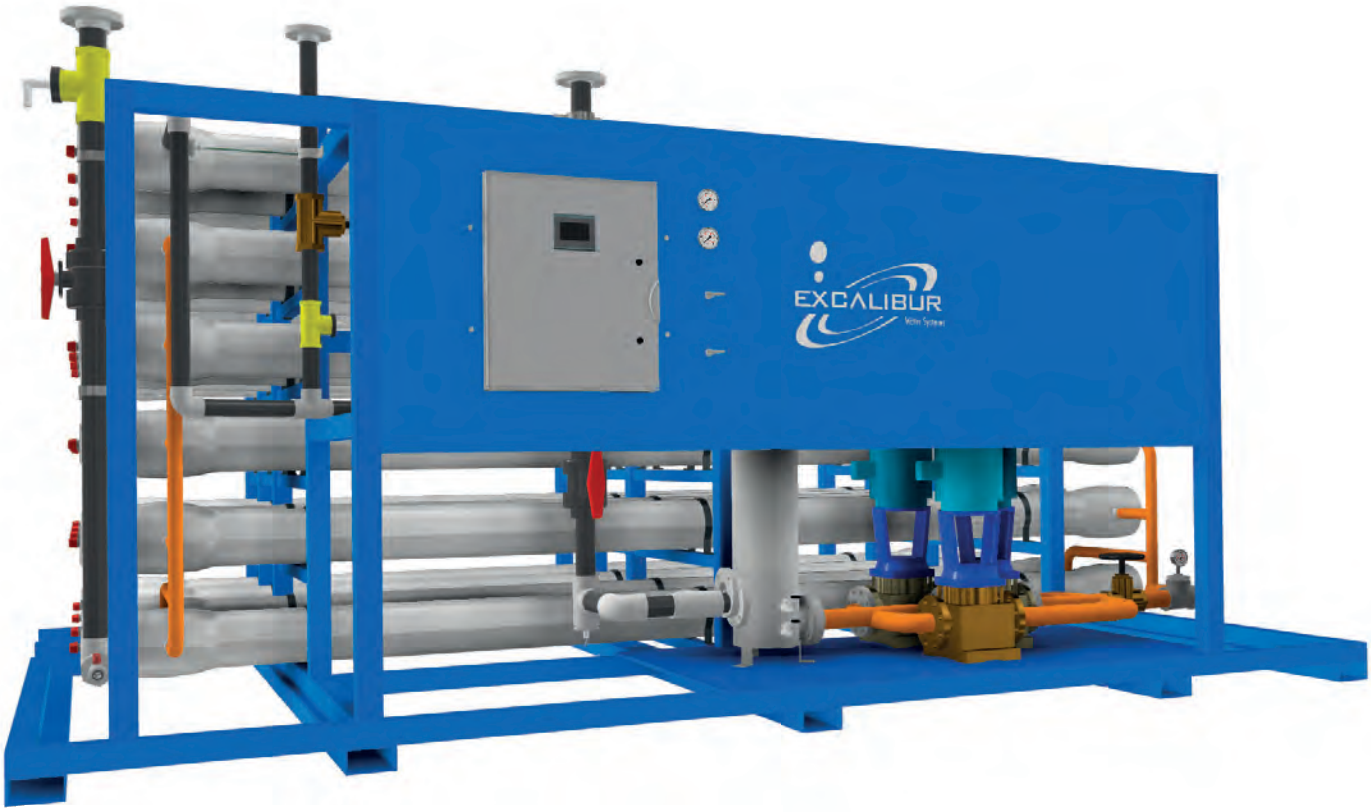
INTELLIGENT INDUSTRIAL **REVERSE OSMOSIS SYSTEMS**



When performance & value matters.

EXCALIBUR
Water Systems

INTELLIGENT INDUSTRIAL REVERSE OSMOSIS SYSTEMS

SCAN ME

How Do You Size an Industrial Reverse Osmosis System?

Use the free industrial reverse osmosis calculator at **excaliburwater.com** to calculate your needs.

What is Reverse Osmosis?

Reverse Osmosis (RO) is a unique process of filtration that utilizes a semipermeable thin film composite membrane with perforations small enough to allow pure water to flow through while preventing larger molecules (i.e., dissolved salts/ions) to pass.

RO Applications for Industry

Industrial Reverse Osmosis Water Systems are typically used for:

- boiler feed/makeup water
- laboratories
- manufacturing process water
- chemical process water
- pharmaceutics
- photographic processing
- printing
- metal finishing
- electronics
- horticulture
- vehicle washes
- food and beverage processing
- cosmetics
- drinking water
- humidification
- ice making
- cooling tower
- desalination

The installation of an Excalibur Water Systems Reverse Osmosis system will be of benefit to all of your industrial applications.

Industrial Reverse Osmosis Water System Performance Factors

1. **Pressure** – in order to overcome the natural osmotic pressure, a minimum threshold of pressure must initially be reached. The rate at which the membrane produces product water (flux) increases as pressure is increased. A practical limit exists because salt rejection does not continually improve as pressure increases. There can be scaling or fouling problems as a result.

2. **Temperature** – membrane flux is heavily dependent on temperature. As temperature increases and pressure remains constant, water production increases. Higher temperatures can also result in an unfortunate drop-off in salt rejection due to an increase in diffusion rate for salt ions through the membrane. RO membranes are volume rated at 77°F.

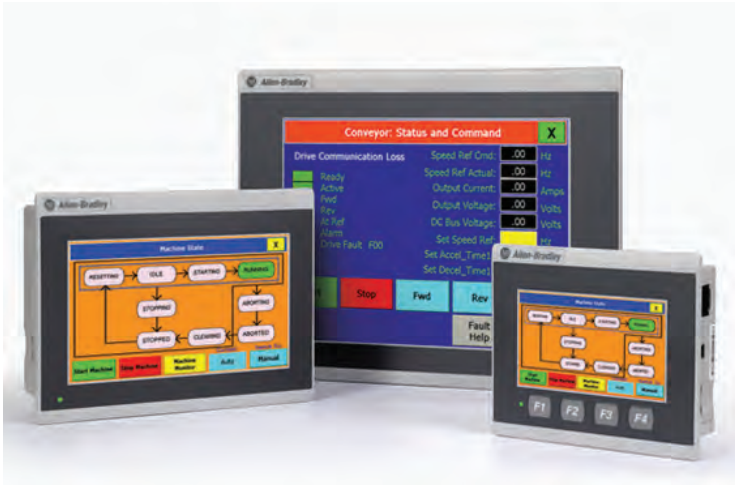
3. **Recovery** – the percent of feed water converted to the product water. A functional limit exists for the recovery rate – too high of a rate requires a more concentrated waste stream. This increases the likelihood of membrane fouling as salt accumulates and creates scale on the membrane surface.

4. **Pre-treatment/Post-treatment** – additional water treatment steps needed either before or after the RO process vary, depending quality requirements and water conditions. If raw water contains iron, chlorine, turbidity, hardness and high total dissolved solids, then pre-treatment should be considered to improve system performance, extending membrane life. Post-treatment steps should be considered if water quality requirements require purified or sterilized water.

5. **Recycle** – the process of recycling waste water back through the RO to increase efficiency and reduce waste water, improving efficiency up to 75 percent.

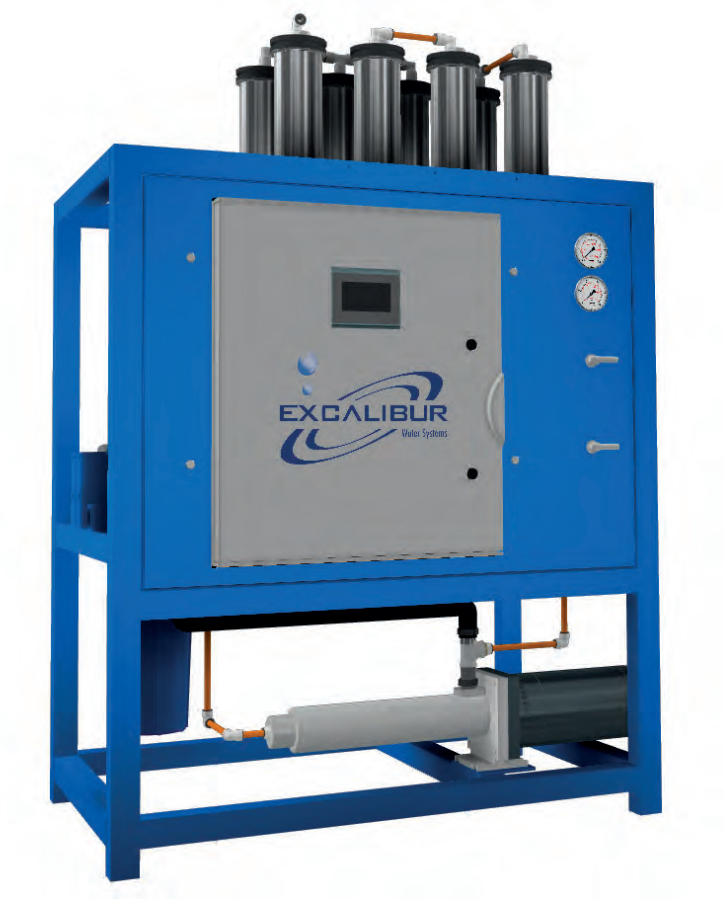
MICRO850 PLC – INTELLIGENT REVERSE OSMOSIS SYSTEMS

Features & Benefits



- 24V DC power supply requirement w/ optional 240V AC power adapter
- 4.3in LED full color touch display (480 x 272p) w/ four tactile function keys human machine interface (HMI) included for operator controllability (24 VDC)
- 7.0in & 10.4in LED touch displays (800 x 480p / 800 x 600p) w/ out tactile function keys available
- Memory storage capability of up to 20,000 commands, can add multiple audible alarms, indicator lights for running status, faults, specific process commands etc. to compliment or modify base RO System function programming
- Login/Logout access provided upon request from Excalibur if a sensor setpoint or input must be changed by the operator, otherwise settings are locked out for safety purposes
- Display operating hours on HMI
- Communication ports: USB 2.0 (non-isolated) RS232/RS485 non-isolated combo serial 10/100 Base T Ethernet port (RJ-45) - Unit can be connected to 3rd party devices and building management systems
- Operational Temperature Range: -20° to 65°C (-4° to 149°F)
- 24 Input/Outputs (14 Input Channels/10 Output Channels) All Digital
- 8 Analog inputs enabled through plug-in modules to support pH sensors, conductivity sensors, flow sensors, tank level sensors relaying information to the unit and allowing it to display readings on the HMI
- 1 pH sensor, 2 conductivity sensors, 3 flow sensors (Inlet/Permeate/Waste), 1-2 tank level sensors
- Low tank level detection automatically triggers system operation (if not already operating), high tank level detection triggers system standby
- Fault detection program included for pH levels, Feed TDS levels, Permeate TDS levels, and high/low pressure conditions. The Micro850 stops the system when these are detected and will attempt to return to operation 3 times before locking out and requiring a physical reset by the operator.
- Manual bypass for pH, Feed/Permeate TDS, and high/low pressure sensors + faults included in program for troubleshooting/maintenance purposes
- Inlet valve solenoid and motor control tied to Micro850 for safety; if any faults are detected the controller will shut these off.
- Auto-flush built into program requiring no manual input from an operator
- Visual operational status of motor, inlet valve, and bypass valve is viewable from the HMI along with TDS levels for both Feed and Permeate updating continuously every second on a digital graph
- Inputs from sensors allow for volume recovery %, rejection %, concentration factor, and flux to be displayed on the HMI

SFCP SERIES INDUSTRIAL REVERSE OSMOSIS SPECIFICATIONS



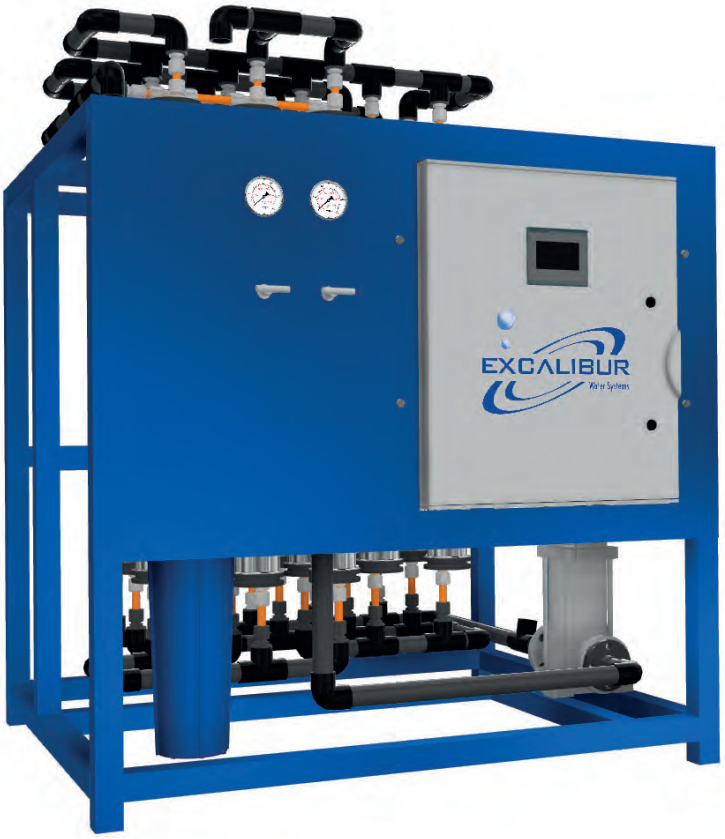
- Flow rates up to 9 USGPM
- Salt rejection rate over 99% NSF
- 75% permeate recovery from feed water supply
- Low pressure 4”x40” TFC membranes
- Blue powder coated steel frame
- Inlet solenoid valve pre-treatment lockout
- Horizontal centrifugal booster pump
- Pre-filtration 5 micron turbidity
- Hall effect electronic flow meters LED displays
- TDS and pH sensor monitoring and display
- Performance data engineering WAVE calculations
- Product divert flush
- Programmable auto flush
- CSA / ESA / UL Certifications

Excalibur SFCP-Series Industrial Reverse Osmosis Systems

MODEL	PERMEATE		FEED		CONCENTRATE		Recirculation Flow (GPM)	Membrane Quantity	VESSEL		ELECTRICAL REQUIREMENTS				WEIGHT (LBS)	SPACE REQUIRED (in)		
	Flow (GPM)	Line Size (inch)	Flow (GPM)	Line Size (inch)	Flow (GPM)	Line Size (inch)			Qty	Array	Voltage	Phase	Max Load Amperes	Pump (HP)		L	W	H
RO SFCP4	4.4	0.50	5.9	0.75	1.5	0.50	9.0	4	4	2:1:1	230	3	5.2	1.5	280	44	30	52
RO SFCP5	5.5	0.50	7.3	0.75	1.8	0.50	7.0	5	5	2:2:1	230	3	5.2	1.5	330	44	30	52
RO SFCP6	6.6	0.75	8.8	1.00	2.2	0.75	10.0	6	6	3:2:1	230	3	5.2	1.5	430	44	30	52
RO SFCP8	8.8	0.75	12.0	1.00	2.2	0.75	7.0	8	8	2:2:1:1:1:1	230	3	5.2	1.5	630	44	30	52

Recirculation flow and waste flow rates given are nominal and can change by changing inlet water properties.

SFCP SERIES INDUSTRIAL REVERSE OSMOSIS SPECIFICATIONS



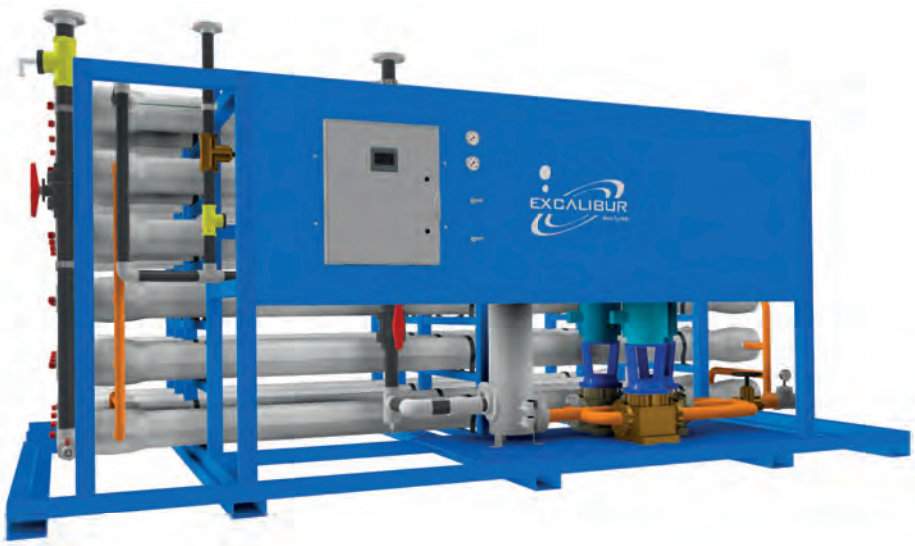
- Flow rates up to 18 USGPM
- Salt rejection rate over 99% NSF
- 75% permeate recovery from feed water supply
- Low pressure 4”x40” TFC membranes
- Blue powder coated steel frame
- Inlet solenoid valve pre-treatment lockout
- Vertical multi stage booster pump
- Pre-filtration 5 micron turbidity
- Hall effect electronic flow meters LED displays
- TDS and pH sensor monitoring and display
- Performance data engineering WAVE calculations
- Product divert flush
- Programmable auto flush
- CSA / ESA / UL Certifications

Excalibur SFCP-Series Industrial Reverse Osmosis Systems

MODEL	PERMEATE		FEED		CONCENTRATE		Recirculation Flow (GPM)	Membrane Quantity	VESSEL		ELECTRICAL REQUIREMENTS				WEIGHT (LBS)	SPACE REQUIRED (ft)		
	Flow (GPM)	Line Size (inch)	Flow (GPM)	Line Size (inch)	Flow (GPM)	Line Size (inch)			Qty	Array	Voltage	Phase	Max Load Amperes	Pump (HP)		L	W	H
RO SFCP14	15.0	1.00	20.0	1.25	5.0	1.00	8.0	14	14	4:3:3:2:2	460	3	4.8	3	930	52	46	52
RO SFCP18	18.0	1.00	24.0	1.25	6.0	1.00	14.0	18	18	5:4:4:3:2	460	3	7.6	5	1430	52	46	52

Recirculation flow and waste flow rates given are nominal and can change by changing inlet water properties.

SFINP SERIES INDUSTRIAL REVERSE OSMOSIS SPECIFICATIONS



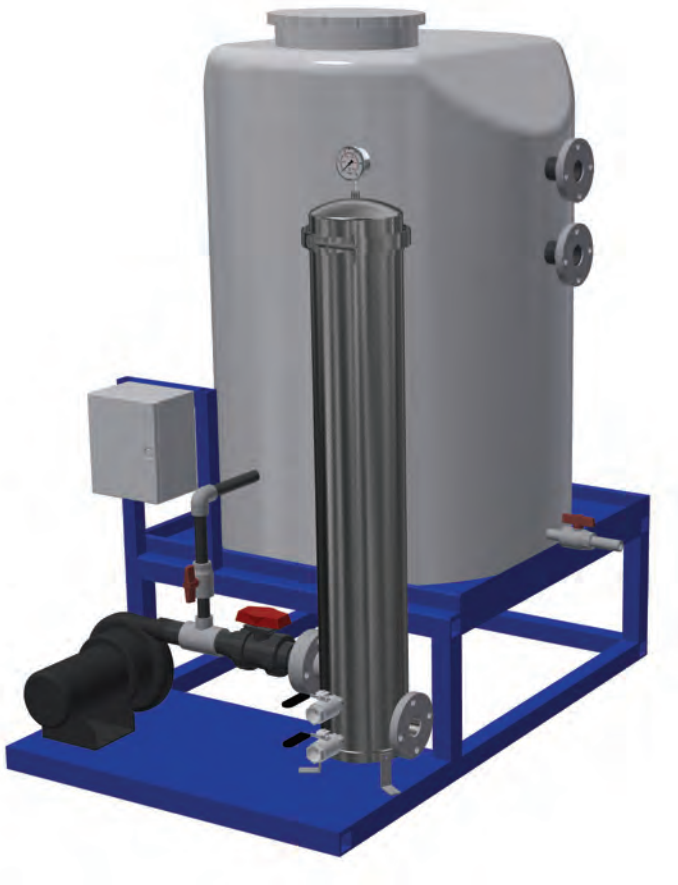
- Flow rates up to 430 USGPM
- Salt rejection rate over 99% NSF
- 5% permeate recovery from feed water supply
- Low pressure 8”x40” TFC membranes
- Blue powder coated steel frame
- Inlet diaphragm valve pre-treatment lockout
- Vertical multi stage booster pump(s)
- Pre-filtration 5 micron turbidity
- Hall effect electronic flow meters LED displays
- TDS and pH sensor monitoring and display
- Performance data engineering WAVE calculations
- Product divert flush
- Programmable auto flush
- CSA / ESA / UL Certifications

Excalibur SFINP-Series Industrial Reverse Osmosis Systems

MODEL	PERMEATE		FEED		CONCEN-TRATE		Recircula-tion Flow (GPM)	Mem-brane Quan-tity	VESSEL		ELECTRICAL REQUIREMENTS				WEIGHT (LBS)	SPACE REQUIRED (ft)		
	Flow (GPM)	Line Size (inch)	Flow (GPM)	Line Size (inch)	Flow (GPM)	Line Size (inch)			Qty	Array	Voltage	Phase	Max Load Amperes	Pump (HP)		L	W	H
RO SFINP6	30	1.5	40	2.0	10	1.0	20	6	2	1:1	575	3	9	7.5	2,530	13	5	8
RO SFINP9	45	2.0	60	2.0	15	1.0	40	9	3	2:1	575	3	11	10	2,780	13	5	8
RO SFINP12	60	2.0	80	2.0	20	1.5	20	12	4	2:1:1	575	3	11	10	3,030	13	5	8
RO SFINP18	90	3.0	120	3.0	30	1.5	20	18	6	3:2:1	575	3	17	15	3,530	13	5	8
RO SFINP28	125	3.0	167	3.0	42	1.5	25	28	7	4:2:1	575	3	34	15x2	4,530	17	6.5	8
RO SFINP32	160	3.0	224	4.0	64	2.0	10	32	8	4:3:1	575	3	34	15x2	4,730	17	6.5	8
RO SFINP48	215	4.0	287	4.0	72	2.0	40	48	12	6:4:2	575	3	34	15x2	6,530	17	6.5	8
RO SFINP72	325	5.0	433	5.0	108	3.0	60	72	18	10:5:3	575	3	51	15x3	7,530	17	9.5	8
RO SFINP96	430	5.0	574	6.0	144	3.0	20	96	24	12:8:4	575	3	81	25x3	9,030	17	11.5	8

Recirculation flow and waste flow rates given are nominal and can change by changing inlet water properties.
Contact Excalibur for flow rates higher than 430 GPM.

EXCALIBUR REVERSE OSMOSIS CLEAN IN PLACE (CIP)



- System designed to deliver longer membrane life
- Membranes flushed prior to being put back into service
- Clean In Place is designed for Specific Reverse Osmosis model
- Remove membrane deposits hence cures high pressure drops between feed and concentrate ports, low permeate flow, membrane fouling and low
  salt rejection
- Process does not need any disassembly
- Remote skid mounted system can be used for multiple units
- Filtered RO permeate is used for mixing chemical and recirculating in membranes
- Electric pump with flow control makes the system to adopt various size RO Systems
- Storage tank with labelled flange connections and drain port with ball valve

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