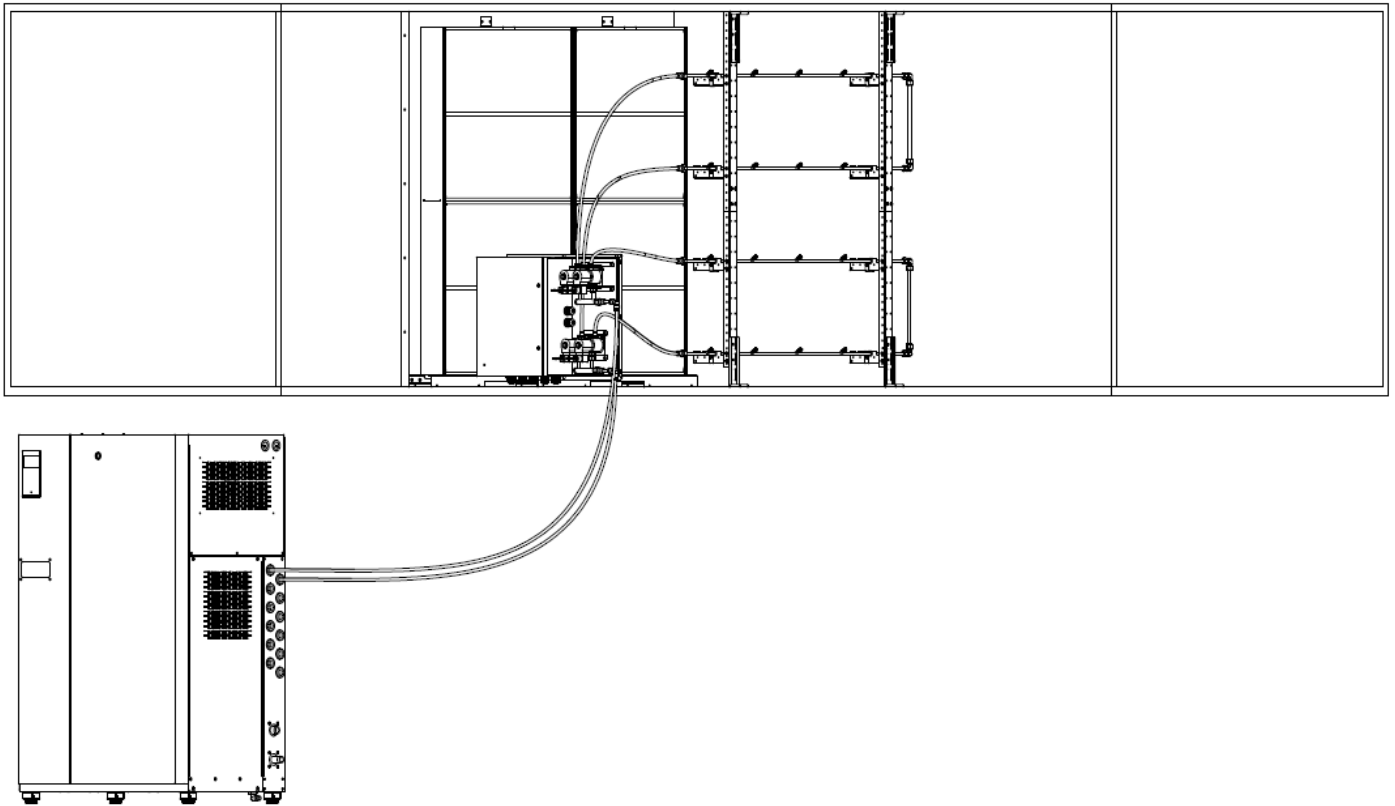




neptronic®

SKH4 High-Pressure Atomizer

AHU Mist Distribution Guide



Mist Humidification Guide

The following document describes the procedure to follow in order to properly install an in-duct mist distribution system for the SKH4. The steps and guidelines outlined in this document must be followed in order to avoid any anomaly resulting from inaccurate installation.



All installation work must be carried out by suitably qualified personnel and must conform to local codes and regulations.

Application

The SKH4 high pressure mist humidification generates extremely fine mist that may be directly absorbed in the ambient air. The in-duct distribution of pressurized water is much more suited to applications with *zero* tolerances for dripping in the space to humidify. The water droplets are confined to a wet section of the AHU, but after passing through the droplet catcher, the air becomes aerosol free.

Site considerations

There are multiple factors specific to the site that can have an impact in high pressure mist absorption. Few examples:

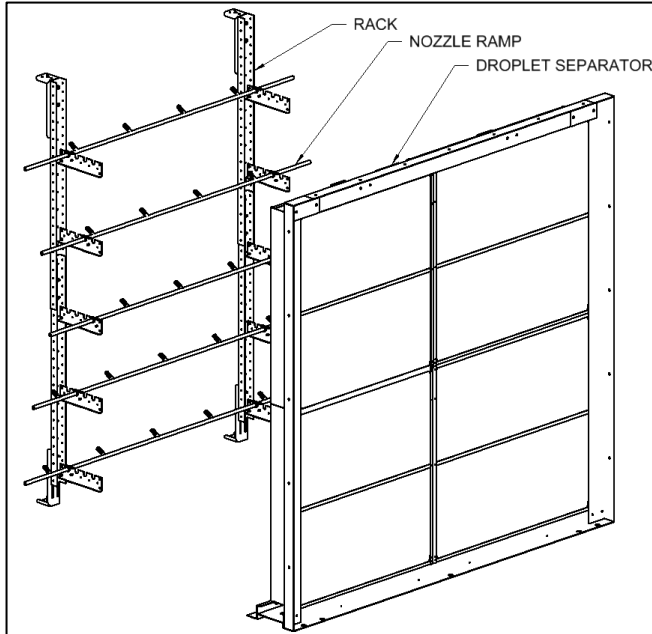
- Temperatures (*Before humidification*):
 - Average: Higher average air temperature will improve mist absorption
- Humidity (*Before humidification*):
 - Average: Lower average air humidity will improve mist absorption
- Control:
 - Instruments: Proper sensor(s) and sensor location(s) are critical in order to ensure proper humidifier operation and may be critical to ensure proper mist absorption.
 - Control: Proper control loops and parameters settings are required for optimal mist absorption.
- Air quality: Dust in air can have negative effects on mist absorption.
- Water quality: Water quality can influence water absorption efficiency. The minerals that are typically found in water, once evaporated, will result in air containing dust particles.
- Smoke detector: Can be triggered by excess humidity. Ensure that there is no smoke sensor placed in the AHU between the humidifying grid and droplet separator.

It is the designer's responsibility to consider the site factors that could have an impact on mist absorption and assess the risks accordingly.

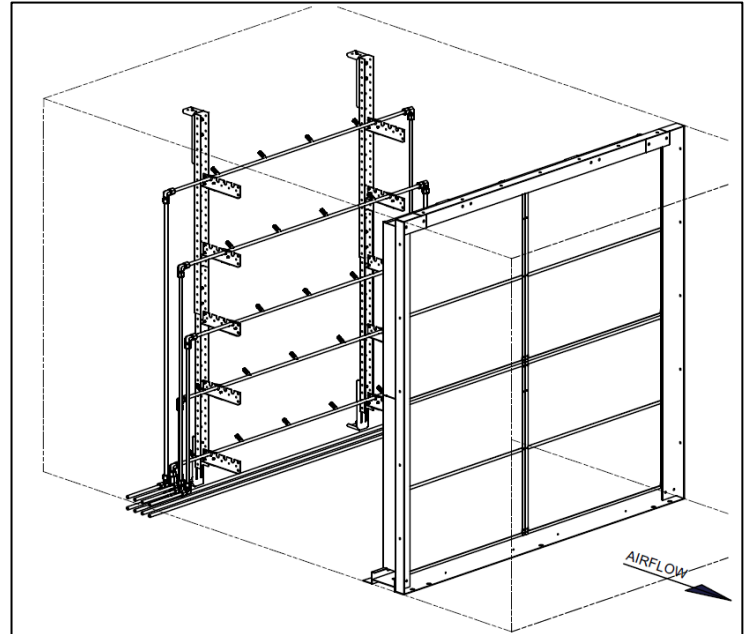
Designers shall always budget the time during commissioning for adjustment and tuning of in-space high pressure humidification.

Mist Distribution System

The mist distribution system comes in separate parts, to be assembled on the job site. First there's the nozzle ramps with the adaptors for the nozzles from the factory. It is assembled with custom made racking parts. The second part is the droplet separator with a frame to hold the media pad, downstream from the nozzles.

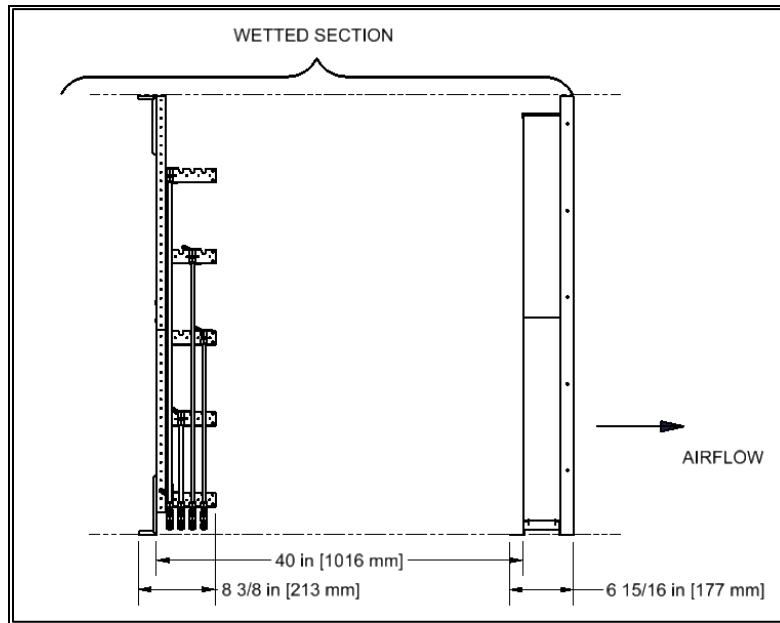


Supplied Parts



Complete System

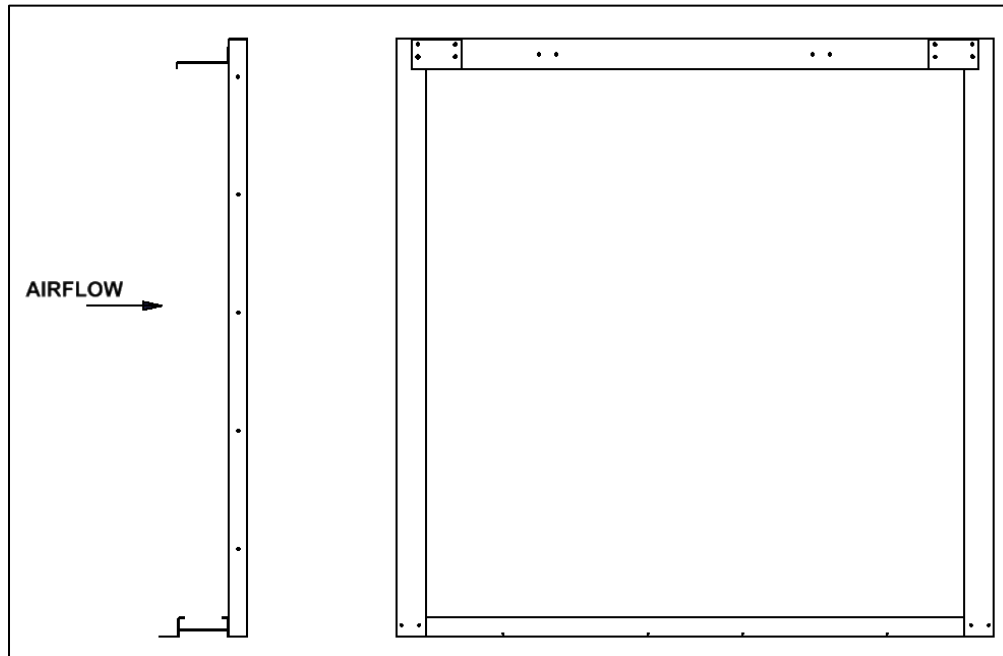
The wet section of the AHU should be watertight with a drain floor. The illustration below shows the clearances for the final assembled system:



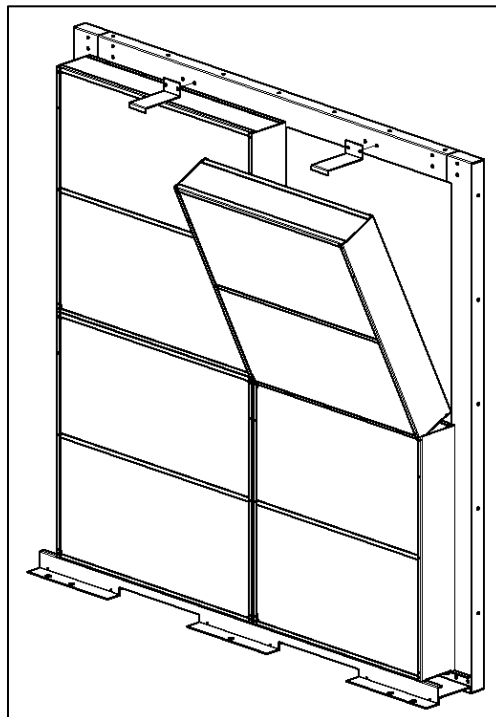
The length of the wet section in front of the nozzles depends highly on the air flow of the system. Allow for some space of the wet section in front of the nozzles, as necessary with variation of air flow and pressure.

AHU Spray System Assembly

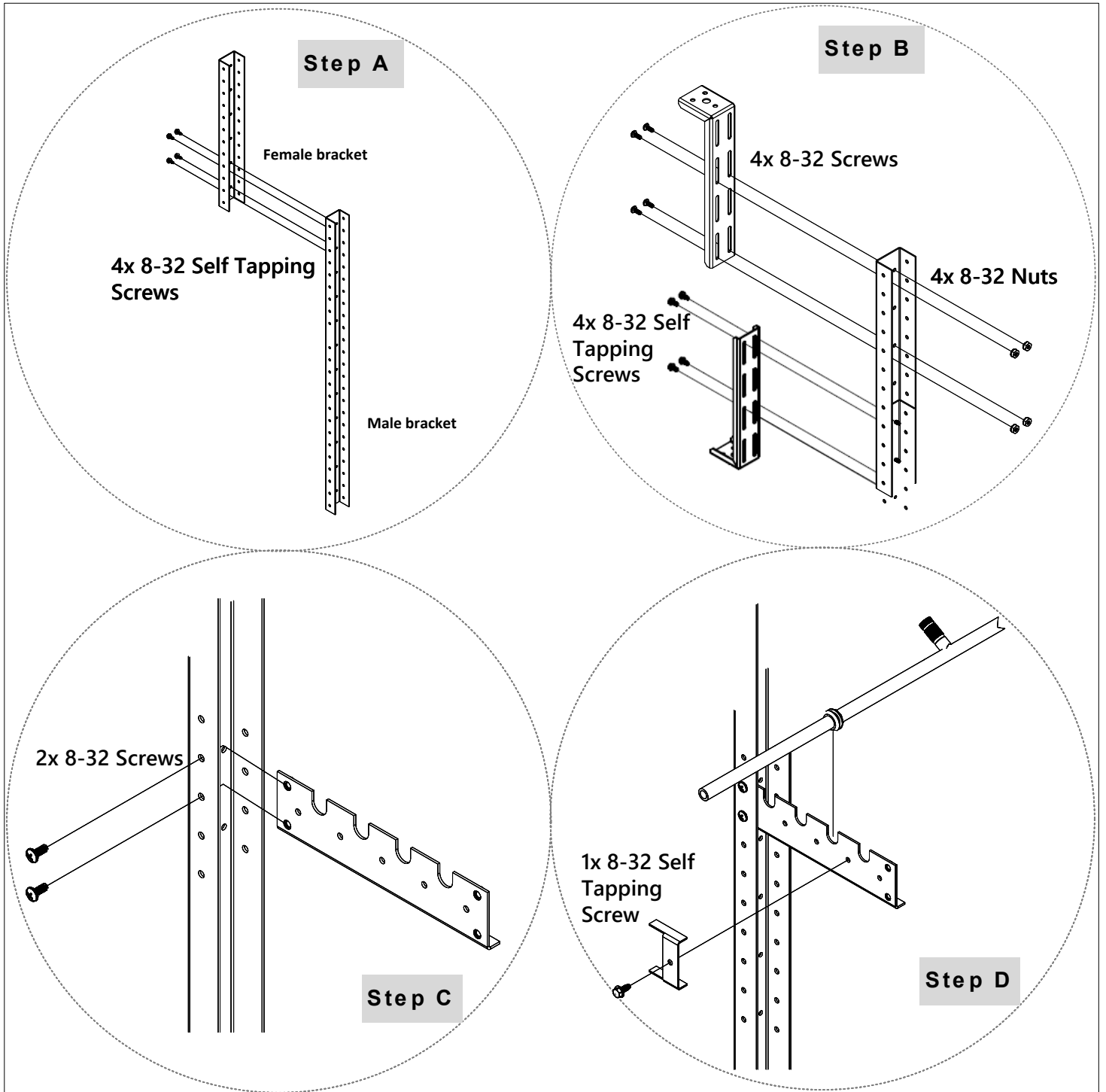
1. Install the wetted media support at the downstream limit of the wetted AHU section, within the pan.
 - 1.1. Fasten the base to the bottom of the duct with $\frac{1}{4}$ " self-drilling screws (not supplied).
 - 1.2. Secure the side pillars by fastening them to the base using #10 screws (supplied), and to the sides of the duct using $\frac{1}{4}$ " self-drilling screws (not supplied).
 - 1.3. Secure the top bar to the top of the duct using $\frac{1}{4}$ " self-drilling screws (not supplied), then fasten it to the two side bars using the rectangular joining plates using $\frac{1}{4}$ " nuts and lock washer.



- 1.4. Insert the media cassettes and lock them into place with the supplied brackets and #10 screws.

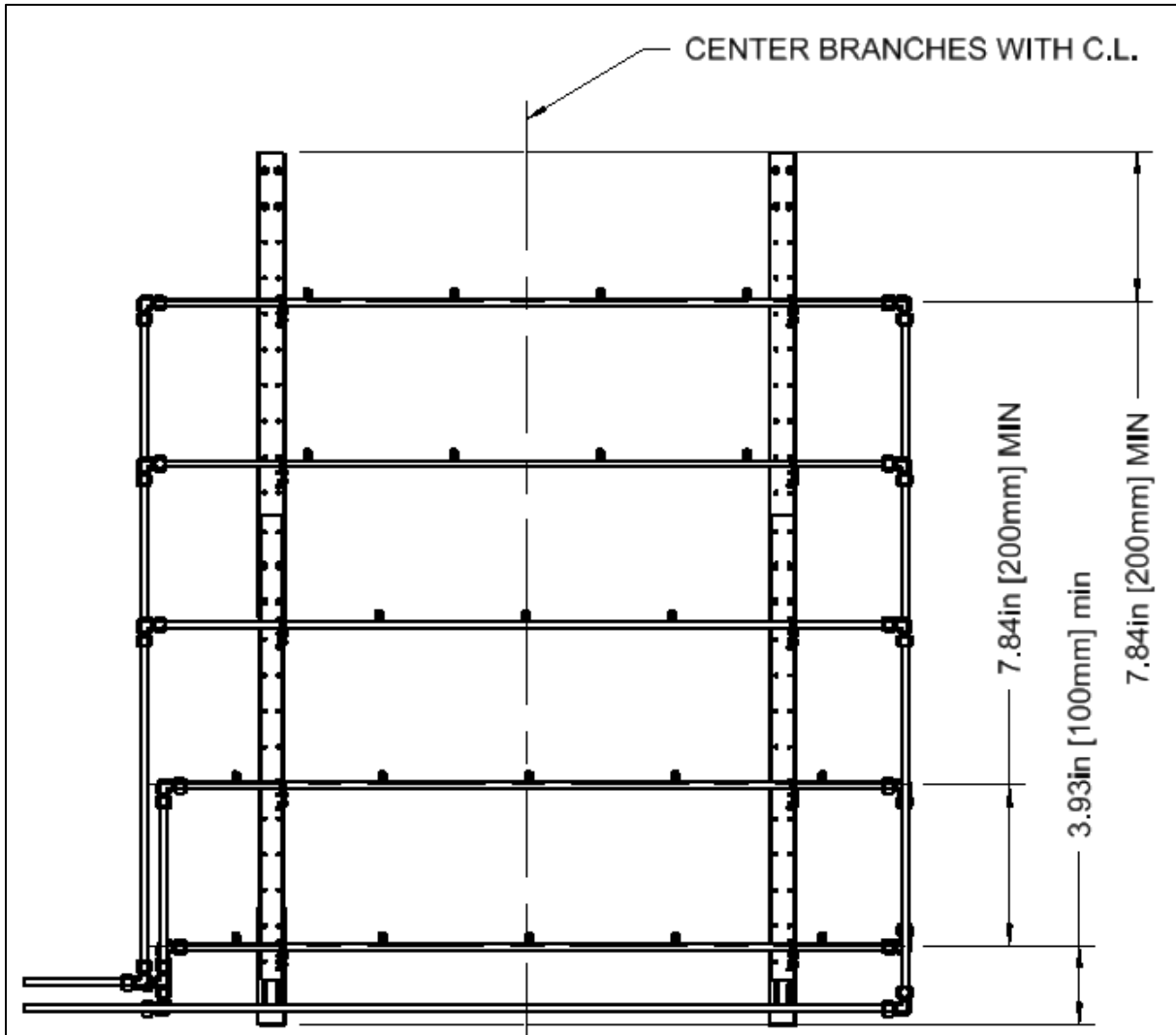


2. Assemble the nozzle rack assembly within the duct as per the following steps, respecting a 40" (1m) distance from the media pad assembly:

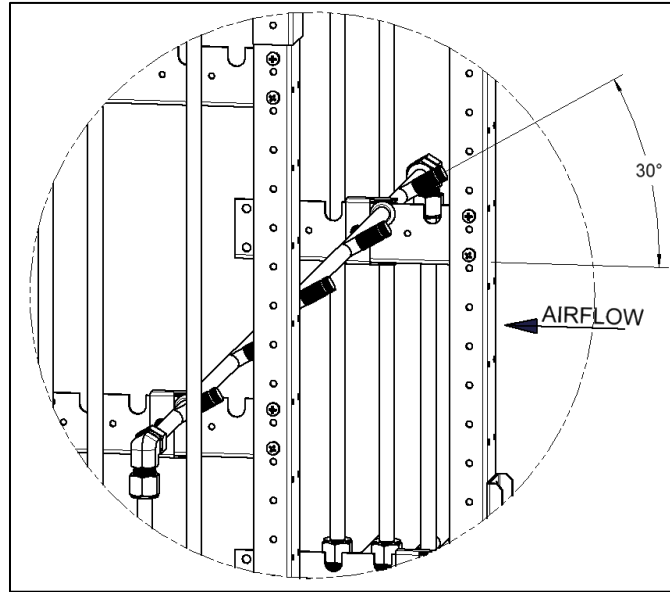




2.1. Respect the vertical clearances between the branches and from the top and bottom of the duct:

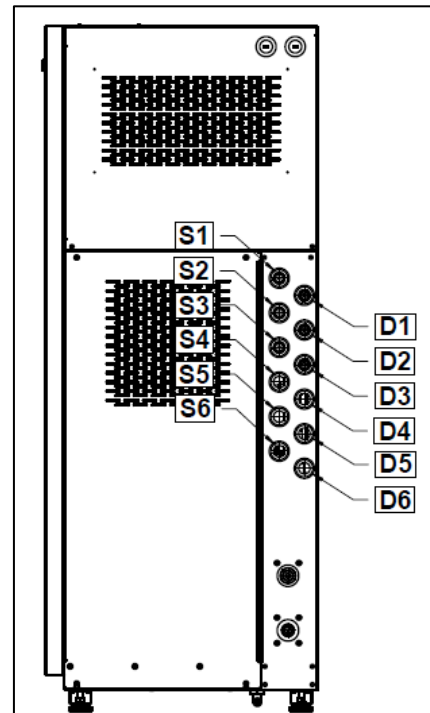
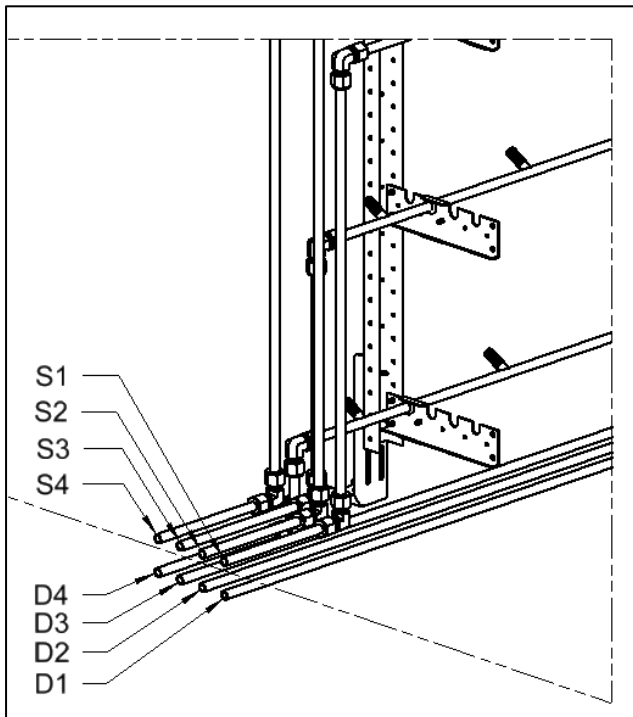


3. Place the nozzles at an angle of 30°:



4. Connect the piping from the assembly inlets (by others) and assign the proper output weights to the proper valves:

Using the controller, in the Installation menu, assign each stage their correct capacity, **in Liter(s)/hour**, based on the number of nozzles multiplied by the capacity per nozzle. (Installation/Quick Config/Stages(1 to 4)). All stages of the same rack must be assigned to the same zone in order to work together properly.



5. Control function (Optional)

Ramp up: Accessing the menu: Installation / Quick Config / Zone[] / StgOpenDelay, this parameter allows the user to add a delay between the opening of the stages, for each zone separately. When that time value is higher than zero, the smallest stage will open, followed by the second smallest after the delay is parameterized.

The output increases progressively, which results in less intense variations in the system, allowing the control to be more precise and reduces the risk of overshooting during the startup process.

Start-Up Procedure

Once the installation is complete, follow this start-up procedure in order to ensure that the SKH4 High-Pressure Atomizer is ready for normal operation. We strictly recommend following this procedure in order to avoid any anomaly resulting from inaccurate installation of the components.



Initial verification and start-up must be carried out by suitably qualified personnel.

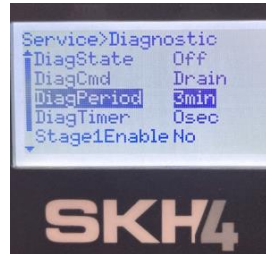
Initial Verification

- | | |
|-------------------|---|
| Clearance | 1. Ensure that the humidifier cabinet is installed in a location where it can be serviced correctly. <input type="checkbox"/> |
| | 2. Ensure that the pump station is installed in a temperature-controlled environment of less than 86°F (30°C). Verify that the pump station is fixed securely to the ground and that it remains stable. <input type="checkbox"/> |
| Mechanical | 3. If an in-duct spray system is used, ensure that the nozzle rack assembly is correctly installed within the AHU. <input type="checkbox"/> |
| | 4. If an MDU or ADU is used for in-space spray distribution, ensure that it is correctly installed and secured onto the ceiling. <input type="checkbox"/> |
| | 5. Verify that the pump station water connections are installed properly: |
| | a) Ensure that water is supplied to the humidifier and that an isolation valve is installed on the water line. With the water isolation valve turned on, verify that there are no apparent leaks. <input type="checkbox"/> |
| | b) Ensure that the pan drain outlet is properly connected to a flexible hose and that it is directed towards an open drain. Verify that the water drainage is not obstructed. <input type="checkbox"/> |
| Hydraulic | 6. Verify that the zone hydraulic connections are installed properly: |
| | a) If an in-duct spray system is used, ensure that all nozzle ramps are properly connected and assembled onto the rack assembly. <input type="checkbox"/> |
| | b) If a standard in-space spray distribution system is used, ensure that all nozzles within the ramp have been connected in series and that they are properly secured. <input type="checkbox"/> |
| | c) If an in-space fan-assisted spray distribution system is used, ensure that all units are connected in series and that they are properly secured. <input type="checkbox"/> |
| | d) Ensure that isolation valves are opened on all the fan-assisted distributors <input type="checkbox"/> |
| Electrical | 7. Verify that the power supply (voltage) conforms to the appliance name plate on the side of the humidifier. <input type="checkbox"/> |
| | 8. Ensure that the Interlock is properly connected to the controller. If Interlock is not used, verify that a jumper is connected between terminals TB3 1&4. <input type="checkbox"/> |
| | 9. If a room or duct humidistat is used, verify that it is fixed securely to the wall or duct and to the pump unit, respectively, and ensure that it is properly connected to the controller. Verify that the setpoints and the address are properly adjusted. <input type="checkbox"/> |
| | 10. If a TRUB is used, verify that it is fixed securely to a support or wall located within the desired zone and ensure that it is properly connected to the pump unit. Verify that the setpoints are properly adjusted. Refer to the TRUB documentation for more information. <input type="checkbox"/> |

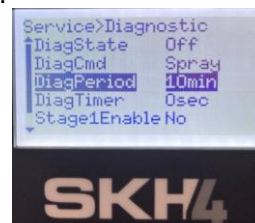
Start-Up

1. Proceed to start-up the humidifier, as follows:
 - a) Remove the Front door and Right door (located on the right side of the front of the humidifier cabinet), in order to gain access to the high-pressure pump.
 - b) Ensure the zones and the number of stages are configured, and the stage valves are connected to the hoses properly.
 - c) **Important!** If the pump unit is stainless steel, loosen the top hex socket screw of the pump in order to bleed the air (see yellow label). This needs to be performed during the drain until the output is clear of any air bubbles, while the pump is running at a low speed. This will spill a bit of water as the air is pumped out in the output and through the valve.
 - d) Press the Menu button ✓ to access the Main Menu screen and enter the password 4433 (Installation level). Navigate to the **Service** menu. Then, select the **Diagnostic** mode and set **DiagPeriod** to 3 minutes and set **DiagCmd** to **Drain** and set **DiagState** to **On**, to start the drain sequence. The system will then start draining.
Warning! This mode disables alarms to give the user full control. To turn off diagnostic mode, exit the menu, or off button, to change **DiagState** to **off**.
 - e) Press the Menu button ✓ to access the Main Menu screen and enter the password 4433 (Installation level). Navigate to the **Service** menu. Then, select the **Diagnostic** mode and set **DiagPeriod** to 3 minutes and set **DiagCmd** to **Drain** and set **DiagState** to **On**, to start the drain sequence. The system will then start draining.
Warning! This mode disables alarms to give the user full control. To turn off diagnostic mode, exit the menu, or off button, to change **DiagState** to **off**.

Start-up



- f) **Important!** If the pump unit is Stainless Steel, once it's free of air, retighten the top hex socket screw of the pump while it's running to seal off the bleeding port. The drain sequence automatically stops after 3 minutes, it can be restarted again if the pump has not been bled.
- g) If the drain is successful and no leaks are detected, the system can be tested at a high pressure.
- h) Change the DiagCmd to Spray and enable each stage, individually at first since the connections and distributions and nozzles need to be inspected for leaking and spraying
- i) Set DiagPeriod to 10 minutes and set DiagState to On to start the high pressure spray sequence.

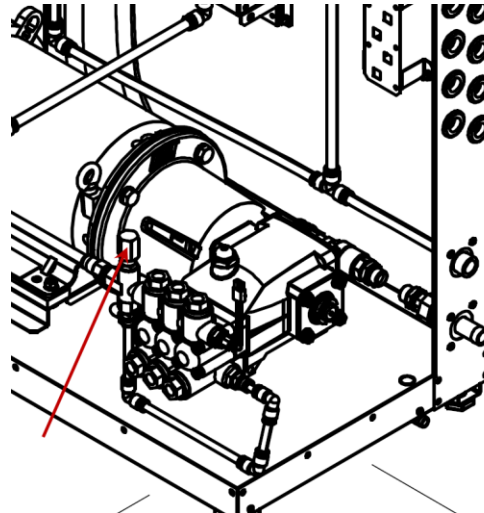




- j) Check the pressure reading on the controls. Pressure should be stable after the air was evacuated from the line.

Warning! This could result in nozzle spitting big water droplets at first.

- k) If the pressure reads <1000psi, slowly turn the high pressure unloader on the pump clockwise until a value of 1000psi is displayed in the Pressure on the Home screen and also on the high pressure manometer located on the front of the unit. The spray sequence of the diagnostic mode will stop automatically after 10 minutes.



Start-up



- l) Verify that all nozzles within the activated stage are spraying correctly and that the pressure is stable at 1000psi.

Warning! With the low and high pressure flush, depending on the installation piping, there can be a lot of particles that will be cleaned of the system and can clog nozzles and valves. Verify that all the nozzles close properly.

- m) Do steps d) through j) with all the remaining stages (except bleeding, that steps only needs to be done once).

- n) Exit diagnostic mode. Turn on the humidifier by pressing and holding the Power button for 3 seconds. Verify that the power display LED light is turned on. If there's a demand for a zone, the unit will start.

- o) Check the Home screen that the **Pressure** is at **1000 psi**, **ControlState** is **Normal**, **State** is **Spraying** If there is any **Alarm** appears, verify the list of Alarms and possible causes provided in the manual.

Safety test

- 2. Check the location of the Airflow switch in the system and its operation by stopping the fan. With no air movement in the AHU, the humidifier should automatically stop.

- 3. Reset the Airflow switch if needed.

- End** 4. The humidifier is now ready for normal operation.

Diagnostic mode

If required, a diagnostic mode is accessible through the Service menu, the diagnostic mode allows manual activation and override of the SKH4. It's possible to activate each stage without any demand to the pump. This allows for inspection, purging the air out of the line and validation of operation of a particular stage.



Alarms and interlocks coming from zone(s) are bypassed while manual override is active.

Enter the mode from the Service, Diagnostic mode. The function allows to select the action to drain or to pressurize the stage(s) selected below, and then to turn the action on or off.

First, select the command type (Spray or Drain), set desired time for test, and enable or disable the desired stage(s) manually. To turn on the action, change the DiagState to ON.

Going out of the menu, changing Command type or the end of Period will turn the State back to Off. The exiting of the diagnostic state sends the SKH4 to its regular Off state.



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