SenSpot™ Displacement Meter

Ultra-Low Power Precision Sensing & Wireless Communication

Typical Applications

- Bridge health monitoring
- Structural integrity monitoring (buildings, dams, tunnels, etc.)
- Monitoring bridge bearing and expansion joints
- Monitoring crack width growth
- Monitoring timber structures and bridges

Benefits and Specifications

- **Long lifetime** (10 years)
- **Wireless communication** (IEEE 802.15.4)
- **Lightweight (about 235 grams or 8.3oz)**
  - Wireless transmitter: 120 g (4.2oz)
  - Cable (3ft): 30 g (1oz)
  - Displacement sensing element: Refer to figure 1.
- **Small size:**
  - Wireless transmitter: 50mm (1.96”) x 50mm (1.96”) x 34mm (1.34”).
  - Displacement sensing element: Refer to figure 1.
- **Communication range:** 300m (980ft) for reliable communication.
- **Resolution:** 0.01mm (0.4mil).
- **Adjustable sampling interval:** The regular sampling interval can be adjusted either remotely or locally by user from 100ms (10 samples/sec) to 15sec.
- **Adjustable transmission interval:** Can be adjusted either remotely or locally by user from 12sec to 360sec.

- **Burst mode: High-rate data transmission triggered by sudden displacement changes (Only for Type C)**:
  - Perfect for recording the waveform of a sudden displacement change (e.g., displacement event) caused by live load.
  - User adjustable sampling rate for event detection and high-rate data from 10 to 100 samples per second.
  - User adjustable triggering threshold from 0.025mm for detecting displacement event
  - (e.g., heavy trucks passing over a bridge, wind gust, loading cycles).
- **Measurement Range:** 50mm (2”), 75mm (3”), 100mm (4”), 150mm (6”) and 300mm (12”).
- **Mechanical stroke length of the sensing element:** 53mm (2.1”), 78mm (3.1”), 103mm (4.1”), 150mm (6”), 300mm (12”).
- **Measurement non-linearity:** <= ±0.10% (Full

Stroke)

- **Working temperature:** -40°C to +65°C (-40°F to +150°F)
- **Ingress Protection:** IP66, weatherproof**.** Protected against rain, snow, and UV exposure.
- **Power source:** Standard non-rechargeable CR123 battery.
- **Different types:**
  - **Type D:** Sampling from every 100ms (10 samples/sec) to every 15 seconds.
  - **Type C:** similar to type D with event detection capability. Start transmitting high rate measurement (up to 100 samples/second) upon detecting sudden change of displacement.

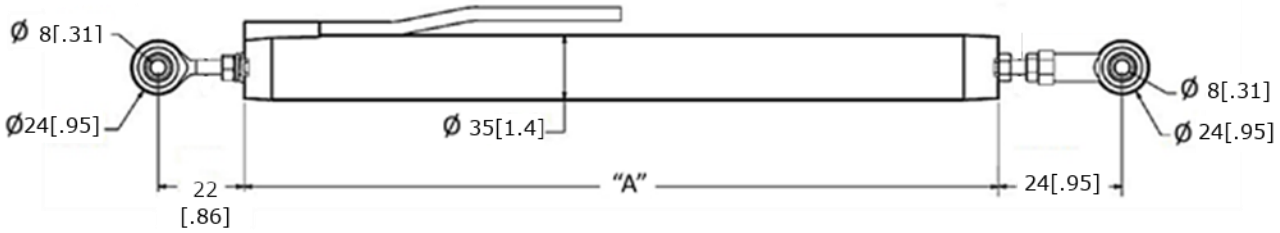
Description

SenSpot™ provides an easy to install, scalable solution for distributed structural integrity monitoring. Resensys SenSpot™ technology offers a high-performance method for 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 during its entire service life. Due to small size and light weight, adhesive-mount SenSpot™ sensors can be applied easily to as many critical spots on a structure as needed, with minimal installation effort.

SenSpot™ displacement meter can be used for measuring the progress of the existing cracks in a structure.

Displacement sensing element



Model	2"	3"	4"	6"	12"
Dimension "A" (mm)[inch]	176 [6.9]	201 [7.9]	227 [8.9]	277 [10.9]	430 [16.9]
Weight (gram)[lb.]	350g[0.77]	400g[0.88]	450g[0.99]	520g[1.14]	750g[1.65]

Figure 1: Displacement SenSpot™ sensing element dimensions and weights

SenSpot™ - Wireless Transmitter

Wireless transmitter is universal and it reads the analog measurement from the sensing element and transmits the data wirelessly to SeniMax™. These units come in either self-adhesive or flange-mount form factors.

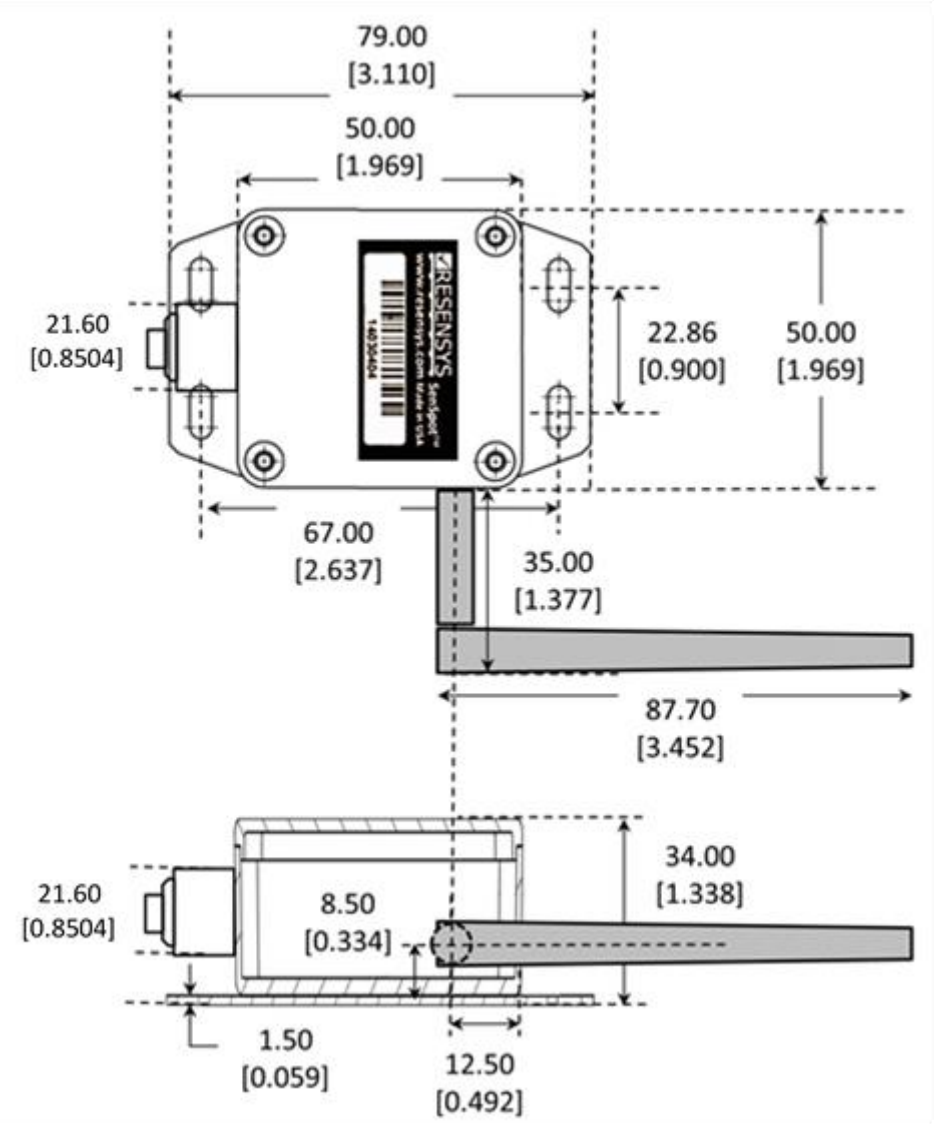


Figure 2: Wireless transmitter dimensions for Displacement SenSpot™. All dimensions are in mm [inch].

Sample displacement measurements in SenScope™

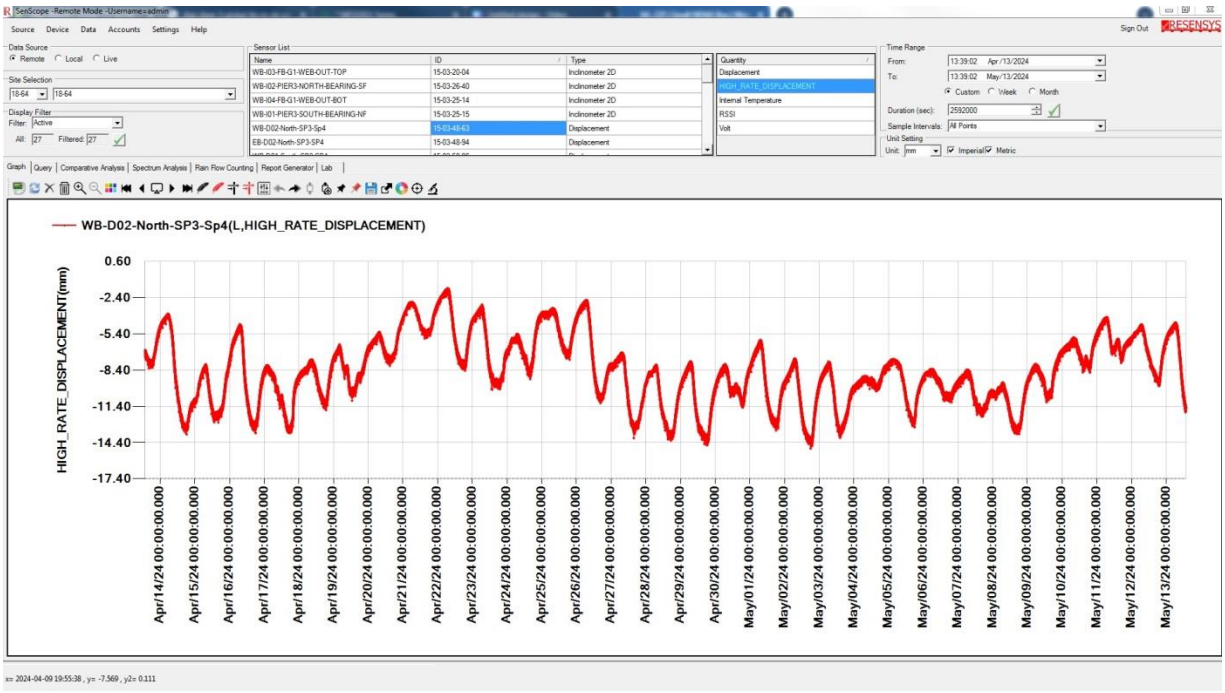


Figure 3: One month of High-rate displacement measurements of an installed SenSpot™

Figure 4: Installed displacement Senspot™ on a concrete tower for monitoring crack width development