BioProcess Technologies®

pH | Dissolved Oxygen

Bioprocess Analytical Measurements Catalog

2014

Broadley® James

Sensors, Instrumentation, Equipment and Supplies for Analytical Bioprocess Applications

Visit Our Website

Need more information about products in our catalog?

Please visit our website

Here's what you'll find online:

- Technical support
- Product manuals

- Installation requirements
- Instruction sheets
- Newsletters
- Maintenance Instructions
- Contact information
- Additional products

… and more

www.broadleyjames.com

To Place An Order

Accepted
for payment

Phone Toll-Free:
1-800-288-2833

U.S. Corporate Office

Broadley-James Corporation
19 Thomas
Irvine, CA 92618 USA

Phone:	1-949-829-5555
Toll-Free:	1-800-288-2833 (US & Canada)
Fax:	1-949-829-5560
Email:	sales@broadleyjames.com techsupport@broadleyjames.com
Hours:	7:00 a.m. to 4:00 p.m. Pacific Time 11:00 a.m. to 4:00 p.m. Eastern Time Monday - Friday

European Contact

Broadley-James Ltd.
Wrest Park
Silsoe, Bedford MK45 4HS
United Kingdom

Phone:	+44 (0) 1525 862 518
Fax:	+44 (0) 1525 862 811
Email:	sales@broadleyjames.co.uk

Your First Source for BioProcess Control Equipment and Supplies

This catalog is a source for instruments, sensors, tools, accessories and maintenance supplies for use in microbial fermentation and cell culture bioprocess applications. Special emphasis is given to the areas of measurement and control of environmental conditions inside fermentation vessels and bioreactors. Key products and supplies are stocked for quick delivery to provide timely backup to round-the-clock production activities. The catalog, and its personnel, strive to be an informed source of application support for the products offered. Broadley-James sells over 2,000 different items and offers many custom options for your specific application.

Introducing New and Useful BioProcess Products

Broadley-James Corporation is always looking for new products that provide new functionality, additional features and improved flexibility to the customer's existing bioprocess systems. Please let us know what products you would like to see the catalog stock for your particular application and maintenance requirements.

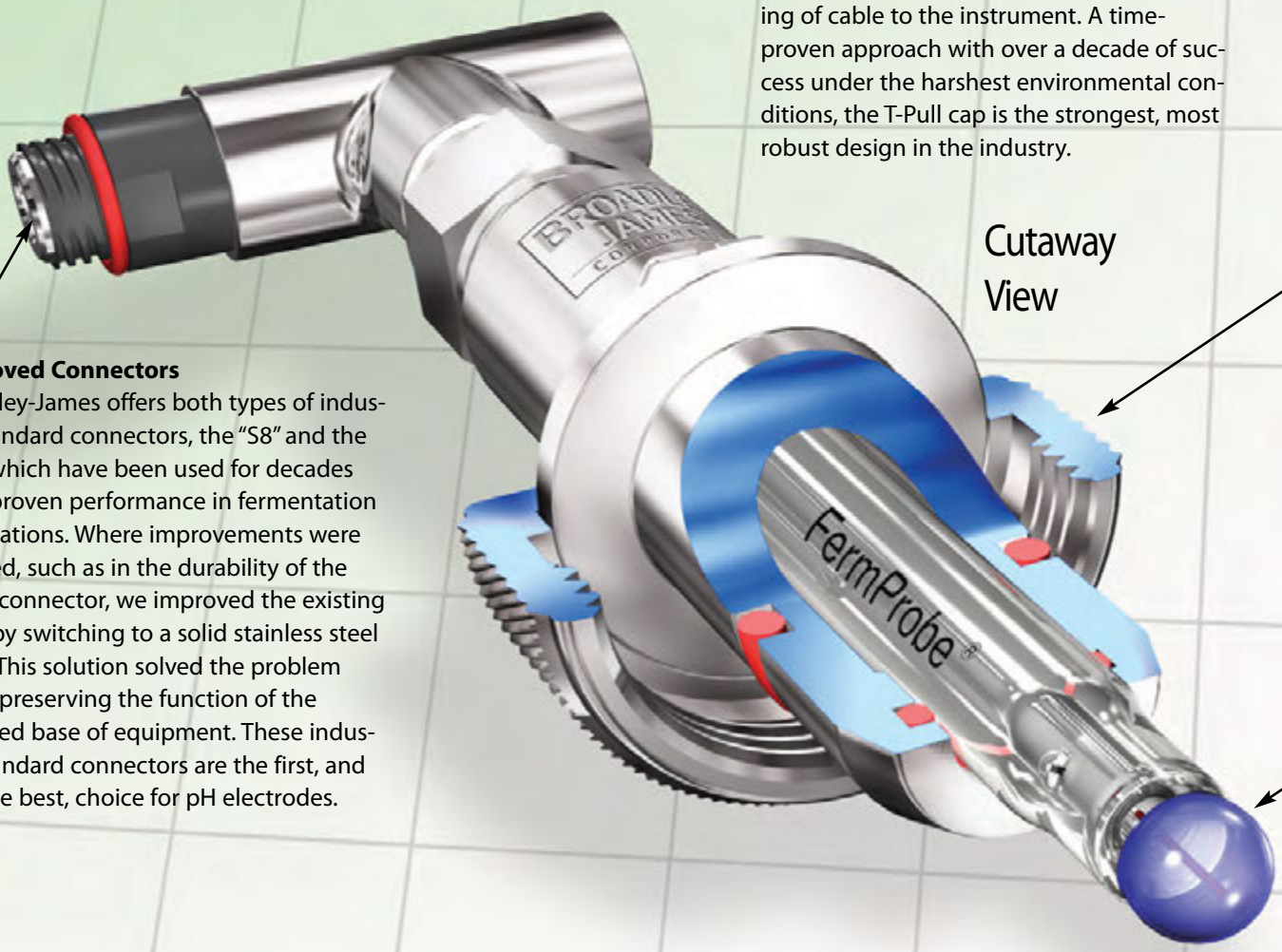
Broadley® James

Broadley-James Corporation
19 Thomas, Irvine, CA 92618 USA
www.broadleyjames.com

FermProbe® pH Electrodes

Steam Sterilizable and Autoclavable

Original T-Pull® Cap
A concept pioneered by Broadley-James, this unique approach greatly improves the serviceability of pH electrodes. The rugged cap facilitates removal from the vessel, prevents cable damage, and allows for optimum routing of cable to the instrument. A time-proven approach with over a decade of success under the harshest environmental conditions, the T-Pull cap is the strongest, most robust design in the industry.



Improved Connectors
Broadley-James offers both types of industry standard connectors, the "S8" and the "K9", which have been used for decades with proven performance in fermentation applications. Where improvements were needed, such as in the durability of the cable connector, we improved the existing style by switching to a solid stainless steel shell. This solution solved the problem while preserving the function of the installed base of equipment. These industry standard connectors are the first, and still the best, choice for pH electrodes.

pH Electrode Design

Suitable for Hygienic Applications.
The FermProbe withstands Steam in Place (SIP) and caustic Clean in Place (CIP) applications. FDA compliant o-rings are used throughout.

Extra Rugged Design
The Broadley-James traditional 25 mm housing body provides a physically robust electrode-housing combination for harsh industrial production environments.

New and Improved pH Glass Bulb
The Broadley-James cobalt blue pH bulb offers the optimum blend of fast response and physical durability. Other manufacturers may have a very thick glass membrane, allowing for better survival of "accidents". However, these thick bulbs slow response and lead to noisy fluctuating readings. The current formula is the result of thousands of tests, subjecting the pH electrodes to 130°C steam for an hour, then quenching in cool water. Every FermProbe shipped is required to pass this test, and can be trusted to work out of the box, and keep on working while retaining its fast response.

USP Pharmaceutical Grade Electrolyte Thickener

To achieve longer life, the electrolyte inside a pH electrode is thickened with an additive. Broadley-James understands that anything that comes into contact with a product should be as safe as possible. For that reason Broadley-James does NOT use polyacrylamide gel like most other manufacturers. The residual acrylamide, which is always present, poses an unacceptable risk of contamination. Broadley-James uses only the purest form of CMC, the same material used in the coating and binding of pharmaceutical tablets.

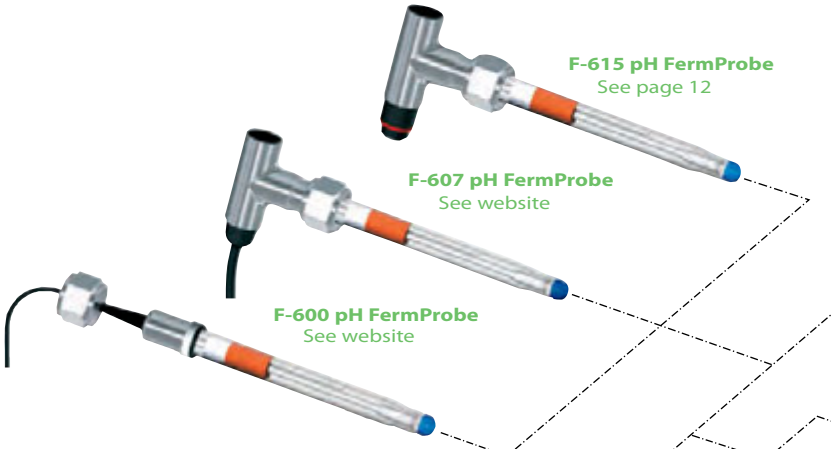
Universally Compatible

All Broadley-James pH electrodes work with existing biotech equipment, no proprietary electronics or cables are required. Broadley-James designs are intended to fit both existing and future requirements, without introducing any unnecessary changes in hardware or cabling. Reduces inventory and confusion, increases flexibility and cost savings.

The Market Leader in pH Electrode Design

Unlike other manufacturers, Broadley-James does not believe in changing the basic design every few years forcing customers into buying new equipment to keep current. Instead, Broadley-James strives to make improvements "backwards compatible" so they can be used with new electronics as well as the old. No changing of connectors which would require new cabling to be run throughout the suite. Instead, Broadley-James strives to protect investments, and help leverage them into the future. Improvements are made with your process in mind.

FermProbe® pH Electrode and Housing System Overview

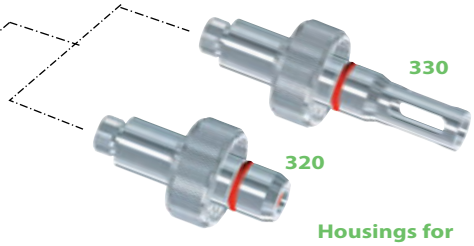


F-615 pH FermProbe
See page 12

F-607 pH FermProbe
See website

F-600 pH FermProbe
See website

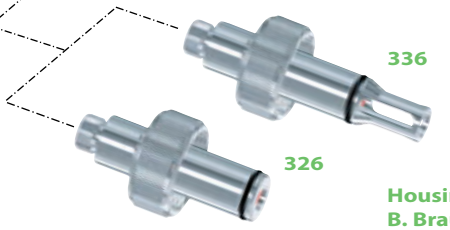
Side Mount



330

320

Housings for standard 25 mm side ports
See page 24



336

326

Housings for B. Braun Biotech 25 mm side ports
See page 26

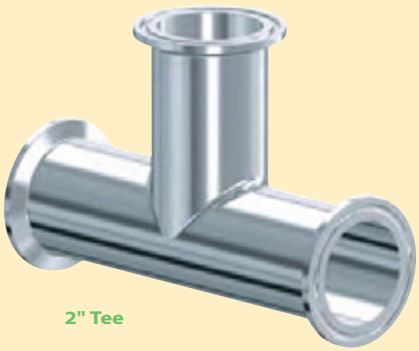
370

Housing for sanitary flanged 25 mm side ports
See page 28

In-Line Mount

350

Housings for standard 2" or 1 ½" sanitary tees
See page 28

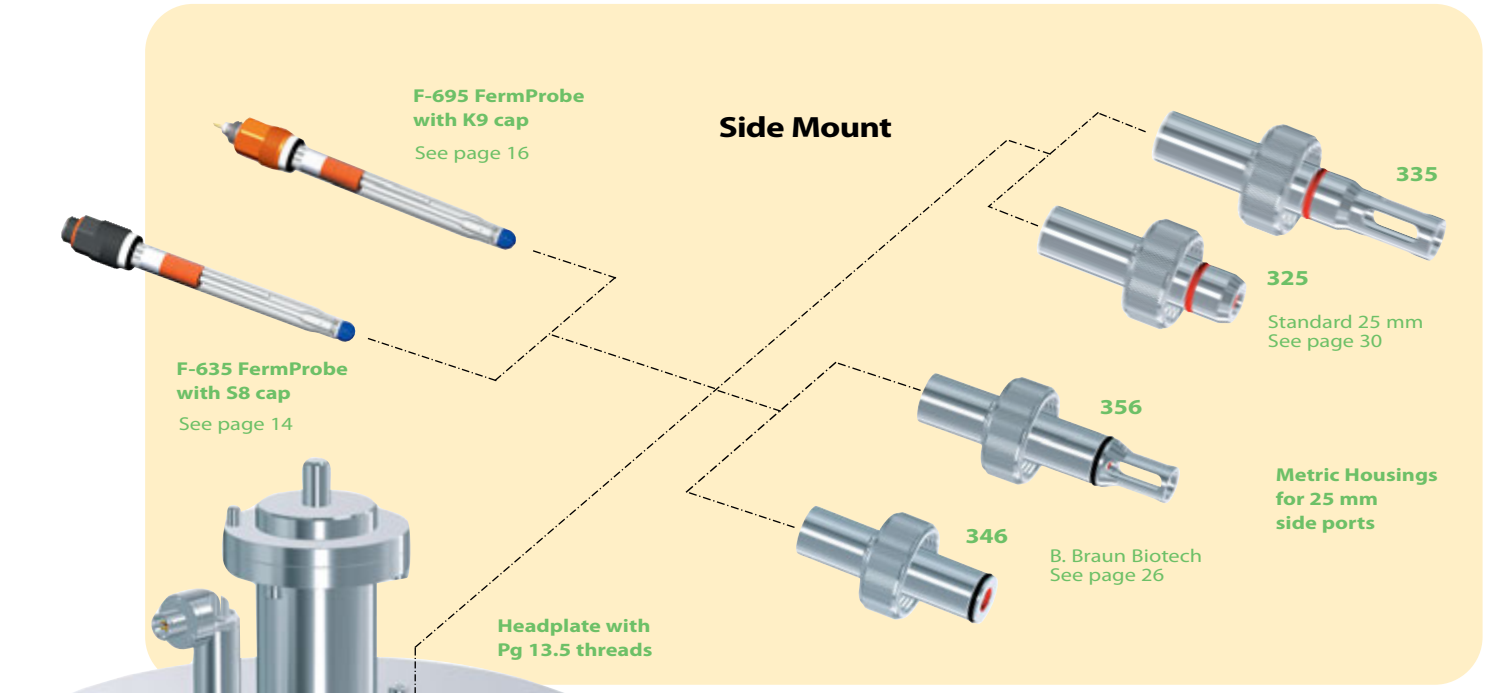


2" Tee

357

1 ½" Tee

Broadley-James Corporation (U.S. & Canada) Toll-Free: 800-288-2833 E-mail: sales@broadleyjames.com


F-695 FermProbe
with K9 cap
See page 16
Side Mount
335
325
Standard 25 mm
See page 30
F-635 FermProbe
with S8 cap
See page 14
356
Metric Housings
for 25 mm
side ports
346
B. Braun Biotech
See page 26
Headplate with
Pg 13.5 threads

How to Select a FermProbe® pH Electrode

STYLE 1 (see page 12)

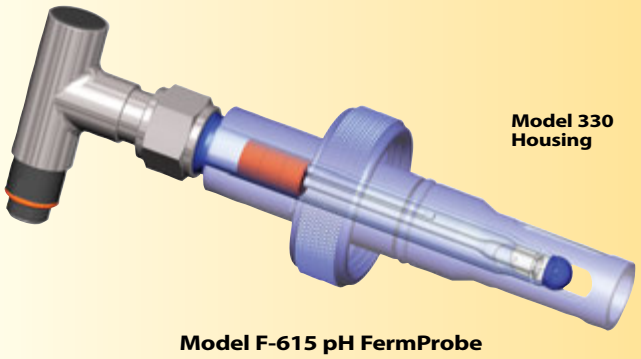
FermProbe® pH Electrodes with T-Pull® Cap

The T-Pull cap eases installation and removal of the electrode from the housing and greatly reduces fatigue of the extension cable. The electrode can be removed from the housing without rotating the electrode and twisting the cable, further reducing cable fatigue.

Features:

- Rugged T-Pull cap eases electrode removal. No tools required.
- T-Pull design greatly reduces cable fatigue.
- Electrode retainer nut is part of handle. Cannot be lost or misplaced.
- Standard S8 detachable cable connection
- Available in both disconnect cap and integral cabled versions.

F-615 pH electrode with T-Pull cap



Model F-615 pH FermProbe

STYLE 2 (see page 14)

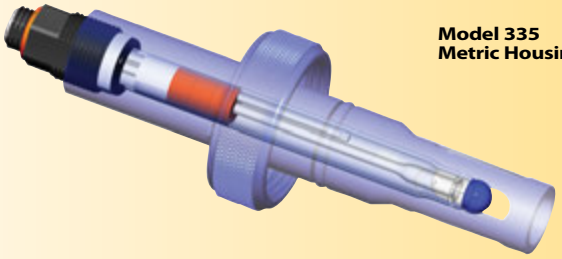
FermProbe® pH Electrodes with Standard S8 Metric Cap

This FermProbe style features a standard S8 detachable cable connection on a metric threaded polymer cap that allows the electrode to be used with European style electrode housings. The design requires the rotation of the electrode during installation. It is compatible with Euro-designed housings requiring a metric Pg13.5 threaded electrode cap.

Features:

- Standard S8 detachable cable connection
- Polymer disconnect cap with metric Pg13.5 threads.
- Compatible with European designed bioprocess housings.

F-635 pH electrode with S8 metric cap



Model F-635 pH FermProbe

STYLE 3 (see page 16)

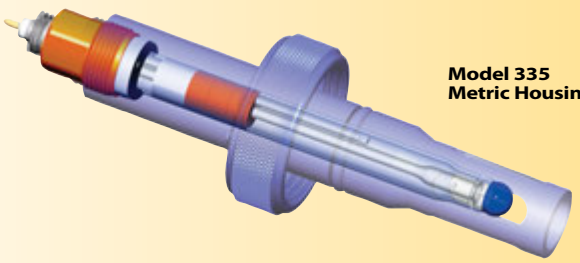
FermProbe® pH Electrodes with K9 Metric Cap

This FermProbe style features a K9 detachable cable connection on a metric threaded polymer cap that allows the electrode to be used with European style electrode housings. The design requires the rotation of the electrode during installation. It is compatible with Euro-designed housings requiring a metric Pg13.5 threaded electrode cap.

Features:

- K9 detachable cable connection
- Polymer disconnect cap with metric Pg13.5 threads.
- Compatible with European designed bioprocess housings.

F-695 pH electrode with K9 metric cap



Model F-695 pH FermProbe

How to Match Electrodes to Housings

Housings and FermProbe® pH electrodes are offered in a variety of lengths. This enables fermentation operators to select the optimum insertion length for the application at hand. The housing *ordering information* box lists the suitable electrode models and lengths for each particular housing style.

There is another way to match electrodes to housings. Each housing length is given a letter classification, i.e., "A", "B", "C". Each electrode length is given a similar letter classification. Any Class "A" pH electrode will fit into any Class "A" housing listed in this catalog. Similarly, any Class "B" electrode will fit into any Class "B" housing. By matching the classifications, the electrode and housing will match.

The class information is found in the *ordering information* box for any electrode or housing in this catalog. If the class letters are the same for an electrode and a housing then the two can be used together. See the illustrated example below:

For a Perfect Match Every Time:

(1) Choose a housing for the vessel and application.

(2) Note the class of the housing (i.e., A, B, C) in the *ordering information* box.

(3) Choose a style and model of electrode (see opposite page).

(4) Find the class of electrode that matches the class of the chosen housing.

SEE EXAMPLE BELOW

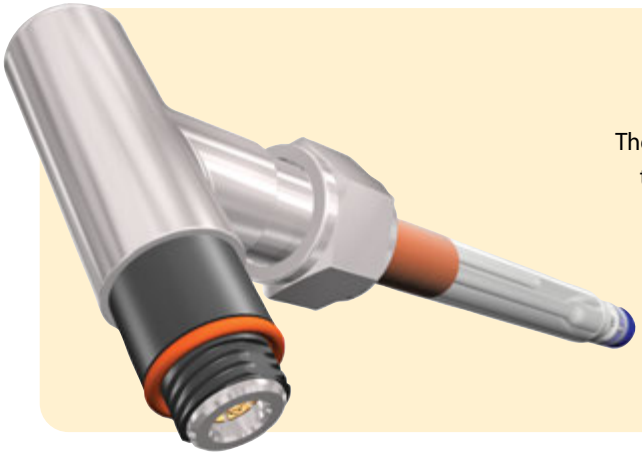
ordering information

Housing Model	Class	Vessel Insertion Length		Used With These pH Electrode Models	Use With This Electrode Length	Housing Part Number
Housings Without Protective Bulb Guards						
320	Ⓐ	38 mm	1.5"	F-615, F-607, F-600	130 mm	320-61-H070
320	Ⓑ	66 mm	2.6"	F-615, F-607, F-600	160 mm	320-61-H100
320	Ⓒ	114 mm	4.5"	F-615, F-607, F-600	210 mm	320-61-H150
Housings With Protective Bulb Guards						
330	Ⓐ	53 mm	2.1"	F-615, F-607, F-600	130 mm	330-61-H070
330	Ⓑ	81 mm	3.2"	F-615, F-607, F-600	160 mm	330-61-H100
330	Ⓒ	127 mm	5.0"	F-615, F-607, F-600	210 mm	330-61-H150

ordering information

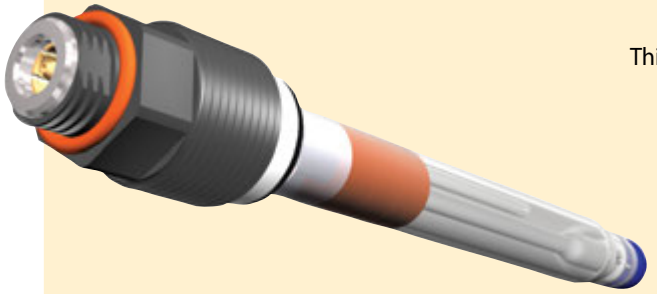
Electrode Model	Class	Use With These Housing Models	Electrode Length	Electrode Part Number
Model F-615 pH FermProbe with T-Pull Handle & Disconnect Cap				
F-615	Ⓐ	320, 330, 326, 336, 350, 357, 370	130 mm	F-615-B130-DH
F-615	Ⓑ	320, 330	160 mm	F-615-B160-DH
F-615	Ⓒ	320, 330	210 mm	F-615-B210-DH

What's the difference between the 3 cap styles?



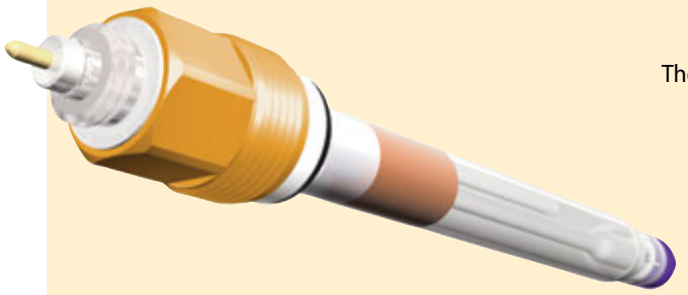
T-Pull® Cap

The T-Pull handle eases installation and removal of the electrode from the housing and greatly reduces fatigue of the extension cable. The electrode can be removed from the housing without rotating the electrode and twisting the cable. Also, the retainer nut is part of the handle and cannot be lost or misplaced. This FermProbe® style has a standard S8 detachable cable connection on a metric threaded polymer cap that allows it to be used with European style electrode housings.



Standard S8 Metric Cap

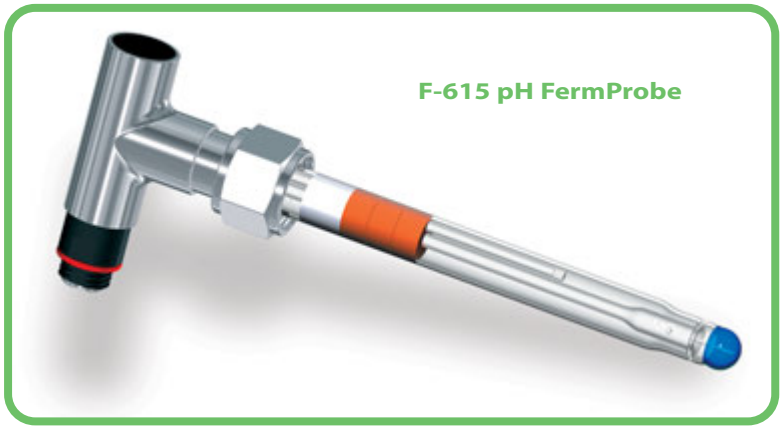
This FermProbe® style features a standard S8 detachable cable connection on a metric threaded polymer cap that allows the electrode to be used with European style electrode housings. The standard metric cap is a newer autoclavable design that protects the connector pin from breakage. The design requires the rotation of the electrode during installation. It is compatible with Euro-designed housings requiring a metric Pg13.5 threaded electrode cap.



K9 Metric Cap

The original K9 autoclavable cap design is still used in many existing bioprocess systems. This FermProbe® style features a K9 detachable cable connection on a metric threaded polymer cap that allows the electrode to be used with European style electrode housings. The design requires the rotation of the electrode during installation. It is compatible with Euro-designed housings requiring a metric Pg13.5 threaded electrode cap.

Broadley-James Corporation (U.S. & Canada) Toll-Free: 800-288-2833 E-mail: sales@broadleyjames.com



T-Pull®
cap style

For electrode
see page 12

For cable
see page 70

Standard S8 Metric
cap style

For electrode
see page 14

For cable
see page 70

K9 Metric
cap style

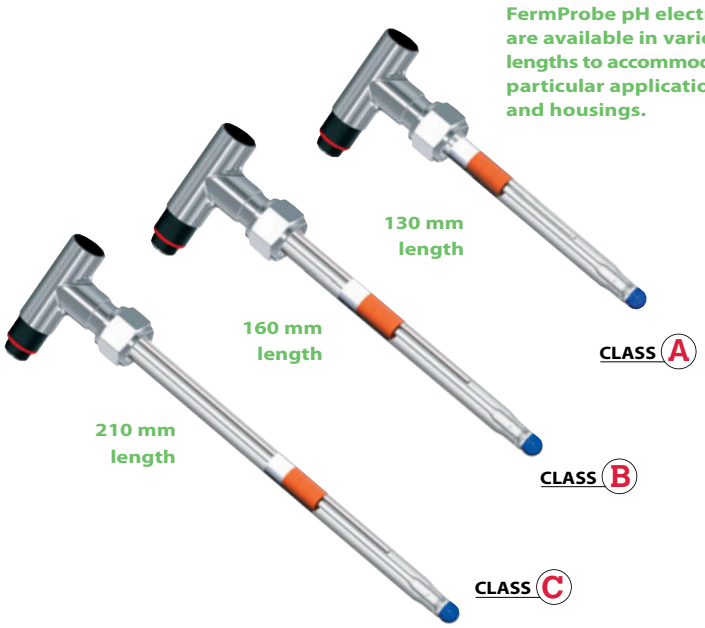
For electrode
see page 16

For cable
see page 72

T-Pull® pH FermProbe® — Style 1

The T-Pull style FermProbe pH electrodes are designed to be used in bioprocess applications where CIP/SIP procedures are used. Built to withstand repeated steam sterilization cycles, the FermProbe quickly stabilizes after steam exposure to be back on-line in half the time of other electrodes. This rugged, low impedance, process pH electrode continues to provide fast and precise pH measurements even after harsh use and prolonged steam exposure.

The FermProbe design specifies that the pH electrode be secured to the housing by a free-spinning threaded retainer nut. This allows the electrode to be installed or removed from the housing without twisting or disconnecting the electrode cable.



FermProbe pH Electrode Specifications:

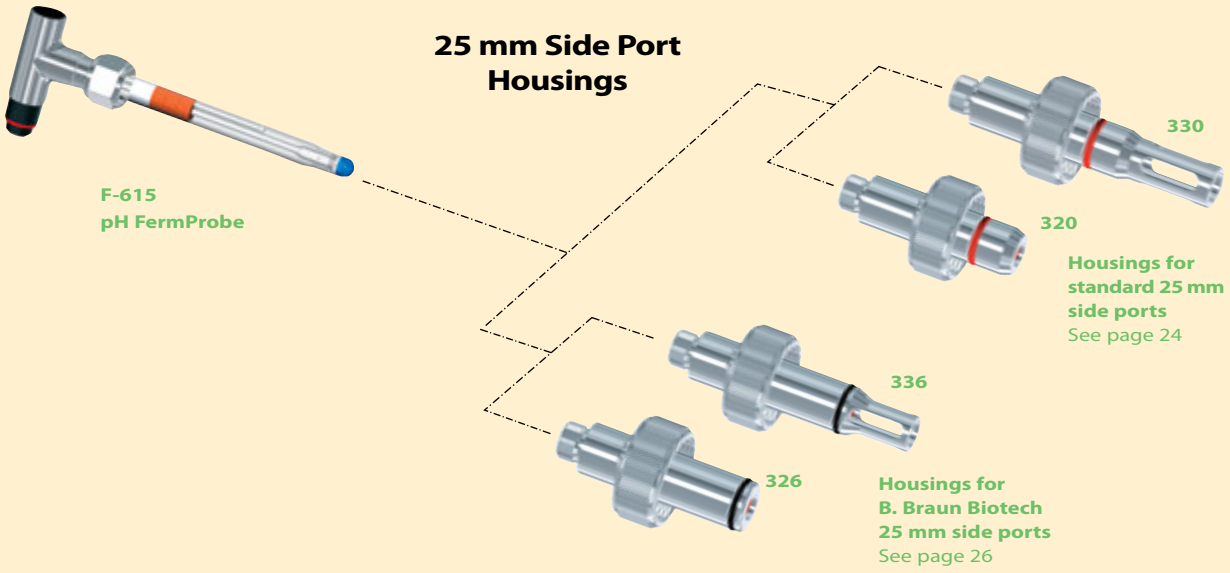
- 0–14 pH range
- Steam sterilizable to 135° C
- 150 psig maximum pressure
- Double junction, Ag-AgCl reference system
- Electrode secures to housing with threaded retainer nut
- S8 disconnect connector in T-Pull cap

FermProbe pH Electrodes with T-Pull Cap

The T-Pull cap eases installation and removal of the electrode from the housing and greatly reduces fatigue of the extension cable. The electrode can easily be removed from the housing without rotating the electrode or twisting the cable, further reducing cable fatigue.

Features:

- Rugged T-Pull cap design eases removal of electrode from housing. No tools required.
- Greatly reduces cable fatigue.
- Electrode retainer nut is part of the handle. Cannot be lost or misplaced.
- Available with integral cable.



How to Order an Electrode

(1) Choose Electrode Model.
If the electrode needs to fit an existing cable, check the cable connector and note its color. If the cable connector is black and has an S8 connector, use the F-615 or F-635 FermProbe. If the cable connector is red or orange and has a K9 connector, use the F-695 FermProbe.

(2) Choose Electrode Length.
If you have already chosen a housing, select an electrode length with the same Class designation as the housing. For more information on selection of housings, see pages 18–20. The housing *ordering information* box also lists the correct electrode length to order. If you have not already chosen the housing, please review the recommendations next to each electrode model below.

(3) Confirm Cable Length and Connector.
Model F-615 pH electrodes require an S8 disconnect cable and connector assembly. See pages 70 and 71

ordering information

Electrode Model	Class	Use With These Housing Models	Electrode Length	Electrode Part Number
Model F-615 pH FermProbe with T-Pull Cap & S8 Disconnect Connector				
F-615	A	320, 330, 326, 336, 350, 357, 370	130 mm	F-615-B130-DH
F-615	B	320, 330	160 mm	F-615-B160-DH
F-615	C	320, 330	210 mm	F-615-B210-DH

pH FermProbe® with S8 Metric Cap — Style 2

This FermProbe pH electrode has the standard Broadley-James S8 connector. Additionally, it features a metric threaded, polymer cap which allows it to be used with European style electrode housings.

All FermProbe pH electrodes are designed to be used in bioprocess applications where CIP/SIP procedures are used. Built to withstand repeated steam sterilization cycles, the FermProbe quickly stabilizes after steam exposure to be back on-line in half the time of other electrodes. This rugged, low impedance, process pH electrode continues to provide fast and precise pH measurements even after harsh use and prolonged steam exposure.

FermProbe pH Electrode Specifications:

- 0–14 pH range
- Steam sterilizable to 135° C
- 150 psig maximum pressure
- Double junction, Ag-AgCl reference system
- Electrode secures to housing with threaded retainer nut
- S8 disconnect connector in a metric PG 13.5 threaded cap

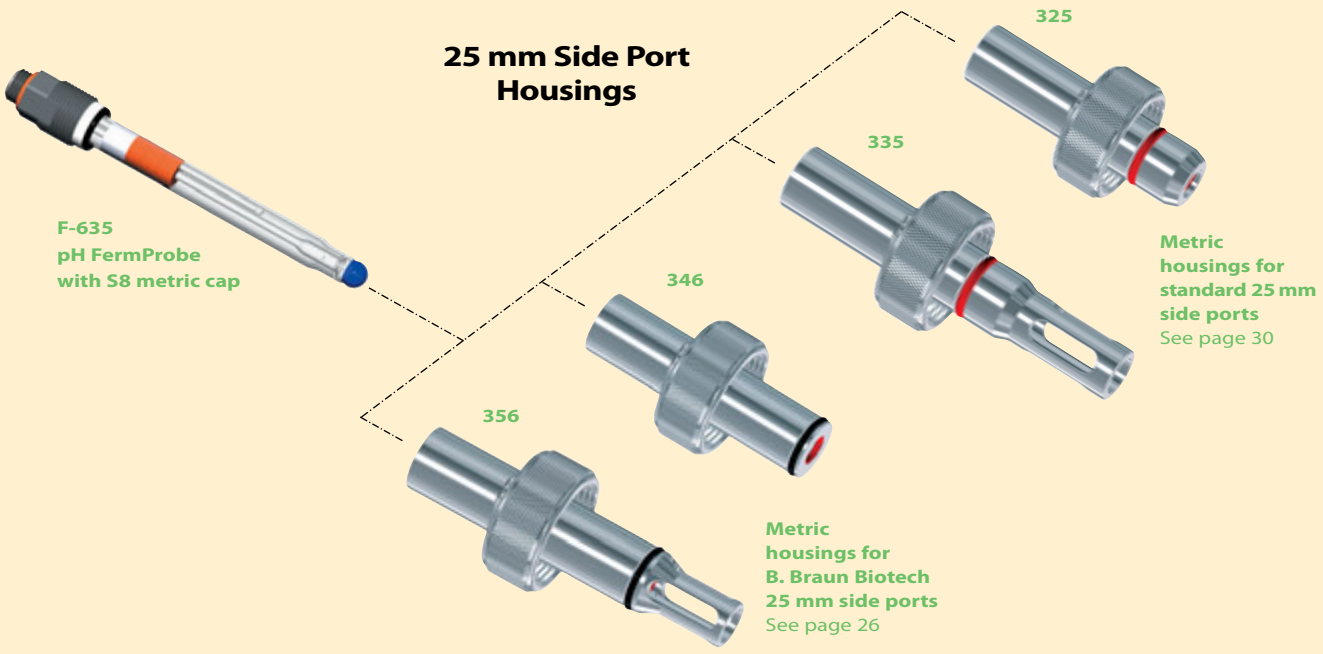
FermProbe pH Electrodes with S8 Metric Cap

This FermProbe style features a standard S8 detachable cable connector on a metric Pg13.5 threaded polymer cap, which allows it to be used with European style electrode housings. Autoclavable as well as steam sterilizable, this style of pH FermProbe is the first choice for use with small autoclavable benchtop vessels.

Features:

- Metric threaded cap is compatible with nearly all European designed bioprocess electrode housings.
- Steam sterilizable and autoclavable.
- First choice for use with small autoclavable vessels.
- Available in a variety of lengths for different insertion length requirements and applications.

Broadley-James Corporation (U.S. & Canada) Toll-Free: 800-288-2833 E-mail: sales@broadleyjames.com



How to Order an Electrode

(1) Choose Electrode Model.
If the electrode needs to fit an existing cable, check the cable connector and note its color. If the cable connector is black and has an S8 connector, use the F-615 or F-635 FermProbe. If the cable connector is red or orange and has a K9 connector, use the F-695 FermProbe.

(2) Choose Electrode Length.
If you have already chosen a housing, select an electrode length with the same Class designation as the housing. For more information on selection of housings, see pages 18–20. The housing *ordering information* box also lists the correct electrode length to order. If you have not already chosen the housing, please review the recommendations next to each electrode model below.

(3) Confirm Cable Length and Connector.
Model F-635 pH electrodes require an S8 disconnect cable and connector assembly. See pages 70 and 71.

ordering information

Electrode Model	Class	Use With These Housing Models	Electrode Length	Electrode Part Number
Model F-635 pH FermProbe with Standard S8 Metric Cap				
F-635	Ⓓ	325, 335	120 mm	F-635-B120-DH
F-635	Ⓕ	325, 335	200 mm	F-635-B200-DH
F-635	Ⓖ	380, 381, 382, 383	225 mm	F-635-B225-DH
F-635	Ⓗ	380, 381, 382, 383	325 mm	F-635-B325-DH
F-635	Ⓧ	*Extended lengths for use with:* compression fittings, short guide tube versions of Models 380 and 382 or thread directly into vessel's headplates	420 mm	F-635-B420-DH
F-635	Ⓧ		480 mm	F-635-B480-DH

pH FermProbe® with K9 Metric Cap — Style 3

The FermProbe pH electrode is available with the K9 metric cap style. This K9 connector cap expands the Broadley-James offering to make it completely compatible with any existing system, regardless of the installed cable type.

All FermProbe pH electrodes are designed to be used in bioprocess applications where CIP/SIP procedures are used. Built to withstand repeated steam sterilization cycles, the FermProbe quickly stabilizes after steam exposure to be back on-line in half the time of other electrodes. This rugged, low impedance, process pH electrode continues to provide fast and precise pH measurements even after harsh use and prolonged steam exposure.

FermProbe pH Electrode Specifications:

- 0–14 pH range
- Steam sterilizable to 135° C
- 150 psig maximum pressure
- Double junction, Ag-AgCl reference system
- Electrode secures to housing with threaded retainer nut
- K9 disconnect connector in a metric PG 13.5 threaded cap

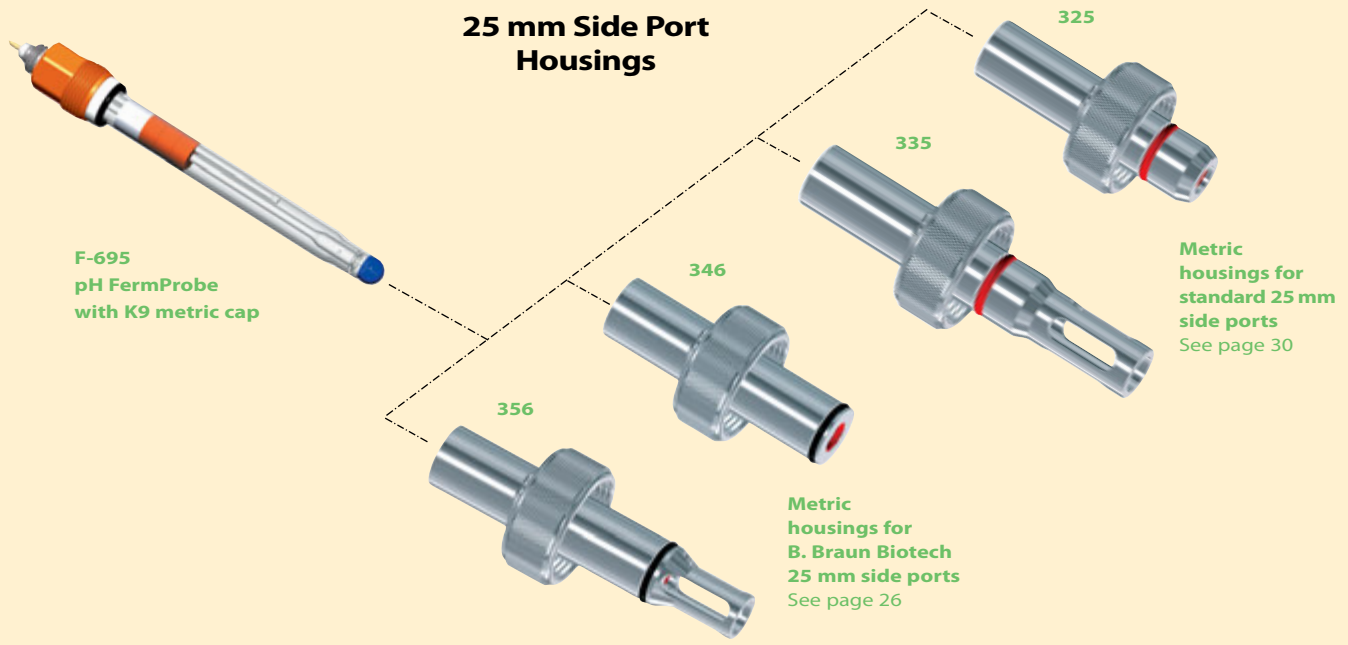
FermProbe pH Electrodes with K9 Metric Cap

This FermProbe style features a K9 detachable cable connector on a metric Pg13.5 threaded polymer cap that allows it to be used with European style electrode housings. Autoclavable as well as steam sterilizable, this style of pH FermProbe is the first choice for use with small autoclavable benchtop vessels.

Features:

- Metric threaded cap is compatible with nearly all European designed bioprocess electrode housings.
- Steam sterilizable and autoclavable.
- First choice for use with small autoclavable vessels.
- Available in a variety of lengths for different insertion length requirements and applications.

Broadley-James Corporation (U.S. & Canada) Toll-Free: 800-288-2833 E-mail: sales@broadleyjames.com



How to Order an Electrode

(1) Choose Electrode Model.
If the electrode needs to fit an existing cable, check the cable connector and note its color. If the cable connector is black and has an S8 connector, use the F-615 or F-635 FermProbe. If the cable connector is red or orange and has a K9 connector, use the F-695 FermProbe.

(2) Choose Electrode Length.
If you have already chosen a housing, select an electrode length with the same Class designation as the housing. For more information on selection of housings, see pages 18–20 . The housing *ordering information* box also lists the correct electrode length to order. If you have not already chosen the housing, please review the recommendations next to each electrode model below.

(3) Confirm Cable Length and Connector.
Model F-695 pH electrodes require disconnect cable and connector assemblies. See the cable assemblies for pH electrodes with the K9 cap on pages 72 and 73.

ordering information

Electrode Model	Class	Use With These Housing Models	Electrode Length	Electrode Part Number
Model F-695 pH FermProbe with K9 Metric Cap				
F-695	Ⓓ	325, 335	120 mm	F-695-B120-DK
F-695	Ⓕ	325, 335	200 mm	F-695-B200-DK
F-695	Ⓖ	380, 381, 382, 383	225 mm	F-695-B225-DK
F-695	Ⓗ	380, 381, 382, 383	325 mm	F-695-B325-DK
F-695	Ⓧ	*Extended lengths for use with:* compression fittings, short guide tube versions of models 380 and 382 or thread directly into vessel's headplates	420 mm	F-695-B420-DK
F-695	Ⓧ		480 mm	F-695-B480-DK

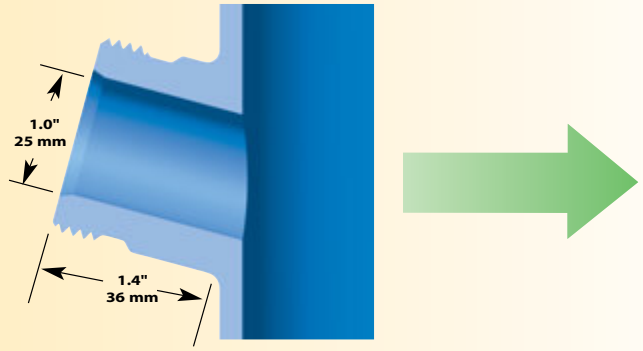
How to Choose a Housing Style: Indentifying the Vessel Port Style

The electrode housing is designed to hold and protect the pH electrode while inserting it into the bioprocess vessel. There are various types of side entry ports and different groups of housings to fit each port type. The size and make of the port must first be identified in order to narrow the selection process.

The two most common types of entry ports found on pilot and production scale vessels are as follows:

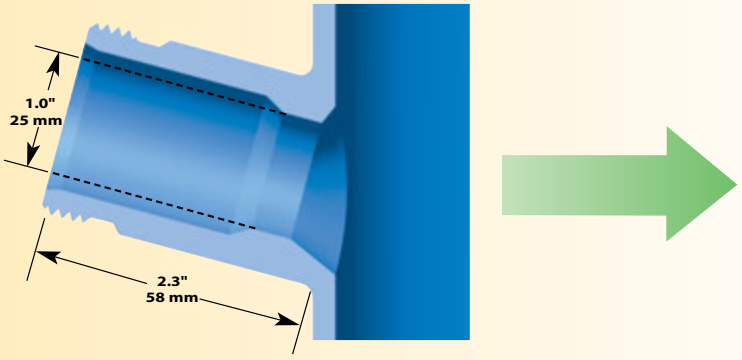
STANDARD 25 mm SIDE PORT

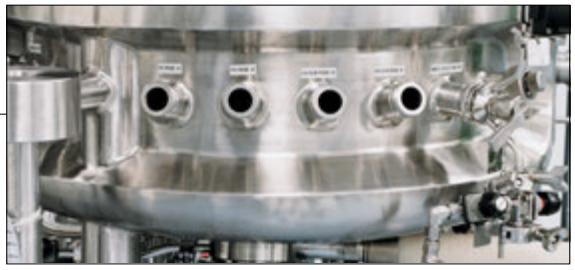
Found on nearly all vessels other than those manufactured by B. Braun Biotech. The port bore is 25 mm i.d. and the housing o-ring seals to the inside of the port. The housing is then secured to the port by a threaded retainer ring. The port is installed at a 15° angle for better electrode performance. See the cutaway drawing to the right for typical installation dimensions.



B. BRAUN BIOTECH 25 mm SAFETY SIDE PORT

Found exclusively on vessels manufactured by B. Braun Biotech. This style of port is longer than the standard port and needs a special housing to fit correctly. (Note: The port opening on newer tanks is 30 mm i.d. and the port narrows down to 25 mm i.d. at the critical point where the housing o-ring seals to the inside wall of the port.) Again, the port is installed at a 15° angle for better electrode performance. See the cutaway drawing to the right for typical installation dimensions.

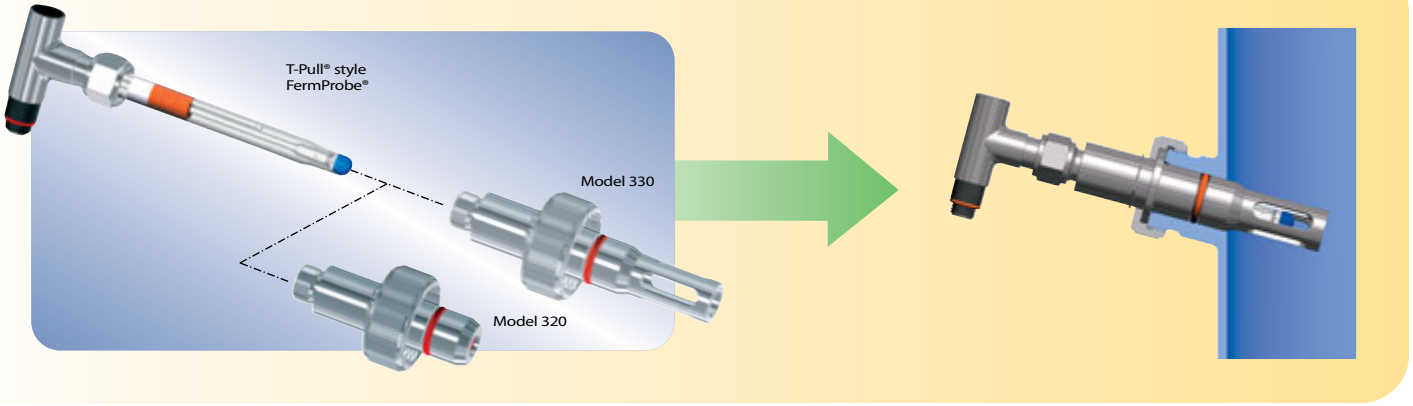


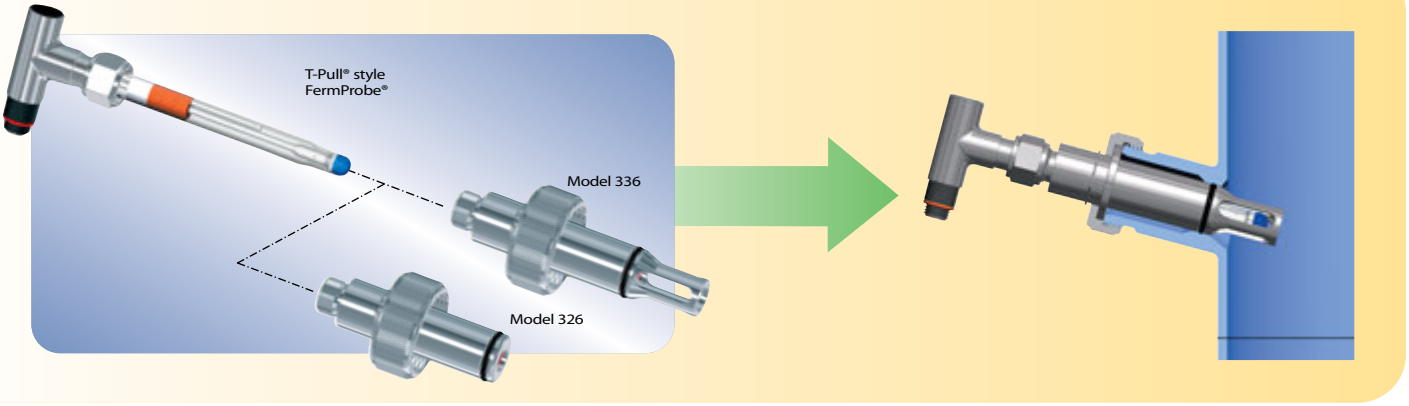


Dual pH electrode and D.O. sensor side ports on a B. Braun Biotech 400 liter bioreactor.

pH electrodes and housings available for this port.

Cutaway of vessel wall with housing and electrode installed.



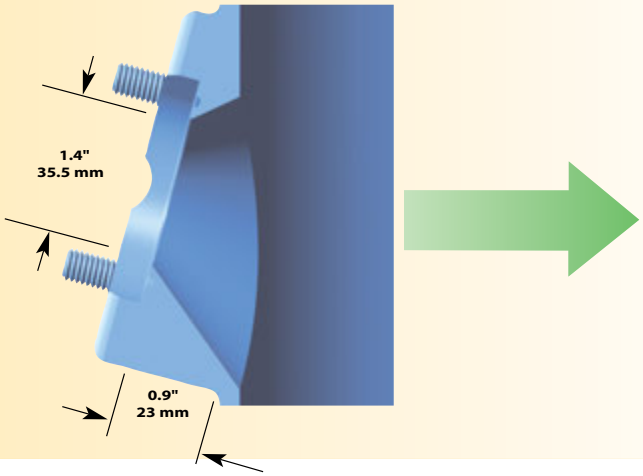


How to Choose a Housing Style: Additional Sanitary Installations

In addition to the standard types of entry ports found on the previous pages, there are other options for sanitary ports. These electrode housings are designed to hold and protect the pH electrode while insertion into sanitary pipe tees and NovAseptic's sanitary side ports. Both entry ports require a unique housing with a narrow front end. Specifically housing models 357 and 367.

NOVASEPTIC SANITARY SIDE PORT

Sometimes found on vessels in biotech facilities, this style of port is flush to the vessel wall to minimize crevices. The unique design of the port offers increased drainage around the port and more effective Clean-In-Place (CIP). The NA-connect® port from NovAseptic is compatible with a special sanitary housing, which is secured to the port by a clamp. The port is installed at a 15° angle to allow for proper electrode performance. See the cutaway drawing to the right for typical installation dimensions.

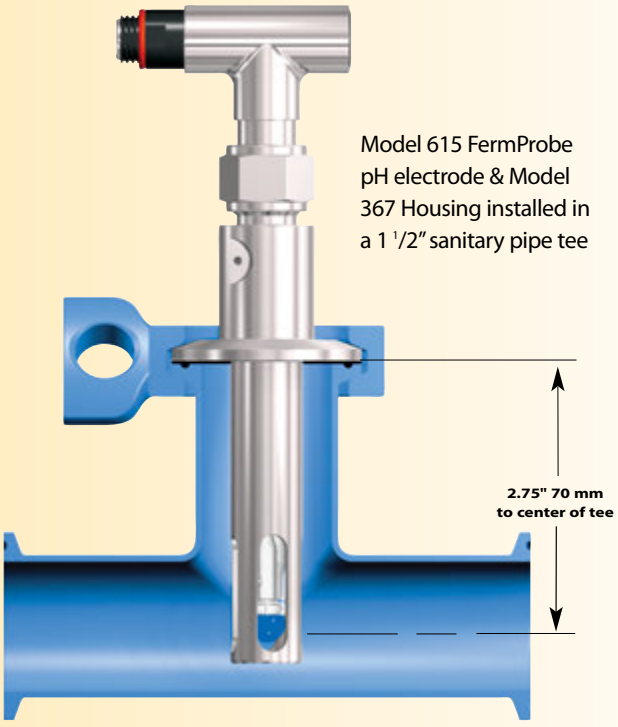


SANITARY PIPE TEE

In-line measurements in a sanitary pipe tee require sanitary flange housings. Since the sanitary gasket is the primary seal, no o-ring is required on the outer portion of the housing.

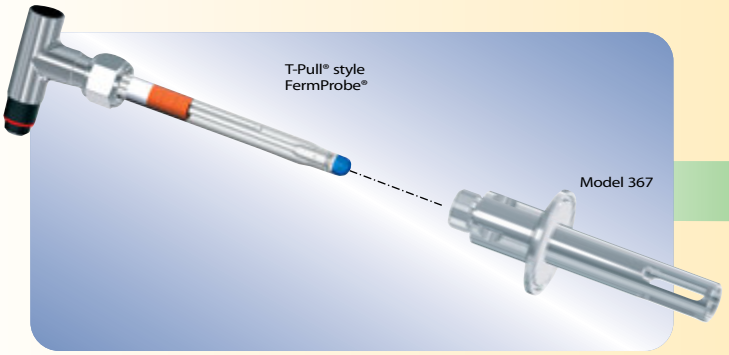
Commonly used in both the food and pharmaceutical industries, the Model 357 and 367 housings are suitable for sanitary pipe systems with CIP requirements. These housings are most often found in downstream processes such as purification.

The housings are secured into a sanitary pipe tee with a standard flange clamp sealed with a flange gasket. The pH electrode is then inserted into the housing for on-line measurements. When using a standard sanitary tee, the sensor is positioned such that the tip of the sensor is in the middle of the process flow.

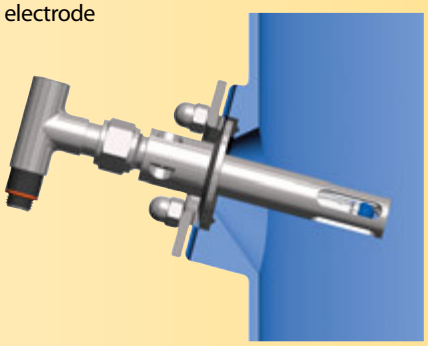


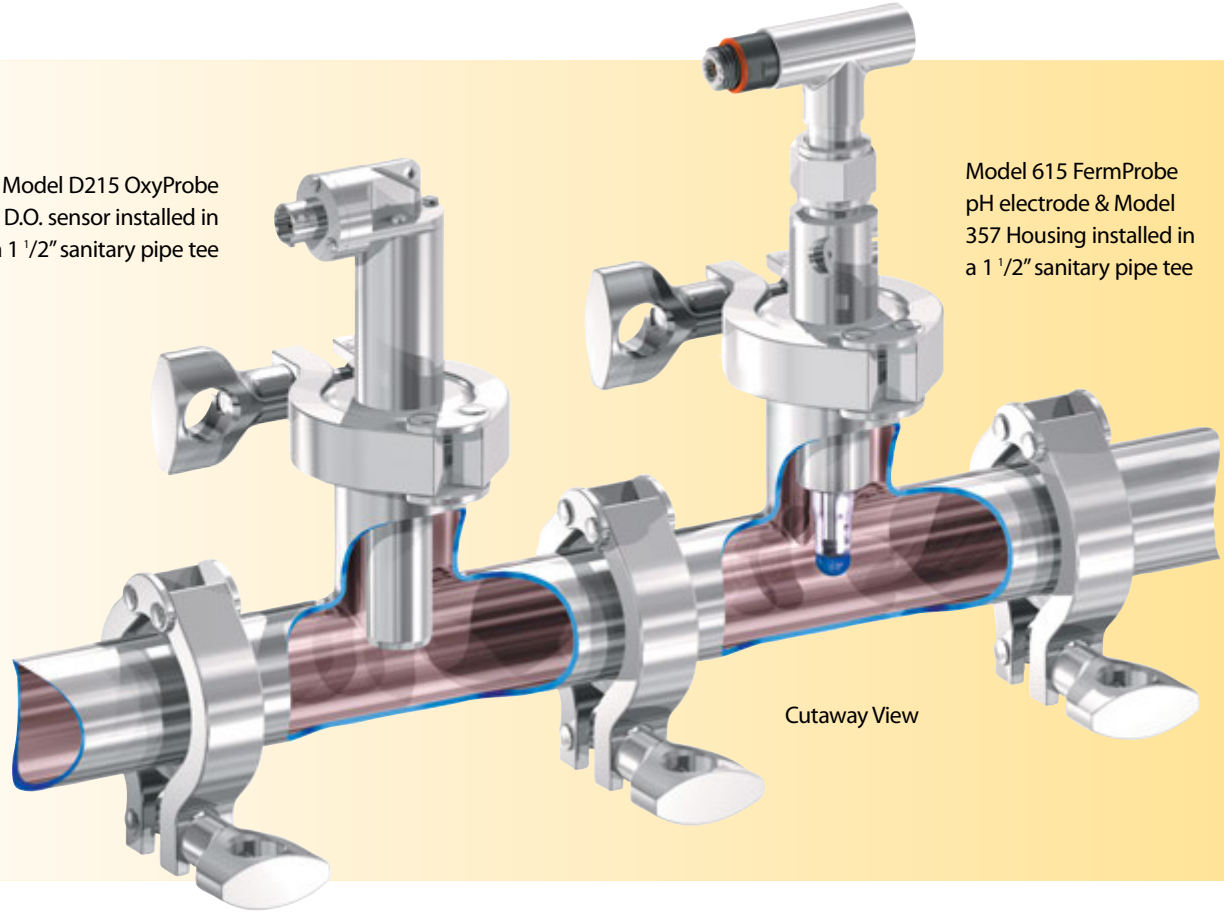
Model 615 FermProbe pH electrode & Model 367 Housing installed in a 1 1/2" sanitary pipe tee

Broadley-James Corporation (U.S. & Canada) Toll-Free: 800-288-2833 E-mail: sales@broadleyjames.com



Cutaway of vessel wall with housing and pH electrode installed





Model D215 OxyProbe D.O. sensor installed in a 1 1/2" sanitary pipe tee

Model 615 FermProbe pH electrode & Model 357 Housing installed in a 1 1/2" sanitary pipe tee

Cutaway View

Two Most Frequently asked Questions

1. Do I want a Guarded or Unguarded Housing?

The electrode/housing assembly can accidentally "bump" into the 25 mm port when being installed. If the pH sensing glass bulb of the electrode is not protected by a housing bulb guard, the electrode can easily be shattered. A guarded housing design is often the engineer's first choice when choosing an electrode housing.

However, sometimes the media is so viscous that it will clog the housing guard and effectively smother the pH sensing glass bulb. In this case, an unguarded housing must be used to ensure that the pH sensing glass bulb is always in contact with fresh media.

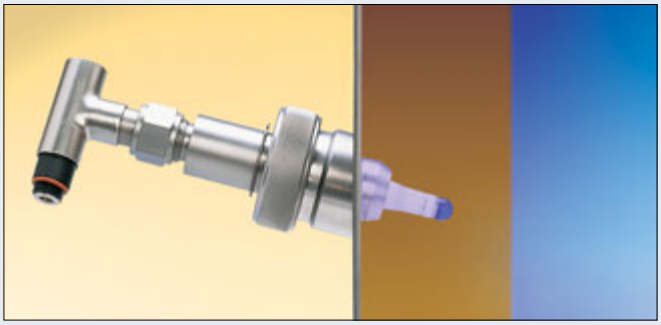
The F-615/326 assembly with unguarded housing. Recommended for viscous media to ensure that the pH sensing bulb of the electrode is always in contact with fresh media.

The F-615/336 assembly with guarded housing to protect the pH glass bulb of the electrode during installation.

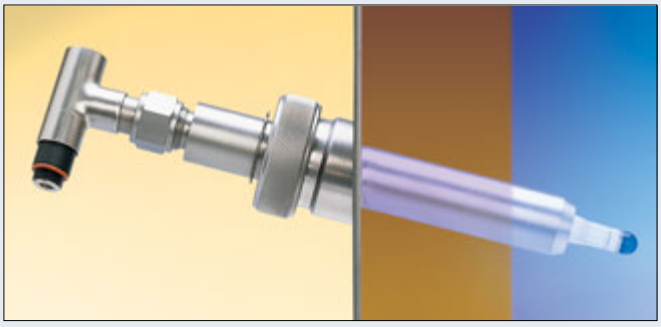
2. When do I Choose a Longer Housing Length?

Sometimes the tank wall can become coated with a thick layer of viscous material that does not mix well with the rest of the media. If the pH sensing bulb of the electrode is located just a couple of inches inside the tank wall, the bulb might be smothered by this viscous layer. Subsequent pH readings may not be representative of the bulk of the media circulating in the rest of the tank. In the illustration at the right, the pH electrode's bulb is trapped in this slow moving viscous layer near the tank wall. The electrode is only measuring the pH of this layer.

A solution to the problem described above is to choose an electrode and a matching housing that extends further into the tank. This will position the pH sensing bulb away from the tank wall and place it closer to the circulating media further inside the tank. The subsequent pH measurements will be much more representative of the circulating media. In the illustration to the right, the electrode and the housing protrude past the viscous zone and into the area of well stirred and circulated media within the production tank.



Bulb of electrode is trapped in thick viscous layer near the wall of the tank.



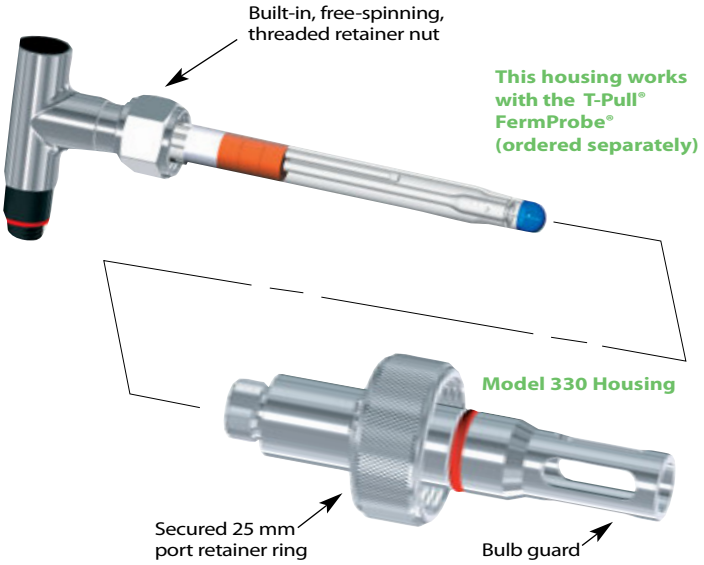
A longer electrode and housing extend further into the tank. The sensing bulb of the pH electrode is past the viscous zone.

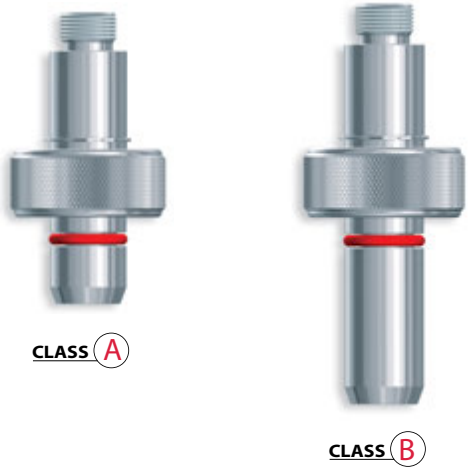
Housings for Standard 25 mm Side Ports

The 320 and 330 style electrode housings are designed to be used with the Model F-615 style FermProbe® pH electrode. These housings fit nearly all standard 25 mm side ports found in production and pilot plant vessels and are available in a variety of different lengths to suit your application.

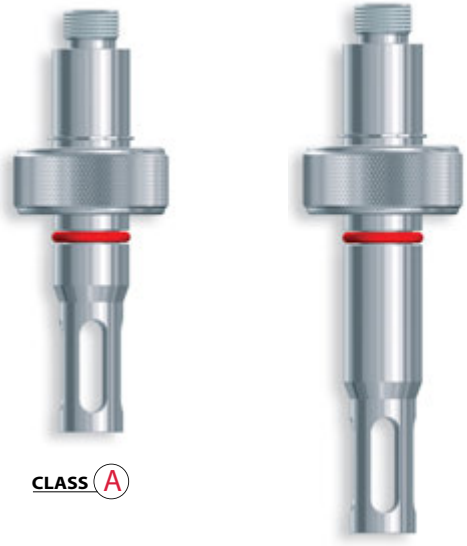
This design requires that the pH electrode be secured to the housing by a free-spinning threaded retainer nut. This allows the electrode to be installed into or removed from the housing without twisting or disconnecting the electrode cable. This feature is very helpful when calibrating the pH electrode tank side in a production environment.

These housings are also designed to be used with Model F-607 and F-600 style FermProbe pH electrodes found on our website.





Model 320
Unguarded housings preferable in viscous media



Model 330
Guarded housings protect glass bulb from impact

Specifications:

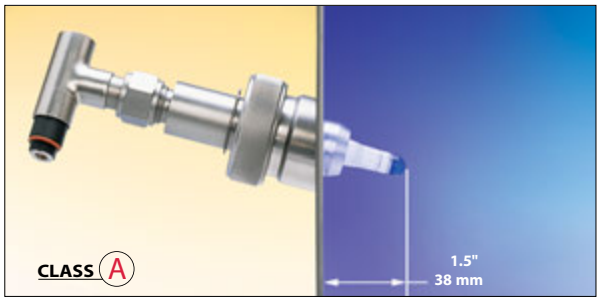
- 316L stainless steel construction.
- Serialized for traceability to mill steel specifications.
- RA32 finish with electropolish on all wetted parts.
- FDA compliant silicone o-rings. (EPDM available upon request.)
- Permanently secured port retainer ring for additional operator safety.

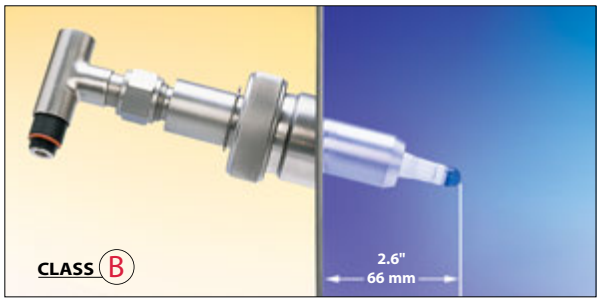
Additional Features Include:

- Guarded versions for rugged handling while protecting the pH glass bulb in a production environment.
- Unguarded versions for viscous media.
- Available in a variety of lengths for different insertion length requirements.
- Custom designs and modifications promptly quoted.

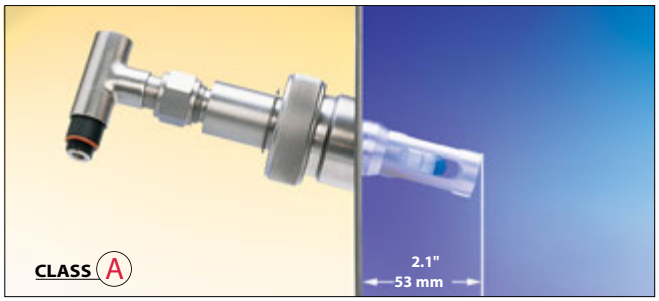
Broadley-James Corporation (U.S. & Canada) Toll-Free: 800-288-2833 E-mail: sales@broadleyjames.com

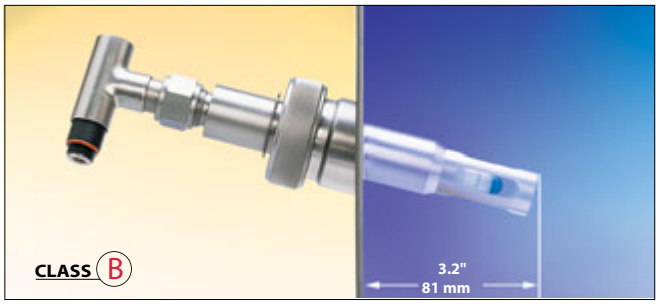
Model 320 Insertion Lengths





Model 330 Insertion Lengths





How to Order a Housing

(1) Confirm that the vessel has a standard 25 mm side port. Cutaway views and dimensions are shown on pages 18 and 19.

(2) Determine whether the application will permit the use of a bulb guard on the housing. The bulb guard design is highly recommended for all types of applications except where the media is highly viscous. Highly viscous media is prone to clog the guard area of the housing which can cause erroneous measurements.

(3) Determine how far the housing and electrode should extend for best performance (see illustration above). For most process media the minimum length is optimum. However, if the media is viscous and tends to thickly coat the inner vessel wall, then a longer length that protrudes farther into the vessel may provide better pH electrode performance.

(4) Choose a pH electrode from among those listed on page 12. These rugged process pH electrodes secure to the housing with a free-spinning threaded retainer nut. The pH electrodes must be ordered separately.

ordering information

Housing Model	Class	Typical Vessel Insertion Length		Used With pH Electrode Models	Used With Electrode Length	Housing Part Number
Unguarded Housings						
320	A	38 mm	1.5"	F-615	130 mm	320-61-H070
320	B	66 mm	2.6"	F-615	160 mm	320-61-H100
Housings With Protective Bulb Guards						
330	A	53 mm	2.1"	F-615	130 mm	330-61-H070
330	B	81 mm	3.2"	F-615	160 mm	330-61-H100

Housings for B. Braun Biotech 25 mm Safety Side Ports

There are two FermProbe® electrode housing designs, standard and metric, for B. Braun Biotech 25 mm side ports. These housings incorporate the latest B. Braun Biotech design requirements and are compatible with both the new 25 mm safety ports and the older 25 mm port designs.

When these housings are used with the new B. Braun Biotech safety port, the port will release internal steam pressure in the vessel before the housing is completely disengaged from the port.

The standard FermProbe pH electrode is secured to the Models 326 and 336 style housings by a free-spinning threaded retainer nut. This allows the electrode to be installed and removed from the housing without twisting or disconnecting the electrode cable. This feature is very helpful when calibrating the pH electrode tank side in a production environment.

The metric FermProbe pH electrodes thread directly into the Models 346 and 356 style housings, eliminating the need for the threaded retainer nut. In order to prevent twisting the cable, the metric FermProbes have a detachable cable.

Guarded and unguarded versions are available. Using a guarded housing is highly recommended for pH electrodes to provide maximum protection against damage to the sensing bulb. However, highly viscous media is prone to clog the guard.

The model 326 and 336 housings are also designed to be used with Model F-607 and F-600 style FermProbe pH electrodes found on our website.

TIPS & HINTS

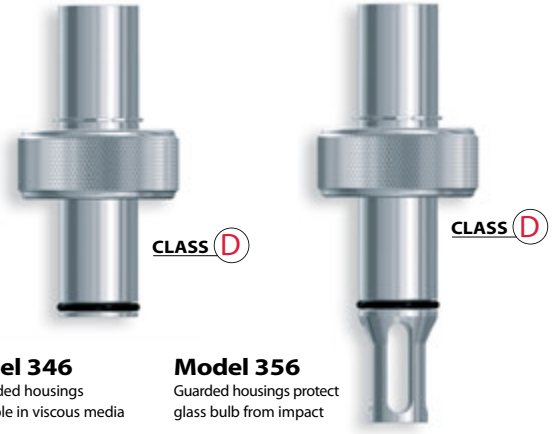
Proper storage of pH electrodes: The first choice for storing FermProbe® electrodes is 2M KCl. If this is not available, buffer solution can be used, preferably pH 4 buffer. Deionized (DI) water should never be used to store pH electrodes. If an electrode has been stored in DI water the resistance of the junction will change, causing instability and noise in the reading. Soaking the electrode in 2M KCl overnight, prior to use, will usually reverse most of this effect.

Housings for Standard FermProbes

Model 326
Unguarded housings preferable in viscous media

Model 336
Guarded housings protect glass bulb from impact

Housings for Metric FermProbes



Model 346
Unguarded housings preferable in viscous media

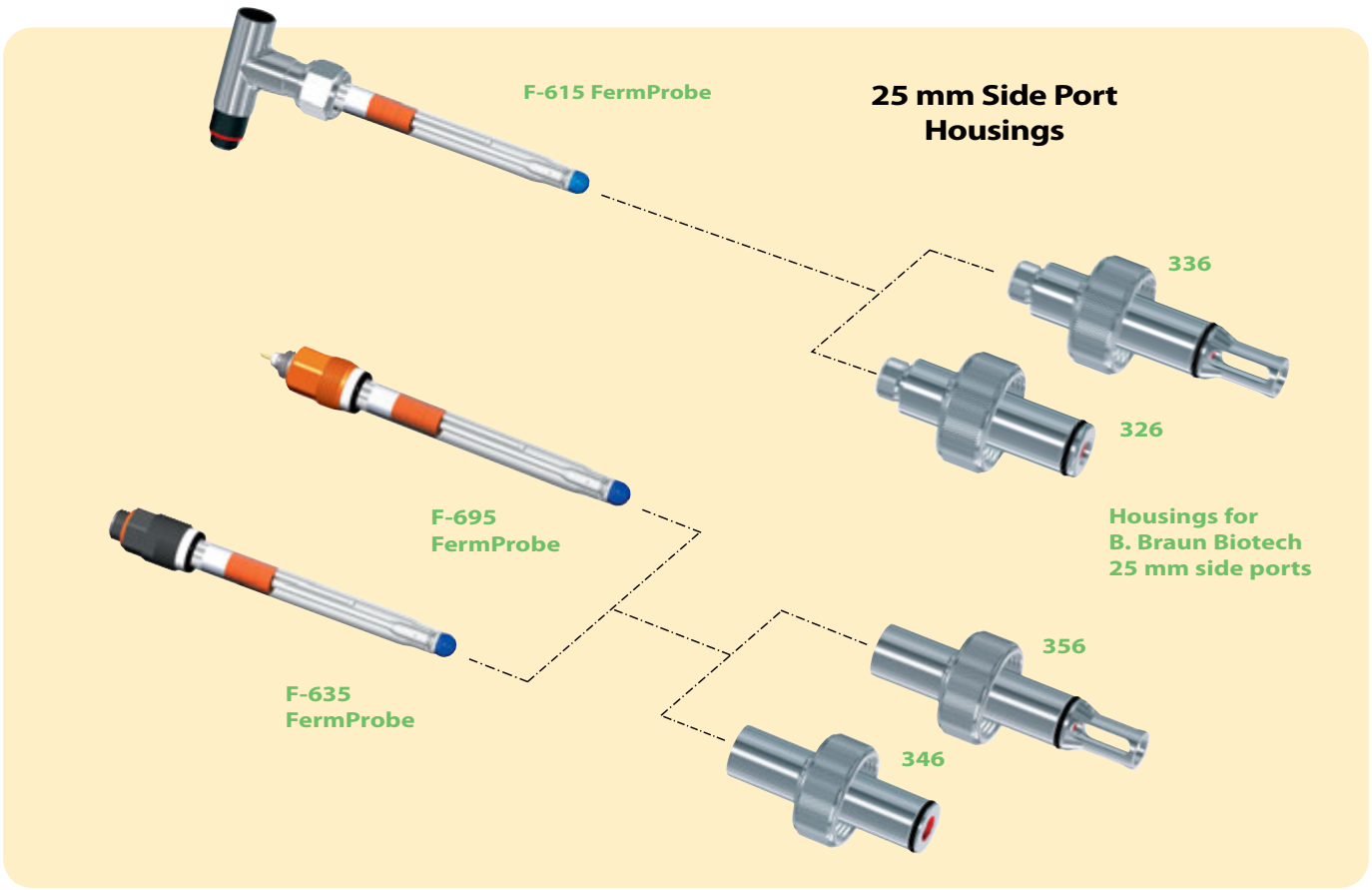
Model 356
Guarded housings protect glass bulb from impact

Specifications:

- 316L stainless steel construction.
- Serialized for traceability to mill steel specifications.
- RA32 finish with electropolish on all wetted parts.
- FDA compliant external EPDM o-rings.
- Permanently secured port retainer ring for additional operator safety.

Additional Features Include:

- Guarded versions for rugged handling while protecting the pH glass bulb. in a production environment.
- Unguarded versions for viscous media.
- Custom designs and custom modifications promptly quoted.



How to Order a Housing

(1) Confirm that the vessel has a B. Braun Biotech 25 mm side port. Cutaway views and dimensions are shown on pages 18 and 19.

(2) Determine whether the application will permit the use of a bulb guard on the housing. The bulb guard design is highly recommended for all types of process applications except when media is highly viscous. Highly viscous media is prone to clog the guard area of the housing. See bulb guard area in pictures on opposite page.

(3) Choose the correct steam sterilizable FermProbe pH electrode.
- See pages 12 and 13 for T-Pull FermProbes.
- See pages 14–17 for Metric FermProbes.

ordering information

Housing Model	Class	Vessel Insertion Length		Used With pH Electrode Models	Used With Electrode Length	Housing Part Number
Unguarded Housing						
326	A	25 mm	1"	F-615	130 mm	326-62-H085
Housing With Protective Bulb Guard						
336	A	40 mm	1.6"	F-615	130 mm	336-62-H085
Unguarded Housing						
346	D	25 mm	1"	F-635, F-695	120 mm	346-62-H085
Housing With Protective Bulb Guard						
356	D	40 mm	1.6"	F-635, F-695	120 mm	356-62-H085

Housings with Sanitary Flanges

Housings for Sanitary Tees and Novasaptic Side Ports

Model 357
Unguarded,
for 1 ½"
Sanitary Tee

Model 367
Guarded,
for 1 ½"
Sanitary Tee

Flanged Housings for Sanitary Pipe Systems

Commonly used in both the food and pharmaceutical industries, the 350 series and 360 series housings are suitable for sanitary pipe systems with CIP requirements. These housings are most often found in downstream processes such as purification.

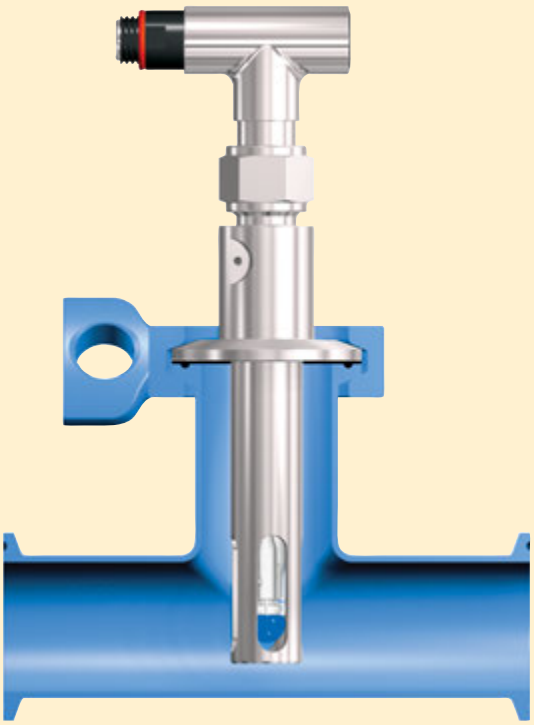
These housings are secured into a sanitary pipe tee with a standard flange clamp sealed with a flange gasket. The pH electrode is then inserted into the housing for on-line measurements. When using a standard sanitary tee, the sensor will be positioned such that the tip of the sensor is in the middle of the process flow. T-Pull® FermProbes® are compatible with these housings.

These housing are also compatible with Novaseptic side ports.

ordering information

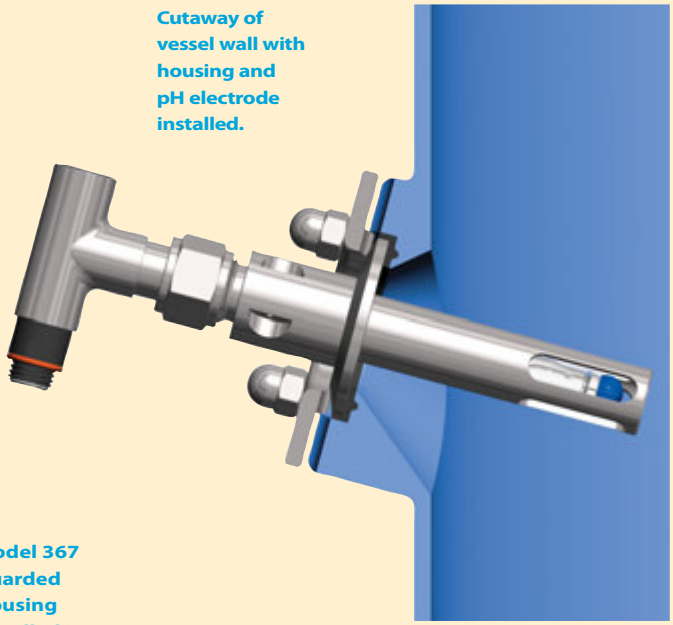
Housing Model	Class	Typical Insertion Length		Used With pH Electrode Model	Used With Electrode Length	Housing Part Number
Model 357 for 1.5" Sanitary Tee Fitting, Unguarded						
357	A	75 mm	3.0"	F-615	130 mm	357-61-H075
Model 367 for 1.5" Sanitary Tee Fitting, Guarded						
367	A	90 mm	3.6"	F-615	130 mm	367-61-H075
Model 350 for 2" Sanitary Tee Fitting, Unguarded (not shown)						
350	A	100 mm	3.9"	F-615	130 mm	350-61-H090
Model 360 for 2" Sanitary Tee Fitting, Guarded (not shown)						
360	A	115 mm	4.5"	F-615	130 mm	360-61-H090

Exploded and Inserted Views

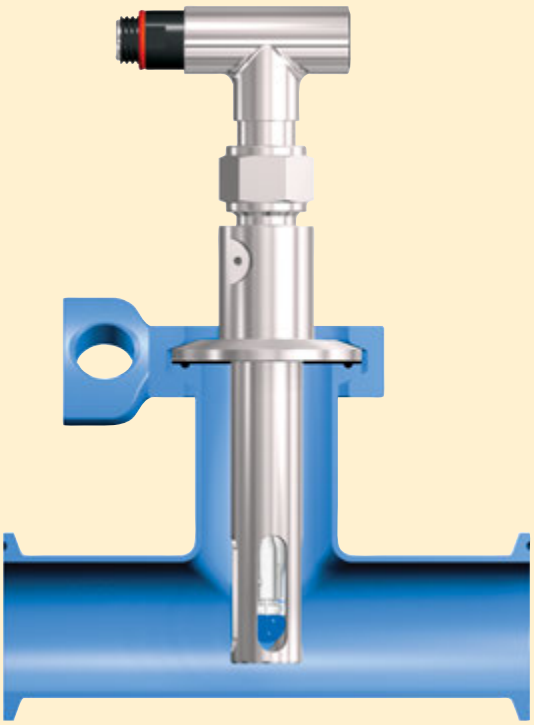


Model 367 Guarded Housing Installed in a 1 ½" Tee

Cutaway of vessel wall with housing and pH electrode installed.

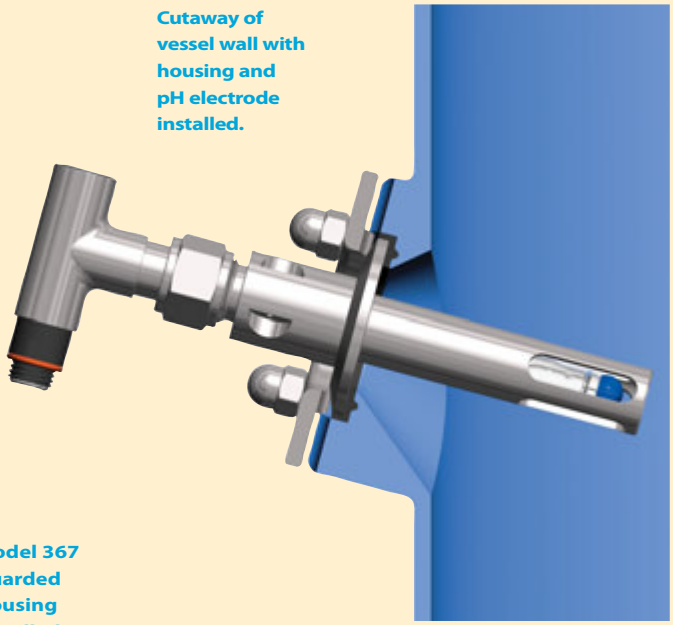


Exploded and Inserted Views



Model 367 Guarded Housing Installed in a 1 ½" Tee

Cutaway of vessel wall with housing and pH electrode installed.



Metric Housings for Standard 25 mm Side Ports

CLASS D

Model 325
Unguarded housings
preferable in viscous media

CLASS D

Model 335
Guarded housings protect
glass bulb from impact

These housings are designed to be used with models F-635 and F-695 Metric FermProbe® electrodes and models D140 and D145 12 mm OxyProbe® sensors. They are also compatible with any sensor that has Pg13.5 threads. These housings fit nearly all standard 25 mm ports found on production and pilot plant vessels. Different housing lengths are available to accommodate various application or vessel requirements.

The pH electrode or D.O. sensor threads directly into this metric housing, eliminating the need for a threaded retainer nut. In order to prevent twisting the cable, the metric FermProbes have a detachable cable.

Guarded and unguarded versions are also available. Using a guarded housing is highly recommended for pH electrodes to provide maximum protection against damage to the sensing bulb. However, highly viscous media is prone to clog the guard.

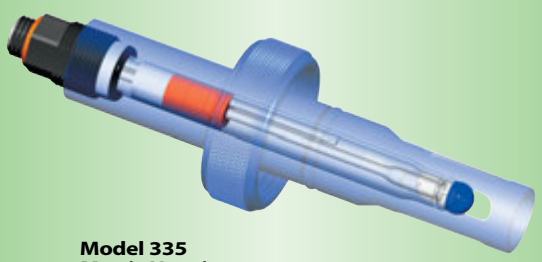
Specifications:

- 316L stainless steel construction.
- Serialized for traceability to mill steel specifications.
- RA32 finish with electropolish on all wetted parts.
- FDA compliant silicone o-rings.
- Permanently secured retainer ring for additional safety.

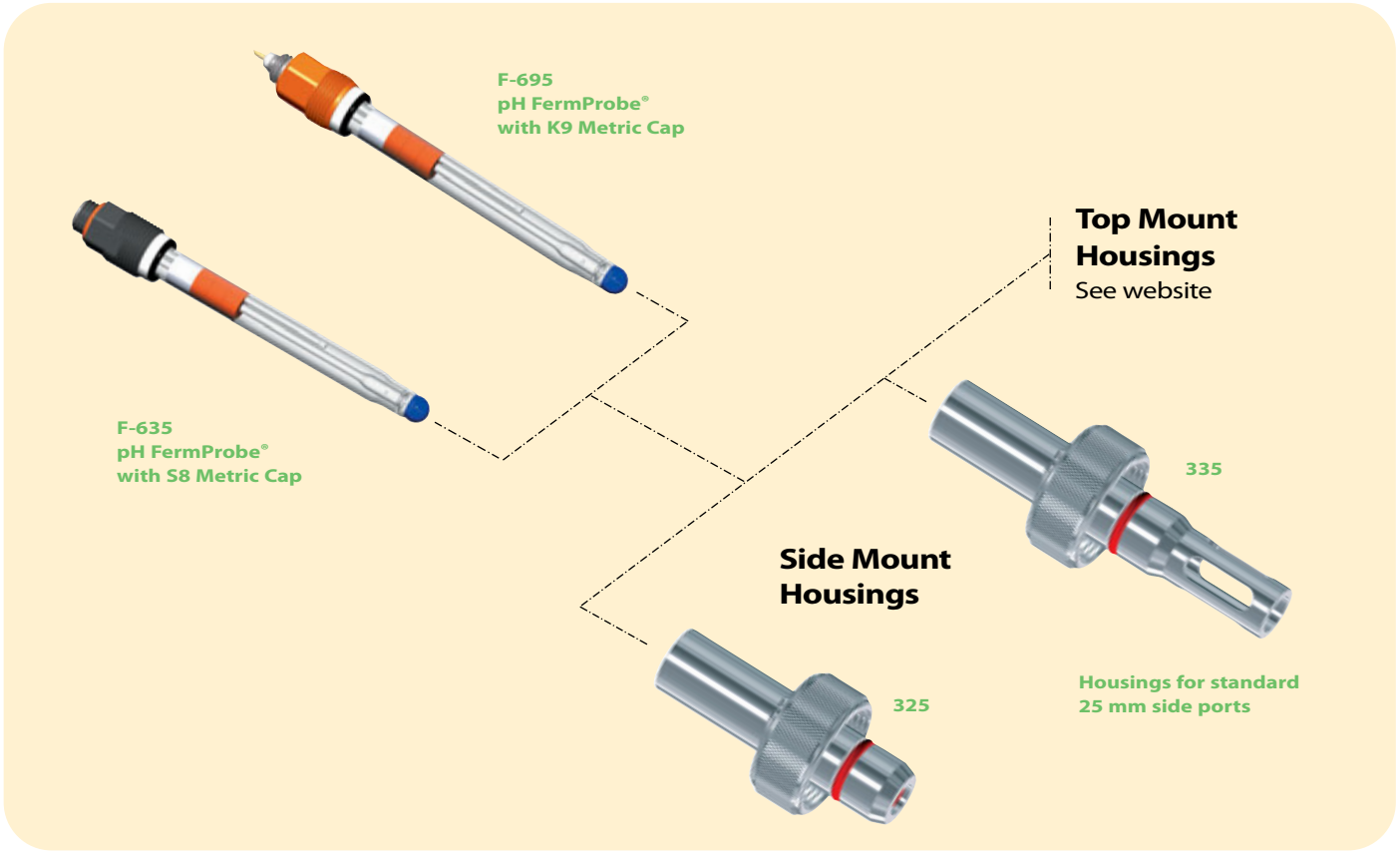
Additional Features:

- Guarded version for rugged handling while protecting the pH glass bulb in a production environment.
- Unguarded version for viscous media.
- Custom designs and modifications promptly quoted.

F-635 electrode with S8 metric
cap and detachable cable



Model 335
Metric Housing



How to select the correct housing

(1) Confirm that the opening is a standard 25 mm side port. Cutaway views and dimensions are shown on pages 18 and 19.

(2) Determine whether the application will permit the use of a bulb guard on the housing. The bulb guard is highly recommended for all applications except when the media is very viscous. Highly viscous media is prone to clog the guard.

(3) Determine how far the housing and pH electrode or D.O. sensor should extend into the vessel.

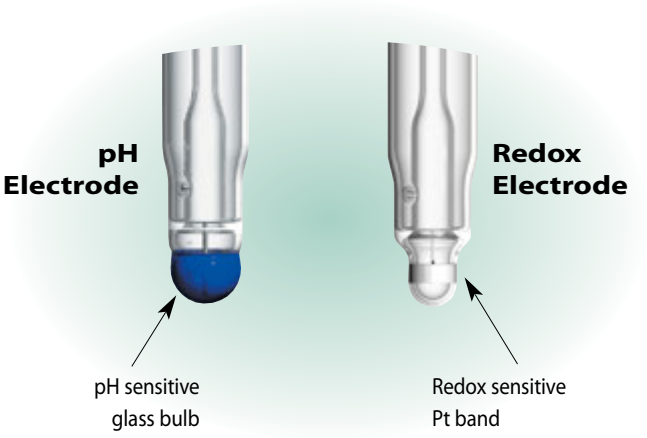
(4) Confirm the electrode or sensor is a metric FermProbe®, 12 mm OxyProbe®, or European sensor with Pg13.5 threads.

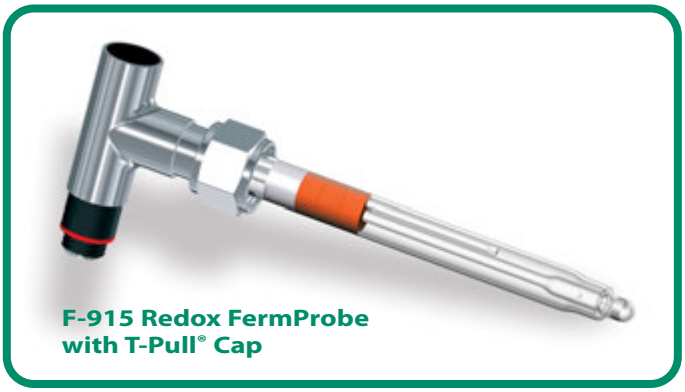
* See pages 14–17 for more information on metric FermProbe electrodes and electrode selection.
* See page 44 for more information on 12 mm OxyProbe sensors and sensor selection.

ordering information

Housing Model	Class	Typical Vessel Insertion Length		Used With pH Electrode and D.O. Sensor Models	Used With Sensor/ Electrode Length	Housing Part Number
Unguarded Housing						
325	Ⓓ	38 mm	1.5"	F-695, F-635, D140, D145	120 mm	325-61-H070
Housing with Protective Bulb Guard						
335	Ⓓ	53 mm	2.1"	F-695, F-635	120 mm	335-61-H070

Redox Electrodes




F-915 Redox FermProbe
with T-Pull® Cap

Redox FermProbes®

- Fits all suitable FermProbe housings
- Works with standard FermProbe cables
- Compatible with pH transmitters that have a millivolt display mode.

Reasons to Measure Redox in Fermentation Media

The metabolic activity of microorganisms depends on many factors, including the redox potential of the culture environment. Measuring the redox potential allows the vessel operator to monitor the addition of reducing agents while ensuring that the potential is in the proper range for initiation of growth. It is also important to monitor the redox potential just before inoculation.

ANAEROBIC FERMENTATION

Redox sensors are most commonly used to maintain anaerobic conditions in a culture media. They can be used to measure trace amounts (<1 ppm) of dissolved oxygen, at levels that are too low for D.O. sensors.

DOWNSTREAM PROCESSING

Sometimes used in steps performed downstream of the fermentation process, redox sensors can monitor changes in concentration or the absence or presence of specific chemicals. Monitoring the redox potential is an effective way of tracking chemical conversions in the process.

PROTEIN FOLDING

The close regulation of redox potential is crucial to allow efficient formation of disulfide bonds, which facilitate folding and the stability of the folded protein. Overly oxidizing conditions can result in misfolding due to the formation of incorrect bonds.

METABOLIC PATHWAYS

Measuring the redox potential is an effective way to determine its influence on the metabolic pathways of microorganisms. This is useful for substrate utilization or the production of specific metabolites.

Specifications:

- ± 5000 mV range
- Steam sterilizable to 135°C
- 150 psig maximum pressure
- Double junction, Ag-AgCl reference system
- Metric Pg13.5 threaded disconnect cap

F-935 Redox FermProbe
with S8 Metric Cap

F-995 Redox FermProbe
with K9 Metric Cap

How to Order a Redox Electrode

(1) Choose Electrode Model.
If the electrode needs to fit an existing cable, check the cable connector and note its color. If the cable connector is black and has an S8 connector, use the F-915 or F-935 Redox FermProbes. If the cable connector is red or orange and has a K9 connector, use the F-995 Redox FermProbe.

(2) Choose Electrode Length.
If you have already chosen a housing, select an electrode length with the same Class designation as the housing. For more information on selection of housings, see pages 18-21. The housing *ordering information* box also lists the correct electrode length to order. If you have not already chosen the housing, please review the recommendations next to each electrode model below.

(3) Confirm Cable Length and Connector.
Model F-915, F-935, and F-995 Redox electrodes require disconnect cable and connector assemblies. See pages 70–73.

TIPS & HINTS

What is Redox (ORP)?

- The terms are interchangable in meaning:
  Redox = Oxidation-Reduction Potential (ORP)
- The term Redox is more commonly used for bioprocess applications in Europe and the U.S.
- The term ORP is more commonly used for industrial chemical process applications in the U.S.
- The redox potential of a media is related to the overall availability of electrons in the media, specifically the ratio of positive and negative ions in the solution. Note that redox measurements vary significantly with changing pH.

ordering information

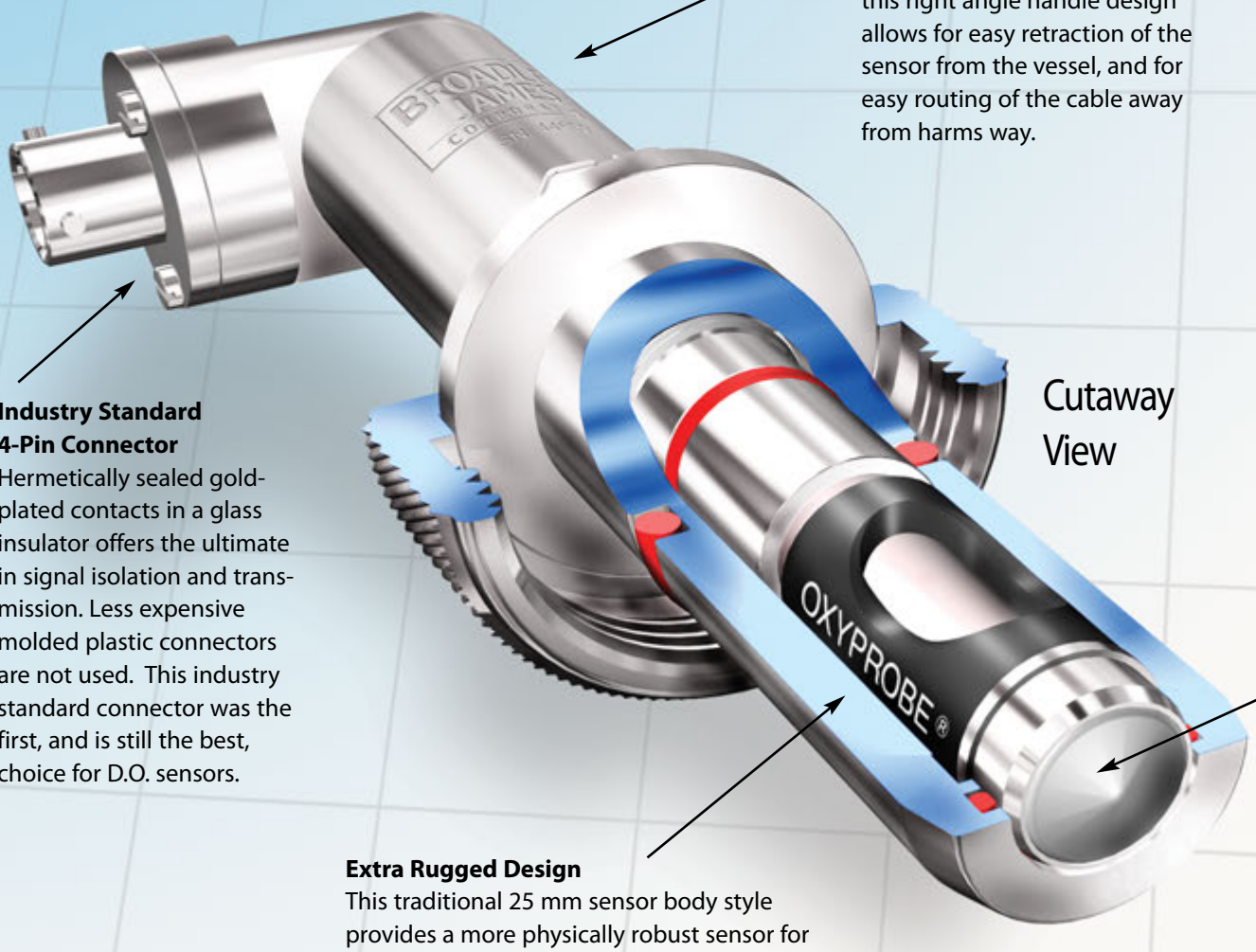
Electrode Model	Class	Use With These Housing Models	Electrode Length*	Electrode Part Number	
Series F-900 Redox FermProbes					
F-915	Ⓐ	320, 330, 326, 336, 350, 357, 370	130 mm	F-915-B130-DH	
F-935	Ⓓ	325, 335	120 mm	F-935-B120-DH	
F-995	Ⓓ	325, 335	120 mm	F-995-B120-DK	

**Other lengths are available upon request.*

OxyProbe® D.O. Sensors

Steam Sterilizable and Autoclavable

Original T-Pull® Handle
Developed by Broadley-James, this right angle handle design allows for easy retraction of the sensor from the vessel, and for easy routing of the cable away from harms way.



Cutaway View

Industry Standard 4-Pin Connector
Hermetically sealed gold-plated contacts in a glass insulator offers the ultimate in signal isolation and transmission. Less expensive molded plastic connectors are not used. This industry standard connector was the first, and is still the best, choice for D.O. sensors.

Extra Rugged Design
This traditional 25 mm sensor body style provides a more physically robust sensor for harsh industrial production environments. The thick walled stainless steel body resists damage better than fragile, thinner walled alternatives. Still the first choice for most applications.

Broadley-James Corporation (U.S. & Canada) Toll-Free: 800-288-2833 E-mail: sales@broadleyjames.com

Performance Specifications

Measurement principal:	Amperometric – Polarographic
Output signal in air:	Approx. 67 nA at 25˚C
Temperature range:	Operation: 0 to 80˚C Sterilization: Max. 135˚C
Stability:	Better than 2% of readout per week at constant pressure and temp. (30˚C)
Maximum Pressure:	4 bar (atm.), 58 psig

Suitable for Hygienic Applications
The OxyProbe withstands Steam in Place (SIP) and caustic Clean in Place (CIP) applications. FDA compliant o-rings on all product contact surfaces.

Easy to Replace Membrane Body
The outer silicone layer protects the inner teflon layer, and an added stainless steel mesh provides the mechanical strength required to withstand repeated autoclaving or steam sterilization. The strongest, most robust membrane in the industry, it is an improvement of the industry standard design. Compatible with existing sensors, there is no need to change sensors or electronics to get improved performance!

D.O. Sensor Design

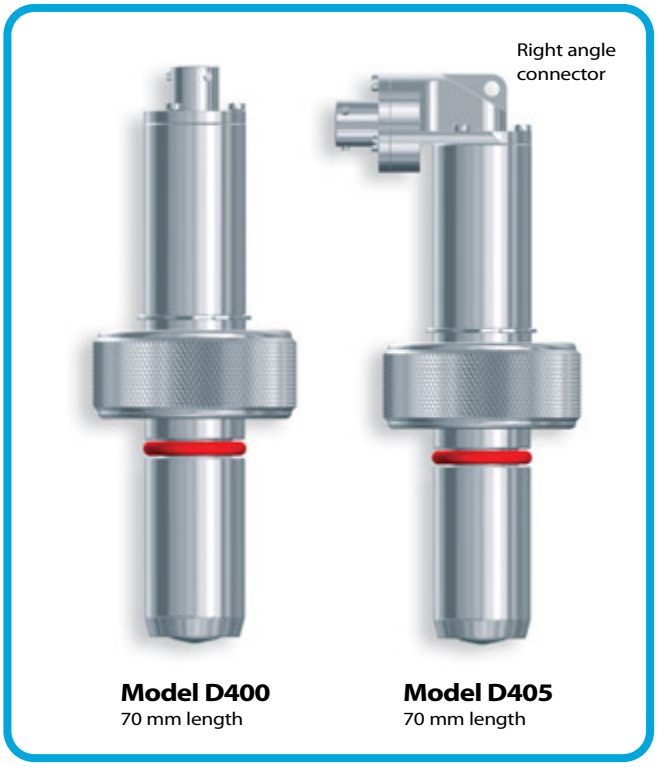
Replaceable Anode/Cathode Assembly
A concept pioneered by Broadley-James, this unique assembly permits the sensor to be repaired quickly, easily, and reliably in just a few minutes. A time-proven approach with years of success under the harshest environmental conditions.

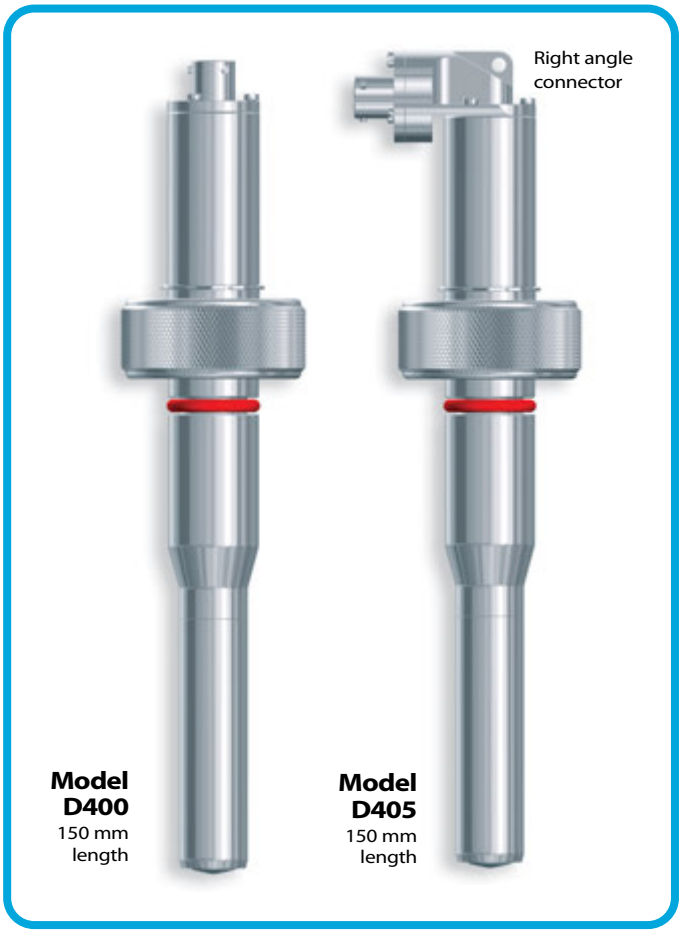
FDA Positive Listed Materials of Construction
Electropolished stainless steel surfaces provide better surface cleanability than mechanically polished 16RA alternatives. Copies of 3.1 certificates and mill certificates are available upon request. Every sensor is serialized with paperwork on file in our database.

Universally Compatible
All Broadley-James D.O. sensors work with existing biotech equipment. No proprietary electronics or cables are required. All designs are intended to fit both existing and future requirements, without introducing any unnecessary changes in hardware or cabling. Reduces inventory and confusion, increases flexibility and cost savings.

The Market Leader in D.O. Sensor Design
Unlike other manufacturers, Broadley-James does not believe in changing the basic design every few years forcing customers into buying new equipment to keep current. Instead, Broadley-James strives to make improvements "backwards compatible" so they can be used with new electronics as well as the old. No changing of connector which would require new cabling to be run throughout the suite, no special RTDs that would require new transmitters, no changing of cartridge design that forces the customer to obsolete perfectly good, but no longer supported, sensor designs. Instead, Broadley-James strives to protect investments, and help leverage them into the future.

OxyProbe® D.O. Sensors for Standard 25 mm Side Ports





Model D400 OxyProbe® D.O. Sensor Series

The OxyProbe® D400 series dissolved oxygen sensor offers the most rugged design for 25 mm side ports. It fits directly into the vessel, eliminating the need for a housing, reducing contamination risks. The modular design allows quick replacement of any part, making it easy to maintain and repair the sensor. OxyProbe dissolved oxygen sensors carry a 1-year warranty.

For peformance specifications see page 35.

Features:

- 316L Stainless Steel
- Serialized for traceability
- RA32 finish with electropolish on wetted parts
- FDA compliant silicone o-rings
- Secured retainer ring

ordering information

Part Number	Sensor Length	Typical Insertion Length	
Model D400 Series 25 mm OxyProbe with Straight Connector • Fits standard 25 mm ports • Secured retainer ring • Custom lengths available			
D400-B070-PT-D9	70 mm	36 mm	1.4"
D400-B150-PT-D9	150 mm	114 mm	4.5"
D400-B220-PT-D9	220 mm	183 mm	7.2"
D400-B320-PT-D9	320 mm	277 mm	10.9"
D400-B420-PT-D9	420 mm	373 mm	14.7"

ordering information

Part Number	Sensor Length	Typical Insertion Length	
Model D405 Series 25 mm OxyProbe with Right Angle Connector • Fits standard 25 mm ports • Secured retainer ring • Custom lengths available			
D405-B070-PT-D9	70 mm	36 mm	1.4"
D405-B150-PT-D9	150 mm	114 mm	4.5"
D405-B220-PT-D9	220 mm	183 mm	7.2"
D405-B320-PT-D9	320 mm	277 mm	10.9"
D405-B420-PT-D9	420 mm	373 mm	14.7"

What makes OxyProbe® sensors unique?

The internal seals of an OxyProbe are all mechanical seals using o-rings. There are no adhesives to leak or fail in process, making this a more rugged and reliable sensor. Replacing the cathode is also much easier and faster since there is no sealant to clean from the integral threads. Additionally, no sealant makes the job of replacing the cathode much easier and cleaner. See pages 48 and 49 for an exploded view of a Dissolved Oxygen sensor.

It is important to properly maintain the sensors by inspecting and calibrating them regularly. The membrane cartridge should be checked and refilled prior to every use.

All Broadley-James dissolved oxygen sensors are available with an optional right angle connector. This low profile design provides:

- Protection against cable fatigue
- Improved grip for sensor extraction
- Increased clearance between vessels

How to choose a sensor:

(1) Confirm that the entry site is a standard 25 mm port. Cutaway views and dimensions are shown on pages 18 and 19.

(2) Determine how far the sensor should extend into the vessel. (See illustration to the right.) For most process media, the minimum length is optimal. However, if the media is viscous and tends to coat the inner wall of the vessel, a longer length may provide better performance.

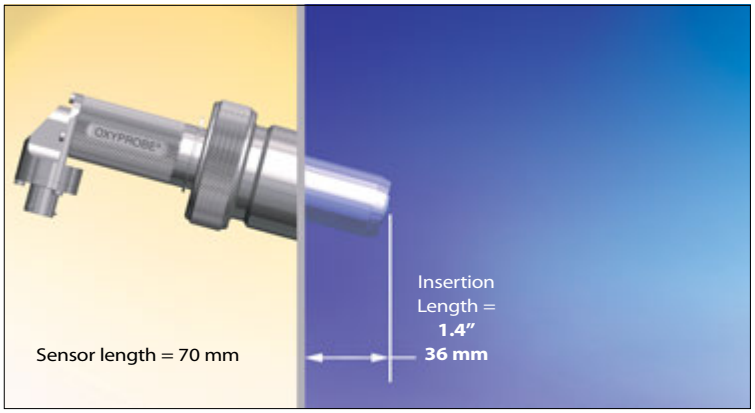
(3) Decide whether a right angle connector is preferred over a straight connector.

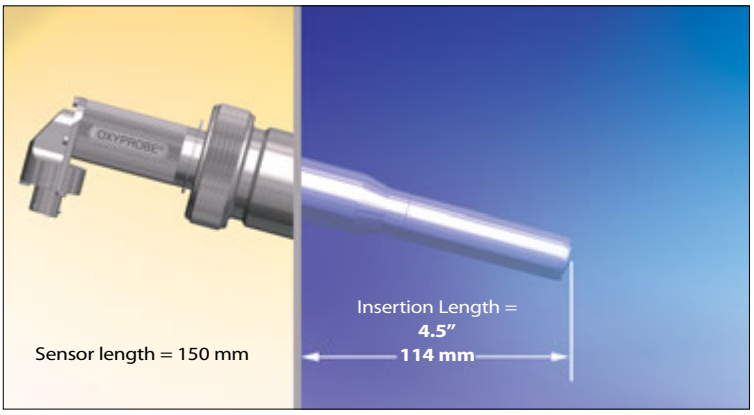
(4) Choose cable length and a connector. All D.O. sensors require cable and connector assemblies. See pages 74 and 75.

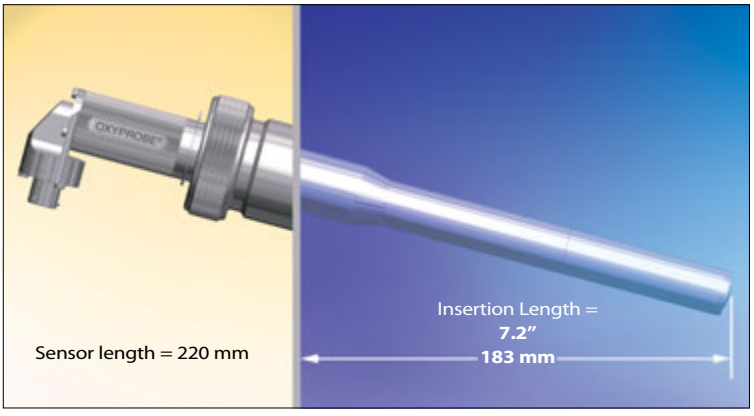
TIPS & HINTS

A D.O. sensor or a pH electrode must be at least 15° above horizontal to consistently function properly. DO NOT install pH electrodes or D.O. sensors in a port perpendicular to the vessel wall. The liquid inside the sensor contains small air bubbles. If not inclined slightly above horizontal, a bubble can adhere to the cathode or pH bulb where it will affect the sensor's performance.

Model D400/D405 Insertion Lengths

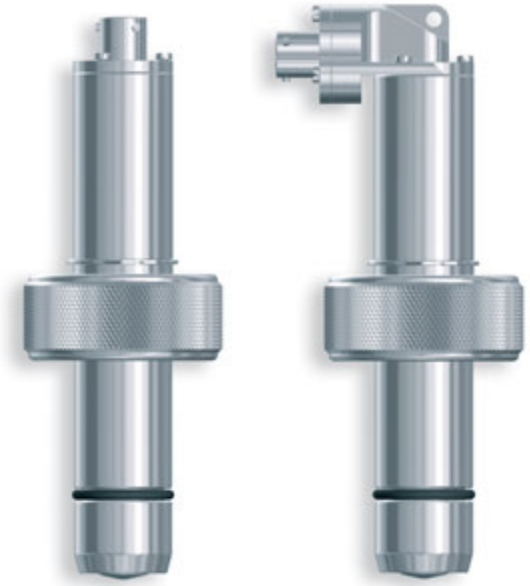






OxyProbe® D.O. Sensors for B. Braun Biotech 25 mm Safety Side Ports

Standard Insertion Length



Model D430
70 mm length

Model D435
70 mm length

Extended Insertion Length

Model D430
95 mm length

Model D435
95 mm length

Model D430 Series OxyProbe® D.O. Sensors

The ports of B. Braun Biotech fermentation vessels are longer and have a slightly different internal design. In order to seal properly, the o-ring on these sensors has been moved closer to the tip of the sensor.

What makes OxyProbe sensors unique?

The internal seals of an OxyProbe are all mechanical seals using o-rings. There are no adhesives to leak or fail in process, making this a more rugged and reliable sensor. Replacing the cathode is also much easier and faster since there is no sealant to clean from the threads.

The sensor fits directly into the vessel, eliminating the need for a housing, reducing contamination risks. Few accessories are required. The modular design allows quick replacement of any part, making it easy to maintain and repair the sensor. OxyProbe dissolved oxygen sensors carry a 1 -year warranty.

For peformance specifications see page 35.

Features:

- 316L Stainless Steel
- Serialized for traceability
- RA32 finish with electropolish on wetted parts
- FDA compliant external EPDM o-ring
- Secured retainer ring

ordering information

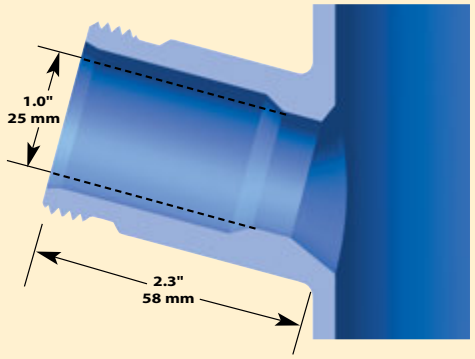
Part Number	Sensor Length	Typical Insertion Length	
Model D430 Series 25 mm OxyProbe with Straight Connector • Unique o-ring placement for better seal • Fits B. Braun Biotech Fermentors			
D430-B070-PT-D9	70 mm	13 mm	0.5"
D430-B095-PT-D9	95 mm	36 mm	1.4"

ordering information

Part Number	Sensor Length	Typical Insertion Length	
Model D435 Series 25 mm OxyProbe with Right Angle Connector • Unique o-ring placement for better seal • Fits B. Braun Biotech Fermentors			
D435-B070-PT-D9	70 mm	13 mm	0.5"
D435-B095-PT-D9	95 mm	36 mm	1.4"

B. BRAUN BIOTECH 25 mm SAFETY PORT.

Found exclusively on vessels manufactured by B. Braun Biotech. This style of port is longer than the standard port and needs a special housing to fit correctly. (Note: The port opening on newer tanks is 30 mm i.d. and narrows to 25 mm i.d. at the critical point where the housing o-ring seals to the inside wall of the port.) The port is installed at a 15° angle for better electrode performance. See the cutaway drawing to the right for typical installation dimensions.



How to choose a sensor:

(1) Confirm that the vessel has a 25 mm B. Braun Biotech side port, as in the drawing above.

(2) Determine how far the sensor should extend into the vessel. (See illustration to the right.) For most process media, the minimum length is optimal. However, if the media is viscous or tends to coat the inner wall of the vessel, a longer length may provide better performance.

(3) Decide whether a right angle connector is preferred over a straight connector.

(4) Choose cable length and connector. All D.O. sensors require a separate cable connector assembly. See pages 74 and 75.

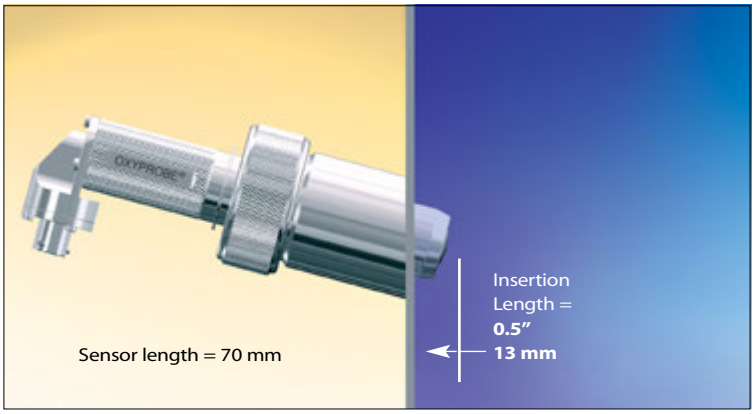
TIPS & HINTS

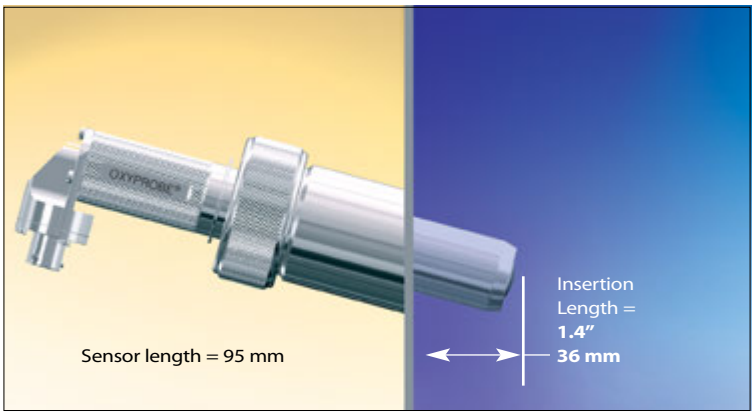
The external seal on the Models D430 and D435 D.O. sensors is slightly different from other 25 mm OxyProbes. The o-ring is EPDM and the groove is more shallow. Therefore, the external o-ring for these sensors has a slightly smaller cross-section.

External o-rings for 25 mm OxyProbes® for B. Braun Biotech side ports

Part Number	*Qty.*
AG-E117-04	4
AG-E117-25	25

Model D430/D435 Insertion Lengths





All OxyProbe dissolved oxygen sensors are available with the right angle connector. This low profile design provides:

- Protection against cable fatigue
- Improved grip for sensor extraction
- Increased clearance between vessels

Broadley-James® Smart Polarizer

Conditions a Polarographic D.O. Sensor

AM-9660

NEW !!

BENEFITS:

- Full zero and air test to verify the dissolved oxygen sensor is fit for purpose.
- Prevents a faulty sensor being fitted to a vessel.
- Simplifies testing procedures.
- Reduces operational costs.

FEATURES:

- Convenient: One unit to test and polarize.
- Universal: Can be used with all popular makes of polarographic sensors.
- Battery Powered: Can be used in the lab or production areas.
- Portable: Small pocket size.

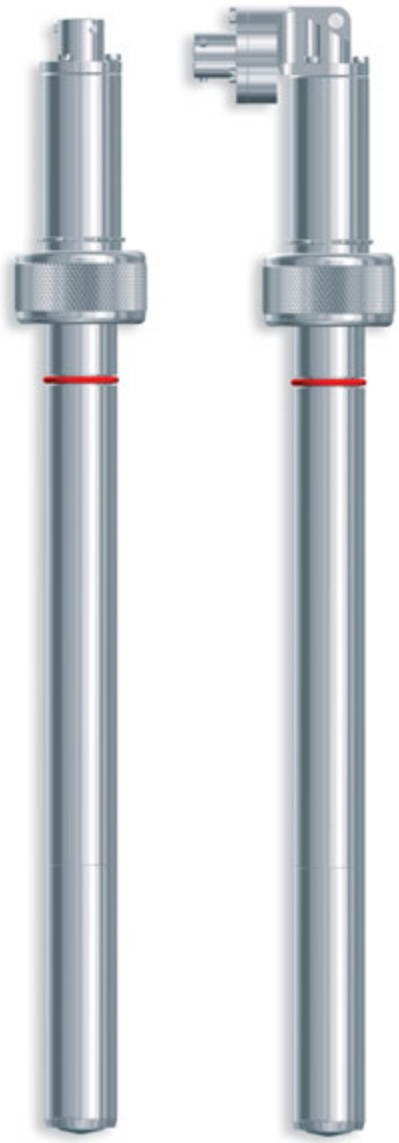
Broadley® James

Manufacturers of Sensors, Bioreactors and Process Control Automation

For Details See:
www.broadleyjames.com

Broadley-James Corporation (U.S. & Canada) Toll-Free: 800-288-2833 E-mail: sales@broadleyjames.com

OxyProbe® 19 mm D.O. Sensors for 19 mm Top Ports



Model **D200**
220 mm length

Model **D205**
220 mm length

All OxyProbes are available with a right angle connector. This low profile design offers:

- Protection against cable fatigue
- Improved grip for sensor extraction
- Increased clearance between vessels

Model D200 Series

The OxyProbe® 19 mm dissolved oxygen sensor features the same rugged and versatile design as the 25 mm OxyProbe. Although the 19 mm OxyProbe sensor has a slightly smaller diameter than the 25 mm sensor, it utilizes the same anode/cathode assembly and membrane cartridges. The 19 mm OxyProbe is often used in both process and benchtop applications, which are equipped with special 19 mm top ports

The Model D200 series dissolved oxygen sensors are made of 316L stainless steel to withstand the bioprocess environment. Each sensor is serialized for traceability, and the port retainer ring is secured to the sensor to prevent loss. All Broadley-James dissolved oxygen sensors carry a 1-year warranty.

For peformance specifications see page 35.

How to choose a sensor:

(1) Determine that the port has a 19 mm diameter.

(2) Decide whether a right angle connector is preferred over a straight connector.

(3) Choose a sensor length appropriate for the application. The sensor tip should be at least 40–50 mm (1-1/2" to 2") below the surface of the media without hitting an obstruction, such as the impeller, within the vessel.

(4) Choose the correct cable length and connector. All D.O. sensors require cable and connector assemblies. See pages 74 and 75.

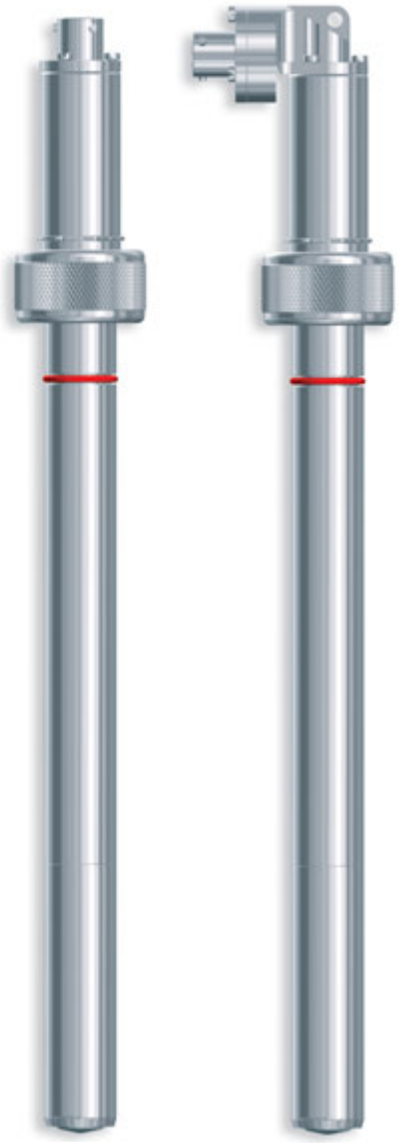
ordering information

Sensor Model	Sensor Length	Typical Insertion Length		Sensor Part Number
D200 Series 19 mm Oxyprobe with Straight Connector				
D200	150 mm	140 mm	5.5"	D200-B150-PT-D9
D200	220 mm	210 mm	8.3"	D200-B220-PT-D9
D200	320 mm	310 mm	12.2"	D200-B320-PT-D9
D200	420 mm	410 mm	16.1"	D200-B420-PT-D9

ordering information

Sensor Model	Sensor Length	Typical Insertion Length		Sensor Part Number
D205 Series 19 mm OxyProbe with Right Angle Connector				
D205	150 mm	140 mm	5.5"	D205-B150-PT-D9
D205	220 mm	210 mm	8.3"	D205-B220-PT-D9
D205	320 mm	310 mm	12.2"	D205-B320-PT-D9
D205	420 mm	410 mm	16.1"	D205-B420-PT-D9

OxyProbe® 19 mm D.O. Sensors for 19 mm Top Ports



Model D200
220 mm length

Model D205
220 mm length

Model D200 Series

The OxyProbe® 19 mm dissolved oxygen sensor features the same rugged and versatile design as the 25 mm OxyProbe. Although the 19 mm OxyProbe sensor has a slightly smaller diameter than the 25 mm sensor, it utilizes the same anode/cathode assembly and membrane cartridges. The 19 mm OxyProbe is often used in both process and benchtop applications, which are equipped with special 19 mm top ports

The Model D200 series dissolved oxygen sensors are made of 316L stainless steel to withstand the bioprocess environment. Each sensor is serialized for traceability, and the port retainer ring is secured to the sensor to prevent loss. All Broadley-James dissolved oxygen sensors carry a 1-year warranty.

For peformance specifications see page 35.

How to choose a sensor:

(1) Determine that the port has a 19 mm diameter.

(2) Decide whether a right angle connector is preferred over a straight connector.

(3) Choose a sensor length appropriate for the application. The sensor tip should be at least 40–50 mm (1-1/2" to 2") below the surface of the media without hitting an obstruction, such as the impeller, within the vessel.

(4) Choose the correct cable length and connector. All D.O. sensors require cable and connector assemblies. See pages 74 and 75.

ordering information

Sensor Model	Sensor Length	Typical Insertion Length		Sensor Part Number
D200 Series 19 mm Oxyprobe with Straight Connector				
D200	150 mm	140 mm	5.5"	D200-B150-PT-D9
D200	220 mm	210 mm	8.3"	D200-B220-PT-D9
D200	320 mm	310 mm	12.2"	D200-B320-PT-D9
D200	420 mm	410 mm	16.1"	D200-B420-PT-D9

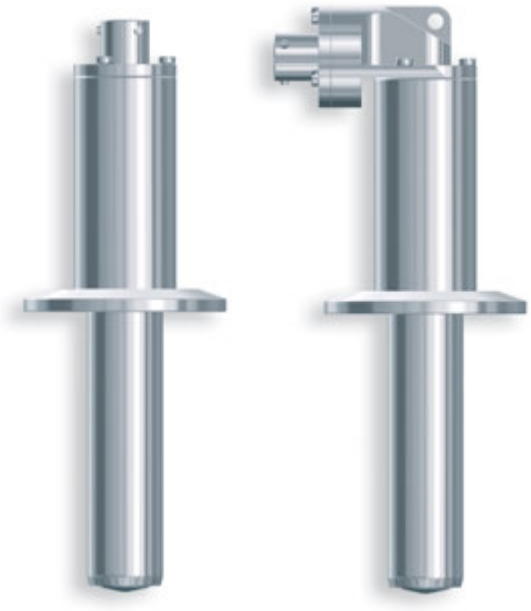
All OxyProbes are available with a right angle connector. This low profile design offers:

- Protection against cable fatigue
- Improved grip for sensor extraction
- Increased clearance between vessels

ordering information

Sensor Model	Sensor Length	Typical Insertion Length		Sensor Part Number
D205 Series 19 mm OxyProbe with Right Angle Connector				
D205	150 mm	140 mm	5.5"	D205-B150-PT-D9
D205	220 mm	210 mm	8.3"	D205-B220-PT-D9
D205	320 mm	310 mm	12.2"	D205-B320-PT-D9
D205	420 mm	410 mm	16.1"	D205-B420-PT-D9

OxyProbe® D.O. Sensor with 1.5" Sanitary Flange for Sanitary Pipe Tee and Novaseptic Side Ports



Model D210
70 mm length

Model D215
70 mm length

How to choose a sensor:

(1) Confirm that the pipe tee has the proper clearance.

(2) Decide whether a right angle connector is preferred over a straight connector.

(3) Choose the optimum length cable and a connector. All D.O. sensors require a separate cable connector assembly. See pages 74 and 75.

Model D210 Series OxyProbe® D.O. Sensors

These sensors are unique in their construction. The front end of the sensor is the same as the 19 mm sensor, with the smaller diameter and no crevices or o-rings. It fits directly into a 1.5" sanitary pipe tee, eliminating the need for a housing, reducing contamination risks. Designed with an integral 1.5" sanitary flange, a gasket seal at the flange holds the sensor securely in place.

It is important to note, these sensors are not intended for use with the standard 25 mm sanitary flange ports found on page 18. However, they can be used with the NovAseptic ports shown on page 43.

The interior design and replacement parts of this sensor are the same as other 25 mm OxyProbes. The modular design allows quick replacement of any part, making it easy to maintain and repair the sensor. OxyProbe dissolved oxygen sensors carry a 1-year warranty.

For peformance specifications see page 35.

Features:

- 316L Stainless Steel
- Serialized for traceability
- RA32 finish with electropolish on wetted parts

Additional Features Include:

- Fits in both sanitary flange ports and NovAseptic ports.
- Can also be used in-line in a sanitary pipe tee.

It is important to maintain the sensors by inspecting and calibrating them regularly. The membrane cartridge should be checked and refilled prior to every use.

ordering information

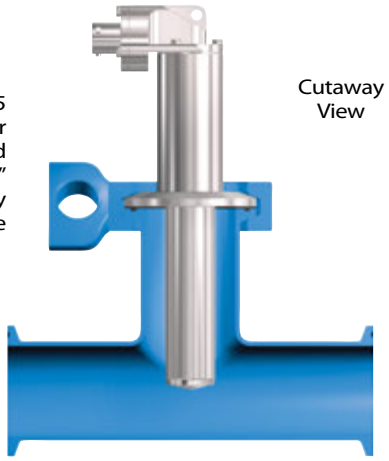
Sensor Part Number	Sensor Length	Typical Insertion Length	
19 mm OxyProbe® with 1.5" Sanitary Flange			
Straight Connector: D210-B070-PT-D9	70 mm	70 mm	2.8"
Right Angle Connector: D215-B070-PT-D9	70 mm	70 mm	2.8"

All OxyProbe dissolved oxygen sensors are available with a right angle connector. This low profile design provides:

- Protection against cable fatigue
- Improved grip for sensor extraction
- Reduced random sensor mobility on flat surfaces (won't roll off the table)

Standard Mounting for Model D210 Series D.O. Sensors

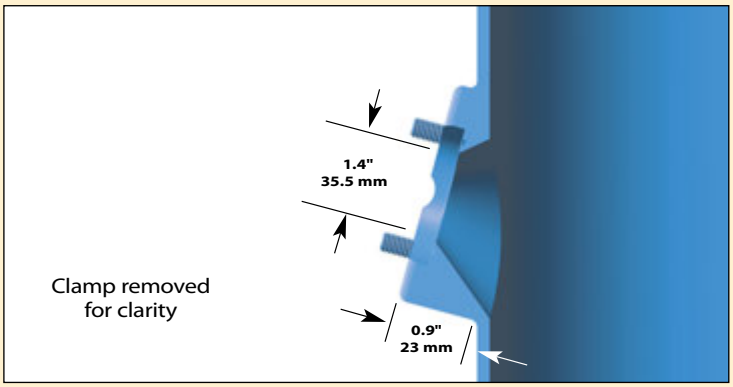
The Models D210 Series D.O. OxyProbe sensors are intended for use in a 1 ½" sanitary pipe tee. The sensor is secured into the tee with a standard flange clamp sealed with a flange gasket. The tip of the sensor is positioned in the middle of the process flow when it is placed in a standard size tee. These sensors can also be used in NovAseptic ports. See the Tip and Hint below for more information.



TIPS & HINTS

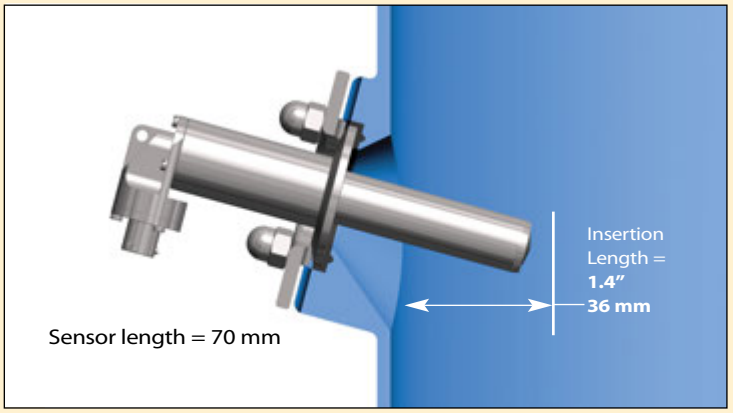
NovAseptic Sanitary Port

A novel approach to vessel port design, this NA-connect® port from NovAseptic is sometimes found on vessels in biotech facilities. This style of port is flush to the vessel wall to minimize crevices. The port is installed at a 15° angle to allow for proper sensor performance. See the cutaway drawing to the right for typical installation dimensions.

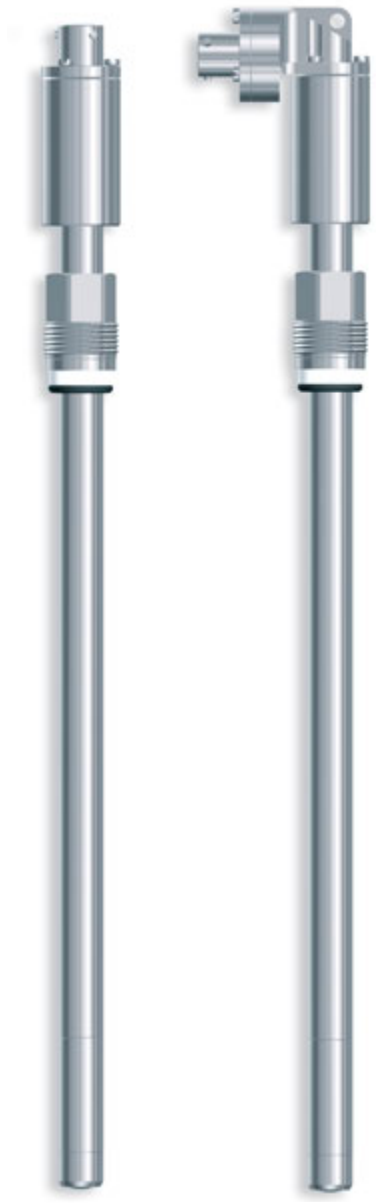


D215 Installed in NovAseptic Port

The Model D210 or D215 sensor installed in a NA-connect® port offers potential benefits in biotech applications. The unique design of the port offers increased drainage around the port and most effective Clean-In-Place (CIP). The flush port allows the use of a 19 mm sensor front end, since there is no need for a forward o-ring to seal the sensor into the vessel. Minimizing or eliminating the cracks or crevices improves cleanability.



OxyProbe® 12 mm D.O. Sensors for Benchtop Vessels



Model D140
220 mm length

Model D145
220 mm length

It is important to regularly maintain the sensors by inspecting and calibrating them. The membrane cartridge should be checked and refilled prior to every use.

Model D140 Series OxyProbe® D.O. Sensors

The OxyProbe 12 mm dissolved oxygen sensor offers the most rugged and versatile design for benchtop vessels. The compact profile saves space on a crowded headplate. It will fit directly into any 12 mm multipurpose port with standard compression fittings or Pg13.5 threads. The small diameter facilitates D.O. measurement in small volumes, especially bottles and spinner flasks.

The OxyProbe 12 mm D.O. sensor has the same rugged performance as the 19 mm and 25 mm sensors. This polarographic sensor utilizes the longer silver anode and small cathode which has become the industry standard. It also uses the same gas-permeable, silicon/teflon composite membrane, reinforced with stainless steel mesh.

For peformance specifications see page 35.

All OxyProbe dissolved oxygen sensors are available with a right angle connector. This low profile design provides:

- Protection against cable fatigue
- Improved grip for sensor extraction
- Increased clearance between vessels
- Reduced random sensor mobility on flat surfaces (won't roll off the table)

How to choose a sensor:

(1) Determine how far the sensor should project into the vessel.

(2) Decide whether a right angle connector is preferred over a straight connector.

(3) Choose the correct cable length and a connector. All D.O. sensors require cable and connector assemblies. See pages 74 and 75.

ordering information

Sensor Model	Sensor Length	Typical Insertion Length		Sensor Part Number
D140 Series 12 mm OxyProbe with Straight Connector				
D140	120 mm	110 mm	4.3"	D140-B120-PT-D9
D140	150 mm	140 mm	5.5"	D140-B150-PT-D9
D140	220 mm	210 mm	8.3"	D140-B220-PT-D9
D140	320 mm	310 mm	12.2"	D140-B320-PT-D9
D140	420 mm	410 mm	16.1"	D140-B420-PT-D9

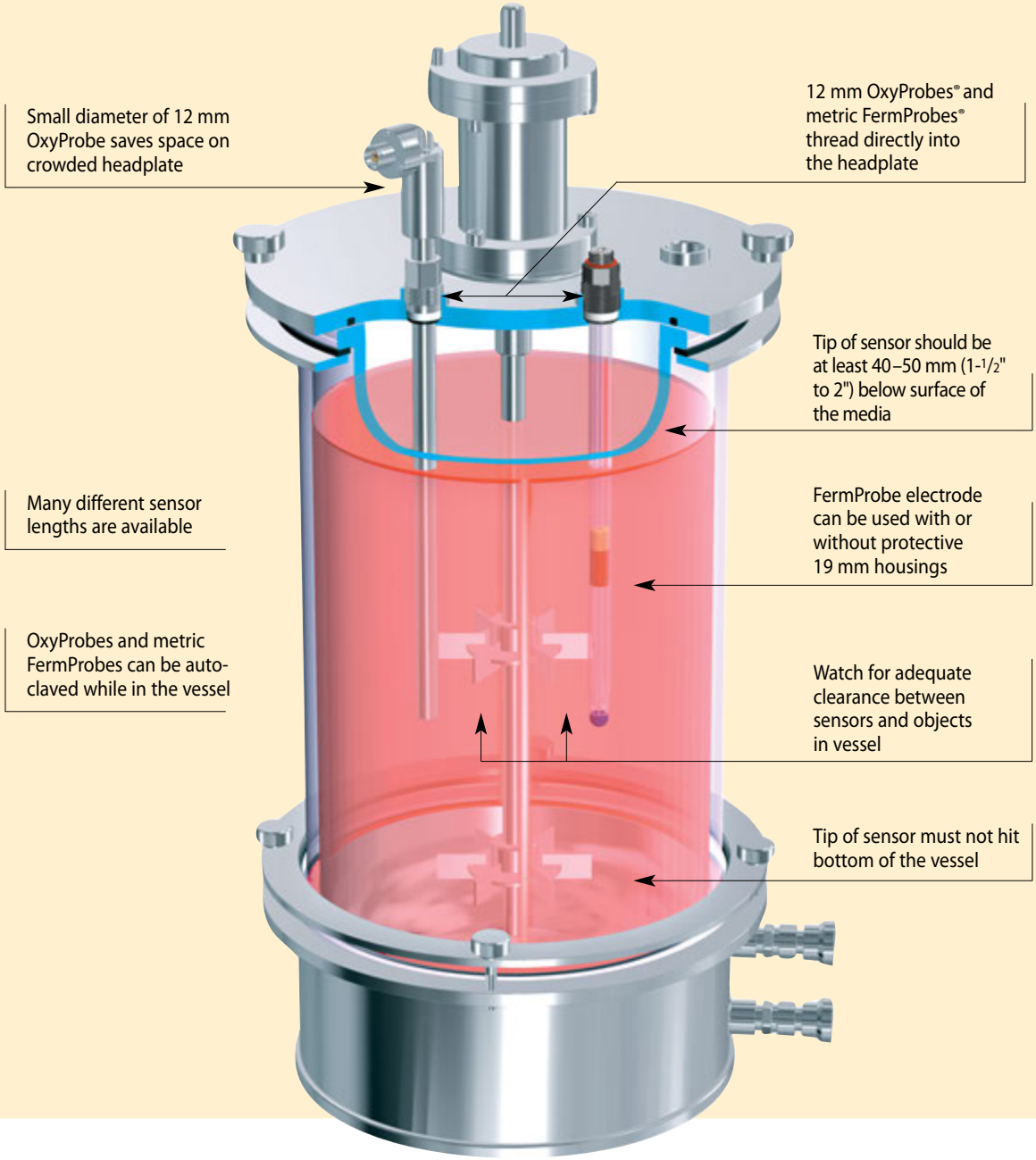
ordering information

Sensor Model	Sensor Length	Typical Insertion Length		Sensor Part Number
D145 Series 12 mm OxyProbe with Right Angle Connector				
D145	120 mm	110 mm	4.3"	D145-B120-PT-D9
D145	150 mm	140 mm	5.5"	D145-B150-PT-D9
D145	220 mm	210 mm	8.3"	D145-B220-PT-D9
D145	320 mm	310 mm	12.2"	D145-B320-PT-D9
D145	420 mm	410 mm	16.1"	D145-B420-PT-D9

TIPS & HINTS

How to Select Sensors for Benchtop Vessels

Typically a benchtop application is less than 5 L, and uses a glass vessel or flask. Usually the entire vessel can be placed or wheeled into an autoclave for sterilization prior to a run. Not only is there a wide range of different vessel sizes used in benchtop bioprocess applications, but also the volume of the media in the vessel will often change during the process. Accordingly, the sensors for benchtop vessels are available in a wide variety of lengths. The operator must choose a sensor length that ensures that the sensor tip is submerged at all times during operation. Some sensor models have been configured to thread directly into the headplate and various access ports found on small vessels. Detachable cables and other design features allow these products to withstand the demands of autoclaving requirements.



Maintenance

Service and Supplies

Improved Sensor Performance & Longevity

Broadley-James® Maintenance Supplies, Designed to make your job easier.

The primary components of a Dissolved Oxygen or pH measurement loop are the sensors and the transmitters. The sensors are designed to be as robust as possible, but still require regular inspection and maintenance. Some items,such as membrane cartridges, are consumables and need to be replaced on a frequent basis. Others, such as 4-pin connectors, provide a safe and repeatable method of restoring a damaged sensor back to "as new" condition. Still others, such as o-rings and gaskets, ensure that the effects of normal wear and tear are eliminated and optimum performance is restored. On the following pages you will find a wide variety of supplies to keep your sensors in optimum condition. If you need something not shown, just call. Broadley-James may have the item in stock or be able to direct you to where it can be found.

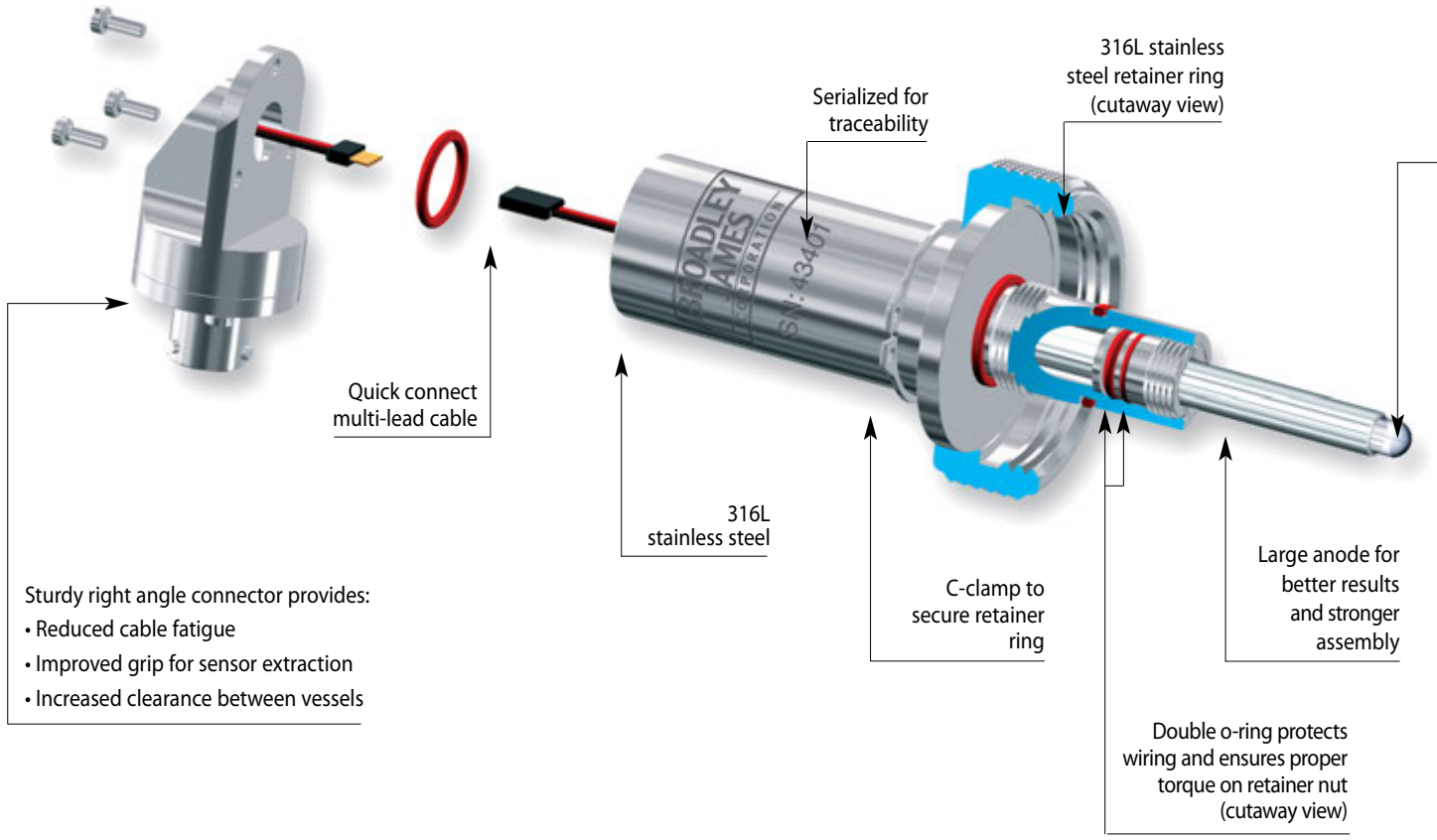
25 mm Membrane Cartridges

The OxyProbe® 25 mm membrane cartridges are a rather complex item. The body is composed of a chemical resistant polymer with a unique silicone internal bladder which contains the internal electrolyte. The shape of this bladder, combined with the shape of the polymer body, allows for the expansion of the electrolyte during the sterilization cycle without distortion of the actual sensing membrane. The sensing membrane is reinforced with an internal stainless steel mesh. Rather than use a nickel-plated brass membrane retainer ring, Broadley-James uses a 316L stainless steel retainer. The combined effect of these improvements is a durable, yet precise and repeatable, membrane cartridge assembly. Each membrane is individually leak tested and visually inspected under high magnification prior to packaging in its own protective vial.

O-rings

One of the smallest parts plays one of the biggest roles. O-rings are the first and only defense against contamination. To properly perform their intended function o-rings must have the proper fit, compression, elasticity, chemical resistance, and durability. All of our o-rings are compatible with steam sterilization and are highly chemical resistant. The sealing materials are all in accordance with FDA guidelines. Documentation of the o-ring compliance is available upon request. Over two pages of this catalog are devoted to just o-rings — every size, material, and quantity that you might need to regularly service your pH housings and D.O. sensors. An interesting and perhaps little known fact about our o-ring catalog pages is that the items are shown actual size! If you have an o-ring and are not sure of the type, just place it on top of the image in the catalog. If it matches then you have found your part.

Complete Rebuild Service for 25 mm, 19 mm and 12 mm D.O. Sensors



Broadley-James provides complete D.O. sensor rebuild service. This service includes rebuilding, testing, polishing and certifying any of the D.O. sensor designs for the cost of 1 hour of labor plus parts. While the modular design of the 25 mm and 19 mm OxyProbe D.O. sensors facilitates rapid rebuilding of the sensor by the customer, it is recommended that 12 mm D.O. sensors always be rebuilt by Broadley-James due to the difficulty in removing the anode/cathode assembly.

The Rebuild Service Consists of These 7 Steps:

1. Inspect the Connector Plug and Wiring

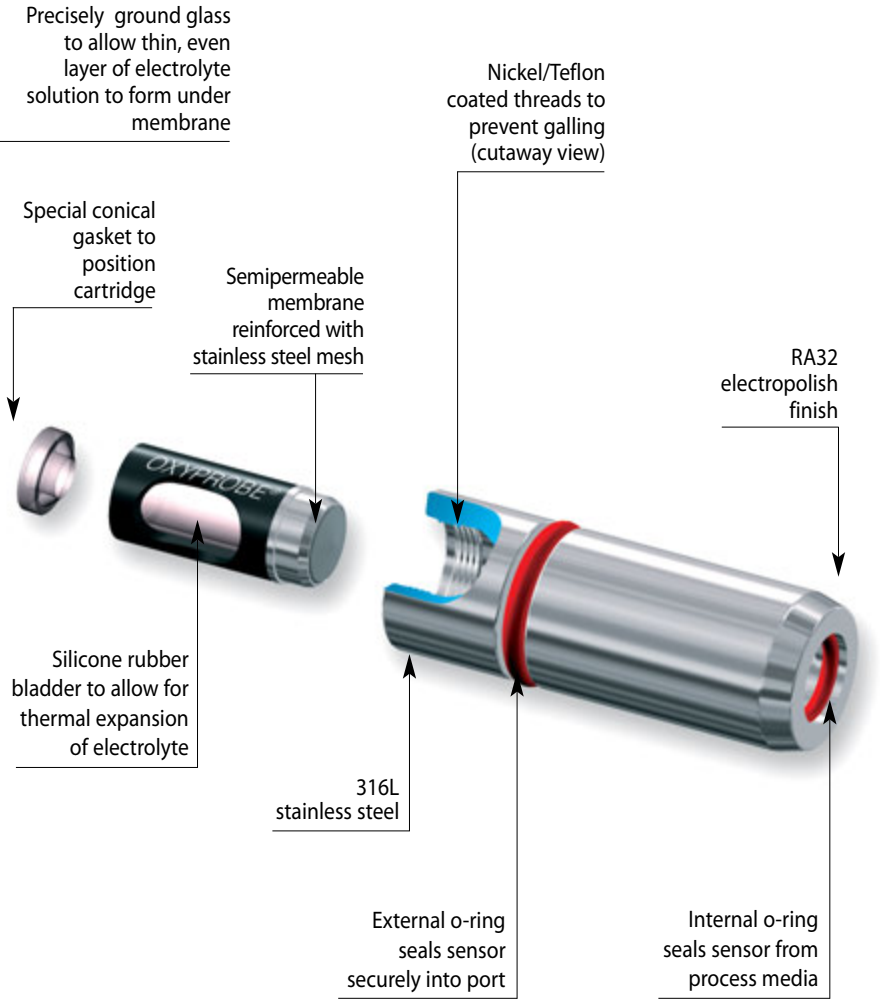
Occasionally the connector pins become bent or broken during use, so the connector will be replaced if necessary. The optional right angle connector minimizes cable fatigue and makes it easier to remove the sensor. Its low profile will also provide additional clearance between vessels. Any D.O. sensor with a straight connector can easily be converted to this right angle style.

2. Replace Cathode Assembly

This is the heart of the sensor. The glass tip should never be bumped or hit. Imperfections in the polish or curve of the tip will affect sensor readings and calibration. For example, nicks in the glass allow pools of electrolyte to form. During the process, oxygen will collect in these same spots and interfere with the reading. If a pool of electrolyte is near the platinum wire of the cathode, the sensor will not zero.

3. Replace all O-rings

All o-rings are replaced during rebuild. The unique feature of the Broadley-James D.O. sensor is that all seals are mechanical seals. There are no adhesive sealants to leak or fail while the sensor is in process.



5. Replace Membrane Cartridge

The silicone membrane is reinforced with stainless steel mesh and can easily be damaged. Just a bump on a hard surface can ruin its integrity. Eventually it will become clogged, stretched or damaged, so it should be changed regularly. Inspection and calibration of the sensor will determine when to change the cartridge. Broadley-James has designed a membrane testing kit to confirm that the membrane has not been compromised prior to use. The membrane cartridge is replaced during rebuild service.

6. Refill Electrolyte Solution

It is recommended that the electrolyte be changed after every run for the sensor to work at optimum reliability. The surface of the cathode assembly is ground to allow a thin layer of electrolyte to be trapped between the membrane and the glass. It is this solution which completes the circuit of the sensor. The electrolyte, along with the membrane, is replaced during rebuild.

7. Provide Quality Assurance Certificate and 1 -Year Warranty

As a final step, Broadley-James Corporation will heat sterilize the sensor and test it to ensure it is working correctly. A QA certificate is provided which includes the date of rebuild and calibration results. The serial numbers of the sensor and cathode are kept on file. This documentation will serve as the new warranty against manufacturer's defects in parts and workmanship.

It is much easier to replace o-ring seals rather than sealant. With sealant, it is necessary to eliminate all residue before re-applying another seal. Always inspect o-rings for wear prior to use. Good o-ring seals are critical to sensor performance for the following reasons:

- To keep moisture out of the wiring pocket allowing the sensor to withstand washdowns and autoclaving.
- To prevent the process from contaminating the sensor and wiring.
- To seal the sensor securely into the port to prevent leakage.

4. Polish the Outer Body

The sensor is polished down to the base metal. Dirt, tarnish and steam scorch marks are removed from the surface. The body of the sensor is fabricated from 316L stainless steel to withstand repeated exposure to both CIP and SIP conditions. Anything less would allow pitting and corrosion of the metal over time. The extra polishing step ensures the sensor is as clean as possible before returning it to service after the rebuild.

Replacement Parts for 25 mm and 19 mm D.O. Sensors

Cathode Removal Tool

The two notches in the bottom of this stainless steel tool fit into the grooves of the cathode retainer nut to quickly remove the nut and the cathode assembly. The knurled handle provides sufficient grip to tighten the retainer nut to the proper torque eliminating the need for additional tools.

Part Number

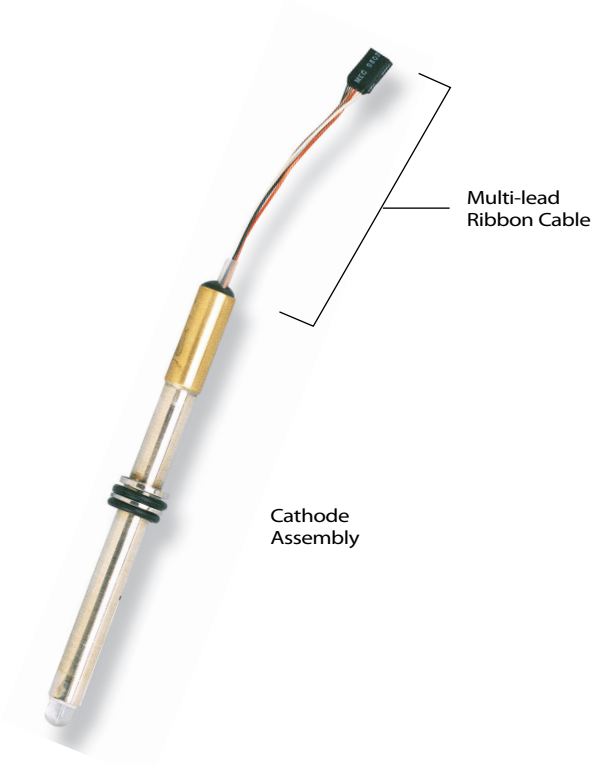
AM-9213

Cathode Retainer Nut

This retainer nut secures the cathode assembly into the sensor body. The mechanical seals on the Broadley-James electrode keep this retainer nut clean and dry. It is reusable and unlikely to need replacing unless accidentally lost during rebuild.

Part Number

AM-9210



Cathode Assembly for 25 mm and 19 mm Sensors

This part number includes the cathode assembly and both o-rings required to seal it into the sensor body. The only difference between each of the models listed below is the length of the multi-lead ribbon cable. The ribbon cable connects the assembly to the sensor's 4-pin connector.

Part Number	Sensor Length
CT25-PT-050MP	70 mm
CT25-PT-130MP	150 mm
CT25-PT-200MP	220 mm
CT25-PT-300MP	320 mm
CT25-PT-400MP	420 mm

Connectors for 25 mm, 19 mm and 12 mm D.O. Sensors

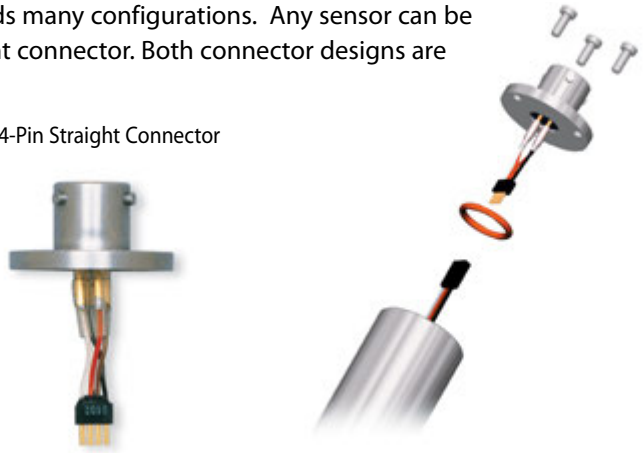
Sensor Connectors

The modular design of Broadley-James OxyProbe® sensors affords many configurations. Any sensor can be quickly converted to or from a right angle connector or a straight connector. Both connector designs are useful; choose whichever one works best for the application.

Straight 4-Pin Connector

Part Number	Description
AM-9202	25 mm Sensor
AM-9203	19 mm Sensor or 12 mm Sensor

4-Pin Straight Connector



Right Angle 4-Pin Connector Assembly

The 4-pin right angle connector assembly is comprised of 2 components, the straight connector and the right angle adapter. These parts can be purchased individually or as a set. To convert from a straight connector to a right angle connector, the 4-pin straight connector listed above needs to be replaced. The 4-pin connector used with the right angle adapter has longer connector wires to accommodate the bend in the right angle adapter. The opening in the extended elbow is a great place to easily attach a dust cap or permanent identification tag to the sensor.

25 mm Sensors

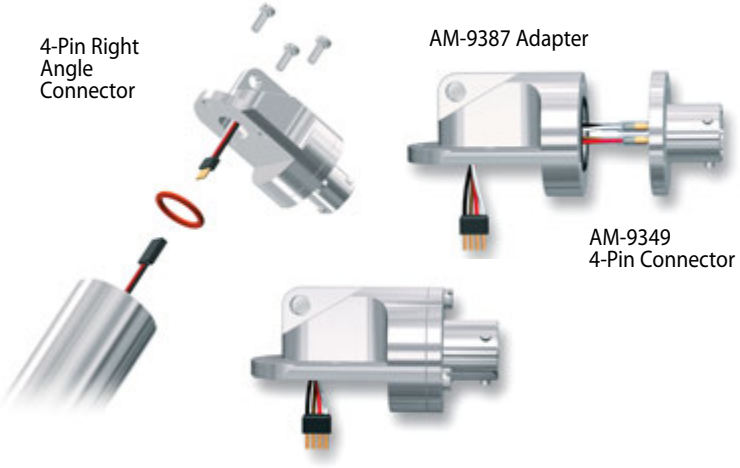
Part Number	Description
AM-9349	4-pin connector
AM-9387	Adapter
AM-9386	Right angle assembly

19 mm or 12 mm Sensors

Part Number	Descriptions
AM-9349	4-pin connector
AM-9392	Adapter
AM-9393	Right angle assembly

4-Pin Right Angle Connector

AM-9387 Adapter



AM-9349 4-Pin Connector

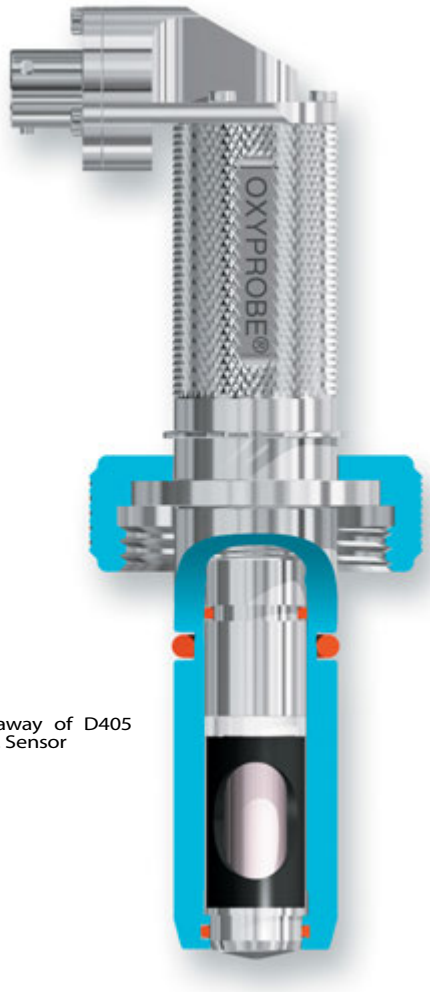
AM-9386 Complete Assembly

TIPS & HINTS

Right Angle 4-Pin Connector Assembly

The right angle connector keeps the sensor from rolling off of the table or laboratory bench and prevents cable stress caused by tight bends as the cable exits the sensor. A sensor with the old style straight connector can be easily retrofitted to use the new right angle connector, which also has a place to attach the connector dust cap and an identification tag. The right angle connector combines form and function to help make the sensors more useful and extend their life.

Membrane Cartridges for 25 mm and 19 mm D.O. Sensors



Cutaway of D405 D.O. Sensor

Membrane Cartridge for 25 mm and 19 mm D. O. Sensors

Single Cartridge Kit

This kit includes everything required to replace the membrane cartridge and internal o-rings on one 25 mm or 19 mm OxyProbe®.

This kit includes:

- One 25 ml bottle of electrolyte
- One membrane cartridge
- One set of internal o-rings

Part Number

KA2501

Four Cartridge Kit

This kit contains everything required to replace four membrane cartridges on any combination of 25 mm or 19 mm OxyProbes. Everything is conveniently packed in one box for easy storage.

This kit includes:

- One 25 ml bottle of electrolyte
- Four membrane cartridges
- Four sets of internal o-rings

Part Number

KA2504

25 Piece Cartridge Kit

This convenient bulk pack is the most popular among large volume users. It contains 25 membrane cartridges in one easy-to-store box. **Internal o-rings, gaskets and electrolyte must be ordered separately.**

Part Number

KA2525

Membrane Cartridges for 12 mm D.O. Sensors

Model D145
D. O. Sensor

Cartridge threads directly onto 12 mm D.O. Sensor

Membrane Cartridge for 12 mm D. O. Sensor

Single Cartridge Kit

This kit includes everything required to replace the membrane cartridge and internal o-rings on one 12 mm OxyProbe®.

This kit includes:

- One 25 ml bottle of electrolyte
- One membrane cartridge
- One set of internal o-rings

Part Number

KA1201

Four Cartridge Kit

This kit contains everything required to replace four membrane cartridges on a 12 mm OxyProbe. Everything is conveniently packaged in one box for easy storage.

This kit includes:

- One 25 ml bottle of electrolyte
- Four membrane cartridges
- Four sets of internal o-rings

Part Number

KA1204

25 Piece Cartridge Kit

This convenient bulk pack is the most popular among large volume users. It contains 25 membrane cartridges in one easy-to-store box. **Internal o-rings, gaskets and electrolyte must be ordered separately.**

Part Number

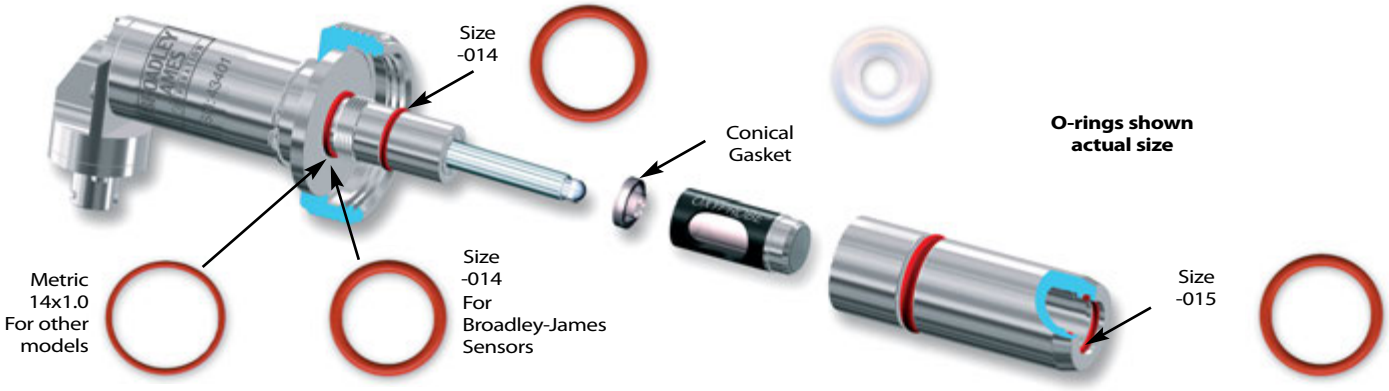
KA1225

O-rings for D.O. Sensors

Internal O-rings for 19 mm and 25 mm D.O. Sensors

O-rings need to be replaced over time. Internal o-rings for 19 mm and 25 mm D.O. sensors are included with each membrane kit. However, bulk packs are also available.

Part Number	Description	Quantity
AG-9206-10	4 internal o-rings, 1 gasket	10 sets



TIPS & HINTS

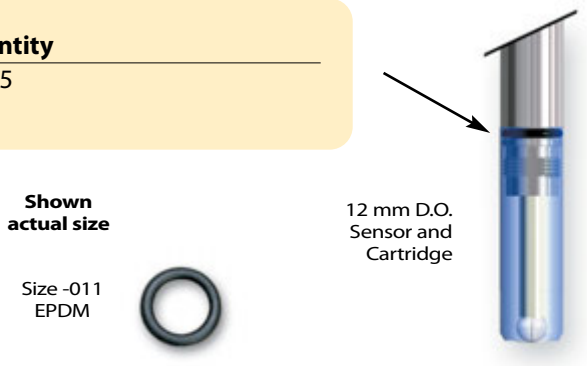
O-ring kits

The Broadley-James D.O. o-ring kit contains five o-rings, but the sensor only has four sealing points. The difference is at the first sealing point (see above). There is a bevel at the very end of the inside threads of a Broadley-James endcap. This bevel creates a pocket into which the o-ring seats securely. Some manufacturers do not have such a pocket, therefore, only a very small, thin o-ring will fit. An extra, thin o-ring is provided to fit these sensors.

Internal O-rings for 12 mm D.O. Sensors

O-rings should be on hand when changing the membrane cartridge of a D.O. sensor. These internal o-rings are included in membrane cartridge kits. However, membrane cartridge bulk packs do not include o-rings or electrolyte solution. These items must be purchased separately.

Part Number	Description	Quantity
AG-E011-25	Internal o-rings for 12 mm D.O.	25

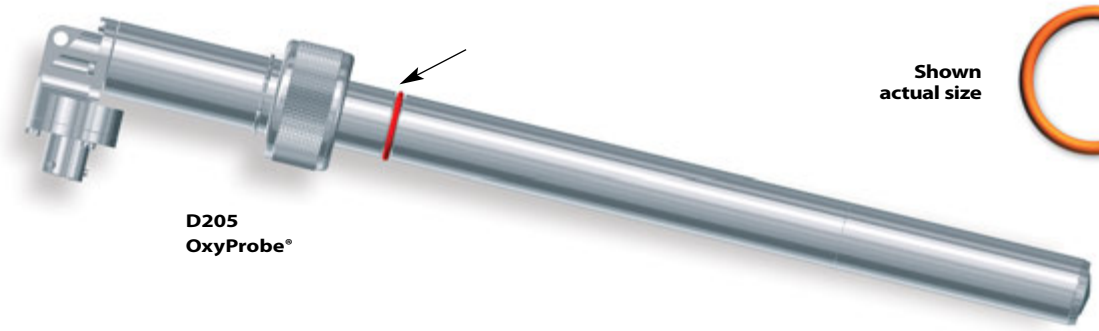


O-rings for D.O. Sensors

Part Number	Quantity
AG-S016-50	50
AG-S016-25	25
AG-S016-10	10

19 mm External O-rings

This silicone o-ring will fit the external groove of any 19 mm D.O. sensor or housing. It should be replaced regularly to ensure that the housing or sensor fits securely into the port.



D205
OxyProbe®

Shown actual size

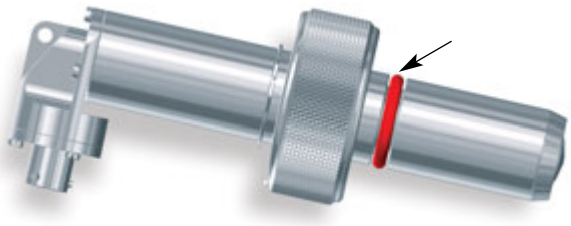
Size -016
Silicone

Part Number	Quantity
AG-SR15-50	50
AG-SR15-25	25
AG-SR15-10	10

Standard 25 mm External O-rings

The external silicone o-ring on a 25 mm D.O. sensor is the same as the one found on a 25 mm housing. It should be replaced regularly to ensure that the sensor fits securely into the port.

D405
OxyProbe®



Shown actual size

Size -R15
Silicone

Part Number	Quantity
AG-E117-50	50
AG-E117-25	25
AG-E117-04	4

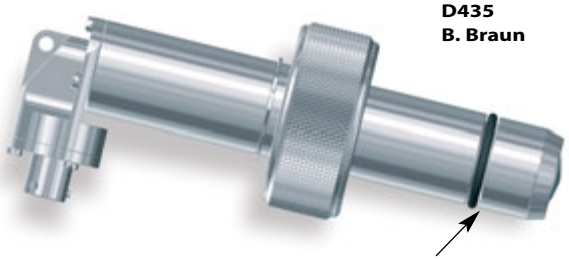
25 mm B. Braun Biotech External O-rings

The B. Braun Biotech D.O. sensors and housings have an EPDM o-ring seal. The internal diameter is slightly larger and the cross-section is slightly smaller than the external silicone o-rings found on other Broadley-James 25 mm housings and D.O. sensors.

Shown actual size

Size -117
EPDM

D435
B. Braun



O-rings for D.O. Sensors and pH Electrodes

External O-rings for 12 mm D.O. Sensors and FermProbe® pH Electrodes

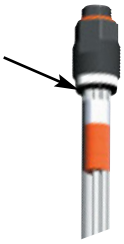
The Viton o-ring and Teflon washer found on 12 mm D.O. sensors is the same as those found on FermProbes with metric threads. These seals should last the lifetime of the sensor or electrode, but replacements can be purchased in sets of three.

Part Number	Compatible Probes	Quantity
300-P101	F-600, F-607 and F-615 FermProbes	3 sets
300-P102	F-695 and F-635 Fermprobes and 12 mm D.O. OxyProbes®	3 sets

Replacement Set Shown Actual Size

Size -111 Viton

Teflon Washer



F-635 FermProbe

F-600 FermProbe

D145 OxyProbe

TIPS & HINTS

FermProbe O-ring Sets

The difference between the above two sets of o-rings is the Teflon washer. Electrodes with the Pg13.5 metric threads require a beveled Teflon washer, which allows the o-ring and electrode to seat better when threaded into a metric threaded port or headplate. A bevel is not required for a FermProbe to seal correctly in a standard housing.

O-rings for FermProbe Connectors

In order to keep moisture out of the connector during autoclaving, FermProbes have a small o-ring gasket at the base of the connector. These o-rings should last the lifetime of the electrode. However, they may need to be replaced on occasion due to loss during handling.

Part Number	Description	Quantity
AG-S013-04	FermProbe connector o-ring	4
AG-S013-25	FermProbe connector o-ring	25

F-615 FermProbe

F-635 FermProbe

Size -013 Silicone

Actual Size O-ring

O-rings for 25mm Housings

Standard 25 mm Housing O-rings

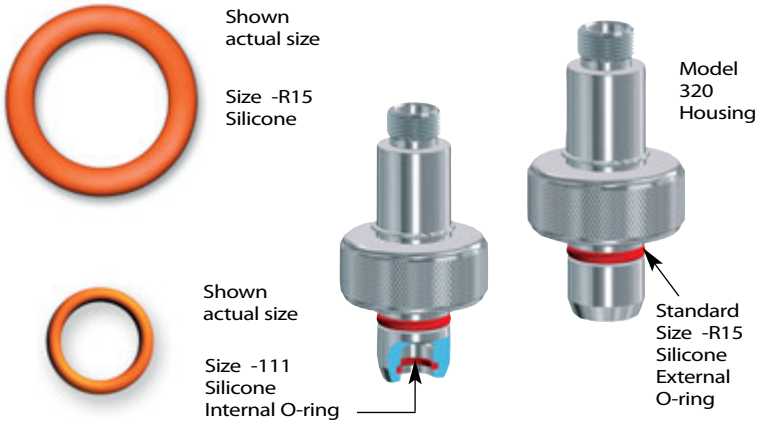
Broadley-James Models 320, 330, 370 housings use the same set of o-rings.
O-rings should be inspected regularly and replaced at the first sign of wear.

External O-rings

Part Number	Quantity
AG-SR15-50	50
AG-SR15-25	25
AG-SR15-10	10

Internal O-rings

Part Number	Quantity
AG-S111-50	50
AG-S111-25	25
AG-S111-10	10



B. Braun Biotech Housing O-rings

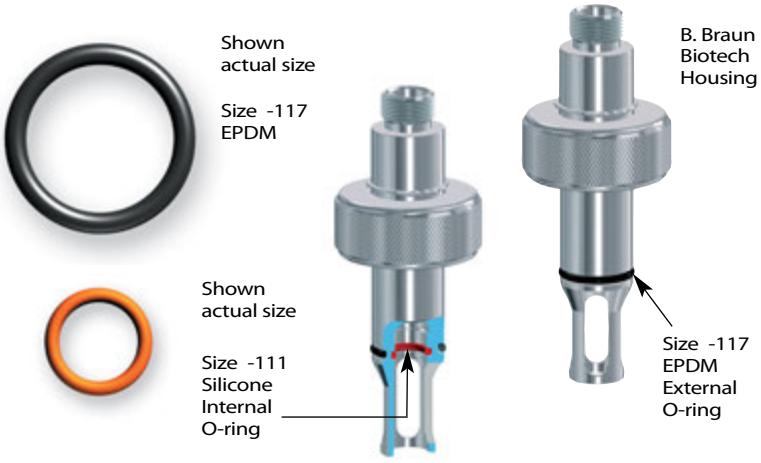
The external EPDM o-ring on the B. Braun Biotech housings, Models 322, 326 and 336, has a slightly smaller cross section than those found on other Broadley-James housings. The internal silicone o-ring is the same on all Broadley-James housings. Regular inspection and replacement is recommended. Do not use grease on any housing o-ring.

External O-rings

Part Number	Quantity
AG-E117-50	50
AG-E117-25	25
AG-E117-04	4

Internal O-rings

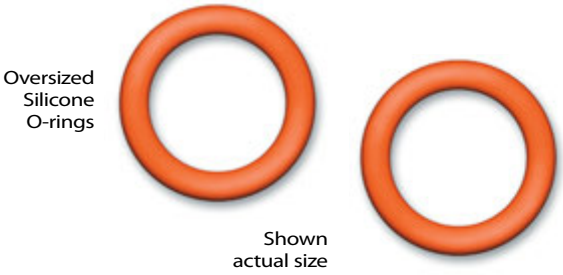
Part Number	Quantity
AG-S111-50	50
AG-S111-25	25
AG-S111-10	10



Oversized 25 mm O-rings

Broadley-James also offers a thicker, more pliable o-ring for certain applications. It has a larger o.d., but is more compressible than other silicone o-rings. It can be used on any standard 25 mm housing or D.O. sensor. This unique o-ring was designed to compensate for port imperfections such as a port that is out-of-round or has an i.d. slightly greater than 25 mm.

Part Number	Quantity
AG-SF25-10	10



Accessories

Line-Powered Four-Station
D.O. Sensor Polarizer

pH & D.O. Sensor Simulator
for Troubleshooting
Instrumentation and
Cable Assemblies

Calibration, Diagnostics and Storage Accessories

The primary components of a measurement loop are the sensors and transmitters. However, when readings are suspect or if noise and interference are a problem, it can be hard to find the source of the problem without having the proper equipment. Many of the accessories are designed with troubleshooting in mind, allowing the metrology department or even the operator to diagnose equipment quickly and efficiently.

pH & D.O. Sensor Simulator

It is difficult to tell whether a problem with a measurement is due to a faulty sensor, or to a faulty cable or instrument. By substituting the pH & D.O. simulator in place of the sensor, a technician can verify if the cable and transmitter are configured correctly. While not intended to "calibrate" a loop, this high precision device mimics the sensor electronically. Problems with the transmitter or cable will become evident when testing, which can save hours trying to examine and diagnose a functioning sensor. Conversely, if the simulator works well on the system, then the technician knows to focus on the sensor for possible difficulties.

Four-Station Polarizer

Polarization plays an important role in the calibration of a D.O. sensor. A sensor which has not been completely polarized can be calibrated to 100%, but any attempt to do a zero calibration may result in an elevated zero value. Initially, D.O. sensors take a minimum of several hours to reach a completely polarized condition. If time is short and a few percent error is not critical, it should be noted that about 98% of the polarization occurs in the first 30 minutes. Another way to save time is to store the sensor attached to a Broadley-James OxyProbe® sensor polarizer. This four-station, line-operated device keeps four sensors polarized and ready for use. As an added feature, it contains a testing station for the battery operated single-station polarizer. Simply attach the battery polarizer to the connector and check the status lights. Two green lights indicate the correct millivolt output and enough battery left to perform the job.

Single-Station Polarizer

A standard in the industry, this battery powered device keeps D.O. sensors polarized as they wait for service. Note that these polarizers should not be autoclaved, since the batteries cannot survive the high temperature involved.

Dust Caps, Ports, Plugs, Cleaning Kits

Broadley-James offers a wide variety of spare parts and accessories to make routine maintenance and upkeep of the sensor a simple process. Purchased in small quantities or large, there are no minimum orders or other penalties should you need a little something to make your system perfect.

pH and D.O. Storage

Benchtop Free Standing Storage Containers

Stanchion Mount Storage Containers for Pipe or Vessel Mounting

Mounting Hardware Kits for Stanchion Mount

Storage Containers

These strong storage containers were designed for industrial applications requiring an easily accessible, short-term, remote storage location for pH electrodes during tank maintenance to prevent the electrodes from dehydrating.

Free standing storage containers for benchtop use.

Part Number	Housing Length
301-P109-H070	≤ 70 mm
301-P109-H150	≤ 150 mm

Stanchion mount storage containers for pipe or vessel mounting.

Part Number	Housing Length
301-P110-H070	≤ 70 mm
301-P110-H150	≤ 150 mm

Mounting hardware kit for stanchion mount.

300-P111-0200	For 50 mm (2") Pipe Diameter

4-Pack of Soaker Bottles

Soaker Bottle

Soaker bottles provide protection for any 12 mm pH electrode or D.O. sensor during transportation or storage. The o-ring fits securely against the sensor body, sealing the solution from the atmosphere to minimize evaporation, prevent spillage and increase solution life. Soaker bottles should be filled with buffer for D.O. sensor storage or KCl solution for pH electrode storage. Soaker bottles are available in a convenient 4-pack.

Part Number
AM-1090-12

pH Accessories

Buffer Solution

Precision reference buffers of pH values 4, 7 and 10 are available in 500 ml size bottles. Certificates of Analysis will be included with each bottle. The pH temperature chart is on the label.

Part Number	Description	Size
AS-3220-C30-0500	Buffer, pH 4	500 ml
AS-3221-C30-0500	Buffer, pH 7	500 ml
AS-3222-C30-0500	Buffer, pH 10	500 ml

Buffer Solution pH 4

Buffer Solution pH 7

Buffer Solution pH 10

pH Electrode Storage Solution

Potassium Chloride (KCl) solution is the first choice for storing FermProbes®. If this is not available, buffer solution can be used. NEVER store pH electrodes in deionized (DI) water.

Part Number	Description	Size
AS-3120-C20-0500	Electrode Storage Solution (KCl)	500 ml

Electrode Storage Solution

Standard Replacement Autoclave Cap

Every FermProbe with a detachable cable is shipped with an autoclave cap and a sealing o-ring. This cap should be used every time the electrode is autoclaved, to prevent moisture from resting in crevices of the connector.

Part Number	Description	Quantity
300-P103-05	S8 Cap	5
300-P203-05	K9 Cap	5

S8 Autoclave Cap

K9 Autoclave Cap

Cable Adapter

This cable adapter converts any pH cable with an AK9 connector to a standard FermProbe connector. This rugged adapter can remain on the cable when not in use.

Part Number
E-1245-AAD-DZ

Cable Adapter

Retainer Rings for pH & D.O. Sensors & Housings

Retainer Ring for 25 mm Port

All port retainer rings from Broadley-James Corporation are 316L stainless steel. Housings and D.O. sensors come with an attached retainer ring, however, the ring may need to be replaced due to loss or damage.

Part Number	Height	Description
AM-9200	0.87″ (22 mm)	Current Style
AM-9363	0.70″ (18 mm)	Old Style

Since 1999, Broadley-James Corporation has been supplying housings and D.O. sensors with a slightly taller retainer ring than in the past. The taller ring and additional threads were necessary to be compatible with the new safety ports offered by B. Braun Biotech and other vessel manufacturers. These taller rings will fit most old and new ports.

19 mm Port
Retainer Ring

19 mm Port Retainer Ring

This port retainer ring will fit most 19 mm ports. The threads on the 19 mm port are finer than those on a 25 mm port. The ring is made of 316L stainless steel.

Part Number
AM-9201

Accessories for All D.O. Sensors

Membrane Cartridge Test Kit

Although the membrane is reinforced with stainless steel mesh, it is easy to damage the surface. A slight impact on a hard surface can damage the membrane and affect sensor performance. If cartridges are to withstand multiple cycles, it is critical to confirm that the membrane has not been compromised from the prior run. A quick test with this device assures that the membrane is in good condition.

Part Number

AM-9425

Membrane Tester

D.O. Electrolyte Solution

In critical biotech applications, the electrolyte should be changed after every run to yield the best results. The shelf life of this solution is approximately 2 years. Lot numbers and expiration dates are clearly marked on each bottle for tracking.

Part Number	Description
AS-3140-C30-0025	25 ml—Approx. 10 cartridge refills
AS-3140-C30-0250	250 ml—Approx. 100 cartridge refills

D.O. Electrolyte Solution

Cable and Sensor Connector Dust Caps

Two different dust caps are available from Broadley-James. One to protect the D4 cable connectors and the other to protect the 4-pin D.O. sensor connection. The dust caps protect the connectors from damage and moisture when not in use.

Part Number

AM-9212

AM-9219

AM-9219 Cable Connector Dust Cap

AM-9212 Sensor Connector Dust Cap

D.O. Sensor Cleaning Kit

Periodic cleaning of the cathode surface with a toothbrush and toothpaste, followed by a D.I. water rinse, has proven to be an effective and simple method for the removal of contamination on the cathode and anode surfaces. The kit includes a bottle of cleaning paste, a soft brush, and two pieces of micron polishing paper.

Part Number

AM-9389

D.O. Sensor Cleaning Kit

Ports and Plugs

25 mm Port Plugs

There are three styles of plugs available from Broadley-James Corporation for straight threaded ports. All are designed to accommodate 25 mm ports and are made from 316L stainless steel. The primary difference in each design is the placement of the o-rings.

Model 300 Straight Plug

Model 303 Straight Plug

Straight Port Plug for Standard 25 mm Port

While these two plugs have the same body dimensions, the o-ring on the Model 303 is further forward, providing a better fit in precision honed ports. The o-rings are silicone, and the distance listed is measured from the inside flange to the top of the o-ring groove.

Model	Part Number	Distance from flange
300	AF-300-61-L040	0.43″ (11 mm)
303	AF-303-61-L040	1.17″ (30 mm)

B. Braun Biotech Plug

Straight Plug for B. Braun Biotech 25 mm Port

The longer body and forward o-ring are necessary for this plug to properly seal in a B. Braun Biotech port. The unique design of these ports makes the position of the o-ring critical for an effective seal. The o-ring is EPDM to conform with B. Braun Biotech's specifications. For more information regarding port identification, see pages 18 and 19.

Part Number	Description
AF-305-62-L055	Straight plug For use with 25 mm B. Braun Biotech ports

Straight 25 mm Threaded Port

Broadley-James offers two 25 mm straight threaded ports, both made of 316L stainless steel. Their i.d. varies to accommodate two different approaches to welding a port to a vessel. The Model 100 has an inner diameter of 25 mm to allow immediate use after welding. The Model 105 has a slightly smaller i.d. to allow the port to be honed out to the proper diameter after it has been attached to the vessel. This second approach is more forgiving of different welding techniques.

Straight Port

Model	Part Number	Description
100	AF-100-60-L040	25 mm port
105	AF-105-60-L040	Undersized 25 mm port

TIPS & HINTS

Ports & Plugs Although the 25 mm threaded port is a standard within the biotech industry, the term "standard port" is no guarantee that two ports will be exactly the same. The overall length of a 25 mm port may vary from tank to tank. This variation is often due to the wall thickness of the tank and the manufacturer's specifications. If a particular sensor or plug is not sealing properly in a port, measure the length of the port and compare it to the position of the o-ring. Perhaps a different plug or sensor will work better.

Chamfered 25 mm Threaded Port

This port style is the one most commonly found in the biotech industry. Proper installation will yield a side mounted port at 15˚ above horizontal. This angle is ideal for D.O. or pH measurement. The measured length is 40 mm from the top of the port to the bottom of the longer side.

Chamfered 25 mm Threaded Port

Part Number	Description
AF-110-60-L040	Standard threaded port, chamfered (15º angle), 25 mm i.d.

Chamfered Threaded Port

Chamfered 25 mm Plug

When properly nstalled, the bottom of this plug should be flush with the tank wall. The length is 40 mm from the inside flange to the end of the longer side of the plug.

i

Chamfered 25 mm Plug

Part Number	Description
AF-310-61-L040	Chamfered plug, 25 mm o.d.

Chamfered Plug

Calibration Accessories for All D.O. Sensors

D.O. Signal Simulator

D.O. Signal Simulator

The simulator isolates the transmitter by mimicking the load of a D.O. sensor. In doing so, the simulator can help confirm whether fluctuations in the display are caused by the sensor or by EMF interferences. A two position switch allows simulation of either 0% or 100% saturation.

Part Number

AM-9222

Single Station Module
(Battery Powered)

Four Station Module
(Line Powered)

Polarization Modules

D.O. sensors may need to be polarized for several hours prior to calibration and use. Polarization modules allow the sensor to be polarized without tying up a transmitter.

Battery Powered Polarizer

The single station, battery operated module attaches directly to any OxyProbe®. It uses a lithium battery, with a five year life span, which should be checked annually. This polarization module allows maximum portability of a polarized sensor.

Part Number

AM-9221

115 VAC Powered Polarizer

The four-station module plugs into any 115 VAC outlet to continuously polarize up to four sensors at 675 mV. The included cables connect the sensors to the polarizer. This polarization module has an additional terminal to check the battery of a single station polarization module.

Part Number

E-1807-AAM-DZ

Calibration Caps

Calibration Caps

Calibration caps slide onto the sensing end of a sensor providing an easy way to flush with N_2. This makes it easier to zero the sensor and check its responsiveness and calibration. Any tubing with a 6 mm (1/4") i.d. attaches easily to the barbed end of the cap. The conical shape of the cap helps prevent the tip of the sensor from accidentally bumping the bottom of the cap, which would damage the membrane.

Part Number	Sensor Length
AM-9351	12 mm sensor
AM-9293	19 mm sensor
AM-9292	25 mm sensor

pH & D.O. Sensor Simulator

- NEW, REDESIGNED SIMULATOR WITH DIGITAL DISPLAY
- A TROUBLESHOOTING DEVICE for both pH and D.O.
- USED FOR TESTING CABLES AND TRANSMITTERS
- NEW, RUGGED ENCLOSURE

HOW IT WORKS

pH

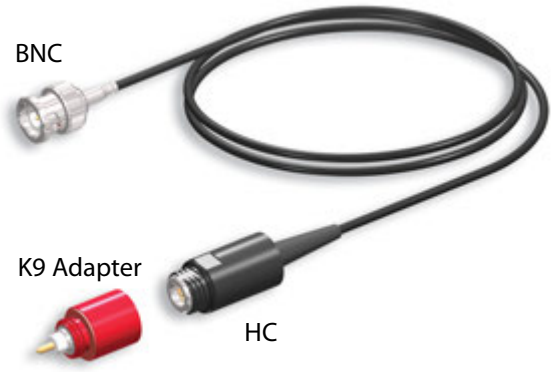
When a pH meter is reading incorrectly the simulator helps determine if the problem is related to the electrode or to the transmitter. It simulates pH and mV values: from 0-14 pH units in 1 pH unit increments (±414 mV). The simulator operates on a 9-volt battery and has a BNC connector, which attaches to the pH cable adapter.

Dissolved Oxygen

The simulator isolates the transmitter by mimicking the load of a D.O. sensor. The 4-pin connector attaches directly to the D.O. cable, in place of the sensor. In doing so, the simulator can help confirm whether fluctuations in the transmitter display are caused by the sensor, or caused by problems with the instrument or cable.

pH SIMULATOR CABLE & ADAPTER

One of the accessory pH cables included with the simulator allows the HP or K9 plug on the instrument pH cable to be attached to the BNC jack on the simulator.



FEATURES AND APPLICATIONS

Troubleshooting Device Isolates Transmitter

The Broadley-James pH & D.O. Simulator allows the operator to troubleshoot a questionable pH or D.O. measurement by isolating the transmitter and cables from the actual pH and D.O. sensor inputs.

Diagnostic Tool Simulates Sensor Input

It simulates an ideal pH electrode or D.O. sensor. Simply attach the simulator in place of the pH electrode or D.O. sensor, and check for the appropriate responses from the transmitter.

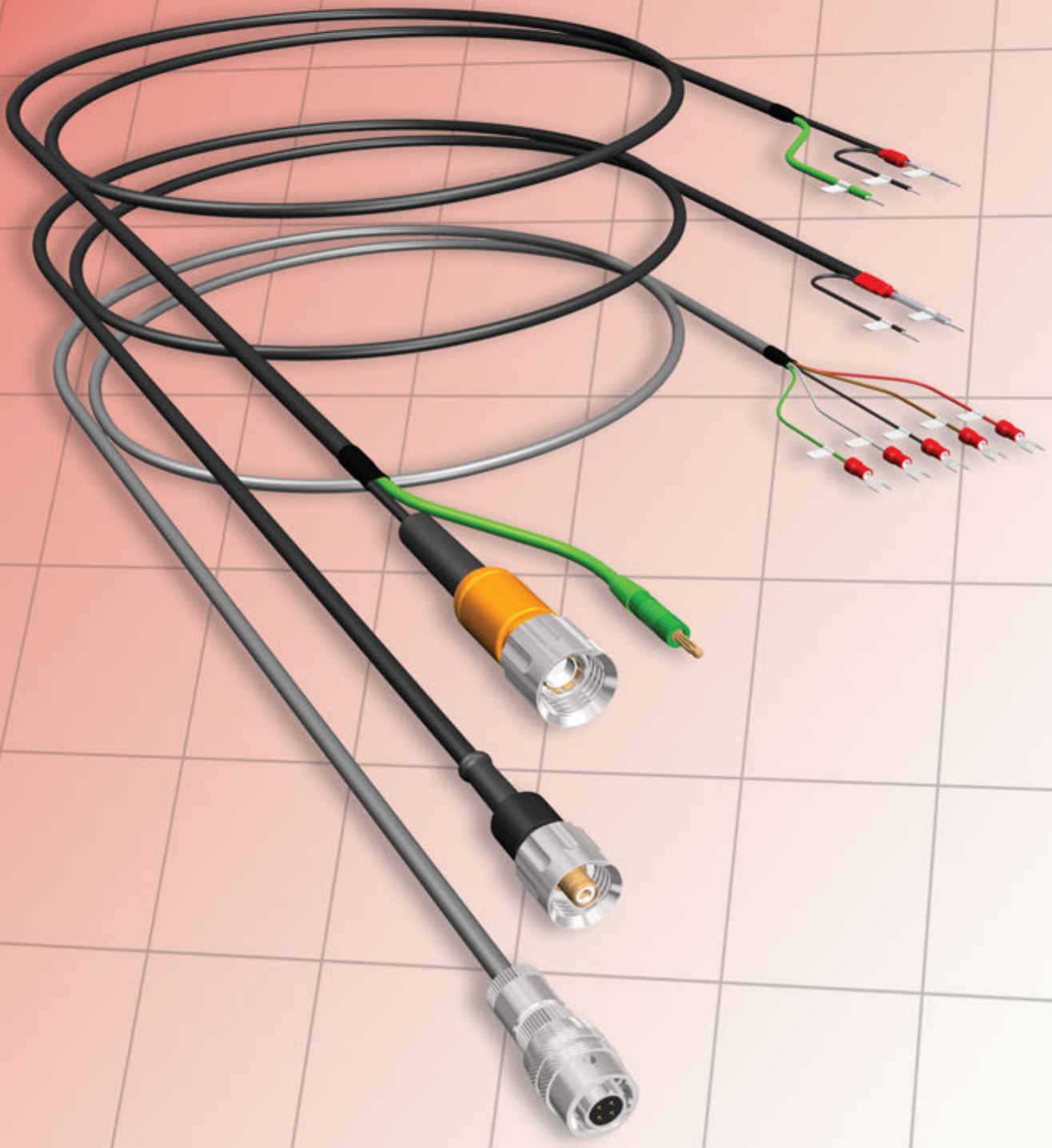
Technical Specifications

- pH Output: 0-14 pH in 1 pH increments
- D.O. Output: 0% sat (0 nA)
  100% sat (~67 nA)
  300% sat (~200 nA)
- Auto Off Feature
- Tactile Membrane Keypad
- Includes 3 different pH cables to accomodate the most common transmitter connections

ordering information

Part Number	Description
AM-9504	pH & D.O. Sensor Simulator Kit

Cables



New & Improved Cable & Connector Designs

Improved Stainless Steel pH Connectors

Broadley-James offers both types of industry standard connectors, the "S8" and the "K9", which have been used for decades with proven performance in fermentation applications. Where improvements were needed, such as in the durability of the cable connector, the existing style was improved by switching to a solid 316L stainless steel shell. This approach solved the problem while preserving the function of the installed base of equipment. These industry standard connectors are the first, and still the best, choice for pH sensors.

Special Low-Noise Coaxial Cable

Some suppliers use standard coaxial cables for pH and D.O. sensors, and while functional, they are not optimal. If such cables are pinched or sharply bent the inner shielding is compromised and the sensor is subject to interference from electromagnetic noise. Broadley-James has found that the environments around a fermentation tank or bioreactor are full of such sources, including agitators, solenoids, electronic valves, and pumps, and use a different style cable instead. These cables have an extra layer of shielding, lying just below the traditional outer braid. It is composed of an electrically conductive polymer and provides for 100% shielding, even when the cable is tightly bent or stressed. This cable is custom made for Broadley-James and is standard on all cables, at no extra charge.

Improved D.O. Sensor Connector

The "D9" connector used on Broadley-James D.O. cables has been used for decades in the industry. However, while the same connectors are used, other companies construction methods are not used. Instead, not only are the leads soldered to the internal gold contacts, they are then coated with epoxy. This seals them in place and acts as a second barrier should any moisture penetrate. The added step, combined with an improvement in the cable compression fitting, prevents the cable from pulling loose from the contacts after extensive service. The end result is a longer lasting installation. The D.O. cable assemblies are made with the same custom fabricated low-noise coaxial cable that is used for the pH cables.

The Market Leader in pH and D.O. Cable and Connector Design

Broadley-James Corporation does not believe in changing the basic design of connectors every few years, forcing customers into buying new equipment to keep current. Instead, Broadley-James strives to make improvements "backwards compatible" so they can be used with new equipment as well as the old. Broadley-James strives to protect investments, and help leverage them into the future. Improvements are made with the customer process in mind.

New & Improved pH Cable Assemblies for T-Pull and S8 Metric Caps

Stock Cable Assemblies for All F-615 and F-635 FermProbe® pH Electrodes

The BioProcess Technologies® Catalog offers a wide range of cable assemblies to connect FermProbe pH electrodes with all of today's pH transmitters and benchtop controllers.

- The cables and electrodes are color coordinated so that the black HP electrode plug will connect to the standard S8 black cap on the pH electrode.
- Stock cable assemblies feature the most commonly requested cable lengths and connector schemes.
- Choice of flexible, lightweight 3 mm or rugged 5 mm low noise coaxial cable.
- Cables are tagged with replacement part numbers to enhance field serviceability.
- Cable assemblies are 100% tested for continuity, polarity, and the absence of short circuits.

Cable Type:

Type A 3 mm, low noise, shielded coaxial cable, lightweight and very flexible. 3 mm cable is frequently chosen for benchtop installations where space is at a premium and cables are required to make many sharp turns and twists.

Type M 5 mm, low noise, shielded coaxial cable. Thicker and more rugged, the 5 mm cable is often specified for pilot and process installations.

Type N 5 mm, low noise, shielded coaxial cable, jacketed with an extra lead for connecting solution ground to differential input style transmitters.

A wide selection of connectors is available upon request.

Custom assemblies to meet unique cabling requirements

How to Order Custom Cables

Ask for the Custom Cable Worksheet to specify custom cable assembly requirements. Return it by fax or mail to receive a quotation within 24 hours.

ordering information

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
HP Electrode Plug to BNC Plug • Lightweight and highly flexible 3 mm cable • Connects to most NBS and Applikon vessel controllers					
AX-1000-HP-A03BC	HP plug	A	3 ft (1 m)	BNC plug	
AX-1000-HP-A06BC	HP plug	A	6 ft (2 m)	BNC plug	
AX-1000-HP-A10BC	HP plug	A	10 ft (3 m)	BNC plug	

A B

HP Electrode Plug BNC Plug

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
HP Electrode Plug to BNC Plug • Rugged 5 mm cable • Connects to most NBS and Applikon vessel controllers					
AX-1000-HP-M03BC	HP plug	M	3 ft (1 m)	BNC plug	
AX-1000-HP-M06BC	HP plug	M	6 ft (2 m)	BNC plug	
AX-1000-HP-M10BC	HP plug	M	10 ft (3 m)	BNC plug	

A B

HP Electrode Plug BNC Plug

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
HP Electrode Plug to DIN 19262 Plug • Rugged 5 mm cable					
AX-1000-HP-M03DN	HP plug	M	3 ft (1 m)	DIN plug	
AX-1000-HP-M06DN	HP plug	M	6 ft (2 m)	DIN plug	
AX-1000-HP-M10DN	HP plug	M	10 ft (3 m)	DIN plug	

A B

HP Electrode Plug DIN 19262 Plug

ordering information

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
HP Electrode Plug to Spade Lugs • Rugged 5 mm cable • Typically connects to terminal strips found in junction boxes					
AX-1000-HP-M03SL	HP plug	M	3 ft (1 m)	Spade Lugs	
AX-1000-HP-M06SL	HP plug	M	6 ft (2 m)	Spade Lugs	
AX-1000-HP-M10SL	HP plug	M	10 ft (3 m)	Spade Lugs	

HP Electrode Plug

Spade Lugs

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
HP Electrode Plug to Crimped Ferrules • Rugged 5 mm cable • Connects to either terminal blocks or terminal strips					
AX-1000-HP-M03FF	HP plug	M	3 ft (1 m)	Crimped Ferrules	
AX-1000-HP-M06FF	HP plug	M	6 ft (2 m)	Crimped Ferrules	
AX-1000-HP-M10FF	HP plug	M	10 ft (3 m)	Crimped Ferrules	

HP Electrode Plug

Crimped Ferrules

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
HP Electrode Plug with Solution Ground to Crimped Ferrules • Rugged 5 mm cable • Connects to either terminal blocks or terminal strips					
AX-1000-H5-N03FF	HP plug[1]	N	3 ft (1 m)	Crimped Ferrules	
AX-1000-H5-N06FF	HP plug[1]	N	6 ft (2 m)	Crimped Ferrules	
AX-1000-H5-N10FF	HP plug[1]	N	10 ft (3 m)	Crimped Ferrules	

Note 1: This HP plug has additional 7" (18 cm) solution ground lead to plug into electrode housing.

HP Electrode Plug
with Solution Ground Lead

Crimped Ferrules

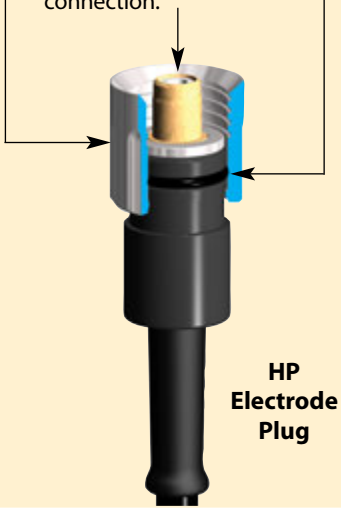
TIPS & HINTS

New & Improved Standard HP Plug

1. Thick walled 316 stainless steel shell is free spinning to reduce cable twisting.

2. O-ring is seated in a precisely machined groove, which provides a better seal to keep the connector moisture-free.

3. Gold plated pH connection.



HP Electrode Plug

New & Improved pH Cable Assemblies for K9 Metric Caps

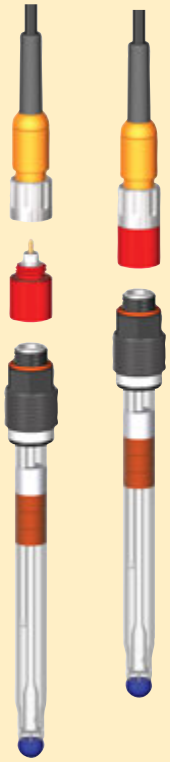
Stock Cable Assemblies for All F-695 FermProbe® pH Electrodes

The BioProcess Technologies® Catalog offers a wide range of cable assemblies to connect FermProbe pH electrodes with all of today's pH transmitters and benchtop controllers.

- Cables with the KP electrode plug fit on all brands of pH electrodes that use the K9 cap.
- The cables and electrodes are color coordinated so that the orange KP electrode plug will connect to the orange K9 cap on the pH electrode.
- Choice of rugged 5 mm or 6 mm low noise coaxial cable.

TIPS & HINTS

How to Convert Cables with a KP Electrode Plug to Work with the F-635 FermProbe® pH Electrodes



E-1245 Adapter

Step 1: Thread the adapter into an AK9 cable plug.

Step 2: Adapter and cable are now converted to work with the FermProbe pH electrode disconnect cap.

E-1245 Adapter **Part Number:** E-1245-AAD-DZ

ordering information

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
KP Electrode Plug to BNC Plug • Rugged 5 mm cable • Connects to most NBS and Applikon vessel controllers					
AX-1000-KP-M03BC	KP plug	M	3 ft (1 m)	BNC plug	
AX-1000-KP-M06BC	KP plug	M	6 ft (2 m)	BNC plug	
AX-1000-KP-M10BC	KP plug	M	10 ft (3 m)	BNC plug	

A B

KP Electrode Plug BNC Plug

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
KP Electrode Plug to DIN 19262 Plug • Rugged 5 mm cable					
AX-1000-KP-M03DN	KP plug	M	3 ft (1 m)	DIN plug	
AX-1000-KP-M06DN	KP plug	M	6 ft (2 m)	DIN plug	
AX-1000-KP-M10DN	KP plug	M	10 ft (3 m)	DIN plug	

A B

KP Electrode Plug DIN 19262 Plug

Cable Type:

Type M 5 mm, low noise, shielded coaxial cable is thicker and more rugged. The 5 mm cable is often specified for pilot and process installations.

Type Z 6 mm, low noise, shielded triaxial cable is jacketed with an extra lead for connecting solution ground to differential input style transmitters.

How to Order Custom Cables

Ask for the Custom Cable Worksheet to specify custom cable assembly requirements. Return it by fax or mail to receive a quotation within 24 hours.

Cables are tagged with replacement part numbers to enhance field serviceability.

Cable assemblies are 100% tested for continuity, polarity, and the absence of short circuits.

Stock cable assemblies feature the most commonly requested cable lengths and connector schemes.

ordering information

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
KP Electrode Plug to Spade Lugs • Rugged 5 mm cable • Typically connects to terminal strips found in junction boxes					
AX-1000-KP-M03SL	KP plug	M	3 ft (1 m)	Spade Lugs	
AX-1000-KP-M06SL	KP plug	M	6 ft (2 m)	Spade Lugs	
AX-1000-KP-M10SL	KP plug	M	10 ft (3 m)	Spade Lugs	

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
KP Electrode Plug to Crimped Ferrules • Rugged 5 mm cable • Connects to either terminal blocks or terminal strips					
AX-1000-KP-M03FF	KP plug	M	3 ft (1 m)	Crimped Ferrules	
AX-1000-KP-M06FF	KP plug	M	6 ft (2 m)	Crimped Ferrules	
AX-1000-KP-M10FF	KP plug	M	10 ft (3 m)	Crimped Ferrules	

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
KP Electrode Plug with Solution Ground to Crimped Ferrules • Rugged 6 mm cable • Connects to either terminal blocks or terminal strips					
AX-1000-K5-N03FF	KP plug[1]	B	3 ft (1 m)	Crimped Ferrules	
AX-1000-K5-N06FF	KP plug[1]	B	6 ft (2 m)	Crimped Ferrules	
AX-1000-K5-N10FF	KP plug[1]	B	10 ft (3 m)	Crimped Ferrules	

Note 1: This KP plug has an additional 7" (18 cm) solution ground lead to plug into the electrode housing.

TIPS & HINTS

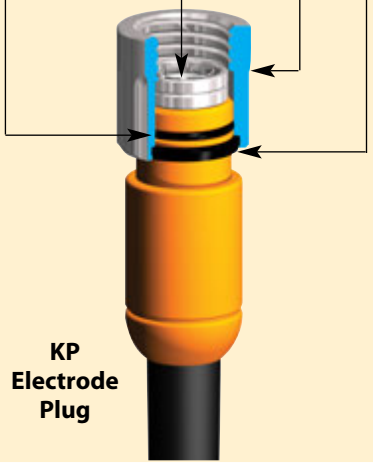
New Connector Offers Improved Seals

1) The o-ring is seated in a precisely machined groove. This provides a better seal to keep the connector moisture-free.

2) Gasket to secure threaded cap.

3) Free-spinning steel nut to reduce cable twisting.

4) Gold plated pH connection.



KP Electrode Plug

Cable Assemblies for Dissolved Oxygen Sensors

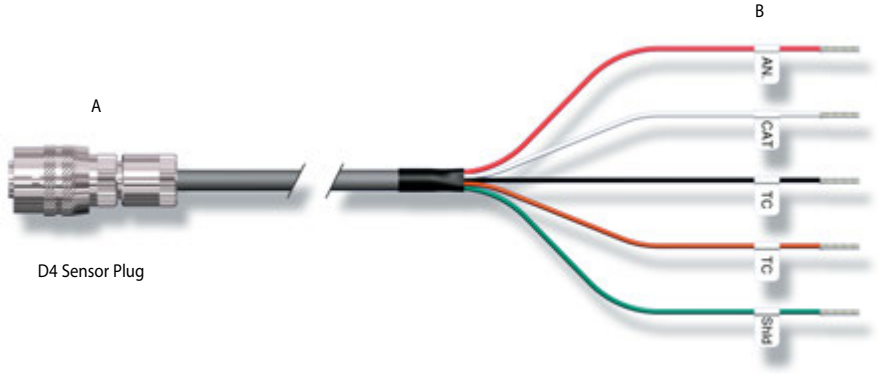
Stock Cable Assemblies for All OxyProbe® Sensors

The BioProcess Technologies® Catalog offers a variety of cable assemblies to connect OxyProbe D.O. sensors with today's D.O. transmitters and controllers.

- Stock cable assemblies feature the most commonly requested cable lengths and connector schemes.
- Cables are shielded to decrease signal noise and other interferences.
- Cables are tagged with part numbers for easy replacement.
- Cables have a D4 twist-lock coaxial cable plug to connect to the sensor.
- Cable assemblies are 100% tested for continuity and the absence of short circuits.
- D-type cables are 6 mm diameter, low noise, multi-conductor cables.

ordering information

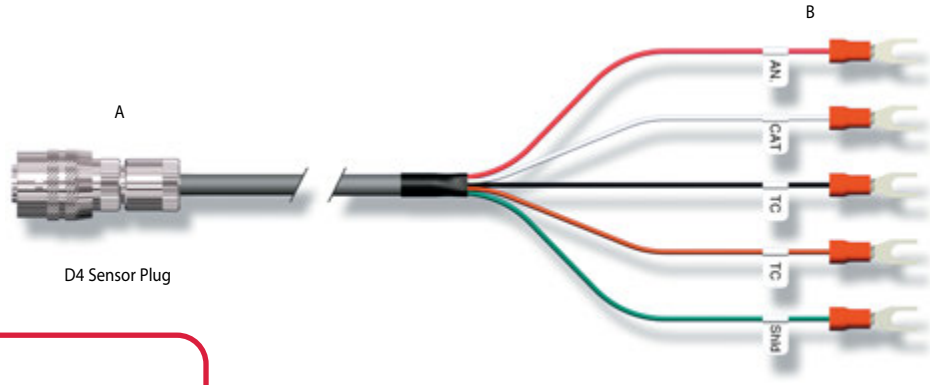
Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
D4 Sensor Plug to Crimped Ferrules • Connects to either terminal blocks or terminal strips					
AX-5000-D4-D03FF	D4	D	3 ft (1 m)	Crimped Ferrules	
AX-5000-D4-D06FF	D4	D	6 ft (2 m)	Crimped Ferrules	
AX-5000-D4-D10FF	D4	D	10 ft (3 m)	Crimped Ferrules	



D4 Sensor Plug

Crimped Ferrules

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
D4 Sensor Plug to Spade Lugs • Connects to either terminal blocks or terminal strips					
AX-5000-D4-D03S5	D4	D	3 ft (1 m)	Spade Lugs	
AX-5000-D4-D06S5	D4	D	6 ft (2 m)	Spade Lugs	
AX-5000-D4-D10S5	D4	D	10 ft (3 m)	Spade Lugs	



D4 Sensor Plug

Spade Lugs

Custom assemblies to meet unique cabling requirements

How to Order Custom Cables

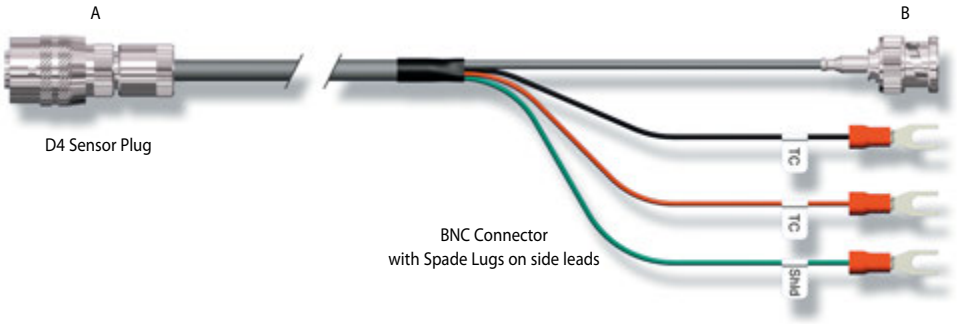
Ask for the Custom Cable Worksheet. Use this worksheet to specify custom cable assembly requirements. Return it by fax or mail to receive a quotation within 24 hours.

ordering information

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
D4 Sensor Plug to Lemo 6 Connector • Connects to B. Braun Biotech and some European vessel controllers					
AX-5000-D4-D03L6	D4	D	3 ft (1 m)	Lemo 6	
AX-5000-D4-D06L6	D4	D	6 ft (2 m)	Lemo 6	
AX-5000-D4-D10L6	D4	D	10 ft (3 m)	Lemo 6	

D4 Sensor Plug Lemo 6 Connector

Cable Part Number	Connector A	Cable Type	Cable Length	Connector B	
D4 Sensor Plug to BNC Connector and Spade Lugs • Connects to Applikon vessel controllers*					
AX-5000-D4-D03G3	D4	D	3 ft (1 m)	BNC with TC & Spade Lugs	
AX-5000-D4-D06G3	D4	D	6 ft (2 m)	BNC with TC & Spade Lugs	
AX-5000-D4-D10G3	D4	D	10 ft (3 m)	BNC with TC & Spade Lugs	



D4 Sensor Plug

BNC Connector
with Spade Lugs on side leads

* Note: On many Applikon controllers the T.C. leads and shield are not utilized. Simply cut off or tape them back out of the way

TIPS & HINTS

Two different dust caps are available from Broadley-James. One to protect the cable and the other to protect the sensor connection. When the sensor is disconnected from the transmitter, attach the cap to the connector to protect it from damage and moisture. When the sensor is connected the cap can hang from the sensor or cable, ready for the next use.

Cable Connector Dust Cap
Part Number: AM-9219

Sensor Connector Dust Cap
Part Number: AM-9212

Broadley-James OxyProbe® II Dissolved Oxygen Sensors

NEW !!

Autoclavable & Sterilizable Styles & Lengths For All Applications Fermentation & Cell Culture

D545-VP

D545-D9

D540-D9

D635-D9

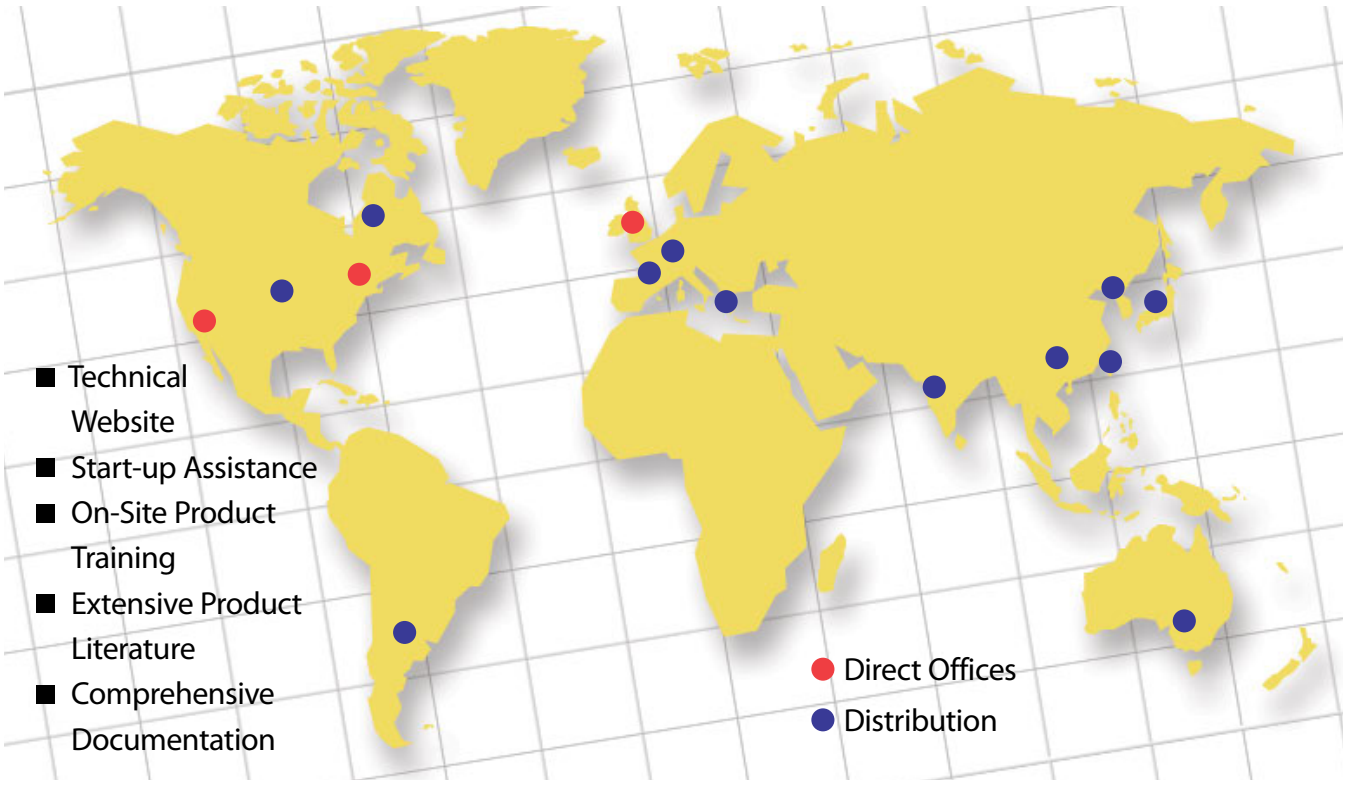
Broadley® James

Manufacturers of Sensors, Bioreactors and Process Control Automation

For Details See:
www.broadleyjames.com

Broadley-James Corporation (U.S. & Canada) Toll-Free: 800-288-2833 E-mail: sales@broadleyjames.com

Global Support



If you don t see what you re looking for in this catalog

We have Over 2000 Items
Broadley-James makes and stocks thousands of items that are not shown in this catalog. With each updated catalog, we show the most popular items currently used in the bioprocess industry. If you don't see what you're looking for, call us. We probably have what you need.

Custom Options are Available
We show the most popular connector combinations, cable lengths, and sensor, electrode and housing lengths in the BioProcess Technologies® Catalog. However, there are many different variations that are available. We make custom assemblies to meet unique requirements.

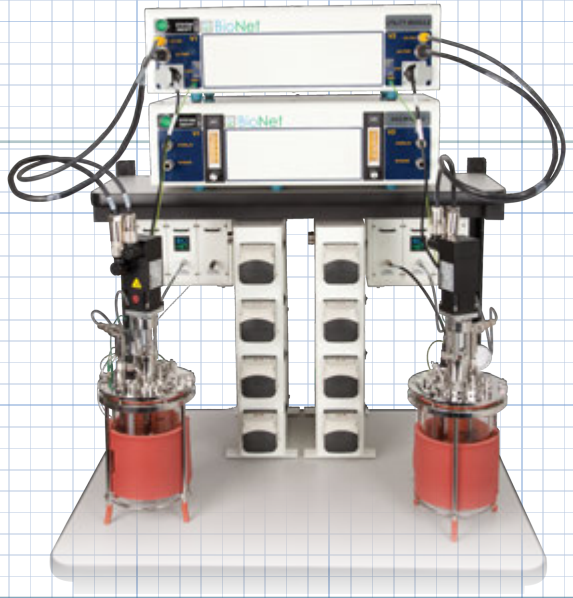
Call Us
Call Broadley-James toll-free at 1-800-288-2833 to speak to one of our friendly and knowledgeable sales representatives. Our trained staff is an excellent source of information for you. We're here to help you make the best choices to meet your needs.

Search Our Web Site
Do you need more information than we provide in the BioProcess Technologies® Catalog? Our website contains a wealth of information on the items we stock and their applications in the various industries we support. For more information, please visit our website.

www.broadleyjames.com

Broadley James®

BIO NET® M3 Bioreactor Control System



- Designed for Cell Culture Or Microbial Applications
- Built-In Continuous Historian To Securely Archive All Process Data
- Various Control Strategies For Fed-Batch And Perfusion Applications
- Sensor Calibration And Sensor Diagnostics Data Stored For Better Experimental Management
- User Definable Substrate Feed Control Strategies Based Upon On-Line BGA Measurements

FEATURES & BENEFITS

The BioNet Modular System offers a number of options for the networked HMI user interface:

Traditional Benchtop Workstations

Locally Mounted Touch Screens

Secure Wireless PC Tablets

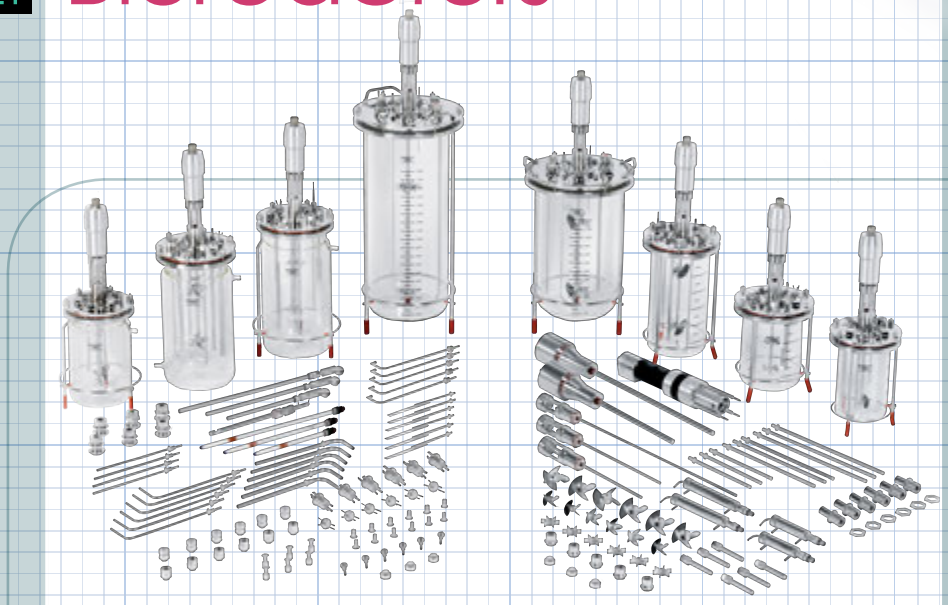
The new Modular BioNet system was designed to completely clear the bench-top of control components allowing all control equipment to be mounted underneath or above the bench-top on a shelf. This space saving design frees up the entire bench-top to be used for more vessels or analytical instruments and significantly reduces the traditional wiring clutter associated with multi vessel installations.
This system design breaks the Bioreactor Control System into three smaller subcomponents:
1. Pump Module
2. Gas MFC Module
3. Dual Vessel Utility Module

Dimensional and Data Sheets available at www.broadleyjames.com
For information about our Bioreactor Control System, please contact us at: **800.288.2833**

Broadley® James

- Suitable for Cell Culture & Microbial Applications
- Like-for-Like Replacement of the Other Leading Manufacturer
- Single-Walled & Jacketed
- pH, DO, Temperature & Optical Density Sensors Available
- Direct Drive & Magnetically Coupled Agitation Assemblies
- Individual Bioreactor Components, Complete Assemblies, Rebuild Kits & O-Ring Packs Available
- Large Inventory Available for Immediate Delivery

BIO NET® Bioreactors



FEATURES & BENEFITS

Complete Bioreactor Systems in a variety of volumes: 3L, 5L, 7L, 15L & 20L.

Single-Walled & Jacketed Styles

The BioNet® Bioreactor is the latest in autoclavable benchtop glass vessels. Available in a range of sizes: 3, 5, 7, 15 and 20 liters total volume. All metal components are manufactured from 316L stainless steel with electropolish.
Integral scaling, improved component designs and extensive product inventory makes this the most user-friendly bioreactor available.

Special configurations are available upon request.
Agitation motors, sensors, cables and control systems are available.

Dimensional and Data Sheets available at www.broadleyjames.com
For information about our Bioreactor Control System:
Please contact us at: **800.288.2833**

Broadley® James

Manufacturers of Sensors, and Process Control Automation

BioProcess Technologies® Catalog of Supplies

- pH Electrodes
- Dissolved Oxygen Sensors
- Redox Electrodes
- Stainless Steel Housings
- Sensor Rebuild Service
- Cable Assemblies
- O-rings
- Solutions
- Simulators
- Accessories

A broad range of products for the biotech industry including:

pH and D.O. sensor simulator for instrument diagnostics

See page 67

See page 34

See page 4

Toll Free: 800-288-2833
Tel: 949.829-5555
Fax: 949.829-5560
E-Mail: sales@broadleyjames.com

Broadley-James Corp.
19 Thomas
Irvine, California 92618
USA

Websites:
US: www.broadleyjames.com
EU: www.broadleyjames.co.uk