Tech Note

The EdgeTech S1/S2 Sensor Design
- **Smaller, lighter, faster**
- **Chilled Mirror Performance**

Background:

The core technology for EdgeTech is the chilled mirror sensor. The chilled mirror sensor provides a primary moisture measurement that is traced to NIST United States government standards.

The flagship chilled mirror sensor design is the EdgeTech "flow-through" sensor. Over the years the sensor has been given different names, as the instrument product line has changed. Designated as the Model 660, Model 911, S1 and S2, the flow-through sensor has long been recognized as the standard in the dew point measurement industry. Our proud past has lead to an exciting future…

The EdgeTech S1/S2 Sensor:

Over the years, many improvements have been applied to the flow-through chilled mirror sensor (S-type). S-type sensors manufactured after February 1997 have been improved significantly to meet particular customer-suggested changes. The purpose of this Tech Note is to detail the milestone improvements.

The S-type sensors are named for the number of stages of Peltier cooling used in the assembly. For example, the S1 sensor is a 1-stage chilled mirror sensor with 45°C of depression capability. The S2 sensor is a 2-stage chilled mirror sensor with 60°C of depression capability.

Field Compatible:

The long term customer will like the fact that the new S1/S2 sensor is compatible with instrument installations that are already in the field. Although interchangeable, it is recommended that the "system" be recertified by the factory for NIST traceability (anytime a component of a system is changed, the calibration may need to be recertified). Compatibility with existing systems virtually eliminates operator training and maintains (or actually improves) the precision sensor performance specifications.

Common Housing:

Previous to 1997, the S1 and S2 sensors "looked" different. Spaces inventory and tracking were more difficult. The new S1/S2 housings are the same, reducing inventory and servicing issues.

Modular Optics/Mirror:

Rather than a manufacturing process that encapsulates the entire sensor components in the potting material, the two chief components (the optics and the chilled mirror/cooler) are assembled in modular designs that are each factory replaceable.

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Rather than replace the entire sensor after years of operation, smaller assemblies can be replaced at a far lower cost. Further, upgrading from a one to a two stage sensor is only a module exchange. EdgeTech does not endorse the design of "field replaceable mirrors" (used by another manufacturer) due to possible problems of intermittent contact with the cooling assembly. The EdgeTech mirror/cooler assembly is soldered and entirely potted for long term stability and a lower cost of ownership.

Optics Protection:

Some applications are more rugged than others. Previously, the user had only the more expensive 2-stage sensor available, if optics protection was required or desired. The new S1/S2 comes with optics protection standard.

Lightweight:

The new S1/S2 is 10% lighter than the former S1 and 65% lighter than the former S2. The lighter weight sensor provides improved center of gravity when installed on the controller and easier and less expensive installation requirements when installed remotely. Fewer parts and less machining are required for the news sensor, which has lead to dramatic weight reduction. For example, the recognizable, heavy brass cooling jacket has been eliminated and replaced by a cooling port adjacent to the cooling module. Installation to the cooling source has also been made easier.

Small Profile:

With a reduction in weight also comes a reduction in size.

The new S1/S2 is 10% shorter than the former S1 and 35% shorter than the former S2. A smaller sensor eliminates sensor installation retrofit issues and allows for easier placement on new installations.

Smaller Internal Volume:

Measurement response time is a function of sample volume. A smaller volume will require a shorter exchange time for a representative sample to be measured. The new S1/S2 sensor has an internal volume that is two-thirds less than previous designs. The actual response time will depend on other factors (such as flow rate) as well as internal volume.

S1 Cooling Capacity:

Both the new S1/S2 sensors are designed to readily accept auxiliary cooling, if desired. Previously, extra cooling could be gained only with an optional cooling jacket, which lowered the base temperature at an increased cost. The location of the external cooling directly under the mirror assembly. Auxiliary cooling capability is standard with both sensors.

Quick Access Cover:

Access to the S1/S2 mirror is as quick as turning the threaded cover. Allen screws from previous S1 designs have been eliminated. Further, the O-ring, which contains pressurized samples, is fixed to the cover, eliminating the possibility of a lost seal.

…..all at a lower price

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