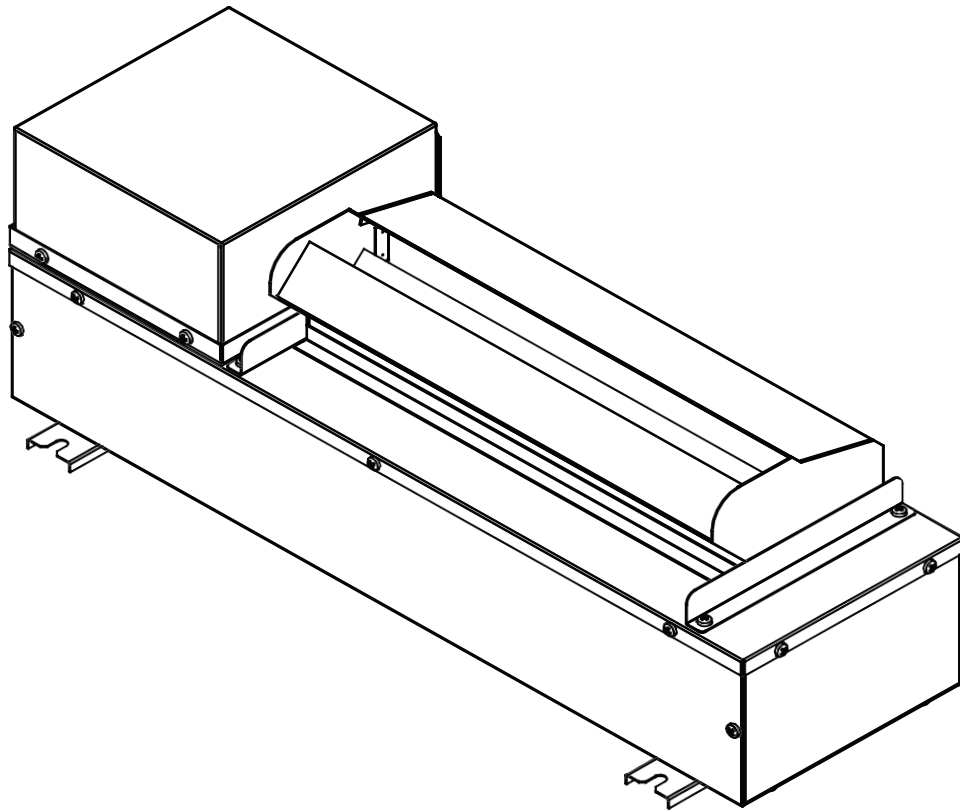


STULZ

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DAH

Ducted Air Humidifier

Installation, Operation and Maintenance Manual

Ultrasonic Humidification

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Nomenclature			
DRH-04-S			
DRH	DAH	S	Number of Transducers
Ducted Air Humidifier	Ducted Air Humidifier	(Blank) = Ultra Series Control S = Stand Alone	04, 08, 12, 16, 24, 30

Introduction

Recognized as a world leader, STULZ Air Technology Systems, Inc. (STULZ) Ultrasonic humidifiers are designed and manufactured with the highest quality craftsmanship using the finest materials available. Your ultrasonic humidification system will provide years of trouble free service if installed and maintained in accordance with this manual.

Damage to the unit from improper installation, operation or maintenance is not covered by the warranty.

This manual contains information for installation, operation, maintenance, troubleshooting and repair. Study the instructions contained in this manual. They must be followed to avoid difficulties. Spare parts are available from STULZ to ensure continuous operation.

Using substitute parts or bypassing electrical components in order to continue operation is not recommended and will void the warranty. Due to technological advancements, components are subject to change without notice.

DAH Series Ultrasonic Humidifiers are designed for use with a central air handler unit (AHU). They may be rack mounted in an AHU or mounted in the air distribution ductwork.

Any use beyond this is deemed to be not intended. STULZ is not liable for any damage resulting from improper use. The system is designed to be installed indoors unless otherwise noted on the equipment nameplate.


Safety


STULZ uses **NOTES** along with **CAUTION** and **WARNING** symbols throughout this manual to draw your attention to important operational and safety information.

A bold text **Note** marks a short message in the information to alert you to an important detail.

A bold text **CAUTION** safety alert appears with information that is important for protecting your equipment and performance. Be especially careful to read and follow all cautions.

A bold text **WARNING** safety alert appears with information that is important for protecting you from harm and the equipment from damage. Pay very close attention to all warnings that apply to your application.

A safety alert symbol  accompanies a general **WARNING** or **CAUTION** safety statement.

A safety alert symbol  accompanies an electrical shock hazard **WARNING** or **CAUTION** safety statement.

Safety Summary

The following statements are general guidelines followed by warnings and cautions applicable throughout the manual.

Prior to performing any installation, operation, maintenance or troubleshooting procedure read and understand all instructions, recommendations and guidelines contained within this manual.

WARNING

High voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe safety precautions.

CAUTIONS

This unit must be installed according to local and national electric codes.

All maintenance and/or repairs must be performed by a qualified technician. All personnel working on or near equipment should be familiar with hazards associated with electrical maintenance.

Always turn off the main power and unplug the unit before beginning work on the equipment.

NOTES

Wiring terminations may become loose during transit of the equipment therefore; verify all wiring terminations are secure prior to operation.

Do not attempt to make repairs without the proper tools.

NOTE: STULZ offers no warranty protection on humidification systems using controls not provided by STULZ.

CAUTIONS

It is essential that De-ionized (DI) or Reverse Osmosis (RO) water be used as the supply water source to maintain full warranty coverage. The use of untreated water will VOID THE WARRANTY.

Use only non-corrosive stainless steel or poly tubing rated for use with DI water to supply the humidifier.

Provide a drain with an air gap per local and national plumbing codes.

Never block the mist outlet or the opening of the air inlet. The humidifier may be filled with the condensed mist and electrical shorts may result.

Observe the unit for water leakage. A short circuit could occur if the humidifier is splashed with water while operating.

Never attempt to remove the mist guide cover and/or the mist blow tubes while the humidifier is operating, or electrical shorts may result.

If there is a risk of supply water freezing, pipe insulation should be provided.

Never apply power when the humidifier is overturned or upside down. Damage to the ultrasonic nebulizer unit or transducer may result.

Never drop the humidifier or apply hard shock to it as this may damage internal parts.

Drain the water in the tank for sanitary reasons when humidifier is turned is off for more than 3 days.



Figure 1. Ultrasonic Humidifier Model DAH-16

Specifications

Type	DAH Series Ultrasonic Humidifier Model					
Model	DAH-04	DAH-08	DAH-012	DAH-16	DAH-24	DAH-30
Nebulizing capacity, lb/h	5.3	10.6	15.8	21.1	30.8	39.6
Qty. of ultrasonic nebulizers/unit	4	8	12	16	24	30
Power source, VDC	48					
Rated power consumption, W	125	246	366	486	726	906
Weight, lb	15.4	21.7	28.0	34.3	37.5	44.1
Electrical Characteristics						
Allowable voltage range, VDC	47-51					
Insulation resistance, MOhms	100 or more (excluding solid-state components).					
Dielectric voltage withstand	Operational when 1500 VAC is applied for 1 minute (excluding solid-state components).					
Operating conditions						
Ambient working conditions	34 °F to 122 °F; 90%RH or less.					
Water supply quality	DI or RO water. Water conductance <5 microsiemens purity.					
Water supply pressure, psi	30 to 75					
Water supply temperature, °F	40 to 104					
These parts must be provided by the user: DI or RO supply water, Water supply valve, Water supply tubing (1/4" stainless steel or poly tubing rated for DI water), power supply wiring and control wiring to the control box.						

1. Calcium, magnesium or other agents that may be contained in the supply water are atomized into the air together with the mist and may form white powders after the water has evaporated. To avoid this, always use DI or RO supply water.
2. The nebulizing capacity of the transducer in the ultrasonic nebulizer unit decreases gradually with use. It should usually be exchanged after about 10,000 to 15,000 hours of operation, (depending on water quality and suitable voltage), although the unit may continue to run as long as its effective capacity meets the particular requirements.
3. To ensure full warranty coverage, the input voltage to the humidifier must not exceed 51VDC. If the input voltage exceeds 51VDC, damage to the transducers and print plates will result.

General Design

The DAH Series Ultrasonic humidifier directly atomizes water with high frequency mechanical oscillation, producing a fine mist to be delivered into the room by the laminar airflow of an AHU fan.

DAH humidifiers may be mounted in the air distribution ductwork or rack mounted in the AHU. For large AHU applications with low AHU air velocity, ultrasonic humidifier models DAH-24 and DAH-30 may be equipped with an optional booster fan to propel the mist out.

The humidifier uses high frequency nebulizers to produce ultrasonic waves and an automatic water supply mechanism to maintain the supply water at a constant level. When conducting routine maintenance, it is important to clean the water tank because it significantly affects the humidifying capacity and life of the ultrasonic nebulizers.

Main Parts

Ultrasonic Nebulizer Unit

This consists of a modular assembly located in the bottom of the water tank incorporating a 1.6 MHz power oscillator on and a piezoelectric transducer. The transducer vibrates at that frequency, developing ultrasonic columnar waves in the water and producing a fine mist above that column.

Mist Outlet

Directs mist out of the humidifier and eliminates larger mist particles so the humidifier only introduces fine mist into the air stream.

High Water Float Switch

For maximum atomization, it is essential the water level in the tank be constantly maintained. The High Water Float Switch is an input to the Level Controller. It is open when the water level is below the optimal level and is closed when the water level reaches the maximum level.

Low Water Float Switch

Operating the humidifier when the water level is below the top of the transducers will damage the Ultrasonic Nebulizer unit. The Low Water Float Switch is an input to the Level Controller. It is open when the water level is near an unsafe level and is closed when the water level is at a minimal level.

Water Fill Valve Solenoid

The Water Fill Valve Solenoid is a 24VDC solenoid that allows water from the water supply to enter into the tank when energized by the Level Controller. There is an orifice to restrict the flow of water.

Water Supply Valve

NOTE: This is to be provided by the user.

A valve must be installed upstream from the humidifier for service and maintenance. The valve must be rated for use with DI water.

Water Supply Tubing

NOTE: Thus user must provide the water supply tubing.

Water supply tubing must be provided to connect the water supply to the water strainer/flow regulator in the back of the unit. The strainer/flow regulator is equipped with a 90° swiveling, 1/4" push-to-connect fitting. Use 1/4" stainless steel or poly tubing rated for use with DI water.

Drain and Overflow Assembly

The Drain and Overflow Assembly contains a 24VDC drain solenoid valve, an overflow pipe and a drain

outlet. The drain valve solenoid is controlled by the Level Controller to drain water from the tank via the drain outlet. If the water level in the tank exceeds the height of the overflow pipe, the excess water is diverted to the drain outlet. The drain outlet pipe is 1/8" MPT and ships with a stainless steel cap.

Temperature Sensor

The temperature sensor monitors the temperature of the tank and is read by the Level Controller which prevents overheating and freeze protection

Solid State Relay

The 48VDC operating voltage for the Ultrasonic Nebulizer Units is switched on and off by a solid state DC relay controlled by the Level Controller.

Level Controller

The Level Controller is a microprocessor based device located in the electric box that receives inputs from sensors and other inputs and in turn controls the valves, fan and Ultrasonic Nebulizer units. It consists of a DC-DC power supply to convert the 48VDC to 24VDC for the fans and solenoids and a further reduction to 5VDC for the microprocessor, sensors, power switches and either a Modbus interface to communicate with the Ultra-Series Control box or a simple standalone input interface depending on which model humidifier was purchased.

The 48VDC must be present at all times to allow the Level Controller microprocessor to monitor the inputs and control the outputs.

The microprocessor monitors the On and Off command from either the Modbus or the input dry contact (depending on which model was purchased). If commanded on, the microprocessor checks the Low Water Float Switch and the High Water Float Switch. If the water is too low, the microprocessor turns on the Water Fill Valve Solenoid and monitors the Float Switches.

When the water level is above the low water level, the fan is turned on. When the water level is above the high water level, the Water Fill Valve Solenoid is turned off and the Solid State Relay is turned on. When the water level falls below the high water level, the microprocessor turns the Water Fill Valve Solenoid on again to maintain optimal water level. When the on/off command is removed, the Solid State Relay is turned off and, after a few seconds time delay to eliminate the remaining mist out of the humidifier, the Fan is turned off.

Proportional control is accomplished by the microprocessor monitoring the proportional signal from the Modbus or proportional input (depending on which model was purchased). When the proportional signal is greater than 10% of the maximum input, the microprocessor will turn the Solid State Relay on and off in a pulse-width modulation control. The period of the pulse width is 1 seconds.

For 10% control, the Solid State Relay is turned on for 0.1 seconds and off for 0.9 seconds. The on time increases as the input approaches 100%. At 100%, the Solid State Relay is on continuously.

Safety control is built into the microprocessor. The voltage applied to the transducer controls the amount of mist produced. Too high a voltage can cause damage to the transducer and too low a voltage prevents mist from being formed. The microprocessor monitors the 48VDC to be with a range of voltages. If the voltage is out of range, the microprocessor will not energize the Solid State Relay.

If the temperature of the tank rises too high, the microprocessor will turn off the Solid State Relay. If the temperature approaches freezing, the microprocessor will turn off the Solid State Relay and the fan, and then drain the tank to prevent damage from freezing water. When the temperature returns to a safe level, normal operation is resumed.

A low level alarm is annunciated when the microprocessor sees the Low Level Float Switch indicate low water after the tank has been filled. A fill alarm is annunciated when the High Water Float Switch does not indicate the water level has been achieved after a predetermined amount of time.

A transducer alarm is annunciated if the transducers have been energized and no water is used in a predetermined time (indicating no transducer is functioning). For the Modbus version of the Level

Controller, failure to receive commands on the Modbus within a predetermined amount of time will annunciate a communications alarm.

The Level Controller has an LED that displays, by blinking, any alarm condition that occurred after power up. Each alarm is associated with a number of blinks, followed by a pause, and then the next alarm is displayed. To view the LED, the Mist Guide Cover must be removed and the electrical access cover removed. The LED blink pattern for each alarm is provided below:

Number of Blinks	Alarm Condition
1	Low Voltage
2	High Voltage
3	Freeze
4	High Temperature
5	Low Water
6	Fill Alarm
7	Communications
8	Transducer

BoosterFan (Optional DAH-24/30 Only)

DAH Series Ultrasonic Humidifiers are to be installed in air handlers or air ducts designed with a terminal velocity of 450 to 750 FPM across the humidifier so the mist is readily eliminated by the pressure drop caused by the air passing over the mist guide. When using continuously adjusting fan speeds in air handlers, it is possible for the air velocity to drop below the minimum velocity (300 FPM) required to direct the mist out of the humidifier.

An optional booster fan assembly may be attached to the back of the humidifier for such applications (available for DAH-24 and 30 units only). The booster fan provides the minimum air flow needed to direct the mist from the humidifier even when it is operating in an air stream with less than the minimum required velocity.

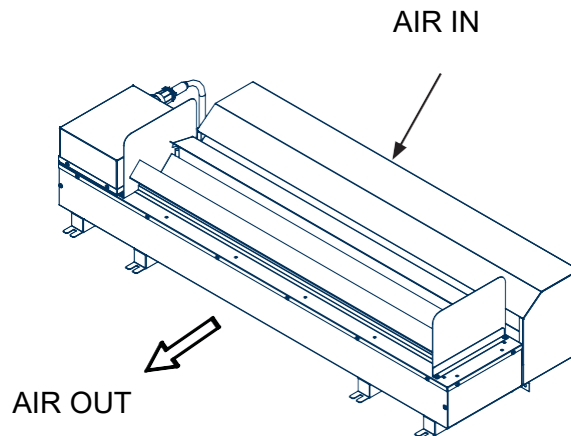


Figure 2. Booster Fan Assembly

Mounting Rack (Optional)

A multi-tier mounting rack can be provided. This enables the assembly of 1 to 5 ultrasonic units together for installation in an AHU or in an air duct.

The mounting rack (Figure 2) is designed to support the total weight of the humidifiers mounted to it. It establishes the optimal spacing between units to ensure efficient operation. The humidifiers are shipped preassembled to the mounting rack. This conveniently combines all the humidifier(s) water connections. For point to point wiring terminations, follow the electrical drawing supplied with your system.

A manual shut- off valve is installed for all the humidifiers on the rack. A water conductivity probe is shipped loose for field installation in the customer provided supply piping.

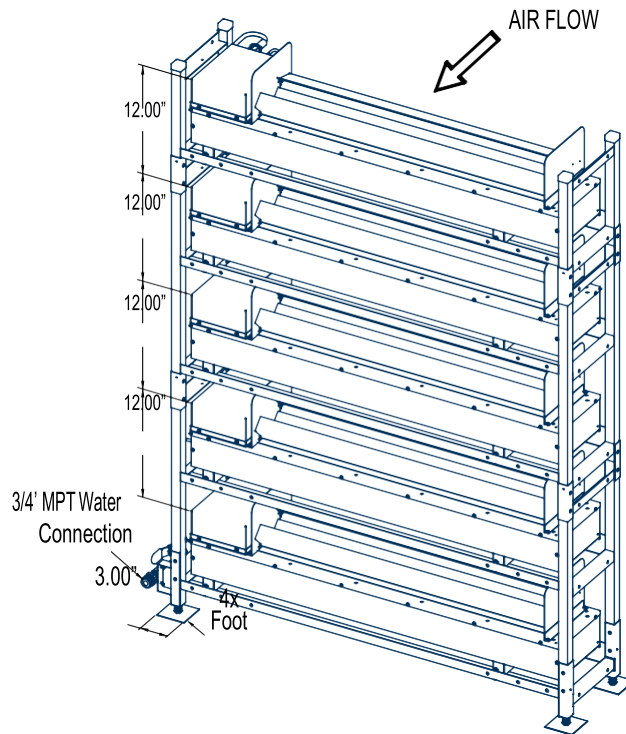


Figure 3. Humidifier Mounting Rack
Front View with five Humidifiers

Installation

Receiving the Equipment

Your Ultrasonic Humidifier has been tested and inspected prior to shipment. To ensure that your equipment has been received in excellent condition, make a visual inspection of the equipment immediately upon delivery. Carefully remove the shipping container and all protective packaging. Open the box and thoroughly inspect the unit for any signs of transit-incurred damage.

If there is shipping damage, it must be noted on the freight carrier's delivery forms before signing for the equipment. Any freight claims must be done through the freight carrier. We ship all equipment FOB factory. We are not liable for any equipment damage while in transit.

We can assist in the claim filing process with the freight carrier. Should any such damage be present, notify Product Support by fax (301) 620-1396, telephone (888) 529-1266 or E-mail (parts@stulz-ats.com).prior to attempting any repairs.

Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies to the appropriate authority.

Contents of the package include:

- ☐ Humidifier
- ☐ Six foot long power cable with moisture-proof, twist-lock connector on one end
- ☐ Installation, Operation and Maintenance manual

Avoid dropping or jarring the unit to prevent damage to the internal parts. The unit should always be stored in a dry location prior to installation.

A Data Package has been sent with your unit. It contains this manual, system drawings, applicable SDS's and other applicable instructions based on the configuration and options selected for your unit. The data package is provided for your unit in a clear plastic bag. These documents need to be kept with the unit for future reference.

Site Preparation

Install the unit in a secure location in an AHU or in the discharge ductwork where it cannot be tampered with and power cannot be inadvertently turned off. Allow access to the unit for routine operation, servicing and maintenance.

A sight window may be installed on the side of the duct section for easy visual inspection. Position the humidifier in such a way that it can be easily removed for future maintenance and inspection. A corrosion resistant drain pan must be provided underneath the humidifier for collecting incidental mist output.

Ensure the drain pan is long enough to extend 20-inches beyond the discharge side of the humidifier (Figure 4 and Figure 5). A stainless steel duct section with a panned section for drainage may also be used (Figure 6). A drain line must be provided and a condensate P-trap is required.

The height of the trap must exceed the static pressure of the system to ensure proper drainage from the pan. See Layout Drawing of Humidifier (Exploded View) and refer to the installation drawing provided with your unit for the dimensions of the humidifier and the mounting holes.

NOTE: Working clearance requirements need to be established prior to mounting the unit. Refer to local and national electrical codes.

The humidifier must be installed horizontally and level to ensure the float switches do not give a false reading. When selecting the installation location, attention should be paid to the air flow so that the atomized mist can be uniformly diffused. The humidifiers must have a face velocity of 450- 750 FPM across the mist guide cover to carry the mist particles out.

When calculating the air velocity in the duct, remember to subtract the area taken by the humidifiers from

the overall area of the duct because they lower the available area and raise the air velocity. If air velocity exceeds 750 FPM. The duct cross sectional area must be increased so the face velocity falls within the recommended range (Figure 4 and Figure 5).

The enlarged duct section must extend at least 24 inches beyond the humidifiers in the direction of the air flow to minimize condensation on the walls of the duct or air handler. Other variables that can affect condensation are air temperature and turbulence. Avoid installing humidifiers in high turbulence areas or immediately before or after an elbow.

If any obstacle exists in front of the atomized mist outlet, the mist will be condensed on the obstacle to form water droplets. Humidifiers should never be placed one behind the other on the same level.

They must be placed either one directly above the other in the same vertical plane (Figure 4) or in a cascade arrangement with the highest humidifier being the first one in the direction of the air flow (Figure 5). In either case, minimum clearances between humidifiers must be maintained. The top and bottom humidifiers must also have a minimum amount of space between them and between the top and bottom of the duct.

NOTE: Humidity control can only be achieved in a sealed room or if the room has vapor barriers installed. It is recommended that walls, ceilings and floors be sealed to prevent migration of humidity.

Mounting and Placement

Ultrasonic humidifiers are designed for mounting to a flat surface. Ensure the mounting surface is capable of supporting the weight of the unit. Weight estimates can be found on the installation drawing provided with your unit. Secure the unit with fasteners (field supplied by others) so that it will not move during operation.

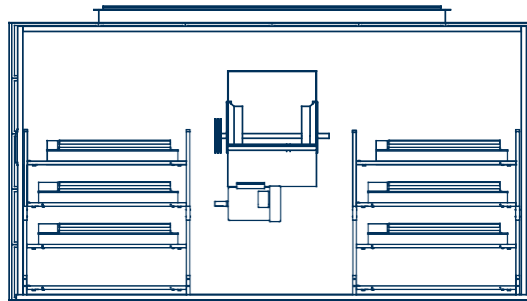
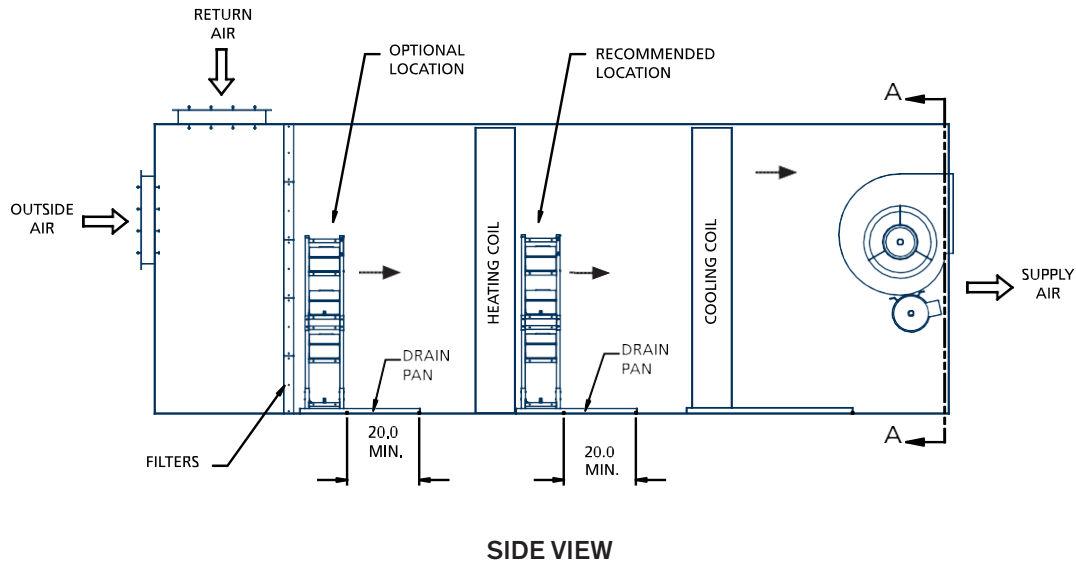


Figure 4. Ultrasonic Humidifier Mounting

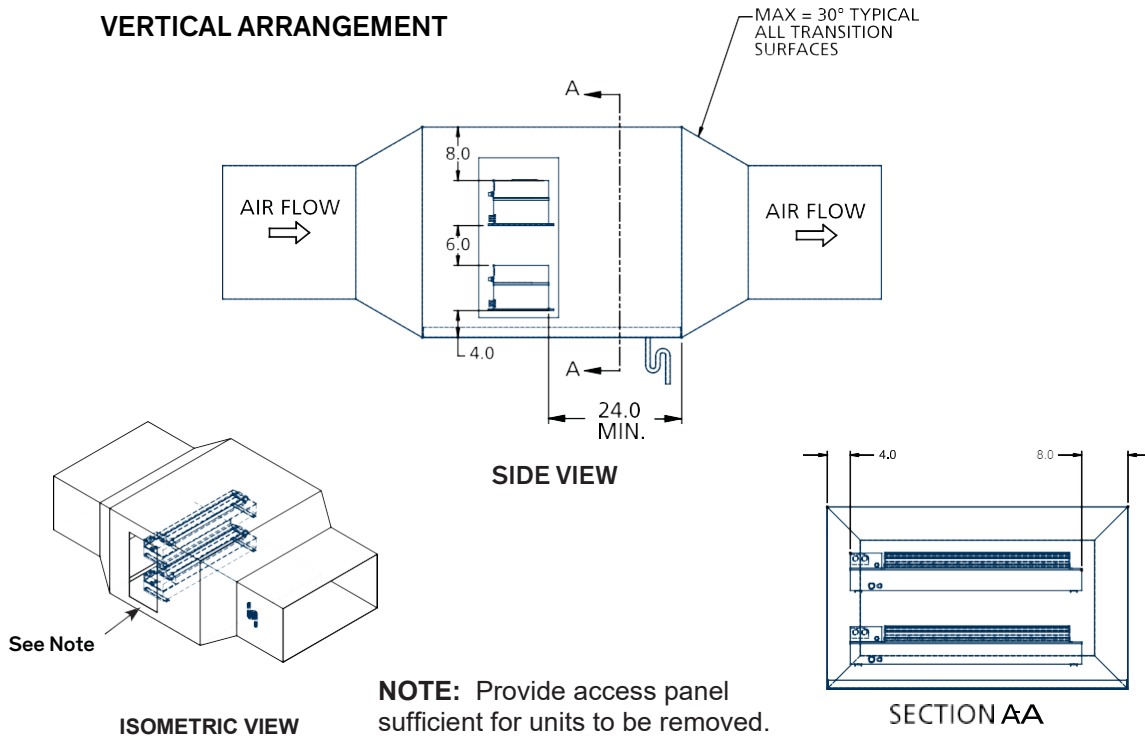


Figure 5. Duct Mounting — Vertical Arrangement

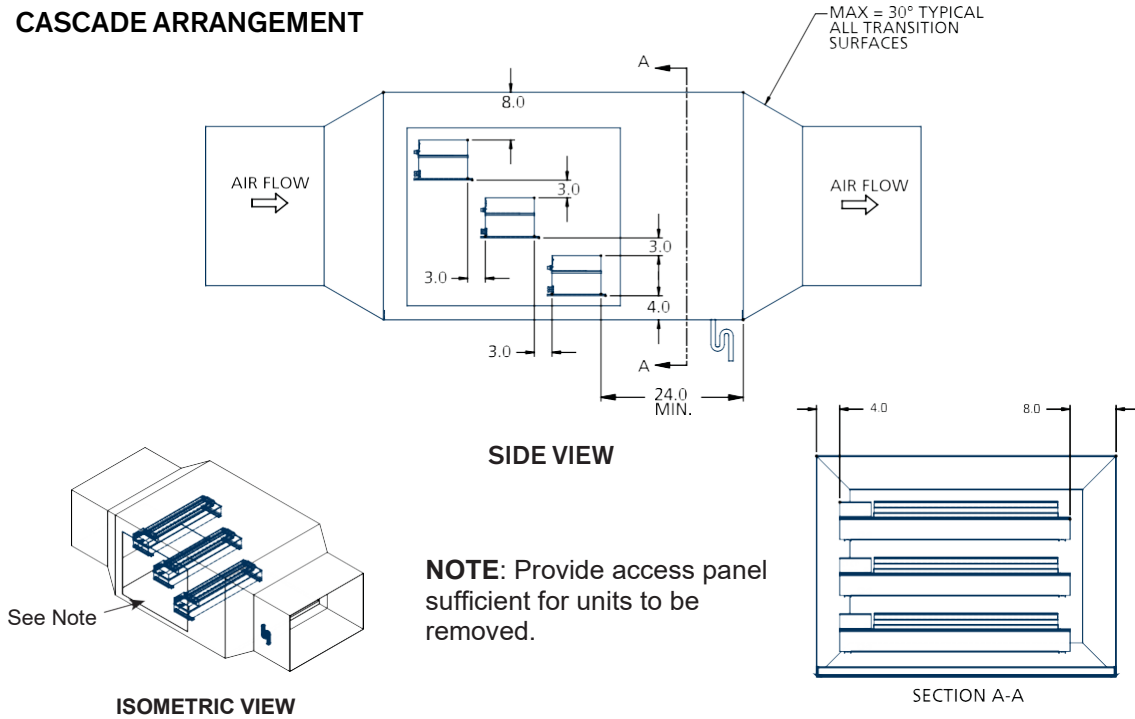


Figure 6. Duct Mounting — Cascade Arrangement

Supply and Drain Piping

The Ultrasonic Humidifier will require a field-installed water supply line and overflow drain line. Refer to the piping diagram provided with your unit for details. For the water supply, use DI or RO water.

The water supply to the humidifier cannot be taken directly from the public water service. Untreated supply water will leave a residue in the conditioned space where white powder that is dissolved in the water is produced after evaporation from the calcium or magnesium.

In cases where water quality, especially residue from evaporation, pH, total hardness and water conductivity exceeds or is outside the range of standard, routine maintenance intervals to ensure continuous operation will be more frequent than usual. Also, the operating life of the transducers and print plates will be significantly reduced.

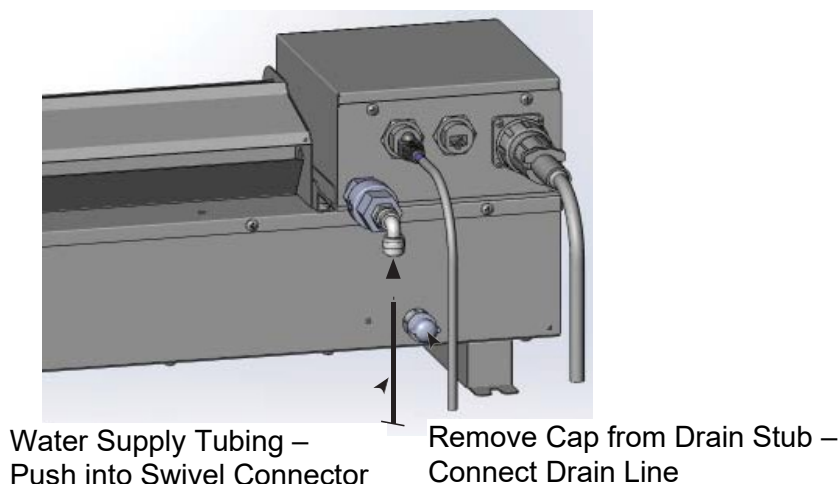


Figure 7. Water Supply and Drain

CAUTION

It is essential that DI or RO water be used as the supply water source to maintain warranty coverage. The use of untreated water will void the warranty.

NOTE: The water supply piping must be noncorrosive stainless steel or poly tubing rated for use with deionized water.

Prepare the water supply piping. The water supply piping should be equipped with a water supply valve for maintenance purposes (user provided) at a place as close as possible to the humidifier. The valve must be rated for use with DI water.

After the water supply valve is installed, flushing should be done by supplying water (see Purge the Water Line). This is a necessary step to prevent chips and oil in the piping from entering the humidifier.

Connect the water supply piping to the humidifier by means of a 1/4" stainless steel or poly tubing (user provided). A strainer or flow regulator is preassembled to the water inlet in the back of the humidifier.

The strainer or flow regulator is equipped with a 1/4" push-to-connect, swivel 90° fitting (see Figure 6). If there is a risk that the water supply piping could freeze, wrap the piping with insulating material.

A drain line rated for use with DI water must be provided from the 1/8" MPT water tank drain stub in the rear of the unit. Connect the drain line to the stub so that overflowing water can be directed into a drain pan or an appropriate place (such as an open building drain).

The drain line must meet local and national plumbing codes, be sloped downward and away from the

humidifier, include an air gap, and the end must not be obstructed.

Main Power and Control Wiring

For wiring, refer to the electrical drawing supplied with your unit to determine the total number of interconnecting conductors required for your system and for the proper wire terminations.

For internal wiring of the humidifier, see the Electrical Diagrams.

NOTES

Wiring terminations may become loose during transit of the equipment, therefore, verify all wiring terminations are secure prior to operation. Provisions must be made to ensure the humidifier only operates when there is air flow.

Verify that the main power supply to the control box coincides with the voltage, phase and frequency information specified on the nameplate. The nameplate also provides the full load amps (FLA), the current that the unit will draw under full design load, the minimum circuit ampacity (MCA) for wire sizing, and the maximum fuse size (MFS) for circuit protection. For safety, the power source must be provided with a circuit breaker.

Ensure a ground is connected to the unit. The humidifier is rated to operate with a nominal input of 48VDC. To maintain warranty coverage, never allow the humidifier input voltage to exceed 51 volts as damage will occur to the transducers and print plates.

Wire Sizing — Control Box to Humidifiers

The table below indicates the correct electrical wire sizing from the control box to the humidifier power cable for three different distances. All wire sizes listed are for stranded, THHN or NTW wire only. (**Do not use solid conductor wire.**) For distances over 75 feet, contact Product Support for assistance by fax (301) 620-1396, telephone (888) 529-1266 or E-mail (parts@stulz-ats.com).

In addition to the above power wires, humidifiers controlled by the Ultra-Series control box use RJ45/CAT5 data communication cables, daisy chained from the humidifier(s) to the control box.

The data communication cable is not to exceed 1000 feet total length from the control box to the last humidifier. A termination resistor must be installed on the last humidifier as shown in the electrical drawing provided with your unit.

CAUTIONS

The termination resistor is only to be placed on the last unit in the data communication string.

The power supply provided with the equipment is sized and selected based on the expected load. **Do not connect any additional loads to the control power supply.**

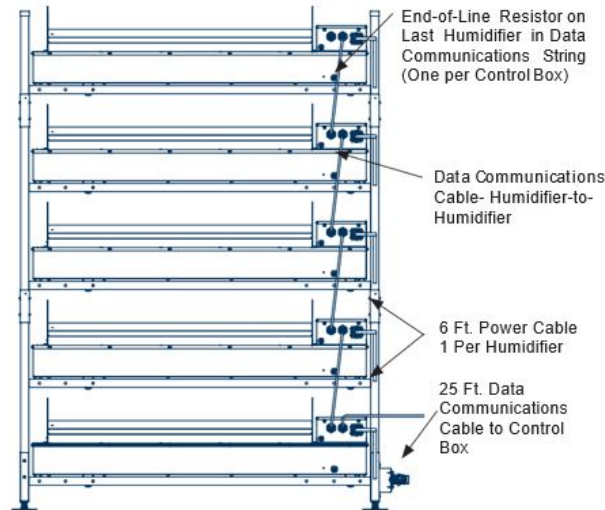


Figure 8. Power and Control Wiring

Connecting Humidifier(s) to Control Box

As a standard, GEN2 Ultrasonic humidifiers are equipped with a twist lock power connector and two RJ45 ports for data communication. The Ultrasonic Humidifier control box will also be equipped with an RJ45 port for data communication. DAH Series Ultrasonic Humidifiers are designed to be installed in an AHU or in discharge ductwork.

For this reason, a 6-foot power cable with a moisture-proof, twist-lock connector on one end is provided with each humidifier. A 25-foot data communication cable is also provided with a moisture proof connector at one end (humidifier connection). Consult Product Support for assistance by fax (301) 620-1396, telephone (888) 529-1266 or E-mail (parts@stulz-ats.com).for optional cable lengths. The table below lists the correct wire sizing from the Control Box to the Ultrasonic humidifiers for various models.

48 VDC Wire Sizing Room Control Box To Ultrasonic Humidifiers					
Model	Current (Amps)	Wire Size (AWG)			# Of Wires (Includes 1 Ground)
		25 Ft	50 Ft	75 Ft	
DAH-04	2.6	16	16	14	3
DAH-08	5.0	16	16	14	3
DAH-12	7.6	16	14	12	3
DAH-16	10.1	16	14	12	3
DAH-24	14.6	16	14	12	5
DAH-24 w/ BF-24	15.4	16	14	12	5
DAH-30	20.0	16	14	12	5
DAH-30 w/ BF-30	20.8	16	14	12	5
NOTE: Table reflects correct electrical wire sizing from the control box to the humidifiers. Do not exceed 75 foot maximum distance.					

Single Humidifier

Once the Ultrasonic Humidifier and control box are installed, the total 48VDC wire length and wire size (AWG) should be determined using the table below. A junction box (not provided) is necessary in the AHU or ductwork to make the connection between the field-installed 48VDC power wiring and the factory provided humidifier power cable.

The factory-provided 25 foot data communication cable must be installed with the moisture-proof RJ45 connector at the humidifier and the standard RJ45 connector at the control box.

The factory provided end-of-line termination resistor must be installed in the second RJ45 port of the humidifier.

Multiple Humidifiers (Grouped)

Once the humidifiers and control box are installed, the total 48VDC wire length and wire size (AWG) should be determined for each humidifier using the table on the preceding page.

A junction box (not provided) is necessary in the AHU or ductwork to make the connection between the field-installed 48VDC power wiring and the factory provided humidifier power cable.

The factory provided 25 foot data communication cable must be installed with the moisture-proof RJ45 connector at the humidifier and the standard RJ45 connector at the control box.

Additional factory provided 20-foot RJ45 cable(s) with moisture-proof connectors at both ends must be used to make the data communications connections between humidifiers within the humidifier or ductwork.

The factory provided end-of-line termination resistor must be installed in the second RJ45 port of the last Ultrasonic Humidifier.

Multiple Humidifiers/Optional Multi-Tier Mounting Rack (Grouped)

Once the humidifiers and control box are installed, the total 48VDC wire length and wire size (AWG) should be determined for each humidifier using the table on the preceding page.

A junction box (not provided) is necessary in the AHU or ductwork to make the connection between the field-installed 48VDC power wiring and the factory provided humidifier power cable. One junction box per rack is typical.

The factory-provided 25-foot data communication cable must be installed with the moisture-proof RJ45 connector at the humidifier and the standard RJ45 connector at the control box.

Additional RJ45 cables with moisture-proof connectors at both ends will be factory installed to complete the data communications connections between all humidifiers on a single rack. Factory provided 20-foot RJ45 cables with moisture-proof connectors at both ends must be used to make the data communications connections between multiple racks within the AHU or ductwork.

The factory-provided end-of-line termination resistor must be installed in the second RJ45 port of the last humidifier.

Operation

Purge the Water Line

Before operating the unit, metal shavings or debris that may form during the installation process must be flushed from the water supply piping. Take these steps before allowing water to flow into the Ultrasonic Humidifier:

1. Verify the main disconnect switch from the control box is set to Off.
2. With the water supply valve closed, disconnect the supply tubing from the filter strainer in the back of the unit.
3. Open the supply valve and flush the tubing into a bucket or building drain for about 30 seconds.
4. After the water line is purged, close the valve and reconnect the supply line to the inlet strainer and flow regulator.

Initial Operation Checklist

For new installations, prior to start up, ensure the unit is ready to operate by verifying the following checklist.

- ☐ The humidifier is installed horizontally and level.
- ☐ No obstacle is in front of the atomizing direction.
- ☐ The electrical wiring is correctly connected.
- ☐ Power to the humidifier is 48VDC.
- ☐ DI or RO supply water is used.
- ☐ The water supply piping and drain piping are correctly connected and secured.
- ☐ All parts are correctly installed.

After the above items are verified, the humidifier is ready to operate.

Operation Procedure

1. Turn on power.
2. Verify the fan is operating.
3. Turn the main power source switch on the control box to the On position.
4. Open the water supply valve.
This allows water to flow to the humidifier.
5. Perform a manual drain cycle to flush any particulates from the tank using the system controller (see STULZ Ultra-Series Controller IOM Manual OUU0078).
6. Set the humidity setpoint to the desired humidity level.
Water is supplied to the water tank and when the required water level is reached, the ultrasonic nebulizers will start producing atomized mist.
7. If the humidifier does not start, increase the setpoint of the humidistat.
Mist is carried through mist guide by the flow of air from the AHU's fan. The mist is delivered through the ductwork thus humidifying the surrounding air.
The humidifier starts and stops by means of a signal from the control box.
8. During operation, the water level in the tank is maintained by the level controller.
9. If the water level in the tank falls below the safety level for any reason during operation, power to the ultrasonic humidifier nebulizers is cut off by the level controller.

After operation starts, verify the following items on a regular basis:

- ☐ Atomized mist is visible from the mist outlet.
- ☐ Check the humidifier parts, supply water piping and drain piping for signs of leaking water.
- ☐ Check to see that the mist diffusion is good and no obstacles are directly exposed to the mist.

CAUTION 

Do not block the outlet of the mist; component failure could occur.

Precautions

1. Do not operate the humidifier when no air flow is present to move the mist out of the humidifier.
2. Do not remove the mist guide cover from the humidifier during operation.
3. For sanitary reasons, drain the water from the tank if the humidifier is turned off for more than 3 days.

Steps for Long Term Shutdown

If the humidifier is not signaled to turn On for a period of three days, the Level Controller will automatically signal the humidifier to initiate a drain cycle.

When operation is stopped for a long time (one week or longer), the following steps must be performed. Also, refer to General Maintenance section.

1. Close the water supply valve.
2. Drain the water tank.
3. Set the main power switch on the control box to Off.
4. Check and clean the water tank interior.

To restart operation after a long-term shutdown, see the Procedure for Operation section

Maintenance

Periodic General Maintenance

Systematic, preventive maintenance of the humidifier is recommended for optimum system performance. Routine periodic maintenance should include:

- ☐ Tightening electrical connections.
- ☐ Cleaning all components
- ☐ Inspecting the unit's components visually.
- ☐ Checking the level of water and ensuring no leaks are present.

A system should be established to record any problems, defects or deficiencies noted by operators and discovered during maintenance inspections, together with the actions taken.

For assistance, contact Product Support by fax (301) 620-1396, telephone (888) 529-1266 or E-mail (parts@stulz-ats.com). Ensure adherence to all safety precautions while performing any type of maintenance.

General Maintenance

Before the maintenance inspection and repairs are done, be sure to set the control box power switch to Off and close the water supply valve.

When performing maintenance or repairs, place small parts such as screws where you can find them (such as in a cup).

Testing insulation resistance and dielectric withstand voltage should be avoided because the humidifier incorporates sensitive electronic parts.

When parts are replaced, genuine STULZ parts must be used. Contact Product Support by fax (301) 620-1396, telephone (888) 529-1266 or E-mail (parts@stulz-ats.com) for assistance.

WARNINGS

Turn off power to the unit (unless you are performing tests that require power). With power and controls energized, the unit could begin operating automatically at any time.

Solid scaffolding must be provided for working in high places.

Do not supply power to the ultrasonic nebulizer units while the transducer lead wires (yellow and orange) are removed.

CAUTION

The transducer is a very delicate part. When the water tank interior is cleaned, ensure the transducer is not scratched on the surface with a screwdriver, etc.

Avoid damaging the sheet metal with sharp edged tools.

Proper tools must be used. Excessive tightening or insufficient tightening may cause failure.

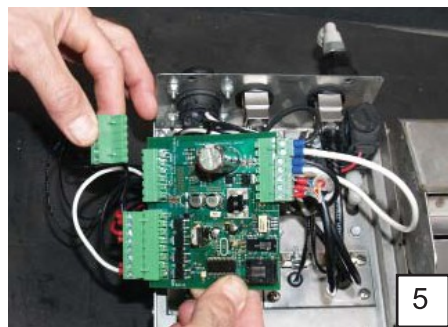
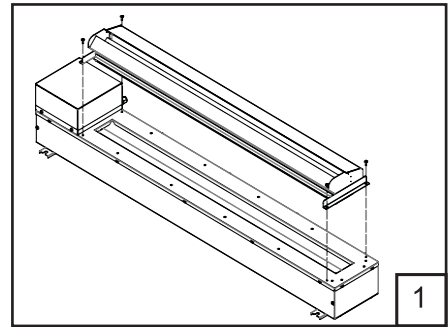
Maintenance Items and Tools

Item	Cycle	Required Tools
Routine Maintenance		
Check water tank interior, mist outlet and electrical parts.	Once a month (or as required) if environment is dusty or water supply quality is poor.	Adjustable wrenches (2) Phillips screwdriver 5.5 mm nut driver Soft cleaning cloth Small brush Diagonal wire cutter
Visually inspect water supply strainer/flow regulator.	Inspect/clean every 3 months. Replace as necessary.	
Replacing Parts		
Replacing Temperature Sensor.	If damaged or upon failure.	
Replacing transducer.	After about 10,000 to 15,000 hours of operation.	
Replacing nebulizer print plate.	If damaged or upon failure. Also recommended when replacing transducer.	
Replacing water supply solenoid valve.	If damaged or upon failure.	
Replacing float switches.		
Replacing level control board.		

Electrical Parts

1. Stop the humidifier.
 2. Set the control box disconnect switch to Off.
 3. Close the water supply valve.
 4. Drain the water tank.
- NOTE:** Do not splash water on the electrical parts.
5. Loosen the mist guide cover mounting screws from the top of the humidifier and remove it (Photo 1).
 6. Remove the terminal box cover and disconnect the electrical connector.
 7. Remove the screws (4 pieces) holding the electrical box access cover (Photo 2).
 8. Remove the electrical box access cover (Photo 3) and inspect the interior and verify the following:
 - No water leakage from the solenoid valve joint.
 - No damage to electrical wires or cables.
 - No parts abnormalities.
 9. Slide the board out and ensure there is no discoloration, deformation or deterioration of the printed circuit (Photo 4).
 10. Remove the terminal connectors (4 each) from the sides of the level control board (Photo 5).

If any defects are found with the electrical parts, take remedial steps. Refer to Common Repairs/Parts Replacement.



Float Switches

1. Perform steps 1 to 3 in the Electrical Parts section.
2. Loosen and remove the float panel mounting screws (2 pieces, Photo 6).

NOTE: Don't let the screws drop into the tank.

3. Lift the float panel out and turn it over (Photo 7).
4. Check for contamination. Manually operate the two float switches ensuring they raise and lower smoothly. Clean any build-up from the float switches with a small brush.

NOTE: Be careful not to remove the float portion from the stem.

5. If no defects are found through the above inspection, re-assemble by reversing the above procedure.

NOTE: When assembling, do not pinch the wires between the sheet metal.

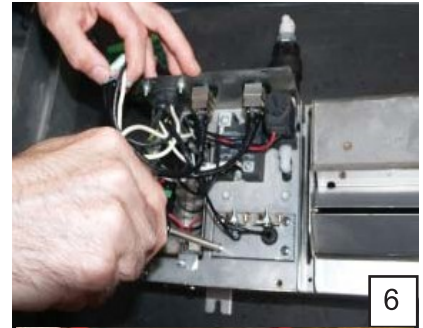
Water Tank

1. Perform steps 1 to 3 in the Electrical Parts section (Photo 1).
2. Check the water tank interior for contamination.
3. Wipe and clean the water tank interior.
4. Clean the surface of the transducers by wiping with a soft, oil free cleaning cloth (Photo 8).

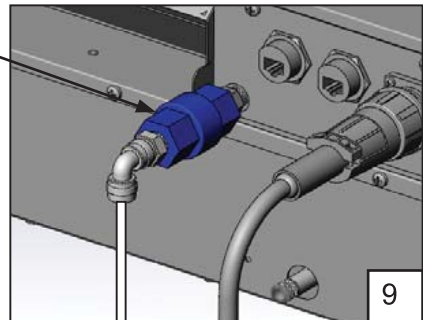
NOTE: Be careful not to scratch the surface of the transducers.

Water Supply Strainer/Flow Regulator

1. Stop the humidifier.
2. Set the control box disconnect switch to Off.
3. Close the water supply valve.
4. Remove the water supply tubing from the 90° inlet fitting (Image 9).
5. Loosen the strainer/flow regulator assembly and remove it.
6. Inspect the inlet screen and clean with DI water to remove any debris.
7. Reinstall the strainer/flow regulator and water supply tubing.



Strainer
and Flow
Regulator



Troubleshooting and Repair

Should any issues occur, see the troubleshooting and repair tables below to resolve the issue.

WARNING

Turn off power when undertaking any repairs.

Check the humidifier and the surrounding area.

Issue	Cause		Checking	Remedy
No mist is generated.	Power supply system	Control box switch turned off.	Visually check switch position.	Turn switch on.
		No power to the power supply.	Measure the voltage at power supply input terminals.	Measure the voltage at power supply output terminals.
		Faulty power supply.	Measure the voltage at power supply output terminals.	Replace the power supply.
	Water supply system	Water supply valve is closed.	Check if the valve is opened or closed.	Open the valve.
	Other	Temperature sensor detects overheating.	Check if ambient temperature and water temperature are within specified range.	Correct.
Amount of mist is too low.	Power supply system	Supply voltage is low.	Check voltage at power supply output terminals while operating the humidifier at 100% capacity.	Correct the voltage with the adjustment screw on the power supply.
	Water supply control system	Operating water level is high and overflowing.	Visually inspect.	See Table 3) on next page.
	Other	Humidifier is not level.	Visually inspect.	Adjust.
		‡ Air filter clogging		
Mist supply is coarse.	Power supply system	Supply voltage is high.	Check voltage at power supply output terminals while operating the humidifier at 100% capacity.	Fine tune the mist quality with the voltage adjustment screw on the power supply.

If the cause cannot be located, remove the mist guide cover and air flow guide and check the interior of the water tank.

The causes of issues marked ‡ can be prevented through periodic maintenance/inspection.

If the cause cannot be located through the above checking, parts may be faulty. Check the interior of the humidifier.

Issue	Cause		Checking	Remedy
No mist is generated.	Water supply control system	Water supply float switch (FS1) is faulty.	Drain the water tank, remove the printed circuit board terminal (X3) and test the continuity of the float switch.	If there is no continuity, replace the switch.
		± Water supply float switch sticking.		Clean the switch. If operation is not restored, replace switch.
		Water supply solenoid valve is faulty.	No supply water is provided even if the water tank is drained and voltage between terminals X2-1 & X2-2 on the printed circuit board is 24VDC.	Replace the solenoid valve.
		Float switch for low water level is faulty.	With the water tank filled with water, remove the wire from terminal (X3) on the printed wiring board and check continuity of the float switch.	If there is no continuity, replace the switch.
		± Float switch for low water level is sticking.		Clean the switch. If operation is not restored, replace the switch.
	Other	Lead wires are loose or disconnected from the terminals.	Open the electrical section and check the lead wire connecting terminals.	Reconnect or tighten connections as required.
Amount of mist is too low.	Water supply system overflowing	Water supply float switch is faulty.	If the water level in the tank is up to the overflow pipe, remove the wire from terminal (X3) on the printed circuit board and ensure there is no continuity on the float switch.	If there is continuity, re- place the switch.
		± Water supply float switch arm sticking.		Clean the switch. If operation is not restored, replace the switch.
		Water supply solenoid valve is faulty.	Overflowing occurs even after power is turned off.	Replace the solenoid valve.

Consumable Parts

Issue	Cause	Checking	Remedy
No mist output, or mist output is too low.	Deterioration of transducer due to aging.	The life is about 10,000 to 15,000 hours of humidifier operation.	Replace the transducer.

If the humidifier is operated for a long time with a deteriorated transducer, the nebulizer print plate may fail. The transducers should be replaced using the estimated lifetime of 10,000 to 15,000 hours as the point of reference. If the cause cannot be identified, contact Product Support. at (888) 529-1266 or email TechnicalSupport@stulz-ats.com.

If the humidification system is supplied with a water conductivity sensor (optional), ensure the sensor is operating properly and that the supply water is within the recommended guidelines for mineral content.

Common Repairs and Parts Replacement

In preparation for replacing parts, first see Electric Parts and follow steps 1 to 4.

Preparation for Repairs (Removal of Water Tank)

Review A.1 Layout Drawing of Humidifier (Exploded View) for an overview of the humidifier's main parts.

1. Remove the drain stub from the tank.
2. Remove the water supply tubing from the 90° inlet fitting (Image 10).
3. Remove the water tank mounting screws from the sides of the humidifier base (Image 11).
4. Lift the water tank from the base and place it on a well-lit, padded work surface for removing/replacing the parts.
5. Remove the electric box access cover (Image 12). See the Electrical Parts section.
6. Remove the top plate mounting screws and lift the top plate from the water tank (Image 12).
7. The transducers are visible when you rotate the tank to view the bottom (Photo 13).
8. The nebulizer print plates are on the side of the tank adjacent to the transducers (Photo 14).

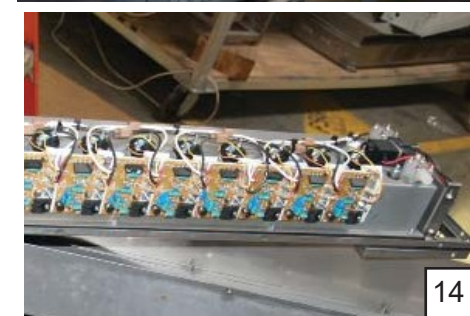
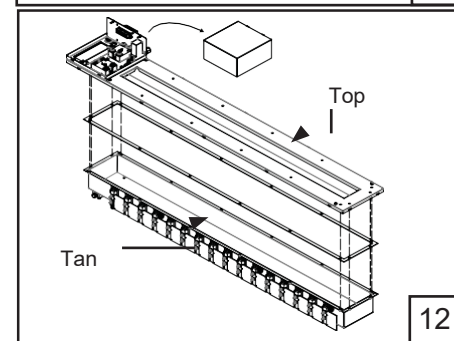
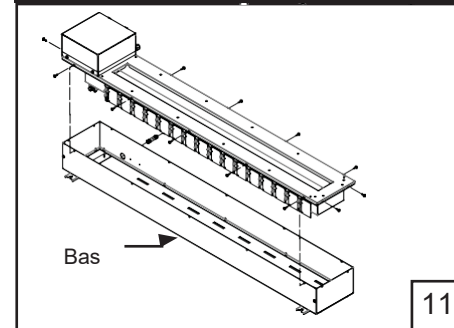
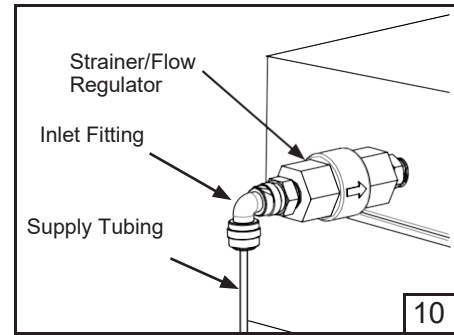
Reassembling

1. Before reassembling the Ultrasonic Humidifier, verify there is no water leakage by pouring water into the tank.
2. When reassembling after replacing parts, inspect the interior and check the following:
 - All the screws are tightly secured.
 - All the lead wires are correctly and securely connected. (Pay attention to the optional booster fan lead wires.)
 - All the print plates, PC boards and relays are free from discoloration, deformation and deterioration.
 - Electrical wires are not damaged.
3. After reassembly is completed, supply water and power to the unit and turn it on.
4. Verify that normal nebulizing mist is visible from the mist outlet guide and that there is no water leakage.

Replacing the Temperature Sensor

The temperature sensor is mounted to the front of the water tank.

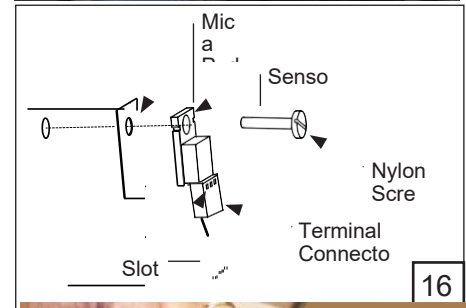
1. Referring to Preparation for Repairs (Removal of Water Tank steps 1 to 5), place the water tank on a well-lit work surface.
2. Locate the sensor (Photo 16). Refer to the Temperature Sensor on the Water Tank section.



Temperature Sensor on Water Tank

The temperature sensor is mounted on the front of the tank near the float switches.

1. Carefully cut the wire tie holding the sensor cable and remove the nylon screw holding the sensor in place.
2. Remove the sensor and save the mica pad and nylon screw to mount the new sensor (Photo 15).
3. Remove the terminal connector from the sensor and connect it to the new sensor. Ensure the three slots in the terminal connector are oriented upwards (Photo 16).
4. Install the new sensor to the tank together with the saved mica pad. Cable tie the sensor cable restrain it.
5. Referring to the Reassembling section, reassemble the unit by reversing the procedure described in Preparation for Repairs (Removal of Water Tank).



Replacing a Transducer

1. Referring to the Preparation for Repairs (Removal of Water Tank) section, place the water tank on a well-lit work surface.
2. To replace a transducer, remove the two transducer lead wires, (yellow and orange) from the nebulizer print plate (Photo 17).

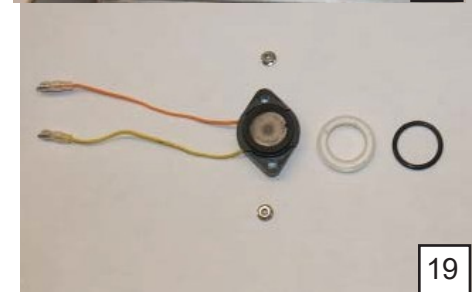
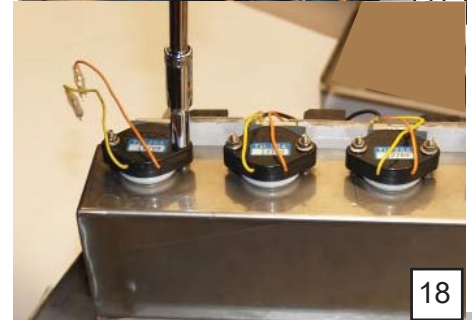
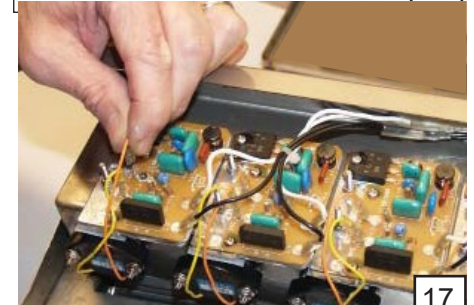
CAUTION

Grasp the terminals when removing wires. Never pull the lead wires.

3. Using a 5.5 mm nut driver, remove the transducer mounting nuts (2 pieces) and remove the transducer, spacer and O-ring. Save the nuts to mount the new part (Photo 18).
4. Clean the spacer, O-ring groove and O-ring.
5. Assemble the new transducer with the spacer and O-ring.
6. Install them with the saved mounting screws (Photo 19).

NOTES

- ☐ Ensure the O-ring is not damaged. If it is damaged, replace it with a new one.
 - ☐ Carefully align the transducer's rubber packing in the indent in the bottom of the water tank to prevent leakage.
 - ☐ The mounting screws must be evenly tightened. Do not overtighten.
7. Connect the lead wires to the nebulizer print plate.
The colored lead wires must be inserted as shown on the plate. (Orange wire to ORG, Yellow wire to YEL)
 8. Refer to the Reassembling section and reassemble the unit by reversing the procedure described in the Preparation for Repairs (Removal of Water Tank) section.

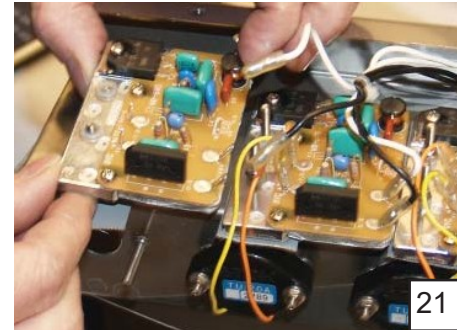
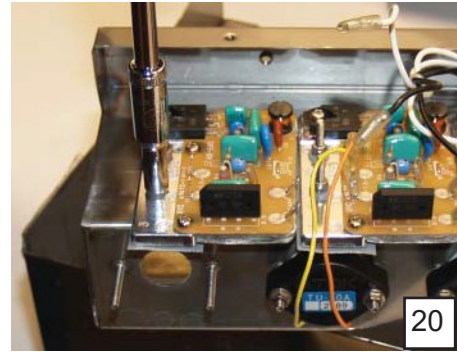


Replacing a Nebulizer Print Plate

1. Referring to Preparation for Repairs (Removal of Water Tank) section, steps 1 - 5, Preparation for Repairs, place the water tank on a well-lit, padded work surface.
2. Using a 5.5 mm nut driver, remove the print plate mounting nuts (2 pieces) and remove the plate.
3. Save the nuts and insulating parts to mount the new print plate (Photo 20).
4. Remove the four interconnecting wires from the terminals of the plate to be replaced (Photo 21).
5. Install the new plate together with the silicon sheet provided using the saved insulating parts and mounting screws (image 22).
6. Connect the nebulizer print plate interconnecting wires (black to H, white to G) and transducer lead wires (orange to ORG, yellow to YEL)

NOTE: When the nebulizer print plate is replaced, it is recommended that the transducer be replaced also.

7. Referring to the Reassembling section, reassemble the unit by reversing the procedure described in the Preparation for Repairs Removal of Water Tank section.



Water Solenoid Valves, Float Switches and Level Control Board

1. Refer to the Removal of Water Tank section and remove the tank from the base.
2. Place the tank on a well-lit, padded work surface (Photo 23).
3. Cut the wire ties bundling the solenoid valve and float switch lead wires.

NOTE: Be careful not to damage the lead wires.

4. Unscrew the wires of the parts to be replaced from the terminal connectors on the level control board.

Fill Solenoid Valve

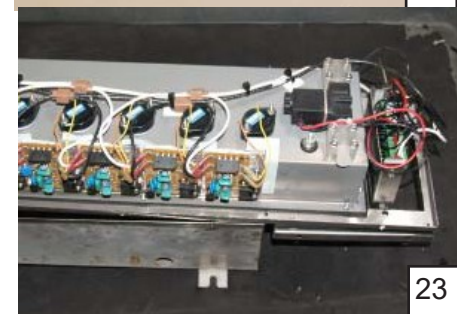
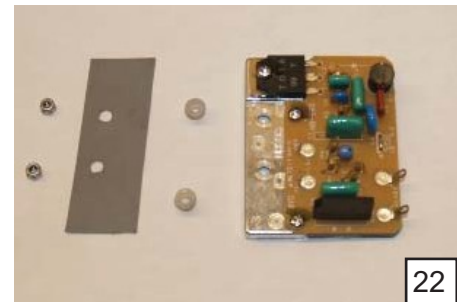
1. Remove the pipe fitting from the inlet side of the solenoid valve.
2. Turn the float panel over and remove the solenoid valve mounting screws (2 pieces, Photo 24).
3. Remove the elbow on the outlet side and install it on the new solenoid valve on the outlet side. Be sure to seal the fitting with Teflon tape (Photo 25).

Ensure the elbow is facing the correct direction.

4. Install the new solenoid valve to the float panel and re-install the pipe fitting.

Ensure the O-ring is not damaged.

If it is damaged, replace it with a new one.



Drain Solenoid Valve

1. To replace the drain solenoid valve, remove the water tank and lay it on its side.
2. Using a 5.5 mm nut driver, remove the nuts holding the two valve outlet adapters.
3. Unscrew the adapters from the solenoid valve.
4. Screw the adapters into the replacement part (Photo 26).
5. Referring to the Reassembling section, assemble the unit by reversing the procedure described in the Preparation for Repairs section.

Outlet Elbow



25

Float Switches

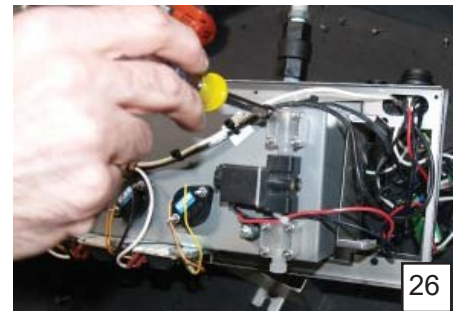
1. To replace a float switch, remove the lock nut on the faulty float switch.
2. Replace it with a new float switch (Photo 27).

Level Control Board

1. To replace the level control board, slide the level control board out along the guides.
2. Remove the lead wire terminal connectors (4 pieces., Photo 28) from the board (see Photos 3 and 4).

NOTE: Grasp the connectors when removing. Never pull the lead wires.

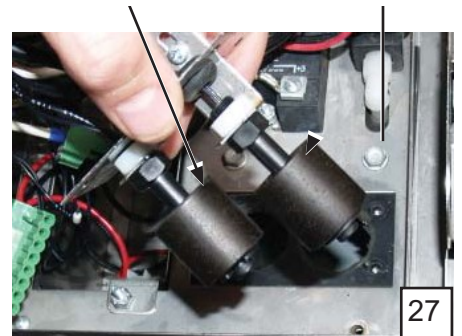
3. Install the terminal connectors onto the new board.
4. Slide the board back into the guides.



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High Level Switch

Low Level Switch



27



28

Product Support

We provide Product Support that not only provides technical support and parts but the following additional services:

- ☐ Performance Evaluations
- ☐ Start-up Assistance
- ☐ Training

For assistance, contact Product Support by fax (301) 620-1396, telephone (888) 529-1266 or E-mail (parts@stulz-ats.com).

We highly recommend using the services of our Field Service Department to perform start-up and commissioning. They will ensure your equipment is installed correctly and operating properly. This will help ensure your unit provides years of trouble free service while operating at its highest efficiency.

Technical Support

The Technical Support Department is dedicated to the prompt reply and solution to any problem encountered with a unit. Should a problem develop that cannot be resolved using this manual, you may call (888) 529-1266 Monday through Friday from 8:00 a.m. to 5:00 p.m. EST. If a problem occurs after business hours, provide your name and telephone number. One of our service technicians will return your call.

When calling to obtain support, it is important to have the following information readily available, (information is found on the unit's nameplate):

- ☐ Unit Model Number (DRH-XX)
- ☐ Sales Order Number
- ☐ Unit Serial Number
- ☐ Description of Problem

Obtaining Warranty Parts

Warranty inquiries are to be made through the Technical Support Department at (888) 529-1266 Monday through Friday from 8:00 a.m. to 5:00 p.m. EST. A service technician will troubleshoot the system over the telephone with a field service technician to determine the defect of the part.

If it is determined that the part may be an issue a replacement part will be sent via UPS ground. If the customer requests that warranty part(s) be sent by any other method than UPS ground the customer is responsible for the shipping charges. If you do not have established credit with STULZ you must give a freight carrier account number.

A written (or faxed) purchase order is required on warranty parts and must be received prior to 12:00 p.m. for same day shipment. The purchase order must contain the following items:

- ☐ Purchase Order Number
- ☐ Date of Order
- ☐ STULZ Stated Part Price
- ☐ Customer Billing Address
- ☐ Shipping Address
- ☐ Customer's Telephone and Fax Numbers
- ☐ Contact Name
- ☐ Unit Model Number
- ☐ Serial Number
- ☐ STULZ Item Number

The customer is responsible for the shipping cost incurred for returning the defective part(s). Return of defective part(s) must be within 30 days at which time an evaluation of the part(s) is conducted and if the

part is found to have an issue a credit will be issued.

When returning defective part(s) complete the Return Material Authorization (RMA) number and the address label received with the replacement part.

- ☐ Purchase Order Number
- ☐ Date of Order
- ☐ STULZ Stated Part Price
- ☐ Customer Billing Address
- ☐ Shipping Address
- ☐ Customer's Telephone and Fax Numbers
- ☐ Contact Name
- ☐ Unit Model Number
- ☐ Serial Number

The customer is responsible for the shipping cost incurred for returning the defective part(s). Return of defective part(s) must be within 30 days at which time an evaluation of the part(s) is conducted. If the part is found to have a manufacturing defect, a credit will be issued.

When returning defective part(s) complete the RMA number and the address label received with the replacement part.

Obtaining Spare and Replacement Parts

Spare and replacement parts requests to Product Support may be made in three ways:

Fax: (301) 620-2606

Phone: (888) 529-1266

E-mail: parts@stulz-ats.com

Quotes are given for specified listed parts for a specific unit.

We accept Visa and MasterCard. We may extend credit to its customers; a credit application must be prepared and approved (this process could take one week).

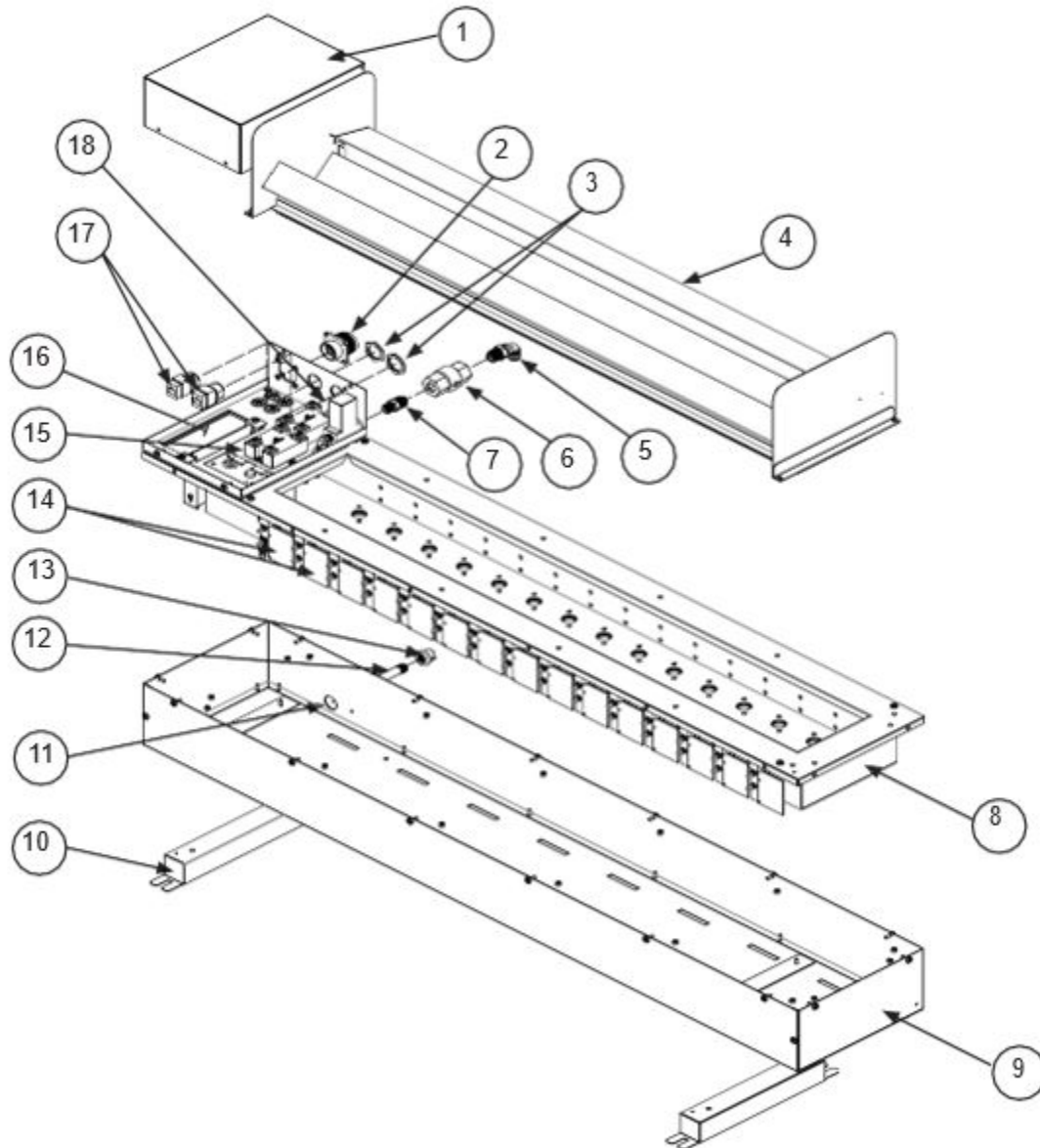
A 25% minimum restocking charge will be applied on returned stocked parts that were sold as spare or replacement parts. If the returned part is not a stocked item, a 50% restocking charge may be applied.

An RMA number is required when returning parts. To receive credit for returned repair/replacement parts, the parts must be returned to us within 30 days of the purchase date.

Spare part sales over 30 days old will be considered final and the parts will remain the sole property of the ordering party.

Drawings

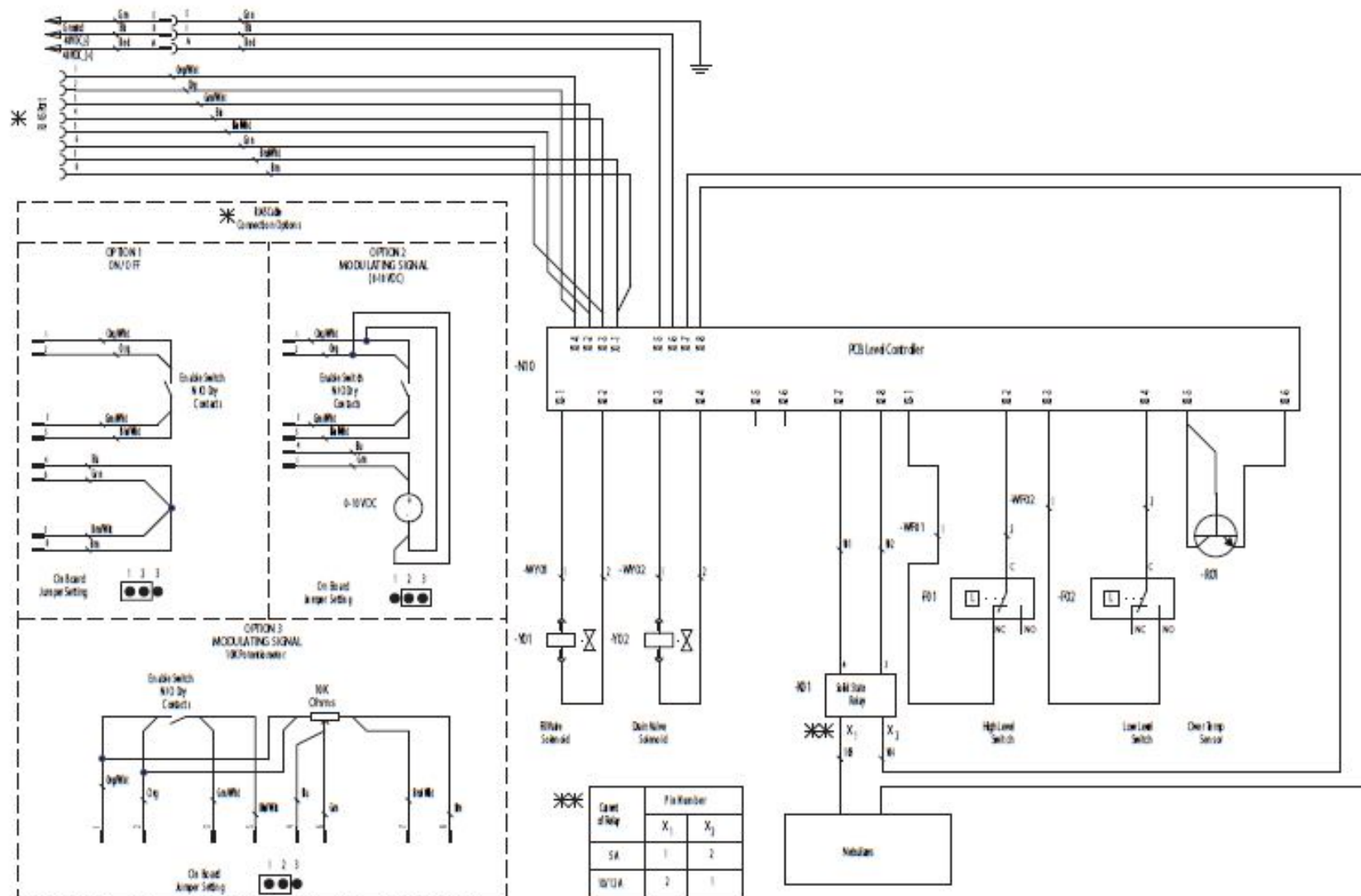
Unit Component Layout Drawing of Humidifier (Exploded View)



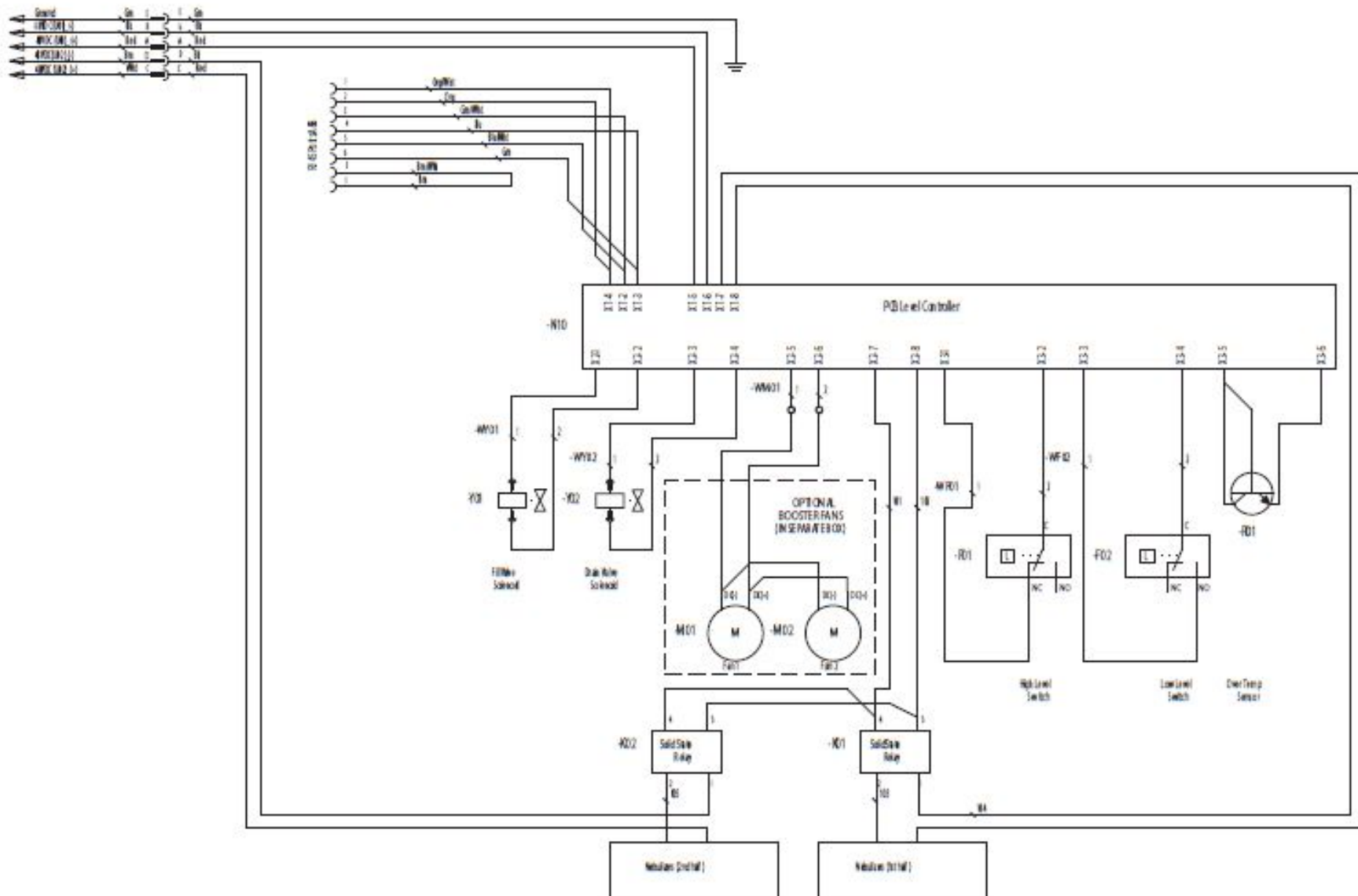
The numbers in the drawing above coincide with the item numbers listed below.

1	Electric Box Cover	10	Mounting Foot
2	Power Connector	11	Hole For Drain Stub
3	Lock Nuts	12	Drain Stub
4	Mist Guide Cover	13	Drain Cap
5	Water Inlet 90° Fitting	14	Print Plates
6	Water Supply Strainer/Flow Regulator	15	Solid State Relay
7	Nipple	16	Slot For Level Control Board
8	Water Tank	17	Data Communication Connectors
9	Base	18	Fill Solenoid

DAH-04/16 - Typical Wiring Diagram for Stand-Alone Version



DAH-24/30 - Typical Wiring Diagram for Stand-Alone Version





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