

SEBRO™

Semi-Batch Reverse Osmosis

Low-energy desalination of feeds up to 25,000 mg/L TDS

OVERVIEW

SEBRO (Semi-Batch Reverse Osmosis) treats brackish water, treated effluent, and other feeds up to 25,000 mg/L TDS. Cyclic pressurization tracks the rising osmotic pressure of the feed, reducing specific energy relative to constant-pressure operation, and delivers a stable concentrate to SAMRO.

KEY FEATURES

Semi-batch pressurization

Applied pressure tracks feed osmotic pressure through each cycle.

Fouling resistance

Time-variant flux and pressure across the membrane surface.

Stable concentrate

Consistent feed quality to downstream SAMRO stages.

TYPICAL APPLICATIONS

- Brackish water desalination
- Treated municipal effluent reuse
- Front end of ZLD and resource recovery trains
- Variable and fouling-prone dilute feeds

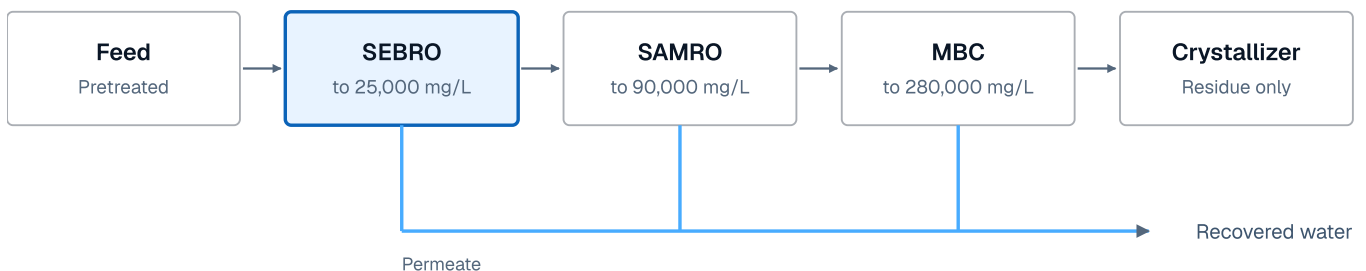
SPECIFICATIONS

Feed salinity	≤ 25,000 mg/L TDS
Operation	Cyclic semi-batch pressurization
Flux and pressure	Time-variant, tracking feed osmotic pressure
Typical feeds	Brackish water and treated effluent
Membrane equipment	Standard spiral-wound elements and pressure vessels
Position in train	First stage on dilute feeds
Downstream process	SAMRO

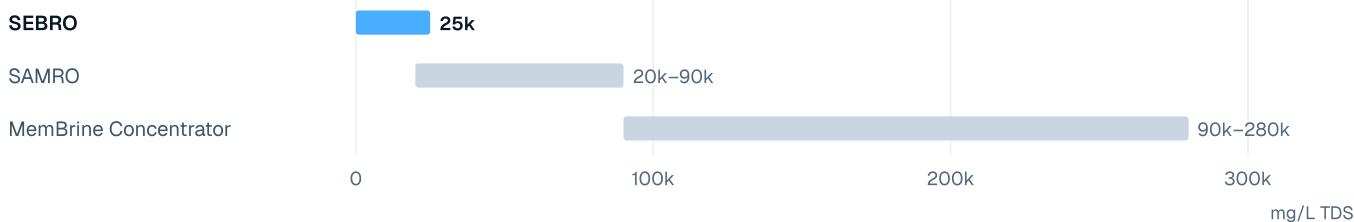
SCOPE OF SUPPLY

- Process design, mass balance, and design basis
- Membrane skids with high-pressure pumps and energy recovery devices, as required
- Instrumentation, control system, and control philosophy
- Factory acceptance testing
- Commissioning, performance testing, and operator training
- Operations support and service

POSITION IN AN OSMOSYS TREATMENT TRAIN

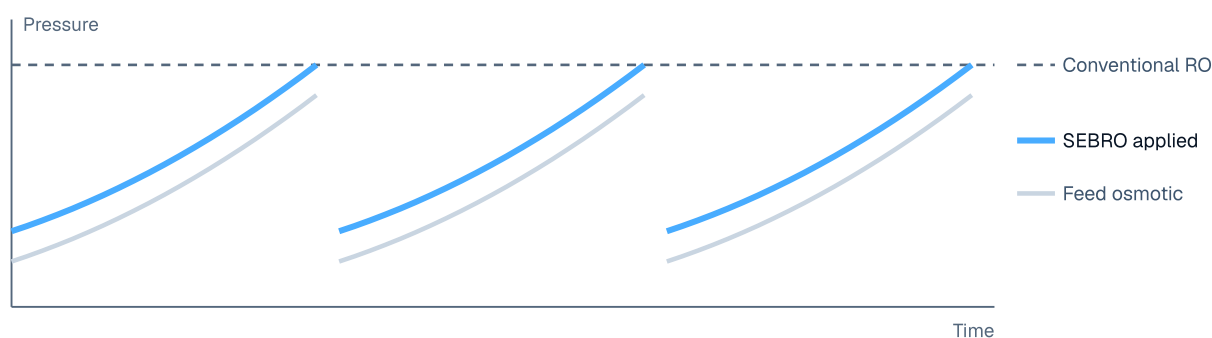


PLATFORM OPERATING ENVELOPES



OPERATING PRINCIPLE

Applied pressure rises with the osmotic pressure of the feed through each cycle. Conventional reverse osmosis operates at a constant pressure set by the final concentrate.



Schematic; not to scale.

PLATFORM SPECIFICATION

Process	Operating range, mg/L TDS	Specific energy	Role in the train
SEBRO	≤ 25,000	Feed-dependent	First stage on dilute feeds
SAMRO	20,000 → 90,000	0.48 kWh/m ³ on seawater	High-recovery desalination
MBC	90,000 → 220,000–280,000	5–12 kWh/m ³	Brine concentration
Thermal evaporation	≥ 90,000	25–60 kWh/m ³	Conventional alternative

DATA REQUIRED FOR A FEASIBILITY ASSESSMENT

- ☐ Design flow rate and expected variability
- ☐ Full ionic analysis, including silica
- ☐ TDS, pH, and temperature range
- ☐ Suspended solids, SDI, and turbidity
- ☐ Organics: TOC, COD, and oil and grease where present
- ☐ Target recovery, concentrate strength, or discharge limit
- ☐ Site utilities and footprint constraints

ENGAGEMENT

01 Feasibility

Flow, full chemistry, variability, and the treatment objective, compared with the incumbent disposal or thermal route.

02 Pilot

Bench and pilot testing on site water to establish recovery, energy, pretreatment, and achievable concentration.

03 Design and supply

Process design, P&IDs, and control philosophy, with supply of the membrane stages or the complete packaged system.

04 Commissioning and operation

Performance testing against the design basis, operator training, and long-term operating support.