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# Moffitt

NATURAL VENTILATION SOLUTIONS



# DeltaStream

Installation, Operation, and Maintenance Instruction Manual

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# 1. About This Manual

Please take the time to read this manual in its entirety before attempting to use this product. This document should be saved and made readily available to all personnel responsible for the installation and operation of the DeltaStream evaporative cooling unit. This document will contain safety symbols and notices to avoid damage to the equipment and personnel. In extreme scenarios, failure to take heed of the safety instructions may lead to injury or death.

## 1.1. Product Name Plate

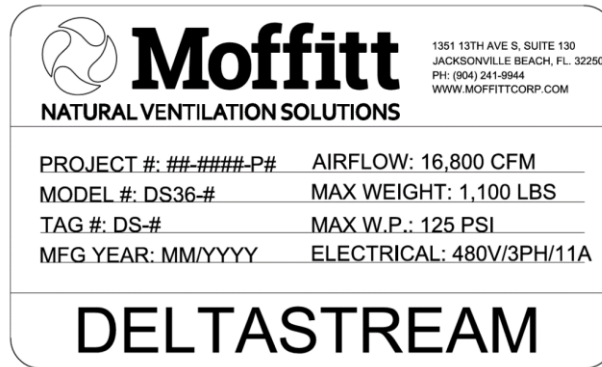


FIGURE 1.1a – DeltaStream Nameplate

The information on the left is project specific and may assist in identifying the unit, including the project number, model number, tag number, and manufacturing date. There are only two model numbers, DS36-U and DS36-D for the upward and downward configurations respectively. The information on the right is standard for all DeltaStream units. The name plate can be found near the disconnect.

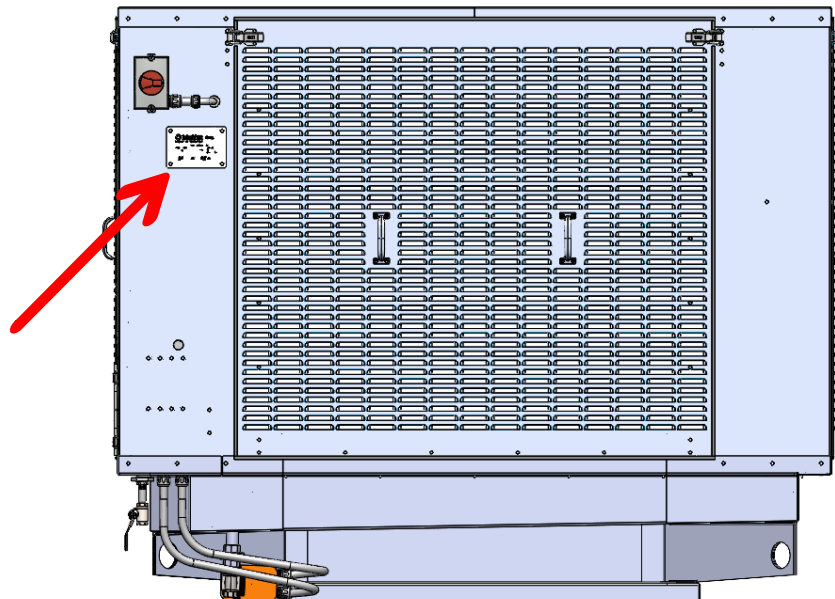


FIGURE 1.1b – DeltaStream Nameplate

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## 1.2. Associated Documents

Each project is unique and requires additional supporting documentation to ensure proper installation, operation, and maintenance. Please reference the following documents when necessary.

- Installation Documentation
- Project Specific Drawings & Specifications
- UL 507: Standard for Safety Electric Fans
- Project Specific Wiring Diagram

# 2. Using the DeltaStream

## 2.1. Description

The DeltaStream is an adiabatic cooling unit that provides natural cooling and ventilation. The DeltaStream draws hot outside air across the wet desorption media within the unit. The water in this media evaporates and removes sensible energy from the air passing through it. This natural process can result in as much as a 30°F supply air temperature decrease. This ensures that fresh, cool air is consistently supplied to the facility in a cost-effective way. In essence the DeltaStream is a self-cleaning, ultra-hygienic, technologically advanced evaporative cooler.

The DeltaStream has very low operating costs and can be up to 7 times more efficient than conventional air conditioning. It is designed for commercial and industrial applications to cool outdoor air 10° to 30° F below ambient conditions. It is designed for 16,800 CFM and utilizes a direct-drive motor.

DeltaStream units are suitable for a wide variety of industries, and can be used whenever natural cooling and ventilation are desired, such as:

- Breweries
- Data Centers
- Exhibition Halls
- Food & Agriculture
- General Manufacturing
- Glass Industry
- Gypsum Facilities
- Plastics Industry
- Pulp & Paper Industry
- Warehouse & Storage
- Transformer Buildings
- Other

If other precision air conditioning is required, including controlling air quality, humidity, or pressure, DeltaStream may supplement this process, but additional equipment or alternative solutions may be required.

## 2.2. Features and Benefits

### 2.2.1. Standard Features

- Construction: Mill-finish aluminum
- Motor: 5 HP/460 V/3 phase direct drive motor
- Filter: Merv 11
- Media: Maximum efficiency cellulose media
- Mounting: Roof or ground mounting available.
- Curb Cap Included – 48 ¾" x 48 ¾" I.D
- Weight: 900 lbs. dry, 1100 lbs. operating, add 200 lbs. for upward discharge units
- Automated controls

- Backdraft damper

### 2.2.2. Optional Features

- Maintenance packages available
- Building management system integration
- Fire alarm control system

### 2.2.3. Product Benefits

- Superior energy savings vs. conventional A.C., 20-30% of the power consumption.
- Free from refrigerants, environmentally friendly.
- Ultra-hygienic design - self-cleaning.
- Ability to cool in either axial direction to offer more variety in cooling solutions.

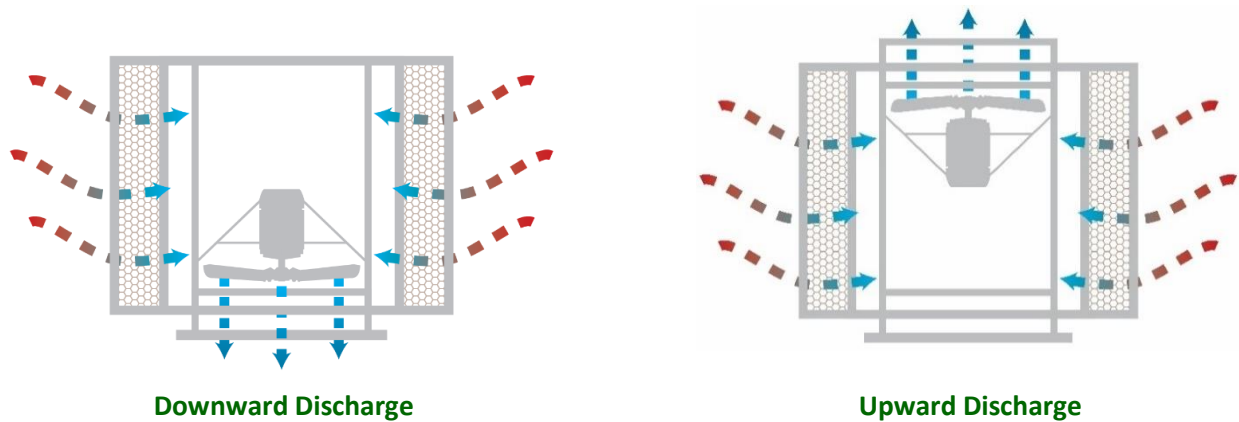


FIGURE 2.2.3 – DeltaStream Airflow

## 2.3. Limitations

Certain applications involve risk, and general limitations of the units and controls are always present. Some limitations are listed below, however this list is not exhaustive.

### 2.3.1. Risk of Leaking Water

Rain can penetrate through the roof through leaks at the junctions of the roof, curb, and unit. If the water distribution, desorption media, or perforated doors are positioned incorrectly, water from the cooling system can enter the supply air duct. High wind loads may cause water to emerge from the desorption media.

### 2.3.2. Structural Support

The DeltaStream is not self-supporting and requires a rigid structural curb for roof mounted applications and a structural stand for ground mounted applications. The structural support cannot deflect under the weight of the unit and allowing it to do so can cause the reservoir to be out of level, compromising its operation. The structural support of the building must be evaluated to ensure it is adequate for the unit's weight. The top cap of the unit is not rated to handle any loading, and all ductwork on upward discharge units must be supported by other means, such as cabling.

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### 2.3.3. Cooling Capability

The effectiveness of the DeltaStream unit as an evaporative cooling system can vary based on the climate of the surrounding environment. The maximum cooling temperature depends on the temperature and humidity of the intake air. Contact your Moffitt representative for more information on whether the DeltaStream is the right product for your cooling needs.

### 2.3.4. Water Usage

The amount of water used by a DeltaStream unit is dependent on the evaporation rate which is dependent on the air of the surrounding environment. The evaporation rate can lead to higher water usage by the end user and higher concentrations of dissolved solids within the reservoir, causing the media to deteriorate faster. A Moffitt representative may be able to assist in determining how the site's water usage will affect the lifespan of your DeltaStream unit.

### 2.3.5. Water Quality

The hardness of the makeup water entering the reservoir can have a direct impact on the operation life of the desorption media. In areas with high hardness levels and evaporation rates, the life of the desorption media may be reduced. Other water quality factors can also reduce the life of the media. A water quality test should be performed by a Moffitt representative to determine if water treatment is necessary, such as water softening or reverse osmosis (preferred).

## 2.4. Improper Usage

DeltaStream units should only be used as intended and never improperly. Improper use can cause damage to the machine or personnel. DeltaStream units are:

- Not suitable for use in cooling mode when temperatures are below freezing.
- Not suitable for drawing in air with high levels of contaminants, gases, or steam. Only uncontaminated outside air should be drawn into the unit, and exhaust air should not be allowed to recirculate. This is in accordance with IMC Section 401.4 intake opening location, which states that the location must be 10 ft horizontally from lot lines, other buildings, contaminant sources, or exhaust. Additionally, the intake may not be less than 3 ft below a contaminant source.
- Not suitable for operation with very dirty recirculated air. Recirculating air filters are not to be used and instead supply air filters are to be used. Supply air filters are typically made from a synthetic material, where recirculating air filters are less durable, made from paper-like materials.
- Not suitable for operation with well water, rainwater, contaminated drinking water, or distilled, de-mineralized or de-scaled water.
- Unit design is for outdoor use. Installing indoors will result in a reduction of cooling capacity.



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## 3. Safety Notes

The safety and well-being of our customers is a top priority at Moffitt, and we ensure that our products are easy and safe to use. However, risks are present if the units are used for unintended purposes. Please be sure to read this full packet and all additional documentation before unpacking, installing, and commissioning the DeltaStream unit. Observe all information and warning signs on the unit and follow local safety regulations. DeltaStream units should always be operated on by a trained professional. Additional safety warnings will be addressed in this chapter for anyone involved in the installation, operation, or maintenance of a DeltaStream unit. Damage due to neglect of these safety notes and recommendations is not covered under the standard Moffitt warranty.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Caution indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

### 3.1. Danger of Electrocution



Electrical components have the potential to cause injury and death through electrocution. Ensure that all electrical components are turned off before beginning to work on them.

Do not route supply and control wiring through the air ducts connecting to the unit. Vibrations through the air may cause damage to the wires, leaving them exposed. Ensure that all wiring is properly connected and tested.

### 3.1. Danger of Moving Improperly



DeltaStream units are at risk of falling or tipping over if transported improperly, which could lead to injury or death. Be sure to read all instructions on transportation, storage, and hoisting, and ensure that only qualified personnel are responsible for moving a DeltaStream unit. Do not attempt to lift the unit by hand.

### 3.2. Danger of Falling



When installing the DeltaStream on any roofing or elevated surface, there is a risk of falling. Wear appropriate equipment, including harnesses, use tie-off points if available, and follow all OSHA guidelines and site-specific requirements. Stay a minimum of 6 feet away from any roofing edge and watch your footing for skylights and other unstable footing.

### 3.3. Danger of Moving Components



The DeltaStream units utilize moving components to take in hot air from the outside, and push cooler air in. The most notable moving component is the propeller. If someone touches a

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propeller spinning at high velocities, serious injury will occur. Ensure that all doors are closed and locked while the propeller is spinning.

### 3.4. **Danger of Unexpectedly Starting**

The central controller may start the DeltaStream at an unexpected time according to its programming. It is the responsibility of qualified personnel to ensure that the DeltaStream cannot start unexpectedly when working on a unit.

### 3.5. **Caution of Hazardous Material When Air Filters Are Dirty**

Dirty air filters are less effective at filtering hazardous materials that may be surrounding your facility. Please check your air filters as part of the standard maintenance procedure. If necessary, Moffitt will be happy to provide a custom maintenance timeline in the event of extreme or unusual air conditions.

In addition to these safety notes focusing on the safety of the installation, operation, and maintenance crew, take heed of the following additional notes focusing on the durability and overall health of the DeltaStream units. A reliable unit free from damage will lead to less unexpected issues, contributing to the safety of those operating on it.

### 3.6. **Caution: Risk of Damage Under Improper Commissioning**

The unit can be damaged if commissioned improperly. Ensure that qualified personnel are responsible for commissioning.

### 3.7. **Caution: Risk of Damage from Frost**

In the winter, or when temperatures drop below freezing, shut off and drain all water from the unit and unheated supply piping to prevent damage to the system.

### 3.8. **Caution: Risk of Damage from Lightning**

DeltaStream units are conductive and typically installed on metal rooftops. There is a chance of a unit being struck by lightning, which may damage the unit. Check that there is lightning protection on site or install a lightning conductor if necessary.

### 3.9. **Caution: Risk of Damage from Dirty Filters**

If the filter is not changed, it may tear, allowing dirty air to enter the building. It will also cause premature wear on the motor. See section 10.8 for evaluating and replacing filters.

# 4. Delivery Procedure

## 4.1. Delivery

**Danger of Moving Improperly**

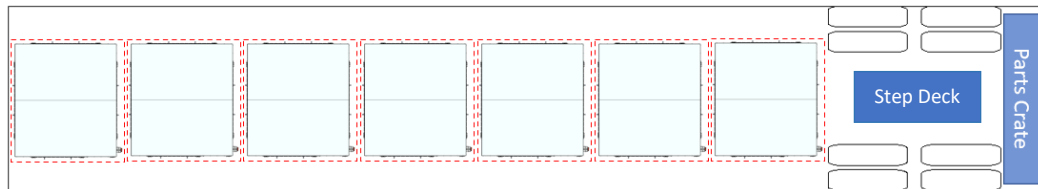


DeltaStream units arrive fully assembled and ready for connection. Please make sure that the delivery includes all the following components:

- DeltaStream unit
- Indoor and outdoor temperature sensors
- Central controller
- Damper
- 90-degree fitting and 10” tube

Check to ensure that none of the components are damaged. If a defect is found, it must be reported directly to Moffitt. For additional components, refer to the project specific packing list.

When shipped, no more than 7 units may fit on a standard 48’ flatbed truck. If more need to be shipped, another flatbed or larger transport will be required. The step deck at the front of the flatbed is not suited to accommodate additional units.



**FIGURE 4.1a** – DeltaStream transport diagram

DeltaStream units are secured to the flatbed using two straps over the pallet they are fastened to. An additional strap may be attached over the unit but is typically not necessary.



**FIGURE 4.1b** – DeltaStream units in transport

## 4.2. Interim Storage

### Danger of Moving Improperly



Storage is typically not required for DeltaStream units as they are lifted directly from the transport to the installation area. If storage is necessary, the following rules should be strictly abided by:

- Keep DeltaStream units in their crating until installation has begun to ensure all additional parts are kept together and to protect the unit from contaminants.
- Do not stack DeltaStream units.
- Do not place additional loads on DeltaStream units
- May be placed outdoors in a safe area away from traffic or hazardous areas which may cause damage to the unit.

## 4.3. Moving the Unit on Site

### Danger of Moving Improperly



The access doors must be closed during transport. Each DeltaStream must be moved with the designed lifting points. There is one at the corner of each DeltaStream, 4 in total. Use straps as depicted in the figure below. The unit weighs 900 lbs. when dry, and 1100 lbs. when wet, excluding the curb. Upward discharge units weigh an additional 200 lbs.

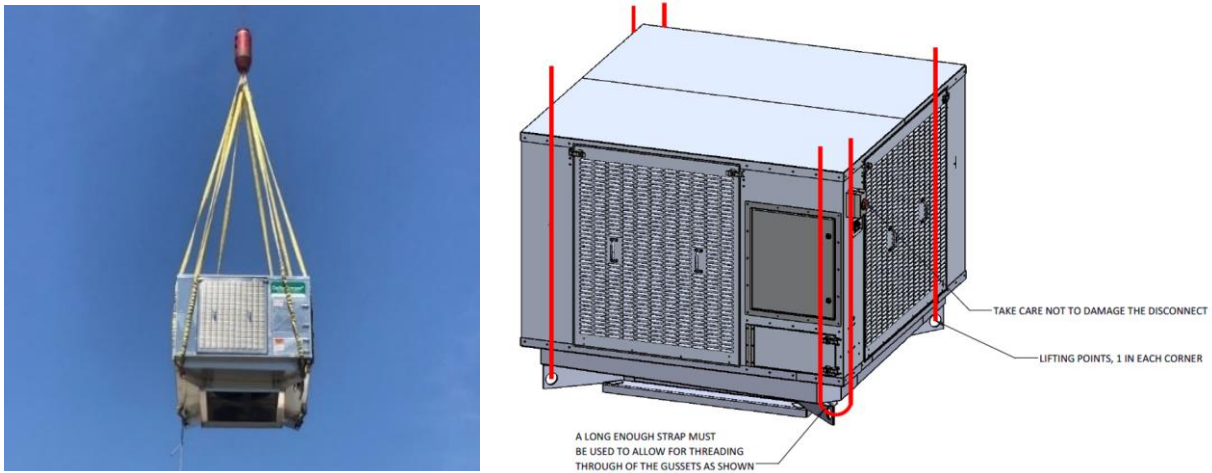


FIGURE 4.3 – Hoisting Example and Diagram

## 5. Unit Components

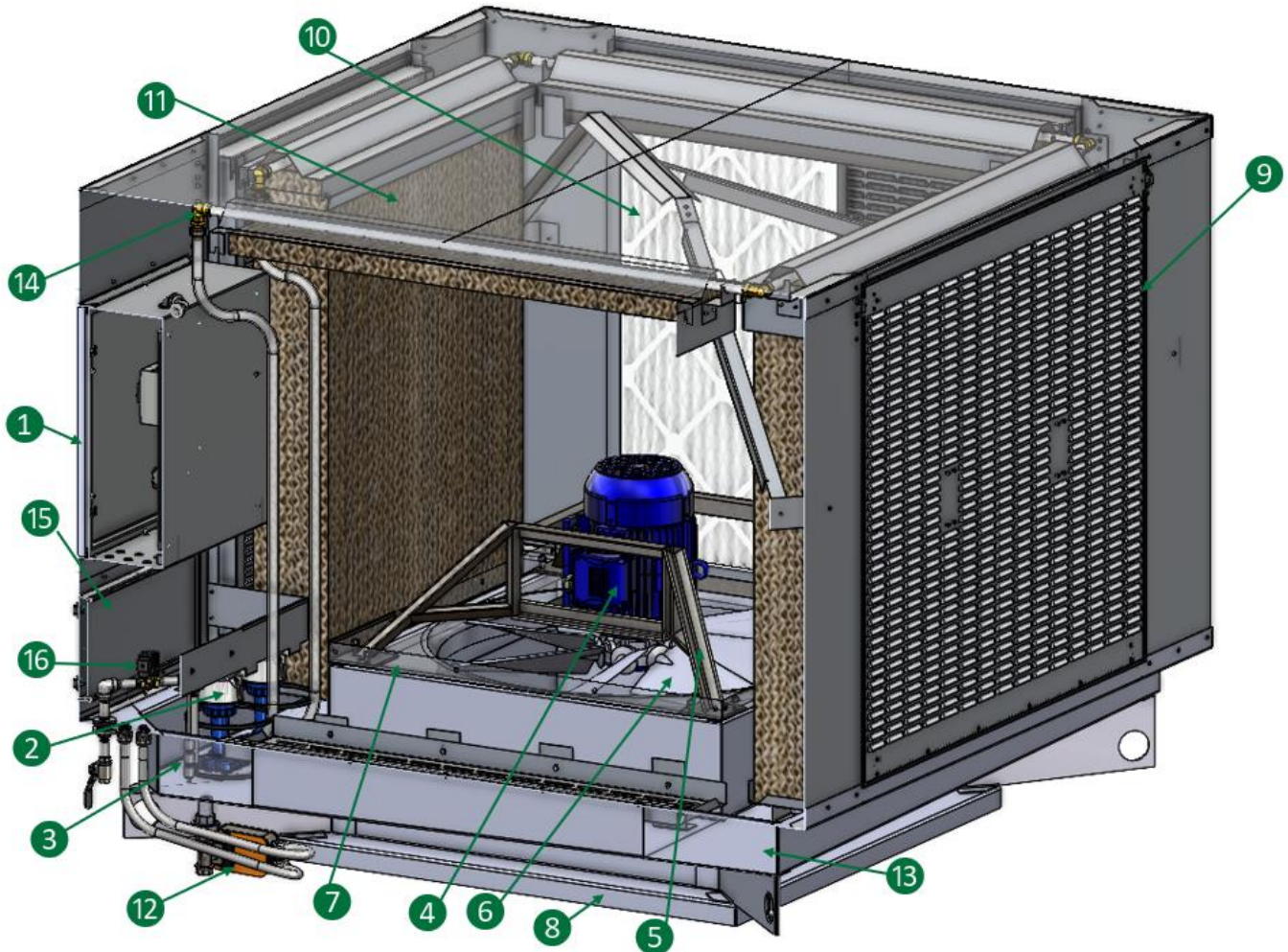
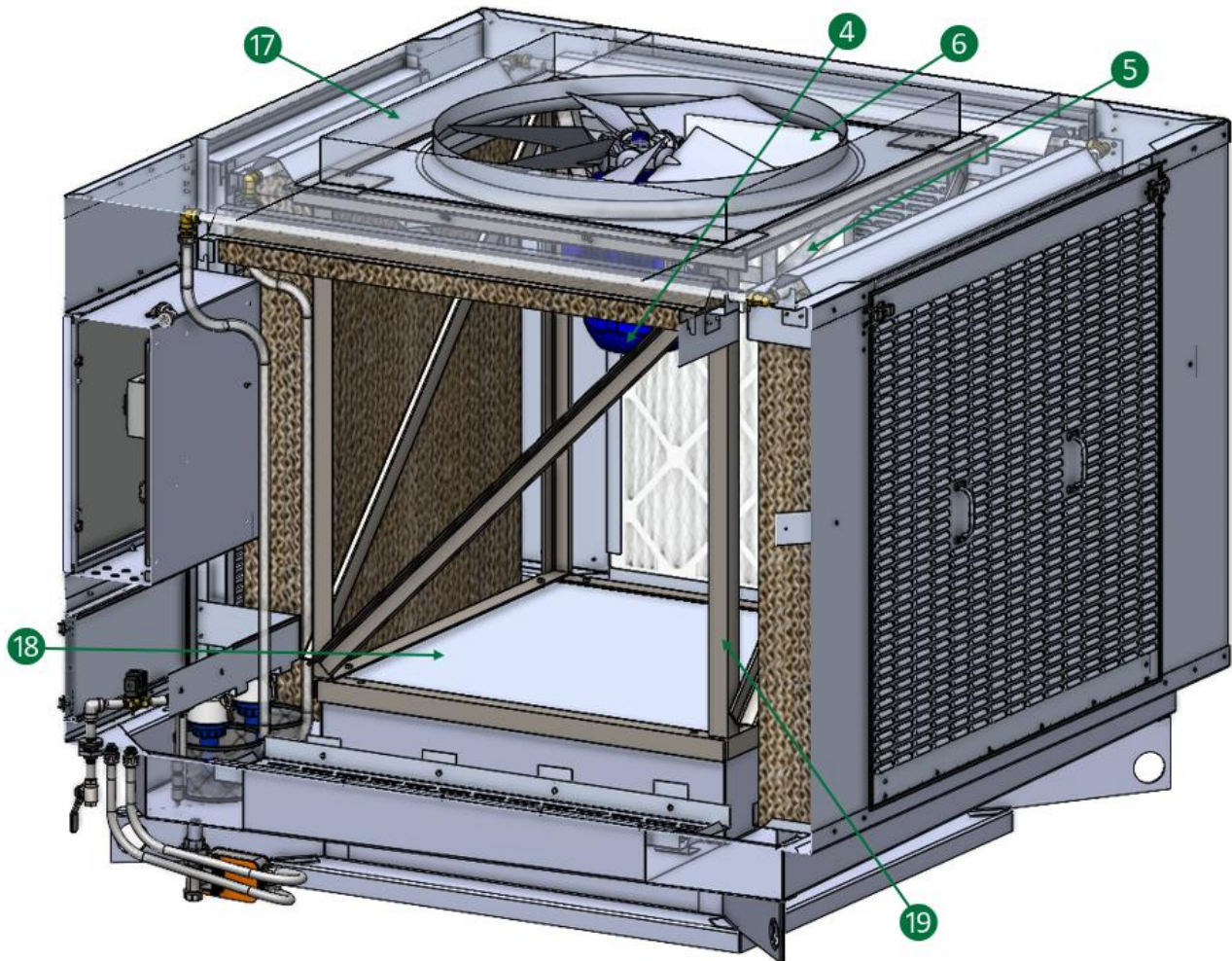


FIGURE 5a – DeltaStream Sectional View (downward configuration)

- 1 Control Panel
  - 2 Water circulation pumps
  - 3 Vertical level sensor
  - 4 5 hp motor
  - 5 Motor mount
  - 6 Propeller
  - 7 Spinning
  - 8 Curb cap
  - 9 Perforated door
  - 10 Air filter
  - 11 Desorption media
  - 12 Drain assembly
  - 13 Reservoir
  - 14 Water distribution system
  - 15 Lower access door
  - 16 Solenoid
- Not pictured: 30A disconnect



**FIGURE 5b** – DeltaStream Sectional View (upward configuration)

- 17 Upward discharge top
  - 18 Reservoir cap
  - 19 Upward discharge motor support
- Not pictured: 30A disconnect

## 6. Technical Data

DeltaStream Specification	Units	Data	
<b>Fan</b>			
Type		Direct Drive, axial, TEFC, Class F	
Fan control		On/Off	
Motor ambient temperature	°C/F	-20 °C to +40 °C, -5 °F to 104 °F	
Motor HP	HP	5	
Motor RPM	RPM	1170	
Frequency	Hz	60	
Motor Frame		213/5T	
Rated Current	Amps	6.83	
<b>Electrical data and controls</b>			
Nominal output	kW	5.06	
Nominal current	Amps	11	
MCA	Amps	13.75	
MOCP	Amps	24.75	
Power supply	VAC-Phase, Hz	460VAC – 3 Phase, 60 Hz	
Internal Breaker	Amps	20	
NEMA rating		4	
<b>Controls</b>			
Type		Central PLC with remote connectivity	
Frequency	Hz	60	
Amp draw	Amps	2.5	
Power supply	Volts	120 VAC – 1 Phase, 60 Hz	
Ethernet Cable Category		5e or higher	
<b>Nominal volumetric flow rate</b>			
Volumetric flow rate	CFM	16,800	
Nominal external pressure drop	in. w.g.	0.9	
Max. external pressure drop	in. w.g.	1.125	
<b>Evaporative cooling</b>			
No. circulation pumps		2	
Drain and overflow		1" NPT	
Supply		½" NPT	
Minimum supply pressure	psi	40	
Maximum supply pressure	psi	125	
Water supply		Potable, Approx. 1.25 GPM flow rate	
Water Quality		pH 7-9, Puckorius Scaling Index 6-7	
Filter		<b>Standard Size</b>	<b>Control Size</b>
Quantity		6 (2 per standard side)	2
Size		24" x 48"	24" X 36"
Rating		Merv 11	
<b>Supply air side connection</b>			
Duct size bottom connection	in.	42" x 42"	
Duct size top connection	in.	42" x 42"	
Max. load top duct connection	lb.	0	
<b>Housing</b>			
Material		Aluminum	
Fasteners		Stainless	
<b>Dimensions and weight</b>			
Curb dimensions	in.	48" X 48"	
Curb cap dimensions	in.	48 ¾" X 48 ¾"	
Overall length	in.	78"	
Overall width	in.	78"	
Overall height	in.	65"	
<b>Dimensions and weight (excluding curb)</b>			
Dry weight	lb.	900	
Wet weight	lb.	1100	
Upward discharge dry weight	lb.	1100	
Upward discharge wet weight	lb.	1300	

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# 7. Installation

Each DeltaStream installation project will be unique in scope. Additional installation documents are necessary and should be read in full before installation. The following section provides general instructions, and the site-specific installation document should be the primary reference in all scenarios.

## 7.1. Preparation

- Ensure that the DeltaStream unit is installed in a suitable location, typically a roof or ground location with supports.
- The installation should be free of vibration.
- Ensure a clearance of three feet around the device.
- Protect yourself using necessary equipment to prevent injury and falls.
- All fasteners should be weather-proof and secure.
- If the supporting structure is made of steel, ensure corrosion resistant measures are taken.
- The curb should have an outer diameter of 48" X 48" and a minimum height of 12". The curb may be taller depending on the roof deck thickness.

## 7.2. Installation onto a Roof Curb

**Danger of Moving Improperly**



Before installing the DeltaStream unit, ensure that the supporting steel structure and curb are in place. Check with a supervisor to ensure that the support structure will be able to withstand the unit's weight and confirm the curb location. Immediately report any deflections or bowing occurring in structural support.

Material, fastener type, installation locations, and installation methods are all site-specific information, and the site-specific installation instructions should be referenced. Some tools that may assist in the installation of a curb may include a screw gun, reciprocal saw, measuring tape, drill and bits, extension cord, utility knife, power shears, nibblers, snips, markers, mastics, caulking with gun, fasteners, double face tape, patch tape, acetone and wipes, chemical resistant rubber gloves, vacuum, and scissors.

Be sure that all members of the installation crew have completed safety training, have all protective equipment required by OSHA, and necessary fall protection equipment. Some general safety guidelines for roof installation include:

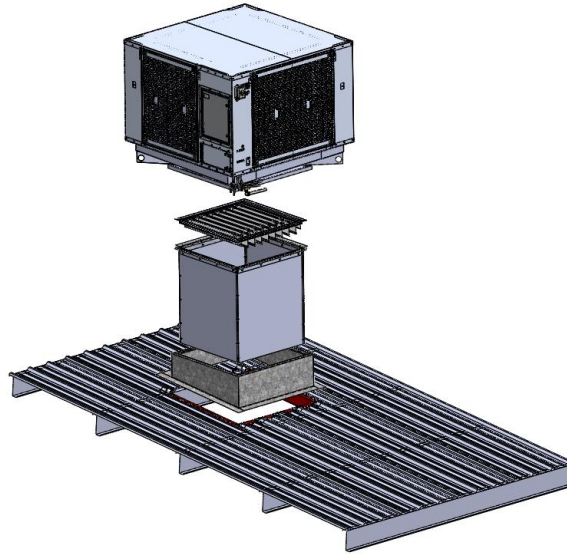
- Stay alert
- Wear a hardhat
- Never stand on skylights or translucent panels
- Wear a harness and attach to available tie off points

Consult the installation instructions, architectural plans, and any other supporting documents to construct the curb as per construction plans. Any changes to the curb installation or location should be consulted with a supervisor. After the curb is constructed and fastened, insert any ducting or dampers as per installation instructions, before proceeding with the installation of the DeltaStream unit. The initial ducting section and damper must be installed prior to mounting the unit on the curb. Additional steps may be required prior to inserting ducting and damper, consult site specific instructions.



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Before the DeltaStream unit is put onto the curb, any membrane roofing should be sealed to the curb. Lift the unit onto the curb via crane. The unit should be level to allow water to drain, shim as needed. Contact a Moffitt representative if shimming is to exceed 1 ½" (one 2X4), as excessive shimming may be a sign that a new curb is needed. Any shimming needed to fix a difference of slope greater than 0.5:12 should not be used, and a new curb should be ordered instead. Fasten the unit to the curb, damper, and ducting in the method that the installation document specifies.



**FIGURE 7.2** – DeltaStream Roof Curb Installation (downward configuration)

### 7.3. Installation onto a Supporting Structure at Ground Level

**Danger of Moving Improperly**

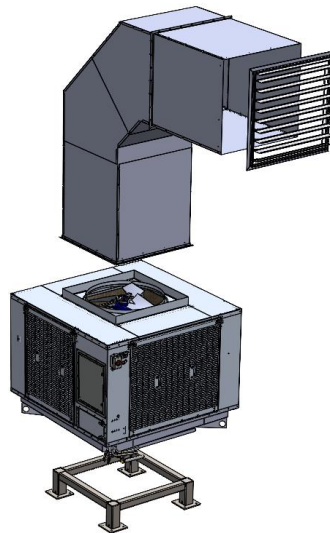


As with the previous section, make sure that all supporting documents have been read and are present. Follow all safety regulations and wear safety equipment.

Mount a DeltaStream stand to the desired installation location. Specific fastener, support structure, and installation instructions should be included in the installation documents.

When installing a DeltaStream unit at ground level, the DeltaStream is typically installed in the upward discharge configuration. Consult the project specific documentation to confirm the proper orientation and consult a Moffitt representative if you suspect that something is wrong.

Using a crane, lift the DeltaStream onto the DeltaStream stand, and use fasteners to secure the unit as per supporting documentation instructions. The unit should be level to allow water to drain, shim as needed.

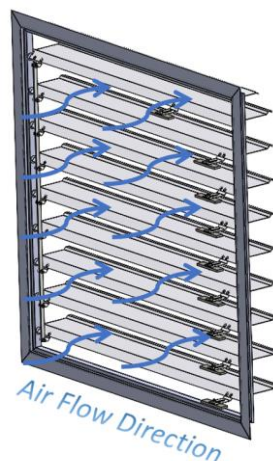


**FIGURE 7.3 – DeltaStream Ground Stand Installation (upward configuration)**  
**CAUTION: DO NOT USE THE DELTASTREAM UNIT TO SUPPORT THE DUCT WORK**

The ducting and damper will attach to the top of the DeltaStream unit; however, the unit should not be under any load to prevent the top from bowing. All support for the ducting and damper must be provided by the building or other structure, as the DeltaStream unit cannot support any downward load. The ducting will enter the building from the side, meaning the use of turning vanes should be used in the ducting design. For this reason, static pressure needs to be evaluated thoroughly when deciding to use the upward discharge unit. The damper provided for use in upward configuration is designed for horizontal flow and should be installed at the point where the ducting enters the building.

## 7.4. Damper

The damper is installed within the ducting before the entrance to the building. On a downward discharge DeltaStream system, the damper will be placed between the unit and the ducting, allowing the DeltaStream to sit on top of the flange. For an upward discharge DeltaStream system, the damper will be orientated horizontally and fastened to the ducting at the building entrance.



**FIGURE 7.4 – DeltaStream Backdraft Damper Example**

## 7.5. Supply Water Connection

### Risk of Damage from Frost



For hygienic reasons, the DeltaStream should only be connected to a potable, cold-water supply and connected as shown in the figure. Distilled/demineralized water should not be used, and softened water should not be used unless specifically designed through a Moffitt water treatment plan. Some sites may require specific water treatment. Consult a Moffitt representative to determine the best treatment for your DeltaStream supply water.

Pipework can expand under load. It is required to provide a section of flexible piping between the plumbing connection pipe and supply network. For all pipework, ensure that there are no torsional forces on the equipment. If the pipework is installed in a building, condensate water may occur as on any cold-water pipework. Any internal pipework should be insulated against condensate in a normal way.

During installation, check to make sure the supply water connection is on a slope and can be drained completely before freezing. All lines should be insulated against condensation. Depending on the site location, frost protection may be required.

A minimum of 40 psi and maximum of 125 psi should be supplied to a unit. The water load during peak hours could be up to 1 GPM per unit.

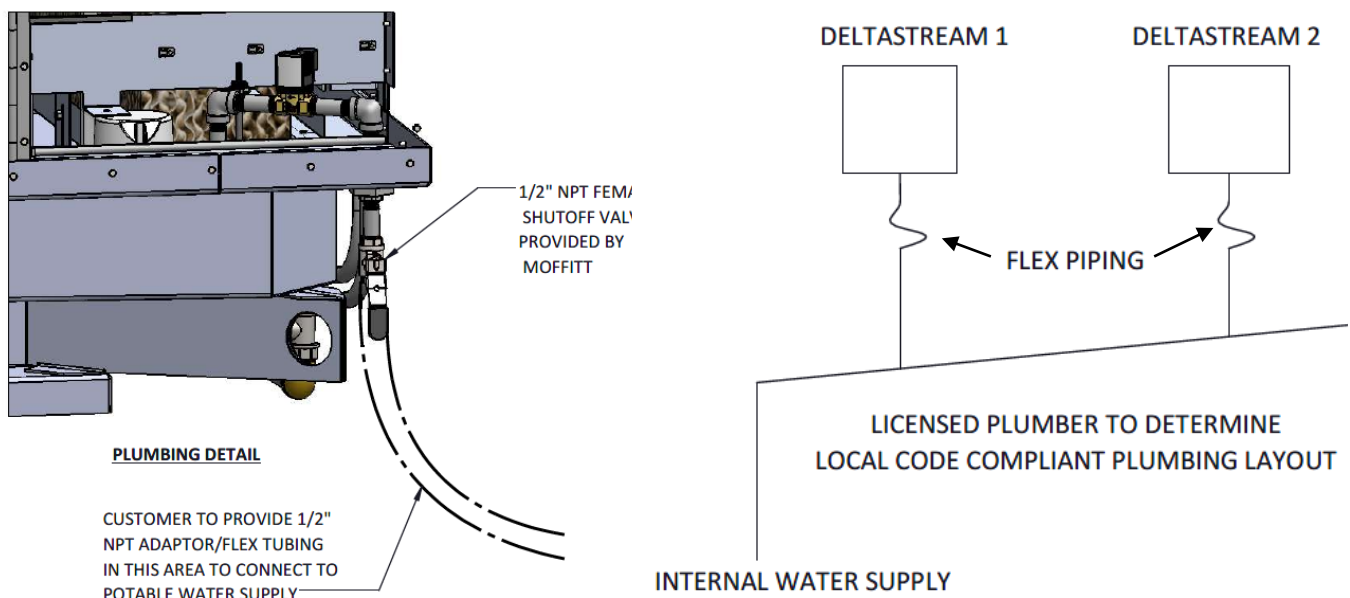


FIGURE 7.5 – Supply Plumbing Detail

## 7.6. Wastewater Connection

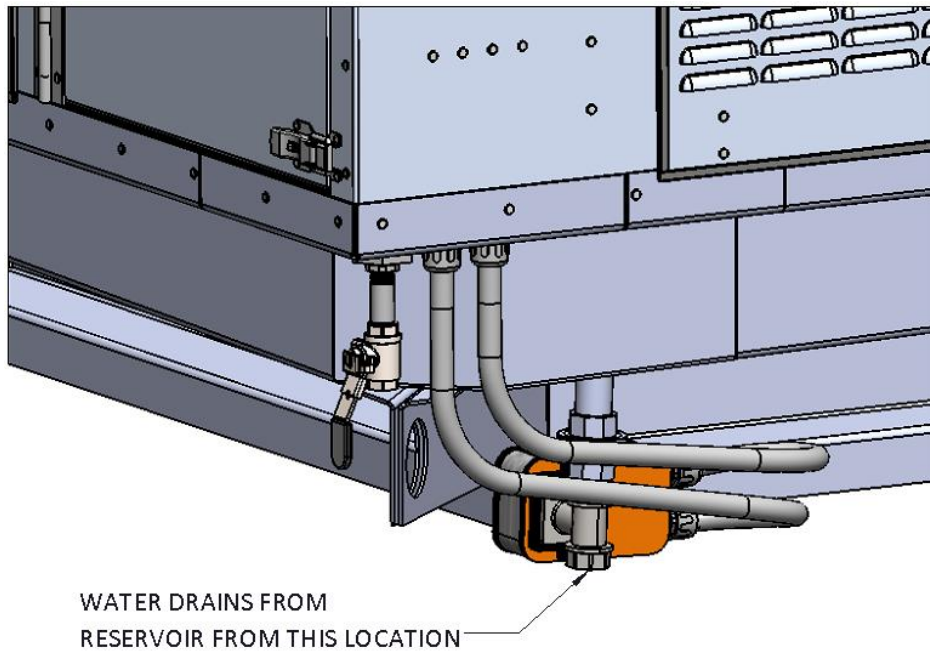
### Risk of Damage from Frost



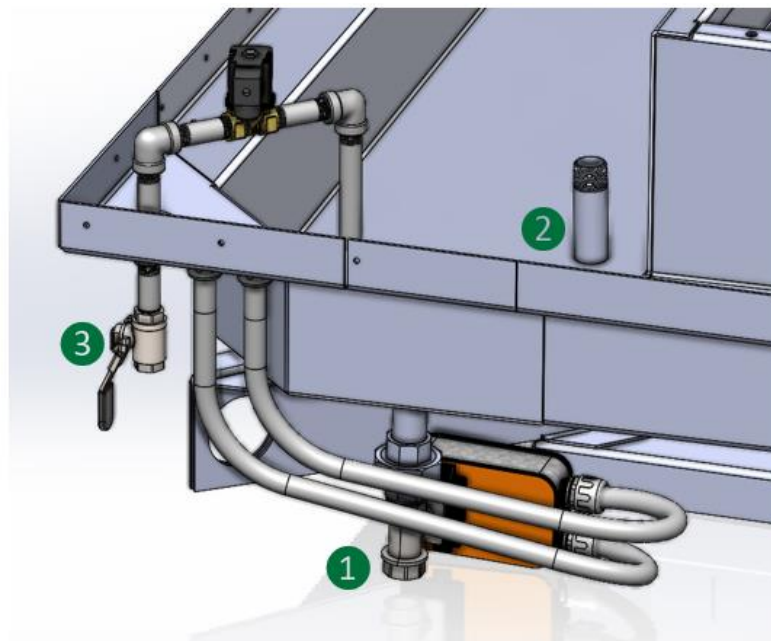
Wastewater is automatically drained at the same corner that the water supply enters the unit. The drain is operated by a spring open/power closed actuator. The drain may be required per local code requirements to be connected to a gutter system rather than depositing it directly onto the roof – see supporting documentation.

The overflow drain provided with each unit (separate from actuated valve), drains onto the roof in the event of a drain failure. Consult the local plumbing code before draining onto the roof, as certain jurisdictions require full drainage piping.

A 90-degree fitting and 10" tube ship loose with the unit. This is the recommended connection to the actuated drain and forces water to drain away from the unit. No additional piping other than what is shown is provided by Moffitt. Consult local plumbing code on waster water plumbing requirements, as some jurisdictions allow drainage to the roof while others require full drainage piping. If the customer extended this pipe, care must be taken to ensure the drain is not restricted or disturbed. Failure to do so may cause the reservoir to overflow.



**FIGURE 7.6a** – Drain Plumbing Detail



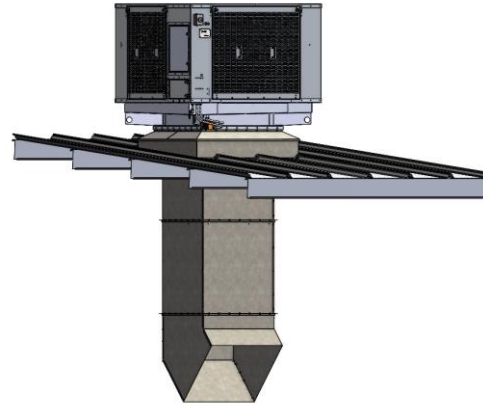
**FIGURE 7.6b** –Actuated Drain (1), Overflow Drain (2), and Incoming Plumbing (3)

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## 7.7. Duct Connection

### 7.7.1. Downward Configuration Ducting

The downward configuration DeltaStream unit is normally roof mounted. After the curb is attached to the roof, the duct should be dropped through the curb. The duct should be able to sit on the top flange of the curb, and the damper may be placed on top of it. When the ducting and damper are installed, the DeltaStream may be lifted and installed onto the curb. Fasten all components as indicated by site installation instructions.

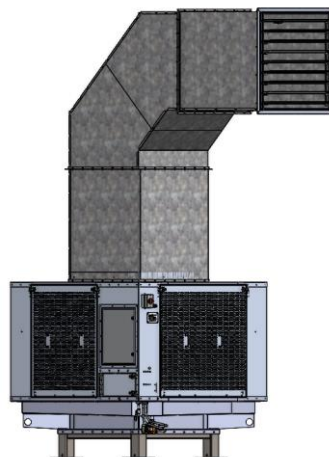


**FIGURE 7.7.1** –Downward Discharge Typical Ductwork

### 7.7.2. Upward Configuration Ducting

The upward configuration will be installed on the ground or solid structure, normally on top of a stand. The DeltaStream unit must be secured to the ground stand before any ducting is attached. No loads may be placed on the DeltaStream top, so ensure that all ducting is supported by another structure or the building itself. The order of installation should be as follows: stand, DeltaStream unit, ducting and damper at building intake, and then duct connection between unit and ductwork.

All ducting should be a minimum of 42" X 42" on the inner surface to ensure proper connection to the DeltaStream unit.



**FIGURE 7.7.2** –Upward Discharge Typical Ductwork

## 7.8. Electrical Installation

### Danger of Electrocutation

Each DeltaStream requires 480VAC, 11A power wired to the disconnect, and an ethernet cord from the central controller. Ethernet can be daisy-chained between multiple units. Max ethernet cable length is 300 ft between any two units, including the central controller. Ethernet cable must be CAT 5e or higher.

All internal wired electrical connections are done per order at Moffitt's manufacturing facility. All wiring on installation should be external to the DeltaStream. It is not permitted to route any power wiring through the unit, it must run directly to the disconnect. Ensure that the 30A disconnect is located on the outside of the unit to the right of the control box. If this is missing or damaged, contact Moffitt immediately.

An adequate power supply as indicated in the submittal documents will be provided by the customer. The following items must be field wired by a licensed electrician:

- Power supply
- Ethernet network cable between the units and central controller
- Indoor and outdoor sensor installed and terminated to central controller.
- Building-side circuit protection (if required)

All wiring must be done by a licensed electrician. Failure to do so could result in injury or death. The electrician is responsible for following all NEC guidelines, including but not limited to wire sizing, electrical conduits, and ground level breakers.

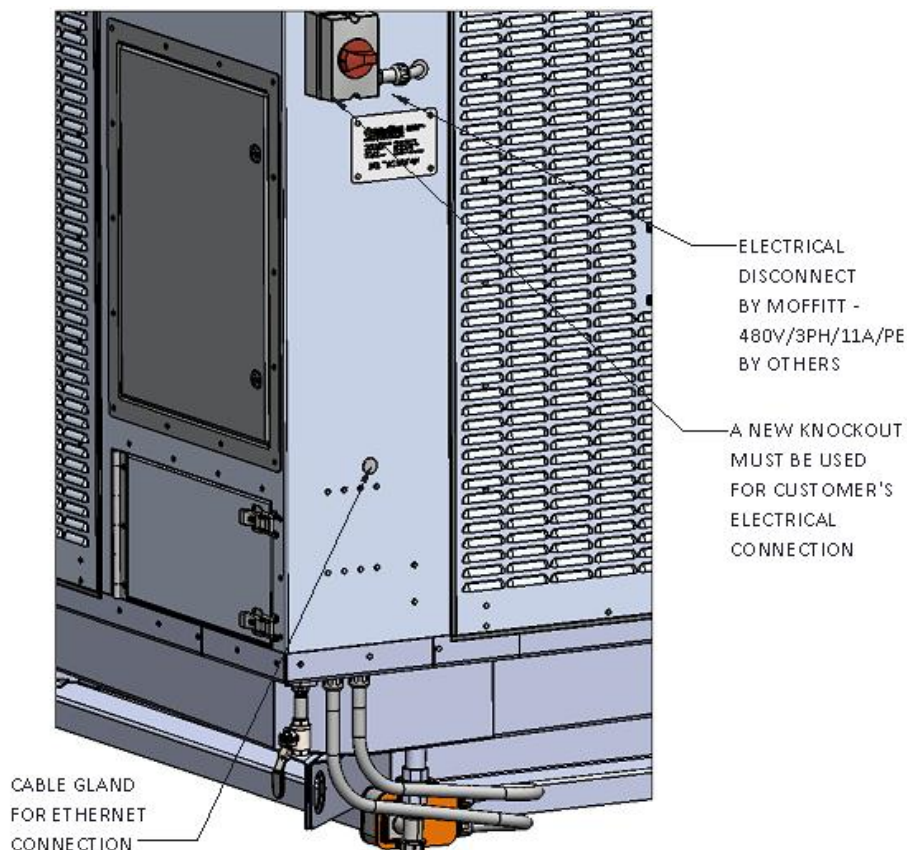
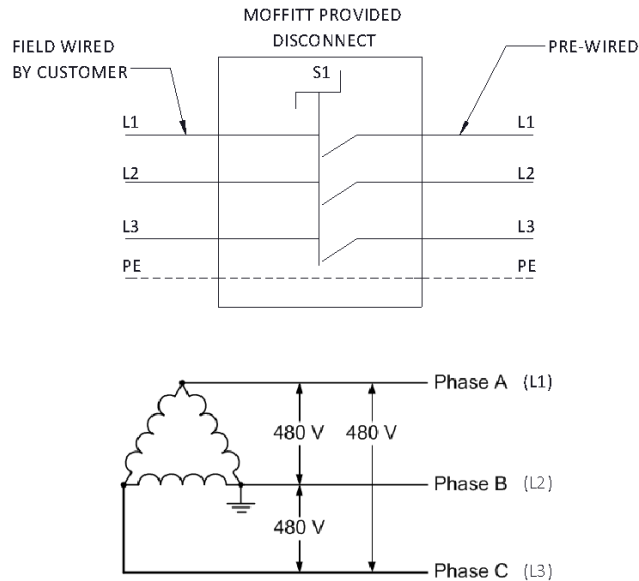
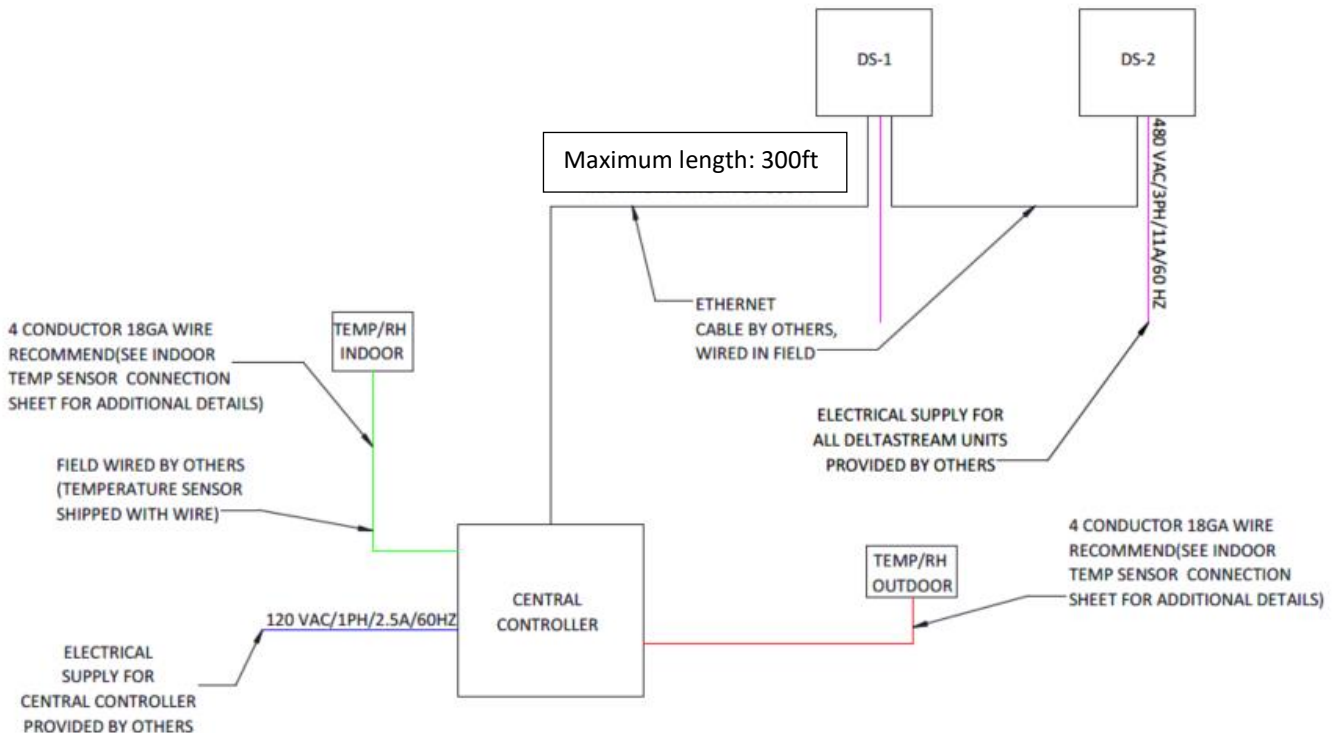


FIGURE 7.8a – Wire Connections

Moffitt provides a circuit breaker internally within the unit to protect the electrical circuit from damage caused by overcurrent/overload or short circuit.

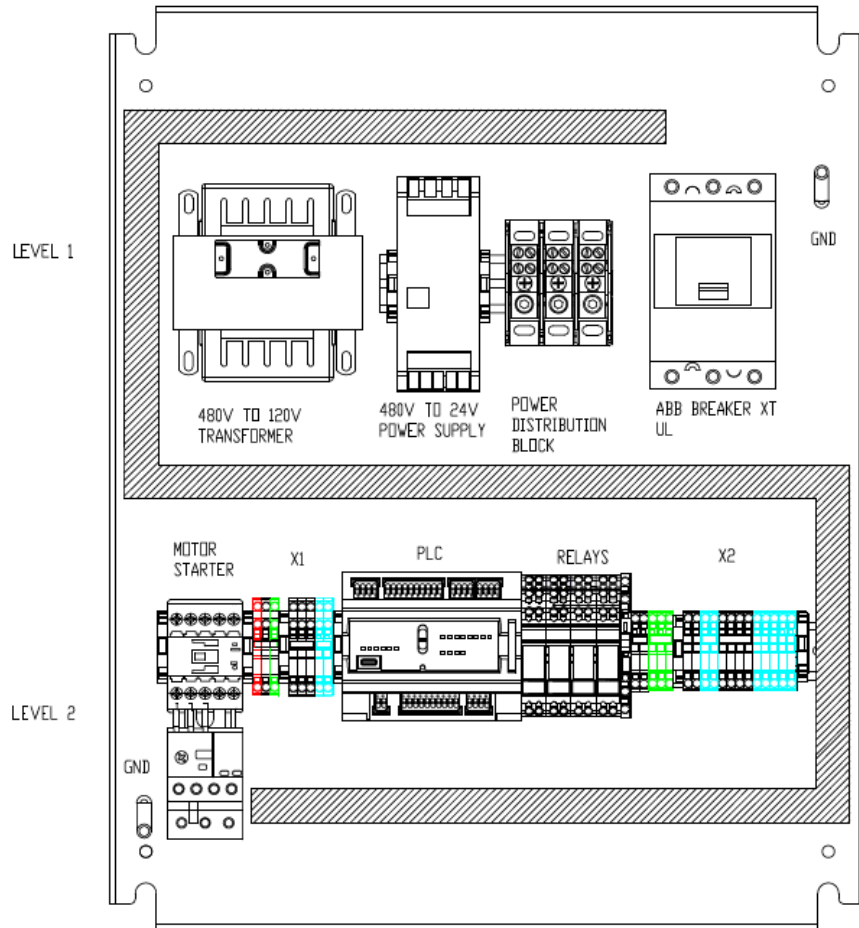


**FIGURE 7.8b – Wiring Diagram (Power Termination and Phase Diagram)**

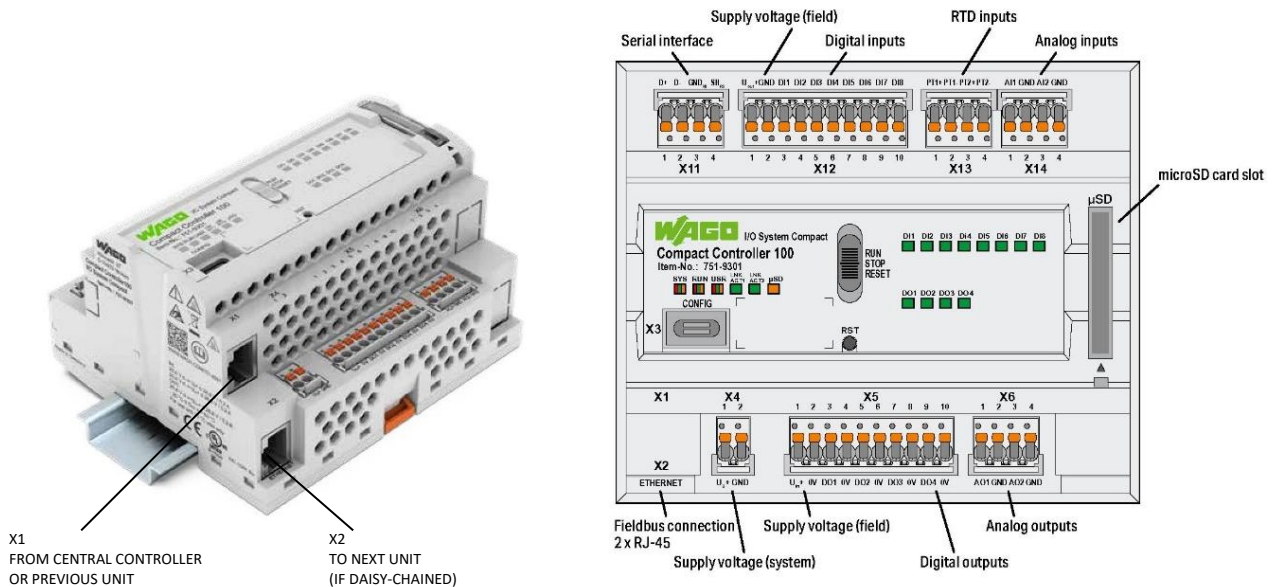


**FIGURE 7.8c – Central Controller Layout**

The central controller can be wired to up to 20 DeltaStream units. Any additional units will require another central controller.



**FIGURE 7.8d** – DeltaStream Control Panel Enclosure Components



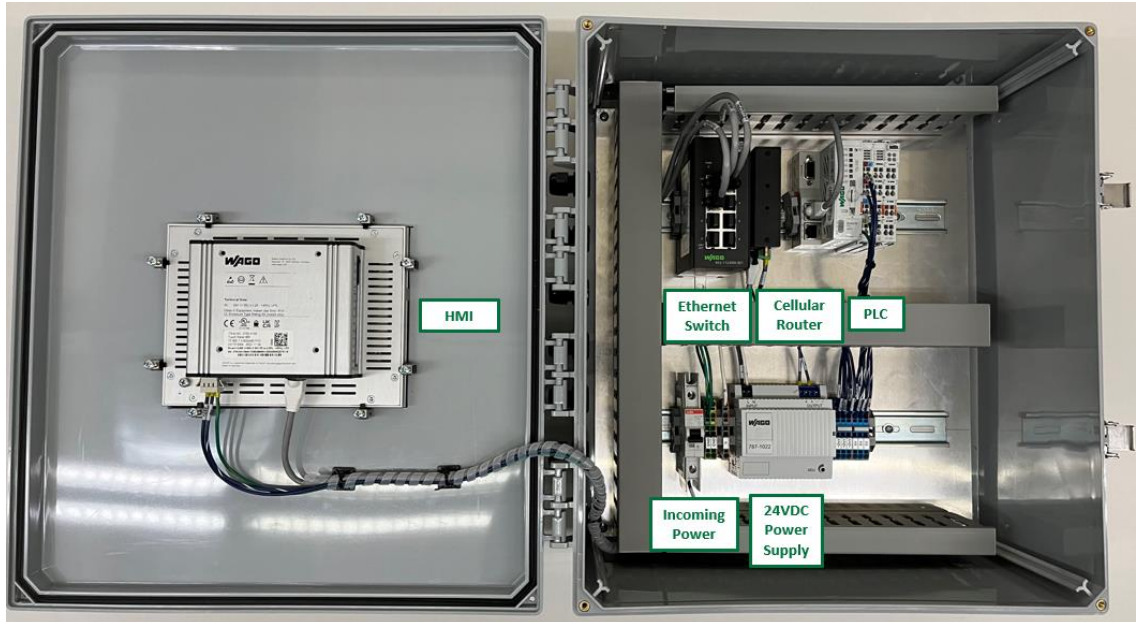
**FIGURE 7.8e** – DeltaStream PLC Diagram and Port Locations



## 7.9. Central Controller Installation

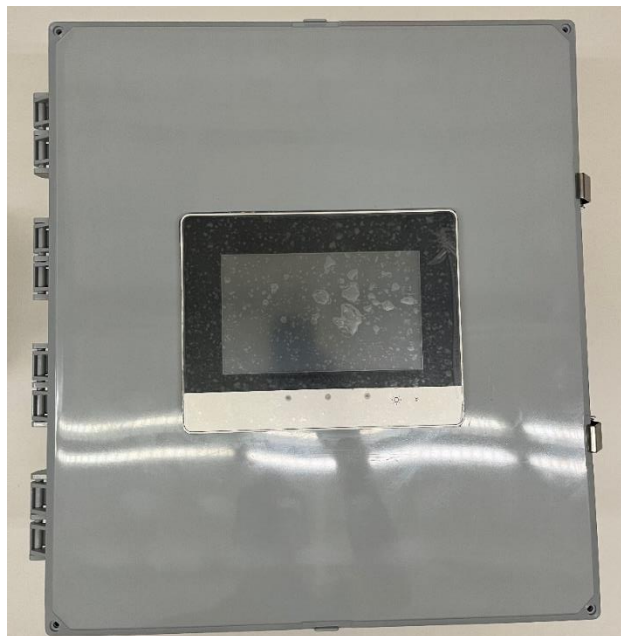
**Danger of Electrocutation** 

The central controller should be installed indoors in a cool, dry place. Make sure that there is enough space to access wiring for maintenance. A 120V standard power connection is required and follow all associated wiring diagrams. The central controller will come pre-assembled, and all internal components and wiring should be present upon delivery. If you suspect issues with your central controller, contact a Moffitt representative for inspection.



**FIGURE 7.9a** – DeltaStream Central Controller Interior

All ethernet connections to and from the DeltaStream units should connect to the ethernet switch.

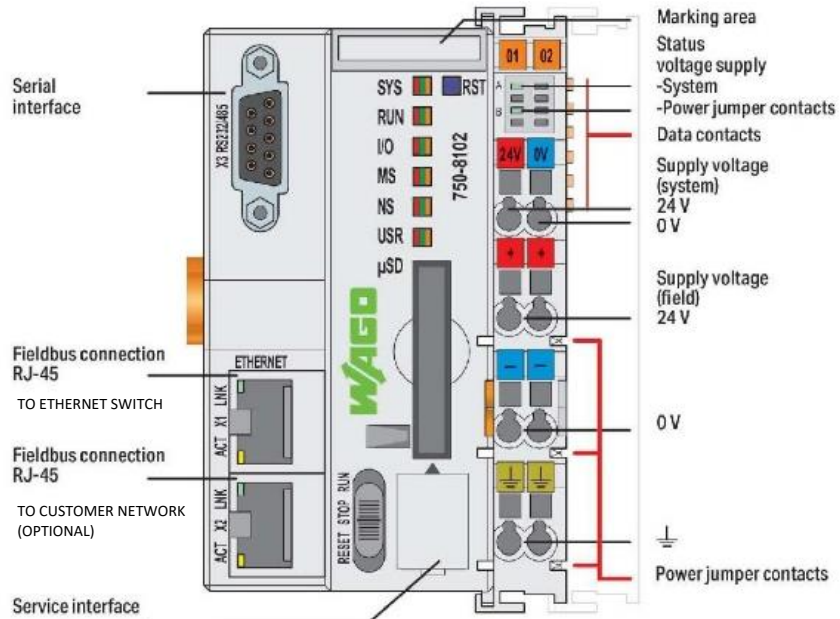


**FIGURE 7.9b** – DeltaStream Central Controller Exterior

The central controller should be wall mounted using the provided mounting feet. These mounting feet are attached to the back side of the central controller, which can then be mounted to the wall. Wall mounting fasteners are dependent on the wall medium and are provided by the installer.



**FIGURE 7.9c** – Central Controller Mounting Feet



**FIGURE 7.9d** – Central Controller PLC Layout and Ethernet Port Connections

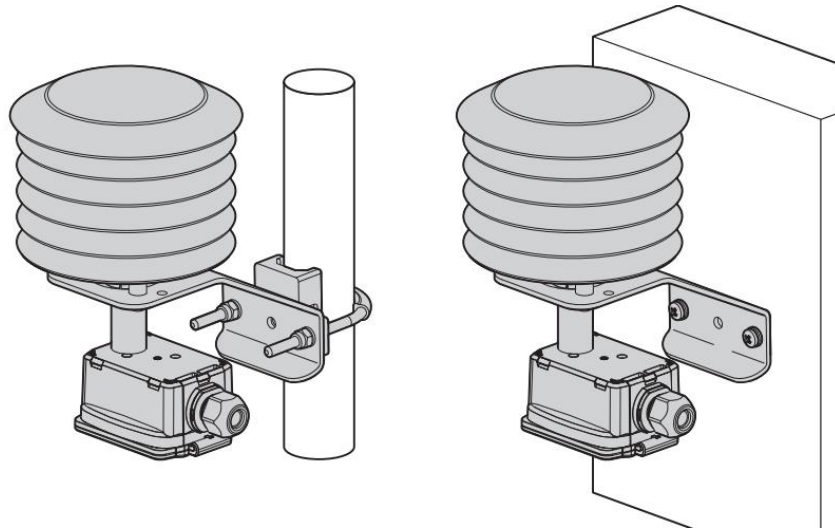
## 7.10. Sensor Installation

**Danger of Electrocutation**



### 7.10.1. Outdoor Sensor

A licensed electrician should perform all wiring for sensor. The indoor and outdoor sensors are the same, Belimo 22UTH-530X models. Both require the same mounting and wiring system. The radiant shield assembly can be mounted using a standard fastener or the provided U-bolt assembly. The 22UTH sensor is then inserted into the radiant shield assembly.



**FIGURE 7.10.1a** – Sensor mounting methods.

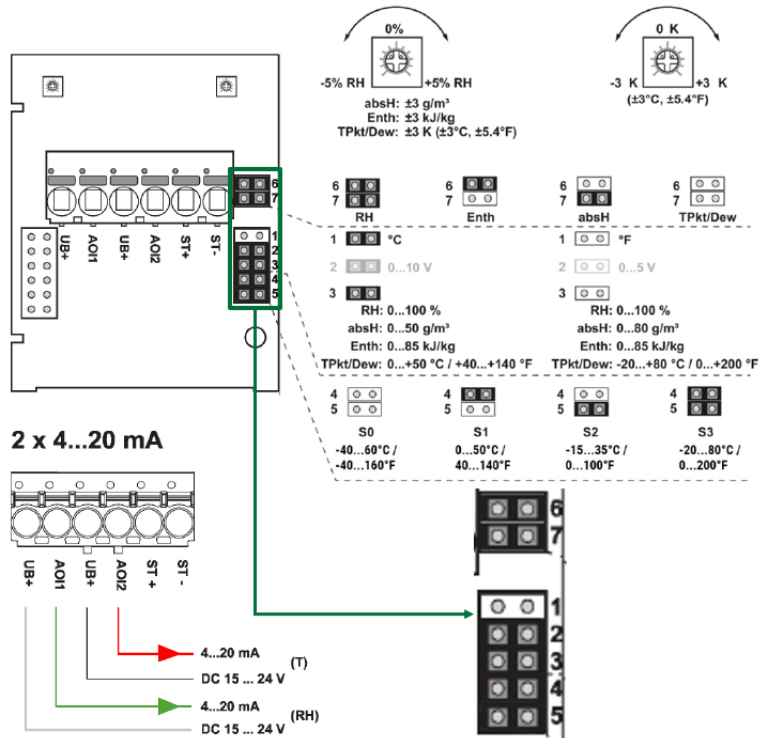
The optimal location for an outdoor sensor will be well ventilated, and protected from harsh environmental conditions, such as high ambient temperature, high humidity, and corrosive gases such as chlorine, ozone, and ammonia. Do not install the sensor under any projecting roof, or in a location exposed to exhaust air.

Some caution should be used when working with or around the sensor. The radiant shield is not attached to the sensor when unboxing and should be attached immediately. Take care to not touch the sensitive humidity sensor. Doing so will void the warranty on the sensor.



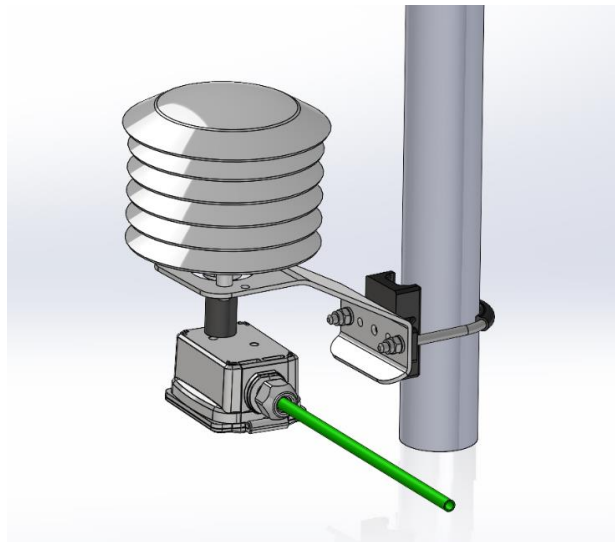
**FIGURE 7.10.1a** – Sensor without radiant shield with radiant shield exposed.

When wiring the outdoor sensor to the central controller, ensure that power is supplied to both the temperature and humidity analog inputs for proper operation. The wiring diagram for the sensor can be seen below.



**FIGURE 7.10.1b** – Sensor wiring

The colored lines above are associated with the recommended conductor color. From left to right: white, green, black, and red. Moffitt will provide 100 ft of wiring for sensor installation.



**FIGURE 7.10.1c** – Example installation with wiring.

For a more in-depth wiring diagram regarding the temperature sensor, see Appendix B. For a wiring diagram of the entire system, refer to figure 7.8c.

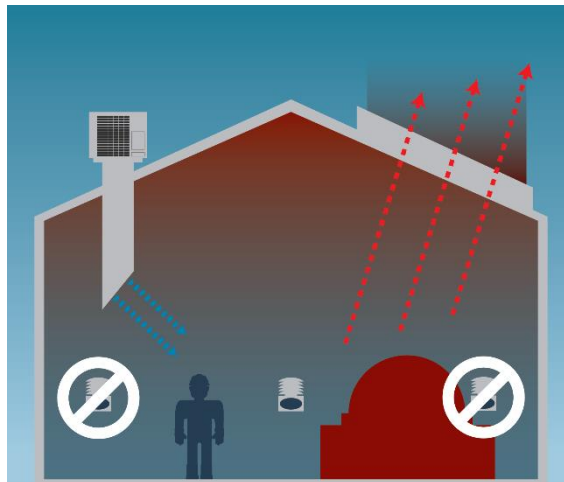
### 7.10.2. Indoor Sensor

All wiring and mounting instructions apply to the indoor sensor in addition to the outdoor sensor. See previous section for more details.

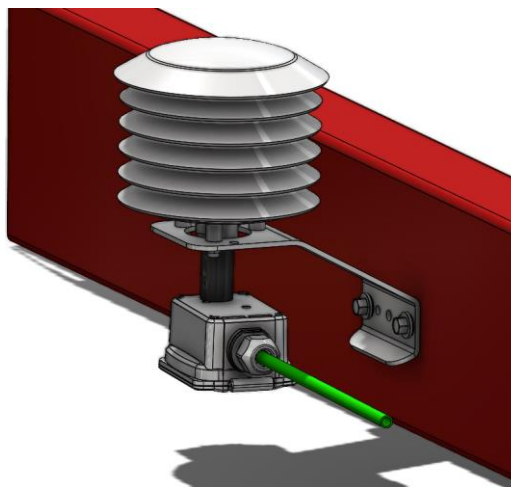
The placement of the indoor sensor differs from that of the outdoor sensor. The optimal location for the sensor is where the cooling effect is desired the most. This is often called the target area, typically where the most people are present. The sensor should be placed in this area around head height.

Do not place the sensor in a corner or crowded space. Do not place the sensor near a radiant heat source, such as near an industrial furnace. Do not place the sensor on an outdoor wall without insulating material. Do not place it near door, window, or other openings, as intake air from these sources may cause inaccurate readings. Do not place the sensor near an intake air source, such as DeltaStream ducting. Instead look for a place between the intake air and the heat source where workers will be residing in the most.

Other precautions still apply. See previous section. For a wiring diagram of the entire system, refer to figure 7.8c.



**FIGURE 7.10.2a** – Indoor Sensor Potential Locations



**FIGURE 7.10.2b** – Wall Mounted Indoor Sensor

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## 8. Commissioning

Risk of Damage Under Improper Commissioning



Danger of Electrocutation



Do not turn on the DeltaStream unit unless the commissioning has been carried out. Commissioning requires special knowledge and is conducted by Moffitt personnel only.

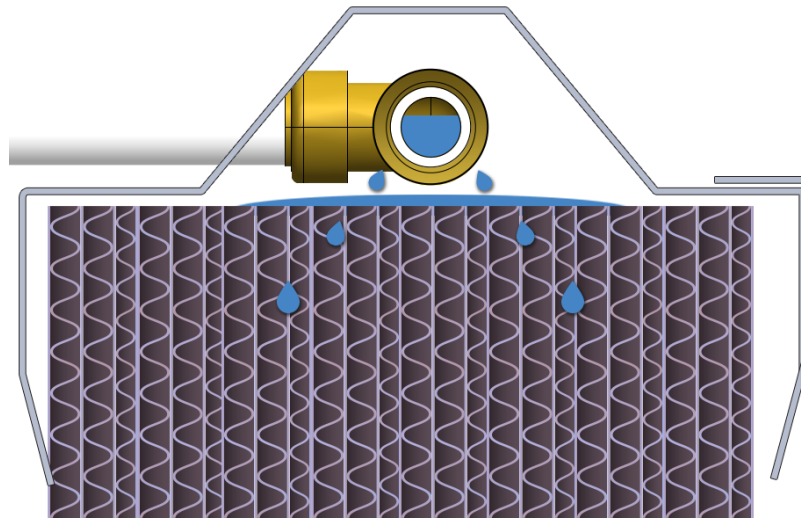
## 9. Operation

### 9.1. Water Distribution System

Risk of Damage from Frost

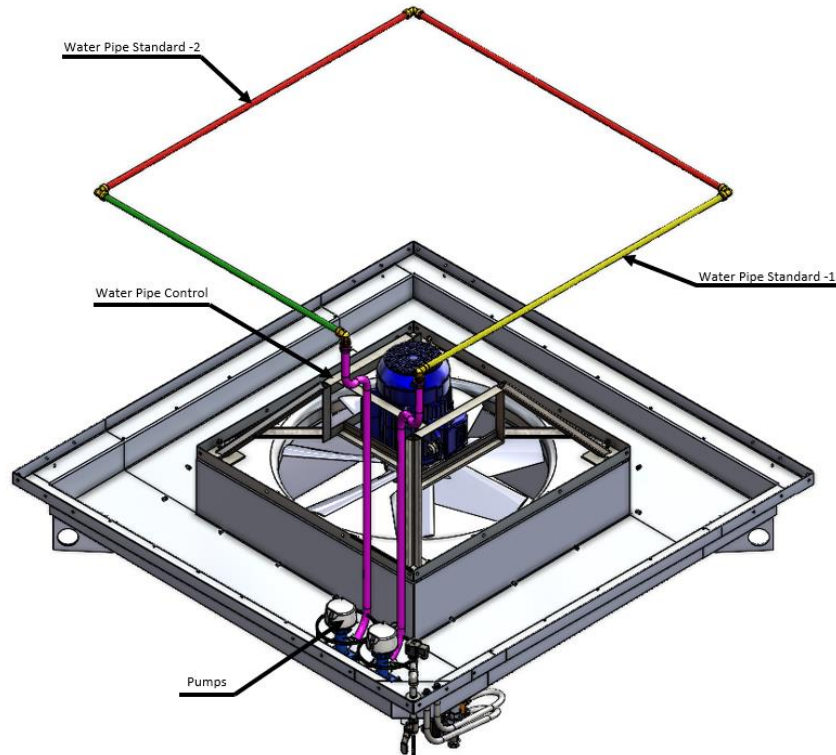


The water distribution system is operating during cooling mode. Water is pumped in from the supply to the reservoir at a minimum of 40 psi and maximum of 125 psi. The pumps will transport the water to the plumbing above the media.



**FIGURE 9.1a** – Water distribution section view

As the water is transported throughout the plumbing, it is distributed across the media through holes in the tubing. The water runs through the media, dampening the entire surface. Water runs off the bottom of the media into a reservoir, where it can then be pumped through the plumbing again.



**FIGURE 9.1b** – Water distribution system

In scenarios where the evaporation rate is high, the concentration of dissolved solids can escalate quickly within the reservoir, which may damage the media. The two solutions to prevent media damage are to either allow some water to bleed off throughout operation or contact a Moffitt representative for recommendations on a site-specific water treatment plan. Over-softening the water source may be more detrimental to the media than hard water. Contact a Moffitt representative to determine a plan that will maximize the life of the media.

## 9.2. Operation Modes

The DeltaStream units have four operating modes that are run by the PLC controller. If a specific system is non-operational, check the operation mode before proceeding with any inspection, maintenance, or repair. The DeltaStream operation modes are:

1. Cooling mode – The DeltaStream will operate based on temperature setpoints within the program. If the indoor temperature is above the max indoor temperature threshold, the water will start filling into the unit and will begin cooling shortly thereafter.
2. Fan Only Mode – Only the fan operates based on the temperature setpoints. No cooling functions will activate in this mode.
3. Make Up Air Option – If the unit is in Cooling or Fan Only mode, the fan will continue to operate regardless of setpoints.
4. Test Mode – Allows for commissioning and testing of the unit. Each component can be operated individually.
5. Error Mode – The mode is divided into two separate functions. In warning mode, a problem exists that does not affect the vital functions of the DeltaStream, and the unit will continue to run and cool while displaying a warning. In error mode, a vital system has ceased to function properly. All functions will cease to be active until the problem is resolved.
6. Off – Unit main functions remain off: fan is off, solenoid closed, drain open.

---

### 9.3. Set Points

DeltaStreams operate within assigned set points, and operation mode may change when outside desired set points. The set points are defined as

1. Minimum Indoor Temperature – If the indoor temperature drops below this set point during operation, the unit will turn off. Recommended setting: 60-70°F
2. Maximum Indoor Temperature - If the indoor temperature rises to this set point and the operation mode is cooling mode, cooling mode will begin. If fan only mode, the fan will turn on at this set point. Recommended setting: 75-85°F
3. Maximum Indoor Humidity – If the indoor humidity rises above this set point, the units will turn off. Recommended setting: 80-85 RH.
4. Minimum Outdoor Temperature – If the outdoor temperature drops below this set point, cooling mode will turn off. Fan only mode will still operate. Recommended setting: 55-65°F
5. Maximum Outdoor Humidity – If the outdoor humidity rises above this set point, the units will turn off. Recommended Setting: 80-85 RH.

### 9.4. How to Turn Off the DeltaStream

The two proper shut down methods are to turn off the associated group using the central controller user interface, or to flip the disconnect switch to the right of control side panel.

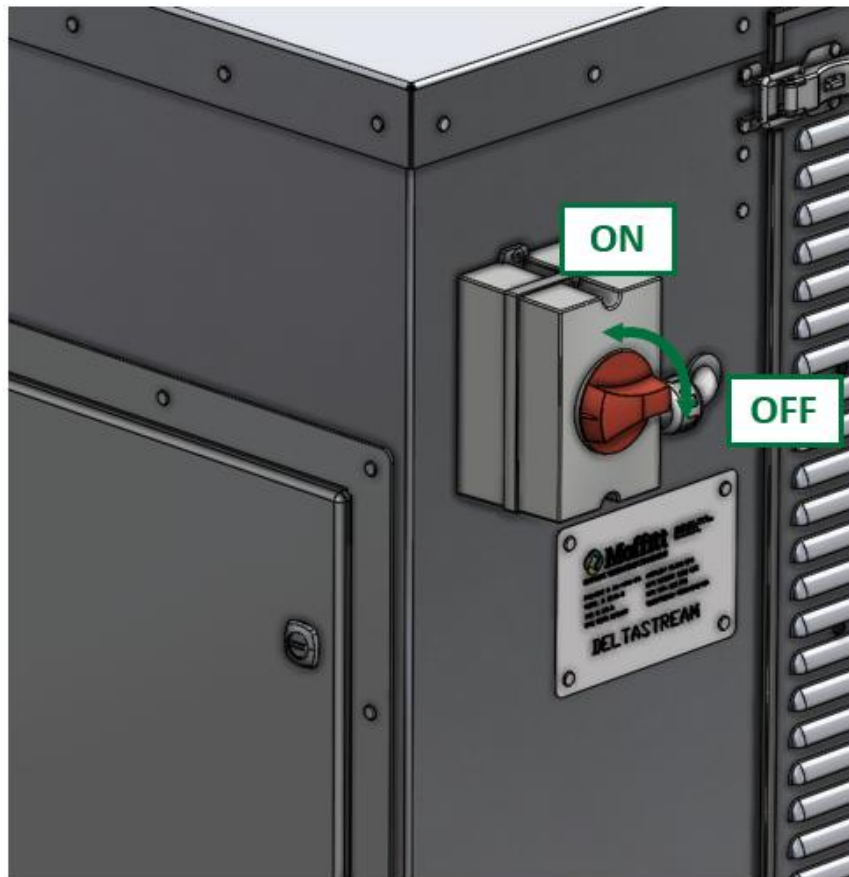


FIGURE 9.3 – Disconnect Switch

For shut off using the central controller, follow instructions on the user interface. See section 9.4.



## 9.5. User Interface

The user interface is streamlined to make it simple to control, monitor, and test the DeltaStream units. This section will provide an overview of the user interface, and will include a navigation tree, along with brief descriptions of each page. The login information is as follows:

- “Service” Username: service
- “Service” Password: 12345

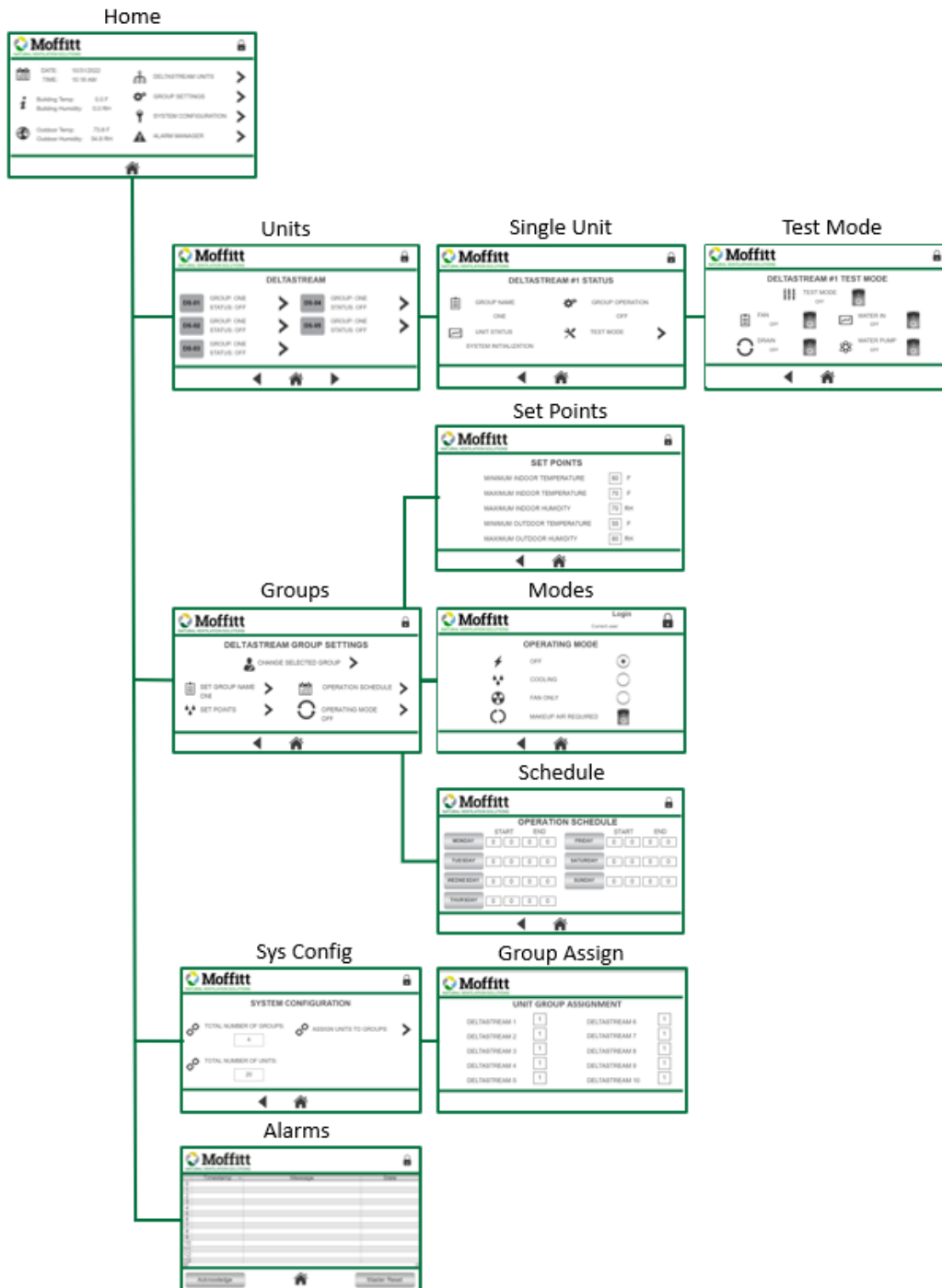


FIGURE 9.4 – UI Navigation Tree

### 9.5.1. Home Page

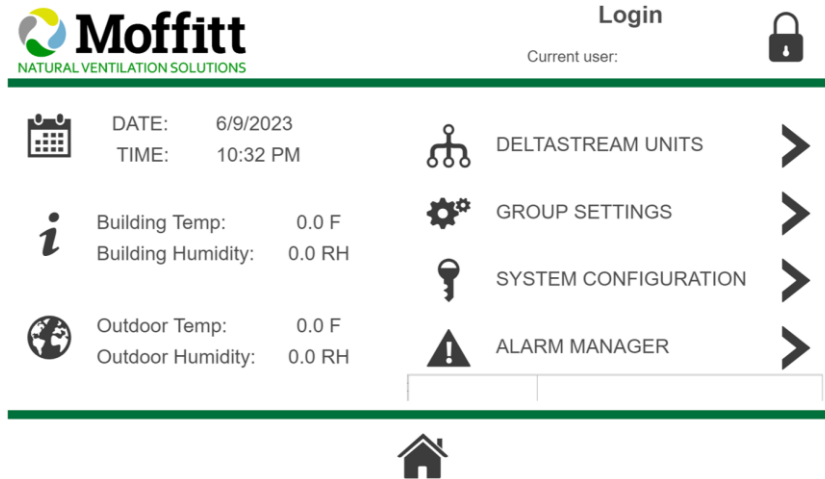


FIGURE 9.4.1 – UI Home Page

The home page displays essential information and allows the user to navigate to different sections of the user interface.

### 9.5.2. DeltaStream Units

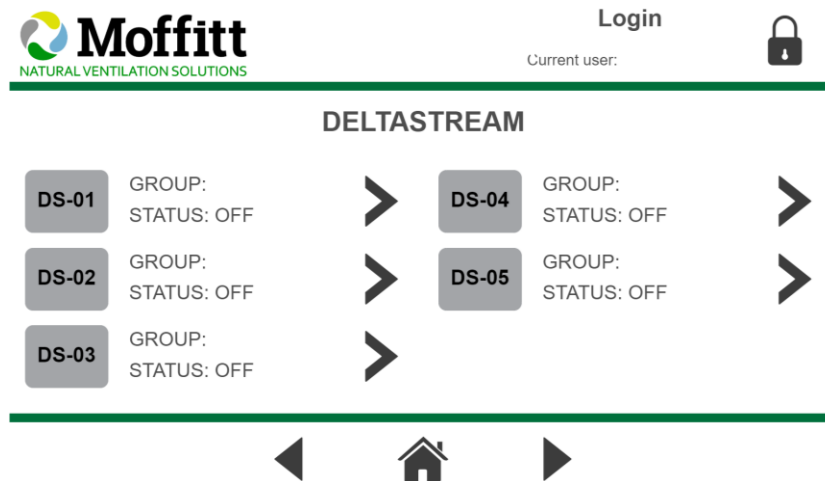


FIGURE 9.4.2a – UI DeltaStream All Units Page

The DeltaStream Units page displays five units at one time and will display the status and group of each unit. To display more units (if available) select the right arrow near the home button.

**DELTASTREAM #1 STATUS**

 GROUP NAME	 GROUP OPERATION OFF
 UNIT STATUS SYSTEM INITIALIZATION	 TEST MODE 













**FIGURE 9.4.2b** – UI DeltaStream Single Unit Page (Admin)

The DeltaStream Status page shows the individual status of a unit and allows the user to enter the unit’s test mode. Both items on the bottom row are not visible with no user logged in.



**DELTASTREAM #1 TEST MODE**

 TEST MODE OFF			
 FAN OFF		 WATER IN OFF	
 DRAIN OFF		 WATER PUMP OFF	












**FIGURE 9.4.2c** – UI DeltaStream Unit Test Mode

In test mode, the user can test each of the units’ separate functions.

**9.5.3. Group Settings**



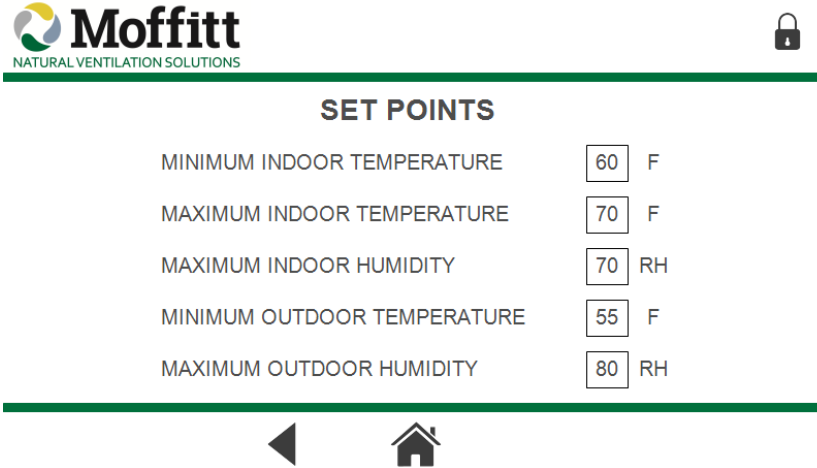
**DELTASTREAM GROUP SETTINGS**

 CHANGE SELECTED GROUP 	
 SET GROUP NAME: ONE 	 OPERATION SCHEDULE 
 SET POINTS 	OPERATING MODE: OFF 



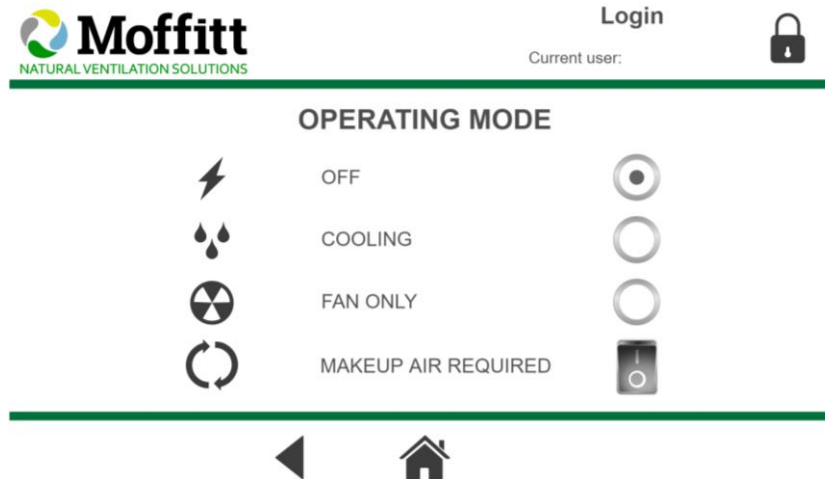
**FIGURE 9.4.3a** – UI DeltaStream Group Settings Page

The central controller allows for DeltaStream units to be separated into groups to perform the same function across multiple units, without having to set schedules and set points individually.



**FIGURE 9.4.3b** – UI DeltaStream Group Set Points Page

Assigning set points for a group sets a threshold for when a group of DeltaStream units will operate.



**FIGURE 9.4.3c** – UI DeltaStream Group Operating Mode Page

The user may set the operating mode of a group if desired.



**OPERATION SCHEDULE**

	START	END		START	END
MONDAY	0:00	0:00	FRIDAY	0:00	0:00
TUESDAY	0:00	0:00	SATURDAY	0:00	0:00
WEDNESDAY	0:00	0:00	SUNDAY	0:00	0:00
THURSDAY	0:00	0:00			



**FIGURE 9.4.3d** – UI DeltaStream Group Operating Mode Page

A schedule for each group for the week can be set to maximize efficiency with cooling throughout peak operation times. The Start and End times using a 24-hour clock.

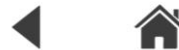
**9.5.4. System Configuration**



**SYSTEM CONFIGURATION**

TOTAL NUMBER OF GROUPS: 
 ASSIGN UNITS TO GROUPS

TOTAL NUMBER OF UNITS:



**FIGURE 9.4.4a** – System Configuration Menu

In the system configuration menu, the user can view the number of units, groups, and assign units to groups. If multiple indoor temperature sensors have been installed the administrator can assign the quantity. The maximum number of groups is 4 and the maximum number of units is 20. The minimum for both is 1.



**UNIT GROUP ASSIGNMENT**

	DELTASTREAM 1	<input type="text" value="1"/>		DELTASTREAM 6	<input type="text" value="1"/>
	DELTASTREAM 2	<input type="text" value="1"/>		DELTASTREAM 7	<input type="text" value="1"/>
	DELTASTREAM 3	<input type="text" value="1"/>		DELTASTREAM 8	<input type="text" value="1"/>
	DELTASTREAM 4	<input type="text" value="1"/>		DELTASTREAM 9	<input type="text" value="1"/>
	DELTASTREAM 5	<input type="text" value="1"/>		DELTASTREAM 10	<input type="text" value="1"/>

◀    🏠    ▶

**FIGURE 9.4.4b** – Unit Group Assignment

From this page, the user can assign units to separate groups for operation.

**9.5.5. Alarms**

**Moffitt**  
NATURAL VENTILATION SOLUTIONS

	Timestamp	Message	State
0	30.08.2023 23:44:36	DeltaStream #7 Connection Lost	Active
1	23.09.2023 01:10:29	DS #1 Fan Overload Detected	Active
2	09.09.2023 00:16:10	DS #4 Fill Time Exceeded Warning	Active
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

Acknowledge    🏠    Master Reset

**FIGURE 9.4.5** – Alarms

The alarms page shows any information, warning or errors present in the system. This page will display the time and description of any active alarms. Warnings are shown in yellow while errors which stop the system are shown in red. Connection errors have no background color, and the unit will operate on its last received command until connection is restored. To acknowledge, master reset or see the history of alarms the user needs to be logged in.

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# 10. Inspection, Maintenance, and Repair

DeltaStream units must be inspected and thoroughly tested semi-annually in the spring and fall seasons. Failure to do so could result in additional wear and malfunctions within the unit. A full inspection checklist can be found in Appendix A.

Maintenance should be carried out by a Moffitt-trained professional. Inspect after extreme weather conditions (e.g., storm, heavy snow, lightning). Promptly report any defects found to Moffitt so a professional may correct them.

## 10.1. General Inspection

**Danger of Moving Components**



**Danger of Unexpectedly Starting**



**Caution of Hazardous Material When Air Filters Are Dirty**



**Danger of Moving Improperly**



**Danger of Electrocutation**



### 10.1.1. Spring Maintenance

1. Switch off the unit properly. See section 9.4.
2. Remove perforated doors.
3. Check and clean the reservoir, level sensor, pump filter, and distribution piping thoroughly.
4. Check that the water supply is available.
5. Change air filters.
6. Hose down both sides of the desorption media carefully. Do not use excess water pressure as this may create 'holes' in the desorption medium and ensure that the cleaning is evenly distributed. Excessive water pressure or sharp objects can cause damage to the desorption media. ***(Note: Damaged desorption media must be replaced immediately and desorption media to be replaced every 3-5 years).***
7. Reassemble the unit. Pay special attention to correct alignment of the water distribution system. Proper arrangement and positioning of the water distribution pipes is essential for satisfactory cooling. The tubes are permanently marked by colored tape within the unit. (See figure 9.1b)

- 
8. Insert desorption media and air filter into unit according to the directions that the arrows indicate. See figures 10.2a-d for desorption media and distribution pad orientations, and 10.8a-b for air filter orientation.
  9. Switch on again using the disconnect switch.
  10. Let the unit cool and check its function. For this purpose, select the Automatic mode and lower the set point for a short time so that cooling is required. If the cooling system does not start, the outdoor temperature and / or the supply air temperature is too low. In this case, repeat in warmer weather.

Set operating mode and set point again to the desired value. If the unit is expected to be turned off following maintenance, you must manually dry the desorption media.

### 10.1.2. Fall Maintenance

1. Switch off the unit properly. See section 9.3.
2. Remove perforated doors.
3. Hose down both sides of the desorption medium carefully. Do not use excess water pressure as this may create 'holes' in the desorption medium and ensure that the cleaning is evenly distributed. Excessive water pressure or sharp objects can cause damage to the desorption medium. ***(Note: A damaged desorption media must be replaced immediately and desorption media to be replaced every 3-5 years).***
4. Check air filters and replace them if necessary. See figures 10.2a-d for desorption media and distribution pad orientations, and 10.8a-b for air filter orientation.
5. Check and, if necessary, clean the water distribution pipes located inside the unit above the desorption medium. When assembling, check the right order of the holes of the individual pipes. Reference figure 9.1b for proper piping layout.
6. Thoroughly clean and dry the reservoir, level sensor, pump, and pump filter.
7. Switch on again using the disconnect switch.
8. Test the functionality using test mode.
9. Assist the customer in draining the water supply pipe located outside to avoid frost damage.

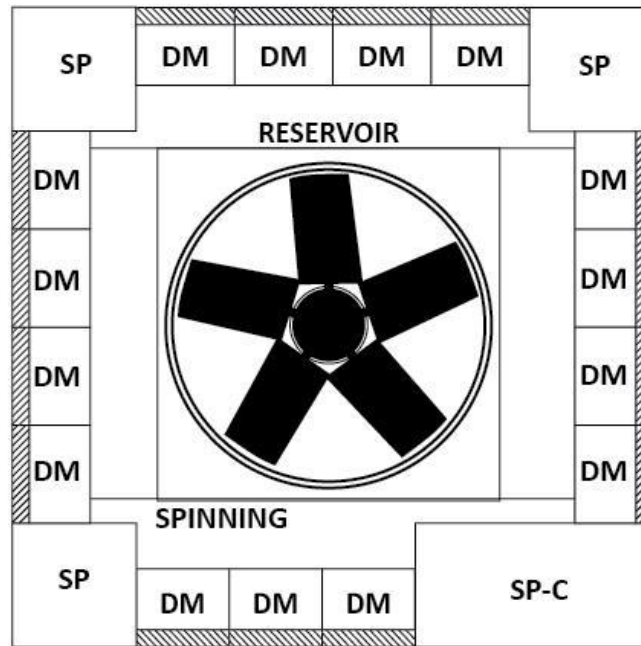
The average replacement time of the desorption media is 3-5 years. Ask a Moffitt representative or qualified inspector to check if your system needs these components replaced.

## 10.2. Evaporative Cooling Media

The DeltaStream uses a state-of-the-art evaporative cooling media. Although the media is self-cleaning, self-supporting, and has a long operation life, maintenance and replacement may be required after a period of 3-5 years.



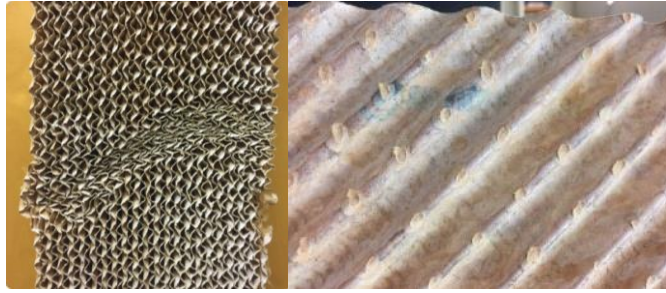
The media comes in sections that are 12” in length, 48” in height, and 8” in depth. Four sections are used for the three standard sides, and three sections are used for the control side. The water distribution system uses about 50 GPM to properly wet the media, of which some is recirculated through the system.



**FIGURE 10.2a** – Desorption media layout  
**DM:** Desorption Media, **SP:** Side Panel, **SP-C:** Control Side Panel

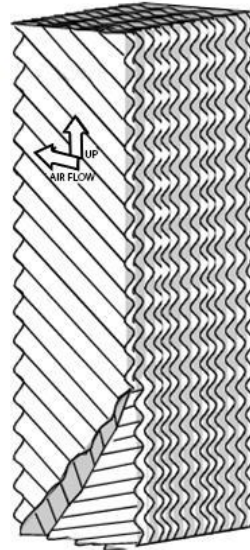
For maintenance, turn off DeltaStream and wait for media sections to completely dry. Remove from the unit and inspect for wear. The media is self-supporting, so if it is sagging under its own weight, it must be replaced. Hose down the filters to clean them. Do not use excessive water pressure as this could damage the media. If the media is exceptionally dirty, replace it immediately. Minor scaling on the surface is not considered a dirty media. Some scaling may extend the life of the media. If the media is heavily scaled, soft, fuzzy, collapsing, or old, it may need to be replaced. Contact a Moffitt representative if you believe your media needs replacing.





**FIGURE 10.2b** – Examples of media that need replacement.

To re-install the media sections, locate the arrows indicating the top side and airflow direction. These arrows are located on the side of the media. The media orientation is vital to effective cooling using the DeltaStream.



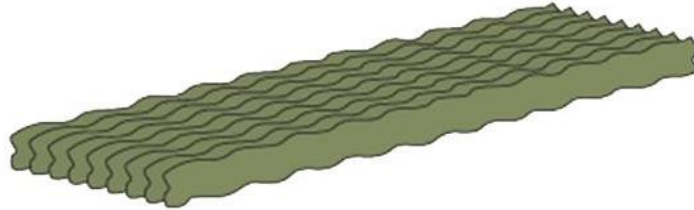
**FIGURE 10.2c** – Desorption media orientation



**FIGURE 10.2d** – Desorption media orientation arrows example

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The distribution pad which rests on top of the media sections is also essential to the DeltaStream unit's cooling function, allowing the media to wet entirely. Standard size is 48" in length, 2" in height, and 8" in depth, while the control side has a shorter length of 36". Rinse and inspect the distribution pad in the same method as the desorption media and replace immediately if damaged. Carefully remove any major scale buildup when cleaning. Re-install the distribution pad in any orientation that spans the length of the desorption media sections.



**FIGURE 10.2e** – Distribution pad

In scenarios where the evaporation rate is high, the concentration of dissolved solids can escalate quickly within the reservoir, which may damage the media. The two solutions to prevent media damage are to either allow some water to bleed off throughout operation or add a water treatment plan. Over-softening the water source may be more detrimental to the media than hard water. In niche scenarios, a Moffitt representative may need to determine a plan that will maximize the life of the media.

### 10.3. Fan

**Danger of Moving Components**



The fan is a rapidly rotating component that requires routine maintenance and close monitoring. Run the fan in test mode and check for any unusual performance, such as noise, vibration, or blowing air in the wrong direction. For fixing any of these issues, check the troubleshooting section 11, or consult a Moffitt representative.

### 10.4. Pumps

**Danger of Electrocutation**



Checking the pump filter is a part of standard maintenance. If the pumps are nonoperational, check to see if the fuse is out in the electrical cabinet. Contact Moffitt for additional troubleshooting.

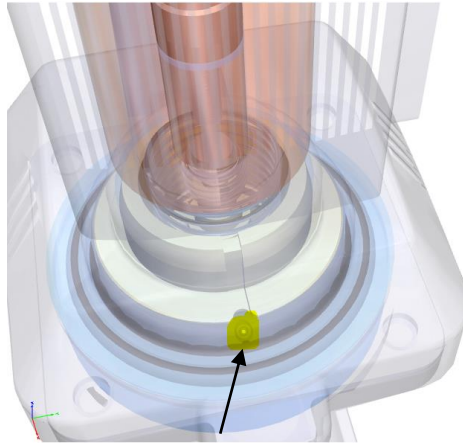
### 10.5. Solenoid

**Danger of Electrocutation**



The solenoid is a spring-closed, power-opened valve. Check and make sure that all plumbing is open before determining that the solenoid needs repaired.

If the solenoid is determined to be the source of the issue, clean the orifice with a pipe cleaning brush. If this does not resolve the issue, contact Moffitt for troubleshooting or a replacement part. Check for calcification, around the solenoid. Calcification may cause the valve to be stuck open. Disconnect the solenoid and attempt to clean the inside of the valve.



**FIGURE 10.5** – Solenoid Orifice (highlighted yellow)

## 10.6. Drain Valve

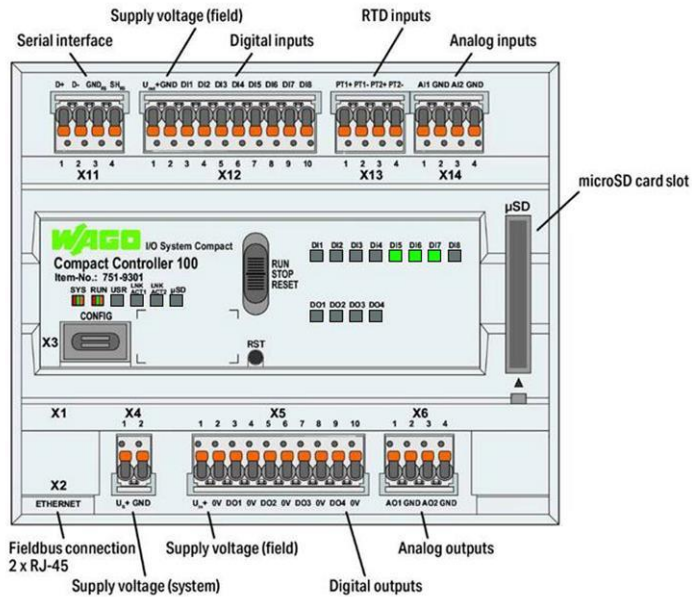
If water is not draining, then the drain valve may require cleaning. Using a pipe cleaning brush, clean the drain valve. If water still does not drain, the actuator may need troubleshooting. Contact Moffitt for more troubleshooting info.

## 10.7. Float Switches

Float switches are reed style sensors that provide digital signals to the PLC controller to verify testing and locate DI5, DI6, and DI7 indication lights on the controller. The low switch is linked to DI5, the middle switch is linked to DI6, and the high switch is linked to DI7.



**FIGURE 10.7a** – Float Switch



**FIGURE 10.7b** – PLC central controller with DI5, DI6, and DI7 lights on

If a float switch is malfunctioning, it may be stuck. Open the lower access door and remove any debris around the float switch if it is stuck. If the float switch needs replacement, contact a Moffitt representative.

## 10.8. Air Filters

**Caution of Hazardous Material When Air Filters Are Dirty**



DeltaStream units use a Merv 8 filter, and other filters of similar size are not recommended. The standard side filter size is 24" in length, 48" in height, and 2" in depth. Two of these are inserted next to each other, with the longer side running vertically on the three standard sides. The control side filter size is 36" in length, 24" in height, and 2" in depth. Two filters rest on top of one another on the control side, with the longer side running horizontally.

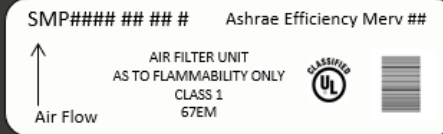


**FIGURE 10.8a** – Filter orientation

Ensure when re-installing the air filter, that the arrow points in the direction of the air flow.

DESORPTION MEDIA

FILTER



DOOR

**FIGURE 10.8b** – Filter airflow direction sticker

Replacing the filter is part of semi-annual maintenance but may require sooner replacement in some scenarios if the filter is exceptionally dirty. The filter may be washed if lightly soiled, but should be replaced immediately if exceptionally dirty, torn, or sagging.



**FIGURE 10.8c** – Dirty filter example

## 10.9. Spare Parts

Only use original equipment manufactured parts when making repairs. Any optional components not within the DeltaStream but are used within the overall system can have their IOMs provided upon request.

Spare Parts List		
Part	Description	Moffitt Part Number
Water Pumps	Pumps water through the distribution system.	DBP5
Solenoid	Controls water supply to the system.	ZIVZ
Float Switch	Monitors water level in reservoir.	RESQ
Propeller	Pumps air into building.	YE26
Fan Motor	Rotates propeller.	QG7P
Drain Actuator	Controls drain valve.	YX5S
Drain Valve	Drains water from reservoir.	YX5S
Temperature Sensor	Sends temperature readings to central controller.	BB7E
CPVC Control	Distributes water over control side media.	GWNQ
CPVC Standard 1	Distributes water over standard side media.	YEJC
CPVC Standard 2	Distributes water over standard side media.	M9HZ
Flex tubing	Runs water from the distribution pumps to the CPVC tubing.	4A7R
Hose Clamps	Connects flex tubing to water distribution pumps.	KMP3
Shark Bite Elbow	Allows for water-tight electrical wiring.	AAVC
Shark Bite Adapter	Allows for water-tight electrical wiring.	HH86
Pump Filter Screen	Filters debris from entering water distribution pumps.	J59D
Desorption Media Sections	Uses evaporative cooling to supply cool air to the system.	ZLSM
Distribution Pad Standard	Distributes water over the standard side desorption media.	BZZ2
Distribution Pad Control	Distributes water over the control side desorption media.	363X
Standard Filter	Filters air on the standard side.	KYAU
Control Filter	Filters air on the control side.	UD8A
Motor Starter	Controls the motor.	XTAE009B10A5E020
Transformer	480 VAC to 120 VAC 350 W transformer.	B350BTZ13JKF
Transformer Fuse 3.5 A	3.5 A fuse connects to transformer on the 480 VAC side.	EDCC 3.5
Transformer Fuse 4.5 A	4.5 A fuse connects to transformer on the 120 VAC side.	EDCC 4.5
Relay	Relay and socket, 24 VDC.	788-304
Circuit Breaker	3 phase, 15 A breaker.	XTINU3015AAA000XXX
PLC	Programable logic controller. 8DI 4DO 2AI 2AO.	751-9301
Terminal Block Fuse	5 A 250 V GLS BDY TD fuse.	GDC5A

# 11. Troubleshooting

## 11.1. Fan

Problem	Possible Causes
Excessive Vibration	<ul style="list-style-type: none"><li>• Propeller loose on shaft</li><li>• Out of balance propeller</li><li>• Excessive buildup of dirt/dust on propeller</li><li>• Bent shaft</li><li>• Weak mounting base for fan</li><li>• Fan mounting bolts loose</li><li>• Bearing or drive misalignment</li></ul>
Excessive Horsepower	<ul style="list-style-type: none"><li>• Static Pressure higher than design</li><li>• Wheel or propeller rotating in wrong direction</li></ul>
Too Little Air	<ul style="list-style-type: none"><li>• Restricted fan inlet or outlet speed higher than design</li><li>• Filters are dirty or clogged</li><li>• Wheel or propeller rotating in the wrong direction</li><li>• System is more restrictive (more static pressure) than expected</li></ul>
Too Much Air	<ul style="list-style-type: none"><li>• Filters not in place</li><li>• Fan speed is higher than design</li></ul>
Fan Does Not Operate	<ul style="list-style-type: none"><li>• Wrong voltage</li><li>• Electricity turned off or not wired properly</li><li>• Blown fuses</li><li>• PLC malfunction</li></ul>
Excessive Noise	<ul style="list-style-type: none"><li>• Propeller, wheel, or sheaves loose</li><li>• Bearing or drive misalignment</li><li>• Accumulation of material on propeller</li><li>• Worn or corroded propeller</li><li>• Wheel or propeller out of balance</li><li>• Wheel or propeller hitting housing</li><li>• Bent shaft</li><li>• Defective or bad bearings</li><li>• Bearings need lubrication</li><li>• Loose bearing bolts</li></ul>



## 11.2. Pump

Problem	Possible Causes
No Water/Little Water	<ul style="list-style-type: none"> <li>• Wheel or propeller rotating in wrong direction</li> <li>• Wheel or propeller rotation impeded or damaged</li> <li>• Wrong voltage</li> <li>• Loose wire connections</li> </ul>
Pressure Too Low	<ul style="list-style-type: none"> <li>• Wheel or propeller rotating in wrong direction</li> <li>• Wheel or propeller rotation impeded or damaged</li> <li>• Wrong voltage</li> <li>• Loose wire connections</li> </ul>
Pressure Too High	<ul style="list-style-type: none"> <li>• Debris in piping orifices</li> </ul>
Pump Does Not Operate	<ul style="list-style-type: none"> <li>• Wrong voltage</li> <li>• Electricity turned off or not wired properly</li> <li>• Clogged intake or filters</li> <li>• Blown fuses</li> <li>• Damaged impeller</li> <li>• PLC malfunction</li> </ul>
Excessive Noise	<ul style="list-style-type: none"> <li>• Wheel or propeller rotating in wrong direction</li> <li>• Wheel or propeller rotation impeded or damaged</li> <li>• Wrong voltage</li> <li>• Electricity turned off or not wired properly</li> <li>• Clogged intake or filters</li> <li>• Blown fuses</li> <li>• Damaged impeller</li> <li>• Loose wire connections</li> </ul>

## 11.3. Solenoid

Problem	Possible Causes
No Power	<ul style="list-style-type: none"> <li>• Wrong voltage</li> <li>• Electricity turned off or not wired properly</li> </ul>
Will Not Open	<ul style="list-style-type: none"> <li>• Wrong voltage</li> <li>• Electricity turned off or not wired properly</li> <li>• Magnet is worn</li> <li>• Solenoid coil is worn</li> <li>• Opening is stuck shut</li> <li>• Accumulation of material on orifice</li> </ul>
Will Not Close	<ul style="list-style-type: none"> <li>• Object in opening preventing solenoid from closing</li> <li>• Spring coil broken, tangled, or worn</li> <li>• Accumulation of material on orifice</li> </ul>
Won't Shut Off	<ul style="list-style-type: none"> <li>• Wrong voltage</li> <li>• Not wired properly</li> <li>• PLC malfunction</li> </ul>

## 11.4. Drain Valve

Problem	Possible Causes
No/Wrong Signal	<ul style="list-style-type: none"> <li>• Wrong voltage</li> <li>• Electricity turned off or not wired properly</li> <li>• Improper commissioning</li> <li>• PLC malfunction</li> </ul>
Not Opening	<ul style="list-style-type: none"> <li>• Wrong voltage</li> <li>• Electricity not wired properly</li> <li>• Valve stuck</li> <li>• Actuator spring malfunction</li> <li>• PLC malfunction</li> </ul>
Not Closing	<ul style="list-style-type: none"> <li>• Wrong voltage</li> <li>• Electricity turned off or not wired properly</li> <li>• Improper commissioning</li> <li>• Valve stuck</li> <li>• PLC malfunction</li> </ul>
No Power	<ul style="list-style-type: none"> <li>• Wrong voltage</li> <li>• Electricity turned off or not wired properly</li> <li>• PLC malfunction</li> </ul>

## 11.5. Float Switches

Problem	Possible Causes
No/Wrong Signal	<ul style="list-style-type: none"> <li>• Wrong voltage</li> <li>• Electricity turned off or not wired properly</li> <li>• Improper commissioning</li> <li>• PLC malfunction</li> <li>• Loose wiring</li> <li>• Splice damaged or lose</li> <li>• Water damage from improper snorkel sealing</li> <li>• Sensor damaged</li> </ul>
Signal On Without Water	<ul style="list-style-type: none"> <li>• Wrong voltage</li> <li>• Electricity not wired properly</li> <li>• Float sensor stuck</li> <li>• Magnets malfunctioning</li> <li>• PLC malfunction</li> </ul>

## 11.6. Central Controller and Alarms

Problem	Possible Causes
HMI Not Displaying/Connection Error	<ul style="list-style-type: none"> <li>• Program loading, please wait 10 minutes before troubleshooting</li> <li>• Connection interrupted, check ethernet cord running to PLC</li> <li>• HMI or PLC is in Stop</li> <li>• HMI WBM Settings configuration issues</li> </ul>
Unit Connection Lost	<ul style="list-style-type: none"> <li>• Unit ethernet cable is unplugged , damaged, or not secure</li> <li>• Ethernet switch is not connected</li> <li>• Lost power to unit</li> <li>• Unit disconnect is off</li> </ul>
Group Outdoor Temperature Below Minimum Set Point	<ul style="list-style-type: none"> <li>• Temperature outside is too low and units have turned off</li> <li>• Outdoor temperature set point is too high</li> <li>• Temperature sensor wired incorrectly</li> </ul>
Group Humidity Above Set Point	<ul style="list-style-type: none"> <li>• Indoor/Outdoor humidity is too high and units have turned off</li> <li>• Humidity set points are too low and units have shut off</li> <li>• Temperature sensor wired incorrectly</li> </ul>
Fan Overload Detected	<ul style="list-style-type: none"> <li>• Excess power supplied to the unit</li> <li>• Fan overload not set to 8 A on the motor starter</li> <li>• Fan incorrectly wired</li> </ul>
Fan Feedback Not Received	<ul style="list-style-type: none"> <li>• Wiring connection issue</li> <li>• Ethernet communication issue</li> </ul>
Drain Cycle Restricted	<ul style="list-style-type: none"> <li>• Debris preventing drain from opening</li> <li>• Calcification preventing drain from opening</li> <li>• Drain wiring issue</li> </ul>
Fill Time Exceeded	<ul style="list-style-type: none"> <li>• High level sensor not registering within a 5 minute window</li> <li>• Water supply interrupted</li> <li>• Solenoid remaining closed: blockage, calcification, connection</li> <li>• Drain remaining open: blockage, calcification, connection</li> </ul>
Fill Level Detected Warning	<ul style="list-style-type: none"> <li>• In fan only mode, low level sensor is triggered</li> <li>• System will cycle, if issues remains, warning develops into an error</li> <li>• Solenoid open: calcification, blockage, connection</li> <li>• Water has not drained from when the unit was last in cooling mode, check drain: blockage, connection</li> </ul>
Fill Level Detected Error	<ul style="list-style-type: none"> <li>• In fan only mode, low level sensor is triggered</li> <li>• Occurs after warning has been triggered twice consecutively</li> <li>• Solenoid open: calcification, blockage, connection</li> <li>• Water has not drained from when the unit was last in cooling mode, check drain: blockage, connection</li> </ul>
Fill Time Exceeded Warning	<ul style="list-style-type: none"> <li>• Drain does not register as closed within an allotted time window</li> <li>• System will cycle, if issues remains, warning develops into an error</li> <li>• Drain remaining open: blockage, calcification, connection</li> </ul>
Fill Time Exceeded Error	<ul style="list-style-type: none"> <li>• Drain does not register as closed within an allotted time window</li> <li>• Occurs after warning has been triggered twice consecutively</li> <li>• Drain remaining open: blockage, calcification, connection</li> </ul>
Level Sensor Malfunction	<ul style="list-style-type: none"> <li>• Level sensor stuck in an upward position</li> <li>• Level sensor/PLC communication issue</li> </ul>
Water Overflow	<ul style="list-style-type: none"> <li>• Solenoid open and drain valve closed for extended period of time</li> <li>• Level sensor top switch stuck</li> </ul>

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## 12. De-Commissioning, Disassembly, and Disposal

The removal and disposal must follow all relevant safety regulations. Please allow qualified personnel to conduct the de-commissioning, disassembly, or disposal of a DeltaStream unit.

## 13. Appendix

### 13.1. Appendix A: Full Inspection Checklist

See next page.

# Inspection Checklist



To be completed for each Moffitt DeltaStream unit.

Project Name \_\_\_\_\_ Technician Name \_\_\_\_\_

Unit Name/No. \_\_\_\_\_ Date \_\_\_\_\_

	Spring	Fall	✓	✗	N/A	Remarks
<b>Evaporative Cooling</b>						
Clean water reservoir	✓	✓				
Clean water pipe system, replace if necessary		✓				
Clean level sensor	✓	✓				
Clean pump filter		✓				
Check media for scaling.		✓				
Clean desorption medium, replace if damaged	✓	✓				
Replace desorption medium						
Check if the water supply is ready	✓					
Winterize the water supply (empty it)		✓				
<b>Fans</b>						
Check fan for contamination, clean if necessary	✓	✓				
Check fan for mechanical defects	✓	✓				
Check the fan for corrosion and mechanical fit	✓	✓				
Check impeller for imbalances	✓	✓				
Check smoothness and noise of bearings	✓	✓				
Check the distance in the gap is uniform	✓	✓				
Check control door for ability to protect	✓	✓				
<b>Air Filters</b>						
Check contamination visually	✓	✓				
Check filters for damage	✓	✓				
Check the filter for airtightness	✓	✓				
Clean filter housing	✓	✓				
Completely change filter	✓					





### 13.2. Appendix B: Temperature Sensor Wiring Diagram

