Radar Speed Sign

Specifications and manual

Principle of Operation

This speed sign uses (Radar) Doppler effect to accurately measure vehicle speed over a wide range of surfaces including roads, rails e.t.c.

In case of power loss or during the night if you use it with solar panel only, the speed sign will operate by using it's internal battery. An internal controller measures the battery charge. It automatically switches off the speed sign if the battery voltage goes below 10,5 VDC and it will switch on again when the voltage goes above 12.5 VDC (after some charging).

1. Specification:

1.1 Operational:

Display Brightness Control: Auto adjust to light conditions

1.2 Dimensions

Driver Feed Back Sign Housing: 640x750x100 mm
Height of letters : 100 mm
Reflective red and white interior border width: 40 mm
LED Display Characters: 2 and half digits, 12,5" high Super Bright red or red/green or red/amber LEDs

1.3 Weight

9 kg without battery (and 15 kg with battery)
Solar panel: 50W is 4 kg and 80W is 5 kg

1.3 Components

Circuit Breaker: Multi-circuit, 5 amp fuses (5x20 mm glass fuse)
Power Supply: 240VAC and optional 12 VDC (20 Ah) battery with solar panel
Power Consumption: < 2.5 W in active mode, idle mode < 0,6 watt (LOW POWER)
LEDs: Super Bright traffic LEDs with 10 000 mcd each (life up to 100,000 hours) according to EN12966

1.4 Radar Unit

Type: K Band, directional Doppler radar, FCC part 15 compliant
Sensor Range: Ordinary sensor range up to 50-70 m (option: long range sensor up to 150 m)
(note: the distance of radar sensor sensitivity depends on a lot of circumstances, it is working with doppler effect)
Beam Width: ordinary 30/40 degrees, +/- 2 degrees (option: long range has 12/20 degrees)
Operating Frequency: 24.125 GHz, +/- 50 MHz
Accuracy: +/- 1.5 kph
Speed Detection Range: 0 - 199 kph

1.5 Housing

Composition & Finish: Aluminum with black powder coat finish, vandal and fire resistant
Thickness: 2 mm - provides maximum protection from elements & vandalism
Temperature Ranges: -20 C to +60 C
Humidity Maximum: 100%
Weatherproof: Conforms to NEMA 4R level design, non-sealed & ventilated
Makrolon Display Cover: 4 mm thick, shatter resistant, protects LEDs

1.6 Pole Mounting Hardware

Hardware Available For 2,5" (76 mm) round poles (2" (60 mm) and 3" (90 mm) is available as option)

1.7 Solar Power

Solar Panel Output: 50 watt, Voltage at Pmax = 17.4V, Current at Pmax = 3.11 Amps
Solar Panel Output: 80 watt, Voltage at Pmax = 17.4V, Current at Pmax = 4.75 Amps
Battery: 12V 20amp hour deep cell, spill proof long life batteries
Battery Controller: Manages flow of solar energy input (up to 80w) from solar panel to battery
Pole Mount: Side pole mount with 20°angle bracket fo r effective solar charging

1.9 Data logger (optional)

The traffic data collection is working with a simple USB flash drive. 2 GB USD flash drive is provided at factory, and over 100 millions data can be stored.
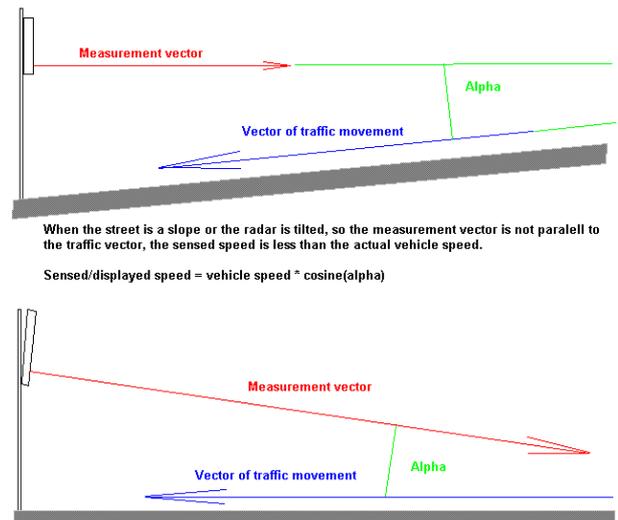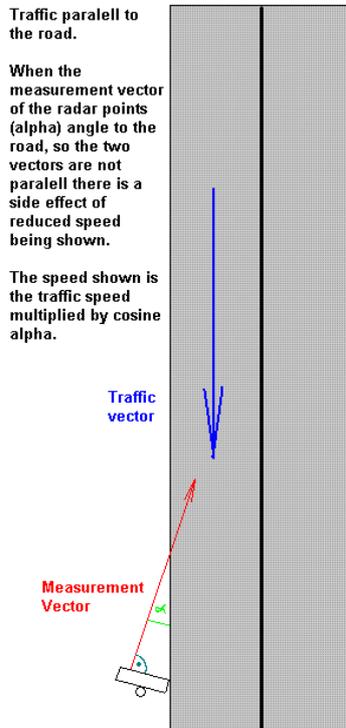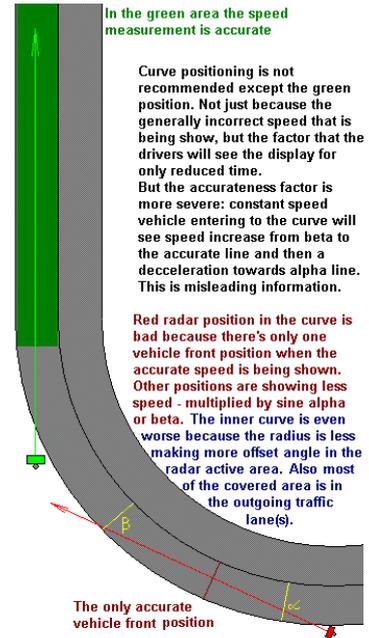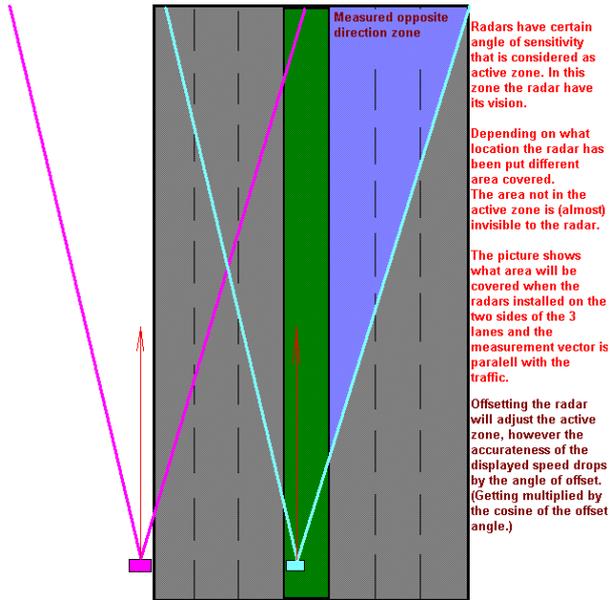
2.0 Warranty
Basics: Parts and Labor: 1 year

2. Installation

2.1 Identifying a suitable location:

To mount the speed sign on a pole, select an existing pole that allows the preferred mounting height of 210-240 cm (7-8 feet) for the center of the display. Make sure the location is close enough to the roadway to align the sign to that it faces the incoming traffic as directly as possible, similar to the diagram (for left side driving countries). This will maximize the accuracy of the radar.

Measured opposite direction zone

Radars have certain angle of sensitivity that is considered as active zone. In this zone the radar have its vision.

Depending on what location the radar has been put different area covered.
The area not in the active zone is (almost) invisible to the radar.

The picture shows what area will be covered when the radars installed on the two sides of the 3 lanes and the measurement vector is paralell with the traffic.

Offsetting the radar will adjust the active zone, however the accurateness of the displayed speed drops by the angle of offset. (Getting multiplied by the cosine of the offset angle.)

In the green area the speed measurement is accurate

Curve positioning is not recommended except the green position. Not just because the generally incorrect speed that is being show, but the factor that the drivers will see the display for only reduced time.
But the accurateness factor is more severe: constant speed vehicle entering to the curve will see speed increase from beta to the accurate line and then a decceleration towards alpha line. This is misleading information.

Red radar position in the curve is bad because there's only one vehicle front position when the accurate speed is being shown. Other positions are showing less speed - multiplied by sine alpha or beta. The inner curve is even worse because the radius is less making more offset angle in the radar active area. Also most of the covered area is in the outgoing traffic lane(s).

The only accurate vehicle front position

Traffic paralell to the road.

When the measurement vector of the radar points (alpha) angle to the road, so the two vectors are not paralell there is a side effect of reduced speed being shown.

The speed shown is the traffic speed multiplied by cosine alpha.

Traffic vector

Measurement Vector

Measurement vector

Alpha

Vector of traffic movement

When the street is a slope or the radar is tilted, so the measurement vector is not paralell to the traffic vector, the sensed speed is less than the actual vehicle speed.

Sensed/displayed speed = vehicle speed * cosine(alpha)

Measurement vector

Alpha

Vector of traffic movement

2.2 Fasten the Mounting bracket:

Special mounting brackets are provided by the supplier. The pole diameter can be 60, 76, 89 mm. Standard mounting is 76 mm, others are options. This bracket will be used for the mounting of solar panel as well.
If there is any special shape of pole (such as conic ligthing pole), a special flexible mounting clamp will be provided as option.

Standard mounting

For tightening, only commercially available tools are required.

1. Please install the aluminum brackets on the back side of speed sign with the provided hexagonal nuts and bolts (4 pcs M8x16) as pic shows.
2.

3. Please install the clamp in the following steps as pics show

4. Rotate Infospeed horizontally such that the radiated beam lies over the carriageway to be monitored. The maximum horizontal angle of rotation should be below 10 degree.
5. Tighten the joints. If necessary secure the Infospeed from slipping by a clamp on the fixing pole or a transverse bolt. In the case of a longer set-up time (after approx. 2 days) tighten the bolts again.

Special mounting

In that case if the pole has special shape (such as conic, hexagonal or concrete e.t.c) or the diameter is too big, a special clamp can be provided. It is made from stainless steel. This clamp is available in any length.


In case of conic pole (such as popular lighting pole), 2 pcs 5 mm thick plastic spacer is provided to install them ont he top bracket to adjust the vertical level.

3. System Start-Up

Once the speed sign is securely positioned, and then it can be start-up as you see in the start-up chapter.

Please open the case with the key (turn it to anit-clockwise) and there will be a small paper box. The 3 pcs fuse has to installed and the display is ready to go.
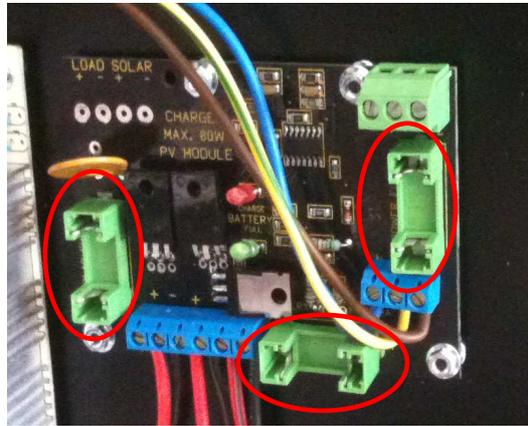
4. Connecting power

- Connecting to the solar panel: The solar panel can be connected to the red and black 4 mm2 wire. Please connect the red wire to the + pole and the black wire to the – pole.

Installing the solar pnel please see chapter 5.

Attention!

- **This is not a household appliance.**
- **Do not short-circuit!**

- Connecting to the 230 VAC

If you connect the 110-240 VAC power use 3x1,5 mm^2 wire and connect the line (L), neutral (N) and GROUND!

N GND L
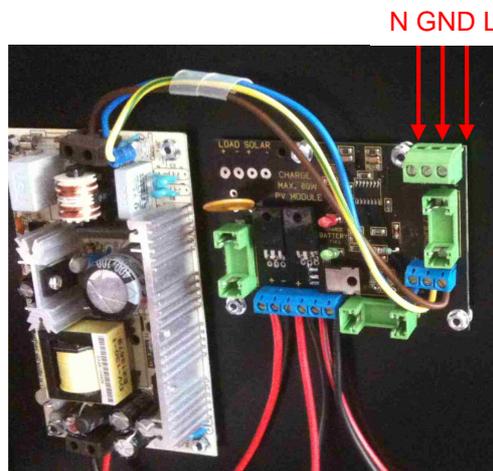
5. Installing the solar panel

If you use solar panel you have to use 350 cm (+ 50 cm in the ground) pole. The pole is 2.5".
The solar can be mounted by aluminium brackets. The panel is fixed in 70° degrees (this degree is the best solution for high voltage).
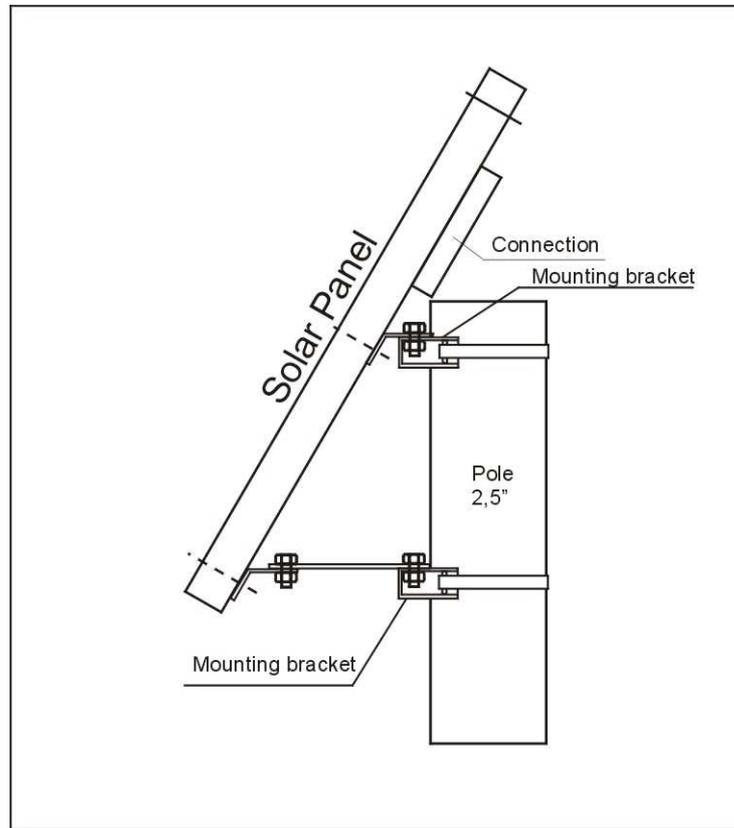

Note: The solar panel should be directed to South. If there is no possibility to do this and the solar panel is directed to North, you will loose at least 60-70 % power of solar panel.

Setting of SPEED SIGN (mono and bi-color)

The display can be set in different function. Please follow the next steps:

1. Open the case, where you can find the DIP-switches, push-button and TEST switch on the mainboard.
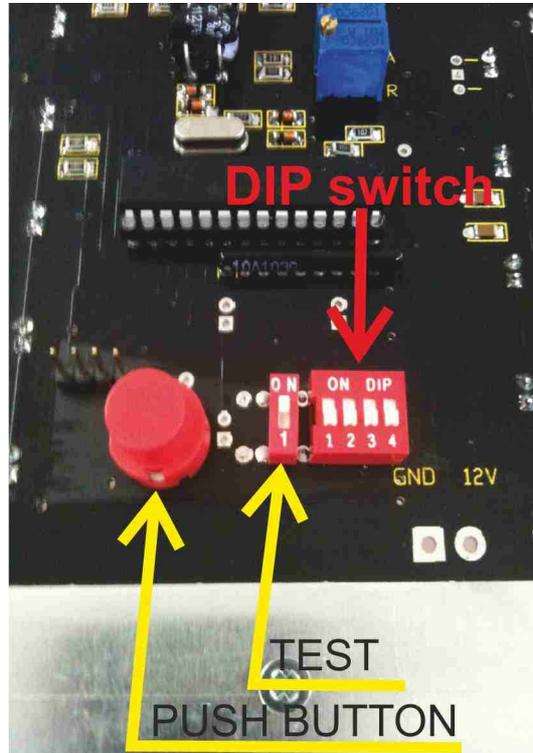
2. Please push the push-button and the speed limit setting will run automatically from 15-80. As you reached the requested speed limit please do not push the push button any more.

Jumpers:

J1: On – there will be no display above 100 kph.
J2: On – there will be no display below the speed limit, Off – there will be display below the speed limit
J3: Off- there will be no display above speed limit+40 kph, On – there will be display always
J4: the refresh time can be set. Off – 1200 msec and On – 400 msec

Please note: If you changed the jumpers, please switch OFF and then ON the speed sign, otherwise the changes will not work.

Note: speed limit setting „50" as factory setup and all DIP switch is OFF.

7. Maintenance

The internal battery used is maintenance free and it can be stored in any position. If the batteries are going to be stored for an extended period of time, they should be fully charged before being stored.