SENSOR TAG BASICS

1. SENSOR TAG TYPES

Passive sensor tags come in three types. Selecting the correct type is important for project success. You may need more than one type and that's ok. If in doubt, ask SensThys to help you.

| | Conventional | On-metal | Ceramic |
|------------------|---|--|---|
| | A X Z-O N AZN3100. AFA A X Z-O N AZN3100-AFR A X Z-O N AZN3100-AFR Motive and temperature Networks Motive and temperature | | Temperature Sensor CTS F |
| Construction | Peelable film strip (flexible plastic film with aluminum antenna) | Longer strip wrapped around an insulating layer | Sealed ceramic package |
| Thickness | Paper thin | Dollar coin thickness (2mm / 0.08'') | 2 or 3 coins stacked (3 - 5mm / 0.1" - 0.2") |
| Other dimensions | ¹ /4" x 2" to ³ /4" x 4" | | I4 - 24mm x I0mm ½" − I" x 0.4" |
| Cost | Low | Medium | High |
| Use | Non-conducting surfaces e.g. cardboard, wood, plastics, glass | Conducting surfaces e.g. metal and carbon fiber | Any surface |
| Temperature | -40C - +85C | -40C - +85C | -40C - +250C |

2. MEASUREMENT TYPE

Sensor tags can measure the following properties. A specific tag may be capable of measuring one or all of these. Ask SensThys if you are unsure.

- Temperature
- Moisture e.g. water ingress, humidity etc
- Cure progress e.g. composites, concrete etc
- Strain

3. ANTENNA: WHERE DOES ENERGY TRANSMIT FROM?

Since there are no wires and no batteries, these tags **receive power** from and **transmit** their status back to a near-by "antenna" or "read-point". The power "bulges out" from the flat polycarbonate (non-metallic) surface of the antenna in about a 140-degree angle. Tags sitting beside or behind the antenna will not be read.



4. READING WIRELESS SENSORS

It is important to have the antenna >6" (inches) away from the sensor tag (avoids poor reads). There is a maximum but that depends on the tag, your environment, and your reader settings.



Cheat: If you have the antenna on your desk facing up, you can place a large, dense book on the antenna and put your sensor tags on top of that. That has a similar affect to creating distance between the tag and the antenna.



5. SENSOR ORIENTATION

Only one orientation is of concern and should be avoided.



6. WHAT CAN'T WE READ THROUGH?

These sensor tags are powered by radio energy delivered by the antenna and communicate back to the same antenna using that power. There are two types of materials that these signals don't go through, everything else is ok:

- Metals and carbon fiber (conductive materials)
- Water or water-based fluids (e.g. wine, human bodies)



A. Useful to know

The signals can't go THROUGH conductive materials, but an appropriate sensor tag (e.g. an "on-metal" sensor tag) can be placed **ON the metal or carbon fiber** and be read from an antenna located on the **same side** as the sensor tag.

Many metal "chicken wire" or other similar structures *usually* have sufficient "holes" to allow the power and signals to pass through. However, sufficient distance (e.g. 1ft) should be between the tag and the metal wire.

Reading down a metal pipe is also ok if both the tag and reader antenna are both inside the pipe.

Oil based fluids don't have the same problem as water-based fluids. The sensor tags will be seen though petroleum, gasoline, baby oil etc

Read distance is affected by:

- How cluttered the area is between the antenna and the sensor tag
 - More metal and water containing objects (e.g. wood) the less distance
- Tag orientation (see above)
- Antenna transmit power (higher is further, nominally 30dBm which is 1 Watt)
- The gain of the antenna (usually the larger the antenna, the more gain it has)
 The more gain the further it reads (but reduces the area covered)
- The physical length of the sensor tag (the longer the tag, the further it reads)



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