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## Sensor Design Overview

*Advanced Sensor Technologies, Inc.* has developed a modular and application specific sensor design which:

- Provides the versatility and flexibility needed to create **custom** solutions meeting the most challenging customer demands. ASTI is also able to interface with all control equipment allowing us to service any process control application.

Delivers significant customer benefits including:

- Increased sensor life
- Improved process control
- Reduced Costs
- Reduced cleaning and calibration

### Integrated Modular Sensor Design

1. Application specific **pH glasses and Ion Sensing** Elements
2. **Solid State Reference Junctions** with application designated chemistry, non-porous cross-linked polymer with saturated salts
3. **Resilient Plastic Housings** available in the required mechanical configurations, providing the thermal and chemical resistivity necessitated by each application.
4. **Integrated electronics components include:**
  - Thermocompensators & Solution Ground Elements
  - Preamplifiers

Electronics are embedded into each sensor such that they can communicate with any process control equipment used. In addition, we developed the only **Industrial Ion Selective Sensor Line** which is designed to survive the rigors of process use and monitoring while maintaining near lab level electrochemical performance. The combination of these various elements creates an application specific sensor to fit any application and interface with all control equipment.

### 1. Specialized pH Glasses and Ion Sensing Elements

Various specialized pH elements have been developed to accommodate conditions which make other pH elements falter or suffer a premature death. These specialized pH elements are designed not only to survive such conditions but perform with great repeatability, accuracy and sensitivity. In addition, several types of ion selective membrane types are employed which are listed below. Each type of ion selective membrane has a specialized reference element which does not create nor is sensitive to the interferences for that particular ion. Consult the ion selective specification sheets for further details on interferences and ion selective reference junctions.

**pH:** General Purpose  
High Temperature Resistant (-5 to 135 degrees C)  
Ultra High Temperature Resistant (-30 to 150 degree C)  
Acid/Fluoride Resistant  
Slurry/Viscous Material Resistant  
Sulfide Resistant  
Saturated Sodium (Brine) Resistant  
High Alkaline Resistant

**Ion Sensing:** Polycrystalline Membrane (Solid-State)  
Glass Membrane  
Organic Polymer Membrane



## 2. Non-Porous Cross-Linked Polymer Reference System

We employ the **only truly solid state reference system** in existence. A solid state reference is a non-porous/non-permeable system in which only selective ionic communication with the secondary junction is permitted. The advantages of a solid state reference system over more conventional porous gel filled systems are: it experiences much less aging and deterioration, it is not easily dried out when exposed to air for prolonged periods, it does not absorb fluids or gases into the junction (thereby reducing premature aging) and it is significantly more impervious to solvents, harsh chemical attack and high temperature. This solid state reference system is housed in a matrix of either High-Density-Poly-Ethylene (HDPE) or Poly-Vinyl-Dene-Fluoride (PVDF). Some of the common applications which these solid-state non-porous cross-linked polymer references service include:

<b>Solid State Reference Junctions:</b>	General Purpose
	High Temperature Resistant (-5 to 135 degrees C)
	Ultra High Temperature Resistant (-30 to 150 degree C)
	Acid/Fluoride Resistant
	Paper/Pulp Resistant
	Sulfide Resistant
	Ultrapure Water Resistant
	Saturated Sodium Resistant
	Organic/Solvent Resistant
	Gaseous containing Resistant

## 3. Resilient Plastic Body Housings

We select plastic body housings based on the application's requirements for temperature, chemical resistivity, and pressure. Each of these plastic body housings is available in a wide variety of configurations. Some custom mounting configurations are also available.

<b>Plastic Housings:</b>	Poly-Vinyl-Chloride (PVC)
	Chloro-Poly-Vinyl-Chloride (CPVC)
	Poly-Phenylene-Sulfide (PPS - RYTON)
	Poly-Ether-Imide (PEI - ULTEM)
	Poly-Ether-Ether-Ketone (PEEK)

<b>Mounting Configuration:</b>	$\frac{3}{4}$ " – $\frac{3}{4}$ "	MNPT Immersion	1" O. D.	Twist Lock
	$\frac{3}{4}$ " – 1"	MNPT Immersion	2 $\frac{1}{2}$ "	Sanitary
	1" – 1 $\frac{1}{4}$ "	MNPT Immersion (F <sup>-</sup> Only)	1" O. D.	Valve Retractable

## 4. Integrated Electrical Components

**Thermocompensators & Solution Grounds:** Temperature Compensators (TC's) are embedded into each sensor to be compatible with the particular make of process instrumentation to which it shall mate. Some manufacturer's instrumentation requires a preamplifier (miniature high impedance CMOS operational amplifier used as a signal conditioner) as well as a temperature compensation element (see below for details). Stainless steel solution grounds are also available for instruments that require this element for a differential preamplifier or for sensor diagnostics support. Stainless steel solution grounds are not available for all applications (not appropriate for applications such as high acid fluoride etching solutions for example).

**Preamplifiers:** Analog signal conditioners can be integrated into most mounting configurations (internal preamplifier) which are compatible with all third party instrumentation make and model. The appropriate temperature compensation element is always embedded into each sensor (available as internal/integrated unit only). Third party instrumentation preamplifiers are also available as external units which are potted into waterproof and/or explosion-proof junction box fixtures. These preamplifiers are all rated to a maximum operating temperature of 135 deg. Celsius (135 deg. Fahrenheit). They can support operation in noisy electrical areas and long cabl lengths up to 500 feet.