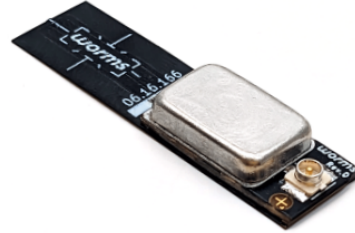*worms*

User Manual

Dragonfly® sensor

Short version

User Manual Dragonfly®

This user manual describes the installation of Dragonfly® sensors short version. It is valid for both passive and IEPE configurations. Dragonfly® sensors are strain sensors, which must be bonded to the surface to be measured. The accuracy of the strain measurements depends on the bonding quality. The objective of this document is to provide all the necessary information for an effective sensor installation.
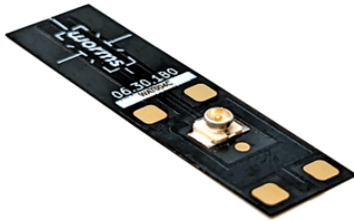
Passive Dragonfly® short sensor   **IEPE Dragonfly® short sensor**

1   Handling recommendations

Before they are installed on test objects, Dragonfly® sensors must be handled with care. Please follow our recommendations on p3.

2   Unboxing & Cabling

This section provides instructions on the cable installation (p4).

3   Surface preparation

A smooth and clean surface is essential for good sensor bonding and precise measures, details on p5.

4   Glue selection

Different glues can be used depending on your testing context, p6.

5   Sensor installation
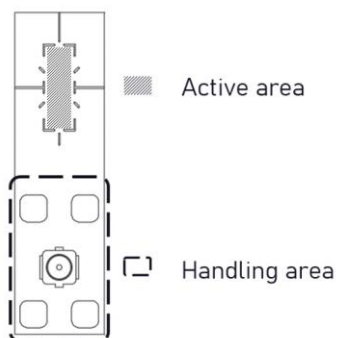
- Quick direct gluing p7.
- Precision gluing p8.
- Applying a protective layer p10.

For more information on sensor testing and measurement, please refer to the documents:

- Application Note: Sensor check
- Application Note: Sensor measurement

1   Handling recommendations

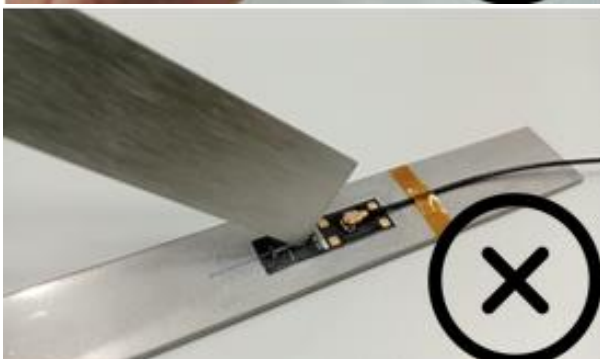**Warning:** before they are installed on test objects, Dragonfly sensors must be handled with care.

Manipulation

- Sensor should be manipulated by connector area prior to wire installation.
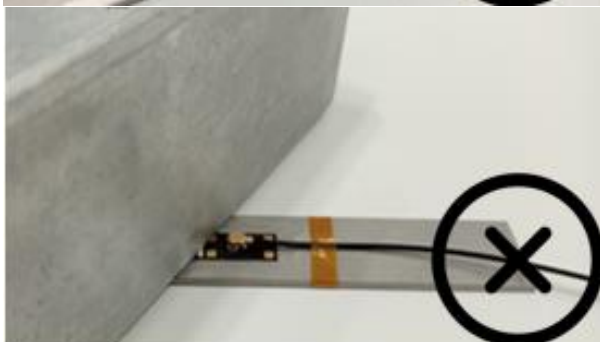- Avoid contact with the active area.

Bending

- Avoid any bending of the sensor prior to installation.

Punctures
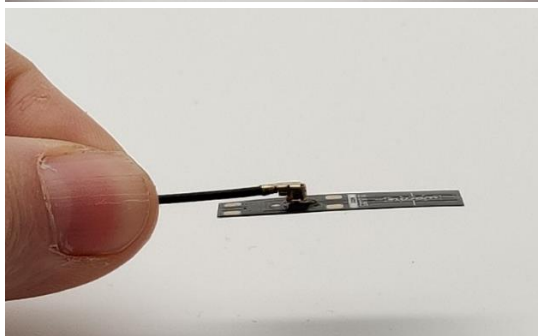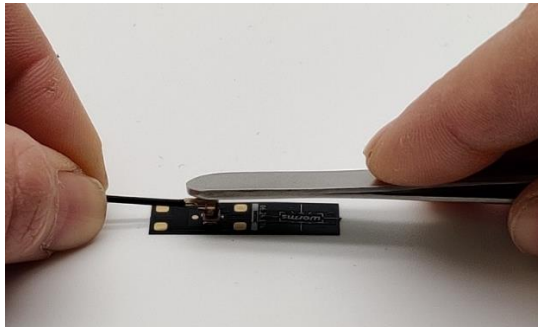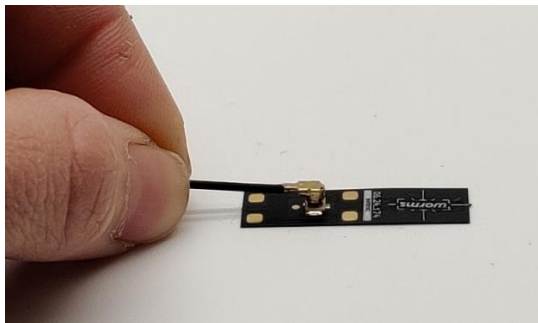
- Avoid local puncture points on the sensor.

Loads

- Avoid mechanical loads over the sensor.

2 Unboxing & Cabling

Sensors are sold with the cable separately. It is recommended to cable the sensor prior to installation on a flat and clean area. However, for long cable lengths or specific applications, it might be convenient to install the cable after installation.

Unboxing

- Pick the sensor handling area with tweezers.

Preparation

- Place the sensor and the cable on a flat surface.
- A rigid tool will be needed to make the connection. Here we use the back side of a sample tweezers.

Align the connectors

- Carefully place the cable UFL connector over the sensor one.
- Make sure they are precisely aligned.

### Apply pressure on the cable connector

- Use a rigid object to apply vertical pressure on the connector. Make sure to maintain the parts in the same vertical alignment.
- A soft "click" can be felt when the connector engages.

Handling

- Once the cable is connected, it can support the sensor weight without problem.
- Manipulate the sensor by the cable for installation.
- Once installed, the cable can't be disconnected.

3 Surface preparation

The test body deformation will be transmitted to the sensor through the glue interface. Surface preparation may be needed to ensure good adhesion of the glue to the test body.
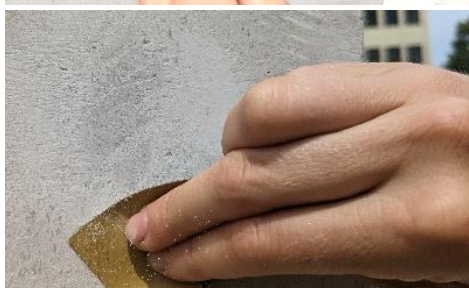
Roughening

- Use an emery paper to roughen a 3cm² surface where the sensor will be installed. Consult your glue dedicated specsheet to know the most appropriate grain size.

Cleaning

- Clean the surface using microfiber fabric and a solvent such as isopropyl alcohol.

Evaluating surface uniformity

- The signal will be the average of the deformation under the active area. Large asperities or inhomogeneities might result in biased results.

4 Glue selection

The interface between the sensor and the test object must be very rigid to transmit the deformation of the test object to the sensor;

- Double-face tape is flexible and **should not** be used for installation as it will not transmit the deformation to the sensor.
- Clamping the sensor **is not** an installation solution as it will not transmit the deformation to the sensor.

The sensor **should not** be scrapped with a solid object after gluing. Use a soft material to apply the pressure (thumb or flexible silicone).

The following schematic helps choosing the right glue for different contexts. The recommended glues have been qualified for Dragonfly®.
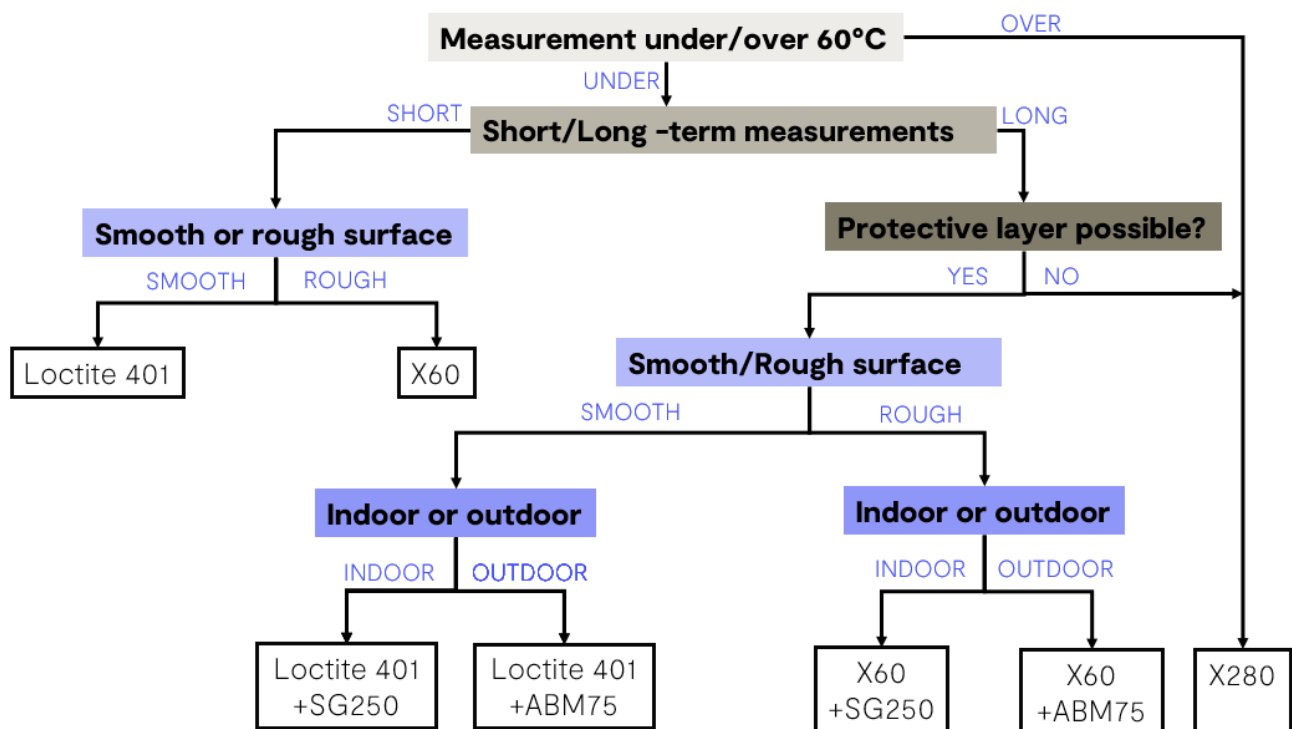
The table below gives further information on the recommended glues.

Glue	Manufacturer	Composition	Usage	Downsides
Loctite 401	Loctite	Cyanoacrylate	Quick measures	Cyanoacrylates are known to degrade with time in humid environment
X60	HBK	Methacrylate	Rough surfaces	Thicker bonding interfaces
X280	HBK	Room-temperature epoxy	Long term measure	Requires mechanical clamping during the curing of the glue

5 Sensor installation

Dragonfly® sensors can be tested prior to installation. Please refer to [Application Note: Sensor check](#) document. Below are presented two different techniques for sensor installation: one that reduces the installation time and one that ensures the best alignment.

5.1 Quick direct installation

This technique is adapted when alignment is not critical. It is also best suited for horizontal sensor installation. For vertical or tilted test object, please refer to the precision installation technique p8. A video demonstration of the quick technique is available here https://youtu.be/lgADE3zEqBM.
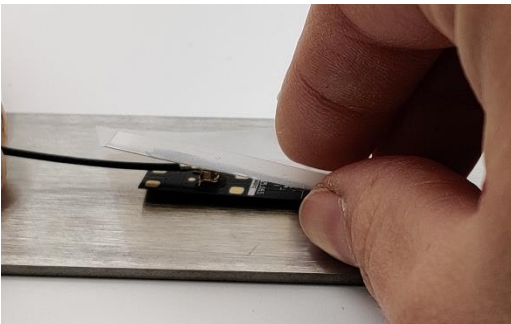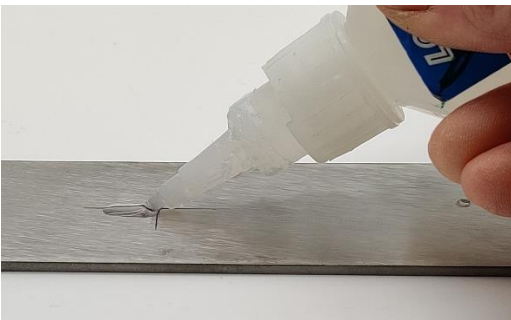
Position Identification

- Make an alignment mark on the surface.

Apply glue on the surface

- Use a glue appropriate to your test context and substrate material.
- Apply enough glue to cover the entire sensor area.

Sensor placement

- Align the sensor with your mark.
- Cover the sensor with a Teflon paper
- Do not make sliding lateral movements once the sensor is in contact with the glue.


Apply pressure

- Apply homogeneous pressure on the full sensor area.
- In the case of cyanoacrylate glue, press gently with your fingers for 30 seconds. For other glues, apply pressure for their recommended cure time. A mechanical clamp is necessary for epoxies.

Fix wire & test

- Fix the wire with adhesive tape to prevent direct pull on the bonding interface. Any tape or glue are ok.
- Test sensor to validate installation [(Application Note: Sensor check)](#).
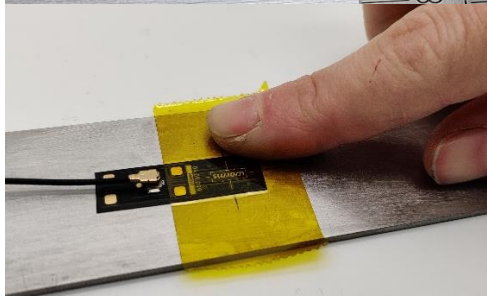
5.2   Precision installation

This gluing technique allows a more precise alignment. A video demonstration is available here
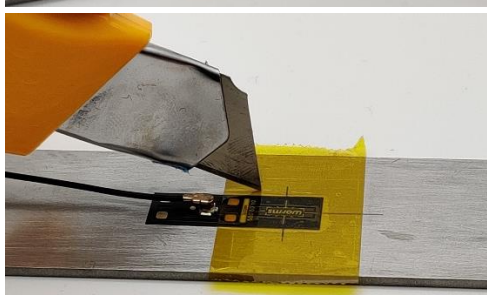https://youtu.be/WMm4LXUvn8U.
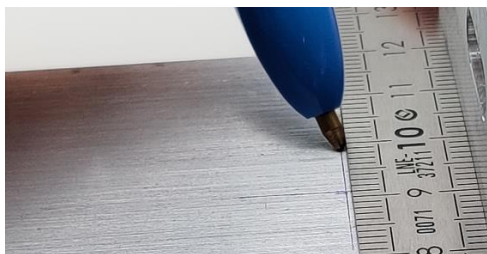
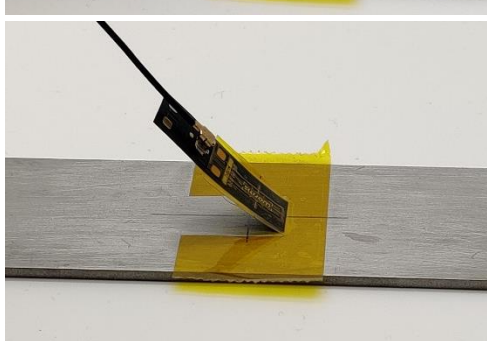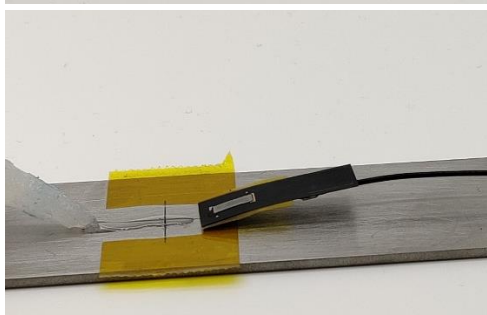|	
	Position Identification Make alignment marks on the surface.
	Align the sensor by covering it with tape • Use a low adhesion tape (such as Kapton®) to place the sensor on the alignment marks. • Stop the tape before the connector.
	Cut the tape on the sensor sides • Use a cutter to cut the tape on both sensor sides • Make the cut approximately 1 mm from the sensor edge. This distance is not critical.
	Lift the sensor • Take the sensor cable and lift it.
	Apply glue • Apply glue on the whole sensor area. Do not forget the connector area located further from the tape.
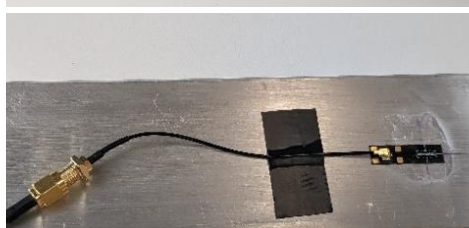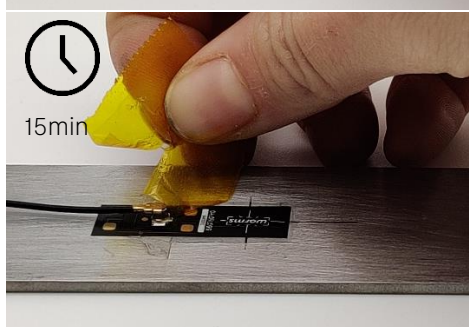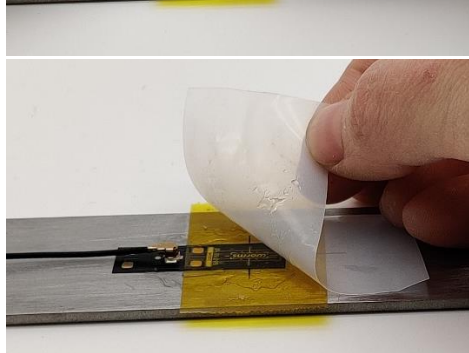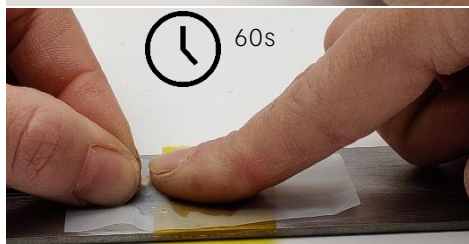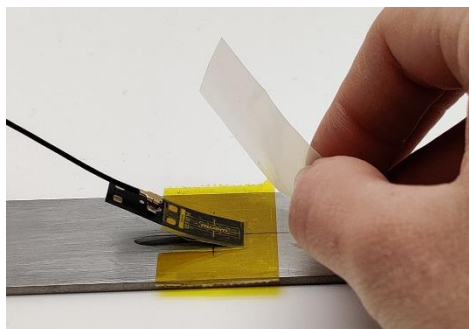
Lower back the sensor

- Use the tape as the alignment.
- Then place a Teflon sheet over the sensor.

Apply pressure through a Teflon sheet (60s)

- Apply an homogeneous vertical pressure on the complete bonding area.
- For cyanoacrylate hold the pressure for 60 seconds with a finger. Epoxy glues have longer curing time and require a mechanical clamp.

Remove the Teflon

Remove the tape after 15min

- Wait for the complete glue setting time. For cyanoacrylate wait at least 15 min.
- Pull the tape at an angle by the corner.
- Removing the tape too soon could result in sensor damage.

Fix the wire & test

- Fix the wire with adhesive tape to prevent direct pull on the bonding interface. Any tape or glue are ok.
- Test sensor to validate installation (Application Note: Sensor check).

5.3   Applying a protective layer

For rough environments (humidity, heat, light), sensor protection is advised to prevent glue interface degradation. The following products are recommended.

Glue	Manufacturer	Composition	Usage
ABM75	HBK	Kneadable putty and aluminum	Outdoor protection
SG250	HBK	Silicone	Lab and indoor

For more information

- Consult our web site at www.wormsensing.com
- Contact us at contact@wormsensing.com