

# CSHV SERIES

005999  
Issue 6

## Open Loop Current Sensors

### DESCRIPTION

The CSHV Series are open loop current sensors that use Hall-effect sensing and patented Honeywell technology to bring the best combination of performance and reliability for current sensing applications.

These products are non-intrusive and electrically isolated from the monitored circuit. This ensures a simple sensing method. They are rated for a primary current measurement range of  $\pm 100$  A to  $\pm 1500$  A dc.

The CSHV Series is AEC-Q100 qualified to meet higher quality and reliability. For motor control applications, the current measurement is directly proportional to the motor torque. Current measurement can also be used to determine the speed at which the motor is turning. Such speed information can be calculated by understanding how the control algorithm affects the current level.

### CUSTOMIZATION

The CSHV Series may be customized to best meet specific application needs. Solutions may be tailored to exact specifications for improved time to market, lower total system costs, and enhanced reliability.

Honeywell provides global technical assistance and engineering/service support.

### DIFFERENTIATION

- **Accuracy:** Hall-effect sensing and stable amplification circuitry for improved accuracy over the full operating temperature range
- **Magnetic immunity:** Optimized magnetic circuit allows for excellent performance in diverse magnetic environments
- **Flexible:** Customizable to meet specific application requirements

### VALUE TO CUSTOMERS

- **Accurate:** Designed to enable precise battery state measurement for improved user experience. Accurate current sensing enables precise and smooth motor control
- **Fast Response Time:** Fast response time allows fault detection and asset protection before catastrophic failure
- **Ease of use:** Magnetic immunity allows for easy integration into different magnetic environments
- **Easy system integration:** Analog voltage output may be used by battery management system

### FEATURES

- Active open loop current sensing using Hall-effect technology
- High accuracy and low temperature drift
- Operating temperature of  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  [ $-40^{\circ}\text{F}$  to  $257^{\circ}\text{F}$ ]
- Analog voltage output
- CE and UKCA certification; REACH and RoHS compliant
- AEC-Q100 qualified for higher reliability



### APPLICATIONS

- Current measurement for battery management systems in electrified vehicles (EV, HEV, PHEV, BEV)
- Current leakage detection and fault isolation in battery charging systems
- Current measurement in energy storage systems
- Fault detection in heavy industrial equipment

### PORTFOLIO

Honeywell offers a variety of current sensors for potential use in many applications. To view the entire product portfolio, click [here](#).

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**TABLE 1. ABSOLUTE MAXIMUM RATINGS (not operating)**

Characteristic	Symbol	Unit	Parameter			Condition
			Min.	Typ.	Max.	
Supply voltage max.	$V_{S \text{ max.}}$	V	—	—	10	—
Reverse supply voltage max.	$V_{R \text{ max.}}$	V	-0.3	—	—	—
Output voltage max.	$V_{OUT \text{ max.}}$	V	-0.3	—	10	$V_{OUT}$ reverse/forward voltage
Output current max.	$I_{OUT \text{ max.}}$	mA	-10	—	10	—
Ambient storage temperature	—	°C	-40	—	125	—
Electrostatic discharge voltage	$V_{ESD}$	kV	—	—	8	—
RMS voltage for AC isolation test	$V_{DWW}$	kV	—	—	2.5	50 Hz, 1 min
Creepage distance	$d_{Cp}$	mm	4.9	—	—	—
Clearance	$d_{Cl}$	mm	4.9	—	—	—
Comparative tracking index	CTI	—	PLC3	—	—	—

**TABLE 2. OPERATING CHARACTERISTICS IN NOMINAL RANGE ( $I_{PN}$ )**

Characteristic	Symbol	Unit	Parameter			Condition
			Min.	Typ.	Max.	
Primary current, nominal DC	$I_{PN}$	A	$-I_{PN}$	—	$I_{PN}$	—
Supply voltage	$V_S$	V	4.5	5	5.5	—
Output voltage	$V_{OUT}$	V	$V_{OUT} = \frac{V_S}{5} (G * I_P + V_{OS})$			$I_P = (V_{OUT} * \frac{5}{V_S} - V_{OS}) / G$
Output voltage (at $I_P = 0$ )	$V_{OS}$	V	—	2.500	—	—
Electrical offset voltage	$V_{OS, ELECT}$	mV	—	±3	—	$T_A = 25^\circ\text{C}$ , $V_S = 5 \text{ V}$
Magnetic offset voltage	$V_{OS, MAG}$	mV	—	±2	—	$T_A = 25^\circ\text{C}$ , $V_S = 5 \text{ V}$
Current consumption	$I_{SUPPLY}$	mA	— —	13 —	— 16	$T_A = 25^\circ\text{C}$ , $V_S = 5 \text{ V}$ —
Load resistance	$R_L$	Ohm	10k	—	—	—
Output impedance	$R_{out}$	Ohm	— —	1 —	— 10	$T_A = 25^\circ\text{C}$ $T = -40^\circ\text{C}$ to $125^\circ\text{C}$
Ratiometric error	$\epsilon_r$	%	—	±0.5	—	—
Sensitivity	G	mV/A	—	$2000/I_{PN}$	—	$T_A = 25^\circ\text{C}$
Sensitivity error: ±100 A to ±1200 A ±1500 A	$\epsilon_g$	%	— —	±0.6 ±0.8	— —	$T_A = 25^\circ\text{C}$ , $V_S = 5 \text{ V}$ $T_A = 25^\circ\text{C}$ , $V_S = 5 \text{ V}$
Linearity error	$\epsilon_L$	%	-1	—	1	% of full scale output
Ambient operating temperature	—	°C	-40	—	125	—
Average temperature coefficient	$V_{OS, ELECT}$	mV/°C	—	±0.04	—	—
Average temperature coefficient of G	—	%/°C	—	±0.02	—	—
Step response time (10 % to 90 %)	$t_r$	µs	—	2	6	—
Frequency bandwidth	BW	kHz	45	—	—	-3 dB
Output RMS noise (RMS)	—	mV	—	—	2	—

<sup>1</sup> See Table 4 for catalog listing specifics.

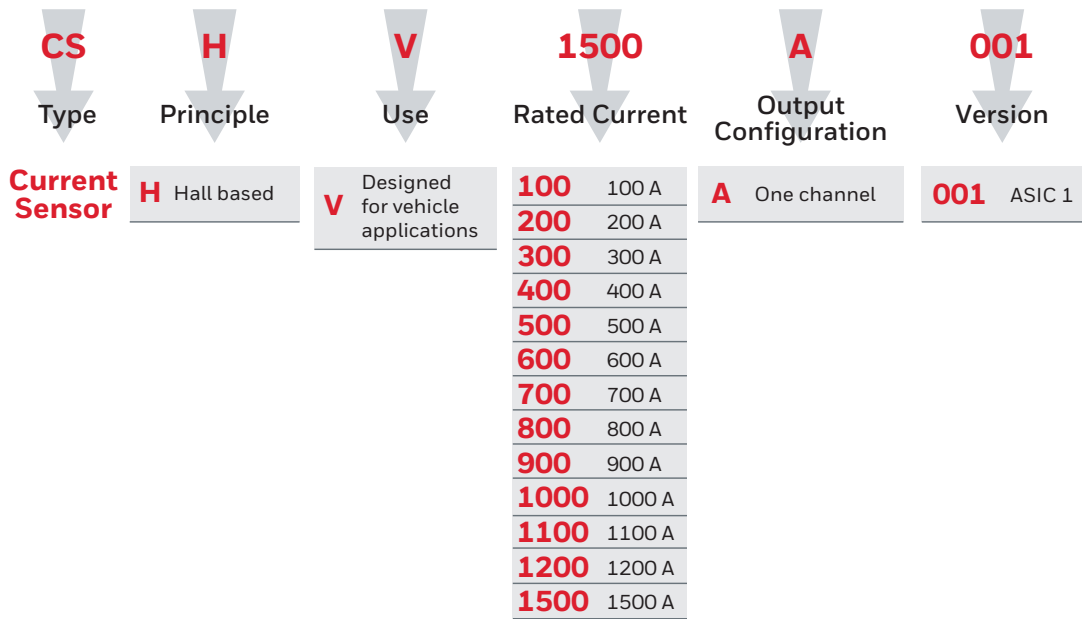
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TABLE 3. MECHANICAL CHARACTERISTICS	
Characteristic	Description
Housing material	PBT + GF30 %
Mounting screw	M4, 2,5 N m torque max.
Mating electrical connector	TE MPN 1473672-1
Weight	58 g ±5 g

TABLE 4. ORDER GUIDE						
Catalog Listing	Measure Range (A)	Sensitivity (mV/A at V <sub>s</sub> = 5 V)	Offset (mV at V <sub>s</sub> = 5 V)		Accuracy (% at V <sub>s</sub> = 5 V)	
			25°C	-40°C to 85°C	25°C	-40°C to 85°C
CSHV100A-001	±100	20	±7 mV	±25 mV	±1 %	±2 %
CSHV200A-001	±200	10	±7 mV	±15 mV	±1 %	±2 %
			25°C	-40°C to 125°C	25°C	-40°C to 125°C
CSHV300A-001	±300	6.667	±7 mV	±18 mV	±1 %	±2 %
CSHV400A-001	±400	5	±7 mV	±13 mV	±1 %	±2 %
CSHV500A-001	±500	4	±7 mV	±10 mV	±1 %	±2 %
CSHV600A-001	±600	3.333	±7 mV	±10 mV	±1 %	±2 %
CSHV700A-001	±700	2.857	±7 mV	±10 mV	±1 %	±2 %
CSHV800A-001	±800	2.5	±7 mV	±10 mV	±1 %	±2 %
CSHV900A-001	±900	2.222	±7 mV	±10 mV	±1 %	±2 %
CSHV1000A-001	±1000	2	±7 mV	±10 mV	±1 %	±2 %
CSHV1100A-001	±1100	1.818	±7 mV	±10 mV	±1 %	±2 %
CSHV1200A-001	±1200	1.667	±7 mV	±10 mV	±1 %	±2 %
CSHV1500A-001	±1500	1.333	±7 mV	±10 mV	±2 %	±3 %

Figure 1. Nomenclature



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Figure 2. Dimensional Drawings (For reference only: mm/in)

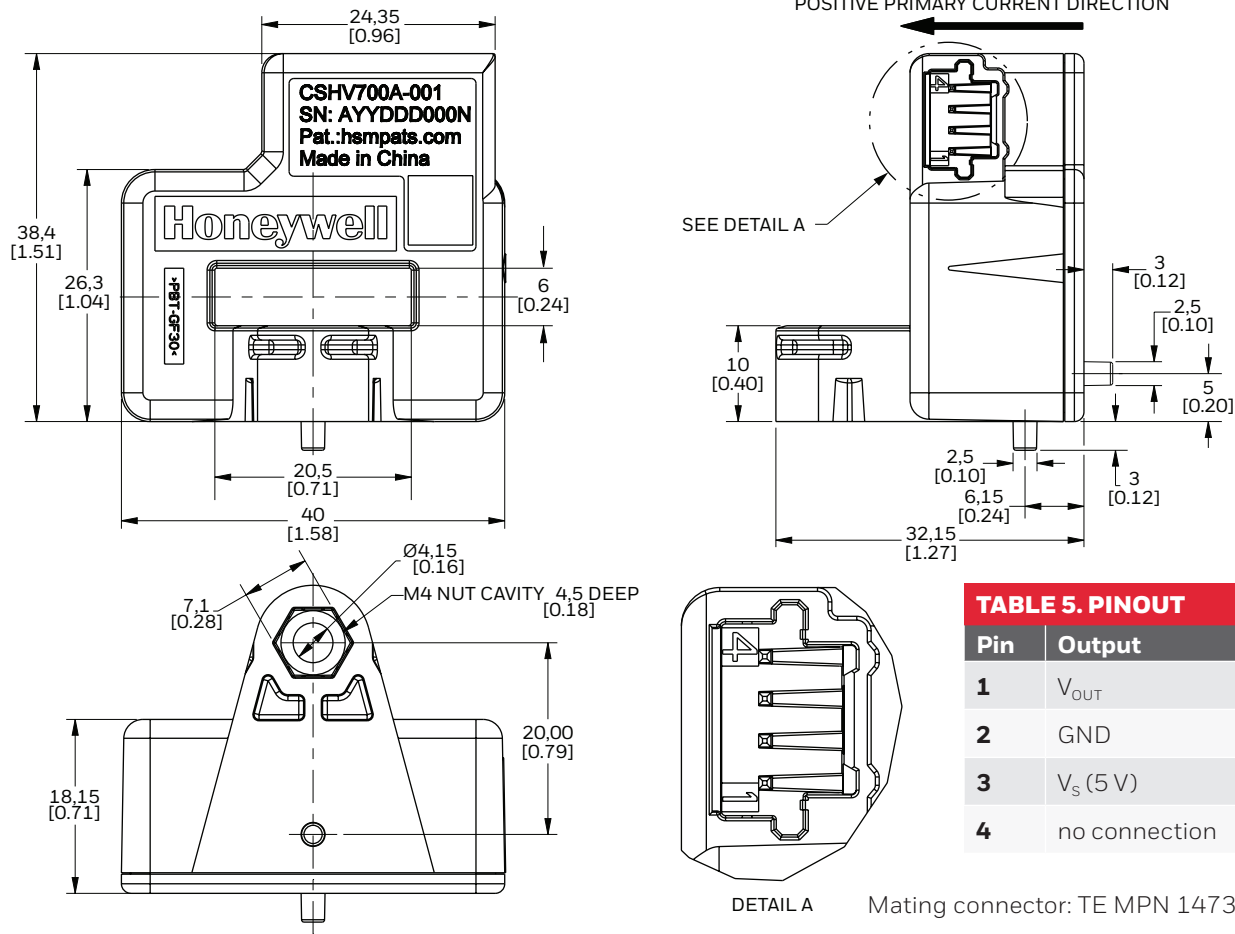


Figure 3. Part Marking Details

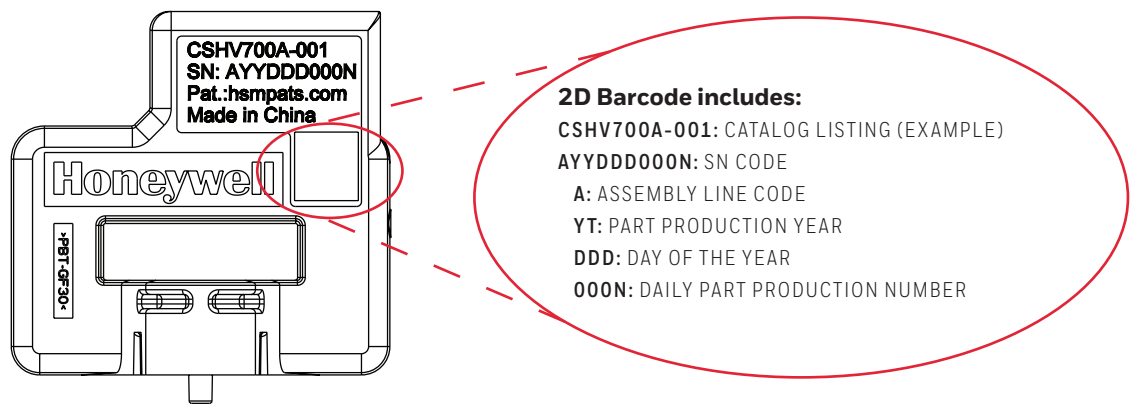
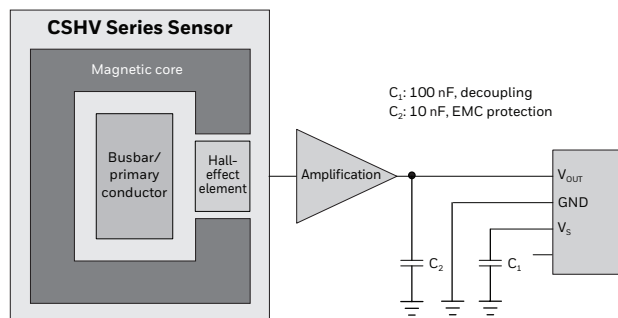


Figure 4. Electrical Diagram



## NOTICE

### SENSOR ACCESSIBILITY

- Ensure that the current sensor is installed in a suitable electrical enclosure which is only accessible with the use of special tools.

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**TABLE 6. EMC TEST SPECIFICATIONS**

Test	Standard	Procedure
<b>CISPR 25 Conducted RF Emissions - Voltage</b>	CISPR25	According to CISPR 25:2008 Commission Form of Testing
<b>CISPR 25 Conducted RF Emissions - Current</b>	CISPR25	According to CISPR 25:2008 Commission Form of Testing
<b>CISPR 25 Radiated Emissions</b>	CISPR25	According to CISPR 25:2008 Commission Form of Testing
<b>Bulk Current Injection (BCI) Test</b>	ISO 11452-4	According to ISO 11452-4
<b>RF Radiated Immunity - ALSE</b>	IEC 61000-4-3	According to ISO IEC 61000-4-3
<b>Electrostatic Discharge</b>	ISO 10605	Unpowered direct contact discharge: $\pm 8$ kV Unpowered air discharge: $\pm 15$ kV Powered-up direct contact discharge: $\pm 4$ kV Powered-up air discharge: $\pm 8$ kV
<b>Fast Transients Burst Immunity Test</b>	IEC 61000-4-4	2 kV Power port, 1 kV signal port
<b>Magnetic Field Emission Test</b>	IEC 61000-4-8	20 kHz to 200 kHz
<b>Conducted/Coupled Immunity</b>	ISO 11452-4	According to ISO 11452-4, test CCC and ICC

**TABLE 7. ELECTRICAL TEST SPECIFICATIONS**

Test	Standard	Procedure
<b>Single line Open Circuit Tests</b>	ISO16750-2-4.9	Connect sensor to 5V power supply and power on the sensor. Disconnect Us, GND, Us & GND for twice. Each open circuit time :60 $\pm$ 1 second & 10 $\pm$ 1 second
<b>Short Circuit Protection</b>	ISO 16750-2-4.10	Connect sensor to power supply and power on the sensor by 5 V. Apply short circuit between Vout & GND, Vout & Us. Each hold for 60 seconds
<b>Insulation Resistance Test</b>	ISO 16750-2-4.12	500 Vdc $\pm$ 10 Vdc for 60 s; Resistance criteria: $\geq 100$ MOhm
<b>dc &amp; ac Voltage Insulation Test</b>		Test voltage: 2500 Vdc & 2500 Vac. Frequency: dc & 50~60 Hz. Test duration: 60 seconds

**TABLE 8. ENVIRONMENTAL TEST SPECIFICATIONS**

Test	Standard	Procedure
<b>High Temperature Operating Test</b>	ISO16750-4	48 hour, 85°C. Performance test before and after test from -40°C to 85°C
<b>Low Temperature Operating Test</b>	ISO16750-4	120 hour, -40°C. Performance test before and after test from -40°C to 85°C
<b>Thermal Cycle Test</b>	ISO16750-4	30 cycles, one cycle contains -40°C (90 minute soak) & 85°C (120 minute soak). Transition time = 270 minutes. Performance test before and after test from -40°C to 85°C
<b>Vibration</b>	SAE J2380	10 Hz to 200 Hz, 10.95 hour/axis, 3 axis. Performance test before and after test from -40°C to 85°C
<b>Mechanical Shock</b>	ISO16750-3	500 m/s, 20 each direction (60 total), half sine pulse. Performance test before and after test from -40 °C to 85 °C
<b>Handling Drop</b>	ISO 16750-3	1 <sup>st</sup> fall of each DUT at a different dimensional axis, 2 <sup>nd</sup> fall with the given DUT at the same dimensional axis but on the opposite side of the housing, from 1 m on concrete floor. Performance test before and after test from -40°C to 85°C
<b>High Temperature Durability Test</b>	ISO16750-4	3000 hour, 85°C. Performance test before and after test from -40°C to 85°C

## 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 acknowledgment 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.**

While Honeywell may provide application assistance personally, through our literature and the Honeywell web site, it is buyer's sole responsibility to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this writing. However, Honeywell assumes no responsibility for its use.

### For more information

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## WARNING PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

**Failure to comply with these instructions could result in death or serious injury.**

## WARNING MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

**Failure to comply with these instructions could result in death or serious injury.**