

REVERSE OSMOSIS SYSTEM

DOUBLE PASS REVERSE OSMOSIS SYSTEM

System Features and Functional Highlights

The PRIME 6,000 x 4,000 GPD-DP Series is designed with advanced features that enhance performance, monitoring, and water efficiency for dialysis-grade water treatment. Below are the key system components and capabilities:

PLC-Based Control System: Equipped with a Programmable Logic Controller (PLC) for precise and efficient system management.

Individual Membrane Monitoring: Each RO membrane includes a dedicated in-line flow meter to allow real-time monitoring of product flow.

Flexible RO Membrane Configuration: Supports variable membrane configurations, including parallel and parallel-series setups, allowing adaptability to operational demands.

Comprehensive Pre-Filtration Monitoring: Integrated pressure gauges and sampling ports at each pre-filter stage enable accurate diagnostics and quality control.

Manual RO Membrane Flushing: Manual flushing function post-operation helps extend membrane life and maintain optimal performance.

Automated Water Recycling: Automatically recycles RO 2 reject water back to the raw water tank, significantly improving water use efficiency.

Integrated Flushing & Declogging Line: Built-in lines facilitate RO membrane flushing and declogging for simplified maintenance and consistent output.

Variable Reflux System: Enables reflux control, allowing a portion of the reject water to be recirculated back into the feed for improved processing.

Advanced RO 2 Reflux System: Allows a portion of RO 2 reject to be returned to the raw holding tank to dilute the raw water. The system includes a manual option to divert this to the RO 1 holding tank. Once both tanks are full, flow is automatically diverted to the reject line to prevent overflow.

4040 RO Membranes

Individual Valve Control

Individual Flow Meter

High Pressure Pump



Description

PRIME 6k x 4k DP Series

The PRIME 6,000 x 4,000 GPD-DP Series is a locally manufactured and assembled water treatment system specifically designed for dialysis use. Built with versatility in mind, the system allows end-users to configure and program settings tailored to their operational requirements—delivering both functionality and convenience.

At the core of the system is a Schneider TM221CE24R Programmable Logic Controller (PLC), ensuring efficient and reliable control of the entire treatment process.

At RC PRIME, we are committed to innovation and continuous improvement. Our systems are developed with an emphasis on ergonomic design, quality, and affordability, positioning them to compete with international brands.

Safety and compliance remain our top priorities. The system is designed to fully comply with AAMI Water Quality Standards and the regulatory guidelines of the Department of Health (DOH), ensuring it meets the highest standards for dialysis applications.



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REVERSE OSMOSIS SYSTEM

6,000 X 4,000 GPD RO SYSTEM



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Control System

Main Controller : Using PLC Module

Low and High-Water Level Sensors : A float switch controls the systems operation as part of the interlocking components.

Raw Water Input Control : A 220 VAC solenoid valve that controls the incoming raw water. Equipped with a by-pass ball valve in case the solenoid is faulty.

Drain Control Valve : Controls the flow of the drain line when backwashing is interrupted due to lack of raw water supply. This prevents the continuous flow of water by gravity while filling up the raw tank.

Low- and High-Pressure Switch : Yes, using a digital pressure controller for a more sensitive and accurate response.

Auto and Manual Switches : Yes, every stage has its own auto and manual switches with the corresponding indicator lamp which motor is running. These include overload indicators.

Back Up System (Automatic) : Yes. Pumps are controlled by a 24-hour timer that switches automatically triggered every 1-hour (default settings).

Back Up System (Manual) : Yes, can be manually triggered in the event of failure of the main pumps.

RO Inlet Pressure Gauge (Oil) : 0-350 PSI

Concentrate Pressure Gauge (Oil) : 0-350 PSI

RO Pre Filter Pressure Gauge (Oil) : 0-100 PSI

Conductivity Meter (Feed) : PPM/ uS/cm

Conductivity Meter (Product) : PPM/ uS/cm

Conductivity Meter (Return/Loop) : PPM/ uS/cm

Low- and High-Pressure Alarm : 14 mm Pilot Lamp

Emergency Stop Switch : Yes, Manually Pressed during Emergency

Auto Flushing : Yes, with 14 mm Pilot Lamp Indicator

RO Pump on Delay : Yes, with 14 mm Pilot Lamp Indicator

Recirculation Mode : Yes, Manually Triggered during night mode (Optional)

RO Pressure Alarm off Delay : Yes, (When High Pressure Is detected)



Pre Treatment System

Feed Pump with Pressure Controller (with Back up Pump) : Horizontal Pump

Rated Power: 1.5 kW, 2 hp, Single/Three Phase, 220/240 VAC, Q: 4 m³/h

Multi-Media Filter : 16 X 65" FRP Tank (PENTAIR/CANATURE), 2.5 Inches Base

Carbon Filter (2 Units) : 16" X 65" FRP Tank (PENTAIR/CANATURE), 2.5 Inches Base

Water Softener : 16" X 65" FRP Tank (PENTAIR/CANATURE), 2.5 Inches Base

Backwashing Release Valve : Yes, automatically triggered when backwashing is activated. This prevents high pressure build up at the FRP Control Head to avoid gear displacement of head controller.

Brine Tank : 200 Liters PVC Tank

Pressure Gauges and Sampling Outlets : Equipped with pressure gauges every after stage with corresponding sampling port.

Storage and Distribution Module

RAW Water Holding Tank (Blue) : 1,000 Liters PE Tank w/ 304 S/S Frame

Permeate Holding Tank 1st Pass : 1,050 Liters Polyethylene Storage Tank

Permeate Holding Tank (White) : 1,050 Liters Polyethylene Storage Tank

Distribution Pump with back up : 2 Units, Horizontal Pump, 1.1 kW, 1.5 hp, Single Phase, 220/240 VAC

Recirculation System : **Rated Power:** Solenoid Ball Valve (220 Vdc) with By-pass Valve and manually triggered during night shift. Programmable 24-hour timer.

UV System Distribution Side : 1 Unit 6 GPM UV Water Sterilizer

Sediment Filter with Housing (Pre UV) : 1 Unit SL 20 Sediment Filter with Housing

UF Filter with Housing : 0.2 Micron Bacteria Filter 2.5" x 20" Clear Housing

Piping and Fittings : Grey Pipe and Fittings Scheduled 40



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Core Control & Monitoring

- PLC Control: Schneider TM221C24R Series Programmable Logic Controller
- Visual Monitoring: Real-time system status display
- Digital TDS/Conductivity Meters: For raw and product water quality monitoring

Filtration & Purification System

- **Sediment Filters:**
 - 10" Slim 5 Micron Pre-RO Sediment Filter
 - 10" Slim 0.22 Micron Bacteria Filter
 - **RO Membrane:**
 - ULP 4021 Membrane with 90% rejection rate
 - Average Permeate: 4–5 LPM
 - Capacity: 600–800 GPD (conservative)
 - **Carbon & Softening:**
 - 8 x 44 FRP Carbon Filter
 - 8 x 44 FRP Water Softener
 - **UV System:** 1 GPM Ultraviolet Disinfection
- #### Mechanical Components
- **Pump:** 1.5 HP Horizontal Pump, 5 Impellers
 - **Storage:** 3.2-Gallon RO Water Pressurized Tank
 - **Distribution:**
 - RO Loop System
 - 4 HD Machine Outlets
 - Recirculating System for consistent flow
 - **Valves & Safety:**
 - Low and High Pressure Switches
 - Feed Water Release Valve
 - Auto-Flushing Function to extend membrane life

Key Advantages

- Automated, user-friendly operation
- Real-time maintenance alerts for consumables
- Compact and portable design
- Designed for stable pressure and reliable water quality
- Fully compliant with AAMI and Department of Health standards

Key Components and System Features

Control and Monitoring

Main Controller – Central processing unit for managing system functions

Auto and Manual Mode Switch – Enables selection between automatic and manual operations

Visual Indicators – LED/LCD indicators for system status and alerts
Sensor and Safety Mechanisms

Low and High Water Level Sensors – Ensures proper water level management in tanks

Low and High Pressure Switches – Protects system from operating under unsafe pressure conditions

Flow and Pressure Management

Raw Water Input Control – Regulates incoming water supply

Drain Control Valve – Controls discharge and flushing cycles

RO Inlet Pressure Gauge (Oil-Filled) – Monitors pressure before RO membrane

Concentrate Pressure Gauge (Oil-Filled) – Measures pressure of reject stream

RO Pre-Filter Pressure Gauge (Oil-Filled) – Assesses pre-filter loading and performance

Conductivity Monitoring

Conductivity Meter (Feed Water) – Monitors input water quality

Conductivity Meter (Product Water) – Ensures treated water meets quality standards

Conductivity Meter (Return/Loop Water) – Tracks water quality in the distribution loop

System Redundancy and Backup

Automatic Backup System – Provides uninterrupted operation in case of primary system failure

Manual Backup System – Allows manual override and operation during system faults

Additional Controls

Temperature Control – Monitors and regulates water temperature to maintain optimal system performance



Control and Safety Features of PRIME 6,000 x 4,000 GPD-DP Series Water Treatment System

- Control Module
- PLC Controller: Utilizes Schneider TM221 PLC Module for intelligent automation and system control.
- Float Switches: Interlocked with the PLC to automatically manage water levels in all tanks.
- Valve and Water Input Control
- Electronic Solenoid Valves: Automatically manage incoming water, interlocked with level sensors for responsive operation.
- Manual Bypass Valve: Allows manual control in case of solenoid valve malfunction.
- Safety Control Valve: Prevents accidental drainage of water during raw water tank refilling.
- Pressure Monitoring and Safety
- Mechanical Pressure Switch: Monitors and responds to both the feed water pressure and pressure generated by the RO membranes.
- Oil-Filled Pressure Gauges:
 - RO Inlet: 0–300 PSI
 - Concentrate/Reject Line: 0–300 PSI
 - Pre-Filter Stage: 0–100 PSI
- Operation Modes and Visual Indicators
- Auto/Manual Mode Selector: Enables users to switch between fully automatic and manual operation.
- Pilot Lamps: 14 mm indicators to display system status and errors at a glance.
- Pump Switching Timer: Internal PLC timer controls pump alternation every 30 minutes (user-configurable).
- IDEC 2-Position Selector Switch: Lets users manually select between Pump A and Pump B in case of fault or maintenance.
- Water Quality and Temperature Monitoring
- In-line Conductivity Meters:
 - Feed Water
 - Product Water
 - Return/Loop Water
- Measurement in ppm / $\mu\text{S}/\text{cm}$



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