



SenSpot

Installation Manual

I. Introduction

Installation of Resensys wireless SenSpot™ strain gauge is a simple procedure and can be done in a few minutes. This instruction describes installation of a steel strain gauge to a metal surface.

Required tools for installation are as follow:

1. A coarse sand paper (grit size around 80) or a sanding drum and drill
2. Cold Cure Adhesive such as LOCTITE 401 from Omega Engineering
3. Wiping tissue
4. ABM75 Strain Gauge Protective Cover Box
5. Resensys SenSpot™ steel strain gauge

Figure 1 shows these items



Figure 1: Tools required for installing SenSpot™ steel strain gauge

Typically, cold cured adhesive and ABM75 protective cover are provided by Resensys to the customer along with SenSpot™ steel strain gauge. Other items such as sanding drum and drill or sand paper and wiping tissues can be purchased from any local hardware store.

II. Configuration of the SenSpot™

SenSpot™ needs be configured properly by Air Update before using it in remote mode. Usually, the

SenSpot™ are air-updated by Resensys before shipping to the customer so nothing is required to be done by the user. However, if the sensor network needs to be reconfigured after shipping (e.g. some repeaters are needed due to poor RF link between SeniMax™ and SenSpot™), Air Update will be needed. Please refer to SenScope™ User Manual for step by step instruction about how to Air Update the SenSpot™. Please make sure that the manual is read thoroughly because incorrect Air Update settings cause improper operation and data loss. Please pay extra attention to the explanation for **Threshold** and **Sampling Interval** in the **Special Parameters** section. For SenSpot™ sensors with event detecting function, the triggering threshold is adjustable from 16μStrain to 512μStrain while the sampling rate can be changed from 10ms to 200ms.

When using the SenSpot™ in live mode, the user should calculate and change the coefficient themselves. For Regular Strain Gauge, the formula: $coef = \frac{1}{2^{11} \times 113.7(GF)}$ should be used. The typical gauge factor (GF) for a full bridge sensing element is 2.14. Therefore, the coefficient is 2.006μS/(raw data). The raw data is the data transmitted by the SenSpot. For the Event-detecting Strain Gauge, the user should use the formula: $coef = \frac{1}{2^{18}(GF)}$. In this case, the coefficient is 1.782μS/(raw data). Please note that all the formulas mentioned here are only applicable to the strain caused by bending of the metal of the structure.

III. Installation Procedure

Before starting the installation choose the desired spot for strain measurement. The sensing element should be adhered to this spot. Given the sensing element cable length, the wireless transceiver must be attached to an appropriate area close to sensing element so that cable should not be under strain. The transceiver may be adhered either before or after sensing element. Figure 2 shows a SenSpot™ steel strain gauge installed on a bridge web.

Another important factor that must be taken in to account, is the environment relative humidity (RH). The strain gauge adhesive needs humidity for proper curing. If RH is less than 40%, then it cannot be cured fully and this degrades bonding of strain gauge and steel. As a result, the measurement accuracy reduces. So, before installation, make sure RH is at least 40%.

Following table provides an easy step by step guide for installing SenSpot™ steel strain gauge to a bridge.



Figure 2: SenSpot™ steel strain gauge installed on a bridge web

1.

Sand the installation spot using a sand paper. It is much easier to do this by a drill and sanding drum (the same as picture). Any rust, paint and oxidized layer must be removed from the steel surface and the bare steel must be appeared.

Please note, this is the desired spot for measuring the strain and the strain gauge will be adhered to this location.

Make sure the size of bared steel area is large enough to contain the whole strain gauge inside.



2.

Use the wiping tissue to remove the produced dust by the sandpaper.



3.

Choose an appropriate spot for installing SenSpot™ wireless transceiver. Clean the metal surface with the wiping tissue to ensure there is no remaining dust or moisture on the installation spot

4.

Peel off the adhesive cover at the back of the SenSpot™ wireless transceiver.

A sharp tool such as tweezers may be used to make peeling easier.



5.

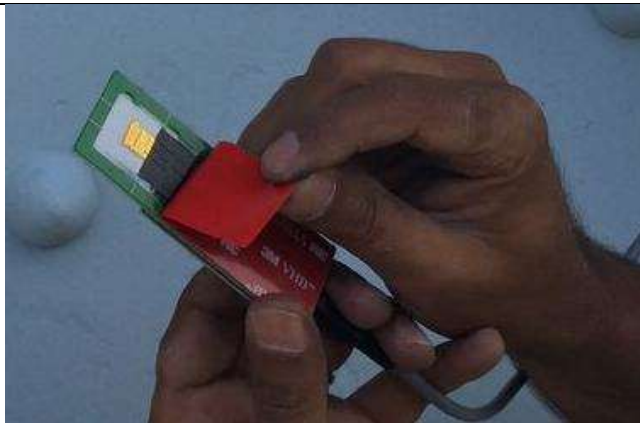
Place the SenSpot™ wireless transceiver on prepared spot and push it for around 10 to 15 seconds to ensure that the attachment is strong and secured.



6.

Peel off the adhesive cover at the bottom of the sensing element.

A sharp tool such as tweezers may be used to make peeling easier.



7.

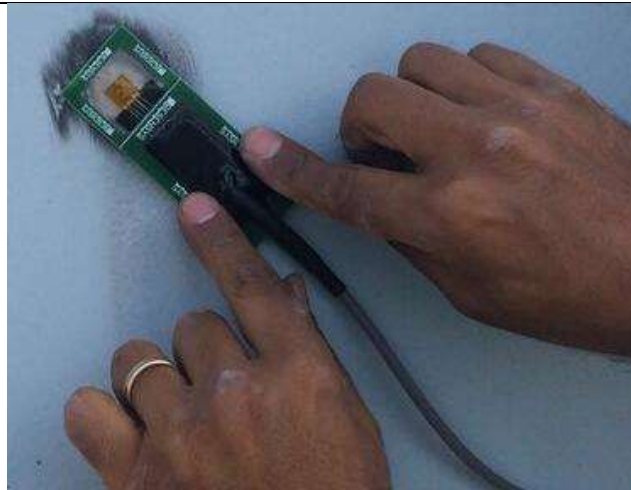
Apply one drop of “Cold Cure Adhesive” such as Loctite 401 to the scratched spot. Try to spread the adhesive on the scratched spot evenly. Note that this adhesive works based on the environment moisture. For proper operation, the relative humidity should be at least 40%.

The next step must be done immediately after this step and before the adhesive gets cured.



8.

Hold the sensing element above the prepared area and adjust its location so that the strain gauge aligned with the scratched spot. Make sure the prepared bared steel area completely contains the strain gauge surface. Then put the sensing element on the metal and apply some force to attach the body of the sensor first. Between 10 to 15 second is enough to secure a strong connection.



9.

Keep pushing the window part of the strain gauge with finger against the steel substrate for around 2 to 3 minutes so that the adhesive cured and strain gauge attached tightly. Try to apply force evenly on the strain gauge surface. The actual required curing time depends on relative humidity (RH). The higher the RH, the faster adhesive cures.



10.

Tuck a bit of ABM 75 to the tail of the probe with flat tools like a screw driver.



11.

Attach the adhesive side of cover to sensing element. Align the cover with sensing element and make sure it covers the entire sensing element.

Press the cover firmly so that it tightly attached to sensing element.

Other side of the cover is adhered to an aluminum sheet.

This aluminum sheet protects the cover and sensing element from UV and overheating.

Please note that the ABM75 at the cable side is pinched so that a tight seal around the cable can be achieved.



12.

Clean the aluminum surface of protective cover. The final SenSpot™ steel strain gauge attached to the steel bridge is shown in the picture.

