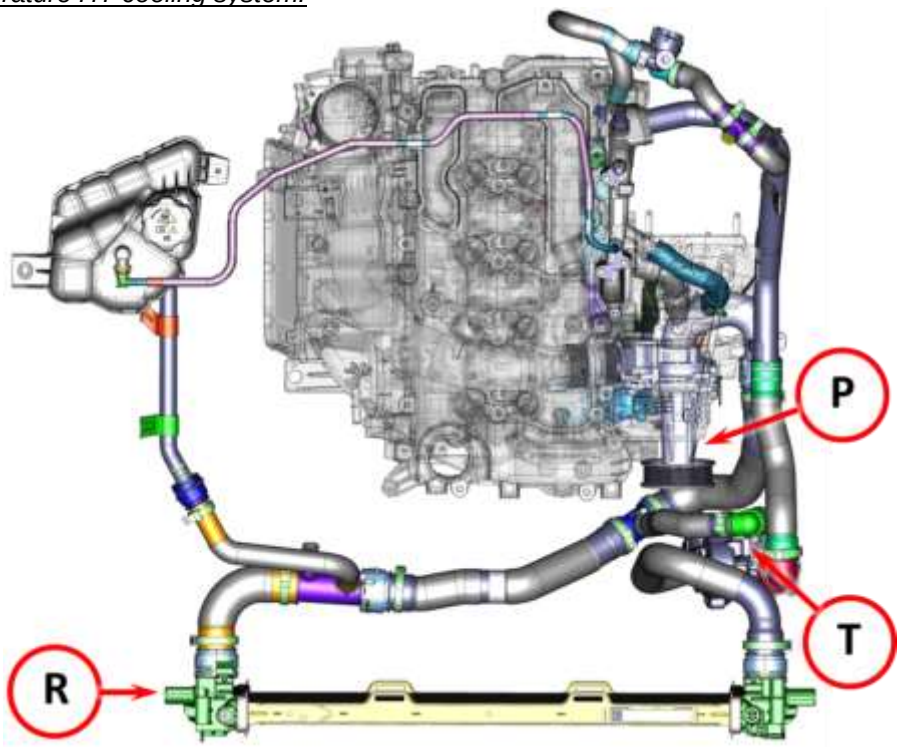
COOLING SYSTEM

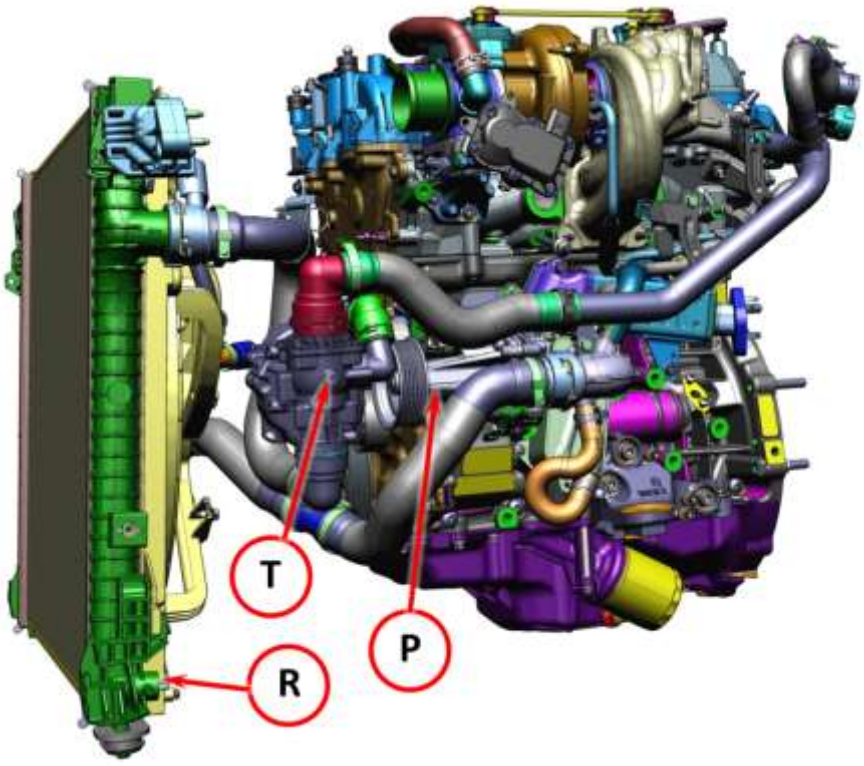
The general cooling system of the engine is divided into two sub-systems:

- A high temperature HT cooling system.
- A low temperature LT cooling system.

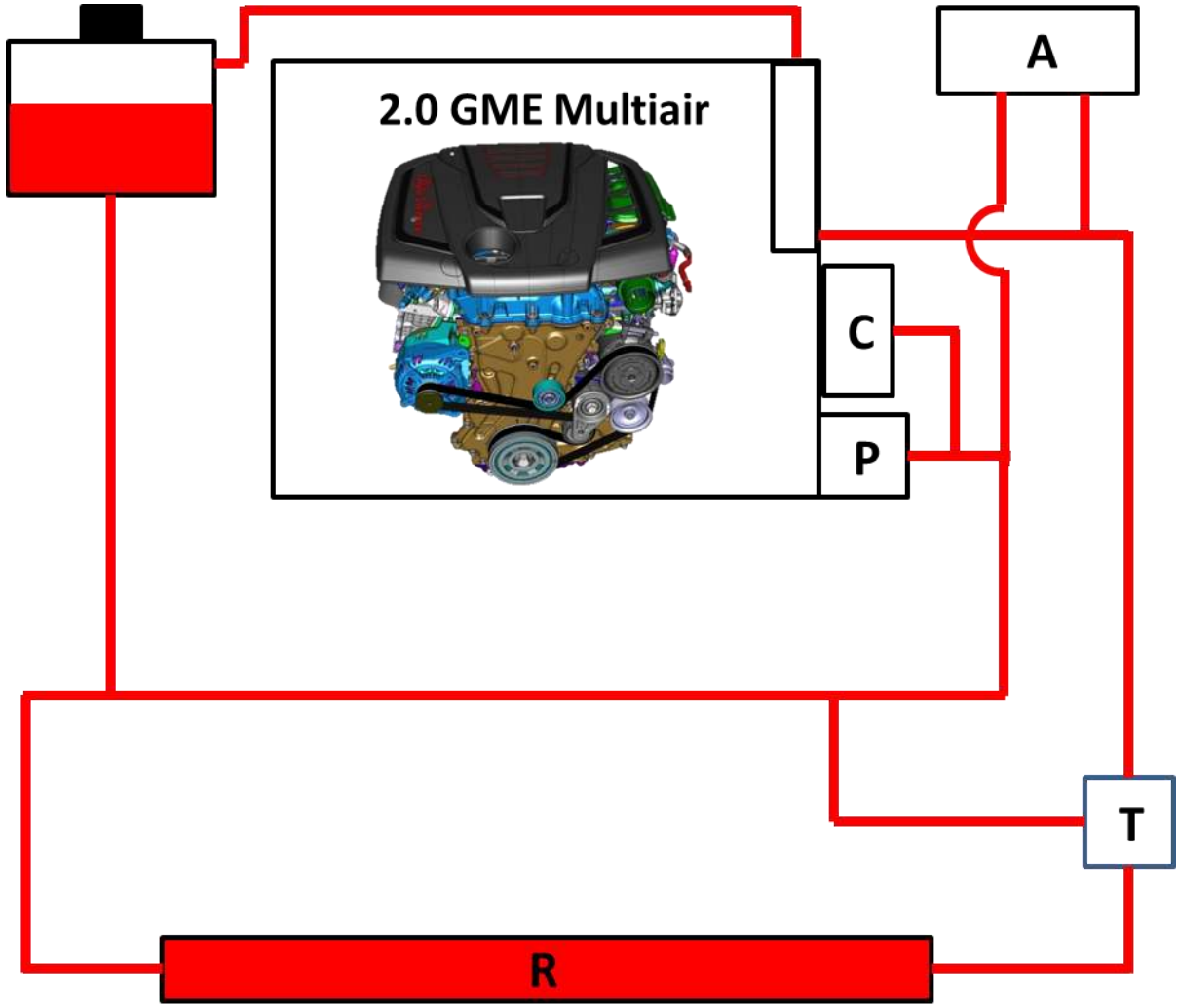
A high temperature HT cooling system.



P – Engine coolant pump driven by the engine component drive belt.
T – Bypass solenoid valve (Thermostat)
R – Engine cooling system radiator

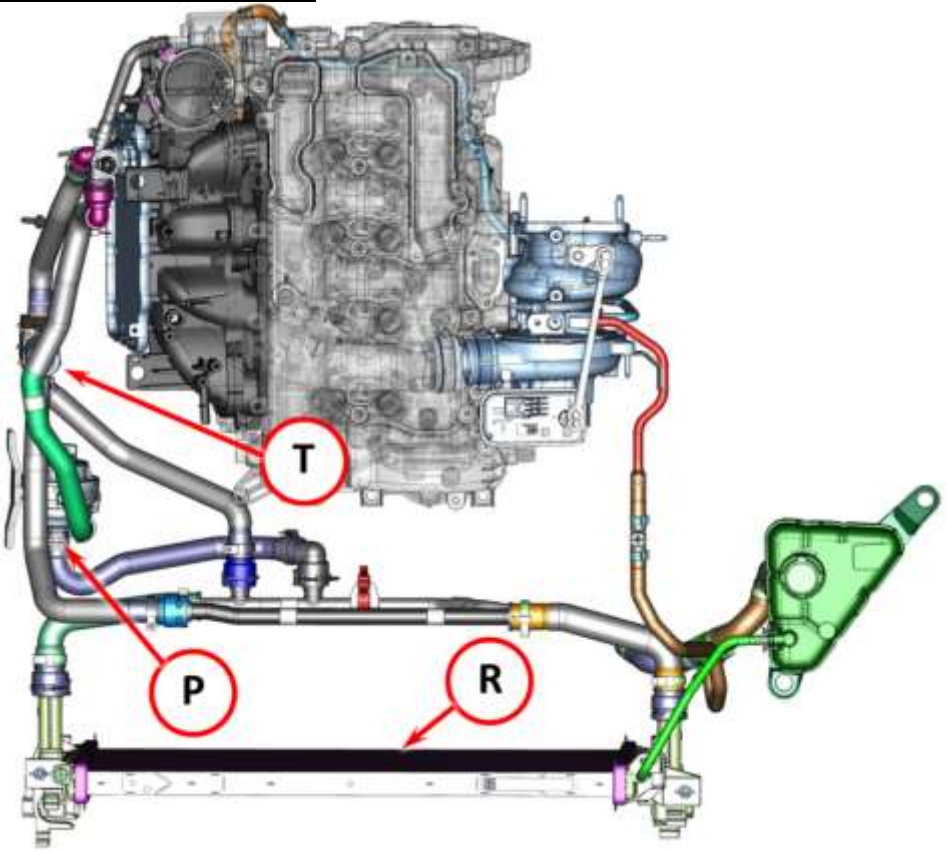


Functional diagram of the high temperature (HT) cooling system

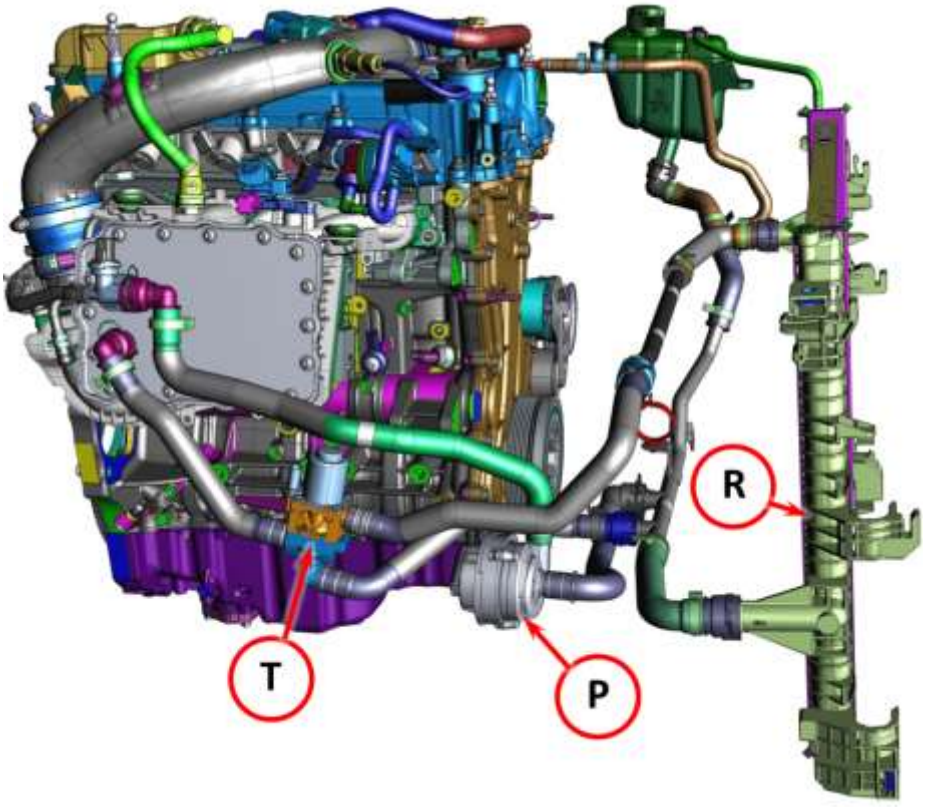


Key:
P – Engine coolant pump driven by the engine component drive belt.
T – Bypass solenoid valve (Thermostat)
R – Engine cooling system radiator
A – Passenger compartment heater.
C – Low pressure EGR heat exchanger.

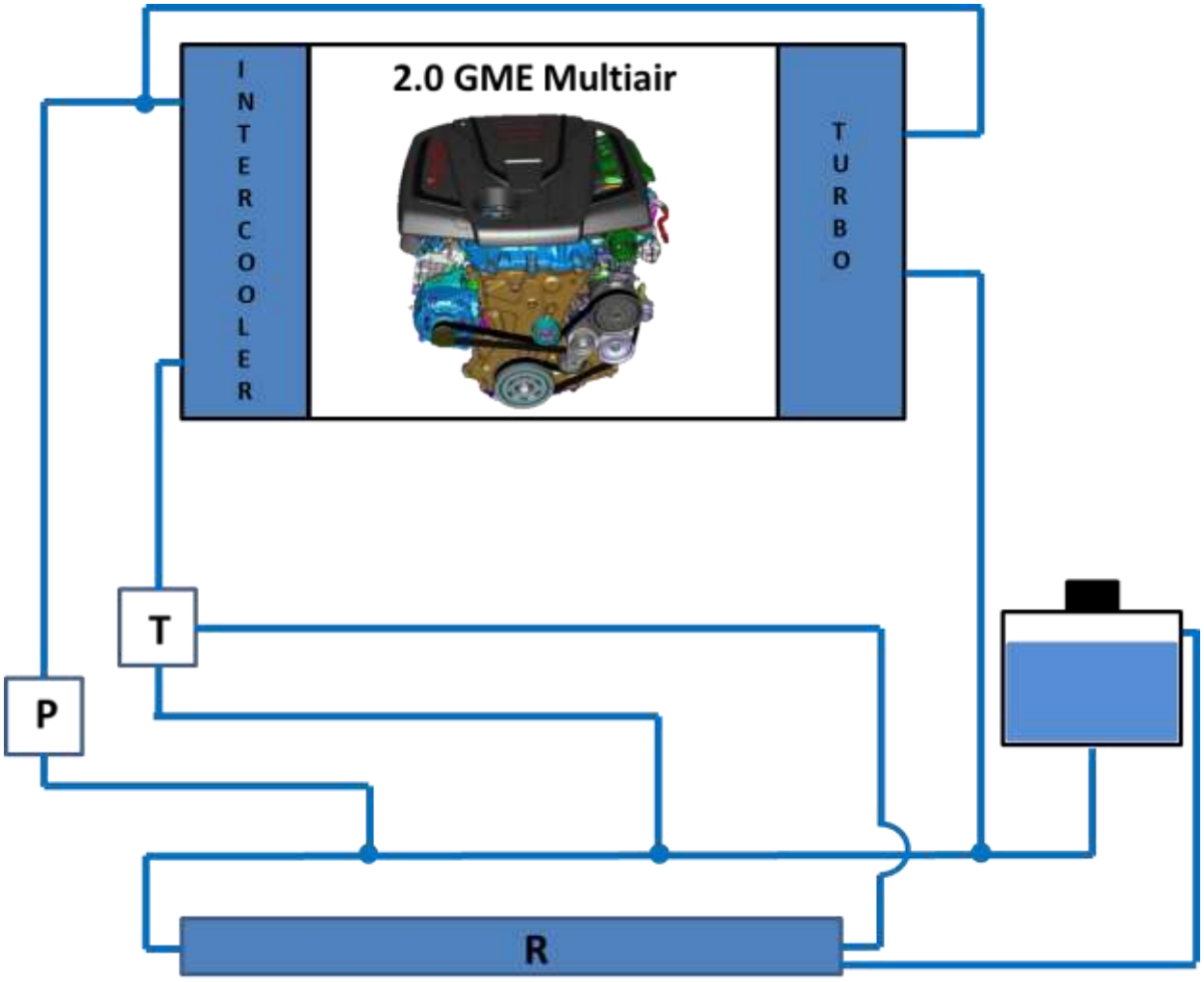
A low temperature LT cooling system.



Key:
P – Electrical pump controlled by the engine control module (ECM).
T – Bypass solenoid valve
R – Intercooler cooling system radiator.



Functional diagram of the low temperature (LT) cooling system



Key:
P – Electrical pump controlled by the engine control module (ECM).
T – Bypass solenoid valve
R – Intercooler cooling system radiator.

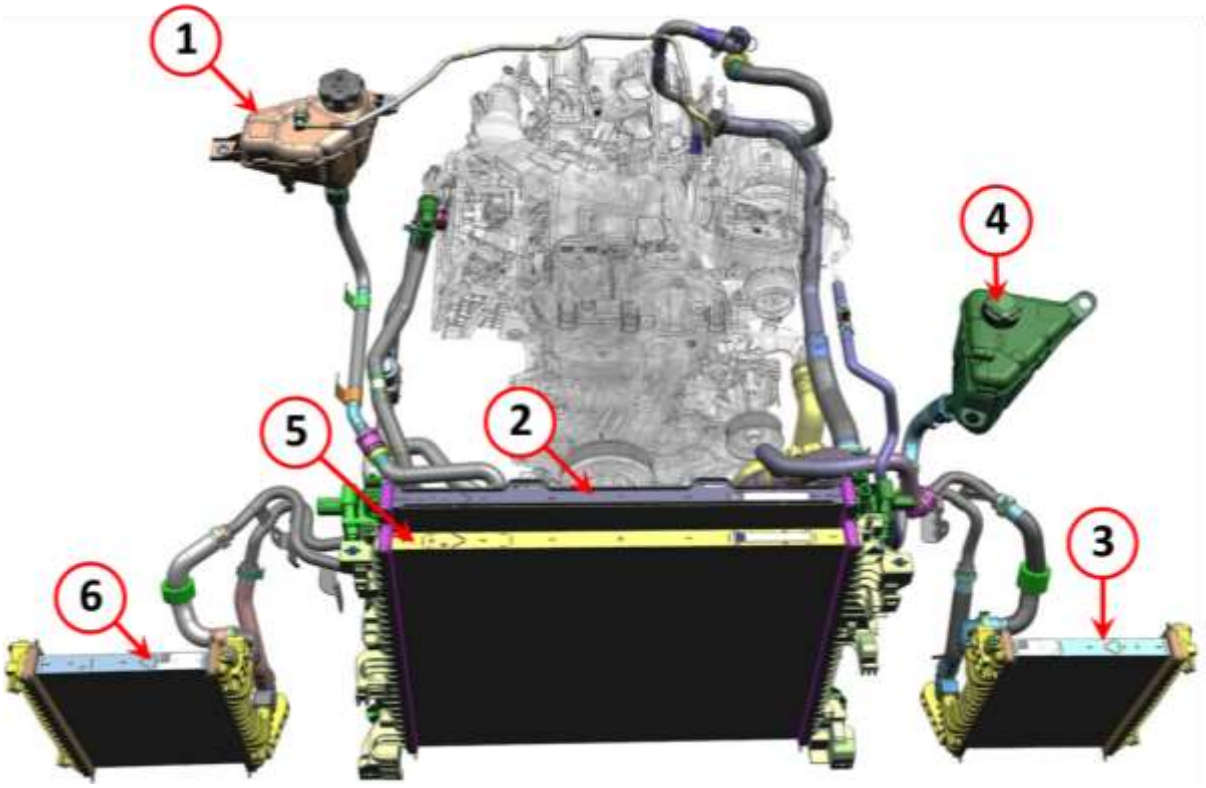
The two HT and LT systems are separate and are not connected to each other. There are two dedicated expansion tanks in the engine compartment: one for the HT system and the other for the LT system.

Alfa Romeo Stelvio cooling system

The cooling system for the 2.0 T4 Multiair engine in the Alfa Romeo Stelvio is equipped with a different number of radiators with respect to the version in the Alfa Romeo Giulia. In particular, it has two additional radiators, one of which is on the right side while the other is on the left.

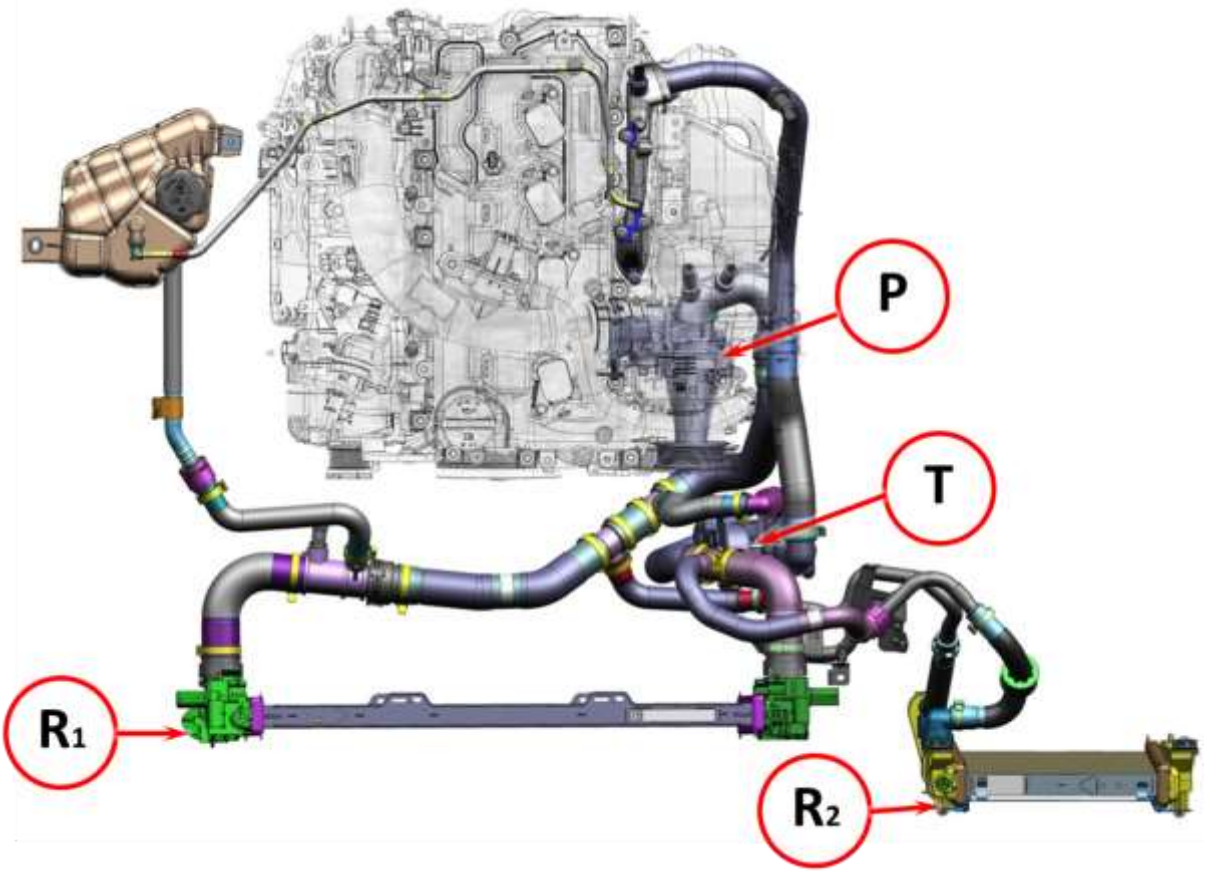
Overall system

The 2.0 T4 Multiair cooling system consists of a high temperature (HT) system and a low temperature (LT) system. The following picture shows an overall view of the two systems.

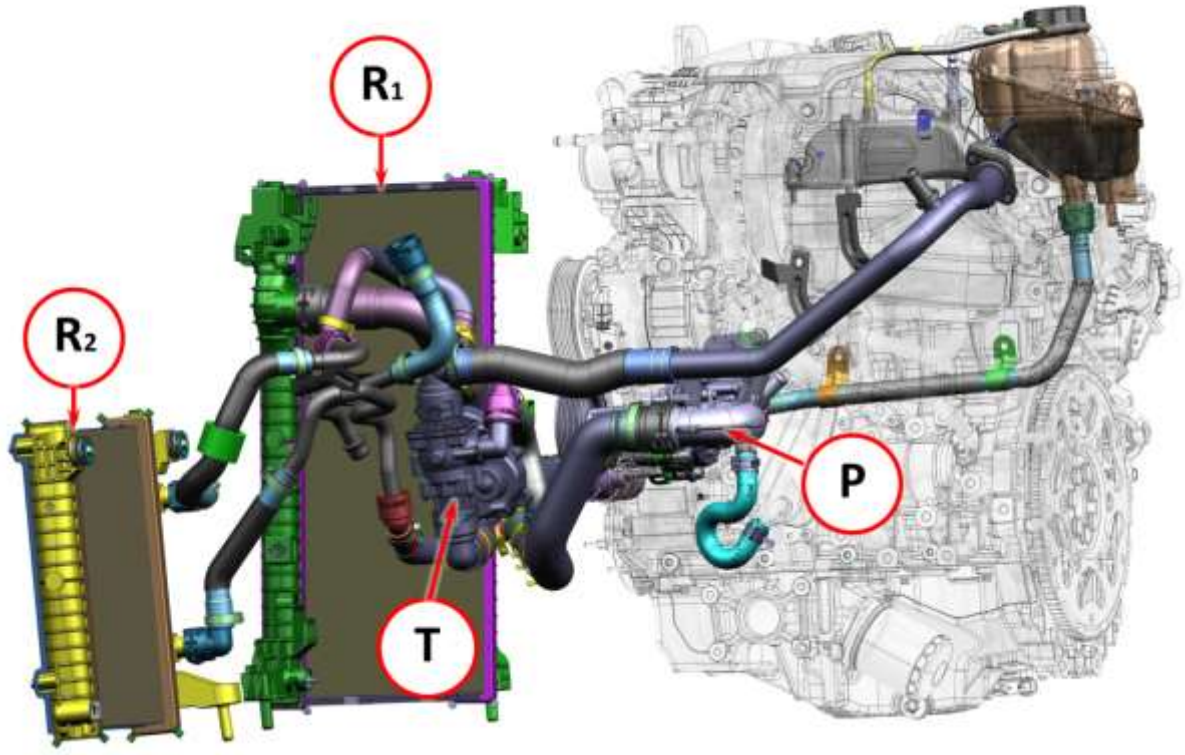


Key:
1 – Expansion tank for the HT cooling system
2 – Main radiator for the HT cooling system
3 – Additional radiator for the LT cooling system
4 – Expansion tank for the LT system.
5 – Main radiator for the LT system
6 – Additional radiator for the LT system.

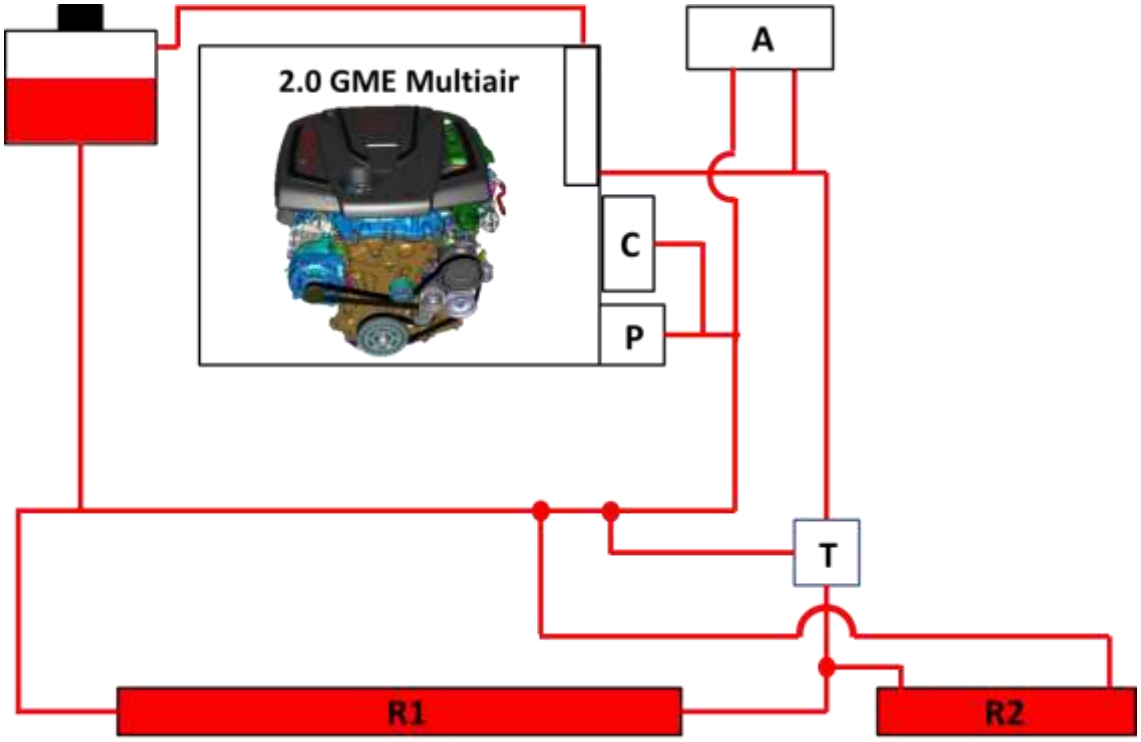
HT cooling system



P – Engine coolant pump driven by the engine component drive belt.
T – Bypass solenoid valve (Thermostat)
R – Engine cooling system radiator

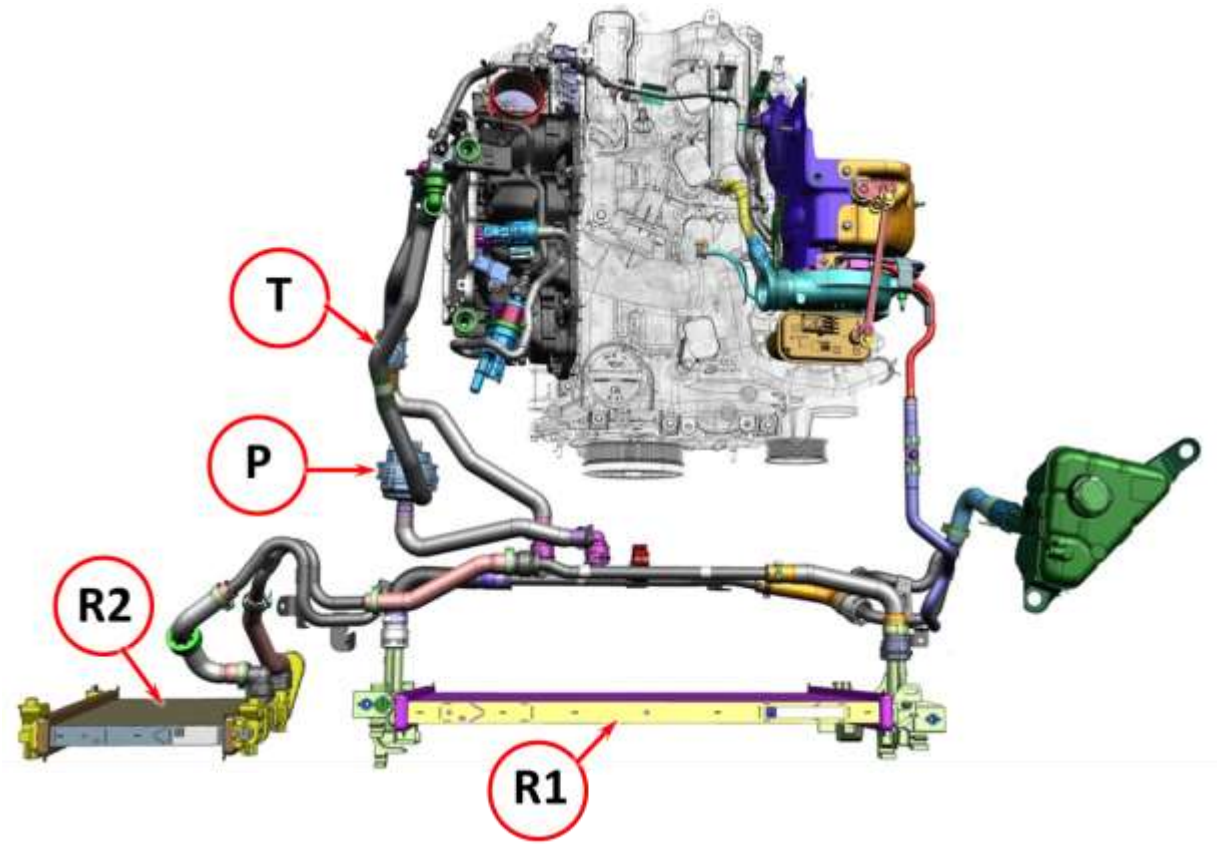


Functional diagram of the high temperature (HT) cooling system

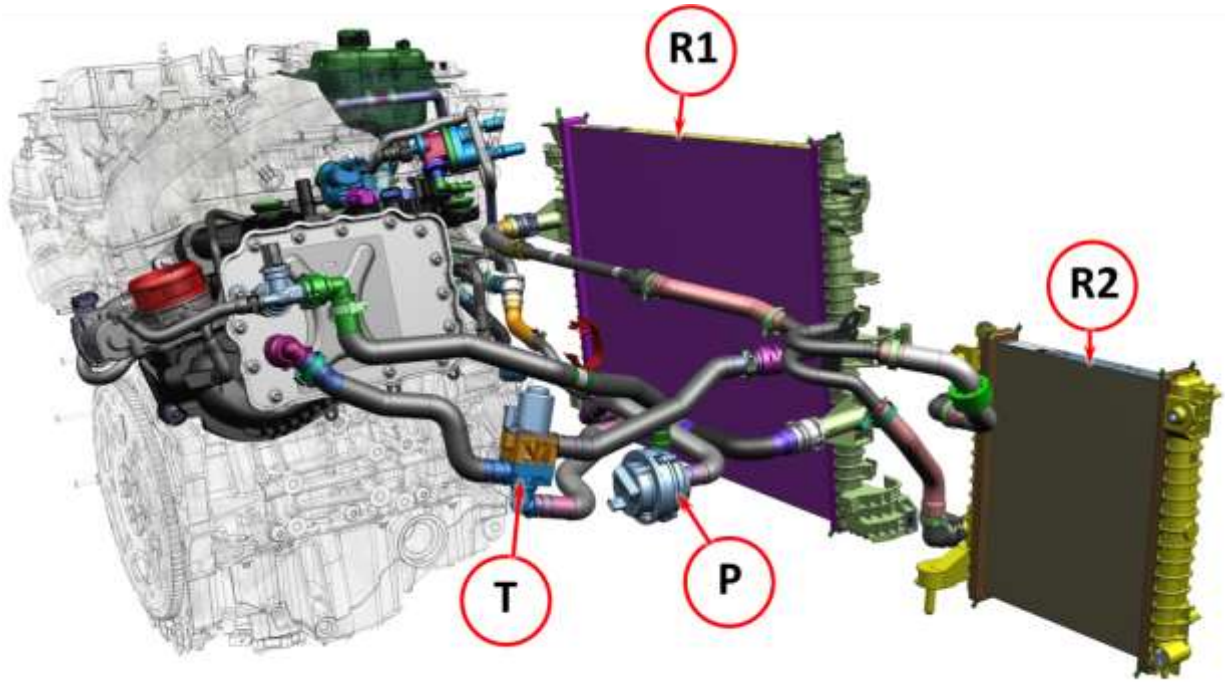


Key:
P – Engine coolant pump driven by the engine component drive belt.
T – Bypass solenoid valve (Thermostat)
R1 – Main radiator for the engine cooling system (HT)
R2 – Additional radiator for the engine cooling system (HT)
A – Passenger compartment heater.
C – Low pressure EGR heat exchanger.

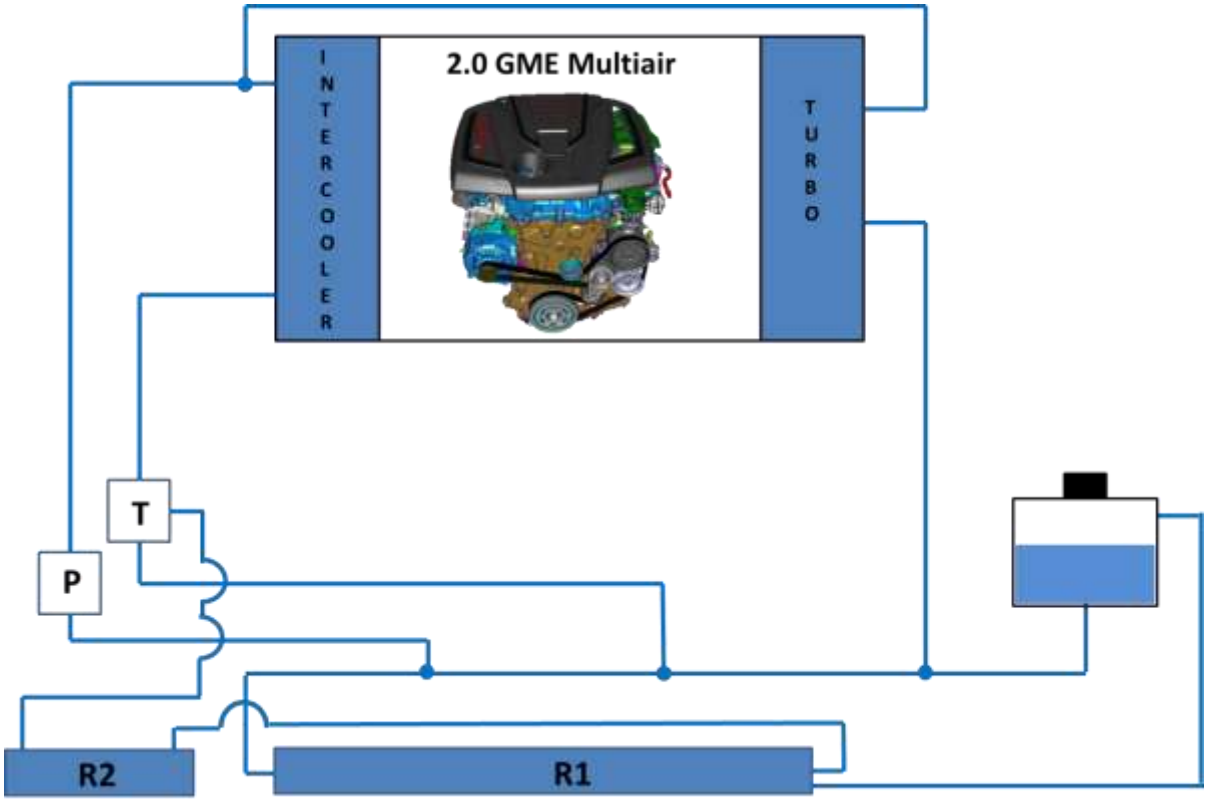
LT cooling system



Key:
P – Electrical pump controlled by the engine control module (ECM).
T – Bypass solenoid valve
R1 – Main radiator for the Intercooler cooling system (LT).
R2 – Additional radiator for the Intercooler cooling system (LT).



Functional diagram of the low temperature (LT) cooling system



Key:
P – Electrical pump controlled by the engine control module (ECM).
T – Bypass solenoid valve
R1 – Main radiator for the Intercooler cooling system (LT).
R2 – Additional radiator for the Intercooler cooling system (LT)

NOTE: The cooling system for the 200 HP version of the 2.0 T4 Multiair engine in the Alfa Romeo Stelvio will be available without the additional radiators, except for a transition period during which there may be additional radiators.

The following paragraphs describe the characteristics of the HT and LT cooling system components. The pictures refer to the cooling system in the Alfa Romeo Giulia, but the components are functionally equivalent also for the Alfa Romeo Stelvio.

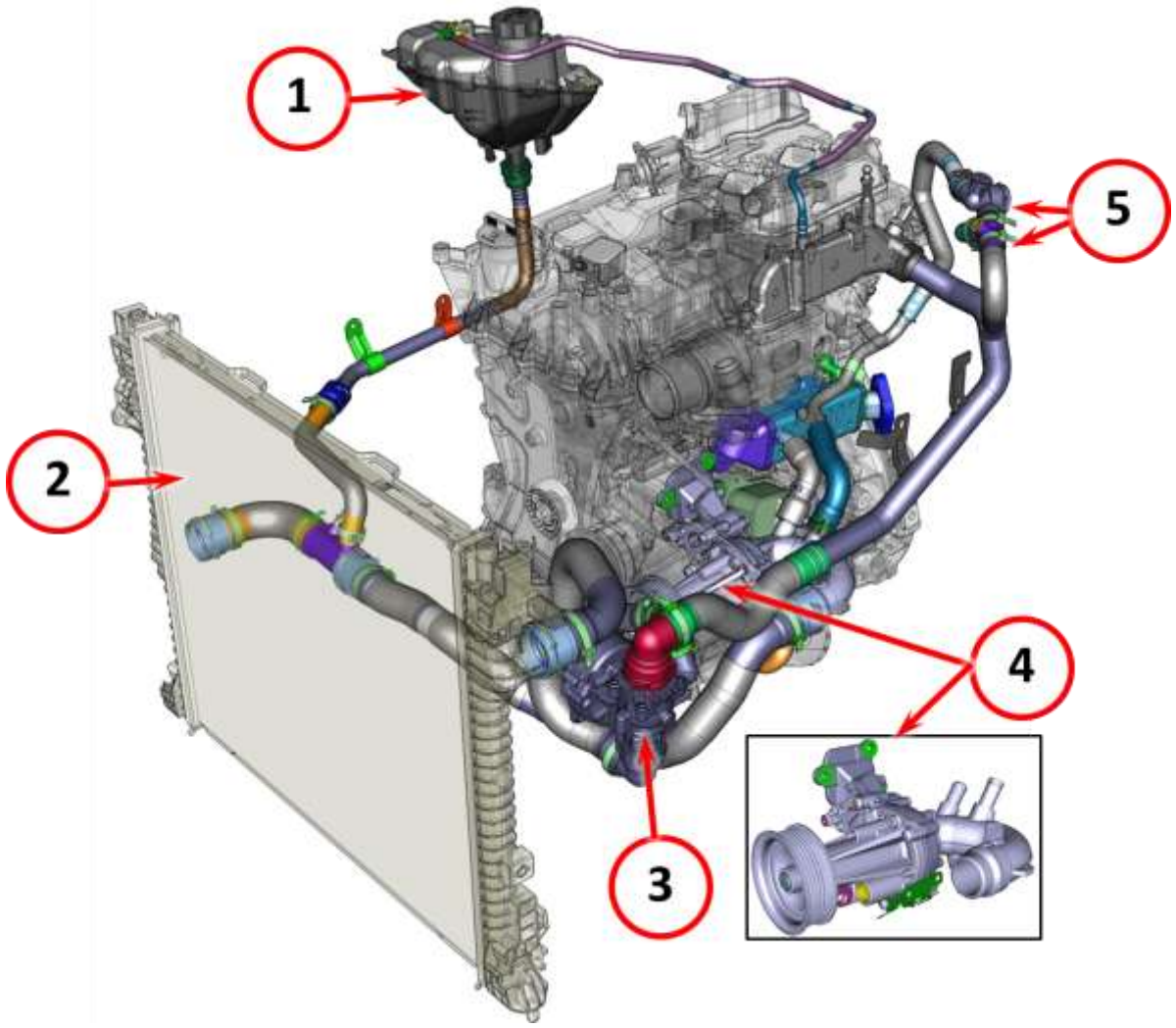
A high temperature HT cooling system.

The high temperature (HT) cooling circuit cools the following systems:

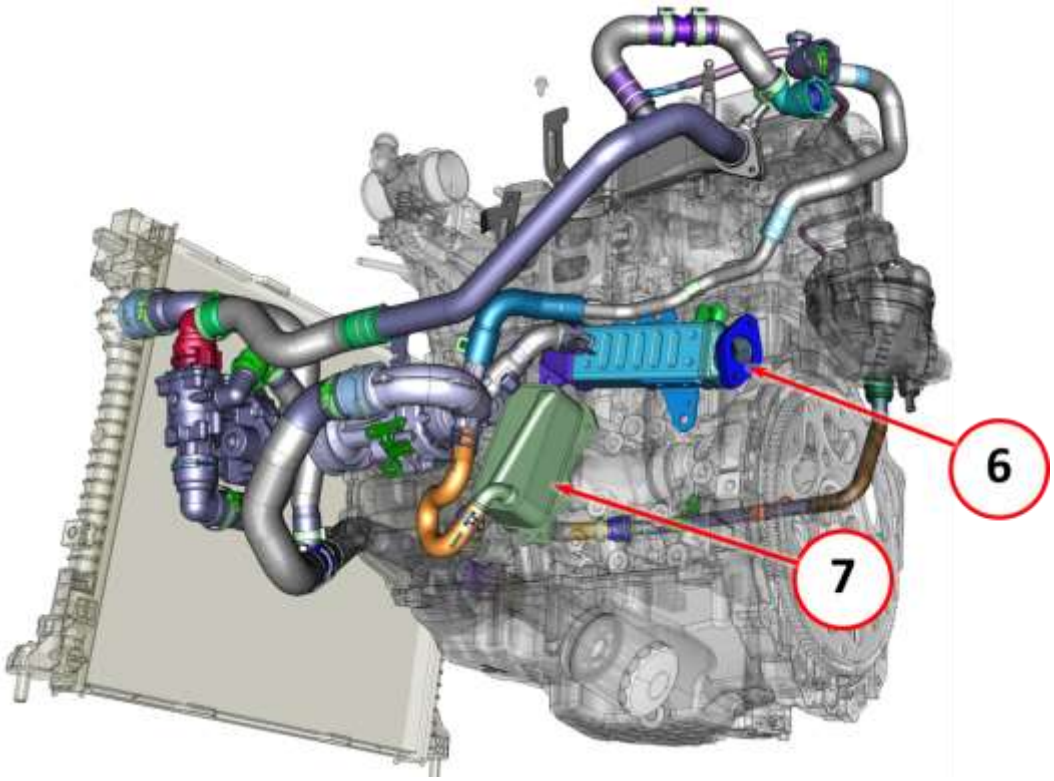
- Engine bed.
- Cylinder head.
- Engine oil.
- Exhaust gas in the low pressure EGR heat exchanger.

Moreover, the engine coolant also reaches the passenger compartment heater and is used to heat the passenger compartment.
The coolant is cooled by a main radiator located at the centre, behind the front bumper. The main radiator uses the dynamic air flow produced by the vehicle's speed and the forced air flow from the electric fan.

HT system components



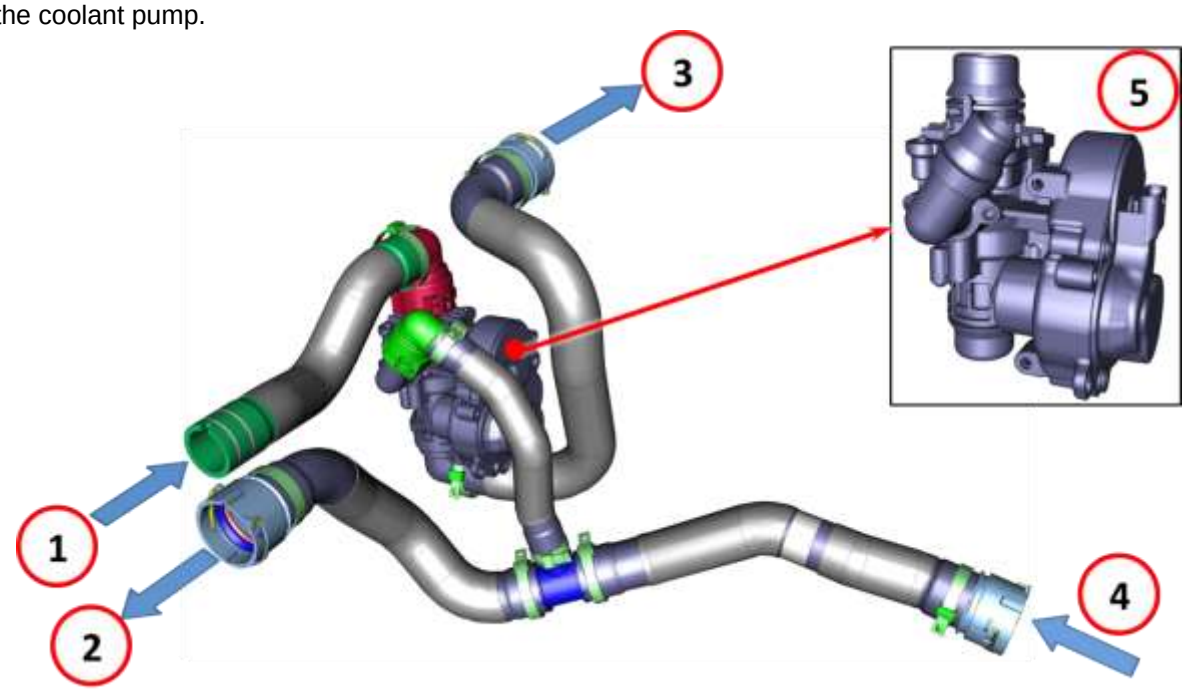
Key:
1 – Expansion tank for HT system.
2 – Radiator.
3 – Bypass solenoid valve for temperature control (Thermostat)
4 – Coolant pump.
5 – Passenger compartment heater connection pipes.



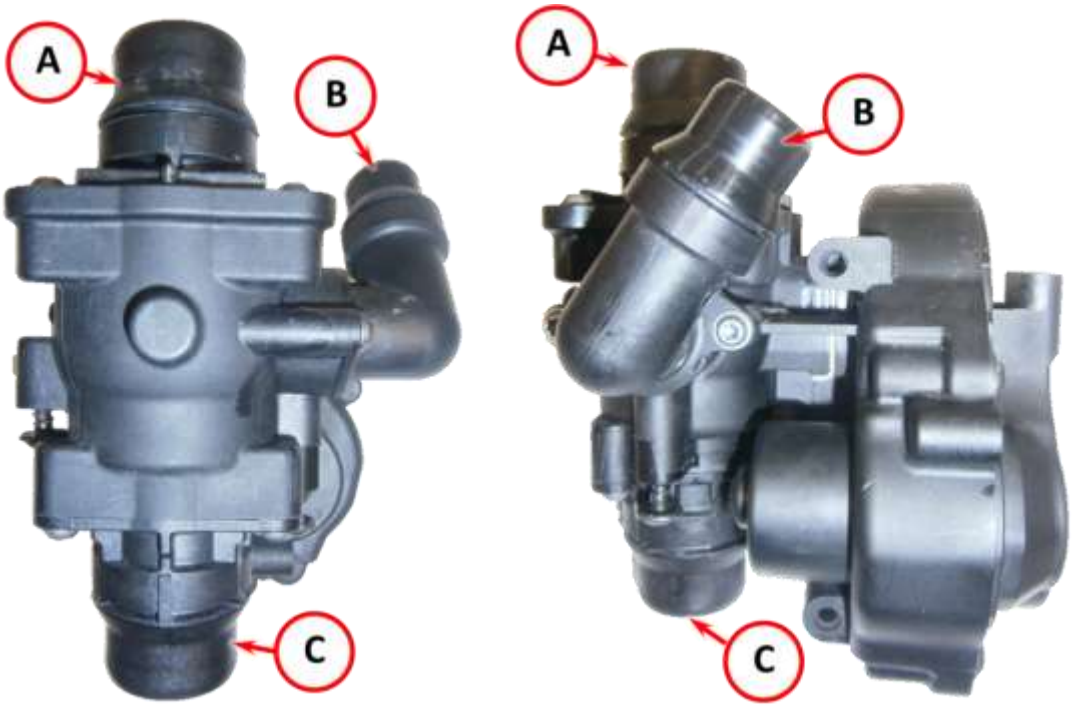
Key:
6 – Engine oil cooling heat exchanger.
7 – Heat exchanger for cooling the exhaust gas

Bypass solenoid valve for temperature control (Thermostat)

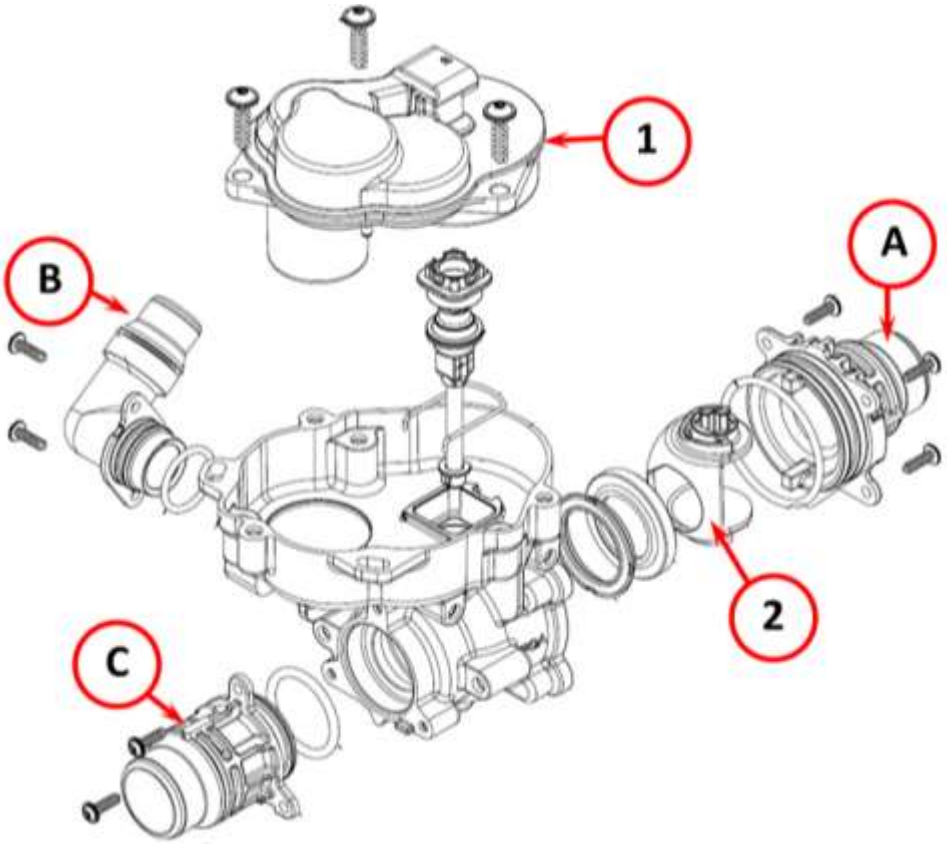
The bypass solenoid valve functions as the engine thermostat. It is electrically controlled by the engine control module (ECM). It has one inlet and two outlets. It is connected to the engine, the radiator and the coolant pump.



Key:
1 – Flow from the engine.
2 – Pump inlet flow
3 – Radiator inlet flow.
4 – Flow from the radiator and expansion tank.
5 – Electric thermostat.

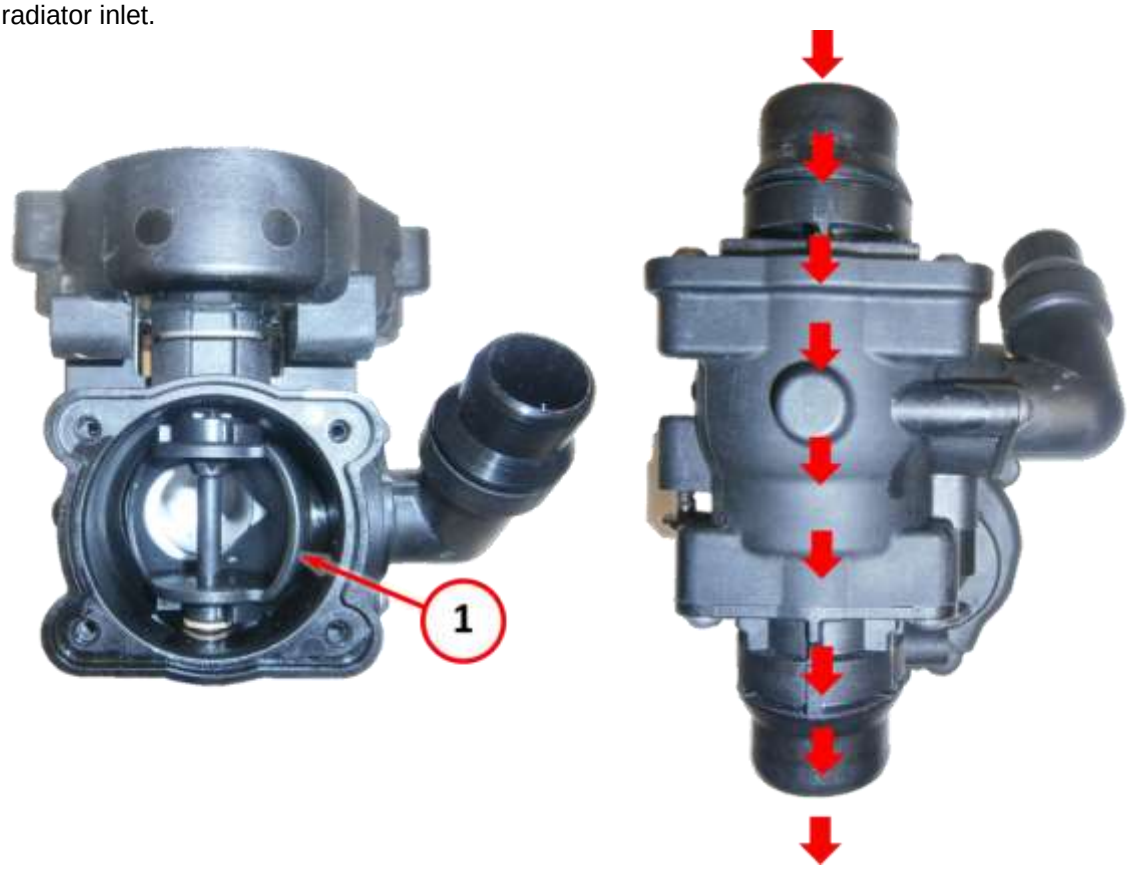


Key:
A – Coolant inlet from the engine.
B – Coolant outlet to the coolant pump intake pipe.
C – Coolant outlet to the radiator.
1 – Electric actuator.
2 – Flow diverter valve.

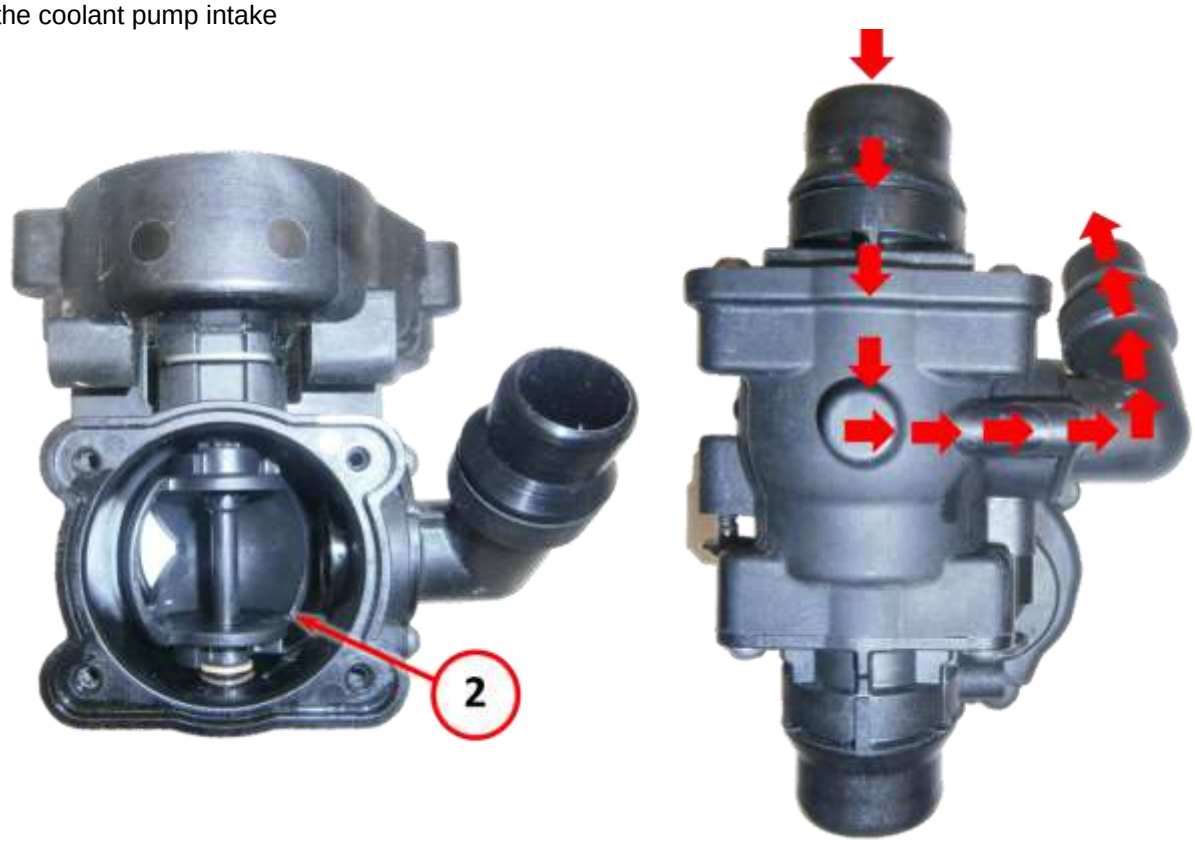


Through a dedicated shaft, the electric actuator moves the flow diverter valve (2), which diverts the flow from the engine.

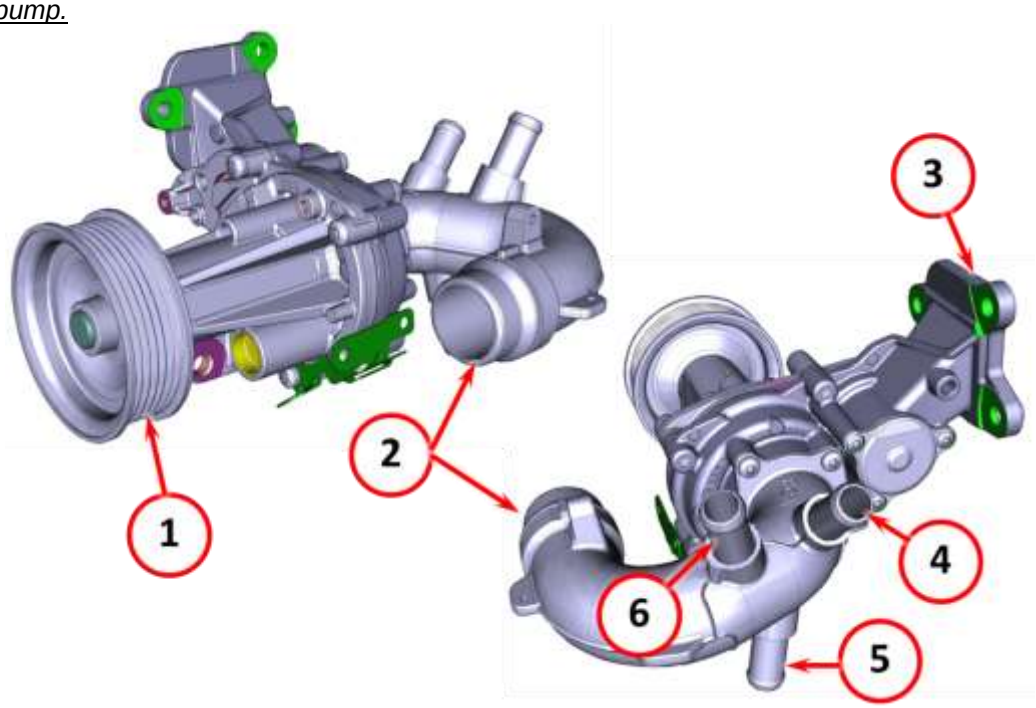
When the diverter valve is in position (1), the thermostat is open. The flow from the engine is sent to the radiator inlet.



When the diverter valve is in position (2), the thermostat is closed. The flow from the engine is sent to the coolant pump intake

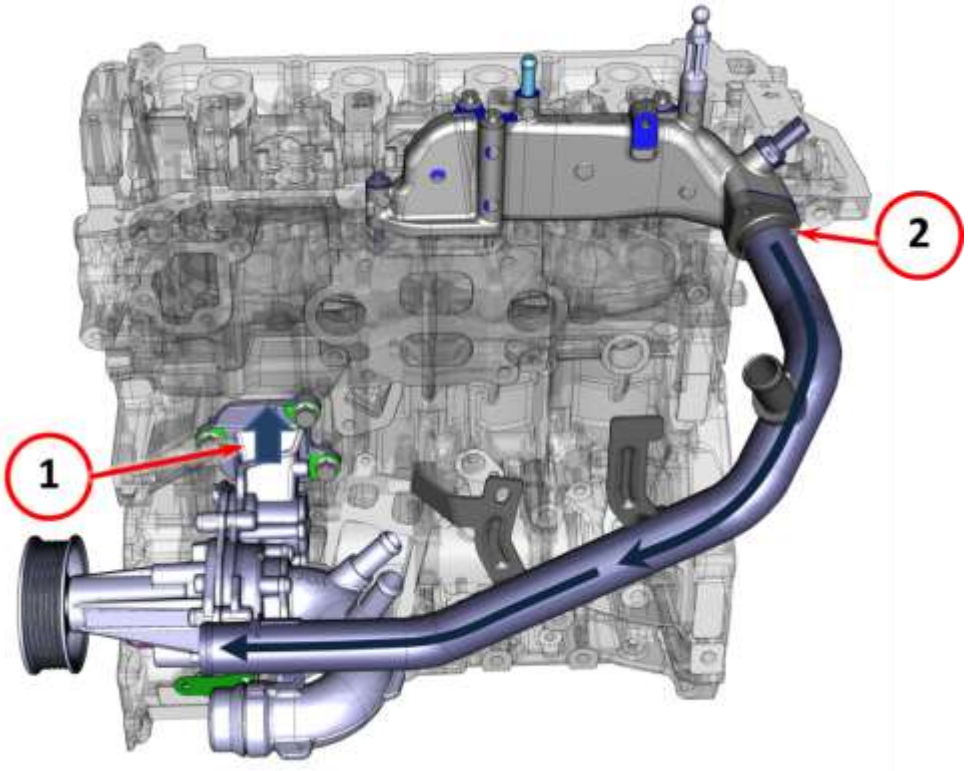


Water pump.



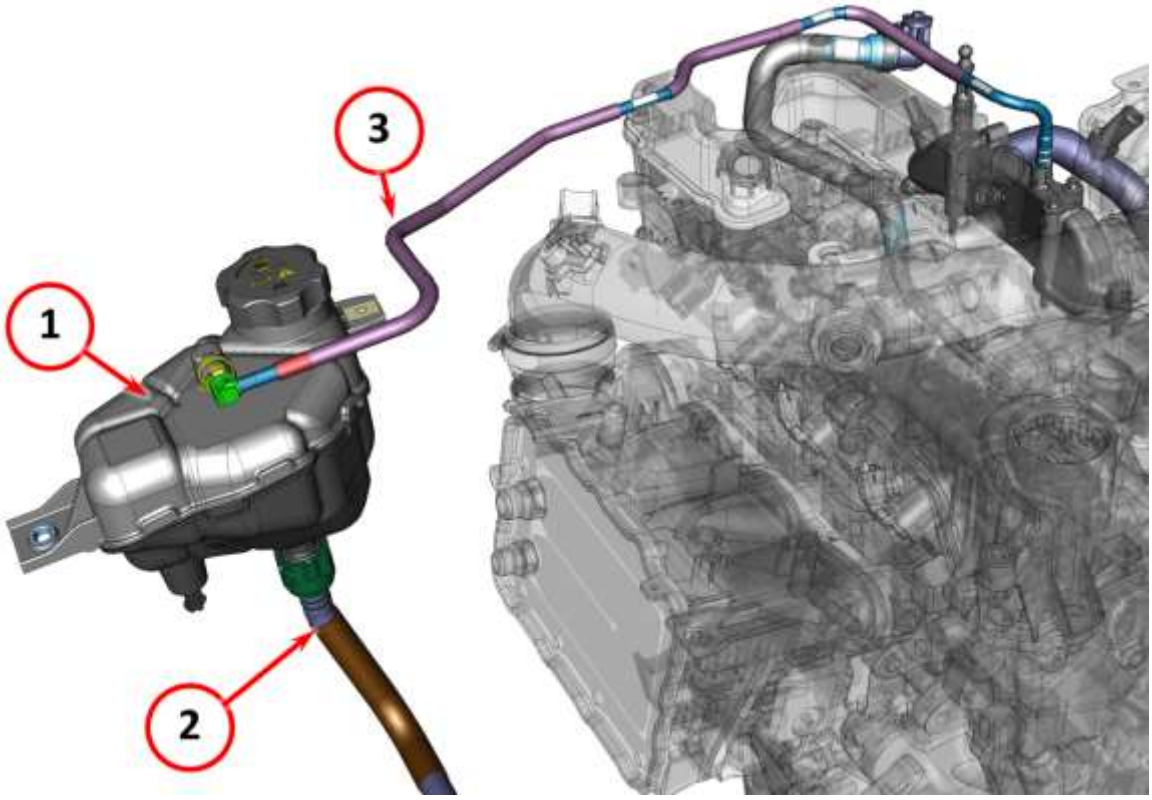
Key:
1 – Pump pulley.
2 – Coolant inlet pipe (intake).
3 – Pump supply.
4 – Connection to the heat exchanger for cooling the EGR exhaust gas
5 – Connection to the heat exchanger for cooling the engine oil coolant.
6 – Connection to the passenger compartment heater.

The water pump is centrifuge type.

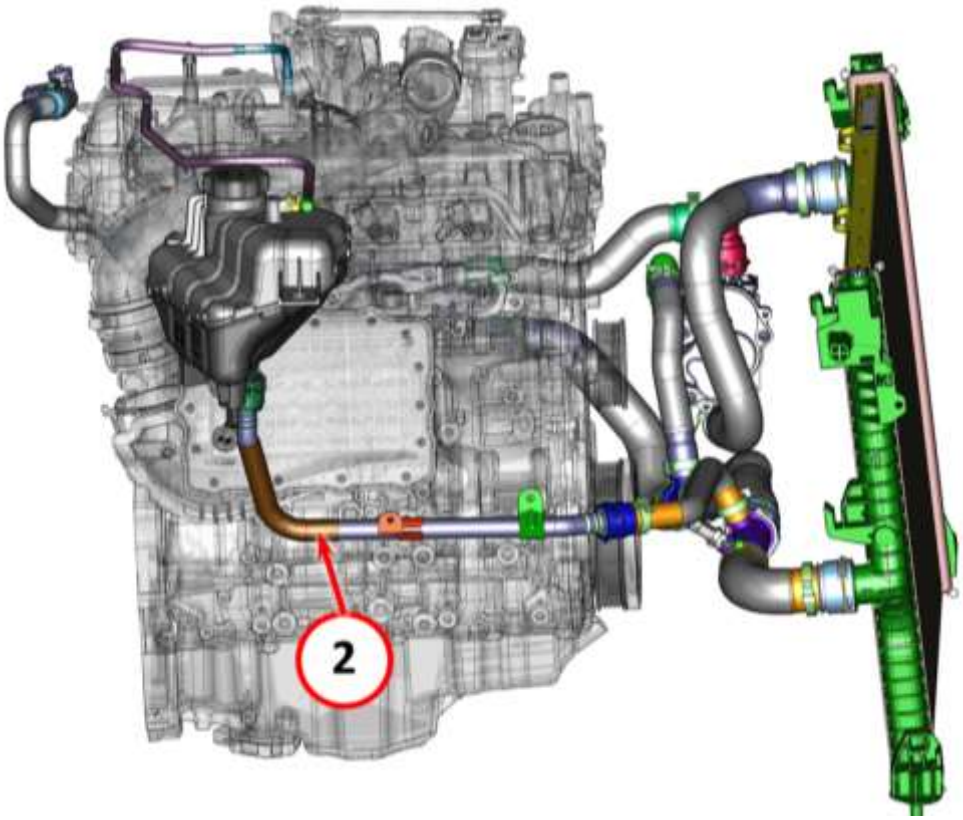


Key:
1 – Supply from the pump to the channels in the crankcase
2 – Coolant exit point from the engine.

HT system expansion tank.



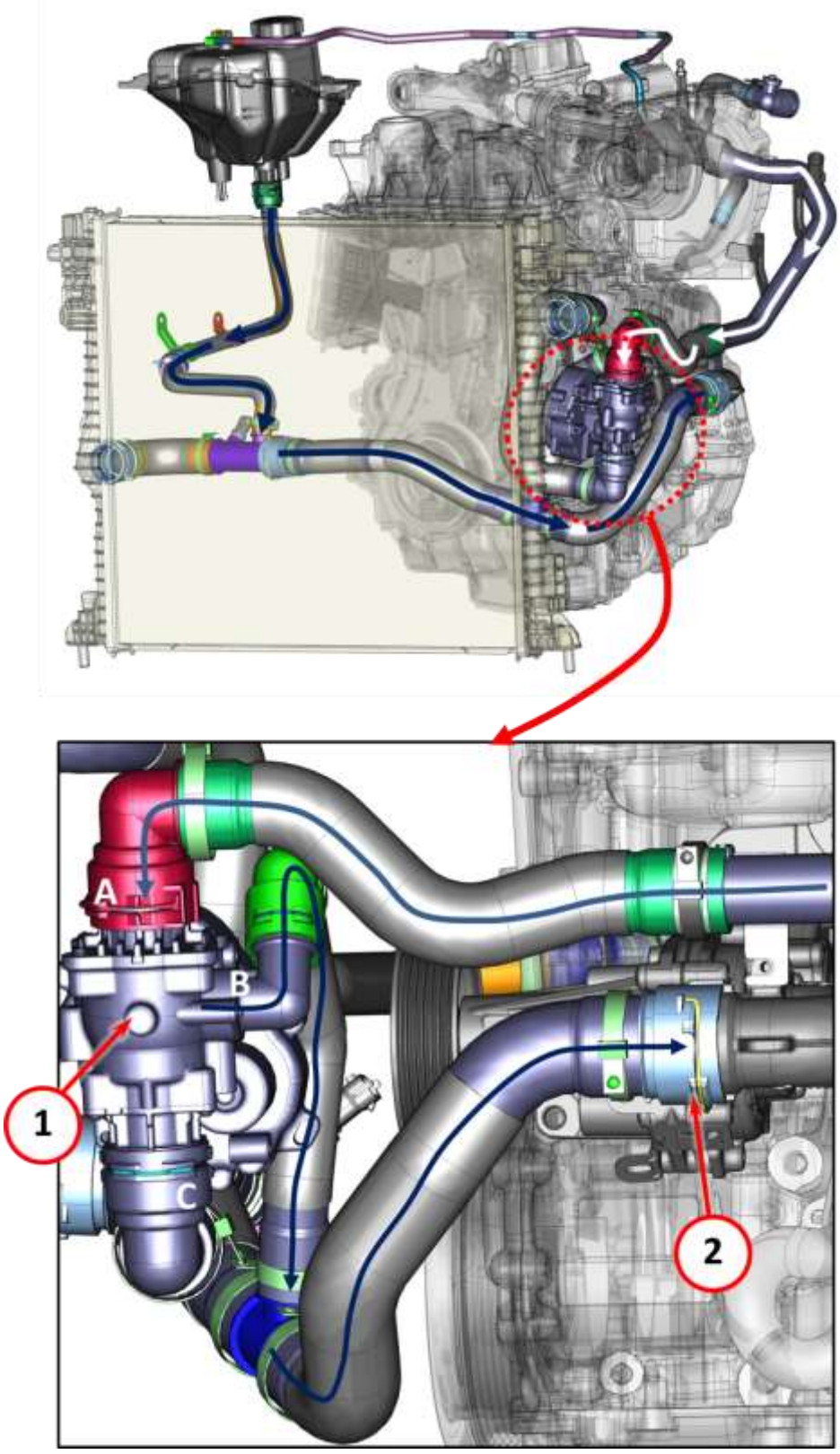
Key:
1 – Expansion tank for HT system.
2 – Outlet pipe connected to the bottom of the expansion tank.
3 – Degassing pipe from the engine.



The HT cooling system is kept at a pressure of 1.4 bar.

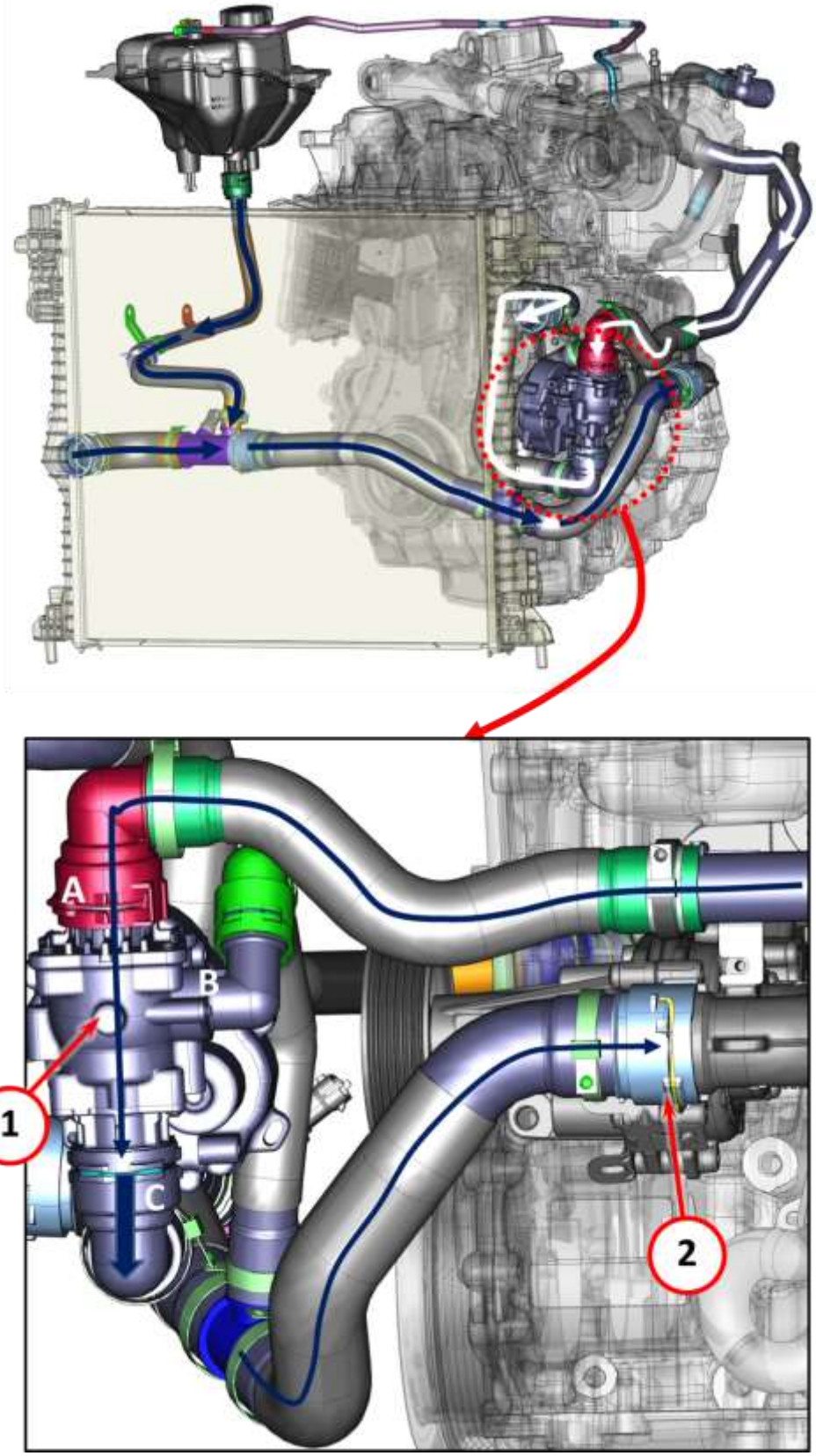
Below are some pictures that show the coolant flow between the engine, radiators and expansion tank.

Pump intake flow with the thermostat closed.



When the electric thermostat (1) is closed, the coolant passes from inlet A (from the engine) to outlet B, and then goes to the pump inlet (2).

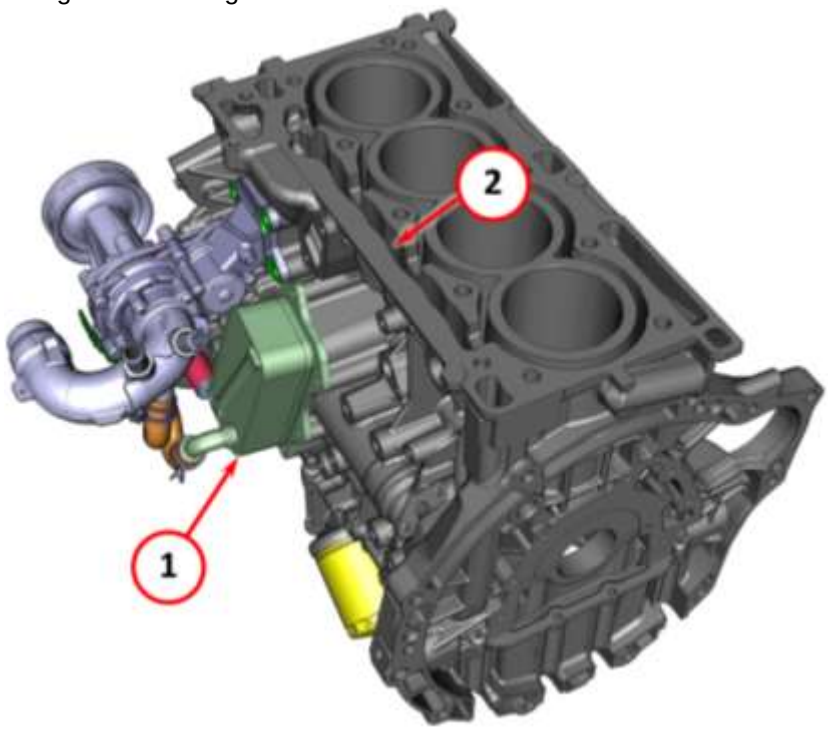
Pump intake flow with the thermostat open.



When the electric thermostat (1) is open, the coolant passes from inlet A (from the engine) to outlet C, and then goes to the radiator inlet. From the radiator, the coolant returns to the pump inlet (2).

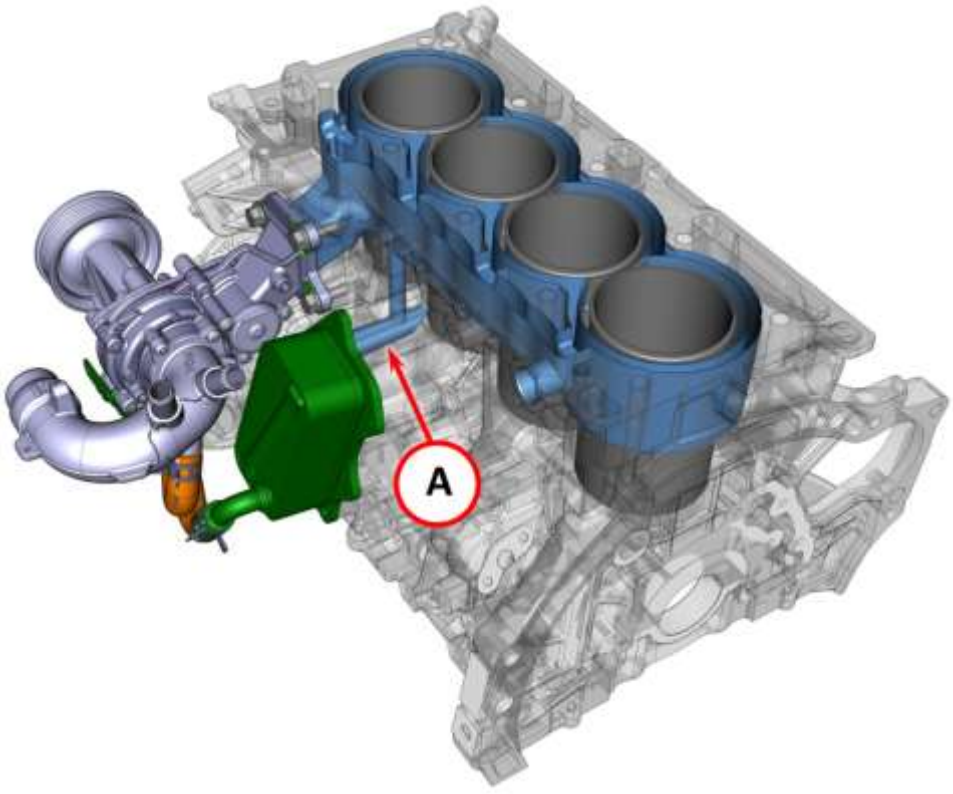
Hydraulic circuit for the engine oil heat exchanger.

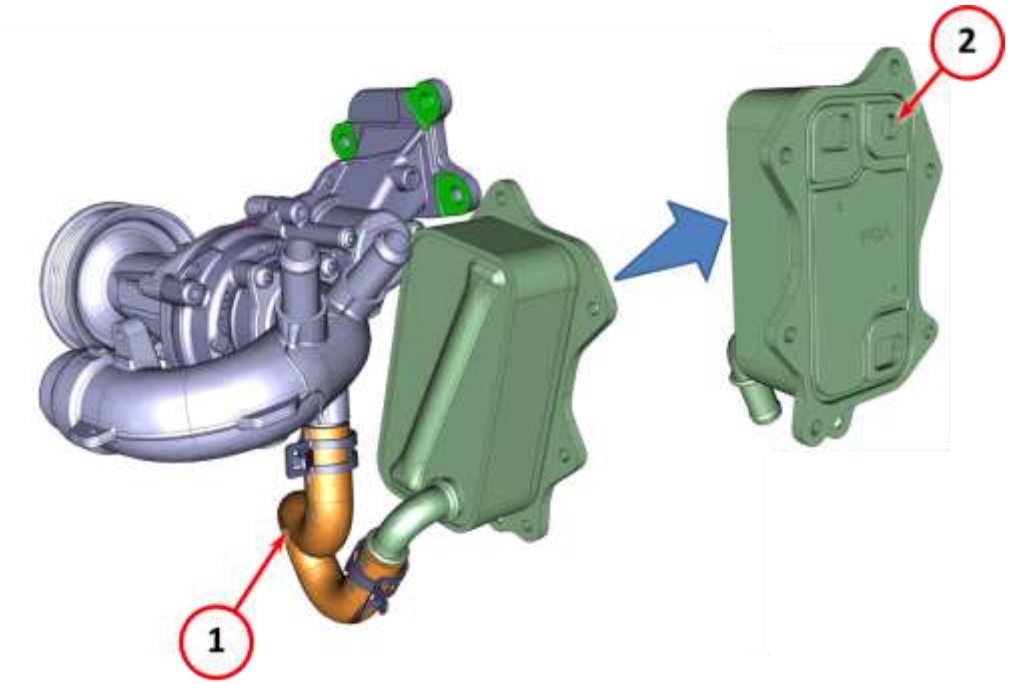
The engine oil cooling heat exchanger is located on the exhaust-side crankcase surface.



Key:
1 – Engine oil cooling heat exchanger
2 – Cavity in the crankcase for distributing the coolant in the engine.

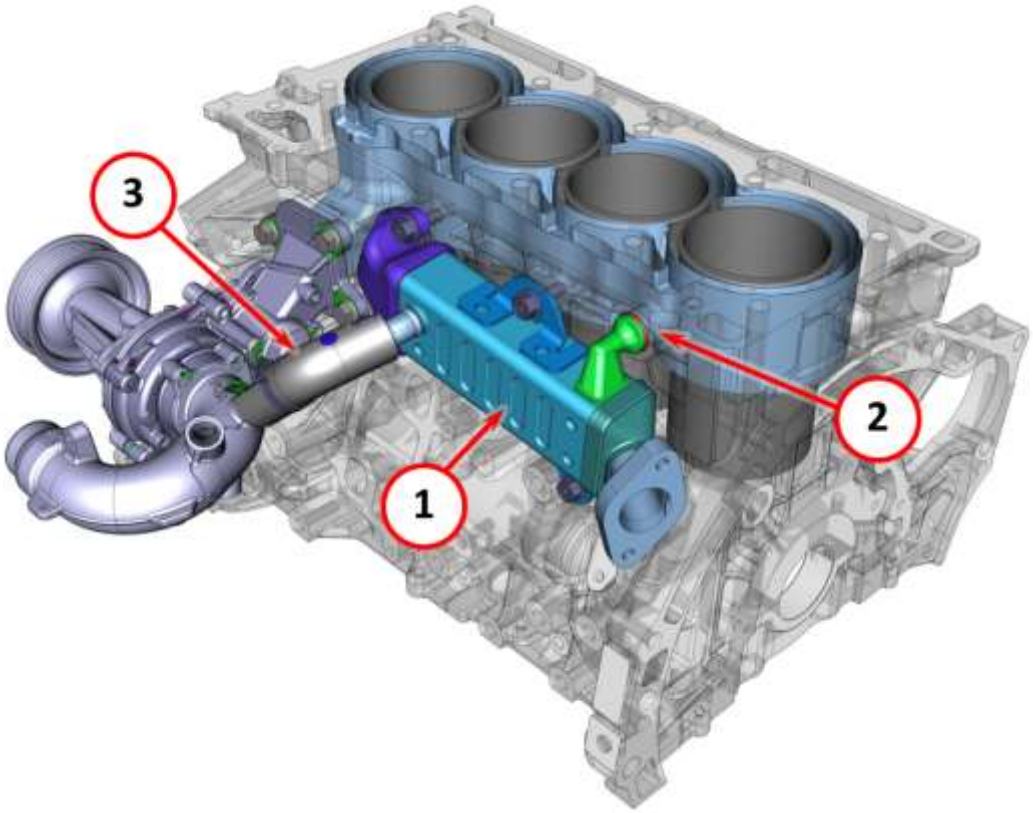
The heat exchanger receives the coolant from the cavity (2) in the crankcase through the channel (A), to normalise the engine oil temperature.





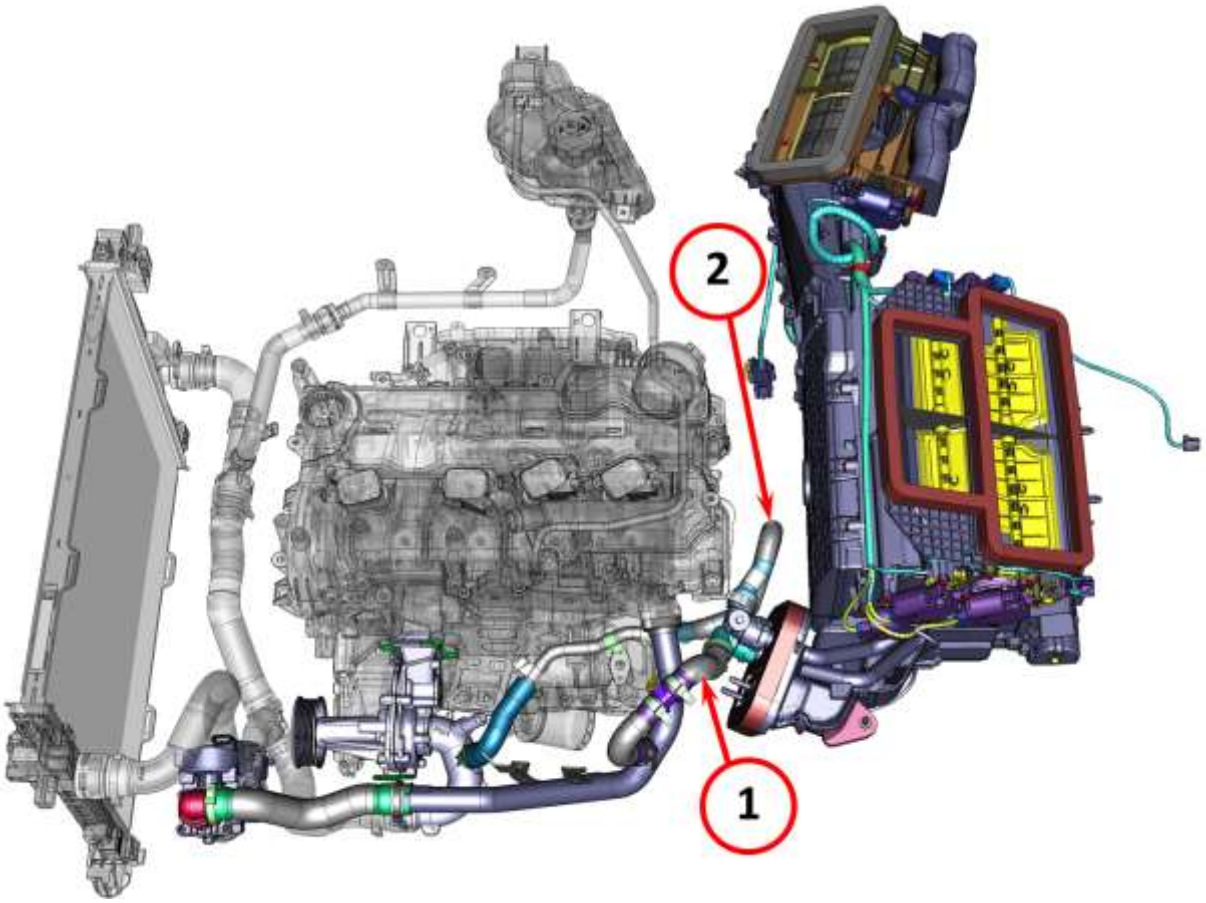
Key:
1 – Coolant outlet (to the coolant pump).
2 – Cooling liquid entry.

Hydraulic circuit for the EGR heat exchanger



Key
1 – EGR heat exchanger
2 – EGR heat exchanger coolant inlet
3 – EGR heat exchanger coolant outlet.

Passenger compartment heating circulation.



Key:
1 –Coolant supply pipe to the passenger compartment heater.
2 – The return cooling liquid pipe from the compartment heater.

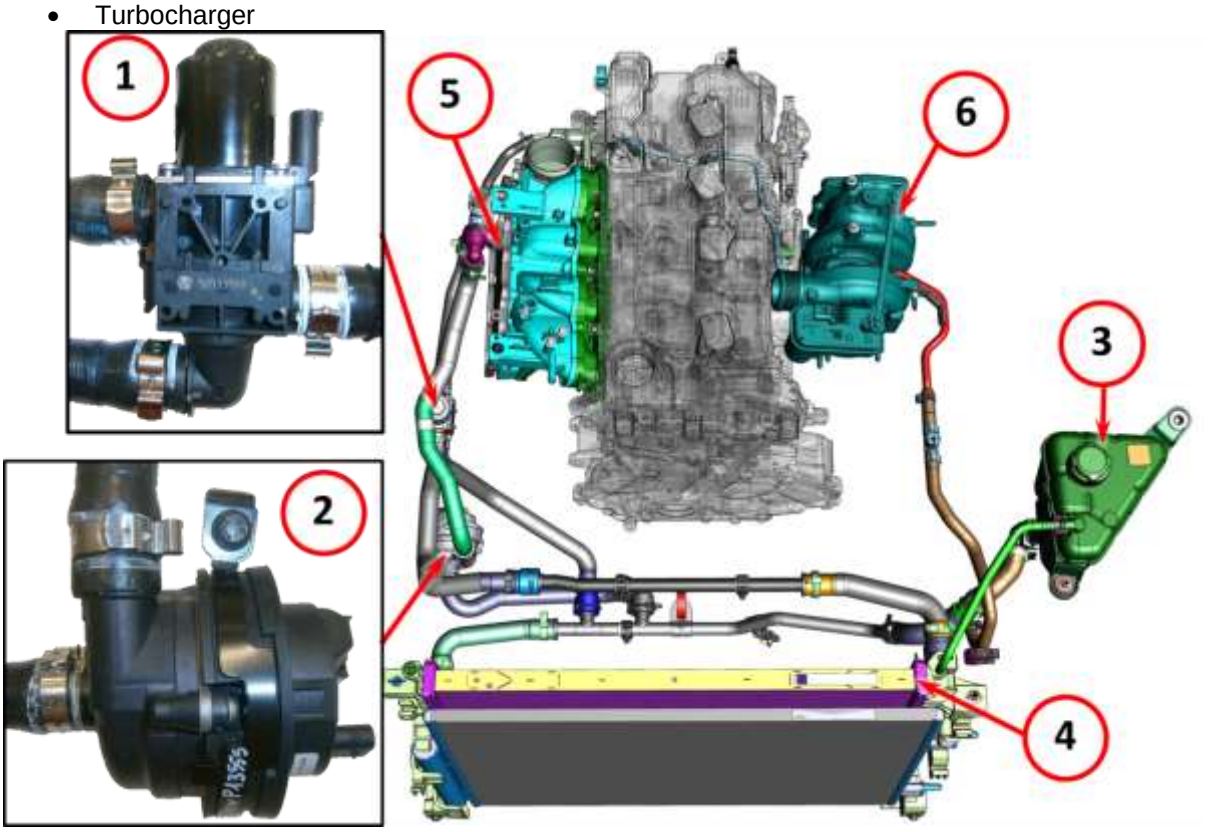
The coolant enters the passenger compartment heater through the pipe (1) connected to the pipe that takes the coolant flow from the engine to the electric thermostat.

On leaving the passenger compartment heater, the coolant is taken to the thermostat through a dedicated pipe (2).

A low temperature LT cooling system.

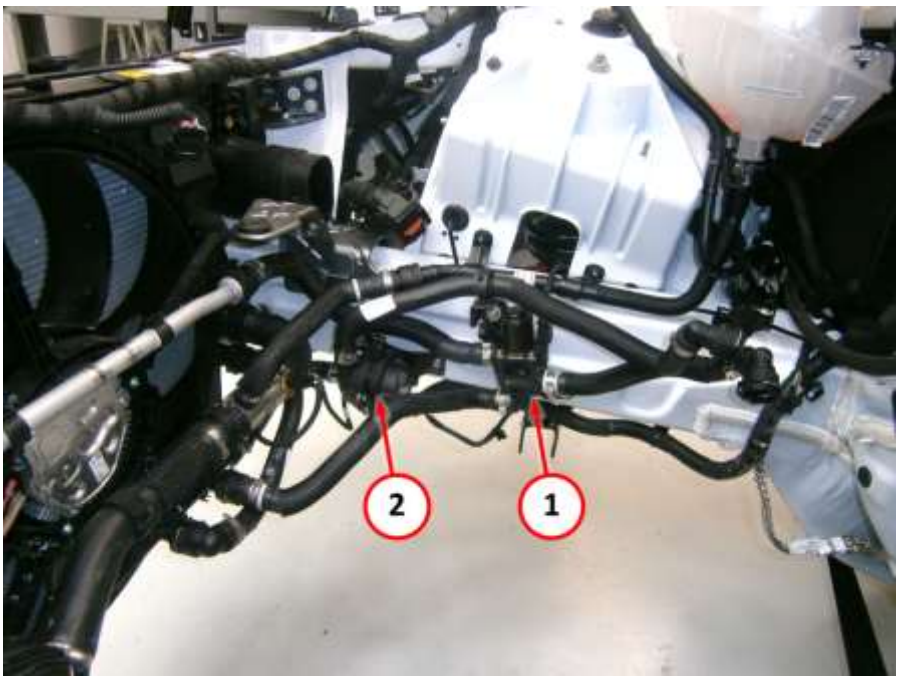
The low temperature (LT) circuit cools the following systems:

- Intercooler
- Turbocharger



Key:

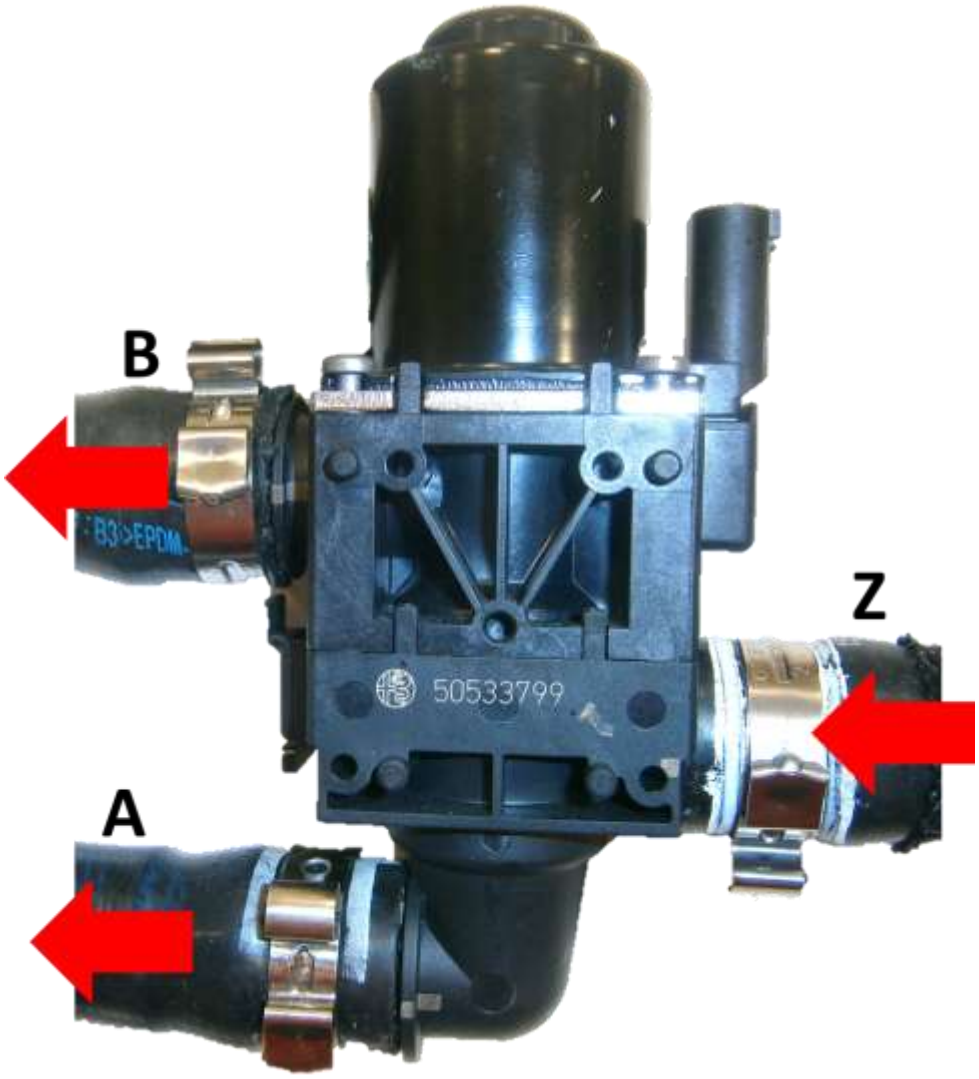
1 – Temperature control valve.
2 – Electric pump P.
3 – Expansion tank.
4 – Radiator.
5 – Intercooler.
6 – Turbocharger.



Intercooler LT cooling system components.

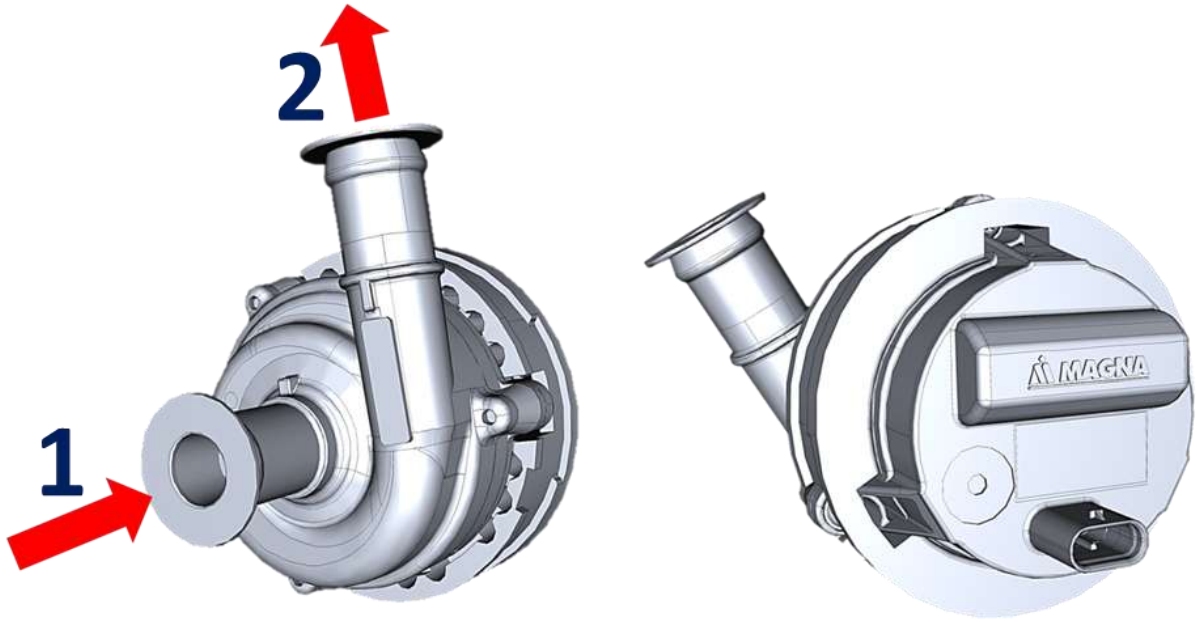
Bypass solenoid valve for temperature control.

The temperature control valve for the cooling system is electrically controlled by the engine control module (ECM). The valve has one inlet (Z) and two outlets (A) and (B).



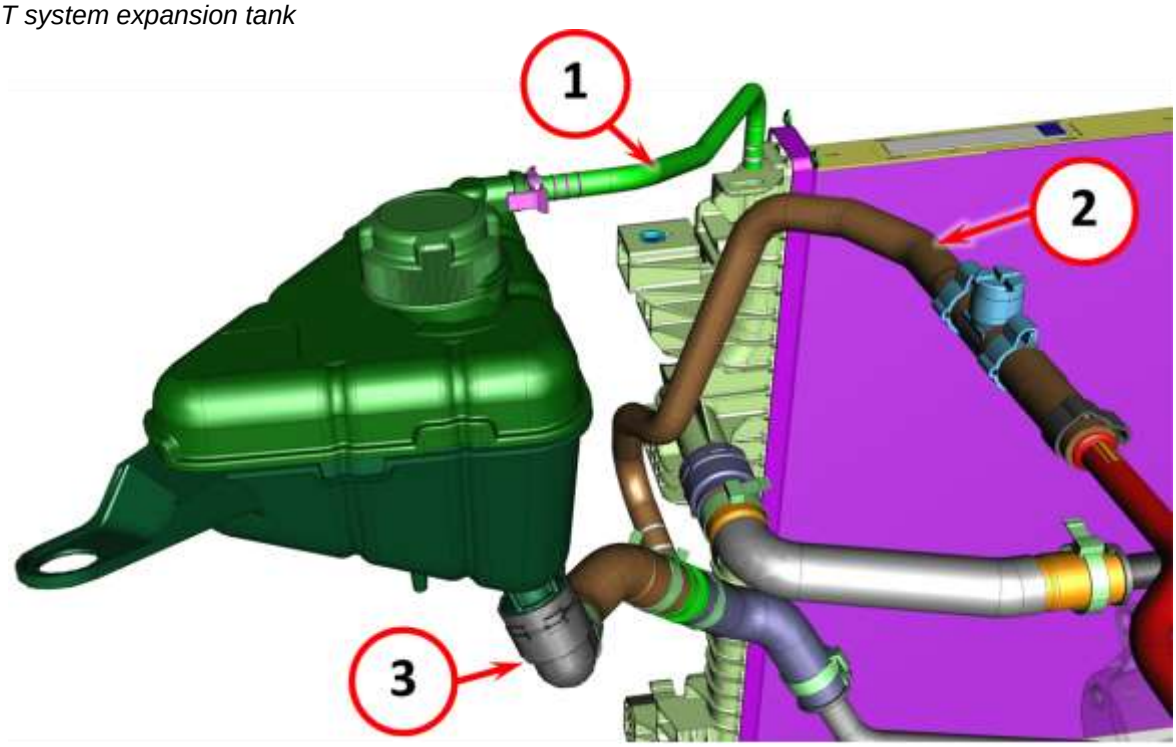
Key
Z – Coolant inlet from the intercooler outlet pipe.
B – Coolant outlet connected to the intake branch of the electric pump.
B – Coolant outlet connected to the radiator inlet pipe.

LT Electric pump.



Key
1 – Coolant inlet.
2 – Coolant outlet.

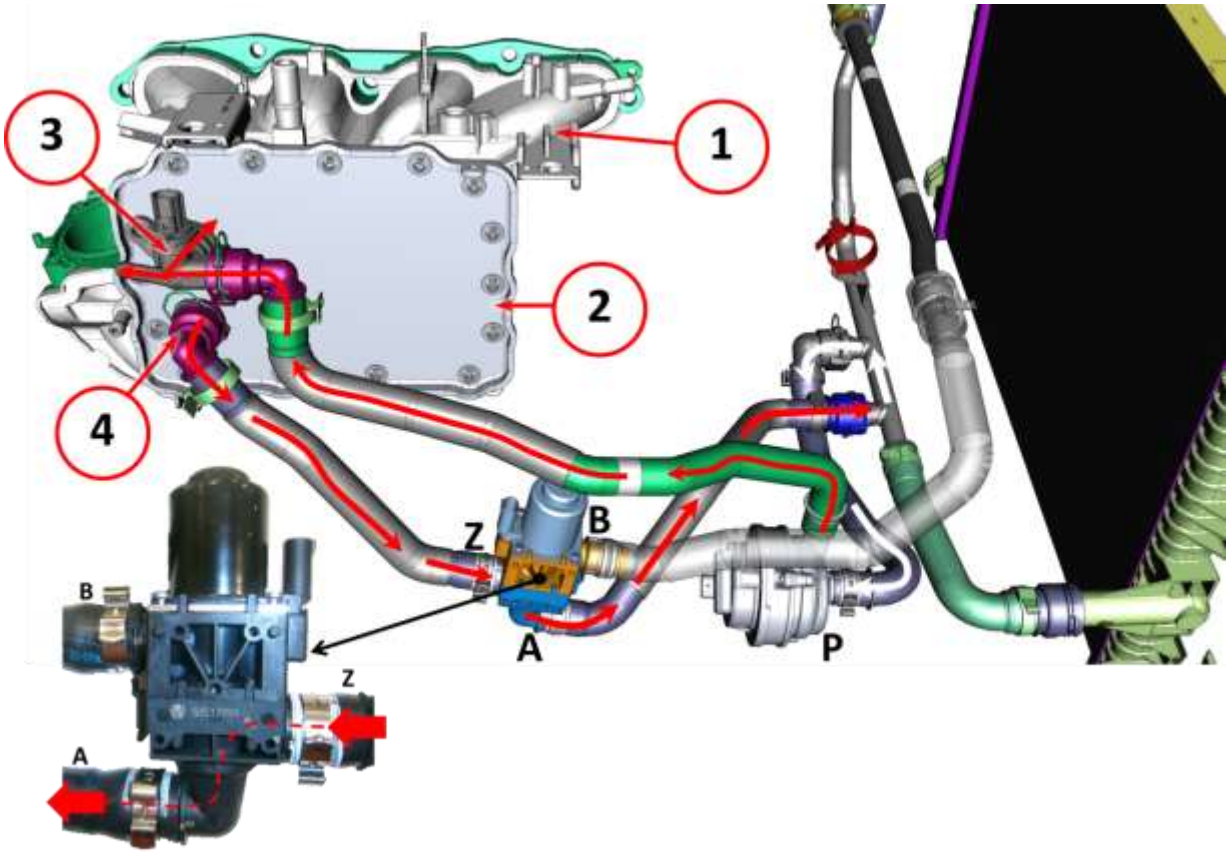
LT system expansion tank



Key
1 – Degassing pipe.
2 – Turbocharger outlet flow pipe.
3 – Electric pump inlet connection pipe.
The LT system expansion tank is connected to the electric pump intake through the pipe (3). The pipe (1) connects the expansion tank to the top of the LT system radiator to degass the system.

Below are some pictures that show the coolant flow between the intercooler, electric pump and radiator.

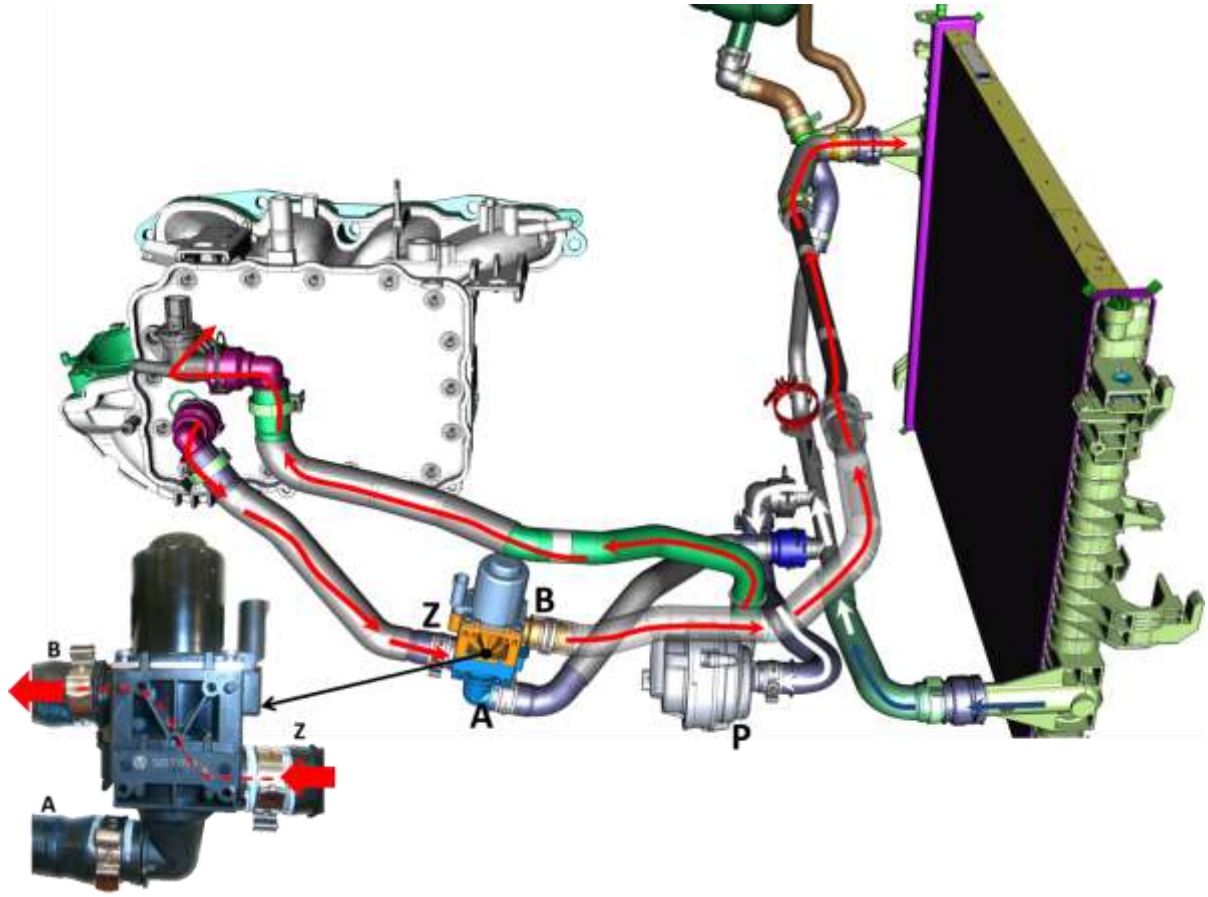
Flow with the temperature control valve active



Key
1 – Intake manifold.
2 – Intercooler.
3 – Coolant inlet fitting.
4 – Coolant outlet fitting.

The coolant outlet flow from the electric pump P, enters the intercooler inlet (3). From the outlet (4), the flow goes to the temperature control valve (inlet Z). As the valve is active (the ECM is sending the electrical control), it deviates the flow to the outlet (A) from which it returns to the intake of the electric pump P.

Flow with the temperature control valve inactive



The coolant outlet flow from the electric pump P, enters the intercooler inlet (3). From the outlet (4), the flow goes to the temperature control valve (inlet Z). As the valve is inactive (the ECM is not sending the electrical control), it deviates the flow to the outlet (B) from which it is directed to the radiator inlet. From the radiator outlet, the coolant goes to the intake of the electric pump P.