GP-PH-1

Instruction and Maintenance Manual





geopal®

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PENDING ITS-I 23ATEXQ36745 DBI reg. no 233.301 DIC444QMS

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1 Safety

Important
Please read this user's manual carefully before the GP-PH-1 is put into operation.

To ensure a safe installation of the GP-PH-1 it is necessary that the installation is carried out only by qualified personnel who are familiar with the relevant national and international legislation, directives and standards.

Always make sure that the supply voltage corresponds with the voltage indicated on the type label.

Warning
Do not discard the protective cap(s) that came with the sensor. If the sensor is removed from the process for an extended period of time, thoroughly clean the sensor, put a piece of cotton ball with few drops of water into the protective cap and replace it on the sensor. This keeps the junction from drying out which causes slow response when put back into operation or causes permanent damage to the sensor. Sensors should not be left in dry lines or empty tanks for extended periods.

Do not store the sensors in a dry or humid location. When storing, check the protective cap(s) regularly to make sure the cotton ball remains moist. Improper storage of sensors voids the warranty.

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2 Declaration of conformity

The producer

Geopal System A/S
Bygmarken 19
DK-3520 Farum

declares that the specified product:

Type: GP-PH-1
Name: Probe for NH3 in liquids

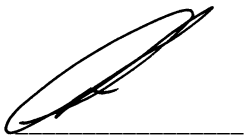
conforms to the following directives and standards:

Low voltage Directive 2014/35/EC
Electromagnetic Compatibility Directive (EMC) 2014/30/EU

EN 61 000-6-2 (2019)
EN 61 000-6-4 (2019)
EN 50 270 (2015)

This declaration is given in compliance with article 7, subsection 1 of the EMC directive. For specification of the acceptable EMC level, refer to the electrical data of the product.

Farum, 1 June 2025



Christian Møller
Producers signature

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3 Functions

3.1 Application

The Geopal GP-PH-1 probe is designed for ammonia leak detection from the secondary side of the refrigerant system.

GP-PH-1 can be used in water, brine, ethylene etc.

Geopal GP-PH-1 probe offers superior performance under conditions that often forces conventional pH probes to fail.

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4 Installation

Installation and mounting must be carried out by qualified personnel.

The GP-PH-1 probe has as standard a 1" tread connection.

Alternatively, it can be supplied with a 2" clamp connection, to ensure a quick and simple service.

Using the 1" thread it will be necessary to disconnect the cable before unscrewing/screwing in the probe. The cable must be connected while performing a calibration.

4.1 General instruction

If the distance between the probe and the instrument is such that a direct connection is not possible, the probe cable should be routed to a junction box with a terminal strip. The box should be well sealed and away from corrosion danger. Be sure that you have sufficient slack cable to allow for probe removal for calibration and servicing.

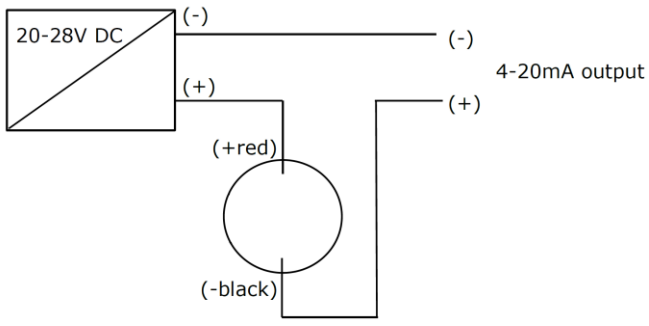
Route the interconnect cable from the junction box to the instrument, preferably in metal conduit. Do not run the power cable or control cables in the same conduit with the probe interconnect cable.

Remove the protective plastic caps from the end of the probe before placing in service.

For best results probes should always be mounted according to drawing GP-PH-1_1_2D. It is very important that the probe is always submerged in water/liquid.

4.2 4-20 mA sensor, connected directly to PLC

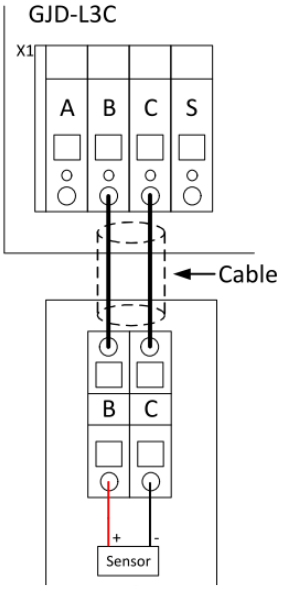
The GP-PH-1 probe have 2 wires; black & red. The red wire is to be connected to the +24 VDC terminal and the back wire to the 24 Vdc common terminal via the load in the loop.



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4.3 *Using Geopal monitor GJD-L3C*

The GP-PH-1 probe have 2 wires; black & red. The red wire is to be connected to the +24 VDC terminal and the back wire to the 24 Vdc common terminal via the load in the loop.



Connecting diagram GP-PH-1 to GJD-L3C

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5 Service and Maintenance

This must only be performed by qualified personnel.

5.1 Cleaning

The probe should be kept reasonably clean to avoid measurement errors. Frequency of cleaning can only be determined by experience. To clean proceed as follows:

Rinse with clean warm water.

Soak the end of the probe in warm water and dish detergent for 3 or 4 minutes.

Brush the end of the probe, particularly the three electrodes with a soft bristle brush such as a toothbrush. Take care not to scratch the glass electrode.

If the probe is still not clean, it may have to be cleaned with acid. CAUTION: Do not acid clean probes used in processes containing cyanide solutions. Some experimentation may be required to determine the most suitable acid for your process. Use the most dilute acid, which is effective. Normally 10 parts of water to one part muriatic acid is sufficient. Do not use hydrofluoric acid.

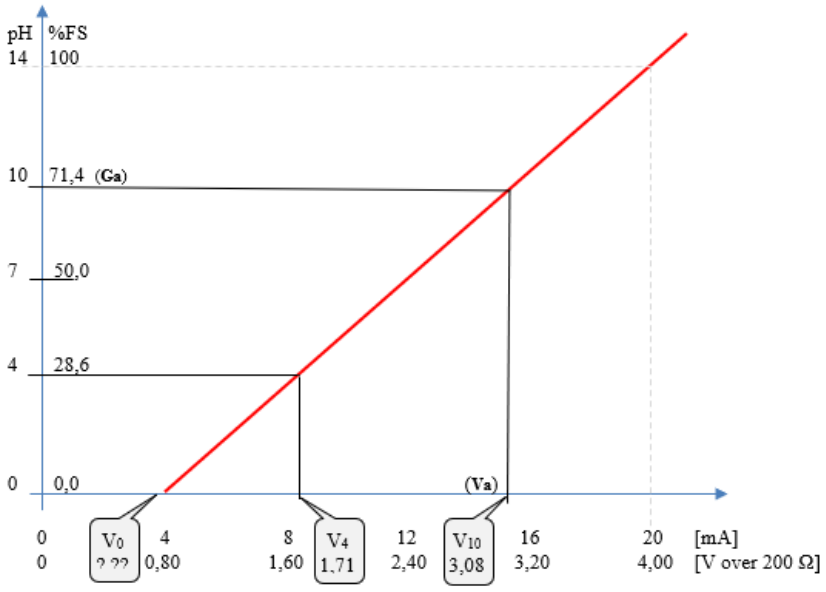
Soak the probe for not more than 5 minutes in the chosen acid; then rinse thoroughly with clean warm water and soak in water for 3-5 minutes.

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5.2 Calibration

In measuring systems where zero-calibration is not available, other methods must be used.

In this example, we need to calibrate a pH sensor where you typically use an acid with an acidity of 4 pH and a base with an acidity of 10 pH. Both points are far from the full measuring range ranging from 0 - 14 pH.



With a 10 pH calibration fluid, sensor output V10 is measured. This is also done at 4 pH where output V4 is noted. The slope of the curve can now be calculated to:

$$\alpha = \frac{\Delta y}{\Delta x} = \frac{10 - 4}{3{,}08 - 1{,}71} = 4{,}38\frac{pH}{V}$$

The voltage change from 0 pH to 10 pH can be calculated by dividing the slope α in just 10 pH.

This gives $\frac{10\ ph}{4{,}38\frac{pH}{V}} = 2{,}28V$ (Now that V10 is 3.08V and V0 is 2.28V lower you can calculate)

V0 = 3.08V-2.28V = 0.796 ≈ 0.80V

The value for V0 can now be inserted into GJD-L3C together with Va and Ga, after which the calibration is completed.

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Calibration summary:
Clean the sensor in demineralized water.

Add calibration fluid with ~ 10 pH and measure the voltage. pH10 V10 _____

Press the calibration bottom. Hold down for 2 sek. wait until green LED blinking returns to normal.

Clean the sensor in demineralized water.

Add calibration fluid with ~ 4 pH and measure the voltage. pH4 V4 _____

Calculate zero point at pH0:

$$V0 = V10 - \frac{(V10 - V4) * pH10}{pH10 - pH4}$$

Place parameter in GJD-L3C for V0

Note: This must only be performed by qualified personnel.

5.2.1 Preparation

1) Remove all four screws holding the front panel on the control unit.



Figure 1 Front panel with the four screws indicated by the blue arrows.

2) Pull the front panel aside, so the yellow push button are reachable.

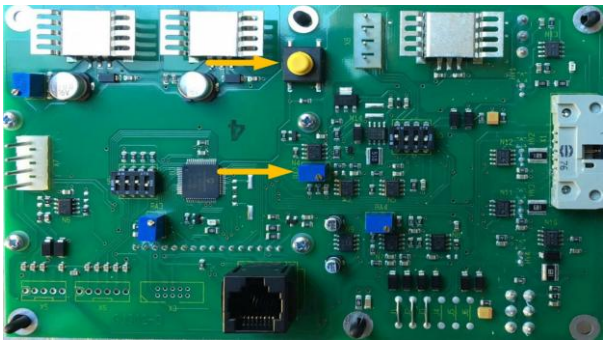


Figure 2 Yellow push button and potentiometer RA2 indicated with yellow arrows.

For further information please see Instruction and Maintenance manual for Geopal GJD-L3C.

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5.2.2 *Calibration tools*

The table below lists the necessary calibration equipment.

Table 1 Necessary calibration tools.

Name	Buffer solution pH4	Buffer solution pH10	Salt bridge	Demineralized water	Communication cable
Picture					
Product number					TEST-1038

5.3 *Replacement of salt bridge*

If the system can't be calibrated after cleaning the probe, it may be necessary to replace the standard cell solution and/or the salt bridge. A salt bridge kit is available from HB Products for this purpose.

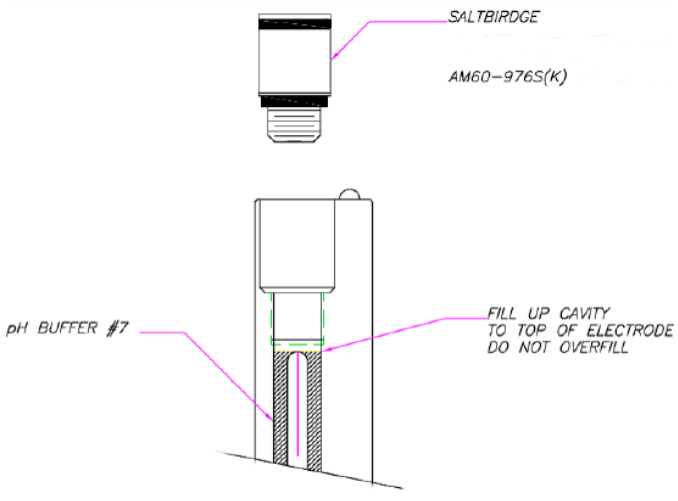
Hold the probe vertically electrodes up. Remove the used salt bridge. The salt bridge is a hexagonal-shaped capsule that can be removed using a 9/16" socket wrench. Use needle nose pliers to unscrew the piece.

Discard the used salt bridge.

Dispose of the used solution inside the bridge chamber and flush with pH 7 solution or distilled water.

Refill the chamber with 7pH buffer solution, up to the tip of the electrode, inside the chamber. DO NOT OVERFILL. It is important to leave space for the salt bridge thread and a small amount of air.

Screw the new salt bridge into the cavity until finger tight. Now perform a 1/4 turn with a 9/16" socket wrench. The salt bridge edges should be flush with the front of the probe face.



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5.4 Storage

Do not discard the protective cap(s) that came with the sensor. If the sensor is removed from the process for an extended period of time, thoroughly clean the sensor, put a piece of cotton ball with few drops of water into the protective cap and replace it on the sensor. This keeps the junction from drying out which causes slow response when put back into operation or causes permanent damage to the sensor. Sensors should not be left in dry lines or empty tanks for extended periods.

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6 Warranty and Disposal

6.1 Warranty

Warranty coverage
Geopal System A/S provides a 1-year warranty, starting from the date of sale to the end-user. The warranty period must be documented with the original invoice or receipt. The warranty covers defects attributable to the materials and/or workmanship.

Warranty period
The warranty period begins at the date of delivery of the product to the first end-user.

If the date of purchase cannot be documented, the warranty period will start at the date of production, as indicated on each product.
Warranty is void if production labels are altered, modified or missing.

Warranty scope
The warranty does not cover labour costs for installation of replacement products or components, where Geopal System A/S chooses not to repair the product. The provision of replacement products or accessories does not extend the original warranty period. Geopal System A/S reserves the right to offer a similar replacement product or component, if the original is no longer available at the time of the complaint.

Coverage pursuant to the warranty requires that the end-user can demonstrate that defects or damages have not directly or indirectly occurred because of:

a) Faulty installation, i.e. installation contrary to the installation instructions or (in the absence of such instructions) contrary to good craftsmanship,

b) Installation outside recommended installation areas,

c) Misuse or abuse,

d) Use of incompatible spare parts or accessories,

e) Transportation, installation or other type of handling,

f) Product modifications,

g) Other defects or damage not caused by material, production or structural faults, if the preceding enumeration is not exhaustive.

Moreover, coverage pursuant to the warranty is conditional on the end-user demonstrating that defects or damages are not directly or indirectly attributable to failure (or that defects, damage and defects could not be prevented by) performing maintenance as prescribed in the instructions and maintenance manual.

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Written complaints
In order to invoke this warranty, the end-user must submit a written complaint during the warranty period to Geopal System A/S or the retailer where the product was purchased. This must occur within two months of when the end-user discovered, or ought to have discovered, the defect.

Geopal System A/S shall then determine whether the product will be repaired, replaced or whether to refund the purchase price.

Repairs under the warranty
Unless Geopal System A/S provides otherwise, the end-user is responsible for the repair. The warranty covers the free supply of spare parts/materials necessary for the end-user's repair of the defect.

Replacement
Redelivery will occur by replacement free of charge of the old product with a new product of the same kind, type and quality. If, at the time of the complaint, the product is no longer produced or is not produced in the exact same version, Geopal System A/S shall be entitled to exchange it for a similar product.

Transportation/shipping to and from Geopal System A/S and/or the dealer and any dismantling and reassembly of the product shall be agreed with Geopal System A/S before implementation, and if this occurs, the customer shall cover the costs.

The warranty does not cover the following
This warranty does not apply to products other than those listed under "Coverage of the warranty". For accessories, including pre-installed accessories, refer to the manufacturer's warranty, where available. Other Geopal System A/S products, regardless of whether these are pre-installed, are covered by the separate conditions stipulated in this warranty, including those relating to the warranty period referred to under "Warranty coverage".

Geopal System A/S accepts no liability for consequential damages, including consequential loss, or product liability other than what may follow from mandatory legislation.

Geopal System A/S accepts no liability for losses resulting directly or indirectly from circumstances over which Geopal System A/S has no control, including e.g. strike, lockout, fire, war, blockades, import restrictions, political unrest, unusual natural occurrences, vandalism or other force majeure.

Geopal System A/S accepts no responsibility for products that are not produced by Geopal System A/S, regardless of whether they are sold or displayed together with the products listed under "Warranty coverage".

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6.2 Disposal of electrical and electronic products



This product complies with the requirements for marking in the WEEE Directive (2002/96/EC).

The affixed label indicates that this electrical/electronic product must not be disposed of with household waste.

Product category
In relation to Annex 1A of the WEEE Directive 2002/96/EC, the product can be classified in Category 9: "Monitoring and control instruments".

Must not be disposed of via household waste!
More detailed information on environmentally safe disposal of electrical and electronic waste, such as waste equipment, or parts thereof, may be obtained by contacting your dealer. Look at Geopal System A/S website, as marked on the product

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7 Technical specifications

7.1 General specifications

Model	GP-PH-1
Supply voltage	24 VDC
Range	0-14 pH
Maximum flowrate	3 m/s
Response time T90	< 60 seconds
Sensitivity	0,01 pH
Accuracy	+/- 0,02 pH
Probe without monitor	2 wire 4-20 mA, max. load 450 Ω
Cable	4,5 m
Materials wetted parts	Ryton (PPS), Caramic junction, glass electrode, viton, AISI 316
IP rating	IP 65 DIN 60529
Weight	0,5 kg
Dimensions	L 190 mm ø 35 mm
Operating Temperature	-5 °C to +90 °C
Operating Pressure	max. 7 bar (higher pressure can damage probe)
Mounting connection	Without clamp 1” NPT Clamping union 1,5” DN 38 PN10 *(option)*

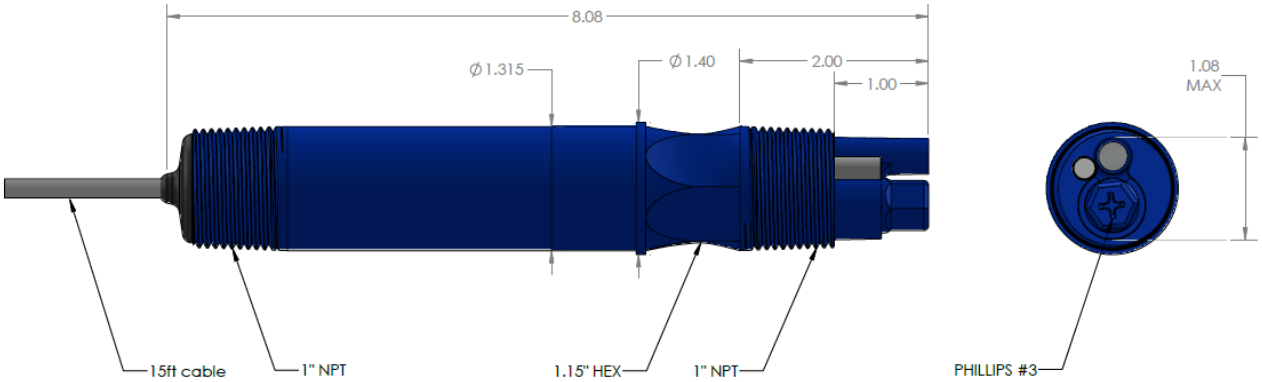
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7.2 Approvals

Approvals	Electromagnet Compatibility Directive (CM) 2014/30/EU Low Voltage Directive 2014/35/EC EN 61 000-6-2 (2019) EN 61 000-6-4 (2019) EN 50 270 (2015)
Quality	ISO 9001:2015

8 Illustrations

8.1 Measurements



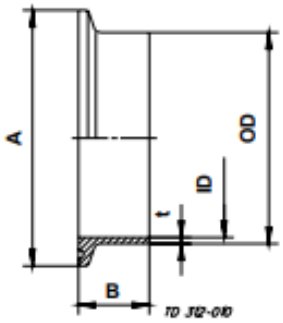
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8.2 Optional equipment

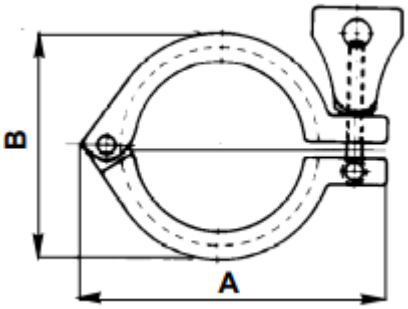
The Geopal GP-PH-1 can be supplied including male part and welding liner as well as clamp ring and gasket on request.



Welding liner - 50,5 x 21,5 mm



Clamping ring – 101,6 x 76,2 mm



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9 Troubleshooting

9.1 Sensor

The operation of the 2-wire, 4-20 mA sensor can be checked by a few simple measurements. Two pH buffer solutions, 7 pH and either 4 pH or 10 pH, and a dc milliammeter are required.

1. Disconnect the red wire at the instrument or power supply and connect it to the milliammeter (-) black.
2. Connect the milliammeter (+) red to the instrument or power supply red wire output terminal.
3. Rinse the probe and place it in 7 pH buffer. Allow the temperature of the buffer and probe to stabilize at room temperature.
4. Check the offset of the probe by reading the milliammeter. The reading should be between 11 and 13 mA. If not the probe is defective. If the offset is OK, note the exact reading and proceed to the next step.
5. Rinse the probe and place it in 4 pH or 10 pH buffer. Allow the temperature of the probe and buffer to stabilize at room temperature. Now check the span of the probe by reading the milliammeter. If the probe is in 4 pH buffer, the reading should be between 2.85 and 3.99 lower than the reading obtained in (4).
6. If the probe is in 10 pH buffer, the reading should be between 2.85 and 3.99 higher than the reading obtained in (4).
7. If this test is not satisfied the probe is defective.
8. If you wish to check the temperature compensator proceed to step (10).
9. If the span of the probe drops below 2.85mA than the probe still can be used adjustments will have to be made to the receiving device to compensate for the low span.
10. To check the operation of the temperature sensor in the probe, heat the buffer used in step (e) with the probe in it to about 50°C. The milliammeter reading should be within ±0.15 mA of the reading observed in step (4).

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9.2 Troubleshooting

A pH probe is a simple instrument. As a potentiometric device it outputs a voltage in response to a change in pH. The built-in transmitter converts the voltage to a current. A probe that is not functioning properly will output a current that is out of range of the specifications listed in Section 5.1. The change in output with calibration standard constitutes the span. For a pH probe: The span between pH 4 and pH 7 or between pH 7 and pH 10 should be between 2.85 and 3.99 mA.

If the span of an pH probe do not satisfy these criteria then the cause of the problem may be one of the following:

1. The process electrode (glass bulb) is coated with scaling or biofouling.
2. The process electrode is inoperable (likely broken).
3. The reference solution has been contaminated with the process to the point that it is no longer pH 7.
4. The salt bridge has fouled to the point that reference solution cannot pass through that is needed to complete the potentiometric circuit.
5. The printed circuit board (PCB) has shorted out by ingress or the op-amp on the board has failed.

The manifestations of these different sources are as follows:

1. A coated electrode (1) will create a narrower span. If the coating is from scaling then soaking the probe in a weak acid (e.g. vinegar or 0.1 N HCl) will remove the scale. If the coating is from fouling then soaking the probe in bleach will clear it.
2. Either problems 2 or 5 If the pH reading does not change when changing from one calibration solution to another then either the cause is a failed PCB (5) or broken electrode (2).
3. A contaminate reference solution (3) will result in both a lower span and higher offset for pH probes.
4. A fouled salt bridge (4) will result in a slower response but not necessarily a narrower span or inaccurate readings. HB Products sells replacement salt bridges at very modest pricing.