



Catalog

Electrochemistry accessories.



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Analytical Cells.



SVC-2



SVC-3

Small Volume Cells

Each voltammetry cell is designed for a specific application (specific working electrode, volume of solution, oxygen-free condition, etc.).

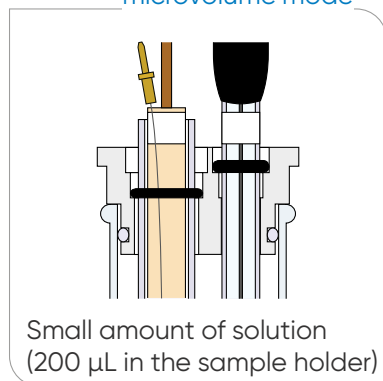
For example, for voltammetry investigations using standard working electrodes with an outer diameter (OD) of 6 mm, the fixed configuration of SVC-3 kit is recommended.

For applications requiring other working electrode shapes, SVC-2 is more suitable.

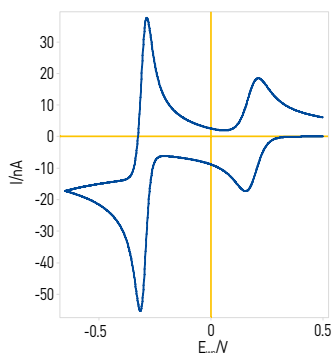
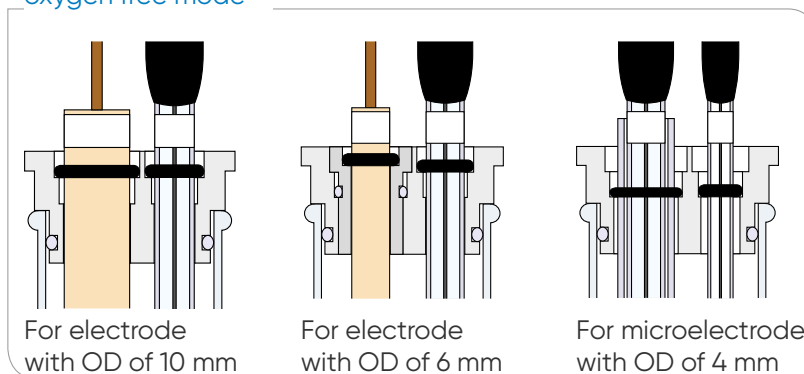
If only a small amount of the electroactive compound is available, SVC-2 in the microvolume mode is recommended. Here is a list of the available cells:

- SVC-2, modular
- SVC-3, for a volume of 5 to 20 mL, only for working electrode with OD of 6 mm
- VC-4, for a volume of 1 to 3 mL, only for working electrode with OD of 6 mm
- Bulk electrolysis cell, for a volume of 100 mL

SVC-2 modularity: microvolume mode



oxygen free mode



Please note that a full, purpose-built, analytical kit is also available SK-2 (A-012763) but the reference electrode must be purchased separately.

This kit includes:

- SVC-3 kit (A-012669)
- PK-3 polishing kit (A-011975) see page 16
- one glassy carbon electrode, OD 6.0 mm, ID 3.0 mm (A-002012) see page 17
- one platinum electrode, OD 6.0 mm, ID 1.6 mm (A-002013) see page 17



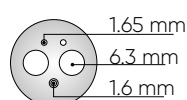
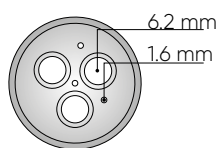
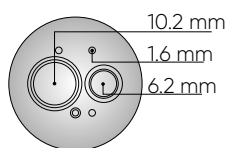
VC-4



Bulk electrolysis cell

| Small Volume Cells | Catalog n° | Catalog n° | Catalog n° | Catalog n° |
|---------------------------|--------------------------------|--------------------------------|------------------------------|---|
| Products | SVC-2 A-012668 | SVC-3 A-012669 | VC-4 A-011224 | Bulk electrolysis cell A-001197 |
| Content | | | | |
| Sample vial/mL | 20 (7 pieces) A-001056 | 20 (7 pieces) A-001056 | 5 (7 pieces) A-011504 | 100 (1 piece) A-012632 |
| Counter electrode (CE)/mm | 57 A-002222 | 50 A-002222 | 57 A-002222 | 230 A-002234 |
| PTFE cap | A-012670 | A-012671 | A-011226 | A-0 12551 |
| Purge tube (ETFE), 100 mm | - | - | - | - |
| Additional items | Adapter 10 to 6 mm - | | Cell holder A-011227 | Porous carbon electrode A-010530 Lid for CE A-001198 Chamber for CE A-001196 O-ring A-001236 Port plug A-009131 Stirrer bar A-000178 |
| Options | | | | |
| Sample holder/mm | 9.0 (2 pieces) A-012177 | 6.0 (2 pieces) A-012176 | | |
| Cell holder for 20 mL | A-001209 | A-001209 | | |
| Purge tube (ETFE)/m | 1 A-010537 | 1 A-010537 | 1 A-010537 | 1 A-010537 |
| Working electrodes | See page 17 | See page 17 | See page 17 | See page 18 |
| Reference electrodes | See page 18 | See page 18 | See page 18 | See page 18 |

PTFE cap



Cell geometry

The geometry of the cell should be optimized to reduce the ohmic drop. Working and reference electrodes must be positioned close to one another. The counter electrode should not limit the transfer of electrons, so its contact surface should be larger than the contact surface of the working electrode.

Analytical Cells.



Large Volume Cells

An analytical cell available in sizes ranging from 50 to 250 mL that is particularly well-suited to larger volumes of electrolyte.

Two types of packages are available:

- A standard analytical cell kit
- A full analytical cell kit (which allows temperature control and gas purging)

| | Standard analytical cell kit (80 mL) EL-ELECTRO-1 | Complete analytical cell kit (80 mL) EL-ELECTRO-2 | Complete analytical cell kit (150 mL) EL-ELECTRO-3 | Catalog n° |
|---|---|---|--|----------------------|
| Glass cell 80 mL | ■ | | | EL-A-001 |
| Double jacketed glass cell 80 mL | | ■ | | EL-A-002 |
| Double jacketed glass cell 150 mL | | | ■ | EL-A-020 |
| PTFE cap 5 holes | ■ | ■ | ■ | EL-A-003 |
| PTFE ring, silicon encapsulated, OD 102 mm | ■ | ■ | ■ | EL-A-004 |
| Cell collar with clamp | ■ | ■ | ■ | EL-A-005 |
| Double purge tube | | ■ | ■ | EL-A-006 |
| Bridge tube for reference electrode, OD 6 mm | ■ | ■ | ■ | EL-A-008 |
| Platinum counter electrode | ■ | ■ | ■ | EL-A-009 |
| Purge tube | ■ | | | EL-A-016 |
| Reference electrode RE-2BP Hg/Hg ₂ Cl ₂ (Cells kits following RoHS recommendations are also provided, see below) | ■ | ■ | ■ | A-013430 |
| Double nut 25 mm and 12 mm diameter | | ■ | ■ | EL-A-011 |
| Telescopic cell stand | | ■ | ■ | EL-A-012 |
| Options | | | | |
| Electrode bridge extension for electroanalytical cell | | | | EL-A-022 |
| Bridge tube for reference electrode of OD 8 mm | | | | EL-A-017 |
| PT100 probe, indicate connector type | | | | EL-C-014 |
| Magnetic stirrer & heater, 220 V | | | | EL-C-015A |
| without PT100 probe, 110 V | | | | EL-C-015B |
| Aluminum base holder for magnetic stirrer | | | | EL-C-018 |
| Set of 10 porous 4 mm glass frits (CoralPor™) with PTFE heat shrink (200 mm) | | | | 092-VYC4 |
| Optional cells kits following RoHS recommendations | | | | |
| EL-ELECTRO-1 cell with Ag/AgCl reference electrode | | | | EL-ELECTRO-1A |
| EL-ELECTRO-2 cell with Ag/AgCl reference electrode | | | | EL-ELECTRO-2A |
| EL-ELECTRO-3 cell with Ag/AgCl reference electrode | | | | EL-ELECTRO-3A |
| EL-ELECTRO-1A compatible with BluRev RDE (comes with 094-A-CAP an additional PTFE cap compatible with BluRev) | | | | EL-BLUREV |



EL-A-012



EL-A-002



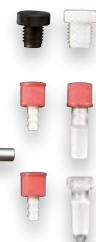
EL-A-003



EL-A-004



EL-A-005



EL-A-008



EL-A-009



EL-A-022



Cross flow cell



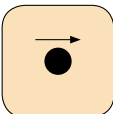
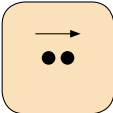


Radial flow cell

Flow Cells

| | Cross Flow Cell | Catalog n° | Radial Flow Cell | Catalog n° |
|-------------------|------------------|-----------------|-------------------|-----------------|
| Product | Cross flow cell* | A-012798 | Radial flow cell* | A-012799 |
| Schematic diagram | | | | |

* Gasket, working, reference electrodes and connectors are sold separately

Options

| | | | | | | |
|--|--|--|---|-----------------|---------------------------------------|-----------------|
|  Single/radial flow | Electrode | Glassy carbon | Ø 3 mm x 2 (dual type), size 25 x 25 mm | A-001000 | | |
| | | Gold | Ø 3 mm x 2 (dual type), size 25 x 25 mm | A-001002 | | |
| | | Platinum | Ø 3 mm x 2 (dual type), size 25 x 25 mm | A-001012 | | |
| | | Silver | Ø 3 mm x 2 (dual type), size 25 x 25 mm | A-001008 | | |
| | | Carbon paste | Ø 3 mm x 2 (dual type), size 25 x 25 mm | A-001004 | | |
| | | Nickel | Ø 3 mm x 2 (dual type), size 25 x 25 mm | A-001009 | | |
|  Cross flow | Gasket | Glassy carbon/gold | Ø 3 mm x 2 (dual type), size 25 x 25 mm | A-001006 | | |
| | | Glassy carbon/platinum | Ø 3 mm x 2 (dual type), size 25 x 25 mm | A-012583 | | |
| | | TG-2M PTFE (4 pieces) | Film thickness 12 µm | A-001046 | | |
| | | TG-5M PTFE (4 pieces) | Film thickness 25 µm | A-001047 | | |
| | | TG-6M PTFE (4 pieces) | Film thickness 50 µm | A-001048 | | |
| | | TG-8M PTFE (4 pieces) | Film thickness 100 µm | A-001049 | | |
|  Dual, series/cross flow | Cross flow cell block | TG-11M silicon (4 pieces) | Film thickness 500 µm | A-001092 | | |
| | | TG-12M silicon (4 pieces) | Film thickness 1,000 µm | A-001093 | | |
| | | | Material PEEK | A-001032 | | |
| | |  Dual, parallel/cross flow | Electrode | Glassy carbon | Ø 6 mm (single type), size 25 x 25 mm | A-001016 |
| | | | | Glassy carbon | Ø 3 mm (single type), size 25 x 25 mm | A-012124 |
| | | | | Platinum | Ø 3 mm (single type), size 25 x 25 mm | A-009908 |
| Gold | Ø 3 mm (single type), size 25 x 25 mm | | | A-011155 | | |
| PFCE (Plastic Formed Carbon Electrode) | Ø 3 mm (single type), size 25 x 25 mm | | | A-000999 | | |
| Carbon paste | Ø 3 mm (single type), size 25 x 25 mm | | | A-010251 | | |
| Radial flow | Gasket | TG-2MR PTFE (4 pieces) | Film thickness 12 µm | A-001146 | | |
| | | TG-5MR PTFE (4 pieces) | Film thickness 25 µm | A-001147 | | |
| | | TG-6MR PTFE (4 pieces) | Film thickness 50 µm | A-001148 | | |
| | | TG-8MR PTFE (4 pieces) | Film thickness 100 µm | A-012802 | | |
| | | TG-11MR PTFE (4 pieces) | Film thickness 500 µm | A-001192 | | |
| | | TG-12MR PTFE (4 pieces) | Film thickness 1,000 µm | A-001193 | | |
| Cross/radial | Radial flow cell block | Material PEEK | A-001031 | | | |
| | RE-3VT Ag/AgCl reference electrode screw type | Size Ø 10 x 48 mm | A-013488 | | | |
| | RE-7VT Non-aqueous Ag/Ag ⁺ reference electrode screw type | Size Ø 10 x 48 mm | A-013489 | | | |
| | 0.04" Single lead connector (2 pieces) | | A-012912 | | | |
| | 0.04" MM connector (10 pieces) | | A-013273 | | | |
| | 1/16" Peek tube | ID 0.25 mm, length 3.0 m | A-001531 | | | |
| Dynased peek fingertight (10 pieces) | Screw for pipe connecting integrated 1/16" | A-004130 | | | | |

Corrosion Cells.

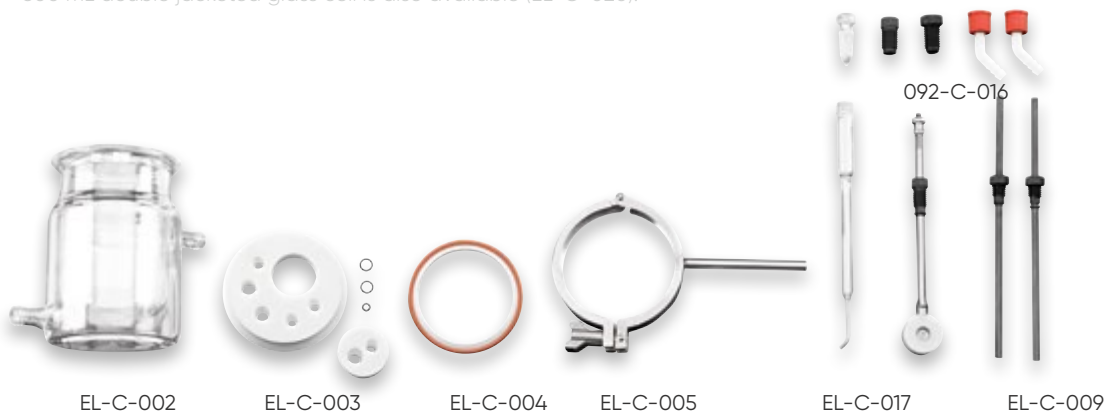
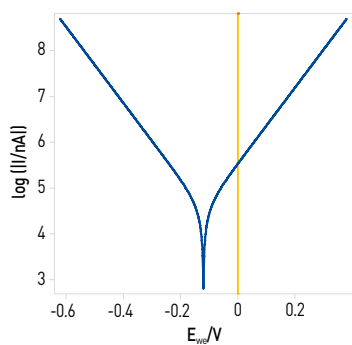
Standard Corrosion Cells

For corrosion applications, two packages for large volumes i.e. ~1 L are available:

- A basic corrosion cell kit
- A complete corrosion cell kit (allows temperature control and includes sample holder and cell stand)



| | Basic corrosion cell kit EL-CORR-1 | Complete corrosion cell kit EL-CORR-2 | Catalog n° |
|--|---------------------------------------|--|------------|
| Glass cell 1 L | ■ | | EL-C-001 |
| Double jacketed glass cell 1 L | | ■ | EL-C-002 |
| PTFE cap | ■ | ■ | EL-C-003 |
| PTFE ring, silicon encapsulated, OD 102 mm | ■ | ■ | EL-C-004 |
| Cell collar with clamp | ■ | ■ | EL-C-005 |
| Double purge tube | | ■ | EL-C-006 |
| Graphite counter electrode rod (2 pieces) $\rho = 1.070 \mu\Omega \text{ cm}$ | ■ | ■ | EL-C-009 |
| Double nut 25 mm and 12 mm diameter | | ■ | EL-C-011 |
| Telescopic cell stand | | ■ | EL-C-012 |
| Sample holder 1 cm ² (max sample thickness 3.4 mm and max diameter 14.6 mm) | | ■ | 092-C-016 |
| Purge tube | ■ | | EL-C-016 |
| Bridge tube for 8 mm diameter reference electrode | ■ | ■ | EL-C-017 |
| Calomel reference electrode length 80 mm, OD 8 mm screw cap | ■ | ■ | R-XR300 |
| Cable connection for screw cap 100 mm, 2 mm banana plug | ■ | ■ | R-A94L111 |
| 12 mm OD conical rings for reference electrode of 8 mm (4 pieces) | ■ | ■ | R-X31M012 |
| Options | | | |
| Bridge tube for 6 mm diameter reference electrode | | | EL-C-008 |
| PT100 probe (indicate connector type) | | | EL-C-014 |
| Magnetic stirrer & heater, without PT100 probe | | 220 V | EL-C-015A |
| | | 110 V | EL-C-015B |
| Aluminum base holder for magnetic stirrer and 1 L cell vial | | | EL-C-018 |
| Set of 10 porous frits (4 mm CoralPor™) with PTFE heat shrink (200 mm) | | | 092-VYC4 |
| 500 mL double jacketed glass cell is also available (EL-C-020). | | | |



Avesta Cell

The Avesta Cell is an electrochemical cell developed for pitting corrosion testing (ASTM G150).

It is designed to avoid microcrevice corrosion formed between the working electrode and the gasket at the bottom aperture of the cell.

A filter paper ring placed between the sample and the gasket is flooded by distilled water in order to eliminate crevice corrosion.

The water flow is controlled by a peristaltic pump (EL-AV-008). The flow rate depends on the chosen tubings, contact your local retailer for more information.

| Avesta Cell | Catalog n° |
|-----------------|------------------|
| Avesta cell kit | EL-AV-001 |

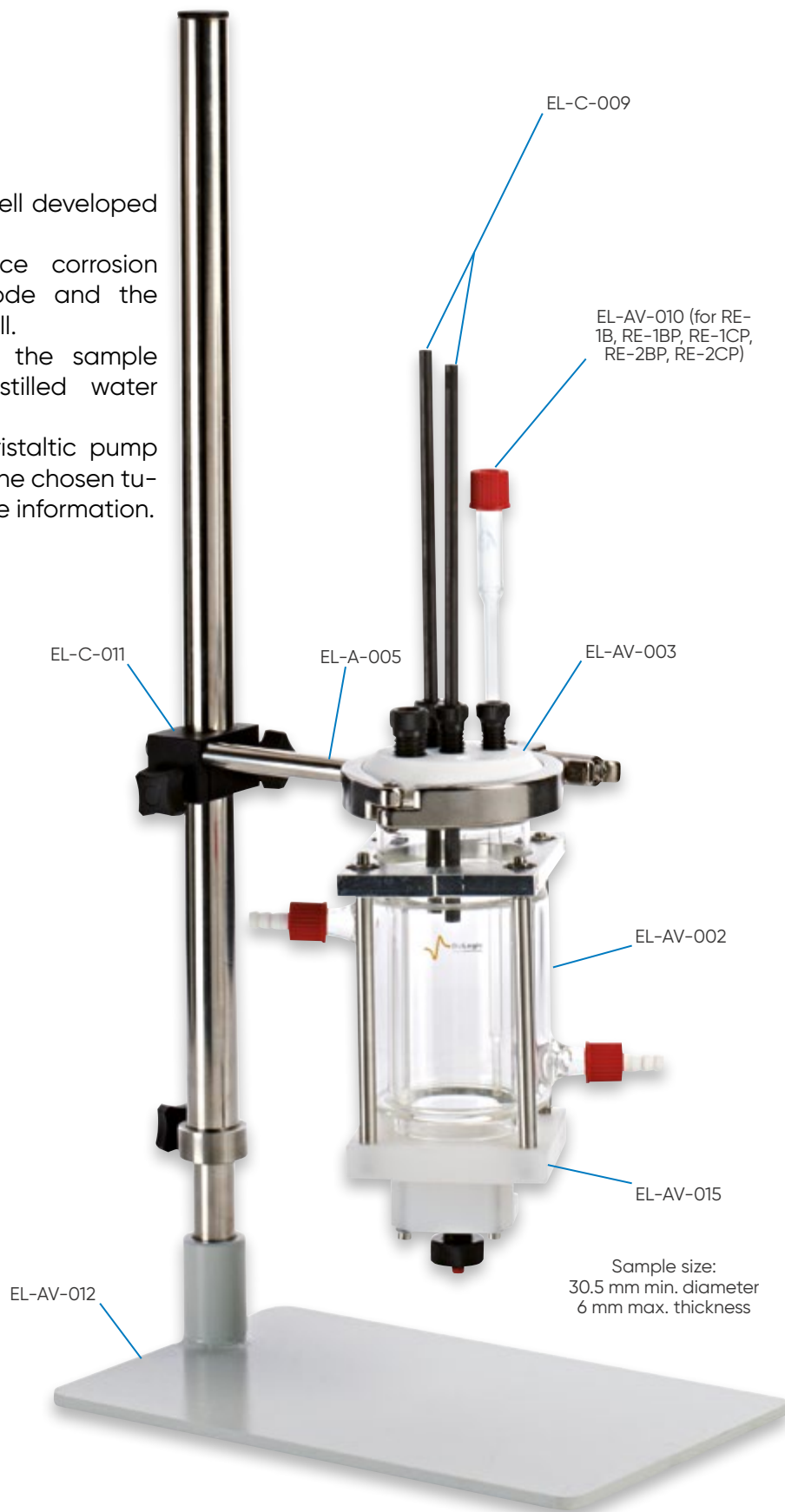
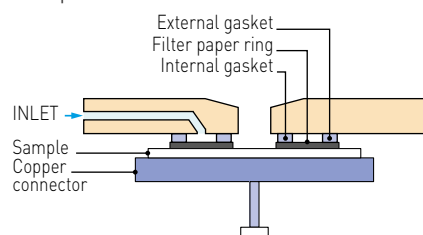
Content

| | |
|--|------------------|
| Double jacketed cell glass 250 mL | EL-AV-002 |
| PTFE cap 5 holes | EL-AV-003 |
| O-ring PTFE silicone encapsulated | EL-AV-004 |
| Cell collar with clamp | EL-A-005 |
| Double purge tube | EL-AV-006 |
| Filter paper ring (100 pieces) | EL-AV-007 |
| Graphite counter electrode rods (2 pieces) $\rho = 1.070 \mu\Omega \text{ cm}$ | EL-C-009 |
| Bridge tube for RE 6 mm | EL-AV-010 |
| Double nut | EL-C-011 |
| Telescopic cell stand | EL-AV-012 |
| Skeleton | EL-AV-015 |

Options

| | |
|--|------------------|
| Peristaltic pump for low flow | EL-AV-008 |
| Bridge tube for reference electrode with OD of 8 mm | EL-AV-013 |
| Single purge tube | EL-AV-014 |
| Temperature probe PT100 | EL-C-014 |
| Set of 10 porous frits (4 mm CoralPor™) with PTFE heat shrink (200 mm) | 092-VYC4 |

Principle of Avesta cell



Corrosion Cells.



Flat Cells, 1 to 10 cm² sample area

Sample size:
30.5 mm min. diameter (EL-FLAT)
40.5 mm min. diameter (EL-FLAT-2)
6 mm max. thickness

This cell with a volume of 250 mL is suited to perform experiments on flat specimens of 1 or 10 cm² surface area.

This cell has a double jacket for temperature control and three holes for reference electrodes, purge tubes and temperature probes with an inner diameter of 17.6 mm and the two others of 8.3 mm.

| Flat Cell 1 cm ² | Catalog n° |
|--|-------------------|
| Flat cell kit 1 cm ² | EL-FLAT |
| Content | |
| RE-2BP calomel reference electrode (length: 90 mm, OD: 6 mm) | A-013430 |
| Platinum mesh counter electrode (54 mm wire/80 mesh), 25 x 35 mm | A-702439 |
| Reference electrode bridge tube (6 mm diameter) | EL-F-004 |
| Corrosion flat cell 1cm ² | EL-FLAT-3 |
| EL-FLAT-3 includes: | |
| - glass part for flat cell (250 mL) | EL-F-002 |
| - mechanical part for corrosion flat cell 1 cm ² | EL-FLAT-3H |

| Flat Cell 10 cm ² | Catalog n° |
|---|-------------------|
| Flat cell kit 10 cm ² | EL-FLAT-2 |
| Content | |
| RE-2BP calomel reference electrode (length: 90 mm, OD: 6 mm) | A-013430 |
| Platinum mesh counter electrode (54 mm wire/ 80 mesh), 25 x 35 mm | A-702439 |
| Reference electrode bridge tube (6 mm diameter) | EL-F-004 |
| Corrosion flat cell 10 cm ² | EL-FLAT-4 |
| EL-FLAT-4 includes: | |
| - glass part for flat cell (250 mL) | EL-F-002 |
| - mechanical part for corrosion flat cell 10 cm ² | EL-FLAT-4H |

Investigations in aggressive media

If the experiment is performed in more aggressive media such as fluorhydric acid, it is possible to obtain the body of the flat cell in PVDF* instead of glass.

| | Fluorhydric acid 48% | | Sulfuric acid 98% | | Phosphoric acid 85% | | Hydrochloric acid 35% | | Nitric acid 70% | | Perchloric acid | | Sodium hydroxide 50% | | Potassium hydroxide concentr. | |
|---------------------|----------------------|-------|-------------------|-------|---------------------|-------|-----------------------|-------|-----------------|-------|-----------------|-------|----------------------|-------|-------------------------------|-------|
| | 20° C | 50° C | 20° C | 50° C | 20° C | 50° C | 20° C | 50° C | 20° C | 50° C | 20° C | 50° C | 20° C | 50° C | 20° C | 50° C |
| PTFE | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| PVDF* | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Borosilicated glass | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

■ excellent
■ good
■ not recommended
■ not compatible

| Options | Catalog n° |
|--|---------------------|
| PVDF* body (single-jacketed) | EL-F-PVDF |
| EPDM O-rings for 1 cm ² with PEEK ferrule for CE** | EL-SEAL-1B |
| EPDM O-rings for 10 cm ² with PEEK ferrule for CE** | EL-SEAL-10B |
| PTFE O-rings for 1 cm ² with PEEK ferrule for CE** | EL-SEAL-T1B |
| PTFE O-rings for 10 cm ² with PEEK ferrule for CE** | EL-SEAL-T10B |
| EPDM O-rings for 1 cm ² ** | EL-SEAL-1 |
| EPDM O-rings for 10 cm ² ** | EL-SEAL-10 |
| PTFE O-rings for 1 cm ² ** | EL-SEAL-T1 |
| PTFE O-rings for 10 cm ² ** | EL-SEAL-T10 |
| Set of 10 porous frits (4 mm CoralPor™) with PTFE heat shrink (200 mm) | 092-VYC4 |

* Polyvinylidene fluoride

** The O-ring kits include 4 O-rings for the glassware side and 10 O-rings for the sample side

Sample size:
30.5 mm min. diameter (EL-GAL-1)
40.5 mm min. diameter (EL-GAL-10)
6 mm max. thickness



Galvanic Cells, 1 to 10 cm² sample area

Thanks to the modular design of the flat cell, it is possible to place two different materials at each end of the cell. The surface area may be 1 or 10 cm².

| Galvanic Cell 1 cm ² | Catalog n° |
|-------------------------------------|-------------------|
| Galvanic cell kit 1 cm ² | EL-GAL-1 |
| Content | |
| Flat cell kit 1 cm ² | EL-FLAT |
| Galvanic kit 1 cm ² | 092-FLAT/1 |

| Galvanic Cell 10 cm ² | Catalog n° |
|---|--------------------|
| Galvanic flat cell kit 10 cm ² | EL-GAL-10 |
| Content | |
| Flat cell kit 10 cm ² | EL-FLAT-2 |
| Galvanic kit 10 cm ² | 092-FLAT/10 |



Plate Material Evaluating Cell, up to 1 cm² sample area

This cell was developed to evaluate a plate material such as metals, semi-conducting plates, etc. The sample plate is sandwiched between the two cell blocks. The required volume of solution is about 1 mL.

| Plate Material Evaluating Cell | Catalog n° |
|--------------------------------------|-----------------|
| Plate material evaluating cell | A-011951 |
| Content | |
| PTFE cell [body & base] (1 piece) | - |
| O-ring (1 piece) | - |
| Screw 20 mm (1 piece) | - |
| Purging tube, 100 mm | - |
| Platinum counter electrode (1 piece) | A-002222 |
| Options | |
| O-ring (10 pieces) | A-012022 |



Coating Cell

| Coating Cell | Catalog n° |
|--|-----------------|
| Coating cell kit | EL-COAT |
| Content | |
| Glass for coating cell | EL-P-002 |
| Nylon base with three feet | EL-P-003 |
| Rubber cup with two holes | EL-P-004 |
| Metallic clamp | EL-P-005 |
| O-ring for coating cell | EL-P-006 |
| Graphite rod counter electrode (L: 145 mm, OD: 6 mm, ρ = 1.070 μΩ cm) | EL-P-009 |
| Options | |
| RE-1B Ag/AgCl reference electrode (OD: 6 mm) | A-012167 |
| Bridge tube for 6 mm reference electrode | EL-P-008 |
| Mask for 1 cm ² (20 pieces) | EL-P-011 |
| Mask for 3 cm ² (20 pieces) | EL-P-012 |
| Mask for 10 cm ² (20 pieces) | EL-P-013 |

Small Volume Cell Vials up to 200 mL

To complete a kit, the cell vials are also available separately.
Please note that other volumes are available on request.



| Small & Large Volume Cell Vials | | Volume/mL | OD/mm | ID/mm | Height/mm | Quantity | Purpose | Catalog n° |
|---------------------------------|--------------------------------------|-----------|-------|-------|-----------|---------------------|---|-----------------|
| Small Volume Cell Vials | Sample vial | 5 | 18 | 15.6 | 30 | 10 | VC-4 | A-011504 |
| | | 20 | 28 | 25.6 | 50 | 10 | SVC-2, SVC-3 | A-001056 |
| | | 100 | 50 | 46.4 | 72 | 1 | RRDE-3A, bulk electrolysis | A-012632 |
| | Water jacketed-glass vial | 5 | 40 | 15.6 | 40 | 1 | VC-4 | A-012672 |
| | | 20 | 55 | 25.6 | 50 | 1 | SVC-2, SVC-3 | A-001051 |
| | | 100 | 70 | 46.4 | 80 | 1 | RRDE-3A, bulk electrolysis | A-012652 |
| | Sample vial for alkaline solution | 100 | 51.5 | 46.5 | 72 | 10 | RRDE-3A, bulk electrolysis | A-013580 |
| | | 200 | 67 | 62 | 72 | 8 | RRDE-3A, bulk electrolysis | A-013581 |
| | Cell holder for 20 mL vial | - | - | - | - | 1 | SVC-2, SVC-3 | A-001209 |
| | PTFE cap for 100 mL cells | - | - | - | - | 1 | For A-012632, A-012652, A-013580 | A-012631 |
| PTFE cap for 200 mL cells | - | - | - | - | 1 | For A-013581 | A-013582 | |
| Large Volume Cell Vials | Sample vial | 80 | 90 | 62 | 80 | 1 | EL-ELECTRO-1 | EL-A-001 |
| | | 250 | - | - | - | 1 | EL-FLAT, EL-FLAT-2, EL-GAL-1, EL-GAL-10 | EL-F-002 |
| | | 1,000 | 120 | 90 | 175 | 1 | EL-CORR-1 | EL-C-001 |
| | Water jacketed-glass vial | 80 | 90 | 62 | 85 | 1 | EL-ELECTRO-2 | EL-A-002 |
| | | 150 | - | - | - | 1 | EL-ELECTRO-3 | EL-A-020 |
| | | 1,000 | 120 | 90 | 200 | 1 | EL-CORR-2 | EL-C-002 |
| | Cell holder for king-size vial (1 L) | - | - | - | - | 1 | EL-CORR-1 | EL-C-018 |

Large Volume Cell Vials up to 2,000 mL



EL-A-001



EL-A-002



EL-C-001

EL-C-018,
cell holder for EL-C-001

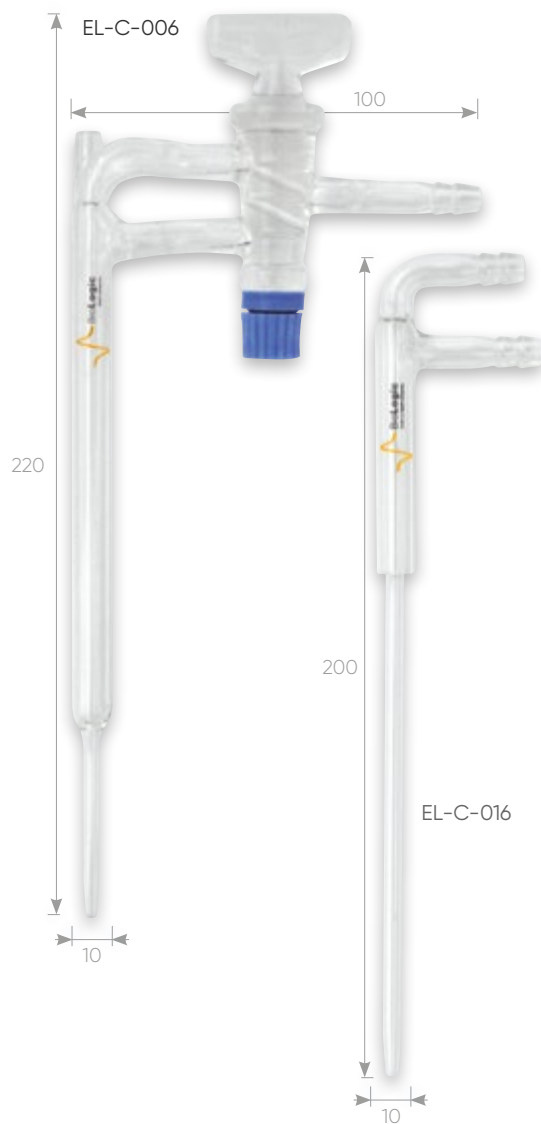
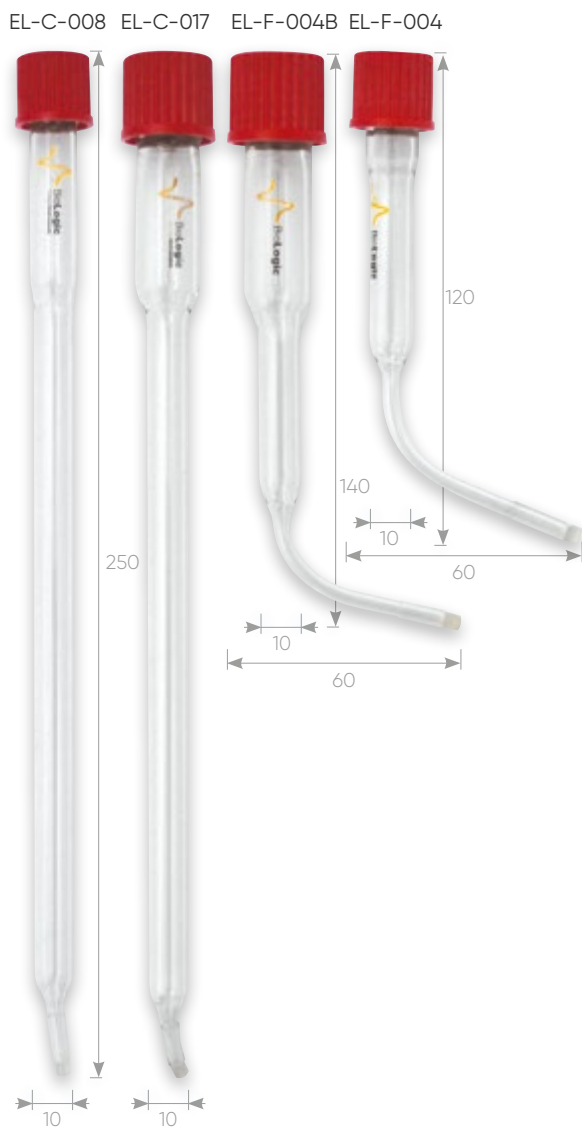


EL-C-002

Dimensions in mm

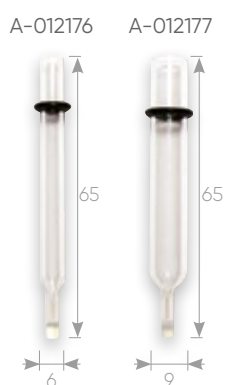
Bridge & Purge Tubes for corrosion cells

The tolerance of each dimension is approximately ± 0.5 mm.



Dimensions in mm

Small-Size Bridge Tubes



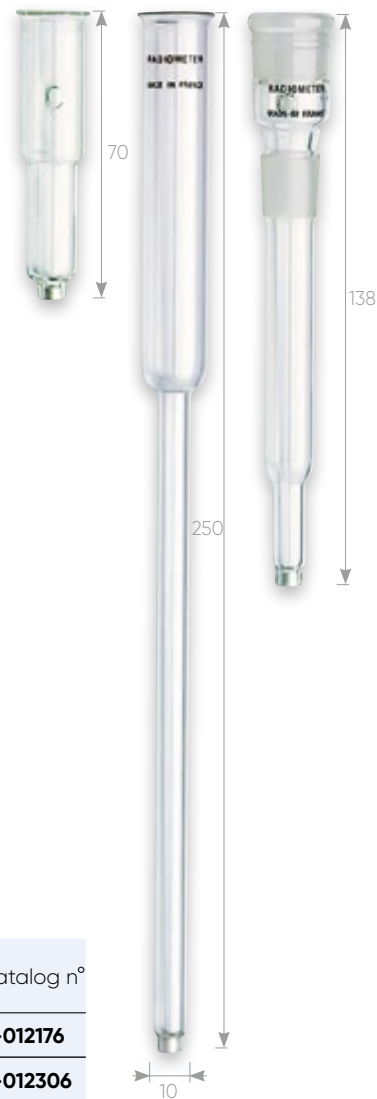
Bridge & Purge Tubes for analytical cells

Bridge Tubes for king-size reference electrodes

EL-A-017 EL-A-008



R-AL100 R-AL110 R-AL120



Dimensions in mm

| Glassware | OD/ mm | Height/ mm | Quan- tity | Purpose | Vycor type compati- bility | Catalog n° |
|---|---|---------------|---------------|-----------------|----------------------------------|------------------|
| Small-size bridge tube | Ø 6 mm | 6 | 2 | SVC-2, SVC-3 | 092-VYC3⁽¹⁾ | A-012176 |
| | Ø 6 mm | 6 | 22 | SVC-2, SVC-3 | | A-012306 |
| | Ø 9 mm | 9 | 2 | SVC-2 | | A-012177 |
| | Ø 9 mm | 9 | 22 | SVC-2 | | A-012307 |
| Bridge tube for corrosion cells | Ø 6 mm | 10 | 1 | EL-CORR | 092-VYC4⁽²⁾ | EL-C-008 |
| | Ø 8 mm | 10 | 1 | EL-CORR | | EL-C-017 |
| | Ø 6 mm | 10 | 1 | EL-FLAT | | EL-F-004 |
| | Ø 8 mm | 10 | 1 | EL-FLAT | | EL-F-004B |
| Bridge tube for analytical cells | Ø 8 mm | 10 | 1 | EL-ELECTRO | | EL-A-017 |
| | Ø 6 mm | 10 | 1 | EL-ELECTRO | | EL-A-008 |
| Purge tube for analytical cells | Single | 10 | 1 | EL-ELECTRO | | EL-A-016 |
| | Double | 10 | 1 | EL-ELECTRO | | EL-A-006 |
| Purge tube for corrosion cells | Single | 10 | 1 | EL-CORR | | EL-C-016 |
| | Double | 10 | 1 | EL-CORR | | EL-C-006 |
| Bridge tube with ceramic junction | Short | 12 | 1 | | | R-AL100 |
| | Standard | 8 | 1 | | | R-AL110 |
| | With reverse sleeve (non aqueous) | 8 | 1 | | | R-AL210 |
| | Standard | 8 | 1 | | | R-AL120 |

Options

- (1) Set of 10 porous 2.8 mm glass frits (CoralPor™) with PTFE heat shrink (200 mm) **092-VYC3**
 (2) Set of 10 porous 4 mm glass frits (CoralPor™) with PTFE heat shrink (200 mm) **092-VYC4**

Electrodes.

Working Electrodes

To address every application, a wide range of working electrodes (WE) is available with diameters ranging from 7 μm up to 6 mm and built with different materials.

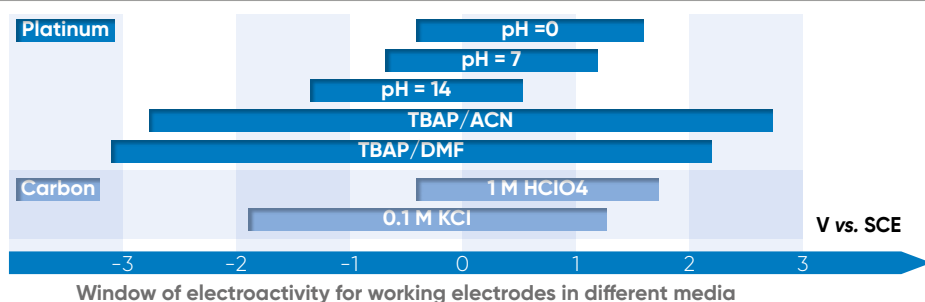
BioLogic exclusive



Maintenance of working electrodes

To refresh the electrode surface, we recommend polishing it before each measurement.

| | Catalog n° |
|--|-----------------|
| PK-3 electrode polishing kit | A-011975 |
| Content | |
| 0.05 μm polishing alumina (20 mL) | A-001050 |
| 1 μm polishing diamond (10 mL) | A-002054 |
| Glass plate (1 piece) | A-002249 |
| Alumina polishing pad (10 pieces) | - |
| Diamond polishing pad (10 pieces) | - |
| Spare parts | |
| Alumina polishing pad (20 pieces) | A-001040 |
| Diamond polishing pad (20 pieces) | A-001041 |
| Emery paper UF800 (20 pieces) | A-012611 |
| Coarse polishing pad (20 pieces) | A-001042 |
| 6 μm polishing diamond (10 mL) | A-002053 |



| Working Electrodes | | Isolation | OD/mm | Electrode Ø ±4% | Catalog n° | |
|--------------------------|---|-------------|-------|-----------------|------------|----------|
| Carbon | Long glassy carbon electrode | PEEK | 6 | 3 mm | A-012744 | |
| | Standard glassy carbon electrode | PEEK | 10 | 5 mm | A-002417 | |
| | | PEEK | 6 | 3 mm | A-002012 | |
| | | PEEK | 6 | 1.6 mm | A-012297 | |
| | | PEEK | 6 | 1 mm | A-002411 | |
| | | PEEK | 3 | 1.6 mm | A-012298 | |
| | Small glassy carbon electrode | PEEK | 3 | 1 mm | A-002412 | |
| | | PEEK | 3 | 1 mm | A-002412 | |
| | Micro carbon fiber electrode | glass | 4 | 33 µm | A-002002 | |
| | | glass | 4 | 7 µm | A-002007 | |
| | Standard pyrolytic graphite electrode | Basal plane | PEEK | 6 | 3 mm | A-002252 |
| | | Edge plane | PEEK | 6 | 3 mm | A-002253 |
| | Standard pfce carbon electrode | PEEK | 6 | 3 mm | A-002408 | |
| | | PEEK | 6 | 1 mm | A-002409 | |
| | | PEEK | 3 | 1 mm | A-011854 | |
| Platinum (99.95% purity) | Platinum gauze electrode 80 mesh | PEEK | - | 25 x 35 mm | A-002250 | |
| | Long platinum electrode | PEEK | 6 | 3 mm | A-012745 | |
| | | PEEK | 10 | 5 mm | A-002420 | |
| | | PEEK | 6 | 3 mm | A-002422 | |
| | Small platinum electrode | PEEK | 6 | 1.6 mm | A-002013 | |
| | | PEEK | 3 | 1.6 mm | A-002313 | |
| | Micro platinum electrode | glass | 4 | 100 µm | A-002009 | |
| | | glass | 4 | 25 µm | A-002003 | |
| | | glass | 4 | 15 µm | A-002015 | |
| | | glass | 4 | 10 µm | A-002005 | |
| Gold | Gold gauze electrode 100 mesh | PEEK | - | 25 x 35 mm | A-002251 | |
| | Long gold electrode | PEEK | 6 | 3 mm | A-012746 | |
| | | PEEK | 10 | 5 mm | A-002418 | |
| | | PEEK | 6 | 3 mm | A-002421 | |
| | Small gold electrode | PEEK | 6 | 1.6 mm | A-002014 | |
| | | PEEK | 3 | 1.6 mm | A-002314 | |
| | Micro gold electrode | glass | 4 | 100 µm | A-002010 | |
| | | glass | 4 | 25 µm | A-002004 | |
| | | glass | 4 | 10 µm | A-002006 | |
| Silver | Standard silver electrode | PEEK | 10 | 5 mm | A-002416 | |
| | | PEEK | 6 | 3 mm | A-002419 | |
| | | PEEK | 6 | 1.6 mm | A-002011 | |
| | Small silver electrode | PEEK | 3 | 1.6 mm | A-002315 | |
| Palladium | Standard palladium electrode | PEEK | 6 | 1.6 mm | A-002019 | |
| | Small palladium electrode | PEEK | 3 | 1.6 mm | A-002319 | |
| Nickel | Standard nickel electrode | PEEK | 6 | 1.5 mm | A-002016 | |
| | Micro nickel electrode | glass | 4 | 100 µm | A-002273 | |
| Copper | Standard copper electrode | PEEK | 6 | 1.6 mm | A-002017 | |
| | | PEEK | 6 | 3 mm | A-012584 | |
| | Micro copper electrode | glass | 4 | 25 µm | A-002271 | |
| Iron (99.65% purity) | Standard iron electrode | PEEK | 6 | 1.5 mm | A-002018 | |
| | | PEEK | 6 | 3 mm | A-012585 | |
| Carbon paste | Standard carbon paste electrode hole depth 4 mm | PEEK | 6 | 3 mm | A-002210 | |
| | Small carbon paste electrode hole depth 4 mm | PEEK | 3 | 1.6 mm | A-002223 | |
| | Cpo carbon paste oil base 1 g | | | | A-001010 | |
| Boron-doped diamond | Doping level between 500 and 1000 ppm. The electrode is 500 µm thick disk attached to a conductive rod in brass. It is polished with an Ra<10 nm. | PEEK | 7 | 3 mm | M-BDD-3 | |

King-Size Reference Electrodes



| King-Size Reference Electrodes | | Connection type | Junction | Length | OD/mm | Catalog n° | |
|--|--|--------------------------|-----------|---------|--------|------------------|------------------|
| Red rod reference electrode | | Banana cable | Ceramic | 103 mm | 7.5 | R-REF201 | |
| Ag/AgCl reference electrode Sat KCl for CV | | Screw cap ⁽¹⁾ | Ceramic | 120 mm | 8 | R-XR300 | |
| Red rod reference electrode in 1 M KNO ₃ | | Screw cap ⁽¹⁾ | Fiber rod | 120 mm | 8 | R-XR440 | |
| Ag/AgCl reference electrode for EIS | | Screw cap ⁽¹⁾ | Ceramic | 160 mm | 8 | R-XR820* | |
| Options | | | | | | | |
| (1) Cable connection for screw cap electrode. | | Banana plug of 2 mm | | 100 mm | | R-A94L111 | |
| We recommend you use this cable to connect these reference electrodes to BioLogic instruments. | | Banana plug of 4 mm | | 1 m | | R-CL111 | |
| Salt bridges | | | | Ceramic | 70 mm | 12 | R-AL100 |
| | | | | Ceramic | 138 mm | 8 | R-AL120 |
| | | | | Ceramic | 250 mm | 8 | R-AL110 |
| Salt bridge with reverse sleeve, non aqueous | | | | | 138 mm | 8 | R-AL210 |
| Conical rings for 8 mm OD 12 mm electrodes (4 pieces) | | | | | | | R-X31M012 |

*Ground joint Rin = 14.5/23

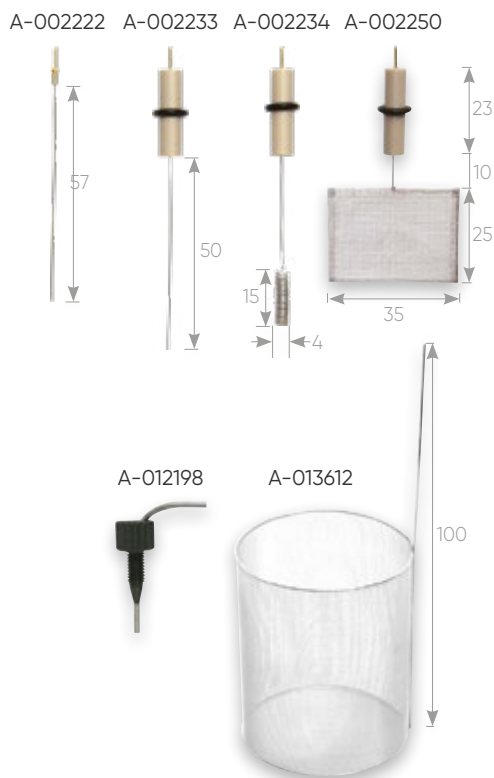
How to check your reference electrode

To check your reference electrode, perform an EIS measurement with a two-electrode connection. Choose Galvano Mode EIS (GEIS) to avoid polarization of your reference electrode.

The reference electrode is used as a working electrode and a platinum or gold electrode can be used as counter electrode.

The impedance of the reference electrode should be below 1 kΩ. If it is higher, the junction needs to be replaced.

Counter Electrodes



Dimensions in mm

Metallic Electrodes



| Counter Electrodes | Size/mm | Wire Ø/mm | Surf. area/ cm ² | Purpose | Catalog n° |
|---|---------|-----------|--------------------------------|--|-----------------|
| Platinum* | 57 | 0.5 | ~ 0.7 | SVC-2, VC-4, plate material evaluating cell | A-002222 |
| | 50 | 0.5 | ~ 0.7 | SVC-3 | A-002233 |
| | 230 | 0.5 | ~ 3.6 | RRDE-3A, bulk electrolysis, SVC-3 | A-002234 |
| Gold | 230 | 0.5 | ~ 3.6 | RRDE-3A, bulk electrolysis, SVC-3 | A-012638 |
| Nickel | 230 | 0.5 | ~ 3.6 | RRDE-3A, bulk electrolysis, SVC-3 | A-012639 |
| Stainless steel | 50 | 1.5 | ~ 2.35 | Flow cell | A-012198 |
| Platinum* gauze electrode, PEEK body 80 mesh | 25x35 | 0.08 | ~ 22.9 | | A-002250 |
| Platinum* gauze electrode, 54 mm wire 80 mesh | 25x35 | 0.08 | ~ 22.9 | Flat cell | A-702439 |
| Platinum* electrode for bulk electrolysis cell 80 mesh | 40x50 | 0.5 | ~ 47.4 | Bulk electrolysis cell | A-013612 |
| Gold gauze electrode, PEEK body 100 mesh | 25x35 | 0.07 | ~ 29 | | A-002251 |

*99.95 % purity

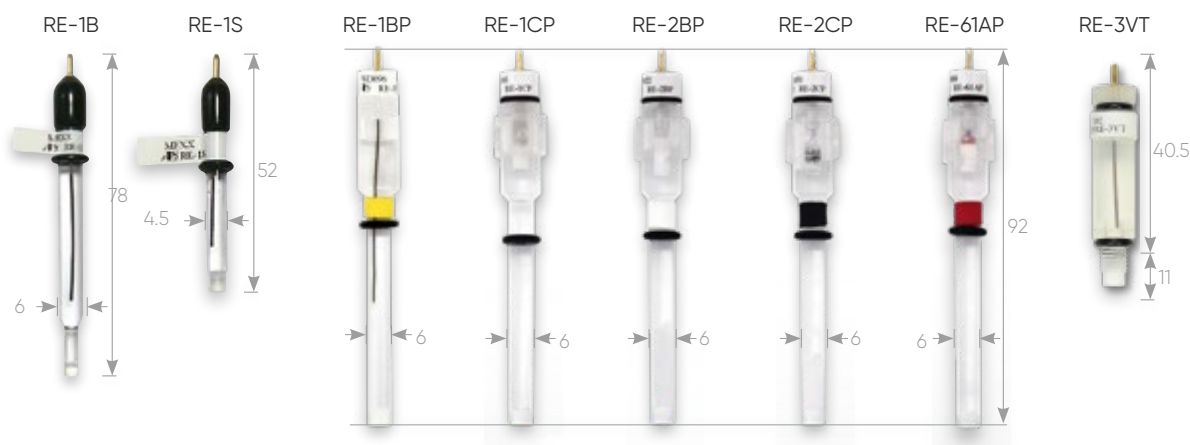
| Metallic Electrodes | Length/mm | OD/mm | Wire dimension/ mm | Catalog n° |
|-------------------------|-----------|-------|-----------------------|----------------|
| Platinum ⁽¹⁾ | 80 | 8 | Ø 1 | R-XM110 |
| | 120 | 8 | Plate 5x5 | R-XM120 |
| | 120 | 8 | Plate 8x8 | R-XM140 |
| | 120 | 12 | Disk of 10 | R-XM150 |

Options

| | | |
|---|-----------------------------|------------------|
| (1) Cable connection for screw cap electrode. We recommend you use this cable to connect these refer- ences electrodes to Biologic instruments. | 100 mm, banana plug of 2 mm | R-A94L111 |
| | 1 m, banana plug of 4 mm | R-CL111 |
| Conical rings for 8 mm OD 12 mm electrodes (4 pieces) | | R-X31M012 |

Small-Size Reference Electrodes for aqueous media

Reference electrodes are divided into two groups according to the media in which the electrode is immersed (aqueous or organic media).



Small-Size Reference Electrode for Aqueous Media (Ag/AgCl, Hg)

| | Junction | Electrolyte | Purpose | Catalog n° |
|---|--|--|---|-----------------|
| RE-1B Ag/AgCl reference electrode ⁽¹⁾ | IPPG* | 3 M NaCl | SVC-2, SVC-3, VC-4, bulk electrolysis, RRDE-3A, flat cell | A-012167 |
| RE-1S Ag/AgCl reference electrode ⁽¹⁾ | IPPG* | 3 M NaCl | SECM | A-012168 |
| RE-1BP reference electrode (Ag/AgCl) | Ceramic | 3 M NaCl | SVC-2, SVC-3, VC-4, bulk electrolysis, RRDE-3A, EQCM, flat cell | A-013613 |
| RE-1CP Ag/AgCl reference electrode | Ceramic | Saturated KCl | SVC-2, SVC-3, VC-4, bulk electrolysis, RRDE-3A, flat cell | A-013429 |
| RE-3VT Ag/AgCl reference electrode screw type | Ceramic | 3 M NaCl | For flow spectroelectrochemical cell SEC-3F | A-013488 |
| Ag/AgCl ink, 2 mL | Surface resistance: 0.2 Ω/25.4 μm ² Viscosity: 50,000 ±10,000 CP @ 21.1 °C Flash point: 82 °C | | For micro CV cell, IDA measurement | A-011464 |
| RE-2BP Hg/Hg ₂ Cl ₂ reference electrode | Ceramic | Saturated KCl | SVC-2, SVC-3, VC-4, bulk electrolysis, RRDE-3A, flat cell | A-013430 |
| RE-2CP Hg/Hg ₂ SO ₄ reference electrode, free from chloride | Ceramic | Saturated K ₂ SO ₄ | SVC-2, SVC-3, VC-4, bulk electrolysis, RRDE-3A, flat cell | A-013431 |
| RE-61AP Hg/HgO reference electrode main body in polyacetal resin | Ceramic | 1 M NaOH | For alkaline media | A-013395 |
| RHE Reversible Hydrogen Electrode kit | IPPG* | HCl or H ₂ SO ₄ | For acidic media (pH < 2) | A-013373 |

Spare parts

| | |
|---|-----------------|
| Set of 10 porous 2.8 mm glass frits (CoralPor™) with PTFE heat shrink (200 mm long, 3.2 mm diameter) Only compatible with: A-012167, A-01277, A-012178 | 092-VYC3 |
| Set of 10 porous 2.8 mm glass frits (CoralPor™) with PTFE heat shrink (200 mm long, 4.8 mm diameter) Only compatible with A-012168 | 092-VYC5 |

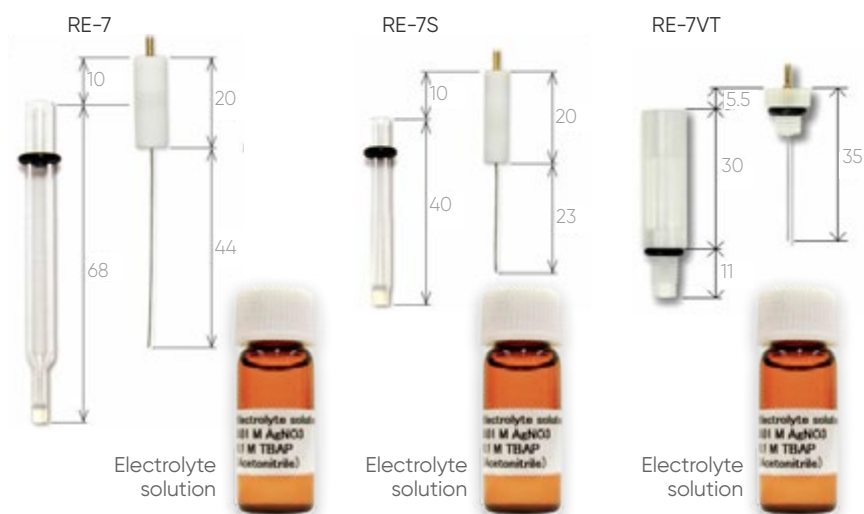
Options

| | |
|--|-----------------|
| RE-PV preservative vial for reference electrode, 10 mL | A-012108 |
| Bridge tube Ø 9.0 mm (2 pieces) | A-012177 |
| Bridge tube Ø 9.0 mm (22 pieces) | A-012307 |
| Double junction chamber kit for RHE | A-013375 |

* Ion Permeable Porous Glass



Small-Size Reference Electrodes for non aqueous media



Small-Size Reference Electrodes for Non Aqueous Media (Ag/Ag⁺)

| | Junction | Electrolyte | Purpose | Catalog n° |
|--|----------|---------------------------------------|---|-----------------|
| RE-7 non aqueous reference electrode (Ag/Ag ⁺) | IPPG* | Ag/Ag ⁺ /ACN**/ TBAP*** | CV | A-012171 |
| RE-7S non aqueous reference electrode (Ag/Ag ⁺) | IPPG* | Ag/Ag ⁺ /ACN**/ TBAP*** | SECM | A-012172 |
| RE-7VT non aqueous reference electrode (Ag/Ag ⁺) with poly-methyl pentene body | Ceramic | Ag/Ag ⁺ /ACN**/ TBAP*** | For flow cell (LC, EQCM, SEC-2F). | A-013489 |

Spare parts

| | |
|---|-----------------|
| Electrolyte solution (10 mL) | A-012549 |
| PTFE cap with Ag wire (for RE-7) | A-012057 |
| PTFE cap with Ag wire (for RE-7S) | A-012058 |
| Sample holder 6 mm diameter (for RE-7) (2 pieces) | A-012176 |
| Set of 10 porous 2.8 mm glass frits (CoralPor) with PTFE heat shrink (200 mm long, 3.2 mm diameter) Only compatible with: A-012171, A-012177, A-012178 | 092-VYC3 |
| Set of 10 porous 2.8 mm glass frits (CoralPor™) with PTFE heat shrink (200 mm long, 4.8 mm diameter) Only compatible with A-012171 | 092-VYC5 |

Options

| | |
|--|-----------------|
| RE-PV preservative vial for reference electrode, 10 mL | A-012108 |
| Bridge tube Ø 9.0 mm (2 pieces) | A-012177 |
| Bridge tube Ø 9.0 mm (22 pieces) | A-012307 |

* Ion Permeable Porous Glass

** Acetonitrile

*** Tetra Butyl Ammonium Perchlorate



Maintenance of Reference Electrodes.

Maintenance of reference electrodes

Store your reference electrode immersed in the electrolyte

When not in use, we recommend that you keep reference electrodes in sealed, air-tight vials in order to prolong their life. The storage solution should be identical to the filling solution of the reference electrode. Prefer a cold and dark place.

* Ion Permeable Porous Glass

Prevent contamination

To prevent contamination of the reference electrode, a sample holder can be used (see p. 14).

Replace the junction when needed

If you are using IPPG junctions, yellowish discoloration indicates contamination. This is caused by the absorption of organic compounds into the pores. The average pore diameter of IPPG is about 40 - 200 Å.

If you are using CoralPor™ junctions, you might want to use the replacement kit 092-VYC3 (see page 20).

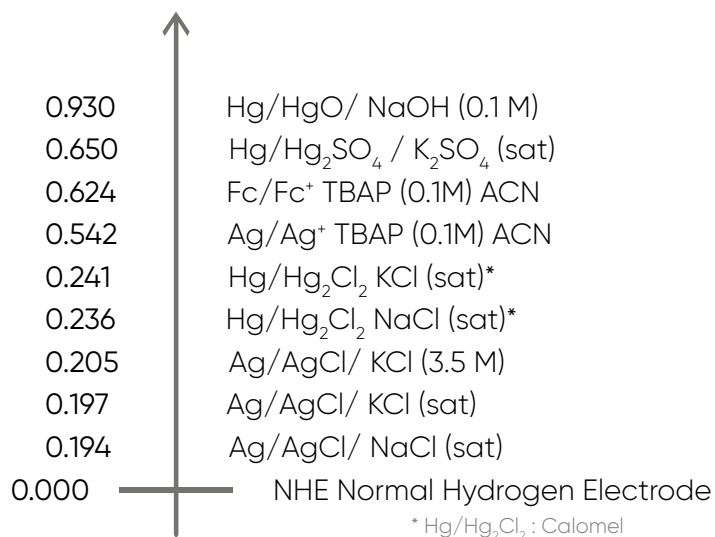
The average pore diameter of CoralPor™ is about 4 - 10 nm.

Storage of reference electrodes

To avoid electrolyte leakage or concentration due to evaporation during storage or transport, the electrolyte is separated from the body. This enables it to be regularly filled up.

Potentials of common reference electrodes

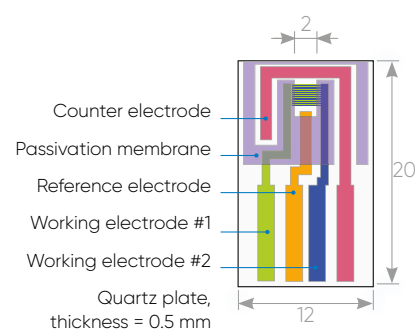
E/V vs. NHE at 25 °C



Other Electrodes.

InterDigitated Array (IDA) electrodes

The passivation membrane is a Novolac resin + naphthoquinone-diazido compounds.



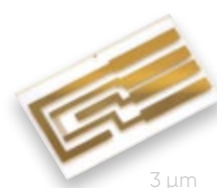
| IDA Electrode | Width/ μm | Interval/ μm | Length/mm | N° of feet | Film thickness/nm | Catalog n° |
|---------------------------------------|----------------------|-------------------------|-----------|------------|-------------------|-----------------|
| Gold | 2 | 2 | 2 | 65 pairs | 90 | A-012257 |
| Platinum | 2 | 2 | 2 | 65 pairs | 90 | A-012258 |
| Gold without passivation membrane | 2 | 2 | 2 | 65 pairs | 90 | A-012261 |
| Platinum without passivation membrane | 2 | 2 | 2 | 65 pairs | 90 | A-012264 |
| Gold | 3 | 3 | 2 | 65 pairs | 90 | A-012129 |
| Platinum | 3 | 3 | 2 | 65 pairs | 90 | A-012130 |
| Gold without passivation membrane | 3 | 3 | 2 | 65 pairs | 90 | A-012260 |
| Platinum without passivation membrane | 3 | 3 | 2 | 65 pairs | 90 | A-012263 |
| Gold | 10 | 5 | 2 | 65 pairs | 90 | A-012125 |
| Platinum | 10 | 5 | 2 | 65 pairs | 90 | A-012126 |
| ITO | 10 | 5 | 2 | 65 pairs | 100 \pm 20 | A-012128 |
| Carbon | 10 | 5 | 2 | 65 pairs | 1200 \pm 100 | A-012127 |
| Gold without passivation membrane | 10 | 5 | 2 | 65 pairs | 90 | A-012259 |
| Platinum without passivation membrane | 10 | 5 | 2 | 65 pairs | 90 | A-012262 |
| ITO without passivation membrane | 10 | 5 | 2 | 65 pairs | 100 \pm 200 | A-012265 |
| Carbon without passivation membrane | 10 | 5 | 2 | 65 pairs | 1200 \pm 100 | A-012266 |

Options

| | |
|--|-----------------|
| Ag/AgCl ink for reference electrode (2.0 mL) | A-011464 |
| Cable kit for IDA electrode | A-011066 |

Content

| | |
|------------------|---|
| Electrode fixer | - |
| Mini vice | - |
| Connecting cable | - |



3 μm



10 μm

Ring-disk type electrodes



12.5 x 22 x 0.5 mm

| Ring-disk type electrodes | Ring OD/mm | Ring ID/mm | Disk/mm | Catalog n° |
|---|------------|------------|---------|-----------------|
| Gold ring-disk electrode (3 pieces) | 6 | 4 | 3 | A-002081 |
| Platinum ring-disk electrode (3 pieces) | 6 | 4 | 3 | A-002082 |
| Carbon ring-disk electrode (3 pieces) | 6 | 4 | 3 | A-002083 |

Rotating Electrodes.

BluRev RRDE with BluRev Enclosure

BluRev Ring Disk Electrode (RDE/RRDE)

The **BluRev RRDE** is a versatile and rugged rotating ring disk electrode ideal for use with any BioLogic potentiostat/galvanostat. It is available with a wide choice of quick-fit exchangeable tips.

The **BluRev RRDE** has been designed to be used with EL-ELECTRO cells series. Please note that if you already have an EL-ELECTRO cell an additional PTFE cap is needed: **094-A-CAP**. **EL-BLUREV** is the cell compatible with the **BluRev RRDE**.

A special enclosure has been designed for an easy operation and set-up of the **BluRev RRDE**: the **BluRev Enclosure**. This makes it easy to hold the RRDE body as well as the BioLogic potentiostat cables.

The **BluRev RRDE** is also available as a Rotating Disk Electrode (**RDE**) only, if you are not interested in ring-disk experiments.

The RC-10k control unit offers an accuracy of ± 1 rpm over the whole rotational range for precise and fully Reproducible experimental conditions. The speed can be set manually or remotely by using the analog output of a BioLogic instrument.

Any other device with an analog output can be used. With EC-Lab[®], you can easily program, perform and analyse ring-disk, Levich and Koutecký-Levich experiments and also use the new EIS element W_{inf} that will directly give you the diffusion coefficient.



Specifications

| | |
|---|--|
| Rotational range/rpm | 100 - 10,000 (9000 for RRDE) |
| Accuracy/rpm | 1 typical over the whole rotational range |
| Precision/rpm | 3 typical over the whole rotational range |
| Runout/mm | <0.1 |
| Setting resolution/rpm | 10 (Manual control) or 25 (Remote control) |
| Materials of RRDE/RDE | PEEK, Al alloy |
| Inert gas inlet for shaft corrosion protection/mm | ∅ 2 |
| Operating temperature/°C | 10 - 40 |
| Power | 24 Vdc, 1 A max |
| Max consumption/W | 24 |
| Dimensions/mm | RC-10k: 95x227x178 (HxWxD), RDE/RRDE: 233.6 (length with tip) |
| Weight/kg | RC-10k: 1.00 RDE/RRDE: 0.36 (without tip) |

| BluRev RRDE and RDE | Catalog n° | 094-RC/RDE | 094-RC/RRDE |
|--|----------------------|------------|-------------|
| Content | | | |
| RC-10k Rotation controller | 094-RC | 1 | 1 |
| Rotating ring-disk electrode (motor, shaft, electrode body with 2 pairs of Ag/C brushes) | 094-RRDE | - | 1 |
| Rotating disk electrode (motor, shaft, electrode body with 1 pairs of Ag/C brushes) | 094-RDE | 1 | - |
| DB9 to BNC connector for external control of RC-10k | 092-22/1 | 1 | 1 |
| 1 m BNC/BNC cable | COR28100 | 1 | 1 |
| Replacement Ag/C brush | 094-RDE-BRUSH | 2 | 4 |
| 1 transport case | - | 1 | 1 |



094-RRDE with tips and 094-RC



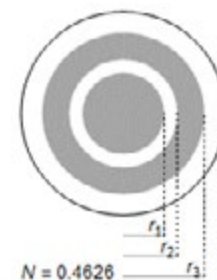
094-RDE without tip

BluRev Tips and cells



| Disk electrodes | Catalog n° |
|--|----------------------|
| 3 mm diameter Glassy Carbon disk electrode with PEEK body (M6 thread) Ra = 50 µm | 094-GC/3 |
| 5 mm diameter Glassy Carbon disk electrode with PEEK body (M6 thread) Ra = 50 µm | 094-GC/5 |
| 5 mm diameter Glassy Carbon disk electrode with PTFE body (M6 thread) Ra = 50 µm | 094-PTFE-GC/3 |
| 5 mm diameter Glassy Carbon disk electrode with PTFE body (M6 thread) Ra = 50 µm | 094-PTFE-GC/5 |
| 3 mm diameter 99.9% Silver disk electrode with PEEK body (M6 thread) Ra = 50 µm | 094-Ag/3 |
| 3 mm diameter 99.9% Aluminum disk electrode with PEEK body (M6 thread) Ra = 50 µm | 094-Al/3 |
| 3 mm diameter 99.9% Silver disk electrode with PEEK body (M6 thread) Ra = 50 µm | 094-Cu/3 |
| 3 mm diameter 99.9% Silver disk electrode with PEEK body (M6 thread) Ra = 50 µm | 094-Ni/3 |
| 3 mm diameter 99.9% Silver disk electrode with PEEK body (M6 thread) Ra = 50 µm | 094-316L/3 |
| 2 mm diameter 99.9% Platinum disk electrode with PEEK body (M6 thread) Ra = 50 µm | 094-Pt/2 |
| 2 mm diameter 99.9% Gold disk electrode with PEEK body (M6 thread) Ra = 50 µm | 094-Au/2 |
| 3 mm diameter Boron Doped Diamond disk electrode with PEEK body (M6 thread) 500 µm diamond layer, typical Ra = 10 nm, boron doping level between 500 and 1000 ppm. | 094-BDD/3 |

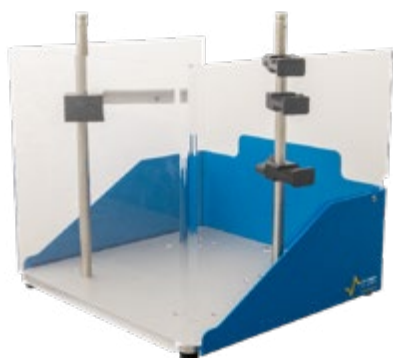
| Ring-Disk electrodes | Catalog n° |
|--|------------------|
| Glassy Carbon ring/disk electrode with PEEK body (M6 thread) Ra = 50 µm | 094-GC-GC |
| 99.9% Pt ring/Glassy Carbon disk electrode with PEEK body (M6 thread) Ra = 50 µm | 094-Pt-GC |



Dimensions/mm: r1=1.5 ; r2 = 2 ; r3 = 3.
 N = maximum theoretical collection factor using Albery formula [1].
 [1] W. J. Albery and S. Bruckenstein, Trans. Faraday Soc. 62 (1966) 1920.

| Cells | Catalog n° |
|---|------------------|
| EL-ELECTRO-1A cell compatible with BluRev RDE | EL-BLUREV |
| PTFE 5 holes cap compatible with BluRev RDE (needed if you already have an EL-ELECTRO cell) | 094-A-CAP |

BluRev Enclosure



BluRev Enclosure

| BluRev Enclosure | Catalog n° |
|---|-----------------|
| Protective housing and stand kit for the BluRev | 094-ENCL |
| Content | |
| 1 stainless steel plate with M6 threaded holes to fix the support poles | - |
| 2 support poles to hold the BluRev RDE and the cell | - |
| (The clamp and the clamping nut are not included) | - |
| 1 clamping flange for the BluRev | - |
| 3 half-clamps for the potentiostat cables (all BioLogic cables are supported) | - |
| 1 plexiglas protective housing | - |
| Specifications | |
| Dimensions with protective housing (HxWxD)/mm | 287x318x308 |
| Weight (with protective housing)/kg | 5.3 |

Rotating Electrodes.

RRDE-3A

RRDE-3A is a system that can be used to perform hydrodynamic (RDE or RRDE) measurement. Its design (short stainless steel shaft) allows users to accurately control electrode rotation and modulation.

Specifications

| | |
|------------------------|---|
| Rotational range/rpm | 100 - 8,000 |
| Setting resolution/rpm | 1 |
| Accuracy | < 0.1% |
| Rotation control type | PWM (Pulse Width Modulation) |
| Bandwidth | 60 Hz at 3,500 rpm Base and 1,000 rpm Peak-to-peak modulation |
| Inlet gas pressure | 5 PSI |
| Temperature/°C | 10-50 |
| Power | 100-240 VAC, 50/60 Hz |
| Dimensions (HxWxD)/mm | 400x185x(base: 230, body: 120) |
| Weight/kg | 6 |



Rotating Ring-Disk Electrode Catalog n°
RRDE-3A apparatus V 2.0 **A-012180**

Working electrodes (page 27), reference electrodes (page 20) and counter electrodes (page 19) must be purchased separately.

Content

| | |
|---|-----------------|
| RRDE-3A glass cell vial 100 mL | A-013580 |
| Spin coating adapter | A-012064 |
| Nipple for purge valve | A-012065 |
| Tygon tubing, OD 6.4 mm x ID 3.2 mm (1.3 m) | A-010058 |
| PTFE cap for RRDE-3A | A-012631 |
| Instruction manual | - |
| Power cable | - |

Options

| | |
|---|------------------|
| Sample vials for alkaline solution (100mL) (10 pcs) | A-013580 |
| Sample vials for alkaline solution (200mL) (8 pcs) | A-013581 |
| Water-jacketed glass cell (100 mL, OD 70 mm, ID 46.4 mm, H 80 mm) | A-012652 |
| DB9 cable to control RRDE-3A | 092-22/11 |
| Bipotentiostat cable for two standard channels | 092-22/12 |
| Corrosion resistant bearing assembly | A-013605 |

Tips

| Disk Replaceable Electrode tips | | Catalog n° |
|---------------------------------|---|-----------------|
| RRDE | Platinum ring/GC disk replaceable electrode kit | A-013336 |
| | Content Platinum ring assembly | A-013337 |
| | Glassy carbon disk | A-013338 |
| | PTFE spacer (3 pieces) | A-013339 |
| RDE | Glassy carbon disk replaceable electrode kit | A-013362 |
| | Content Glassy carbon disk | A-013338 |
| | PTFE spacer (3 pieces) | A-013339 |
| | Disk assembly | A-013361 |
| | Gold disk replaceable electrode kit | A-013364 |
| | Content Gold disk | A-013366 |
| | PTFE spacer (3 pieces) | A-013339 |
| | Disk assembly | A-013361 |
| | Platinum disk replaceable electrode kit | A-013365 |
| | Content Platinum disk | A-013367 |
| | PTFE spacer (3 pieces) | A-013339 |
| | Disk assembly | A-013361 |
| Tool kit | | |
| | Disk electrode polishing/exchange kit | A-013340 |

Standard tips

| | | Tips length/mm | Tips OD/mm | Ring ID/mm | Ring OD/mm | Disk Ø/mm | Catalog n° |
|------|---------------------------------------|----------------|------------|------------|------------|-----------|-----------------|
| RRDE | Platinum ring/platinum disk | 25 | 12 | 5.0 | 7.0 | 4.0 | A-011172 |
| | Platinum ring/glassy carbon disk | 25 | 12 | 5.0 | 7.0 | 4.0 | A-011162 |
| | Gold ring/glassy carbon disk | 25 | 12 | 5.0 | 7.0 | 4.0 | A-011163 |
| | Platinum ring/gold disk | 25 | 12 | 5.0 | 7.0 | 4.0 | A-011164 |
| | Gold ring/platinum disk | 25 | 12 | 5.0 | 7.0 | 4.0 | A-012617 |
| | Glassy carbon ring/glassy carbon disk | 25 | 12 | 5.0 | 7.0 | 4.0 | A-012618 |
| RDE | Glassy carbon disk | 25 | 12 | - | - | 3.0 | A-011169 |
| | Glassy carbon disk | 25 | 12 | - | - | 5.0 | A-013482 |
| | Glassy carbon disk with PTFE spacer | 25 | 12 | - | - | 3.0 | A-013490 |
| | Glassy carbon disk with PTFE spacer | 25 | 12 | - | - | 5.0 | A-013491 |
| | Platinum disk | 25 | 12 | - | - | 3.0 | A-011170 |
| | Gold disk | 25 | 12 | - | - | 3.0 | A-011171 |
| | Aluminum disk | 25 | 12 | - | - | 3.0 | A-011966 |
| | Silver disk | 25 | 12 | - | - | 3.0 | A-011967 |
| | Copper disk | 25 | 12 | - | - | 3.0 | A-011968 |
| | Nickel disk | 25 | 12 | - | - | 3.0 | A-011969 |
| | Tantalum disk | 25 | 12 | - | - | 3.0 | A-011970 |
| | Titanium disk | 25 | 12 | - | - | 3.0 | A-011971 |
| | Tungsten disk | 25 | 12 | - | - | 3.0 | A-011972 |
| | Carbon paste disk, hole depth 4 mm | 25 | 12 | - | - | 3.0 | A-011973 |

Option

| | |
|--------------------|-----------------|
| PK-3 polishing kit | A-011975 |
|--------------------|-----------------|

RDE

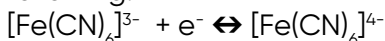
W_{inf} : direct access to the diffusion coefficient.

Levich and Koutecký-Levich methods¹ are powerful analysis tools used to obtain kinetic electrochemical parameters such as the diffusion coefficient of a redox species in a given medium and the reaction constant. These analyses require potentiodynamic curves at various rotation speeds.

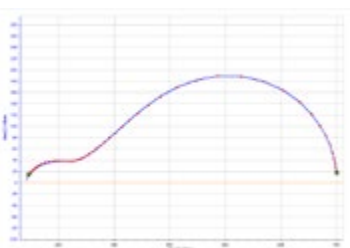
However, fitting impedance measurements made on a redox reaction occurring at a rotating electrode, at only one rotation speed, also enables the direct measurement of the diffusion coefficient.

A PEIS measurement was performed on a 2 mm Pt electrode, using an equimolar solution of $K_3Fe(CN)_6$ and $K_4Fe(CN)_6$ with concentrations of 5 mM in 0.1 M KCl, a BluRev RDE rotating at 2000 rpm.

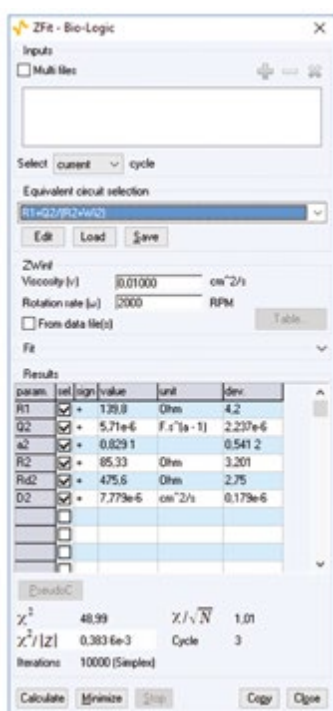
The considered electrochemical reaction is the following:



The obtained impedance graph is shown below:



Using ZFit and the equivalent circuit shown below that contains W_{inf} as a diffusion impedance, we directly obtain the diffusion coefficient of the species of interest, in our case $7.8 \times 10^{-6} \text{ cm}^2/\text{s}$, which is in agreement with the data found in the literature^{2,3}. For more detailed information please see the EC-Lab application note #66⁴.



RRDE

For RRDE measurements, a bipotentiostat is needed. A bipotentiostat controls the two working electrodes i.e. one channel to control the disk electrode and the other to control the ring. An SP-300 equipped with two channels would be an appropriate instrument for RRDE applications.

Because of the presence of two working electrodes in the same setup, a specific connection mode (to avoid any ground loop trouble) is needed. This can be achieved in two different ways:

- isolating the two channels (at least one potentiostat in floating mode),
- grounding the counter electrode. The "CE-to-ground" mode of the BioLogic instruments provides this unique capability.

Of these two options, the latter is preferred because there is less leakage of current. All of the BioLogic multichannel potentiostats (except cyclers) offer such types of electrode connection.

At the disk electrode, the electro-active species are oxidized or reduced according to the applied potential. This new species is detected by reduction or oxidation at the ring, respectively.

In a typical experiment, a CV is performed on the disk electrode and a constant voltage is applied on the ring electrode. This is the CV-CA technique that is available in EC-Lab® in the "bipotentiostat" techniques folder.

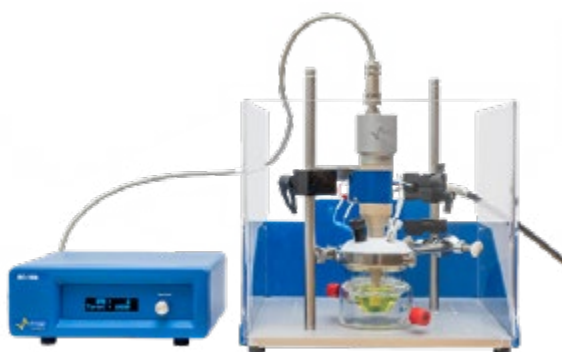
(1) Application Note #56 "Electrochemical reaction kinetics measurement: the Levich and Koutecký-Levich analysis tools"

(2) A. J. Bard, W. Faulkner, in: Electrochemical Methods, Fundamentals and Applications, 2nd Ed., Wiley, New York (2001) 381.

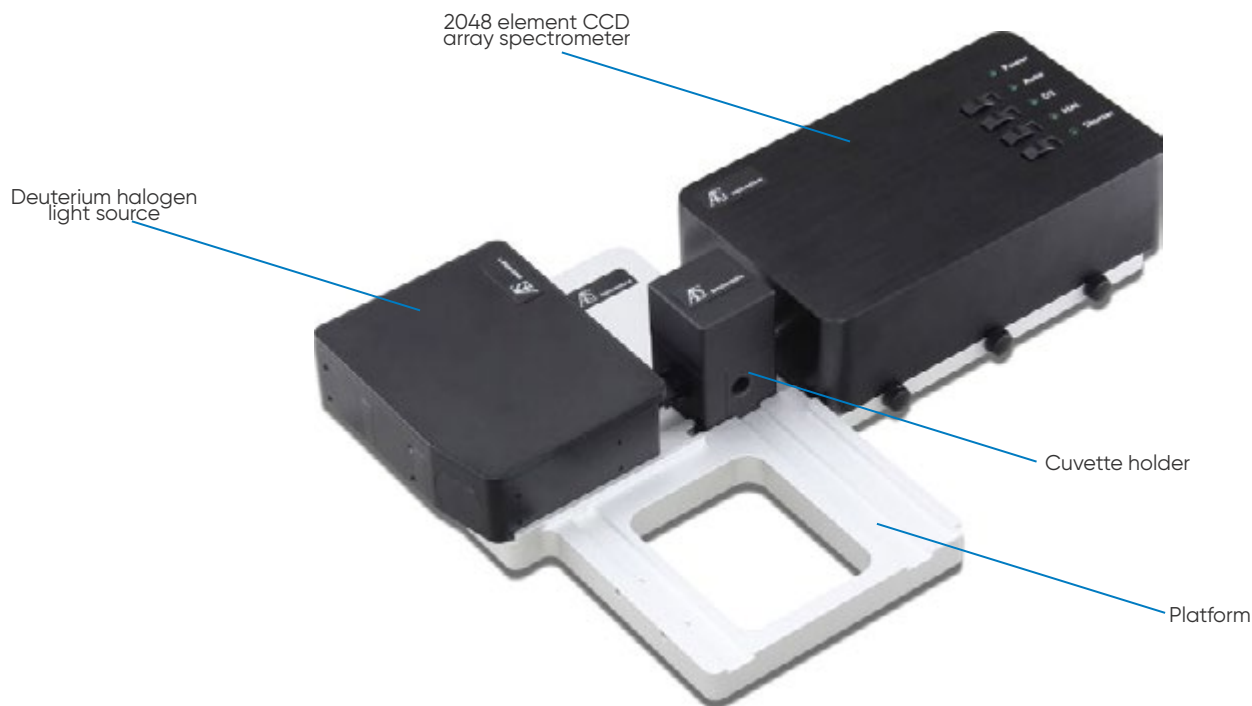
(3) D. R. Lide, H. V. Kehiaian, in: CRC handbook of thermophysical and thermochemical data, CRC Press, Inc., Boca Raton, (1994)

(4) Application Note 66 "EIS measurements on a Rotating Disk Electrode (RDE) Part I: Determination of a diffusion coefficient using the new element W_{inf} "

For an introduction to the Rotating Ring Disk Electrode technique please see our dedicated articles in the Learning Center of the BioLogic website.



Spectroelectrochemistry.



Spectrometer System

Spectroelectrochemistry (SEC) can be useful to elucidate electrochemical reaction mechanisms.

The spectroelectrochemical kit is made up of three parts (spectrometer, light source and cuvette holder).

The spectrometer is equipped with a trigger to synchronize electrochemical and spectroscopic measurements.

SEC2020 Spectrometer system

Catalog n°

SEC2020 spectrometer kit

A-013609

Content

| | |
|--|---|
| SEC2021 Spectrometer (x 1) | - |
| SEC2022 Deuterium halogen light source (x 1) | - |
| SEC2023 Cuvette holder (x 1) | - |
| SEC2024 Platform (x 1) | - |
| AC adaptor (x 1) | - |
| Power cable (x 1) | - |
| USB cable (x 1) | - |
| Collimator (x 2) | - |
| Fiber collimator (x 1) | - |
| Platform screw (x 7) | - |
| External device connection trigger cable (x 1) | - |
| Light source control trigger cable (x 1) | - |
| Plastic cuvette (x 1) | - |
| SMA905 adaptor for light source (x 3) | - |
| SMA905 adaptor for light shielding (x 2) | - |
| Hexagon wrench 0.89 mm (x 1) | - |
| Hexagon wrench 1.50 mm (x 1) | - |
| Software (USB memory) (x 1) | - |
| Waterproof box (x 1) | - |

Quick manual, wavelength calibration data sheet, linearity test data sheet and warranty certificate are also included.

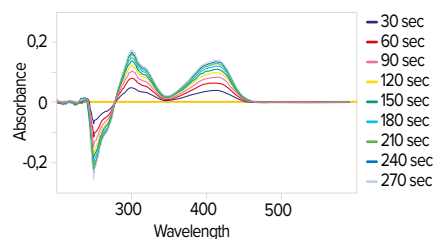
Option

Connecting cable to synchronize the SEC2020 with BioLogic instrument.

092-22/11

Spectrometer specifications

| | |
|--------------------------|--|
| Detector | 2048 element linear silicon CCD array |
| Full description | SEC2021-025-DUVN |
| Detector range/nm | 200 - 1025 |
| Grating | Blaze wavelength (300 nm) |
| Slit/ μm | 25 |
| Wavelength resolution/nm | 1.3 |
| Fiber connector | SMA905 Core diameter: 600 μm NA=0.22 |
| Interface | USB2.0 |
| Operating system | Windows™ 7 / 8.1/ 10 (32bit/ 64bit) |
| Dimensions (HxWxD)/mm | 32x86x110 |



Light source specifications

| | |
|---------------------|---|
| Light type | Deuterium halogen light source |
| Wavelength range/nm | 200 - 1700 |
| Stability | <0.1% |
| Drift/h | 0.25% |
| Bulb life/h | >1000 (D2 lamp) >2000 (halogen lamp) |
| Fiber connector | SMA905 |
| Size (HxWxD)/mm | 46x100x165 |

The SEC2020 spectrometer system uses the Czerny-Turner optical mount. This system is an M-shaped structure symmetrical to the grating (4) and is an optical system with extremely small aberration.

Light source structure



1. SMA905 Connector
2. Slit
3. Collimating mirror
4. Grating
5. Focus mirror
6. 2048 element CCD array

Utilization modes

Transmittance

- Absorbance/transmittance**
- Concentration of chemicals (solution)
 - Polymer extrusion processes
 - DNA quantification

- Reflectance**
- Freshness testing
 - Film thickness/composition (quality control)
 - Activation energy of photocatalytic species
 - Textile quality control

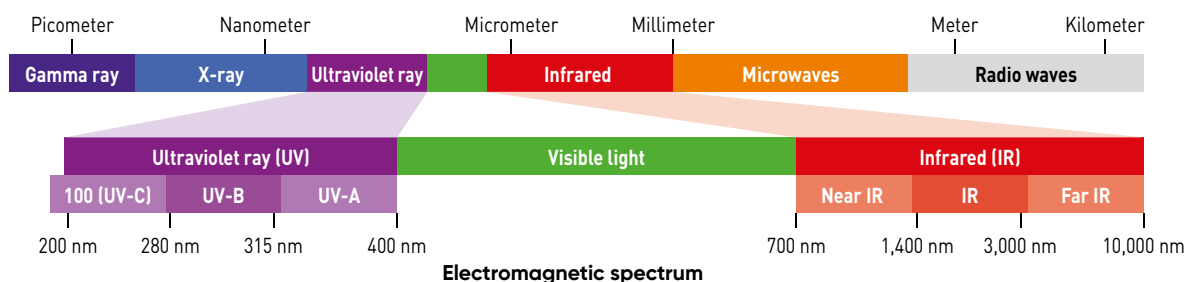
Fluorescence

- Fluorescence**
- Marine organisms
 - Biology (DNA, protein, cell proliferation assay, histamine-analysis, alga monitoring)
 - Environmental fields (waste water analysis, ground water trace studies, hydrocarbon detection, dissolved oxygen)
 - Plant efficiency (plant physiology, plant breeding, horticulture, agronomy, agrochemicals, pollution studies, forestry, ecology)
 - Tissue diagnosis

- Scattering**
- Oil concentrations of oil/water system
 - Raman spectroscopy
 - Physical transition phenomena (e.g. melting point, glass transition crystallize temperature)

Irradiance

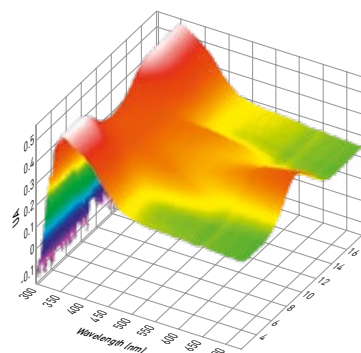
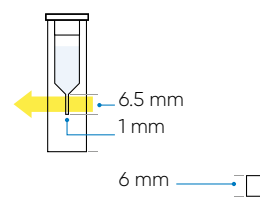
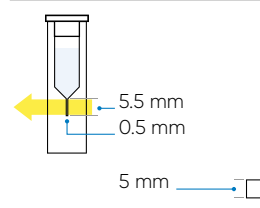
- Emission**
- Astronomy (e.g. spectra of Hale-Bopp, plasma monitoring)
 - In situ metal monitoring
 - Luminescence (PL,EL), LED & laser wavelength



Static Cell



| Quartz glass spectroelectrochemical cell kit | Platinum | | Gold | |
|--|----------------------|-----------------|-----------------------|-----------------|
| | | Catalog n° | | Catalog n° |
| 0.5 mm | | A-012813 | | A-012814 |
| Content | | | | |
| Platinum counter electrode | | A-012609 | | A-012609 |
| Thin layer quartz glass cell | | A-012815 | | A-012815 |
| PTFE cap | | A-011501 | | A-011501 |
| Purging tube (ETFE, 100 mm) | | - | | - |
| Gauze working electrode | 80 mesh, height 5 mm | A-012606 | 100 mesh, height 5 mm | A-012607 |
| 1 mm | | A-013510 | | A-013511 |
| Content | | | | |
| Platinum counter electrode | | A-012906 | | A-012906 |
| Thin layer quartz glass cell | | A-012907 | | A-012907 |
| PTFE cap | | A-011501 | | A-011501 |
| Purging tube (ETFE, 100 mm) | | - | | - |
| Gauze working electrode | 80 mesh, height 6 mm | A-011498 | 100 mesh, height 6 mm | A-012017 |
| Options | | | | |
| RE-1BP Ag/AgCl reference electrode | | | | A-013613 |
| RE-7 non aqueous reference electrode | | | | A-012171 |
| Purging tube (ETFE), 1 m | | | | A-010537 |



Flow Cell

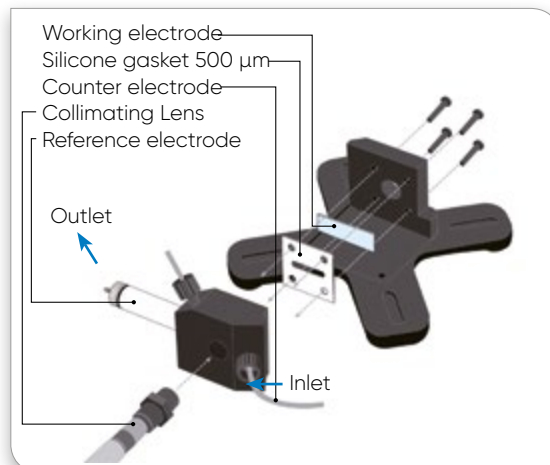
| Flow Cell | Quantity | Catalog n° |
|---|----------|-----------------|
| SEC-2F spectroelectrochemical flow cell | | A-012660 |

Content

| | | | |
|---|---------|---|-----------------|
| SEC-2F flow cell | Base | 1 | - |
| | Cover | 1 | - |
| | Block a | 1 | - |
| | Block b | 1 | - |
| SEC-2F S500 silicone gasket | | 2 | A-012661 |
| Stainless tube OD 1.59 mm (length of 50 mm) | | 1 | A-012198 |
| Needle adaptor | | 1 | - |
| Dynaseal PEEK fingertight | | 2 | - |
| Silicon tube (300 mm) | | 1 | - |
| PTFE tube (1 m) | | 1 | - |

Options

| | | | |
|--------------------------------------|-----------------|---------------------------------------|-----------------|
| Reference electrode screw type | Ø 10x55 mm | RE-3VT aqueous | A-013488 |
| | | RE-7VT non aqueous | A-013489 |
| Working grid electrode for flow cell | 8x27x1 mm | Platinum (1 piece) | A-012655 |
| | | Gold (1 piece) | A-012656 |
| | | Carbon grid electrode (1 piece) | A-012657 |
| | | ITO electrode (4 pieces) | A-012658 |
| | 8x27x0.5 mm | ITO electrode (12 pieces) | A-011465 |
| | 10x20x0.5 mm | ITO electrode (10 pieces) | A-010887 |
| | 10x10x0.5 mm | ITO electrode (30 pieces) | A-011233 |
| | Ø 4 inchx0.5 mm | ITO electrode (1 piece) | A-011827 |
| Gasket | Silicone | S500, 500 µm thick (4 pieces) | A-012661 |
| | | T500, 500 µm thick (4 pieces) | A-012664 |
| | PTFE | T250, 250 µm thick (4 pieces) | A-012665 |
| | | T100, 100 µm thick (4 pieces) | A-012666 |
| Fibre and lens | | 400 µm optical fibre SR, 250 mm | A-012667 |
| | | 400 µm optical fibre SR, 2 m | A-011522 |
| | | UV/VIS collimating lens, 200-2,000 nm | A-012234 |



Gold grid electrode **A-012656**

Solution volumes

| Gasket of | Volume |
|-----------|---------|
| 100 µm | 4.6 µl |
| 250 µm | 11.5 µl |
| 500 µm | 230 µl |

Thin Layer Cells

The UFS set has been designed to perform thin-layer (optical path ~ 0.2 mm) spectroelectrochemistry experiments.



UF-Full

Spacer



- Pseudo-reference electrode
- Working electrode
- Auxiliary electrode
- Embedded in LDPE

Thin layer spectroelectrochemical cell kit

Full kit

Content

- 1 PTFE windows aligner + 1 spacer (platinum auxiliary electrode/Ag pseudo-reference electrode)
- Stainless steel body cell
- XY holder (with magnets) to universally fit the cell in a spectrophotometer
- Plug
- PTFE mask

Platinum Catalog n°

Gold Catalog n°

UF-Full-PT

UF-Full-AU

Platinum working electrode

UF-SEC-PT

Gold working electrode

UF-SEC-AU

-

UF-XY

-

UF-XY

UF-P

UF-M

UF-P

UF-M

Options

PTFE adapter for optical fibres with UV/VIS/NIR collimating lenses (200-2500 nm), adjustable focus, SMA-905 connection

UF-OFA

Base stand for optical fibre measurements

UF-BS

PTFE cuvette holder to be used with UF-OFA and UF-BS

UF-C

1 spacer (platinum working electrode/platinum auxiliary electrode/Ag pseudo-reference electrode)

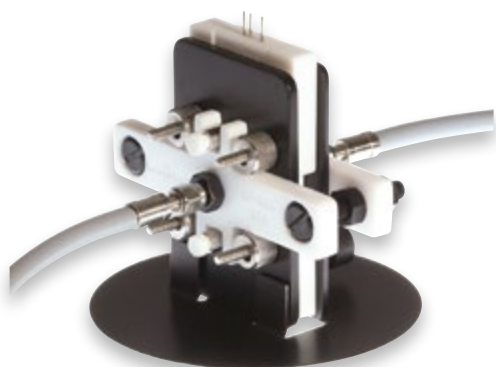
UF-SPP

1 spacer (gold working electrode/platinum auxiliary electrode/Ag pseudo-reference electrode)

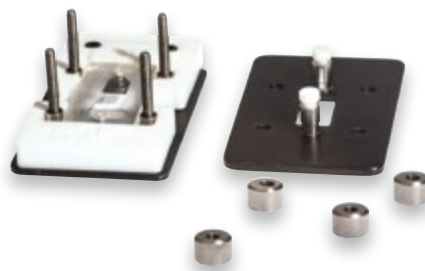
UF-SPA

Optical fibre: SMA-SMA connector length 1 m

092-101



Full kit + PTFE adapter for optical fibres + optical fibres



Finite Diffusion Conditions

In such finite diffusion conditions, a thin solution layer (≤ 0.2 mm) adjacent to the electrode is confined by the cell walls, so that the cell thickness is smaller than the diffusion layer and the mass transfer can be ignored. The most significant virtue of thin-layer cells is the absence of the effect of the diffusion process and the rapidity with which the electro-active species can be completely electrolyzed. The dropping to near zero of the current flow following the peak in the current potential plot is a characteristic behavior of thin-layer cells, indicating exhaustive electrolysis of the cell reactant and minimal diffusion effects in thin-layer electrochemical cells^{(1) (2)}.

Small potential sweep rates (2-10 mV/s) are necessary both to ensure homogeneity of the reactant/product concentrations in the cell and to control resistive effects.

Cyclic voltammetry should be used in your SEC cell to better identify the redox process of interest: in fact, the UF spacer has a silver pseudo-reference electrode, which is sensitive to the solution medium (but is expected to remain constant in time in each given experimental

condition). Potential drifts can be observed in the presence of irreversible redox reactions, which may alter the solution/analyte composition.

To keep the ohmic drop as low as possible, the current should also be kept low which means low scan rates and low sample concentrations may be preferred. However, in some cases, due to the narrowness of the optical path, the use of a relatively high concentration of the sample may be required to study the changes of bands with a low molar extinction coefficient.

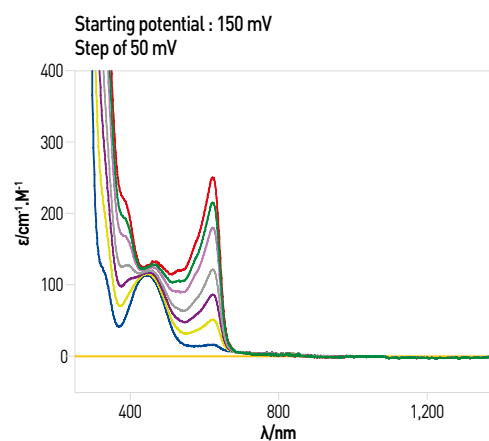
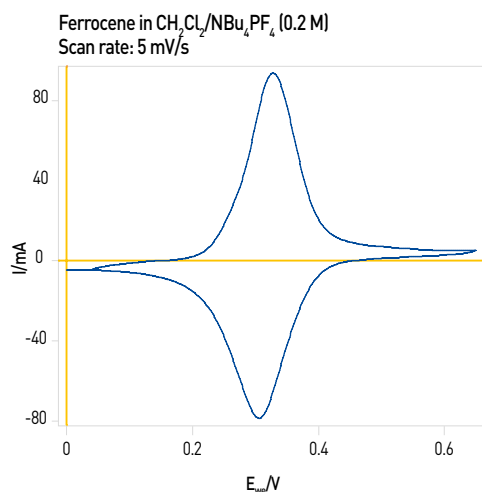
A milli-molar concentration appears to be the most optimized concentration, but in some cases, the concentration can be adapted.

Due to the high Infra-Red absorbance of more common solvents and electrolytes, a very carefully measured background should be obtained before each Infra-Red spectroelectrochemical experiment.

For the same reason, it is also important to avoid changing the tightness of the cell screws during the experiment itself to avoid changes of the optical path.

(1): M. Krejčík, M. Daněk and F. Hartl, J. Electroanal. Chem., 1991, 317, 179.

(2): P. Leoni, F. Marchetti, C. Bonaccorsi, F. Fabrizi de Biani, L. Marchetti, P. Zanello, Chem. Eur. J., 2008, 14, 847



Quartz Crystal Microbalance.

BluQCM QSD

Acoustic sensing principle

The acoustic sensing principle is based on the precise detection of changes on the properties of an acoustic (mechanical) wave traveling through the bulk (QCM-AWS, HFF-AWS) or the surface (LOVE-AWS) of the acoustic wave sensor.

QCM-AWS sensors consist of a thin piece of quartz confined between a pair of metal-based electrodes. An alternating current applied to the quartz crystal induces mechanical oscillations on the quartz due to the piezoelectric effect. A wave is generated and propagated through the sensor and the films attached to it.

The resonance frequency of this wave depends on the oscillating mass of the sensor and its adhering layers. When a thin film is attached to the sensor, the properties of the wave change as well, modifying the resonance frequency and amplitude. If the film is thin and rigid, the decrease in frequency is proportional to the mass of the film.




Special features

- High accuracy temperature control
- Dissipation measurement
- Measurement in air
- Measurement at overtones

Available sensors

| Sensor type | Substrate | Material | Resonant frequency/MHz | Finish | Quantity | Catalog N° |
|---------------|-----------|--------------------------|------------------------|----------|----------|--------------|
| 14 mm WRAPPED | Cr | Au | 10 | Polished | 10 | AW-R10AU10P |
| | Ti | Au | 10 | Polished | 10 | AW-R10AU11P |
| | - | Cu | 5 | Polished | 10 | AW-R5CUP |
| | - | Al | 10 | Polished | 10 | AW-R5ALP |
| | - | C | 10 | Polished | 10 | AW-R10C10P |
| | - | Pt | 10 | Polished | 10 | AW-R10PT10P |
| | Cr | Au | 5 | Polished | 10 | AW-R5AU10P |
| | Ti | Au | 5 | Rough | 10 | AW-R5AU11 |
| | Ti | Au | 5 | Polished | 10 | AW-R5AU11P |
| | Cr | SiO ₂ over Au | 5 | Polished | 10 | AW-R5SIO2P |
| 1 INCH | Cr | Au | 5 | Polished | 5 | AW-R5AU20P |
| | Ti | Au | 5 | Polished | 5 | AW-R5AU21P |
| | - | Pt | 5 | Polished | 5 | AW-R5PT20P |
| | Cr | Au | 9 | Rough | 5 | AW-R9AU20 |
| | Cr | Au | 9 | Polished | 5 | AW-R9AU20P |
| LOVE-SAW | Ti | Au | 9 | Rough | 5 | AW-R9AU21 |
| | Ti | Au | 9 | Polished | 5 | AW-R9AU21P |
| | Cr | Au | 120 | - | 5 | AW-R120AU01L |
| | Cr | Au | 50 | - | 5 | AW-R50AU01H |
| HFF-QCM | Cr | Au | 100 | - | 5 | AW-R100AU01H |
| | Cr | Au | 150 | - | 5 | AW-R150AU01H |

| Sensor | 14 mm wrapped | 1" wrapped | HFF |
|--|---|---|-------------------|
|  |  |  | |
| Cell | | | |
| In-batch eQCM  | AW-BEQ01Q | AW-BEQ02Q | AW-BEQ01HQ |
| Flow eQCM  | AW-FEQ01Q | - | AW-FEQ01HQ |
| Flow QCM  | AW-FQ01Q | - | AW-FQ01HQ |
| In-batch QCM  | AW-BQ01Q | AW-BQ02Q | AW-BQ01HQ |
| Hermetic Li research in batch eQCM  | AW-BEQLIQ | - | - |
| In batch probe eQCM  | AW-PEQ11Q | - | - |

All these cells feature the patented Quick-Lock design that facilitates operation and ensures an excellent reproducibility.

Most of these cells are available with SMA connectors to be used with standard impedance and network analyzers. Please contact your local reseller for further details.

Reference and counter electrodes have to be purchased separately (except for eQCM flow cells where the Pt plate counter electrode is integrated in the lid of the cell). Compatible counter and reference electrodes are shown in the following table:

| | Reference electrode | | Counter electrode |
|---------------------|--------------------------|--------------------------|---|
| | Aqueous | Non-aqueous | |
| In-batch eQCM cells | RE-1B A-012167 | RE-7 A-012171 | Pt wire 23 cm coiled A-002234 |
| Flow eQCM cells | RE-1S A-012168 | RE-7S A-012172 | Pt disk integrated in the cell lid |

QSD-300

| | |
|--|--|
| General function | |
| Operation modes | Tracking* and high resolution** at single and multiple overtones |
| Sensors technologies | QCM, HFF-QCM, LOVE-SAW |
| Cells available | See p.3 |
| Liquid volume above sensor/ μL | 3 – 45 (depending on sensor and cell type) |
| Temperature control | Optional (QSD-TCU) |
| Measurement in air | Yes |
| Simultaneous overtones measurements | Up to 7 (up to 13th) |
| Dimensions (HxWxD)/mm | 90x220x260 |
| Weight/ kg | 3 |
| Sensor | |
| Frequency range/MHz | 4 – 160 |
| Best frequency resolution/Hz | 0.1 |
| Best frequency accuracy/Hz | ± 0.5 |
| Max. acquisition rate***/points/s | 250 |
| Best mass sensitivity in liquid****/pg/cm ² | 50 |
| Best dissipation sensitivity | 10 ⁻⁷ |
| Catalog n° | |
| BluQCM QSD-300 | AW-QSD-300 |

* Tracking mode provides the full impedance spectrum of the sensor around resonance frequency

** Patented fast and high-resolution single frequency point measurement

*** High-resolution mode at single frequency

**** For HFF-QCM

QSD-TCU

| | |
|---|-------------------|
| General function | |
| Temperature control range/ $^{\circ}\text{C}$ | 15 – 45 |
| Temperature stability/ $^{\circ}\text{C}$ | ± 0.05 |
| Dimensions (H x W x D)/mm | 60x220x260 |
| Weight/kg | 4.5 |
| Catalog n° | |
| BluQCM QSD-TCU | AW-QSD-TCU |

QSD-FCU

| | |
|--|--|
| General function | |
| Syringe volume/ μL | 250 (default)* |
| Flow rate range for a 250 μL syringe/ $\mu\text{L}/\text{min}$ ** | 12.5-14500 (Standard) 0.625 – 1062.5 (Smooth) |
| Dimensions (H x W x D)/mm | 195x70x250 |
| Weight/kg | 0.75 |
| Catalog n° | |
| Standard flow control unit | AW-QSD-FCU |
| Smooth flow control unit | AW-QSD-FCUS |

*Other syringe volumes are available upon request, from 12.5 μL to 5000 μL

** Flow rates depend on the syringe volume. For the standard flow unit, the flow rate change is 0.6250 – 290000 $\mu\text{L}/\text{min}$. For the smooth flow unit, it is 0.0313-21250 $\mu\text{L}/\text{min}$. For more information, please contact your local reseller.

Quartz Crystal Microbalance.

QCA922A

This instrument monitors both the resonant frequency and the resonant resistance which are also reflected on the two analog outputs.

It is possible to connect the QCM device to a Biologic potentiostat using a DB9-8BNC cable (catalog n°: 092-22/1).

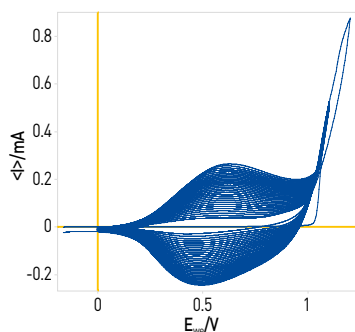


092-QCA-FC



SE-CL3

| eQCM | | Catalog n° | | |
|--|--------------------------------|---|--------------------------------|-----------------|
| Quartz crystal microbalance 27 MHz kit | | SE-QCA922A | | |
| Content | | | | |
| EQCM 27 MHz main unit and cable | | SE-QCA922A-00 | | |
| Male BNC/BNC cable (2 pieces, length 1 m) | | COR28100 | | |
| Options | | | | |
| Connector from QCA to potentiostat | | 092-22/1 | | |
| Low flow peristaltic pump | | EL-AV-008 | | |
| Cells | | | | |
| Holder is needed to get a full QCM or EQCM set-up | | 092-QCA-FC | | |
| Static and flow QCA cell | | SE-CL3 | | |
| Dip cell | | SE-CL4 | | |
| Well cell (PTFE) | | SE-CL4PK | | |
| Well cell (PEEK) | | SE-CL5 | | |
| Transparent well cell | | SE-CL6 | | |
| Flow cell (90 µl) (PTFE) | | SE-CL7 | | |
| Flow cell (90 µl) transparent (PTFE) | | SE-CL6PK | | |
| Flow cell (90 µl) (PEEK) | | | | |
| Resonators | | | | |
| 5 MHz | | | | |
| Standard finish | Resonator and lead wire | Gold electrode (25 pieces) | SE-5AU | |
| | | Aluminum electrode (25 pieces) | SE-9AL | |
| | | Gold electrode (25 pieces) | SE-9AU | |
| | | Copper electrode (25 pieces) | SE-9CU | |
| | | Molybdenum electrode (25 pieces) | SE-9MO | |
| | | Nickel electrode (25 pieces) | SE-9NI | |
| | | Platinum electrode (25 pieces) | SE-9PT | |
| | | Stainless steel (SS304) electrode (25 pieces) | SE-9SS | |
| | | Separated lead wire | Gold electrode (25 pieces) | SE-9AU-S |
| | | Separated lead wire | Platinum electrode (25 pieces) | SE-9PT-S |
| Mirror finish | Resonator and lead wire | Aluminum electrode (25 pieces) | SE-9AL-M | |
| | | Gold electrode (25 pieces) | SE-9AU-M | |
| | | Gold electrode (500 pieces) | SE-9AU-M2 | |
| | | Copper electrode (25 pieces) | SE-9CU-M | |
| | | ITO electrode (25 pieces) | SE-9IT-M | |
| | | Nickel electrode (25 pieces) | SE-9NI-M | |
| | | Platinum electrode (25 pieces) | SE-9PT-M | |
| | | Silicon electrode (25 pieces) | SE-9SI-M | |
| | | Stainless steel (SS304) electrode (25 pieces) | SE-9SS-M | |
| | | Separated lead wire | Titanium electrode (25 pieces) | SE-9TI-M |
| Separated lead wire | Gold electrode (25 pieces) | SE-9AU-MS | | |
| Separated lead wire | ITO electrode (25 pieces) | SE-9IT-MS | | |
| Separated lead wire | Platinum electrode (25 pieces) | SE-9PT-MS | | |
| Others | | | | |
| Resonators lead wire no sputter (50 pieces) | | SE-LEAD/2 | | |
| Resonators 9 MHz, no sputter | | No lead wire (50 pieces) SE-9Q/2 | | |
| | | Mirror finish no lead wire (50 pieces) SE-9Q-M/2 | | |
| Control software for QCM922, QCM922A (no potentiostat control) | | SE-WQCM | | |



Gold electrode



Platinum electrode



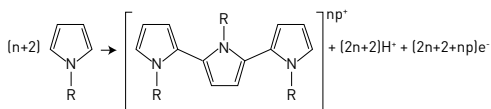
Stainless steel electrode



Measurement examples

Electropolymerization of pyrrol

The polypyrrol film was deposited on an Au-coated quartz using cyclic voltammetry (twenty cycles).



The quartz electrode was immersed in an acetonitrile solution (Bu_4NPF_6 0.2 mol/L) containing a solution of 1 methylpyrrol monomer (0.01 mol/L).

Polypyrrol film growth on the quartz working electrode

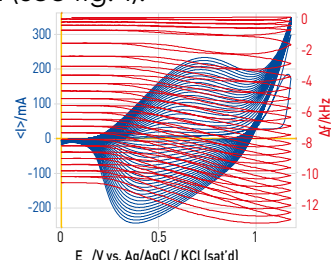
Fig. 1 represents polypyrrol film growth on the quartz electrode during successive cycles of cyclic voltammetry. The reversibility of the charge transfer in such a polymer film is often dependent on the deposition mode (quasi-reversible in this example). This growth is very regular but tends to slow down during the last cycles. This can be due to an interfacial depletion of the solution in methyl pyrrol species in the layer close to the electrode surface and to a saturation of the working electrode surface area.

- (1): G. Sauerbrey, Phys. Verh., 1957, 8, 113-114.
- (2): G. Sauerbrey, Z. Phys., 1959, 155, 206-222.
- (3): Application note #13. Section "Apps & literature of EC-Lab division".

QCM measurements during the film growth

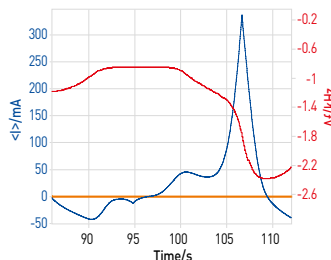
Fig. 1 shows the resonant frequency decrease and the resonant resistance increase while the polymer film is growing. Moreover, the variation is dependent on the potential sweep resulting in a pseudo oscillation of frequency and resistance related to successive cycles. This plot can also be made versus potential (see fig. 1).

Fig. 1: overlaid frequency and current vs. E_{we} of the polymer film growth. Scanning at 100 mV/s between 0 and 1.018 V.

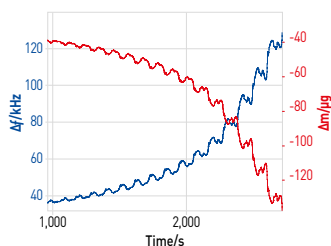


Here, it is interesting to note the frequency evolution versus potential on one cycle. The figure below shows the time evolution on one cycle.

Fig. 2: graphic zoom on one cycle showing the resonant frequency and the current density versus elapsed time⁽³⁾.



The mass calculation is carried automatically by the EC-Lab[®] process data tool. More details can be found in the application note⁽³⁾.



QCA922A specifications

| | |
|---------------------------|--|
| Frequency range | 5 MHz-30 MHz, resolution 0.01 Hz |
| Resonant resistance range | 10-16 Ω, resolution 0.1 Ω |
| ΔF output | Full scale: ±10 V (14 bit) ±100 Hz / ±500 kHz |
| Mass range | 0.1 ng / Hz // 3.5 ng / Hz |
| Resistance output | Full scale: 0-10 V (14 bit) 10 Ω to 10 kΩ |
| Gate time | Variable (10 ms / 20 ms / 100 ms / 1 s / 10 s) |
| Interface | USB |

Surface finishing

| | Roughness | Electrode materials deposition |
|-----------------|-----------|--------------------------------|
| Standard finish | 0.6 μm | Sputtered |
| Mirror finish | 0.06 μm | Sputtered |

A high roughness means a large surface area. A low roughness means an exact surface area.

Battery Accessories.



CCH



CCH-8

Coin Cell Holders

| | CCH-1 | CCH-120 | CCH-124 | CCH | CCH-8 | |
|--------------------------------|-------------------|--------------------|--------------------|------------------|---|--------------------|
| Cell max diameter/mm | 24 | 20 | 24 | 24 | 24 | |
| Cell height/mm | 1.6 | 3.2 | 3.2 | 3 | 1.6 - 3.2 | |
| Number of channels | 1 | 1 | 1 | 4 | 8 | |
| Measurement type | 4 point | 2 point | 2 point | 2 point | 4 point | |
| To be used with | Any instruments | BCS-805 BCS-810 | BCS-805 BCS-810 | MPG2 VMP3 | VSP VMP3 VSP-300 VMP-300 MPG2 | BCS-805 BCS-810 |
| Climatic chamber compatibility | Yes (-30 to 80°C) | No | No | No | Yes (-30 to 80°C) | |
| Catalog n° | 096-126 | 096-120 | 096-124 | 092-22/14 | 092-22/24 | 096-128 |

CCH-120



CCH-124

CCH-1



Pouch Cell Holders

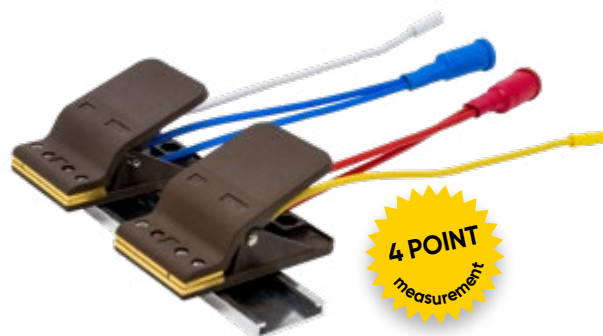
| | PBH-125 | PBH-150 | PBH-4 | PBH-8 |
|----------------------------------|--------------------------|----------------------------|------------------|------------------|
| Min leads separation distance/mm | 0 | | 12 | |
| Max leads separation distance/mm | 110* | | 44 | |
| Number of channels | 1 | | 4 | 8 |
| Max current/A | 25 | 50 | 32 | |
| Measurement type | 4 point | | | |
| Receptacles diameter/mm | 4 (power) 2 (voltage) | 6 (power)** 4 (voltage) | 4 | |
| To be used with | All instruments | | | |
| Max operating T°/°C | 80 | 100 | 80 | |
| Size : HxWxD/mm | 40x50x210*** | | 135x325x180 | 135x650x180 |
| Weight/kg | 0.2*** | | 1.9 | 3.8 |
| Catalog n° | 092-P25/1 | 092-P50/1 | 092-P32/4 | 092-P32/8 |

*Measured using the guide rail and the middle of the clamp.

Eyelet ring (The connection kit **094-110/CNT can be used for an easier connection to 6 mm diameter cables).

***Measured with the two clamps mounted on the guide rail.

PBH-125





BH-1i

2 and 4 mm receptacles are available for the current (power) cables. For voltage (sense) cables, only 2 mm receptacles are available.



CBH-8

4 mm receptacles are available for the current (power) and voltage (sense) cables.

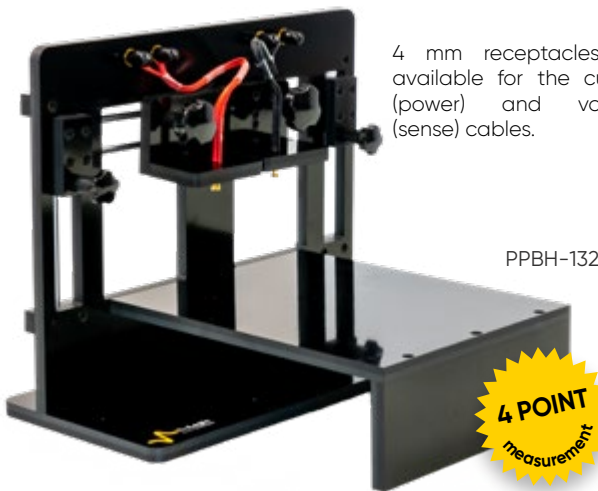
Cylindrical Cell Holders

| | BH-1i | CBH-4 | CBH-8 |
|-------------------------|------------------|------------------|------------------|
| Cell max diameter/mm | 26 | 60 | |
| Cell min height/mm | 0 | 30 | |
| Cell max height/mm | 76 | 100 | |
| Number of channels | 4 | 4 | 8 |
| Max current/A | 15 | 32 | |
| Measurement type | 4 point | 4 point | |
| Receptacles diameter/mm | 2 and 4 | 4 | |
| To be used with | All instruments | | |
| Max operating T°/°C | 60 | 80 | |
| Size : HxWxD/mm | 205x150x95 | 335x260x150 | 335x520x150 |
| Weight/kg | 0.6 | 1.9 | 3.8 |
| Catalog n° | 092-22/15 | 092-C32/4 | 092-C32/8 |



PBH-4

4 mm receptacles are available for the current (power) and voltage (sense) cables.



PPBH-132

4 mm receptacles are available for the current (power) and voltage (sense) cables.



PPBH-1100

4 mm receptacles can be used for currents up to 32 A. For higher currents, the 6 mm flush mounting plugs should be used. These are compatible with FlexP 0160, HCV-3048, CC4-60A and CC8 cables (See page 40).

Prismatic and Pouch Cell Holders

| | PPBH-132 | PPBH-1100 |
|----------------------------------|---------------------|-----------------------------------|
| Cell min height/mm | | 0 |
| Cell max height/mm | | 139 |
| Min leads separation distance/mm | | 66 |
| Max leads separation distance/mm | | 155 |
| Number of channel | | 1 |
| Max current/A | 32 | 100 |
| Measurement type | 4 point | |
| Receptacles diameter/mm | 4 (power and sense) | 4 (power and sense) and 6 (power) |
| To be used with | All instruments | |
| Max operating T°/°C | 80 | |
| Size : HxWxD/mm | 265x320x300 | 320x320x360 |
| Weight/kg | 3 | 5.1 |
| Catalog n° | 092-PC32/1 | 092-PC100/1 |

Battery Accessories.



CC4-200A



CC8

Current Collectors

BioLogic's current collectors offer the possibility to connect in parallel several channels and increase the maximum current that can be passed through the cell, in order to simplify and reduce the footprint of your setup.



CC4-60A

SAM-50



| | CC4-60A | CC8 | CC4-200A |
|---------------------------------------|---|------------------|---|
| Connection details | | | |
| Input | | | |
| Power cables/receptacles diameter/mm | | 4 | 6 (IP2x) |
| Voltage sense receptacles diameter/mm | | 2 | 4 |
| Number of input channels | 4 | 8 | 4 |
| Max current/channel/A | | 15 | 50 |
| Output | | | |
| Power receptacles diameter/mm | | 6 (IP2x) | 8 (Amphenol, IP2x) |
| Voltage sense receptacles diameter/mm | | 2 (IP2x) | 4 (IP2x) |
| Max output current/A | 60 | 120 | 200 |
| Cables details | | | |
| Output power cables | 1 pair of 2 m power cables with 6 mm receptacles | | 1 pair of 2.5 m power cables with 8 mm receptacles and M8 threads |
| Output voltage cables | 1 pair of 2 m sense cables with 2 mm banana plugs | | 1 pair of 2.5 m sense cables with 4 mm banana plugs |
| Instrument compatibility | BCS-815 VSP-300 VMP-300 | BCS-815* | FlexP0160 FlexP0060 HCV-3048 |
| Included connection kit | 094-110/CNT** | | 093-200/CNT** |
| Measurement type | 4 point | | |
| Max operating T°/°C | 80 | | |
| Size (with feet) : HxWxD/mm | 70x170x88 | 70x300x88 | 120x248x169 |
| Weight/kg | 3.8 | | |
| Catalog n° | 096-022 | 096-015/1 | 093-100/CC4 |

*The CC8 comes with BCS tablets and cables. It is also compatible with the VSP-300 and VMP-300 and can be provided without cables and tablets using the following part number: 096-015.

**Please see p. 42 for the detailed content of the connection kits.

Sense Adapter Module (SAM-50)

This can be added to a multichannel system to perform stack measurements up to 60 V for 5 channel boards and a 10-element measurement. 3 SAM-50s can be linked to follow-up 30 elements.

| Sense Adapter Module | Catalog n° |
|----------------------|---------------|
| SAM-50 | 092-26 |

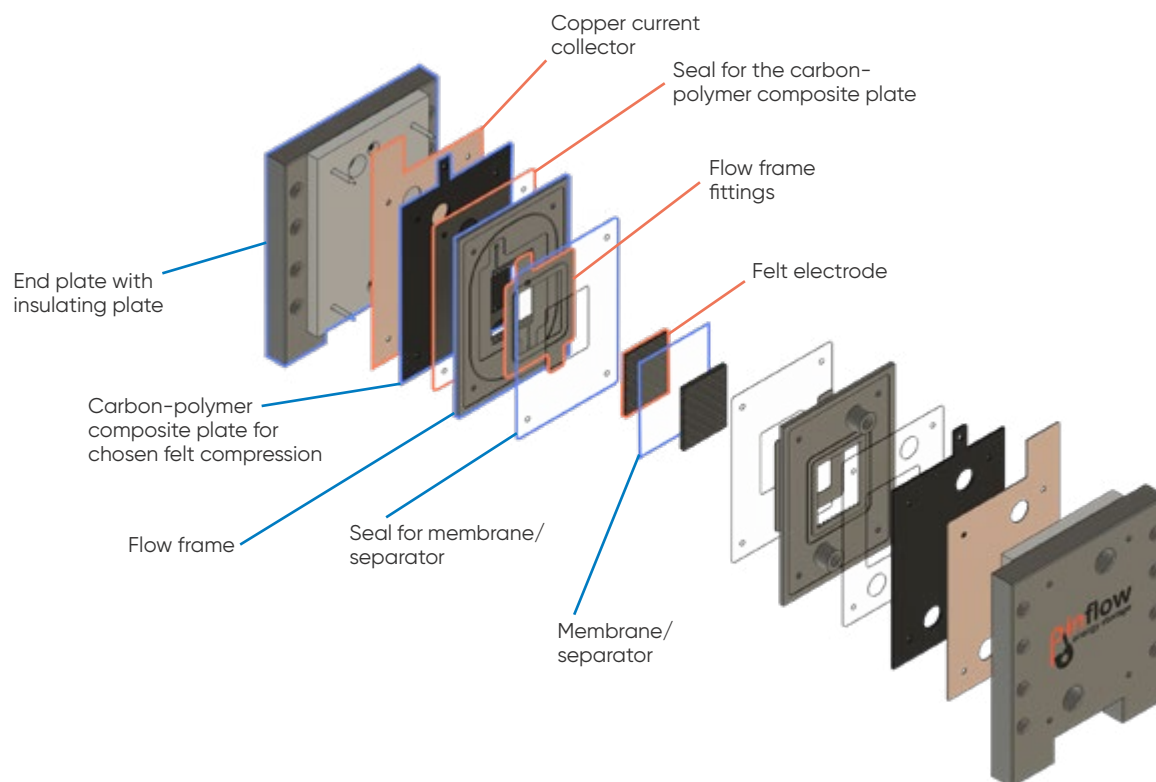
Redox Flow Battery Cells.

This range of redox flow battery cells are manufactured by **Pinflow energy storage**.

The lab cells are specially designed to control the pressure applied on the carbon felts that are used as electrodes. Using rigid components and non-flat bipolar plates, you can not only perform reproducible experiments but you can also use various electrode thicknesses.

Cells stacks, complete turnkey set-ups with climatic chambers and flow control are also available.

Please ask your local reseller for more information.



| Description | Catalog n° |
|---|------------------------|
| Lab cells | |
| Redox Flow Lab Cell 4 cm ² and 3.75 mm spacer thickness, for organic media | P-LABCELL/4F |
| Redox Flow Lab Cell 5 cm ² and 3.75 mm spacer thickness | P-LABCELL/5 |
| Redox Flow Lab Cell 20 cm ² and 3.75 mm spacer thickness | P-LABCELL/20 |
| Redox Flow Lab Cell 50 cm ² and 3.75 mm spacer thickness | P-LABCELL/50 |
| Spares | |
| Set of sealings for 5 cm ² cell | P-SSEAL/5 |
| Pack of sealings for 5 cm ² cell, contains 10 sets | P-PSEAL/5 |
| Set of bipolar plates for different compression for 5 cm ² cell | P-SBIPOL/5 |
| Set of sealings for 20 cm ² | P-SSEAL/20 |
| Pack of sealings for 20 cm ² cell, contains 10 sets | P-PSEAL/20 |
| Set of bipolar plates for different compression for 20 cm ² cell | P-SBIPOL/20 |
| Set of sealings for 50 cm ² | P-SSEAL/50 |
| Pack of sealings for 50 cm ² cell, contains 10 sets | P-PSEAL/50 |
| Set of bipolar plates for different compression for 50 cm ² cell | P-SBIPOL/50 |
| Accessories | |
| Pump with 2 heads for Pinflow cell | P-LABCELLPUMP/2 |
| Tubings and vessels for Pinflow cell | P-TUBINGS |
| Mounting stand | P-STAND |
| Felt cutter (Please indicate cell area) | P-CUTTER |
| Torque wrench | P-WRENCH |
| Set of fittings with new FPM O-rings (Please indicate cell area) | P-FPM |

Pinflow cells were used and characterized in the following papers:

<https://doi.org/10.1016/j.memsci.2018.02.011>

<https://doi.org/10.1016/j.jpowsour.2018.01.079>

Connection Accessories.



DC3



Dummy cell for booster



Dummy cell for BCS

Dummy Cells

A specific dummy cell is available for boosters. This cell and DC3s have been designed to clamp onto one another, for ease of use, and to help you better manage your experiments.

| Dummy Cell | | Catalog n° |
|------------------------|---|------------------|
| DC3 | R+R/C+R/C circuit. | 094-111/3 |
| Dummy cell for booster | 1 power resistor, 5 mΩ. Precision: 1% Temperature coefficient: ±50 ppm/°C | 092-32/1 |
| DC-BCS (AC) | For EIS measurements: R+R/C+R/C and supercap (1 F, 5.5 V) | 096-016 |
| DC-BCS (DC) | For DC measurements: Three test resistors with 1% precision. | 096-016/1 |

Test Boxes

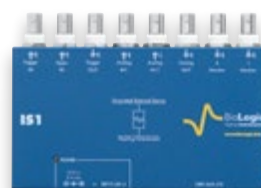
| Test Boxes | | Catalog n° |
|------------|---|-----------------|
| Test Box 2 | Several circuits with high precision resistors, for calibration and validation | 092-22/6 |
| Test Box 3 | Three circuits: linear, two non-linear systems (Tafel & passivating) for teaching and demonstration | 092-22/7 |

Connection kits

| Connection kits | | Catalog n° |
|---|---|--------------------|
| For HCV-3048, FlexP 0060, 0160, CC4-60A and CC8 | Contains: 2x6 mm receptacles, 4 lugs with 4 mm receptacles | 094-110/CNT |
| For FlexP0012 and CC4-200A | Contains: 2 Amphenol 8 mm receptacles, 4 lugs with 4 mm receptacles | 093-200/CNT |

External Device Connection

| External device connection | | Catalog n° |
|--|--|------------------|
| DB9-8 BNC connector for auxiliary I/O | | 092-22/1 |
| IS1 isolation module for auxiliary I/O for VMP-300 based instruments | | 094-081/5 |



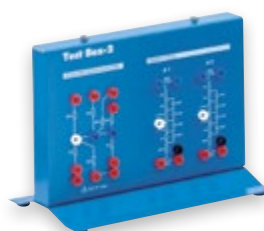
IS1



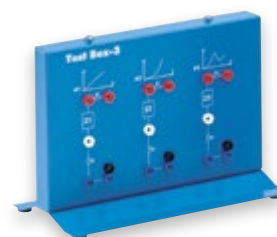
DB9-8 BNC

| Pt Probe | | Catalog n° |
|---|--|-------------------|
| PT100 temperature probe, to be connected to the auxiliary I/O, temperature range: -50 °C to 250 °C, Dimensions: 3 x 20 mm, Length of cable: 2.5 m, Accuracy: ±1 °C For T° measurement in air | | 092-22/13 |
| PT100 temperature probe for T° measurement in solution with SubD9 connector | | EL-C-014 |
| PT100 temperature probe for T° measurement in solution with triad connector | | EL-C-014/1 |

Test Box 2



Test Box 3



Transport Cases

| Transport Cases | | Catalog n° |
|----------------------|--|----------------|
| SP-200/SP-240/SP-300 | | 094-093 |



Hermetic cell cable for glove box

Hermetic cell cable for glove box

| | VMP3 | VMP-300 |
|----------------------------------|--|--|
| Catalog n° | 092-23/5 | 094-101/6 (standard cable) 094-101/8 (low current cable) |
| Content: | | |
| Feedthrough type | 12 pins | 25 pins* |
| Inside glovebox (length: 1 m) | Cable with 2 mm connectors on one side and 12-pin Jaeger connector on the other side | Cable with electrometer on one side and 25-pin connector on the other side |
| Outside glovebox (length: 1.5 m) | Cable with SubD25 connector on one side and 12-pin Jaeger connector on the other side (length 1.5 m) | Cable with SubD25 connector on one side and 12-pin Jaeger connector on the other side (length 1.5 m) |
| Requirement: | | |
| Hole to make in the glove box/mm | 27 | 45 |

Specific Cables

By default, the potentiostat and the booster are provided with a 1.5 m long cell cable.

The cable connected from the booster to the potentiostat is 0.8 m long for VMP3 based instruments.

For some applications, the user may need different length cables. For this reason, longer cables are available.

For applications carried out in glove boxes, cell cables are also available.

| Connection cable from booster to potentiostat | Available length/m | Catalog n° |
|---|--------------------|-----------------|
| All boosters | 3 | 092-33/5 |
| | 5 | 092-33/6 |

| Longer cables | Available length/m | Catalog n° |
|---|--------------------------------------|---------------------|
| Essential (VMP3) range | 1.5 | 092-23/1 |
| | 1.5 stack measurements | 092-23/1S |
| | 1.5 High temperature -40°C to +150°C | 092-23/1HT |
| | 2.5 | 092-23/2 |
| | 3 | 092-23/7 |
| Booster 2 A, 5 A for essential range (VMP3) | 5 | 092-23/3 |
| | 10 | 092-23/4 |
| | 2.5 | 092-33/11 |
| | 3 | 092-33/12 |
| | 5 | 092-33/13 |
| Booster 10 A, 20 A for essential range (VMP3) | 2.5 | 092-33/21 |
| | 3 | 092-33/22 |
| | 5 | 092-33/23 |
| | 2.5 | 094-101/3A |
| | 3 | 094-101/3B |
| Premium (VMP-300) range | 5 | 094-101/3C |
| | 2.5* | 094-101/4-25 |
| | 2.5 (Ultra Low Current) | 094-101/4A |
| | 5 (Ultra Low current) | 094-081/4D |
| | BCS-805/810 | 0.3 |
| 2.5 | | 096-21/2 |
| 5 | | 096-21/3 |
| BCS-815 | 0.25 | 096-011/1 |
| | 2.5 | 096-011/2 |
| | 5 | 096-011/3 |
| | 10 | 096-011/4 |

*Without electrometer (compatible with HV-48 & ULC) - requires 094-081/4

Set-up connection

Bad connections can affect measurements (stability of potentiostat, artifacts etc).

In order to optimise your set-up, we recommend you use the accessories described in this section.

Connectors

2 mm alligator clip (pack of 10)

4 mm alligator clip (pack of 5)

2 mm receptacle (pack of 10)

4 mm receptacle (pack of 10)

2 mm banana plug (pack of 10)

4 mm banana plug (pack of 5)

2 mm receptacle to 4 mm plug adapter (pack of 5)

2 mm receptacle to 4 mm plug adapter for banana plug (pack of 5)

4 mm receptacle to 2 mm plug adapter for banana plug (pack of 5)

Connection kits

| | Black colour | Red colour | Blue colour | White colour | Catalog n° |
|--------------------|------------------------------|-------------------------|-------------|--------------|--------------------|
| For standard board | - 4 alligator clips of 2 mm: | blue, white, red, black | | | 092-1001/30 |
| | - 3 receptacles of 2 mm: | blue, white, red | | | |
| For booster board | - 3 alligator clips of 2 mm: | blue, white, red | | | 092-1001/31 |
| | - 2 alligator clips of 4 mm: | red, black | | | |
| | - 3 receptacles of 2 mm: | blue, white, red | | | |
| | - 2 receptacles of 4 mm: | blue, white | | | |

Connection Accessories.



Nstat box (8 channels)



Bipot cable: dedicated to RRDE applications

Multi-Electrode Investigation Cables

Multi-electrode investigation cables

| | Channel | Nb of channels | Length/m | Catalog n° |
|--|-------------|----------------|----------|------------------|
| Nstat box (for VSP, VMP3) | standard | 4 | 1.5 | 092-16 |
| | Low current | 8 | 1.5 | 092-22/3 |
| Bipot cable (for VSP, BiStat, VMP3) | Standard | 2 | 1.5 | 092-22/12 |

Option

| | |
|---|-----------------|
| External power supply for the Nstat box (this option is needed if more than one Nstat box is connected to a VMP3 or if the user uses VSP) | 092-16/1 |
|---|-----------------|

Faraday Cages



Advanced Faraday cage

To avoid any external perturbations, especially for low current applications, we recommend using a Faraday cage.

Please note that in order to ensure that the cage is fully functional, it must be earthed by connecting it to the ground (this is done via a green plug on the instrument's rear panel).



FC-45 Faraday cage

Advanced Faraday cage specifications

| | |
|----------------|------------------------------|
| Temperature/°C | 0 - 50 |
| Power supply | 100 VAC-240 VAC, 50/60 Hz |
| Fuse/A | 1 |
| Gas pressure | < 34 kPa max. |
| Interface | IEEE-488, RS-232C |
| Weight/kg | 3.8 |

Faraday cages

| | Catalog n° |
|---------------------------------------|------------------|
| FC-45 Faraday cage, 450x450x450 mm | 094-084/1 |
| Stand for FC-45 | 094-084/2 |
| Standard Faraday cage, 400x200x600 mm | NS-FAR600 |
| Advanced Faraday cage, 286x230x320 mm | A-012033 |

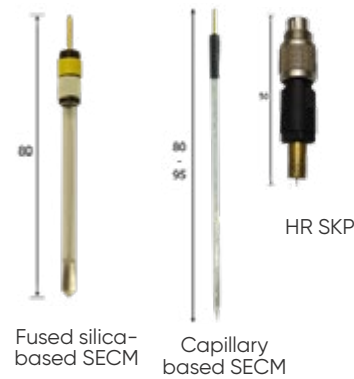
Scanning Product Accessories.

Probes

A range of probes dedicated for use with our SECM, SVP, SKP and LEIS scanning probe applications are available for the M370 and M470 systems. SECM probes can also be used with SECM150

| Probes | Catalog n° |
|--|-----------------------------|
| Fused silica-based SECM 10 µm diameter Platinum disk | U-23/10 |
| Fused silica-based SECM 15 µm diameter Platinum disk | U-23/15 |
| Fused silica-based SECM 25 µm diameter Platinum disk | U-23/25 |
| Capillary based SECM 1 µm diameter Platinum disk | U-P5/1^{1 2} |
| Capillary based SECM 2 µm diameter Platinum disk | U-P5/2^{1 2} |
| Capillary based SECM 5 µm diameter Platinum disk | U-P5/5¹ |
| Capillary based SECM 10 µm diameter Platinum disk | U-P5/10 |
| Capillary based SECM 15 µm diameter Platinum disk | U-P5/15 |
| Capillary based SECM 25 µm diameter Platinum disk | U-P5/25 |
| SKP 500 µm diameter | U-SKP370/1 |
| HR SKP 150 µm diameter | U-SKP-150 |
| LEIS | U-LEIS370/1 |
| SVP | U-SVP370/1 |

¹Unsuitable for ic-SECM/ ²Unsuitable for M370



VCAM3 Video Microscope System

The VCAM3 is a long working distance video microscope which allows users to view the positioning between probe tip and sample surface in many scanning probe electrochemistry techniques.



VCAM3 specifications

| | |
|--------------------------|--------------------------|
| Working Distance | 108 mm |
| Min illumination/lux | 0.0003 |
| Field of view/mm | 1.4 (x4.5) to 8.6 (x0.7) |
| Operation temperature/°C | -30 to +70 |
| Catalog n° | U-VCAM3 |

Scanning Product Accessories.

Cells

Three cells are available :

The TriCell™ is a large volume, wide scan range cell, dedicated to LEIS, SVP, SKP, SDS techniques.

The μ TriCell™ and its Shallow version are dedicated to SECM techniques (dc, ac and ic mode). The Shallow μ TriCell™ contains a slightly smaller volume of electrolyte than the μ TriCell™ is more accessible and ideal for ic-SECM.

The Foil Cell has been designed for use with flat, foil type samples, such as those used for battery electrodes. It has been designed to mount directly on the baseplate of the μ TriCell™ and Shallow μ TriCell™.

All TriCells accommodate samples mounted in a 32 mm diameter resin cylinder.

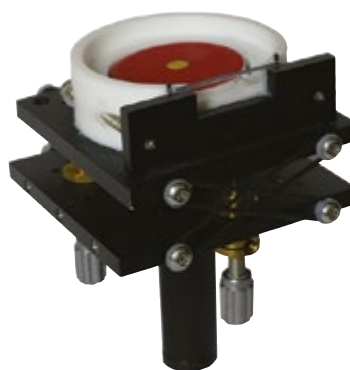
| Cells | Volume (mL) | Catalog n° |
|------------------------|-------------|--------------------|
| TriCell™ | 700 | U-TRICELL |
| μ TriCell™ | 7 | U-uTRICELL |
| Shallow μ TriCell™ | 6 | U-SuTRICELL |
| Foil Cell | 1 | U-uFoilCell |



TriCell™



μ TriCell™



Shallow μ TriCell™



Foil Cell™

M470 Glovebox Cables

The M470 Scanning Electrochemical Workstation is supplied with a full set of standard cables for use with all techniques.

For applications requiring use of the M470 in a glove box, additional cell cables are available.

These are supplied as a set of internal, feedthrough and external cables to replace a single cable.



Hermetic scan stage cable for glove box

| | Electrometer | Piezo Strain Gauge | Piezo Drive | Scan Stage | 3300 |
|----------------------------------|--|--|---|--|---|
| Content : | | | | | |
| Feedthrough Type/pins | 8 | 6 | 3 | 8 | 25 |
| Inside glove box | Electrometer cable connects directly to 8 pin LEMO feedthrough. | Cable with connector to piezo strain gauge on one side and 6-pin Jaeger connector on the other side (length 1.5 m) | Cable with connector to piezo drive on one side and 3-pin Jaeger connector on the other side (length 1.5 m) | Cable with connector to scan stage on one side and 8-pin Jaeger connector on the other side (length 1.1 m) | Cable with 4 mm connectors on one side and 25-pin Jaeger connector on the other side (length 1 m) |
| Outside glove box | 1 m cable with connector to SCV470 in one side and 8 pins LEMO connector in the other side | Cable with connector to SCV470 on one side and 6-pin Jaeger connector on the other side (length 1 m) | Cable with connector to SCV470 on one side and 3-pin Jaeger connector on the other side (length 1 m) | Cable with connector to SCV470 on one side and 8-pin Jaeger connector on the other side (length 1.1 m) | Cable with connector to SCV470 on one side and 25-pin Jaeger connector on the other side (length 1 m) |
| Requirement: | | | | | |
| Hole to make in the glove box/mm | 12.1 | 21 | 21 | 27 | 45 |
| Max. Required | 1 | 1 | 1 | 3 | 2 |
| Catalog n° | U-HC470ELE-L | U-HC470PSG | U-HC470PD | U-HC470STG | U-HC3300CL |

*When used with an M470 and SP-300 configuration the SP-300 Ultra Low Current (ULC) glove box cable sets are also required.

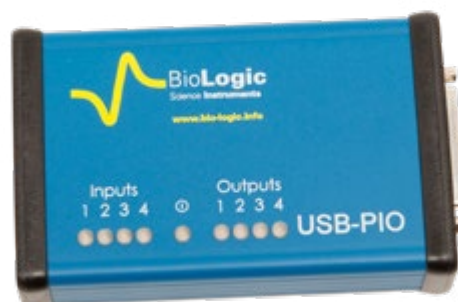
USB-PIO

The USB-PIO, designed for use with the M470, allows external devices to be switched on and read. It can be used to control up to four different channels individually or collectively using the M470 software.

The USB-PIO can interface directly to user supplied cables, or to the supplied breakout PCB using the DB25 pin female connector.

USB-PIO Specifications

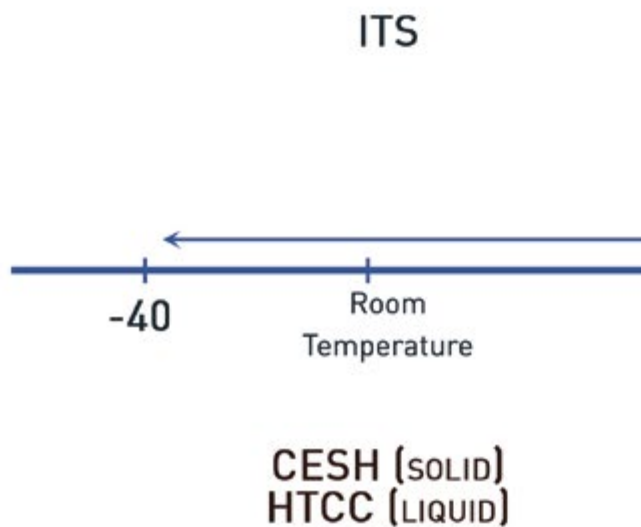
| | |
|----------------|---------------------------|
| Temperature/°C | 0 - 50 |
| Power supply | 100 VAC-240 VAC, 50/60 Hz |
| Fuse/A | 1 |
| Gas pressure | < 34 kPa max. |
| Interface | IEEE-488, RS-232C |
| Weight/kg | 3.8 |



Material Testing Accessories.

How to identify the correct solution

As the electrical properties of materials depend on temperature, a Temperature Control Unit and a Sample Holder are needed to control the temperature and hold the sample (solid, pasty and liquid sample) between the parallel plates.



Temperature Control Units

High Temperature Furnace (HTF-1100)

HTF-1100 is a horizontal laboratory tube furnace dedicated to the electrical characterization of materials and to heat treatment in the temperature range between the ambient and 1100 °C.



HTF-1100 & HTSH-1100

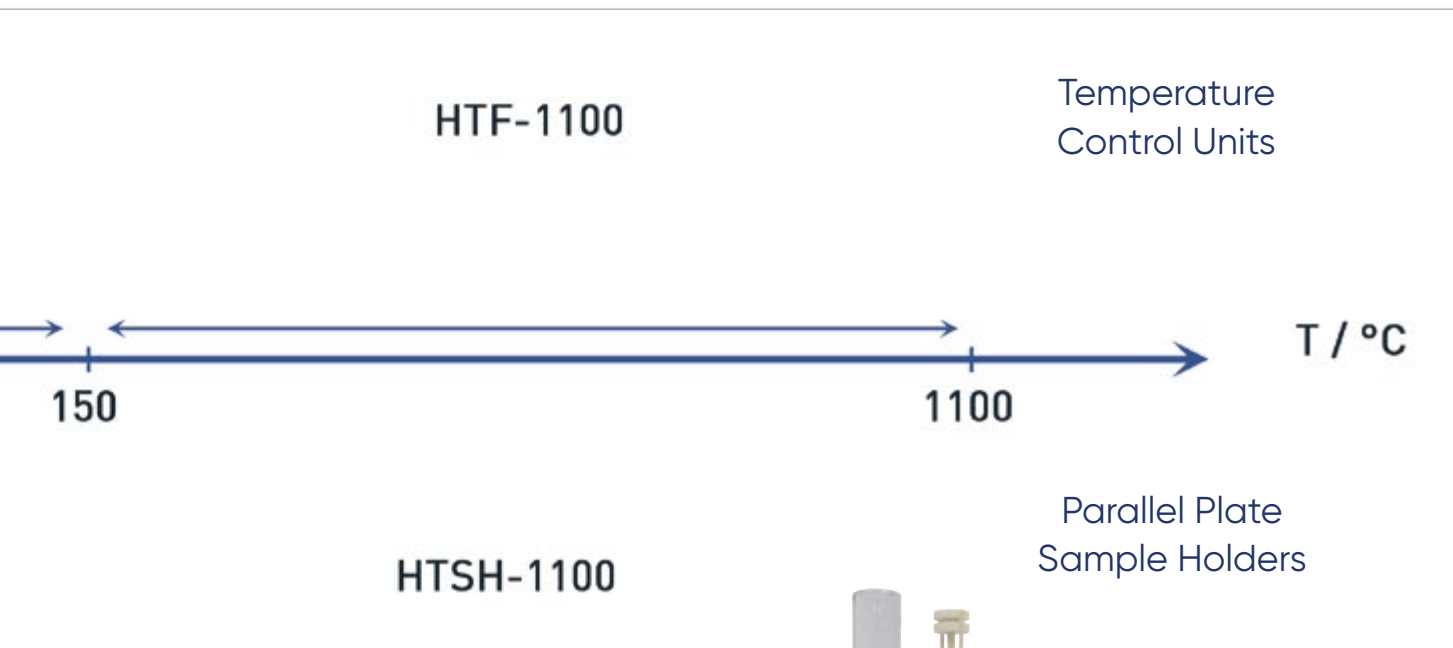
Intermediate Temperature System (ITS)

ITS is a compact temperature chamber dedicated to the characterization of electrical properties of materials by impedance spectroscopy under controlled atmosphere in the temperature range between -35 °C and 150 °C.



ITS

| Temperature Control Unit | Operating Temp. | Features | Catalog n° |
|--------------------------|-----------------|--|-------------------|
| HTF-1100 | RT to 1100 °C | Heating rate adjustable K-type thermocouple | 097-110 |
| In-plane ITS | -35 to 150 °C | Temperature accuracy: 0.3 °C | 097-140/11 |
| Through-plane ITS | -35 to 150 °C | PT1000 probes | 097-140/12 |



Sample Holders

High Temperature Sample Holder (HTSH-1100)

HTSH-1100 is a test fixture dedicated to the characterization of electrical properties of materials at high temperatures (up to 1100°C).



CESH on its base



HTCC



HTSH-1100

Controlled Environment Sample Holder (CESH)

CESH is a sample holder designed to the electrical characterization of flat material samples in parallel plate configuration in the temperature range between -40°C and 150°C.

High Temperature Conductivity Cell (HTCC)

HTCC is a parallel plate conductivity cell dedicated to laboratory measurements in a wide conductivity range (200 mS/cm to 2 μS/cm).

| Sample Holders | Operating Temp. | Features | Compatibility | Catalog n° |
|----------------|---------------------|---|--------------------------------|-------------------|
| HTSH-1100 | Φ=25 mm | Quartz tube for controlled atmosphere Leak-tight up to 2 bar relative K-type thermocouple | HTF-1100 Tubular furnaces | 097-133/S |
| | Φ=12 mm | | | 097-132/S |
| | Φ=03 mm | | | 097-130/S |
| CESH | In-plane | Leak-tight up to 2 bar relative | ITS Other temperature units | 097-150/1 |
| | Through-plane | | | 097-150/2 |
| HTCC | Platinized (x1) | Cell factor: K = 1 +/- 5% cm ⁻¹ volume: 0.5 - 1.0 mL | MCS 10 | 098-010/10 |
| | Non-platinized (x1) | | | 098-010/11 |

| Other accessories | Catalog n° |
|--|-------------------|
| PT1000 probe long sleeve | 097-140/3 |
| BNC/SMB RJ175 cell cable for CESH (x4) | 097-140/CC |
| K-type Thermocouple for HTSH-1100 | 097-13/KT |
| Quartz tube for standard HTSH-1100 | 097-13/QT |
| Quartz tube for leak-tight HTSH-1100 | 097-13/QTS |
| SMB-Banana cables set (x4) for CESH | 097-13/AD |



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Application notes



White papers



Tutorials

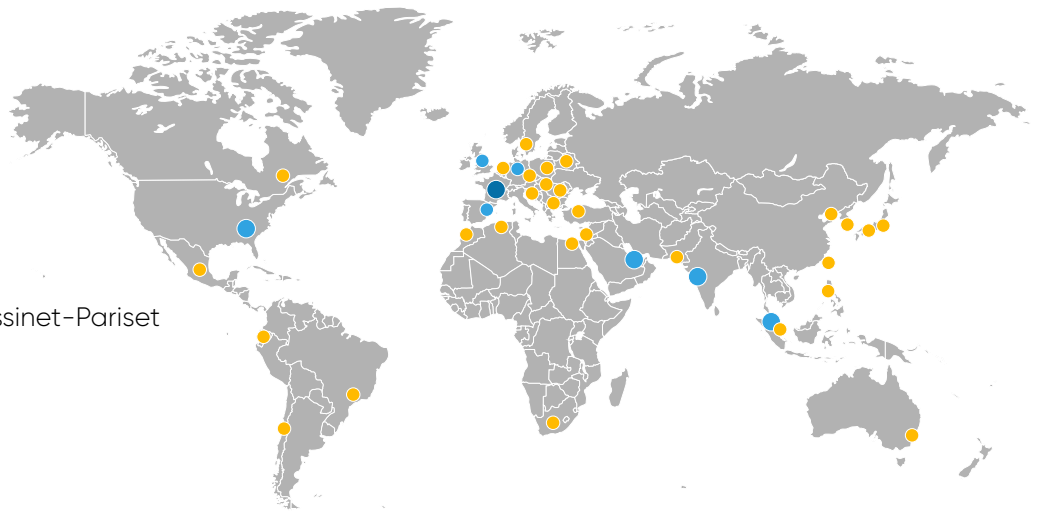


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