

READ AND SAVE THESE INSTRUCTIONS




XTR MODULATING SERIES








Electrode Steam Humidifier

Installation, Operation, and Maintenance Manual

Warnings and cautions

 WARNING Indicates a hazardous situation that could result in death or serious personal injury if instructions are not followed.	CAUTION Indicates a hazardous situation that could result in damage to or destruction of property if instructions are not followed.
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 WARNING	
 Attention installer Read this manual before installing, and leave this manual with product owner. This product must be installed by qualified HVAC and electrical contractors. Installation must be code approved. Improper installation can cause property damage, severe personal injury, or death as a result of electric shock, burns, or fire. DriSteem® Technical Support: North America: 800-328-4447 Europe: +3211823595 Read all warnings and instructions 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. 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. mc_032612_1153	
   Hot surfaces and hot water This steam humidification system has extremely hot surfaces. Water in steam cylinders, steam tubing, and dispersion assemblies can be as hot as 212 °F (100 °C). Discharged steam is not visible. Contact with hot surfaces, discharged hot water, or air into which steam has been discharged can cause severe personal injury. To avoid severe burns, follow the cool-down procedure in this manual before performing service or maintenance procedures on any part of the system. mc_032612_1154	
  Disconnect electrical power 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. Contact with energized circuits can cause property damage, severe personal injury, or death as a result of electrical shock or fire. Do not remove cabinet covers until electrical power is disconnected. Follow the shutdown procedure on Page 38 before performing service or maintenance procedures on any part of the system. mc_032612_1155	

Warnings and cautions



WARNING



Electrical shock hazard

If the humidifier starts up responding to a call for humidity during maintenance, severe personal injury or death from electrical shock could occur. To prevent such start-up, follow the shutdown procedure on Page 38.

mc_032612_1156

CAUTION

Follow steam piping recommendations

Controlling condensate flow and collection in an electrode steam humidifier system is critical to maximum performance. Failure to follow the steam piping recommendations in this manual can cause system pressure fluctuations and increase cylinder pressure, steam velocity, and condensate noise.

Hot discharge water

Discharge water can be as hot as 212 °F (100 °C) and can damage some drain plumbing materials not rated for hot drain water. To prevent such damage, make sure drain water tempering is selected, and supply water is not heated. Do not shut off supply water to the cylinder before it is drained.

Excessive supply water pressure

Supply water pressure greater than 80 psi (550 kPa) can cause the humidifier to overflow.

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Table of contents

WARNINGS AND CAUTIONS	ii
OVERVIEW	2
Product overview	2
SPECIFICATIONS	4
Dimensional drawing	4
Voltages, weights, and dimensions	5
INSTALLATION	6
Dispersion options	6
Selecting a location	7
Humidifier	7
Control and dispersion devices	7
Mounting	8
Removing covers and steam cylinder	8
Wall mounting humidifier	8
Installing steam cylinder	8
Piping:	9
Supply water and drain	9
Field piping overview	10
XTR steam blower and XTR fan pack	11
Field wiring	12
Sensor placement	18
Dispersion:	20
Selecting the location	20
Interconnecting piping requirements	21
XTR dispersion tube	22
XTR steam blower	24
XTR fan pack	27
OPERATION	32
Principle of operation	32
Control panel	34
Start-up	36
MAINTENANCE	38
Steam cylinder	38
Drain valve	39
Troubleshooting	40
Replacement parts:	45
Dispersion devices	45
XTR humidifier	46
WARRANTY	48

Download DriSteem literature

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

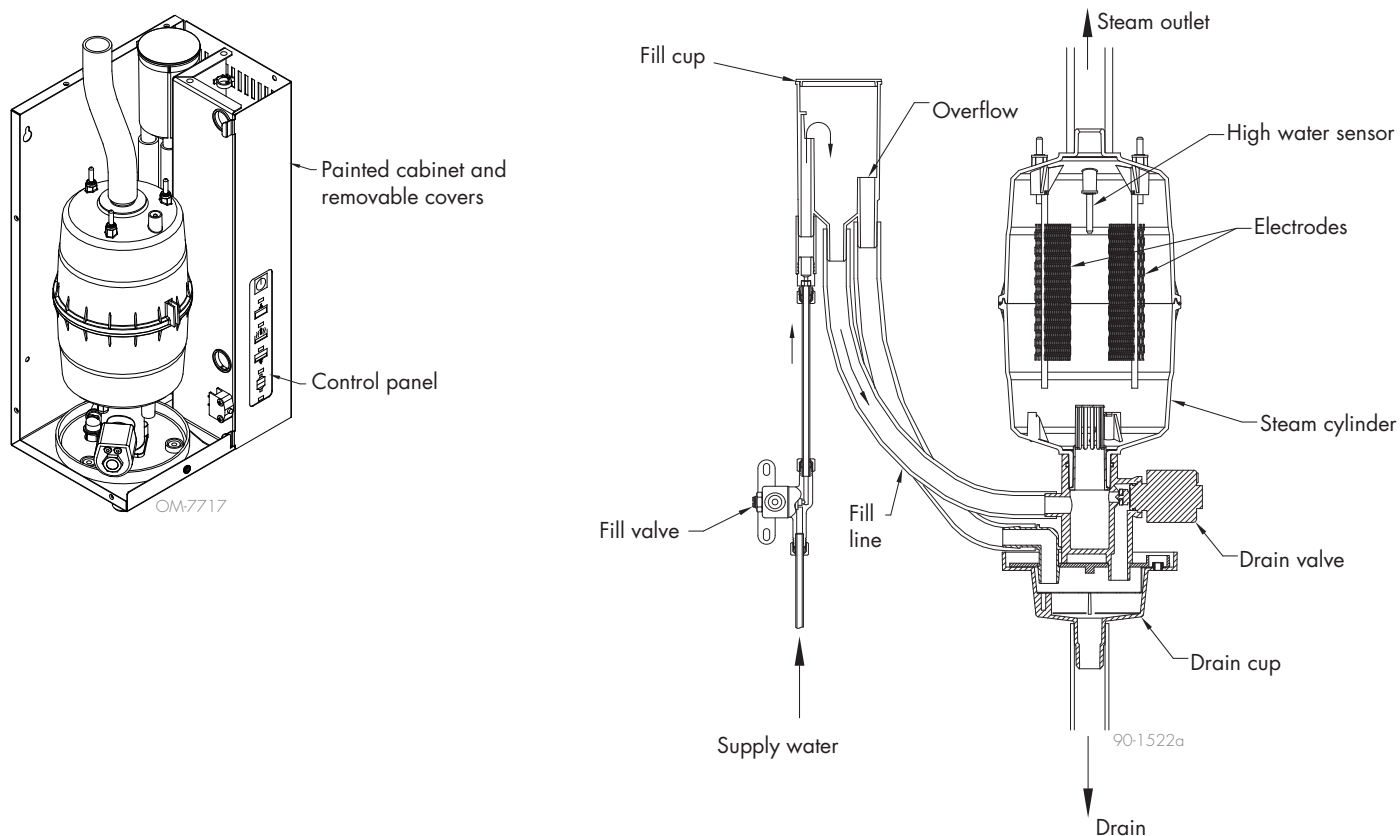
DriSteem Technical Support
800-328-4447

Product overview

HUMIDIFIER

DriSteem XTR electrode steam humidifiers use heat caused by electrical resistance in their fill water to boil the fill water into humidification steam. Steam output and water conductivity are managed via automatic draining and filling. See Figure 2-1.

FIGURE 2-1: XTR HUMIDIFIER COMPONENTS



Product overview

SUPPLY WATER

There are benefits and trade-offs to consider when the application allows a choice between hard and softened water:

Hard water: The benefit of hard water is less frequent draining and filling than with soft water, which results in better energy and water efficiency and more consistent steam output. However, cylinder replacement could be more frequent with hard water, because hard water scale coats the electrodes. The harder the water, the more frequent the need for a new cylinder.

Softened water: The benefit of softened water is longer cylinder life (depending on water chemistry) than with hard water, because softened water does not coat the electrodes as much as hard water. However, softened water ions stay in solution to much higher concentrations than hard water ions. This requires more frequent draining and filling, which results in less energy and water efficiency and less consistent steam output.

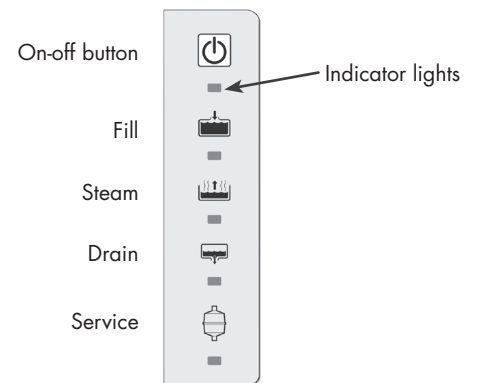
CONTROL PANEL

The XTR humidifier controller provides push-button operation and indicator lights for operating status and troubleshooting information. See "Operation" beginning on Page 32 for details.

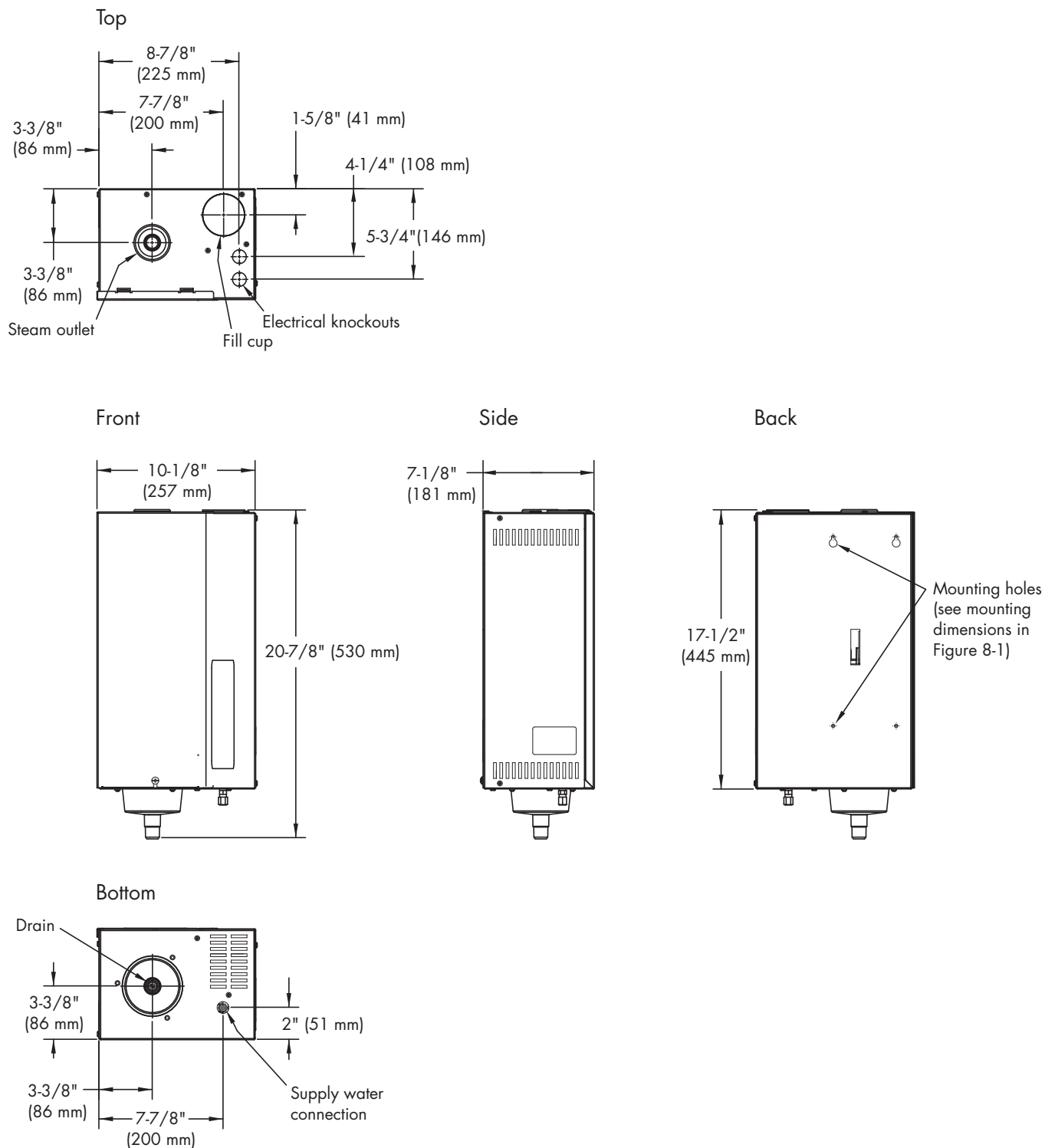
Important:

- Recommended supply water conductivity for DriSteem electrode humidifiers is 125 to 1250 $\mu\text{S}/\text{cm}$ (roughly comparable to water hardness of 3 to 36 grains per gallon).
- Demineralized, deionized, and reverse-osmosis water cannot be used. These water types are not conductive enough for electrode humidifiers.

FIGURE 3-1:
XTR HUMIDIFIER CONTROL PANEL



Dimensional drawing

FIGURE 4-1: XTR HUMIDIFIER DIMENSIONS


90-1701X
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Voltages, weights, and dimensions

Table 5-1:
XTR humidifier capacities and electrical specifications

Mode	Voltage	Input power	Nominal steam capacity		Nominal current draw	Maximum line current	Fuse
			lbs/hr	kg/h			
16 A	120V, 60 Hz	1.92 kW	5.6	2.5	16 A	19.2 A	25 A
	208V, 60 Hz	3.33 kW	9.9	4.5			
	230V, 50 Hz	3.68 kW	10.8	4.9			
	240V, 60 Hz	3.84 kW	11.3	5.1			
The XTR humidifier can be configured to operate in a current limited mode if lower maximum operating capacity is desired. See page 15 for setting this option.							
11.5 A	120V, 60 Hz	1.38 kW	4.0	1.8	11.5 A	13.8 A	25 A
	208V, 60 Hz	2.39 kW	7.1	3.2			
	230V, 50 Hz	2.65 kW	7.8	3.5			
	240V, 60 Hz	2.76 kW	8.1	3.6			

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Table 5-2:
XTR humidifier weights and dimensions

Shipping weight		Maximum operating weight		Dimensions					
				Width		Height		Depth	
lbs	kg	lbs	kg	inches	mm	inches	mm	inches	mm
27.0	12.2	23.0	10.4	10-1/8	257	20-7/8	530	7-1/8	181

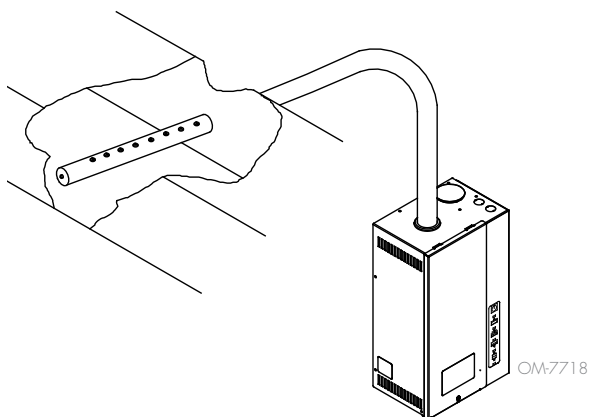
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Dispersion options

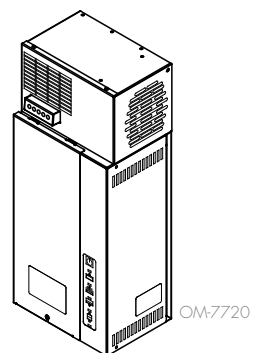
The dispersion options in Figure 6-1 are available for XTR humidifiers. For installation details, see "Dispersion" beginning on Page 7.

FIGURE 6-1: XTR HUMIDIFIER DISPERSION OPTIONS

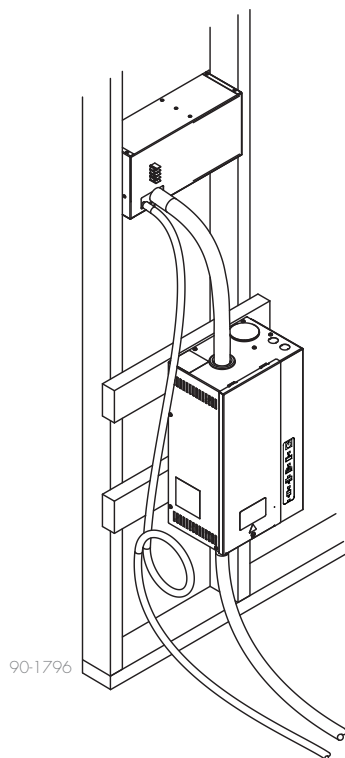
XTR dispersion tube in a duct



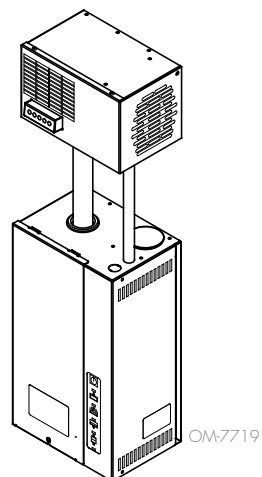
XTR steam blower mounted on top of humidifier



XTR fan pack



Remote-mounted XTR steam blower



Selecting a location

HUMIDIFIER

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

- **Proximity to duct**

Install the humidifier near the duct. The maximum recommended length for steam hose connecting an XTR humidifier to a dispersion tube is 6' (1.8 m).

See "Dispersion" beginning on Page 20.

- **Elevation of installed dispersion assembly**

The recommended installation location for the dispersion device is at an elevation higher than the humidifier. However, if the dispersion device must be installed at an elevation lower than the humidifier, install a drip tee and drain, as shown in Figure 19-3.

- **Temperature and relative humidity (RH):**

Install humidifier only in locations that meet the following temperature and RH requirements:

- Maximum ambient temperature: 104 °F (40 °C)
- Minimum ambient temperature: 41 °F (5 °C)
- Maximum ambient humidity: 80% RH (non-condensing)

- **Recommended clearances** (see Figure 7-1)

- **Electrical connections**

See "Field wiring" beginning on Page 12.

- **Supply water and drain piping connections**

See "Piping" on Page 9.

- **Exterior wall insulation**

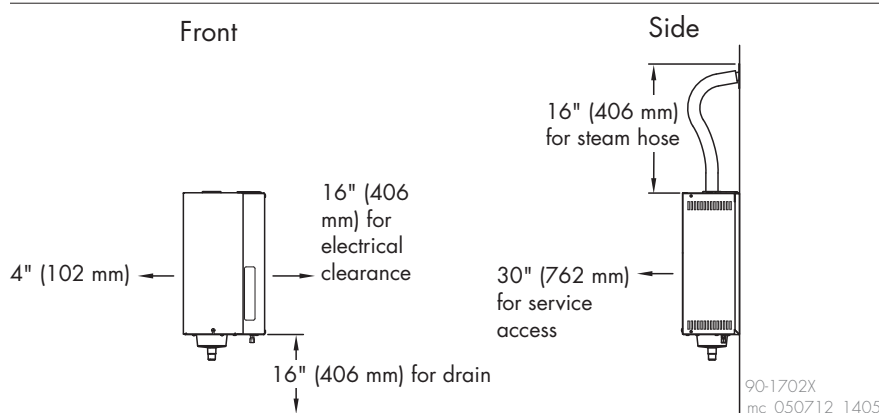
Install the humidifier on an exterior wall only if the wall is properly insulated.

Control and dispersion devices

See "Sensor placement" on Page 18.

See "Dispersion" beginning on Page 20.

FIGURE 7-1: XTR HUMIDIFIER RECOMMENDED MINIMUM CLEARANCES



Mounting

REMOVING COVERS AND STEAM CYLINDER

1. Unpack humidifier from shipping carton, and remove front cover by removing screw and lifting cover up and away from humidifier.
2. If any wires are connected to top cylinder, pull straight up on plugs to disconnect them from pins.
3. Remove cylinder and any packaging from inside of humidifier cabinet.
4. Remove two screws on right side of humidifier and remove side cover to expose electrical compartment.

WALL MOUNTING HUMIDIFIER

The XTR humidifier weighs 23 lbs (10.5 kg) with a full cylinder. Make sure the mounting system will support its weight. Secure humidifier to sturdy wall or to sheet metal duct. If mounting to stud frame wall:

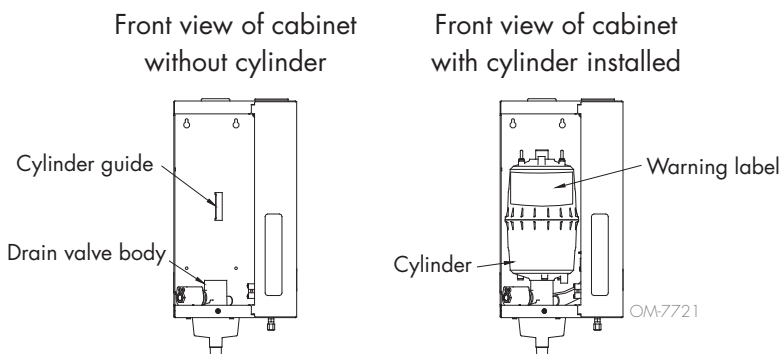
1. Install two spanner boards spanning two studs. Position top spanner board so it will align with top of cabinet, and center bottom spanner board on bottom mounting holes. See mounting holes in Figure 8-1.
2. Predrill holes in spanner boards, and secure humidifier to spanner boards with screws provided.

Note: Use appropriate mounting methods and mounting hardware for other mounting surfaces.

INSTALLING STEAM CYLINDER

1. Verify that O-ring is in place in slot of drain body. See Figure 8-2.
2. Use water to lubricate drain outlet on bottom of cylinder and O-ring in drain valve body. Do not use oil, grease or any lubricant.
3. Insert cylinder drain outlet into drain valve body, and rotate cylinder so Warning label is visible.
4. Attach the two electrode wires (they are interchangeable) and high water sensor wire to pins on top of cylinder. Make sure plugs fit snugly and are fully engaged on pins.

FIGURE 8-2: XTR STEAM CYLINDER INSTALLATION



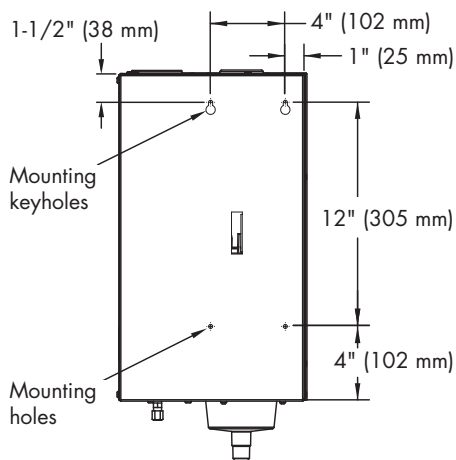
WARNING

Mounting hazard

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

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FIGURE 8-1: XTR HUMIDIFIER MOUNTING HOLES



90-1701-dims
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Piping: Supply water and drain

SUPPLY WATER QUALITY

XTR humidifiers use tap water to generate humidification steam. Recommended supply water conductivity for DriSteem electrode humidifiers is 125 to 1250 $\mu\text{S}/\text{cm}$ (roughly comparable to water hardness of 3 to 36 grains per gallon). Do not use 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. The fill valve connection size is a 1/4" (DN8) compression fitting.

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 9-1.

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

ACTIVATING AUTOMATIC DRAIN WATER TEMPERING

The XTR humidifier is shipped with drain water tempering set to OFF. To activate automatic drain water tempering, locate the DIP switch #4 on the control board, and place it in the ON position as shown in Figure 15-1.

Note: Control board location is shown in Figure 42-1.

Important:

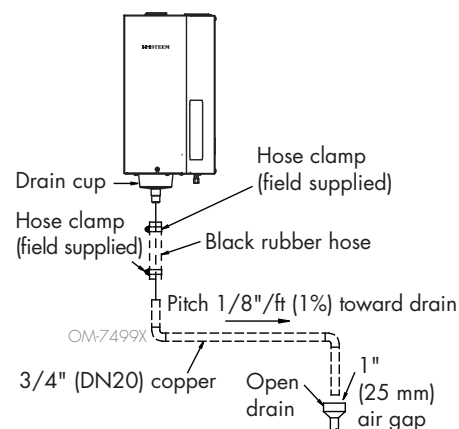
Thoroughly flush the supply water piping to remove pipe residue and stagnant water before connecting piping to the humidifier. Pipe residue and stagnant water in the water supply piping can cause foaming, preventing the humidifier from reaching the required steam capacity.

! WARNING

Hot drain pipes

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

FIGURE 9-1: DRAIN PIPING DETAIL



Note: Dashed lines indicate provided by installer.

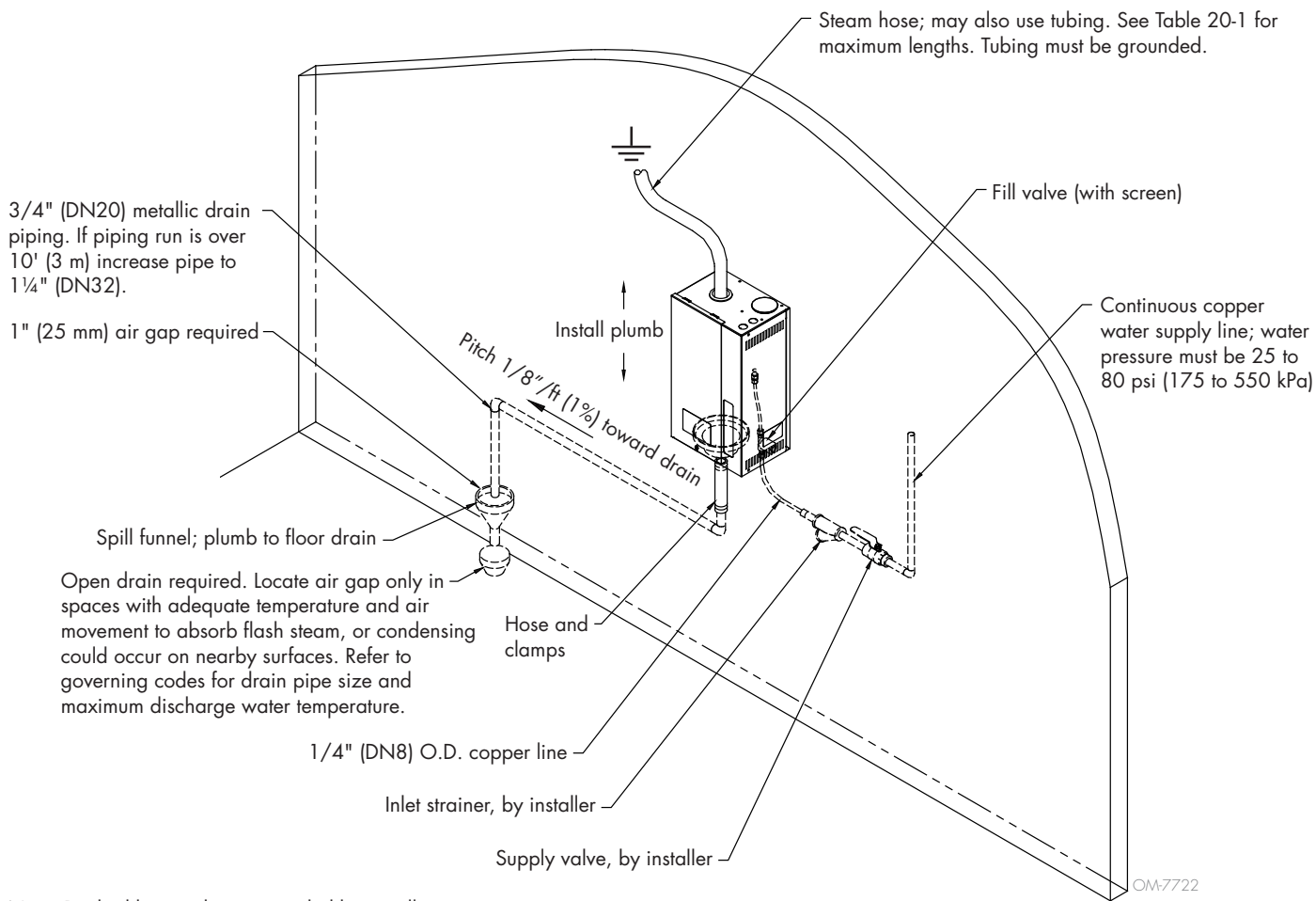
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CAUTION

To prevent drain steam from condensing on the cabinet, do not install the drain under the humidifier.

Piping: Field piping overview

FIGURE 10-1: XTR HUMIDIFIER FIELD PIPING OVERVIEW



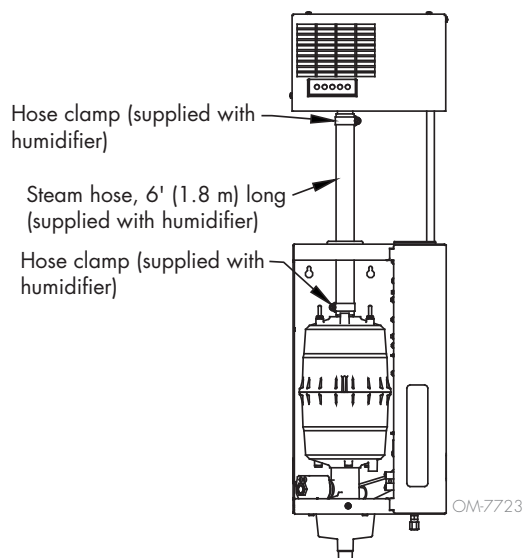
Note: Dashed lines indicate provided by installer.

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Piping: XTR steam blower and XTR fan pack

FIGURE 11-1: PIPING CONNECTIONS TO XTR STEAM BLOWER

XTR steam blower mounted remotely



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XTR steam blower mounted directly on top of XTR humidifier

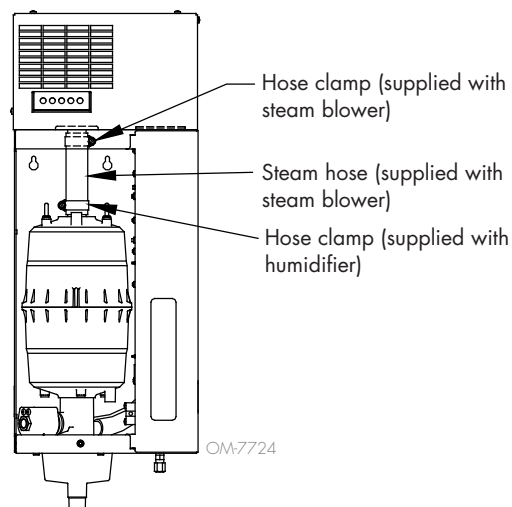
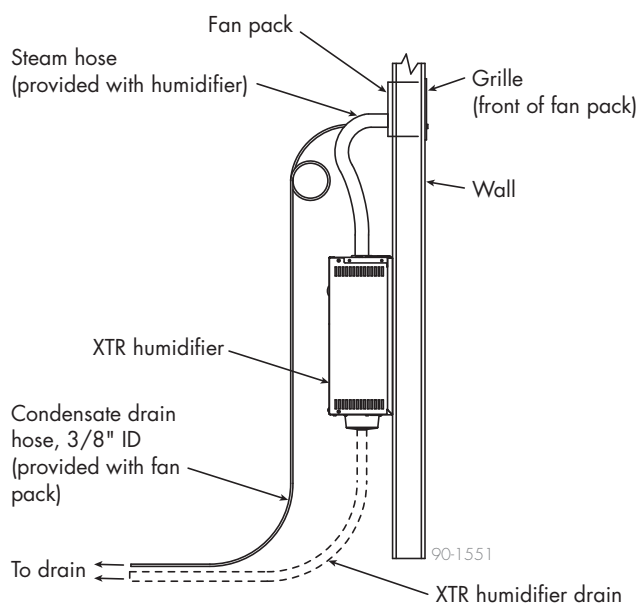


FIGURE 11-2: PIPING CONNECTIONS TO XTR FAN PACK

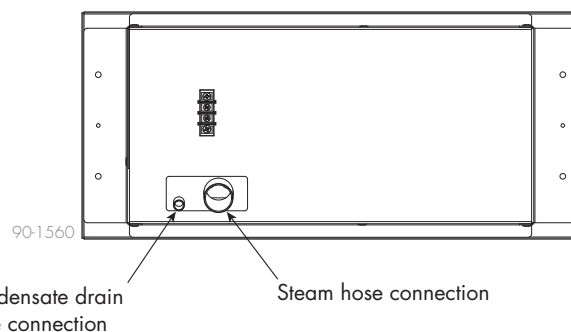
Side view of wall



Note: Dashed lines indicate provided by installer.

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Back view of fan pack



Field wiring

All wiring must be code approved and in accordance with the unit wiring diagram. Power supply wiring must be rated for 220 °F (105 °C). See Figure 12-1 for the humidifier wiring diagram location.

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.

CONDUIT KNOCKOUTS

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

CAUTION

Adding conduit connections not recommended

Adding alternate conduit connections is not recommended. If you must make additional holes in the humidifier cabinet, protect all internal components from debris, and vacuum out the cabinet when finished. Failure to follow these precautions can damage sensitive electronic components and void the DriSteem warranty.

FIELD WIRING CONNECTION INSTRUCTIONS

- **Connect to line power.**

XTR humidifier is shipped configured for 230V or 240V. To configure for 120V or 208V, refer to wiring diagram on humidifier subpanel and inside of humidifier side cover.

See Table 5-1 and the data plate on outside of cabinet for nominal current draw, maximum line current, and recommended fusing.

- **Connect to control signal wiring** from a humidistat. See note below.
- **Connect to duct airflow proving switch and duct high limit humidistat wiring** (recommended optional devices). See note below.

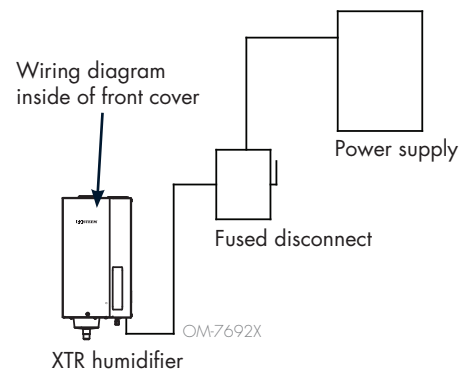
Note: See recommended control wiring in Figure 14-1.

WARNING

Electric shock hazard

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

FIGURE 12-1:
FIELD WIRING REQUIREMENTS



Notes:

- Control wiring and power wiring must be run in dedicated or separate earthed metal conduit, cable trays, or trunking.
- Separate line-voltage wiring from low-voltage control circuit wiring when routing electrical wiring inside humidifier cabinet.
- Do not use chassis or safety grounds as current-carrying commons. Never use a safety ground as a conductor or neutral to return circuit current.
- For circuit protection requirements, see recommended fusing in Table 5-1.

Field wiring

EARTH GROUNDING REQUIREMENTS

A code-approved safety earth grounding system 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 COMPONENT PLACEMENT

Follow the guidelines on Page 18 for placing humidistats, transmitters, and airflow proving switches.

CONTROL INPUT WIRING

XTR humidifiers accept RH signals from DriSteem control components. For wiring connection requirements, first determine which control scenario applies. Then, refer to the control input wiring diagram in the humidifier cabinet.

WARNING

Excessive moisture hazard

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

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Proper wiring prevents electrical noise.

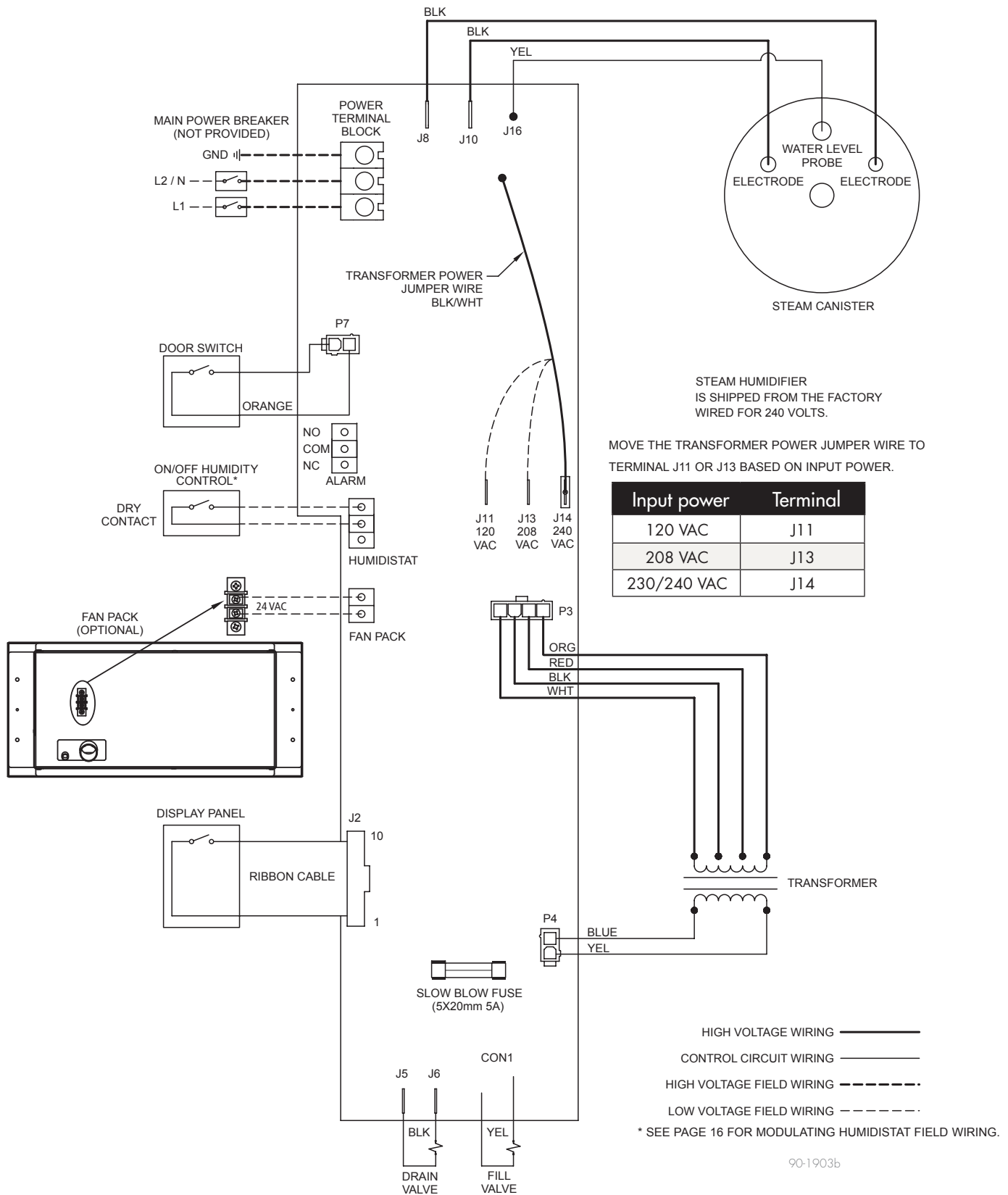
Electrical noise can produce undesirable effects on electronic control circuits, which affects controllability. Electrical noise is generated by electrical equipment such as inductive loads, electric motors, solenoid coils, welding machinery, or fluorescent light circuits. The electrical noise or interference 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.

Field wiring

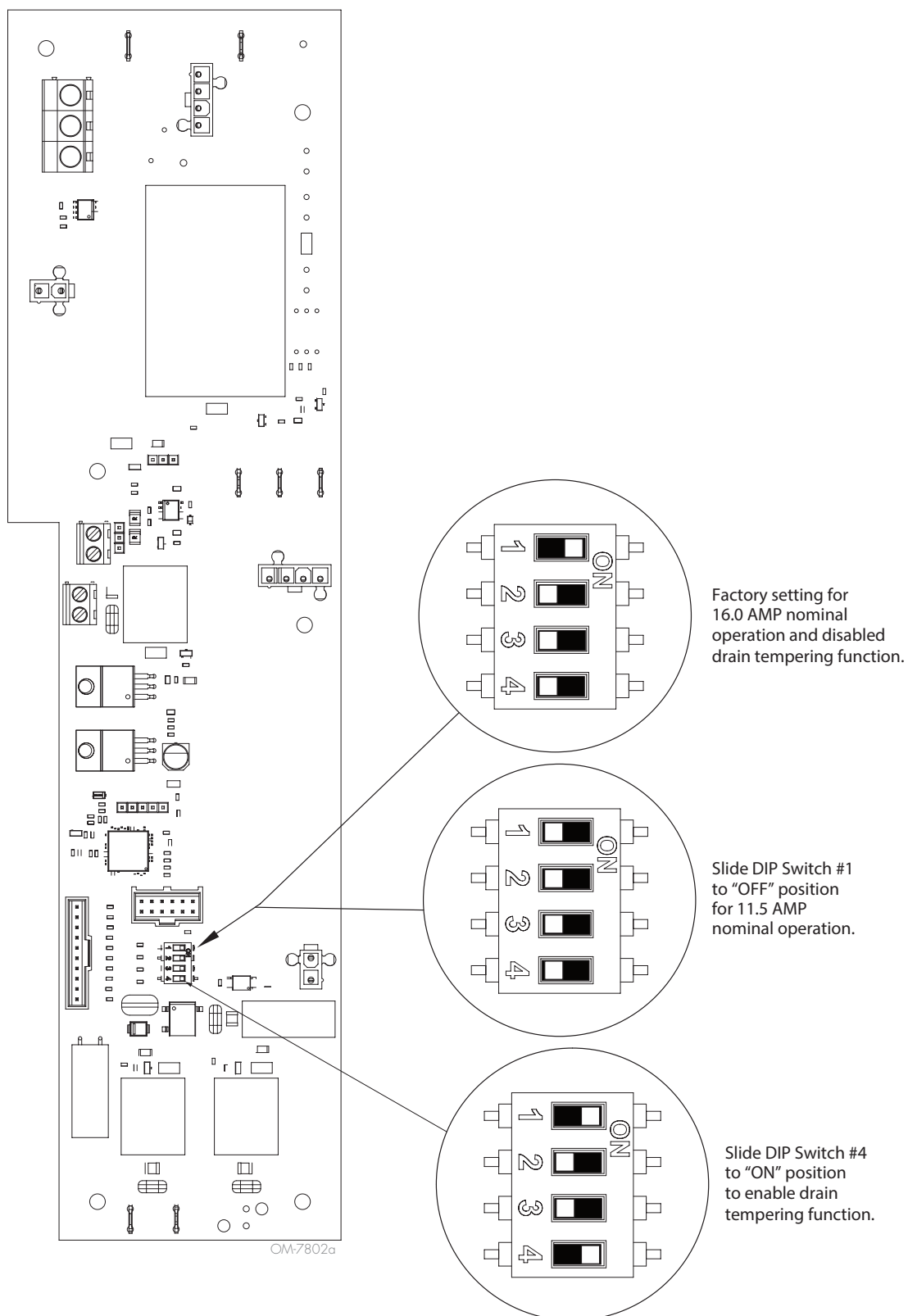
FIGURE 14-1: XTR CONTROL BOARD WIRING



90-1903b

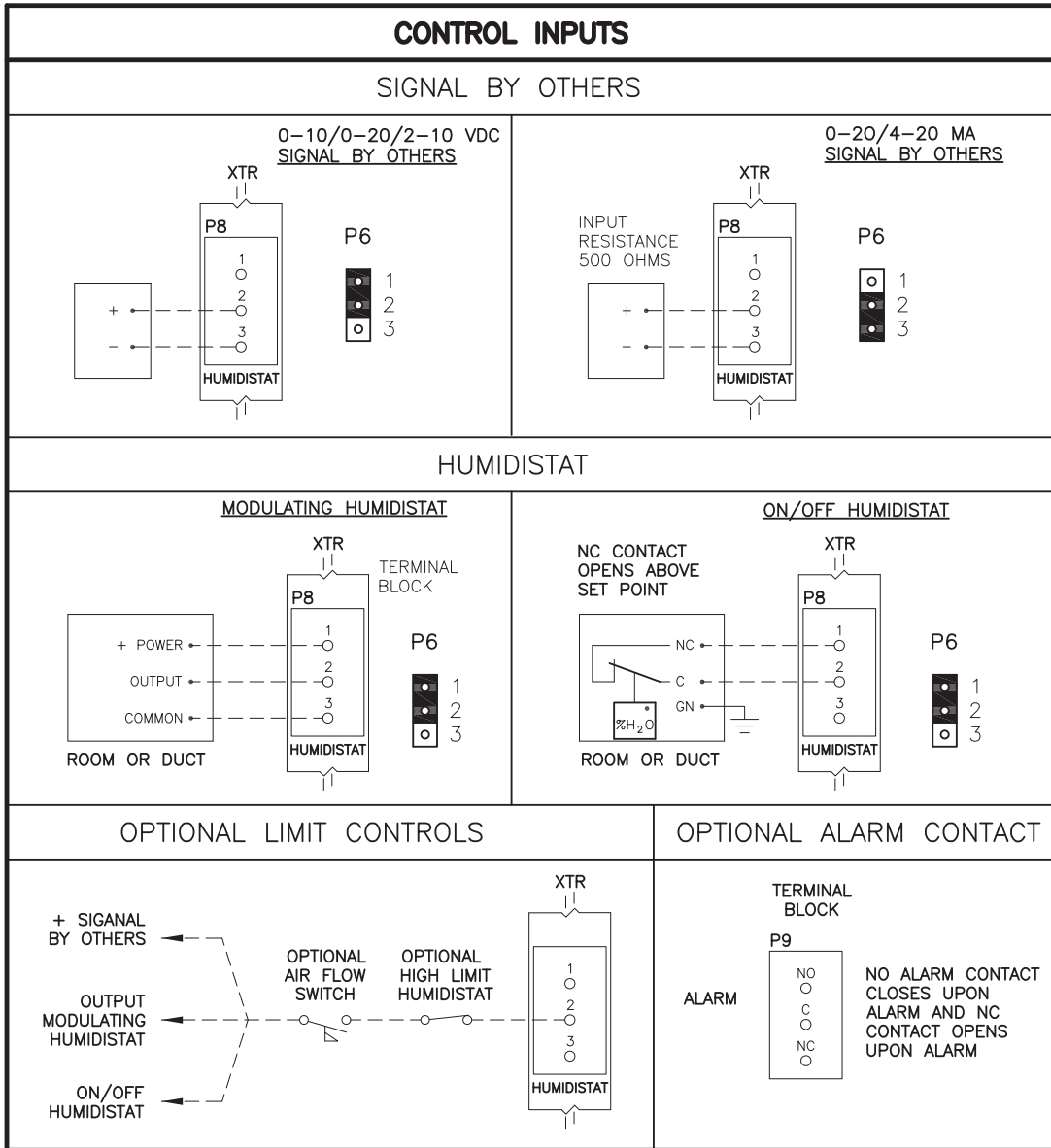
Field wiring

FIGURE 15-1: XTR CONTROL BOARD



Field wiring

FIGURE 16-1: XTR EXTERNAL CONTROL CONNECTIONS



XTR-2

* SHUNT P6 IS LOCATED NEXT TO TERMINAL BLOCK P8
FACTORY DEFAULT IS TERMINALS 1 & 2.

CONTROL CIRCUIT
WIRING

FIELD WIRING

OPTIONAL FACTORY

OPTIONAL FIELD

CONTROL DIP SWITCH SETTING

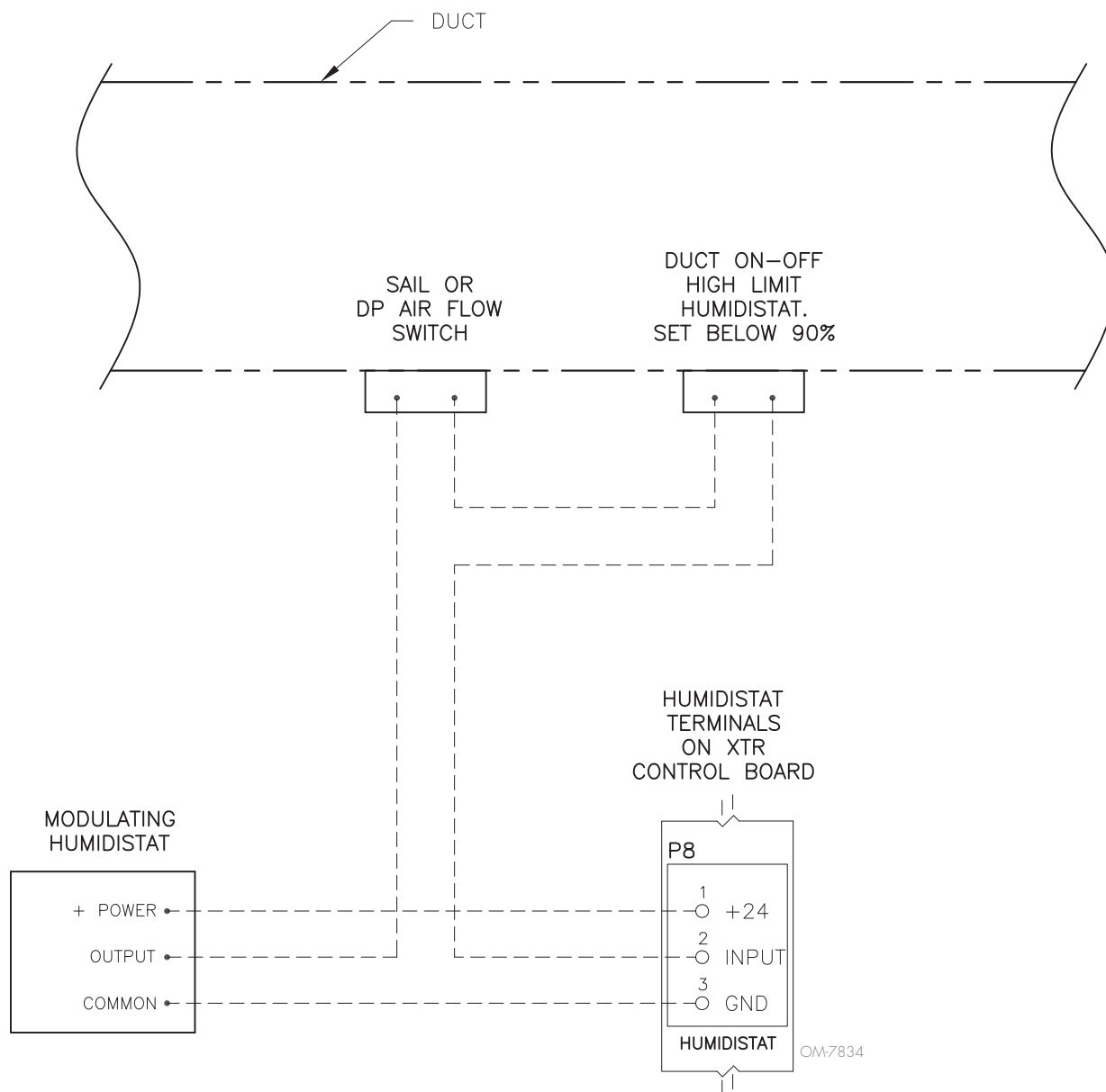
DIP 2	DIP 3	SIGNAL TYPE
OFF	OFF	ON/OFF HUMIDISTAT
ON	OFF	0-20 VDC
OFF	ON	0-10 VDC (OR) 0-20MA
ON	ON	2-10 VDC (OR) 4-20MA

XTR HUMIDISTAT CONNECTION TERMINALS

LABEL	FUNCTION
1	+24 VDC
2	INPUT
3	GROUND

Field wiring

FIGURE 17-1: TYPICAL MODULATING CONTROL WIRING



Sensor placement

SENSOR LOCATION IS CRITICAL

Sensor location has a significant impact on humidifier performance. See the recommendations below and Figure 15-1.

Note: Use humidity sensing devices only in their intended location. Room humidity devices are calibrated with zero or little airflow, whereas duct humidity devices require air passing across them.

Recommended humidity control (transmitter/humidistat) locations:

- A. Ideal. Ensures the best uniform mix of dry and moist air with stable temperature control.
- B. Acceptable, but room environment can affect controllability, such as when sensor is too close to air grilles, registers, or heat radiation from room lighting.
- C. Acceptable. Provides uniform mixture of dry and moist air. If extended time lag exists between humidity generation and sensing, extend sampling time.
- D. Acceptable (behind wall or partition) for sampling entire room if sensor is near an air exhaust return outlet. Typical placement for sampling a critical area.
- E. Not acceptable. These locations might not represent actual overall conditions in the space.
- F. Not acceptable. Do not place sensors near windows, door passageways, or areas of stagnant airflow.

Recommended safety (airflow and high limit) sensor location:

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

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Other factors affecting humidity control

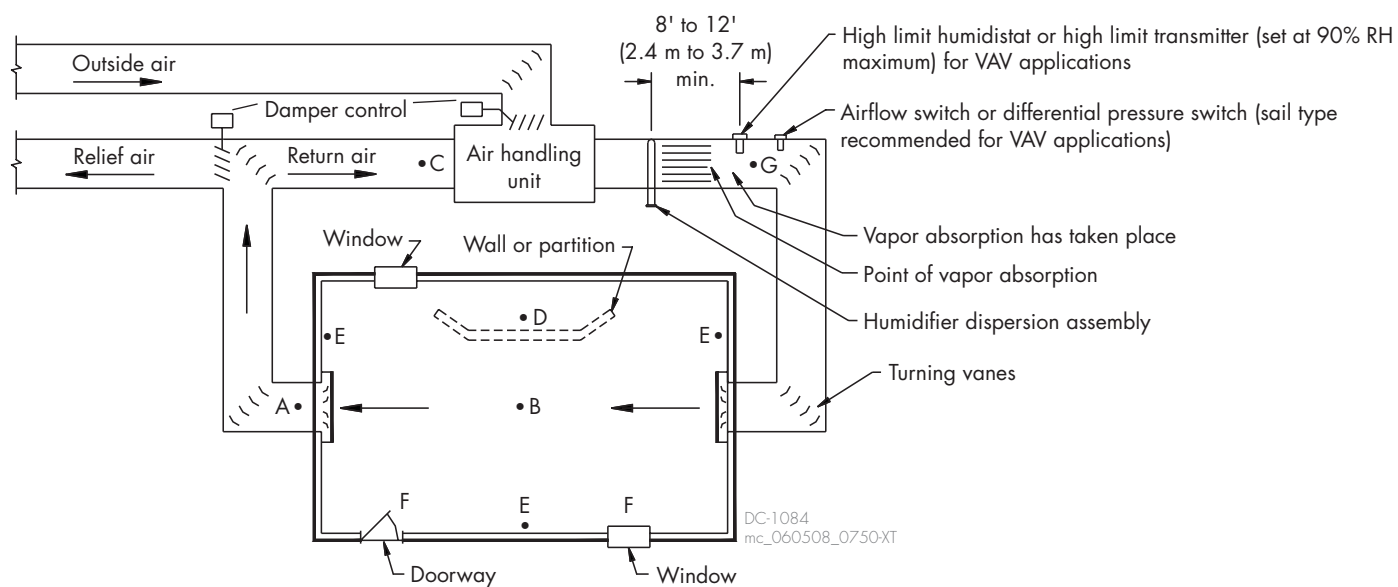
Humidity control involves more than the controller's ability to control the system. Other factors that play an important role in overall system control are:

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

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Sensor placement

FIGURE 19-1: RECOMMENDED SENSOR LOCATIONS



Dispersion: Selecting the location

For XTR steam blower and XTR fan pack location information, go to the page indicated below:

- **XTR steam blower:** Instructions begin on Page 24
- **XTR fan pack:** Instructions begin on Page 27

The XTR dispersion tube must be positioned in the duct where water vapor being discharged is carried off with the airstream and absorbed before it can cause condensation or dripping. DriSteam documents distances required for non-wetting to occur. Find more information about absorption non-wetting distances at www.dristeam.com.

- In general, dispersion tube is best placed where air can absorb moisture being added without causing condensation at or after dispersion tube. This normally will be after heating coil or where air temperature is highest.
- Place dispersion tube such that absorption will occur
 - before intake of a high efficiency filter, because filter can remove visible moisture and become waterlogged;
 - before coming in contact with any metal surface;
 - before fire or smoke detection devices;
 - before split in duct; otherwise, dispersion tube can direct more moisture into one duct than the other.

Important:

Failure to follow the recommendations in this section can result in excessive back pressure on the humidifier. This will result in unacceptable humidification system performance such as leaking gaskets, blown water seals, erratic water level control, and spitting condensate from dispersion tubes.

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Table 20-1:
Maximum steam carrying capacity and length of interconnecting steam hose and tubing

Developed length of steam hose or insulated tubing*		120V, 60 Hz				208V, 60 Hz				230V, 50 Hz				240V, 60 Hz			
		Steam hose		Insulated tubing		Steam hose		Insulated tubing		Steam hose		Insulated tubing		Steam hose		Insulated tubing	
ft	m	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h
< 2	< 0.6	4.0	1.8	4.0	1.8	7.1	3.2	7.1	3.2	7.8	3.5	7.8	3.5	8.1	3.7	8.1	3.7
2	0.6	3.8	1.7	3.8	1.7	7.0	3.2	7.0	3.2	7.7	3.5	7.7	3.5	8.0	3.6	8.0	3.6
4	1.2	3.5	1.6	3.8	1.7	6.6	3.0	7.0	3.2	7.3	3.3	7.7	3.5	7.6	3.4	8.0	3.6
6	1.8	3.1	1.4	3.8	1.7	6.3	2.9	7.0	3.2	7.0	3.2	7.3	3.3	7.3	3.3	7.6	3.4
8	2.4	—	—	3.5	1.6	—	—	6.6	3.0	—	—	7.3	3.3	—	—	7.6	3.4
10	3.0	—	—	3.5	1.6	—	—	6.6	3.0	—	—	7.3	3.3	—	—	7.6	3.4
12	3.7	—	—	3.5	1.6	—	—	6.6	3.0	—	—	7.3	3.3	—	—	7.6	3.4
14	4.3	—	—	3.1	1.4	—	—	6.3	2.9	—	—	7.0	3.2	—	—	7.3	3.3
16	4.9	—	—	3.1	1.4	—	—	6.3	2.9	—	—	7.0	3.2	—	—	7.3	3.3
18	5.5	—	—	3.1	1.4	—	—	6.3	2.9	—	—	7.0	3.2	—	—	7.3	3.3
20	6.1	—	—	3.1	1.4	—	—	6.3	2.9	—	—	6.7	3.0	—	—	7.0	3.2

Notes:

- * Developed length equals measured length plus 50% of measured length to account for fittings.
- DriSteam recommends 6' (1.8 m) maximum steam hose length pitched at 2"/ft (15%) toward humidifier. Steam hose tends to sag if not supported for its full length, which leads to collecting condensate and system pressure issues. Tubing sags less and can allow for 1/8"/ft (1%) pitch with longer runs.

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Dispersion: Interconnecting piping requirements

CONNECTING HUMIDIFIER TO DISPERSION DEVICE

- See Table 18-1 for interconnecting tubing and pitch requirements.
- Steam outlet on humidifier is sized to output of humidifier. **Do not** use interconnecting tubing with inside diameter smaller than 7/8" (22 mm). **Reducing inside diameter of interconnecting piping will result in internal humidifier system pressure exceeding the parameters for acceptable performance.**
- See Table 16-1 for the maximum steam carrying capacities.
- If humidifier must be located higher than dispersion tube, use recommend installation shown Figure 19-1.

CONNECTING HUMIDIFIER TO DISPERSION DEVICE WITH STEAM HOSE

- Support steam hose to prevent sags or low spots.
- Use DriSteem steam hose. Other manufacturers of steam 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 cylinder and accelerated steam hose aging. Foaming causes condensate discharge at the dispersion tube.
- Do not use steam hose in outdoor applications.
- Do not insulate steam hose. Insulation causes accelerated heat aging, causing steam hose to become hard and susceptible to failure due to cracks.

CONNECTING HUMIDIFIER TO DISPERSION DEVICE WITH TUBING

- 90° elbows are not recommended; use two 45° elbows, 1' (0.3 m) apart.
- Insulate tubing to reduce the loss in output caused by condensation.

WARNING

Hot surface and steam hazard

Dispersion device, steam hose, and tubing can contain steam, and surfaces can be hot. Discharged steam is not visible.

To avoid burns, do not touch dispersion tube, front of steam blower, or front of fan pack, and do not put any part of body in front of steam outlets. Avoid contact with hot surfaces and air into which steam has been discharged.

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CAUTION

Each humidifier requires its own steam hose and dispersion tube. Do not connect steam hoses from more than one humidifier together. Back-pressure from one humidifier can lower the water level in the cylinder in the other humidifier and cause operational problems.

Do not install the dispersion tube in a duct with greater than 2" wc (498 Pa) static pressure. High duct pressure can cause back-pressure in the cylinder which can result in unstable humidifier operation.

Condensate control and collection

Controlling condensate flow and collection is critical to XTR humidifier performance. To maximize performance, follow all installation recommendations for your specific humidifier voltage and dispersion device.

Dispersion: XTR dispersion tube

If dispersing steam with the XTR steam blower or XTR fan pack, skip this procedure and go to the page listed below.

- **XTR steam blower:** Instructions begin on Page 24
- **XTR fan pack:** Instructions begin on Page 27

DISTANCE FROM HUMIDIFIER TO XTR DISPERSION TUBE

The maximum recommended length of steam hose is 6' (1.8 m). Longer runs of steam hose or tubing result in more condensation.

Note: If 6' (1.8 m) steam hose does not reach from humidifier to dispersion tube, extend run to a maximum of 20' (6 m) with copper tube as shown in Figure 19-2. Insulate the tubing with 1" (25 mm) of fiberglass to minimize loss of capacity and efficiency.

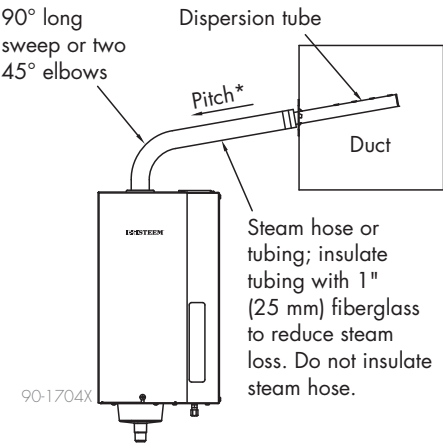
INSTALLING DISPERSION TUBE IN DUCT

Make sure dispersion tube is mounted higher than humidifier so condensate that forms in tube runs back to cylinder. See Figure 22-1.

Note: If dispersion tube cannot be mounted higher than humidifier, or if steam hose must extend up from humidifier then down to dispersion tube (due to an obstruction), install a drip tee. See Figure 19-3.

1. Drill 1-1/4" (32 mm) diameter hole in vertical surface of duct at location chosen for dispersion tube.
2. Position dispersion tube so it is angled up, regardless of airflow direction. Secure with four sheet metal screws provided.

FIGURE 22-1: XTR DISPERSION TUBE MOUNTED HIGHER THAN HUMIDIFIER



- * Pitch toward humidifier:
- 2"/ft (15%) minimum when using steam hose
 - 1/4"/ft (2%) when using tubing

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Table 22-1: Pitch of XTR dispersion tube and interconnecting piping*				
Condensate drain	Type of interconnecting piping	Diameter of dispersion tube and interconnecting piping	Pitch of interconnecting piping	Pitch of dispersion tube
None	Steam hose	7/8" (22 mm)	2"/ft (15%) toward humidifier	2"/ft (15%) toward humidifier
	Tubing	7/8" (22 mm)	1/8"/ft (1%) toward humidifier	
* When piping over an obstruction, see the drip tee installation illustration in Figure 19-1.				

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Dispersion: XTR dispersion tube

FIGURE 23-1: XTR DISPERSION TUBE DIMENSIONS

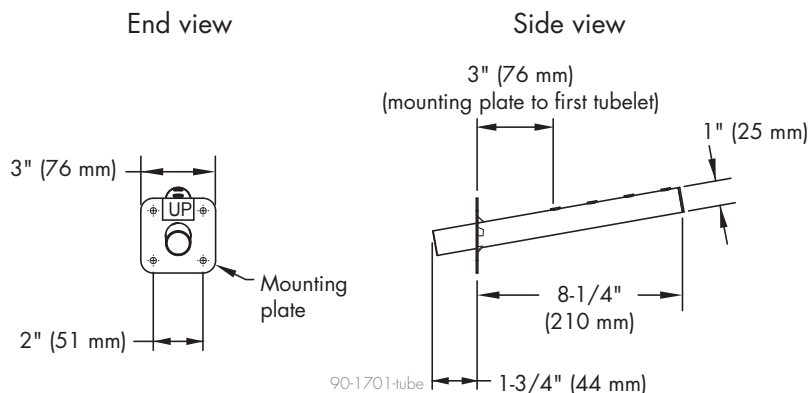
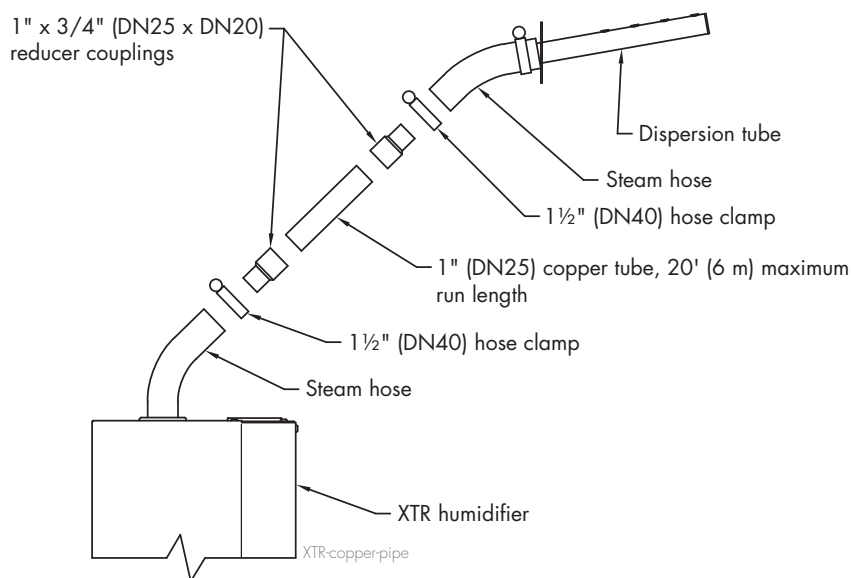
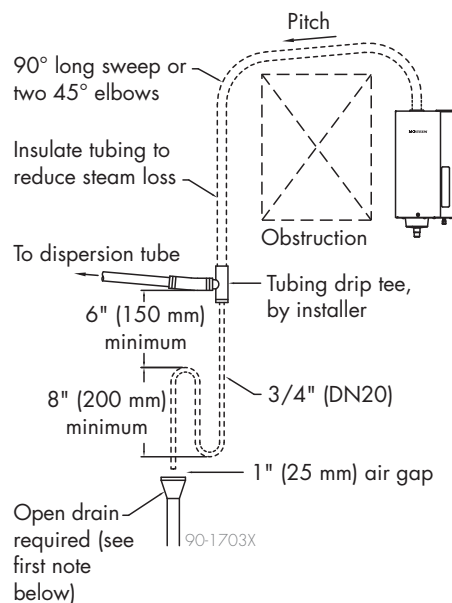


FIGURE 23-3: EXTENDING DISTANCE FROM HUMIDIFIER TO DISPERSION TUBE WITH COPPER TUBE



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FIGURE 23-2: DRIP TEE INSTALLATION FOR DISPERSION TUBE LOWER THAN HUMIDIFIER (OR 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 steam hose so there are no sags or low spots
- Dashed lines indicate provided by installer

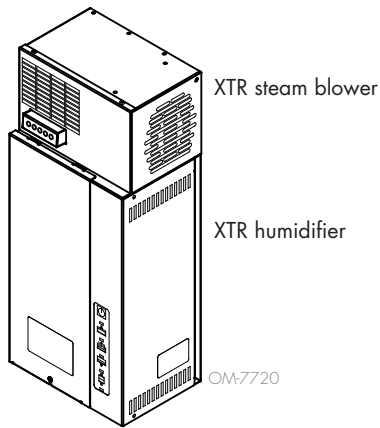
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Dispersion: XTR steam blower

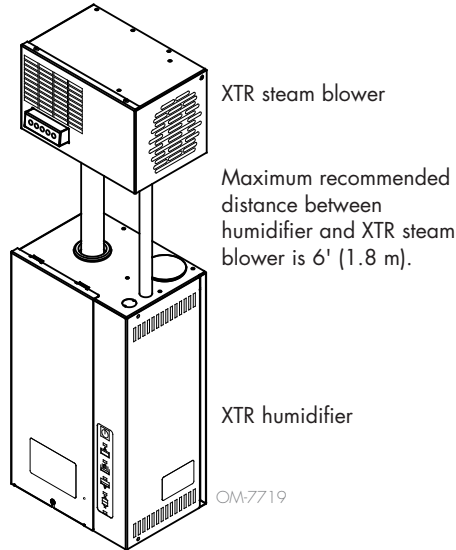
XTR steam blowers are designed for use in finished spaces. They disperse steam into large open spaces and are useful where there are no air-handling ducts.

FIGURE 24-1: XTR STEAM BLOWER DISPERSION

Mounted on top of the humidifier



Mounted remotely from the humidifier



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Table 24-1:

XTR steam blower rise, spread, and throw non-wetting distances for 16.0 Amp current mode

XTR humidifier voltage	Maximum steam capacity		30% RH @ 70 °F (21 °C)						50% RH @ 70 °F (21 °C)					
			Rise		Spread		Throw		Rise		Spread		Throw	
	lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
120	5.6	2.5	1.4	0.4	1.2	0.4	3.8	1.2	2.4	0.7	1.4	0.4	5.2	1.6
208	9.9	4.5	2.4	0.7	1.4	0.4	4.1	1.3	3.2	1.0	1.6	0.5	5.7	1.7
230	10.8	4.9	2.8	0.9	1.5	0.5	4.3	1.3	3.5	1.1	1.7	0.5	6.1	1.9
240	11.3	5.1	2.9	0.9	1.5	0.5	4.3	1.3	3.6	1.1	1.7	0.5	6.2	1.9

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

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Dispersion: XTR steam blower

On a call for humidity the XTR humidifier produces steam and provides power to the XTR steam blower. The steam blower distributes the steam to the room. When the call for humidity ends and the humidifier stops producing steam, the steam blower operates for another two minutes to distribute the remaining steam before deactivating.

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

Table 20-1 lists the maximum rise, spread, and throw non-wetting distances for XTR humidifiers with XTR steam blowers. Surfaces cooler than ambient temperature, or objects located within this minimum dimension, could cause condensation and dripping. To avoid steam impingement on surrounding areas, observe the minimum non-wetting distances in the table.

DISTANCE FROM HUMIDIFIER TO XTR STEAM BLOWER

The maximum recommended length of steam hose is 6' (1.8 m). Longer runs of steam hose or tubing result in more condensation.

MOUNTING

The XTR steam blower can be mounted directly on top of an XTR humidifier or remotely from the humidifier. See Figure 20-1. 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 (see Figure 25-1) and predrill 1/8" (3 mm) diameter pilot holes. Secure with screws provided.

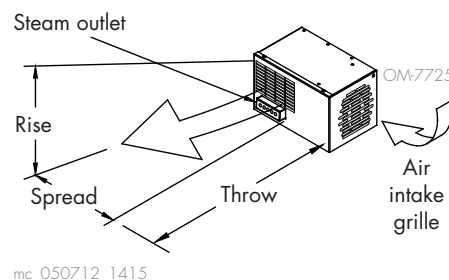
Note: Use the appropriate mounting methods and mounting hardware for other mounting surfaces.

Securing the steam blower to a stud wall or using anchors for other types of wall are both acceptable for mounting in finished spaces.

- Always take care to avoid excess stress on blower and humidifier when performing maintenance.
- To determine steam blower clearance requirements and account for minimum non-wetting distances, see Figure 25-1 and Table 20-1.

Continued

FIGURE 25-1: XTR STEAM BLOWER RISE, SPREAD, THROW



mc_050712_1415

**Table 25-1:
XTR steam blower specifications**

Steam blower model	Shipping weight		Operating weight		Sound*
	lbs	kg	lbs	kg	dBA*
SDU-003E	8.8	4.0	6.8	3.1	< 38

Notes:

- * Sound measurement taken 6.5' (2 m) in front of steam blower cabinet.
- Input voltage: 24 VAC, supplied by XTR humidifier.
- Steam blower ships separately from humidifier.

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Dispersion: XTR steam blower

MOUNTING (CONTINUED)

- Provide at least 4" (102 mm) clearance on each side of XTR steam blower for air intake.
- Pitch entire length of interconnecting steam hose or tubing between humidifier and remote-mounted steam blower toward humidifier without sags or low spots. Condensate that forms in XTR steam blower must be able to drain back to steam cylinder.
- XTR steam blower is constructed with a pitch toward the drain; however, steam blower frame must be installed plumb and level for proper drainage. See Warning at left.
- If mounting the XTR steam blower remotely from humidifier, see "Interconnecting piping requirements" on Page 17.

WIRING

XTR steam blowers are powered by the XTR humidifier blower terminals. Connect the leads from the steam blower to terminals 7 and 8 on the XTR circuit board. Be sure to tighten terminals securely. An external connections wiring diagram is included with the XTR steam blower.

 **WARNING**

Standing water in XTR steam blower

Make sure the XTR steam blower is installed plumb. If not installed plumb, standing water can accumulate, which can:

- Cause bacteria and mold growth, which can cause illness;
- Affect steam blower performance;
- Cause 212 °F (100 °C) water to discharge from the steam blower, which can cause severe personal injury.

FIGURE 26-1: XTR STEAM BLOWER DIMENSIONS

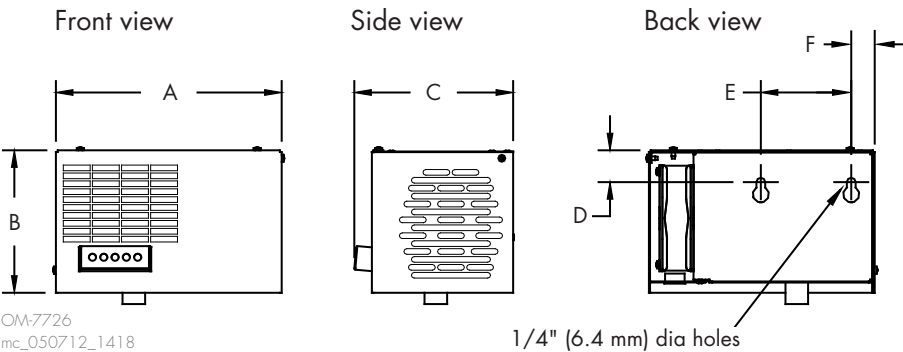


Table 26-1: XTR steam blower dimensions		
Dimension	inches	mm
A	10	254
B	6-1/4	159
C	7	178
D	1-3/8	35
E	4	102
F	1	25

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Dispersion: XTR fan pack

XTR fan packs are designed for use in finished spaces. They disperse steam into large open spaces and are useful where there are no air-handling ducts.

On a call for humidity the XTR humidifier produces steam and provides power to the XTR fan pack. The fan pack distributes the steam to the room. When the call for humidity ends and the humidifier stops producing steam, the fan pack operates for another two minutes to distribute the remaining steam before deactivating.

Due to condensation inside the hose or tubing, the output of the fan pack depends on the length of the steam hose or tube connecting it to the humidifier. When the humidifier is wired to 120V, the fan pack will deliver 5.6 lbs/hr (2.5 kg/h) of steam with up to 24" (610 mm) of steam hose or insulated tubing. Each additional 24" of hose or tubing will reduce steam output by approximately 0.3 lbs/hr (0.1 kg/h).

DISTANCE FROM HUMIDIFIER TO XTR FAN PACK

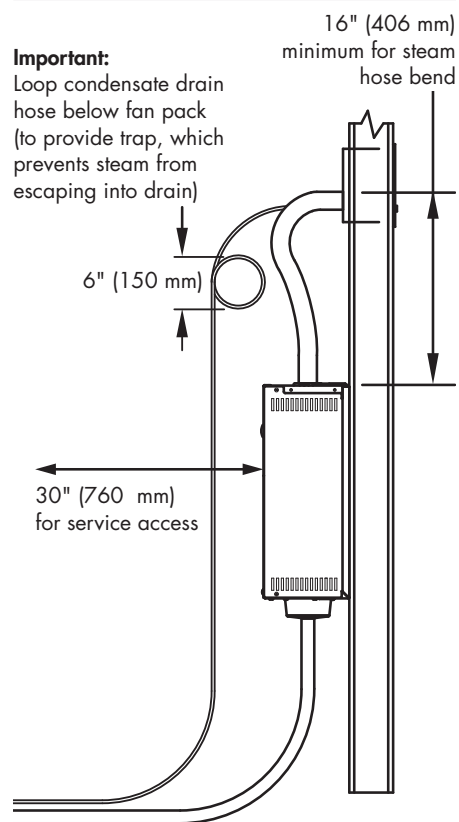
The XTR fan pack must be mounted near the XTR humidifier to minimize the steam hose length. If the fan pack is mounted directly above the humidifier, 16" (406 mm) of clearance is required for the steam hose to make the bend without kinking, as shown in Figure 23-1.

- See the XTR fan pack dimensions in Figure 24-1.
- See the piping connection notes in Figure 11-2.

The maximum recommended length of steam hose is 6' (1.8 m). Longer runs of steam hose or tubing result in more condensation.

Note: If 6' (1.8 m) of steam hose does not reach from the humidifier to the fan pack, extend the run to a maximum of 20' (6 m) with copper tubing as shown in Figure 24-2. Insulate the tubing with 1" (25 mm) of fiberglass to minimize loss of capacity and efficiency.

FIGURE 27-1: XTR FAN PACK AND HUMIDIFIER RECOMMENDED DIMENSIONS AND CLEARANCES



Note: See Figure 25-1 for fan pack clearance recommendations in the humidified space.

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90-1551-clearance

Dispersion: XTR fan pack

FIGURE 28-1: XTR FAN PACK DIMENSIONS

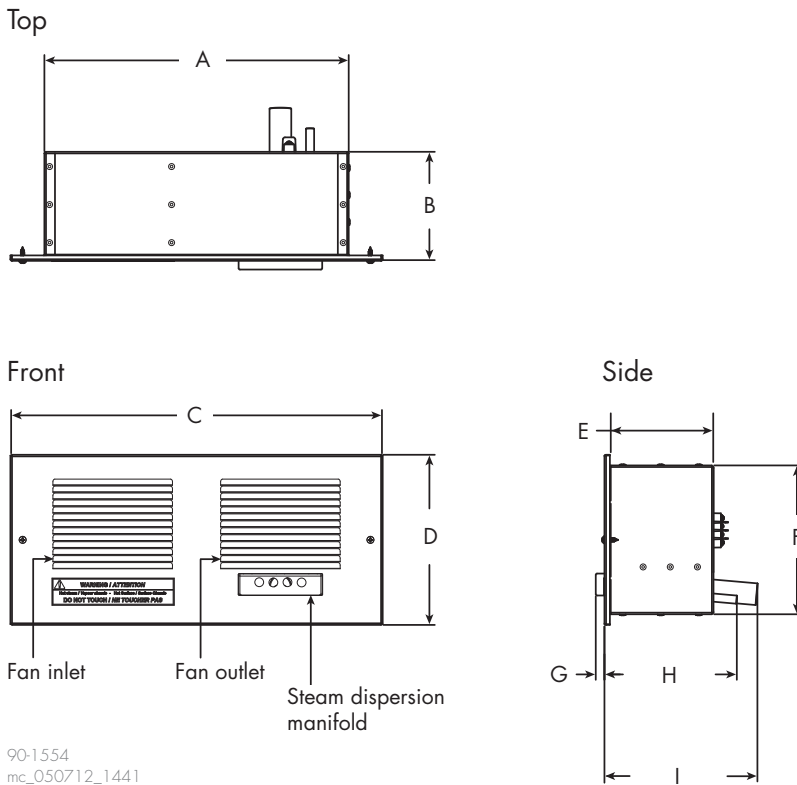


Table 28-1:
XTR fan pack dimensions

Dimension	inches	mm
A	14	356
B	5	127
C	17-1/16	433
D	7-13/16	198
E	4-3/4	121
F	6-7/8	175
G	3/8	10
H	6-1/16	154
I	7-1/16	179

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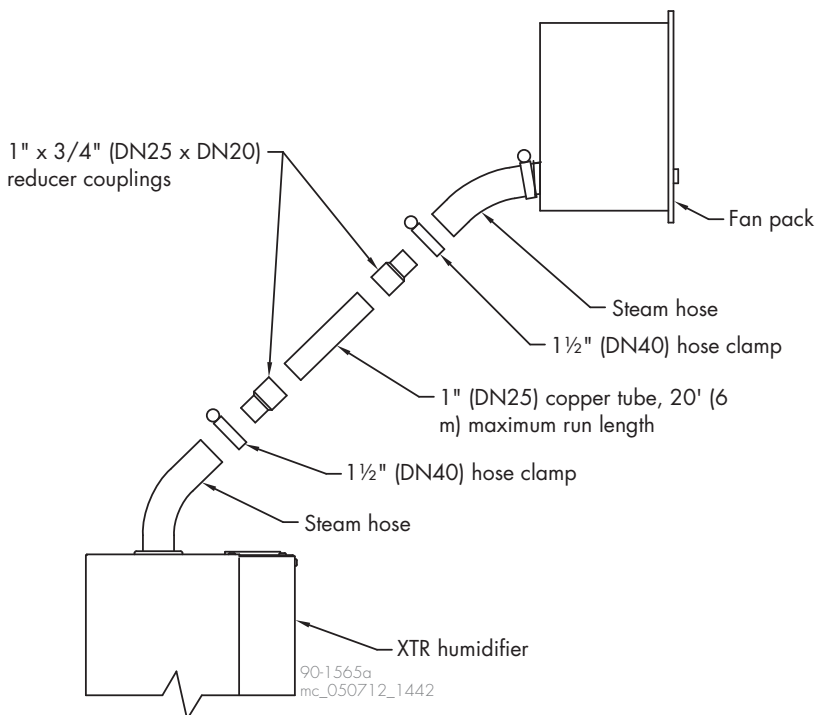
Table 28-2:
XTR fan pack specifications

Fan pack model	Shipping weight		Operating weight		Sound*
	lbs	kg	lbs	kg	
SDU-003F	10.4	4.7	8.4	3.8	< 38

Notes:
 * Sound measurement taken 6.5' (2 m) in front of steam blower cabinet.
 • Input voltage: 24 VAC, supplied by XTR humidifier.
 • Fan pack ships separately from humidifier.

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FIGURE 28-2:
EXTENDING DISTANCE FROM HUMIDIFIER TO FAN PACK WITH COPPER TUBE



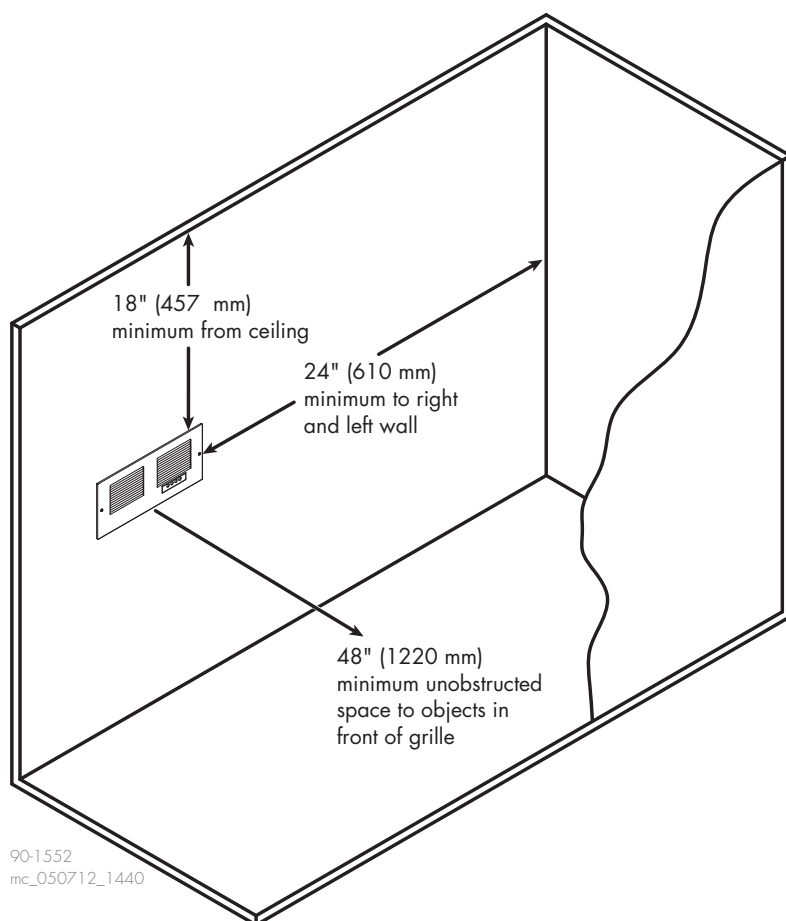
Dispersion: XTR fan pack

MINIMUM CLEARANCES IN THE HUMIDIFIED SPACE

Air movement due to drafts or as a result of temperature stratification may cause uneven distribution of humidity within the conditioned space. To ensure even distribution, install the fan pack in a central location.

To prevent condensation on surfaces and furnishings, install the fan pack so the steam being discharged has enough room to be absorbed into the air before encountering surfaces. See Figure 29-1.

FIGURE 29-1: XTR FAN PACK RECOMMENDED MINIMUM CLEARANCES IN HUMIDIFIED SPACE



Distances provided are recommended minimums. These guidelines are for a 120V installation with fan pack discharging into a space with 70 °F (21 °C) air temperature and 30% RH.

- If XTR humidifier operates on 208V or higher, allow 12" (305 mm) additional space between grille and any obstruction or surface.
- If room temperature is less than 70 °F (21 °C), allow an additional 6" (150 mm) to each distance for every 2 °F (1.1 °C) drop in temperature.
- If RH set point is higher than 45%, allow an additional 12" (305 mm) of space between grille and any obstruction or surface.
- Warmer room air temperature and RH below 30% will reduce the amount of unobstructed space required to absorb discharged steam.

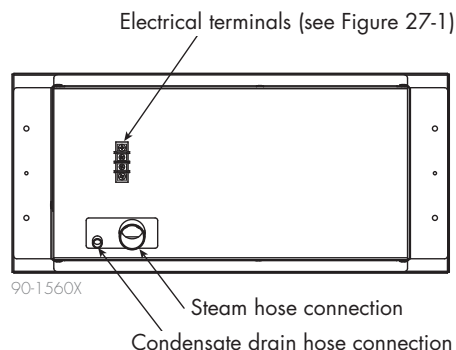
Dispersion: XTR fan pack

MOUNTING

The XTR fan pack installs between the studs of a standard 16"-on-center wall. Drywall on both sides of the wall must be removed for piping and wiring. To ensure proper operation, the fan pack must be mounted level. See Figure 26-2.

1. Use the four 1-1/2" mounting screws (provided with fan pack) to attach fan pack housing to wall studs.
2. Connect steam hose to fan pack, and secure with hose clamp (steam hose and clamp are provided with humidifier). See Figure 26-1.
Note: If more than 6' (1.8 m) of steam hose is required, see Figure 28-2.
3. Connect 3/8" ID condensate tubing to fan pack, and secure with wire-tie.
4. To create a seal, make a 6" (150 mm) loop in the condensate hose, as shown in Figure 30-1. Loop must be located below fan pack condensate connection. Use wire to secure loop, and do not kink condensate hose. Loop is required to prevent steam from escaping into drain.
5. Use the two 5/8" screws (provided with fan pack) to attach grille to fan housing and drywall. If painting grille is desired, see a painting professional for acceptable paint products for high-temperature (212 °F [100 °C]), high-humidity environments.

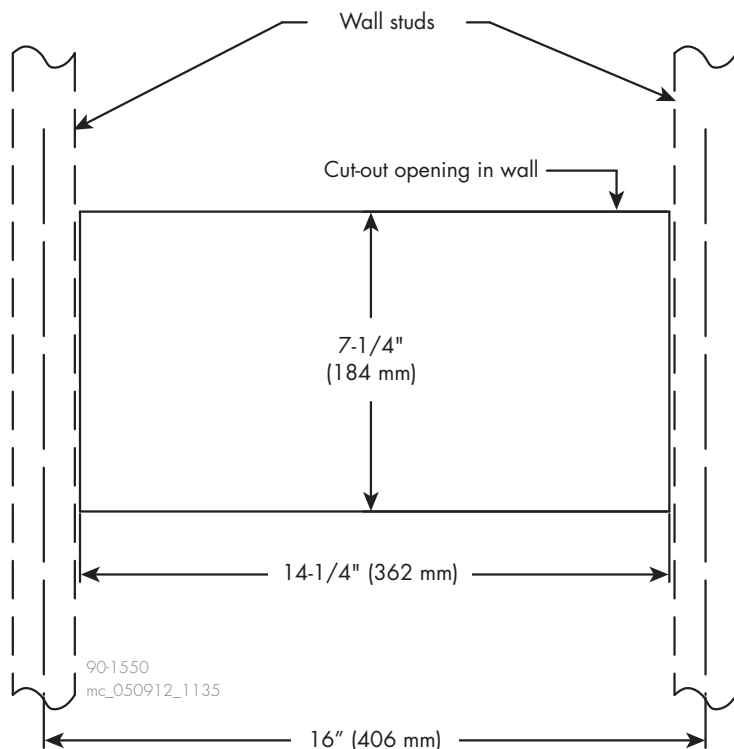
**FIGURE 30-1:
XTR FAN PACK CONNECTIONS**



Note: Back of fan pack shown

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FIGURE 30-2: WALL OPENING DIMENSIONS



Dispersion: XTR fan pack

WIRING

See Figure 14-1.

1. Mount humidistat in area to be humidified according to installation instructions included with control. Install humidistat in same room or area as fan pack, but at least 10' (3 m) from fan pack.
2. Wire humidistat to humidifier using standard 24V thermostat wire.
3. Disconnect all power to humidifier before wiring fan pack terminals to humidifier terminals labeled FAN PACK. Use standard 24V thermostat wire.

Principle of operation

The XTR humidifier delivers humidity in the form of steam to the conditioned space via a dispersion tube in the HVAC system duct, or an optional XTR steam blower or XTR fan pack.

The humidifier generates steam by energizing two electrodes that extend into the water in the replaceable steam cylinder. Current flowing between the electrodes causes the water to boil, creating steam. See Figure 29-1.

Water is introduced to the humidifier through a fill valve to a fill cup located in the top of the cabinet. The fill cup serves as an overflow reservoir and provides an air gap between the humidifier and the water source.

The steam cylinder is filled from the bottom; it is seated in a drain cup assembly which includes a drain valve.

The drain valve and fill valve work together to

- maintain the water level in the cylinder;
- deliver the rated steam capacity, based on the electrical conductivity of the water; and
- temper the drain water.

Steam is delivered into the airstream through a dispersion tube mounted in the HVAC system ductwork. Openings in the dispersion tube are fitted with tubelets that extend into the center of the tube. The design of the dispersion tube and tubelets distribute steam over a wide area in the duct and direct any condensed moisture back into the steam hose.

When the humidifier controller detects humidity below the set point, and the humidifier is turned on:

1. Internal controller in humidifier energizes electrodes and measures current in water between electrodes.
2. Controller adjusts water level in cylinder via fill valve and drain valve to maintain constant current.

Note: During operation, water level in cylinder depends on conductivity of water (which is determined by mineral content of water).

Start-up time

The time needed for the XTR electrode humidifier to reach rated capacity depends on input voltage to the humidifier and the electrical conductivity of the supply water.

Input voltage

The humidifier can be installed to operate using 120, 208, 230, or 240 volts. The higher the voltage, the higher the nominal steam capacity. See Table 5-1.

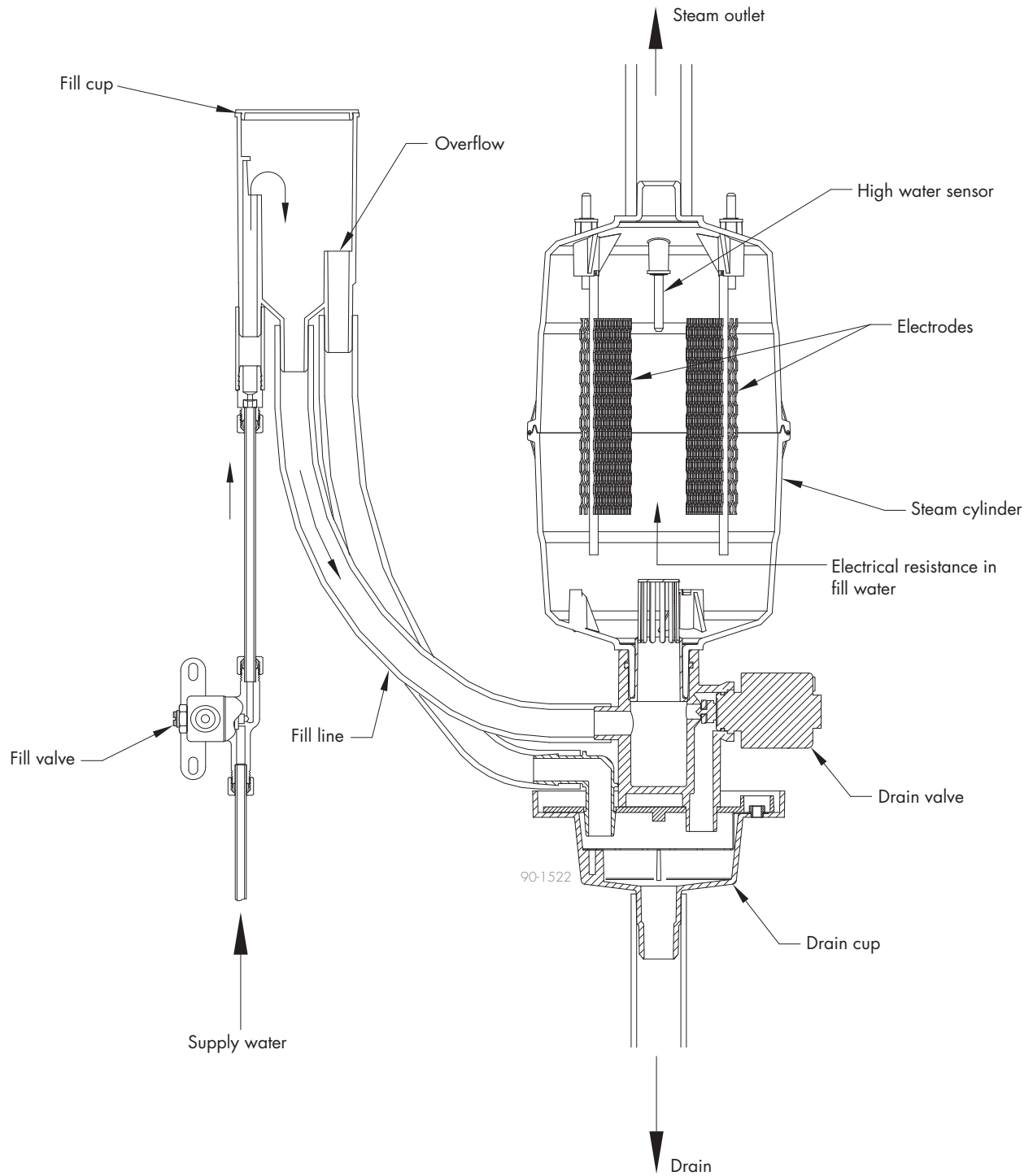
A system operating at 120 volts will take longer to reach capacity than a system operating at 240 volts.

Supply water conductivity

The humidifier should be plumbed to cold water with conductivity from 125 to 1250 $\mu\text{S}/\text{cm}$. Hard water, which has a high mineral content, and softened water generally have higher conductivity than naturally soft water. Systems plumbed to high-conductivity water will reach capacity sooner than systems plumbed to low-conductivity water. As the humidifier operates, minerals build up in the cylinder, which increases the conductivity of the water. With a new cylinder, allowing the humidifier to operate continuously will allow it to reach rated capacity in the shortest amount of time.

Principle of operation

FIGURE 33-1: XTR HUMIDIFIER PRINCIPLE OF OPERATION



Control panel

Green lights indicate normal operation.

Yellow Steam light indicates humidifier is operating at less than rated capacity.

Yellow Steam light also indicates humidifier is in Test mode.

Flashing red Service light indicates cylinder has reached the end of its life and needs to be replaced.






Solid red lights indicate humidifier has shut down and requires service.

Disconnecting power to humidifier resets internal timers.

Safety functions

XTR humidifiers are protected against running dry. Current does not flow if the electrodes in the steam cylinder are not submerged in water.

Table 34-1:
XTR humidifier control panel

Function	Symbol	Light	Description
On-off button		Off	Humidifier is turned off or is not receiving power.
		Solid green	Humidifier is turned on.
		Flashing green	Humidifier is preparing to turn on. Occurs if power is disconnected, then restored with switch ON. Flashes for one minute.
Fill		Solid green	Normal operation. Fill valve is energized allowing water to flow into cylinder via fill cup. Does not illuminate when tempering water during drain cycle.
		Solid red	Fault mode. Indicates cylinder needs water but cannot fill. Humidifier shuts down. Occurs if high water sensor does not detect water after fill valve is energized for 40 minutes.
Steam		Solid green	Normal operation. Humidistat is calling for steam, and humidifier is operating.
		Solid yellow	Humidifier is operating but is not delivering steam at rated capacity. Occurs if humidifier has operated for 168 hours at less than rated capacity due to low water conductivity. Light will turn green once water conductivity increases and humidifier is producing steam at rated capacity.
Drain		Flashing green	Humidifier is preparing to drain. Fill valve is open to temper water in cylinder. Occurs when humidifier is turned off and during forced drain down (168 hours of operation with no drain activity.)
		Solid green	Drain valve is energized and open, draining cylinder. Valve remains energized for four minutes.
			Indicates end-of-season shutdown. Occurs if humidifier does not receive call for humidity for 72 hours. Light remains on for 24 hours.
Service		Flashing red	Cylinder has reached the end of its life and needs to be replaced. Occurs after humidifier has operated for at least 168 hours and for an additional 24 hours at a current level below 75% of the maximum operating current. Humidifier continues to operate, but at reduced capacity.
		Solid red	Operational problem with humidifier. Humidifier shuts down. Occurs when unit detects over-current which can be caused by failure to drain or other system failures. Contact DriSteem for assistance.

Control panel

During initial start up with a new cylinder, the humidifier may run through a series of drain and fill cycles until the conductivity of the water is in a range that allows normal operation. During this time, the Steam light illuminates green. If the humidifier cannot produce steam at the rated level after trying for 168 hours, the Steam light illuminates yellow. The humidifier continues to operate in this state until the rated output is reached.

The conductivity of naturally soft water, hard water, and softened water changes as the water heats up, but the internal controller adjusts the water level to maintain a nominal current between the electrodes. Over the life of the cylinder, minerals that build up on the electrodes will reduce their effective surface area and affect the resistance between them. The operating water level will increase with use until it reaches the high water sensor. At that point, the Service light will flash red indicating that the cylinder needs to be replaced. The humidifier will continue to operate but with reduced output.

Any time power is disconnected or the humidifier is turned off, the internal timer for start-up and drain cycles is reset.

If the humidifier has operated 168 hours without a drain cycle, the drain valve will open to drain the cylinder. Normal operation will continue.

Note: When automatic drain water tempering is activated, the fill valve opens to introduce cold water into the cylinder when the humidifier begins a drain cycle. This is to prevent hot water from entering the drain. The drain valve remains open for four minutes to allow all water to drain from the cylinder. See "Activating automatic drain water tempering" on Page 9.

If the humidifier is operating and a power failure occurs, once power is restored, the On-off light will flash green for one minute, then the humidifier will turn on.

END-OF-SEASON DRAIN

If the humidifier does not receive a call for humidity for 72 hours, the humidifier controller will drain the cylinder, and the Drain light will remain on for 24 hours if there is no call for humidity. The humidifier will resume normal operation when there is a call for humidity.

Outdoor temperature and indoor RH

It is important to adjust the RH setting according to Table 35-1 to avoid excessive condensation when outdoor temperature is low. For example, with an outdoor temperature of 20 °F (-7 °C) the correct setting will be 35%. If the temperature is expected to fall to 0 °F (-18 °C) that evening, reduce the setting to 25% several hours prior to the temperature change.

These settings represent a balance between humidity levels that would be most desirable for comfort and humidity levels that are suitable for avoiding condensation on windows.

Table 35-1:
Outdoor temperature and indoor RH

Outdoor temperature	Recommended indoor 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%

Keeping humidity in

Be sure to keep fireplace dampers closed when not in use. They provide an escape route for heat, as well as humidity.

Dissipating excessive humidity

On occasion, indoor moisture-producing activities such as clothes drying, cooking, showers, etc., may raise the humidity level higher than it should be, even though the humidifier is not operating. Telltale indications are condensation or frost on cold surfaces such as windows, doors, or walls. If such condensation persists for several hours, the home or building should be ventilated to dissipate the potentially damaging excess moisture.

Start-up

START-UP CHECKLIST

- ☐ Read this manual and other information sent with your humidifier.
- ☐ Verify that field wiring is done per instructions in this manual and per unit wiring diagram.
- ☐ Do not use demineralized, deionized, or reverse-osmosis water.
- ☐ Confirm that proper grounding and approved earth ground are provided.
- ☐ Confirm that water fill line was thoroughly flushed before it was connected to humidifier.
- ☐ Turn water supply on, and confirm that drain valve is closed.
If the force of air exiting water supply lines blows fill cup cap off during first fill cycle, this is not a sign of defect or a cause for concern; simply replace fill cup cap after all air has exited water line.
- ☐ Confirm that airflow proving switch (if installed) is closed.
- ☐ Confirm that high limit humidistat (if installed) is closed.
- ☐ Turn power on, and confirm that humidifier control panel lights are illuminated.
- ☐ If you experience difficulties, see "Troubleshooting" on Page 40
- ☐ Verify that humidifier, controls, piping, electrical connections, steam supply, and dispersion device are installed according to the following:
 - Installation instructions in this manual
 - Ladder style wiring diagram (inside of humidifier side cover) and external connections wiring diagram (on humidifier subpanel)
 - Governing codes
- ☐ Make sure cylinder is fully seated into drain valve, and verify that all electrical connections are secure before applying power.
- ☐ Make sure cabinet front and side covers are in place and secure.
- ☐ Verify that humidifier is mounted level and securely supported before filling with water. See operating weights in Table 5-2.
- ☐ Verify that humidifier is level from front to back and side to side after it is full of water.



WARNING

Electric shock hazard

Only qualified electrical personnel should perform start-up.

Contact with energized circuits can cause property damage, severe personal injury or death as a result of electrical shock or fire.

Make sure cabinet front and side covers are installed before turning on electrical power.

Start-up

START-UP PROCEDURE

The control for your humidifier (purchased separately) mounts either in the return air duct or on a wall in the humidified room. If a blower or fan pack is installed, a call for humidity will turn on the indoor unit blower. After the XTR humidifier and control are installed and connected properly:

1. Perform all applicable "Start-up checklist" items at left.
2. Set control to the maximum RH setting.
3. Make sure water saddle valve is open and humidifier is on.
4. After **Fill** light turns off, perform cleaning procedure as follows:
 - a. Operate humidifier long enough for steam to be produced.
 - b. Press On-off button to begin draining cylinder. You might hear fill valve open to allow cold water to flow into cylinder to cool drain water. **Drain** light flashes for several minutes while cylinder drains.
 - c. Press On-off button to turn humidifier on, and repeat Steps a and b.
5. Once humidifier operation is verified, reduce setting to recommended inside RH (see Table 31-1).

Note: If your humidifier control has a test mode, do not leave in test mode, or humidifier will not operate.
6. Monitor humidifier operation through multiple drain and fill cycles. Verify that there are no leaks in steam hose and (if using fan pack) condensate hose connections.



WARNING

Hot surface and steam hazard

Dispersion device, steam hose, and tubing can contain steam, and surfaces can be hot. Discharged steam is not visible.

To avoid burns, do not touch dispersion tube, front of steam blower, or front of fan pack, and do not put any part of body in front of steam outlets. Avoid contact with hot surfaces and air into which steam has been discharged.

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Steam cylinder

BEFORE PERFORMING SERVICE OR MAINTENANCE PROCEDURES ON THE HUMIDIFIER, FOLLOW THE SHUTDOWN PROCEDURE.

Each month during the humidification season, inspect the steam cylinder, fill and drain valves, steam 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.

Steam cylinder service life depends on operating hours and water hardness. Replace the steam cylinder when flashing red **Service** light indicates cylinder has reached the end of its life and needs to be replaced — after extended run time.

To replace the steam cylinder:

1. Follow shutdown procedure.
2. Remove front cover.
3. Pull three wires straight up off posts on top of cylinder. (Two large electrode conductors and one water level probe conductor.)
4. Loosen hose clamp at top of cylinder.
5. Slide hose off top of cylinder.
6. Slide cylinder up and out of drain assembly. Discard cylinder.
7. Remove O-ring from groove in drain assembly using small screw driver.
8. Inspect drain assembly and remove any debris.
9. Insert new O-ring into groove in drain assembly. (O-ring is provided with cylinder.) Dampen O-ring with water before inserting canister. Do not use oil, grease, or any lubricant besides water.
10. Make sure strainer is inserted into bottom of new cylinder.
11. Insert cylinder into drain assembly. Position cylinder with label facing out.
12. Slip steam hose over top of cylinder, and tighten hose clamp.
13. Reattach three wires to posts on top of cylinder. (Larger electrode conductors are interchangeable.) Make sure all wires fit snugly and are fully engaged on pins.
14. Replace front cover.
15. Restore electrical power to humidifier.
16. Turn humidifier on and verify green **On-off** light is illuminated.
17. Each time cylinder is replaced, ensure fan in steam blower or fan pack is operating during a call for humidification, and ensure steam outlet is not blocked.
18. See Start-up procedure on Page 32 if necessary.

WARNING

Shutdown procedure

To prevent severe personal injury or death from electrical shock, follow this shutdown procedure before performing service or maintenance procedures on this humidifier (after cylinder is drained and cooled):

1. Press On-off switch to turn humidifier off. Humidifier will begin to drain.
2. Allow humidifier to drain (humidifier will drain for four minutes).
3. When the green **Drain** light turns off, shut off all electrical power to humidifier using field-installed fused disconnect, and lock all power disconnect switches in OFF position.
4. Close field-installed manual water supply shut-off valve.

WARNING

Hot water

Cylinder and any undrained water may be hot. To avoid injury from hot water, follow the shutdown procedure above, and allow the humidifier to cool down before proceeding with maintenance.

Note:

DriSteem recommends keeping a spare steam cylinder in stock during the humidification season. See "Replacement parts" on Page 41.

CAUTION

If cylinder plugs become loose, damage to the humidifier may occur. Obtain replacement plugs from DriSteem.

Drain valve

If either of the following issues occur after several months of runtime, follow the drain valve maintenance procedures below. See Figure 39-2.

- Drain valve is closed, but draining and filling continue.
- End of cylinder life prompt appears prematurely.

1. When steam cylinder is empty, turn humidifier off. Place all power disconnects in OFF position, and lock in OFF position.
2. Remove cabinet front and side covers and steam cylinder (see Page 34).
3. Vacuum loose scale and debris out of the drain valve port.
4. Disconnect quick connect from 24 VAC drain valve coil.
5. Slide cap (A) off of drain valve coil (C).
6. Turn hex nut (B) counter-clockwise. Loctite on nut will cause drain valve coil assembly to turn out of drain valve body (G). Remove coil/actuator assembly from drain valve body. Make sure spring (E) and plunger (F) do not fall out of actuator (D).
7. Clean plunger (F), spring (E), actuator (D), and plastic drain valve body (G) with clean water.
8. Reassemble drain valve.

Note: When threading actuator (D) into drain valve body (G), make sure it is not cross threaded. Torque actuator into drain valve body to 18 in-lb (2.0 N·m).
9. Connect drain valve coil quick connect, and slide cap (A) onto drain valve coil (C).
10. See "Start-up procedure" on Page 32 if returning humidifier to operation.

Note: If this procedure does not resolve valve issues, perform the drain valve assembly maintenance procedure in Figure 39-1.

FIGURE 39-2: DRAIN VALVE BODY MAINTENANCE

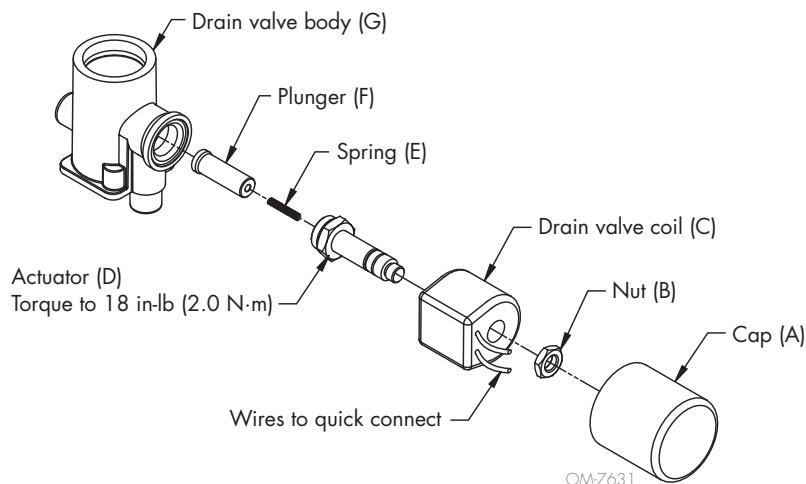
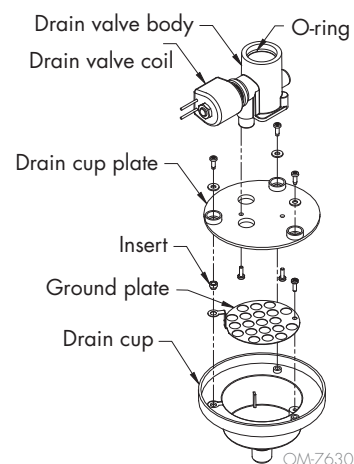


FIGURE 39-1: DRAIN VALVE ASSEMBLY MAINTENANCE



Perform the following procedure only if the procedure at left does not resolve drain valve issues.

1. Perform Steps 1 through 4 at left.
2. Remove the three screws and washers securing drain cup plate to drain cup.
3. Lift drain valve body/plate assembly off of drain cup.
4. Vacuum loose scale and debris out of drain cup.
5. Remove ground plate, and clean scale and debris from ground plate and outlet of drain valve body.
6. Reassemble drain valve assembly: Fit mounting screws with washers, insert them through drain cup plate, and tighten them into drain cup.

Note:

Pay close attention to all parts shown above. Verify that:

- Ground plate is in groove of drain cup.
- Insert is in place through ground plate loop.

Failure to get ground plate and insert solidly connected to frame will compromise ground safety circuit.

7. Clean end of hose, and reconnect it to drain valve body with hose clamp.
8. Plug Molex plug into its mating wire harness plug.

Troubleshooting

The troubleshooting guide (Table 42-1) and the test procedure below are intended to help diagnose and resolve general operational problems with the XTR humidifier.


If a problem persists, call DriSteem Technical Support. See inset at left.

TEST MODE

To check general function of humidifier and components, the following Test Mode procedure can be performed. Humidifier must be powered, and control must be turned to OFF position. The humidifier should be plumbed to a water supply and the drain line should be connected. Test Mode involves repeatedly pressing the On-off button and listening for audible clicks as the various components are energized and de-energized. The humidifier will remain in Test Mode for five minutes, then automatically return to the Off state. If the procedure is not completed in five minutes, restart Test Mode. If the humidifier or components do not respond as indicated, investigate components being tested.

1. Press On-off button, and hold it for 10 seconds until all control panel lights turn on. **On-off**, **Fill**, **Steam**, and **Drain** lights will illuminate green. **Service** light will illuminate red.
2. Press On-off button again. All control panel lights will turn off.
3. Press On-off button again. **Fill** light will illuminate red, and **Steam** light will illuminate yellow.
4. Press On-off button again. Red **Fill** light will turn off. **Steam** light will remain yellow.
5. Press On-off button again. Listen for audible click as power relay is energized. If click is not heard replace control circuit board.
6. Press On-off button again. Listen for audible click as power relay is de-energized. If click is not heard, replace control circuit board.
7. Press On-off button again. Listen for a click as fill valve is energized. Water should flow, filling the cylinder. If valve does not energize. measure voltage across the CON1 FILL terminals on control circuit board. If 24 VAC is present, replace fill valve. If 24 VAC is not present, replace control circuit board.

Continued

 **WARNING**

Electric shock hazard
Contact with electrical circuits can cause property damage, personal injury or death. Service and troubleshooting must be performed by qualified electrician.

DriSteem Technical Support
Have the following information ready when calling Technical Support. See phone number inside front cover of this manual.

Humidifier model number
Humidifier serial number
When issue began
Issue description

Troubleshooting

TEST MODE (CONTINUED)

8. Press On-off button again. Listen for click as fill valve is de-energized.
Water should stop flowing. If valve remains energized, check for voltage across CON! FILL terminals on control circuit board. If less than 1 VAC is present, replace fill valve. If more than 1 VAC is present, replace control circuit board.
9. Press On-off button again. Listen for a click as the drain valve is energized.
Water should flow down the drain. If the valve does not energize, remove the drain valve wires from terminals J5 and J6 on the control circuit board and measure voltage across the terminals. If 24 VAC is present, replace drain valve. If 24 VAC is not present, replace control circuit board.
10. Press On-off button again. Listen for click as drain valve is de-energized.
Water should stop flowing down the drain. If valve remains energized, remove the drain valve wires from terminals J5 and J6 on the control circuit board and measure voltage across the terminals. If less than 1 VAC is present, replace drain valve. If more than 1 VAC is present, replace control circuit board.
11. Press On-off button again. Listen for a faint click as the FAN PACK terminals on the control circuit board are energized. If the terminals do not energize, (24 VAC measured across P10 terminals) replace the control circuit board.
12. Press On-off button again. Listen for click as FAN PACK terminals are de-energized. If the terminals fail to energize (more than 1 VAC measured across terminals) replace control circuit board.

Exit Test Mode by disconnecting power to humidifier or allowing five minutes to elapse.

Troubleshooting

Table 42-1:
XTR humidifier troubleshooting guide

Problem	Possible cause	Action
General operating problems. Humidifier will not turn on or turn off.	Field-wired terminal connections	Check L1, N/L2 and Ground connections. Check HUMIDISTAT and FAN PACK Terminal connections. HUMIDISTAT terminals must be connected to an on/off or modulating device. Control circuit board will be damaged if 24 volts are connected to HUMIDISTAT terminals. Check wiring connections and settings on accessory items such as high limit switch and airflow proving switch.
	Internal connections	Check electrode and high water probe connections on the top of the cylinder.
		Check to make sure two sets of blue/white wire jumpers from control circuit board to current sensing circuit board are secure and have the proper polarity. Blue wire on jumper set towards front of humidifier should be on top on both plugs. Blue wire on jumper set towards back of humidifier should be on bottom of both plugs.
		Make sure ribbon cable from membrane switch is securely plugged into control circuit board.
		Check that terminals from internal components are securely attached to proper tabs on circuit boards.
		Make sure one of the electrode wires extends through toroid ring on current sensing circuit board.
	No power to humidifier	Make sure Black/white wire from L1 is attached to terminal that matches input voltage.
		Check main power supply and switch. Check for proper voltage across L1 and N/L2 terminals.
	Humidifier not turned on	Check main power supply and switch.
	No power to 24 volt control circuit	Check for proper voltage across L1 and N/L2 terminals.
		Make sure front cover is attached to engage safety interlock switch. Press On-off button.
		Make sure ribbon cable from membrane switch is securely plugged into control circuit board.
		Check reset switch on transformer.
Steam light does not turn on.	Call for humidity not being received	With humidifier energized, check for 24± 6 volts AC across J2 & J5 terminals. If okay, check for 5 Volts DC across +5V and GND test points on control circuit board. If okay, replace membrane switch. If not, replace control circuit board.
	Check control wiring and setting. Check wiring and settings of high RH limit switch and airflow proving switch, if installed.	
Water leaking from humidifier.	Loose plumbing connections	If 5 volts DC are not present between +5V and GND test points, remove blue/white wire jumpers and check DC voltage across +5V and GRD points. If 5 Volts DC are present, replace current sensing circuit board. If 5 volts DC are not present, replace control circuit board.
		Check water supply connection at fill valve inlet. Tighten as needed.
		Check internal hose clamp connections. Reposition clamps and tighten as needed. Check steam hose connection on top of cylinder. Tighten clamp as needed.
Water constantly runs down drain.	Malfunctioning drain valve	Check valve function using Test Mode.
	Debris in drain valve preventing it from closing	Remove cylinder and clean debris from drain valve.
	O-ring in drain valve is not properly seated in groove	Remove cylinder and reposition O-ring.
	Water is flowing from fill cup overflow port	Check internal hoses and remove kinks or blockage. Disassemble brass fitting in feed line between inlet valve and fill cup. Make sure small rubber flow orifice is in place in brass fitting.

Continued

Troubleshooting

Table 42-1:
XTR humidifier troubleshooting guide (continued)

Problem	Possible cause	Action
Humidifier makes gurgling sound.	Excess condensation in steam hose	Make sure steam hose has constant downward slope to humidifier or to tees and traps in low spots of hose.
Fill valve makes banging sound.	Water hammer from line pressure	Make sure water supply line does not contact ductwork.
		Install shock arrestor.
		Install section of 1/4" braided fill line. Conform to local codes.
Humidifier will not fill.	Saddle valve not open	Open saddle valve.
	Malfunctioning fill valve	Check valve function using Test Mode.
Humidifier will not drain.	Debris in drain valve blocking outlet port	Remove cylinder and clean debris from drain valve.
	Malfunctioning drain valve	Check valve function using Test Mode.
Water in duct from dispersion tube.	Dispersion tube installed incorrectly	Install dispersion tube with tubelets facing straight up.
	Impurities in steam hose or tubing causing foaming	Rinse cylinder and hose in clean water.
Service light flashing red before end of humidification season.	Cylinder full of mineral deposits	Plumb humidifier to filtered water.
	Humidifier runs in short cycles (does not reach capacity)	Plumb humidifier to softened water.
		Use blower activation relay, or run constant HVAC fan.
Yellow Steam light.	Humidifier operating below rated capacity. Notes: • Normal for systems plumbed to low-conductivity water and systems that operate for short cycles. • Recommended fill water conductivity is 125 to 1250 $\mu\text{S}/\text{cm}$.	Plumb humidifier to softened water.
		Use blower activation relay, or run constant HVAC fan.
		To determine operating current, attach clamp-on ammeter to one of the electrode wires on top of cylinder.
		Add add 1/4 to 1/2 tab sodium bicarbonate (i.e., Alka Seltzer) to water in cylinder increase water conductivity. Consult DriSteem for further advice.
Humidifier is not satisfying demand.	Control setting is too low	Adjust control to higher setting.
	Control mounted in wrong location	See Installation Instructions with control for correct mounting location.
	Short run times	Use blower activation relay, or run constant HVAC fan.
Excess humidity.	Control setting is too high	Adjust control to lower setting.
	Control mounted in wrong location	See Installation Instructions with control for correct mounting location.

Continued

Troubleshooting

Table 42-1:
XTR humidifier troubleshooting guide (continued)

Problem	Possible cause	Action
Water dripping from fan pack or steam blower	Tubing connection	Check all connections.
	Fan not operating	See "Fan does not operate" in Problem column below.
	Steam outlet blocked	Clean steam dispersion manifold outlet.
	Foaming in cylinder or steam hose	Rinse components with clean water.
Fan pack or steam blower fan does not operate	Wiring	Check wiring.
	XTR humidifier power	Check that humidifier is powered and on.
	No call for humidity	Adjust humidistat setting. Check location of humidistat.
	Circuit board output	During a call for humidity, confirm 24 VAC output from humidifier terminals for steam blower or fan pack. See steam blower wiring on Page 22. See fan pack wiring on Page 27.
	Motor failure	Replace fan motor.
Fan noise in fan pack or steam blower	Obstructed or damaged fan	Clear and clear obstructions, or replace fan motor.

Replacement parts: Dispersion devices

FIGURE 45-1: REPLACEMENT PARTS, XTR DISPERSION

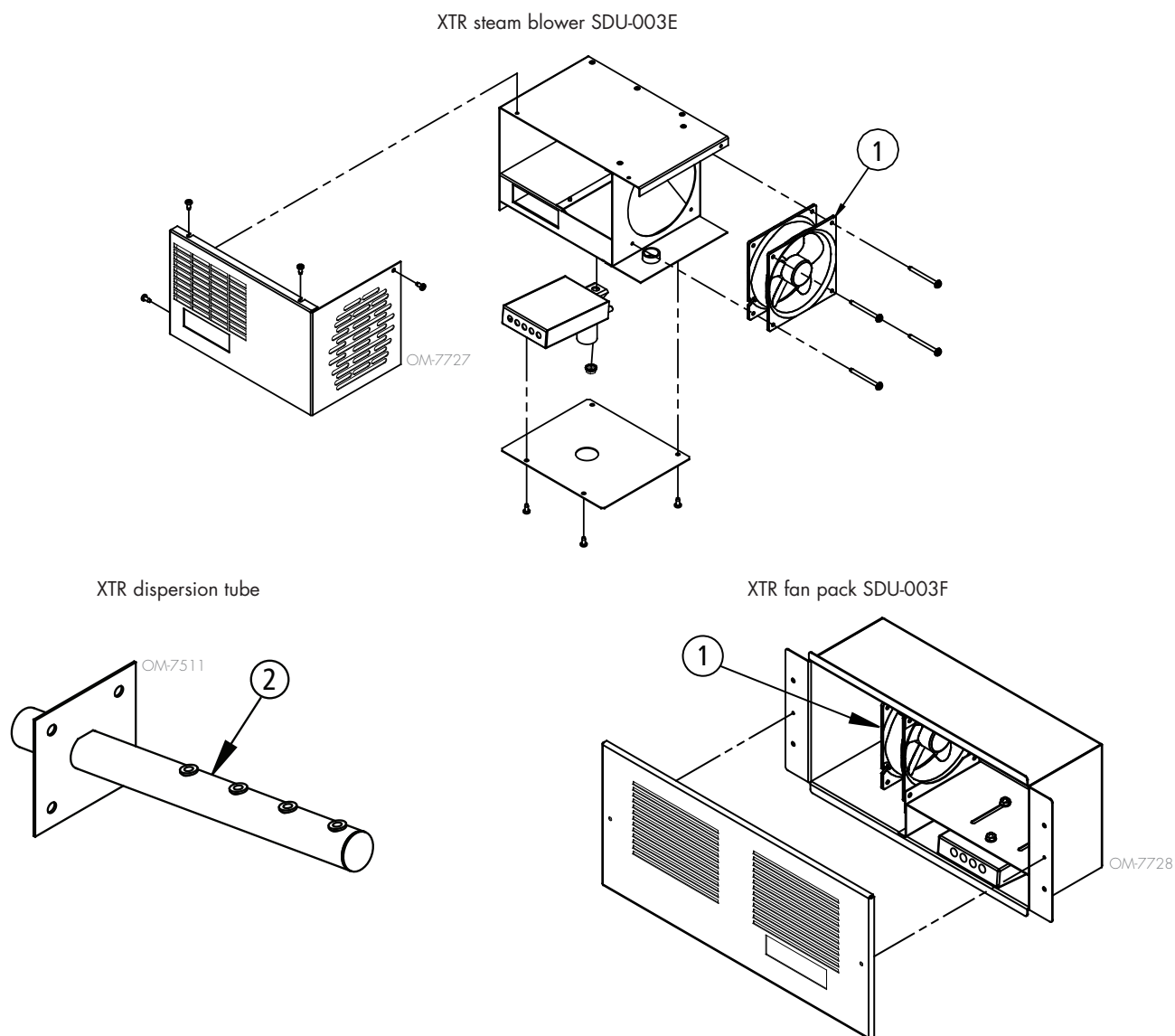
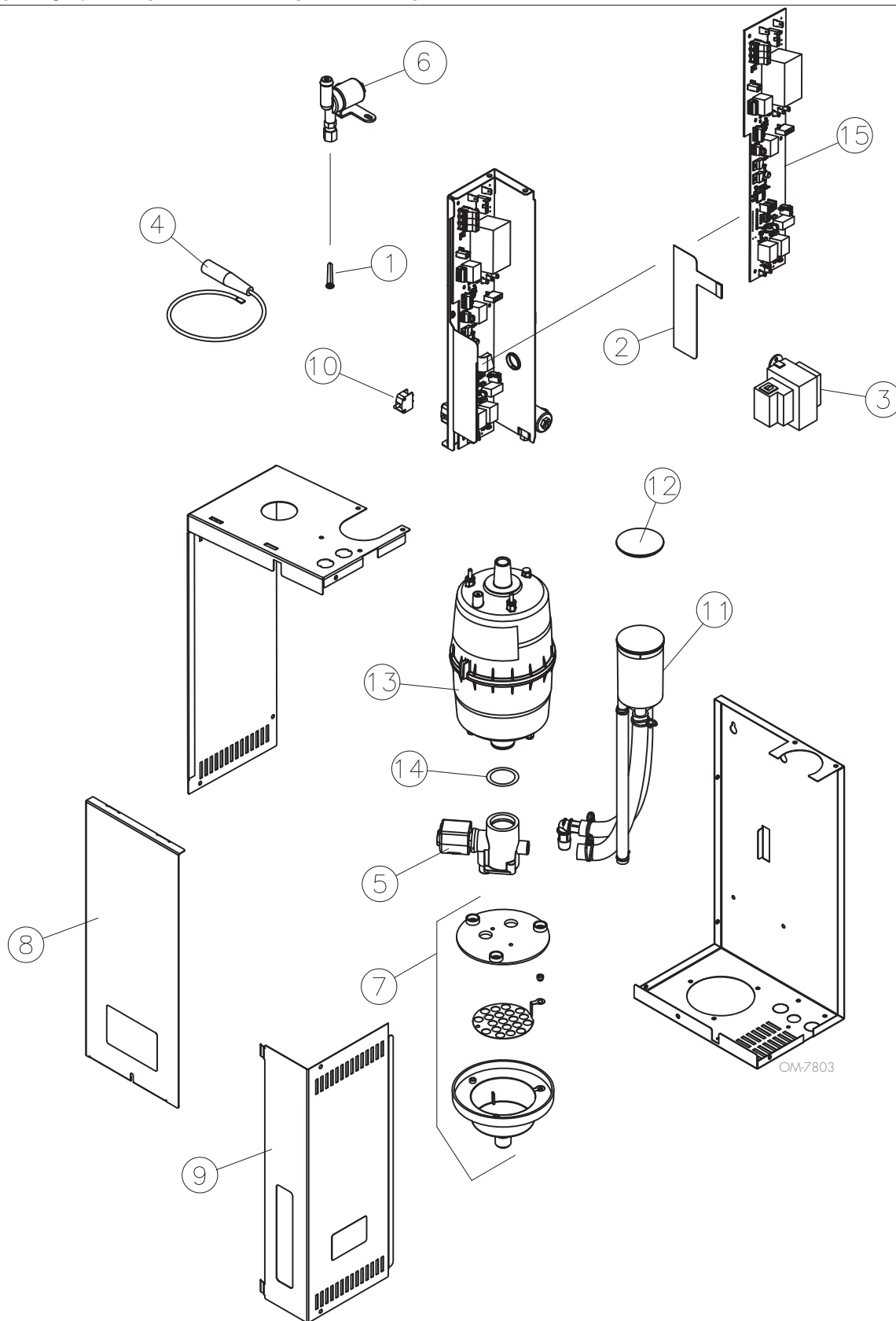


Table 45-1:
Replacement parts, XTR dispersion

Item	Description	Part No.
1	Fan, SDU-003E steam blower and SDU-003F fan pack	407109-004
2	XTR dispersion tube, with screws	162728-001

Replacement parts: XTR humidifier

FIGURE 46-1: XTR HUMIDIFIER REPLACEMENT PARTS



Replacement parts: XTR humidifier

Table 47-1:
XTR humidifier replacement parts

Item	Description	Part No.
1	Strainer, in-line, fill valve	300051-100
2	Switch, membrane	408638-001
3	Transformer	408965-003
4	Wire, electrode	531008-101
5	Valve, drain	405900-003
6	Inlet valve, supply water	505096-100
7	Drain cup assembly	194610-101
8	Cover front, with screw	531013-401
9	Cover, side, with screws	531013-402
10	Switch, safety interlock	530010-103
11	Fill cup, with hoses	531004-002
12	Cap, fill cup	530010-064
13	Kit, cylinder, XTR, XT-5/10, XT-002/003, 120-277V, IP	194601-001
14	O-Ring, cylinder	530001-044
15	Control board	

Table 47-2:
Accessories

Description	Part No.
XTR fan pack (see Figure 41-1)	SDU-003F
XTR steam blower (see Figure 41-1)	SDU-003E
XTR dispersion tube (see Figure 41-1)	162728-001
Relay, blower activation	530010-153
Switch, airflow proving (electric)	406190
Switch, airflow proving, sail	406192
Switch, duct limit, high humidity (HC 201)	405850-201
Pump, condensate, rated for 160 °F (65 °C)	400283
Hose, steam, 6' (1.8 m), with clamps	305400-100
Hose, drain, 10' (3 m), with clamps	530005-010
Humidistat, duct, on-off (DS 300)	405842-030
Humidistat, room, on-off (DS 200)	405842-035
Humidistat, duct, modulating	405875
Humidistat, room, modulating	405840

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 XTR humidifier. DriSteem also leads the industry with a Two-year Limited Warranty and optional extended warranty.

For more information

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

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Form No. XTR-IOM-EN-0816
Part No. 10010628 B2206355A
890000-145 REV B

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.

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

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

Extended warranty

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

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

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