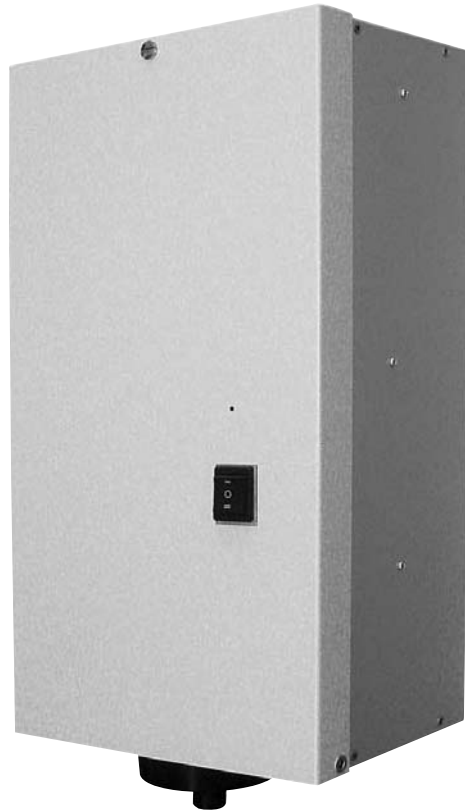


DRISTEEM[®]
The humidification experts



XTR

Electrode Steam Humidifier

**Installation, Operation,
and Maintenance Manual**

Safety precautions

ATTENTION INSTALLER

Read this manual before installing humidifier.

Leave manual with product owner.

DRI-STEEM technical support

800-328-4447

WARNING!

This product must be installed by qualified HVAC and electrical contractors and in compliance with local, state, and federal codes. Improper installation may cause property damage, severe personal injury, or death as a result of electric shock, burns, and/or fire.

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Specifications and dimensions

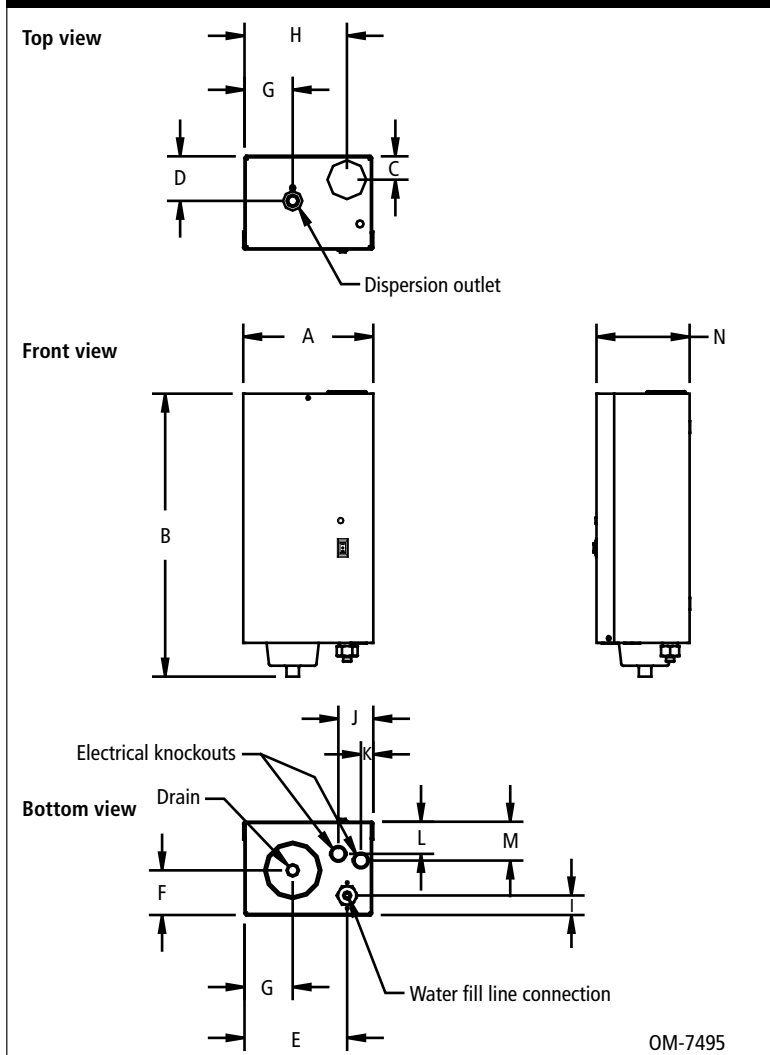
**Table 2-1:
XTR humidifier specifications**

Voltage	kW	Maximum steam capacity		Current draw (amps)	Shipping weight		Maximum operating weight	
		lbs/hr	kg/h	Amps	lbs	kg	lbs	kg
120V	1.38	4.0	1.8	11.5	13.1	5.9	17.1	7.8
208V	2.39	7.1	3.2	11.5	13.1	5.9	17.1	7.8
240V	2.76	8.1	3.6	11.5	13.1	5.9	17.1	7.8

**Table 2-2:
XTR humidifier dimensions**

Dimension	XTR humidifier	
	inches	mm
A	9.00	229
B	19.25	489
C	1.625	41
D	3.13	80
E	7.13	181
F	3.13	80
G	3.38	86
H	7.13	181
I	1.38	35
J	2.38	60
K	0.88	22
L	2.25	57
M	2.63	67
N	6.43	163

**Figure 2-1:
XTR humidifier dimensions**



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Choosing a location

Choosing a location for the humidifier

When selecting a location for the humidifier, consider the following:

- **Proximity to duct**
Install the humidifier near the air duct system where the dispersion assembly will be located. The maximum recommended length for vapor hose connecting a single humidifier to a dispersion assembly is 10' (3 m). The maximum recommended developed length for tubing or pipe connecting a single humidifier to a dispersion assembly is 20' (6 m). See the dispersion section of this manual for more information about installing dispersion assemblies.
- **Elevation of the installed dispersion assembly**
The recommended installation location for the dispersion assembly is at an elevation higher than the humidifier. However, if the dispersion assembly must be installed at an elevation lower than the humidifier, install a drip tee and drain as shown in Figure 16-1. Before installing a dispersion assembly or interconnecting piping, review all pitch requirements in the dispersion section of this manual.
- **Required clearances** (see Figure 3-1)
- **Electrical connections**
Electrical power supply connections are made at the bottom right panel corner of the electrical enclosure. The system wiring is inside the cover of the control cabinet. See the field wiring instructions.
- **Supply water and drain piping connections**
Water supply piping connections are made on the bottom right side of the unit. Drain piping connections are made at the bottom center of unit. See the field piping illustration and instructions.
- **Exterior wall insulation**
Do not install the humidifier on an exterior wall unless that wall is properly insulated.

Choosing a location for the dispersion assembly and control devices

See the dispersion section of this manual for recommended installation locations for the dispersion assembly. See Page 10 for recommended installation locations for humidistats.

Important:

Install humidifier only in locations that meet the following temperature and relative humidity (RH) requirements:

Maximum ambient temperature:
104 °F (40 °C)

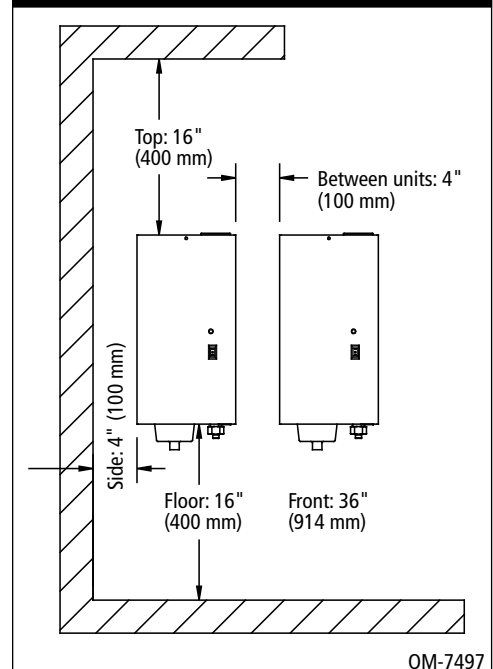
Minimum ambient temperature:
41 °F (5 °C)

Maximum ambient humidity:
80% RH (non-condensing)

Note:

To open the humidifier access door, rotate the screw counter-clockwise ¼ turn. The door pivots toward the front of the unit from the bottom of the door. To close the access door, position screw slot so that it is horizontal and then push the door shut. Make sure sides of door go outside the enclosure.

Figure 3-1:
Recommended minimum clearances

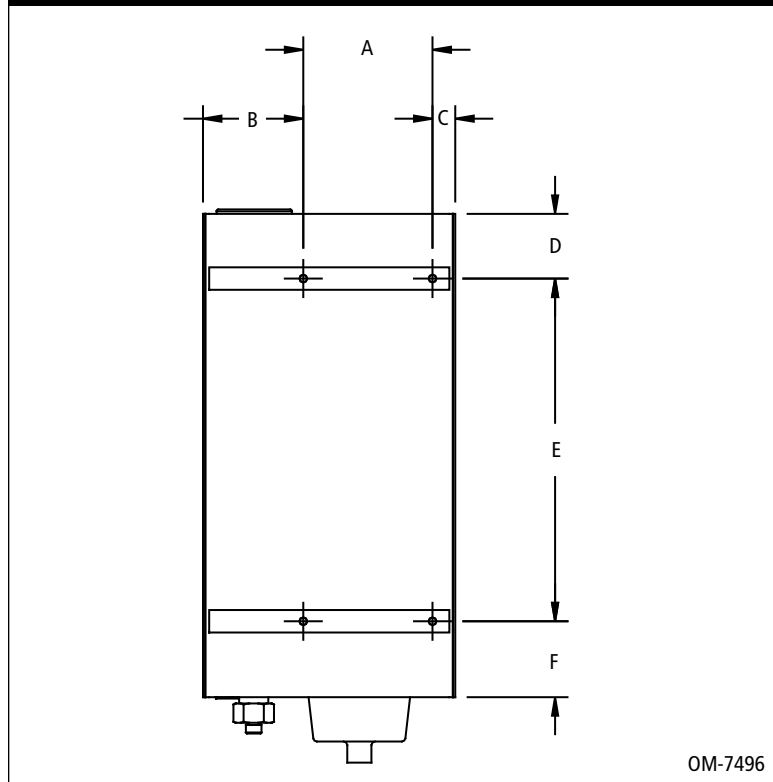


Mounting the humidifier

**Table 4-1:
Mounting dimensions**

Dimension	XTR humidifier	
	inches	mm
A	4.63	117.5
B	3.63	92.1
C	0.75	19.0
D	2.25	57.2
E	12.25	311.2
F	2.75	69.9

**Figure 4-1:
Mounting hole locations**



WARNING!

Mount humidifier per the instructions in this manual and to a structurally stable surface. Improper mounting of humidifier can cause the humidifier to fall off the wall resulting in severe personal injury or death.

Prepare humidifier for mounting

Unpack unit from shipping carton and open steam cylinder door. Disconnect electrode and high water sensor connectors from steam cylinder. Remove steam cylinder from drain valve body.

Mount humidifier

Mount the humidifier so that it is plumb. See Figure 6-1 for an installation overview.

When mounting on a wood stud wall, locate studs and attach two spanner boards. Locate one 3" (76 mm) on center from the top of the cabinet for the mounting screws and the other board located 3.5" (89 mm) on center from the bottom of the cabinet. Mark hole locations per Table 4-1 and predrill 1/8" (3 mm) diameter pilot holes. Secure cabinet to spanner board with screws provided.

Mounting the humidifier

When mounting on a metal stud wall, locate the studs and drill a ¼" (6 mm) hole through the studs and wall. Mount spanner boards with ¼" (6 mm) bolts through the wall, studs, and a backing plate on the backside of the wall and secure with a nut and washer.

For hollow block or poured concrete wall mounting, mark mounting holes per Table 4-1. Drill pilot holes sized for the proper concrete anchors. Secure cabinet in place using four screws.

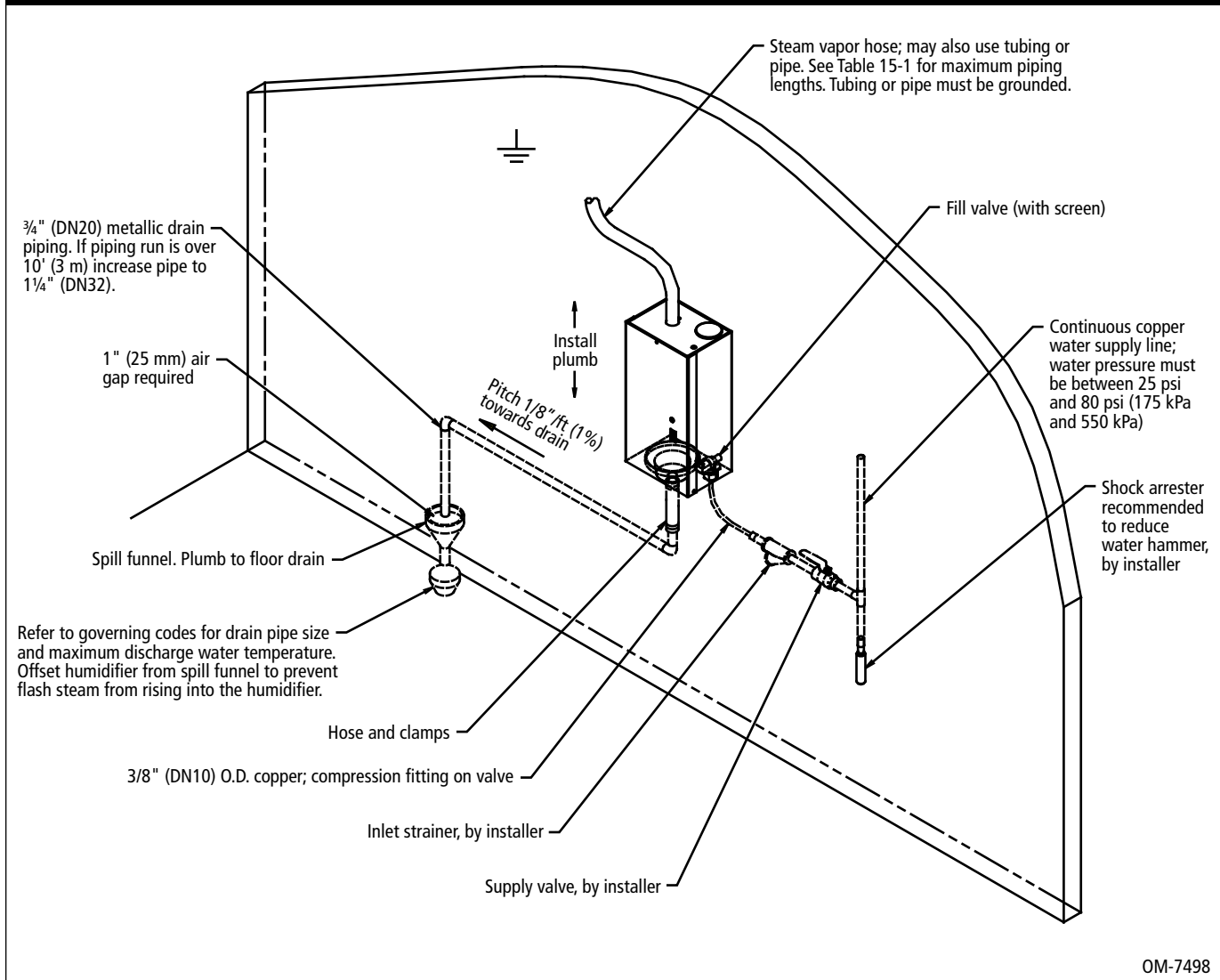
For finished space mounting with blower, locate stud for mounting XTR unit to wall. Use of anchors is acceptable for mounting blower in finished spaces. Always take care to avoid excess stress on the blower and humidifier when performing maintenance.

Insert steam cylinder

1. Slide steam cylinder (with warning label facing toward operator) into drain valve body.
2. Connect electrode and high water sensor connectors to steam cylinder (refer to unit wiring diagram located inside of unit).

Supply water and drain piping

Figure 6-1:
Field piping overview for XTR humidifier



WARNING!

Drain piping surface may be hot. Touching or contact with hot pipe can cause severe personal injury.

Supply water and drain piping

Supply water quality

XTR humidifiers use normal tap water to generate humidification steam. Water conductivity must be within the range of 125 to 1250 $\mu\text{S}/\text{cm}$ (which, in many cases, is roughly equivalent to 3.4 to 36.3 grains/gallon). Do not use softened or demineralized water. Do not use heated supply water because unheated supply water is required for drain water tempering.

Supply water piping

Use only copper for supply water piping—do not use rubber or plastic. A strainer is recommended to be installed in the supply piping before the fill valve. The fill valve connection size is a 3/8" (DN10) compression fitting. In cases where water hammer may be a possibility, consider installing a shock arrestor. Water pressure must be between 25 psi and 80 psi (175 kPa and 550 kPa).

Humidifier drain piping

Drain piping must be code-approved copper or steel rated for 212 °F (100 °C) minimum. The final connection size is 3/4" (DN20) copper for the steam cylinder drain. Do not reduce this connection size.

See Figure 6-1 for typical installation dimensions and requirements.

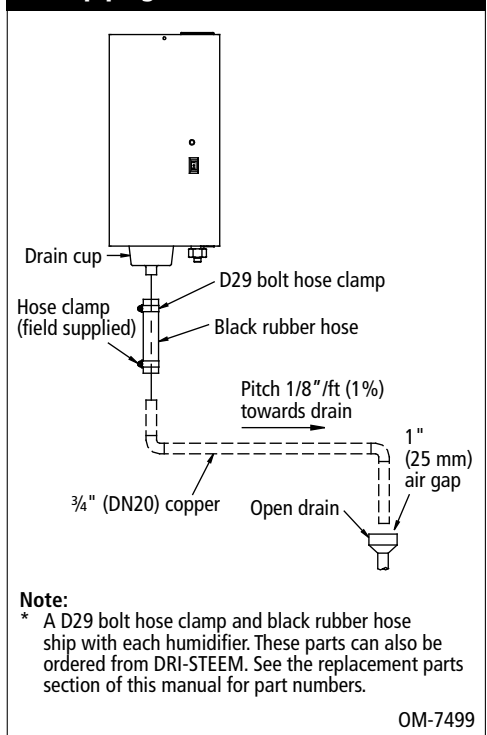
If drainage by gravity is not possible, use a reservoir pump rated for 212 °F (100 °C) water.

A 10" (254 mm) piece of hose is provided to function as the flexible connection from the drain cup to the field installed drain plumbing. A D29 hose clamp is provided to secure the drain hose to the drain cup.

If the equivalent length of pipe from the humidifier drain to the plumbing system drain is more than 10' (3 m), increase the pipe size to 1 1/4" (DN32).

Important: Thoroughly flush the supply water piping to remove pipe residue and stagnant water before connecting piping to the humidifier. Pipe residue and stagnant water in the water supply piping can cause the humidifier to not reach required steam capacity.

Figure 7-1:
Drain piping detail



Field wiring

WARNING!

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

Humidifier field wiring

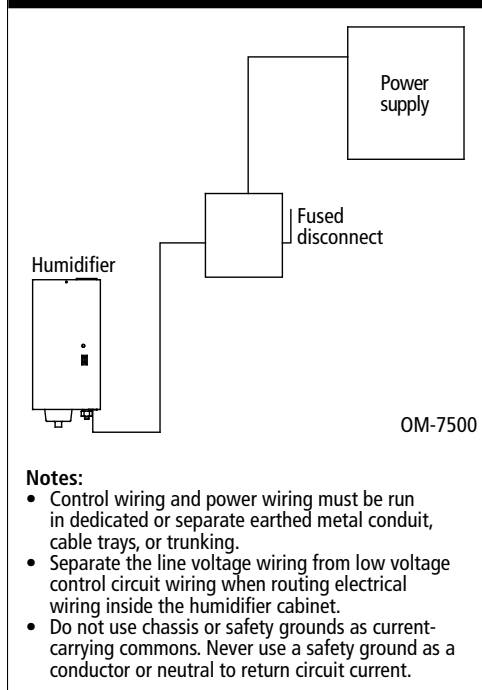
All wiring must be in accordance with all governing codes and with the unit wiring diagram. The unit wiring diagram is inside the cabinet door. Power supply wiring must be rated for 105 °C.

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

Do not loop power wiring.

Do not use aluminum wire.

Figure 8-1:
Field wiring requirements



Field wiring connections and requirements

Knockouts are provided on the bottom of the cabinet. Control wiring knockouts are toward the bottom front; power wiring knockouts are on the bottom rear.

CAUTION! Adding alternate conduit connections is not recommended; however, if making holes and knockouts in the humidifier cabinet, protect all internal components from debris and vacuum out cabinet when finished. Failure to comply with this caution can damage sensitive electronic components and void the DRI-STEEM warranty.

Control component placement

Follow the guidelines on Page 10 for placing humidistats and airflow proving switches.

More on the next page ►

Field wiring

Below are field wiring connection instructions:

- **Connect to line power.**
Refer to the wiring diagram or the data plate on the outside of the cabinet for wire sizing amperage.
- **Connect to control signal wiring** from a humidistat. See the control wiring diagrams on pages 11-12.
- **Connect to the duct airflow proving switch and duct high limit humidistat wiring** (recommended optional devices).

WARNING!

DRI-STEEM strongly recommends installing a duct airflow proving switch and a duct high limit humidistat. These devices prevent the humidifier from making steam when there is no airflow in the duct or when the RH level in the duct is too high. Failure to install these devices can result in excessive moisture in the duct, which can cause bacteria and mold growth or dripping through the duct.

Grounding requirements

A safety grounding system that meets national, state, and local electrical codes is required. The ground connection must be made with solid metal to metal connections. Ground wire should be the same size as power wiring.

Control input wiring

XTR humidifiers accept RH signals from DRI-STEEM control components. For wiring connection requirements, first determine which control scenario applies. Then, refer to the corresponding control input wiring diagram shown on the following pages, or located inside the accessory box.

Proper wiring prevents electrical noise.

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

Important:

- For maximum EMC effectiveness, wire all humidity, high limit, and airflow controls using multicolored shielded/screened plenum-rated cable with a drain wire for the shield/screen. Connect the drain wire to the shield/screen ground terminal with wire less than 2" (50 mm) in length.
- Do not ground shield at the device end.

Humidistat placement

**Table 10-1:
Outdoor-indoor relative humidity**

Outside temperature	Recommended RH
+40°F (4°C)	45%
+30°F (-1°C)	40%
+20°F (-7°C)	35%
+10°F (-12°C)	30%
0°F (-18°C)	25%
-10°F (-23°C)	20%
-20°F (-29°C)	15%

Your new humidifier can be controlled by a Manual Humidifier Control installed either in the living area (typically near the thermostat) or in the cold air return. It is important to anticipate a drop in outdoor temperature and reduce the setting accordingly to avoid excessive condensation. For example, with an outdoor temperature of 20°F (-7°C) the correct setting will be 35% relative humidity. If the temperature is expected to fall to 0°F (-18°C) that evening, then merely reduce the setting to 25% several hours prior to the temperature change.

The recommended settings on the humidifier control are based on years of research (see Table 10-1) and experience as to what is best for the average home. These settings represent a compromise between RH levels that would be most desirable for comfort reasons and humidity levels that are suitable for protection of your home. For example, a wintertime indoor RH of 50% may be considered ideal by some, but unfortunately, it probably would result in damage to your home.

Observance of the recommended RH levels on your humidifier control, therefore, is an important safeguard. Condensation of water on inside windows in the form of fogging or frost is usually an indication that the relative humidity is too high. This same condensation can take place in other areas in your home with the possibility of damage resulting.

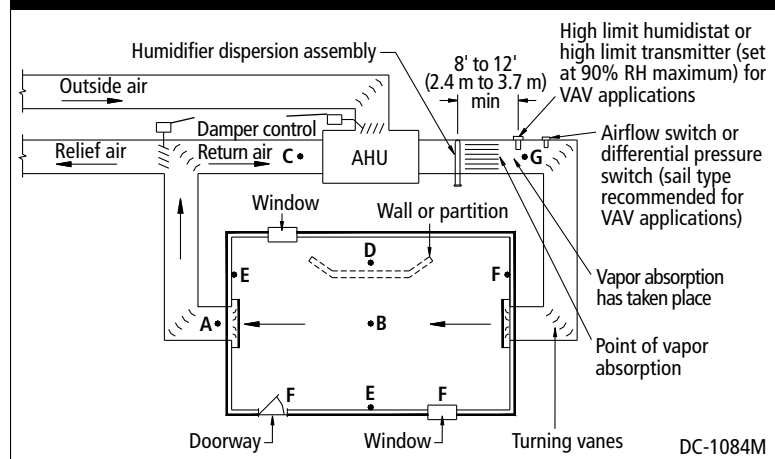
Humidistat locations are critical

Refer to humidistat installation instructions for more details on installation.

Humidistat location has a significant impact on humidifier performance. In most cases, it is recommended that you do not interchange duct and room humidity devices. Room humidity devices are calibrated with zero or little airflow; whereas duct humidity devices require air passing across them. Recommended humidistat locations (see Figure 10-1):

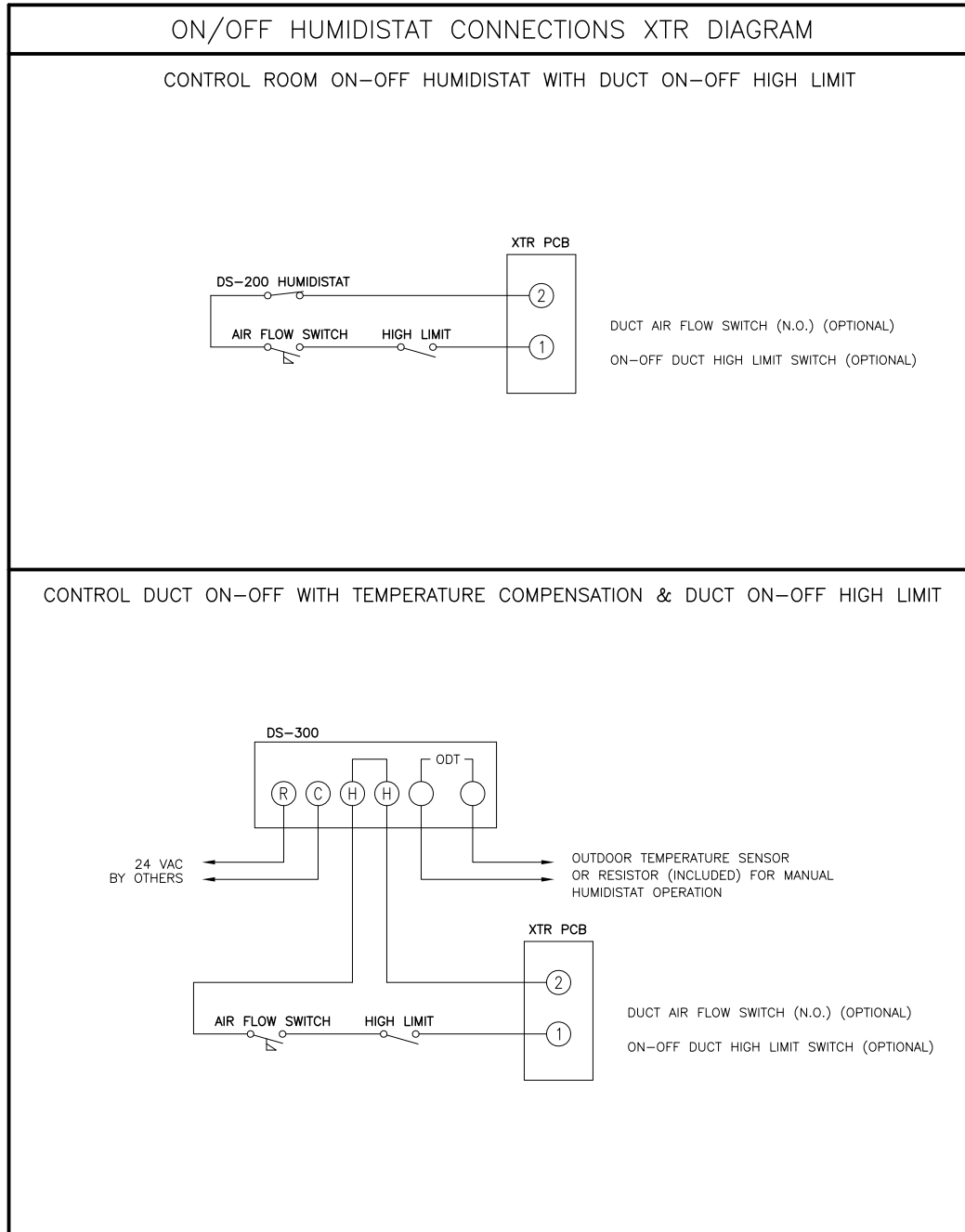
- A This is the ideal sensing location because this placement ensures the best uniform mix of dry and moist air with stable temperature control.
- B This location is acceptable, but the room environment may affect controllability such as when the humidistat is too close to air grilles, registers, or heat radiation from room lighting.
- C This location is acceptable because it provides a good uniform mixture of dry and moist air, but if an extended time lag exists between moisture generation and sensing, make sure the control contractor extends the sampling time.
- D 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 humidistat placement for sampling a critical area.
- E These locations are not acceptable because they may not represent actual overall conditions in the space.
- F These locations are not acceptable. Do not place humidistats near windows, door passageways, or areas of stagnant airflow.
- G This is the best location for a duct high limit humidistat.

**Figure 10-1:
Recommended humidistat and transmitter locations**



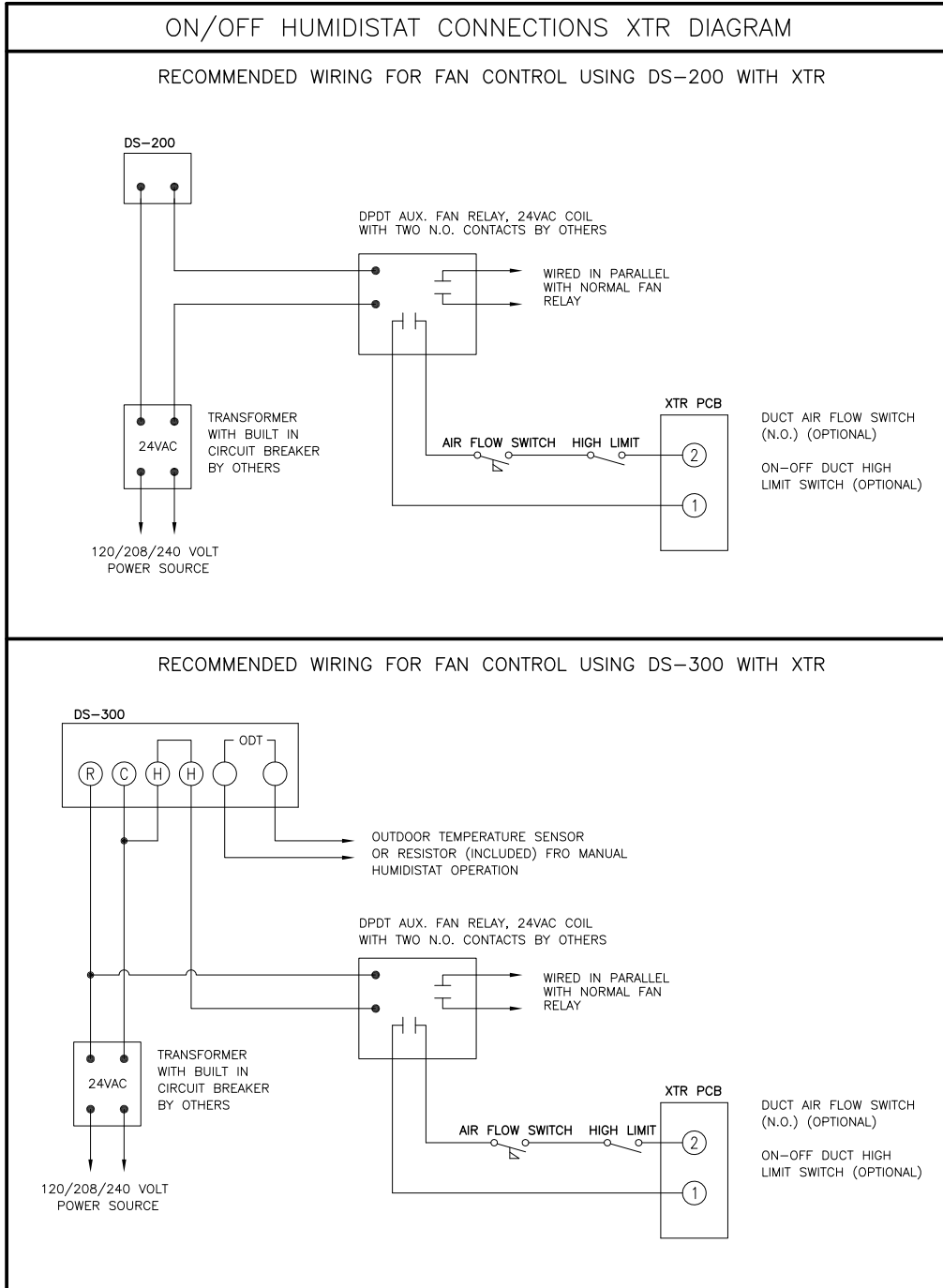
Wiring diagrams

**Figure 11-1:
Control wiring diagrams**



Wiring diagrams

Figure 12-1:
Control wiring diagrams



Dispersion: General instructions

Selecting the dispersion assembly location

- It is important that the dispersion assembly be positioned where the water vapor being discharged is carried off with the airstream and is absorbed before it can cause condensation or dripping in the duct.
- In general, the dispersion assembly is best placed where the air can most readily absorb the moisture being added without causing condensation at or after the unit. This normally will be after the heating coil or where the air temperature is highest.
- Place the dispersion assembly such that absorption will occur before the intake of a high efficiency filter. The filter can remove the visible moisture and become waterlogged.
- Place the dispersion assembly such that absorption will occur before coming in contact with any metal surface.
- Place the dispersion assembly such that absorption will occur before fire or smoke detection devices.
- Place the dispersion assembly such that absorption will occur before a split in the duct. Otherwise, the dispersion assembly may direct more moisture into one duct than the other.

IMPORTANT:

Failure to follow the recommendations in this section can result in excessive back pressures on the humidifier. This will result in unacceptable humidification system performance such as water siphoning from the steam cylinder, blown water seals, erratic water level control, and spitting condensate from the dispersion tube(s).

Dispersion: Interconnecting piping requirements

Connecting humidifier to dispersion assembly with vapor hose

- Always support vapor hose to prevent sags or low spots.
- See the table on Page 17 for interconnecting tubing and pipe pitch requirements for single tube applications.
- See the maximum steam carrying capacity table on the next page.
- Use DRI-STEEM vapor hose. Other manufacturers of vapor hose may use unacceptable release agents or material mixes that can affect humidifier system performance adversely. Using hose from alternative manufacturers increases the possibility of foaming in the steam cylinder. Foaming can cause water level control inaccuracies and reduced steam production.
- Do not use vapor hose in outdoor applications.
- Do not insulate vapor hose. Insulation causes accelerated heat aging, causing the vapor hose to become hard and susceptible to failure due to cracks.
- The steam outlet on the humidifier is sized to the output of the humidifier. DO NOT use hose with an inside diameter (ID) smaller than 7/8".
- If the humidifier must be located above the dispersion assembly, use the recommend installation as shown on Page 16.
- **To avoid cracking the steam cylinder outlet, use the bolt hose clamp when attaching white braided hose to the steam cylinder.** Use the worm-drive hose clamp for clamping white braided hose to the stainless steel adapter.

Connecting humidifier to dispersion assembly with tubing or pipe

- See the table on Page 17 for interconnecting tubing and pipe pitch requirements for single tube applications.
- The steam outlet on the humidifier is sized to the output of the humidifier. DO NOT use interconnecting tubing or pipe with an inside diameter (ID) smaller than 7/8". REDUCING THE INSIDE DIAMETER OF THE INTERCONNECTING PIPING WILL RESULT IN THE INTERNAL HUMIDIFIER SYSTEM PRESSURE EXCEEDING THE PARAMETERS FOR ACCEPTABLE PERFORMANCE.
- 90° elbows are not recommended; use two 45° elbows, 1' (0.3 m) apart.
- Thin wall tubing heats up faster and causes less start-up loss than heavy wall pipe.

More on the next page ►

Dispersion: Interconnecting piping requirements

Connecting humidifier to dispersion assembly with tubing or pipe (continued)

- Insulating hard pipe reduces the loss in output caused by condensation.
- When using hard pipe, take care to remove ALL traces of residual materials used to assemble the pipe. This will minimize the possibility of foaming in the steam cylinder. Denatured alcohol or mineral spirits work best for removing residual materials.
- If the humidifier must be located above the dispersion assembly, use the recommend installation as shown on Page 16.
- See the maximum steam carrying capacity table below.

**Table 15-1:
Maximum steam carrying capacity and length of interconnecting vapor hose, tubing, and pipe***

DRI-STEEM white braided hose ^{†††}					
Hose I.D.		Maximum capacity		Maximum length ^{**}	
inches	DN	lbs/hr	kg/h	ft	m
7/8	22	20	9	10	3

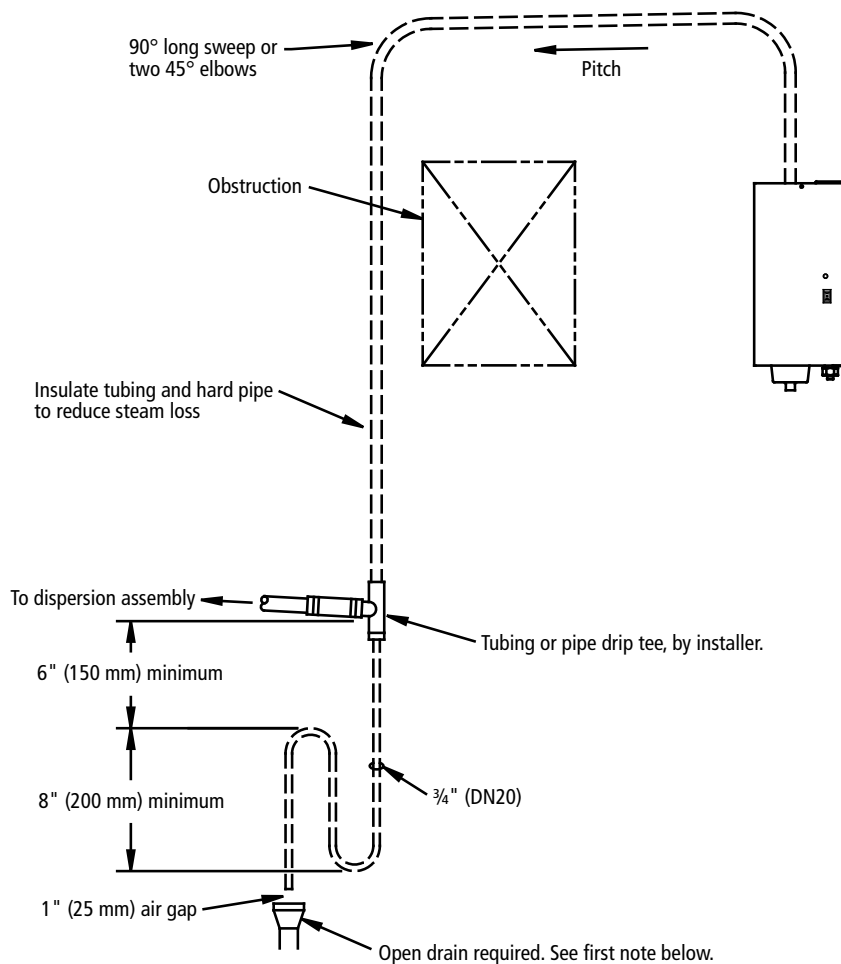
* Based on total maximum pressure drop in hose, tubing, or piping of 5" wc (1244 Pa)
^{**} Maximum recommended length for vapor hose is 10' (3 m). Longer distances can cause kinking or low spots.
^{†††} When using vapor hose, use DRI-STEEM vapor hose for best results. Field-supplied hose may have shorter life and may cause foaming in the evaporating chamber resulting in condensate discharge at the dispersion assembly. Do not use vapor hose for outdoor applications.

Dispersion: Drip tee installation

Install a drip tee as shown below when the humidifier is mounted higher than the dispersion assembly, when interconnecting hose or piping needs to go over an obstruction, or when interconnecting piping runs are long.

IMPORTANT: Vapor hose must be supported to prevent sagging or low spots.

Figure 16-1:
Drip tee installation (piping over an obstruction)



Notes:

- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Support vapor hose so there are no sags or low spots
- Dashed lines indicate provided by installer

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Dispersion tube installation

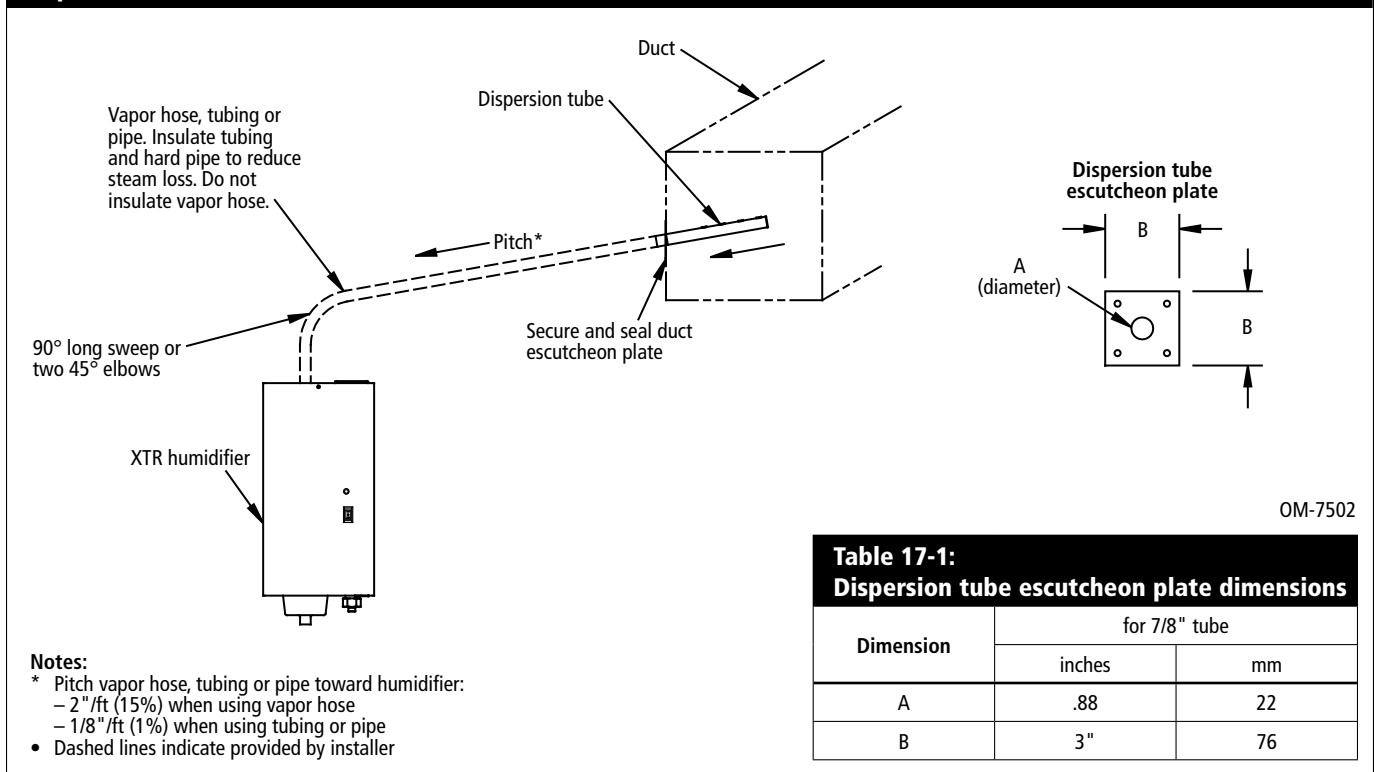
Dispersion tube mounting

- Orient dispersion tube so that tubelets (steam orifices) point up.
- When mounting the humidifier above the level of the dispersion tube, see the drip tee installation drawing on the previous page.

IMPORTANT:

Failure to follow the recommendations in this section can result in excessive back pressures on the humidifier. This will result in unacceptable humidification system performance such as water siphoning from the steam cylinder, blown water seals, erratic water level control, and spitting condensate from the dispersion tube(s).

**Figure 17-1:
Dispersion tube installation**



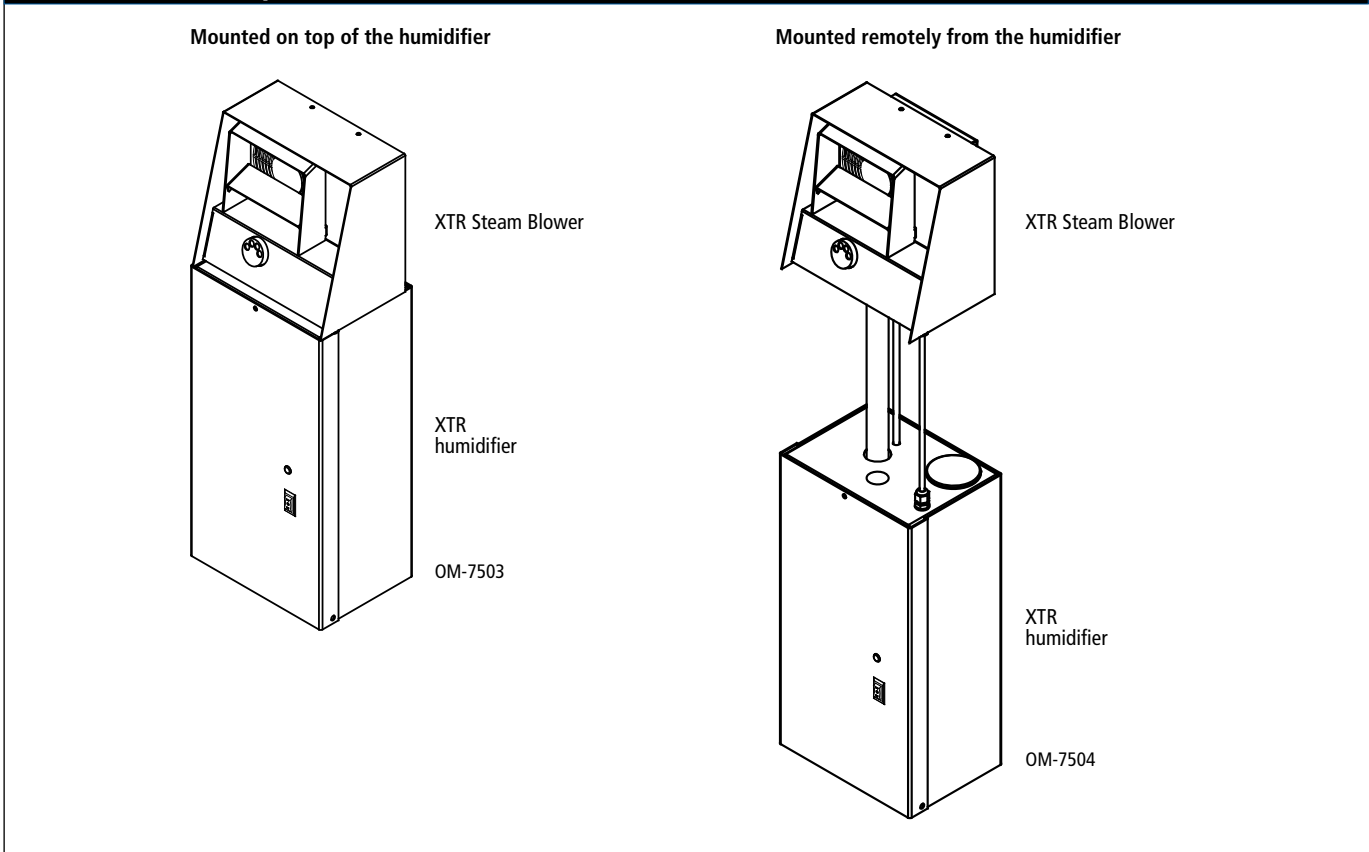
**Table 17-2:
Pitch of dispersion tube(s) and interconnecting piping for Single Tube evaporative dispersion units***

Condensate drain	Type of interconnecting piping	Diameter of dispersion tube and interconnecting piping	Pitch of interconnecting piping	Pitch of dispersion tube
Without drain	Vapor hose	7/8"	2"/ft (15%) toward humidifier	2"/ft (15%) toward humidifier
	Tubing or pipe	7/8"	1/8"/ft (1%) toward humidifier	

Note:
 * When piping over an obstruction, see the drip tee installation illustration on Page 16.

Dispersion: XTR Steam Blower

**Figure 18-1:
XTR Steam Blower dispersion**



XTR Steam Blower

The XTR Steam Blowers (XTRB), designed for use in finished spaces, disperse steam into large open spaces and are particularly useful where there are no air-handling ducts.

Dispersion: XTR Steam Blower

As steam is discharged from the XTR Steam blower (XTRB) it quickly cools and turns to a visible fog that is lighter than air. As this fog is carried away from the XTRB by the airstream, it tends to rise toward the ceiling. If this fog contacts solid surfaces (columns, beams, ceiling, pipes, etc.) before it disappears, it can collect and drip as water. The greater the space relative humidity, the more the fog will rise, spread, and throw.

The table below lists the maximum rise, spread, and throw non-wetting distances for XTR humidifiers with an XTRB at 30%, 40%, and 50% RH in the space. Surfaces cooler than ambient temperature, or objects located within this minimum dimension, can cause condensation and dripping. To avoid steam impingement on surrounding areas, observe the minimum non-wetting distances in the table below.

The XTRB contains an 115 cfm (3.26 m³/min) blower (24 VDC, 50/60 Hz) field wired to the XTR humidifier blower terminals. Refer to the XTR wire diagram noting the blower terminals for blower wiring.

On a call for humidity, the humidifier begins producing steam and the contactor energizes the XTR steam blower. When the call for humidity is satisfied, the contactor opens and the blower is de-energized.

Figure 19-1:
XTR Steam Blower rise, spread, throw

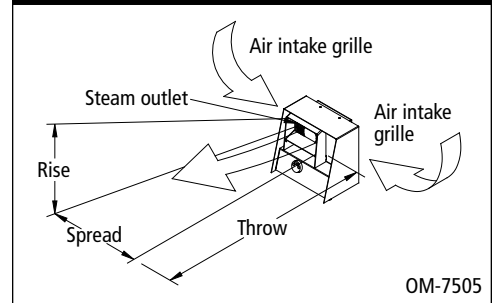


Table 19-1:
XTR Steam Blower minimum non-wetting distances

Voltage	Maximum steam capacity		30% RH @ 70 °F (21 °C)						40% RH @ 70 °F (21 °C)						50% RH @ 70 °F (21 °C)					
			Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw	
	lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
120	4.0	1.8	1.0	0.3	1.3	0.4	3.1	0.9	1.2	0.4	1.7	0.5	3.7	1.1	1.5	0.5	1.9	0.6	4.2	1.3
208	7.1	3.2	1.3	0.4	1.5	0.5	3.9	1.2	1.7	0.5	2.0	0.6	4.7	1.4	2.1	0.6	2.2	0.7	5.3	1.6
240	8.1	3.6	1.5	0.5	1.7	0.5	4.0	1.2	1.8	0.5	2.3	0.7	4.8	1.5	2.4	0.7	2.5	0.8	5.4	1.6

Notes:

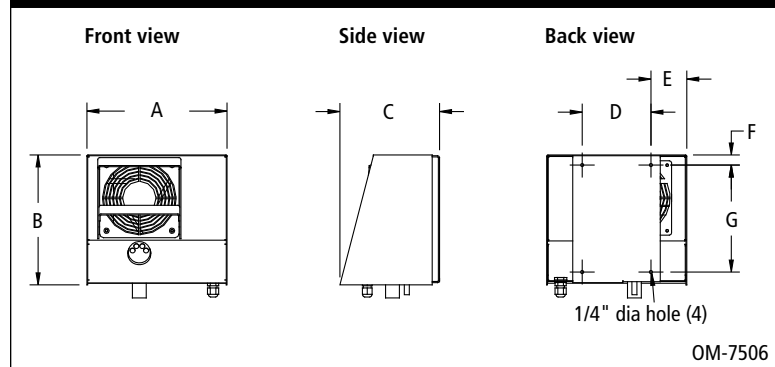
- Rise: Minimum non-wetting height above the steam outlet of the XTRB
- Spread: Minimum non-wetting width from the steam outlet of the XTRB
- Throw: Minimum non-wetting horizontal distance from the steam outlet of the XTRB

Dispersion: XTR Steam Blower

**Table 20-1:
XTR Steam Blower dimensions**

Dimension	inches	mm
A	8.76	223
B	8.13	207
C	6.25	159
D	4.38	111
E	2.25	57
F	0.63	16
G	6.75	171

**Figure 20-1:
XTR Steam Blower dimensions**



Mounting the XTR Steam Blower

The XTR Steam Blower can be mounted directly on top of an XTR humidifier cabinet or remotely from the humidifier.

Installation must comply with governing codes.

Mount the steam blower so that it is plumb.

When mounting on a wood stud wall, locate studs and attach spanner board. Mark hole locations per Table 20-1 and predrill 1/8" (3 mm) diameter pilot holes. Secure with screws provided.

When mounting on a metal stud wall, locate the studs and drill a 1/4" (6 mm) hole through the studs and wall. Mount spanner board with 1/4" (6 mm) bolts through the wall, studs, and a backing plate on the backside of the wall and secure with a nut and washer.

For hollow block or poured concrete wall mounting, mark holes per Table 20-1. Drill pilot holes sized for the supplied anchors. Secure cabinet in place using the two supplied screws and anchors.

Securing blower to stud, or use of anchors, is acceptable for mounting in finished spaces. Always take care to avoid excess stress on the blower and humidifier when performing maintenance.

More on next page ►

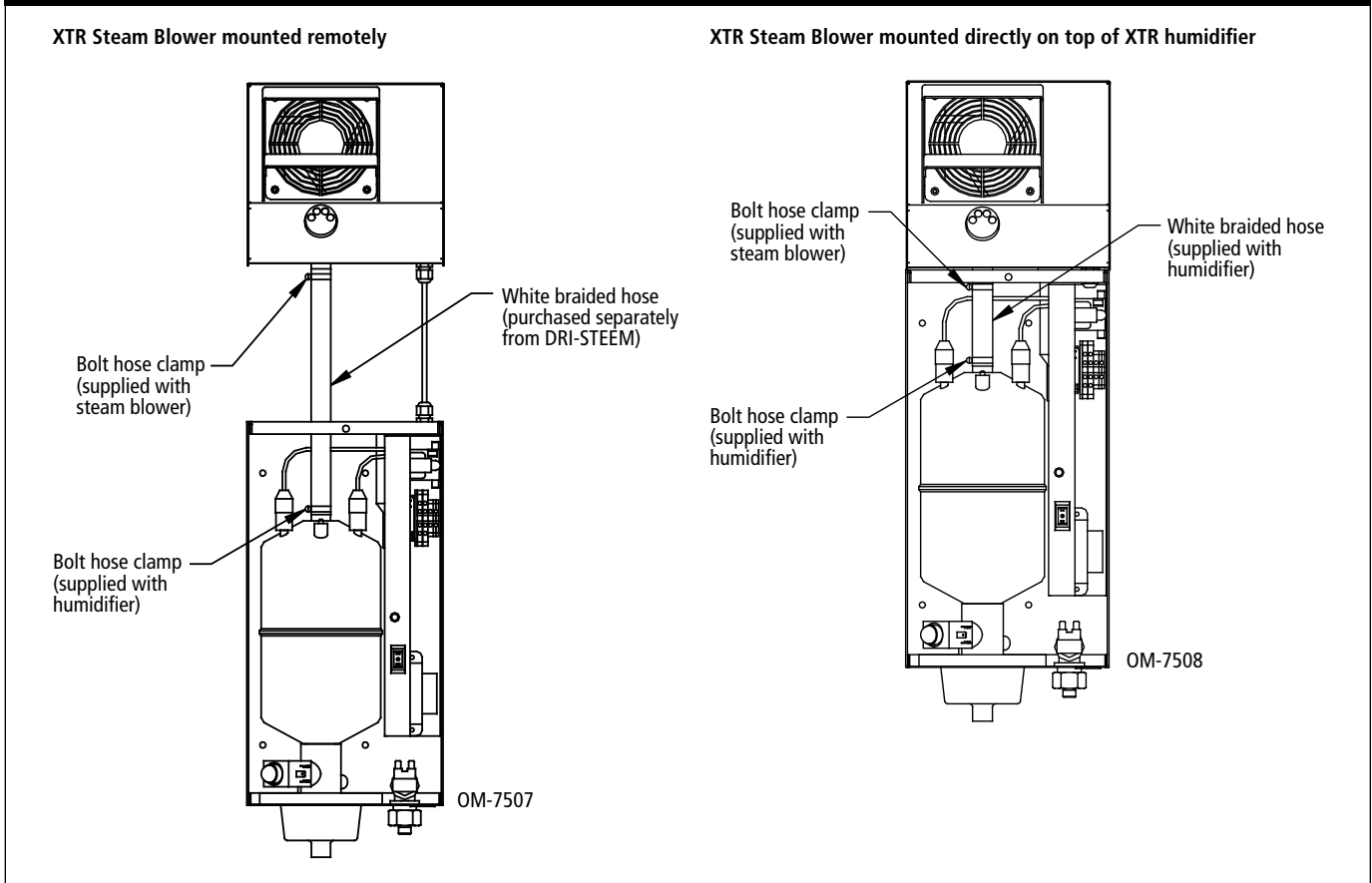
Dispersion: XTR Steam Blower

To determine steam blower mounting clearance dimensions, see Table 19-1 on Page 19 to determine minimum rise, spread, and throw non-wetting distances for your application. Make sure walls, ceilings, or other obstructions are not within this region, or condensation and dripping could occur. Provide at least 4" (102 mm) clearance on each side of the XTR Steam Blower for air intake.

Low voltage field wiring is required to connect the XTR Steam Blower fan to the humidifier blower terminals. Refer to the external connections diagram in the package shipped with the unit.

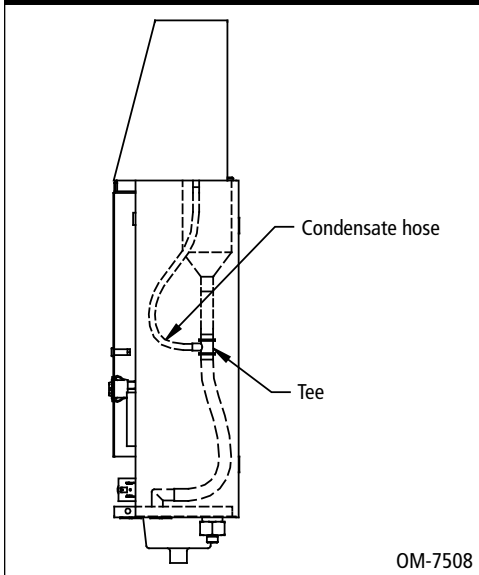
For mounting the XTR Steam Blower remotely from the humidifier, see the tables in this document for interconnecting piping requirements.

Figure 21-1:
Piping connections to XTR Steam Blower



Dispersion: XTR Steam Blower

Figure 22-1:
Unit mounted blower drain line



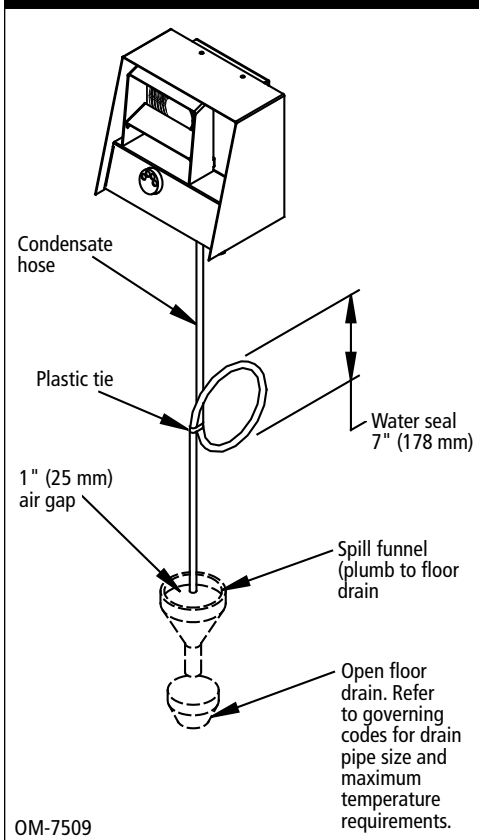
Unit mounted condensate drain connection to XTR Steam Blower

1. Install steam blower on unit using included mounting screw.
2. Connect supplied condensate hose to condensate drain of the blower from inside the XTR.
3. Remove rubber plug from condensate return tee in the XTR (refer to Figure 22-1).
4. Connect opposite end of condensate hose to condensate return tee in the XTR.

Condensate drain connection to XTR Steam Blower

1. Drain line must be routed as shown in the drawing on this page. Provide a 7" (178 mm) water seal to:
 - Ensure drainage of condensate from the steam blower
 - Keep steam from blowing out of the drain line
2. After the water seal, run the drain line to an open drain with a 1" (25 mm) vertical air gap. Cut the drain line at a 45 degree angle on the end above the drain to permit a direct stream of water into the drain pipe while maintaining a 1" (25 mm) air gap. Alternatively, run the condensate hose to the fill cup, via hole in the fill cup cap by installer.
3. All drain lines must be installed and sized according to governing codes.
4. The XTR Steam Blower is constructed with a pitch toward the drain; however, the XTR Steam Blower frame must be installed plumb and level for proper drainage.

Figure 22-2:
XTR Steam Blower drain line



WARNING!

Make sure the XTR Steam Blower is installed plumb. If it is not installed plumb then standing water can accumulate in the steam blower, which can:

- Cause bacteria and mold growth, which can cause illness.
 - Affect unit performance and cause hot water at 212 °F (100 °C) to discharge from the XTR Steam Blower, which can cause severe personal injury.
-

Dispersion: XTR Steam Blower

Wiring the XTR Steam Blower

Power is provided to the XTR Steam Blower from the humidifier blower terminals. Connect leads from XTRB to terminals 7 and 8 on the XTR circuit board. Be sure to tighten terminals securely.

**Table 23-1:
XTR Steam Blower specifications**

Steam blower model	Maximum capacity		Shipping weight		Operating weight		Amps at 24VDC (50/60 Hz)	Input power	Volume airflow		Noise
	lbs/hr	kg/h	lbs	kg	lbs	kg	A	W	cfm	m ³ /min	dBa*
XTRB	8.1	3.6	3.8	1.7	3.2	1.5	0.38	6.96	115	3.26	54

Notes:

* Measurement taken 6.5 ft (2 m) in front of steam blower cabinet
Steam blowers ship separately from XTR humidifiers.

Operation

Principle of operation

When the relative humidity level in the space being humidified drops below set point, the microprocessor controller in the XTR humidifier receives a call for humidity and calculates a corresponding amperage value. The controller closes the contactor, which energizes the electrodes. If there is no water or not enough water in the steam cylinder, the fill valve opens and water enters the steam cylinder.

As soon as water rises to touch the electrodes, current flows through the conductive water from one electrode to another. The conductive water provides resistance to current flow, producing heat, and causing water in the steam cylinder to boil and produce steam. As the amount of water covering the electrodes increases, or as water conductivity increases, current flow increases. The fill valve remains open until the current flow increases to the amperage corresponding to the demand signal. When this amperage is met, the fill valve closes and water continues to boil off into steam. As the water level decreases, current flow decreases. When current flow becomes less than the amperage corresponding to the demand signal, the fill valve opens to increase the water level in the cylinder to increase current flow, increasing steam production. Steam created in the cylinder flows through the steam outlet via vapor hose or piping to the dispersion assembly, where it is discharged into the airstream.

The humidifier has integral drain water tempering. Water automatically cools to 140 °F (60 °C) or cooler when draining.

More on next page ►

Operation

End-of-season drain

If there is no call for humidity for 72 hours, the humidifier is placed in End-of-Season (EOS) mode. When the unit enters EOS mode, the drain valve remains open for five minutes to allow the steam cylinder to drain, and then closes. When the humidifier receives a call for humidity after the end-of-season drain, the steam cylinder refills and the humidifier resumes normal operation. Draining the steam cylinder after 72 hours reduces the possibility of electrode corrosion and microbial growth in the cylinder.

Extended shutdown

To prepare the unit for an extended shutdown:

1. Drain the steam cylinder to reduce possibility of electrode corrosion. Open the drain valve by switching the three-way switch on the front of the unit to the "down" position. This will open the drain valve. Check to make sure the steam cylinder is drained.
2. Turn the unit off by switching the three-way switch to the middle, or "off" position.
3. Open the main external fused disconnect to stop power to the humidifier.
4. Close the water supply shut-off valve to the humidifier.
5. After shutdown, limit unit access to qualified service personnel only.

More on next page ►

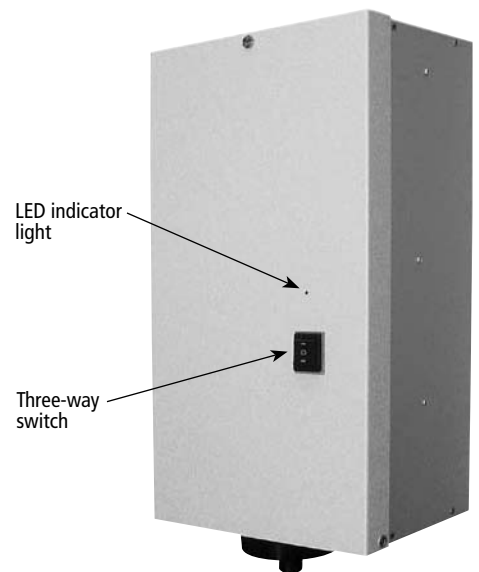
Safety functions

XTR humidifiers are protected against running dry — current does not flow when the electrodes in the steam cylinder are no longer submerged in water. After 30 minutes of no current, the LED will illuminate flashing red.

Should the current rating exceed 120% of nominal current, the drain valve opens automatically. As the water level drops, the current rating drops back to the nominal value.

Should the current rating exceed 130% of the nominal current after several drainage operations, the humidifier will shut down automatically and the LED will illuminate solid red.

To prevent duct saturation, installing a high limit humidistat and airflow proving switch is recommended.



Humidifier start-up

Humidifier start-up

After connecting the steam hose, water supply, drain piping, and power per the instructions in this manual, open the water supply and turn on the humidifier's on-off control switch.

When there is a call for humidification with the airflow proving switch and high limit humidistat contacts closed, the contactor closes, the inlet valve opens, and water flows into the steam cylinder. When the water reaches the electrodes, electric current flows, heats up the water, and steam is produced after a short time. The nominal steam capacity will be reached after a start-up time dependent on the supply water conductivity.

It is possible that the maximum fill level will be reached during start up or after the installation of a replacement cylinder. When this occurs, the inlet valve closes momentarily. This is quite normal during this water conductivity verification phase of operation. The duration of this phase varies and lasts until the cylinder has achieved the nominal output. The LED on the unit will flash red with a green background if this condition is met.

Steam capacity limitation

The steam capacity can be limited by a potentiometer on the printed circuit board. The XTR humidifier is adjusted to operate at the nominal capacity (no limitation). The limitation can be adjusted down from 100% to as low as 25% of the maximum output.

Start-up checklist

Your humidification system may not have all of the options listed below. If an item does not apply to your system, skip to the next item and continue the process.

- Before you start, read this manual and other information sent with your humidifier.
- Verify that the field wiring is done per the instructions in this manual and per the unit wiring diagram.
- Your humidifier uses cold potable water. Do not use softened, reverse osmosis (RO), or deionized (DI) water.
- Confirm that all wiring is correct per the wiring diagram.
- Confirm that proper grounding and an approved earth ground are provided.
- Turn water supply on and confirm that the drain valve is closed.
- Turn power on and confirm that the LED is illuminated.
- Confirm that the airflow switch is closed.
- Confirm that the high limit humidistat input is closed.
- With sufficient water in the steam cylinder, the airflow switch closed, the high limit humidistat closed, and a call for humidity, verify that the heat outputs are activated.
- If you experience difficulties, have the above information available with the model and serial number of the humidifier and firmware version and call DRI-STEEM for assistance.

System messages

LED messages

The humidifier is factory programmed to display five system messages using the LED. The LED messages indicate the following:

LED is green: Normal operation

LED is flashing green: Check steam cylinder. This message indicates the steam cylinder can no longer meet demand. Inspect the cylinder to determine if it needs to be cleaned or replaced. This message is a service message only; the humidifier will continue to operate with a reduced output.

LED is flashing red with a green background: High water level reached

LED is flashing red: Supply water failure. Humidifier stops automatically. Cycle the three-way switch off and on to reset. This message indicates there is no water in the steam cylinder. The humidifier shuts down automatically after 30 minutes if no current is sensed. Check the water supply (supply valve, in-line water strainer, inlet valve) for water flow. Next, look for constant water flow out of the drain cup (may indicate drain valve stuck open). If this doesn't help, resolve the condition by manually clearing the drain valve if it is stuck open (see **Cleaning the drain valve** in **Maintenance procedures** section on page 30).

LED is red: Over-current condition reached. Humidifier stops automatically. Cycle three-way switch off and on to reset. This message indicates the humidifier has been switched off due to an over current condition (130% of the nominal current). Resolve the over current condition by clearing the drain if clogged, or by cleaning or replacing the cylinder if there is excessive mineral buildup.

Maintenance procedures

WARNING!

When performing maintenance on the XTR humidifier:

- Close the field installed manual supply water shut-off valve.
- Turn the humidifier off.
- Place all power disconnects in OFF position and lock in OFF position.

Failure to follow these instruction can result in property damage, severe personal injury, or death as a result of electric shock, burns, and/or fire.

Note:

It is advisable to keep a spare steam cylinder in stock during humidification season. See the replacement parts section of this manual for part numbers.

Inspect unit every 500 hours of operation

At 500 hour intervals, inspect the steam cylinder, fill and drain valves, vapor hose, condensate piping, water supply piping, drain, drain piping, and all other parts for proper operation and/or cleaning requirements. Verify proper operation of high limit humidistat, relays, and airflow proving switch.

Clean and/or replace the steam cylinder

Steam cylinder service life depends on operating hours and water hardness. Replace the steam cylinder when the electrodes become insulated with mineral deposits to a degree that output demand can no longer be achieved (when the maximum water level sensor is repeatedly triggered).

To clean and/or replace the steam cylinder:

1. Close the field installed manual supply water shut-off valve.
2. Drain water from the steam cylinder.
Open the drain valve by pressing the three-way switch to the down, or off, position.
3. When the steam cylinder is completely empty, turn the humidifier off. Place all power disconnects in the OFF position and lock in the OFF position.
4. Open the steam cylinder door.
CAUTION! Cylinder and any undrained water may be hot. To avoid injury from hot water, make sure cylinder and humidifier components have cooled before proceeding with maintenance.
5. Disconnect the steam hose.
After the cylinder and humidifier components have cooled, loosen the steam hose clamp and disconnect the steam hose from the cylinder.
6. Disconnect the electrode plugs and high water sensor wire.

More on next page ►

Maintenance procedures

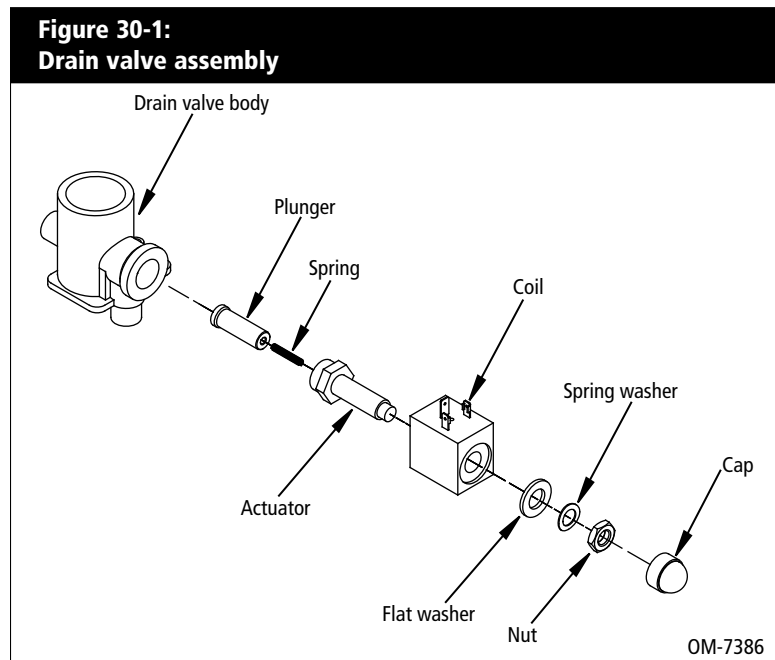
7. Remove the cylinder.
8. Check the drain valve.
If the drain valve port is dirty, clean per the instructions on the next page.
9. Check O-ring.
Ensure that the O-ring of the drain valve body is correctly placed. Change the O-ring if necessary. Dampen the O-ring seals **with water** before replacing cylinder. **Do not use lubricant or other substance.**
10. Clean the cylinder if mineral buildup is minimal.
To clean the cylinder, **flush with fresh water only**. Remove the strainer and flush. Do not use chemicals, acids, or soap to clean the cylinder because they can cause foaming.
11. Ensure strainer is in place.
12. Insert the cleaned or new cylinder.
13. Connect electrode plugs to cylinder electrode pins.
Ensure that cylinder plugs fit snugly on the pins. If cylinder plugs become loose, obtain a new replacement plug from DRI-STEEM. See the replacement parts section of this manual.
14. Connect the high water sensor wire.
Connect the yellow wire to the single pin surrounded by a plastic shoulder.
15. Connect the steam hose.
16. Start up the humidifier per the instructions on Page 26.

Maintenance procedures

Cleaning the drain valve

Always check the drain valve for need to clean before installing a new steam cylinder. Typically, the drain valve port is as dirty as the used steam cylinder.

1. Remove the steam cylinder.
2. Remove the three screws and washers securing the drain cup plate to the drain cup.
3. Disconnect the two slip-on terminals from the two tabs on the 24 VAC drain valve coil.
4. Remove the hose clamp and hose from the drain valve body. Take the drain valve assembly to a sink for disassembly and cleaning.
5. Remove the snap-fit black cap, nut, and washers from the coil assembly. Slide coil off the actuator.
6. Loosen the actuator with a wrench and unscrew from the plastic valve body.
7. Clean the exposed plunger, spring, actuator, and plastic drain valve body with clean water.
8. Reassemble. Tighten actuator 1/8 turn past being hand-tight.
9. Clean out the end of the hose. Reconnect it to the drain valve body with the hose clamp.
10. Fit mounting screws with washers through the drain cup plate.
11. Push the two female terminals back onto the two opposing tabs on the coil.



Troubleshooting

1. Review possible causes and recommended actions.

If you have a problem with your XTR humidifier, review the troubleshooting guide on the following pages for possible causes and recommended actions for typical problems.

2. If you're still having problems, call us.

If the troubleshooting guide does not help you solve your problem, call us with the following information available:

- Product name and serial number
You'll find this information on the wiring diagram or on the outside of the control cabinet door
- Problem definition
Example: water leaking, low humidity, high humidity, etc.
- Time problem began
Example: Always, after remodel, after a change in weather, etc.
- System changes
Example: Pressure, new service, new controller, relocation, change in maintenance, etc.

Calling DRI-STEEM technical support: 800-328-4447

Have the following information ready before calling technical support.

Humidifier model number _____

Humidifier serial number _____

Firmware version _____

Problem definition _____

Time problem began _____

Troubleshooting

**Table 32-1:
Problem/possible cause/action**

Problem	Possible cause	Action
No LED display	No power or incorrect voltage to processor board	<ul style="list-style-type: none"> • Check main power supply.
Humidifier does not energize; steam cylinder does not heat up	Non-existent supply voltage to humidifier	<ul style="list-style-type: none"> • Check main line fuse. • Check main line safety switch. • Verify terminal block electrical connections. • Verify power relay electrical connections.
	Non-existent control voltage	<ul style="list-style-type: none"> • Check for proper supply voltage per wiring diagram. • Verify terminal block electrical connections. • Check for control circuit voltage, 24 VAC. • Reset if needed by pressing On/Off switch on display panel.
	Control terminals are open.	<ul style="list-style-type: none"> • Check if auxiliary limit controls are not allowing system to operate, e.g., high limit humidistat, airflow proving switch, etc. Reset, replace, or calibrate as needed.
	Humidistat faults: <ul style="list-style-type: none"> • Open, shorted, or incorrect wiring of transmitter or humidistat • Signal is incorrect, out of range, or miswired. • Ground loop 	<ul style="list-style-type: none"> • Check AC supply voltage terminals.
Reduced or no output (even though water level is correct)	Malfunctioning control system	<ul style="list-style-type: none"> • Check if auxiliary limit controls are not allowing system to operate, e.g., high limit humidistat, airflow proving switch, etc. Reset, replace, or calibrate as needed. • Check fuse in power circuit. If open, replace fuse with equal fuse.
	Steam cylinder malfunctioning	<ul style="list-style-type: none"> • Verify that proper voltage is being applied to the steam cylinder. • Check current through electrode wires. • If power components are not functioning, replace.
Steam cylinder failure	Improper wiring	<ul style="list-style-type: none"> • Verify proper voltage applied to steam cylinder. • Verify proper electrical connections.
	Mineral buildup on steam cylinder electrodes	<ul style="list-style-type: none"> • Inspect steam cylinder for severe mineral buildup on or around electrodes. If present, increase cleaning frequency or replace steam cylinder.
	Steam cylinder electrode corrosion	<ul style="list-style-type: none"> • Inspect electrodes for surface corrosion or pitting. This is usually caused by a high chloride level in the supply water. Test water and consult DRI-STEEM for advice.
Unit does not fill with water.	No water supply to fill valve	<ul style="list-style-type: none"> • Verify that manual water supply valve is open and that pressure exists. • Check if water supply line strainer is plugged. Clean strainer or replace. • Verify fill valve electrical connections. • Clean or replace fill valve strainer if plugged.
	Unit control is not on	<ul style="list-style-type: none"> • Press On/Off switch on display panel.
	Malfunctioning fill valve	<ul style="list-style-type: none"> • If fill valve does not open: <ul style="list-style-type: none"> – Verify fill valve electrical connections. – Verify proper 24 VAC (terminals 12 and 13) to fill valve. If voltage is present and valve does not open, replace valve.
	Humidifier is in end-of-season drain mode.	<ul style="list-style-type: none"> • Check for humidification demand signal at control board. See control wiring diagrams for terminal check points.

More on the next page ►

Troubleshooting

**Table 33-1:
Problem/possible cause/action**

Problem	Possible cause	Action
Fill valve does not close.	Malfunctioning level control system	<ul style="list-style-type: none"> Check that high water sensor electrical plug is fully engaged. Check water conductivity. Water conductivity must be at least 125 $\mu\text{S}/\text{cm}$. Add sodium bicarbonate only to increase. Consult DRI-STEEM for further advice.
	Fill valve is stuck.	<ul style="list-style-type: none"> Check for control voltage across fill valve coil (terminals 12 and 13 on control terminal strip). Check if there is an obstruction that does not allow valve to seat properly. Clean or replace valve as needed.
	Drain valve is open.	<ul style="list-style-type: none"> Clean or replace drain valve if an obstruction in the valve does not allow complete closure. Replace broken or weak return spring on drain valve.
Fill valve cycles on and off frequently (several times per minute)	Malfunctioning level control system	<ul style="list-style-type: none"> Check water conductivity. Water conductivity must be at least 125 $\mu\text{S}/\text{cm}$. Add sodium bicarbonate only through steam outlet on top of the steam cylinder to increase. Consult DRI-STEEM for further advice.
	Drain valve not fully closed	<ul style="list-style-type: none"> If an obstruction does not allow drain valve to fully close, clean valve. Replace broken or weak return spring on drain valve.
Unit does not perform autodrain sequence	No power to automatic drain valve	<ul style="list-style-type: none"> Verify drain valve electrical connections. Check if 24 VAC is present at the internal controller board terminals 11 and 14 for drain valve.
	Drain fault, plugged drain valve, or plugged drain pipe	<ul style="list-style-type: none"> Check drain valve piping.
	Defective automatic drain valve	<ul style="list-style-type: none"> If voltage is present at valve and it still does not open, replace valve.
Unit does not perform end-of-season drain	Input signal always has a demand	<ul style="list-style-type: none"> Reduce demand signal.
	Drain valve	<ul style="list-style-type: none"> Verify drain valve electrical connections. Verify drain valve is wired correctly to control board. Check 24 VAC across valve coil during test cycle (terminals 11 and 14 on control terminal strip).
Humidity below desired level	No humidity demand signal from humidistat	<ul style="list-style-type: none"> Low or no signal strength from humidistat. Check for proper wiring. No demand signal by others.
	Unit is operating but fails to meet required humidity output	<ul style="list-style-type: none"> If water is siphoning from the steam cylinder to the overflow drain, check if there is excessive internal steam pressure, determine the cause of the high pressure (e.g., high duct static pressure or crushed vapor hose) and repair as required. If drain valve does not close fully, determine the cause and clean, repair, or replace as needed. If fill valve is stuck open, repair or replace. Recalibrate if controls are out of calibration. Replace leaking vapor hose. Unit is undersized; replace with a larger unit or add additional humidifier.
	Steam cylinder not heating	<ul style="list-style-type: none"> Verify that humidistat is calling for humidity. Check for control voltage if limit controls (airflow proving switch, etc.) are not allowing unit to operate. Check power fuse. If open, replace fuse with equal fuse. Verify power relay electrical connections. Check water conductivity. Water conductivity must be at least 125 $\mu\text{S}/\text{cm}$. Add sodium bicarbonate only through steam outlet on top of the steam cylinder to increase. Consult DRI-STEEM for further advice.
	Excessive outside air volume	<ul style="list-style-type: none"> Verify proper operation of fans and dampers.

More on the next page ►

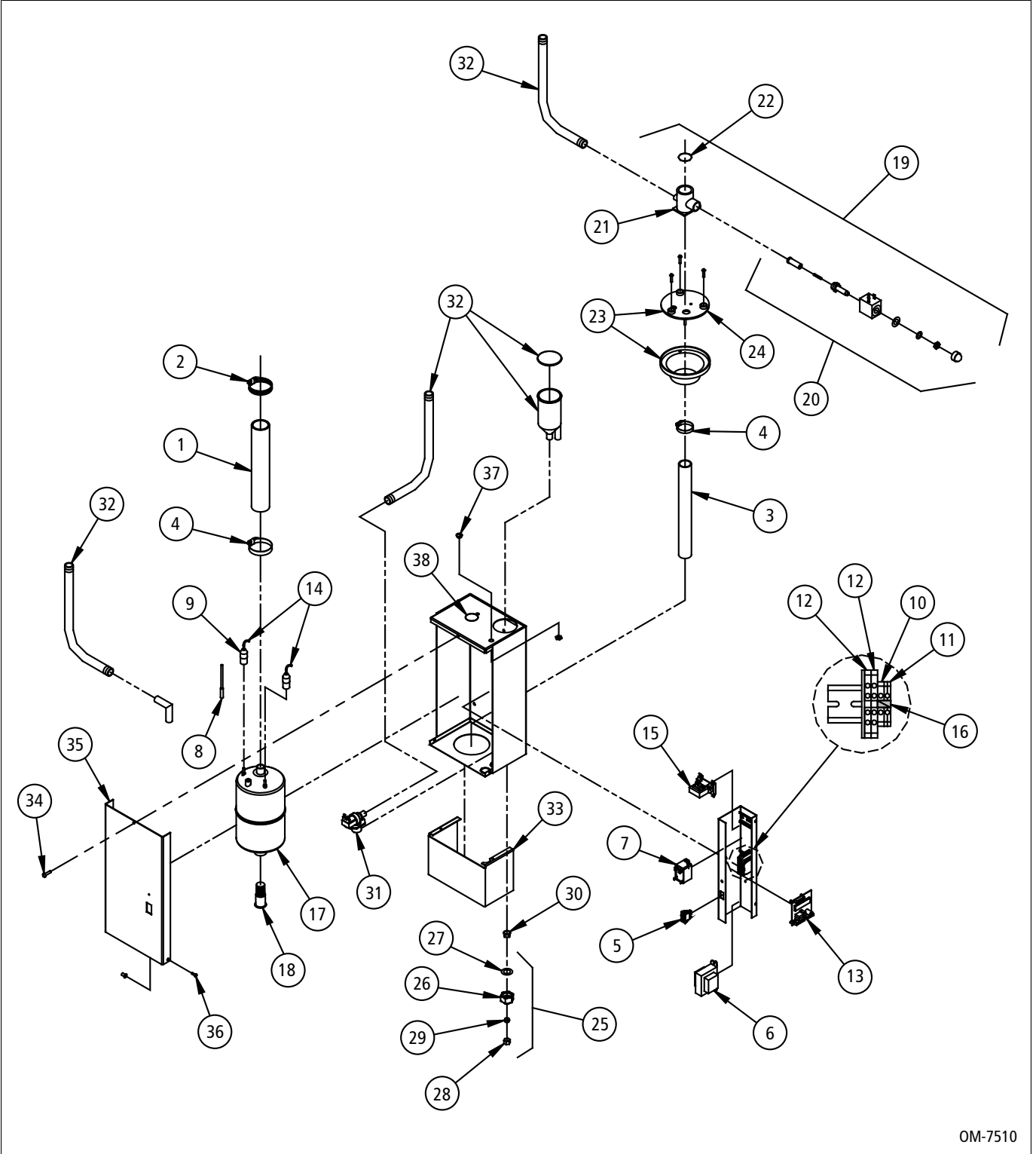
Troubleshooting

**Table 34-1:
Problem/possible cause/action**

Problem	Possible cause	Action
Humidity above set point	Improperly located humidistat	<ul style="list-style-type: none"> Relocate, using guidelines described in this manual.
	Reduced airflow	<ul style="list-style-type: none"> Check fans and dampers.
	Malfunctioning controls	<ul style="list-style-type: none"> Check for incorrect supply voltage. Check for incorrect control signal. Check for improper wiring hookup. If humidity controller is out of calibration or malfunctioning, repair or recalibrate. Check if contactor shorted. Repair or replace as needed.
	Unit oversized	<ul style="list-style-type: none"> Reduce output limit (OL) setting via circuit board potentiometer.
	High entering relative humidity	<ul style="list-style-type: none"> Dehumidify.
Hunting (humidity swings above and below desired set point)	Malfunctioning control system	<ul style="list-style-type: none"> If there is a faulty or inaccurate humidity controller repair or replace. Relocate poorly located control components. See humidity control placement information in this manual.
Noisy operation	Fill/drain valve noise	<ul style="list-style-type: none"> A clicking sound as the fill valve opens or closes, and a hissing sound during fill are normal. A slamming sound as fill valve closes is "water hammer" and can be minimized by installing a shock arrestor. A loud buzzing sound indicates poor alignment of valve stem. Replace valve.

Replacement parts

Figure 35-1:
XTR humidifier replacement parts



OM-7510

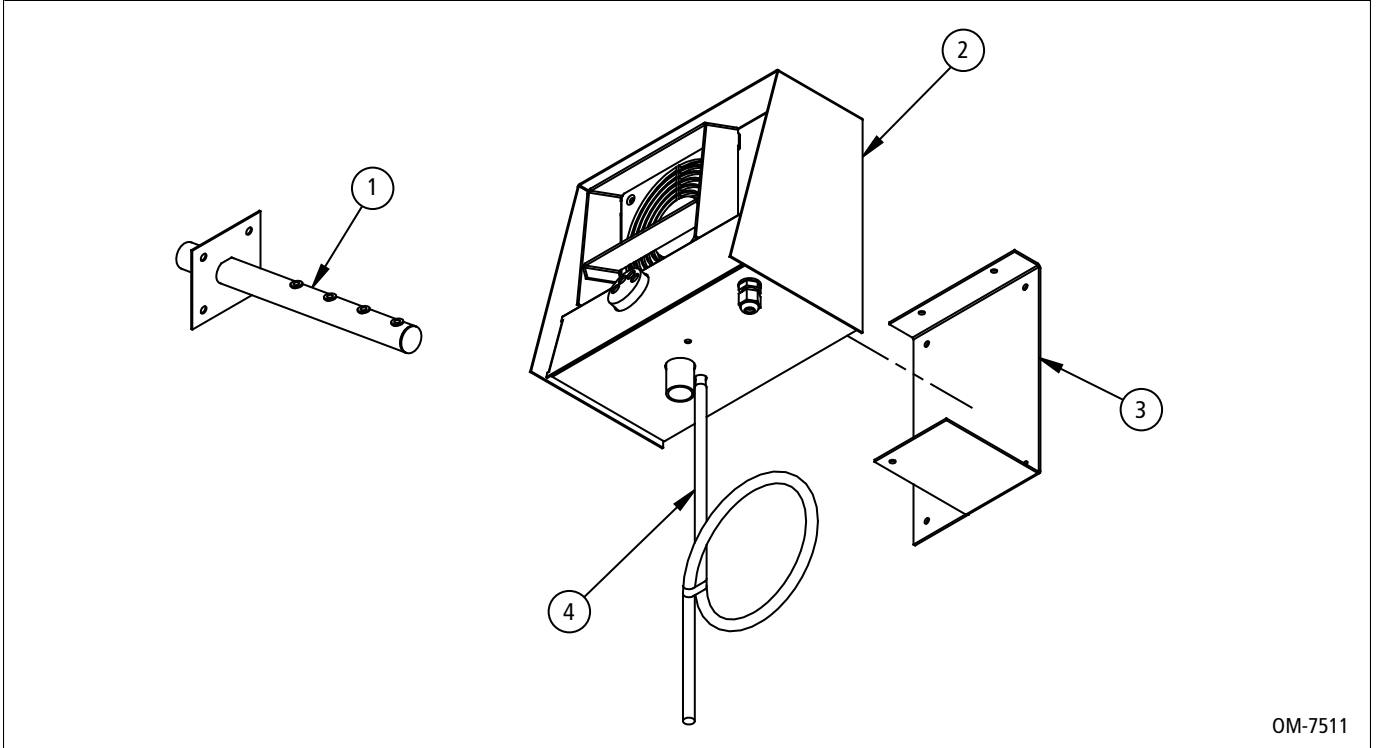
Replacement parts

**Table 36-1:
XTR humidifier replacement parts**

No.	Description	Part no.	No.	Description	Part no.
	Hoses, adaptors, and clamps			Inlet	
1	Hose, steam 22/29 mm	530002	25	Fill adapter assembly, 3/8" XT unit	180994-038
2	Hose clamp, steam hose to XTR dispersion	700560-075	26	Fill adapter, 3/8" O.D. tubing	530001-002
3	Hose, drain 22/29 mm × 10.00	530005-010	27	Washer, 5/8" hose	530001-003
4	Hose clamp D29, drain cup and steam cylinder to steam hose	530001-051	28	Compression nut, 3/8"	530001-006
	Electrical		29	Compression sleeve, 3/8"	530001-008
5	Switch, main on-off-drain	530010-049	30	Strainer, inlet valve	530001-004
6	Transformer	408965-002	31	Valve, inlet XTR	530001-065
7	Power relay	530010-052	32	Fill cup, XTR	530010-063
8	Plug, max. water level sensor	530010-005		Exterior	
9	Plug, electrode	530010-006	33	Skirt, XTR bottom	530001-062
10	Terminal	530010-010	34	Door fastener	530001-054
11	Ground terminal	530010-013	35	Door, XTR	530001-056
12	Terminal, double (L1/N)	530010-048	36	Door fixation, screws	530012-008
13	Board, PCB	530010-035	37	Cover, XTR top electrical screw	530012-009
14	Wiring kit	530010-050	38	Cap, XTRB mount hole	530012-010
15	Transformer, current sensing XTR	530010-047			
16	Jumper, terminal	530010-051			
	Steam cylinders				
17	Steam cylinder	530011-001			
18	Strainer, steam cylinder	530001-047			
	Drain				
19	Drain valve assembly, 24 V	530001-041			
20	Drain valve, with operator 24 V	530001-042			
21	Drain valve body	530001-043			
22	O-ring, drain valve body	530001-044			
23	Drain cup with screws	530001-045			
24	Drain cup plate	530001-046			

Replacement parts

**Figure 37-1:
XTR dispersion replacement parts**



OM-7511

**Table 37-1:
XTR dispersion replacement parts**

No.	Description	Part no.
1	Dispersion, XTR assembly	162728-001
2	DRI-STEEM Model XTRB Steam Blower	412016-101
3	Bracket, XTRB Remote Blower Mount	530001-061
4	Hose, condensate 6/10 mm	530004

Expect quality from the industry leader

For more than 40 years, DRI-STEEM has been leading the industry with creative and reliable humidification solutions. Our focus on quality is evident in the construction of this humidifier, which features a two year limited warranty.

For the most current product information, visit our Web site: www.dristeem.com

Technical support

800-328-4447

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Form No. XTR-IOM-0508
Part No. 890000-144

Two-year limited warranty

DRI-STEEM Corporation (“DRI-STEEM”) warrants to the original user that its products (with the exception of the electrode cylinder) 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 DRI-STEEM ships such product, whichever date is the earlier.

If any DRI-STEEM product is found to be defective in material or workmanship during the applicable warranty period, DRI-STEEM’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 DRI-STEEM’s election. DRI-STEEM shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or reinstallation of any defective product.

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