

Typical Applications

- Bridge health monitoring
- Monitoring inclination of bridge piers
- Scour critical bridge monitoring
- General structural integrity monitoring (buildings, dams, tunnels, etc.)
- Automation technology
- Aerospace engineering
- Monitoring of manufacturing process



Benefits

- **Long lifetime:** (battery life of 10 years)
- **Wireless communication:** No wiring is required for data collection
- **Lightweight:** 400 g (14.1 oz.)
- **Easy mounting:** Flange-mount or adhesive tape
- **Adjustable sampling interval:** 18sec to 10min
- **Long communication range:** 1.0Km (0.62miles) free space
- **2D-Measurement:** Monitoring the tilt of the whole surface instead of just one direction

Specifications

- **Operating range:**
 - Narrow Range High Resolution Tilt: $\pm 1^\circ$ (with respect to vertical position)
 - Mid-Range HRT: $\pm 10^\circ$
 - Regular tilt: all directions
- **Resolution:**
 - Narrow Range HRT: $\leq 0.0003^\circ$ ($5.2\mu\text{rad}$)
 - Mid-Range HRT: $\leq 0.003^\circ$ ($52\mu\text{rad}$)
 - Regular tilt: 0.1°

- **Linear range:**
 - Narrow Range HRT: $\pm 0.5^\circ$
 - Mid-Range HRT: $\pm 10^\circ$
 - Regular tilt: $\pm 60^\circ$
- **Repeatability:**
 - Narrow Range HRT: $\leq 0.001^\circ$ ($17.5\mu\text{rad}$)
 - Mid-Range HRT: $\leq 0.001^\circ$ ($17.5\mu\text{rad}$)
 - Regular Tilt: 1°
- **Time constant:** $\leq 1\text{sec}$ (High resolution tilt)
- **Working temperature:** -40°C to $+65^\circ\text{C}$ (-40°F to $+150^\circ\text{F}$)
- **Transmitter Dimension:** 79.6mm (3.13") x 74.6mm (2.94") x 52mm (2.05")
- **Assembly Dimension:** 120.8mm (4.76") x 96.6mm (3.8") x 149.9mm (5.9")
- **Ingress Protection:** IP67, weatherproof, waterproof, protected against rain, snow, and UV exposure
- **Power source:** replaceable lithium-ion battery

Description

SenSpot™ provides an easy to install, scalable solution for distributed structural integrity monitoring. SenSpot™ inclination/tilt uses Resensys’s proprietary technology for reliable and accurate measurement, large-scale sensing, wireless synchronization, and ultra-energy efficient wireless communication.

SenSpot™ is designed to operate maintenance-free for more than a decade. After installation, SenSpot™ does not need calibration, battery replacement, or any other maintenance for at least 10 years. Due to small size and lightweight, SenSpot™ sensors can be applied easily to as many critical spots on a structure as needed, with minimal installation effort.

As a part of the Resensys solution for integrity monitoring system, SenSpot™ inclination/tilt can be used to monitor the smallest movements of structural components such as piers, decks, bearings on a highway bridge. In addition, SenSpot™ inclination/tilt monitors changes in these quantities as the structure expands or contracts as a result of temperature variations. In addition to bridges, SenSpot™ inclination/tilt can be used in a variety of other structures. Examples include buildings, dams, etc.

Installation and Dimensions

The tilt sensors are built-in the SenSpot™ unit. The measured value is transmitted wirelessly to SeniMax™. It is recommended to install the SenSpot™ with screws and anchors through the flange. It is possible to install the SenSpot™ with VHB tape on smooth surfaces. However, since adhesive tape is soft its shape and thickness may change due to the temperature and humidity variations. This in turn, degrades the accuracy of high-resolution tilt measurement. High-resolution tilt measurement is ONLY valid in the horizontal direction (please see Figure 2). For detailed explanation about the installation of SenSpot™, please see 2D HRT SenSpot™ instruction manual. Figure 1 shows the box dimensions and Figure 2 shows Pitch and Roll orientation and direction. Please remember, when the antenna side is raised, both Pitch and Roll are increased. As a result, it is pretty easy to keep in mind the direction of change of Pitch and Roll.

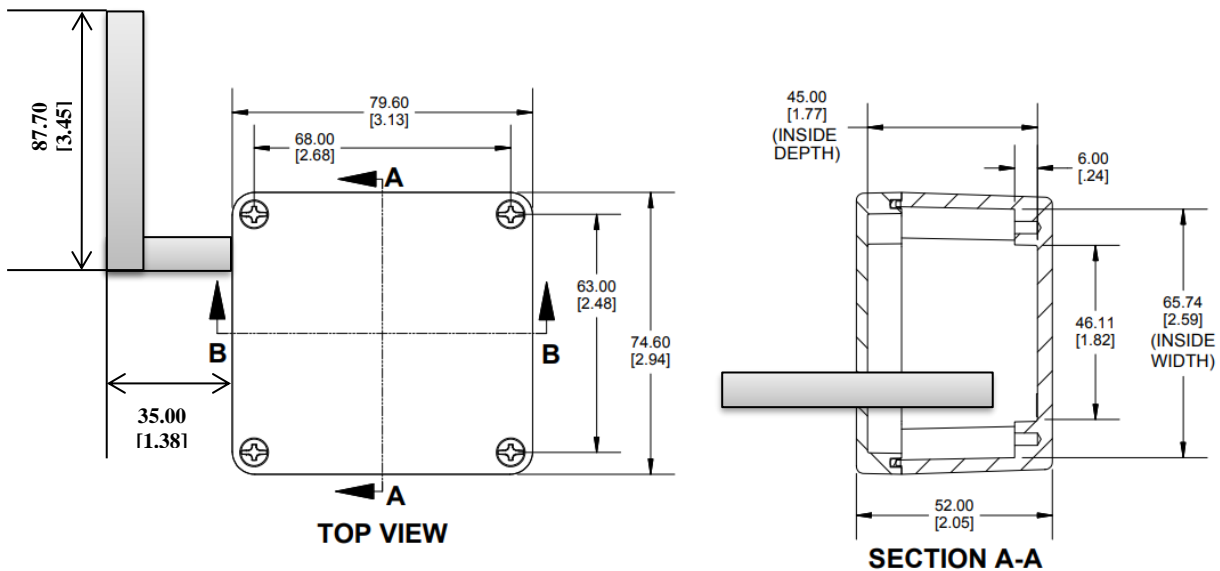


Figure 1: 2D HRT SenSpot™ Dimensions. All measurements are in mm [inch].

Direction Diagram

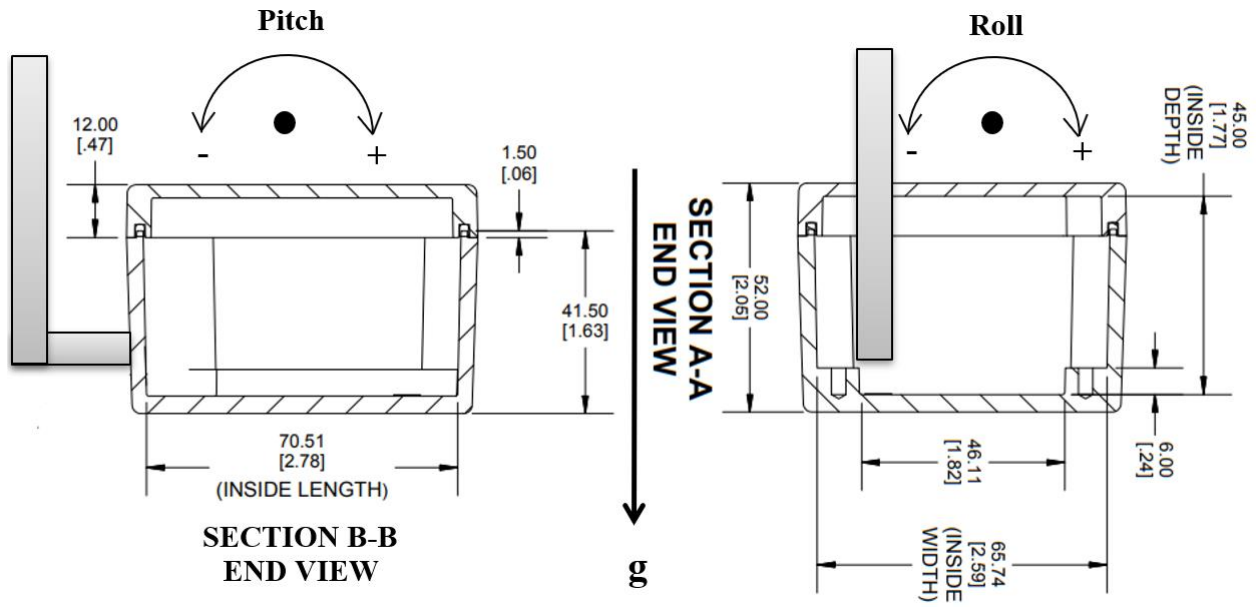


Figure 2: Pitch and roll orientations.

The data shown in SenScope™

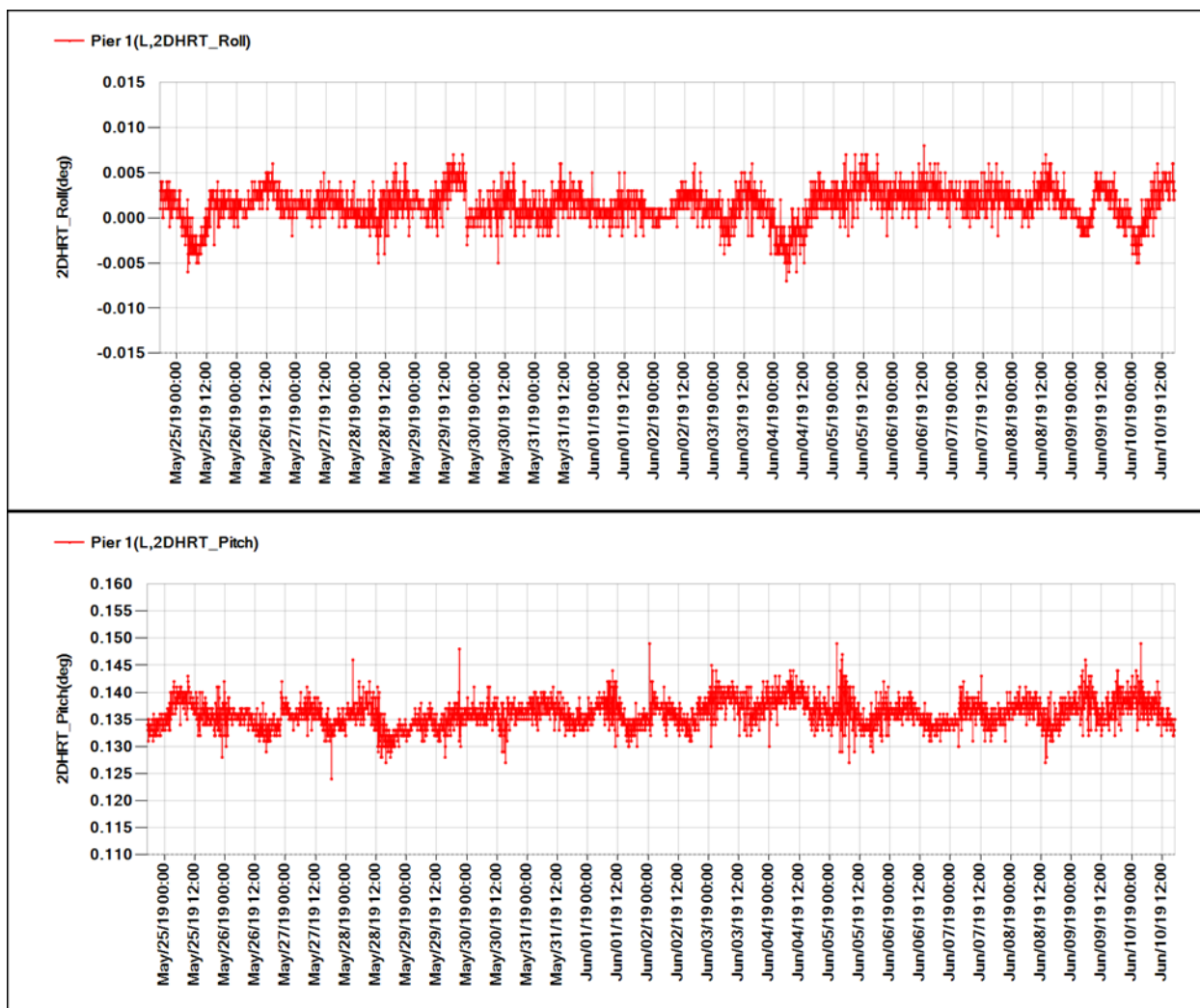


Figure 3: High-resolution tilt measurements (2D-roll & pitch) for a HRT gauge (inclinometer)