

# ADIATEC®


Ultrasonic Humidifier









Installation, Operation, and  
Maintenance Manual

**Read and save these instructions**

# Warnings and cautions

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

 <b>WARNING</b>	
	<p><b>Attention installer</b> Read this manual before installing, and leave this manual with product owner. This product must be installed by qualified HVAC, plumbing, and electrical contractors and in compliance with local, state, federal, and governing codes. Improper installation can cause property damage, severe personal injury, or death as a result of electric shock, burns, or fire.</p> <p>DriSteem Technical Support: 800-328-4447</p> <p><b>Read all warnings and instructions</b> Read this manual before performing service or maintenance procedures on any part of the system. Failure to follow all warnings and instructions could produce the hazardous situations described, resulting in property damage, personal injury, or death.</p> <p>Failure to follow the instructions in this manual can cause moisture to accumulate, which can cause bacteria and mold growth or dripping water into building spaces. Dripping water can cause property damage; bacteria and mold growth can cause illness.</p> <p>Work on the humidifier may only be carried out as described in these instructions.</p>
 	<p><b>Hot surfaces</b> Ultrasonic mechanical assemblies can be hot. Contact with hot surfaces can cause severe personal injury. To avoid severe burns, follow the cool down procedure on page 52 before performing service or maintenance procedures on any part of the system.</p>
 	<p><b>Disconnect electrical power</b> Disconnect electrical power before installing supply wiring or performing service or maintenance procedures on any part of the humidification 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.</p> <p>Contact with energized circuits can cause property damage, severe personal injury, or death as a result of electrical shock or fire. Do not remove humidifier electrical cover until electrical power is disconnected.</p> <p>Follow the shutdown procedure on page 52 before performing service or maintenance procedures on any part of the system.</p>
	Do not stand in or breathe the visible aerosol water droplet fog exiting the humidifier. Breathing in the aerosols could cause personal injury or death.
	Drain water in tank and shutdown (see page 52) if humidifier will be off for more than seven days. Bacteria and mold growth can cause illness.

# Warnings and cautions

## **WARNING**



### **Electric shock hazard**

- If the humidifier starts up responding to a call for humidity 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 humidifier (after the tank has drained):
  - a. Manually set the demand signal at 0%.
  - b. Shut off all electrical power to the humidifier using fused disconnect, and lock all power disconnect switches in the OFF position.
  - c. Confirm all water in the humidifier has been drained (takes about 5 to 7 minutes).
  - d. Close field-installed manual supply water shut-off valve.
- The appliance is not to be used by persons (including children) with reduced physical sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- Children being supervised not to play with the appliance.
- Thermal cut-out component is critical to the safety of this equipment: use only DriSteem replacement part.
- Do not connect a damaged humidifier (e.g.: damaged during transport) to the power supply.

## **CAUTION**

### **Excessive supply water pressure**

Supply water pressure greater than 60 psi (414 kPa) can cause the humidifier to overflow.

**Never use high pressure cleaners to clean the humidifier.**

**Use grease and oil-free materials only.**

## **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 Ultrasonic systems, products, and components are designed, with consideration, to reduce the risk of Legionnaires disease and other similar situations. The water treatment and ultrasonic 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, and/or silver ionization 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.

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## ATTENTION INSTALLER

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

**DriSteem® Technical Support**  
800-328-4447

## WHERE TO FIND MORE INFORMATION

### Our web site:

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

- [Ultrasonic Catalog and Brochure](#)
- [Ultrasonic Humidifier Installation, Operation, and Maintenance manual \(IOM\)](#)

### DriCalc® sizing and selection software:

DriCalc, our software for humidification system sizing and selection, can be ordered at [dristeem.com](http://dristeem.com).

### Call us at 800-328-4447

Obtaining documents from our web site is the quickest way to view our literature.



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## Fill in the following information for your records

Date of purchase	_____
Customer's name	_____
Model number	_____
Serial number	_____

# Unpacking

**Table 2-1:**  
Scope of delivery for Model BR humidifier

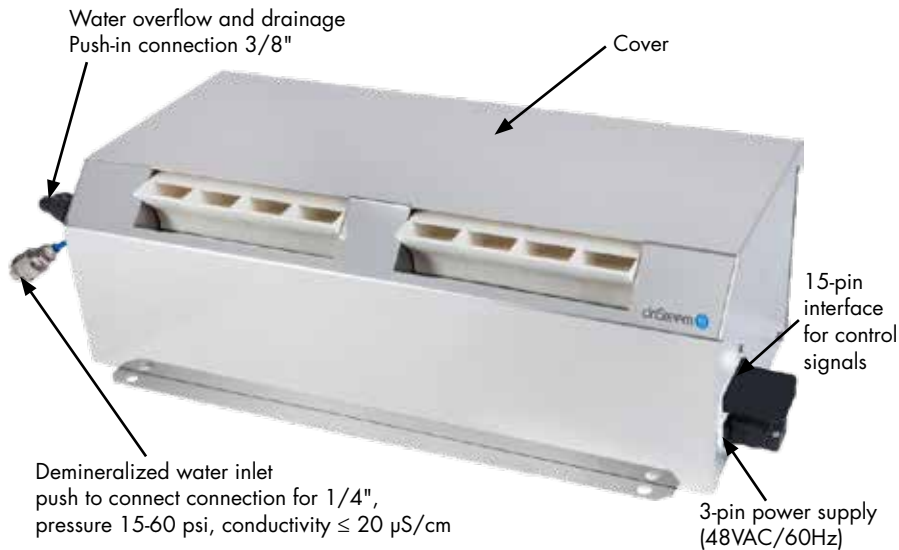
	Room humidifier
	Drain tube (consisting of tube $\varnothing 12$ mm, elbow connection, T-connector, screwing-on connector, and 3/8" adapter)
	Water filter for tube connection D/d=6/4 mm
	Valve, $\varnothing 6$ mm, 1/4" adaptor (not shown)
	Plug part 3-pin, 16 A
	SUB-D Connector male, 15-pin, housing

**Table 2-2:**  
Scope of delivery for Model BA humidifier

	Duct humidifier
	Valve, $\varnothing 10$ mm, 1/4" adaptor (not shown)
	Straight reducing connection $\varnothing 10$ mm $\varnothing 6$ mm
	SUB-D Connector male, 9-pin, housing
	Water filter

# Product overview

**FIGURE 3-1: MODEL BR ROOM HUMIDIFIER**



## MODEL BR ROOM ULTRASONIC HUMIDIFIER

The room type Ultrasonic humidifier provides adiabatic humidification to in-space or room type applications. The cooling mist is distributed through the distribution outlets through integral fan(s).

Ultrasonic humidifiers are a cost effective solution as it uses 93% of electricity compared to isothermal humidifiers.

This technology requires treated water (RO or DI) as to protect the humidifier and to produce high purity mist. This also helps prevent white dust settling which can contaminate processes and accumulate in ducts and on furnishings.

## TECHNICAL TERMS

- **Transducer:**  
Piezoelectric transducer (PET)
- **Aerosols:**  
Finely distributed material (solids or liquids) in air or other gases, such as in smoke, dust, vapor and nebula
- **Demineralized water:**  
RO permeate, DI water
- **Concentrate:**  
Concentrated water, waste water of reverse osmosis system

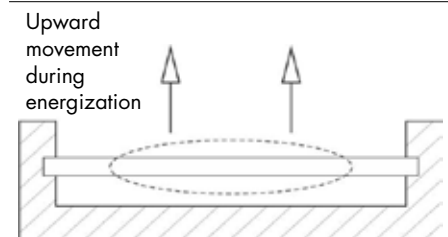
## PHYSICAL PRINCIPLES OF PIEZO CERAMICS

If certain crystals are deformed by mechanical stress, electrical charges will build up proportionally on their surface, producing electric field strength in the crystal.

This effect was discovered by Pierre and Jacques Curie in 1880. Even the reversal of this so-called piezoelectric effect or piezo-effect is possible. The same materials change their dimensions under the influence of an electric field.

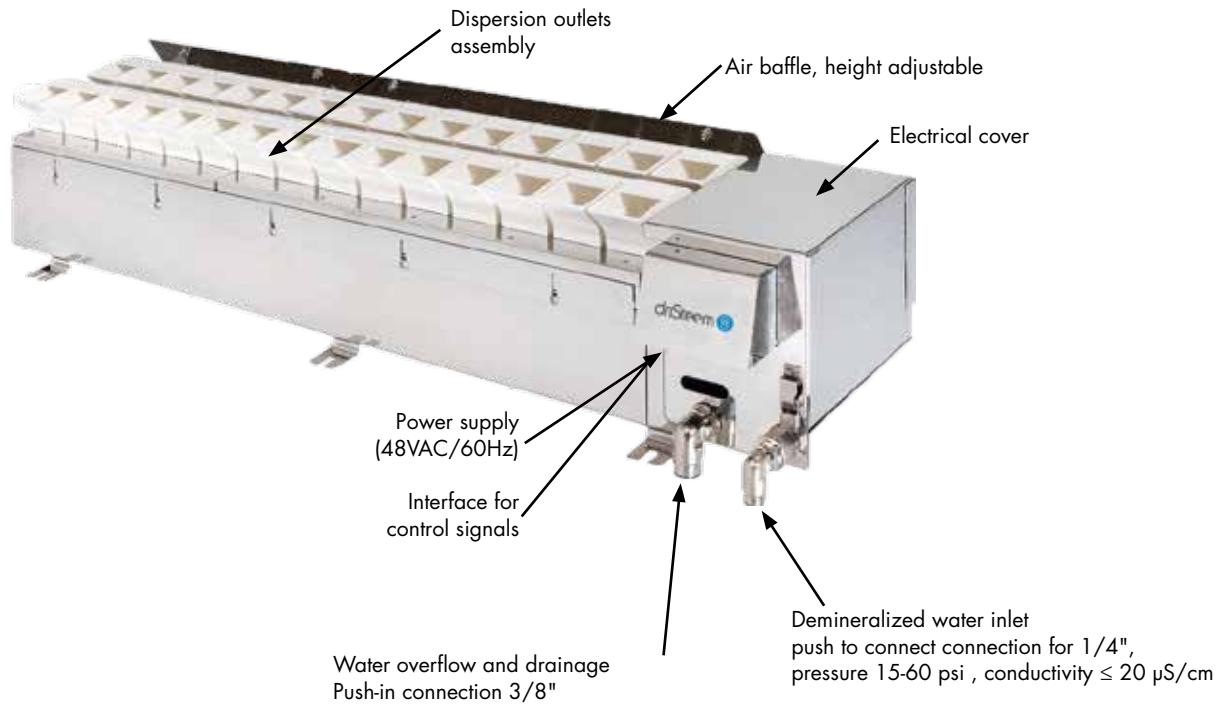
Ceramic piezoelectric materials are hard, chemically inactive and completely insensitive to humidity or other atmospheric influences.

**FIGURE 3-2: PIEZO-EFFECT**



# Product overview

**FIGURE 4-1: MODEL BA DUCT HUMIDIFIER**



## MODEL BA DUCT/AHU ULTRASONIC HUMIDIFIER

The room type Ultrasonic humidifier provides adiabatic humidification to in-space or room type applications. The main force for this humidifier is through existing air movement caused by the duct/AHU blower/fan. The adjustable air baffles allow for ultimate adjustment to optimize capacity.

Ultrasonic humidifiers are a cost effective solution as it uses 93% of electricity compared to isothermal humidifiers.

This technology requires treated water (RO or DI) as to protect the humidifier and to produce high purity mist. This also helps prevent white dust settling which can contaminate processes and accumulate in ducts and on furnishings.



## Principle of operation

All frequencies above 20,000 Hz are called Ultrasonic.

According to their physical nature, acoustic waves consist of mechanical oscillations of compressible media. These oscillations develop due to the deflection of the particles of a compressible material from their equilibrium position. Acoustic waves are bound to a medium and thus do not occur in the vacuum.

Oscillations develop as a result of a change in pressure. Repeated pressure increase and pressure reduction produce different acoustic waves.

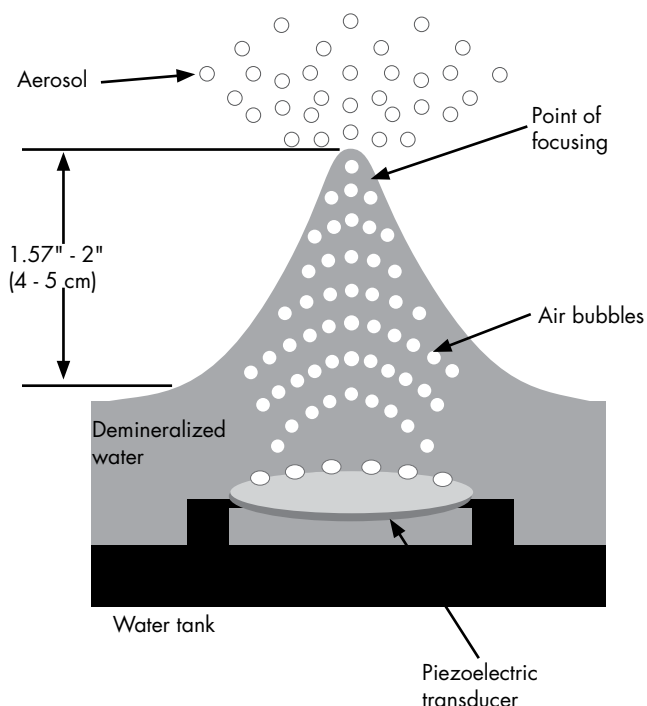
In order to be able to use Ultrasonic waves for air humidification, electrical energy must be converted into mechanical energy. This takes place in the piezoelectric transducer.

A vibration unit consists of the resonance circuit where the high frequency of  $\sim 1.7$  MHz is produced and the piezoelectric transducer to convert the electrical frequency into a proportional mechanical oscillation. This frequency is not audible for human beings or animals.

The piezoelectric transducers are attached to the bottom of the water tank. During excitation of the transducer, the water leads the ultrasonic vibrations to the boundary layer between water and air. Constant compression and decompression of the water gauge over the piezoelectric transducer causes cavitation in the immediate proximity of the water surface. Thus, crossing capillary waves are developed, the finest water particles of which, the aerosols, are produced in the wave crest.

The aerosols are delivered by the air flow in the humidifier and quickly mix with the ambient air. They have a small diameter 1 - 5  $\mu\text{m}$  and thus form a freely floating mist. The droplet diameter depends on the surface tension and the density of the medium, but also on the excitation frequency. The higher the excitation frequency, the smaller is the diameter of the droplets.

**FIGURE 5-1: HUMIDIFICATION PRODUCTION**



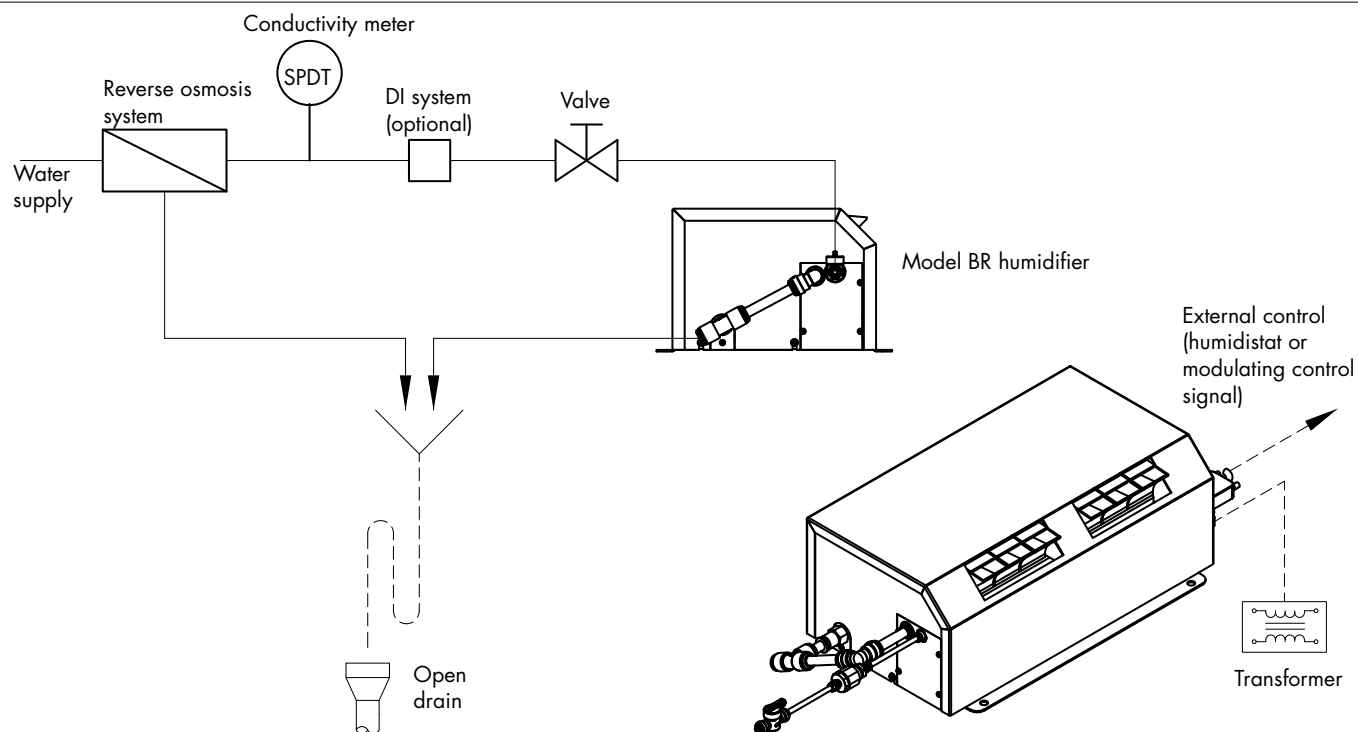
# Principle of operation

## ADVANTAGES OF ULTRASONIC AIR HUMIDIFICATION

- **Maximum energy saving:**  
Compared to steam and steam humidifiers with the same humidification output, ultrasonic air humidifiers need up to 93% less electricity.
- **Lowest connected load:**  
Compared to electric steam humidifiers with the same humidification output, only approximately 7% of the power input is required. Thus, lower third-party installation costs are possible.
- **Cooling effect:**  
During humidification with the ultrasonic air humidifiers, the room air is cooled at the same time due to the adiabatic humidification principle. The result is a lower cooling load for traditional cooling systems upstream.
- **Lowest water consumption:**  
Ultrasonic humidifiers utilize up to 70% of the water, steam humidifiers only use 30%. The Adiatec Ultrasonic humidifier only drains during hygienic drain and flush to inactivity.
- **Instantaneous maximum humidification:**  
Instantaneous humidification is carried out without any delay.  
Exception: During automatic draining and line flushing.
- **Maximum evaporation of the water:**  
Ultrasonic air humidifiers produce a very fine aerosol mist. On average, the diameter of the aerosols is only 1 - 5  $\mu\text{m}$ . The mist is readily absorbed into the airstream and is taken up by the air after a very short time.

# Principle of operation: Model BR room humidifier

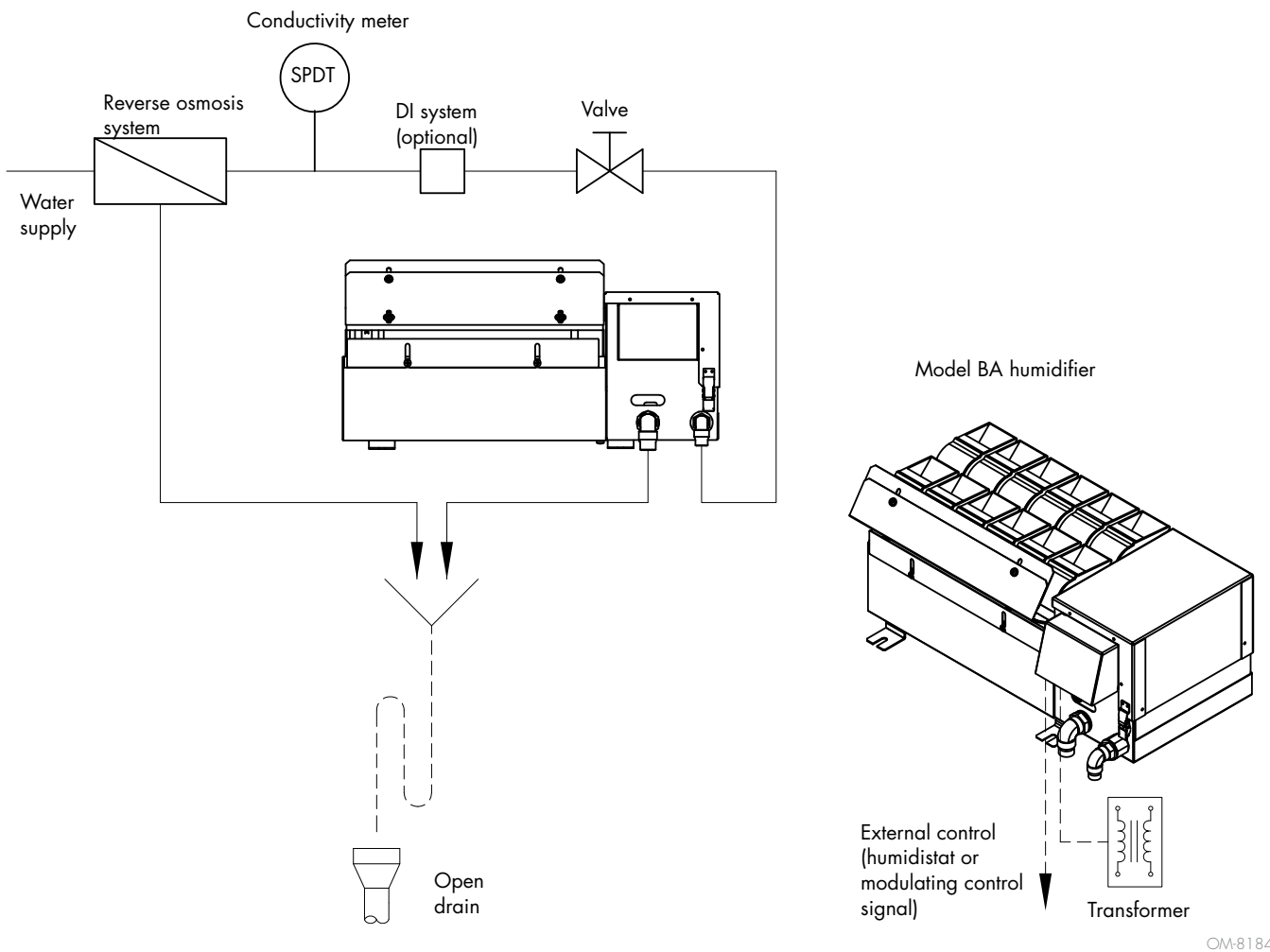
**FIGURE 7-1: MODEL BR HUMIDIFICATION SYSTEM**



OM-8183

# Principle of operation: Model BA duct humidifier

**FIGURE 8-1: MODEL BA DUCT HUMIDIFICATION SYSTEM**



# Water

## DECHLORINATION, WATER SOFTENING, AND REVERSE OSMOSIS EQUIPMENT

Water quality is integral to the operation and longevity of humidification and evaporative cooling equipment. Required maintenance, system performance, and water/energy usage are all affected by water quality. Operating with treated water reduces or eliminates hard water scale on equipment surfaces, thereby reducing maintenance requirements. Performance improves in systems using treated water with benefits such as reduced downtime, higher energy transfer.

Humidifier performance, humidification vapor quality, indoor air quality, and maintenance requirements are significantly affected by humidifier supply water type. Most humidifier technologies can operate using either treated or untreated water; however, most contaminants in supply water pass through a humidifier system. Especially when misted or sprayed, supply water with minerals produces white dust, which along with other water contaminants can be an inhalation hazard. Settling white dust can also contaminate processes and accumulate in ducts and on furnishings.

- Ultra-pure water can eliminate white dust fallout and bacteria/virus proliferation, that can occur when using potable water.
- Using water technologies such as hygienic drain, silver ionization and UV technology helps prevent bacteria and viral proliferation.
- Scale buildup on PETS can decrease PET lifespan.
- Having a level unit helps keep PET lifespan. The key to output and longevity is consistent water level.

Table 9-1:

### DriSteem supply water guidelines

<b>Temperature*</b>	40°F - 104°F
*Water temperature 77 - 113°F is likely to grow/harbor bacteria. Do not pre-heat the water.	
<b>Chlorides*</b> RO/DI water	< 5 ppm
* Damage caused by chloride corrosion is not covered by your DriSteem warranty.	
<b>Total hardness</b> RO/DI water	< 0.5 ppm
<b>pH</b> RO/DI, softened water	5.5 to 9.0
<b>Silica</b>	< 0.1 ppm
<b>Conductivity</b>	≤20µS/cm
Supply water outside of the guidelines may void your DriSteem warranty. Please contact your DriSteem Representative or DriSteem Technical Support if you need advice.	

### Supply water guidelines

Supply water quality is an important component of humidifier reliability and maintenance.

Examples:

- Corrosive water can decrease the service life of the humidifier.
- Excessive water hardness can increase the humidifier maintenance requirements and cause damage to the piezoelectric transducers.

To maximize humidifier service life and minimize humidifier maintenance, DriSteem has established guidelines for supply water. See Table 9-1.

# Models, capacities, and electrical specifications

**Table 10-1:**  
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 duct/AHU 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.

**Table 10-2:**  
Safety conditions

Safety device	Description
Dry-running protection with functional redundancy	If the water level falls below the minimum level in the water tank, the humidification switches off. For this purpose, both level switches are monitored separately.
Overheating protection	The humidifier stops humidifying at water temperatures > 140°F (60°C).
Overflow protection	If the humidifier water tank is overfilled, the excess water is drained off to the outside through the overflow.
Disconnect protection	There are no defects in the event of electrical interruptions between the driver board and the piezoelectric transducer.
Monitoring	Monitoring of important system components with integrated problem solver routines.

**Table 10-3:**  
Operating conditions

Operation conditions	Parameter
Maximum air humidity	<90% relative humidity - non-condensing
Air temperature	41 - 113°F (5 - 45°C)
Demineralized water pressure	15 - 60 psi (100 - 400 kPa)
Demineralized water quality	Fully demineralized
Demineralized water conductivity	≤20 µS/cm

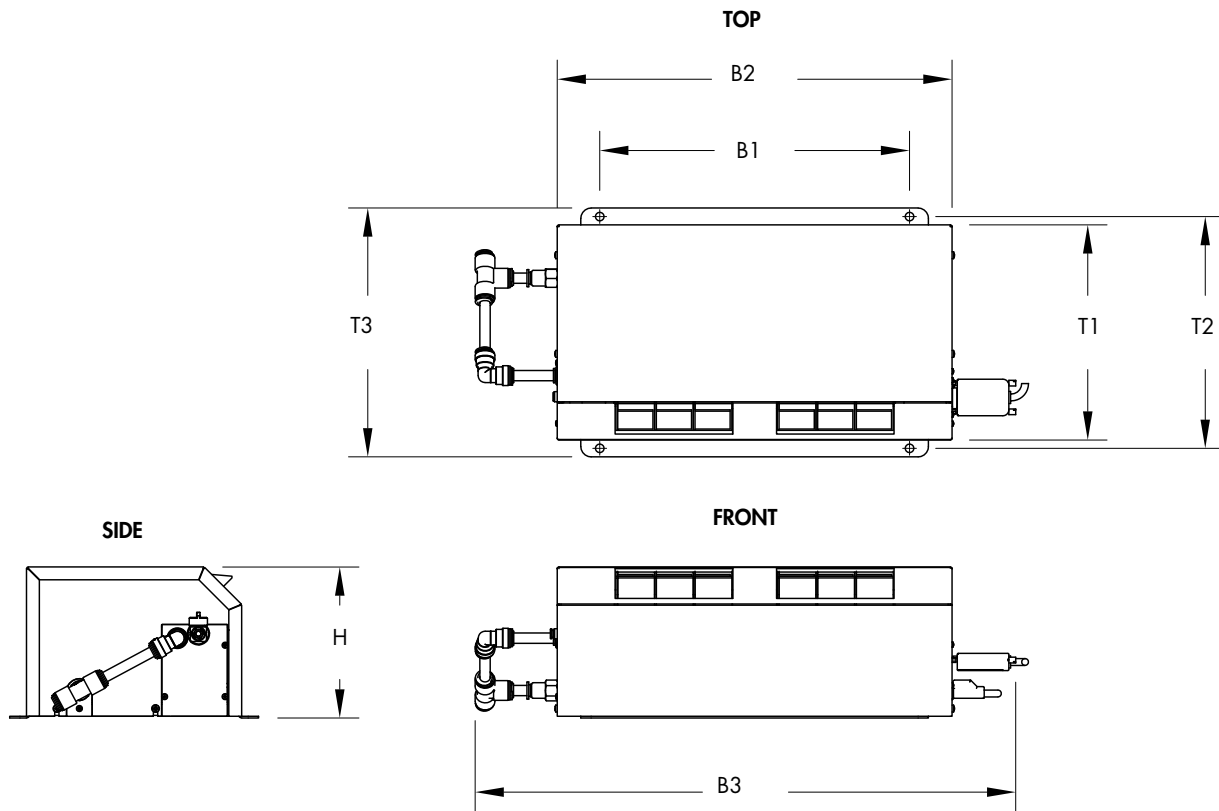
# Models, capacities, and electrical specifications

**Table 11-1:**  
Transformer specifications

Model	Power (VA)	Input voltage	Output voltage	Width		Height		Depth		Weight (Installed)		Weight (Shipping)	
				inches	mm	inches	mm	inches	mm	lbs	kg	lbs	kg
Transformer (enclosure)	500	120 VAC	48 VAC	7	178	8.4	213	8.7	220	21	9.6	28	12.6
Transformer (enclosure)	1000			10.7	271	12.3	313	15.1	383	45	20.4	52	23.4
Transformer (enclosure)	1600			10.7	271	12.3	313	15.1	383	62	28	68	31
Transformer (no enclosure)	500			4.8	120	5.1	130	5.3	135	15	6.8	22	9.8
Transformer (no enclosure)	1000			6.0	150	8.7	220	6.1	160	30	13.4	36	16.4
Transformer (no enclosure)	1600			6.9	174	9.1	230	6.1	180	46	21	53	24

# Dimensions and weights:Model BR

**FIGURE 12-1: DIMENSIONS (ROOM)**



See Table 12-1 for dimensions

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**Table 12-1:**  
Ultrasonic humidifier specifications (Room)

Model	Width						Depth						Height H		Weight (Installed)	
	B1		Width (without plugs) B2		B3		T1		T2		T3					
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	lbs	kg
BR-02	6	162	10	261	17	444	10	251	11	270	11	290	7	176	15	7
BR-04	11	271	15	370	22	553	10	251	11	270	11	290	7	176	20	9
BR-06	14	361	18	460	25	643	10	251	11	270	11	290	7	176	24	11
BR-08	18	451	22	550	29	733	10	251	11	270	11	290	7	176	29	13
BR-10	21	541	25	640	32	823	10	251	11	270	11	290	7	176	33	15
BR-16	32	811	36	910	43	1093	10	251	11	270	11	290	7	176	46	21



## Dimensions and weights: Model BR

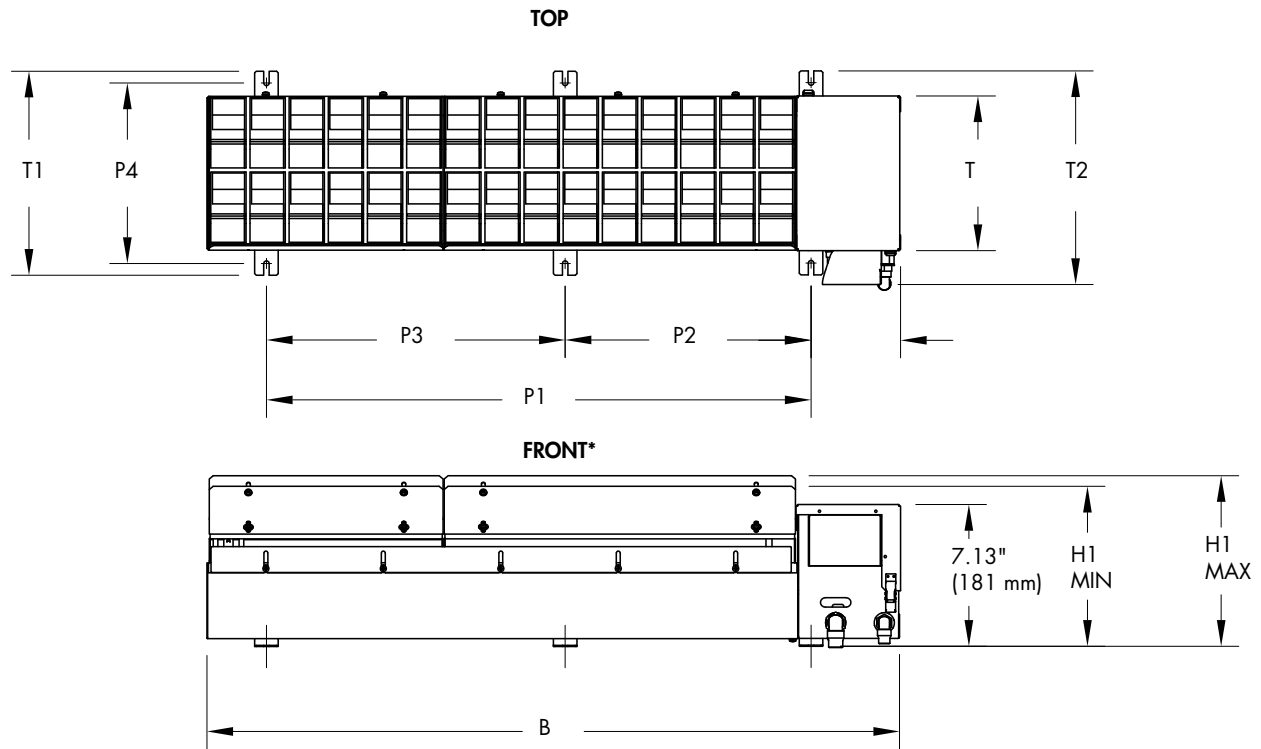
**Table 13-1:**  
**Model BR transformers**

Model	Power required	Transformer (VA)
BR-02	135VA	500
BR-04	220VA	500
BR-06	290VA	500
BR-08	360VA	500
BR-10	430VA	500
BR-16	780VA	1000

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.

# Dimensions and weights:Model BA

**FIGURE 14-1: DIMENSIONS (DUCT/AHU)**



See Table 14-1 and 15-1 for dimensions.  
\*Optional rotation. See page 42.

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**Table 14-1:**  
**Ultrasonic humidifier specifications (Duct/AHU)**

Model	Width		Depth						Height H1				Weight (Installed)	
	B		T		T1		T2		Minimum		Maximum			
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg
BA-06	11	286	8	198	10	261	11	288	8	201	9	241	13	6
BA-12	17	436	8	198	10	261	11	288	8	201	9	241	17	7.7
BA-18	23	586	8	198	10	261	11	288	8	201	9	241	21	9.5
BA-24	29	736	8	198	10	261	11	288	8	201	9	241	26	11.7
BA-30	35	886	8	198	10	261	11	288	8	201	9	241	30	13.7
BA-36	41	1036	8	198	10	261	11	288	8	201	9	241	34	15.2
BA-42	47	1186	8	198	10	261	11	288	8	201	9	241	38	17.2

## Dimensions and weights: Model BA

**Table 15-1:**  
Ultrasonic humidifier specifications (Duct)

Model	Mounting point							
	P1		P2		P3		P4	
	in	mm	in	mm	in	mm	in	mm
BA-06	5	124	-	-	-	-	9	231
BA-12	11	274	-	-	-	-	9	231
BA-18	16	394	-	-	-	-	9	231
BA-24	21	544	-	-	-	-	9	231
BA-30	27	694	12	312	15	382	9	231
BA-36	33	844	15	387	18	457	9	231
BA-42	39	994	22	562	21	532	9	231

**Table 15-2:**  
Model BA transformer specifications

Model	Power required	Transformer (VA)
BA-06	220VA	500
BA-12	448VA	500
BA-18	660VA	1000
BA-24	875VA	1000
BA-30	1089VA	1600
BA-36	1303VA	1600
BA-42	1518VA	1600

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.

# Mounting: Model BR

- The humidifier must be level to ensure that the water level is the same above all Ultrasonic piezoelectric transducers.
- The installation site must allow for the humidifier to be easily removed and replaced for maintenance and inspection purposes.
- The installation site must allow an even mist distribution in the room.
- Impacts by external air directly next to the humidifier by fans, ventilation system, etc., or even a strong natural airflow must be avoided.
- The humidistat or measurement sensor of the modulating control must be positioned in such way that it is located in the area of the humidifier, but that direct influence by the aerosol flow is excluded. Refer to Figure 20-1 for sensor placement.
- The installation site must provide sufficient structure for mounting BR units to the wall, keeping in mind weight of unit and access to water/electrical.
- For transformer clearance follow NEC code.

## WARNING

The humidifier must not be exposed to large temperature difference during installation as there is otherwise a danger of condensation inside the humidifier which could lead to a failure of the integrated electronics.

## WARNING

Protect humidifier from contamination. The protective foil on the dispersion outlets assembly should only be removed immediately prior to commissioning.

**Table 16-1:**  
Mist distribution clearances mounting location based on room conditions

RH (%)	Floor Height above ground		Front Distance outwards	
	ft	m	ft	m
30	5.5	1.7	10	3.0
40	6	1.8	10	3.0
50	7	2.1	12	3.7
60	8	2.4	13	4.0

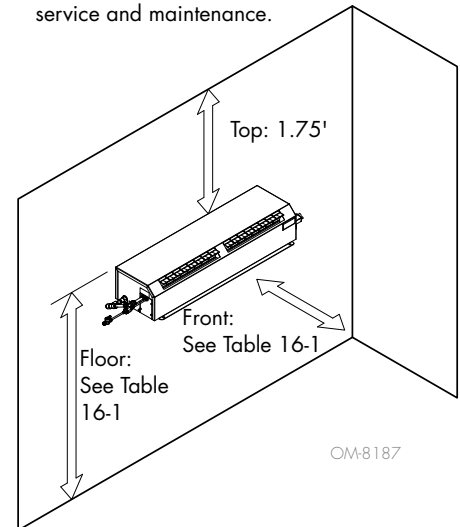
**Table 16-2:**  
Non-wetting distances

Temperature		Outlet RH (%)							
°F	°C	≤ 30		≤ 31 - 50		≤ 31 - 50		≤ 31 - 50	
		ft	m	ft	m	ft	m	ft	m
45	7.2	> 7	> 2.13	> 8	> 2.44	> 12	> 3.66	> 12	> 3.66
55	12.8	> 7	> 2.13	> 8	> 2.44	> 9	> 2.74	> 12	> 3.66
65	18.3	> 7	> 2.13	> 8	> 2.44	> 9	> 2.74	> 12	> 3.66
75	23.9	> 7	> 2.13	> 8	> 2.44	> 9	> 2.74	> 12	> 3.66
105	40.6	> 6	> 1.83	> 7	> 2.13	> 8	> 2.44	> 12	> 3.66

Note: Testing completed at 500 fpm using laminar flow and tight temperature control  $\pm 0.5^{\circ}\text{F}$ .

**FIGURE 16-1: MODEL BR CLEARANCE RECOMMENDATIONS**

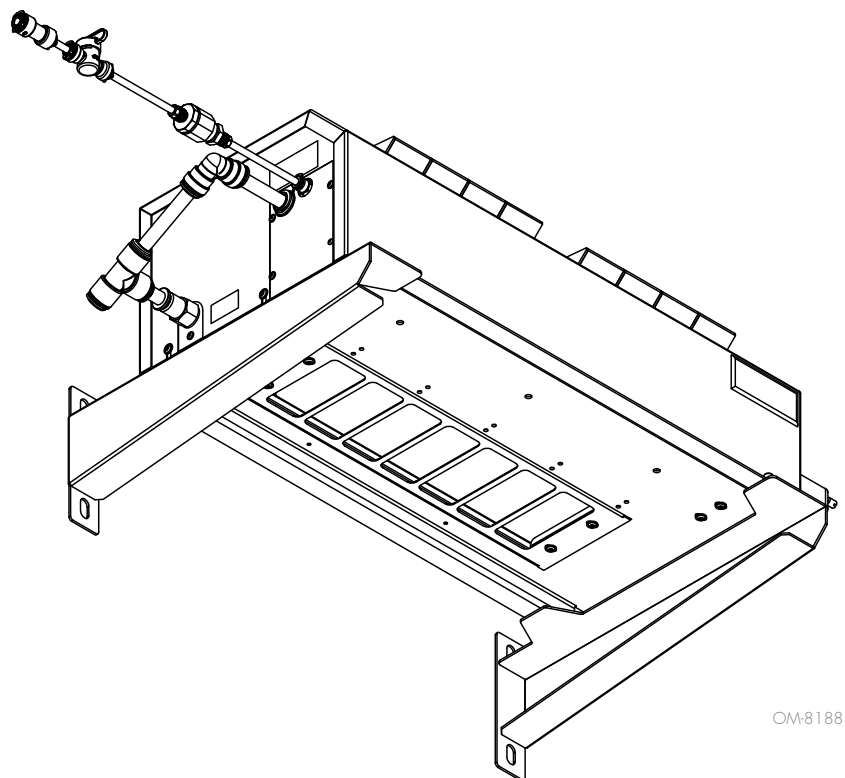
Maintain these clearances for service and maintenance.



# Location and clearance recommendations: Model BR

When selecting a location for the humidifier, consider a location that the humidifier is easy to inspect and easily accessible on site.

**FIGURE 17-1: WALL BRACKET INSTALLATION (ROOM)**



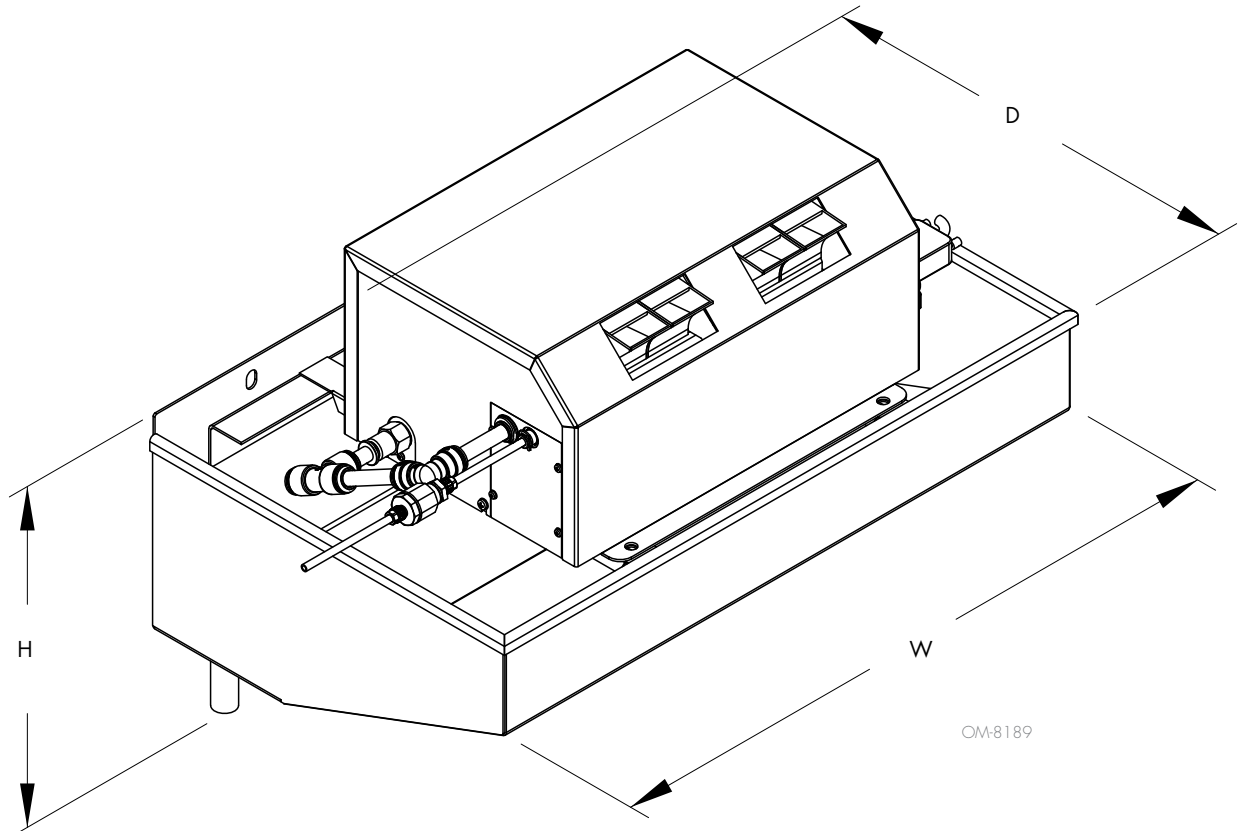
See Table 17-1 for dimensions.

Table 17-1: Wall bracket specifications										
Model	Width (W)		Height (H)		Depth (D)		Weight		Shipping Weight	
	inches	mm	inches	mm	inches	mm	lbs	kg	lbs	kg
601139	2.75	70	5.50	140	14.50	365	2*	0.9	4	1.8

\*Weight of 1 bracket. Kit 601139 includes two brackets.

# Location and clearance recommendations: Model BR

**FIGURE 18-1: INSTALLATION ON DRIP TRAY (ROOM)**



See Table 18-1 for dimensions.

Table 18-1: Model BR Ultrasonic humidifier drip tray specifications										
Model	Width (W)		Height (H)		Depth (D)		Weight (Installed)		Weight (Shipping)	
	inches	mm	inches	mm	inches	mm	lbs	kg	lbs	kg
Drip tray (small)	13.3	338	8.1	205	10.3	261	18	8	24	11
Drip tray (medium)	32.4	823	8.6	219	11.4	290	33	15	40	18
Drip tray (large)	38.6	980	10.6	268	14.5	368	62	28	68	31
Note: Small drip tray is for Models BR-02 - BR06. Medium drip tray is for Models BR-08 and BR-10. The large drip tray is for Model BR-16.										

# Mounting: Model BA

The location of the humidifier installation is predetermined by the requirements of the ventilation system and should be defined before installation work starts.

- The place of installation must allow the humidifier to be easily removed and replaced. Access panel in duct or AHU is required.
- The Model BA must be installed in an absolutely level position to ensure that ALL the ultrasonic transducers are covered by the same level of water.
- The automatic drainage of the water tank and the automatic flushing of the demineralized water line requires an open drain.
- In the immediate vicinity of the duct humidifier, the ventilation unit should be waterproof (stainless steel or with corrosion-proof coating) and should be provided with an open drain. Install a drain pan under the humidifier extending a minimum of two feet downstream.
- The air velocity in the free duct cross section (net area after installation of the humidifiers)  $V = 200\text{-}800\text{ ft/min}$  ( $1.0\text{ - }4.0\text{ m/s}$ ).
- Solid objects must not be installed within the humidification distance in order to avoid condensation. See Table 16-2.
- If downstream equipment is within non-wetting distance, a mist eliminator can be used.

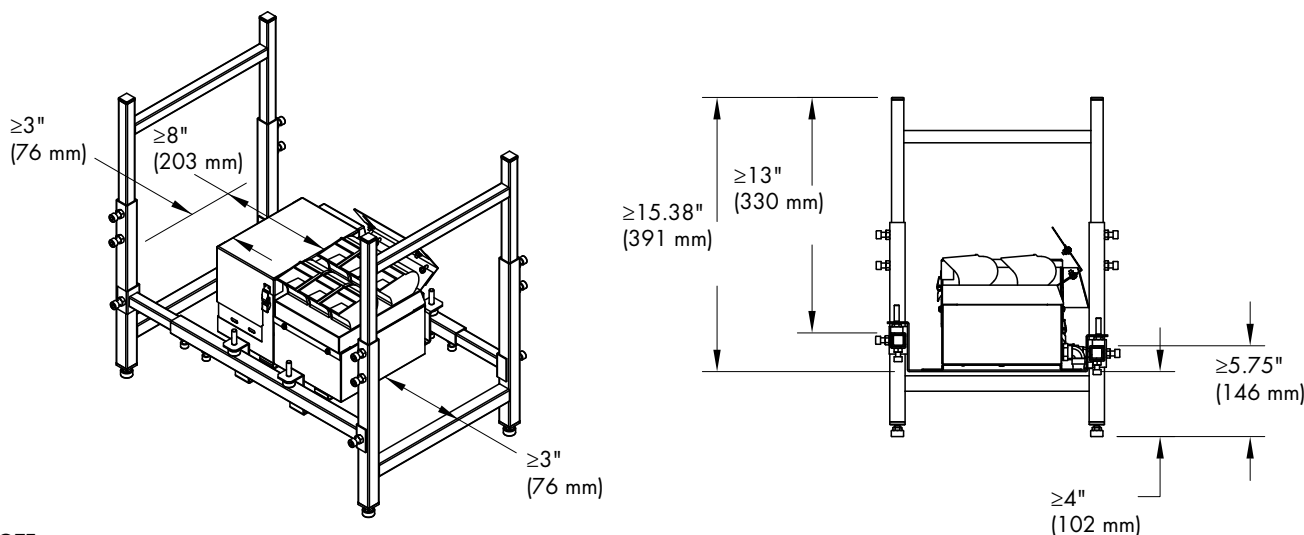
## WARNING

The humidifier must not be exposed to large temperature differences during installation as there is otherwise a danger of condensation inside the humidifier which could lead to a failure of the integrated electronics.

## WARNING

Protect humidifier from contamination! The protective tape on the dispersion outlets assembly should only be removed immediately prior to commissioning.

**FIGURE 19-1: MODEL BA CLEARANCE RECOMMENDATIONS**



**NOTE:**

- See Table 16-2 for obstruction free distances.
- A minimum clearance of 20" upstream from humidifier is needed.

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## Placement: Model BA

A. A1: This is the ideal RH sensing location because this placement ensures the best uniform mix of dry and moist air with stable temperature control.

A2: This is the ideal dewpoint sensing location for discharge control schemes.

B. This location is acceptable, but the room environment may affect controllability such as when the sensor is too close to air grilles, registers, or heat radiation from room lighting.

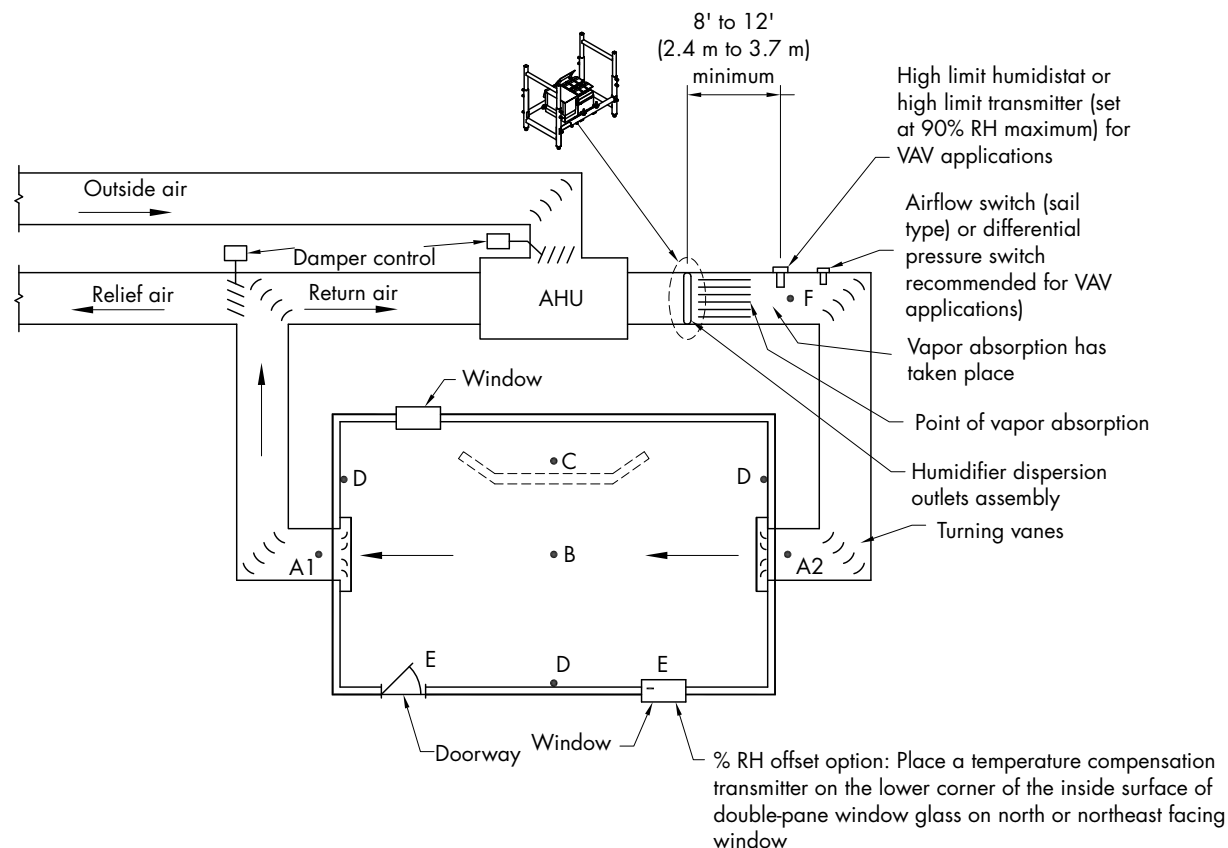
C. This location behind a wall or partition is acceptable for sampling the entire room if the sensor is near an air exhaust return outlet. This location is also typical of sensor placement for sampling a critical area.

D. These locations are not acceptable because they may not represent actual overall conditions in the space.

E. These locations are not acceptable. Do not place sensors near windows, door passageways, or areas of stagnant airflow.

F. This is the best location for a duct high limit humidistat.

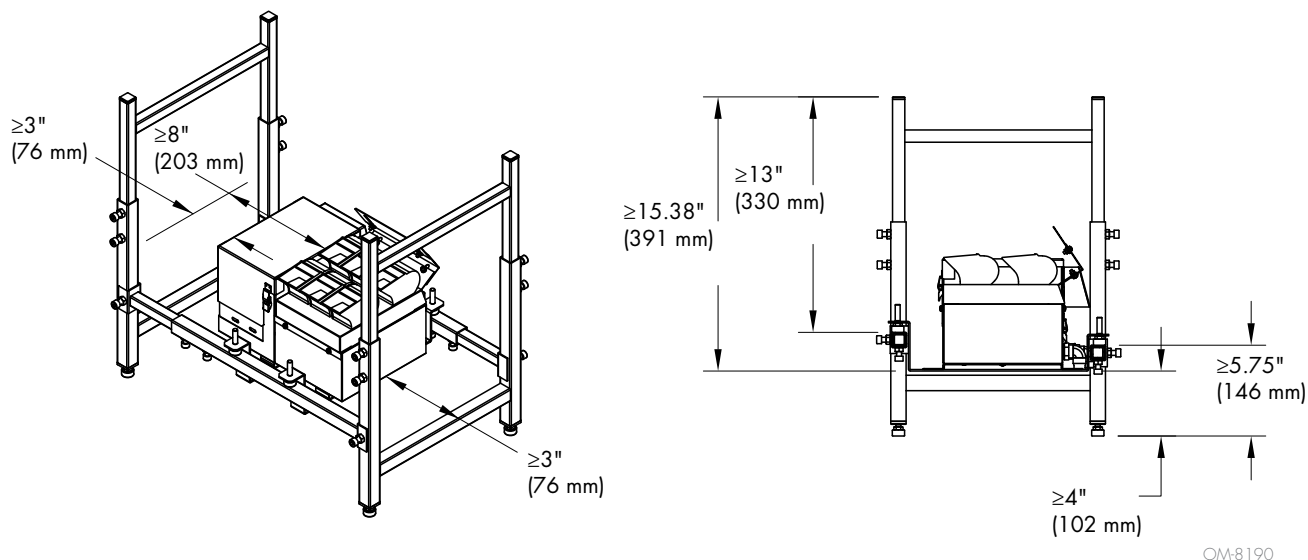
**FIGURE 20-1: RECOMMENDED SENSOR LOCATIONS**



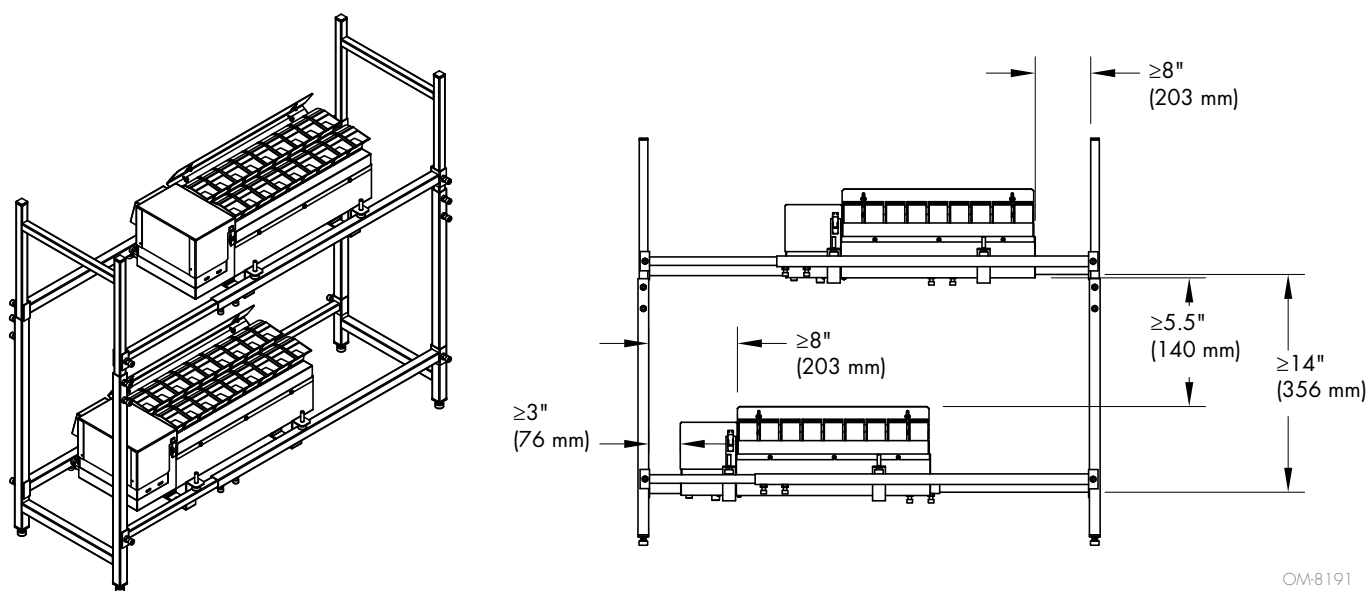


# Location and clearance recommendations: Model BA

**FIGURE 21-1: MOUNTING POINT ONE HUMIDIFIER**

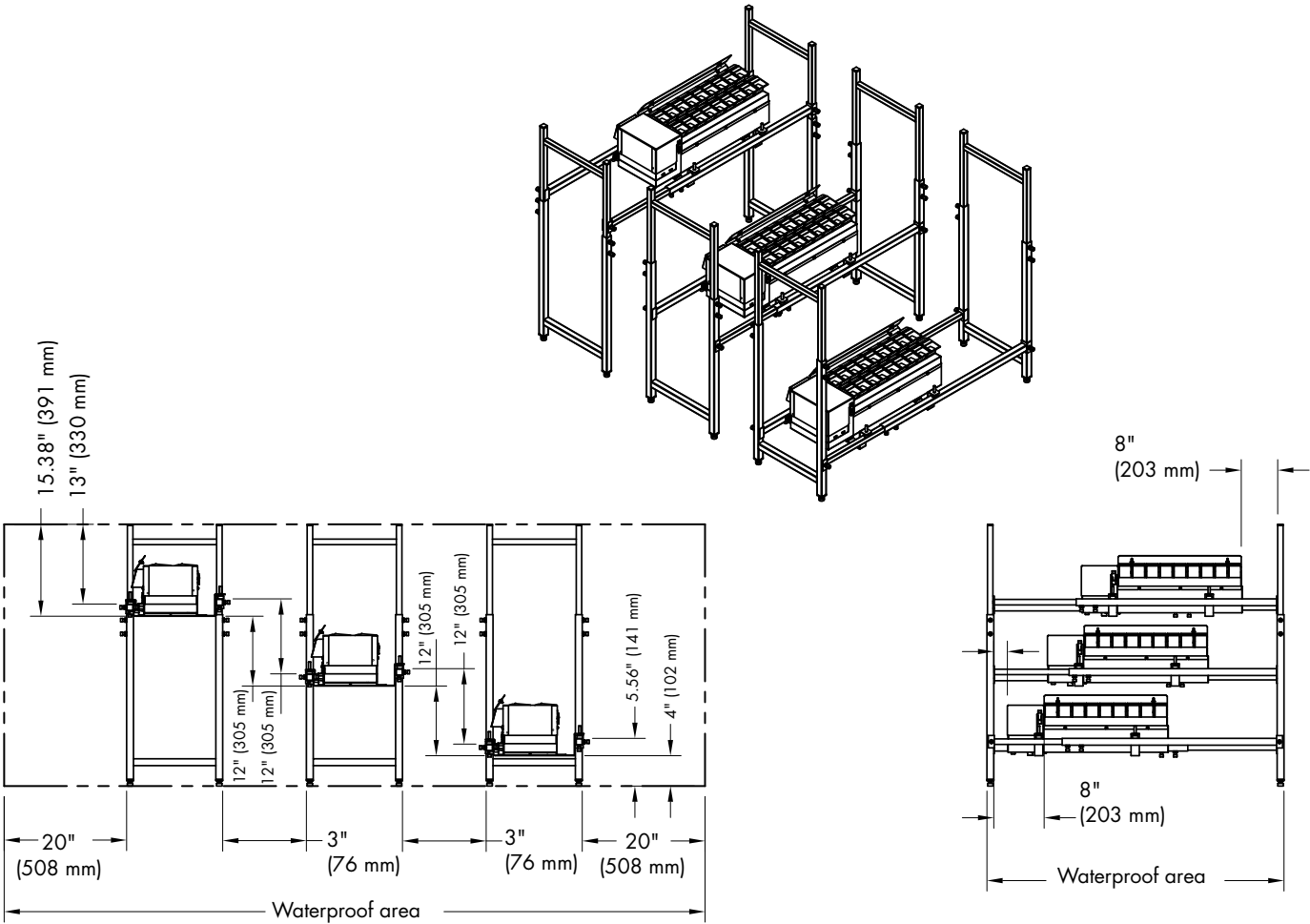


**FIGURE 21-2: MOUNTING POINT TWO HUMIDIFIERS**



# Location and clearance recommendations: Model BA

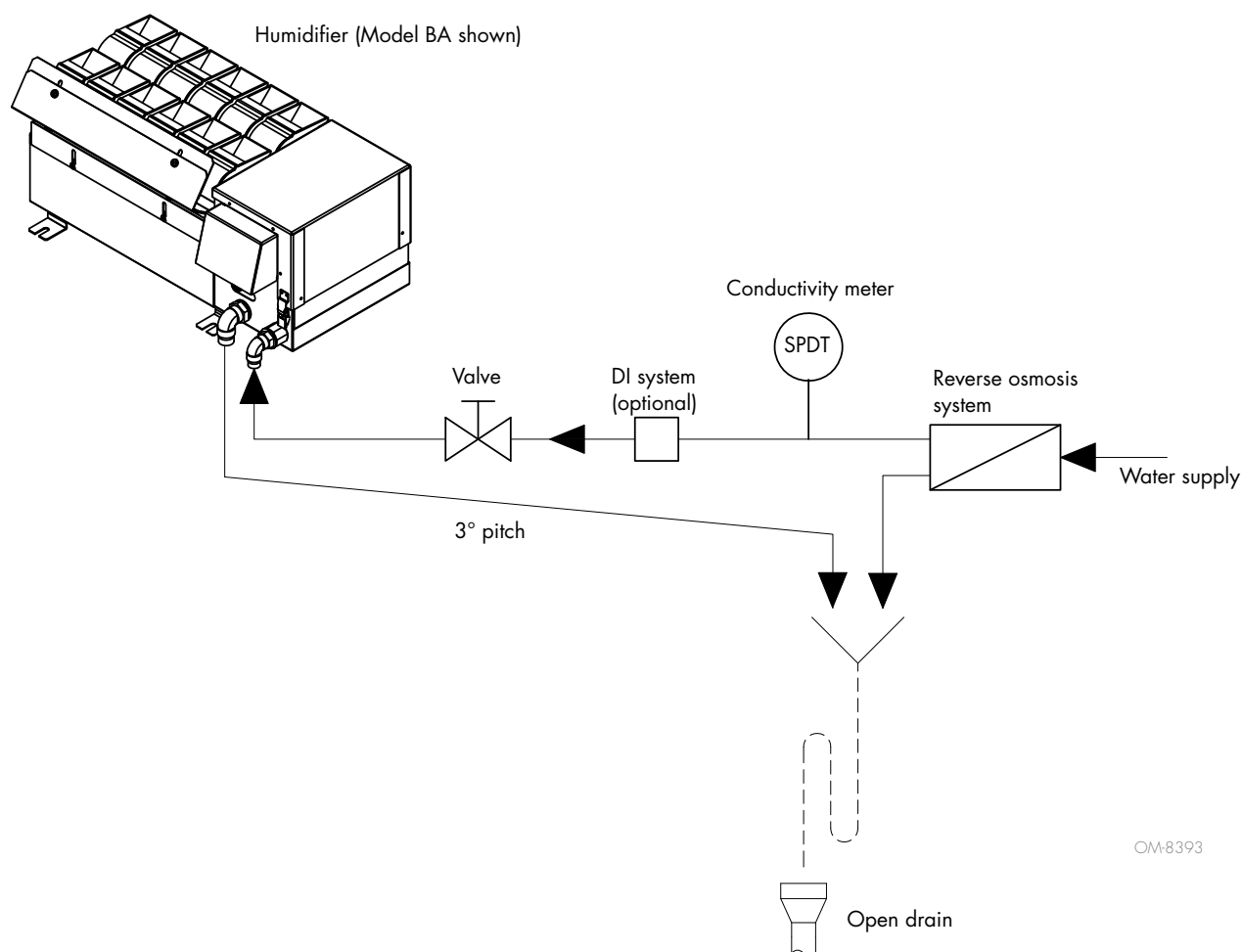
FIGURE 22-1: TELESCOPIC STRUT



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# Water connection

**FIGURE 23-1: ULTRASONIC HUMIDIFIER SCHEMATIC DIAGRAM OF WATER CONNECTIONS**



OM-8393

## Important notes:

- The humidifier may only be operated with fully demineralized water (produced for example by a reverse osmosis system). The demineralized water must have a conductivity of maximum 20  $\mu\text{S}/\text{cm}$ .
- The demineralized water is corrosive, therefore use stainless steel or plastic only. Non-ferrous metals (e.g. copper, brass) must not be used.
- Water pressure must be minimum 15-60 psi (100 - 400 kPa).
- The water overflow and drain tube must be pitched with a slope of min. 3% 1.18" over 39.4" (3 cm over 1 m).
- For easy maintenance, the valve (included) must be installed in the demineralized water supply line close to the humidifier.

## **! WARNING**

All materials coming into contact with the demineralized water must be resistant to demineralized water. Pressure and temperature stability must be observed.

Demineralized water pipes must be flushed prior to commissioning the humidifier.

# Water connections

The connectors provide durable, safe and watertight connections between tub and connecting elements. The tube is inserted by hand. The retaining element holds the tube safely without pressing it or decreasing the flow.

## 1. Establishing the connection

Cut tube squarely and free of burrs. Make sure that the tube has no sharp edges, grooves, or other damage. See Figure 24-1.

## 2. Connection is stable prior to sealing

Insert the tube up to the stop. The supporting element holds the tube in the connector. With the help of the O-ring, a tight connection is established. See Figure 24-2.

## 3. Check the connection by pulling towards the opposite side

By pulling towards the opposite side check whether the tube was correctly inserted. Then slide on the locking ring. See Figure 24-3.

## 4. Detaching the connection

First remove the locking ring. The tube can be detached by pushing back the supporting element. See Figure 24-4.

**FIGURE 24-1: ESTABLISHING THE CONNECTION**



**FIGURE 24-2: INSERT TUBE**



**FIGURE 24-3: CHECK CONNECTION**



**FIGURE 24-4: DETACHING THE CONNECTION**



# Wiring

Wire the humidifier and controls according to all governing codes and as stated in the wiring diagrams and Installation and Operation Manual that shipped with the unit.

## **WARNING**

The neutral conductor (N) on the secondary side must not be grounded!

### TRANSFORMER

- The transformers are available either loose or installed in a sheet metal enclosure. When installing in a control cabinet, it is essential to make allowance for the heat dissipated from the transformers if rated conditions exceed environmental conditions listed in Table 10-3.
- The transformer transforms the primary voltage of 120VAC / 60 Hz to the secondary voltage of 48 - 53VAC / 60 Hz.
- The transformers of DriSteem are manufactured according to the following specifications: Single-phase control-power transformer in accordance with VDE 0550 Parts 1+3 and VDE 0113, IP00, Protection Class 1, Insulation Class T40E, separate windings, screw-connection in accordance with VBG4, 50/60 Hz.
- The transformers are offered in a NEMA2 enclosure to protect against incidental contact and falling debris/dirt.

**Table 25-1:**  
Relay X3 external alarm status

Operational status	
Device switched off no supply voltage	Contact open
Humidification active	Contact closed
Humidification inactive	Contact open
Alarm status	
Device switched off / no supply voltage	Contact open
Normal operation	Contact closed
Fault Mode – Error Mode	Contact open

## Wiring

Table 26-1:

Model BA: 48 VAC sizing room transformer box to Ultrasonic humidifiers

Model	Current (Amps)	Minimum wire size (AWG)					
		25 ft	7.62 m	50 ft	15.24 m	75 ft	22.86 m
BA-06	3.9	16	4.88	14	4.27	14	4.27
BA-12	7.8	14	4.27	12	3.66	10	3.05
BA-18	11.6	14	4.27	10	3.05	8	2.44
BA-24	15.3	12	3.66	10	3.05	8	2.44
BA-30	19.1	10	3.05	8	2.44	-	-
BA-36	22.8	10	3.05	8	2.44	-	-
BA-42	26.6	10	3.05	-	-	-	-

## NOTES:

Table reflects correct electrical wire sizing from the control box to the humidifiers. Do not exceed 75' (22.86 m) maximum distance.  
Gauge wire is assuming solid copper wire with common insulation 105°F (40.55°C).

Table 26-2:

Model BR: 48 VAC sizing room transformer box to Ultrasonic humidifiers

Model	Current (Amps)	Minimum wire size (AWG)					
		25 ft	7.62 m	50 ft	15.24 m	75 ft	22.86 m
BR-02	2.3	16	4.88	16	4.88	14	4.27
BR-04	3.8	16	4.88	14	4.27	14	4.27
BR-06	5	16	4.88	14	4.27	12	3.66
BR-08	6.5	14	4.27	12	3.66	10	3.05
BR-10	7.7	14	4.27	12	3.66	10	3.05
BR-16	13.5	12	3.66	10	3.05	8	2.44

## NOTES:

Table reflects correct electrical wire sizing from the control box to the humidifiers. Do not exceed 75' (22.86 m) maximum distance.  
Gauge wire is assuming solid copper wire with common insulation 105°F (40.55°C).

## Wiring: Model BR

### HUMIDIFIER FIELD WIRING

All wiring must be in accordance with governing codes, and with the humidifier wiring diagrams shipped with the humidifier. The diagrams are located inside humidifier packaging.

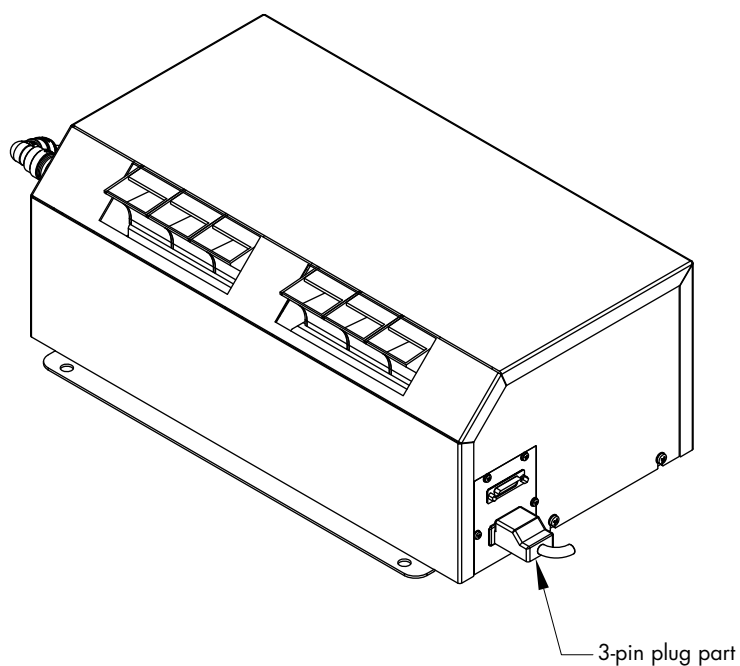
When selecting a location for installing the humidifier, avoid areas close to sources of electromagnetic emissions such as power distribution transformers.

### POWER CONNECTION

The 3-pins plug part has to be used for the 48VAC/60Hz power supply of the humidifier. The socket is included. (See Figure 27-1).

1. Unscrew the black cap from the socket. The socket is external connection X01 on the wire diagrams. The cable screw connectors are marked:
  - a. N = neutral wire
  - b. PE = protective conductor
  - c. L1 = conductor 48VAC/60Hz
2. Connect the cables between the secondary output of the transformer and the socket according to the labeling.

**FIGURE 27-1: POWER CONNECTION**



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# Control connections: Model BR

**FIGURE 28-1: 15-PIN D-SUB CONNECTOR MUST BE USED FOR THE CONTROL SIGNALS FOR OPERATING THE HUMIDIFIER. EXTERNAL CONNECTION X02.**



**Table 28-1:**  
Status messages operation/error

Contact	Function	Description
1	Interlock switch	Input for normally closed safety switches
2	Interlock switch	Input for normally closed safety switches
3	Alarm status	Output alarm status
4	Alarm status	Output alarm status
5	Operational status	Output operation status
6	Operational status	Output operation status
7	Humidification requirement 50% output	Input for normally open on/off humidistat
8	Humidification requirement 100% output	Input for normally open on/off humidistat
9	Supply humidistat	Common supply humidistat
10	Common	Common ground analog control
11	Analog input 4...20 mA	Control input 4-20 mA
12	Analog input 0...10 V	Control input 0-10 V
13	Interface RS-485, A	RS-485 Modbus A
14	Interface RS-485, B	RS-485 Modbus B
15	Interface RS-485, GND	RS-485 Modbus Common
GND	Not used	



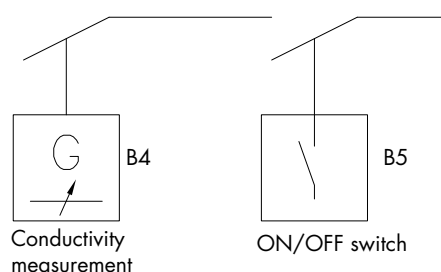
# Control connections: Model BR

## SAFETY CHAIN FOR THE INTERLOCK SWITCH

Connect safety chain to the screw-type connectors marked 1 and 2.

The input of the safety chain must always be connected to safety devices with an NC contact. A cable bridge is always wired at the factory between connections 1-2/safety chain , to be left in place until the cable bridge is replaced with the safety chain. The humidifier does NOT work otherwise.

**FIGURE 29-1: TYPICAL SAFETY CHAIN**

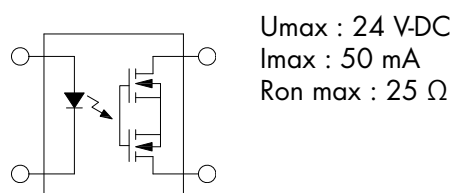


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## STATUS MESSAGE OPERATION - ALARM

There are two signal outputs labeled error message ST-2 and operation message ST-1 on terminal X3 on the control board. To use them, wire to the D-Sub 15 according to Table 29-1. See Table 25-1 to decode the values of these outputs.

**FIGURE 29-2: PHOTOMOS RELAY OUTPUTS FOR OPERATION AND ALARM MESSAGES**



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Table 29-1: Status messages operation/alarm		
Status message	Message type	Connection terminal on the green plug
1	Operational status	5 + 6
2	Alarm status	3 + 4

## ! WARNING

The Model BR humidifier always supplies 48 VAC for the safety circuit at terminal 1. The 48 VAC source can vary from humidifier to humidifier. Isolation relays must be used when sharing one safety chain across multiple BR humidifiers.

## Control connections: Model BR

### CONTROL ON-OFF

- The humidifier can be controlled via normally open contacts in on-off operation.
- The output power can be set to 50% or 100% humidifier output. See Figure 28-1.

### MODULATING CONTROL

- The output can be controlled in the smallest steps between 0% and 100% output.
  - 0-10 V-DC
  - 4-20 mA
- The humidifier uses a pulse width modulation algorithm to modulate the output in accordance with the input signal. When the control signal is below the OFF threshold, the outputs will be off. PWM control cycles the PET(s) on and off to maintain the desired output level when the control signal reaches the ON threshold. When the control signal climbs above the Out 100% threshold the humidifier will be on at 100%.

Table 30-1:  
Thresholds analog input

Control signal	Out PWM ON	Out 100%	Out PWM OFF
0-10 V	1.1 V $\pm$ 0.5	8.5 V $\pm$ 0.5	0.9 V $\pm$ 0.5
4-20 mA	5.4 mA $\pm$ 0.1	18.5 mA $\pm$ 0.5	5.2 mA $\pm$ 0.1

### CONTROL VIA MODBUS RTU

- The humidifier can be controlled via Modbus both in on-off operation or in modulating operation. See page 43.
- Further information can be found in the Modbus interface description. This can be requested from the manufacturer or viewed and downloaded from the [www.dristeem.com](http://www.dristeem.com) website.

### CONTROL VIA BACNET

- To control the humidity setpoint via BACnet, use the DriSteem BACnet humidistat as an external 0-10V control signal. Wiring is the same as for 0-10VDC modulating control.
- For the setup, installation and operation of the BACnet humidistat, view the BACnet humidistat instructions IOM at [www.dristeem.com](http://www.dristeem.com).

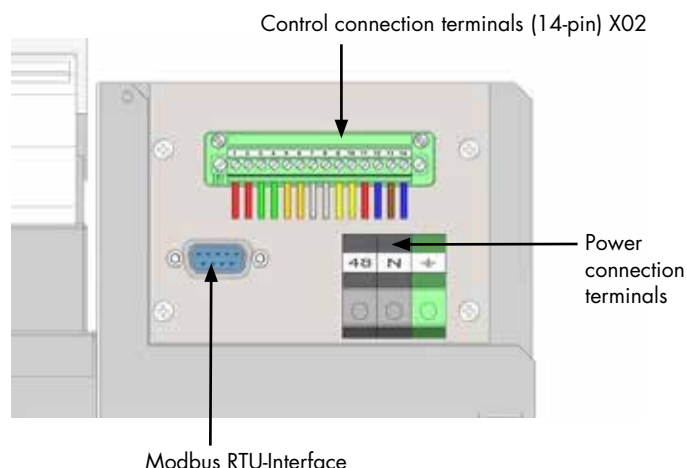
### CROSS FLOW FAN

The integrated cross flow fan for the mist transport is switched by the control electronics depending on the humidifier's function. After the demand has been switched off, the fan remains on for 15 seconds (run-on time) in order to distribute the remaining mist out of the device.

# Control connections: Model BA

The electrical connection of the humidifier is made for the electrical power at the 48 V (L, N, PE) bushing terminals and for the regulation, control, safety chain, status message and function control at the 14-pin plug connector in the middle part of the control housing. The terminals are exposed when you release the fasteners on the control housing cover and remove the cover.

**FIGURE 31-1: ELECTRICAL CONNECTIONS FOR THE MODEL BA HUMIDIFIER**



**Table 31-1:**

**Power connection terminals**

Connection	Name of terminal
L 48 V-AC	48
N 48 V-AC	N
PE	Protective earth

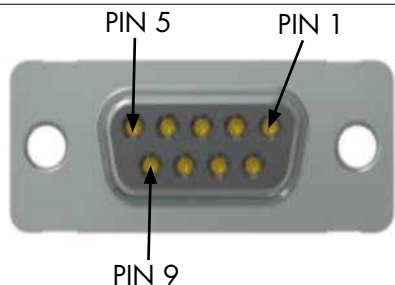
**Table 31-2:**

**Assignment of control connection terminals**

Contact	Description	Information
1	Safety chain 48 VAC or - 24 VDC	Observe the polarity (DC)
2	Safety chain 48 VAC or + 24 VDC	Observe the polarity (DC)
3	Error message ST-2 (normally open contact)	Error message
4	Error message ST-2(normally open contact)	Error message
5	Operation message ST-1 (normally open contact)	Operation message
6	Operation message ST-1 (normally open contact)	Operation message
7	Input Humidistat 1	50 % Output capacity
8	Input Humidistat 1	50 % Output capacity
9	Input Humidistat 2	100 % Output capacity
10	Input Humidistat 2	100 % Output capacity
11	Control signal input + 4 ... 20 mA	Observe the polarity Impedance 50 KΩ
12	Control signal input - 4 ... 20 mA	Observe the polarity Impedance 50 KΩ
13	Control signal input + 0 ... 10 V	Observe the polarity Impedance 50 KΩ
14	Control signal input - 0 ... 10 V	Observe the polarity Impedance 50 KΩ

# Control connections: Model BA

**FIGURE 32-1: MODBUS D-SUB SOCKET**



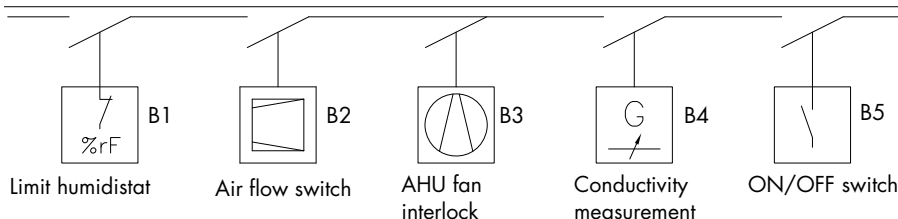
**Table 32-1:**  
Assignment of D-SUB socket

PIN	Description
1	MODBUS RTU < COMMON >
5	MODBUS RTU < B/B' >
9	MODBUS RTU < A/A' >

## SAFETY CHAIN

Connect safety chain to the screw-type connectors marked 1 and 2. Connectors 1 and 2 are not internally connected to a voltage supply. The voltage for the safety circuit can be 48 VAC from a humidifier or 24 VAC from an external transformer, such as a humidistat transformer.

**FIGURE 32-2: ELECTRICAL POWER CONNECTION**

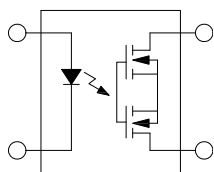


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## STATUS MESSAGE OPERATION - ERROR

There are two signal outputs labeled X3.1 and X3.2 on the control board. See Table 25-1 to decode the values of these outputs.

**FIGURE 32-3: PHOTOMOS RELAY OUTPUTS FOR OPERATION AND ALARM MESSAGES**



Umax : 24 V-DC  
Imax : 50 mA  
Ron max : 25 Ω

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## ! WARNING

The input of the safety chain must always be supplied with 48 V AC (alternatively 24 VAC) voltage. Otherwise the humidifier will NOT work!

If several humidifiers are connected to the safety chain, they must be connected in parallel to each humidifier.

ATTENTION: The feed may only be done once.

**Table 32-2:**  
Status messages operation/error

Status message	Message type	Connection terminal on the green plug
1	Operational status	5 + 6
2	Alarm status	3 + 4

# Control connections: Model BA

## CONTROL ON-OFF

- The humidifier can be controlled via normally open contacts in on-off operation.
- The output power can be set to 50% or 100% humidifier output. See Figure 28-1.

## MODULATING CONTROL

- The output power can be controlled in the smallest steps between 0% and 100% output.
  - 0-10 VDC
  - 4-20 mA
- The humidifier uses a pulse width modulation algorithm to modulate the output in accordance with the input signal. When the control signal is below the OFF threshold, the outputs will be off. PWM control cycles the PET(s) on and off to maintain the desired output level when the control signal reaches the ON threshold. When the control signal climbs above the Out 100% threshold the humidifier will be on at 100%.

Table 33-1: Thresholds analog input			
Control signal	Out PWM ON	Out 100%	Out PWM OFF
0-10 V	1.1 V $\pm$ 0.5	8.5 V $\pm$ 0.5	0.9 V $\pm$ 0.5
4-20 mA	5.4 mA $\pm$ 0.1	18.5 mA $\pm$ 0.5	5.2 mA $\pm$ 0.1

## CONTROL VIA MODBUS RTU

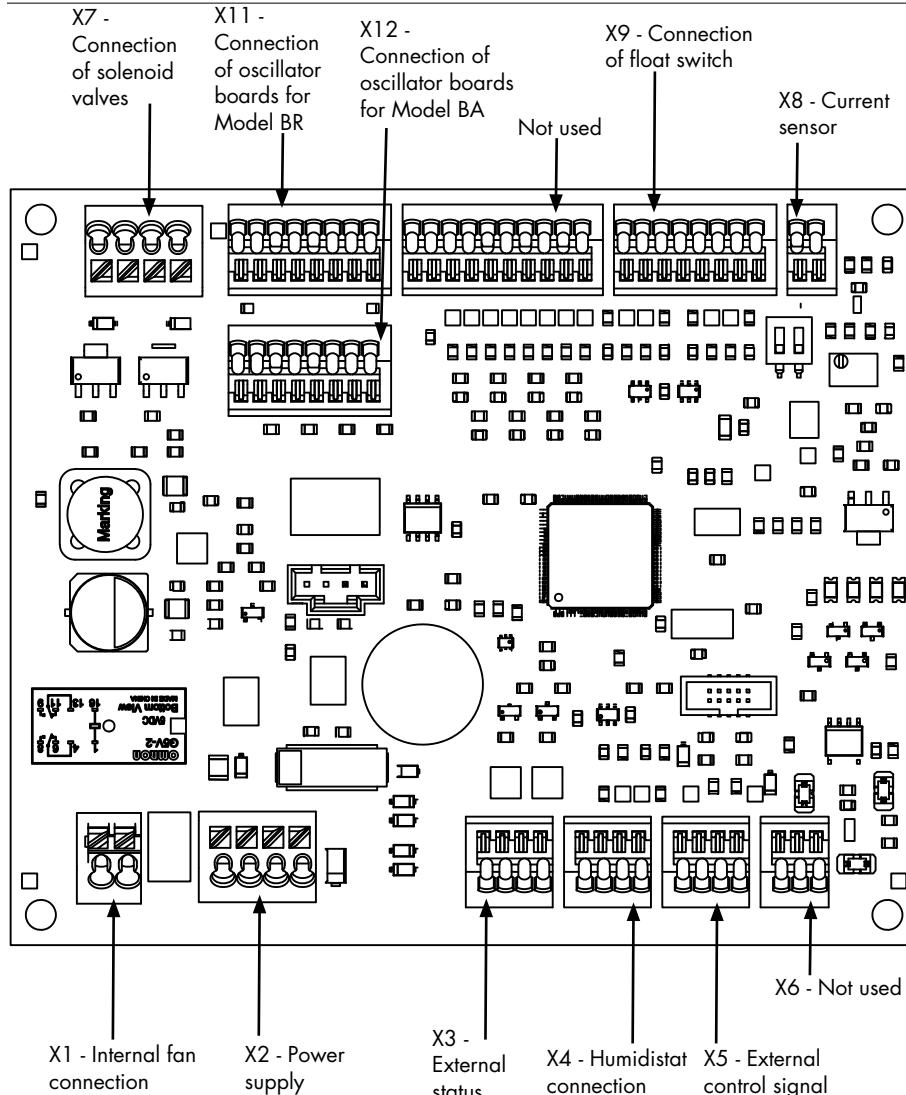
- The humidifier can be controlled via Modbus both in on-off operation or in modulating operation. See page 43.
- Further information can be found in the Modbus interface description. This can be requested from the manufacturer or viewed and downloaded from the [www.dristeem.com](http://www.dristeem.com) website.

## CONTROL VIA BACNET

- To control the humidity setpoint via BACnet, use the DriSteem BACnet humidistat as an external 0-10V control signal. Wiring is the same as for 0-10VDC modulating control.
- For the setup, installation and operation of the BACnet humidistat, view the BACnet humidistat instructions IOM at [www.dristeem.com](http://www.dristeem.com).

# Control board

**FIGURE 34-1: CONTROL BOARD CONNECTIONS**



**X1 - Internal fan connection:**

Relay closing contact  
Relay closing contact

**X2 - Power supply:**

Power supply L 48 V-AC  
Power supply N 48 V-AC  
Safety chain 48 V-AC, 24 V-DC  
Safety chain 48 V-AC, 24 V-DC

**X3 - External status:**

1 + 2: Operational status  
3 + 4: Alarm status

**X4 - Humidistat connection:**

Humidistat input 1  
Humidistat input 1  
Humidistat input 2  
Humidistat input 2

**X5 - External control signal:**

Control signal mA + (Ri: 500  $\Omega$ )  
Control signal mA -  
Control signal V + (Ri: 50 k $\Omega$ )  
Control signal V -

**X7 - Fill and drain:**

Solenoid valve drain L+  
Solenoid valve drain N-  
Solenoid valve supply L+  
Solenoid valve supply N-

**X8 - Current sensor:**

Current measurement -  
Current measurement +

**X9 - Connection of float switch:**

Float switch, level "S1" black  
Float switch, level "S1" brown  
Float switch, level "S1" blue  
Float switch, level "S1" grey  
Float switch, level "S2" black  
Float switch, level "S2" brown  
Float switch, level "S2" blue  
Float switch, level "S2" grey

**X11 - Connection of driver boards: Current measurement. Pulse width modulation (PWM)**

PWM 4 -  
PWM 4 +  
PWM 3 -  
PWM 3 +  
PWM 2 -  
PWM 2 +  
PWM 1 -  
PWM 1 +

**X12 - Connection of driver boards: Current measurement. Pulse width modulation (PWM)**

PWM 4 -  
PWM 4 +  
PWM 3 -  
PWM 3 +  
PWM 2 -  
PWM 2 +  
PWM 1 -  
PWM 1 +

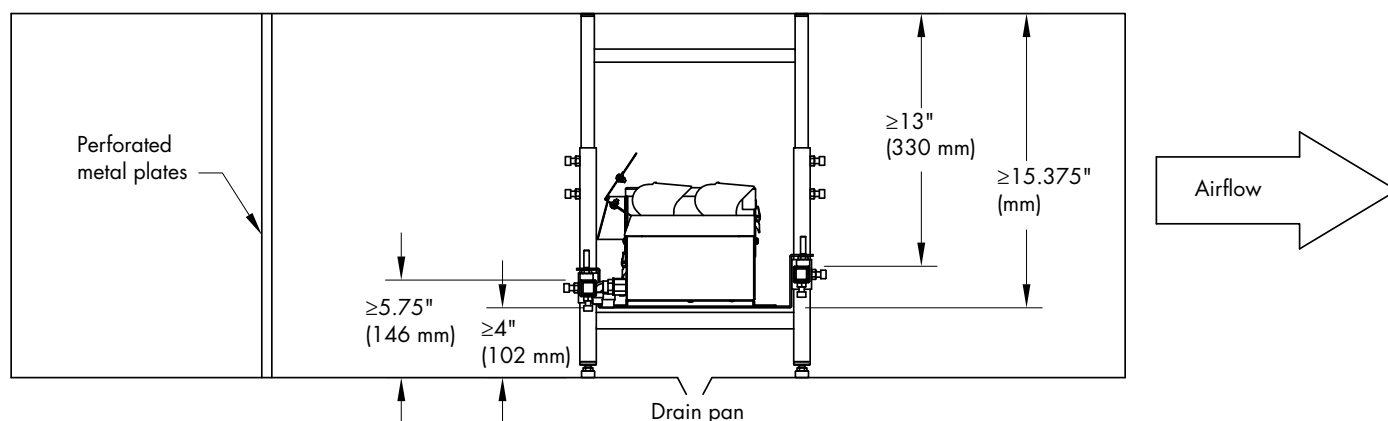
QM-8205

# Model BA: Configuration

## STANDARD CONFIGURATION

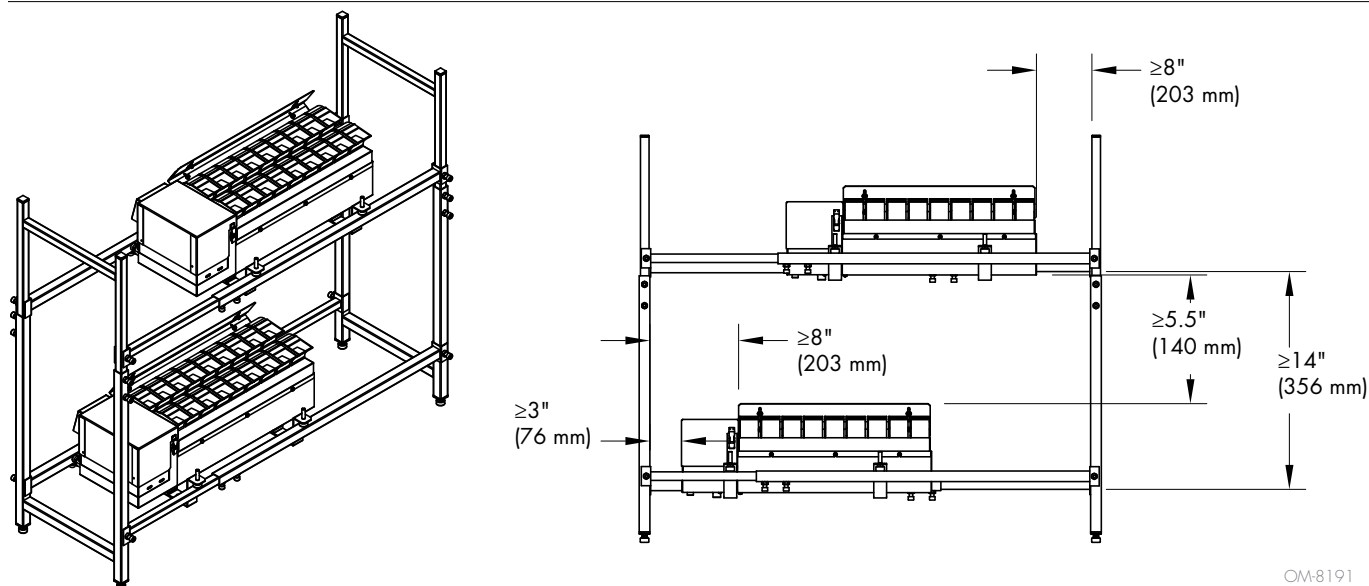
Mounting example on mounting frame (on site) with mounting bracket Model BA.

**FIGURE 35-1: SIDE VIEW INTO AN AIR DUCT WITH ONE MODEL BA HUMIDIFIER**



The humidifiers can be arranged directly one above the other. The vertical distance between the humidifiers should be  $\geq 5.5$  inches (140 mm).

**FIGURE 35-2: VIEW INTO AN AIR DUCT IN DIRECTION OF AIR FLOW, TWO MODEL BA HUMIDIFIERS MOUNTED ONE ABOVE THE OTHER**



OM-8191

## Model BA: Configuration

## STEPPED CONFIGURATION

Humidifiers are mounted one above the other; offset horizontally (See Figure 36-1 and Figure 36-2).

Mounting example on mounting frame (on site) with Model BA mounting brackets.

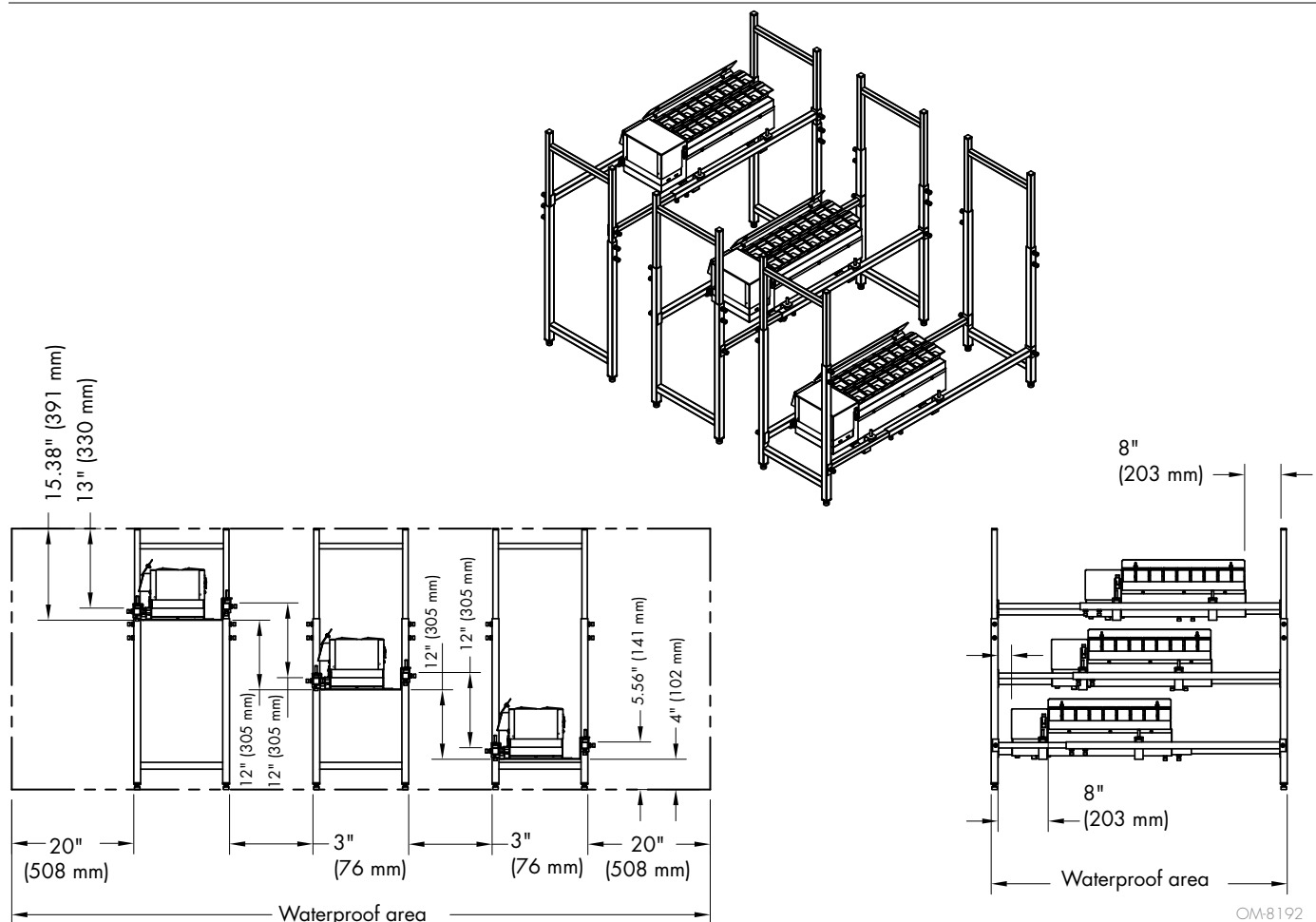
Stepped configuration is necessary:

- if the permissible air velocity would be exceeded (  $V = 200\text{-}800 \text{ ft/min}$  ( $1.0 - 4.0 \text{ m/s}$ ) on standard configuration or
- if more humidification is necessary than would be possible with the standard configuration. The minimum vertical distances are smaller than with the standard configuration, which permits installation of more units and thus increased humidification.

### Requirements:

- With stepped configuration, the vertical distance between several humidifiers must be  $\geq 2.8"$  (71 mm)
- The minimum horizontal distance between several humidifiers must be  $\geq 3"$  (76 mm)
- Several humidifiers should be evenly distributed over the entire duct width, observing the minimum distance of 8" (203 mm) from the duct walls.

**FIGURE 36-1: SIDE VIEW INTO AN AIR DUCT WITH THREE MODEL BA HUMIDIFIERS**





# Commissioning

Before commissioning the humidifier, check once again that all installation and wiring work has been carried out correctly and fully completed. In particular, the water and power supply connections must be in proper order and comply with the relevant safety regulations.

## MANUAL FUNCTIONS

1. Release of permeate water inlet into the device (See Figure 37-1).
2. Release of 120VAC/60Hz to the transformer and switch on transformer (See Figure 37-2).
3. The humidity setpoint must be higher than the actual humidity to create a demand for humidity (See Figure 37-3).

## AUTOMATIC FUNCTIONS

- **Flushing of water supply line:**  
The solenoid valve supply of the humidifier opens. The solenoid valve drain is open. The water supply line is flushed without the water tank of the humidifier being filled.

After that, the solenoid valve supply closes again. The solenoid valve drain stays open for 3, 4 or 5 minutes (See Table 38-1).

- **Filling the water tank:**  
The solenoid valve drain closes. The Solenoid valve supply opens. The water tank of the humidifier is filled. The water level is automatically controlled with float switches.

Filling the tank can take from 5-7 minutes depending on the size of the water tank and water supply pressure.

- **Humidification:**  
Once the maximum water level is reached and the humidification request is still present, humidification will start.

## FINAL STEPS

1. Set target humidity.
2. Commissioning of the humidifier is complete.

**FIGURE 37-1: VALVE**



**FIGURE 37-2: TRANSFORMER**



**FIGURE 37-3: ROOM HUMIDISTAT**



## WARNING

The water tank may only be filled if a humidification request has been made. Otherwise the water tank of the humidifier will remain dry.

# Control functions

## CURRENT MEASUREMENT OF THE DRIVER BOARDS

A current check of the driver boards is performed every 3 hours. This test only takes place when the humidification request is present and lasts max. 5 seconds. During this time, the humidifying power is set to 100% and a functional test of all Piezoelectric transducers is performed.

## CHANGE OF THE LEVEL CONTROL

Since the level control in the humidifier is an important control, the two existing level float switches are monitored simultaneously. Both float switch levels reliably detects critical and alarm states.

## CHECK AND HOLDING VOLTAGE OF THE SOLENOID VALVES

The current consumption of the solenoid valves is checked before and during filling. If a fault is detected, contact "alarm status" opens.

## FURTHER MONITORING-ROUTINES

Optionally there are monitoring routines for the filling (maximum filling time) and monitoring routines for emptying the water tank (maximum drainage time). If a fault is detected, an automatic problem-solving routine will attempt to correct this fault.

If a system component does not work correctly, contact "alarm status" opens.

The default settings of the control board PCB are shown in Table 38-1.

Table 38-1:  
Default settings

		Model BR Room Humidifier						Model BA Duct Humidifier						
	Parameter	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
Time Constraints	Hydronic drain duration	3 minutes		4 minutes			5 min.	3 min.	4 minutes			5 minutes		
	Hydronic drain cycle time							12 hours						
	Hydronic drain delay							disabled						
	Flush time							120 seconds						
	Inactivity flush timeout							12 hours						
	Inactivity drain timeout							12 hours						
	Humidification timeout							disabled						
	Fill timeout							15 minutes						
Current Measurement	Inlet Valve							enabled						
	Outlet Valve							enabled						
	Fan	enabled						disabled						
	Driver	25%						enabled						
	Driver check interval							3 hours						
IOs	Voltage input scale							0-10 V DC						
	Voltage input functionality							active						
	Current input scale							4-20 mA						
	Current Input Functionality							active						
Modbus	Functionality							enabled						
	Address							last two digits of serial number*						
	Speed							19.2 kbs						
*Replacement control board will be addressed as "100" unless changed via Modbus RTU.														

\*Replacement control board will be addressed as "100" unless changed via Modbus RTU.

# Adjustment options

## **HYDRONIC DRAIN DURATION**

The hydronic drain duration is the time the humidifier needs to empty the water tank. This value is given by design and depends on the type of humidifier, the size of the water tank and the installation.

- Default setting: Depending on the device type.

## **HYDRONIC DRAIN CYCLE TIME**

The hydronic drain cycle time is directly linked to the automatic emptying of the water tank. The hydronic drain process is also performed when there is an initial humidification request or a long enough pause in humidification that the tank empties.

- Default setting: 12 hours.

## **HYDRONIC DRAIN DELAY**

The hydronic drain delay is used when several humidifiers are mounted in a system and hydronic drain is enabled. The hydronic drain delay prevents all humidifiers from being emptied at the same time.

- Default setting: No delay.

## **FLUSH TIME**

The flushing time is the time at which the water supply line is flushed before the first operation and after a period of time if the tank is empty.

- Default setting: 120 seconds.

## **INACTIVITY FLUSH TIMEOUT**

The "Inactivity Flush Timeout" causes the water supply line to be flushed after a specified time. If the internal fluid tank is empty and the humidifier is in idle mode for this adjustable time, the water supply line is flushed before the internal fluid tank is filled again.

- Default setting: 12 hours.

## Adjustment options

### **INACTIVITY DRAIN TIMEOUT**

If no humidification is requested, the humidifier is in standby mode. If the water tank is still filled, it is automatically emptied after the adjustable time "Inactivity Drain Timeout".

- Default setting: 12 hours.

### **HUMIDIFICATION TIMEOUT**

The humidification timeout is implemented to check for possible water quality above 20µm. If the humidifier operates for an adjustable amount of time and does not refill, the water may be dirty and cannot be used. When the "Humidification Timeout" time has elapsed, the humidifier checks the function of the level switches, empties the water tank and refills it to remove the contaminated water. Another cause of this alarm could be a lack of airflow. This problem-solving process runs three times. If the problem-solving process is unsuccessful, the humidifier will enter the alarm mode and display via the LED code (see Table 54-1) and Modbus the "Humidification Request Not Available" alarm.

- Default setting: disabled.

### **FILL TIMEOUT**

The "Fill Timeout" is the time the humidifier needs to fill the water tank. When the time for filling expires, without reaching the necessary fluid level in the water tank, a fill error has occurred and a problem solving routine is activated and ran three times. If the alarm cannot be cleared, the humidifier displays the "Error Filling". The time to fill depends on the water supply pressure and the type and size of humidifier. See Table 54-1.

- Default setting: 15 minutes.

### **DRIVER BOARD CHECK INTERVAL**

The driver boards can be automatically checked after a certain time. If the time interval has expired and a humidification request is present, the humidifier will operate for a short time (approximately 5 seconds) with 100% humidification performance to test a PET(s) in the device.

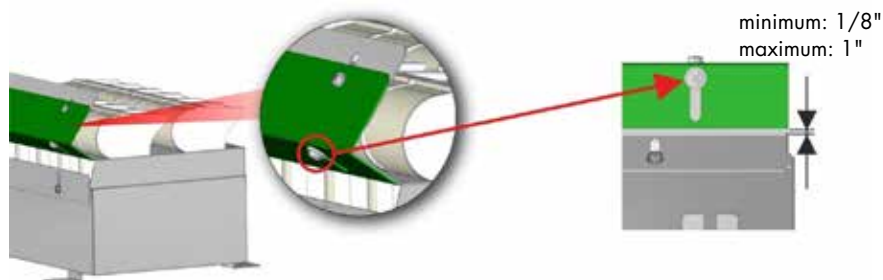
- Default setting: 3 hours.

# Model BA: Recommended settings of the airflow

## AIR BAFFLE AND EXTENSION ON THE BODY DUCT SUPPORT

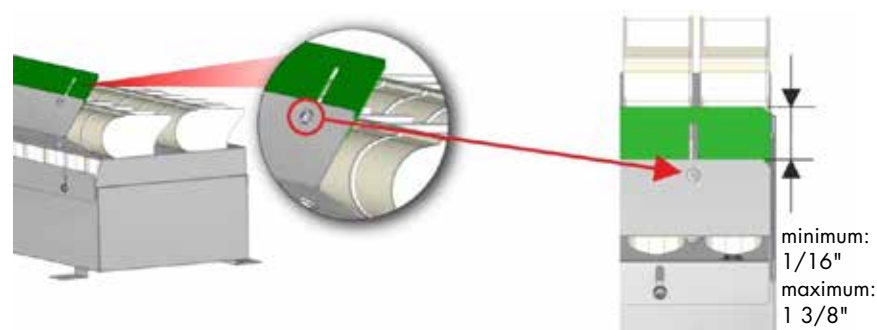
Set the air baffle at the minimum distance to the body duct support for the first setting.

**FIGURE 41-1: SET THE AIR BAFFLE**



In addition, the extension is set at the maximum distance to the folded sheet.

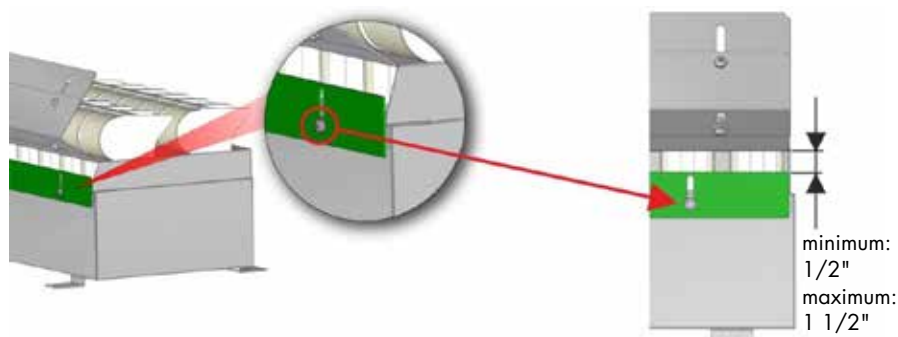
**FIGURE 41-2: SET AIR BAFFLE EXTENSION**



## AIR INLET RESTRICTOR ON THE TANK COVER

The air inlet restrictor is set to a minimum by closing.

**FIGURE 41-3: AIR INLET RESTRICTOR**



## WARNING

Depending on the duct design and air velocity, these basic settings can be modified to optimize the humidification capacity.

## BEST PRACTICES

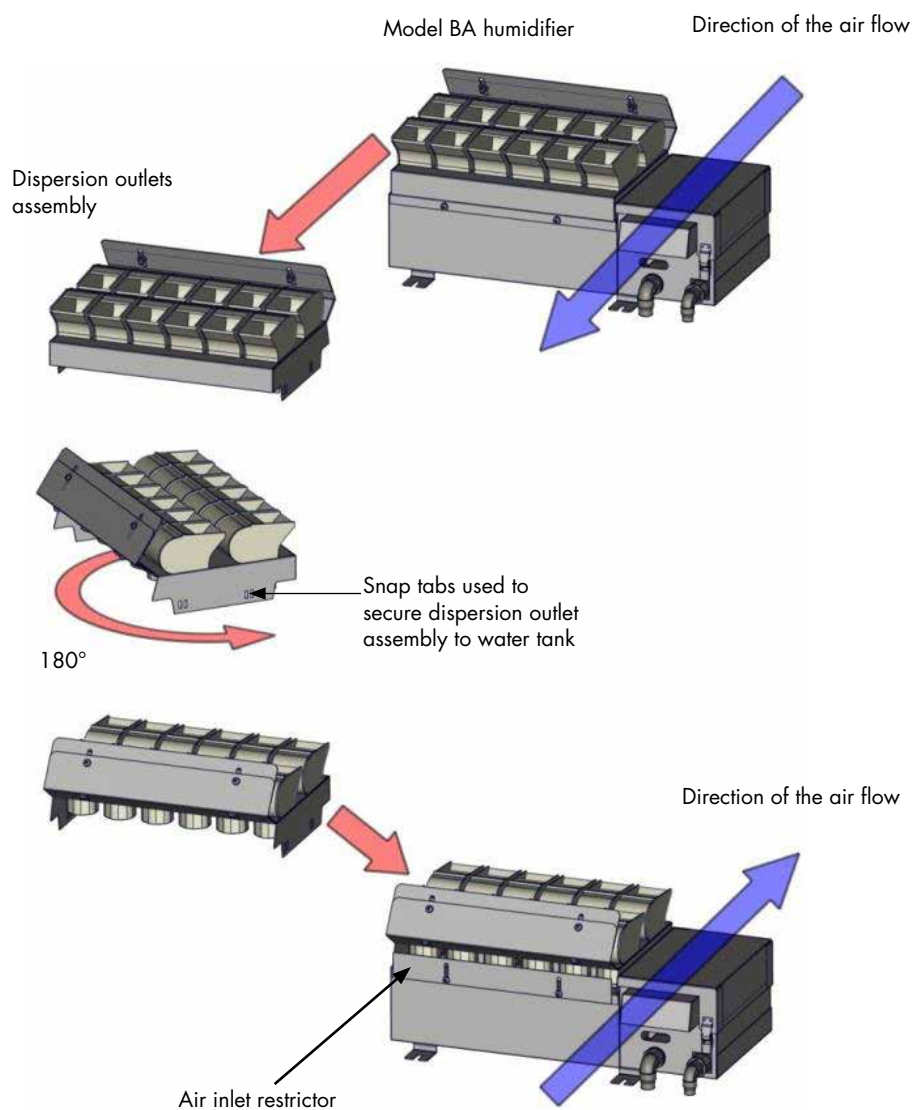
For air speeds of 2m/s or slower, the air inlet restrictor would want to be at its maximum distance from the baffles above, and the baffles themselves would want to be at full extension.

For air speeds of greater than 2m/s, the air inlet restrictor would want to be at its minimum distance from the baffles above, and the baffles would want to be at their minimum as well.

## Model BA: Adjustment to the direction of airflow

The Model BA humidifier can be adjusted to the flow direction of the duct air. Therefore, if required, the dispersion outlets assembly must be rotated by 180° and the air inlet restrictor must be mounted on the opposite side. This allows the humidifier to be situated in a favorable position for the water and electrical connections.

**FIGURE 42-1: ROTATE DISPERSION OUTLETS ASSEMBLY**



# Modbus

**Table 43-1:**  
**Modbus technical specifications**

Device type	Slave
Bandwidth rates	9,600 or 19,000 bit/s
Number of stations	Recommended max. 32 per segment, without repeater
Device address range	1-247
Protocol	MODBUS RTU. Other MODBUS-protocols such as ASCII, TCP/IP are not supported.
Data bits	8
Stop bits	2
Parity	none
RTS	disabled
Electrical interface	RS-485 2-wire
Connection type	Device-specific (see MBA)
Maximum cable length	600 meters (with CAT5) without additional Ethernet cable type
<b>Supported function codes</b>	
Function 2	read discrete Input
Function 3	read holding Registers
Function 4	read input Registers
Function 6	Write single Register
<b>Factory settings</b>	
Device address	XX = the last 2 digits of the serial number*
Bandwidth rates	19,200 bit/s
*Replacement control board will be addressed as "100" unless changed via Modbus RTU. Contact DriSteem if the address must be changed.	

# Modbus

## BASIC MODBUS RTU (RS-485) 2-WIRE-BUS

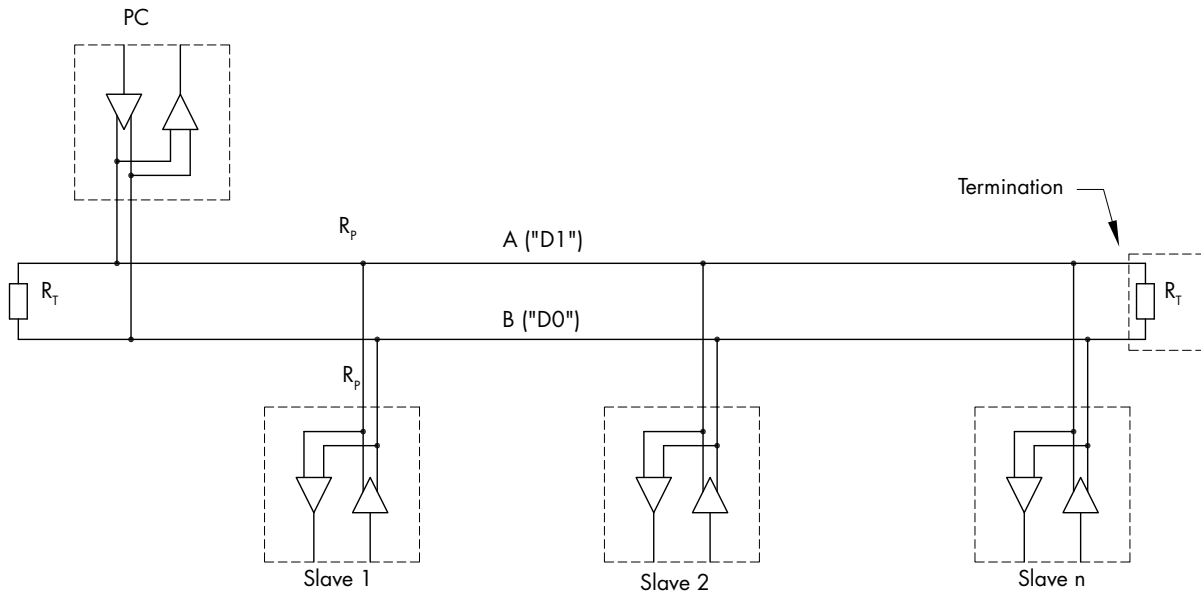
The communication between a PC (master) and a device (slave) via the Modbus protocol takes place according to the principle in the form of data requests / master-slave.

The Modbus RTU (RS-485) network connection is shown in Figure 44-1.

The bus structure does not allow T-branches.

At the end of the BUS communication link, the MODBUS RTU (RS-485) must be terminated with resistance on the BUS terminals. For termination, a 120  $\Omega$  resistor can be switched on the PCB via the existing jumper JP3. From the factory, the jumper is open (see Figure 45-1).

**FIGURE 44-1: TERMINATION**



OM-8201



# Modbus

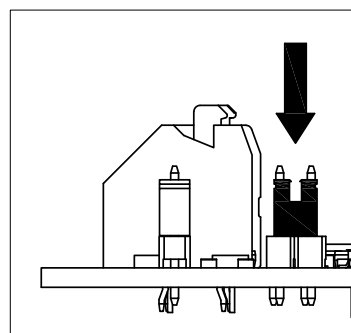
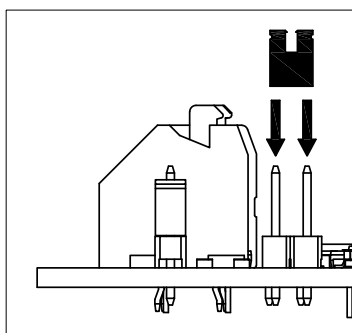
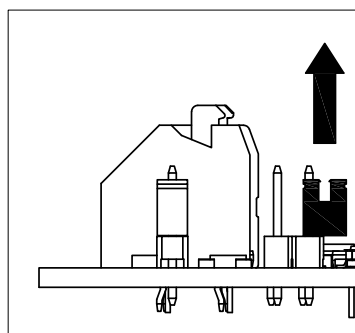
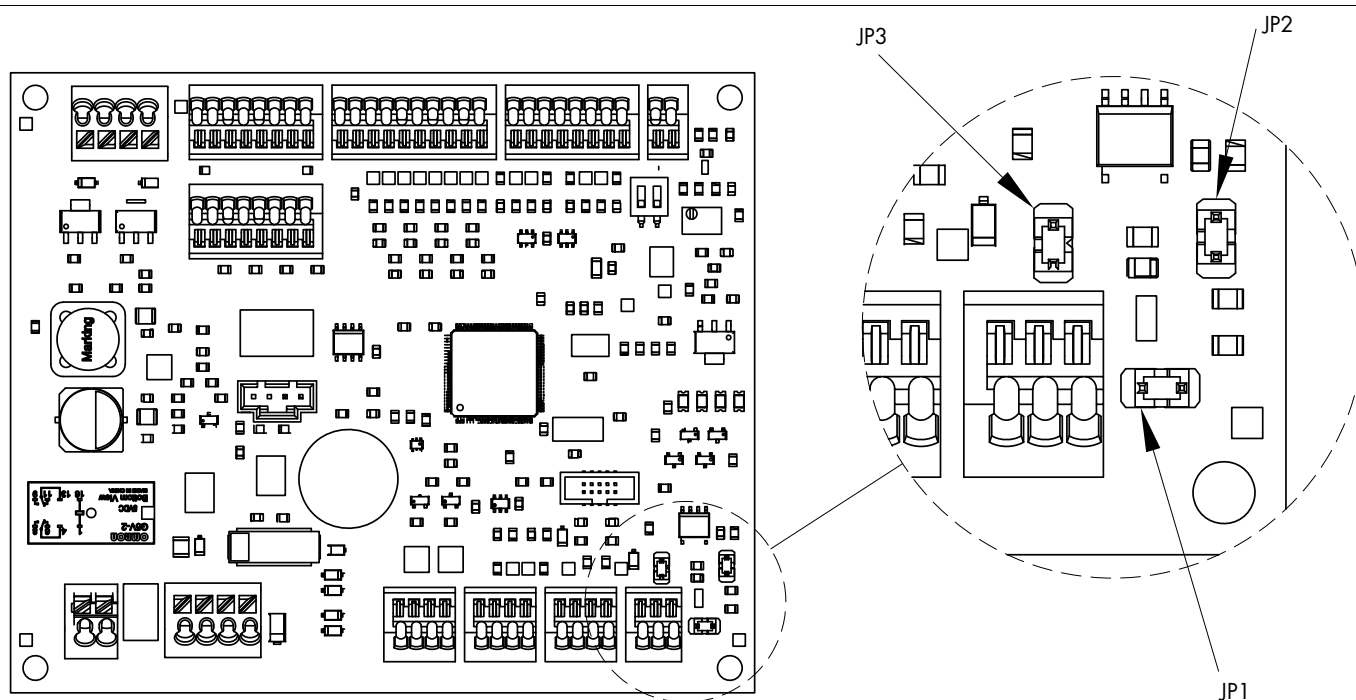
## CONTROL BOARD OVERVIEW

- Jumper JP3 terminating resistor (120  $\Omega$ )

### Note:

Record the MODBUS RTU device address legibly on the unit. This enables the devices to be re-assigned from the replacement default address of 100 in the event of a revision or replacement.

**FIGURE 45-1: CONTROL BOARD WITH JUMPER**



OM-8204

# Modbus:Holding register - system and firmware information

**Table 46-1:**  
Holding register - system and firmware information. Access: Read only.

Address (DEZ)	Address (HEX)	Description	Data format
0	0x0000	Software version sign 1	ASCII Code
1	0x0001	Software version sign 2	
2	0x0002	Software version sign 3	
3	0x0003	Software version sign 4	
4	0x0004	Software date sign 1	
5	0x0005	Software date sign 2	
6	0x0006	Software date sign 3	
7	0x0007	Software date sign 4	
8	0x0008	Software date sign 5	
9	0x0009	Software date sign 6	
10	0x000A	Software date sign 7	
11	0x000B	Software date sign 8	
12	0x000C	Software date sign 9	
13	0x000D	Software date sign 10	
14	0x000E	Software variant code sign 1	
15	0x000F	Software variant code sign 2	
16	0x0010	Software variant code sign 3	
17	0x0011	Software variant code sign 4	
18	0x0012	Software variant version sign 1	
19	0x0013	Software variant version sign 2	
20	0x0014	Software variant version sign 3	
21	0x0015	Software variant version sign 4	
22	0x0016	Software variant date sign 1	
23	0x0017	Software variant date sign 2	
24	0x0018	Software variant date sign 3	
25	0x0019	Software variant date sign 4	
26	0x001A	Software variant date sign 5	
27	0x001B	Software variant date sign 6	
28	0x001C	Software variant date sign 7	
29	0x001D	Software variant date sign 8	
30	0x001E	Software variant date sign 9	
31	0x001F	Software variant date sign 10	

# Modbus:Running times, operating times, program status

Table 47-1:

Holding register - running times, operating times, program status. Access: Read only.

Address (DEZ)	Address (HEX)	Description	Data format
32	0x0020	Runtime since switch-on days	Unsigned Int
33	0x0021	Runtime since switch-on hours	
34	0x0022	Runtime since switch-on minutes	
35	0x0023	Runtime since switch-on seconds	
36	0x0024	Total running time in days	
37	0x0025	Total running time in hours	
38	0x0026	Total running time in minutes	
39	0x0027	Total running time in seconds	
40	0x0028	Oscillator operating time (since service) days	
41	0x0029	Oscillator operating time (since service) hours	
42	0x002A	Oscillator operating time (since service) minutes	
43	0x002B	Oscillator operating time (since service) seconds	
44	0x002C	Oscillator operating time (total) days	
45	0x002D	Oscillator operating time (total) hours	
46	0x002E	Oscillator operating time (total) minutes	
47	0x002F	Oscillator operating time (total) seconds	
48	0x0030	Oscillator operating time (for service) days	
49	0x0031	Oscillator operating time (for service) hours	
50	0x0032	Oscillator operating time (for service) minutes	
51	0x0033	Oscillator operating time (for service) seconds	
52	0x0034	Time since last AquaDrain (days)	
53	0x0035	Time since last AquaDrain (hours)	
54	0x0036	Time since last AquaDrain (minutes)	
55	0x0037	Time since last AquaDrain (seconds)	
56	0x0038	Time current program status (days)	
57	0x0039	Time current program status (hours)	
58	0x003A	Time current program status (minutes)	
59	0x003B	Time current program status (seconds)	

# Modbus: Operating states

**Table 48-1:**  
Holding register - operating states 1. Access: Read only.

Address (DEZ)	Address (HEX)	Description	Level	Declaration
60	0x003C	Service state	0	No service required
			1	Service 1 required
			2	Service 2 required
62	0x003E	Release (safety chain)	0	Release
			1	No release
64	0x0040	Synchronization state	0	Synchronized
			1	Not synchronized
66	0x0042	Fill level (A + B)	0	Tub empty
			1	Tub normal
			2	Tub full
			3	Unknown error
67	0x0043	Fill level (A)	0	Tub empty
			1	Tub normal
			2	Tub full
			3	Unknown error
68	0x0044	Fill level (B)	0	Tub empty
			1	Tub normal
			2	Tub full
			3	Unknown error
69	0x0045	Program state	0	Initialization
			1	Mode Flushing
			2	Mode AquaDrain
			3	Mode Standby
			4	Mode current measure
			5	Mode fill up & fan start
			6	Mode fogging
			7	Mode problem solving routine
			8	Error Drain (Drain Timeout)
			9	Error Fill up (Fill up Timeout)
			10	Error MV-supply current measurement
			11	Error MV-drain current measurement
			12	Error Fan current measurement
			13	Error Level-Switch
			14	Error Humidification timeout

# Modbus: Operating states

**Table 49-1:**  
Holding register - operating states 2. Access: Read only.

Address (DEZ)	Address (HEX)	Description	Level	Declaration
70	0x0046	Mode MV-Supply	0	Turn off mode
			1	Turn on mode
			2	Problem solve mode
			3	Unknown error
71	0x0047	State MV-Supply	0	Voltage-free
			1	Tightening-voltage
			2	Holding-voltage
			3	Unknown error
72	0x0048	Mode MV-Drain	0	Turn off mode
			1	Turn on mode
			2	Problem solve mode
			3	Unknown error
73	0x0049	State MV-Drain	0	Voltage-free
			1	Tightening-voltage
			2	Holding-voltage
			3	Unknown error
74	0x004A	State Fan	0	Fan off
			1	Fan continuous mode
			2	Fan run-on
			3	Unknown error
75	0x004B	Mode current measurement	0	Standby
			1	Absolute measurement
			2	Wire-break measurement
76	0x004C	State single device current measurement	0	Inactive
			1	Initialization
			2	Measurement active
			3	Measurement completed
78	0x004D	State wire break current measurement	0	Inactive
			1	Initialization measurement 1
			2	Measurement 1 active
			3	Waiting
			4	Initialization measurement 2
			5	Measurement 2 active
			6	Wire break measurement completed
			7	Error

# Modbus: Operating states

Table 50-1:  
Holding register - operating states 3. Access: Read only.

Address (DEZ)	Address (HEX)	Description	Data format	Declaration
61	0x003D	Service Reset Counter	Unsigned Int	-
63	0x004F	Grid frequency		Frequency = value / 10 (507 = 50,7 Hz)
65	0x0041	Number of synchronization errors		-
77	0x004D	Current measurement last value		Digits
79	0x004F	Current measurement (wire-break) no.1		Digits
80	0x0050	Current measurement (wire-break) no.2		Digits
81	0x0051	Potentiometer 1		0-100%
82	0x0052	Potentiometer 2		0-100%
83	0x0053	Potentiometer 3		0-100%
84	0x0054	Potentiometer 4		0-100%
85	0x0055	Potentiometer 5		0-100%
86	0x0056	Potentiometer 6		0-100%
87	0x0057	Potentiometer 7		0-100%
88	0x0058	Potentiometer 8		0-100%
89	0x0059	Voltage input value (VIN)		0-100%
90	0x005A	Current input value (AIN)		0-100%
91	0x005B	Humidistat 1 (50%) demand		0: no demand 1: demand active
92	0x005C	Humidistat 2 (100%) demand		0: no demand 1: demand active
93	0x005D	Oscillator 1 control		0-100%
94	0x005E	Oscillator 2 control		0-100%
95	0x005F	Oscillator 3 control		0-100%
96	0x0060	Oscillator 4 control		0-100%
97	0x0061	Oscillator 5 control		0-100%
98	0x0062	Oscillator 6 control		0-100%
99	0x0063	Oscillator 7 control		0-100%
100	0x0064	Oscillator 8 control		0-100%
101	0x0065	Current measurement value		Digits
102	0x0066	Humidification active		0: not activ 1: activ
103	0x0067	Temporary Amplification current measurement		Drops @ Reference-measurement auto gain max. 255 to target value
104	0x0068	State Ext. Status message 1 (humidification)		0 humidification off 1 humidification on
105	0x0069	State Ext. Status message 2 (fault)		0 fault activ 1 fault off
106	0x006A	Collective fault		0: no fault 1: fault active
107	0x006B	Humidification request available		0: no request 1: request active

# Modbus: Device control and freely available memory

**Table 51-1:**  
Holding register - operating states 3. Access: Read/Write.

Address (DEZ)	Address (HEX)	Description	Data format	Declaration
150	0x0096	Modbus AquaDrain requirement	Unsigned Int	Send 1 for requirement
151	0x0097	Modbus AquaDrain cancellation		Send 1 for cancellation
152	0x0098	Modbus current reference measurement request		Send 1 for request
153	0x0099	Modbus system reset request		Send 1 for request
154	0x009A	Modbus oscillator default value channel 1		0-100% (Reset after 10 seconds without control)
155	0x009B	Modbus oscillator default value channel 2		0-100% (Reset after 10 seconds without control)
156	0x009C	Modbus oscillator default value channel 3		0-100% (Reset after 10 seconds without control)
157	0x009D	Modbus oscillator default value channel 4		0-100% (Reset after 10 seconds without control)
158	0x009E	Modbus oscillator default value channel 5		0-100% (Reset after 10 seconds without control)
159	0x009F	Modbus oscillator default value channel 6		0-100% (Reset after 10 seconds without control)
160	0x00A0	Modbus oscillator default value channel 7		0-100% (Reset after 10 seconds without control)
161	0x00A1	Modbus oscillator default value channel 8		0-100% (Reset after 10 seconds without control)

**Table 51-2:**  
Holding register - Freely available memory. Access: Read/Write.

Address (DEZ)	Address (HEX)	Description	Data format	Declaration
300	0x012C	Start address memory area	Unsigned Int	0-65535 / 0x0000-0xFFFF
363	0x016B	End address memory area		0-65535 / 0x0000-0xFFFF

# Preparing for maintenance

## COOL DOWN PROCEDURE

Before performing any maintenance, allow the PETs to cool down by waiting for the water to drain completely from the tank.

- Verify that there is no call for humidity so the unit does not energize while cooling down the PETs and drain the water tank.
- Prior to opening the humidifier, it must be disconnected from the electricity and water supply. See "Electric shock hazard" Warning at right.

## REPLACEMENT PARTS

When servicing or repairing this equipment, use only DriSteem-approved service replacement parts. Complete replacement part lists are on Pages 65 through 67. Refer to the rating plate on the Ultrasonic humidifier for complete unit model number, serial number, and company address. Any substitution of parts or controls not approved by DriSteem will be at owner's risk and will void the warranty.

## WATER QUALITY AND MAINTENANCE

RO water significantly reduces mineral accumulation inside the humidifier.

- The maintenance intervals depend on the respective levels of contamination of the humidifier. It depends directly on the cleanliness of the intake air and the feed water quality. It may be necessary to perform maintenance at shorter intervals.
- The performance of the Ultrasonic piezoelectric transducers decreases with actual operating hours. The lifetime of the Ultrasonic piezoelectric transducers will be shortened by non ideal operating conditions (i.e. water and air contamination or over-voltage).

Remove the housing cover and body duct support. In case of contamination, the water tank of the humidifier must be cleaned by using a clean, dirt, oil, and grease free medium hard brush and clean water. The piezoelectric transducers must be wiped clean with a soft, scratch-free cloth. Scale or solid deposits on the piezoelectric transducers must be carefully removed. For that purpose, it is recommended to use 20% formic acid.

## TOOLS NEEDED

- Torx 20
- Metric hex 6mm
- 1/2" wrench/socket
- 7mm wrench/socket
- 5.5mm wrench/socket
- PH #2
- Amp clamp
- Soft cloth

## MODEL BA SPECIFIC

- 7/16" wrench/socket
- Putty knife

## WARNING

### SHUTDOWN PROCEDURE

To prevent severe personal injury or death from electrical shock, fire, or explosion, follow this shutdown procedure before performing service or maintenance procedures on this humidifier.

1. Manually set the demand signal at 0%.
2. Shut off all electrical power to the humidifier using fused disconnect, and lock all power disconnect switches in the OFF position.
3. Confirm all water in the humidifier has been drained. Supplied drain valve is normally open (takes about 5 to 7 minutes).
4. Close field-installed manual supply water shut-off valve.

## WARNING

Even without visible contamination, cleaning must be done at least every 12 months.

## WARNING

Never use high-pressure cleaners to clean the humidifier.



# Inspection and maintenance

## USER INSPECTION EVERY 30 DAYS

1. Check the water tank, the transducers and the intake air filter (BR units) for contamination. Clean them, if any contamination is present.  
**Initially, a check has to be carried out after 1 week.** Depending on the degree of contamination of the water tank, the transducers and the intake air filter, the cleaning intervals must be adjusted.  
 If contamination is found during the check, cleaning must be performed.
2. Clean:
  - Slime in the water tank is a sign of the presence of micro-organisms.  
Cause: Air and/or water
  - Scale are mineral deposits.  
Cause: Water
  - Measure:
    - Check and clean the environment, if required
    - Check supply water DI or reverse osmosis system
    - Adjust cleaning intervals
3. When the maintenance requirements are complete:
  - Replace and secure all covers and doors.
  - Turn on the water supply.
  - Turn on the electrical power.
  - Verify proper operation of the humidifier after servicing is complete.

## END-OF-SEASON

- When the user inspection process is complete:
  - Dry the inside of the water tank with a soft cloth.
  - Replace and secure all covers and doors.
  - After cleaning, the humidifier should remain empty until humidification is required.

## 5,000 HOUR MAINTENANCE INTERVAL

- PET(s)
- Inline water filter elements
- Overall check for component damage
- Reset maintenance interval led code (see page 60 for instructions)

## 10,000 HOUR MAINTENANCE INTERVAL

- All parts from 5,000 hour maintenance
- Solenoid valves
- Reset maintenance interval led code (see page 60 for instructions)

## **WARNING**

### **Electric shock hazard**

Do not remove humidifier electrical panel cover or subpanel access panels until electrical power is disconnected. 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.

Only qualified electrical personnel should perform maintenance procedures.

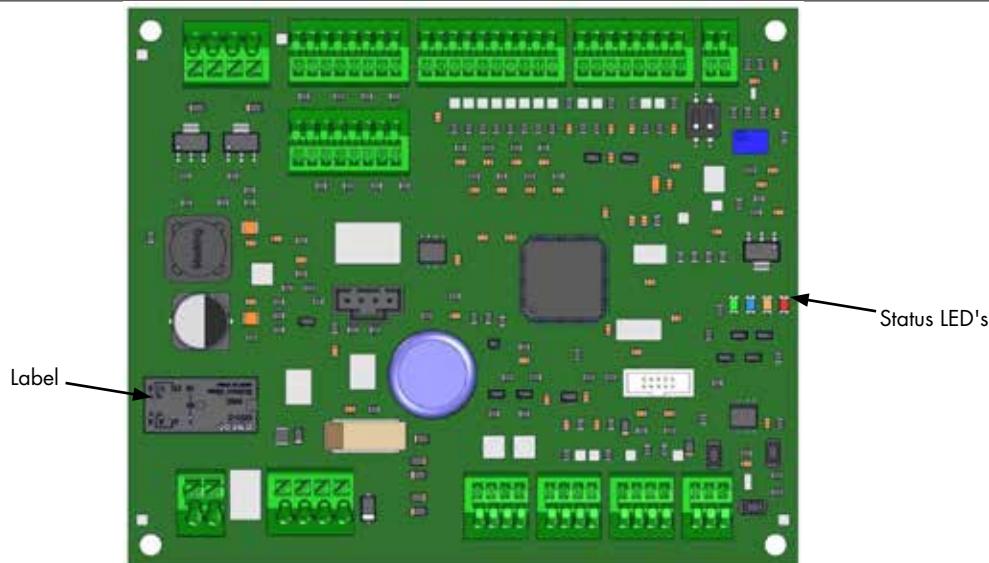
# Inspection and maintenance

## LED-INDICATOR AND DECODING

There are 4 different colored LEDs on the control board PCB. Using different flashing and light frequencies all system states are displayed here. The sequence lasts six seconds and repeats. Table 54-1 indicates the number of blinks during sequence.

Information about the next service (5,000 working hours) or maintenance interval (10,000 working hours) is also displayed here.

**FIGURE 54-1: LED-INDICATOR**



**Table 54-1:**  
**LED-Indicators**

	Description	LED green	LED blue	LED orange	LED red
Alarm code	Alarm filling (fill timeout)			1	1
	Alarm draining (Drain timeout)			2	1
	Alarm current measurement supply valve			1	∞
	Alarm current measurement drain valve			2	∞
	Alarm current measurement fan			3	∞
	Alarm current measurement oscillator boards			4	∞
	Alarm humidification timeout			3	1
	Alarm level switch			4	1
Status	Standby (no release and no requirement)	∞			3
	Humidifying	∞		∞	
	Problem solving	∞		1	
	Flushing	∞		2	
	Draining	∞		3	
	Fill tank and fan pre-run	∞		4	
Maintenance	Maintenance 1 (5,000 hours)		1		
	Maintenance 2 (10,000 hours)		∞		
	Humidification request not available	∞			1
	Safety circuit fault not available	∞			2
	Unknown error			4	4

# Piezoelectric transducers

## REMOVING THE PIEZOELECTRIC TRANSDUCER

Knowing when to replace a PET is important. No output from a dispersion outlet most likely means the PET below is not operational. A limited, or smaller production of mist could be a result of other factors (debris in water tank, or poor airflow) but it could be a sign that the PET is ready to be replaced.

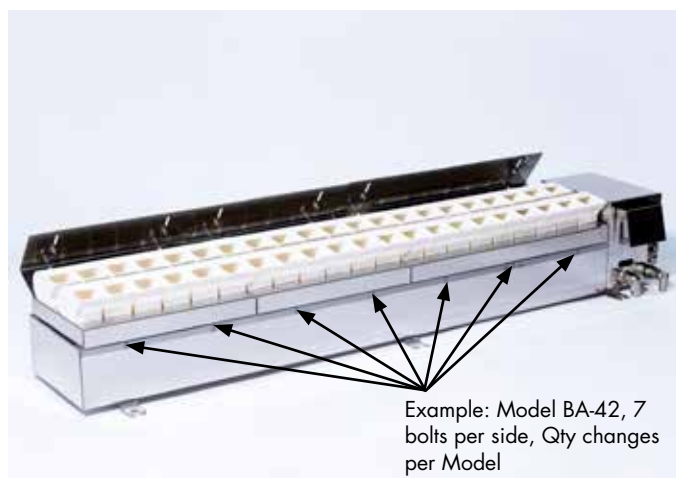
## MODEL BA ACCESS

1. The BA systems have two rows of PETs, and the driver boards are located on both the front and back of the water tank.
2. To access the PETs and driver boards user will need to remove the tank assembly from the unit housing. To do this there are bolts found around the base of the unit. Removing these will allow you to lift the tank assembly out of the unit housing. See Figure 55-1.
3. The user will then lift the water tank assembly out of the unit.

**NOTE:** Figure 55-2 shows that the electrical system comes out as part of the tank assembly

4. For ease of PET replacement the tank assembly should be placed upside down to for access to the PETs. Turning the water tank assembly upside down also helps to be sure the electrical components do not get wet and allows any remaining water to drip, without touching electrical components. Figure 55-3.
5. Loosen the two M3 nuts with a 5.5 mm socket wrench and remove the PET keeping the white plastic spacer (this will be reused).

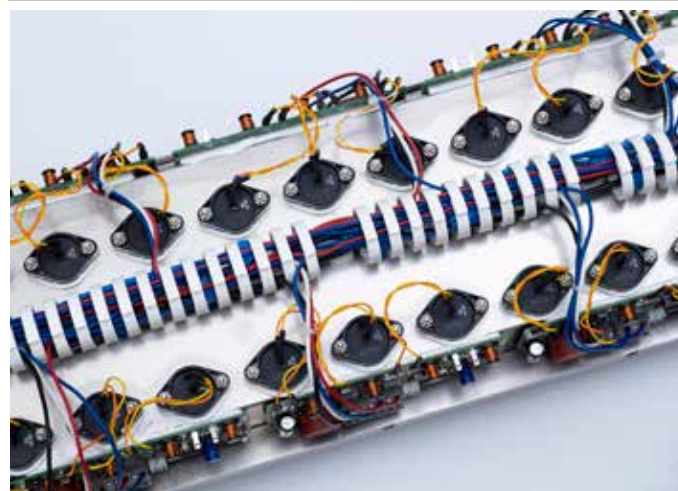
**FIGURE 55-1: REMOVE TANK ASSEMBLY**



**FIGURE 55-2: ELECTRICAL SYSTEM**



**FIGURE 55-2: PET ASSEMBLY**



## Piezoelectric transducers

### MODEL BR ACCESS

1. Model BR systems have a cover that can be removed to make everything visible.
2. To access the PETs user will have to remove the water tank from the unit. To remove the water tank, loosen the four screws (two on each end) of the water tank. See Figure 56-1.
3. User will then lift the water tank assembly out of the unit.
4. For ease of PET change place the bottom side up showing the PETs attached to the bottom of the water tank, this also allows the remaining water to drip without touching electrical components. See Figure 56-2.
5. Loosen the two M3 nuts with a 5.5 mm socket wrench and remove the PET keeping the white plastic spacer (this will be reused).

**FIGURE 56-1: MODEL BR -REMOVE SCREWS**



**FIGURE 56-2: MODEL BR**





# Piezoelectric transducers

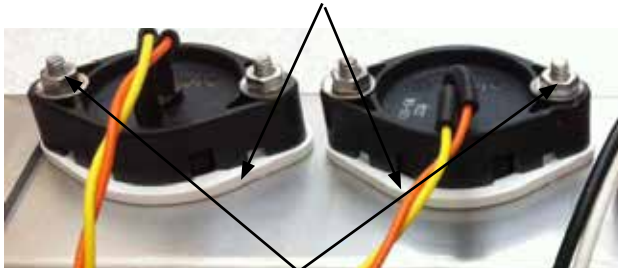
## REPLACEMENT

Please note installation direction of the PET (watch the yellow and orange wires extending from the PET). The orange wire comes from the middle, and the yellow comes from the edge. The yellow wire indicates the direction of the 7° angle of the ceramic disk. This is important to keep the resulting direction of the oscillated water column.

6. Replace the new PET by replacing the two M3 nuts to hold the PET in place paying attention to the orientations of the orange and yellow wires, and the resulting angle of the ceramic disk. Correct orientation results in proper function.
7. For adjusting the output capacity there is a separate potentiometer for every PET on each driver board.

**FIGURE 57-1: PET REPLACEMENT**

The white plastic space disk must be placed between the transducer and the metal wall of the humidifier.

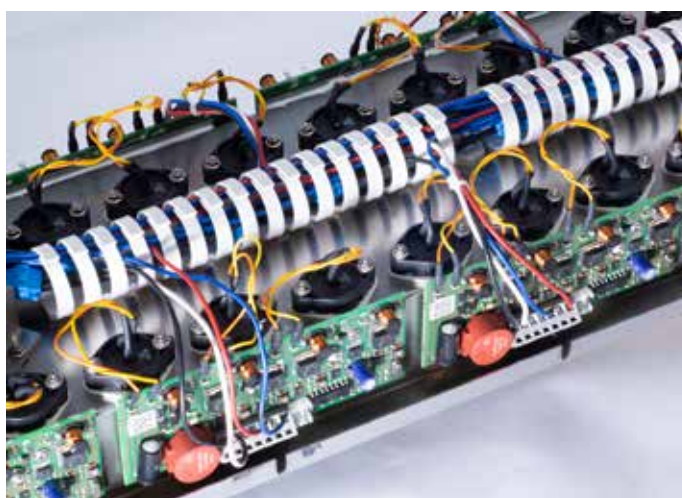


The spring washer has to be used together with nut for a secure fixing. Tighten the nut by hand and then with the socket wrench 5.5 mm.

**FIGURE 57-2: CORRECT WIRE ASSEMBLY (MODEL BR)**



**FIGURE 57-3: CORRECT WIRE ASSEMBLY (MODEL BA)**



# Piezoelectric transducers

## SETTING THE PET OUTPUTS

1. To adjust the potentiometers, you will need to ready the unit for a test operation, to do this turn the water tank assembly over to its normal orientation. The installation of DriSteem's Maintenance cover will help the unit to be tested without damaging electronics.

### CAUTION

Use only insulated adjusting screwdriver!

2. The water tank must be filled (if necessary, manually).

### WARNING

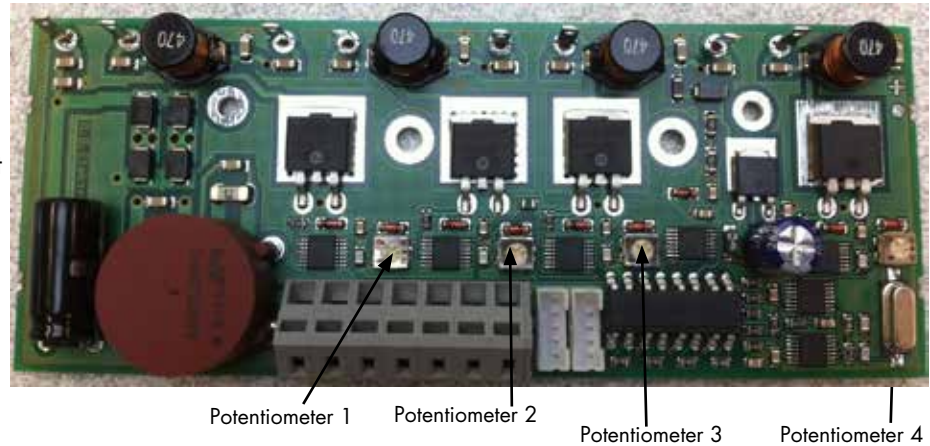
Powering the unit on while electrical parts are exposed is dangerous and should only be done after reading and understanding the entire PET change process.

3. Ensure power supply is providing power.
4. The safety chain must be closed.
5. A humidification request must be present (example: Hyg. 100%)
6. Adjust the potentiometers to set the PET outputs. Set all potentiometers to the minimum. See Figure 58-1.
7. Apply amp clamp meter to the Black wire leading off the Driver board (this will measure the collective amperage of the Driver board). See Figure 59-1.
8. Measure the sum of all the PETs on a single driver board at a time. Each potentiometer should be set to 0.6A. See Table 59-1.
9. Using Tables 59-2 and 59-3 you will find how many PETs should be on each driver board.
10. Starting with Potentiometer 1 set each potentiometer to 0.6A.
11. The resulting sums will also have a visual check. The correct setting of the potentiometer will result in a height of the water column in the range of 1.5 - 2" (4 -5 cm) above the water level in the tank.
12. Making fine adjustments might be necessary to keep the water column in the 1.5 - 2" (4 -5cm) height range.
13. Once within the height range be careful to not touch the potentiometer adjustment, as this could result in needing to redo the adjustments.
14. Once the PET is properly adjusted and the water column is within the 1.5 - 2" (4 -5cm) range the PET replacement procedure is complete, and the unit can be put back together.

**NOTE:** Some units do not have all four potentiometers utilized by PETs. This is correct and not an error. Using Tables 59-2 and 59-3 you will be able to see if this affects your unit.

**FIGURE 58-1: ADJUSTING OUTPUT CAPACITY**

Clockwise = decrease capacity  
Counter clockwise = increase capacity



# Piezoelectric transducers

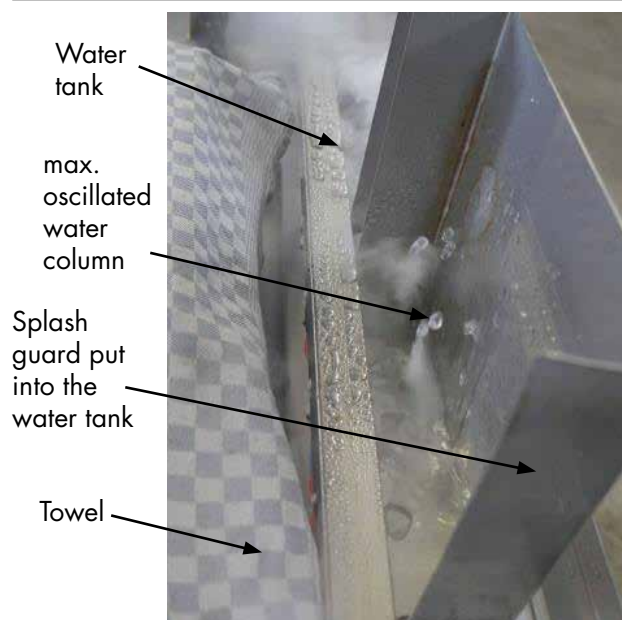
**FIGURE 59-1: APPLY CLAMP METER**



**Table 59-1:**  
Potentiometer set points

Poti	Driver board total	Maximum
1	0.6A	0.65A
2	1.2A	1.30A
3	1.8A	1.95A
4	2.4A	2.60A

**FIGURE 59-2: SPLASH GUARDS**



**Table 59-2:**  
Model BA

Model	PETs/Driver Board
BA-06	3 PETs / 1 driver board
BA-12	3 PETs / 1 driver board
BA-18	3 PETs / 1 driver board
BA-24	3 PETs / 1 driver board
BA-30	3 PETs / 1 driver board
BA-36	3 PETs / 1 driver board
BA-42	3 PETs / 1 driver board

**Table 59-3:**  
Model BR

Model	PETs/Driver Board
BR-02	2 PETs / 1 driver board
BR-04	4 PETs / 1 driver board
BR-06	3 PETs / 1 driver board
BR-08	4 PETs / 1 driver board
BR-10	2x4 PETs / 1 driver board 1x2 PETs / 1 driver board
BR-16	4 PETs / 1 driver board



Examples of splash guards  
(user provided)

# Resetting the maintenance intervals

## RESET THE MAINTENANCE INTERVAL

The resetting of the LED display may only be carried out by trained specialists. After service or maintenance has been carried out, the LED display can be reset as follows:

1. Switch off the device and let it drain.
2. Remove the cover (Model BR) or the dispersion outlets assembly (Model BA).
3. Deactivate the safety chain by removing the control unit plug.
  - Model BR: Remove the 15-pin plug.
  - Model BA: Remove the wires from the safety chain terminal 1 and 2.
4. Switch on the device, wait for the flushing cycle and the hydronic drain to complete.
5. Do the following action 5 times in a row.  
Raise level switch S2 to the upper position, wait 1 second and then move it back to the lower position. See Figure 60-1.
6. If the reset of the maintenance interval is successful, the blue LED light is dim.
7. If the blue LED does not go out, repeat Steps 5 and 6.
8. Put the cover (Model BR) or the dispersion outlets assembly (Model BA) on and activate the safety chain.
  - Model BR: Attach the 15-pin plug.
  - Model BA: Attach the wires from the safety chain terminal.

FIGURE 60-1: FLOAT SWITCH POSITION

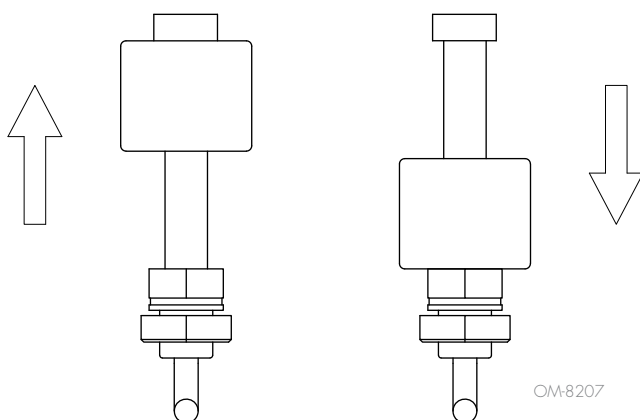
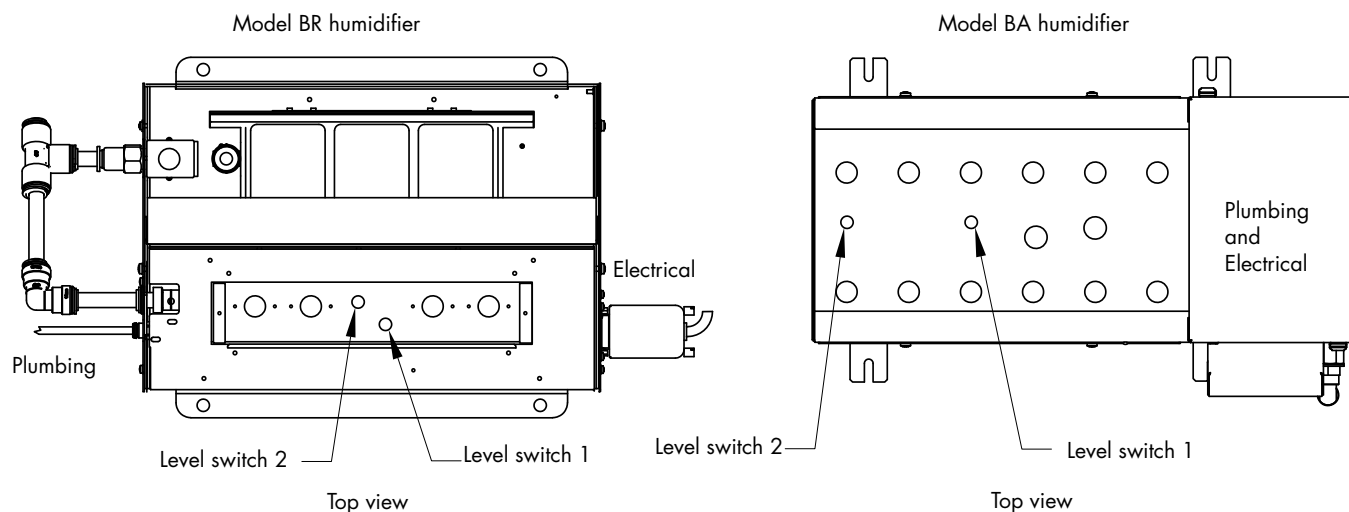


FIGURE 60-2: LEVEL SWITCH S2





# Troubleshooting

**Table 61-1:**  
**Ultrasonic humidifier troubleshooting guide**

Problem	Possible cause	Action
Humidifier will not turn on	No power to humidifier	Check main power supply and switch.
		Check for proper voltage across all terminals.
	Field-wired terminal connections	Check all connections.
		Check wiring connections and settings on accessory items such as high limit switch and airflow proving switch.
	Internal connections	Follow the shutdown procedure on Page 52. Confirm electrical connections are powered off at terminal block.
		Check that terminals from internal components are securely attached to proper tabs on circuit boards.
No power to control circuit	Check reset switch on transformer.	
Water constantly runs down drain.	Wrong type of drain valve	Consult factory.
	Malfunctioning drain valve	Check valve function.
	Debris in drain valve preventing it from closing	Remove drain block plug, and clean debris from drain valve.
	Water flowing from overflow port	Check internal hoses, and remove kinks or blockage.
		Check level probe function.
Water is leaking from humidifier.	Loose plumbing connections	Check all connections and fittings on the fill valve. Tighten as necessary.
		Check internal connections and tighten as needed.
		Check steam hose connection on top of tank. Tighten clamp or piping as needed.
	Failure at tank welds due to corrosive water	Consult factory.
	PET gasket life exceeded	Replace gasket/o-ring.
Humidifier makes gurgling sound.	Incorrect drain piping	Confirm drain piping is done correctly, including the installation of a vacuum breaker.
Fill valve makes banging sound.	Water hammer from line pressure	Make sure water supply line does not contact ductwork.
		Install shock arrestor.
		Decrease line pressure with pressure regulator.
Humidifier will not fill within the specified time	Field-installed supply water shut-off valve not open	Open valve.
	Malfunctioning fill valve	Check valve function.
	Inadequate water supply	Confirm adequate water pressure and flow.
	Error filling	Check inlet water pressure > 15 psi.
		Check the water filters for debris or blockage.
		Check control unit settings.
		Restart the humidifier.

*Continued*

# Troubleshooting

**Table 62-1:**  
Ultrasonic humidifier troubleshooting guide (continued)

Problem	Possible cause	Action
Humidifier will not drain.	Debris in drain valve blocking outlet port	Clean debris from drain valve.
	Malfunctioning drain valve	Check valve function.
	Error draining	Check to confirm open drain.
		Check water tank for cleanliness and clean if necessary function solenoid valve, check sequence.
		Check control unit settings.
		Restart humidifier.
Humidifier is not satisfying demand.	Control setting too low	Adjust control to higher setting.
	Control mounted in wrong location	See the controller instruction manual for correct control mounting location.
	Significant amount of hard water scale on PETs.	Perform water tank cleaning.
	Operating conditions changed and humidifier is now undersized	Consult factory.
	Low current to PET	Check the Amp input PETs and adjust.
	Error current measurement driver boards	Check the function of the piezoelectric transducer visually. Check service status.
		Check control unit settings.
		Restart humidifier.
	PET failure.	Replace the PET.
Excess humidity.	Control setting too high	Adjust control to lower setting.
	Control mounted in wrong location	See the controller instruction manual for correct control mounting location.
	Operating conditions changed and humidifier is now undersized	Consult factory.
	Malfunctioning control system	Consult factory.
Biological growth.	Humidifier is contaminated	Clean unit. See page 53 for instructions.
		Confirm the incoming air and water are free of biological growth.

*Continued*

# Troubleshooting

**Table 63-1:**  
Ultrasonic humidifier troubleshooting guide (continued)

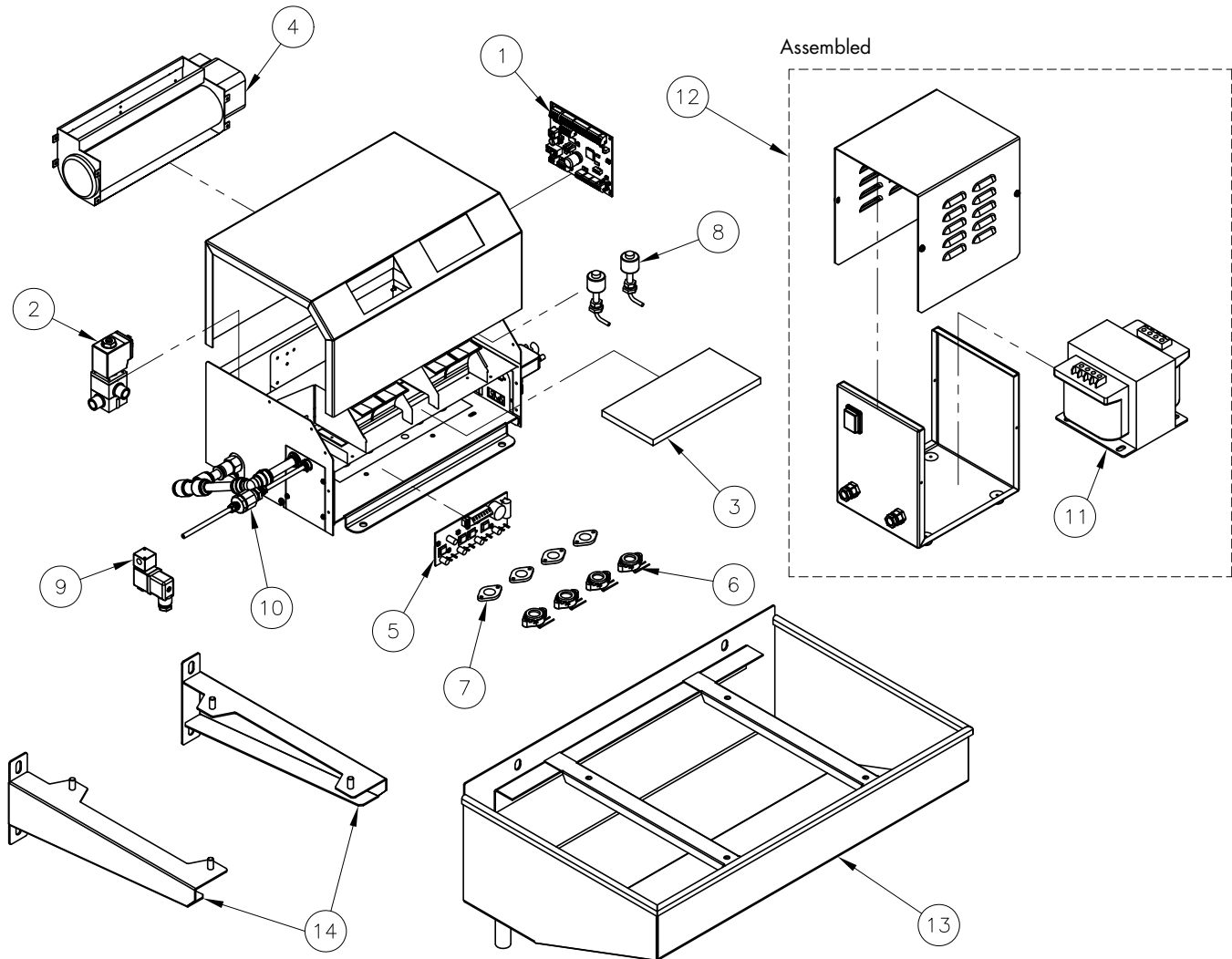
Problem	Possible cause	Action
No humidification	The solenoid valve coil is not connected.	Function solenoid valve, check inlet.
		Function solenoid valve, check discharge.
		Check unit settings.
		Restart humidifier.
	A refilling of the water tank did not take place during the specified duration (humidification time out)	Function solenoid valve, check inlet.
		Cleaning the water tank and level switch.
		Check unit settings.
		Restart humidifier.
	Error level switch	Check water tank for contamination.
		Check level switch functions.
		Restart humidifier.
		Change level switch.
		Check exact level of the unit from installation.
	Unknown error	Check connection of the device.
		Check for visual defects.
		Check control unit settings.
		Disconnect the power supply for at least 1 minute and then restart.

## DriSteem Technical Support

Have the following information ready when calling Technical Support (800-328-4447). See phone number inside front cover of this manual.

Humidifier model number
_____
Humidifier serial number
_____
When issue began
_____
Issue description
_____
_____

## Model BR room humidifier

**FIGURE 64-1: MODEL BR ULTRASONIC HUMIDIFIER**

OM-8202

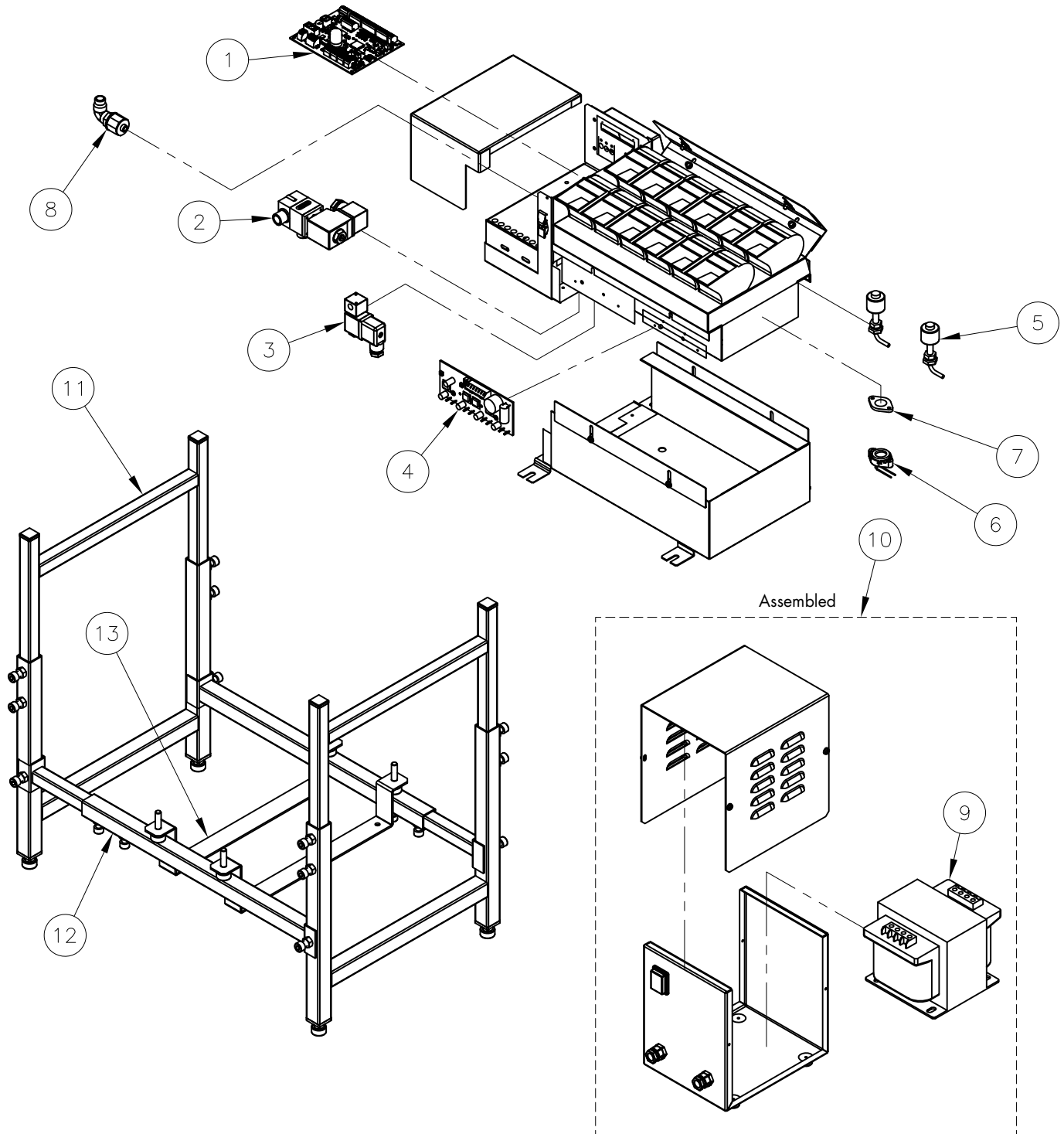
# Model BR room humidifier

**Table 65-1:**  
**Model BR humidifier replacement parts**

No.	Description	Qty.	Part No.
1	ULTRASONIC CONTROL BOARD (MODEL BR-02 - BR-06)	1	601143-001
	ULTRASONIC CONTROL BOARD (MODEL BR-08 - BR-10)	1	601143-002
	ULTRASONIC CONTROL BOARD (MODEL BR-16)	1	601143-003
2	ULTRASONIC SOLENOID VALVE DRAIN	1	601146-002
3	ULTRASONIC BR FILTER 130 X 100 mm (MODEL BR-02)	1	601144-001
	ULTRASONIC BR FILTER 210 X 100 mm (MODEL BR-04)	1	601144-002
	ULTRASONIC BR FILTER 330 X 100 mm (MODEL BR-06, BR-08, & BR-10)	1	601144-003
	ULTRASONIC BR FILTER 685 X 100 mm (MODEL BR-16)	1	601144-004
4	ULTRASONIC BR CROSSFLOW FAN SMALL (MODEL BR-02 & BR-04)	1	601145-001
	ULTRASONIC BR CROSSFLOW FAN LARGE (MODEL BR-06, BR-08, BR-10, & BR-16)	1	601145-002
5	ULTRASONIC PET DRIVER BOARD	1	601140
6	PEZIO ELECTRIC TRANSDUCER	1	601141
7	PIEZOELECTRIC TRANSDUCER SPACER	1	601141-001
8	ULTRASONIC FLOAT SWITCH	2	601147
9	ULTRASONIC SOLENOID VALVE FILL	1	601146-001
10	ULTRASONIC WATER FILTER BR	1	601148-001
11	TRANSFORMER 500VA 120-48V (Model BR-02 - BR-10)	1	601134-501
	TRANSFORMER 1000VA 120-48V (Model BR-16)	1	601134-1001
12	HOUSED TRANSFORMER 500VA 120-48V (Model BR-02 - BR-10)	1	601134-500
	HOUSED TRANSFORMER 1000VA 120-48V (Model BR-16)	1	601134-1000
13	ULTRASONIC DRIP TRAY BR-(02-06)	1	601135-001
	ULTRASONIC DRIP TRAY BR-(08-10)	1	601135-002
	ULTRASONIC DRIP TRAY BR-16	1	601135-003
14	ULTRASONIC WALL BRACKETS BR SERIES	1 (SET OF 2)	601139

# Model BA duct humidifier

**FIGURE 66-1: MODEL BA ULTRASONIC HUMIDIFIER**



OM-8203

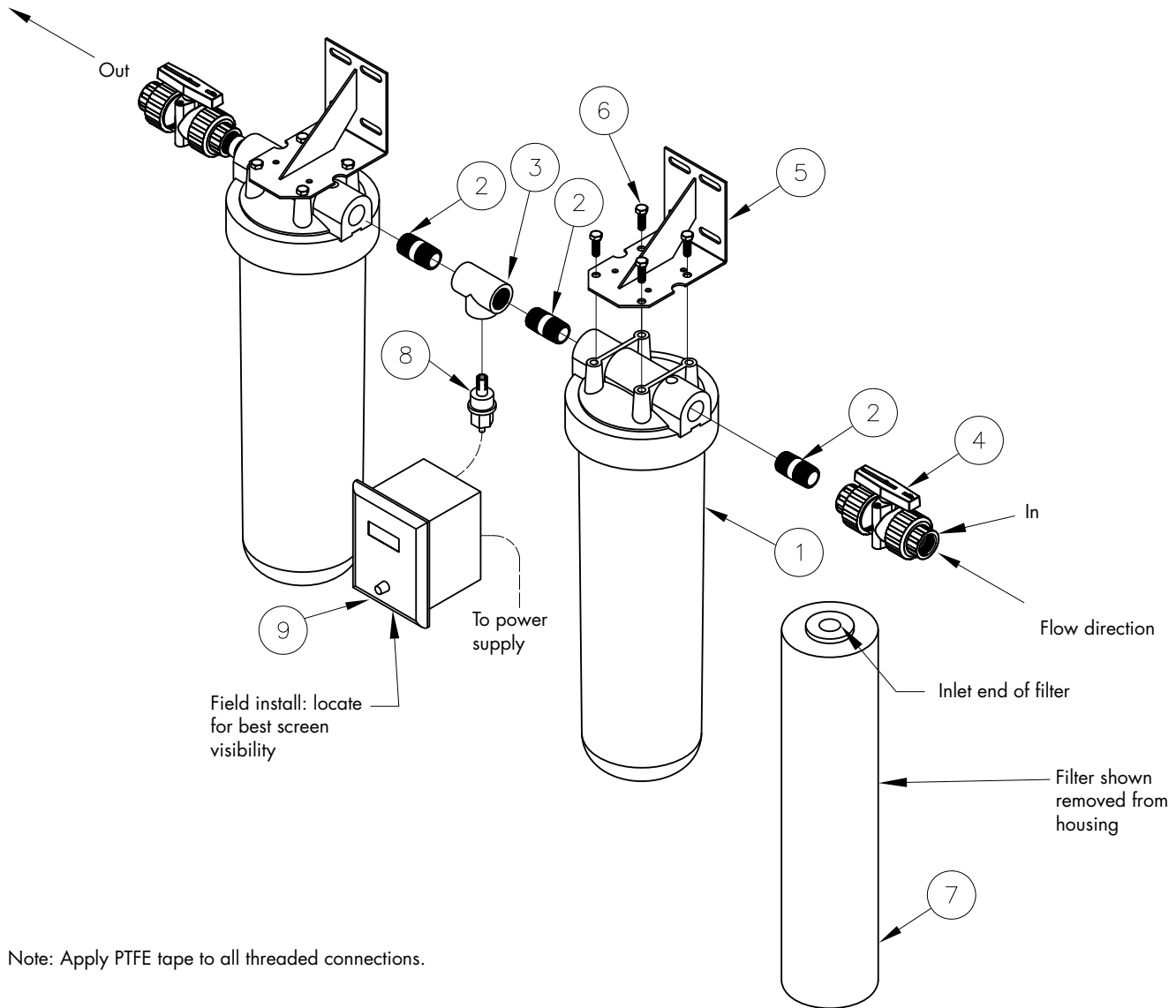
# Model BA duct humidifier

**Table 67-1:**  
**Model BA humidifier replacements parts**

No.	Description	Qty.	Part No.
1	ULTRASONIC CONTROL BOARD (Model BA-06 and BA-12)	1	601143-101
	ULTRASONIC CONTROL BOARD (Model BA-18, BA-24, and BA-30)	1	601143-102
	ULTRASONIC CONTROL BOARD (Model BA-36 and BA-42)	1	601143-103
2	ULTRASONIC SOLENOID VALVE DRAIN	1	601146-002
3	ULTRASONIC SOLENOID VALVE FILL	1	601146-001
4	ULTRASONIC PET DRIVER BOARD	1	601140
5	ULTRASONIC FLOAT SWITCH	2	601147
6	PEZIO ELECTRIC TRANSDUCER	1	601141
7	PIEZOELECTRIC TRANSDUCER SPACER	1	601141-001
8	ULTRASONIC WATER FILTER BA	1	601148-002
9	TRANSFORMER 500VA 120-48V (Model BA-06 and BA-12)	1	601134-0501
	TRANSFORMER 1000VA 120-48V (Model BA-18, BA-24, and BA-30)	1	601134-1001
	TRANSFORMER 1600VA 120-48V (Model BA-36 and BA-42)	1	601134-1601
10	HOUSED TRANSFORMER 500VA 120-48V (Model BA-06 and BA-12)	1	601134-0500
	HOUSED TRANSFORMER 1000VA 120-48V (Model BA-18, BA-24, and BA-30)	1	601134-1000
	HOUSED TRANSFORMER 1600VA 120-48V (Model BA-36 and BA-42)	1	601134-1600
11	ULTRASONIC VERTICAL FRAME 19.5"-27.5"	1 (set of 2)	601136-001
12	ULTRASONIC VERTICAL FRAME 27.5"-47"	1 (set of 2)	601136-002
13	ULTRASONIC VERTICAL FRAME 47"-78.5"	1 (set of 2)	601136-003
14	ULTRASONIC HORIZONTAL STRUT 19.5"-31"	1 (set of 2)	601137-001
15	ULTRASONIC HORIZONTAL STRUT 31"-55"	1 (set of 2)	601137-002
16	ULTRASONIC HORIZONTAL STRUT 55"-78.5"	1 (set of 2)	601137-003
17	ULTRASONIC MOUNTING BRACKET BA SERIES (MODEL BA-06, BA-12, BA-18, BA-24)	2	601138
	ULTRASONIC MOUNTING BRACKET BA SERIES (MODEL BA-30, BA-36, BA-42)	3	601138

# Ultrasonic DI screen assembly

**FIGURE 68-1: DI SCREEN ASSEMBLY (PART # 601152-001)**



OM-8210

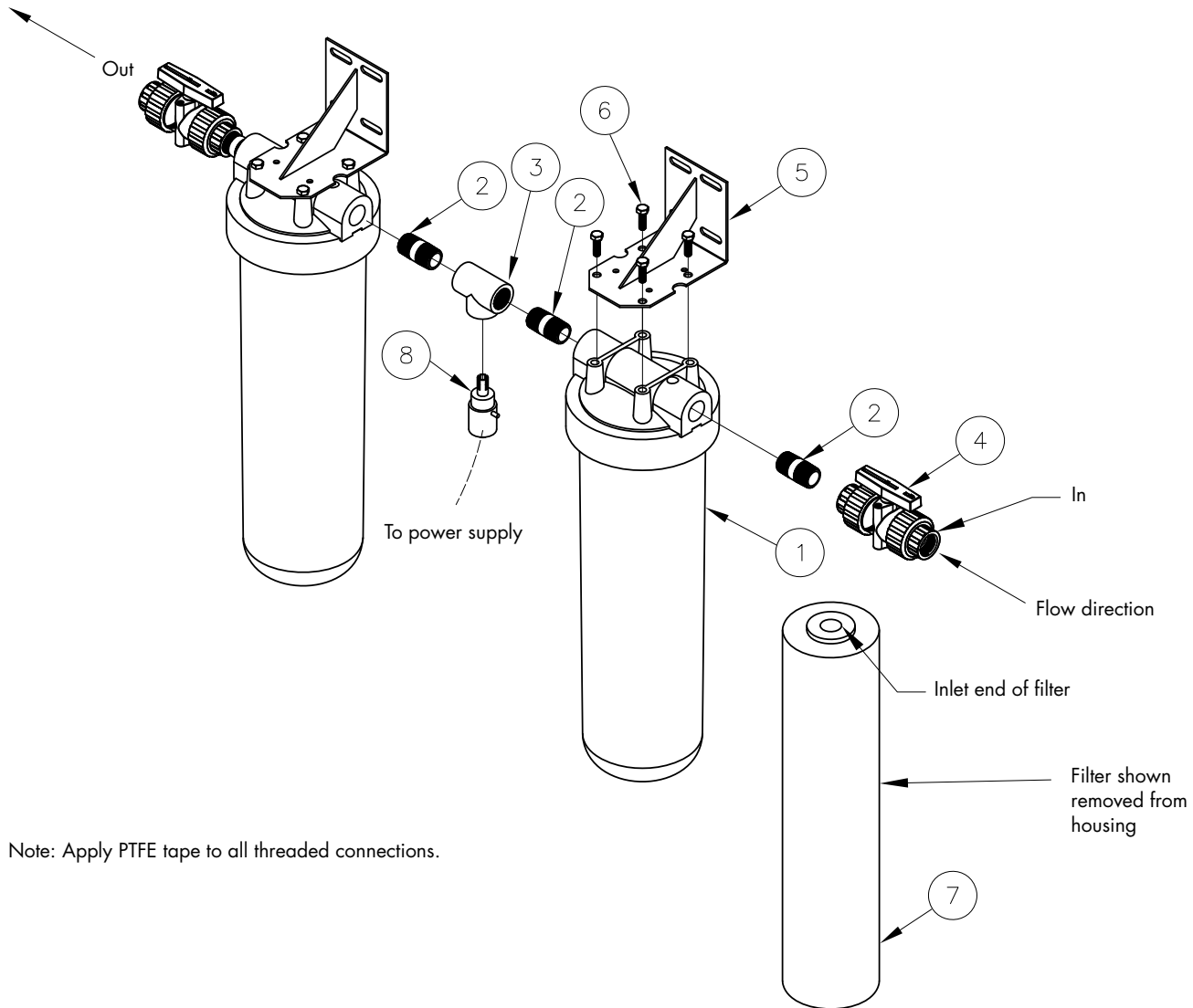


# Ultrasonic DI screen assembly

**Table 69-1:**  
Ultrasonic DI screen assembly replacements parts

No.	Description	Qty.	Part No.
1	3/4 PLUMB HOUSING FILTER 4.5" DIA x 20"	2	550028-009
2	3/4" x 2" SCH80 PVC NIPPLE	4	601186-001
3	3/4" SCH80 PVC TEE THREADED	1	601186-002
4	3/4" PVC TRUE UNION BALL VALVE SOCKET/THREAD	2	601187
5	BRACKET WELD FILTER COMBO	2	160196-001
6	BOLT 5/16" - 18x1" UNC SST	8	700350-040
7	DI FILTER CARTRIDGE	2	601151
8	DI RESISTIVITY SENSOR CS-10 3/4"	1	601153-002
9	DI RESISTIVITY DISPLAY	1	601153-001

## Ultrasonic DI LED assembly

**FIGURE 70-1: DI LED ASSEMBLY (PART # 601152-002)**

Note: Apply PTFE tape to all threaded connections.

# Ultrasonic DI LED assembly

**Table 71-1:**  
Ultrasonic DI LED assembly replacements parts

No.	Description	Qty.	Part No.
1	3/4 PLUMB HOUSING FILTER 4.5" DIA x 20"	2	550028-009
2	3/4" x 2" SCH80 PVC NIPPLE	4	601186-001
3	3/4" SCH80 PVC TEE THREADED	1	601186-002
4	3/4" PVC TRUE UNION BALL VALVE S/T	2	601187
5	BRACKET WELD FILTER COMBO	2	160196-001
6	BOLT 5/16" - 18x1" UNC SST	8	700350-040
7	DI FILTER CARTRIDGE	2	601151
8	DI RESISTIVITY SENSOR LED 3/4"	1	601154

### 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 the RTS humidifier, which features cleanable, stainless steel construction. DriSteem also leads the industry with a Two-year Limited Warranty and optional extended warranty.

### For more information

[www.dristeem.com](http://www.dristeem.com)  
[sales@dristeem.com](mailto:sales@dristeem.com)

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

### DRI-STEEM Corporation

a subsidiary of Research Products Corporation  
DriSteem U.S. operations are ISO 9001:2015 certified

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 Corporation; therefore, product features and specifications are subject to change without notice.

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Patents pending.

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### Two-year Limited Warranty

DriSteem 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.

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.

DRI-STEEM 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.

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



Form No. ULTRASONIC-IOM-EN-REVA  
Part No. 890000-550 Rev A