



**neptronic®**

# SKH High-Pressure Atomizer



## Installation Instructions and User Manual

**Read and save this manual**



# Foreword

## Neptronic Company Overview

Founded in 1976, Neptronic is a private corporation that designs, manufactures and distributes products for the HVAC industry. Our product line includes intelligent controllers, electronic actuators, actuated valves, humidifiers and electric heaters.

Our products are designed and manufactured by over 250 dedicated employees in our 7,500 m<sup>2</sup> (80,000 ft<sup>2</sup>) state-of-the-art facility located in Montreal, Canada. Our entire manufacturing chain is under one roof from software and hardware development to SMT circuit board assembly, to sheet metal fabrication, to product testing ensuring that our products are engineered to last using a vertical integration model.

We currently hold several national and international patents, and with our continued commitment to research and development, we provide innovative products and technologies for the ever-evolving challenges of the HVAC industry. Exporting over 85% of our sales, we have an exclusive distribution network around the globe that provides comprehensive solutions to our worldwide customers.

## About the Manual

These installation and operation instructions have been developed to facilitate the installation of the SKH High-Pressure Atomizer humidifier.

- The strict application of these instructions ensures conformity of your installation and operation as per the manufacturer's recommendations.
- The application of these instructions is one of the conditions for the application of the warranty.
- The application of these instructions does not ensure, at any time, conformity to procedures, regulation or local codes, regarding electric connections and installation to local water supply.

This product has been declared to conform to the applicable Canadian and American safety standards and directives and bear the ETL (c) & (us) mark. The Certificate of Conformity for ETL is available, upon request with the manufacturer.

This product has been declared to conform to the applicable European safety and electromagnetic compatibility standards and directives and bear the CE mark. The Certificate of Conformity for CE is available, upon request to the manufacturer.

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# Health and Safety Instructions

## General

This manual has been written to ensure correct, safe and sustainable operation of the SKH High-Pressure Atomiser and is intended for use by engineers and technical personnel trained by or their official agents. This manual must be read thoroughly before specifying, designing, installing or operating a SKH High-Pressure Atomizer. Please retain for reference and contact Neptronic should you have any questions.



The triangular symbol with the word **WARNING**: is used to designate danger of severe or lethal consequence.



The circular symbol with the word **CAUTION**: is used to designate danger of injury, or to warn of the hazardous operating condition, or other relevant information.

## Electrical Warning Message



### WARNING

- Risk of electric shock. Do not access. Disconnect SKH High-Pressure Atomizer before opening the access door.
- All work concerned with electrical installation **MUST** only be performed by skilled and qualified technical personnel (such as an electrician or a technician with appropriate training). The customer is always responsible for ensuring the suitability of the technical personnel.
- Please observe the local regulations concerning the provision of electrical installations.

## Health & Safety

Installation, maintenance, repair work or de-commissioning should only be carried out by appropriately qualified technical personnel. Any risks or hazards relating to the system, including during installation and maintenance, should be identified by a qualified Health & Safety representative who shall be responsible for introducing effective control measures, as necessary. The customer is responsible for ensuring that the installation of the equipment complies with all local regulations.



**CAUTION:** Maintenance personnel must be trained by Neptronic or their official agent, and it is the customer's responsibility to ensure their suitability. Failure to use a qualified personnel may lead to a hazardous operating condition.



**WARNING:** Danger of Electrocution! Danger of contact with live parts when the unit is open. Always isolate all water and electrical supplies to the system before commencing any maintenance or repair. Isolate power and water immediately if there is any sign of water leaking from the unit.

## Protective Equipment

Please refer to the Health and Safety Executive for recommendations about Personal Protective Equipment and information on the Control of Substances Hazardous to Health (COSHH).

## Hygiene

### IMPORTANT:

Refer to local Health and Safety regulation and codes on the control of Legionellosis in water systems. In the absence of such, ASHREA guideline 12-2000 does provide recommendations. If not adequately maintained, water systems can support the growth of microorganisms including the bacterium that causes Legionnaires' disease.

The SKH has been designed to reduce the potential risk of legionellosis growth. Users also share the responsibility for reducing the risk of legionellosis; users are required to:

- Conduct a risk assessment of the complete water system.
- Implement proper control of the water system.
- Connect the SKH to a clean and chlorinated water supply main.
- Avoid stagnant water.
- Avoid water temperatures that increase the risk of Legionella growth.
- Clean and disinfect the system regularly.



**WARNING:** Risk of Legionnaires' disease, which can be fatal. Install and operate the SKH High-Pressure Atomizer as per the instructions given in this Installation Instructions and User Manual.



**WARNING:** If the SKH High-Pressure Atomizer is turned off for prolonged periods (more than 24 hours), ensure that any piping supplying the unit is drained, unless they supply other systems which ensure a regular renewal of water in the system. Failure to do so may result in stagnation of the water and contamination that might cause Legionnaires' disease, which can be fatal.

It is the responsibility of the person on whom the statutory responsibility falls to determine all control and preventative measures outlined in this manual.

## Correct Use

Neptronic systems and products are designed only for humidification use. Any other application is not considered appropriate for the intended purpose. The manufacturer cannot be made liable for any damage resulting from incorrect use.

## Important Start-Up Information

Before turning on and operating the SKH High-Pressure Atomizer:

- Read all instructions and installation procedures outlined in this manual. Ensure that the operation of the system is properly understood before commencing the start-up procedure.
- Ensure that all wiring is properly installed and that all connections have been made correctly, including the network communication cable between the pump station and the EZC controller(s). Proper termination and shield wiring is critical to the operation of the system.
- Verify all piping before starting up the system. As each zone may have a different capacity and the system has been configured as such, connecting the wrong EZC output to a zone may lead to erratic operation.

## General Warranty

This product is subject to the terms and conditions described at [www.neptronic.com/sales-conditions.aspx](http://www.neptronic.com/sales-conditions.aspx).

# Contents

Overview.....	5
Product Description .....	5
Benefits.....	5
Features .....	5
SKH Pump Station Overview .....	6
Specifications .....	7
Handling and Packaging .....	8
Handling and Lifting.....	8
Correct Lifting Method .....	8
Inspection .....	8
Unpacking.....	8
Installation Overview .....	9
Local Regulations .....	9
List of Supplied Accessories .....	9
Installation Method Statement.....	10
Step 1 – SKH Pump Station Installation.....	11
Step 2 – Electronic Zone Controller (EZC) Installation .....	12
Step 3 – Mist Distribution Ramp and Nozzle Installation .....	13
Step 4 – Water and Drain Connections.....	21
Step 5 – Power Supply Connections.....	25
Step 6 – Electrical Control Connections.....	28
Step 7 – Controller Installation and Configuration.....	36
Start-Up Procedure .....	48
Initial Verification .....	48
Start-Up .....	50
Servicing and Maintenance .....	52
Preventative Maintenance.....	52
Standard Maintenance .....	53
De-scaling the Droplet Separator .....	53
Exploded View and Bill of Material .....	54
Exploded View.....	54
Bill of Material .....	56

# Overview

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## Product Description

The SKH High-Pressure Atomizer uses water through a high-pressure system to produce a fine mist with a droplet size of less than 20µm. The ambient air absorbs the fine mist, and the SKH adapts to seasonal changes to provide direct evaporative cooling in summer and humidification in winter. Additionally, the SKH provides BACnet MS/TP communication, multi-zone operation (up to 3 zones) and remote connection to the entire system from any zone.

## Benefits

- Very low energy consumption
- Free cooling up to 21.5°F (12°C)
- Hygienic operation
- Environmentally friendly
- Low pressure drop
- All parts in contact with water are made of stainless steel and designed for life

## Features

The following are the features of the SKH High-Pressure Atomizer:

- 5 microns PP pre-filter and silver ion dosing cartridges prevent microbial growth (included with SKH100 and SKH200 models)
- BACnet communication (optional)
- Master/Slave configuration for up to 4 pump stations
- User-friendly, menu-driven LCD (128 x 64)
- Real-time clock and SD card for schedule, trending, and history log
- Firmware upgrade using an SD card
- Water overflow outlet (optional)



# SKH Pump Station Overview

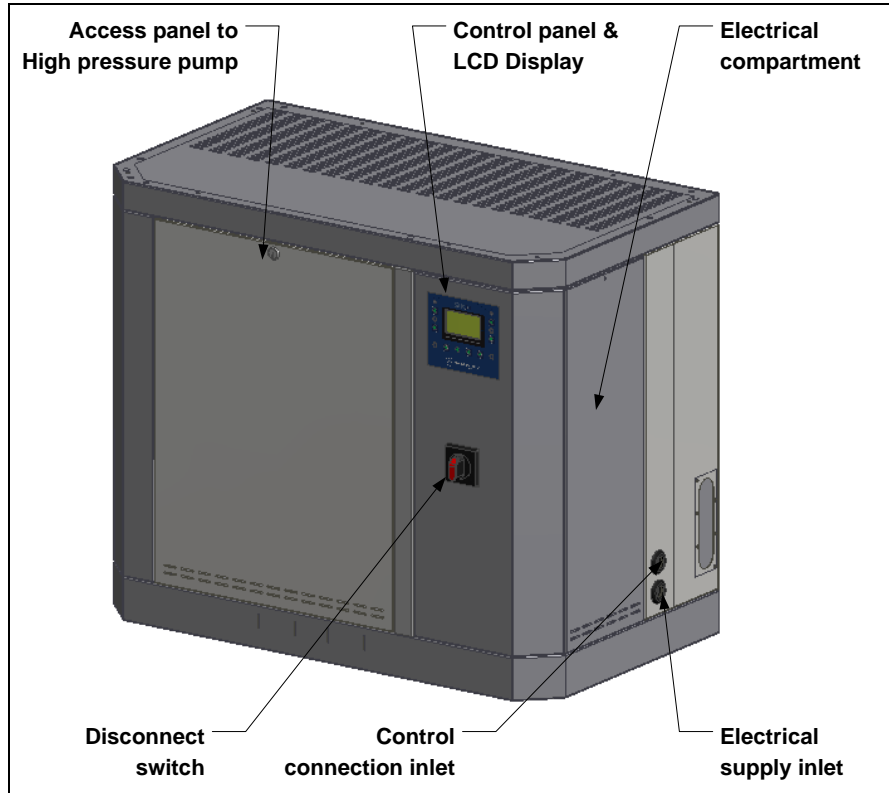


Illustration 1 - SKH Pump Station Visual Overview

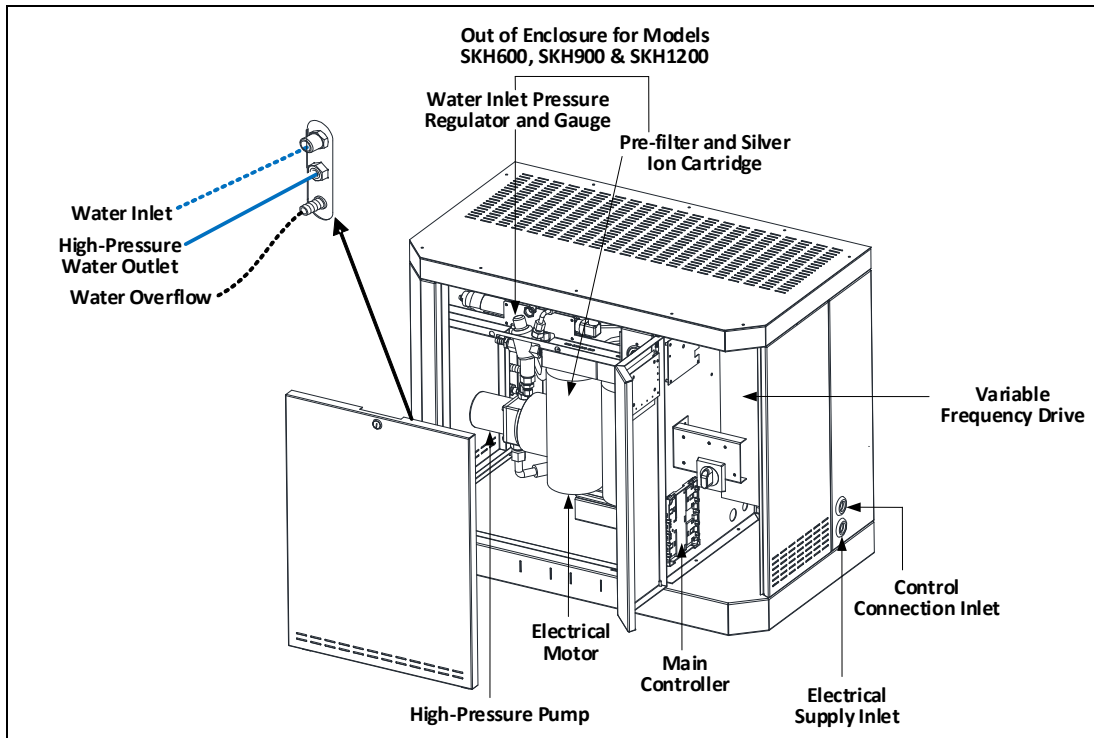
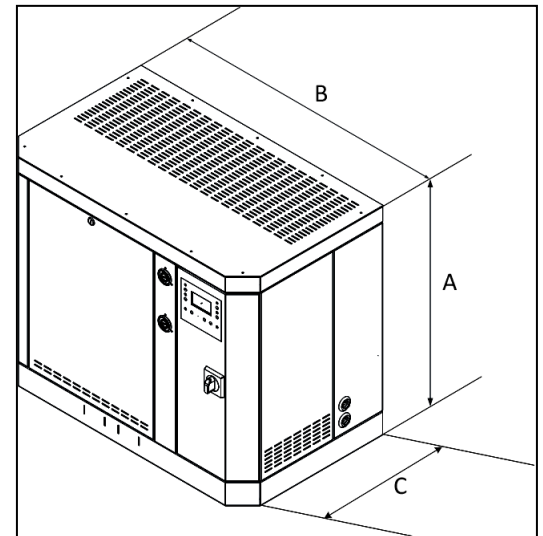


Illustration 2 - SKH Pump Station Overview

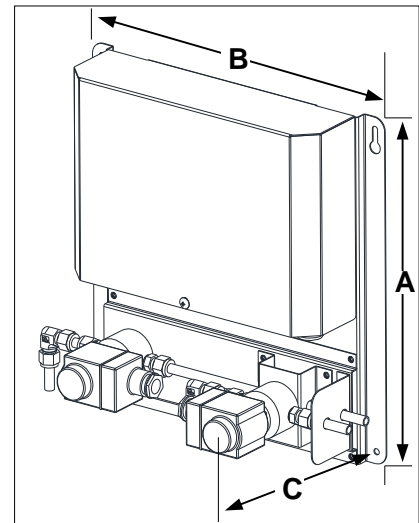
## Specifications

**Table 1 - Pump Station Dimensions & Weight**

Model	Capacity range lb/hr (kg/hr)	Dimensions in (mm)			Weight lb (kg)
		A	B	C	
SKH100	66 (30) to 660 (300)	30 (763)	36 (915)	20 (508)	187 (85)
SKH200	141 (64) to 1126 (512)				
SKH300	231 (105) to 1454 (661)	34 (871)	46 (1156)	24 (622)	209 (95)
SKH600	453 (206) to 2343 (1065)				
SKH900	585 (266) to 3645 (1657)				
SKH1200	805 (366) to 4638 (2108)				


**Illustration 3 - Pump Station  
Dimensions & Weight**
**Table 2 - Electronic Zone Controller (EZC) Dimensions & Weight**

Model	No. supply	Dimensions in (mm)			Weight lb (kg)
		A	B	C	
EZC1	1	14.3 (362)	13.9 (353)	6 (152)	7 (3)
EZC2	2	17.1 (434)	13.9 (353)	6 (152)	11 (5)
EZC3	3	19.9 (505)	13.9 (353)	6 (152)	15 (7)
EZC4	4	22.6 (575)	13.9 (353)	6.1 (154)	20 (9)


**Illustration 4 - Electronic Zone Controller (EZC)  
Dimensions & Weight**



# Handling and Packaging

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## Handling and Lifting

Lifting or Handling **MUST** be carried out by trained and qualified personnel. Ensure that the lifting operation has been properly planned, assessed for risk and that the equipment is checked by a qualified Health & Safety representative, and effective control measures are in place.



It is the customer's responsibility to ensure that the operators are trained in handling heavy goods and to enforce the relevant lifting regulations.

The SKH High-Pressure Atomizer **MUST** always be handled and lifted with care and should remain in its original packaging for as long as possible before installation.

The SKH High-Pressure Atomizer package may be carried using a forklift from the underside. Caution should be exercised to ensure balanced load before lifting.

## Correct Lifting Method

Any personnel handling or lifting the SKH High-Pressure Atomizer must follow the Lifting Operations and Lifting Equipment Regulations 1998 and Approved Code of Practice L113. The regulation imposes duties on employers and self-employed persons and authorities who have control, to any extent of lifting equipment.

Refer to Dimensions and Weights as indicated on the nameplate and the submittal drawing for system dry weights.

## Inspection

Upon receipt, and once packaging material is removed, carry out an inspection to ensure that no damage occurred during transit. Report any damage immediately to your Neptronic representative.

## Unpacking

The SKH pump station is delivered in a crate. The Electronic Zone Controller, Mist Distribution Ramps, and the Nozzles are delivered in a carton.

## Installation Overview

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**WARNING:** Failure to observe manufacturer's installation recommendations voids the manufacturer's warranty.

## Local Regulations

Lifting or Handling **MUST** be carried out by trained and qualified personnel. Ensure that the lifting operation has been properly planned, assessed for risk and that the equipment is checked by a qualified Health & Safety representative, and that effective control measures are in place.



It is the customer's responsibility to ensure that the operators are trained in handling heavy goods and to enforce the relevant lifting regulations.

The SKH pump station **MUST** always be handled and lifted with care and should remain in its original packaging for as long as possible before installation.

The SKH pump station package may be carried using a forklift from the bottom. Caution should be exercised to ensure a balanced load before lifting.

## List of Supplied Accessories

- Water filter assembly
- 5 microns PP pre-filter and silver ion dosing anti-bacterial cartridges (for models SKH100 and SKH200)
- 5 microns PP pre-filter (for models SKH300 to SKH200)
- Installation Instructions and User Manual



# Installation Method Statement

- Step 1 – SKH Pump Station Installation
- Step 2 – Electronic Zone Controller (EZC) Installation
- Step 3 – Mist Distribution Ramp and Nozzle Installation
- Step 4 – Water and Drain Connections
- Step 5 – Power Supply Connections
- Step 6 – Electrical Control Connections
- Step 7 – Controller Installation and Configuration

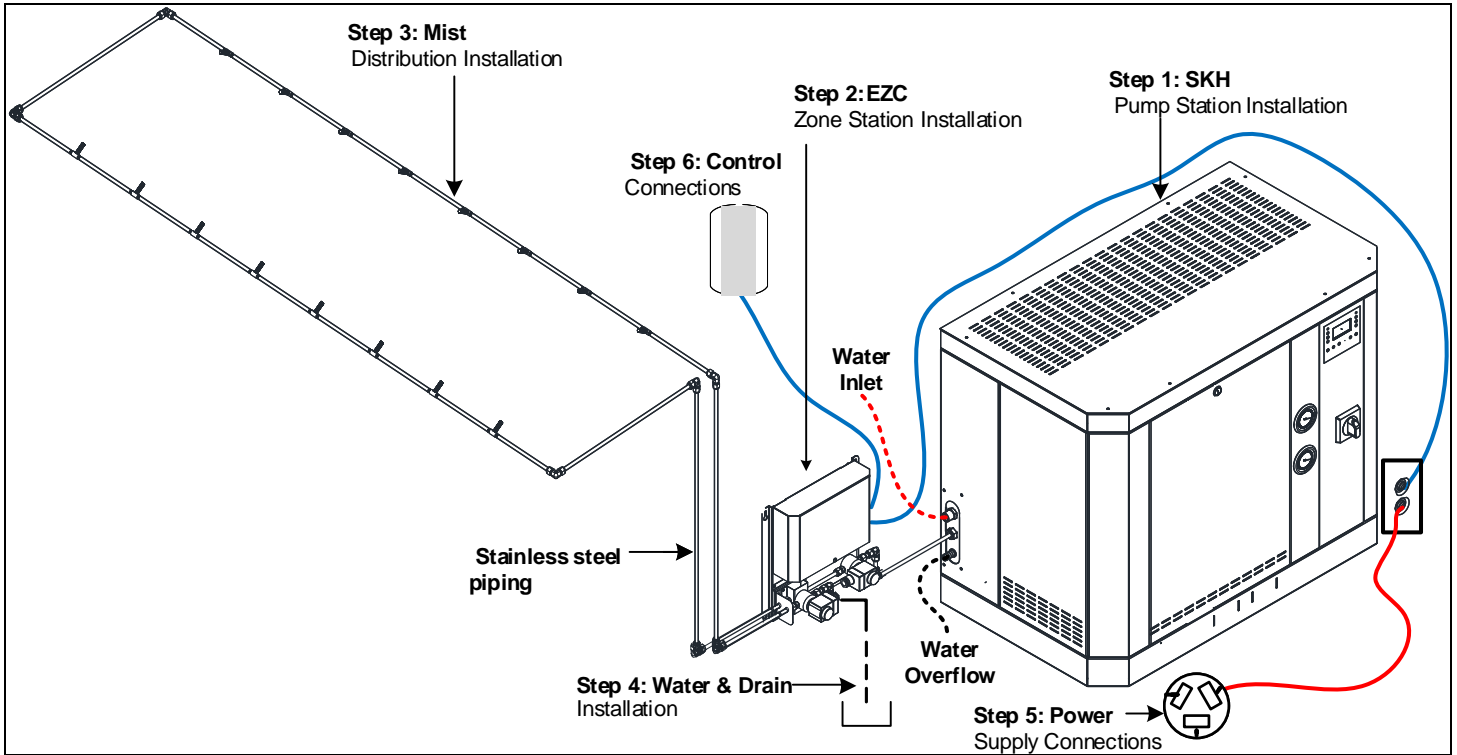


Illustration 5 - Installation Steps

## Step 1 – SKH Pump Station Installation

### General Recommendations



**WARNING:** Risk of electric shock. Disconnect the appliance from the electric supply before commencing installation.



**CAUTION:** Risk of injury. The SKH pump station is heavy; It **MUST** always be handled and lifted with care.

### Location

Consider the following points before deciding the location for the pump station:

- Plan a location that is easy to access to permit an easy inspection and servicing of the pump station.
- Do not install the pump station where the failure of the appliance could cause damage to the building structure or other expensive equipment.
- Ensure that the location is ventilated appropriately and that the ambient temperature is less than 86°F (30°C).

### Positioning

- There is no required minimum safety clearance.
- Provide a minimum clearance of 47" (1.20 m) on the front of the pump station, in order to permit access to connections and allow for servicing.
- It is recommended (but not mandatory) to allow some clearance on both sides and on the top of the SKH pump station for ease of service.
- The SKH pump station must be floor mounted.

### Floor Mounting

- Provide a level, solid foundation for the SKH pump station.
- Ensure that the floor beneath the SKH pump station is waterproof to withstand any water spillage during servicing or if a problem occurs.
- Ensure that the SKH pump station is provided with adjustable legs to ensure proper level from the ground.
- Allow some space beneath the pump station for the drain pan connection, located below the bottom plate.

## Step 2 – Electronic Zone Controller (EZC) Installation



**WARNING:** Risk of electric shock. Disconnect the appliance from the electric supply before commencing installation.

### Location

- Plan a location that is easy to access and permits an easy inspection and servicing of the EZC zone controller.
- Do not install the EZC zone controller where failure of the valve could cause damage to the building structure or to other expensive equipment.
- Ensure that the location is ventilated appropriately and that the ambient temperature is less than 86°F (30°C).

### Positioning

- There is no minimum clearance required for safety purposes.
- Provide a minimum clearance of 31" (0.80 m) on the front of the EZC zone controller, in order to permit access to connections and allow for servicing.
- It is recommended (but not mandatory) to allow some clearance on both sides and on the top of the EZC zone controller for ease of service.

### Wall Mounting

- Use the keyholes located on the back of the EZC zone controller.
- Check the solidity of the chosen support or wall (brick, concrete, or stud partition wall) on which the EZC zone controller is mounted.
- Drill holes for the upper anchors (holes with keyholes) into the support or wall, as per dimensions specified in the below table (anchors not supplied):

**Table 3 - Dimensions for Drilling Holes (EZC)**

Model	Dimensions in (mm)	
	D	E
EZC1	13.2 (336)	13 (330)
EZC2	16 (408)	13 (330)
EZC3	19 (480)	13 (330)
EZC4	22 (550)	13 (330)

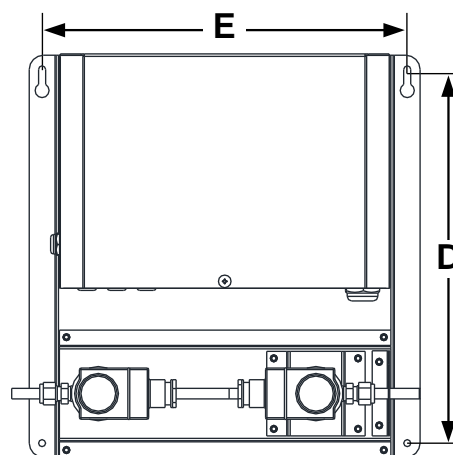


Illustration 6 - EZC Drilling Hole Dimensions (Back View)

- Ensure that the hole dimensions (diameter and depth) adhere to the recommendations of the chosen anchors. If required, you can install and then bolt the anchors.
- Affix two screws (not supplied) with a minimum diameter of 0.23" (6mm) to the top keyholes. Leave a clearance between the head screws and the wall to permit the mounting of the EZC zone controller.
- Hang the EZC zone controller on the two screws. Based on the size and weight of the EZC zone controller, you may need the assistance of another person.
- Tighten the screws to secure the EZC zone controller once it is positioned on the upper screws.
- Install and secure two screws (not supplied) onto the bottom screw holes of the EZC zone controller.

## Step 3 – Mist Distribution Ramp and Nozzle Installation

### Spraying in Space (Standard)

- Plan a location that is easy to access and permits an easy inspection and servicing of the nozzle.
- Do not install the ramp and nozzle where failure of the system could cause damage to the building structure or to other expensive equipment.
- Ensure that the mist is not directed and condensed on any electrical equipment.
- Construct the drain pipe in such a way that there is no water accumulation and stagnation.

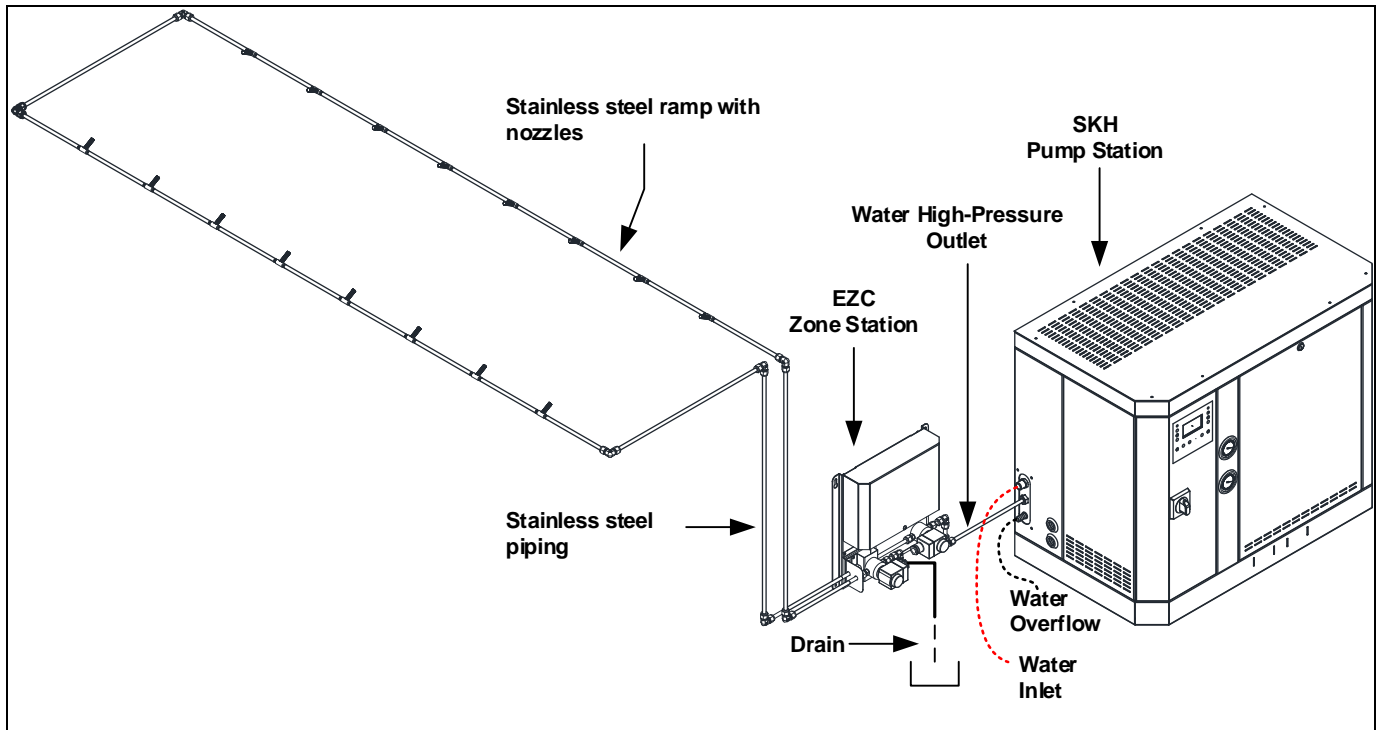


Illustration 7 - Typical Installation with Rigid Nozzle Ramp



Note: *The flexible HP hose must be maintained/attached and should not move when pressure is applied.*

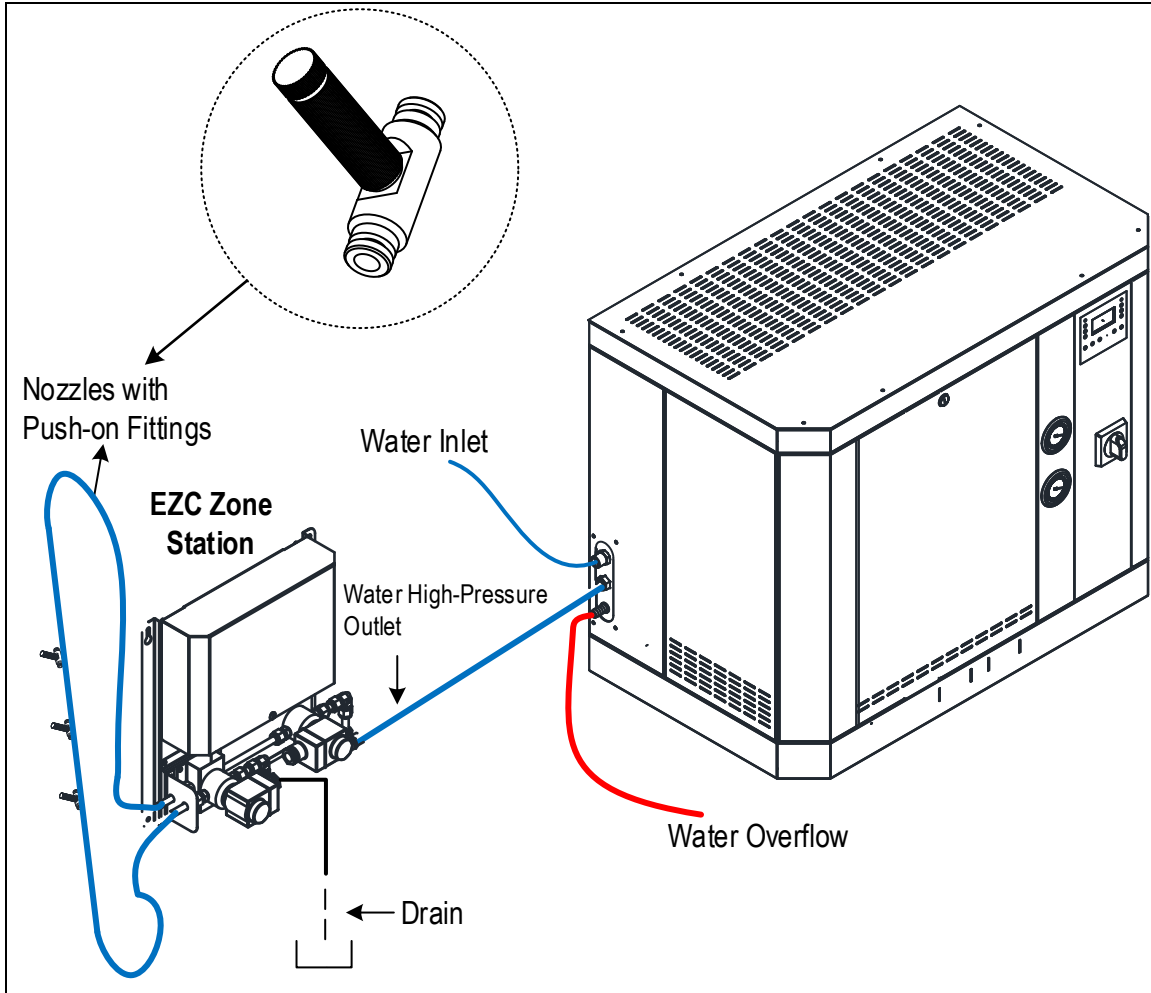


Illustration 8 - Typical Installation with Flexible Hose

## Spraying in Space with MDU

- Plan a location that is easy to access and permits an easy inspection and servicing.
- Do not install the MDU where failure of the system could cause damage to the building structure or to other expensive equipment.
- Ensure that the mist is not directed and condensed on any equipment, particularly electrical equipment.
- Construct the drain pipe in such a way that there is no water accumulation and stagnation.

## Ceiling Installation

To install the MDU to the ceiling, connect two metallic suspension cables (not supplied) to the three 0.213" (5.4mm) holes found around the unit as per the following steps. Verify the strength of the cables and ensure that they are capable of supporting the weight of the MDU (15 lb [6.8 kg]) before commencing installation.

- A. Attach a Y-fit suspension cable in any two of the three support holes. Ensure that the cable is securely and appropriately affixed to the MDU.
- B. Attach a suspension cable in the remaining third hole. Ensure that the cable is securely and appropriately affixed to the MDU.
- C. Connect the MDU to the ceiling using the ends of the two suspension cables. Ensure that the unit remains in balance and that it is firmly held in place by the two metal cables. Verify that all connections are secure.

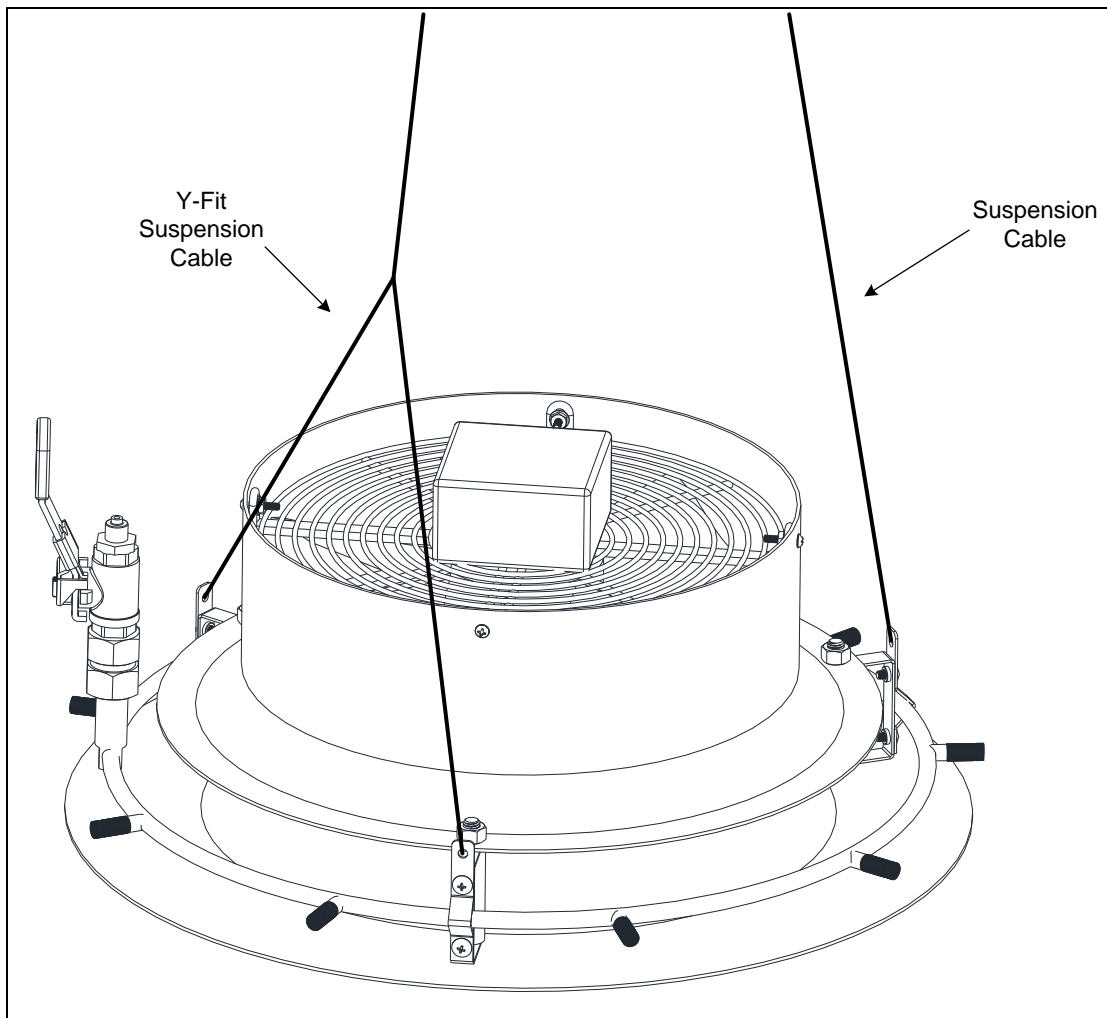


Illustration 9 - Installation of the MDU to the Ceiling



### Connecting the MDU to the EZC Zone Station

- After completing the installation of the MDU(s) to the ceiling, connect piping from the EZC Zone Station to the MDU system using flexible hoses (not supplied), as illustrated in the following diagram.
- For systems comprised of multiple MDUs, connect each MDU in series along a flexible hose line.
- Connect each MDU to the flexible hose line using a T push-on fitting (supplied). Connect the bottom side of the T push-on fitting to the MDU using a 3/8" flexible hose with a 3/8" quick connect fitting (supplied).

**i** Note: Compression fittings are available upon request. Please contact factory for details.

- Ensure that each MDU is separated by a radius of 10ft (3m) from any other device. Leave a distance of 20ft (6m) between two nearby MDUs.

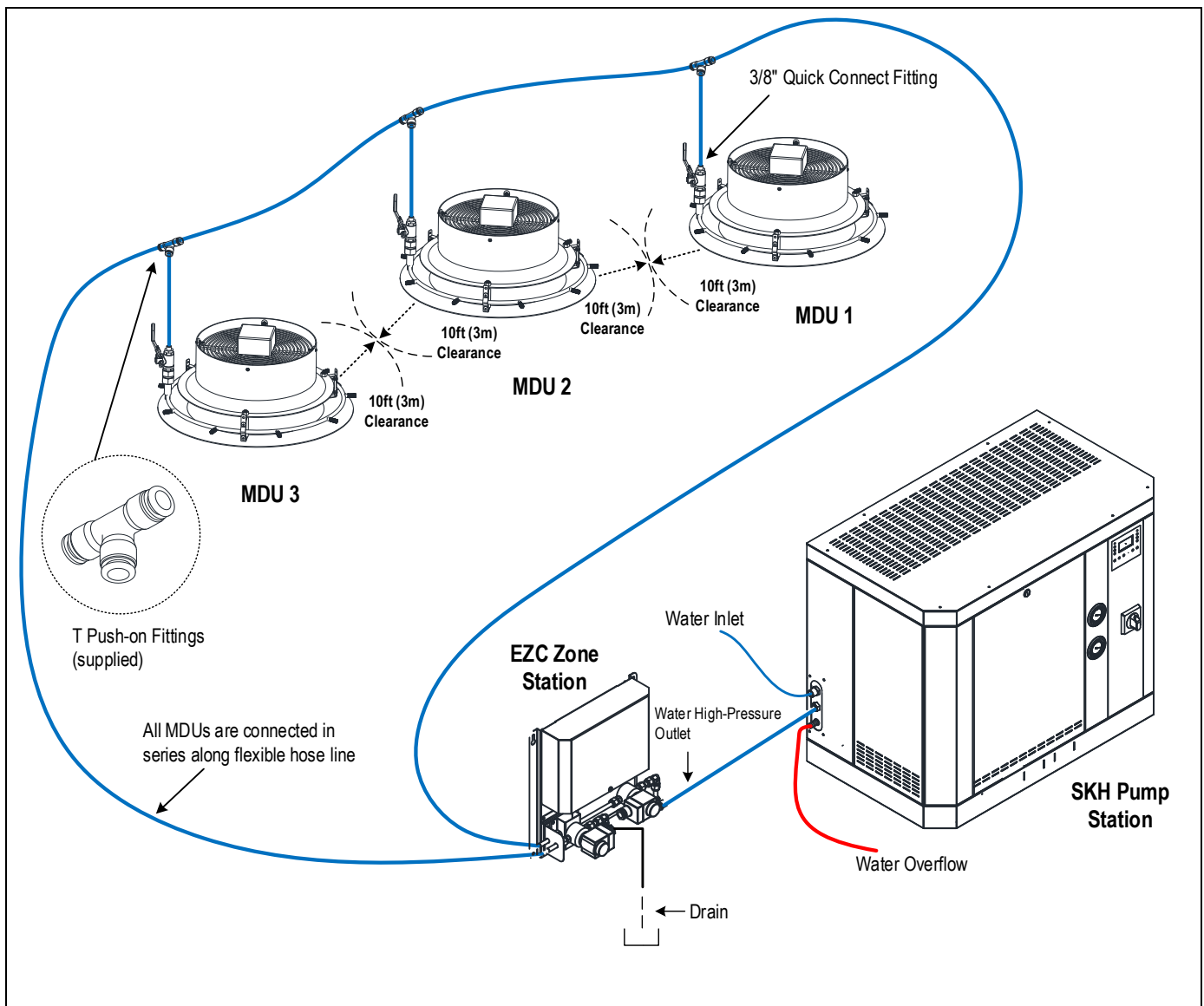


Illustration 10 - Typical Installation of MDU to EZC

## Spraying in Duct

- Plan a location that is easy to access and permits an easy inspection and servicing of the nozzle.
- Do not install the ramp and nozzle where failure of the system could cause damage to the building structure or to other expensive equipment.
- Ensure that the mist is not directed and condensed on any electrical equipment.
- Construct the drain pipe in such a way that there is no water accumulation and stagnation.
- The wet section of the duct must be constructed in stainless steel in order to prevent corrosion and must be equipped with a pan drain outlet in order to remove any water residue.

## Assembling the Racks



**WARNING: Risk of electric shock. Ensure that you take precautions to prevent electrostatic discharge (ESD) damage.**



*Note: Ensure that tools such as a screwdriver, adjustable wrench, and so on are available before assembling the racks.*

- A. Affix the female brackets to the male bracket using 4x 8-32 self-tapping screws and tighten securely.
- B. Affix the feet at the top and at the bottom of the racks. When attaching the feet to a female bracket, use 4x 8-32 screws with 4x 8-32 nuts. When attaching the feet to a male bracket, use 4x 8-32 self-tapping screws and tighten securely.
- C. Use 2x 8-32 screws to affix the cross angles.
- D. Affix the piping and spray nozzles with push-on fittings using an 8-32 self-tapping screw and grommets.

The following diagram describes how to affix the rack assembly within a duct:

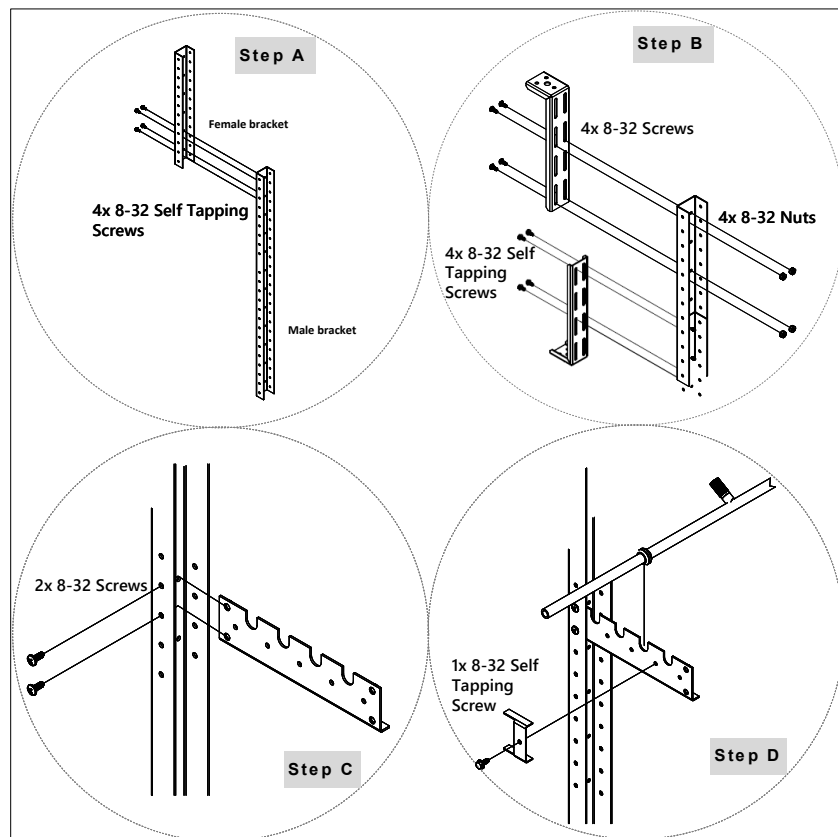


Illustration 11 - Assembling the Racks



Ensure that the nozzles with push-on fittings are fixed at an angle of 30°, as shown in the following diagram:

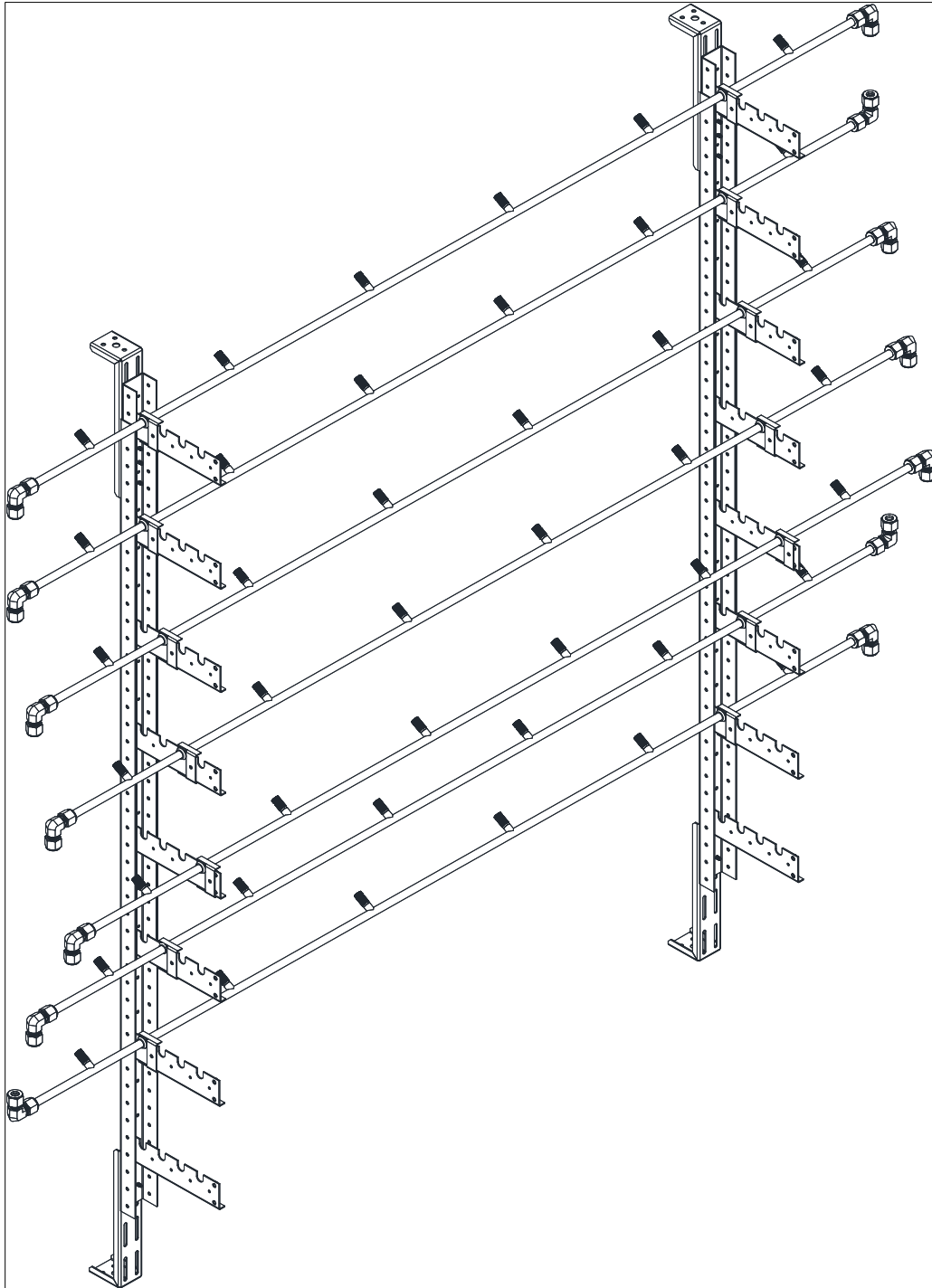


Illustration 12 - Rack Assembly within a Duct

After completing the rack assembly within the duct, connect piping from the EZC Zone Station to the appropriate rack assembly inlets, as illustrated in the following diagram:



*Note: Parts of the rack assembly described in the following diagram are provided by Others/Third-party vendors and are not supplied by Neptronic.*

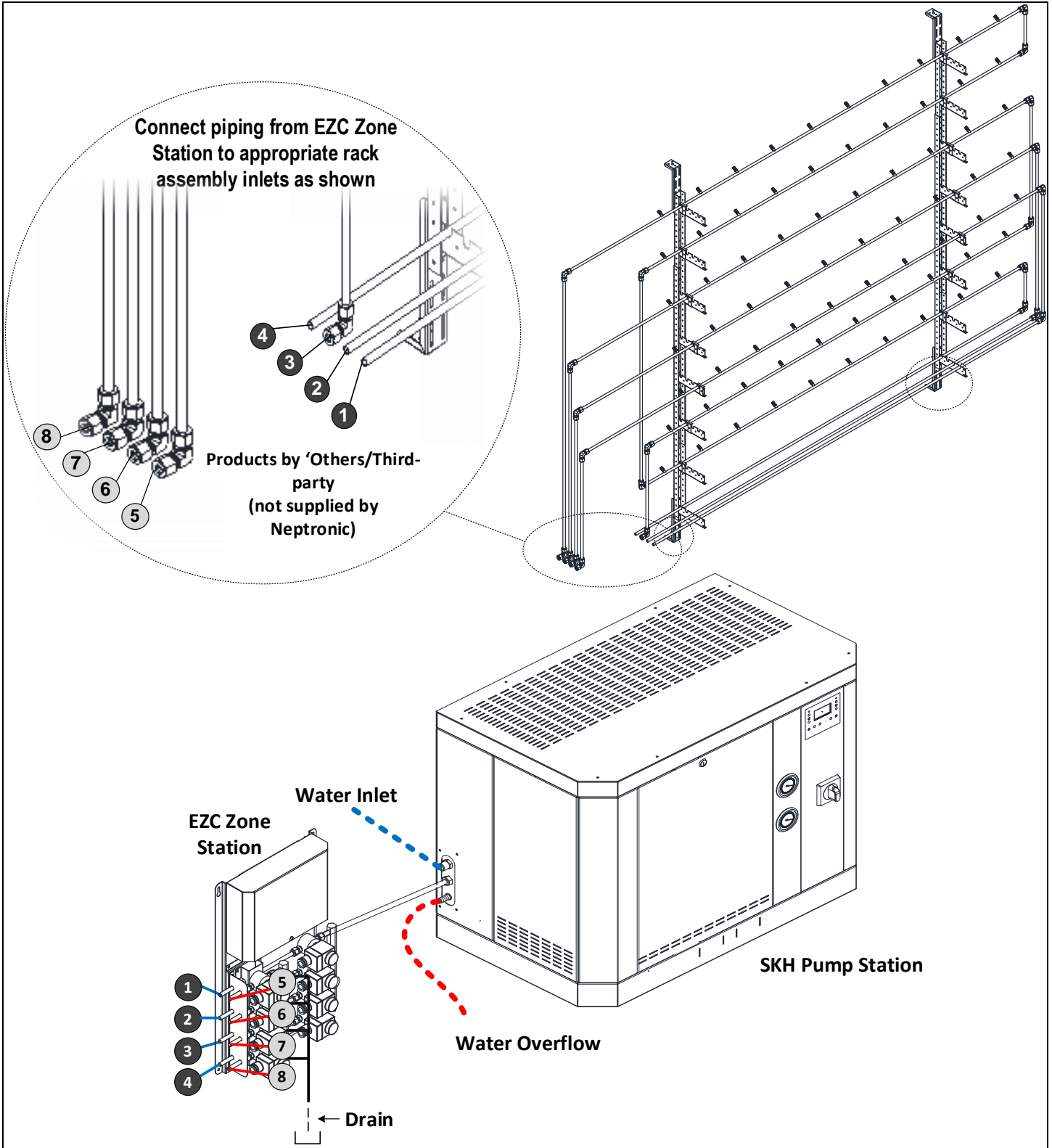


Illustration 13 - Typical Installation – Connecting to the EZC Zone Station



### Installing a Droplet Separator (Optional)

An optional droplet separator can be added at any time during the life of the SKH to prevent any possible carryover.

- If no trap is included, install a separate trap that can adequately handle the condensate load.
- The distance between the droplet separator and the nozzle rack assembly must be of minimum 3.3ft (1m).



*Note: Neptronic recommends the use of a droplet separator when the air velocity is above 600FPM (3m/sec).*

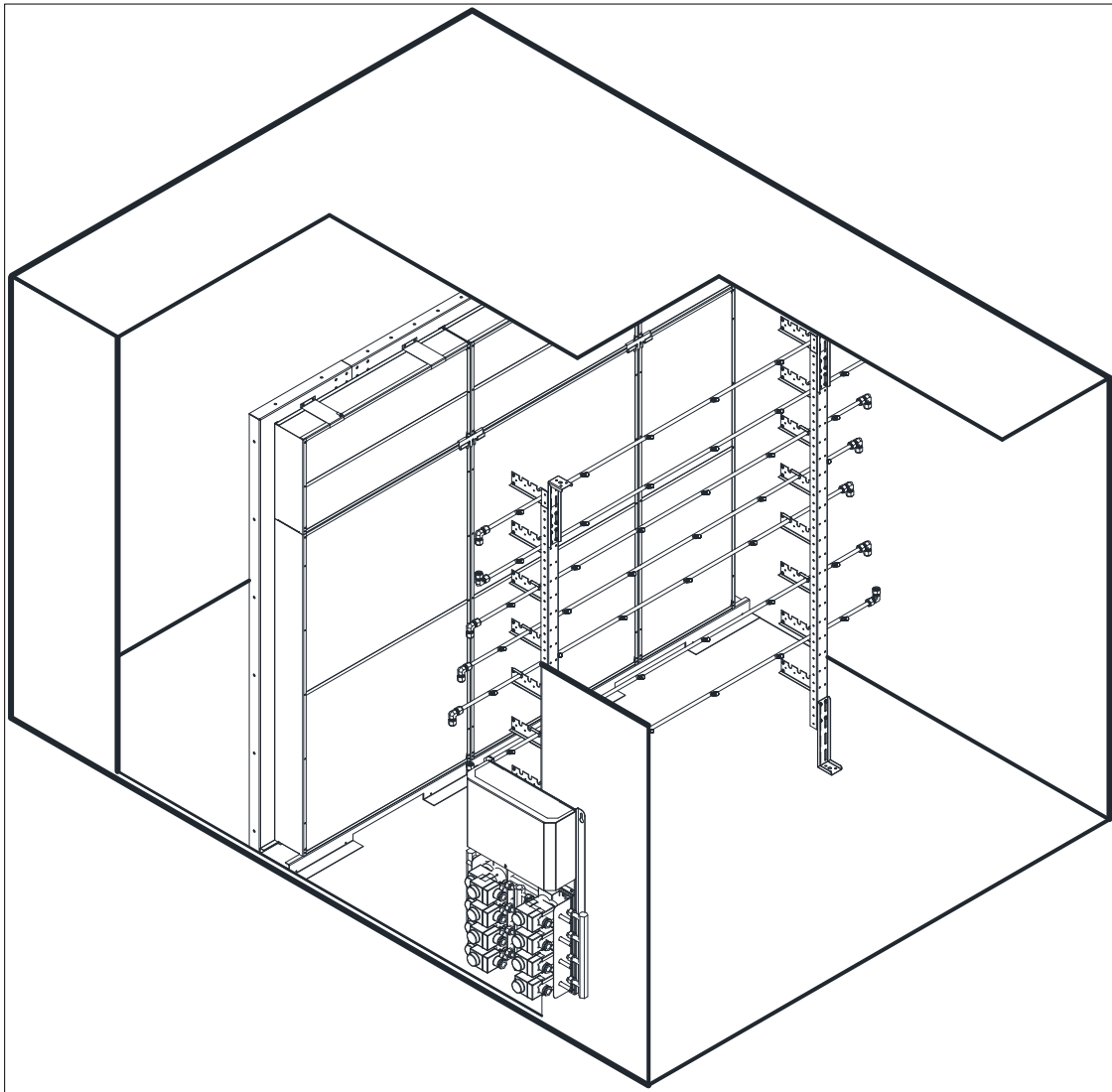


Illustration 14 - Droplet Separator

## Step 4 – Water and Drain Connections

### Water Connections for SKH Pump Station – Overview

- Install an isolation valve (not supplied) on the water line near the evaporative module's inlet for ease of maintenance and servicing.
- Flush the water line thoroughly before connecting the feed water pipe-work to the evaporation module.

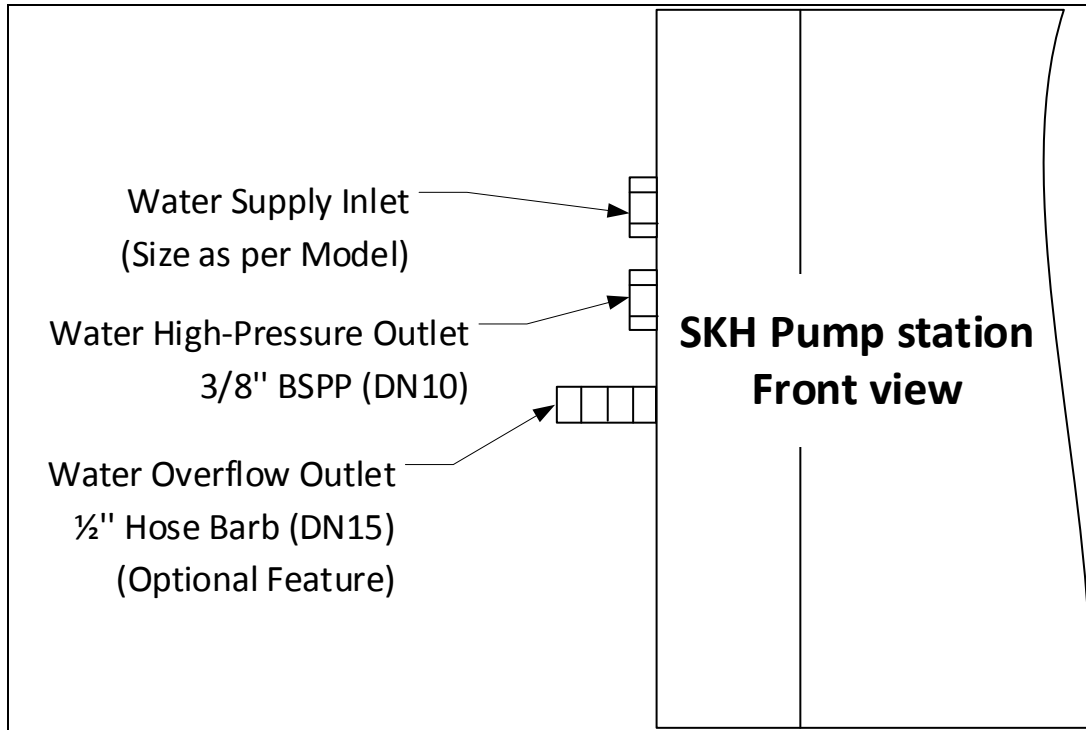


Illustration 15 - Water Connections – Pump Station



*Note: Do not over tighten the hose fittings as this may damage the seals.*

**Table 4 - Water Supply and Drain Connection Specifications**

Specification	Models					
	SKH100	SKH200	SKH300	SKH600	SKH900	SKH1200
Water overflow outlet type and size (Optional feature)	½" (DN15) Hose barb					
Water supply inlet type and size	Female NPT ½" (DN15)			Female NPT ¾" (DN20)		
Minimum water supply pressure	30 PSI (2.0 bar)					
Maximum water supply pressure	70 PSI (4.8 bar)					
Minimum water supply temperature	38°F (3°C)					
Maximum water supply temperature	77°F (25°C)					
Water supply quality	35 ppm TDS					
Pan drain outlet type and size	⅞" (DN22) Hydraulic tube					
High-pressure water outlet type and size	Female 3/8" (DN10) BSPP					

## Water Supply

- Connect the female NPT connection of the water supply inlet of the humidifier to a clean drinking water supply.
- The SKH is capable of operating with water qualities such as reverse osmosis (RO) or tap water.
- If the humidifier is connected to hard water, it results in scale build-up and clogging of the spray nozzles, resulting in frequent replacement of nozzles. Furthermore, most of the minerals contained in the water are sprayed into the air.
- If the supplied water is treated with reverse osmosis or deionization filtration, control the total dissolved solid contents in the water, as there is no need for ultra-pure water.
- Ensure that the conductivity of water is between 1.92 and 5.12 PPM (30 and 80  $\mu\text{S}/\text{cm}$ ) at 68°F (20°C).

## High-Pressure Water Outlet

- Connect the high-pressure water outlet from the SKH pump station to the high-pressure water inlet on the EZC controller using a flexible hose (not supplied), in order to dampen vibrations.
- Use a 3/8" (DN10) flexible high-pressure nylon hose or a high-pressure hydraulic hose (not supplied). The hose must use stainless steel quick connect fittings with one male 3/8" (DN10) BSPP and one male 1/4" (DN8) BSPP fitting (not supplied).
- Connect the male 3/8" (DN10) BSPP fitting of the hose to the female 3/8" (DN10) BSPP fitting of the high-pressure water outlet of the pump station.
- Connect the male 1/4" (DN8) BSPP fitting of the hose to the female 1/4" (DN8) BSPP fitting of the high-pressure water inlet of the EZC controller.



*Note: Ensure that the rating of the flexible hose is appropriate for the operating pressure (1000PSI / 70 bar).*

## Water Drain

- Connect a 7/8" (DN22) flexible hose (not supplied) to the 7/8" (DN22) pan drain outlet tube, located below the base of the SKH pump station, and direct it to the main building open drain.



**WARNING: Risk of flooding. Never connect drains to closed pipework.**

## Water Overflow (Optional Feature)

- Connect the 1/2" (DN15) hose barb fitting of the water overflow outlet, located on the side of the SKH pump station, to a 1/2" (DN15) flexible hose (not supplied).
- Do not combine the overflow and drain to a common pipe if you plan to drain the water. Install two independent traps for drain and overflow.
- Re-circulate the overflowing water as required by making appropriate connections.



## Water Connections on EZC

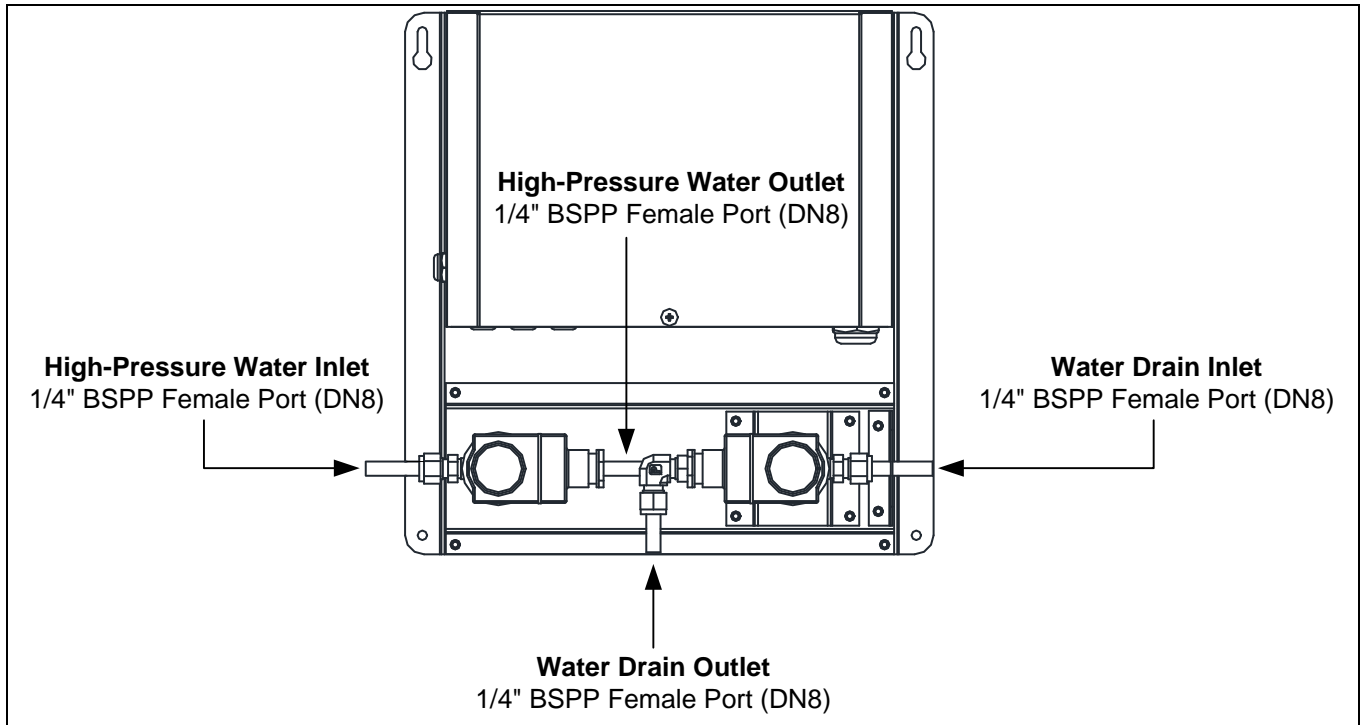


Illustration 16 - Water Connections on EZC (Back View)

### High-Pressure Water Inlet from SKH Pump Station

- Connect the high-pressure water inlet on the EZC controller to the high-pressure water outlet from the SKH pump station using a flexible hose (not supplied), in order to dampen vibrations.
- Use a 3/8" (DN10) flexible high-pressure nylon hose or a high-pressure hydraulic hose (not supplied). The hose must use stainless steel quick connect fittings with one male 3/8" (DN10) BSPP and one male 1/4" (DN8) BSPP fitting (not supplied).
- Connect the male 1/4" (DN8) BSPP fitting of the hose to the female 1/4" (DN8) BSPP fitting of the high-pressure water inlet of the EZC controller.
- Connect the male 3/8" (DN10) BSPP fitting of the hose to the female 3/8" (DN10) BSPP fitting of the high-pressure water outlet of the pump station.



Ensure that the rating of the flexible hose is appropriate for the operating pressure (1000 PSI / 70 bar).

### High-Pressure Water Outlet to Nozzle

- Connect the 1/4" (DN8) BSPP fitting of the high-pressure water outlet from the EZC controller to the nozzle ramps, MDU(s) or nozzles.
- For in-duct spray systems, ensure that the high-pressure water line is made up of 3/8" (DN10) rigid stainless steel pipes (not supplied).
- For standard in-space spray systems, ensure that the high-pressure water line is made up of 3/8" (DN10) flexible nylon hoses or rigid stainless steel pipes (not supplied).
- For in-space spray systems with MDU(s), ensure that the high-pressure water line is made up of 3/8" (DN10) flexible nylon hoses (not supplied).



Ensure that the rating of the flexible hoses is appropriate for the operating pressure.



## Water Drain

- Connect a ¼" (DN8) flexible hose (not supplied) to the ¼" (DN8) BSPP fitting of the water drain outlet, located below the EZC controller, and direct it to a main building open drain.
- If an in-duct spray system is used, connect the ¼" (DN8) BSPP fitting of the water drain inlet to the nozzle rack assembly using a 3/8" (DN10) rigid stainless steel pipe with compression fittings (not supplied).
- If a standard in-space spray system is used, connect the ¼" (DN8) BSPP fitting of the water drain inlet to the nozzles using a 3/8" (DN10) flexible nylon hose with quick connect fittings or a 3/8" (DN10) rigid stainless steel pipe with compression fittings (not supplied).
- If an in-space spray system with MDU is used, connect the ¼" (DN8) BSPP fitting of the water drain inlet to the MDU(s) using a 3/8" (DN10) flexible nylon hose with quick connect fittings (not supplied).



**WARNING: Risk of flooding. Never connect drains to closed pipework.**

## Step 5 – Power Supply Connections



**WARNING:** All work concerned with electrical installation **MUST** only be performed by skilled and qualified technical personnel, such as electricians or technicians with appropriate training. The customer is responsible for ensuring their suitability.



**WARNING:** Risk of electric shock. Isolate all power supplies before installation and maintenance of the SKH High-Pressure Atomizer or the EZC.



You **MUST** externally fuse all incoming power supplies for over current protection.  
 Observe local codes and regulations concerning the provision of electrical installations.

The installation engineer must ensure the following:

- Use copper power conductors only.
- Ensure that the size of the power conductors is suitable for the maximum current supplied.
- Secure incoming power cables using a suitably sized cable gland.
- Secure each terminal connection with a cable ferrule.
- Do not use the SKH pump station's frame to connect to ground. The SKH pump station cabinet has a continuous or unbroken electrical ground.

### Power Supply Connections on MDU

When using an in-space distribution system with MDU, refer to the following specifications:

**Table 5 - MDU Power Supply Specifications**

Model	Voltage (Vac) / 1ph	Current (A)	Frequency (Hz)
MDU-120	120	1	60
MDU-230	230	1	50

## Power Supply Connections on SKH Pump Station

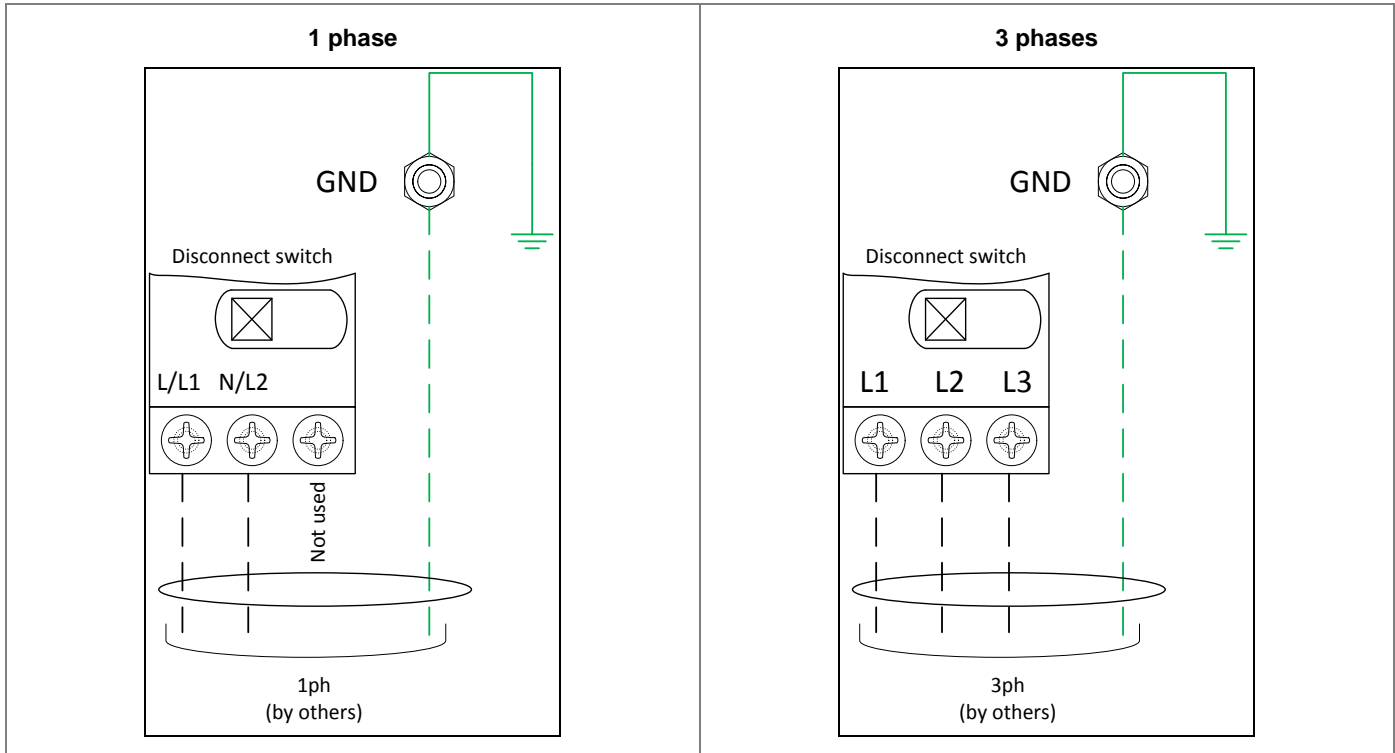


Illustration 17 - Power Supply Connections on SKH Pump Station

**Table 6 - SKH Pump Station Power Supply Specifications**

Phase	Voltage (V)	Models					
		SKH100	SKH200	SKH300	SKH600	SKH900	SKH1200
		<b>Current (A)</b>					
1 Phase	208 - 240	6.0	8.7	N/A	N/A	N/A	N/A
3 Phase	208 - 240	6.0	8.7	12.3	18.3	23.5	23.5
	380 - 480	3.1	4.4	6.2	9.2	11.8	11.8
	575 - 600	2.3	3.5	4.9	7.3	9.4	9.4
<b>Power</b>							
	HP	2	3	5	7.5	10	10
	kW	1.5	2.25	3.75	5.6	7.5	7.5



**Power Supply Connections on Electronic Zone Controller (EZC)**

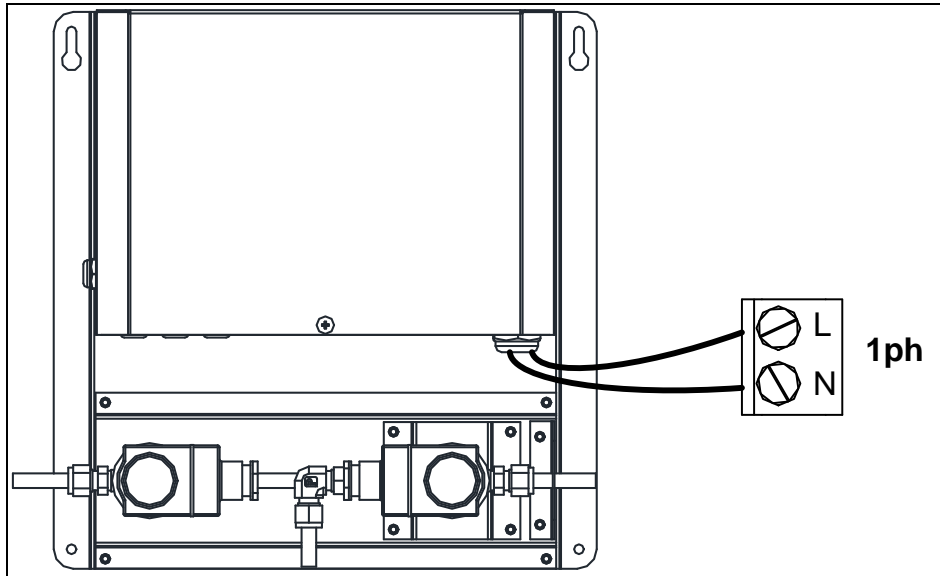


Illustration 18 - Power Supply Connections on EZC

**Table 7 - EZC Power Supply Specifications**

Model	Voltage (Vac) / 1ph	Current (A)	Frequency (Hz)
EZC1	120	1.4	60
	208/240	0.7	60
	230	0.7	50
	400	0.4	50
	480	0.4	60
	575/600	0.3	60
EZC2	120	2.0	60
	208/240	1.1	60
	230	1.1	50
	400	0.6	50
	480	0.6	60
	575/600	0.4	60
EZC3	120	2.7	60
	208/240	1.4	60
	230	1.4	50
	400	0.8	50
	480	0.8	60
	575/600	0.5	60
EZC4	120	3.4	60
	208/240	1.8	60
	230	1.8	50
	400	1.0	50
	480	1.0	60
	575/600	0.7	60
EZC MDU (with MDU)	120	11.4	60
	208/240	10.7	60
	230	10.7	50

## Step 6 – Electrical Control Connections



**WARNING:** All work concerned with electrical installation **MUST** only be performed by skilled and qualified technical personnel, such as electricians or technicians with appropriate training. The customer is responsible for ensuring their suitability.



**WARNING:** Risk of electric shock. Isolate all power supplies before installation and maintenance of the SKH High-Pressure Atomizer.

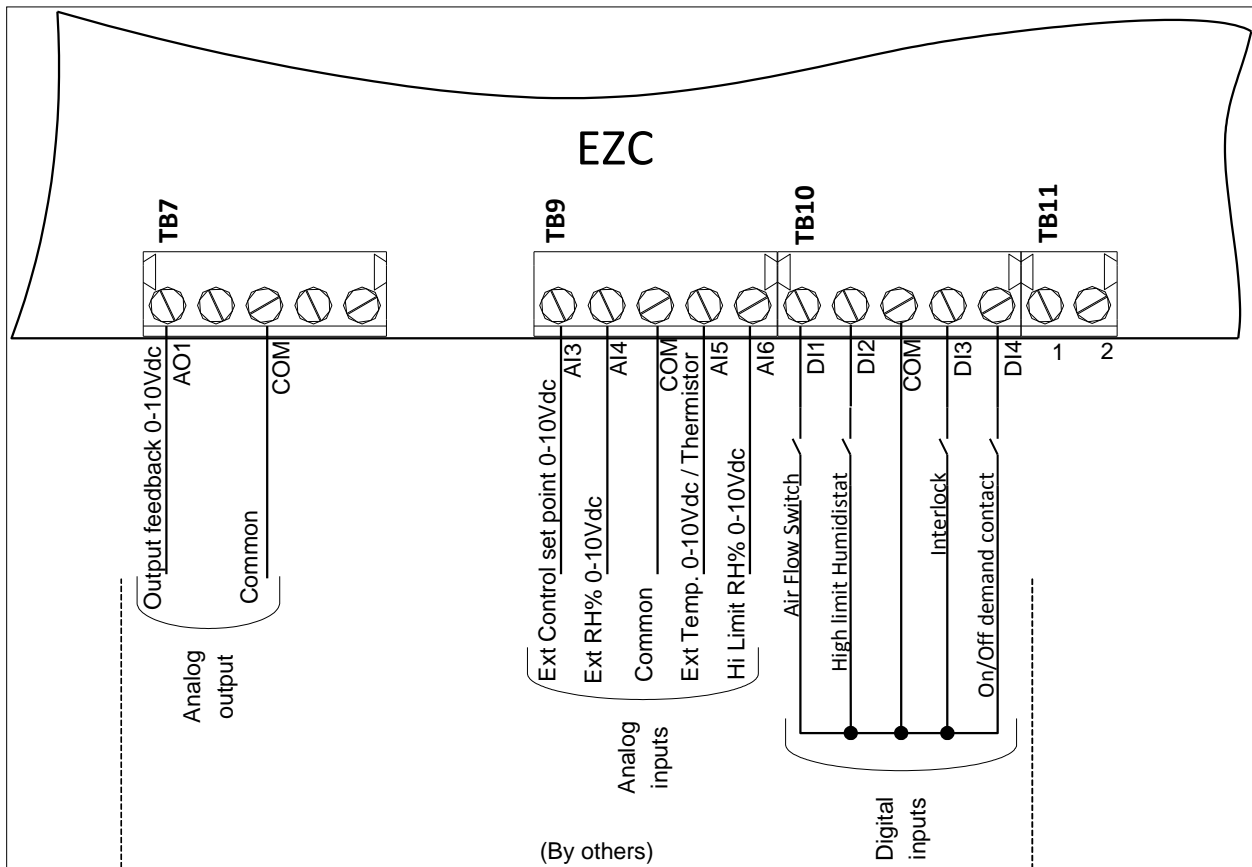


Illustration 19 - SKH Controller Wiring Diagram

### Safety Contact Connections

- *Airflow Switch.* Wire the contact on the EZC between terminals TB10 1&3. If this contact opens, the operation of the SKH unit stops. The unit displays the Airflow Switch as 'open,' but will **not** generate an alarm.
- *High Limit Humidistat.* Wire the contact on the EZC between terminals TB10 2&3. If this contact opens, the operation of the SKH unit stops, and an **Alarm** will be displayed. If spraying in-space, High limit humidistat is not required, but a jumper must be installed between terminals TB10 2&3.
- *Interlock.* Wire the switch on the EZC between terminals TB10 3&4. If this contact opens, the operation of the SKH unit stops and an **Alarm** will be displayed. If Interlock is not used, install a jumper between terminals TB10 3&4.

### On/Off Operation

For On/Off operation, connect the On/Off contact between TB10 3&5. If this contact opens, the SKH humidifier will turn off. If this contact closes, the SKH humidifier will operate.

## Modulating Operation

### Analog – External Signal

Irrespective of the source of the control signal (BMS, room or duct humidistat, room or duct thermostat, or a combination), the external control signal should be connected on the EZC between terminals TB9 1&3. These analog inputs are configurable at step 4A “Source” and 4B “Signal” of the Controls menu (see page 43).

### BACnet – Network

The SKH master pump station may use BACnet to communicate with the EZC zones. If the control signal is a BACnet network, use terminals TB7 1&2 to connect to an external BMS integration system. Select network control signal at step 4A “Source” of the Controls menu (see page 43). Refer to step 5I “BACnet Network” of the Configuration menu (see page 44) to set up the communication parameters.

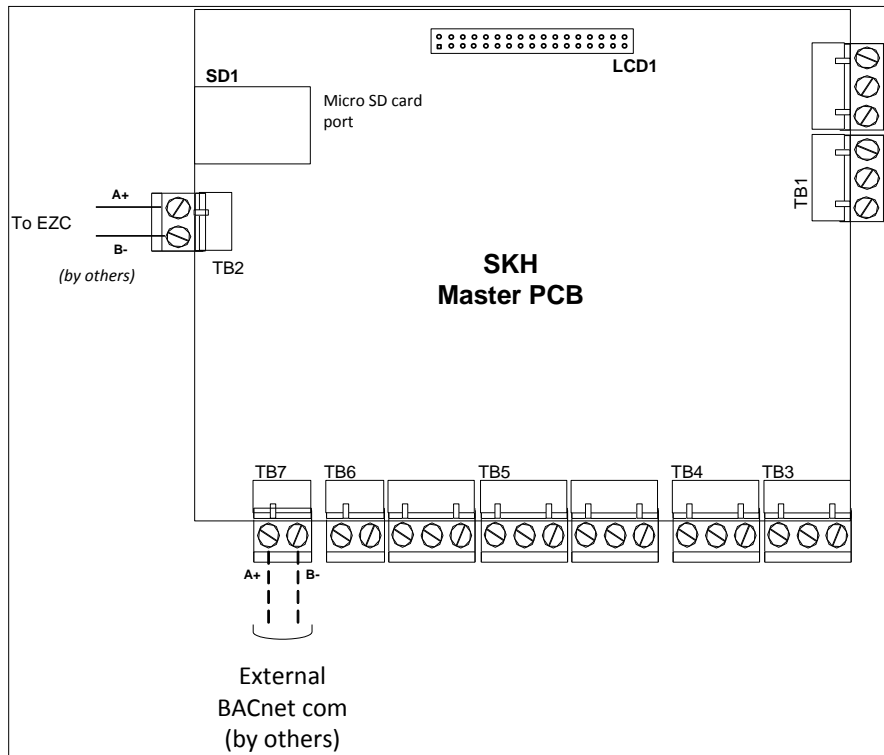


Illustration 20 - BACnet Connection

### TRLH Control

When using a TRLH thermostat, connect the EZC controller to the TRLH as per the following diagram. For more details, consult the TRLH24-INT Thermostat Specification & Installation Instructions.

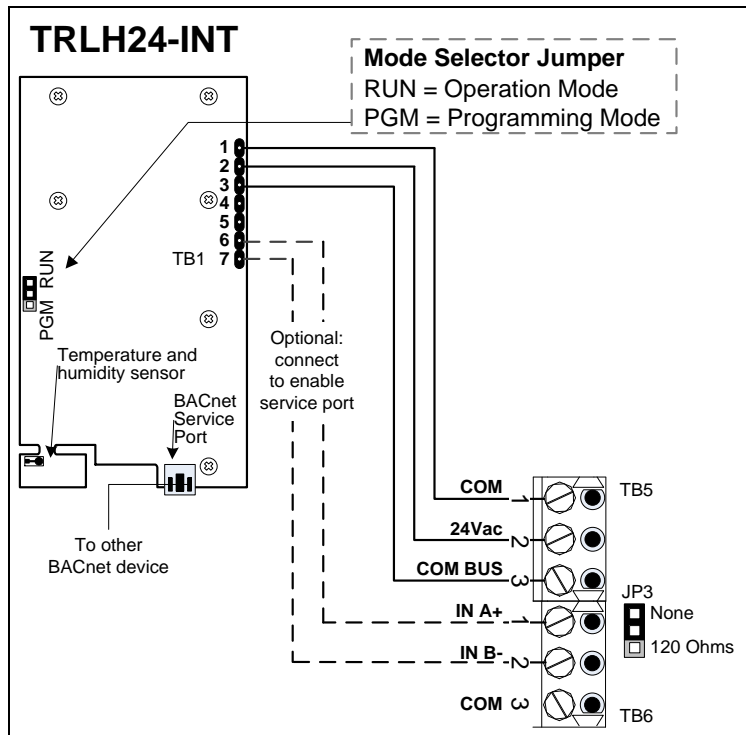
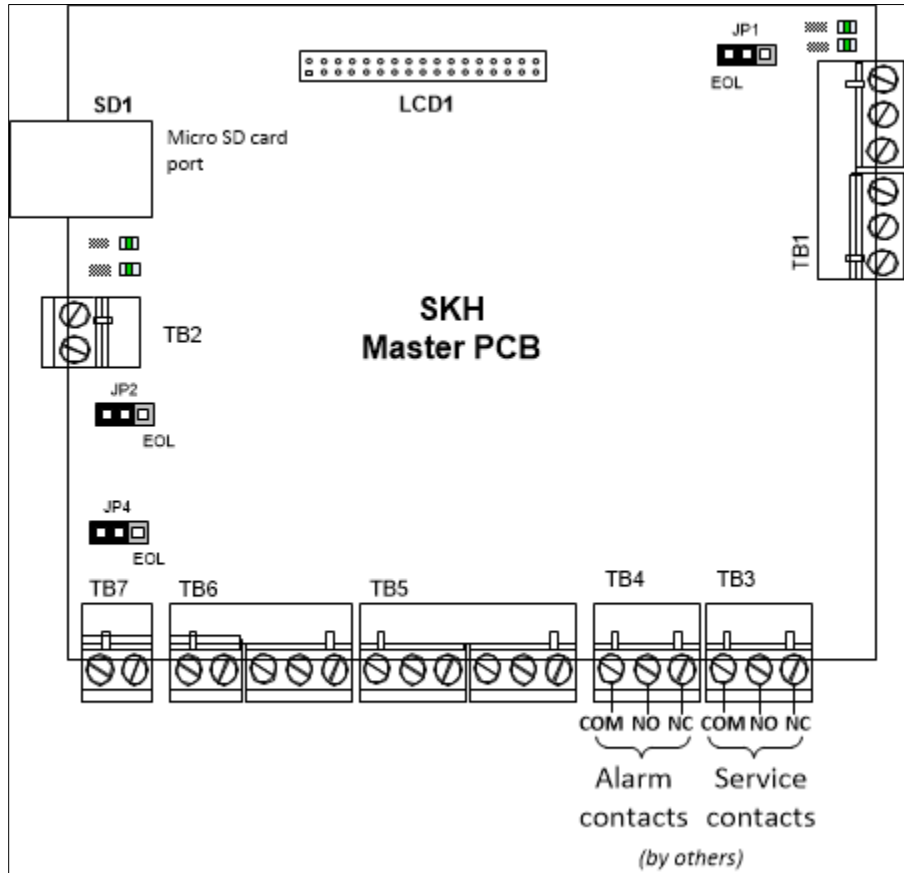


Illustration 21 - TRLH to EZC Control Connections

### Dry Contacts

Two series of volt free contacts are provided on the SKH pump station master PCB:

1. Alarm Contacts (TB4)
  2. Service Contacts (TB3)
- These contacts are used to switch a low voltage, ideally 24V, with a switching current of no more than 3 Amps.
  - Each series has one Normally Closed contact and one Normally Open contact.
  - It is recommended to use the Normally Closed contact, as this contact will open in the event of a humidifier fault.





### Pump Station to EZC Control Connections

The pump station PCB must be connected to the EZC controller using a network communication cable. Terminals TB2 1&2 on the SKH pump station master PCB must be connected with terminals TB6 1&2 on the EZC controller.

**i** Ensure that low capacitance, EIA RS-485, 22 or 24 AWG shielded twisted pair cables are used (Belden 9841 or equivalent).

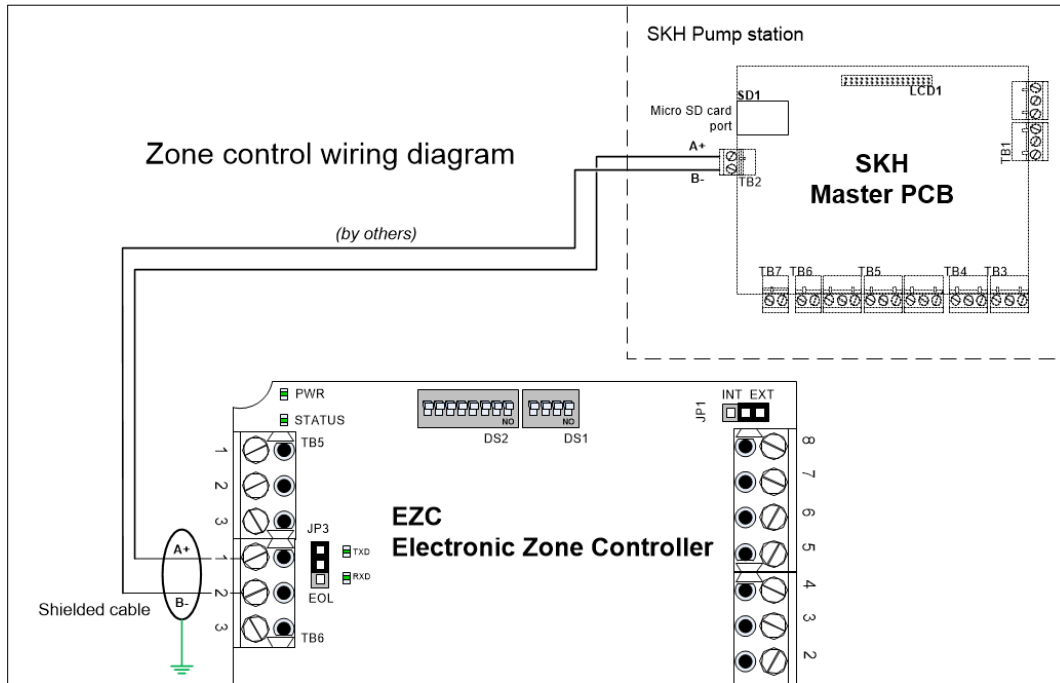


Illustration 22 - Pump Station to EZC Control Connections (Single EZC)

For systems comprised of more than one zone, each EZC controller must be connected in a daisy chain configuration, meaning that every controller must be connected in parallel directly along the path of the main communication cable. Connect terminals TB6 1&2 of every EZC controller along the chain with terminals TB6 1&2 of the previous EZC controller. It is important to keep the same color for all the A+ wiring and a different color for all the B- wiring.

**i** It is recommended to use low capacitance, EIA RS-485, 22 or 24 AWG shielded twisted pair cables (Belden 9841 or equivalent).

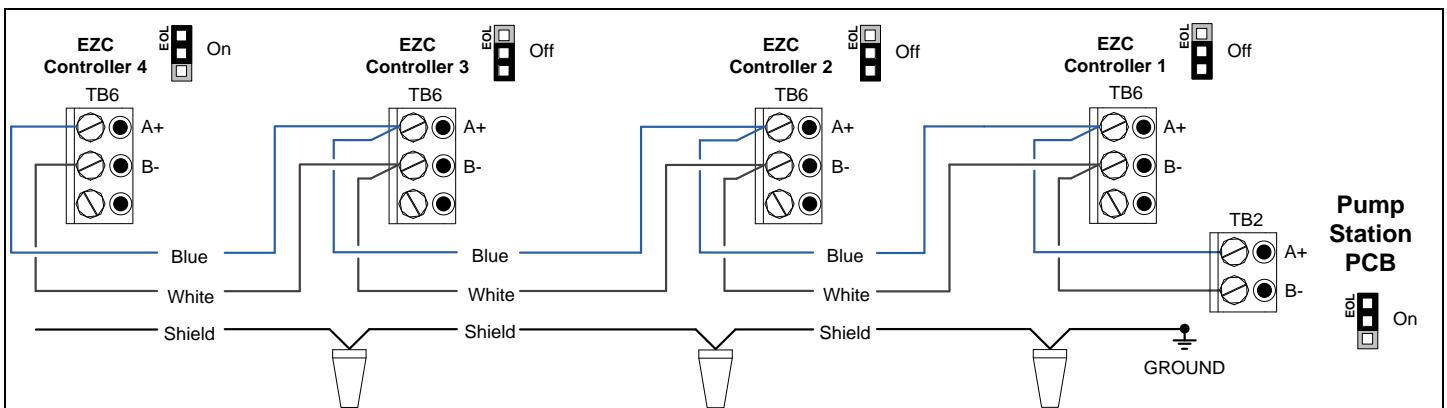


Illustration 23 - Pump Station to EZC Control Connections (Multiple EZCs)

### Shield Wiring

Shields from each feed of the network connection to a controller must be wired together. Special attention must be taken to ensure that the shields are well-protected (ends tapped or covered) to prevent any connection to ground that could influence the shield reference. This could create ground loops and change the reference level of the network. The shield in a daisy chain format is then grounded at one end only. Do not ground the shield at more than one location, as this may induce ground loop noise.

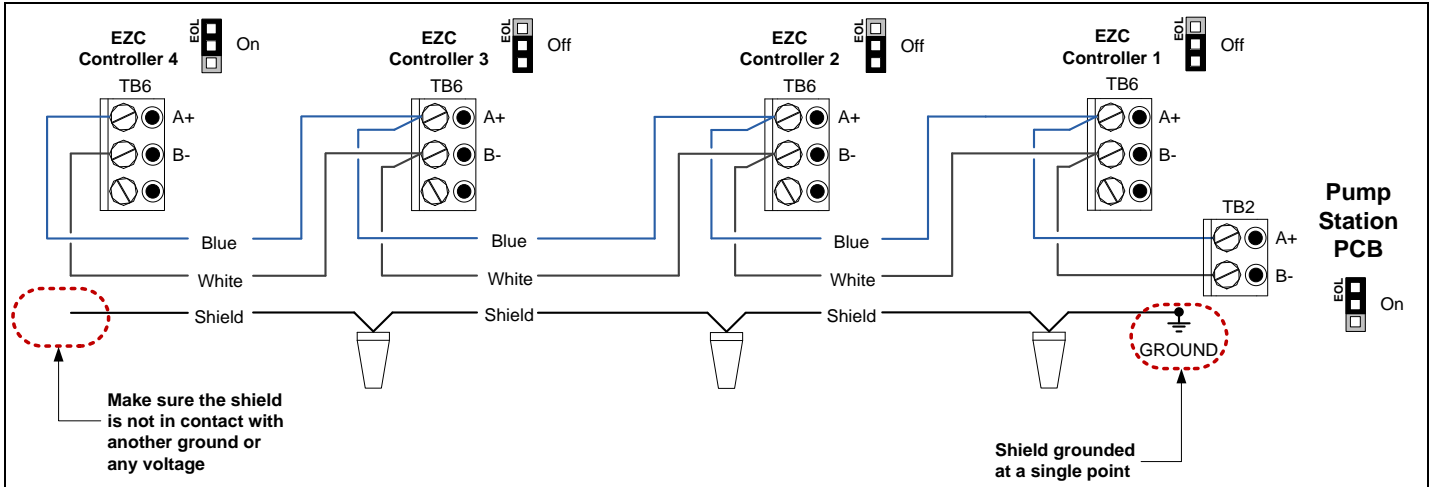


Illustration 24 - Pump Station to EZC Shield Wiring

### End of Line (EOL) Termination

In order to avoid reflection issues, an End of Line (EOL) must be installed at both ends of the physical network wire (the pump station PCB and the last EZC controller). Set the EOL directly on the controller. Do not install an EOL at any intermediate EZC controller on the network. Communication is achieved by using an electrical pulse signal and when no EOLs are installed, the pulse signal reflects backwards and collides with other data pulses.

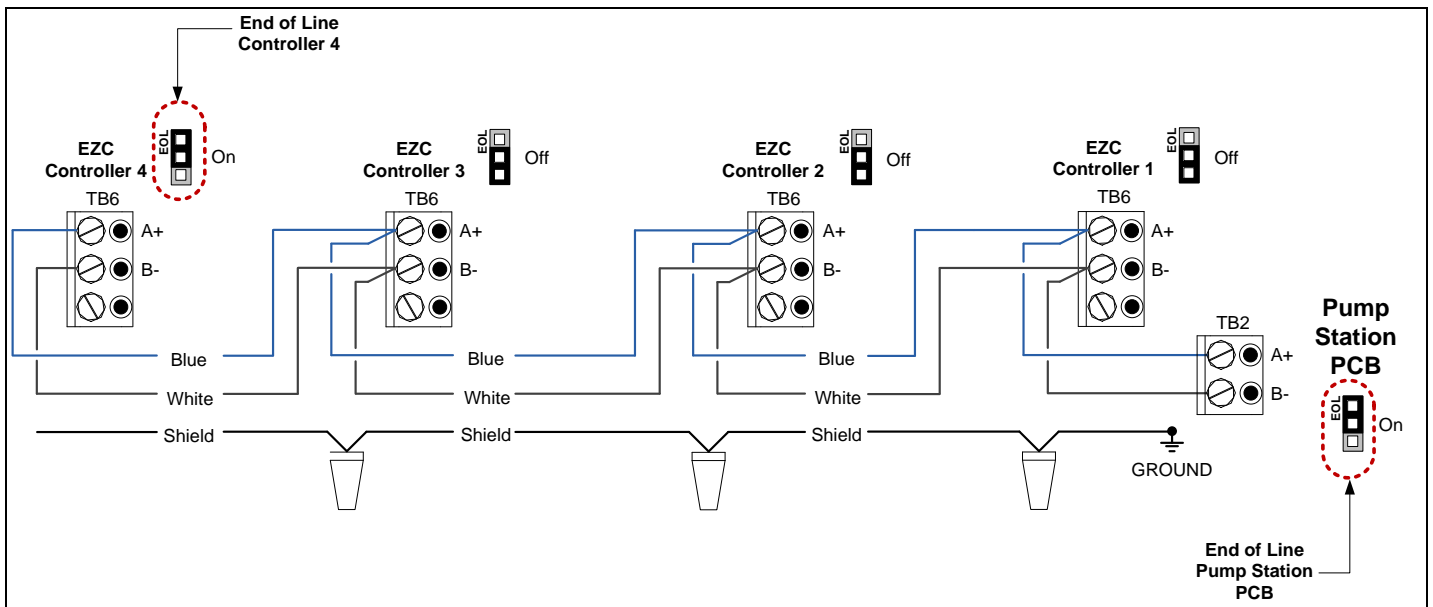


Illustration 25 - Pump Station to EZC EOL Setup



## EZC Controller DIP Switches

### DS1 (Network Options)

Baud Rate Selection		Auto Baud Rate	Network Type
1	2	3	1
1 OFF / 2 OFF	= 9600	OFF = Disabled ON = Enabled	OFF = BACnet MS/TP ON = Modbus
1 ON / 2 OFF	= 19200		
1 OFF / 2 ON	= 38400		
1 ON / 2 ON	= 76800		

### DS2 (MAC Address)

MSTP/MAC address for communication is selectable by DIP switch using binary logic. If the device instance is not changed using program mode, it will automatically be modified according to the MAC address.

MAC Address	DS.1 = 1	DS.2 = 2	DS.3 = 4	DS.4 = 8	DS.5 = 16	DS.6 = 32	DS.7 = 64	DS.8 = 128	Default Device Instance
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	153000
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	153001
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	153002
3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	153003
4	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF	153004
...	...	...	...	...	...	...	...	...	...
126	OFF	ON	ON	ON	ON	ON	ON	OFF	153126
127	ON	ON	ON	ON	ON	ON	ON	OFF	153127

### EZC to MDU Control Connections

For in-space spray distribution systems using one or multiple MDUs, connect the EZC controller to the MDU(s) as per the following diagram.

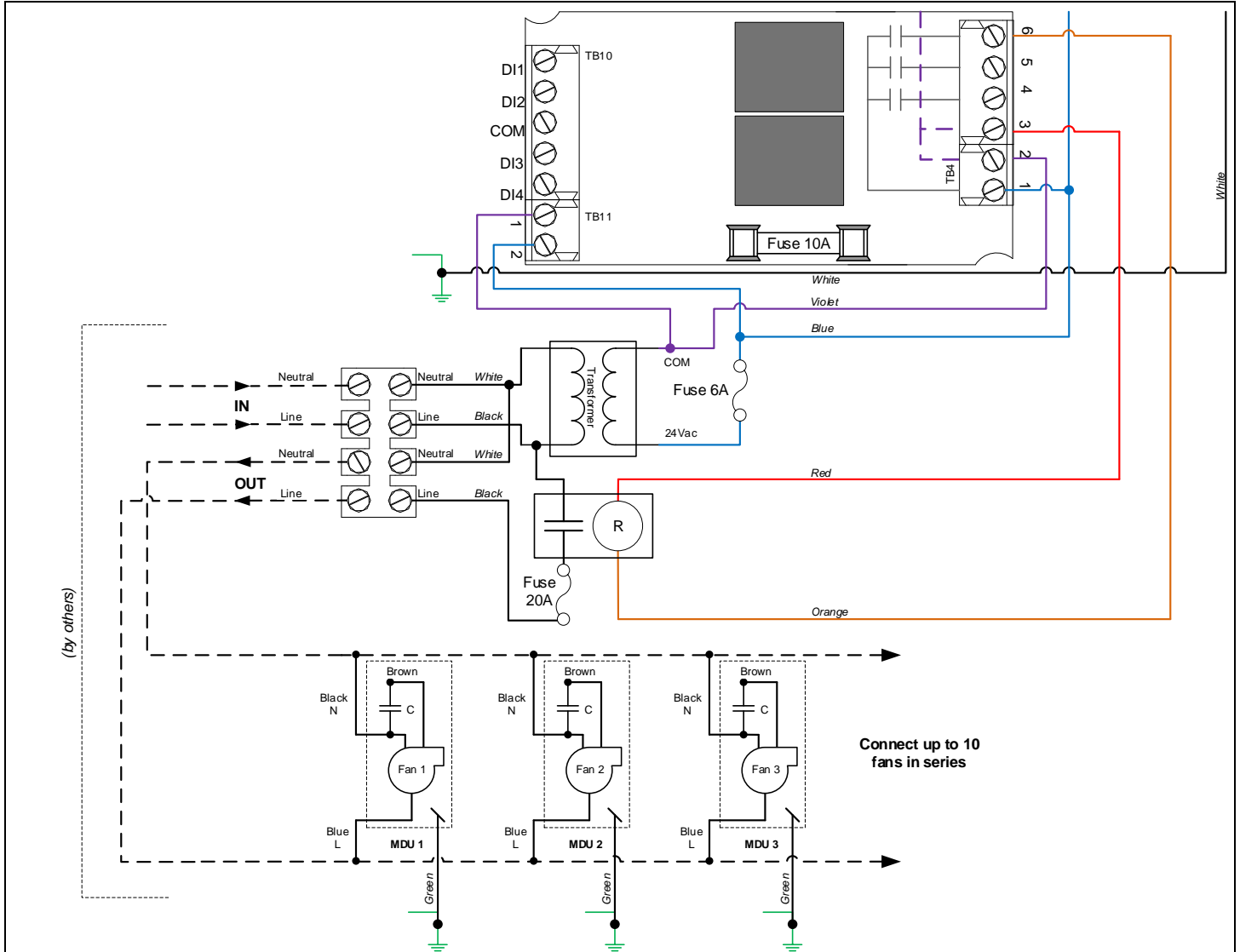


Illustration 26 - EZC to MDU Control Connection

## Step 7 – Controller Installation and Configuration

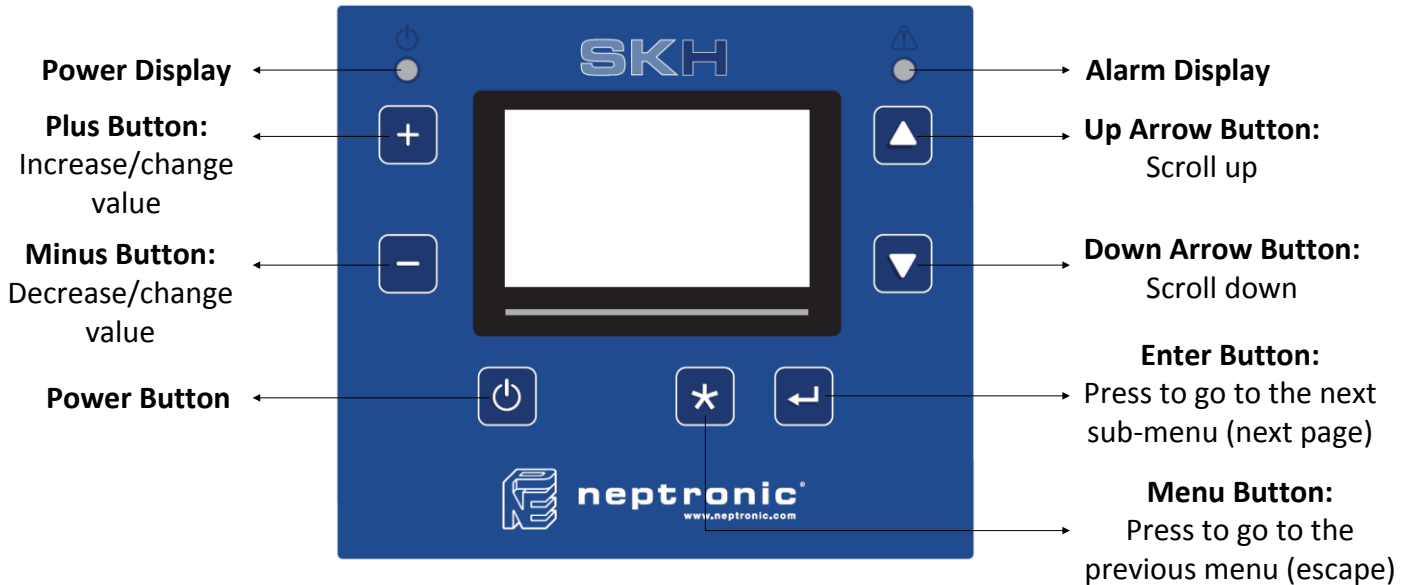


Illustration 27 - SKH Controller



The Power button is protected from accidental activation by a 3 second delay. **Press and hold the Power button for 3 seconds to perform the related action.**

### Menu Overview

When the SKH controller is in operation, the unit displays two information screens. After the Model screen is displayed for 3 seconds, the controller displays and remains on the System Info screen. Press the ▲ and ▼ buttons located on the right of the screen to manually scroll through each screen.

Model	
Model	SKH
Firmware	1.0
Serial #	14H010001
SD ▶	2015-06-02 15 :13 :23

The first screen indicates the model #, firmware revision installed and the controller's serial #.

The SD icon appears if the controller detects a micro SD card. Current time and date are also displayed.

System Info	
Inlet water temp.	
Inlet Pressure	100.0%
Output Press.	1000kg/h
VFD	
In. Water Temp. High	
In. Water Temp. Low	
Output	
SD ▶	2015-06-02 15 :13 :23

The second screen displays information about the operation of the system.

The SD icon appears if the controller detects a micro SD card. Current time and date are also displayed.



## Menu Navigation and Configuration

- A. Press the Menu \* button.
- B. Use the ▲, ▼ buttons to select the desired main menu category and press Enter ↵.
- C. If a password is required (see table below), enter the password and press Enter ↵. If you enter the wrong password, the SKH controller displays an "invalid password" message.

**Table 8 - Passwords**

Mode/Menu	Password	Priority
User	None	1
Status	None	1
Service	637	2
Controls	757	3
Configuration	372	4



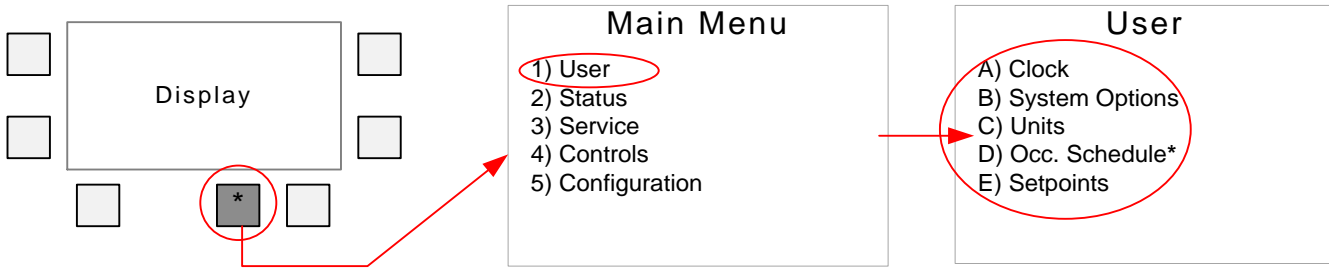
*If a password of higher priority was already provided, individual passwords are not required. For example, if the Configuration Menu password was validated already, access to other menus such as Controls is unlocked automatically.*

- D. Use the + and - buttons to increase and decrease the values. Use the ▲, ▼ buttons to scroll to the next or previous menu item. The entered values are saved immediately once the changes are done.
- E. Press the Menu \* button to go back one menu. Press the Enter ↵ button to advance to the next sub-menu.
- F. To exit completely, press the Menu \* button to exit until you return to the menu overview or after 60 seconds of inactivity, the controller will automatically return to the menu overview.



*Available settings and range of selections may vary depending on current configuration. The tables in the following sections display all the possible selections. The Notes/Conditions column indicates the conditions required for the associated setting to appear.*

### Main Menu – User



Press [\*] to access the Main Menu

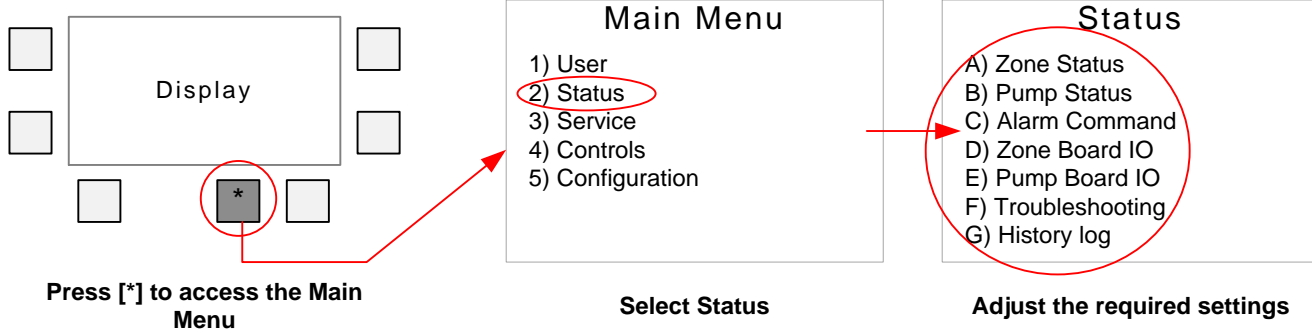
Select User

Adjust the required settings

\*Option D only appears if an internal control mode has been selected in menu **4A) Source**.

USER	Settings	Default	Range	Notes/Conditions
<b>1A) Clock</b>	Time format:	24h	12h (AM/PM) or 24h	
	Actual time:	00:00	0 to 24 hours: 00 to 59 minutes	
	Date (YY-MM-DD):	YYYY-MM-DD	YYYY-MM-DD	
	UTC diff:	-300 min	-780 to +780 min	
	Daylight saving:	Off	On (Enable), Off (Disable)	
<b>1B) Options</b>	Language:	English	English	
	Contrast:	10	0 to 10	
	Alarm beep:	Off	On (Enable), Off (Disable)	
	Key press beep:	Off	On (Enable), Off (Disable)	
<b>1C) Units</b>	Temp. units:	°C	°C or °F	
	Press. units:	kPa	kPa, bar, psi	
	Mass flow units:	kg/h	kg/h, lb/h	
<b>1D) Occ. Schedule</b>	<b>Zone Select:</b>	<b>1</b>	<b>1 to 3</b>	<b>Select zone before setup.</b>
	Out of service:	Off	On (Enable), Off (Disable)	
	Start Date:	YYYY-MM-DD	YYYY-MM-DD	
	End Date:	YYYY-MM-DD	YYYY-MM-DD	
	Sched. Default:	Off	Occup., Unoccup., Vacancy, Off, Null	Appears if an internal control mode is selected in menu <b>4A) Source</b> .
	Prio. For Writ.	1	1 to 16	
	<b>a) Weekly schedule</b>			
	<b>Zone Select:</b>	<b>1</b>	<b>1 to 3</b>	<b>Select zone before setup.</b>
	Day:	Monday	Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday	
	Event 1:	Off   00:00	Unused, Occup., Unoccup., Vacancy, Off   00:00 to 23:59	
	Event 2:	Off   00:00	Unused, Occup., Unoccup., Vacancy, Off   00:00 to 23:59	
	Event 3:	Off   00:00	Unused, Occup., Unoccup., Vacancy, Off   00:00 to 23:59	
	Event 4:	Off   00:00	Unused, Occup., Unoccup., Vacancy, Off   00:00 to 23:59	
Event 5:	Off   00:00	Unused, Occup., Unoccup., Vacancy, Off   00:00 to 23:59		
Event 6:	Off   00:00	Unused, Occup., Unoccup., Vacancy, Off   00:00 to 23:59		
<b>1E) Setpoints</b>	<b>Zone Select:</b>	<b>1</b>	<b>1 to 3</b>	<b>Select zone before setup.</b>
	Occupied:	22.0 °C or **40.0 %RH	10 to 40 °C or **5.0 to 95.0 %RH	Appears if an internal control mode is selected in menu <b>4A) Source</b> .
	Unoccupied:	0.0 °C or **0.0 %RH	10 to 40 °C or **5.0 to 95.0 %RH	If "Setpoint source" setting is set to <i>Inter. stpnt</i> , Occupied setting will appear.
	Vacant:	0.0 °C or **0.0 %RH	10 to 40 °C or **5.0 to 95.0 %RH	If "Setpoint source" setting is set to <i>Network</i> , Occupied(ntwrk) setting will appear.
	Occupied(ntwrk):	0.0 °C or **0.0 %RH	10 to 40 °C or **5.0 to 95.0 %RH	**Setpoint is displayed as either temperature or humidity depending on the configuration selected in menu <b>4A) Source</b> .

## Main Menu – Status



STATUS	Settings	Default	Range (* indicates no configuration; display only)	Notes/Conditions
<b>2A) Zone Status</b>	<b>Zone Select:</b>	1	1 to 3	Select zone station to review.
	State:	stand-by	*	
	Occupancy:	Occup.	* Occup., Unoccup., Vacancy, Off	Appears if an internal control mode is selected in menu <b>4A) Source</b> .
	Zone demand:	0.0 %	*	
	Zone Output:	0.0 %	*	
	Ext sensor hum:	0.0 %RH	*	Appears if the "Humidity source" setting is set to <i>A14</i> in menu <b>4A) Source</b> .
	Ext sensor temp:	0.0 °C	*	Appears if the "Temp. source" setting is set to <i>A15</i> in menu <b>4A) Source</b> .
	TRLH Hum:	0.0 %RH	*	
	TRLH Temp:	0.0 °C	*	
	Network RH:	0.0 %RH	*	Appears if the "Humidity source" setting is set to <i>Network</i> in menu <b>4A) Source</b> .
	Network temp.:	0.0 °C	*	Appears if the "Temp. source" setting is set to <i>Network</i> in menu <b>4A) Source</b> .
	External setpoint:	0.0 °C or **0.0 %RH	*	Appear if the "Setpoint source" setting is set to <i>A13</i> in menu <b>4A) Source</b> , when using an internal control mode.  **Setpoint is displayed as either temperature or humidity depending on the configuration selected in menu <b>4A) Source</b> .
	High limit Hum:	0.0 %RH	*	Appears if the "High limit src" setting has been configured in menu <b>4A) Source</b> .
	Interlock:	Closed	* (Opened or Closed)	
	Air flow cutout:	Closed	* (Opened or Closed)	
	High Lim. cutout:	Closed	* (Opened or Closed)	
	Drain countdown:	0 s	*	
	Inact countdown:	0 s	*	
	Stage 1:	Off	* On, Off	Appear if there is more than one stage.
	Stage 2:	Off	* On, Off	
Stage 3:	Off	* On, Off		
Stage 4:	Off	* On, Off		
Board temp:	0.0°C	*		
Micro temp:	0.0°C	*		
<b>2B) Pump Status</b>	State:	stand-by	*	
	Enable VFD:	On	* On, Off	
	Pump demand:	0.0 %	*	
	Pump feedback:	0.0 %	*	
	Inlet temp. sens:	0.0 °C	*	
	Inlet press. sens:	0.0 kPa	*	
Output pressure:	0.0 kPa	*		

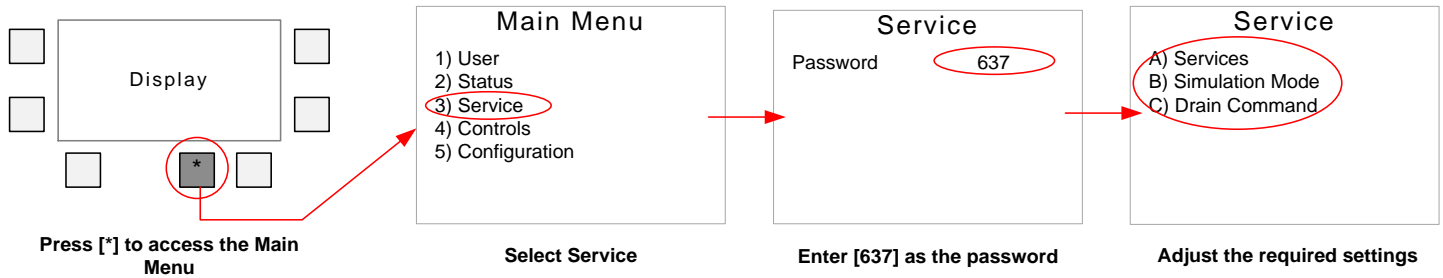


STATUS	Settings	Default	Range (* indicates no configuration; display only)	Notes/Conditions
	Weight duty time:	0 h	*	
	Duty time:	0 h	*	
	Drain valve:	Closed	*	
<b>2C) Alarm Command</b>	<b>System</b>			
	Reset Alarms:	No	Yes or No	
	<b>Pump</b>			
	Reset Alarms:	No	Yes or No	
	Zone Select:	1	1 to 3	Select zone before setup.
	Reset Alarms:	No	Yes or No	
<b>2D) Zone Board IO</b>	Zone Select:	1	1 to 3	Select zone station to review.
	AI3:	0 mV	* (mV)	Appears if the "Control mode" setting is set to <i>Ext. on A13</i> , or set to an internal mode with the "Setpoint source" setting set to <i>A13</i> , in menu <b>4A) Source</b> .
	AI4:	0 mV	* (mV)	Appears if the "Humidity source" setting is set to <i>A14</i> in menu <b>4A) Source</b> .
	AI5:	0 mV	* (mV)	Appears if the "Temp. source" setting is set to <i>A15</i> in menu <b>4A) Source</b> .
	AI6:	0 mV	* (mV)	Appears if the "High limit src" setting is set to <i>A16</i> in menu <b>4A) Source</b> .
	DI1:	Closed	* (Opened or Closed)	Digital Input 1
	DI2:	Closed	* (Opened or Closed)	Digital Input 2
	DI3:	Closed	* (Opened or Closed)	Digital Input 3
	DI4:	Closed	* (Opened or Closed)	Digital Input 4
	Fan Low:	Off	* On, Off	Only appears depending on system configuration.
	Fan Med:	Off	* On, Off	
	Fan High:	Off	* On, Off	
	AO1:	Off	* On, Off	Analog Output 1
	DO1:	Off	* On, Off	Digital Output 1 (Only appears depending on configuration.)
	DO2:	Off	* On, Off	Digital Output 2 (Only appears depending on configuration.)
	DO3:	Off	* On, Off	Digital Output 3 (Only appears depending on configuration.)
	DO4:	Off	* On, Off	Digital Output 4 (Only appears depending on configuration.)
	TO1:	Off	* On, Off	TRIAC 1
	TO2:	Off	* On, Off	TRIAC 2
	TO3:	Off	* On, Off	TRIAC 3 (Only appears depending on configuration.)
TO4:	Off	* On, Off	TRIAC 4 (Only appears depending on configuration.)	
<b>2E) Pump Board IO</b>	AI5:	0 mV	* (mV)	Analog Input 5
	AI6:	0 mV	* (mV)	Analog Input 6
	AI7:	0 mV	* (mV)	Analog Input 7
	AI8:	0 mV	* (mV)	Analog Input 8
	DI1:	Closed	* (Opened or Closed)	Digital Input 1
	AO1:	0 mV	* (mV)	Analog Output 1
	K1:	Off	* On, Off	
	K2:	Off	* On, Off	
	K3:	Off	* On, Off	
<b>2F) Troubleshooting</b>	<b>System</b>			
	Alarm:	00000000	*	
	Latched Alarm:	00000000	*	
	Status:	00000000	*	
	Options:	00000000	*	
	<b>Pump</b>			



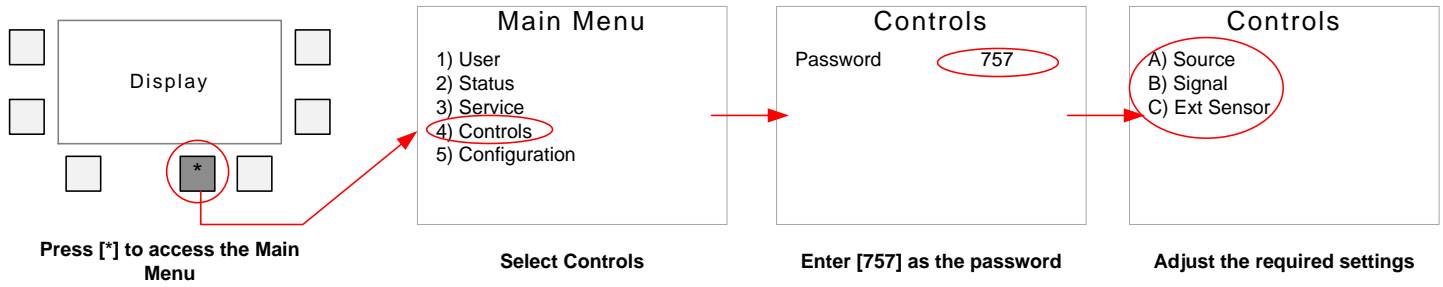
STATUS	Settings	Default	Range (* indicates no configuration; display only)	Notes/Conditions
	Alarm:	00000000	*	
	Latched Alarm:	00000000	*	
	Status:	00000000	*	
	Options:	00000000	*	
	Comm Status:	00000000	*	
	<b>Zone Select:</b>	<b>1</b>	<b>1 to 3</b>	<b>Select zone station to review.</b>
	Alarm:	00000000	*	
	Latched Alarm:	00000000	*	
	Status:	00000000	*	
	Options:	00000000	*	
<b>2G) History log</b>	<b>a) System Alarms</b>			
	YYYY-MM-DD   event name			Displays the last three alarms of the system.
	YYYY-MM-DD   event name			
	YYYY-MM-DD   event name			
	<b>b) Zone Alarms</b>			
	<b>Zone Select:</b>	<b>1</b>	<b>1 to 3</b>	<b>Select zone station to review.</b>
	YYYY-MM-DD   event name			Displays the last three alarms of the selected zone.
	YYYY-MM-DD   event name			
	YYYY-MM-DD   event name			
	<b>c) Pump Alarms</b>			
	YYYY-MM-DD   event name			Displays the last three alarms of the pump.
	YYYY-MM-DD   event name			
	YYYY-MM-DD   event name			
Trend # days:	7 days	7-21 days		
Trend interval:	5 min	1-30 min		
Events of last:	3 months	1-6 months		

### Main Menu – Service



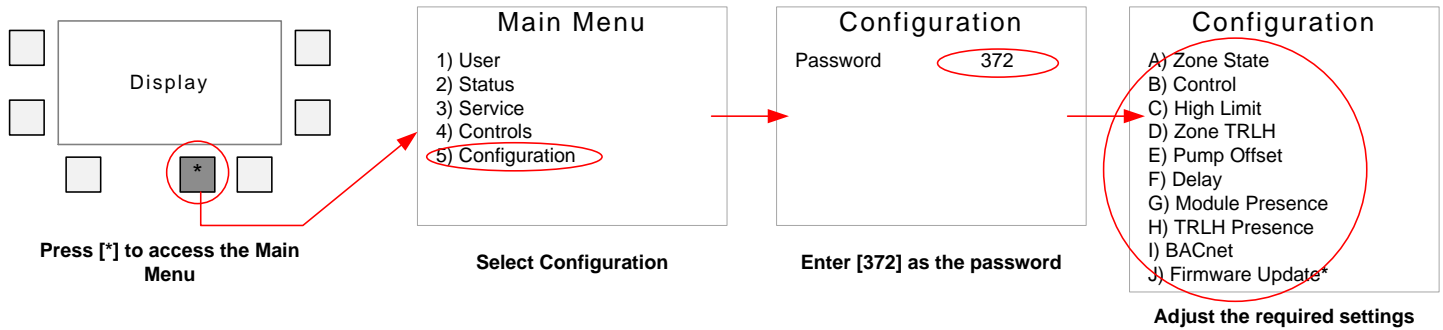
SERVICE	Settings	Default	Range (* indicates no configuration; display only)	Notes/Conditions
3A) Services	<b>System</b>			
	UV lamp due on:	YYYY-MM-DD	*	Displays the date on which the UV Lamp will have to be replaced. Appears if using an UV lamp.
	Last UV lamp:	YYYY-MM-DD	*	Displays last date on which the “UV lamp changed?” was set to Yes. Appears if using an UV lamp.
	UV lamp changed?	No	* Yes or No	If the UV lamp has been changed, set this value to Yes to reset the “UV lamp due on”.
	<b>Pump</b>			
	Filters due on:	YYYY-MM-DD	*	Displays the date on which the pre-filter and silver ion cartridges will have to be replaced.
	Last filters:	YYYY-MM-DD	*	Displays the date on which the “Filters changed?” was set to Yes.
	Filters changed?	No	Yes or No	If the pre-filter and silver ion cartridges have been changed, set this value to Yes to reset the “Last filters” date.
	Service due on:	YYYY-MM-DD	*	Displays the date on which service must be performed.
	Last service:	YYYY-MM-DD	*	Displays the date on which the “Service done?” was set to Yes.
	Service done?	No	Yes or No	If service has been performed, set this value to Yes to reset the “Last service” date.
	<b>Zone Select:</b>	1	1 to 3	<b>Select zone before setup.</b>
	Runtime Stage1:	0 h	*	Appear if there is more than one stage.
	Reset Runtime:	No	Yes or No	
	Runtime Stage2:	0 h	*	
	Reset Runtime:	No	Yes or No	
	Runtime Stage3:	0 h	*	
Reset Runtime:	No	Yes or No		
Runtime Stage4:	0 h	*		
Reset Runtime:	No	Yes or No		
3B) Simulation Mode	Sim. mode:	Off	On, Off	
	Duration:	5 min	5 to 60 min	Appears if “Sim. mode” is set to Off.
	Time Remaining:	0 s	*	Appears if “Sim. mode” is set to On.
	<b>Zone Select:</b>	All	1 to 3 or All	
	Nb of stage:	0	0 to 76	
	<b>Pump</b>			
Pump override:	Off	On, Off		
Pump demand:	0 %	0 to 100 %	Appears if “Pump override” is set to On.	
3C) Drain Command	Man. Prime Start:	Off	Off or Start	Set to Start to start the drain sequence.
	Man. Prime Stop:	Off	Off or Stop	Set to Stop to stop the drain sequence. Appears after “Man. Prime Start” has been set to Start.

### Main Menu – Controls



CONTROLS	Settings	Default	Range	Notes/Conditions
4A) Source	<b>Zone Select:</b>	1	1 to 3	<b>Select zone before setup.</b>
	Control mode:	Ext. on AI3	Ext. on AI3 Int. in RH Int. in temp Int. Altern. Network	External control mode using Analog Input 3 (AI3). Internal control mode using Thermostat humidity. Internal control mode using Thermostat temperature.  <i>Network</i> option only applicable for BACnet models.
	Setpoint source:	AI3	AI3, Inter. stpnt, Network	Appears if an internal control mode is selected.  <i>Network</i> option only applicable for BACnet models.
	Humidity source:	AI4	AI4, TRLH, Network, None	<i>Network</i> option only applicable for BACnet models.
	Temp. source:	AI5	AI5, TRLH, Network, None	<i>Network</i> option only applicable for BACnet models.
	High limit src:	AI6	AI6, Network, None	<i>Network</i> option only applicable for BACnet models.
4B) Signal	<b>Zone Select:</b>	1	1 to 3	<b>Select zone before setup.</b>
	AI3 signal:	0-10 Vdc	0-10Vdc, 2-10Vdc	Appears if the "Control mode" setting is set to <i>Ext. on AI3</i> , or set to an internal mode with the "Setpoint source" setting set to <i>AI3</i> , in menu <b>4A) Source</b> .
	AI4 signal:	0-10 Vdc	0-10Vdc, 2-10Vdc	Appears if the "Humidity source" setting is set to <i>AI4</i> in menu <b>4A) Source</b> .
	AI5 signal:	0-10 Vdc	0-10Vdc, 2-10Vdc	Appears if the "Temp. source" setting is set to <i>AI5</i> in menu <b>4A) Source</b> .
	AI6 signal:	0-10 Vdc	0-10Vdc, 2-10Vdc	Appears if the "High limit src" setting is set to <i>AI6</i> in menu <b>4A) Source</b>
	Feedback signal:	0-10 Vdc	0-10Vdc, 2-10Vdc	
4C) Ext Sensor	<b>Zone Select:</b>	1	1 to 3	<b>Select zone before setup.</b>
	AI3 setpoint min:	0.0 °C or **0.0 %RH	10.0 to max °C or **5.0 to max %RH	Appear if the "Setpoint source" setting is set to <i>AI3</i> in menu <b>4A) Source</b> , when using an internal control mode.
	AI3 setpoint max:	0.0 °C or **0.0 %RH	Min to 40.0°C or **Min to 95.0%RH	
	AI3 setpnt offset:	0.0 °C or **0.0 %RH		**Setpoint is displayed as either temperature or humidity depending on the configuration selected in menu <b>4A) Source</b> .
	AI4 RH min:	0.0%RH	5.0 to max %RH	Appear if the "Humidity source" setting is set to <i>AI4</i> in menu <b>4A) Source</b> .
	AI4 RH max:	0.0%RH	Min to 95.0%RH	
	AI4 RH offset:	0.0%RH		
	AI5 Temp. min:	0.0°C	10.0 to max °C	Appear if the "Temp. source" setting is set to <i>AI5</i> in menu <b>4A) Source</b> .
	AI5 Temp. max:	0.0°C	Min to 40.0°C	
	AI5 Temp. offset:	0.0°C		
AI6 RH min:	0.0%RH		Appear if the "High limit src" setting is set to <i>AI6</i> in menu <b>4A) Source</b> .	
AI6 RH max:	0.0%RH			
AI6 RH offset:	0.0%RH			

### Main Menu – Configuration



\*Option J only appears when a micro SD card containing a new firmware version is inserted.

CONFIGURATION	Settings	Default	Range	Notes/Conditions
5A) Zone State	Zone Select:	1	1 to 3	Select zone before setup.
	Operation	On	On, Off	
5B) Control	Zone Select:	1	1 to 3	Select zone before setup.
	Auto PID:	On	On, Off	
	Output Limit:	100 %	0 to 100 %	
	Stage on thresh:	50 %	0 to 100 %	Appears if there is no modulating stage.
	Stage off thresh:	45 %	0 to 100 %	Appears if there is no modulating stage.
5C) High Limit	Zone Select:	1	1 to 3	Select zone before setup.
	Setpoint:	80.0 %RH	10 to 90 %RH	Appear if the "High limit src" setting has been configured in menu 4A) Source.
	High Lim. cutout:	90.0 %RH	50 to 95 %RH	
	Prop. band RH:	5.0 %RH	1.0 to 20.0 %RH	Proportional High limit humidity control. Not applicable for In-Space application.
	Integral Time:	60 s	0 to 600 sec	
Derivative Time:	0.0 s	0.0 to 60.0 sec		
5D) Zone TRLH	Zone Select:	1	1 to 3	Select zone before setup.
	Occ. setpoint min:	10.0 °C or **5.0 %RH	10.0 to max °C or **5.0 to max %RH	Appear if an internal control mode is selected in menu 4A) Source.
	Occ. setpoint max:	40.0 °C or **95.0 %RH	Min to 40.0 °C or **Min to 95.0 %RH	
	Hum sens. offset:	0.0 %RH	-10.0 to 10.0 %RH	**Setpoint is displayed as either temperature or humidity depending on the configuration selected in menu 4A) Source.
	T sens. offset:	0.0 °C	-10.0 to 10.0 °C	
	Display Time:	Off	On, Off	
	Setpnt. Lock:	Off	On, Off	
	On/Off Lock:	Off	On, Off	
Time format:	24h	12h, 24h		
5E) Pump Offset	Inlet temp. sens:	0.0 °C	* (sensor reading only)	
	--- offset:	0.0 °C	-10.0 to 10.0 °C	
	Inlet press. sens:	0 kPa	* (sensor reading only)	
	--- offset:	0 kPa	-500 to 500 kPa	
	Output pressure:	0 kPa	* (sensor reading only)	
---	0 kPa	-500 to 500 kPa		
5F) Delay	<b>System</b>			
	Inact delay:	4 h	4 to 72 h	Maximum allowable time of inactivity for the water inlet.
	Inact drain time:	1 min	1 to 255 min	Regulates water line drain time in the event that the Inlet Inactivity delay is attained.
	<b>Pump</b>			
	Inact delay:	4 h	4 to 72 h	
	Inact drain time:	1 s	1 to 255 s	
	Zone Select:	1	1 to 3	Select zone before setup.
Fan control:	Off	On, Off		

CONFIGURATION	Settings	Default	Range	Notes/Conditions
	Fan on delay:	1 s	1 to 255 s	Appears if the "Fan control" setting is set to <i>On</i> .
	Fan off delay:	1 s	1 to 255 s	Appears if the "Fan control" setting is set to <i>On</i> .
	Inact delay:	4 h	4 to 72 h	
	Inact drain time:	1 s	1 to 255 s	
<b>5G) Module Presence</b>	Zone 1 to Zone 3	Off/On	On, Off	
<b>5H) TRLH Presence</b>	<b>Zone Select:</b>	<b>1</b>	<b>1 to 3</b>	<b>Select zone before setup.</b>
	Zone TRLH:	Off/On	On, Off	
	<b>System</b>			
<b>5I) BACnet</b>	MAC Address:	000	0 to 254	Available with BACnet models only.
	Fallback Timeout:	00000	0 to 65534	
	Device Instance:	0153000	0 to 4194302	
	Auto Baud Rate:	On	On (Enable), Off (Disable)	
	Baud Rate:	9600	9.6k, 19.2k, 38.4k, 76.8k	
	<b>Zone Select:</b>	<b>1</b>	<b>1 to 3</b>	<b>Select zone before setup.</b>
	Device Instance:	0153000	0 to 4194302	Available with BACnet models only.
	Network Number:	15300		
	<b>Modules From to Update?</b>			
<b>5J) Firmware Update</b>	Uploading pumps...	0 %	0 to 100% update progress	Appears if a micro SD card containing a new firmware version is inserted.
	Uploading zones...	0 %	0 to 100% update progress	
	Pump	No	Yes or No	
	Zone 1 To Zone 3	No	Yes or No	
	System x.xx	No	Yes or No	

## Firmware Update

The firmware update function is available when the unit detects a new firmware version on the micro SD card and the "Firmware update ready" message appears.



*Install the firmware files in a folder named "SKH\_fw\_pack" in the root of the micro SD card.*

1. Press the Menu \* button.
2. Use the ▲, ▼ buttons to select "5) Configuration" and press Enter ↵.
3. Enter the Configuration password [372]. Use the + and - buttons to increase and decrease the numbers, use the ▲, ▼ buttons to change a digit, and then press Enter ↵ to validate the password.
4. Use the ▲, ▼ buttons to select "5J) Firmware Update" and press Enter ↵.
5. Start by updating the pump firmware. To update, change the value from No to Yes. Then proceed to update the zone and system firmware.
6. The upgrade process can take a few minutes, and the unit will be offline for 60 seconds during the upgrade.

## List of Alarms

Display	Origin	Description	Alarm Reset
High limit cutout	Zone	Indicates that the high limit item is open. Verify that the signal from the high limit (duct) sensor is present at the SKH controller's input on the PCB (see schematic).	Automatic
Air flow cutout	Zone	Indicates that the airflow sensor is open. Verify that the signal from the airflow sensor is present at the SKH controller's input on the PCB (see schematic).	Automatic
Interlock cutout	Zone	Indicates that the interlock and the cut-out circuitry are open. Verify that the signal from the interlock contact is present at the SKH controller's input on the PCB (see schematic).	Automatic
Board temperature failure	Zone	Indicates that the EZC PCB temperature is above the maximum allowable temperature. The board will resume operation once the temperature cools down. If the temperature is below the maximum and the alarm remains, replace the PCB.	Automatic
TRL timeout	Zone	Indicates that the communication between the EZC and TRL has not been established within the programmed delay. Verify that the wiring connections between the TRL and EZC are good and that the fuse on the EZC is functional. Once the connection is re-established, the system will resume operation.	Automatic
Network timeout	Zone	Indicates that the network communication has not been established within the programmed delay. Verify the network wiring connections and ensure that the signal coming from the network is good. Once communication is re-established, the system will resume operation.	Automatic
Invalid config	Zone	Indicates that the EZC configuration is invalid. Correct the configuration settings according to the instructions. The system will resume operation once the configurations are within operating parameters.	Automatic
External humidity failure	Zone	Indicates that the humidity signal is absent or incorrectly wired. Verify the connection and state of the humidity sensor, and replace if necessary.	Automatic
External temperature failure	Zone	Indicates that the temperature signal is absent or incorrectly wired. Verify the connection and state of the temperature sensor, and replace if necessary.	Automatic
High Limit humidity failure	Zone	Indicates that the high limit humidity signal is absent or incorrectly wired. Verify the connection and state of the high limit sensor, and replace if necessary.	Automatic
TRL humidity failure	Zone	Indicates that the TRL humidity signal is absent or incorrectly wired. Verify the TRL wiring and connections, and replace if necessary.	Automatic
TRL temperature failure	Zone	Indicates that the TRL temperature signal is absent or incorrectly wired. Verify TRL wiring and connections, and replace if necessary.	Automatic
Water inlet temperature failure	Pump	Indicates that the water inlet temperature sensor is absent or incorrectly wired. Ensure that the wiring from the sensor has not been damaged and the connections are properly secured. Fixing the connection wire or replacing the sensor will enable the system to resume normal operation.	Automatic
Water inlet pressure failure	Pump	Indicates that the water inlet pressure sensor is absent or incorrectly wired. Ensure that the wiring from the sensor has not been damaged and the connections are properly secured. Fixing the connection wire or replacing the sensor will enable the system to resume normal operation.	Automatic
Pump output pressure failure	Pump	Indicates that the high pressure sensor is absent or incorrectly wired. Ensure that the wiring from the sensor has not been damaged and the connections are properly secured. Fixing the connection wire or replacing the sensor will enable the system to resume normal operation.	Automatic
VFD failure	Pump	Indicates that the VFD is out of operation. Verify if the fuses for the VFD are still intact. Replacing the fuses or the VFD and initialising the VFD will reset the alarm and enable the system to resume normal operation.	Automatic



Display	Origin	Description	Alarm Reset
Water inlet temperature too high	Pump	Indicates that the water inlet temperature is above the maximum temperature of 55°C (131°F). The system will resume operation once the water is cooled down.	Automatic
Water inlet temperature too low	Pump	Indicates that the water inlet temperature is below the minimum temperature of 2°C (36°F). The system will resume operation once the water is warmer.	Automatic
Water inlet pressure too low	Pump	Indicates that the water inlet pressure is below the minimum pressure of 207 kPa (30 PSI). Verify the water supply. The system will resume operation once the water pressure is between 207 kPa (30 PSI) and 483 kPa (70 PSI).	Automatic
Water inlet pressure too high	Pump	Indicates that the water inlet pressure is above the maximum pressure of 483 kPa (70 PSI). Verify the water supply pressure and the low-pressure regulator. The system will resume operation once the water pressure is between 207 kPa (30 PSI) and 483 kPa (70 PSI).	Automatic
Pump output pressure too low	Pump	Indicates that the high pressure value is below the minimum pressure. Ensure that the water distribution rack or piping is not leaking. Ensure that none of the solenoids valves from the EZC are letting water go to the drain. If this is the case, clean or change the faulty valve. The system will resume operation once the pump pressure is between 3447 kPa (500 PSI) and 7584 kPa (1100 PSI).	Automatic
Pump output pressure too high	Pump	Indicates that the high pressure value is above the maximum pressure. Ensure that the piping and the nozzle are not blocked. If this is the case, replace the blocked nozzles and clean the blocked piping. Ensure that all the solenoids on the EZC valve are functioning properly. The system will resume operation once the pump pressure is between 3447 kPa (500 PSI) and 7584 kPa (1100 PSI).	Automatic
Pressure Timeout	Pump	Indicates that pressurisation has not been performed within the programmed delay (30sec). This value can be adjusted based on the size of the distribution system. See description from <i>Pump output pressure too low</i> alarm if troubleshooting is required.	Automatic
Invalid configuration	Pump	Indicates that the pump station configuration is invalid. Correct the configuration settings according to the instructions. The system will resume operation once the configuration is within operating parameters.	Automatic
Filter service due	Pump	Indicates that the pre-filter and silver ion cartridges need to be replaced. The alarm will reset automatically once the service counter is reset.	Automatic
Pump service due	Pump	Indicates that the pump requires servicing. The alarm will reset automatically once the service counter is reset.	Automatic
Pump timeout	System pump	Indicates that the communication between the SKH Slave PCB and Master PCB has not been established within the programmed delay. Verify that the wiring connections coming from the PCBs in the pump station are good. Once connection is re-established, the system will resume operation.	Automatic
Zone timeout	System pump	Indicates that the communication between the EZC PCB and SKH Master PCB has not been established within the programmed delay. Verify that the wiring connections coming from the EZC are good. Once connection is re-established, the system will resume operation.	Automatic
Service warning	System pump	Indicates that the system will require service soon. See Servicing and Maintenance section.	Manual
Service alarm	System pump	Indicates that the system requires service. See Servicing and Maintenance section.	Manual



# Start-Up Procedure

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Once the installation is complete, follow this start-up procedure in order to ensure that the SKH 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

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### ***Clearance***

1. Ensure that the humidifier cabinet and the EZC controller are installed in a location where they can be serviced correctly.

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.

### ***Mechanical***

3. Ensure that the EZC controller is installed in a temperature controlled environment of less than 86°F (30°C). Verify that the EZC controller is fixed securely to a support or wall.

4. If an in-duct spray system is used, ensure that the nozzle rack assembly is correctly installed within the AHU.

5. If an MDU is used for in-space spray distribution, ensure that it is correctly installed and secured onto the ceiling.

6. 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.

b) Ensure that the high-pressure water outlet of the pump station is connected properly to the high-pressure water inlet of the EZC controller.

c) 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.

d) If the humidifier has the optional water overflow outlet feature, ensure that it is connected properly to a flexible hose.

### ***Hydraulic***

7. Verify that the EZC controller water connections are installed properly:

a) Ensure that the high-pressure water inlet of the EZC controller is connected properly to the high-pressure water outlet of the pump station.

b) Ensure that the high-pressure water outlet of the EZC controller is connected properly to the nozzle ramps, MDU(s) or nozzles.

c) Ensure that the water drain inlet is properly connected to the nozzle ramps, MDU(s) or nozzles.

d) Ensure that the water 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.

8. 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.



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.

c) If an in-space spray distribution system with MDU(s) is used, ensure that all MDUs are connected in series and that they are properly secured.

**Electrical**

9. Verify that the power supply (voltage) conforms to the appliance name plate on the side of the humidifier.

10. Confirm that 24Vac is present between tab 1&2 of terminal block TB11 on the EZC controller.

11. Ensure that the communication cable between the pump station PCB and the EZC controller is properly installed and connected. For multi-zone systems, ensure that all EZC controllers are connected in a proper daisy chain format. Verify that shield wiring and EOL termination has been done correctly.

12. Ensure that the Airflow switch is properly installed and connected to the EZC controller. If an Airflow switch is not used, verify that a jumper is connected between terminals TB10 1&3.

13. Ensure that the High limit duct humidistat is properly installed and connected to the EZC controller. Verify that the setpoint is properly adjusted. If a High limit duct humidistat is not used, verify that a jumper is connected between terminals TB10 2&3.

**Controls**

14. Ensure that the Interlock is properly connected to the EZC controller. If Interlock is not used, verify that a jumper is connected between terminals TB10 3&4.

15. If a room or duct humidistat is used, verify that it is fixed securely to the wall or duct respectively and ensure that it is properly connected to the EZC controller. Verify that the setpoints are properly adjusted.

16. If a TRLH thermostat 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 EZC controller. Verify that the setpoints are properly adjusted.

17. Turn the power on using the circuit breaker disconnect switch.

18. Confirm the control set-up of the humidifier by accessing the **4A) Source** option, located in the **Controls** menu. If a password is required, enter **757**.

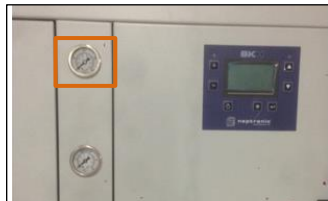
19. Confirm that the type of signal (0-10Vdc or 2-10Vdc) of each analog input corresponds to the type set by accessing the **4B) Signal** option, located in the **Controls** menu.


## Start-Up

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1. Proceed to start-up the humidifier, as follows:
  - a) Turn on the water supply valve that is connected to the humidifier and verify that water is flowing directly to the water supply inlet of the pump station. Ensure that the water isolation valve is turned off.
  - b) Remove the access panel located on the left side of the front of the humidifier cabinet, in order to gain access to the high-pressure pump.
  - c) Loosen the 2 Allen screws located on the top and the bottom of the pump.
  - d) Press the Menu button \* to access the Main Menu screen. Navigate to the **Service** menu and enter the password **637** (if required). Then, select the **C) Drain Command** option.
  - e) Set the value of the **Man. Prime Start** setting to **Start**, in order to start the drain sequence. The system will then start draining.
  - f) After 3 minutes have passed and the air from the pump has drained, retighten the 2 Allen screws located on the top and the bottom of the pump.
  - g) Set the value of the **Man. Prime Stop** setting to **Stop**, in order to stop the drain sequence.
  - h) In order to drain the air from the zone(s) and run a zone test, press the Menu button \* to return to the **Service** menu screen. Then, navigate to and select the **B) Simulation Mode** option.
  - i) Set the value of the **Pump demand** setting to **30%**.
  - j) Select the appropriate zone(s) using the **Zone Select** setting (**1, 2, 3 or All**) and set the value of the **Zone demand** setting to **100%** for each zone that will be used.
  - k) Set the value of the **Duration** setting to **10 min.**
  - l) Once steps (i) to (k) have been completed, set the value of the **Sim. Mode** setting to **On**.
  - m) After 3 minutes have passed and the air from the zone(s) has drained, slowly increase the value of the **Pump demand** setting until a value of 1000psi is displayed on the high-pressure manometer located on the front of the unit.

### Start-up



- n) Verify that all nozzles or MDUs within the zone(s) are spraying correctly and that the pressure is at 1000psi. Then, set the value of the **Sim. Mode** setting to **Off** and press the Menu button \* to return to the Main Menu screen.
- o) Turn on the humidifier by pressing and holding the Power button  for 3 seconds. Verify that the Power Display LED light is turned on.
- p) Verify that there is a humidity demand displayed on the LCD screen. If there is a humidity demand, the pump station will begin pumping water to the zones and each configured zone will be activated.
- q) Observe the pump station and each zone for water leaks.



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**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 air duct, the humidifier should automatically stop.

3. Reset the Airflow switch if needed.

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

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# Servicing and Maintenance



This humidifier must be installed, operated, and maintained by suitably qualified personnel and in accordance with this manual.

## Preventative Maintenance

Component	How Often is Maintenance Required	Maintenance Steps
Pressure manometers	Every 2000 hours	<ul style="list-style-type: none"> <li>- Inspect the high pressure and low pressure manometers in front of the unit and verify that the pressure is the same as the ones indicated under the <i>Inlet press. sens</i> and <i>Output pressure</i> settings in the menu <b>2B) Pump Status</b>.</li> <li>- If the pressure is not the same, replace the high pressure or low pressure manometer.</li> </ul>
Hydraulic pipes		<ul style="list-style-type: none"> <li>- With the unit turned on, check for leaks coming from the water supply inlet, high-pressure outlet and zone distribution piping.</li> <li>- If a leak is observed, replace the leaking pipes or fittings.</li> </ul>
Nozzles		<ul style="list-style-type: none"> <li>- With the unit turned on, verify whether the nozzles are blocked during normal operation.</li> <li>- If the nozzles are blocked, disassemble them for inspection:               <ol style="list-style-type: none"> <li>a) If blocked by large particles, remove the particles and reassemble the nozzles.</li> <li>b) If blocked by the presence of mineral deposit or scale, replace the nozzles.</li> </ol> </li> </ul>
MDU fan (only for MDU option)		<ul style="list-style-type: none"> <li>- With the unit turned on, verify whether the MDU fan is operating correctly and without any problems.</li> <li>- Replace the motor fan if faulty operation is observed.</li> </ul>
Droplet separator (option)	<ul style="list-style-type: none"> <li>- If operated with regular tap water, every 2500 hours.</li> <li>- If operated with treated water, every 5000 hours.</li> </ul>	<ul style="list-style-type: none"> <li>- Verify that the droplet separator is not being obstructed by scale.</li> <li>- If there is scale, proceed to de-scale the droplet separator as per the steps described in the De-scaling the Droplet Separator section on page 53.</li> </ul>
Danfoss PAHT pump	Every 8000 hours	<p><u>Verifying the conditions of the pump:</u></p> <ul style="list-style-type: none"> <li>- Measure the noise level of the pump while the unit is operating. Ensure that it is below 76db.</li> </ul> <p><u>Disassembling and inspecting the pump:</u></p> <ul style="list-style-type: none"> <li>- Remove the pump from the pump station by disconnecting the four screws that secure the pump to the station and by disconnecting the hydraulic hoses.</li> <li>- Disassemble the pump (refer to the Danfoss <i>PAH/PAHT/PAHT G 10-12.5 Disassembling and assembling</i> service guide for more details).</li> <li>- If the measured noise level of the pump was found to be higher than 76db, ensure that this is not due to any malfunctioning parts.</li> <li>- Replace any damaged or worn parts as necessary.</li> <li>- Reassemble the pump (refer to the Danfoss <i>PAH/PAHT/PAHT G 10-12.5 Disassembling and assembling</i> service guide for more details) and re-attach it to the pump station.</li> </ul> <p><u>Restarting the unit:</u></p> <ul style="list-style-type: none"> <li>- Follow the steps outlined in the Start-Up section on page 50 to restart the humidifier and ensure that it is operating correctly before resuming normal operation.</li> </ul>

## Standard Maintenance

Component	How Often is Maintenance Required	Maintenance Steps
Pre-filter and silver ion cartridges (for models SKH100 and SKH200)	Every 1500 hours (Service alarm will be displayed)	- Replace the pre-filter and silver ion cartridges. - Modify the value of the <i>Filters changed?</i> setting to <i>Yes</i> in the menu <b>3A) Services</b> , in order to reset the servicing date for the pre-filter and silver ion cartridges.
UV lamp (option)		- Replace the UV lamp. - Modify the value of the <i>UV lamp changed?</i> setting to <i>Yes</i> in the menu <b>3A) Services</b> , in order to reset the servicing date for the UV lamp.

## De-scaling the Droplet Separator

### Step 1 - Preparation

- Refer to the manufacturer's recommendations for concentrations to apply and the method of preparation of the solution. When using white vinegar (acetic acid), do not exceed a concentration of 250-260 ppm when descaling the media.
- Ensure that the air system (central air or ventilation system) is stopped.
- Ensure that the SKH is stopped.



**CAUTION:** When working with de-scaling solutions, always wear appropriate personal protective clothing, protective gloves, and eye protection.

### Step 2 - Dismantle the Droplet Separator

- Turn off and isolate electrical supplies to the unit.
- Remove all media cassettes.

### Step 3 - Prepare the De-scaling Solution



**CAUTION:** Risk of emanation of gas irritants, ensure to perform these tasks in a well-ventilated area. It is recommended to perform the following steps outside.

- Mix the de-scaling solution according to the manufacturer's recommendations.
- Use a clean container of a suitable size to completely immerse each media cassette.
- Ensure that a second clean container of a suitable size is within reach and has been filled with clean, clear water to immerse each cassette after de-scaling.

### Step 4 - Remove Scale from Individual Cassettes

- Using a soft brush, lightly brush any loose scale from the surface of the media.
- Lower the individual cassettes into the de-scaling solution.
- Keep each matrix cassette in the solution until the reaction between the calcium on the matrix and the de-scaling solution is complete.



*Note: The effect of the de-scaling solution will vary depending on the condition of the media's material. For an improved effect, the above process may have to be repeated.*

- Clean and if necessary apply the de-scaling solution on all parts which are covered with scale.

### Step 5 - Rinse

- Lift the individual cassettes out of the acid solution, while allowing any excess de-scaling solution to drip, and directly submerge them into the clean water container.
- If necessary, rinse a second time while profusely wetting the media.

### Step 6 - Re-assemble and Restart

- Replace the media cassettes and media frames on the droplet separator.
- Reconnect the power supply.



# Exploded View and Bill of Material

## Exploded View

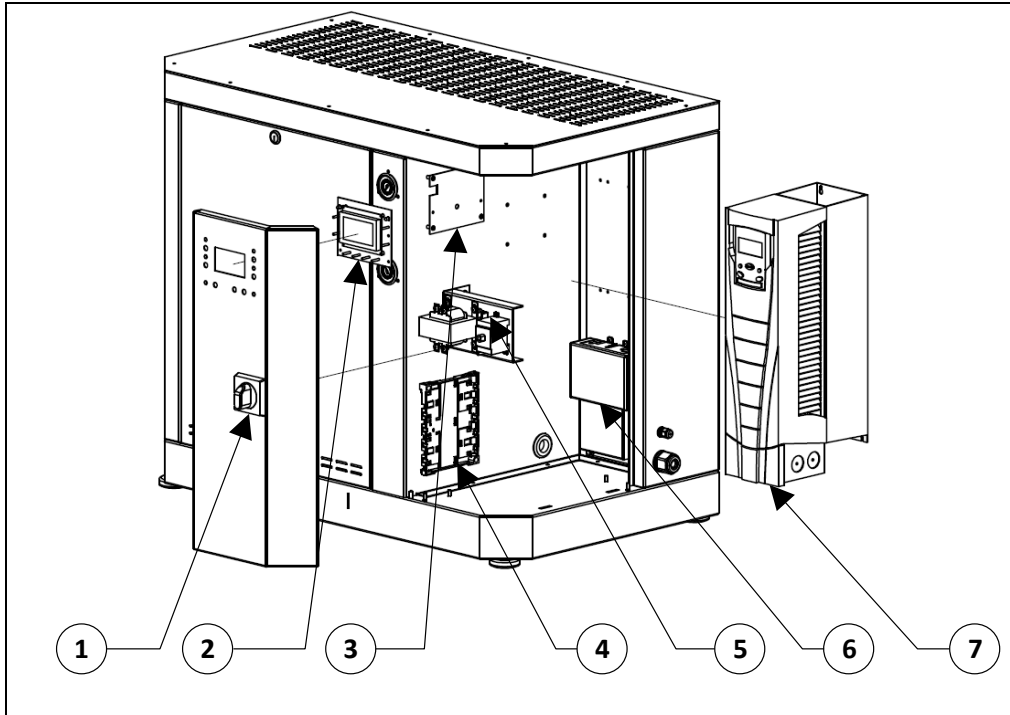


Illustration 28 - Electrical Components

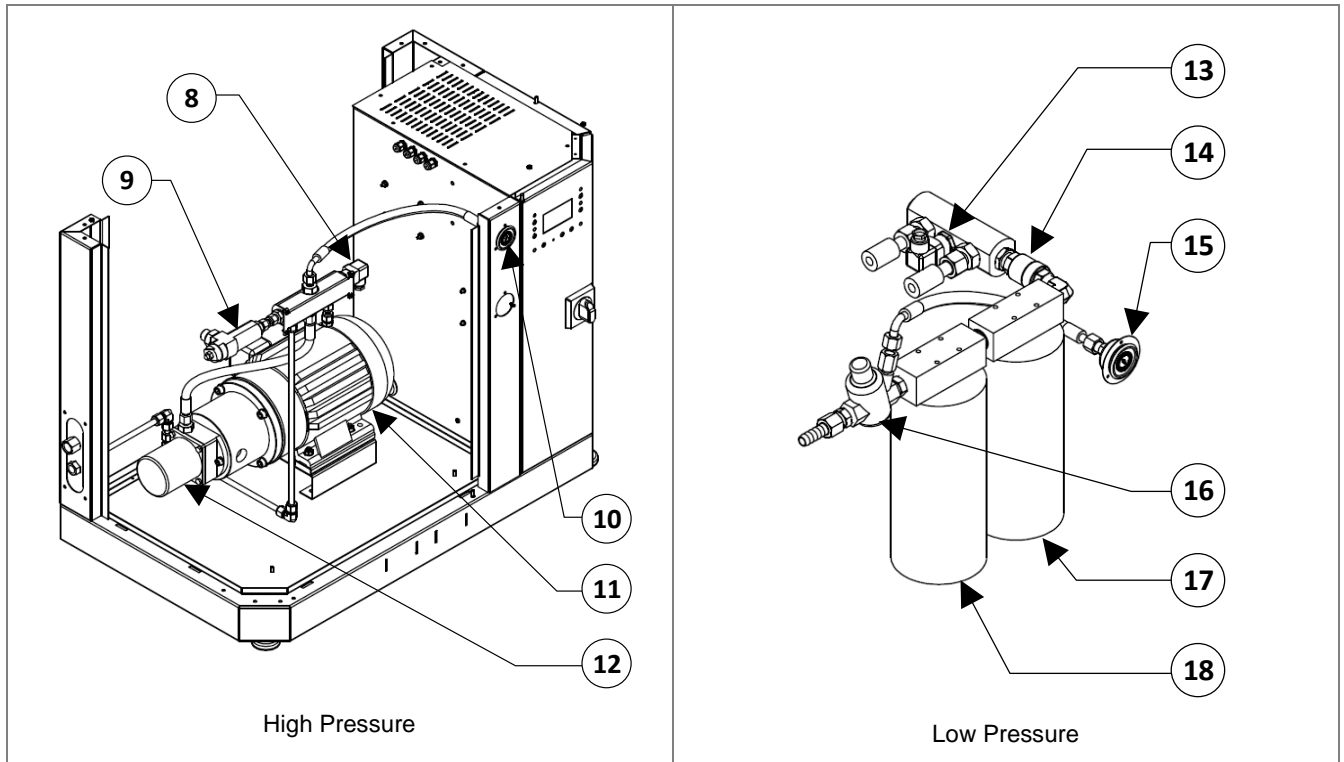


Illustration 29 - High and Low Pressure Components



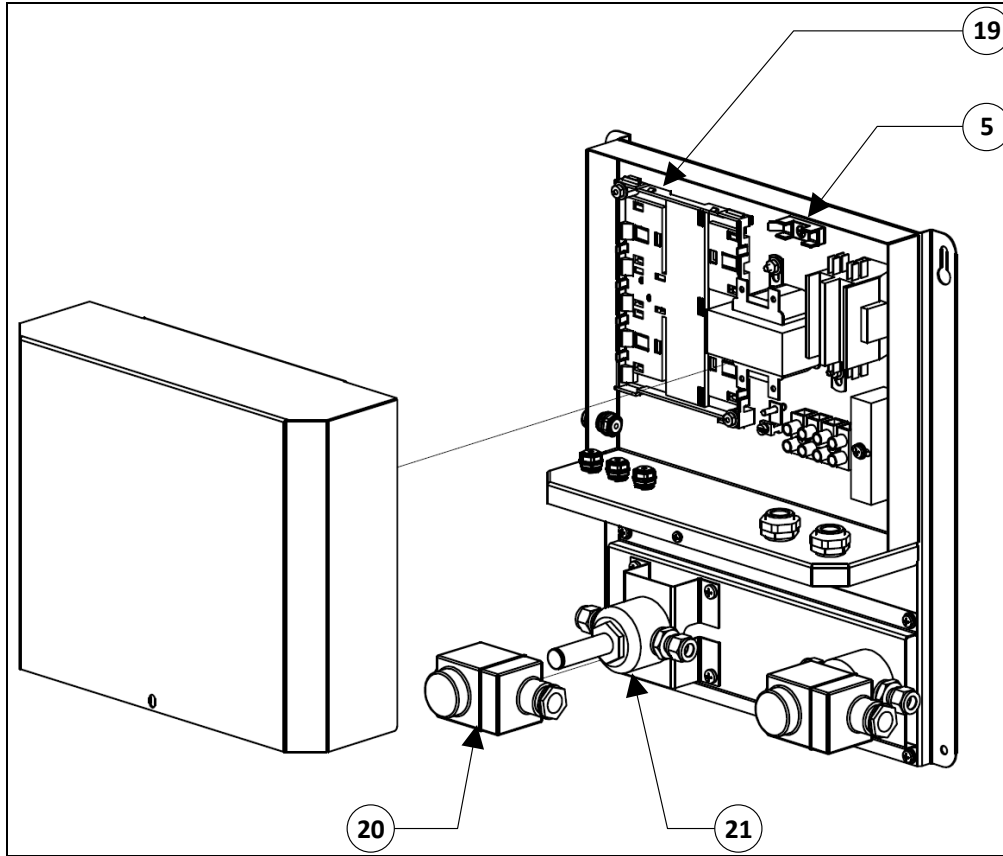


Illustration 30 - Electronic Zone Controller (EZO)

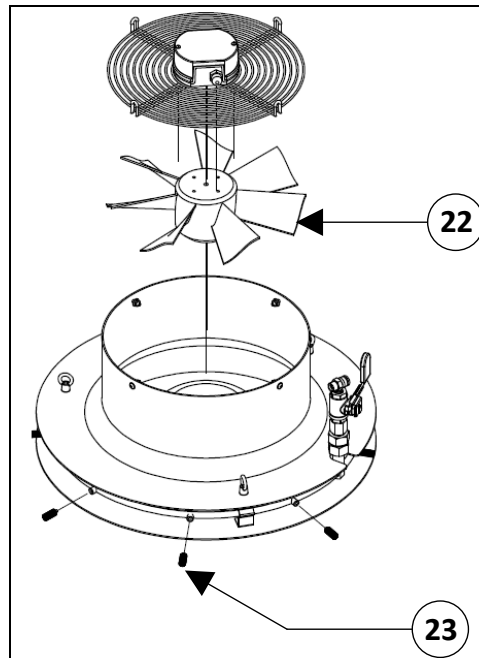


Illustration 31 - Mist Distribution Unit (MDU)



## Bill of Material

<i>Item</i>	<i>Description</i>	<i>Model</i>	<i>Part Number</i>
<b>1</b>	Disconnect switch	SKH100 to SKH600	DP13-3004
		SKH900 & SKH1200	DP13-3005
<b>2</b>	Pump unit display board	All models	NW SKV-DISPLAYSS
<b>3</b>	Main PCB	All models	NW SKH-MASTERSS
<b>4</b>	Pump unit PCB	All models	NW SKH-SLAVESS
<b>5</b>	Low voltage circuit fuse	All models	SP5109
<b>6</b>	High speed fuse	DFJ-6A	SPH6001
		DFJ-10A	SPH6003
		DFJ-15A	SPH6004
		DFJ-20A	SPH6005
		DFJ-25A	SPH6002
		DFJ-30A	SPH6007
		DFJ-35A	SPH6008
		DFJ-60A	SPH6009
<b>7</b>	Variable frequency drive	SKH100 (208, 230, 240V - 1ph)	SPH6212
		SKH100 (208, 230, 240V - 3ph)	SPH6213
		SKH100 (400, 480V - 3ph)	SPH6214
		SKH100 (600V, 3ph)	SPH6215
		SKH200 (208, 230, 240V - 1ph)	SPH6216
		SKH200 (208, 230, 240V - 3ph)	SPH6217
		SKH200 (400, 480V - 3ph)	SPH6218
		SKH200 (600V, 3ph)	SPH6219
		SKH300 (208, 230, 240V - 3ph)	SPH6228
		SKH300 (400, 480V - 3ph)	SPH6229
		SKH300 (600V, 3ph)	SPH6230
		SKH600 (208, 230, 240V - 3ph)	SPH6221
		SKH600 (400, 480V - 3ph)	SPH6222
		SKH600 (600V, 3ph)	SPH6223
		SKH900 & 1200 (208, 230, 240V - 3ph)	SPH6224
		SKH900 & 1200 (400, 480V - 3ph)	SPH6225
SKH900 & 1200 (600V - 3ph)	SPH6226		
<b>8</b>	Pressure transmitter (0-2321 psi [0-160 bar])	All models	SPH2603
<b>9</b>	Pressure relief valve	All models	SPH2021
<b>10</b>	High pressure manometer	All models	SPH2101
<b>11</b>	Motor	SKH100 (208 to 240V, 380 to 480V)	SPH6108
		SKH200 (585 to 600V)	SPH6109
		SKH200 (208 to 240V, 380 to 480V)	SPH6104
		SKH200 (585 to 600V)	SPH6105
		SKH300 (208 to 240V, 380 to 480V)	SPH6113
		SKH300 (585 to 600V)	SPH6114
		SKH600 (208 to 240V, 380 to 480V)	SPH6106
		SKH600 (585 to 600V)	SPH6112
		SKH900 & SKH1200 (208 to 240V, 380 to 480V)	SPH6107
SKH900 & SKH1200 (585 to 600V)	SPH6110		



<i>Item</i>	<i>Description</i>	<i>Model</i>	<i>Part Number</i>
<b>12</b>	Pump	SKH100	SPH2011
		SKH200	SPH2012
		SKH300	SPH2013
		SKH600	SPH2014
		SKH900	SPH2015
		SKH1200	SPH2016
<b>13</b>	Pressure transmitter (0-87 psi [0-6 bar])	All models	SPH2602
<b>14</b>	Low pressure check valve	SKH100 to SKH600	SP6023
		SKH900 & SKH1200	SPH2130
<b>15</b>	Low pressure manometer	All models	SPH2100
<b>16</b>	Low pressure regulator	SKH100 to SKH600	SPH2104
		SKH900 & SKH1200	SPH2105
<b>17</b>	5 microns PP pre-filter	SKH100 & SKH200	VP PF05-10
<b>18</b>	Silver ion cartridge	SKH100 & SKH200	VP NS-10
<b>19</b>	EZC PCB	All models	NW SKH-EZCSS
<b>20</b>	Solenoid coil	60Hz models	SPH6031
		50Hz models	SPH6032
<b>21</b>	Solenoid valve	All models	SPH2024
<b>22</b>	MDU motor fan	MDU-120	SPH4401
		MDU-230	SPH4402
<b>23</b>	Nozzle	Nozzle cap	SF SKHNOZ-1
		6 lb/h (2.7 kg/h) nozzle	SF SKHNOZ-3
		8.8 lb/h (4 kg/h) nozzle	SF SKHNOZ-4
		10.8 lb/h (4.9 kg/h) nozzle	SF SKHNOZ-5





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