

Amphenol Sensors

Connecting your world through
Sensing Innovations

Electrification Solutions for EV/HEV

Amphenol Sensors is a leading innovator in sensor technologies and measurement solutions. Offering the most diverse sensor portfolio of standard and customized products for the world's most demanding regulatory and industry-driven applications, Amphenol creates value by providing critical information for real-time decisions.

The advantages of Electric and Hybrid Electric Vehicles (EV/HEV) have been long-known. To the everyday driver, they offer reduced fuel costs. For the environment, they utilize renewable energy and offer reduced emissions.

Challenges associated with EV/HEV stem from a limited availability of technologies to enable the use of electricity as a fuel source in a safe and cost-effective manner.

With our vast automotive expertise, engineering resources and manufacturing capabilities, Amphenol Sensors offers various sensor solutions that enable automotive manufacturers to accelerate the electrification of vehicles around the world.



Amphenol Sensors

Electrification Solutions for EV/HEV

● Temperature ● Pressure ● Gas ● Position ● Level ● Combination

Battery Pack

Consists of a cluster of individual batteries that serve as the primary fuel source of the vehicle, replacing hydrocarbon fuels used in conventional ICE automobiles.

● Temperature Sensors

Thermal Runaway

Occurs when battery cells exceed allowable operating temperature causing an explosion/fire, which then propagates, or spreads, to other cells within the battery pack.

● Temperature Sensors
● Pressure Sensors
● Gas Detection Sensors

Cell Connection System (CCS)

Used as top cover of the battery cell to provide connectivity with the Battery Management System (BMS).

● Temperature Sensors

Power Inverter / E-Motor

Converts higher voltage DC electricity to lower voltage AC electricity that is required to power the electric motor.

● Temperature Sensors
● Inductive Position Sensors

High Voltage Charger Connector

Connects the high voltage source to charge the battery within the vehicle.

● Temperature Sensors

Battery Coolant

Circulates around the battery cell to assist in maintaining optimum battery temperature.

● Temperature Sensors
● Pressure Sensors
● Combined Pressure & Temperature Sensors
● Ultrasonic Level Sensors

Motor Coil

Wire coils that generate a magnetic field and conduct electric current. The interaction between the two generates rotation of the motor shaft and the actual conversion of electrical to mechanical energy.

● Temperature Sensors

THERMAL RUNAWAY

Temperature Sensors

Measure and monitor battery temperature to detect Thermal Runaway conditions.

- Capable of single or multiple cell detection



Pressure Sensors

Detect pressure change inside the battery cell that indicates Thermal Runaway conditions.

- Surface mountable
- Simple 3-command I²C interface
- Very low current consumption: <35µA



Gas Detection Sensors

Detect the out-gassing of Carbon Dioxide (CO₂) to indicate pre-combustion conditions.

- Single and dual channel configurations
- Self-calibration with patented ABC Logic™ Software



Gas Detection Sensors

Detect the presence of combustible gases that indicate Thermal Runaway conditions.

- Sensitive to multiple gases: H₂ / CH₄ / CO₂
- Fast response time: <10 seconds
- IP6K7 rating



BATTERY PACK

Temperature Sensors

Measure and monitor surface temperature of the many batteries within the battery cell, which is critical to preserving the chemistry of the battery.

- Single point temperature sensors
- Rigid and flexible types
- Custom sensor packaging



CELL CONNECTION SYSTEM (CCS)

Temperature Sensors

Provide temperature and voltage sensing to monitor the state of charge of the battery cells.

- High current circuit for battery cell connectivity
- Available styles:

Wire Harness and Flexible Printed Circuit (FPC)



HIGH VOLTAGE CHARGER CONNECTOR

Temperature Sensors

Detect over-temperature conditions during charging.

- Installed within the connector



BATTERY COOLANT

Temperature Sensors

Measure and monitor fluid temperature of inlet/outlet battery coolant to provide indication of battery cell temperature.

- No leak path - Sensor cavity and tube are one piece
- USCAR sealed connection system
- Many part geometries: Inline tube, flying lead and integral sensor



Pressure Sensors

Measure the pressure in the cooling system to control pump capacity.

- Internal metal sealing for high media compatibility and no leakage
- Customized calibration for high accuracy



Combined Pressure & Temperature Sensors

Measure pressure in the cooling system, while, at the same time, measure temperature of the coolant for optimum thermal management.

- Available versions: R1234yf (up to 35bar) and R744 (up to 200bar)
- Tested LIN 2.1 conformity
- Automatic address assignment within LIN network (Slave Node Position Detection)



Ultrasonic Level & Temperature Sensors

Continuously monitor fluid level for early detection of coolant leakage.

- Level accuracy: ±2mm
- Temperature accuracy: ±2.5°C
- Output protocol offerings: Analog, PWM, SENT, CAN, LIN
- Input voltage options: 5V / 12V / 48V



MOTOR COIL

Temperature Sensors

Measure and monitor temperature of the motor coil to provide feedback on the operating conditions of the electric motor.

- Field-proven design
- Variety of lead lengths, terminal and connector options



POWER INVERTER / E-MOTOR

Temperature Sensors

Measure and monitor operating temperature of the power inverter to provide feedback on unsafe conditions.

- Fast response time
- Pigtail connector



Inductive Position Sensors

Provide data on the angular position of the rotating motor shaft to optimize control of the motor inverter.

- Inductive eddy-current with weight and size reduction
- Stable output over extended temperature range (-40°C/+160°C) and radial/axial misalignment
- Robust against magnetic flux and external stray fields



Sensor Technologies

MAJOR MARKETS SERVED	Thermometrics, Inc. Temperature	Telaire Gas & Moisture	NovaSensor Pressure	Protimeter Moisture Meters	Kaye Thermal Validation	SGX Sensortech Gas	Piher Sensing Systems Position	Wilcoxon Sensing Technologies Vibration	Piezo Technologies Ultrasonic	i2s Pressure & Temperature	All Sensors Ultra Low Pressure	SSI Technologies Level, Quality & Pressure	Exa Thermometrics Temperature
Aerospace (Commercial)	●		●			●	●				●	●	●
Agriculture	●	●		●		●	●			●		●	●
Air Quality (Indoor)	●	●	●	●		●	●	●			●	●	●
Automation	●	●					●	●			●		●
Automotive	●	●	●			●	●			●		●	●
Construction & Restoration				●								●	
ELECTRIFICATION - EV/HEV	●	●	●			●	●			●		●	●
Battery Coolant	●		●							●		●	●
Battery Pack	●												●
Cell Connection System (CCS)	●												
Charger Connector	●												
Motor Coil	●												●
Power Inverter / E-Motor	●						●						●
Thermal Runaway	●	●	●			●							
Energy	●					●		●	●				●
Environmental Monitoring					●	●					●		
Heavy Equipment & Off-Road (HVO)	●		●			●	●			●		●	●
HVACR	●	●	●			●	●	●		●	●	●	●
Industrial	●	●	●	●		●	●	●		●	●	●	●
Marine	●					●	●	●				●	
Medical	●	●	●		●		●		●		●	●	
Military	●		●			●	●	●	●		●	●	
Non-Destructive Testing (NDT)									●				
Oil & Gas	●		●			●	●	●	●		●	●	●
Pharmaceutical & Biotech					●						●	●	
Process Control	●	●	●			●	●	●		●	●	●	●
Railway	●							●				●	●
Thermal Validation					●								

**Amphenol
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