Engine Cooling - 1.1L Duratec (51kW/70PS)/1.1L Duratec (63kW/85PS)/1.1L Duratec (55kW/75PS) (FS) - Engine Cooling - System Operation and Component Description	Fiesta 2017.00 (01/2017-)

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Description and Operation

System Operation

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder heads. A separate circuit from the engine also feeds the heat exchanger with coolant. The coolant pump, operated by engine rotation through the accessory drive belt, circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the small/large coolant circuit thermostat opens, coolant flows through the radiator circuit to transfer engine-generated heat to the outside air. The thermostat contains a bypass valve. Then the thermostat is in a closed position the bypass valve is allowed to open above 3,000 rpm to route coolant directly back to the mechanical coolant pump reducing cooling system pressure.

The degas bottle holds surplus coolant and removes air from the cooling system. It also allows for coolant expansion and system pressurization, replenishes coolant to the cooling system and serves as the location for service fill.

The thermostat monitor is a function of the null (powertrain control module) and is designed to verify correct thermostat operation. The monitor executes once per drive cycle and has a monitor run duration of 300-800 seconds. If a malfunction occurs, null (diagnostic trouble code) P0125 or P0128 sets, and the null (malfunction indicator lamp) illuminates.

The engine's cooling circuit consists of an additional cylinder block thermostat. When this thermostat is in a closed position. Coolant is routed only through the exhaust side of the cylinder head, heater core, and returns to the mechanical coolant pump. When the cylinder block thermostat opens coolant then flows though the engine block similar to a conventional cooling system. Stagnating engine block coolant flow makes it possible for the engine components to warm up faster. The result is a significant reduction in the emissions of harmful pollutants and an improvement in fuel economy (i.e. reduced friction) during the warm-up phase.

The cooling system is controlled in **3 phases**:

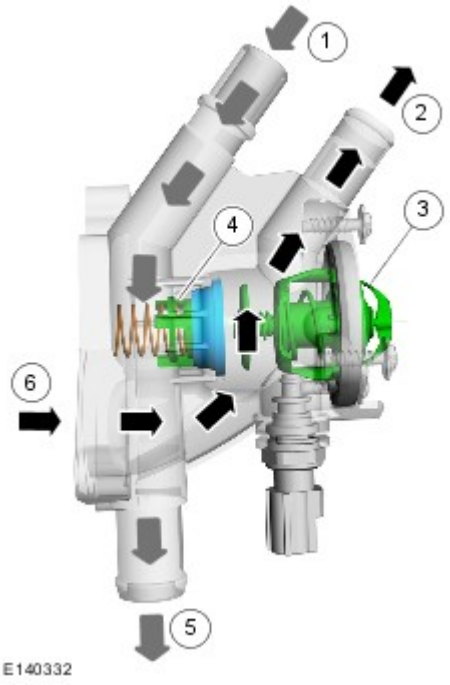
Phase 1

When the **engine is cold**, the small/large coolant circuit thermostat and the short block thermostat are closed.

The mechanical coolant pump delivers the coolant only to the exhaust-side part of the cylinder head. In this phase, the coolant in the coolant jacket around the cylinder and in the intake-side part of the cylinder head remains motionless.

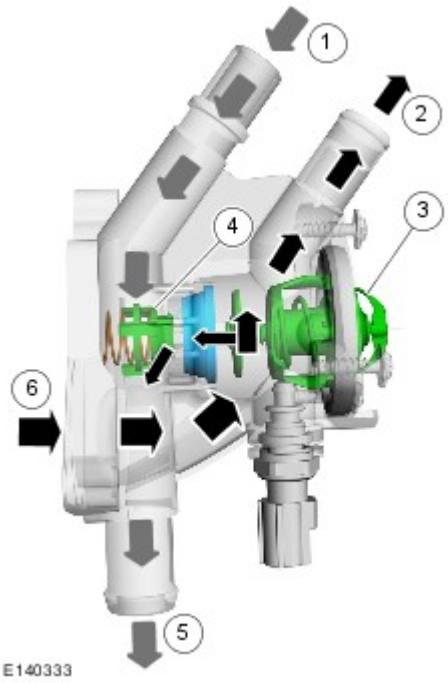
Below a coolant temperature of approximately 50°C and below an engine speed of approximately 3000 rpm, only the exhaust-side part of the cylinder head is cooled.

From the exhaust-side part of the cylinder head, the coolant flows into the small/large coolant circuit and bypass valve thermostat casing and, from there, on past the heat exchanger and then back to the coolant pump.



Item	Description
1	Coolant flow from heat exchanger
2	Coolant flow to heat exchanger
3	Small/large coolant circuit thermostat
4	Bypass valve
5	Coolant flow to coolant pump
	Coolant flow from exhaust-side part of the cylinder head

Below a coolant temperature of approximately 50°C and below an engine speed of approximately 3000 rpm, the small/large coolant circuit thermostat and the bypass valve are closed.



Item	Description
1	Coolant flow from heat exchanger
2	Coolant flow to heat exchanger
3	Small/large coolant circuit thermostat
4	Bypass valve
5	Coolant flow to coolant pump
	Excessive coolant flow from exhaust-side part of the cylinder head

If the engine speed exceeds approximately 3000 rpm, the bypass valve opens. The now increased coolant pressure from the engine opens the bypass valve so that the increase pressure can escape directly to the intake side of the coolant pump.

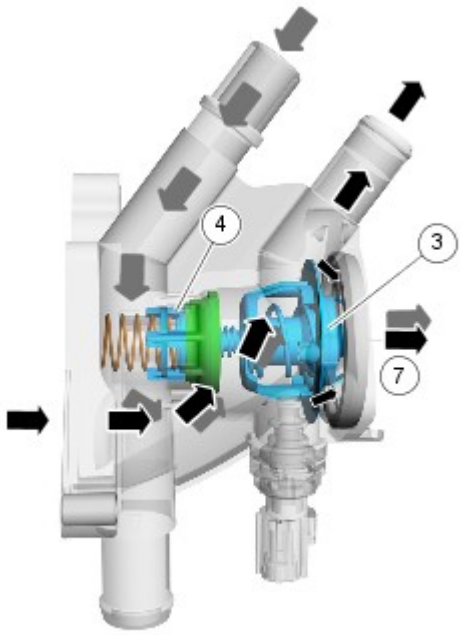
Phase 2

The cylinder block thermostat opens at a coolant temperature of **50 °C** and is completely open at **85 °C**.

As with a conventional system, this opens the **small coolant circuit**.

The coolant pump now also delivers the coolant to the cooling jacket around the cylinder, washes around it and enters the entire cylinder head via the bore holes.

Phase 3



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Item	Description
3	Small/large coolant circuit thermostat
4	Bypass valve
7	Coolant flow to the radiator

The small/large coolant circuit thermostat opens at a coolant temperature of **92 °C** and is completely open at **106 °C**. At the same time, the bypass valve thermostat closes. This ensures that the entire coolant flow, regardless of the coolant pressure, is always routed via the radiator and heater core.