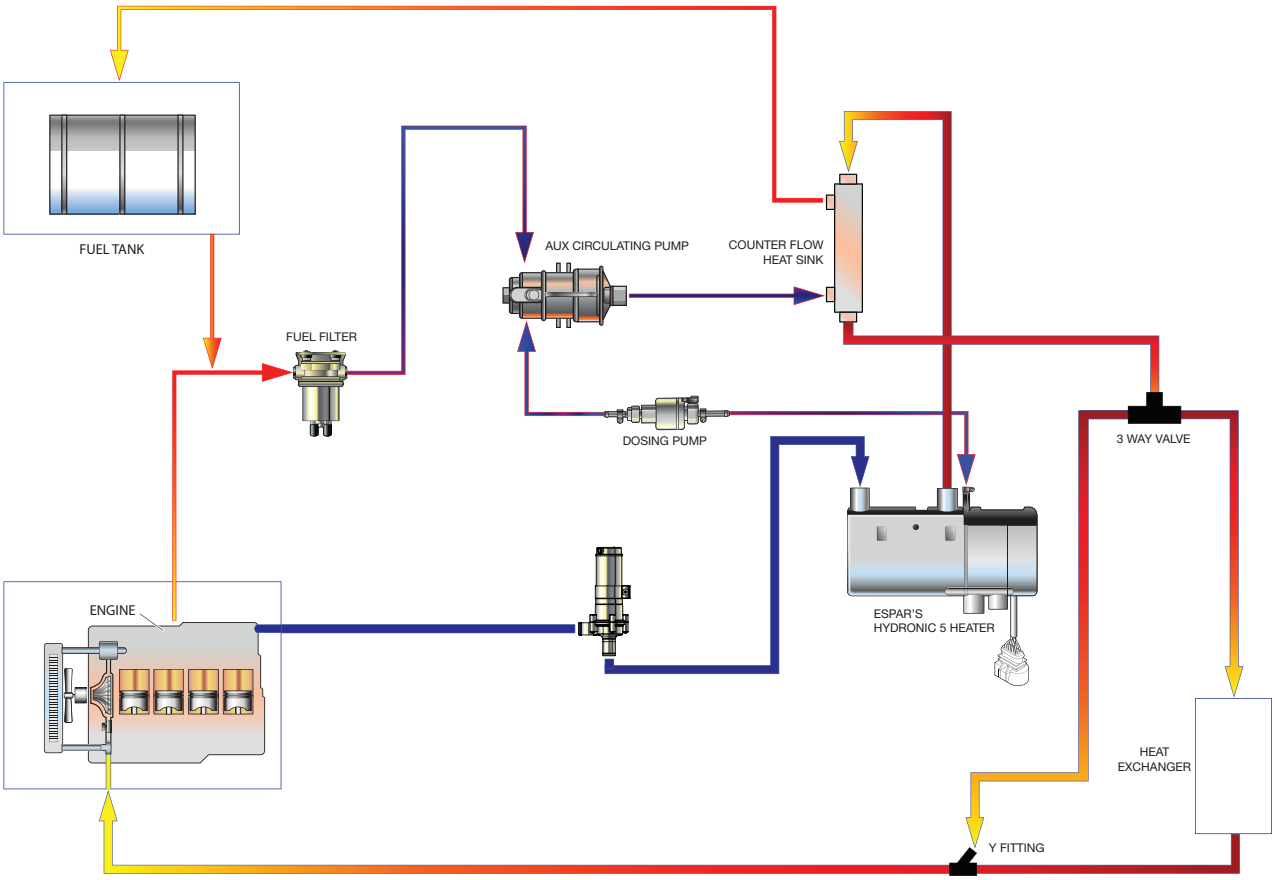
- Plain installation location
- Gather required tools
- Gather required parts not included in the kit
- Mount unit on the vehicle
- Plan coolant system layout
- Mount heater exchanger in vehicle
- Connect coolant hoses and fittings
- Plan fuel system layout
- Connect fuel lines and fittings
- Install control switches and harnesses
- Install battery separator (optional) and batteries
- Connect batteries
- Run vehicle and bleed air from coolant system
- Test run the heater and re-secure all coolant and fuel connections

Operational cycle

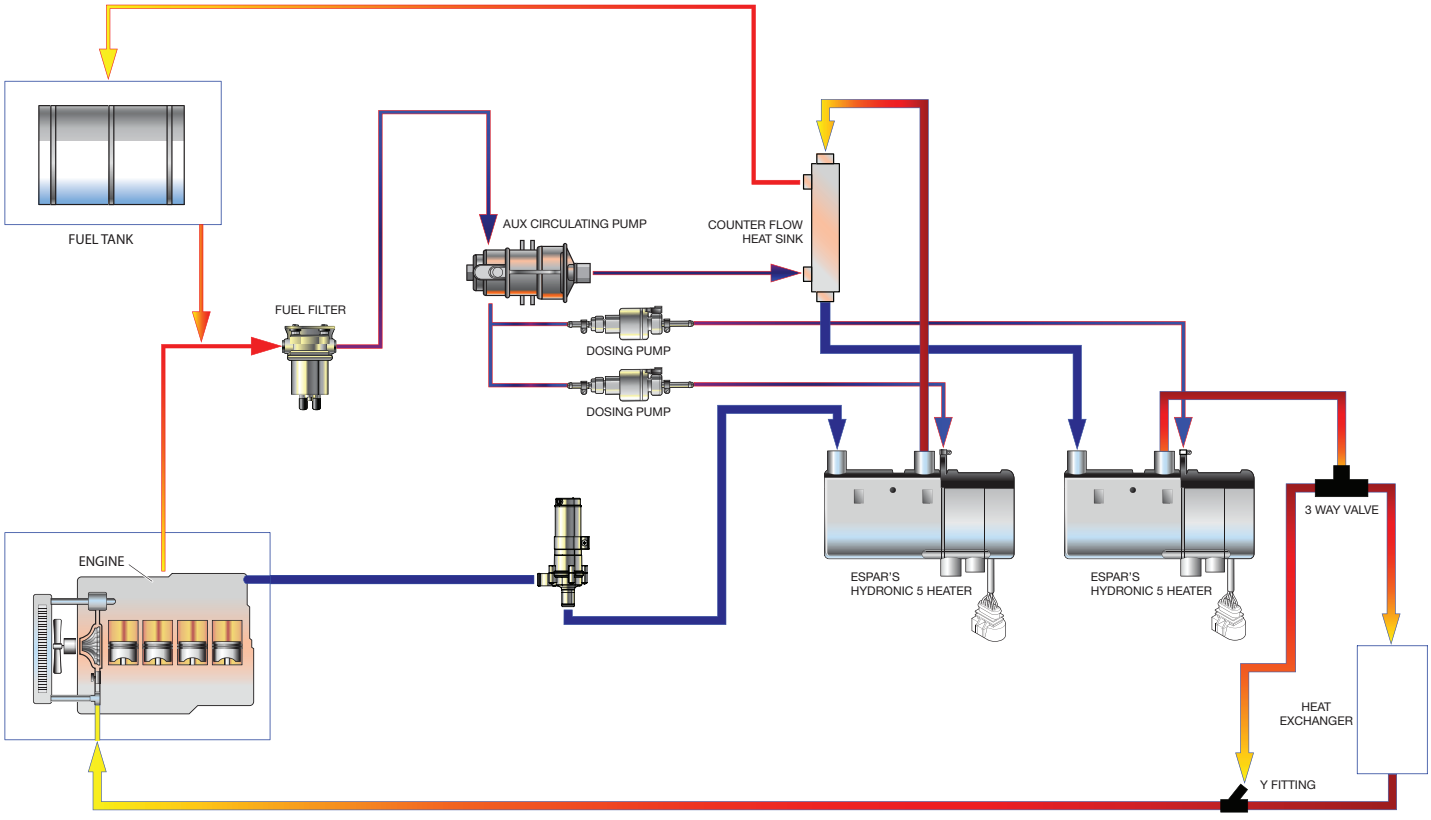
When the Hybernator is switched ON

- The Hybernator controller activates the water pump and the coolant begins to circulate through the vehicle engine, cab heat exchanger and the Hybernator plate heat exchanger.
- The auxiliary fuel pump starts up and begins to circulate the fuel through the Hybernator plate heat exchanger.
- The water temperature sensor monitors the temperature of the circulating coolant.
- If the temperature of the coolant is above 105°F, the *Hydronic* heater is not turned ON.
- When the temperature of the coolant drops below 105°F, the controller switches on the *Hydronic* heater.
- The *Hydronic* heater starts and runs in the “High” heat out put mode.
- When the temperature of the coolant climbs above 155°F, the controller switches off the heater.
- This cycle is repeated and the temperature of the coolant is maintained between 105°F to 155°F, until the unit is switched off.
- Heater will run for minimum of 5 min before shut down. even if switch is off.

Flow Diagram - Single Heater Version Plumbing Schematic



Flow Diagram - Dual Heater Version Plumbing Schematic



Installation Instructions

1. Before attempting to install the unit on or between the frame rails check that there are no obstruction and enough space available.
2. Assemble coolant ports to the unit before fastening the unit to the vehicle.
3. Fasten unit to the vehicle.

4. Determine suitable location for mounting heat exchanger and blower under bunk. When determining location of heat exchanger and blower consideration of cross frame supports and under bunk lines must be determined before any drilling is done.

5. Fasten heat exchanger and blower to vehicle floor.
6. Fasten actuator valve to underbody of cab near blower parts.

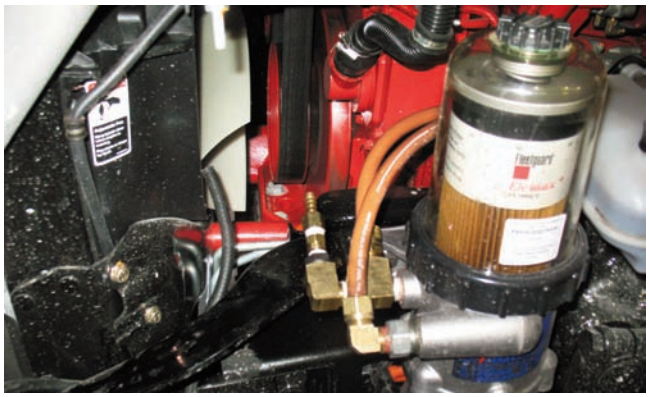
7. Determine the path that the coolant and fuel lines will be routed and be sure to leave enough length to allow for cab movement.
   Where possible it is recommended that split loom be used to protect the hoses against any abrasions.

8. After the hose lengths have been determined and cut, connect one end to the units ports and route the hoses as planned.

9. Refer to Plumbing Schematic for hose connection to vehicle and heat exchanger.

10. Ensure hose is adequately protected and secured to prevent sagging and damage.

11. Disconnect the outlet fitting on the engines fuel filter and install supplied check valve with 3/8” hose barb. Depending on the filter additional modifications may be required. (Additional fittings etc.)



12. Using the predetermined cut length of fuel hose, make the first connection to the outlet side of the fuel filter and clamp securely. Route the hose as planned, protecting and securing the hose as much as possible. Make the connection to the inlet side of the auxiliary fuel pump.

13. Install fitting on the vehicle fuel return tank tee, to accommodate a 3/8” Hose barb.

14. Using the pre-determined cut length of fuel hose make the first connection on the 3/8 hose barb and clamp securely. Route the hose as planed, protecting and securing the hose as much as possible. Make the connection to the outlet side of the auxiliary fuel pump and clamp securely.

15. Mount control switches at desired location in vehicle.

16. Route the wiring harness to all components and make connections.

Trouble shooting guide for the Espar Hybernator controller.

Trouble shooting the Hybrenator control unit is very easy. All that's needed is a multi meter and basic electrical knowledge. By using the LED's on the controller you will only need the multi meter to check voltage going to the controller, and voltage out of the coolant temperature and ambient air temperature sensors. All temperatures are Fahrenheit except table 2.

#	Description of problem	Cause and Method of repair
1	Green power light does not come on.	Check for 12 volts coming into the controller. If 12 volts is not present to the fuse, check reason and repair. Check fuse and replace if needed.
2	Low Voltage LED is on and will not turn off.	Check battery voltage. If low voltage disconnect is active, voltage will have to rise above 12.1 volts to reset.
3	Battery voltage is below 11.0 volts and low voltage LED does not come on.	Replace controller.
4	In "ON" & "AUTO" mode the water pump LED comes on and water pump runs but heater does not start.	Check engine coolant temperature must be below 130° for "ON" mode and below 35° in "AUTO" mode for heater to run. Check heater for fault codes.
5	In "ON" & "AUTO" mode the water pump LED comes on but water pump does not run.	Check fuse and replace if needed. If fuse is good check water pump and replace.
6	In "ON" & "AUTO" mode water pump LED does not come on and water pump does not run but heater starts.	Replace controller
7	In "ON" mode the water pump LED comes on and water pump runs but heater does not start.	Check coolant temperature sensor output. (See below for procedure.)
8	In "AUTO" mode water pump LED does not come on and water pump does not run.	Check ambient temperature. Temperature must be below 40°. If below 40° check coolant temperature, it must be below 35° to start. Check both ambient and coolant temperature sensor outputs. (See below for procedure.)
9	In "ON" & "AUTO" mode fuel circulating pump LED comes on but pump does not run.	Check fuse. If fuse is OK check fuel pump and replace.
10	In "ON" & "AUTO" mode fuel circulating pump LED does not come on but the rest of the system runs.	Replace controller.
11	In "ON" & "AUTO" mode heater 1 LED comes on but heater does not run.	Check fuse, if OK check heater fault codes.
12	In "ON" & "AUTO" mode heater 1 LED does not come on but the rest of the system runs.	Replace controller.
13	In "ON" & "AUTO" mode heater 2 LED comes on but heater does not run.	Check fuse, if OK check heater fault codes.
14	In "ON" & "AUTO" mode heater 2 LED does not come on but the rest of the system runs.	Check to be sure jump wire is between pin 1 and pin 12 on large 16 pin round connector. Check coolant temperature, coolant needs to be below 120° in "ON" mode and below 30° in "AUTO" mode.
15	Heaters do not seem to rotate	Check heater that is not rotating for bad fuse or fault codes.

Extreme caution needs to be used when checking sensor voltage output. Crossing pin 2 & 3 or 5 & 6 will result in sensor being damaged.

When trouble shooting sensors first make sure wire colors match the pin out. Refer to table 1 below. To check voltage output on the coolant and ambient air temperature sensors, use your multi meter in the lowest setting (ie;2 volt range). While round 9 pin connector is connected to the controller, back probe the connector between pin 1 and pin 3 for the coolant sensor, and pin 4 and pin 6 on the ambient sir sensor. Depending on temperature of the coolant or ambient air you can have and output that ranges from .150 to 1.75, typical reading is around .7 at 70° f, use table 2 for reference.

Table 1		Table 2	
Pin 1	Orange	Volts	Temp ºC
Pin 2	Red	0.15	-40
Pin 3	Brown	0.5	5
Pin 4	Violet	1.0	50
Pin 5	Red	1.5	100
Pin 6	Brown	1.75	125

Recommended maintenance

- Run the Hybernator unit once a month for 15 minutes, every month of the year
  During summer months wait till the vehicle engine cools down before starting the unit so that the heater will kick in immediately.
- Check for any coolant leaks from the heater.
- Check the condition of the coolant hoses and the connectors for leakage or damage.
- Check the condition of the fuel lines and fittings for leakage or damage.
- Check the condition of the batteries and the electrical conections for corrosion, damage etc.
- Check the water pump for any contamination or blockage.
- Take apart and clean it if necessary.
- Check the Espar fuel pump filter screen.
- Check the Auxiliary fuel pump screen (is there a screen?)
- Check the mounting bolts of the unit to see if any have come loose due to vibration. Tighten them if necessary.
- In case of heater having issues starting up, inspect the glow pin and replace the glow pin screen.

When faults occur, first check...

- Faulty wiring?
  (short circuits, interruptions)

- Visual check for
  – corroded contacts
  – defect fuses
  – damaged electrical leads, links and connections
  – damaged exhaust and combustion air guidance

- Check battery voltage
  – Battery voltage < 10 volt: the undervoltage protection has triggered in *HYDRONIC* – 12 volt.
  – Battery voltage < 20 volt: the undervoltage protection has triggered in *HYDRONIC* – 24 volt.

- Check fuel supply

- When changing over to winter operations:
  Is there still summer diesel in the pipes?

- **Check voltage supply $_{Ubatt}$ (terminal 30)**
  Disconnect the 8-pole connection S1 / B1 and measure the voltage present in connector B1 between chamber 1 (cable 2.5² red) and chamber 2 (cable 2.5² brown). For deviations in the battery voltage, check the fuses, supply lines, ground connection and plus point on battery for loss of voltage (corrosion / interruption).

- **Check switch-on signal (S+)**
  Disconnect the 8-pole connector S1 / B1 and then press button on the controls.
  Measure the voltage present in connector 1 between cham ber 7 (cable 0.5² yellow) and chamber 2 (cable 2.5² brown).

  If there is no voltage, then check the power supply line (cable 0.5² yellow), the fuse 5A (item 2.7.1 in wiring diagram) and the controls.

Controller lock

The controller is locked when the following faults occur:

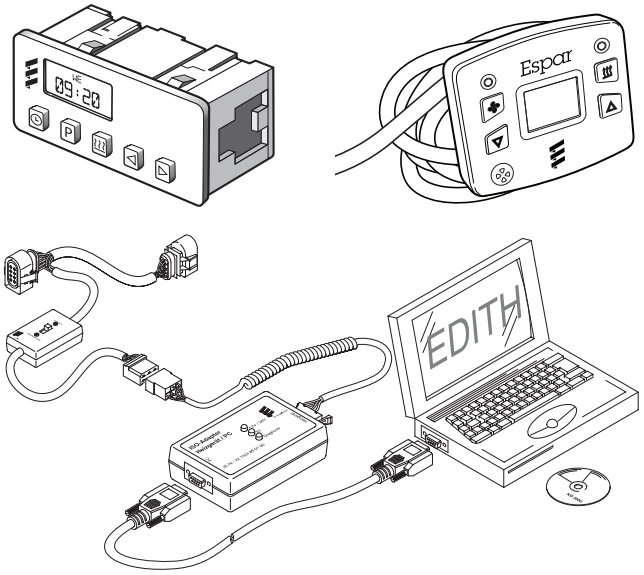
- **Overheating**
  If HYDRONIC overheats 10 times in succession, error code 015 appears and the controller is locked.

- Too many start attempts
  If HYDRONIC performs 10 start attempts in vain, error code 050 appears and the controller is locked.

Cancel the controller lock

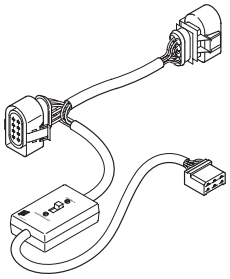
Cancelling the controller lock depends on the corresponding testing equipment.

Heater diagnostics



- Diagnostic tools for the Hydronic D5 Z heater

  -Diagnostic unit (Part # 22 1529 89 0000)
  -DIGI diagnostics (Part # 20.2800.70.1002)
  -EDiTH Software (Free download at www.espar.com)



- Adaptors

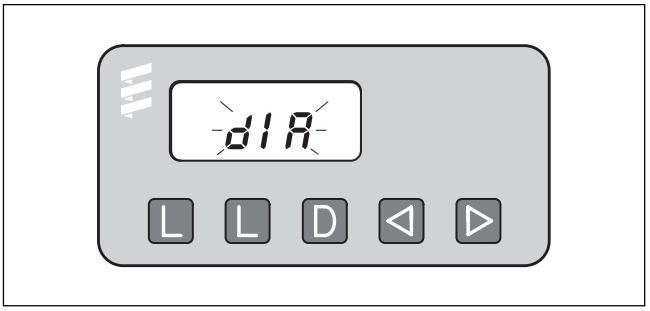
  Y Adapter (Part # 22 1000 31 63 00)
  For use with all diagnostic tools

  ISO Adaptor for EDiTH (Part # 22 1541 89 00 00)

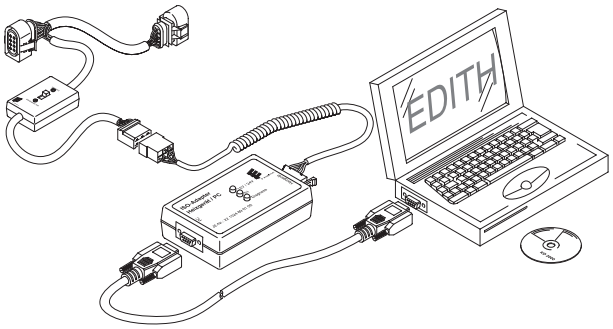
Testing equipment

The electronic controller of HYDRONIC can save up to 5 errors. The errors can be read and displayed from the controller using one of the following items of equipment.
In addition, the controller lock can be cancelled.

- **Diagnosis instrument**
  After connecting the diagnosis instrument, the function or error is shown numerically in the display. For connection and handling of the diagnosis instrument, see page 10 and 13. An adapter cable is necessary to connect up the diagnosis instrument.



Order no.
Diagnosis instrument 20 2900 70 50 20
Adapter cable 22 1000 31 63 00



Order no.
ISO adapter 22 1541 89 00 00
Adapter cable 22 1000 31 63 00

The electronic controller of HYDRONIC can save up to 5 faults, which can be read and displayed with the diagnosis instrument.

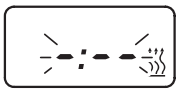
The current fault is shown as “AF” and a 2-digit number and always written in memory place F1.
Previous faults are transferred to memory places F2 to F5, and the contents of memory place F5 are overwritten.

Connecting up the diagnosis instrument

- Disconnect the 8-pole connector from the *HYDRONIC* cable harness and connect the adapter cable.
- Then connect the diagnosis instrument to the adapter cable.
  The display shows:

Querying the fault memory

- Press the button D on the diagnosis unit to switch on *HYDRONIC*.
  The display shows:



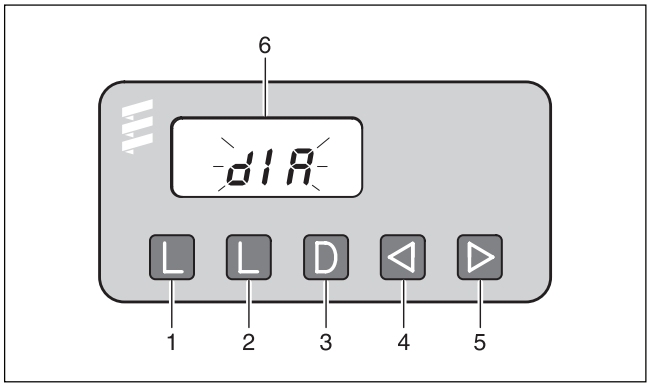
- After 8 secs, the display shows:

no error

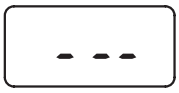
current fault (e.g. error code 64)

Error code, fault description, cause and remedies are described on pages 22 to 26.

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.



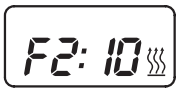
① Button L – delete fault memory
② Button L – delete fault memory
③ Button D – switch heater on / off
request diagnosis
④ Button ◁ – backwards, fault F5 – F1, AF
⑤ Button ▷ – forwards, fault AF, F1 – F5
⑥ Display



Fault diagnosis not possible

Possible causes:
– adapter cable not connected properly
– controller defect or not capable of diagnosis (not a universal controller).

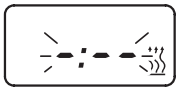
Display of fault memory F1 – F5 or F5 – F1
• Press the buttons e or f once or several times to show the individual fault memories in decreasing or increasing order. The display shows:



e.g. fault memory 2 / error code 10

Only those fault memories occupied by a fault are shown.

Delete fault memory
• Eliminate cause of fault.
• Press both buttons at the same time until the display shows:



• Once the fault memories are deleted, the last current fault is shown. The current fault is not reset to 00 until the next restart of *HYDRONIC*, insofar as no other current fault has occurred. The display shows:

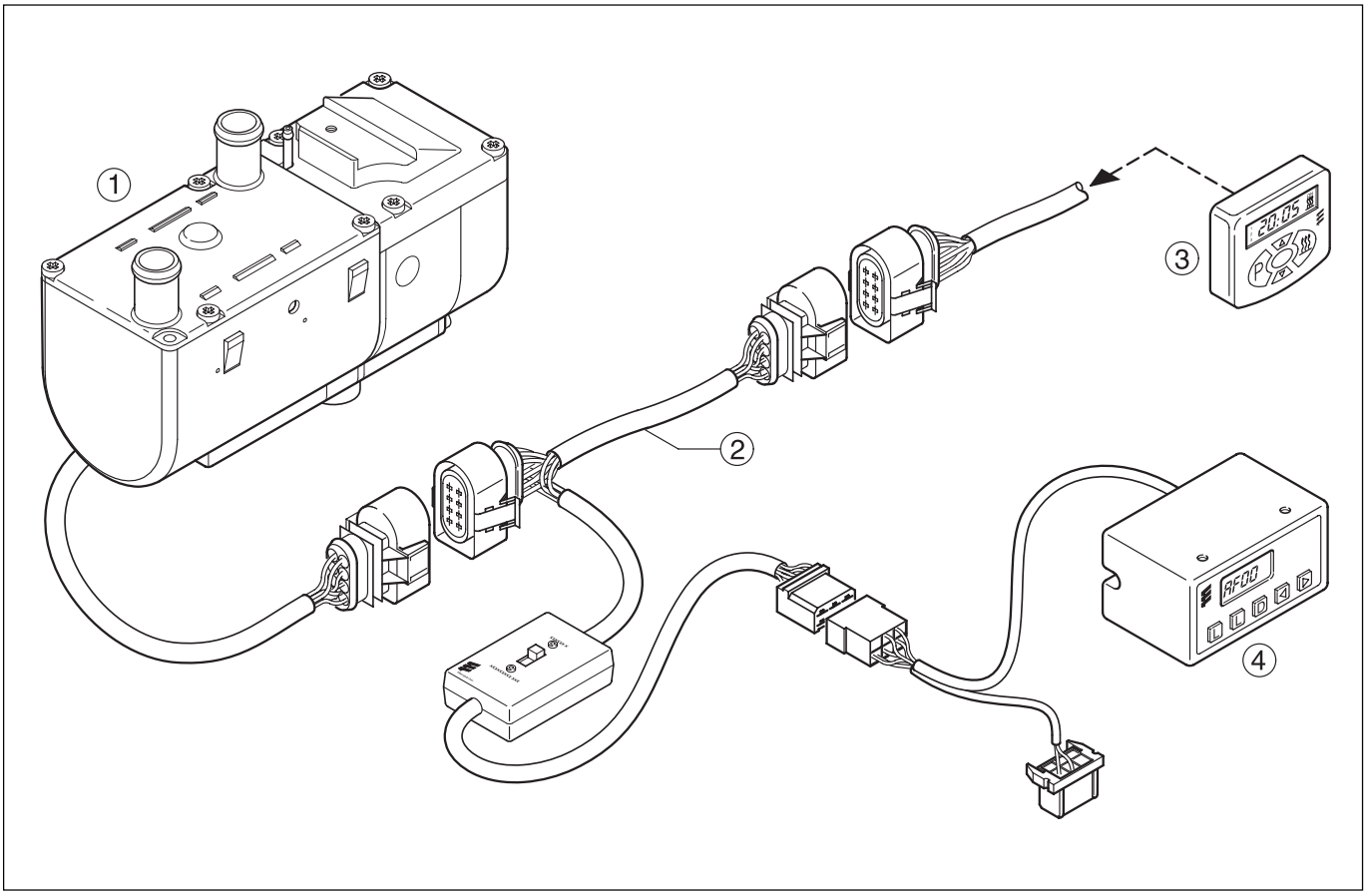
HYDRONIC no faults

Controller lock
• Overheating:
If HYDRONIC overheats 10 times in succession, fault 012, AF 015 appears in the display, i.e. the controller is locked.
• Too many start attempts:
If HYDRONIC performs 10 start attempts in vain, fault 052, AF 050 appears in the display, i.e. the controller is locked.

Cancelling the controller lock
• Delete the fault memory as described and switch off HYDRONIC with button D.
• The controller lock is cancelled and the diagnosis finished.
The display shows:

Note: Not only a defect component but also a defect current path results in a display.

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.



① HYDRONIC
② Adapter cable
③ Mini timer
④ Diagnosis instrument

EDiTH diagnostic tool with ISO adapter

An adapter cable is also required to connect the ISO adapter

Note: • It is very important to always install in the given order.
• Not only the defective component, but also a defective current
circuit results in a fault being displayed.
• The fault code, fault description, cause / remedial action are described on pages 18 to 20.
• The EDiTH diagnostic tool scope of delivery does not include the software, this must be downloaded from the Service Portal.

Connect ISO adapter

Disconnect the cable loom.
Connect the adapter cable connector to the heater. Connect the cable loom to the adapter cable housing connector.
Connect the adapter cable with the cable loom connector of the ISO adapter.
Connect the SUB-D connection cable with the ISO adapter and at the PC.
Start the diagnosis query.

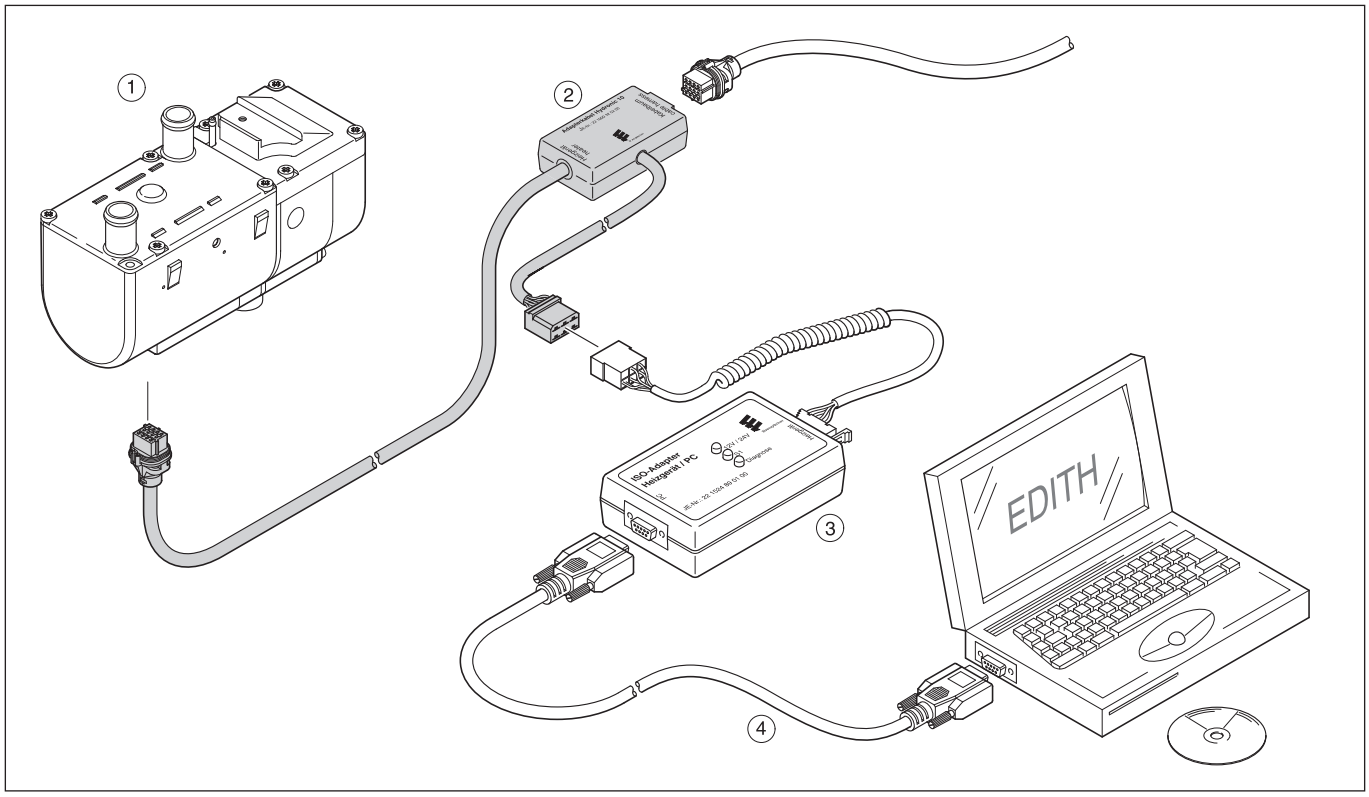
Install software on the PC
- Double-click to start the "setup.exe" file and follow the instructions of the SETUP program.

Query/Delete fault memory F1 – F5 or cancel the control box lock

- Start the software at the PC:
  – on the Desktop —> double-click the "EDiTH" icon
  – select heater type
  – press the "GO" button.
- Delete fault memory or cancel the control box lock:
  – press the "Delete fault memory" button
  —> the stored faults F1 – F5 are deleted and the control box is unlocked.

Quit diagnosis
- Press the "STOP" button –> the fault memory query is ended.

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.



① Heater
② Adapter cable
③ ISO adapter
④ SUB-D connection cable

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.

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

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

Measurement

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

Evaluation

	Hydronic D5W SC Hydronic B5W S
Max	9.5 cm^3 / 90 seconds
Min	8.5 cm^3 / 90 seconds

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

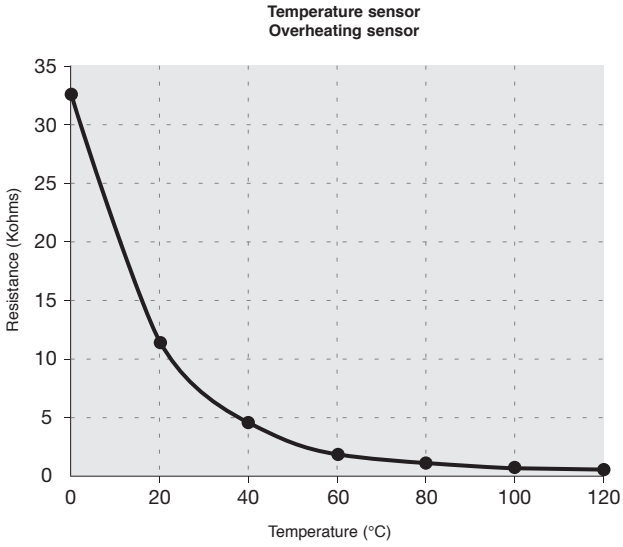
Test values

Resistance

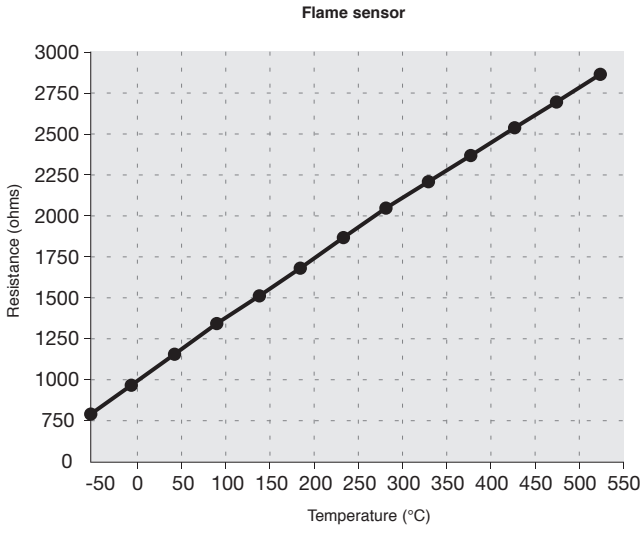
Metering pump	approx. 10 Ω for 12 volt heater; approximately 36 Ω for 24 volt heater
Glow Pin	approx. 0.9 Ω

Checking the sensors

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



R> 2 Ω = open circuit
R< 50 Ω = short circuit



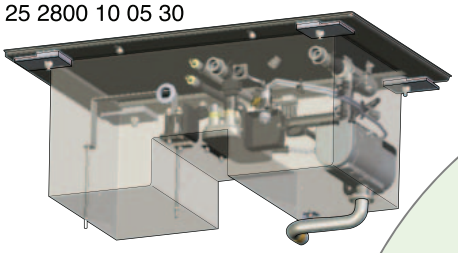
R> 3400 Ω = open circuit
R< 50 Ω = short circuit

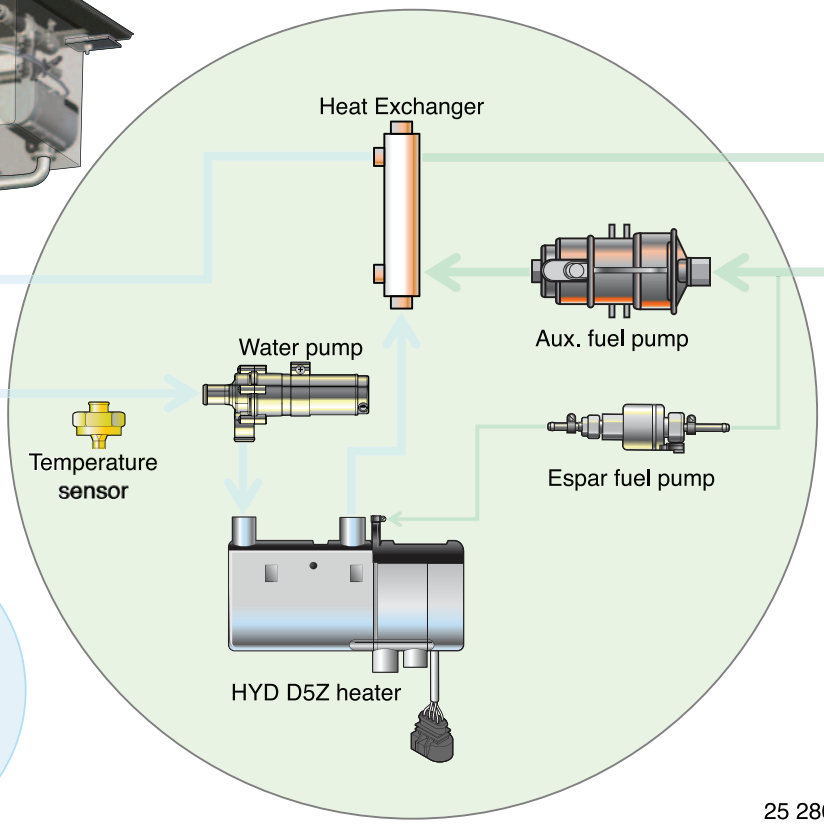
Fault Code	Fault Description	Causes / Repair
000	Normal Operation	
010	Overvoltage	Check voltage between terminals 1(red) and 2(brown) at connector (B1). This must be less than 16 volts. Check battery, electrical leads and vehicle charging system.
011	Under voltage shut down	Check voltage between terminals 1(red) and 2(brown) at connector (B1). This must be greater than 10.2 volts. Check battery, electrical leads and vehicle charging system.
012	Overheating	Check for possible causes of overheat (water circuit), Sensor. Check overheat switch resistance values. Temperature at temperature sensor or overheat sensor is greater than 125°C.
014	Possible overheating detected (difference evaluation)	Difference of measured values at temperature sensor >15°C (min. 70°C water temperature and metering pump in operation); Check temperature sensor and overheating sensor, replace if necessary. Check values from previous page.
015	Too many overheats	Remove cause of over heat. Reset control unit using 7 day timer or fault code retrieval device to unlock control unit. Permanent overheating counter reading exceeded. Heating enable only possible by means of diagnostics system (press both “LL” keys simultaneously).
017	Overheating detected	Temperature at temperature or overheating sensor > 130 °C, emergency OFF if Fault Code 012 or 014 not applicable; check water circuit, check temperature sensor and overheating sensor; replace if necessary. See graph on page 15.
020	Open circuit - glow pin	Check glow pin and electrical leads for continuity, replace if necessary.
021	Short circuit - glow pin	Check glow pin and electrical leads for continuity, replace if necessary.
030	Combustion air blower motor	Blower impeller or electric motor may be jammed (frozen solid, dirty,etc.) Fix jam, replace electric motor if necessary.
031	Combustion air blower motor	Check lead to combustion air motor for continuity, replace motor if necessary.
032	Combustion air blower motor short-circuit	Check combustion air blower motor (electric motor); replace if necessary. Check power supply (chafed, corroded etc.)
038	Vehicle fan relay control break	Check electric lead to relay, fix break, replace relay if necessary. For wiring harness (20 2900 70 04 01) without relay, replace harness.
039	Vehicle fan relay control short circuit	Check electric lead to relay, fix break, replace relay if necessary. For wiring harness (20 2900 70 04 01) without relay, replace harness.
047	Short circuit - fuel metering pump	Check for wires for short to fuel metering pump. Test fuel metering pump. Replace if necessary.
048	Open circuit - fuel metering pump	Check supply lead to metering pump for continuity, remedy break, replace if necessary.

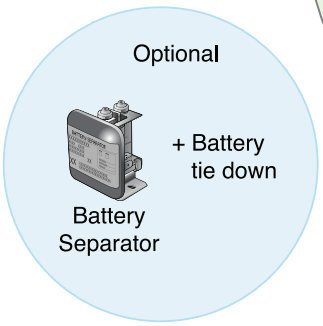
Fault Code	Fault Description	Causes / Repair
050	Too many no start attempts	Safety time counter reading exceeded. Reset control unit using 7 day timer or fault code retrieval device to unlock control unit.
051	Faulty flame recognition	At start, if flame sensor is a above 70°C > 240 seconds; check exhaust gas and combustion air supply, check flame sensor, replace if necessary. For flame sensor values see graph on page 15.
052	No start safety time exceeded	No flame detected on start attempt. Check fuel delivery and fuel supply, Check exhaust gas and combustion air ducts.
053	Flame cutout in boost mode	Heater has started successfully the flame has extinguished. Check fuel supply. Check combustion air and exhaust flow. Check flame sensor resistance value. Replace flame sensor if necessary.
054	Flame cutout in high mode	Heater has started successfully the flame has extinguished. Check fuel supply. Check combustion air and exhaust flow.
056	Flame cutout in low mode	Check flame sensor resistance value.
060	Open circuit - temperature sensor	Temperature sensor detects a value beyond it's range. Check connections. Check sensor resistance values between 11 and 12 at connector B2 > 2 M (if open circuit)
061	Short circuit - external temperature sensor	Check connections. Check sensor resistance values between 11 and 12 at connector B2 < 50 (if short circuit) Temperature sensor values on previous pages.
064	Open circuit - flame sensor	Sensor is sensing value outside of range. Check connection leads. Resistance values between 13 and 14 at connector B2 > 3040 (if open circuit)
065	Short circuit - flame sensor	Check connection leads. Resistance values between 13 and 14 at connector B2 > 780 (if short circuit). Flame sensor values on page 15.
071	Open circuit - overheat sensor	Check connection leads. Resistance values between 9 and 10 at connector B2 > 2 M (if open circuit)
072	Short circuit - overheat sensor	Check connection leads. Resistance values between 9 and 10 at connector B2 < 50 M (if short circuit)
090 092 - 103	Controller defect	Control unit malfunction due to interference voltage from vehicle electrical system; possible causes low batteries, charges, other sources of interference, eliminate interference voltages. Internal faults failure detected in microprocessor/ memory detected. Replace control unit if necessary.
Faults not shown by the diagnosis system		After switching *HYDRONIC* on, the water pump and vehicle fan start immediately.
	HYDRONIC won't start	· Remove and check temperature sensor. After switching *HYDRONIC* on, the vehicle fan starts, functioning "pre-venting" is activated. · Changeover venting to heating at "heating/venting changeover switch.

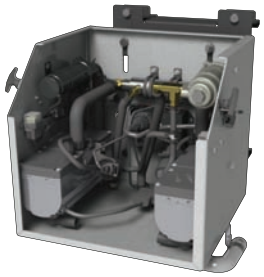
Hybernator Components

25 2800 10 05 30









25 2800 10 0515 (Single Heater)
25 2800 10 0525 (Dual Heater)

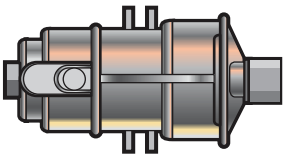
Hybernator specifications

25 2800 10 0530 - Hybernator II In Frame Spare Parts list	
Part Number	***Description***
25.2216.05.0000.0F	D5 Z HYDRONIC ADD HEATER 12V
22.4517.04.0000.0D	FUEL M.PUMP B/D5 (1820/59/2217/2325/2361
25.2800.90.0027.0A	HYBRNATOR II -- AUX FMP PRE ASSEMBLY
25.2800.90.0011.0B	Hybernator Water Pump Assembly - FM
5520038	3/8 MNPT to 3/8 MNPT Piston Check Valve
25.2800.90.0013.0A	HYBERNATOR COMPACT - CONTROLLER
25.2800.70.0016.0A	HYBERNATOR II - IN FRAME HARNESS
25.2800.70.0013.0A	HYBERNATOR COMPACT - SENSOR HARNESS
5520089	AF HEAT EXCHANGER I-701-NPT
25.2800.70.0009.0A	HYBERNATOR C SYSTEM CONTROL HARNESS
25.2800.70.0014.0A	HYBERNATOR COMPACT - OUTSIDE HARNESS

25 2800 10 0515/0525 - Hybernator Compact Spare Parts list	
Part Number	***Description***
25.2216.05.0000.0F	D5 Z HYDRONIC ADD HEATER 12V
22.4517.04.0000.0D	FUEL M.PUMP B/D5(1820/59/2217/2325/2361
25.2800.90.0016.0A	HYBERNATOR COMPACT - AUX FUEL PUMP ASSY
25.2800.90.0015.0A	HYBERNATOR COMPACT - WATER PUMP ASSY
5520038	3/8 MNPT to 3/8 MNPT Piston Check Valve
25.2800.90.0013.0A	HYBERNATOR COMPACT - CONTROLLER
25.2800.70.0015.0A	HYBERNATOR COMPACT - 1 HEATER HARNESS
25.2800.70.0009.0A	HYBERNATOR C SYSTEM CONTROL HARNESS
5520089 AF	HEAT EXCHANGER I - 701 - NPT
25.2800.70.0013.0A	HYBERNATOR COMPACT - SENSOR HARNESS
25.2800.70.0014.0A	HYBERNATOR COMPACT - OUTSIDE HARNESS
25.2800.70.0008.0A	HYBERNATOR COMPACT - 2 HEATER HARNESS

25 2800 90 0019 - AUX Blower Kit Spare Parts list	
Part Number	***Description***
25.2800.60.0006.0A	HEAT EXCHANGER 201HSS
5590187	ELECTRIC ACTUATED 3 PORT VALVE
5590186	5/8 -3/4 PLASTIC Y FITTING
25.2800.70.0011.0A	HYBERNATOR COMPACT - BL SWITCH HARNESS
25.2800.70.0012.0A	BLOWER POWER HARNESS
20.2900.60.1086.0A	MOPAR 90DEG 5/8 HOSE (28467)

Aux. Fuel Pump Technical Info

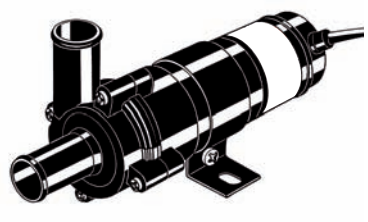


FRB-5 - Auxiliary Fuel Pump (Reciprocating type)	
Voltage	12 Volt (9.0min - 16.0 vdc max)
Minimum Flow Rate	45 gph (170 litres per hour)
Deadhead pressure	8.0 to 11.0 psi (56 to 76 kPa)
Maximum Current Draw	2.3 amps
Inlet and Outlet Size	¼ - 18 NPSF (Production)
Operating temperature range	-40°F to 155°F (-40°C to 68°C)
Life	> 18000 hours (Diesel Fuel)
Dry Lift	48” (120” with optional valves)
Corrosion Resistance	96 hr. salt spray test (ASTM B-117)
Reverse Voltage Protection	Yes
Compatible Fuels	No-lead regular gasoline, premium gasoline, gasoline-alcohol blends, diesel and biodiesel fuels (20% and 100%), E85

Heat exchanger Technical Info

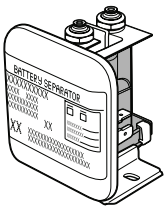
Cylindrical Heat Exchanger
By-Directional Flow
Copper braised stainless steel
½ FNPT Ports
0.32 Bar Pressure

Water Pump Technical Info



55 20055 - Johnson water pump							
Pressure and Capacity		Back pressure			Flow		Amperage	
		Bar	kPa	Ft	l/min	USGPM	12 V	24 V
CM 30P7-1	Hose connection	0.10	10	3.3	26.0	6.9	2.2	1.1
	20 mm (3/4”)	0.20	20	6.6	19.5	5.2	2.0	1.0
		0.30	30	9.8	9.0	2.4	1.7	0.75
	Fuse required						3.0	1.6

Recommended Battery Separator Technical Info



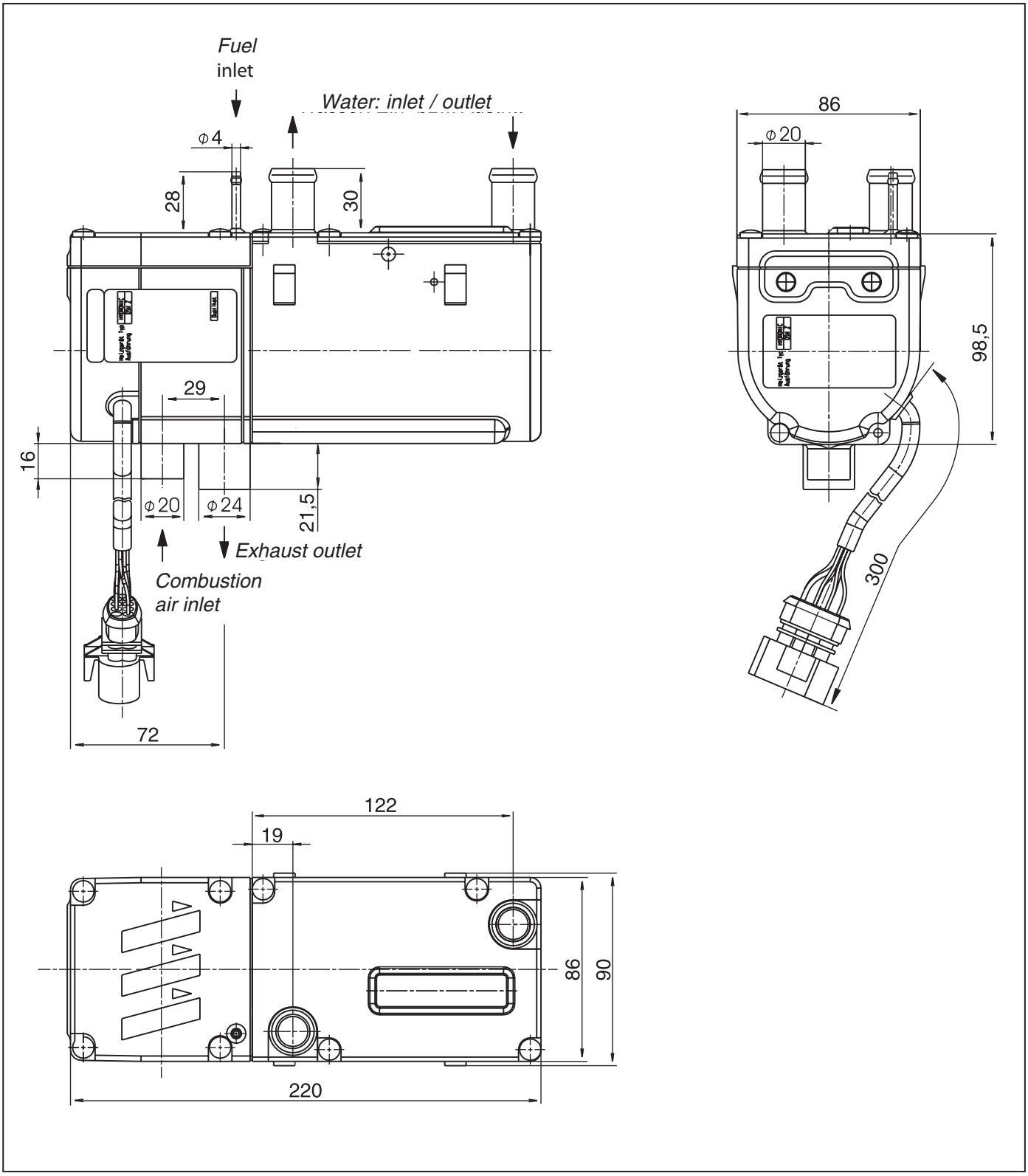
Not included

SURE POWER Battery Separator	
Model	1315
Input	12 V
Current	100 amps
Features	Uni-directional W/Aux Start

Technical data for diesel heaters

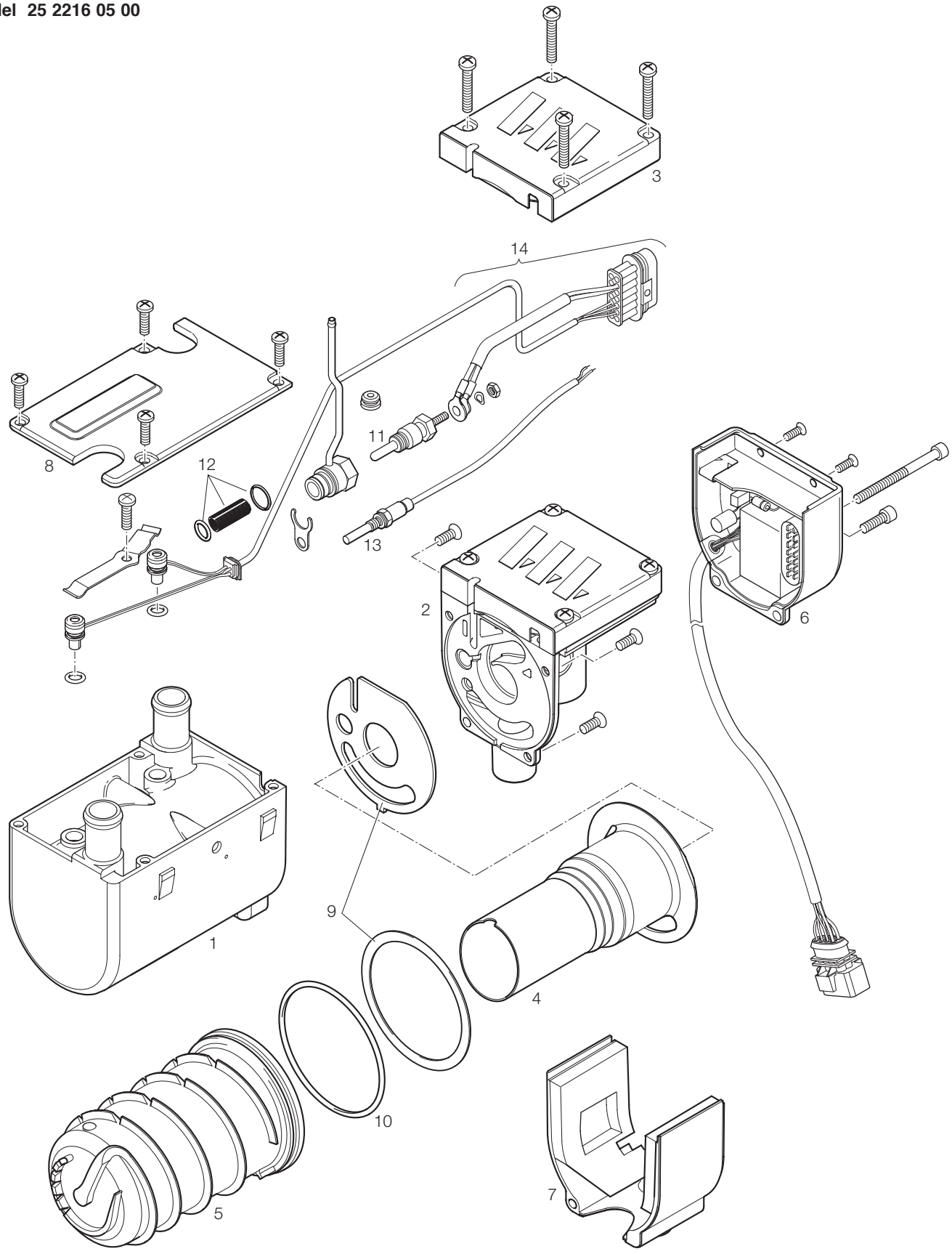
Heater		D 5 W Z	
Heating medium		Water, cooling fluid	
Control of the heat flow		Large	Small
Heat flow (watt)		5000	2400
Fuel consumption (l/h)		0.62	0.27
Mean electr. power (watt)	in operation	37	10
	at start	110	
	after-running	8	
Rated voltage		12 volt	
Operating range • Lower voltage limit: An undervoltage protection in the controller switches the heater off on reaching approx 10 volt.		10.2 volt	
• Upper voltage limit: An overvoltage protection in the controller switches the heater off on reaching approx 16 volt.		16 volt	
Tolerable operating pressure		up to 2.5 bar overpressure	
Minimum water flow rate of the heater		250 l/h	
Fuel (see also fuel supply, page 24).		commercially available diesel (DIN EN 590)	
Tolerable operating temperature	operation heater	–40 °C to +80 °C	
	operating, dosing pump	–40 °C to +80 °C	
	storage	–40 °C to +105 °C	
Interference suppression class		5 for VHF, SW, MW, 2 for LW	
Weight • without controller and cooling fluid • with dosing pump and water pump		ca. 2.3 kg ca. 2.5 kg	

Main dimensions



Hydronic D 5 W Z Parts Diagram

Model 25 2216 05 00



Hydronic D 5 W Z Parts List

Description & Part #'s

Ref. No.	Description	Part Number
1	Casing	20 1799 01 01 01
2	Combustion air fan blower with cover	20 1819 99 16 00
3	Cover	20 1756 01 00 03
4	Flame tube	25 2216 10 00 00
5	Heat exchanger	25 2149 06 00 01
6	Control unit ECU	22 5201 01 80 02
7	Motor cover	20 1756 99 01 03
8	Casing cover	25 1922 01 00 02
9	Gasket / Seal set	20 1820 99 00 01
10	O-ring 74 x 3 mm	320 75 104
11	Glow pin	25 2106 01 10 00
12	Screen and O-rings	25 2121 99 01 13
13	Flame sensor	25 1920 35 00 00
14	Overheat / temp sensor	25 2149 01 200 00

October 2011
Web Edition
P/N: 25 2800 80 5004 0A

Espar Products, Inc.

(800) 387-4800

(905) 670-0960

www.espar.com