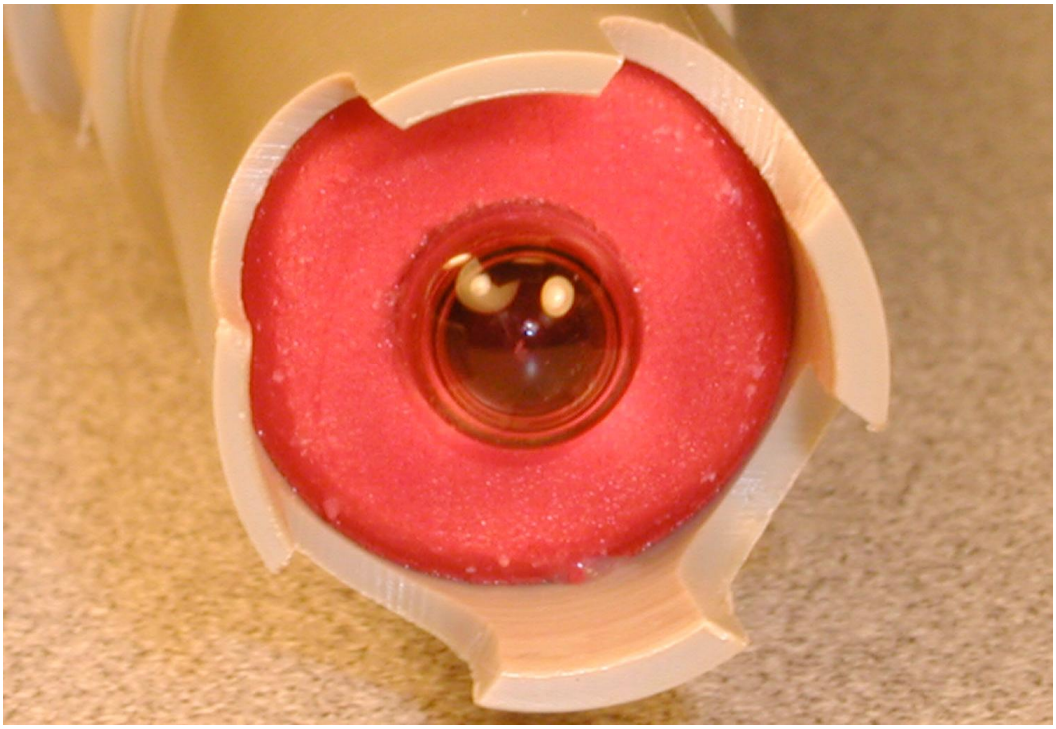
Advanced Sensor Technologies, Inc.
Orange, California USA

Superior pH / ORP / ISE Industrial Sensors

Features

- Guaranteed Longest Lasting Sensors Available with performance guarantee *
- Sensors are compatible with most existing pH/ORP Meters, Transmitters & Analyzers **
- Application Specific Engineering results in optimum Lifetime & Performance ***
- Integrated Temperature Compensation, Preamplifiers & Solution Ground Elements
- Solid State Reference System offers superior resistance to Fouling & Dehydration
- Applications such as Acid/Fluoride, Hi-Temp, Saturated Sodium and Sulfide Resistant are available as standard options
- Custom Applications are available, often at no additional charge
- Most Installation Styles are Supported Including: Immersion, Twist Lock, Valve Retractable & Sanitary
- Available in a wide range of plastics, from cost effective CPVC to thermally & chemically resilient ULTEM® and PEEK thermoplastic
- High Pressure Applications up to 100 psi for Valve Retractable & 150 psi for Inline Installations can be supported for continuous use
- Operating Temperatures from $^{-}30$ to $^{+}150$ ºC ($^{-}22$ to $^{+}302$ ºF) can be supported for continuous use



Case Study No. 1 – Ammonium Nitrate Manufacturing

Ammonium Nitrate Fertilizer Manufacturer - High Temperature Inline Environments

- Strong Acid/Fluoride Resistant pH Element & High Temperature and Acid/Fluoride Resistant Solid State Reference Junction.
- Chemically & Thermally Resistant ULTEM & PEEK plastic body housings
- Application Oriented Engineering and Custom Built to Order sensor increased the lifetime ***by Two to Five Fold***

The Problem

An ammonium nitrate fertilizer manufacturer was lacking a pH sensor that offered accurate measurement in high-temperature inline acid and ammonia environments, resulting in under reacted chemicals with lower production yields. The extreme process conditions resulted in limited lifetime for the sensor; which rarely exceeded days or weeks in the reactor and only functioned for up to a month in a specially constructed heat-reducing bypass system. To circumvent this problem, the manufacturer had to cool the sample by diluting it 1:1 with water via the heat-reducing bypass system. This action solved the temperature problem, but decreased the accuracy of the measurement making it dependent on the 1:1 sample to water ratio measurement. The signal also was delayed because of the addition of the bypass line. If the reaction was running on the ammonia excess side, the ammonia gas entered the sensor and destroyed the secondary reference half cell, thus suddenly and significantly reducing the operational lifetime of the sensor. If the process was allowed to run on the nitric acid excess side, the result was under reacted ammonia gas and rapid aging of the pH element.

Features

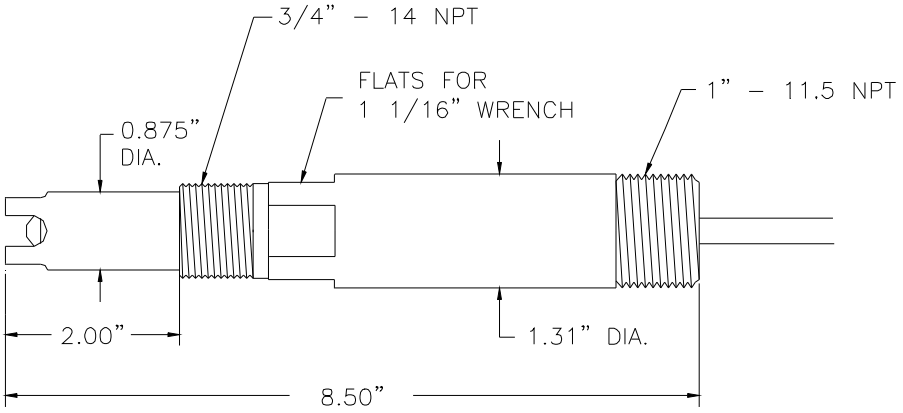
- Guaranteed Longest Lasting Sensors Available with performance guarantee *
- Sensors are compatible with most existing pH/ORP Meters, Transmitters & Analyzers **
- Application Specific Engineering results in optimum Lifetime & Performance ***
- Integrated Temperature Compensation, Preamplifiers & Solution Ground Elements
- Solid State Reference System offers superior resistance to Fouling & Dehydration
- Applications such as Acid/Fluoride, Hi-Temp, Saturated Sodium and Sulfide Resistant are available as standard options
- Custom Applications are available, often at no additional charge
- Most Installation Styles are Supported Including: Immersion, Twist Lock, Valve Retractable & Sanitary
- Available in a wide range of plastics, from cost effective CPVC to thermally & chemically resilient ULTEM® and PEEK thermoplastic
- High Pressure Applications up to 100 psi for Valve Retractable & 150 psi for Inline Installations can be supported for continuous use
- Operating Temperatures from $^{-}$30 to $^{+}$150 ºC ($^{-}$22 to $^{+}$302 ºF) can be supported for continuous use

The Solution

The combination of a high temperature and acid resistant pH element (with a protective seal against the ammonia gas) in conjunction with a high temperature and acid resistant solid state junction was able to facilitate all the measurement needs of this application. This system was encased within an acid resistant ¾"–1" MNPT ULTEM or PEEK thermoplastic sensor body housing. This permitted the manufacturer to place the sensor into the wall of the reactor and obtain real time pH readings thereby increasing the yield of their production. The improved design increased the lifetime of the sensor by approximately four times over the previously used sensor, despite the increase in the temperature and chemical exposure. The appropriate electronic components were integrated into each pH sensor to retrofit directly with the available pH transmitters.

The Ultra-High Temperature rated pH Sensor Used:
Model: PNA 6241/6441-873-10 Inline pH Sensor (Rated to 150 ºC at 150 psi)
Description: ¾"- 1" MNPT Immersion PEEK Bodied Ultra High Temperature, Dissolved Gas and Acid/Fluoride Resistant pH Sensor; Integrated 100 Ohm Platinum Temperature Element, Stainless Steel Solution Ground & Foxboro compatible 873 preamplifier; 10 feet cable to connect directly to Foxboro 873 pH Analyzer/Transmitter

The High Temperature rated pH Sensor Used:
Model: PNA 6131/6431-1181-10 Inline pH Sensor (Rated to 135 ºC at 100 psi)
Description: ¾"- 1" MNPT Immersion ULTEM Bodied High Temperature, Dissolved Gas and Acid/Fluoride Resistant pH Sensor; Integrated 3000 Ohm Balco Temperature Compensator & Uniloc-Rosemount compatible 1181 preamplifier; 10 feet cable to connect directly to Uniloc-Rosemount 1181 pH Analyzer/Transmitter



Choosing the Correct pH/ORP Sensor

1. Choose a sensor body type that suits the physical parameters of the installation (refer to the ***Configurations Portion of pH/ORP and Ion Selective webpages***).
2. Choose a sensor that suits the process application, temperature, chemistry, and physical parameters of the installation (refer to ***Sensor Selection Guides and call factory or local sales agent for support***)
3. Choose a sensor housing material that is compatible with the process chemistry, temperature & pressure (refer to ***Chemical Resistance Charts as posted under the Technical Documents portion of the website***).
4. Select suitable temperature compensation element, solution ground & integrated preamplifier based upon the mating pH/ORP Instrument (refer to ***Electrochemical Instrumentation Page & ask for factory support***).
5. Specify the required cable length based upon installation location (refer to ***Part Numbering Guide***).

* Subject to application qualification and review by an approved ASTI sales agent and/or factory. Performance guarantee is posted on the ASTI online application questionnaire page.
** See list of supported pH/ORP/ISE Instruments webpages as posted on the ASTI website.
*** Completion of Application Questionnaire form is required. Other restrictions may apply.

Advanced Sensor Technologies, Inc.
Tel: + 1-714-978-2837
Orange, California USA
Web: www.astisensor.com