



# Rugged Ceramic Sensors - Epoxy Attachment Recommendations

## KEYWORDS

Ceramic sensor  
Contoured surface  
Vibration  
Adhesive  
Epoxy  
Sensor

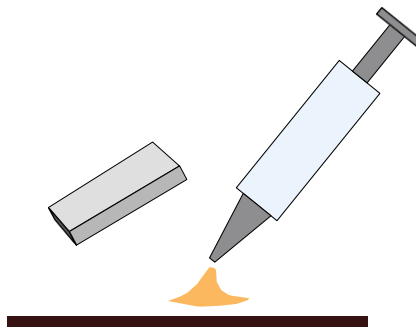
## ESSENTIAL POINTS

Tape down for testing  
Check ease of reading  
Clean the surface  
Apply the sensor  
Apply epoxy  
Let cure before use

## Addressing hard-to-stick surfaces

The RFM3250, RFM3254, AZN3256 & AZN3260 rugged ceramic temperature sensor's adhesive backing works well on clean flat surfaces. However, in an industrial setting, slightly contoured surfaces and enamel paint might not bond well to the adhesive. Epoxies can be a good solution in these situations.

Epoxies can affect the RF performance and accuracy of the sensor. This document recommends epoxies and a process for properly applying epoxy to all Axzon rugged ceramic sensors. Then, this document describes possible effects of the epoxy on performance.



## Recommended epoxies

The recommended epoxies are chosen for their strength and limited effect on both read range and temperature accuracy. Gorilla Epoxy can normally be found in home improvement stores. Arctic Alumina epoxy may need to be ordered, and it is designed for applications such as computer heat sinks. Both epoxies provide similar performance.

- Gorilla Epoxy
- Arctic Alumina Thermal Adhesive

## Before applying epoxy

It is good practice to verify that a sensor can be read at the desired location before applying epoxy. One method to temporarily install the sensor in the desired location is to simply tape it down. Ensure that the sensor is taped securely with the bottom of the sensor flush with the metal surface. An air gap between metal and the sensor can significantly reduce read range. If a sensor is difficult to read, it can be moved to an easier-to-read location. Only epoxy the sensor when it is certain that the sensor can be read at the desired location.

## Applying epoxy

Our rugged ceramic sensors need a relatively flat piece of metal directly below it, or the read range of the sensor will be reduced. Therefore, epoxy should only be used to get the sensor to stick to slightly contoured surfaces.

Epoxy should not be used to force the sensor to stick to highly contoured surfaces.

### Installation Process:

- Temporarily tape the sensor in place and ensure that it can be read BEFORE permanently epoxying the sensor.
- Clean the surface thoroughly with rubbing alcohol and wait for it to dry.
- Peel release paper from the sensor's adhesive backing.
- Place adhesive backing on desired location while applying firm pressure to the top of the sensor.
- Mix 2-part epoxy.
- Apply a small amount of epoxy to the sides of the sensor.
- Clean off extra epoxy. The epoxy fillet should be approximately 1 mm tall.
- Allow epoxy to cure per the epoxy's instructions.



Rugged ceramic sensor epoxyed with clear Gorilla Epoxy around the edges.

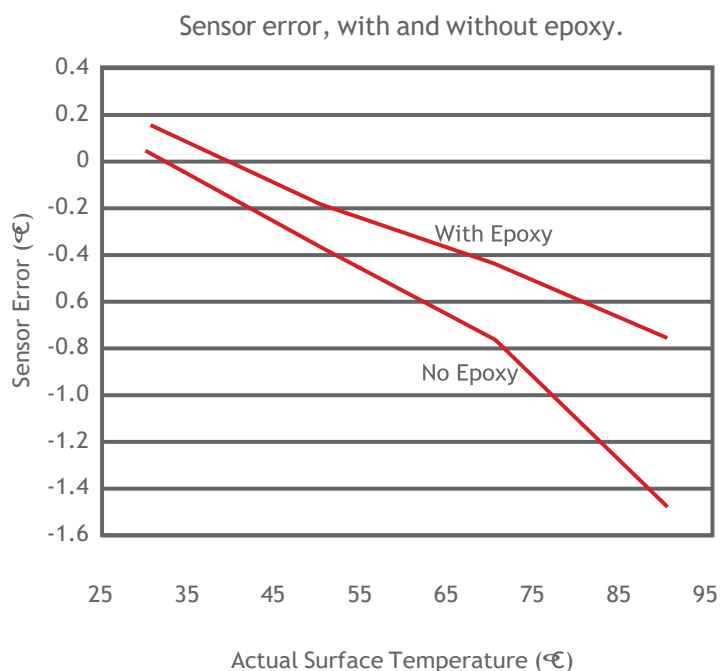
## Effect of epoxy on read range

Certain kinds of epoxy can interfere with the ceramic sensor's antenna and reduce RF performance. For example, JBWeld is not a recommended epoxy since the material properties result in reduced read range when applied around a ceramic sensor. When applied to the sides, the recommended epoxies have little effect on the RF performance of the ceramic sensor.

## Temperature accuracy when using epoxy

A rugged ceramic sensor is often used to measure the temperature of a surface, although the reported temperature will be that of the silicon sensor IC (the small square on the short side of the sensor). Augmenting the normal adhesive with epoxy can change the thermal flow from the surface to the IC.

The figure below shows the sensor's measurement error compared to the reference surface. Ambient air is at room temperature, and there is little air flow. Results will likely be different if the ambient temperature is changed or air flow is introduced. The recommended epoxies do not cause significant errors. Surface temperature is more accurately reported with rather than without epoxy.



## Conclusions

Epoxies are a good option for surface materials that don't bond well with the rugged ceramic sensor's adhesive backing. Recommended epoxies are GorillaEpoxy and Arctic Alumina. Both epoxies have little effect on a sensor's readability or temperature accuracy.