

3 INSTALLATION PROCEDURE

ENGINE PLUMBING - PROCEDURE

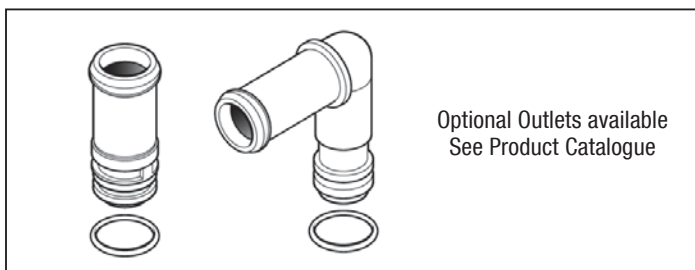
Follow these guidelines and refer to various engine plumbing diagram shown.

- 1 Locate and use the existing holes in the engine block or remove blanking plugs if possible for coolant access. Install fittings into the block for pick up and returns.
- 2 Provide 3/4" hose barbs to connect 3/4" hose for adequate coolant flow.
- 3 For proper heat transfer inside the engine between coolant and the engine block, keep the pick up and return points as far apart as possible.
- 4 If possible, use 5/8" ball shut off valves at pick up and return lines for system isolation from the engine when not in use or under maintenance.
- 5 Ensure the proper direction of the coolant flow in the circuit protect heating system from overheating and leaking i.e pick up from back of the block and return to the suction side at the front. (the flow direction should never be against the vehicle coolant pump.)
- 6 The minimum coolant flow rate must be kept within prescribed limits available in the heater technical data to keep the heater from overheating. It is recommended to use EasyScan for post installation run up to access the data.
- 7 Heater and coolant pump are installed as low as possible to allow the natural purging of air (both as well as any of the coolant lines should never be installed higher than the maximum water line inside the expansion tank.)
- 8 Before commissioning the heater/or after replenishing the coolant, always bleed the air out of the heating circuit via radiator or expansion tank. (Ensure vehicle manufacturer's guidelines for bleeding the coolant lines are followed).
- 9 Carry out thorough inspection of heating system and record operating data from EasyScan if necessary.
- 10 For further installation suggestions, please contact Eberspacher North America.

i NOTE

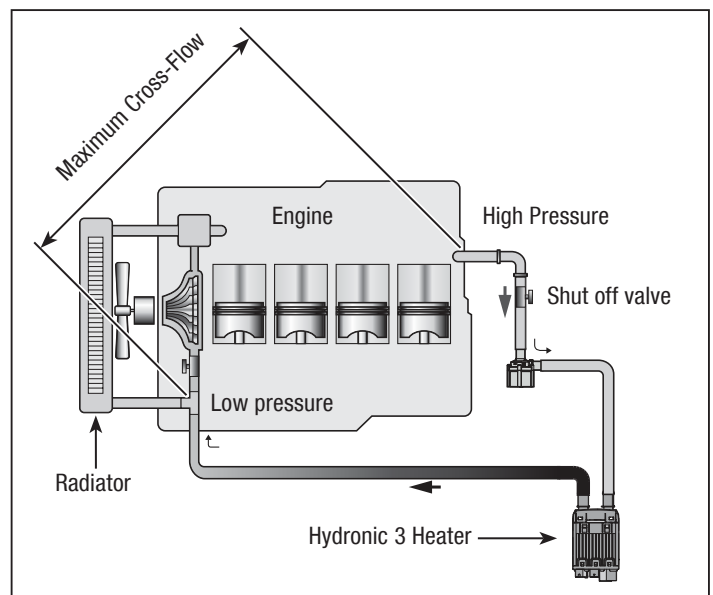
- Before working on the coolant circuit, switch the heater off and wait until all components have cooled down completely.
- Parts conveying water must be routed and fastened in such a way that they pose no temperature risk to anyone.
- Route the water hoses without any kinks and observe sufficient clearance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

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

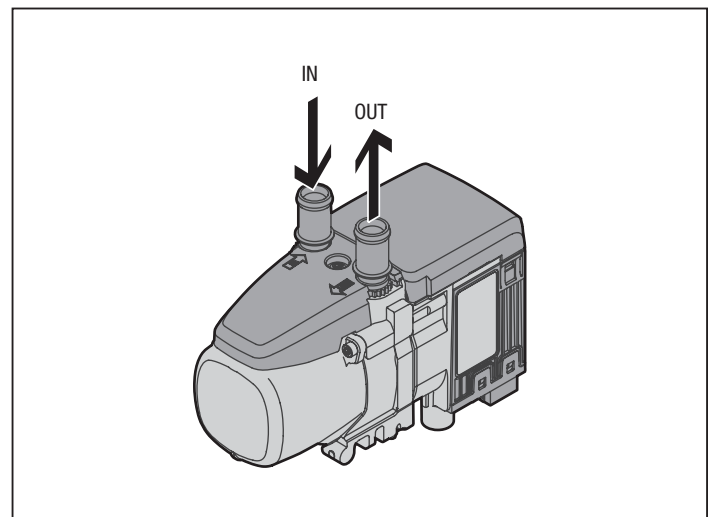


i NOTE

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



For illustration purposes only



i NOTE

- The coolant must contain a minimum of 20% antifreeze at all times as a protection against corrosion. Fresh water will corrode internal heater parts.

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HEATER PLUMBING

TYPES OF HEATER CONNECTION TO THE COOLING WATER CIRCUIT

As discussed earlier, the heater is integrated in to existing coolant circuit of the vehicle between engine and heat exchanger. However, the orientation of coolant layout through the heater and vehicle systems define the characteristics of the heating circuit.

There are four possible alternative installations available which can be selected based on the heating application and priority i.e cab heat, engine heat or both. The alternatives are described on [pages 17 - 18](#).

COOLANT LIQUID CIRCUIT “INLINE INTEGRATION”

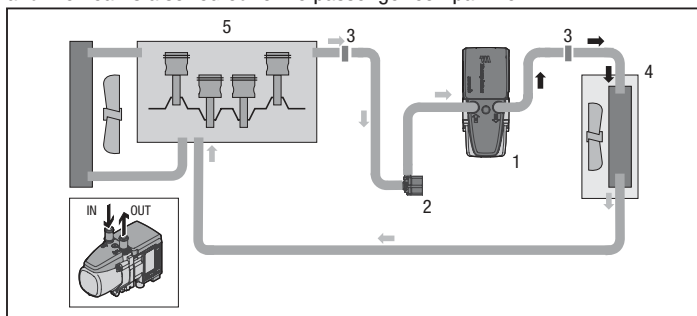
Cut the water flow hose from the vehicle engine to the vehicle’s heat exchanger. Use connectors and water hoses to connect the heater and the water pump to the water flow hose.

Lay a water hose from the discharge end of the water pump to the water inlet socket of the heater and connect.

Heating characteristics

If the heater is switched on, the heat is initially fed via the heater’s own heat exchanger to the vehicle’s engine only.

If the coolant liquid temperature reaches approx. 30 °C, the vehicle fan starts and the heat is also routed to the passenger compartment.



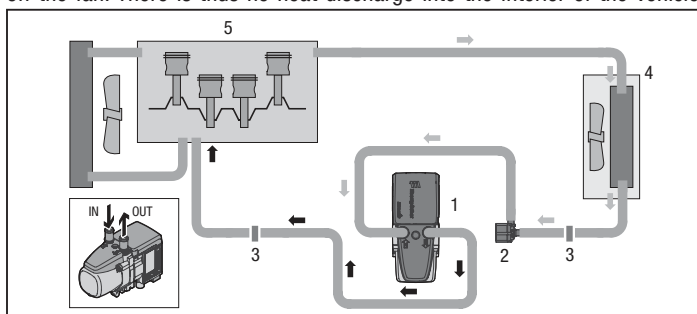
- | | |
|--------------|------------------|
| 1 Heater | 4 Heat exchanger |
| 2 Water pump | 5 Vehicle engine |
| 3 Connector | |

COOLANT LIQUID CIRCUIT “INLINE – ENGINE PRE-HEATING ONLY”

Disconnect the water return hose from the heat exchanger to the vehicle engine. Use connectors and water hoses to connect the heater and the water pump.

Heating characteristics

For engine pre-heating only, set the temperature controller to “cold” and switch off the fan. There is thus no heat discharge into the interior of the vehicle.



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|--------------|------------------|
| 1 Heater | 4 Heat exchanger |
| 2 Water pump | 5 Vehicle engine |
| 3 Connector | |

COOLING LIQUID CIRCUIT WITH NON-RETURN VALVE AND THERMOSTAT

Cut the water flow hose from the vehicle engine to the vehicle’s heat exchanger and insert the non-return valve.

Cut the water return hose from the vehicle’s heat exchanger to the vehicle engine and insert the T-piece.

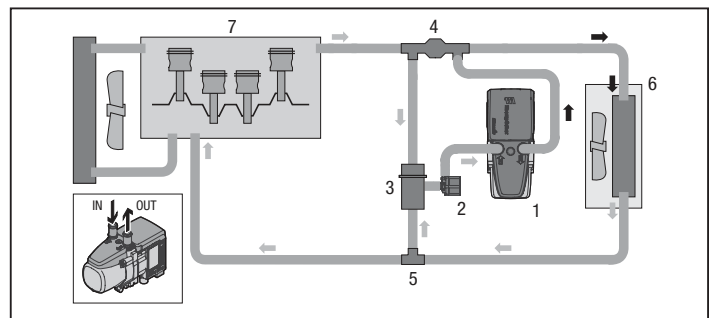
Use water hoses to connect the heater and water pump to the thermostat, the non-return valve and T-piece – as shown in the sketch.

Heating characteristics – small cooling water circuit

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

Heating characteristics – large cooling water circuit

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



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|--------------------|------------------|
| 1 Heater | 5 T-piece |
| 2 Water pump | 6 Heat exchanger |
| 3 Thermostat | 7 Vehicle engine |
| 4 Non-return valve | |

i NOTE

The thermostat, non-return valve and T-piece must be ordered separately, please refer to the “Product information” document for the Order No.

THERMOSTAT FUNCTION

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

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

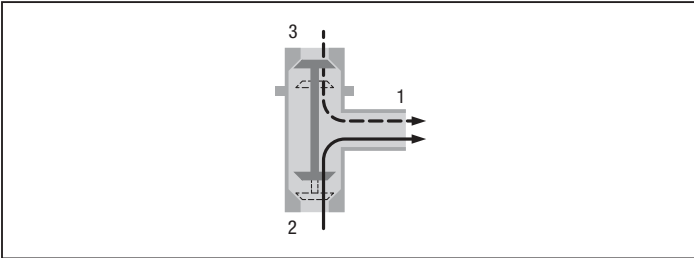
At a coolant liquid temperature > 75 °C – large cooling water circuit:

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

i NOTE

Use the connections Item (1), (2) and (3) – as shown in the sketch – to integrate the thermostat in the coolant liquid circuit.

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- 1 Connection socket to the heater
- 2 Connection socket to the T-piece
- 3 Connection socket to the non-return valve

COOLANT LIQUID CIRCUIT WITH COMBINATION VALVE

Using the combination valve with 5 connections

If the water flow line and water return line from the vehicle engine to the vehicle's heat exchanger are laid separately in the engine compartment, the combination valve with 5 connections and an additional T-piece must be used.

Using the combination valve with 6 connections

If the water flow line and water return line from the vehicle engine to the vehicle's heat exchanger are laid in parallel in the engine compartment, the combination valve with 6 connections (without T-piece) must be used.

Heating characteristic in pre-heater mode – small cooling water circuit
Initially, up to a cooling water temperature of approx. 67 °C, the heater's heat is fed to the vehicle's heat exchanger only – fast heating of the inside of the vehicle.

From a cooling water temperature of approx 67 °C, part of the heater's heat is also passed to the vehicle's engine. This causes additional engine pre-heating, without rapid cooling of the "small cooling water circuit" for interior heating.

Heating characteristic in auxiliary heater mode – large cooling water circuit

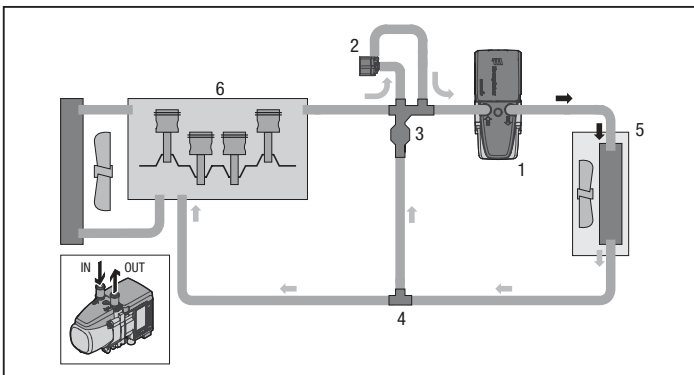
While the vehicle's engine is running the heat is distributed between the vehicle's heat exchanger and the vehicle engine – further shortening of the heating up phase and heating of the inside of the vehicle.

Install combination valve with 5 connections

Cut the water flow hose from the vehicle engine to the vehicle's heat exchanger and insert the combination valve.

Cut the water return hose from the vehicle's heat exchanger to the vehicle engine and insert the T-piece.

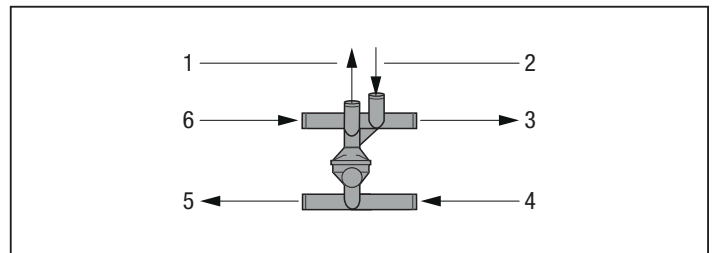
Use water hoses to connect the heater and water pump to the combination valve and T-piece – as shown in the sketch.



Install combination valve with 6 connections

Cut the water flow hose and the water return hose from the vehicle engine to the vehicle's heat exchanger and insert the combination valve.

Use water hoses to connect the heater and water pump to the combination valve – as shown in the sketch.



- 1 To the water pump
- 2 From the water pump
- 3 To the heater
- 4 From the vehicle's heat exchanger
- 5 To the vehicle engine
- 6 From the vehicle engine

COOLANT LIQUID WITH 2 NON-RETURN VALVES

Preheat the vehicle interior only (vehicle engine uncoupled)

Cut the water flow hose and the water return hose from the vehicle engine to the vehicle's heat exchanger and insert one non-return valve in each.

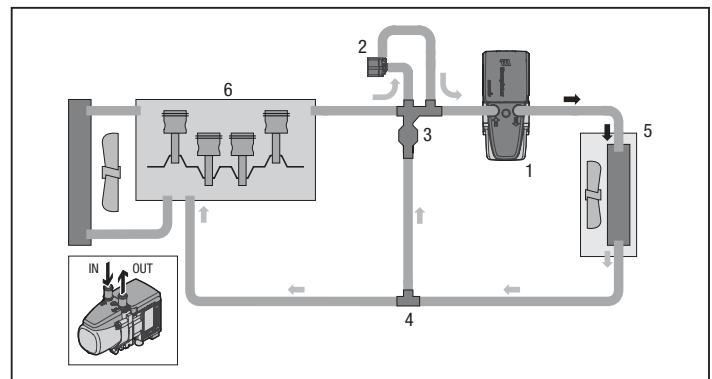
Insert the heater between the non-return valve and the vehicle's heat exchanger in the water flow hose.

Use water hoses to connect the water pump to the non-return valves.

Heating characteristics

If the heater is switched on, the heat is only fed to the vehicle's own heat exchanger. If the coolant liquid temperature reaches approx.

30 °C, the vehicle fan starts and the heat is routed to the passenger compartment.



- 1 Heater
- 2 Water pump
- 3 T-piece with non-return valve
- 4 Vehicle heat exchanger
- 5 Vehicle engine

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EXHAUST SYSTEM



DANGER!

Risk of injuries and burns!

Every type of combustion produces high temperatures and toxic exhaust fumes. This is why the exhaust system must always be routed as described in these installation instructions.

- Do not perform any work on the exhaust system while the heater is working.
- Before working on the exhaust system, switch off the heater first and wait until all the parts have completely cooled down, wear safety gloves if necessary.
- Do not inhale exhaust fumes.



ATTENTION!

The whole exhaust system gets very hot while the heater is running and immediately afterwards. This is why the exhaust system must always be routed as described in these installation instructions.

- The exhaust pipe must end in the open air.
- The exhaust pipe may not protrude beyond the lateral limits of the vehicle.
- Lay the exhaust pipe sloping slightly downwards. If necessary, make a drain hole with approx. Ø 5 mm at the lowest point as a condensation outlet.
- Important functional parts of the vehicle may not be impaired (maintain sufficient clearance).
- Mount the exhaust pipe with sufficient clearance to heat-sensitive parts. Pay particular attention to fuel lines (made of plastic or metal), electrical cables and brake hoses, etc.!
- Exhaust pipes must be safely fixed (recommended clearance of approx. 50 cm) to avoid damage from vibrations.
- Lay the exhaust system so that the outflowing exhaust gases are not drawn in as combustion air.
- The mouth of the exhaust pipe must not become clogged with dirt and snow.
- The mouth of the exhaust pipe must not point in the ram air or slip stream (Ensure the openings of intake and exhaust pipe are pointing downwards to reduce interference from ram air or slip stream).
- Always fix the exhaust silencer to the vehicle to minimize the exhaust noise.
- Lay the exhaust system so that the exhaust fumes do not flow directly onto heat-sensitive components.



WARNING!

- Never point the outlet of the exhaust pipe towards fuel tank or flammable material.
- Exhaust pipe can be extremely hot; therefore, handle it with care during inspection or disassembly.
- Ensure the exhaust is not drawn into the cab. Relocate the exhaust pipe if necessary.
- Improper intake or exhaust pipe installation may lead to extreme accumulation of carbon in the combustion chamber.
- Never integrate the heater exhaust in to vehicle exhaust pipe.



NOTE

- The exhaust pipe end should be much shorter than the flexible exhaust pipe from the heater to the exhaust silencer.
- To avoid contact corrosion, the clips for fixing the exhaust pipe must be made of stainless steel. For the Order No. of the fixing clips, please refer to the "Product Information" document.

The hydronic 3 requires a stainless steel type flexible exhaust pipe (ID: 24 mm, length: 200 to 760 mm) as shown in image [on page 20](#).

INSTALLING THE EXHAUST SYSTEM

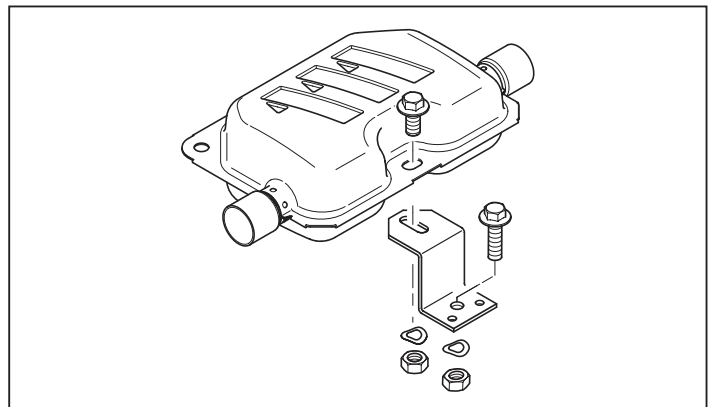
Use a bracket to fix the exhaust silencer in a suitable place on the vehicle (see sketch).

Lay the flexible exhaust pipe from the heater to the exhaust silencer and fasten with pipe clips (tightening torque $6+0.5$ Nm), adjust the length if necessary.

If necessary, shorten the exhaust pipe end with end sleeve, push onto the exhaust silencer and fix with a pipe clip (tightening torque $6+0.5$ Nm).

If necessary, use pipe clips to fasten the flexible exhaust pipe and the exhaust pipe end in suitable positions in the vehicle (recommended guide value at approx. 50 cm spacings).

If necessary attach spacer rings on the flexible exhaust pipe and onto the exhaust pipe end, to ensure a safe distance from heat-sensitive parts of the vehicle. If applicable, use additional exhaust pipe insulation (see product information).



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COMBUSTION AIR INTAKE SYSTEM

⚠ ATTENTION!

Safety instructions for the combustion air system

- ➔ The combustion air opening must remain free at all times.
- ➔ Lay the combustion air intake to ensure that exhaust fumes cannot be drawn in as combustion air.
- ➔ Do not direct the combustion air intake against the vehicle's airstream.
- ➔ The combustion air intake must not become clogged with dirt and snow.
- ➔ Install the combustion air intake system sloping slightly downwards. If necessary, make a drain hole approx. \varnothing 5 mm at the lowest point to drain off condensation.
- ➔ If necessary, use fastening clips or cable ties to fix the flexible combustion air hose to the vehicle in suitable places.

INSTALLING THE COMBUSTION AIR INTAKE SYSTEM

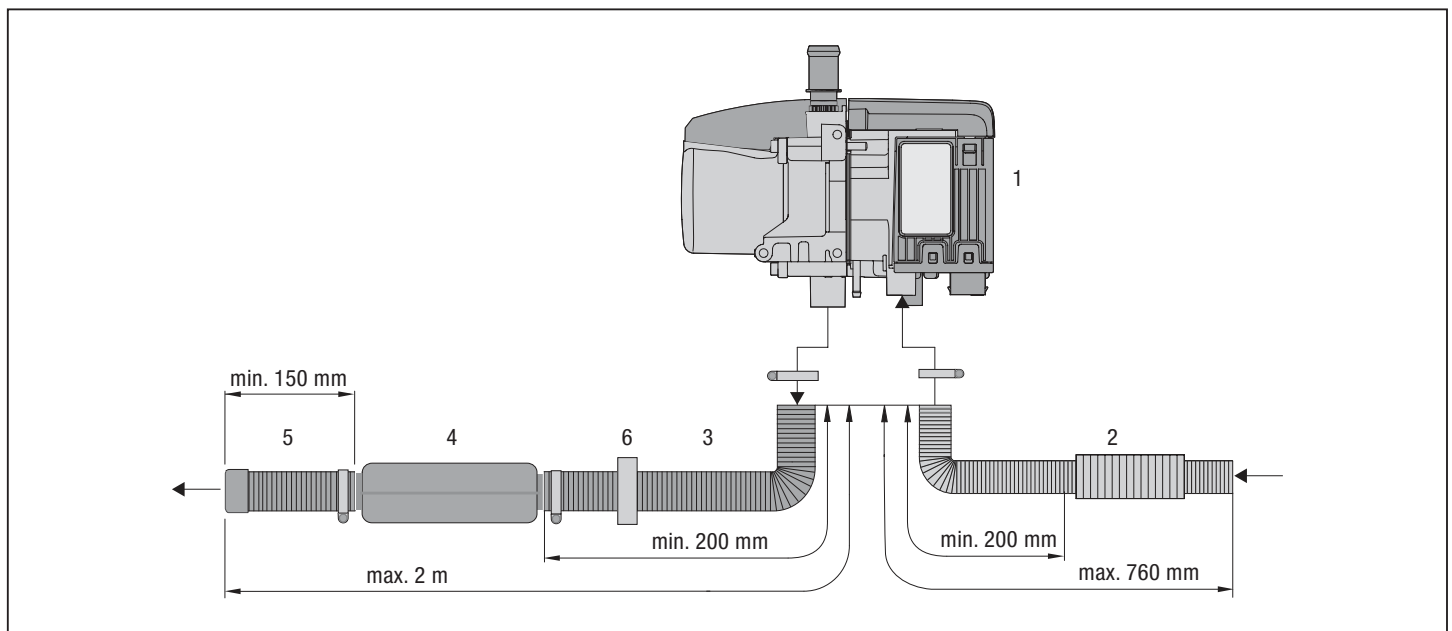
The hydronic 3 requires a flexible pipe for combustion air intake (ID: 20 mm, length: 200 mm to 2 m). It is recommended to include air intake silencer to improve combustion performance.

Push the flexible pipe from the combustion air intake silencer onto the combustion air connection socket of the heater and fix with a hose clip (tightening torque $3+^{0.5}$ Nm).

Lay the combustion air intake silencer so that the combustion air is removed from an area, which fulfils the named conditions.

If necessary, the flexible pipe from the combustion air intake silencer can be shortened according to the installation conditions.

When shortening the flexible pipe, ensure the cutting edge is clean, small cut-off pieces could block the combustion air fan.



- | | | | |
|---|--------------------------------|---|----------------------------------|
| 1 | Heater | 4 | Exhaust silencer |
| 2 | Combustion air intake silencer | 5 | Exhaust pipe end with end sleeve |
| 3 | Flexible exhaust pipe | 6 | Spacer ring |