Comparison Calibration

For measurements on samples < 0.8 µS/cm, perform the buffer calibration as described previously and place the pHure sensor™ back on-line measuring the sample. Measure the same flowing sample with a calibrated, sealed, portable flow through system using a flowing junction reference electrode. Perform a one-point calibration on the pHure sensor™ instrument to make it agree with the portable system.

IMPORTANT: Use extra care with the portable pH measurement and do not use an open grab sample because air/CO_2 contamination can rapidly lower the pH of a low conductivity sample. Do not use the comparison calibration method unless all of the requirements can be met, including use of a flowing junction reference electrode.

Maintenance

pH electrodes in clean water require little maintenance. However, if corrosion products or other solids accumulate, clean the electrode tip 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 3 M potassium chloride (223.5 g/L KCl) solution and replaced on the electrode tip. See electrode instructions for further information.

Specifications

pH Range:	1-11
Conductivity Range:	> 0.8 µS/cm using direct buffer calibration; < 0.8 µS/cm using comparison calibration with portable flowing junction reference
Sample Flowrate:	50-150 mL/min
Temperature:	0-80 °C (32-176 °F); short term to 100 °C (212 °F)
Pressure:	atmospheric pressure for maximum stability; operational 0-35 psig (0-2.5 bar); can safely withstand 100 psig (7 bar)
Inlet/Outlet:	1/4" NPTF
Wetted Materials:	316 stainless steel, glass, silicone rubber
Temp Comp:	Pt1000 ohm RTD integral to electrode

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Leading Pure Water Analytics

OPERATING INSTRUCTIONS
3X3-21X pHure Sensor™ High Purity pH Sensors

Introduction

The Thornton 3X3-21X pHure Sensor™ Assemblies, used with Thornton 200pH, 2000, and 770MAX 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 0.5 to 50 µS/cm. 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 preamplifier 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 and pre-pressurized gel reference electrode which yields performance similar to a flowing junction. This provides high accuracy by ensuring consistent electrolyte conditions in the reference junction both in low conductivity samples and in buffer solutions during calibration. No electrolyte filling is required; the electrode is replaceable. pHure Sensors are available in the following models and with replacement components identified:

VP Cable Length	**pHure Sensor for 200pH, 2000**	Repl. Preamp for 200pH, 2000	**pHure Sensor for 770MAX**	Repl. Preamp for 770MAX
3 ft (1 m)	**363-211**	1200-01	**333-211**	1200-21
10 ft (3 m)	**363-212**	1200-02	**333-212**	1200-22
16 ft (5 m)	**363-213**	1200-03	**333-213**	1200-23
33 ft (10 m)	**363-214**	1200-04	**333-214**	1200-24

Replacement pH Electrode 3201-UPW-120-PT1000	**52 002 447**
Replacement 316 SS Flow Housing	**02385**

METTLER TOLEDO

Installation

Exercise care in unpacking and installing the pHure Sensor™ assembly. It has both a heavy stainless steel flow housing and a fragile glass membrane tip on the 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. For best stability there should be no valve or other restriction downstream of the flow housing. 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 holes in its rectangular plate. Locate the preamplifier in an area away from potential dripping water and calibrating solutions. Various lengths of VP sensor cables and patch cords are available to provide flexibility in preamplifier location. Orient the preamplifier with the sensor cable upwards and mount it using suitable screws through the mounting feet supplied. **IMPORTANT:** Confirm that the W1 jumper on the preamp circuit board is in the “solution ground” position “2-3” as identified on the preamp inside cover label.

Connect sample and drain tubing using suitable 1/4” NPT adapter fittings. Connect a solution ground wire between the thumb screw terminals on the flow housing and the preamplifier box as shown. Also connect a second length of solution ground wire to the housing terminal with its loose end insulation stripped 1 inch (25 mm) but not connected. This will be used for the solution ground during calibration.

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. There is a drop of white silicone sealant covering the reference junction of the electrode to prolong its shelf life. Using the blade supplied, cut and scrape away all of the sealant to expose the white ceramic beneath. Connect the preamp cable VP connector to the electrode, making sure the VP connector threads are engaged at least one full turn.

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. 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.

Buffer Calibration

Before buffer calibration, activate the HOLD function (if available) in the instrument as described in its instruction manual. This holds the relays and output signals constant to prevent unwanted alarm or control action.

Remove the electrode from the housing and carefully immerse the tip in buffer solution, preferably in a plastic beaker to prevent breakage or scratching.

IMPORTANT: Immerse the loose solution ground wire from the housing terminal into the buffer solutions along with the electrode.

Perform a two point calibration in two buffer solutions according to the instrument instructions, always immersing the solution ground wire with the electrode and rinsing between buffer solutions. When complete and the electrode is back in the flow housing, deactivate the HOLD function on the instrument and coil up the loose solution ground wire next to the housing for future use.