

Trim Calibration

Perform the buffer calibration as described previously and place the pHure Sensor LE back on-line measuring the sample. For power plant samples with calculated pH available from specific and cation conductivity measurements, higher accuracy can be obtained by using this calculated value for a one-point trim calibration of the pHure Sensor LE.

Maintenance

Observe electrolyte level and refill when it drops to one-fourth of the reservoir height. Use supplied syringe and electrolyte. Rinse syringe with deionized water after each use.

If KCl crystals form on outside of electrode, rinse with deionized water taking care not to let water enter the reservoir.

If corrosion products or other solids accumulate on the electrode tip, clean it with dilute (5%) hydrochloric acid or other cleaning agent to restore rapid response. After cleaning, install the electrode in the housing and run sample for at least 10 minutes to allow the electrode to recover from the strong cleaner before attempting calibration or measurement.

WARNING: USE GOOD LABORATORY PRACTICE, SAFETY EQUIPMENT AND PROCEDURES WHEN HANDLING AGGRESIVE CLEANING AGENTS.

Layup/Storage

For less than one month shutdown the assembly can be left as in operation if the housing remains full of sample. For longer storage or if the housing will drain and dry out, the electrode should be removed and the original electrode cap should be refilled with 3M potassium chloride (223.5 g/L KCl) solution and replaced on the electrode tip. Replace reservoir plug and secure it with the rubber band. See electrode instructions for further information.

Specifications

pH Range: 1-12
Conductivity Range: > 0.3 $\mu\text{S}/\text{cm}$ for highest accuracy
Sample Flowrate: 50-150 mL/min
Temperature: 0-100 °C (32-212 °F)
Pressure: atmospheric pressure for operation, can safely withstand 7 bar (100 psig)
Inlet/Outlet: 1/4" NPTF
Wetted Materials: 316 stainless steel, glass, silicone rubber, platinum
Temp Comp: Integral to electrode

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OPERATING INSTRUCTIONS 5803225X and 5803242X pHure Sensor™ LE High Purity pH Sensors

Introduction

Thornton pHure Sensor™ Assemblies, used with M800, M300 and M300 ISM instruments, are designed to allow pH measurement in flowing high purity water samples. Applications include measurement of sample streams in power plant, pharmaceutical, semiconductor and other waters in the range of 0.3 to 50 $\mu\text{S}/\text{cm}$ or higher. The assembly provides on-line measurement in a sealed flow housing to prevent carbon dioxide (carbonic acid) contamination from the air. The stainless steel construction shields the electrode and eliminates flow sensitivity due to streaming potentials. A dual high impedance shielded and isolated measuring circuit works with a solution ground connection to further stabilize the measurement. Construction and operation are consistent with the requirements of ASTM Test Method D5128.

The assembly includes a combination pH sensor with fast-responding temperature compensator, integral solution ground, and liquid electrolyte reference electrode for optimal performance. This provides high accuracy by ensuring consistent electrolyte conditions in the reference junction both in low conductivity samples and in buffer solutions during calibration. Periodic electrolyte filling is required. pHure Sensors are available in the following models and with replacement components identified:

Cable Length	pHure Sensor for M300 ¹	pHure Sensor for M800/M300 ISM ²
1m (3ft)	58 032 250	58 032 420
3m (10ft)	58 032 251	58 032 421
5m (16ft)	58 032 252	58 032 422
10m (33ft)	58 032 253	58 032 423

¹ Replacement pHure Sensor™ 2003 electrode for M300 30 039 085

² Replacement pHure Sensor™ 2003i ISM electrode for M800/M300 ISM 30 039 086

Replacement electrolyte 3M KCl 250 mL 51 340 049

Replacement 316 SS Flow Housing and Cover (all models) 58 084 017

Replacement syringe for electrolyte refill 58 079 520

Replacement Test Tubes 58 140 014

Installation

Exercise care in unpacking and installing the pHure Sensor™ LE assembly. It has both a heavy stainless steel flow housing and a fragile glass pH electrode.

Provide the sample line with pressure reduction/regulation and rotameter upstream to control flow to 50-150 mL/min through the flow housing. Install with the outlet connected to an open drain. There must be no valve or other restriction downstream of the flow housing and discharge tubing must flow downward. Best performance will be obtained with sample temperature within 10-50 °C (50-122 °F) although it can withstand a much wider range. Mount the stainless steel flow housing with suitable screws through the 4.8 mm (0.19") holes in its rectangular plate. Connect sample and drain tubing using suitable 1/4" NPT adapter fittings. Drain tubing should be 10 mm O.D. (3/8") or larger.

Review the instructions packed with the pH electrode. Carefully remove the storage watering cap from the end of the pH electrode, exposing the fragile glass membrane. Route the cable through the protective polycarbonate cover and connect the cable connector to the electrode, making sure the connector threads are fully engaged.

On a new installation, before installing the electrode, be sure all construction debris and corrosion products have been flushed out of the sample system and flow housing. Then install the electrode in the flow housing, tightening the red compression nut. Lift the rubber band and remove the electrolyte reservoir plug from the electrode. Save the plug for later electrode storage. Screw the protective cover over the electrode and onto the stainless steel housing. Position the window in the protective cover so the electrolyte level is visible. Before calibration, allow the sample to run through the electrode/housing assembly for at least half an hour to allow the electrode to become acclimated to the sample.

Pure water temperature compensation

For high purity pH measurements, the solution temperature coefficient (STC) compensates for the ionization of pure water. This is in addition to the conventional (Nernst) temperature compensation, which is always active. STC is needed for pure water samples with a conductivity of less than 30 µS/cm where the changing ionization of water is significant. It references the pH to 25 °C.

For ammonia, phosphate and/or amine-treated power plant samples, the STC should be set to -0.033 pH/°C.

For pure makeup water or boiling water reactor samples, the STC should be -0.016 pH/°C.

Refer to the instrument instructions for editing the STC value.

Buffer Calibration

Clean and then fill the two plastic test tubes one-third full with the desired two buffer solutions. Remove the protective cover and the electrode from the housing and carefully immerse the tip in buffer solution.

Perform a two point calibration in two buffer solutions according to the instrument instructions, always rinsing between buffer solutions. When complete install the electrode back in the flow housing and secure protective cover.

