PRODUCT INFORMATION
COOLANT CIRCULATION PUMP

- → Optimal Thermal Management: Regulates coolant flow to maintain ideal temperatures for batteries (EVs) and engines, maximizing efficiency and lifespan.
- → Enhanced Cabin Comfort: Ensures continuous heat supply to the cabin, even when the engine is off, crucial for start-stop and hybrid systems.
- → Fuel Efficiency & Emissions: Allows electronic control units (ECUs) to precisely manage flow, helping engines warm up faster and run efficiently, reducing fuel consumption and harmful emissions.
- → Support for Advanced Systems: Essential for electric vehicle (EV) thermal management, managing battery temperature for performance and longevity, and for vehicles with start-stop functionality.

PRODUCT FEATURES

Thermal management in motor vehicles is an indispensable part of modern vehicle architecture. Components such as the media pump ensure optimal control of heat flows in the vehicle and improve the service life, efficiency and performance of electric vehicles.

To make optimum use of the heat energy generated, the thermal management system controls the relevant heat flows in the vehicle. This ensures that parts and components, such as engines or batteries, can be operated within their ideal temperature range and that the vehicle interior can be air-conditioned according to individual needs

Design and function
The electric coolant circulation pump used in the cooling circuit to circulate the coolant and to cool the battery, electric drive and power electronics accordingly. The pump works independently of the engine and according to the requirement, and it has continual levels of activation. It can be used as a circulation pump or a bypass pump. Consequently, it is possible to increase the service life and efficiency of the lithium-ion battery, as well as boost the overall range of electric vehicles.

The media pump has a lightweight, compact design and is equipped with safety features such as blockage detection, dry-running protection, temperature, voltage and current detection. In addition, the pump has an active cooling concept

Blockage detection, dry-running detection
If there is a blockage or no coolant in the pump, the defect is detected by the integrated electronics based on the pump speed and the starting current. If there is no change within a test cycle initiated by the control unit, the pump is switched off and an error entry is generated.

Temperature detection
Since the maximum coolant temperature for the media pump is 90°C, the temperature reduction is designed to maintain the temperature within the specified range. The temperature derating of the pump controls the temperature of the electronics by reducing the current consumption.

If the coolant temperature rises above the maximum value or the temperature sensor on the PCB is damaged, the electronics detect the over temperature error. The pump electronics classify 124°C as an over temperature error and stop the pump in a controlled manner.

COOLANT CIRCULATION PUMP

Voltage and current detection
If overvoltage or undervoltage is detected, the pump goes into idle mode and runs at reduced power to ensure the coolant flow.

If overcurrent is detected, the pump stops to prevent the high currents from damaging the pump.

For both errors, a fault code is stored in the fault memory

Active cooling concept
The active cooling concept ensures improved dissipation of thermal energy within the pump by thermally coupling the printed circuit board and the motor windings to the cooling circuit and optimally placing the current-carrying components to improve temperature distribution on the printed circuit board.

This means that the MP150e can be operated with high electrical current density in the stator windings without overheating and is largely outside the influence of the ambient temperature

Areas of application
Electric coolant circulation pumps are used in main or auxiliary cooling circuits of vehicles with combustion engines or alternative drives.

Their areas of application are:

- → Engine cooling
- → Cooling of the exhaust gas recirculation
- → Indirect charge air cooling
- → Transmission cooling

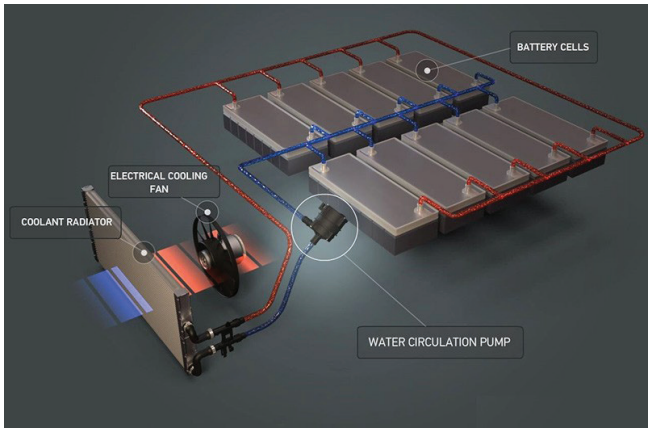
Cooling of battery, power electronics or drive in hybrid and electric vehicles
Depending on the drive type (internal combustion engine, hybrid, electric) and the system, one or even several pumps can be installed in the vehicle

SYSTEM INTEGRATION IN THE VEHICLE

Example of system integration in the cooling system on a vehicle with combustion engine and electric motor.

Vehicles with combustion engines or hybrid vehicles (Fig. 1)
The media pump is integrated into the engine cooling circuit in addition to the mechanical water pump and is used for additional cooling in vehicles with combustion engines. The pump's functions include controlling the temperature for charge air cooling, transmission cooling, exhaust gas recirculation or other demand-controlled systems. As a result, both emissions and fuel consumption can be significantly reduced.

Electric vehicle (Fig. 2)
By using the media pump, the coolant flow in the electric vehicle can be made more flexible and efficient. It ensures an optimal battery temperature and increases the battery's lifetime and efficiency. The media pump guarantees an adequate flow of coolant so as not to exceed the maximum allowable battery temperature. This ensures a long battery life and protects all other components in a thermal management system from thermal damage..



COMPONENTS

Example of the structure of the HELLA Coolant Circulation Pump
A = electronics module; B = motor module; C = hydraulics module; 1. cover, 2. seal; 3. printed circuit board; 4. stator; 5. seal; 6. rotor, 7. seal; 8. rotor starting disc; 9. motor housing; 10. impeller; 11. seal; 12. pump housing; 13. damper