Hamilton Warranty

Please refer to the General Terms of Sales (GTS).

Important Note

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1 General Information

1.1 Intended Use

The Arc Module SU pH is intended to be used with the dedicated OneFerm pH sensors for the measurement of pH in Single Use (SU) applications (see Chapter 9.2). This Module provides both a 4-20 mA and a digital Modbus signal, when connected to a OneFerm pH sensor. Additional equipment such as amplifier or transmitter are not required.

The Arc Module SU pH is not gamma or steam sterilizable.

1.2 About these Operating Instructions

This manual refers to the Arc Module SU pH designated as «Arc Module» for the OneFerm pH sensors from Hamilton Bonaduz AG.

⚠️ ATTENTION! Essential information for avoiding personal injury or damage to equipment.

💡 NOTE: Important instructions or interesting information.

2 Liability

The liability of Hamilton Bonaduz AG is detailed in the document «General Terms and Conditions of Sale and Delivery,» chapter 12.

Hamilton is expressly not liable for direct or indirect losses arising from use of the Arc Module or sensor. It must in particular be insured in this conjunction that malfunctions can occur on account of the inherently limited useful life of the Arc Module or sensor contingent upon their relevant applications. The user is responsible for the calibration and maintenance of the Arc Module or sensor. In the case of critical applications, Hamilton recommends using back-up measuring points in order to avoid consequential damages. The user is responsible for taking suitable precautions in the event of a module failure.
3 Safety Instructions

⚠️ ATTENTION! Read and follow the safety instructions carefully before installing and operating the Arc Module.

3.1 General Precautions

For safe and correct use of the Arc Module, it is essential that both operating and service personnel follow generally accepted safety procedures as well as the safety instructions given in this document, the «Arc Module SU pH Operating Instructions».

Cleaning, assembly and maintenance should be performed by personnel trained in such work. When removing and cleaning the Arc Module, it is recommended to wear safety goggles and protective gloves.

The Arc Module cannot be repaired by the operator and has to be sent back to Hamilton for inspection. Necessary precautions should be taken when transporting the Arc Module. For repair or shipment the Arc Module should be sent back in the original reusable packaging box. Every Arc Module sent back for repair must be decontaminated (see also Chapter 7.3).

If the conditions described in these Operating Instructions are not adhered to or if there is any inappropriate interference with the equipment, all of our manufacturer’s warranties become obsolete.

3.2 Operation of the Arc Module

The Arc Module must be used for its Intended Use (Chapter 1.1), and in optimum safety and operational conditions. The specifications such as temperature or pressure defined on the Specification Sheet available at www.hamiltoncompany.com must not be exceeded under any circumstances. Potential hazards exist if the Arc Module is not operated correctly.

Strictly follow the instructions given to connect (Chapter 6.1) and disconnect (Chapter 6.3) the Arc Module from a OneFerm pH sensor. Do not apply any forces to the bag or the OneFerm pH sensor. Failure to do so may break the OneFerm pH sensor and/or damage the bag integrity.

⚠️ ATTENTION! Do not twist or turn the Arc Module to avoid damage or leakage.

3.3 Electrical Safety Precautions

Do not connect the Arc Module to a power source of any voltage beyond the power rating stated in the Specification Sheet (www.hamiltoncompany.com).

Always use Hamilton VP cables for safe connection. Cables are available in a broad range of lengths (Chapter 9.3). Make sure the cable is intact and properly plugged in to avoid any short circuit.
Keep the Arc Module away from other equipment which emits electromagnetic radio frequency fields, and minimize static electricity in the immediate environment of Arc Module and sensor. Carefully follow all the instructions in chapter 5 to avoid electrical damage to the sensor. The contacts must be clean and dry before sensor is connected to the cable.

⚠️ ATTENTION! Switch off the power supply and unplug the connector before dismounting the Arc Module.

3.4 Chemical, Radioactive or Biological Hazard Precautions

Selection of the appropriate safety level and implementation of the required safety measures for working with the Arc Module is the sole responsibility of the user.

If working with hazardous liquids, observe and carry out the maintenance procedures, paying particular attention to cleaning and decontamination. If the Arc Module becomes contaminated with biohazardous, radioactive or chemical material, it should be cleaned. Failure to observe and carry out the maintenance procedures may impair the reliability and correct functioning of the measuring module.

4 Product Description

4.1 General Description

Optimal yields in bioprocesses are only obtained with extensive process control, especially precise monitoring of pH value. The glass pH electrode is the most robust and reliable device available for the measurement of pH.

The reusable Arc Module converts the weak electrochemical signal of the OneFerm pH sensor into a digital signal. The Arc Module stores all relevant sensor data, including calibration and diagnostic information, simplifying the calibration and maintenance. It directly connects to the PCS without a transmitter and provides either 4-20 mA or digital Modbus communication.

The Arc Module used with the OneFerm pH sensor is compatible with all other components of the Hamilton Arc family, including a complete family of intelligent sensors (pH, ORP, dissolved oxygen and conductivity) and accessories. Reusable and SU sensors can work on the same system. Additional wireless sensor diagnostics functionality is enabled by the ArcAir™ App running on mobile devices (e.g. Hamilton’s Arc View Mobile) and computers.

Key benefits include:

- Electrochemical pH measurement with stable measurement signal
- Reusable electronic, detachable from the sensor
- No separate transmitter needed
- Simple maintenance with robust industrial design
- Direct digital Modbus or analog communication to the PCS system via 4-20 mA standard signal
4.2 Hardware Description

Always check the Arc Module for possible defects after first unpacking. In the unlikely event of a damaged Arc Module, return it immediately in original packing to your Hamilton representative.

The Arc Module and OneFerm pH sensors are delivered directly from the factory, pre-calibrated according to operational specifications. The integrated 4–20 mA analog interface and RS485 digital interface (Modbus RTU) are configured according to factory defaults. Full details, including serial number and most important specifications can be found on the sensor tag provided with each sensor.

To be sure to avoid electrical damage to the sensor, carefully follow all the instructions in the section entitled «Electrical Connection.» Before using the sensor for measurement, monitoring or regulation, be sure to first check its configuration by means of an operational test.

5 Installation

5.1 Unpacking and Cleaning

1. Carefully unpack the Arc Module SU pH. Enclosed you will find the Arc Module and the Arc Module SU pH Quick Guide.
2. Inspect the sensor for shipping damages or missing parts.
3. For cleaning purposes of the Arc Module, soak a paper towel with Isopropanol 70% and wipe down the module. After cleaning the module, air dry the isopropanol prior to connecting with the sensor. Make sure that all contacts of module and sensor are completely dry to prevent electrical damage (short circuit).

**NOTE:** Arc Module is not designed for gamma or steam sterilization.
**ATTENTION!** The sensor can measure and communicate over digital RS485 interface up to a temperature of 60 °C. If the process temperature exceeds 50 °C, both 4-20 mA interfaces are set to 3.5 mA output. The analog measurements will continue when the temperature drops back below 50 °C.

**NOTE:** The performance of the OneFerm pH sensor can change by damage of the electrodes in aggressive media, high temperature, or by contamination of the electrodes during the sensor’s lifetime. A quality indicator of the Arc Module shows deviation of the zero point when performing a product calibration. The quality indicator status is updated automatically after each product calibration.

### 5.2 Electrical Connection

The Arc Module is fitted with a VP8 socket head. The eight golden contacts are denoted as pin A to pin H. For easy identification of each pin, the head has a notch between pin A and pin B.

For the easiest and safest connection of Arc Module, always use Hamilton VP8 cables, available in a range of different lengths. To ensure highest signal quality standard, a cable between the OneFerm pH sensor and the Arc Module is not recommended.

<table>
<thead>
<tr>
<th>VP Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4–20 mA interface (mA interface #2)</td>
</tr>
<tr>
<td>B</td>
<td>4–20 mA interface (mA interface #1)</td>
</tr>
<tr>
<td>C</td>
<td>Power supply: +24 VDC (7 to 30 VDC)</td>
</tr>
<tr>
<td>D</td>
<td>Power supply: Ground</td>
</tr>
<tr>
<td>G</td>
<td>RS485 (A)</td>
</tr>
<tr>
<td>H</td>
<td>RS485 (B)</td>
</tr>
</tbody>
</table>

*Figure 2: Pin configuration*

### 5.3 Connection to PCS or Controller

#### 5.3.1 Layout and Overview

The Arc Module can be connected to the PCS or controller by a wired connection (for reference numbers see also «Parts and Accessories»):
The digital RS485 interface of the Arc Module can be accessed by operators when integrated by the OEM system supplier. The three-tier operator levels and factory default passwords are shown in the table below.

<table>
<thead>
<tr>
<th>Operator Status</th>
<th>Operator Level</th>
<th>Password</th>
<th>Read</th>
<th>Calibrate</th>
<th>Configure</th>
</tr>
</thead>
<tbody>
<tr>
<td>User</td>
<td>U</td>
<td>–</td>
<td>✓</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Administrator</td>
<td>A</td>
<td>18111978</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
</tr>
<tr>
<td>Specialist</td>
<td>S</td>
<td>16021966</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

### 5.3.2 Electrical connection of the 4–20 mA current interfaces

The 4–20 mA interface enables direct connection of the Arc Module to a data recorder, indicator, control unit or PCS with analog I/O. Apart from the two wires used for 4–20 mA current loop no additional equipment is required for analog signaling. The Arc Module is delivered from the factory with the analog 4–20 mA interface set «active». When using the 4–20 mA interface, pins have the following designations with respect to VP cable conductor colors:

<table>
<thead>
<tr>
<th>VP Pin</th>
<th>VP8 Cable</th>
<th>Arc Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Yellow</td>
<td>4–20 mA three-wire interface, functions as a current sink. It regulates the input current according to the sensor measurements. This interface needs a separate power supply (pin B or C). Factory default is assigned to a temperature measurement.</td>
</tr>
<tr>
<td>B</td>
<td>Green</td>
<td>4–20 mA two-wire interface, functions as a current sink. It regulates the input current according to the sensor measurements. This interface can be powered directly from 4–20 mA two-wire current loop. Nominal power of 60 mW must be provided. Factory default is assigned to a pH measurement.</td>
</tr>
<tr>
<td>C</td>
<td>Red</td>
<td>Power supply: +24 VDC (7 to 30 VDC). Max. power consumption: 150 mW</td>
</tr>
<tr>
<td>D</td>
<td>Blue</td>
<td>Power supply: Ground</td>
</tr>
</tbody>
</table>
The 4–20 mA interface is configured at the factory with the range, value and measurement units as indicated on the certificate. Follow the instructions in the section entitled «Configuration and Monitoring of the Sensor» to adjust the sensor according to the requirements of your application.

**Controlling 4–20 mA current interface signals by pulse-width modulation**

Hamilton Arc Module use the method of pulse-width modulation (PWM) to adjust the DC currents of the 4–20 mA interfaces corresponding to the measured values. In principle, the pulse width \( t_i \) of a rectangular signal with a constant frequency, the pulse duty factor \( \frac{t_i}{T} \), is modulated and afterwards demodulated by a low-pass filter to generate continuous analog DC signals. The resulting value \( y_i \) corresponds to the average of the PWM signal (see Figures 3 and 4). The PWM-loads of the Arc Module have low-pass filters which are not able to eliminate all AC fractions of the used PWM frequency of 3.5 kHz due to technical impossibilities. Therefore, the current signals of the 4–20 mA interfaces are still overlaid by a certain AC current which should be masked by lag smearing or input filters of the current input card of the process control system (PCS). Recommended PCS settings are a sampling rate below 3 kHz, an averaging over more than 1 s, and the use of galvanically separated inputs to avoid oscillations. It is also possible to use mathematical functions or isolating amplifiers for signal processing filtering if necessary. For detailed technical advice about suitable isolating amplifiers, please contact Hamilton technical support.

Figure 4: Progress of a rectangular signal with a period \( T \) and a pulse duration \( t_1 \) for the generation of an analog signal with the value \( y_1 \).

Figure 5: Progress of a rectangular signal with a period \( T \) and a pulse duration \( t_2 \) for the generation of an analog signal with the value \( y_2 \).
ATTENTION! The Arc Module generates the 4–20 mA signals by pulse width modulation (PWM) which is not compatible to all PCS systems. Also a galvanic separation between the power supply and the PCS is necessary for correct sensor functionality when used in 4–20 mA setups (see Figure 5).

Analog interface 1 and 2
Galvanically not isolated, pulse width modulation with 3.5 kHz, recommended PCS settings:
- Use galvanically separated inputs
- Sampling rate < 3 kHz and ≠ n * 3.5 KHz
- Average over > 1 s

Examples of circuit arrangement

Figure 6: Two-wire loop wiring diagram for the 4–20 mA interface (mA interface #1). In this wiring scheme, power is not supplied to the sensor VP pin C, therefore the wiring is not applicable to a sensor with the Arc Wi Adapter BT.

Figure 7: Three-wire loop wiring diagram for the 4–20 mA interfaces. The figure represents both 4–20 mA interfaces at pin A and pin B.

Figure 8: The safest form of wiring, using an isolation amplifier. The figure represents both 4–20 mA interfaces at pin A and pin B. For detailed technical advice, please contact Hamilton technical support.
5.3.3 Electrical connection for the digital RS485 interface

The digital RS485 interface enables communication with Arc Module for the OneFerm pH sensor to perform measurements, calibrate the sensor and change the sensor’s configuration parameters. Arc Modules are always connected to digital controlling devices as a Modbus slave. To function, they require a power supply using VP8 pins C and D. See Figure 8 below. The section entitled «Configuration and Monitoring of the Sensor» describes operation in digital mode.

By using the correct access password the system operator can adapt Arc Module to many tasks by:

- Selecting the 4–20 mA interface
- Scaling (configuring) the 4–20 mA interface
- Selecting the measured parameter:
  - pH: mV, pH
  - Temperature T: °C, K, °F

In addition, operators can read sensor information from the RS485 interface such as:

- The sensor’s serial number (SN), reference number (Ref) and manufacturing number (Lot)
- The Arc Module firmware version
- The Arc Module status (e.g., operation hours, warnings and errors)

Additional information:


⚠️ ATTENTION! Because all Arc Modules are delivered with factory-default settings, each sensor must be configured for its specific application before first use (See the section entitled «Configuration of the Arc Module» for more information).

The pins for the digital RS485 interface have the following designation with respect to VP cable conductor colors:

<table>
<thead>
<tr>
<th>Arc pH</th>
<th>VP Pin</th>
<th>VP8 Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply: +24 VDC (7 to 30 VDC)</td>
<td>C</td>
<td>Red</td>
</tr>
<tr>
<td>Max. power consumption 150 mW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply: Ground</td>
<td>D</td>
<td>Blue</td>
</tr>
<tr>
<td>RS485 (A)</td>
<td>G</td>
<td>Grey</td>
</tr>
<tr>
<td>RS485 (B)</td>
<td>H</td>
<td>Pink</td>
</tr>
</tbody>
</table>

In an electromagnetically noisy environment, it is advisable to connect the VP cable shield to the ground. This significantly improves resistance to noise and signal quality.
Examples of circuit arrangement

Figure 9: Wiring diagram for the RS485 interface.

Figure 10: Multi-drop bus wiring for the Modbus two-wire mode. Each sensor functions as a Modbus slave.

NOTE: In the connection scheme shown above, each sensor must have the unique Modbus device address for proper communication.

The serial Modbus connection between the RS485 port of the master and the corresponding interfaces of the sensors has to be ensured according to the EIA/TIA RS485 standard. Only one sensor can communicate with the master at any time.
5.4 Connection to PC or Mobile

5.4.1 Layout and Overview

The Hamilton Arc View Mobile (Ref 243690) represents an ideal solution for Arc sensor management. This includes an automated calibration by scanning the QR-code of the OneFerm pH sensor tag. The Arc View Mobile included in the package is a compact mobile wireless device with long battery lifetime and broad functionality. When using with a mobile device, each Arc Module requires an Arc Wi Adapter BT (Ref 243460 or 243470) and an Arc USB Power Cable (Ref 243490-01 or -02) for external power supply. The Arc View Mobile is based on the Samsung Galaxy Tab Active tablet and comes pre-configured with ArcAir™ App, app blocker application, power supply cable, instruction manual and Hamilton quick guide.

A wired connection to the PC is possible using the USB port. For connection to the PC, an Arc USB Power Cable (Ref 243490-01) is needed.
5.4.2 ArcAir™ App

The ArcAir™ App can be used to display measurement values, for configuration and calibration or to generate GMP reports for calibration, verification, communication and configuration. It can be downloaded from App Store, Google Play or for PC on www.hamiltoncompany.com. To upgrade your PC version from basic to advanced version, you must connect your PC using the Arc Wireless Converter BT with your mobile device. For this purpose, the mobile device must run on the correct ArcAir version (Advanced) to activate the upgrade on your PC (for more details, see also «ArcAir™ App – Operating Instructions» on www.hamiltoncompany.com).

**ArcAir Lite** (read only) user can read sensor information such as:
- Arc Module and sensor status (e.g. warnings and errors or quality indicator)
- Measurement values
- Arc Module and sensor information serial number (SN), reference number (Ref) and manufacturing number (Lot)
- Arc Module and sensor settings

**ArcAir Basic** user can use ArcAir Lite functionality and in addition:
- Execute initial calibration including calibration report (see chapter 6.2)
- Product calibration (follow the wizard of the ArcAir™ App)
- Configure the Arc Module and sensor setting including configuration report

**ArcAir Advanced** user can use ArcAir Basic functionality and in addition can create:
- GMP-reports for verification and communication settings
- Configuration profile

<table>
<thead>
<tr>
<th>ArcAir Version</th>
<th>Read</th>
<th>Calibrate</th>
<th>Configure</th>
<th>GMP-Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lite</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Basic</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
</tr>
<tr>
<td>Advanced</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
6 Operation

NOTE: This operation description refers to ArcAir™ App. For operation with PCS refer to operating instructions from the OEM system supplier.

ATTENTION! Only use the Arc Module according to the «Specification Sheet» on www.hamiltoncompany.com. Failure to do so may lead to damages or measurement failure.

6.1 Connecting the Arc Module to a OneFerm pH sensor

ATTENTION! Do not screw in the OneFerm pH sensor while connecting the Arc Module to avoid any leakage.

Prepare the sensor for measurement as follows:

1. Carefully remove the protective caps from the VP head.
2. Connect the Arc Module to the OneFerm pH sensor (Hold the Arc Module housing and screw in the coupling nut)
3. Make sure that the Arc Module is configured as required. If in doubt, test as described in chapter 5.3 «Connection to PCS or Controller»
4. Connect the Arc Module SU pH to the OneFerm pH sensor according to the section «Electrical Connection» in the desired configuration (analog 4–20 mA interface, digital RS485 interface or both).

The signal stabilizes itself within a few minutes. The Arc Module is programmed with default calibration values. To achieve best accuracy, execute calibration of the sensor (chapter 6.2).

6.2 Calibration

The OneFerm pH sensor has been pre-calibrated at pH 4 and pH 7 at 25 °C; hence calibration prior to the process is not necessary. The calibration values for zero point and sensitivity (slope) can be found on the label attached to the sensor head.

Figure 13: Example sensor label with calibration data.
1. Read the zero point (mV) and sensitivity (mV/pH) written on the sensor label (see figure 13).
2. Enter the calibration and sensor data into the Arc Module:
   
   **Calibration data (mandatory):**
   - Zero-Point
   - Sensitivity
   
   **Sensor data (enter data for traceability):**
   - Ref-number
   - Name
   - Lot-number
   - Lot date
   - SN-number
   - Sensor ID
   - a-length
   
   Push the save button to save the data.

3. If required, perform a product calibration step to increase accuracy to ± 0.1 pH (valid within 2 pH units from the product calibration point and at measurement temperature).
4. Save the data to the Arc Module

**NOTE:** The Arc View Mobile supports automatic calibration for predefined calibration values by scanning the QR-code. Use ArcAir software on tablet or PC to perform manual input of the calibration data.

The concept behind Hamilton single use Arc System enables calibration based on the pre-calibrated values. Additional 2-point calibration for the installation in the process setup is not required.

### Product calibration

Product calibration is an in-process calibration procedure that adjusts the measurement to specific process conditions. Follow the wizard of the ArcAir™ App.

In order to restore the original standard calibration curve, the product calibration can be cancelled at any time.

### 6.3 Disconnecting the Arc Module from a OneFerm pH Sensor

**ATTENTION!** Do not unscrew the OneFerm pH sensor while disconnecting the Arc Module to avoid any leakage.

1. Hold the Arc Module housing
2. Unscrew the coupling nut
3. Remove the Arc Module from the OneFerm pH sensor

The OneFerm pH sensor is a single use sensor meant to be discarded with the bag. If the process requires disconnection, the sensor must be decontaminated prior to disposal.
7 Troubleshooting

7.1 Arc Module and OneFerm pH Sensor Self-Diagnostics

7.1.1 Verify Status of Arc Module and OneFerm pH Sensor

The Arc Module and OneFerm pH sensor provides a self-diagnosis functionality to detect and identify the most common sensor malfunctions. The communication interfaces can be used for warning and error messages. The analog 4-20 mA interface can be configured according to the NAMUR recommendations to indicate an abnormal event. Use the ArcAir™ App for monitoring the sensor status and for troubleshooting. The following types of messages are provided by the self-diagnosis function.

<table>
<thead>
<tr>
<th>Indicator status</th>
<th>What does it mean?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>The connectivity to the sensor is OK. The sensor is operating correctly and no warnings or errors have been registered.</td>
</tr>
<tr>
<td>Yellow</td>
<td>The connection to the sensor is OK. However, the sensor indicates a warning. Verify the sensor warnings in «Info &gt; Status».</td>
</tr>
<tr>
<td>Red</td>
<td>The connection to the sensor is OK. However, the sensor indicates an error. Verify the sensor error in «Info &gt; Status».</td>
</tr>
</tbody>
</table>
| Grey, Flashing Red | The ArcAir™ App lost connection to the sensor due to one of the following reasons:  
  - The wireless signal strength is low (ArcAir indicator grey; LED on Arc Wi Adapter BT can be green/yellow/red)  
  - The Arc Wi Adapter BT has been removed from the sensor.  
  - The Arc Module or Arc Wi Adapter BT electronic is defective. |

7.1.2 Warnings

<table>
<thead>
<tr>
<th>Warnings</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH reading below lower limit</td>
<td>pH-reading too low (pH &lt; 3)</td>
<td>Verify calibration data (Chapter 6.2)</td>
</tr>
<tr>
<td>pH reading above upper limit</td>
<td>pH-reading too high (pH &gt; 10)</td>
<td>Verify calibration data (Chapter 6.2)</td>
</tr>
<tr>
<td>Verify / set calibration data</td>
<td>Arc Module was disconnected from power supply or from the OneFerm pH sensor</td>
<td>Verify calibration data (Chapter 6.2)</td>
</tr>
<tr>
<td>Calibration recommended</td>
<td>No calibration executed</td>
<td>Verify calibration data (Chapter 6.2)</td>
</tr>
</tbody>
</table>
7.1.3 Errors

<table>
<thead>
<tr>
<th>Errors (failures)</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH reading failure</td>
<td>The OneFerm pH sensor is broken</td>
<td>Replace the sensor</td>
</tr>
<tr>
<td>Glass resistance too high</td>
<td>The OneFerm pH sensor is broken</td>
<td>Replace the sensor</td>
</tr>
<tr>
<td>Glass resistance too low</td>
<td>The reference system of the OneFerm pH sensor is broken</td>
<td>Replace the sensor</td>
</tr>
<tr>
<td>Temperature out of</td>
<td>The measured temperature is outside the defined measurement temperature range (4-50 °C)</td>
<td>If the process temperature is outside this range, the sensor will not perform pH readings</td>
</tr>
<tr>
<td>measurement range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature out of</td>
<td>The measured temperature is outside the defined operating temperature range (0-60 °C)</td>
<td>The sensor can be damaged</td>
</tr>
<tr>
<td>operating range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor missing</td>
<td>No sensor connected to the Arc Module</td>
<td>Connect OneFerm sensor</td>
</tr>
<tr>
<td>Sensor not matching</td>
<td>Wrong sensor connected to the Arc Module</td>
<td>Connect OneFerm pH NTC sensor</td>
</tr>
<tr>
<td>Temperature sensor</td>
<td>The temperature sensor in the OneFerm pH sensor is broken</td>
<td>Replace the sensor</td>
</tr>
<tr>
<td>Sensor quality low</td>
<td>Quality indicator too low</td>
<td>Verify calibration data or repeat product calibration (Chapter 6.2)</td>
</tr>
<tr>
<td>Internal communication</td>
<td>Hardware defect of Arc Module</td>
<td>Replace Arc Module</td>
</tr>
<tr>
<td>failure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7.2 Getting Technical Support

If a problem persists even after you have attempted to correct it, contact Hamilton’s Customer Support: Please refer to the contact information at the back of this Manual.

7.3 Returning Arc Module for Repair

Before returning an Arc Module to Hamilton for repair, contact our Customer Service and request: a Returned Goods Authorization (RGA) or Returned Material Authorization (RMA) number.

Do not return an Arc Module to Hamilton without an RGA/RMA number. This number assures proper tracking of your sensor. Arc Modules that are returned without an RGA number will be sent back to the customer without being repaired.

Decontaminate the Arc Module and remove health hazards, such as radiation, hazardous chemicals, infectious agents, etc. Provide complete description of any hazardous materials that have been in contact with the sensor.
8 Disposal

The design of Hamilton sensors optimally considers environmental compatibility. In accordance with the EC guideline 2002/96/EG Hamilton sensors that are worn out or no longer required must be sent to a dedicated collection point for electrical and electronic devices, alternatively, must be sent to Hamilton for disposal. Sensors must not be sent to an unsorted waste disposal point.

9 Ordering Information

9.1 Arc Module SU pH

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>243233</td>
<td>Arc Module SU pH</td>
</tr>
</tbody>
</table>

9.2 OneFerm pH Sensors for the Arc Module SU pH

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>243235</td>
<td>OneFerm pH VP70 NTC</td>
<td>70</td>
</tr>
<tr>
<td>243236</td>
<td>OneFerm pH VP120 NTC</td>
<td>120</td>
</tr>
<tr>
<td>243237</td>
<td>OneFerm pH VP225 NTC</td>
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</tr>
<tr>
<td>243238</td>
<td>OneFerm pH VP325 NTC</td>
<td>325</td>
</tr>
</tbody>
</table>
9.3 Parts and Accessories

**Arc View Mobile (Ref 243690)**

![Arc View Mobile](image1)

**Arc USB Power Cable (Ref 243490-01 or -02)**

Arc USB Power Cable available with VP8 connector for the Arc Wi 1G Adapter BT or with M12 8-pole connector for the Arc Wi 2G Adapter BT

![Arc USB Power Cable](image2)

**Arc Wi 1G Adapter BT (Ref 243460)**

Arc Wi 1G Adapter BT (Ref 243460)

for Wireless Communication
(recommended for Modbus-Integrations)

![Arc Wi 1G Adapter BT](image3)

**Arc Wi 2G Adapter BT (Ref 243470)**

Arc Wi 2G Adapter BT (Ref 243470)

(recommended when integrated via 4–20 mA interface)

![Arc Wi 2G Adapter BT](image4)

**Arc Wireless Converter BT (Ref 243499)**

Arc Wireless Converter BT (Ref 243499)

![Arc Wireless Converter BT](image5)
<table>
<thead>
<tr>
<th>Ref</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>243460</td>
<td>Arc Wi 1G Adapter BT</td>
</tr>
<tr>
<td>243470</td>
<td>Arc Wi 2G Adapter BT</td>
</tr>
<tr>
<td>243490-01</td>
<td>Arc USB Power Cable VP8</td>
</tr>
<tr>
<td>243490-02</td>
<td>Arc USB Power Cable M12 8-pole</td>
</tr>
<tr>
<td>243499</td>
<td>Arc Wireless Converter BT</td>
</tr>
<tr>
<td>243690</td>
<td>Arc View Mobile Package</td>
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<tr>
<td>355263</td>
<td>Sensor Data Cable VP8, 1m</td>
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<tr>
<td>355264</td>
<td>Sensor Data Cable VP8, 3m</td>
</tr>
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<td>355265</td>
<td>Sensor Data Cable VP8, 5m</td>
</tr>
<tr>
<td>355266</td>
<td>Sensor Data Cable VP8, 10m</td>
</tr>
<tr>
<td>355267</td>
<td>Sensor Data Cable VP8, 15m</td>
</tr>
<tr>
<td>355268</td>
<td>Sensor Data Cable VP8, 20m</td>
</tr>
</tbody>
</table>

9.4 Services

**OEM Training session**

On-site training (2-day)

*Description:* Imparting of fundamental knowledge about pH sensor measuring technology and PCS integration incl. documents and participation confirmation, excl. travel costs