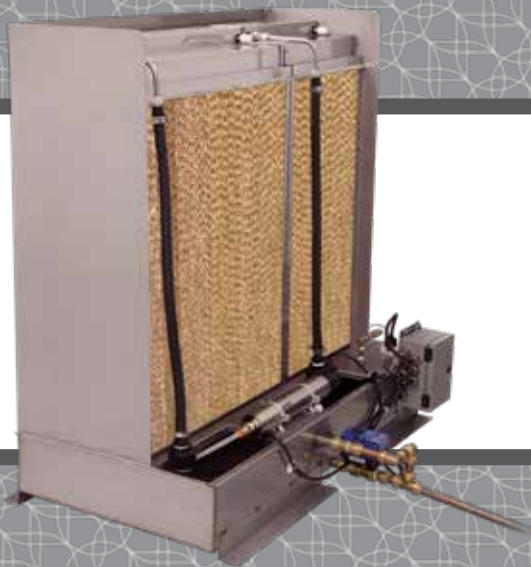


READ AND SAVE THESE INSTRUCTIONS




## EVAPORATIVE COOLING AND HUMIDIFICATION

Wetted Media System  
User Controlled








Installation, Operation,  
and Maintenance Manual

driSteem 

# Warnings and cautions

 <b>WARNING</b> Indicates a hazardous situation that could result in death or serious injury if instructions are not followed.	<b>CAUTION</b> Indicates a hazardous situation that could result in damage to or destruction of property if instructions are not followed.
--	---

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 <b>INSTALLATION AND MAINTENANCE WARNINGS</b>	 <b>UV SYSTEM WARNINGS</b>
 <b>Attention installer</b> Read this manual before installing, and leave this manual with product owner. This product must be installed by qualified HVAC and electrical contractors. Installation must be code approved.	<b>UV exposure:</b> Do not illuminate UV lamp outside of UV Chamber. Always use protective gear, including gloves and UV safety glasses. Never look directly at illuminated UV Lamp, even when using protective gear. If accidental exposure occurs, immediately cool affected area and consult physician.
 <b>Disconnect electrical power</b> Disconnect electrical power before installing supply wiring or performing service or maintenance procedures on any part of 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.	<b>Impalement:</b> Do not inspect, repair, or maintain quartz sleeve until UV chamber has been isolated and depressurized.
	<b>Hot UV chamber:</b> Allow UV lamps and UV chamber to cool for a minimum of 10 minutes before handling.
 <b>Monitor for leaks or drips</b> Monitor duct or air handling unit (AHU) for leaks or drips in and near area where Wetted Media System is installed. 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.	<b>Cut or ingestion:</b> Ensure that quartz sleeve and UV lamp are not broken, cracked, or damaged before handling them.
 <b>Preventing bacteria and mold growth</b> Wetted Media System automatically initiates dry-out cycles to prevent bacteria and mold growth, which can cause illness. Allow system to complete all dry-out cycles, and maintain tank and media as recommended.	<b>Scald from hot water:</b> When there is no water flow, water in UV chamber will become hot. To prevent scalding, allow system to cool before draining system.
	<b>Fire:</b> Do not store combustible or flammable material close to the system.
	<b>Mercury exposure:</b> UV lamp contains mercury. If lamp breaks, avoid inhaling or ingesting debris, and avoid exposure to eyes and skin. Do not use a vacuum cleaner to clean up broken lamp; this could scatter spilled mercury. Obey local regulations and guidelines for removal and disposal of mercury waste.
	<b>Water leak:</b> Use only recommended UV assembly plumbing materials and fittings to avoid potential material degradation from UV exposure.

<b>CAUTION</b>
<b>Operate system at above-freezing temperatures</b> Operating the system at temperatures below freezing can cause damage to the system or other property damage.
<b>Maintain pump and supply water</b> Inadequately maintained supply water can cause the system to fail. Refer to the maintenance section (beginning on page 19) for recommendations.
<b>Prevent water drops in airstream</b> To prevent water drops from becoming entrained in the airstream: <ul style="list-style-type: none"> <li>• Maintain the media as recommended.</li> <li>• Do not exceed the maximum recommended air velocity in the duct or AHU.</li> </ul>
<b>Follow all instructions in this manual to maintain product warranty.</b>

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## ATTENTION INSTALLER

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

## DriSteem® Corporation Technical Support

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Europe: +3211823595

## WHERE TO FIND MORE INFORMATION

### Our website:

The following documents are available on our web site: [www.dristeem.com](http://www.dristeem.com)

- Evaporative Cooling and Humidification Catalog

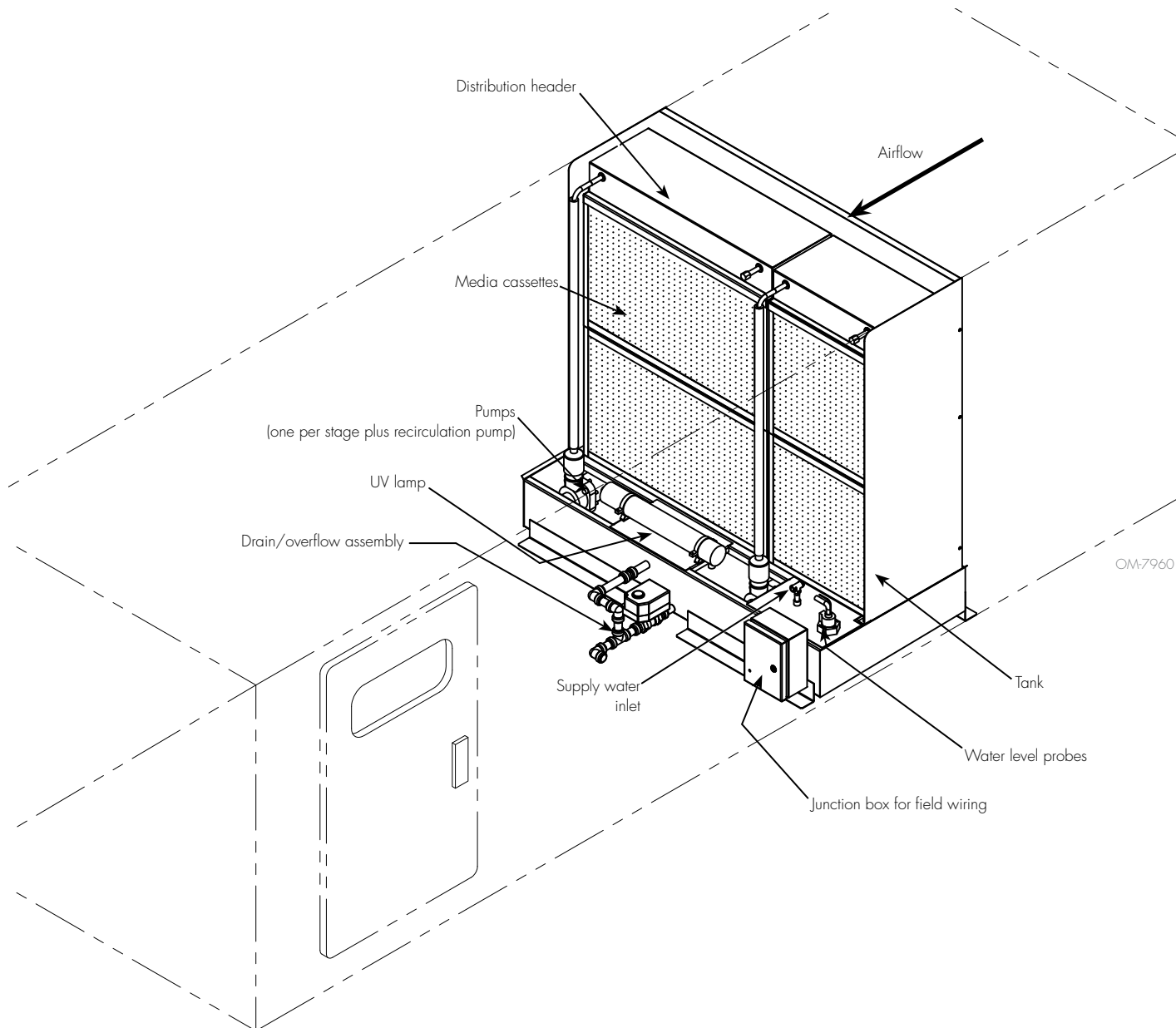
### Call us at 800-328-4447

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

### Download DriSteem literature

Most DriSteem product manuals are available on our website: [www.dristeem.com](http://www.dristeem.com)

# Components

**FIGURE 2-1: DRISTEEM WETTED MEDIA SYSTEM OVERVIEW**


**Note:** System components and configuration may vary to meet application requirements.



# Specifications

**Table 3-1:**  
**Wetted Media System specifications**

Item	Specification
System capacity	Varies with application. See graph on page 4 for system efficiencies and to calculate system capacity.
System voltage/phase/Amp draw*	120 Volts, Max 7 Amps, 1 phase, 60 Hz      230 Volts, Max 15 Amps, 1 phase, 50 Hz
Fuse size**	120 Volts, 1 phase, 60 Hz: 10 Amps 230 Volts, 1 phase, 50 Hz: 20 Amps
Height	30" to 120" (762 mm to 3048 mm)
Width	24" to 120" (610 mm to 3048 mm)
Depth	34.5" (876 mm)
Operating weight***	System operating weight = tank operating weight + media operating weight Pounds = 65 lbs/ft of width + 20 lbs/ft <sup>2</sup> Kilograms = 98 kg/m of width + 30 kg/m <sup>2</sup>
Shipping weight***	System shipping weight = tank shipping weight + media shipping weight Pounds = 30 lbs/ft of width + 10 lbs/ft <sup>2</sup> Kilograms = 45 kg/m of width + 15 kg/m <sup>2</sup>
Supply water pressure	25 to 80 psi (170 to 550) kPa
Supply water connection, diameter	3/8" to 3/4", (DN10 to DN20) depending on flow rate
Drain connection, diameter	1" (DN25), copper
Recommended inlet water flow rate	3x system capacity or 11 gpm (42 L/m) max.
Air velocity, maximum recommended	700 fpm (3.5 m/s) through wetted media without droplet separator (900 fpm [4.6 m/s] with droplet separator)
Water quality requirements	System recycle rate depends on water quality. Contact DriSteen for more information.
<p>* Cataloged amperages assume one pump per stage. Some large systems may require additional pumps depending on operating conditions. Contact DriSteen for system amperages.</p> <p>** Wiring and branch circuit protection (Type RK1, J, or T fusing) to be provided by installer in accordance with National Electrical Code (NEC) requirements or (in Europe) IEC 60364 requirements.</p> <p>*** <b>System weight calculation examples</b></p> <p>Operating weight in <i>pounds</i> for a 6-ft-high x 8-ft-wide Wetted Media System):            = (65 lbs/ft) x (8 ft wide) + (20 lbs/ft<sup>2</sup>) x (8 ft wide) x (6 ft high – 1 ft tank height)            = 520 lbs + 800 lbs = 1320 lbs</p> <p>Operating weight in <i>kilograms</i> for a 2-meter-high x 3-meter-wide Wetted Media System):            = (98 kg/m) x (2 m wide) + (30 kg/m<sup>2</sup>) x (3 m wide) x (2 m high – 0.3 m tank height)            = 196 kg + 153 kg = 349 kg</p>	

# Specifications

FIGURE 4-1: WETTED MEDIA SYSTEM COOLING EFFICIENCY AND PRESSURE DROP

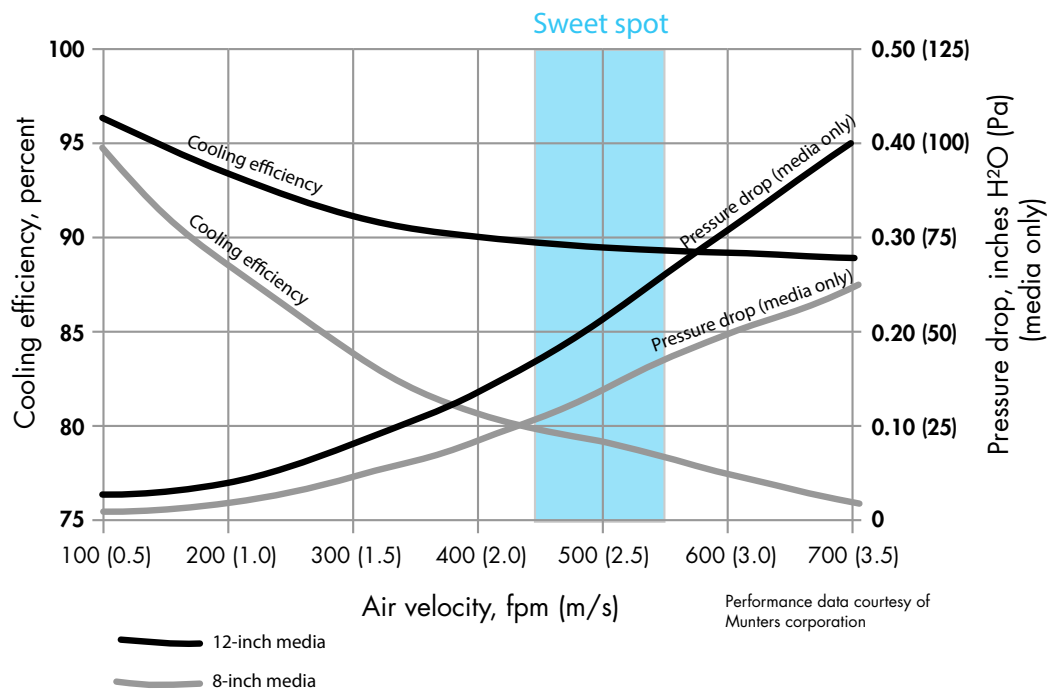


FIGURE 4-2: DRISTEEM WETTED MEDIA SYSTEM DIMENSIONS AND CLEARANCES

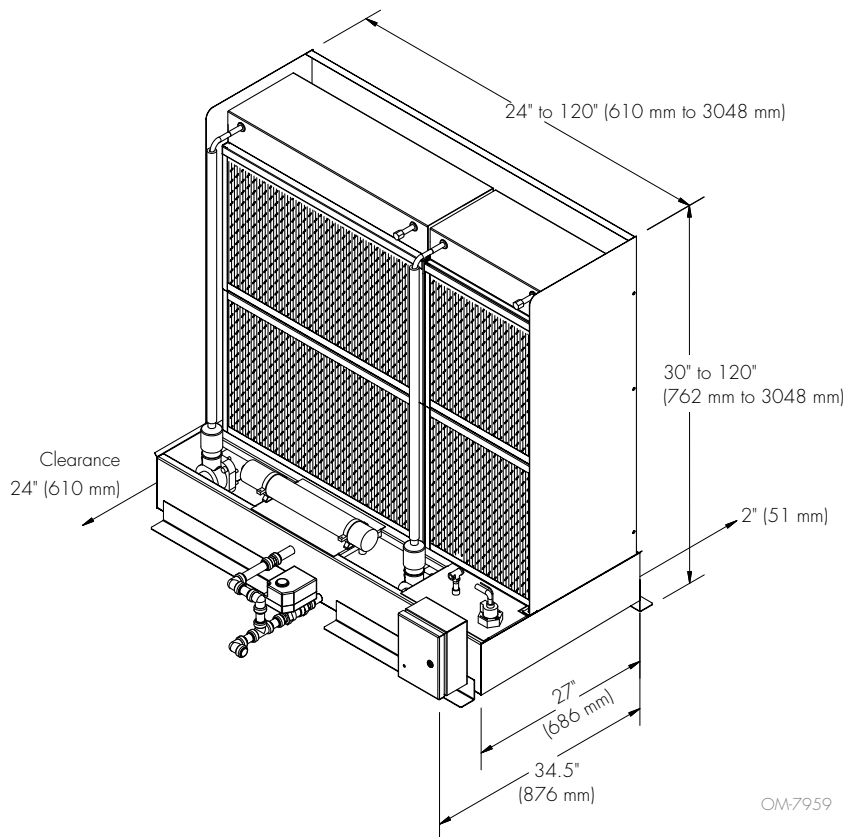
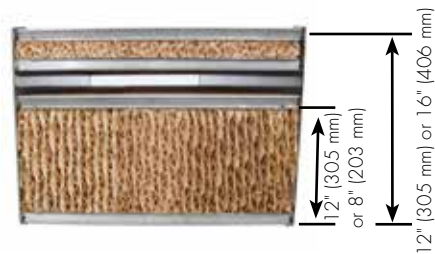


FIGURE 4-3: MEDIA THICKNESS



# Installation locations

## WETTED MEDIA SYSTEM

Consider the following when selecting the installation location for the Wetted Media System:

- Ability of duct/AHU to support the maximum operating weight of the system. See **Operating weight** in Table 3-1 and warning at right.
- Easy access for maintenance. Provide at least 24" (610 mm) downstream for operator to repair the equipment. No additional space requirements are needed upstream from the wetted media system.
- Maximum ambient temperature is 104 °F (40 °C).
- Clearance recommendations (see Figure 4-2).
- Electrical connections: Power, control, and safety circuits
- Plumbing connections: Supply water and drain piping (see "Field piping overview" on page 7).
- 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.
- Air velocities should be from 100 to 900 fpm (0.5 to 4.6 m/s). Droplet separation required for speeds greater than 700 fpm (3.5 m/s).

## Important:

Installation must comply with governing codes.

### **WARNING**

#### **Duct/AHU must support system weight**

Install the system in a structurally stable duct or AHU. Installing the system where the duct/AHU cannot support the system can cause it to fall, resulting in severe personal injury or death.

# Installation locations

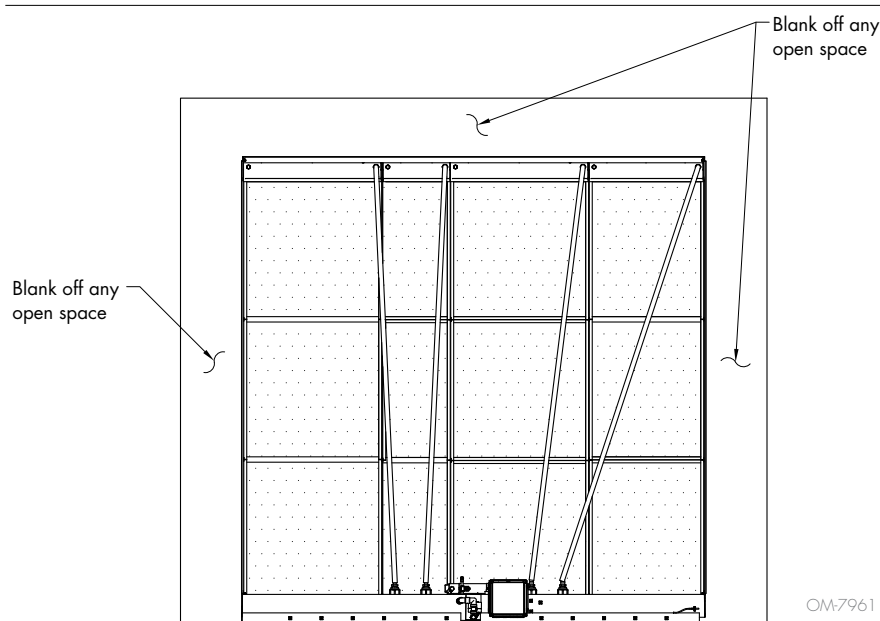
## CONTROL CABINETS

A ground wire is necessary from the machine ground lug in the junction box to earth ground. The bonding machine ground wire should be sized per National Electrical Code (NEC) or IEC 60364 requirements.

## CLEARANCES

- Provide at least 24" (610 mm) in front of the unit to allow the operator to repair the equipment.
- For AHU applications if an RH sensor is used:
  - Position it in the return air section where the air conditions are most similar to the space conditions being controlled.
  - Position it at least 3' (1 m) upstream of and in the same airstream as the Wetted Media System.

**FIGURE 6-1: BLANK OFF OPEN SPACE**





# Field piping

## **SUPPLY WATER PIPING**

Required inlet pressure range is 25 to 80 psi (170 to 550 kPa). Minimum inlet dynamic (while running) pressure is 25 psi (170 kPa).

DriSteem recommends installing the following (supplied by others) in the supply water line:

- Manual shut-off valve
- Water pressure gauge rated to 120 psi (830 kPa)

## **DRAIN PIPING**

The Wetted Media System drain connection is a push-to-connect fitting.

- Run the drain piping (supplied by others) from the Wetted Media System to the AHU or duct drain.
- Do not reduce the diameter of the drain line downstream from the drain connection.
- DriSteem recommends copper drain piping.

# Assembling tank and frame

Choose the installation location (see “Installation locations” on page 5) in the duct or AHU, and assemble the system in place. See Figure 10-1 for components and fastening hardware included with the system. After unpacking the system, verify that all packing list items are included in shipment.

## TYPICAL TOOLS AND ACCESSORIES NEEDED

Depending on system configuration, some items listed might not be required.

- Wrenches and nut driver or power driver for fastening hardware
- Adjustable wrench for pipe fittings
- Screwdrivers for power connections and cabinet access
- Precision screwdrivers for signal connections
- Pipe fittings, reducing fittings, and supply water and drain piping
- Teflon-tape
- Pipe supports/hangers

## SEQUENCE OF ASSEMBLY

To avoid wasting time undoing connections, assemble the components in the order described below.

1. Place tank assembly on duct/AHU floor with overflow/drain facing downstream. Make sure tank is level from left to right and from front to back.

**Note:** If the duct/AHU floor is not level, insert shims under the tank support feet to level the tank. A level/plumb system is important for proper tank draining and for the even distribution of water across the media.

2. Attach side braces to side panels, then to tank. Attach additional blank-off to the side panel from ceiling to floor for increase efficiency of system.

**Note:** Carefully orient the bracing parts as shown.

3. Attach frame support to tops of bracing members. Attach additional blank-off to the top panel for increase efficiency of system. See Figure 6-1.
4. Attach center braces (only used on larger systems) to tank and to frame support.
5. Confirm baffle plate is positioned with baffles angled down and directing drainage upstream.

## Assembling tank and frame

6. Place media cassettes inside of frame.

**Note:** Tabs on the media cassette frames ensure proper orientation. To ensure maximum performance and media life, do not try forcing the media cassettes into their slots if the tabs conflict with the frame or with each other.

7. Attach distribution header(s) on top of frame with the inlets facing downstream.
8. Attach pump hoses to distribution header inlets on pumps, and tighten hose clamps.

**Note:** The hoses should not cross or loop as they run from pump to hood.

9. Install drain/overflow assembly to welded tank connections.
10. Install drain line (by others) from Wetted Media System drain tee to building drain. See "Drain piping" on page 7.
11. Install water line (by others) from municipal water supply to Wetted Media System supply water inlet. See "Supply water piping" on page 7.
12. Connect controls (by others).

Note:

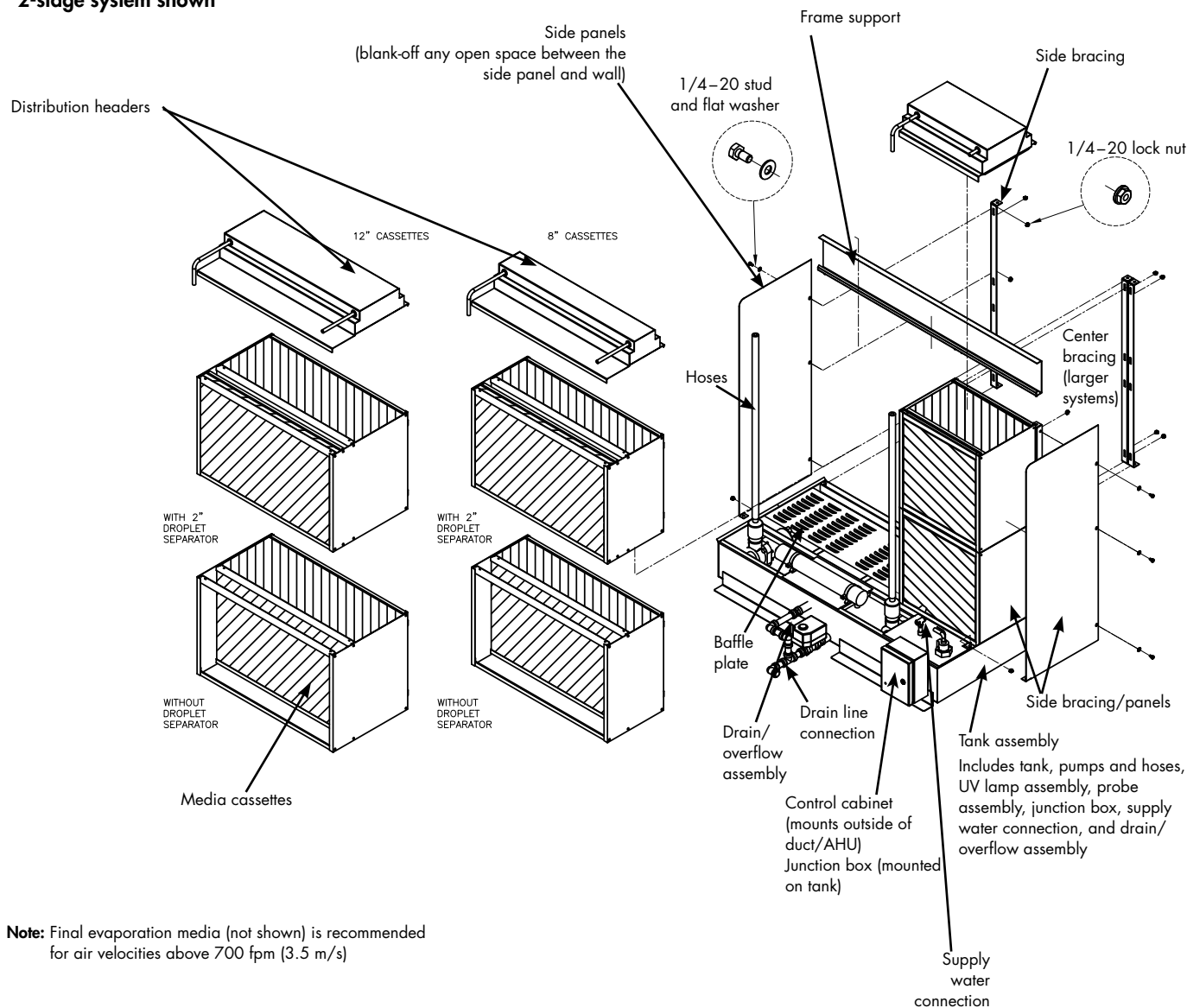
- During a power failure, the Wetted Media system will automatically drain the water from the system.
- To prevent water from continuously fill/drain, install a normally closed water inlet valve.

13. Securely attach the system to the air handler, walls, and/or ceiling.

# Assembling tank and frame

**FIGURE 10-1: WETTED MEDIA SYSTEM ASSEMBLY DRAWING**

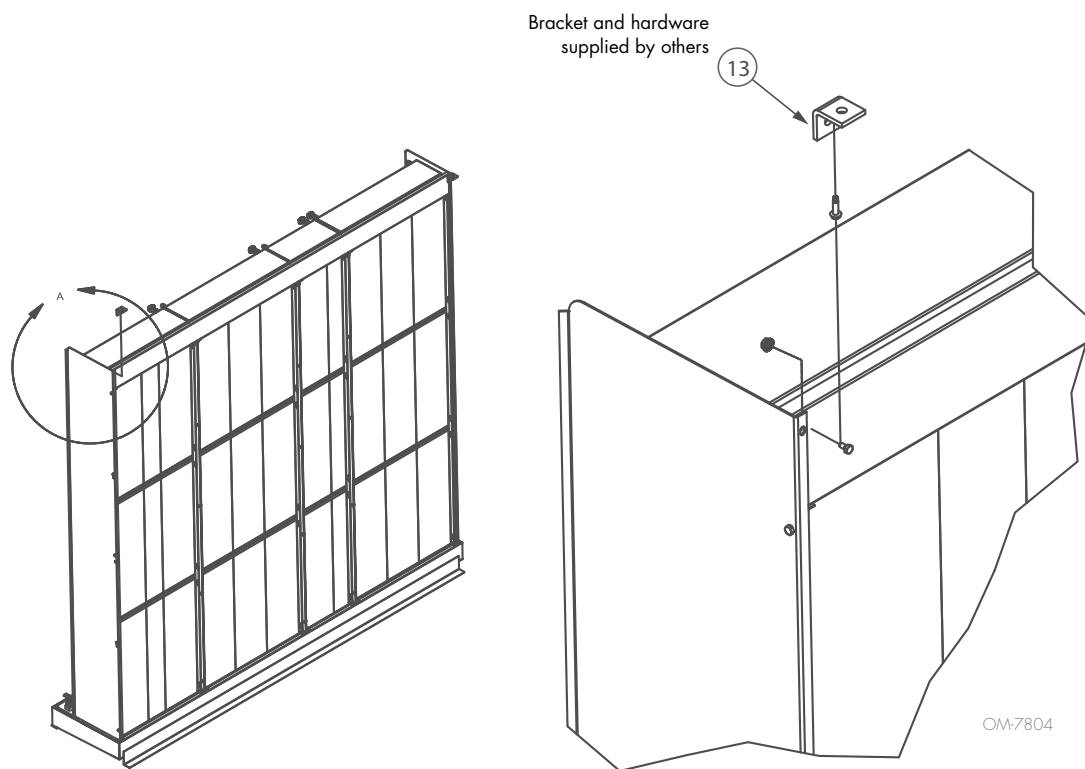
## 2-stage system shown



OM-7958\_uc

# Assembling tank and frame

**FIGURE 11-1: WETTED MEDIA SYSTEM ASSEMBLY DRAWING**



# Wiring

## CONTROL CABINET AND FIELD WIRING

- Locate the wiring diagrams referenced in the note at left.
- Terminals for field connections are labeled in the junction box mounted on the Wetted Media System tank.
- All wiring can be run in a single conduit. Waterproof conduit is required.
- See pages 13 and 14 for detailed wiring recommendations.

## CONTROL INPUT DEVICES

Refer to wiring diagrams supplied with the system and the Vapor-logic Controller Installation and Operation Manual for wiring requirements and connection points.

AHU applications:

- Position the air flow switch (if used) at least 3' (1 m) upstream of and in the same airstream as the Wetted Media System.
- See page 6 for control sensor installation recommendations.

## WIRING DIAGRAMS

The following wiring diagrams are included with the Wetted Media System separate from this manual:

- Ladder style wiring diagrams show power, control, and equipment-to-junction box interconnection requirements.

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



# Wiring

## 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, use 75 °C wire, and refer to local building codes.

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.

## 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 sized per NEC requirements (in Europe, IEC 60364 requirements).

A field-installed 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 sized per NEC or IEC 60364 requirements.

## 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 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.

# Wiring

## 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.
- Use separate electrical conduits for line and low voltage wiring to the unit.
- 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.
- When wiring sensors or control signal connections from a building control system, use 18-gauge minimum (1 mm<sup>2</sup>), plenum-rated, twisted pair wire with cable shielding and drain wire for grounding.
- 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:

- Control wiring must be plenum-rated, shielded, twisted pair wire with a bare drain wire for grounding.
  - North America: 18-gauge minimum
  - Europe: 1 mm<sup>2</sup> minimum
- Airflow proving switch wiring must be stranded wire in conduit. The airflow proving switch can be wired using plenum-rated, shielded, twisted pair wire with a bare drain wire for grounding.
  - North America: 18-gauge minimum
  - Europe: 1 mm<sup>2</sup> minimum
- 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.



## WARNING

### Excessive moisture hazard

DriSteem strongly recommends installing a duct airflow proving switch. This device prevents the system from operating when there is low or no airflow in the duct. Failure to install this device can result in excessive moisture in the duct, which can cause bacteria and mold growth or dripping through the duct.

**Important:** Do not use shielded cable for water level control devices

# Cycles of concentration

Table 15-1:  
Cycles of concentration

		Total alkalinity as mg/l HCO <sub>3</sub> <sup>-</sup>																			
		10	20	30	40	50	60	70	80	90	100	125	150	175	200	250	300	350	400	450	500
Total hardness as mg/l Ca <sup>2+</sup>	10	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.0	4.4	3.9	3.5	3.2	3.0	2.8
	20	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.3	4.7	4.2	3.9	3.3	3.0	2.7	2.5	2.3	2.1
	30	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.6	5.2	4.5	4.0	3.6	3.3	2.9	2.5	2.3	2.1	1.9	1.8
	40	6.0	6.0	6.0	6.0	6.0	6.0	5.9	5.4	5.0	4.7	4.1	3.6	3.3	3.0	2.6	2.3	2.1	1.9	1.7	1.6
	50	6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.0	4.6	4.3	3.7	3.3	3.0	2.7	2.4	2.1	1.9	1.7	1.6	1.5
	60	6.0	6.0	6.0	6.0	6.0	5.6	5.1	4.7	4.3	4.0	3.5	3.1	2.8	2.6	2.2	2.0	1.8	1.6	1.5	1.4
	70	6.0	6.0	6.0	6.0	6.0	5.3	4.8	4.4	4.1	3.8	3.3	2.9	2.6	2.4	2.1	1.8	1.7	1.5	1.4	1.3
	80	6.0	6.0	6.0	6.0	5.7	5.1	4.6	4.2	3.9	3.6	3.1	2.8	2.5	2.3	2.0	1.8	1.6	1.5	1.3	1.3
	90	6.0	6.0	6.0	6.0	5.5	4.8	4.4	4.0	3.7	3.5	3.0	2.6	2.4	2.2	1.9	1.7	1.5	1.4	1.3	1.2
	100	6.0	6.0	6.0	6.0	5.2	4.6	4.2	3.8	3.6	3.3	2.9	2.5	2.3	2.1	1.8	1.6	1.5	1.3	1.2	1.2
	125	6.0	6.0	6.0	5.6	4.8	4.3	3.9	3.5	3.3	3.0	2.6	2.3	2.1	1.9	1.7	1.5	1.3	1.2	1.1	1.1
	150	6.0	6.0	6.0	5.2	4.5	4.0	3.6	3.3	3.0	2.8	2.5	2.2	2.0	1.8	1.6	1.4	1.2	1.1	1.1	1.0
	175	6.0	6.0	5.9	4.9	4.2	3.8	3.4	3.1	2.9	2.7	2.3	2.1	1.9	1.7	1.5	1.3	1.2	1.1	1.0	0.9
	200	6.0	6.0	5.6	4.7	4.0	3.6	3.2	3.0	2.7	2.6	2.2	2.0	1.8	1.6	1.4	1.2	1.1	1.0	0.9	0.9
	250	6.0	6.0	5.2	4.3	3.7	3.3	3.0	2.7	2.5	2.3	2.0	1.8	1.6	1.5	1.3	1.1	1.0	0.9	0.9	0.8
	300	6.0	6.0	4.8	4.0	3.5	3.1	2.8	2.5	2.3	2.2	1.9	1.7	1.5	1.4	1.2	1.1	1.0	0.9	0.8	0.8
	350	6.0	5.9	4.6	3.8	3.3	2.9	2.6	2.4	2.2	2.1	1.8	1.6	1.4	1.3	1.1	1.0	0.9	0.8	0.8	0.7
	400	6.0	5.7	4.3	3.6	3.1	2.7	2.5	2.3	2.1	2.0	1.7	1.5	1.4	1.2	1.1	1.0	0.9	0.8	0.7	0.7
	450	6.0	5.4	4.1	3.4	3.0	2.6	2.4	2.2	2.0	1.9	1.6	1.4	1.3	1.2	1.0	0.9	0.8	0.8	0.7	0.7
	500	6.0	5.2	4.0	3.3	2.8	2.5	2.3	2.1	1.9	1.8	1.6	1.4	1.2	1.1	1.0	0.9	0.8	0.7	0.7	0.6
Cycles <2: Conductivity controlled bleed-off not recommended																					
Cycles <1.5: Direct water recommended																					
Cycles <1: Non-usable water																					

# Cycles of concentration

Table 15-1 shows the maximum recommended cycles of concentration (COC) for different water qualities. Cycles of concentration = mineral concentration in humidifier water/mineral concentration in supply water. The cycle value is used to calculate the bleed off. If the cycle rate is 2 or lower, it is recommended that the supply water should be treated to improve the water quality. Table 16-1 can be used to convert local measuring units to fit the table.

**Table 16-1:**  
**Conversion table**

Total hardness (calcium hardness)	
°dH	°dH × 7.2 → mg/l Ca <sup>2+</sup>
°f	°f × 4.0 → mg/l Ca <sup>2+</sup>
°clark	°clark × 5.7 → mg/l Ca <sup>2+</sup>
ppm CaCO <sub>3</sub>	ppm CaCO <sub>3</sub> × 0.25 → mg/l Ca <sup>2+</sup>
Total alkalinity (carbonate hardness, bicarbonate)	
°dH	°dH × 21.8 → mg/l HCO <sub>3</sub> <sup>-</sup>
ppm CaCO <sub>3</sub>	ppm CaCO <sub>3</sub> × 1.2 → mg/l HCO <sub>3</sub> <sup>-</sup>
ppm NaOH	ppm NaOH × 1.5 → mg/l HCO <sub>3</sub> <sup>-</sup>
General	
Concentration	mg/l = g/m <sup>3</sup> = ppm
Conductivity	1 mS/m = 10 µS/cm = 10 µMHO

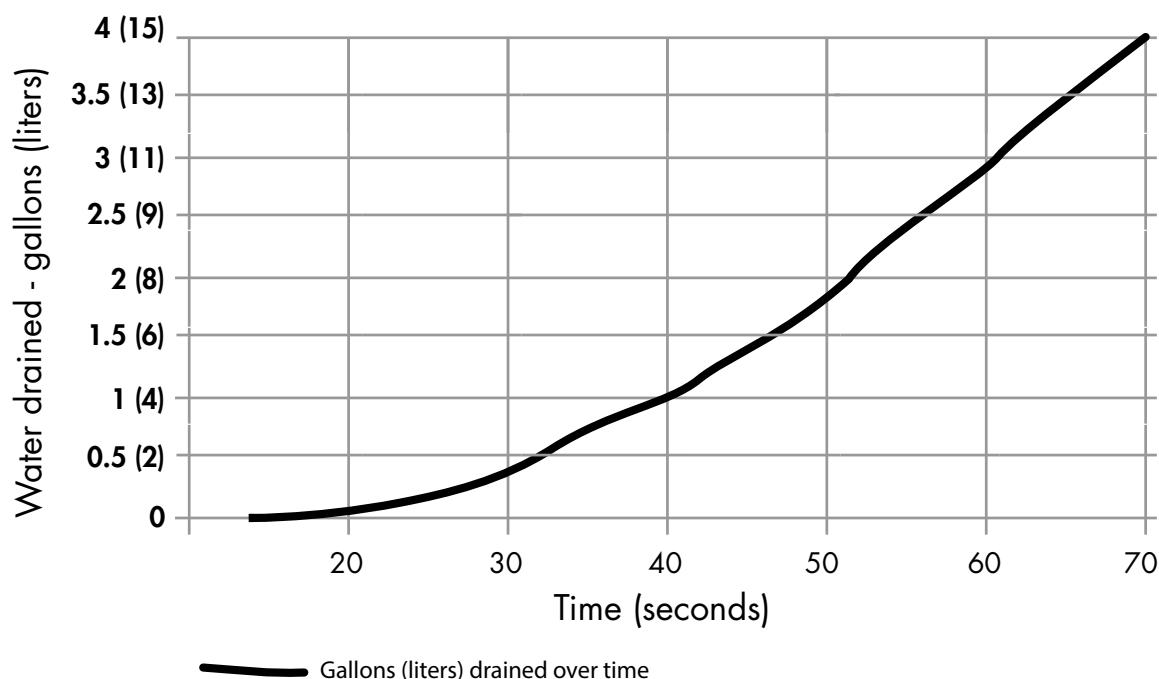
## PROCEDURE FOR DETERMINING COC AND THE CORRESPONDING DRAIN STRATEGY

1. Test your supply water and choose your desired / required COC from the chart above
2. Given your system operating conditions, calculate the water evaporation rate: E (gallons/hour [liters/hour])  
 $E = (1.2 \times CFM \times (IT_d - ET_d)) / 10,000$   
 $(E = (4.8 \times CMH \times (IT_d - ET_d)) / 10,000)$
3. Water must be periodically drained from the tank to maintain the desired COC, calculate the required drain rate: D (gallons/hour [liters/hour])  
 $D = E / ((C-1))$ 
  - C = desired cycles of concentration
  - E = evaporation rate

4. Total flow rate required for the system are  
 $T = E + D$  GPH (LPH)
5. CFM = cubic feet per minute air flow  
 CMH = cubic meters per hour air flow
  - $IT_d$  = incoming dry bulb temperature
  - $ET_d$  = exiting dry bulb temperature
6. To achieve that drain rate, several drain events must take place over the course of an hour. The frequency of drain events and corresponding gallons (liters) drained per event are based on customer preference.
  - More frequent drain events where smaller volumes of water are drained will result in tighter COC control but more drain valve ware
  - Less frequent drain events where larger volumes of water are drained will result in looser COC control but less wear on the drain valve.
7. Figure 16-1 shows the number of gallons (liters) that will be drained through the drain valve during a given period of drain activation. Select a desired drain duration and corresponding gallons per drain.
  - The gallons (liters) drained includes the volume drained while power is provided to the drain as well as the volume drained while the valve is closing.
  - Graph will be provided seconds of drain vs. gallons (liters) per drain.
  - S = seconds per drain
  - g = gallons per drain
8. Calculate the required frequency of drain events: df ((drain events)/hour)
  - $df = D/g$  (l)
  - D = drain rate
  - g (l) = gallons (liters) per drain
9. Now control the drain to power on (df) timer per hour for your chosen (S) seconds

# Cycles of concentration

**FIGURE 17-1: WATER DRAINED OVER TIME**



## WATER FROM OTHER SOURCES

If the supply water is not classified as drinking water from the mains the following additional concentration limits are recommended.

Chlorides (mg/l Cl-)  $Cl^- \times C < 200 \text{ mg/l}$

Sulphates (mg/l  $SO_4^{2-}$ )  $SO_4^{2-} \times C < 300 \text{ mg/l}$

Bacteria rate (CFU/ml, KBE/ml)  $CFU/ml \times C < 1000$

Multiply the concentration by the cycle ratio (C) and compare to the recommended limit. If the value is over the limit, reduce the cycle rate.

When using softened water, the total hardness can't be used for dimensioning the bleed-off. Instead use a conductivity limit of 1000µS/cm to calculate the cycle ratio. Supply conductivity  $\times C < 1000\mu\text{S/cm}$ .

In poor water quality areas, a blend of treated water and raw water can be used to lower the mineral content. The water should be blended so that the conductivity  $> 100\mu\text{S/cm}$ .

## EXAMPLE CONDITIONS

- Makeup Water Alkalinity:- 90 mg/l  $HCO_3$
- Makeup Water Hardness: 100 mg/l  $Ca^2$
- Air handler is moving 25,000 CFM (42.475 CMH)
- Entering temperature 95°F (35°C)
- Exiting temperature 85°F (29.5°C)

## EXAMPLE CALCULATIONS

1. Per Table 15-1 the recommended cycles of concentration would be 3.6.
2.  $E = (1.2 \times 25,000 \times (95-85)) / 10,000 = 30 \text{ GPH}$   
 $(E = (4.8 \times 42,475 \times (35-29.5)) / 10,000 = 112 \text{ LPH})$
3.  $D = 30 / (3.6-1) = 11 \text{ GPH}$   
 $(D = 112 / (3.6-1) = 43 \text{ LPH})$
4.  $T = 30 + 11 = 41 \text{ GPH}$   
 $(T = 112 + 43 = 155 \text{ LPH})$
5. Continue to next step.
6. A 45 second, 1.5 gallon (6 liter) drain event is selected.
7.  $df = 11 / 1.5 = 7 \text{ drain events per hour}$   
 $(45 \text{ seconds each})$   
 $(df = 43 / 6 = 7 \text{ drain events per hour})$   
 $(45 \text{ seconds each})$

# Start-up checklist

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

- ☐ 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.
- ☐ Turn on the water supply, and confirm that the drain valve is functioning.
- ☐ Confirm that there is at least 25 psi (170 kPa) at the fill valve. Allow the tank to fill with water.
- ☐ In the Status screen, confirm that the Duct Airflow Switch is closed.
- ☐ Confirm the system is setup to operate at the Cycles of Concentration setting recommended by DriSteem. Contact DriSteem if you do not know the value to enter for your application's supply water.
- ☐ With sufficient water available, the airflow switch closed, the safety interlock closed, and the unit getting a demand signal, verify that the pump or pumps are activated.
- ☐ Monitor system activity, and watch for drips or leaks in the duct or AHU.  
If a leak is found:
  - a. Remove demand signal, and put system in Standby mode.
  - b. Tighten any loose connections.
  - c. Return system Auto mode.
- ☐ Verify that the UV lamp is on. The LED on the power wiring end of the cylinder is illuminated when the UV lamp is on.
- ☐ If you experience difficulties, have the serial number and unit Model, and call DriSteem Technical Support at 800-328-4447.
- ☐ Return the system to the desired mode.



## Media

Evenly distributed water is the most important contributing factor to long media life. Water flow flushes away dirt and contaminants, which may be harmful to the media. Areas starved for water will be the first to clog or soften. To ensure that water gets evenly distributed across the entire media surface, make sure the system is level from side to side and from front to back. Other factors affecting media life:

- Often, the major influence on microbial growths and odors is lack maintenance on the tank and media. Keep in mind the following:
  - Algae, bacteria, and fungi cannot proliferate without nutrients. Eliminate and control sources of nutrients to eliminate microbes.
  - Algae, bacteria and fungi need moisture to live. Ensure that the bottom of the media cassette is not touching the water.
  - Do not override the system's automatic, dry-out cycles.
- Oxidizing biocides (such as chlorine and bromine) are not recommended for reducing algal and microbial growth in Wetted Media System. They are unstable and can soften and destroy the media.

DriSteem recommends nonoxidizing biocides, such as isothiazolin, methylene bis-thiocyanate, 2,2-Dibromo-3-Nitrilopropionamide (DBNPA), and carbamates. These chemicals are available from industrial water treatment specialists and should be used in strict accordance with the instructions on their product labels.

- Contact DriSteem for media care recommendations for your application.

**Note:** Foaming of the water may occur during initial startup. This is a normal part of startup with new media. Remove the foam by initiating multiple drain cycles or by using a commercially available defoaming agent until the foam is gone. (Defoaming agent is available at carpet cleaning or spa dealers).

### **WARNING**

#### **Shutdown procedure**

Follow all installation specific shutdown procedures prior to performing service or maintenance on the system.

#### **TEST OUTPUTS**

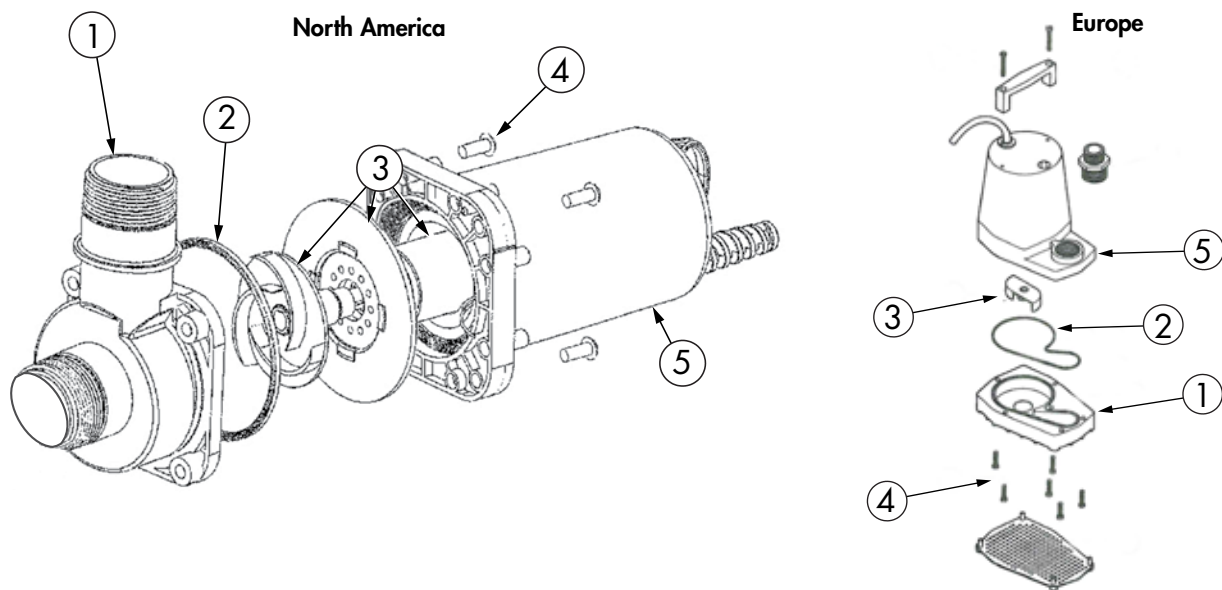
When completing an installation or repair, cycle all outputs to verify operation.

# Pumps

Pump maintenance requirements depend on water hardness. Inspect the pump inlet after a few weeks of operation for scale build-up. If there is scale build-up, follow the procedure below to inspect and clean the rotor assembly. See Figure 20-1.

1. Follow all shutdown procedures prior to performing service or maintenance on the system.
2. Remove housing screws (4) securing impeller casing (1) to motor (5).
3. Remove impeller casing from motor.
4. Remove rotor assembly (3).
5. Inspect and clean all parts. Replace pump if necessary.
6. If replacing pump, skip to step 7. Otherwise, reassemble pump as follows:
  - a. Install o-ring (2) onto impeller casing.
  - b. Carefully slide rotor assembly into motor, ensuring that holes align.
  - c. Check to ensure that rotor assembly rotates freely.
  - d. Using the four housing screws, attach impeller casing to motor, ensuring that o-ring remains in place.
7. Open field-installed manual water supply shut-off valve.
8. Return system to service, and make sure it is operating properly.

**FIGURE 20-1: RECIRCULATION PUMPS**



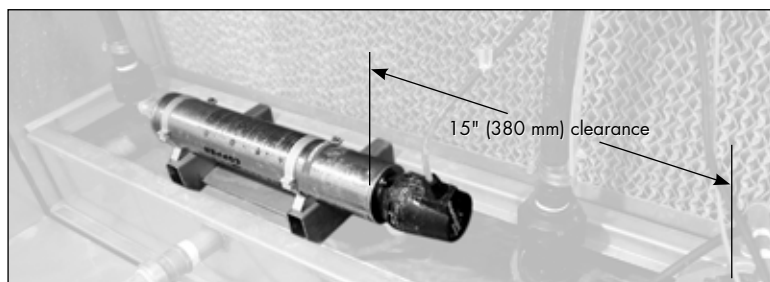
Images courtesy of Franklin Electric Co., Inc.

## UV lamp replacement

The controller displays a message after 9000 hours of use when the lamp needs to be replaced. There is no need to disconnect the system from the water supply or to drain the UV chamber, and lamp replacement requires no special tools.

1. Follow all shutdown procedures prior to performing service or maintenance on the system. Do not run system while replacing lamp.
2. Slide UV assembly and components apart from each other to create at least 15" (380 mm) clearance for lamp removal. See Figure 21-1.

**FIGURE 21-1: CLEARANCE FOR LAMP AND QUARTZ SLEEVE REMOVAL**

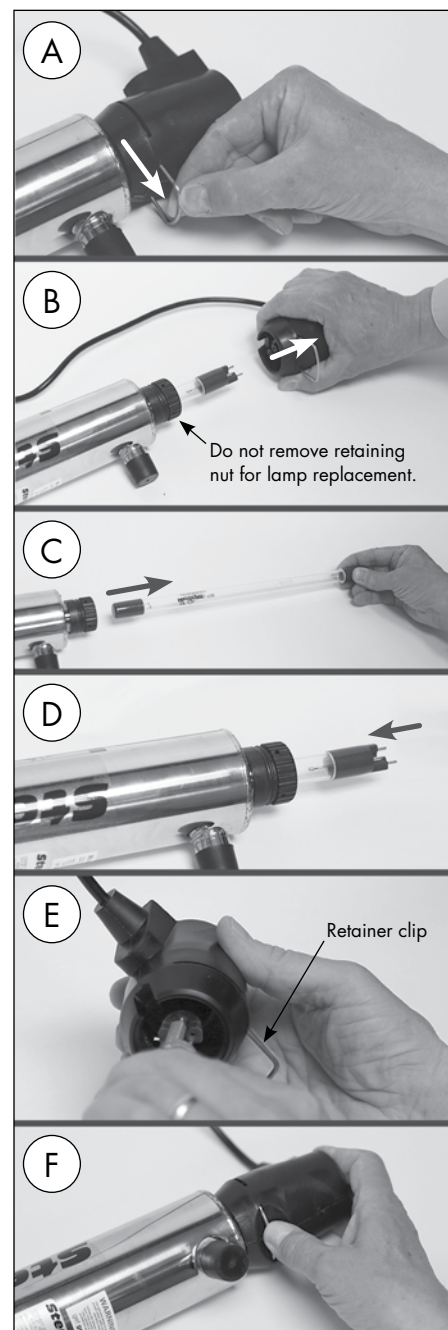


3. Pull metal retainer clip out of connector slot (Figure 21-2-A).
  4. Remove connector from UV chamber (Figure 21-2-B).
  5. **Do not remove retaining nut.** Slide UV lamp straight out of UV chamber (Figure 21-2-C).
- Note:** Avoid angling the lamp when removing it. Stress against the quartz sleeve inside of the UV chamber could cause the sleeve to break.
6. Dispose of UV lamp following hazardous waste procedures.
  7. Touching only ceramic ends, remove new lamp from protective packaging.
  8. Insert lamp straight into UV chamber, leaving about 2" (50 mm) of lamp protruding from chamber (Figure 21-2-D).

**Note:** Touch only ceramic ends of UV lamp.

9. Make sure retainer clip is pulled away from body of connector. Align notch on connector with grounding lug on UV chamber, and attach connector to lamp (Figure 21-2-E).
10. Pressing connector onto UV chamber (Figure 21-2-F), push retainer clip into slot. Make sure retainer clip engages with retaining nut.
11. Open field-installed manual water supply shut-off valve.
12. Return system to service, and make sure it is operating properly.

**FIGURE 21-2: UV LAMP**



## UV assembly quartz sleeve replacement

Deposits and sediment on the quartz sleeve can decrease the effectiveness of the UV lamp. Inspect the quartz sleeve periodically; cleaning frequency depends on water hardness.

Quartz sleeve replacement requires no special tools.

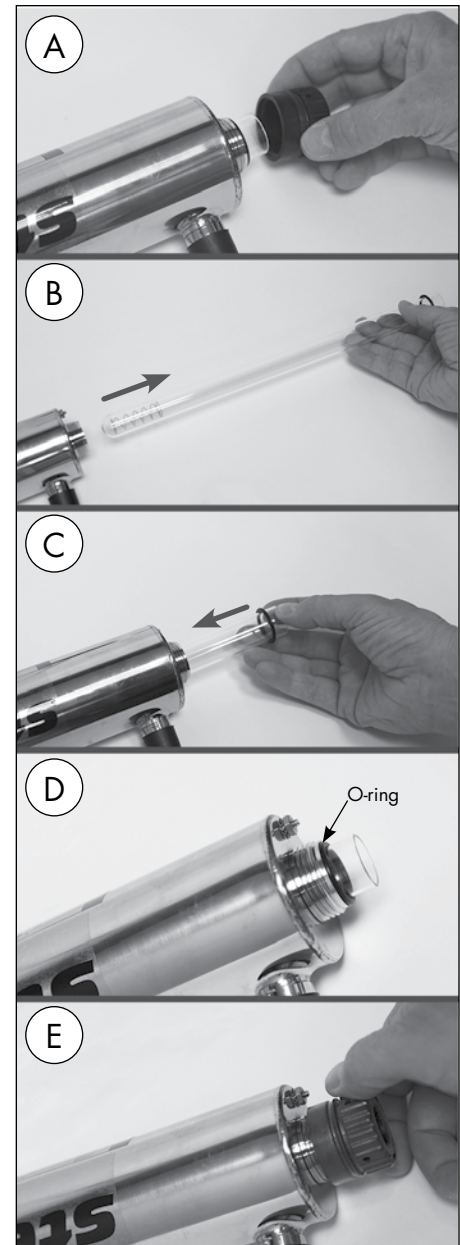
**Note:** Properly maintained supply water will reduce the accumulation of residue on the quartz sleeve.

1. Follow all shutdown procedures prior to performing service or maintenance on the system.
2. Shut off upstream water supply that feeds water into UV chamber.
3. Remove UV lamp as explained in steps 2 through 5 on page 21.

**Note:** If not replacing the UV lamp, touch only the ceramic ends of the lamp when removing and handling it.

4. Remove retaining nut (Figure 22-1-A).
5. Pull quartz sleeve straight out of UV chamber (Figure 22-1-B).  
**Note:** Avoid angling the sleeve when removing it. Stress against the sides of the UV chamber could cause the sleeve to break.
6. Clean quartz sleeve with commercially available scale remover and a lint-free cloth. Remove all traces of cleaning fluid from sleeve.  
**Note:** Do not allow liquid inside of sleeve.
7. Push quartz sleeve straight into UV chamber (Figure 22-1-C).  
**Note:** The UV chamber has guides to center the sleeve during insertion.
8. Lubricate o-ring (with silicone release grease), and slide it onto quartz sleeve until it is against chamfered seat of UV chamber (Figure 22-1-D).
9. Thread retaining nut onto UV chamber hand-tight (Figure 22-1-E). Do not use a wrench.
10. Install UV lamp and connector as explained in steps 8 through 10 on page 21.
11. Slowly turn on water to pressurize UV chamber. Verify that there are no leaks.
12. Return system to service, and make sure it is operating properly.

**FIGURE 22-1: QUARTZ SLEEVE**



# Tank and probe

## **TANK**

Drain the tank and scrape away any loose sludge or scale from the side and bottom of the tank, and clean the overflow and drain outlets.

## **WATER LEVEL PROBE**

Disconnect the probe plug and cable assembly, and unscrew the probe rod assembly from the top of the tank.

- Clean the probe housing, ensuring that all the housing passageways are clear.
- Clean the probe rods. The scale should flake off easily from the rods.
  - The bottom 0.4" (10 mm) of each rod is the sensing portion; clean these areas with a wire brush, emery cloth, or steel wool.
  - Inspect the composite plastic probe rod assembly for any signs of cracking, roughness, or deterioration. Replace probe assembly if necessary.

# Interval maintenance

**Table 24-1:**  
**Wetted Media System maintenance intervals**

<b>Monthly</b>	Overflow	<ul style="list-style-type: none"> <li>Verify that the overflow outlet is not obstructed and that water would be able exit the overflow if it got that high without overflowing the tank.</li> <li>Remove residue from anywhere near the overflow outlet.</li> </ul>
	Drain	<ul style="list-style-type: none"> <li>Verify that the drain outlet is not obstructed and that water exits the tank.</li> <li>Remove residue from anywhere near the drain outlet.</li> </ul>
<b>Seasonally</b>	UV lamp quartz sleeve	Inspect and clean if necessary. See "UV assembly quartz sleeve replacement" on page 22.
<b>Annually</b>	UV lamp assembly	Replace the UV lamp if it has more than 9000 hours of use. See "UV lamp replacement" on page 21.
	Pumps	Inspect the rotor assemblies to ensure that they are clean and not obstructed. If cleaning is necessary, see "Pumps" on page 20.
	Media	Inspect the media for scale or biological build-up. If cleaning is necessary, see "Media" on page 19.
	Tank	Inspect the tank for scale or biological build-up. If cleaning is necessary, see "Tank and probes" on page 23.

**Table 24-1:**  
**Wetted Media System replacement parts**

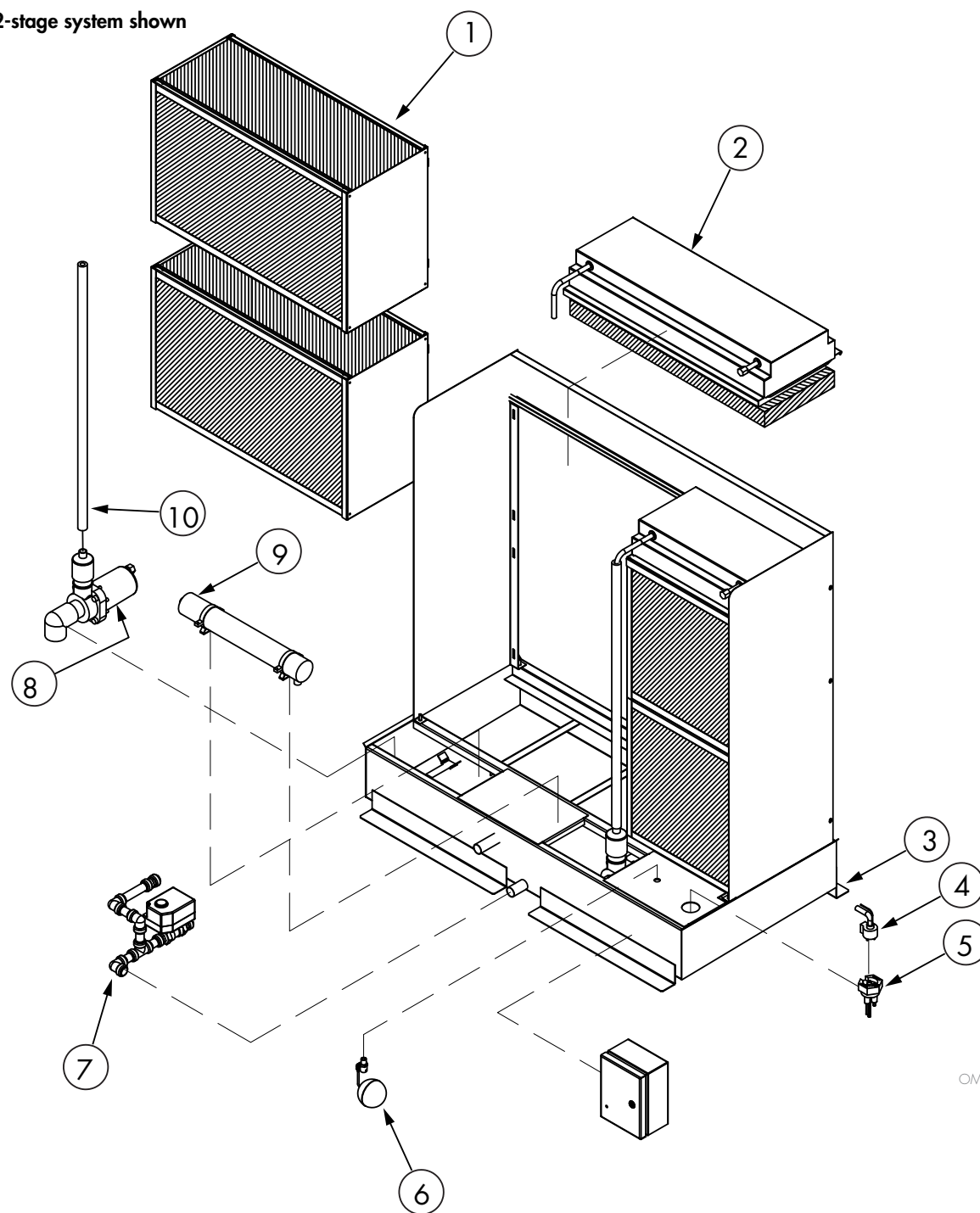
No.	Description	Qty.	Part No.
1	Media cassette	Varies with model	Contact DriSteem
2	Distribution header	1 per stack of media	
3	Tank assembly	1	
4	Probe plug assembly	1	
5	Probe assembly	1	
6	Float valve water control	1	
7	Drain/overflow assembly	1	
8	Pump assembly	1 per stack of media	
9	Quartz sleeve (inside of stainless steel housing shown in drawing)	1	
10	UV lamp (inside of quartz sleeve)	1	
	Hose	1 per stack of media	



# Replacement parts

**FIGURE 25-1: WETTED MEDIA SYSTEM REPLACEMENT PARTS**

2-stage system shown



OM-7957

# Troubleshooting

The following troubleshooting table provides instructions for common issues. If the instructions in this section do not resolve your issue, please contact DriSteem Technical Support for further assistance. The telephone numbers are on page 1.

For additional information, including messages and alarms, see the “Operation” section of this manual, beginning on page 18.

**Table 26-1:**  
**Troubleshooting**

Issue	Action
System does not start	<ul style="list-style-type: none"> <li>• Check the supply voltage.</li> <li>• Check the circuit breaker(s).</li> <li>• Verify that the water supply valve is in the Open position.</li> <li>• Verify that supply water pressure is at least 25 psi (170 kPa).</li> <li>• Check the control and power fuses in the control cabinet and on the power panel.</li> <li>• Check transformer voltage(s).</li> <li>• Verify that the set point is lower than the temperature in the conditioned space.</li> <li>• Verify that the device sending the demand signal is operating.</li> <li>• Verify that the detection instrument is calibrated correctly.</li> <li>• Verify that the Pump Enable switch is in the On position.</li> </ul>
No water appears on media	<ul style="list-style-type: none"> <li>• Verify that the water supply is on, valves are open, and filters and screens (if any) are clean.</li> <li>• Check operating status to see if the system is in Idle mode. If yes, change to Auto mode.</li> <li>• Verify that all distribution headers are installed properly.</li> <li>• Verify that all pumps are operating properly.</li> <li>• Verify that all media cassettes are installed properly. See “Assembling tank and frame” on page 8.</li> </ul>
Dry spots or streaks on media	<ul style="list-style-type: none"> <li>• Water has not fully deployed through the media. Make sure water is supplied to all distribution headers, wait for a few minutes, then check again.</li> <li>• Remove the distribution header covers and visually inspect for clogs. Utilize flush valves at ends of spray pipe, if present.</li> <li>• Water inlet, orifice, or in-line filters are plugged. Inspect and clean as required.</li> <li>• Water flow is not properly adjusted. Adjust the amount of flow to all distribution headers.</li> <li>• Ensure that all distribution headers are installed properly.</li> </ul>
Media sections have shrunk in their cassette frames.	Media may be degraded due to biological or chemical attack. Replace media cassettes if needed. See “Media” on page 19.
Water not coming out of flush lines	<ul style="list-style-type: none"> <li>• Water is not being supplied to the distribution headers. Verify that water is turned on, and check the pumps.</li> <li>• Flush ball valves may be closed. Check that ball valves are open.</li> <li>• Flush line may be blocked or plugged. Open the valves or caps, and clean the line.</li> </ul>
White, soft scale build-up on media	<ul style="list-style-type: none"> <li>• Some soft scale is common on media. <b>Excessive</b> buildup may indicate water quality problems or uneven water distribution. See “Media” on page 19.</li> <li>• Clean or replace the media.</li> </ul>
Media plugged solid with soft scale.	<ul style="list-style-type: none"> <li>• Media was inadvertently installed backward. Reinstall, clean, or replace media.</li> <li>• Mineral concentration in supply water might be excessive Contact DriSteem.</li> <li>• Replace media if it cannot be cleaned.</li> </ul>
Excessive debris and build-up in tank	<ul style="list-style-type: none"> <li>• Debris and foreign objects eventually accumulate in the tank. Drain, flush, and clean tank.</li> <li>• Make sure there is no debris in drain outlet or overflow outlet.</li> </ul>

*Continued*

# Troubleshooting

**Table 26-1:**  
**Troubleshooting (continued)**

Issue	Action
Water on duct or AHU floor downstream of Wetted Media System	<ul style="list-style-type: none"> <li>• Water carryover problem. Check blank-off and seal areas for water droplets.</li> <li>• Water bypass problem. Check piping connections for leaks.</li> <li>• Check overflow outlet, and make sure tank is not overflowing</li> <li>• Verify that all media cassettes are properly oriented.</li> <li>• Verify that splash cover is installed.</li> </ul>
Foaming on initial startup or after media replacement	<ul style="list-style-type: none"> <li>• If water is once-through, continue to run fresh water to rinse the media.</li> <li>• If water is recirculated, turn off water, drain and flush tank, refill tank, and run fresh water over the media. Repeat if necessary.</li> </ul>
Softened or settling media	<ul style="list-style-type: none"> <li>• Media might be subjected to harsh chemicals or soft water. Test the water.</li> <li>• Replace pads if air can short circuit around the pads.</li> </ul>
Musty odor from media	<ul style="list-style-type: none"> <li>• Verify that the dry-out cycles run long enough for the media to dry out.</li> <li>• Verify that water distribution is adequate to sufficiently flush pads during normal operation.</li> <li>• Perform regular cleaning and flushing of distribution header and tank.</li> <li>• Adjust water level in tank so it stays below the bottom of the media.</li> <li>• Replace the media if it has softened or become heavily scaled.</li> </ul>
Pump does not run	<ul style="list-style-type: none"> <li>• Verify that pump is getting electrical power.</li> <li>• Inspect impeller to see if it is jammed with foreign object. Clear impeller (see "Pumps" on page 20).</li> <li>• Thermal overload protection has shut down pump.</li> </ul>
Pump runs, but it does not deliver water.	<ul style="list-style-type: none"> <li>• Tank water level is below pump inlet.</li> <li>• Verify that suction screen is unobstructed (see "Pumps" on page 20).</li> <li>• Verify that hose and orifice leading up to distribution header is unobstructed.</li> </ul>





### **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 Wetted Media System. DriSteem also leads the industry with a Two-year Limited Warranty and optional extended warranty.

### **For more information**

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[sales@dristeem.com](mailto:sales@dristeem.com)

For the most recent product information visit our website: [www.dristeem.com](http://www.dristeem.com)

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Form No. WMS-UC-IOM-0818

Part No. 890000-865 Rev B

### **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. 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 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.

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.