ADIATEC® EVAPORATIVE COOLING AND HUMIDIFICATION

High-Pressure System

- *Energy efficient*
- *Provides both direct and indirect evaporative cooling*
- *Multiple zone capabilities in air handlers, ducts, and open spaces*
- *Complete water treatment options available from DriSteem*
- *Simple, reliable operation*

Ultrasonic Humidifier

- *In room or in AHU/duct application flexibility*
- *93% less energy required compared to isothermal humidifiers*
- *Greater effectiveness in low load sensible applications*
- *±1% controllability with modulating demand signal and constant temperature/airflow control*
- *Small water droplet for easily evaporated water*
- *Adiabatic cooling*

driSteem™

ADVANCED, EFFICIENT COOLING AND HUMIDIFICATION

ENERGY EFFICIENT

Evaporative cooling and humidification systems draw heat from air to evaporate unheated water introduced by high-pressure nozzles. This process raises the relative humidity (RH) level and lowers the dry bulb air temperature. Consequently, these systems humidify and cool air very efficiently.

REDUCES COOLING LOAD

As water is absorbed in air, the evaporative cooling effect reduces the building's cooling load. Twelve pounds of unheated evaporated water (vapor) reduces the cooling load by about one ton, saving about 12,000 Btus (3.5kW).

LOW MAINTENANCE

High-Pressure Systems are very low maintenance systems.

The High-Pressure System's stainless-steel pump is designed to run for 8000 hours before its first maintenance check, and the stainless-steel dispersion nozzles and manifolds are maintenance free.

High-Pressure System water treatment options available from DriSteem provide ultra-pure water that leaves no white dust. The reverse osmosis (RO) system automatically flushes the membrane for extended membrane life.

HYGIENIC DESIGN

The high-pressure system is certified to hygiene standards VDI 6022 part 1 & 6. This ensures best design practices; including stainless steel and NSF approved materials, mist elimination (aerosols), hygienic flush sequences and more.

HIGH-PRESSURE SYSTEM

The DriSteem High-Pressure System delivers evaporative cooling and humidification to multiple zones in air handlers, ducts, and open spaces. The Vapor-logic controller provides comprehensive management of all system variables.

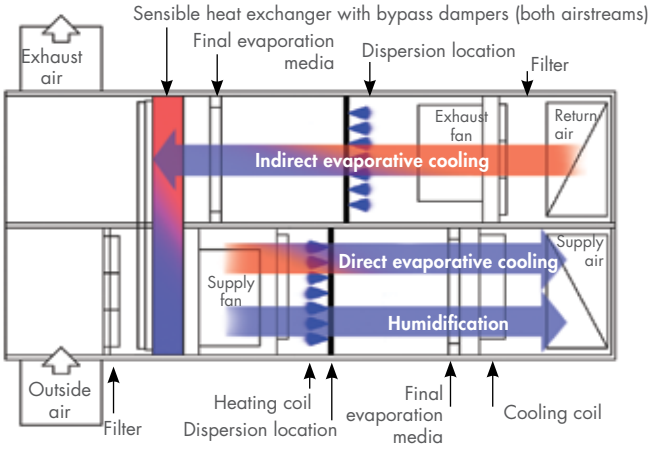
Learn More

DIRECT OR INDIRECT EVAPORATIVE COOLING

Direct evaporative cooling adds moisture to the supply air while humidifying and cooling the space at the same time.

Indirect evaporative cooling occurs in the heat exchanger without adding moisture. Cooling air before it enters the space without adding moisture to the space.

A High-Pressure System is shown here.



Feature	High-Pressure System
Application versatility	Suitable for any application; commonly used in agriculture, painting, industrial manufacturing, printing facilities,and applications using air-side economizers
Advanced technology	Precision-machined atomizing nozzles fragment water droplets into ultra-fine particles (90% are ten microns or less)
	Water delivered to nozzles at up to 1200 psi (82.7 bar) requires no pressurized air
	Integral check valve in nozzle ensures no dripping when system shuts off
Cooling effect saves energy	Every pound of atomized water absorbed in air removes approximately 1000 Btu of heat from the air (every kg absorbed removes approximately 2300 kJ of heat)
	Significant energy savings when cooling and humidifying simultaneously
	Utility rebates can offset initial costs
Low maintenance	Stainless-steel pump is cooled by purified supply water; 8000 hours before maintenance check and service
	Stainless-steel nozzles and manifolds require little maintenance (replacement as needed)
	Thorough water filtration protects stainless-steel components from corrosion and undue wear
	Final evaporation media as close as three feet (0.9 m) downstream from heating coil prevents downstream wetting
Comprehensive system control with Vapor-logic	Accurate, responsive RH control; PID control tunes system for maximum performance
	Set up, view, and adjust system functions with intuitive keypad/display or Web interface
	Integrates into any building automation system via an optional BACnet, LonTalk, or Modbus communication protocols
User controlled	Not available
Multiple zone control capability	Individual zone monitoring and modulated staging valves provide tight control in all zones with optimized absorption and minimal water waste
	One system cools and humidifies multiple zones with separate demands
Fan-assisted dispersion	Fan assisted fans have a hub style design for localized access and more efficient evaporation as it moves air more effectively. The fan-assisted dispersion unit pulls the air from above where it tends to be warmer.
Versatile	Cools and humidifies in air handlers, ducts, and open spaces
	Nozzle staging and pulsed modulation allow high turndown of system output. Additionally, a mechanical relief valve allows for internal recirculation; providing further turndown.
	Capacities up to 5500 lbs/hr (2495 kg/hr), multiple systems can be combined for larger capacities
	Flexibility to accommodate the most challenging applications; extensive network of DriSteem representatives available to assist with system layout and design

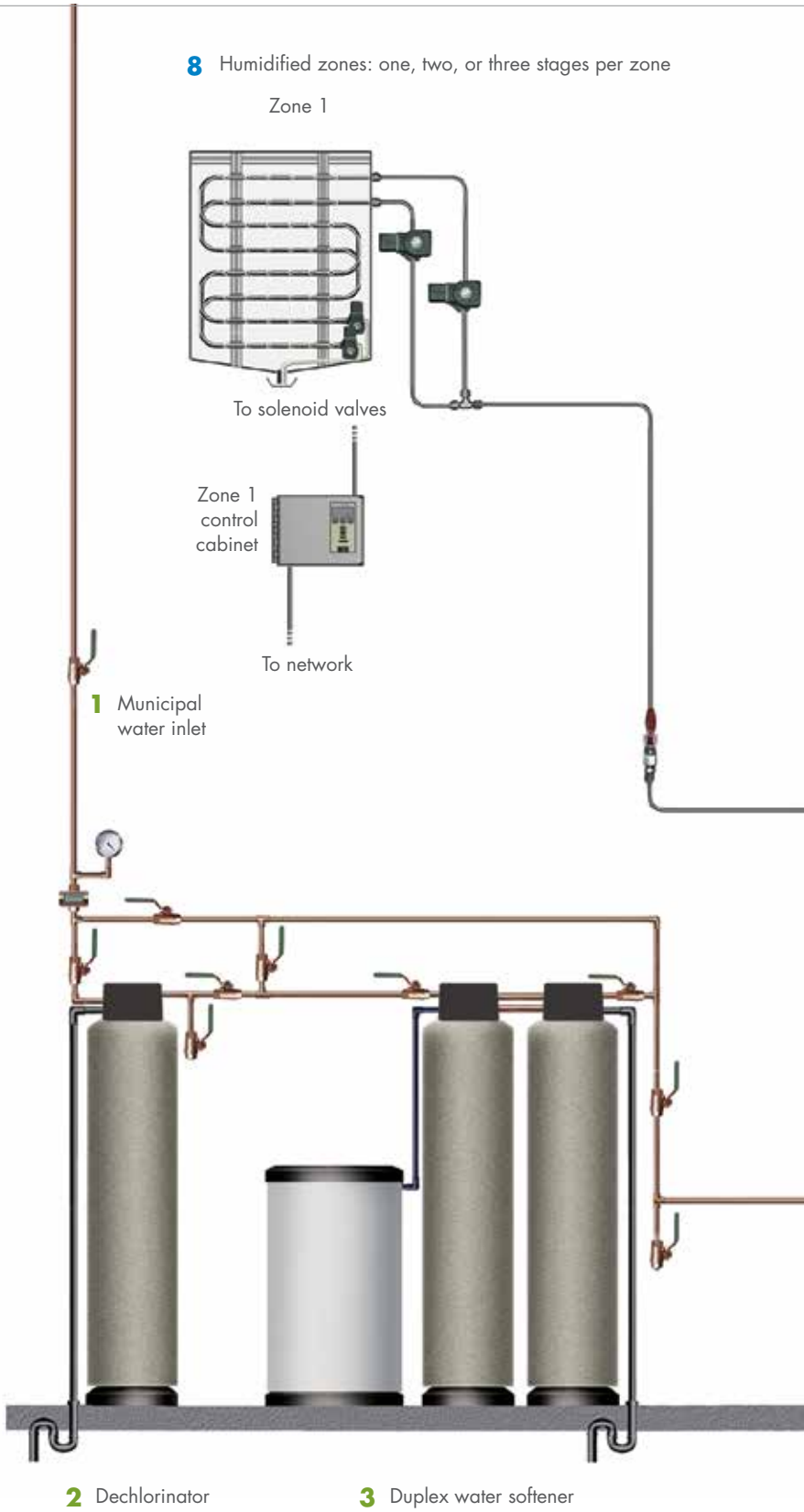
HIGH-PRESSURE SYSTEM SEQUENCE OF OPERATION

A COMPLETE SYSTEM THAT INCLUDES WATER TREATMENT

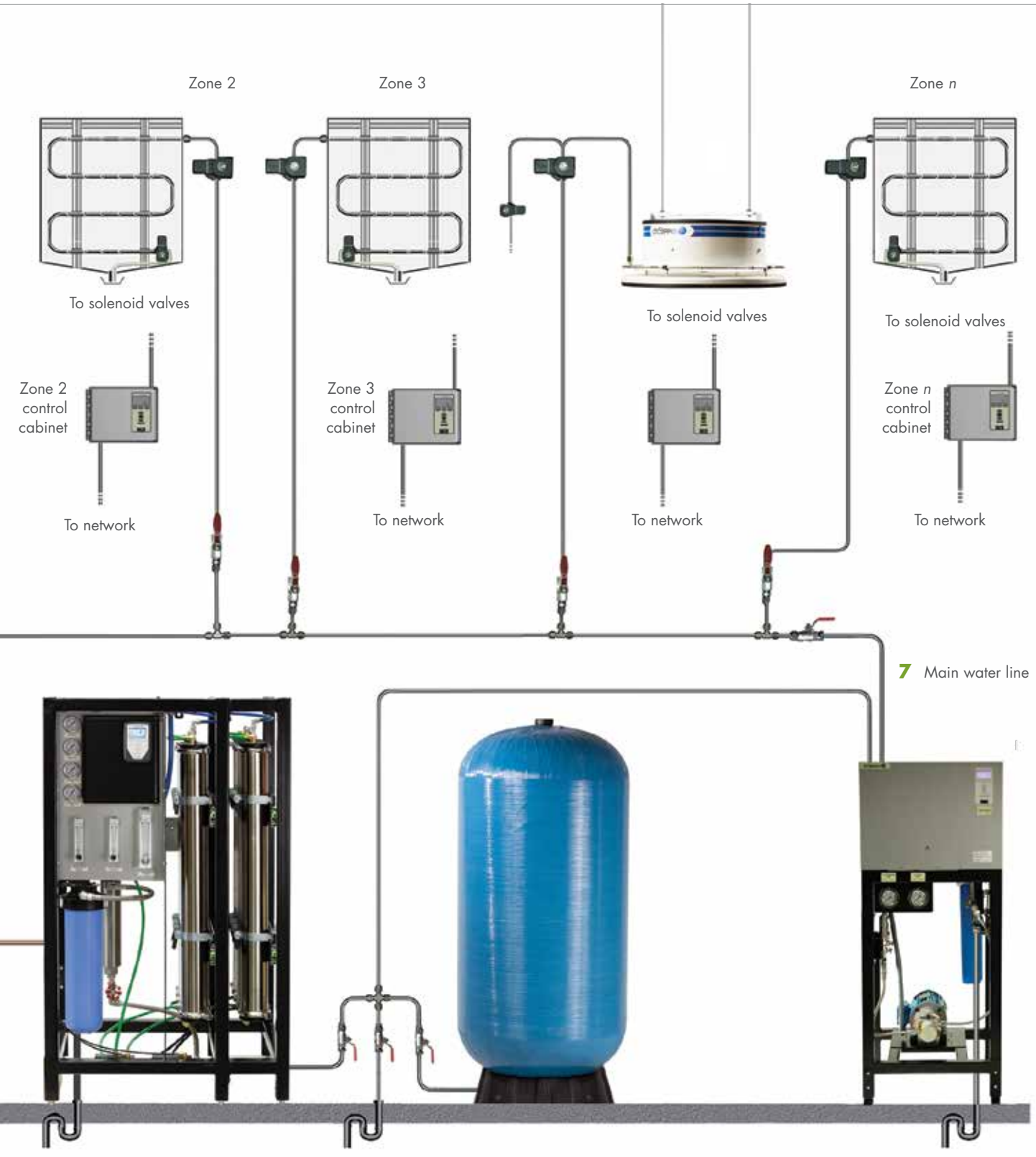
1. Water enters system from municipal water supply
2. Dechlorinator (wall-mounted on smaller models)
3. Duplex water softener with brine tank
4. RO station with particulate filter and RO membranes
5. Pressurized RO holding tank
6. High-pressure pump station:

   All-stainless-steel axial-piston high-pressure pump delivers purified, high-pressure water to atomizing nozzles

   Vapor-logic controller optimizes absorption in multiple humidification zones
7. Main water line feeds network of high-pressure, stainless-steel piping
8. Humidified zones: purified, ultra-fine water droplets exit nozzles and disperse in AHUs, ducts, and/or open spaces



HIGH-PRESSURE SYSTEM SEQUENCE OF OPERATION

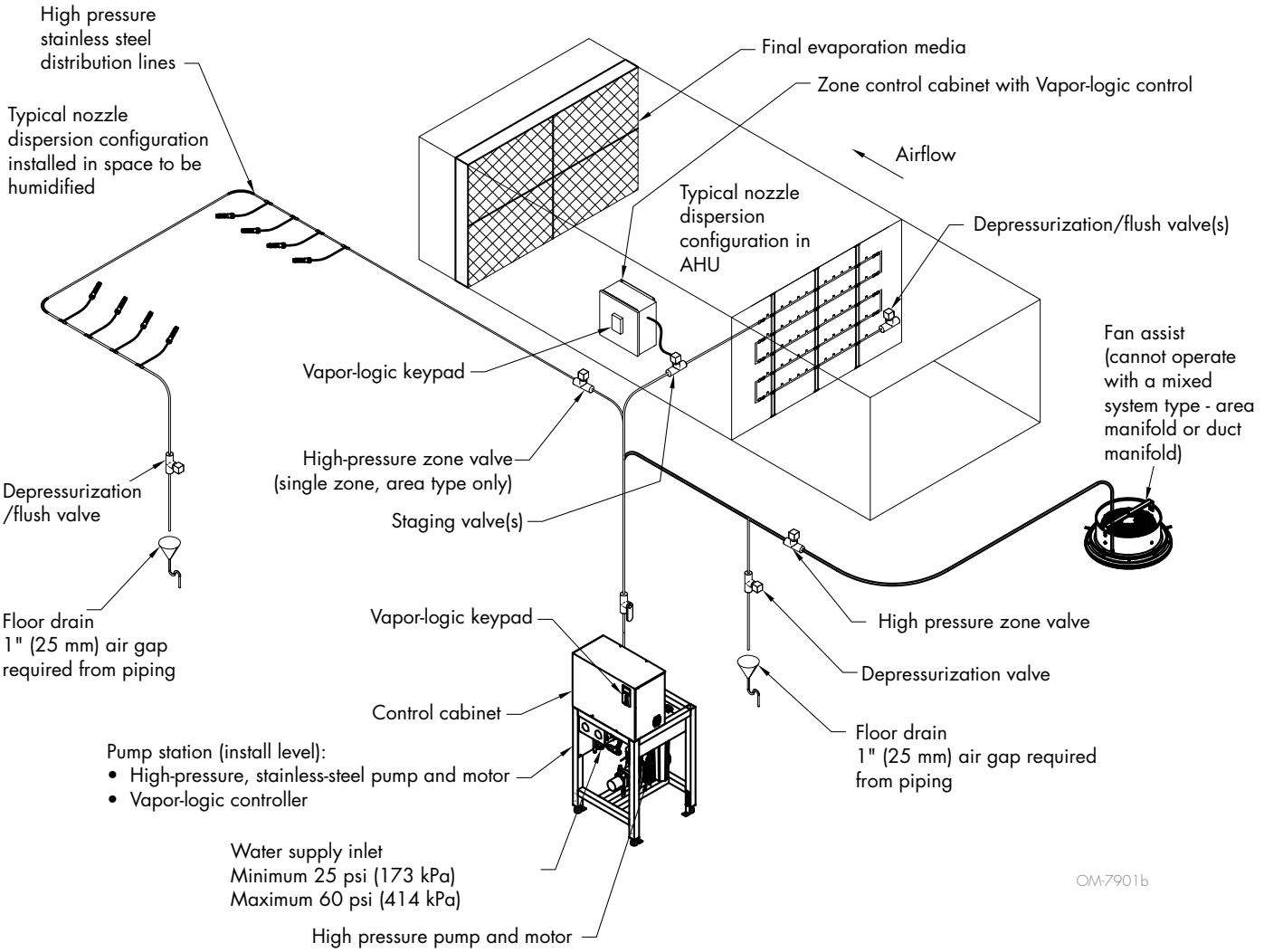


4 RO station:
- Particulate filter
- RO membranes

5 Pressurized RO holding tank

6 High-pressure pump station:
- High-pressure stainless steel pump
- Vapor-logic controller

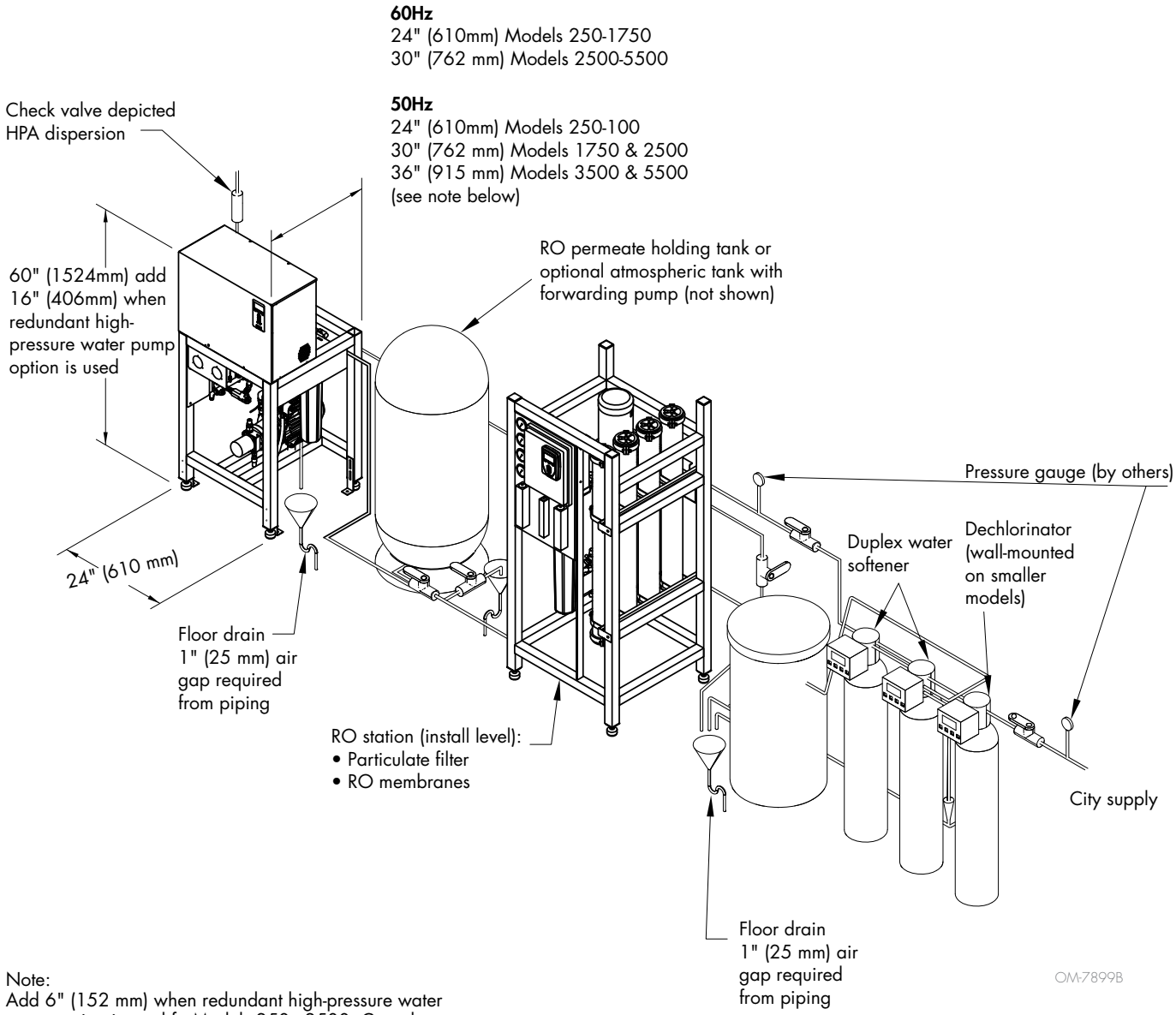
FIGURE 6-1: GENERAL DRISTEEM HIGH-PRESSURE SYSTEM DISPERSION OVERVIEW



Notes:

- 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.
- All units must be wired in strict accordance with the wiring diagrams and piping furnished with this unit.
- If the developed piping length is greater than 500' (152 m), consult factory for proper sizing and layout for area type or fan assist.
- Maximum 16 zones per pump station.

FIGURE 7-1: DRISTEEM HIGH-PRESSURE SYSTEM DIMENSIONS



Note:
Add 6" (152 mm) when redundant high-pressure water pump option is used fo Models 250 - 2500. Consult factory for Models 3500 and 5500 (for 50 Hz design).

HIGH-PRESSURE SYSTEM SPECIFICATIONS

Table 8-1:
Adiatec high-pressure pump station specifications (60Hz)

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)
Operating weight, lbs (kg)	275 (125)	300 (136)	325 (147)	325 (147)	350 (159)	400 (181)	450 (204)
Operating weight with redundant high-pressure pump option, lbs (kg)	375 (170)	400 (181)	475 (216)	475 (216)	500 (227)	625 (284)	700 (318)
Shipping weight, lbs (kg)	296 (134)	323 (146)	349 (158)	349 (158)	376 (171)	430 (195)	484 (219)
Shipping weight with redundant high-pressure pump option, lbs (kg)	403 (183)	430(195)	511 (232)	511 (232)	538 (244)	672 (305)	753 (341)
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.

Table 9-1:
Adiatec high-pressure pump station specifications (50Hz)

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	230/1, 5.2 400/3, 1.9	230/1, 9.2 400/3, 3.3	230/1, 16.9 400/3, 6	400/3, 8.1	400/3, 10.6	400/3, 14.7	400/3, 20.6
Fuse size *(see Note 1)*	230/1, 25 400/3, 15	230/1, 35 400/3, 15	230/1, 50 400/3, 20	400/3, 30	400/3, 35	400/3, 40	400/3, 50
Dimensions (W/D/H), inches (mm)	24/24/60 (610/610/1524)	24/24/60 (610/610/1524)	24/24/60 (610/610/1524)	24/30/60 (610/762/1524)	24/30/60 (610/762/1524)	24/36/60 (610/915/1524)	24/36/60 (610/915/1524)
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)	Consult factory	Consult factory
Operating weight, lbs (kg)	275 (125)	325 (147)	350 (159)	375 (170)	400 (181)	450 (204)	525 (238)
Operating weight with redundant high-pressure pump option, lbs (kg)	375 (170)	425 (193)	480 (218)	510 (231)	575 (261)	Consult factory	Consult factory
Shipping weight, lbs (kg)	295 (133)	349 (158)	376 (170)	403 (182)	430 (195)	485 (220)	564 (255)
Shipping weight with redundant high-pressure pump option, lbs (kg)	403 (182)	456 (206)	516 (234)	548 (248)	618 (280)	Consult factory	Consult factory
Supply water connection diameter, inches with metric adapter *(see Note 2)*	1/2 (12 mm)	1/2 (12 mm)	1/2 (12 mm)	1/2 (12 mm)	3/4 (18 mm)	3/4 (18 mm)	3/4 (18 mm)
High-pressure water connection diameter, inches with metric adapter *(see Note 2)*	1/2 (12 mm)	1/2 (12 mm)	1/2 (12 mm)	1/2 (12 mm)	1/2 (12 mm)	1/2 (12 mm)	1/2 (12 mm)
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)	2 (1.5)	4 (3)	5.5 (4)	7.5 (5.5)	10 (7.5)	15 (11)
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. Metric adapter attached to system (optional).
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.

HIGH-PRESSURE SYSTEM EVAPORATION EFFICIENCY

USING THE EVAPORATION EFFICIENCY CHART

Using 55% leaving air RH and 15 grains of moisture per pound of dry air, the chart identifies:

- Required entering air temperature = 68 °F (20 °C)
- Evaporation efficiency = 70%

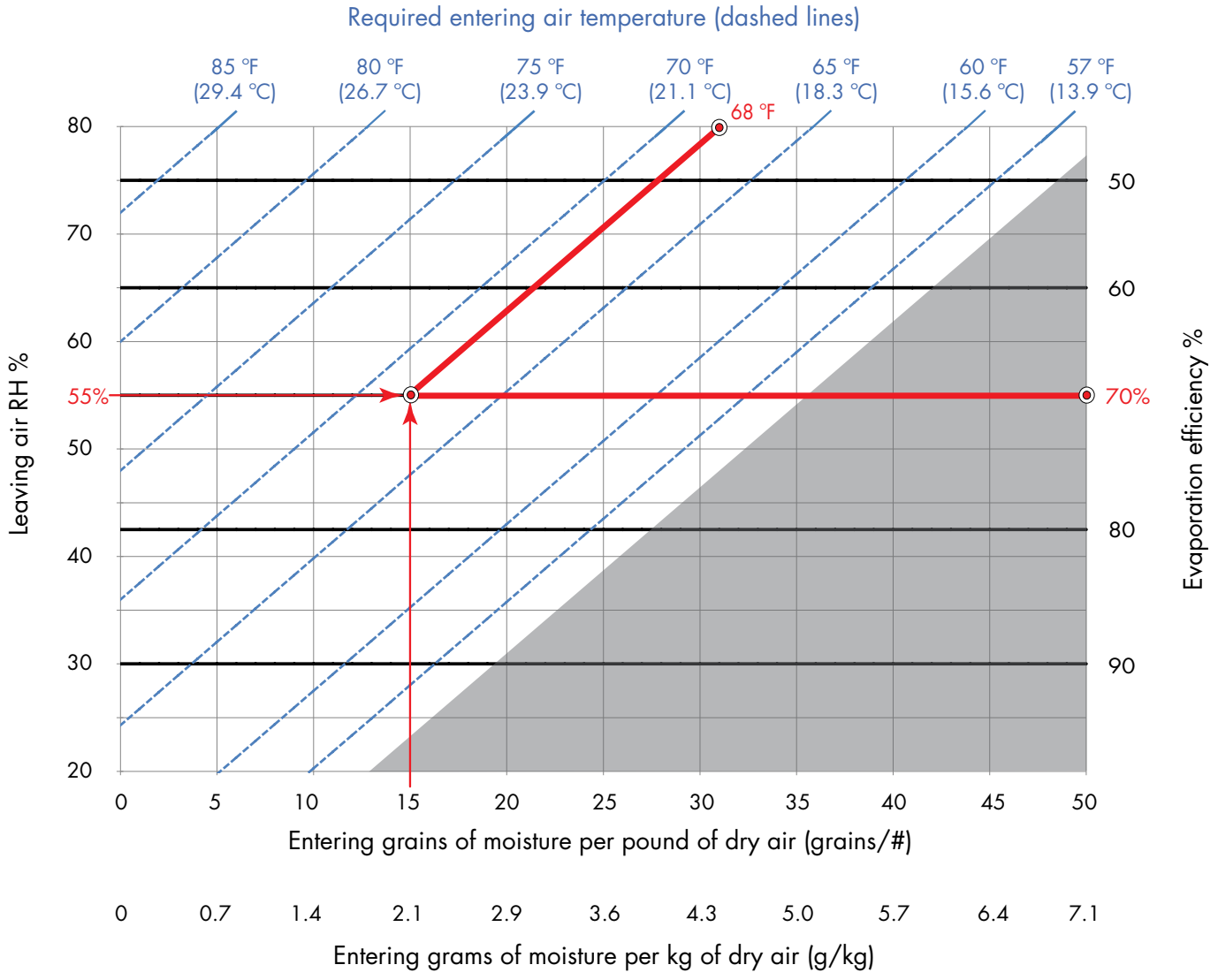
From these values, required system capacity can be calculated:

$$\frac{\text{Load}}{\text{Evaporation efficiency}} = \text{Required system capacity}$$

$$\frac{385 \text{ lbs/hr}}{0.7} = 550 \text{ lbs/hr} \quad \text{or} \quad \frac{174.6 \text{ kg/h}}{0.7} = 249.4 \text{ kg/h}$$

To accurately size a High-Pressure System, first define all the values, as shown in this section. This will ensure a system that maximizes efficiency and delivers consistent output.

EVAPORATION EFFICIENCY CHART*



* *Evaporation efficiency shown here is based on 4-ft evaporation distance, 55 °F leaving air temperature, and 500 fpm air velocity.*

FAN-ASSISTED DISPERSION

DriSteem's high-pressure fan-assisted dispersion Model FA is a component of a high-pressure atomization system. The fan is designed to throw small water droplets and increase air movement. The Model FA-2 is designed for low ceiling heights. Models FA-3 and FA-4 are designed to pull air from above the fan (typically the hottest air), which promotes better absorption, and throws moisture horizontally. The Model FA can be used for cooling and/or humidification applications.

- Pulls air from above the system rather than below, using the warmest air and minimizing the chance for condensation forming from fog return.
- Utilizes flexible tubing to increase installation speed.
- The hub style system allows for easier access to service all nozzles on the unit.
- Promotes better air movement.
- The stainless steel design provides quality and longevity of the dispersion system.
- Fan powered dispersion allows for installation in lower ceiling applications.


Model FA-2


Model FA-3


Model FA-4

APPLICATION VERSATILITY

- Greenhouses
- Germination chambers
- Printing
- Paper products
- Wood working
- Warehouses
- Electronics
- Textiles
- Clean rooms
- Cigar manufacturing
- Plastic fabrication

SUSTAINED QUALITY AND DEPENDABILITY

WHY CHOOSE THE DRISTEEM ULTRASONIC HUMIDIFIER

- ON/OFF control via 2-step humidistat controls unit at 50% or 100% output.
- Modulating control via pulse width modulation. Can achieve up to ±1% controllability with consistent airflow and temperature.
- Reduce air conditioning/mechanical cooling while taking advantage of free cooling (sensible).
- Hygienic drain allows for removal of water to help mitigate bio-growth.
- No/minimized risk of fire with no heating or boiling of water.

ROOM ULTRASONIC HUMIDIFIERS (MODEL BR SERIES)

The Model BR series is designed for a magnitude of in-room applications. With the polished/mirrored cover we are able to provide a sleek design with great performance. These units can be mounted on the wall or using a drip tray.

- Mounts on the wall below the ceiling.
- Adsorption distance dependent on room conditions.
- Integral fan(s) carry the mist out of the unit.
- Drip tray accessory provided as an option for additional piece of mind.

DUCTED ULTRASONIC HUMIDIFIER (MODEL BA SERIES)

The Model BA series is specifically designed for the unit to be placed in an AHU or duct application. These units can be purchase with a mounting rack or placed into the airstream.

- Mounts into a duct or AHU.
- Utilizes existing airflow to carry the mist out of the unit.
- Handles common air velocities of 200 - 800 fpm.
- Adjustable air baffles to optimize performance.

Learn More

Humidistat controllers

- *Digital display of humidity and setpoint.*
- *Mount to wall or standard junction box.*
- *One universal input for a remote humidity sensor.*
- *One 0 - 10VDC or 4 - 20mA output*
  Input voltage of either 24VAC or 24VDC.

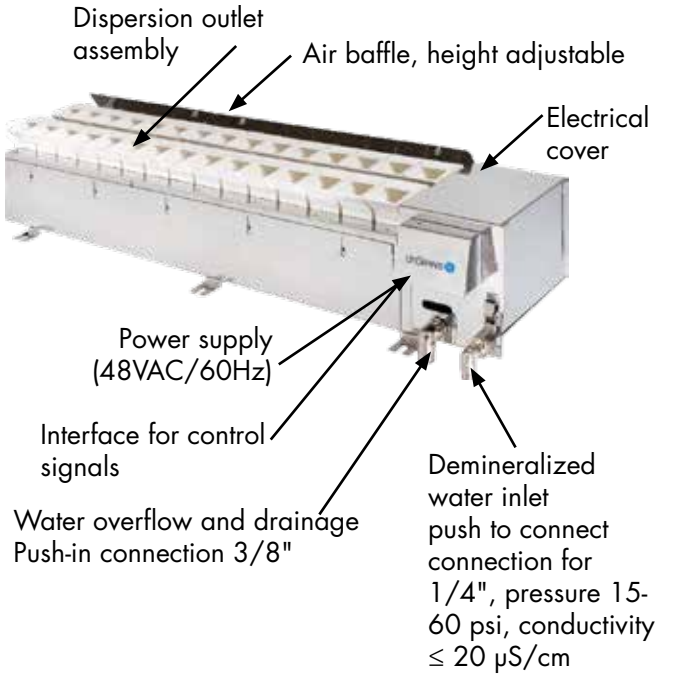
Table 13-1:
Ultrasonic humidifier specifications

Specifications	Model BR Humidifier						Model BA Humidifier						
	BR-02	BR-04	BR-06	BR-08	BR-10	BR-16	BA-06	BA-12	BA-18	BA-24	BA-30	BA-36	BA-42
Capacity* lbs/hr	2.2	4.4	6.6	8.8	11	17.6	7.9	15.8	23.7	31.6	39.5	47.4	55.3
Capacity* kg/h	1.0	2.0	3.0	4.0	5.0	8.0	3.6	7.2	10.8	14.4	18.0	21.6	25.2
Piezoelectric transducer (each)	2	4	6	8	10	16	6	12	18	24	30	36	42
Power supply VAC/60 Hz (transformer)	120	120	120	120	120	120	120	120	120	120	120	120	120
Power supply VAC/60 Hz (humidifier)	48	48	48	48	48	48	48	48	48	48	48	48	48
Power consumption VA/60 Hz	135	220	290	360	430	780	220	448	660	875	1089	1303	1518
Transformer (VA)**	500	500	500	500	500	1000	500	500	1000	1000	1600	1600	1600
Maximum fan performance (cfm)	60	60	85	85	85	175	-	-	-	-	-	-	-

- * The effective humidifying capacity depends on the level of supply voltage under load (set 48 V) and on the length and cross section of the tubes/pipes leading to the place of humidification.
- ** The power output of the transformers stated is optimized for the humidifier types. Their power reserves are sufficient to bear the power consumption of a correctly laid supply cable with short distance between humidifier and transformer. Nevertheless, it is recommended to check transformer selection mathematically according to local conditions.

FIGURE 13-1: MODEL BR ROOM HUMIDIFIER

FIGURE 13-2: MODEL BA DUCT HUMIDIFIER



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EXPECT QUALITY FROM THE INDUSTRY LEADER
For more than 45 years, DriSteem has been leading the industry with creative and reliable humidification solutions. Our focus on quality is evident in the construction of DriSteem Evaporative Cooling Systems. DriSteem leads the industry with a Two-year Limited Warranty and optional extended warranty.

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For the most recent product information visit our website:
www.dristeem.com

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