

PUBLISHED 2026

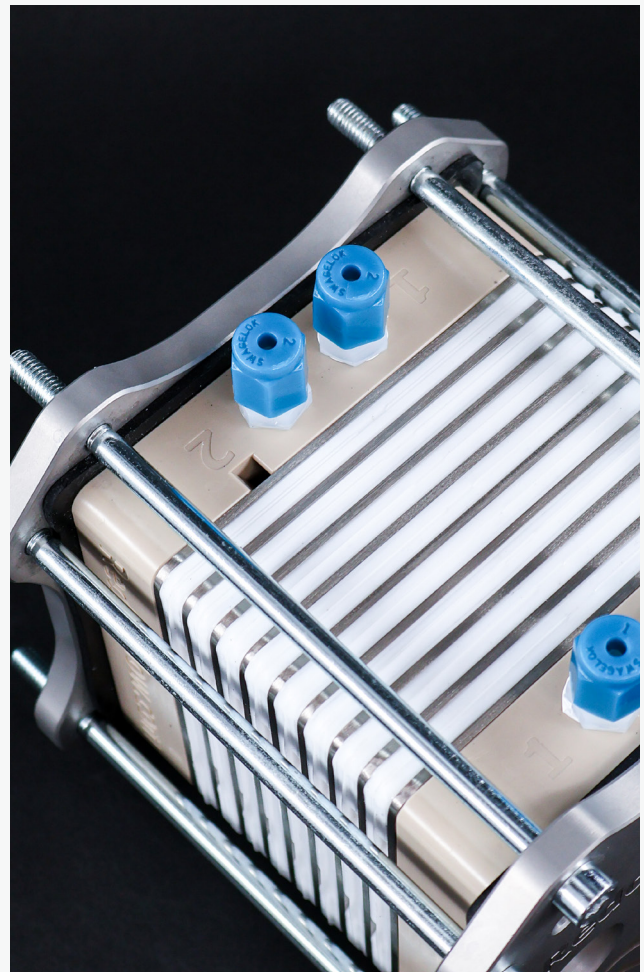


THE X-STACK

MODULAR ELECTROLYSIS STACK FOR
R&D



Our **Flexible & Modular** Electrolysis Stack for *R&D*



The X-Stack

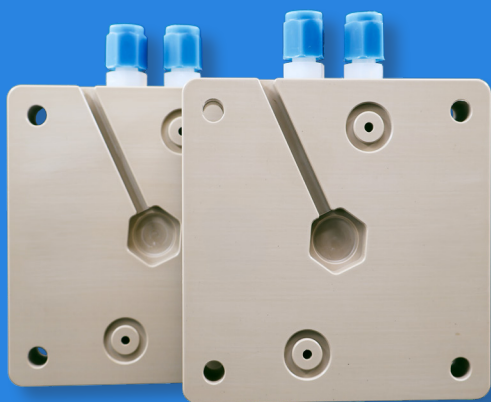
The X-Stack builds on more than a decade of redox-flow expertise to deliver a stack platform designed for maximum flexibility, precision, and reliability. Whether you are testing new electrodes, membranes, or complete cell designs, the X-Stack adapts easily to your experimental needs.

Electrode compression can be precisely tuned with exchangeable spacers. The stack can be supplied with a variety of bipolar plate materials, such as nickel, stainless steel, titanium copper, platinum coated titanium and gold coated titanium - ensuring compatibility diverse chemistries. It is designed for optimal performance, minimizing pressure losses while keeping shunt currents low.

What makes it a great choice for R&D?

- Most flexible stack for electrolysis research
- 25 cm² active area
- Flow-field or flat-plate design
- Configurable up to 9 cells
- Works with any electrode thickness or material
- Individual cell voltages can be measured directly on bipolar plate
- Accurate temperature measurement
- High chemical resistance across full pH range

Components & Configuration



Flow Bodies

Material: PEEK or PTFE

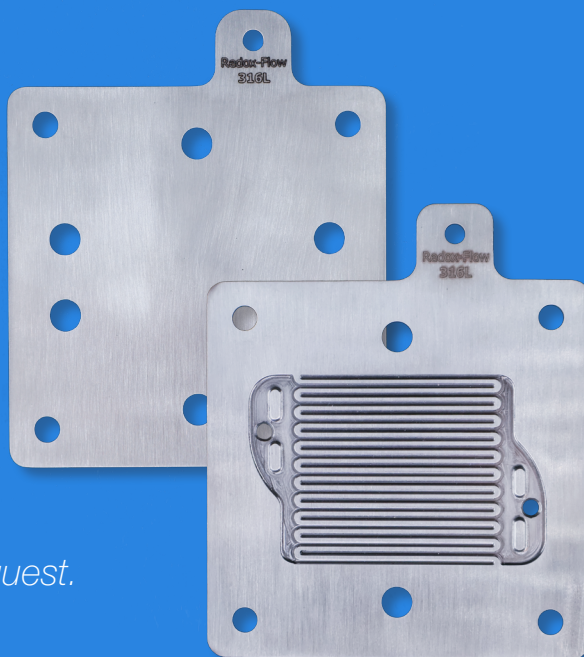
Ensures minimal contamination.

Anode and Cathode Current Collectors & Bipolar Plates

5 x 5 cm or no flow field area

Nickel, stainless steel (316L), titanium,
copper, platinum-coated titanium,
gold-coated titanium

Custom materials and dimensions on request.



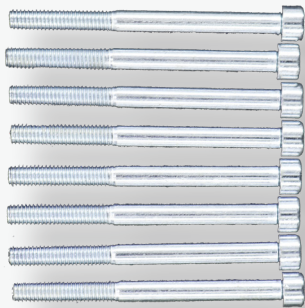
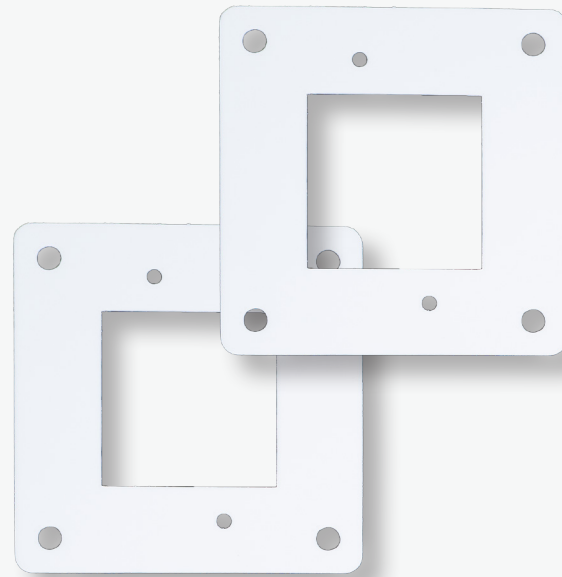


Cover gaskets

Two sets of cover gaskets per cell.

Material: VITON, EPDM, PTFE

Thickness: 0.05 mm, 0.1 mm, 0.25 mm,
0.5 mm, 1 mm

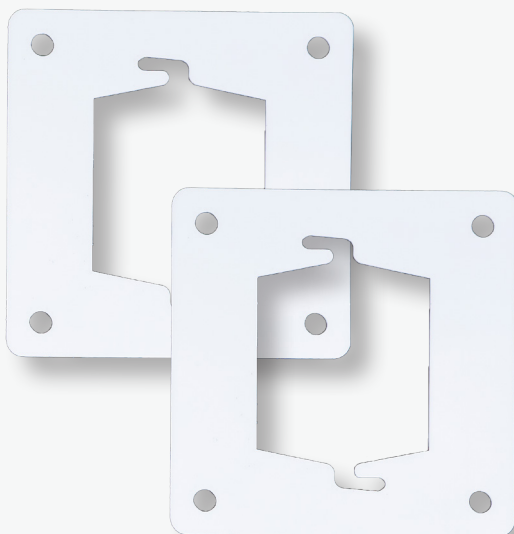


M6 Bolts

Standard: 7 cm & 8 cm
Lengths up to 18 cm available

Alignment bars

For ensuring exact cell alignment
with every reassembly



Flow field gaskets

One set per cell.

Material: VITON, EPDM, PTFE

Active area: 2.5 x 2.5 cm, 5 x 5 cm

Thickness: 0.5 mm, 1 mm, 1.5 mm, 2 mm



About the individual cells

Modular Electrolysis Cell for Versatile Flow Applications

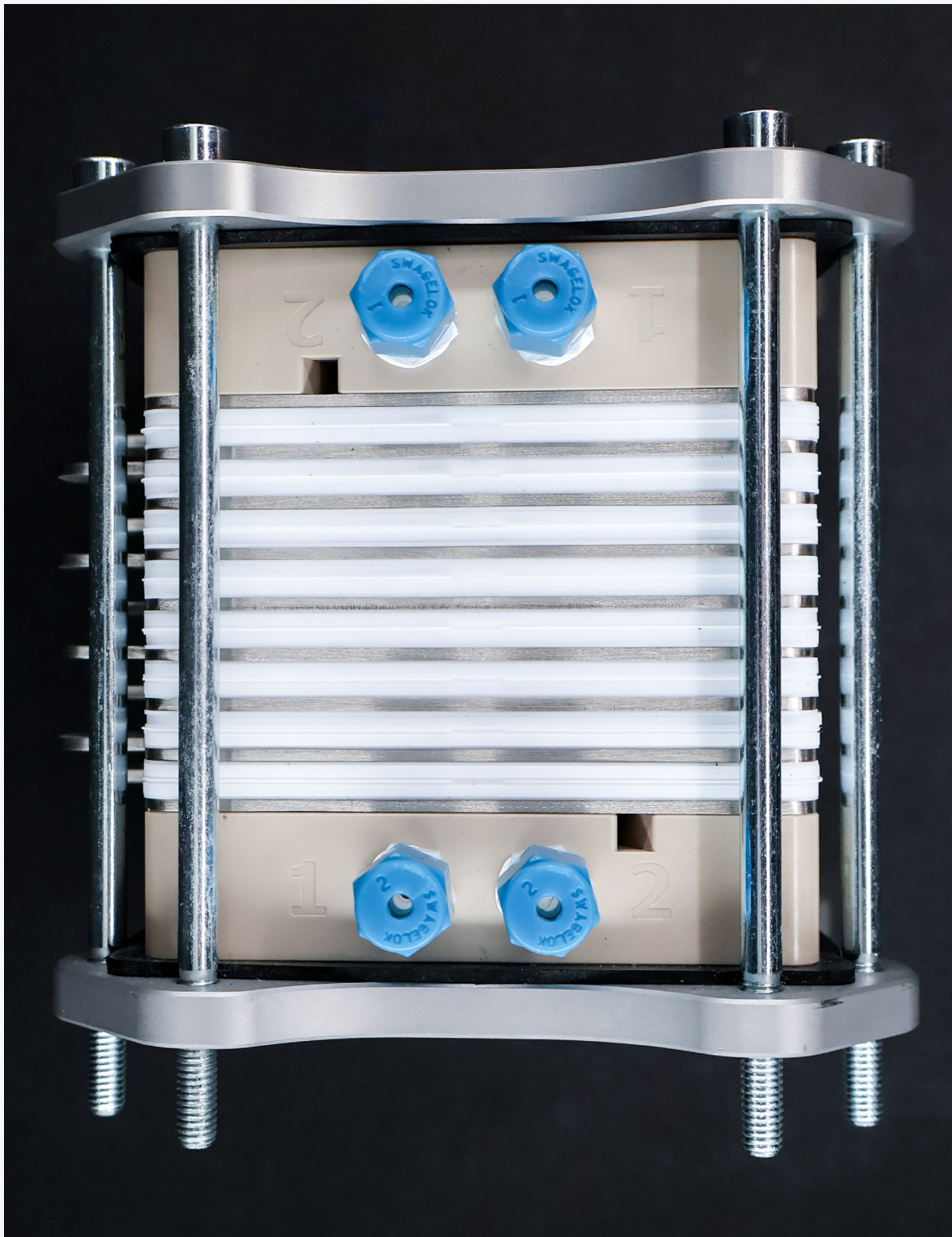
The X-Stack is a high-performance, modular electrolysis cell designed for a wide range of electrochemical applications in flow. It is especially suited for research and development where flexibility, chemical compatibility, and ease of configuration are essential. The design allows users to adapt the cell to specific experimental needs without switching platforms.

Key Features and Flexibility

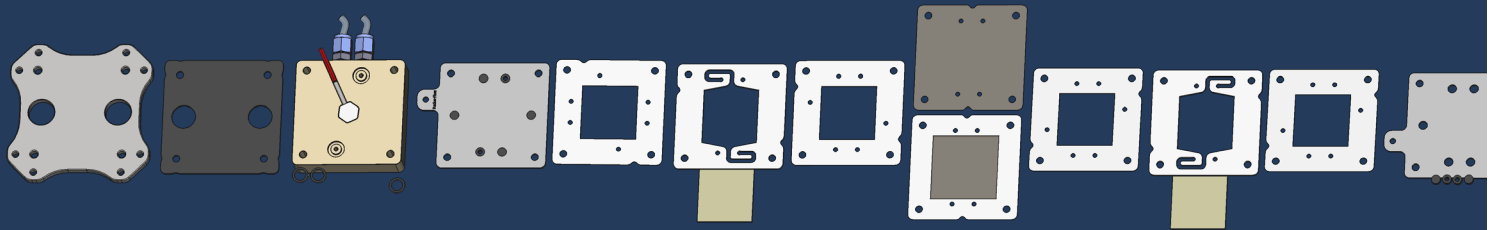
- Fully modular design with interchangeable current collectors
- Choice of flat surface or flow-field collectors, which can be combined in asymmetric configurations
- Bipolar plates in nickel, stainless steel, titanium copper, platinum-coated titanium, and gold-coated titanium
- Compatible with both ion exchange membranes and porous separators
- Operates with a wide variety of electrolytes, including acidic, neutral, alkaline and organic solvents
- Designed for high chemical resistance, minimal leaching or catalyst poisoning
- Suitable for operation at elevated temperatures up to 95°C



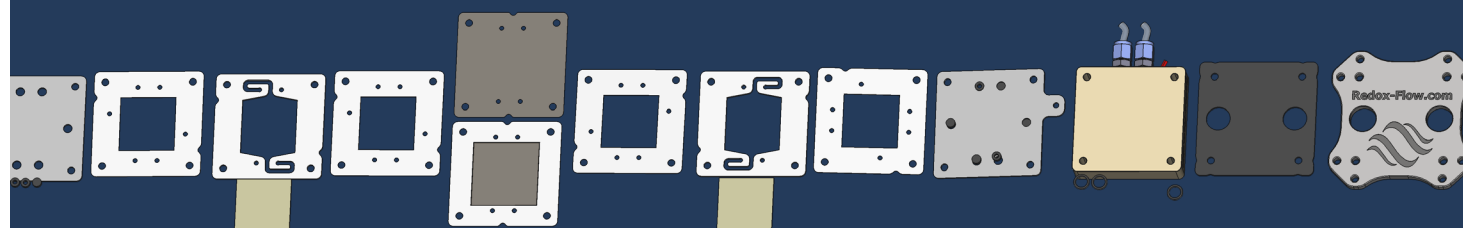
THE X-STACK



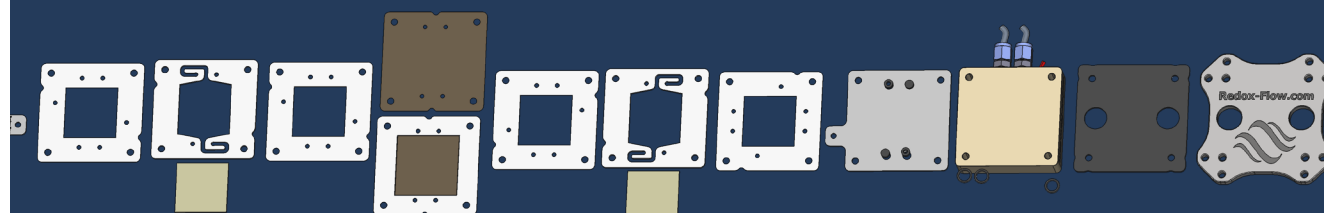
REDOX FLOW

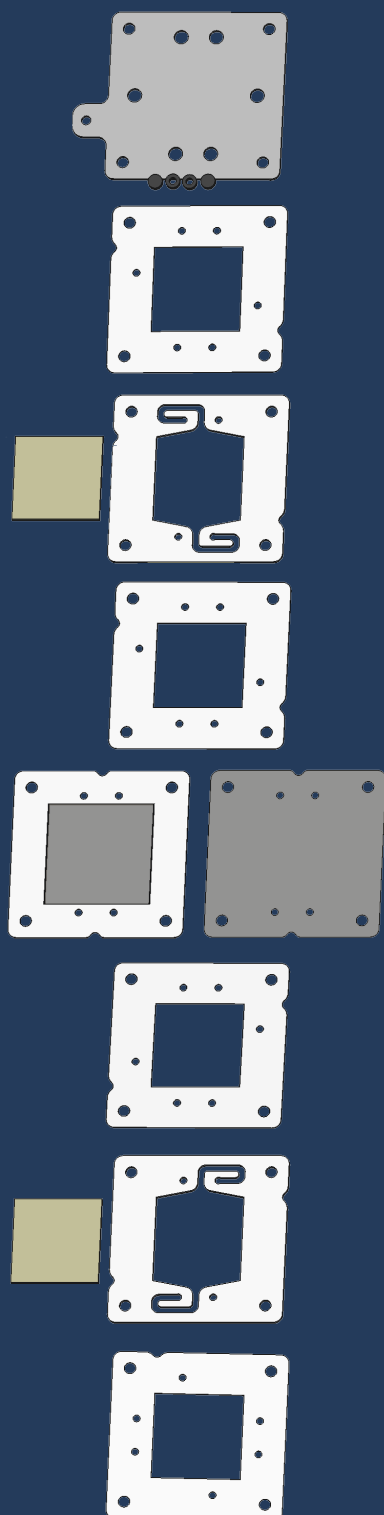


Gasket configuration with two cells
With flow field area



Gasket configuration with two cells With flat surface bipolar plates





Repeating cell structure

The stack can be configured with up to 9 cells. Each cell is built up around a membrane or separator with an electrode on each side and a bipolar plate.

The electrodes (5×5 cm) are placed within a set of gaskets, consisting of cover gaskets and a central flow-field gaskets, specifically designed for the X-Stack for best performance. Hence for each cell, 4 cover gaskets and 2 flow-field gaskets are needed. The combined thickness of the cover gaskets and flow-field gaskets on each side defines the desired compressed thickness of the electrodes.

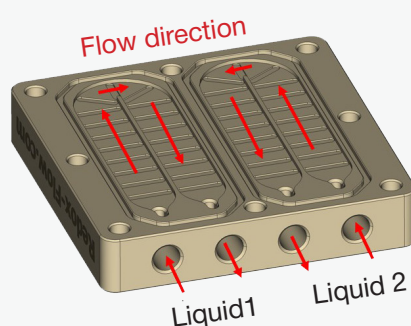


Temperature control

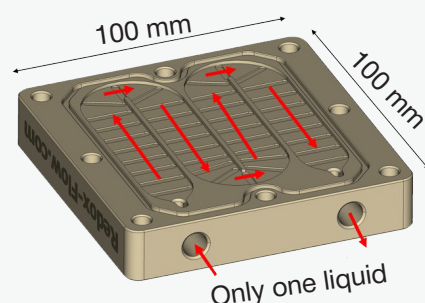
Temperature Control Unit

This system can be used in combination with a dedicated temperature control setup based on a flow heat exchanger principle. To the best of our knowledge, similar products cannot be found by any other companies in the field.

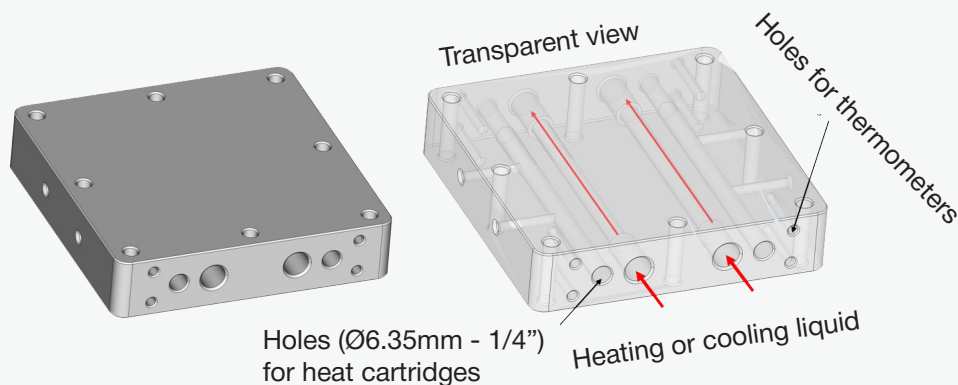
PEEK flow body variant



PEEK flow body variant 2



Metal heating/cooling block

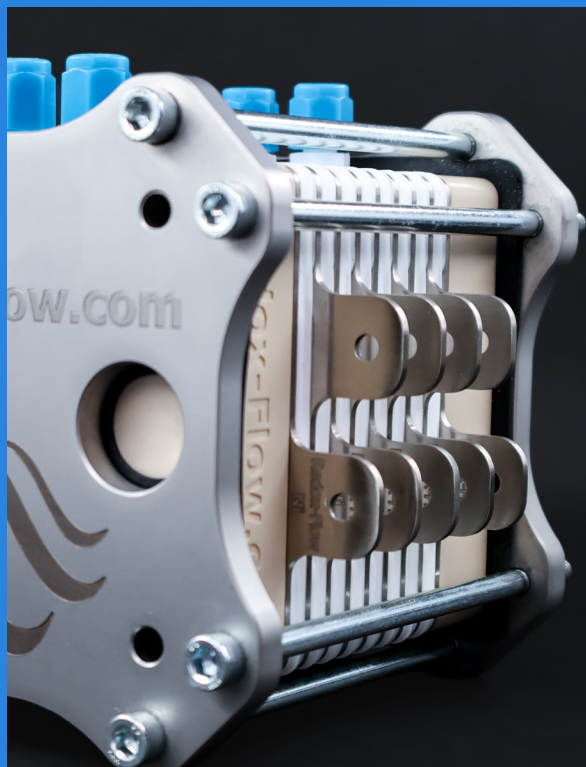


Our solution comes as three different configurations that are based on the same components and can be interchanged. All options are based on a PEEK flow body and metal block shown above. The PEEK body contains one (variant 1) or two separate (variant 2) flow chambers for heating/cooling one or two independent liquids, respectively. The liquids in the experimental setup are circulated through the PEEK flow body and placed up against a metal heating/cooling plate, whereby heat is transferred to or from the liquids in the PEEK flow body. The metal plate is separated from the liquids by a thin PTFE sheet, whereby corrosive/oxidative solutions also can be heated without corroding the metal plate.

Besides the possibility for placing the metal block on a heating plate, it also comes with holes for heat cartridges, cooling liquids, and thermometers.



Variants

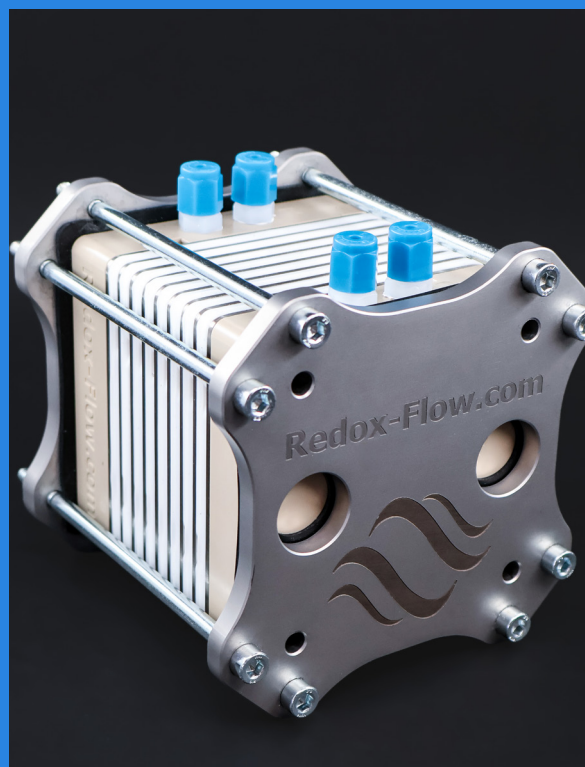


X-Stack with flat surface

The X-Stack is the result of nearly a decade of development in flow redox chemistry. Built for component testing, stack optimization, upscaling, and demonstration, it can be configured with up to nine cells. Electrodes (≥ 1 mm thickness) of any material can be used, with compression easily adjusted by spacer thickness. A wide selection of bipolar plate materials is available, such as nickel, stainless steel, titanium, copper, platinum-coated titanium, and gold-coated titanium. The stack is engineered to balance low pressure drop with minimal shunt currents, ensuring stable and efficient operation.

X-Stack with flow field

The X-Stack FF (Flow field) is a variant of the X-Stack Flat, designed with interdigitated flow fields in the bipolar plates. This enables reliable testing with very thin electrodes, while the Flat version is recommended for electrodes that are ≥ 1 mm thick. Both variants support up to nine cells and are ideal for component testing, stack property evaluation, upscaling, and demonstration.



Accessories



Inline Pressure Unit

Differential Pressure Measurement Unit.

- Compact, inline design for direct differential pressure measurement
- Monitor hydraulic resistance of electrodes with high accuracy
- Integrated temperature sensing for added diagnostics
- Built from chemically highly resistant materials



Open Circuit Voltage Cell

Reference Cell For OCV & Potential Monitoring.

- For accurate anode/cathode potential measurement
- Multifunctional design for OCV and overpotential studies
- Easy integration into existing setups with internal reference electrolyte chamber
- Durable graphite flow bodies ensure chemical resistance and stability



UV/VIS Flow Cell

UV/VIS Fiber Optical Flow-Cell.

- Adjustable optical path length (0.05–8 mm) for maximum flexibility
- Supports high flow rates (>100 ml/min) with minimal pressure loss from unique design with hydraulic bypass
- Connects with standard fiber based spectrometers using SMA 905 connectors



Flow-through electrode holder

Inline Reference Potential Measurement Unit.

- Fits a wide range of electrode diameters (3–17 mm)
- Durable, chemically resistant construction
- Measures e.g. pH, ORP, or reference potential.

Application Areas

The X-Stack supports a broad range of electrochemical processes, including:

- Alkaline water electrolysis
- PEM and AEM water electrolysis
- CO₂ electrolysis and electrochemical reduction
- Electrochemical metal recovery and refining
- Desalination and ion removal
- Organic electrosynthesis and non-aqueous systems
- Redox flow battery testing
- General-purpose electrochemical flow testing

Technical Specifications

Active Area: 25 cm² (5 cm x 5 cm)

Bipolar plates: Standard materials for current collectors: nickel, stainless steel, titanium, copper, platinum-coated titanium, gold-coated titanium

Electrode thicknesses $\geq$ 0.1 mm

Flow body made of PEEK or PTFE

With or without flow field area

Stainless steel end plates

Swagelok fittings for tight connection to 1/4" tubing

Comes ready-to-use as on pictures but without membranes and electrodes

We accommodate custom requests for active area sizes, materials for current collectors, and tubing dimension. For this, submit a request on www.redox-flow.com.

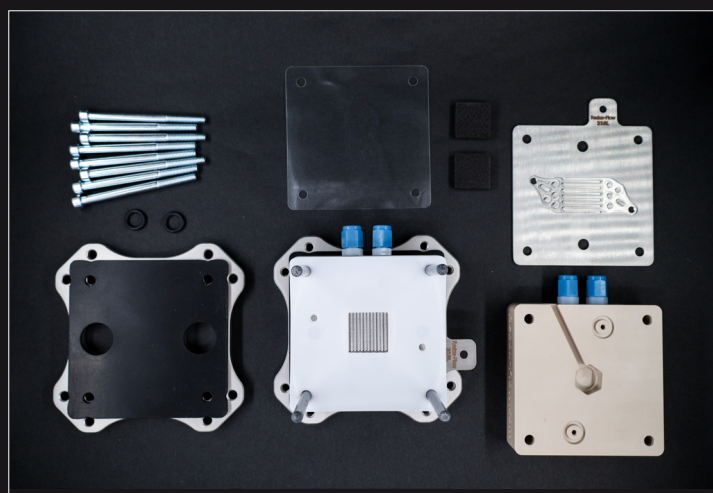
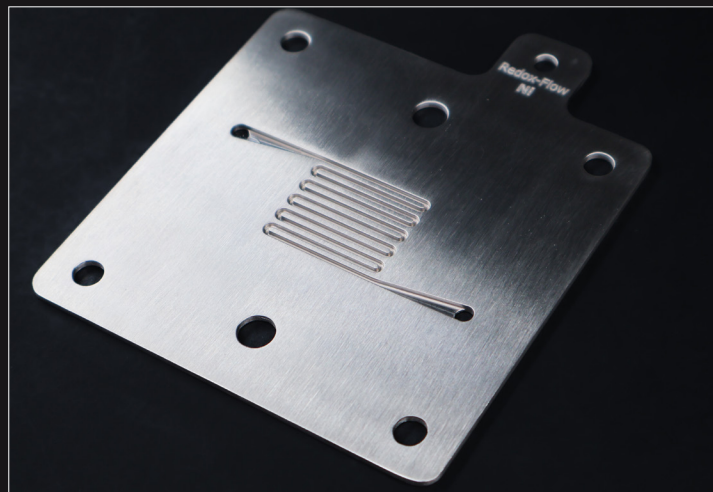


REDOX FLOW

Our Solutions

Born from PhD project that identified *the need for modular design* in flow cell R&D, we've grown in five years into a startup with *over 1,000 customers worldwide.*

WWW.REDOX-FLOW.COM





Custom

Electrochemical research is constantly evolving — and so are we. Whether you want to test a new material, explore a novel geometry, or build something entirely from scratch, we're here to help. Serpentine flow fields, BMED cell designs, custom gasket shapes — these are just a few of the projects we've taken on over the years. From small design tweaks to full custom builds, we've got you covered.

THE X-STACK

One-Stop



We sell Complete Flow Battery Setups — including the flow cell, pump, hydraulic connection pack, battery control unit, and all the fittings and gaskets needed for a classic R&D setup. Everything arrives ready to run, so you can skip the sourcing headaches and get straight to experimentation. If you're looking for an out-of-the-box solution, this is the easy choice.



Modular & Scalable

Our flow cells are built to be flexible and upgradeable. Parts are compatible across our entire cell range, so switching to a completely different chemistry is as simple as swapping a few components — no need for a new cell. Assembly and disassembly are equally straightforward, giving you the freedom to experiment as your research demands. Add extra parts to upgrade a single cell into a stack, or order replacement flow bodies and gaskets for electrode and membrane testing. One cell really can do a lot.

REDOX FLOW

Redox Flow[®] Family

X-Stack

X-Cell

X-Cell with ports for
reference electrodes

S-Stack

A-Cell

S-Cell

M-Cell



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Any questions?
We're happy to hear from you.



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