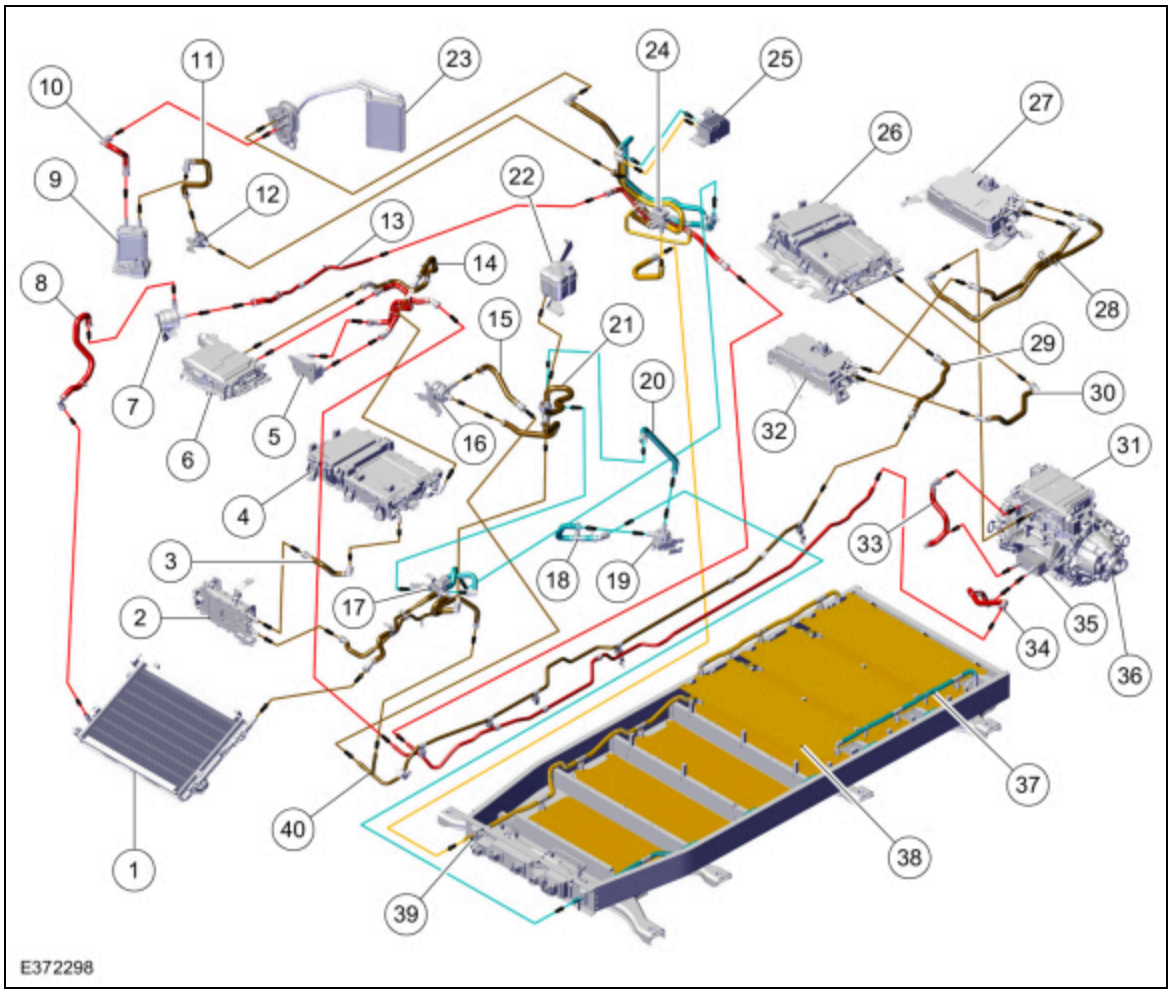
302-03A Electrified Drivetrain Cooling - Electric
Description and Operation

2023 F-150
Procedure revision date: 11/3/2022

Electrified Drivetrain Cooling

NOTE: *Coolant temperature will vary with ambient temperature and load. Temperatures shown are for ambient temperature of 25° C (77° F). Red arrows indicate a temperature approximately 70° C (158° F), Brown arrows indicate a temperature below 70° C (158° F, Orange arrows indicate a temperature of approximately 40° C (104° F), Blue arrows indicate a temperature below 40° C (104° F).*

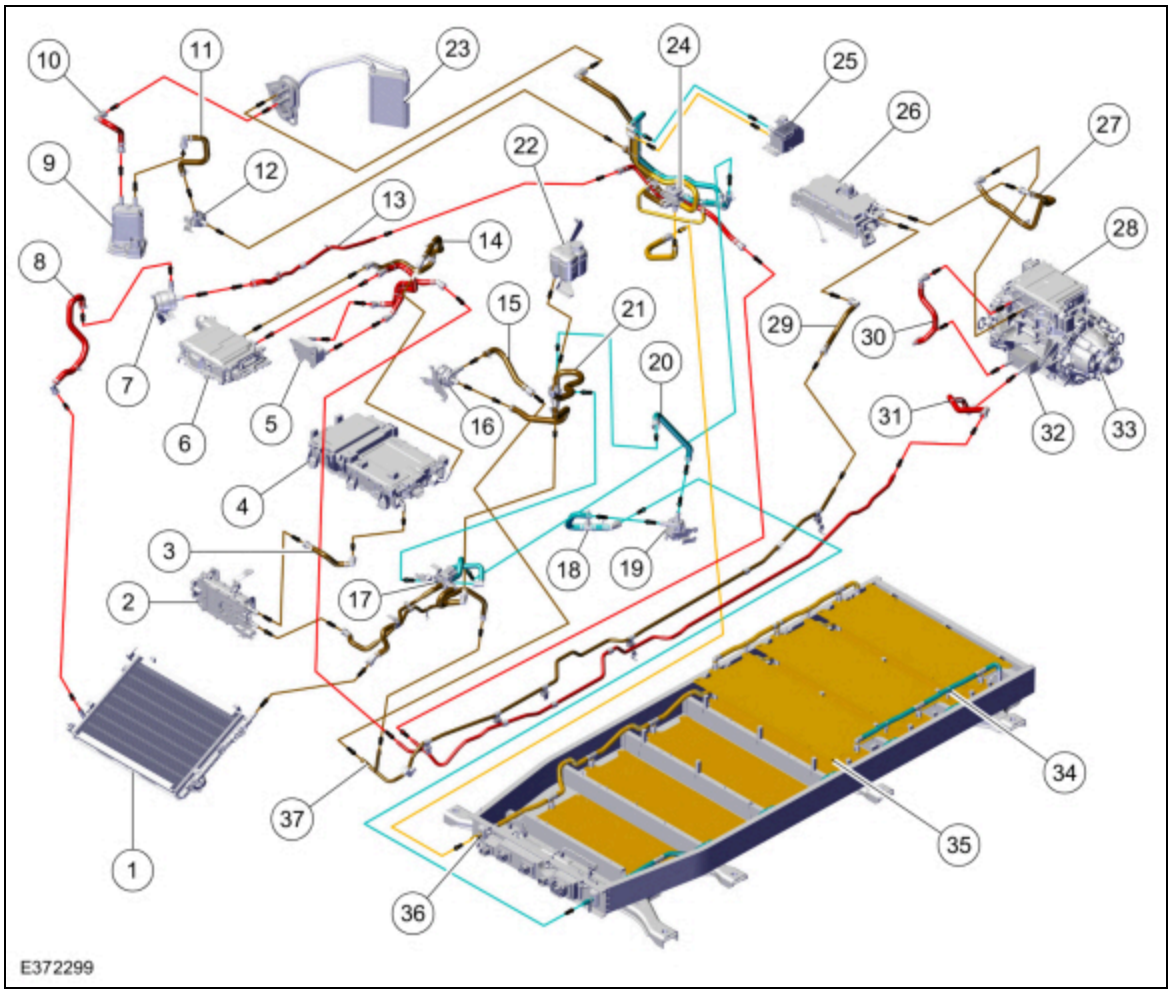
Base Trailer Tow - With 9.6kW Pro Power Onboard



Item	Part Number	Description
1	—	Radiator
2	—	DC/DC (direct current/direct current converter control module)
3	—	DC/DC outlet hose
4	—	SOBDM (Secondary On-Board Diagnostic Control Module A)
5	—	Front electric drive assembly oil cooler
6	—	Secondary Inverter system controller (SOBDM-B)
7	—	Front coolant pump
8	—	Radiator inlet hose
9	—	Cabin coolant heater
10	—	Heater core inlet hose

11	—	Cabin coolant heater inlet hose
12	—	Cabin heater coolant pump
13	—	Front coolant pump inlet hose
14	—	Secondary Inverter system controller (SOBDM-B) inlet hose
15	—	Rear coolant pump outlet hose
16	—	Rear coolant pump
17	—	High voltage battery radiator coolant diverter valve
18	—	High voltage battery coolant temperature sensor
19	—	High voltage battery coolant pump
20	—	High voltage battery coolant pump inlet hose
21	—	Coolant expansion tank hose
22	—	Coolant expansion tank
23	—	Heater core
24	—	High voltage battery coolant diverter valve
25	—	High voltage battery coolant cooler
26	—	GFM2 (Generic Function Module 2)
27	—	DC/AC (direct current/alternating current) inverter (7.2kW)
28	—	DC/AC inverter (7.2kW) hose assembly
29	—	GFM2 inlet hose
30	—	DC/AC inverter (2.4kW) inlet hose
31	—	Inverter system controller (SOBDM-C)
32	—	DC/AC inverter (2.4kW)
33	—	Rear electric drive assembly oil cooler inlet hose
34	—	Rear electric drive assembly oil cooler outlet hose
35	—	Rear electric drive assembly oil cooler
36	—	Rear electric drive unit
37	—	High voltage battery coolant hose assembly
38	—	High voltage battery plates
39	—	High voltage battery coolant tube assembly
40	—	Coolant hose assembly

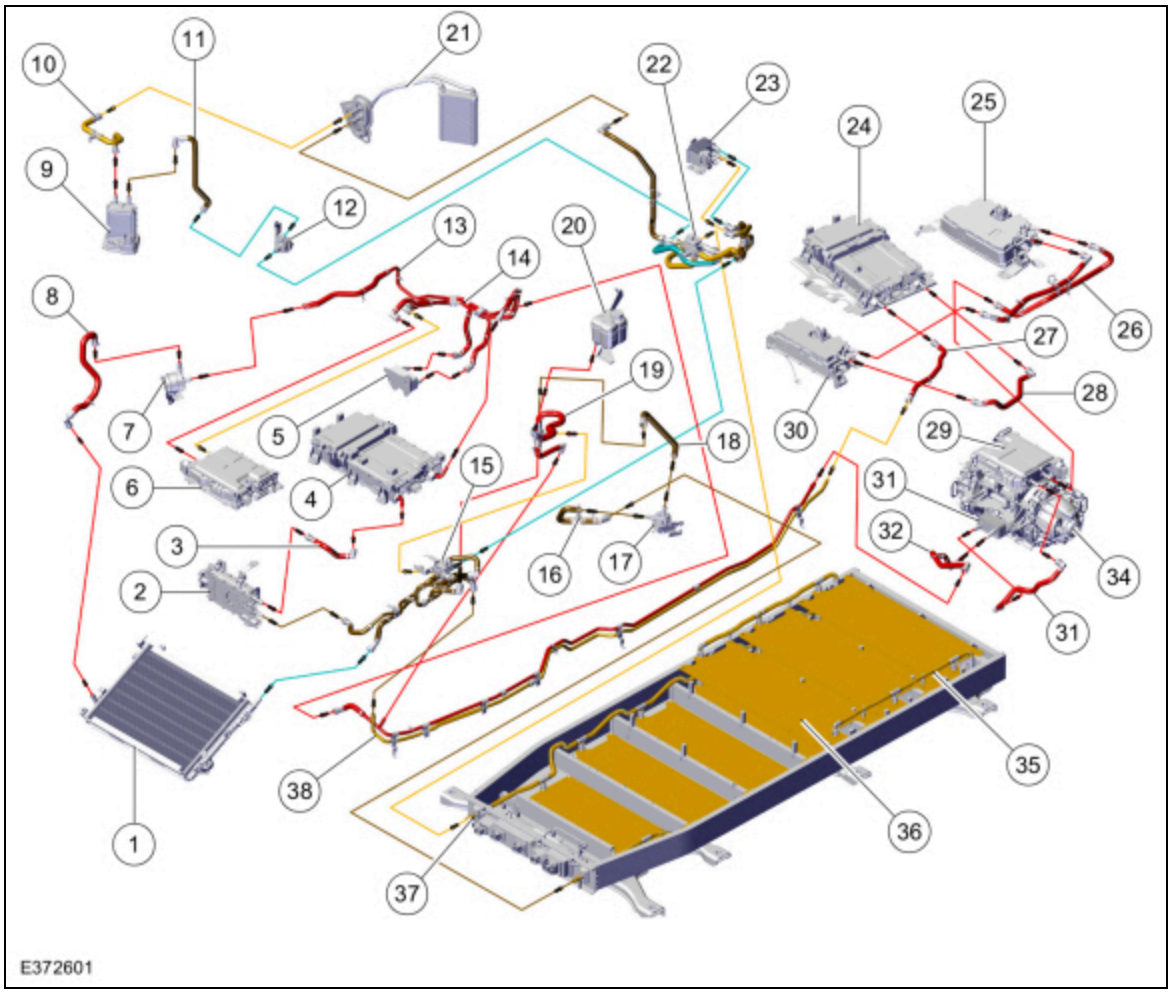
Base Trailer Tow - With 2.4kW Pro Power Onboard



Item	Part Number	Description
1	—	Radiator
2	—	DC/DC (direct current/direct current converter control module)
3	—	DC/DC outlet hose
4	—	SOBDM (Secondary On-Board Diagnostic Control Module A)
5	—	Front electric drive assembly oil cooler
6	—	Secondary Inverter system controller (SOBDM-B)
7	—	Front coolant pump
8	—	Radiator inlet hose
9	—	Cabin coolant heater
10	—	Heater core inlet hose
11	—	Cabin coolant heater inlet hose
12	—	Cabin heater coolant pump
13	—	Front coolant pump inlet hose
14	—	Secondary Inverter system controller (SOBDM-B) inlet hose
15	—	Rear coolant pump outlet hose
16	—	Rear coolant pump
17	—	High voltage battery radiator coolant diverter valve
18	—	High voltage battery coolant temperature sensor
19	—	High voltage battery coolant pump

20	—	High voltage battery coolant pump inlet hose
21	—	Coolant expansion tank hose
22	—	Coolant expansion tank
23	—	Heater core
24	—	High voltage battery coolant diverter valve
25	—	High voltage battery coolant cooler
26	—	DC/AC (direct current/alternating current) inverter
27	—	Inverter system controller (SOBDM-C) inlet hose
28	—	Inverter system controller (SOBDM-C)
29	—	DC/AC inverter inlet hose
30	—	Rear electric drive assembly oil cooler inlet hose
31	—	Rear electric drive assembly oil cooler outlet hose
32	—	Rear electric drive assembly oil cooler
33	—	Rear electric drive unit
34	—	High voltage battery coolant hose assembly
35	—	High voltage battery plates
36	—	High voltage battery coolant tube assembly
37	—	Coolant hose assembly

Max Trailer Tow - With 9.6kW Pro Power Onboard



Item	Part Number	Description
1	—	Radiator
2	—	DC/DC (direct current/direct current converter control module)
3	—	DC/DC outlet hose
4	—	SOBDM (Secondary On-Board Diagnostic Control Module A)
5	—	Front electric drive assembly oil cooler
6	—	Secondary Inverter system controller (SOBDM-B)
7	—	Front coolant pump
8	—	Radiator inlet hose
9	—	Cabin coolant heater
10	—	Heater core inlet hose
11	—	Cabin coolant heater inlet hose
12	—	Cabin heater coolant pump
13	—	Front coolant pump inlet hose
14	—	Secondary Inverter system controller (SOBDM-B) inlet hose
15	—	High voltage battery radiator coolant diverter valve
16	—	High voltage battery coolant temperature sensor
17	—	High voltage battery coolant pump
18	—	High voltage battery coolant pump inlet hose
19	—	Coolant expansion tank hose

20	—	Coolant expansion tank
21	—	Heater core
22	—	High voltage battery coolant diverter valve
23	—	High voltage battery coolant cooler
24	—	GFM2 (Generic Function Module 2)
25	—	DC/AC (direct current/alternating current) inverter (7.2kW)
26	—	DC/AC inverter (7.2kW) hose assembly
27	—	GFM2 inlet hose
28	—	DC/AC inverter (2.4kW) inlet hose
29	—	Inverter system controller (SOBDM-C)
30	—	DC/AC inverter (2.4kW)
31	—	Rear electric drive assembly oil cooler
32	—	Rear electric drive assembly oil cooler outlet hose
33	—	Rear electric drive assembly oil cooler inlet hose
34	—	Rear electric drive unit
35	—	High voltage battery coolant hose assembly
36	—	High voltage battery plates
37	—	High voltage battery coolant tube assembly
38	—	Coolant hose assembly

Electrified Drivetrain Cooling Description

The electrified drivetrain cooling system contains three circuits: High voltage battery circuit, heater circuit, and a powertrain electronics circuit. The system includes a four port and a five port valve that can isolate or combine circuits to heat or cool components within each circuit as necessary. All three circuits are connected to a common coolant expansion tank.

High Voltage Battery Circuit

The high voltage battery circuit uses coolant to cool and heat the high voltage battery. The coolant passes through the high voltage battery, a five port proportional control valve and a four port valve. The five port valve allows the coolant to be cooled by a refrigerant heat exchanger (High voltage battery coolant cooler) or in combination with the high voltage battery radiator valve through the radiator. A temperature sensor in the high voltage battery circuit provides the control module with coolant temperature. The upper temperature limit for the high voltage battery circuit is 55°C (131°F).

Heater Circuit

The heater circuit uses a positive temperature coefficient (PTC) heater to heat coolant that is transferred to the cabin through a heater core. This circuit also passes through the five port valve to allow this circuit to be combined with the high voltage battery circuit for battery heating.

Powertrain Electronics Circuit

The powertrain electronics circuit uses a radiator to cool all powertrain electronic components within the system. This circuit also passes through the four port valve to allow it to be combined with the high voltage battery circuit. Combining the two circuits provides additional methods to heat or cool the high voltage battery.