Automotive Solutions

LEM specializes in developing and manufacturing current sensors for battery management and start-stop applications for conventional cars, electrical motor controls, and battery pack management and charging systems for hybrid and electric vehicles. LEM's broad portfolio of sensor solutions can be utilized to meet the challenges, technical requirements, and safety standards of a wide range of automotive applications while optimizing performance, safety, and efficiency. Additionally, LEM provides access to leading engineering services when customer-specific solutions are required.

Battery Management Systems:

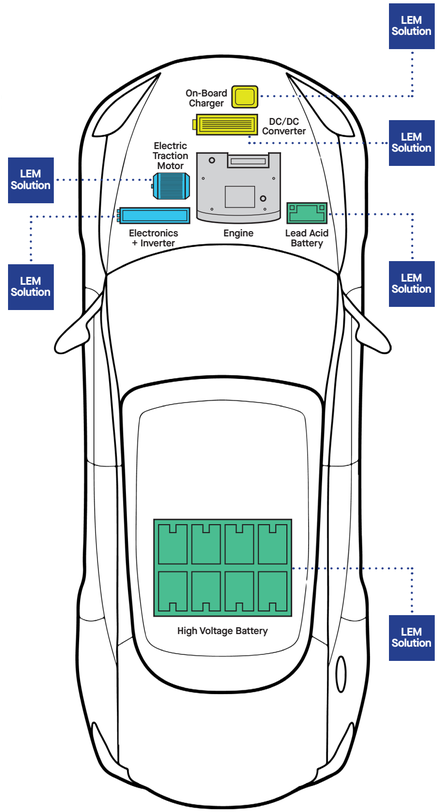
Battery management systems (BMS) require reliable, fast monitoring of the battery current. Highly accurate and Automotive Safety Integrity Level (ASIL) ready current sensors provide the required information and real-time data to improve efficiency and safety during the charging and discharging process of the BMS.

Motor Control:

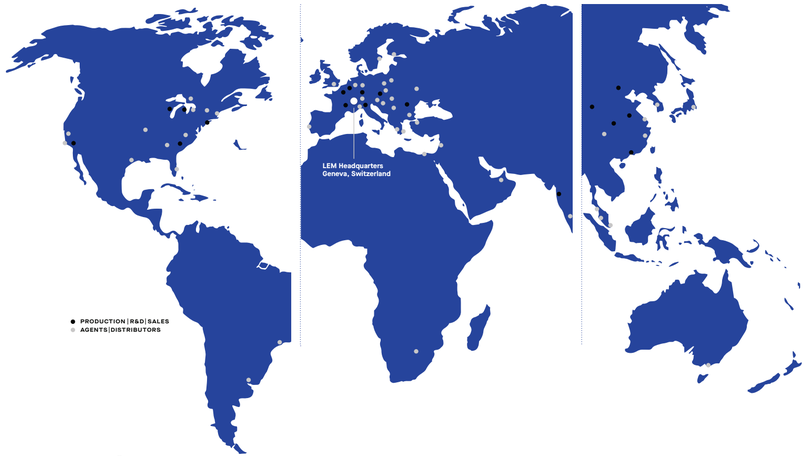
Motor control sensors are integral components that monitor and regulate various aspects of a vehicle's motors, including those used in electric power steering and more. These sensors ensure efficient and precise operation while enhancing safety and comfort for vehicle occupants.

Charging Systems:

In charging systems, current sensors are crucial components that monitor the flow of electric current between the alternator or generator and the battery. They ensure that the battery receives the correct charging current and prevent overcharging or undercharging, which can lead to battery damage or failure.



Global Support Network



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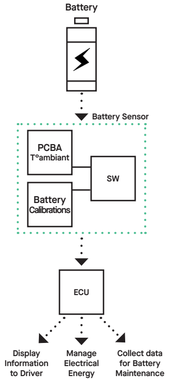
Battery Management Systems

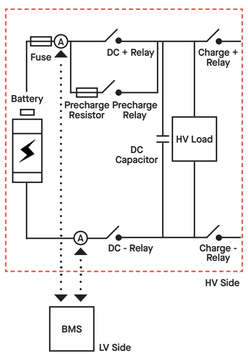
LEM addresses the BMS challenges of start-stop, hybrid, and electric vehicles by offering a range of highly accurate and ASIL-rated current sensors. LEM's sensor solutions feature a wide range of power levels and technologies that optimize battery performance, extend battery life, and prioritize safety.

Low Voltage:



	HBCT 250-V/SP3 HBCT 250-V/SP4	SSVT314	SSVT316	SSVT409 SSVT410
Application	12V Start-Stop	24V Truck	24V Truck	24V Truck
Bandwidth	1kHz	100Hz	100Hz	100Hz
Consumption	8mA	15mA	15mA	25mA
Current Range Max	+/- 250A	+/- 1600A	+/- 1600A	+/- 2000A
Supply Voltage	+5V	16V - 32V	16V - 32V	+12V
Mounting	Clamp	Clamp	Clamp	Clamp
Output	Analog	LIN	LIN	CAN
Overall Accuracy	2.5%	1%	1%	1%
Technology	Open Loop	Shunt	Shunt	Shunt

High Voltage:

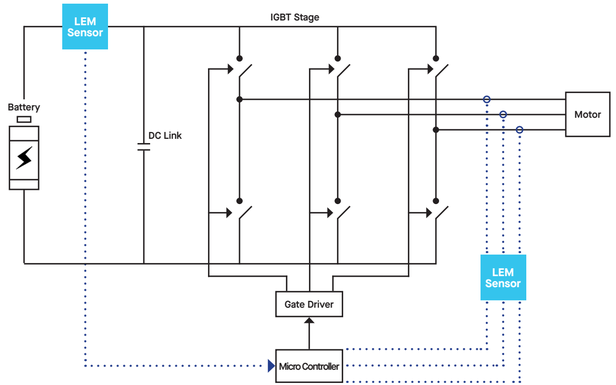


	HAH1BVW	DHAB	CAB 500	SMU	CAB 1500	HSU
Application	Mid / High	Mid / High	HV BMS xEVs	HV BMS for EVs	HV BMS xEVs	HV BMS for xEVs
Bandwidth	1.1kHz	1.1kHz	100Hz	100Hz	100Hz	1kHz
Consumption	Single 7mA Dual 14mA	16mA	40mA (0A) 130mA (@500A)	20mA	40mA (0A) 500mA (@1500A)	8mA
Current Range Max	+/- 1200A	+/- 100A LR +/- 9000A HR	+/- 500A	1500A	+/- 1500A	2000A
Supply Voltage	+5V	+5V	+12V	8V - 16V	+12V	+5V
Mounting	Busbar	Cable/Busbar	Cable/Busbar	Busbar	Cable/Busbar	Busbar
Output	Voltage Single/Dual	Voltage Dual	CAN	LIN/UART	CAN	Analog
Overall Accuracy	2.5%	2.5%	0.5%	1% up to 1350A, 1.3% at 1500A	0.5%	0.5% Shunt 2% Hall
Technology	Open Loop Dual Range	Open Loop Dual Core	Fluxgate	Open Loop	Fluxgate	Shunt + Hall

Motor Control

LEM offers sensors dedicated to power inverter applications that provide flexible designs to vehicle manufacturers and Tier 1 suppliers as well as solutions compatible with various subsystems: printed circuit design boards, power modules, integrated busbars, and standard busbar mountings.

Motor Inverters:

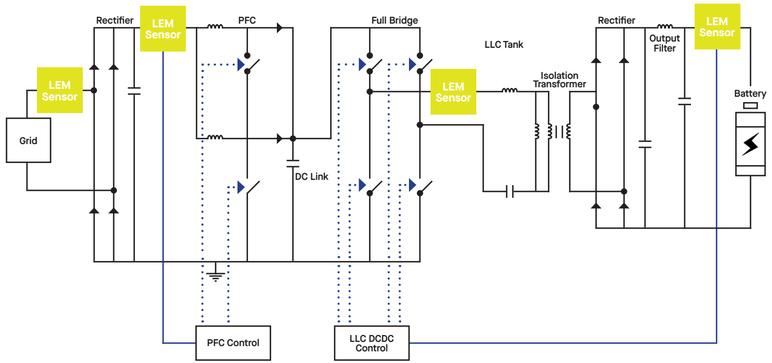


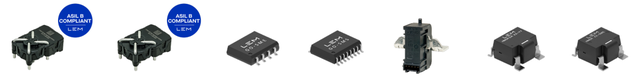
	HC5FW	HSNDR	HAH1DR	HAH2DR	HAH3DR S03	HAH3DR S06	HAH3DR S07
Application	Motor Control	Motor Control	Motor Control	Motor Control	Motor Control	Motor Control	Motor Control
Bandwidth	50kHz	50kHz	50kHz	50kHz	50kHz	50kHz	50kHz
Consumtion	15mA	15mA	15mA	15 mA/phase	15mA/phase	15mA/phase	15mA/phase
Current Range Max	1 Phase +/- 900A	1 Phase +/- 1200A	1 Phase +/- 1500A	2 Phases +/- 650A	3 Phases +/- 900A	3 Phases +/- 900A	3 Phases +/- 1200A
Supply Voltage	+5V	+5V	+5V	+5V	+5V	+5V	+5V
Mounting	Busbar	Integrated Busbar	Busbar	Busbar	Busbar	Busbar	Infineon Hybrid Pack
Output	Through-Hole PCB Voltage	Voltage Molex Connector	Voltage Tyco Connector	Voltage JAM Connector	Voltage Hirose Connector	Voltage Molex Connector	Voltage Pressfit
Overall Accuracy	2%	3.2%	3.75%	3.2%	3.5%	4.25%	3.2%
Technology	Open Loop Hall Effect	Open Loop Hall Effect	Open Loop Hall Effect	Open Loop Hall Effect	Open Loop Hall Effect	Open Loop Hall Effect	Open Loop Hall Effect

Charging Systems

LEM offers sensors designed for charging systems to support transfer energy subsystems from AC to DC and DC to DC with high and low voltage applications that ensure safety and efficiency. Solutions dedicated to current leakage detection meet the technical requirements for bi-directional on-board charging and vehicle-to-grid/load.

On-Board Chargers:





	CDT	DCDT	GO SME	GO SMS	HAM	HMSR DA	HMSR SMS
Application	Leakage Detection	Leakage Detection	Control Loop	Control Loop	Power Fuel Cell Secondary DC/DC	Control Loop	Control Loop
Bandwidth	2kHz	100kHz	300kHz	300kHz	500kHz	300kHz	300kHz
Consumption	60mA	60mA	20mA	20mA	15mA	24mA	20mA
Current Range Max	48A Per Phase +/- 300mA (leakage)	48A Per Phase +/- 300mA (leakage)	25A - 37.5A	10A - 75A	+/- 300A	10A - 75A	15A - 75A
Supply Voltage	+5V	+5V	3.3V - 5V	3.3V - 5V	+5V	3.3V - 5V	3.3V - 5V
Mounting	1 Phase - 2 Jumpers 3 Phases - 4 Jumpers	1 Phase - 2 Jumpers 3 Phases - 4 Jumpers	SMD SOIC 8	SMD SOIC 16	Integrated Busbar	SMD SOIC 16	SMD SOIC 16
Output	SPI + Analog Tripping Output	SPI + Tripping Output	Analog	Analog	Voltage	Digital	Analog
Overall Accuracy	10% @ 5mA	10% @ 5mA	1.3% - 3%	1.3% - 3%	3.2%	1% - 3%	1% - 3%
Technology	Open Loop Fluxgate	Open Loop Fluxgate	ICS	ICS	Open Loop Hall Effect	ICS	ICS