Webasto
Feel the drive

Webasto BlueCool Premium

DBW 2010 - Chiller

Installation Manual

⚠ CAUTION

– Improper installation or repair of Webasto heating and cooling systems can cause fire or the leakage of deadly carbon monoxide leading to serious injury or death.
– Installation and repair of Webasto heating and cooling systems requires special Webasto training, technical information, special tools and special equipment.
– NEVER attempt to install or repair a Webasto heating or cooling system unless you have successfully completed the factory training course and have the technical skills, technical information, tools and equipment required to properly complete the necessary procedures.
– ALWAYS carefully follow Webasto installation and repair instructions and heed all WARNINGS.
– Webasto rejects any liability for problems and damage caused by the system being installed by untrained personnel.

Contents Page

1. Foreword

General

Webasto Product North America, Inc. is pleased to provide this installation manual with the DBW 2010 designed for the BlueCool Premium System. When used according to the guidelines stated in this manual, you can expect to provide years of trouble-free, enjoyable operation for your customer.

We encourage our customers to write to us with their comments or criticisms concerning this manual or product. Thank you for your participation.

Please write to us at:
Webasto Product North America, Inc.
Technical Documentation Group
15083 North Road
Fenton MI 48430

You are also invited to fill out our online questionnaire concerning our technical documentation and web site at: www.techwebasto.com

If you have immediate questions concerning this manual, the installation procedures within or the product itself, please call our technical support team at: (800) 860-7866 or send a fax to: (810) 593-6001

Scope and Purpose

This manual is intended to provide the information necessary to ensure proper installation and operation of the DBW 2010 in conjunction with the BlueCool Premium System. Improper installation can result in unsatisfactory performance and/or premature failure of these units. BEFORE proceeding, please read this manual completely. In the interest of product improvement, specifications and design are subject to change without prior notice.

Safety and Important Information

Failure to follow the installation instructions and the notes contained therein will lead to all liability being refused by Webasto Product. The same applies if repairs are carried out incorrectly or with the use of parts other than genuine spare parts.

All Webasto BlueCool (WBC) products are 110 or 220 volt components that are only allowed to be installed, connected and maintained by trained and duly certified personnel. The electrical power supply must be permanently disconnected before any work is started on the systems.

The year in which the heater is used for the first time must be permanently recorded on the heater's factory plate by deleting the inapplicable year figures.

The heater must not be operated:

- In filling stations
- In places where explosive vapors or dust may build up (e.g. near fuel, coal, wood, or dust).
- In enclosed rooms (e.g. winter storage facilities)

The heater must not:

- Be exposed to temperatures of more than 248°F (120 °C) (storage temperature), otherwise the electronics may suffer permanent damage.

The heater must:

- Be operated with the fuel specified on the factory plate.
- Be switched off if considerable quantities of smoke is generated, in case of unusual combustion noises or if you smell fuel. Switch it off by removing the fuse. The heater must not be restarted until the unit has been checked by personnel duly trained by Webasto.
- Be operated for 10 minutes at least once a month. The heater must be inspected by a specialist at the beginning of the heating season or earlier.

Symbol Identification

The purpose of safety symbols is to attract your attention to possible hazardous conditions. This manual uses a series of symbols and signal words which are intended to convey the level of importance of the safety messages. The progression of symbols is described below. Remember that safety messages by themselves do not eliminate danger and are not a substitute for proper accident prevention measures.

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠ WARNING Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.

⚠ CAUTION Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury or property damage. It may also be used to alert against unsafe practices.

OR These symbols are used to alert the installer to important or useful information about proper installation of the equipment.

Heater Description

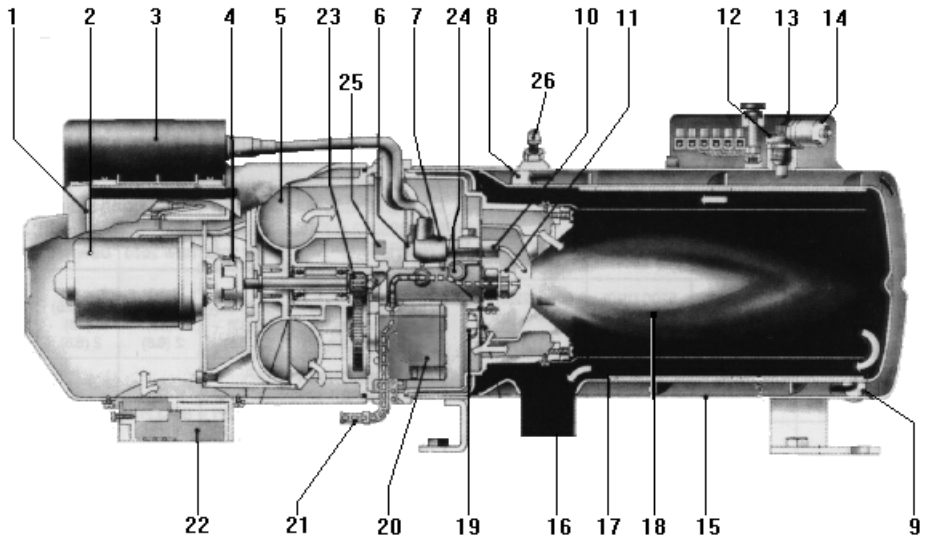


Fig. 1 Heater Description of DBW 2010

1 Electronic control unit
2 Motor
3 Electronic ignition coil
4 Coupler
5 Combustion air fan
6 Solenoid valve
7 Electrode holder
8 Outlet water pipe (1 in. OD.)
9 Inlet water pipe (1 in. OD.)
10 Ignition electrodes
11 Fuel nozzle
12 Overheat fuse
13 Control thermostat
14 Overheat limiter
15 Heat exchanger
16 Exhaust pipe
17 Combustion air swirler
18 Combustion tube
19 Flame detection photocell
20 Fuel pump (single line, no return)
21 Fuel connection pipe (JIC #4)
22 Combustion air intake
23 Reduction gearing
24 Nozzle preheat cartridge
25 Preheat thermostat
26 Bleed screw

Heater Dimensions

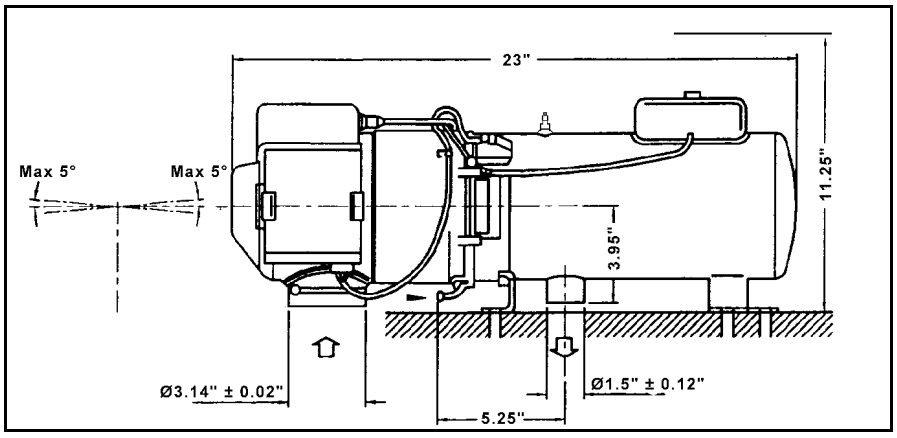


Fig. 2 Heater Dimensions of DBW 2010

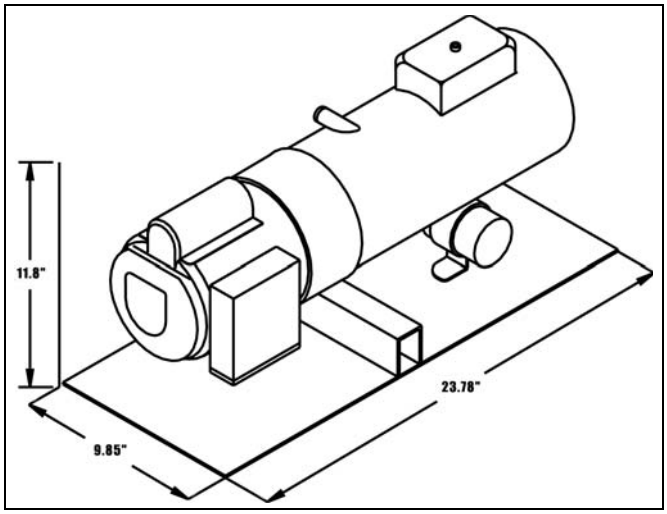


Fig. 3 Heater Tray Mount Dimensions of DBW 2010

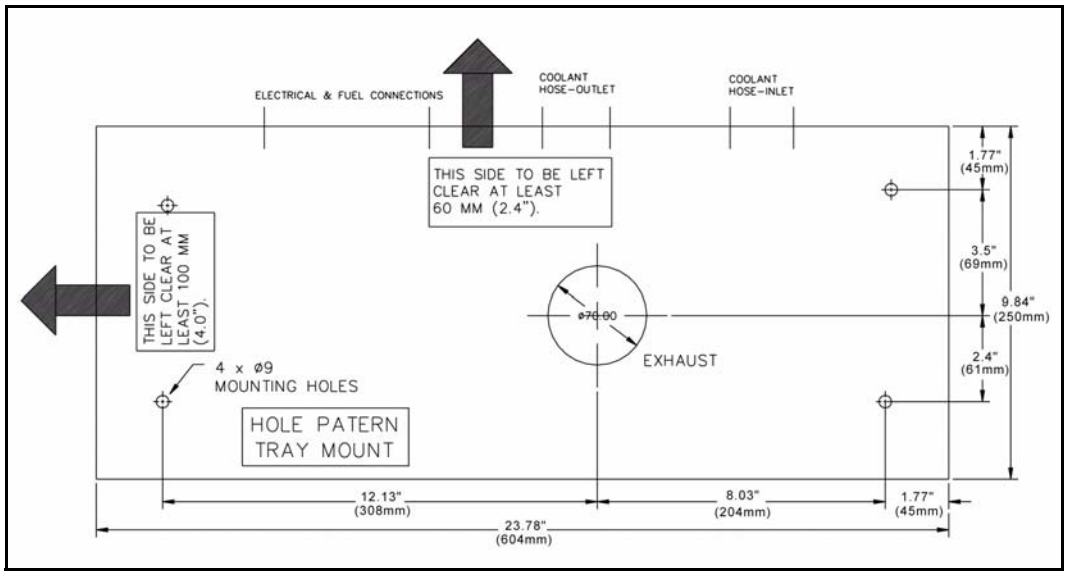


Fig. 4 Foot Print - DBW 2010 Tray Mount

Packaged Components

Category	*Description*	*Qty.*
Intake and Exhaust	TUBE FLEX SS 38MM X 5M	1
	THRU HULL FITTING 38MM	1
	INSULATION TAPE 25FT	1
Manuals / Warranty	INSTALL / OPERATION MANUAL P/N 5001077A	1
Heater Parts	DBW 2010 MARINE ON TRAY	1
Parts Bag Mounting	MOUNTING BRACKET KIT	1

2. Installation

General Information

IMPORTANT

- The DBW 2010 must be installed outside the passenger cabin.
- The following temperature ranges apply to some components:
  - ABS pipe system (G. Fischer) and fittings from -40°F - 140°F (-40°C to +60°C). Use a pipe system designed for temperatures up to 248°F (120 °C), e.g. Hep2O made by Hepworth.
  - Radial blower on the heat exchanger (arranged on inlet side) up to 131°F (55 °C)
- For this reason, a DBW 2010 with a specialized control unit must be used. The heater has a pre-programmed nominal temperature of 126°F (52 °C).
- DBW 2010 Heater – 12 volt diesel
- If the volume of water in the circuit is too small less than 2.5gal. (10 liters), the heating system may shut down prematurely. To avoid this, a storage tank should be installed ahead of the heater.
- The heater is incorporated into the water circuit of the air conditioning unit by means of an additional, electrical 3-way valve. Activation is controlled by the TECC card within the Webasto Blue Cool Premium (WBCP) air conditioning unit.
- The heater is powered by 12 volt battery voltage. The heater is activated by the electronic control unit via a 12 volt signal wire. The Webasto BlueCool Premium Air Conditioning Unit functions with 110 or 220 volts.
- The circulation pump (P1) operates continuously when the system is switched on. This means there is no need for the circulating pump on the heater. As a result, it is integrated directly at the heater inlet. **A cool down cycle is assured from program version 413 of the TECC card onwards.**
- The DBW 2010 offers excellent heat capacity to an air handler power up to 31,000 BTU.
- If an external heater is incorporated into a Webasto Blue Cool Premium System with an electrically operated 3-way valve, **function F 04:** "Automatic with External Heater" or **function F 05** "Heat Cycle Only with External Heater" must be preset on the Chiller Control and the operating element must be blocked by a code.
- When connecting the heater, it is essential that the correct terminal is selected for the nominal temperature.

NOTE: If the vessels manufacturer has issued separate instructions, they must be followed.

Installation Site / Installation Position

The heater must be installed in as low a position as possible to allow the heater and circulating pump to be bled automatically.

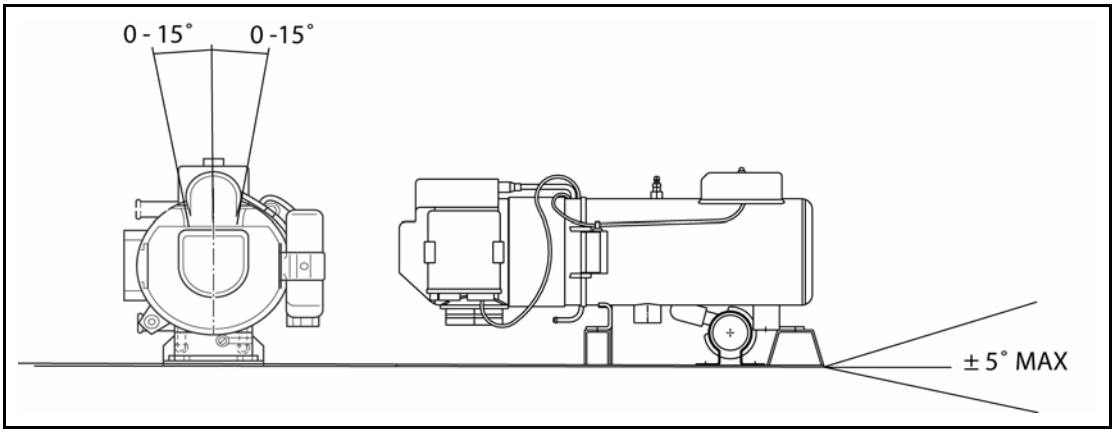


Fig. 5 DBW 2010 Mounting Angle Restrictions

Mounting the Heater

Step by Step:

1. Ensure that the enclosure is big enough to accommodate the heater. Use supplied installation template.
2. The installation housing must be provided with adequate ventilation [4 in² (20 cm²)].
3. Lay supplied installation template in enclosure box. Mark the mounting hole location and exhaust location.
4. Drill 4 mounting holes (9 mm) and Exhaust hole 70 mm (2.75").
5. Bolt tray in enclosure box.

Hose Connections to Chiller Unit

The DBW 2010 is intragrated into the Chiller unit water circuit via a electrically actuated 3-way valve assembly.

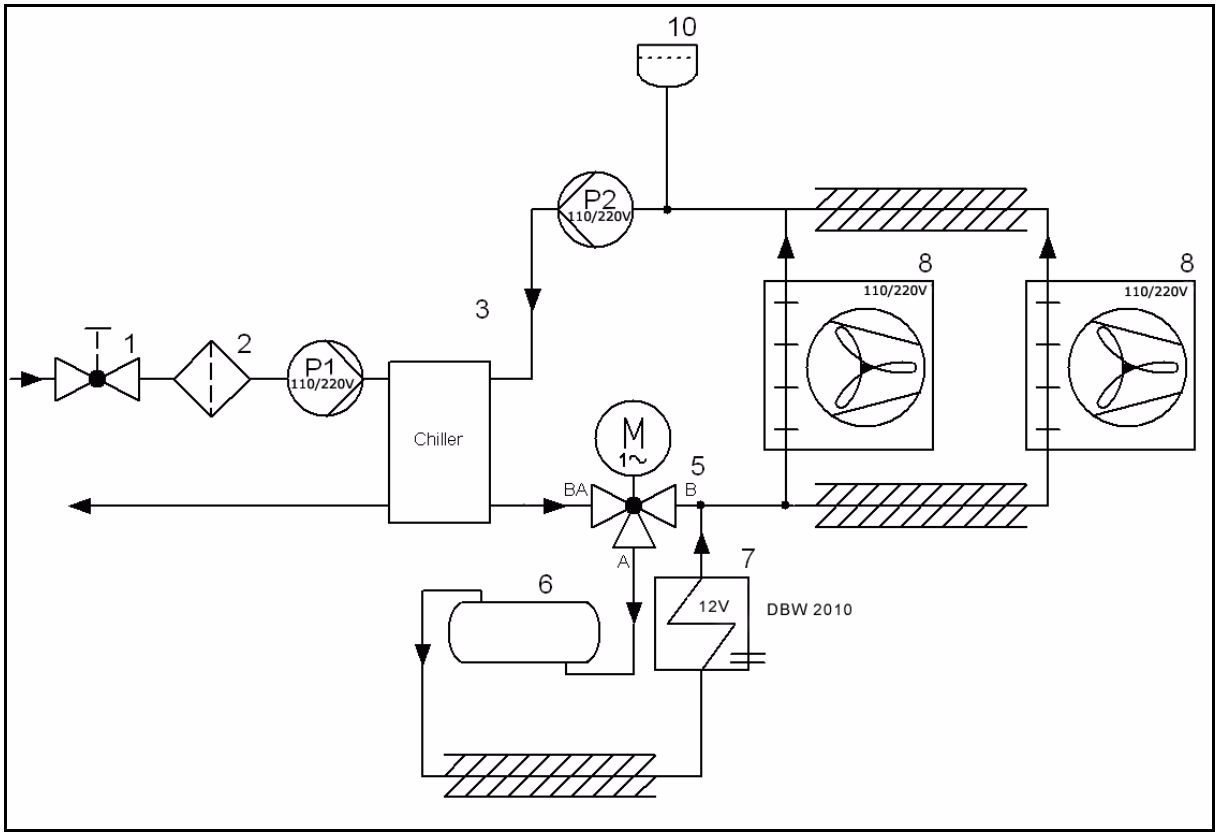


Fig. 6 BlueCool Premium System with a DBW 2010

Components:

1. Stop valve at ship's side inlet
2. Sea water filter
3. Webasto Blue Cool Premium Unit 110 / 220 volts
5. 3-way valve
6. Intermediate storage tank (optional)
7. Water heater – DBW 2010 126°F (52 °C)
8. Webasto BlueCool Air Handler 110 / 220 volts
10. Expansion tank

P1 Sea water pump – 110 / 220 volts
P2 Circulating pump – 110 / 220 volts

Electrically actuated 3-way valve:

Electrically actuated 3-way valves of the relevant sizes are used in chiller systems with up to 36,000 BTU.
The selection is made according to the diameter of the pipe used.

- 3-way valve 5/8" incl. fitting
- 3-way valve 3/4" incl. fitting
- 3-way valve 1" incl. fitting

The hoses must be installed without kinks and (to ensure perfect bleeding) rising if possible. Hose connections must be supported by hose clips to prevent them slipping.

NOTE: The hose clips must be tightened with a torque value of 35 lb-in. (4 Nm).

⚠CAUTION

The cooling system must be bled carefully before using the heater for the first time or after replacing the water. The heater and lines should be installed in such a way as to ensure static bleeding. Perfect ventilation can be identified by the circulating pump operating almost silently. Poor bleeding may cause the resetting temperature limiter to trip while the heater is operating.

Fig. 7 Electrically Actuated 3-way Valve

Fuel System

The fuel is drawn from the vessels fuel tank through a fuel standpipe. This stand pipe can be utilized on vessels with a spare threaded port, or if no threaded port is available, a 1" hole can be drilled into the tank and the universal tank boss installed. Keep the fuel standpipe 2" from the bottom of the fuel tank.

Fuel Supply

The fuel can be used from the vessels fuel tank or from a separate fuel tank.

Note: A sign must be affixed to the fuel filler neck warning that the heater must be switched off before refuelling.

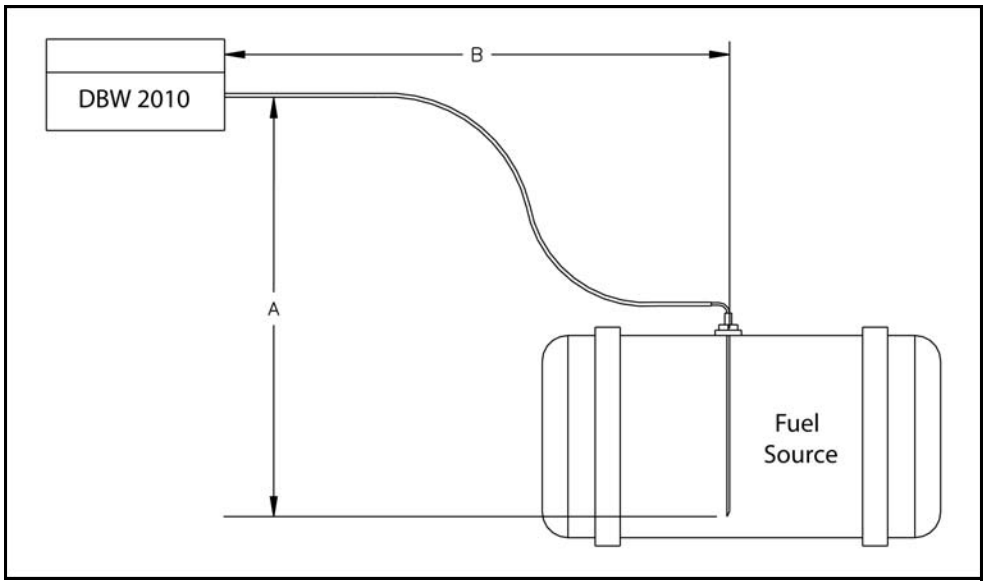


Fig. 8 Fuel Supply

Fuel line parameters
A = Suction height 6' 6" (2,0 m)
A+B = Suction length 33' (10 m)

6. Cut or extend fuel stand pipe to length, approx. 2" off fuel tank bottom
   - mount stand pipe in fuel tank
7. Install the universal fuel stand pipe
   - use 1/4" or 1/2" spare port on fuel tank (if available) and install fuel standpipe

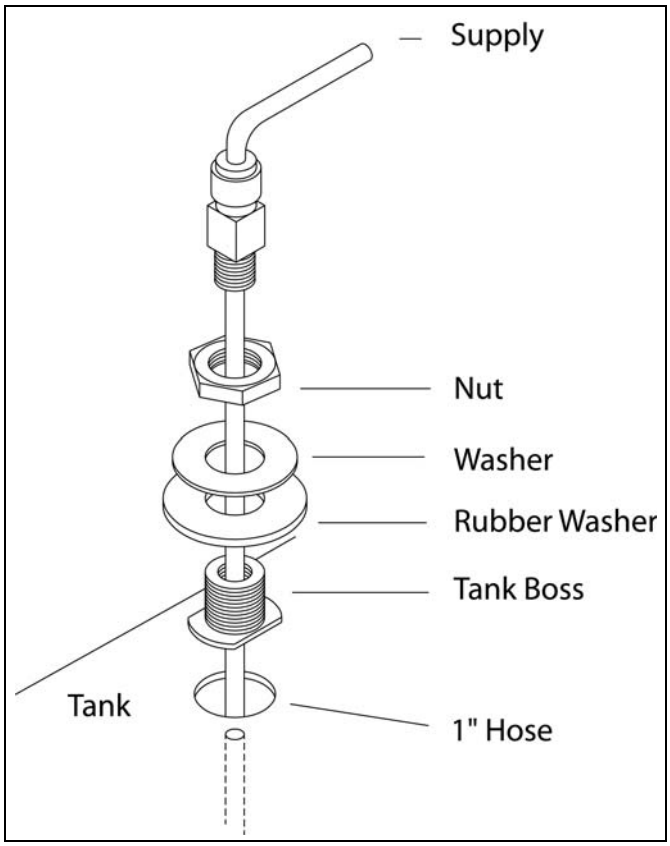
   or
   - drill 1" hole on top of tank (assemble tank-boss and fuel standpipe) and install assembled universal fuel standpipe
8. Route and secure fuel line from heater to fuel tank.
9. Connect fuel line to fuel stand pipe suction and return using rubber fuel hose(1/4" [6 mm]) meeting SAE 30RI specifications.

Note: After fuel stand pipe has been cut to length, remove any burr.
Note: The heater is equipped with an internal self priming fuel pump.

⚠CAUTION If the fuel tank is higher than the fuel pump, the top of the tank may not be more than 20" above the pump.

Connection to Fuel Source

The fuel can be taken from the vessels fuel tank or a separate tank



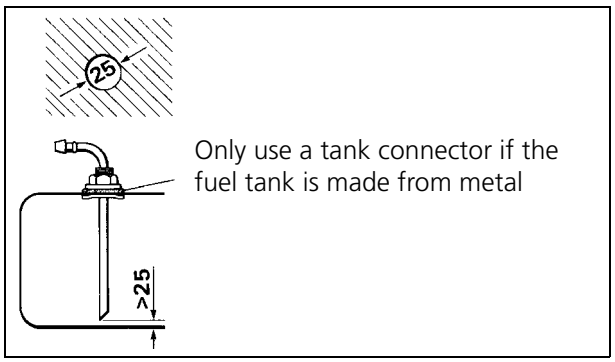


Fig. 9 Fuel Standpipe

Note:

Use supplied hose clamps to secure connections.

CAUTION Fuel lines must be secured every 12" and kept away from hot exhaust and moving parts.

Since the lines cannot be routed with a constant rising gradient, the internal diameter must not exceed a certain size. Air or gas bubbles will accumulate in lines with an internal diameter of more than 4 mm and will cause malfunctions if the lines sag or are routed downwards. The lines should not be routed downwards from the metering pump to the heater. Unsupported fuel lines must be secured to prevent them sagging. They must be installed in such a way that they cannot be damaged by flying debre and high temperatures (e.g. exhaust line).

Combustion Air Supply

⚠WARNING **Asphyxiation risk! The combustion air required for the heater may only be drawn in from the outside or from spaces that are not occupied by persons e.g. ventilated foredeck box or ventilated *engine compartment (Diesel only).**

The combustion air intake line (internal diameter at least 3.2" (80 mm) may be 1 1/2" (0.5 m) to 16 1/2" (5 m) long with several bends totalling 360°. The minimum bending radius is 1 3/4" (45 mm). The combustion air intake must not be routed above the exhaust outlet.

Where combustion air is drawn from an internal source, the combustion air tube should be routed away from the heater with a downward pitch to prevent condensation or moisture from collecting in the tube.

Where combustion air is drawn from an external source, the end of the combustion air intake tube must be routed with a goose-neck bend with a downward pitch toward the outlet so any water that may penetrate, can drain out and not into the heater. A 3/16 in. (5mm) condensation weep hole must be provided at the lowest point between the goose-neck to allow drainage of any trapped condensation or splash water.

⚠CAUTION **Keep combustion air intake tube opening clear of obstructions!**

To avoid pressure differences between exhaust gas outlet and combustion air inlet, the openings of the through-hull fittings should be located in an area where equal pressure prevails. Do not point the inlet of the combustion air tube in the direction of travel when intake air is drawn from an external source.

Secure the intake tube to the heater with the provided hose clamps. Secure the tube to the adjacent structures with P-clips or nylon wire ties.

Heater Exhaust

Route the flexible exhaust 1.5" (38mm) in such a way that the heat cannot affect adjacent heat sensitive materials, plastic piping, electric cables and sails etc. Make sure to use the glass / silicon protective insulating sleeve supplied in the kit to ensure surrounding objects are protected.

If additional protection is required, it is recommended to over-sleeve with an additional layer of insulation (available from your local Webasto marine dealer).

⚠CAUTION

DO NOT connect the heater exhaust into the engine or generator exhaust. Doing so will result in unacceptable back-pressure levels and may damage the heater or cause operational failure.

DO NOT install a flapper valve (clamshell) over the exhaust outlet as this will cause excessive back pressure within the exhaust system and heater.

DO NOT cover or block the exhaust outlet while the heater is in operation.

The end of the exhaust pipe must be routed with a goose-neck bend and be pitched downward toward the outlet. Any splash water that may have penetrated can thus drain back out again and not into the heater. **This is a dry exhaust and not water injected.**

The exhaust pipe is to be kept as short as possible. The maximum length of 5 meters (16 1/2') without muffler or 2 meters (6 1/2') with muffler must on no account be exceeded. The total radius of bends should not exceed 270 degrees with a minimum bend radius of 50mm (2 in.).

The exhaust tube and exhaust components must be securely fastened using approved exhaust tube clamps and P-clips as supplied with the heater kit.

At the lowermost point of the exhaust pipe, a condensation water drain should be installed in which condensation or excess water collecting in the exhaust pipe can be drained off at regular intervals. Make sure to fill condensation drain with water to provide a seal against exhaust gas leakage once drain has been installed.

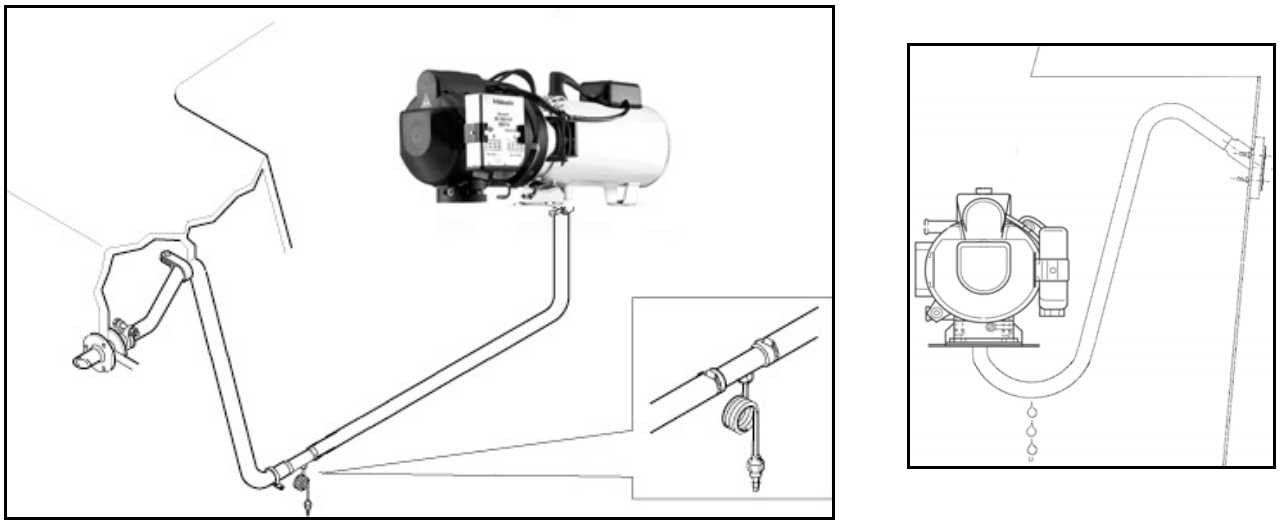


Fig. 10 Exhaust System

⚠WARNING

Avoid asphyxiation! If the exhaust pipe is routed through the inside of the vessel, exhaust gas tube must be as leakproof as possible:

- use only Webasto approved exhaust clamps and firmly tighten clamps.
- an approved exhaust sealant can be used on the inside of the exhaust tube at all connection points
- use condensation water drain
- if desired, use an optional gas tight exhaust muffler to reduce interior noise

⚠CAUTION

- DO **NOT** fit the skin fitting below the water line.
- DO **NOT** cover the exhaust while the heater is in operation.
- DO fit the skin fitting as high as possible to avoid ingress of water.
- DO make sure exhaust clamps are tight and fit well to avoid gas escape.
- DO make sure that exhaust fumes cannot reach the air intake.

Electrical System

General Information

Electrical connections are to be carried out in accordance with the circuit diagrams contained in this installation manual.

When installing the electrical system make sure that the components are installed in protected, dry areas to prevent corrosion.

If vessel only has one battery, we recommend a second battery be installed for the operation of the heater. To avoid having to charge the battery too often, its capacity should not be too small.

If you have highly sensitive electronic components on board, a special electrical interference suppression may become necessary. In this case, please consult a competent specialist workshop.

When actuating the battery disconnect switch (if equipped), wait until the cool down cycle of the heater has been completed.

Control Module / Heater Connection

The electrical connection of the heaters is undertaken in accordance with the circuit diagrams in Figures 11, 13, and 15.

DBW 2010 Control Module

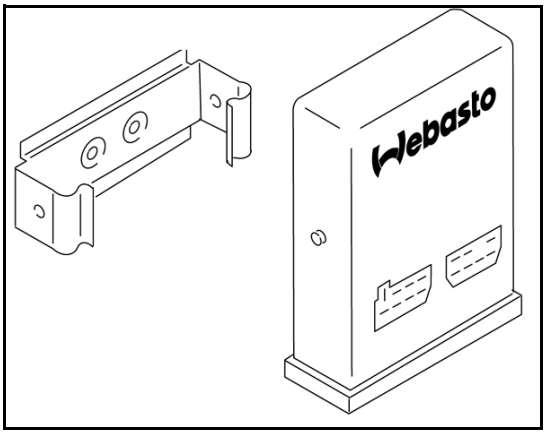


Fig. 11 DBW 2010 Control Module

TECC Program 412 and Higher with DBW 2010 and Electrical 3-Way Valve

Because an external water heater (DBW 2010) is being installed with a BlueCool Chiller Unit, the TECC Card must be reprogrammed for proper operation. This step must be completed in order for proper operation of the DBW 2010.

Deep Programming Mode:

*Numbering below in ** represent reference numbers in Fig 12.*

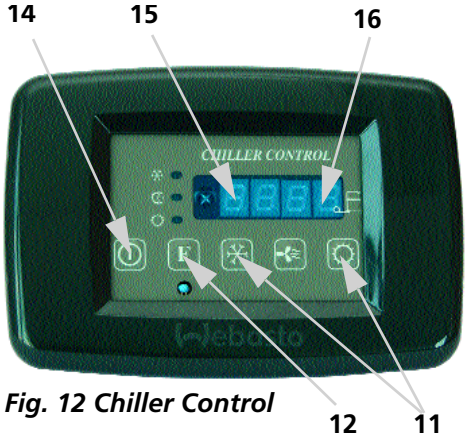


Fig. 12 Chiller Control

Setting Code 2:

10. Programming Code 2: With unit on, lower temperature set-point to 59° F (15° C).
11. Turn the system off by pressing the <on /off button> - *14*.
12. Simultaneously press the <Snow Flake> and <Sun> buttons - *11*.
13. Now in deep programming mode, hit the <F> button twice. The number 2 will be displayed *15* on the left along with the current value code to the right *16*. e.g. 2 00
14. To change this value, use the <Snow Flake> or <Sun> buttons to increase or decrease the value. For c5 confutations, use the-following value:
    - Programming at nominal temperature 59°F (15 °C) Code 2 value 00 (C1 and T1 closed in heating mode)
15. To confirm a function change, hit the <F> button once to proceed to the next category and hit the <on / off> button to confirm.
16. Change is successful when the message " NENO" is displayed.

Setting Code 9:

1. Programming Code 9: With unit on, raise temperature set-point to 84° F (29° C).
2. Turn the system off by pressing the <on /off button> - *14*.
3. Simultaneously press the <Snow Flake> and <Sun> buttons - *11*.
4. Now in deep programming mode, hit the <F> button nine times. The number 9 will be displayed *15* on the left along with the current value code to the right *16*. e.g. 9 03
5. To change this value, use the <Snow Flake> or <Sun> buttons to increase or decrease the value. For c5 confutations, use the following value:
    - Programming at nominal temperature 84°F (29 °C) Code 9 value 03 (C2 and T1 closed in heating mode)
6. To confirm a function change, hit the <F> button once to proceed to the next category and hit the <on / off> button to confirm.
7. Change is successful when the message " NENO" is displayed.

Setting the Proper Function:

1. To change the function mode: turn the unit on by pressing the <on / off> button.
2. Hit the <F> button until the Function category is reached. The letter F will be displayed *15* on the left along with the current value code to the right *16*. e.g. F 04
3. To change the value, use the <Snow Flake> or <Sun> buttons to increase or decrease the value. For c5 confutations, F 04 and F05 will be the only recommended and usable selections. Refer to the descriptions below to determine which value is correct for the end user.
    - F 04 = Auto Cycle Switching with External Heat Source (AC Heat, Fuel/Water Heater, etc.) - No Reversed Cycle Valve.
    - F 05 = Heat Cycle Only with External Heat Source Alone.
4. To confirm a function change, hit the <F> button once to proceed to the next category and hit the <on / off> button to confirm.
5. Change is successful when the message " NENO" is displayed.

For electrical connections between the TECC Card and the DBW 2010, refer to Figures 12, 13, and 15.

Connections on the TECC Card:

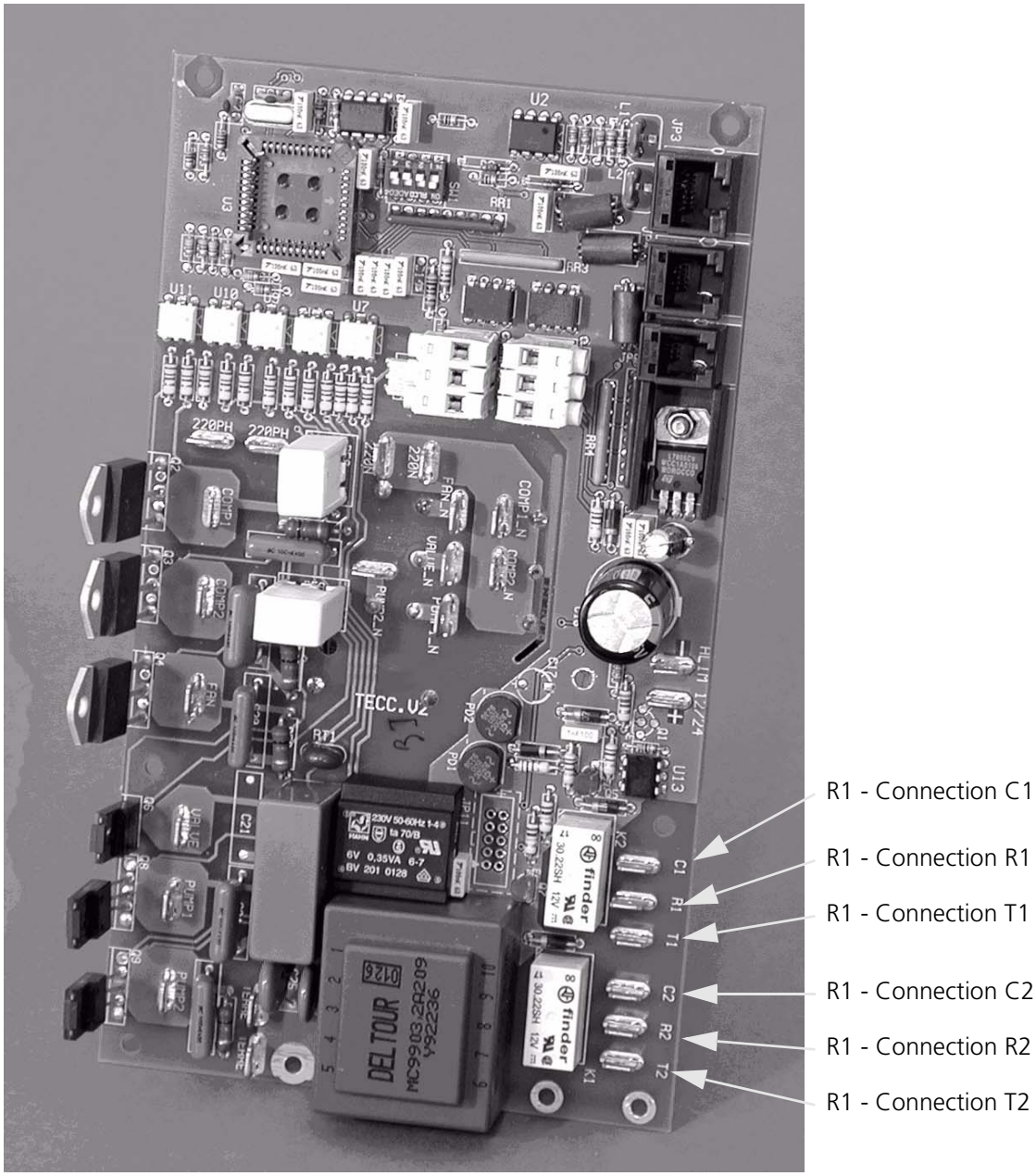


Fig. 13 Chiller Unit TECC Card

Information about Air Guidance

Inlets and outlets:

In principle, the air guidance in the ship is designed for air conditioning operation. This means the air is extracted at floor level and blown out at ceiling level. By nature, cool air subsides so this arrangement provides a natural circulation of air. In heating mode, this circulation is weaker and, theoretically, the air is only circulated by the blower.

Improvement possibilities:

One possible solution involves installing closable air outlets in addition to the aforementioned outlet grilles in the floor area. To do this, a switch must be integrated at a suitable point in the air guidance hoses of the air handler. It is possible to change from air conditioning to heating operation by operating the switch manually.

Principle of an Air Guidance Switch:

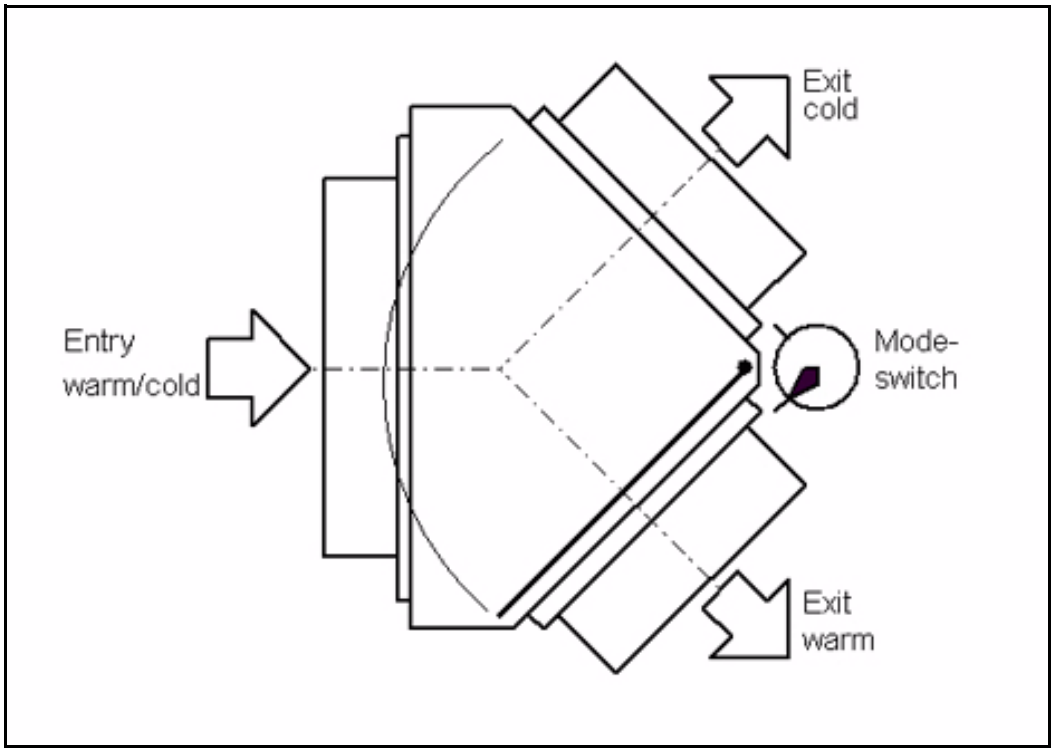


Fig. 14 Air Guidance Switch

Important points:

- The distance between the (hot) air outlet and the (circulating) air inlet must be at least 5' (1.5m). (Danger of air closed circuit)
- Consider the installation complexity (price)
- The customer must perform the changeover manually.
- Currently unavailable as a single part

3. Circuit Diagrams

Circuit diagram legend for the DBW 2010

6. Temperature coding (temperature at water outlet): Refer to following circuit diagram legend for further information.

7. Vessel Fuse

8. Vessel Blower Switch

Cable cross-sections		
	< 7.5 m	7.5 - 15 m
———	0.75 mm^2	1.0 mm^2
– — — –	0.75 mm^2	1.0 mm^2
– — — –	1.0 mm^2	1.5 mm^2
———	1.5 mm^2	2.5 mm^2
———	2.5 mm^2	4.0 mm^2
———	4.0 mm^2	6.0 mm^2

Cable Colors	
bl	Blue
br	Brown
ge	Yellow
gn	Green
gr	Grey
or	Orange
rt	Red
sw	Black
vi	Violet
ws	White

DBW 2010 Circuit Diagram Legend

Item	Designation	Comment
E	Ignition Electronics	
F1	Not Used	
F2	Fuse 15 AMP	
F3	Fuse 15 AMP	
F4	Fuse 20 AMP	
HR	Heating Element	Fuel Pre-Heating
K1	Relay	Fuel Pre-Heating
L1	Solenoid Valve	
L2	Ignition Coil	
M2	Electric Motor	Heater
R	Flame Detector	
S2	Thermostat	Fuel Pre-Heater
S3	Thermostat	Control Thermostat
S4	Thermostat	Overheat
X1	Connector	2-Way
X2	Connector	2-Way
X3	Connector	3-Way
X4	Connector	9-Way

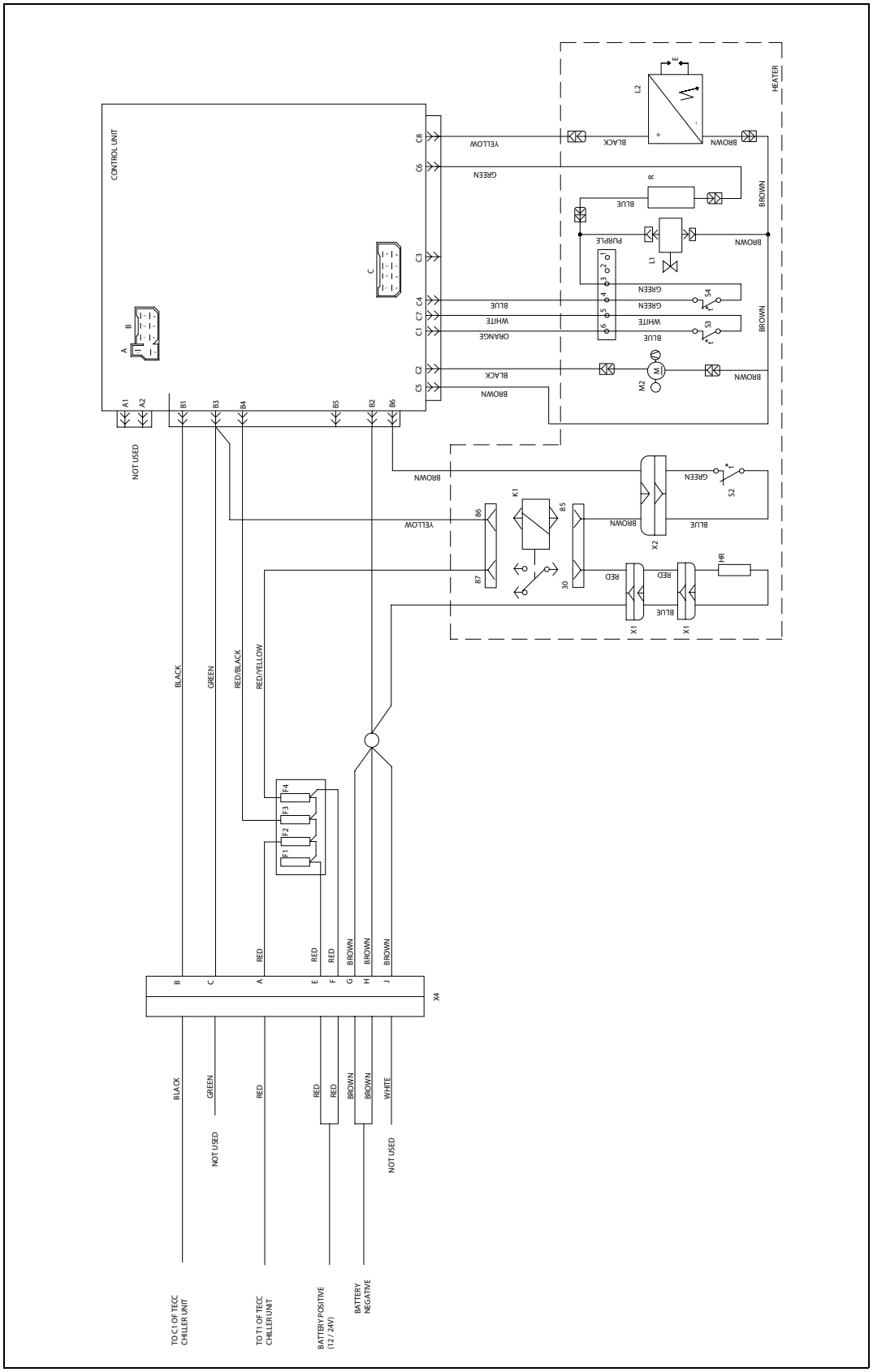


Fig. 15 DBW 2010 Schematic

4. Initial Start-up

General

After you have installed the heater, bleed the water system and the fuel supply system carefully.

Conduct a trial of the heater to check all the water and fuel connections for leaks and to ensure that they are secure. If the heater suffers a fault during operation, the fault must be located and remedied.

Description and Operation

After the heater is installed and the TECC Card is programmed to reflect Function F4 (*Preferred Function)*, the end user will enjoy seamless comfort control. The TECC Card will now request the DBW 2010 rather than reverse compressor cycling when heat is requested.

Air Conditioning Operation:

Display function F1, F2 and F3 - In air conditioning mode, the 3-way valve is de-energized and remains in a spring-loaded position. The cooled water flows through the air handler and cools the drawn in recirculated air. The water temperature at the chiller outlet is 39 - 50°F (4 – 10 °C) depending on the sea water temperature.

Heating Mode:

Display function F4 and F5 - The 3-way valve switches to the spring loaded position if the automatic mode switches to the heating function (F4) or if "Heating operation with external heating" (F5) is selected. This means the heater is integrated in the water circuit and heats the water to max. 144°F (62 °C). The heat is given off by the air handler. A storage tank should be installed ahead of the heater if the water volume in the circuit is too small less than 2 1/2gal. (10 liters).

Cool Down Mode:

To ensure adequate volumetric flow during heater cool down, the control program of the TECC card has been adapted to cool down the heater for 5 minutes. **The Cool Down is active from program version 413 onwards.**

5. Technical Data

The following data is subject to the normal tolerance for heaters, if no tolerance is specified. This is approximately +/-10% in an ambient of 20 °C at nominal voltage.

Heater	**DBW 2010**
Design	Coolant heater with high pressure nozzle
Heat output BTU/hr. (kW)	45,000 (13.1)
Fuel	Diesel #1, Diesel #2 and Arctic
Fuel Consumption l/hr. (gal/hr.)	1.5 (0.4)
Rated Voltage (V)	12
Operating Voltage (V)	10-14
Power Consumption w/o water pump (W)	60
Permissible ambient temperature during operation °C (°F)	-40...+60 (-40...+140)
Storage temperature °C (°F)	+85 max. (185 max.)
Min. capacity of cooling system l (gal)	10 (2.6)
Permissible operating pressure of coolant bar (psi)	0.4 -2 (06 - 29)
CO in exhaust gas ppm	32
CO_2 in exhaust gas % by volume	10 ± 0.5
NO_x in exhaust gas ppm	70
HC in exhaust gas ppm	< 5
Emission Bacharach	1
Dimension of L Heater W mm (inch) H	 584 (23) 205 (8.1) 228 (9)
Dimension of L Tray Mount W mm (inch) H	 610 (24) 254 (10) 300 (11.75)
Weight on Tray (lb)	21.5 (65)
Weight of heater including control unit kg (lb)	15 (33)

Water pump	**U4846 (Magnetic Drive)**
Flow rate l/hr. (gal/min)	1650 (7) against 0.15 bar
Rated voltage (V)	12
Power Consumption (W)	28
Dimensions L mm (inch) W H	 128 (7.16) 94 (3.70) 82 (3.23)
Weight kg (lb)	0.85 (1.88)
Hose Connections mm (inch)	20 (0.78)

6. Troubleshooting

General Information

This section describes trouble shooting procedures for the water heater DBW 2010. Trouble shooting is normally limited to the isolation of defective components.

Before trouble shooting, check for and eliminate these defects:

- **- fuel supply (plugged fuel filter)**
- **- corrosion on battery terminals**
- **- corrosion on electrical wiring and fuses**
- **- corrosion on connector**
- **- loose contact on connector**
- **- wrong crimping on connector**
- **- shut down initiated by temperature limiter (automatic reset)**

⚠CAUTION

Trouble shooting requires extensive knowledge about structure and theory of operation of the heater components and may only be performed by skilled personnel.

NOTE

After any repair of a defect, a functional test must be performed prior to use.

Heater Test Unit 440.280

The tester unit has been designed to quickly check the proper operation of the various heater components. By using the tester in place of the heater control unit, you are able to manually control the heater to test components and actually operate the unit in heating mode.

The actual testing is completed in two steps, first you do an individual component test and then a manual start and run test, both designed to pinpoint actual problems in the heater system.

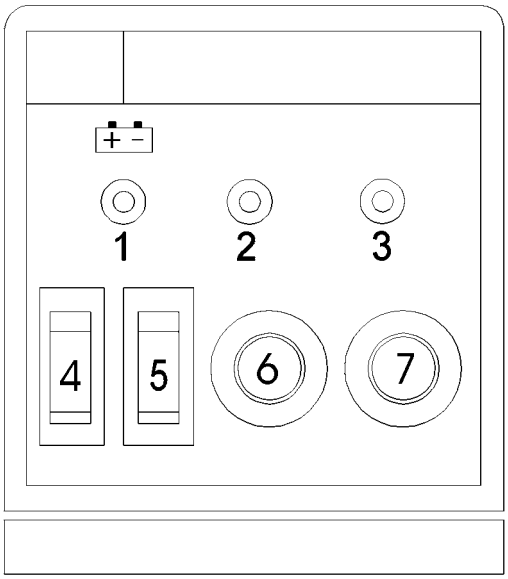


Fig. 16 DBW 2010 Test Controller

1	LED - input power to heater
2	LED - control thermostat
3	LED - flame detector
4	On/Off switch water pump
5	On/Off switch motor
6	Push button - ignition spark coil
7	Push button - fuel solenoid valve

NOTE

Make sure Water Pump and Motor switches (4,5) are in "OFF" position before connecting to heater.

Test Procedures

Setup

- Remove connector blocks from heater control unit, inspect for loose wires, corrosion and proper wire connections.
- Plug control unit connector blocks into tester.
- Put heater switch/timer to "ON" and turn vessel heater valve to "FULL" mode (if equipped).
- Proceed to component test procedures.

⚠WARNING

Do not attempt to test or run heater with burner head open. Ensure burner head is properly closed and secured in place.

Component Test Procedures

Test Setup	Result	If Not
Tester connected	Battery LED (1) unit Lights up CONRTROL THERMOSTAT LED (2) Lights up	- test input voltage at control terminals B4 (+) and B2 (-) - check battery connections - check battery voltage - test switch/timer - test control thermostat on heater Normal Operating Range - approx. 158°F or higher open (no heat required) - approx. 140°F or lower closed (heat required)
Push Fuel Solenoid Valve button (7) several times	clicking of solenoid should be heard	- test temperature fuse (if equipped) - test overheat limiter - test solenoid valve
Push IGNITION SPARK COIL button (6)	sparking should be heard	- check electrode gap - ignition spark coil
Turn motor switch (5) "ON"	motor should run	- test motor
Turn WATER PUMP (4) "ON"	pump should run	- test pump

NOTE
Make sure Water Pump and Motor switches (4,5) are in "OFF" position before connecting to heater.

NOTE
Since the heater operates in the 60 °C (140°F) to 70 °C (158°F) (On to Off/Off to On) range, if the vessels engine is hot (e.g. coolant above 70 °C (158°F), the heater will not start until the coolant temperature drops below 60 °C (140°F).

THIS IS NORMAL.

Manual test run of heater

- Turn WATER PUMP switch (4) "ON"
- Turn MOTOR switch (5) "ON"
- Push and hold FUEL SOLENOID VALVE button (7) "ON" (start fuel flow to combustion chamber)
- Push and hold IGNITION SPARK COIL button (6) "ON" (starts electrodes sparking) until combustion has taken place.

NOTE
Hold IGNITION SPARK COIL button (6) "ON" until FLAME DETECTOR LED (3) lights or combustion is heard, then release; in any case do not hold button on for more than 15 seconds.

Results:

- LED (3) lights and combustion achieved
  - operation normal
- Combustion achieved but no LED (3) light
  - check flame detector
- Combustion not achieved and no LED (3) light
  - check fuel nozzle
  - check fuel pressure
  - check for blocked fuel lines (dirt or ice)
  - check ignition electrodes for damage and set gap

NOTE
If flame does not stop when the FUEL SOLENOID VALVE button (7) is released, turn MOTOR switch (5) "OFF" to stop heater. Check solenoid valve.

- Heater should now be in heating mode and will continue to run until you release the fuel solenoid valve button (7) which stops fuel flow and extinguishes flame immediately. Allow heater to continue running (for cool down) approximately 30 seconds and then turn WATER PUMP switch (4) and MOTOR switch (5) "OFF".

- If manual test run has been successfully completed, turn heater switch/timer "OFF", remove the tester and re-connect the control unit. Once done, turn switch/timer "ON"; if heater or a heater component does not respond, control unit is defective; replace control unit and re-test heater.

Notes

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Feel the drive

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