

Welcome to the world of precision rallying! Your new Helius Odometer brings you the following features:

- A precision of **1 m** and a range of **1000 km**
- Typical calibration accuracy of **2.5 m per 100 km!**
- On-the-fly 1m and 10m odometer adjustments
- Reset, count down, hold, and freeze options
- Operates in either kilometers or miles
- Numeric velocity based on the calibration
- A large, bright 5 digit odometer display
- A large, bright 3 digit velocity display
- Display dimming for nighttime driving

Your odometer, shown in the figure below, has eight buttons and four display modes.



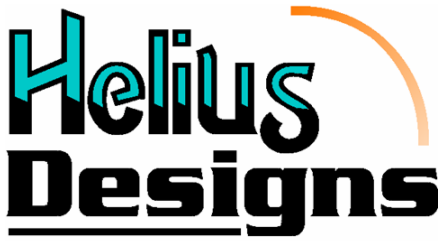
## MODES

- 1) **odometer:** displays the odometer
- 2) **pulse count:** displays the number of pulses received from the odometer sensor (used for the calibration procedure described below)
- 3) **calibration:** displays the calibration factor
- 4) **silent mode:** blanks the displays

## CALIBRATION

Calibration is performed in five steps:

- 1) Press **RESET** in **odometer** or **pulse** mode at the exact start of a known length of road
- 2) Now that the pulse count is zeroed, precisely drive the known length of road
- 3) Then in **pulse** mode, note the number of pulses received
- 4) Divide the distance traveled by the number of pulses received; convert this distance to millimeters to an accuracy of one hundredth of a millimeter
- 5) Enter the distance traveled per pulse in **calibration** mode, pressing **PRECISION** as required



## CALIBRATION EXAMPLE

We recommend driving no less than 1 km, but longer lengths, such as 20 km, make for a more accurate calibration. Suppose we know that a length of road is 7.5 km in length. We drive to the start of the road, and then press **RESET** in **pulse** mode, which zeros the odometer and pulse count. After driving the marked section of road as accurately as possible, and stopping precisely at the end, we see in **pulse** mode that 19108 pulses were received. Our calibration factor is the *distance traveled per pulse*, or

$$7.5 \text{ km} / 19108 \text{ pulses} = 7500 \text{ m} / 19108 \text{ pulses} = 0.39251 \text{ m per pulse, or } \mathbf{392.51} \text{ mm per pulse}$$

which we enter in the **calibration** mode, pressing **PRECISION** to access the second decimal place and holding **UP** or **DOWN** for faster adjustment. We press **RESET** in **odometer** mode and are ready to go!

### Example in Miles

$$10 \text{ miles} / 20380 \text{ pulses} = \mathbf{490.68} * 10^{-6} \text{ miles per pulse}$$

**Note 1:** The odometer automatically resets the pulses received after 50,000 pulses

**Note 2:** If you are performing a small modification to your calibration factor, you can use the following formula instead:  
*new calibration factor = (measured distance traveled / odometer distance traveled) \* old calibration factor*

## BUTTONS

**MODE** selects the current mode by rotating through modes 1 to 6 described above.

### Odometer Mode

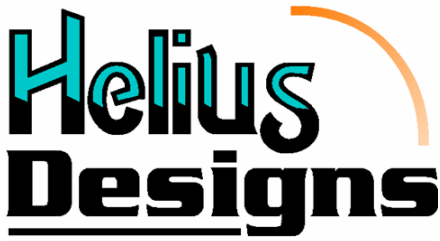
- UP/DOWN** - modifies the odometer by 1m or 10m, depending on the PRECISION button
- PRECISION** - toggles between displaying the odometer in **##.###** km and **###.##** km format
- RESET** - unrecoverably resets the odometer to 0.000km and the number of pulses received to 0
- HOLD** - locks the odometer at its current value
- FREEZE** - locks *only the odometer display* at the current value
- REVERSE** - odometer counts downward from the current value

### Pulse Count Mode

- RESET** - unrecoverably resets the odometer to 0.000km and the number of pulses received to 0
- FREEZE** - dims the display for nighttime driving

### Calibration Mode

- UP/DOWN** - modifies the calibration factor by 0.01mm or 0.1mm, depending on the PRECISION button
- PRECISION** - toggles between displaying the calibration factor in **###.##** mm and **####.#** mm format
- FREEZE** - dims the display for nighttime driving



## DISPLAY DIMMING

To dim the display for nighttime driving, press **FREEZE** in any mode except **odometer** mode.

## DEFAULT CALIBRATION VALUES

To save time when entering your calibration value the odometer can be set to one of four factory calibration values by holding down one of the buttons and then applying power to the odometer. These default values correspond roughly to 4, 3, 2, and 1 pulses per revolution. Set the values as follows:

| Calibration Value (mm) | Button to Hold While Powering Unit |
|------------------------|------------------------------------|
| 392.50                 | (no button)                        |
| 523.33                 | <b>HOLD</b>                        |
| 785.00                 | <b>FREEZE</b>                      |
| 1570.00                | <b>REVERSE</b>                     |

## REMOTE RESET

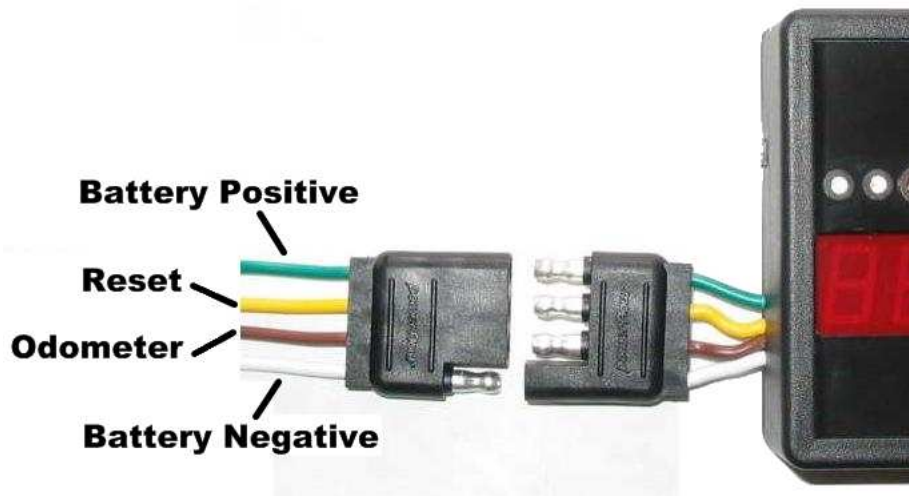
You can use any momentary, normally open (disconnected) switch in between the remote reset signal input and 12V to reset the odometer remotely.

## ADDITIONAL NOTES

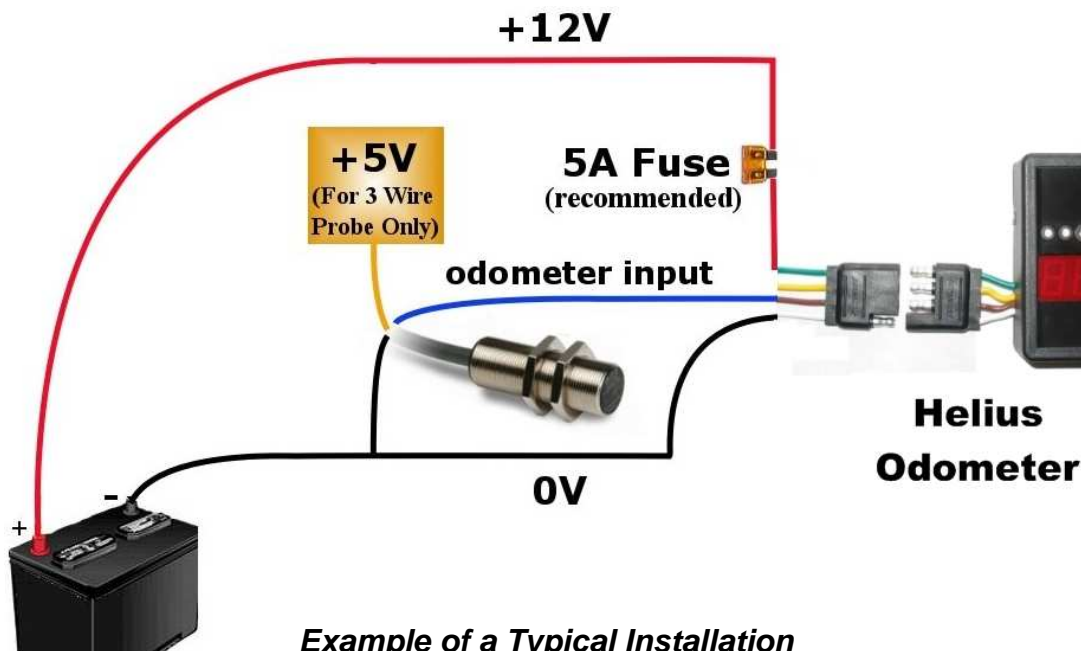
- All stored values are reset when the vehicle battery is disconnected or the unit is removed.
- Hold **UP/DOWN** for faster adjustment.
- The Helius Odometer automatically goes to sleep (enters low power mode) after 15 minutes of inactivity; begin driving or press any button to resume normal operation.

## INSTALLATION (POWER & GROUND)

You can install the odometer yourself, or have any automotive shop help. Follow your vehicle owner's manual for taking safety precautions and read the CAUTION section of this guide before performing any electrical work.



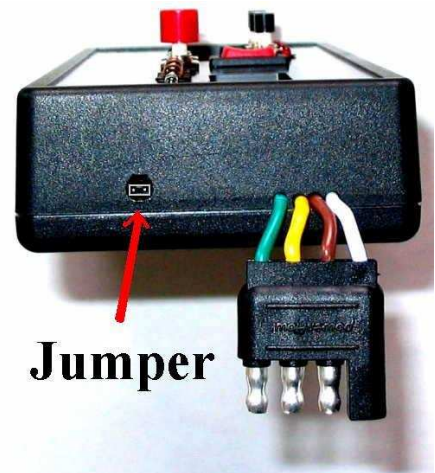
Standard wire colouring conventions are not used as a result of the robust trailer-style quick disconnect chosen for your odometer. To install the odometer, connect power (+12V, the positive side of the battery) from your vehicle to the **green** wire through a 5A fuse and connect ground (the negative side of the battery, or the vehicle chassis, but not dash components) to the **white** wire, as shown in the figures on this page. Choose a power wire that is unaffected by the ignition switch, such as the horn or internal lighting fuses, otherwise you will lose stored values when you turn your vehicle off. Do not use unreliable dash components, such as mounting screws, for the ground connection.



## INSTALLATION (ODOMETER INPUT)

The **brown** wire is the signal input for the odometer, and the **yellow** wire is the signal input for the remote reset.

The **jumper** (shown to the right), if included, allows the Helius Odometer to be configured for use with the widest range of sensors. Installing the jumper provides a special source of power at the odometer input for sensors such as Terratrip and Brantz. Once configured you may place a piece of electrical tape over the jumper opening to help prevent dust from entering the housing.



### Sensor Options

(Contact Helius Designs for Additional Sensor-Specific Installation Instructions)

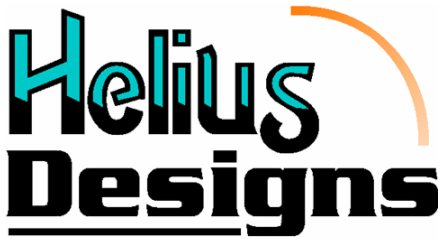
- 1) You may choose to tap in to your vehicle's odometer/speedometer and tachometer lines, which you can find from electrical schematics. These signals must be *digital pulse trains* (the voltage alternates between 0V and 5V or 0V and 12V). Depending on the make of your vehicle, you may need to place a signal conditioner such as supplied by Terratrip between your vehicle and the odometer.  
**\*The jumper may or may not be required if you use this approach.**
- 2) If you have a mechanical speedometer you can use the Terratrip or Brantz speedometer sensor.  
**\*Remove the jumper for the Brantz sensor. Install the jumper for the Terratrip sensor.**
- 3) The Helius Odometer is compatible with the Terratrip and Brantz universal wheel sensors.  
**\*Install the jumper if you use this approach. Terratrip sensor: blue = 0V, brown = odometer.**
- 4) You may also use ALFA sending units or bicycle odometers.  
**\*Install the jumper if you use this approach.**

**Note:** Use four sensor pulses per revolution for the highest odometer and speedometer precision.

## MOUNTING

Your Helius Odometer may be supplied with strips of industrial strength Velcro™, which can be used as a temporary mount for the odometer within your vehicle. Be sure to clean both the odometer housing and your vehicle's dashboard of any grease or other contaminants, and allow the surfaces to dry. Then place the Velcro™ on a flat area of your dashboard such that the driver and navigator can clearly observe the odometer once mounted (read the CAUTION section of this guide first). You may want to test a small piece of Velcro™ in an obscure area of your dashboard if you are concerned that the adhesive may damage the dashboard material.

Alternatively, you may fashion your own bracket mount (read the CAUTION section of this guide first).



## CAUTION

### *Installation*

- Read and follow your vehicle owner's manual before performing any electrical work on your vehicle.
- Have a professional automotive shop install the Helius Odometer if you have any uncertainties.

### *Mounting*

- It is the sole responsibility of the owner/operator of the Helius Odometer to locate and secure the odometer such that it will not obscure the driver's view of driving conditions, or interfere with the vehicle's operating controls and safety devices, or cause damage or personal injury in an accident.
- The Velcro™ mounting equipment is used at the discretion of the owner/operator.
- Do not locate the Helius Odometer over airbag panels or in the field of airbag deployment.

### *Use*

- Performing any modifications or additions to a vehicle is inherently dangerous, as is rallysport and driving while using electronic equipment such as the Helius Odometer. Helius Designs will not be responsible for any personal injury or loss of property, time, money, or honours that may be sustained through the direct or indirect use of this product.
- Avoid prolonged exposure to direct sunlight or deformation of the plastic housing may occur.
- To protect against risk of electric shock, keep the Helius Odometer away from water or other liquids.
- To reduce the risk of electric shock or temperature burns, do not open the housing of the Helius Odometer; high temperature components are housed within.
- If you choose to open the odometer housing, ensure all electrical connections to the Helius Odometer are removed and wait five minutes for internal components to cool. Avoid touching the circuit boards or any components as electrostatic discharge may cause permanent damage.

## WARRANTY

Your Helius Odometer is warranted against defects in materials and workmanship for one year from the date of purchase. This warranty does not cover damage due to neglect or abuse, as determined by Helius Designs, and is void if evidence is discovered of tampering inside the housing.

## SPECIFICATIONS (subject to change)

### **General**

|                 |                       |
|-----------------|-----------------------|
| Microprocessor: | 8-bit CMOS RISC       |
| Crystal:        | 4MHz Quartz           |
| Display Height: | 14.22mm (0.56in)      |
| Display Type:   | Red AS-AlInGaP, 15mcd |

### **Operation**

|                   |                                   |
|-------------------|-----------------------------------|
| Odometer Range:   | 0.001 – 1000 km or miles          |
| Speed Supported:  | 0 – 235 km/h<br>(0 – 147 miles/h) |
| Speed Resolution: | 1 to 2 km/h (miles/h)             |

### **Electrical**

|                |   |
|----------------|---|
| Power:         | 8 – 16 VDC, 700mA max                                     |
| Sensor Inputs: | 0 – 1V Low, 3 – 24 V High<br>0 – 160 Hz (Pulses / Second) |
| Fuse:          | 5 Ampere Fast Acting                                      |

### **Physical**

|                   |  |
|-------------------|--|
| Housing Material: | 1599 ABS Plastic                                     |
| Housing Size:     | 170 W x 86 H x 33 mm D<br>(6.7" W x 3.4" H x 1.3" D) |
| Weight:           | 300g (11 oz) approx.                                 |

**Helius Designs**  
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