NELSEN™
WATER SOLUTIONS
Light Commercial
Reverse Osmosis

Light Commercial RO Systems



NRO-LC200
200 GPD System



NRO-LC350
350 GPD System



NRO-LC500
500 GPD Booster Pump System



NRO-LC750
750 GPD Booster Pump System

INSTALLATION, OPERATION & SERVICE MANUAL

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SERVICE SCHEDULE

Congratulations, you have just purchased one of the finest Reverse Osmosis Drinking Water Systems. These systems were designed for minimum service and will serve you for years to come.

Like any other fine product, this appliance requires periodic maintenance in accordance with the schedule outlined to the right.

Recommended Filter Change Schedule*	
1 Pre-filter, 10", 5 Micron	6 Months
2 Carbon Block Pre-Filter (2)	6 Months
3 Reverse Osmosis Membrane	24 - 36 Months
4 Post Granulated Activated Carbon In-Line Filter	6 Months

*Based on standard conditions.

FEED WATER REQUIREMENTS

Feed water quality has a huge effect on the performance of the reverse osmosis system. Supplying the reverse osmosis system with the feed water quality shown on page 3 is important. If the parameters below are not met, pretreatment may be required. Failure to meet feed water requirements may foul membranes, void the system warranty, and/or affect the system's stated performance.

The RO feed water must be pretreated to prevent membrane damage and/or fouling. Proper pretreatment is essential for the reliable operation of any RO system.

Pretreatment requirements vary depending on the quality of the feed water. Pretreatment equipment is sold separately. The most common forms of pretreatment are described below.

Media Filter: Used to remove large, suspended solids (sediment) from the feed water. Backwashing the media removes the trapped particles. Backwash can be initiated by time or differential pressure.

Water Softener: This Device removes calcium and magnesium from the feed water to prevent hardness scaling. Softening is the preferred method of controlling hardness scale.

Carbon Filters: Remove chlorine and organics from the feed water. The residual free chlorine in most municipal water supplies will damage the thin film composite structure of the membranes used in this unit. Carbon filtration or sodium bisulfite injection should be used to remove the free chlorine residual completely.

Chemical Injection: Typically used to feed anti-scalent, coagulant, or bisulfite into the feed water or to adjust the feed water pH.

Pre-filter Cartridge: Used to remove smaller suspended solids and trap any particles that may be generated by the other pretreatment. The cartridge(s) should be replaced when the pressure drop across the housing increases 5 - 10 psi over the clean cartridge pressure drop.

Iron & Manganese: These foulants should be removed to less than 0.1 ppm. Special media filters and/or chemical treatment is commonly used.

pH: The pH is often lowered to reduce the scaling potential.

Silica: Reported on the analysis as SiO2. Silica forms a coating on membrane surfaces when the concentration exceeds its solubility. Additionally, the solubility is highly pH and temperature-dependent. Silica fouling can be prevented with chemical injection and/or reducing the recovery.

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INTRODUCTION

Your new Reverse Osmosis (RO) Drinking Water System uses a combination of filtration technologies to reduce unwanted contaminants in a water supply. The following steps combine to give you the best in clear sparkling drinking water:

Mechanical Filtration: The sediment pre-filter removes larger particles such as silt, rust, and scale. Its nominal rating of 5 microns (equal to 0.0002 inch) helps give maximum life to the RO Membrane and carbon filter.

Carbon Block Pre-Filters: The carbon block pre-filters remove any chlorine in the feed water. This pre-treatment is also necessary for membrane protection.

Reverse Osmosis Membrane: The RO Membrane is the heart of the filtration system. It is designed to reduce the dissolved mineral content of the water. Minerals picked up in the environment by the water are measured as Total Dissolved Solids (T.D.S.). In the Reverse Osmosis process, dissolved minerals are separated from the incoming water (Feed Water) to produce the product water (the Permeate). The excess minerals are rinsed to drain (the Reject Water). The spiral wound construction of the RO Membrane provides maximum surface area for water production and is less susceptible to fouling by particulate matter, turbidity, and colloidal materials.

TFC Membranes: Thin Film Composite (T.F.C.) Membranes are specially constructed, fully aromatic polyamide film and are classified as a thin film composite. These membranes are NOT chlorine resistant.

Activated Carbon Post In-Line Filter: The In-Line Post-filter, Granular Activated Carbon, (GAC) filter contains coconut shell carbon to reduce unpleasant taste and odor from drinking water.

The product water from the membrane and the holding tank passes through the post-filter on its way to the Dispensing Faucet. The post-filter reduces tastes and odors that may pass through the system and adds a final “polish” to the water.

Automatic Shut-Off Valve: The A.S.O. Valve senses when the product water tank is full and closes the feed water supply to prevent excess reject water from going to drain when the unit is not producing water.

Feed Water Operating Limits	
T.D.S.	1000 ppm max
Temperature	40 - 110° F
pH	5 - 10
Pressure	40 - 85 P.S.I.
Hardness	Less Than 10 GPG
Iron	Less than 0.1 ppm
Manganese	Less than 0.05 ppm
Hydrogen Sulfide	NONE
Supply	No Chlorine
Bacteria	Must Be Potable

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PREPARATION

Major System Components

The following components comprise an RO Drinking Water System:

- An RO assembly consisting of the mounting bracket, filter housings, automatic shut-off or inlet solenoid, and membrane module
- A plastic tubing kit
- Other items necessary for installation not included may include holding tank, concrete anchors for hanging on the wall, additional tubing or tube connectors, plastic wire ties for organizing tubing

Optional Components

- A T.D.S. Monitor with feed water and product water test cells

*The T.D.S. Monitor may be necessary to conform to state or local codes; check with the local plumbing authority.

Determine System Location

Depending on space availability and preference, the system can be located in any area where the temperature is above freezing. Never install where the potential of freezing can occur as damage to the system will result.

The exact placement of the various components of the system will vary from installation to installation. In conjunction with the customer, the installer must decide where to place the tank and purification assembly by balancing convenience with ease of installation and servicing.

Holding Tank: The holding tank may be placed where it is convenient within 10 feet of the RO. Remember, these tanks can weigh over 100 pounds when full of water, a firm, level area is required.

R.O Assembly: The RO Assembly should be mounted where cold potable water and drain access is handy. The mounting location should allow adequate clearance and accessibility for cartridge changes.

Feed Water Connection: The feed water shut-off valve should be located as close to the RO assembly as possible. USE A POTABLE COLD WATER SUPPLY ONLY. Softened water is preferred, as it will extend the life of the RO Membrane.

Drain Connection: Conform to local plumbing codes.

ASSEMBLY

Some assembly is required for the 500 and 750 Gallon Per Day Systems before installation.

The membrane housing assembly must be seated in the housing clips. When seating the assembly in the clips, ensure that the drain line flow control, shut-off valve, and tubing are positioned between the mounting bracket and behind the membrane clips. The housing will not seat correctly if the tubing is inside the membrane clips.



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INSTALLATION

Prepare the Area for Installation

Determine where components will be located and how they will be mounted. Special mounting brackets and hardware may be necessary to secure the system to a wall or floor.

Inspect the cold water supply line and drain to determine if any special fittings, in addition to those included in the kit, are required.

Prepare the System for Installation

NOTE: The system should be sanitized before installing the Filter Cartridges

The 5 Micron Sediment Cartridge and Carbon Block Cartridges have been included separately in special packaging to assure you the highest purity level.

The proper method of installation is outlined below.

Installation of the 5-micron Sediment Pre-filter Cartridge: Completely unscrew and remove the "Pre-filter" housing from the assembly. Remove the protective film from the Sediment Cartridge. Carefully center the cartridge in the housing before reassembling it. As you reassemble the housing to the system, ensure the cartridge is centered on the filter housing head and the housing itself. Once tight, the "Pre-filter" label on the filter housing should be centered on the front of the assembly.

Installation of the Carbon Block Cartridges: The Carbon Block Cartridges are installed in the same manner as outlined above for the "Pre-filter".

NOTE: This RO System contains filters which must be replaced at regular intervals to maintain proper performance. Use only factory approved filters.

Make Initial Tubing Connections

Feed Water Connection: Connect the orange 3/8" tube from an incoming water source to the 3/8" QC bulkhead labeled "FEED".

Concentrate Connection: Connect 1/4" tubing from the 1/4" QC on the Flow Restrictor to drain (waste). Run the concentrate line to an open drain in a free and unrestricted manner (no back-pressure).

Holding Tank Connection: This system has been designed to operate together with an external bladder or atmospheric tank. Connect yellow 3/8" tubing from the 3/8" QC bulkhead labeled "TO TANK" to a permeate storage tank.

NOTE: The permeate water must be directed to drain for the first 30 minutes of use. Do not fill storage tank until the system has been flushed for 30 minutes.

IMPORTANT: Pressure in the holding tank should be 5-8 p.s.i.

IF EQUIPPED, THE TANK HIGH PRESSURE SWITCH WILL SHUT THE SYSTEM OFF AUTOMATICALLY WHEN THE BLADDER TANK IS FULL.

Permeate Connection: Connect blue 3/8" tubing from the 3/8" QC bulkhead labeled "TO FAUCET" to the final point–of–use (i.e. faucet).

Ensure that the permeate water can flow freely with no back-pressure. Back-pressure can cause irreversible damage to the membrane elements.

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OPERATION & MAINTENANCE

Normal Operation

It is normal for the Total Dissolved Solids (T.D.S.) of the water to be higher than normal during the first 5 gallons of operation, this is due to the sanitizing solution and the new Post-filter. After this water is rinsed to drain, the removal rate should stabilize at a value greater than 75%. Water pressure affects the production rate and quality.

RO systems produce drinking water at relatively slow rates, it can take up to 8 hours or more to fill the holding tank. Normal operation is to let the Holding Tank fill with water and then draw water as is needed. When the pressure in the Holding Tank falls to a given pressure (as the water is being used) the Automatic Shut Off Valve (A.S.O. Valve) will start water production and the system will refill the Holding Tank. When the Holding Tank is full and no water is being used, the A.S.O. Valve will automatically shut off the feed water to conserve water.

The more water that is used (up to the capacity of the system) the better the RO system will function. Utilize other uses for the water, such as flowers, pets and rinsing glassware.

After periods of non-use, it is better to empty the holding tank and allow the system to produce fresh water for use. If the system is not used for 3-4 weeks or longer, it is a good idea to re-sanitize the system and to change the Activated Carbon and Sediment Filters.

Membrane Removal & Replacement



Membrane changing can be an easy process if you have the proper tools and information on hand. Follow the below instructions when removing and replacing membrane(s).

NOTE: Always remove & replace the membrane in the direction of the FEED flow. This protects the brine seal from folding over. The brine seal should always be on the FEED end of the membrane housing.

WARNING: Depressurize the system before proceeding. Before attempting, booster pump models, disconnect the power from the system and bleed all water pressure from the system.

Remove the tubing and fittings from cap end of the membrane housing.

Unscrew (counter-clockwise) the end cap from the membrane housing.

Remove the membranes from the membrane housing. Needle-nose pliers may be necessary to pull the old membrane out.

CAUTION: Wear gloves for the following steps in order not to contaminate the membrane

IMPORTANT: The brine seal, a rubber seal that protrudes from one side of the membrane, must be in the correct position for the membrane housing. It should be on the same side as the membrane housing end cap.

Lubricate the brine seal and O–rings with a non–petroleum based lubricant, such as Dow Corning 111. Do not use a petroleum–based lubricant.

With a smooth and constant motion, push the membrane element into the housing so the brine seal enters the housing without coming out of the brine seal groove.

Re–install the end cap by twisting in a clockwise direction until firmly tightened. Ensure that you do not pinch or fatigue any O–rings while re-installing the end cap(s).

Reconnect any fittings that may have been disconnected when the pressure vessels were disassembled.

CAUTION: New or factory cleaned membranes are shipped in a preservative solution and must be flushed for at least 30 minutes to remove the preservative from the membrane. Discard all of the permeate, which is produced during the flush period.

NOTE: Discard the permeate and concentrate water during this operation.

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OPERATION & MAINTENANCE

CAUTIONARY REMINDERS

- Change the cartridge filters regularly
- Run the system, as much as possible, on a continuous basis.
- Always feed the RO with filtered water.
- **DO NOT** permit chlorine to enter or be present in the feed water.
- **DO NOT** shut down the system for extended periods.
- **DO NOT** operate the system with insufficient feed flow.

Changing Filters

See Page 2 for the recommended interval for changing the filters. Local conditions may dictate more frequent changes.

Use a drip pan to catch any water that may spill when the Filter Housing is removed.

1 Close the Feed Water Valve.

2 Relieve pressure in the system by pressing the red pressure-relief button on the filter housings.

3 Loosen and remove the appropriate Filter Housing. Discard the cartridge(s).

4 Wash the inside of the Housing(s) using a mild detergent and a soft cloth. Do not use abrasive cleaners or pads. Thoroughly rinse all soap from the housing before reassembly.

5 To sanitize the system and replace the filter cartridge(s):



a) Use a good quality sanitizer product such as Pro Products Sani-System for ROs. Sani-System Liquid Sanitizer Concentrate is the only EPA registered & NSF approved sanitizer for use in water softeners and reverse osmosis units.

b) Follow the directions on the sanitizer for proper sanitizing of the RO assembly.

c) Shut off water supply to RO unit and remove membrane and all filters. Use rubber gloves and store filters and membranes in water to prevent damage.

d) Open pure water faucet and depressurize system

e) Pour entire packet of Sani-System directly into the first main housing unit. Make sure pure water faucet is closed and turn on water supply.

f) Allow system to fill with water. The time will vary depending on the water pressure. However, the system should be full within 5 – 10 minutes without the filters or membrane. Flush the system two times.

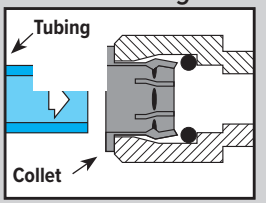
g) Replace or re-install membranes and all filters.

h) Check for leaks.

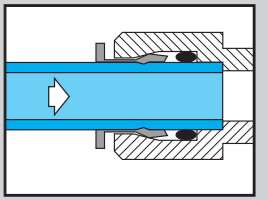
How to Use the "Quick Connect" Fittings

Your new Reverse Osmosis Drinking Water Appliance is outfitted with the new generation of user-friendly "Quick Connect" push-in fittings. Proper use of the fittings is shown in the diagrams. It is important that the tubing selected for use with these connectors be of high quality, exact size and roundness, and with no surface nicks or scratches. If it is necessary to cut the tubing, use a plastic tubing cutter or sharp razor knife. Make a clean, square cut. An red locking clip is installed in certain fittings to provide extra security. Remove this clip first before trying to remove tubing by sliding away from fitting. Should a leak occur at a fitting, the cause is usually defective tubing.

To Attach Tubing

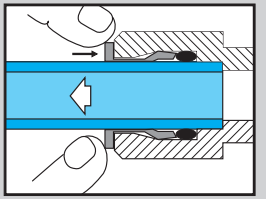


Push tubing straight in as far as it will go.



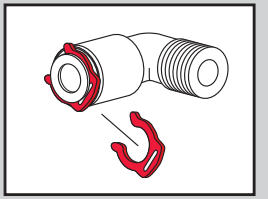
Tubing is secured in position.

To Release Tubing



Push in collet to release tubing.

Locking Clip



Red Locking clip slides between collet and fitting.

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TECHNICAL DATA

Water Quality

1 Water quality is normally measured with a special meter that measures the water ability to conduct electricity. The more dissolved solids in the water, the higher the conductivity. The results are usually reported in Parts per Million (ppm) or Milligrams per Liter (mg/l) of Total Dissolved Solids (T.D.S.). (Although technically they are not exactly equal, in most discussions ppm = mg/l.)

2 RO Membranes are rated by the amount of dissolved solids that are rejected. This rating is a ratio of the T.D.S. in the product water and is reported as Percent Rejection. If the feed water contained 100 ppm of T.D.S. and the product water contained 10 ppm of T.D.S., 90 ppm have been rejected and the reject ratio is 90%.

$$\text{Percent Rejection} = \frac{\text{Feed T.D.S. - Product T.D.S. x 100\%}}{\text{Feed T.D.S.}}$$

Water Quantity

1 Water quantity is termed Flux or Product Water Rate and is measured as the amount of water produced in one day. It is reported as Gallons per Minute (gpm) or as Milliliters per Minute (ml/min).

2 The flow of water to drain is the Reject Water Rate and is measured as Gallons per Minute (gpm) or Milliliters per Minute (ml/min).

Milliliters per minute x .38 = gallons per day

EXAMPLE: The drain flow will fill a graduated cylinder to the 105 ml mark in one minute.

105 ml/min. x .38 = 40 gpd

If the container available measures ounces, use the following conversion:

Ounces per minute x 11.2 = gallons per minute

3 The Reject Ratio is the amount of water produced compared to the amount of water flowing to drain.

$$\text{Reject Ratio} = \frac{\text{Reject Rate}}{\text{Product Rate}}$$

4 The Percent Recovery is another way to measure the amount of water produced as compared to the amount actually used.

$$\text{\% Recovery} = \frac{\text{Product Rate x 100\%}}{\text{Feed Rate}}$$

NOTE: The total flow or feed water rate into the system is the sum of the product flow and the drain flow.

Water Pressure and Temperature

Most RO Membranes are rated at a standardized condition of 77°F (25°C) and 60 psi (414 kPa) discharging to atmospheric pressure.

Product water quality and quantity greatly depend upon the Net Pressure Differential (Δp) across the RO Membrane. This pressure differential is a summation of the feed water pressure at the Membrane, which tries to push the water through, the pressure in the Holding Tanks, which tries to push the water backwards and the osmotic pressure, which also tries to push the water backwards.

The Osmotic Pressure is in proportion to the dissolved minerals in the water and can be approximated by 1 psi for each 100 ppm of T.D.S.

The higher the net pressure differential, the higher the water quantity and quality produced.

Some loss of production when using a pressurized Holding Tank is normal.

Feed water temperature also affects water production. The lower the temperature, the lower the quantity of water produced.

$$\text{Water Production Rate} = \text{Rated Flow} \times \text{Pressure Correction} \times \text{Temperature Correction}$$

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TABLE 1: Pressure Correction factors for Thin Film Composite (T.F.C.) Membrane Production Rate

Pressure Δpsi	Pressure ΔkPa	Correction Factor	Percent Rejection	Pressure Δpsi	Pressure ΔkPa	Correction Factor	Percent Rejection
10	69	.17	84	60	414	1.00	94
15	103	.25	88	65	448	1.08	94
20	138	.33	90	70	483	1.17	95
25	172	.42	92	75	517	1.25	95
30	207	.50	93	80	552	1.33	95
35	241	.58	93	85	586	1.42	95
40	276	.67	94	90	621	1.50	96
45	310	.75	94	95	655	1.58	96
50	345	.83	94	100	689	1.67	96
55	379	.92	94				

To adjust form 60 psi (414)kPa) to another pressure multiply the production rate by the correction factor. To adjust from given pressure to standard conditions divide by the factor.

*Percent rejection of Total Dissolved Solids

TABLE 2: Temperature Correction Factors for Thin Film Composite (T.F.C.) Membrane Production Rate

Temperature °F	Temperature (°C)	Correction Factor	Temperature °F	Temperature (°C)	Correction Factor
50.0	(10.0)	1.711	68.4	(20.2)	1.180
50.5	(10.3)	1.692	68.9	(20.5)	1.168
51.1	(10.6)	1.673	69.4	(20.8)	1.156
51.6	(10.9)	1.654	70.0	(21.1)	1.144
52.2	(11.2)	1.636	70.5	(21.4)	1.132
52.7	(11.5)	1.618	71.1	(21.7)	1.120
53.2	(11.8)	1.600	71.6	(22.0)	1.109
53.8	(12.1)	1.582	72.1	(22.3)	1.097
54.3	(12.4)	1.564	72.7	(22.6)	1.086
54.9	(12.7)	1.547	73.2	(22.9)	1.075
55.4	(13.0)	1.530	73.8	(23.2)	1.064
55.9	(13.3)	1.513	74.3	(23.5)	1.053
56.5	(13.6)	1.496	74.8	(23.8)	1.042
57.0	(13.9)	1.480	75.4	(24.1)	1.031
57.6	(14.2)	1.464	75.9	(24.4)	1.021
58.1	(14.5)	1.448	76.5	(24.7)	1.010
58.6	(14.8)	1.432	77.0	(25.0)	1.000
59.2	(15.1)	1.417	77.5	(25.3)	0.991
59.7	(15.4)	1.401	78.1	(25.6)	0.982
60.3	(15.7)	1.386	78.6	(25.9)	0.974
60.8	(16.0)	1.371	79.2	(26.2)	0.965
61.3	(16.3)	1.356	79.7	(26.5)	0.957
61.9	(16.6)	1.342	80.2	(26.8)	0.948
62.4	(16.9)	1.327	80.8	(27.1)	0.940
63.0	(17.2)	1.313	81.3	(27.4)	0.932
63.5	(17.5)	1.299	81.9	(27.7)	0.924
64.0	(17.8)	1.285	82.4	(28.0)	0.915
64.6	(18.1)	1.272	82.9	(28.3)	0.908
65.1	(18.4)	1.258	83.5	(28.6)	0.900
65.7	(18.7)	1.245	84.0	(28.9)	0.892
66.2	(19.0)	1.232	84.6	(29.2)	0.884
66.7	(19.3)	1.219	85.1	(29.5)	0.877
67.3	(19.6)	1.206	85.6	(29.8)	0.869
67.8	(19.9)	1.193			

To Adjust from 77° F (25° C) to another temperature, multiply the production rate by the correction factor. To adjust from a temperature to standard conditions divide by the factor.

BOOSTER PUMP

The booster pump consists of the pump, transformer unit and the tank shut-off switch. The tank shut-off switch will shut down the pump when continuous water production is not necessary, as when the tank is full, so as not to prematurely burn out the pump. The AC transformer steps down the primary household 110 voltage to a safe 24 volts.

Installation of the Booster Pump Pressure Switch

- Turn off the water at the needle valve if on.
- Cut the yellow 3/8" O.D. flexible tubing with a clean square cut to insure proper seal and to avoid misalignment of the compression fitting connectors.
- Insert tubing into switch ports.
- Open the feed-water valve.
- Check fittings for leaks.
- Check the transformer voltage and plug into appropriate receptacle.
- Allow water to circulate to relieve entrapped air.

The pump will now build pressure. Operating pressure will vary with membrane flow rate, flow restrictor flow rate, feed-water pressure and line voltage. Typical operating pressure is constant, between 80 - 110 psi.

If the flow restrictor is too small, or the R.O. system is clogged, an internal pump by-pass mechanism limits the output pressure to “feed water pressure plus 80 psi”. As pump output pressure approaches “feed-water pressure plus 80 psi”, a slight squeaking sound may be heard. This “sound” can be avoided by eliminating the system clogging.

Technical Notes

Membrane production rate is rated at 60 psi; the same membrane operating at 90 psi or 100 psi will increase production rate by 30% - 40%.

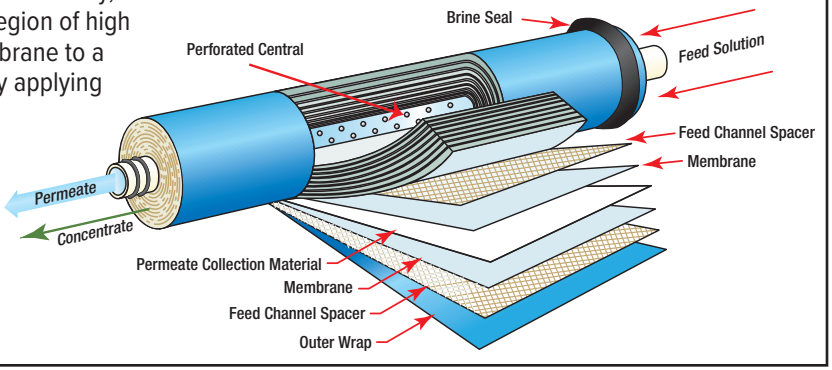
Membrane rejection rate is rated at 60 psi; the same membrane operating at 90 psi - 100 psi will increase reject rate by 5% - 10% depending on the system “back-pressure”.

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REVERSE OSMOSIS – HOW DOES IT WORK?

Reverse osmosis (RO) is a separation process that uses pressure to force a solvent through a membrane that retains the solute on one side and allows the pure solvent to pass to the other side. More formally, it is the process of forcing a solvent from a region of high solute concentration through a membrane to a region of low solute concentration by applying a pressure in excess of the osmotic pressure. This is the reverse of the normal osmosis process, which is the natural movement of solvent from an area of low solute concentration, through a membrane, to an area of high solute concentration when no external pressure is applied. The membrane here is semipermeable, meaning it allows the passage of solvent but not of solute.



Nominal Rejection of Thin Film Composite Polyamide Membrane*

Ion	Symbol	% Rejection	Ion	Symbol	% Rejection
Aluminum	Al+3	97 – 98	Magnesium	Mg+2	95 – 98
Ammonium	NH4+	85 – 95	Mercury	Hg+2	95 – 97
Borate	B4O2-2	30 – 50	Nickel	Ni+2	97 – 98
Boron	B	60 – 70	Nitrate	NO3-	90 – 95
Bromide	Br -	93 – 96	Phosphate	PO4-3	95 – 98
Cadmium	Cd+2	93 – 97	PFAS/PFOA		95 – 99
Calcium	Ca+2	95 – 98	Potassium	K+	92 – 96
Chloride	Cl -	92 – 98	Silica	Si	85 – 90
Chromate	CrO4-2	85 – 95	Silicate	SiO2-2	92 – 95
Copper	Cu+2	96 – 98	Silver	Ag+	95 – 97
Fluoride	F -	93 – 95	Sodium	Na+	92 – 98
Iron	Fe+2	96 – 98	Sulfate	SO4-2	96 – 98
Lead	Pb+2	95 – 98	Thiosulfate	S2O3-2	97 – 98
Manganese	Mn+2	97 – 98	Zinc	Zn+2	97 – 99

* The above percent of rejection is for reference only and not to be construed as chemistry, temperature, and TDS are not constant in each water supply.

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SYSTEM SPECIFICATIONS

MODEL	NRO-TLC-200	NRO-TLC-350	NRO-TLC-500	NRO-TLC-750
Production*	200 GPD	350 GPD	500 GPD	750 GPD
Configuration	SINGLE PASS			
Feedwater Source (ppm)**	TDS <1000			
Standard Recovery Rate %	25	50	50	50
FLOW RATES (GPM)				
Permeate	0.13	0.25	0.35	0.53
Concentrate	0.41	0.2	0.35	0.53
Maximum Feed Flow	8	8	8	8
CONNECTIONS (INCHES)				
Feed	3/8" Quick Connect			
Permeate	3/8" Quick Connect			
Concentrate	1/4" Quick Connect			
MEMBRANES				
Membrane Quantity	2	1	1	2
Membrane Size	1.8 x 12	3 x 12	3 x 12	3 x 12
Nominal TDS Rejection %	98	98	98	98
VESSELS				
Vessel Array	1:1	1	1	1:1
Vessel Quantity	2	1	1	2
SYSTEM DIMENSIONS				
L x W x H (inches)	18 x 13 x 35		18 x 13 x 38	
Weight (lbs)	29		32	
OPERATING LIMITS				
Maximum Feed Temp (F)	85			
Minimum Feed Temp (F)	40			
Maximum Feed Pressure (psi)	85			
Minimum Feed Pressure (psi)	40			
Booster Pump			Aquatec 5300	
System Electrical			6.7a, 100-240 VAC in, 24 VDC out	

* The stated product performance is based on data taken after 30 minutes of operation at the following test conditions: 250 mg/L NaCl solution at 60 psig (.41 MPa) applied pressure, 15% recovery, 77° F (25° C), pH 6.5–7.0

** Temperature and Feedwater quality, such as high TDS levels will significantly affect the systems production capabilities and performance.

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NELSEN CORPORATION LIMITED WARRANTY

Nelsen Corporation ("Nelsen") is pleased to provide you this limited warranty as described below (the "Limited Warranty").

Limited Warranty

Subject to the terms of this Limited Warranty, Nelsen warrants to the original buyer of its NRO Light Commercial Reverse Osmosis Drinking Water System product (the "Product") from a Nelsen authorized dealer ("Buyer") that, except as otherwise provided in this Limited Warranty, the Product will be free from defects in material or workmanship for a period of one (1) year after the date of original installation. In addition, individual components of the Product may be covered by the original manufacturer's warranty. This Limited Warranty shall apply only if the Product is installed, operated and maintained in strict accordance with Nelsen's or the manufacturer's guidelines and other legal requirements. This Limited Warranty shall not cover and shall be null and void with respect to any goods that, in Nelsen's discretion, are: (a) modified after sale, (b) improperly installed, stored, used or handled, (c) abused or misused or otherwise damaged due to fire, lightning, power surges or other acts of God or exposure to freezing or hot water or the effects of normal wear and tear.

Additional Conditions

- This limited warranty only covers the Product if installed and used for residential purposes. Any Product installed or used for commercial or industrial applications are not subject to this limited warranty.
- Water pressure and temperature must not exceed manufacturer guidelines.
- This limited warranty does not cover the disposable sediment and carbon cartridges whose service life depends on feed water conditions.
- This limited warranty will not apply to any membrane if the required pre-filter conditions to the membrane are not followed.

Warranty Claims

All Limited Warranty claims hereunder shall be submitted by Buyer to Nelsen dealer who sold the Product in writing and shall include the Buyer's name, address, telephone number, date of purchase of the Product, receipt evidencing proof of purchase and a copy of this Limited Warranty. All Limited Warranty claims shall be submitted to Nelsen at the following address: 5151 Portside Dr., Medina, OH 44256. Nelsen or its dealer will investigate the claim. Buyer must fully cooperate in investigating and evaluating the claim, including, without limitation, providing additional information upon request. TO BE ELIGIBLE FOR LIMITED WARRANTY COVERAGE, BUYER MUST SUBMIT A CLAIM WITHIN SIXTY (60) DAYS OF THE DATE THE ALLEGEDLY DEFECTIVE PRODUCT IS FIRST DISCOVERED BY BUYER.

Repair or Replacement/Credit

Subject to the conditions and limitations herein, if Nelsen determines that a Product does not conform to this Limited Warranty, Nelsen will repair or replace the defective Product. Any replaced Products, or any parts therein, shall be retained by and become the property of Nelsen. If Nelsen determines that repair or replacement of defective goods is not commercially practicable, Nelsen will issue a credit in favor of Buyer in an amount not to exceed the purchase price of the Product. Notwithstanding anything to the contrary contained herein, this Limited Warranty does not cover any cost or labor associated with the removal or re-installation of the replacement Product or any shipping costs associated with the returned Product or repaired or replacement Product.

Eligibility/Non-Transferable

This Limited Warranty applies only to Buyer if the Products are purchased from a Nelsen authorized dealer. This Limited Warranty is personal to Buyer, and may not be assigned or otherwise transferred by Buyer. Any attempt to transfer this Limited Warranty shall be null and void and not recognized by the Company.

Disclaimer of Other Warranties/Limitation on Liability

EXCEPT AS PROVIDED ABOVE AND TO THE EXTENT PERMITTED BY LAW, THERE ARE NO OTHER REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE PRODUCT, EITHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, OR ARISING UNDER CUSTOM OF TRADE, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. NO REPRSENTATIONS OR WARRANTIES AT ANY TIME MADE BY ANY EMPLOYEE, AGENT OR REPRESENTATIVE OF NELSEN SHALL BE EFFECTIVE TO VARY OR EXPAND ANY WRITTEN WARRANTY OR THE TERMS HEREOF. TO THE EXTENT A WAIVER OF IMPLIED WARRANTIES IS PROHIBITED BY LAW, ANY IMPLIED WARRANTIES SHALL BE LIMITED TO THE DURATION OF ANY WRITTEN WARRANTY PROVIDED BY NELSEN.

In no event shall Nelsen be liable to Buyer or to any third party for consequential, incidental, special or punitive damages, or for lost profits or loss of use, resulting from or in any manner related to the goods, their delivery, non-delivery, use, or inability to use the same, whether such damages be claimed under contract, tort or any other legal theory.

Waiver of Class Action

ANY AND ALL CLAIMS ASSERTED BY BUYER OR ANY OTHER PERSON OR ENTITY SHALL BE RAISED IN SUCH PARTY'S INDIVIDUAL CAPACITY AND MAY NOT BE RAISED AS A PLAINTIFF OR CLASS MEMBER IN ANY PURPORTED CLASS OR REPRESENTATIVE PROCEEDING.

Applicable Law

This Limited Warranty shall be interpreted and governed under the laws of the State of Ohio without giving effect to the choice of law rules thereof. Nelsen and Buyer agree to submit to the jurisdiction of the state or federal courts located in Medina County, Ohio for purposes of resolving any dispute or claim arising in connection with a transaction.

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