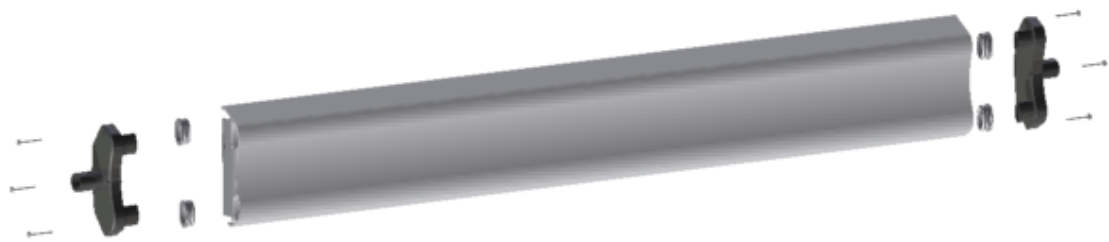


Installation instructions for Veheat convectors

- *Mounting and function* -



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Install with proper conditions

Before mounting your convectors, make sure they are the correct lengths, the right number of items for your installation, and that you have the right tools necessary for a good result.

To get the best performance from your new heating system ensure the temperature and flow rate of the cooling water are correct. Also ensure the proper control of the heating system.

If the valves are incorrect, your system will not give the desired temperature. The correct temperature of the cooling water should be between 75-95 ° C. Proper flow rate of cooling water should be at least 20L/min (900L / h), but the higher the flow rate, the higher the effect. The components in your system must not have a back pressure so high that it reduces the flow rate in your system, i.e. an undersized valve causes your flow to decrease, which means that less energy is transported per minute. The higher the pressure in your system is, the worse will the circulation pump operate. The flow capacity of the valve is specified in Kv and corresponds to the flow of water at a pressure drop of 1 bar. Minimum flow rate Kv is 60L/min but we recommend over 100L/min. The control of your heating system is key priority when it comes to establishing a comfortable climate. There are various forms of control systems, everything from on-off controllers to shunting. The better control of the water, the better and more consistent climate you will get.

If you need help with your installation or your choice of heating systems and controlling systems, you are always welcome to contact Vehtec through mail or telephone. Info@vehtec.se +46 31-78 78 900

Materials and tools

It is very important that you use the right components and the right tools when you mount Vehtec's heating system. If you do not use the right materials and tools, your vehicle or your heating system may be damaged and **Vehtec** cannot guarantee that your system will work properly and cannot cover any warranties on your products.

Checklist for components

- VeHeat convector VHC
- VeHeat water connections VH1, VH2, VHR
- VeHeat sealing VHS
- VeHeat mounting brackets VHB
- VeHeat screw for water connection VHFS
- PTFE / Silicone lubricant for VHS
- Spring clamps for connecting hoses
- Self-drilling screw for mounting bracket is recommend

Checklist for tools

- Electric screwdriver or similar for mounting brackets, water connections i.e.
- PZ2 -bits / PZ2-screwdriver for water connections screw, VHFS.
- Aluminum cutter for convectors
- Deburring tool of inside hole edges
- Measuring tape
- Hole saw, drill
- Hose clamp tools / clamp tongs
- Hose cutter
- Proper safety equipment / safety glasses

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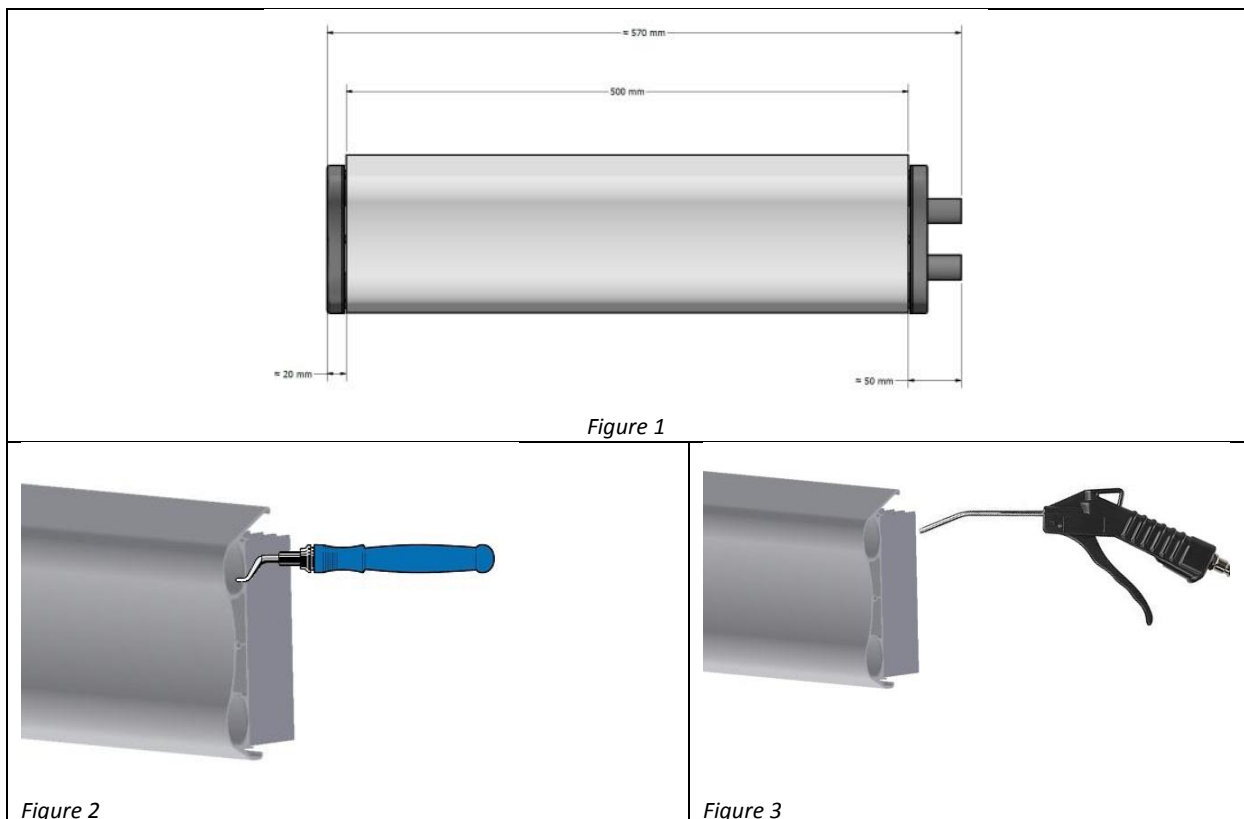
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Assemble the products

Start by cutting your convectors to desired length, *if it is not pre-cut by Vehtec.*

Measure where the convector should be mounted, note where the water connections to the convector is. The Return Connection VHR adds approx.: 20mm, the 1-pipe and 2-pipe connection is approx.: 45mm plus pipe connections, *see Figure 1.*

You can now cut the convector to desired length. When you cut the convector the holes **MUST** be deburred so there are no sharp edges that can damage the sealant VHS, *see Figure 2.* Now the convector channels **MUST** be cleared of sawdust that might otherwise block the valves or block your vehicle engine parts, *see Figure 3.*



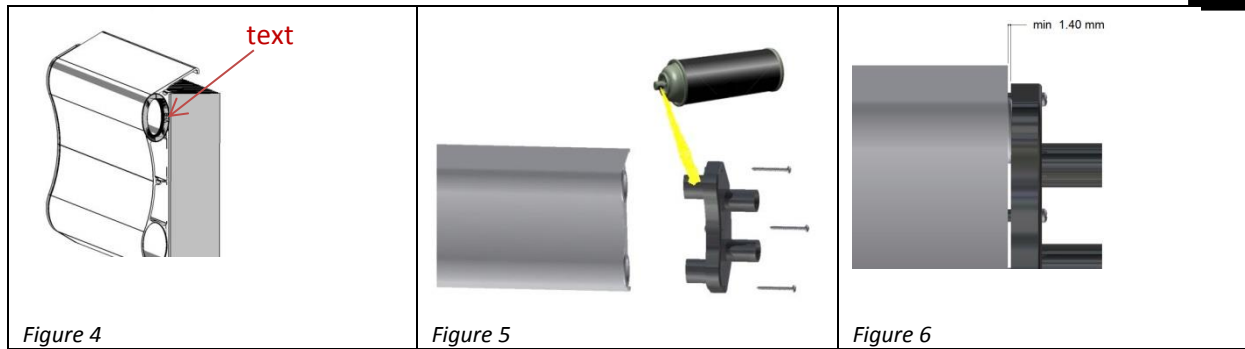
The next step is to attach the convectors to the water connections, sealing and screws. The water channels in the convector must be de-burred so there are no sharp edges where the sealing will be fitted.

Then fit the sealing into the holes so that the text "VHS" can be seen from the side and the sealing edge closes off the hole, *see Figure 4.* Use some lubricant (PTFE / silicone) on the connection pipes of the water connections and press the tubes in the mounted sealing, *see Figure 5.* Secure the connections with the 3 fixing screws (VHFS) so that the plastic is just lightly pressed against the convector. These screws make the water connections stay in place. The sealing will makes so that it becomes sealed which means that it should not be screw too tightly. Minimum distance between the water connections bottom and the convector should **NOT** be less than 1.40 mm, *see Figure 6.*

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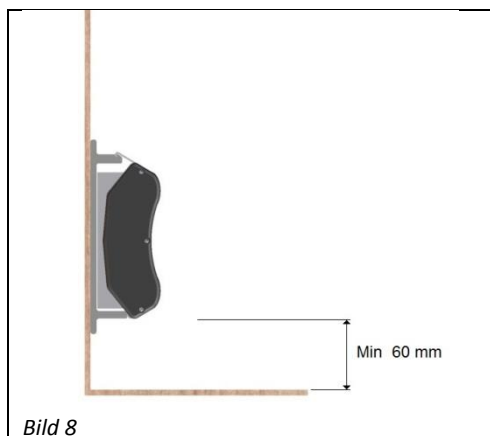
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Start by mounting the first and last mounting bracket on the wall where the convector to be mounted. Screw only the bracket in the upper screw hole. Apply the remaining brackets on the convector with a spacing of 50-70cm, see *Figure 7*. Hang the convector on the first and last bracket which are mounted on wall. Now, screw the bottom screws on these two brackets. Now, screw the other brackets.



Minimum distance between floor and bottom of the convector must not be less than 60mm. If it is less, the air flow and convection may be inhibited, see *Figure 8*.



Now the convector is completed and ready to be connected to the heating system in your vehicle.

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Installation of heating systems in small buses

(Sprinter, Crafter, Transit)

Start by overviewing of your bus heating system, i.e. *Is there any electric/fuel -preheater? What kind of connections are there? Which pipe dimension is it on the connections? How is the defroster mounted? Where do you draw the hose in and under the vehicle?*

For small busses we believe that you will need **at least 275W per cubic meter** assumed ambient temperature of 0°C and water temperature of 80°C. It is therefore Q80.

Extra heater blowers are also recommended to help your vehicle to be quickly warmed and take care of drafts that occur when the doors open. We recommend that you use a heating blower of 5kW or more for each door/opening.

Example – volume 25m³

Your bus has a cabin volume of approx. 25m³, 1 piece passenger door and is used in Europe. With VeHeat convectors you get at Q80 approx. 975W/m

Solution: $25 \times 275 = 6'875W \rightarrow 6'875 / 975 = 7m$ convectors.

Recommendation: We recommend that you install a total convector length of at least 7m convectors and one heater blower of 5kW or more. Your bus must also have the proper conditions, An electric/fuel preheater of at least 9 kW; also recommended.

Installation and overview of small bus

There is an overview of the installation on page 6, see Figure 9. The following is an explanation of the overview.

Your engine is connected either to the defroster or to the preheater. For a small bus (Sprinter, Crafter, Transit), it is recommended to use an additional heater/preheater of at least 9kW **2** together with a circulation water pump **1**. Between the extra heater/preheater **2** and your vehicle's defroster heater (front window) **8** we install a 4-way non-return valve **3** where we connect the new heating system. This valve works so that when your heating system is NOT "calling" for hot water it passes through the valve and to the defroster heater. When the heating system IS "calling" on hot water it will be transported to your heating system and then back to the 4-way non-return valve and also helps prevent water from going back through the valve. A solenoid valve is mounted **4** at the beginning of the heating system that opens fully when heating is required and that closes completely when not needed. At the same time as the valve opens a circulating water pump starts **7**. The pump is placed at the end of the heating system after the last convector and at a point where the water has long way to travel before next pump **5** and is mounted so that it helps

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the water to keep right flow. To prevent air getting stuck in the circulation pump it should be mounted as shown in *Figure 10* and it's an advantage if it is filled with glycol water before mounting.

Between the valve and the circulation water pump you install the convectors **5** and the heater blowers **6**, as calculated in example on page 6.

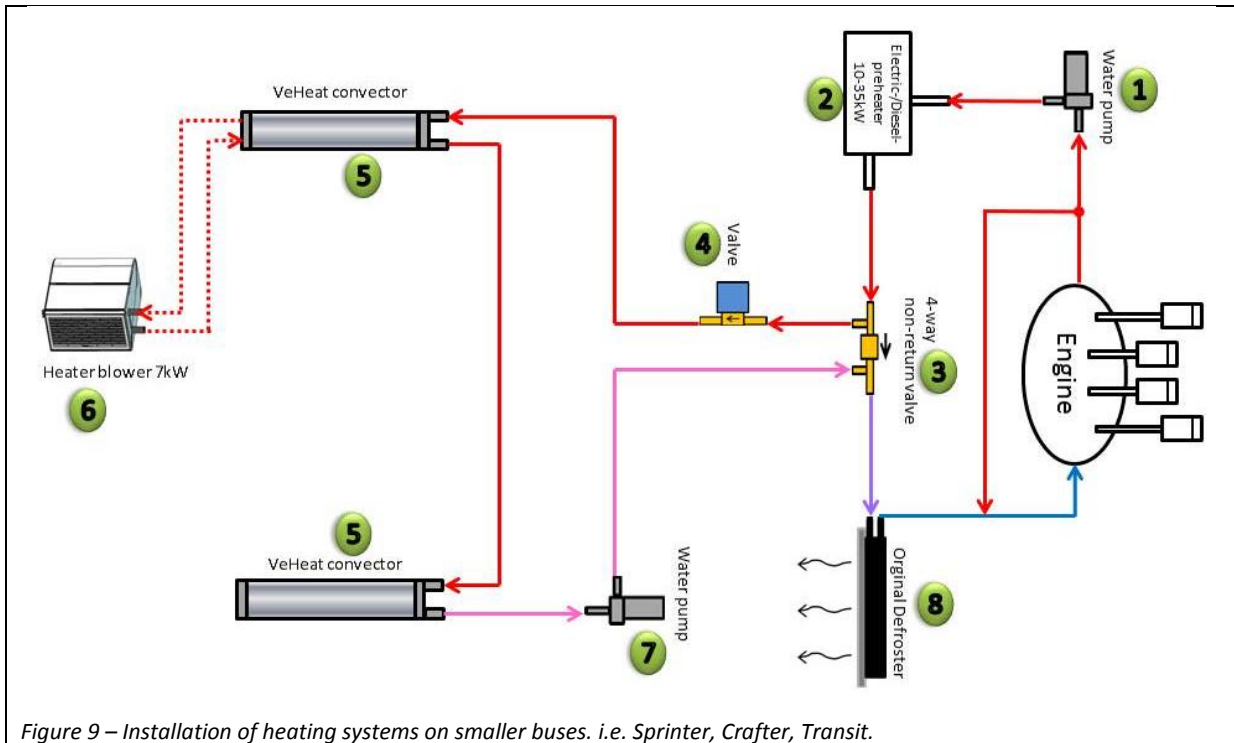


Figure 9 – Installation of heating systems on smaller buses. i.e. Sprinter, Crafter, Transit.

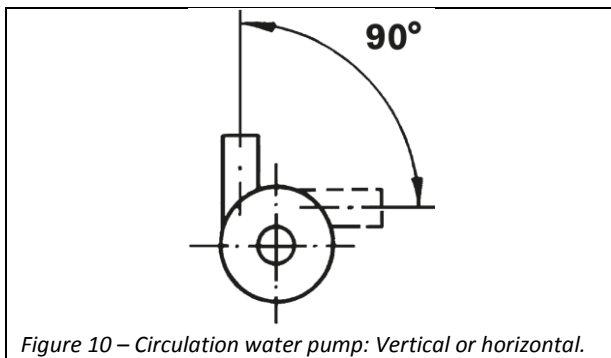


Figure 10 – Circulation water pump: Vertical or horizontal.