HAMILTON

Process Analytics

Measuring Solutions

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Process Analytics

Measuring Solutions

HAMILTON®

Cell Density

See more on page 4

Single Use Sensors

See more on page 5

CO_2NTROL

See more on page 6

VisiFerm RS485

See more on page 6

Table of Contents

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 also available for easy integration of digital signals and allow, in combination with the ArcAir app, to benefit from the Arc technology. Thus calibration data provided on a label can easily be scanned and the sensors are ready to be used with seconds.

VisiFerm DO SU Family
Reliable Dissolved Oxygen Measurement

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

OneFerm pH Family
High Performance pH Measurement

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

Incyte SU Family
Monitoring Viable Cell Density

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

Conducell SU Family
Conductivity Measurement In Bags

The Conducell SU Family allows measurements in a wide conductivity range in SU applications.

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.

Find all details about our new sensor on pages 74 to 77.

Maintenance Free

Simple Calibration

Made for Bioproduction

VisiFerm RS485

The Sensor for Biopharma

Hamilton fully redesigned the sensor electronics and optical cap to create the most robust VisiFerm dissolved oxygen sensor yet. Upgrading both key components allowed the VisiFerm RS485 to have less frequent need for calibration, less measurement error, and longer lifetime than previous optical sensor thechnologies.

- 80% Fewer Calibrations
- 3x Longer Cap Life
- 50% Longer Sensor Life
- Supply security for the upcoming decade

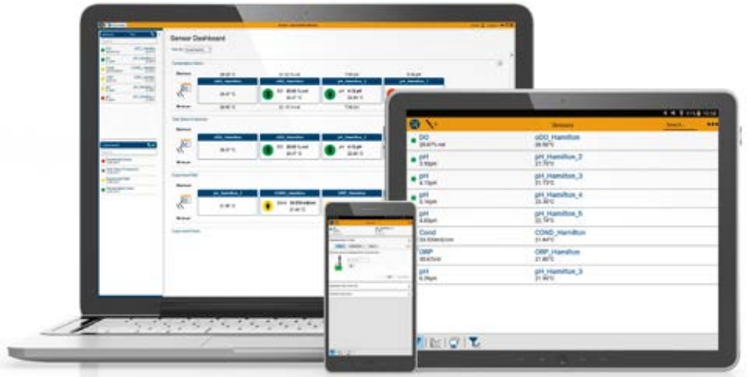
VisiTrace RS485

Trace Level DO Measurement

Hamilton fully redesigned the sensor electronics to create the most robust VisiTrace sensor yet. VisiTrace RS485 is designed for trace measurement from 1 to 2,000 ppb and stable against active chlorine and chlorine dioxide.

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

HAMILTON arc Air

Download on the App Store

GET IT ON Google Play

Arc Modbus OPC Converter

Easy Integration in SCADA

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

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 5-Year Shelf Life

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

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

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

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

VisiFerm DO

The most reliable Optical Dissolved Oxygen sensor in the Industry

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

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

The True Power

Intelligence Integrated

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

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

Fully compensated signal

- Temperature compensated
- E.g. Pressure, Salinity

Signal output

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

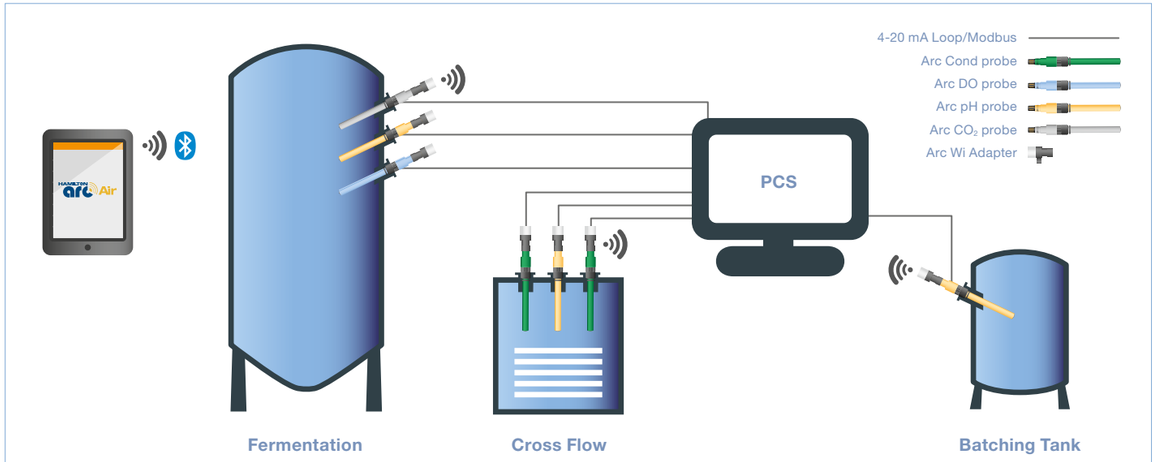
The integrated micro-transmitter stores

- Last calibration data
- Diagnostic information
- Sensor configuration

Arc Intelligence

Wireless Communication & Calibration

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

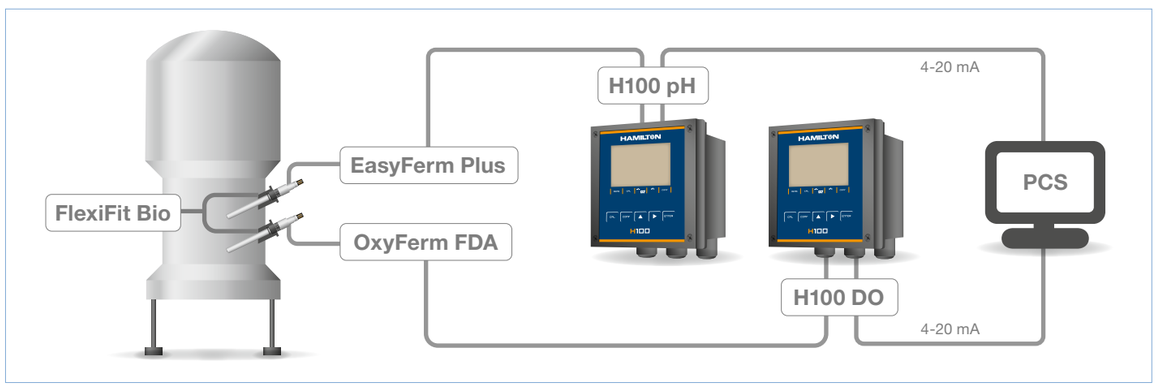


Laboratory Calibration

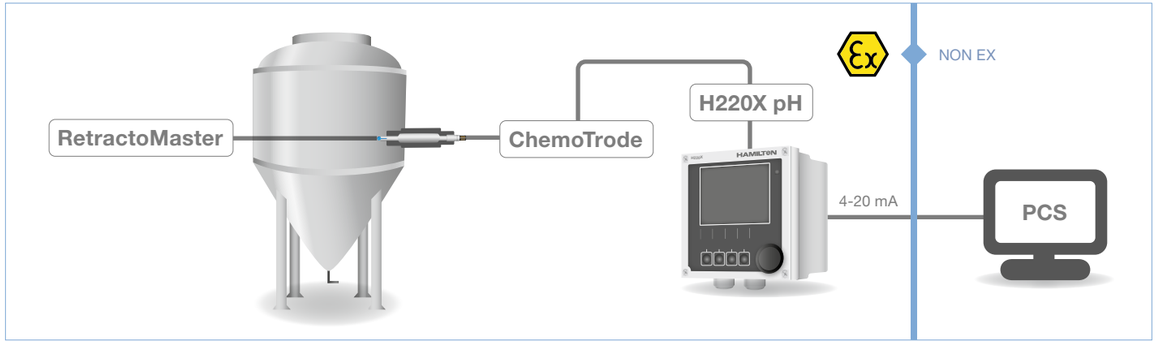
Complete Arc Sensor Portfolio

Analog Systems

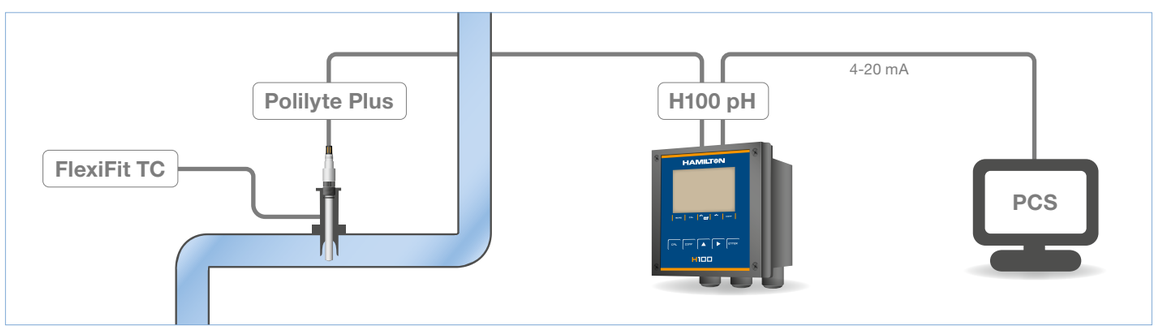
Standard Measuring Loop



Measuring Loop in Hazardous Area

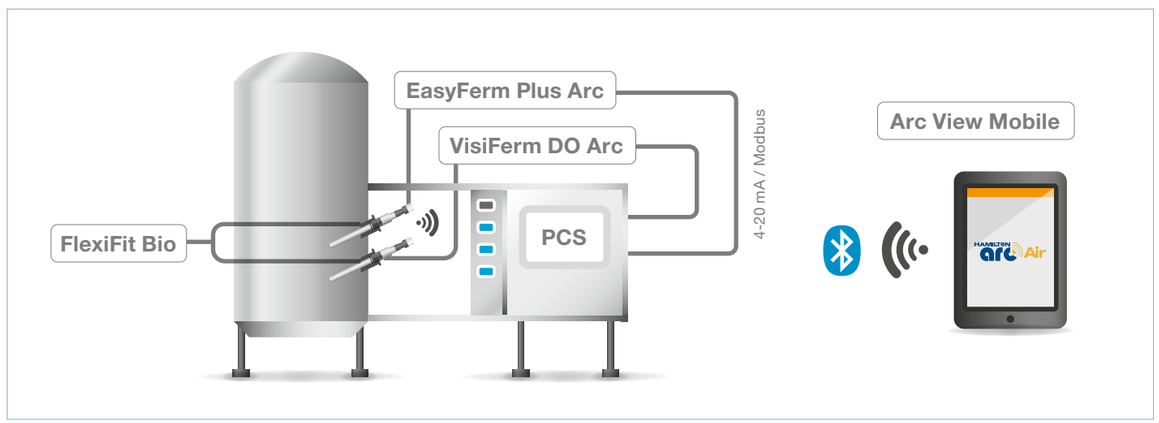


Measuring Loop in Pipe

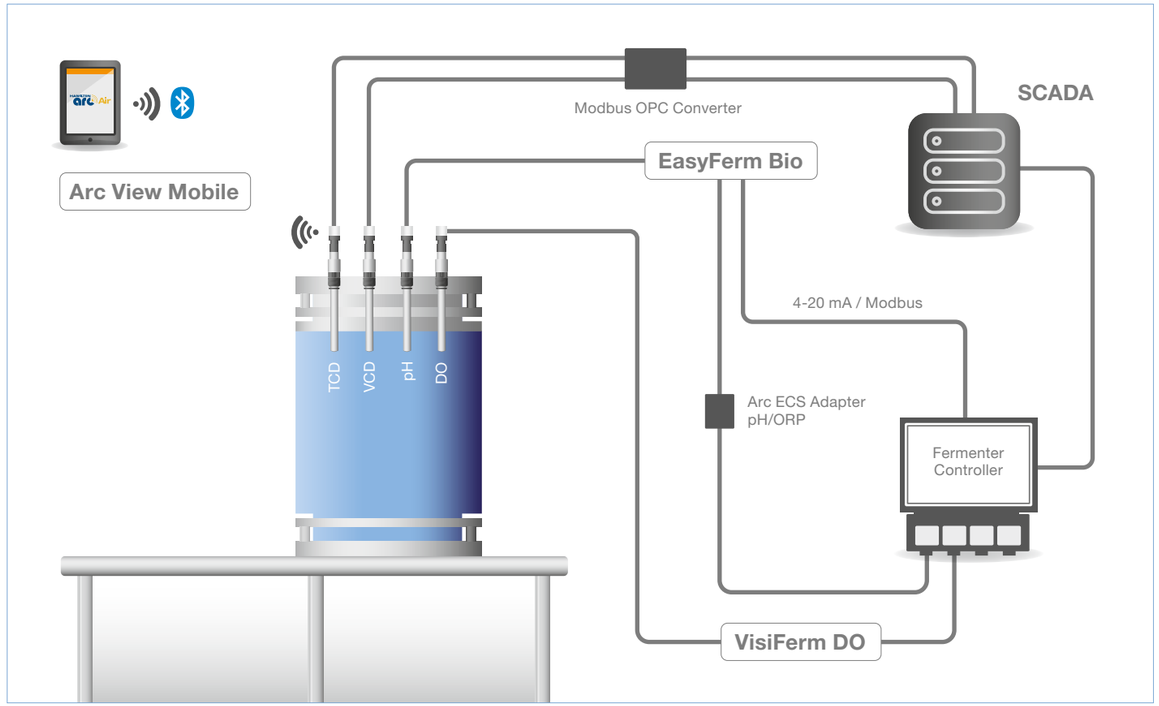


Arc Systems

Skid System



Arc in R&D

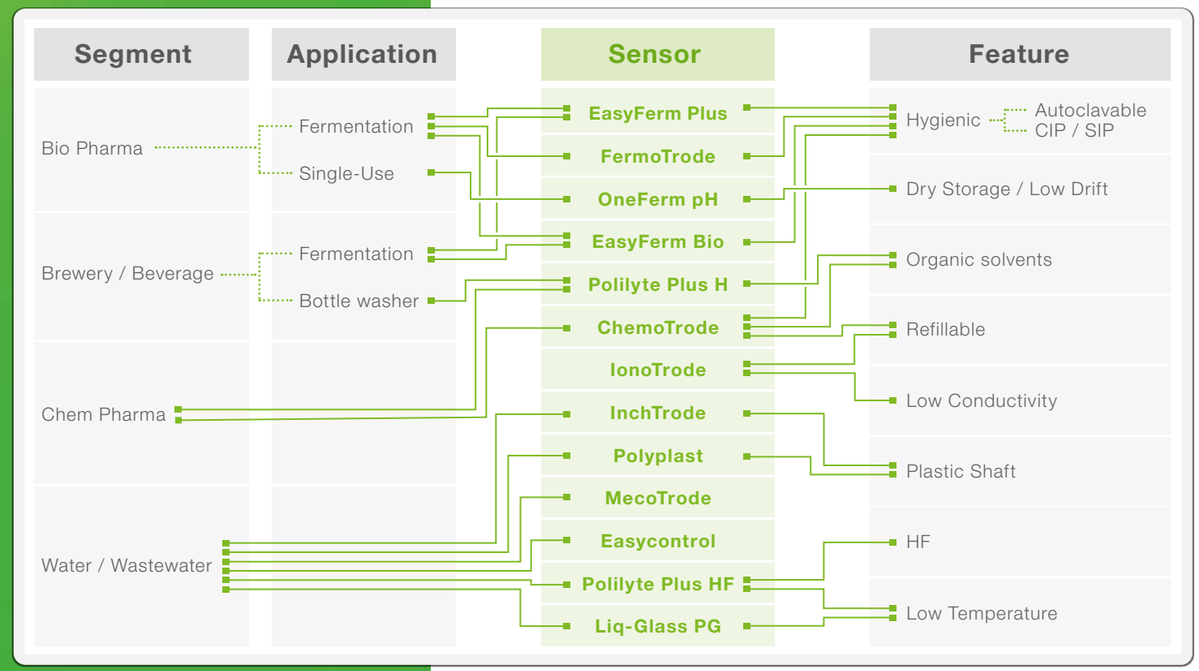


pH

pH 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 or a calomel electrode.

In general, the pH value is a measure of the acidity or the basicity of an aqueous solution. In technical terms, pH is the negative logarithm of the activity of the solvated protons H^+. It's mostly explained as the measure of the proton concentration which is correct for dilute aqueous solutions.



Polilyte Plus family

The outstanding success of the Polilyte Plus in chemical and wastewater applications gave the inspiration for transferring the good features to a whole family of sensors. The expanded portfolio widens the range of applications that can be covered.

All members have the same reference electrolyte Polisolve Plus, use the Single Pore technology but will have different pH glasses.

Benefits

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

Typical applications

- Sugar industry
- Microelectronics
- Industrial wastewater
- Downstream processes
- Fermentation

How to choose the sensor	New sensor	pH glass	Electrolyte	Predecessor
HF in the media, low temperature	**Polilyte Plus HF**	HF	Polisolve Plus	ClaryTrode
Low conductivity	**Polilyte Plus H**	H	Polisolve Plus	Polilyte HT
CIP, SIP, autoclavations, chemical robustness	**Polilyte Plus PHI**	PHI	Polisolve Plus	Polyclave
CIP, SIP, autoclavations, fast response time	**Polilyte Plus HB**	HB	Polisolve Plus	
High pressure	**Polilyte Plus XP**	H	Polisolve Plus	Polilyte Plus XP

Specifications

Measuring range	0 to 14 pH
Process temperature	See table on page 160/161
Pressure range (relative to ambient)	See table on page 160/161
Hygienic aspects	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

Ordering Information

Polilyte Plus Family Structure

242428 **Basic number = Polilyte Plus VP 120 (old Ref)**

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 – ← **Order Code**

238811	**Polilyte Plus XP S8 120**
242415	**Polilyte Plus XP VP 120 Pt1000**

Accessories

pH buffers see page 100 **Cables** see page 108 **Housings** see page 126

EasyFerm Plus family

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
Hygienic aspects	Autoclavable, SIP, CIP
pH glass	HB, PHI
Electrolyte	Phermlyte
Reference system	Everef-F
Diaphragm	HP Coatramic
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

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

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

“Did you know… that with a pre-pressurized reference system the life time of a sensor is extended?”

Benefits

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

Typical applications

- Bioreactors
- Industrial processes
- Downstream processes

How to choose the sensor	New sensor	pH glass	Electrolyte	Predecessor
CIP, SIP, autoclavations, chemical robustness	**EasyFerm Plus PHI**	PHI	Phermlyte	EasyFerm Plus
CIP, SIP, autoclavations, fast response time	**EasyFerm Plus HB**	HB	Phermlyte	

Ordering Information

EasyFerm Plus Family Structure

238633

Code	pH glass
1	PHI (recommended pH glass type)
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
8	275

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 – ← **Order Code**

Accessories

pH buffers see page 100 **Cables** see page 108 **Housings** see page 126

EasyFerm Bio family

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
Hygienic aspects	Autoclavable, SIP, CIP
pH glass	HB, PHI
Electrolyte	Foodlyte
Reference system	Everef-F
Diaphragm	HP Coatramic
O-ring	Silicone

For more specifications see www.hamiltoncompany.com

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

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

“Did you know… that you may even eat the Foodlyte?”

Benefits

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

Typical applications

- Bioreactors
- Brewhouse
- Downstream processes
- Gelatine manufacturing

How to choose the sensor	New sensor	pH glass	Electrolyte	Predecessor
CIP, SIP, autoclavations, fast response time	**EasyFerm Bio HB**	HB	Foodlyte	EasyFerm Bio
CIP, SIP, autoclavations, chemical robustness	**EasyFerm Bio PHI**	PHI	Foodlyte	

Ordering Information

EasyFerm Bio Family Structure

243632

Code	pH glass
1	PHI
2	HB (recommended pH glass type)

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 – ← **Order Code**

Accessories

pH buffers see page 100 **Cables** see page 108 **Housings** see page 126

MecoTrode

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

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

Specifications

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

For more specifications see www.hamiltoncompany.com

“Did you know…
that the MecoTrode is already 25 years in the market?”

Benefits

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

Typical applications

- Water and Wastewater
- Industrial processes

Ordering Information

	a-length	S8	VP 6	MS	Arc
MecoTrode H	120	238801	238437	242837	10110152*
MecoTrode HF	120	–	–	242839	–
	225	–	–	242840	–

*Not for explosive environments

Accessories

pH buffers see page 100
Cables see page 108
Housings see page 126

OneFerm pH new

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

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

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

Benefits

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

Typical applications

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

Specifications	
Measuring range	3 to 10 pH
Process temperature	4 to 50 °C
Pressure range (relative to ambient)	0 to 1 bar
Hygienic aspects	Gamma irradiation up to 45 kGy (for the OneFerm sensors and the pH-port)
Diaphragm	HP Coatramic
O-ring	Silicone

For more specifications see www.hamiltoncompany.com

Ordering Information

	a-length	VP 6 / Pt100	VP 6 / Pt1000	VP 6 / 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

*Only for OEM integration available

Arc Module SU pH
Ref 243233

pH Port
Ref 243462

Accessories

Cables see page 108

ChemoTrode / P
ChemoTrode Bridge

The ChemoTrode is the most robust sensor to measure pH in demanding applications in pharmaceutical and chemical industries.

The ChemoTrode has a refill hole which allows refilling of the electrolyte and pressurization of the reference system. Its Everef-F reference cartridge ensures that the reference electrolyte remains free of silver and precipitation of proteins.

“Did you know… that the ChemoTrode Bridge has an extended life time due to its special reference system?”

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	0 to 14 pH
Process temperature	0 to 130 °C
Pressure range (relative to ambient)	0 to 6 bar
Hygienic aspects	SIP, CIP
pH glass	PHI
Electrolyte	ChemoTrode: Viscous 3 M KCl-LR ChemoTrode Bridge: Skylyte ChemoTrode P: Protelyte
Reference system	ChemoTrode: Everef-F ChemoTrode Bridge: Everef-B ChemoTrode P: Everef-F
Diaphragm	ChemoTrode: HP ceramic ChemoTrode Bridge: Platinum ChemoTrode P: HP ceramic
Temperature sensor	Pt1000 in VP version

For more specifications see www.hamiltoncompany.com

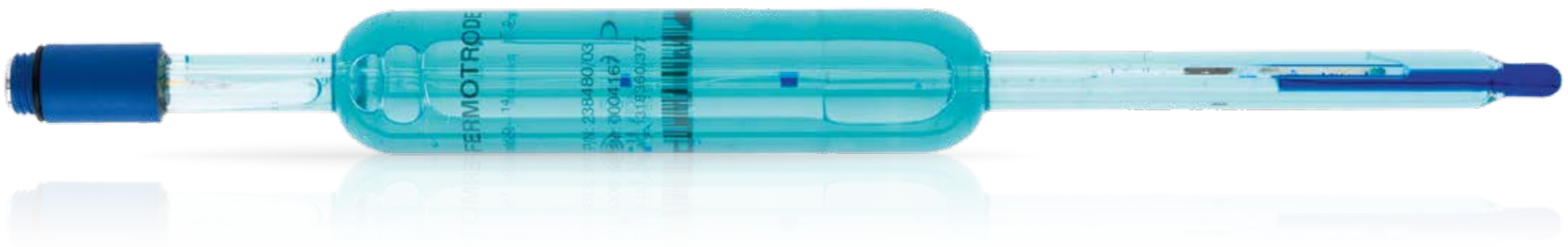
Ordering Information

	a-length	S7	VP 6 / Pt1000	VP 6 / Pt100
ChemoTrode	120	238760	242700	–
	150	238762	242701	–
	200	238764	–	–
	250	238766	242703	10069903
ChemoTrode P	120	238761	243252	–
	150	238763	243253	–
	250	238767	243254	–
ChemoTrode Bridge (Non Ex)	120	238770	–	–
	150	238772	–	–
	250	238776	–	–

Accessories

pH buffers see page 100
Cables see page 108
Housings see page 126

FermoTrode



Specifications	
Measuring range	0 to 14 pH
Process temperature	0 to 130 °C
Pressure range (relative to ambient)	0 to 4 bar
Hygienic aspects	SIP
pH glass	PHI
Electrolyte	Skylyte
Reference system	Everef-F
Diaphragm	Coatramic

For more specifications see www.hamiltoncompany.com

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

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

Benefits

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

Typical applications

- Biotechnology
- Pharmaceutical Industry

Ordering Information

	a-length	S7
FermoTrode	120	238480
	150	238482
	200	238484
	250	238486

Accessories

pH buffers see page 100
Cables see page 108
Housings see page 126

IonoTrode

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

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

Did you know…

„that the IonoTrode is designed for ion weak media with a low conductivity of only 0.2 µS/cm?"

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

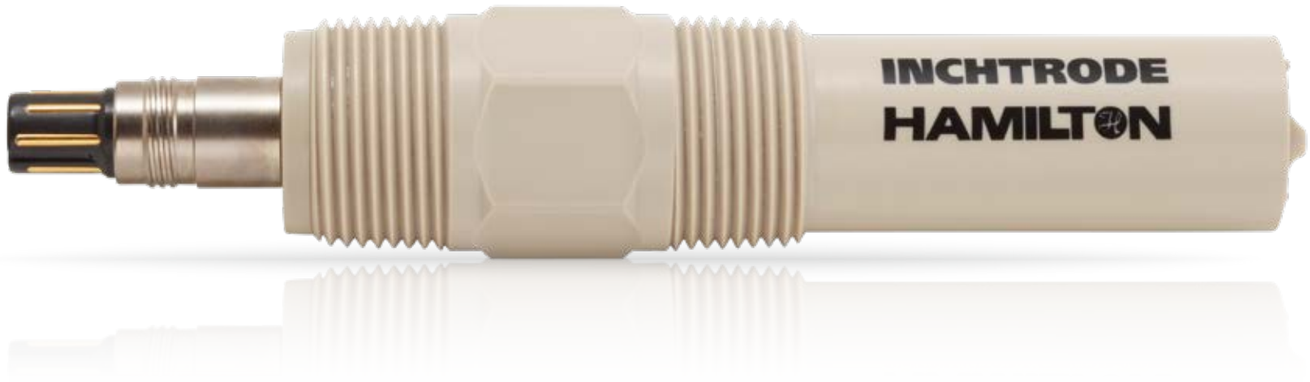
Ordering Information

	a-length	S7
IonoTrode	120	238525

Accessories

pH buffers see page 100
Cables see page 108
Housings see page 126

InchTrode



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.

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

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 (25 °C) 0 to 6 bar (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

Ordering Information

	Type	a-length	VP 6	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

Accessories

pH buffers see page 100
Cables see page 108
Housings see page 126

Polilyte Pro
Polyplast Pro

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.

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

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
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

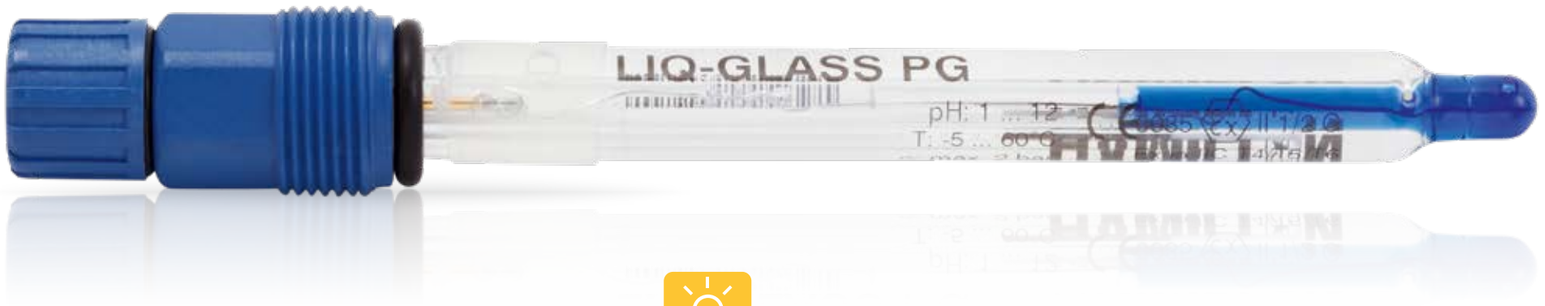
Ordering Information

	a-length	S8	VP 6
Polilyte Pro	120	238411	238417
Polyplast Pro	120	238408	–

Accessories

pH buffers see page 100
Cables see page 108
Housings see page 126

Liq-Glass PG EasyControl



The maintenance free Liq-Glass PG and the EasyControl sensors are entry level sensors for chemical or waste water applications and low process temperatures. They show good 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
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

“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

Accessories

pH buffers see page 100
Cables see page 108
Housings see page 126

ORP

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.

Polilyte Plus 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 130 °C)
Pressure range (relative to ambient)	0 to 3 bar (140 °C) 0 to 10 bar (130 °C) 0 to 16 bar (100 °C)
Hygienic aspects	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

Ordering Information

	a-length	S8	Arc	VP 6
Polilyte Plus ORP	120	243185	243060	243648
	225	243186	243061	–
	325	10078139	243062	–
	425	10078140	243063	–

Accessories

ORP buffers see page 101
Cables see page 108
Arc Accessories see page 117
Housings see page 126

EasyFerm Plus ORP

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
Hygienic aspects	Autoclavable, CIP, SIP
ORP element	Pt ring
Electrolyte	Phermlyte
Reference system	Everef-F
Diaphragm	HP Coatramic
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

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

Ordering Information

	a-length	S8	Arc
EasyFerm Plus ORP	120	243187	243050
	225	243188	243051
	325	–	243052
	425	–	243053

Accessories

ORP buffers see page 101
Cables see page 108
Arc Accessories see page 117
Housings see page 126

ChemoTrode ORP

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

Specifications

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

For more specifications see www.hamiltoncompany.com

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

Ordering Information

	a-length	S7
ChemoTrode ORP	120	238740
	150	238742

Accessories

ORP buffers see page 101
Cables see page 108
Housings see page 126

OxyTrode Pt

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

Specifications

Measuring range	± 2000 mV
Process temperature	0 to 130 °C
Pressure range (relative to ambient)	0 to 16 bar (25 °C) 0 to 6 bar (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

“Did you know… *that the OxyTrode Pt is the ORP version of the MecoTrode?*”

Benefits

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

Typical applications

- Water and Wastewater
- Industrial processes

Ordering Information

	a-length	S8
OxyTrode	120	238810

Accessories

ORP buffers see page 101
Cables see page 108
Housings see page 126

Polilyte RX
Polyplast Pro RX

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

For more specifications see www.hamiltoncompany.com

Ordering Information

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

Accessories

ORP buffers see page 101
Cables see page 108
Housings see page 126

EasyControl ORP

The maintenance free EasyControl ORP is an entry level ORP sensor for chemical or wastewater applications and low process temperatures.

It is also often used in swimming pools to control the disinfection with chlorine. They show also good behavior in samples containing few ions, with respectively low conductivity.

Specifications

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

For more specifications see www.hamiltoncompany.com

Benefits

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

Typical applications

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

Ordering Information

	a-length	S8
EasyControl ORP	120	238523

Accessories

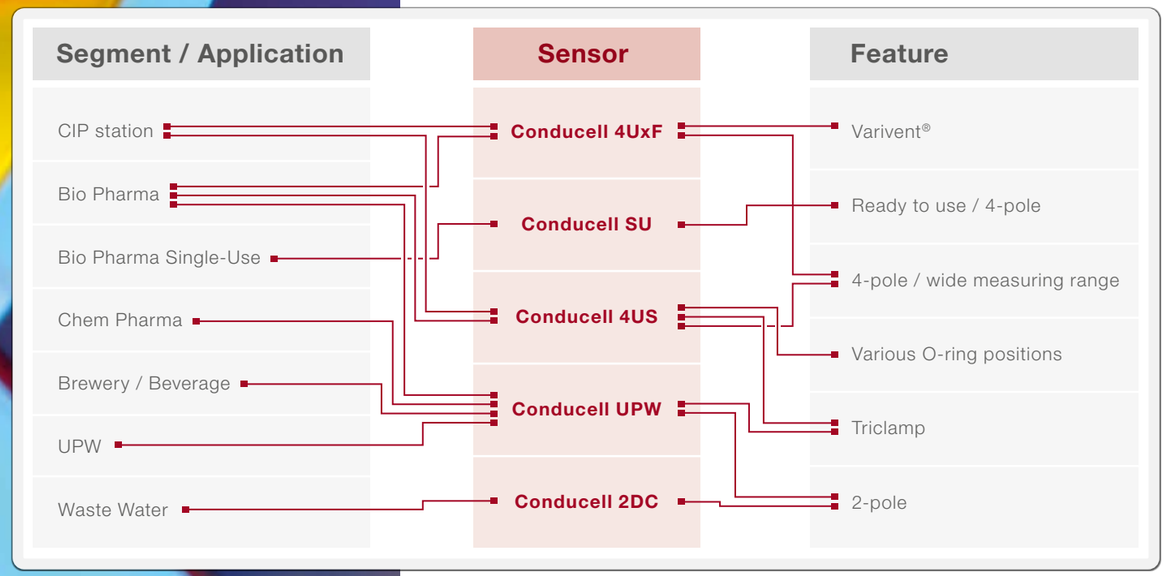
ORP buffers see page 101
Cables see page 108
Housings see page 126

Cond

The electrical conductivity is important for the characterization of liquids in different kinds of processes. In aqueous solutions the conductivity is caused by the decomposition of dissolved acids, bases or salts into positive cations and negative anions. In ultra-pure water, where no ions, except very few 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.



Conducell 4UxF family

The Conducell 4UxF sensors are suited for measurements in hygienic applications. All wetted parts are FDA-approved, can be cleaned easily and withstand CIP cleanings and autoclavations. The sensors show a very good linearity over a broad measuring range.

They are available with different process connections such as Varivent®.

The Conducell 4USF with stainless steel electrodes is most common. This sensor is suitable for various applications in biopharma, water or food industry. The newly implemented lengths are perfectly designed for flow cells e.g. in downstream applications.

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

Benefits

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

Typical applications

- CIP station
- Water preparation

Specifications

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

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

243590 – ← Order Code

	a-length	VP 6
Conducell 4USF-VV	3	237640 (non Ex)

Accessories

Conductivity Standards see page 102
Cables see page 108
Housings see page 126

Conducell SU new

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.

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

Benefits

- Specially designed for sterile application in SU Pharma and Biotechnology
- Highly reliable measurements after gamma sterilization and dry storage even after short wet-in time (<30 min)
- Biocompatible materials

Typical applications

- Mixing bags for buffer preparation, virus inactivation or 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
Hygienic aspects	Gamma irradiation up to 50 kGy (for the disposables)
Cell constant	1.31/cm
Material of electrodes	Pt = Platinum

For more specifications see www.hamiltoncompany.com

Ordering Information

Arc Module Cond-P SU	Conducell-P SU*
10071707	10076677

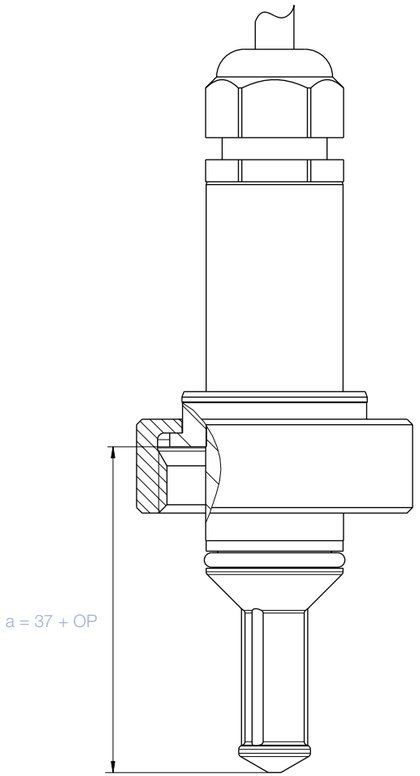
*Only for OEM integration available

Accessories

Conductivity Standards see page 102

Cables see page 108

Conducell 4US



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

For more specifications see www.hamiltoncompany.com

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

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

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

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

Benefits

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

Typical applications

- Fermentation
- Chemical industry

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

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

Conductivity Standards see page 102
Safety Socket see page 152

Conducell UPW

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

For more specifications see www.hamiltoncompany.com

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

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

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

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

Benefits

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

Typical applications

- Ultra Pure Water
- Pure Water
- Water for Injection

Ordering Information

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

UPW Simulator

Accessories

UPW Simulator Ref 243580

Traceable resistor to verify the Arc module acc. to USP <645>

Conductivity Standards see page 102
Cables see page 108
Arc Accessories see page 117
Housings see page 126

Conducell 2DC-PG

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

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
Cell constant	1/cm
Material of electrodes	Graphite
O-ring	EPDM (other versions available on request)

For more specifications see www.hamiltoncompany.com

Benefits

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

Typical applications

- Water and Wastewater

Ordering Information

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

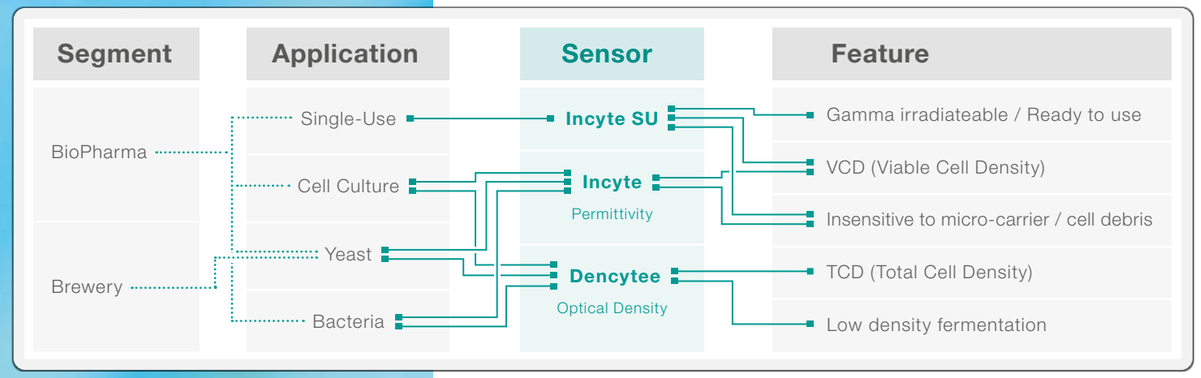
Accessories

Conductivity Standards see page 102
Housings see page 126

Cell Density

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.



Incyte Arc

Viable Cell Density Measurements in real-time provide actionable data to automate process control. This is not possible by relying on off-line measurements, which only provide a window into the past.

Incyte Arc is Hamilton's next-generation viable cell density sensor, offering high-fidelity permittivity measurements comes now paired with integrated microtransmitters that leverage ArcAir technology. 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.

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

Benefits

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

Typical applications

- Eucaryotic cells
- Viability prediction possible

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
Hygienic aspects	Autoclavable, CIP, SIP
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Ordering Information

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

Accessories

Conductivity standard 12880 µS/cm, Basic Line Ref 238988

Solution B for Incyte Verification Ref 243742

Cables see page 108

Arc Accessories see page 117

Housings see page 126

Incyte SU new

Accurately analyzing the characteristics of viable cells during bioprocess is crucial. Only viable and healthy cells are producing the product of interest. Today these characteristics are monitored by labor intensive offline samplings.

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

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

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

“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?”

Benefits

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

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
Hygienic aspects	Gamma irradiation up to 50 kGy (for the disposables)
Material of electrodes	Platinum

For more specifications see www.hamiltoncompany.com

Ordering Information

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

**Only for OEM integration available*

Accessories

Conductivity Standards see page 102

Cables see page 108

Dencytee Arc new

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

Dencytee Arc sensors perform on-line measurement of Total Cell Density in solution. The sensor is designed to measure the turbidity of the cell suspension. The measurement is made at NIR (near-infrared) wavelengths so it is insensitive to changes in media color.

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.

“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.”

Benefits

- Simple On-Line Measurement of Cell Growth
- Reliable Values During the Growth Phase
- Improved Linearity at High Concentrations
- Early Detection of Process Deviations

Typical applications

- Yeast & Bacteria Processes

Ordering Information

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

Accessories

Dencytee Maintenance Tool Kit
Ref 10146924

Cables see page 108
Arc Accessories see page 117
Housings see page 126

CO_2

Dissolved carbon dioxide (DCO_2) is a critical process parameter (CPP) in biopharma production processes according to 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 new 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 new

The Solid State Sensor directly measures DCO_2 and provides maintenance free, real-time, and in-line control of this new critical process parameter.

Unlike traditional sensors that are based on the electrochemical Severinghaus principle, CO_2NTROL is a pure direct measurement in a solid state design: CO_2 molecules diffuse into a gas permeable membrane where the sensor measures the absorption of CO_2-specific Mid-IR wavelengths. This absorption correlates to the partial pressure of CO_2 in the media.

CO_2NTROL's hygienic design makes it compliant with requirements of biopharma applications. The sensor is EHEDG approved (EL Class I, test executed with Hamilton hygienic socket REF 242545) and is ready for GMP compliance. Embedded electronics convert the MIR CO_2 measurement into standard digital and analog signals that are easily integrated into your control strategy.

Arc Wi 2G Adapter BT (REF 243470) is required to output an analog 4-20 mA signal from the digital Modbus communication.

"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"

Benefits

- Maintenance-free
- Simple calibration
- Hygienic design: SIP/CIP compatible, autoclavable
- Inverted installation possible
- Direct measurement of CO_2 – no ammonia interference

Typical applications

- Biopharma Cell Cultures and Fermentations

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	R_a < 0.4 µm (N5)
Steam Sterilizable	Yes
Autoclavable	Yes
CIP	Yes
Operating temperature range	-10 to 60 °C

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 have, in reality, a shaft length of 215 mm. This ensures optimal rinsing in replaceable armatures, such as Retractex.

Accessories

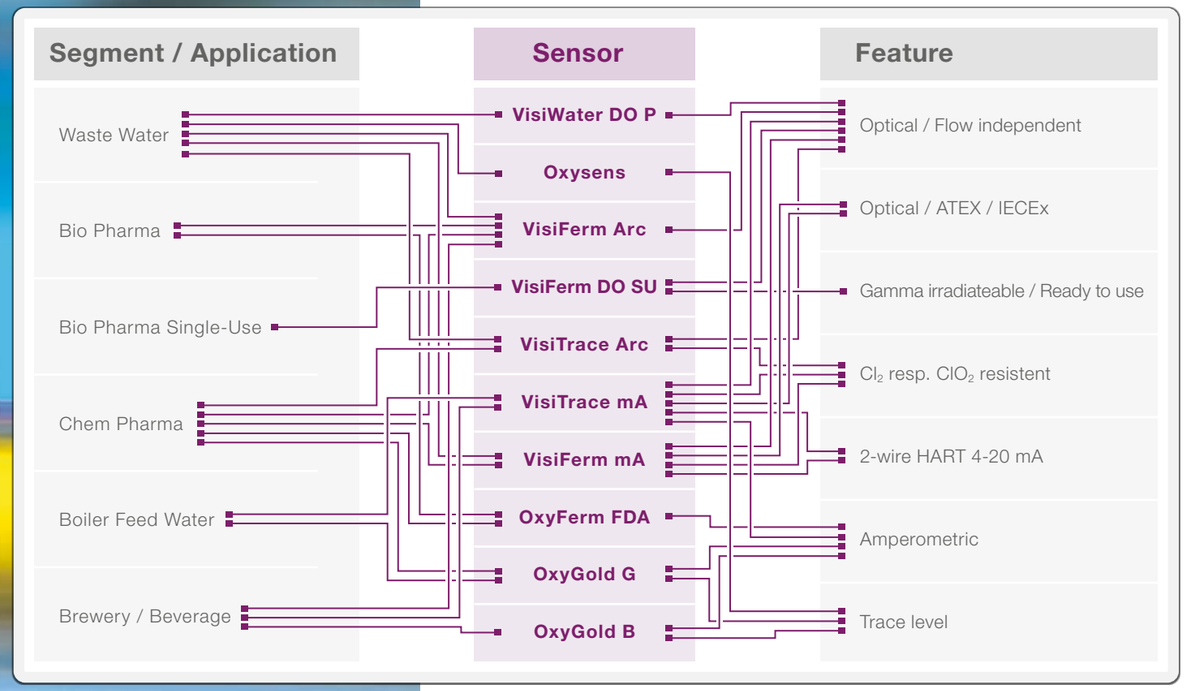
Calibration Station Ref 243575

Cables see page 108
Arc Accessories see page 117
Housings see page 126

DO

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.



VisiFerm RS485 family new

The VisiFerm RS485 is the first optical oxygen sensor with integrated opto-electronics, having the full functionality of a measuring device with self-diagnostics. It is steam sterilizable, autoclavable and CIP compatible. The VisiFerm requires less maintenance than a classical oxygen sensor as it does not have a mechanically sensitive membrane or a corrosive electrolyte.

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

Benefits

- Reliable and robust optical measurement
- No fragile membrane – with a solid sensor cap
- No polarization time required
- Instantly stable values, low drift, quick response
- Electrolyte-free, so no leakage
- Convenient precalibration in the laboratory, because data is stored in the sensor head
- Calibration, verification, and maintenance data accessible via ArcAir app

Typical applications

- Ethanologenic fermentation
- Biotechnical fermentation
- Brewery fermentation, filtration, filling
- Proactive corrosion control in HVAC systems

Specifications

Measuring range	4 ppb to 25 ppm (DO)
Measurement Principle	Oxygen dependent luminescence quenching
Response time $t_{98\%}$	< 30 s at 25 °C, from air to nitrogen
Process temperature	-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
Hygienic aspects	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

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 –		← Order Code

ODO Cap H0 + H3: For general application in biotechnology, water treatment and monitoring as well as in breweries, wineries and soft drink processing.

ODO Cap H2 + 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.

Accessories

- **ODO Cap H0 Kit** Ref 243515
- **ODO Cap H2 Kit** Ref 243505
- **ODO Cap H3 Kit** Ref 10068400
- **ODO Cap H4 Kit** Ref 10078261

Cables see page 108
Arc Accessories see page 117
Housings see page 126

VisiFerm DO SU new

Hamilton's single-use dissolved oxygen monitoring system is comprised of the reusable VisiFerm DO SU and a single-use optical dissolved oxygen sensor cap. The cap is integrated with the single-use container by the container manufacturer.

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

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

Benefits

- Specially designed for sterile application in SU Pharma and Biotechnology
- Highly reliable measurements after gamma sterilization and dry storage even after short wet-in time (<30 min)
- Very low drift
- Biocompatible material

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)
Measurement Principle	Oxygen dependent luminescence quenching
Response time $t_{98\%}$	< 30 s at 25 °C, from air to nitrogen
Process temperature	4 to 50 °C
Operating voltage	7 to 30 VDC max. 1 W
Hygienic aspects	Gamma irradiation up to 50 kGy (for the disposables)
O-ring	EPDM

For more specifications see www.hamiltoncompany.com

Ordering Information

	a-length	Arc	ECS	ODO Cap S0*	ODO Cap S2*	ODO Cap S3*
VisiFerm DO SU	120	10078255	10116427	243461	10077858	10113953
	225	10087920	10116428	–	–	–

*Only for OEM integration available

Accessories

Silicone Sleeve (for ODO Cap S3)
Ref 10114324

Cables see page 108
Arc Accessories see page 117

VisiFerm mA family

Specifications	
Measuring range	4 ppb to 25 ppm (DO)
Measurement Principle	Oxygen dependent luminescence quenching
Response time $t_{98\%}$	< 30 s at 25 °C, from air to nitrogen
Process temperature	-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
Hygienic aspects	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

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

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

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

Benefits

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

Typical applications

- Explosive atmospheres environment
- Fermentation
- Wort aeration in breweries

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 –					**← Order Code**

**The VisiFerm mA 225 have, in reality, a shaft length of 215 mm. This ensures optimal rinsing in retractable armatures, 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: The ODO Cap H4 is designed for fermentation processes where sterilization in place (SIP) is performed in media containing higher amounts of lipophilic compounds. It comes with a hygienic design.

Accessories

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

Cables see page 108
Housings see page 126

VisiTrace RS485 family new

Specifications	
Measuring range	0 to 2000 ppb (DO)
Measurement Principle	Oxygen dependent luminescence quenching
Response time $t_{98\%}$	< 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
Hygienic aspects	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

The VisiTrace RS485 is designed to measure dissolved oxygen in the low ppb ranges in brewing applications, notably during filtration, and filling. In addition, the special designed ODO Cap L1 for breweries is stabilized against standard disinfectant solution with active chlorine and chlorine dioxide. This is powerful during measurements in breweries, which may not allow for calibration after every CIP.

With the transmitter integrated, the intelligent VisiTrace RS485 sensor provides more reliable measurements.

“Did you know… that the VisiTrace RS485 is the only optical DO sensor that withstands chlorine and chlorine dioxide for a long time?”

Benefits

- For measurements from 0 to 2000 ppb
- Stable against chlorine and chlorine dioxide
- Rapid start-up with no polarization
- Flow and CO_2 independent readings
- Robust design for high flow rates

Typical applications

- Breweries
- Power Plants

Ordering Information

VisiTrace RS485 Family Structure

	Code	Interface
10140043	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 –					← Order Code

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

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

Accessories

- **ODO Cap L1 Kit** Ref 10107102
- **Calibration station** Ref 243575

Cables see page 108
Housings see page 126

VisiTrace mA family

Specifications	
Measuring range	0 to 2000 ppb (DO)
Measurement Principle	Oxygen dependent luminescence quenching
Response time $t_{98\%}$	< 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
Hygienic aspects	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

The VisiTrace mA is designed to measure dissolved oxygen in the low ppb ranges in brewing applications, notably during filtration, and filling. In addition, the special designed ODO Cap L1 for breweries is stabilized against standard disinfectant solution with active chlorine and chlorine dioxide. This is powerful during measurements in breweries, which may not allow for calibration after every CIP.

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

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

Benefits

- For measurements from 0 to 2000 ppb
- Stable against chlorine and chlorine dioxide
- Rapid start-up with no polarization
- Flow and CO_2 independent readings
- Robust design for high flow rates

Typical applications

- Breweries
- Power Plants

Ordering Information

VisiTrace mA Family Structure

10068709					
	Code	**Interface**			
	1	mA/HART			
		Code	**a-length (mm)**		
		1	120		
		2	225*		
		3	325		
		4	425		
			Code	**ODO Cap**	
			1	L1	
				Code	**Wetted Parts**
				1	EPDM
10068709 –					**← Order Code**

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

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

Accessories

- **ODO Cap L1 Kit** Ref 10107102
- **Calibration station** Ref 243575

Cables see page 108
Housings see page 126

VisiWater DO P

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

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

Benefits

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

Typical applications

- Water and Wastewater
- Fish farming

Specifications

Measuring range	0 to 40 ppm (DO)
Response time $t_{98\%}$	< 60 s at 25 °C, from air to nitrogen
Process temperature	0 to 60 °C
Pressure range	-1 to 12 bar
Material	Shaft: PVC-U Cap: PPA

For more specifications see www.hamiltoncompany.com

Ordering Information

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

Accessories

- **ODO Cap H20** Ref 243536
- **Junction Box** Ref 10076282

Cables see page 108

OxyFerm FDA

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

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

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)
Response time $t_{98\%}$	< 60 s at 25 °C, from air to nitrogen
Process temperature	0 to 130 °C (Arc: analog 0 to 110 °C, digital 0 to 130 °C)
Pressure range (relative to ambient)	0 to 4 bar
Hygienic aspects	Autoclavable, CIP, SIP
Electrolyte	Oxylyte
Surface Quality	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

Ordering Information

	a-length	T82	VP 6	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	–
	125	237170	–	–	–
	262	237174	–	–	–
OxyFerm CIP	120	243289	–	–	–

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

Accessories

- **Membrane Kit FDA** Ref 237140
- **Membrane Kit CIP** Ref 237126
- **Membrane Kit** Ref 237123
- **Oxylyte 30 mL** Ref 237118
- **Replacement Cathode OxyFerm** Ref 237306
- **Autoclavation Cap Oxyferm** Ref 242000
- **Polarization Module G** Ref 237350
- **Polarization Module T** Ref 237370

Cables see page 108
Arc Accessories see page 117
Housings see page 126

OxyGold B

Specifications	
Measuring range	8 ppb to 40 ppm (DO)
Response time $t_{98\%}$	< 60 s at 25 °C, from air to nitrogen
Process temperature	0 to 100 °C
Pressure range (relative to ambient)	0 to 12 bar
Hygienic aspects	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

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.

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

Benefits

- No cross-sensitivity with 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

Ordering Information

	a-length	VP 6	Arc
OxyGold B	120	237180	not available anymore*
	225	237185	

*See VisiTrace sensor, page 92

Accessories

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

Cables see page 108
Housings see page 126

OxyGold G

Specifications	
Measuring range	1 ppb to 40 ppm (DO)
Response time $t_{98\%}$	< 60 s at 25 °C, from air to nitrogen
Process temperature	0 to 130 °C (Arc: analog 0 to 110 °C, digital 0 to 130 °C)
Pressure range (relative to ambient)	0 to 12 bar
Hygienic aspects	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

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

Ordering Information

	a-length	VP 6	Arc
OxyGold G	120	237395	243110
	225	237396	243111

Accessories

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

Cables see page 108
Arc Accessories see page 117
Housings see page 126

Oxysens

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

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

Benefits

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

Typical applications

- Water and Wastewater
- Fish farming

Specifications

Measuring range	40 ppb to 40 ppm (DO)
Response time $t_{98\%}$	< 60 s at 25 °C, from air to nitrogen
Process temperature	0 to 60 °C
Pressure range (relative to ambient)	0 to 4 bar
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

Ordering Information

	a-length	5 m fixed cable
Oxysens	120	237150

Accessories

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

Housings see page 126

Buffer Solutions you can Trust

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

Traceability

An important issue for the production of Certified Reference Materials is to ensure traceability through an unbroken chain of comparisons to reference material of the highest metrological quality (Primary Reference Material) from 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 4.01, 7.00, 9.21 and 10.01 are classified as “Certified Reference Material” (CRM).

Features

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

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	Hamilton	500 mL	238272
2.00	±0.02	60	Hamilton	500 mL	238273
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
4.01	±0.01/±0.02	24/60	DAkkS	1000 L	238895
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
7.00	±0.01/±0.02	24 / 60	DAkkS	1000 L	238896
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
9.21	±0.02	60	DAkkS	1000 L	238897
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
10.01	±0.02	60	DAkkS	1000 L	238898
11.00	±0.05	24	Hamilton	500 mL	238278
12.00	±0.05	24	Hamilton	500 mL	238279
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

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. 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.

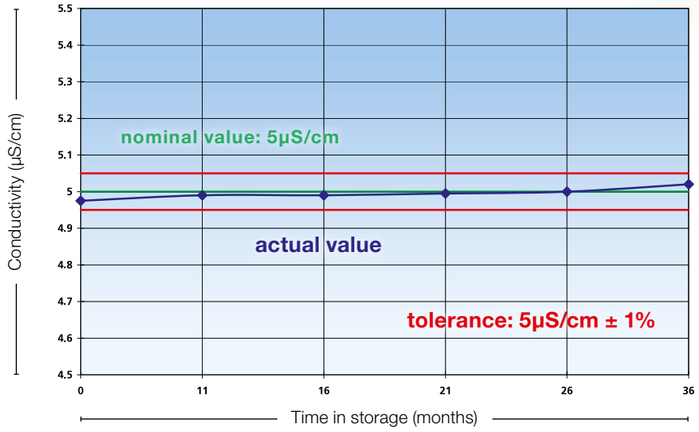
1) DFM: Danish Institute of Fundamental Metrology, Dänemark
2) PTB: Physikalisch-Technische Bundesanstalt, Braunschweig
3) DAkkS: Deutsche Akkreditierungsstelle
4) NIST: National Institute of Standards and Technology, Gaithersburg MD, USA

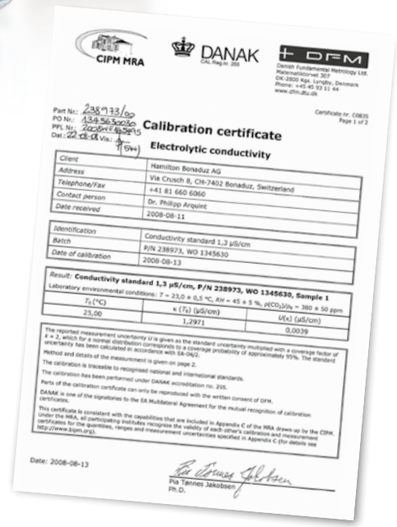
Unique advantages:

- 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]





Value at 25°C	Accuracy	Stability*	Certificate From	Packaging Unit	Volume	Ref
1.3 µS/cm	±1%	12	DFM	Glass bottle	300 mL	238973
5 µS/cm	±1%	36	DFM	Glass bottle	300 mL	238926
15 µS/cm	±1%	36	DFM	Glass bottle	300 mL	238927
84 µS/cm	±1%	18	DFM	Calpack bottle	500 mL	238984
100 µS/cm	±1%	36	DFM	Glass bottle	300 mL	238934
147 µS/cm	±1%	18	DFM	Calpack bottle	500 mL	238985
706 µS/cm	±2%	36	Hamilton	Glass bottle	300 mL	238929
1413 µS/cm	±1%	36	DFM	Glass bottle	300 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	300 mL	238935

**In months after date of manufacturing*

Oxygen Accessories

OxyFerm Membrane Kit

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

Ref	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.

Ref	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.

Ref	237126

OxyGold Membrane Kit

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

Ref	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.

Polarization Module T OxyFerm / OxyFerm FDA / OxyFerm XL	Ref 237370
Polarization Module G OxyFerm VP / OxyGold G	Ref 237350
Polarization Module B OxyGold B	Ref 237360

Replacement Cathode OxyFerm	Ref 237306
Replacement Cathode OxyGold G	Ref 237427
Replacement Cathode OxyGold B	Ref 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.

Autoclavation Cap OxyFerm	Ref 242000

Electrolytes and Solutions

Electrolyte

Electrolytes for pH Sensors		Ref
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		**Ref**
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.

Storage Solution	500 mL	Ref 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.

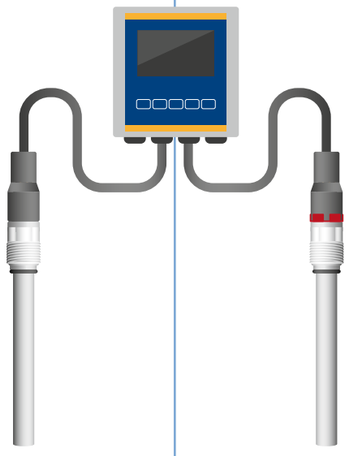
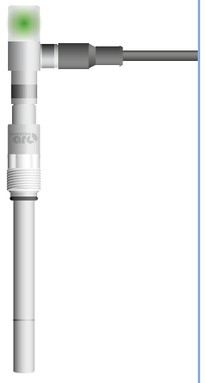
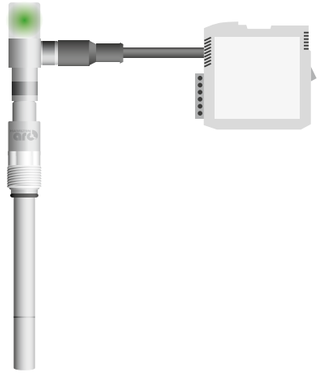
Cleaning Solution Set	Ref 238290

Connectivity

An 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	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 *4-20 mA only with Arc Wi 2G*		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 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.

SENSOR CONNECTION

CABLE CONNECTOR

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

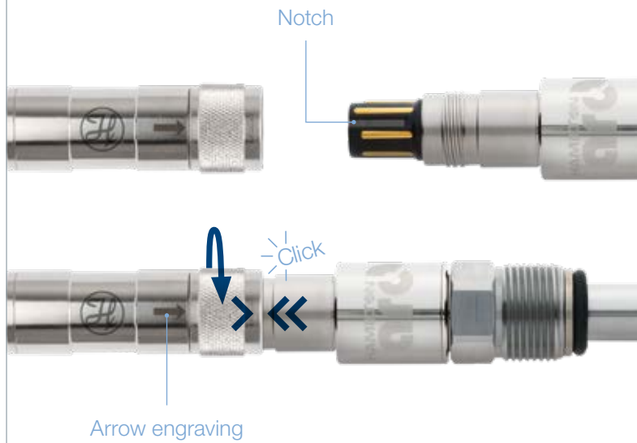
Memosens® signals are digitalized and transferred inductively via a non-contact connection. Memosens features complete galvanic isolation and is fully waterproof and resistant to environmental influences.

new

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 K8 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 VP6 connector. VP6 single coaxial cable.
Controller side no connector (open end).

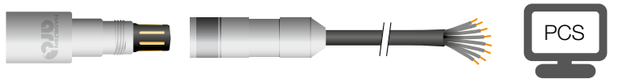
Length	Diameter	Ref
1 m	7,5 mm	355108
2 m	7,5 mm	355187
3 m	7,5 mm	355109
5 m	7,5 mm	355110
10 m	7,5 mm	355111
20 m	7,5 mm	355112

Cables for Intelligent Sensors

Connection for Industrial Processes e.g. Production (see page 13)

VP8

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*

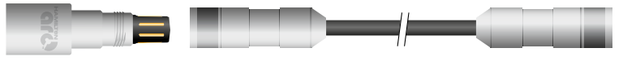
Ref	Description	Interface
355263	1 m Data Cable VP8 / Open End	4-20 mA/Modbus
355264	3 m Data Cable VP8 / Open End	4-20 mA/Modbus
355265	5 m Data Cable VP8 / Open End	4-20 mA/Modbus
355266	10 m Data Cable VP8 / Open End	4-20 mA/Modbus
355267	15 m Data Cable VP8 / Open End	4-20 mA/Modbus
355268	20 m Data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

VP8 M12-8 Pole

Compatible with:
- All Arc Sensors

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

VP8 VP8



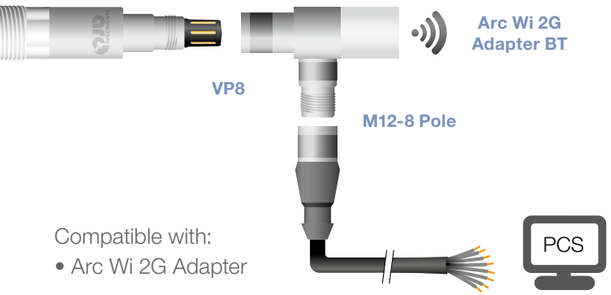
Compatible with:
- All Arc Sensors

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

Power Cables for Bio Controllers

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

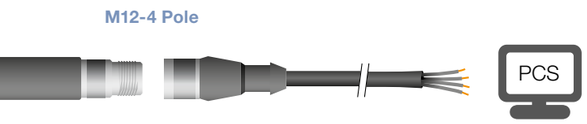
M12 8-Pole



Compatible with:
- Arc Wi 2G Adapter

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

M12 4-Pole



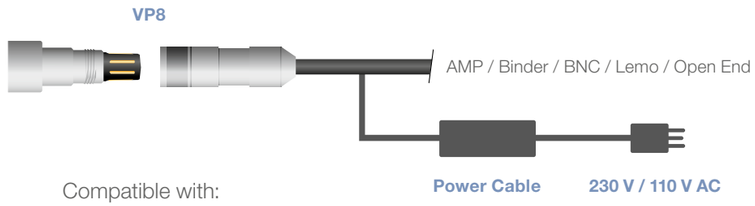
Compatible with:
- VisiFerm mA family
- VisiTrace mA familiy

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

Compatible with:
- VisiFerm mA family
- VisiTrace mA familiy

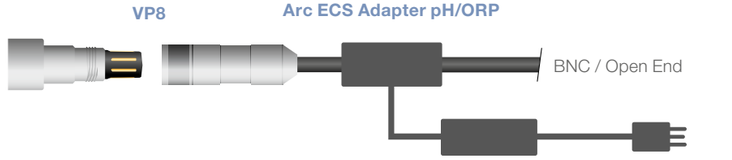
Ref	Description
355288	3 m Power Cable M12-4 Pole

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

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



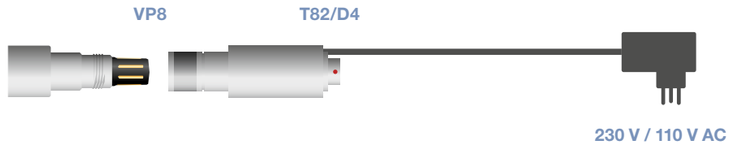
Compatible with:
- pH Arc family
- ORP Arc family

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

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.



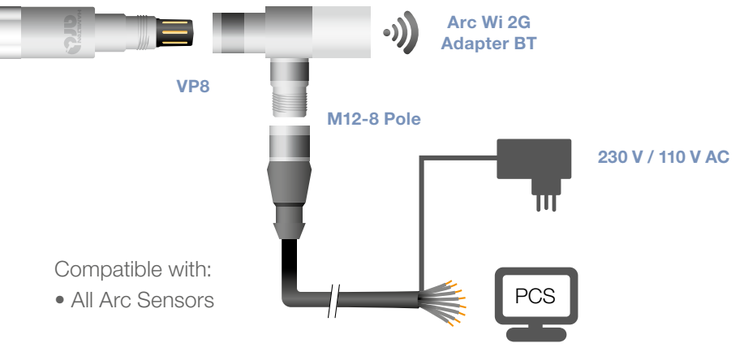
Compatible with:
- VisiFerm RS485-ECS family

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

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

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.

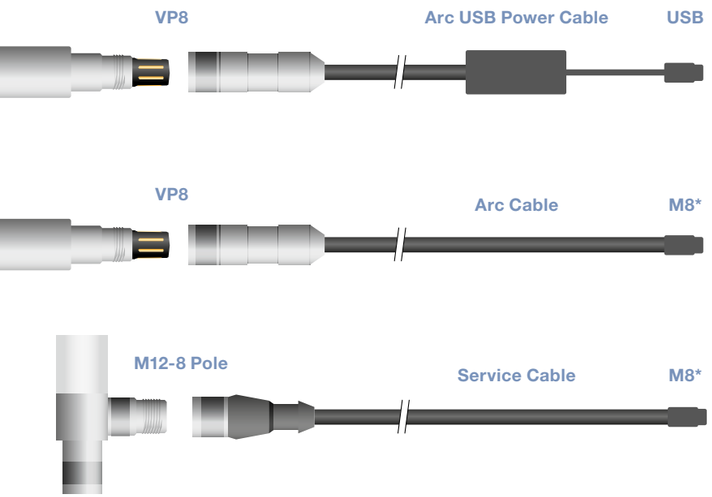


Compatible with:
- All Arc Sensors

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

Cables for connection to Arc Sensors

For connecting Arc sensors to ArcAir software



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

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

Arc Accessories

Arc Wireless Converter BT

Designed for wireless communication between ArcAir and Arc sensors via Computer. ArcAir Advanced license included.

Ref	242333

USB RS485 Modbus Converter

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

Ref	242411

Arc Wi 1G Adapter BT Arc Wi 2G 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.

Ref	Description
243460	Arc Wi 1G Adapter BT
243470	Arc Wi 2G Adapter BT

Arc View Mobile

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

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

Digital Converters

Arc Modbus OPC Converter

The Arc Modbus OPC converter converts the Modbus protocol of Arc sensors into OPC UA protocol. All Arc parameters are supported.

Ref	10089359

Modbus Profinet Converter

The Arc Modbus Profinet Converter ist a 24VDC DIN rail mounted device that can power up to four Arc sensors and converts their Modbus output to Profinet.

Ref	10116586

Modbus Profibus Converter

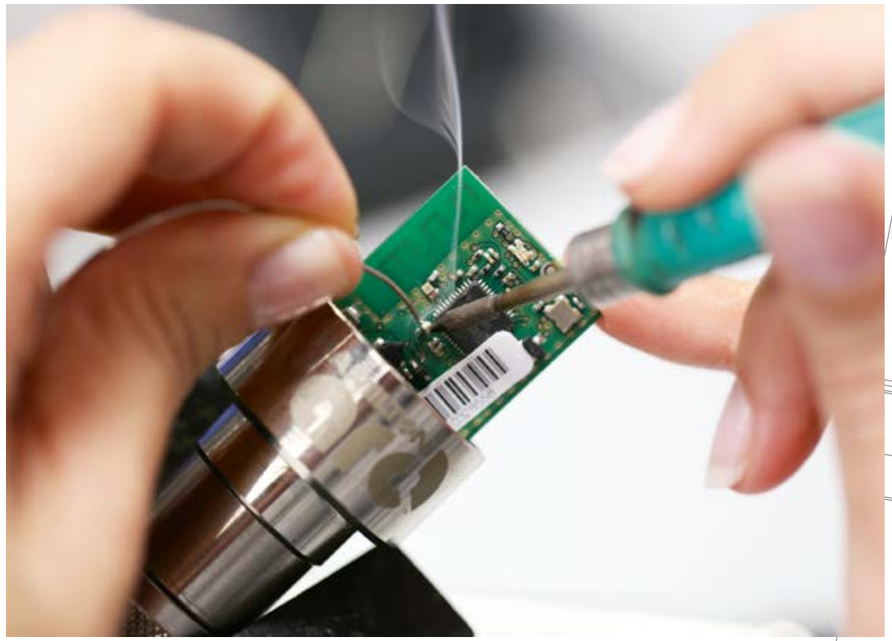
The Arc Modbus Profibus Converter is a 24VDC DIN rail mounted device that powers up to four Arc sensors and converts their Modbus output to Profibus DP.

Ref	243555

Hamilton Customized Products

Customized products for our customers' special needs

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



HAMILTON CUSTOMIZED PRODUCT

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

The H100 is a transmitter for universal use in the chemical industry, power stations, biotechnology, food processing and pharmaceutical industries as well as in water/wastewater treatment. Icons guide the operator and show the sensor status.

Sensor failures are detected, shown on the display and an alarm is set. Calibration can be done manually or by selecting standard calibration media. After each calibration the sensor data will be shown and evaluated. The H100 is easy to handle and can be mounted on the wall as well as on a panel.

User friendly, robust and reliable

Easy to install, operate and calibrate

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

Robust design

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

Reliable instrument for process applications

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

Transmitter H100 pH

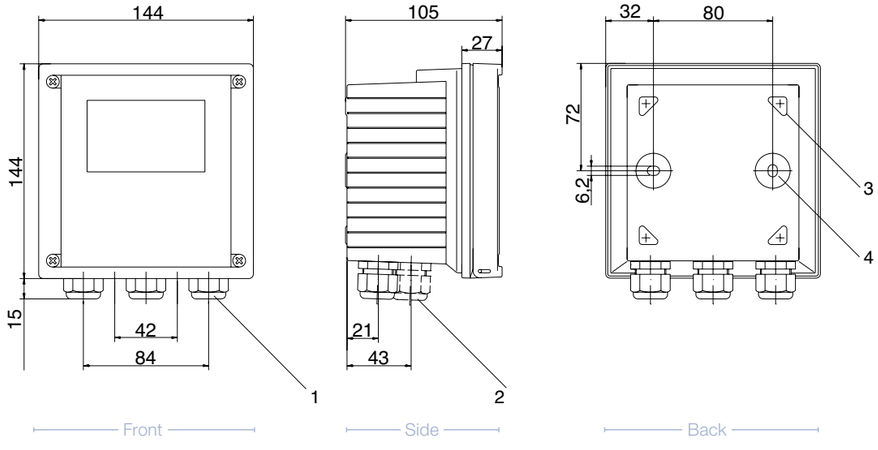
pH

Specifications

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

Mounting plan

all dimensions in mm



Ordering Information

Type	Ref
H100 pH	243080-01

Accessories

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

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)

Cond

Transmitter H100 Cond

Specifications

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

Ordering Information

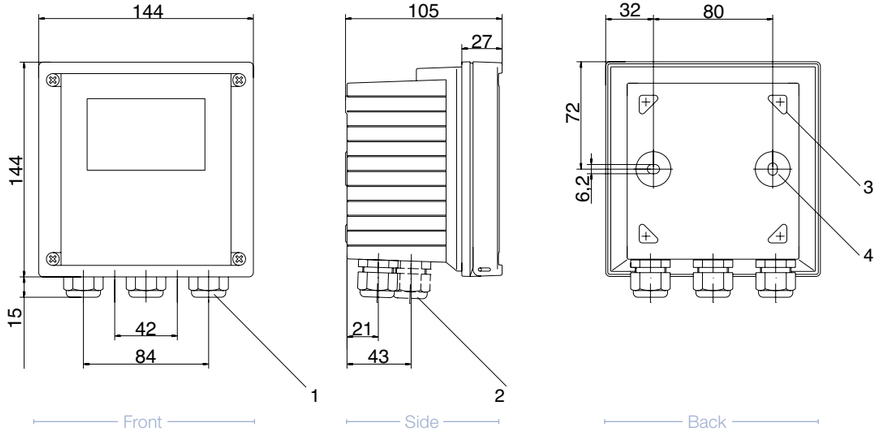
Type	Ref
H100 Cond	243080-02

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)

DO

Transmitter H100 DO

Specifications

Measured variable	DO saturation, DO concentration
Measuring current	-2 to 1800 nA
O_2 resolution	0.05 nA
O_2 saturation	0 to 200 %
O_2 concentration	0.00 to 20.00 mg/l / 0.00 to 20.00 ppm
Polarization voltage	0 to 1000 mV (User-defined)
Salinity correction	00.00 to 45.00 g/kg (User-defined)
Measuring error	< 0.5 % meas. val. + 0.5 %
Temperature input	NTC 22 kOhm, NTC 30 kOhm
Temperature measuring range	-20.0 to +150 °C
Temperature resolution	0.1 °C
Power supply	24 to 230 V AC/DC
Display	LC display, 7-segment with icons
Ambient temperature	-20 to 55 °C
Relative humidity	80 % at temperatures up to 55 °C
Ingress protection	IP 65, NEMA 4X
Alarm contact	Yes
Hold mode	Yes
FM	NI Class I, Div 2 Group A, B, C, D, T4 Ta = 55 °C; Type 2 NI Class I, Zone 2 Group IIC, T4 Ta = 55 °C; Type 2

Ordering Information

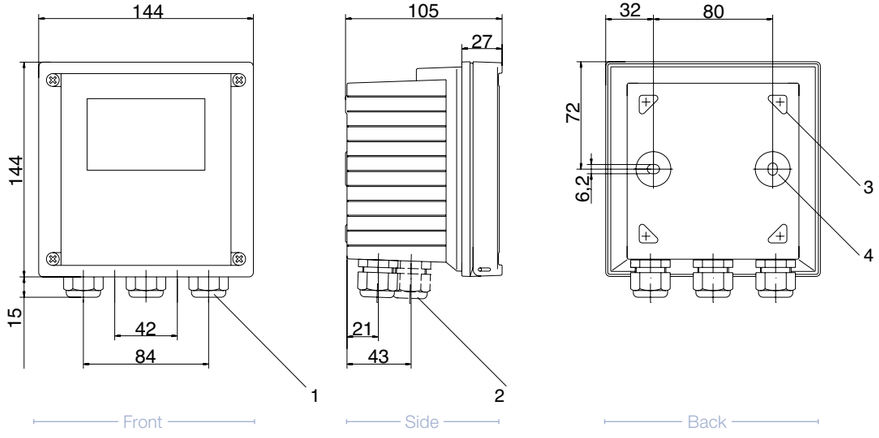
Type	Ref
H100 DO	243080-03

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)

Transmitter H220X family

ORP Cond pH

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.

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.

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 –			← Order Code

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

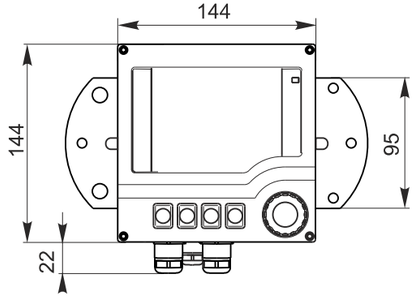
- Suitable for Explosions protected areas (Ex II (1) 2G Ex ib [ia Ga] IIX T6/T4 Gb)
- Wall, post/pipe, or panel mounting possible
- Transmitter suitable for pollution degree 3

Reliable instrument for process applications

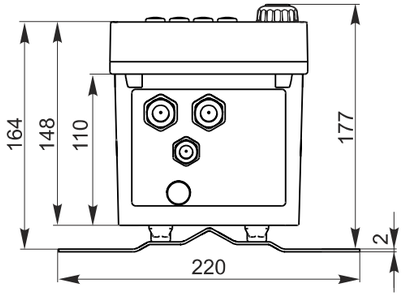
- Sensor status and potential defects are continuously monitored; errors and alarms are displayed in real time
- Asymmetry potential, slope and response time are evaluated during calibration through the sensor lifetime for preventive maintenance indication
- User-guided commissioning, graphic display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

Mounting plan

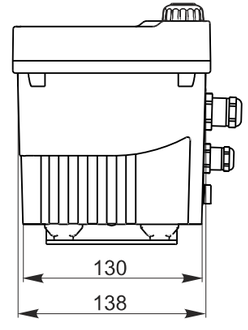
all dimensions in mm



Front



Bottom



Side

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 and armatures: static, retractable, pressurizable, pneumatic, manual, weld-in and hygienic sockets.

No matter what type of housing is needed for a pipe or a vessel, on the following pages the right one for each application can be found.

FlexiFit

The FlexiFit housings are designed for 120 mm sensors in different kinds of industries. A variety of process connections ensure the usability in the chemical industry as well as in hygienic processes. All FlexiFit have EPDM o-rings and the electropolished surface quality (Ra < 0.4 µm) quality is shown on a certificate. They are suitable for autoclavation, CIP and SIP procedures.

Benefits

- Easy installation and handling
- Various o-ring positions available
- Hygienic design

Ordering Information

Type	Process Connection	Ref
FlexiFit Bio	G 1¼	237331-OP
FlexiFit U Bio	G 1¼	237380-OP
FlexiFit TC 150-33	TC 1.5”	237341
FlexiFit VV-0	Varivent®	237344
FlexiFit VV-15	Varivent®	237345

U = Unprotected
TC = Triclamp

Specifications

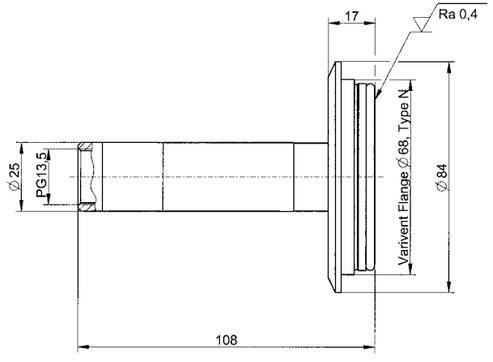
Wetted parts	Stainless Steel 1.4435
O-ring material	EPDM
O-ring position	22 to 55 mm (G 1¼)
Pressure range (relative to ambient)	0 to 6 bar
Temperature range	-10 to 140 °C
Sensor thread	PG 13.5
Sensor a-length	120 mm
Surface finish	R_a < 0.4 µm (N5 electropolished)

For more specifications see www.hamiltoncompany.com

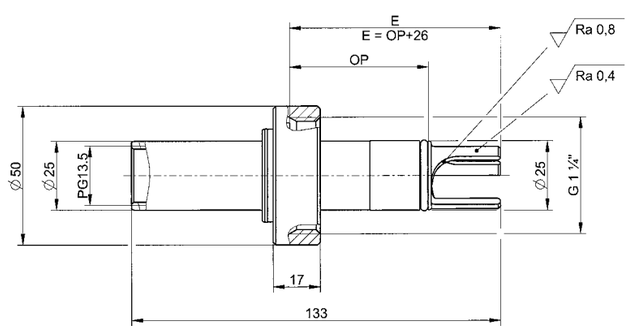
Other designs and materials available on request

Dimensional drawing / FlexiFit

all dimensions in mm



FlexiFit VV-0



FlexiFit Bio

Accessories

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

Safety Socket see page 152

RetractoFit

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

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

Benefits

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

Ordering Information

Type	Process Connection	Ref
RetractoFit	G 1¼	237240
RetractoFit PEEK 25	G 1¼	237490

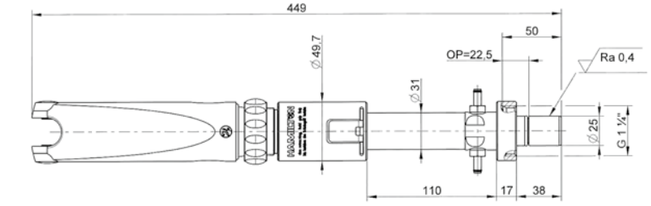
Specifications

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
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)

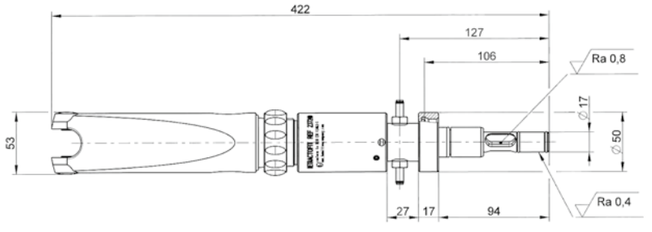
For more specifications see www.hamiltoncompany.com

Dimensional drawings / RetractoFit

all dimensions in mm



Maintenance position



Measuring position

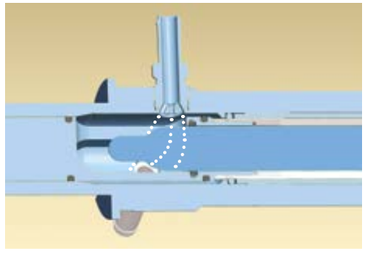
Accessories

- **Service Kit RetractoFit** Ref 237239
- **FFKM Kit RetractoFit** Ref 237339

Safety Socket see page 152

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.



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*

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

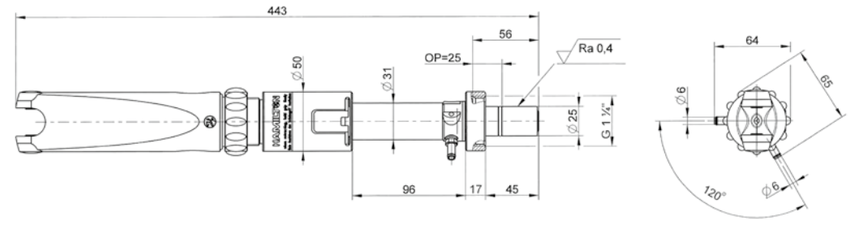
Wetted parts	Stainless Steel 1.4435
O-ring material	EPDM
O-ring position	22 mm and 55 mm
Pressure range (relative to ambient)	0 to 6 bar
Temperature range	-10 to 140 °C
Sensor thread	PG 13.5
Sensor a-length	225 mm
Surface finish	R_a < 0.4 µm (N5 electropolished)

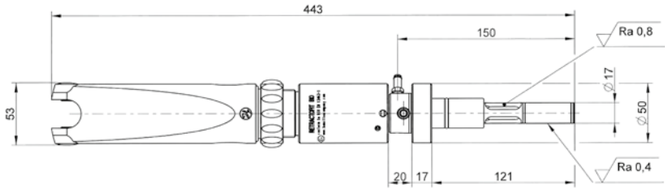
For more specifications see www.hamiltoncompany.com

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

Accessories

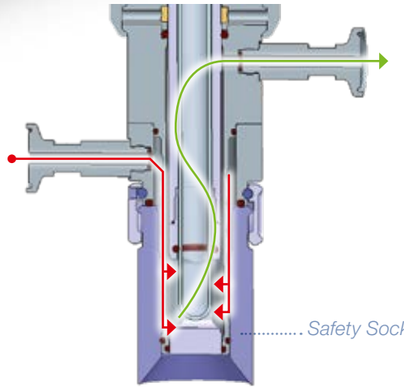
- **FDA Service Kit** Ref 237338

Safety Socket see page 152

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 armature and socket up to the process seal so the most remote parts of the chamber are rinsed. Thus HyCIP housings are unmatched for their cleaning performance of the sensor and of all relevant seals.

Benefits

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

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 (120 °C), 10 bar (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

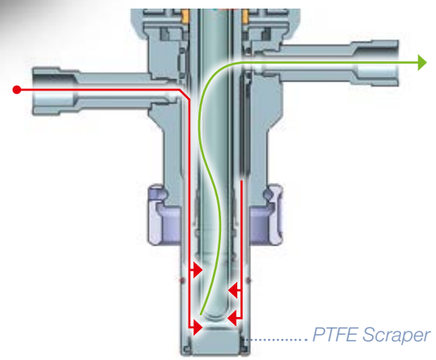
Ordering Information

Retractable Housing: Retractex B (hygienic)

243240	**Retractex B (pneumatic)**						
243275	**Retractex B M (manual)**						
	Code	**Material (wetted parts)**					
	1	Stainless Steel 1.4404					
	0	special					
		Code	**Sealing Material (wetted sealings)**				
		1	EPDM/FDA USP class VI				
		2	FKM				
		0	special				
			Code	**Sensor**			
			1	225 mm PG13,5			
			0	special			
				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		
				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		
					Code	**Cleaning Connection**	
					1	G ⅛" thread female	
					2	G ¼" thread female	
					3	¼" NPT female	
					4	TriClamp ¾" Ø 4 mm	
					9	TriClamp ¾" Ø 10,3 mm (Sartorius)	
					0	special	
						Code	**Position switch**
						1	pneumatic / without for manual
						0	special
Ref							**← Order Code**

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

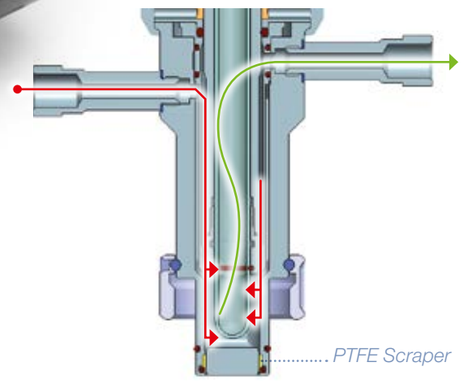
For more specifications see www.hamiltoncompany.com

Ordering Information

Retractable Housing: Retractex BC Steel

237730	**Retractex BC Steel (pneumatic)**						
237735	**Retractex BC Steel M (manual)**						
	Code	**Material (wetted parts)**					
	1	Stainless Steel 1.4404					
	2	Stainless Steel 2.4602					
	0	special					
		Code	**Sealing Material (wetted sealings)**				
		1	EPDM/FDA USP VI				
		2	FKM				
		3	FFKM				
		0	special				
			Code	**Sensor**			
			1	225 mm PG13,5			
			0	special			
				Code	**Process Connection**		
				1	Ingold (G 1¼") o-Ring Position 28 mm		
				2	Ingold (G 1¼") o-Ring Position 50 mm		
				0	special		
					Code	**Cleaning Connection**	
					1	G ⅛" thread female	
					2	G ¼" thread female	
					3	¼" NPT female	
					0	special	
						Code	**Position switch**
						1	pneumatic
						0	special
Ref							**← Order Code**

Retractex BC Plastic



PTFE Scraper

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

Cleaning of the Retractex BC?

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

Benefits

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

Specifications

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

For more specifications see www.hamiltoncompany.com

Ordering Information

Retractable Housing: Retractex BC Plastic

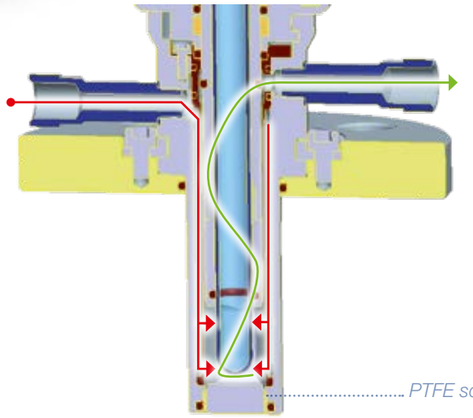
237740	**Retractex BC Plastic (pneumatic)**		
237745	**Retractex BC Plastic M (manual)**		
	Code	**Material (wetted parts)**	
	1	PP	
	2	PVDF / Stainless Steel 2.4602	
	3	PEEK	
	0	special	
	Code	**Sealing Material (wetted sealings)**	
	1	EPDM/FDA USP VI	
	2	FKM	
	3	FFKM	
	0	special	
	Code	**Sensor**	
	1	225 mm PG13,5	
	0	special	
	Code	**Process Connection**	
	1	Ingold (G 1¼") o-Ring Position 25 mm	
	0	special	
	Code	**Cleaning Connection**	
	1	G ⅛" thread female	
	2	G ¼" thread female	
	3	¼" NPT female	
	0	special	
	Code	**Position switch**	
	1	pneumatic / without for manual	
	0	special	
Ref			**← Order Code**

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 armature and does not harm the o-ring.



PTFE scraper

Benefits

- Extremely compact design
- Integrated safety concept- no sensor – no insertion
- Very low maintenance
- Easy installation of the pneumatic armature 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 (120 °C), 10 bar (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

Retractex C Steel

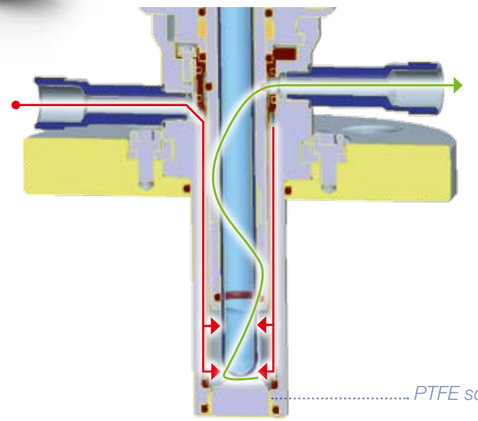
243200	Retractex C Steel (pneumatic)						
243255	Retractex C Steel M (manual)						
	Code	Material (wetted parts)					
	1	Stainless Steel 1.4404					
	2	Stainless Steel 2.4602					
	0	special					
		Code	Sealing Material (wetted sealings)				
		1	EPDM / USP class VI				
		2	FKM				
		3	FFKM				
		0	special				
			Code	Sensor			
			1	225 mm PG13,5			
			0	special			
				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	TriClamp 2”		
				0	special		
					Code	Cleaning Connection	
					1	G ⅛” thread female	
					2	G ¼” thread female	
					3	¼” NPT female	
					0	special	
						Code	Position switch
						1	pneumatic / without for manual
						0	special
Ref							← Order Code

Retractex C Plastic

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

Cleaning of the Retractex C?

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



Benefits

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

Specifications	
Wetted parts	PVDF or PEEK or PP
O-ring material	EPDM or FKM or FFKM
Pressure range (relative to ambient)	0 to 16 bar (120 °C), 10 bar (140 °C)
Temperature range	-10 to 140 °C
Sensor a-length	225 mm
Surface finish	R_a < 0.8 µm (N6)

For more specifications see www.hamiltoncompany.com

Ordering Information

Retractable Housing: Retractex C Plastic

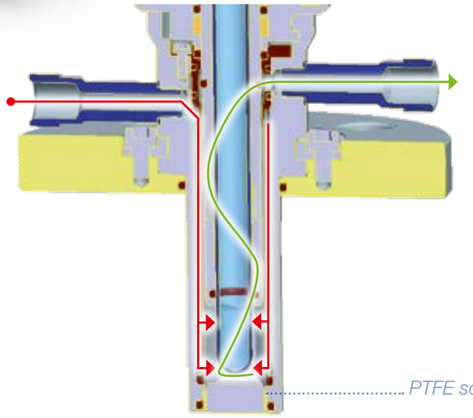
243220	**Retractex C Plastic (pneumatic)**						
243265	**Retractex C Plastic M (manual)**						
	Code	**Material (wetted parts)**					
	1	PP					
	2	PVDF / Stainless Steel 2.4602					
	3	PEEK					
	0	special					
		Code	**Sealing Material (wetted sealings)**				
		1	EPDM / FDA USP class VI				
		2	FKM				
		3	FFKM				
		0	special				
			Code	**Sensor**			
			1	225 mm PG13,5			
			0	special			
				Code	**Process Connection**		
				1	Flange DN50		
				2	Flange ANSI 2”		
				3	NPT M 1¼”		
				0	special		
					Code	**Cleaning Connection**	
					1	G ⅛” thread female	
					2	G ¼” thread female	
					3	¼” NPT female	
					0	special	
						Code	**Position switch**
						1	pneumatic / without for manual
						0	special
Ref							**← Order Code**

Retractex C Steel LT

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

Cleaning of the Retractex C?

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



Benefits

- Extremely compact design (only 36 mm 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 armature 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 (120 °C), 10 bar (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

Retractable Housing: Retractex C Steel LT

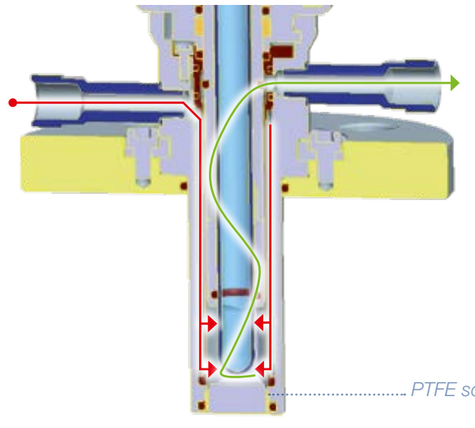
243210	**Retractex C Steel LT (pneumatic)**						
243260	**Retractex C Steel LT M (manual)**						
	Code	**Material (wetted parts)**					
	1	Stainless Steel 1.4404					
	2	Stainless Steel 2.4602					
	0	special					
		Code	**Sealing Material (wetted sealings)**				
		1	EPDM / FDA USP class VI				
		2	FKM				
		3	FFKM				
		0	special				
			Code	**Sensor**			
			1	325mm PG13,5			
			0	special			
				Code	**Process Connection**		
				1	Flange DN40		
				2	Flange DN50		
				3	Flange ANSI 1½”		
				4	Flange ANSI 2”		
				0	special		
					Code	**Cleaning Connection**	
					1	G ⅛” thread female	
					2	G ¼” thread female	
					3	¼” NPT female	
					0	special	
						Code	**Position switch**
						1	pneumatic / without for manual
						0	special
Ref							**← Order Code**

Retractex C Plastic LT

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

Cleaning of the Retractex C?

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



Benefits

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

Specifications	
Wetted parts	PVDF or PEEK
O-ring material	EPDM or FKM or FFKM
Pressure range (relative to ambient)	0 to 16 bar (120 °C), 10 bar (140 °C)
Temperature range	-10 to 140 °C
Sensor a-length	325 mm
Surface finish	R_a < 0.8 µm (N6)

For more specifications see www.hamiltoncompany.com

Ordering Information

Retractable Housing: Retractex C Plastic LT

243230	**Retractex C Plastic LT (pneumatic)**						
243270	**Retractex C Plastic LT M (manual)**						
	Code	**Material (wetted parts)**					
	1	PVDF / Stainless Steel 2.4602					
	2	PEEK					
	0	special					
		Code	**Sealing Material (wetted sealings)**				
		1	EPDM / FDA USP class VI				
		2	FKM				
		3	FFKM				
		0	special				
			Code	**Sensor**			
			1	325mm PG13,5			
			0	special			
				Code	**Process Connection**		
				1	Flange DN50		
				2	Flange ANSI 2”		
				0	special		
					Code	**Cleaning Connection**	
					1	G ⅛” thread female	
					2	G ¼” thread female	
					0	special	
						Code	**Position switch**
						1	pneumatic / without for manual
						0	special
Ref							**← Order Code**

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 armature at any time.

Benefits

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

Ordering Information

Type	Process Connection	Ref
MasterFit 120	G 1¼	237200-OP
MasterFit 150	G 1¼	237225-OP
MasterFit 250	G 1¼	237245-30

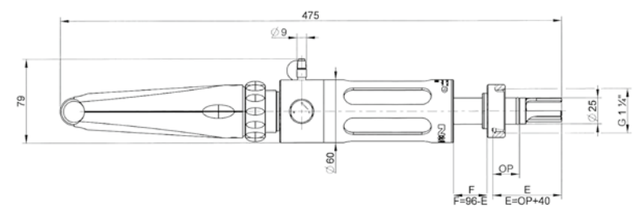
Specifications

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
Temperature range	-10 to 130 °C
Sensor a-length	120, 150, 200 mm
Surface finish	R_a < 0.8 µm (N6)

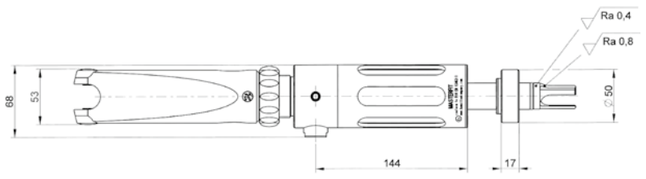
For more specifications see www.hamiltoncompany.com

Dimensional drawings / MasterFit 120

all dimensions in mm



Maintenance position



Measuring position

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

Accessories

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

Safety Socket see page 152

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

RetractoMaster

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

Benefits

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

Ordering Information

Type	Process Connection	Ref
RetractoMaster	G 1¼	237250

Specifications

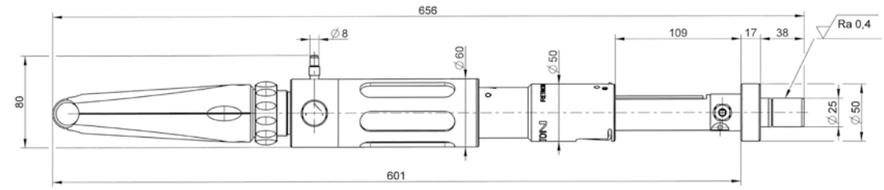
Wetted parts	Stainless Steel 1.4571
O-ring material	FKM
O-ring position	22.5 mm
Pressure range (relative to ambient)	0 to 6 bar
Temperature range	-10 to 130 °C
Sensor a-length	250 mm
Surface finish	R_a < 0.4 µm (N5)

For more specifications see www.hamiltoncompany.com

Dimensional drawings

all dimensions in mm

Maintenance position



Measuring position

Accessories

- **Pressure Adapter** Ref 237252

Safety Socket see page 152

Safety Socket

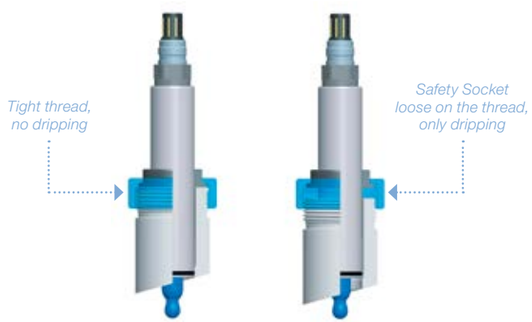
The Safety Sockets are hygienic weld-in sockets suitable for hygienic armatures like the FlexiFit Bio. They are available for 3 different o-ring positions to cover different standards. Furthermore you can choose between two kinds of stainless steel and two different angles.

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

Benefits

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

O-ring sealing position



Specifications

Wetted parts	Stainless Steel 1.4435, 1.4404 or 1.4571
O-ring material for blind plug	EPDM
Pressure range (relative to ambient)	0 to 50 bar
Temperature range	-30 to 160 °C
Process connection	G 1¼
Surface finish	R_a < 0.4 µm (N5)

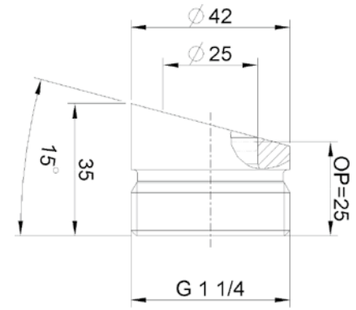
For more specifications see www.hamiltoncompany.com

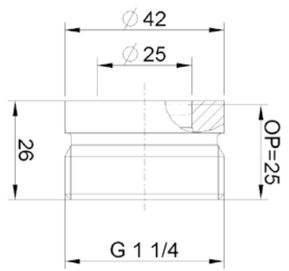
Ordering Information

Type	Steel	Angle	OP	Ref
Safety Socket	**1.4404**	**15**	**25**	242570
Safety Socket	**1.4404**	**15**	**50**	242571
Safety Socket	**1.4404**	**15**	**55**	242572
Safety Socket	**1.4404**	**0**	**25**	242573
Safety Socket	**1.4404**	**0**	**50**	242574
Safety Socket	**1.4404**	**0**	**55**	242575
Safety Socket	**1.4435**	**15**	**25**	242576
Safety Socket	**1.4435**	**15**	**50**	242577
Safety Socket	**1.4435**	**15**	**55**	242578
Safety Socket	**1.4435**	**0**	**25**	242579
Safety Socket	**1.4435**	**0**	**50**	242580
Safety Socket	**1.4435**	**0**	**55**	242581
Weld in socket without safety feature	**1.4571**	**15**	**25**	237202

Dimensional drawings

all dimensions in mm





Accessories

- **Blind plug 1.4404-25** Ref 242560
- **Blind plug 1.4404-50** Ref 242562
- **Blind plug 1.4404-55** Ref 242564
- **Blind plug 1.4435-25** Ref 242565
- **Blind plug 1.4435-50** Ref 242567
- **Blind plug 1.4435-55** Ref 242569
- **Blind Plug 1.4571-25** Ref 237230

Hygienic Socket

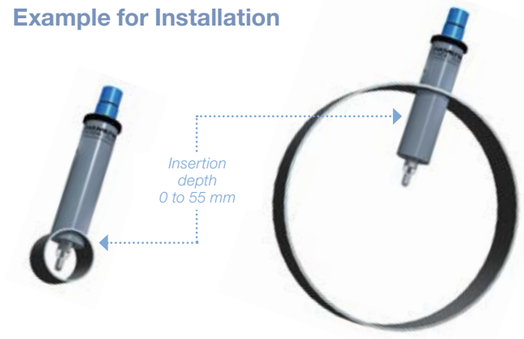
The Hygienic Socket with its space saving design and simple sterilization is ideal to weld in fermenters or small pipes. The advantages are numerous for many other applications in tanks or pipes for water treatment and in the pharmaceutical and chemical industries.

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 sensors by using the Hamilton DO Adapter.

Benefits

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

Example for Installation



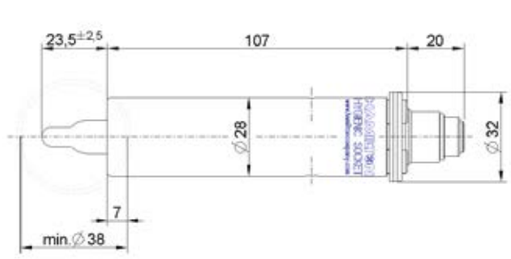
Specifications

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
Temperature range	-10 to 140 °C
Sensor thread	PG 13.5
Sensor a-length	120 mm
Surface finish	R_a < 0.4 µm (N5)

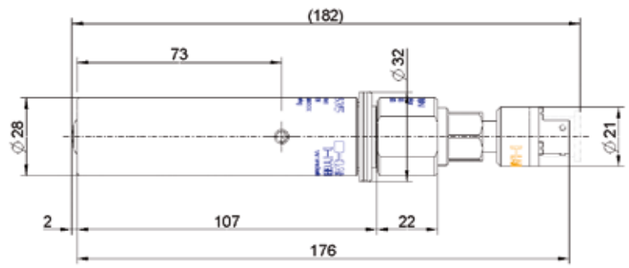
For more specifications see www.hamiltoncompany.com

Dimensional drawings

all dimensions in mm



Hygenic socket with a pH sensor



Hygenic socket with DO adapter and oxygen sensor

Ordering Information

Type	Ref
Hygienic Socket 1.4404	242535
Hygienic Socket 1.4435	242545
Hygienic Socket 1.4571	242548
Hygienic Socket 2.4602	242550

Accessories

- **Hyienic Socket DO Adapter** Ref 242538
- **Replacment Kit Seal Pusher** Ref 242532
- **O-ring set EPDM** Ref 242595
- **Sensor Dummy 96 mm** Ref 242540
- **Sensor Dummy 117 mm** Ref 242563
- **O-ring set FKM** Ref 242596
- **O-ring set Silicone** Ref 242597
- **O-ring set FFKM** Ref 242598

FlowCell/XL

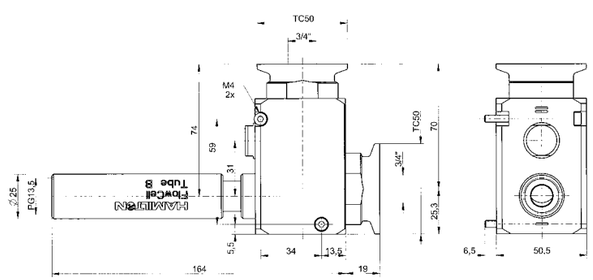
Hamilton Flow-Through Cells are designed for measuring one or two parameters at a time. Possible combinations are pH/DO and pH/Conductivity. The measurement is done in bypasses when inline measurement is not possible due to small pipe dimensions. Application fields are biotechnology, water treatment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

Benefits

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

Dimensional drawings / 242590

all dimensions in mm



Specifications

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

For more specifications see www.hamiltoncompany.com

Ordering Information

Flow Cell

242585

Code	Measuring position
1	only pH or Conducell UPW
2	only Conductivity or Oxygen
3	pH and Conductivity or Oxygen
4	Conductivity and Oxygen
0	special

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

Code	o-ring material
1	EPDM
2	FFKM (two measuring positions)
3	FFKM (one measuring position)
0	special

242585 – ← Order Code

Flow Cell XL

242590

Code	Measuring position
1	only pH or Conducell UPW
2	only Conductivity or Oxygen
3	pH and Conductivity or Oxygen
4	Conductivity and Oxygen
0	special

Code	Pipe Connection
1	TC50 ¾”
2	TC50 1”
3	TC50 1.5” *
0	special

Code	o-ring material
1	EPDM
2	FFKM (two measuring positions)
3	FFKM (one measuring position)
0	special

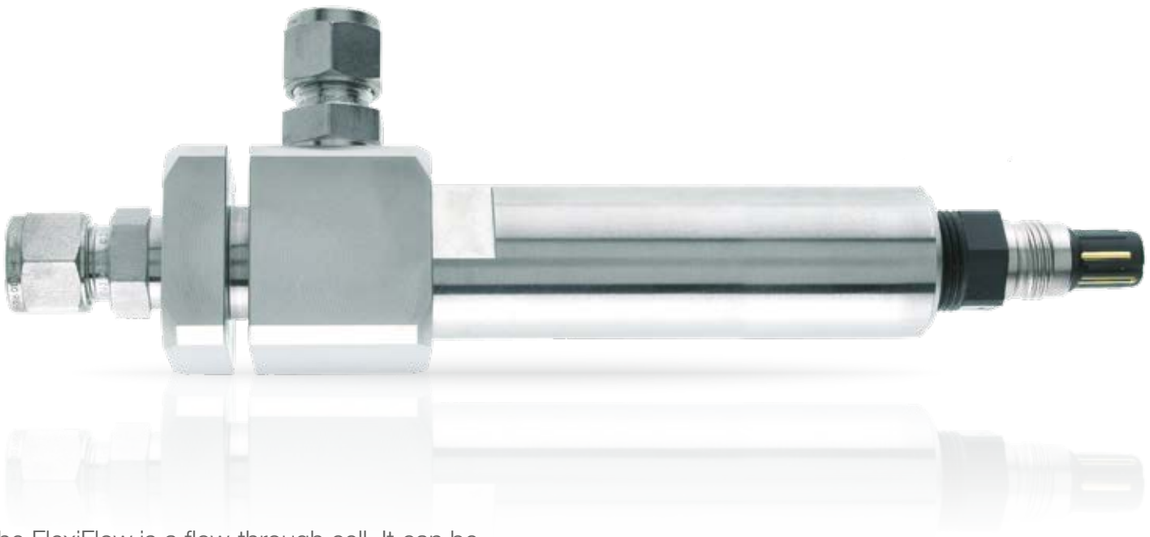
242590 – ← Order Code

*Not self draining

Accessories

- **O-ring kit Flow Cell** Ref 237387
- **O-ring kit Flow Cell XL** Ref 237390
- **Sensor Dummy**
  96 mm Ref 242540
  117 mm Ref 242563

FlexiFlow SL 10



The FlexiFlow is a flow-through cell. It can be used in all cases where pH or oxygen must be reliably measured in ion-weak media including coolant piping in power generating stations.

The sample is fed into the cell from the bottom at a low flow speed, and out of the cell again at the side. A groove cut into the FlexiFlow allows it to easily be attached anywhere with commercially available screws.

Benefits

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

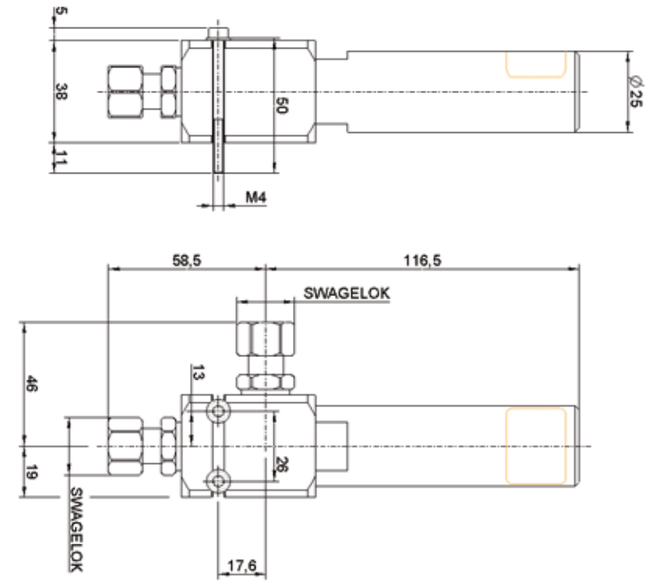
Specifications

Wetted parts	Stainless Steel 1.4435
O-ring material	EPDM
Pressure range (relative to ambient)	0 to 16 bar
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

Dimensional drawings

all dimensions in mm



Ordering Information

Type	Ref
FlexiFlow SL 10	237340

SENSOR COMPARISON

Sensor Comparison

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	
ORP Sensors												
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 caps / membranes
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	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

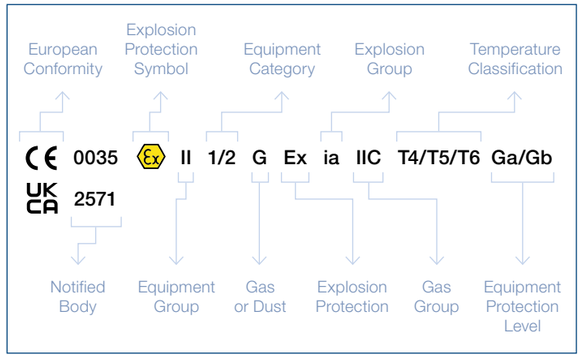
Safety First

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. For general overview please refer to:

www.hamiltoncompany.com/support/process-analytics/certificates/products-for-explosive-atmospheres

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

INDEX

Alphabetical Index

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