

LEM

Life Energy Motion

AUTOMOTIVE SOLUTIONS

Electrical Measurement Solutions for Automotive Applications



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:

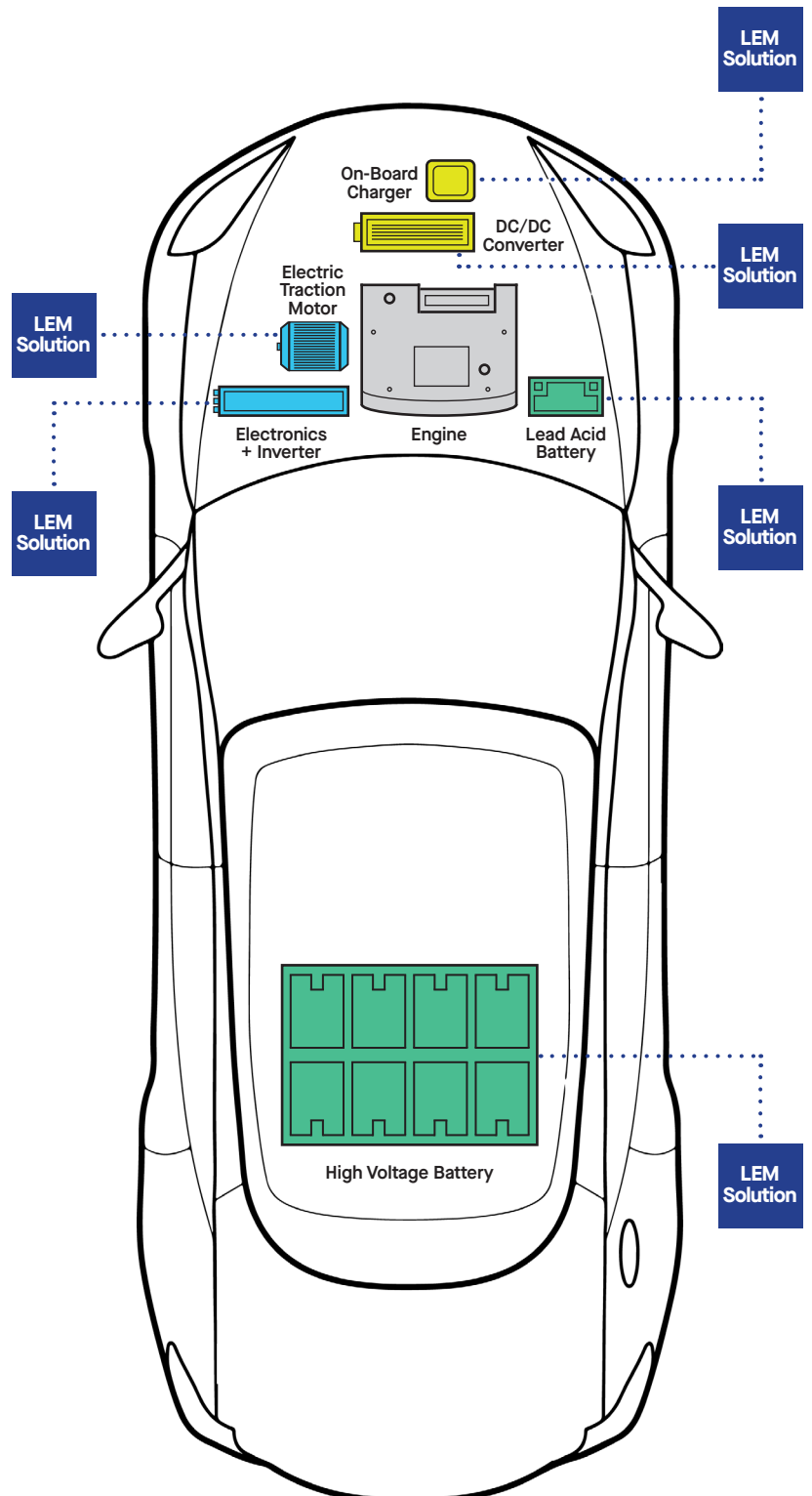
Battery management systems (BMS) require reliable, fast monitoring of the battery current. Highly accurate and Automotive Safety Integrity Level (ASIL) ready current sensors provide the required information and real-time data to improve efficiency and safety during the charging and discharging process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

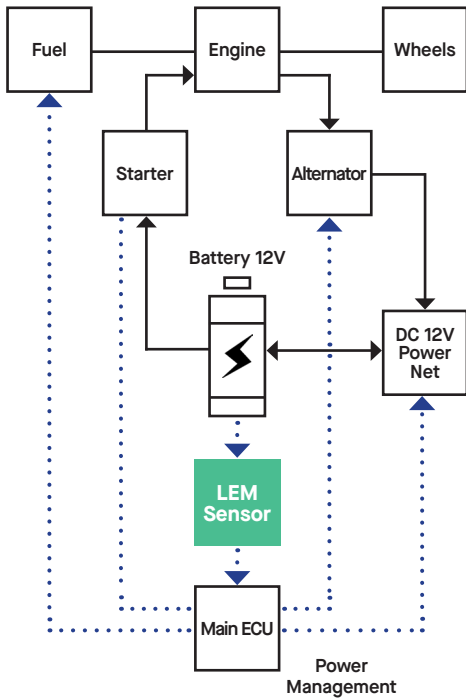
In charging systems, current sensors are crucial components that monitor the flow of electric current between the alternator or generator and the battery. They ensure that the battery receives the correct charging current and prevent overcharging or undercharging, which can lead to battery damage or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



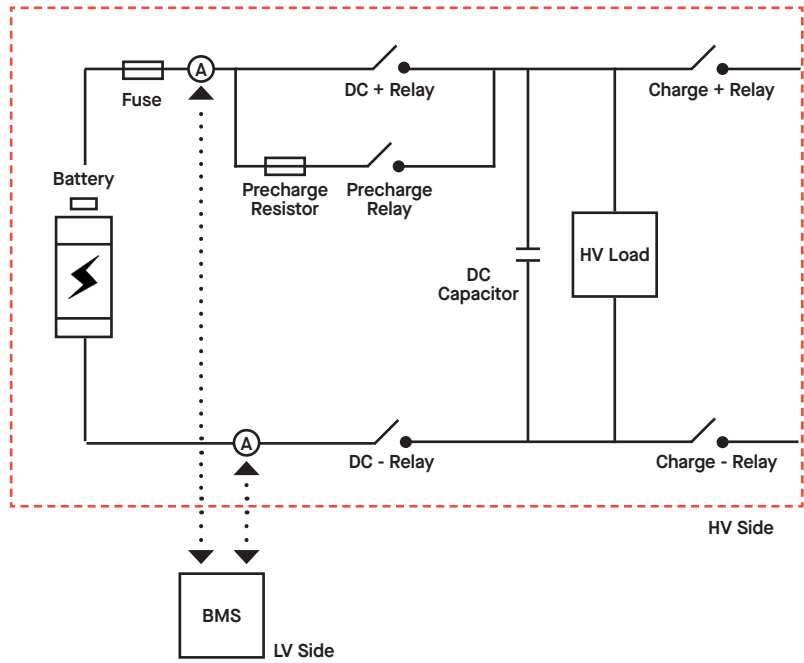
Battery Management Systems

LEM addresses the BMS challenges of internal combustion engines, 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.

ICE & Start-Stop:



Hybrid & Electric Vehicles:



HBCT



HAH1BVW



DHAB



SMU

ASIL
READY
B



CAB (SF) 500

ASIL
READY
B



CAB (SF) 1500

ASIL
READY
C

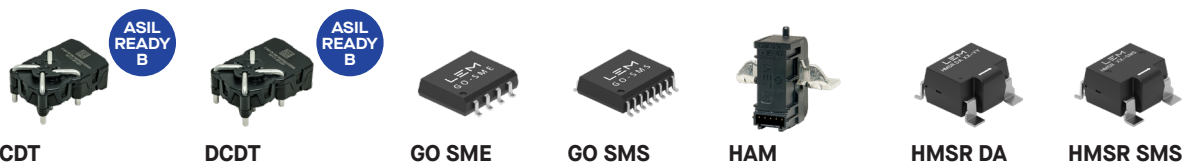
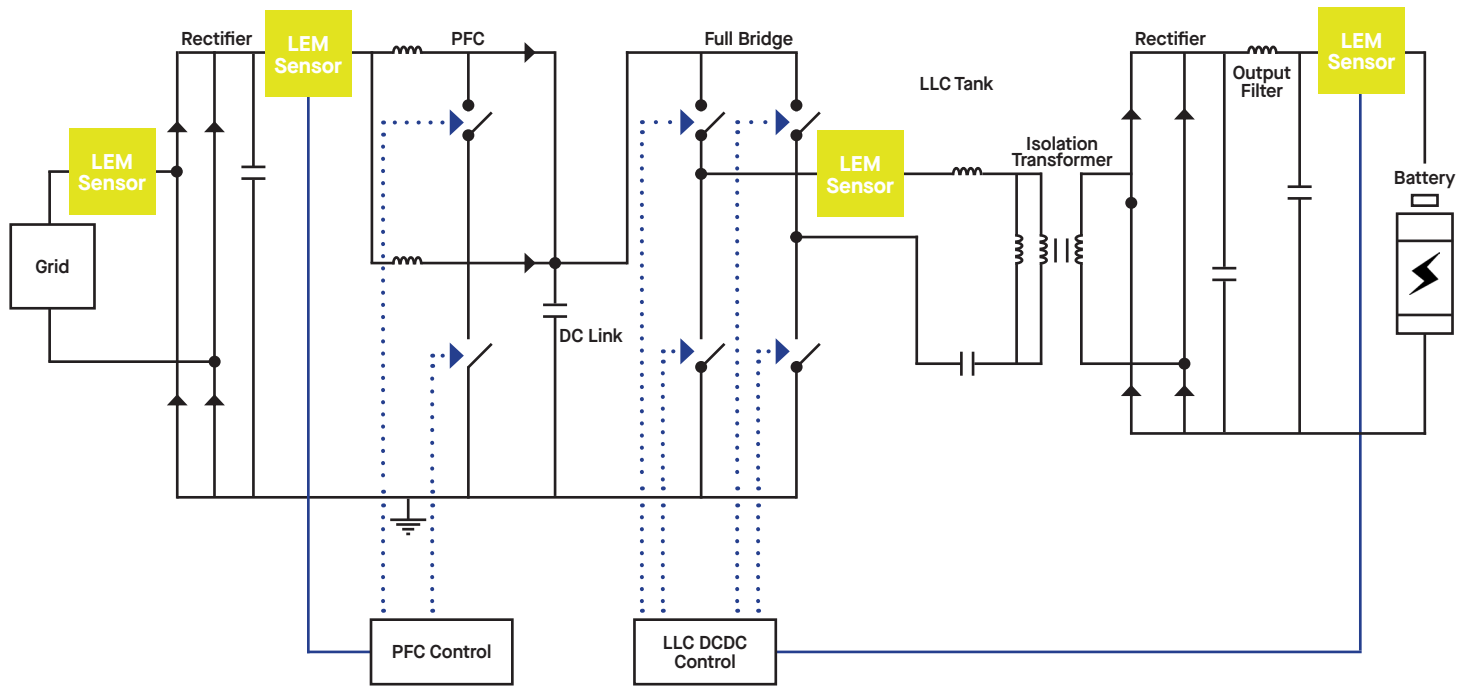
BMS SENSORS

| | HBCT | HAH1BVW | DHAB | SMU | CAB (SF) 500 | CAB (SF) 1500 |
|--------------------------|----------------|-------------------------|-----------------------------|----------------------------------|----------------------------|-----------------------------|
| Application | BMS Start-Stop | Mid / High | Mid / High | Mid / High | HV BMS xEVs | HV BMS xEVs |
| Bandwidth | 1.1kHz | 1.1kHz | 1.1kHz | 100Hz | 100Hz | 100Hz |
| Consumption | 10mA | Single 7mA Dual 14mA | 16mA | 20mA | 40mA (OA) 130mA (@500A) | 40mA (OA) 500mA (@1500A) |
| Current Range Max | +/- 250A | +/- 1200A | +/- 100A LR +/- 9000A HR | 1500A | +/- 500A | +/- 1500A |
| Supply Voltage | +5V | +5V | +5V | 8V - 16V | +12V | +12V |
| Mounting | Clamp | Busbar | Cable/Busbar | Busbar | Cable/Busbar | Cable/Busbar |
| Output | Voltage | Voltage Single/Dual | Voltage Dual | LIN/UART | CAN | CAN |
| Overall Accuracy | 2.5% | 2.5% | 2.5% | 1% up to 1350A, 1.3% at 1500A | 0.5% | 0.5% |
| Technology | Open Loop | Open Loop Dual Range | Open Loop Dual Core | Open Loop | Fluxgate | Fluxgate |

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

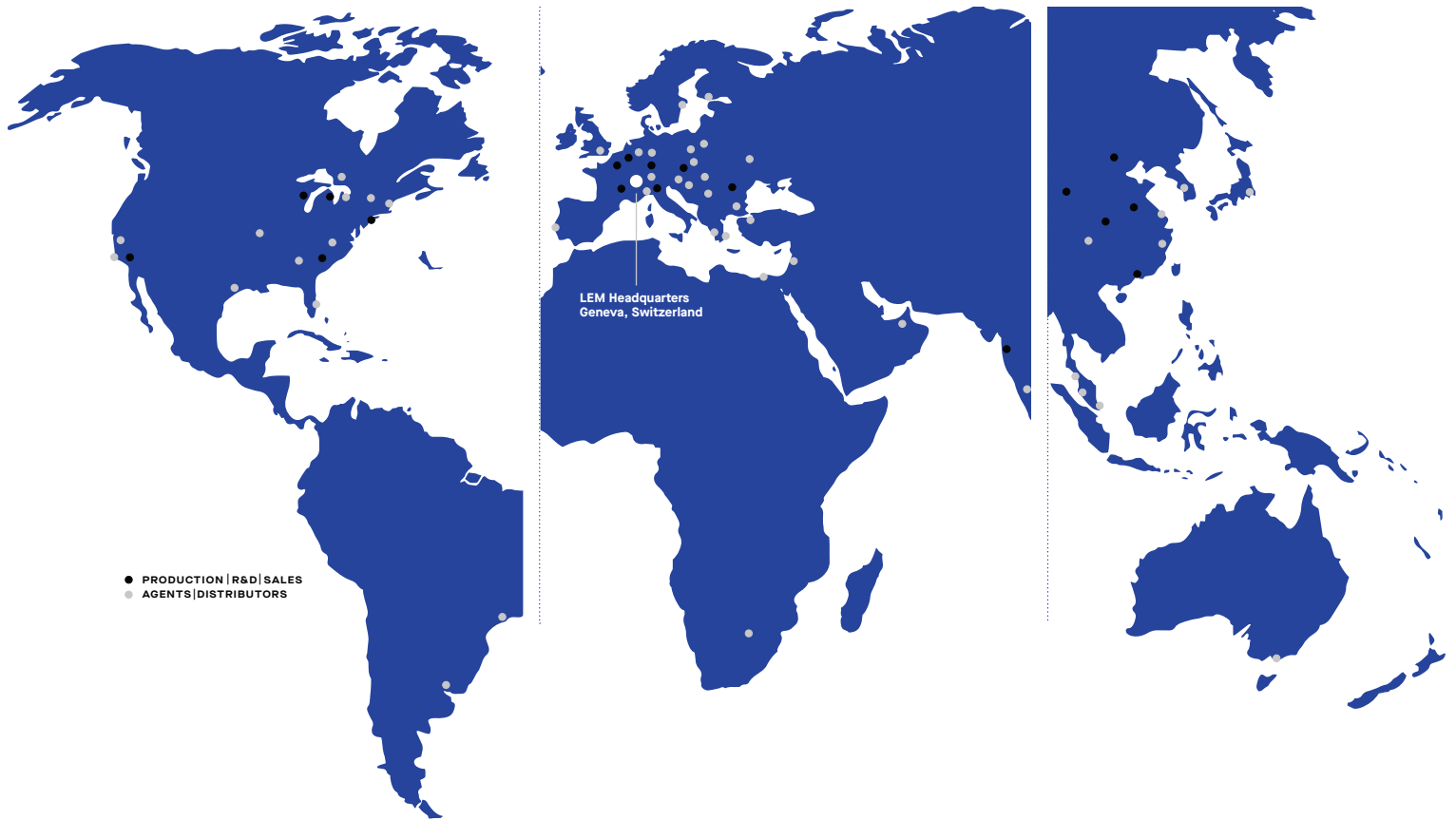
HMSR DA

HMSR SMS

CS SENSORS

| | 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 |

Global Support Network



Locations:

Americas:

LEM USA, Inc.
11665 W Bradley Road
Milwaukee, WI 53224
Tel. +1 800 236 5366

Bulgaria:

LEM Bulgaria EOOD
ul. "Iliyansko Shose" 8
1220 Sofia, Bulgaria
Tel. +359 2 424 6333

China:

LEM Electronics (China) Co., Ltd.
Linhe Street 28, Shunyi District
CN-101300 Beijing
Tel. +86 10 8945 5288

Europe:

LEM Europe GmbH
Frankfurter Street 74
64521 Groß-Gerau, Germany
Tel. +49 6152 93010

Headquarters:

LEM International SA
Route du Nant-d'Avril 152
1217 Meyrin, Switzerland
Tel. +41 22 706 11 11

Japan:

LEM Japan KK
2-1-2 Nakamachi
Machida, Tokyo 194-0021, Japan
Tel. +81 42 725 8151

Malaysia:

LEM Malaysia DN BHD
Jalan PSPN 3
14100 Simpang Ampat, Pulau Pinang, Malaysia

South Korea:

LEM Management Services Sàrl
FASTFIVE #311, #312
10 Nambusunhwan-ro 333-gil
Seocho-gu, Seoul 06725, Korea
Tel. +82 10 7150 2450

LEM

Life Energy Motion

