

# PARKER SEA RECOVERY ULTROCLEAR Direct Feed (DF) LOW PRESSURE REVERSE OSMOSIS (RO) 400-1500 GPD SECOND PASS RO SYSTEM, DIRECT FEED

(1.5 M3/day to 5.75 M3/day)



# QUICK START GUIDE UC-DF

![](_page_0_Picture_5.jpeg)

![](_page_1_Picture_0.jpeg)

#### GENERAL

The ULTROclear (UC) Direct Feed (DF) low pressure reverse osmosis (RO) system is designed to treat RO permeate/product water from an upstream first pass RO/watermaker system, directly without intermediate break tanks. Installation of the Parker Sea Recovery low pressure ULTROclear DF system is typically inside of a ship/vessel or inside of a building for land based applications. The second pass RO system provides ultrapure water for spot free rinsing (zero mineral deposits) and similar high purity applications.

#### **Key Features:**

- Direct Feed operation treating first pass RO permeate directly without buffer tank(s)
- Corrosion resistant low pressure RO system coated aluminum frame
- Run dry RO pump operation without damage Robust & Reliable
- Simple operation, ON & OFF automatic
- Parker Quality Parker Hannifin Corporation/Water Purification Sea Recovery

#### **INSTALLATION**

Refer to the attached installation diagram

**Step 1A:** Place the RO system in a suitable location in the ship or building with enough room for maintenance and servicing.

**Step 2A:** Secure the RO system down with appropriate anchorage and vibration mounts, as necessary.

**Step 3A:** Connect <sup>1</sup>/<sub>2</sub>" tubing (Parker Nylon N series tubing) to the INLET port on the connection panel. Feed water is supplied directly from an upstream RO watermaker. Typical supply pressure is 20 to 50 psi.

Note: The UC can treat onboard potable water or dockside potable water in addition to direct-feed from the watermaker.

![](_page_1_Picture_15.jpeg)

**Step 4A:** Connect <sup>1</sup>/<sub>2</sub>" tubing to the BRINE port and route to drain or recycle back to the low pressure piping of the seawater RO watermaker for 100% recovery.

![](_page_2_Picture_0.jpeg)

**Step 5A:** Connect <sup>1</sup>/<sub>2</sub>" tubing to the PRODUCT (RO permeate) port and route to the product tank.

**Step 6A:** Connect the primary power supply (110V/1ph/60hz or 220V/1ph/50hz) to the RO system.

Note: Provide appropriate fuse and/or circuit breaker protection upstream of the low pressure dock water RO system, per all applicable electrical codes and guidelines.

**Step 7A:** Remove both prefilter housings and verify the prefilter elements are installed. Then tighten both prefilter housings and secure them for operation.

**Step 8A:** Verify the BRINE recycle (BV-35) valve is fully OPEN (Direct Feed UC) *Note: The recycle valve can be throttled slightly for fine tuning, as necessary, but never CLOSED* 

![](_page_2_Picture_6.jpeg)

**Step 9A:** Check the system to ensure all fittings and connections are tight and ready for operation.

# **INITIAL STARTUP AND OPERATION**

**Step 1B:** Verify source water flow and pressure are available to the INLET of the low pressure RO system.

**Step 2B:** Turn the black **BRINE** flow meter control knob clockwise (CW) until it is fully closed. Then turn the black knob counterclockwise (CCW) two full turns (partially open).

*CAUTION: Never operate the RO system with the black BRINE knob fully closed.* **Step 3B:** Turn the ON/OFF selector switch to the ON position. The RO system will START, once the inlet pressure reaches approximately 40 psi (2.5 bar).

**Step 4B:** Gradually turn the black **BRINE** knob clockwise until the Filter OUT pressure is approximately 35 to 50 psi, typically approximately 40-45 psi.

NEVER operate the UC system with the Filter OUT pressure over 55-60 psi, max.

Normal Operation: The DF ULTROclear will then turn ON at 40 psi and OFF at 20 psi automatically, as a function of the upstream RO product water supply from the first pass RO watermaker.

![](_page_3_Picture_0.jpeg)

Nominal Product/Permeate flow ratings for each ULTROclear DF model are noted below.

ZK-A1F	One vessel rated flow	400 gpd / 17 gph max
ZK-A2F	Two vessel rated flow	800 gpd / 33 gph max
ZK-A3F	Three vessel rated flow	1,200 gpd / 50 gph max
ZK-A4F	Four vessel rated flow	1,500 gpd / 62 gph max

![](_page_3_Picture_3.jpeg)

Typical Filter Out Pressure: Typical Membrane Pressure range: 20 to 50 psi 75 to 130 psi

Typical operation for a ZK-A2F system is shown below producing 30 gph of RO PRODUCT water at 42 psi Filter OUT pressure

![](_page_4_Picture_0.jpeg)

![](_page_4_Picture_1.jpeg)

RO PRODUCT FLOW, 30 GPH ZK-A2 (2 MEMBRANES)

#### ULTROclear ZK-A2F Typical Operation

- ✓ 35-50 psi source water pressure (in range)
- ✓ 75-130 psi membrane pressure (in range)
- ✓ Up to 33 gph RO product flow (in range)

#### **Pressure Relief Valve**

![](_page_4_Picture_8.jpeg)

INTERNAL PRESSURE RELIEF BYPASS VALVE, 60 PSI SETPOINT

Turn Clockwise (CW) to increase the relief pressure, default 60 psi

# **AUTO OPERATION:**

With the direct feed (DF) ULTROclear RO system in the ON position and operating, the unit will remain in operation until pressure in the feed line decreases to approximately 20 psi (default adjustable). At 20 psi, the RO system will STOP. Once the pressure increases to more than 40 psi (default), the RO system will automatically START and operate to produce RO product water.

![](_page_5_Picture_0.jpeg)

As the upstream seawater RO watermaker starts and stops, the ULTROclear also turns on and off for simple and reliable two-pass ultrapure RO operation.

# **Standard Design Conditions**

- Supply pressure 20 to 60 psi
  - Note: An internal pressure relief valve is installed in the UC and set at approximately 60 psi. If the feed water pressure at the Filter OUT pressure gauge is over 55 psi, feed water will bypass around the UC system through the pressure relief valve to the final product line.
- Source water conductivity, design 1,000 microsiemens, max 2,500 microsiemens, with derated capacity (650 to 1,250 mg/L TDS)
- Product water maximum flow of 400 gpd (17gph), 800 gpd (33gph), 1,200 gpd (50gph), or 1,500 gpd (62gph), refer to the model rating.
- RO recovery of approximately 65-90% (adjustable), as P2 RO
  *CAUTION: With increased recovery, membrane life will be reduced*
- Product water pressure, 0 to 25 psi
- Brine pressure, 0-20 psi
- UC Feed Power: 2 amp (230V) & 3 amp (110V)
- Typical operating power: less than 175 watts (low energy under <sup>1</sup>/<sub>4</sub> hp)
- 100 to 230V, 1 phase, 50 60 hz

# **Common Options:**

- A. Mounting pads for the low pressure RO unit:
  - a. (4) 2115030120
  - b. (4) 061142150020
  - c. (4) 061100049000
  - *d.* Note: Holes can be drilled into the base of the frame for mounting, as applicable for the installation.
- B. RO product water neutralizing filter (drinking water), P/N: B561080001 (change 1x/month, typ.)
- C. Handheld TDS meter, P/N: 99-1990
- D. Handheld multi-parameter meter, P/N: 91-3557 (ph, ORP, TDS, cond, temp., resistivity)
- E. Prefilter sediment/carbon: 0803004773 (change 1x/month, typ.)
- F. Cleaner 1 cartridge: 40012002 (clean 1x/1-3months)
- G. Cleaner 2 cartridge: 40012003 (clean 1x/1-3months)
- H. Preservative cartridge: 40012018 (preserve when not in regular use)
- I. RO lubricant: PN:21-1122 (recommended: 10 min)
- J. RO feed 3-way inlet valve for two feed water sources (a) direct watermaker feed and (b) feed from dock-side potable water or the boats potable distribution system. Contact Parker engineering.

#### **General Service Guidelines**

![](_page_6_Picture_0.jpeg)

Service and maintenance for the RO system depends upon many factors such as the source water type, quality, frequency of operation, hours of operation per day, ambient conditions, and overall installation. Regular maintenace is required in order to keep the ULTROclear Z series RO system operating efficiently. The table below provides GENERAL guidelines for maintaining the RO system.

Description	Frequency	Other /notes
Clean RO membranes	1-4 months	depending upon water quality and operations
Record keeping and system monitoring	Daily	recorded with photos
Replace cartridge filters	Monthly	more frequently with higher DP
Replace carbon cartridge filters	2-4 weeks	ORP to RO to be < 300mV
Replace pH neutralizing cartridge	1-2x/month	monitor pH, replace if < 7.5-8
Flush RO membranes	as req'd	when not operating for more than 2-7 days
RO membrane replacement	1-5 years	depending upon operations & cleaning
Replace carbon pretreat tank media	6-18 months	monitor ORP daily
Replace media in prefilter MMF	1-4 years	relating to source water turbidity/quality

Note: System warranty requires the use of only Parker Hannifin/Water Purification spares, consumables, chemicals, components and appurtenances. Use of any other products or equipment voids all warranty for the system. Daily operational information for all pressure, flow, and conductivity in the system is required to be provided in the case of any warranty claims. Pressure, flows, and conductivity must be provided for each flow stream with daily recordings, photos and documentation.

# **ULTROclear (DF) System Cleaning**

The ULTROclear DF RO system should be cleaned when the membrane pressure is observed to increase by approximately 10-15% or at least once every 2-6 months. Cleaning involves introducing Parker cleaning chemicals onto the membranes, soaking, and flushing the chemicals out of the system. Cleaning always involves flushing the ULTROclear unit with clean dechlorinated fresh water (or permeate) followed by the use of cleaner 1 and then cleaner 2.

- 1. Record all current flows, pressure and permeate conductivity for the system
- 2. Stop the UC system and flush the unit with dechlorinated fresh water or permeate with the brine control black knob fully open, counterclockwise.
- 3. Turn the system off, open the downstream prefilter housing AC-20B and remove the carbon/sediment prefilter.
- 4. Install cleaner 1, into the AC-20B housing
- 5. Remove the carbon/sediment filter from AC-20A and install a new carbon/sediment filter
- 6. Using fresh water feeding the system, turn the UC unit ON with the black brine control knob fully open and flush the unit with cleaning chemical for approximately 5 minutes
- 7. Route the brine and product lines to drain
- 8. Stop the UC system and allow the chemical 1 solution to soak on the membranes for 5 to 60 minutes (longer soaks for more heavily fouled membranes)

![](_page_7_Picture_0.jpeg)

- 9. Remove the cleaner 1 cartridge from the downstream prefilter housing AC-20B and install a carbon/sediment filter element.
- 10. Flush the UC system for 5 minutes with fresh clean water to remove cleaner 1 from the system
- 11. Stop the UC system, and perform the sames steps as noted above, but using cleaner 2.
- 12. End with a fresh water flush through the system and install two new carbon/sediment prefilters.
- 13. With cleaning and flushing complete, restart the UC system under normal operating conditions and record all new flows, pressures, and conductivity after 5 10 minutes of steady-state operation.

Note: For extended RO system shutdowns for more than 2-4 days, perform a cleaning and then flush a Parker preservative solution through the membranes. Parker Membrane Preservative: 85-0103

#### Standard RO Cleaning Guidelines - Fundamentals

In normal operation, the membranes in reverse osmosis elements can become fouled by mineral scale, biological matter, colloidal particles, insoluble organic constituents and other contaminants. Deposits build up on the membrane surfaces during operation until they cause loss in normalized permeate flow, loss of normalized salt rejection, or both.

Membrane elements should be cleaned when one or more of the below mentioned parameters are applicable:

- The normalized permeate flow drops 10%
- The normalized salt passage increases 5 10%
- The normalized pressure drop (feed pressure minus concentrate pressure) increases 10 -15%
- 2-6 months of RO system operation (potable city/tap water or similar well water)
- 1-3 months of RO system operation (surface waters or similar)
- 1-4x/month (high fouling source waters/wastewaters)

If you wait too long, cleaning may not restore the membrane element performance successfully. In addition, the time between cleanings becomes shorter as the membrane elements will foul or scale more rapidly.

Please follow the guidelines below when handling, transporting and storing RO elements:

- Protect from direct sunlight.
- Store in a cool, dry place with an ambient air temperature range of 33°F to 95°F (1°C to 35°C).
- Do not allow the elements to freeze.
- Keep elements in their original packaging until required for use.
- Do not store membranes for more than a year.

Use the record keeping charts and complete the monitoring tables at least daily.

![](_page_8_Picture_0.jpeg)

# **ULTROclear DF Reverse Osmosis Overall Configuration**

Corrosion resistant durable low pressure RO system designed for use in marine environments

![](_page_8_Picture_3.jpeg)

![](_page_9_Picture_0.jpeg)

# Parker Water Purification – Sea Recovery Contact Information

![](_page_9_Picture_2.jpeg)

![](_page_10_Picture_0.jpeg)

# **Membrane Water Purification**

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#### Parker ULTROclear Z Series RO

Description		Parameter	Other
Date	mo./day/yr		
Source water Temperature	НН		
Source water EC	НН		conductivity
Source water feed pressure	PI-10		psi
Filter out pressure	PI-20		psi
Membrane pressure	PI-25		psi
Concentrate pressure	PI-35		psi
Permeate pressure	PI-50		psi
RO permeate flow	FI-50		gpm
RO concentrate flow	FI-40		gpm
RO conc. Recycle flow	FI-35		Gpm
RO permeate EC	AIT50 / HH		Conductivity
RO feed ORP, at CF-20	CF-20 mV		mV

#### Contact Information:

Parker Hannifin Corporation - Filtration Group-Water Purification 2630 E. El Presidio Street • Carson, CA 90810 • Phone 310 608 5600 • Fax 310 608 5692 E-mail: waterpurification@parker.com • www.parker.com • www.villagemarine.com

#### ENGINEERING YOUR SUCCESS

# ULTRO CLEAR DF

Simply plug into your watermaker to get endless spot-free rinse water for your boat.

![](_page_11_Picture_2.jpeg)

# Unit capacities from 400 GPD to 1500 GPD (1.5-5.75 M3D) of ultra pure demineralized water.

The UltroClear DF system works with the Aqua Matic to produce water that is double purified. It's reliable piping connection allows direct feed from the Aqua Matic and activates automatic operation. The UltroClear DF starts when water is fed into the system and stops when water no longer passes through. The final product water is ultra pure, capable of absorbing and pulling away dirt and debris from all surface finishes.

Made for sport fishing (40 - 100 ft / 12 - 30.5 m)

## **UltroClear Key Features**

- Direct feed from the watermaker
- Simple and reliable add on, easy to use
- High efficiency, fully automatic operation
- Polished water, perfect for hull wash downs

# Dimensions - ULTRO CLEAR $^{\text{DF}}$

Front

![](_page_12_Figure_2.jpeg)

Top view

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Side view

![](_page_12_Figure_5.jpeg)

Models

![](_page_12_Picture_7.jpeg)

![](_page_12_Picture_8.jpeg)

![](_page_12_Picture_9.jpeg)

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18.9"

481 mm

0 60

28" | 712 mm

![](_page_12_Picture_10.jpeg)

ZK-A4-F

### Specifications - UltroClear DF

Model #*	Production / 24hrs.	Number of Membranes	Weight
ZK-A1F-116 / ZK-A1F-215	400 Gal / 1.50 M3D	1	40 lbs / 18 kg
ZK-A2F-116 / ZK-A2F-215	800 Gal / 3.0 M3D	2	45 lbs / 20 kg
ZK-A3F-116 / ZK-A3F-215	1200 Gal / 4.50 M3D	3	50 lbs / 23 kg
ZK-A4F-116 / ZK-A4F-215	1500 Gal / 5.75 M3D	4	55 lbs / 25 kg

\*110v/1ph/60hz: 116 & 220V/1ph/50hz:215

![](_page_13_Figure_0.jpeg)