



## Instruction Manual

The CarSense101 operates by detecting the movement of vehicles near the probe with an adjustable detection range up to 12 feet at a minimum speed of 5 mph. The CS101 will only detect a moving vehicle and will not detect a stationary vehicle. It may be used as a free exit sensor to allow gates to open and guests to exit without the use of a key fob or passcode. The CS101 may also be wired to notify a home automation system or security system that a vehicle is moving down a driveway. This vehicle motion detector requires a probe that is ordered separately and available in 50, 100, or 150 foot lead lengths.

### Cautions and Warnings



The CS101 is designed to detect moving vehicles. It is not suitable for use as a vehicle presence detector such as a reversing loop for a gate or door.

The CS101 detects ferrous metals. It will not detect aluminum, but will detect any moving ferrous metallic object.

The probe must be stationary to function properly.

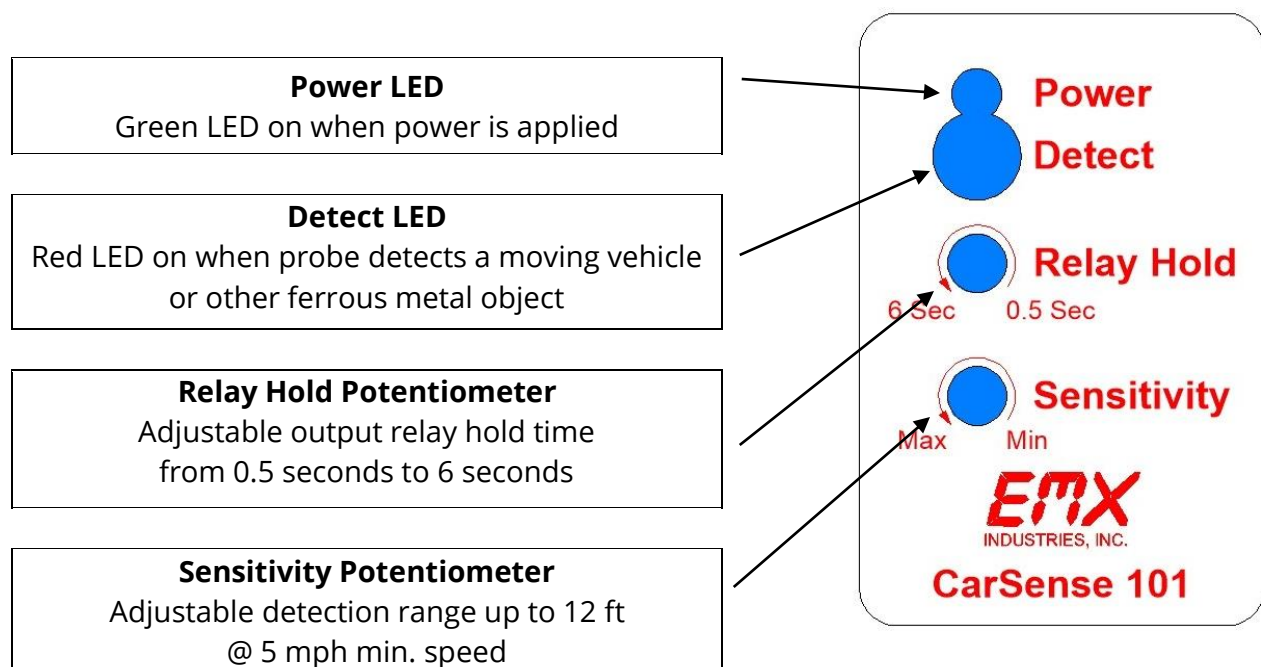
### Specifications

Power	9-41 VDC or 6-29 VAC
Standby Current	2.5 mA
Detection Current	50 mA
Range Sensitivity	12 ft @ 5 mph min. speed
Sensitivity Adjustment	Dependent on mass and speed
Output on Time Adjustment	0.5 - 6 seconds
Surge Protection	Probe input circuitry protected by surge suppressors
Relay Output Configuration	Form C (SPDT)
Relay Contact Rating	1 A @ 24 VDC / 1 A @ 120 VAC
Operating Temperature	-40° to 82°C (-40° to 180°F) 0 to 95% relative humidity
CS101 Housing Material	Polycarbonate
CS101 Dimensions (L x W x H)	3.365" (84 mm) x 1.6" (41 mm) x 2.2" (55 mm)
Probe Housing Material	PVC watertight
Probe Dimensions (L x Dia.)	17" (432 mm) x 1" (25 mm)
Probe Cable	3-wire, shielded, direct burial

## Ordering Information

- CS101-LV Low voltage vehicle motion detector (included)
- LD-11B 11 pin DIN rail socket, black, narrow base (included)
- LD-11 11 pin DIN rail socket, black, wide base
- HAR-11 11 position harness, 3' of wire
- PROBE-50 Probe 50' lead-in wire
- PROBE-100 Probe 100' lead-in wire
- PROBE-150 Probe 150' lead-in wire
- PROBE-XX Probe (enter required length in ft) lead-in wire

## Controls and Indicators



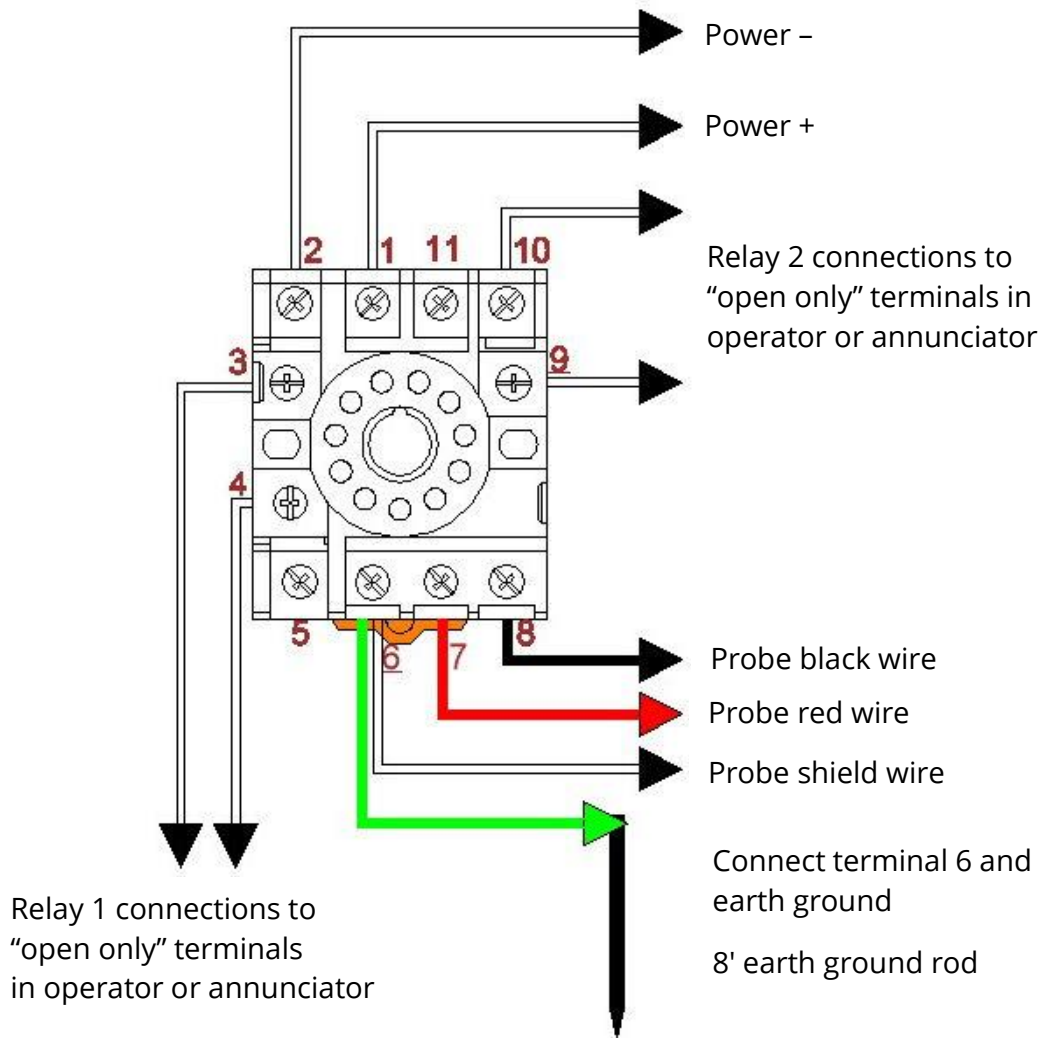
**TIP:**

Sensitivity is a function of speed and mass. The slower a vehicle is moving, the closer it must pass the probe to trigger the detector.

# Wiring Connections

## 11 Pin Connector Assignments

1	Power + (9-41 VDC or 6-29 VAC)	7	Probe (red wire)
2	Power - (9-41 VDC or 6-29 VAC)	8	Probe (black wire)
3	RELAY 1 - NO (normally open contact)	9	RELAY 2 - NO (normally open contact)
4	RELAY 1 - COM (common contact)	10	RELAY 2 - COM (common contact)
5	RELAY 1 - NC (normally closed contact)	11	RELAY 2 - NC (normally closed contact)
6	Probe shield wire & earth ground (provides connection for transient and noise suppression devices)		



### **IMPORTANT: EARTH GROUND CONNECTION**

The CS101 contains transient protection devices to guard the sensitive electronic circuitry from damage and false triggering due to electrical transients caused by lightning or other sources. Always provide a good earth ground. An 8' copper rod or metal cold-water pipe provides a sufficient earth ground connection. Both the probe shield and PIN 6 of the CS101 must be connected to this earth ground.

# Installation

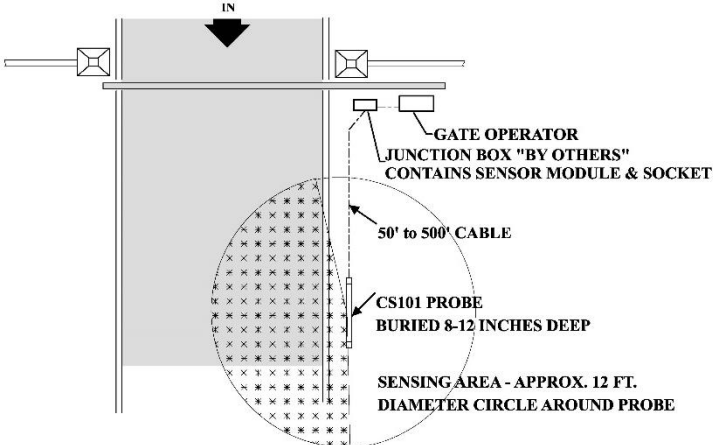
**Read the following list of tips prior to beginning the installation process.**  
**This will save significant time in the long run.**

- The detector's sensitivity is a function of speed and mass. The detection range for a moving, average size car or truck is approximately 12 feet at a speed of 5 mph. At higher speeds, detection range can exceed 12 feet as noted below.

Size of Moving Vehicle	Speed	Detection Range
Average size car or truck	5 mph min.	Up to 12'
Average size car or truck	10-50 mph	Greater than 12'
Large truck or semi-truck	Over 50 mph	Greater than 40'
Train	Any	100'

- The detector is sensitive to minute changes in the magnetic field around the probe. Power lines, transformers, and other electrical devices located in the vicinity of the probe that produce transients could cause disturbances in the magnetic field that may result in triggering the detector. Avoid installation of the probe near these devices.
- Do not install the probe or lead wire near or parallel to:
  - Low voltage lighting wires or in-ground power lines
  - Telephone lines or intercom systems
  - Electric motors or control relays
  - Overhead power lines, transformers or underground power lines
  - Cell phone towers, TV towers or communications links
  - Moving metal flagpoles, fences, gates or horses with metal shoes
- Do not mount on any moving surface, such as bridges or walkways that may vibrate under traffic. The probe must always be installed in such a way that it remains completely motionless. Any movement will cause the probe to trigger.
- Probes are available in various cable lengths, when possible select the appropriate cable length for the installation. If it is necessary to extend the cable length (maximum 900'), use a high-quality lead-in cable suitable for direct burial, and a high quality, watertight cable splice to prevent moisture from entering the cable causing false triggering. Lead-in wire is available from EMX.
- When there is a high incidence of damage from burrowing animals or other potential damaging activities, it is recommended that the cable be placed in plastic conduit (1.5" internal diameter). Damage to the cable jacket may allow moisture to enter the cable causing false triggering. When placing the probe in plastic conduit, use foam or tape to assure that the probe does not move or vibrate. It is recommended that the conduit be sealed to prevent water from collecting in it.

## Installation Methods

Adjacent to Roadway (Recommended Method)	In a Roadway
<p>1. Temporarily place the probe parallel to the roadway (driveway) in the desired location.</p>  <p>The diagram illustrates the 'Adjacent to Roadway' installation method. It shows a cross-section of a roadway with a gate operator junction box on the left. A cable labeled '50' to 500' CABLE' runs from the junction box to a 'CS101 PROBE BURIED 8-12 INCHES DEEP'. A circular 'SENSING AREA - APPROX. 12 FT. DIAMETER CIRCLE AROUND PROBE' is shown around the probe. The junction box is labeled 'GATE OPERATOR JUNCTION BOX "BY OTHERS" CONTAINS SENSOR MODULE &amp; SOCKET'. An arrow labeled 'IN' points towards the roadway.</p>	<p>1. Position the probe in the center of the roadway, perpendicular to the direction of traffic. The probe should be located at a minimum of 2" deep in concrete or asphalt.</p> <p><b>TIP:</b></p> <ul style="list-style-type: none"> <li>• If installing the probe prior to paving a hot asphalt roadway, the CS101 and its lead cable need to be insulated. A common method to do this would be to dig a small trench and bury the probe and lead cable in 4" of sand prior to paving. <b>(DO NOT APPLY HOT ASPHALT DIRECTLY AGAINST PROBE AND LEAD CABLE!)</b></li> <li>• If installing the probe in concrete, make sure it is installed above the rebar.</li> <li>• The probe may be positioned prior to paving or a cut may be made in the finished pavement for installation.</li> </ul>
<p>2. Connect the probe to the CS101 by connecting the red probe wire to terminal 7 and the black probe wire to terminal 8. Connect the shield probe wire to terminal 6 and to the earth ground. Always provide a good earth ground. An 8' copper rod or metal cold-water pipe provides a sufficient earth ground connection. <b>BOTH THE PROBE SHIELD AND TERMINAL 6 OF THE CS101 MUST BE CONNECTED TO THE EARTH GROUND.</b></p>	
<p>3. Connect positive power (9-41 VDC or 6-29 VAC) to terminal 1. Connect power ground to terminal 2. <b>DO NOT EXCEED 41 VDC or 29 VAC.</b></p>	
<p>4. Apply power and allow 5 minutes of warm-up for system stabilization.</p>	
<p>5. Set sensitivity to minimum and relay hold to desired time setting.</p>	
<p>6. Drive a vehicle at a minimum speed of 5 mph passed the probe and to the far side of the roadway.</p>	
<p>7. Repeat step 5 while gradually increasing the sensitivity until the system detects the vehicle.</p> <p><b>TIP:</b></p> <ul style="list-style-type: none"> <li>• A higher sensitivity setting than required to detect the vehicle makes the system more vulnerable to triggering from unintended sources such as movement of other objects, including bicycles, horses, small vehicles, metal in shoes or other electrical disturbances.</li> <li>• When the detector is set to maximum sensitivity (full counterclockwise on the sensitivity adjustment) detection range is approximately 12 feet at a speed of 5 mph. At higher speeds, 10-15 mph, detection range can exceed 12 feet.</li> </ul>	
<p>8. Temporarily disconnect power to the CS101 and bury the probe at this location approximately 8-12" deep for typical applications. Repeat the previous sensitivity check (steps 4 -7) to verify proper operation. Installation adjacent to roadway complete.</p>	<p>8. Installation in roadway complete.</p>
<p><b>TIP:</b> For instances of high pedestrian traffic, heavy animals or heavy vehicles, bury the probe 24" deep to prevent false triggering in either installation method.</p>	

## Troubleshooting

Symptom	Possible Cause	Solution
False triggering	<p>Electrical disturbances</p> <p>Damaged probe cable</p> <p>Moisture in probe cable</p> <p>Movement in the probe's environment</p> <p>Dirty or noisy power supply</p> <p>Lightning</p>	<ol style="list-style-type: none"> <li>1. Verify that the earth ground and the probe shield are both connected to terminal 6 securely. If the connection is not secure, reconnect both the probe shield and the earth ground and retest the system.</li> <li>2. Disconnect the probe wires and see if the false triggering continues. If the false triggering stops, check the probe as outlined below in step 3. If the false triggering continues, disconnect the power and temporarily connect a 9 or 12V battery to the CS101 and reconnect the probe. Wait 5 minutes for the system to stabilize. If the false triggering stops, consider using a separate power supply for the CS101 such as a 120 VAC to 12 VDC power converter (min. 100 ma). Reconnect the probe and retest the system.</li> <li>3. Inspect the area around the probe to see if any ferrous metal objects may be subject to any movement. These may include fences, flagpoles, signs, etc. Other possible causes are electrical power lines, electric motors, invisible dog fences, low voltage lighting and high-power lighting.</li> </ol>
No output (but red LED indicates detection)	<p>Bad wire connection</p> <p>Failed relay</p>	<ol style="list-style-type: none"> <li>1. Disconnect the output contacts from the operator.</li> <li>2. Connect a digital multimeter, set to read ohms, to the COM and NO contacts.</li> <li>3. The meter should read open (infinity). Move a metal tool over the length of the probe. Verify that the red LED turns on and that the meter reads less than 10 ohms. If red LED turns on and the meter reads more than 10 ohms, the CS101 is defective.</li> </ol>
No detection	<p>Minimum 5 mph</p> <p>Bad wire connection</p> <p>Faulty power connection</p> <p>Failed relay</p> <p>Failed probe</p>	<ol style="list-style-type: none"> <li>1. Check to see if the detection LED turns on. If so, check the relay output and related connections.</li> <li>2. Verify that the green LED is on. If not, check the supply voltage using a digital multimeter. Verify the voltage is 9-41 VDC or 6-29 VAC. If voltage is present and there is still no detection, the CS101 is defective.</li> <li>3. Disconnect the probe wires from the CS101. Using a digital multimeter, measure the resistance between the red and black wires. If not 950 ohms +/- 10%, then the probe is defective. Check the resistance between the probe shield wire and the red and black wires and verify that the meter indicates open (infinity).</li> </ol>

## Warranty

EMX Industries, Inc. products have a warranty against defects in materials and workmanship for a period of two years from date of sale to our customer.