Adiatec®

High-Pressure System with the Hydrotrue® Water Treatment System

Installation, Operation, and Maintenance Manual

Read and save these instructions

driSteem

Warnings and cautions

⚠ WARNING

Attention installer
Read this manual before installing, and leave this manual with product owner. This product must be installed by qualified plumbing, HVAC and/or electrical contractors. Installation must be code approved.

Disconnect electrical power
Disconnect electrical power before installing supply wiring or performing service or maintenance procedures on any part of the system. Failure to disconnect electrical power could result in fire, electrical shock, and other hazardous conditions. These hazardous conditions could cause property damage, personal injury, or death.

Contact with energized circuits can cause property damage, severe personal injury, or death as a result of electrical shock or fire. Do not remove pump cover, or subpanel access panels until electrical power is disconnected.

Follow the shutdown procedure in this manual before performing service or maintenance procedures on any part of the system.

Electric shock hazard
If the reverse-osmosis system starts up during maintenance, severe bodily injury or death from electric shock could occur. To prevent such start-up, follow the procedure below before performing service or maintenance procedures on this reverse-osmosis system:

1. Use Vapor-logic® keypad/display to change control mode to Standby.
2. Shut off all electrical power to the reverse-osmosis system using field-installed fused disconnect, and lock all power disconnect switches in OFF position.
3. Close field-installed manual water supply shut-off valve.

Tipping hazard
Before installing the 400 series reverse-osmosis system, use supplied leg brackets or lag points to permanently fix the system to the floor and/or adjacent building structure. Failure to install according to instructions can result in serious injury or death. See page 23 for instructions.

Monitor open-space dispersion areas for leaks or drips
Monitor the system for leaks or drips in the dispersion area. Uncorrected leaks or drips could cause wet floors and slippery footing, which could lead to personal injury. Leaks or drips above equipment could cause property damage.

Warnings and cautions

CAUTION

Operate system at above-freezing temperatures.
Operating the system at temperatures below freezing can damage the system or cause other property damage.

Maintain pumping and water treatment equipment.
Inadequately maintained pumping and water treatment equipment can cause the system to fail. Refer to the maintenance section of this IOM for recommended maintenance.

Do not install the system using steel or galvanized-steel piping and joints.
Steel and steel-galvanized piping and joints can corrode and cause system damage. Use PVC or stainless steel piping and joints when assembling system.

Follow all instructions in this manual to maintain product warranty.

Damage to pump
Do not close the valve on the outlet of the pump. Do not operate the pump below minimum combined flow rate (permeate + concentrate + recirculating).

Models 401-402: 4 gpm (15.2 L/min)
Models 403-412: 6 gpm (22.7 L/min)

Team lift required

Team lift is required when replacing the membranes. Membrane banks are heavy. Do not try to lift without assistance. Wear steel-toed shoes and have adequate room for maneuvering when servicing. Never lean membrane banks vertically when removed from system. Failure to do so may damage the system or result in injury. See maintenance information on page 101.

NOTICE

Health risks
The user is responsible for operating and maintaining the provided system in accordance with city, state, and federal regulations. Please follow local health and state codes for regulations around application of adiabatic humidifiers or adiabatic cooling devices. There is an associated risk with all water sources and the potential for bio growth, including bacterium that causes Legionnaires disease.

DriSteem high-pressure systems, products, and components are designed, with consideration, to reduce the risk of Legionnaires disease and other similar situations. The water treatment and high-pressure system design take into account lower operating temperatures, minimization of stagnant water through mechanical design and flush cycles, and provides an option for UV disinfection of the RO storage water.

Inadequate installation, operation or maintenance of the water system and humidifier can support the growth of bacterium.

A competent environmental, health, and safety representative should identify the risks of any interacting systems. As deemed appropriate, plans and controls should be implemented at the facility to help mitigate risk.

Fill in the following information for your records

Date of purchase _____

Customer's name _____

Model number _____

Serial number _____

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Table of contents

ATTENTION INSTALLER

Read this manual before installing.
Leave manual with product owner.

DriSteem® Technical Support
800-328-4447

WHERE TO FIND MORE INFORMATION

Our website:

The following documents are available on our web site: www.dristeem.com

- Evaporative Cooling and Humidification Catalog
- Vapor-logic Controller Installation and Operation Manual
- Water Treatment System Catalog

DriCalc® sizing and selection software:

DriCalc, our software for system sizing and selection, can be ordered at our web site. Also in DriCalc:

- Library of installation guides
- Dispersion and sensor placement in ducts and air handlers

Call us at 800-328-4447

Obtaining documents from our web site or from DriCalc is the quickest way to view our literature, or we will be happy to mail literature to you.

Keypad/display and troubleshooting

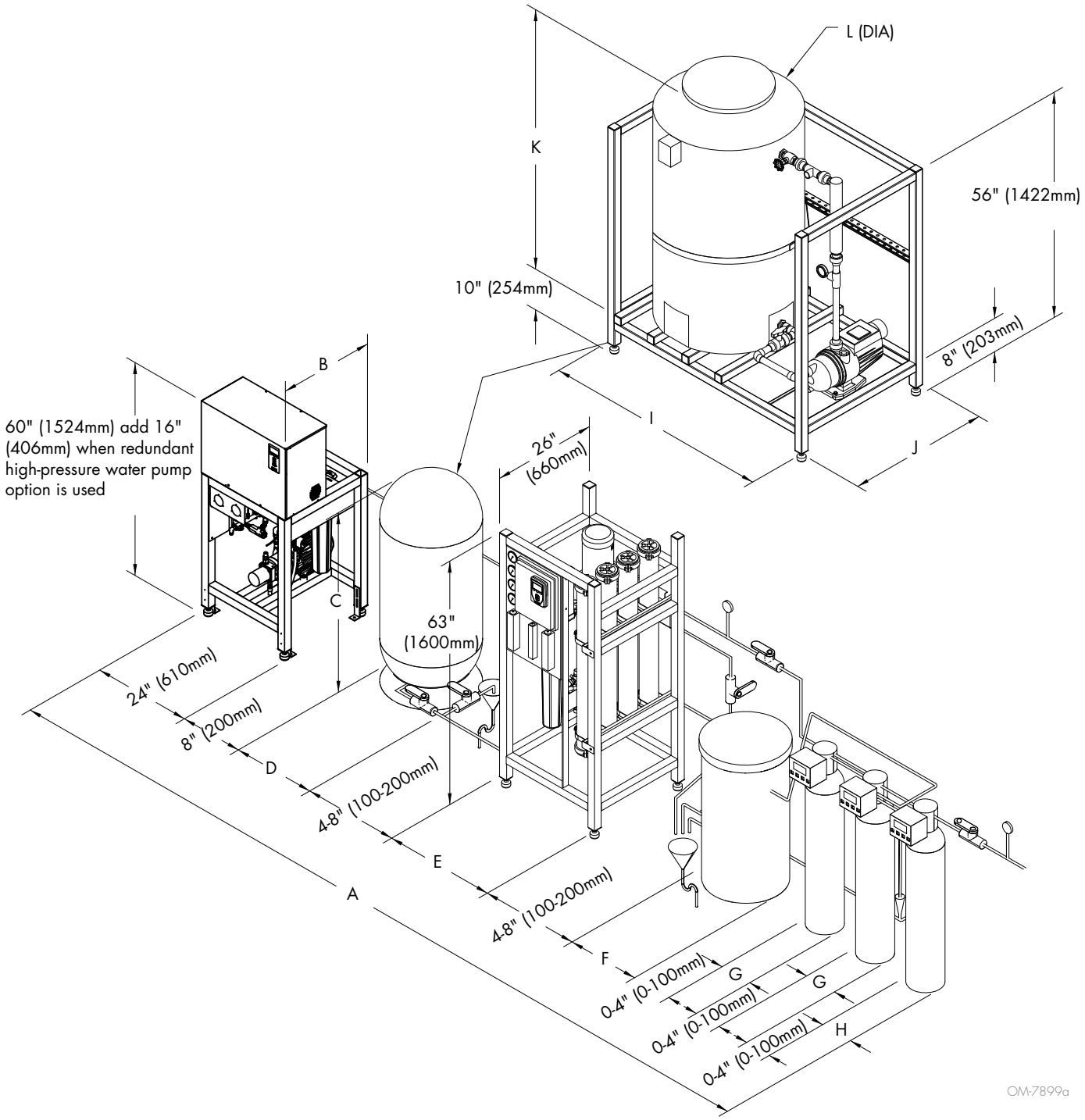
The *Vapor-logic Installation and Operation Manual*, which was shipped with your High-Pressure System, is a comprehensive operation manual. Refer to it for information about using the keypad/display and Web interface, and for troubleshooting information.

Download DriSteem literature

Most DriSteem product manuals can be downloaded, printed, and ordered from our website: www.dristeem.com

System dimensions

FIGURE 2-1: DRISTEEM HIGH-PRESSURE SYSTEM DIMENSIONS



System dimensions

Table 3-1:
DriSteem Adiatec High-Pressure System dimensions[1]

Model	Dimensions [5]															
	A [2]		B		C		D		E		F		G		H	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
250	150 [3]	3810 [3]	24 [3]	610 [3]	55	1397	24	610	28	711	18	457	12	305	4 [4]	102 [4]
500	160 [3]	4064 [3]	24 [3]	610 [3]	55	1397	24	610	28	711	24	610	14	356	4 [4]	102 [4]
1000	176 [3]	4470 [3]	24 [3]	610 [3]	55	610	24	610	28	711	24	610	16	406	16	406
1750	176 [3]	4470 [3]	24 [3]	610 [3]	55	610	24	610	28	711	24	610	16	406	16	406
2500	197 [3]	5004 [3]	30	762	80	2032	24	610	37	940	30	762	21	533	21	533
3500	221 [3]	5613 [3]	30	762	72	1829	30	762	37	940	39	991	24	610	24	610
5500	239 [3]	6071 [3]	30	762	90	2286	30	762	47	1194	39	991	30	762	30	762

Notes:
1. Water treatment component sizing is based on city-treated water, 20-grain hardness, and 50 °F (10 °C) or higher. City-treated water or well water with different hardness or temperature may require different components/dimensions. Call DriSteem with your water characteristics for component sizing.
2. Dimension given is maximum dimension when all components are located sequentially. Component locations are flexible; components may be placed in front of each other if floor space allows.
3. Add 6" (152 mm) when redundant high-pressure water pump option is used.
4. Wall-mounted dechlorinator standard (tank-style optional).
5. Typical non-skidded. For other options see the Water Treatment System or Pre-treatment Installation, Operation, and Maintenance Manual or contact Dristeem.

Table 3-2:
Atmospheric RO holding tank specifications

RO station model	Description	I	J	K	L	Weight		Connections
						Shipping	Operating	
AT-165	165 gal (567 L)	56" (1422 mm)	35" (889 mm)	65" (1651 mm)	31" (787 mm)	320 lbs (145.15 kg)	1695 lbs (768.84 kg)	1" (25 mm) PVC, In: Female NPT Out: Socket
AT-300	300 gal (1135 L)	60.5" (1536.7 mm)	39.5" (1003 mm)	88" (2235.2 mm)	35.5" (901.7 mm)	360 lbs (163.3 kg)	2860 lbs (1297.27 kg)	1" (25 mm) PVC In: Female NPT Out: Socket

Water quality and component overview

WATER QUALITY

Supply water must be softened and dechlorinated before being supplied to the reverse-osmosis system. If water is not properly dechlorinated or softened, it can damage reverse osmosis membranes. If you are not installing DriSteem water pretreatment components, verify that your water has had chlorine removed and is softened.

DECHLORINATOR REMOVES CHLORINE

The dechlorinator removes chlorine from supply water before it enters the reverse osmosis membranes.

Supply water enters the dechlorinator and passes through a charcoal sieve, which neutralizes chlorine before entering the water softener. The dechlorinator is automatically backflushed whenever a programmed calendar date or water meter usage is met. During automatic backflushing, clean water flows through the dechlorinator to rinse the charcoal, and then flows to drain (tank dechlorinators only).

WATER SOFTENER REMOVES CALCIUM, MAGNESIUM, AND IRON

The water softener removes dissolved hard water minerals from supply water before it enters the reverse osmosis membranes.

Water passes from the dechlorinator into the softener where dissolved minerals are removed by an ion-exchange process. Softened water exits through a water meter to enter the reverse osmosis membranes. When the water meter flow setpoint is satisfied, the softener will take brine from the brine tank to regenerate the resin. Water will be rejected to drain during this period of rinsing.

REVERSE OSMOSIS MEMBRANES ELIMINATE REMAINING MINERALS AND ORGANICS

Dissolved minerals and organics must be eliminated from the water in order to keep system components operating properly. Potable water passes through a dechlorinator and duplex water softener to take out chlorine and hard water deposits. The softened water enters the RO station, then flows through a 5 micron filter cartridge. Thereafter, a multi-stage pump pressurizes the water to approximately 125 psig (860 kPa), depending on the quality of water and the desired flow. Then, water is forced to cross a reverse-osmosis membrane, which removes most dissolved minerals. The water is now purified and contains very few minerals (typically less than 10 ppm) and is then stored in the pressurized storage tank. A portion of the rejection water may be recirculated; the rest, which is saturated with minerals, is sent to the drain.

CAUTION

Water supplied to the reverse-osmosis system that does not meet the required water quality standards will cause premature component failure and void the DriSteem warranty.

Table 4-1:
Water quality guidelines

Water supply	5-50 ppm
Total dissolved solids (TDS)	5 - 50 ppm
pH	5.5-8.0
Total hardness	<0.1 ppm
Turbidity	<0.5 NTU
Temperature	40 - 60°F, 68°F maximum
Bacteria count	<1 CFU/mL
Free chlorine	<0.1 ppm
Iron	<0.05 ppm

Water quality and component overview

COMPONENT OVERVIEW

Your system may include all or some of the following Hydrotrue™ water treatment components.

- Water pretreatment components
  - Dechlorinator (tank style floor mount recommended on all sizes, cartridge style wall mount available for RO models 401 and 402)
  - Single or duplex water softener and brine tank
- RO storage options include:
  - Pressurized RO holding tank
  - Atmospheric RO holding tank with UV sterilization and booster pump

DESIGN BASIS

- Systems rated at: 50°F (10°C) using 1000 PPM sodium chloride solution operating at 200 psi pressure.
- Minimum feed pressure to RO System: 40 PSI. System capacity changes significantly with water temperature. For higher TDS a water analysis must be supplied and could result in modifications to the system.
- Chlorine must be removed if present in feed water prior to RO with a dechlorinator.
- Water must be pretreated with a softener to avoid scaling the membranes.
- Feed water turbidity: Less than 1 NTU; Feed water silt density index (SDI): 3 maximum. If exceeded, pretreatment with media filter recommended. All pretreatment equipment are available from DriSteem.
- Capacity Basis: 24 hrs/day

DESIGN NOTES

1. Pump flow/Feed flow: The pump has been designed to include recycle flow (if any) coming back to the pump inlet from the concentrate stream based on desired recovery. The sum of permeate flow, concentrate flow and recycle flow (if any) will equal the pump design flow.
2. Permeate flow: Indicates design flow rate from RO membranes as product water for use.
3. Concentrate flow: Water flowing to the drain. Concentrate flow is critical for proper system operation.
4. Recycle flow: Flow stream that returns from the concentrate line back to the pump intake, rather than to the drain.

Important:

- System pressure is a variable. It is important to adjust the pressure to get the correct permeate and concentrate flows. The exact value of the pressure is not important.
- Permeate flow will increase at higher temperature.

CAUTION

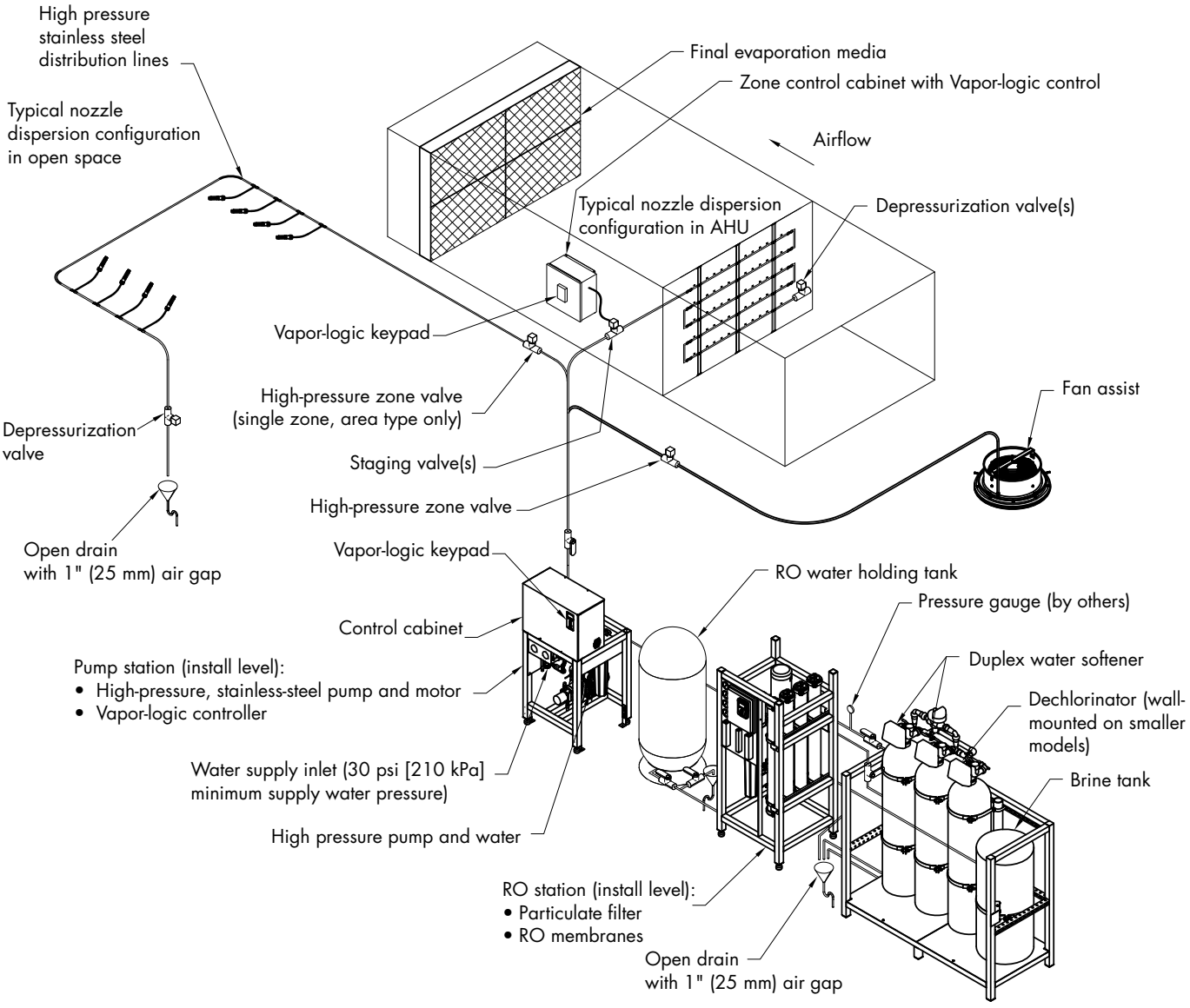
Damage to pump

Do not close the valve. Do not operate the pump below minimum combined flow rate (permeate + concentrate + recirculating).

Models 401-402: 4 gpm (15.2 L/min)
Models 403-412: 6 gpm (22.7 L/min)

System overview

FIGURE 6-1: DRISTEEM HIGH-PRESSURE SYSTEM OVERVIEW



Note:

- System components and configuration may vary to meet application requirements.
- A water treatment system must be used with the DriSteem High-pressure system. See the Pre-treatment Installation, Operation, and Maintenance manual for skid mounted options.

Components overview

Your system may include all or some of the following components.

- Pretreatment equipment
  - Dechlorinator
  - Softener
- RO system components
  - Water pump
  - Vapor-logic controller
  - Gauges, valves
  - Control cabinet
  - Storage tank
- Pumping station components
  - High-pressure water pumping components
  - Vapor-logic controller
  - Gauges, valves
  - Control cabinet
- Atomization piping, manifolds, nozzles, valves
- Fan-assist dispersion with nozzles, tubing, valves
- Final evaporation media
- RH transmitters and airflow switches

PUMPING STATION

The pumping station arrives at the job site ready for single-point connection to power and water. Contained within the rugged, painted-steel frame are the high-pressure water pumping components, gauges, valves, and a control cabinet.

FIGURE 7-1: PUMPING STATION

Dechlorinator specifications

DECHLORINATOR

The dechlorinator removes chlorine from the water that degrades the reverse osmosis membranes.

120V, single-phase, 60 Hz, 5A electrical service is required for all dechlorinator models, except for the DC-CB dechlorinator (requires no electrical service).

FIGURE 8-1: DECHLORINATOR

FIGURE 8-2: WALL MOUNT DECHLORINATOR

Table 8-1:
Dechlorinator specifications

Dechlorinator model*	Media volume	Dimensions, diameter x height	Connections, in /out	Drain connection	Backwash flow**	Operating weight	Shipping weight***
DC-CB	Carbon black filter	4" × 20" (102 x 508 mm)	1" Female NPT	—	—	—	—
DC-744	0.5 ft^3 (0.014 m^3)	7" × 44" (178 x 1118 mm)	1" Brass SWT	¾" Male NPT	2.7 gpm (10.2 L/m)	120 lbs (54.4 kg)	100 lbs (45.4 kg)
DC-844	0.75 ft^3 (0.021 m^3)	8" x 44" (203 x 1118 mm)	1" Brass SWT	¾" Male NPT	3.2 gpm (12.1 L/m)	130 lbs (59.0 kg)	115 lbs (52.2 kg)
DC-948	1.00 ft^3 (0.028 m^3)	9" × 48" (229 x 1219 mm)	1" Brass SWT	¾" Male NPT	4.2 gpm (15.9 L/m)	150 lbs (68.0 kg)	130 lbs (59.0 kg)
DC-1054	1.50 ft^3 (0.042 m^3)	10" x 54" (254 x 1372 mm)	1" Brass SWT	¾" Male NPT	5.3 gpm (20.1 L/m)	175 lbs (79.4 kg)	150 lbs (68.0 kg)
DC-1252	2.00 ft^3 (0.050 m^3)	12" x 52" (305 x 1321 mm)	1" Brass SWT	¾" Male NPT	7.5 gpm (28.4 L/m)	210 lbs (95.3 kg)	190 lbs (86.2 kg)
DC-1354	2.50 ft^3 (0.071 m^3)	13" x 54" (330 x 1372 mm)	1" Brass SWT	¾" Male NPT	10.0 gpm (37.9 L/m)	240 lbs (108.9 kg)	225 lbs (102.1 kg)
DC-1465	3.00 ft^3 (0.085 m^3)	14" x 65" (356 x 1651 mm)	1" Brass SWT	1" Male NPT	12.0 gpm (45.4 L/m)	375 lbs (170.1 kg)	335 lbs (152.0 kg)
DC-1665	4.00 ft^3 (0.113 m^3)	16" x 65" (406 x 1651 mm)	1" Brass SWT	1" Male NPT	15.0 gpm (56.8 L/m)	450 lbs (204.1kg)	385 lbs (174.6 kg)
DC-2162	6.00 ft^3 (0.170 m^3)	21" x 62" (533 x 1575 mm)	1.5" Female NPT	1" Male NPT	25.0 gpm (94.6 L/m)	750 lbs (340.2 kg)	645 lbs (292.6 kg)
DC-2472	8.00 ft^3 (0.227 m^3)	24" x 72" (610 x 1829 mm)	1.5" Female NPT	1" Female NPT	33.0 gpm (124.9 L/m)	1200 lbs (544.3 kg)	950 lbs (430.9 kg)
DC-3072	12.50 ft^3 (0.354 m^3)	30" x 72" (762 x 1829 mm)	2" Female NPT	1" Female NPT	50.0 gpm (189.3 L/m)	1850 lbs (839.1 kg)	1535 lbs (696.3 kg)

* DC-CB is wall mounted; all other models are floor mounted.
** Based on 60 to 90 psi (415 to 620 kPa) inlet pressure.
*** DC-2162, DC-2472, and DC–3072 media shipped separate, but included in shipping weight total.

Single water softener specifications

WATER SOFTENER AND BRINE TANK

The water softener and brine tank are floor-mounted and exchange water hardness for sodium.

120V, single-phase, 60 Hz, 5A electrical service is required for all water softener models.

FIGURE 9-1: SINGLE WATER SOFTENER AND BRINE TANK

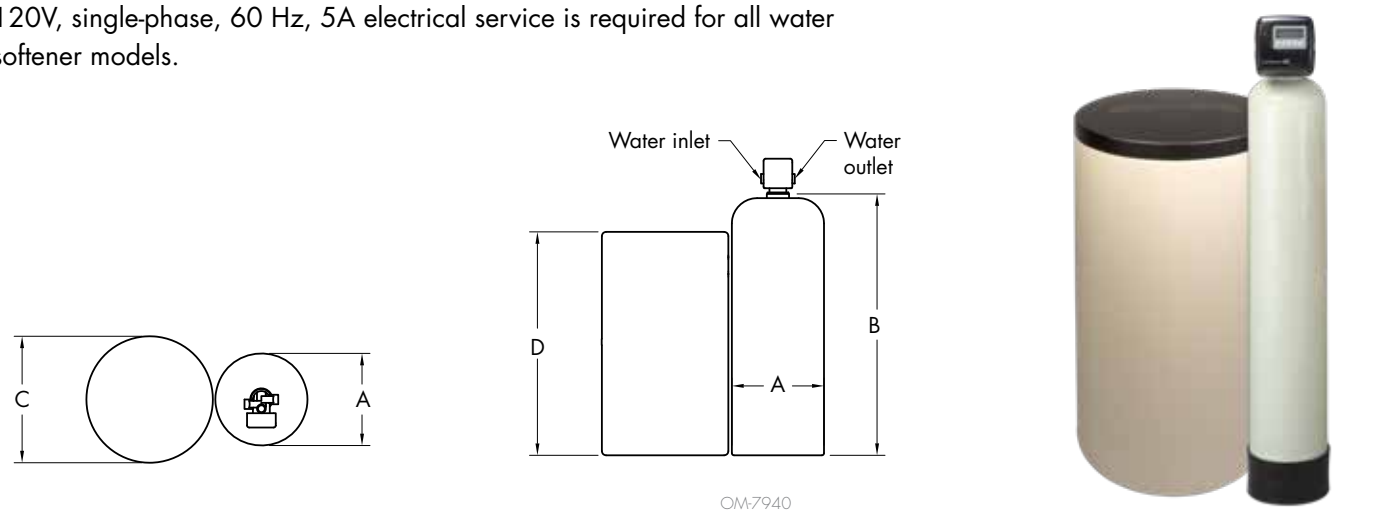


Table 9-1:
Single softener and brine tank specifications

Softener model	Media volume per tank	Resin tank diameter (A) x height (B) (per tank)	Connections, in /out	Drain connection	Brine connection	Backwash flow**	Brine tank diameter (C) x height (D)	Operating weight	Shipping weight***
WS-744	0.5 ft^3 (0.014 m^3)	7" x 44" (178 x 1118 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	1.35 gpm (4.9 L/m)	18" x 33" (457 x 838 mm)	550 lbs (249.5 kg)	110 lbs (49.9 kg)
WS-844	0.75 ft^3 (0.021 m^3)	8" x 44" (203 x 1118 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	1.70 gpm (6.4 L/m)	18" x 40" (457 x 1016 mm)	675 lbs (306.2 kg)	125 lbs (56.7 kg)
WS-948	1.00 ft^3 (0.028 m^3)	9" x 48" (229 x 1219 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	2.2 gpm (8.3 L/m)	18" x 40" (457 x 1016 mm)	700 lbs (317.5 kg)	140 lbs (63.5 kg)
WS-1054	1.50 ft^3 (0.042 m^3)	10" x 54" (254 x 1372 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	2.7 gpm (10.2 L/m)	18" x 40" (457 x 1016 mm)	710 lbs (322.1 kg)	160 lbs (72.6 kg)
WS-1252	2.00 ft^3 (0.050 m^3)	12" x 52" (305 x 1321 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	3.2 gpm (12.1 L/m)	18" x 40" (457 x 1016 mm)	750 lbs (340.2 kg)	200 lbs (90.7 kg)
WS-1354	2.50 ft^3 (0.071 m^3)	13" x 54" (330 x 1372 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	4.2 gpm (15.9 L/m)	18" x 40" (457 x 1016 mm)	800 lbs (362.9 kg)	235 lbs (106.6 kg)
WS-1465	3.00 ft^3 (0.085 m^3)	14" x 65" (356 x 1651 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	5.3 gpm (20.1 L/m)	24" x 41" (610 x 1041 mm)	1350 lbs (612.3 kg)	345 lbs (156.5 kg)
WS-1665	4.00 ft^3 (0.113 m^3)	16" x 65" (406 x 1651 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	6.5 gpm (24.6 L/m)	24" x 41" (610 x 1041 mm)	1400 lbs (635.0 kg)	395 lbs (179.2 kg)
WS-2162	6.00 ft^3 (0.170 m^3)	21" x 62" (533 x 1575 mm)	1.5" Female NPT	1" Male NPT	½" OD tube	12.0 gpm (45.4 L/m)	30" x 48" (762 x 1219 mm)	2300 lbs (1043.3 kg)	655 lbs (297.1 kg)
WS-2472	8.00 ft^3 (0.227 m^3)	24" x 72" (610 x 1829 mm)	1.5" Female NPT	1" Male NPT	½" OD tube	15.0 gpm (56.8 L/m)	39" x 48" (991 x 1219 mm)	4000 lbs (1814.4 kg)	960 lbs (435.4 kg)
WS-3072	12.50 ft^3 (0.354 m^3)	30" x 72" (762 x 1829 mm)	2" Female NPT	1" Male NPT	½" OD tube	25.0 gpm (94.6 L/m)	39" x 48" (991 x 1219 mm)	4700 lbs (2131.9 kg)	1545 lbs (701.0 kg)

** Based on 60 to 90 psi (415 to 620 kPa) inlet pressure.
*** WS-2162, WS-2472, and WS–3072 media shipped separate, but included in shipping weight total.

Duplex water softener specifications

WATER SOFTENER AND BRINE TANK

The water softener and brine tank are floor-mounted and exchange water hardness for sodium.

120V, single-phase, 60 Hz, 5A electrical service is required for all water softener models.

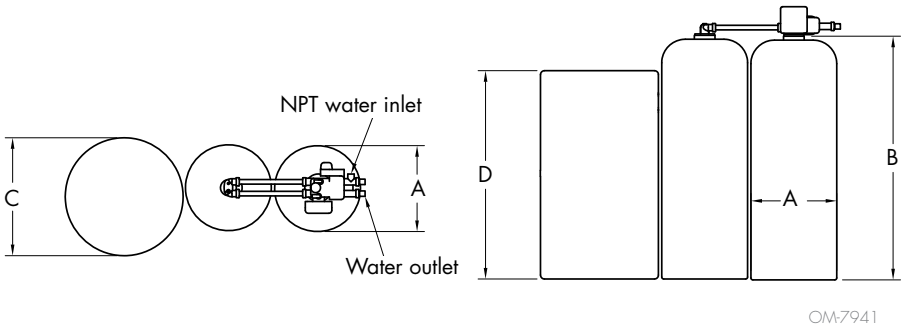


FIGURE 10-1: DUPLEX WATER SOFTENER AND BRINE TANK

Table 10-1:
Duplex softener and brine tank specifications

Softener model*	Media volume per tank	Resin tank diameter (A) x height (B) (per tank)	Connections, in /out	Drain connection	Brine connection	Backwash flow**	Brine tank diameter (C) x height (D)	Operating weight	Shipping weight
WD-744	0.5 ft^3 (0.014 m^3)	7" x 44" (178 x 1118 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	1.35 gpm (4.9 L/m)	18" x 33" (457 x 838 mm)	650 lbs (294.8 kg)	210 lbs (95.3 kg)
WD-844	0.75 ft^3 (0.021 m^3)	8" x 44" (203 x 1118 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	1.7 gpm (6.4 L/m)	18" x 40" (457 x 1016 mm)	800 lbs (362.9 kg)	250 lbs (113.4kg)
WD-948	1.00 ft^3 (0.028 m^3)	9" x 48" (229 x 1219 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	2.2 gpm (8.3 L/m)	18" x 40" (457 x 1016 mm)	850 lbs (385.6 kg)	270 lbs (122.5 kg)
WD-1054	1.50 ft^3 (0.042 m^3)	10" x 54" (254 x 1372 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	2.7 gpm (10.2 L/m)	18" x 40" (457 x 1016 mm)	900 lbs (408.2 kg)	310 lbs (140.6 kg)
WD-1252	2.00 ft^3 (0.050 m^3)	12" x 52" (305 x 1321 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	3.2 gpm (12.1 L/m)	18" x 40" (457 x 1016 mm)	950 lbs (430.9 kg)	390 lbs (176.9 kg)
WD-1354	2.50 ft^3 (0.071 m^3)	13" x 54" (330 x 1372 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	4.2 gpm (15.9 L/m)	18" x 40" (457 x 1016 mm)	1050 lbs (476.3 kg)	460 lbs (208.7 kg)
WD-1465	3.00 ft^3 (0.085 m^3)	14" x 65" (356 x 1651 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	5.3 gpm (20.1 L/m)	24" x 41" (610 x 1041 mm)	1700 lbs (771.1 kg)	680 lbs (308.4 kg)
WD-1665	4.00 ft^3 (0.113 m^3)	16" x 65" (406 x 1651 mm)	1" Brass SWT	¾" Male NPT	3/8" OD tube	6.5 gpm (24.6 L/m)	24" x 41" (610 x 1041 mm)	1850 lbs (839.1 kg)	778 lbs (352.9 kg)

** Based on 60 to 90 psi (415 to 620 kPa) inlet pressure.

Duplex water softener specifications

FIGURE 11-1: DUPLEX WATER SOFTENER AND BRINE TANK

Table 11-1:
Duplex softener and brine tank specifications

Softener model*	Media volume per tank	Resin tank diameter (A) x height (B) (per tank)	Connections, in /out	Drain connection	Brine connection	Backwash flow**	Brine tank diameter (C) x height (D)	Operating weight	Shipping weight***
WD-2162	6.00 ft^3 (0.170 m^3)	21" x 62" (533 x 1575 mm)	1.5" Female NPT	1" Male NPT	½" OD tube	12.0 gpm (45.4 L/m)	30" x 48" (762 x 1219 mm)	3050 lbs (1383.5 kg)	1300 lbs (589.7 kg)
WD-2472	8.00 ft^3 (0.227 m^3)	24" x 72" (610 x 1829 mm)	1.5" Female NPT	1" Male NPT	½" OD tube	15.0 gpm (56.8 L/m)	39" x 48" (991 x 1219 mm)	5100 lbs (2313.3 kg)	1910 lbs (866.4 kg)
WD-3072	12.50 ft^3 (0.354 m^3)	30" x 72" (762 x 1829 mm)	2" Female NPT	1" Male NPT	½" OD tube	25.0 gpm (94.6 L/m)	39" x 48" (991 x 1219 mm)	6500 lbs (2948.4 kg)	3080 lbs (1397.1 kg)

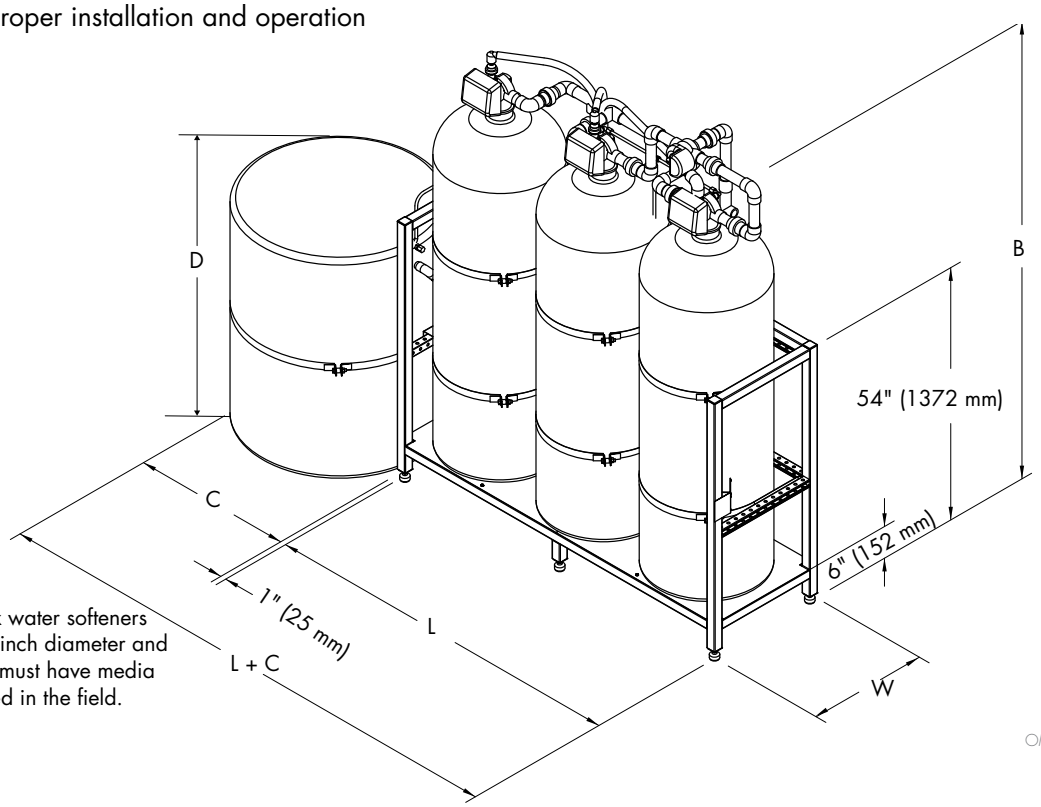
** Based on 60 to 90 psi (415 to 620 kPa) inlet pressure.
*** WD-2162, WD-2472, and WD–3072 media shipped separate, but included in shipping weight total.

Optional pretreatment skid mounting

SELECT PRETREATMENT SKID MOUNTING FOR EASE OF INSTALLATION

Reduce installation cost and time by having pretreatment components come pre-assembled. The DriSteem water softener(s), brine tank, and dechlorinator have a single point water inlet, water outlet, and power for all components.

- Save time and cost on installation
- Maximize clearance
- Ensure proper installation and operation



Note: Duplex water softeners for 21-inch diameter and larger must have media installed in the field.

Table 12-1: Voltages

AC adapter	U.S.
Supply voltage	120 VAC
Supply frequency	60 Hz
Output voltage	12 VAC
Output current	500 mA

Skidded single water softener and dechlorinator specifications

Table 13-1:
Skidded single water softener and dechlorinator

Skid size* (outside dimensions) L x W x H	Tank quantity on skid	Media tank diameter (A) x height (B) (per tank)	Connections, in/out	Backwash flow***	Brine tank diameter (C) x height (D)	Shipping weight
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	7" x 44" (178 x 1118 mm)	1"	1.35 gpm (4.9 L/m)	18" x 33" (457 x 838 mm)	370 lbs (167.8 kg)
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	8" x 44" (203 x 1118 mm)	1"	1.70 gpm (6.4 L/m)	18" x 40" (457 x 1016 mm)	400 lbs (181.4 kg)
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	9" x 48" (229 x 1016 mm)	1"	2.2 gpm (8.3 L/m)	18" x 40" (457 x 1016 mm)	420 lbs (190.5 kg)
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	10" x 54" (254 x 1372 mm)	1"	2.7 gpm (10.2 L/m)	18" x 40" (457 x 1016 mm)	470 lbs (213.2 kg)
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	12" x 52" (305 x 1321 mm)	1"	3.2 gpm (12.1 L/m)	18" x 40" (457 x 1016 mm)	530 lbs (240.4 kg)
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	13" x 54" (330 x 1372 mm)	1"	4.2 gpm (15.9 L/m)	18" x 40" (457 x 1016 mm)	620 lbs (281.2 kg)
66"x 28" x 54" (1676 x 711 x 1372 mm)	3	14" x 65" (356 x 1651 mm)	1"	5.3 gpm (20.1 L/m)	24" x 41" (610 x 1041 mm)	860 lbs (390.1 kg)
66"x 28" x 54" (1676 x 711 x 1372 mm)	3	16" x 65" (406 x 1651 mm)	1"	6.5 gpm (24.6 L/m)	24" x 41" (610 x 1041 mm)	910 lbs (412.8 kg)
100"x 34" x 54" (2540 x 864 x 1372 mm)	3	21" x 62" (533 x 1575 mm)	1.5"	12.0 gpm (45.4 L/m)	30" x 48" (762 x 1219 mm)	1540 lbs (698.5 kg)
66"x 28" x 54" ** (1676 x 711 x 1372 mm)	2	24" x 72" (610 x 1829 mm)	1.5"	15.0 gpm (56.8 L/m)	39" x 48" (991 x 1219 mm)	2090 lbs (948.0 kg)
82"x 28" x 54" ** (2083 x 711 x 1372 mm)	2	30" x 72" (762 x 1829 mm)	2"	25.0 gpm (94.6 L/m)	39" x 48" (991 x 1219 mm)	3280 lbs (1487.8 kg)

* Non-skidded pre-treatment dimensions are 4" (102 mm) less.
** Skid does not include brine tank. The brine tank is floor mounted.
*** Based on 60 to 90 psi (415 to 620 kPa) inlet pressure.

Skidded duplex water softener and dechlorinator specifications

Table 14-1:
Skidded duplex water softener and dechlorinator

Skid size (outside dimensions) L x W x H	Tank quantity on skid	Media tank diameter (A) x height (B) (per tank)	Connections, in/out	Backwash flow***	Brine tank diameter (C) x height (D)	Shipping weight
66"x 28" x 54" (1676 x 711 x 1372 mm)	4	7" x 44" (178 x 1118 mm)	1"	1.35 gpm (4.9 L/m)	18" x 33" (457 x 838 mm)	490 lbs (222.3 kg)
66"x 28" x 54" (1676 x 711 x 1372 mm)	4	8" x 44" (203 x 1118 mm)	1"	1.7 gpm (6.4 L/m)	18" x 40" (457 x 1016 mm)	545 lbs (247.2 kg)
66"x 28" x 54" (1676 x 711 x 1372 mm)	4	9" x 48" (229 x 1016 mm)	1"	2.2 gpm (8.3 L/m)	18" x 40" (457 x 1016 mm)	575 lbs (260.8 kg)
66"x 28" x 54" (1676 x 711 x 1372 mm)	4	10" x 54" (254 x 1372 mm)	1"	2.7 gpm (10.2 L/m)	18" x 40" (457 x 1016 mm)	640 lbs (290.3 kg)
66"x 28" x 54" (1676 x 711 x 1372 mm)	4	12" x 52" (305 x 1321 mm)	1"	3.2 gpm (12.1 L/m)	18" x 40" (457 x 1016 mm)	760 lbs (344.7 kg)
66"x 28" x 54" (1676 x 711 x 1372 mm)	4	13" x 54" (330 x 1372 mm)	1"	4.2 gpm (15.9 L/m)	18" x 40" (457 x 1016 mm)	865 lbs (392.4 kg)
82"x 28" x 54" (2083 x 711 x 1372 mm)	4	14" x 65" (356 x 1651 mm)	1"	5.3 gpm (20.1 L/m)	24" x 41" (610 x 1041 mm)	1215 lbs (551.1 kg)
82"x 28" x 54" (2083 x 711 x 1372 mm)	4	16" x 65" (406 x 1651 mm)	1"	6.5 gpm (24.6 L/m)	24" x 41" (610 x 1041 mm)	1363 lbs (618.2 kg)
82"x 28" x 54" ** (2083 x 711 x 1372 mm)	3	21" x 62" (533 x 1575 mm)	1.5"	12.0 gpm (45.4 L/m)	30" x 48" (762 x 1219 mm)	2145 lbs (972.9 kg)
82"x 28" x 54" ** (2083 x 711 x 1372 mm)	3	24" x 72" (610 x 1829 mm)	1.5"	15.0 gpm (56.8 L/m)	39" x 48" (991 x 1219 mm)	3060 lbs (1387.9 kg)
100"x 34" x 54" ** (2540 x 864 x 1372 mm)	3	30" x 72" (762 x 1829 mm)	2"	25.0 gpm (94.6 L/m)	39" x 48" (991 x 1219 mm)	4855 lbs (2202.2 kg)

* Non-skidded pre-treatment dimensions are 4" (102 mm) less.
** Skid does not include brine tank. The brine tank is floor mounted.
*** Based on 60 to 90 psi (415 to 620 kPa) inlet pressure.

Skidded duplex water softener specifications

Table 15-1:
Skidded duplex water softener

Skid size (outside dimensions) L x W x H	Tank quantity on skid	Media tank diameter (A) x height (B) (per tank)	Connections, in/out	Backwash flow***	Brine tank diameter (C) x height (D)	Shipping weight
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	7" x 44" (178 x 1118 mm)	1"	1.35 gpm (4.9 L/m)	18" x 33" (457 x 838 mm)	370 lbs (167.8 kg)
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	8" x 44" (203 x 1118 mm)	1"	1.7 gpm (6.4 L/m)	18" x 40" (457 x 1016 mm)	410 lbs (185.9 kg)
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	9" x 48" (229 x 1016 mm)	1"	2.2 gpm (8.3 L/m)	18" x 40" (457 x 1016 mm)	430 lbs (195.0 kg)
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	10" x 54" (254 x 1372 mm)	1"	2.7 gpm (10.2 L/m)	18" x 40" (457 x 1016 mm)	470 lbs (213.2 kg)
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	12" x 52" (305 x 1321 mm)	1"	3.2 gpm (12.1 L/m)	18" x 40" (457 x 1016 mm)	550 lbs (249.5 kg)
52"x 26" x 54" (1321 x 660 x 1372 mm)	3	13" x 54" (330 x 1372 mm)	1"	4.2 gpm (15.9 L/m)	18" x 40" (457 x 1016 mm)	620 lbs (281.2 kg)
66"x 28" x 54" (1676 x 711 x 1372 mm)	3	14" x 65" (356 x 1651 mm)	1"	5.3 gpm (20.1 L/m)	24" x 41" (610 x 1041 mm)	860 lbs (390.1 kg)
66"x 28" x 54" (1676 x 711 x 1372 mm)	3	16" x 65" (406 x 1651 mm)	1"	6.5 gpm (24.6 L/m)	24" x 41" (610 x 1041 mm)	958 lbs (434.5 kg)
100"x 34" x 54" (2540 x 864 x 1372 mm)	3	21" x 62" (533 x 1575 mm)	1.5"	12.0 gpm (45.4 L/m)	30" x 48" (762 x 1219 mm)	1540 lbs (698.5 kg)
66"x 28" x 54" ** (1676 x 711 x 1372 mm)	2	24" x 72" (610 x 1829 mm)	1.5"	15.0 gpm (56.8 L/m)	39" x 48" (991 x 1219 mm)	2090 lbs (948.0 kg)
82"x 28" x 54" ** (2083 x 711 x 1372 mm)	2	30" x 72" (762 x 1829 mm)	2"	25.0 gpm (94.6 L/m)	39" x 48" (991 x 1219 mm)	3280 lbs (1487.8 kg)

* Non-skidded pre-treatment dimensions are 4" (102 mm) less.
** Skid does not include brine tank. The brine tank is floor mounted.
*** Based on 60 to 90 psi (415 to 620 kPa) inlet pressure.

Reverse osmosis specifications

REVERSE OSMOSIS STATION

The reverse-osmosis (RO) station is floor-mounted and removes approximately 98% of total dissolved solids.

Table 16-1:
400 series RO station specifications

Model	401*	402*	403**	404**	406**	408**	412**
Permeate flow rate, lbs/hr (kg/hr) or GPD (LPD) 50 °F (10 °C) (see Note 4)	250 (115) 720 (2,760)	500 (230) 1,435 (5,520)	1,000 (455) 2,870 (10,920)	1,750 (795) 5,025 (19,080)	2,500 (1,140) 7,175 (27,360)	3,500 (1,590) 10,045 (38,180)	5,500 (2,500) 15,785 (60,000)
Permeate flow rate, lbs/hr (kg/hr) or GPD (LPD) 77 °F (25 °C) (see Note 4)	620 (280) 1,800 (6,810)	1,040 (470) 3,000 (11,350)	1,800 (821) 5,170 (19,570)	2,250 (1,020) 6,500 (24,600)	3,475 (1,580) 10,000 (37,850)	4,510 (2,050) 13,000 (49,200)	6,600 (3,000) 19,000 (71,910)
System voltage/phase, Amp draw with RO components (see Note 1)	480/3, 2.5 220-240 /1, 10.0 120/1, 19.2	480/3, 2.5 220-240 /1, 10.0 120/1, 19.2	480/3, 6.0 208-240 /1, 15.4	480/3, 6.0 208-240 /1, 15.4	480/3, 6.0 208-240 /1, 15.4	480/3, 6.0 208-240 /1, 15.4	480/3, 6.0 208-240 /1, 15.4
Fuse size with RO components (see Note 2)	480/3, 15 220/1, 15 120/1, 25	480/3, 15 220/1, 15 120/1, 25	480/3, 15 220/1, 20	480/3, 15 220/1, 20	480/3, 15 220/1, 20	480/3, 15 220/1, 20	480/3, 15 220/1, 20
Dimensions (W/D/H), inches (mm)	28/26/63 (711/660/1600)	28/26/63 (711/660/1600)	28/26/63 (711/660/1600)	28/26/63 (711/660/1600)	37/26/63 (940/660/1600)	37/26/63 (940/660/1600)	46½/26/63 (1181/660/1600)
Shipping weight, lbs (kg)	440 (200)	470 (213)	510 (231)	540 (245)	645 (293)	705 (320)	870 (395)
Operating weight, lbs (kg) (see Note 5)	460 (209)	510 (231)	570 (259)	620 (281)	775 (352)	875 (397)	1100 (499)
Supply water connection dia., inches (see Note 3)	¾" hose barb	¾" hose barb	¾" hose barb	¾" hose barb	¾" hose barb	¾" hose barb	¾" hose barb

Reverse osmosis specifications

Table 16-1:
400 series RO station specifications (Continued)

Model	401*	402*	403**	404**	406**	408**	412**
RO system permeate water outlet connection dia., inches	¾" female NPT	¾" female NPT	¾" female NPT	¾" female NPT	¾" female NPT	¾" female NPT	¾" female NPT
Connection to pressurized RO storage tank dia., inches	1	1	1	1	1	1	1
Common drain outlet connection dia., inches	1" hose barb	1" hose barb	1" hose barb	1" hose barb	1" hose barb	1" hose barb	1" hose barb
5-micron RO prefilter diameter x height, inches (mm)	2.5 × 20 (64 x 508)	2.5 × 20 (64 x 508)	2.5 × 20 (64 x 508)	2.5 × 20 (64 x 508)	4 × 20 (102 x 508)	4 × 20 (102 x 508)	4 × 20 (102 x 508)
RO pump motor power, hp (kW)	1 (0.75)	1 (0.75)	3 (2.2)	3 (2.2)	3 (2.2)	3 (2.2)	3 (2.2)
Qty. of RO membranes	1	2	3	4	6	8	12
RO membrane diameter x height, inches (mm)	4 × 40 (102 x 1016)	4 × 40 (102 x 1016)	4 × 40 (102 x 1016)	4 × 40 (102 x 1016)	4 × 40 (102 x 1016)	4 × 40 (102 x 1016)	4 × 40 (102 x 1016)

Notes:
1. 220V/1-phase systems can also operate on 208V/1-phase and 240V/1-phase power.
2. Wiring and branch circuit protection (Type RK1, J, or T fusing) to be provided by installer in accordance with NEC requirements.
3. 40 psi (280 kPa) minimum supply water pressure.
4. Extra low energy membranes.
5. Without tank weight
6. The standard enclosure on the RO-400 series is NEMA 1.

* RO-401 and 402 220V/1-phase systems can also operate on 240V/1-phase power.

** RO-403 thru RO-412 220V/1-phase systems can also operate on 208V/1-phase and 240V-1phase power.

System operation temperature

DriSteem rates reverse-osmosis systems at 50°F (10°C).
This is lower than the industry standard of 77°F (25°C).

To find the membrane permeate rate at a different temperature, follow these steps:

1. Find the temperature correction factor (TCF) from the below table.
2. Divide the rated permeate flow from Table 16-1 on page 16 by the temperature correction factor.

The result is the permeate flow at the desired temperature.

Table 18-1:
Optional permeate rate

Feed water temperature		TCF for thin film
°C	°F	
1	33.8	3.64
2	35.6	3.23
3	37.4	3.03
4	39.2	2.78
5	41.0	2.58
6	42.8	2.38
7	44.6	2.22
8	46.4	2.11
9	48.2	2.00
10	**50.0**	**1.89**
11	51.8	1.78
12	53.6	1.68
13	55.4	1.61
14	57.2	1.54
15	59.0	1.47
16	60.8	1.39
17	62.6	1.34

Feed water temperature		TCF for thin film
°C	°F	
18	64.4	1.29
19	66.2	1.24
20	68.0	1.19
21	69.8	1.15
22	71.6	1.11
23	73.4	1.08
24	75.2	1.04
25	77.0	1.00
26	78.8	0.97
27	80.6	0.94
28	82.4	0.91
29	84.2	0.88
30	86.0	0.85
31	87.8	0.83
32	89.6	0.80
33	91.4	0.77
34	93.2	0.75

Feed water temperature		TCF for thin film
°C	°F	
35	95.0	0.73
36	96.8	0.71
37	98.4	0.69
38	100.4	0.67
39	102.2	0.65
40	104.0	0.63
41	105.8	0.61
42	107.6	0.60
43	109.4	0.58
44	111.2	0.56
45	113.0	0.54
46	114.8	0.53
47	116.6	0.51
48	118.4	0.49
49	120.2	0.47
50	122.0	0.46

Components overview

PRESSURIZED RO HOLDING TANK

The pressurized RO holding tank holds RO water in reserve to be available for high-pressure pumping when there is a demand.

FIGURE 19-1: PRESSURIZED RO HOLDING TANK

Table 19-1:
Pressurized RO holding tank specifications

Model	RO station model	Dimensions		Weight		Connections	
		Diameter	Height	Empty	Full		
401 402 403 404	80 gal (303 L)	24" (610 mm)	55.5" (1410 mm)	58 lbs (26 kg)	295 lbs (134 kg)	1¼" male NPT	FRP with rubber bladder
401-406	120 gal (454 L)	24" (610 mm)	66 (1676 mm)	335 lbs (152 kg)	1235 lbs (560 kg)	2" female NPT	Painted steel with rubber bladder
401-408	158 gal (598 L)	30" (762 mm)	58 (1473 mm)	435 lbs (197 kg)	1620 lbs (735 kg)	2" female NPT	
401-412	211 gal (799 L)	30" (762 mm)	76 (1930 mm)	515 lbs (234 kg)	2100 lbs (953 kg)	2" female NPT	

Notes:
- There is a possibility that the tank becomes much heavier if the air balloon is emptied or if precharge is different than 28 psi (195 kPa).
- Listed water volumes and weights are at an operating pressure of 30 to 50 psi (210 to 345 kPa) with a precharge of 28 psi (195 kPa).

Components overview

ATMOSPHERIC RO HOLDING TANK

The atmospheric RO hold tank holds a large amount of RO water for large jobs or when additional runtime needs to be guaranteed. System includes a recirculation/booster pump and an UV sterilization system to ensure water purity and supply 30-50 psi (207-345 kPa) water to downstream equipment.

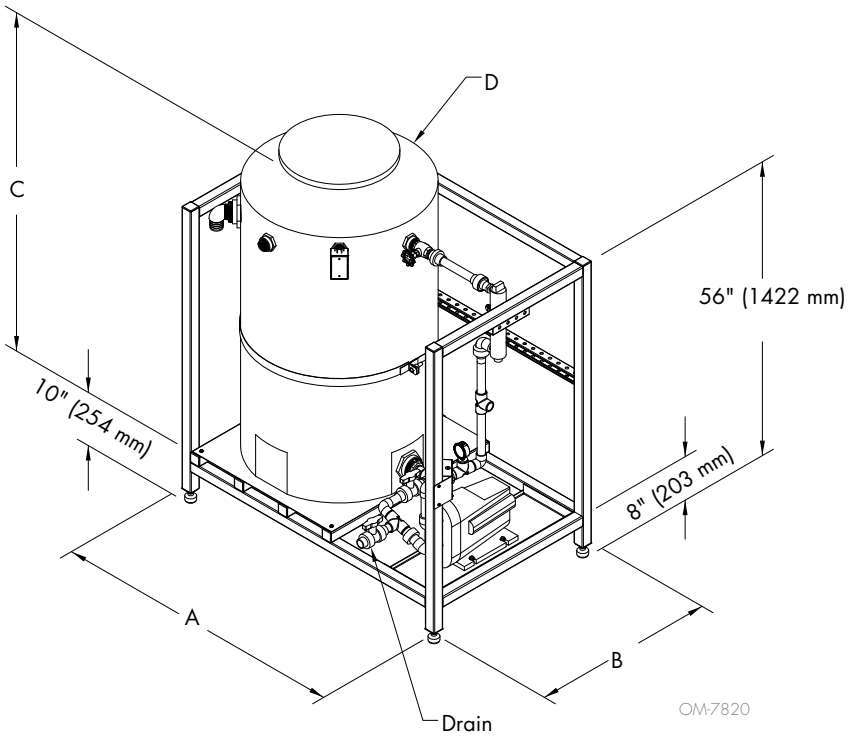


FIGURE 20-1: ATMOSPHERIC RO HOLDING TANK

Table 20-1:
Atmospheric RO holding tank specifications

RO station model	Description	A	B	C	D	Weight		Connections
						Shipping	Operating	
AT-165	165 gal (567 L)	56" (1422 mm)	35" (889 mm)	65" (1651 mm)	31" (787 mm)	320 lbs (145.15 kg)	1695 lbs (768.84 kg)	1" (25 mm) PVC, In: Female NPT Out: Socket
AT-300	300 gal (1135 L)	60.5" (1536.7 mm)	39.5" (1003 mm)	88" (2235.2 mm)	35.5" (901.7 mm)	360 lbs (163.3 kg)	2860 lbs (1297.27 kg)	1" (25 mm) PVC In: Female NPT Out: Socket

Table 20-2:
Pumps and disinfection

	Make	Model	Voltage	Phase	Frequency	Running Amps	Noise level dB(A)
UV system	Viqua	VT4	120V	single	60 Hz	0.28A	-
Forwarding pump	Grundfos	Scala2	120V	single	60 Hz	2.8A	<47

Components overview

Table 21-1:
Adiatec high-pressure pump station specifications

Model	250	500	1000	1750	2500	3500	5500
System capacity, lbs/hr (kg/h)	250 (113)	500 (227)	1000 (454)	1750 (794)	2500 (1134)	3500 (1588)	5500 (2495)
System voltage/phase, Amp draw	240/1, 5.2 480/3, 1.6 600/3, 1.3	240/1, 7.3 480/3, 2.2 600/3, 1.8	240/1, 13.8 480/3, 4.0 600/3, 3.2	480/3, 6.6 600/3, 5.3	480/3, 6.6 600/3, 5.3	480/3, 9.2 600/3, 7.3	480/3, 12.6 600/3, 10.1
Fuse size *(see Note 1)*	240/1, 25 480/3, 16 600/3, 6	240/1, 35 480/3, 10 600/3, 6	240/1, 50 480/3, 15 600/3, 10	480/3, 30 600/3, 15	480/3, 30 600/3, 15	480/3, 35 600/3, 20	480/3, 40 600/3, 20
Dimensions (W/D/H), inches (mm)	24/24/60 (610/610/1524)	24/24/60 (610/610/1524)	24/24/60 (610/610/1524)	24/24/60 (610/610/1524)	24/30/60 (610/762/1524)	24/30/60 (610/762/1524)	24/30/60 (610/762/1524)
Dimensions (W/D/H) with redundant high-pressure pump option, inches (mm)	24/30/76 (610/762/1930)	24/30/76 (610/762/1930)	24/30/76 (610/762/1930)	24/30/76 (610/762/1930)	24/30/76 (610/762/1930)	24/30/76 (610/762/1930)	24/30/76 (610/762/1930)
Weight, lbs (kg)	275 (125)	300 (136)	325 (147)	325 (147)	350 (159)	400 (181)	450 (204)
Weight with redundant high-pressure pump option, lbs (kg)	375 (170)	400 (181)	475 (216)	475 (216)	500 (227)	625 (284)	700 (318)
Supply water connection diameter, inches *(see Note 2)*	1/2	1/2	1/2	1/2	3/4	3/4	3/4
High-pressure water connection diameter, inches *(see Note 2)*	1/2	1/2	1/2	1/2	1/2	1/2	1/2
5-micron prefilter diameter x height, inches (mm)	2.5 x 40 (64 x 1016)	2.5 x 40 (64 x 1016)	2.5 x 40 (64 x 1016)	2.5 x 40 (64 x 1016)	2.5 x 40 (64 x 1016)	2.5 x 40 (64 x 1016)	2.5 x 40 (64 x 1016)
High-pressure pump flow rate, gpm (L/m)	0.5 (1.89)	1.0 (3.78)	2.0 (7.57)	3.5 (13.2)	5 (18.9)	7 (26.5)	11 (41.6)
High-pressure pump motor power, hp (kW)	1 (0.75)	1.5 (1.1)	3 (2.2)	5 (3.7)	5 (3.7)	7.5 (5.5)	10 (7.5)
High-pressure pump motor rpm	1000–1500	1000–2550	1000–2250	1000–2550	1000–2250	1000–2550	700–2450

Notes:
1. Wiring and branch circuit protection (Type RK1, J, or T fusing) to be provided by installer in accordance with NEC requirements.
2. High-pressure compression fittings.
3. Unit ships with 36" x 1/2" high-pressure flexible hose and a 1/2" union for easy connection to dispersion piping.
4. 25 psi (170 kPa) supply water pressure at 125% of maximum flow rate, 60 psi (415 kPa) maximum
5. The standard enclosure on the RO-400 series is NEMA 1.

Components overview

ATOMIZING NOZZLES

Atomizing nozzles (Figure 22-1) operate in ducts, air handlers, and open space.

FINAL EVAPORATION MEDIA

The final evaporation media (Figure 22-2), installed in the AHU downstream from the atomizing nozzles, removes unabsorbed water droplets from the air.

CONTROL TRANSMITTERS AND SWITCHES

A system of temperature, humidity, and airflow transmitters/switches installed upstream and downstream from the atomizing nozzles and/or in affected space(s) allow the system to quickly respond to demand while avoiding over-saturation.

FIGURE 22-1: ATOMIZING NOZZLE

FIGURE 22-2: FINAL EVAPORATION MEDIA

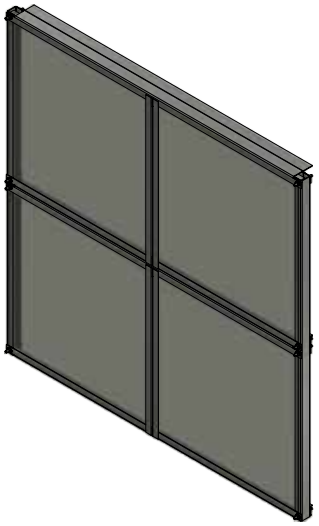
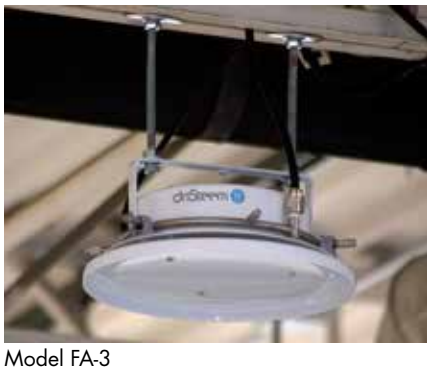


Table 22-1:
Atomizing nozzle specifications

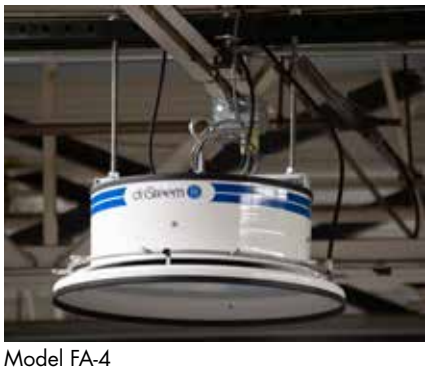
Model	Capacity, lbs/hr (kg/h) at 1000 ±250 psi (6.9 ±1.72 MPa)
270010-006	6.0 (2.7)
270010-010	10. (4.5)
270010-015	15.0 (6.8)

FIGURE 22-1: FAN-ASSISTED DISPERSION

Model FA-2



Model FA-3



Model FA-4

Components and tools needed

System configuration may not include all components.

TYPICAL TOOLS/SUPPLIES NEEDED

- PTFE-tape
- Adjustable wrench for water fittings
- Screwdrivers for power connections and cabinet access
- Precision screwdrivers for signal connections
- Air compressor (for precharging RO tank) and female schrader valve connection
- Stainless-steel tube bender (recommend Swagelok® Model MS-HTB-8 for 1/2" stainless-steel tubing)
- Thread sealant (recommend Loctite 545 or 565)
- Teflon-tape
- Three-wire shielded cable
- Hex key wrench for pump bleed fittings
- Two adjustable crescent wrenches for compression fittings
- Tubing cutter (for stainless steel)
- Dial type tire pressure gauge
- Feeler gauge
- Torque wrench (25 lb/in setpoint)
- ¼" socket torque wrench
- Depth tool for tube fittings

⚠ WARNING

All DriSteem RO-400 series reverse-osmosis systems and high-pressure pump stations must be bolted to the floor or permanently attached to the building structure. Use the shipping brackets that come with the system to anchor the system to the floor or use the attachment points on the underside of the top frame rail on the back of the system to secure the system to the building structure. Ensure adequate anchors and/retaining means are used. Failure to install according to instructions can result in serious injury or death.

Components and tools needed

TYPICAL FIELD-SUPPLIED COMPONENTS

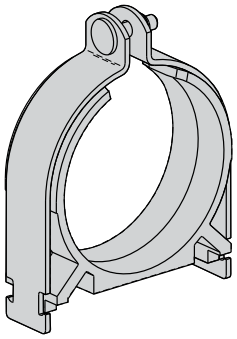
- Gauges, fittings, and interconnecting piping as shown in Figure 40-1 or 41-1 (depending on your model).
- Pipe supports/hangers (if needed)
- Reducing fittings for water connections (if needed)
- Mounting brackets for dispersion
- Drain line and clamp for flush valve
- Interconnecting piping and fittings
- Water softener salt (pulverized type recommended)
- Plastic tee for duplex-water-softener-to-brine-tank connection
- Funnel for pouring resin beads into duplex water softener tanks for 21" (533 mm) and larger
- Code approved electrical disconnect.

System configuration may not include all components.

TYPICAL COMPONENTS SUPPLIED BY OR AVAILABLE FROM DRISTEEM

- Duplex water softener
- Brine tank
- Dechlorinator
- Reverse osmosis system
- Pumping station
- Stainless-steel tubing (or field supplied)
- Compression-type unions (or field supplied)
- Pipe supports/hangers (see Figure 24-1)
- Distribution manifold(s)
- Atomizing nozzles
- Flexible nozzle extenders (open space applications only)
- High-pressure shut-off valve(s), 1 per zone (or field supplied)
- Controls (transmitter(s), airflow switch) (or field supplied)
- Fan-assisted dispersion
- Nylon high-pressure tubing
- Nylon tubing ready quick connect fittings
- Torque bit adapter for nozzle connection to 1/4" drive (torque wrench not provided)

FIGURE 24-1: PIPE CLAMP



Contact DriSteem for pipe clamp parts.

Placing components

When placing components, consider the following:

- Easy access for maintenance.
- Minimum ambient temperature is 40 °F (4 °C). Maximum ambient temperature is 104 °F (40 °C).
- Clearance recommendations (see Figure 25-1).
- Electrical connections: Power, control, and safety circuits
- Plumbing connections: Supply water and drain piping (see the "System piping" section of this manual, beginning on Page 44.
- Avoid locations above critical equipment or processes.
- Avoid locations close to sources of electromagnetic emissions, such as power distribution transformers and high horsepower motors controlled by variable frequency drives.

Important:

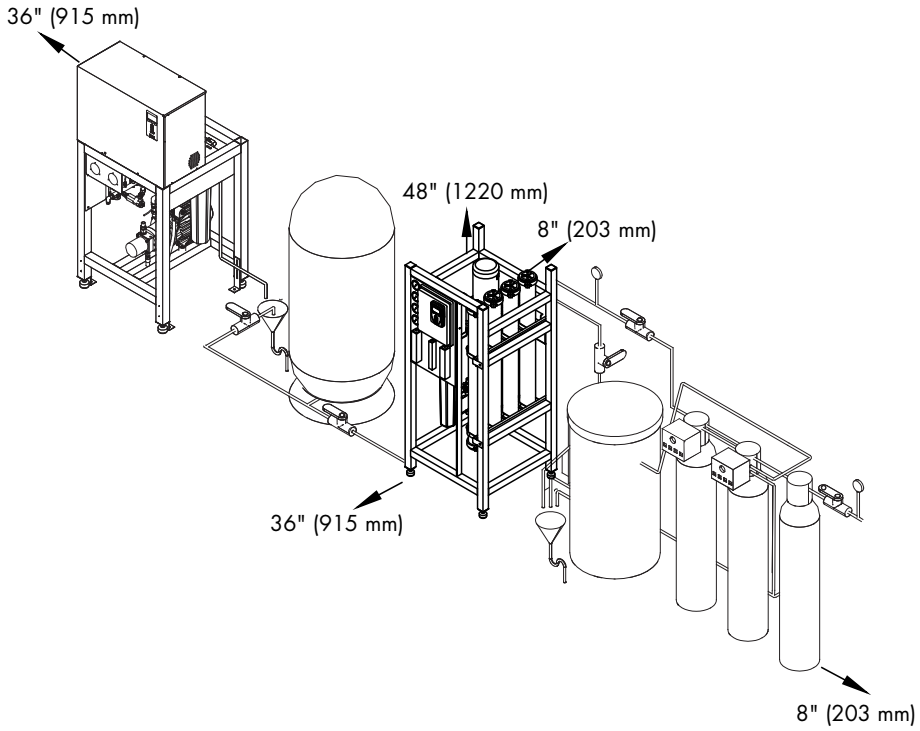
Installation must comply with governing codes.

Consult DriSteem if installing at altitudes of 6500' (2000 m) or greater.

DECHLORINATOR, SOFTENER, AND PUMPING STATION

- Select a location near a water supply, power supply, and drain.
- Minimize distance between pumping station and dispersion assemblies.
- Note clearances recommendations in Figure 25-1.

FIGURE 25-1: MINIMUM RECOMMENDED CLEARANCES



Placing components

Table 26-1:
High pressure specifications

Equipment component	Minimum obstruction-free clearance allowance inches (mm)						Maximum distance from drain (if applicable) inches (mm)
	Front face (upstream)	Back face (downstream)	Left side	Right side	Top	Bottom	
Softener(s)	15 (381)	—	—	—	15 (381)	—	—
Dechlorinator	15 (381)	—	—	—	15 (381)	—	—
Brine tank	15 (381)	—	24 (610)	24 (610)	15 (381)	—	—
Softener/ dechlor/brine skid (only applies to skidded water treatment systems)	20 (508)	—	—	—	15 (381)	—	—
RO generation station	36 (914)	—	—	—	48 (1219)	—	—
RO storage tank	18 (457) from front of plumbing	—	—	—	—	—	—
Pump station	36 (914)	36 (914)	8 (203)	8 (203)	24 (610)	—	240 (6096)
AHU dispersion manifold/nozzles	12 (305)*	Minimum: 24 (610) Maximum: 96 (2438) Recommended: 48 (1219)	—	—	6 (152)	6 (152)	—
Sensors	24 (610)	—	—	—	—	—	—
Solenoid valves	24 (610)	—	—	—	—	—	—

* 24 (610) if airspeed is below 400 fpm.

Placing components

PUMPING STATION

- Select a location where electrical components will remain dry and the temperature remains above freezing. Minimum ambient temperature is 40 °F (4 °C). Maximum ambient temperature is 104 °F (40 °C).

DISPERSION PIPING AND MANIFOLDS

Vibration-dampening mounting hardware (field supplied) is recommended (see Figure 24-1).

For area-type applications:

- Dispersion tube manifolds need to be rigidly supported so motion does not occur when valves open and close.
- Do not locate over electrical equipment.
- Try to avoid obstructions such as piping and/or lighting, if possible. Use the flexible nozzle extenders to direct spray to its optimal direction.
- Consider any bends that might be required.
- When mounting staging valves, ensure that they are properly supported.
- A drain is required at the end of the distribution piping.
- Do not bend extensions beyond a bend radius of 1.38" (35 mm).
- Add plug(s) where items are critical to be dry or extensions don't direct mist far enough away.
- Orient manifold at a slight upward angle in relation to the ceiling/floor.
- Rigidly mount area type zone valves beyond the pipe support mounting.
- Do not remove the pressure accumulator and flexible hydraulic hose on the area type zone inlets as this will prevent potential water hammer.

For AHU applications:

- Many factors affect evaporation efficiency, especially temperature and RH rise. Ensure that system specifications match design.
- Ensure that the entire dispersion section of air handler is constructed of or lined with stainless steel to prevent corrosion. Pitch this dispersion section in the same direction as the airflow to a drain at or after the final evaporation media.
- Air velocities in the area should be between 250 fpm and 750 fpm (1.3 m/s and 3.8 m/s).

For fan-assist applications (additional to area-type above):

- Maintain 18 - 24 in (457 - 610 mm) above unit for air movement from ceiling.
- Consider the throw and drop distance shown on page 30.
- Place fans according to diagrams on page 31 and 30. Do not overlap spray as it will conglomerate and fall to the ground.
- Before placement on the fan-assist device, flush the nozzle ring to remove any construction debris. This shall be done without nozzles installed. Construction debris can clog nozzles or can affect the spray pattern.
- Ensure the surface these are mounted to support the weight of the system.
- Position the fan as shown on page 31 and 30 avoiding obstacles such as ductwork, beams, equipment, conflicting airflow such as large doors, cold air inlets, or fans. Do not position the nozzles at cold parts in the building as condensation can occur (i.e. windows, cold pipes or equipment).
- Place the fan-assist unit in a way that it can be serviced in the future.

Placing components

SENSORS

- Select locations where there is minimal mechanical or environmental risk of damage to the sensors.
- For AHU applications:
  - Position RH sensor in the return air section where the air conditions are most similar to the space conditions being controlled.
  - Position the air flow switch at least 3' (1 m) upstream of the dispersion manifolds, in the same airstream.
- For area-type applications:
  - Position the RH sensor near where the conditions must be controlled.
  - Position the RH sensor away from where the system is likely to influence them.
  - Position the sensor away from any other conflicting source of humidity or temperature.

SOLENOID VALVES

- For AHU applications, install the solenoid valves close to the dispersion manifolds.
- Position the valves in places where they are sheltered from damage.
- Dispersion control valves are pump station mounted for single-stage, single-zone applications.
- For fan-assist dispersion, the inlet and depressurization valve are an assembly mounted near the pump station.

HIGH LIMIT SENSORS

- RH high limit sensors will reduce over spray and water waste.
- Locate the RH high limit downstream of the final evaporation media panel. Recommended max RH set point is 70% RH. Set RH high limit set point 5% above calculated supply RH %.

Placing components

ZONE CONTROL CABINETS

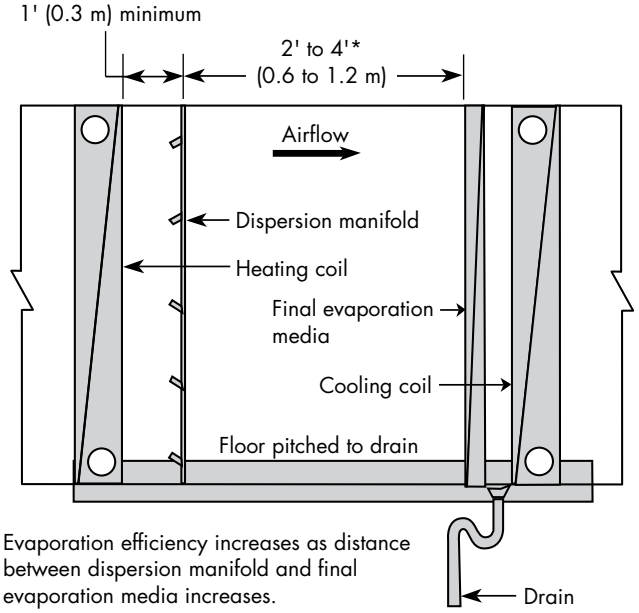
A ground wire is necessary from the machine ground lug in the control cabinet to earth ground. The bonding machine ground wire should be no less than 14-gauge AWG (1.63 mm dia.) or sized per National Electrical Code (NEC) or IEC 60364 requirements.

ATOMIZING NOZZLES

For area-type applications:

- Select a location below the piping manifolds with accessibility for a lift truck or ladder to allow for replacement or cleaning of the nozzles.
- Support the dispersion piping every 5' (1.5 m).
- Allow 2" (51 mm) clearance from nozzle and pipe support.
- Select a location where electrical components will remain dry.
- Position the piping manifold with the threaded connections pointing slightly up, approximately 15° angle to the horizontal.
- Direct the nozzles so that they have at least 10" (254 mm) clearance above to prevent condensation on the ceiling.

FIGURE 29-1: FINAL EVAPORATION MEDIA



For fan-assisted dispersion applications:

- Place 24" (610 mm) from ceiling.
- Select location where nozzles have 10' (3 m) horizontal clearance.
- Plug saddles where mist will not have clearance.

For AHU applications:

- Select a location for the nozzles that allow space for an operator to check or replace them. See Figure 29-1.
- Allow for piping support every 8' (2.4 m).
- Select a location where electrical components will remain dry.
- Orient each nozzle manifold stick so that the nozzles are directed back into the airflow at a 30-45 degree angle to the horizontal. The top half of the manifolds should point downward and the bottom half up.

FINAL EVAPORATION MEDIA (AHU APPLICATIONS ONLY):

- Install final evaporation media in stainless steel duct section. See Figure 29-1.
- Locate as far as possible downstream of the dispersion manifolds.
- Assemble the final evaporation media panel as shown in the installation drawing that shipped with your High-Pressure System.
- Slide the final evaporation media panel up into the top rail and allow to drop down into the bottom rail. Slide in other panels to cover entire cross section of the AHU/duct.

Important: Pitch the AHU/duct floor towards the final evaporation media and locate drain after the assembly.

Placing components

FIGURE 30-1: PLACEMENT OF FAN-ASSISTED (FA-2) FOR WALL OR CEILING ARRANGEMENT

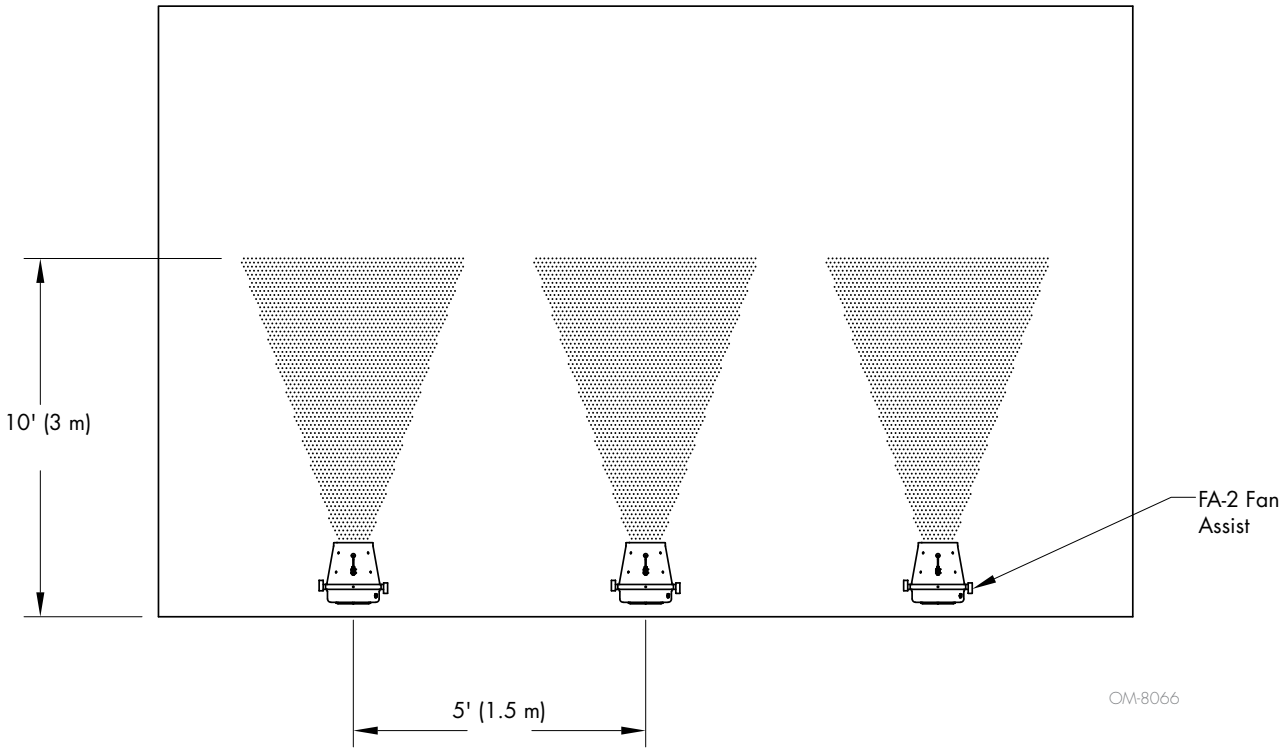
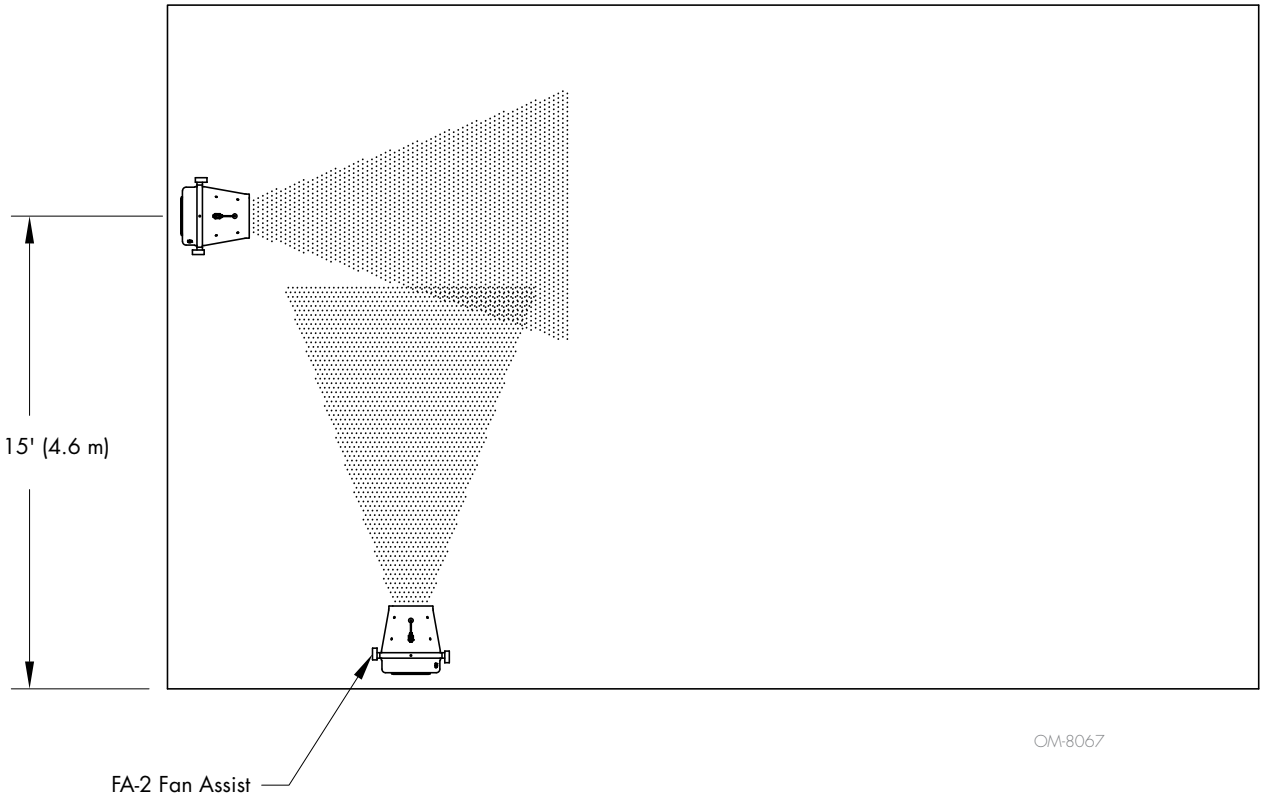
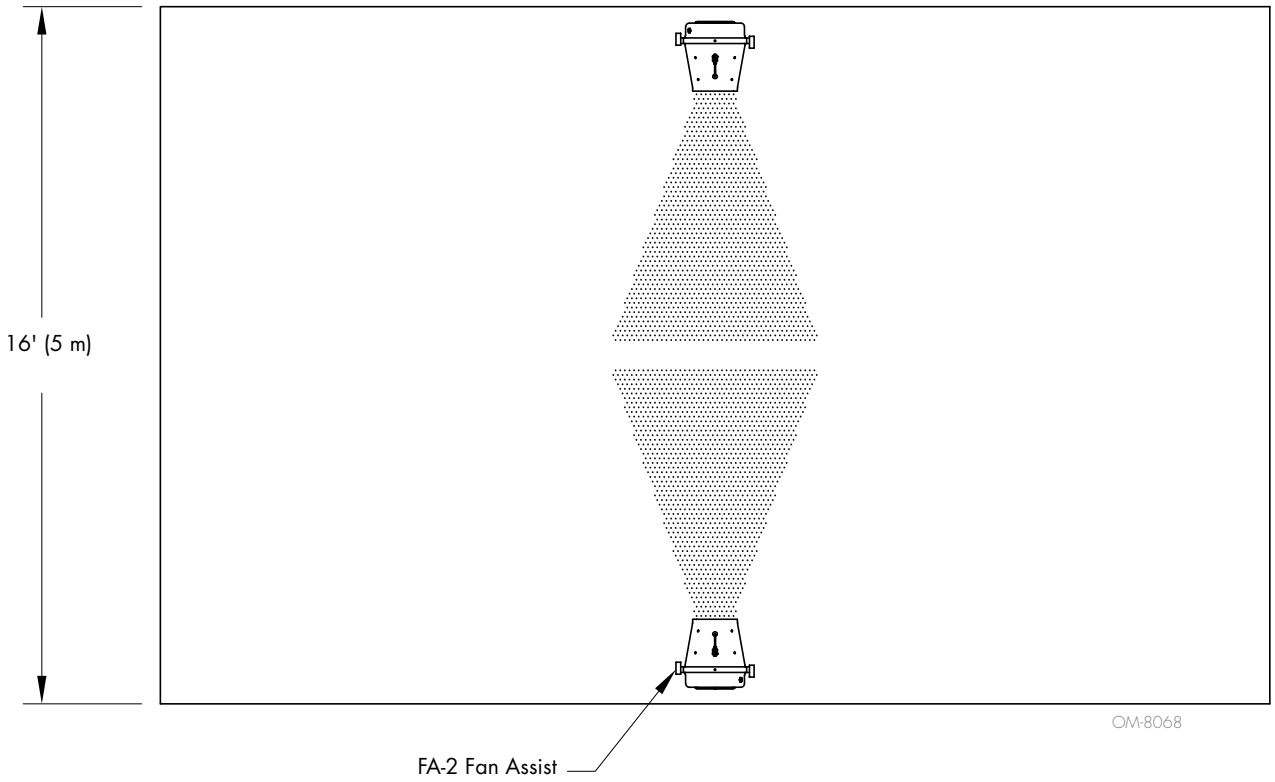


FIGURE 30-2: PLACEMENT OF FAN-ASSISTED (FA-2) FOR WALL OR CEILING ARRANGEMENT



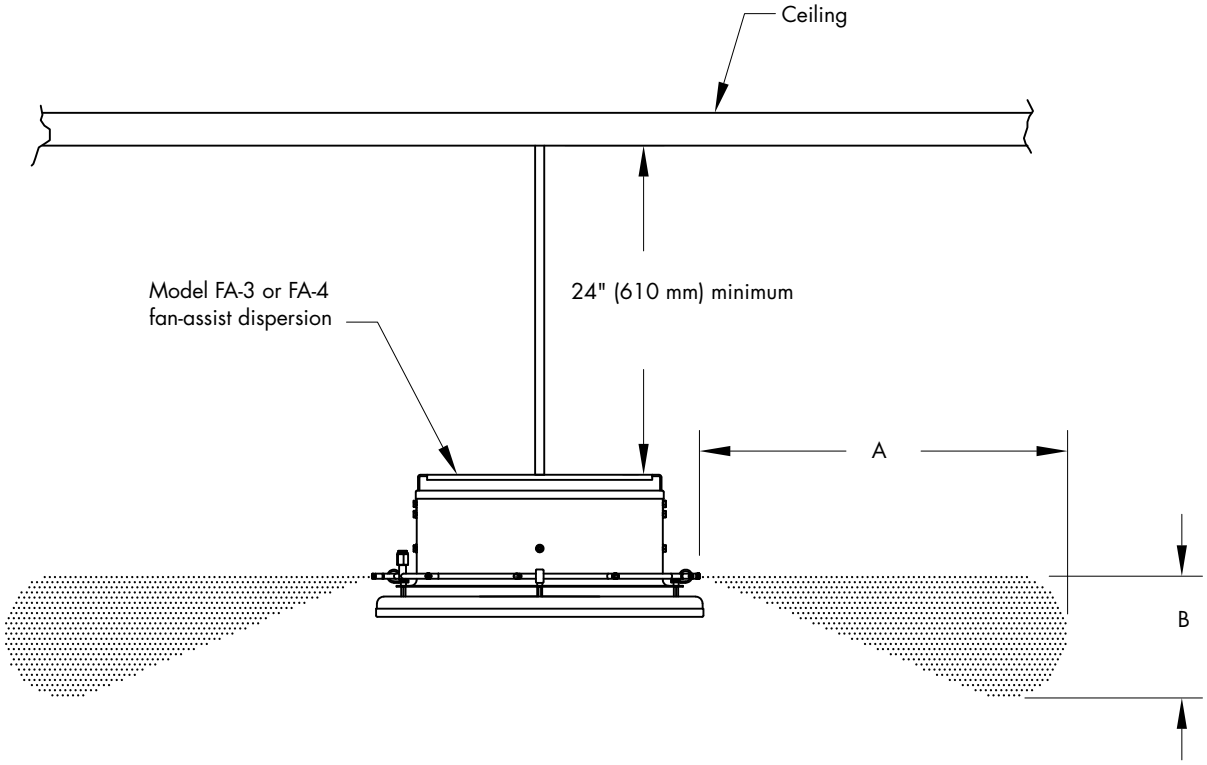
Placing components

FIGURE 31-1: PLACEMENT OF FAN-ASSISTED (FA-2) FOR WALL OR CEILING ARRANGEMENT



Placing components

FIGURE 32-1: PLACEMENT OF FAN-ASSISTED (FA-3 AND FA-4) FOR WALL OR CEILING ARRANGEMENT

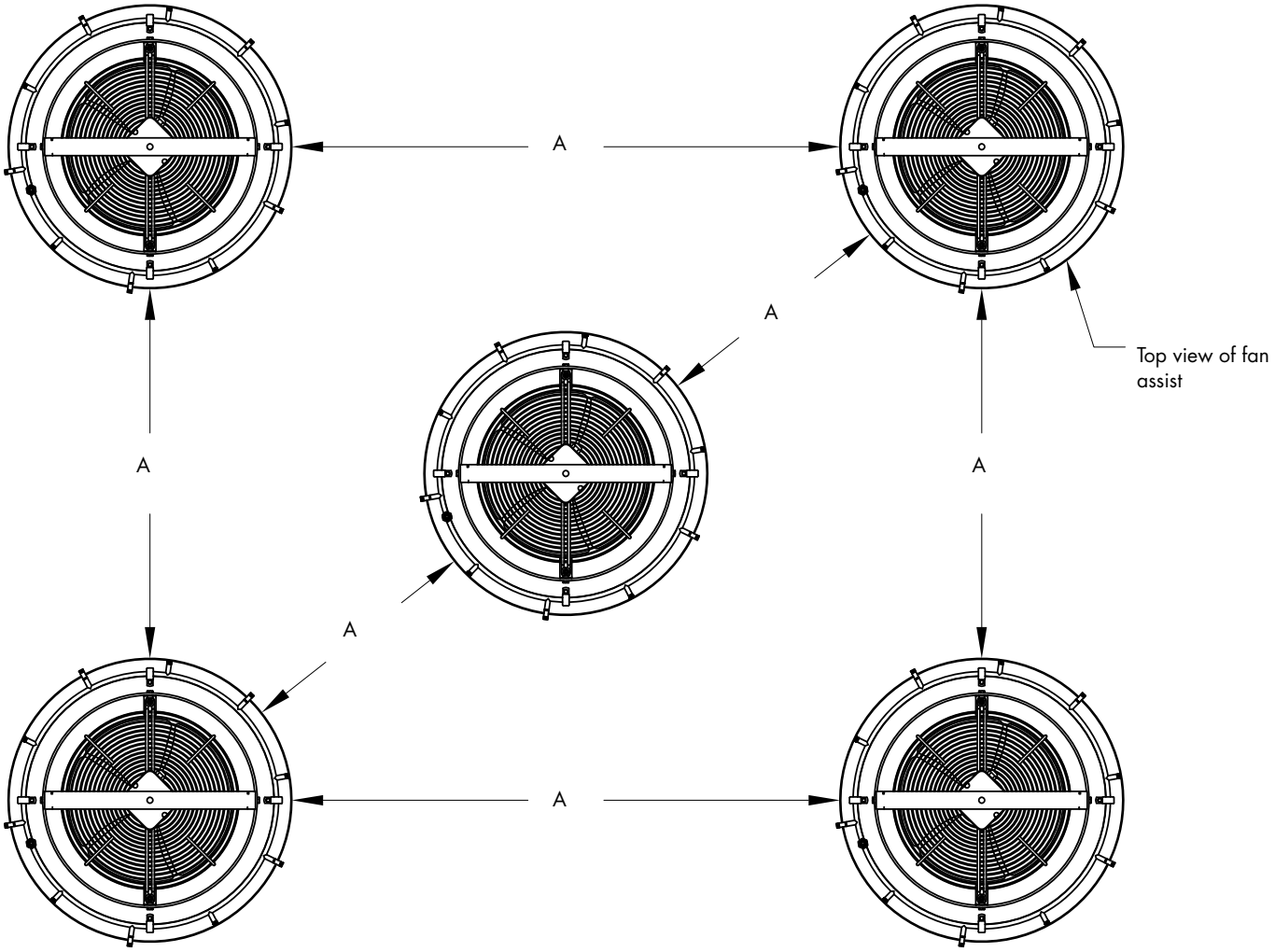


		NOZZLE CAPACITY (PPH)		
		6	10	15
DIMENSION	A	10’	10’	10’
	B	6’	7’	8’

OM-8074

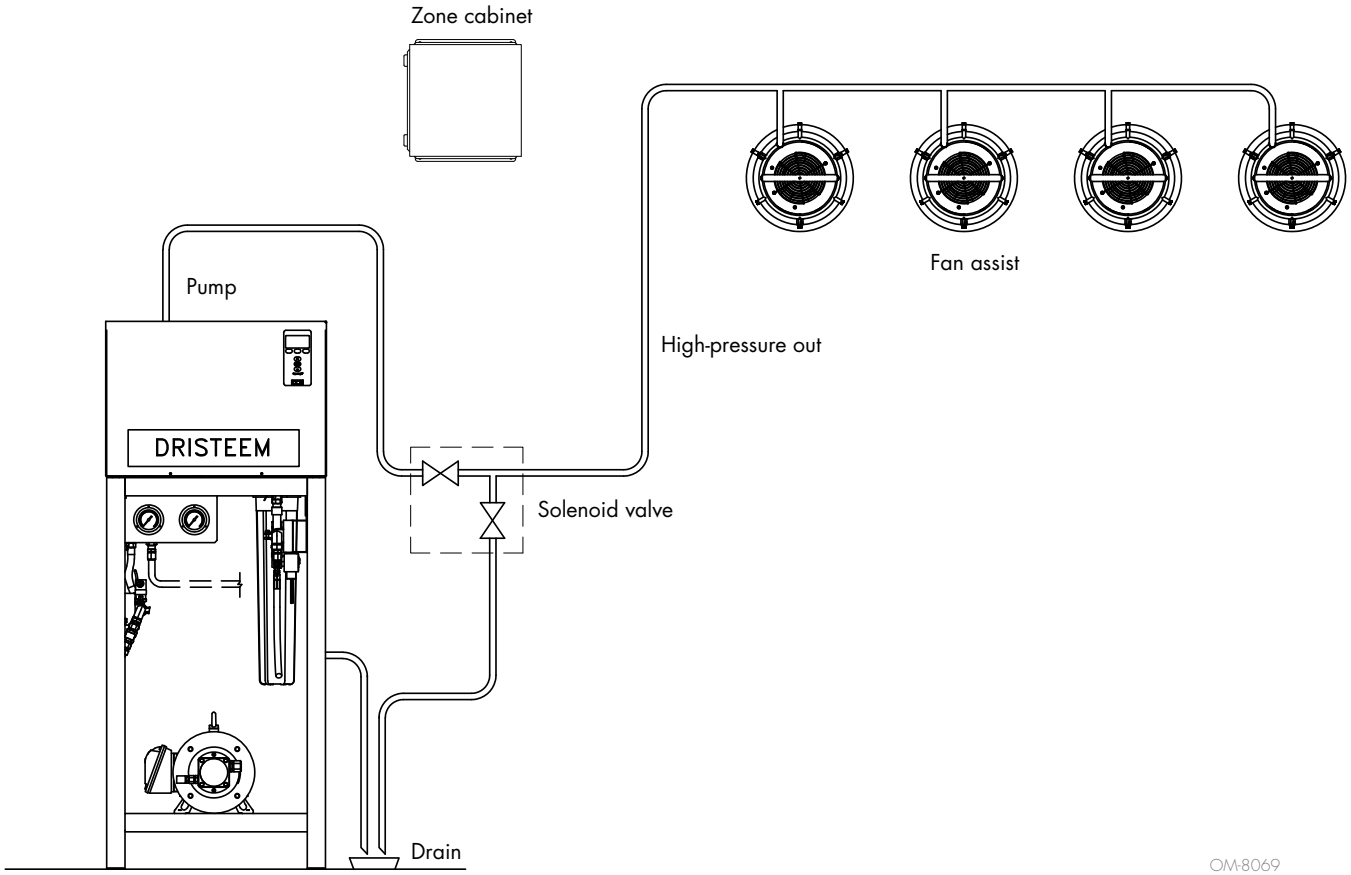
Placing components

FIGURE 33-1: PLACEMENT OF FAN-ASSISTED (FA-3 AND FA-4) FOR CEILING ARRANGEMENT



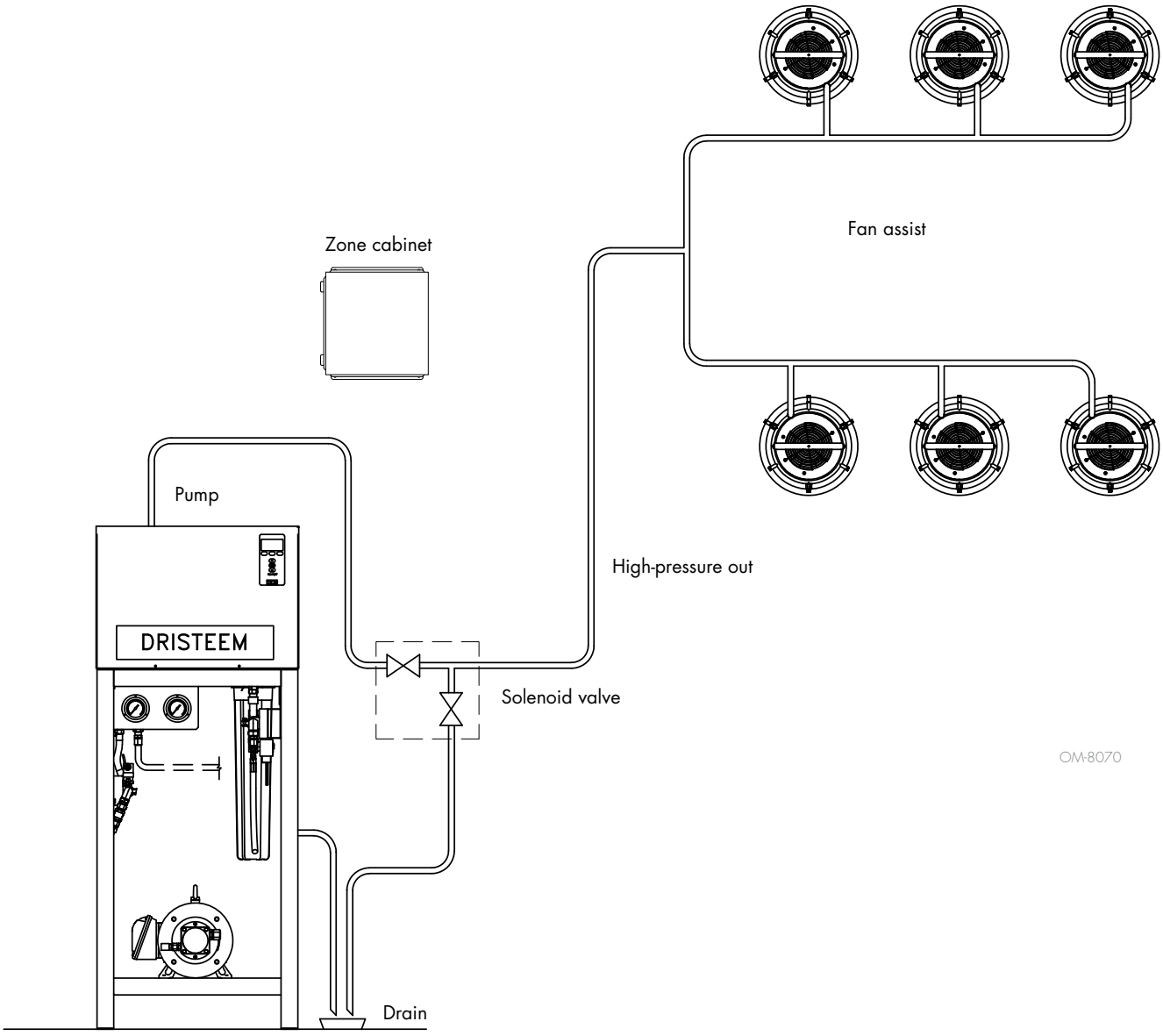
Pump station/dispersion/zone valves layout

FIGURE 34-1: SERIES LAYOUT



Pump station/dispersion/zone valves layout

FIGURE 35-1: PARALLEL LAYOUT



Loading the carbon media

LOADING THE CARBON MEDIA

1. Place tank on a level, solid surface in the correct position for installation. Lift the riser tube from the tank, keeping the attached hub within the opening of the tank. Within the tank, assemble the laterals onto the hub, twisting each lateral into the hub to lock securely. Gently lower the assembly to the bottom of the tank. The top of the riser tube should be about level with the top of the tank. (See Figure 100-1).
2. The "riser tube" inside the media/resin tank delivers treated water to your control valve. It will need to be temporarily covered with tape on the top end to prevent anything from falling down inside the tube during loading.
3. Step back and look at the tank to make sure it is standing straight, and not tilted. The black base on the bottom of the tank should also be straightened before filling the tank. If your tank is tilted, simply pick up the tank 2-3 inches off the floor and drop it gently (but firmly) down, favoring the side of the base that needs to be adjusted.
4. Before loading the media, fill the tank with 2-3 feet of water (or 1/3 full, depending on the tank size), to soften the fall of the rocks and prevent damage to the distributor. To load the media, use a funnel in the top of the media tank with the riser tube still inside. Make sure the riser tube is covered with tape to keep media out.
5. Scoop the media into the funnel, slowly letting it fall down inside the media tank around the riser tube. Fill the tank with the media provided, pouring the media in the following order (1st will end up on the bottom of the tank, last will end up at the top of the tank, etc.). Note: The tank will be approximately ½ - 2/3 full after loading is complete.
   I. Gravel ¼" x 1/8" – YMGRVL1418 – 0.5 CF (50 lbs) per bag (not used in DC-2162)
   II. Gravel – YMGRVL11618 – 1 CF (100 lbs.) per bag
   III. YMC1240RCOAL – 1 CF (27.5 lbs.) per bag
6. Remove the funnel from the top of the tank, and the tape from the end of the riser tube. Brush any loose media or resin off the top opening of the tank.
7. The bottom of the control valve has an opening with O-rings inside; lubricate the O-ring with a non-petroleum based lubricant. Position the valve over the top of the media tank, making sure the top of the riser tube inserts inside the opening in the bottom of the valve.
8. Screw the valve down into the media tank. Another person should hold the tank as the valve is being snugly tightened onto the tank. Do not over-tighten. Tighten until snug, tighten a bit more, then Stop. The large o-ring will seal itself.

FIGURE 36-1: LOADING THE MEDIA

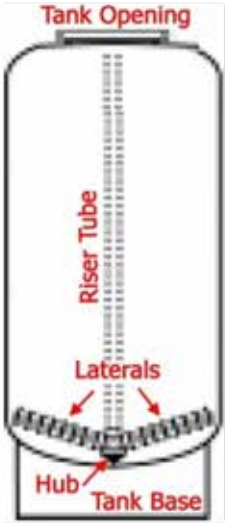


Table 36-1:
Carbon media quantity per model

Carbon model	I. Gravel 1/4 x 1/8	II. Gravel 1/16 x 1/8	III. Carbon
DC-2162	N/A (0)	1 CF (100 lbs)	6 CF (165 lbs)
DC-2472	1 CF (100 lbs)	1 CF (100 lbs)	8 CF (220 lbs)
DC-3072	2 CF (200 lbs)	2 CF (200 lbs)	12.5 CF (344 lbs)

Loading the water softener media

LOADING THE WATER SOFTENER MEDIA

1. Place each resin tank on a level, solid surface in the correct position for installation, taking note of correct ALT A and ALT B tank positions. Lift the riser tube from the tank, keeping the attached hub within the opening of the tank. Within the tank, assemble the laterals onto the hub, twisting each lateral into the hub to lock securely. Gently lower the assembly to the bottom of the tank. The top of the riser tube should be about level with the top of the tank. (See Figure 36-1).
2. The "riser tube" inside the media/resin tank delivers treated water to your control valve. It will need to be temporarily covered with tape on the top end to prevent anything from falling down inside the tube during loading.
3. Step back and look at the tank to make sure it is standing straight, and not tilted. The black base on the bottom of the tank should also be straightened before filling the tank. If your tank is tilted, simply pick up the tank 2-3 inches off the floor and drop it gently (but firmly) down, favoring the side of the base that needs to be adjusted.
4. Before loading the media, fill the tank with 2-3 feet of water (or 1/3 full, depending on the tank size), to soften the fall of the rocks and prevent damage to the distributor. To load the media, use a funnel in the top of the media tank with the riser tube still inside. Make sure the riser tube is covered with tape to keep media out.
5. Scoop the media into the funnel, slowly letting it fall down inside the media tank around the riser tube. Fill the tank with the media provided, pouring the media in the following order (1st will end up on the bottom of the tank, last will end up at the top of the tank, etc.). Note: The tank will be approximately ½ - 2/3 full after loading is complete. Refer to Table 37-1 for the proper quantities of each media.
   I. Gravel ¼" × 1/8" – YMGRVL1418 – 0.5 CF (50 lbs) per bag (not used in DC-2162)
   II. Gravel – YMGRVL11618 – 1 CF (100 lbs.) per bag
   III. Resin - CGS - 1CF (50 lbs) per bag
6. Remove the funnel from the top of the tank, and the tape from the end of the riser tube. Brush any loose media or resin off the top opening of the tank.
7. The bottom of the control valve has an opening with O-rings inside; lubricate the O-ring with a non-petroleum based lubricant. Position the valve over the top of the media tank, making sure the top of the riser tube inserts inside the opening in the bottom of the valve.
8. Screw the valve down into the media tank. Another person should hold the tank as the valve is being snugly tightened onto the tank. Do not over-tighten. Tighten until snug, tighten a bit more, then Stop. The large o-ring will seal itself.

Table 37-1:
Water softener resin and media quantity per model

Water softener model	I. Gravel 1/4 x 1/8	II. Gravel 1/16 x 1/8	III. Softening resin (per tank)
WS-2162	N/A (0)	1 CF (100 lbs)	6 CF (300 lbs)
WS-2472	1 CF (100 lbs)	1 CF (100 lbs)	8 CF (400 lbs)
WS-3072	2 CF (200 lbs)	2 CF (200 lbs)	12.5 CF (638 lbs)

System piping

FIGURE 38-1: ADIATEC HIGH-PRESSURE SYSTEM GENERIC MECHANICAL PIPING

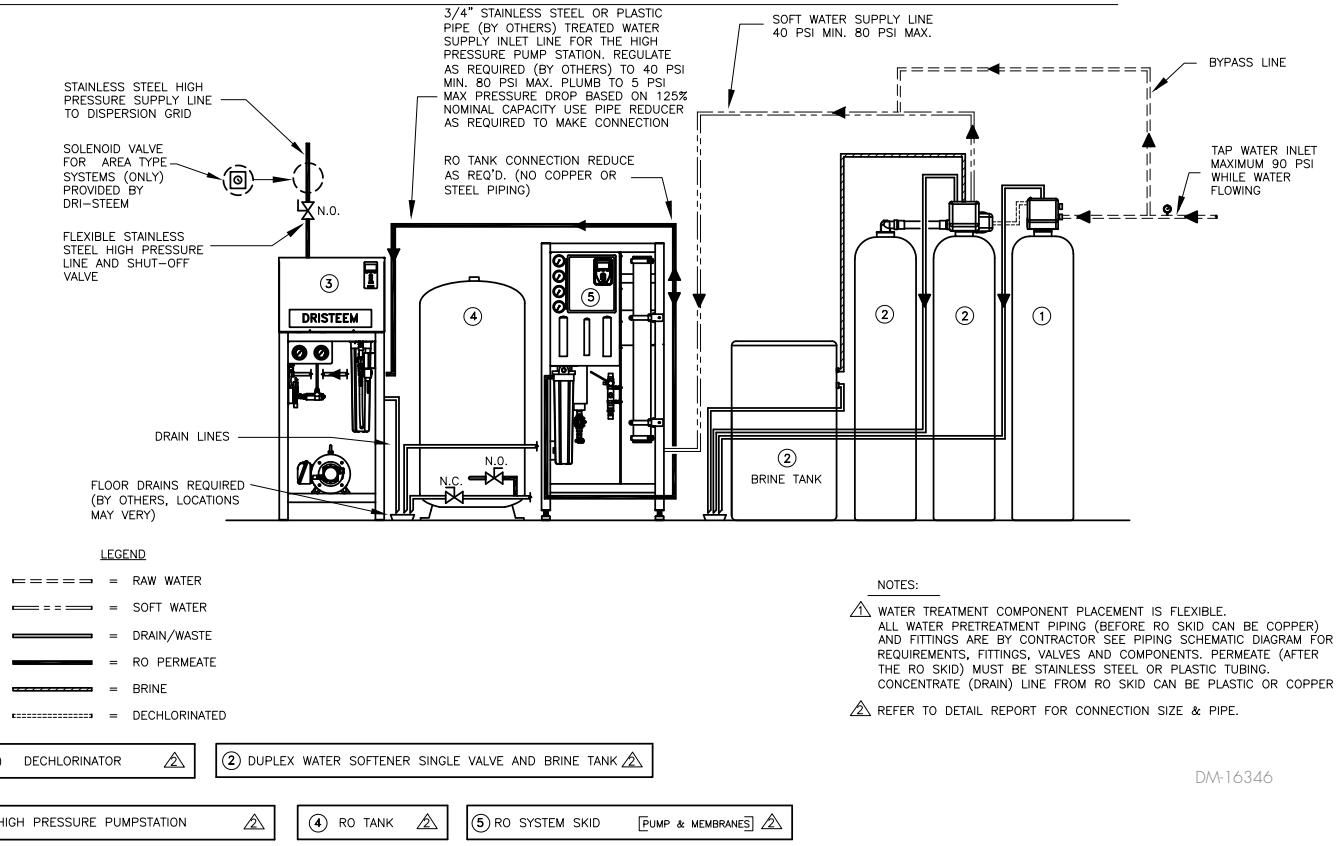
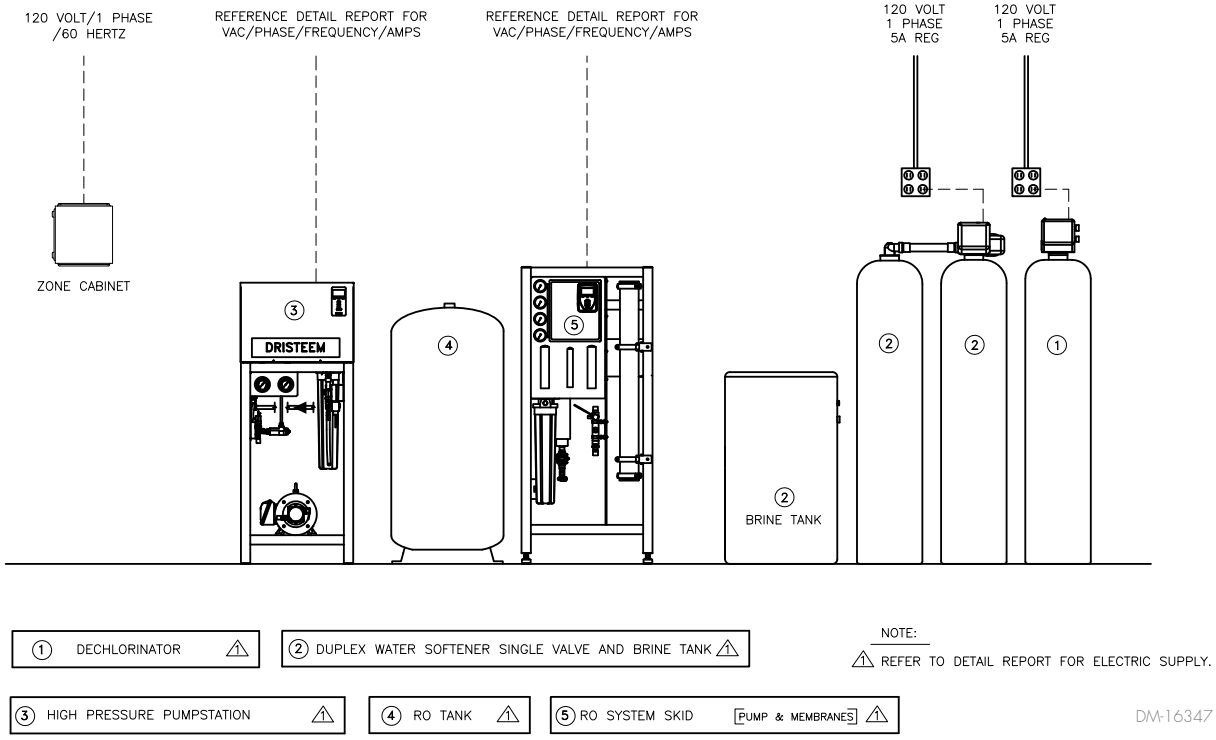
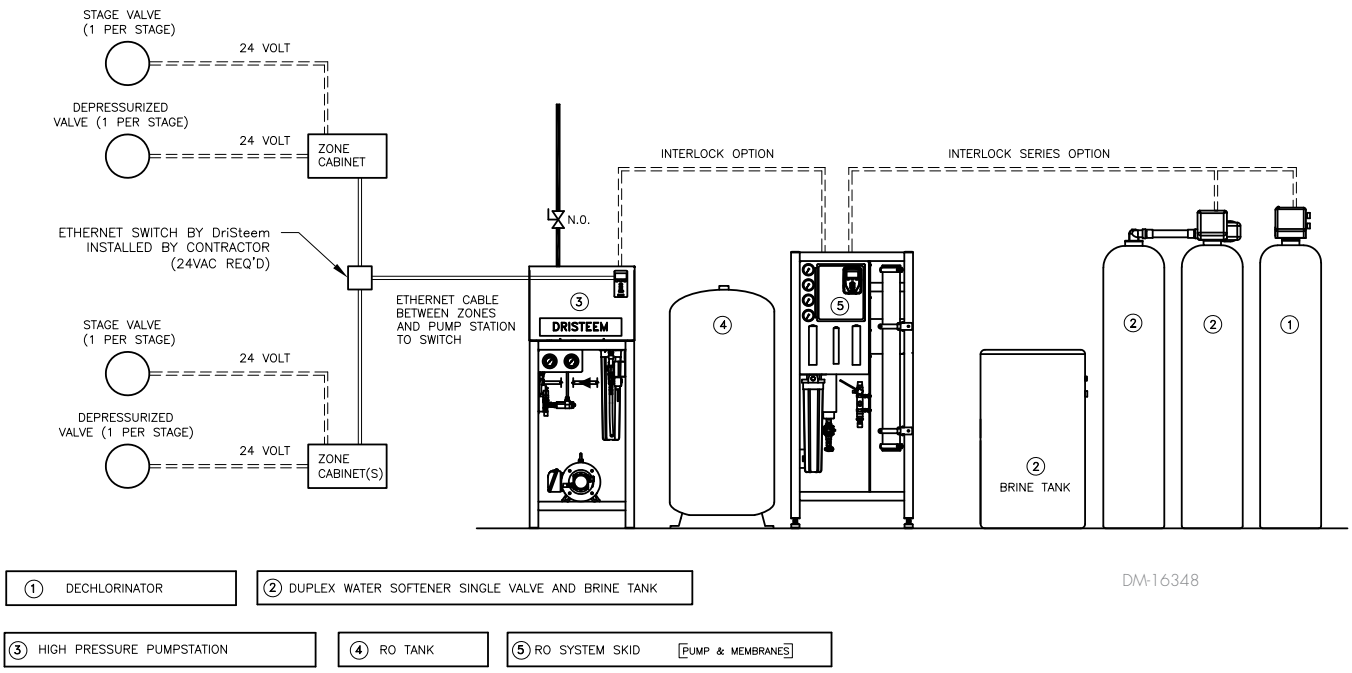


FIGURE 38-2: HIGH-PRESSURE SYSTEM GENERIC ELECTRICAL SUPPLY



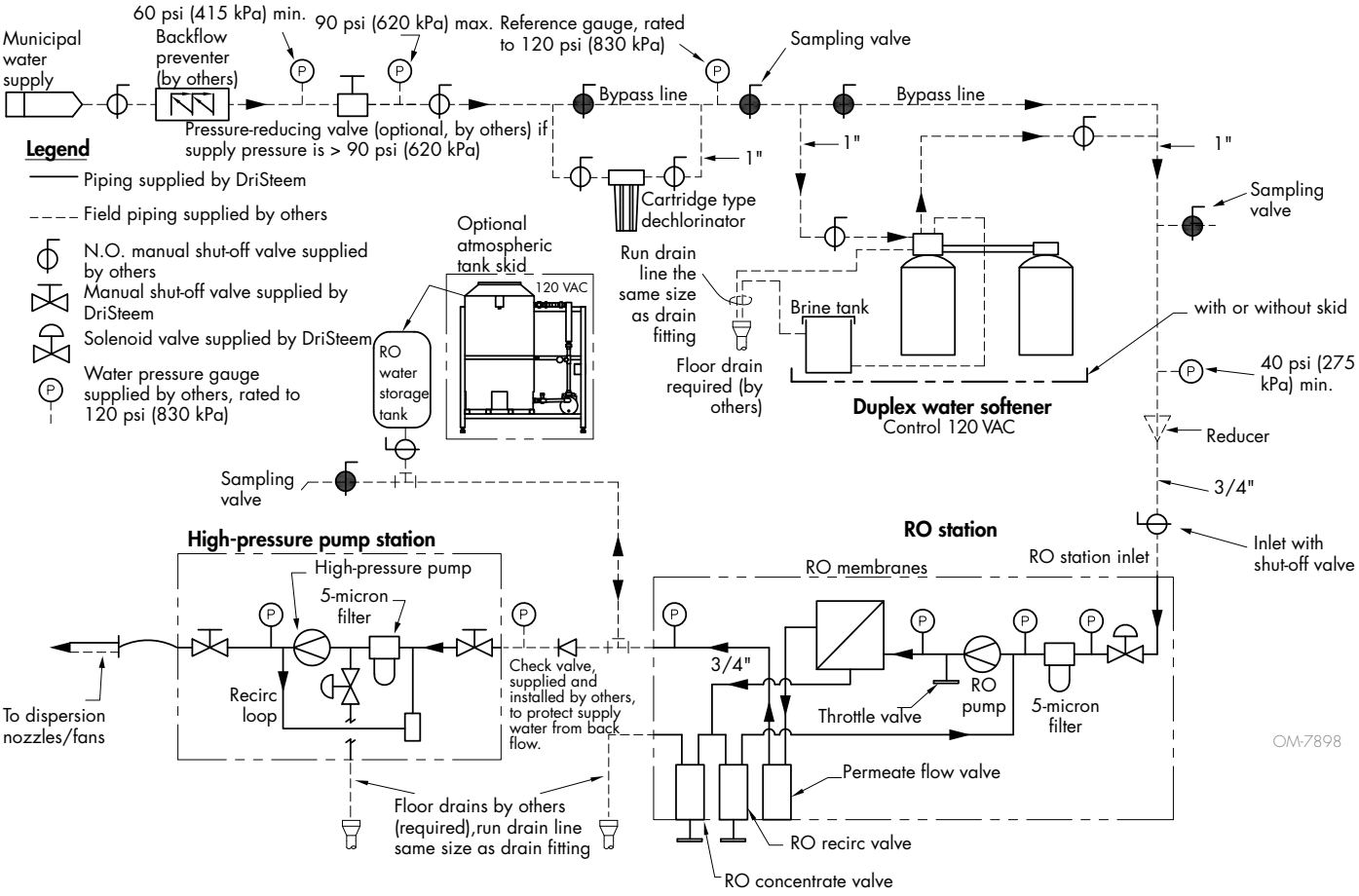
System piping

FIGURE 39-1: HIGH-PRESSURE SYSTEM GENERIC INTERCONNECTING WIRING/SIGNAL



Piping and instrumentation arrangement

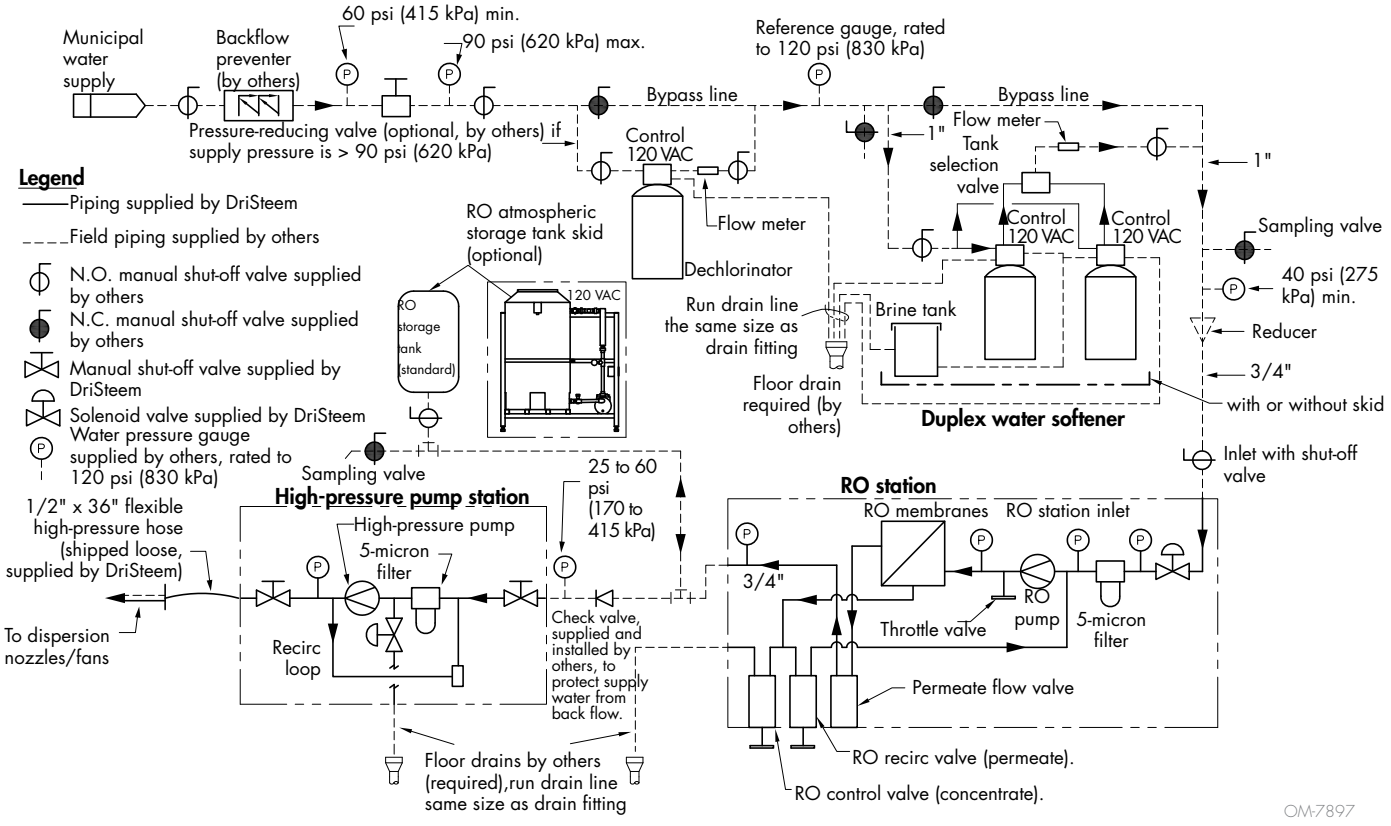
FIGURE 40-1: PIPING AND INSTRUMENTATION ARRANGEMENT, MODELS 250 AND 500



Note:
Wiring and branch circuit protection (Type RK1, J, or T fusing) to be provided by installer in accordance with National Electrical Code.

Piping and instrumentation arrangement

FIGURE 41-1: PIPING AND INSTRUMENTATION ARRANGEMENT, MODELS 250 THROUGH 5500



Note: Wiring and branch circuit protection (Type RK1, J, or T fusing) to be provided by installer in accordance with National Electrical Code.

Site requirements

SITE REQUIREMENTS

1. The plug in Power Adapter is for dry locations only, and should be connected to an uninterrupted outlet installed within 15 feet (4.57 meters) of the water conditioner. If the Power Adapter cord has not yet been connected to the control valve, remove the control valve cover and the drive bracket, and thread the Power Adapter cord through the hole in the back plate. Reinstall the drive bracket. Weave the cord through the hooks on the right hand side of the drive bracket and connect the end to the four-prong connector on the printed circuit board. Replace the cover, and plug the Power Adapter into an uninterrupted outlet.
2. The tanks should be on a firm, level surface.
3. All plumbing should be done in accordance with local codes.
4. Do not locate unit where it or its connections (including the drain and overflow lines) will ever be subjected to room temperatures below 40° F (4° C).
5. INLET/OUTLET PLUMBING: Connect to a supply line downstream of outdoor spigots. Install an inlet shutoff valve and plumb to the unit's inlet. Installation of a bypass valve is recommended. If using plastic fittings, ground the water conditioner per local electrical codes. Do not install any water conditioner with less than 10 feet of piping between its outlet and the inlet of a water heater. If a water meter is used, install the water meter on the outlet side of the control valve. The turbine assembly may be oriented in any direction, but is usually oriented pointing up to reduce drainage out of the pipe during service.
6. Locate the water conditioner so the distance between the drain and the water conditioner is as short as possible. All units are shipped without a drain line flow control washer. Correctly size the drain line and install an appropriately sized drain line flow control. 1.5" valves are shipped with a ¾" fitting that can be used with the drain line flow controls up to 10 gpm, or an optional 1" fitting can be purchases to be used with drain line flow controls up to 25 gpm. For higher backwash rates, the adapter can be removed and the 1 ¼" NPT threaded drain outlet can be used. For 2" valves the drain outlet is 1.5" NPT threads. Solder joints near the drain must be done prior to connecting the drain line flow control fitting. Leave at least 6" (152.4mm) between the drain line flow control fitting and the solder joints to prevent heat from damaging the flow control. Avoid elevating the drain line above the control valve where possible. Discharge the drain line through an air gap to a receptacle in accordance with local plumbing codes.

IMPORTANT: Never insert a drain line directly into a drain, sewer line or trap. Always allow and air gap between the drain line and the receptacle to prevent back siphonage.

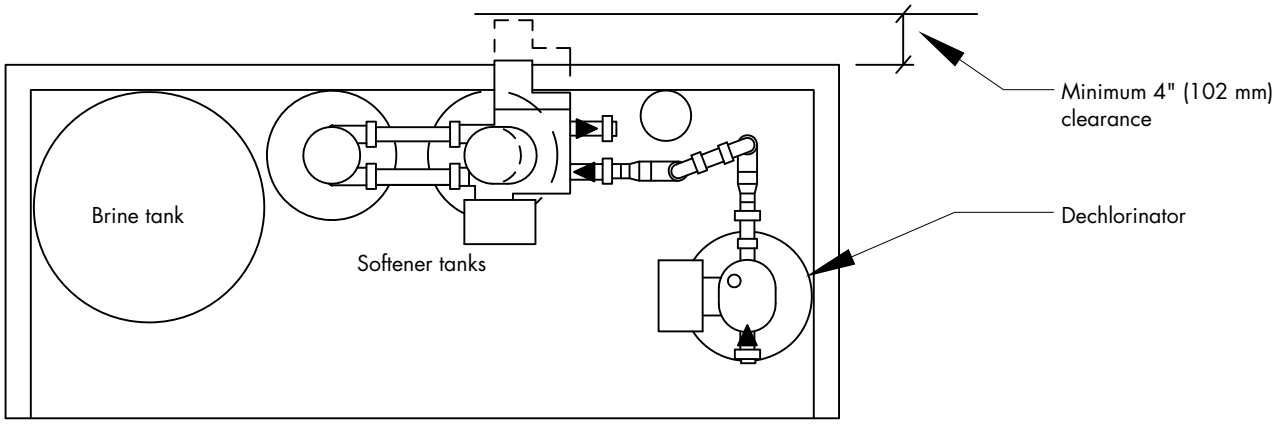
Site requirements

1. Regenerant tanks should be accessible for easy refilling. If the control valve is to be used to regenerate the water conditioner with brine (saturated salt solution) or other regenerants, use a polyethylene tube to connect the brine valve contained in the regenerant tank to the regenerant port on the control valve. It is recommended the brine valve contain a safety float. The 1.5" control valve's regenerant port has a ½" fitting. Note: ½" tubing that runs longer than 6 feet may restrict draw rates with G and H injectors. A 5/8" fitting is also available.

   The 2" control valve regenerant port has a 1" threaded connection. To ensure acceptable operation of the injectors, use 1" pipe to connect to the brine tank.

   An overflow drain line from the regenerant tank that discharges into an acceptable drain is recommended, as a regenerant overflow could damage furnishings or the building structure. Connect a line to the overflow fitting on the regenerant tank. If an overflow fitting is not already installed on the regenerant tank, install one. Do not elevate the overflow drain line. Discharge the overflow drain line through an air gap to a receptacle in accordance with local plumbing codes.

FIGURE 43-1: WATER SOFTENER CLEARANCE



Plumbing and wiring for dual softener 21, 24, 30 inch models

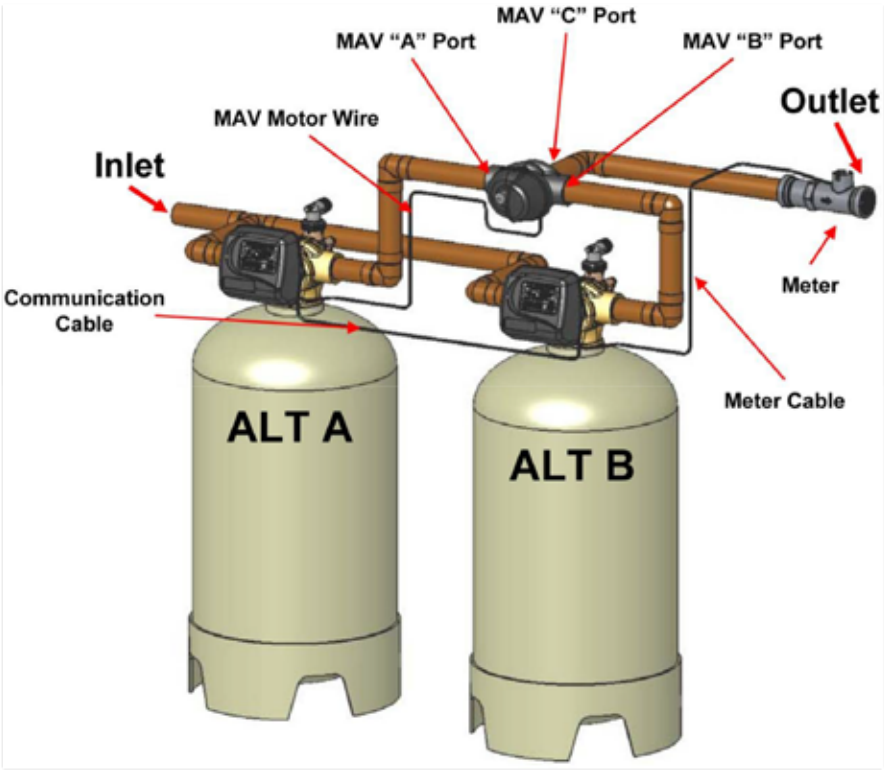
Note:

- All plumbing is to be done in accordance with state and local codes.
- The control valve, fittings and/or bypass are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.
- Connect to a supply line downstream of outdoor spigots. Install an inlet shutoff valve and plumb them to the unit's inlet. Installation of a bypass valve is recommended. If using plastic fittings, ground the water conditioner per local electrical codes.
- Do not use pipe dope or other sealant on threads. Use teflon tape on threaded inlet, outlet and drain fittings.

1. Plumb the Motorized Alternating Valve (MAV) according to Figure 36-1. Note: Ensure that the valve labeled "Alt A" is connected to the "A" port on the MAV, and the valve labeled "Alt B" is connected to the "B" port.
2. Install connecting piping between raw water source and input pipe on control valve.
3. Install drain line from control valve to a free flowing drain. Solder joints near the drain must be done prior to connecting the drain line flow control fitting. Leave at least 6" (152.4mm) between the drain line flow control fitting and the solder joints to prevent heat from damaging the flow control. Avoid elevating the drain line above the control valve where possible. Discharge the drain line through an air gap to a receptacle in accordance with local plumbing codes.

Important: Never insert a drain line directly into a drain, sewer line or trap. Always allow an air gap between the drain line and the receptacle to prevent back siphonage.

FIGURE 44-1: PLUMBING THE MOTORIZED ALTERNATING VALVE



Plumbing and wiring for dual softener 21, 24, 30 inch models

1. Install the water meter on the outlet side of the control valve. The meter may be threaded directly into the valve or may be plumbed separately downstream of the unit. Ensure the arrow on the meter body is going the same direction as the water flow. The turbine assembly may be oriented in any direction, but is usually oriented pointing up to reduce drainage out of the pipe during service. Meter can be installed horizontally or vertically.
2. Install piping between meter output and point of use.
3. Use a tee to install Brine/Refill line between brine tank and regenerant line.
4. Install an overflow drain line from the regenerant tank. Connect a line to the 1" overflow fitting on the regenerant tank. Do not elevate the overflow drain line. Discharge the overflow drain line through an air gap to a recaptacle in accordance with local plumbing codes.

VALVE WIRING

1. Connect MAV Motor Wire & Interconnect cable to valve head Alt A:
   - On the backside of the valve, remove the strain relief cover with a screwdriver.
   - Remove the cover of the valve by pulling out on the release tabs located on each side of the cover.
   - Feed the MAV motor wire and interconnect (communication) cable through the hole in the back of the valve.
   - Connect the MAV motor wire to the two pin connector labeled "DRIVE" on the PC Board.
   - Connect the interconnect (communication) cable to the three pin connector labelled "INTERCONNECT CABLE" on the PC Board.
   - After connecting the cables, weave the wires through the strain relief on the backside of the valve, and replace the strain relief cover and screw. Replace the valve cover.
2. Connect MAV Cables to valve head Alt B:
   - On the backside of the valve, remove the strain relief cover with a screwdriver.
   - Remove the cover of the valve by pulling out on the release tabs located on each side of the cover.
   - Feed the other end of the interconnect (communication) cable & the meter cable through the hole in the back of the valve.
   - Connect the interconnect cable to the three pin connector labelled "INTERCONNECT CABLE" on the PC Board.
   - After connecting the cables, weave the wires through the strain relief on the backside of the valve, and replace the strain relief cover and screw. Replace the valve cover.
   - Ensure meter cable is connected to the meter assembly.

Interconnecting tubing requirements

Table 46-1:
Maximum length of interconnecting tubing between pump station and RO holding tank

RO station model	Volume		Tubing nominal diameter	Minimum tube I.D.		Maximum developed length*	
	gpm	L/m		in.	mm	ft	m
401	0.55	2.1	1/2"	0.375	10	>100	>30
			3/4"	0.625	16	>100	>30
			1"	0.875	23	>100	>30
402	1.10	4.2	1/2"	0.375	10	64	>20
			3/4"	0.625	16	>100	>30
			1"	0.875	23	>100	>30
403	2.20	8.3	1/2"	0.375	10	18	5.5
			3/4"	0.625	16	>100	>30
			1"	0.875	23	>100	>30
404	3.85	14.6	1/2"	0.375	10	—	—
			3/4"	0.625	16	>100	>30
			1"	0.875	23	>100	>30
406	5.50	20.8	1/2"	0.375	10	—	—
			3/4"	0.625	16	95	29
			1"	0.875	23	>100	>30
408	7.70	29.1	1/2"	0.375	10	—	—
			3/4"	0.625	16	51	16
			1"	0.875	23	>100	>30
412	12.1	45.8	1/2"	0.375	10	—	—
			3/4"	0.625	16	22	7
			1"	0.875	23	89	27

* Calculations are based on pipe finish factor of 130 and low-pressure piping length of 1' (0.3 m).
** Installation must meet the minimum and maximum inlet pressures for all components, as stated in the specification tables in the "Installation" section of this manual.

Pre-treatment system piping

FOR SYSTEMS TO BE PIPED IN THE FIELD

WATER PRE-TREATMENT

Typical inlet pressure range to dechlorinator is 60 to 90 psi (415 to 620 kPa). Minimum inlet dynamic (while running) pressure to dechlorinator is 60 psi (415 kPa).

DECHLORINATOR

For detailed instructions see the dechlorinator manual that shipped with your system.

Refer to Figure 40-1 for arrangement of piping and instrumentation.

1. Connect the water supply and bypass piping to the inlet of the dechlorinator.
2. Plumb drain outlet from the dechlorinator to nearby drain.
3. Connect outlet of dechlorinator to water softener inlet.
4. Plug in the power cord to a 120V, single-phase receptacle.

Wall mounted dechlorinator (Models 401 and 402 only):

1. Mount dechlorinator housing assembly near the water softener.
2. Insert carbon block filter and reattach blue housing.
3. Connect the water supply to the inlet of the dechlorinator.
4. Plumb dechlorinator outlet to water softener inlet.
5. **For systems that have a tank style carbon filter with control valve:** Be sure that the elastomeric Drain Line Flow Control restrictor washer is installed correctly in the drain outlet plumbing assembly prior to use. This item is required to prevent overflow and potential carry over of carbon to the drain system.

   For wall mounted systems that use extruded carbon black filter: Weekly chlorine level checks are recommended. Once chlorine is determined to be passing through, change the carbon filter. Typical life is 1-3 months depending on usage.

DUPLEX WATER SOFTENER

For detailed instructions see the water softener manual that shipped with your system.

Refer to Figure 40-1 for arrangement of piping and instrumentation.

1. Connect water supply and bypass piping to inlet to duplex water softener.
2. Connect brine tank to water softener control system using plastic hose supplied.
3. Add salt to brine tank. DriSteem recommends using pulverized salt because it dissolves easily.
4. Plumb drain outlet from water softener to nearby drain.
5. Connect water softener outlet to RO station inlet.
6. Plug in power cord to a 120V, single-phase receptacle.

RO system piping

PLUMBING

Plumbing materials can significantly contribute to the contamination of the water. Care must be exercised over the choice of thread sealants. PTFE tape is suitable for all threaded connections in this system. Pipe dope can leach objectionable impurities into the water and must be avoided.

FEED WATER CONNECTION

Connect the raw water supply to the inlet of the solenoid valve, observing the following:

- The line size shall be ¾ inches (19 mm) or larger to minimize pressure loss.
- A manual valve should be installed on this line to shut off the water supply if it will ever be needed. Be sure that this valve in no way restricts the water flow when it is fully open.
- Water supply min pressure 40 psi (276 kPa). A pressure regulator may be required if pressure is above 70 psi (483 kPa).

CONCENTRATE/REJECT CONNECTION

Connect a line to the single point drain outlet on the skid. The drain must have a minimum capacity which meets or exceeds the combined output of all system drains.

PERMEATE/PRODUCT WATER CONNECTION

Connect the product water line to the product connection point on the system. Run this line to your storage tank or other downstream equipment, observing the following:

- Run this line in such a manner as to minimize static head pressure in the product line.
- The product line should have no restrictions to the product flow.
- Inspect to insure that no flexible pumping lines have been kinked or damaged during installation.

CAUTION

This unit produces high quality water which could cause corrosion or leaching of the plumbing following the system. Use only plumbing components of inert material that are compatible with the application. Copper plumbing cannot be used.

Important:

All plumbing is to be done in accordance with state and local codes.

CAUTION

RO membranes will fail immediately if the product water is allowed to flow backward into the elements.

CAUTION

The highest point of the tubing should not be higher than four feet above the top of the RO modules, or the elements may be damaged.

CAUTION

Do not fully close the manual valve located directly after the RO pump. This could cause cavitation and premature pump failure.

CAUTION

Damage to pump

Do not close the valve. Do not operate the pump below minimum combined flow rate (permeate + concentrate + recirculating).

Models 401-402: 4 gpm (15.2 L/min)
Models 403-412: 6 gpm (22.7 L/min)

RO system piping

RO STATION AND PRESSURIZED RO HOLDING TANK

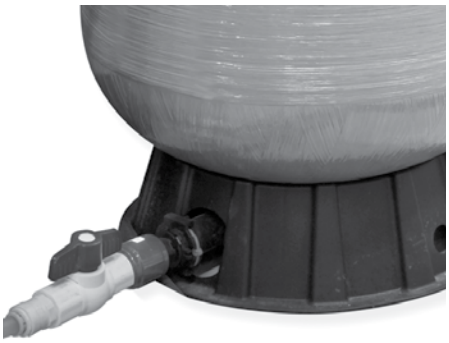
Refer to Figure 40-1 for arrangement of piping and instrumentation. Minimum inlet dynamic (while running) pressure is 40 psi (275 kPa).

1. Connect outlet of water softener to RO station inlet.
2. Plumb RO drain connection to drain.
3. Plumb RO water output to pressurized RO holding tank and downstream equipment.

   Be sure to install manual shut-off valve for pressurized RO holding tank as shown in Figure 22-1 to prevent tank contamination while flushing the RO system.

   It is recommended to install an additional manual shut off valve with piping for flushing and draining the system (see Figure 47-1 and Figure 47-2.
4. Set recirc flow meter to desired level, but not above the maximum allowed setting corresponding to specific model as shown in Table 81-1.
5. Precharge pressurized RO holding tank to 26 to 28 psi (180 to 195 kPa). See “Pressurized RO Holding tank” on Page 101.

FIGURE 49-1: HOSE FROM RO WATER OUTLET CONNECTED TO PRESSURIZED RO HOLDING TANK



Adiatec high-pressure system piping

HIGH-PRESSURE PUMP STATION

Refer to Figures 40-1 and 41-1 for arrangement of piping and instrumentation. Inlet water pressure must be 25 to 60 psi (170 to 415 kPa). See note at left.

1. Connect RO water to high-pressure pump station inlet.
2. For single-zone, single-stage applications, plumb high-pressure solenoid drain relief to nearby drain.
3. Using the DriSteem-supplied 1/2" x 36" flex hose, complete the connection between pumping station and distribution manifold.
4. Apply bends and pipe supports as required.
5. Pipe supports to be a maximum of 8' (2.4 m) apart.
6. Tighten all unions.
7. Plumb RO flush valve to drain.
8. Plumb high-pressure water outlet to dispersion assembly.

DISPERSION PIPING AND MANIFOLDS

General instructions:

- Included in dispersion installation kit are compression fittings or quick connect fitting for nylon tubing. Use these fittings along with a compression tube bender (Model MS-HTB-8) to complete dispersion and interconnecting piping installation.
- Best practice is to run entire length of interconnecting piping and dispersion manifolds first, then connect compression fittings hand-tight until entire installation is completed.
- Vibration-dampening mounting hardware (field supplied) is recommended.
- Do not bleed system by loosening fitting nut or fitting plug.
- Do not assemble or tighten fittings when system is pressurized.
- Make sure tubing rests firmly on shoulder of tube fitting body before tightening nut. See fitting installation instructions below.
- Always use proper thread sealants on tapered pipe threads.
- Never turn fitting body. Instead, hold fitting body and turn nut.
- Avoid unnecessary disassembly of unused fittings.

Initial installation instructions – compression fittings:

1. Fully insert tube into fitting and against shoulder, rotate nut finger-tight.
2. Mark nut at the 6 o'clock position.
3. While holding fitting body steady, tighten nut one and one-quarter turns until mark made in step two is located at the 9 o'clock position.

Reassembly installation instructions – compression fittings:

You may disassemble and reassemble compression tube fittings many times.

Prior to disassembly, mark tube at back of nut; mark a line along nut and fitting body flats.

1. Insert tube with preswaged ferrules into fitting until front ferrule seats against fitting body.
2. While holding fitting body steady, rotate nut with wrench to previous position.

High-pressure system piping

PUSH-CONNECT FITTINGS
(USED WITH NYLON TUBING FOR FAN-ASSIST DISPERSION)

1. Cut tubing to length with tube cutter. (Make sure not to flatten tube).
2. Fully insert tube to fitting.
3. Pull on tube to make sure fitting is fully installed.

TUBE FITTINGS

Tube fitting are supplied assembled and finger tight. Disassembly before use can allow that entry of dirt or other particles.

1. Insert the tubing into the fitting. Check that the tube rests firmly on the fitting shoulder and that the nut is finger tight.
2. Tighten the nut. 1¼ turns of the nut are required for ¼" (6mm) and higher.

REASSEMBLY INSTRUCTIONS

Fitting connections may be disconnected and remade repeatedly without loss of the leak tight seal.

1. Before disconnecting, mark the position of the nut in relation to the fitting body.
2. To reassemble, use a wrench to tighten the nut to original position.
3. Tighten slightly with a wrench until there is a slight rise in torque.

TUBE CUTTING

There is only one way to cut tubes for use in high-pressure applications:

1. **Tube cutter**
   To attain a leak-free connection, cut the tubing squarely. Use a good quality tube cutter with the appropriate blade for the tubing.
   Do not try to reduce the time of cutting by taking deep cuts with teach turn of the cutter. This will work-harden the tube. Deburr the end of the tube avoid damage to the fitting and to ensure that the tube reaches the bottom of the fitting.

TUBE HANDLING

Scratches on the tube might cause leaks. Therefore, use caution in handling the tube in order to reduce the possibility of leaks.

Some precautions to be taken:

1. Tubes must not be dragged on the floor.
2. Tubes must not be dragged out of a tubing rack, especially in case of large OD tubes.

WARNING

Do not hold the tube in a vise at the place where it will be inserted into the fitting (the vise will leave a mark on the tube that may cause leaks, and might cause ovality).

Adiatec high-pressure system piping

GAP INSPECTION GAUGES

Gap inspection gauges assure the installer or inspector that the fitting has been sufficiently pulled up on initial installation with wrench tightening. All metal tube fittings are gaugeable.

DEPTH MARKING TOOLS

Depth marking tools help ensure that tubing is bottomed on the shoulder inside the tube fitting body.

FOR FAN-ASSIST DISPERSION APPLICATIONS

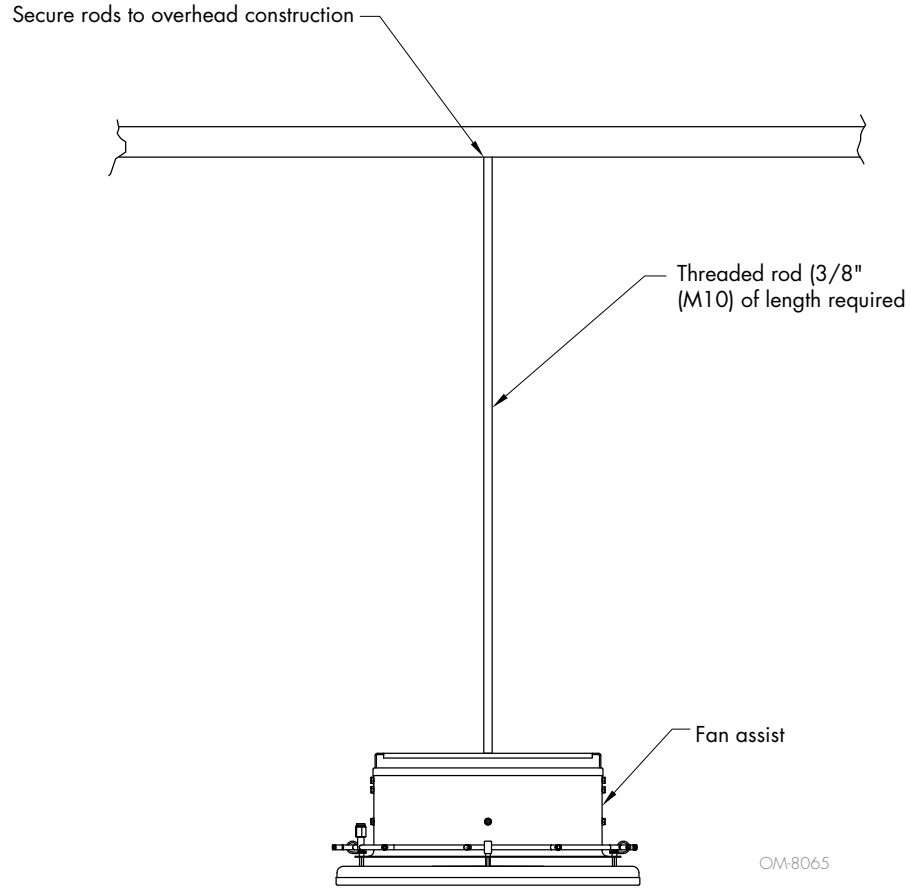
The FA series dispersion systems are typically hung from a ceiling via chains or threaded rod, and water is fed via the high-pressure tubing and electricity is fed via cables.

1. Adjust the chains/rod so the unit is level. After flushing and bleeding of the FA unit, remove the excess chain and close S-hooks.
2. Confirm the chains/rod as been fastened to the ceiling with appropriate material (screws, raw plugs, concrete screw anchors, etc).

CAUTION

Avoid u-bends in the tubing. This can cause air entrapment that will not be fully removed and cause compression. Failure to install correctly, can lead to dripping from the nozzles during depressurization.

FIGURE 52-1: FA-4 AND THREADED ROD INSTALLATION



Adiatec high-pressure system piping

FOR AREA-TYPE APPLICATIONS

1. Place pipe supports and/or hangers where distribution manifold will be placed. Place pipe supports no more than 8' (2.4 m) apart.
2. Place first section of distribution manifold into place using pipe supports.
3. Angle the manifolds slightly upward at approximately 15° angle from the horizontal.
4. Measure and make any bends that are required to avoid obstructions.
5. Place a compression union on each side of distribution piping.
6. Place next section of distribution manifold.
7. Connect sections using union.

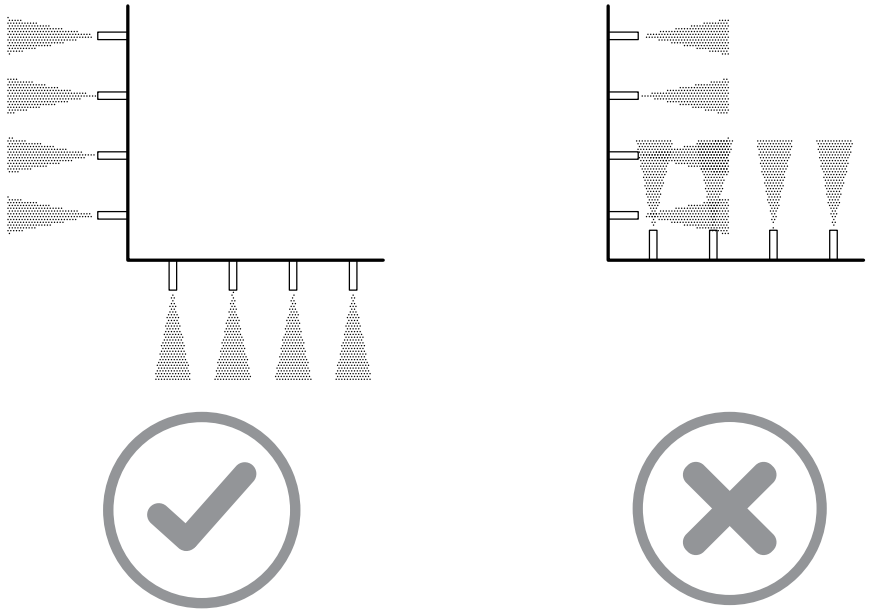
   Note: Make union connections hand-tight only until distribution system is fully assembled.
8. Continue until entire zone manifold is in place.
9. Install a ball valve for manual drainage of distribution piping bypassing depressurization valve.
10. Rigidly mount area type zone valves beyond the pipe support mounting.
11. Do not remove the pressure accumulator and flexible hydraulic hose on the area type zone inlets as this will prevent potential water hammer.
12. Tighten all unions.

See Page 68 for dispersion nozzle installation instructions.

FIGURE 53-1: DRAIN VALVE AND DRAIN PIPING AT END OF MANIFOLD SECTION

FIGURE 53-2: TOP HALF OF MANIFOLDS ANGLE DOWNWARDS, OTHER HALF ANGLE UPWARDS

FIGURE 53-3: INSTALLATION OF NOZZLES



Do not install nozzles where mist pattern will intersect.
Note: Intersecting mist patterns will cause the water droplets to coalesce and drip to the floor.

OM-8034

High-pressure system piping

FOR AHU APPLICATIONS

Refer to the dispersion and final evaporation media installation drawings that shipped with your High-Pressure System.

For multiple dispersion assemblies refer to manifold drawings supplied with the unit.

1. Install support system for each manifold.
2. Mount each manifold into place while maintaining spacing via end connectors.
3. Place compression union on each side of distribution piping.
   Note: Make union connections hand-tight only until distribution system is fully assembled.
4. Connect ends of manifolds using end connectors.
5. Connect high-pressure solenoid valve on supply side of manifold.
6. Connect depressurization valve to end of manifold section.
7. Arrange manifolds so nozzles in top half of AHU angle down, and nozzles in bottom half of AHU angle up. See Figure 53-2.
8. Adjust remaining rows of manifold to point upwards at a maximum of 45 degrees from horizontal.
9. Tighten all unions.

Important: Refer to the dispersion assembly drawing that shipped with the dispersion assembly. Replace nozzles with supplied stainless steel plugs as indicated or as needed to avoid critical areas. Ensure that all plugs are tight before conducting the leakage test (Page 70).

High-pressure system pressure loss: 0.125" Nylon

Table 55-1:
High-pressure loss (0.125" Nylon)

Developed length of tubing	Maximum humidification load (lbs/hr)							
	5	**10**	**15**	**20**	**25**	**30**	**35**	**40**
20	1	4	9	16	24	34	45*	58*
40	2	9	19	32	49	68	90	116
60	4	13	28	48	73	102	136	174
80	5	18	38	64	97	136	181	232
100	6	22	47	80	121	170	226	290
125	8	28	59	100	152	212	283	362
150	9	33	71	120	182	255	339	434
200	12	44	94	160	243	340	452	579
250	15	56	118	201	303	425	565	724
300	18	67	141	241	364	510	678	869
400	25	89	188	321	485	680	905	1158
500	31	111	235	401	606	850	1131	1448
750	46	167	353	602	910	1275	1696	2172
1000	62	222	471	802	1213	1700	2262	2896
2000	123	444	942	1604	2426	3400	4523	5792
3000	185	667	1413	2407	3638	5100	6785	8688
4000	246	889	1884	3209	4851	6800	9046	11584
5000	308	1111	2354	4011	6064	8499	11308	14480

NOTES:
Developed length includes piping and fitting.
Shaded cells are strongly not recommended, due to excessive pressure drop.
* Cells signify pipe velocities over 7 ft/sec and are not recommended.

High-pressure system pressure loss: 0.25" Nylon

Table 56-1:
High-pressure loss (0.25" Nylon)

Developed length of tubing	Maximum humidification load (lbs/hr)												
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**150**	**200**	**250**
20	0	0	0	0	0	1	1	1	1	2	3	6	9
40	0	0	0	1	1	1	2	2	3	3	7	11	17
60	0	0	1	1	1	2	2	3	4	5	10	17	26
80	0	0	1	1	2	2	3	4	5	6	13	23	34
100	0	0	1	1	2	3	4	5	6	8	17	28	43
125	0	1	1	2	3	4	5	7	8	10	21	36	54
150	0	1	1	2	3	5	6	8	10	12	25	43	65
200	0	1	2	3	4	6	8	10	13	16	33	57	86
250	0	1	2	4	5	8	10	13	16	20	42	71	108
300	0	1	3	4	7	9	12	16	19	24	50	85	129
400	0	2	3	6	9	12	16	21	26	32	67	114	172
500	1	2	4	7	11	15	20	26	32	39	84	142	215
750	1	3	6	11	16	23	31	39	49	59	125	214	323
1000	1	4	8	14	22	31	41	52	65	79	167	285	431
2000	2	8	17	29	44	61	82	104	130	158	334	570	861
3000	3	12	25	43	66	92	122	157	195	237	502	855	1292
4000	4	16	34	58	87	123	163	209	260	316	669	1140	1723
5000	6	20	42	72	109	153	204	261	325	395	836	1424	2153

NOTES:
Developed length includes piping and fitting.
Shaded cells are strongly not recommended, due to excessive pressure drop.
* Cells signify pipe velocities over 7 ft/sec and are not recommended.

High-pressure system pressure loss: 0.375" Nylon

Table 57-1:
High-pressure loss (0.375" Nylon)

Developed length of tubing	Maximum humidification load (lbs/hr)													
	50	100	150	200	250	300	350	400	450	500	750	1000	1250	1500
20	0	0	0	1	1	2	2	3	4	4	9	16	24	33
40	0	0	1	2	2	3	4	6	7	9	18*	31*	47*	66*
60	0	1	1	2	4	5	7	9	11	13	27*	47*	71*	99
80	0	1	2	3	5	7	9	11	14	17	37*	62*	94	132
100	0	1	2	4	6	8	11	14	18	22	46*	78*	118	165
125	0	1	3	5	7	10	14	18	22	27	57*	97	147	206
150	0	2	3	6	9	13	17	21	27	32	69*	117	177	248
200	1	2	5	8	12	17	22	29	36	43	91	156	236	330
250	1	3	6	10	15	21	28	36	44	54	114	195	294	413
300	1	3	7	12	18	25	33	43	53	65	137	234	353	495
400	1	4	9	16	24	34	45	57	71	86	183	312	471	660
500	2	5	12	20	30	42	56	71	89	108	229	389	589	825
750	2	8	17	30	45	63	84	107	133	162	343	584	883	1238
1000	3	11	23	40	60	84	111	143	178	216	457	779	1178	1651
2000	6	22	46	79	120	168	223	285	355	432	914	1558	2355	3301
3000	9	33	70	119	179	251	334	428	533	647	1372	2337	3533	4952
4000	12	44	93	158	239	335	446	571	710	863	1829	3116	4711	6603
5000	15	55	116	198	299	419	557	714	888	1079	2286	3895	5888	8253

NOTES:
Developed length includes piping and fitting.
Shaded cells are strongly not recommended, due to excessive pressure drop.
* Cells signify pipe velocities over 7 ft/sec and are not recommended.

High-pressure system pressure loss: 0.5" Stainless Steel

Table 58-1:
High-pressure loss (0.5" Stainless Steel)

Developed length of tubing	Maximum humidification load (lbs/hr)													
	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500
20	0	1	3	6	10*	15*	20*	27*	35*	43*	53*	63*	74*	86*
40	0	1	5	11	19*	29*	41*	54*	70*	87*	105	126	148	171
60	1	2	8	17	29*	44*	61*	82*	105	130	158	189	222	257
80	1	3	11	23	39*	58*	82*	109	140	174	211	252	296	343
100	1	4	13	28	48*	73*	102	136	174	217	264	315	370	429
125	1	5	17	35	60*	91	128	170	218	271	330	393	462	536
150	2	6	20	43	72*	110	154	204	262	325	396	472	555	643
200	2	7	27	57	97	146	205	272	349	434	527	629	739	857
250	3	9	33	71	121	183	256	341	436	542	659	787	924	1072
300	3	11	40	85	145	219	307	409	523	651	791	944	1109	1286
400	4	15	54	113	193	292	410	545	698	868	1055	1259	1479	1715
500	5	19	67	142	242	365	512	681	872	1085	1319	1573	1848	2144
750	8	28	100	213	362	548	768	1022	1308	1627	1978	2360	2773	3216
1000	10	37	134	284	483	731	1024	1362	1745	2170	2637	3147	3697	4287
2000	21	74	268	567	967	1461	2048	2725	3489	4340	5275	6293	7393	8575
3000	31	111	402	851	1450	2192	3072	4087	5234	6509	7912	9440	11090	12862
4000	41	148	535	1135	1933	2922	4096	5449	6978	8679	10549	12586	14787	17150
5000	51	185	669	1418	2416	3653	5120	6812	8723	10849	13187	15733	18483	21437

NOTES:
Developed length includes piping and fitting.
Shaded cells are strongly not recommended, due to excessive pressure drop.
* Cells signify pipe velocities over 7 ft/sec and are not recommended.

High-pressure system pressure loss: 0.75" Stainless Steel

Table 59-1:
High-pressure loss (0.75" Stainless Steel)

Developed length of tubing	Maximum humidification load (lbs/hr)													
	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500
20	0	0	0	1	1	2	3	4	5	6	7	9*	10*	12*
40	0	0	1	2	3	4	6	7	9	12	14	17*	20*	23*
60	0	0	1	2	4	6	8	11	14	18	21	26*	30*	35*
80	0	0	1	3	5	8	11	15	19	24	29	34*	40*	46*
100	0	1	2	4	7	10	14	18	24	29	36	43*	50*	58*
125	0	1	2	5	8	12	17	23	30	37	45	53*	63*	73*
150	0	1	3	6	10	15	21	28	35	44	54	64*	75*	87*
200	0	1	4	8	13	20	28	37	47	59	71	85*	100	116
250	0	1	5	10	16	25	35	46	59	73	89	107	125	145
300	0	2	5	12	20	30	42	55	71	88	107	128	150	174
400	1	2	7	15	26	40	55	74	95	118	143	170	200	232
500	1	3	9	19	33	49	69	92	118	147	179	213	250	290
750	1	4	14	29	49	74	104	138	177	220	268	320	376	436
1000	1	5	18	38	65	99	139	185	236	294	357	426	501	581
2000	3	10	36	77	131	198	277	369	473	588	714	852	1001	1161
3000	4	15	54	115	196	297	416	554	709	882	1072	1279	1502	1742
4000	6	20	73	154	262	396	555	738	945	1176	1429	1705	2003	2323
5000	7	25	91	192	327	495	694	923	1182	1470	1786	2131	2504	2904

NOTES:
Developed length includes piping and fitting.
Shaded cells are strongly not recommended, due to excessive pressure drop.
* Cells signify pipe velocities over 7 ft/sec and are not recommended.

High-pressure system pressure loss: 1.0" Stainless Steel

Table 60-1:
High-pressure loss (1.0" Stainless Steel)

Developed length of tubing	Maximum humidification load (lbs/hr)													
	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500
20	0	0	0	0	0	0	1	1	1	1	2	2	2	3
40	0	0	0	0	1	1	1	2	2	3	4	4	5	6
60	0	0	0	1	1	1	2	3	3	4	5	6	7	9
80	0	0	0	1	1	2	3	4	5	6	7	8	10	11
100	0	0	0	1	2	2	3	5	6	7	9	10	12	14
125	0	0	1	1	2	3	4	6	7	9	11	13	15	18
150	0	0	1	1	2	4	5	7	9	11	13	16	18	21
200	0	0	1	2	3	5	7	9	12	14	18	21	25	29
250	0	0	1	2	4	6	9	11	15	18	22	26	31	36
300	0	0	1	3	5	7	10	14	17	22	26	31	37	43
400	0	0	2	4	6	10	14	18	23	29	35	42	49	57
500	0	1	2	5	8	12	17	23	29	36	44	52	62	71
750	0	1	3	7	12	18	26	34	44	54	66	79	92	107
1000	0	1	4	9	16	24	34	45	58	72	88	105	123	143
2000	1	2	9	19	32	49	68	91	116	145	176	210	246	286
3000	1	4	13	28	48	73	102	136	174	217	264	314	269	428
4000	1	5	18	38	64	97	136	181	232	289	351	419	492	571
5000	2	6	22	47	80	122	171	227	291	361	439	524	616	714

NOTES:
Developed length includes piping and fitting.
Shaded cells are strongly not recommended, due to excessive pressure drop.
* Cells signify pipe velocities over 7 ft/sec and are not recommended.

Electrical installation

The control valve and fittings are not designed to support the weight of the system or the plumbing.

- Teflon tape is recommended to be used on all threads. Do not use pipe dope, as it may break down the plastics in the control valve.
- Allow one foot of clearance to service WS1.5 valves and two feet of clearance to service WS2 and WS2QC valves.
- The valve will withstand transportation and storage temperatures of -13 °F (-25 °C) to 131 °F (55 °C) and for short periods up to 158 °F (70 °C). If valve has been exposed to freezing conditions let valve warm up to room temperature before running water through it. The valve has been packaged to prevent damage from the effects of normal humidity, vibration and shock.

CAUTION

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary.

CAUTION

Hydrocarbons such as kerosene, benzene, gasoline, etc., may damage products that contain o-rings or plastic components. Exposure to such hydrocarbons may cause the products to leak. Do not use the products(s) contained in this document on water supplies that contain hydrocarbons such as kerosene, benzene, gasoline, etc.

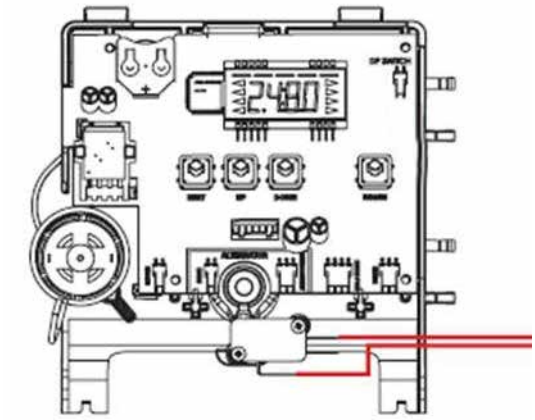
CAUTION

DriSteem water meters should not be used as the primary monitoring device for critical or health effect applications.

SINGLE SOFTENER/DECHLORINATOR LOCKOUT SWITCH

Single softeners have a RO lockout switch if it is desired to lockout the RO system to prevent any hard water passing to the RO system when the softeners are in backwash. See Figure 70-1 for connections to the RO system lockout terminals.

FIGURE 61-1: SINGLE SOFTENER/DECHLORINATOR LOCKOUT SWITCH WIRING



WMS_Lockout_wiring

Connecting communication components

CONTROL INPUT DEVICES

Refer to wiring diagrams supplied with the unit for wiring requirements and connection points.

High-pressure units supplied with RO systems:

- A motor starter switch on the RO system is provided to interlock the high-pressure skid. The interlock will reset on the high-pressure system skid automatically when the motor starter has been fixed.

Area-type applications:

- Install a room RH transmitter mounted to a standard 4"× 4" electrical junction box.
- Wire transmitter to pumping station control cabinet or zone control cabinet.

AHU applications:

- Install airflow-proving switch at least 5' (1.5 m) upstream of dispersion manifolds.
- See Figure 65-1 for control sensor installation recommendations.
- Install high limit sensor at least 24" (610 mm) or preferred 8-12' (2 - 3m) downstream of final evaporation media.
- Wire control devices to pumping station or zone control cabinet, as indicated for this system.
- Connect high-pressure solenoid valves to pumping station or zone control cabinet, as indicated for this system.

NOTE:

Max distance, without switch, on Ethernet run is 300' (91 m). If necessary add switch between zone control and pump station.

Fan-assist dispersion applications:

- Install a room RH or dewpoint transmitter mounted to a standard 4" x 4" electrical junction box.
- Wire transmitter to pumping station control cabinet or zone control cabinet.
- If applicable, for fan control option selected at sizing, run wire from power circuit relay (24V, supplied by Others) to the Vapor-logic zone control cabinet.

Connecting components

WIRING

- Ladder style wiring diagrams (included with unit, separate from this manual) show power, control, and equipment-to-control-cabinet interconnection requirements.
- External connections diagrams (included with unit, separate from this manual) show connection points to the microprocessor-based controller and wire terminals for external safety and control devices, airflow proving switches, high limits, transmitters, fan-assist dispersion, or humidistats.

  Note: External connections shown in the wiring diagrams refer to the pump-station-mounted controller for single-zone, single-stage systems; they refer to the individual zone controllers for all other systems.

All wiring must be in accordance with all governing codes and with wiring diagrams.

ELECTRICAL INSTALLATION

Wiring and branch circuit protection is provided by the installer per NEC (or IEC 60364 in Europe) requirements.

For power supply and machine ground connections, size the wire using the 75 °C wiring table, per NEC (or IEC 60364 in Europe) requirements. Then use copper conductors rated for a 105 °C environment. The wiring from the control cabinet to the equipment must be rated for 105 °C.

Verify electrical current characteristics (voltage, phase and amp draw) and capacity requirements against those listed on the name plate.

SERVICE DISCONNECT

A service disconnect must be installed per NEC requirements and governing codes.

PREVENTING ELECTRICAL NOISE

Electrical noise can produce undesirable effects on electronic control circuits, thereby affecting controllability. Electrical noise is generated by electrical equipment such as inductive loads, electric motors, solenoid coils, welding machinery, or fluorescent light circuits. The electrical noise or interference generated from these sources (and the effect on controllers) is difficult to define, but the most common symptoms are erratic control or intermittent operational problems.

Most electrical noise problems can be prevented by using proper wiring practices and techniques to prevent coupling or inducing of electrical interference into control circuits. The following wiring practices should minimize interaction of noise and controls:

- Connect unit and control cabinet to a code approved earth ground.
- Separate the line voltage wiring from low voltage control circuit wiring when routing electrical wiring inside the control cabinet.

⚠ WARNING

Electric shock hazard
Only qualified electrical personnel should perform field wiring installation procedures. Improper wiring or contact with energized circuits can cause property damage, severe personal injury, or death as a result of electric shock and/or fire.

Do not open control cabinet or remove heater terminal or subpanel access panels until electrical power is disconnected.

CAUTION

Damage from debris
When drilling penetrations in the control cabinet, protect all internal components from debris, and vacuum out the control cabinet when finished. Failure to comply with this directive can damage sensitive electronic components, cause erratic operation or failure, and void your DriSteem warranty.

Important:

Failure to follow these wiring procedures can result in erratic operation or failure.

This product has been tested at the factory for proper operation. Product failures resulting from faulty handling, incorrect wiring, or shorting of wires together on external components are not covered under your DriSteem warranty. Review information and diagrams before proceeding.

Connecting components

When wiring external electrical connections to humidistats, humidity and temperature transmitters, or control signal input connections from a building control system, use 18-gauge minimum (1 mm^2) plenum-rated twisted pair wire with cable shielding and drain wire for grounding.

- Use separate electrical conduits for line and low voltage wiring to the unit.
- Ensure proper supply line voltage wiring on three-phase units. See Caution at right.
- Do not use chassis or safety grounds as current-carrying commons. A safety ground should never be used as a conductor or neutral to return circuit current.
- Return all shielded cable connections to the control cabinet for grounding. **Do not ground shield at the device end.**

CONTROL WIRING

The following wiring methods for external low-voltage control wiring should minimize electrical noise problems:

- Humidistat, room/duct transmitter, and temperature transmitter wiring must be minimum 18-gauge (1 mm^2) plenum rated, shielded, twisted pair wire with a bare drain wire for grounding.
- Airflow proving switch wiring must be minimum 18-gauge (1 mm^2) stranded wire run in conduit. The airflow proving switch can be wired using minimum 18-gauge (1 mm^2) plenum rated, shielded, twisted pair wire with a bare drain wire for grounding.
- The shield wire should be connected to the shield ground terminal/lug with a length less than 2" (51 mm). Do not ground the shield wire on the humidistat or transmitter end.

GROUNDING REQUIREMENTS

The approved earth ground must be made with solid metal-to-metal connections and must be a good conductor of radio frequency interference (RFI) to earth (multistranded conductors).

Ground wire should be the same AWG (mm^2) size as the power wiring or sized per NEC requirements (in Europe, IEC 60364 requirements).

When the control cabinet is mounted remotely from the unit, a ground wire is necessary from the machine ground lug on the unit to the machine ground lug in the control cabinet. The bonding machine ground wire should be the same AWG (mm^2) as the largest heater wire or sized per NEC or IEC 60364 requirements.

MOTOR STARTER SWITCH

A motor starter switch is provided to interlock any equipment downstream. The switch is located on the RO motor starter. The downstream interlock point is the high-pressure station. The motor starter switch will reset the high-pressure Vapor-logic controller once the mechanical starter is back to operation.

CAUTION

On three-phase units ensure proper supply line voltage wiring. Incorrect wiring will cause the high-pressure pump to run backwards and void your DriSteem warranty.

⚠ WARNING

Excessive moisture hazard
DriSteem strongly recommends installing a duct airflow proving switch and a duct high limit humidistat. These devices prevent the system from operating when there is low airflow in the duct or when the RH level in the duct is too high. Failure to install these devices can result in excessive moisture in the duct, which can cause bacteria and mold growth or dripping through the duct.

Important:

Installing the keypad/display

If the keypad/display has been shipped loose, mount it in a convenient location for easy access, but not inside the control cabinet. Mount the keypad/display using a field-supplied network phone wall plate. To mount, slide the keypad/display onto the tabs on the phone plate.

Note that the keypad/display requires an ambient temperature range of 32 °F to 122 °F (0 °C to 50 °C) to operate properly. Exceeding these limits results in a poor reading or no reading.

Connecting components

SENSOR LOCATION

Sensor location has a significant impact on system performance. See the recommendations below and Figure 65-1.

Note: DriSteem recommends that you do not interchange room and duct devices. Room devices are calibrated with zero or little airflow, whereas duct devices require air passing across them.

Recommended humidity control (transmitter/humidistat) locations:

A. Ideal. Ensures the best uniform mix of dry and moist air with stable temperature control.

B. Acceptable, but room environment can affect controllability, such as when sensor is too close to air grilles, registers, or heat radiation from room lighting.

C. Acceptable. Provides uniform mixture of dry and moist air. If extended time lag exists between humidity generation and sensing, extend sampling time.

D. Acceptable (behind wall or partition) for sampling entire room if sensor is near an air exhaust return outlet. Typical placement for sampling a critical area.

E. Not acceptable. These locations might not represent actual overall conditions in the space.

F. Not acceptable. Do not place sensors near windows, door passageways, or areas of stagnant airflow.

Recommended safety (airflow and high limit) sensor location:

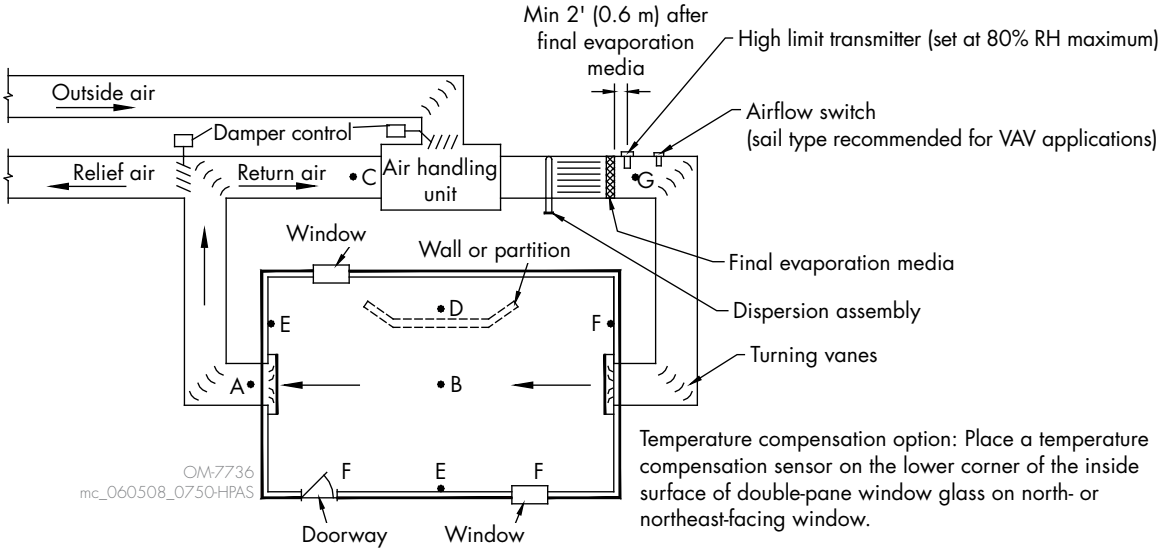
G. Best sensing location for high limit humidistat or humidity sensor and airflow proving switch.

Other factors affecting control

Control involves more than the controller's ability to control the system. Other factors that play an important role in overall system control are:

- Size of system relative to load
- Overall system dynamics associated with moisture migration time lags
- Accuracy of humidistats and humidity transmitters and their location
- Dry bulb temperature accuracy in space or duct
- Velocities and airflow patterns in ducts and space environments
- Electrical noise or interference

FIGURE 65-1: RECOMMENDED SENSOR LOCATIONS

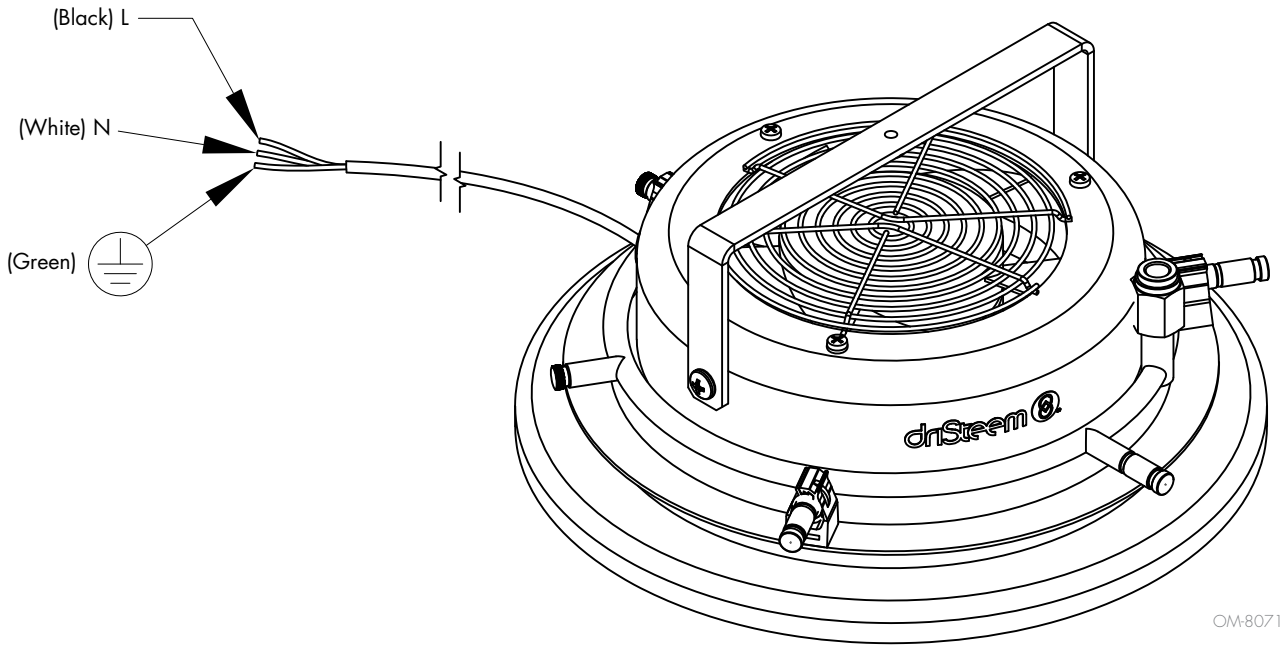


Connecting components

FA-2 AND FA-3 WIRING INSTRUCTIONS

1. Use the appropriate size inulated cord to wire fan.
2. Land black wire with power terminal or plug.
3. Land white wire on neutral plug or terminal.
4. Green wire shall properly be landed to ground.
5. Replace cover and tighten screws.

FIGURE 66-1: FA-2 AND FA-3



Connecting components

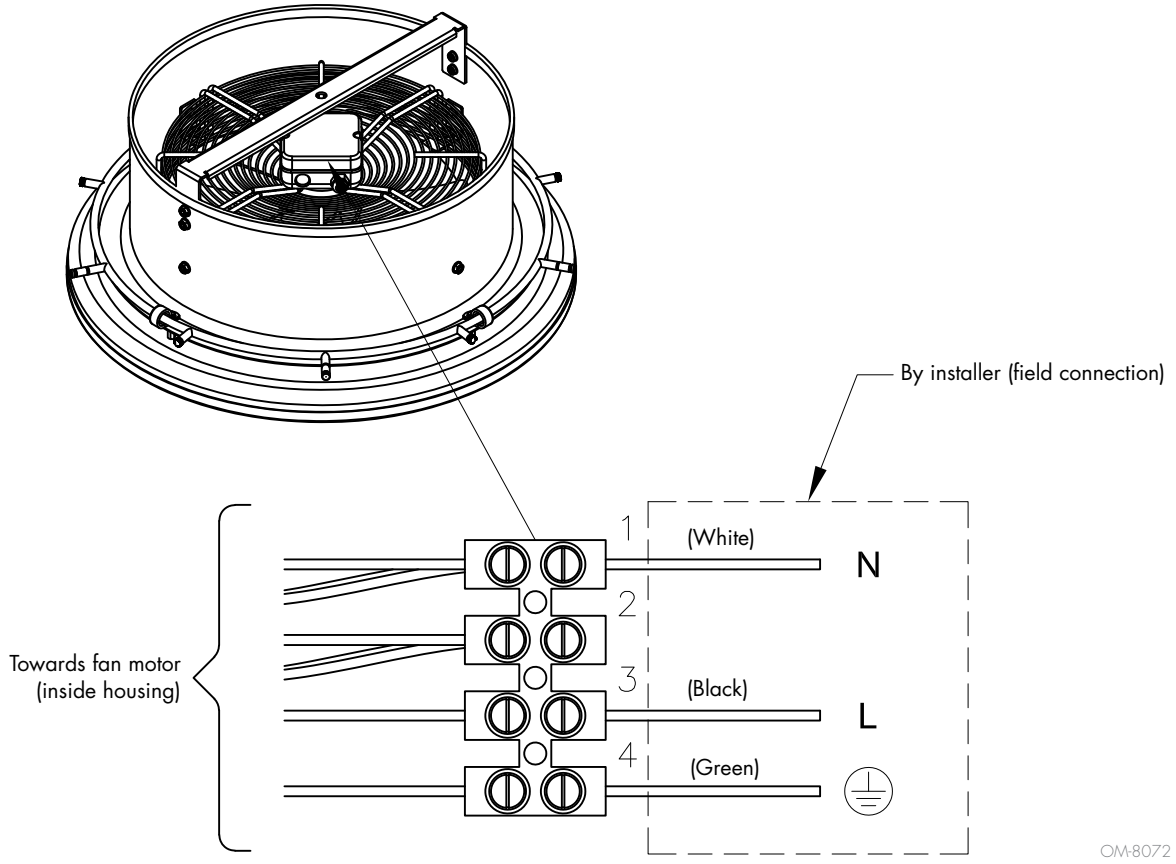
FA-4 WIRING INSTRUCTIONS

1. Use the appropriate size insulated cord to wire fan.
2. Remove the cover from the hosing on top of the fan.
3. Attach black wire from the power cord in terminal block #1, the white wire in terminal block #3, and the green wire in terminal block #4 by loosening the set screws, inserting wires, and tightening the set screws. Do not overtighten.
4. Replace cover and tighten screws.

NOTE: The fan must be connected to power supply by a licensed electrician. Follow federal, state, and local code.

The fan is normally connected for continuous operation. The air is constantly moving.

FIGURE 67-1: FA-4 (VIEW OF WIRING WITH HOUSING COVER REMOVED)



Connecting components

NOZZLE INSTALLATION

Area-type dispersion:
Nozzles are installed directly to the manifold before shipping. After the manifolds have been installed, remove each nozzle before proceeding.

1. Connect nozzle to flexible nozzle extension. Handle nozzles carefully, as impacts may affect performance. Do not over-tighten (torque to 25 in-lb.).
2. Install nozzle extension into each saddle. Do not over-tighten (torque to 25 in-lb.).
3. Adjust nozzle orientation using flexible connector to avoid obstacles. Hold flexible nozzle extension tubing at manifold end to avoid overstressing welded connection. Do not bend extensions beyond a bend radius of 1.38" (35 mm).
4. Repeat until all nozzle assemblies are installed.

AHU dispersion:
AHU dispersion manifolds come with nozzles pre-assembled. Refer to the supplied dispersion assembly drawing for proper manifold order and assembly instructions.

Connecting components

FLUSH DISPERSION PIPING AND MANIFOLDS

Verify that pressurized RO storage tank is full and pressurized to approximately 50 psi (345 kPa).

Fan-assist zone valves:
Run parallel directions

1. Remove fan unit from box.
2. Connect city water to the ring (nozzles not installed).
3. Flush fan ring with city water for five minutes to remove construction debris.
4. Install nozzles with hands.
5. Tighten nozzles to 25 in-lb using torquing bit and drive.

DriSteem-controlled zone valves:
For each zone, perform the following procedure:

1. Using zone control cabinet keypad/display change the mode to one of the four modes listed below.
2. Select the zone flush time depending on interconnecting piping and manifold length:
   - 4 minutes (100 ft)
   - 16 minutes (500 ft)
   - 24 minutes (1000 ft)
   - 30 minutes (1500 ft)

   Zone controller display will indicate that staging valve cycles on to begin flush, and off to end flush.
3. After zone flush is complete, return system to Auto mode.

Zone valves controlled by others:
For each zone, perform the following procedure:

1. Power open all staging and depressurization valves.
2. Using the pump station keypad/display, change the mode to zone flush. The pump station will remain in zone flush for 30 minutes unless interrupted by the user.
3. Return the controller to Auto mode.
4. Remove power from staging and depressurization valves.
5. After all zones are flushed, place BMS in operating mode.

Connecting components

STARTING SYSTEM TO FLUSH PIPING AND MANIFOLDS

Follow this procedure for initial start-up and when RO membranes are replaced.

1. Open water supply valve to dechlorinator or water softener.
2. Verify that no leaks exist.
3. Close bypass valve at water softener a little at a time. Fill slowly to avoid getting resin in the head.
4. Verify that no leaks exist at water softener and in piping to pumping station.
5. Manually adjust controller to flush one of the beds. See Operation & Maintenance manual shipped with water softener for instructions.
6. When first bed has finished flushing, manually adjust controller to flush other bed. This step can be accomplished any time prior to step 9.
7. Open main inlet water valve at RO station. The 5-micron filter will fill with water.
8. Verify that system water supply pressure gauge displays above 5 psi (35 kPa).
9. Apply power to RO station. During initial RO membrane flush, close valve to RO tank, and open drain valve downstream from it. Flush RO membranes for 30 minutes to remove preservation chemicals that membranes were shipped with. After initial flush, fill and drain pressurized RO holding tank at least once.

Connecting components

10. Slowly adjust RO pump pressure regulator to desired permeate flow. See permeate flow recommendations in the Pre-treatment installation, operation, and maintenance manual.
11. Watching pressure gauge on RO station interface kit, let system continue to operate, and pressurize RO storage tank to approximately 50 psi (345 kPa). RO system pump should automatically turn off after 50 psi (345 kPa) is developed at storage tank.
12. Connect a hose to storage tank drain valve to nearby drain.
13. Remove power to RO station.
14. Open pressurized RO holding tank drain valve to flush tank and interconnecting piping.
15. Drain pressurized RO holding tank entirely until water stops flowing.
16. Close pressurized RO holding tank drain valve.
17. Verify air side of bladder tank to validate proper air pressure. Fill or release air as needed.
18. Return power to the RO station. On power-up, the pump will run to re-pressurize the pressurized RO holding tank

Start-up checklist: Pre-treatment

If an item in the Start-up checklist below does not apply to your system, skip to the next item and continue the process.

GENERAL

- ☐ Inspect to insure that no flexible plumbing lines have been kinked or damaged during installation.
- ☐ Read this manual and all other information that was provided with your system.
- ☐ Verify that all field wiring is done according to the instructions in this manual and in the unit wiring diagram.
- ☐ Confirm that proper grounding and an approved earth ground are provided.
- ☐ Ensure all media has been installed into the softener and dechlorinator.

SOFTENER

- ☐ Slowly turn on the water supply and confirm there are no leaks.
- ☐ Add water to the brine tank. 1/3 water (12-inches) water and 2/3 salt.
- ☐ Systems with tank-style carbon filter with control valve: Ensure that elastomeric Drain Line Flow Control restrictor washer is installed correctly in drain outlet plumbing assembly. This is required to prevent overflow and potential carry-over of carbon to the drain system.

See “Dechlorinator” on Page 101 of this manual.

Start-up checklist: RO 400 water treatment system

If an item in the Start-up checklist below does not apply to your system, skip to the next item and continue the process.

- ☐ Confirm that the keypad/display is mounted with its modular cable routed away from high-voltage circuits and connected to the Display connector on the Vapor-logic board.
- ☐ Install cartridge filter and check for leaks. (See "System Piping" on Page 20.)
- ☐ Precharge pressurized RO storage tank to 28 psi (195 kPa).
  Note: This precharge pressure is for pressurized RO storage tank cut-in and cut-out switch points at 30 and 50 psi (210 and 345 kPa) respectively.
- ☐ Turn on the water supply, and confirm there are no leaks.
- ☐ Turn on power to the unit, and confirm the Main menu is displayed on the keypad/display. The display may take several seconds to appear as the controller powers up.
- ☐ Confirm in the Main Menu that the mode is "Auto".
- ☐ Confirm that the inlet pressure is at least 40 psi (276 kPa) on the display.
- ☐ With sufficient water available, the system in Auto mode, and the storage tank pressure less than 30 psi (210 kPa), verify that the pump is activated.
- ☐ Set permeate and concentrate flow meter to desired setting. See Table 81-1.
- ☐ Systems with tank-style carbon filter with control valve: Ensure that elastomeric Drain Line Flow Control restrictor washer is installed correctly in drain outlet plumbing assembly. This is required to prevent overflow and potential carry-over of carbon to the drain system.

  See "Dechlorinator" on Page 101 of this manual.
- ☐ If you experience difficulties, have the keypad/display information available along with the serial number and unit Model, and call DriSteem Technical Support at 800-328-4447.

  Note: Instructions on how to properly care for the freeze protect chemical that is shipped with the system is available on the MSDS sheet at www.dristeem.com.
- ☐ Inspect to insure that no flexible plumbing lines have been kinked or damaged during installation.

WARNING

Tipping hazard
Before installing the 400 series reverse-osmosis system, use supplied leg brackets or lag points to permanently fix the system to the floor and/or adjacent building structure. Failure to install according to instructions can result in serious injury or death. See page 23 for instructions.

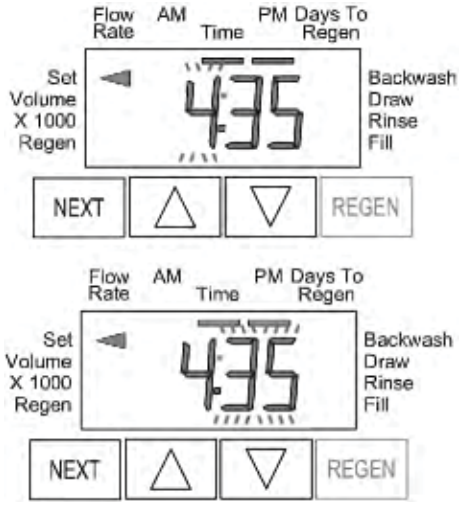
Start-up checklist: High-pressure system

If an item in the Start-up checklist below does not apply to your system, skip to the next item and continue the process.

- ☐ Install cartridge filters and check for leaks. (See "System Piping" on Page 20.)
- ☐ Turn on the water supply, and confirm that the drain valve is closed.
- ☐ Turn on power to the unit, and confirm the Main menu is displayed on the keypad/display. The display may take several seconds to appear as the controller powers up.
- ☐ Confirm high-pressure tubing has been installed and tested for appropriate fitting alignment.
- ☐ I**mportant:** Flush the High-pressure system before proceeding with start-up by placing the system into "Flush" mode to avoid nozzles becoming clogged.
- ☐ Confirm in the Main Menu that the mode is "Auto" and that tank status is "Idle."
- ☐ When "Idle" appears in main menu, confirm that the inlet pressure is at least 30 psi (210 kPa) on the display.
- ☐ In the Status screen, confirm that the Duct Airflow Switch is closed.
- ☐ In the Status screen, confirm that the high limit humidistat input is closed or the high limit transmitter is connected.
- ☐ With sufficient water available, the airflow switch closed, the high limit closed, the safety interlock closed, and the unit getting a call for humidity/cooling, verify that the pump is activated.
- ☐ If you experience difficulties, have the keypad/display information available along with the serial number and unit Model, and call DriSteem Technical Support at 800-328-4447.

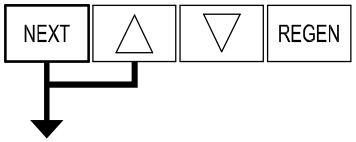
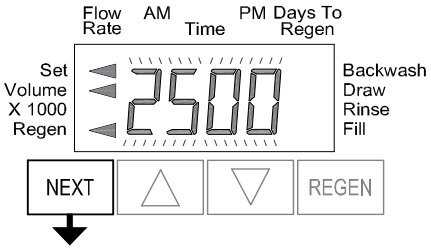
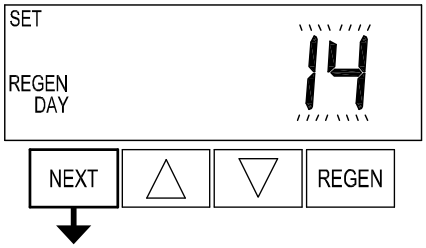
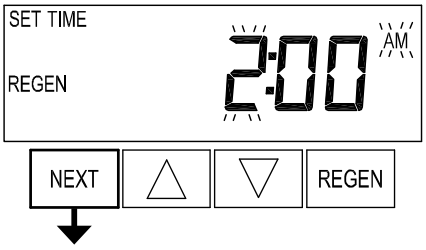
System startup: Softener and dechlorinator

Table 75-1:
Set time of day

Buttons	Description
	1. Press NEXT until the time of day screen is displayed. 2. Press and hold the ↑ or ↓ until the SET indicator is displayed and the hour flashes. 3. Press the ↑ or ↓ until the correct hour is displayed. 4. Press NEXT. The minutes will flash. 5. Press ↑ or ↓ until the correct minute is displayed. 6. Press NEXT to return to the display screen. Note: In the event of a prolonged power outage, time of day flashes, indicating that it needs to be reset. All other information will be stored in memory no matter how long the power outage. Complete the steps above to reset the time of day.

System startup: Softener and dechlorinator

Table 76-1:
Softener start-up

Buttons	Description
	To enter Installer Display press NEXT and ↑ simultaneously for about 5 seconds and release.
	Press ↑ or ↓ to enter the volumetric capacity in gallons. See Table 77-1. Press NEXT to go to the Day Override screen. Press REGEN to return to previous step.
	Day Override: When volume capacity is set to "oFF", sets the number of days between regenerations. When volume capacity is set to AUTO or to a volume, sets the maximum number of days between regenerations. If value set to "oFF", regeneration initiation is triggered solely by volume used. If value is set in days (allowable range from 1 to 28) regeneration initiation will be called for on that day regardless of actual water usage. Set Day Override using ↑ or ↓: • number of days between regeneration (1 to 28); or • "oFF". Press NEXT. Press REGEN to return to previous step.
	Next Regeneration Time (hour): Set the hour of day for regeneration using ↑ or ↓. The default time is 2:00. This display will show "REGEN on 0 GAL" if "on 0" is selected in Set Regeneration Time Press NEXT. Press REGEN to return to previous step.
 **EXIT INSTALLER DISPLAY SETTINGS**	Next Regeneration Time (minutes): Set the minutes of day for regeneration using ↑ or ↓. Press NEXT to exit Installer Display Settings. Press REGEN to return to previous step.

System startup: Softener and dechlorinator

SALT USAGE AND GRAINS CAPACITY SETTINGS

The softener can be set to use different amounts of salt per regeneration. The higher the quantity of salt used, the higher the resin's hardness removing capacity will be. DriSteem recommends using 10lbs/cu. ft. Alternatively, higher salt usage may be set in order to maximize resin capacity between regenerations, or a lower salt usage settings can be used to reduce salt consumption, but this will result in more frequent regeneration.

- To find volume capacity:
  - Find the model and desired salt setting from Table 62-1. DriSteem recommends using 10lbs/cu. ft. to find the total grains capacity for the tank model.
  - Divide the grains capacity by the number of grains per gallon of hardness present in the feed water. (Example: If feed water is 10 grains per gallon hardness, the WS-744 [with 10cu. ft. salt setting] has 14,500 grains capacity. 14,500 ÷ 10 = 1,450 gallon capacity).
- To find brine fill time:
  - Use number from Brine fill time column for the model number in the appropriate salt settings column.

Water softener salt quantity estimate

Total brine tank volume (cubic inches)= $\pi r^2 h$

- r = radius of the brine tank in inches
- h = height of the brine tank in inches

Pounds of salt needed =
2/3 x (Brine Tank Volume / 1728) x 28

Example

For a WS-1465 softener, the pounds of salt needed = 2/3 x (π x 242 x 41 / 1728) x 28 = 200 lbs

Regeneration frequency

If using a water meter to initiate regeneration, take grain capacity of model and divide by inlet grains. This will product volume capacity in gallons. Daily water usage can determine hours or days between regeneration.

Table 77-1:
Capacity (per tank) at various pounds of salt per regeneration settings

Model	15 lbs/cu. ft.			10 lbs/cu. ft. (Recommended)			7.5 lbs/cu. ft.			5 lbs/cu. ft.		
	Grains capacity	Salt used per regen (pounds)	Brine fill time (minutes)	Grains capacity	Salt used per regen	Brine fill time (minutes)	Grains capacity	Salt used per regen	Brine fill time (minutes)	Grains capacity	Salt used per regen	Brine fill time (minutes)
WS-744	15,000	7.5	5.0	14,500	5.0	3.3	12,850	3.8	2.5	10,000	2.5	1.7
WS-844	18,000	9.0	6.0	17,400	6.0	4.0	15,420	4.5	3.0	12,000	3.0	2.0
WS-948	22,500	11.3	7.5	21,750	7.5	5.0	19,275	5.6	3.8	15,000	3.8	2.5
WS-1054	37,500	18.8	12.5	36,250	12.5	8.3	32,125	9.4	6.3	25,000	6.3	4.1
WS-1252	52,500	26.3	17.5	50,750	17.5	11.6	44,975	13.1	8.8	35,000	8.8	5.8
WS-1354	60,000	30.0	20.0	58,000	20.0	13.2	51,400	15.0	10.0	40,000	10.0	6.6
WS-1465	90,000	45.0	30.0	87,000	30.0	19.8	77,100	22.5	15.0	60,000	15.0	9.9
WS-1665	105,000	52.5	35.0	101,500	35.0	23.1	89,950	26.3	17.5	70,000	17.5	11.6
WS-2162	198,000	90.0	60.0	174,000	60.0	40.0	152,400	45.0	30.0	120,000	30.0	20.0
WS-2472	264,000	120.0	80.0	232,000	80.0	53.3	203,200	60.0	40.0	160,000	40	26.7
WS-3072	412,500	188.0	28.5	362,500	125.0	18.9	317,000	94.0	14.2	250,000	63.0	9.5

System startup: Softener and dechlorinator

1. After installation is completed, turn on the supply water to check for leaks.
2. Fully open a cold water faucet downstream of the system.
3. Allow water to run until clear.
4. Close the cold water faucet.
5. Turn off the supply water.
6. The system is now ready for startup.

SYSTEM STARTUP

7. Initiate manual regeneration of the control valve to regenerate: press the REGEN button for three seconds.
8. Ensure drain line flow remains steady for 10 minutes or until clear. Step through the different regeneration cycles by pressing the REGEN button again.
9. Observe regeneration effluent and continue to regenerate until discharge is clear. Steps 7 and 8 may need to be repeated as necessary.
10. Observe that the brine tank is filling during brine tank refill cycle.
11. Install brine tank overflow line. Attach plastic tubing to the fittings from the brine tank and run to an open drain. This drain line will not be under pressure. Do not tie into the backwash drain line. This line should be higher than the normal drain line, and must be a separate line from fitting to drain. It is a safety overflow drain and will not be in use during normal operation.
12. Observe that the valve advances through the different regeneration cycles and ends in service. Step through the different regeneration cycles by pressing REGEN.
13. Fill brine tank with salt. Salt may be sodium chloride (NaCl) or potassium chloride (KCl). Fill tank to only 2/3 full. Note: The brine tank holds a large quantity of salt, so you will not need to refill at frequent intervals. Refilling the brine tank with salt should be performed after your system is successfully installed and has been operating trouble-free. Brine tank should be refilled with salt at least two hours before the next generation is performed.
14. Review Tables 7-6-1 to ensure settings are properly programmed before placing the softener in service.

System startup: RO 400 water treatment system

START-UP PROCEDURE

Check component installation per the layout shown in Figure 40-1 (depending on your model). After all components are installed and connected properly:

1. Perform all applicable "Start-up checklist" items on Page 92.
2. Read and follow instructions in the "Operation" section of *Vapor-logic Installation and Operation Manual*.

   Note: During start-up, do not leave the system unattended.
3. Close the manual valves to both the RO holding tank and all downstream equipment. Open the manual valve leading to the drain.
4. Open the feed water supply valve.
5. Open the system pressure (pump throttle) control valve fully counterclockwise (if applicable). Open the concentrate control valve fully counterclockwise. Close the recycle valve.
6. Put the system into 'Auto' mode. Note inlet water pressure must be at least 40 psi (276 kPa).
7. If incoming pressure is too high, an inlet pressure regulator (not included) may be installed. This should be set at 40 psi (276 kPa).
8. Some fittings may have loosened during shipment. Check for leaks at all tube fittings and threaded joints.
9. Allow the unit to run for at least 30 minutes to flush the preservative solution from the system.
10. Once the preservative solution has been flushed from the system, shut down the system by putting the system into 'Standby' mode on the Vapor-logic keypad and close the manual valve going to the drain. Open the manual valves to both the RO storage tank and downstream equipment.

Important

If the system is not in operation within six months of shipment, it is strongly recommended to use an organic cleaning cartridge prior to performing the start-up checklist to ensure proper operation. See page 106 for information and part number.

System startup: RO 400 water treatment system

1. Put the system back into 'Auto' mode.
2. Adjust the throttle valve to get the specified permeate flow within the range listed in their individual flow columns to equal the combined flow listed. See Table 81-1.
3. Adjust the concentrate and recycle valves until the specified concentrate flow and recycle flow are obtained. It may be necessary to make iterative adjustments to all three valves. See Table 81-1.
   Note: The permeate flow may exceed the minimum value listed depending on water temperature.
4. Test the operation of the pressure switch by slowly closing the inlet water supply valve. The unit should shut off after a short 5 second time delay.
5. Once all the desired flows are set, allow the system to run for approximately 30 minutes. Then record the performance information using the system operation data log on page 111. The values recorded at startup will be important for determining system performance at a later date.
6. Leave system in Auto mode. It will automatically refill the RO holding tank.

OPERATING DO'S AND DONT'S

DO

1. Change the cartridge filters regularly
2. Monitor the system and keep a log daily
3. Run the system, as much as possible, on a continuous basis.
4. Adjust the system recovery to the recommended value

DON'T

1. Permit chlorine in the feed water.
2. Shut down the system for extended periods. If system will be down for more than one month, treat the system with a membrane preservative. See page 107 for instructions.
3. Close the throttle valve completely.
4. Operate the system with insufficient feed flow.

CAUTION

Do not operate the system with the throttle valve closed.

Important:

By setting the feed pressure as low as possible to meet the application requirement, the service life of the pump and RO elements will be optimized. The system should be run continuously when possible, rather than go through frequent start/stop cycles.

CAUTION

Damage to pump

Do not close the throttle valve. Do not operate the pump below minimum combined flow rate (permeate + concentrate + recirculating).

Models 401-402: 4 gpm (15.2 L/min)
Models 403-412: 6 gpm (22.7 L/min)

System startup: RO 400 water treatment system

SHUTDOWN

1. Put the system in 'Standby' mode or remove power. Close the isolation valve if it is installed on the feed line.
2. If the unit is to be shut down for more than one week, a membrane preservative should be used. To accomplish this, perform 30 second flush using cartridge filter insert (see page 79 and 106 for more information). After 30 seconds, press the power button OFF, and close the concentrate valve. This will hold the preservative in the pressure vessel.
3. When the system is restarted after an extended shutdown, follow initial system start-up procedures.

FIGURE 81-1: CONTROL VALVES

CAUTION

To prevent concentrate from precipitating and causing irreversible fouling of the RO membrane, do not operate the system with the concentrate to drain valve completely closed.

Table 81-1:
Recommended concentrate and permeate flow

RO station model	Permeate flow (minimum)		Combined concentrate and recirc	Concentrate flow		Recirc (recycle)*	
	gpm	L/m	gal/liter	gpm	L/m	gpm	L/m
401	1.0	3.8	4.3/16.3	0.9 - 4.3	3.4 - 16.3	0 - 3.4	0 - 12.9
402	1.7	6.4	3.4/12.9	1.6 - 2.6	6.1 - 9.8	0.8 - 1.8	3.0 - 6.8
403	2.9	11.0	4.5/17.0	2.3 - 3.5	8.7 - 13.2	1.0 - 2.2	3.8 - 8.3
404	3.6	13.6	4.0/15.1	1.5 - 3.0	5.7 - 11.4	1.0 - 2.5	3.8 - 9.5
406	5.5	20.8	5.5/20.8	2.0 - 4.0	7.6 - 15.1	1.5 - 3.5	5.7 - 13.2
408	7.2	27.3	6.5/24.6	3.5 - 4.5	13.2 - 17.2	2.0 - 3.0	7.6 - 11.4
412	11.0	41.6	6.5/24.6	3.5 - 4.5	13.2 - 17.2	2.0 - 3.0	7.6 - 11.4

*Higher recirculation increases water efficiency.

Permeate tank pressure loss: 0.5" Polyethylene

Table 82-1:
Permeate tank pressure loss (psig) (0.5" Polyethylene)

Developed length of tubing (ft)	Maximum humidification load (lbs/hr)					
	50	100	150	200	250	300
20	0	0	0	1	1	2
40	0	0	1	2	2	3
60	0	1	1	2	4	5
80	0	1	2	3	5	7
100	0	1	2	4	6	8
125	0	1	3	5	7	10
150	0	2	3	6	9	13
200	1	2	5	8	12	17

NOTE:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options)
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

Table 82-2:
Permeate tank pressure loss (psig) (0.5" Polyethylene)

Developed length of tubing (ft)	Maximum water use (gpm)					
	0.10	0.20	0.30	0.40	0.50	0.60
20	0	0	0	1	1	2
40	0	0	1	2	2	3
60	0	1	1	2	4	5
80	0	1	2	3	5	7
100	0	1	2	4	6	8
125	0	1	3	5	7	10
150	0	2	3	6	9	13
200	1	2	5	8	12	17

NOTE:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

Permeate tank pressure loss: 0.5" Stainless Steel Tube

Table 83-1:
Permeate tank pressure loss (psig) (0.5" Stainless Steel Tube)

Developed length of tubing (ft)	Maximum humidification load (lbs/hr)			
	250	500	1000	1500
20	0	1	3	6
40	0	1	5	11
60	1	2	8	17
80	1	3	11	23
100	1	4	13	28
125	1	5	17	35
150	2	6	20	43
200	2	7	27	57
250	3	9	33	71

NOTE:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

Table 83-2:
Permeate tank pressure loss (psig) (0.5" Stainless Steel Tube)

Developed length of tubing (ft)	Maximum water use (gpm)			
	0.5	1	2	3
20	0	1	3	6
40	0	1	5	11
60	1	2	8	17
80	1	3	11	23
100	1	4	13	28
125	1	5	17	35
150	2	6	20	43
200	2	7	27	57
250	3	9	33	71

NOTE:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

Permeate tank pressure loss: 0.5" Polyvinyl Chloride (PVC) Pipe

Table 84-1:
Permeate tank pressure loss (psig) (0.5" Polyvinyl chloride pipe)

Developed length of tubing (ft)	Maximum humidification load (lbs/hr)			
	250	500	1000	1500
20	0	0	1	2
40	0	0	2	4
60	0	1	3	6
80	0	1	4	8
100	0	1	4	9
125	0	2	6	12
150	1	2	7	14
200	1	2	9	19
250	1	3	11	24

NOTE:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

Table 84-2:
Permeate tank pressure loss (psig) (0.5" Polyvinyl chloride pipe)

Developed length of tubing (ft)	Maximum water use (gpm)			
	0.5	1	2	3
20	0	0	1	2
40	0	0	2	4
60	0	1	3	6
80	0	1	4	8
100	0	1	4	9
125	0	2	6	12
150	1	2	7	14
200	1	2	9	19
250	1	3	11	24

NOTE:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

Permeate tank pressure loss: 0.75 Stainless Steel Tube

Table 85-1:
Permeate tank pressure loss (psig) (0.75" Stainless Steel Tube)

Developed length of tubing (ft)	Maximum humidification load (lbs/hr)											
	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
20	0	0	0	1	1	2	3	4	5	6	7	9
40	0	0	1	2	3	4	6	7	9	12	14	17
60	0	0	1	2	4	6	8	11	14	18	21	26
80	0	0	1	3	5	8	11	15	19	24	29	34
100	0	1	2	4	7	10	14	18	24	29	36	43
125	0	1	2	5	8	12	17	23	30	37	45	53
150	0	1	3	6	10	15	21	28	35	44	54	64
200	0	1	4	8	13	20	28	37	47	59	71	85
250	0	1	5	10	16	25	35	46	59	73	89	107

NOTE:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

Table 85-2:
Permeate tank pressure loss (psig) (0.75" Stainless Steel Tube)

Developed length of tubing (ft)	Maximum water use (gpm)											
	0.5	1	2	3	4	5	6	7	8	9	10	11
20	0	0	0	1	1	2	3	4	5	6	7	9
40	0	0	1	2	3	4	6	7	9	12	14	17
60	0	0	1	2	4	6	8	11	14	18	21	26
80	0	0	1	3	5	8	11	15	19	24	29	34
100	0	1	2	4	7	10	14	18	24	29	36	43
125	0	1	2	5	8	12	17	23	30	37	45	53
150	0	1	3	6	10	15	21	28	35	44	54	64
200	0	1	4	8	13	20	28	37	47	59	71	85
250	0	1	5	10	16	25	35	46	59	73	89	107

NOTE:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

Permeate tank pressure loss: 0.75" Polyvinyl Chloride (PVC) Pipe

Table 86-1:
Permeate tank pressure loss (psig) (0.75" Polyvinyl chloride pipe)

Developed length of tubing (ft)	Maximum humidification load (lbs/hr)											
	250	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
20	0	0	0	0	0	1	1	1	2	2	2	3*
40	0	0	0	1	1	1	2	3	3	4	5	6
60	0	0	0	1	1	2	3	4	5	6	7	9
80	0	0	0	1	2	3	4	5	6	8	10	12
100	0	0	1	1	2	3	5	6	8	10	12	14
125	0	0	1	2	3	4	6	8	10	12	15	18
150	0	0	1	2	3	5	7	9	12	15	18	22
200	0	0	1	3	4	7	9	13	16	20	24	29
250	0	0	2	3	6	8	12	16	20	25	30	36

NOTES:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

* Cells signify pipe velocities over 7 ft/sec and are not recommended.

Table 86-2:
Permeate tank pressure loss (psig) (0.75" Polyvinyl chloride pipe)

Developed length of tubing (ft)	Maximum water use (gpm)											
	0.5	1	2	3	4	5	6	7	8	9	10	11
20	0	0	0	0	0	1	1	1	2	2	2	3*
40	0	0	0	1	1	1	2	3	3	4	5	6
60	0	0	0	1	1	2	3	4	5	6	7	9
80	0	0	0	1	2	3	4	5	6	8	10	12
100	0	0	1	1	2	3	5	6	8	10	12	14
125	0	0	1	2	3	4	6	8	10	12	15	18
150	0	0	1	2	3	5	7	9	12	15	18	22
200	0	0	1	3	4	7	9	13	16	20	24	29
250	0	0	2	3	6	8	12	16	20	25	30	36

NOTES:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

* Cells signify pipe velocities over 7 ft/sec and are not recommended.

Permeate tank pressure loss: 1.0 Stainless Steel Tube

Table 87-1:
Permeate tank pressure loss (psig) (1.0 Stainless Steel Tube)

Developed length of tubing (ft)	Maximum humidification load (lbs/hr)										
	2500	3000	3500	4000	4500	5000	5500	6000	7000	8000	9000
20	0	1	1	1	1	2	2	2	3	4*	5*
40	1	1	2	2	3	4	4	5	7	8	10
60	1	2	3	3	4	5	6	7	10	13	16
80	2	3	4	5	6	7	8	10	13	17	21
100	2	3	5	6	7	9	10	12	16	21	26
125	3	4	6	7	9	11	13	15	20	26	33
150	4	5	7	9	11	13	16	18	25	31	39
200	5	7	9	12	14	18	21	25	33	42	52
250	6	9	11	15	18	22	26	31	41	52	65
300	7	10	14	17	22	26	31	37	49	63	78
400	10	14	18	23	29	35	42	49	66	84	104

NOTES:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

* Cells signify pipe velocities over 7 ft/sec and are not recommended.

Table 87-2:
Permeate tank pressure loss (psig) (1.0 Stainless Steel Tube)

Developed length of tubing (ft)	Maximum water use (gpm)										
	5	6	7	8	9	10	11	12	14	16	18
20	0	1	1	1	1	2	2	2	3	4*	5*
40	1	1	2	2	3	4	4	5	7	8	10
60	1	2	3	3	4	5	6	7	10	13	16
80	2	3	4	5	6	7	8	10	13	17	21
100	2	3	5	6	7	9	10	12	16	21	26
125	3	4	6	7	9	11	13	15	20	26	33
150	4	5	7	9	11	13	16	18	25	31	39
200	5	7	9	12	14	18	21	25	33	42	52
250	6	9	11	15	18	22	26	31	41	52	65
300	7	10	14	17	22	26	31	37	49	63	78
400	10	14	18	23	29	35	42	49	66	84	104

NOTES:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

* Cells signify pipe velocities over 7 ft/sec and are not recommended.

Permeate tank pressure loss: 1.0" Polyvinyl Chloride (PVC) Pipe

Table 88-1:
Permeate tank pressure loss (psig) (1.0 Polyvinyl chloride pipe)

Developed length of tubing (ft)	Maximum humidification load (lbs/hr)												
	2500	3000	3500	4000	4500	5000	5500	6000	7000	8000	9000	10000	11000
20	0	0	0	0	0	1	1	1	1	1	2*	2*	3*
40	0	0	1	1	1	1	1	2	2	3	4*	4*	5*
60	0	1	1	1	1	2	2	3	3	4	5*	6*	8
80	1	1	1	2	2	2	3	3	4	6	7	9	10
100	1	1	2	2	2	3	4	4	6	7	9	11	13
125	1	1	2	2	3	4	4	5	7	9	11	13	16
150	1	2	2	3	4	4	5	6	8	11	13	16	19
200	2	2	3	4	5	6	7	8	11	14	18	22	26
250	2	3	4	5	6	7	9	10	14	18	22	27	32
300	2	3	5	6	7	9	11	13	17	21	27	32	39
400	3	5	6	8	10	12	14	17	22	29	36	43	51

NOTES:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

* Cells signify pipe velocities over 7 ft/sec and are not recommended.

Table 88-2:
Permeate tank pressure loss (psig) (1.0 Polyvinyl chloride pipe)

Developed length of tubing (ft)	Maximum water use (gpm)												
	5	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**14**	**16**	**18**	**20**	**22**
20	0	0	0	0	0	1	1	1	1	1	2*	2*	3*
40	0	0	1	1	1	1	1	2	2	3	4*	4*	5*
60	0	1	1	1	1	2	2	3	3	4	5*	6*	8*
80	1	1	1	2	2	2	3	3	4	6	7	9	10
100	1	1	2	2	2	3	4	4	6	7	9	11	13
125	1	1	2	2	3	4	4	5	7	9	11	13	16
150	1	2	2	3	4	4	5	6	8	11	13	16	19
200	2	2	3	4	5	6	7	8	11	14	18	22	26
250	2	3	4	5	6	7	9	10	14	18	22	27	32
300	2	3	5	6	7	9	11	13	17	21	27	32	39
400	3	5	6	8	10	12	14	17	22	29	36	43	51

NOTES:
- Shaded cells indicates pressure loss is too great (<25 psig at end user, based on pressurized or AT RO tank options).
- Outlet condition of pressurized storage tank or permeate forwarding pump assumed to be 30 psig.
- Developed length doesn't include vertical (static pressure drop).
- Vertical contribution to pressure loss is 1 psi per 2.31' of vertical pipe.

* Cells signify pipe velocities over 7 ft/sec and are not recommended.

System startup: High-pressure system

START-UP PROCEDURE

Check component installation per the layout shown in Figures 40-1 and 41-1 (depending on your model). After all components are installed and connected properly:

1. Perform all applicable "Start-up checklist" items on Page 93.
2. Read and follow instructions in the Vapor-logic section and "Operation" section of *Vapor-logic Installation and Operation Manual*.
   Note: During start-up, do not leave the system unattended.
3. Ensure that pump station unloader valve is operating at correct pressure. See "Confirming unloader valve pressure setting" on page 90.

SEQUENCE OF OPERATION

1. Water stored in the pressurized RO storage tank is pumped by the high-pressure pump, which increases the water pressure in the high-pressure distribution lines to approximately 1000 psig (6.9 MPa).
2. On a demand from the control system, a solenoid valve opens and lets pressurized water flow to the atomizing nozzles.
3. Inside each atomizing nozzle is a mini-turbine that fragments water before it is forced through the nozzle orifice.
4. These very fine fragmented droplets quickly evaporate and are absorbed into the air, increasing the relative humidity and cooling the air.

Start-up

CONFIRMING UNLOADER VALVE PRESSURE SETTING

1. Ensure that there is RO water in pressurized RO holding tank.
2. Ensure that pump station inlet water valve is open, and that water can flow to high-pressure pump.
3. Ensure system is bled and flushed.
4. Bump the pump/motor for three seconds while slowly unscrewing pump end plugs (see Figure 90-2). Bleed until only water is coming out.

NOTE: Do not unthread too much at a time.

5. Close high-pressure outlet valve on pump station.
6. Using pump station keypad/display, enter Test Run mode in Test Run section of Diagnostics menu.
7. Set Test Run duration for 60 seconds.
8. While system is running and recirculating, pump pressure should be in the range of 1200 to 1300 psi (8.3 to 8.9 MPa). If outside this range, use procedure below to set unloader valve pressure to 1225 psi (8.5 MPa):
   a. Loosen the locknut on end of unloader valve (see Figure 90-1).
   b. If necessary, start a new 60-second Test Run duration (Step 4 above).
   c. Using a metric hex key wrench, turn hex key screw on end of unloader valve until pressure reading on pump is approximately 1225 psi (8.5 MPa).
   d. Tighten locknut that was loosened in Step a.
   e. Rerun Test mode to ensure output valve opens at set point.
   f. Put system in Auto mode.

NOTE: The unloader is designed to minimize noise. The design considers flow rate range to unloader model, sequence of operation to minimize pump pressure spike to opened drain valve, and the use of flexible hoses. However, some noise will occur when the unloader is in transition.

FIGURE 90-1: UNLOADER VALVE ON PUMP STATION

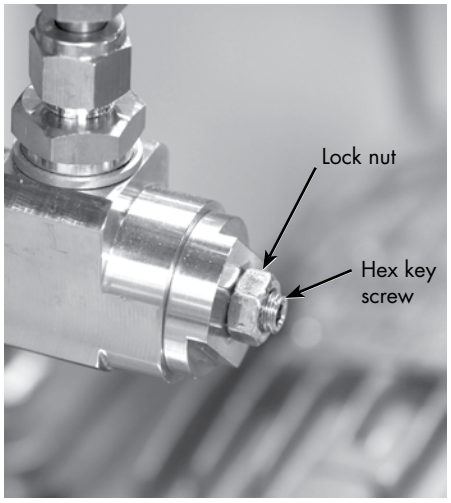


FIGURE 90-2: PUMP PLUG

Start-up

TEST OPERATION

Using the keypad/display or web interface, place the zone controllers (if DriSteem controlled) and pump station in Auto mode. For each zone, perform the following procedure:

1. Create a call for humidity by either increasing RH set point or overriding BMS with a 100% control signal.
   - If using a DriSteem-supplied RH transmitter, increase set point until demand is over 100%.
   - If control signal by others, supply a 100% demand signal.
   - To test system operation, you may need to bypass high limit and airflow proving switch. In such cases, test run will proceed regardless of conditions in zones. To avoid saturation, keep test runs brief, and return safety devices to their proper configurations.
2. Monitor dispersion nozzle performance, and watch for leaks.
3. If a leak is found:
   a. Remove demand signal, and put zone in Standby mode.
   b. Tighten any loose connections (including nozzles).
   c. Return zone to Auto mode, and restart high-pressure pump.
   d. If a nozzle leak persists, replace nozzle or nozzle assembly.
4. Adjust set point or demand signal to desired value.
5. After all zones have been tested, set pump station in Auto mode.
6. Put system in Auto mode.

Hydrotrue Softener and RO checklist

Visit date _____
Model # _____
Serial # _____
Tag # _____

Job site representation _____
Job name _____
Program code _____
DriSteem rep _____

Dechlorinator/softener system (RO by DriSteem only)

- ☐ Water treatment system must be purged and free of leaks
- ☐ Verify power supply to all equipment
- ☐ Verify inlet water pressure is 60-90 psi
- ☐ Set the menu item "Regenerate Refill" to "OFF"
- ☐ Verify backwash sequence is calibrated
- ☐ Verify drain line is run to floor drain
- ☐ Slowly open the inlet valve to permit flow of water to tank
- ☐ Completely open inlet valve when tank is filling
- ☐ Show the backwash procedure – Proceed with a backwash as noted the Dechlorinator IOM manual

Water softener and brine tank operation and maintenance

- ☐ Show how to input/adjust setup settings
- ☐ Inspect venturi and brine tank for any blockage
- ☐ Verify brine tank water over flow line is ran to floor drain
- ☐ Verify water softener drain line is ran to floor drain
- ☐ Verify and maintain proper salt and water levels in brine tank
- ☐ Slowly open the inlet to permit first tank to fill with water
- ☐ Verify backwash sequence is calibrated
- ☐ Adjust backwash sequence in relation to the water hardness
- ☐ Ensure flow meter cable is connected correctly to the controller
- ☐ Proceed with a first and complete backwash as noted in IOM manual (1 for each tank)
- ☐ Slowly open the inlet to permit second tank to fill with water
- ☐ Verify backwash sequence is calibrated
- ☐ Adjust backwash sequence in relation to the water hardness
- ☐ Ensure flow meter cable is connected correctly to the controller
- ☐ Proceed with a second and complete backwash

RO pump station (RO by DriSteem only)

Permeate liquid filled flowmeter gauge	_____ GPM
Concentrate liquid filled flowmeter gauge	_____ GPM
Recirc liquid filled flowmeter gauge	_____ GPM
Filter-in pressure gauge	_____ PSI
Filter-out pressure gauge	_____ PSI
Concentrate pressure gauge	_____ PSI
System pressure gauge	_____ PSI

- ☐ Verify the distance and diameter of piping between RO station permeate output and the pressurized tank kit permeate input should match Table 46-1.
- ☐ Verify air side of bladder tank has full charge of air, if applicable.
- ☐ Inspect connections to RO pump,verify water lines are connected and free of cracks and leaks
- ☐ Ensure tap water inlet pressure is above 5 psi during RO operation
- ☐ Ensure water is flowing from both the pure water (permeate) and rejected water (concentrate) outlets
- ☐ Proceed with purging the presence of air from the membranes
- ☐ Fill RO water storage tank
- ☐ Close concentrate valve to correct RO pressure (~125psi)
- ☐ When the RO tank is filled, stop RO pump and proceed with completely draining the first fill of tank
- ☐ Verify proper operation of the ultra-violet lamps (if applicable)
- ☐ Start RO pump for new fill cycle of RO tank
- ☐ Verify and maintain pressure between 30-50 psi in purified water holding tank
- ☐ Check the stop-and-go set point for purified water holding tank
- ☐ Check the low pressure set point for an alarm

Adiatec high-pressure atomizing system checklist

High-pressure pump station

☐ Level high-pressure pump station using adjustable feet

Instrument panel gauges and operating ranges

_____ PSI RO inlet

High-pressure dispersion gauge reading at full operation

_____ PSI

Stainless steel pumps are water cooled therefore do not have an oil level to maintain

High-pressure dispersion

How many stages per zone _____

How many rows of nozzles per stage _____

How many zones per atomization pump station unit _____

☐ Final evaporation media/mist eliminator (per drawing)

☐ Verify the nozzles maintain proper direction as related to the air flow

☐ Nozzles are hand tight and secure to manifold and free of leaks

☐ Make sure nozzle caps are removed before starting the unit

☐ If parts are replaced the high-pressure lines must be flushed and drained

☐ Do not drain lines during humidification season - always maintain pressure in the system

Controls and control cabinet readings and operation

☐ Verify operation of main cut-off

☐ Verify the touchscreen display is on and reading

☐ Run through the key pad menus and functions

☐ Verify the supply and return sensors readings are accurate and corresponds to each AHU

☐ Verify installation readings of flow switch and zone valves

☐ Check that the solenoid valves correspond to the correct AHU

☐ Verify the DDC/BAS control network is communicating

☐ Verify the demand control reading is accurate

Adiatec high-pressure sequence of operation

RO 200 SERIES WATER TREATMENT SYSTEM

1. Demand signal generated by pressure setpoint (30-50 psig) or float switch in the RO storage tank.
2. RO system opens supply water solenoid valve.
3. RO flushes for default 30 seconds, sends water to drain (user can change).
4. RO turns on the pump.
5. RO begins to fill permeate storage tank.
6. RO recognizes tank is full through pressure switch (50 psig) and turns off pump, goes to idle mode.
7. RO flushes for default 300 seconds, sends water to drain (user can change).
8. RO monitors inlet pressure to protect pump, permeate TDS to alarm (signifies need to clean/replace membranes), tank pressure (to signal a start/stop condition), water temperature.
9. RO has inactivity flush sequence that is user defined but defaulted for every 72 hours of inactivity (helps prevent biological growth by keeping water moving).
10. The RO system drains the storage tank and goes through a normal fill cycle as described above.

HIGH-PRESSURE SYSTEM PUMP STATION

1. Demand signal generate by zone controller (zone wants to open valves so tells pump to make pressure) and passed back through Ethernet switch to the pump station.
2. High pressure pump turns on and is controlled by a VFD.
3. VFD maintains outlet pressure of 1,000 psig via a pressure transducer.
4. VL displays demand and output percentages.
5. Pump station monitors inlet pressure and alarms off below 5 psig to protect the water cooled pump.
6. Pump station has internal recirculation, through an unloader valve, when all downstream zone valves are closed.
7. Pump station monitors water temperature and activates a solenoid valve to drain if it gets above 110F setpoint.
8. Pump has a run time to signal pump maintenance at 1,000 hours.
9. Pump station after a period of no demand, pump recirculates internally for variable seconds (defined system size dependent, valve type, and communications timing) via an unloader valve.
10. VFD is at minimum RPM's to minimize recirculation.
11. Allows the system to react effectively for precise control.
12. Pump turns off (pump model variable time).
13. High-pressure system has inactivity flush sequence that is user defined but defaulted for every 72 hours of inactivity (helps prevent biological growth by keeping water moving).
14. Flushes for 34-68 minutes depending on system volume/size.

Adiatec high-pressure sequence of operation

HIGH-PRESSURE SYSTEM ZONE CONTROLLER

1. RH transmitter sends signal to zone controller (Or any of our other demand types).
2. Zone controller reads signal and compares to user defined setpoints.
3. If the RH is below setpoint, the zone sends signal to pump station there is demand.
4. The zone controller energizes the zone inlet valve to the open position (NC valve).
5. The zone will pulse the valve proportional to the demand until the setpoint is met. When the valve is closed it will depressurize depending on valve type (pump model variable time).
6. Zone controller will communicate 0% demand to the pump station.
7. Zone controller will initiate a flush at 72 hours of inactivity to purge any stagnant water, it will flush for 30 minutes.

Note:

- If reset is more frequent than air changes, the control of the high-pressure zone dispersion will chase the setpoint.
- The high-pressure zone will control based on the transmitter location and overall system performance can be affected by equipment downstream (i.e. VAV boxes with reheat, mechanical cooling coils, etc).

Fan-assist dispersion:

1. Fan will turn on as demand is called for.
2. The valve will open 10 seconds later to humidify.
3. The fan will turn off after 30 seconds of no demand.
4. Fan-assist will flush periodically in small increments to remove stagnant water. It will turn over the volume every 24 hours.

HIGH-PRESSURE SYSTEM RECLAIM SYSTEM

1. Condensate pump float switch closes and the pump turns on to send water back to a reclaim storage tank.
2. The storage tank is filled until the pump float switch closes.
3. Overflow from the reclaim storage tank is sent to an open drain via an overflow port.
4. Upon the activation of the tank float switch the city supply feed valve will close and the reclaimed storage tank supply valve will open to send water to RO system .
5. Water in the storage tank is circulated continuously with the forwarding pump .
6. As long as water is circulating, a tank float switch, will initiate the UV light.

Note:

- Condensate pump has end-switch for alarm, if desired.

Keypad/display Home screens,Test outputs, Test run

Vapor-logic returns to the Home screen on the keypad/display after a user-defined period of idleness. The Home screen displays the items most frequently viewed.

FIGURE 96-1: RO STATION KEYPAD/ DISPLAY HOME SCREEN

CHANGING MODE

Mode can be changed from the Home screen. Press the Up or Down arrow key until the Mode is highlighted, press Enter, press Up or Down arrow key to change value, press Enter to confirm. All other parameters shown on the Home screen are for viewing only and cannot be changed. Go to the Setup menu to change these items.

CONTROLLER DISPLAY ACTIVITY DEFINITIONS (FIGURE 96-1)

RO flush: System is performing an RO flush.

Idle: No demand, or an active alarm is preventing operation.

Filling: System is supplying high-pressure water to meet demand.

Full: Storage tank is full, system not running.

TEST OUTPUTS

When completing an installation or repair, cycle all outputs, to verify operation. Go to the test outputs section of the Diagnostics menu and scroll through each connected output to verify operation. During testing, the unit mode changes to Standby and the tank status changes to Test.

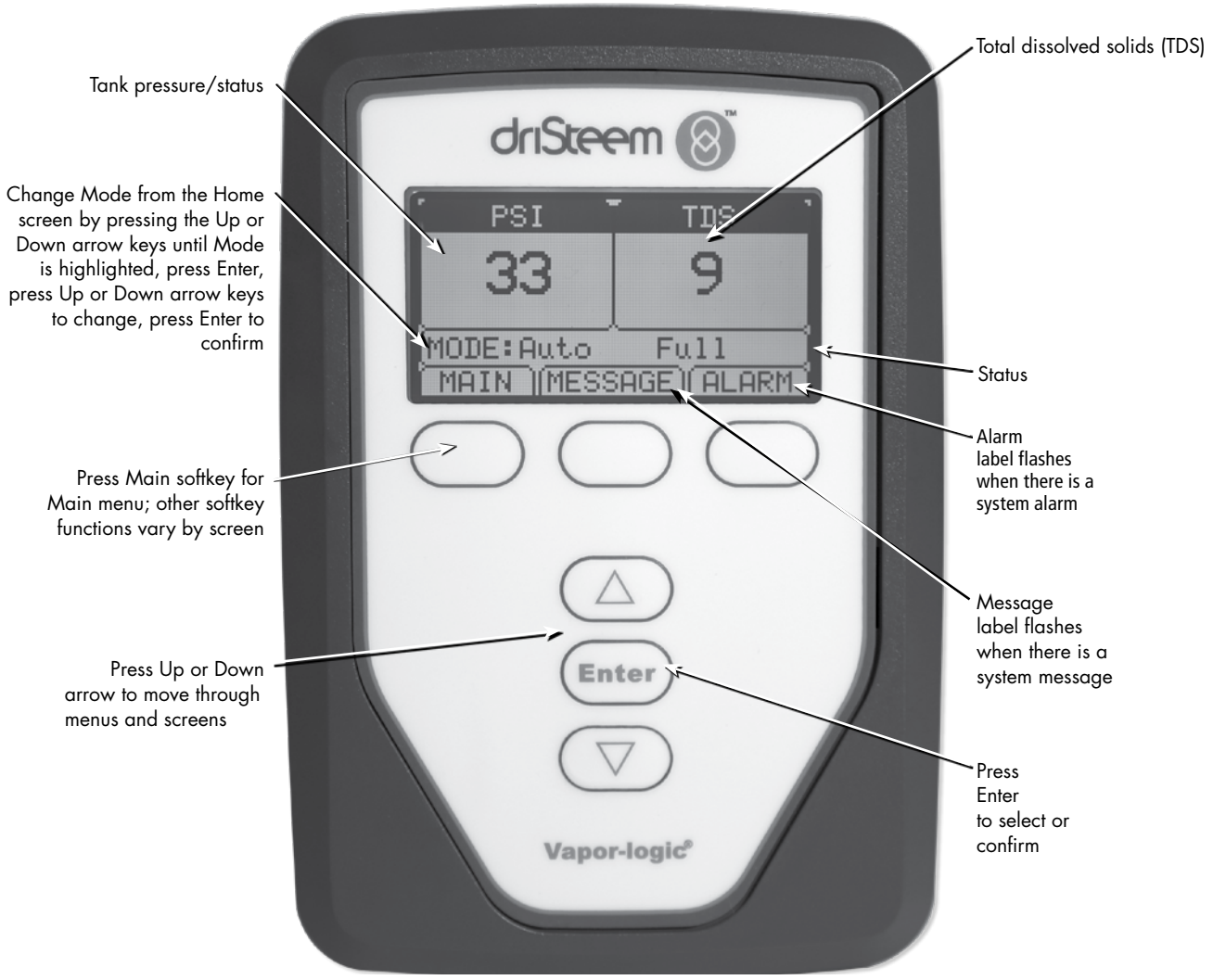
TEST RUN

Vapor-logic has a test run capability to confirm system functionality. This capability allows a technician to simulate a demand when there isn't one (such as when performing routine maintenance). To confirm functionality, go to the test run section of the Diagnostics menu. Set system demand percent and set test run time duration. During testing, the unit mode changes to Standby and the tank status changes to Test.

Vapor-logic keypad/display:RO water treatment system

FIGURE 97-1: USING THE VAPOR-LOGIC KEYPAD/DISPLAY

Typical Home screen



Vapor-logic keypad/display:High-pressure system

CONNECTING TO THE NETWORK

The High-Pressure System controller and zone controllers are configured to be connected to a router with a DHCP server available. The controllers are configured to automatically go out and find IP addresses on the network. If a DHCP server is not available, the controllers will need to be configured with a unique static IP address. Go to Setup/Communications/Network IP address on the keypad/display to change the IP address.

WEB INTERFACE COMMUNICATION

Utilizing the Vapor-logic Web interface is optional. The High-Pressure System can be operated using the keypad/display and/or the Web interface. When using the Web interface, the system can be accessed through a network.

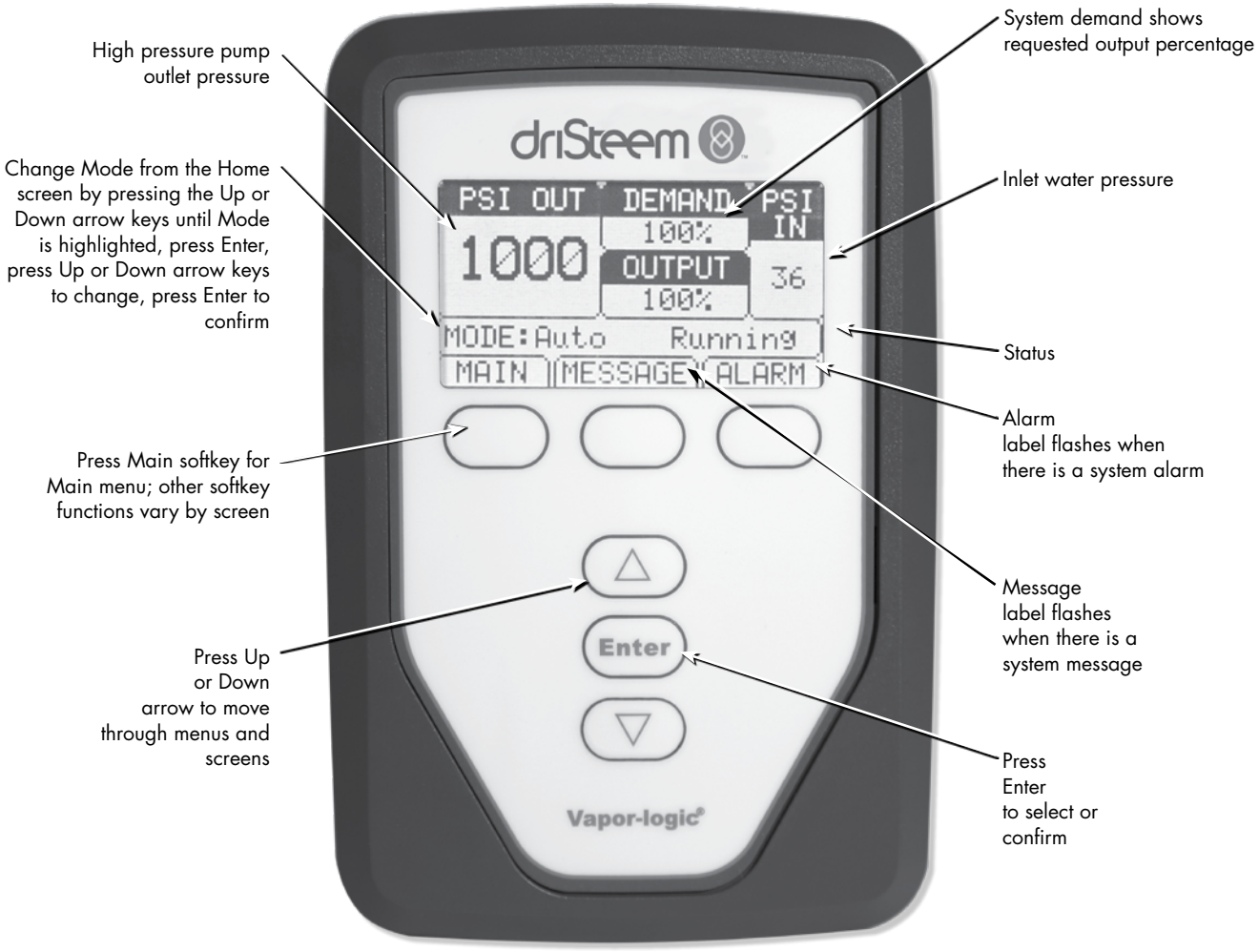
Static IP addresses

See the Vapor-logic Controller Installation and Operation Manual shipped with the High-Pressure System for more information about configuring IP addresses.

High-pressure system keypad/display

FIGURE 99-1:USING THE VAPOR-LOGIC KEYPAD/DISPLAY

Typical Home screen



Keypad/display Home screens, Test outputs, Test run

FIGURE 100-1: PUMP STATION KEYPAD/ DISPLAY HOME SCREEN

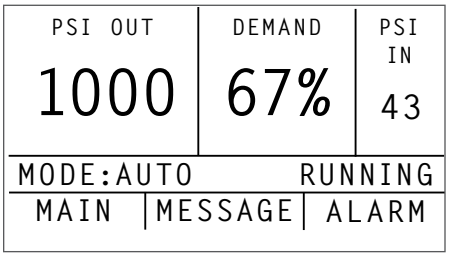
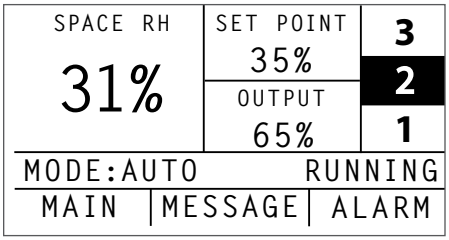


FIGURE 100-2: ZONE CONTROLLER KEYPAD/DISPLAY HOME SCREEN



Vapor-logic returns to the Home screen on the keypad/display after a user-defined period of idleness. The Home screen displays the items most frequently viewed.

CHANGING MODE

Mode can be changed from the Home screen. Press the Up or Down arrow key until the Mode is highlighted, press Enter, press Up or Down arrow key to change value, press Enter to confirm. All other parameters shown on the Home screen are for viewing only and cannot be changed. Go to the Setup menu to change these items.

PUMP STATION CONTROLLER DISPLAY ACTIVITY DEFINITIONS (FIGURE 100-1)

RO flush: System is performing an RO flush.

Idle: No demand, or an active alarm is preventing operation.

Running: System is supplying high-pressure water to meet demand.

Alarm: System has an active alarm.

ZONE CONTROLLER DISPLAY ACTIVITY DEFINITIONS (FIGURE 100-2)

Zone flush: System is performing a zone flush.

TEST OUTPUTS

When completing an installation or repair, cycle all outputs, to verify operation. Go to the test outputs section of the Diagnostics menu and scroll through each connected output to verify operation. During testing, the unit mode changes to Standby and the tank status changes to Test.

TEST RUN

Vapor-Logic has a test run capability to confirm system functionality. This capability allows a technician to simulate a demand when there isn't one (such as when performing routine maintenance). To confirm functionality, go to the test run section of the Diagnostics menu. Set system demand percent and set test run time duration. During testing, the unit mode changes to Standby and the tank status changes to Test.

Hydrotrue water treatment system components

GAUGES AND VALVES

Verify proper operation by visual inspection during operation.

DECHLORINATOR

1. Visually inspect components for leaks or breakage.
2. Monthly, have a water sample taken after dechlorinator to check for chlorine. If 0.2 ppm or greater, replace carbon media.
3. Dechlorinator is typically backwashed once per week to remove debris and to fluff the bed.
4. Dechlorinator backwash duration is typically 8-15 minutes.

WATER SOFTENER

1. Check brine tank salt level at least weekly. Maintain salt level above the half-full mark at all times.

   Note: DriSteem recommends using pulverized salt because it dissolves easily.
2. Visually inspect all components for leaks or breakage.
3. Annually, have a water sample taken downstream from water softener to check for hardness. If water hardness is 15 ppm or greater, make sure there is salt in brine tank. If there is salt, and water hardness if 15 ppm or greater, contact DriSteem for water softener resin replacement.
4. Water softener is regenerated either daily from a fixed time or uses a water meter throughput signal based on capacity. Frequency according to water meter is variable based on load.
5. Water softener regeneration is typically 1.25-1.5 hours.

PRESSURIZED RO HOLDING TANK

1. Precharge pressurized RO holding tank with air to 26 to 28 psi (180 to 195 kPa) using Schrader valve on top of the tank.
2. Set pressurized RO storage tank to cut in at 30 psi (210 kPa) and cut out at 50 psi (345 kPa). See instructions that shipped with Pressurized RO holding tank and RO station interface kit.
3. Check cut-in and cut-out pressures as follows:

   Drain pressurized RO holding tank until RO generation cycle begins. Verify that starting and stopping pressures are approximately 30 psi and 50 psi (210 and 345 kPa) respectively.

High-pressure system components

HIGH-PRESSURE PUMP

The all 316 SST high-pressure pump is designed for a minimum of 8000 hours of maintenance-free run time.

If the high-pressure pump fails to meet demand, contact DriSteem to rebuild or replace the high-pressure pump.

GAUGES AND VALVES

Verify proper operation by visual inspection during operation.

HIGH-PRESSURE PIPING SYSTEM

Every three months, verify that all joints are watertight.

SEDIMENT FILTER

Change filter if pressure drops below 10 psi, the minimum inlet pressure, or every one year, whichever comes first. After filter change out, bleed air from line/pump to return to normal operation.

CAUTION

Avoid forcing filter into housing. Forcing the filter can cause a decrease in flow due to channel being limited (See Figure 102-1).

NOZZLES

Nozzles are maintenance-free for many years when used with properly treated water.

Inspect every month to ensure proper operation:

1. **O-rings.** Nozzles are watertight because of o-rings located between nozzle and adapter. Inspect to ensure water tightness. When replacing, hand-tighten until nozzle seats on adapter. Never use tools, besides a torque wrench, to tighten nozzles, if O-ring is over-compressed it can crack or bend, causing leakage. Make sure all components are free of any dust, oil or grease when you install them. Flush and drain high-pressure lines after replacing parts.
2. **Filters.** If nozzles are not dispersing water, nozzle filter could be clogged. Remove nozzle filter and replace filter. Make sure replacement parts are free of any dust, oil or grease when installing them. Flush and drain high-pressure lines after replacing parts.

CAUTION

Over-tightened nozzles can cause O-rings to crack or bend leading to leakage. Only tighten nozzles by hand. Apply torque wrench to $20lb_f$-in.

FIGURE 102-1: DAMAGED FILTER

Hydrotrue water treatment maintenance information

MAINTENANCE TIPS

Maintain proper operating conditions:

- Do not exceed 60-90 psi (414-620 kPa)on the system inlet pressure gauge.
- Do not over use recycle flow. This can cause premature scaling of the membrane. A proper concentrate flow is required for a long membrane life. See page 16 for maximum recycle flow.
- To ensure no chlorine reaches the RO membranes, test the water from your dechlorinator periodically for chlorine break through.

WHEN TO CHANGE SEDIMENT FILTERS

Sediment filters should be changed regularly to maintain proper pressure and flow.

Change the filters when the difference between filter pressure gauge increases by 10 psi over the initial pressure difference. For example, if initial readings are 60 psi in and 58 psi out, the difference is 2 psi. Therefore, when that difference reaches 12 psi, it is time to replace the sediment and carbon cartridges.

WHEN TO CLEAN MEMBRANES

In normal operation, the membrane in reverse osmosis elements can become fouled by mineral scale, biological matter, and grime. These deposits build up during operation until it causes loss in water output or loss of salt rejection, or both. Elements should be cleaned or replaced whenever the water output rate drops by 10 percent from its initial flow rate (the flow rate established during the first 24 to 48 hours of operation) or when TDS in the product water (permeate) rises above 50 ppm. Use the factory mounted TDS sensor located on the right side of the system.

It should be noted that the water output rate will drop if feed water temperature decreases (about 1.5% per °F). This is normal and does not indicate membrane fouling. A malfunction in the pretreatment, pressure control or pump can cause a drop in feed water delivery pressure, feed water flow, product water output, or an increase in salt passage. If such adjustments are needed, the element may not require cleaning.

MEMBRANE CLEANING AND PRESERVATIVE CARTRIDGES

- Clean and preserve membranes without removing them from your system
- Reduce downtime
- Maintain your system performance at a higher level
- Prolong membrane life by regular use of cleaning cartridge

FIGURE 103-1: SEDIMENT FILTER

DriSteem replacement part

- 2½" x 20" - Model 401-404 (part number: 550026-002)
- 4" x 20" - Model 406-412 (part number: 550026-003)

Maintenance continued

SEDIMENT PRE-FILTER CARTRIDGE

WHEN TO CHANGE SEDIMENT PREFILTER CARTRIDGE

Sediment filters should be changed regularly to maintain proper pump pressure and flow. If the pressure drop across the cartridge filter (as indicated by the differential between the filter inlet and filter outlet pressure gauges) increases by 10 psi, the sediment filters should be changed.

CHANGING CARTRIDGE FILTERS

1. Put the system into 'Standby' mode and shut down the RO system.
2. Close inlet supply valve.
3. Un-assemble the filter housing (twist the sump counter-clockwise).
4. Remove and inspect the cartridge. Replace as needed.
5. Before replacing housing, insure that O ring seal is lubed and placed in groove of housing. Inspect seal and replace as needed.
6. Assemble housing (turn the sump clockwise into the cap until tight).

Maintenance continued

MEMBRANE CLEANING IN THE RO SYSTEM

Membrane cleaning cartridges:

- Clean membranes without having to remove them from the RO system
- Reduce downtime
- Maintain the system performance at a higher level
- Prolong membrane life by regular use of cleaning cartridges

HOW DOES IT WORK?

NOTE: Clean monthly to obtain optimum results.

1. Exchange the system's sediment filter with a cleaning cartridge.
2. Follow the instructions.
3. Restart the system.
4. Repeat the process if required.

SCALE CLEANING CARTRIDGE

The scale cleaning cartridge is for removal of mineral scale and build-up.

CLEANING PROCEDURE

1. Put the system into 'Standby' mode and shutdown the RO system.
2. Disconnect permeate line and divert to drain before any cleaning cartridge is installed.
3. Remove the sediment filter from the pre-filter housing.
4. Replace the sediment filter with the cleaning cartridge and assemble into the filter housing.
5. Turn the system ON and put into 'Auto' mode. After 30-40 seconds, shut down the system.

   OPTIONAL: Instead of time, use one of the following criteria:

   a. Run the system until the pH of the concentrate is almost the same as the cleaning solution (pH=3)

   b. Permeate rate for the system drops to a very low value.
6. Let the membrane(s) soak in the cleaning solution overnight.
7. Remove the empty cleaning cartridge and replace it with the original filter.
8. Restart the system. Direct the permeate to drain for five minutes.
9. Go back to normal operations.

FIGURE 105-1: 20 INCH BIG BLUE SCALE CLEANING CARTRIDGE

DriSteem replacement part

- 2½" x 20" - Model 401-404 (part number: 550045-001)
- 4" x 20" - Model 406-412 (part number: 550045-201)

CAUTION

Handle all chemicals with care. Wear protective clothing and eye protection.

CAUTION

The system must be flushed thoroughly between acid and alkaline cleaning.

Maintenance continued

ORGANIC CLEANING CARTRIDGE

The organic cleaning cartridge is for removal of organics/fouling.

CLEANING PROCEDURE

1. Put the system into 'Standby' mode and shutdown the RO system.
2. Disconnect permeate line and divert permeate to drain during cleaning.
3. Remove the sediment filter from the filter housing.
4. Replace the sediment filter with the cleaning cartridge and assemble into the filter housing.
5. Turn the system ON. After 30-40 seconds, shut down the RO system.
   OPTIONAL: Instead of time, use one of the following criteria:
   a. Run the system until the pH of the concentrate is almost the same as the cleaning solution (pH=10-12)
   b. Permeate rate for the system drops to a very low value.
6. Let the membrane(s) soak in the cleaning solution overnight.
7. Remove the empty cleaning cartridge and replace it with the original filter.
8. Restart the system. Direct the permeate to drain for five minutes.
9. Go back to normal operations.

FIGURE 106-1: 20 INCH BIG BLUE ORGANIC CLEANING CARTRIDGE

DriSteem replacement part
- 2½" x 20" - Model 401-404 (part number: 550045-101)
- 4" x 20" - Model 406-412 (part number: 550045-301)

CAUTION

Handle all chemicals with care. Wear protective clothing and eye protection.

CAUTION

The system must be flushed thoroughly between acid and alkaline cleanings.

Storage

To prevent bacterial growth and help maintain flux, it is recommended that elements be immersed in a preservative solution if the system will be OFF for more than one week.

MEMBRANE PRESERVATIVE CARTRIDGE

PRESERVING PROCEDURE

1. Put the system into 'Standby' mode and shutdown the RO system.
2. Disconnect the permeate line and direct permeate to drain during cleaning/preserving.
3. Remove the sediment filter from the pre-filter housing.
4. Replace the sediment filter with the preservative cartridge and assemble into the filter housing.
5. Turn the system ON. After 30-40 seconds, shut down the system.
6. Drain the system of the permeate solution as much as possible by opening a valve/fitting at a low point in the system.
7. Put the system into 'Standby' mode and shutdown the RO system.
8. Close OFF the inlet and outlet to the system.

FLUSHING OUT PRESERVATIVE/RESTART PROCEDURE

9. Open valves and put the system back in the position it was before preserving.
10. Remove the empty preservative cartridge and replace it with a new sediment filter.
11. Restart the system. Direct permeate to drain for 15-30 minutes.
12. Go back to normal operation.

FIGURE 107-1: 20 INCH BIG BLUE PRESERVATIVE CARTRIDGE

DriSteem replacement part
- 2½" x 20" - Model 401-404 (part number: 550045-801)
- 4" x 20" - Model 406-412 (part number: 550045-901)

CAUTION

Handle all chemicals with care. Wear protective clothing and eye protection.

CAUTION

The system must be flushed thoroughly between acid and alkaline cleanings.

Membrane replacement

TOOLS

- Rubber mallet
- Flat blade screwdriver
- Open end wrench, ⅞ inch
- Food grade RT-111 silicone
- Safety glasses

MEMBRANE REPLACEMENT

1. Remove clamps from vessel using 9/16" socket or wrench. Use two screw drivers on each side to push end caps out of vessel slowly.
2. Push the membrane out through the vessel from the feed end towards the concentrate end.
3. If there is not enough room to remove the membrane from the vessel through the concentrate end it can be removed from the feed end.
4. Install the new membrane from the feed end. Ensure that the brine seal is oriented towards the feed end. Check that the end adapters and all O-rings are in good condition and in position.
5. Replace end plug(s) using glycerin lubricant as required on O-rings.
6. It is highly recommended to have a spare set of O-rings and brine seal while replacing the membranes.
7. As the membranes may have preservative or be contaminated, wash your hands thoroughly after replacing membranes.

   Note: Keep all plumbing routed the same as shipped from DriSteem. Any different orientation will destroy the RO membranes.

FIGURE 108-1: DRISTEEM REVERSE OSMOSIS MEMBRANES

DriSteem replacement part number 550035-040.

⚠ CAUTION

Team lift required
Membrane banks are heavy. Do not try to lift without assistance. Wear steel-toed shoes and have adequate room for maneuvering when servicing. Never lean membrane banks vertically when removed from system. Failure to do so may damage the system or result in injury.

Water quality test strips

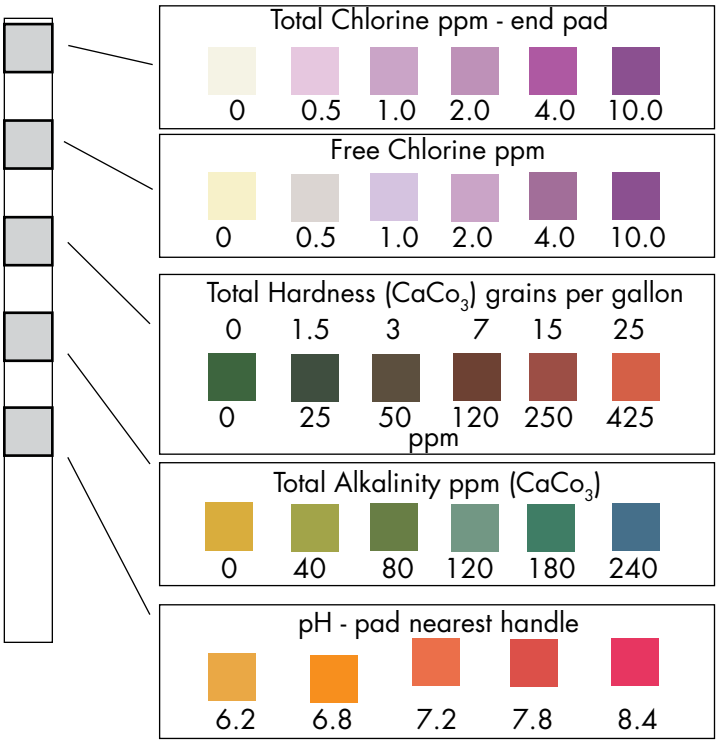
Carbon filters in the low-maintenance humidification system should be changed regularly to maintain proper pressure and flow and water quality.

The carbon filter removes chlorine. Change the carbon filter when chlorine from supply water starts to pass through. Check regularly for chlorine pass through.

To check for chlorine, obtain a water sample from the concentrate drain line and test the water. If chlorine is present, change the carbon filter and record the interval to estimate the next carbon filter change.

For best results, test water chlorine every two weeks.

To order more Water Quality Test Strips, contact your local DriSteem rep, or call 1-800-328-4447.



DIRECTIONS:

1. Dip entire strip into water for 1 second (or pass under water stream), remove. Do not shake excess water from the test strip. Hold the strip for 30 seconds.
2. Compare TOTAL HARDNESS, TOTAL ALKALINITY and pH pads to color chart to the left.
3. Dip strip into the water again and move back and forth for 30 seconds (or hold two chlorine pads under water stream for 10 seconds).
4. Compare CHLORINE pads to color chart to the left.
5. Track results in the chart below.
6. Change the carbon cartridge filter once chlorine is detected in the concentrate water of the humidification system (see page 103).

Inlet water quality test log

Date tested	Total Chlorine ppm	Free Chlorine ppm	Total Hardness	Total Alkalinity	pH
Week 1 _____					
Week 3 _____					
Week 5 _____					
Week 7 _____					
Week 9 _____					
Week 11 _____					
Week 13 _____					
Week 15 _____					
Week 17 _____					
Week 19 _____					

RO system operating log

SYSTEM MONITORING AND RECORD KEEPING

The system should be monitored and all pertinent data recorded on a daily basis. This includes cartridge filter pressure in/out, system pressure in/out, flow and water quality (TDS) in/out. Data is needed to determine operating efficiency and for performing system maintenance. The latter includes cleaning of the membranes, adjusting the operating conditions as well as replacement of cartridge filters and RO membranes.

Table 111-1:
System operating log

Date							
Time							
Chlorine							
Filter in psi							
Filter out psi							
Water temperature							
TDS in							
TDS out							
Concentrate in psi							
Concentrate out psi							
Cartridge filter change							
Membrane change							
Recorded by							

Notes

High-pressure system operating log

Table 112-1:
System operating log

Date	Time	Entering RO pressure	Pressure setpoint	Minimum operating VFD HZ	Maximum operating Hz	Pump1 run hours	Pump2 run hours (if applicable)	Name/initials
Baseline								

Notes

Table 112-2:
Filter log

Date filter changed										Order new box of filters												Order new box of filters		
Startup																								
Name/initials																								

Notes

Pre-treatment system troubleshooting

Table 113-1:
Troubleshooting

Issue	Possible Cause	Solution
1. No display.	No power at electric outlet.	Repair outlet or use working outlet.
	Control valve power adapter not plugged into outlet or power cord end not connected to PC board connection.	Plug power adapter into outlet or connect power cord end to PC board connection.
	Improper power supply.	Verify proper voltage is being delivered to PC board.
	Poor connection between POD connector and PC board.	Check connector on POD, possible broken wire or terminal pin not inserted properly in connector. Clean pins on PC board by plugging & unplugging the POD connector a few times to remove excess protective coating.
	Defective power adapter.	Replace power adapter.
	Defective PC board.	Replace PC board.
2. Does not display correct time of day.	Power Adapter plugged into electric outlet controlled by light switch.	Use uninterrupted outlet.
	Tripped breaker switch and/or tripped GFI.	Reset breaker switch and/ or GFI switch.
	Power outage.	Reset time of day.
	Defective PC board.	Replace PC board.
3. Display does not indicate that water is flowing. Refer to user instructions for how the display indicates water is flowing.	Bypass/ isolation valve in bypass position.	Turn bypass/ isolation handles to place in service position.
	Meter is not connected to meter connection on PC board.	Connect meter to three pin connection labeled FLOW on PC board.
	Restricted/ stalled meter turbine.	Remove meter and check for rotation or foreign material.
	Meter wire not installed securely into three pin connector.	Verify meter cable wires are installed securely into three pin connector labeled FLOW.
	Defective meter.	Replace meter
	Defective PC board.	Replace PC board.
4. Control valve regenerates at wrong time of day.	Power outage.	Reset time of day.
	Time of day not set correctly.	Reset to correct time of day.
	Time of regeneration set incorrectly.	Reset regeneration time.
	Control valve set at “on 0” (immediate regeneration).	Check programming setting and reset to dEL (for a delayed regen time)
5. Time of day flashes on and off.	Power outage.	Reset time of day.
6. Control valve does not regenerate automatically when the REGEN button is depressed and held.	Broken drive gear or drive cap assembly.	Replace drive gear or drive cap assembly. Contact Dristeem technical support.
	Defective PC board.	Replace PC board.
	For the case of systems, another unit in regen would not allow another unit to go into regeneration.	Wait for unit in regeneration to finish.

Pre-treatment system troubleshooting

Table 114-1:
Troubleshooting

Issue	Possible Cause	Solution
7. Control valve does not regenerate automatically but does when the REGEN button is depressed and held.	Bypass/ isolation valves in bypass position.	Turn bypass/ isolation valves handles to place in service position.
	Meter is not connected to meter connection on PC board.	Connect meter to three pin connection labeled FLOW on PC board.
	Restricted/ stalled meter turbine.	Remove meter and check for rotation or foreign material.
	Incorrect programming.	Check for programming error.
	Meter wire not installed securely into three pin connector.	Verify meter cable wires are installed securely into three pin connector labeled FLOW.
	Defective meter.	Replace meter.
	Defective PC board.	Replace PC board.
8. Hard or untreated water is being delivered.	Check water quality directly at unit outlet.	
	Water quality is good • Bypass/ isolation valves are open or faulty	External bypass leak • Fully close bypass/ isolation valves or replace
	Water quality is poor • Damaged seal/stack assembly • Faulty riser tube or seal • Control valve body type and piston type mix matched	Internal bypass leak • Replace seal/stack assembly • Verify seal placement & engagement with riser • Verify proper control valve body type and piston type match
	Media is exhausted, water quality is poor • Higher than anticipated water usage • Meter not registering • No regenerant or low level of regenerant in regenerant tank • Control fails to draw in regenerant • Water quality fluctuation • Fouled media bed	No internal leaks • Check program settings or diagnostics for abnormal water usage • See Troubleshooting Guide #3 • Check refill setting in programming. Check refill flow control for restrictions or debris and clean or replace, check refill flow control rate for proper fill time. • Refer to Troubleshooting Guide # 12 • Test water and adjust program values accordingly • Replace media bed
9. Control valve uses too much regenerant.	Improper refill setting or refill fill flow control is not sized properly	Check refill setting and check refill flow control for proper refill rate.
	Improper program settings	Check program setting to make sure they are specific to the water quality and application needs.
	Control valve regenerates frequently	Check for leaking fixtures that may be exhausting capacity or system is undersized.
10. Residual regenerant being delivered to service.	Low water pressure	Check incoming water pressure – water pressure must remain at minimum of 25 psi.
	Plugged, fouled, or incorrect injector size	Inspect and clean or replace injector, or replace injector with correct size for the application.
	Restricted drain line	Check drain line for restrictions or debris and clean.

Pre-treatment system troubleshooting

Table 115-1: Troubleshooting		
Issue	**Possible Cause**	**Solution**
11. Excessive water in regenerant tank	Tank is being overfilled • Improper program settings • Missing refill flow controller	Excess from fill cycle • Verify program settings • Visual inspection / measure volume output into container
	Previous regenerant is not being drawn out	See Troubleshooting Guide #12
12. Control valve fails to draw in regenerant	Injector is plugged	Remove injector and clean or replace
	Faulty regenerant piston	Replace regenerant piston
	Regenerant line connection leak	Inspect regenerant line for air leak
	Drain line restriction or debris cause excess back pressure	Inspect drain line and clean to correct restriction
	Drain line too long or too high	Shorten length and/or height
	Low water pressure	Check incoming water pressure – water pressure must remain at minimum of 25 psi
	Damaged seal/ stack assembly	Inspect seal stack assembly for damage and replace
13. Water running to drain	Power outage during regeneration or unit is currently in regeneration	Upon power being restored control will finish the remaining regeneration time. Reset time of day.
	Damaged seal/ stack assembly	Replace seal/ stack assembly
	Piston assembly failure	Replace piston assembly
	Drive cap assembly not tightened properly	Re-tighten the drive cap assembly
14. Err – 1001 = Control unable to sense motor movement	Motor not inserted fully to engage pinion, motor wires broken or disconnected	Disconnect power, make sure motor is fully engaged, check for broken wires, make sure two pin connector on motor is connected to the two pin connection on the PC Board labeled REGEN. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.
	PC Board not properly snapped into drive bracket	Properly snap PC Board into drive bracket and then Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.
	Missing reduction gears	Replace missing gears
	Damaged or dirty reduction gear reflectors	Clean or replace reduction gear
	Faulty or dirty optics on back of PC board	Clean or replace PC board

Pre-treatment system troubleshooting

Table 116-1:
Troubleshooting

Issue	Possible Cause	Solution
15. Err – 1002 = Control valve motor ran too short and was unable to find the next cycle position and stalled	Foreign material is lodged in control valve	Open up control valve and pull out piston assembly and seal/ stack assembly for inspection. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.
	Mechanical binding	Check piston and seal/ stack assembly, check reduction gears, check drive bracket and main drive gear interface. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. Check that pinion is not pressed up tight against motor
	Main drive gear too tight	Loosen main drive gear. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. Verify free motion by rotating main drive gear by hand, driving piston in and out
	Improper voltage being delivered to PC board	Verify that proper voltage is being supplied. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.
16. E4, Err – 1004, Err – 104 = Control valve motor ran too long and timed out trying to reach home position	Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface	Snap drive bracket in properly then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
17. Err -1006, Err – 106, Err - 116 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too long and unable to find the proper park position. Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV	Control valve programmed for ALT A or b, nHbP, SEPS, or AUX MAV with out having a MAV or NHBP valve attached to operate that function	Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. Then re-program valve to proper setting
	MAV/ NHBP motor wire not connected to PC Board	Connect MAV/ NHBP motor to PC Board two pin connection labeled DRIVE. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	MAV/ NHBP motor not fully engaged with reduction gears	Properly insert motor into casing, do not force into casing Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor	Replace piston and stack assemblies. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
18. Err – 1007, Err – 107, Err - 117 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too short (stalled) while looking for proper park position Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV	Foreign material is lodged in MAV/ NHBP valve	Open up MAV/ NHBP valve and check piston and seal/ stack assembly for foreign material. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	Mechanical binding	Check piston and seal/ stack assembly, check reduction gears, drive gear interface, and check MAV/ NHBP black drive pinion on motor for being jammed into motor body. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.

RO water treatment system troubleshooting

The following troubleshooting instructions are specific to the DriSteem Reverse-Osmosis System. For additional information, including messages and alarms, see the Vapor-logic section of this manual and the main Vapor-logic controller installation, operation, and maintenance manual.

Table 117-1:
Troubleshooting

Issue	Action
The system does not start manually or automatically.	Check supply voltage. Check circuit breakers. Check interlock switch.
	Verify that the field supplied manual inlet valve is open. Verify that the water pressure is at least 40 psi (276 kPa). Verify that the sediment filter is clean.
	Check for alarms.
	Check the control and power fuses located inside the control and power panel. Check the transformer voltage.
	Verify the RO holding tank is empty and is not pressurized with trapped air.
The system is operating but provides only low pressure or no pressure.	The pressure gauge on the pump should match the pressure set point. If needed, adjust the operating pressure with the unloader valve.
	Check if there are any leaks in the water lines. Repair if needed.
	Verify that the field supplied manual inlet valve is open. Verify that the water pressure is at least 40 psi (276 kPa). Verify that the sediment filter is clean.
	Verify the RO flush valve is not open.
	Verify that the field supplied manual permeate supply valve(s) are open.
	Verify that the internal plumbing does not have a kink.
	Check pump rotation for three phase motors.
The system turns on but it turns off after a certain period of time.	Verify that the field supplied manual inlet valve is open. Verify that the water pressure is at least 40 psi (276 kPa). Verify that the sediment filter is clean. Check for alarms.
	Verify that there are no leaks in the water piping. Repair if needed.
	Verify that the RO flush valve is not enabled.
Inlet pressure low*	Correct incoming supply pressure.
	Verify the sediment filter is not plugged. Change filters if needed.
	Verify solenoid valve is working properly. Replace if needed.

* Pressure alarm will occur if inlet pressure falls below 5 psi. Alarm will self-clear when RO system supply pressure is above 10 psi for at least 10 consecutive seconds. A pressure fault can be manually cleared at any time. System will try to operate every 10 consecutive seconds per hour up to 72 hours while in low pressure alarm condition.

RO water treatment system troubleshooting

Table 118-1:
Troubleshooting

Issue	Action
Permeate flow low	Adjust water temperature.
	Adjust concentrate control valve to prevent low system pressure.
	Clean membranes.
	Adjust pump throttling valve.
Pump noisy	Correct low inlet pressure.
Permeate quality poor	Adjust concentrate control valve to prevent low inlet flow.
	Correct low inlet pressure.
	Reduce too high of a recovery.
	Clean membranes.
	Replace damaged membranes.
	Ensure adequate concentrate to drain flow.

Adiatec high-pressure system troubleshooting

Table 120-1:
Troubleshooting

Issue	Action
The system turns on but it turns off after a certain period of time.	Verify that the low-pressure manual water supply valve is in the Open position. Verify that the water pressure is at least 25 psi (170 kPa). Verify that the cartridge filter is clean. Check for alarms.
	Verify that there are no leaks in the high-pressure network. Repair if needed.
	Verify that the zone depressurization valves are in the Off position.
	Verify that the high-pressure zone manual valves are in the On position.
	Verify that the high-pressure zone valve is not blocked and is in the On position.
	Verify that the pressure gauge on the pump indicates approximately 1000 psi (6.9 MPa).
	Verify that the humidifying nozzles and the filter are not clogged.
	Make sure that 10% of the pump flow capacity (gpm) is used.
	Verify that the RO flush valve is not enabled.
	In order to make the pump unit operate again, push the main switch on the power and control panel.
Supply water over temperature	Verify that the high-pressure staging valves are not blocked and are in the On position.
	Verify that the high-pressure zone manual valve is in the On position.
	Verify that the humidifying nozzles or line filter are not sealed off.
	Verify incoming water temperature.
Some dispersion nozzles do not disperse enough or do not disperse at all.	Make sure the nozzles or filters are not clogged. Replace if needed.
	Verify that the low-pressure manual water supply valve is in the Open position. Verify that water pressure is at least 25 psi (170 kPa). Verify that the cartridge filter is clean.
	Verify that the high-pressure pump gauge indicates approximately 1000 psi (6.9 MPa). If needed, adjust the operating pressure with the unloader valve. See “Confirming unloader valve pressure setting” on Page 90.
	Verify that the zone staging valves are not blocked and are in the On position.
	Verify that the high-pressure zone manual valve is in the On position.
	Verify that the zone depressurization valves are not blocked and are in the Off position.
	Verify that the RO flush valve is not enabled.
High-pressure pump emits abnormal noises and excessive vibrations (cavitation)	Verify that the low-pressure manual water supply valve is in the Open position. Verify that the water pressure is at least 25 psi (170 kPa). Verify that the cartridge filter is clean.
	Verify that the low-pressure water supply passage is not blocked.
	Verify that the water supply flow to the pump is adequate.
	Verify that the pump and motor are not exceeding recommended revolutions per minute (rpm).
	Verify that the ball valves are in the open position.
	Vent any air from the high-pressure network.

Adiatec high-pressure system troubleshooting

The following troubleshooting instructions are specific to the DriSteem High-Pressure System. For additional information, including messages and alarms, see the *Vapor-logic Control System High-Pressure System Addendum*.

Table 120-1:
Troubleshooting (continued)

Issue	Action
The system does not start manually or automatically.	Check supply voltage. Check circuit breakers. Check interlock switch.
	Verify that the low-pressure manual water supply valve is in the Open position. Verify that the water pressure is at least 25 psi (170 kPa). Verify that the cartridge filter is clean.
	Check for alarms.
	Check the control and power fuses located inside the control and power panel. Check the transformer voltage.
	Verify that actual relative humidity is lower than desired relative humidity. Verify that the device sending the humidity demand signal is operating. Verify that the humidity detection instrument is calibrated correctly.
	Verify that the Pump Enable switch is in the On position.
The system is operating but provides only low pressure or no pressure.	The pressure gauge on the pump should match the pressure set point. If needed, adjust the operating pressure with the unloader valve. See "Confirming unloader valve pressure setting" on Page 90.
	Check if there are any leaks in the high-pressure lines. Repair if needed.
	Verify that the depressurization valve is turned off.
	Verify that the low-pressure water supply is in the On position. Verify that the low-pressure water supply is at least 25 psi (170 kPa). Verify that the filter cartridge is clean.
	Verify that the that the RO flush valve is not open.
	Verify that the high-pressure lines are adequately drained with no air in the lines. See "Flush dispersion piping and manifolds" on Page 69.
	Verify that the high-pressure supply ball valves are open.
VFD fault	Make sure that there is adequate ventilation around the motor to keep it from overheating. Verify that the motor fan is operating and unobstructed.
	Verify that the voltage and amperage of the motor electrical supply is adequate and follows the specifications written on the motor.
	Verify that the pressure gauge located on the pump matches the pressure set point. If needed, adjust the operating pressure with the unloader valve. See "Confirming unloader valve pressure setting" on Page 90.
	Verify that the humidifying nozzles or line filters are not sealed off.
	Verify that the high-pressure staging valves are not blocked and are in the On position.
	Verify that the high-pressure zone manual valve is in the On position.

Adiatec fan-assist dispersion troubleshooting

Table 121-1:
Troubleshooting

Issue	Cause	Solution
Fan is not turning on	No power	fix power issue, ensure site wiring is correct/complete.
	Contact not made at controller	Confirm contact at Vapor-logic controller to "fan control contact" from circuit installer relay.
	Site circuit protection is tripped	Fix reason for protection tripping. Turn back on circuit.
	Circuit is on an independent switch	Find switch and turn on.
	Faulty motor	Replace fan unit.
Water is dripping from nozzles or fittings	Defective or clogged nozzle zone valve bypass	Replace nozzle.
	Zone valve bypass	Adjust valve packing or replace.
	Air is in system	Bleed system of air.
	System idle pressure between 100-400 psi	Check for system leaks, repair leaks. Check pump for issues and repair.
	Water is below 5 microSiemens	Adjust water chemistry from RO/DI system.
	Nozzles not tightened	Tighten nozzles with torque tool.
Unit cycles on/off frequently	Humidistat directly under unit	Move humidistat to more uniform area away from unit.
	Humidistat near open door	Move humidistat away from door.
	Defective humidistat	Replace humidistat.
Humidification load not being met	Valve is stuck shut	Fix/replace valve and or coil
	Air change is too high	System evaluation needed compared to original scope.
	Defective humidistat	Replace humidistat.
	Spray nozzles clogged	Replace nozzles.
	System leaks	Find leaks and fix issue.
System needs humidification but is off	Valve is stuck shut	Fix/replace valve and or coil.
	Incorrect wiring	Check/fix wiring terminations to proper location.
	Defective humidistat	Replace humidistat.
	Incorrect zone setpoint	Change zone setpoint.
	Communication between zone controller and pump station is not happening.	Fix communication issue with a reset or add a switch if distance is too long (>300').
Water is condensing	Humidification setpoint too high	Change setpoint.
	Units are too close to each other	Move units to appropriate distances.

Hydrotrue water treatment system

FIGURE 122-1: REPLACEMENT PARTS

Table 122-1:
Water softener replacements parts

Description	Qty.	Part No.
Gravel water treatment 1/16 x 1/8	1 bag	600227
Gravel water treatment ¼ x 1/8	1 bag	600228
Resin	1 bag	550136-001
Single tank water softener		
Softener single control valve 1" inlet (7" - 16" tank)	1	550134-001
Softener single control valve 1.5" inlet (21" - 24" tank)	1	550134-002
Softener single control valve 2" inlet (30" tank)	1	550134-003
Dual tank water softener		
Dual softener control valve 1" inlet (7" - 16" tank)	1	550134-021
Dual softener control valve 1.5" inlet (21" - 24" tank)	1	550134-022
Dual softener control valve 2" inlet (30" tank)	1	550134-023

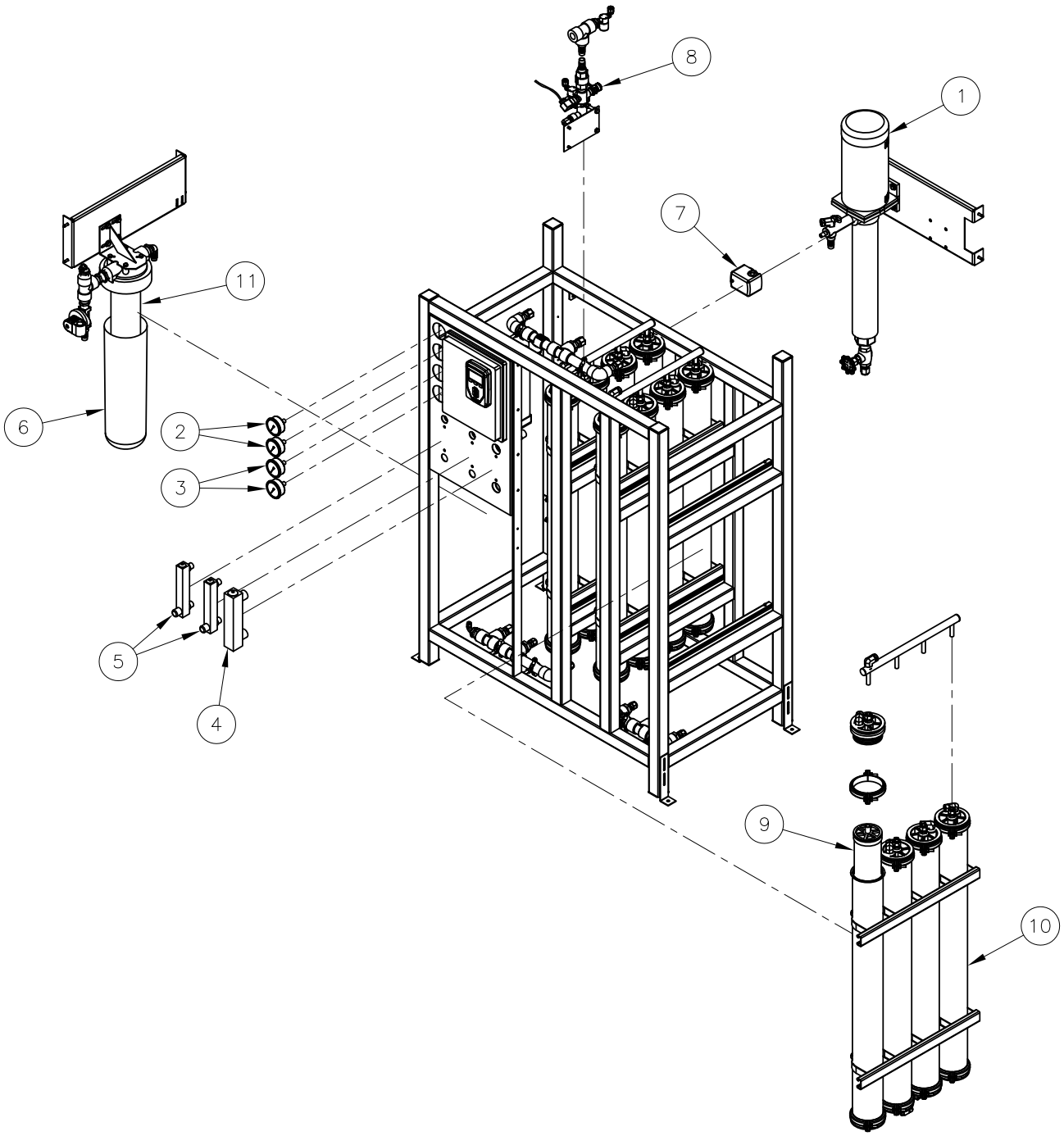
Hydrotrue water treatment system

Table 123-1:
Dechlorinator replacements parts

Description	Qty.	Part No.
Housing filter wall mount accessory 20" with valves (filter not included)	1	550028-001
Carbon filter, 4x20"	1	550027-002
Dechlorinator single control valve 1" inlet (7" -16" tank)	1	550134-011
Dechlorinator single control valve 1.5" inlet (21" - 24" tank)	1	550134-012
Dechlorinator single control valve 2" inlet (30" tank)	1	550134-013
Gravel water treatment 1/16 x 1/8	1 bag	600227
Gravel water treatment ¼ x 1/8	1 bag	600228
Carbon water treatment	1 bag	600229

RO system

FIGURE 124-1: RO 400 SYSTEM REPLACEMENT PARTS



RO system

Table 125-1:
RO system replacements parts

No.	Description	Qty.	Part No.
1	PUMP RO 10 GPM 1 HP 208-230/460V 3PH	1	400290-010
	PUMP RO 20 GPM 3 HP 208-230/460V 3PH	1	400290-020
	PUMP RO 10 GPM 1 HP 115/230V 1PH	1	400290-110
	PUMP RO 20 GPM 3 HP 208/230V 1PH	1	400290-120
2	GAUGE LIQUID FILLED 100 PSI PNL MNT KIT	1	260004-100
3	GAUGE LIQUID FILLED 400 PSI PNL MNT KIT	1	260004-400
4	METER 5 GPM WATER FLOW	1	501907-105
	METER 10 GPM WATER FLOW	1	501907-110
	METER 20 GPM WATER FLOW	1	501907-120
5	METER 5 GPM WATER FLOW W/ NEEDLE VALVE	1	501907-205
6	PLUMB HOUSING FILTER 2.5" DIA X 20"	1	550028-002
	HOUSING FILTER 4.5" DIA X 20"	1	550028-006
7	PRESSURE SWITCH DPST, 10/5 PSI	1	260172-028
8	MANIFOLD ASSY RO OUTPUT - PRESSURE STORAGE	1	187712-001
	MANIFOLD ASSY RO OUTPUT - ATMOSPHERIC STORAGE	1	187712-002
9	MEMBRANE RO 4.0" X 40" EXTRA LOW ENERGY	1	550035-040
10	HOUSING RO MEMBRANE 4" DIA X 40" 316SST	1	550028-007
11	PLUMB FILTER SEDIMENT 5 MICRON 2.5"X 20"	1	550026-002
	PLUMB FILTER SEDIMENT 5 MICRON 4"X 20"	1	550026-003

* Specify RO system model and serial numbers when ordering.

RO system subpanel

FIGURE 126-1: CONTROL CABINET ASSY RO-400

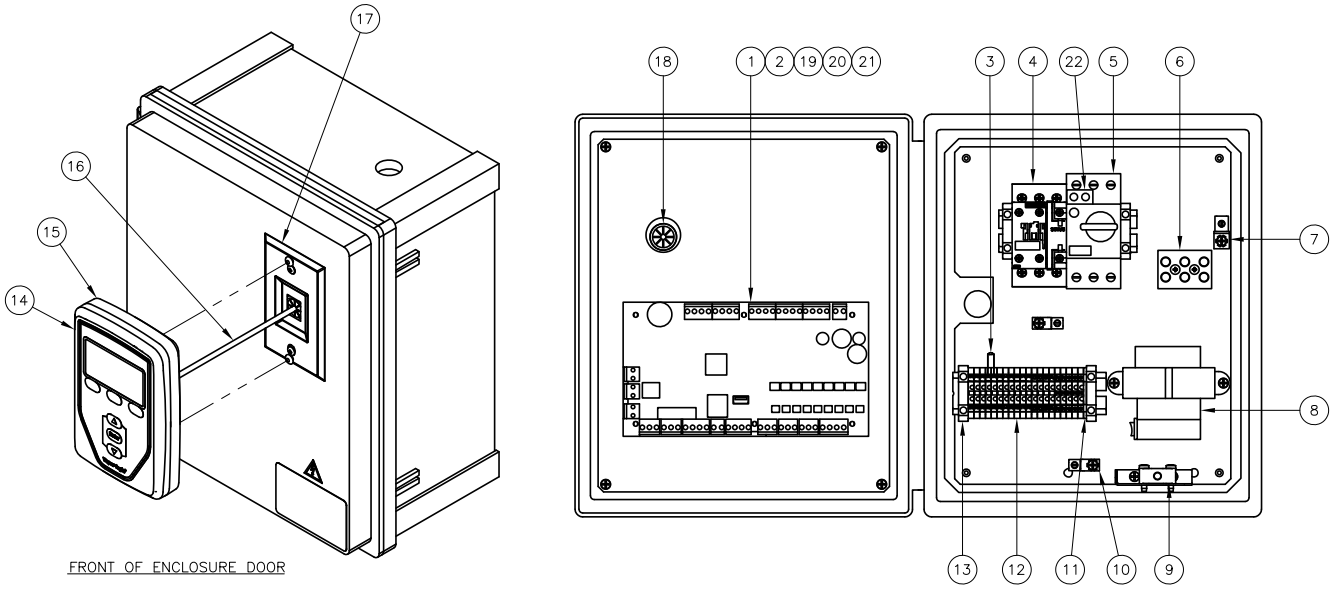


Table 126-1:
Control cabinet assy RO-400

No.	Description	Qty.	Part No.	No.	Description	Qty.	Part No.
1	Main controller VL6	1	408496-006	10	Lug wire	1	409250-003
2	Module LON protocol (LON option only)	1	408642	11	Terminal DIN rail end cap	1	408252-005
3	Resistor 1.2K OHM through hole	1	408995-008	12	Terminal DIN rail 20A center	1	408252-001
4	Contactor	1	407010-*	13	Terminal DIN rail end	1	408252-006
5	Starter motor manual 2.5-4 AMP rotary (WT 1HP 480V/3PH)	1	407015-003	14	Display VL w/o back Vapor-logic	1	408495-002
	Starter motor manual 6.3-10 AMP Rotary (WT 1HP 220V/1PH) (WT 3HP 480V/3PH)	1	407015-005	15	Case rear display Vapor-logic	1	408495-003
	Starter motor manual 11-16 AMP rotary (WT 3HP 220V/1PH)	1	407015-006	16	Wire data cable 27" RJ-12	1	408490-014
	Starter motor manual 14-20 AMP rotary (WT 1HP 120V/1PH)	1	407015-007	17	Mount wallplate wallphone SST	1	408490-021
6	Terminal block 3 pole pressure contact	1	408300-002	18	Bushing 7/8" shutter heyco	1	407129
7	Lug medium	1	409250-027	19	Plug 2 circuit vertical euro molex	1	406246-002
8	Transformer 120/277/600 TO 24VAC 75V	1	408980-001	20	Plug 3 circuit vertical euro molex	1	406246-003
9	Switch door interlock	1	530010-002	21	Plug 4 circuit vertical euro molex	1	406246-004
				22	Motor starter aux switch, no	1	407015-010

High-pressure system

FIGURE 127-1: HIGH-PRESSURE SYSTEM REPLACEMENT PARTS

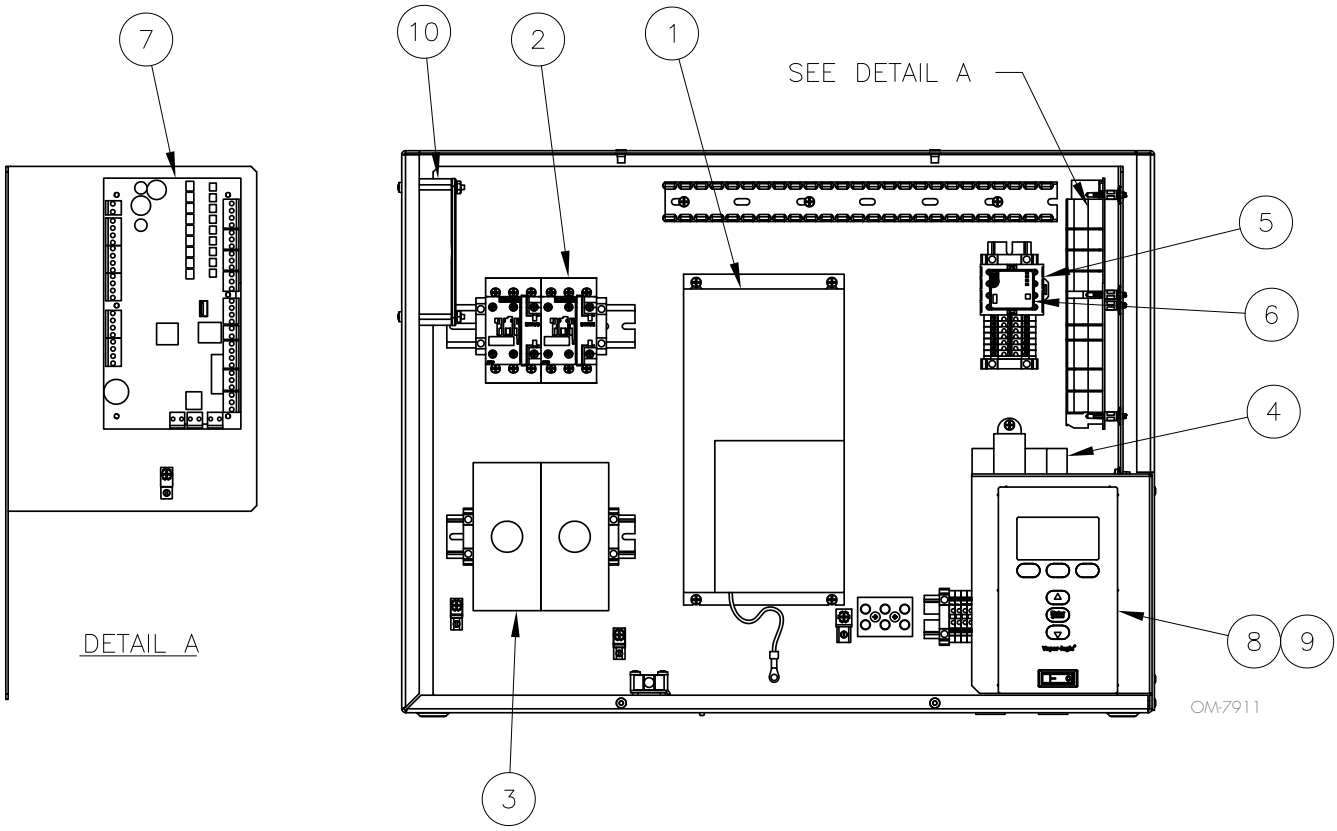


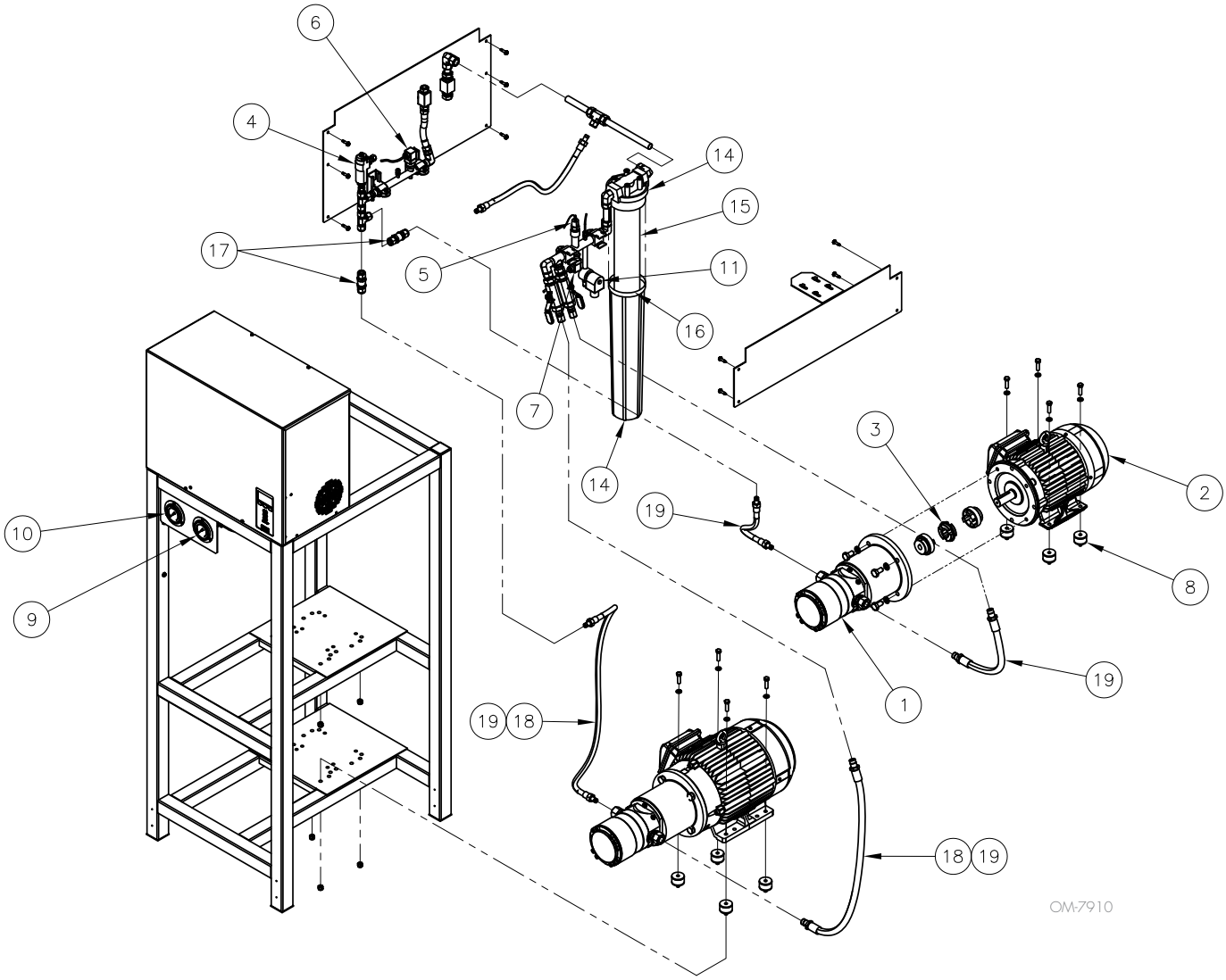
Table 127-1:
High-pressure system replacements parts

No.	Description	Qty.	Part No.	No.	Description	Qty.	Part No.
1	Drive variable freq 2HP 230 V 1 PH micro	1	407020-001	3	Starter motor manual 1-1.6 AMP rotary	1	407015-001
	Drive variable freq 2HP 480 V 3 PH micro	1	407020-003		Starter motor manual 1.6-2.5 AMP rotary	1	407015-002
	Drive variable freq 2HP 600 V 3 PH micro	1	407021-001		Starter motor manual 2.5-4 AMP rotary	1	407015-003
	Drive variable freq 3HP 230 V 1 PH micro	1	407020-002		Starter motor manual 4-6.3 AMP rotary	1	407015-004
	Drive variable freq 3HP 480 V 3 PH micro	1	407020-004		Starter motor manual 6.3-10 AMP rotary	1	407015-005
	Drive variable freq 3 HP 600V 3 PH micro	1	407021-002		Starter motor manual 11-16 AMP rotary	1	407015-006
	Drive variable freq 5HP 480 V 3 PH micro	1	407020-005		Transformer 120/277/600 TO 24VAC 75V	1	408980-001
	Drive variable freq 5 HP 600V 3 PH micro	1	407021-003	4	Transformer 600V TO 24VAC 75VA	1	408986
	Drive variable freq 7.5HP 480 V 3P micro	1	407020-006	5	Socket relay DPDT without time delay	1	407900-019
	Drive variable freq 7.5HP 600V 3PH micro	1	407021-004	6	Relay 24V DPDT finder	1	407900-016
	Drive variable freq 10HP 480 V 3PH micro	1	407020-007	7	Main controller VL6	1	408496-006
	Drive variable freq 10 HP 600V 3PH micro	1	407021-005	8	Membrane VL XTP	1	408495-115
	Drive variable freq 15HP 480 V 3PH micro	1	407020-008	9	Board display VL XT	1	408495-004
	Drive variable freq 15 HP 600V 3PH micro	1	407021-006	10	Fan cooling 24" leads VM99	1	408677-001
2	Contractor	1	407010-*				

High-pressure system

FIGURE 128-1: HIGH-PRESSURE SYSTEM REPLACEMENT PARTS

Exploded view of the each unique replacement part for the High-pressure system.



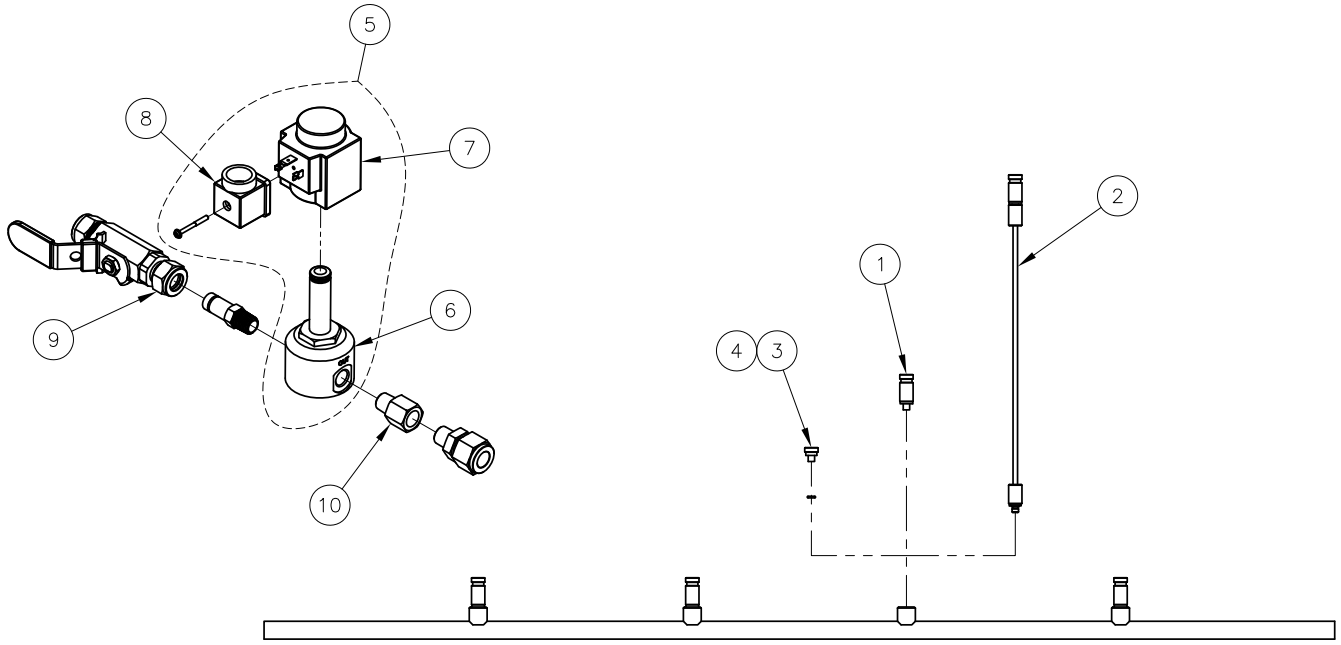
High-pressure system

Table 129-1:
High-pressure system replacements parts

No.	Description	Qty.	Part No.	No.	Description	Qty.	Part No.
1	Pump high pressure - PAH 2CC/REV (Model-250/500)	1	400285-001	7	Control transducer low pressure 0-100PSI	1	405882-002
	Pump high pressure - PAH 4CC/REV (Model–1000)	1	400285-003	8	Mount 5/16"-18 vibration damping 55#	1	310171-001
	Pump high pressure - PAH 6.3CC/REV (Model–1750)	1	400285-004		Mount 3/8"-16 vibration damping 125#	1	310171-002
	Pump high pressure - PAH 10CC/REV (Model–2500)	1	400285-005	9	Gauge liquid filled panel mount 0-2000PSI	1	260004-005
	Pump high pressure - PAH 12.5CC/REV (Model–3500)	1	400285-006	10	Gauge liquid filled panel mount 0-100PSI	1	260004-004
	Pump high pressure - PAHT 20CC/REV (Model–5500)	1	400286-001	11	Valve fill SST 1/4" 24V 0.281 NEMA4	1	505086
2	Motor -3 Phase 1 HP 208-230/460V	1	407025-001	14	Plumb housing filter 2.5" DIA X 20"	1	550028-002
	Motor - 3 Phase 1.5 HP 208-230/460V	1	407025-002	15	Plumb filter sediment 5 micron 2.5"X20"	1	550026-002
	Motor - 3 Phase 3 HP 208-230/460V	1	407025-004	16	O-ring 2.5" diameter filter housing	1	550028-005
	Motor - 3 Phase 5 HP 208-230/460V	1	407025-005	17	Valve check ½" 1/3PSI	1	505057
	Motor - 3 Phase 7.5 HP 208-230/460V	1	407025-006	18	Hose ½" X 28" TEFLON TSXTS (Single, low pressure, Model-250 thru 1750)	1	307022-028
	Motor - 3 Phase 10 HP 208-230/460V	1	407025-007		Hose ¾" X 28" TEFLON TSXTS (Single, low pressure, Model-2500 THRU 3500)	1	307023-028
	Motor - 3 Phase 15 HP 208-230/460V	1	407025-008		Hose ¾" X 26" TEFLON TSXTS (Single, low pressure, Model-5500)	1	307023-026
	Motor - 3 Phase 1 HP 575V	1	407025-101		Hose ½" X 18" TEFLON TSXTS (Single, high pressure, Model-250 thru 1750)	1	307022-018
	Motor - 3 Phase 1.5 HP 575V	1	407025-102		Hose ½" X 16" TEFLON TSXTS (Single, high pressure, Model-2500 THRU 3500)	1	307022-016
	Motor - 3 Phase 3 HP 575V	1	407025-104		Hose ½" X 12" TEFLON TSXTS (Single, high pressure, Model-5500)	1	307022-012
	Motor - 3 Phase 5 HP 575V	1	407025-105	19	Hose ½" X 24" TEFLON TSXTS (REDUN, PUMP-1, low pressure, Model-250 THRU 1750)	1	307022-024
	Motor - 3 Phase 7.5 HP 575V	1	407025-106		Hose ¾" X 24" TEFLON TSXTS (REDUN, PUMP-1, low pressure, Model-2500 THRU 3500)	1	307023-024
	Motor - 3 Phase 10 HP 575V	1	407025-107		Hose ¾" X 22" TEFLON TSXTS (REDUN, PUMP-1, low pressure, Model-5500)	1	307023-022
	Motor - 3 Phase 15 HP 575V	1	407025-108		Hose ½" X 42" TEFLON TSXTS (REDUN, PUMP-2, low pressure, Model-250 THRU 1750)	1	307022-042
3	Coupling insert small Hytrel	1	400303-001		Hose ¾" X 42" TEFLON TSXTS (REDUN, PUMP-2, low pressure, Model-2500 THRU 3500)	1	307023-042
	Coupling insert medium Hytrel	1	400303-002		Hose ¾" X 40" TEFLON TSXTS (REDUN, PUMP-2, low pressure, Model-5500)	1	307023-040
	Coupling insert large Hytrel	1	400303-003		Hose ½" X 16" TEFLON TSXTS (REDUN, PUMP-1, high pressure, Model-250 THRU 1750)	1	307022-016
4	Valve pressure relief VRH30	1	300171-001		Hose ½" X 14" TEFLON TSXTS (REDUN, PUMP-1, high pressure, Model-2500 THRU 3500)	1	307022-014
	Valve pressure relief VRH60	1	300171-002		Hose ½" X 10" TEFLON TSXTS (REDUN, PUMP-1, high pressure, Model-5500)	1	307022-010
	Valve pressure relief VRH5	1	300171-004		Hose ½" X 38" TEFLON TSXTS (REDUN, PUMP-2, high pressure, Model-250 THRU 1750)	1	307022-038
5	Sensor temperature ½" NPT 1K RTD	1	405760-003		Hose ½" X 36" TEFLON TSXTS (REDUN, PUMP-2, high pressure, Model-2500 THRU 3500)	1	307022-036
6	Control transducer high pressure 0-2000 PS	1	405882-001		Hose ½" X 32" TEFLON TSXTS (REDUN, PUMP-2, high pressure, Model-5500)	1	307022-032

High-pressure dispersion system

FIGURE 130-1: HIGH-PRESSURE DISPERSION SYSTEM (10-24 WELDED SADDLE, OCTOBER 2020 - PRESENT)



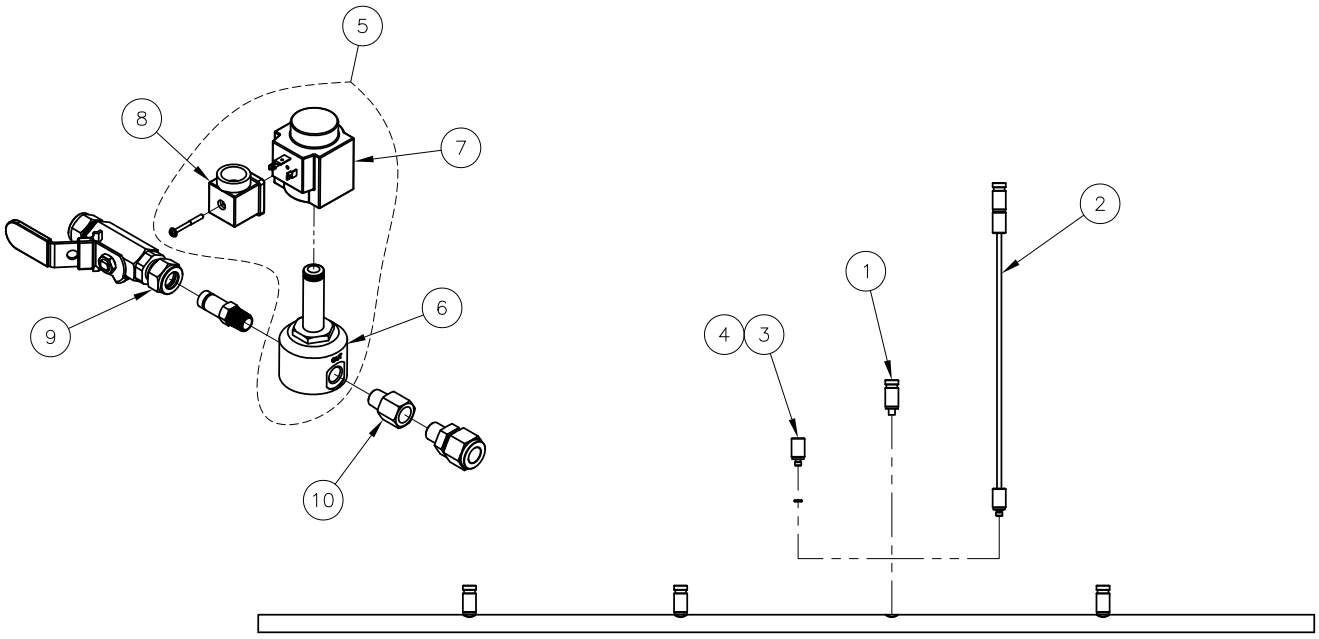
OM-8061

Table 130-1:
High-pressure system

No.	Description	Qty.	Part No.
1	Nozzle assembly 6 lb/hr 0.15 mm hole	1	197102-006
	Nozzle assembly 10 lb/hr 0.20 mm hole	1	197102-010
	Nozzle assembly 15 lb/hr 0.30 mm hole	1	197102-015
2	Nozzle extension assembly 6 pph service kit	1	197101-006
	Nozzle extension assembly 10 pph service kit	1	197101-010
	Nozzle extension assembly 15 pph service kit	1	197101-015
3	Plug manifold 10-24 mnpt nozzle tip	1	270013
4	O-ring 3.5 mm ID x 5.9 mm OD 70D Buna-N	1	300500-006
5	Valve assembly solenoid ¼" staging HPAS	1	184300-001
6	Valve ¼" solenoid high pressure	1	505086-008
7	Valve coil solenoid	1	505086-007
8	Valve coil cap conduit	1	505086-006
9	Valve ball 316SST H-700 ½" CMP	1	505005-001
10	½" Hydraulic hose, 18" L (Not Shown)	1	307022-08
11	Accumulator, ½" connection, 635 psi setpoint (Not Shown)	1	600780

High-pressure dispersion system

FIGURE 131-1: HIGH-PRESSURE DISPERSION SYSTEM (10-24 FLOW DRILL, AUGUST 2016 - OCTOBER 2020)



OM-7908

Table 131-1:
High-pressure system

No.	Description	Qty.	Part No.
1	Nozzle assembly 6 lb/hr 0.15 mm hole	1	197102-006
	Nozzle assembly 10 lb/hr 0.20 mm hole	1	197102-010
	Nozzle assembly 15 lb/hr 0.30 mm hole	1	197102-015
2	Nozzle extension assembly 6 pph service kit	1	197101-006
	Nozzle extension assembly 10 pph service kit	1	197101-010
	Nozzle extension assembly 15 pph service kit	1	197101-015
3	Plug manifold 10-24 M	1	270012-002
4	O-ring 3.5 mm ID x 5.9 mm OD 70D Buna-N	1	300500-006
5	Valve assembly solenoid ¼" staging HPAS	1	184300-001
6	Valve ¼" solenoid high pressure	1	505086-008
7	Valve coil solenoid	1	505086-007
8	Valve coil cap conduit	1	505086-006
9	Valve ball 316SST H-700 ½" CMP	1	505005-001
10	½" Hydraulic hose, 18" L (Not Shown)	1	307022-08
11	Accumulator, ½" connection, 635 psi setpoint (Not Shown)	1	600780

High-pressure dispersion system

FIGURE 132-1: HIGH-PRESSURE DISPERSION SYSTEM (1/8" WELDED SADDLE, AUGUST 2016)

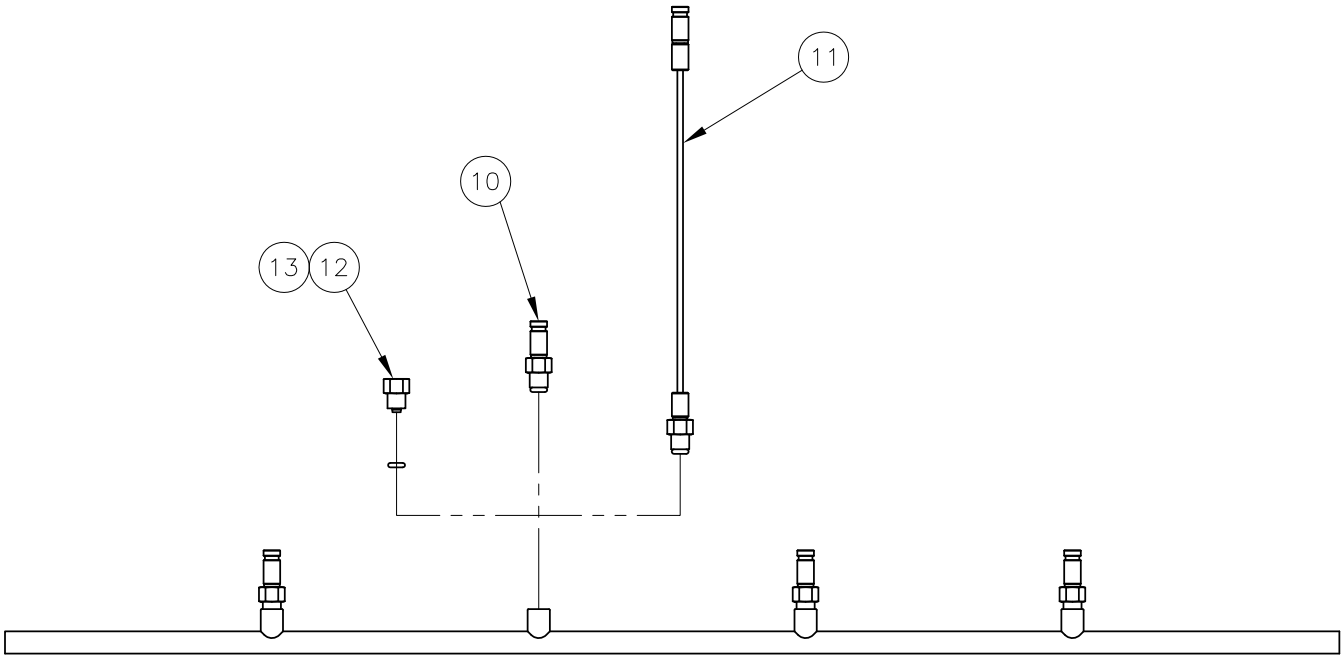


Table 132-1:
High-pressure system

No.	Description	Qty.	Part No.
10	Nozzle assembly HPS 6 pph retrofit kit	1	900102-006
	Nozzle assembly HPS 10 pph retrofit kit	1	900102-010
11	Nozzle extension 8" HPS 6 pph retrofit kit	1	900101-006
	Nozzle extension 8" HPS 10 pph retrofit kit	1	900101-010
12	Plug manifold 1/8" MNPT	1	270007-002
13	O-ring 0.174 id x 0.103W 70d	1	300500-005

Atmospheric tank

FIGURE 133-1: ATMOSPHERIC STORAGE TANK

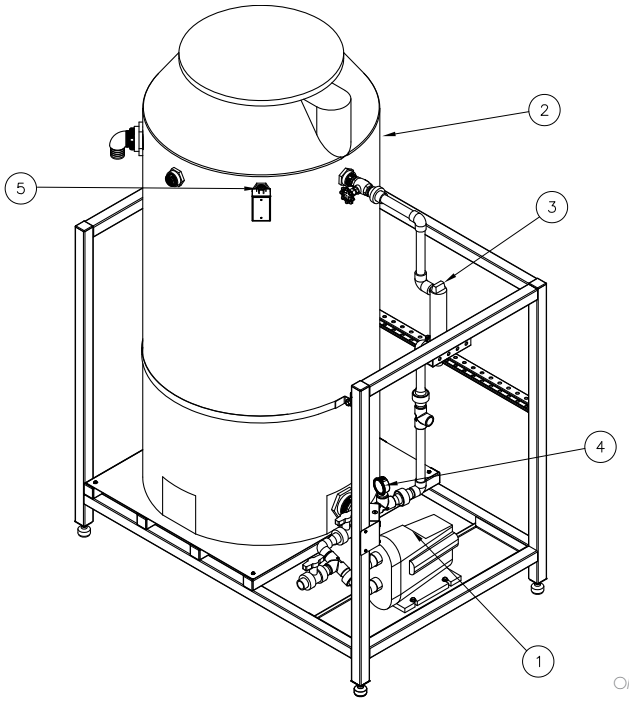
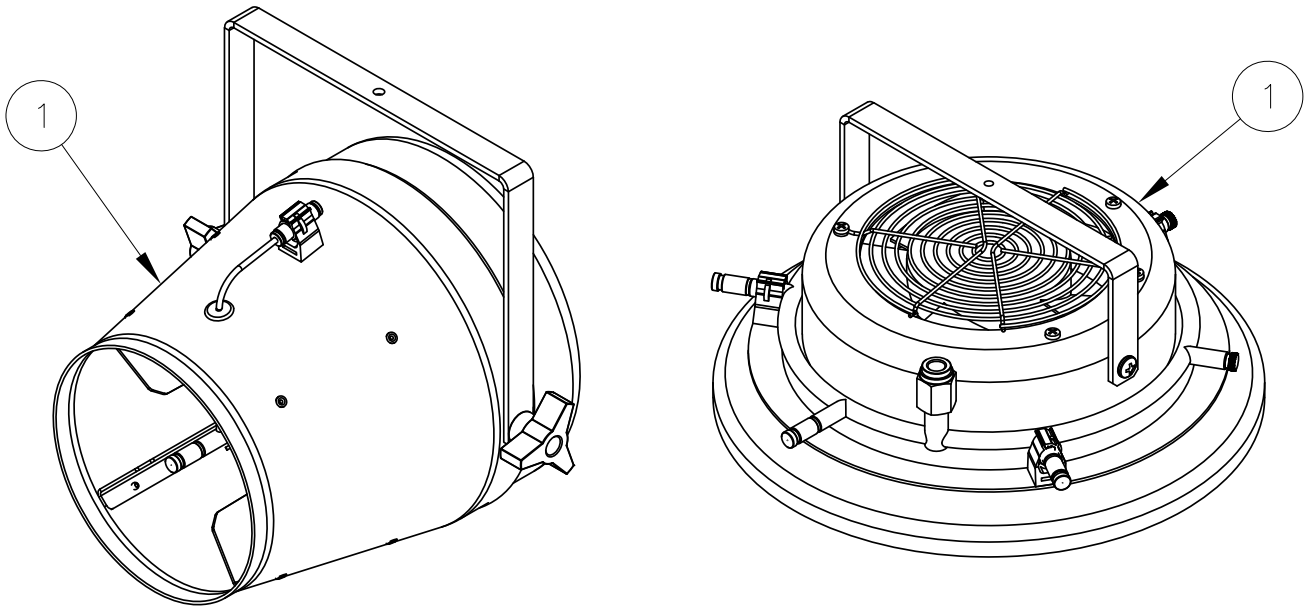


Table 133-1: Atmospheric Tank			
No.	**Description**	**Qty.**	**Part No.**
1	PUMP, ATMOSPHERIC STORAGE, SCALA 2	1	601060
2	ATMOSPHERIC STORAGE 165 GALLON TANK	1	550137-165
	ATMOSPHERIC STORAGE 300 GALLON TANK	1	550137-300
3	LAMP REPLACEMENT UV STERILIGHT 17.5W	1	406605-101
	LAMP UV STERILIZE 17.5W STERILIGHT	1	406605-001
	LAMP UV STERILIZE 17.5W STERILIGHT 230V	1	406605-002
	QUARTZ SLEEVE UV LAMP STERILIGHT 17.5W	1	406605-111
4	GAUGE 1/4" NPT PRESSURE 0-100 PSI G	1	260140-025
5	ATM STORAGE FLOAT SWITCH PUMP UP	1	550130-005
	ATM STORAGE FLOAT SWITCH PUMP DOWN NO PLUG	1	550130-002
	ATM STORAGE FLOAT SWITCH PUMP DOWN WITH PLUG	1	550130-001

Fan-assist dispersion

FIGURE 134-1: FAN-ASSIST



OM-8073

Table 134-1:
Fan-assist dispersion

No.	Description	Qty.	Part No.
1	High-pressure fan asst small dispersion unit FA-2 115V	1	600958
	High-pressure fan asst medium dispersion unit FA-3 115V	1	600959
	High-pressure fan asst large dispersion unit FA-4 115V	1	600960

Notes

Expect quality from the industry leader

Since 1965, DriSteem has led the industry with innovative methods for humidifying and cooling air with precise control. Our focus on ease of ownership is evident in the design of the Adiatec High-Pressure System, which features cleanable, stainless steel construction. DriSteem also leads the industry with a Two-year Limited Warranty and optional extended warranty.

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U.S. Headquarters:
14949 Technology Drive
Eden Prairie, MN 55344
800-328-4447 or 952-949-2415
952-229-3200 (fax)

Continuous product improvement is a policy of DriSteem; therefore, product features and specifications are subject to change without notice.

Form No. HPAS-IOM-EN-REVK-0522
Part No. 890000-855 REV K

TWO-YEAR LIMITED WARRANTY

DRI-STEEM Corporation ("DriSteem") warrants to the original user that its products will be free from defects in materials and workmanship for a period of two (2) years after installation or twenty-seven (27) months from the date DriSteem ships such product, whichever date is the earlier.

If any DriSteem product is found to be defective in material or workmanship during the applicable warranty period, DriSteem's entire liability, and the purchaser's sole and exclusive remedy, shall be the repair or replacement of the defective product, or the refund of the purchase price, at DriSteem's election. DriSteem shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or reinstallation of any defective product. The Limited Warranty does not include cylinder replacement for electrode steam humidifiers or media replacement for Wetted Media Systems.

DriSteem's Limited Warranty shall not be effective or actionable unless there is compliance with all installation and operating instructions furnished by DriSteem, or if the products have been modified or altered without the written consent of DriSteem, or if such products have been subject to accident, misuse, mishandling, tampering, negligence or improper maintenance. Any warranty claim must be submitted to DriSteem in writing within the stated warranty period. Defective parts may be required to be returned to DriSteem. Excluded from the Limited Warranty are all consumable and wear and tear items such as cylinders, membranes, filters, or media replacements. These items are subject to usual wear and tear during usage.

DriSteem's Limited Warranty is made in lieu of, and DriSteem disclaims all other warranties, whether express or implied, including but not limited to any IMPLIED WARRANTY OF MERCHANTABILITY, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, any implied warranty arising out of a course of dealing or of performance, custom or usage of trade.

DriSteem SHALL NOT, UNDER ANY CIRCUMSTANCES BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, REVENUE OR BUSINESS) OR DAMAGE OR INJURY TO PERSONS OR PROPERTY IN ANY WAY RELATED TO THE MANUFACTURE OR THE USE OF ITS PRODUCTS. The exclusion applies regardless of whether such damages are sought based on breach of warranty, breach of contract, negligence, strict liability in tort, or any other legal theory, even if DriSteem has notice of the possibility of such damages.

By purchasing DriSteem's products, the purchaser agrees to the terms and conditions of this Limited Warranty.

EXTENDED WARRANTY

The original user may extend the term of the DriSteem Limited Warranty for a limited number of months past the initial applicable warranty period and term provided in the first paragraph of this Limited Warranty. All the terms and conditions of the Limited Warranty during the initial applicable warranty period and term shall apply during any extended term. An extended warranty term of an additional twelve (12) months or twenty four (24) months of coverage may be purchased. The extended warranty term may be purchased until eighteen (18) months after the product is shipped, after which time no extended warranties are available. When a Dristeem humidifier is purchased with a DriSteem RO system, an extended twenty-four (24) month coverage is included.

Any extension of the Limited Warranty under this program must be in writing, signed by DriSteem, and paid for in full by the purchaser.