Webasto
Feel the Drive

Air Heater

Air Top Evo 40/55

Installation/Operation Manual

WARNING!

- When heater is in use, the surface of the hot air outlet may become hot to the touch. Contact with skin may cause burns.
- 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.
- Improper installation or installation by untrained personnel voids all warranties on this product.
- Webasto heating and cooling systems require qualified and/or professional installation and repair technicians. Warranty shall be void if not installed by a certified or trained installer/repair technician who has successfully completed the factory training course for installation and repair of Webasto heating and cooling systems, and has been provided with the technical information, tools and equipment required to properly complete the necessary installation/repairs.
- Product produces temperatures high enough to ignite surrounding combustible materials such as inflammable liquids, gases, vapor, and other combustible matter. The heater must be switched off when loading or unloading inflammable materials to prevent the risk of explosion.

Contents Page

1. Safety and General Information 5
1.1 Warning Symbols in this Installation Manual . . . 5
1.2 General Information . . . 5
2. Regulation for Installation in the Vehicle 6
2.1 Legal Provisions . . . 6
2.2 Position of the Heater . . . 6
2.3 Fuel Supply . . . 6
2.4 Exhaust System . . . 7
2.5 Combustion Air Inlet . . . 7
2.6 Hot Air Inlet . . . 7
2.7 Hot Air Outlet . . . 7
2.8 Automatic Control of the Heating System . . . 7
3. Purpose of the Air Heater 8
4. Installation 9
4.1 Recommended Installation and Service Tools . . . 9
4.2 Air Top EVO 40/55 Installation Situation . . . 9
4.3 Installation Location . . . 9
4.4 To Install the Heater . . . 10
4.5 Optional Mounting Plate . . . 11
4.6 Factory Plate / Label . . . 11
4.7 Installation Example . . . 12
5. Cold and Hot Air System 13
5.1 External Temperature Sensor . . . 15
6. Fuel Supply 16
6.1 Removing fuel from vehicle fuel tank . . . 16
6.2 Vehicles with Fuel Injection Engines . . . 16
6.3 Vehicles with Diesel Engines . . . 17
6.4 Fuel Lines . . . 17
6.5 Fuel Metering Pump . . . 19
6.6 Fuel Filter . . . 19
7. Combustion Air System and Exhaust System 21
7.1 Exhaust Muffler . . . 22
8. Electrical Connections 23
8.1 Heater Connection . . . 23
8.2 Supply Voltage Connection . . . 23
8.3 Control Element (Rheostat) . . . 24
8.4 Control Element (SmarTemp) . . . 25
8.5 Control Element (MC04) . . . 26
9. Pre-Start Checklist 28
10.Operation Instructions 30
10.1 Starting Heater for the first time . . . 30
10.2 Control Element Description . . . 30
10.3 Product Registration . . . 31
11.Troubleshooting 32
11.1 Error Code Output . . . 32
11.2 Fault Lock-out . . . 32

11.3 Heater Lock out Reset Procedure 33

12.Technical Data **34**

12.1 Heater 34
12.2 Electrical Components 35
12.3 Fuel for Air Top EVO 40/55 B (Gasoline): 35
12.4 Fuel for Air Top EVO 40/55 D (Diesel/Heating Oil): 35

13.Version **36**

14.Annex **37**

14.1 Drilling Template: heater 37
14.2 Legends to the wiring diagrams 39
14.3 Wiring Diagrams 41

1. Safety and General Information

1.1 Warning Symbols in this Installation Manual

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.

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

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

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.

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

1.2 General Information

Webasto Product North America, Inc. is pleased to provide this installation manual with the Air Top EVO 40/55 air heater. When installed according to the guidelines stated in this manual, you can expect your customer to enjoy many years of trouble-free heater operation.

This manual represents our latest effort to produce the best technical documentation possible.
In our efforts towards continuous, ongoing product improvement, we encourage our customers to write to us with their comments or criticisms concerning this manual and the Air Top EVO 40/55 air heating system.

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 any immediate questions concerning this manual, the installation procedures within or the product itself, please call us at:

(800) 555-4518 or send a fax to: (810) 593-6001

2. Regulation for Installation in the Vehicle

Read this installation manual in its entirety before installing this equipment.

2.1 Legal Provisions

2.1.1 The installation and service of Webasto heaters requires special expertise and training. Installations and servicing of Webasto products by untrained, unauthorized personnel and end-users voids all warranties and releases Webasto Product North America, Inc. and Webasto authorized distributors, dealers and their personnel from responsibility for damage to Webasto products, any resulting collateral property damage and personal injury.

2.1.2 Any use, operation, installation, modification or application of the product not described in Webasto manuals, or subjecting the product to extreme or unusual conditions beyond the limits of specified performance characteristics is misuse of the product. Failure to comply with all installation instructions is a misuse of Webasto products. The same applies for repairs without using genuine Webasto service parts. This will void the heaters "official Marks of Conformity."

IMPORTANT!
All relevant state and provincial licensing regulations if any, governing the installation and use of auxiliary heating devices must be observed!

2.2 Position of the Heater

CAUTION

When heater is in use, the surface of the hot air outlet may become hot to the touch. Contact with skin may cause burns.

2.2.1 Parts of the vehicle body and other components in the immediate vicinity of the heater must be protected against excessive heat and the danger of contamination by fuel or oil.

2.2.2 The internal combustion heater must not pose a fire hazard even when overheated. This requirement is deemed to have been met if care is taken during installation to ensure an adequate distance from all parts, as well as adequate ventilation and if fire-resistant materials or heat shields are used.

2.2.3 The model/ Serial plate or a duplicate there of (duplicate model/ Serial plate) must be fitted in such a way that it is still clearly legible when the heater has been installed in the vehicle.

2.2.4 When positioning the heater, all reasonable precautions must be taken to minimize the risk of personal injury or damage to items in the vehicle.

2.2.5 A clearly visible indicator within the user's field of vision must show when the heater is switched on or off.

2.3 Fuel Supply

2.3.1 Fuel lines are to be installed in such a way that they remain unaffected by torsional stresses created by vehicle and engine movement.

2.3.2 Fuel lines must be securely fastened to the vehicle every 12 inches (30 cm) or less along the total length from heater to fuel tank.

2.3.3 Fuel-carrying components must be protected against excessive heat and are to be installed so that any drippings or evaporating fuel can neither accumulate nor be ignited by hot components or electrical equipment.

2.3.4 In buses, fuel lines are not to be located in the passenger area or in the driver's compartment. Fuel supply must not be by means of gravity or pressurization of the fuel tank.

2.3.5 The fuel tank must be equipped with a vent cap or ventilated in another way (vent line).

2.3.6 When a separate fuel supply is used the fuel filler neck must not be located in the passenger compartment and must have a tightly fitting cap to prevent any fuel leaks.

2.3.7 The type of fuel and the fuel filler neck must be clearly identified for liquid fuel heaters which have a fuel supply separate from the vehicle fuel supply.

2.3.8 A label must be affixed to the fuel filler neck warning that the heater must be switched off before refuelling. An identical warning must also be included in the manufacturer's operating instructions.

2.4 Exhaust System

2.4.1 The exhaust outlet must be positioned in such a way that exhaust fumes cannot get into the interior of the vehicle through ventilation devices, hot-air inlets or open windows. Also note that exhaust should always point away from the direction of travel.

2.4.2 Do not route exhaust components within 100 mm (4 inches) of flammable materials such as fuel system components, polyurethane or similar foam insulation, styene sheet installation, wood and paper products, carpet, glycol reservoirs, coolant lines, brake lines, electrical wiring, etc.

2.5 Combustion Air Inlet

2.5.1 The air for the combustion chamber of the heater must not be extracted from the passenger cabin of the vehicle.

2.5.2 The air inlet must be positioned in such a way that it cannot be obstructed by other objects.

2.6 Hot Air Inlet

2.6.1 The supply of heating air must consist of either fresh air or recirculated air and must be taken from a clean area which cannot be contaminated by exhaust fumes from the engine, the internal combustion heater or any other source in the vehicle.

2.6.2 The inlet line must be protected by a grating or other suitable means.

2.7 Hot Air Outlet

When heater is in use, the surface of the hot air outlet may become hot to the touch. Contact with skin may cause burns.

2.7.1 Hot air lines within the vehicle must be positioned or protected in such a way as to exclude all risk of injury or damage caused by direct contact.

2.7.2 The air outlet must be positioned or protected so that it cannot be obstructed by other objects.

2.8 Automatic Control of the Heating System

When the engine stops, the heating system must cut out automatically and the fuel supply must be stopped within 5 seconds.

The heating system may remain in operation if a manual unit has already been activated.

3. Purpose of the Air Heater

The Webasto Air Top EVO 40/55 air heaters are designed
– to heat vehicle cabins, boats **(Diesel Only)**, trucks, minibuses, vans and motor homes
– to defrost vehicle windows
– to heat cargo

The air heaters operate independently of the engine and are connected to the fuel tank and the electrical system of the vehicle.

They may be used for vehicles with either water or air-cooled engines.

They are not designed for heating hazardous substances.

4. Installation

IMPORTANT!
The regulations governing installation on pages 4 and 5 must be adhered to.
The heater must not be operated without the control unit cover (#9 below) (this will cause the heater to overheat).

4.1 Recommended Installation and Service Tools

- Digital Multi-Meter - Should be a good quality VAO meter.
- 1/2 Heavy-Duty, low speed drill with good quality, sharp drill bits and a selection of hole saws.
- Mounting/ Drilling Templates.

4.2 Air Top EVO 40/55 Installation Situation

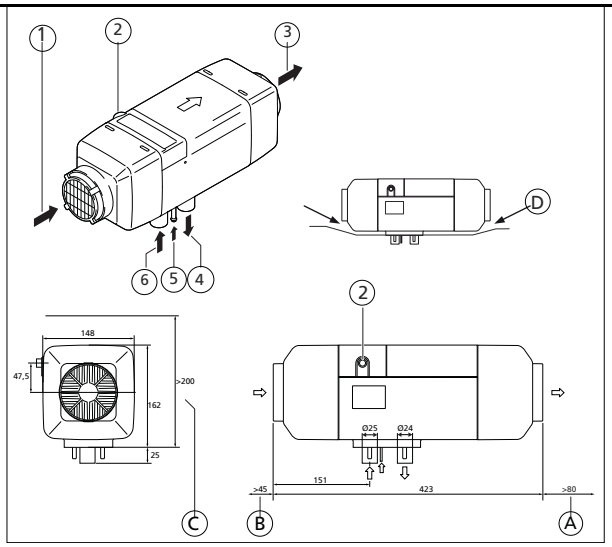
NOTE:
Check the installation situation of the relevant vehicle type.

4.3 Installation Location

The heater may be fitted both in the interior or on the exterior of the vehicle.
If it is installed on the exterior ensure that the heater is fitted in a position where it is protected from splashing water and spray.

The heater must be installed in such a way that no water can ingress into it if the vehicle travels through a water hazard for which that vehicle is licensed.

The openings for the combustion air inlet port, the exhaust outlet port and the fuel line must be sealed if the heater is installed in the interior. The seal designed and supplied for this purpose must be used (see Figure 4). The same applies when using the optional mounting plate and closed cell foam gasket (see Figure 5).



1. Cold air inlet
2. Cable outlet (optionally on right or left)
3. Hot air outlet
4. Exhaust gas outlet
5. Fuel inlet
6. Combustion air inlet

A. Space required for hot air outlet
B. Space requirements for cold air inlet
C. Space requirements for removing heater
D. Heater is supported only by the base

Figure 1. Dimensions of the Heater

4.4 To Install the Heater

The M6 nuts used to install the heater must be tightened with a torque of 6 Nm ±1 Nm (4.4 lb.-ft ± 74 lb.-ft).
The installation dimensions and space requirement for service access are shown in the installation drawing (Figure 1).
The specified horizontal and axial angles must not be exceeded (Figure 2).

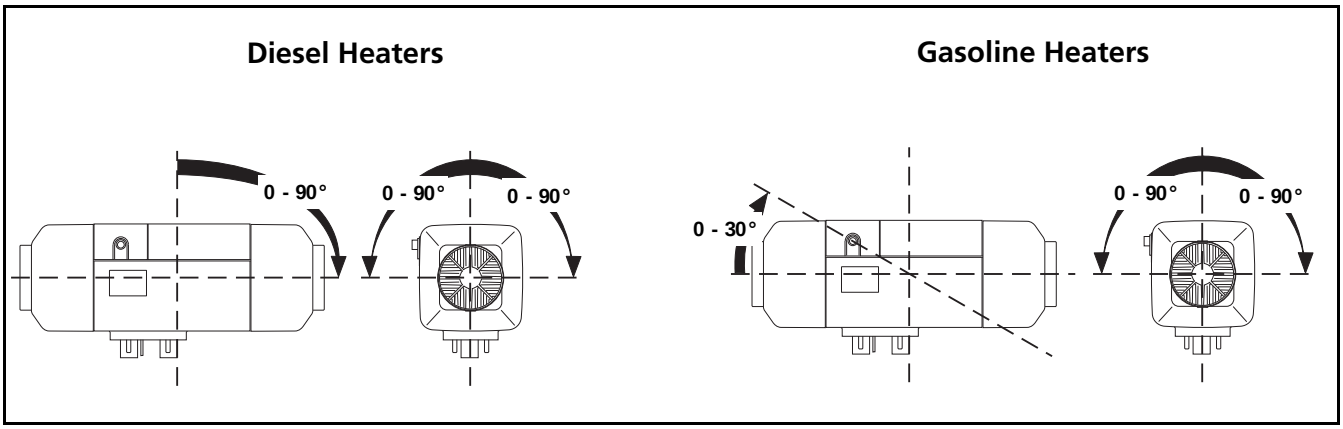


Figure 2. Recommended Installation Positions for AT 40/55 Heaters

A seal (Figure 4) **must** be fitted between the heater and the vehicle body. This seal must be replaced each time the heater is installed. The support area for the heater foot must be flat. A special tool can be purchased from Webasto to drill the holes and, if necessary, smooth the support area. The seal can compensate for unevenness of max. 1 mm.

⚠WARNING ***The seal or foam gasket or both must be replaced each time the heater is removed and re-installed.***

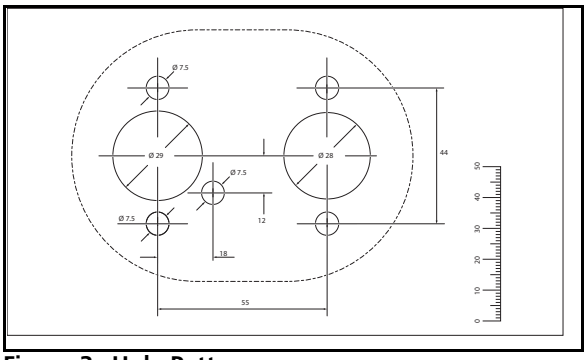


Figure 3. Hole Pattern

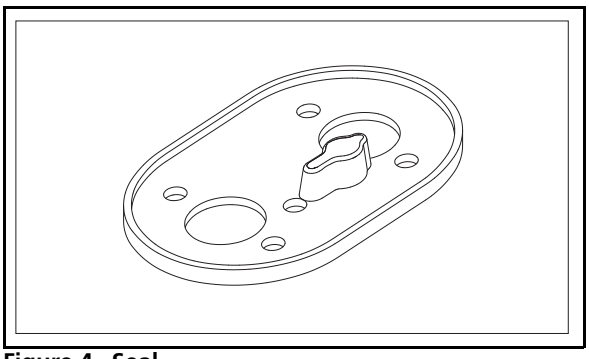
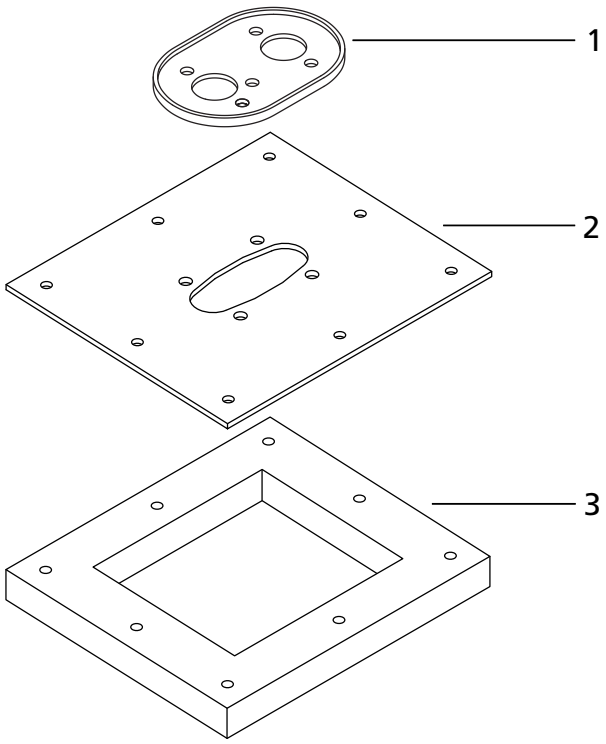


Figure 4. Seal

4.5 Optional Mounting Plate



1. Seal - Heater to vehicle floor or optional mounting plate.
2. Mounting plate - Facilitates installation on corrugated vehicle floors.
3. Closed Cell Foam Gasket - Seals area between mounting plate and vehicle floor.

⚠WARNING ***The seal or foam gasket or both must be replaced each time the heater is removed and re-installed.***

A mounting plate template is provided in the installation kit for locating the heater on the floor of the vehicle. All recommended hole locations and sizes are included.

Figure 5. Mounting with optional mounting plate

⚠CAUTION ***When using the optional mounting plate and closed cell foam gasket, do not over tighten the mounting bolts. Doing so will cause the mounting plate to warp and result in stress damage to the heater and fan motor.***

IMPORTANT!
After installation, check that the heater casing is not in contact with any parts of the vehicle body. A failure to do this may result in the hot air fan binding internally (Figure 6).

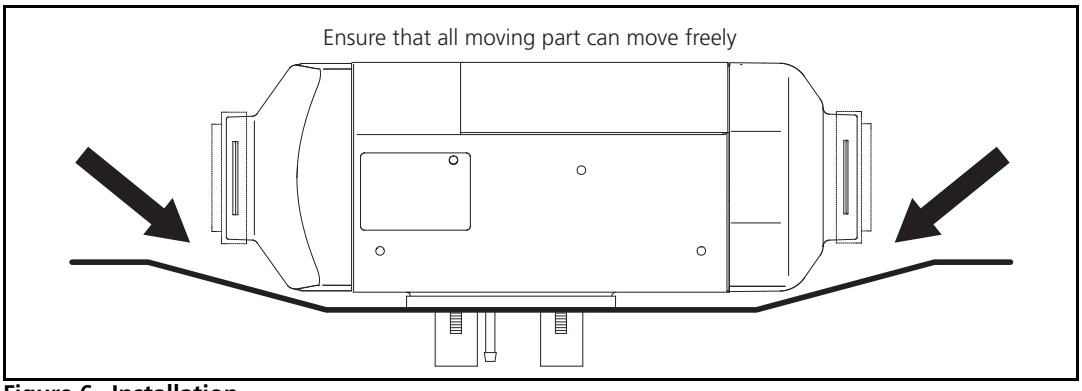
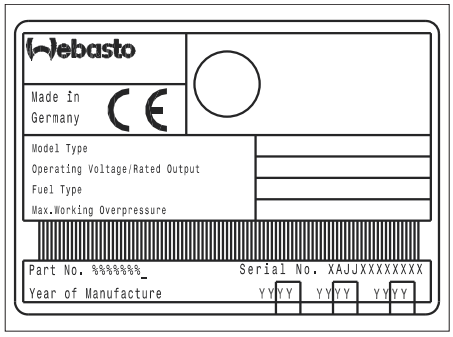


Figure 6. Installation

4.6 Factory Plate / Label

The model/serial number plate of the heater must be positioned so that it cannot be damaged and must be clearly legible when the heater is installed (otherwise a duplicate model plate must be used).

Inapplicable years must be erased from the model plate.



4.7 Installation Example

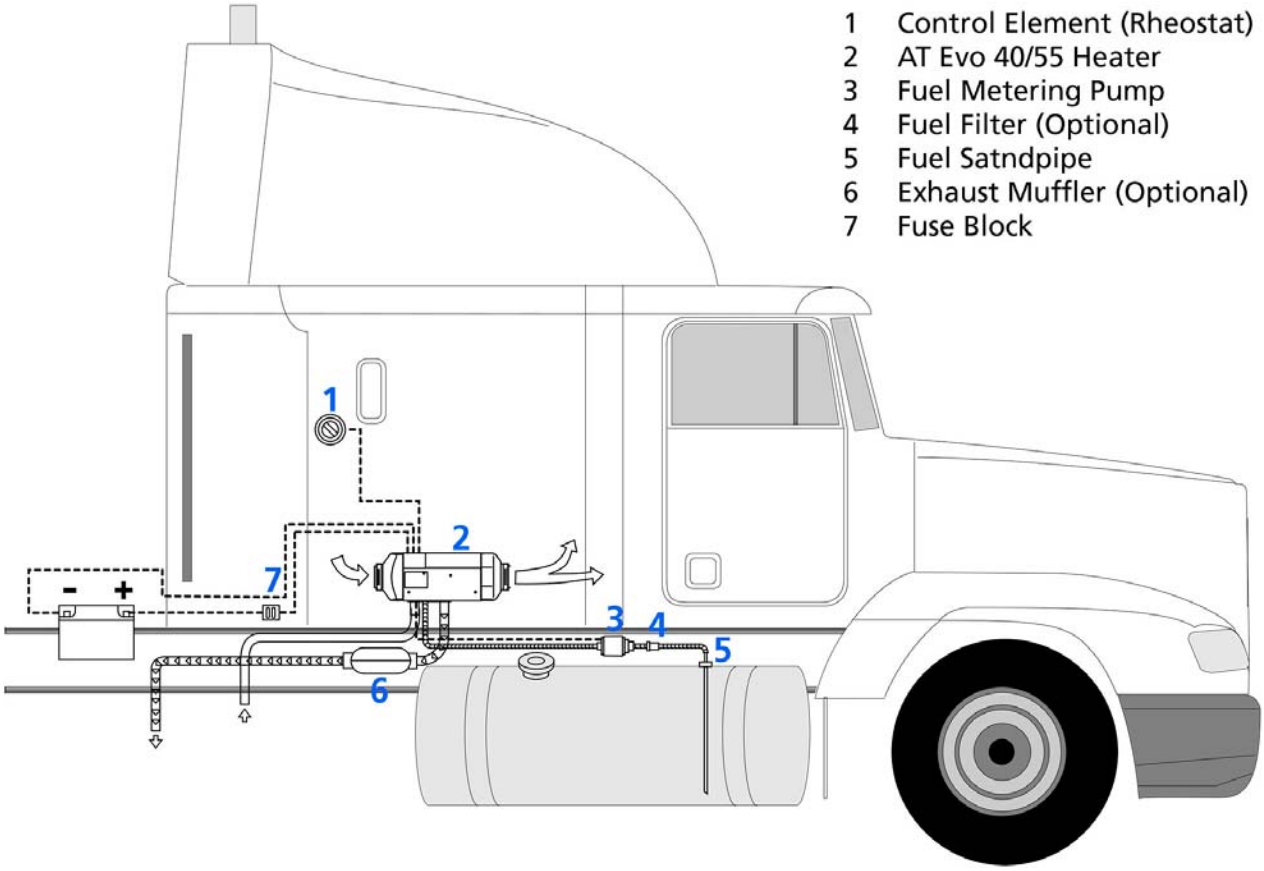


Figure 7. Installation example (installation conditions dependent on vehicle type)

5. Cold and Hot Air System

CAUTION

When heater is in use, the surface of the hot air outlet may become hot to the touch. Contact with skin may cause burns.

NOTE:
The heater must not be integrated into the vehicle's air system.

Both recirculation and fresh air modes are possible.

For fresh air mode it must be ensured that the inlet (hot) air is taken from an area protected from splashing water and spray and in such a way that no water can ingress into the heater if the vehicle travels through a water hazard for which that vehicle is licensed.

NOTE:
For fresh air mode, an external temperature sensor must be fitted in the appropriate zone. The standard pause speed for the blower motor is 0 rpm if the external temperature sensor is used

Inside the control unit there is a temperature sensor, which operates the heater in the appropriate heat output range in conjunction with the control element depending on the intake temperatures and the position of the set point generator. The heat output is controlled such that after the selected interior temperature has been reached quickly, it is then kept at this selected value.

The internal diameter of the main section of the hot air line should be:
90 mm (3.54 in.) minimum for the Air Top EVO 55
90 mm (3.54 in.) minimum for the Air Top EVO 40

NOTE:
Only materials that can permanently withstand temperatures of at least 130°C (266°F) may be used for the hot air line. The hot air opening is to be positioned in such a way that the air is not blown on to any parts that cannot withstand the heat.

IMPORTANT!
In vehicles used to transport people, the air outlet opening is to be directed in such a way that it is at least 20 cm (8 in.) away from all body parts.

The pressure loss in the cold and hot air system must be below the specified limits (see "Technical Data" table, figure 42. The heating capacity will be reduced if the limits are exceeded.

Reduced output by drawing in hot air
Fault in heating operation: Install cold air inlet such that the hot air from the heater or the hot air from the vehicle heating system is not drawn in directly.

If the heater is used in recirculation mode, for example, in the under bunk compartment of a truck's sleeper, without a hot air directional outlet grille, do not short circuit the hot air flow.

The installation location for the cold air inlet must satisfy the following requirements:
- Hot air is not drawn in from the vehicle's heating system.
- Hot air is not drawn in from the heater.
- Exhaust gas is not drawn in.
- The installation location is protected from splash water and water spray.
- The installation location is above the minimum permissible ground clearance to prevent water submersion.

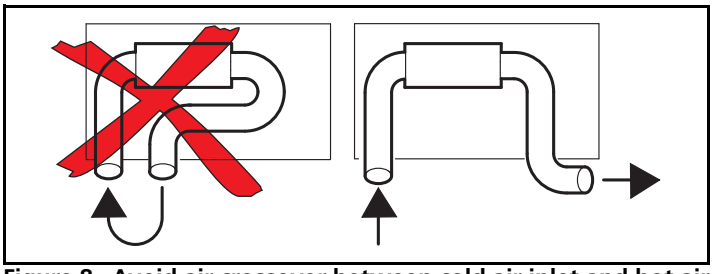


Figure 8. Avoid air crossover between cold air inlet and hot air outlet)

IMPORTANT!
If no cold air ducts is used: Install mesh guard over intake.

NOTE:

- Make sure that the installation location satisfies the requirements.
- Make sure that the hot air duct satisfies the requirements.
- Make sure the cold air inlet, hot air outlet as well as the cold and hot air ducting are installed in the correct position.
- Drill holes.
- Secure cold and hot air ducts at all connections.

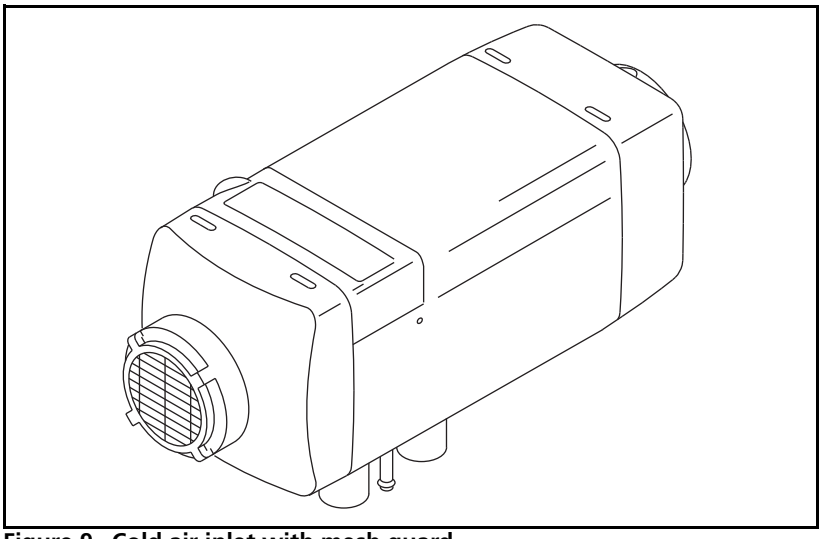


Figure 9. Cold air inlet with mesh guard

Installing heater in casing:

- Provide a cross section area of at least 50 cm^2 for the cold air inlet.
- Seal off the hot air outlet such that no hot air can enter the casing.

5.1 External Temperature Sensor

For fresh air mode, an external temperature sensor must be installed in the area to be heated.

5.1.1 To Install the External Temperature Sensor

The external temperature sensor must be installed at medium height in the passenger cabin on vertical surfaces if possible in the area that requires heating.

The temperature sensor must **not**
- be in the direct current of hot air (from the vehicle's own heating system or the hot air heater).
- by close to heat sources (for example the vehicle's own heating system).
- be placed in direct sunlight (for example on the dashboard).
- be installed behind curtains or the like.

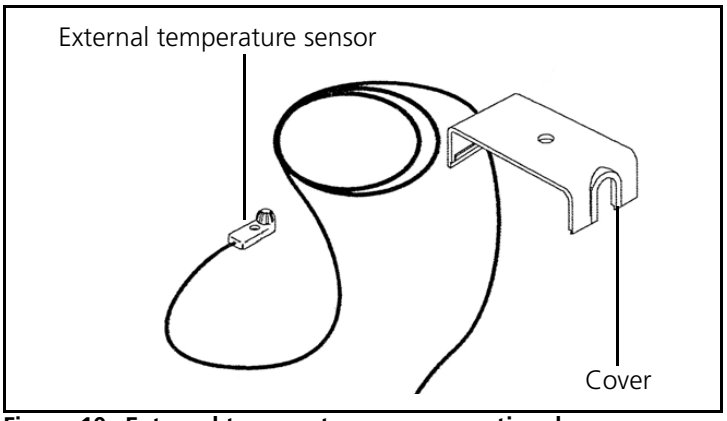
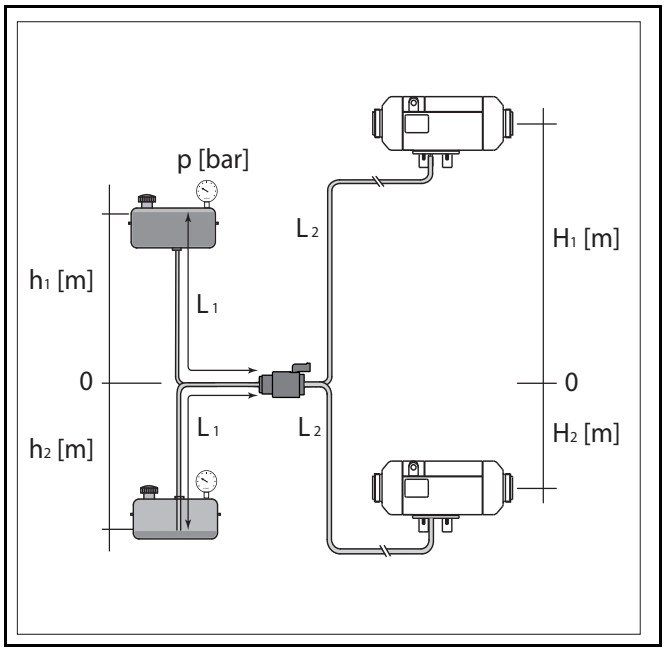


Figure 10. External temperature sensor - optional

6. Fuel Supply

The fuel is taken from the vehicle fuel tank or from a separate fuel tank. The values for the maximum pressure at the fuel extraction point are shown in below.

Figure 11. Fuel Supply

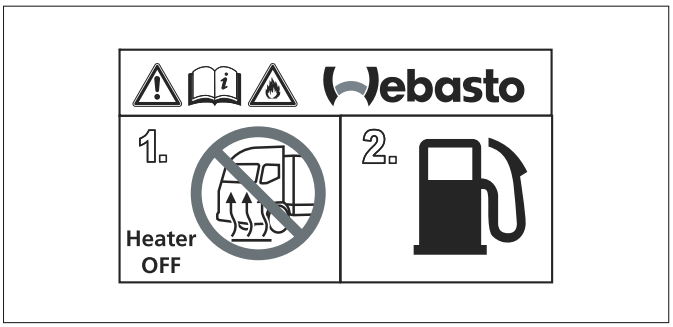


	Parameter	Value
	Inside diameter of fuel line	2 mm
L_1	Length of fuel line (intake side)	Max. 5 m
L_2	Length of fuel line (pressure side)	Max. 10 m
$L_1 + L_2$	Total length of fuel line	Max. 15 m
H_1	Height difference between heater and fuel pump (Heater above fuel pump)	Max. 3 m
H_2	Height difference between heater and fuel pump (heater below fuel pump)	Max. 1m

Fuel level (tank above fuel pump), h1 [M]	Maximum permissible fuel pressure at take-off point, p [bar]
$h_1 = 0$	-0.1 to +0.5
$h_1 = 0$ to 1	-0.1 to +0.4
$h_1 = 1$ to 2	-0.1 to +0.3

Fuel level (tank below fuel pump), h2 [M]	Maximum permissible fuel pressure at take-off point, p [bar]
$h_2 = 0$ to 1.3	-0.1 to +0.5

A sign must be affixed to the fuel tank's filler neck warning that the heater must be switched off before refueling. Affix the following sticker "Switch Off Heater Before Refueling" (included in scope of delivery) in area of fuel filler neck.



6.1 Removing fuel from vehicle fuel tank

The fuel extractor must be fitted in such a way that any air or gas bubbles are automatically discharged towards the tank (see Figure 13).

The fuel extractor should not be located near the engine, as gas bubbles may form in the lines on account of heat radiated from the engine. This may cause problems during combustion.

6.2 Vehicles with Fuel Injection Engines

When installing the heater in a vehicle with fuel injection system, it is important to establish whether the fuel pump is located inside or outside the tank.

If the fuel pump is located inside the tank, fuel can only be extracted from the return line using the Webasto fuel extractor (see Figure 13), in which case it must be ensured that the return line continues almost to the bottom of the tank (see Figure 12 for details of the minimum distance from the bottom of the tank). If this is not the case Webasto fuel extractors or standpipes (see Figures 12, 15 and 16) may be used.

If the fuel pump is installed outside the tank, the fuel connection may also be made between the tank and the fuel pump, again using only the Webasto fuel extractor (see Figure 13).

6.3 Vehicles with Diesel Engines

The fuel must be taken from the vehicle fuel tank or from a separate tank (see Figs. 12, 15 and 16). This separate fuel pickup precludes any effect of pressure.

NOTE:
The tank fitting must be made from metal!

6.4 Fuel Lines

Only steel, copper and plastic lines of plasticized, light and temperature-stabilized PA 11 or PA 12 (e.g. Mecanyl RWTL) pursuant to DIN 73378 may be used for the fuel lines.

Since the lines normally cannot be routed with a constant rising gradient, the internal diameter must not be allowed to exceed a certain size. Air or gas bubbles will accumulate in lines with an internal diameter of more than 2 mm and these will cause malfunctions whilst the heater is operating if the lines sag or are routed downwards. The diameters specified in Figure 11will ensure that bubbles do not form.

The lines should not be routed downwards from the metering pump to the heater.

Unsupported fuel lines must be secured to prevent them from sagging. They must be installed in such a way that they cannot be damaged by flying road debris and high temperatures (exhaust line).

The fuel lines must be secure at the connections using hose clamps to prevent their slipping.

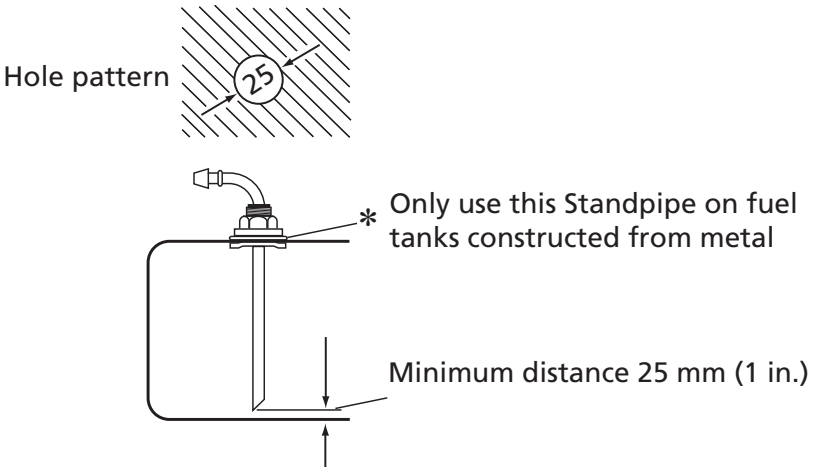


Figure 12. Webasto fuel standpipe

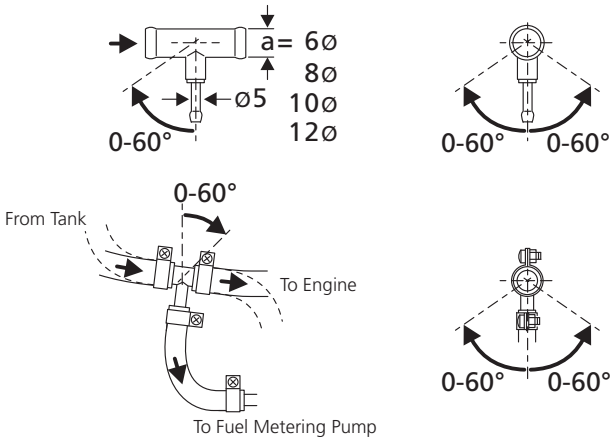


Figure 13. Webasto fuel extractor

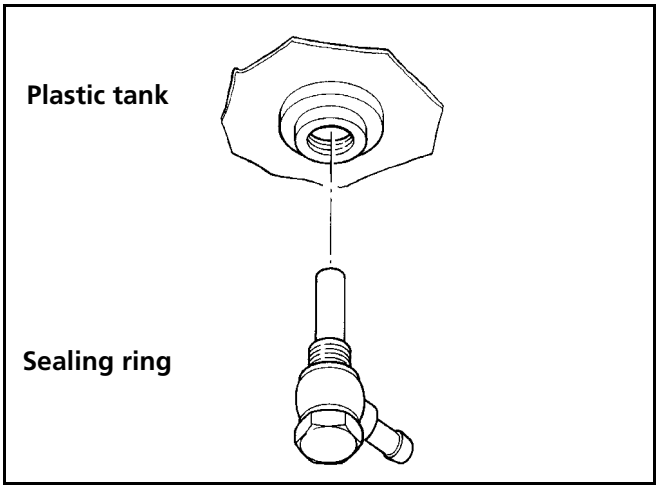


Figure 14. Fuel supply from plastic tank drain screw

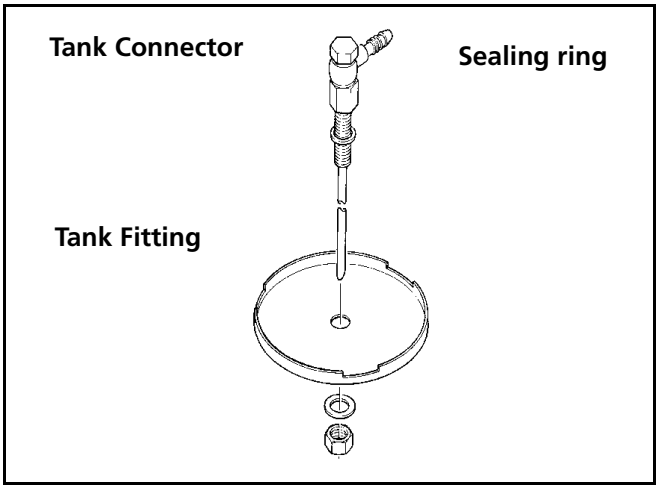


Figure 15. Fuel supply from plastic tank fitting

6.4.1 Connecting Two Fuel Lines with a Coupler Hose

The correct procedure for connecting fuel lines with hosing is shown in Figure 16. Ensure that there are no leaks.

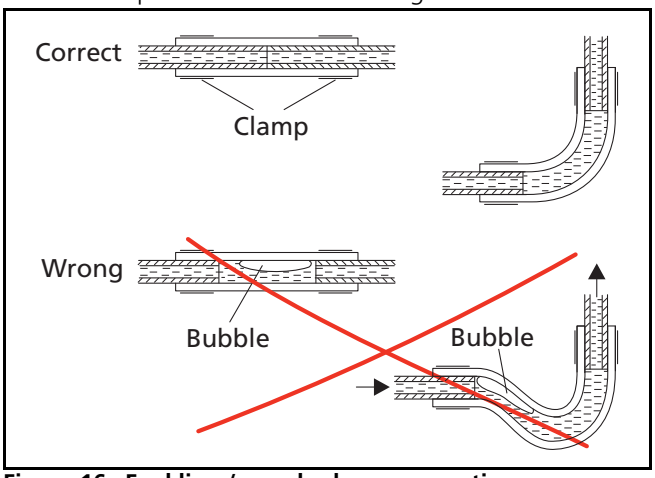


Figure 16. Fuel line / coupler hose connection

6.5 Fuel Metering Pump

The fuel metering pump is a combined delivery, metering and shut-off system and is subject to certain installation criteria (see Figures 11 and 17).

6.5.1 Installation Location

It is advisable to install the metering pump in a cool place. The maximum ambient temperature must not exceed +20 °C (68 °F) for gasoline heaters at any time during operation.

The metering pump and fuel lines must not be installed within range of the radiated heat from hot vehicle parts. A heat shield must be used if necessary

.

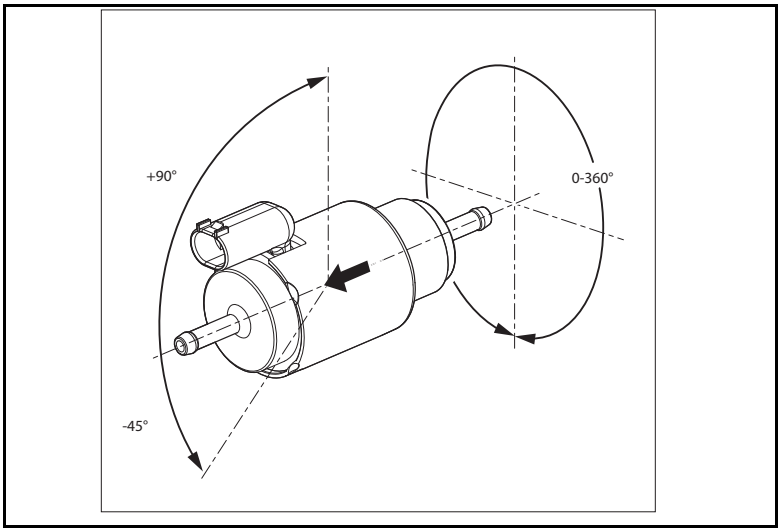


Figure 17. Installation position of DP42 fuel pump and direction of flow

6.5.2 Installation and Attachment

The metering pump must be secured with a vibration-damping mounting. Its installation position is limited as shown in Figure 17 in order to ensure effective automatic bleeding.

As a result of the risk of corrosion, only genuine Webasto parts may be used for the plug connections between the metering pump and the metering pump wiring harness.

6.6 Fuel Filter

Only a Webasto filter is allowed to be used if the fuel is expected to be contaminated. Install vertically if possible, however at least horizontally (check flow direction).

IMPORTANT!
Do not substitute the Webasto supplied fuel filter with a non Webasto replacement. Irregular heater operation may result.

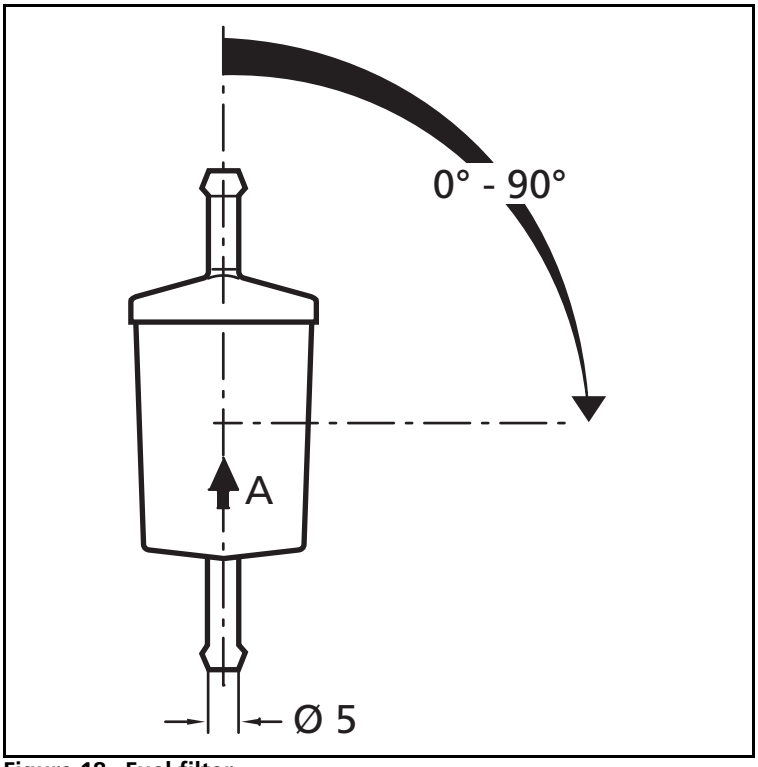


Figure 18. Fuel filter

7. Combustion Air System and Exhaust System

Under no circumstances may the combustion air be taken from areas occupied by people. The combustion air intake opening must not point in the direction of travel. It must be located so that it cannot become clogged with dirt and road debris.

NOTE:
An intake silencer must be fitted if the intake hose length is shorter than 0.6 m.

NOTE:
The combustion air must be extracted using a combustion air line from a position that is as cool as possible and protected from splashing water.
Do not use an exhaust line as the combustion air line since otherwise the metering pump cable from the combustion air inlet port may be damaged.
The combustion air opening must not be under the minimum water drive-through level permitted for the vehicle.

See the regulations for the installation for further regulations.
Both lines are to be installed falling away from the heater. If this is not possible, a condensate drain hole with a diameter of 4 mm (5/32 in.) must be made at its lowest point.

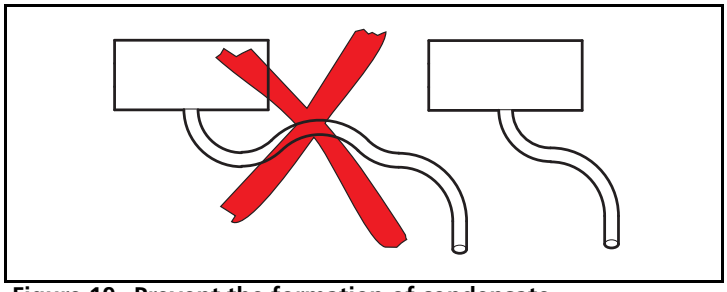


Figure 19. Prevent the formation of condensate

The lines must not point to the front of the vehicle.

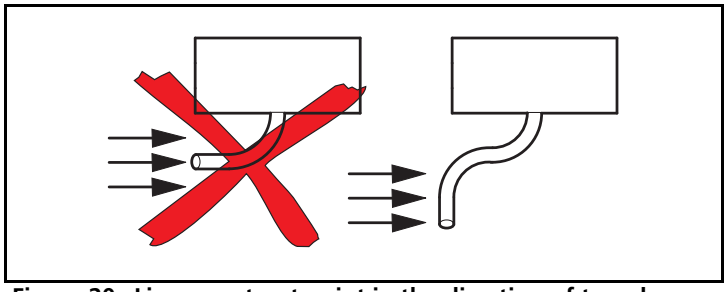


Figure 20. Lines must not point in the direction of travel

The lines must be located so that they cannot become clogged with dirt and road debris.

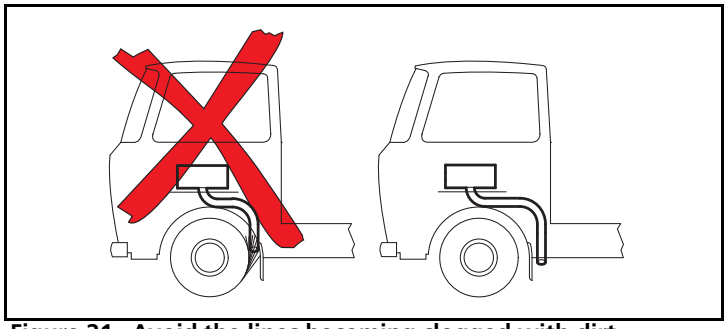


Figure 21. Avoid the lines becoming clogged with dirt

Length of the combustion air inlet and exhaust lines in total:
With muffler: max. 2.0 m
Without muffler: max. 5.0 m

NOTE:
If the exhaust line is over 2 m in length the lines must be insulated (to prevent falling below the dewpoint)

Internal diameter of the lines:
Combustion air line: 25 mm
exhaust line (metal): 24 mm

Minimum bending radius: 50 mm

Total bends:
Combustion air line: max. 270°
Exhaust line: max. 270°.

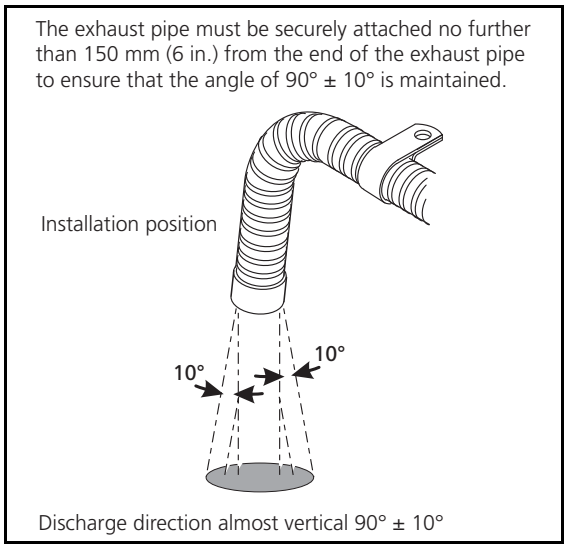


Figure 22. Exhaust pipe opening

IMPORTANT!
If the exhaust pipe ends other than as shown in Figure 22, it will pose a fire risk.

7.1 Exhaust Muffler

Webasto recommends installing an exhaust silencer to reduce noise. The installation must satisfy the following requirements:
- The installation location is as close as possible to the heater.

Installing exhaust muffler:
- Ensure the correct installation position.
- Do not secure the exhaust muffler to heat-sensitive parts (e.g. brake lines, electrical cables).
- Maintain adequate distance from heat-sensitive parts. A heat shield can be fitted.
- Install exhaust muffler such that condensation can drain off through the condensation drain hole in the exhaust muffler.

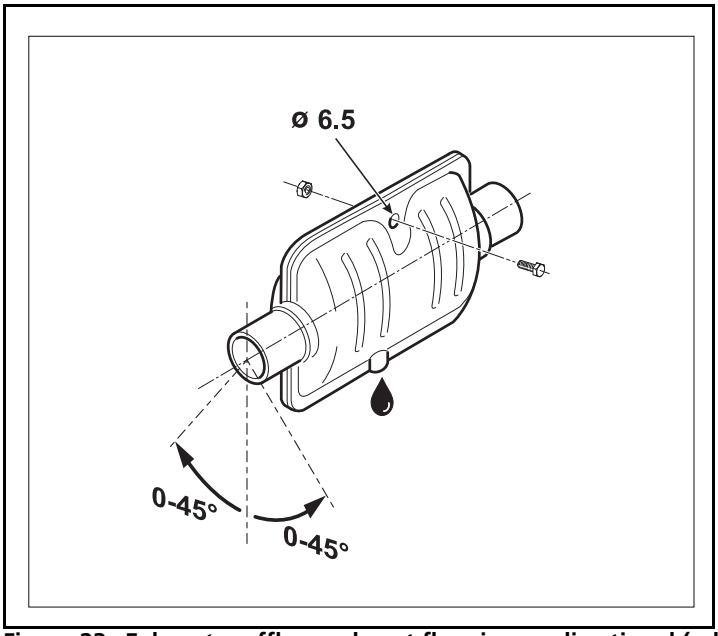


Figure 23. Exhaust muffler - exhaust flow is non-directional (arbitrary)

8. Electrical Connections

All the cables and wires that are not required must be insulated against accidental shorting or grounding.

NOTE:
The electrical connection is made as shown in the system circuit diagram.

8.1 Heater Connection

After it is switched off the heater continues running. The voltage supply must not be disconnected before approx. 240 seconds have elapsed. An electrical battery disconnect or relay can be connected in accordance with the wiring diagram. Connect heater corresponding to the wiring diagram.

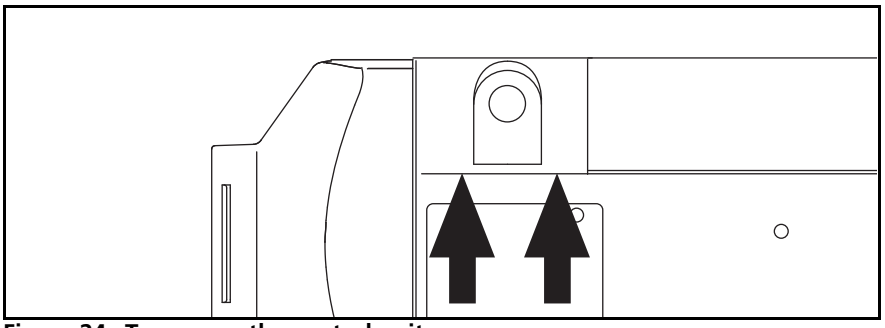


Figure 24. To remove the control unit cover

NOTE:
- Raise the control unit cover on both sides using a blunt blade (Figure 24 arrows).
- Plug in wiring harness connector at control unit.
- Route cable through left or right cable lead-through.
- Position cable grommet such that the cable lead-through is sealed off in the control unit cover.
- Connect the supply voltage to the vehicle electrical system.
- Install fuse holder in vehicle interior.
- Install a fuse (according to SAE J 1284, F=15A for 24 V, F=20A for 12 V) with fuse holder as a safety measure for the heater.
- Connect heater corresponding to the wiring diagram.
- Replace control unit cover.

8.2 Supply Voltage Connection

Ideally from the vehicle's central electrical system or at the batteries.

A weather sealed fuse holder is to be fitted to protect the heater (supplied with the heater harness).

IMPORTANT!
All power connections must be fused within 14" of the battery.

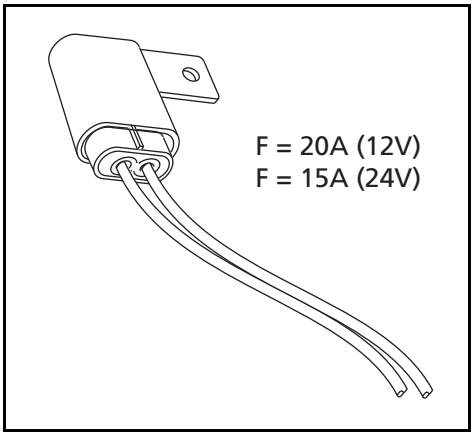


Figure 25. Fuse holder - weather sealed

IMPORTANT!
The Air Top EVO 40/55 requires 6.25 amps @ 12 volts or 12.5 amps @ 24 volts during start-up. The main power connection has to be made at a circuit designed to sustain this load without voltage drop. Cigar lighter sockets and auxiliary power outputs for C.B. radio's and other electronic accessories are not considered adequate power supplies for the Air Top EVO 40/55.

8.3 Control Element (Rheostat)

The wiring harness is prepared for connection to the control element.

Simply pull on the connector housing to unplug the connector.

The connector housing can be locked (self-locking action) by simply pulling on the wiring harness.

Locate the control element in a convenient location. The control element is not affected by temperature. Temperature is monitored inside the heater or via an optional external temperature sensor (see Figure 29).

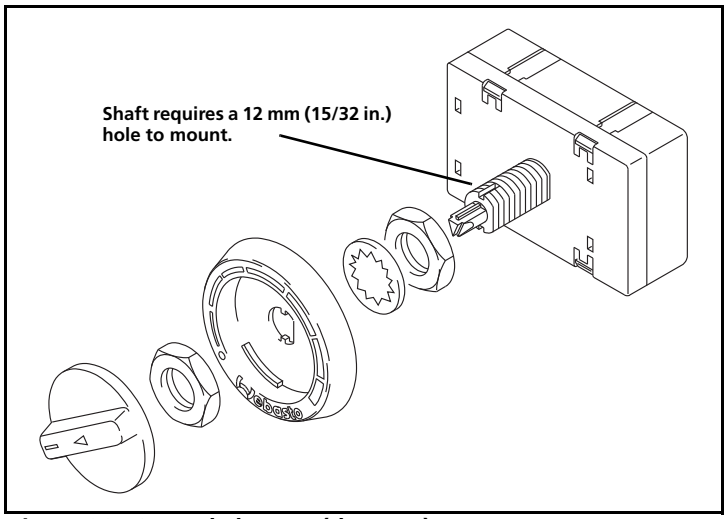


Figure 26. Control element (rheostat)

NOTE:
The fibre optic lens must be in contact with the rotary knob.

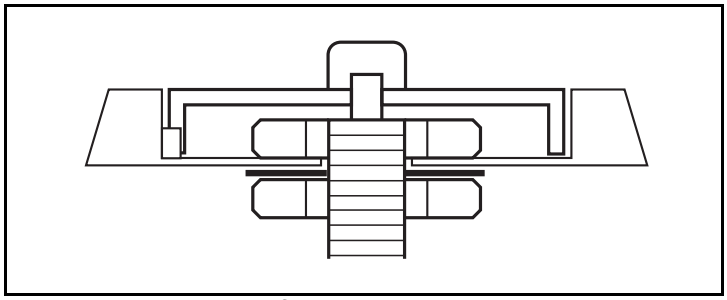


Figure 27. Installation of the control element - correct

NOTE:
The rotary knob must sit flush with the bezel (Figure 27) not above it as illustrated in Figure 28.

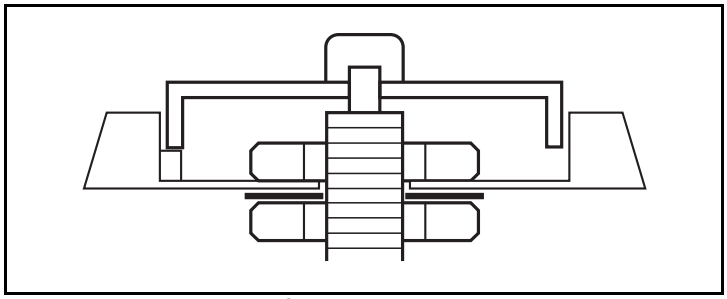


Figure 28. Installation of the control element - incorrect

NOTE:
As an option an external temperature sensor may be installed in the passenger cabin (see page15).

See installation instructions included with the sensor or see the service instructions in the Workshop manual for further information.

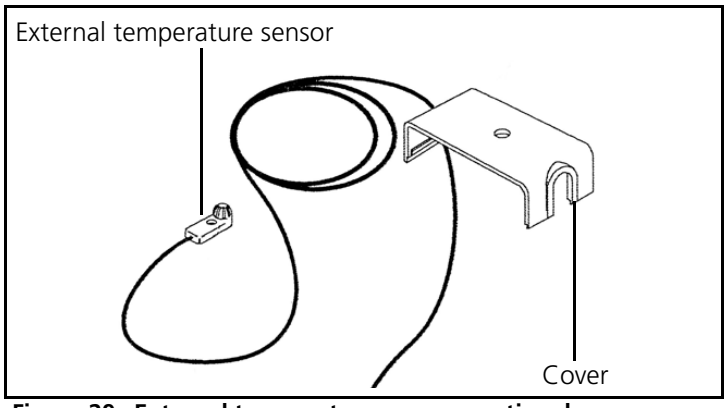


Figure 29. External temperature sensor - optional

8.4 Control Element (SmarTemp)

The Control Panel should be installed in a suitable location on a flat surface if possible in a visible area.

- Connect control panel to existing connectors on heater-unit wiring harness (see "Connections Diagrams Section")
- Use the drilling dimensions (fig. 31) to lightly mark the two mounting holes.
- To route wire harness through the mounting surface, drill a 22 mm hole. Make sure to push harness through the hole before installing terminals into connector housing)
- Secure the SmarTemp Control using the two supplied #4 screws.
- Follow the electrical pin-out fig. 32 to install the supplied harness connector and harness adapters.
- Apply any warning or caution stickers that are supplied with the SmarTemp Control.
- Observe the installation / operating manual supplied for proper menu setup.

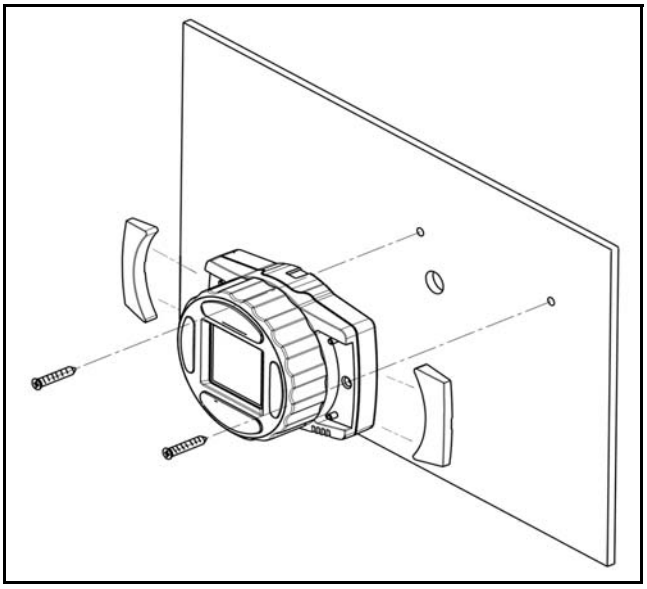


Figure 30. Control element (SmarTemp)

NOTES:

- Always make sure there are no obstacles behind the mounting location prior to drilling.
- Ensure good readability when selecting installation location.
- Observe information on adhesive labels and colored markings when connecting the control element to vehicles wiring harness.

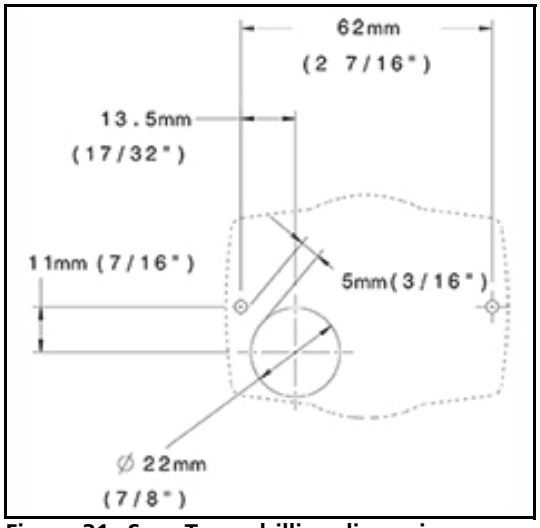


Figure 31. SmarTemp drilling dimensions

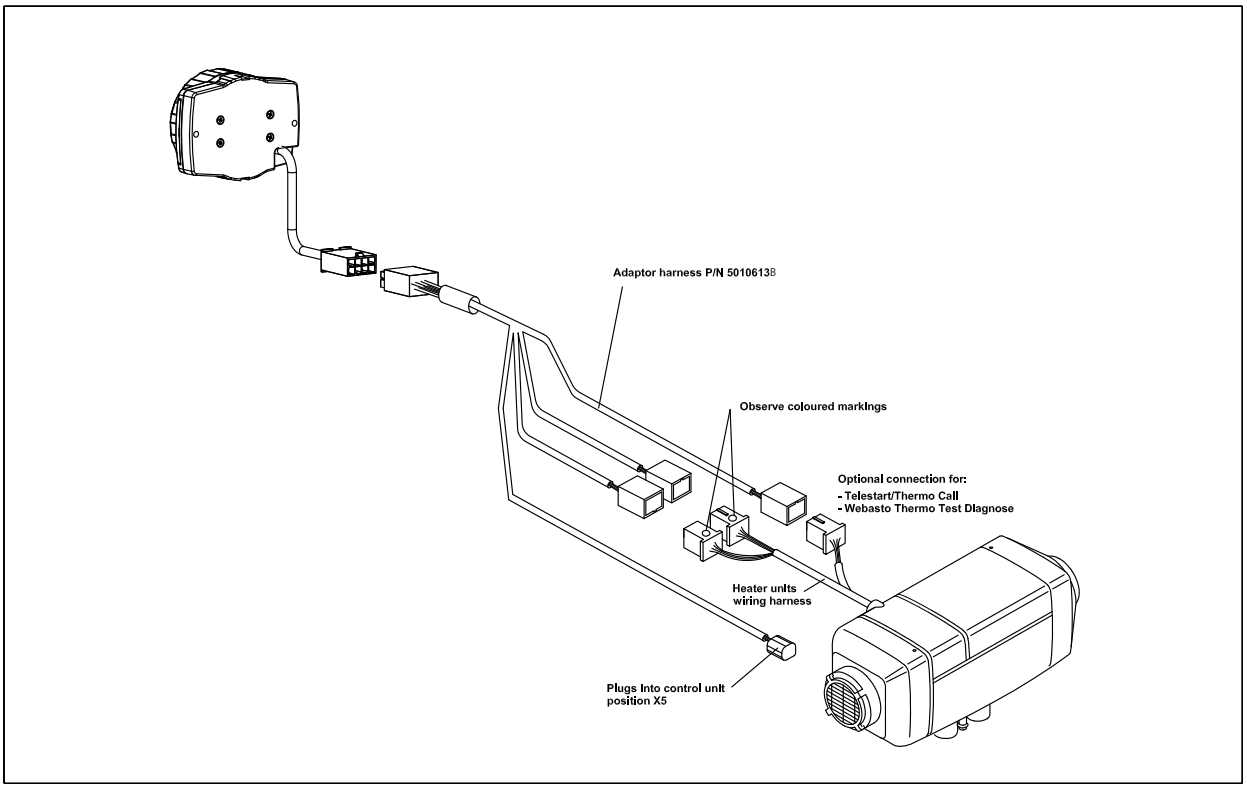


Figure 32. Air Top 40/55 EVO with SmarTemp Control - connection diagram

8.5 Control Element (MC04)

The Control Panel should be installed in a suitable location (on a flat surface if possible) in a visible area.

- Use Drilling Template for Control Panel MC04 for cut-out and holes (see "drilling templates")
- Connect Control Panel to existing connectors on heater-unit wiring harness (see "Connection diagram/Circuit diagram")
- Pre-mount control unit in cut-out
- Lightly press fastening screws into holes and screw in
- Carefully clip on trim frame

NOTES:

- Control Panel is only intended for installation in passenger compartment
- Ensure good readability when selecting installation location
- Observe information on adhesive labels and colored markings when connecting Control Panel to vehicle wiring harness

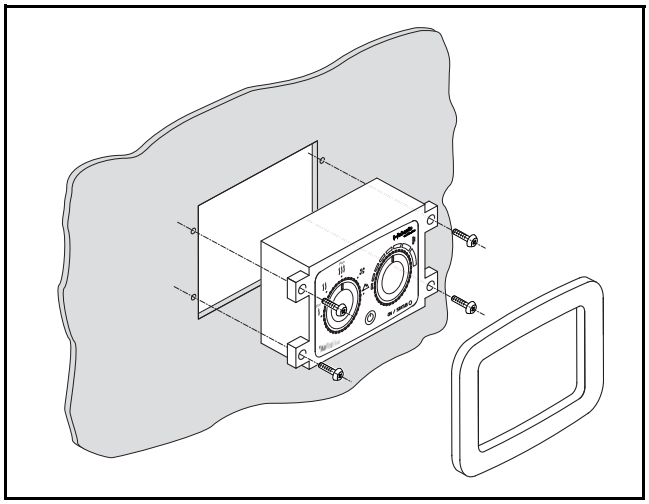


Figure 33. Installing control element MC04

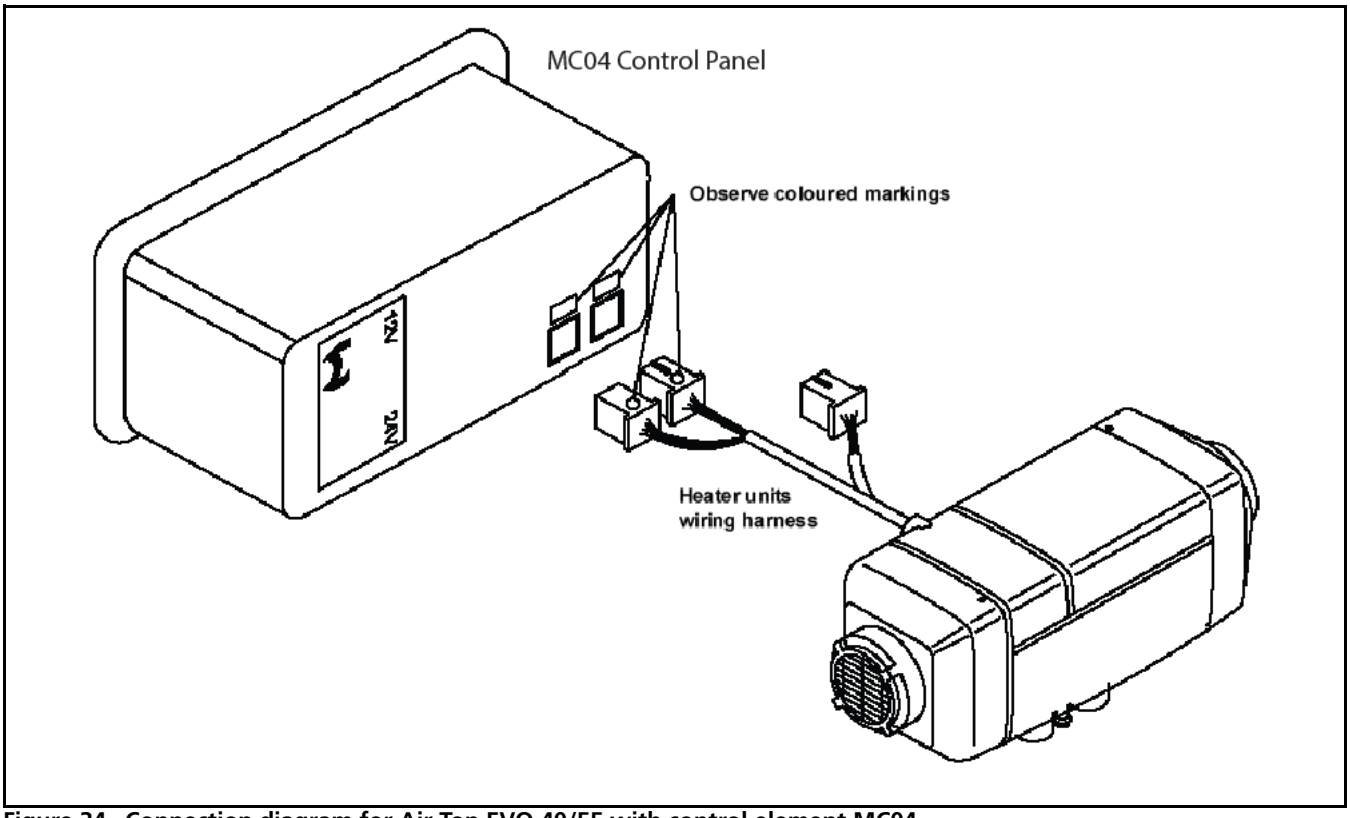


Figure 34. Connection diagram for Air Top EVO 40/55 with control element MC04

9. Pre-Start Checklist

This checklist is provided as a technical aid to technicians for final heater installation guidance.

	HEATER MOUNTING	Complete (Yes/No/Comments)
1	Is the heater installation safely secure / rigid? (Ensure that all bracket bolts are tight)	
2	Is there a safe clearance from heat generating Components? (I.e. exhaust, etc...)	
3	Is the heater mounted in an acceptable position according to the limitations noted in the installation manual?	
4	Is the heater installed in a protected location from road debris and splash-water or items stored in the same area?	

	ELECTRICAL	Complete (Yes/No/Comments)
1	Has all wiring been safely secured away from moving components and / or heat sources?	
2	Check for proper power and ground connections.	
3	Check for proper fuse tap connection.	
4	Verify the correct fuses are in the specified locations per the installation manual.	
5	Ensure heater and vehicle fuse boxes are closed and secure. Was the Webasto fuse block installed in a location protected from water and / or moisture?	
6	Ensure battery is mounted securely and connections are properly tightened.	
7	Ensure battery is at ≥ 12.2Vdc.	

	FUEL SYSTEM	Complete (Yes/No/ Comments)
1	Is the standpipe properly mounted in the fuel tank? (sealed, structural integrity maintained).	
2	Validate the standpipe does not interfere with function of sending unit by checking fuel gauge for proper operation before completing installation of tank.	
3	Verify that all fuel lines are properly secured and are a safe distance (min. 4 in.) from exhaust systems and / or moving components.	
4	Check all fuel lines for leaks or kinks.	
5	Check fuel line clamps for proper positioning and tightness. Ensure fuel system is free of leaks.	
6	Ensure fuel pump is securely mounted in a cool location **NOTE:** Vehicle fuel tank area is generally a location with minimal sound transfer path to vehicle interior.	

EXHAUST SYSTEMS		Complete (Yes/No/Comments)
1	Is the muffler and clamps securely tightened?	
2	Has muffler and exhaust tube been routed a safe distance (min. 4 in.) from flammable material?	
3	Ensure drain-holes are drilled in low bend areas of exhaust tube.	
4	Ensure exhaust is venting a safe distance from any vehicle interior openings.	
5	Ensure exhaust is venting in the direction that will not cause back pressure while driving.	

COMBUSTION AIR INTAKE		Complete (Yes/No/Comments)
1	Is the combustion air intake drawing fresh air from a non-turbulent location? (i.e. not in direction of travel)	
2	Ensure air intake system is securely fastened.	

HEATER FUNCTION		Complete (Yes/No/ Comments)
1	Ensure heater starts and runs for a minimum of 20 minutes.	
2	Ensure timer (control device) is functions properly.	
3	Check and Modify CO2 setting as needed based on altitude (will the heater "live" or the majority of time above 5,000 Feet) (See service manual for instructions to make adjustment)	

COSMETICS		Complete (Yes/No/ Comments)
1	Has the vehicle interior, engine compartment, trunk & glove compartment been inspected for cleanliness after installation.	
2	Has user manual placed in glove box?	
3	Is the vehicle clock time correct after disconnecting the battery?	

⚠ DANGER

HEATER MUST BE SWITCHED "OFF" WHEN REFUELING AT FILLING STATIONS AND/OR WHILE LOADING OR UNLOADING FLAMMABLE MATERIALS FOR TRANSPORT, TO PREVENT THE RISK OF EXPLOSION. PLEASE REVIEW OWNER'S MANUAL FOR SAFETY AND USE INSTRUCTIONS.

If you have any questions, contact our technical support team at (800) 860-7866 or via email at: info-us@webasto.com.

10. Operation Instructions

10.1 Starting Heater for the First Time

⚠ DANGER

HEATER MUST BE SWITCHED "OFF" WHEN REFUELING AT FILLING STATIONS AND/OR WHILE LOADING OR UNLOADING FLAMMABLE MATERIALS FOR TRANSPORT, TO PREVENT THE RISK OF EXPLOSION. PLEASE REVIEW OWNER'S MANUAL FOR SAFETY AND USE INSTRUCTIONS.

- Make sure the control unit cover is fitted in position.
- Install contact guard if necessary.
- Bleed the fuel supply system carefully using Webasto Thermo Test PC Diagnosis.
- Switch on the heater via the control element (see control element operating instructions).

NOTE:
As a result of the low fuel consumption the heater must be switched on several times to fill the fuel line and prime the system.

Conduct a trial of the heater to check all the 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.

10.2 Control Element Description

10.2.1 Rheostat

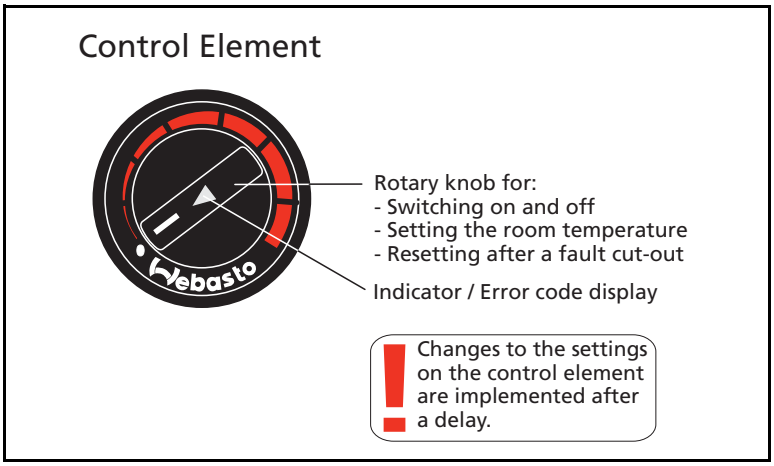


Figure 35. Control element (Rheostat)

10.2.2 SmarTemp Control

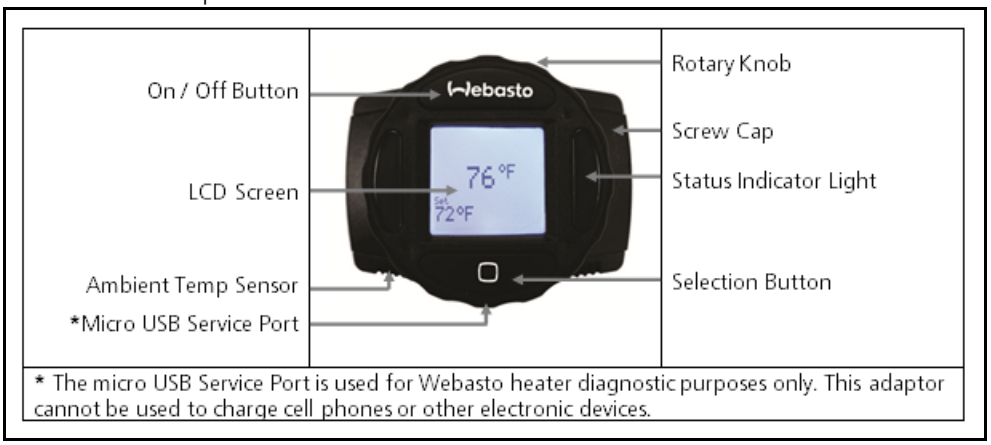


Figure 36. Control element (SmarTemp Control)

10.2.3 MC-04

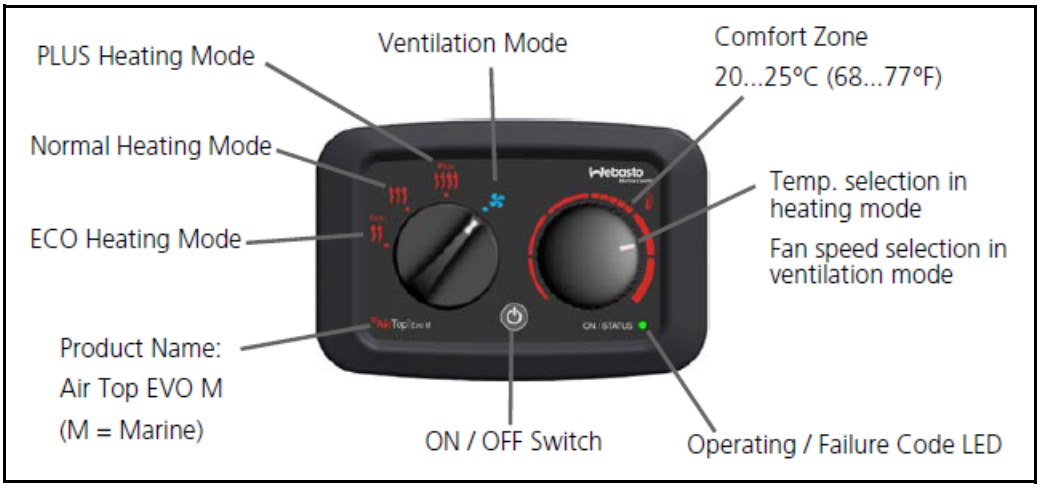


Figure 37. Control element (MC-04)

10.3 Product Registration

- Register the product on the internet under: http://techwebasto.com
- Hand over the registration document to the next owner or user of the unit.

11. Troubleshooting

11.1 Error code output

- If an error occurs, the unit outputs a fault code via the control element.
- You will find further information in the operating instructions and in the heater workshop manual.

NOTE:
An error code is generated on the control element indicator light after an error has occurred. When determining the generated code, there will be a series of 5 fast flashes after which, the error code will be generated by a sequence of long flash pulses, count only the long flash pulses to obtain the code. Error codes are shown in the table below.

If the heater is fitted with a combination timer, an error message will appear on the display of the timer after a fault occurs. If the control element is used, the error number is indicated by the indicator light flashing:

F 00 Control unit error / incorrect parameter set / warm start recognition
F 01 No start (after 2 attempts to start) / no flame formation
F 02 Flame failure (repeated more than 3 times)
F 03 Under voltage or over voltage
F 04 Premature flame recognition
F 06 Temperature sensor interrupt or short circuit
F 07 Metering pump interrupt or pump short circuit
F 08 Fan motor interrupt or short circuit or overload or blocked
F 09 Ceramic glow pin interrupt or short circuit
F 10 Overheating: Resulting in permanent heater fault lock-out
F 11 Overheating sensor interrupt or short circuit
F 12 Heater lock-out
F 13 Heater lock-out permanent
F 14 Overheating sensor incorrect position
F 15 Set point generator interrupt

11.2 Fault Lock-out

The control unit continuously monitors the heater operation. The control unit identifies errors on individual heater components and faults during operation. Should the control unit experience component errors and operational faults, the heater will be shut down.

The heater is shut down (fault lock-out) if:
– No or incorrect start
– Temperature sensor defective
– Overheating sensor interrupt or short circuit
– Overheating sensor installed incorrectly
– Ceramic glow pin interrupt or short circuit
– Fan motor overload or blocked or short circuit or interrupt
– Error in the fuel metering pump or overheating guard circuit (start phase only)
– Under voltage less than 10 V or over voltage greater than 15 V and for longer than 20 seconds (on 12 V heater)
– Under voltage less than 20 V or over voltage greater than 32 V and for longer than 20 seconds (on 24 V heater)
– Control unit defective
– Overheating

The fuel supply is stopped if the heater overheats.
The heater continues to run in the same way as if it is switched off manually.
After the heater stops the control unit will be set to fault lock-out.
Overheating is indicated by the indicator flashing 10 times.

11.3 Heater Lock out Reset Procedure

1. Using switch or standard timer control, turn heater on
2. Remove the main power connection to heater from battery or pull fuse for a minimum of 20 seconds.
3. Using switch or standard timer control, turn the heater off.
4. Reinstall main heater power connection where previously disconnected.

Rectify the cause of the fault.

IMPORTANT: Heater fault codes can be read using PC Diagnostics, however, the heater lockout reset must be manually performed using the procedure stated above.

12. Technical Data

12.1 Heater

Heater	Air Top Evo 40 B	Air Top Evo 40 D	Air Top Evo 55 B	Air Top Evo 55 D
Type approval: EMC	E1 03 5529			
Type approval: Heating	E1 00 0385		E1 00 0386	
Design	Air heater with vaporising burner			
Heat flow over control range [kW]	1.7 to 3.5 (4.0)	1.5 to 3.5 (4.0)	1.7 to 5.0 (5.5)	1.5 to 5.0 (5.5)
Fuel	Petrol DIN EN 228	Diesel / bio-diesel DIN EN 590/ ?DIN EN 14214	Petrol DIN EN 228	Diesel / bio-diesel DIN EN 590/ ?DIN EN 14214
Fuel consumption over control range	0.18 to 0.38 (0.43) kg/h 0.25 to 0.51 (0.58) l/h	0.15 to 0.36 (0.41) kg/h 0.18 to 0.43 (0.49) l/h	0.18 to 0.54 (0.59) kg/h 0.25 to 0.73 (0.80) l/h	0.15 to 0.51 (0.56) kg/h 0.18 to 0.61 (0.67) l/h
Rated voltage [V]	12	12 / 24	12	12 / 24
Operating voltage range [V]	10.5 to 16	10.5 to 16 / 20.5 to 31	10.5 to 16	10.5 to 16 / 20.5 to 31
Rated power consumption over control range [W]	15 to 40 (55)		15 to 95 (130)	
Permissible ambient temperature (operation/storage): Heater [°C]	–40 to +40 / –40 to +85			
Permissible ambient temperature (operation/storage): Fuel pump [°C]	–40 to +20 / –40 to +85			
Permissible combustion air intake temperature [°C]	–40 to +20			
Set-point temperature range [°C]	+5 to +35			
Volumetric flow rate with pressure loss in cold/hot air system ?0.5 hPa [m^3/h]	Max. 132 (140)		Max. 200 (220)	
CO_2 in exhaust gas: Rated heating capacity VL [kW]	3.5		5.0	
CO_2 in exhaust gas: CO_2 rated value VL [vol%]	8.9	9.2	10.0	
Heater length [mm]	423 ± 2			
Heater width [mm]	148 ± 1			
Heater height [mm]	162 ± 1			
Heater weight [kg]	5.9			
IP class: Heater	IP5K4K			
IP class: Fuel pump	IPX6 / IPX7 / IP6K9K			
Max. length of combustion air line and exhaust line with exhaust silencer [m]	2			
Max. length of combustion air line and exhaust line without exhaust silencer [m]	5			
Max. permissible pressure loss in cold and hot air system [hPa]	2.0		3.0	

Figure 38. Technical Data Table

The technical data apply under the following conditions:
- Ambient temperature: +20 °C
- Geodetic height: 0 m above sea level
- Rated voltage

The standard tolerances of ±10 % for heaters shall apply if no limits are specified.

The values in brackets apply for the extended heating capacity (boost function) that is activated temporarily during each start.

12.2 Electrical Components:

Control unit, motor, metering pump, lamp in the timer and ceramic glow pin / flame monitor are designed for either 12 or 24 Volt.

12.3 Fuel for Air Top EVO 40/55 B (Gasoline):

The fuel specified by the vehicle manufacturer must be used.

12.4 Fuel for Air Top EVO 40/55 D (Diesel/Heating Oil):

The diesel fuel specified by the vehicle manufacturer must be used. Heating oil may also be used as long as it complies to the normal quality available on the North American market.

We know of no negative influences due to additives.
If fuel is extracted from the vehicle's tank, follow the additive instructions issued by the vehicle manufacturer.

If you change to low-temperature fuel, the heater must be operated for approx. 20 minutes so that the fuel system is filled with the new fuel.

The Air Top EVO 40/55 heater is also licensed for use with PME (bio-diesel), which complies with DIN EN 14214.

13. Version

Air Top EVO 40/55 B (Gasoline)
Air heater for gasoline (12 V)

Air Top EVO 40/55 D (Diesel)
Air heater for Diesel/heating oil (12 or 24 V)

14. Annex

14.1 Drilling Template: heater

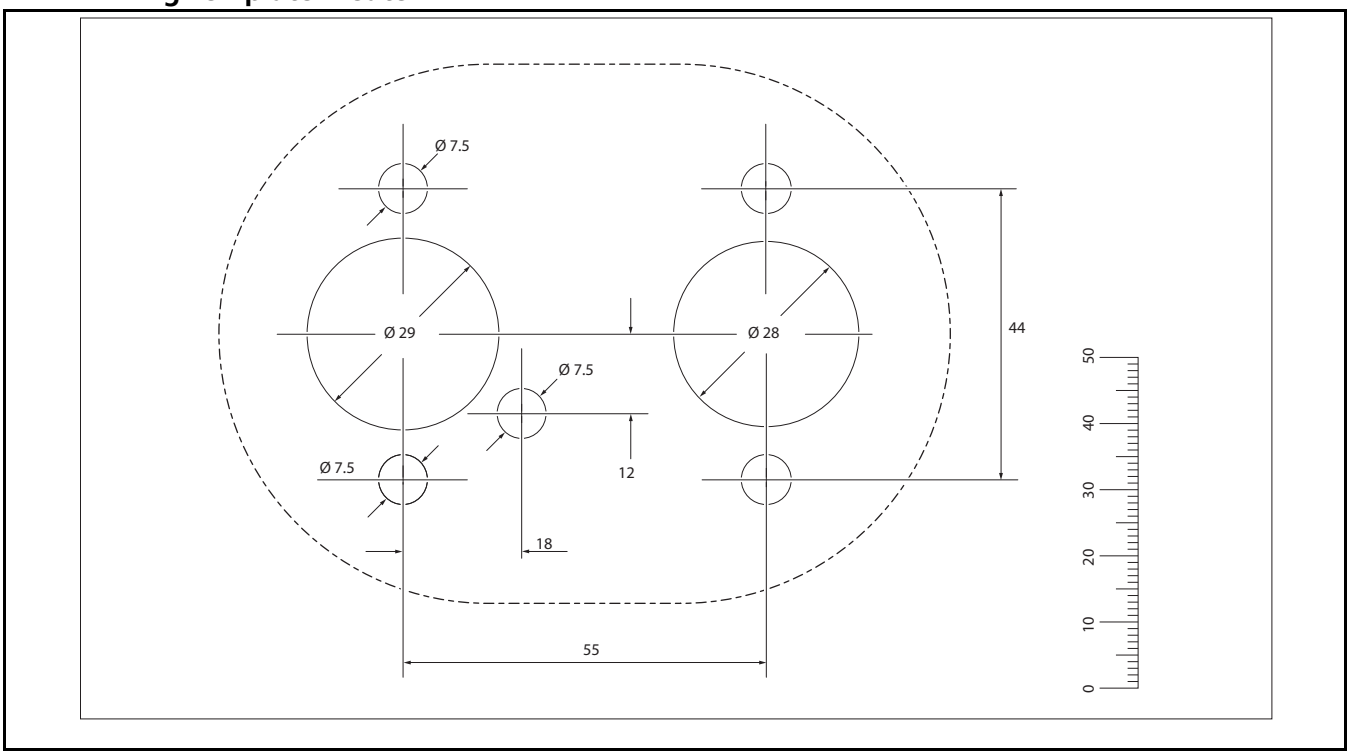


Figure 39. Drilling Template for Heater Installation (Dimensions in millimeters)

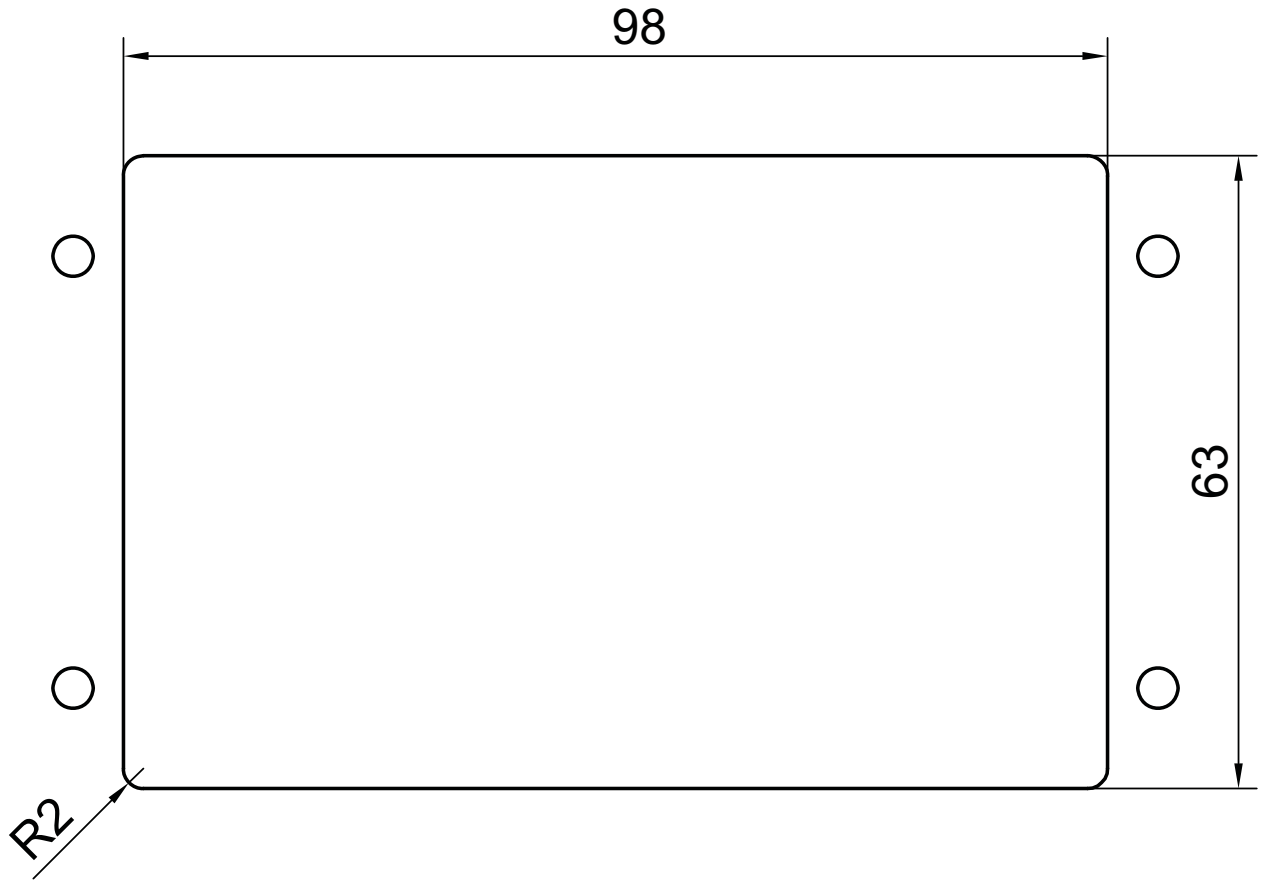


Figure 40. Drilling Template for MC04 Control Panel

14.2 Legends to the wiring diagrams

Legend to wiring diagram

Item	Description	Remarks
A1	Heater	Air Top Evo 40 / 55
A2	Control unit	Control unit 1580
A3	UniBox	–
B2	Room temperature sensor	Inside
B3	Overheat temperature sensor	Overheating protection
B4	Room temperature sensor	Outside
B5	Exhaust gas temperature sensor	Overheating protection / flame monitor
E	Glow plug	–
F1	Fuse 24 V, 15 A / 12 V, 20 ?A	Blade type fuse SAE J 1284
F2	Fuse 4 A	Not included in wiring harness
F3	Fuse 1 A	Blade type fuse SAE J 1284
F4	Fuse 4 A	Not included in wiring harness
F5	Fuse	Value [in A] to be selected corresponding to wire cross section
H1	LED green (in Item S1)	Operating indicator
H2	LED red (in Item P)	Lighting: Quick Heating button, Ready indicator, ON indicator
H3	Heating symbol on display (in Item P)	Operating indicator
H4	Bulb/LED (in Item P and S)	Display and button lighting
H7	Symbol on display	–
M1	Motor	Combustion air and heating air blower
P1	SmartControl	–
P2	SmartControl / Multi Control	–
S	Air Top Evo Multi Control ?(MC04)	ON/OFF button, selector switch for additional functions and temperature selector
S1	Rotary selector control element	ON switch and temperature selector
S2	Switch	Ventilation
S3	Switch	CO2 setting
X1 – X6	Plug connection	To Item A2
X7	Plug connection	To control unit
X8	Plug connection	To Item A2
X9	Plug connection	–
X9 (a)	Plug connection	To Item S or S1
X9 (b)	Plug connection	To Item S or S2
X9 (c)	Plug connection	W-bus, optional Telestart ?(12 V) or Thermo Call connection
X1 – X11	Plug connections	In heater on control unit
X13	Plug connection	To Item Y1
X14	Plug connection	–
X15	Plug connection	To Item S3
X16	Plug connection	Wiring harness connection DP42
X17	Plug connection	Wiring harness connection DP42
Y1	Fuel pump	DP42

Legend to remarks in wiring diagrams

Item	Remarks
1	Positive from terminal 15/75 to connection 10: Continuous heating mode is possible in connection with quick heating function provided the ignition is switched on.
2	All heater versions: W-bus diagnosis connection
3	CO2 setting (see workshop manual)
4	Connection to terminal 30: Continuous heating mode is possible with ignition switched off.
5	External temperature sensor (optional) Installation as system: External temperature sensor must be connected to master heater.
6	Pin 7 "Boost" Only ambulance heater version (door contact connected to terminal 31).
7	Wiring harness adapter (optional)
8	Switching capacity 250 mA

Connector X7 pin assignments

Item	Remarks
1	Battery disconnect / operation indicator
2	Power supply, control element / error code output
3	Battery disconnect / operation indicator
4	Voltage supply + (terminal 30)
5	Voltage supply - (terminal 31)
6	Switch-on signal (ON/OFF)
7	Multifunction (ventilation, boost, ECO) with control element MC02, only Boost activation for ambulance units
8	Set-point sensor –
9	CO2 setting
10	Not used
11	Set-point sensor +
12	W-bus (Webasto Thermo Test PC-Diagnosis connection)

14.3 Wiring Diagrams

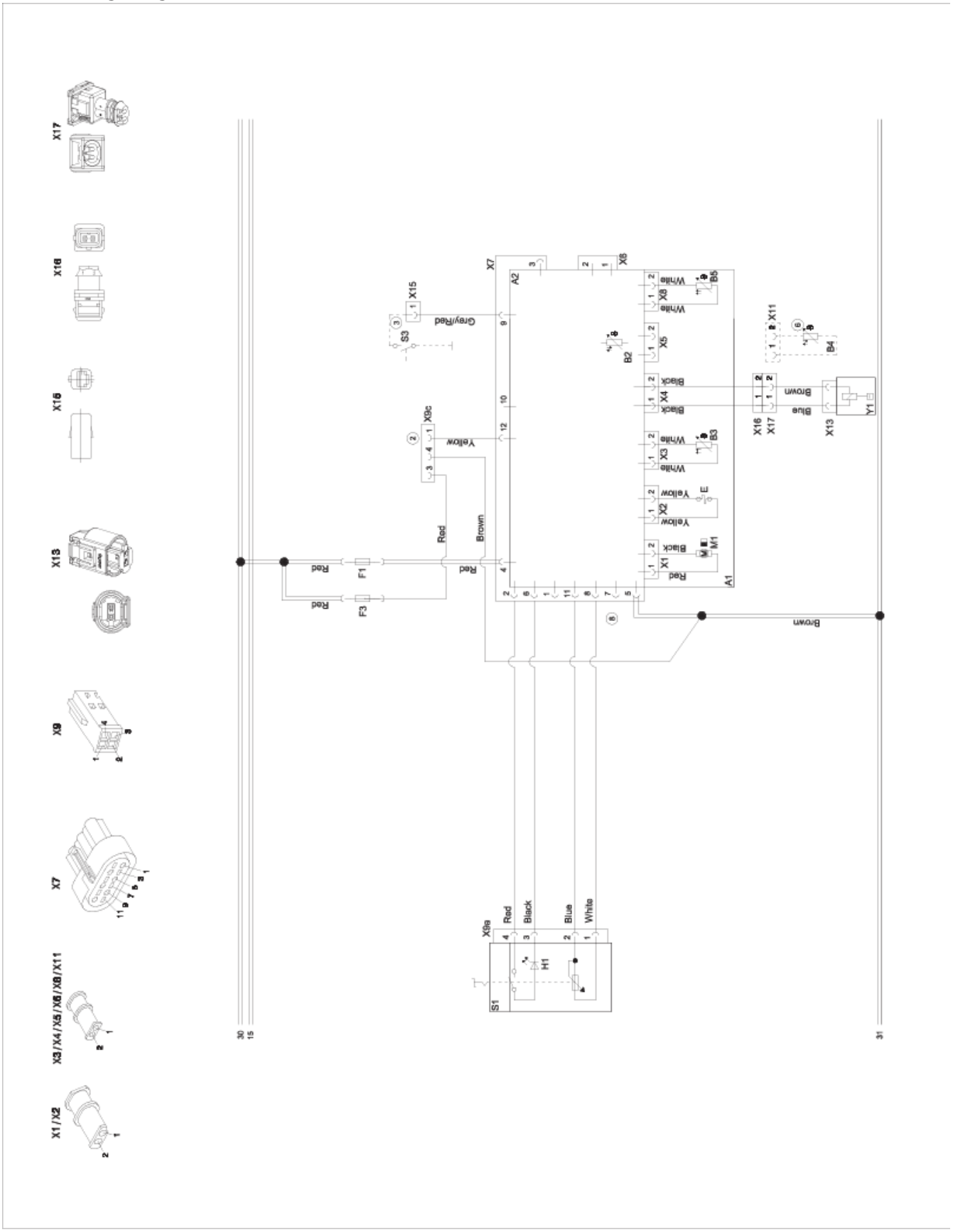


Figure 41. Air Top Evo 40/55, 12V / 24V with rheostat

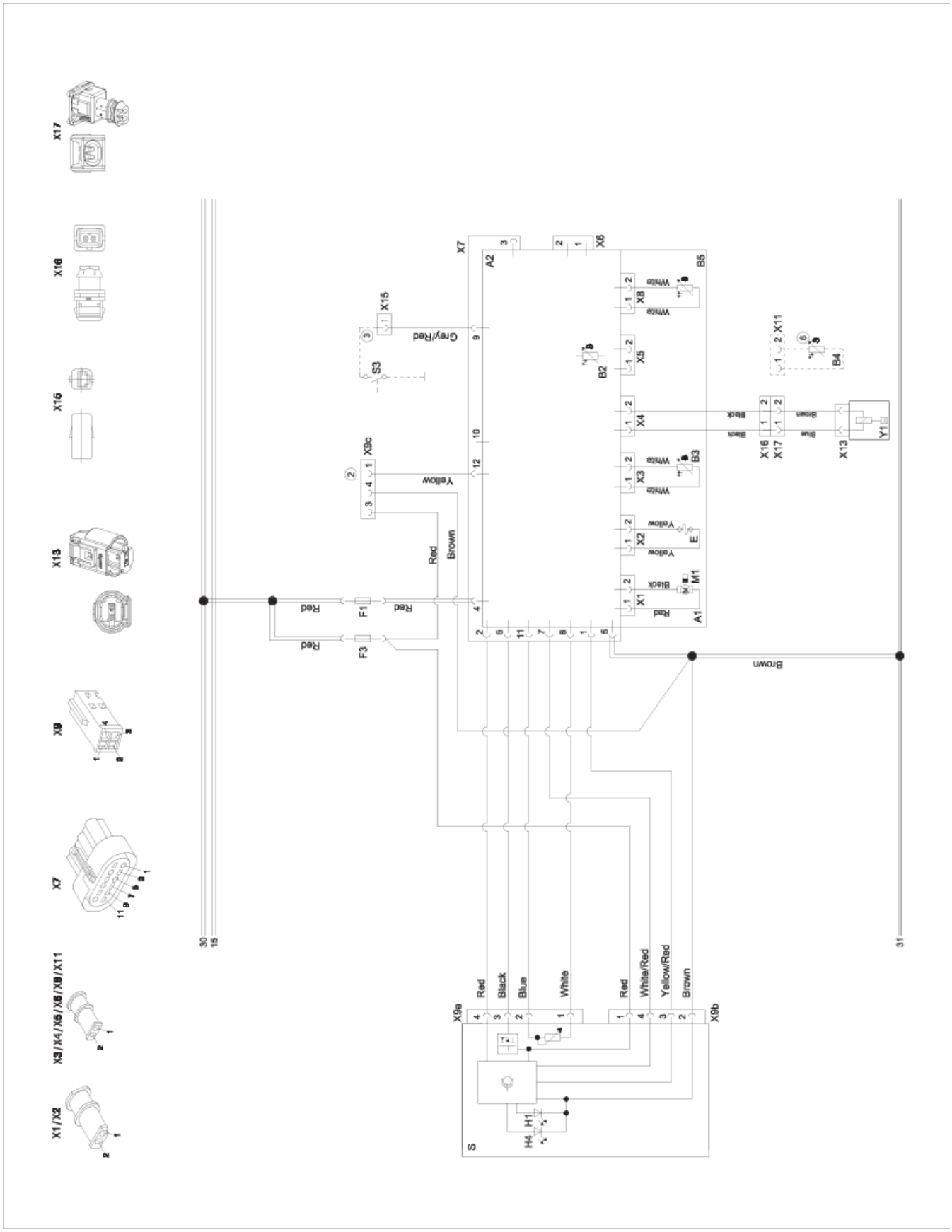


Figure 42. Air Top Evo 40/55, 12V/24V with MultiControl (MC04) control element

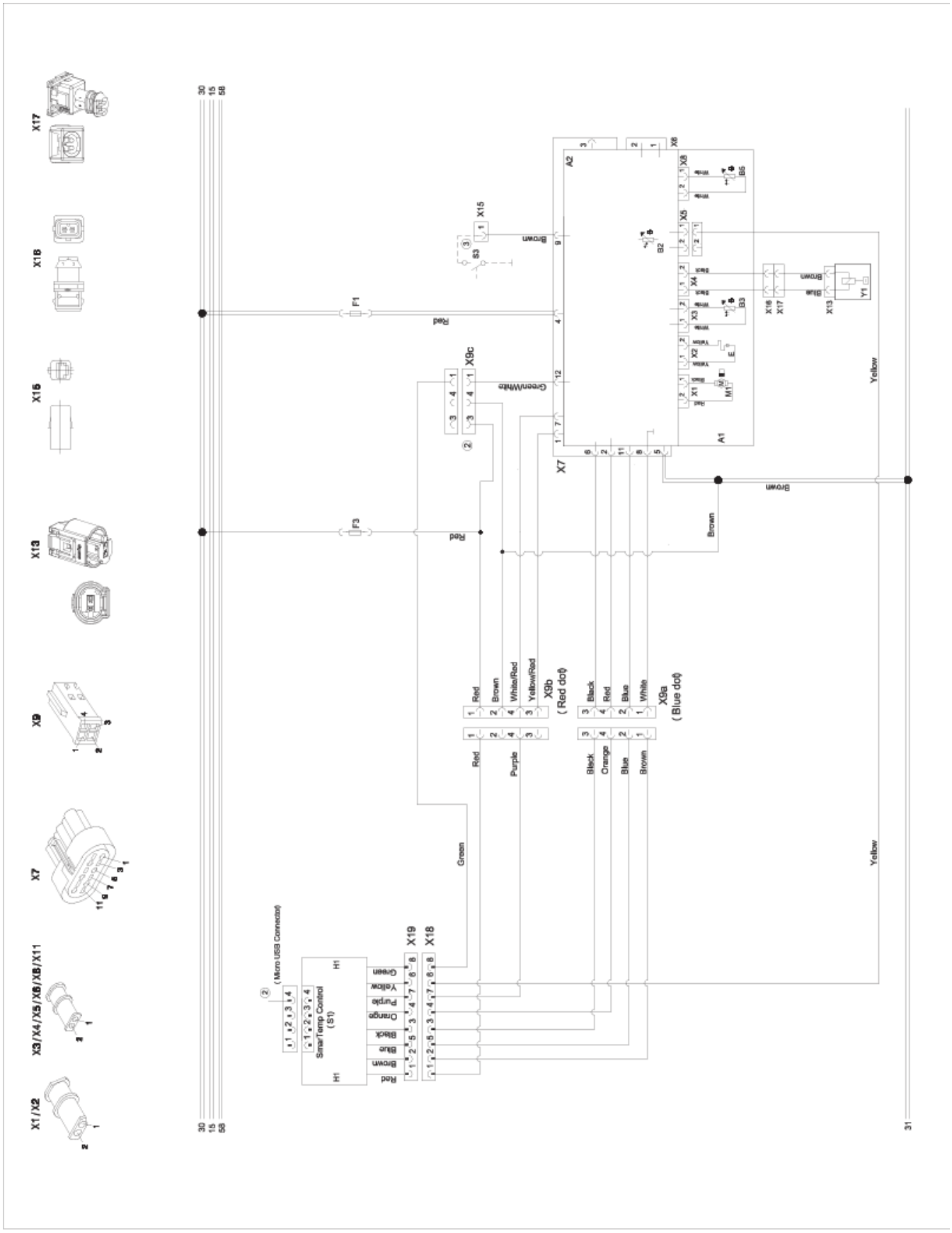


Figure 43. Air Top Evo 40/55, 12V/24V with SmarTemp

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