# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highlights</td>
<td>4</td>
</tr>
<tr>
<td>Innovations</td>
<td>8</td>
</tr>
<tr>
<td>Arc Family</td>
<td>12</td>
</tr>
<tr>
<td>System Installations</td>
<td>14</td>
</tr>
<tr>
<td>Sensors</td>
<td>17</td>
</tr>
<tr>
<td>pH</td>
<td>17</td>
</tr>
<tr>
<td>ORP</td>
<td>41</td>
</tr>
<tr>
<td>Conductivity</td>
<td>55</td>
</tr>
<tr>
<td>Cell Density</td>
<td>69</td>
</tr>
<tr>
<td>DO</td>
<td>81</td>
</tr>
<tr>
<td>Beverly</td>
<td>100</td>
</tr>
<tr>
<td>DuraCal pH Buffers</td>
<td>102</td>
</tr>
<tr>
<td>Conductivity Standards</td>
<td>104</td>
</tr>
<tr>
<td>Oxygen Accessories</td>
<td>106</td>
</tr>
<tr>
<td>Electrolytes and Solutions</td>
<td>107</td>
</tr>
<tr>
<td>Cables</td>
<td>108</td>
</tr>
<tr>
<td>Arc Accessories</td>
<td>112</td>
</tr>
<tr>
<td>Hamilton Customized Products</td>
<td>114</td>
</tr>
<tr>
<td>Transmitter</td>
<td>115</td>
</tr>
<tr>
<td>H100</td>
<td>115</td>
</tr>
<tr>
<td>H220X</td>
<td>120</td>
</tr>
<tr>
<td>Housings</td>
<td>123</td>
</tr>
<tr>
<td>Sensor Comparison</td>
<td>158</td>
</tr>
<tr>
<td>Safety First</td>
<td>160</td>
</tr>
<tr>
<td>Alphabetical Index</td>
<td>162</td>
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Hamilton has worked closely with single-use (SU) equipment manufacturers to understand the market needs in order to adapt measurement technologies from reusable sensors because all applications have their own requirements. The Hamilton SU sensors offer the known high accuracy of traditional sensors even after gamma irradiation and dry storage. The SU portfolio offers sensing elements as well as a wide variety of possible connections to transmitters and controllers. Arc modules are also available for easy integration of digital signals and allow, in combination with the ArcAir app, to benefit from the Arc technology. Thus calibration data provided on a label can easily be scanned and the sensors are ready to be used with seconds.

VisiFerm DO SU Family
Reliable Dissolved Oxygen Measurement
The Hamilton VisiFerm DO SU sensor systems are available in a wide application range for bag and rigid containers. Various mechanical connections in the vessel are available with a single-use sensor element and reusable electronic for a cost effective application. The new single use optical dissolved oxygen sensor offers a reliable and comparable measurement to existing reuseable probes.

OneFerm pH Family
High Performance pH Measurement
The Hamilton OneFerm pH sensor is a single use glass electrode in order to ensure a wide measuring range, and a very low drift, even after dry storage and wet-in time. Sensors are available in various lengths and electrical connections so that the pH measurement can benefit from the Arc technology.

Incyte SU Family
Monitoring Viable Cell Density
Online cell density measurement is essential to ensure reliable processes, especially for long running, i.e. perfusion. Online data provides continuous information in order to optimize control and yield.

Conducell SU Family
Conductivity Measurement In Bags
The Conducell SU Family allows measurements in a wide conductivity range in SU applications.
Cell Density

Viable Cell Density Monitoring

On-line, respectively in-line or in-situ, measurements are standard methods of process monitoring and required for control. pH and dissolved oxygen are commonly controlled in biopharmaceutical processes but both values are not directly linked to the viable cell physiology. Therefore, off-line measurements are done and provide only a limited reactionary window into the past.

With online monitoring of the viable cell density, continuous information about the most relevant process driver is available. This information is necessary to understand the process, automate and control the yield.

Incyte, measures the permittivity, which correlates with the viable cell density, especially in cell culture applications. Incyte is now integrated in the Arc technology. The transmitter is integrated in the sensor and provides a digital signal for direct Modbus integration. Easy integration via 4-20 mA as well as OPC UA are possible as well.

Arc Modbus OPC Converter

Easy Integration in SCADA

The Arc Modbus OPC converter is designed to connect Arc Modbus to OPC UA. It is perfect to be used in R&D areas for the integration via Ethernet into SCADA systems and supports all VP8 Arc sensors. Up to 4 sensors in parallel can be used. The conversion script is pre-installed and the converter ready-to-use.

VisiFerm mA

The Sensor For Production Environment

Hamilton fully redesigned the sensor electronics and optical cap to create the most robust VisiFerm dissolved oxygen sensor yet. Upgrading both key components allowed the VisiFerm mA to have less frequent need for calibration, less measurement error, and longer lifetime than previous optical sensor technologies.

Employing the VisiFerm mA can yield:

- 80% Fewer Calibrations
- 3 x Longer Cap Life
- 50% Longer Sensor Life

VisiTrace mA

Trace Level DO Measurement

Hamilton fully redesigned the sensor electronics to create the most robust VisiTrace sensor yet. VisiTrace mA is designed for trace measurement from 1 to 2,000 ppb and stable against active chlorine and chlorine dioxide.

Interface Output: 2 wire 4-20 mA, HART and Bluetooth integrated!

VisiWater

DO P Arc

DO Measurement For Fish Farming and Waste Water

The VisiWater DO P is an optical dissolved oxygen sensor designed for applications in water, wastewater, fish farming, lakes, and rivers. Its robust plastic shaft is ideal for these applications. The optical measurement technology ensures fast response time and minimum maintenance without polarization time. Like for all optical DO sensors the only spare part is the cap, which is easy and quickly replaceable.

The output signals 4-20 mA or Modbus can easily be integrated into process control systems (PCS). Calibration and configuration can be done via the PCS or ArcAir Desktop version with the help of the USB RS485 Modbus Converter.
Beyond Process Analytics

Hamilton’s electrochemical and optical sensors are the solution for process analytical measurement systems, characterized by proven quality and outstanding performance. Offering measurement parameter solutions in pH, ORP, dissolved oxygen and conductivity, our sensors and accessories are backed by over 50 years of engineering and manufacturing expertise in innovative design.

Foodlyte

**Biocompatible Reference Electrolyte**

The Foodlyte electrolyte was specifically developed for the needs of the biotechnology, pharmaceutical and food industries. It’s based on food ingredients and the perfect electrolyte for applications where non-toxicity is mandatory. Foodlyte is taste-, odor- and harmless for microorganisms.

The biocompatibility is approved by MDT1 according to EN ISO 10993-52 and USP 31, 2008 Chapter 873 and according to international GLP4 guidelines.

**pH Glasses**

**Measurement Accuracy in Various Applications**

Measurement stability and sensor lifetime in various environments requires different pH glasses.

Our high performance glasses, the PHI and the HB glass, were developed to withstand frequent steam sterilization, autoclaving and CIP cleaning using hot caustics. PHI and HB glass provide the lowest drift and show almost no shift after sterilization and cleaning procedures.

The H glass has excellent aging characteristics and offers stable readings even in samples with low water content such as anhydrous or only partially aqueous solutions. The low alkali error of H glass means accurate measurements even at high pH or high operating temperatures. HF glass ensures the longest possible lifetime in low temperature processes and processes containing hydrofluoric acid.

**Polisolve Plus**

**Most innovative Polymer Reference Electrolyte**

Hamilton has designed innovative Polisolve Plus polymer electrolyte sensors that cover the full pH range, a wide temperature range and withstand reference poisoning for an extended lifetime. It’s also stable against most organic solvents and free of toxic acrylamide.

When Polisolve Plus and Single Pore concepts are combined the result is a Polilyte Plus sensor for a wide range of applications as well as a problem solver for difficult applications.

- Industrial waste water
- Hot sugar juice
- Samples containing color pigments
- Oily samples

The combination leads to more stable reference signals and minimized diffusion potentials. Polisolve Plus represents a significant contribution to long lasting pH sensors.

**Single Pore Concept**

**The never-clog Liquid Junction**

A Single Pore is an open liquid junction and an alternative to diaphragms. Instead of many tiny pores in a ceramic diaphragm, a single pore, about 2000 times larger in diameter, is used. This concept provides a direct contact between reference electrode and sample. In combination with the bigger diameter this liquid junction can hardly be clogged. The Single Pore results in a faster response time, more accurate readings and prevents reference poisoning.

**Note:** The PTB (Physikalisch-Technische Bundesanstalt = Physical Technical Federal Institute) in Braunschweig, Germany, determined the Single Pore pH electrode to be the most accurate laboratory electrode. Further information can be found in “Traceability of pH measurement” by Petra Spitzer; ISBN 3-89429-877-4 or ISSN 0947-7063
Conductivity Standards

Certified and Traceable

Hamilton was the first to offer conductivity standards at 1.3 and 5 μS/cm with a certified accuracy of ±1% and a durability of 1.5 or 3 years. All conductivity standards exhibit a previously unknown level of stability which has been confirmed by measurements done by the PTB. Governmental metrological institutes that deal with measurement of electrolytic conductivity have become aware of these standards, and the composition of these standards is patented. The measurement procedure for determining conductivity has been developed in collaboration with the DFM. Each batch is certified by the DFM. In an inter-laboratory test among prestigious European metrological institutes (PTB, DFM, DAkkS), Hamilton standards were used as a measurement solution.

DuraCal pH Buffers

Easy Calibration with 5-Year Shelf Life

DuraCal pH buffers consist of a complete range of patented stable pH buffer solutions from pH 1.09 to pH 12.00. Hamilton guarantees that they will last for five years from the date of manufacture. The pH 9.21 and pH 10.01 buffers are even stable in air. High buffer capacities enable quick and stable calibrations.

Closed-loop traceability: In contrast with other manufacturers Hamilton has developed a “closed-loop” traceability. For users of DuraCal pH buffer solutions this means a unique level of reliability.

Top-down traceability: With Hamilton the pH value of the DuraCal buffer is determined by a comparison with two secondary reference solutions.

Bottom-up traceability: From each lot manufactured, a representative quantity is measured at DAkkS (Deutsche Akkreditierungsstelle, Wolfen, Germany). This ensures an external independent verification by an accredited institute. The DAkkS issues an official calibration certificate for every DuraCal batch manufactured.

VisiFerm DO

The most reliable Optical Dissolved Oxygen sensor in the Industry

The VisiFerm DO is the first optical dissolved oxygen (DO) process sensor for demanding applications in the pharmaceutical, biotechnology and beverage industries. The measuring principle is based on oxygen dependent quenching of the emitting light of a luminophore. Easy and fast to maintain, the multiple time-constraints caused by the use of electrochemical type DO sensors is eliminated. Decreased cost of ownership is further improved with an integrated sensor lifetime check that indicates when the sensor is in need of maintenance. A simple, replaceable cap rebuilds the sensor in seconds.

The optical measurement is independent from the flow and insensitive to CO₂. A special window behind the luminophore enables the sensor to withstand pressure hammers and spikes. Due to this design, the VisiFerm DO is suitable for inline measurement of dissolved oxygen in various processes.

Beverly

Portable Dissolved Oxygen Measurement

Beverly is designed for at-line and laboratory use in small and midsize breweries as well as in the beverage industry to provide excellent reliability in a rugged design, and purpose built to handle the environmental extremes encountered in everyday brewing operations. Superior performance at an affordable price is achieved using Hamilton’s best in class optical sensor VisiFerm DO with built-in intelligence, making Beverly the brewer’s best friend.
The True Power

Intelligence Integrated

Hamilton Arc revolutionizes the integration of sensors by rethinking communication between sensors, end users and process control systems (PCS). The functionality of a traditional transmitter has been replaced by a microprocessor within the sensors head. Arc sensors communicate directly with the PCS through 4-20 mA standard and digital signals.

With the micro-transmitter integrated, Arc sensors offer a fully compensated, converted digital and 4-20 mA signal directly to the process control system.

**Fully compensated signal**
- Temperature compensated
- E.g. Pressure, Salinity

**Conversion to**
- Digital Modbus
- 4-20 mA analog
- Different parameter units (e.g. mV, ppb, %sat, ...)

**The integrated micro-transmitter stores**
- Last calibration data
- Diagnostic information
- Sensor configuration

Arc Intelligence

Wireless Communication & Calibration

Arc sensors provide full online wireless option for monitoring, configuration and calibration.

Laboratory Calibration

Complete Arc Sensor Portfolio

- pH
- DO
- ORP
- Cond
- Cell
- Density
Analog Systems

Standard Measuring Loop

Measuring Loop in Hazardous Area

Measuring Loop in Pipe

Arc Systems

Skid System

Arc in R&D
pH measurements are important in many processes. There is almost none where the pH value does not play a dominant role. All biological processes depend on the activity of enzymes because they show a pH optimum and lose their functionality if the pH is too low or too high.

The pH value is measured in most processes using a glass electrode. This pH glass forms a thin gel layer in aqueous solutions that is highly selective to H⁺ ions. The pH dependent potential of the gel layer is measured against a built-in reference electrode with a constant potential. This reference electrode may be a silver wire in contact with solid silver chloride or a calomel electrode.

In general, the pH value is a measure of the acidity or the basicity of an aqueous solution. In technical terms, pH is the negative logarithm of the activity of the solvated protons H⁺. It’s mostly explained as the measure of the proton concentration which is correct for dilute aqueous solutions.
The outstanding success of the Polilyte Plus in chemical and wastewater applications gave the inspiration for transferring the good features to a whole family of sensors. The expanded portfolio widens the range of applications that can be covered.

All members have the same reference electrolyte Polisolve Plus, use the Single Pore technology but will have different pH glasses. A new member with the HB glass will be established.

**Benefits**
- More applications with HB pH glass
- Better overview of the portfolio
- There’s always at least one family member that suits the different applications
- Resistant against solvents, strong acids and bases

**Typical applications**
- Sugar industry
- Microelectronics
- Industrial wastewater
- Downstream processes
- Fermentation

**Ordering Information**

<table>
<thead>
<tr>
<th>Code</th>
<th>pH glass</th>
<th>Electrical Connector</th>
<th>a-length (mm)</th>
<th>Temperature sensor</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>H</td>
<td>VP</td>
<td>120</td>
<td>P1100 (VP)</td>
</tr>
<tr>
<td>2</td>
<td>HB (not for MS)</td>
<td>S8</td>
<td>225</td>
<td>P11000 (VP)</td>
</tr>
<tr>
<td>3</td>
<td>HF</td>
<td>Arc</td>
<td>325</td>
<td>none (S8) or given (Memosens, Arc)</td>
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<tr>
<td>4</td>
<td>PHI</td>
<td>Memosens</td>
<td>360 (not for Arc, MS only with H glass)</td>
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<td>5</td>
<td></td>
<td></td>
<td>425</td>
<td></td>
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</table>

**Specifications**
- Measuring range: 0 to 14 pH
- Process temperature: See table on page 158/159
- Pressure range: See table on page 158/159
- Hygienic aspects: Autoclavable: H, HB, PHI
- Electrolyte: Polisolve Plus
- pH glass: See table on page 18
- Diaphragm: Single Pore
- O-ring: EPDM*: HB, PHI

For more specifications see [www.hamiltoncompany.com](http://www.hamiltoncompany.com)
The EasyFerm Plus family of pH sensors is designed to withstand demanding applications in the Pharmaceutical and Chemical industries. All family members have the same reference electrolyte Phermlyte, the same type of diaphragm HP Coatramic but different pH glasses. The standard EasyFerm Plus, with its PHI glass, is directed at the BioPharm and Pharmaceutical industries because the glass has an excellent chemical robustness and provides best results in applications where sterilization either in an autoclave or an SIP is performed frequently. The new versions with the HB glass show a very fast recovery after CIP and SIP cycles leading to a shortened set-up time.

The LEVP (LE = Liquid Earth) versions have a stabilized sensor signal and an extended sensor diagnosis.

### Benefits
- Pre-pressurized reference electrolyte ensures a clog-free diaphragm
- Almost drift-free measurement
- Stable measurement signals after steam sterilization, autoclavage and CIP cleanings

### Typical applications
- Bioreactors
- Industrial processes
- Downstream processes

### Specifications
- Measuring range: 0 to 14 pH
- Process temperature: 0 to 140 °C (Arc: analog 0 to 110 °C, digital 0 to 140 °C)
- Pressure range: 0 to 6 bar
- Hygienic aspects: Autoclavable, SIP, CIP
- pH glass: PHI, HB
- Electrolyte: Phermlyte
- Reference system: Everef-F
- Diaphragm: HP Coatramic
- O-ring: EPDM

### Ordering Information

#### EasyFerm Plus Family Structure

<table>
<thead>
<tr>
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<th>pH glass</th>
<th>Code</th>
<th>Electrical Connector</th>
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<tr>
<td>3</td>
<td>VP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>S8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Arc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Memosens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>K8</td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td>LEVP (only for 120 and 225 mm length)</td>
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#### a-length (mm)

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<th>a-length (mm)</th>
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<tr>
<td>2</td>
<td>160</td>
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<td>3</td>
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<td>4</td>
<td>225</td>
</tr>
<tr>
<td>5</td>
<td>325</td>
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<tr>
<td>6</td>
<td>360 (not for Arc and only PHI glass)</td>
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<td>7</td>
<td>425</td>
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<tr>
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<td>275</td>
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#### Temperature sensor

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<tr>
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<td>Pt1000 (VP, LEVP)</td>
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<td>none (S8, K8) or given (Memosens, Arc)</td>
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</table>

For more specifications see www.hamiltoncompany.com
EasyFerm Bio family

The EasyFerm Bio family of pH sensors is designed for applications in the Pharmaceutical, Biotechnology and Food & Beverage industries. All family members have the same reference electrolyte Foodlyte, with its certified bio-compatibility. The standard EasyFerm Bio, with its HB glass, is directed at the Food & Beverage industry where CIP and SIP cycles occur frequently because the glass shows a very fast recovery leading to a shortened set-up time. The new versions with the PHI glass show an excellent chemical robustness at high pH values.

The LEVP (LE = Liquid Earth) versions have a stabilized sensor signal and an extended sensor diagnosis.

**Benefits**
- Specifically designed for sterile applications in Pharma and Biotechnology (EHEDG, Biocompatibility)
- Highly reliable measurements after steam sterilization, autoclaving and CIP cleanings
- Drift free measurements
- Ceramic diaphragm is an improved barrier of the electrode

**Typical applications**
- Bioreactors
- Brewhouse
- Downstream processes
- Gelatine manufacturing

**Did you know... that you may even eat the Foodlyte?**

**Specifications**

- **Measuring range**: 0 to 14 pH
- **Process temperature**: 0 to 140 °C (Arc: analog 0 to 110 °C, digital 0 to 140 °C)
- **Pressure range**: 0 to 6 bar (relative to ambient)
- **Hygienic aspects**: Autoclavable, SIP, CIP
- **pH glass**: HB, PHI
- **Electrolyte**: Foodlyte
- **Reference system**: Everef-F
- **Diaphragm**: HP Coatramic
- **O-ring**: Silicone*

**Ordering Information**

**EasyFerm Bio Family Structure**

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<td>K8</td>
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<td>6</td>
<td>LEVP (only for 120 and 225 mm length)</td>
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<table>
<thead>
<tr>
<th>Code</th>
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**Code | Temperature sensor |
<table>
<thead>
<tr>
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<tbody>
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<td>3</td>
<td>none (SR, K8) or given (Memosens, Arc)</td>
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</table>

**Accessories**

- **pH buffers**: see page 102
- **Cables**: see page 108
- **Housings**: see page 123
The OneFerm family of pH sensors is designed for applications in the single-use (SU) Pharmaceutical and Biotechnology Industries. Hamilton OneFerm sensors are the next step in the evolution of single-use measurement. Their design solves some of the issues that commonly occur with reusable pH sensors that are inserted into the bag.

Specifically, Hamilton’s single-use sensors combine the reliability and measurement stability of our long-term proven conventional sensors with the ease of use as an integral part of the bioreactor. The sensors retain the high accuracy performance even after gamma irradiation and a sufficient shelf life making it the ideal single-use solution.

**Did you know… that with the reusable Arc Module SU pH a very stable digital signal can be achieved?**

**Benefits**
- Specially designed for sterile application in SU Pharma and Biotechnology
- Highly reliable measurements after gamma sterilization and dry storage even after short wet-in time (<30 min)
- Very low drift (<0.1 pH per week)
- Biocompatible materials (ISO 10993-5 and USP <87>)

**Typical applications**
- SU bioreactors (bag application)
- SU bioreactors (rigid containers)
- SU mixer
- SU downstream processes

**Specifications**

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Measuring range</th>
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<th>Pressure range (relative to ambient)</th>
<th>Hygienic aspects</th>
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<tr>
<td></td>
<td>3 to 10 pH</td>
<td>4 to 50 °C</td>
<td>0 to 1 bar</td>
<td>Gamma irradiation up to 45 kGy</td>
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<td>(for the OneFerm sensors and the pH-port)</td>
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<td></td>
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<td>Diaphragm HP Coatramic</td>
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<td></td>
<td></td>
<td>O-ring Silicone*</td>
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**Accessories**

- **Cables** see page 108
- **Arc Module SU pH** Ref 243233
- **pH Port** Ref 243462

**Ordering Information**

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</tbody>
</table>

**For more specifications see [www.hamiltoncompany.com](http://www.hamiltoncompany.com)**

**Only for OEM integration available**
The ChemoTrode is the most robust sensor to measure pH in demanding applications in pharmaceutical and chemical industries. The ChemoTrode has a refill hole which allows refilling of the electrolyte and pressurization of the reference system. Its Everef-F reference cartridge ensures that the reference electrolyte remains free of silver and precipitation of proteins.

**Benefits**
- Liquid electrolyte ensures fast response time and high precision
- Longer lifetime thanks to refillable electrolyte
- Everef-F reference cartridge extends electrode life in aggressive media

**Typical applications**
- Industrial processes
- Mining Industry
- Pulp and Paper industry
- Fermentations

For more specifications see www.hamiltoncompany.com
The maintenance free FermoTrode sensors are designed for measuring pH in pharmaceutical and biotechnological industries and fit in the MasterFit and RetractoMaster housings. The Everef-F reference cartridge ensures that the reference electrolyte Skylyte remains free of silver and precipitation, and withstands steam sterilization.

It is not suited for contact with caustic soda like in CIP-cleanings or for use in media containing citric acid.

Benefits
- No air pressure required, no risk of empty reference electrolyte compartment
- 3 Coatramic diaphragms prevent clogging due to proteins
- Very long lifetime, stable calibration after sterilization and practically drift-free signals

Typical applications
- Biotechnology
- Pharmaceutical Industry

For more specifications see www.hamiltoncompany.com
IonoTrode

The IonoTrode sensor is designed for applications in ion weak media. The F glass membrane has a very low resistance, therefore the sensor can be used in samples with low conductivity, where it offers highest accuracy over a long period of time.

If there is a storage container with 3 M KCl attached via a tube to the side-arm of the IonoTrode, the flow-out of the electrolyte can be controlled with the sleeve diaphragm.

Benefits
- Offers highest accuracy over a long period of time
- Stable measurements in samples with low conductivity of at least 0.2 µS/cm
- Removable PTFE sleeve diaphragm to check electrolyte outflow
- Side-arm attachment via tube to storage vessel containing 3 M KCl, and control of electrolyte flow with PTFE diaphragm ring

Did you know...
that the IonoTrode is designed for ion weak media with a low conductivity of only 0.2 µS/cm?

Typical applications
- Drinking Water Plants
- Boiler Feed Water

Specifications
<table>
<thead>
<tr>
<th>Specifications</th>
<th>Measuring range</th>
<th>Process temperature</th>
<th>Pressure range (relative to ambient)</th>
<th>pH glass</th>
<th>Electrolyte</th>
<th>Reference system</th>
<th>Diaphragm</th>
<th>O-ring</th>
</tr>
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<tr>
<td></td>
<td>0 to 14 pH</td>
<td>-10 to 40 °C</td>
<td>0 to 0.5 bar or higher if pressurization by side-arm</td>
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</table>

Electrolyte 3 M KCl
Reference system Everef
Diaphragm Sleeve
O-ring EPDM

Accessories

Did you know...
that the IonoTrode is designed for ion weak media with a low conductivity of only 0.2 µS/cm?
The InchTrode sensors are designed to measure pH in demanding applications in the paper making as well as in the chemical industries. The Single Pore liquid junction guarantees the best and fast measuring results because of direct contact between the sample and the Polisolve electrolyte. The InchTrode sensors are easy to install without additional housing and have a robust PEEK shaft.

**Benefits**
- Single Pore for direct sample contact with Polisolve electrolyte – no clogging
- Very long-lasting reference system
- Robust PEEK shaft
- Simple installation without additional housing

**Typical applications**
- Pulp and Paper industry
- Water and Wastewater

**Did you know… that the InchTrode is available in two different sizes and with different membrane shapes?**

**Ordering Information**

<table>
<thead>
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P = Flat membrane
P = Cylindrical membrane
C = Fix cable

For more specifications see www.hamiltoncompany.com

---

**Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
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<tr>
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<td>(cylindrical membrane) 0 to 130 °C</td>
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<td>Process temperature (cylindrical membrane)</td>
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<td>Pressure range</td>
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<td>0 to 6 bar (130 °C)</td>
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<td>Polisolve</td>
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<td>Diaphragm</td>
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<td>Temperature sensor</td>
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<td>Pt100 in fix cable version</td>
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Accessories
- pH buffers see page 102
- Cables see page 108
- Housings see page 123
MecoTrode

The maintenance free MecoTrode sensor is designed for processes in the chemical industry with extreme pH values. The H glass type membrane glass provides a low alkaline error and stable measurement even at high temperatures.

Three high-performance ceramic diaphragms reduce the effect of flow potential in pipe mounting.

**Benefits**

- 3 high-performance ceramic diaphragms for reduced flow potentials when mounted in pipes
- H+ glass for most accurate readings at high pH values or high temperatures
- Very good precision at low pH values (pH < 2)

**Typical applications**

- Water and Wastewater
- Industrial processes

---

**Did you know...**

*that the MecoTrode is already 25 years in the market?*

---

**Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
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<td>Temperature sensor</td>
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<td>O-ring</td>
<td>EPDM*</td>
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**Ordering Information**

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**Accessories**

- pH buffers see page 102
- Cables see page 108
- Housings see page 123

For more specifications see [www.hamiltoncompany.com](http://www.hamiltoncompany.com)
The maintenance free Polilyte Pro and Polyplast Pro sensors are designed for pH measurement in water applications, especially in low conductivity samples, e.g. wastewater, fish farming, ground water, etc. The Single Pore liquid junction guarantees best measurement results because of direct contact between the sample and the Polisolve electrolyte – clogging is nearly impossible. The Polyplast Pro sensor comes with a robust plastic shaft and glass bulb protection.

**Benefits**
- Single Pore for direct sample contact with Polisolve electrolyte
- No clogging
- Fast response even in low conductivity media
- Easy maintenance due to non-refillable electrolyte

**Typical applications**
- Wastewater applications
- Fish farming
- Ground water

**Did you know...**
that the Polilyte Pro has the HF resistant pH glass?

**Ordering Information**

<table>
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</table>

**Accessories**
- pH buffers see page 102
- Cables see page 108
- Housings see page 123

For more specifications see www.hamiltoncompany.com
Liq-Glass PG
EasyControl

The maintenance free Liq-Glass PG and the EasyControl sensors are entry level sensors for chemical or waste water applications and low process temperatures. They show good behavior in samples containing few ions, respectively low conductivity.

Benefits
- Suitable for low conductivity media
- Easy maintenance due to non-refillable electrolyte
- Liq-Glass PG has 3 ceramic diaphragms for reduced flow potentials

Did you know...
that the EasyControl is also available as ORP sensor?

Typical applications
- Wastewater applications
- Fish farming
- Ground water
- Swimming Pools

Specifications
- Measuring range
  - Liq-Glass PG: 1 to 12 pH
  - EasyControl: 0 to 14 pH
- Process temperature
  - Liq-Glass PG: -5 to 60 °C
  - EasyControl: 0 to 60 °C
- Pressure range (relative to ambient)
  - Liq-Glass PG: 0 to 2 bar
  - EasyControl: 0 to 2 bar
- pH glass
  - Liq-Glass PG: F
  - EasyControl: HF
- Electrolyte
  - Liq-Glass PG: Viscous 3 M KCl-LR
  - EasyControl: Gel electrolyte
- Reference system
  - Liq-Glass PG: Everef
  - EasyControl: Ag/AgCl
- Diaphragm
  - Ceramic
- O-ring
  - Liq-Glass: EPDM*
  - EasyControl: EPDM*

Ordering Information

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<td>EasyControl</td>
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</table>

Accessories
- pH buffers see page 102
- Cables see page 108
- Housings see page 123

For more specifications see www.hamiltoncompany.com
ORP (Oxidation Reduction Potential) is a common measurement in biochemistry, environmental chemistry and water quality. In the biochemical perspective, an oxidizing chemical pulls electrons away from the cell membrane which means it can be destabilized and leaky. The rapid death of a cell is the consequence of a destroyed membrane. The ORPs of natural systems like aerated surface water, rivers, lakes, rainwater and acid mine water usually have oxidizing conditions leading to positive potentials. Submerged soils, swamps and marine sediments, where air supply has its limitations, reducing conditions are the norm leading to negative potentials. For water system monitoring, the ORP value provides the operator with a rapid and single-value assessment of the disinfection potential of water in the postharvest system. This enables the operator to assess the activity of the applied disinfectant rather than the applied dose.

ORPs in aqueous solutions are determined by measuring the potential difference between an inert sensing electrode in contact with the solution and a stable reference electrode. The reference electrode is connected to the solution by a salt bridge. It has a known potential and is made of silver chloride or saturate calomel. Platinum is frequently used for the sensing electrode.

The Oxygen-Reduction Potential, also known as Redox Potential describes the tendency of a chemical species or a solution to acquire electrons and therefore to be reduced. Each species has its own reduction potential. It is measured in Volts (V) or mV.
The maintenance free Polilyte Plus ORP sensors are designed to withstand demanding applications in chemical and petrochemical industries. Monitoring the ORP value is becoming increasingly important in many applications, especially harsh chemical environments or high alkaline wastewater. Because of its Single Pore diaphragms you will never have liquid junction problems and total breakdowns. The Polilyte Plus ORP sensors demonstrate reliable reproducible measurement accuracy in highly alkaline solutions as well as in samples with low conductivity. Additionally, the Everef-L reference cartridge ensures a long lifetime.

### Benefits
- 2 Single Pores prevent clogging and ensure reliable measurements
- Minimal diffusion potential
- Highly reproducible measurements and very stable over a long period of time
- Resistant against solvents, strong acids and bases

### Typical applications
- Sugar industry
- Dye industry
- Industrial wastewater
- Paper industry

### Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<td>Measuring range</td>
<td>± 2000 mV (Arc: ± 1500 mV)</td>
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<tr>
<td>Process temperature</td>
<td>0 to 130 °C (Arc: analog 0 to 110 °C, digital 0 to 130 °C)</td>
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<td>Pressure range (relative to ambient)</td>
<td>0 to 3 bar (140 °C)</td>
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<td>0 to 10 bar (130 °C)</td>
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<td>0 to 16 bar (100 °C)</td>
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<td>Hygienic aspects</td>
<td>Autoclavable, CIP, SIP</td>
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<td>ORP element</td>
<td>Pt wire</td>
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<td>Electrolyte</td>
<td>Polisolve Plus</td>
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<td>Reference system</td>
<td>Everef-L</td>
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<td>Diaphragm</td>
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<td>O-ring</td>
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### Ordering Information

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### Accessories
- ORP buffers see page 103
- Cables see page 108
- Arc Accessories see page 112
- Housings see page 123

For more specifications see www.hamiltoncompany.com
EasyFerm Plus ORP

The EasyFerm Plus ORP sensors are designed to withstand demanding applications in pharmaceutical and chemical industries. It is supplied with a pre-pressurized electrolyte which prevents the diffusion of sample into the sensors. The Everef-F reference cartridge ensures that the Phermlyte reference electrolyte remains free of silver and precipitation. Measuring the ORP value is getting more and more important in the branches mentioned above.

**Benefits**
- Pre-pressurized reference electrolyte ensures a clog-free diaphragm
- Almost drift-free measurement
- Stable measurement signals after steam sterilization, autoclavage and CIP cleanings
- Large platinum ring

**Typical applications**
- Bioreactors
- Industrial processes
- Downstream processes

**Ordering Information**

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**Specifications**

- **Measuring range**: ± 2000 mV (Arc: ± 1500 mV)
- **Process temperature**: 0 to 140 °C (Arc: analog 0 to 110 °C, digital 0 to 140 °C)
- **Pressure range**: 0 to 6 bar (relative to ambient)
- **Hygienic aspects**: Autoclavable, CIP, SIP
- **ORP element**: Pt ring
- **Electrolyte**: Phermlyte
- **Reference system**: Everef-F
- **Diaphragm**: HP Coatramic
- **O-ring**: EPDM

For more specifications see www.hamiltoncompany.com
ChemoTrode ORP

The ChemoTrode ORP is the most robust sensor to measure the oxidation-reduction potential in demanding applications in pharmaceutical and chemical industries. The ChemoTrode ORP has a refill hole which allows refilling the electrolyte and pressurization of the reference electrolyte. Its Everef-F reference cartridge ensures that the reference electrolyte remains free of silver and precipitation of proteins.

Benefits
- Liquid electrolyte ensures fast response time and high precision
- Longer lifetime thanks to refillable electrolyte
- Everef-F reference cartridge extends electrode life in aggressive media

Typical applications
- Industrial processes
- Mining Industry
- Pulp and Paper industry
- Fermentations

Specifications
- Measuring range: ± 2000 mV
- Process temperature: 0 to 130 °C
- Pressure range: 0 to 6 bar (relative to ambient)
- ORP element: Pt ring
- Electrolyte: Viscous 3 M KCl-LR
- Reference system: Everef-F
- Diaphragm: HP Ceramic

Ordering Information

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For more specifications see www.hamiltoncompany.com

Accessories
- ORP buffers see page 103
- Cables see page 108
- Housings see page 123
OxyTrode Pt

The maintenance free OxyTrode Pt is an ORP sensor designed for processes in the chemical industry and for applications in wastewater treatment. Three high-performance ceramic diaphragms reduce the effect of flow potential in pipe mounting.

Did you know... that the OxyTrode Pt is the ORP version of the MecoTrode?

Benefits
- 3 high performance ceramic diaphragms for reduced flow potentials when mounted in pipes
- Platinum wire coil welded onto the glass

Typical applications
- Water and Wastewater
- Industrial processes

Ordering Information

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Accessories

- ORP buffers see page 103
- Cables see page 108
- Housings see page 123

Specifications

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<td>Pressure range</td>
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<td>(relative to ambient)</td>
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<td>Pt wire</td>
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For more specifications see www.hamiltoncompany.com
The maintenance free Polilyte RX and Polyplast Pro RX sensors are designed for ORP measurement in water applications and low conductivity samples, e.g. wastewater, fish farming, ground water, etc.

The Single Pore liquid junction guarantees best measurement results because of direct contact between the sample and the Polisolve electrolyte – clogging is nearly impossible. The Polyplast Pro sensor comes with a robust plastic shaft and glass bulb protection, making it one of our most economical and longest lasting sensors.

**Benefits**
- Single Pore for direct sample contact with Polisolve electrolyte
- No clogging
- Fast response even in low conductivity media
- Easy maintenance due to non refillable electrolyte

**Typical applications**
- Wastewater applications
- Fish farming
- Ground water

**Specifications**

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</table>

**Accessories**

- ORP buffers see page 103
- Cables see page 108
- Housings see page 123

For more specifications see www.hamiltoncompany.com
EasyControl ORP

The maintenance free EasyControl ORP is an entry level ORP sensor for chemical or wastewater applications and low process temperatures. It is also often used in swimming pools to control the disinfection with chlorine. They show also good behavior in samples containing few ions, with respectively low conductivity.

**Benefits**
- Suitable for low conductivity media
- Easy maintenance due to non refillable electrolyte

**Typical applications**
- Wastewater applications
- Fish farming
- Ground water
- Swimming Pools

**Specifications**
- Measuring range: ± 2000 mV
- Process temperature: 0 to 60 °C
- Pressure range (relative to ambient): 0 to 2 bar
- ORP element: Pt-wire
- Electrolyte: Gel electrolyte
- Reference system: Ag/AgCl
- Diaphragm: Ceramic
- O-ring: EPDM

**Accessories**
- ORP buffers: see page 103
- Cables: see page 108
- Housings: see page 123

For more specifications see www.hamiltoncompany.com
The electrical conductivity is important for the characterization of liquids in different kinds of processes. In aqueous solutions the conductivity is caused by the decomposition of dissolved acids, bases or salts into positive cations and negative anions. In ultra-pure water, where no ions, except very few $\text{H}_3\text{O}^+$ and $\text{OH}^-$, are present, the conductivity is extremely low. This intrinsic conductivity of water represents the lower border of the conductivity scale.

The electrical conductivity is determined by a resistivity measurement when an alternating voltage is applied to a measurement cell that consists of two or four electrodes. To compensate for the geometry of the conductivity cell a cell constant is used. This constant is either known or determined by means of conductivity standards.

Electrical conductivity is the reciprocal of electrical resistivity, and measures a material’s ability to conduct an electric current. Its SI unit is Siemens per meter ($\text{S/m}$). For the measurement of the conductivity of a solution it’s common to use $\mu\text{S/cm}$ or mS/cm.

<table>
<thead>
<tr>
<th>Segment / Application</th>
<th>Sensor</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIP station</td>
<td>Conducell I</td>
<td>Inductive</td>
</tr>
<tr>
<td>Bio Pharma</td>
<td>Conducell 4UxF</td>
<td>Varivent®</td>
</tr>
<tr>
<td>Chem Pharma</td>
<td>Conducell 4US</td>
<td>4 pole / wide measuring range</td>
</tr>
<tr>
<td>Brewery / Beverage</td>
<td>Conducell UPW</td>
<td>Various O-ring positions</td>
</tr>
<tr>
<td>UPW</td>
<td>Conducell 2DC</td>
<td>Triclamp</td>
</tr>
<tr>
<td>Waste Water</td>
<td></td>
<td>2 pole</td>
</tr>
</tbody>
</table>
Specifications

- **Measuring range**: 1 µS/cm to 300 mS/cm
- **Measurement Principle**: 4 pole contacting
- **Process temperature**: -20 to 150 °C (Arc: analog 0 to 110 °C, digital 0 to 140 °C)
- **Pressure range**: 0 to 20 bar (135 °C) 0 to 10 bar (150 °C)
- **Hygienic aspects**: Autoclavable, CIP, SIP
- **Cell constant**: 0.36/cm
- **Material of electrodes**:
  - S = Stainless steel 1.4435
  - H = Hastelloy C 2.4602
  - T = Titanium
  - Pt = Platinum
- **O-ring**: EPDM* (other versions available on request)

The Conducell 4UxF sensors are suited for measurements in hygienic applications. All wetted parts are FDA-approved, can be cleaned easily and withstand CIP cleanings and autoclavations. The sensors show a very good linearity over a broad measuring range. They are available with different process connections such as BioConnect® (BC) or Varivent®.

All plastic materials are compliant with the order EU 10/2011.

**Benefits**

- Very good linearity, especially for applications with sharp variations in conductivity
- All wetted parts are FDA-compliant
- Sensor is very easy to clean due to the forward facing, flush arrangement of electrodes
- Specifically designed for sterile applications in Pharma and Biotechnology (EHEDG)

**Typical applications**

- CIP station
- Water preparation

**Ordering Information**

<table>
<thead>
<tr>
<th>Code</th>
<th>Electrode Material</th>
<th>Code</th>
<th>Electrical Connector</th>
<th>Code</th>
<th>a-length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stainless Steel 1.4435</td>
<td>1</td>
<td>VP</td>
<td>1</td>
<td>120 (PG13,5)</td>
</tr>
<tr>
<td>2</td>
<td>Platinum (not for Triclamp)</td>
<td>2</td>
<td>225 (PG13,5)</td>
<td>2</td>
<td>225 (PG13,5)</td>
</tr>
<tr>
<td>3</td>
<td>Stainless Steel 2.4602</td>
<td>3</td>
<td>325 (PG13,5)</td>
<td>3</td>
<td>325 (PG13,5)</td>
</tr>
<tr>
<td>4</td>
<td>Titanium (not for Triclamp)</td>
<td>4</td>
<td>425 (PG13,5)</td>
<td>4</td>
<td>425 (PG13,5)</td>
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<tr>
<td>5</td>
<td></td>
<td>5</td>
<td>30 (PG13,5)</td>
<td>5</td>
<td>30 (PG13,5)</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>6</td>
<td>60 (PG13,5)</td>
<td>6</td>
<td>60 (PG13,5)</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>7</td>
<td>21 – Triclamp 1.5&quot;</td>
<td>7</td>
<td>21 – Triclamp 1.5&quot;</td>
</tr>
</tbody>
</table>

**Conducell 4USF-VV**

- a-length VP 6
- Code 237640

<table>
<thead>
<tr>
<th>Conducell 4USF-BC</th>
<th>a-length</th>
<th>VP 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>237650 (non Ex)</td>
<td></td>
</tr>
</tbody>
</table>
Hamilton’s single-use conductivity monitoring system is comprised of the reusable Arc Module Cond-P SU and a single-use sensor patch Conducell-P SU. The Conducell-P SU is integrated within the single-use container by the container manufacturer.

Unlike other single-use conductivity solutions, Hamilton’s reusable Arc Module enables a compact and cost-effective measurement solution without sacrificing accuracy or precision. A standard measuring loop consists of a sensor element (Conducell-P SU), which is connected directly to the electronic (Arc Module Cond-P SU) to enable disturbance free measurement signals.

**Benefits**
- Specially designed for sterile application in SU Pharma and Biotechnology
- Highly reliable measurements after gamma sterilization and dry storage even after short wet-in time (<30 min)
- Very low drift (<0.1 pH per week)
- Biocompatible materials (ISO 10993-5, USP <87> and USP Class VI)

**Did you know... that with the reusable Arc Module and the precalibrated sensor a ready-to-use system can be achieved?**

**Typical applications**
- Mixing bags for buffer preparation, virus inactivation or intermediate storage

**Specifications**
- Measuring range: 0.1 to 100 mS/cm
- Measurement Principle: 4 pole contacting
- Process temperature: 4 to 50 °C
- Pressure range (relative to ambient): 0 to 1 bar
- Hygienic aspects: Gamma irradiation up to 50 kGy (for the disposables)
- Cell constant: 1.31/cm
- Material of electrodes: Pt = Platinum

**Conductivity Standards**
see page 104

**Cables**
see page 108

**Accessories**

**Ordering Information**

<table>
<thead>
<tr>
<th>Arc Module Cond-P SU</th>
<th>Conducell-P SU*</th>
</tr>
</thead>
<tbody>
<tr>
<td>10071707</td>
<td>10076677</td>
</tr>
</tbody>
</table>

*Only for OEM integration available

For more specifications see www.hamiltoncompany.com

“Did you know... that with the reusable Arc Module and the precalibrated sensor a ready-to-use system can be achieved?”
Conducell 4US

The Conducell 4US 4-pole conductivity sensors are designed for different process connections such as TriClamp or G 1¼" with various O-ring positions.

The sensors show a very good linearity over a broad range of conductivities.

The Conducell 4US 4-pole sensor can easily be cleaned and is suitable for steam sterilization, autoclavation and CIP cleanings.

All plastic materials are compliant with the order EU 10/2011.

Benefits
- Very good linearity, especially for applications with wide variations in conductivity
- All wetted parts are FDA-compliant
- Sanitary: Sensor is easy to clean
- O-ring position can be chosen individually

Typical applications
- Fermentation
- Chemical industry

Specifications
- Measuring range: 0.1 µS/cm to 500 mS/cm
- Measurement Principle: 4 pole contacting
- O-ring position: 22 to 55 mm
- Process temperature: -20 to 135 °C
- Pressure range (relative to ambient): 0 to 6 bar
- Hygienic aspects: CIP, SIP
- Cell constant: 0.147/cm
- Material of electrodes: Stainless steel 1.4435
- O-ring: EPDM* (other versions available on request)

Ordering Information

Benefits
- Very good linearity, especially for applications with wide variations in conductivity
- All wetted parts are FDA-compliant
- Sanitary: Sensor is easy to clean
- O-ring position can be chosen individually

Typical applications
- Fermentation
- Chemical industry

Accessories
- Flow-through cell PEEK TC 1.5" Ref 237931
  This flow through cell made of FDA approved PEEK facilitates insertion of Conducell 4US-T150-50 in pipework.

Conductivity Standards see page 104
Safety Socket see page 150

Conducell 4US-G125 variable 237700-OP
Conducell 4US-T150-50 50 237750
Conducell 4US-T150-100 100 237760

For more specifications see www.hamiltoncompany.com
Conducell UPW

The Conducell UPW 2-pole conductivity sensors are designed for the use in liquids with very low conductivity, i.e. Ultra Pure Water, Pure Water and Water for Injection, particularly in the pharmaceutical and chemical industry.

Conducell UPW sensors are available with different process connections such as TriClamp 1.5", PG 13.5.

All plastic materials are compliant with the order EU 10/2011.

Did you know... that with Arc all the important information is stored in the sensor head?

Benefits
- Sanitary design: all wetted parts are FDA approved
- Easy cleanable
- Intelligence in the sensor: fully compensated measurement signals
- Easy handling due to user-friendly interface

Typical applications
- Ultra Pure Water
- Pure Water
- Water for Injection

Specifications
- Measuring range: 0.01 to 1500 µS/cm
- Measurement Principle: 2 pole contacting
- Process temperature: Arc: analog 0 to 110 °C, digital 0 to 130 °C
- Pressure range (relative to ambient): 0 to 10 bar (130 °C)
- Hygienic aspects: Autoclavable, CIP, SIP
- Cell constant: < 0.1/cm
- Material of electrodes: Stainless Steel DIN 1.4435
- Surface quality: Ra < 0.4 μm (N5)
- O-ring: EPDM* (other versions available on request)

Ordering Information

<table>
<thead>
<tr>
<th>a-length</th>
<th>VP6</th>
<th>Arc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducell UPW PG 13.5</td>
<td>120</td>
<td>243640</td>
</tr>
<tr>
<td>Conducell UPW TC 1.5&quot;</td>
<td>87</td>
<td>–</td>
</tr>
</tbody>
</table>

Accessories
- UPW Simulator Ref 243580
  Traceable resistor to verify the Arc module acc. to USP <645>
- Conductivity Standards see page 104
- Cables see page 108
- Arc Accessories see page 112
- Housings see page 123

For more specifications see www.hamiltoncompany.com
Conducell 2DC-PG

The Conducell 2DC sensor is constructed in a simple way and is best suited for measurements in clean solutions and non-critical applications. Contaminants, such as lime, will affect the measurement.

**Benefits**
- 2 large graphite electrodes for stable measurements
- Mechanically-stable plastic shaft
- Easily cleanable

**Typical applications**
- Water and Wastewater

**Ordering Information**

<table>
<thead>
<tr>
<th>Product</th>
<th>a-length</th>
<th>5 m fix cable</th>
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</thead>
<tbody>
<tr>
<td>Conducell 2DC-PG 120</td>
<td>120</td>
<td>237610</td>
</tr>
</tbody>
</table>

**Specifications**

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>10 µS/cm to 20 mS/cm</td>
</tr>
<tr>
<td>Measurement Principle</td>
<td>2 pole contacting</td>
</tr>
<tr>
<td>Process temperature</td>
<td>-5 to 80 °C</td>
</tr>
<tr>
<td>Pressure range</td>
<td>0 to 6 bar (relative to ambient)</td>
</tr>
<tr>
<td>Cell constant</td>
<td>1/cm</td>
</tr>
<tr>
<td>Material of electrodes</td>
<td>Graphite</td>
</tr>
<tr>
<td>O-ring</td>
<td>EPDM* (other versions available on request)</td>
</tr>
</tbody>
</table>

For more specifications see www.hamiltoncompany.com

**Accessories**

- **Conductivity Standards** see page 104
- **Housings** see page 123
The inductive conductivity cell Conducell I is specifically designed for use in demanding applications in beverage and pharmaceutical industries and in biotechnology. Thanks to its food-grade PEEK body and its hygienic design it meets the demands of these industries.

Benefits
- Unique hygienic design, therefore no risk of contamination
- Made from non-corrosive materials which is good for acids and bases
- Fast temperature response time t90 under 26 s enable safe and efficient phase separations
- Insensitive to electrode soiling and polarization thanks to electrodeless, inductive measuring principle.

Typical applications
- Phase separation
- Control of CIP (cleaning in place)
- Leakage monitoring

Specifications
- Measuring range: 100 µS/cm to 2000 mS/cm (uncompensated)
- Measurement Principle: Inductive
- Process temperature: -10 to 125 °C
- Pressure range: 0 to 8 bar (125 °C), 0 to 12 bar (90 °C)
- Hygienic aspects: CIP, SIP
- Cell constant: 6.3/cm
- Wetted Parts*: PEEK (USP class VI, EU 10/2011)

Accessories

For more specifications see www.hamiltoncompany.com
Biological processes are increasingly important in biotechnical and pharmaceutical industries. The variability of living organisms is often very high, making the culture process difficult to standardize. Extensive process optimization and control are required for stable cell cultures, fermentations and improved yield. Today bioprocess development relies on labor intensive sampling and offline measurements that also lack the necessary granularity to fully optimize the yield. The available on-line measurements of pH and dissolved oxygen are not linked to the cell status and characteristics.

On-line monitoring of cell density provides the continuous information necessary to optimize control and yield beyond what is possible off-line. Hamilton now offers sensors for continuous cell density measurement. The Incyte Arc permittivity sensor delivers information on viable cell density whereas the Dencytee sensor measures total cell density via turbidity. In combination with our advanced Arc pH and dissolved oxygen probes, permittivity and turbidity sensors provide all relevant information on the process of mammalian, yeast and high density bacteria cultures. This enables better understanding and control.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Application</th>
<th>Sensor</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>BioPharma</td>
<td>Cell Culture</td>
<td>Incyte</td>
<td>VCD (Viable Cell Density)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Insensitiv to micro-carrier / cell debris</td>
</tr>
<tr>
<td>Brewery</td>
<td>Yeast</td>
<td>Dencytee</td>
<td>TCD (Total Cell Density)</td>
</tr>
<tr>
<td></td>
<td>Bacteria</td>
<td></td>
<td>Low density fermentation</td>
</tr>
</tbody>
</table>
Viable Cell Density Measurements in real-time provide actionable data to automate process control. This is not possible by relying on off-line measurements, which only provide a window into the past.

Incyte Arc is Hamilton’s next-generation viable cell density sensor, offering high-fidelity permittivity measurements comes now paired with integrated microtransmitters that leverage ArcAir technology. It comes in two versions Incyte Arc providing the (correlated) permittivity and Expert holding advanced measurements for deeper process analysis and improved correlation.

**Did you know...** Incyte Arc is now part of the Hamilton Arc family providing a digital Arc Modbus signal directly from the sensor?

### Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring Range</td>
<td>5 x 10⁵ to 8 x 10⁹ cells/mL (Mammalian)</td>
</tr>
<tr>
<td>Conductivity range</td>
<td>1 to 80 mS/cm</td>
</tr>
<tr>
<td>Measuring principle</td>
<td>Permittivity</td>
</tr>
<tr>
<td>Process temperature</td>
<td>0 to 60 °C</td>
</tr>
<tr>
<td>Pressure range</td>
<td>0 to 12 bar</td>
</tr>
<tr>
<td>Hygienic aspects</td>
<td>Autoclavable, CIP, SIP</td>
</tr>
<tr>
<td>O-ring</td>
<td>EPDM*</td>
</tr>
</tbody>
</table>

### Ordering Information

<table>
<thead>
<tr>
<th>Length</th>
<th>Arc Code</th>
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</thead>
<tbody>
<tr>
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<td>242950-0213</td>
</tr>
<tr>
<td>420</td>
<td>242950-0214</td>
</tr>
</tbody>
</table>

### Benefits

- Specific for viable cells
- Suitable for cell culture
- Insensitive to microcarriers and cell debris
- No more hidden events
- Optimization of feeding strategy and yield

### Typical applications

- Eucaryotic cells
- Viability prediction possible

### Accessories

- Conductivity Standard 12880 µS/cm
  Ref 243580
- Cables see page 108
- Arc Accessories see page 112
- Housings see page 123

For more specifications see www.hamiltoncompany.com
Accurately analyzing the characteristics of viable cells during bioprocess is crucial. Only viable and healthy cells are producing the product of interest. Today these characteristics are monitored by labor intensive offline samplings.

Analyzing cell characteristics online provides deep insight into the bioprocess. It allows stable process control, fast optimization and reduces the risk of sampling errors. The Incyte SU sensor is especially designed for measuring viable cells during mammalian cell culture, yeast and high density bacterial fermentation.

The measurement principle of Incyte sensors is based on permittivity. Viable cells behave like little capacitors and their polarization and depolarization in an alternating electrical field is measured. This signal can be correlated to the viable cell density. This method is insensitive to cell debris and microcarriers because only viable cells can be polarized.

A measuring Unit consists of an sensor element (Incyte-P SU) and an electronic (Arc Module Incyte-P SU), which converts the analog measurement to a stable digital signal.

**Benefits**
- Specific for viable cells
- Suitable for cell culture and fermentation
- Insensitive to microcarriers and cell debris
- No more hidden events
- Optimization of feeding strategy and yield
- Biocompatible materials (ISO 10993-5, USP <87> and USP class VI)

**Typical applications**
- Eucaryotic cells
- High density yeast fermentation
- High density bacteria fermentation

**Did you know...** that Hamilton is the only provider of all relevant parameters in single use and re-usable technology for cell culture & fermentations: viable cell density, pH and DO².

**Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring Range</td>
<td>5 x 10⁵ to 8 x 10⁹ cells/mL</td>
</tr>
<tr>
<td>(Mammalian)</td>
<td></td>
</tr>
<tr>
<td>Conductivity range</td>
<td>1 to 50 mS/cm</td>
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<tr>
<td>Measuring principle</td>
<td>Permittivity</td>
</tr>
<tr>
<td>Process temperature</td>
<td>4 to 50 °C</td>
</tr>
<tr>
<td>Pressure range (relative to ambient)</td>
<td>0 to 1 bar</td>
</tr>
<tr>
<td>Hygienic aspects</td>
<td>Gamma irradiation up to 50 kGy (for the disposables)</td>
</tr>
<tr>
<td>Material of electrodes</td>
<td>Platinum</td>
</tr>
</tbody>
</table>

**Ordering Information**

- **Arc Module Incyte-P SU**
  - 10073158
- **Incyte-P SU**
  - 10076676

*Only for OEM integration available

For more specifications see www.hamiltoncompany.com
Accurately analyzing the characteristics of viable cells during bioprocess is crucial. Only viable and healthy cells are producing the product of interest. Today these characteristics are monitored by labor intensive offline samplings.

Analyzing cell characteristics online provides deep insight into the bioprocess. It allows stable process control, fast optimization and reduces the risk of sampling errors. The Incyte sensor is especially designed for measuring viable cells during mammalian cell culture, yeast and high density bacterial fermentation.

The measurement principle of Incyte sensors is based on permittivity. Viable cells behave like little capacitors and their polarization and depolarization in an alternating electrical field is measured. This signal can be correlated to the viable cell density. This method is insensitive to cell debris and microcarriers because only viable cells can be polarized.

A measuring Unit consists of an Incyte sensor and a pre-amplifier, which converts the analog measurement to a stable digital signal. This unit has to be connected to the Arc View Controller, equipped with a required Incyte and optional Incyte scan license.

**Did you know... that Hamilton is the only provider of all relevant parameters for cell cultures & fermentations: viable cell density, pH and DO?**

Benefits
- Specific for viable cells
- Suitable for cell culture and fermentation
- Insensitive to microcarriers and cell debris
- No more hidden events
- Optimization of feeding strategy and yield

Typical applications
- Eucaryotic cells
- High density yeast fermentation
- High density bacteria fermentation

Did you know... that Hamilton is the only provider of all relevant parameters for cell cultures & fermentations: viable cell density, pH and DO?
Accurate cell growth analysis during bioprocesses is essential. The Dencytee sensor is especially designed for monitoring total cell density during low density bacterial fermentation, as well as yeast and mammal cell cultivation.

As soon as the required amount of cells is reached, bio-production and analysis can begin. Monitoring total cell density requires offline sampling and analysis, which leads to delayed result information. By measuring this parameter online the cell growth rate can be determined quickly and accurately without the loss of any information. Dencytee sensors are based on optical density respectively the turbidity of a suspension at NIR (near-infra red) wavelengths. All particles and molecules that scatter the NIR light will be detected and can be correlated to the total cell density. The sensor keeps the light intensity at the detector constant, which leads to a broader measuring range.

A measuring Unit consists of a Dencytee sensor, available in different lengths, and a pre-amplifier. This unit has to be connected to the Arc View Controller, equipped with a required Dencytee license.

---

**Dencytee**

Accurate cell growth analysis during bioprocesses is essential. The Dencytee sensor is especially designed for monitoring total cell density during low density bacterial fermentation, as well as yeast and mammal cell cultivation.

As soon as the required amount of cells is reached, bio-production and analysis can begin. Monitoring total cell density requires offline sampling and analysis, which leads to delayed result information. By measuring this parameter online the cell growth rate can be determined quickly and accurately without the loss of any information. Dencytee sensors are based on optical density respectively the turbidity of a suspension at NIR (near-infra red) wavelengths. All particles and molecules that scatter the NIR light will be detected and can be correlated to the total cell density. The sensor keeps the light intensity at the detector constant, which leads to a broader measuring range.

A measuring Unit consists of a Dencytee sensor, available in different lengths, and a pre-amplifier. This unit has to be connected to the Arc View Controller, equipped with a required Dencytee license.

---

**Did you know... that Dencytee is the only optical density sensor that works with a constant light intensity at the detector?**

---

**Benefits**

- Wide linear measuring range
- LED provides long lifetime

---

**Typical applications**

- Low density fermentation

---

**Specifications**

- **Measuring Range**
  - 10⁹ to 7 x 10⁸ cells/mL (Mammalian)
  - 0.5 to 100 g/L dry weight (fermentation)
- **Optical density**
  - 880 nm to 2500
- **Measuring principle**
  - Optical density, Near Infrared (NIR, 880 nm)
- **Process temperature**
  - 0 to 80 °C
- **Pressure range**
  - 0 to 10 bar (25 °C)
- **Hygienic aspects**
  - Autoclavable, CIP, SIP
- **Optical window**
  - Sapphire glass
- **Optical path length**
  - 5 mm
- **O-ring**
  - EPDM

---

**Ordering Information**

<table>
<thead>
<tr>
<th>a-length</th>
<th>Unit**</th>
<th>Replacement Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dencytee 120</td>
<td>243755</td>
<td>243750</td>
</tr>
<tr>
<td>Dencytee 225</td>
<td>243756</td>
<td>243751</td>
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<tr>
<td>Dencytee 325</td>
<td>243757</td>
<td>243752</td>
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<tr>
<td>Dencytee 425</td>
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<td>243753</td>
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</tbody>
</table>

**Accessories**

- Val/Cal Solution Dencytee Ref 243896
- Dencytee Pre-Amp Ref 243760
- 10 m cable M12/M12 Ref 243871
- 20 m cable M12/M12 Ref 243872
- 5 m cable M12/M12 Ref 243870
- 40 m cable M12/M12 Ref 243873

For more specifications see [www.hamiltoncompany.com](http://www.hamiltoncompany.com)
In order to understand a biological process, all relevant parameters must be plotted on a graph to be interpreted. This is done manually after ending a process run or continuously with a process control system.

It is now possible to display all relevant parameters of a bioprocess simultaneously on a screen and directly at the fermenter. The Arc View Controller, ComBox, and Cell Density Integration Kit (CDIK) are specifically designed for viable and total cell density measurements and supports Hamilton’s wireless Arc-technology to graph and record pH and DO measurements. This allows process analysis directly on site.

The Controller stores the calibration and recorded data of the Incyte and Dencytee units. When the recorded data of the connected units is displayed, errors or failures will be detected, reported and an alarm initiated. A software license is required for the use of the specific Controller for Incyte and Dencytee; an additional license will also be needed if options such as the Incyte Scan or OPC are selected.

The ComBox is a compact alternative to the Arc View Controller and is designed to easily fit minimal space requirements. It is operated by a simple connection to an existing computer. The Cell Density Integration Kit is designed to allow easy integration into skid fermenter controllers or production cabinets.

With the Arc Wi adapter, to the Arc wireless converter connected to the Controller. The Arc View Controller is available with 2 or 4 wired input channels for cell density, and additionally two inputs of Arc sensors for every wired channel. Two screen sizes are available and data output can be Modbus, OPC or 4-20 mA (AUX).

The ComBox is a compact alternative to the Arc View Controller and is designed to easily fit minimal space requirements. It is operated by a simple connection to an existing computer. The Cell Density Integration Kit is designed to allow easy integration into skid fermenter controllers or production cabinets.

### Benefits

- All relevant parameters for cell culture and fermentation can be shown at once.
- Various different outputs ensure compatibility to process control systems.
- Immediate automatic re-start after power failure ensures minimum loss of data.
- Data of several runs can be stored and copied on a USB stick.
- Different licenses for different customers’ needs.

### Specifications

<table>
<thead>
<tr>
<th>Measured variable</th>
<th>Conductivity, permittivity, optical density</th>
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<tr>
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<td>Viable cell density, total cell density</td>
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<td>Analog output</td>
<td>AUX to Analog Output Box 4-20 mA</td>
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<tr>
<td>Digital outputs</td>
<td>Modbus RTU (RS485), Ethernet RJ45 (OPC XML-DA)</td>
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<td>Digital inputs</td>
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</tr>
<tr>
<td>Dimensions (W x D x H)</td>
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<td>Operating humidity</td>
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<td>Ambient temperature</td>
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<td>Power supply</td>
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### Accessories

- **Incyte License** Ref 243822
- **Incyte Scan License** Ref 243823
- **Dencytee License** Ref 243824
- **OPC License** Ref 243820

### Ordering Information

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For more specifications see [www.hamiltoncompany.com](http://www.hamiltoncompany.com)
The partial pressure of dissolved oxygen (DO) plays an important role in many biological, chemical and physical processes. Respiration in a lung or a leaf depends on the differences of the partial pressure as well as fermentation of substrates by yeast or bacteria. The amount of dissolved oxygen is also important for the safety and the quality of many other industrial processes.

The most common technologies to measure DO are the classical amperometric and the modern optical method. Classical amperometric Clark cells, where cathode and anode are separated from the sample by a gas permeable membrane, generate an electrical current proportional to the oxygen partial pressure of dissolved oxygen. The oxygen is reduced in the sensor, catalyzed by an electrolyte at a platinum cathode. At the anode silver is oxidized. In contrast to the Clark cells the optical measurement is based on the luminescence of a luminophore that absorbs photons and releases a part of the absorbed energy by emission of photons with a higher wavelength. Oxygen quenches this process by transferring the energy partially by collision. The more oxygen present the more quenching is observed. Hamilton measures the phase shift between excitation and emission across a population of light pulses in order to achieve the highest accuracy and widest operating range. The difference in the intensity of both waves is used for online sensor diagnostics.

The table shows the different sensors and their features in various segments and applications.
The VisiFerm DO is the first optical oxygen sensor with integrated opto-electronics, having the full functionality of a measuring device with self-diagnostics. It is steam sterilizable, autoclavable and CIP compatible. The VisiFerm requires less maintenance than a classical oxygen sensor as it does not have a mechanically sensitive membrane or a corrosive electrolyte.

**Benefits**
- No fragile membrane – with a solid sensor cap
- No polarization time required
- Instantly stable values, low drift, quick response
- Electrolyte-free, so no leakage
- Convenient precalibration in the laboratory, because data is stored in the sensor head

**Typical applications**
- Ethanologenic fermentation
- Biotechnological fermentation
- Brewery fermentation, filtration, filling
- Proactive corrosion control in HVAC systems

Did you know... that Hamilton invented the first optical DO sensor in 12 mm format?

**Ordering Information**

**VisiFerm DO Family Structure**

<table>
<thead>
<tr>
<th>Code</th>
<th>Interface</th>
<th>Code</th>
<th>a-length (mm)</th>
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<tr>
<td>24366</td>
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<tr>
<td></td>
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</table>

**Code | ODO Cap**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>H0</td>
</tr>
<tr>
<td>2</td>
<td>H2</td>
</tr>
</tbody>
</table>

**Specifications**
- **Measuring range**: 4 ppb to 25 ppm (DO)
- **Measurement Principle**: Oxygen dependent luminescence quenching
- **Response time t 98%**: < 30 s at 25 °C, from air to nitrogen
- **Process temperature**: -10 to 140 °C, the sensor provides no DO reading above 85 °C
- **Operating voltage**: 7 to 30 VDC max., 1 W
- **Pressure range**: -1 to 12 bar
- **Hygienic aspects**: Autoclavable, CIP, SIP
- **Surface Quality**: Ra < 0.4 μm (N5)
- **Material**: Stainless steel 1.4435
- **O-ring**: EPDM*

“Did you know... that Hamilton invented the first optical DO sensor in 12 mm format?”

For more specifications see www.hamiltoncompany.com

**Accessories**
- **ODO Cap H0**: For general application in biotechnology, water treatment and monitoring as well as in breweries, wineries and soft drink processing.
- **ODO Cap H2**: The ODO Cap H2 is designed for fermentation processes where sterilization in place (SIP) is performed in media containing higher amounts of lipophilic compounds. It comes with a hygienic design.

For more information, please visit page 83.
Hamilton's single-use dissolved oxygen monitoring system is comprised of the reusable VisiFerm DO SU and a single-use optical dissolved oxygen sensor cap. The cap is integrated with the single-use container by the container manufacturer.

Hamilton’s reusable sensor element enables a compact and cost-effective measurement solution without sacrificing accuracy or precision. A standard measuring loop consists of a sensor element, which is connected to the VisiFerm DO SU.

**Did you know... that Hamilton invented the first optical DO sensor in 12 mm format?**

**Benefits**
- Specially designed for sterile application in SU Pharma and Biotechnology
- Highly reliable measurements after gamma sterilization and dry storage even after short wet-in time (<30 min)
- Very low drift
- Biocompatible material (ISO 10993-5, USP <87> and USP Class VI)

**Typical applications**
- SU bioreactors (bag application)
- SU bioreactors (rigid containers)
- SU mixer fill and finish application

**Ordering Information**

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*Only for OEM integration available*

**Specifications**
- Measuring range: 4 ppb to 25 ppm (DO)
- Measurement Principle: Oxygen dependent luminescence quenching
- Response time t98%: < 30 s at 25 °C, from air to nitrogen
- Process temperature: 4 to 50 °C
- Operating voltage: 7 to 30 VDC max. 1 W
- Hygienic aspects: Gamma irradiation up to 50 kGy (for the disposables)
- O-ring: EPDM*

For more specifications see www.hamiltoncompany.com
### VisiFerm mA Family

The VisiFerm mA is the optical dissolved oxygen (DO) sensor for use in explosive environments. VisiFerm mA optical technology improves the measuring performance and simplifies maintenance. Improvements compared to conventional electrochemical (amperometric) sensors include flow independence, rapid startup with no polarization time, and simplified maintenance.

Designed especially for production environments, the new VisiFerm mA is a 2-wire sensor with 4-20 mA standard or digital HART signal output, and ATEX approval. The new VisiFerm mA mitigates the negative effects of aging, temperature, and photobleaching in order to reduce the frequency of calibration and deviation reports.

**Did you know... that Hamilton invented the first optical DO sensor in 12 mm format?**

### Benefits

- Reliable and robust optical measurement in hazardous environments
- Longer cap and sensor life
- Less frequent calibrations
- Easy installation with 2-wire connection
- Direct analog 4-20 mA or digital HART communication
- Calibration, verification, and maintenance data accessible via ArcAir app

### Typical applications

- ATEX environment
- Fermentation
- Wort aeration in breweries

### Ordering Information

#### VisiFerm mA Family Structure

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**The VisiFerm mA 225 have, in reality, a shaft length of 215 mm. This ensures optimal rinsing in retractable armatures, such as Retractex.**

### Specifications

- **Measuring range**: 4 ppb to 25 ppm (DO)
- **Measurement Principle**: Oxygen dependent luminescence quenching
- **Response time**: < 30 s at 25 °C, from air to nitrogen
- **Process temperature**: -20 to 140 °C, the sensor provides no DO reading above 85 °C
- **Operating voltage**: 7 to 30 VDC max. 1 W
- **Pressure range**: -1 to 12 bar
- **Hygienic aspects**: Autoclavable, CIP, SIP
- **Surface Quality**: Ra < 0.4 μm (N5)
- **Material**: Stainless steel 1.4435
- **O-ring**: EPDM

### Accessories

- **ODO Cap H3** Kit: Ref 10068400
- **ODO Cap H4** Kit: Ref 10078261

### Cables

See page 108

### Housings

See page 123

For more specifications see www.hamiltoncompany.com
The VisiTrace mA is designed to measure dissolved oxygen in the low ppb ranges in brewing applications, notably during filtration, and filling. In addition, the special designed ODO Cap L0 for breweries is stabilized against standard disinfectant solution with active chlorine and chlorine dioxide. This is powerful during measurements in breweries, which may not allow for calibration after every CIP.

With the transmitter integrated, the intelligent VisiTrace mA sensor provides more reliable measurements directly to your process control system via the 4-20 mA output. The also integrated Bluetooth 5 wireless interface may be used for monitoring, configuration and calibration, and saves time without compromising quality.

**Did you know... that the VisiTrace mA is the only optical DO sensor that withstands chlorine and chlorine dioxide for a long time?**

**Benefits**
- For measurements from 0 to 2000 ppb
- Stable against chlorine and chlorine dioxide
- Rapid start-up with no polarization
- Flow and CO2 independent readings
- Robust design for high flow rates

**Typical applications**
- Breweries
- Power Plants

**Ordering Information**

**VisiTrace mA Family Structure**

<table>
<thead>
<tr>
<th>Code</th>
<th>Interface</th>
<th>Code</th>
<th>Code</th>
<th>Code</th>
<th>Code</th>
<th>ODO Cap</th>
<th>Wetted Parts</th>
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**ODO Cap L0**
The LO cap is designed for trace level measurements of dissolved oxygen in breweries, water de-aeration and power plants.

**Accessories**
- ODO Cap L0 Kit  Ref 243530
- Calibration station Ref 243575
- Housings see page 123

For more specifications see www.hamiltoncompany.com
The VisiWater DO P is an optical dissolved oxygen sensor designed for applications in water, wastewater, fish farming, lakes, and rivers. Its robust plastic shaft is ideal for these applications. The optical measurement technology ensures fast response time and minimum maintenance without polarization time. Like for all optical DO sensors the only spare part is the cap, which is easy and quickly replaceable.

The output signals 4-20 mA or Modbus can easily be integrated into process control systems (PCS). Calibration and configuration can be done via the PCS or ArcAir Desktop version with the help of the USB RS485 Modbus Converter.

**Specifications**

- Measuring range: 0 to 24 ppm (DO)
- Response time $t_{98\%}$ < 60 s at 20 °C, from air to nitrogen
- Process temperature: 0 to 60 °C
- Pressure range: -1 to 12 bar
- Material: Shaft: PVC-U, Cap: PPA

**Features**

- Simple and low maintenance
- Robust design
- Outdoor use incl. submersion

**Benefits**

- Water and Wastewater
- Fish farming

**Ordering Information**

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**Accessories**

- ODO Cap H2O Ref 243536
- Junction Box Ref 10067282

For more specifications see www.hamiltoncompany.com
**OxyFerm FDA**

The OxyFerm FDA is an electrochemical oxygen sensor suited for applications with high demands for hygiene, e.g. in pharmaceutical industry, in biotechnology, and in food & beverage production. It is available with 12 mm or 25 mm (XL) shaft diameter.

The sensor is equipped with an FDA-approved membrane for use in hygienic processes. It withstands steam sterilization, autoclavation and CIP cleanings.

**Specifications**

- **Measuring range:** 10 ppb to 40 ppm (DO)
- **Response time t 98%** < 60 s at 25 °C, from air to nitrogen
- **Process temperature**
  - 0 to 130 °C (Arc: analog 0 to 110 °C, digital 0 to 130 °C)
- **Pressure range** (relative to ambient)
  - 0 to 4 bar
- **Hygienic aspects:** Autoclavable, CIP, SIP
- **Electrolyte:** Oxylyte
- **Surface Quality Ra < 0.4 μm (N5)**
- **Current in air at 25°C** 40 to 80 nA
- **Material:** Stainless steel 1.4435
- **Polarization voltage** -670 mV
- **O-ring:** EPDM

**Benefits**

- Sanitary Feature: The silicone membrane seals without a gap to steel membrane body (no additional o-ring)
- Little drift, fast response, short polarization time
- Replacing the cathode is possible and very simple to perform.

**Typical applications**

- ATEX environment
- Fermentation

**Ordering Information**

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*With the XL option, the o-ring position can be optimally matched to the weld-in socket from 22 to 55mm. Please state the OP you need when ordering.*

**Accessories**

- Membrane Kit FDA Ref 237140
- Membrane Kit CIP Ref 237126
- Membrane Kit Ref 237123
- Oxylyte 30 mL Ref 237116
- Replacement Cathode OxyFerm Ref 237300
- Autoclavation Cap Oxyferm Ref 242000
- Polarization Module G Ref 237390
- Polarization Module T Ref 237370

**For more specifications see www.hamiltoncompany.com**
Specifications

- Measuring range: 8 ppb to 40 ppm (DO)
- Response time t98% < 60 s at 25 °C, from air to nitrogen
- Process temperature: 0 to 100 °C
- Pressure range: 0 to 12 bar (relative to ambient)
- Hygienic aspects: CIP
- Electrolyte: Oxylyte B
- Surface Quality: Ra < 0.4 μm (N5)
- Current in air at 25°C: 180 to 500 nA
- Material: Stainless steel 1.4435
- Polarization voltage: 0 mV
- O-ring: EPDM*

The OxyGold B is an electrochemical oxygen sensor especially designed for applications which contain carbon dioxide like the production of beer, sparkling wine or soft drinks. The sensor is not affected by acidic gases.

Apart from the production of sparkling beverages, the OxyGold B can be used in all production processes where CO² might be an issue for electrochemical sensors.

**Did you know... that the OxyGold B is the only sensor in the market with a polarization voltage of 0 mV?**

Benefits

- No cross-sensitivity with CO₂
- Only very little flow required
- Pressure and CIP resistant
- Replacing the cathode is possible and very simple to perform.

Typical applications

- CO₂ recovery
- Water de-aeration

Did you know...

Did you know...

Ordering Information

<table>
<thead>
<tr>
<th>a-length</th>
<th>VP 6</th>
<th>Arc</th>
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<tbody>
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</table>

**See VisiTrace sensor, page 88**

Accessories

- OxyGold Membrane Kit: Ref 237135
- Oxylyte B 30 mL: Ref 237138
- Polarization Module B: Ref 237360
- Replacement Cathode OxyGold B: Ref 237437

Cables: see page 108
Housings: see page 123

For more specifications see www.hamiltoncompany.com
The OxyGold G is an electrochemical oxygen sensor designed for processes in which very small amounts of oxygen have to be traced, like in the pharmaceutical or microelectronics industry. It is also suitable for processes where high pressures are applied.

Benefits
- Trace level measurement
- Suitable for use at high temperatures and high pressures during sterilization and CIP
- Little flow sensitivity
- Replacing the cathode is possible and very simple to perform.

Typical applications
- Boiler Feed Water
- Microelectronics

Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Value</th>
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<td>Process temperature</td>
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<td>Electrolyte</td>
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<td>Surface Quality</td>
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<td>O-ring</td>
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The OxyGold G is an electrochemical oxygen sensor designed for processes in which very small amounts of oxygen have to be traced, like in the pharmaceutical or microelectronics industry. It is also suitable for processes where high pressures are applied.

Benefits
- Trace level measurement
- Suitable for use at high temperatures and high pressures during sterilization and CIP
- Little flow sensitivity
- Replacing the cathode is possible and very simple to perform.

Typical applications
- Boiler Feed Water
- Microelectronics

For more specifications see [www.hamiltoncompany.com](http://www.hamiltoncompany.com).

### Ordering Information

<table>
<thead>
<tr>
<th>OxyGold G</th>
<th>a-length</th>
<th>VP 6</th>
<th>Arc</th>
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</tr>
<tr>
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</tr>
</tbody>
</table>

### Accessories

- **OxyGold Membrane Kit** Ref 237135
- **Oxylyte G 30 mL** Ref 237139
- **Polarization Module G** Ref 237350
- **Replacement Cathode OxyGold G** Ref 237427

Cables see page 108
Arc Accessories see page 112
Housings see page 123
The Oxysens is an electrochemical oxygen sensor designed for applications in water, e.g. wastewater treatment, swimming pools or fish farms. It is easy to maintain, because the membrane and the electrolyte do not need to be replaced.

The response time of the Oxysens is fast, it is almost independent to flow and insensitive to soiling.

**Benefits**
- Maintenance-free DO sensor, no change of membrane or electrolyte
- Robust design
- Insensitive to soiling
- Short polarization and response times

**Typical applications**
- Water and Wastewater
- Fish farming

**Specifications**
- **Measuring range**: 40 ppb to 40 ppm (DO)
- **Response time**: \( t_{98\%} < 60 \text{ s at } 25 \degree \text{C, from air to nitrogen} \)
- **Process temperature**: 0 to 60 \degree \text{C}
- **Pressure range**: 0 to 4 bar (relative to ambient)
- **Electrolyte**: Oxylyte
- **Surface Quality**: Ra < 0.8 \mu m (N6)
- **Current in air at 25\degree \text{C}**: 40 to 80 nA
- **Material**: Stainless steel 1.4435
- **Polarization voltage**: -670 mV
- **O-ring**: EPDM

**Ordering Information**
- **Oxysens**
  - a-length: 120
  - 5 m fix cable: 237150

**Accessories**
- **Immersing Set**: Ref 237158
  - The Immersing Set sheaths and protects 120 mm sensors such as Oxysens while immersed in streams or channels.

For more specifications see www.hamiltoncompany.com
Born with a Purpose

Beverly is designed for at-line and laboratory use in small and midsize breweries as well as in the beverage industry to provide excellent reliability in a rugged design, and purpose built to handle the environmental extremes encountered in everyday brewing operations. Superior performance at an affordable price is achieved using Hamilton’s best in class optical sensor VisiFerm DO with built-in intelligence, making Beverly the brewer’s best friend.

Portable DO Measurement

Measure DO in the bottle or can

Beverly can be used as shown in the pictures and even beyond. An additional application is to check the oxygen content of the exhaust gas of vessels while flushing with CO2 after cleaning and prior to filling. Measuring the oxygen at this point can help to save time and CO2. Even if Beverly stays connected to a pipe or a vessel while CIP is running it’s robust stainless steel flow cell prevents damage.

Measure DO during or after filtration

Check DO of bright beer tank prior to bottling

Benefits

- Efficiency and serviceability bred from VisiFerm DO optical sensors
- Built to endure IP 67 watertight standards
- Stamina for 50 hours of continuous operation
- Fast response time down to ppb level
- Calibration without removing the sensor

Specifications

- Operating temperature range: 0 to 80 °C (media)
- Operating pressure range: 0 to 10 bar
- Dimensions (B x W x H): 222 x 142 x 322 mm
- Ø O.D. Barbed hose fittings: 8 mm
- Weight: 4.7 kg
- Protection rate: IP67
- Battery: 50 h (continuous operation)
- Measuring range: 4 ppb to 25 ppm (DO)
- Accuracy at 25 °C: 1 ± 0.05%-vol: 21± 0.2%-vol
- Measurement principle: Oxygen dependent luminescence quenching
- Response time t 98% < 30 s at 25 °C, from air to nitrogen

Ordering Information

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</thead>
<tbody>
<tr>
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</table>

For more specifications see www.hamiltoncompany.com

Accessories

- VisiFerm DO Ref 243666-211
- ODO Cap Kit H0 Ref 243515
- Hoses Ref 817134
- Power supply Ref 817804
- Torx screwdriver Ref 817145
Buffer Solutions you can Trust

All calibration procedures assume that the labeled values of the calibration buffers are correct. But buffer values can change over time and so can your results. A complete range of patented buffer solutions provides pH stability up to 5 years, something never achieved before. The pH buffers 9.21 and 10.01 are even stable when exposed to air. High buffering capacity provides rapid, stable calibration. The growth of fungus and micro-organisms is prevented.

Traceability

An important issue for the production of Certified Reference Materials is to ensure traceability through an unbroken chain of comparisons to reference material of the highest metrological quality (Primary Reference Material) from NIST1 and PTB2. Unlike other manufacturers, where only top-down traceability is applied, Hamilton works with circular or closed-loop traceability, providing unique reliability of Hamilton DuraCal buffers.

Top-down traceability: At Hamilton, the pH value of DuraCal buffers is determined by comparison against two secondary reference buffer solutions from accredited suppliers of secondary reference materials. The solutions themselves are compared against primary reference solutions from PTB or NIST. The measurement uncertainties of every measurement comparison are known and documented.

Bottom-up traceability: To ensure the highest possible accuracy and full reliability of the pH value, a representative number of samples from every single production lot is verified by an external, independent and impartial DAkkS3 laboratory. The DuraCal samples are compared against secondary reference solutions from DAkkS and these are referenced themselves to primary reference solutions from PTB or NIST. At this stage, the traceability loop is closed. DAkkS provides Hamilton with a calibration certificate for every DuraCal production batch.

Features

- Convenient 250 mL or 500 mL bottle with built-in calibration compartment
- Economical, only about 15 mL of buffer is used per calibration
- Certified pH value from a DAkkS laboratory accredited for pH measurement
- First class certificate with traceability to international standards
- Certificates available at www.hamiltoncompany.com
- Expiration date on the bottle
- Immune to microbial growth

Certified reference material: Due to the complete traceability of the measurement procedure and the assignment of uncertainties to the particular testing steps, the buffers pH 4.01, 7.00, 9.21 and 10.01 are classified as “Certified Reference Material” (CRM).

ORP Buffers

Value  Accuracy  Stability*  Certified By  Packaging Unit  Ref
271 mV  ±5 mV  24  None  500 mL  238226
475 mV  ±5 mV  24  None  500 mL  238322
475 mV  ±5 mV  24  None  500 mL  238227

*p in months after date of manufacturing

1) NIST: National Institute of Standards and Technology, Gaithersburg, MD, USA
2) PTB: Physikalisch-Technische Bundesanstalt, Braunschweig, Germany
3) DAkkS: Deutsche Akkreditierungsstelle GmbH (D-K-15186-01-00), Zentrum für Messen und Kalibrieren GmbH, Wolfen, Germany

DURACAL pH BUFFERS

Simple handling for professional results

Step 1 Open bottle
Step 2 Fill calibration compartment
Step 3 Calibrate electrode
Step 4 Empty calibration compartment

pH Buffers

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<thead>
<tr>
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<th>Stability*</th>
<th>Certified By</th>
<th>Packaging Unit</th>
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<td>DAkkS</td>
<td>500 mL, mixed</td>
<td>238924</td>
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</table>
Hamilton Conductivity Standards

Long-term stability and accuracy

For measurements in the low conductivity range stable and reliable calibration standards have been completely lacking up to now. Since a conductivity standard is not a buffer solution, the lower the value of the conductivity standard, the greater the effect of entry of CO₂ or contamination. Hamilton is the first manufacturer to offer patented conductivity standards of 1.3 and 5 μS/cm with a certified accuracy of ±1% and a lifetime of 1 and 3 years, respectively. The procedure for determining conductivity was developed in collaboration with DFM. Many metrological institutes choose Hamilton standards because of their unprecedented stability and independent verification by PTB. During an interlaboratory test among prestigious European metrological institutes (PTB, DFM, DAkkS) Hamilton standards were used as measurement solutions.

Unique advantages:
- Remains stable for a minimum of 1 year for 1.3 μS/cm, and up to 3 years for all other values
- Certificate with calibration document from DFM (available at www.hamiltoncompany.com)
- Expiration date shown on every bottle
- Bottles are permitted to stay open for a total of 60 minutes

Stability of the Hamilton 5µS/cm Conductivity Standard over 36 months

Check measurement by PTB²

Hamilton offers conductivity standards whose stability of ±1% is guaranteed over a lifetime of up to 3 years. They can be used repeatedly under the condition that the bottle is not left open for more than 1 hour in total.

A representative number of bottles from every batch are measured by DFM. Their value is recorded on the calibration certificate and on every bottle. DFM enjoys the highest prestige in Europe in the area of electrolytic conductivity and is equipped with an absolute measurement cell that was developed in collaboration with NIST, and is accredited by the Danish accreditation agency DANAK to a conductivity of 0.9 μS/cm. DFM and NIST⁴ have made comparisons of their measurement uncertainty and have confirmed in a series of scientific publications that the measurement accuracy is in each case the same. Because no primary standards exist in the low conductivity range, measurements depend on absolute measurement cells which trace electrical conductivity back to the SI units: meter and volt. Testing of Hamilton standards is thus carried out on the most precise measurement apparatus in the world, and certified accordingly.

1) DFM: Danish Institute of Fundamental Metrology, Dänemark
2) PTB: Physikalisch-Technische Bundesanstalt, Braunschweig
3) DAkkS: Deutsche Akkreditierungsstelle
4) NIST: National Institute of Standards and Technology, Gaithersburg MD, USA

Hamilton is Different

Value at 25°C | Accuracy | Stability | Certificate From | Packaging Unit | Volume | Ref
--- | --- | --- | --- | --- | --- | ---
1.3 μS/cm | ±1% | 12 | DFM | Glass bottle | 300 mL | 238973
5 μS/cm | ±1% | 36 | DFM | Glass bottle | 300 mL | 238926
15 μS/cm | ±1% | 36 | DFM | Glass bottle | 300 mL | 238927
84 μS/cm | ±1% | 18 | DFM | Cappack bottle | 500 mL | 238964
100 μS/cm | ±1% | 36 | DFM | Glass bottle | 300 mL | 238834
147 μS/cm | ±1% | 18 | DFM | Capback bottle | 500 mL | 238805
706 μS/cm | ±2% | 36 | Hamilton | Glass bottle | 300 mL | 238929
1413 μS/cm | ±1% | 18 | DFM | Capback bottle | 500 mL | 238988
12880 μS/cm | ±1% | 18 | DFM | Capback bottle | 500 mL | 238989
100 mS/cm | ±1% | 36 | DFM | Glass bottle | 300 mL | 238935

*In months after date of manufacturing
Oxygen Accessories

OxyFerm Membrane Kit
The OxyFerm Membrane Kit contains 3 membrane bodies, Oxylyte electrolyte, pipette, spare o-ring and a polishing strip.

Membrane Kit FDA
The Membrane Kit FDA is the kit for the OxyFerm FDA sensors and contains 3 FDA membrane bodies, Oxylyte electrolyte, pipette, spare o-ring and a polishing strip. The membrane body of the FDA membrane has a special rounded design to prevent accumulation of gas bubbles.

Membrane Kit CIP
The Membrane Kit CIP contains 3 membrane bodies that are especially designed to withstand CIP cleanings. Oxylyte electrolyte, pipette, spare o-ring and a polishing strip.

OxyGold Membrane Kit
The OxyGold Membrane Kit contains 3 membrane bodies with the rounded design, pipette and a spare o-ring. Electrolyte must be ordered separately to match the sensor (see page 107).

Polarization Module
The Polarization Module is to prepare replacement sensors so that they can be used immediately for measurements without connection to a transmitter. It polarizes the oxygen sensors and saves polarization time at the transmitter.

Autoclavation Cap
The Autoclavation Cap is used to protect the OxyFerm T82 connector from moisture during autoclavation. It is important to keep connections dry and clean to ensure reliable measurements.

Electrolytes and Solutions

Electrolyte

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<tr>
<td>3 M KCl 500 mL</td>
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<td>Skylyte-CL 100 mL</td>
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</tr>
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<td>Protelyte 100 mL</td>
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<tr>
<td>3 M KCl LR 500 mL</td>
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<td>Skylyte 500 mL</td>
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<table>
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<td>OxyGold Oxylyte B 30 mL</td>
<td>237138</td>
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<td>OxyFerm Oxylyte 30 mL</td>
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Storage Solution
In order to achieve long sensor life and faster electrode response times, it is recommended to store electrodes in our storage solution. It is an acid-buffered solution that ensures the regeneration of the electrode in addition to provide an optimized storage.

Cleaning Solution Set
Depending on the type of application, the pH glass or diaphragm can get contaminated through various ingredients of the measuring solution. This is indicated by a slow response of the electrode, or even incorrect readings. To overcome these problems, Hamilton has developed a cleaning solution set. The intention is to have an overall cleaning of the pH glass as well as the diaphragm. The set is comprised of Cleaning Solution A, Cleaning solution B and a storage solution. To clean the electrode put it into each solution for 15 – 30 minutes, and your electrode will be ready for new measurements again.

Ref 237123
Ref 237140
Ref 237126
Ref 237135
Ref 237370
Ref 237350
Ref 237360
Ref 237306
Ref 237427
Ref 237437
Ref 242000
Ref 238290
Ref 238931
Cables for traditional and Memosens Sensors

For sensors with standard (S7) connector. Device side no connector (open end).

<table>
<thead>
<tr>
<th>Length</th>
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</tr>
</thead>
<tbody>
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<td>10 m</td>
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<td>355080</td>
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</table>

For sensors with standard (S7) connector. Device side BNC connector.

<table>
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<tr>
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For sensors with standard (S7) connector. Device side DIN connector.

<table>
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<tr>
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<tr>
<td>3 m</td>
<td>3 mm</td>
<td>355059</td>
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For sensors with K8 connector. Device side no connector (open end).

<table>
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<th>Diameter</th>
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For sensors with VP 6 connector. VP 6 single coaxial cable. Device side no connector (open end).

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For sensors with T82/D4 connector, e.g. OxyFerm. Device side Lemo connector.

<table>
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For sensors with T82/D4 connector, e.g. OxyFerm. Device side no connector (open end).

<table>
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For sensors with Memosens connector. Device side no connector (open end).

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<td>355352</td>
</tr>
</tbody>
</table>
### Cables for Intelligent Sensors

**Connection for Industrial Processes e.g. Production**

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>355263</td>
<td>1 m Data Cable VP8 / Open End</td>
<td>4-20 mA/Modbus</td>
</tr>
<tr>
<td>355264</td>
<td>3 m Data Cable VP8 / Open End</td>
<td>4-20 mA/Modbus</td>
</tr>
<tr>
<td>355265</td>
<td>5 m Data Cable VP8 / Open End</td>
<td>4-20 mA/Modbus</td>
</tr>
<tr>
<td>355266</td>
<td>10 m Data Cable VP8 / Open End</td>
<td>4-20 mA/Modbus</td>
</tr>
<tr>
<td>355267</td>
<td>15 m Data Cable VP8 / Open End</td>
<td>4-20 mA/Modbus</td>
</tr>
<tr>
<td>355268</td>
<td>20 m Data Cable VP8 / Open End</td>
<td>4-20 mA/Modbus</td>
</tr>
</tbody>
</table>

**M12-4 Pole**

Compatible with:
- VisiFerm DO family
- pH Arc family
- Conducell 4UxF family
- ORP Arc Sensors
- Conducell UPW Arc Sensors
- eDO Arc Sensor (e.g. OxyFerm FDA Arc)

**M12-8 Pole**

Compatible with: All Arc Sensors

**VP8**

Compatible with:
- Arc Sensors (Note: does not support VisiFerm mA and VisiTrace mA family)

**Power Cables for Bio Controllers**

**Connection for old Bio Controllers or Transmitters in R&D**

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>243168-XX</td>
<td>Arc ECS Adapter pH/ORP</td>
<td>Power Cable 230 V / 110 V AC</td>
</tr>
<tr>
<td>243169-XX</td>
<td>Arc ECS Adapter pH/ORP</td>
<td>Power Cable 230 V / 110 V AC</td>
</tr>
</tbody>
</table>

**M12-4 Pole**

Compatible with:
- VisiFerm DO ECS family

**M12-8 Pole**

Compatible with:
- pH Arc family
- ORP Arc family

**Arc Wi 2G Adapter BT**

Compatible with:
- VisiFerm mA family / VisiTrace mA family

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>243490-01</td>
<td>2 m arc USB Power Cable VP8</td>
<td>USB</td>
</tr>
<tr>
<td>243490-02</td>
<td>2 m arc USB Power Cable M12-8 Pole</td>
<td>USB</td>
</tr>
</tbody>
</table>

**VP8**

Compatible with:
- VisiFerm mA family / VisiTrace mA family

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>355288</td>
<td>3 m Power Cable M12-4 Pole</td>
<td></td>
</tr>
</tbody>
</table>

**M12-4 Pole**

Compatible with:
- VisiFerm DO family

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>242413-XX</td>
<td>VisiFerm T82/D4 Power Adapter</td>
<td></td>
</tr>
</tbody>
</table>
Arc Accessories

Arc Wireless Converter BT
Designed for wireless communication between ArcAir and Arc sensors via Computer. ArcAir Advanced license included.
Ref 242333

USB RS485 Modbus Converter
Designed for wired communication between ArcAir and Visiwater DO fix cable sensor.
Ref 242411

Arc Wi 1G Adapter BT
The Arc Wi 1G Adapter BT is expanding the functionality of Arc sensors by providing wireless communication wire Bluetooth® 4.0 for local monitoring all analog and digital signals are bypassed through the Arc Wi 1G Adapter BT.
Ref 243460

Arc Wi 2G Adapter BT
The Arc Wi 2G adapter is expanding the functionality of Arc sensors by providing wireless communication for local monitoring in parallel to robust 4-20 mA signal, and simple sensor connection to the PCS with additional internal galvanic isolator for an enhanced signal quality.
Ref 243470

Arc View Mobile
This mobile device empowers the operator to monitor measurement values, calibrate Arc sensors and configure various parameters with a unified user interface for pH, DO, Conductivity and ORP. The Arc View Mobile device is based on the Samsung Galaxy Tab Active tablet and comes pre-configured with the ArcAir application, app blocker application, power supply cable, instruction manual and Hamilton quick guide.

Modbus Profibus Converter
The Deutschmann Unigate® CL Module converts the Modbus protocol of the Arc and VisiFerm DO sensors into the Profibus DP protocol. All Arc parameters DO, pH, ORP and conductivity are supported. The conversion script is pre-installed.

Arc Modbus OPC Converter
The Arc Modbus OPC converter converts the Modbus protocol of Arc and VisiFerm DO sensors into OPC UA protocol. All Arc parameters are supported.
Hamilton Customized Products

Customized products for our customers’ special needs

The adaptation of standard products to customer’s special needs is the main focus of our application engineering team. Customizing can include modifications to length, insertion depth, process adaptation of the sensor or changing the housing to a different material. Many more adoptions are possible.

Transmitter H100

The H100 is a transmitter for universal use in the chemical industry, power stations, biotechnology, food processing and pharmaceutical industries as well as in water/wastewater treatment. Icons guide the operator and show the sensor status. Sensor failures are detected, shown on the display and an alarm is set. Calibration can be done manually or by selecting standard calibration media. After each calibration the sensor data will be shown and evaluated. The H100 is easy to handle and can be mounted on the wall as well as on a panel.

User friendly, robust and reliable

- Easy to install, operate and calibrate
  - Large terminal compartment and pre-assembled rear unit for easy installation.
  - The large display and intuitive menu structure ensure straightforward navigation.
  - Icons supply operating messages and signal unusual states.
  - Simple calibration with automatic buffer recognition.

- Robust design
  - Optional protective hood for additional protection against weather exposure and mechanical damage.
  - Wall, post/pipe, or panel mounting possible with optional panel- or pipe-mount kit.

- Reliable instrument for process applications
  - The sensor status and potential defects are continuously monitored for real time display of error or alarm.
  - Asymmetry potential, slope and response time are evaluated during calibration through the sensor lifetime for preventive maintenance indication.
  - The integrated calibration timer automatically indicates when calibration is required.
Transmitter H100 pH

Specifications

- Measured variable: pH, mV and temperature
- Measuring range (pH / OPR): -1500 to +1500 mV
- Display range pH: -2.00 to 16.00
- Measuring error: <0.02 pH, <1 mV
- Temperature input: Pt 100, Pt 1000, NTC 30 kOhm
- Temperature measuring range: -20.0 to +150 °C
- Temperature resolution: 0.1 °C
- Calibration: 1 point, 2 point and product calibration
- Power supply: 24 to 230 V AC/DC
- Display: LC display, 7-segment with icons
- Ambient temperature: -20 to 55 °C
- Relative humidity: 80 % at temperatures up to 55 °C
- Ingress protection: IP 65, NEMA 4X
- Alarm contact: Yes
- Hold mode: Yes
- FM: NI Class I, Div 2 Group A, B, C, D, T4 Ta = 55 °C; Type 2
  NI Class I, Zone 2 Group IIC, T4 Ta = 55 °C; Type 2

Accessories

- Pipe-mount kit: Ref 243082
- Panel-mount kit: Ref 243083
- Protective hood: Ref 243084

Mounting plan

Ordering Information

Type: H100 pH
Ref: 243080-01

Transmitter H100 Cond

Specifications

- Measured variable: Conductivity, resistivity, concentration, salinity, temperature
- Measuring range conductivity: 0 to 999.9 mS/cm
- Effective range conductivity: 0.2 µS x cm to 1000 mS x cm
- Measuring range resistivity: 0.00 to 99.99 MΩ x cm
- Measuring range concentration: 0.00 to 9.99 % by wt
- Measuring range salinity: 0.0 to 45 ‰ (0 to 35 °C)
- Measuring error: < 1 % meas. val. + 0.4 µS x cm
- Temperature input: Pt 100, Pt 1000, NTC 30 kOhm
- Temperature measuring range: Pt 100/Pt 1000: -20.0 to +200 °C
  NTC 30 kOhm: -20.0 to +150 °C
- Temperature resolution: 0.1 °C
- Power supply: 24 to 230 V AC/DC
- Display: LC display, 7-segment with icons
- Ambient temperature: -20 to 55 °C
- Relative humidity: 80 % at temperatures up to 55 °C
- Ingress protection: IP 65, NEMA 4X
- Alarm contact: Yes
- Hold mode: Yes
- FM: NI Class I, Div 2 Group A, B, C, D, T4 Ta = 55 °C; Type 2
  NI Class I, Zone 2 Group IIC, T4 Ta = 55 °C; Type 2

Accessories

- Pipe-mount kit: Ref 243082
- Panel-mount kit: Ref 243083
- Protective hood: Ref 243084

Mounting plan

Ordering Information

Type: H100 Cond
Ref: 243080-02

144 144 15 84 21 43
1 Cable gland (3x)
2 Knockouts for cable glands or 1/2" conduit (conduits not incl.)
3 Knockout for pipe mounting (4x)
4 Knockout for wall mounting (2x)
**Transmitter H100 DO**

**Specifications**
- Measured variable: DO saturation, DO concentration
- Measuring current: -2 to 1800 nA
- O₂ resolution: 0.05 nA
- O₂ saturation: 0 to 200%
- O₂ concentration: 0.00 to 20.00 mg/l / 0.00 to 20.00 ppm
- Polarization voltage: 0 to 1000 mV (User-defined)
- Salinity correction: 0.00 to 45.00 g/kg (User-defined)
- Measuring error: < 0.5 % meas. val. + 0.5 %
- Temperature input: NTC 22 kOhm, NTC 30 kOhm
- Temperature measuring range: -20.0 to +150 °C
- Temperature resolution: 0.1 °C
- Power supply: 24 to 230 V AC/DC
- Display: LC display, 7-segment with icons
- Ambient temperature: -20 to 55 °C
- Relative humidity: 80 % at temperatures up to 55 °C
- Ingress protection: IP 65, NEMA 4X
- Alarm contact: Yes
- Hold mode: Yes
- FM: Ni Class I, Div 2 Group A, B, C, D, T4 Ta = 55 °C; Type 2
  Ni Class I, Zone 2 Group IIC, T4 Ta = 55 °C; Type 2

**Ordering Information**
- Type Ref: H100 DO 243080-03

**Mounting plan**
- Front
- Side
- Back

---

**Transmitter H100 CondI**

**Specifications**
- Measured variable: Inductive conductivity, concentration, salinity
- Measuring range conductivity: 0.000 to 1999 mS/cm
- Measuring range concentration: 0.00 to 9.99 % by wt
- Measuring range salinity: 0.0 to 45 ‰ (0 to 35 °C)
- Measuring error: < 1 % meas. val. + 0.005 mS
- Temperature input: Pt100 / Pt1000 / NTC 100 kOhm
- Temperature measuring range: Pt100 / Pt1000: -20.0 to +200.0 °C (-4 to +392 °F)
  NTC 30 kOhm: -20.0 to +130.0 °C (-4 to +266 °F)
- Temperature resolution: 0.1 °C
- Power supply: 24 to 230 V AC/DC
- Display: LC display, 7-segment with icons
- Ambient temperature: -20 to 55 °C
- Relative humidity: 80 % at temperatures up to 55 °C
- Ingress protection: IP 65, NEMA 4X
- Alarm contact: Yes
- Hold mode: Yes
- FM: Ni Class I, Div 2 Group A, B, C, D, T4 Ta = 55 °C; Type 2
  Ni Class I, Zone 2 Group IIC, T4 Ta = 55 °C; Type 2

**Ordering Information**
- Type Ref: H100 CondI 243080-04

**Mounting plan**
- Front
- Side
- Back

---

**Accessories**
- Pipe-mount kit Ref 243082
- Panel-mount kit Ref 243083
- Protective hood Ref 243084

---

**Ordering Information**
- Type Ref: H100 CondI 243080-04
Hamilton H220X Transmitters combine ease of use and reliability. They are available in different configurations: Analog pH / ORP, Conductivity and inductive Conductivity as well as Memosens® pH and Oxygen.

It has been designed for universal process application including use in pharmaceutical, chemical, food & beverage industries as well as water / waste water treatment. The self-explaining user interface ensures comfortable and intuitive handling. Hamilton H220X transmitters provide continuous sensor monitoring and preventive maintenance indication for maximal reliability. The Memosens® Technology allows plug & play with pre-calibrated Memosens® sensors. Predictive maintenance system detects when a sensor has to be cleaned, calibrated or replaced.

Perfectly designed for hazardous areas and the Memosens® technology

Easy to install, operate and calibrate
- The large display and intuitive menu structure ensure straightforward navigation
- Simple calibration with automatic buffer recognition
- Memosens® sensors can be connected for even more simple handling

Robust design
- Suitable for Explosions protected areas (Ex II (1) 2G Ex ib [Ia Ga] IX T6/T4 Gb)
- Wall, post/pipe, or panel mounting possible
- Transmitter suitable for pollution degree 3

Reliable instrument for process applications
- Sensor status and potential defects are continuously monitored; errors and alarms are displayed in real time
- Asymmetry potential, slope and response time are evaluated during calibration through the sensor lifetime for preventive maintenance indication
- User-guided commissioning, graphic display and plain text guidance for maximum operating safety

The Transmitter H220X is available for the following parameters
- pH / ORP analog
- pH / ORP Memosens
- Conductive Conductivity analog
- Inductive Conductivity analog
- eDO Memosens

More info about measuring ranges, temperature ranges, input and output signals can be found on the Hamilton website.

The Transmitter H220X Family Structure

<table>
<thead>
<tr>
<th>Code</th>
<th>Sensor Module</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conductivity, Conductive Sensor</td>
<td>Standard Version</td>
</tr>
<tr>
<td>2</td>
<td>Conductivity, Inductive Sensor</td>
<td>Advanced Version</td>
</tr>
<tr>
<td>3</td>
<td>Digital, Memosens pH, ORP</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Digital, Memosens eDO</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>pH or ORP (analog)</td>
<td></td>
</tr>
</tbody>
</table>

Order Code: 243081
Different processes have different requirements for sensors to provide an accurate and reliable measurement. Being in contact with the media is the most important one. In order to meet the different requirements, Hamilton has developed various kinds of housings and armatures: static, retractable, pressurizable, pneumatic, manual, weld-in and hygienic sockets.

No matter what type of housing is needed for a pipe or a vessel, on the following pages the right one for each application can be found.
The FlexiFit housings are designed for 120 mm sensors in different kinds of industries. A variety of process connections ensure the usability in the chemical industry as well as in hygienic processes. All FlexiFit have EPDM o-rings and the electropolished surface quality (Ra < 0.4 µm) quality is shown on a certificate. They are suitable for autoclavation, CIP and SIP procedures.

**Benefits**
- Easy installation and handling
- Various o-ring positions available
- ATEX approved
- Hygienic design

**Ordering Information**

<table>
<thead>
<tr>
<th>Type</th>
<th>Process Connection</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>FlexiFit Bio</td>
<td>G 1¼</td>
<td>237331-OP</td>
</tr>
<tr>
<td>FlexiFit U Bio</td>
<td>G 1½</td>
<td>237380-OP</td>
</tr>
<tr>
<td>FlexiFit TC 150-33</td>
<td>TC 1.5”</td>
<td>237341</td>
</tr>
<tr>
<td>FlexiFit VV-0</td>
<td>Varvent®</td>
<td>237344</td>
</tr>
<tr>
<td>FlexiFit VV-15</td>
<td>Varvent®</td>
<td>237345</td>
</tr>
</tbody>
</table>

*U = Unprotected
TC = Triclamp

**Specifications**

- Wetted parts: Stainless Steel 1.4435
- O-ring material: EPDM
- O-ring position: 22 to 55 mm (G 1¼)
- Pressure range (relative to ambient): 0 to 6 bar
- Temperature range: -10 to 140 °C
- Sensor thread: PG 13.5
- Sensor a-length: 120 mm
- Surface finish: Ra < 0.4 µm (N5 electropolished)
- ATEX approval: CE 0035 II 1/2 G Ex ia IIC T4/T5/T6

For more specifications see www.hamiltoncompany.com

Other designs and materials available on request

**Dimensional drawing / FlexiFit**

FlexiFit VV-0

FlexiFit Bio

**Accessories**

- Service Kit FlexiFit Bio Ref 237366
- Service Kit FFKM Ref 237319
- Service Kit FKM Ref 237219
- Service Kit Retractofit PEEK Ref 237388

Safety Socket see page 150
RetractoFit

The RetractoFit is a retractable armature designed for 225 mm sensors in industrial applications. It allows the operator to mount and dismount sensors while the process is running. Safe sensor handling during process is guaranteed because insertion into the vessel without a sensor is impossible so is removal while in the measuring position. It is easy to use and maintain: only one press on the red button is needed to move the sensor into or out of the process. All o-rings can easily be replaced by the operator without special tools. The RetractoFit is available in different versions.

When the housing with an Arc sensor, VisiFerm mA, VisiTrace mA, VisiPro DO (Ex), VisiTrace DO and protective sleeve the aperture (hole) in the protective sleeve must be enlarged or the housing has to be used without the protective sleeve. Wireless adapters on top of Arc sensors can only be used without the protective sleeve.

### Benefits
- Integral safety mechanism
- Sensor can be withdrawn from the process for cleaning, calibration or replacement
- Easy maintenance
- 3.1 material certificate included

### Specifications

| RetractoFit | Stainless Steel 1.4571 |
| RetractoFit PEEK | PEEK (FDA approved) |
| O-ring material | FKM |
| O-ring position | RetractoFit: 22.5 mm  
RetractoFit PEEK: 25 mm |
| Pressure range (relative to ambient) | 0 to 6 bar |
| Temperature range | -10 to 130 °C |
| Sensor thread | PG 13.5 |
| Sensor a-length | 225 mm |
| Surface finish | RetractoFit: Ra < 0.4 µm (N5 electropolished)  
RetractoFit PEEK: CE 0035 ll 1/2 G Ex ia II A T4/T5/T6 |

### Process Type Connection Ref

| RetractoFit | G 1¼  237240 |
| RetractoFit PEEK | G 1¼  237490 |

### Ordering Information

For more specifications see www.hamiltoncompany.com
RetractoFit Bio

The RetractoFit Bio is a retractable housing designed for 225 mm sensors in hygienic applications in the biotechnology, food & beverage and the pharmaceutical industry. It allows the operator to mount and dismount sensors while the process is running. Safe sensor handling during the process is guaranteed because insertion into a vessel without sensor is impossible so is removal while in the measuring position. It is easy to use and maintain: only one press on the red button is needed to move the sensor into or out of the process. All o-rings can be easily be replaced by the operator without special tools.

Benefits
- Integral safety mechanism
- Sensor can be withdrawn from the process for cleaning, calibration or replacement
- Special hygienic design of cleaning chamber
- Easy maintenance

“Did you know... that the RetractoFit Bio has a special rinsing chamber with angled connections for cleaning solutions and special inlet construction guarantees an entire cleaning of the chamber through a swirl effect”

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetted parts</td>
<td>Stainless Steel 1.4435</td>
</tr>
<tr>
<td>O-ring material</td>
<td>EPDM*</td>
</tr>
<tr>
<td>O-ring position</td>
<td>22 mm and 55 mm</td>
</tr>
<tr>
<td>Pressure range (relative to ambient)</td>
<td>0 to 6 bar</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-10 to 140 °C</td>
</tr>
<tr>
<td>Sensor thread</td>
<td>PG 13.5</td>
</tr>
<tr>
<td>Sensor a-length</td>
<td>225 mm</td>
</tr>
<tr>
<td>Surface finish</td>
<td>R&lt;sub&gt;a&lt;/sub&gt; &lt; 0.4 µm (N5 electropolished)</td>
</tr>
<tr>
<td>ATEX approval</td>
<td>CE 0035 ll 1/2 G Ex ia IIC T4/T5/T6</td>
</tr>
</tbody>
</table>

For more specifications see www.hamiltoncompany.com

Dimensional drawings / RetractoFit Bio 55

<table>
<thead>
<tr>
<th>Dimensional drawings / RetractoFit Bio 55</th>
<th>all dimensions in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance position</td>
<td></td>
</tr>
<tr>
<td>Measuring position</td>
<td></td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>Type</th>
<th>Process Connection</th>
<th>Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>RetractoFit Bio 25</td>
<td>G 1¼</td>
<td>237480</td>
</tr>
<tr>
<td>RetractoFit Bio 55</td>
<td>G 1¼</td>
<td>237440</td>
</tr>
</tbody>
</table>

Accessories
- FDA Service Kit Ref 237338
- Safety Socket see page 150

USP Class VI

Specifications

- Wetted parts: Stainless Steel 1.4435
- O-ring material: EPDM*
- O-ring position: 22 mm and 55 mm
- Pressure range (relative to ambient): 0 to 6 bar
- Temperature range: -10 to 140 °C
- Sensor thread: PG 13.5
- Sensor a-length: 225 mm
- Surface finish: R<sub>a</sub> < 0.4 µm (N5 electropolished)
- ATEX approval: CE 0035 ll 1/2 G Ex ia IIC T4/T5/T6
Retractex B

The retractable pneumatic or manual housing Retractex B was designed for sanitary applications in biotechnology, food & beverage and pharmaceutical industry. The compact design with a stroke of only 36 mm keeps wear on seals to a minimum and creates excellent reliability – day and night, all year long. It can be cleaned easily and thoroughly in place, including the space between the socket and rinsing chamber. The Retractex B with its patented HyCIP cleaning principle offers the best available cleaning efficiency for Ingold sockets (G 1¼”).

It is designed for 12 mm sensors and is equipped with several safety features (e.g. no sensor – no insertion, window to check seals for leakage etc.) to provide operator safety. It is available with various process connections that can be used with all vessels used in these branches.

How does the HyCIP process connection work?

In cleaning position, the sensor can be cleaned and sterilized together with all wetted seals. In the HyCIP connection the cleaning solution is directed between armature and socket up to the process seal so the most remote parts of the chamber are rinsed. Thus HyCIP housings are unmatched for their cleaning performance of the sensor and of all relevant seals.

Benefits

- Extremely compact design
- Integrated safety concept: no sensor – no insertion
- Very low maintenance
- Sterile safety and unique cleaning efficiency with HyCIP

How does the HyCIP process connection work?

In cleaning position, the sensor can be cleaned and sterilized together with all wetted seals. In the HyCIP connection the cleaning solution is directed between armature and socket up to the process seal so the most remote parts of the chamber are rinsed. Thus HyCIP housings are unmatched for their cleaning performance of the sensor and of all relevant seals.

Benefits

- Extremely compact design
- Integrated safety concept: no sensor – no insertion
- Very low maintenance
- Sterile safety and unique cleaning efficiency with HyCIP
Retractex BC Steel

The retractable pneumatic or manual housing Retractex BC is designed for applications in the chemical industry. The compact design with a stroke of only 36 mm keeps wear on seals to a minimum and creates excellent reliability – day and night, all year long. It can be cleaned easily and thoroughly in place. It is designed for 12 mm sensors and is equipped with several safety features (e.g. no sensor – no insertion, window to check seals for leakage etc.) to provide operator safety. The Retractex BC comes with a G 1¼" process connection and is available with two different o-ring positions.

Cleaning of the Retractex BC?
In cleaning position, the sensor can be cleaned while the process is running. The advantage of the insertion tube is the short way for insertion. A PTFE scraper with o-ring guarantees that dirt stays outside of the armature and does not harm the o-ring.

Benefits
► Extremely compact design
► Integrated safety concept: no sensor – no insertion
► Very low maintenance
► Sterile safety and unique cleaning efficiency with HyCIP

Specifications
- Wetted parts: Stainless Steel 1.4404 or 2.4602
- O-ring material: EPDM* or FKM or FFKM
- Pressure range (relative to ambient): 0 to 16 bar (120 °C), 10 bar (140 °C)
- Temperature range: -10 to 140 °C
- Sensor a-length: 225 mm
- Surface finish: Ra < 0.8 µm (N6)
- ATEX approval: Conform to DIN EN 13463-1

Ordering Information

Retractable Housing: Retractex BC Steel

<table>
<thead>
<tr>
<th>Code</th>
<th>Material (wetted parts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stainless Steel 1.4404</td>
</tr>
<tr>
<td>2</td>
<td>Stainless Steel 2.4602</td>
</tr>
<tr>
<td>0</td>
<td>special</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Sealing Material (wetted sealings)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EPDM/FDA USP VI</td>
</tr>
<tr>
<td>2</td>
<td>FKM</td>
</tr>
<tr>
<td>3</td>
<td>FFKM</td>
</tr>
<tr>
<td>0</td>
<td>special</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>225 mm PG13,5</td>
</tr>
<tr>
<td>0</td>
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<tbody>
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<td>G ½&quot; thread female</td>
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<tr>
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</table>

For more specifications see www.hamiltoncompany.com

PTFE Scraper

Image of Retractex BC Steel housing
Retractex BC Plastic

The retractable pneumatic or manual housing Retractex BC was designed for applications in the chemical industry. The compact design with a stroke of only 36 mm keeps wear on seals to a minimum and creates excellent reliability — day and night, all year long. It can be cleaned easily and thoroughly in place. It is designed for 12 mm sensors and is equipped with several safety features (e.g. no sensor – no insertion, window to check seals for leakage etc.) to provide operator safety. The Retractex BC comes with a G 1¼" process connection and is available with two different o-ring positions.

Cleaning of the Retractex BC?

In cleaning position, the sensor can be cleaned while the process is running. The advantage of the insertion tube is the short way for insertion. A PTFE scraper with o-ring guarantees that dirt stays outside of the armature and does not harm the o-ring.

Benefits

- Extremely compact design
- Integrated safety concept: no sensor – no insertion
- Very low maintenance
- Easy installation of the pneumatic armature with color coded connectors
- Choice of 3 different plastics

Specifications

- Wetted parts: PVDF or PEEK or PP
- O-ring material: EPDM or FKM or FFKM
- Pressure range (relative to ambient): 0 to 16 bar (120 °C), 10 bar (140 °C)
- Temperature range: -10 to 140 °C
- Sensor a-length: 225 mm
- Surface finish: Rₚ < 0.8 µm (N6)
- ATEX approval: Conform to DIN EN 13463-1

For more specifications see www.hamiltoncompany.com

Ordering Information

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Ref: Order Code

For more information, visit www.hamiltoncompany.com
Retractex C Steel

The retractable pneumatic or manual housing Retractex C was designed for applications in the chemical industry. The compact design with a stroke of only 36 mm keeps wear on seals to a minimum and creates excellent reliability – day and night, all year long. It can be cleaned easily and thoroughly in place. It is designed for 12 mm sensors and is equipped with several safety features (e.g. no sensor – no insertion, window to check seals for leakage etc.) to provide operator safety. It is available with various process connections that can be used with all vessels used in this branch.

Cleaning of the Retractex C?

In cleaning position, the sensor can be cleaned while the process is running. The advantage of the insertion tube is the short way for insertion. A PTFE scraper with o-ring guarantees that dirt stays outside of the armature and does not harm the o-ring.

Benefits
- Extremely compact design
- Integrated safety concept: no sensor – no insertion
- Very low maintenance
- Easy installation of the pneumatic armature with color coded connectors

Did you know... that the pneumatic Retractex can be connected to the RetractoControl for even more comfortable handling?

Ordering Information

For more specifications see www.hamiltoncompany.com
Retractex C Plastic

The retractable pneumatic or manual housing Retractex C was designed for applications in the chemical industry. The compact design with a stroke of only 36 mm keeps wear on seals to a minimum and creates excellent reliability – day and night, all year long. It can be cleaned easily and thoroughly in place. It is designed for 12 mm sensors and is equipped with several safety features (e.g. no sensor – no insertion, window to check seals for leakage etc.) to provide operator safety. It is available with various process connections that can be used with all vessels used in this branch.

Cleaning of the Retractex C?

In cleaning position, the sensor can be cleaned while the process is running. The advantage of the insertion tube is the short way for insertion. A PTFE scraper with o-ring guarantees that dirt stays outside of the armature and does not harm the o-ring.

Benefits
- Extremely compact design
- Integrated safety concept: no sensor – no insertion
- Very low maintenance
- Easy installation of the pneumatic armature with color coded connectors
- Choice of 3 different plastics

Ordering Information

Specifications

- Wetted parts: PVDF or PEEK or PP
- O-ring material: EPDM® or FKM or FFKM
- Pressure range (relative to ambient): 0 to 16 bar (120 °C), 10 bar (140 °C)
- Temperature range: -10 to 140 °C
- Sensor a-length: 225 mm
- Surface finish: Rₚ < 0.8 µm (N6)
- ATEX approval: Conform to DIN EN 13463-1

Cleaning of the Retractex C?

Cleaning of the Retractex C?

Cleaning of the Retractex C?

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Cleaning of the Retractex C?
Retractex C Steel LT

The retractable pneumatic or manual housing Retractex C was designed for applications in the chemical industry. The compact design with a stroke of only 36 mm with an insertion depth up to 207 mm keeps wear on seals to a minimum and creates excellent reliability – day and night, all year long. It can be cleaned easily and thoroughly in place. It is designed for 12 mm sensors and is equipped with several safety features (e.g. no sensor – no insertion, window to check seals for leakage etc.) to provide operator safety. It is available with various process connections that can be used with all vessels used in this branch.

Cleaning of the Retractex C?

In cleaning position, the sensor can be cleaned while the process is running. The advantage of the insertion tube is the short way for insertion. A PTFE scraper with o-ring guarantees that dirt stays outside of the armature and does not harm the o-ring.

Benefits

► Extremely compact design (only 36 mm stroke of insertion tube with an insertion depth of 207 mm)
► Integrated safety concept: no sensor = no insertion
► Very low maintenance
► Easy installation of the pneumatic armature with color coded connectors

Specifications

<table>
<thead>
<tr>
<th>Wetted parts</th>
<th>Stainless steel 1.4404 or 2.4602</th>
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</thead>
<tbody>
<tr>
<td>O-ring material</td>
<td>EPDM® or FKM or FFKM</td>
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<tr>
<td>Pressure range (relative to ambient)</td>
<td>0 to 16 bar (120 °C), 10 bar (140 °C)</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-10 to 140 °C</td>
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<tr>
<td>Sensor a-length</td>
<td>325 mm</td>
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<tr>
<td>Surface finish</td>
<td>Ra &lt; 0.8 µm (N6)</td>
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<tr>
<td>ATEX approval</td>
<td>Conform to DIN EN 13463-1</td>
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</tbody>
</table>

Ordering Information

For more specifications see www.hamiltoncompany.com
Retractex C Plastic LT

The retractable pneumatic or manual housing Retractex C was designed for applications in the chemical industry. The compact design with a stroke of only 36 mm with an insertion depth up to 207 mm keeps wear on seals to a minimum and creates excellent reliability – day and night, all year long. It can be cleaned easily and thoroughly in place. It is designed for 12 mm sensors and is equipped with several safety features (e.g. no sensor – no insertion, window to check seals for leakage etc.) to provide operator safety. It is available with various process connections that can be used with all vessels used in this branch.

Cleaning of the Retractex C?
In cleaning position, the sensor can be cleaned while the process is running. The advantage of the insertion tube is the short way for insertion. A PTFE scraper with o-ring guarantees that dirt stays outside of the armature and does not harm the o-ring.

Benefits
► Extremely compact design (only 36 mm travel of insertion tube with an insertion depth of 207 mm)
► Integrated safety concept: no sensor – no insertion
► Very low maintenance
► Easy installation of the pneumatic armature with color coded connectors

Specifications
- Wetted parts: PVDF or PEEK
- O-ring material: EPDM® or FKM or FFKM
- Pressure range (relative to ambient): 0 to 16 bar (120 °C), 10 bar (140 °C)
- Temperature range: -10 to 140 °C
- Sensor a-length: 325 mm
- Surface finish: Rₐ < 0.8 µm (N6)
- ATEX approval: Conform to DIN EN 13463-1

Ordering Information

<table>
<thead>
<tr>
<th>Code</th>
<th>Material (wetted parts)</th>
<th>Sealing Material (wetted sealings)</th>
<th>Process Connection</th>
<th>Cleaning Connection</th>
<th>Position switch</th>
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<tr>
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<td>EPDM / FDA USP class VI</td>
<td>Flange DN50</td>
<td>G 3/8” thread female</td>
<td>pneumatic / without for manual</td>
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<td>2</td>
<td>PEEK</td>
<td>FKM</td>
<td>Flange ANSI 2”</td>
<td>G 1/4” thread female</td>
<td>special</td>
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</table>

For more specifications see www.hamiltoncompany.com
The MasterFit is a housing for pressurizable pH sensors like the ChemoTrode types. The pressurization ensures a constant outflow of electrolyte. This helps to prevent clogging of the diaphragm and poisoning of the electrolyte. The MasterFit can be used in a huge variety of applications mainly in the chemical industry. The pressure inside the MasterFit can be controlled via a built-in manometer. Furthermore the liquid level of the electrode can be controlled through the coated glass body of the armature at any time.

**Benefits**
- Sealing feature prevents loss of pressure caused by soiling
- Pressure reduction on disassembly
- Various o-ring positions available
- Easy maintenance

**Ordering Information**

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<thead>
<tr>
<th>Type</th>
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<td>MasterFit 150</td>
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<td>MasterFit 250</td>
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**Specifications**

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<tr>
<td>Temperature range</td>
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<tr>
<td>Sensor a-length</td>
<td>120, 150, 200 mm</td>
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<td>Surface finish</td>
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<td>ATEX approval</td>
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**Process Type Connection**

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<td>475 mm</td>
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<tr>
<td>MasterFit 150</td>
<td>70 mm</td>
<td>505 mm</td>
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<tr>
<td>MasterFit 250</td>
<td>170 mm</td>
<td>605 mm</td>
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**Accessories**

- **Pressure Adapter** Ref 237252
- **Service Kit for MasterFit** Ref 237229
- **FFKM Kit for MasterFit** Ref 237319
- **Flange Adapter for MasterFit** Ref 237910

**Safety Socket** see page 150

*The Flange Adapter is used with a MasterFit 120 and a sensor with a shaft length of 150 mm
The RetractoMaster is a retractable housing for pressurizable sensors like the ChemoTrode. The pressurization ensures a constant outflow of electrolyte. This helps to prevent clogging of the diaphragm and poisoning of the electrolyte. It allows the operator to mount and dismount the sensors while the process is running. The pressure inside the RetractoMaster can be controlled via a built-in manometer. Only one press on the red button is needed to move the sensor into or out of the process. Safe sensor handling during process is guaranteed because insertion into a vessel without the sensor is impossible so is removal while in measuring position. O-rings can easily be replaced without special tools. Furthermore the liquid level of the electrode can be controlled through the coated glass body of the armature at any time. The RetractoMaster can be used in a huge variety of applications mainly in the chemical industry.

**Benefits**
- Sensor can be withdrawn from the process for cleaning, calibration or replacement
- Easy maintenance
- Long life time of the sensor due to pressurization of the sensor and the possibility to remove it while the process is running.
- 3.1 certificate included

**Ordering Information**

<table>
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<tr>
<th>Type</th>
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For more specifications see [www.hamiltoncompany.com](http://www.hamiltoncompany.com)
RetractoControl Plus

The RetractoControl is a control unit for a pneumatic Retractex used to clean a sensor automatically. The full power of the automatic cleaning system can be achieved with an Arc sensor because it can be built-in pre-calibrated. Analog sensors in combination with a transmitter can be used as well. The measurement and cleaning cycles can be programmed very easily according to the needs of the process. Thanks to automatically controlled cleanings the life time of the sensor can be extended and manpower can be saved.

Benefits
- Scheduled and unattended maintenance
- Easy interaction with process control system
- Menu based user interaction
- Manpower can be saved

Ordering Information

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<tr>
<td>2</td>
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</table>

Automatic Control Unit for Retractables

242216 RetractoControl Plus

Specifications
- Protection Rating: IP 54
- Power Supply: 24V DC 30 VA
- Air pressure: 4 to 6 bar

For more specifications see www.hamiltoncompany.com

Connection Plan with Arc Sensor

Connection Plan with Analog Sensor

Accessories
- Wall Mounting Set (for plastic housing) Ref 242214
- Wall Mounting Set (for stainless steel housing) Ref 242212
- Post Mounting Set (for plastic and stainless steel housing) Ref 242213
- Cleaning valve set PVDF/FKM with 2 membrane-valves for one cleaning solution and one drain; connectors, PTFE-tubing and mounting brackets included Ref 242210
- Cleaning valve set PVDF/FKM with 3 membrane-valves for two cleaning solution and one drain; connectors, PTFE-tubing and mounting brackets included Ref 242211
The Safety Sockets are hygienic weld-in sockets suitable for hygienic armatures like the FlexiFit Bio. They are available for 3 different o-ring positions to cover different standards. Furthermore you can choose between two kinds of stainless steel and two different angles.

The Safety Socket narrows at the o-ring positions and it seals only if the o-ring of the armature is exactly at the right place. If the process is under pressure, a dripping process medium can be a strong hint that the armature should not be loosened entirely. Therefore the Safety Socket is suited for a wide variety of applications and installations.

**Benefits**
- Safety design, leakage before total release of the armature
- Hygienic surface finish
- 3 different o-ring positions and two different stainless steels available

O-ring sealing position
- Tight thread, no dripping
- Safety Socket: loose on the thread, only dripping

---

### Ordering Information

<table>
<thead>
<tr>
<th>Type</th>
<th>Steel</th>
<th>Angle</th>
<th>OP</th>
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**Accessories**
- Blind plug 1.4404-25 Ref 242560
- Blind plug 1.4404-50 Ref 242562
- Blind plug 1.4404-55 Ref 242564
- Blind plug 1.4435-25 Ref 242565
- Blind plug 1.4435-50 Ref 242567
- Blind plug 1.4435-55 Ref 242569
- Blind Plug 1.4571-25 Ref 237230
The Hygienic Socket with its space saving design and simple sterilization is ideal to weld in fermenters or small pipes. The advantages are numerous for many other applications in tanks or pipes for water treatment and in the pharmaceutical and chemical industries.

It is designed for 120 mm sensors and developed for easy installation and maintenance, improve the cleaning process and increase safety. Two “Live Guard” openings provide an indication of sealing failures. The sensor insertion depth can be varied for DO sensors by using the Hamilton DO Adapter.

Benefits
- Hygienic design because complete sensor installation with only one wetted o-ring
- Space saving
- Cost saving: Socket and Housing all in one
- Low maintenance and easy replacement of o-ring

Example for Installation

Insertion depth 0 to 60 mm

Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Wetted parts</th>
<th>O-ring material</th>
<th>Pressure range</th>
<th>Temperature range</th>
<th>Sensor thread</th>
<th>Sensor a-length</th>
<th>Surface finish</th>
<th>ATEX approval</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Stainless Steel 1.4435 or 1.4404 or 1.4571 or 2.4602</td>
<td>EPDM*</td>
<td>0 to 16 bar</td>
<td>-10 to 140 °C</td>
<td>PG 13.5</td>
<td>120 mm</td>
<td>Ra &lt; 0.4 μm (N0)</td>
<td>Conform to DIN EN 13463-1</td>
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</tbody>
</table>

For more specifications see www.hamiltoncompany.com

Dimensional drawings

For more specifications see www.hamiltoncompany.com

Example for Installation

Dimensional drawings

For more specifications see www.hamiltoncompany.com

Ordering Information

<table>
<thead>
<tr>
<th>Type</th>
<th>Ref</th>
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<tbody>
<tr>
<td>Hygienic Socket 1.4404</td>
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<tr>
<td>Hygienic Socket 1.4435</td>
<td>242545</td>
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<td>Hygienic Socket 1.4571</td>
<td>242548</td>
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<tr>
<td>Hygienic Socket 2.4602</td>
<td>242550</td>
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</table>

Accessories

- Hygienic Socket DO Adapter Ref 242538
- Replacement Kit Seal Pusher Ref 242532
- O-ring set EPDM Ref 242595
- Sensor Dummy 96 mm Ref 242540
- Sensor Dummy 117 mm Ref 242563
- O-ring set FKM Ref 242596
- O-ring set Silicone Ref 242597
- O-ring set FFKM Ref 242598
FlowCell/XL

Hamilton Flow-Through Cells are designed for measuring one or two parameters at a time. Possible combinations are pH/DO and pH/Conductivity. The measurement is done in bypasses when inline measurement is not possible due to small pipe dimensions. Application fields are biotechnology, water treatment and power plants, where reliable measurements have to be carried out in ion-weak media. There are two different sizes of the flow cells available.

Benefits
- Flexible design for one or two measuring points
- PEEK insert of high chemical resistance
- Low dead volume
- Self draining
- Internal aseptic clamp pipe connection

Specifications
- Wetted parts: Stainless Steel 1.4435, PEEK
- O-ring material for blind plug: EPDM*
- Pressure range (relative to ambient): 0 to 16 bar
- Temperature range: -10 to 140 °C
- Sensor thread: PG 13.5
- Sensor a-length: 120 mm
- Process connection: TC 25, TC 50, Swagelok
- ATEX approval: Conform to DIN EN 13463-1

For more specifications see www.hamiltoncompany.com

Ordering Information

Flow Cell

<table>
<thead>
<tr>
<th>Code</th>
<th>Measuring position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>only pH or Conductell UPW</td>
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<tr>
<td>2</td>
<td>only Conductivity or Oxygen</td>
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<tr>
<td>3</td>
<td>pH and Conductivity or Oxygen</td>
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<td>Conductivity and Oxygen</td>
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<table>
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<tr>
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<tr>
<td>2</td>
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</tr>
<tr>
<td>3</td>
<td>TC25 1/4&quot;</td>
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<tr>
<td>4</td>
<td>Swagelok 6 mm</td>
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<tr>
<td>5</td>
<td>Swagelok 10 mm</td>
</tr>
<tr>
<td>6</td>
<td>Swagelok ⅛&quot;</td>
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<tr>
<td>7</td>
<td>Swagelok 5/8&quot;</td>
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<td>EPDM</td>
</tr>
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<td>FFKM (two measuring positions)</td>
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<td>FFKM (one measuring position)</td>
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Flow Cell XL

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<td>2</td>
<td>only Conductivity or Oxygen</td>
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<td>4</td>
<td>Conductivity and Oxygen</td>
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<th>Code</th>
<th>Pipe Connection</th>
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<tbody>
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<tr>
<td>2</td>
<td>TC50 1/2&quot;</td>
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<td>3</td>
<td>TC50 1.5&quot;</td>
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<tr>
<td>0</td>
<td>special</td>
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<table>
<thead>
<tr>
<th>Code</th>
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<td>2</td>
<td>FFKM (two measuring positions)</td>
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<td>FFKM (one measuring position)</td>
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<tr>
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<td>special</td>
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</tbody>
</table>

For more specifications see www.hamiltoncompany.com

**USP Class VI**

*Not self draining*
FlexiFlow SL 10

The FlexiFlow is a flow-through cell. It can be used in all cases where pH or oxygen must be reliably measured in ion-weak media including coolant piping in power generating stations. The sample is fed into the cell from the bottom at a low flow speed, and out of the cell again at the side. A groove cut into the FlexiFlow allows it to easily be attached anywhere with commercially available screws.

Benefits
- Compact design
- Easy to attach to a plate
- For use in small pipes where sensors cannot be inserted directly
- Self draining

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Wetted parts</td>
<td>Stainless Steel 1.4435</td>
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<td>O-ring material</td>
<td>EPDM*</td>
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<tr>
<td>Pressure range (relative to ambient)</td>
<td>0 to 16 bar</td>
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<tr>
<td>Temperature range</td>
<td>-10 to 130 °C</td>
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<tr>
<td>Sensor thread</td>
<td>PG 13.5</td>
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<tr>
<td>Sensor a-length</td>
<td>120 mm</td>
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<tr>
<td>Process connection</td>
<td>Swagelok 10 mm</td>
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<tr>
<td>ATEX approval</td>
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For more specifications see www.hamiltoncompany.com

Ordering Information

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For more dimensional drawings see www.hamiltoncompany.com
## Sensor Comparison

### pH or ORP sensor

<table>
<thead>
<tr>
<th>pH glass type</th>
<th>Nominal measurement range</th>
<th>Recommm. measurement range</th>
<th>Reference system</th>
<th>Reference electrolyte</th>
<th>Diaphragm type</th>
<th>Recommm. min. conductivity (µS/cm)</th>
<th>Nominal temperature range (°C)</th>
<th>Recommm. temperature range (°C)</th>
<th>Nominal pressure max. (bar)</th>
<th>Upside down installation</th>
<th>Comments</th>
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<tbody>
<tr>
<td>ChemoTrode</td>
<td>PHI</td>
<td>0 to 14</td>
<td>Everef-F</td>
<td>3M KCl-LR</td>
<td>HP ceramic</td>
<td>20</td>
<td>0 to 130</td>
<td>0 to 130</td>
<td>6</td>
<td>No</td>
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<td>ChemoTrode Bridge</td>
<td>PHI</td>
<td>0 to 13</td>
<td>Everef-B</td>
<td>Skylyte</td>
<td>HP ceramic</td>
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<td>0 to 130</td>
<td>0 to 130</td>
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<td>6</td>
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<td>FemtoTrode</td>
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<td>0 to 13</td>
<td>Everef-F</td>
<td>Skylyte</td>
<td>Cozamatic</td>
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<td>0 to 130</td>
<td>0 to 130</td>
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<td>Ag/AgCl</td>
<td>Viscous 3M KCl</td>
<td>Ceramic</td>
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<td>0 to 130</td>
<td>0 to 130</td>
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<td>Everef-L</td>
<td>Polisolve</td>
<td>Single Pore ring</td>
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<td>-10 to 130</td>
<td>5 to 100</td>
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<td>No</td>
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<td>Everef-L</td>
<td>Polisolve</td>
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<td>-10 to 130</td>
<td>5 to 100</td>
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<td>2 to 12</td>
<td>Everef-L</td>
<td>Polisolve</td>
<td>Single Pore ring</td>
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<td>0 to 130</td>
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<td>No</td>
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<tr>
<td>InchTrode N75F</td>
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<td>0 to 14</td>
<td>Everef-L</td>
<td>Polisolve</td>
<td>Single Pore ring</td>
<td>5</td>
<td>0 to 130</td>
<td>5 to 100</td>
<td>6</td>
<td>No</td>
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<tr>
<td>IonoTrode</td>
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<td>0 to 13</td>
<td>Everef</td>
<td>3M KCl</td>
<td>Ceramic</td>
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<td>0.5</td>
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<tr>
<td>LIQ-Glass PG</td>
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<td>Everef</td>
<td>3M KCl-LR</td>
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<td>No</td>
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<tr>
<td>MecoTrode</td>
<td>H</td>
<td>0 to 14</td>
<td>Everef</td>
<td>Viscous 3M KCl</td>
<td>HP ceramic</td>
<td>50</td>
<td>0 to 130</td>
<td>0 to 130</td>
<td>6</td>
<td>No</td>
<td>0 to 16 bar at 25 °C, 0 to 6 bar at 130 °C</td>
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<tr>
<td>PoliLyte Pro</td>
<td>V</td>
<td>2 to 12</td>
<td>Everef-L</td>
<td>Polisolve</td>
<td>Single Pore</td>
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<td>-10 to 60</td>
<td>-10 to 60</td>
<td>6</td>
<td>only VP</td>
<td></td>
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<tr>
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<td>V</td>
<td>2 to 12</td>
<td>Ag/AgCl</td>
<td>Polisolve</td>
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<td>0 to 40</td>
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<td>Polisolve Plus</td>
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<td>0 to 130</td>
<td>16</td>
<td>only VP</td>
<td>0 to 50 bar (60 °C), 0 to 20 bar (100 °C), 0 to 16 bar (130 °C)</td>
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<td>Everef-L</td>
<td>Polisolve Plus</td>
<td>Single Pore</td>
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<td>0 to 130</td>
<td>10</td>
<td>only VP</td>
<td>Predecessor: PoliLyte Plus, PoliLyte HT</td>
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<tr>
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<td>0 to 130</td>
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<td>10</td>
<td>only VP</td>
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<td>only VP</td>
<td>Predecessor: DiaryTrode</td>
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<td>Everef-L</td>
<td>Polisolve Plus</td>
<td>Single Pore</td>
<td>5</td>
<td>0 to 130</td>
<td>5 to 130</td>
<td>10</td>
<td>only VP</td>
<td>Predecessor: Polyclavie</td>
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<td>Everef-F</td>
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<td>HP Cozamatic</td>
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<td>5 to 140</td>
<td>6</td>
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<td></td>
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<tr>
<td>EasyFerm Plus HB</td>
<td>HB</td>
<td>2 to 12</td>
<td>Everef-F</td>
<td>Phermlyte</td>
<td>HP Cozamatic</td>
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<td>0 to 140</td>
<td>5 to 140</td>
<td>6</td>
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<td>Everef-L</td>
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### ORP Sensors

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<th>pH glass type</th>
<th>Nominal measurement range</th>
<th>Recommm. measurement range</th>
<th>Reference system</th>
<th>Reference electrolyte</th>
<th>Diaphragm type</th>
<th>Recommm. min. conductivity (mV)</th>
<th>Nominal temperature range (°C)</th>
<th>Recommm. temperature range (°C)</th>
<th>Nominal pressure max. (bar)</th>
<th>Upside down installation</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
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<td>Platinum ring</td>
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<td>Everef-F</td>
<td>3M KCl-LR</td>
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<td>± 2000 mV</td>
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<td>No</td>
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<td>± 2000 mV</td>
<td>Ag/AgCl</td>
<td>Ceramic</td>
<td>Gel</td>
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<td>± 2000 mV</td>
<td>± 2000 mV</td>
<td>2</td>
<td>No</td>
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<td>Everef</td>
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<td>Ceramic</td>
<td>20</td>
<td>± 2000 mV</td>
<td>± 2000 mV</td>
<td>2</td>
<td>No</td>
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</tr>
<tr>
<td>Polyplast Pro RX</td>
<td>Platinum wire</td>
<td>± 2000 mV</td>
<td>Ag/AgCl</td>
<td>Polisolve</td>
<td>Single Pore</td>
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<td>-10 to 60</td>
<td>-10 to 60</td>
<td>6</td>
<td>No</td>
<td></td>
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<tr>
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<td>Platinum wire</td>
<td>± 2000 mV</td>
<td>Everef-F</td>
<td>Phermlyte</td>
<td>HP Cozamatic</td>
<td>100</td>
<td>± 2000 mV</td>
<td>± 2000 mV</td>
<td>6</td>
<td>Arc: ± 1500 mV</td>
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<td>± 2000 mV</td>
<td>Everef-L</td>
<td>Polisolve</td>
<td>Single Pore</td>
<td>50</td>
<td>± 2000 mV</td>
<td>± 2000 mV</td>
<td>6</td>
<td>Arc: ± 1500 mV, 0 to 16 bar at 100 °C, 0 to 3 bar at 140 °C</td>
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</tbody>
</table>
Marking sensors or housings for ATEX / IECEx is as follows:

Example OxyFerm FDA

Gas:
CE 0035 II 1/2 G ia IIC T4/T5/T6 Ga/Gb

Dust:
CE 0035 II 1/2 D ia IIIC T x °C Da/Db

The temperature value x in dust atmospheres needs to be calculated.

Many industrial processes are in hazardous environments and require suitable equipment with the European ATEX or the global IECEx approval. Hamilton provides safe sensors and housings since many years for these applications. In case a gas atmosphere and a dust atmosphere are or could be present at the same time, the risk of explosion must be examined carefully and special precautions may be necessary. Typical gas atmospheres can be found in oil refineries, printing industries and biogas plants. Dust atmospheres can be found in underground coalmines, woodworking areas and in all kind of mills. In the chemical industry both atmospheres can be found.

ATEX is the widely used synonym for the ATEX directives of the European Union. ATEX stands for the French abbreviation «ATmosphère EXplosible». The objective of ATEX is to ensure the free movement of goods throughout the European Union, by offering one harmonized compliance procedure accepted by all EU countries. This means that different national standards within the EU are obsolete. ATEX covers equipment only. Equipment for hazardous areas requires an ATEX approval when sold within the European Union.

The IECEx system is a conformity assessment system of the International Electrical Commission (IEC). It is the objective of the IECEx system to facilitate international trade in equipment and services. Currently Australia, New Zealand, and Singapore accept the IECEx certificate of conformity as meeting all of the national requirements for Ex Certification. No further national certification is required. The IECEx is also accepted in many other countries.

The table gives an overview of the approvals available for the different product lines. Detailed information about a specific product can be found on the Hamilton website their spec sheets. For general overview please refer to: www.hamiltoncompany.com/support/process-analytics/certificates/products-for-explosive-atmospheres

DO sensor

<table>
<thead>
<tr>
<th>Measurement principle</th>
<th>Nominal measurement range (DO)</th>
<th>Nominal temperature range</th>
<th>Measurement temperature range</th>
<th>Nominal pressure max. (bar)</th>
<th>Compatible caps / membranes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OxyFerm FDA</td>
<td>Amperometric</td>
<td>10 ppb to 40 ppm</td>
<td>0 to 130 °C</td>
<td>0 to 130 °C</td>
<td>4</td>
</tr>
<tr>
<td>OxyGold B</td>
<td>Amperometric</td>
<td>8 ppb to 40 ppm</td>
<td>0 to 100 °C</td>
<td>0 to 100 °C</td>
<td>12</td>
</tr>
<tr>
<td>OxyGold G</td>
<td>Amperometric</td>
<td>1 ppb to 40 ppm</td>
<td>0 to 130 °C</td>
<td>0 to 130 °C</td>
<td>12</td>
</tr>
<tr>
<td>Oxygenes</td>
<td>Amperometric</td>
<td>40 ppb to 40 ppm</td>
<td>0 to 60 °C</td>
<td>0 to 60 °C</td>
<td>4</td>
</tr>
</tbody>
</table>

Conductivity sensor

<table>
<thead>
<tr>
<th>Measurement principle</th>
<th>Nominal measurement range</th>
<th>Nominal temperature range</th>
<th>Cell constant</th>
<th>Nominal pressure max. (bar)</th>
<th>Electrodes materials available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducell 4UxF</td>
<td>4 pole contacting</td>
<td>1 µS/cm to 300 mS/cm</td>
<td>-20 to 150 °C</td>
<td>0.36/cm</td>
<td>Stainless steel 1.4435, Titanium, Hastelloy C 2.4602, Platinum</td>
</tr>
<tr>
<td>Conducell 4US</td>
<td>4 pole contacting</td>
<td>0.1 µS/cm to 500 mS/cm</td>
<td>-20 to 135 °C</td>
<td>0.147/cm</td>
<td>Stainless steel 1.4435</td>
</tr>
<tr>
<td>Conducell UPW</td>
<td>2 pole contacting</td>
<td>0.01 to 1500 µS/cm</td>
<td>0 to 130 °C</td>
<td>&lt; 0.12/cm</td>
<td>Stainless steel 1.4435</td>
</tr>
<tr>
<td>Conducell 2DC-PG</td>
<td>2 pole contacting</td>
<td>10 µS/cm to 20 mS/cm</td>
<td>-5 to 80 °C</td>
<td>1/cm</td>
<td>Graphite</td>
</tr>
<tr>
<td>Conducell I</td>
<td>inductive</td>
<td>100 µS/cm to 2000 mS/cm</td>
<td>-10 to 125 °C</td>
<td>6.3/cm</td>
<td>none</td>
</tr>
</tbody>
</table>

Safety First

Hamilton Offers More Certificates Then Ever

Many industrial processes are in hazardous environments and require suitable equipment with the European ATEX or the global IECEx approval. Hamilton provides safe sensors and housings since many years for these applications. In case a gas atmosphere and a dust atmosphere are or could be present at the same time, the risk of explosion must be examined carefully and special precautions may be necessary. Typical gas atmospheres can be found in oil refineries, printing industries and biogas plants. Dust atmospheres can be found in underground coalmines, woodworking areas and in all kind of mills. In the chemical industry both atmospheres can be found.

ATEX is the widely used synonym for the ATEX directives of the European Union. ATEX stands for the French abbreviation «ATmosphère EXplosible». The objective of ATEX is to ensure the free movement of goods throughout the European Union, by offering one harmonized compliance procedure accepted by all EU countries. This means that different national standards within the EU are obsolete. ATEX covers equipment only. Equipment for hazardous areas requires an ATEX approval when sold within the European Union.

The IECEx system is a conformity assessment system of the International Electrical Commission (IEC). It is the objective of the IECEx system to facilitate international trade in equipment and services. Currently Australia, New Zealand, and Singapore accept the IECEx certificate of conformity as meeting all of the national requirements for Ex Certification. No further national certification is required. The IECEx is also accepted in many other countries.

Marking sensors or housings for ATEX / IECEx is as follows:

Example OxyFerm FDA

Gas: CE 0035 II 1/2 G ia IIC T4/T5/T6 Ga/Gb
Dust: CE 0035 II 1/2 D ia IIIC T x °C Da/Db

The temperature value x in dust atmospheres needs to be calculated.