

## Maintenance of pH sensors

### For your information

#### Distribution to operators and owners of installations concerned

**Component concerned**

Green Instrument pH sensors that are used in the water monitoring systems part of WÄRTSILÄ® Exhaust Gas Cleaning (EGC) systems.

**Introduction**

The purpose of this service bulletin is to advise WÄRTSILÄ® Exhaust Gas Cleaning (EGC) system owners about changes in the Onboard Maintenance Manual (OMM) regarding Green Instruments pH sensor maintenance and storage condition.

The lifetime of the pH/temperature sensor is mainly limited by the lifetime of the electrode. The electrode has a shelf life of 1 year at 25°C followed by an operating lifetime of approximately 1 year at 25°C.

**Validity**

Until further notice.

Before taking any action, always check the available online systems for the latest revision of this document. Any locally stored or printed version is considered to be an uncontrolled document.

## Document history

Issue	Date	Description	SBWT ID
1	09-10-2020	Initial release	003524

## Introduction

The purpose of this service bulletin is to advise WÄRTSILÄ® Exhaust Gas Cleaning (EGC) system owners about changes in the Onboard Maintenance Manual (OMM) regarding Green Instruments pH sensor maintenance and storage condition. The aim of the updated maintenance and storage procedures is to ensure that pH sensor manufacturers recommendations and the proper validation program are followed, which will enable more flexibility with decreased maintenance cost and downtime of the system.



**Figure 1, pH sensor**



**Figure 2, pH electrode**

## Instructions



### **ATTENTION:**

The below pH sensor storage and maintenance recommendation must be followed in order to ensure proper operation.

The lifetime of the pH/temperature sensor is mainly limited by the lifetime of the electrode. The electrode has a shelf life of 1 year at 25°C ambient temperature followed by an operating lifetime of approximately 1 year at 25°C. Electrode lifetime will have reduced lifetime expectancy at elevated temperatures.

Due to the above described, it is important to emphasize the importance of correct storage. This should be affected immediately after receiving the pH sensor or the electrode.

The sensor is delivered wrapped in a moist packing, do not open the electrode until installation. Please note that the electrode must always be kept moist. If the electrode dries out, it will not operate as intended.

Please study the pH sensor manual found in the enclosure for further information.

**ATTENTION:**

Wärtsilä instructs that pH sensor validation shall be conducted monthly rather than quarterly.

**ATTENTION:**

The electrode must be replaced whenever one of the symptoms described in section 5.1 of the pH Sensor Manual has occurred.

## Recommendation

It is recommended that spare electrodes are always kept in stock on the vessel and that electrodes are considered as a critical spare part.

## Enclosures

G6100 pH Sensor Manual Water Monitoring System Ver.1.0 – Sep 2020, 30 pages.

## Contact

For services, spare parts and/or tools, please contact your nearest Wärtsilä representative or log in to Wärtsilä Online: [www.wartsila.com/wartsila-online](http://www.wartsila.com/wartsila-online)

If you do not have the contact details at hand, please follow the link:

[www.wartsila.com/contact](http://www.wartsila.com/contact)

# G6100 pH Sensor Manual Water Monitoring Sytem





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# 1 Introduction

## 1.1 About this Manual

This manual contains data and instructions for the installation, operation and maintenance of the pH sensor.

The instructions & figures have been made in general terms and do not take into consideration a specific installation. The figures used in the manual are only for general illustration purposes. The manual is designed only for the pH sensor.

The manual does not describe all possible situations but only the most common and known situations and cannot replace the necessary education of the personnel. Should situations not described in the manual occur, which cannot be solved in accordance with normal known practice and good workmanship, the operator should contact Wärtsilä Moss AS for instructions.

### Attention

Before operation read all instructions and warnings within this manual and associated documentation. Improper use may cause personal injury and/or damage of equipment and may void the warranty. Wärtsilä Moss AS disclaims any responsibility for damage and/or injury caused by improper installation, use or maintenance of the equipment.

Wärtsilä Moss AS reserves the right to minor alterations and improvements owing to developments without being obliged to enter the corresponding changes in this manual.

Wärtsilä Moss AS reserves the copyright of the manual. Without prior written permission of Wärtsilä Moss AS, the manual may not be copied and given to unauthorized people.

## 1.2 Inquiries and Feedback

All claims and inquiries for spares shall be addressed to Wärtsilä Moss AS or our distributors. In all correspondence or when ordering spare parts, please carefully state the equipment type and serial number, which you can find on the label on the equipment.

Wärtsilä Moss AS appreciates all feedback and suggestions for improvement. If you have any questions or find any errors in the manual, you are welcome to contact us at the following address:



**Wärtsilä Moss AS**

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## 2 Specifications

pH/Temperature Module	
Legislation	Compliance towards MEPC. 259(68) has been demonstrated under the surveillance of various class societies
Approval	DNV/GL, Rina, NK, KR, LR, ABS, BV and CCS
Measurement Technology	According to BS EN ISO 60746-1 & BS EN ISO 60746-2:2003
pH Range	0...14 pH units;
Temperature Range	0...50 °C
Power Supply	Refer to Electrical Drawings
Wetted Materials	AISI 316 or PPS, glass, PVDF & PVC
Signals	2 Analog 4...20 mA (Passive)
Accuracy	Max $\pm 0.2$ pH unit

Specifications are subject to changes without notice.

<div style="border-bottom: 1px solid black; margin-bottom: 10px;"></div> <div style="display: flex; justify-content: space-between;"><div style="width: 60%;"><h2 style="color: #0070C0; margin: 0;">TYPE APPROVAL CERTIFICATE</h2></div><div style="width: 35%; text-align: right;"><div style="margin-bottom: 10px;"><b>DNV·GL</b></div><div>Certificate No: <b>TAA0000178</b></div><div>Revision No: <b>1</b></div></div></div> <div style="margin-top: 20px;"><p><b>This is to certify:</b></p><p><b>That the Monitoring System</b></p><p>with type designation(s) <b>G6100 Water Monitoring System</b></p><p>Issued to <b>Green Instruments A/S</b> <b>Brønderslev, Nordjylland, Denmark</b></p><p>is found to comply with <b>DNV GL rules for classification – Ships, offshore units, and high speed and light craft</b></p><p><b>Application :</b></p><p><b>Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.</b></p><p><b>Location classes:</b></p><table border="0" style="margin-top: 10px;"><tr><td style="padding-right: 10px;"><b>Temperature</b></td><td><b>A</b></td></tr><tr><td><b>Humidity</b></td><td><b>B</b></td></tr><tr><td><b>Vibration</b></td><td><b>A</b></td></tr><tr><td><b>EMC</b></td><td><b>A</b></td></tr><tr><td><b>Enclosure</b></td><td><b>IP54</b></td></tr></table></div> <div style="margin-top: 40px; display: flex; justify-content: space-between;"><div style="width: 40%;"><p>Issued at <b>Høvik</b> on <b>2018-12-20</b></p><p>This Certificate is valid until <b>2020-12-31</b>.</p><p>DNV GL local station: <b>Aalborg</b></p><p>Approval Engineer: <b>Ingrid Hagen Johansen</b></p></div><div style="width: 20%; text-align: center;"></div><div style="width: 35%; text-align: right;"><p>for <b>DNV GL</b></p><p>Digitally Signed By: Grimsrud, Jan Tore</p><p>Location: DNV GL Høvik, Norway</p><div style="border-top: 1px solid black; margin-top: 10px; display: flex; justify-content: center;"><div style="text-align: left; width: 60%;"><b>Jan Tore Grimsrud</b> <b>Head of Section</b></div></div></div></div> <div style="margin-top: 20px; font-size: 0.8em;"><p>This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.</p></div> <div style="display: flex; justify-content: space-between; align-items: center; margin-top: 10px;"><div style="width: 15%;"></div><div style="width: 30%;"><p>Form code: TA 251</p></div><div style="width: 30%;"><p>Revision: 2016-12</p></div><div style="width: 15%;"><p>www.dnvgl.com</p></div><div style="width: 10%; text-align: right;"><p>Page 1 of 4</p></div></div> <div style="text-align: center; margin-top: 5px; font-size: 0.7em;">© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.</div>	<b>Temperature</b>	<b>A</b>	<b>Humidity</b>	<b>B</b>	<b>Vibration</b>	<b>A</b>	<b>EMC</b>	<b>A</b>	<b>Enclosure</b>	<b>IP54</b>
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<b>EMC</b>	<b>A</b>									
<b>Enclosure</b>	<b>IP54</b>									

Figure 2-1: DNV/GL Approval

### 3 Safety Aspects



#### Warning

Follow the instructions.

Please ensure correct connection of all power and signal cables before operating the water monitoring system.

The pH/Temperature sensor uses an electrode which is stored inside the system in a separate container to maximize electrode lifetime. The electrode is delivered with a safety cap on to ensure the electrode is kept moist. The electrode will be damaged if it dries out. The cap must be removed prior to start-up of the system. The pH/temperature sensor is also fitted with a plug to prevent moisture from entering the electrical connection. The plug must be removed, and the electrode fitted prior to start-up.



The pH/temperature sensor is also fitted with a plug to prevent moisture from entering the electrical connection. The plug must be removed, and the electrode fitted prior to start-up.

Do not block the drain or outlet from a safety valve. Damage of components will occur.

Check the function of the safety valve to ensure correct operation.

Follow the planned maintenance program.

The system is only suitable for installation in a safe, non-hazardous area and is not suitable for use with flammable sample liquids. Non-wetted components such as cabinet enclosure ect. must be kept dry and clean.



It should be pointed out that installation and operation of this system and associated equipment must be carried out by skilled, and certified personnel, and that Wärtsilä AS does not take any responsibility for the operation of the equipment and associated equipment whatsoever. Successful and safe operation of this equipment depends on proper handling, installation, operation and maintenance.

The equipment must only be applied as described in this instruction manual. If the system is used in a manner not specified by Wärtsilä AS, the protection provided by the equipment may be impaired.

### **Hazardous voltage!**

Disconnect the power before installing or servicing the equipment. Ignoring this warning can result in severe personal injury or material damage. Read the instruction carefully to ensure correct connection of all power and signal leads.

Make sure that the correct voltage is connected to the system.



### **Circuit breaker!**

The installation must include a means of isolating electrical power by a clearly marked switch or circuit breaker external to the system. The external switch or circuit breaker shall be in close proximity to the system and within easy reach of the operator.

### **Overload protection!**

For compliance with the safety requirements IEC 61010-1 (2010), the installation must include a means of overcurrent protection to provide protection against excessive energy being drawn from the power supply system in case of a fault in the equipment.

### **Protective earth!**

The system must be connected to protective earth.

### **Installation and fault finding!**

Electrical installation and fault finding on the system should only be undertaken by a suitably trained and qualified engineer.

### **EMC!**

For compliance with the EMC product standard IEC 60533 (1999), the connection cables for the main supply and communication signals should be shielded or provided with equivalent protection.

### **Sensor!**

The sensor modules must be connected to the Water Monitor before powering up (risk of damage). As soon as the system is under voltage, the connection to the sensor modules must not be interrupted. Therefore, please disconnect the power when you need to connect or disconnect sensor modules. The equipment must not be exposed to strong mechanical shocks.

### **Pressure!**

Do not shut-off the pipeline to or from the system when the system is in operation! Damage of components can occur.

Before removing any sensor, please depressurize the system.

### Harmful components!

The water can contain poisonous components that are potential harmful to humans and animals. Some calibration fluids contain high concentration of harmful components. Risk of chemical burns can occur. Protection must be worn whenever risk of being in contact with water and/or calibration fluids can occur.

Please consult MSDS for further information.

### Recycling!

Please do not dispose the equipment with regular disposal. Disposal should be in accordance with the requirements of the current statutory regulations.

### Symbol identification!



Caution, risk of danger



Caution, risk of electrical shock



Chemical burns and etching



Protective earth



The CE mark proves the compliance of the instrument with the requirements of the relevant EU directives



Caution, hot surface

## **4 Control at Delivery**

When receiving the equipment, please inspect and confirm that the received scope of supply is in accordance with the packing list and not damaged. Any discrepancy should be reported to the Wärtsilä A/S immediately. If any of the received parts are damaged, the shipping company should be informed, and new parts should be made available before completing the installation.

## 5 Installation

**Read this chapter in its entirety before installing the sensor.**

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### 5.1 pH /Temperature

The lifetime of the pH/temperature sensor is mainly limited by the lifetime of the electrode. The electrode has a shelf life of 1 year at 25°C followed by an operating lifetime of approximately 1 year at 25°C. Electrode lifetime will be shortened at elevated temperatures. The electrode must be kept moist at all times. If the electrode dries out, it will not operate properly.

The following signs indicate an electrode reaching its end of lifetime. The electrode must be replaced whenever one of the below signs are identified:

- The pH/Temperature sensor is difficult to calibrate. Storing a calibration point should take max 180 seconds. The electrode must be replaced if longer time is required.
- The pH/Temperature sensor was calibrated successfully, but output drifts within 15 minutes.
- The pH/Temperature sensor gives a fixed output of around pH 7.
- The pH/Temperature sensor gives no output.
- The glass tip of the electrode is damaged.
- Water has entered the electrical connection of the electrode.
- If the pH sensor flashes every second, the calibration is not accepted.

Changing of the Electrode is easily done by following the maintenance instruction in the operation manual. It is recommended to keep an electrode in stock as a spare part.

### 5.2 pH Electrode

The electrode must be calibrated after storage if the recommended calibration interval is overdue. The pH electrode has a shelf life of approximately 12 months. It is important that the electrode is kept moist. If the electrode or system is stored in a high temperature environment, it could be necessary to refill the cap covering the tip of the electrode in order to keep it moist. 3,5% KCL liquid must be used to refill the cap.



### 5.3 Mounting the Electrode

Upon delivery of the pH sensor, the electrode is not mounted.

The pH sensor is configured for the electrode type included in the delivery, and therefore it must only be used together with the electrode with which it was delivered.

The pH sensor should be used only with the electrode type included the delivery. Contact Wartsilä AS if other electrode types should be used.

#### 5.3.1 Gasket, O-ring and Plug

It is very important that both gasket and O-ring and packing surfaces is clean and smooth and without cracks and scratches to avoid penetration of liquid in the center plug connection.

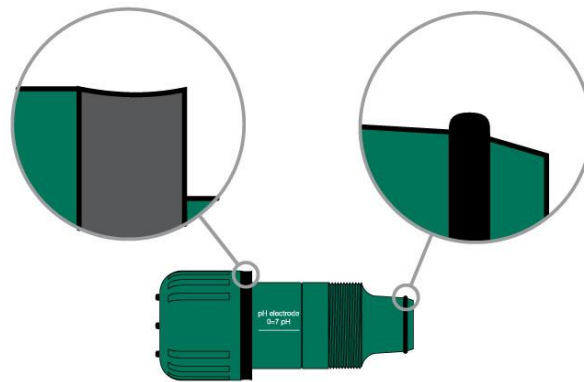


Figure 5-1: Check gasket and O-ring

Check that the gasket and O-ring are complete and clean and that they are placed correctly.

Likewise, the connectors in both transmitter and electrode should be absolutely clean and dry. Eventually use a dry cloth.

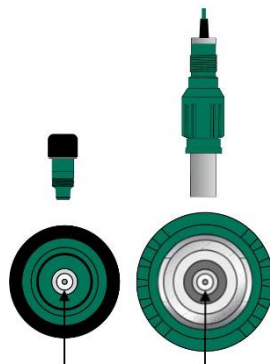


Figure 5-2: Check the connectors

### 5.3.2 Mounting the Electrode

1. Lubricate the O-ring in acid free grease or Vaseline.
2. Check the O-ring is placed correctly in the recess of the new electrode.
3. Check that the hole for the electrode in the pH sensor is completely dry – If necessary, use a dry cloth.
4. Screw in the new electrode and tighten by hand.  
Do not use tools, when mounting the electrode.
5. The pH sensor must be buffer adjusted prior commissioning.

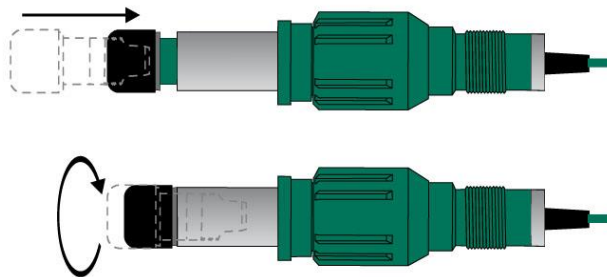


Figure 5-3: Mounting the electrode

## 5.4 Mechanical Mounting

### 5.4.1 General

The pH sensor is made from Ryton (PPS)

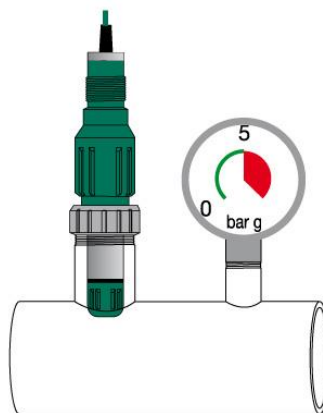


Figure 5-4: Working pressure of max. 5 bar

The pH sensor conforms to class PN 5, and can therefore be mounted in closed systems with a working pressure of max. 5 bar.

### 5.4.2 Mounting in Closed Systems

The electrode is filled with liquid which should cover the membrane internally at all times. Therefore, the pH sensor should not be mounted in angles exceeding  $75^\circ$  from vertical.

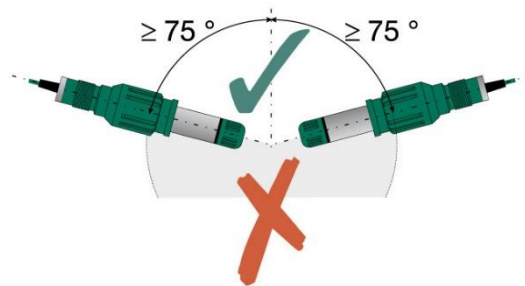


Figure 5-5: Mounting the pH Sensor

The sensor can be screwed into a pipe stub with 2" outer thread by means of a union that is placed over the housing flange after removal of the rotary switch ring.

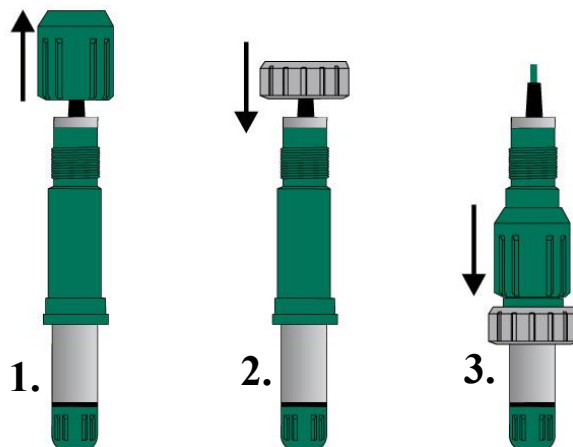


Figure 5-6: Mounting the pH Sensor

1. Pull off the switch ring.
2. Put on the Union.
3. Put on the switch ring back on – if needed.

### 5.4.3 Mounting on a Pipe Stub

In order to ensure a tight seal and correct function of the pH sensor, the following should be complied with:

1. The pipe stub must be flush and free of scales, burrs etc.
2. Diameter of pipe stub must be maximum Ø59,5mm. Inner diameter of pipe stub must be minimum Ø43mm.
3. The pipe stub must have a length so that the tip of the electrode is exposed minimum 10mm into the liquid.
4. Take care to have adequate room for mounting and removal of the pH sensor.
5. Take care to avoid accumulation of air around the wetted parts of the sensor and electrode.
6. The working pressure of the system must not exceed 5 bar g.
7. The working temperature of the system must not exceed 80°C.
8. The pH sensor is correctly mounted with the electrode about 10 mm in the inside diameter of the pipe

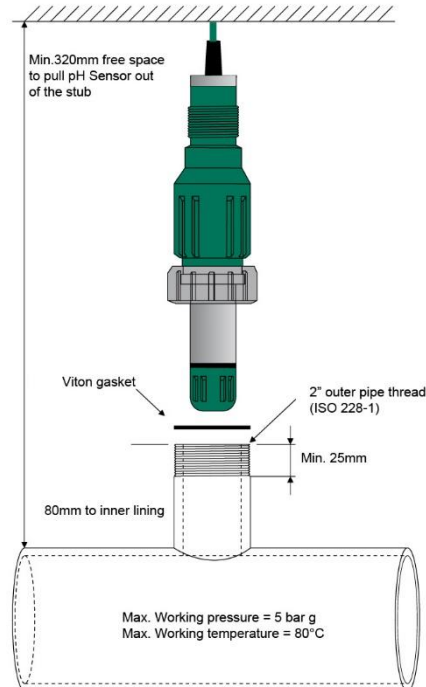


Figure 5-7: Mounting on a Pipe Stub.

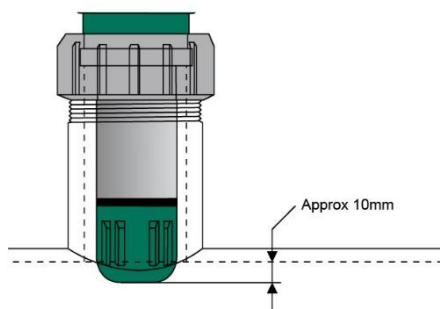


Figure 5-8: The pH Sensor correctly Mounted

## 5.5 Electrical Connections

### 5.5.1 General

- The pH sensor must not be installed in explosion hazardous locations!
- The pH sensor should be connected to an active 4...20mA input or be supplied from a separate 14...26 VDC voltage source.
- Max. Power consumption is 50mW.
- The pH sensor 4...20mA outputs are galvanic separated from the liquid.

### 5.5.2 Signal Cable

The pH sensor comes with either 2 galvanically separated signal outputs.

Description	Designation	Characteristic
Shield	Shield	Thick black wire
Power Supply	+ 12...30V DC	Red
Power Supply	+ 12...30V DC	White
PH Signal	4...20 mA	Black
Temperature Signal	4...20 mA	Grey

#### Note

The pH/Temperature sensor is a passive transmitter. Thus, the common port of your analog input must be connected to the DC Power Supply.

### 5.5.3 Extending the Signal Cable

There are no specific demands to the cable that may be used for extending the existing cable, except that it should be shielded and make sure that load out is max 600ohm/24VDC.

The pH sensor is a passive transmitter. Please take note of the voltage drop in the signal cable. The supply voltage on the site must not drop below 10 VDC at max 20 mA.

In order not to compromise operational reliability, the cables should be interconnected by means of a watertight connection box.

## 6 Commissioning

Before starting the pH/Temperature sensor for the first time after completing the installation, please check and confirm that installations and connections are carried out according to the instructions.

After completing the installation, please verify the installation and setup by making sure that:

- The flow path to and from the sensor is not blocked.
- The power supply connection is as specified.
- The signal connection is as specified.
- The protective endcap of the pH electrode is removed.
- Power up the sensor
- The pH/Temperature Module will measure if the green rotary switch is set to “M”

## 7 Calibration

### 7.1 Validation/Calibration of the pH Module

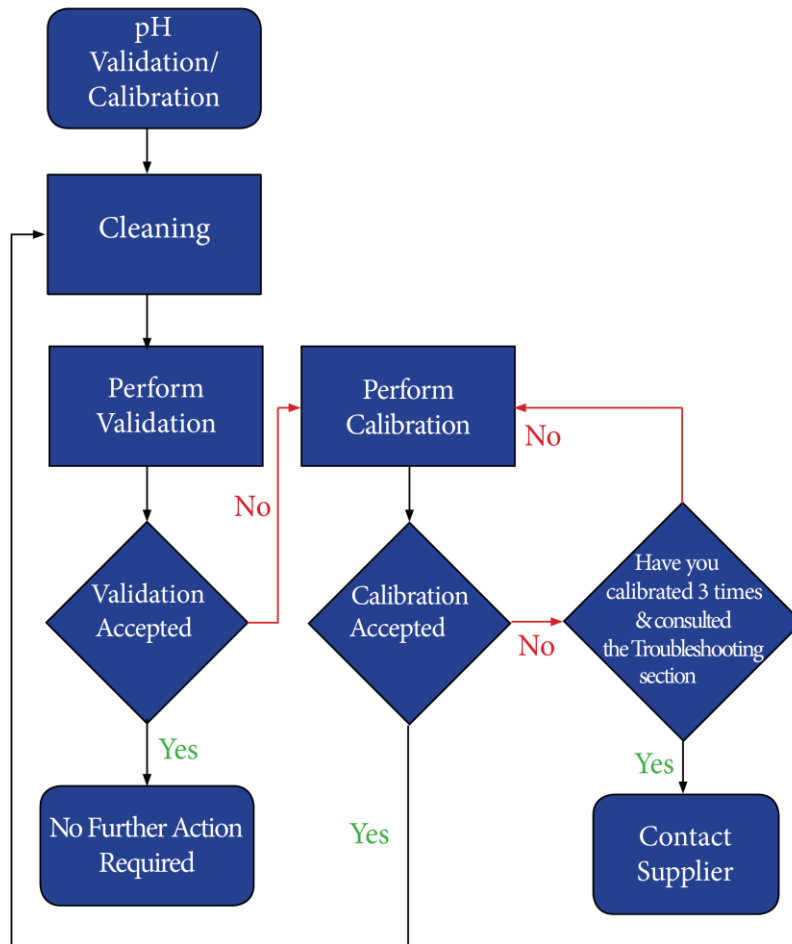


Figure 7-1: pH Validation/Calibration Procedure Flow Chart

#### Note

**For validation use pH buffer 7.**  
**For calibration use pH buffer 4, 7 & 10.**

1. Place a cup under the calibration fluid drain off to collect the discharge.
2. Turn **VALVE 2** to **STOP** position. Then turn **VALVE 1** to **DRAIN** position.
3. Loosen the grey union nut by hand and park the sensor in the clamp.
4. Observe the fluid draining off into the cup.
5. **Clean** the electrode and clean the measuring chamber using a cleaning pad. If a cleaning pad is not available on hand, other clean rags may be used.



6. **For validation:** open a bag of **pH 7 buffer**, make sure the sensor and the pH buffer liquid have the same temperature, and then place the sensor into the pH buffer. Stir the sensor around the bag and wait for a few seconds for a stable reading. Make sure there is enough pH buffer to cover the tip of the electrode.
7. If the reading is within  $\pm 0.2$  of the pH buffer, the **validation** with pH is successful. When the validations are completed, jump to step 14.
8. If the reading is not within  $\pm 0.2$  of the pH buffer, a **calibration** of the module is required.
9. **For calibration:** turn the black rotary switch from position **M** to position which matches the used pH buffer. Wait for the red light to flash **3 consecutive times**, then place the sensor into the pH buffer.
10. Stir the sensor around and wait for a stable reading. Make sure there is enough pH buffer to cover the tip of the electrode.
11. Wait for the sensor to calibrate which can take several minutes. Calibration is successful when the red-light flashes **2 consecutive times**.
12. Once the calibration is done for all 3 pH buffers, the entire calibration is complete.
13. Repeat step 5 & 6.
14. Turn **VALVE 1** to **STOP**
15. Pour some water into the measuring chamber in order to keep the electrode moist.
16. Put the sensor back to the measuring chamber and fasten the black union.
17. Turn all **VALVES** to **RUN** and place the system in auto again.

## **8 Routine Maintenance**

As a routine maintenance, please make sure the sensor is clean. We recommend a visual inspection every month. If necessary, use the cleaning pads provided with the calibration kit.

For the pH/Temperature sensor a calibration every 3<sup>rd</sup> month will be required.

## 9 Sensor Lifetime

The lifetime of the pH/temperature sensor is mainly limited by the lifetime of the electrode. The electrode has a shelf life of 1 year at 25°C followed by an operating lifetime of approximately 1 year at 25°C. Electrode lifetime will be shortened at elevated temperatures. The electrode must always be kept moist. If the electrode dries out, it will not operate properly. Please refer to electrode trouble shooting section.

Changing of the Electrode is easily done by following the maintenance instruction MI6100-0007 in the operation manual.

### Note

It is recommended to keep an electrode in stock as a spare part.

## 10 Troubleshooting

### Note

For trouble shooting the system, please refer to the PI diagram of each system.

Troubleshooting should always be carried out by skilled personnel. The water monitoring system is connected to hazardous electric voltages, which can cause personal injury or mechanical damage if not handled correctly and in accordance with normal safety regulations.

Trouble	Possible Cause → Action
Incorrect indication of pH value	→ Try to clean the sensor and chamber manually. → Try to recalibrate the pH sensor. → Change the pH Electrode.

### 10.1 PH/Temperature

#### Resetting Calibration Offset

The pH sensor and pH electrode must be calibrated together in order to represent a functional pH-meter. Calibration data is stored within the pH sensor while the pH electrode acts as the sensing element.

During field calibration, the factory calibration data within the sensor is updated/overwritten in order to compensate for the deterioration of the pH electrode. If a defective pH electrode has been replaced by a new electrode, then the calibration data must be overwritten. However, the field calibration data stored in the sensor will not match the new pH electrode – resulting in the new electrode giving measurements that are offset compared to expectations.

If the offset is too large, then the pH sensor will not accept the field calibration data as valid (**Error code:** The red LED on the PH sensor flashes every second). In order to remove the calibration offset, an intermediate buffer solution must be mixed – refer to example 1 + 2 in the following tables:

### Example 1: pH Negative offset – Reading Too Low

Step	Description	Buffer solution	Observed pH	Calibration Data	Conclusion
Step 1	Initial test	7.0	6.5	Not accepted	Offset too big
Step 2	Reducing offset by mixing buffers	(90% buffer 7.0 + 10% buffer 10) = buffer 7.3	Before calibration: 6.8 After calibration: 7.0	Accepted. Red LED will flash 3 times	Offset reduced. Reading is 7.0 but real value should be 6.8
Step 3	Normal calibration (1 of 3)	7.0	6.7 Before calibration: 7.2 After calibration: 7.0	Accepted. Red LED will flash 3 times	Calibration Success. Offset Removed
Step 4	Normal calibration (2 of 3)	4.0	4.0	Accepted. Red LED will flash 3 times	Calibration Success
Step 5	Normal calibration (3 of 3)	10.0	10.1	Accepted. Red LED will flash 3 times	Calibration Success

Figure 10-1: pH Negative offset - Reading Too Low

### Example 2: pH Positive Offset – Reading Too High

Step	Description	Buffer solution	Observed pH	Calibration Data	Conclusion
Step 1	Initial test	7.0	7.5	Not accepted	Offset too big
Step 2	Reducing offset by mixing buffers	(90% buffer 7.0 + 10% buffer 4) = buffer 6.7	Before calibration: 7.2 After calibration: 7.0	Accepted. Red LED will flash 3 times	Offset reduced. Reading is 7.0 but real value should be 7.2
Step 3	Normal calibration (1 of 3)	7.0	7.3 Before calibration: 6.8 After calibration: 7.0	Accepted Red LED will flash 3 times	Calibration Success Offset removed
Step 4	Normal calibration (2 of 3)	4.0	4.0	Accepted Red LED will flash 3 times	Calibration Success
Step 4	Normal calibration (3 of 3)	10.0	10.0	Accepted Red LED will flash 3 times	Calibration Success

Figure 10-2: pH Positive Offset – Reading Too High

**Note:** Use the measurement from the pH sensor when mixing the buffer solutions.

The following signs indicate an electrode reaching its end of lifetime. The electrode must be replaced whenever one of the below signs are identified:

- The pH/Temperature sensor is difficult to calibrate. Storing a calibration point should take max 180 seconds. The electrode must be replaced if longer time is required.
- The pH/Temperature sensor was calibrated successfully, but the output drifts within 15 minutes after the calibration. To test drift please immerse the sensor in e.g. clean tap water – note the initial displayed pH value – leave the sensor in the water for 15 minutes - then note the displayed value after 15 minutes.

Calculate drift:

$$\text{Drift} = \text{“Initial value”} \div \text{“15 minute value”}$$

Max drift allowed is +/-0,2 pH units

- The pH/Temperature sensor gives a fixed output of around pH 7
- The pH/Temperature sensor gives no output.
- The glass tip of the electrode is damaged.
- Water has entered the electrical connection of the electrode.
- If the pH sensor flashes every second, the calibration is not accepted.

Changing of the Electrode is easily done by following the maintenance instruction MI6100-0007 in the operation manual.





### Note

It is recommended to keep an electrode in stock as a spare part.

## 11 Spare Parts

Spare parts are not included in the standard delivery. Spare parts can be ordered when necessary. When ordering spare parts, please mention the serial number of the sensor.

Part No.	Part Description	The specific appearance of the spare parts is subject change without notice; the function however will not change
<b>pH sensor</b>		
XAAA132732	pH sensor without electrode	
XAAB683026	pH sensor (6m cable) without electrode	
XAAA132734	Electrode for pH sensor	
XAAA132733	pH chamber	
XAAA132735	Gasket for pH sensor	
XAAA802758	Locking nut for & gasket for pH sensor	
<b>Calibration Kit</b>		
XAAA132742	pH 4 buffer	

Part No.	Part Description	The specific appearance of the spare parts is subject change without notice; the function however will not change
XAAA132743	pH 7 buffer	
XAAA132744	pH 10 buffer	
XAAA132756	Cleaning pads	
XAAC160340	This manual	





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