PURE™ Humidifier

**READ AND SAVE THESE INSTRUCTIONS**

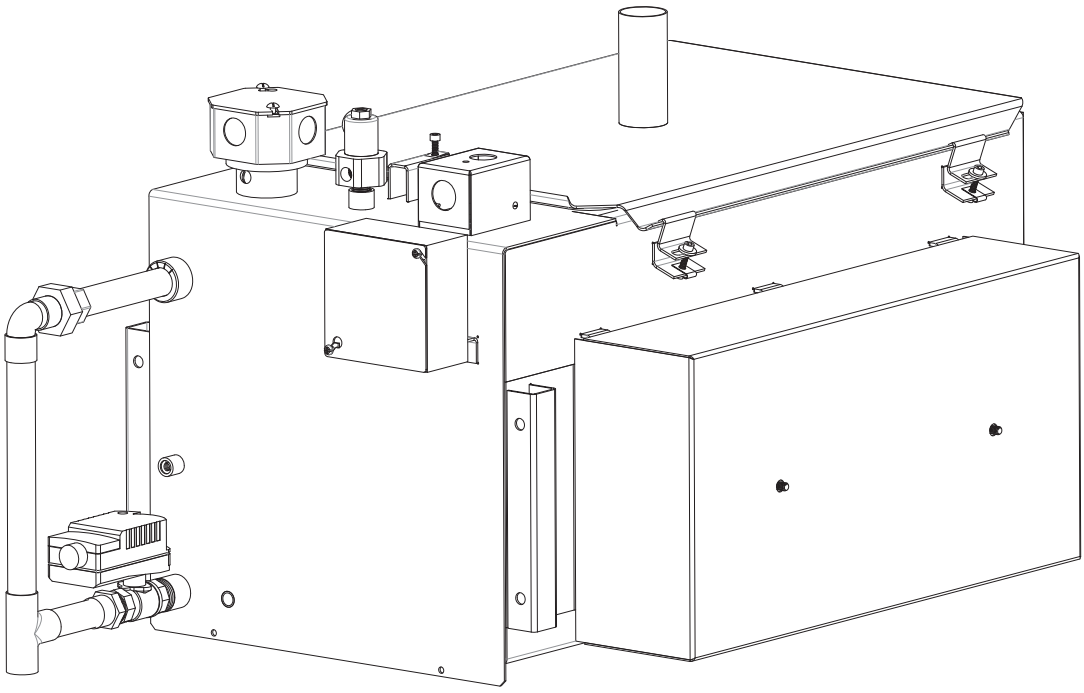
*Standard Water*

# *ES Series*

## *Electric Humidifier*

## Installation Instructions

## Operation and Maintenance Manual



*Our results are comforting*



**Form No: ESOM-6-2023**

# *To the User of PURE Humidifier Co.'s ES Humidifiers*

We at PURE Humidifier Co. thank you for choosing one of our quality products. PURE Humidifier Co.'s ES Series humidifiers are models of simplicity to install, operate and maintain. However, they must be maintained to provide maximum operating efficiency.

**PLEASE READ AND FOLLOW ALL INSTRUCTIONS CAREFULLY. PROPER OPERATION AND HUMIDITY CONTROL IS POSSIBLE ONLY WITH PROPER INSTALLATION AND MAINTENANCE.**

The ES Series Humidifier utilizes a Tri-Probe conductive type water control system, which is designed for use with standard (hard or soft) tap water. Use of demineralized, deionized or reverse osmosis water will cause a failure of the water level control system and void the warranty.

High chloride content in feed water can cause chloride stress cracking and chloride pitting in stainless components. Chloride stress corrosion cracking (CSCC) and chloride pitting of stainless steel components is not covered by warranty. Do not use hydrochloric acid descalers or bleach to clean the tank. We offer an easy-to-use, non-toxic descaling solution to help keep your units clean and operating with maximum efficiency. Please contact your local PURE Humidifier representative for more information about our PURE Clean descaling solution.

PURE Humidifier Co.'s ESDDR Series should be installed on applications that require demineralized, deionized or reverse osmosis water.

To ensure proper installation of this product, it must be installed by qualified HVAC and electrical contractors, and must be in compliance with local, state, federal, and governing codes. If installed improperly this product may cause damage to property, severe personal injury, or death as a result of electric shock, burns, and/or fire.

Do not adjust any components inside humidifier control box without consulting the factory

For indoor installation only unless supplied with an outdoor enclosure.

PURE™ Humidifier

# *Table of Contents*

# *WARNINGS*

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## ⚠ WARNINGS

**SERVICING**
Disconnect main power before servicing or maintaining humidifier.
The humidifier system including the humidifier tank, steam supply piping, condensate piping and steam distribution grid can be extremely hot and can cause burns if touched.
Do not use hydrochloric acid descalers or bleach to clean the tank. Consult the factory if you are unsure about which chemical descaler to use.

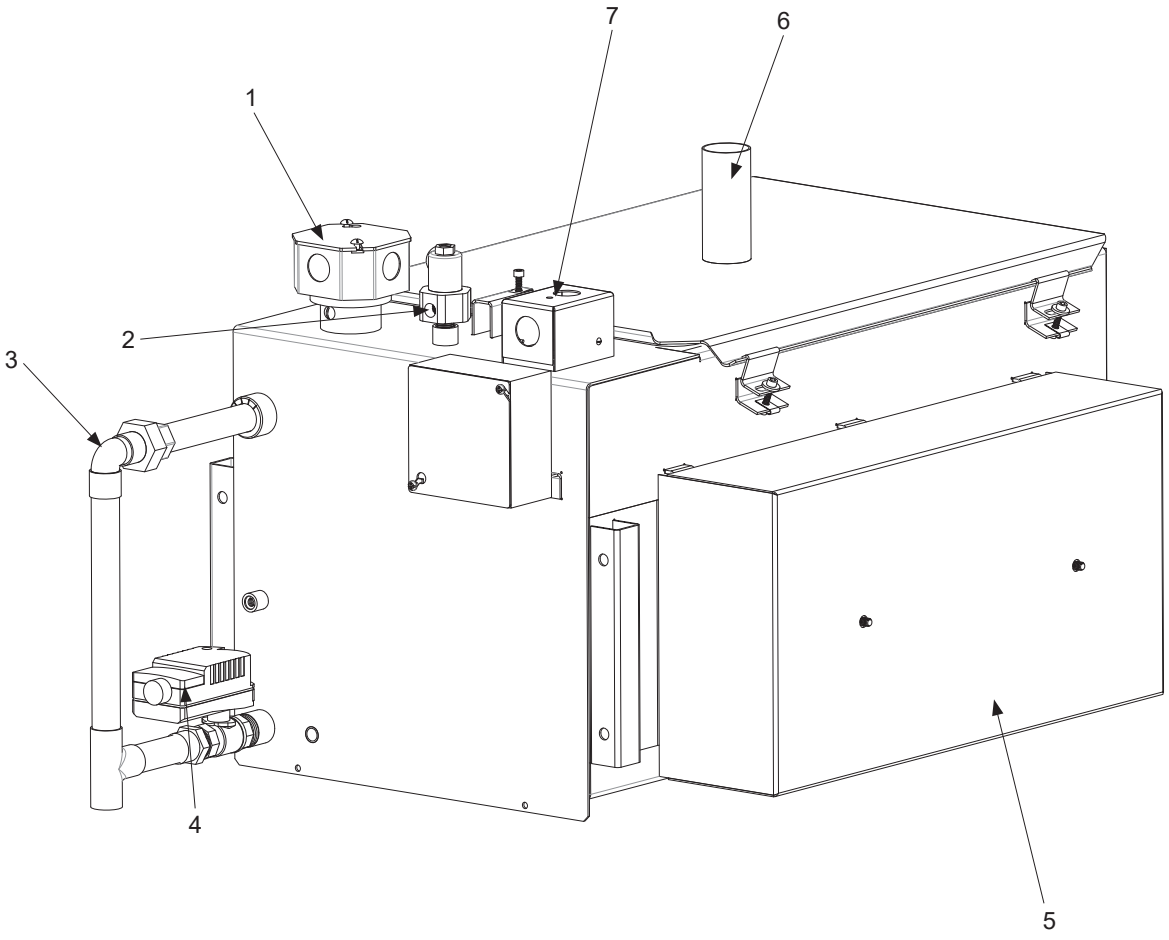
**ELECTRICAL**
Electrical work should be done by qualified electrical contractors and must be in compliance with local, state, federal, and governing codes.

**PLUMBING**
Plumbing and pressurized steam work should be done by qualified installers and must be in compliance with local, state, federal, and governing codes.
Drain and overflow water can be 212°F (100°C). If you are not using a DCT-927 Drain Tempering Kit, allow the water to cool before draining tank.

**INSTALLATION**
This humidifier produces steam at atmospheric pressure. Do not install any components between humidifier tank and steam distribution grid which can block or restrict steam flow.
Do not mount on hot surfaces.
Do not mount on vibrating surfaces.
High chloride content in feed water can cause chloride stress cracking and chloride pitting in stainless components. Chloride stress corrosion cracking (CSCC) and chloride pitting of stainless steel components is not covered by warranty.

Use of mineralized (hard or soft) tap water will cause fill valve failure and void the warranty. PURE Humidifier Co.'s ES Series should be installed on applications that require tap water.
Do not adjust any components inside humidifier control box without consulting the factory.
For indoor use only unless supplied with an Outdoor Enclosure.

# *Features*




**Features**

1. Tri-Probe Sensor
2. 1/4” NPT Fill Inlet Connection
3. Overflow Piping
4. Automatic Drain Valve
5. Heater Assembly Access
6. Humidifier Steam Outlet Connection
7. Over Temperature Cut-Out Switch

PURE™ Humidifier

# *Capacities & Weights*

| Standard Water Unit Model No. | Steam Output Capacity † | | KW | Humidifier Reservoir Weight* | | | | Control Cabinet Weight Δ | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Empty | | Full | | | |
| | lbs/hr | kh/hr | | lbs | kg | lbs | kg | lbs | kg |
| ES-3 | 9.0 | 4.1 | 3 | 50.5 | 22.9 | 130.5 | 59.2 | 32.0 | 14.5 |
| ES-4.5 | 13.5 | 6.1 | 4.5 | 50.5 | 22.9 | 130.5 | 59.2 | 32.0 | 14.5 |
| ES-5.5 | 18.0 | 8.1 | 6 | 50.5 | 22.9 | 130.5 | 59.2 | 32.0 | 14.5 |
| ES-7.5 | 22.5 | 10.2 | 7.5 | 50.5 | 22.9 | 130.5 | 59.2 | 32.0 | 14.5 |
| ES-11 | 31.5 | 14.2 | 10.5 | 50.5 | 22.9 | 130.5 | 59.2 | 32.0 | 14.5 |
| ES-14 | 40.5 | 18.4 | 13.5 | 50.5 | 22.9 | 130.5 | 59.2 | 32.0 | 14.5 |
| ES-15 | 45.0 | 20.4 | 15 | 50.5 | 22.9 | 130.5 | 59.2 | 32.0 | 14.5 |
| ES-16.5 | 49.5 | 22.5 | 16.5 | 50.5 | 22.9 | 130.5 | 59.2 | 32.0 | 14.5 |
| ES-19.5 | 58.5 | 26.5 | 19.5 | 50.5 | 22.9 | 130.5 | 59.2 | 32.0 | 14.5 |
| | | | | | | | | | |
| ES-22 | 63.0 | 28.6 | 21 | 61.0 | 27.7 | 177.0 | 80.3 | 55.0 | 25.0 |
| ES-28 | 81.0 | 36.7 | 27 | 61.0 | 27.7 | 177.0 | 80.3 | 55.0 | 25.0 |
| ES-30 | 90.0 | 40.8 | 30 | 61.0 | 27.7 | 177.0 | 80.3 | 55.0 | 25.0 |
| ES-33 | 99.0 | 45.0 | 33 | 61.0 | 27.7 | 177.0 | 80.3 | 55.0 | 25.0 |
| ES-39 | 117.0 | 53.1 | 39 | 61.0 | 27.7 | 177.0 | 80.3 | 55.0 | 25.0 |
| ES-42 | 126.0 | 57.2 | 42 | 61.0 | 27.7 | 177.0 | 80.3 | 55.0 | 25.0 |
| ES-45 | 135.0 | 61.2 | 45 | 65.5 | 29.7 | 181.5 | 82.3 | 72.0 | 32.7 |
| ES-49.5 | 148.5 | 67.4 | 49.5 | 65.5 | 29.7 | 181.5 | 82.3 | 72.0 | 32.7 |
| ES-58.5 | 175.5 | 80.0 | 58.5 | 65.5 | 29.7 | 181.5 | 82.3 | 72.0 | 32.7 |
| ES-63 | 189.0 | 85.7 | 63 | 65.5 | 29.7 | 181.5 | 82.3 | 72.0 | 32.7 |
| | | | | | | | | | |
| ES-66 | 198.0 | 89.8 | 66 | 88.0 | 39.9 | 243.0 | 110.2 | 72.0 | 32.7 |
| ES-78 | 234.0 | 106.1 | 78 | 88.0 | 39.9 | 243.0 | 110.2 | 72.0 | 32.7 |
| ES-84 | 252.0 | 114.3 | 84 | 88.0 | 39.9 | 243.0 | 110.2 | 72.0 | 32.7 |
| ES-102 | 306.0 | 138.8 | 102 | 88.0 | 39.9 | 243.0 | 110.2 | 72.0 | 32.7 |

* When calculating the total dry weight of the humidifier, the control cabinet weight must be added to the reservoir weight.

Δ The control cabinet is shipped loose unless optional factory mounting is specified. Reference the “Dimension Sheet” for control cabinet dimensions.

† The above capacities are based on 100% efficiency. Actual humidifier capacity may vary due to the heat loss from the humidifier reservoir. The ambient air temperature, air velocity, and injection tube system will affect the rate of heat loss from the humidifier reservoir.

PURE™ Humidifier

# *Electrical Specifications*

## Single Phase Amperage†

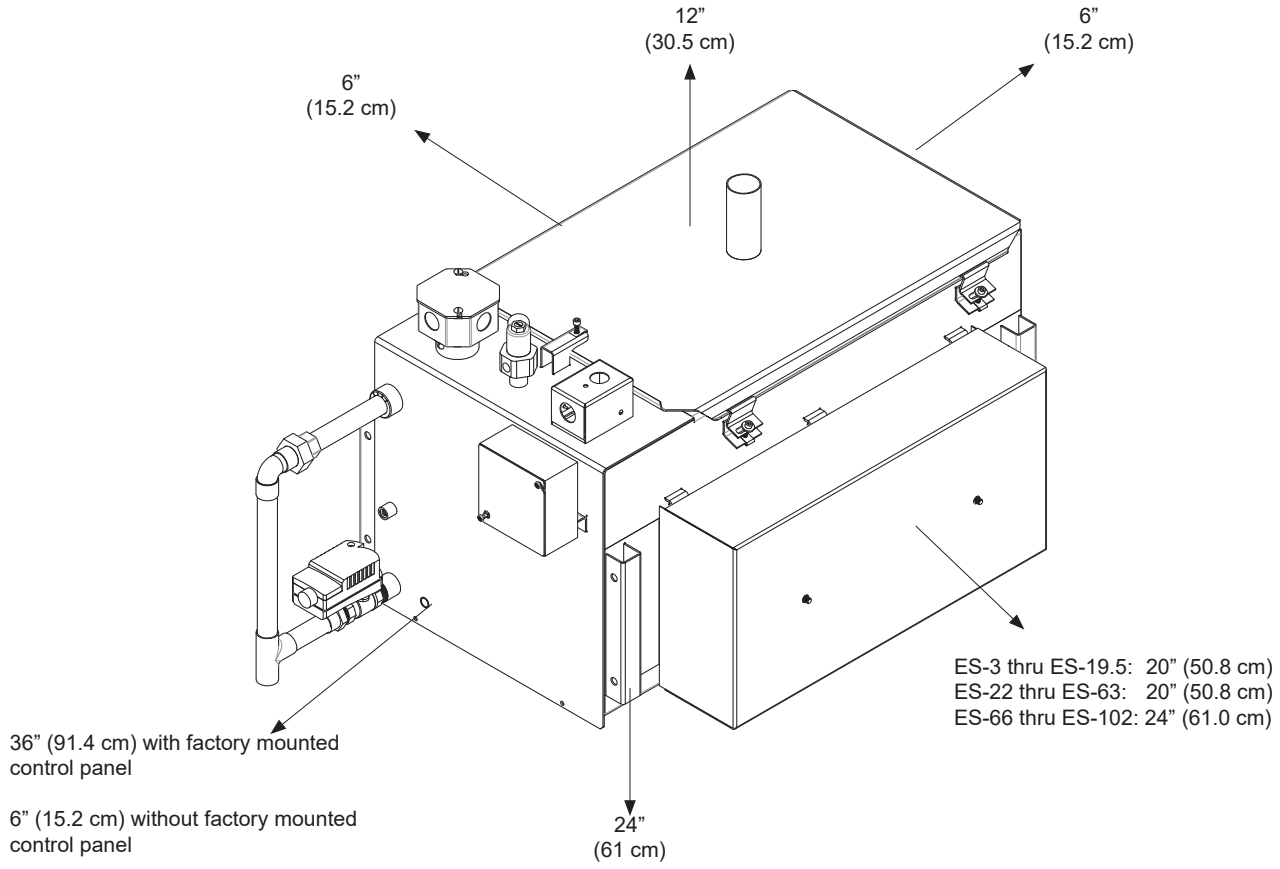
| Standard Water Unit Model No. | Unit KW | 120V | 208V | 240V | 480V | 600V | No. of Heaters | Heater KW | Control Circuit Voltage |
|---|---|---|---|---|---|---|---|---|---|
| ES-3 | 3 | 25 | 14.4 | 12.5 | 6.3 | 5 | 3 | 1 | 24 vac |
| ES-4.5 | 4.5 | 37.5 | 21.6 | 18.8 | 9.4 | 7.5 | 3 | 1.5 | 24 vac |
| ES-5.5 | 6 | | 28.8 | 25 | 12.5 | 10 | 3 | 2 | 24 vac |
| ES-7.5 | 7.5 | | 36.1 | 31.3 | 15.6 | 12.5 | 3 | 2.5 | 24 vac |
| ES-11 | 10.5 | | | | 21.9 | 17.5 | 3 | 3.5 | 24 vac |
| ES-14 | 13.5 | | | | 28.1 | 22.5 | 3 | 1.5 | 24 vac |
| ES-15 | 15 | | | | 31.3 | 25 | 3 | 5 | 24 vac |
| ES-16.5 | 16.5 | | | | 34.4 | 27.5 | 3 | 5.5 | 24 vac |
| ES-19.5 | 19.5 | | | | 40.6 | 32.5 | 3 | 6.5 | 24 vac |
| | | | | | | | | | |
| ES-22 | 21 | | | | 43.8 | 35 | 6 | 3.5 | 24 vac |
| ES-28 | 27 | | | | 56.3 | 45 | 6 | 4.5 | 24 vac |
| ES-30 | 30 | | | | 62.5 | 50 | 6 | 5 | 24 vac |
| ES-33 | 33 | | | | 68.8 | 55 | 6 | 5.5 | 24 vac |
| ES-39 | 39 | | | | 81.3 | 65 | 6 | 6.5 | 24 vac |
| ES-42 | 42 | | | | 87.5 | 70 | 6 | 7 | 24 vac |
| ES-45 | 45 | | | | 93.8 | 75 | 9 | 5 | 24 vac |
| ES-49.5 | 49.5 | | | | 103.1 | 82.5 | 9 | 5.5 | 24 vac |
| ES-58.5 | 58.5 | | | | 121.9 | 97.5 | 9 | 6.5 | 24 vac |
| ES-63 | 63 | | | | 131.3 | 105 | 9 | 7 | 24 vac |
| | | | | | | | | | |
| ES-66 | 66 | | | | 137.5 | 110 | 12 | 5.5 | 24 vac |
| ES-78 | 78 | | | | 162.5 | 130 | 12 | 6.5 | 24 vac |
| ES-84 | 84 | | | | 175 | 140 | 12 | 7 | 24 vac |
| ES-102 | 102 | | | | | 170 | 12 | 8.5 | 24 vac |

## Three Phase Amperage†

| Standard Water Unit Model No. | Unit KW | 208V | 240V | 480V | 600V | No. of Heaters | Heater KW | Control Circuit Voltage |
|---|---|---|---|---|---|---|---|---|
| ES-3 | 3 | 8.3 | 7.2 | 3.6 | 2.9 | 3 | 1 | 24 vac |
| ES-4.5 | 4.5 | 12.5 | 10.8 | 5.4 | 4.3 | 3 | 1.5 | 24 vac |
| ES-5.5 | 6 | 16.6 | 14.4 | 7.2 | 5.8 | 3 | 2 | 24 vac |
| ES-7.5 | 7.5 | 20.8 | 18 | 9 | 7.2 | 3 | 2.5 | 24 vac |
| ES-11 | 10.5 | 29.1 | 25.3 | 12.6 | 10.1 | 3 | 3.5 | 24 vac |
| ES-14 | 13.5 | 37.5 | 32.4 | 16.2 | 13 | 3 | 4.5 | 24 vac |
| ES-15 | 15 | 41.6 | 36.1 | 18 | 14.4 | 3 | 5 | 24 vac |
| ES-16.5 | 16.5 | 45.8 | 39.7 | 19.8 | 15.9 | 3 | 5.5 | 24 vac |
| ES-19.5 | 19.5 | | | 23.5 | 18.8 | 3 | 6.5 | 24 vac |
| | | | | | | | | |
| ES-22 | 21 | 58.3 | 50.5 | 25.3 | 20.2 | 6 | 3.5 | 24 vac |
| ES-28 | 27 | 75 | 64.9 | 32.5 | 26 | 6 | 4.5 | 24 vac |
| ES-30 | 30 | 83.3 | 72.2 | 36.1 | 28.9 | 6 | 5 | 24 vac |
| ES-33 | 33 | 91.6 | 79.4 | 39.7 | 31.8 | 6 | 5.5 | 24 vac |
| ES-39 | 39 | | | 46.9 | 37.5 | 6 | 6.5 | 24 vac |
| ES-42 | 42 | | | 50.5 | 40.4 | 6 | 7 | 24 vac |
| ES-45 | 45 | 124.9 | 108.3 | 54.1 | 43.3 | 9 | 5 | 24 vac |
| ES-49.5 | 49.5 | 137.4 | 119.1 | 59.5 | 47.6 | 9 | 5.5 | 24 vac |
| ES-58.5 | 58.5 | | | 70.4 | 56.3 | 9 | 6.5 | 24 vac |
| ES-63 | 63 | | | 75.8 | 60.6 | 9 | 7 | 24 vac |
| | | | | | | | | |
| ES-66 | 66 | | | 79.4 | 63.5 | 12 | 5.5 | 24 vac |
| ES-78 | 78 | | | 93.8 | 75.1 | 12 | 6.5 | 24 vac |
| ES-84 | 84 | | | 101 | 80.8 | 12 | 7 | 24 vac |
| ES-102 | 102 | | | 122.7 | 98.2 | 12 | 8.5 | 24 vac |

† Other voltages available upon request. Please consult factory for specific availability.

# *Clearances & Mounting Considerations*




**Mounting Location Considerations**

Install in a location where the ambient air temperature is between 40°F - 100°F (4.4°C - 37.8°C) and relative humidity between 0% - 90% and non-condensing.

Install in a location where there is easy access to a water supply, electrical supply, and open sanitary drain.

Install as close as possible to the steam distribution grid.

Clearances shown are minimum recommendations only. Please consult local and national codes for final installation location.

Do not install where humidifier operational noise will be a nuisance.

Allow enough room for proper water seal depths.

Do not install above any critical processes, equipment, or locations in case of a water leak.

Do not install near variable frequency drives, electromagnetic equipment, or motors.

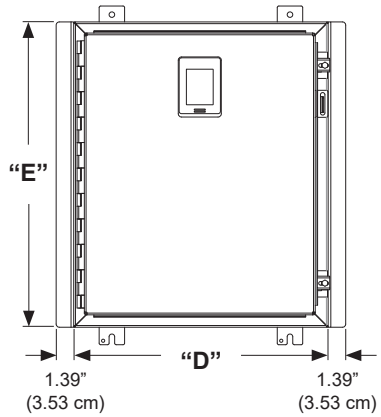
**SCR RELAY CLEARANCE NOTE**

**When SCR modulating control is supplied on a non-factory mounted control panel you will need to leave 12” clearance on the sides of the panels where the SCR heat sinks are located.**

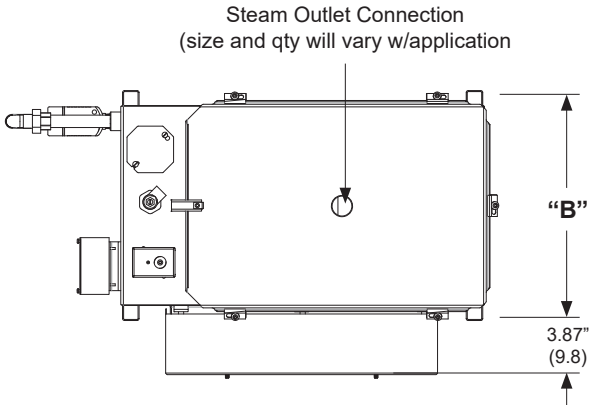
# *Dimensions*

## NEMA-12 Humidifier Control Cabinet

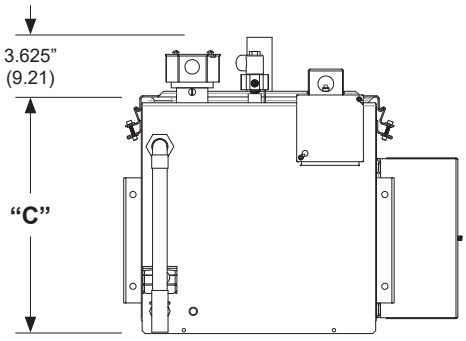
(reference control cabinet notes)



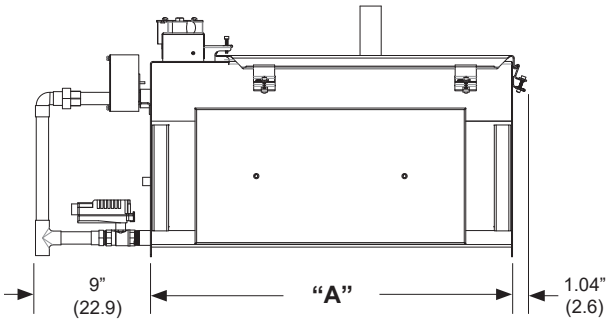

1. Door has been removed from the drawing for clarity.
2. Control cabinet is shipped loose for field mounting unless optional factory mounting is specified.
3. Dimension "F" = Control cabinet depth.
4. Heatsinks located on both sides of cabinet for all units except ES-3 through ES-19.5.




**Top View**




**Front View**




**Right Side View**

**Unit Dimensions in inches (cm)**

| Model Number | Dim. "A" | Dim. "B" | Dim. "C" |
|---|---|---|---|
| ES-3 thru ES-19.5 | 17.50" (44.5) | 14.00" (35.6) | 13.75" (34.9) |
| ES-22 thru ES-63 | 25.50" (64.8) | 14.00" (35.6) | 13.75" (34.9) |
| ES-66 thru ES-102 | 34.00" (86.4) | 18.25" (46.4) | 13.75" (34.9) |

**Control Cabinet Dimensions in inches (cm)**

| Model Number | Dim. "D" | Dim. "E" | Dim. "F" |
|---|---|---|---|
| ES-3 thru ES-19.5 | 14.00" (35.6) | 16.00" (40.6) | 6.00" (15.2) |
| ES-22 thru ES-63 | 20.00" (50.8) | 20.00" (50.8) | 7.00" (17.8) |
| ES-66 thru ES-102 | 20.00" (50.8) | 24.00" (61.0) | 7.00" (17.8) |
| ES-* | 24.00" (61.0) | 30.00" (76.2) | 7.00" (17.8) |

*Control panel for use with units having 123 amps or higher

# Installation & Location

**Important:** Remove all shipping brackets and materials before operating the humidifier. Humidifier flue gases must be vented to the outside atmosphere. Power supply disconnect switch must be in the off position while making wiring connections to prevent electrical shock and equipment damage. All units must be wired in strict accordance with wiring diagram furnished with this unit. Turn off all gas while installing the supply gas piping and field installed manual gas shut-off valve for the humidifier.

**Location**

The location selected must provide for electrical service, cold or hot water supply, and sanitary drain.

When selecting a location, try to keep the humidifier within 10 feet (305 cm) of the duct to avoid unnecessary heat losses and condensation within the steam supply line.

Visible “fog” will saturate and condense when it contacts objects such as turning vanes, filters, fans, elbows or take-offs. The warmer the air, the more easily it will dissipate the visible steam. The most active and warmest portion of the duct will provide better mixing of the steam and air. The injection tube should be mounted a minimum of 2 feet (61 cm) downstream from an elbow or other turbulent air flow area.

Avoid mounting single style injection tube(s) closer than 8-10 feet (244-305 cm) upstream of objects that could become saturated and condense the steam (reference the paragraph above). If the duct layout does not provide a straight unobstructed run of 8-10 feet (244-305 cm), a multiple injection tube system should be considered to reduce the visible steam travel distance.

For Fast-Pac and Insty-Pac multiple tube assemblies please consult factory for job specific non-wetting distances.

Reference Fast-Pac or Insty-Pac O&Ms for full installation details.

**CAUTION:** Do not humidify upstream of filters. Consult factory.

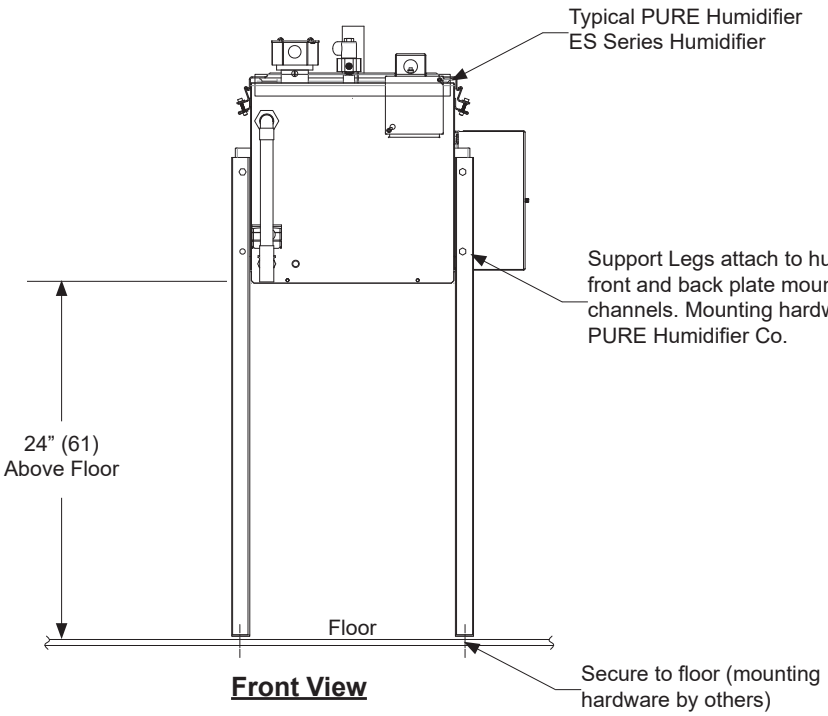
**CAUTION:** Smoke detectors should not be located downstream of injection tube assemblies.

**Location of Controls**

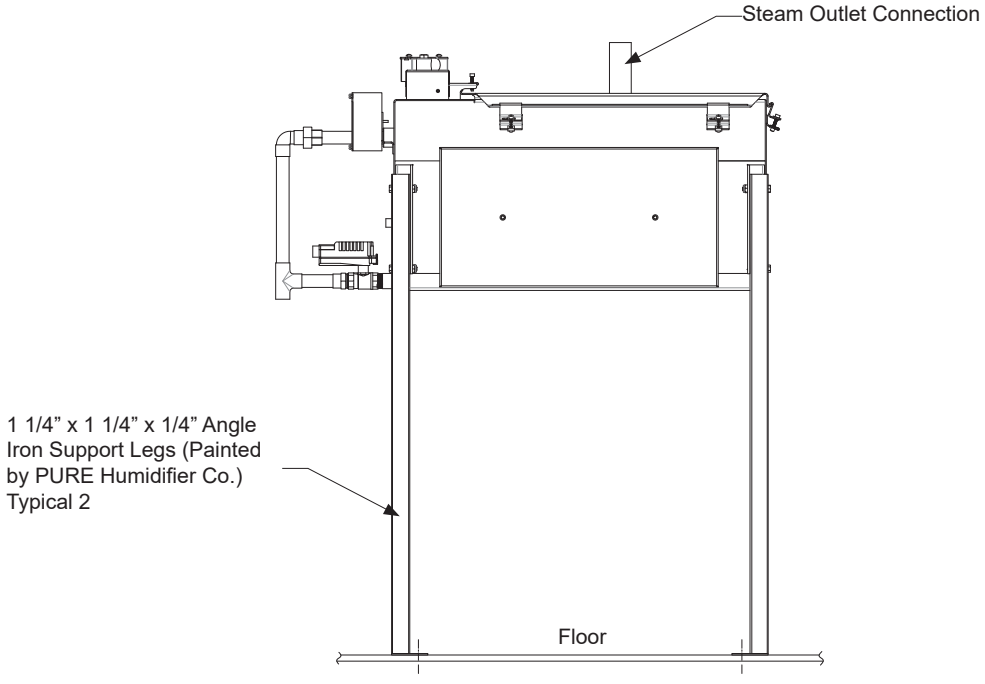
It is important to avoid mounting any controls within the visible steam. The controls should be mounted a minimum of 8-10 feet (244-305 cm) downstream from the humidifier injection tube. Due to the temperature rise that exists within the visible steam dissipation area, thermostats should not be mounted near the injection tube.

High-limit humidistats should be installed before any duct obstruction to make sure the humidifier is interrupted before saturation can occur on the object. The high-limit should be mounted a minimum of 8-10 feet (244-305 cm) downstream from the injection tube. Installing the high-limit closer than 8 feet (244 cm) from the humidifier may cause erratic control.

# *Mounting Applications*
## *Support Legs*

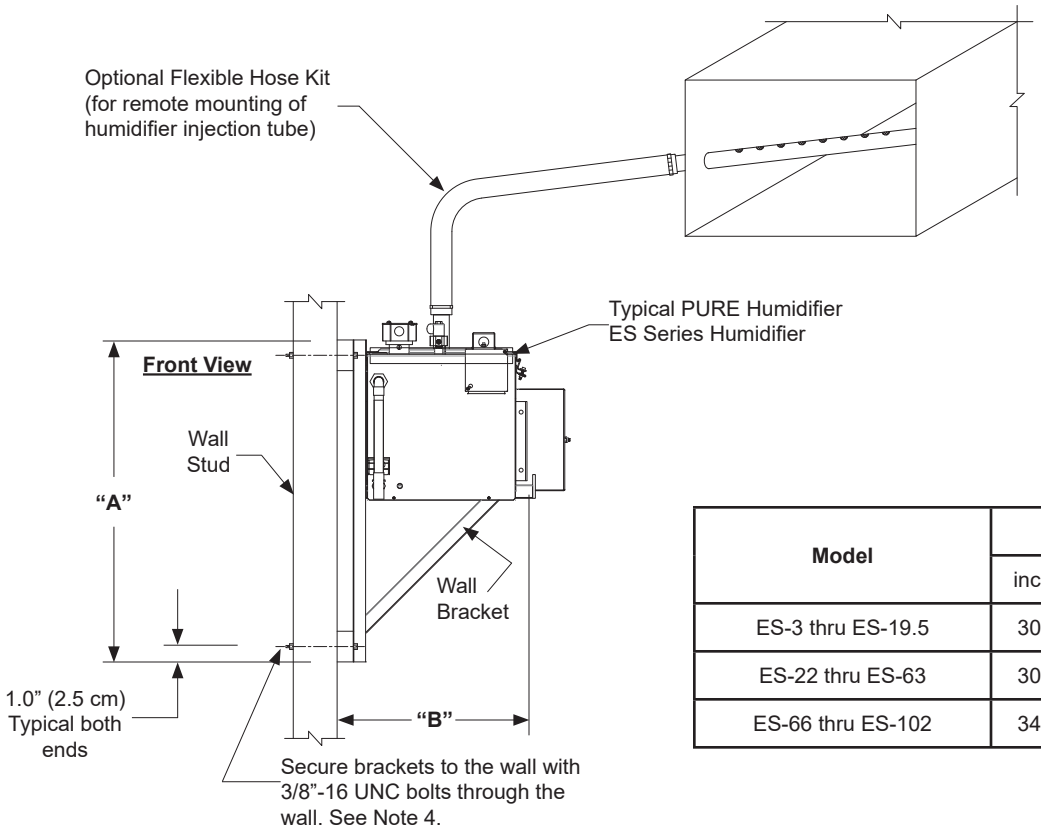



**Front View**

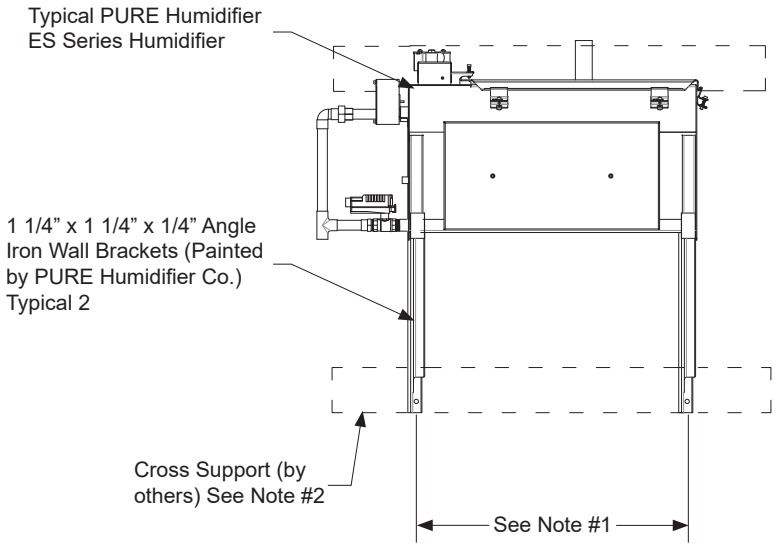



**Right Side**

# *Mounting Applications*
## *Wall Brackets*




| Model | Dim. "A" | | Dim. "B" | |
|---|---|---|---|---|
| | inches | cm | inches | cm |
| ES-3 thru ES-19.5 | 30.50 | 77.5 | 16.75 | 42.6 |
| ES-22 thru ES-63 | 30.50 | 77.5 | 16.75 | 42.6 |
| ES-66 thru ES-102 | 34.75 | 88.3 | 21.00 | 53.3 |

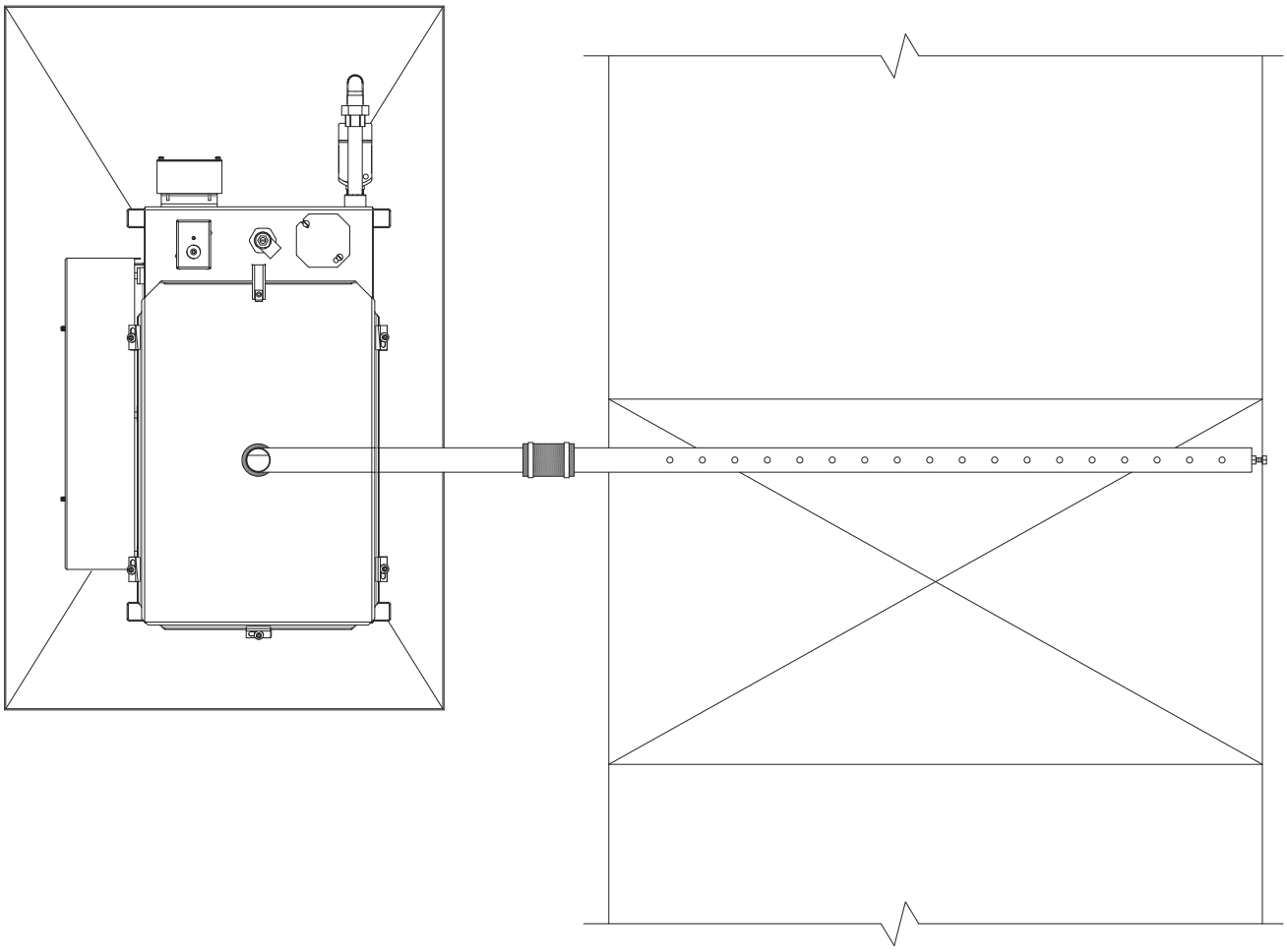



**NOTES:**

1. Secure brackets to wall support studs. Attachment bolts must be secured throught he wall stud.
2. A cross support (by others) may be required to span between the wall studs.
3. Reference the humidifier schedule to verify which injection tube system is to be provided.

**Drain Pan Mounting**

A drain pan is an additional safety feature which may be required to be supplied in the field. In a proper humidifier installation, a drain pan is not required. However, if the humidifier and injection tube are located in an area that contains valuable equipment or is a water sensitive area, PURE Humidifier Co. recommends the addition of a drain pan under the humidifier and under the injection tube. The drain pan should extend past all edges of the humidifier and if installed in the duct, it should extend a minimum of 3 feet (91 cm) downstream from the injection tube. The pan should be of a size which is capable of draining at a rate of 3 gpm for units with a capacity of up 200 lbs/hr, and 5 gpm for units with a capacity over 200 lbs/hr. The pan should be drained to a sanitary drain.



# *Water Supply & Drain Piping*

**ALL DRAIN AND CONDENSATE PIPING MUST BE INSTALLED IN ACCORDANCE TO LOCAL PLUMBING CODES.**

**HIGH CHLORIDE CONTENT IN FEED WATER CAN CAUSE CHLORIDE STRESS CRACKING AND CHLORIDE PITTING IN STAINLESS COMPONENTS. CHLORIDE STRESS CORROSION CRACKING (CSCC) AND CHLORIDE PITTING OF STAINLESS STEEL COMPONENTS IS NOT COVERED BY WARRANTY.**

**Water Supply Piping**

Supply pressure: 35-95 psi optimal

This style of humidifier utilizes a Tri-Probe conductive type water control system which is designed for use with standard (hard or softened) tap water. Use of demineralized, deionized or reverse osmosis water will cause failure of the water level control system and void the humidifier warranty.

Install stainless pipe on make-up water line within 5 feet of humidifier fill valve connection. If plastic pipe is used beyond this point a check valve is required to prevent steam from entering the plastic section in the event that the water treatment system runs out of water.

Cold or hot standard tap water can be supplied to the humidifier. A minimum water pressure of 35 psi (2.4 Bar) should be maintained to provide the proper water level within the humidifier. If the water pressure is above 95 psi (6.6 Bar), the valve may not shut off. The humidifier has a factory built-in 1.5” (4 cm) air gap between the water inlet and the overflow. Local codes should be checked to see if the addition of a vacuum-breaking device is required.

**Drain Piping**

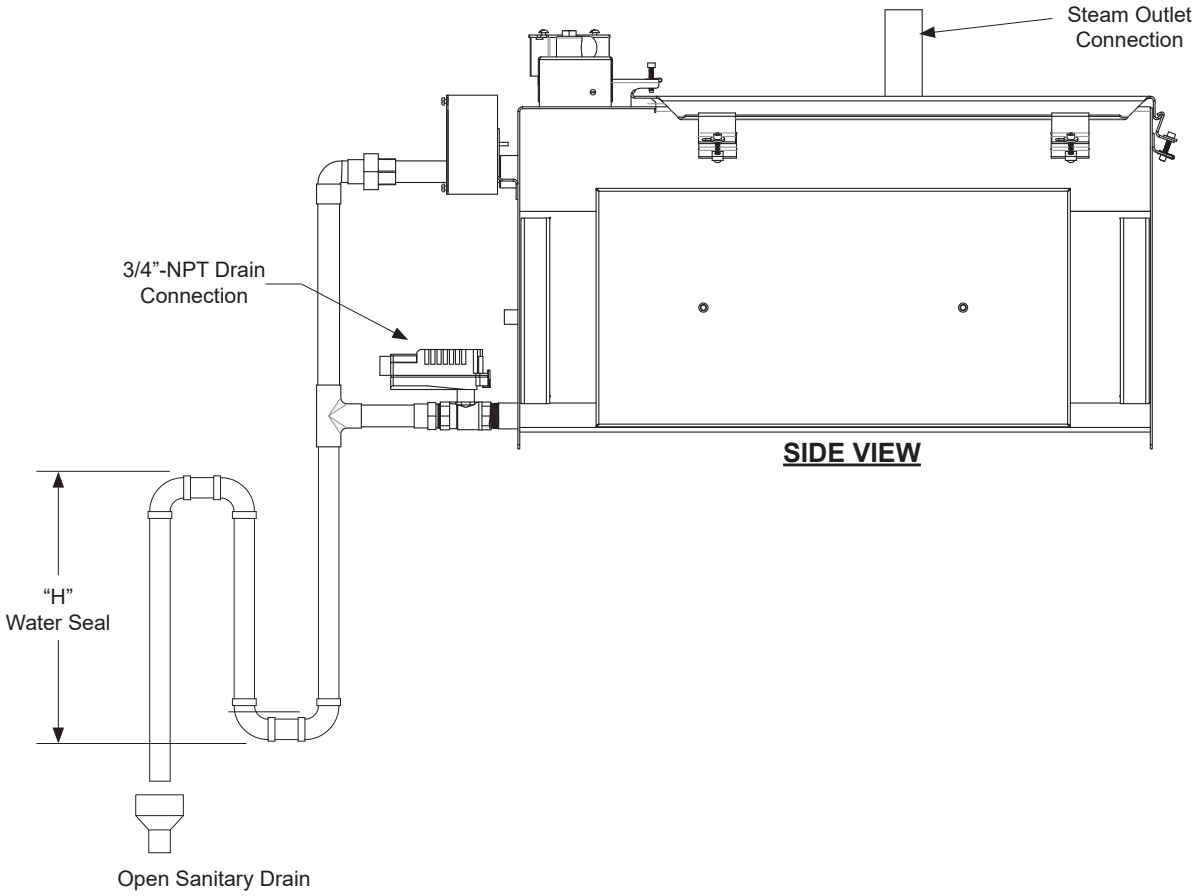
A water seal as shown in the piping illustration should be installed to prevent steam from escaping through the drain line. The water seal should be of sufficient height to overcome the pressure developed in the humidifier (reference water seal height table) and the duct static pressure.

The drain piping should be stainless steel. The use of PVC piping is not recommended; the humidifier temperature will cause the PVC to soften and fail.

If gravity drain is not possible please use a condensate pump rated for 212°F water or contact a PURE Humidifier Co. Representative to purchase one.

Local codes may require tempering of 212°F (100°C) water before entering drain. The PURE Humidifier Co. DCT-927 Drain Tempering Kit will temper water to 140°F (60°C).

# *Piping*
## *Drain Piping*



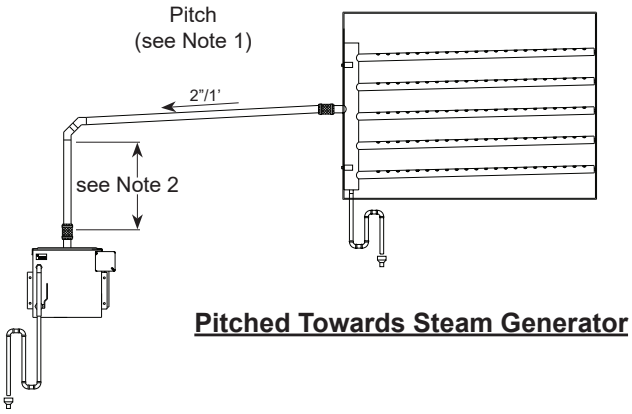

| Water Seal Height Δ | | |
|---|---|---|
| Unit Size | "H" | |
| Total KW | inches | cm |
| 3 - 19.5 | 8 | 20 |
| 22 - 33 | 11 | 28 |
| 39 - 49.5 | 17 | 43 |
| 58.5 - 102 | 19 | 48 |
| Δ The water seal height may have to be increased if excessive duct static pressure exists. | | |

**NOTES**

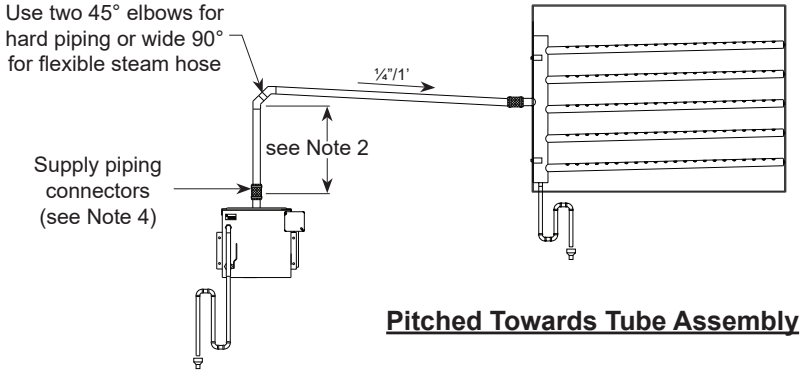
1. All drain piping is by others.
2. Drain and overflow connection requires field piping.
3. Do NOT use PVC or other plastic piping that is not rated for 220°F or higher.

† This model is typically supplied with non-potable water. However, a backflow preventer may still be needed to prevent contamination of the attached water system.

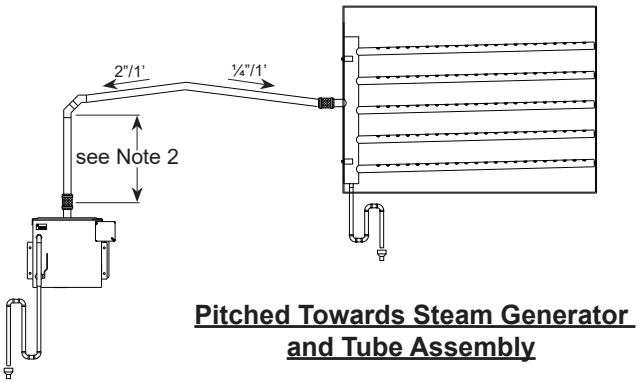
# *Steam Supply Piping Examples*



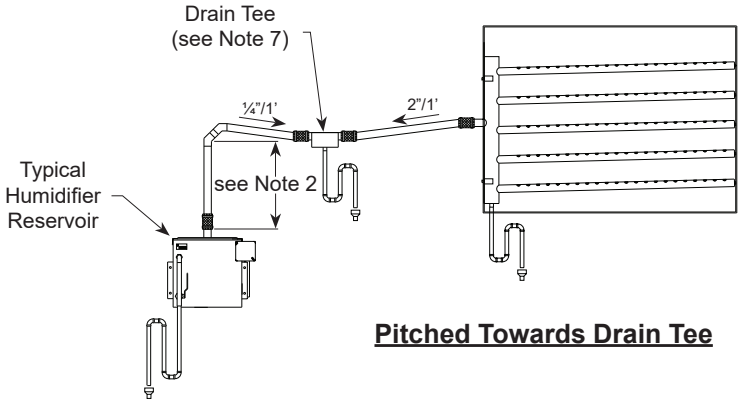

**Pitched Towards Steam Generator**




**Pitched Towards Tube Assembly**




**Pitched Towards Steam Generator and Tube Assembly**




**Pitched Towards Drain Tee**

**Notes:**

1. Pitch hard piping or flexible hose 2" per foot if steam is flowing uphill, ¼" per foot if the steam is flowing downhill. Reference piping examples shown.
2. When feasible to do so, install a minimum one-foot riser from the top of the tank to reduce condensate carryover.
3. Use flex connectors or unions to allow for easy removal of cover.
4. Support flexible hose every 18" to avoid sagging.
5. Hard piping or flexible hose must match reservoir outlet size. Do not use supply piping with a smaller inside diameter than the reservoir outlet.
6. Failure to follow the piping recommendation on this page may result in blown water seals, leaking cover gasket, or dispersion tubes spitting.
7. Install a Drain Tee at any low spots in supply piping run where condensate will accumulate. **All horizontal to vertical up transitions require a water-sealed drip leg.**
8. Reference job specific tube assembly O&M included with your order for complete details.

# *Single or Multiple Injection Tube Installation*

**Single or Multiple Injection Tube Installation**

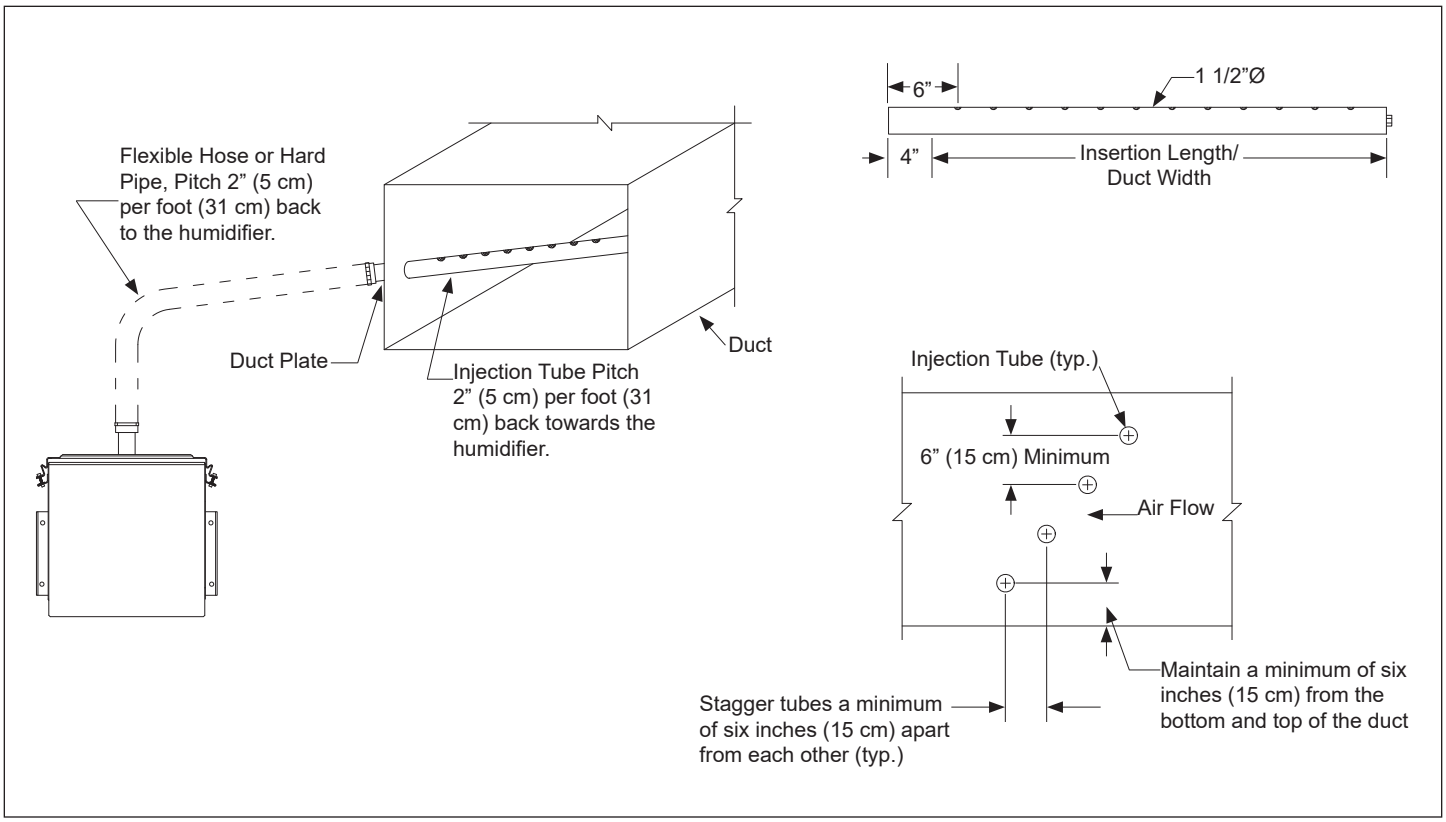
Single injection tubes should be installed in the center of the duct. Multiple injection tubes should have the tubes staggered within the duct as shown in the illustration.

The supply piping and injection tube should be pitched according to the examples on page 13. If the injection tube is mounted lower than the humidifier, a “Drain Tee” will be required (reference “Drain Tee” illustration on page 15).

Install the injection tube with the steam ports injecting steam up. NOTE: If narrow ducts (6” / 15 cm or less, in height) are utilized, install the tube with the steam ports injecting with the air flow at a 45° angle.

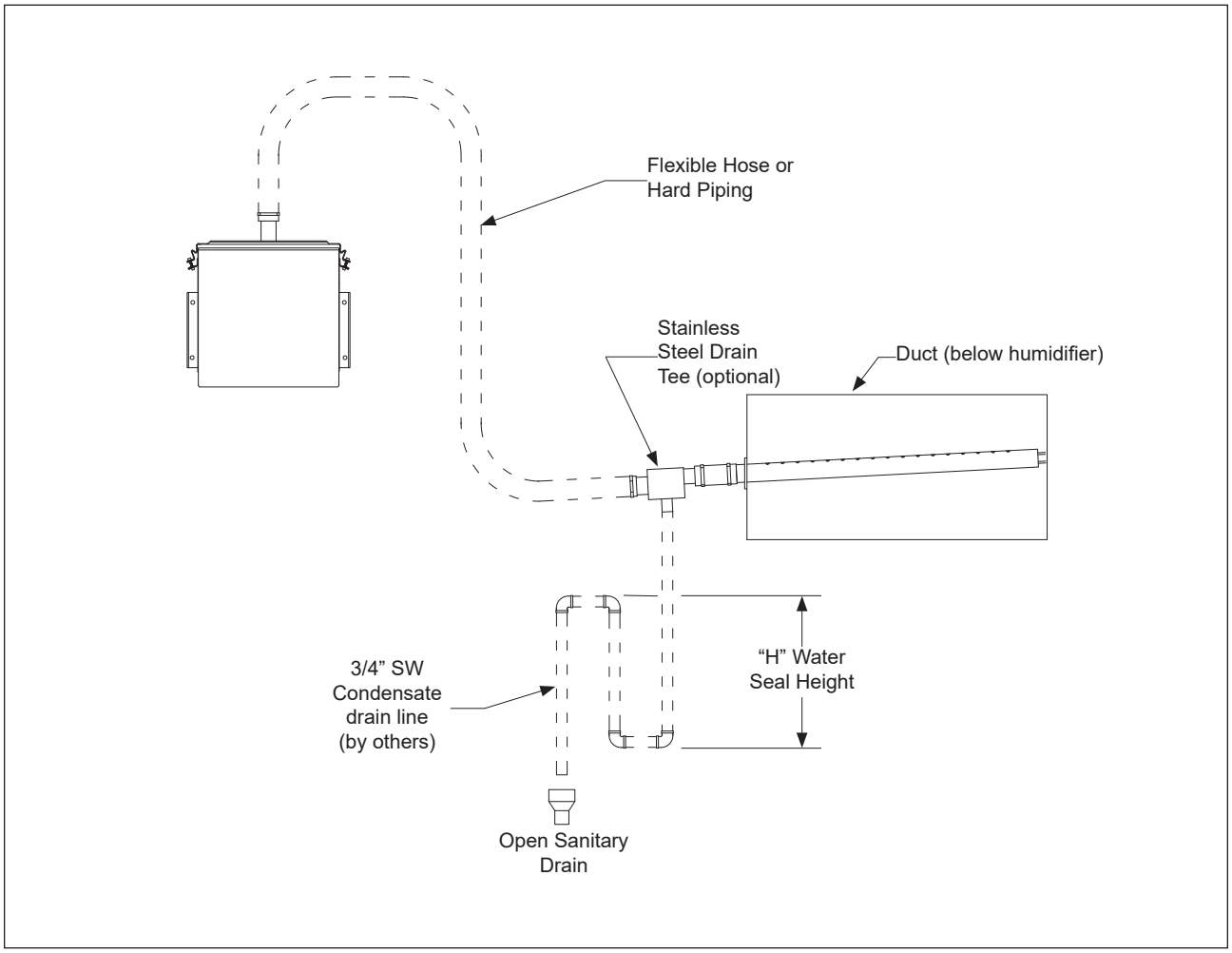
Galvanized steel duct plates are provided to seal the opening where the tube enters the duct.

For Fast-Pac or Insty-Pac multiple tube assemblies please reference their O&M for complete installation details.



# *Single or Multiple Injection Tube Installation*

**Single or Multiple Injection Tubes with Drain Tee**




| Water Seal Height Δ | | |
|---|---|---|
| Unit Size | "H" | |
| Total KW | inches | cm |
| 3 - 19.5 | 8 | 20 |
| 22 - 33 | 11 | 28 |
| 39 - 49.5 | 17 | 43 |
| 58.5 - 102 | 19 | 48 |
| Δ The water seal height may have to be increased if excessive duct static pressure exists. | | |

# *Steam Supply Piping*

PURE recommends stainless tubing or pipe to match the steam outlet diameter connection on the humidifier cover. Stainless has superior corrosion resistance over copper and is less expensive but slightly harder to install. Stainless tubing is preferable over stainless pipe due to the fact that the tubing is less expensive and reduces heat loss/condensate formation during operation. Stainless pipe may be easier to install compared to stainless tubing because fittings are readily available and it does not require welding. As always, the installer should refer the material required by the project documents and/or the authority having jurisdiction.

**Maximum Steam Supply Piping Capacities**

| Line I.D. | Flexible Hose | | Copper or Stainless Tubing | | Schedule 40 Pipe | |
|---|---|---|---|---|---|---|
| | Maximum Capacity | | Maximum Capacity | | Maximum Capacity | |
| | lbs/hr | kg/hr | lbs/hr | kg/hr | lbs/hr | kg/hr |
| 1 1/2” | 150 | 68.0 | 130 | 59.0 | 150 | 68.0 |
| 2” | 250 | 113.4 | 200 | 90.7 | 215 | 97.5 |
| 3” | 500 | 226.8 | 411 | 186.4 | n/a | n/a |
| 4” | n/a | n/a | 730 | 331.1 | n/a | n/a |

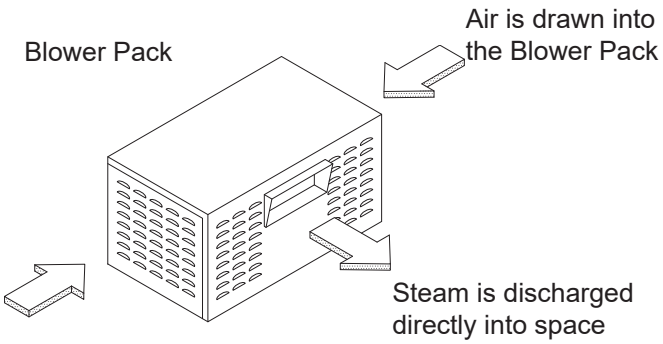
Note: Maximum length of flexible hose is 10’. Longer runs will cause sagging of the line and create low spots.

# *Blower Pack*

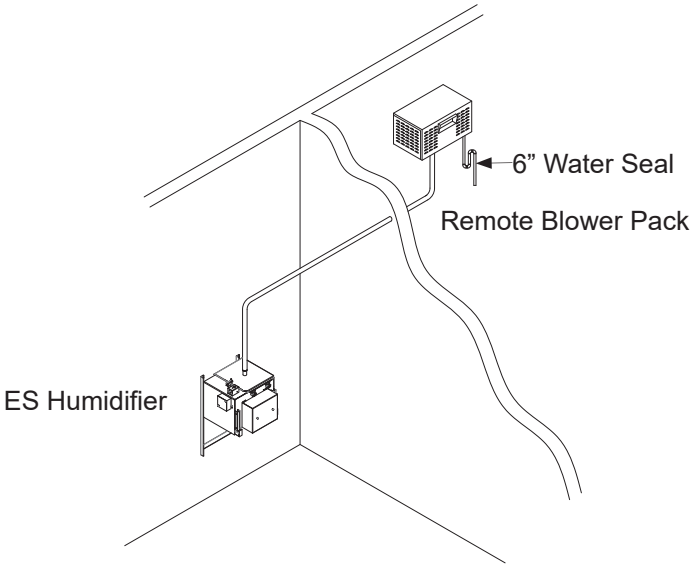
In applications where a ducted air system is not available, PURE offers the optional Blower Pack. The Blower Pack contains a two-speed adjustable blower that moves the air over the steam discharge outlet and disperses the steam directly into the space (see Fig. 1).

**Mounting**

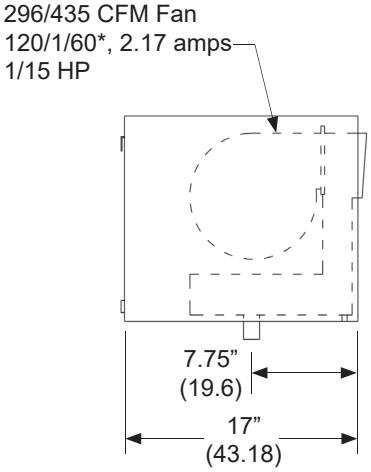
The Blower Pack may be remote-mounted up to ten feet away from the ES humidifier (see Fig. 2).



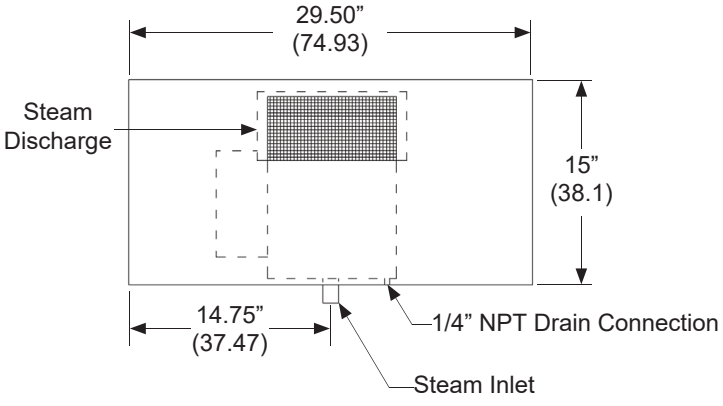

**Blower Pack**
**Fig. 1**




**Remote-Mounted Blower Pack**
**Fig. 2**




**Left Side View**




**Front View**

**Optional Blower Pack Dimensions**
Blower Pack weight is 60 lbs (27.2 kg)
* Blower requires a separate 120/1 circuit (by others)

### Locating Blower Pack

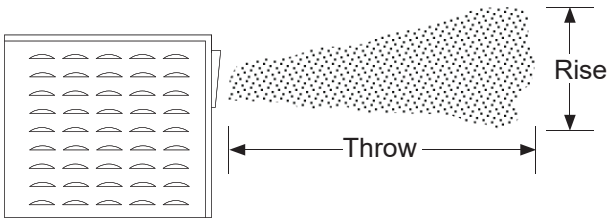
The distance that visible steam will travel after leaving the Blower Pack is dependent upon the relative humidity in the room and the capacity of the humidifier. If this visible steam comes in contact with any solid object (walls, beams, machinery, etc.) it may form condensate and drip. Refer to Fig. 3 and tables for data on visible steam travel, this will aid you in planning the location of the Blower Pack.

**NOTE: Blower Pack steam capacity is 102 lbs/hr max.**

| **Visible Steam Rise & Throw** | | **Humidifier Model 5-25 kW** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5 kW (1) | | 10 kW (1) | | 15 kW (1) | | 20 kW (1) | | 25 kW (1) | |
| **Blower Pack Qty. (-)** | | feet | meters | feet | meters | feet | meters | feet | meters | feet | meters |
| **50% RH** | Rise | 1.0 | .30 | 2.0 | .61 | 3.0 | .91 | 4.0 | 1.2 | 5.5 | 1.7 |
| | Throw | 8.0 | 2.4 | 10.0 | 3.0 | 13.0 | 4.0 | 16.0 | 4.9 | 18.0 | 5.5 |
| **60% RH** | Rise | 2.0 | .61 | 3.0 | .91 | 4.0 | 1.2 | 5.0 | 1.5 | 6.0 | 1.8 |
| | Throw | 13.0 | 4.0 | 14.0 | 4.3 | 16.0 | 4.9 | 18.0 | 5.5 | 20.0 | 6.1 |

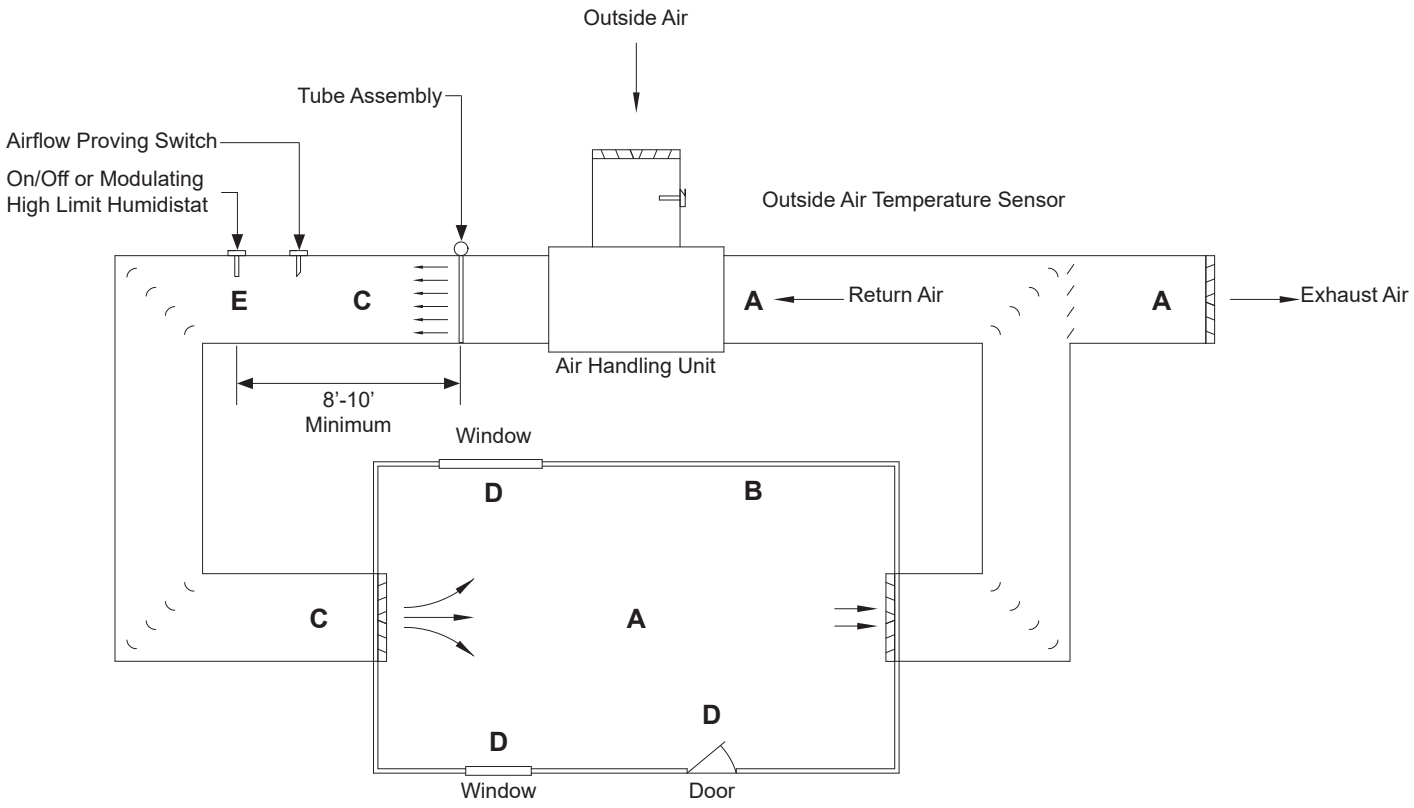
| **Visible Steam Rise & Throw** | | **Humidifier Model 33-102 kW** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5 kW (1) | | 10 kW (1) | | 15 kW (1) | | 20 kW (1) | | 25 kW (1) | |
| **Blower Pack Qty. (-)** | | feet | meters | feet | meters | feet | meters | feet | meters | feet | meters |
| **50% RH** | Rise | 8.0 | 2.4 | 4.0 | 1.2 | 5.5 | 1.7 | 8.0 | 2.4 | 8.0 | 2.4 |
| | Throw | 23.0 | 7.0 | 16.0 | 4.9 | 18.0 | 5.5 | 23.0 | 7.0 | 23.0 | 7.0 |
| **60% RH** | Rise | 8.0 | 2.4 | 5.0 | 1.5 | 6.0 | 1.8 | 8.0 | 2.4 | 8.0 | 2.4 |
| | Throw | 25.0 | 7.6 | 18.0 | 5.5 | 20.0 | 6.1 | 25.0 | 7.6 | 25.0 | 7.6 |

**Throw** is the horizontal distance the visible steam travels from the steam discharge.
**Rise** is the vertical distance the visible steam travels from the steam discharge.
Objects in the direct line of the visible steam or objects that are cooler than the ambient temperature may accumulate condensation.
**Note:** Data above based on 70°F room temperature.




**Visible Rise and Throw**
**Fig. 3**

# *Controls Locations*




**Recommended Humidistat and Sensor Locations**

A. Optimal location for even airflow and a stable temperature
B. Adequate location
C. Supply air location is not recommended for controlling humidity sensors
D. Do not locate humidistats or sensors near doors or windows
E. Best location for on/off or modulating high limit

# ES Pre-Startup Procedure

**Pre-Startup Checklist**

Before starting the ES PURE Humidifier Co. Electric Humidifier, check the following installation items:

_____ 1. MOUNTING - Verify that the humidifier evaporating chamber is securely supported and that the evaporating chamber is level in both directions.

_____ 2. INJECTION TUBE - Verify that the humidifier injection tube is mounted within the duct with the proper pitch back to the humidifier (2”/5 cm per foot / 31 cm). NOTE: If the humidifier evaporating chamber or the flexible hose (optional) is mounted higher than the injection tube, a drain “tee” is required to drain the condensate out of the injection tube steam line. If it is an Insty-Pac or Fast-Pac, refer to the respective O&M to determine if they are mounted properly and have the proper p-trap size.

_____ 3. ELECTRICAL - Verify that all wiring connections have been connected in accordance with the wiring diagram. **CAUTION: Live power may exist in the control cabinet. Turn off the main power at the disconnect switch before verifying the electrical connections!**

_____ 4. SAFETY CONTROLS – The supply air duct RH high-limit should be installed at least 10 feet downstream from the humidifier tube(s). Any other control sensors should be at least 10 feet downstream from the humidifier tube(s). Smoke detectors should not be installed downstream of the humidifier tube(s). If a smoke detector absolutely has to be installed downstream from the humidifier tubes then it should be installed as far from the tubes as possible.

_____ 5. PIPING: Water Supply - Verify that all piping connections have been completed as recommended and that water pressure is available to the humidifier. Verify that the supply water pressure is 35-60 psi. There should be at least 5 feet of metal pipe and check valve between the tank and any plastic pipe.

_____ 6. PIPING: Drain - Make sure a water seal of the proper height (reference page XXX for height) is provided in the drain line.

_____ 7. PIPING: Steam Outlet - Refer to Supply Piping Examples page for proper outlet steam piping from the generator to the tube(s). **Any horizontal to vertical up transition in the outlet steam pipe requires a water-sealed drip leg!** Improper outlet steam piping will cause steam to leak from the steam generator. Runs over 20 feet long may require upsizing of the steam pipe.

Signature:_____ Date:_____

# ES Startup Procedure

**Startup Procedure**

_____ 1. Turn the electric power “on” to the humidifier.

_____ 2. RH Setpoint on the touchscreen should be set to 0.0% RH (no call for humidity). If there is no display of actual humidity on the touchscreen the procedure must be done through the Building Management System.

_____ 3. Open the water supply on/off control valve (by others) and allow the humidifier evaporating chamber to fill to the proper level.

_____ 4. Make sure all the optional safety switches are satisfied (airflow proving switch, high-limit humidistat, etc).

_____ 5. After the humidifier is full of water the touchscreen will read “Water Level FULL”.

_____ 6. Verify the low water safety shutoff by changing the operation mode to “Drain” on the touchscreen. The humidifier should drain to a level where the touchscreen will read Water Level “Low”.

_____ 7. Change the operation mode back to “Normal”. Verify that the Control Relay is off/deenergized while the water level reads “Low”. The relay should energize when the water level reading changes to “Refill”. This indicates that the low water safety shutoff is operational.

_____ 8. Set The RH Setpoint on the touchscreen above the actual reading to get a call for humidity. If Building Automation System is controlling the humidifier, set it to call for 100% demand. For Building Automation System verify 0% and 100% demands are displayed as 0% and 100% on the touchscreen or adjust the input high and low values to match accordingly.

_____ 9. The heater(s) should energize.

_____ 10. Check operation of optional field-installed safety switches (airflow proving switch, high-limit humidistat, etc) to make sure that they turn the power off to the control circuit power. The safety switches should shut off the humidifier heaters whenever one or more of the optional safety switches create an “open circuit”.

_____ 11. Check heater amperage draw by testing and recording voltage and amperage in each phase. Readings should match the factory heater nameplate.

Amps A:_____ Amps B:_____ Amps C:_____

_____ 12. Inspect installation for leaks by operating humidifier at a full rolling boil. This may take up to 50 minutes from a cold start. Any leaks should be sealed. Just tightening a pressure clamp will not work if the gasket is not properly positioned between the sealing surfaces. If necessary, remove the cover, reseat gasket and replace the cover.

_____ 13. After the unit is producing steam, check and retighten all hose clamp connections in the system and make sure they are torqued to 35-40 in-lbs. There are 6 clamps total inside the cabinet.

_____ 14. Adjust the RH setpoint back to the desired value.

Signature:_____ Date:_____

**SCR Modulation**

SCR modulation is designed to provide extremely accurate control of humidifier output. For a three phase humidifier, each set of three heating elements within the humidifier evaporating chamber will be modulated to provide 0-100% control of the humidifier output (capacity). The SCRs used are zero-cross, meaning they switch on and off when the alternating current crosses from negative to positive (and vice versa), reducing line noise. It fires on a one-second time base (field adjustable), allowing the humidifier output to parallel the control signal from the humidity controller. The SCR pulses the immersion heater power according to the control signal for a percentage of each second e.g. at 50% power the heater will be on for 1/2 a second and off for 1/2 a second.

# *Troubleshooting*

- Verify humidifier and accessories are installed according to Operation and Maintenance manuals.
- Please read all Operation and Maintenance manuals to familiarize yourself with the equipment.
- A job specific wiring diagram can be located inside the control panel door.

| Problem | Possible Cause | Recommended Action |
|---|---|---|
| **Humidifier will not heat** | Blown main heater fuse(s) | Check and replace. |
| | Control transformer not producing 24 vac control voltage | Check transformer output. Verify voltage across 24VAC Fused & 24VAC Com. |
| | Safety controls open (airflow proving, high limit, etc) | Verify that all safety controls are completing the safety circuit. |
| | Faulty humidity sensor | Verify voltage to and from humidity sensor. |
| | Faulty immersion heater | Check and verify heater voltage and amperage. Compare to diagram or nameplate ratings. |
| **Humidifier will not fill** | No water pressure | Check Water Supply. |
| | Drain valve open | Close drain ball valve. If auto drain system is utilized, verify that the drain valve is closed by removing actuator and looking at valve stem position. |
| | No power to the fill valve | Check the fill relay and see if it is energized. |
| **Humidifier does not stop filling or is short cycling** | Fill valve stuck open | Check the fill relay and see if it is energized. If no voltage, check for dirt under valve seat. |
| | Drain valve open | Close drain ball valve. If auto drain system is utilized, verify that the drain valve is closed by removing actuator and looking at valve stem position.The stem can be manually turned. |
| | Probes need cleaning | Remove Tri-Probe sensor and clean probe ends. |
| | Check Tri-Probe wiring on PLC | Make sure the Tri-Probe wiring matches the wiring diagram. |

**PURE Humidifier Co. ES Maintenance Instructions**

The ES Series Electric Humidifier is designed to provide the best possible operation with minimum maintenance. However, the humidifier should be inspected and place on a dedicated maintenance schedule to ensure continued operation of the humidifier and its accessories. **PURE Humidifier Co. recommends that the following items be inspected, and/or, cleaned on a minimum basis of twice a year.** If excessive mineral build-up occurs, the maintenance schedule should be increased.

| Inspect/Maintenance Item | Procedure to Follow |
|---|---|
| Water Fill Valve | Check to make sure the fill valve is operating properly. If the valve appears to continually fill, check the valve seat and seal (see trouble shooting instructions). |
| Safety Interlocks (Airflow, High Limit) | Check to make sure the safety interlocks (air flow, high-limit, etc) will shut down the humidifier. |
| Immersion Heaters | Verify the correct amperage is being drawn by the heating element. Reference the wiring diagram for correct amperage. |
| Humidifier Cover/Tank | Inspect for any leaks. Repair as required. Remove the mineral deposits from floor of the humidifier reservoir. If excessive build-up is found, the cover may need to be removed to facilitate complete cleaning of the humidifier. |
| Tri-Probe | Remove Tri-Probe assembly from humidifier (set-screw and o-ring seal) and inspect for excessive mineral build-up. Inspect plastic housing for cracks. Probe ends should be cleaned and the probe assembly re-installed. |
| Drain Valve & Drain Piping | The drain valve seat and seal should be inspected and cleaned as required. The drain line and water seal should be inspected and cleaned to ensure free flow of the overflow and drain line. |
| Flexible Hose | Inspect for cracks or leaks. It is normal for the hose to become hard and develop a “set”. |

**Cleaning Instructions**

**Hard Make-up Water**
If utilizing hard make-up water, humidifier tanks will likely need to be cleaned manually. This can be done from the side-entry plate or cover. Remove all loose solids from tank and/or exchanger with a wet vacuum or putty knife and bucket. After removal of solids, replace the side-entry plate/cover. At this point you may wish to add a descaling solution. Contact your local representative for our easy to use, non-toxic PURE Clean descaling solution.

**Softened Make-up Water**
If utilizing softened make-up water, help eliminate build-up in the tank simply by adding a descaling solution. Contact your local representative for our easy to use, non-toxic PURE Clean descaling solution.

**DO NOT** use Hydrochloric acid-based descalers; this will corrode stainless steel.

# *Heater Plate Gasket Replacement Instructions*

**WARNING**
**Disconnect the humidifier power and allow the unit to cool prior to servicing. Drain water from tank.**

1. Loosen the exchanger cover clamp screws with a 7/16” socket wrench until the locknuts can be slid out from the mounting clamps. Repeat this step for all clamps. Remove exchanger.

2. Remove the old gasket and adhesive left of the heat exchanger. Make sure this surface is clean, dry, and free of oil, grease or water. Turpentine may be used to clean the surface areas.

3. Spray contact adhesive such as 3M product Super 77 on one side of the new gasket and on the exchanger surface where the gasket is to be applied. Allow both surfaces to dry a minimum of one minute or until the surfaces become tacky to assure proper bonding.

4. Square one end of the new gasket on one end of the exchanger and set by applying light to moderate pressure to the gasket. Square the other end of the gasket on the other end of the heater plate. It is common for the gasket to appear too long. Now slowly start setting the gasket from the ends towards the middle of the heater plate. A slight compression of the gasket will occur ensuring proper fit on the ends.

5. Apply moderate to heavy pressure on the newly installed gasket all the way around ensuring proper fit. A properly installed gasket will lay flat with no raised areas.

6. Reinstall the heater plate into the humidifier.

7. Loosely install all of the exchanger cover clamps.

8. Using a 7/16” torque wrench set at 60 inch/pounds tighten all clamp screws.

9. In a reverse manner, reconnect all electrical connections. Fill humidifier with water and check for leaks.

10. Observe for leaks and tighten slightly if a leak area is found. DO NOT EXCEED 100 inch/pounds.

# *Cover Gasket Replacement Instructions*

Remove the reservoir cover. While looking at the top of the unit, reference Figure A and B to determine which humidifier tank style you have.

**Figure A Installation**

Fit the gasket around the entire lip of the tank opening. Cut the gasket ⅛" longer than required, this will ensure proper fit when the cover is clamped back on. Slide the gasket onto lip of tank around the entire perimeter, and seal the ends together with a small amount of silicone.

**Figure B Installation**

Fit the gasket around the entire lip of the tank opening. Cut the gasket ⅛" longer than required, this will ensure proper fit when the cover is clamped back on. Slide the gasket onto lip of tank around the entire perimeter. Notch only the bottom flap of the gasket (reference Fig. C) in the corners of the tank. Seal the ends together with a small amount of silicone.

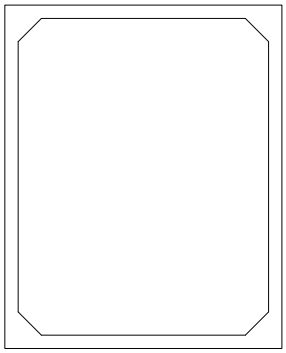


Fig. A
Plan View of Humidifier

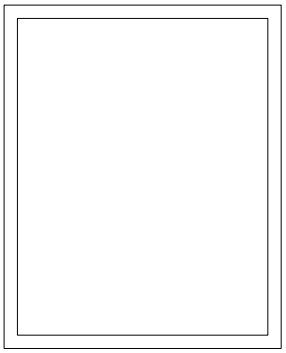
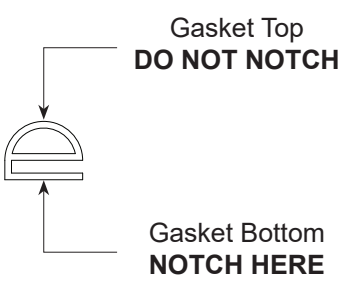
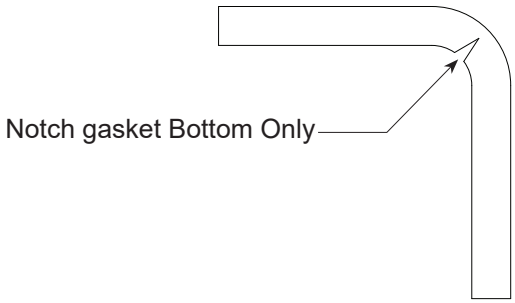


Fig. B
Plan View of Humidifier




Section View of Gasket




Bottom View of Gasket

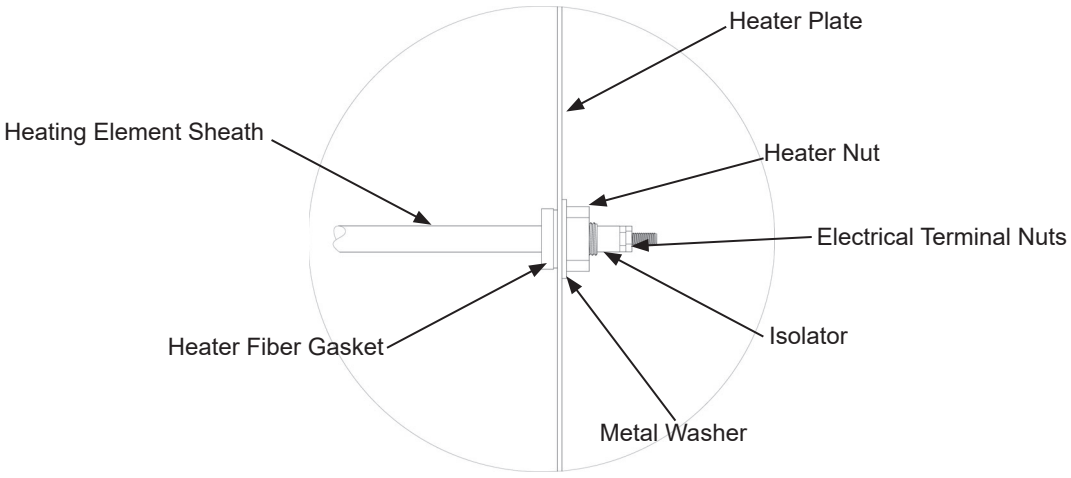
Fig. C

# *Tool Requirements & Torque List*

| Recommended Maintenance Tool List |
|---|
| 7/16” Wrench |
| 3/4” Wrench |
| Crescent Wrench |
| 11/32” Nut Driver or Socket |
| 3/8” Nut Driver or Socket |
| 5/32” Allen Head |
| Flat Head Screw Driver |
| Wire Stripper |
| Wire Crimper |

| Torque List | |
|---|---|
| Cover Bolts | 18 inch/pounds MAX |
| Hose Cuff Screws | 35-40 inch/pounds MAX when hot |
| Heater Nut | 18-20 **foot/pounds*** |
| Heater Electrical Terminal | 35 inch/pounds |
| * Use a pliers to hold heater sheath from twisting. | |

**Heater Assembly Sectional Detail**



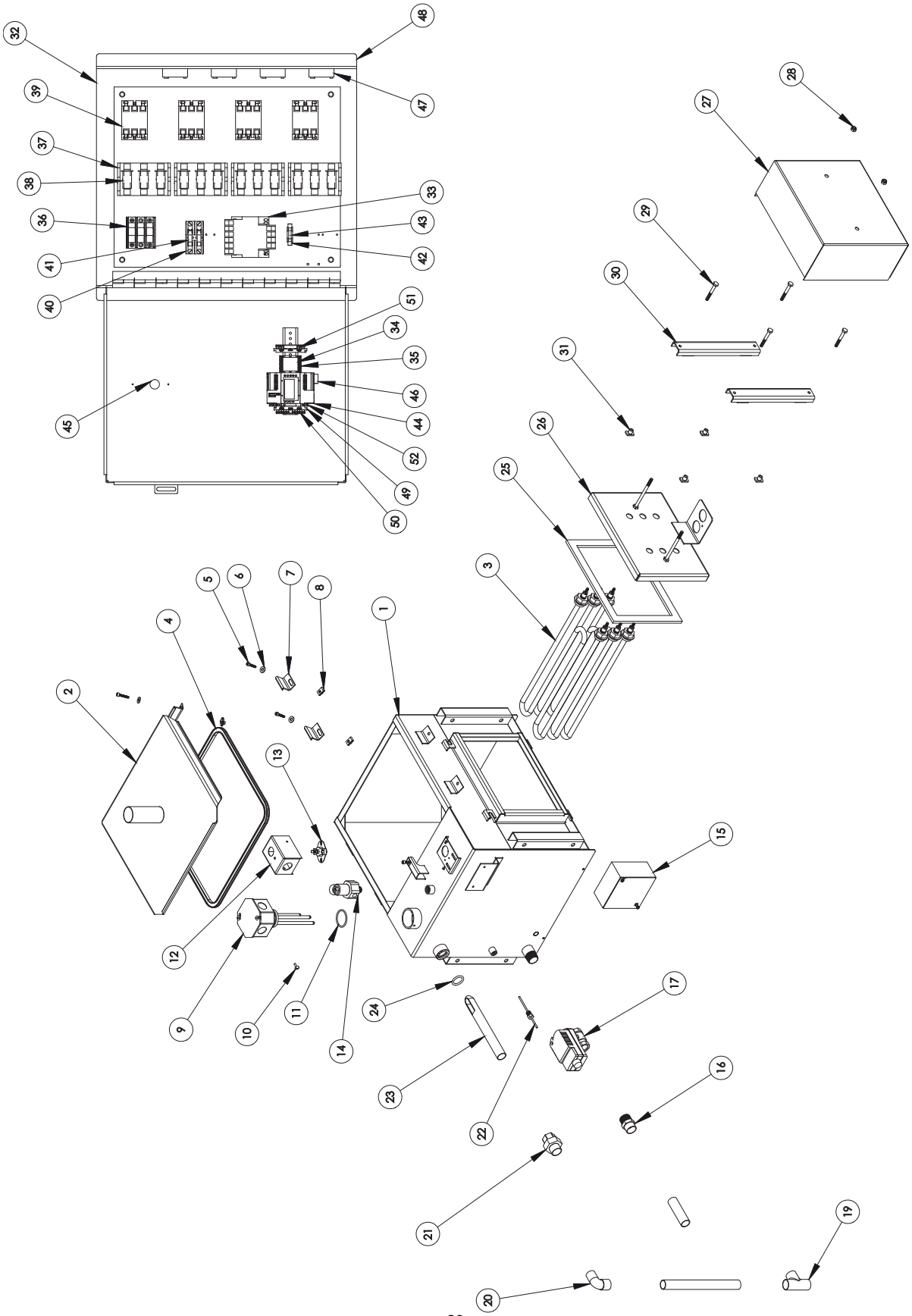
PURE™ Humidifier

# *Maintenance Notes*

| Maintenance Performed | Date | By |
|---|---|---|

PURE™ Humidifier

# *Exploded Parts Drawing*






As of June 2023

# *PURE Humidifier Co. ES Series*
# *Parts List & Two Year Recommended Spare Parts*

| Item No. | Description | Part No. | Qty Per Unit |
|---|---|---|---|
| 1 | ES Tank | A | 1 |
| 2 | ES Top Cover | A | 1 |
| 3 | Immersion Heating Element(s) | A | 3 |
| 4 | Cover Gasket | 15520 | 1 |
| 5 | Cover Clamp Screw (10-24 x 1" Hex Socket) | 15522 | A |
| 6 | #12 SAE Zinc Washer | 15184 | A |
| 7 | Cover Clamp | 15930 | A |
| 8 | Cover Clamp Nut (10-24 U-Nut) | 15524 | A |
| 9 | ES Tri-Probe | 05328 | 1 |
| 10 | Tri-Probe Set Screw (10-32 x 3/8" SST) | 15525 | 1 |
| 11 | Tri-Probe O-Ring | 15166 | 1 |
| 12 | Overtemp Switch Housing | 15072 | 1 |
| 13 | Overtemp Protection Switch | 15047 | 1 |
| 14 | 1/4" Stainless Steel Fill Valve with Strainer | 09128 | 1 |
| 15 | Electrical Box & Cover | 15076 | 1 |
| 16 | 3/4" Copper Male Adaptor | 08013 | 1 |
| 17 | Motorized Drain Valve | A | 1 |
| 18 | 3/4" Brass Ball Valve (Not Shown) | 09037 | 1* |
| 19 | 3/4" Copper Sweat Tee | 08014 | 1 |
| 20 | 3/4" 90 Degree Copper Elbow | 08011 | 1 |
| 21 | Sweat Union | 08015 | 1 |
| 22 | Tank Temp Sensor | A | 1 |
| 23 | Copper Flusher | 01113 | 1 |
| 24 | Flusher O-Ring | 15164 | 1 |
| 25 | ES Heater Plate Gasket | A | 1 |
| 26 | ES Heater Plate | A | 1 |
| 27 | ES Heater Cover | A | 1 |
| 28 | Heater Cover Nut (1/4-20 Nylock) | 15865 | 2 |
| 29 | Clamp Bar Bolt (1/4-20 x 2" Hex) | 15841 | A |
| 30 | Clamp Bar | 99136 | A |
| 31 | Clamp Bar Nut (1/4"-20 Weld Nut) | 15702 | A |
| 32 | Control Enclosure | Consult Factory | |
| 33 | Step-Down Transformer | A | 1 |
| 34 | Low Voltage Plug-In Relay | 12018 | 1 |
| 35 | Relay Base | 12020 | 1 |
| 36 | Power Distribution Block | A | A |
| 37 | Heater Fuse Block | A | 1 |
| 38 | Heater Fuse | A | A |
| 39 | Heater Contactor | A | 1 |
| 40 | Primary Fuse Holder | A | A |
| 41 | Primary Fuse | A | A |
| 42 | Secondary Fuse Holder | 12085 | 1 |
| 43 | Secondary Fuse | 12063 | 1 |
| 44 | INTAC® PLC 18I/O | 16129 | 1 |
| 45 | Touchscreen | 16131 | 1 |
| 46 | PLC Terminal Blocks | A | A |
| 47 | SCR Relay | A | A |
| 48 | SCR Heat Sink | A | A |
| 49 | Wago 221-500 Splice Terminal Carrier | 12382 | 2 |
| 50 | Wago 221-415 Lever Splice Terminal (5 Position) | 12381 | 2 |
| 51 | Wago 221-413 Lever Splice Terminal (3 Position) | 12380 | 2 |
| 52 | Slim Relay 24VAC/DC | 16133 | 1 |

**NOTES/CODES:**

A = Part Number and quantity vary with model number.

*As of June 2023* * = Optional feature that may not be on all equipment.

# *The PURE Humidifier Co. Warranty*

PURE Humidifier Co. guarantees its products to be free from defects in material and workmanship for a period of one year from the date of shipment; provided the product is properly installed, serviced, and put into the service for which it was intended.

Chloride stress corrosion cracking (CSCC) and chloride pitting of stainless steel components is not covered by warranty.

PURE Humidifier Co. is obligated under the terms of this warranty to the repair or replacement of the defective part(s), excluding any labor charges, or to refund the purchase price at our option. PURE Humidifier Co. assumes no obligation for incidental or consequential damages. The above provisions are in lieu of all other guarantees, obligations, liabilities or warranties, expressed or implied.

**DISCLAIMER**

Product Changes: Changes in products may be required from time to time due to the need for continuing improvement of products and due to factors beyond PURE Humidifier Co.'s control. PURE Humidifier Co. reserves the right to make reasonable changes in products, specifications and performance of any kind without notice or liability. PURE Humidifier Co. also reserves the right to deliver revised designs or models of products against any order, unless this right is specifically waived in writing by PURE Humidifier Co. PURE Humidifier Co. shall have no responsibility whatsoever with respect to changes made by the manufacturer in products sold but not manufactured by PURE Humidifier Co.

PURE™ Humidifier

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