

CURRENT SENSORS

Prevailing Excellence



Honeywell

KEY SENSORS FOR CRITICAL APPLICATIONS



From electric vehicles to healthcare devices and commercial appliances, the ability to measure current is an important element in any application where electric power current needs to be metered, monitored, and managed.

Current sensors are widely used where current must be measured and then transformed into a voltage that can also be measured. The resulting voltage quantity is exactly proportional to the amount of current that passing through the channel being monitored. The voltage signal can then be used in control applications, analyzed for future use, or communicated through in system feedback displays.

The ability to measure current is an important element in any application where electric power current needs to be metered, monitored, and managed. This information is critical for power metering, control system measurement, and diagnosis, load control, charge integration, fault detection in machinery, and safeguarding of commercial appliances against surges.

At Honeywell, you can choose from a wide variety of current sensors ranging from digital output detectors sensing a few hundred milliamps to linear sensors monitoring over one thousand amps. Our comprehensive offerings provide superior cost-effective performance as well as the advantages you expect from a global leader in sensing devices with decades of engineering expertise.

Honeywell current sensors are available in devices incorporating different sensing technologies, fast response times, minimum energy dissipation, built-in temperature compensation, and excellent reliability.

ALTERNATING CURRENT INPUT

- Analog or bipolar output that duplicates the wave shape of the sensed current
- Unipolar output that is proportional to the average (RMS) value of the sensed current

DIRECT CURRENT INPUT

- Unipolar (unipolar output) that duplicates the wave shape of the sensed current
- Digital output that switches when the sensed current exceeds a specified threshold

WHERE ELECTRIC CURRENT IS CRITICALLY IMPORTANT, SO ARE CURRENT SENSORS

Managing power is serious business, and Honeywell has current sensors that are specifically designed to handle that role with expertise. Our current sensors offer fast, accurate responses in adjustable linear, null balance, digital, and linear versions.

Non-intrusive and electrically isolated from the monitored circuit, Honeywell current sensors ensure a simple and reliable structure without loss of power to the monitored circuit. Our proprietary, patented temperature compensation algorithms enable better accuracy performance throughout the operating temperature range. When fluctuations in environmental temperature occur, the current sensor is not affected and maintains its high accuracy and low temperature drift.

Multiple Honeywell current sensors for multiple power management applications

Current sensors can be key components in a wide variety of power management applications.

Honeywell offers a new line of current sensors for the electric vehicle (EV) market and a wide variety of other Honeywell current sensors are available to meet the demands of the healthcare industry, commercial, HVAC, and other markets.

Open loop current sensors, for example, can be especially important in some situations because they are not damaged by overcurrent in the sensed conductor. Since they do not use feedback control, in addition to battery-powered circuits where they use less power they are well designed for use in uninterruptible power supply (UPS) devices that power equipment, nearly instantaneously, in the event of grid power failure to protect equipment from damage.

Closed loop current sensors, a second popular option, are engineered with enhanced accuracy and linearity to deliver fast response and their output is relatively immune to electrical noise.

Read on to learn more about vital role Honeywell current sensors play in a breadth of applications.



TAKING THEIR PLACE IN ELECTRIC VEHICLES

While demand for current sensors used in the fossil-fuel automotive market is anticipated to decrease as that market continues to age out, recent technological developments have accelerated the demand for new and advanced current sensors in electric vehicles (EVs), aircraft, and machinery. In new autonomous and electric vehicles, current sensors are widely used in dc/dc power converters and adjustable-speed motors. These types of converters are the basic elements of drivetrains in EVs and hybrid electric vehicles (HEVs). The accuracy, bandwidth and efficiency of current sensors can boost vehicle performance, making them a key contributor to widespread EV acceptance.

A current sensor in a Battery Disconnect Unit (BDU) can be used for overcurrent protection, battery health monitoring, system control and safety, and energy efficiency. Current sensors are utilized by an electric vehicle's battery management system (BMS) to estimate the battery pack's state of charge (SOC).

Combined with firmware, a BMS uses voltage, current, and temperature sensors to accurately assess SOC. Current sensors measure the current in and out of the battery, while voltage sensors then monitor the current within the battery pack. Temperature sensors ensure the system is operating in the acceptable range to conserve energy (Honeywell offers all of these types of sensors, not just current sensors).

Designed as non-intrusive and electrically isolated from the monitored circuit, Honeywell current sensors ensure a simple and reliable structure without loss of power to the monitored circuit. The sensor's CAN output provides fault detection and communication capability. The digital CAN communication is resistant to electrical interference and is designed to enable precise battery state measurement that can improve user experience.

Honeywell current sensors feature a proprietary, patented temperature compensation algorithm to enable better accuracy performance throughout the operating temperature range. When fluctuations in environmental temperature occur, the current sensor is not affected and maintains its high accuracy and low temperature drift. They are also less susceptible to magnetic field interference.

For example, in a BMS, there are multiple busbars that carry current and also can create electrical interference. The robust anti-magnetic interference design of Honeywell current sensors allows excellent sensing performance even when the distance between the sensor and busbar is only 5 mm. Our current sensors can be closer together, allowing the busbars to also be closer and minimizing space for more flexibility when designing a BMS system.

In another type of application found within the electric vehicle's motor, Honeywell CSHV open-loop current sensors can be used to monitor the operation of the electric drives while isolating faults. This offers instantaneous overcurrent protection for current leakage detection, fault detection, and isolation within the EV drive control.

It's not just in the BMS, though, where Honeywell current sensors can be deployed. They also can provide...

- Current leakage detection and fault isolation in charging systems
- Current measurement in energy storage systems
- Fault detection in heavy industrial vehicles

Our sensors may be customized to meet application needs. Solutions may be tailored to exact specifications for improved time to market, lower total system costs, and enhanced reliability.





Honeywell CSHV Current Sensor



Honeywell CSNV Current Sensor



Honeywell CSSV Current Sensor



MULTIPLE HONEYWELL CURRENT SENSORS FOR MULTIPLE EV APPLICATIONS

Honeywell has engineered a suite of sensor offerings for enhanced safety in EV batteries and energy storage systems to bring the best combination of performance and reliability. Honeywell's current sensors provide high-accuracy readings with low-temperature drift to the BMS for electrical management protection and (SOC) monitoring.

When it comes to electric vehicles, for example, thermal runaway can be far more disastrous than just a mechanical complication – it's a top safety concern for the electric vehicle industry.

Safety requirements for (EVs) are very different than those for gas-fueled vehicles and there are significant challenges, such as the lithium-ion batteries used to power EVs that are susceptible to thermal runaway. This occurs when the lithium-ion cell enters an uncontrollable self-heating state that can result in catastrophic explosions of engine parts as well as dangerous fires.

Both the Honeywell CSNV Series and CSHV Series current sensors offered as part of our EV battery monitoring suite of sensors use patented Honeywell technology for precise battery state measurement as well as magnetic immunity for different magnetic environments. The CSNV Series are advanced flux gate current sensors and CAN communication capability for optimization of battery systems, while the CSHV Series are open-loop current sensors that use Hall-effect sensing to meet different sensing ranges and analog output for current leakage detection and fault isolation. The CSSV Series, designed for safety-critical applications, incorporates a dual channel sensing method and diagnostic functionality. Both CSNV700 and CSSV1500 sensors incorporate integrated circuits that are AEC-Q100 qualified to meet higher quality and reliability requirements for automotive applications.

For more, visit <https://sps.honeywell.com/us/en/products/advanced-sensing-technologies/aero-and-transportation-sensing/aero-and-transportation-sensors/electric-vehicles-sensors>

CLOSED LOOP CURRENT SENSORS

Closed loop current sensors use feedback control to provide output proportional to measured current. They are engineered with enhanced accuracy and linearity to deliver fast response, and their output is relatively immune to electrical noise. These trusted devices are widely used in variable speed drives, Servo motors and drives, robotics, power supplies, ground fault detectors, and watt meters as well as for overcurrent protection in many types of industrial and commercial equipment.



TABLE 1. CLOSED LOOP CURRENT SENSOR COMPARISON

Series	Rated Current	Sensing Current Ranges	Response Time	Accuracy
CSNE	25 A, 50 A	±36 A, ±90 A	< 1 μs	±0.5 %
CSNF	100 A	±150 A, ±180 A, ±200 A	< 0.5 μs	±0.5 %
CSNG	100 A	±180 A, ±200 A	< 0.5 μs	±0.5 %
CSNH	25 A	±43 A	< 1 μs	±0.5 %
CSNJ	300 A	±600 A	< 0.5 μs	±0.5 %
CSNK	500 A	±1200 A	< 1 μs	±0.5 %
CSNP	50 A	±90 A	< 0.5 μs	±0.5 %
CSNR	125 A	±200 A	< 0.5 μs	±0.5 %
CSNS	100 A, 200 A, 300 A	±320 A, ±600 A	< 0.5 μs	±0.5 %

OPEN LOOP CURRENT SENSORS

Open loop current sensors provide output voltage proportional to measured current without using feedback control. They are often preferred in battery-powered circuits due to their compact size and lower power consumption which can enable longer battery life. This type of current sensor is often used in welding machines, variable speed drives, and overcurrent protection applications.



TABLE 2. OPEN LOOP CURRENT SENSOR COMPARISON

Series	Current	Sensing Current Ranges	Response Time	Connectors
CSCA-A	ac, dc, im-pulse current	±150 A, ±300 A, ±600 A, ±900 A	3 μs to 7 μs	Molex & Gallant

DIGITAL/INDUCTIVE CURRENT SENSORS

Each Honeywell CS Series digital current sensor provides a logic-level output that changes from approximately Vcc to 0.4 volts when the sensed current exceeds the pre-set operate point. Each digital sensor will operate on ac or dc current, but the output will turn off at every zero crossing when sensing ac current. These sensors are not damaged by overcurrent and can be used in renewable energy equipment, industrial automation applications to optimize performance of motors and drives, and in consumer electrics for battery management systems, power supplies, and charging circuits.



HONEYWELL CURRENT SENSORS FOR PREVAILING EXCELLENCE TODAY AND TOMORROW

Like all Honeywell sensors, switches, and control components, our current sensors are tailored to exact specifications for stronger performance, longer productivity, and increased safety. Enhanced accuracy and durability are built into every part, improving output and endurance that can reduce expenditures and operational costs.

Our sensing solutions are suitable for both basic and complex applications and if you also need clean-slate development or simple modifications to an existing design, our design engineering expertise is at your beck and call.

When you value global service, sourcing, and manufacturing and industry-leading engineering experience, Honeywell is your full-service one-stop partner.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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For more information

Honeywell Sensing & Safety Technologies services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or the nearest Authorized Distributor, visit [our website](#) or call:

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