

# Innovation in Electrochemistry



Process Sensors

**HAMILTON**

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# The Product Range of HAMILTON

To order products from this catalogue, please contact your HAMILTON Process Sensor Dealer or HAMILTON Company for the dealer in your area.

## Other Product Lines Made by HAMILTON:

- pH Electrodes for Laboratory and Portable Use
- Customized Sensors and Accessories
- Syringes
- SoftGrip™ Pipettes
- HPLC Columns
- Diluters/Dispensers
- Valves
- OEM Components
- Pipetting Robots
- Automated Analyzers

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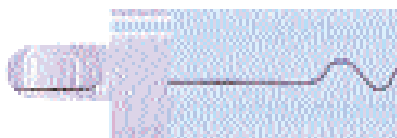
# Innovation in Electrochemistry

HAMILTON manufactures more than pH sensors. Our electrochemical sensors are reliable tools for application-oriented use and are characterized by the highest quality, long life and competitive price. In order to meet these high requirements we are constantly striving to find new ways to build our sensors. As a result of the extensive work by our research and development department, HAMILTON and only HAMILTON is able to offer the following detailed solutions:

## The SINGLE PORE concept:

**Precise reliable, fast readings with a never clog liquid junction**

Since its introduction in 1991, the SINGLE PORE concept is increasingly successful. The advantage of this solution is clear: Instead of many tiny pores in a ceramic diaphragm, a single pore about 2000 times larger (in the form of a glass capillary) is used. This SINGLE PORE is practically impossible to clog. In combination with a special electrolyte, the flow rate through the pore is faster and provides much better contact between the reference electrode and sample. This allows shorter response time and more accurate readings.



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

## The unique POLISOLVE electrolyte:

**Most innovative polymer reference electrolyte**

It used to be that pH electrodes with a polymer electrolyte could not be used over the entire pH or temperature range. Now with the new, innovative POLISOLVE polymer electrolyte it is possible to use Hamilton polymer sensors from pH 0 to 14 and at temperatures from -10°C to 130°C. As an added benefit the POLISOLVE polymer is also stable to most organic solvents.

The one thing it does not do is contaminate your process or sample with acrylamide. The POLISOLVE polymer electrolyte is free of toxic acrylamide.



When you combine the new POLISOLVE electrolyte and a modified SINGLE PORE concept you have a truly revolutionary maintenance free industrial sensor. These sensors are the solution to pH or Redox measurement in a wide variety of samples including:

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

## The EVEREF reference system:

**Long electrode life thanks to stable reference potentials**

Stable reference systems are at the heart of reliable, long life electrodes. This is why many Hamilton electrodes are equipped with reference systems from the EVEREF family. The silver chloride reservoir is separated from the reference electrolyte by a diffusion distance preventing the loss of silver chloride due to temperature variations, allowing the use of silver-free electrolytes. The EVEREF-L labyrinth system used in the POLILYTE electrodes further extends the diffusion distance to almost 200 mm, greatly increasing electrode life in aggressive media. The



EVEREF-F system contains a silver barrier which prolongs electrode life in aggressive samples.

# Innovation in Electrochemistry

## The capillary electrolyte bridge:

### Longer life in aggressive samples

HAMILTON was the first manufacturer to equip their swimming pool electrodes with maintenance-free electrolyte bridges of two different gel electrolytes. The new capillary electrolyte bridge represents a further refinement of this technology, and for the first time uses the SINGLE PORE concept for internal phase interfaces. This unique technology guarantees long life and reliable readings even in demanding process control technology. Aggressive sample components no longer affect the reference electrolytes or the reference system.



This is yet another HAMILTON innovation producing reliable measurements and a long sensor life.

## The HAMILTON engineered pH glasses:

### Guarantee the accuracy of your measurements

Continuous improvement of our pH glass provides benefits that have not been previously available.

Most electrodes for low temperature applications have a membrane made of the newly developed V-glass. This unique HAMILTON development has been able to dramatically reduce membrane resistance still further.

It is now possible to form mechanically stable membranes that are significantly less sensitive to ageing effects (such as slow response times and growing sodium error).

Another high performance glass called H-



glass is the result of recent research at HAMILTON. This membrane material has excellent ageing characteristics and offers stable readings even in samples with a low water content such as anhydrous or only partially aqueous titration. The low alkali error of H-glass means accurate measurements even at high pH or high operating temperatures.

PHI glass was developed for continuous use at high pH and high temperatures. The alkali error of this glass remains almost constant with continuous use, so that the best results

in critical applications can be achieved with this glass. An HF-glass is the latest development to ensure longest possible lifetime in hydrofluoric acid containing processes.

## The TK inner buffer:

### Ion-weak samples are no longer a problem

Ion-weak samples have always been a problem for electrochemical electrodes. This has been solved by the development of the TK inner buffer, used for the first time in the



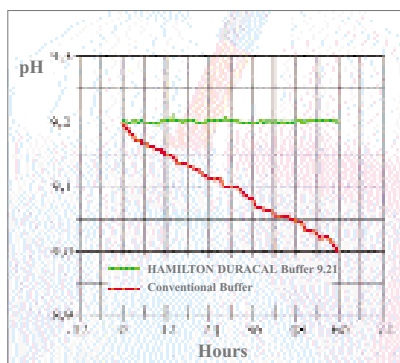
LIQ-GLASS PG and IONOTRODE electrodes. In combination with a special membrane shape, you are guaranteed low membrane resistance and easy pH measurement in ion-weak samples. For maintenance-free measurement of ion-weak samples try POLILYTE PRO sensors.

# DURACAL pH and Redox Buffers

## Can you trust your buffer solution?

GMP, GLP, ISO 9000, EN 45000, Calibration, Verification, Certification from an accredited organisation : Key words that are increasingly important. The calibration of pH and Redox electrodes has never been easy. 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. HAMILTON DURACAL buffers have the following advantages:

### Unique 5 Year Buffer Stability:



A complete range of patented buffer solutions provides never before achieved pH stability. HAMILTON guarantees DURACAL pH buffers for 5 years after the date of manufacture. The pH 9.21 and pH 10.01 buffers are even stable in air. See the diagram for details. High buffering capacity provides rapid stable calibration. Preservatives are added to prevent microbial and mold growth.



### International First Class Traceability:



All DURACAL pH buffers are traceable to primary standards from N.I.S.T. and PTB. That's two international standard agencies. HAMILTON's unique certification program includes certified tests from an external accredited laboratory for pH measurement. A German DKD (Deutscher Kalibrierdienst) laboratory provides Hamilton with an internationally acknowledged certificate for the most common buffers (see table). Each package of DURACAL pH buffer comes with a HAMILTON certificate including detailed information. A copy of the DKD certificate is available on request.

### Value and Expiry Date on Bottle:



### Safe and Easy CalPack Bottle:



### Features:

- First Class Certificate including the actual value and expiry date
- Certified traceable to N.I.S.T. and PTB
- Actual value is determined from a DKD laboratory accredited for pH measurement
- Fast calibration through built-in potassium chloride to exclude memory effects
- Immune to micro-organisms
- Economical, since only about 20 mL of buffer is used per calibration
- Convenient 250 mL and 500 mL plastic bottle with built-in calibration compartment
- Also available in 5 L and 10 L plastic tanks for high volume customers

# DURACAL pH and Redox Buffers

## DURACAL pH Buffers

pH Value	Accuracy	Stability [Months]	Certificate	Package	Part #
1.09	± 0.02	60	Hamilton	3 CalPack bottle 500 mL	238 962
1.68	± 0.02	60	Hamilton	3 CalPack bottle 500 mL	238 963
2.00	± 0.02	60	Hamilton	3 CalPack bottle 500 mL	238 964
3.06	± 0.02	60	Hamilton	3 CalPack bottle 500 mL	238 932
4.01	± 0.01 / 0.02	18 / 60	DKD	1 CalPack bottle 250 mL	238 317
4.01	± 0.01 / 0.02	18 / 60	DKD	1 CalPack bottle 500 mL	238 217
4.01	± 0.01 / 0.02	18 / 60	DKD	3 CalPack bottle 500 mL	238 917
4.01	± 0.01 / 0.02	18 / 60	DKD	1 plastic tank, 5 L	238 332
4.01	± 0.01 / 0.02	18 / 60	DKD	1 plastic tank, 10 L	238 194
5.00	± 0.02	60	Hamilton	3 CalPack bottle 500 mL	238 965
6.00	± 0.02	60	Hamilton	3 CalPack bottle 500 mL	238 966
7.00	± 0.01 / 0.02	18 / 60	DKD	1 CalPack bottle 250 mL	238 318
7.00	± 0.01 / 0.02	18 / 60	DKD	1 CalPack bottle 500 mL	238 218
7.00	± 0.01 / 0.02	18 / 60	DKD	3 CalPack bottle 500 mL	238 918
7.00	± 0.01 / 0.02	18 / 60	DKD	1 plastic tank, 5 L	238 333
7.00	± 0.01 / 0.02	18 / 60	DKD	1 plastic tank, 10 L	238 188
8.00	± 0.02	60	Hamilton	3 CalPack bottle 500 mL	238 967
9.21	± 0.02	60	DKD	1 CalPack bottle 250 mL	238 319
9.21	± 0.02	60	DKD	1 CalPack bottle 500 mL	238 219
9.21	± 0.02	60	DKD	3 CalPack bottle 500 mL	238 919
9.21	± 0.02	60	DKD	1 plastic tank, 10 L	238 216
10.01	± 0.02	60	DKD	1 CalPack bottle 250 mL	238 321
10.01	± 0.02	60	DKD	1 CalPack bottle 500 mL	238 223
10.01	± 0.02	60	DKD	3 CalPack bottle 500 mL	238 923
10.01	± 0.02	60	DKD	1 plastic tank, 10 L	238 187

## HAMILTON pH Buffers

pH Values	Accuracy	Stability [Month]	Certificate	Package	Part #
11.00	± 0.05	24	Hamilton	3 CalPack bottle 500 mL	238 968
12.00	± 0.05	24	Hamilton	3 CalPack bottle 500 mL	238 969

## DURACAL pH Buffer Mixed Packages

pH Values	Accuracy	Stability [Month]	Certificate	Package	Part #
4.01/7.00/9.21	± 0.02	60	DKD	1 CalPack bottle 500 mL, each	238 922
4.01/7.00/10.01	± 0.02	60	DKD	1 CalPack bottle 500 mL, each	238 924

## HAMILTON Redox Buffer

Redox Value	Accuracy [mV]	Stability [Month]	Certificate	Package	Part #
475 mV	± 5	24	none	1 CalPack bottle 500 mL	238 227

# pH: Pharmaceutical Industry, Fermentation, ...

## CHEMOTRODE P

pH: 0...14  
0...130 °C  
Max. 6 bar  
Refillable electrolyte

- Steam sterilizable
- PROTELYTE electrolyte, air pressurizable for a clog-free liquid junction.
- EVEREF-F reference cartridge for silver free electrolyte
- 3 High Performance ceramic diaphragms for minimal flow dependency
- Extremely long life in protein-containing and partly organic solutions
- HAMILTON "PHI" pH glass



## FERMOTRODE

pH: 2...12 (0...14 briefly)  
0...130 °C  
Max. 4 bar  
Maintenance free

- Steam sterilizable
- Very long life, ultra stable calibration after sterilization and practically drift free signals
- No air pressure required, no risk of empty reference electrolyte compartment
- 3 COATRAMIC diaphragms prevent clogging due to proteins
- EVEREF-F reference cartridge for silver free SKYLYTE electrolyte
- HAMILTON "PHI" pH glass
- Not recommended for citric acid and frequent CIP



## EASYFERM EASYFERM VP

pH: 2...12 (0...14 briefly)  
0...130 °C  
Max. 4 bar at 130 °C  
Pt100 in VP-version

- Steam sterilizable and autoclavable
- Long life, stable calibration after sterilization and virtually drift free signals
- Space saving 12 mm shaft design
- 3 COATRAMIC diaphragms prevent clogging due to proteins
- EVEREF-F reference cartridge for silver free SKYLYTE electrolyte
- HAMILTON "PHI" pH glass
- Not recommended for citric acid and frequent CIP!

New!

VP



Description	Part #
CHEMOTRODE P 120	238 761
CHEMOTRODE P 150	238 763
CHEMOTRODE P 200	238 765
CHEMOTRODE P 250	238 767

Description	Part #
FERMOTRODE 120	238 480
FERMOTRODE 150	238 482
FERMOTRODE 200	238 484
FERMOTRODE 250	238 486

Description	Part #
EASYFERM 120	238 490
EASYFERM 170	238 475
EASYFERM 225	238 492
EASYFERM 325	238 494
EASYFERM 425	238 498
EASYFERM VP 120	238 445
EASYFERM VP 225	238 446

### Accessories:

Storage Solution 500 mL	238 931
PROTELYTE 100 mL	238 038
MASTERFIT (pg. 27)	
Connecting cables (pg.24)	

### Accessories:

Storage Solution 500 mL	238 931
MASTERFIT (pg. 27)	
Connecting cable (pg. 24)	

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT BIO (pg. 31)	
RETRACTOFIT BIO (pg. 30)	
Connecting cable (pg. 24)	

# ... Biotechnology, Food and Beverage

## POLYCLAVE POLYCLAVE VP

pH: 0...14  
0...130 °C  
Max. 6 bar at 130 °C  
Pt100 in VP-version



- It's a POLISOLVE!
- Most reproducible measurements after sterilization and other cleaning
- CIP, steam sterilizable and autoclavable
- Sterility proven many times over by the industry!
- 2 SINGLE PORE's to contact POLISOLVE directly with the sample for best results
- Up-side-down mounting with VP-types possible
- HAMILTON "PHI" pH glass

Description	Part #
POLYCLAVE 120	238 450
POLYCLAVE 170	238 452
POLYCLAVE 200	238 453
POLYCLAVE 225	238 451
POLYCLAVE 325	238 454
POLYCLAVE VP 120	238 455
POLYCLAVE VP 200	238 457
POLYCLAVE VP 225	238 456
POLYCLAVE VP 325	238 458
POLYCLAVE VP 425	238 459

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT BIO (pg. 31)	
RETRACTOFIT BIO (pg. 30)	
Connecting cables (pg.24)	

## POLILYTE HT POLILYTE HTVP

pH: 0...14  
0...130 °C  
Max. 6 bar at 130 °C  
Pt100 in HTVP-version



- It's a POLISOLVE!
- Best measurement accuracy in very alkaline processes as well as samples with very low conductivity.
- Steam sterilizable and autoclavable
- Sterility proven many times over by the industry!
- 2 SINGLE PORE's to contact POLISOLVE directly with the sample for best results
- Up-side-down mounting with VP-types possible
- HAMILTON "H" pH glass

Description	Part #
POLILYTE HT 120	238 431
POLILYTE HT 225	238 432
POLILYTE HT 425	238 467
POLILYTE HTVP 120	238 428
POLILYTE HTVP 225	238 429
POLILYTE HTVP 425	238 449

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT BIO (pg. 31)	
RETRACTOFIT BIO (pg. 30)	
Connecting cables (pg.24)	

## POLISOLVE pH Sensors:

**The new benchmark for maintenance-free sensors in pharmaceutical, fermentation and chemical processes! Great performance in food and beverage applications provide trouble-free operation!**

- Solves about 80% of conventional pH sensor problems with diaphragms or liquid junctions
- Two SINGLE PORE's instead of diaphragms. Never again liquid junction problems and total break downs!
- Suitable for pH 0 - 14 up to 130 °C
- Designed for all kinds of cleaning: steam sterilization, autoclavation, CIP, organic solvents, strong acids
- Fully compatible with TRIS and HEPES buffers
- Free of unwanted toxic acrylamide monomer
- The POLISOLVE polymeric electrolyte is protected by patent law

### POLISOLVE sensor families:

- POLYCLAVE
- POLILYTE HT
- POLILYTE PRO
- POLYPLAST PRO
- CLARYTRODE

# pH: Sugar Industry

## POLILYTE HT POLILYTE HTVP POLILYTE HTSK

pH: 0...14  
0...130 °C  
Max. 6 bar at 130 °C  
Pt100 in HTVP and  
HTSK version



- It's a POLISOLVE (pg. 9)!
- Withstands continuous high process temperature
- Proven design for sugar factories
- Specially formed pH glass for excellent mechanical stability
- Hamilton "H" pH glass provides stable readings
- 2 SINGLE PORE's for direct sample contact with the POLISOLVE electrolyte. No Clogging!
- Standard 12 mm shaft



## POLILYTE PRO POLILYTE PRO VP POLILYTE PRO XP POLILYTE RX

pH: 0...14 or  
Redox: +/- 2000 mV  
-10...60 °C  
Max. 6 or **50 bar** at 60 °C  
**Pt1000** in VP-version



- It's a POLISOLVE (pg. 9)!
- Suitable for process temperatures up to 60 °C
- POLILYTE PRO XP pH sensors withstand continuous pressure of 50 bar !
- POLILYTE PRO VP are equipped with a built-in Pt1000
- POLILYTE RX is the redox sensor version of the same product family
- SINGLE PORE for direct sample contact with the POLISOLVE electrolyte. No Clogging!



## CHEMOTRODE P

pH: 0...14  
0...130 °C  
Max. 6 bar  
Refillable electrolyte

- Long-term high temperature stable
- Protelyte electrolyte, air pressurizable for a clog-free liquid junction
- EVEREF-F reference cartridge prolongs electrode life in aggressive samples
- 3 High Performance ceramic diaphragms for lower risk of blocking
- Extremely long life in partially organic solutions and those containing proteins



Description	Part #
POLILYTE HT 120	238 431
POLILYTE HT 225	238 432
POLILYTE HT 425	238 467
POLILYTE HTVP 120	238 428
POLILYTE HTVP 225	238 429
POLILYTE HTVP 425	238 449
POLILYTE HTSK 120	238 468
POLILYTE HTSK 225	238 469

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT BIO (pg. 31)	
RETRACTOFIT BIO (pg. 30)	
Connecting cables (pg.24)	

Description	Part #
POLILYTE PRO 120	238 411
POLILYTE PRO VP 120	238 417
POLILYTE PRO XP 120	238 811
POLILYTE RX 120	238 433
POLILYTE RX 225	238 434

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT BIO (pg. 31)	
RETRACTOFIT BIO (pg. 30)	
Connecting cables (pg.24)	

Description	Part #
CHEMOTRODE P 120	238 761
CHEMOTRODE P 150	238 763
CHEMOTRODE P 200	238 765
CHEMOTRODE P 250	238 767

### Accessories:

Storage Solution 500 mL	238 931
PROTELYTE 100 mL	238 038
MASTERFIT (pg. 27)	
Connecting cables (pg.24)	

# pH: Swimming Pool, Sea and Ground Water

## EASYCONTROL EASYCONTROL ORP

pH: 0...14 or  
Redox: +/- 2000 mV  
-10...60 °C  
Max. 2 bar at 60 °C

- Suitable for process temperatures up to 60 °C
- EASYCONTROL is the pH sensor
- EASYCONTROL ORP is the redox sensor version of the same product family
- Ceramic diaphragm is the liquid junction.



## POLYPLAST PRO POLYPLAST PRO RX POLYPLAST PRO SK

pH: 0...14 or  
Redox: +/- 2000 mV  
-10...40 °C, briefly 60 °C  
Max. 6 bar at 60 °C  
Pt100 in SK-version

- It's a POLISOLVE (pg. 9)!
- Suitable for slightly contaminated process samples
- Robust plastic shaft with integrated pH membrane protection
- POLYPLAST PRO SK are equipped with a built-in Pt100 and a SMEK connector head
- POLYPLAST PRO RX is the redox sensor version of the same product family
- SINGLE PORE for direct sample contact with the POLISOLVE electrolyte. No Clogging!



## POLILYTE PRO POLILYTE PRO VP POLILYTE PRO XP POLILYTE RX

pH: 0...14 or  
Redox: +/- 2000 mV  
-10...60 °C  
Max. 6 or **50 bar** at 60 °C  
Pt1000 in VP-version

- It's a POLISOLVE (pg. 9)!
- Suitable for process temperatures up to 60 °C
- POLILYTE PRO XP pH sensors withstand continuous pressure of 50 bar!
- POLILYTE PRO VP are equipped with a built-in Pt1000
- POLILYTE RX is the redox sensor version of the same product family
- SINGLE PORE for direct sample contact with the POLISOLVE electrolyte. No Clogging!



Description	Part #
EASYCONTROL 120	238 522
EASYCONTROL ORP 120	238 523

Description	Part #
POLYPLAST PRO 120	238 408
POLYPLAST PRO SK 120	238 413
POLYPLAST PRO RX 120	238 409

Description	Part #
POLILYTE PRO 120	238 411
POLILYTE PRO VP 120	238 417
POLILYTE PRO XP 120	238 811
POLILYTE RX 120	238 433
POLILYTE RX 225	238 434

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 29)	
Connecting cables (pg.24)	

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 29)	
Connecting cables (pg.24)	

### Accessories:

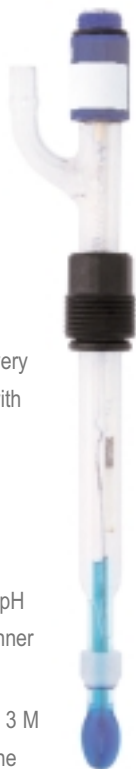
Storage Solution 500 mL	238 931
FLEXIFIT (pg. 29)	
RETRACTOFIT (pg. 25)	
Connecting cables (pg.24)	

# pH: Low Conductivity/Ion Weak Samples

## IONOTRODE

pH: 0...14  
-10...40 °C  
Max. 0.5 bar, or higher with pressure load at the side tube connector

- Stable measurements in very low conductive samples with less than 0.2 μS/cm
- Removable PTFE ground sleeve ring diaphragm for electrolyte flow control
- Extremely large "F-glass" pH membrane filled with TK inner buffer (pg. 5)
- Connect the side arm to a 3 M KCl reservoir and adjust the flow with the PTFE ring for optimal performance!



## LIQ-GLASS PG

pH: 1...11  
-5...60 °C  
Max. 2 bar at 60 °C  
Maintenance free - no refill

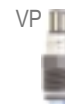
- Suitable for process temperatures up to 60 °C and samples with just 2 μS/cm conductivity
- Maintenance free and simple handling
- A proprietary electrolyte provides more consistent readings in low ionic content samples than conventional sensors
- 3 ceramic diaphragms for flow direction independent signals
- Hamilton "F" pH glass provides stable readings



## POLILYTE PRO POLILYTE PRO VP POLILYTE PRO XP

pH: 0...14  
-10...60 °C  
Max. 6 bar at 60 °C or **50 bar** with XP version  
Pt1000 in VP-version

- It's a POLISOLVE (pg. 9)!
- Fantastic stable readings in most ion weak samples
- Suitable for process temperatures up to 60 °C
- POLILYTE PRO XP pH sensors withstand continuous pressure of 50 bar !
- POLILYTE PRO VP are equipped with a built-in Pt1000
- SINGLE PORE for direct sample contact with the POLISOLVE electrolyte. No clogging!



Description	Part #
IONOTRODE 120	238 525

Description	Part #
LIQ-GLASS PG 120	238 515

Description	Part #
POLILYTE PRO 120	238 411
POLILYTE PRO VP 120	238 417
POLILYTE PRO XP 120	238 811

**Accessories:**

Storage Solution 500 mL	238 931
3 M KCL, 500 mL	238 936
Connecting cables (pg.24)	

**Accessories:**

Storage Solution 500 mL	238 931
Connecting cables (pg.24)	

**Accessories:**

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 29)	
Connecting cables (pg.24)	

# pH: Petrochemistry

## POLILYTE HT POLILYTE HTVP POLILYTE HTSK

pH: 0...14  
0...130 °C

Max. 6 bar at 130 °C

Pt100 in HTVP and HTSK version



- It's a POLISOLVE (pg. 9)!
- Withstands continuous high process temperature
- Works well in most organic solvents including those with low water and salt content
- Proprietary pH glass for improved mechanical stability
- Two SINGLE POREs for direct sample contact with the POLISOLVE electrolyte. No Clogging!
- Upside-down mounting with VP-types possible

Description	Part #
POLILYTE HT 120	238 431
POLILYTE HT 225	238 432
POLILYTE HT 425	238 467
POLILYTE HTVP 120	238 428
POLILYTE HTVP 225	238 429
POLILYTE HTVP 425	238 449
POLILYTE HTSK 120	238 468
POLILYTE HTSK 225	238 469

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 29)	
RETRACTOFIT (pg. 25)	
Connecting cables (pg.24)	

## CHEMOTRODE P

pH: 0...14  
0...130 °C

Max. 6 bar

Refillable electrolyte



- Long-term high temperature stability
- Protelyte electrolyte, air pressurizable for a clog-free liquid junction
- EVEREF-F reference cartridge prolongs electrode life in aggressive samples
- 3 High Performance ceramic diaphragms for lower risk of blocking
- Long lifetime in partially organic solutions

Description	Part #
CHEMOTRODE P 120	238 761
CHEMOTRODE P 150	238 763
CHEMOTRODE P 200	238 765
CHEMOTRODE P 250	238 767

### Accessories:

Storage Solution 500 mL	238 931
PROTELYTE 100 mL	238 038
MASTERFIT (pg. 27)	
Connecting cables (pg.24)	

## CHEMOTRODE BRIDGE CHEMOTRODE BRIDGE VP

pH: 0...14  
0...130 °C

Max. 6 bar

Refillable electrolyte

Pt100 in VP-version



- The problem solving pH sensor, that just works longer!
- SKYLYTE electrolyte, air pressurizable for a poison-resistant liquid junction
- EVEREF-B reference cartridge for highest protection of the reference half cell and silver free electrolyte
- 1 platinum diaphragm for clog-free operation
- HAMILTON "PHI" pH glass
- H-XL-type comes with extra thick "H" pH glass for abrasive samples

Description	Part #
CHEMOTRODE BRIDGE 120	238 770
CHEMOTRODE BRIDGE 150	238 772
CHEMOTRODE BRIDGE 200	238 774
CHEMOTRODE BRIDGE 250	238 776
CHEMOTRODE BRIDGE VP 120	238 753
CHEMOTRODE BRIDGE VP 150	238 754
CHEMOTRODE BRIDGE H-XL150	238 756

### Accessories:

Storage Solution 500 mL	238 931
SKYLYTE 100 mL	238 037
SKYLYTE 500 mL	238 937
MASTERFIT (pg. 27)	
Connecting cables (pg.24)	

# pH: Chemical Industry

## CHEMOTRODE BRIDGE CHEMOTRODE BRIDGE VP

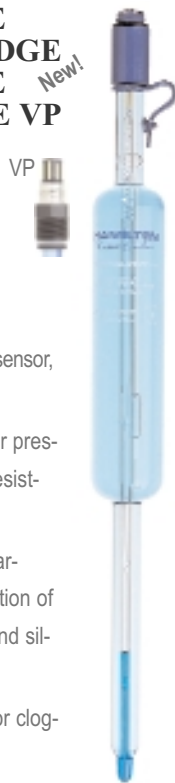
pH: 0...14  
0...130 °C

Max. 6 bar

Refillable electrolyte

Pt100 in VP-version

- The problem solving pH sensor, that just works longer!
- SKYLYTE electrolyte, air pressurizable for a poison-resistant liquid junction
- EVEREF-B reference cartridge for highest protection of the reference half cell and silver free electrolyte
- 1 platinum diaphragm for clog-free operation
- HAMILTON "PHI" pH glass
- H-XL-type comes with extra thick "H" pH glass for abrasive samples



## CHEMOTRODE CHEMOTRODE ORP

pH: 0...14 or

Redox: +/- 2000 mV

0...130 °C

Max. 6 bar

Refillable electrolyte

- Viscous 3 M KCl electrolyte "KCl-LR" air pressurizable for less contamination
- EVEREF-F reference cartridge prolongs electrode life in aggressive samples
- 3 High Performance ceramic diaphragms for lower risk of blocking
- CHEMOTRODE ORP is the Redox version and comes with a huge platinum ring
- Fits into most common pressurizable armatures for electrodes with a reservoir diameter of about 30 mm



## POLYCLAVE POLYCLAVE VP

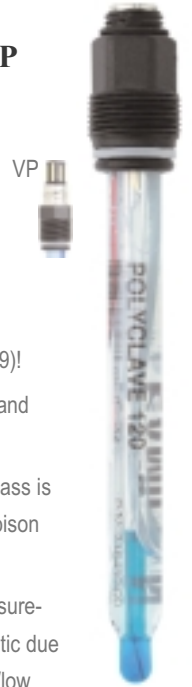
pH: 0...14

0...130 °C

Max. 6 bar at 130 °C

Pt100 in VP-version

- It's a POLISOLVE (pg. 9)!
- CIP, steam sterilizable and autoclavable
- HAMILTON "PHI" pH glass is almost impossible to poison from process samples
- Most reproducible measurements even in hot caustic due to proprietary pH glass/low drift
- Two SINGLE POREs for direct sample contact with the POLISOLVE electrolyte. No clogging!
- Upside-down mounting with VP-types possible



Description	Part #
CHEMOTRODE BRIDGE 120	238 770
CHEMOTRODE BRIDGE 150	238 772
CHEMOTRODE BRIDGE 200	238 774
CHEMOTRODE BRIDGE 250	238 776
CHEMOTRODE BRIDGE VP 120	238 753
CHEMOTRODE BRIDGE VP 150	238 754
CHEMOTRODE BRIDGE H-XL150	238 756

### Accessories:

Storage Solution 500 mL	238 931
SKYLYTE 100 mL	238 037
SKYLYTE 500 mL	238 937
MASTERFIT (pg. 27)	
Connecting cables (pg.24)	

Description	Part #
CHEMOTRODE 120	238 760
CHEMOTRODE 150	238 762
CHEMOTRODE 200	238 764
CHEMOTRODE 250	238 766
CHEMOTRODE 550	238 775
CHEMOTRODE ORP 120	238 740
CHEMOTRODE ORP 150	238 742
CHEMOTRODE ORP 200	238 744
CHEMOTRODE ORP 250	238 746

### Accessories:

Storage Solution 500 mL	238 931
3 M KCl-LR 500 mL	238 939
MASTERFIT (pg. 27)	
Connecting cables (pg.24)	

Description	Part #
POLYCLAVE 120	238 450
POLYCLAVE 170	238 452
POLYCLAVE 200	238 453
POLYCLAVE 225	238 451
POLYCLAVE 325	238 454
POLYCLAVE VP 120	238 455
POLYCLAVE VP 200	238 457
POLYCLAVE VP 225	238 456
POLYCLAVE VP 325	238 458
POLYCLAVE VP 425	238 459

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 29)	
RETRACTOFIT (pg. 25)	
Connecting cables (pg.24)	

# pH: Chemical Industry, Hydrofluoric Acid

## MECOTRODE MECOTRODE VP OXYTRODE PT

New!



pH: 0...14 or  
Redox: +/- 2000 mV  
0...130 °C; Max. 16 bar at  
25 °C or 6 bar at 130 °C  
Pt100 in VP version



- Maintenance free reference gel electrolyte
- 3 High Performance ceramic diaphragms for reduced flowing potentials when mounted in pipes
- Hamilton "H" pH glass provides the most accurate readings at high pH values or high temperatures
- OXYTRODE PT is a Redox sensor with a platinum wire coil melted onto the glass
- Standard 12 mm shaft

## POLILYTE HT POLILYTE HTVP POLILYTE HTSK

New!



pH: 0...14  
0...130 °C  
Max. 6 bar at 130 °C  
Pt100 in HTVP / HTSK version



- It's a POLISOLVE (pg. 9)!
- Withstands continuous high process temperature
- Specially formed pH glass for improved mechanical stability
- Propriety pH glass for improved mechanical stability
- Two SINGLE POREs for direct sample contact with the POLISOLVE electrolyte. No Clogging!
- Upside-down mounting with VP-types possible

## CLARYTRODE

New!



pH: 0...14  
-10...100 °C  
Max. 6 bar at 100 °C  
For up to 0.01M HF at 20 °C  
and 0.05M HF at 50 °C

- It's a POLISOLVE (pg. 9)!
- HF - Hydrofluoric acid containing applications dissolve normal pH glasses within hours at low pH values
- HAMILTON "HF" pH glass is much more resistant to HF than other pH glasses. This significantly increases sensor lifetime
- Stable readings in those harsh conditions
- Two SINGLE POREs for direct sample contact with the POLISOLVE electrolyte

Description	Part #
MECOTRODE 120	238 801
MECOTRODE 225	238 806
MECOTRODE VP 120	238 437
MECOTRODE VP 225	238 438
OXYTRODE PT 120	238 810

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 29)	
RETRACTOFIT (pg. 25)	
Connecting cables (pg.24)	

Description	Part #
POLILYTE HT 120	238 431
POLILYTE HT 225	238 432
POLILYTE HT 425	238 467
POLILYTE HTVP 120	238 428
POLILYTE HTVP 225	238 429
POLILYTE HTVP 425	238 449
POLILYTE HTSK 120	238 468
POLILYTE HTSK 225	238 469

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 29)	
RETRACTOFIT (pg. 25)	
Connecting cables (pg.24)	

Description	Part #
CLARYTRODE 120	238 821

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 29)	
Connecting cables (pg.24)	

# pH: Water and Waste Water

## POLYPLAST PRO POLYPLAST PRO RX POLYPLAST PRO SK

pH: 0...14 or  
Redox: +/- 2000 mV  
-10...40, briefly 60 °C  
Max. 6 bar at 60 °C  
Pt100 in SK-version

- It's a POLISOLVE (pg. 9)!
- Suitable for slightly contaminated water and waste water
- Robust plastic shaft with pH membrane protection
- POLYPLAST PRO SK are equipped with a built-in Pt100 and a SMEK connector head
- POLYPLAST PRO RX is the redox sensor version
- SINGLE PORE for direct sample contact with the POLISOLVE electrolyte. No clogging!



Description	Part #
POLYPLAST PRO 120	238 408
POLYPLAST PRO SK 120	238 413
POLYPLAST PRO RX 120	238 409

**Accessories:**

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 25ff)	
Connecting cables (pg.24)	

## POLILYTE PRO POLILYTE PRO VP POLILYTE PRO XP POLILYTE RX

pH: 0...14 or  
Redox: +/- 2000 mV  
-10...60 °C; Max. 6 or  
**50 bar** at 60 °C  
Pt1000 in VP-version

- It's a POLISOLVE (pg. 9)!
- Suitable for samples containing solids, bacteria or sludge as well as normal drinking water
- POLILYTE PRO XP pH sensors withstand continuous pressure of 50 bar!
- POLILYTE PRO VP are equipped with a built-in Pt1000
- POLILYTE RX is the redox sensor version
- SINGLE PORE for direct sample contact with the POLISOLVE electrolyte. No clogging!



Description	Part #
POLILYTE PRO 120	238 411
POLILYTE PRO VP 120	238 417
POLILYTE PRO XP 120	238 811
POLILYTE RX 120	238 433
POLILYTE RX 225	238 434

**Accessories:**

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 25ff)	
RETRACTOFIT (pg. 25ff)	
Connecting cables (pg.24)	

## POLILYTE HT POLILYTE HTVP POLILYTE HTSK

pH: 0...14  
0...130 °C  
Max. 6 bar at 130 °C  
Pt100 in HTVP and  
HTSK version

- It's a POLISOLVE (pg. 9)!
- For all extremely demanding applications requiring maintenance free sensors
- Withstands continuous high process temperature
- Very well protected reference system with the EVEREF-L reference systems
- Two SINGLE POREs for direct sample contact with the POLISOLVE electrolyte. No clogging!
- Upside-down mounting with VP-types possible



Description	Part #
POLILYTE HT 120	238 431
POLILYTE HT 225	238 432
POLILYTE HT 425	238 467
POLILYTE HTVP 120	238 428
POLILYTE HTVP 225	238 429
POLILYTE HTVP 425	238 449
POLILYTE HTSK 120	238 468
POLILYTE HTSK 225	238 469

**Accessories:**

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 25ff)	
RETRACTOFIT (pg. 25ff)	
Connecting cables (pg.24)	

# pH: Water and Waste Water

## CLARYTRODE

pH: 0...14  
-10...100 °C  
Max. 6 bar at 100 °C  
For up to 0.01M HF at 20 °C  
and 0.05M HF at 50°C

- It's a POLISOLVE (pg. 9)!
- HF - Hydrofluoric acid containing applications dissolve normal pH glasses within hours at low pH values
- HAMILTON "HF" pH glass is much more resistant to HF than other pH glasses. This significantly increases sensor lifetime
- Stable readings in those harsh conditions
- Two SINGLE POREs for direct sample contact with the POLISOLVE electrolyte



## MECOTRODE MECOTRODE VP OXYTRODE PT

pH: 0...14 or  
Redox: +/- 2000 mV  
0...130 °C; Max. 16 bar at  
25 °C or 6 bar at 130 °C  
Pt100 in VP version

- Maintenance free reference gel electrolyte
- 3 High Performance ceramic diaphragms for reduced flowing potentials when mounted in pipes
- Hamilton "H" pH glass provides the most accurate readings at high pH values or high temperatures
- OXYTRODE PT is a Redox sensor with a platinum wire coil melted onto the glass
- Standard 12 mm shaft



## CHEMOTRODE BRIDGE CHEMOTRODE BRIDGE VP

pH: 0...14  
0...130 °C  
Max. 6 bar  
Refillable electrolyte  
Pt100 in VP-version

- The problem solving pH sensor, that just works longer!
- SKYLYTE electrolyte, air pressurizable for a poison-resistant liquid junction
- EVEREF-B reference cartridge for highest protection of the reference half cell and silver free electrolyte
- 1 platinum diaphragm for clog-free operation
- HAMILTON "PHI" pH glass
- H-XL-type comes with extra thick "H" pH glass for abrasive samples



Description	Part #
CLARYTRODE 120	238 821

Description	Part #
MECOTRODE 120	238 801
MECOTRODE 225	238 806
MECOTRODE VP 120	238 437
MECOTRODE VP 225	238 438
OXYTRODE PT 120	238 810

Description	Part #
CHEMOTRODE BRIDGE 120	238 770
CHEMOTRODE BRIDGE 150	238 772
CHEMOTRODE BRIDGE 200	238 774
CHEMOTRODE BRIDGE 250	238 776
CHEMOTRODE BRIDGE VP 120	238 753
CHEMOTRODE BRIDGE VP 150	238 754
CHEMOTRODE BRIDGE H-XL150	238 756

**Accessories:**

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 29)	
Connecting cables (pg.24)	

**Accessories:**

Storage Solution 500 mL	238 931
FLEXIFIT (pg. 29)	
RETRACTOFIT (pg. 25)	
Connecting cables (pg.24)	

**Accessories:**

Storage Solution 500 mL	238 931
SKYLYTE 100 mL	238 037
SKYLYTE 500 mL	238 937
MASTERFIT (pg. 25ff)	
Connecting cables (pg.24)	

# 6-in-1, Temperature and Conductivity Sensors

## JACOTRODE VP 6-in-1 Sensors

pH: 2...12 (0...14 briefly) and  
Temperature: Pt1000 and  
Redox: +/- 2000 mV and/or  
Conductivity: c = 0.4/cm and/or  
Liquid earth platinum contact  
Reference for pH/Redox built-in

- Steam sterilizable and auto-clavable
- 2 large platinum rings for Redox, conductivity and liquid earth
- Sanitary advantage: just one space and o-ring saving 12 mm shaft
- EVEREF-F cartridge and SKYLYTE electrolyte
- COATRAMIC diaphragm; not recommended for citric acid and frequent CIP
- Maximum 4 bar at 130 °C
- It's just one high-tech innovation from HAMILTON!

Description	Part #
JACOTRODE VP 120	238 442
JACOTRODE VP 225	238 443

### Accessories:

Storage Solution 500 mL	238 931
FLEXIFIT BIO (pg. 31)	
RETRACTOFIT BIO (pg. 30)	
Connecting cables (pg.24)	

New!



## Pt100 PG13.5 TEMP Pt1000 PG13.5 TEMP Temperature Sensors

Type: Pt100 or Pt1000  
-20...110 °C  
Max. 20 bar at 110 °C

- Glass shaft
- Chemically resistant
- No corrosion risk if used in strong acids or salty samples
- Standard pH cable connector
- 12 x 120 mm shaft design

Description	Part #
Pt100 PG13.5 TEMP	238 982
Pt1000 PG13.5 TEMP	238 983

### Accessories:

FLEXIFIT (pg. 29)	
FLEXIFIT BIO (pg. 31)	
Connecting cables (pg.24)	



## CONDUCELL 2UP 2-Pole Conductivity Sensors

1.0...200 µS/cm or  
0.1...200'000 µS/cm linearized  
Cell constant: c = 0.4/cm  
Max. 20 bar at 130 °C  
Temperature Sensor: Pt1000

- Steam sterilizable and auto-clavable, CIP
- 2 large platinum rings
- Sanitary advantage: just one FDA-EPDM o-ring and easy cleaning in a space saving 12 mm shaft
- Note: 2-pole cells do not respond linearly, especially at higher conductivity values. Therefore a linearization with the instrument used is recommended for measurements. This is not required for a relative set-point control.

Description	Part #
CONDUCELL 2UP-PG-120	237 600

### Accessories:

Conductivity Stds. (pg. 20)	
FLEXIFIT/BIO (pg. 29/31)	
Connecting cables (pg.24)	

New!

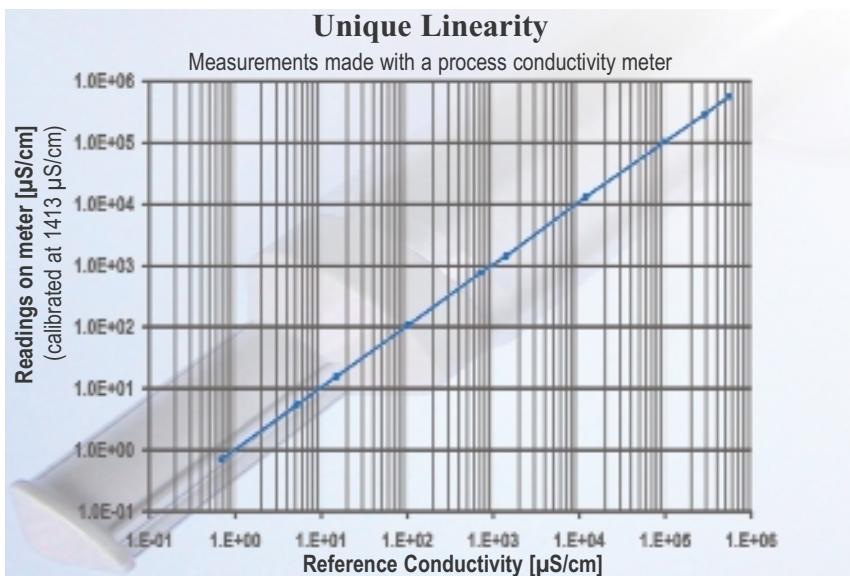
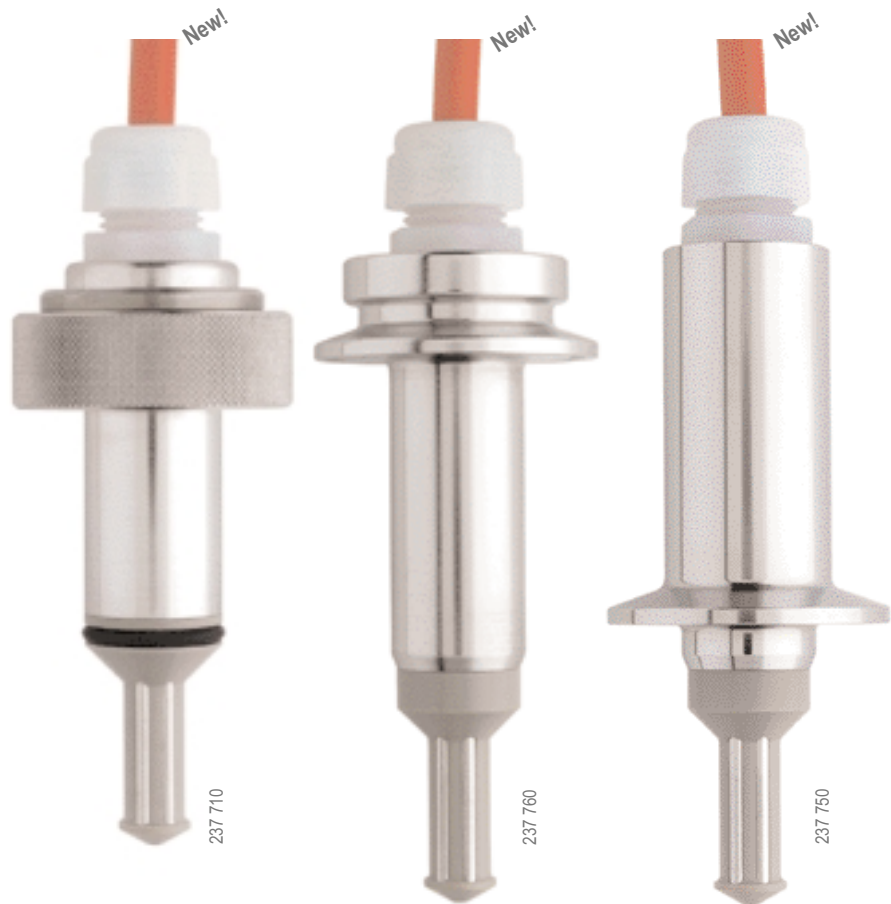


# Conductivity Sensors

## CONDUCELL 4US CONDUCELL 4UC 4-Pole Conductivity Sensors

0.1...500'000  $\mu\text{S/cm}$   
 Cell constant:  $c = 0.135/\text{cm}$   
 Max. 6 bar at 135 °C  
 Temperature Sensor: Pt1000  
 Wetted parts are FDA approved

- Suitable for steam sterilization and CIP cleanings
- Certificate confirms: all wetted parts conform to FDA: PEEK, Stainless Steel DIN 1.4435, Carbon, EPDM.
- Fixed 5 m high temperature cable
- Sanitary advantage: surface quality is N5 (0.4  $\mu\text{m}$ ), electro-polished and sensor is easy to clean
- The CONDUCELL 4UC types have special FDA approved carbon electrodes for stable measurements in strongly oxidizing samples, e.g. those containing ozone
- Other types and dimensions on request.



Description	Part #
CONDUCELL 4US-G125-62/25	237 700
CONDUCELL 4US-G125-85/48	237 710
CONDUCELL 4US-T150-50	237 750
CONDUCELL 4UC-T150-50	237 751
CONDUCELL 4US-T150-100	237 760
CONDUCELL 4UC-T150-100	237 761

**Example:** 4US-G125-62/25  
 4: 4-pole  
 U: Undefined/open field  
 S: Stainless steel; C: Carbon; P: Pt electrodes  
 G125:G1.25"; T150: TriClamp 1.5" connection  
 62: 62 mm shaft length  
 /25: (optional) o-ring seals at 25 mm.

**Accessories:**  
 Conductivity Standards (pg. 20)



# Dissolved Oxygen Sensors

## What is important for dissolved oxygen measurements?

Oxygen measurement today is performed in a very wide range of applications and is one of the most important parameters of process control technology. Since their introduction in 1995, HAMILTON oxygen sensors have become world leaders because of their signal performance and low maintenance requirements.

Building on the success of the first OXYFERM sensor, the family of oxygen sensors has been continuously extended and now comprises three groups. The OXYGOLD sensor with its very low limit of detection has ideal properties for applications in brewing, boiler feed water and for all applications requiring a low limit of detection. The sterilizable and autoclavable OXYFERM sensors represent a new standard in biotechnology. In addition to the PG 13.5 versions with their various lengths, they are now also available as 25 mm versions. The OXYSENS sensors have been developed as 100% maintenance-free, low cost sensors for wastewater and pool monitoring.

## Measurement principle

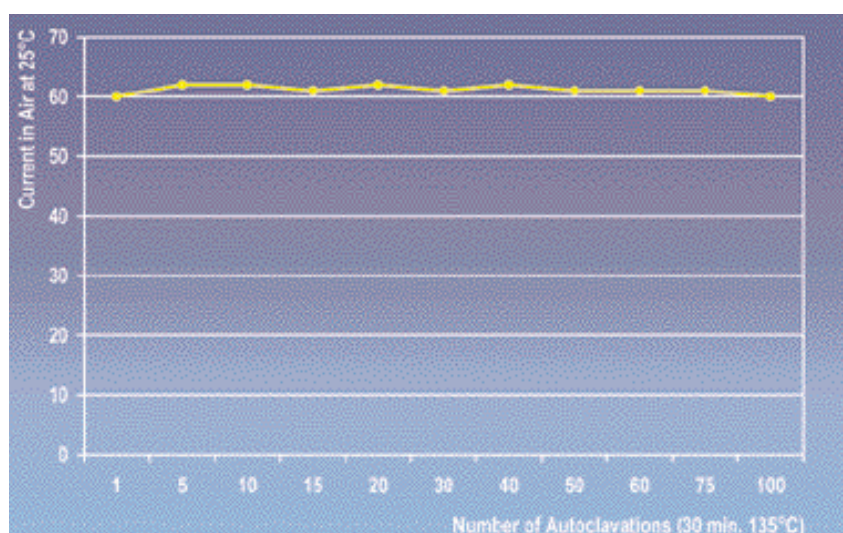
The oxygen content in liquids is best measured with cells using Clark's principle. These cells generate an electrical current proportional to the oxygen partial pressure which can be evaluated with a suitable measurement converter. In order to prevent interference effects, the Clark's cell is covered with a gas permeable membrane. The PTFE membranes typically used, however are mechanically very fragile, with the result that they must be frequently changed to allow reliable measurement. It is difficult to handle such fragile membranes.

As a solution, HAMILTON developed the the OPTIFLOW membrane. This membrane is very mechanically stable and is manufactured as a laminate around a steel mesh. OPTIFLOW membranes are stable under harsh ambient conditions as well as high pressures. This ingenious design allows fast response times to be combined with unusually low flow dependence.

## Outstanding performance

### Short response times

The outstanding properties of the new membrane material result in fast response times of 30 to 60 seconds.



### Little maintenance/long life

Maintenance is rarely necessary due to the improved design of the sensor. The construction of the electrode guarantees excellent stability even after numerous sterilization cycles. The graph illustrates the excellent performance of OXYFERM electrodes even after 100 sterilizations without the need for maintenance. Other types of oxygen sensor subjected to the same conditions require regeneration after 5 to 10 sterilization cycles.

### Low flow sensitivity

Many other oxygen sensors show a clear dependence on the flow rate, especially

with slowly flowing samples. This can lead to excessively low or erratic readings. As a result of the OXYFERM design, the effect of the flow rate on the reading is negligible.

### Short stabilization time

The stabilization time is the time between connection of the oxygen sensor to the amplifier and the time when accurate measurements can be expected. This is due to the oxygen, which has diffused inside the sensor and is present around the cathode when no voltage is applied. The OXYSENS stabilization time is typically less than 15 min.

# Dissolved Oxygen Sensors

## OXYSENS OXYSENS W

O<sub>2</sub>: 40 ppb to saturation  
0...60 °C  
Max. 4 bar  
TC: 22 or 30 kOhm NTC  
Maintenance-free

- First maintenance-free DO sensor in the market; never change membranes or electrolyte again!
- Designed for use in water, waste water, pools, fish farms and composting plants.
- Required flow for correct values is 0.02 m/sec only!
- OXYSENS has a built-in 22 kOhm NTC for temperature compensation, the OXYSENS W a 30 kOhm NTC.
- 5 m fixed and sealed cable
- 12 mm shaft and PG 13.5



## OXYFERM OXYFERM VP OXYFERM XL

**Steam sterilizable DO sensor**

O<sub>2</sub>: 10 ppb to saturation or  
0.1%...200% of air  
0...130 °C; max. 4 bar  
TC: 22 kOhm NTC  
Required flow: min. 0.02 m/sec

- Suitable for steam sterilization, autoclavation and CIP
- Designed for the use in biotechnology, pharmaceutical and chemical industry
- Low drift for reliable measurements and fast response
- Reduced cost of ownership due to prolonged service cycles. See graph on page. 21.
- Comes with a material and performance test certificate
- 12 mm shaft or 25 mm shaft (XL-type)
- UNIQUE: Up-side-down mounting possible when using OXYLYTE USD electrolyte. Very helpful for measurements in almost empty tanks.



Description	Part #
OXYSENS 120	237 150
OXYSENS W 120	237 160

**Accessories:**  
FLEXIFIT (pg. 29)  
IMMERSING SET (pg. 32)

Description	Part #
OXYFERM 120	237 100
OXYFERM VP 120	237 400
OXYFERM 170	237 105
OXYFERM 225	237 110
OXYFERM VP 225	237 401
OXYFERM 325	237 120
OXYFERM VP 325	237 402
OXYFERM 425	237 130
OXYFERM XL 100	237 175
o-ring seals at 41 mm!	
OXYFERM XL 150	237 170
o-ring seals variable with VariFlange technology	
OXYFERM XL 300	237 174
o-ring seals variable with VariFlange technology	

Description	Part #
<b>Accessories:</b>	
OXYFERM MEMBRANE KIT	237 123
MEMBRANE KIT CIP	237 126
MEMBRANE KIT FDA	237 140
OXYLYTE 50 mL	237 118
OXYLYTE USD 50 mL	237 136
FLEXIFIT BIO (pg. 31)	
RETRACTOFIT BIO (pg. 30)	
Connecting cables (pg.24)	

# Dissolved Oxygen Sensors

## MEMBRANE KITS & POLARIZATION MODULES

### OXYGOLD MEMBRANE KIT

Set of 3 membranes for OXYGOLD sensors.  
Electrolyte is to be purchased separately.

### OXYFERM MEMBRANE KIT

3 Membranes,  
Oxlyte, pipette, O-rings, polishing strip



### MEMBRANE KIT CIP

As above but with a special membrane for intensive CIP

### MEMBRANE KIT FDA

FDA certified membrane material and without membrane protection collar



### POLARIZATION MODULE New!

Stabilize spare sensors without an amplifier



Description	Part #
OXYGOLD MEMBRANE KIT	237 135
OXYFERM MEMBRANE KIT	237 123
MEMBRANE KIT CIP	237 126
MEMBRANE KIT FDA	237 140
POLARIZATION MODULE G for OXYFERM VP and OXYGOLD G	237 350
POLARIZATION MODULE B for OXYGOLD B	237 360

#### Accessories:

OXYGOLD OXYLYTE G 50 mL	237 139
OXYGOLD OXYLYTE B 50 mL	237 138
OXYFERM OXYLYTE 50 mL	237 118
OXYLYTE USD 50 mL	237 136

## OXYGOLD G

Trace level general application DO sensor

O<sub>2</sub>: 2 ppb to saturation or  
0.02%...200% of air  
0...130 °C

Max. 12 bar

TC: 22 kOhm NTC

Required flow: min. 0.1 m/sec

- Designed for use in power generation, water treatment, chemical, pharmaceutical and semiconductor industries
- Suitable for high temperature, high pressure, sterilization and CIP
- No cooling or bypass required
- Fast response time  
t<sub>98%</sub> < 60 sec.
- Comes with a material and performance test certificate
- 12 mm shaft and IP 68 VP connector head



Description	Part #
OXYGOLD 120	237 180
plus OXYLYTE G	237 139
OXYGOLD 225	237 185
plus OXYLYTE G	237 139

#### Accessories:

OXYGOLD MEMBRANE KIT incl. 3 membrane bodies	237 135
OXYLYTE G 50 mL	237 139
POLARIZATION MODULE G	237 350
FLEXIFIT/BIO (pg. 29/31)	
RETRACTOFIT/BIO (pg. 25ff)	
Connecting cables (pg.24)	

## OXYGOLD B

DO sensor for measuring in samples containing acidic gases like CO<sub>2</sub>, e.g. beer

O<sub>2</sub>: 10 ppb to saturation or  
0.1%...200% of air  
0...100 °C

Max. 12 bar

TC: 22 kOhm NTC

Required flow: min. 0.1 m/sec

- Designed for use in breweries, other beverages and specific chemical processes
- Suitable for high temperature, high pressure, sterilization and CIP
- No cooling or bypass required
- Shortest response time in the market from air to pure CO<sub>2</sub>: t<sub>98%</sub> < 60 sec
- Comes with a material and performance test certificate
- 12 mm shaft and IP 68 VP connector head



Description	Part #
OXYGOLD 120	237 180
plus OXYLYTE B	237 138
OXYGOLD 225	237 185
plus OXYLYTE B	237 138

#### Accessories:

OXYGOLD MEMBRANE KIT incl. 3 membrane bodies	237 135
OXYLYTE B 50 mL	237 138
POLARIZATION MODULE B	237 360
FLEXIFIT/BIO (pg. 29/31)	
RETRACTOFIT/BIO (pg. 25ff)	
Connecting cables (pg.24)	

# Connecting Cables for Sensors



**For sensors with S7 cable connector. Instrument side is without plug (open end)**

	<b>Part #</b>
Length: 1 m, diameter: 5 mm	355 072
Length: 5 m, diameter: 5 mm	355 066
Length: 10 m, diameter: 5 mm	355 080
Length: 10 m, diameter: 7 mm, Triax-cable for pH-coaxial cable plus a liquid earth on a 4 mm banana plug <i>New!</i>	355 115



**For sensors with S7 cable connector. Instrument side has BNC plug**

	<b>Part #</b>
Length: 1 m, diameter: 3 mm	355 043
Length: 3 m, diameter: 3 mm	355 057
Length: 5 m, diameter: 3 mm	355 056



**For sensors with S7 cable connector. Instrument side has DIN plug**

	<b>Part #</b>
Length: 1 m, diameter: 3 mm	355 045
Length: 3 m, diameter: 3 mm	355 059
Length: 5 m, diameter: 3 mm	355 058



**For sensors with VP cable connector. Instrument side is without plug (open end) *New!***

	<b>Part #</b>
Length: 1 m, diameter: 7.5 mm	355 108
Length: 3 m, diameter: 7.5 mm	355 109
Length: 5 m, diameter: 7.5 mm	355 110
Length: 10 m, diameter: 7.5 mm	355 111
Length: 20 m, diameter: 7.5 mm	355 112



**For sensors with SK/SMEK cable connector. Instrument side is without plug (open end) *New!***

	<b>Part #</b>
Length: 1 m, diameter: 7.5 mm	355 140
Length: 3 m, diameter: 7.5 mm	355 141
Length: 5 m, diameter: 7.5 mm	355 142
Length: 10 m, diameter: 7.5 mm	355 143



**For OXYFERM sensors without "VP" cable connector. Instrument side is without plug (open end)**

	<b>Part #</b>
Length: 1 m, diameter: 5 mm	355 087
Length: 3 m, diameter: 5 mm	355 088
Length: 5 m, diameter: 5 mm	355 089

# Retractable Armature for General Use

## RETRACTOFIT

The HAMILTON RETRACTOFIT is an ideal armature for industrial applications. The armature allows the user to install maintenance-free electrodes in critical processes. The main advantage of this design is that the sensor can be withdrawn while the process is running (i.e. for cleaning, calibration or even to replace the electrode), without interrupting the process. The design allows the use of sensors with 210 to 225 mm shaft length and a PG 13.5 thread, e.g. electrodes such as the HAMILTON POLYCLAVE 225, POLILYTE HTSK 225, EASYFERM VP 225, MECOTRODE 225 and OXYGOLD 225.

The armature is very easy to use and maintain. Only one press of the red button is needed to move the electrode into or out of the process. All o-rings are easily replaced without special tools.

An integral safety mechanism prevents the armature from being inserted into the sample without an electrode installed. This prevents an open connection between the inside of the process vessel and the external environment. In the retracted position, the electrode

is retained in a chamber where it can be kept moist, cleaned and even calibrated. This can all be done without process interruption or disassembly of the armature. Two tube connectors allow access to the rinsing chamber. Two accessories are available for the RETRACTOFIT. A shortened insertion tube that allows use of the armature in narrow-bore pipes for which the standard insertion tube is too long. A closed insertion tube converts the RETRACTOFIT into a sampling system for diverse applications. Both accessories can easily be exchanged for the standard insertion tube using only gentle hand pressure.

The RETRACTOFIT BIO on page 30 is the sanitary designed version for biotechnology and food applications.



Description	Part #
RETRACTOFIT	237 240
<b>Accessories:</b>	
Short Insertion Tube (pg. 33)	
Sampling Tube (pg. 33)	
Various Service-Kits (pg. 33)	
Weld-in Socket (pg. 32)	

# Retractable Armature 24 VDC Powered

## RETRACTOMATIC

This armature has everything. The RETRACTOMATIC is the motorized version of the RETRACTOFIT described on the previous page. Use of an electrically driven system allows maintenance, servicing and calibration tasks to be largely automated, it is also easier to use than existing pneumatic systems.

The robust housing and the powerful 24 VDC drive easily handle the most severe process conditions. The RETRACTOMATIC can be controlled in a variety of ways from a simple

time switch to a computerized process control system such as PLC's. At the same time the user has available two switches for end position control. These contacts can be used either for reporting the electrode position (inserted/retracted) or for control of external instruments (pumps, magnetic valves).

The armature is supplied with a fixed 5 m long cable.



Description	Part #
RETRACTOMATIC	237 260

### Accessories:

Various Service-Kits (pg. 33)

Sampling Tube (pg. 33)

# Pressurizable Armature

## MASTERFIT

Suitable for applications where high accuracy or long-term stability is required in conjunction with liquid electrolyte electrodes. Such electrodes must be pressurized to ensure flow of the electrolyte solution.

The MASTERFIT armature allows electrodes to be mounted on pipe work or tanks with a weld-in socket. Large windows allow visual inspection of the electrolyte level in the installed electrode. The manometer integrated into the housing is protected against physical damage. The armature closure mechanism is fitted with a tension lever that allows a slow release of the pressure in the

armature in the event it needs to be opened. This prevents the armature from being opened under pressure. The tension lever also makes it very easy to unscrew the housing and remove the sensor.

Three stainless steel pins protect the electrode tip from damage.

The MASTERFIT armature is available in three insertion depths for vessels or fermenters of different wall thicknesses.



Description	Part #
MASTERFIT 120	237 200
MASTERFIT 150	237 225
MASTERFIT 200	237 235
<b>Accessories:</b>	
Pressure Adapter (pg. 32)	
Various Service-Kits (pg. 33)	

# Retractable Pressurizable Armature



## RETRACTOMASTER

Suitable for applications in which liquid electrolyte electrodes must be used and cleaning or recalibration during the process is desirable.

The RETRACTOMASTER armature allows these electrodes to be mounted on a tank with a weld-in socket. As with the MASTERFIT, there are no awkward flat seals for sealing the armature. Large windows allow visual inspection of the electrolyte level inside the electrode. The manometer integrated into the housing and the other specifications match that of the MASTERFIT armature.

The armature is very easy to use and maintain. Only one press of the red button is needed to move the electrode into or out of the process. All O-rings are easily replaced without special tools. In the retracted position, the electrode is retained in a chamber where it can be kept moist, cleaned and even calibrated. This can all be done without process interruption or disassembly of the armature. Two tube connectors allow access to the rinsing chamber.

Note: Use CHEMOTRODE type sensors with a shaft length of 250 mm.



Description	Part #
RETRACTOMASTER	237 250

**Accessories:**

- Pressure Adapter (pg. 32)
- Weld-in Socket (pg. 32)
- Various Service-Kits (pg. 33)

# Standard Armatures for General Use

## FLANGE-ADAPTER

The FLANGE-ADAPTER allows a MASTERFIT 120 to be mounted on an ANSI B 16.5 - 1-1/2" flange. The materials wetted by the media are PTFE and KALREZ™. An example installation would include a CHEMOTRODE sensor with a shaft length of 150mm, such as the CHEMOTRODE BRIDGE 150, pressurized in the MASTERFIT 120. A combination like this is often able to achieve a long lifetime even in highly aggressive process media.

The FLANGE-ADAPTER fits the PFA Flange through-flow Cell (see page 32).



## FLEXIFLANGE

The FLEXIFLANGE is the FLEXIFIT version for ANSI B 16.5 1-1/2" flange. The materials wetted by the media are PTFE and KALREZ™.

Maintenance-free process electrodes with a shaft of 12 mm in diameter and 120 mm length in combination with the FLEXIFLANGE armature provide a robust process solution for extremely corrosive process media. The FLEXIFLANGE fits the PFA Flange through-flow Cell (see page 32).



## FLEXIFIT

The FLEXIFIT armature is the best design for standard industrial use. Any 12 mm electrode with a 120 mm shaft length and PG 13.5 thread can be inserted into the FLEXIFIT armature. This includes pH, redox, conductivity and oxygen sensors. The FLEXIFIT is easy to attach to a weld-in socket and the VITON™ O-rings can be changed without any special tools. The practical cable protection cap protects the electrical connection against dirt and humidity.



Description	Part #
FLANGE-ADAPTER	237 910

### Accessories:

- Pressure Adapter (pg. 32)
- Through-flow Cell (pg. 32)
- Various Service-Kits (pg. 33)

Description	Part #
FLEXIFLANGE	237 320

### Accessories:

- Through-flow Cell (pg. 32)
- Various Service-Kits (pg. 33)

Description	Part #
FLEXIFIT	237 220

### Accessories:

- Weld-in Socket (pg. 32)
- Various Service-Kits (pg. 33)

# Sanitary Retractable Armature

New!



## RETRACTOFIT BIO

The HAMILTON RETRACTOFIT BIO is an armature designed for applications where sanitary concerns are critical. The armature is steam sterilizable and autoclavable. The stainless steel DIN 1.4435 (SS 316) and the FDA approved EPDM O-rings withstand typical CIP cleanings.

The main advantage of this armature is that the sensor can be withdrawn while the process is running (i.e. for cleaning, calibration or even to replace the electrode), without interrupting the process. The design allows the use of sensors with 210 to 225 mm shaft length and a PG 13.5 thread, e.g. electrodes such as the HAMILTON POLYCLAVE 225, POLILYTE HTVP 225, EASYFERM VP 225 and OXYFERM 225.

The armature is very easy to use and maintain. Only one press of the red button is needed to move the electrode into or out of the process. All O-rings are easily replaced without special tools.

An integral safety mechanism prevents the armature from being inserted into the sample without an electrode installed. This prevents

the risk of open connection between the inside of the process vessel and the external environment. Two leakage detection openings indicate sealing failures during operation.

In the retracted position, the electrode is retained in a chamber where it can be kept moist, cleaned and even calibrated. This can all be done without process interruption or disassembly of the armature. Two tube connectors allow access to the rinsing chamber.

The RETRACTOFIT on page 25 is designed for applications in the chemical and waste water industry.

### ATTENTION:

Check with your dealer for the right O-ring position or weld-in socket! (O-ring seals at 55 mm; other distances on request.)



Description	Part #
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RETRACTOFIT BIO	237 440
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(o-ring seals at 55 mm;  
other on request.)

**Accessories:**

FDA Service-Kit (pg. 33)

Weld-in Socket on request

# Sanitary Non-Retractable Armatures

## FLEXIFIT VV

The FLEXIFIT VV is an armature suitable for Tuchenhagen VARIVENT sanitary process connections. It fits industrial sensors with a standard 12 x 120 mm design and PG 13.5 thread. The 15° version might be used for classic sensors with the need for vertical mounting of the connector head. The 0° version is ideal when using HAMILTON electrodes for upside-down mounting such as: POLILYTE HTVP 120, POLYCLAVE VP 120 and OXYFERM 120 filled with OXYLYTE USD.



## FLEXIFIT TC

The FLEXIFIT TC is designed for mounting on TriClamp process connections. The materials used are stainless steel DIN 1.4435 (SS 316) and FDA approved EPDM O-rings. Steam sterilization, autoclavation and CIP cleaning are possible with the sanitary design. The short immersion depth makes this armature perfect for small flow-through cells. Maintenance-free sensors with a standard 12 x 120 mm design and PG 13.5 thread will fit perfectly.



## FLEXIFIT BIO

The FLEXIFIT BIO armature provides the best of both worlds. It is the right compromise between good sensor protection (with 3 protection rods) and good sanitary design (easy cleaning and no sensor clogging). The FLEXIFIT BIO is manufactured from stainless steel DIN 1.4435 (SS 316). The surface quality is N5 ( $R_a = 0.4 \mu m$ ), electropolished. The EPDM O-rings are FDA approved. The armature comes with a material certificate. It is SIP, autoclavable, and CIP compatible.



Description	Part #
FLEXIFIT VV-0	237 344
FLEXIFIT VV-15	237 345

Description	Part #
FLEXIFIT TC150-33	237 341

Description	Part #
FLEXIFIT BIO 51/25	237 331
FLEXIFIT BIO 74/48	237 332

### Accessories:

- Weld-in Socket (pg. 32)
- FDA Service-Kit (pg. 33)

# Accessories for Armatures

## Immersing Set

Sheaths and protects 120 mm electrodes such as OXYSENS while immersed in streams or channels. About 300 g in weight!



**Part #**

237 158

## 25 mm Weld-in Socket with G 1-1/4"

The weld-in socket allows armatures and sensors with a G 1-1/4" thread to be mounted on steel tubes and reaction vessels. A special design allows the internal diameter to remain unaffected by the welding process, so that post-welding abrasion is unnecessary. The sockets have an angle of 15° which allows universal mounting of the housing.

For sealing at 25 mm. Other dimensions on request.



**Part #**

237 202

## Socket Closure Cap for Weld-in Sockets

Allows closure of weld-in sockets without armatures.

It seals at 25 mm. Other dimensions on request.



**Part #**

237 230

## Flange Through-flow Cell PFA

PFA coated steel T-piece with flange connectors (ANSI B 16.5:2X2" AND 1X1-1/2") to fit FLEXIFLANGE and FLANGE-ADAPTER for MASTERFIT.

Other dimensions on request.



**Part #**

237 930

## Pressure Adapter for MASTERFIT and RETRACTOMASTER

This adapter allows the armature to be connected to a compressed air line. Positive gauge pressure in the housing is guaranteed and manual repressurization is unnecessary.



**Part #**

237 252

# Accessories for Armatures

## Short Insertion Tube (for RETRACTOFIT and RETRACTOMASTER)

Part #

This is exchanged for the standard insertion tube by loosening the two maintenance screws at the head of the armature. The short insertion tube reduces the insertion depth of the armatures to 47 mm allowing their use in even narrow-bore pipe work.



237 255

## Sampling Tube (for RETRACTOFIT and RETRACTOMATIC)

Part #

Converts the armature into a sampling system. A sample (approx. 3 mL) can then be drawn off or blown out via the flushing opening.



237 278

## Service-Kits

Part #

The Service Kits contain all necessary O-rings and applicable tools for the maintenance of the armatures.

Service Kit for FLEXIFIT	237 219
Service Kit for MASTERFIT	237 229
Service Kit for RETRACTOFIT and RETRACTOMASTER	237 239
Service Kit FDA for FLEXIFIT BIO and RETRACTOFIT BIO	237 338
Service Kit for RETRACTOMATIC	237 290

## Kalrez-Kits

Part #

All armatures are routinely supplied with VITON™ O-rings. If the chemical compatibility of VITON™ is insufficient we recommend purchasing the Kalrez™ O-ring kit for your armature.

Kalrez Kit for FLEXIFIT and MASTERFIT	237 319
Kalrez Kit for RETRACTOFIT, RETRACTOMATIC and RETRACTOMASTER	237 339

# Technical Specifications for Armatures

	<b>RETRACTOFIT</b>	<b>RETR.-MATIC</b>	<b>MASTERFIT</b>	<b>RETR.-MASTER</b>	<b>FLEXIFLANGE</b>
Process connection:	G 1 1/4"	G 1-1/4"	G 1-1/4"	G 1-1/4"	ANSI B16,5
Min. total length	420 mm	420 mm	various (see pg. 27)	630 mm	290 mm
Max. total length	450 mm	450 mm	various (see pg. 27)	660 mm	290 mm
Max. diameter	70 mm	160 mm	60 mm	70 mm	150 mm
Sensor insertion depth	70 mm	70 mm	70 mm	70 mm	55 mm
Armature insertion depth	105 mm	105 mm	80 mm	105 mm	34 mm
Materials used	SS 316/DIN 1.4571	SS 316/DIN 1.4571	SS 316/DIN 1.4571	SS 316/DIN 1.4571	PTFE
Standard seals	VITON	VITON	VITON	VITON	KALREZ
Temperature range	-10...+130°C	-10...+130°C	-10...+130°C	-10...+130°C	-10...+130°C
Max. pressure	6 bar	6 bar	6 bar	6 bar	6 bar
Weight	1350 g	3400 g	1400 g	2150 g	850 g
Electrode type	12 mm PG 13.5	12 mm PG 13.5	30 mm standard	30 mm standard	12 mm PG 13.5
Electrode shaft length	a = 225 mm	a = 225 mm	various	a = 250 mm	a = 120 mm
Catalog page	25	26	27	28	29

	<b>FLEXIFIT</b>	<b>RETR.-FIT BIO</b>	<b>FLEXIFIT VV</b>	<b>FLEXIFIT TC</b>	<b>FLEXIFIT BIO</b>
Process connection:	G 1-1/4"	G 1-1/4"	Varivent	TriClamp 1.5"	G 1-1/4"
Min. total length	295 mm	366 mm	100 mm	133 mm	133 mm
Max. total length	295 mm	443 mm	100 mm	133 mm	133 mm
Max. diameter	57 mm	70 mm	85 mm	50.5 mm	50 mm
Sensor insertion depth	70 mm	70 mm	30 mm	32 mm	various
Armature insertion depth	80 mm	132 mm	2 mm	33 mm	various
Materials used	SS 316/DIN 1.4571	SS 316/DIN 1.4435	SS 316/DIN 1.4435	SS 316/DIN 1.4435	SS 316/DIN 1.4435
Standard seals	VITON	FDA-EPDM	FDA-EPDM	FDA-EPDM	FDA-EPDM
Temperature range	-10...+130°C	-10...+130°C	-10...+130°C	-10...+130°C	-10...+130°C
Max. pressure	6 bar	6 bar	6 bar	6 bar	6 bar
Weight	770 g	1840 g	950 g	490 g	490 g
Electrode type	12 mm PG 13.5	12 mm PG 13.5	12 mm PG 13.5	12 mm PG 13.5	12 mm PG 13.5
Electrode shaft length	a = 120 mm	a = 225 mm	a = 120 mm	a = 120 mm	a = 120 mm
Catalog page	29	30	31	31	31

# Technical Specifications for Oxygen Sensors

	<b>OXYGOLD G</b>	<b>OXYGOLD B</b>	<b>OXYFERM</b>	<b>OXYFERM XL</b>	<b>OXYSENS</b>	<b>OXYSENS W</b>
Detection limit	2 ppb	10 ppb	10 ppb	10 ppb	40 ppb	40 ppb
Polarisation voltage	-670 +/- 50 mV	0 mV	-670 +/- 50 mV	-670 +/- 50 mV	-670 +/- 50 mV	-670 +/- 50 mV
Current in air 25°C	180 - 400 nA	180 - 400 nA	40 - 80 nA	40 - 80 nA	40 - 80 nA	40 - 80 nA
Response time $t_{98\%}$	30 - 60 sec.	30 - 60 sec.	30 - 60 sec.	30 - 60 sec.	60 sec.	60 sec.
Min. required flow	0.1 m/sec.	0.1 m/sec.	0.02 m/sec.	0.02 m/sec.	0.02 m/sec.	0.02 m/sec.
Temperature range	0 - 130°C	0 - 100°C	0 - 130°C	0 - 130°C	0 - 60°C	0 - 60°C
Pressure range	0 - 12 bar	0 - 12 bar	0 - 4 bar	0 - 4 bar	0 - 4 bar	0 - 4 bar
Drift at 25°C	< 1% per week	< 4% per week	< 2% per week	< 2% per week	< 2% per week	< 2% per week
Installation	PG 13.5 thread	PG 13.5 thread	PG 13.5 thread	G 1 1/4"	PG 13.5 thread	PG 13.5 thread
Electrical connection	VP 6.0	VP 6.0	Standard 4 pole	Standard 4 pole	Cable 5 m	Cable 5 m
Temperature sensor	NTC 22kOhm	NTC 22kOhm	NTC 22kOhm	NTC 22kOhm	NTC 22kOhm	NTC 30kOhm
Shaft diameter	12 mm	12 mm	12 mm	25 mm	12 mm	12 mm
Shaft length	various	various	various	various	120 mm	120 mm
Catalog page	23	23	22	22	22	22

# Technical Specifications for pH Sensors

	<b>pH Glass Type</b>	<b>Membrane Resistance</b>	<b>Measuring Range</b>	<b>Reference System</b>	<b>Reference Electrolyte</b>	<b>No. of Diaphragms</b>
CHEMOTRODE	pH glass type PHI	moderate	0...14	EVEREF-F	3 M KCl-LR	3
CHEMOTRODE BRIDGE	pH glass type PHI	moderate	0...14	EVEREF-B	SKYLITE	1
CHEMOTRODE ORP	platinum 99.9	N/A	+/- 2000 mV	EVEREF-F	3 M KCl-LR	3
CHEMOTRODE P	pH glass type PHI	moderate	0...14	EVEREF-F	PROTELYTE	3
CLARYTRODE	pH glass type HF	moderate	0...14	EVEREF-L	POLISOLVE	2
EASYCONTROL	pH glass type V	low	0...14	Ag/AgCl	gel	1
EASYCONTROL ORP	platinum 99.9	N/A	+/- 2000 mV	Ag/AgCl	gel	1
EASYFERM	pH glass type PHI	moderate	0...14	EVEREF-F	SKYLITE	3
FERMOTRODE	pH glass type PHI	moderate	0...14	EVEREF-F	SKYLITE	3
IONOTRODE	pH glass type F	very low	0...14	EVEREF	3 M KCl	1
LIQ-GLASS PG	pH glass type F	low	1...12	EVEREF	liquid	3
MECOTRODE	pH glass type H	moderate	0...14	EVEREF	gel	3
OXYTRODE PT	platinum 99.9	N/A	+/- 2000 mV	EVEREF	gel	3
POLILYTE HT	pH glass type H	moderate	0...14	EVEREF-L	POLISOLVE	2
POLILYTE PRO	pH glass type V	low	0...14	EVEREF-B	POLISOLVE	1
POLILYTE PRO XP	pH glass type V	low	0...14	EVEREF-B	POLISOLVE	1
POLILYTE RX	platinum 99.9	N/A	+/- 2000 mV	EVEREF-L	POLISOLVE	1
POLYCLAVE	pH glass type PHI	moderate	0...14	EVEREF-L	POLISOLVE	2
POLYPLAST PRO	pH glass type V	moderate	0...14	Ag/AgCl	POLISOLVE	1
POLYPLAST PRO RX	platinum 99.9	N/A	+/- 2000 mV	Ag/AgCl	POLISOLVE	1

# Technical Specifications for pH Sensors

Diaphragm Type	Minimum Conductivity	Temperature Range	Pressure Range *	Shaft Length	Electrode Head	Catalog Page
HP-ceramic	50 $\mu$ S/cm	0...130°C	< 6 bar	various	Standard	14
Platinum	250 $\mu$ S/cm	0...130°C	< 6 bar	various	various	13, 14, 17
HP-ceramic	50 $\mu$ S/cm	0...130°C	< 6 bar	various	Standard	14
HP-ceramic	50 $\mu$ S/cm	0...130°C	< 6 bar	various	Standard	8, 10, 13
SINGLE PORE	5 $\mu$ S/cm	-10...100°C	< 6 bar	120 mm	PG 13.5	15, 17
ceramic	50 $\mu$ S/cm	0...60°C	< 2 bar	various	PG 13.5	11
ceramic	50 $\mu$ S/cm	0...60°C	< 2 bar	various	PG 13.5	11
COATRAMIC ***	50 $\mu$ S/cm	0...130°C	< 4 bar	various	various	8
COATRAMIC ***	50 $\mu$ S/cm	0...130°C	< 4 bar	various	Standard	8
sleeve	0.2 $\mu$ S/cm	-10...40°C	< 0.5 bar **	120 mm	PG 13.5	12
ceramic	2 $\mu$ S/cm	-5...60°C	< 2 bar	120 mm	PG 13.5	12
HP-ceramic	50 $\mu$ S/cm	0...130°C	< 16 bar	various	various	15, 17
HP-ceramic	50 $\mu$ S/cm	-10...130°C	< 16 bar	120 mm	PG 13.5	15, 17
SINGLE PORE	2 $\mu$ S/cm	0...130°C	< 6 bar	various	various	9, 10, 13, 15, 16
SINGLE PORE	2 $\mu$ S/cm	-10...60°C	< 6 bar	120 mm	various	10, 11, 12, 16
SINGLE PORE	2 $\mu$ S/cm	-10...60°C	< 50 bar	120 mm	PG 13.5	10, 11, 12, 16
SINGLE PORE	5 $\mu$ S/cm	-10...60°C	< 6 bar	various	PG 13.5	10, 11
SINGLE PORE	50 $\mu$ S/cm	0...130°C	< 6 bar	various	various	9, 14
SINGLE PORE	5 $\mu$ S/cm	-10...40/60°C	< 6 bar	120 mm	various	11, 16
SINGLE PORE	5 $\mu$ S/cm	-10...40/60°C	< 6 bar	120 mm	various	11, 16

\* at 25°C; \*\* Depending on the positioning of the electrolyte reservoir; \*\*\* Not suitable for hot concentrated alkali or citric acid

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237 123	.22-23	237 750	.19	238 458	.9, 14	238 927	.20
237 126	.22-23	237 751	.19	238 459	.9, 14	238 928	.20
237 130	.22	237 760	.19	238 467	.9-10, 13, 15-16	238 929	.20
237 135	.23	237 761	.19	238 468	.10, 13, 15-16	238 931	.8
237 136	.22-23	237 910	.29	238 469	.10, 13, 15-16	238 932	.7
237 138	.23	237 930	.32	238 475	.8	238 934	.20
237 139	.23	238 037	.13-14, 17	238 480	.8	238 935	.20
237 140	.22-23	238 038	.8, 10, 13	238 482	.8	238 936	.12
237 150	.22	238 187	.7	238 484	.8	238 937	.13-14, 17
237 158	.32	238 188	.7	238 486	.8	238 938	.20
237 160	.22	238 194	.7	238 490	.8	238 939	.14
237 170	.22	238 216	.7	238 492	.8	238 962	.7
237 174	.22	238 217	.7	238 494	.8	238 963	.7
237 175	.22	238 218	.7	238 498	.8	238 964	.7
237 180	.23	238 219	.7	238 515	.12	238 965	.7
237 185	.23	238 223	.7	238 522	.11	238 966	.7
237 200	.27	238 227	.7	238 523	.11	238 967	.7
237 202	.32	238 228	.7	238 525	.12	238 968	.7
237 219	.33	238 317	.7	238 740	.14	238 969	.7
237 220	.29	238 318	.7	238 742	.14	238 982	.18
237 225	.27	238 319	.7	238 744	.14	238 983	.18
237 229	.33	238 321	.7	238 746	.14	355 043	.24
237 230	.32	238 332	.7	238 753	.13-14, 17	355 045	.24
237 235	.27	238 333	.7	238 754	.13-14, 17	355 056	.24
237 239	.33	238 408	.11, 16	238 756	.13-14, 17	355 057	.24
237 240	.25	238 409	.11, 16	238 760	.14	355 058	.24
237 250	.28	238 411	.10-12, 16	238 761	.8, 10, 13	355 059	.24
237 252	.32	238 413	.11, 16	238 762	.14	355 066	.24
237 255	.33	238 417	.10-12, 16	238 763	.8, 10, 13	355 072	.24
237 260	.26	238 428	.9-10, 13, 15-16	238 764	.14	355 080	.24
237 278	.33	238 429	.9-10, 13, 15-16	238 765	.8, 10, 13	355 087	.24
237 290	.33	238 431	.9-10, 13, 15-16	238 766	.14	355 088	.24
237 319	.33	238 432	.9-10, 13, 15-16	238 767	.8, 10, 13	355 089	.24
237 320	.29	238 433	.10-11, 16	238 770	.13-14, 17	355 108	.24
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237 338	.33	238 438	.15, 17	238 775	.14	355 111	.24
237 339	.33	238 442	.18	238 776	.13-14, 17	355 112	.24
237 341	.31	238 443	.18	238 801	.15, 17	355 115	.24
237 344	.31	238 445	.8	238 806	.15, 17	355 140	.24
237 345	.31	238 446	.8	238 810	.15, 17	355 141	.24
237 350	.23	238 449	.9-10, 13, 15-16	238 811	.10-12, 16	355 142	.24
237 360	.23	238 450	.9, 14	238 821	.15, 17	355 143	.24
237 400	.22	238 451	.9, 14	238 917	.7		
237 401	.22	238 452	.9, 14	238 918	.7		

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