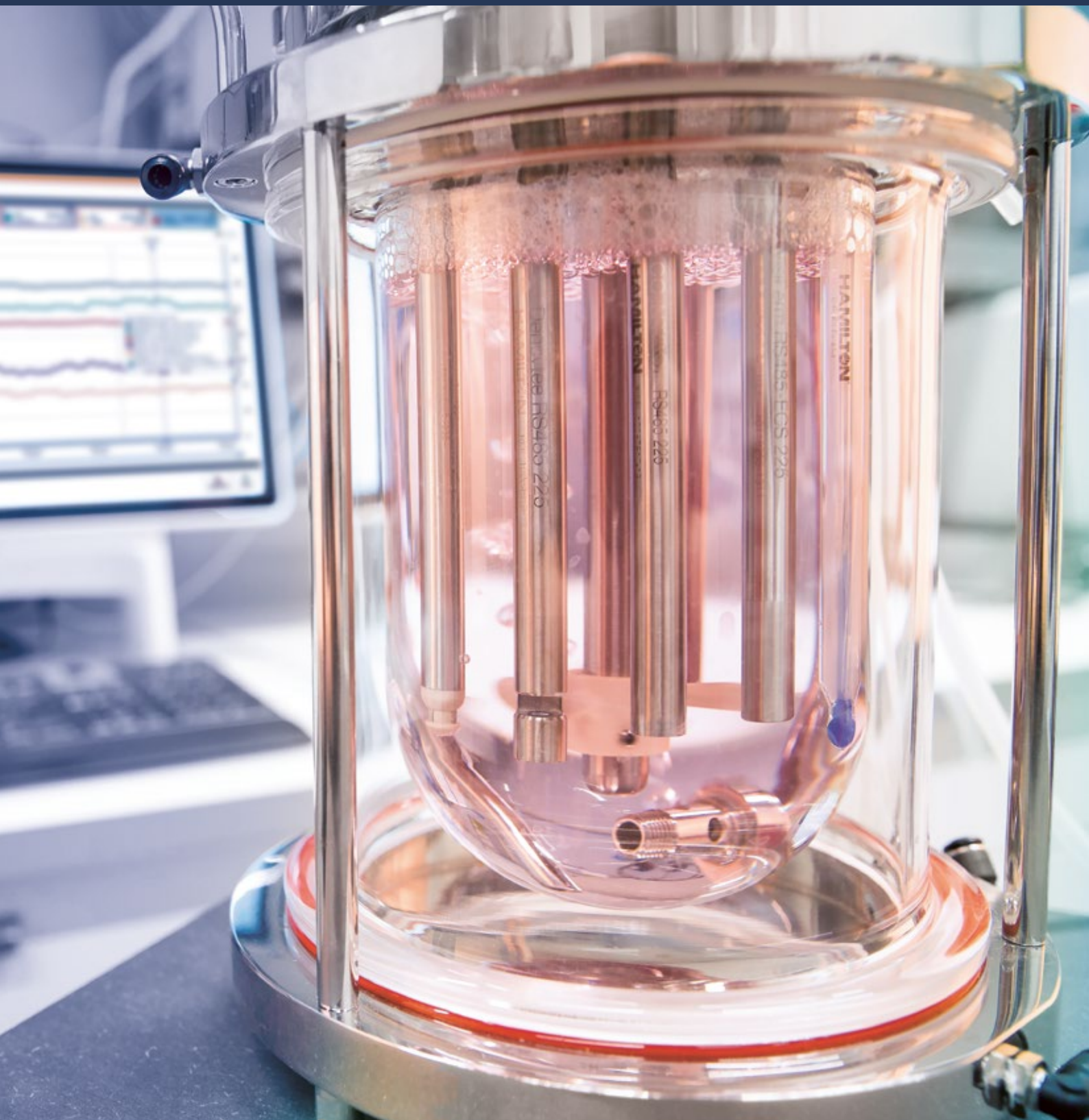
HAMILTON

Process Analytics

Measuring Solutions



Innovation for a better world

«With our pioneering sensor technology, we solve bioprocess and biopharma challenges.»

The world of Process Analytics
Learn more on our website

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Manuals & Specifications
Application Notes
Quality & Regulatory Certificates

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Highlights
Cell Density

On-Line Data
Real-Time Decisions

On-line monitoring of cell density provides the continuous information necessary to optimize control and yield beyond what is possible off-line. Clear, instantly available information ensures critical process events that could have been missed between off-line samples are now immediately recognizable. Hamilton offers sensors for both viable and total cell density measurement.

Measure Viable Cell Density with Incyte Arc
Permittivity measurements are the most reliable method of monitoring Viable Cell Density (VCD). This measurement is immediately affected by changes in Viable Cell Density and can be used to time process-specific actions for maximum yield. Permittivity can also be used to detect changes in cell physiology and is the most immediate method for determining the beginning of the cell death phase.

Next Generation Total Cell Density Measurement with Dencytee Arc
With the Dencytee Arc sensor, Hamilton now offers a new generation of in-line total cell density biomass measurement. We have taken the measurement technology to the next level and combined the advantages of transmission and reflection measurement. By upgrading to two detectors, higher measurement resolution can be achieved. This results in higher reliability that can be used in both low and high cell concentrations.

Single-Use

One Vendor All Measurements

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 available for easy integration of 4 to 20mA and 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 SU Family
Reliable Dissolved Oxygen Measurement
The Hamilton VisiFerm 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 re-useable probes.

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

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.

Get Co_2ntrol

Solid-State Optical DCO_2 Sensor

Though DCO_2 is commonly recognised as a critical process parameter in biopharmaceutical production, the measurement technology has not really changed a lot. In fact, all in-line sensors available on the market until now are based on the indirect Severinghaus measuring principle – a technology that is more than 50 years old and prone to measurement errors and high maintenance.

It was clear that Hamilton Process Analytics would take on the challenge to develop a new type of sensor that would combine real-time control together with reliability and cost efficiency.

We are now more than proud to present you CO_2NTROL – our new solid state sensor that directly measures DCO_2 and provides maintenance free, real-time, and in-line control of this critical process parameter.

See more from page → 78

Maintenance Free

Simple Calibration

Made for Bioproduction

Intuitive Sensor Management

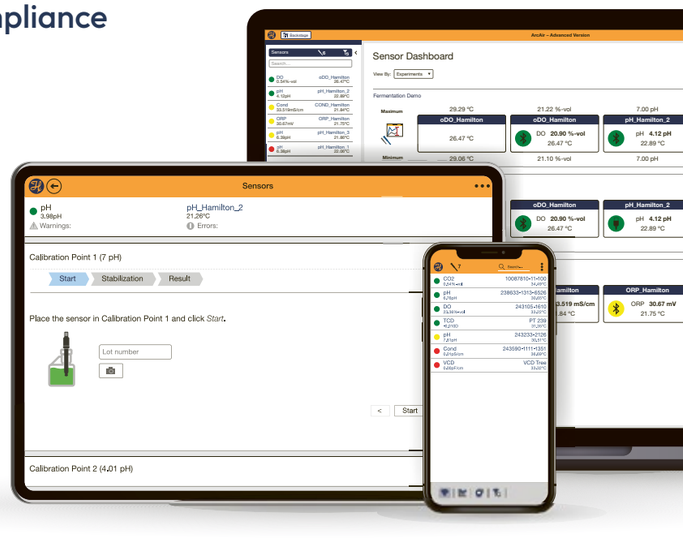
The ArcAir App: One Tool for Sensor Management & Ready for GMP Compliance

- Wireless configuration and calibration
- Common interface for mobile, tablet, and PC
- Automated validation and documentation
- Ready for compliance with FDA CFR 21 Part 11 and Eudralex Volume 4 Annex 11

Download on the App Store

GET IT ON Google Play

HAMILTON arc Air



Field Services

Hamilton's experienced Field Service Team are ready to visit your facility to provide operation installation, qualification support, service diagnostics, maintenance & calibration services, and tailored on-site training. Our on-site services ensure an effortless integration of Hamilton products with your systems.

Let us take the set-up and maintenance stress out of your process. Contact us to find out if we currently offer field services in your local area.

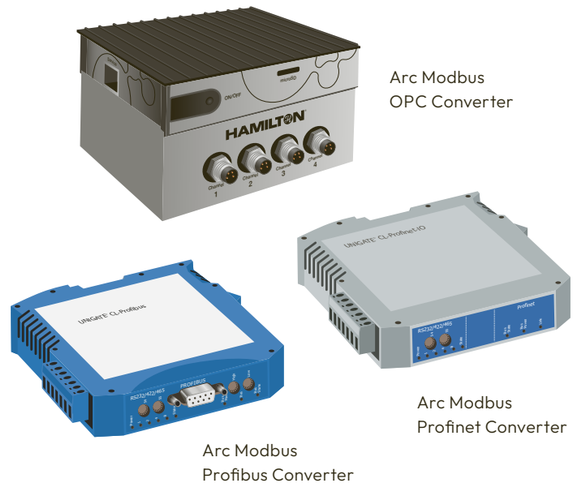
See more from page → 164

Arc Modbus Converter Portfolio

Our Arc Modbus Converters are now supporting all parameters. Just like the many languages that are spoken around the world, there are various communication protocols in bioproduction, so proper communication among the different devices and process control systems is not necessarily an easy task.

Thanks to our large Arc converter portfolio, we offer seamless integration of our sensors to your protocol so that you can take full advantage of our Arc technology.

See more from page → 116



Arc Modbus OPC Converter

Arc Modbus Profinet Converter

Arc Modbus Profibus 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.

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.

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 MDT[1] according to EN ISO 10993-5[2] and USP 31, 2008 Chapter 87[3] and according to international GLP[4] guidelines.

1 Medical Device Testing GmbH Ochsenhausen

2 Biological evaluation of medical devices -- Part 5: Tests for in vitro cytotoxicity

3 Biological Activity Tests, In Vitro

4 Good Laboratory Practice

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.

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.

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[1]. 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[2]. Each batch is certified by the DFM. In an inter-laboratory test among prestigious European metrological institutes (PTB, DFM, DAkkS[3]), Hamilton standards were used as a measurement solution.

[1] PTB: Physikalisch-Technische Bundesanstalt, Braunschweig, Germany

[2] DFM: Danish Institue of Fundamental Metrology, Lyngby, Denmark

[3] DAkkS: Deutsche Akkreditierungsstelle, Wolfen, Germany

DuraCal pH Buffers

Easy Calibration with special designed bottles

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 up to 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 to 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 and cap lifetime check that indicates when the sensor is in need of maintenance. A simple, replaceable ODO cap rebuilds the sensor in seconds.

The optical measurement is independent from the flow and insensitive to CO_2. 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.

See more from page → 82

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 sensor's head. Arc sensors communicate directly with the PCS through 4-20 mA standard and digital signals.

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

Fully compensated signal
- Temperature
- Pressure, Salinity

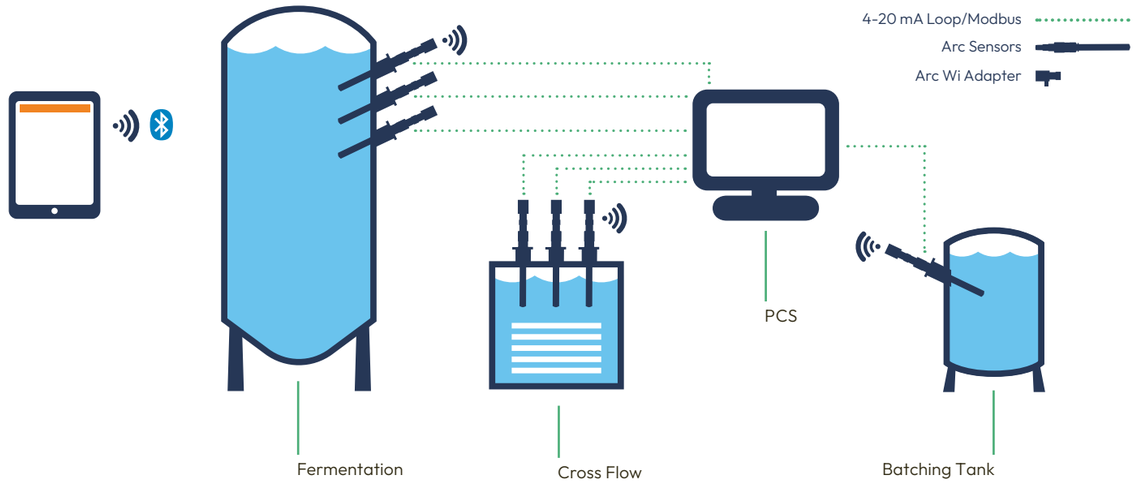
Signal output
- Digital Modbus
- 4-20 mA analog
- Different parameter units (e.g. mV, ppb, %sat....)

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

Arc Intelligence

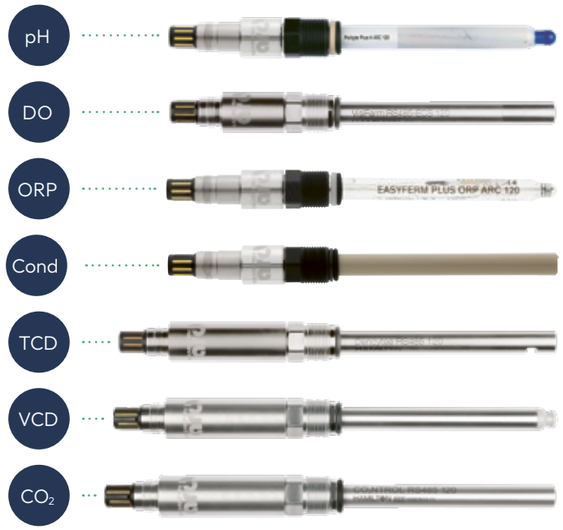
Arc Sensor Communication

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



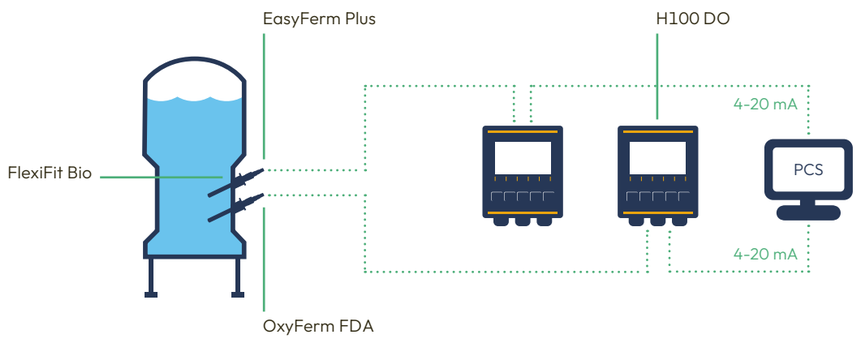
Laboratory Calibration

Complete Arc Sensor Portfolio

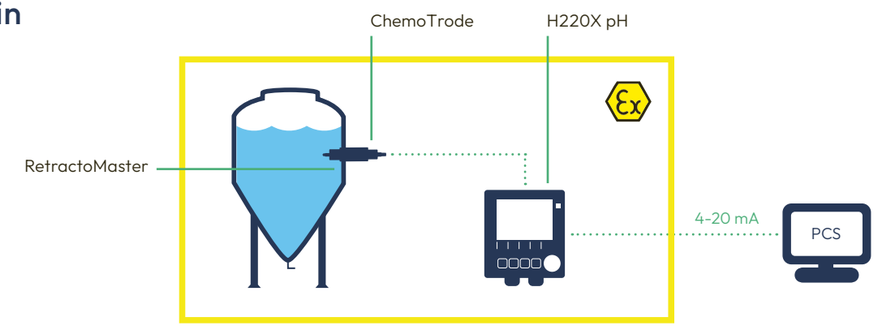


Analog Systems

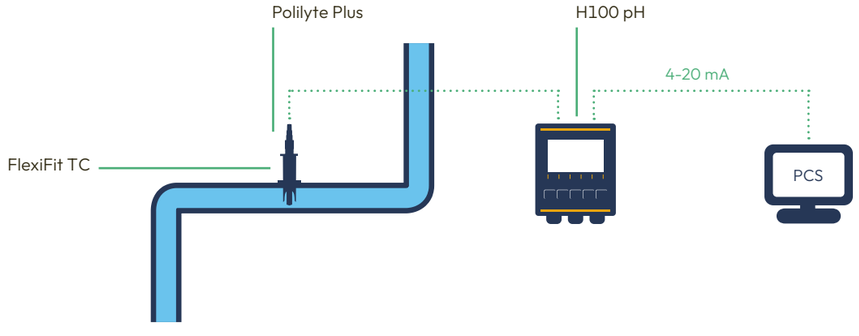
Standard Measuring Loop



Measuring Loop in Hazardous Area

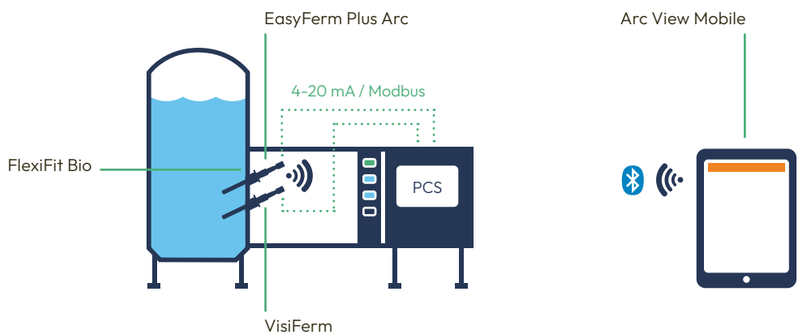


Measuring Loop in Pipe

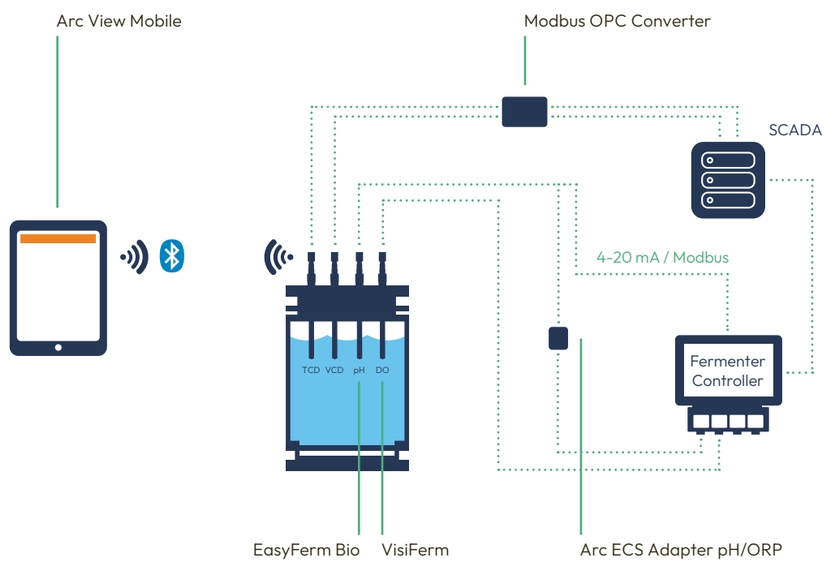


Arc Systems

Skid System



Arc in R&D



pH

pH Sensors

pH measurements are important in many processes. There is almost no application 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.

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.

		Biopharma				Chempharma	Cultivated Meat	Brewery and Beverages		Food, Industrial processes	Harsh industrial applications	Waste water treatment	General water applications
Sensor	Feature	Single-Use	Upstream	Downstream	Cleaning (CIP) Water treatment			Brewing Fermentation Storage	Cleaning equip-ment, CIP and water treatment				
OneFerm pH	Dry Storage / Low Drift	✓											
EasyFerm Plus	Designed for hygenic applications (autoclavable, CIP and SIP)		✓ (PHI)							✓ (PHI, HB)			
EasyFerm Bio	Designed for hygenic applications (autoclavable, CIP and SIP)		✓ (PHI)	✓ (PHI)			✓ (PHI)	✓ (PHI, HB)		✓ (PHI, HB)			
Polilyte Plus	Designed for low conductivity measurements and strong acids, bases and solvents				✓ (H)	✓ (H)			✓ (H)	✓ (H, HB, PHI)		✓ (HF)	✓ (HF)
MecoTrode	Designed for extreme pH values and temperature					✓ (H)				✓ (H)		✓ (HF)	✓ (HF)
ChemoTrode	Designed for hygenic applications					✓				✓	✓		
InchTrode	Designed to withstand demanding applications										✓	✓	✓
IonoTrode	Designed for very low conducitvity measurements												✓
Polilyte Pro	Designed to perform maintenance free in water applications											✓	✓
Polyplast	Designed to perform maintenance free in water applications											✓	✓
EasyControl	Entry level process sensor for chemical and waste water applications											✓	✓
Liq-Glass PG	Entry level process sensor for chemical and waste water applications											✓	✓

Polilyte Plus

family pH

The Polilyte Plus sensors is designed for harsh industrial conditions, ensuring maintenance-free operation with anti-clog junctions and reliable accuracy in various solutions. It features an Everef-L reference cartridge for an extended lifespan and integrates Liquid Earth in the VP version for stable signals and enhanced diagnostics.

Benefits

- Maintenance free design: elimination of clogging with two single pore junctions
- Good performance in highly alkaline solutions and in samples with low conductivity
- Suitable for demanding industrial applications in chemical, petrochemical, process water, and wastewater treatment

Typical applications

- Chemistry
- Waste Water
- Demanding Applications

How to choose the glass

Requirement	Sensor	pH glass
Hydrofluoric acid (HF) in the media, low temperature	**Polilyte Plus HF**	HF
Low conductivity	**Polilyte Plus H**	H
CIP, SIP, autoclavations, chemical robustness	**Polilyte Plus PHI**	PHI
CIP, SIP, autoclavations, fast response time	**Polilyte Plus HB**	HB
High pressure	**Polilyte Plus XP**	H

Specifications	
Measuring range	0 to 14 pH
Process temperature	See table on page 166
Pressure range (relative to ambient)	See table on page 166
Sterilization / cleaning method	Autoclavable: H, HB, PHI CIP: HB, PHI SIP: H, HB, PHI
pH glass	See table on page 18
Electrolyte	Polisolve Plus
Reference system	Everef-L
Diaphragm	Single Pore
O-ring	EPDM: HB, PHI FKM: H, HF

For more specifications see www.hamiltoncompany.com

Accessories

- pH buffers → 52
- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

Ordering Information

Polilyte Plus Family Structure

242428

Code	pH glass
1	H
2	HB (not for MS)
3	HF
4	PHI

Code	Electrical Connector
1	VP
2	S8
3	Arc
4	Memosens

Code	a-length (mm)
1	120
2	225
3	325
4	360 (not for Arc, MS only with H glass)
5	425

Code	Temperature sensor
1	Pt100 (VP) (not applicable for Arc)
2	Pt1000 (VP) (not applicable for Arc)
3	none (S8) or given (Memosens, Arc)

242428 –

238811 – Polilyte Plus XP S8 120

242415 – Polilyte Plus XP VP 120 Pt1000

EasyFerm Bio

family pH

The Foodlyte electrolyte of the EasyFerm Bio sensors is Certified for bio-compatibility, making it the ideal choice for Food or Biopharma applications.

Different glass membrane formulations are suitable for different applications, allowing the user to optimize their processes. Hamilton's clog-free diaphragm increases the stability and accuracy of readings, while increasing the lifetime of the sensor.

«Did you know... that you may even eat the Foodlyte?»

Benefits

- Certified Bio-compatible
- Pre-pressurized reference design for accurate pH measurement
- Clog-free diaphragm ensures extremely low drift over the sensor's lifetime
- Customizable to your application

Typical applications

- Bioreactors
- Brewhouse
- Downstream processes
- Gelatine manufacturing

How to choose the glass

Requirement	Sensor	pH glass
CIP, SIP, autoclavations, chemical robustness	**EasyFerm Bio PHI**	PHI
CIP, SIP, autoclavations, fast response time	**EasyFerm Bio HB**	HB

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 (relative to ambient)	0 to 6 bar g
Sterilization / cleaning method	Autoclavable, SIP, CIP
pH glass	See table on page 20
Electrolyte	Foodlyte
Reference system	Everef-F
Diaphragm	HP Coatramic
O-ring	Silicone

For more specifications see www.hamiltoncompany.com

Accessories

- pH buffers → 52
- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

Ordering Information

EasyFerm Bio Family Structure

243632

Code	pH glass
1	PHI
2	HB

Code	Electrical Connector
1	VP
2	S8
3	Arc
4	Memosens
5	K8
6	LEVP (only for 120 and 225 mm length)

Code	a-length (mm)
1	120
2	160
3	200
4	225
5	325
7	425

Code	Temperature sensor
1	Pt100 (VP, LEVP) (not applicable for Arc)
2	Pt1000 (VP, LEVP) (not applicable for Arc)
3	none (S8, K8) or given (Memosens, Arc)

243632 –

EasyFerm Plus

family pH

The EasyFerm Plus with the different glass membrane formulations are suitable for different applications, allowing the user to optimize their processes.

Pairing Hamilton's Phermlyte electrolyte with a pre-pressurized reference and their clog-free HP Coatramic diaphragm increases the stability and accuracy of readings, while increasing the lifetime of the sensor.

«Did you know... that with a pre-pressurized reference system the life time of a sensor is extended?»

Benefits

- Suitable for all industries
- Pre-pressurized reference design for accurate pH measurement
- Clog-free diaphragm ensures extremely low drift over the sensor's lifetime
- Customizable to your application

Typical applications

- Bioreactors
- Industrial processes

How to choose the glass

Requirement	Sensor	pH glass
CIP, SIP, autoclavations, chemical robustness	**EasyFerm Plus PHI**	PHI
CIP, SIP, autoclavations, fast response time	**EasyFerm Plus HB**	HB

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 (relative to ambient)	0 to 6 bar g
Sterilization / cleaning method	Autoclavable, SIP, CIP
pH glass	See table on page 22
Electrolyte	Phermlyte
Reference system	Everef-F
Diaphragm	HP Coatramic
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Accessories

- pH buffers → 52
- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

Ordering Information

EasyFerm Plus Family Structure

238633

Code	pH glass
1	PHI
2	HB

Code	Electrical Connector
1	VP
2	S8
3	Arc
4	Memosens
5	K8
6	LEVP (only for 120 and 225 mm length)

Code	a-length (mm)
1	120
2	160
3	200
4	225
5	325
6	360 (not for Arc and only PHI glass)
7	425

Code	Temperature sensor
1	Pt100 (VP, LEVP) (not applicable for Arc)
2	Pt1000 (VP, LEVP) (not applicable for Arc)
3	none (S8, K8) or given (Memosens, Arc)

238633 –

MecoTrode

pH

The MecoTrode pH sensors are designed for processes in the chemical industry with extreme pH values.

They are constructed from a H-glass type membrane which provides a low alkaline error and stable measurement even at high temperatures. Three high-performance ceramic diaphrams reduce the effect of flow potential in viscous liquids.

Benefits

- Capable of measuring a broad range of pH (including extreme pH values)
- Stable and accurate pH readings, even at high temperatures
- Low maintainance
- Suitable for the chemical industry

Typical applications

- Water and wastewater
- Industrial processes

Specifications	
Measuring range	0 to 14 pH
Process temperature	0 to 130 °C
Pressure range (relative to ambient)	0 to 16 bar g (25 °C), 0 to 6 bar g (130 °C)
pH glass	MecoTrode H: H MecoTrode HF: HF
Electrolyte	Viscous 3 M KCl-Pharma, blue
Reference system	Everef
Diaphragm	HP ceramic
Temperature sensor	Pt100 in VP version NTC 22 kOhm in Arc Version NTC 30 kOhm in MS Version
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Accessories

- pH buffers → 52
- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

«Did you know...
that the MecoTrode is already 25 years in the market?»

Ordering Information					
	a-length	S8	VP6	MS	Arc
MecoTrode H	120	238801	238437	242837	10110152*
MecoTrode HF	120	–	–	242839	–
	225	–	–	242840	–

*Not for explosive environments

OneFerm pH

pH

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 occure with reusable pH sensors that are inserted into the bag.

Specifically, Hamilton's single-use sensors combine the reliability and measurement stability of our longterm 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.

Benefits

- Market-leader solution for a wide range of single-use Biopharma applications
- Certified Bio-compatible
- Ready to use
- Clog-free diaphragm ensures extremely low drift over the sensor's lifetime
- Customisable to your application

Typical applications

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

Specifications	
Measuring range	3 to 10 pH
Process temperature	4 to 50 °C
Pressure range (relative to ambient)	0 to 1 bar g
Sterilization / cleaning method	Gamma irradiation up to 45 kGy (for the OneFerm sensors together with the pH Insert)
O-ring	Silicone

For more specifications see www.hamiltoncompany.com

Accessories

Cables → 106
Arc Accessories → 115
Service & Support → 164

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

Ordering Information					
	a-length	VP6 / Pt100	VP6 / Pt1000	VP6 / NTC22	K8
OneFerm pH	70	243216	243266	243235	–
	120	243217	243267	243236	243271
	160	10064894	10108674	10065001	10106075
	225	243218	243268	243237	243272
	325	243219	243269	243238	243273
	425	10101065	10089592	243239	243274

Arc Module SU pH
REF 243233

pH Insert T
REF 10155128

ChemoTrode / P

pH

The ChemoTrode is our most robust sensor, designed for measuring pH in demanding applications in pharmaceutical and chemical industries.

The Everef-F reference cartridge ensures that the reference electrolyte remains free of silver and precipitation of proteins, while the liquid electrolyte can be easily refilled and pressurized up to 6 bar through a port in the sensor for easy maintenance. Refillable liquid electrolyte ensures fast response times and high precision during measurements.

Benefits

- Robust sensor suitable for demanding applications in pharmaceutical and chemical industries
- Liquid electrolyte ensures fast response time and high precision
- Everef-F reference cartridge extends electrode lifetime by preventing diaphragm clogging

Typical applications

- Chemical
- Demanding Applications

Specifications	
Measuring range	0 to 14 pH
Process temperature	0 to 130 °C
Pressure range (relative to ambient)	0 to 6 bar g
Sterilization / cleaning method	SIP, CIP
pH glass	PHI
Electrolyte	ChemoTrode: Viscous 3 M KCl-LR ChemoTrode P: Protelyte
Reference system	Everef-F
Diaphragm	HP ceramic
Temperature sensor	Pt1000 in VP version

For more specifications see www.hamiltoncompany.com

Accessories

- pH buffers → 52
- Cables → 106
- Housings → 123
- Service & Support → 164



Ordering Information				
	a-length	S7	VP6 / Pt1000	VP6 / Pt100
ChemoTrode P	120	238761	243252	–
	150	238763	243253	–
	250	238767	243254	–
ChemoTrode	120	238760	242700	–
	150	238762	242701	–
	200	238764	–	–
	250	238766	242703	10069903

InchTrode

pH

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

Specifications	
Measuring range	0 to 14 pH
Process temperature	-10 to 130 °C (flat membrane) 0 to 130 °C (cylindrical membrane)
Pressure range (relative to ambient)	0 to 10 bar g (25 °C) 0 to 6 bar g (130 °C)
pH glass	HF (flat membrane) PHI (cylindrical membrane)
Electrolyte	Polisolve
Reference system	Everef-L
Diaphragm	Single Pore
Temperature sensor	Pt1000 in VP version Pt100 in fix cable version

For more specifications see www.hamiltoncompany.com

Accessories

- pH buffers → 52
- Cables → 106
- Housings → 123
- Service & Support → 164

«Did you know... that the InchTrode is available in two different sizes and with different membrane shapes?»

Ordering Information				
	Type	a-length	VP6	fix cable
InchTrode	N75F	143	238346	–
	N75P	150	238342	–
	N75FC10	143	–	238364
	N75PC10	150	–	238359
	N100F	140	238352 (non Ex)	–

F = Flat membrane
P = Cylindrical membrane
C = Fix cable

IonoTrode

pH

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

Typical applications

- Drinking Water Plants
- Boiler Feed Water

Specifications	
Measuring range	0 to 14 pH
Process temperature	-10 to 40 °C
Pressure range (relative to ambient)	0 to 0.5 bar or higher if pressurization by side-arm
pH glass	F
Electrolyte	3 M KCl
Reference system	Everef
Diaphragm	Sleeve
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Accessories

- pH buffers → 52
- Cables → 106
- Housings → 123
- Service & Support → 164

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

Ordering Information		
	a-length	S7
IonoTrode	120	238525

Polilyte Pro
Polyplast Pro

pH

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

Specifications	
Measuring range	0 to 14 pH
Process temperature	Polilyte Pro: -10 to 60 °C Polyplast Pro: -10 to 40 °C
Pressure range (relative to ambient)	0 to 6 bar g
pH glass	Polilyte Pro: HF Polyplast Pro: V
Electrolyte	Polisolve
Reference system	Polilyte Pro: Everef-B Polyplast Pro: Ag/AgCl
Diaphragm	Single Pore
Temperature sensor	Pt1000 in VP version
O-ring	Polilyte Pro: EPDM Polyplast Pro: EPDM

For more specifications see www.hamiltoncompany.com

Accessories

- pH buffers → 52
- Cables → 106
- Housings → 123
- Service & Support → 164

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

Ordering Information			
	a-length	S8	VP6
Polilyte Pro	120	238411	238417
Polyplast Pro	120	238408	–

Liq-Glass PG EasyControl

pH

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 behaviour in samples with low conductivity.

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)	0 to 2 bar g
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

For more specifications see www.hamiltoncompany.com

Accessories

- pH buffers → 52
- Cables → 106
- Housings → 123
- Service & Support → 164

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

Benefits

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

Typical applications

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

Ordering Information		
	a-length	S8
Liq-Glass PG	120	238515
EasyControl (Non Ex)	120	238522

ORP

ORP Sensors

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.

		Biopharma				Chempharma	Food, Industrial processes	Harsh industrial applications	Waste water treatment	General water applications
Sensor	Feature	Single-Use	Upstream	Downstream	Cleaning (CIP) Water treatment					
EasyFerm Plus ORP	Designed for hygenic applications (autoclavable, CIP and SIP)		✓	✓			✓			
Polilyte Plus ORP	Designed for low conductivity measurements and strong acids, bases and solvents					✓	✓	✓	✓	✓
ChemoTrode ORP	Designed for hygenic applications					✓	✓	✓		
OxyTrode Pt	Designed to perform maintenance free in water applications					✓	✓		✓	✓
Polilyte RX	Designed to perform maintenance free in water applications								✓	✓
Polyplast Pro RX	Designed to perform maintenance free in water applications								✓	✓
EasyControl ORP	Entry level process sensor for chemical and waste water applications								✓	✓

Polilyte Plus ORP

ORP

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 potenital
- 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	
Measuring range	± 2000 mV (Arc: ± 1500 mV)
Process temperature	0 to 130 °C (Arc: analog 0 to 110 °C, digital 0 to 140 °C)
Pressure range (relative to ambient)	0 to 3 bar g (140 °C) 0 to 10 bar g (130 °C) 0 to 16 bar g (100 °C)
Sterilization / cleaning method	Autoclavable, CIP, SIP
ORP element	Pt wire
Electrolyte	Polisolve Plus
Reference system	Everef-L
Diaphragm	Single Pore
O-ring	FKM

For more specifications see www.hamiltoncompany.com

Accessories

- ORP buffers → 52
- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

Ordering Information				
	a-length	S8	Arc	VP6
Polilyte Plus ORP	120	243185	243060	243648
	225	243186	243061	–
	325	10078139	243062	–
	425	10078140	243063	–

EasyFerm Plus ORP

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, autoclavation and CIP cleanings
- Large platinum ring

Typical applications

- Bioreactors
- Industrial processes
- Downstream processes

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 (relative to ambient)	0 to 6 bar g
Sterilization / cleaning method	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

Accessories

- ORP buffers → 52
- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

Ordering Information		S8	Arc
EasyFerm Plus ORP	120	243187	243050
	225	243188	243051
	325	–	243052
	425	–	243053

ChemoTrode ORP

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 (relative to ambient)	0 to 6 bar g
Sterilization / cleaning method	CIP, SIP
ORP element	Pt ring
Electrolyte	Viscous 3 M KCl-LR
Reference system	Everef-F
Diaphragm	HP Ceramic

For more specifications see www.hamiltoncompany.com

Accessories

- ORP buffers → 52
- Cables → 106
- Housings → 123
- Service & Support → 164

Ordering Information		
	a-length	S7
ChemoTrode ORP	120	238740
	150	238742

OxyTrode Pt

ORP

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.

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

Specifications	
Measuring range	± 2000 mV
Process temperature	0 to 130 °C
Pressure range (relative to ambient)	0 to 16 bar g (25 °C) 0 to 6 bar g (130 °C)
ORP element	Pt wire
Electrolyte	Viscous 3 M KCl-Pharma, blue
Reference system	Everef
Diaphragm	HP ceramic
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Accessories

- ORP buffers → 52
- Cables → 106
- Housings → 123
- Service & Support → 164

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

Ordering Information		
	a-length	S8
OxyTrode	120	238810

Polilyte RX
Polyplast Pro RX

ORP

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	
Measuring range	± 2000 mV
Process temperature	Polilyte RX: -10 to 60 °C Polyplast Pro RX: -10 to 40 °C
Pressure range (relative to ambient)	0 to 6 bar g
ORP element	Pt-wire
Electrolyte	Polisolve
Reference system	Polilyte RX: Everef-B Polyplast Pro RX: Ag/AgCl
Diaphragm	Single Pore
O-ring	Polilyte RX: EPDM Polyplast Pro RX: EPDM

For more specifications see www.hamiltoncompany.com

Accessories

- ORP buffers → 52
- Cables → 106
- Housings → 123
- Service & Support → 164

Ordering Information		
	a-length	S8
Polilyte RX	120	238433
Polyplast Pro RX	120	238409

EasyControl ORP

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 g
ORP element	Pt-wire
Electrolyte	Gel electrolyte
Reference system	Ag/AgCl
Diaphragm	Ceramic
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Accessories

- ORP buffers → 52
- Cables → 106
- Housings → 123
- Service & Support → 164

Ordering Information		
	a-length	S8
EasyControl ORP	120	238523

Buffer Solutions
for pH and ORP Sensor Calibration

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 NIST[1] and PTB[2]. 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 DAkkS[3] 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.

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 1.68, 2, 4.01, 7.00, 9.21, 10.01 and 12 are classified as “Certified Reference Material” (CRM).

Benefits

- Convenient: bottle has a built-in calibration compartment
- Economical: only 15 mL used per calibration
- Certified and traceable pH value from an accredited DakkS laboratory

First class certificates available at www.hamiltoncompany.com

[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 for Messen und Kalibrieren GmbH, Wolfen, Germany

pH Buffers

pH Value	Accuracy	Stability*	Certified By	Packaging Unit	REF
1.09	±0.02	60	Hamilton	500 mL	238271
1.68	±0.02	60	DAkkS	500 mL	238272
2.00	±0.02	60	DAkkS	500 mL	238273
2.00	±0.02	60	DAkkS	10 L	11011362
3.06	±0.02	60	Hamilton	500 mL	238274
4.01	±0.01/±0.02	24/60	DAkkS	250 mL	238317
4.01	±0.01/±0.02	24/60	DAkkS	500 mL	238217
4.01	±0.01/±0.02	24/60	DAkkS	3 x 500 mL	238917
4.01	±0.01/±0.02	24/60	DAkkS	5 L	238332
4.01	±0.01/±0.02	24/60	DAkkS	10 L	238194
5.00	±0.02	60	Hamilton	500 mL	238275
6.00	±0.02	60	Hamilton	500 mL	238276
7.00	±0.01/±0.02	24 / 60	DAkkS	250 mL	238318
7.00	±0.01/±0.02	24 / 60	DAkkS	500 mL	238218
7.00	±0.01/±0.02	24 / 60	DAkkS	3 x 500 mL	238918
7.00	±0.01/±0.02	24 / 60	DAkkS	5 L	238333
7.00	±0.01/±0.02	24 / 60	DAkkS	10 L	238188
8.00	±0.02	60	Hamilton	500 mL	238277
9.21	±0.02	60	DAkkS	250 mL	238319
9.21	±0.02	60	DAkkS	500 mL	238219
9.21	±0.02	60	DAkkS	3 x 500 mL	238919
9.21	±0.02	60	DAkkS	10 L	238216
10.01	±0.02	60	DAkkS	250 mL	238321
10.01	±0.02	60	DAkkS	500 mL	238223
10.01	±0.02	60	DAkkS	3 x 500 mL	238923
10.01	±0.02	60	DAkkS	10 L	238187
11.00	±0.05	24	Hamilton	500 mL	238278
12.00	±0.05	24	DAkkS	500 mL	238279
12.00	±0.05	24	DAkkS	10 L	10165246
4.01/7.00/9.21	±0.01/±0.02	24/60	DAkkS	500 mL, mixed	238922
4.01/7.00/10.01	±0.01/±0.02	24/60	DAkkS	500 mL, mixed	238924

ORP Buffers

Value	Accuracy	Stability*	Certified By	Packaging Unit	REF
271 mV	±5 mV	24	None	500 mL	238228
475 mV	±5 mV	24	None	250 mL	238322
475 mV	±5 mV	24	None	500 mL	238227

*In months after date of manufacturing

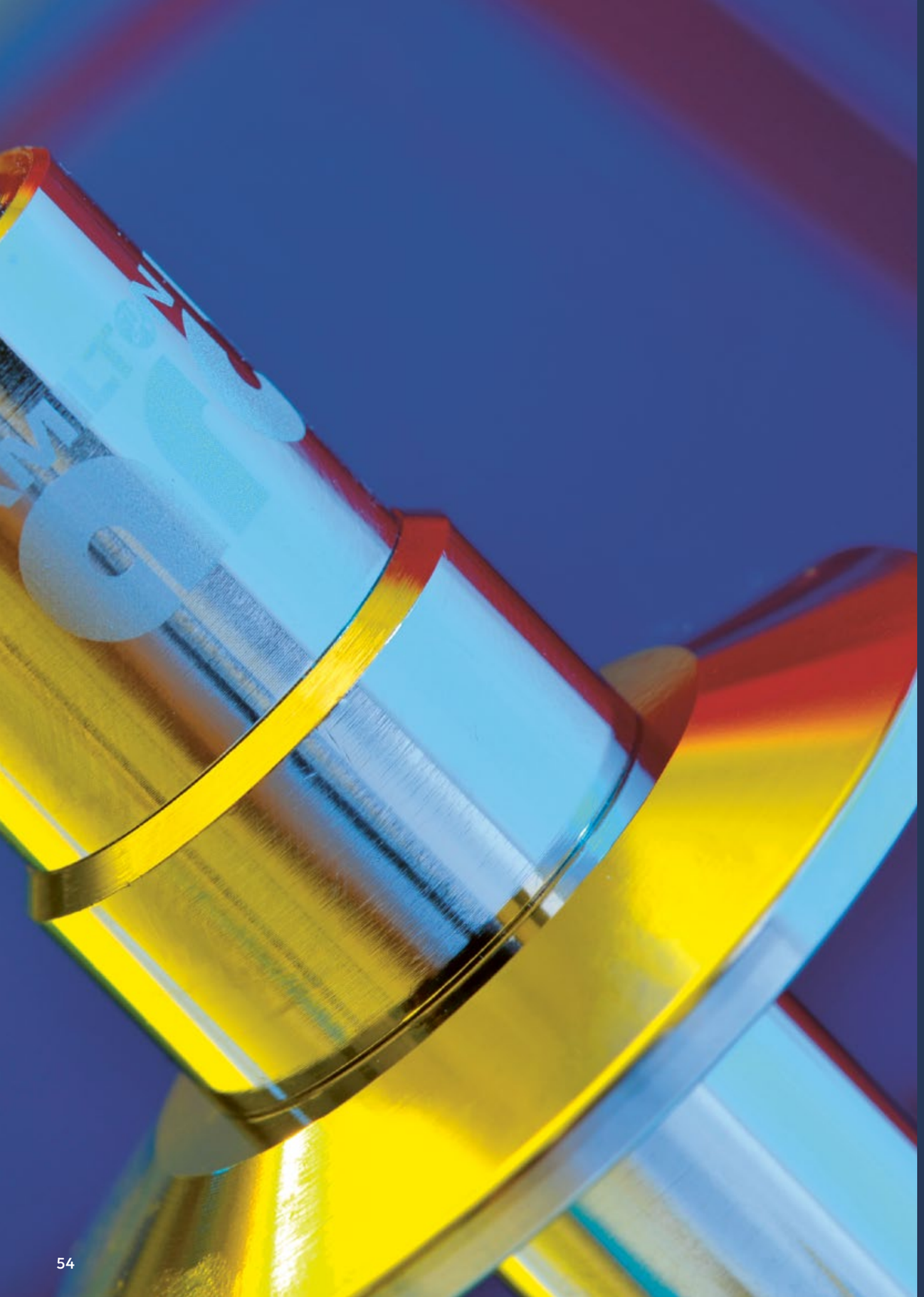
Simple handling for professional results

Step 1
Open bottle

Step 2
Fill calibration compartment

Step 3
Calibrate electrode

Step 4
Empty calibration compartment



Cond

Conductivity Sensors

The electrical conductivity is important for the characterization of liquids in various processes. In aqueous solutions the conductivity is caused by the decomposition of dissolved acids, bases or salts into positively charged cations and negatively anions. In ultra-pure water, where ions are absent, except a few H_3O+ and 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 (S/m). For the measurement of the conductivity of a solution it's common to use µS/cm or mS/cm.

		Biopharma				Chempharma			Food & Beverages	Water / Wastewater	Ultra Pure Water
		Single-Use	Media Prep, Upstream	CIP Station	Downstream	Product Quality	Water Preparation	CIP Station	CIP Station		
Sensor	**Feature**										
Conducell 4UxF	• Flexible process connections • High robustness • Wide measuring range and good linearity across whole range		✓	✓	✓	✓		✓	✓		
Conducell SU	• Ready to use and precalibrated • Gamma sterilizable • Ready to integrate in single-use bags • Seamless integration with Hamilton Arc technology	✓									
Conducell 4US	• High robustness • Wide measuring range and good linearity across the whole range • No housing required, comes with standard TC 1.5" or G125 Ingold connection			✓					✓		
Conducell UPW	• Fully compliant with USP 645, EP and JP • Wide operating temperature and pressure • Seamless integration with Hamilton Arc technology						✓				✓
Conducell 2DC-PG	• Wide operating temperature and pressure • Easy submersion beneath liquid surface									✓	

Conducell 4UxF

family Cond

The Conducell 4UxF is capable of measuring a broad range of conductivity (from 1 to 500’000 µS/cm (Analog) and 1 to 300’000 µS/cm (Arc)), making it suitable for both low and high conductivity measurements.

All wetted parts (DIN 1.4435, PEEK, EPDM) are FDA compliant and are CIP, SIP and autoclaving compatible, with good linearity.

Hamilton offers Conducell 4UxF sensors made from different materials which are suitable for various applications and come in Traditional or Arc models.

Benefits

- Can measure a broad range of conductivity (trace – very high)
- Real-time self-diagnostic capabilities
- FDA compliant and suitable for CIP, SIP and autoclaving
- Compatible with wired or wireless transmission
- Customisable to your application

Typical applications

- CIP monitoring
- BioPharma upstream (media preparation)
- Downstream (buffer mixing, chromatography, filtration)
- ChemPharma (phase separation and product quality)

Specifications	
Measuring range	Arc: 1 µS/cm to 300 mS/cm Analog: 1 µS/cm to 500 mS/cm
Measurement principle	4 pole contacting
Process temperature	Analog: -20 to 150 °C Arc: 0 to 110 °C (analog interface), 0 to 140 °C (digital interface)
Pressure range (relative to ambient)	0 to 20 bar g (135 °C) 0 to 10 bar g (150 °C)
Sterilization / cleaning method	Autoclavable, CIP, SIP
Cell constant	0.36/cm
Material of electrodes	x = S: Stainless steel 1.4435 x = H: Hastelloy C 2.4602 x = T: Titanium x = Pt: Platinum
O-ring	EPDM (other versions available on request)

Accessories

- Conductivity Standards → 66
- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

For more specifications see www.hamiltoncompany.com

Ordering Information

Conducell 4UxF Family Structure

243590 –

Code	Electrode Material
1	Stainless Steel 1.4435
2	Platinum (not for Triclamp)
3	Stainless Steel 2.4602
4	Titanium (not for Triclamp)

Code	Electrical Connector
1	Arc
2	VP

Code	a-length (mm)
1	120 (PG13,5)
2	225 (PG13,5)
3	325 (PG13,5)
4	425 (PG13,5)
5	30 (PG13,5)
6	60 (PG13,5)
7	21 – Triclamp 1.5"

Code	O-ring Material
1	EPDM

Ordering Information

	a-length	VP6
Conducell 4USF-VV	3	237640 (non Ex)

Conducell SU

Cond

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

- Suitable for low and high conductivity measurements (100 µS/cm to 300'000 µS/cm)
- Certified bio-compatibility, perfect for single-use biopharma applications
- Ready to integrate in single-use bags
- Pre-calibrated

Typical applications

- Single use mixing bags for buffer preparation
- Virus inactivation and intermediate storage

Specifications	
Measuring range	0.1 to 300 mS/cm
Measurement principle	4 pole contacting
Process temperature	4 to 50 °C
Pressure range (relative to ambient)	0 to 1 bar g
Sterilization method	Gamma irradiation, up to 50 kGy (for the disposables)
Suitable for gamma irradiation	No
Cell constant	1.31/cm
Material of electrodes	Pt = Platinum

For more specifications see www.hamiltoncompany.com

Accessories

- Conductivity Standards → 66
- Cables → 106
- Arc Accessories → 115
- Service & Support → 164

«Did you know... that with the reuseable Arc Module and the precalibrated sensor a ready to use system can be achieved?»

The Arc Module Cond-P (in combination with the Conducell-P SU) enables precise conductivity measurement in single-use bags.

Ordering Information		
	Arc Module Cond-P SU	Conducell-P SU
	10071707	10076677

Conducell 4US

Cond

The Conducell 4US is ideal for measuring a broad range of conductivity (from 0.1 to 500’000 µS/cm) with superior accuracy, resolution, and temperature compensation.

All wetted parts are FDA compliant and suitable for biopharma application (DIN 1.4435, PEEK, EPDM).

The Conducell 4US data works with a Traditional output.

Benefits

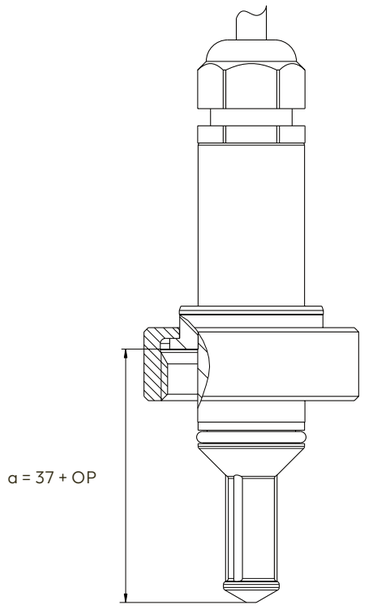
- All of your conductivity needs in one sensor: capable of measuring a broad range of conductivity
- All wetted parts are FDA compliant and suitable for biopharma application
- No need for separate housing, already integrated

Typical applications

- CIP monitoring
- Fermentation

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 g
Sterilization / cleaning method	CIP, SIP
Cell constant	0.147/cm
Material of electrodes	Stainless steel 1.4435
O-ring	EPDM (other versions available on request)

For more specifications see www.hamiltoncompany.com



Ordering Information		
	a-length	5 m fix cable
Conducell 4US-G125	variable	237700-OP
Conducell 4US-T150-50	50	237750
Conducell 4US-T150-100	100	237760

Accessories

- Conductivity Standards → 66
- Safety Socket → 128
- Service & Support → 164

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

Conducell UPW

Cond

The Conducell UPW sensor provides industry-leading, accuracy and sensitivity for producing pure and ultra-pure water in the pharmaceutical industry. The sensor is USP 645, EP, JP and FDA compliant, therefore appropriate for Pharmaceutical and pure water treatment applications.

The Arc model can be directly integrated into standard control systems, eliminating the need for a transmitter. Arc technology allows calibrations, predictive diagnostics, automated documentation, as well as user and process assignment to be stored in the sensor.

The Traditional model is suitable for use in hazardous areas and is ATEX and IECEx approved.

Benefits

- Industry leading accuracy and precision – exceptional temperature compensation
- Seamless integration
- Easy cleaning – USP 645, EP and JP compliant
- All wetted parts are FDA compliant

Typical applications

- Ultra Pure Water
- Pure Water
- Water for Injection
- CIP monitoring

Specifications	
Measuring range	Arc: 0.01 to 1500 µS/cm Analog: 0.02 to 2000 µS/cm
Measurement principle	2 pole contacting
Process temperature	Arc: analog interface 0 to 110 °C, digital interface 0 to 130 °C
Pressure range (relative to ambient)	0 to 10 bar g (130 °C)
Sterilization / cleaning method	Autoclavable, CIP, SIP
Cell constant	< 0.1/cm
Material of electrodes	Stainless Steel DIN 1.4435
Surface quality	R_a < 0.4 µm (N5)
O-ring	EPDM (other versions available on request)

For more specifications see www.hamiltoncompany.com

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

Ordering Information			
	a-length	VP6	Arc
Conducell UPW PG 13.5	120	243640	243579
Conducell UPW TC 1.5"	87	–	243578

Accessories

- Conductivity Standards → 66
- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

UPW Simulator
REF 243580
Traceable resistor to verify the Arc module acc. to USP <645>

UPW Simulator

Conducell 2DC-PG

Cond

The Conducell 2DC-PG 2-Pole sensor is a low-cost solution for contaimination-free processing in the wastewater industry.

Its stable 1.0 cell constant enables measurements from 0 to 20 mS/cm, while its 2-electrode design makes it a cost-effective solution.

The 5 M fixed cable ensures the sensor remains below the liquid surface during operation, while the plastic shaft and graphite electrode are easy to clean. The Conducell 2DC-PG is available with a PG13.5 process connection.

Benefits

- Suitable for Wastewater Industry applications and is implemented with a PG-35 process connection
- High Accuracy and Cost Effective
- Capable for operating in a wide range of temperature (-5 to 80 °C) and pressure (0 – 6 bar) conditions

Typical applications

- Water and Wastewater

Specifications	
Measuring range	10 µS/cm to 20 mS/cm
Measurement principle	2 pole contacting
Process temperature	-5 to 80 °C
Pressure range (relative to ambient)	0 to 6 bar g
Cell constant	1/cm
Material of electrodes	Graphite
O-ring	EPDM (other versions available on request)

For more specifications see www.hamiltoncompany.com

Accessories

- Conductivity Standards → 66
- Housings → 123
- Service & Support → 164

Ordering Information		
	a-length	5 m fix cable
Conducell 2DC-PG 120	120	237610

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 CO_2 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[1]. Many metrological institutes choose Hamilton standards because of their unprecedented stability and independent verification by PTB[2]. During an interlaboratory test among prestigious European metrological institutes (PTB, DFM, DAkkS[3]) Hamilton standards were used as measurement solutions.

Hamilton is Different

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 NIST[4] 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

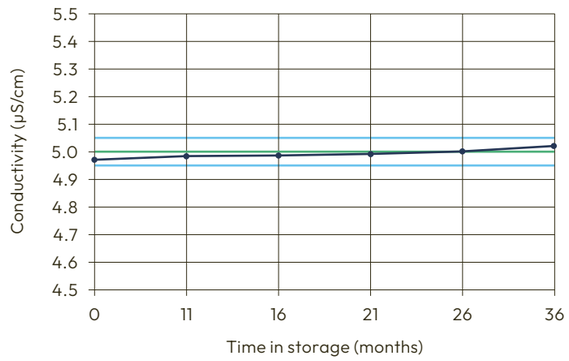
4 NIST: National Institute of Standards and Technology, Gaithersburg MD, USA

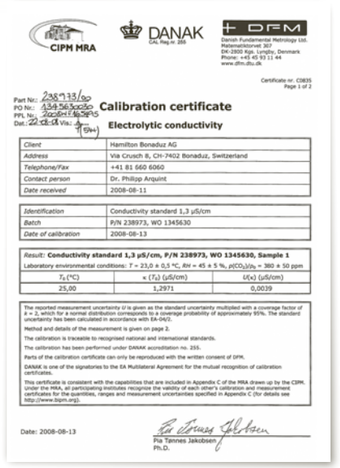
Unique advantages

- 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 PTB[2]




CIPM MRA
DANAK
DFM
Calibration certificate
Electrolytic conductivity

Client	Hamilton Bonaduz AG
Address	Via Crusch 8, CH-7402 Bonaduz, Switzerland
Telephone/Fax	+41 81 660 6060
Contact person	Dr. Philipp Arquint
Date received	2008-08-11

Identification	Conductivity standard 1,3 µS/cm
Batch	P/N 238973, WO 1345630
Date of calibration	2008-08-13

Result: Conductivity standard 1,3 µS/cm, P/N 238973, WO 1345630, Sample 1

Laboratory environmental conditions: $T = 23,0 \pm 0,5$ °C, $RH = 45 \pm 5$ %, $p(CO_2)/p_0 = 380 \pm 50$ ppm

T_X (°C)	κ (T_X) (µS/cm)	$U(\kappa)$ (µS/cm)
25,00	1,2971	0,0039

Date: 2008-08-13
Pia Tønnes Jakobsen Ph.D.

Value at 25°C	Accuracy	Stability*	Certificate From	Packaging Unit	Volume	REF
1.3 µS/cm	±1%	12	DFM	Glass bottle	250 mL	238973
5 µS/cm	±1%	36	DFM	Glass bottle	250 mL	238926
15 µS/cm	±1%	36	DFM	Glass bottle	250 mL	238927
84 µS/cm	±1%	18	DFM	Calpack bottle	500 mL	238984
100 µS/cm	±1%	36	DFM	Glass bottle	250 mL	238934
147 µS/cm	±1%	18	DFM	Calpack bottle	500 mL	238985
706 µS/cm	±2%	36	Hamilton	Glass bottle	250 mL	238929
1413 µS/cm	±1%	36	DFM	Glass bottle	250 mL	238928
1413 µS/cm	±1%	18	DFM	Calpack bottle	500 mL	238986
12880 µS/cm	±1%	18	DFM	Calpack bottle	500 mL	238988
100 mS/cm	±1%	36	DFM	Glass bottle	250 mL	238935

*In months after date of manufacturing

VCD

TCD

Cell Density Sensors

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.

		Cultivated Food	Biopharma		Brewery
		• Cell Culture • Yeast • Algae	• Cell Culture • Yeast • Bacteria • Algae	• Single-Use	• Yeast
Sensor	**Feature**				
Incyte SU	• Wave bioreactor applications • Suitable for gamma irradiation / ready to use • VCD (Viable Cell Density) • Insensitive to micro-carrier / cell debris			✓	
Incyte Arc	• VCD (Viable Cell Density) • Insensitive to micro-carrier / cell debris	✓	✓		✓
Dencytee Arc	• TCD (Total Cell Density) • Perfect linearity over whole process	✓	✓		✓

Incyte Arc

VCD

When used on-line, the Incyte Arc sensor delivers real-time viable cell density measurements for deeper process insights and data driven process optimization and control.

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. Arc Wi 2G Adapter BT (REF 243470) is required to output an analog 4-20 mA signal from the digital Modbus communication. Arc Wi 1G Adapter BT (REF 242360) is required with Arc Modbus OPC Converter (REF 10089359) to enable an OPC communication.

Benefits

- Never miss an important event during your bioprocess by measuring viable cell density
- Gain deeper process insights e.g., cell size & morphology
- Determine viability in real-time for data-driven process optimization

Typical applications

- Eucaryotic cells
- Viability prediction possible

Specifications	
Measuring range	5 x 10^5 to 8 x 10^9 cells/mL (Mammalian)
Conductivity range	0.5 to 80 mS/cm
Measuring principle	Permittivity
Process temperature	0 to 60 °C
Pressure range	0 to 12 bar
Sterilization / cleaning method	Autoclavable, CIP, SIP
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

«Did you know...

Incyte Arc is now part of the Hamilton Arc family providing a digital Arc Modbus signal directly from the sensor?»

Ordering Information		
	a-length	Arc
Incyte Arc Expert	120	243950-0211
	220	243950-0212
	320	243950-0213
	420	243950-0214

Accessories

- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

Conductivity standard for verification
12880 µS/cm, Basic Line
REF 238988

Solution B for Incyte Arc e-conditioning
REF 243742

Incyte SU

VCD new

Hamilton's Incyte SU sensors are ready-to-use and pre-calibrated for single use, on-line applications. Collect real-time viable cell density measurements for deeper process insights and data driven process optimization and control.

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

- Never miss an important event during your bioprocess by measuring viable cell density
- Gain deeper process insights e.g., cell size & morphology
- Patches come ready-to-use and pre-calibrated for wave version and steering tank

Typical applications

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

Specifications	
Measuring range	5 x 10^5 to 8 x 10^9 cells/mL (Mammalian)
Conductivity range	1 to 50 mS/cm
Measuring principle	Permittivity
Process temperature	4 to 50 °C
Pressure range (relative to ambient)	0 to 1 bar g
Sterilization / cleaning method	Gamma irradiation up to 50 kGy (for the disposables)
Material of electrodes	Platinum

For more specifications see www.hamiltoncompany.com

Accessories

- Conductivity Standards → 66
- Cables → 106
- Arc Accessories → 115
- Service & Support → 164

«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 DO?»

Ordering Information			
	Arc Module Incyte-P SU	Arc Module Incyte-W SU	Incyte-P SU
	10073158	10087686	10076676

Dencytee Arc

TCD new

Hamilton's Dencytee Arc sensor is an on-line optical Transmittance and Reflectance sensor capable of accurately measuring the total cell density of cultures from 0-200 g/L.

All particles and molecules that scatter light at 860 nm will be detected, including living and dead cells as well as cell debris. The sensor is also very effective after inoculation when cells are expanding quickly but concentrations are low, making capacitance-based readings less reliable.

Dencytee Arc sensors provide a robust connection directly to the Process Control System without the need for an additional external transmitter.

The combination of Incyte Arc and Dencytee Arc can deliver viability information of your bioprocess.

Benefits

- 1% accuracy over the whole measuring range from 0 to 200 g/L
- Never miss an important event during your bioprocess
- Robust design adapts to changes in ambient light and temperature
- Easy air verification with our Maintanance Tool Kit

Typical applications

- Yeast & Bacteria processes
- Algae processes

Specifications	
Measuring range	e.g. 0 to 200g/l cell dry weight yeast 0 to 4 AU 0 to 30'000 NTU
Measuring principle	Transmission and Reflection (incl. temperature compensation, daylight filter and subtraction)
Wavelength	860 nm

For more specifications see www.hamiltoncompany.com

Accessories

- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

Dencytee Maintenance Tool Kit for easy sensor verification
REF 10146924

«Did you know... to be able to measure low and high cell density at a high quality signal the sensor is able to measure the transmitted as well as the reflected light of the cells.»

Ordering Information		
	a-length	Arc
Dencytee RS485	120	10064919-11
	225	10064919-12
	325	10064919-13
	425	10064919-14

CO_2

CO_2 Sensors

Dissolved carbon dioxide (DCO_2) is a critical process parameter (CPP) in biopharma production processes according to Process Analytical Technology (PAT) guidelines. By influencing other parameters such as extracellular and intracellular pH, it has an effect on different metabolic pathways which are involved in cell growth or in product formation and quality.

In the past, continuous in-line monitoring of DCO_2 has only been possible through electrochemical sensors that are based on the Severinghaus principle and measure the DCO_2 concentration indirectly. The result is significant maintenance effort and multiple sources of drift that must be compensated by time-consuming product calibration.

Now, Hamilton has introduced a completely new way to measure DCO_2: The in-line sensor CO_2NTROL is a maintenance-free, solid-state sensor that directly measures DCO_2 resulting in better measurement accuracy and lower cost of ownership.

CO_2NTROL

CO_2

Hamilton's CO_2NTROL is a solid-state sensor (no electrolyte) that directly measures DCO_2 and provides maintenance-free (no consumables), real-time, and in-line control of this important critical process parameter.

Automated control of DCO_2 enables increased titer, better batch-to-batch reproducibility, and more consistency from R&D to production-scale bioreactors.

Benefits

- Automated control of DCO_2 in bioproduction
- Maintenance-free (save cost and time)
- Simple calibration

Typical applications

- Biopharma cell cultures and fermentations

«Did you know... Hamilton is the first and only supplier to bring the maintenance-free optical IR technology into a SIP/CIP compliant 12mm CO_2 sensor.»

Specifications	
Measurement principle	Optical – CO_2 Absorption in Middle Infrared (MIR)
Measuring range	5 to 1000 mbar or 0.5 to 100 %-Vol or 7.5 to 1500 mg/L (in liquid phase at 101.3 kPa and 25 °C)
Diameter	12 mm
Process connection	PG 13.5
Wetted parts	Stainless Steel 1.4435, EPDM (Ethylene propylene elastomer) FDA compliant silicone
Surface quality	Ra < 0.4 µm (N5)
Sterilization / cleaning method	Autoclavable, CIP, SIP
Operating temperature range	-10 to 140°C; the sensor provides no CO_2 reading above 60°C

For more specifications see www.hamiltoncompany.com

Accessories

- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

Calibration Station
REF 243575

Ordering Information		
	a-length	Arc
CO_2NTROL RS485	120 mm	10087810-11
	160 mm	10087810-12
	225 mm*	10087810-13
	325 mm	10087810-14
	425 mm	10087810-15

*CO_2NTROL 225 has, in reality, a shaft length of 215 mm. This ensures optimal rinsing in replaceable housings, such as Retractex.

DO

DO Sensors

The partial pressure of dissolved oxygen (DO) plays an important role in many biological, chemical and physical processes. 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.

		Biopharma / Biotech		Chempharma	Boiler Feed Water Power Plant	Wastewater	Brewery and Beverages
Optical DO Sensors	Feature	Single-Use	Reusable				
VisiFerm SU	• Flow independent • Gamma irradiateable • Ready to use	✓					
VisiFerm RS485	• Flow independent		✓	✓			
VisiFerm mA	• Flow independent • ATEX / IECEx • 2-wire 4-20mA, HART		✓	✓			
VisiTrace RS485	• Flow independent • Trace level • Cl2 resp. ClO2 resistant			✓			✓
VisiTrace mA	• Flow independent • Trace level • ATEX / IECEx • 2-wire 4-20mA, HART • Cl2 resp. ClO2 resistant			✓	✓		✓
VisiWater						✓	
Amperometric DO Sensors	Feature						
OxyFerm FDA			✓	✓			
OxyGold G	• Trace level				✓		
OxyGold B	• Trace level						✓

VisiFerm RS485

family DO

The VisiFerm is delivered ready-to-use without the need for polarization. It has improved measurement performance and no CO_2 fouling issues, delivering the lowest drift of available Hamilton DO sensors and requires 80% less calibration*.

The VisiFerm performs real-time self-diagnostics on sensor and cap health to further ensure optimum performance and reduce process downtime or batch losses. The VisiFerm also has a 50% longer lifetime compared to the older generation of VisiFerm sensors.

*With ODO Cap H3 or ODO Cap H4

Benefits

- Ready-to-use
- Real-time self-diagnostic capabilities
- Most stable and robust DO sensor – no CO_2 fouling issues
- Easily replaceable sensor ODO Cap

Typical applications

- Ethanologenic fermentation
- Biotechnical fermentation
- Brewery fermentation, filtration, filling
- Proactive corrosion control

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

Specifications	
Measuring range	4 ppb to 25 ppm (DO) 0 to 62.85 %-vol or 0 to 300 %-sat
Measurement principle	Oxygen dependent luminescence quenching
Response time t98%	ODO Cap H3 / H0: < 30 s at 25 °C ODO Cap H4 / H2: < 60 s at 25 °C
Process temperature	-20 to 140 °C, the sensor provides no DO reading above 85 °C
Operating voltage	10 to 27 VDC max. 1.5W
Pressure range (relative to ambient)	-1 to 12 bar g
Sterilization / cleaning method	Autoclavable, CIP, SIP
Surface quality	Ra < 0.4 µm (N5)
Material	Stainless steel 1.4435
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Accessories

Cables → 106
Arc Accessories → 115
Housings → 123
Service & Support → 164

ODO Cap H3
REF 10068400

ODO Cap H4
REF 10078261

T82/D4-Power Adapter
REF 242413-XX

Calibration Station
REF 243575

Ordering Information

VisiFerm RS 485 Family Structure

	Code	Interface			
10118255	1	RS485-ECS			
		Code	a-length (mm)		
		1	120		
		2	160		
		3	225*		
		4	325		
		5	425		
			Code	ODO Cap	
			1	H0	
			2	H2	
			3	H3	
			4	H4	
				Code	Wetted Parts
				1	EPDM
10118255 –					

*The VisiFerm RS485 225 has, in reality, a shaft length of 215 mm. This ensures optimal rinsing in retractable housings, such as Retractex.

ODO Cap H3: For general application in biotechnology, water treatment and monitoring as well as in breweries, wineries and soft drink processing.

ODO Cap H4: 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.

VisiFerm SU

DO new

The VisiFerm Single-Use (SU) offers Hamilton's proven optical measurement technology in a single-use format. It is intended to be used with the dedicated ODO Cap Sx sensor elements for the measurement of dissolved oxygen values in single-use applications.

The reusable VisiFerm SU is not in media contact and therefore no need for sterilization.

The VisiFerm SU together with the ODO Cap Sx sensor element provide a standard analog (ECS) interface and a digital Modbus interface. It can be connected and calibrated with traditional transmitters.

Benefits

- Hamilton's proven optical DO technology, available in a single-use format minimizes contamination and leakage risks
- Ready-to-use

Typical applications

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

Specifications	
Measuring range	4 ppb to 25 ppm (DO) 0 to 62.85 %-vol 0 to 300 %-sat
Measurement principle	Oxygen dependent luminescence quenching
Response time t98%	< 30 s at 25 °C
Process temperature	4 to 50 °C
Operating voltage	10 to 27 VDC max. 1.5 W
Sterilization / cleaning method	Gamma irradiation up to 50 kGy (for the disposables)

For more specifications see www.hamiltoncompany.com

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

Accessories

Cables → 106
Arc Accessories → 115
Service & Support → 164

VisiFerm T82/D4-Power Adapter
REF 242413-XX

Example of sensor head and shaft with ODO cap

Ordering Information				
	a-length	RS485-ECS	ODO Cap S3	ODO Cap S2
VisiFerm SU	120	10140046-11	10113953	10077858
	225	10140046-12	–	
	325	10140046-13	–	
	425	10140046-14	–	

VisiFerm mA

family DO

The VisiFerm mA is the optical dissolved oxygen (DO) sensor for use in explosive environment. The VisiFerm is delivered ready-to-use without the need for polarization.

It has improved measurement performance and no CO_2 fouling issues, delivering the lowest drift of available Hamilton DO sensors and requires 80% less calibration. The VisiFerm performs real-time self-diagnostics on sensor and cap health to further ensure optimum performance and reduce process downtime or batch losses. The VisiFerm also has a 50% longer lifetime compared to the older generation of VisiFerm sensors.

Designed especially for production environments, the VisiFerm mA is a 2-wire sensor with 4-20 mA standard or digital HART signal output, and ATEX & IECEx approval.

Benefits

- Ready-to-use
- Real-time self-diagnostic capabilities
- Most stable and robust DO sensor – no CO_2 fouling issues
- Easily replaceable sensor ODO Cap

Typical applications

- Explosive atmospheres environment
- Fermentation
- Wort aeration in breweries

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

Specifications	
Measuring range	4 ppb to 25 ppm (DO) 0 to 62.85 %-vol or 0 to 300 %-sat
Measurement principle	Oxygen dependent luminescence quenching
Response time t98%	ODO Cap H3: < 30 s at 25 °C ODO Cap H4: < 60 s at 25 °C
Process temperature	-20 to 140 °C, the sensor provides no DO reading above 85 °C
Operating voltage	18 to 30 VDC
Pressure range (relative to ambient)	-1 to 12 bar g
Sterilization / cleaning method	Autoclavable, CIP, SIP
Surface quality	Ra < 0.4 µm (N5)
Material	Stainless steel 1.4435
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Accessories

- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

ODO Cap H3
REF 10068400

ODO Cap H4
REF 10078261

Junction Box
REF 10076282

Calibration Station
REF 243575

Ordering Information

VisiFerm mA Family Structure

10070760	Code	Interface			
	1	mA/HART			
		Code	a-length (mm)		
		1	120		
		2	160		
		3	225*		
		4	325		
		5	425		
			Code	ODO Cap	
			1	H3	
			2	H4	
				Code	Wetted Parts
				1	EPDM
10070760 –					

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

ODO Cap H3: For general application in biotechnology, water treatment and monitoring as well as in breweries, wineries and soft drink processing.

ODO Cap H4: 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.

VisiTrace RS485

family DO

The VisiTrace offers all the advantages of Hamilton`s optical dissolved oxygen sensors (fast response time and low maintenance) with the additional advantage of being specifically designed to measure ppb levels of dissolved oxygen. VisiTrace sensors are suitable for Brewery and Power Plant applications.

The special designed ODO Cap L1 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.

Benefits

- Optical dissolved oxygen sensor: fast response time and low maintenance
- Designed to measure trace (ppb) levels of dissolved oxygen
- Flow and CO_2 independent readings

Typical applications

- Breweries (Filtration and Filling)
- Power Plants

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

Specifications	
Measuring range	0 to 2000 ppb (DO)
Measurement principle	Oxygen dependent luminescence quenching
Response time t90%	< 20 s in gas; < 90 s in water
Process temperature	-20 to 140 °C, the sensor provides no DO reading above 85 °C
Operating voltage	10 to 27 VDC max. 1.5W
Pressure range (relative to ambient)	-1 to 12 bar g
Sterilization / cleaning method	Autoclavable, CIP, SIP
Surface quality	Ra < 0.4 µm (N5)
Material	Stainless steel 1.4435
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Accessories

Cables → 106
Arc Accessories → 115
Housings → 123
Service & Support → 164

ODO Cap L1
REF 10107102

Calibration Station
REF 243575

Ordering Information					
VisiTrace RS485 Family Structure					
10140043	Code	Interface			
	1	RS485			
		Code	a-length (mm)		
		1	120		
		2	160		
		3	225*		
		4	325		
		5	425		
			Code	ODO Cap	
			1	L1	
				Code	Wetted Parts
				1	EPDM
10140043 –					

*The VisiTrace RS485 225 has, in reality, a shaft length of 215 mm. This ensures optimal rinsing in retractable housings, such as Retractex.

ODO Cap L1: Designed for trace level measurements of dissolved oxygen in breweries, water de-aeration and power plants.

VisiTrace mA

family DO

The VisiTrace offers all the advantages of Hamilton`s optical dissolved oxygen sensors (fast response time and low maintenance) with the additional advantage of being specifically designed to measure ppb levels of dissolved oxygen. VisiTrace sensors are suitable for Brewery and Power Plant applications.

The integrated Bluetooth 5 wireless interface may be used for monitoring, configuration and calibration, and saves time without compromising quality.

Benefits

- Optical dissolved oxygen sensor: fast response time and low maintenance
- Designed to measure trace (ppb) levels of dissolved oxygen
- VisiTrace mA is ATEX and IECEx approved
- Flow and CO_2 independent readings

Typical applications

- Breweries (Filtration and Filling)
- Power Plants

Specifications	
Measuring range	0 to 2000 ppb (DO)
Measurement principle	Oxygen dependent luminescence quenching
Response time t90%	< 20 s in gas; < 90 s in water
Process temperature	-20 to 140 °C, the sensor provides no DO reading above 85 °C
Operating voltage	18 to 30 VDC
Pressure range (relative to ambient)	-1 to 12 bar g
Sterilization / cleaning method	Autoclavable, CIP, SIP
Surface quality	R_a < 0.4 µm (N5)
Material	Stainless steel 1.4435
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Accessories

Cables → 106
Arc Accessories → 115
Housings → 123
Service & Support → 164

ODO Cap L1
REF 10107102

Calibration Station
REF 243575

Junction Box
REF 10076282

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

Ordering Information					
VisiTrace mA Family Structure					
10068709	Code	Interface			
	1	mA/HART			
		Code	a-length (mm)		
		1	120		
		2	160		
		3	225*		
		4	325		
		5	425		
			Code	ODO Cap	
			1	L1	
				Code	Wetted Parts
				1	EPDM
10068709 –					

*The VisiTrace mA 225 has, in reality, a shaft length of 215 mm. This ensures optimal rinsing in retractable housings, such as Retractex.

ODO Cap L1: Designed for trace level measurements of dissolved oxygen in breweries, water de-aeration and power plants.

VisiWater DO P

DO

VisiWater sensors are optical technology sensors intended for the measurement of dissolved oxygen submersible applications in the environmental water industry due to the long fixed cable (10m) and IP68 rating.

The VisiWater requires less maintenance due to its integrated self-diagnostic opto-electronics, and absence of a mechanically sensitive membrane or corrosive electrolyte.

Optical DO technology ensures no CO_2 fouling, fast response time and stable measurement.

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.

Benefits

- Intended for water applications
- Self diagnostic capabilities
- Less maintenance: no mechanically sensitive membrane or corrosive electrolyte
- Optical dissolved oxygen sensor: fast response time and stable measurement
- Easily replaceable sensor ODO cap (UV stabilized Polyamid)

Typical applications

- Environmental (outdoor) applications
- Water and Wastewater
- Fish farming

Specifications	
Measuring range	4 ppb to 40 ppm (DO)
Measurement principle	Oxygen dependent luminescence quenching
Response time t90%	< 30 s at 25 °C
Process temperature	0 to 60 °C
Pressure range	-1 to 12 bar
Material	Shaft: PVC-U Cap: PA

For more specifications see www.hamiltoncompany.com

Accessories

ODO Cap H20
REF 243536

Junction Box
REF 10076282

USB RS485 Modbus Converter
REF 242411

Ordering Information		
	a-length	10 m fix cable
VisiWater DO P Arc 120 FC10	150	10066566

*Only for OEM integration available

ODO Cap H20: The standard ODO Cap H20 is the default option for water applications.

OxyFerm FDA

DO

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.

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

- Explosive atmospheres environment
- Fermentation

Specifications	
Measuring range	10 ppb to 40 ppm (DO)
Measurement principle	Electrochemical reduction of oxygen
Response time t98%	< 60 s at 25 °C
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 g
Sterilization / cleaning method	Autoclavable, CIP, SIP
Electrolyte	Oxylyte
Surface quality	R_a < 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

For more specifications see www.hamiltoncompany.com

Accessories

- Cables → 106
- Arc Accessories → 115
- Housings → 123
- Service & Support → 164

Membrane Kit FDA REF 237140

Membrane Kit CIP REF 237126

Membrane Kit REF 237123

Oxylyte 30 mL REF 237118

Replacement Cathode OxyFerm REF 237306

Autoclavation Cap Oxyferm REF 242000

Polarization Module G REF 237350

Polarization Module T REF 237370

Ordering Information					
	a-length	T82	VP6	Arc	MS
OxyFerm FDA	120	237450	237540	243100	237713
	160	237455	237541	243101	10069701
	225	237452	237542	243102	237715
	325	237453	237543	243103	10069700
	425	237454	237544	243104	–
OxyFerm XL	56	237175-OP	–	243140-OP	–
OxyFerm CIP	120	243289	–	–	–

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

OxyGold B

DO

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 CO_2 might be an issue for electrochemical sensors.

Benefits

- No cross-sensitivity with CO_2
- Only very little flow required
- Pressure and CIP resistent
- Replacing the cathode is possible and very simple to perform

Typical applications

- CO_2 recovery
- Water de-aeration

Specifications	
Measuring range	8 ppb to 40 ppm (DO)
Measurement principle	Electrochemical reduction of oxygen
Response time t90%	< 60 s at 25 °C
Process temperature	0 to 100 °C
Pressure range (relative to ambient)	0 to 12 bar g
Sterilization / cleaning method	CIP
Electrolyte	Oxylyte B
Surface quality	R_a < 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

For more specifications see www.hamiltoncompany.com

Accessories

Cables → 106
Housings → 123
Service & Support → 164

OxyGold Membrane Kit
REF 237135

Oxylyte B 30 mL
REF 237138

Polarization Module B
REF 237360

Replacement Cathode OxyGold B
REF 237437

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

Ordering Information	a-length	VP6	Arc
OxyGold B	120	237180	not available anymore*
	225	237185	

*See VisiTrace sensor, page 90

OxyGold G

DO

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	
Measuring range	1 ppb to 40 ppm (DO)
Measurement principle	Electrochemical reduction of oxygen
Response time t90%	< 60 s at 25 °C
Process temperature	0 to 130 °C (Arc: analog 0 to 110 °C, digital 0 to 130 °C)
Pressure range (relative to ambient)	0 to 12 bar g
Sterilization / cleaning method	Autoclavable, CIP, SIP
Electrolyte	Oxylyte G
Surface quality	R_a < 0.4 µm (N5)
Current in air at 25°C	180 to 500 nA
Material	Stainless steel 1.4435
Polarization voltage	-670 mV
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Accessories

Cables → 106
Arc Accessories → 115
Housings → 123
Service & Support → 164

OxyGold Membrane Kit
REF 237135

Oxylyte G 30 mL
REF 237139

Polarization Module G
REF 237350

Replacement Cathode OxyGold G
REF 237427

Ordering Information			
	a-length	VP6	Arc
OxyGold G	120	237395	243110
	225	237396	243111

Oxysens

DO

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)
Measurement principle	Electrochemical reduction of oxygen
Response time t90%	< 60 s at 25 °C
Process temperature	0 to 60 °C
Pressure range (relative to ambient)	0 to 4 bar g
Electrolyte	Oxylyte
Surface quality	R_a < 0.8 µm (N6)
Current in air at 25°C	40 to 80 nA
Material	Stainless steel 1.4435
Polarization voltage	-670 mV
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Accessories

Housings → 123
Service & Support → 164

Immersing Set
The Immersing Set sheaths and protects 120 mm sensors such as Oxysens while immersed in streams or channels
REF 237158

Ordering Information		
	a-length	5 m fixed cable
Oxysens	120	237150

Oxygen Accessories

OxyFerm Membrane Kit

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

Description	REF
OxyFerm Membrane Kit	237123

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.

Description	REF
Membrane Kit FDA	237140

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.

Description	REF
Membrane Kit CIP	237126

OxyGold Membrane Kit

The OxyGold Membrane Kit contains 3 membrane bodies with the rounded design, pipette and spare o-ring. Electrolyte must be ordered separately to match the sensor.
See page → 105

Description	REF
OxyGold Membrane Kit	237135

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.

Description	REF
Polarization Module T OxyFerm / OxyFerm FDA / OxyFerm XL	237370
Polarization Module G OxyFerm VP / OxyGold G	237350
Polarization Module B OxyGold B	237360
Replacement Cathode OxyFerm	237306
Replacement Cathode OxyGold G	237427
Replacement Cathode OxyGold B	237437

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.

Description	REF
Autoclavation Cap OxyFerm	242000

Electrolytes & Solutions

Electrolyte

Description		REF
Electrolytes for pH Sensors		
3 M KCl	100 mL	238036
3 M KCl	500 mL	238936
Skylyte-CL	100 mL	242080
Protelyte	100 mL	238038
3 M KCl-LR	500 mL	238939
Skylyte	500 mL	238937
Electrolytes for Oxygen Sensors		
OxyGold Oxylyte G	30 mL	237139
OxyGold Oxylyte B	30 mL	237138
OxyFerm Oxylyte	30 mL	237118

Storage Solution

In order to 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.

Description		REF
Storage Solution	500 mL	238931

Cleaning Solution Set

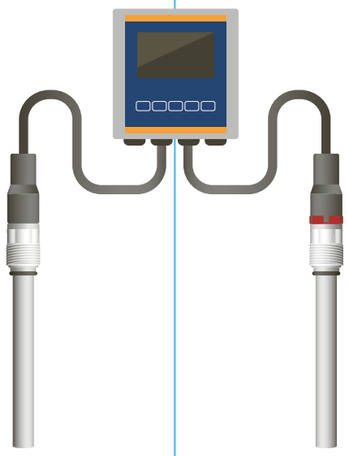
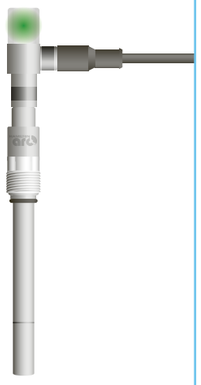
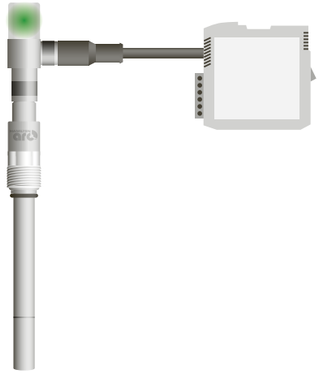
Depending on the type of application, the pH glass or diaphragm can get contaminated through various ingredients of the measuring solution. This is indicated by a slow response of the electrode, or even incorrect readings. To overcome these problems, Hamilton has developed a cleaning solution set. The 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.

Description	REF
Cleaning Solution Set	238290

Connectivity overview

Where and why, we need all these accessories

A quality measurement is nothing without a quality connection to your system. Whether a traditional analog connection or digitally via Modbus RS 485, we offer a broad range of connectivity options for you to choose from. The below diagram should help you navigate through the necessary requirements with ease.

Process Control Signal	Transmitter / Controller	4-20 mA		Bus Communication			Ethernet Communication	
		2-wire HART + ATEX	4-wire Galvanic Isolated	Modbus RTU Integrated in all Arc Sensors	Profibus DP REF 243555	Foundation Fieldbus REF 111009053	Profinet REF 10116586	OPC UA REF 10089359
Diagram								
Product	Traditional nA/mV	Memosens Sensors	VisiFerm mA VisiTrace mA	Arc Wi 2G	Arc Wi 2G / 1G / No Wi	Arc Wi 1G + Converter		Arc Wi 1G + OPC
				Arc RS485 Sensors				
Parameter	pH ORP DO Cond	pH DO	DO	CO_2 VCD TCD DO pH ORP Cond				

Cables

A high quality measurement requires a high quality connection to the process control system. Hamilton cables ensure the best possible connection between your sensor and your process control system.

Sensor Connection

Sensor connector and relevant cables
So what connector does my sensor have and what cable do I use? Below are a list of connectors available with Hamilton sensors.

VP

The VP (VarioPin) is a common connector used throughout the Hamilton sensor product line. VP is abbreviation for “VarioPin”. The VP designation often includes a number referring to the number of exposed.

K8

K8 connectors are typically used on traditional pH / ORP sensors which lack temperature compensation. These connectors have a two pole design comprised of the center core and outer metallic threaded connection.

S7/S8

S7 and S8 connectors are typically found on traditional pH sensors with no temperature compensation. They are the same basic design however S8 connectors have PG13.5 mounting threads, while S7 connectors do not. These connectors are recessed thus care must be taken to avoid moisture getting trapped which could lead to a short circuit.

T82

The T82 connector is sometimes known as a D4 connector. It uses a twist lock design to secure the cable to the sensor. These connectors are less common and only found on the Hamilton OxyFerm FDA Dissolved Oxygen Sensors.

M12

The M12 connector is a common industrial connector found on our Visiferm mA and Visitrace mA sensors as well as various accessories. Be careful with cable selection as there can be many different variations of this connector in both number of pins and connection type.

Memosens

Memosens® signals are digitalized and transferred inductively via a non-contact connection. Memosens features complete galvanic isolation and is fully waterproof and resistant to environmental influences.

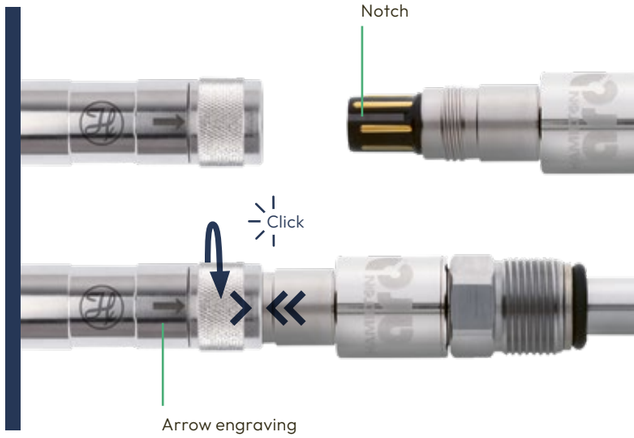
Cable Connection

Easier Connection

Introducing the Hamilton made VP connector

Now on all of our VP cables

Traditionally, VP connecters were every difficult to connect and disconnect. Our new connector was developed with special focus on the ease of connection.



Closing:
- Easy self alignment
- Closed position feedback

Opening:
- Tool less
- Low force

Cables for Traditional Sensors

S7

For sensors with standard (S7) connector. Controller side no connector (open end). Best suited for use with transmitters or devices with open wiring terminals.

Length	Diameter	REF
1 m	5 mm	355072
5 m	5 mm	355066
10 m	5 mm	355080

For sensors with standard (S7) connector. Controller side BNC connector. BNC connectors are commonly found on Applikon biocontrollers and some older transmitters.

Length	Diameter	REF
1 m	3 mm	355043
3 m	3 mm	355057
5 m	3 mm	355056

For sensors with standard (S7) connector. Device side DIN connector. The DIN connector may be found on older Satorius biocontrollers and some laboratory pH meters.

Length	Diameter	REF
1 m	3 mm	355045
3 m	3 mm	355059

K8

For sensors with standard (S7) connector. Controller side no connector (open end). Best suited for use with transmitters or devices with open wiring terminals.

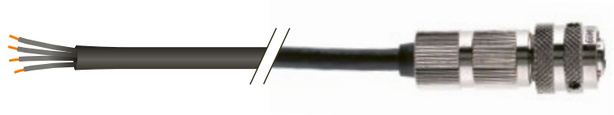
Length	Diameter	REF
1 m	5 mm	355153
3 m	5 mm	355154
5 m	5 mm	355155
10 m	5 mm	355156

For sensors with K8 connector. Controller side DIN connector. The DIN connector may be found on older Satorius biocontrollers and some laboratory pH meters.

Length	Diameter	REF
1 m	5 mm	355157
2 m	5 mm	355158
3 m	5 mm	355159

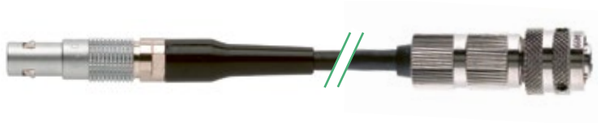
T82/D4

For sensors with T82/D4 connector, e.g. OxyFerm. Controller side no connector (open end).



Length	Diameter	REF
1 m	5 mm	355087
3 m	5 mm	355088
5 m	5 mm	355089
10 m	5 mm	355311

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



Length	Diameter	REF
1 m	5 mm	355160
2 m	5 mm	355161
3 m	5 mm	355162
5 m	5 mm	355163

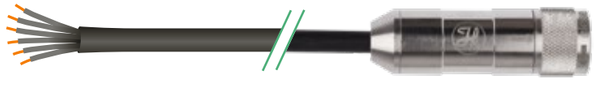
Memosens

For sensors with Memosens connector.
Controller side no connector (open end).

Length	Diameter	REF
3 m	6.3 mm	355350
5 m	6.3 mm	355351
10 m	6.3 mm	355352

VP6

For sensors with Memosens connector.
Controller side no connector (open end).

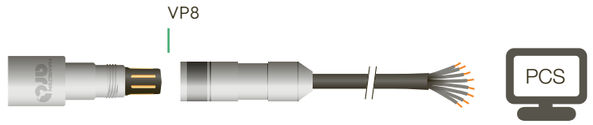


Length	Diameter	REF
1 m	7,5 mm	355108
2 m	7,5 mm	355187
3 m	7,5 mm	355109
5 m	7,5 mm	355110
10 m	7,5 mm	355111
20 m	7,5 mm	355112

Cables for Intelligent Sensors

Connection for Industrial Processes e.g. Production see page → 13

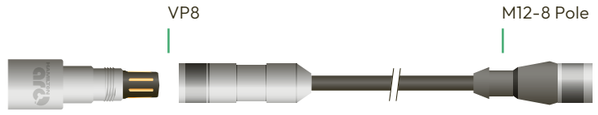
VP8



Compatible with:
- VisiFerm RS485-ECS family
- pH Arc family
- Conducell 4UxF family
- ORP Arc Sensors
- Conducell UPW Arc Sensors
- eDO Arc Sensor (e.g. OxyFerm FDA Arc)

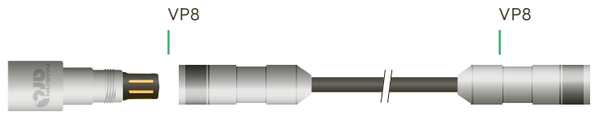
* VisiFerm DO family only

Description	Interface	REF
1 m Data Cable VP8 / Open End	4-20 mA/Modbus	355263
3 m Data Cable VP8 / Open End	4-20 mA/Modbus	355264
5 m Data Cable VP8 / Open End	4-20 mA/Modbus	355265
10 m Data Cable VP8 / Open End	4-20 mA/Modbus	355266
15 m Data Cable VP8 / Open End	4-20 mA/Modbus	355267
20 m Data Cable VP8 / Open End	4-20 mA/Modbus	355268
1 m Cable VP8 / Open End	ECS mode*	355217
3 m Cable VP8 / Open End	ECS mode*	355218
5 m Cable VP8 / Open End	ECS mode*	355219
10 m Cable VP8 / Open End	ECS mode*	355220
15 m Cable VP8 / Open End	ECS mode*	355221
20 m Cable VP8 / Open End	ECS mode*	355222
1m Data Cable (4 wire)	Modbus	10109026
2m Data Cable (4 wire)	Modbus	10109251
3m Data Cable (4 wire)	Modbus	10109250



Compatible with all Arc Sensors

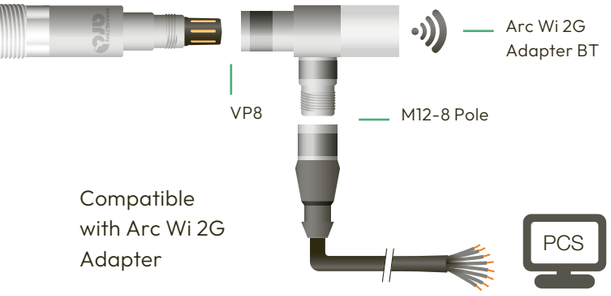
Description	REF
1 m Data Cable VP8 / M12-8 Pole (male)	10070910
1.5 m Data Cable VP8 / M12-8 Pole (male)	10160638
3 m Data Cable VP8 / M12-8 Pole (male)	10071905
5 m Data Cable VP8 / M12-8 Pole (male)	10067844
10 m Data Cable VP8 / M12-8 Pole (male)	10067846



Compatible with all Arc Sensors

Description	REF
1m Cable VP8 (F) / VP8 (F)	10108609
2m Cable VP8 (F) / VP8 (F)	10108610
3m Cable VP8 (F) / VP8 (F)	10108611

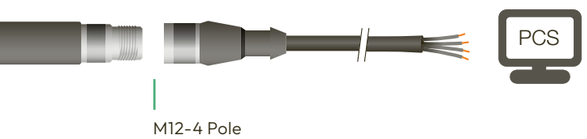
M12 8-Pole



Compatible
with Arc Wi 2G
Adapter

Description	REF
3 m Cable M12-8 Pole / Open End	355320
5 m Cable M12-8 Pole / Open End	355321
10 m Cable M12-8 Pole / Open End	355322

M12 4-Pole



Compatible with:
- VisiFerm mA family
- VisiTrace mA familiy

Description	REF
3 m Cable M12-4 Pole / Open End	355283
5 m Cable M12-4 Pole / Open End	355284
10 m Cable M12-4 Pole / Open End	355285

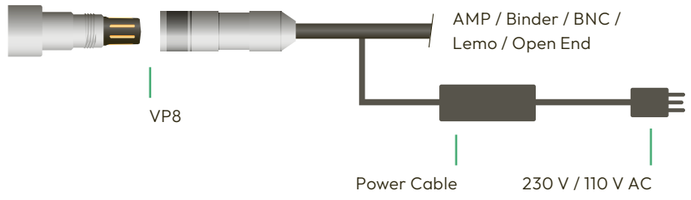
Compatible with:
- VisiFerm mA family
- VisiTrace mA familiy

Description	REF
3 m Power Cable M12-4 Pole	355288

Power Cables for Bio Controllers

Connection for old Bio Controllers or Transmitters in R&D see page → 15

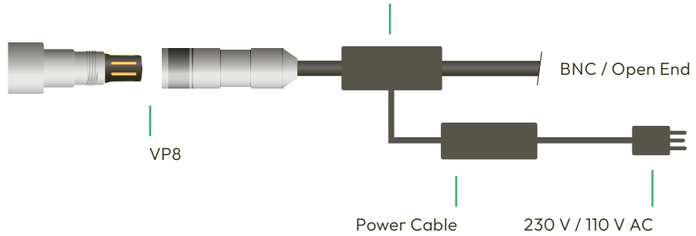
If you want to gain the benefits our Arc Intelligent sensors can give you but need to stick with an analog sensor connection with your transmitter or PCS, the following cables can assit in giving you this backwards capability.



Compatible with
VisiFerm RS485-ECS family

Description	REF
1 m Power Cable VP8 / AMP	355298
4 m Power Cable VP8 / Binder	355258
1 m Power Cable VP8 / BNC	355297
3 m Power Cable VP8 / BNC	355296
2.5 m Power Cable VP8 / Lemo	355245
1 m Power Cable VP8 / Open End	355194

Arc ECS Adapter pH/ORP



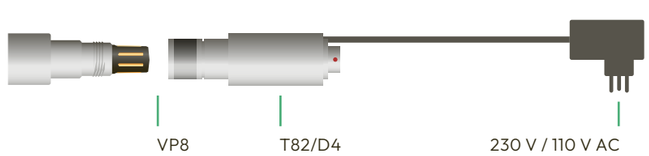
Compatible with:
- pH Arc family
- ORP Arc family

Description	REF
Arc ECS Adapter pH/ORP BNC	243168-XX
Arc ECS Adapter pH/ORP Open End	243169-XX

The code XX in the product number defines the type of electrical power connector:

01 – Power cord EU / 02 – Power cord CH /
03 – Power cord US / 04 – Power cord UK /
05 – Power cord AU/NZ

For retrofit of existing polarographic DO sensor installations with VisiFerm RS485-ECS sensors.



Compatible with
VisiFerm RS485-ECS family

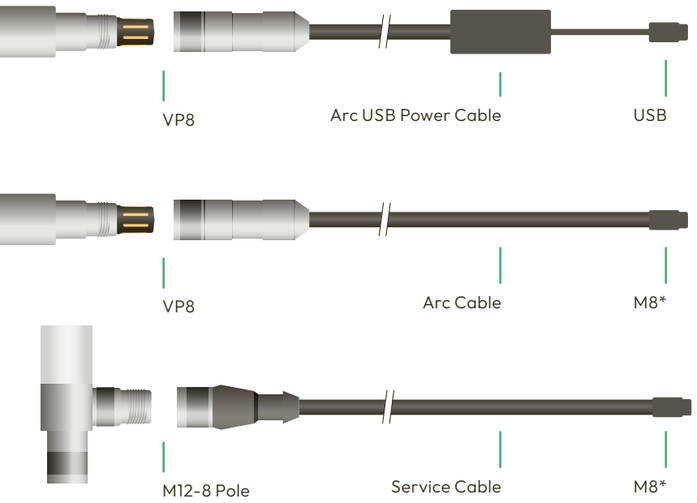
Description	REF
VisiFerm T82/D4-Power Adapter	242413-XX

The code XX in the product number defines the type of electrical power connector:

01 – Power cord EU / 02 – Power cord CH /
03 – Power cord US / 04 – Power cord UK /
05 – Power cord AU/NZ

Cables for connection to Arc Sensors

For connecting Arc sensors to ArcAir software

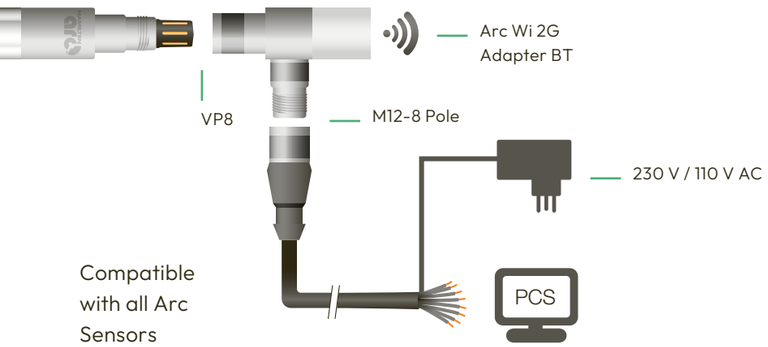


Description	REF
2 m Arc USB Power Cable VP8	243490-01
2 m Arc USB Power Cable M12-8 Pole	243490-02
2 m Arc Cable VP8 / M8	242176
2 m Service Cable M12-8 Pole / M8	355339
2 m Service Cable M12-4 Pole / M8	355289

*For connection with the Arc USB power cable or Arc Modbus OPC Converter

The new Power Cable M12-8 Pole / open end is designed for use with the Arc Wi 2G Adapter BT (REF 243470) to facilitate an “active” 4-20 mA signal.

Description	REF
1m Power Cable M12-8 Pole / open end / power plug	10143091
3m Power Cable M12-8 Pole / open end / power plug	10143092



Compatible with all Arc Sensors

Arc Accessories

ArcAir Advanced License Key

The ArcAir Advanced License Key is a physical USB device that, when connected to a system running the standard ArcAir software, upgrades it to the Advanced version. This key is essential for enabling advanced features tailored for environments requiring adherence to Good Manufacturing Practices (GMP).

Description	REF
ArcAir Advanced License Key	10155643

USB RS485 Modbus Converter

Designed for wired communication between ArcAir and Visiwater DO fix cable sensor.

Description	REF
USB RS485 Modbus Converter	242411

Arc Wi 1G Adapter BT

Arc Wi 2G Adapter BT

Arc Wi Adapter BT

These Adapters are expanding the functionality of Arc sensors by providing wireless communication for local monitoring all analog and digital signals, in parallel to robust 4-20 mA signal, and simple sensor connection to the PCS.

Description	REF
Arc Wi 1G Adapter BT	243460
Arc Wi 2G Adapter BT	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 all Hamilton Arc sensors. 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 and power supply.

Description	REF
Arc View Mobile Basic	10071111
Arc View Mobile Advanced	10071113

Converters

Digital Converters

Hamilton Arc Converters are gateway devices designed to seamlessly integrate Hamilton Arc sensors RS485 Modbus RTU protocol with various other industrial communication protocols, including PROFIBUS DP, PROFINET, FOUNDATION Fieldbus and OPC UA.

These gateways enable you to integrate Hamilton Arc Sensors in the protocol of your choice, thereby reducing programming time and costs while unlocking the full potential of our Arc technology.

Compare Hamilton's Converter Options

		REF	Protocol	Max. Sensors	Application	Required Software
Arc Modbus OPC Converter**		10089359	OPC UA	4	Laboratory	1.10.0 (Web) 1.10.0 (SD Card)
Modbus Profinet Converter*		10116586	PROFINET	4	Production	4.2 (Profinet script + GSDML)
Modbus Profibus Converter*		243555	PROFIBUS DP	4	Production	4.2 (Profibus script + GSD)

*No SCAN function on Incyte Arc
**Only read, writing functions to be done using and Arc Wi BT converter

Customized Products

Hamilton 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 adaptions are possible.

HAMILTON
Customized Product
Process Analytics

Need a custom housing or sensor? The Hamilton Customized Product team is happy to help design products for your specific application. Give us a call to learn more.

Transmitter H100

pH Cond DO

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

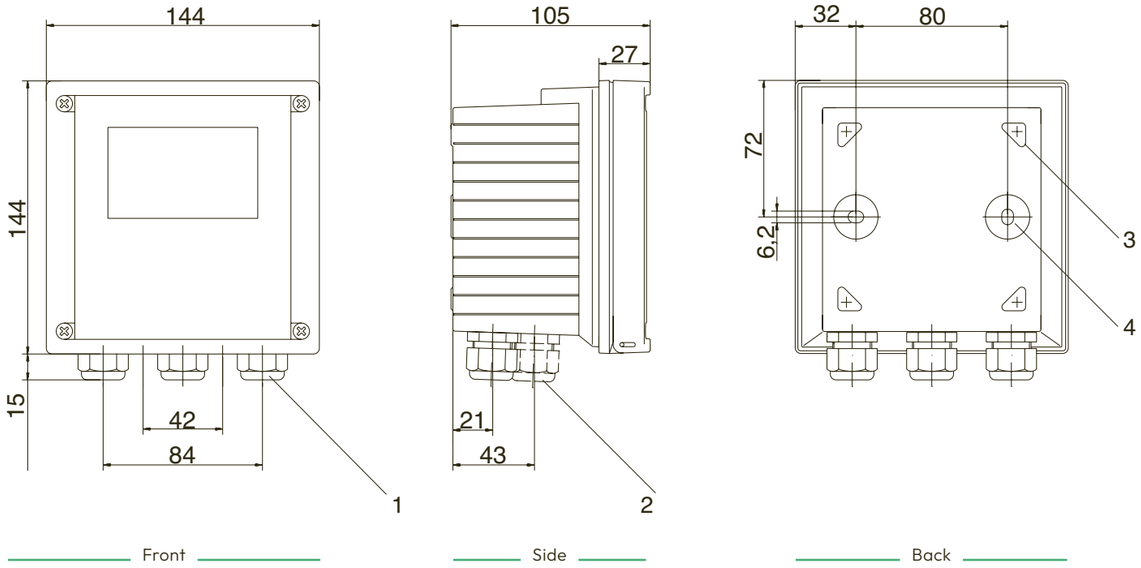
Accessories

Pipe-mount kit
REF 243082

Panel-mount kit
REF 243083

Protective hood
REF 243084

Mounting plan (all dimensions in mm)



1 Cable gland (3x)
2 Knockouts for cable glands or ½" conduit (conduits not incl.)
3 Knockout for pipe mounting (4x)
4 Knockout for wall mounting (2x)

Ordering Information	
Type	**REF**
H100 pH	243080-01
H100 Cond	243080-02
H100 DO	243080-03

Transmitter H220X

family pH Cond ORP

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

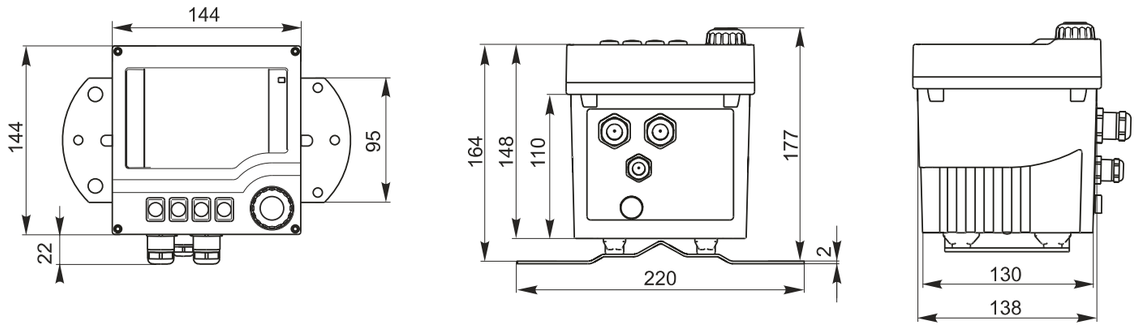
Robust design

- Suitable for Explosions protected areas (Ex II (1) 2G Ex ib [ia Ga] IIX 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

Mounting plan (all dimensions in mm)



Front Bottom Side

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.

Ordering Information			
Transmitter H220X Family Structure			
243081	Code	Sensor Module	
	1	Conductivity, Conductive Sensor	
	2	Conductivity, Inductive Sensor	
	3	Digital, Memosens pH, ORP	
	4	Digital, Memosens eDO	
	5	pH or ORP (analog)	
	↓	Code	Software
		1	Standard Version
		2	Advanced Version
243081 –			

Housings

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: 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.

«Hamilton Housings:
Our Flexibility for
Your Precision»

Housings overview

Process Analytics Housings

Static Housings
Weld in Housings
Rectractable Housings
Pressurized Housings
Flow-trough Housings
Service Kits and Parts

FlexiFit
Hygienic Socket
Safety Sockets
RetractoFit
Retractex
MasterFit
FlowCells

Manual
Pneumatic
Retracto Control
FlowCell/XL
Peek FlowCell
FlexiFlow

Product Family

Product Configuration











FlexiFit family

	Ingold (FlexiFit Bio)	Triclamp TC50	VariVent
With pins	 34OP		
Without pins	 34OP	 73IL	
15° angle		 39IL	

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 (R_a < 0.4 µm) is shown on a certificate. They are suitable for autoclavation, CIP and SIP procedures.

There are further sealing replacement kits with different sealing materials available.

Benefits

- Easy integration for PG13,5 sensors in various stainless steel tanks or pipes
- Optimal sensor postioning for best measurement performance
- 185 versions (connection, insertion length, angeled, o-ring position, sensor protection) to meet all the requirements of process connections

Specifications	
Wetted parts	Stainless Steel 1.4435
O-ring material	EPDM
O-ring position	22 to 55 mm (G 1¼)
Insertion length (TC)	3 to 75 mm 12 to 50 mm 15° version
Pressure range (relative to ambient)	0 to 6 bar g
Temperature range	-10 to 140 °C
Sensor thread	PG 13.5
Sensor a-length	120 mm
Surface finish	R_a < 0.4 µm (N5 electropolished)

For more specifications see www.hamiltoncompany.com

The Hamilton customized products team (HCP) is happy to offer special designs or materials on request.

Ordering Information

Type	Process Connection	Angle of sensor	Protective Pins	REF
FlexiFit Bio	G 1¼	0°	Yes	237331-OP
FlexiFit U Bio	G 1¼	0°	No	237380-OP
FlexiFit VV-0	Varivent®	0°	No	237344
FlexiFit VV-15	Varivent®	15°	No	237345
FlexiFit TC50-33	TC 1.5"	0°	Yes	237341
FlexiFit U TC50	TC 1.5"	0°	No	242335-IL
FlexiFit U TC50-15	TC 1.5"	15°	No	242325-IL

U = Unprotected / TC = Triclamp

Accessories

Safety Socket → 128

Matching Tools & Sensor Dummies → 163

Service Kit FlexiFit Bio EPDM
REF 237366

Service Kit FlexiFit Bio FKM
REF 237219

Service Kit FlexiFit Bio FFKM
REF 237319

Service Kit FlexiFit TC EPDM
REF 243575

Service Kit FlexiFit VV EPDM
REF 243575

Safety Sockets

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

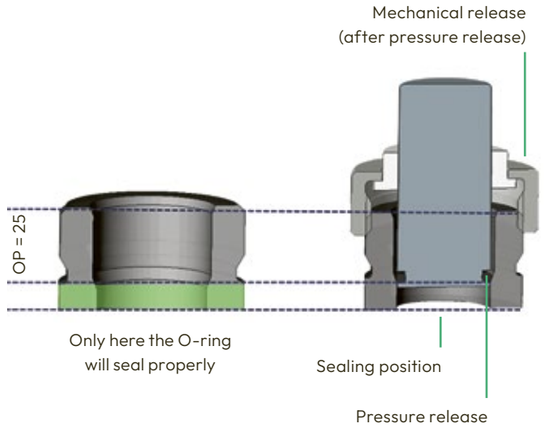
Benefits

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

Specifications	
Wetted parts	Stainless Steel 1.4435 or 1.4404
O-ring material for blind plug	EPDM
Pressure range (relative to ambient)	0 to 50 bar g
Temperature range	-30 to 160 °C
Process connection	G 1¼
Surface finish	R_a < 0.4 µm (N5, electropolished)

For more specifications see www.hamiltoncompany.com

O-ring sealing position
Choose the right OP



Having the Hamilton Socket in combination with a Hamilton housing and sensor ensures the best possible compatibility, hygienic sealing and most accurate measurement results.

Ordering Information				
Type	**Steel**	**Angle**	**OP**	**REF**
Safety Socket	1.4404	15	25	242570
	1.4404	15	50	242571
	1.4404	15	55	242572
	1.4404	0	25	242573
	1.4404	0	50	242574
	1.4404	0	55	242575
	1.4435	15	25	242576
	1.4435	15	50	242577
	1.4435	15	55	242578
	1.4435	0	25	242579
	1.4435	0	50	242580
	1.4435	0	55	242581
Safety weld-in socket*	1.4404	0	28	243247
	1.4404	15	28	243248

Accessories			
Type	**Steel**	**OP**	**REF**
Blind Plug	1.4404	25	242560
	1.4404	50	242562
	1.4404	55	242564
	1.4435	25	242565
	1.4435	50	242567
	1.4435	55	242579

Only if the o-ring position of the Safety Socket and the housing or Blind Plug match, a proper sealing is guaranteed.

*Socket for Retractex (B / BC) with OP 28 (Ingold G¼")

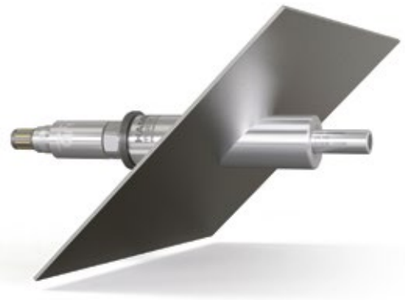
Hygienic Socket

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 or Conductivity sensors by using the Hygienic Socket DO Adaper.

Benefits

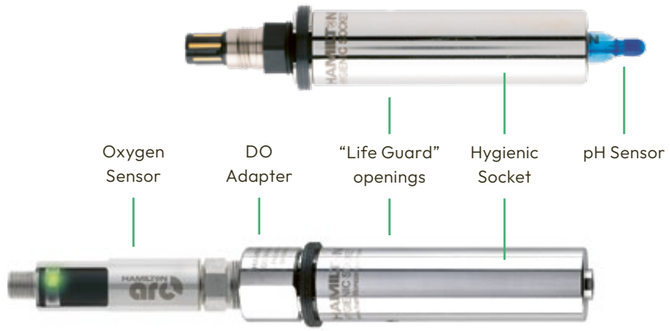
- Patented, hygienic and safe sealing design
- Flexible housing positioning for best measurement performance
- Easy and time saving o-ring replacement



Specifications	
Wetted parts	Stainless Steel 1.4435 or 1.4404 or 1.4571 or 2.4602
O-ring material	EPDM
Pressure range (relative to ambient)	0 to 16 bar g
Temperature range	-10 to 140 °C
Sensor thread	PG 13.5
Sensor a-length	120 mm
Surface finish	R_a < 0.4 µm (N5)

For more specifications see www.hamiltoncompany.com

Hygienic Socket with 120 mm pH Sensor



Hygienic Socket with 120 mm Oxygen Sensor and DO Adapter

Ordering Information	
Type	**REF**
Hygienic Socket 1.4404	242535
Hygienic Socket 1.4435	242545
Hygienic Socket 1.4571	242548
Hygienic Socket 2.4602	242550

Only one wetted o-ring. Reduced risk of sensor damage and increased safety due to the patented system that compresses the o-ring only when the sensor is inserted and gets tightened.

Accessories

Matching Tools & Sensor Dummies → 163

Hygienic Socket DO Adapter
REF 242538

Replacement Kit Seal Pusher
REF 242532

Service Kit Hygienic Socket EPDM
REF 242595

Service Kit Hygienic Socket FKM
REF 242596

Service Kit Hygienic Socket Silicone
REF 242597

Service Kit Hygienic Socket FFKM
REF 242598

RetractoFit Easy

The RetractoFit Easy is a straightforward retractable probe housing crafted from stainless steel or plastic. It's designed for accommodating Ø12-120mm sensors on tanks and pipes. With an integrated locking mechanism, it securely holds the sensor in place while enabling effortless alignment of the protective cage. This ensures the inserted sensor is shielded from mechanical impacts and can nevertheless be aligned for the best possible measurement results.

Not suitable for Conducell and Incyte Sensors.

Benefits

- Compact design
- Manually retractable
- Suitable for processes up to 6bar

Specifications	
Process pressure	O to 6 bar
Process temperature	10 to 80 °C
Ambient temperature	-10 to 70 °C
Sensors	120 mm 12 PG13.5
Material	Stainless steel 1.4404 (316L) < R_a 0.78um; PP
Sealings	EPDM; FPM (Viton)
Process connections	Thread NPT 1" Thread G 1" Ingold DN25 G 1¼"
Drive unit	manually operated; axially movable
Feedback	without
Length of protection cage	36 mm

For more specifications see www.hamiltoncompany.com

Accessories

RetractoFit Easy mounting tool
REF 243249

Safety weld-in socket straight, OP 28, 1.4404 incl. 3.1 Cert.
REF 243247

Safety weld-in socket inclined, OP 28, 1.4404 incl. 3.1 Cert.
REF 243248

Blind plug DN25 (Ingold) G1 ¼" 1.4404 EPDM, OP28
REF 243251

Ordering Information

243293 RetractoFit Easy

Code	Material (wetted parts)
1	PP
2	Stainless steel 1.4404 / 316L (3.1 steel certificate included)
0	Special Design

Code	Sealing Material (wetted sealings)
1	EPDM / USP VI (elastomer certificate included)
2	FKM (Viton)
0	Special Design

Code	Sensor
1	120mm PG 13,5 Ø 12 mm
0	Special Design

Code	Process Connection
1	MNPT 1"
2	Thread G1" male
3	Ingold DN25 G1 1/4" O-Ring-position 28 mm
0	Special Design

Cable protection	
1	without
2	with cable protection*
0	Special Design

243293 –

*The cable protection is not compatible with the Dencytee, CO_2NTROL and Incyte sensors. Special cable protection available.

RetractoFit Easy with Ingold connection and cable protection

RetractoFit Easy version without cable protection

RetractoFit

The RetractoFit is a retractable housing 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 and protective sleeve the aperture (hole) in the protective sleeve must be enlarged or the housing has to be used without the protective sleeve.

Benefits

- Hygienic design – avoid contamination
- Safe sensor extraction during a running process
- Easy, cost-effective manual retractable measuring point

Specifications	
Wetted parts	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 g
Temperature range	-10 to 130 °C
Sensor thread	PG 13.5
Sensor a-length	225 mm
Surface finish	RetractoFit: R_a < 0.4 µm (N5 electropolished)

For more specifications see www.hamiltoncompany.com

Accessories

Safety Socket → 128
Matching Tools & Sensor Dummies → 163

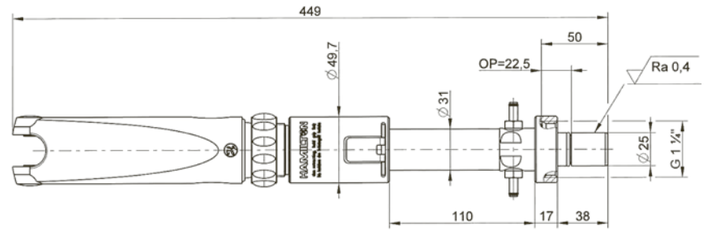
Service Kit RetractoFit FKM
REF 237239

Service Kit RetractoFit FFKM
REF 237339

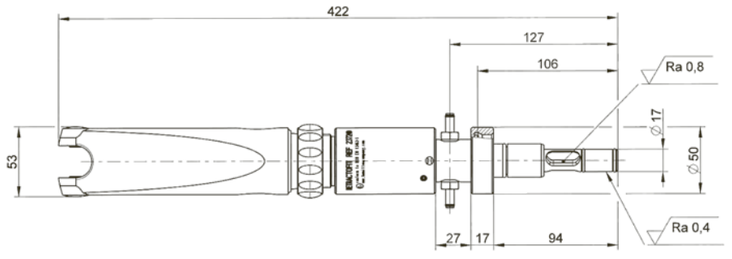
Service Kit RetractoFit PEEK
REF 237388

Dimensional drawings / RetractoFit (all dimensions in mm)

Maintenance position



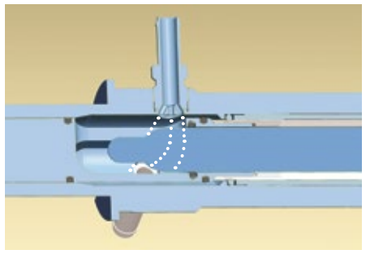
Measuring position



Ordering Information		
Type	**Process Connection**	**REF**
RetractoFit	G 1¼	237240
RetractoFit PEEK 25	G 1¼	237490

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

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 g
Temperature range	-10 to 140 °C
Sensor thread	PG 13.5
Sensor a-length	225 mm
Surface finish	Ra < 0.4 µm (N5 electropolished)

For more specifications see www.hamiltoncompany.com

Accessories

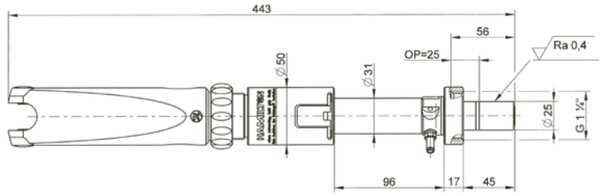
- Safety Socket → 128
- Matching Tools & Sensor Dummies → 163

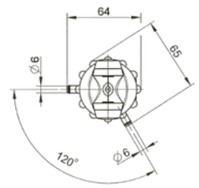
Service Kit RetractoFit Bio (EPDM)
REF 237338

«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.»

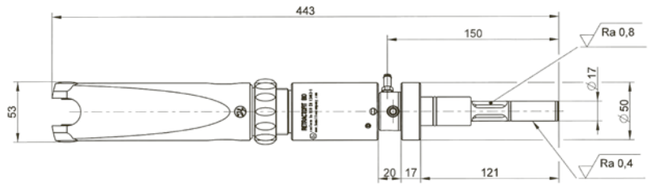
Dimensional drawings / RetractoFit Bio 25 (all dimensions in mm)

Maintenance position





Measuring position

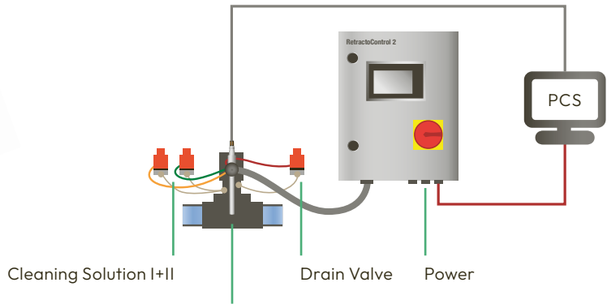


Ordering Information		
Type	**Process Connection**	**REF**
RetractoFit Bio 25	G 1¼	237480
RetractoFit Bio 55	G 1¼	237440

Retractex

Retractex is a retractable housing available in various designs tailored to meet the needs of chemical or biological applications. Retractable housings make it possible to remove the sensor while the process is still running. This provides the convenience to clean or calibrate the sensor without interrupting the process and further the possibility to extract the sensor during particularly intense processes, Providing the maximum protection of the sensor. It is available in both manual and pneumatic versions.

Connection Plan with Arc Sensor



The RetractoControl 2 is an automated electro-pneumatic control system for our Retractex housings. The control system was developed and adapted to the Retractex. A plug and play solution for automatic sensor retraction and cleaning processes with customizable programming.

The Retractex enables exceptional measurement precision, extended sensor lifespan, and cost savings through automation. Whether you require a manual or pneumatic version, the Retractex is an essential housing for ensuring accurate, reliable measurements that meet your specific needs.

RetractoControl 2

Specifications	
Dimensions (W/H/D)	300 mm x 400 mm x 250 mm
Ambient temperature	0 to 140 °C
Transport and storage temperature	-10 to 60 °C
Relative humidity	10 to 95 %, non-condensing
Protection class	IP 54, with guard door closed
Voltage supply	24 VDC (+/-10 %)
Input for external contacts	24 VDC
Maximum current consumption	1.6 A
Output	24 VDC

For more specifications see www.hamiltoncompany.com

Accessories

Wall Mount Set (plastic) RetractoControl 2
REF 10110475-1

Wall Mount Set (steel) RetractoControl 2
REF 10110475-2

Ordering Information

10110474 Automatic Control Unit for Retractables

Code	Housing
3	Plastic housing (with display)
4	Stainless Steel housing (with display)
0	Special Design

Code	Cleaning
1	without
2	for one cleaning solution
3	for two cleaning solutions
0	for three cleaning solutions

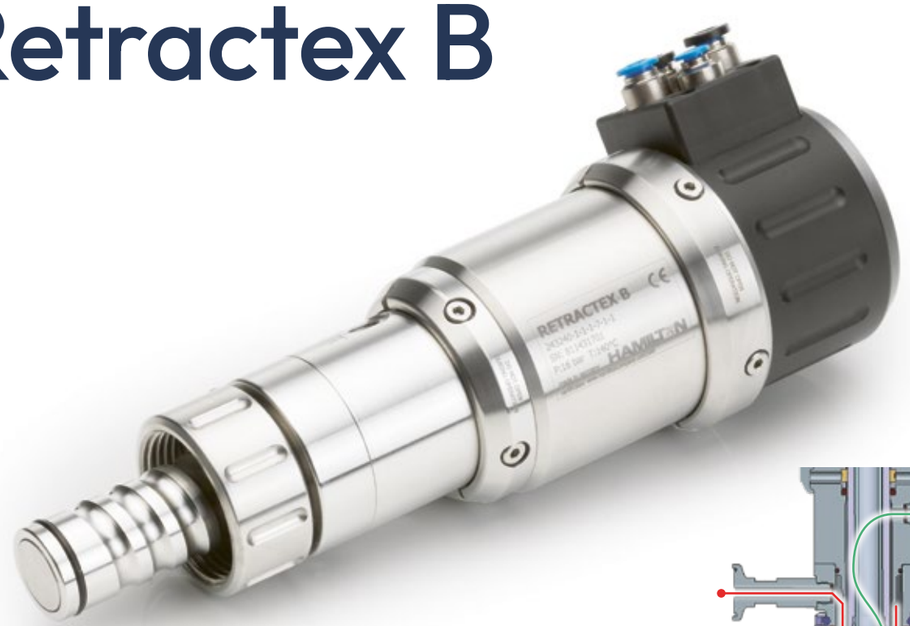
Code	Connecting hose
1	without
2	3 m length
3	5 m length
4	10 m length
0	Special Design

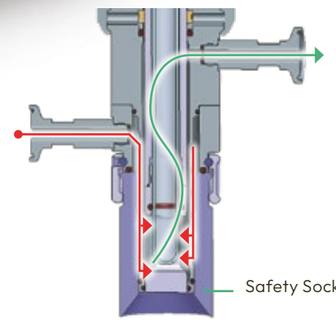
Code	Maintenance unit
1	without
2	with Maintenance unit
0	Special Design

Interface	
1	without
0	Special Design

10110474 –					

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 operater 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 sterilzed together with all wetted seals. In the HyCIP connection the cleaning solution is directed between housing 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

Specifications	
Wetted parts	Stainless Steel 1.4404
O-ring material	EPDM or FKM
O-ring position	25 mm, 50 mm and 55 mm
Pressure range (relative to ambient)	0 to 16 bar g (120 °C), 10 bar g (140 °C)
Temperature range	-10 to 140 °C
Sensor a-length	225 mm
Surface finish	R_a < 0.8 µm (N6)

For more specifications see www.hamiltoncompany.com

Ordering Information

243240 Retractex B (pneumatic)
243275 Retractex B M (manual)

	Code	Material (wetted parts)
	1	Stainless Steel 1.4404 (material certificate included)
	0	Special Design

	Code	Sealing Material (wetted sealings)
	1	EPDM/FEP; FDA USP VI (elastomer certificate included)
	2	FKM/FEP
	0	Special Design

	Code	Sensor
	1	225 mm PG13,5
	0	Special Design

	Code	Process Connection
	1	Ingold (G 1¼") o-Ring Position 28 mm
	2	Varivent N DN 40-125
	3	TriClamp 1,5" (OD Ø 50,5 mm)
	4	TriClamp 2" (OD Ø 64 mm)
	5	NEUMO BioControl 50
	6	DIN 11851 DN50 (Milchrohr)
	7	HyCIP for Ingold (G 1¼") o-Ring Position 25 mm
	8	HyCIP for Ingold (G 1¼") o-Ring Position 50 mm
	9	HyCIP for Ingold (G 1¼") o-Ring Position 55 mm
	0	Special Design

	Code	Cleaning Connection
	1	G ⅛" thread (internal)
	2	G ¼" thread (internal)
	3	¼" NPT (internal)
	4	TriClamp ¾" Ø 4 mm
	9	TriClamp ¾" Ø 10,3 mm (Sartorius)
	0	Special Design

	Code	Position switch
	1	Pneumatic
	2	Electrical (Namur)
	0	Special Design

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Accessories

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Service Kit Retractex B EPDM/FEP (FDA) Ingold (not HyCip)
REF 243241

Service Kit Retractex B EPDM/FEP (FDA) all except Ingold or HyCIP
REF 243242

Service Kit Retractex B EPDM/FEP (FDA) HyCip
REF 243243

Service Kit Retractex B FKM/FEP Ingold (not HyCip)
REF 243244

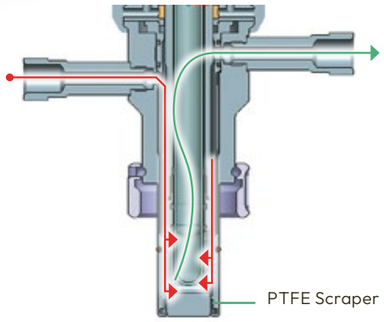
Service Kit Retractex B FKM/FEP all except Ingold or HyCIP
REF 243245

Service Kit Retractex B FKM/FEP HyCIP
REF 243246

Service tool PG13.5 for retractable housing
REF 242231

Unlocking device for insertion rod Retractex M
REF 243261

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 to 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 housing and does not harm the o-ring.

Benefits

- Extremely compact design
- Integrated safety concept – no sensor – no insertion
- Very low maintenance

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 g (120 °C), 10 bar g (140 °C)
Temperature range	-10 to 140 °C
Sensor a-length	225 mm
Surface finish	R_a < 0.8 µm (N6)

For more specifications see www.hamiltoncompany.com

Ordering Information

237730 Retractex BC Steel (pneumatic)
237735 Retractex BC Steel M (manual)

Code	Material (wetted parts)
1	Stainless Steel 1.4404 / 316L (Declaration of Quality)
2	Alloy C22 2.4602
0	Special Design

Code	Sealing Material (wetted sealings)
1	EPDM/FDA USP VI
2	FKM (Viton)
3	FFKM (Kalrez)
0	Special Design

Code	Sensor
1	225 mm PG13,5
0	Special Design

Code	Process Connection
1	Ingold (G 1¼") o-Ring Position 28 mm
2	Ingold (G 1¼") o-Ring Position 50 mm
0	Special Design

Code	Cleaning Connection
1	G ⅛" thread (internal)
2	G ¼" thread (internal)
3	¼" NPT (internal)
0	Special Design

Code	Position switch
1	Pneumatic
2	Electrical (Namur)
0	Special Design

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Service Kit Retractex BC EPDM
REF 237736

Service Kit Retractex BC FKM (Viton)
REF 237737

Service Kit Retractex BC FFKM (Kalrez)
REF 237738

Scraper ring 18 x 6 x 1 mm PTFE (BC)
REF 237733

Service tool PG13.5 for retractable housing
REF 242231

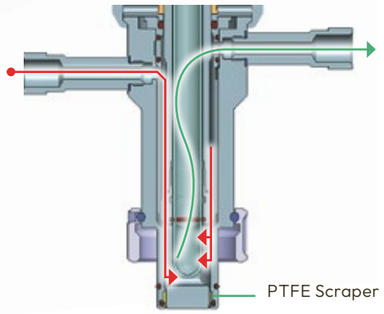
Unlocking device for insertion rod Retractex M
REF 243261

Set blind plug G⅛" 1.4301/316 for cleaning chamber
REF 243206

Safety weld-in socket straight, OP 28, 40mm, 1.4404/316L inkl. Mat.-Cert.
REF 243247

Safety weld-in socket inclined, OP 28, 40mm, 1.4404/316L inkl. Mat.-Cert.
REF 243248

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 housing 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 housing 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 g (120 °C), 10 bar g (140 °C)
Temperature range	-10 to 140 °C
Sensor a-length	225 mm
Surface finish	R_a < 0.8 µm (N6)

For more specifications see www.hamiltoncompany.com

Ordering Information

237740 **Retractex BC Plastic (pneumatic)**
237745 **Retractex BC Plastic M (manual)**

	Code	Material (wetted parts)
	1	PP
	2	PVDF / 2.4602
	3	PEEK
	0	Special Design

	Code	Sealing Material (wetted sealings)
	1	EPDM/FDA USP VI
	2	FKM (Viton)
	3	FFKM (Kalrez)
	0	special

	Code	Sensor
	1	225 mm PG13,5
	0	Special Design

	Code	Process Connection
	1	Ingold (G 1¼") o-Ring Position 25 mm
	0	Special Design

	Code	Cleaning Connection
	1	G ⅛" thread (internal)
	2	G ¼" thread (internal)
	3	¼" NPT (internal)
	0	Special Design

	Code	Position switch
	1	Pneumatic
	2	Electrical (Namur)
	0	Special Design

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Service Kit Retractex BC EPDM
REF 237736

Service Kit Retractex BC FPM (Viton)
REF 237737

Service Kit Retractex BC FFPM (Kalrez)
REF 237738

Scraper ring 18 x 6 x 1 mm PTFE (BC)
REF 237733

Service tool PG13.5 for retractable housing
REF 242231

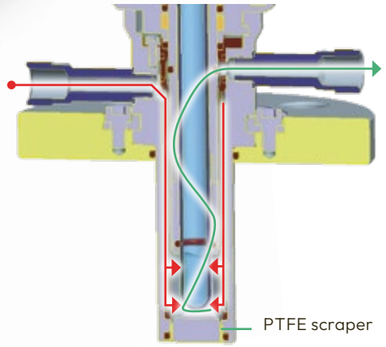
Unlocking device for insertion rod Retractex M
REF 243261

Set blind plug G⅛" PVDF for cleaning chamber
REF 243224

Set blind plug G⅛" PP for cleaning chamber
REF 237746

Set blind plug G⅛" PEEK for cleaning chamber
REF 237747

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 to 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 housing 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 housing with color coded connectors

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 g (120 °C), 10 bar g (140 °C)
Temperature range	-10 to 140 °C
Sensor a-length	225 mm
Surface finish	R_a < 0.8 µm (N6)

For more specifications see www.hamiltoncompany.com

Ordering Information

243200 Retractex C Steel (pneumatic)
243255 Retractex C Steel M (manual)

Code	Material (wetted parts)
1	Stainless Steel 1.4404 (material certificate included)
2	Stainless Steel 2.4602 (material certificate included)
0	Special Design

Code	Sealing Material (wetted sealings)
1	EPDM / USP VI (elastomer certificate included)
2	FKM (Viton)
3	FFKM (Kalrez)
0	Special Design

Code	Sensor
1	225 mm PG13,5
0	Special Design

Code	Process Connection
1	Flange DN32 PN16
2	Flange DN40 PN16
3	Flange DN50 PN16
4	Flange ANSI 1¼" 150lbs
5	Flange ANSI 1½" 150lbs
6	Flange ANSI 2" 150lbs
7	NPT M 1¼"
8	Tri Clamp 2" (OD Ø 64 mm)
9	Tri Clamp 1.5" (OD Ø 50.5 mm)
0	Special Design

Code	Cleaning Connection
1	G ⅛" thread (internal)
2	G ¼" thread (internal)
3	¼" NPT (internal)
0	Special Design

Code	Position switch
1	Pneumatic
2	Electrical (Namur)
0	Special Design

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Service Kit Retractex C EPDM
REF 243201

Service Kit Retractex C FKM (Viton)
REF 243202

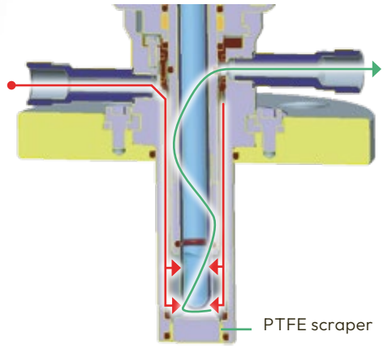
Service Kit Retractex C FFKM (Kalrez)
REF 243203

Service tool PG13.5 for retractable housing
REF 242231

Unlocking device for insertion rod Retractex M
REF 243261

Set blind plug G⅛" 1.4301 for cleaning chamber
REF 243206

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 housing 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 housing 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 g (120 °C), 10 bar g (140 °C)
Temperature range	-10 to 140 °C
Sensor a-length	225 mm
Surface finish	R_a < 0.8 µm (N6)

For more specifications see www.hamiltoncompany.com

Ordering Information

243220 **Retractex C Plastic (pneumatic)**
243265 **Retractex C Plastic M (manual)**

Code	Material (wetted parts)
1	PP
2	PVDF / 2.4602
3	PEEK (FDA approval certificate included)
0	Special Design

Code	Sealing Material (wetted sealings)
1	EPDM / FDA USP VI (elastomer certificate included)
2	FKM (Viton)
3	FFKM (Kalrez)
0	Special Design

Code	Sensor
1	225 mm PG13,5
0	Special Design

Code	Process Connection
1	Flange DN50 PN16
2	Flange ANSI 2" 150lbs
3	NPT M 1¼"
0	Special Design

Code	Cleaning Connection
1	G ¹⁄₈" thread (internal)
2	G ¼" thread (internal)
3	¼" NPT (internal)
0	Special Design

Code	Position switch
1	Pneumatic
2	Electrical (Namur)
0	Special Design

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Service Kit Retractex C EPDM
REF 243201

Service Kit Retractex C FKM (Viton)
REF 243202

Service Kit Retractex C FFKM (Kalrez)
REF 243203

Service tool PG13.5 for retractable housing
REF 242231

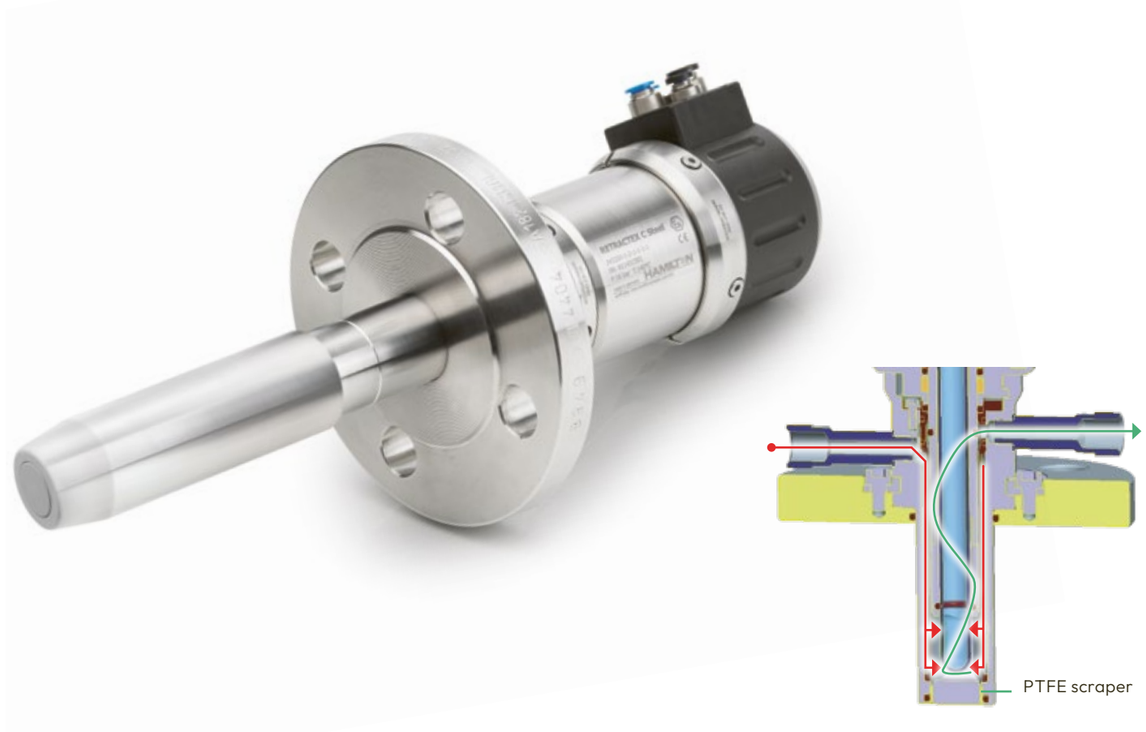
Unlocking device for insertion rod Retractex M
REF 243261

Set blind plug G¹⁄₈" PVDF for cleaning chamber
REF 243224

Set blind plug G¹⁄₈" PP for cleaning chamber
REF 237746

Set blind plug G¹⁄₈" PEEK for cleaning chamber
REF 237747

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 housing and does not harm the o-ring.

Benefits

- Extremely compact design (only 36 mm trave of inertion tube with an insertion depth of 207 mm)
- Integrated safety concept- no sensor – no insertion
- Very low maintenance
- Easy installation of the pneumatic housing with color coded connectors

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 g (120 °C), 10 bar g (140 °C)
Temperature range	-10 to 140 °C
Sensor a-length	325 mm
Surface finish	R_a < 0.8 µm (N6)

For more specifications see www.hamiltoncompany.com

Ordering Information

243210 Retractex C Steel LT (pneumatic)
243260 Retractex C Steel LT M (manual)

Code	Material (wetted parts)
1	Stainless Steel 1.4404 (material certificate included)
2	Stainless Steel 2.4602 C22 (material certificate included)
0	Special Design

Code	Sealing Material (wetted sealings)
1	EPDM / FDA USP VI (elastomer certificate included)
2	FKM
3	FFKM
0	Special Design

Code	Sensor
1	325 mm PG13,5
0	Special Design

Code	Process Connection
1	Flange DN40
2	Flange DN50
3	Flange ANSI 1½"
4	Flange ANSI 2"
0	Special Design

Code	Cleaning Connection
1	G⅛" thread (internal)
2	G ¼" thread (internal)
3	¼" NPT (internal)
0	Special Design

Code	Position switch
1	Pneumatic
2	Electrical (Namur)
0	Special Design

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Service Kit Retractex C LT EPDM
REF 243211

Service Kit Retractex C LT FKM (Viton)
REF 243212

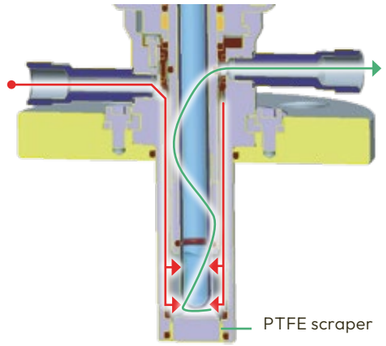
Service Kit Retractex C LT FFKM (Kalrez)
REF 243213

Service tool PG13.5 for retractable housing
REF 242231

Unlocking device for insertion rod Retractex M
REF 243261

Set blind plug G⅛" 1.4301 for cleaning chamber
REF 243206

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 housing 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 housing 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 g (120 °C), 10 bar g (140 °C)
Temperature range	-10 to 140 °C
Sensor a-length	325 mm
Surface finish	R_a < 0.8 µm (N6)

For more specifications see www.hamiltoncompany.com

Ordering Information

243230	Retractex C Plastic LT (pneumatic)
243270	Retractex C Plastic LT M (manual)

Code	Material (wetted parts)
1	PVDF / 2.4602
2	PEEK
0	Special Design

Code	Sealing Material (wetted sealings)
1	EPDM / FDA USP VI (elastomer certificate included)
2	FKM (Viton)
3	FFKM (Kalrez)
0	Special Design

Code	Sensor
1	325 mm PG13,5
0	Special Design

Code	Process Connection
1	Flange DN50
2	Flange ANSI 2”
0	Special Design

Code	Cleaning Connection
1	G ⅛” thread (internal)
2	G ¼” thread (internal)
0	Special Design

Code	Position switch
1	Pneumatic
2	Electrical (Namur)
0	Special Design

2432XX –

Accessories

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Service Kit Retractex C LT EPDM
REF 243211

Service Kit Retractex C LT FKM (Viton)
REF 243212

Service Kit Retractex C LT FFKM (Kalrez)
REF 243213

Service tool PG13.5 for retractable housing
REF 242231

Unlocking device for insertion rod Retractex M
REF 243261

Set blind plug G⅛” PVDF for cleaning chamber
REF 243224

MasterFit

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 housing at any time.

Benefits

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

Specifications	
Wetted parts	Stainless Steel 1.4435
O-ring material	EPDM
O-ring position	22 to 55 mm
Pressure range (relative to ambient)	0 to 6 bar g
Temperature range	-10 to 130 °C
Sensor a-length	120, 150, 200 mm
Surface finish	R_a < 0.8 µm (N6)

For more specifications see www.hamiltoncompany.com

Type	A (housing insertion depth)	B (total length)
MasterFit 120	40 mm	475 mm
MasterFit 150	70 mm	505 mm
MasterFit 250	170 mm	605 mm

Accessories

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Pressure Adapter
REF 237252

Service Kit for MasterFit
REF 237229

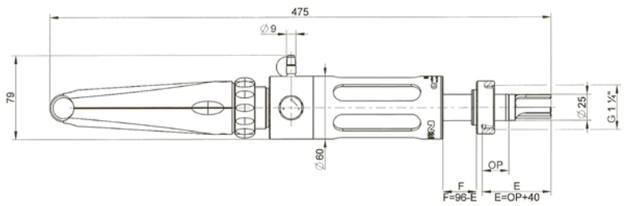
Service Kit for MasterFit FFKM
REF 237319

Flange Adapter for MasterFit*
REF 237910

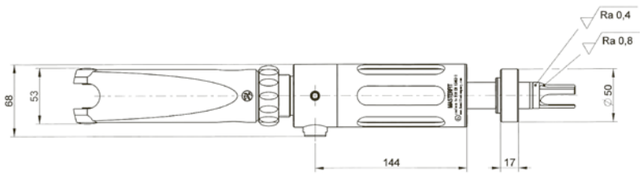
*The Flange Adapter is used with a MasterFit 120 and a sensor with a shaft length of 150 mm

Dimensional drawings / MasterFit 120 (all dimensions in mm)

Maintenance position



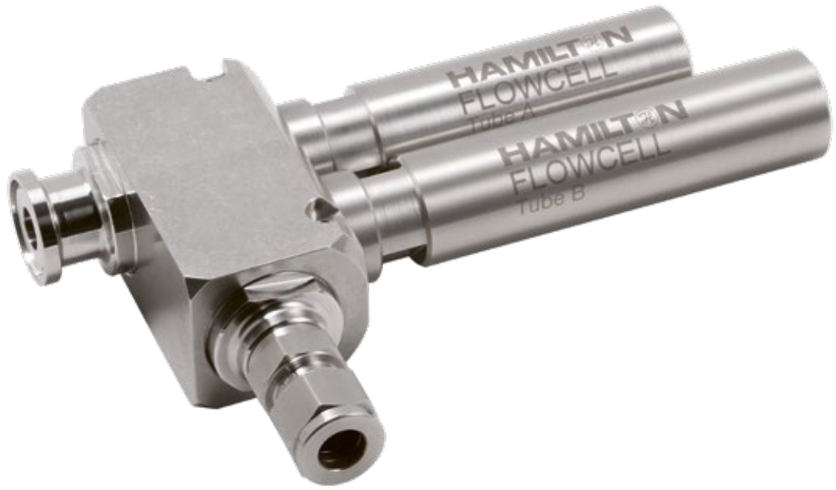
Measuring position



Ordering Information		
Type	Process Connection	REF
MasterFit 120	G 1¼	237200-OP
MasterFit 150	G 1¼	237225-OP
MasterFit 250	G 1¼	237245-30

Hamilton FlowCells

Where Innovation Flows Seamless



No two processes are identical, and neither are your measurement needs. With the Hamilton FlowCells, you gain unparalleled versatility. Whether it's pH, conductivity, dissolved oxygen, or any of our compatible sensors listed in Table 1, this ingenious housing allows you to select different positions and tubes, ensuring optimal performance tailored to your unique requirements. Crafted with the highest quality materials, the internal part of the FlowCell is expertly fashioned from PEEK, guaranteeing durability and resistance to demanding industrial conditions.

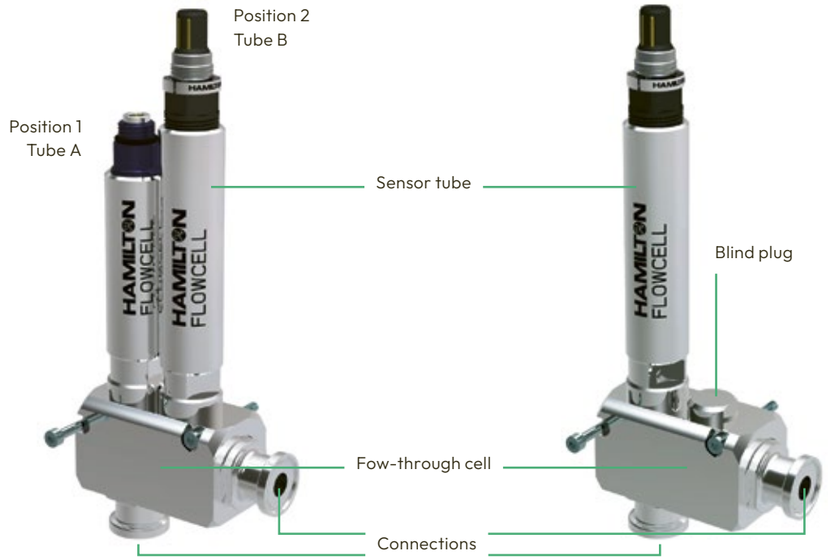
Immerse yourself in real-time insights as you monitor processes directly within the process line or through a bypass, ensuring accurate data collection and informed decision-making.

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	
Process connection	Triclamp or Swagelok
Wetted parts	PEEK, Stainless Steel 1.4435
Non wetted parts	Stainless Steel 1.4435
Standard seals	EPDM (FDA approved)
Temperature range	-10 – 140 °C
Maximum pressure	0 – 16 bar
Internal volume	REF 242585: approx. 8 mL (only within the Peek cell) REF 242590: approx. 25 mL (only within the Peek cell)

For more specifications see www.hamiltoncompany.com



Components of the FlowCell 242585 with two sensor tubes

Components of the FlowCell 242590 with one sensor tube

Sensor compatibility	
Position 1	**Position 2**
pH / ORP Sensors	Conducell 4UxF***
Conducell UPW*	OxyFerm / OxyGold
Dencytee**	VisiFerm / VisiFerm mA
	VisiTrace mA
	CO_2NTROL

Tube A and the fitting sensors can only be used in Position 1. Tube B and the fitting sensors can be used in both positions. Thus, either Tube A and/or B or twice the tube B are possible but not twice the tube A. If a single-sensor FlowCell is required, we always deliver it with position 1.

*Conducell UPW is compatible only with the TC connection versions of the Flowcell (242585-xxx).

**Dencytee Optical Cell Density sensor is only compatible with the larger Flowcell XL (242590-xxx).

***All Conducell 4UxF should be calibrated within the flowcell for best accuracy. The Arc Conducell 4UxF is not compatible with the Flowcell (242585-xxx). It works best with the larger Flowcell XL (242590-xxx).

FlowCell

Experience precision in a compact form with the small version of the FlowCell. Choose from TC25 and Swagelok connection options, each available in different versions. The ingeniously designed housing boasts a minimal internal volume of just 8ml, ensuring the utmost accuracy in measurements while optimizing valuable space.

Ordering Information				
242585	Flow Cell			
	Code	Measuring position		
	1	only Tube A (short)		
	2	only Tube B (long)		
	3	Tube A (short) and Tube B (long)		
	4	2 x Tube B (long)		
	0	Special Design		
		Code	Pipe Connection	
		1	TC25 ¼”	
		2	TC25 ⅜”	
		3	TC25 ½”	
		4	Swagelok 6 mm	
		5	Swagelok 10 mm *	
		6	Swagelok ¼”	
		7	Swagelok ⅜” *	
		8	Swagelok ½” *	
		0	Special Design	
			Code	o-ring material
			1	EPDM
			2	FFKM (two measuring positions)
			3	FFKM (one measuring position)
			0	Special Design
242585 –				

Accessories

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Service Kit FlowCell (EPDM)
REF 237387

FlowCell XL

Discover unparalleled performance in a spacious design with the FlowCell XL. This expanded version of the FlowCell features TC50 connectors in various configurations and a generous internal volume of 25ml. The housing is available in different sealing materials to meet every demand.

Ordering Information				
242590	Flow Cell XL			
	Code	Measuring position		
	1	only Tube A (short)		
	2	only Tube B (long)		
	3	Tube A (short) and Tube B (long)		
	4	2 x Tube B (long)		
	0	Special Design		
		Code	Pipe Connection	
		1	TC50 ¾”	
		2	TC50 1”	
		3	TC50 1.5” *	
		0	Special Design	
			Code	o-ring material
			1	EPDM
			2	FFKM (two measuring positions)
			3	FFKM (one measuring position)
			0	Special Design
242590 –				

Accessories

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Service Kit FlowCell XL (EPDM)
REF 237390

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.

Not suitable for Conducell and Incyte Sensors.

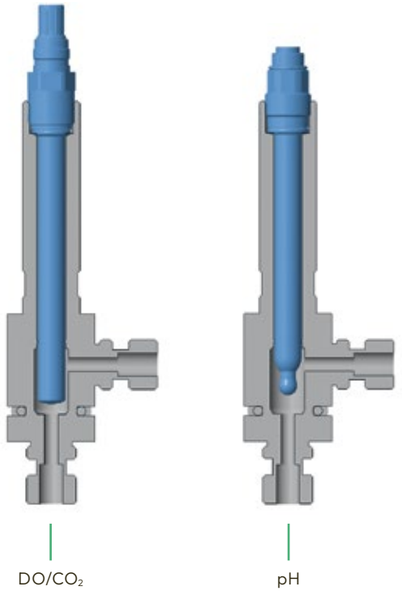
Benefits

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

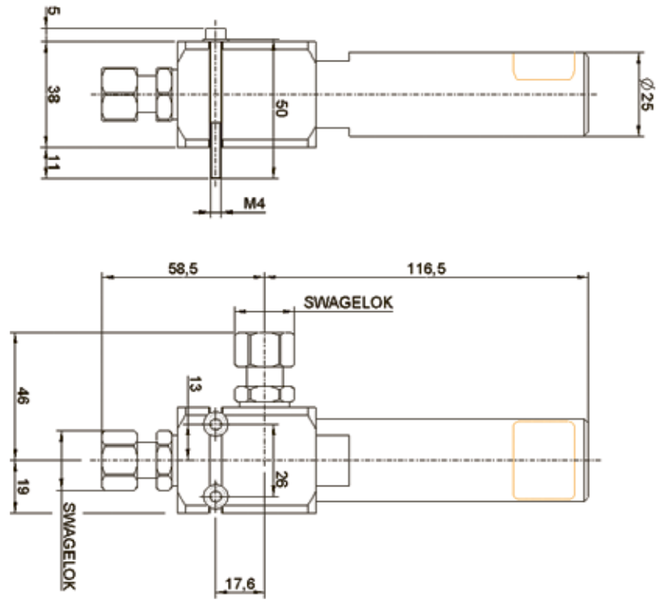
Specifications	
Wetted parts	Stainless Steel 1.4435
O-ring material	EPDM
Pressure range (relative to ambient)	0 to 16 bar g
Temperature range	-10 to 130 °C
Sensor thread	PG 13.5
Sensor a-length	120 mm
Process connection	Swagelok 10 mm

For more specifications see www.hamiltoncompany.com

Sensor installation example



Dimensional drawings (all dimensions in mm)



Ordering Information	
Type	REF
FlexiFlow SL 10	237340

Housing Service Kits, Parts and Tools

We offer a wide range of replacement and individual parts for all our products. Regular replacement ensures maximum reliability. Our consumables are neatly packaged in convenient sets enable the most hygienic and efficient management, storage and replacement of consumables. We also provide further parts and customized sets upon request. Choose us for all your replacement and tool needs!

Tool for retractable housings

This simple and ingenious tool is on the one hand a hex kex (inbus) screwdriver and at the same time, thanks to a PG13.5 thread, it allows the operation of a retractable housing by simulating an installed sensor. An indispensable tool for training, installation and maintenance.

Ordering Information	
Type	**REF**
Tool for retractable housings	242231

Sensor Dummy

With the sensor dummies a sensor can be simulated, due to the same sealing properties and size as a sensor, and the specifications, the dummy is the ideal tool both for testing and training purposes but also the easiest way to replace a sensor during calibration, cleaning or replacement.

Specifications	
a-length	96 mm / 112 mm
Process connection	PG 13.5
Wetted parts	Stainless Steel 1.4435, EPDM
O-ring material	FDA 21 CFR 177.2600, EG 1935/2004, USP <87>, USP <88> Class VI (121 °C)

Ordering Information	
Type	**REF**
Sensor Dummy 96 mm	242540
Sensor Dummy 117 mm	242231
Sensor Dummy 204 mm	10068190

Immersion Set

The steel housing with hygienic surface and 3.1 material certificate serves as a weight to hang sensors freely suspended in the liquid to be measured. A simple and reliable installation of a sensor and at the same time extremely suitable for spot measurements.

Specifications	
For sensors with	120 mm, 12 mm, PG 13.5
Wetted parts	Stainless Steel 1.4571, NBR
Surface quality of steel	R_a < 0.8 µm (N6)
Certificate	Yes, 3.1 certificate with heat number

Ordering Information	
Type	**REF**
Immersion Set	237158

Field Services

Ensure Effortless Integration with Your Systems

Hamilton's experienced Field Service Team visits your facility to provide operation installation, qualification support, service diagnostics, maintenance & calibration services, and tailored on-site training. Our on-site services ensure an effortless integration of Hamilton products with your systems. Let us take the set-up and maintenance stress out of your process.

Key Benefits

Cost Savings

Save on process costs by avoiding down-times and freeing up labor.

Enhanced Satisfaction

We provide a high level of customer support and responsiveness to enhance satisfaction and build long-term relationships.

Expert Support

Get expert support from experienced and factory trained technicians.

On-site Service

We visit your site and work with your team and equipment.

Hamilton Field Service Options

Installation Support
Installation, set-up, and calibration support directly on-site.

Maintenance & Calibration Services
Preventative maintenance and regular service.

Modular Service Contracts
Contracts tailored to your needs.

On-site Service Diagnostics
Diagnosing and resolution of problems on-site.

On-site Training
User training, and on-site training for technicians.

Qualification IQ/OQ
Support for the qualification of Hamilton products including documentation.

Request Field Services
hamiltoncompany.com/field-services

pH or ORP Sensor

	pH glass type	Nominal measurement range	Recomm. measurement range	Reference system	Reference electrolyte	Diaphragm type	Recomm. min conductivity (µS/cm)	Nominal temperature range (°C)	Recomm. temperature range (°C)	Nominal pressure max. (bar)	Upside down Installation	Comments
ChemoTrode	PHI	0 to 14	0 to 13	Everef-F	3M KCl-LR	HP ceramic	20	0 to 130	5 to 130	6	No	
ChemoTrode Bridge	PHI	0 to 14	0 to 13	Everef-B	Skylyte	HP ceramic	20	0 to 130	5 to 130	6	No	
ChemoTrode P PHI	PHI	0 to 14	0 to 13	Everef-F	Protelyt	HP ceramic	20	0 to 130	5 to 130	6	No	
FermoTrode	PHI	0 to 14	0 to 13	Everef-F	Skylyte	Coatramic	20	0 to 130	5 to 130	4	No	
EasyControl	HF	0 to 14	0 to 13	Ag/AgCl	Viscous 3M KCl	Ceramic	20	0 to 60	0 to 60	2	No	
InchTrode N100F	HF	0 to 14	2 to 12	Everef-L	Polisolve	Single Pore ring	5	-10 to 130	5 to 100	6	No	
InchTrode N75F	HF	0 to 14	2 to 12	Everef-L	Polisolve	Single Pore ring	5	-10 to 130	5 to 100	6	No	
InchTrode N75FC10	HF	0 to 14	2 to 12	Everef-L	Polisolve	Single Pore ring	5	-10 to 130	5 to 100	6	No	
InchTrode N75P	PHI	0 to 14	2 to 12	Everef-L	Polisolve	Single Pore ring	5	0 to 130	5 to 100	6	No	
InchTrode N75PC10	PHI	0 to 14	2 to 12	Everef-L	Polisolve	Single Pore ring	5	0 to 130	5 to 100	6	No	
IonoTrode	F	0 to 14	0 to 13	Everef	3M KCl	Sleeve	0.2	-10 to 40	-10 to 40	0.5	No	
LIQ-Glass PG	F	1 to 12	1 to 12	Everef	3M KCl-LR	Ceramic	2	-5 to 60	-5 to 60	2	No	
MecoTrode	H	0 to 14	0 to 14	Everef	Viscous 3M KCl	HP ceramic	50	0 to 130	0 to 130	6	No	0 to 16 bar at 25 °C, 0 to 6 bar at 130 °C
Polilyte Pro	HF	0 to 14	2 to 12	Everef-B	Polisolve	Single Pore	5	-10 to 60	-5 to 60	6	Only VP	
Polyplast Pro	V	0 to 14	2 to 12	Ag/AgCl	Polisolve	Single Pore	50	-10 to 40	0 to 40	6	No	
Polilyte Plus XP	H	0 to 14	2 to 12	Everef-L	Polisolve Plus	Single Pore	5	0 to 130	0 to 130	16	Only VP	0 to 50 bar (60 °C), 0 to 20 bar (100 °C), 0 to 16 bar (130 °C)
pH families												
Polilyte Plus H	H	0 to 14	2 to 12	Everef-L	Polisolve Plus	Single Pore	5	0 to 130	0 to 130	10	Only VP / MS	Predecessor: Polilyte Plus, Polilyte HT
Polilyte Plus HB	HB	0 to 14	2 to 12	Everef-L	Polisolve Plus	Single Pore	5	0 to 130	0 to 130	10	Only VP / MS	
Polilyte Plus HF	HF	0 to 14	2 to 12	Everef-L	Polisolve Plus	Single Pore	5	-10 to 100	-10 to 100	16	Only VP / MS	Predecessor: ClaryTrode
Polilyte Plus PHI	PHI	0 to 14	2 to 12	Everef-L	Polisolve Plus	Single Pore	5	0 to 130	5 to 130	10	Only VP / MS	Predecessor: Polyclave
EasyFerm Plus PHI	PHI	0 to 14	2 to 12	Everef-F	Phermlyte	HP Coatramic	100	0 to 140	5 to 140	6	No	
EasyFerm Plus HB	HB	0 to 14	2 to 12	Everef-F	Phermlyte	HP Coatramic	100	0 to 140	5 to 140	6	No	
EasyFerm Bio PHI	PHI	0 to 14	2 to 13	Everef-F	Foodlyte	HP Coatramic	100	0 to 140	0 to 140	6	No	
EasyFerm Bio HB	HB	0 to 14	2 to 13	Everef-F	Foodlyte	HP Coatramic	100	0 to 140	0 to 140	6	No	

	pH glass type	Nominal measurement range	Recomm. measurement range	Reference system	Reference electrolyte	Diaphragm type	Recomm. min conductivity (µS/cm)	Nominal temperature range (°C)	Recomm. temperature range (°C)	Nominal pressure max. (bar)	Upside down Installation	Comments
ChemoTrode ORP	Platinum ring	± 2000 mV	± 2000 mV	Everef-F	3M KCl-LR	HP ceramic	20	0 to 130	0 to 130	6	No	
EasyControl ORP	Platinum wire	± 2000 mV	± 2000 mV	Ag/AgCl	Gel	Ceramic	20	0 to 60	0 to 60	2	No	
OxyTrode Pt	Platinum wire	± 2000 mV	± 2000 mV	Everef	Viscous 3M KCl	HP ceramic	50	0 to 130	0 to 130	6	No	
Polilyte RX	Platinum wire	± 2000 mV	± 2000 mV	Everef-B	Polisolve	Single Pore	5	-10 to 60	-10 to 60	6	No	
Polyplast Pro RX	Platinum wire	± 2000 mV	± 2000 mV	Ag/AgCl	Polisolve	Single Pore	50	-10 to 40	-10 to 40	6	No	
EasyFerm Plus ORP	Platinum wire	± 2000 mV	± 2000 mV	Everef-F	Phermlyte	HP Coatramic	100	0 to 140	5 to 140	6	No	Arc: ± 1500 mV
Polilyte Plus ORP	Platinum ring	± 2000 mV	± 2000 mV	Everef-L	Polisolve Plus	Single Pore	5	0 to 130	0 to 130	10	Only VP	Arc: ± 1500 mV, 0 to 16 bar at 100 °C, 0 to 3 bar at 140 °C

Sensor Comparison

DO Sensor

	Measurement principle	Nominal measurement range (DO)	Nominal temperature range	Measurement temperature range	Nominal pressure max. (bar)	Compatible ODO Caps / Membrane Kits
VisiFerm RS485	Optical	4 ppb to 25 ppm	-10 to 140 °C	-10 to 85 °C	12	H0, H2, H3, H4
VisiFerm mA	Optical	4 ppb to 25 ppm	-10 to 140 °C	-10 to 85 °C	12	H3, H4
VisiTrace mA / RS485	Optical	1 ppb to 2 ppm	-10 to 140 °C	-10 to 85 °C	12	L1
VisiWater DO P Arc	Optical	0 to 40 ppm	0 to 60 °C	0 to 60 °C	12	H20
OxyFerm FDA	Amperometric	10 ppb to 40 ppm	0 to 130 °C	0 to 130 °C	4	FDA, CIP, standard
OxyGold B	Amperometric	8 ppb to 40 ppm	0 to 100 °C	0 to 100 °C	12	OxyGold
OxyGold G	Amperometric	1 ppb to 40 ppm	0 to 130 °C	0 to 130 °C	12	OxyGold
Oxysens	Amperometric	40 ppb to 40 ppm	0 to 60 °C	0 to 60 °C	4	none

Conductivity Sensor

	Measurement principle	Nominal measurement range	Nominal temperature range	Cell constant	Nominal pressure max. (bar)	Electrodes materials available
Conducell 4UxF	4 pole contacting	1 µS/cm to 300 mS/cm	-20 to 150 °C	0.36/cm	20 (135 °C)	Stainless steel 1.4435, Titanium, Hastelloy C 2.4602, Platinum
Conducell 4US	4 pole contacting	0.1 µS/cm to 500 mS/cm	-20 to 135 °C	0.147/cm	6	Stainless steel 1.4435
Conducell UPW	2 pole contacting	0.01 to 1500 µS/cm	0 to 130 °C	< 0.1/cm	10	Stainless steel 1.4435
Conducell 2DC-PG	2 pole contacting	10 µS/cm to 20 mS/cm	-5 to 80 °C	1/cm	6	Graphite

Safety First

Hamilton Offers More Certificates Then Ever

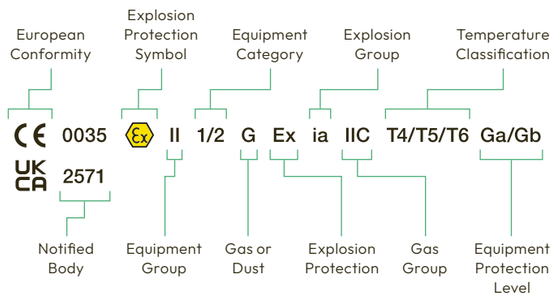
Many industrial processes are in hazardous environments and require suitable equipment with the European ATEX, the British UKEX or the global IECEx approval. Hamilton provides safe sensors and housings since many years for these applications. In case a gas atmosphere and a dust atmosphere are or could 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 **UKEX** regulation applies to Great Britain and corresponds to the ATEX directive.

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

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

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.

	ATEX		UKEX		IECEx	
Sensor/Housing	**Gas**	**Dust**	**Gas**	**Dust**	**Gas**	**Dust**
Analog Sensors	✓	✓	✓	✓	✓	✓
Housings	✓	✓	✓	✓	✓	✓
Arc	–	–	–	–	–	–
Memosens	✓	–	✓	–	✓	–
VisiFerm mA	✓	✓	✓	✓	✓	✓
VisiTrace mA	✓	✓	✓	✓	✓	✓

Alphabetical Index

HAMILTON

Years of Experience
75+

Locations Worldwide
22+

Employees Internationally
3,000+

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