

## Measuring Temperature in a Small Diameter Line

### APPLICATION



Measuring temperature accurately in small diameter lines (less than 4" diameter) can be problematic with standard immersion style sensors. Where long term high accuracy and repeatability are required the platinum resistance thermometer (PRT) is the sensor of choice, unfortunately, standard configurations are generally not suitable for small diameter lines without some creative plumbing and many times that creates additional problems. Lines larger than 4" provide sufficient space for mounting common styles of PRT assemblies and provide an accurate measurement. One of the largest errors associated with PRTs is stem conduction and is usually caused by insufficient immersion of the sensor into the process fluid. A 1/4" diameter PRT requires about 3.5" of immersion to avoid stem conduction error. Depending on the difference between ambient temperature and the process fluid temperature the error can be several degrees.

### CHALLENGE



One solution for small diameter lines has been the non-intrusive style probe assembly. First generation of this probe style incorporates a surface mount PRT surrounded by an insulated stainless steel housing welded to the process tubing resulting in a one-piece assembly. They work fairly well and do not interfere with the fluid flow and can be adapted to lines down to 1/4". Biggest drawback has been with maintenance. The probe assembly has to be removed from the process for calibration or replacement which can involve draining the lines and subsequent sterilization for some applications. Then there is the challenge of calibrating the probe assembly. Because they are of one-piece construction, a large bath is required to fully immerse the housing. This is not always practical or possible especially when calibrating in the field versus a laboratory setting.

### SNR



▶ **Non-intrusive with removable sensor**

### SOLUTION



Burns Engineers were tasked with designing a solution that would allow for removal of the sensor assembly without removing the housing from the process. The result was the Model SNR. The specially designed tip sensitive spring loaded probe is held in the housing with a 1/2" hygienic ferrule connection that provides a watertight connection and allows for easy removal of the probe for calibration or replacement. Performance is similar to the one-piece design.

**Model SNR product detail and ordering information can be viewed at: <http://www.burnsengineering.com/non-intrusive-rtids>**

**For further information on measuring temperature in small diameter lines visit the technical papers location on our website: [www.burnsengineering.com/tech-papers](http://www.burnsengineering.com/tech-papers)**