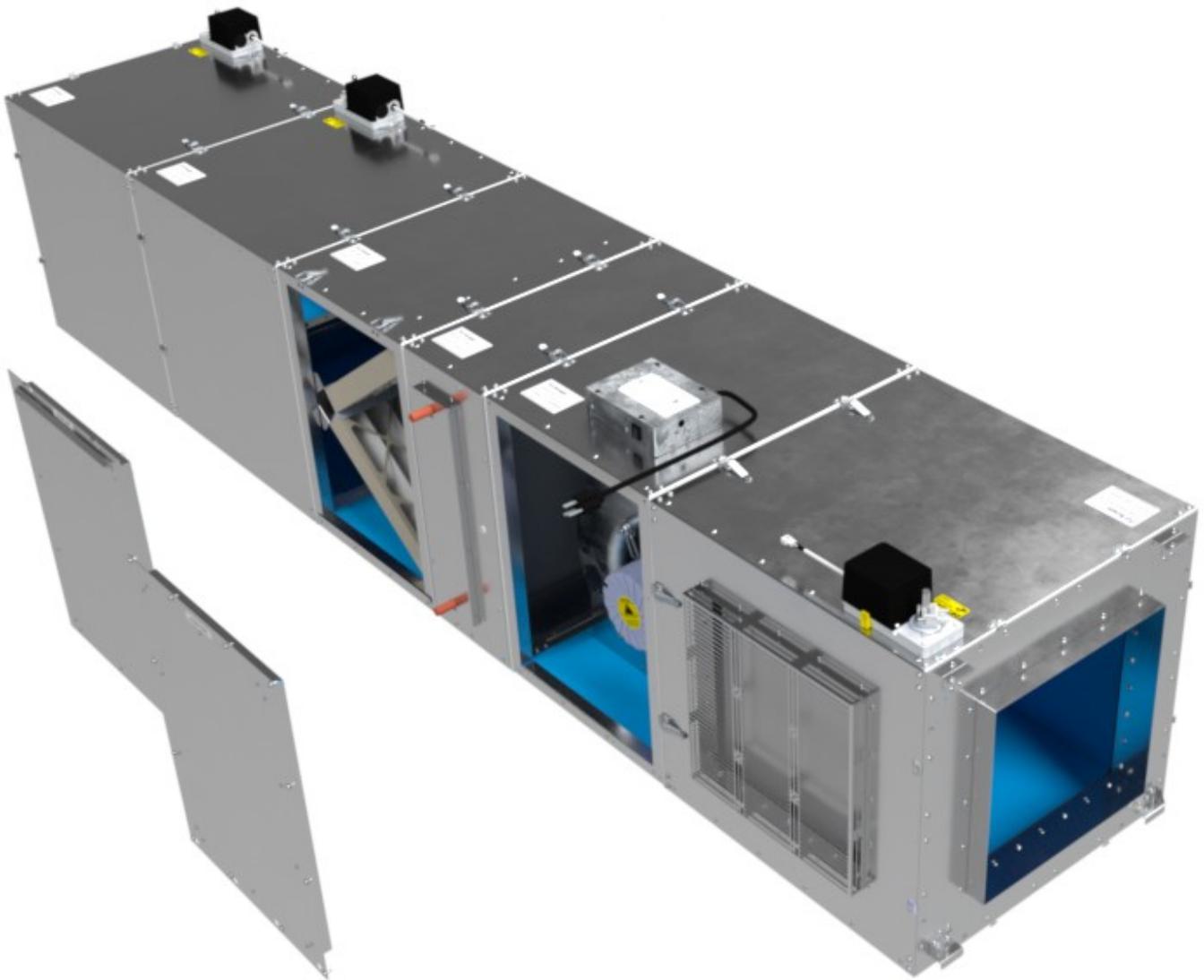


Make-Up Air Unit

Installation and Operation Manual



Thank you for your purchase!

INDEX

[WHY DO I NEED MAKE-UP AIR?](#)

[SAFETY INFORMATION](#)

[SUPPLIES INCLUDED](#)

[REQUIRED TOOLS AND SUPPLIES NOT INCLUDED](#)

[ELECTRICAL REQUIREMENTS](#)

[PURCHASE OPTIONS](#)

[SYSTEM INSTALL GUIDE](#)

[NETWORK SET-UP](#)

[INSTALLATION OF THE HEATING-ASSIST OPTION](#)

[INSTALLATION OF THE WHOLE HOUSE FAN OPTION](#)

[INSTALLATION OF THE HOT WATER HEAT OPTION](#)

[INSTALLATION OF THE FILTER PRESSURE SENSOR OPTION](#)

[INSTALLATION OF WIRING AND CONTROL](#)

[CONTROLLER INTERFACE](#)

[CONTROLLER BOARD](#)

[THEORY OF WHF OPERATION](#)

[START-UP AND OPERATION](#)

[OPERATING TIPS](#)

[MAINTENANCE](#)

[GLOSSARY](#)

[TROUBLE SHOOTING](#)

[SPECIFICATIONS](#)

[ELECTRICAL SCHEMATICS](#)

WHY DO I NEED MAKE-UP AIR?

Modern building codes require homes to be built much “tighter” than in the past. This makes modern homes much more efficient, but also much easier to depressurize. As a result, today's homes now need a supply of make-up air, to “make up” for the exhausted air and prevent depressurization.

IAQ or Inside Air Quality is mostly overlooked in these modern homes. Besides the usual “off-gassing” of the materials used in the construction of the home, the occupant introduces many particulates to the living space air. Fresh Air is necessary for comfortable and healthy living. Unfortunately, an unavoidable consequence of daily living is the production of undesirable waste gases, even in small amounts. Showers produce water vapor, a wide variety of objects off-gas VOC's, gas appliances emit carbon monoxide, human beings exhale CO₂. Left to accumulate, these pollutants quickly render a living space uncomfortable and unhealthy.

Through breathing, carbon dioxide is introduced into the home. Some people wake-up groggy without ever understanding why, unaware of the level of carbon dioxide in the room they spend their night in. This can have a measurable influence on the health and well being of the occupants. Not to mention the dust, viruses, molds, spores and many other airborne particulates which can wreak havoc on the Indoor Air Quality of your home. AirScape felt something had to be done and with proper filtration and added functionality to our Make-Up Air Unit managed to handle these issues.

A wide variety of exhausts (e.g. bath fans, dryer fans, kitchen hoods, etc.) are used to expel these pollutants from the home. However, whenever an exhaust fan is used, fresh air from outside of the living space must flow into it to replace the expelled air. If this does not happen, the air pressure within the living space starts to drop relative to the outdoor pressure. This depressurization can have many unpleasant, and even dangerous consequences: doors open with difficulty and slam shut; dirt, debris, and insects are “sucked” into the home; pilot lights operate erratically; fireplaces, wood stoves, and combustion appliances backdraft and toilets bubble sewer gas into the living space.

The [AirScape® Make-Up Air unit](#) (“MUA”) is designed to mechanically supply make-up air in residential applications. Once properly installed, the MUA unit uses pressure sensors to continuously monitor indoor and outdoor air pressure. When the relative indoor pressure drops below the programmed (settable) target, a damper opens and the unit's fan dynamically engages, supplying the living space with filtered fresh air from outdoors. The Make-Up Air unit is controlled with an online web interface which can be accessed from a computer, tablet or smart phone when the unit is on a local network. The unit's housing is insulated to maintain the integrity of the home's thermal envelope. To achieve the highest possible efficiency, the unit's fan is driven by a high-efficiency ECM motor and controlled by a micro processor.

The [AirScape® Make-Up Air unit](#) has been modularly designed to be a multi-functional system. The standard MUA consists of a Cabinet Fan, V-Bank Filter box (MERV13), Air Inlet Selector (damper) and our sophisticated controller box. The standard unit allows for a multi-functional approach to handling Make-Up Air and includes fully customizable controller settings that can be easily accessed, operated and read. This includes a real time Graph Tab which keeps track of the temperatures and pressures in your building. Besides the always present Make-Up Air Mode the controller interface allows for several other modes. The Cooling Assist Mode which continuously or periodically (depending on settings) cools the living space by bringing in fresh Outside Air when the Outside Air is cooler than the Inside Air Temperature. An Air filtration mode which continuously or periodically filters recirculated Inside Air and an IAQ (Inside Air Quality) mode brings in filtered Outside Air in adjustable (changeable/settable) proportions improving the

Air Quality inside the house. Or if you wish to operate the unit manually this is also possible by turning this function on and then opening the AIS (damper) and operating the fan speed slider in the control interface.

The [AirScape® Make-Up Air](#) can be expanded to include several options which have to be mechanically added to the standard unit to be operable in the controller interface. These Options give added abilities to the standard unit like:

Option 1: with the addition of an optional second air inlet selector box (damper), mounted before the filter box, the load on the home's primary heating system is reduced by drawing warm air through the filters from the attic into the living space. The controller is expanded with a sensor and additional settings are unlocked.

Option 2: with the addition of an optional third air inlet selector box (damper), mounted to the fan exit, a traditional [Whole House Fan](#) mode is possible (exhaust only) using ventilation cooling to drive the warm air from the living space into the attic and out the [soffit vents](#) to the outside. This efficient low cost natural cooling system can pre-cool the entire home to majorly reduce or eliminate the need for an air conditioner. In the controller the WHF mode setting is unlocked.

Option 3: with the "hot" coil box or hydronic coil box, hot water or a glycol system can be used to heat the incoming make-up air, or recirculated air into the living space. The controller will have additional settings unlocked.

Option 4: Allows for an indication on the interface of the filter status. With the additional pressure sensor added to the controller and the two static ports (on the V-Bank Filter Box) the "dirtiness" of the filters in the Make-Up Air Unit can be determined by reading the differential pressure over the filters. This unlocked function also shows up in the graph tab and over time you'll know when to change the filters with real world experience.

Airscape also decided to make a simplified version consisting of a Cabinet Fan, V-Bank Filter box (MERV13) and our sophisticated controller box. The simplified Make-Up Air unit includes fully customizable controller settings that can be easily accessed, operated and read. This includes a real time Graph Tab which keeps track of the temperatures and pressures in your building. The Basic Make-Up Air Unit only brings in make-up air and this limits the abilities of the controller interface.

Also check out this [Balanced Make-Up Air System](#) (BMAS) made by Airscape but sold on our sister company [HVACQuick.com](#) website if such a simplified MUA is required. The BMAS is a simplified approach to Make-Up air and is designed to only deal with kitchen exhaust and needed make-up air.

The [AirScape® Make-Up Air unit](#) works in the background to push outside air into your house to maintain a neutral building pressure. Kitchen and other fans exhaust air out of the house, dropping the pressure of the house. Fireplaces and other combustion appliances require a neutral or positive pressure in your house to prevent "back drafting".

The Make-up Air system is a sophisticated integrated air handling and control system. A considerable amount of effort has been expended to make this manual and the control software clear and straightforward. However, as in all technical projects, the installer will be required to have certain installation skills that involve duct work, wiring, controls and local area networks.

If you are in doubt about what's required, please feel free to contact AirScape directly at [1.866.448.4187](tel:1.866.448.4187) or by email at experts@airscapefans.com

SAFETY INFORMATION



Some of the principles of this product's safe installation and operation are not immediately obvious. Read the following safety information before continuing further:



- This fan is meant for general ventilation. It has NOT been designed to ventilate particle (large) laden and/or explosive mixtures of air.
- This fan is not for use in kitchens.
- Never force open the damper door(s), this could severely damage the actuator. **Always** depress the actuator's yellow clutch release before manually opening or closing the damper door(s).
- Before installing or servicing this fan, switch power off at the home's electrical panel to reduce the risk of damaging circuit boards, fire, electrical shock, or injury. The **fan may come on** at any time based on control sequence requirements.
- Never operate the Whole House Fan mode without a window or door opened.

SUPPLIES INCLUDED

Prior to beginning installation, please verify all of the following items were received:

- MUA Assembly, check, note serials. Depends on what you ordered, CF, FB, AIS etc (see [Specifications](#) for identification of the main parts)
- MUA Controller package, note serial (incl. Cat5 Fan Cable, screws / strain relief for interlock)

Once all received parts are verified, perform an operational test BEFORE installing it in the attic. See "[Installing the Controller](#)" and "[Start-up and Operation](#)" for connections to be made. *This is a good time to write down the serial number(s) on this IOM, which will save you a trip to the attic if you require Tech Support.*

REQUIRED TOOL & SUPPLIES NOT INCLUDED

In addition to the included items listed above, the following tools and supplies are required to install the Make-Up Air Unit:

- Safety Glasses, Gloves
- [Receptacle tester](#)
- Cutter / Jig Saw
- Heat Gun to install/remove the 1/8" vinyl tubing to the barbs of the sensor and inlet plates.
- Cordless screwdriver with Phillips head and miscellaneous drill bits, driver bits and sockets
- Hardware to mount Outside Air Opening, Duct, Framing etc.
- High quality caulk /sealant / duct tape
- Lumber to create a cradle or MUA mounting frame and/or Metal to create mounts for the MUA units modules (corner screw mounts).
- Fishing tape or similar tool (to pull tubing and cables through the wall)
- 1/8" I.D. vinyl tubing, from living space to the controller, from outside to the controller (Note: install guide)
- 1/8" I.D. vinyl tubing, from V-Bank Filter Box to the controller (2pcs) (if the option was purchased)
- 1/8" barbed air ports (2x, +bug screen) for mounting the pressure tubing in the living space and to the outside.
- Return Air (recirc.) Inlet with grille and duct and/or adapter and 18" flex duct. A connection to the house return air ducting may be convenient.
- Outside (make-up) Air inlet with bug guard and duct and/or adapter and 18" flex duct
- Supply (make-up air) Fan outlet with grill and duct and/or adapter and 18" flex duct
- Two standard electrical sockets (single 15A)
- Hood and Fire Interlock dry contacts and wiring (not incl)
- Conduit to run low voltage wiring.
- Coil Box requires a hot water or glycol plumbing system, hot water source, pump and a valve to control (0-10VDC or 24VDC PWM) the volume including wiring to control the valve.
- An Ethernet cable to connect the controller to a wireless router (not incl.)
- A wireless router (not incl.)
- A wireless capable Tablet or mobile phone or a PC on a local network (not incl.)

ELECTRICAL REQUIREMENTS

The [AirScape® Make-Up Air](#) model requires a dual socket 120 volt, Single Phase, 60 Hz, 15A uninterrupted power supply. These specifications must be taken into account when allocating power from existing circuits. We strongly recommend providing a dedicated circuit.

This Circuit MUST be Ground Tested. This can be done easily using a [receptacle tester](#) available at most hardware stores. This fan and controller each has a factory-installed, 20 ft. power cord. Consider this length when choosing a location for this fan. Depending on the location of existing outlets in the installation space, the installation of an additional outlet may be required.

NOTE: if a GFCI is used it MUST be a Motor Rated GFCI

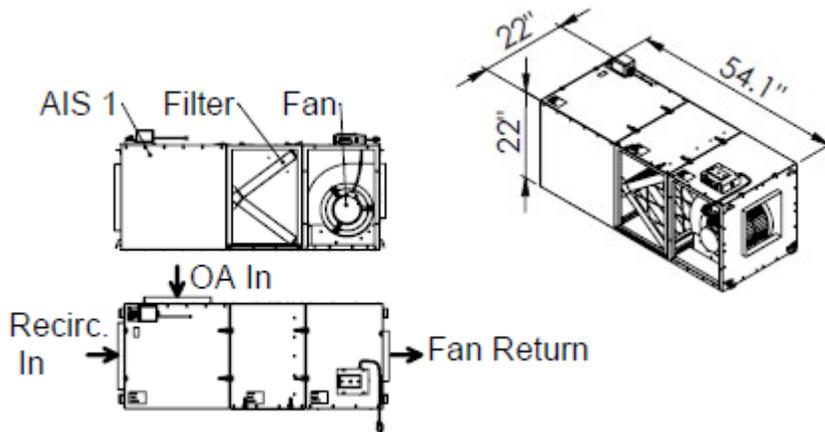
All wiring and connections must be made according to this manual and acceptable wiring standards. All local codes must be followed. Consult an electrician if necessary.

PURCHASE OPTIONS

(Standard Configuration 1)

MAKE-UP AIR UNIT WITH:

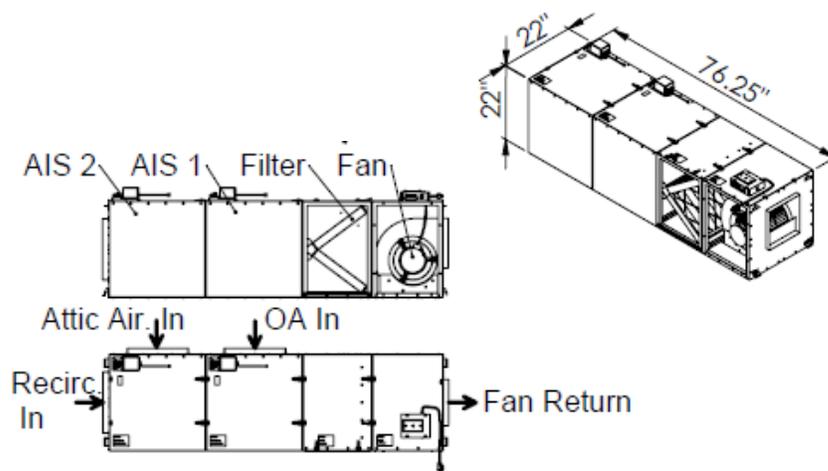
- Fan Module (20 ft Power Cord)
- V-Bank Filter Module (MERV13)
- Air Inlet Selector Module (AIS-1)
(**MUA** - Outside Air IN/ Recirc. Air IN)
- MUA Controller (10 ft Power Cord)
- Cat5 Fan Cable (10 ft)



(Configuration 2)

MAKE-UP AIR UNIT WITH:

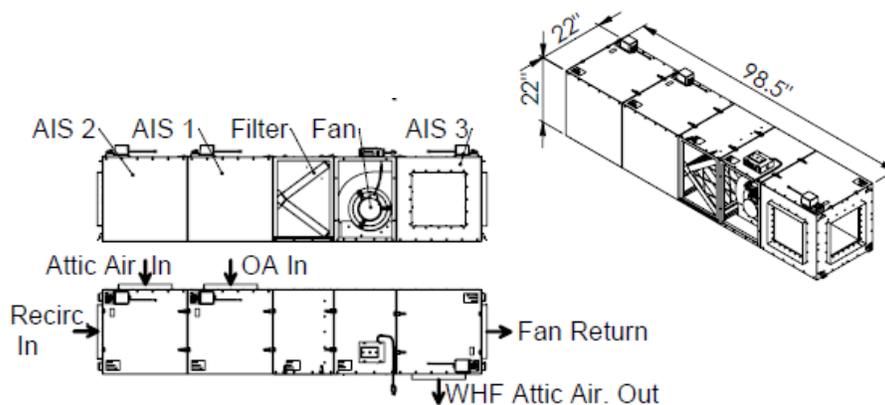
- Fan Module (20 ft Power Cord)
- V-Bank Filter Module (MERV13)
- Air Inlet Selector Module (AIS-1)
(**MUA** - Outside Air IN/ Recirc. Air IN)
- Air Inlet Selector Module (AIS-2)
(**Heat Assist** - Recirc. Air IN/Attic Air IN)
- MUA Controller (10 ft Power Cord)
- Cat5 Fan Cable (10 ft)



(Configuration 3)

MAKE-UP AIR UNIT WITH:

- Fan Module (20 ft Power Cord)
- V-Bank Filter Module (MERV13)
- Air Inlet Selector Module (AIS-1)
(**MUA** - Outside Air IN/ Recirc. Air IN)
- Air Inlet Selector Module (AIS-2)
(**Heat Assist** - Recirc. Air IN/Attic Air IN)
- Air Inlet Selector Module (AIS-2)
(**WHF** - Fan Return Air OUT/
WHF Air OUT to Attic)
- MUA Controller (10 ft Power Cord)
- Cat5 Fan Cable (10 ft)

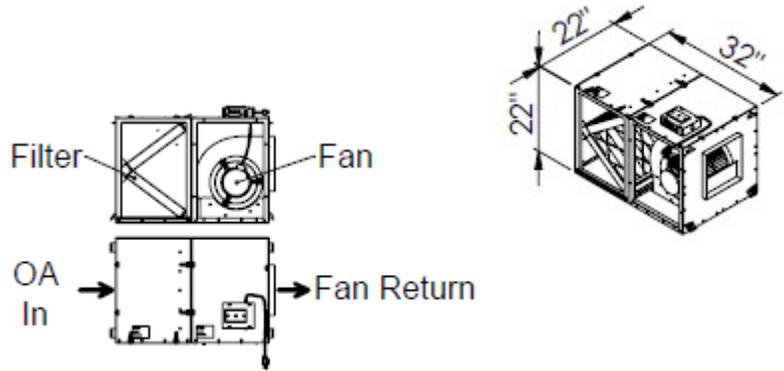


INDEX

(Configuration 4- MUA UNIT ONLY)

MAKE-UP AIR UNIT WITH:

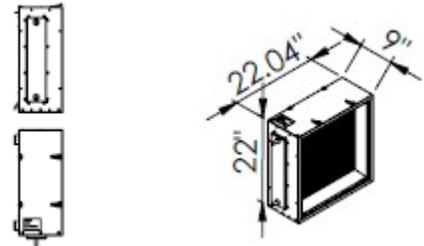
- Fan Module (20 ft Power Cord)
- V-Bank Filter Module (MERV13)
- MUA Controller (10 ft Power Cord)
- Cat5 Fan Cable (10 ft)



OPTIONAL MUA ADDITIONS THAT CAN BE ADDED TO ALL CONFIGURATIONS:

HOT WATER COIL BOX:

Use Hot Water or Glycol to Heat the Make-Up Air coming in. The Coil Assembly must be installed between the fan and the filter modules. (½" plumbing connections, bottom feed) The Coil has been designed for closed loop systems, separated from domestic water systems (the coil is not "drinkable" water rated)



NOTE: Setting up a water heating coil system may involve plumbing and controls that are beyond the average skillset. If in doubt of any safety or control concerns, please contact AirScape technical support at [1.866.448.4187](tel:18664484187) or by email at experts@airscapefans.com or consult a professional. **IN PARTICULAR IT IS CRITICAL TO AVOID CONTAMINATING DOMESTIC WATER SYSTEMS.**

Filter Differential Pressure Sensor:

Alerts you to dirty filters. The Additional 500 Pascal pressure sensor, harness and mounting hardware is installed into the controller box. The additional software abilities are unlocked in the software config. It furthermore requires 1/8" I.D. Vinyl tubing to connect the two sensor ports to the filter module's two static ports (2 x tubing, which is not included).



SYSTEM INSTALL GUIDE

The [AirScape® Make-Up Air](#) is going to be placed in the attic or mechanical room and can be difficult to access once installed. It is wise to "plan" and document your Make-Up Air Unit Installation. Picking a location for the make-up air unit is very important and will influence the cost of the installation. Consider the length of duct, accessibility, and routing to ensure an efficient installation.

Unit installation:

The unit ought to be placed within reach of the 20 foot long power cord to an existing receptacle outlet. This may eliminate the need for an electrician if possible and will reduce the cost of the installation. Mount the unit on top of the ceiling frame (attic), or on top of a frame. You can hang the unit with a support frame and threaded rod. Mechanical Installation Options are an Attic Installation, installation in

the Crawl Space. Installation into a mechanical room or basement. The MUA Unit can be mounted vertically as well. This unit is **NOT** designed to be mounted outdoors in the weather and if this is a necessity will require appropriate covers and enclosures to properly protect the MUA from the elements. Also note the need for filter and service access in such an install.

The unit's modules have built in mounting points on the corner of each module located by the screws that have already been placed there. These can be used to mount metal brackets and/or plates to mount several modules to the wall or framing of the space in which you are installing the MUA. It is a good idea to securely mount the MUA to be able to endure earthquakes.

Mounting the unit to a frame can cause vibrational noise which is conducted through the structure and the ducting, so we recommend a rubber isolator between the unit and the mounting frame and ducting (metal only). If a unit with Heating Assist and/or Whole House Fan was purchased, make sure the inlets are free to take in air (or exhaust it, WHF). Although the seal tape between the modules has proven sufficient we recommend applying a bead of silicone between the unit's segments or taping the seams with aluminum tape.

Mount the controller within the 10 foot Green CAT5 Cable length and the 20 foot power cord length. The green Ethernet Cable (Cat-5) provided is to be plugged into the fan's RJ45 port and the control panel's "Fan" port. NOTE: Cat-5 cable is unshielded, do not run it parallel to high-voltage wiring. Building codes require low-voltage wiring to be run through conduit.

Picking the place to measure the pressure in the kitchen (area) and outside air pressure will influence the MUA unit's operation. For the outside, pick a place that is protected from prevailing winds. Select a measuring point outside the house that is sheltered from prevailing winds and reflects the outside pressure without interference as much as possible. The attic can be used for this but only if it is properly vented (see [WHF venting](#)) and only if there are no other sources venting into the attic which could create inaccurate readings. It should be noted that this will vary from installation to installation and really ought to be properly tested, also NOTE that this configuration may require a more involved "dialing in" of the settings of the controller to get a correct MUA response.

For the inside, place the pressure tube within the room with the largest exhaust source, most likely the kitchen. A point inside the house that is away from vents and fans.

The 1/8" ID vinyl tubing needed to measure the air pressure inside the house, atmospheric pressure and differential pressure over the filters (if ordered) **must be heated** to be installed (OR REMOVED) onto the pressure sensors in the control panel. Use a heat gun to heat the tubing for easy removal / installation. Failure to do so may result in damaged or broken sensors. Installation of the inside and outside pressure hoses should be done in such a way as to minimize distortion in the reading.

NOTE: Install the Make-Up Air System in accordance with this manual and all local codes and standards. Disconnect power whenever working in or near the fan compartment. The fan may come on at any time based on control sequence requirements and settings. Disconnect power when working on the electrical control panel. ALSO check the Net free Area of the Attic vents if you purchased the WHF option (see [WHF THEORY OF OPERATION](#))

FOR BEST RESULTS PLACE THE TEMPERATURE SENSORS CLOSE TO THEIR SOURCE IN THE AIR STREAM. The Inside Air T-Sensor is best placed in the fans exhaust (close to the fan). The Outside Air T-Sensor is best placed outside in the air inlet.

NETWORK SETUP

In order to change target settings (room pressure, etc) and to monitor the status of the Make-Up Air Unit, it is necessary to connect the MUA control panel to your local area network (LAN).

This is accomplished by doing the following:

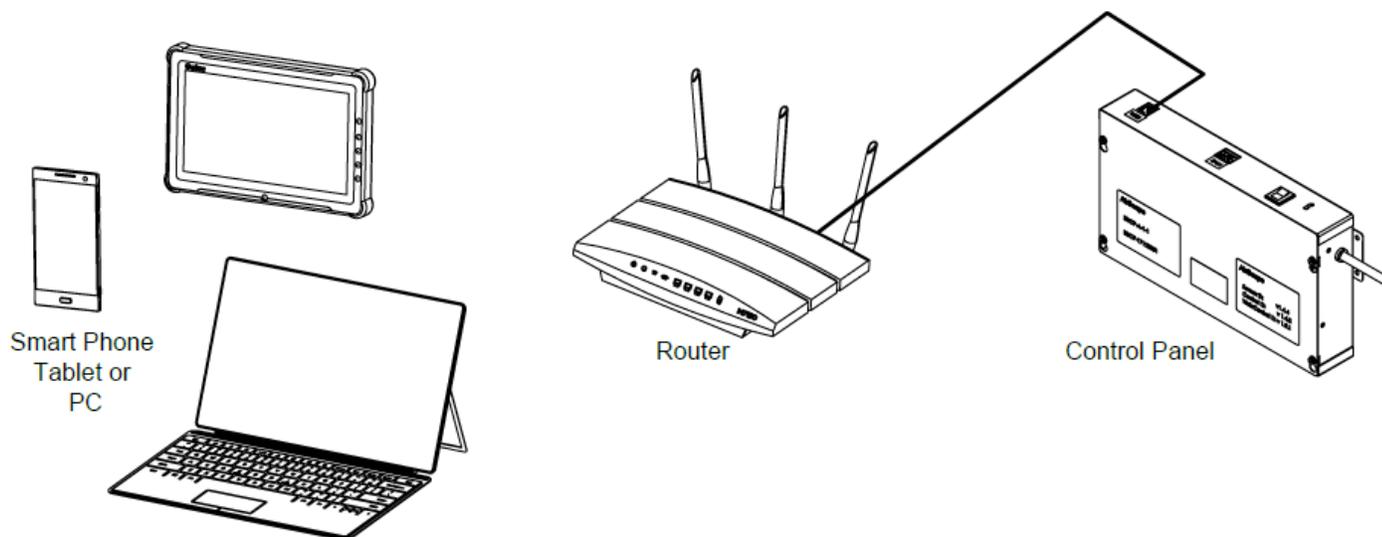
- Connect an Ethernet cable (not incl.) between the control panel and your wireless LAN router (see diagram below). NOTE: CAT-5 cable is usually unshielded, do not run it parallel to high-voltage wiring. Building codes require low-voltage wiring to be run through conduit.
- Verify that the router has DHCP turned on. DHCP assigns an IP address (e.g. 192.168.1.7) to connected devices. DHCP and is normally on by default.
- Once connected, you can "lock in" that IP address. This is done within the router software, and is often referred to as "IP reservation". The router will also have a 'tab' in which you can find the IP address of the MUA unit controller. An easy way to find the MUA unit controller is to look for connected devices with "MAC addresses" similar to " B0:D5:CC:41:98:4F". The MAC vendor will show up as "Texas Instruments" or "Beagle Bone"
- The device you are using to interface with must be on the same network you are attempting to access. So if you are using a tablet, set the tablets wireless connection to the network the MUA is connected to. Open a web browser (Firefox, Internet Explorer, or others) and type in the assigned IP address in the URL bar. You should see a web page showing the MUA Interface and the status of the MUA controller.

Tip:

- a free app like [FING](#) can be used to locate the MUA Controller on the network which shows up as "Texas Instruments" or "Beagle Bone". This will give you the IP address.
- a bookmark can be created for the MUA Unit's address when the IP address has been "locked in" allowing you quick access, yet flexibility.
- we also suggest you keep the digital pdf of this iom on the device you are using to interface with.

Be advised that some wireless mobile devices might not be able to scan or locate devices on local networks due to rigorous security measures implemented by the device manufacturers. Usually an updated app will fix that.

INDEX

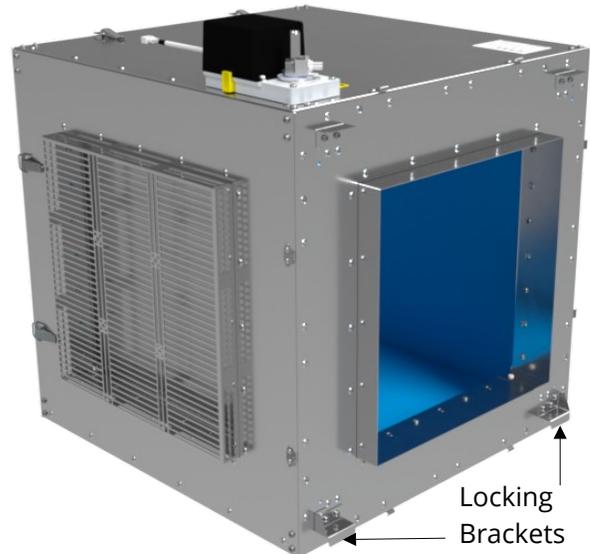


INSTALLATION OF THE HEAT ASSIST OPTION

IF YOU PURCHASED YOUR UNIT WITH THIS OPTION: THE MAKE-UP AIR UNIT AND CONTROLLER COME FULLY ASSEMBLED AND CONFIGURED SO THE FOLLOWING INSTRUCTIONS NEED **NOT** BE DONE, although we include them here anyway.

The Additional Air Inlet Selector (AIS) module (see image) should come with a 10 foot molex and a temperature harness to connect the controller to the module. The AIS can be installed in either position before the filter box module. This gives you some freedom to adapt to your installation situation and the only thing you'll have to keep an eye on is that the controller harnesses are connected to the correct AIS module.

This Heat Assist module (AIS-2) allows you to (re)use the heat in your attic to (re)heat the living space and has an inlet grille which should be free enough to properly breathe. The interface settings allow you to dial in this functions for your installation.



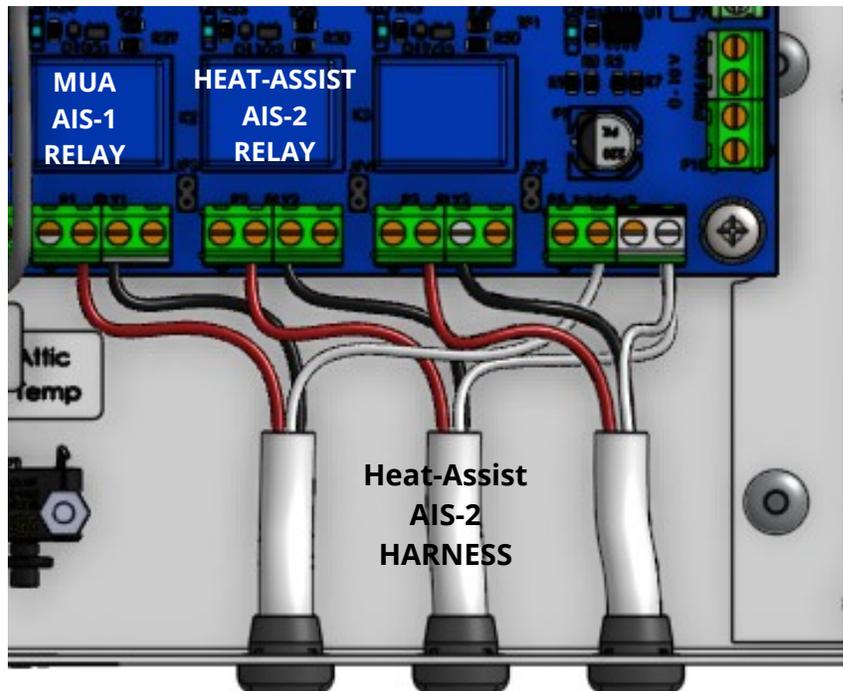
If you purchased this module separately It will have to be installed into the Make-Up Air unit system. The module is designed to be quickly “clicked” onto the another module with brackets, guiding plates and quick-lock clips. For this to be done with ease the entire unit has to be removed to create access and allow you to lock the brackets (see image) into the other module while you hold the new module at an angle. It might be possible to add it, with the MUA installed. These brackets lock behind the rim of the module you are installing. It will become clearer if you inspect an already assembled module. The AIS Module can be mounted in multiple orientations to fit your needs.

After you have physically installed the Module it has to be connected to the controller with the supplied Molex Harness (AIS-2) and strain relief.

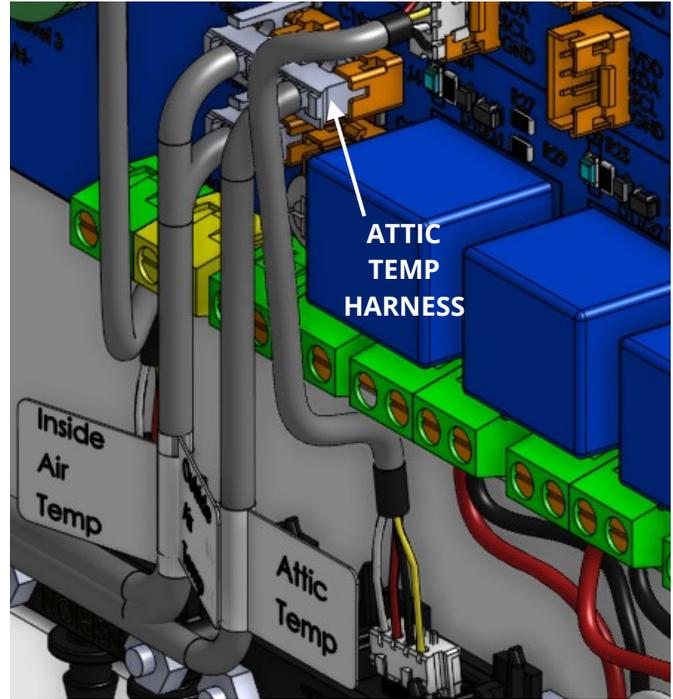
Open the controller by removing the lid. This is accomplished by loosening the 4 lid screws and sliding the lid upward until it can be removed.

Install the AIS-2 harness as shown in the image and connect the molex connector to the actuator on the AIS-2 you just installed

Install the Power jumper (shunt) onto JP4 to supply power through the relay to the actuator.



Remove the strain relief holding two temperature harnesses to the side wall of the control box. Route the included Attic Temperature sensor through the same opening and connect the connector as shown to J4 on the blue main board. Make sure there is a little slack in the temp sensor harnesses and reinstall the strain relief on the outside of the box.



The head or black tip of temperature sensor needs to be in the attic and so leave it in safe spot.

In order to activate and control the Heat Assist Module the added ability has to be unlocked in the controller.

This is done via a web browser on any computer, tablet or smartphone that is connected to the same Local Area Network (LAN) as the MUA unit.

Make sure the MUA unit is on and connected to the network router via Cat-5 cable. Open a web browser on any device that is connected to the same network as the MUA unit. In the URL Address Bar of the browser, type in the IP Address of the MUA Unit and allow the window to load. (See [Network Set-Up](#) and it's "tip" if it does not work)

If the page loads and the MUA interface is up enter the address bar and at the end of the IP address add /config and press enter. (like: 192.168.10.3/config)

The Factory Settings page should now be up. On the right hand bottom of the page there are some check boxes (see image)

Click the "Attic Module" check box
Select "Attic-conf" (on the RH top of the page)
Click the "Submit" Button
this completes the activation of the Heat Assist Module

Go back to the main MUA unit page by clicking on the "Back to Main Page" button.

You can also click in the IP Address in the URL Address Bar and by simply deleting the /config portion of the address and by pressing Enter you reactivate the main interface.

Perform an operational test of the Heat Assist box (see [Start-Up and Operation](#))

Water Heater Proportional Gain:

Water Heater Integral Gain:

Water Heater Derivative Gain:

AIS

- Extended (Recirculation) Module
- Attic Module ← Click "Attic Module" Checkbox
- Whole House Fan Module

Water Heater

- Water Heater Module
- Water Heater Freeze Prevention Mode

General Warning

Setting up a hot water heating coil system may involve plumbing and controls that are beyond the average skillset. If in doubt of any safety or control concerns, please contact us at AirScape or consult a professional. In particular, it's critical to avoid contaminating domestic hot water systems.

← Then Click Submit

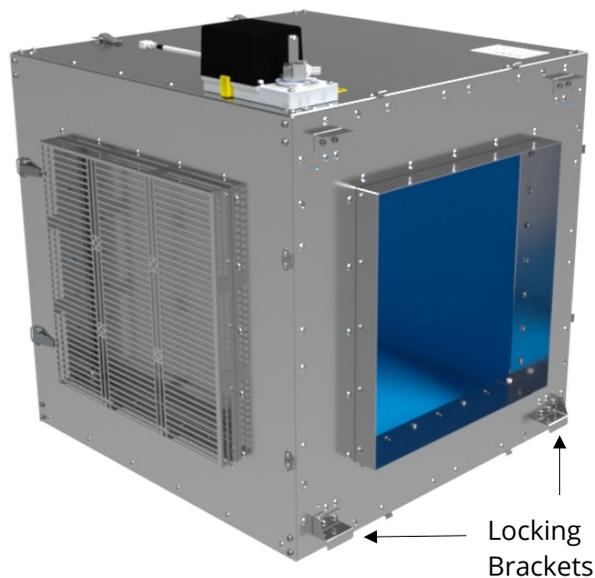
INSTALLATION OF THE WHOLE HOUSE FAN OPTION

IF YOU PURCHASED YOUR UNIT WITH THIS OPTION: THE MAKE-UP AIR UNIT AND CONTROLLER COME FULLY ASSEMBLED AND CONFIGURED SO THE FOLLOWING INSTRUCTIONS NEED **NOT** BE DONE, although we include them here anyway.

The Additional Air Inlet Selector (AIS) module (see image) should come with a 10 foot molex harness to connect the controller to the module. The AIS WHF Module is installed in front of the fan module (on the fan exhaust).

This [Whole House Fan](#) module (AIS-3) allows you to use your MAU unit to ventilation cool the living space and has an exhaust grille which should be free enough to properly breathe.

If you purchased this module separately It will have to be installed onto the Make-Up Air unit system. The module is designed to be quickly “clicked” onto the fan module using brackets, guiding plates and quick-lock clips. For this to be done with ease the entire unit has to be removed to create access and allow you to lock the brackets (see image) into the other module while you hold the new module at an angle. It might be possible to add it, with the MUA installed. These brackets lock behind the rim of the module you are installing. It will become clearer if you inspect an already assembled module. The AIS Module can be mounted in multiple orientations to fit your needs.



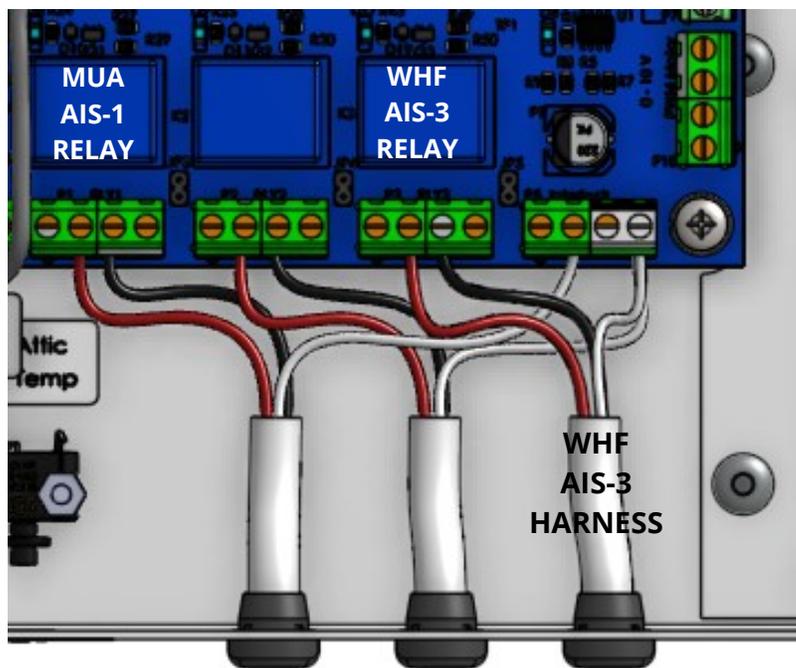
INDEX

After you have physically installed the Module it has to be connected to the controller with the supplied Molex Harness (AIS-3) and strain relief.

Open the controller by removing the lid. This is accomplished by loosening the 4 lid screws and sliding the lid upward until it can be removed.

Install the AIS-3 harness as shown in the image and connect the molex connector to the actuator on the AIS-3 you just installed

Install the Power jumper (shunt) onto JP5 to supply power through the relay to the actuator.



In order to activate and control the [Whole House Fan](#) Module the added ability has to be unlocked in the controller. This is done via a web browser on any computer, tablet or smartphone that is connected to the same Local Area Network (LAN) as the MUA unit. Make sure the MUA unit is on and connected to the network router via Cat-5 cable. Open a web browser on any device that is connected to the same network as the MUA unit. In the URL Address Bar of the browser, type in the IP Address of the MUA Unit and allow the window to load. (See [Network Set-Up](#) and it's "tip" if it does not work)

If the page loads and the MUA interface is up enter the address bar and at the end of the IP address add /config and press enter. (like: 192.168.10.3/**config**)

The Factory Settings page should now be up. On the right hand bottom of the page there are some check boxes (see image)

Click the "Whole House Fan Module" check box

Click the "Submit" Button

this completes the activation of the Whole House Fan Module.

Go back to the main MUA unit page by clicking on the "Back to Main Page" button.

You can also click in the IP Address in the URL Address Bar and by simply deleting the /config portion of the address and by pressing Enter you reactivate the main interface.

Perform an operational test of the Whole House Fan Mode (see [Start-Up and Operation](#))

The screenshot shows the configuration page with the following elements:

- Water Heater Proportional Gain:** Input field containing 1.00
- Water Heater Integral Gain:** Input field containing 0.10
- Water Heater Derivative Gain:** Input field containing 0.50
- AIS** section:
 - Extended (Recirculation) Module
 - Attic Module
 - Whole House Fan Module
- Water Heater** section:
 - Water Heater Module
 - Water Heater Freeze Prevention Mode
- General Warning** section:

Setting up a hot water heating coil system may involve plumbing and controls that are beyond the average skillset. If in doubt of any safety or control concerns, please contact us at AirScape or consult a professional. In particular, it's critical to avoid contaminating domestic hot water systems.
- Buttons: **Submit** and **Reset to Defaults**

Annotations on the image:

- An arrow points from the text "Click 'Whole House Fan Module' Checkbox" to the "Whole House Fan Module" checkbox.
- An arrow points from the text "Then Click Submit" to the "Submit" button.

NOTE: FOR AN WHOLE HOUSE FAN TO OPERATE PROPERLY ENOUGH NET FREE VENTING OPENING MUST EXIST IN THE SOFFIT AND GABLE VENTS THAT VENT THE ATTIC SPACE. SEE THE [WHF THEORY OF OPERATION](#) TO CALCULATE YOUR ATTICS NET FREE VENTING OPENING.

INSTALLATION OF THE HOT WATER HEAT

IF YOU PURCHASED YOUR UNIT WITH THIS OPTION: THE MAKE-UP AIR UNIT AND CONTROLLER COME FULLY ASSEMBLED AND CONFIGURED SO THE FOLLOWING INSTRUCTIONS NEED **NOT** BE DONE, although we include them here anyway.

The Hot Water Heat option (coil box module, see image) allows you to heat the Make-Up air that enters your home when the MAU unit is active. **The Coil Box Module MUST be installed between the fan and the filter module.**

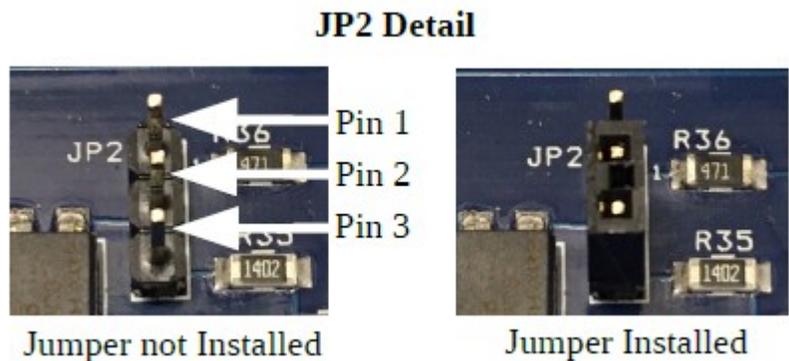
If you purchased this module separately It will have to be installed onto the Make-Up Air unit system. The module is designed to be quickly “clicked” onto another module using brackets, guiding plates and quick-lock clips. For this to be done with ease the entire unit has to be removed to create access and allow you to lock the brackets (see image) into the other module while you hold the new module at an angle. It might be possible to add it, with the MUA installed. These brackets lock behind the rim of the module you are installing. It will become clearer if you inspect an already assembled module. The Coil Module can be mounted in multiple orientations to fit your needs.



INDEX

After you have physically installed the Module you will have to make a few changes to the controller and install the plumbing system.

Open the controller by removing the lid. This is accomplished by loosening the 4 lid screws and sliding the lid upward until it can be removed.



On the main (blue) [control board](#) under the Ethernet jack for the Motors (fan) you will find a the JP2 Header (see JP2 detail). In the MUA controller we are using the 2nd motor control signal output (JP2) to control the Hot Water Supply Valve (not included). This allows the controller to throttle the supply valve which sends hot water through the Coils inside the coil box thus heating the Air moving toward the living space. The Valve Control signal **is usually supplied as a 0-10VDC signal** as shown in the image (pin 2 and 3 are jumped). It is however also possible to create a 0-24VDC **PWM** signal when the jumper is set to jump pin 1 and 2. Install and/or check if the jumper on JP2 is set to the correct pins for the supply valve you chose.

In order to send this signal to the valve in your hot water supply system (not incl.) you will have to run wiring from the controller to the adjustable supply valve (not incl.). The wiring can be small gauge wire (20ga) as these are low voltage control signals.

Route the wiring (not incl.) from the valve through the box side (knock-out or existing opening) and secure it with the supplied strain relief. You may have to combine it with the interlock wiring if you are installing this option.

Connect your supply valve control wires to the Motor 2 Header P23. This is the 2nd header from the left on the bottom of the [blue main board](#). **Note the polarity shown in the image. (0-10VDC or 0-24VDC PWM)**



Connect the rest of the plumbing to the Coil Module in such a way that you are feeding the hot water/glycol into the BOTTOM header of the Coil Module. (½" plumbing). And fill the system with the fluid of your choice and then and bleed the air out of it.

NOTE: Setting up a water heating coil system may involve plumbing and controls that are beyond the average skillset. If in doubt of any safety or control concerns, please contact AirScape technical support at [1.866.448.4187](tel:18664484187) or by email at experts@airscapefans.com or consult a professional.

IN PARTICULAR IT IS CRITICAL TO AVOID CONTAMINATING DOMESTIC WATER SYSTEMS.

In order to activate and control the Hot Water Heat Module, added ability has to be unlocked in the controller. This is done via a web browser on any computer, tablet or smartphone that is connected to the same Local Area Network (LAN) as the MUA unit. Make sure the MUA unit is on and connected to the network router via Cat-5 cable. Open a web browser on any device that is connected to the same network as the MUA unit. In the URL Address Bar of the browser, type in the IP Address of the MUA Unit and allow the window to load. (See [Network Set-Up](#) and it's "tip" if it does not work)

If the page loads and the MUA interface is up enter the address bar and at the end of the IP address add /config and press enter. Like: 192.168.10.3/config

The Factory Settings page should now be up. On the right hand bottom of the page there are some check boxes (see image)

Click the "Water Heater Module" check box
Click the "Water Heater Freeze Protection" check box

Click the "Submit" Button

this completes the activation of the Hot Water Heat Module.

Go back to the main MUA unit page by clicking on the "Back to Main Page" button.

Water Heater Proportional Gain:

Water Heater Integral Gain:

Water Heater Derivative Gain:

- AIS
- Extended (Recirculation) Module
 - Attic Module
 - Whole House Fan Module

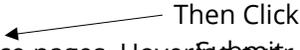
- Water Heater
- Water Heater Module
 - Water Heater Freeze Prevention Mode

General Warning

Setting up a hot water heating coil system may involve plumbing and controls that are beyond the average skillset. If in doubt of any safety or control concerns, please contact us at AirScape or consult a professional. In particular, it's critical to avoid contaminating domestic hot water systems.

Click
 "Water Heater Module"
 And
 "Water Heater freeze
 protection Mode"
 Checkboxes

You can also click in the IP Address in the URL Address Bar and by simply deleting the /config portion of the address and by pressing Enter you reactivate the main interface.

Note the blue “i” buttons throughout the MUA unit web interface pages. Hovering  or clicking on these icons provides additional information about the various functions of the MUA unit. The now available Hot Water Heat Slide Button can be used to turn this function on.

Also note the information banner toward the top of the page regarding adding glycol to the heating loop. Clicking on the Settings Tab of the main MUA unit’s main page will bring up various settings that can be controlled by the user. Set the Water Heating Target by sliding the selector to the desired temperature, then press the “Confirm” button at the bottom of the page. Some experimentation will need to take place to find the optimum setting for your configuration and location.

Perform an operational test of the Hot Water Heat Mode by sliding the hot water heat button to ON and then entering manual mode (slide manual button to ON) which allows you to control the supply valve output and fan speed manually without having to wait for Make-Up air conditions.
(also see [Start-Up and Operation](#))

INSTALLATION OF THE FILTER PRESSURE SENSOR OPTION

IF YOU PURCHASED YOUR UNIT WITH THIS OPTION: THE MAKE-UP AIR CONTROLLER COMES FULLY CONFIGURED SO THE FOLLOWING INSTRUCTIONS NEED **NOT** BE DONE, although we include them here anyway.

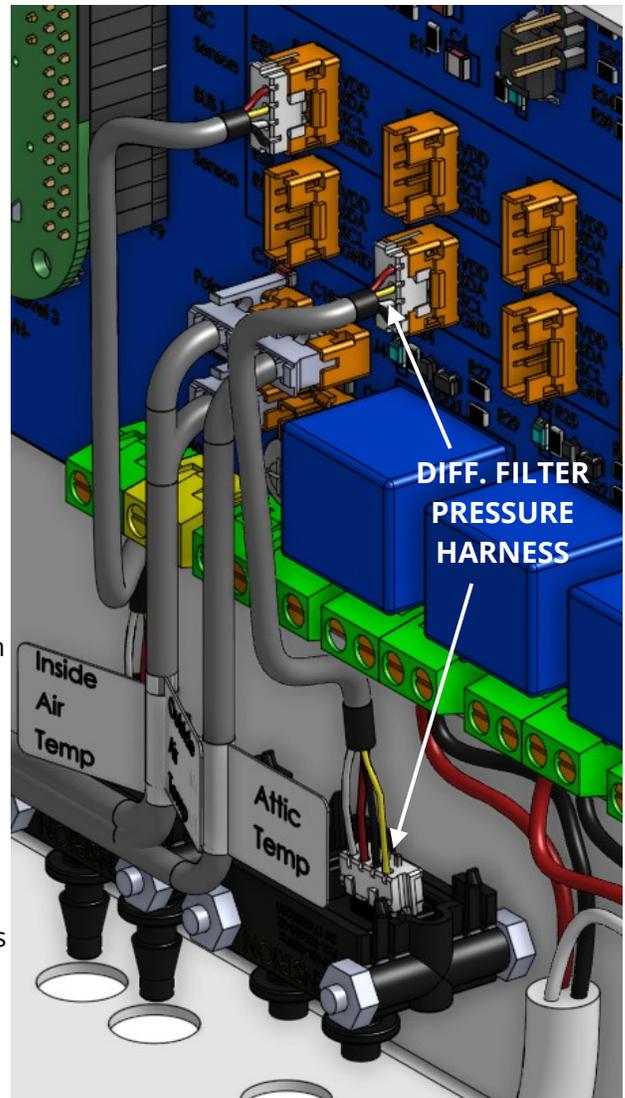
Filter Differential Pressure Sensor:

Alerts you to dirty filters. The Additional 500 Pascal pressure sensor, harness and mounting hardware are installed into the controller box. The additional software abilities are unlocked in the software config.

Open the controller by removing the lid. This is accomplished by loosening the 4 lid screws and sliding the lid upward until it can be removed.

Install the mounting screws (2X) from the back of the control box inward (see image) and lock them in place with 2 nuts. Connect the harness to the pressure sensor as shown. NOTE: SENSOR ORIENTATION (PORTS UP) VS HARNESS WIRE COLORS (ONLY WORKS ONE WAY). Slide the sensor over the two installed screws and check if the ports line up with the holes in the box, if so mount sensor with 2 nuts.

Connect the other side of the harness to the i2C bus that is empty (i2C bus runs horizontally and there are 2) NOTE: THE ORIENTATION OF THE WIRE COLORS



Replace the lid and tighten the screws

In order to activate and control the Differential Pressure Sensor, added ability has to be unlocked in the controller. This is done via a web browser on any computer, tablet or smartphone that is connected to the same Local Area Network (LAN) as the MUA unit. Make sure the MUA unit is on and connected to the network router via Cat-5 cable. Open a web browser on any device that is connected to the same network as the MUA unit. In the URL Address Bar of the browser, type in the IP Address of the MUA Unit and allow the window to load. (See [Network Set-Up](#) and it's "tip" if it does not work)

If the page loads and the MUA interface is up enter the address bar and at the end of the IP address add /config and press enter. Like: 192.168.10.3/config

The Factory Settings page should now be up. On the right hand top of the page there is a box with 4 sensor configuration options. (see image)

If you purchased the **standard MUA** unit select "**basic-filter.conf**"

If you purchased the **Heating Assist MUA** unit select "**attic-filter.conf**"

Click the "Submit" Button at the bottom of the page. this completes the activation of the Differential Pressure Sensor Option.

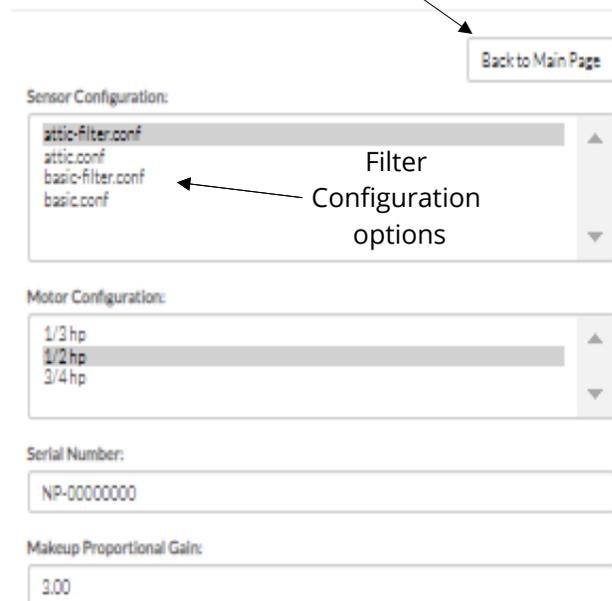
Go back to the main MUA unit page by clicking on the "Back to Main Page" button (RH Top see image).

You can also click in the IP Address in the URL Address Bar and by simply deleting the /config portion of the address and by pressing Enter you reactivate the main interface.

It furthermore requires 1/8" I.D. Vinyl tubing to connect the two sensor ports to the filter module's two static ports (2 x tubing, which is not included).

Looking at the static ports (on the back of the filter box) connect the lowest (closest to the fan) static port with the RH sensor port in the controller. (negative pressure side) Connect the other port to the LH sensor port on the controller for negative pressure indications of the filter status (this can be reversed if desired).

Return to
MUA Control Tab



INSTALLATION OF WIRING AND CONTROL

Most of the wiring connections to the MUA Unit are made at the fan-mounted electrical box and at the controller, however the controller needs to be (hard)wired to the wireless router in your network. The main connections are a 20 ft, black, factory-installed power cord on the fans electrical box and a 10 ft power cord for the controller need to be plugged into a ground tested receptacle. The supplied green Cat5 Ethernet cable connects the controller fan port to the fan's RJ45 Jack. Depending on the configuration of MUA you purchase upto three molex harnesses need to be connected to the actuators of the correct AIS modules. See below.

A - Route and connect the Green Cat5 Cable from the MUA CP Fan Jack to the Fan Box on the unit
B - Route and connect the actuator wires from the MUA CP (bottom) to the actuators on the selector box(es)

ACTUATOR 1 = MUA

ACTUATOR 2 = HEAT ASSIST

ACTUATOR 3 = WHOLE HOUSE FAN
 (see [Electrical Schematic](#))

C - Route and connect a Cat5 Cable (not incl.) from the MUA CP Web Jack to the router of your network

D - Route and Install the (OAT) Outside Air Temp sensor in the outside air inlet.

E - Route and Install the (IAT) Inside Air Temperature sensor close to the Fan (return) inside the Duct and seal around the wiring.

(AAT) Place the Attic Temperature in a safe place in the Attic (if purchased).

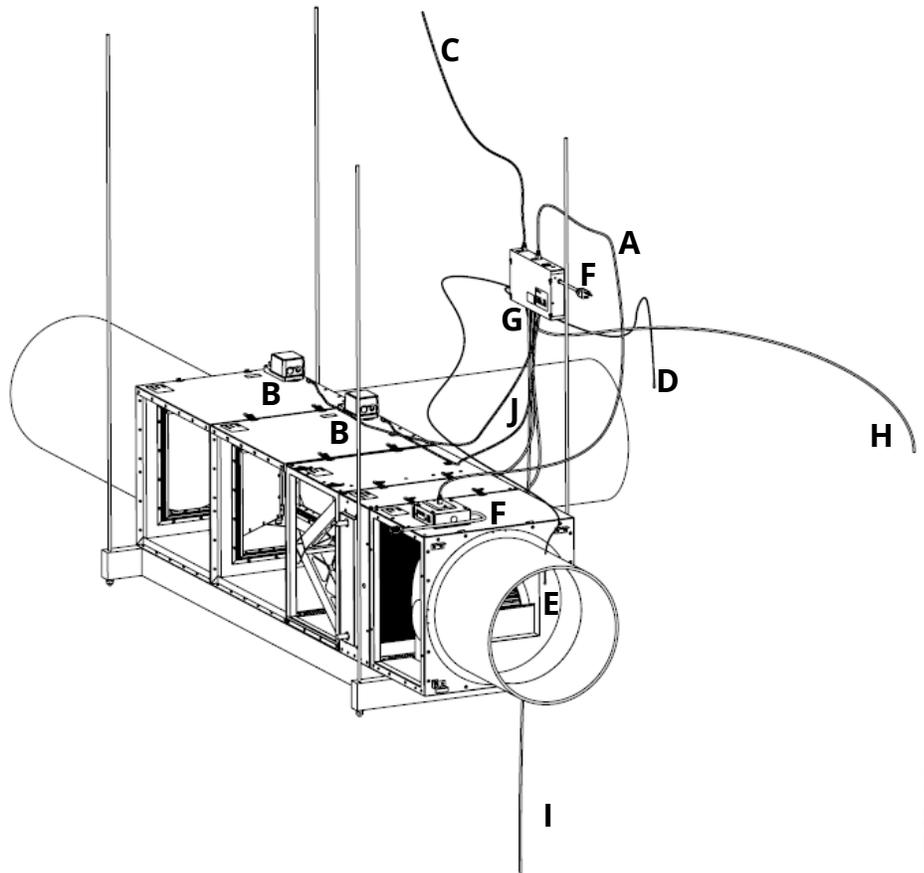
F - Plug the 20 ft fan and 10 ft controller power cords into a ground tested socket.

G - OTHER CONNECTIONS, see details in [Control Board](#) (depends on building codes)

FIRE ALARM: Fire Interlock, if triggered (connects P5-1 to P5-2), all dampers to default, Fan OFF, Overrides all other modes (Safety Interlock).

KITCHEN HOOD: Hood Interlock, if triggered (connect P5-3 to P5-4) Force Enable Make-up Air mode, maintains at least min speed, Overrides all other modes EXCEPT Fire Interlock.

HOT WATER HEAT: The Hot Water Flow Control to the Coil Box is established through a 0 - 10VDC Control Signal, connect to P23-3 and P23-1(Control Signal Only)



Note: Control Signal Wires can be routed through the Control Panel Box wall knock-out or open hole, using provided strain relief and adapter.

H - Route 1/8" I.D. tubing (not incl.) from the controller pressure sensor to the outside.

I - Route 1/8" I.D. tubing (not incl.) from the controller pressure sensor to the living space.

J - Route two 1/8" I.D. tubing (not incl.) from the controller filter pressure sensor to filter module (if purchased).

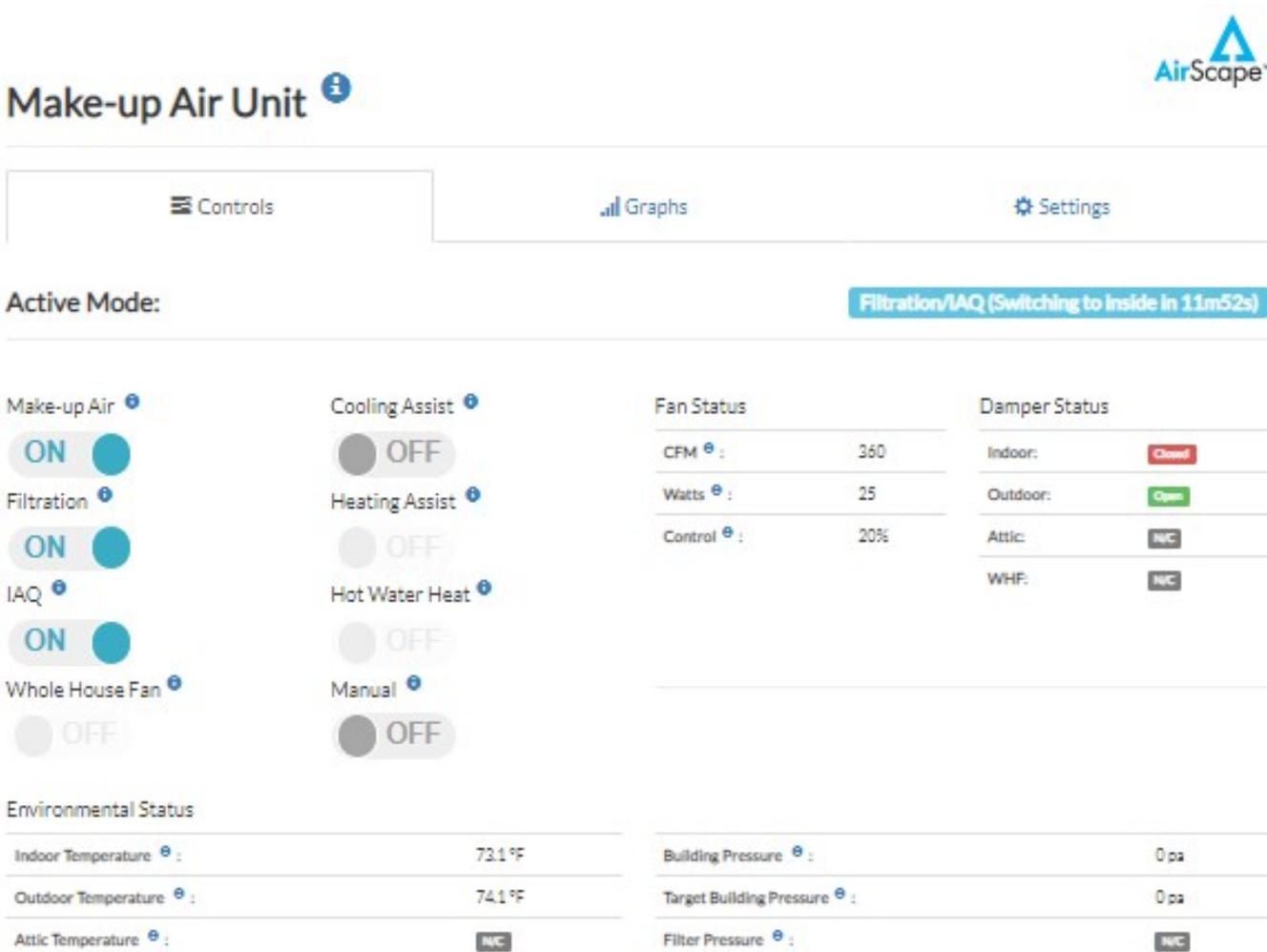
Controls:

The Make-Up Air Unit's controls can be accessed through a webpage, which means the Control Box must be wired to a network, see [network setup](#)

CONTROLLER INTERFACE

The Make-Up Air unit is controlled with an online web interface which can be accessed from a computer, tablet or smart phone when the MUA controller and your device are on the same local network. The interface consists of a single page with three tabs: CONTROLS, GRAPHS AND SETTINGS

The first Tab is the main page and is the Control Page.



Make-up Air Unit i AirScape

Controls | Graphs | Settings

Active Mode: Filtration/IAQ (Switching to inside in 11m52s)

Make-up Air	Cooling Assist	Fan Status	Damper Status
<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF	CFM : 360	Indoor: Closed
<input checked="" type="checkbox"/> Filtration	<input type="checkbox"/> Heating Assist	Watts : 25	Outdoor: Open
<input checked="" type="checkbox"/> IAQ	<input type="checkbox"/> Hot Water Heat	Control : 20%	Attic: NIC
<input type="checkbox"/> Whole House Fan	<input type="checkbox"/> Manual		WHF: NIC

Environmental Status	
Indoor Temperature :	73.1°F
Outdoor Temperature :	74.1°F
Attic Temperature :	NIC
Building Pressure :	0 pa
Target Building Pressure :	0 pa
Filter Pressure :	NIC

INDEX

NOTE:

Warnings may appear above the tabs which ought to be noticed as some of them can alert you to a failure. The “active mode” in blue, the little “i” circle buttons give additional info when clicked, the Blue “ON” slider buttons which control the main options, Environmental Status giving you feedback on the measured values , there is more below this but this has been omitted to simplify the amount of information available here.

TIPS: (many combinations are possible, experiment)

- Even with Make-Up Air “OFF”, Hood Interlock will engage Make-Up Air regardless of other modes (“ON”).
- Some functions when activated will show additional controls here (not shown).
- When you turn on the “Hot Water Heat” and then “Manual” control sliders show up here (not shown).
- **ALWAYS open windows** when operating the “Whole House Fan” and the sliders that show up.
- When the “timer” slider in the “WHF” controls is set to 0 the fan will run continuously.
- IAQ periodically opens the Outside Air damper (MUA-AIS) to mix in fresh filtered outside air.

The second Tab is the Graphs Tab and graphically shows the status of the temperatures and pressures in the living space.



Make-up Air Unit i

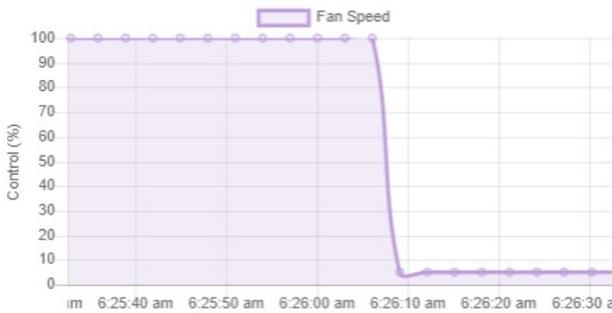
Controls

Graphs

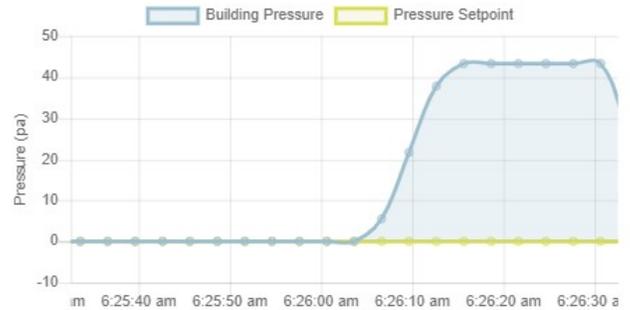
Settings

See real-time information on the building and system.

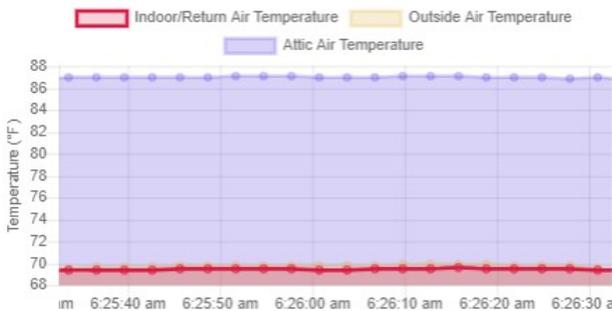
Fan Speed



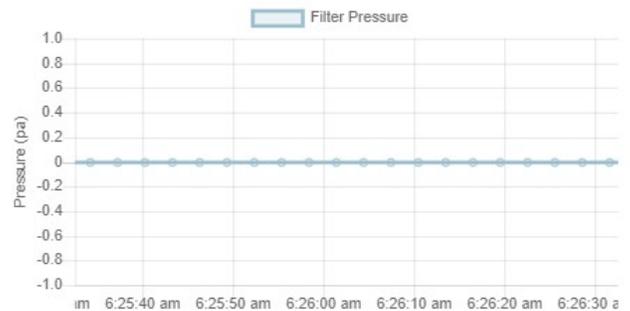
Building Pressure



Temperature



Filter Pressure



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NOTE:

The interface is in "real time"* and is showing current conditions of the living space and MUA unit. The Fan Speed vs the building pressure (also pressure set-point). The up to three live temperature readings. (3 if you purchased the Heat-Assist Option) The differential pressure over the filters, high pressures (- or +) indicates dirtier filters. (if you purchased the Filter Option and depending on how the sensor tubing was connected)

* some hysteresis or lag exists but is very small, all sensors are very responsive.

INDEX

The third Tab is the Settings Tab and shows some of the settings that can be used to dial in the unit

The screenshot displays the Settings Tab with the following controls:

- Make-up Building Depressurization Limit:** Slider set to -3 pa.
- Filtration Fan Speed:** Slider set to 20%.
- Make-up Building Pressure Setpoint:** Slider set to 0 pa.
- Outside Air Ventilation Rate:** Slider set to 20%.
- Make-up Fan Shutoff Setpoint:** Slider set to 5%.
- Water Heating Target:** Slider set to 69°F.
- Assist Fan Speed:** Slider set to 50%.
- HVAC Assist Targets:**
 - Cooling Target: 75 °F
 - Cooling Deadband: 3 °F

At the bottom, there is a "Reset to Defaults" button, a "Confirm" button, and a "Cancel" button.

NOTE:

- The Building Depressurization Limit slider which determines when the MUA unit activates.
- The Building Pressure Setpoint slider which sets the pressure in the living space the MUA unit will maintain.
- The Filtration Fan Speed slider.
- The Outside Ventilation Rate adjusts the amount of fresh air taken in in IAQ mode.
- The Make-up Fan Shutoff Setpoint sets at what speed the fan shuts off.
- The Water Heating Target slider allows you to adjust the temperature you want the Air to be set to. (this can be Filtration-mode, IAQ-mode, Make-Up Air mode, Manual Mode when Hot Water Heat is "ON")
- The Assist Fan sets the fan speed for heating and cooling assist.

NOTE: the "CONFIRM" button must be clicked for values to be changed

NOTE: some settings will create "Warnings" which ought to be taken seriously.

Further Settings can be altered in the /config of the controller or factory settings screen but should be done **with proper testing** as the results will influence the MAU performance at a fundamental level. Making a screenshot (picture) or note of the standard values is a good idea before you adjust these core response values. Luckily a “reset to defaults” button exists within the factory settings screen to save the day.

To access the Factory Settings page make sure the MUA unit is on and connected to the network router via Cat-5 cable. Open a web browser on any device that is connected to the same network as the MUA unit. In the URL Address Bar of the browser, type in the IP Address of the MUA Unit and allow the window to load. (See [Network Set-Up](#) and it’s “tip” if it does not work)

If the page loads and the MUA interface is up enter (click in it) the address bar and at the end of the IP address add /config and press enter, like: 192.168.10.3/**config**

The Factory Settings page should now be up. Note: the 6 Bars with numbers in them below the Serial Number Bar on the RH side of the page those are the fundamental controls mentioned earlier.

The following fundamental response values for Make-Up Air and Hot Water Heat Control can be adjusted:

Proportional gain: The proportional gain determines the ratio of output response to the error signal. For instance, if the error term has a magnitude of 10, a proportional gain of 5 would produce a proportional response of 50. In general, increasing the proportional gain will increase the speed of the control system response.

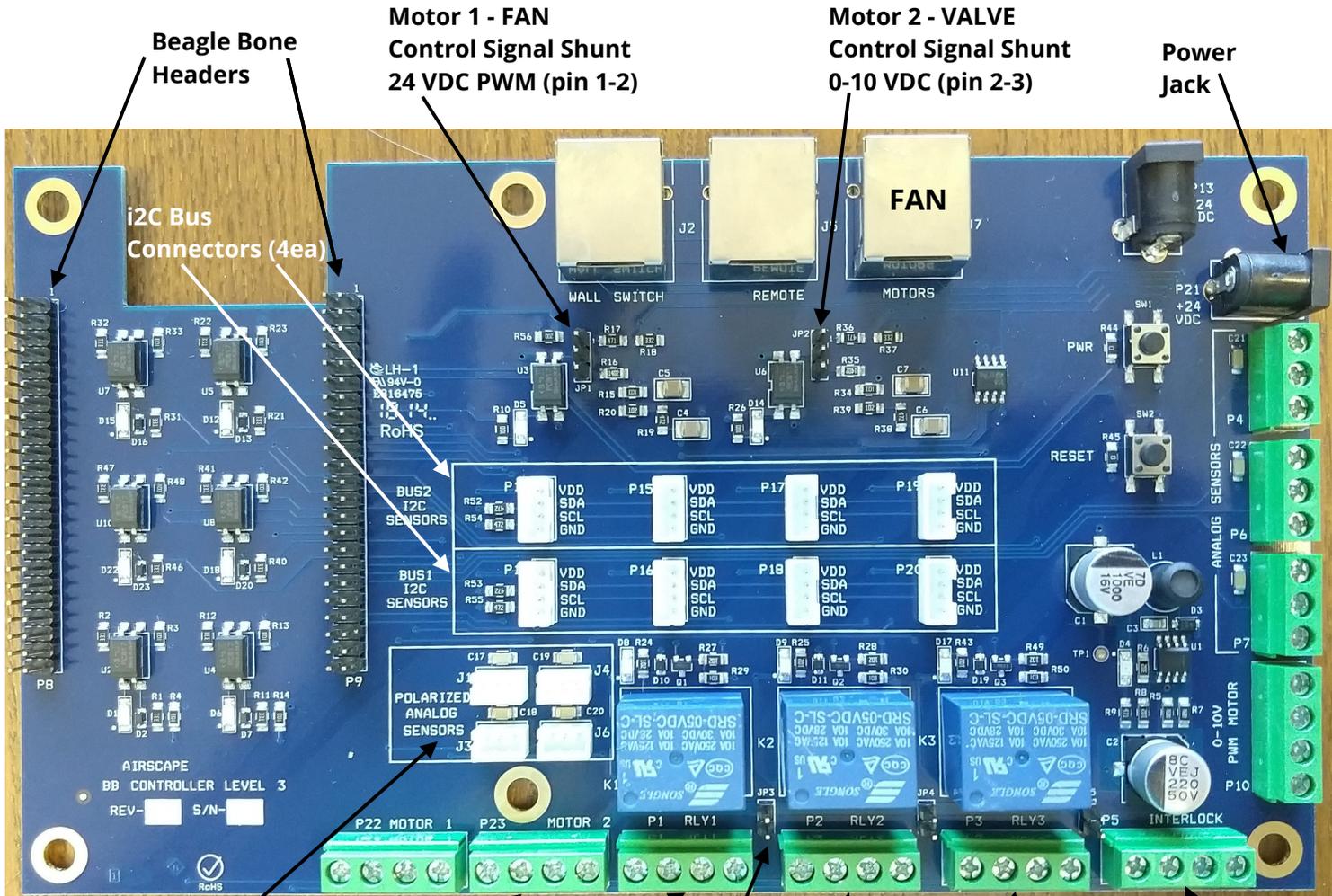
Integral gain: The integral gain controls how much of the Control Output is generated due to the accumulated Position Error or Velocity Error while in position control or velocity control, respectively. The integral gain units are: percent of the maximum Control Output per unit of control (position, velocity, pressure, force etc) of Position Error times time. A low gain slows the response of the axis to changes and may keep the axis from reaching the Command Position or Command Velocity. A gain that is too high may make the axis oscillate.

Derivative gain: The derivative gain (rate of change) represents the damping effects on the system, working with proportional gain to reduce overshoot and oscillations. The term “derivative” is used because this parameter is proportional to the rate of change (derivative) of the error. Large derivative action tends to destabilize a loop because it doesn't allow it to change. The rule of thumb is that if your derivative time is greater than the reset time of your controller, you've got issues.

NOTE: the “SUBMIT” button must be pushed for the values to be set

PROPER TESTING WITH ALL AIR EXPELLING SOURCES AND MAKE-UP AIR FUNCTIONS PURCHASED MUST BE COMPLETED TO VERIFY CORRECT AND EFFICIENT FUNCTIONING OF THE MAKE-UP AIR SYSTEM AND IT'S OTHER MODES.

CONTROLLER BOARD



- OAT = J1
- IAT = J3
- AAT = J4
- TEMP SENSORS
- Motor 2 - VALVE HEADER
- MUA ACTUATOR HEADER P1
- MUA ACTUATOR JUMPER JP3
- HEAT ASSIST ACTUATOR HEADER P2
- WHF ACTUATOR HEADER P3
- INTERLOCK HEADER P5

The Beagle Bone (not shown) is a computer and it has been programmed with the software that controls the MUA.

JP1 = Motor 1 Control Signal Shunt (0-24VDC PWM) selects the control signal for the fan (pin 1-2)

JP2 = Motor 2 Control Signal Shunt (0-10VDC standard) selects the control signal for the Hot Water Heat SUPPLY VALVE (pin 2-3 = 0-10VDC, pin 1-2 = 0-24VDC PWM).

P21 = Power Jack 24 VDC from Power supply.

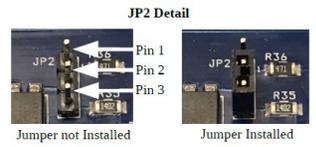
P13, 15, 17, 19 = i2C BUS 2 Usually this is where the Make-Up Air Differential Pressure Sensor is connected.

P12, 16, 18, 20 = i2C BUS 1 Usually this is where the Filter Differential Pressure Sensor is connected.

J1 = OAT Outside Air Temperature Sensor connects here.

J3 = IAT Inside Air or Conditioned Air Temperature Sensor connects here.

J1 = AAT Attic Air Temperature Sensor connects here.



INDEX

P23 = Motor 2 header, this header is where the Supply Valve Control Wires are connected. NOTE: polarity P23-1 = ground (-), P23-3 = positive (+)

P1 = MUA header, this header is where the actuator for the AIS Module that brings in Outside Make-Up Air is wired to. The **JP3** jumper must be shunted to supply 24VDC to the actuator.

P2 = Heat Assist header, this header is where the actuator for the AIS Module that brings in Hot Attic Air is wired to. The **JP4** jumper must be shunted to supply 24VDC to the actuator.

P3 = WHF header, this header is where the actuator for the AIS Module that allows Hot Living Space Air into the Attic (ventilation cooling) is wired to. The **JP5** jumper must be shunted to supply 24VDC to the actuator.

P5 = InterLock header, this header is where the FIRE InterLock and HOOD InterLock are wired to.

It is important that **no voltage** be sent to the board from external sources.

FIRE-INTERLOCK: P5-1 = High (+) P5-2 = ground (-) circuit to be closed to activate

HOOD INTERLOCK: P5-3 = High (+) P5-4 = ground (-) circuit to be closed to activate

Note: the grounds are used by the Actuator harnesses just add your circuit wire to it.



Fire Interlock:

P5-1, 2, 3, 4

This allows you to disable operation of the unit when a fire alarm is triggered.

This will override ALL other active MUA modes. While triggered, this interlock disables the fan and sets the damper doors to the Off position. Removal of the interlock allows the unit to resume. It is important that **no voltage** be sent to the board from external sources when choosing how to wire this interlock. It is designed to operate only as a closed loop circuit.

Hood Interlock:

This allows you to FORCE Enable Make-up Air when an Appliance such as the Kitchen Hood is activated. This will override ALL other active MUA modes EXCEPT the Fire Interlock.

It is important that **no voltage** be sent to the board from external sources when choosing how to wire this interlock. It is designed to operate only as a closed loop circuit. This interlock is triggered by closing the circuit between two contacts on the board.

If you wish to only turn on the MUA when a certain appliance is active but you still want to use the other modes available. Than this can be accomplished by turning the Make-Up Air slide button (in the MUA interface) to "OFF" and wiring the HOOD Interlock to be closed when that appliance is turned on. This will keep Make-Up Air "OFF", regardless of the pressure in the living space, and allows you to operate other Modes. Yet the Make-Up Air Unit will activate (and override all other active modes) and bring in outside air when the appliance is turned on.

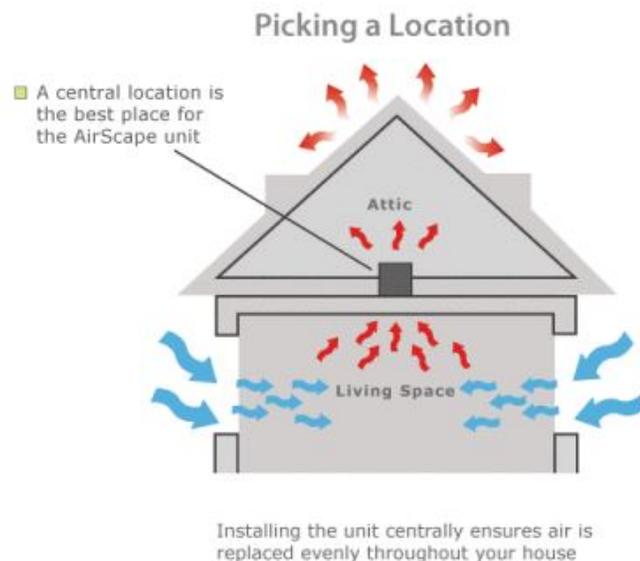
The exact method of closing this circuit will depend on the particular installation and equipment the controller interlock is interfacing with. One possible way of doing so is with a double-pole wall switch, in which it is wired so that one pole is used to control power to the appliance and the other pole (DISCONNECTED) closes the interlock contacts. Another way would be to use a relay or current switch that is activated when the appliance is turned on. It is also possible to use switch like devices that close a switch when certain conditions are met like an AccuStat (LH1) AS LONG AS NO VOLTAGE IS SENT TO THE BOARD. More modern devices like Wifi Smart Controllers can also be used to activate both appliance and MUA with an App.

NOTE: the **reset** button on the board next to the power jack.

WHOLE HOUSE FAN THEORY OF OPERATION

As a home heats up during the day, a large amount of heat is retained in its structure and contents. These materials give off their heat slowly and continue to heat the home's interior even if the outdoor temperature is comfortable. Homeowners are then forced to endure either uncomfortable hot indoor temperatures, or the expense of air conditioning. AirScape's [Whole House Fans](#) resolve this dilemma by exhausting hot indoor air out of, and drawing cool outdoor air into, the home.

Each of our fans has been designed for quiet and efficient operation. As such, we strongly recommend running this fan through the night to extract the maximum possible amount of heat from the home. This not only helps maintain a comfortable indoor temperature, but essentially "[pre-cools](#)" the home ahead of the next day's rise in temperature, which reduces, or can even eliminate, the need for traditional air conditioning.



INDEX

- Locate this fan in a central location away from windows that will be opened to promote an even replacement of air throughout the home and greater the cooling effect.
- Locate this fan at the highest point possible to exploit natural convection and help exhaust the hottest indoor air from the home.
- In a two-story home, the ideal location for this fan is typically in the open area at the top of the stairs.

Required Attic Ventilation:

It is critical that the attic be sufficiently ventilated for this fan to operate properly. Without adequate ventilation, hot air cannot easily escape from the attic, which creates back-pressure that can substantially reduce the fan's performance. Specifically, operating this fan in an attic with less net free ventilation area than recommended will decrease its airflow and energy efficiency.

We recommend a minimum of **2.3 ft² to 4 ft²** of "net free" ventilation area for the MUA Unit's fan highest speed.

Net free ventilation area can be provided by any combination of [gable](#), eyebrow, roof cap, [soffit](#), or ridge vents, or any other method of ventilating the attic space. However, the openings of most vents are partially obstructed by grilles, louvers, and/or screens. A vent's "net free" ventilation area is then the

surface area of its opening minus the surface area of any grilles, louvers, or screening covering it. Different types of vents have different ratios of net free area to total area.

Manufacturers typically publish their vents net free ventilation areas and/or ratios in their products specification documents. *If this information is unavailable, a ratio of 50% net free area to total area is usually a good rule of thumb.* The most notable exception to this rule of thumb are ridge vents. The industry standard net free ventilation area for ridge vents is 13% of the vent's length in feet. Thus, a ten foot ridge vent would provide 1.3 sq. ft. of net free ventilation area.

While in our experience most properly constructed homes have adequately ventilated attics, not all do. Because sufficient ventilation is so critical to this fan's performance, it is important that the home's existing ventilation be verified before it is installed.

Since most attics have multiple vents, often of different types, it is necessary to count each vent, noting its type and size. Apply the appropriate ratio to the dimensions of each vent to find its net free area, and sum these values to find the attic's total ventilation. An example of how these calculations are made is given in the chart below.

Vent Type	Dimensions	Total Area (sq/ft)	Net Free Area Ratio (NFA)	Net Free Ventilation Area (= Total Area x NFA)
Louver	24" x24"	$24" \times 24" \div 144 = 4 \text{ ft}^2$	50%	$4 \text{ ft}^2 \times 0.50 = 0.89 \text{ ft}^2$
Ridge	10 feet	n/a	13%	$10 \text{ feet} \times 0.13 = 1.33 \text{ ft}^2$
Round soffit	10" diameter	$3.14 \times 5" \times 5" \div 144 = 0.55 \text{ ft}^2$	50%	$0.55 \text{ ft}^2 \times 0.50 = 0.28 \text{ ft}^2$
Total Net Free Ventilation Area				1.57 ft ²

START-UP AND OPERATION

Note to the user: The Airscape Make-Up Air unit is designed to be used with a well sealed building. The fan controller is dependent on a measurement of pressure within the building that is readily influenced by any depressurization sources, as well as the introduction of make-up air into the building. A building that is not well-sealed has a lessened response to pressure influences. As such, a Make-Up Air unit that is installed in a building that is not well sealed, or operated in a building that has openings to the outside such as windows or doors, will have a lessened response to depressurization sources, and may even operate improperly. Many homes have small constant-demand depressurization appliances, such as bathroom fans. If such devices are present, the unit may constantly run, as it detects the slight depressurization caused by these appliances. If this behavior is unwanted, configuration of the unit during installation may be needed.

Make Up Air Unit Calibration

Close all windows, doors, and other commonly-used ventilation openings in the home. Turn off all appliances that cause intermittent depressurization, such as kitchen hoods and user controlled bathroom fans. If there are constant-demand depressurization appliances present, leave them on.

Connect to the Make-Up Air interface using a web-enabled device. On the Controls tab in the interface, make note of the Building Pressure within the home. This is the ambient home pressure.

Note: Depending on what appliances are present in the home, as well as the level of sealing in the home construction, this value may be slightly negative or positive.

In the MUA unit interface Settings tab, set the Make-Up Building Depressurization Limit to 2-4pa below (-) the ambient home pressure. This will set the Make-Up Air unit to activate only when a user controlled depressurization appliance is running.

Note: If, in normal usage, the Make-Up Air unit activates when it is not needed, adjust this value lower; if it does not activate when needed, adjust this value higher.

The default Make-Up Building Pressure Setpoint is 0pa. This can be adjusted as desired, but it must be at least 1pa above the Make-Up Building Depressurization Limit. Hit Confirm at the bottom of the Settings page to save changes, and proceed with testing the Make-Up Air unit.

Make Up Air Unit Testing

In the MUA interface screen go to the Controls tab to monitor the unit during operation. Ensure that the Make-Up Air toggle is activated (Blue="ON").

Activate all depressurization appliances. Note the Building Pressure lowering into negative values. When the Building Pressure drops below the set Depressurization Limit, the unit will switch to Make-Up Air mode and dynamically engage the fan.

Note: Depending on what appliances are present in the home, as well as the level of sealing in the home construction, this may take between a few seconds and 1-2 minutes. If, after a reasonable time, the Building Pressure does not drop below the Depressurization Limit and activate Make-Up Air mode, recheck that all openings to the outside of the home, such as doors and windows, are closed. If so, note the current Building Pressure, and set the Depressurization Limit slightly above this level.

The fan speed will increase until the building pressure reaches the Make-Up Building Pressure Setpoint.

Note: If the fan increases to 100% before the pressure target is reached, the unit is not capable of reaching the Pressure Setpoint. Consider reducing the target, or installing a larger make-up air unit. A well-sealed building is required for the unit to reach a positive target value.

Deactivate the depressurization appliances. The Make-Up Air unit will continue to run. Note that when the Building Pressure rises above the pressure target, the fan speed will reduce.

The fan speed will continue to reduce as long as the building pressure is above target.

When the fan speed reduces below the Fan Shutoff Setpoint, the unit will go into a shutoff cool-down mode of 2 minutes. During this time, the fan speed will continue to lower until it reaches a minimum speed of 5%, the hot water supply is shut-off and the outside air actuator closes the door.

Note: The fan speed may lower to a point where building pressure is no longer reaching target. This may happen if the Make-Up Building Pressure Setpoint is set to a positive value in a building that is not well sealed, or there are constant-demand depressurization appliances present. If this happens, note the point at which the fan no longer lowers in speed, and set the Make-up Fan Shutoff Setpoint 5-10% above this value. This will cause the unit to go into shutoff mode when significant make-up air is no longer needed.

Ensure that the fan shuts off. If any changes were made in the configuration, run another cycle with the depressurization appliance to ensure proper operation.

OPERATING TIPS

The Make-Up Air unit is controlled with an online web interface which can be accessed from a computer, tablet or smart phone when the unit is on a local network. Use the "Fing" app or other network scanner to locate the MUA unit on the network, which shows up as a "Texas Instruments" or "Beagle Bone" device.

In most cases the MUA unit is quick to start-up and it can take up to several minutes for the MUA unit to turn off, depending on the settings. This is done as a cool-down mode for the Hot Water Heat Coil Box and is also related to the speed of the actuator but furthermore stops the unit from quickly starting up and shutting down. In the MUA Unit Interface there is a timer that shows how long it takes before the unit stops and this is visible on the Control Tab.

See the [Controller Interface](#) Section for a more in depth look at the abilities of the AirScape MUA Unit

HEAT ASSIST TIPS:

- The Heat Assist Mode can only supply heat out of the attic when the temperature in the Attic is higher than in the living space (depending on Heat Assist Temperature target set).
- The Hot Air removed from the Attic and moved to the living space is replaced by the cooler outside air and air vented into the Attic and will take time to heat up again to a level higher than the living space temperature.

WHOLE HOUSE FAN MODE TIPS:

- Never operate your whole house fan mode without also opening a window or door. Doing so can excessively depressurize your home.
- Only operate your whole house fan mode when the outdoor air temperature is cooler than the indoor temperature.
- Make sure your air conditioner and furnace are off before you turn on your whole house mode. Running either of these together with your whole house fan wastes energy and money because the fan will force expensively conditioned or heated air out of your home.
- Use your whole house fan's higher speed settings to cool your home quickly in the evening. Then, switch to its lower settings to run it quietly and efficiently through the night.
- We recommend you run your whole house fan through the night.
Here's why: The goal of using a whole house fan is to cool your entire home, not just the air inside it. Once heated, your home's structure and contents continue to radiate heat until reaching the temperature of the surrounding air. By running your fan through the night, you speed up this cooling process and can then further "pre-cool" your home, reducing or eliminating the need to use air conditioning the next day. AirScape fans are extremely efficient, so operating your fan in this way is very inexpensive, especially compared to the cost of air conditioning.
- If your home has a basement, extra cooling can be achieved by drawing in air through the basement windows.
- You can control where your fan's cooling effect is concentrated by adjusting the location of the windows you open. Visualize the path air will travel from the windows to your fan's opening. Generally, the longer the path, the more cooling.

MAINTENANCE

Your Make-Up Air Unit has a set of filters installed. If you have the optional filter pressure sensor installed, as a guide; you ought to replace the filters when the pressure exceeds a maximum of 125 pascals / 0.5" water column as shown on the web interface. Otherwise replace filters every 2-3 months. The pleated media size is MERV 13: 14" x 20" x 2" (13.5" x 19.5" x 1.75" Actual). Filter media is available at www.hvacquick.com

Door actuators should be inspected annually to verify operation. There is no maintenance required for these actuators except to check that connections are tight and no foreign material is blocking door operation.

The supply fan motor requires no maintenance. Annually check that the supply fan compartment is clean and free of any debris. After disconnecting power vacuum any dust or foreign matter to ensure fan wheel balance.

A re-settable circuit breaker is located on the Fan-mounted and control electrical boxes to protect the motor and circuit boards from power surges. In the case of a power surge, this breaker can be reset by simply pushing the button back in.

GLOSSARY

- AIS:** Air Inlet Selector, an actuator activated damper door module switching between air streams
- AAT:** Attic Air Temperature. The temperature of the air inside the attic space
- BB:** BeagleBone, a programmable micro computer.
- CAT:** Conditioned Air Temperature. Temperature of the air leaving the system
- CEC:** California Energy Commission.
- CF:** Cabinet Fan. A module which has a motor driving a fan which moves the air through the system.
- CFM:** Cubic Feet per Minute. An indication of the volume of the air flowing (moved by) through the system.
- CP:** Control Panel, or controller box, houses the electronics that "control" the functions of the unit.
- dB(A):** Decibels A is a noise level measured in decibels (dB) 60dBA is considered conversation level noise.
- DIFFERENTIAL PRESSURE:** This is the difference in air pressure between 2 spots. In the case of a make-up air unit, we measure the pressure difference between outside and inside the building. In the case of the filters we are measuring before and after the filters.
- ECM:** Electronically Commutated Motor is a very efficient motor that unlike standard motors keeps its high efficiency even when working at part load.
- FB:** Filter Box, the module which houses the v-bank filters that filters the air going through the MUA unit.
- GFCI:** Ground Fault Circuit Interrupter, for systems using a motor use a **Motor Rated GFCI**.
- Hz:** Hertz equals the number of cycles per second (alternating currents)
- IAT:** Inside Air Temperature, Temperature within the living space.
- IAQ:** Inside Air Quality, the Quality or cleanliness of the Air in the living space.
- I.D.:** Inner Diameter of a tube
- MUA:** Also listed as MUA Unit means Make-Up Air unit
- OAI:** Outside Air In, the Air Inlet of the air outside the structure.
- OAT:** Outside Air Temperature, the temperature of the air outside the structure
- O/C:** On Center, indication of framing distance between beams measured in the center of the beam.

PASCALS: This is the metric measure of pressure. One pascal is a very small amount of pressure.

Typical sea level air pressure is about 100,000 Pascals. (100 Pa = 0.402 "WC)

PSU: Power Supply Unit. Usually transforms power from 115VAC to 24VDC in our units.

PWM: Pulse Width Modulation is used for controlling the amplitude of digital signals in order to control motor speed or other devices.

TARGET: Also know as Setpoint is the desired value that a control system is working to achieve.

VA: Volt-ampere (VA) is a measurement of power in a direct current (DC) electrical circuit 1 VA = 1W

VAC: Volts Alternating Current.

VDC: Volts Direct Current.

W.C.: Water Column, a column of water is used to measure the pressure in an area.

WHF: Whole House Fan a ventilation system intended for cooling the entire house by moving cool air.

TROUBLE SHOOTING



Before servicing your Make-Up Air Unit, turn off power to it at your home's electrical panel to reduce the risk of electrical shock, injury, fire, and/or circuit board damage.



If you encounter problems with the unit, please take a few minutes to run through the following troubleshooting procedures ***before calling for technical support.***

The Make-Up Air unit is controlled with an online web interface which can be accessed from a computer see [Network Set-Up](#) to access the MUA unit control interface.

NOTE: A "kinked" CAT5E Cable may cause a failure to connect to the router or the fan to not start. Use another cable to rule out a cable issue before proceeding.

A re-settable circuit breaker is located on the Fan-mounted electrical box to protect circuit boards from power surges. In the case of a power surge, this breaker can be reset by simply pushing the button back in.

Symptom: Control Interface works but Fan Unit does not start

Possible causes: No mode selected, no power to fan unit or kinked Ethernet Cable

Suggestion 1: Select "Manual Mode" in the interface and move the fan speed slider.

Suggestion 2: Check power (115VAC) at the electrical outlet, inside the fan's electrical box wiring at the Motor wiring connectors (115VAC)

Suggestion 3: Check the re-settable circuit breaker on fan's electrical box.

Suggestion 4: Check for pwm (control 0-24VDC, 80Hz PWM) signal at fan box RJ45 connections.

Symptom: Control Interface works but Door does not open, but Fan starts

Possible causes: No Mode selected, no power to damper actuator, or damper shaft loose.

Suggestion 1: Select "Manual Mode" in the interface and click the Damper Configuration button.

Suggestion 2: Operate door(s) manually using the Actuator Clutch. Verify that the Actuator rotates with the door shaft and that the shaft rotates with the door.

Suggestion 3: Check for 24VDC at the actuator(s) harness, inside the actuator and in the control box

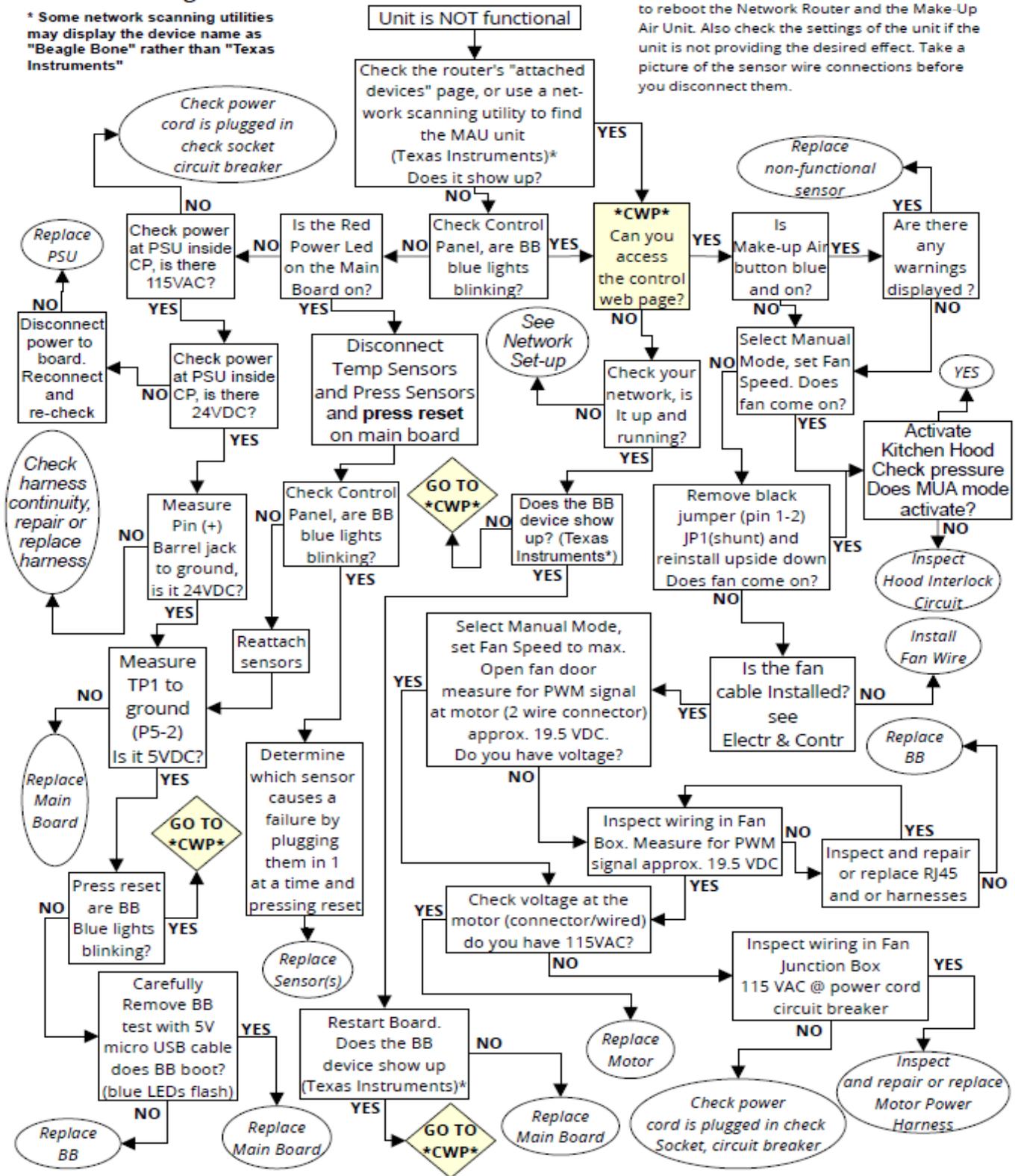
NOTE: IN NORMAL OPERATION THE MAKE-UP AIR UNIT COMES ON WITHIN A MOMENT AND MAY TAKE SEVERAL MINUTES TO SHUT OFF (SEE THE COUNTER TELLING YOU HOW LONG).

NOTE: THE ACTUATOR OPERATION CAN BE REVERSED BY SWITCHING THE DIRECTIONAL SWITCH

Troubleshooting Flow-Chart

* Some network scanning utilities may display the device name as "Beagle Bone" rather than "Texas Instruments"

NOTE: Before you start troubleshooting, attempt to reboot the Network Router and the Make-Up Air Unit. Also check the settings of the unit if the unit is not providing the desired effect. Take a picture of the sensor wire connections before you disconnect them.



INDEX

If these suggestions do not work, contact AirScape technical support at [1.866.448.4187](tel:18664484187) or by email at experts@airscapefans.com for further assistance. NOTE: You will be asked for a Serial number for the Fan and Damper Door Box so our technician is able to direct you and/or diagnose your system.

SPECIFICATIONS

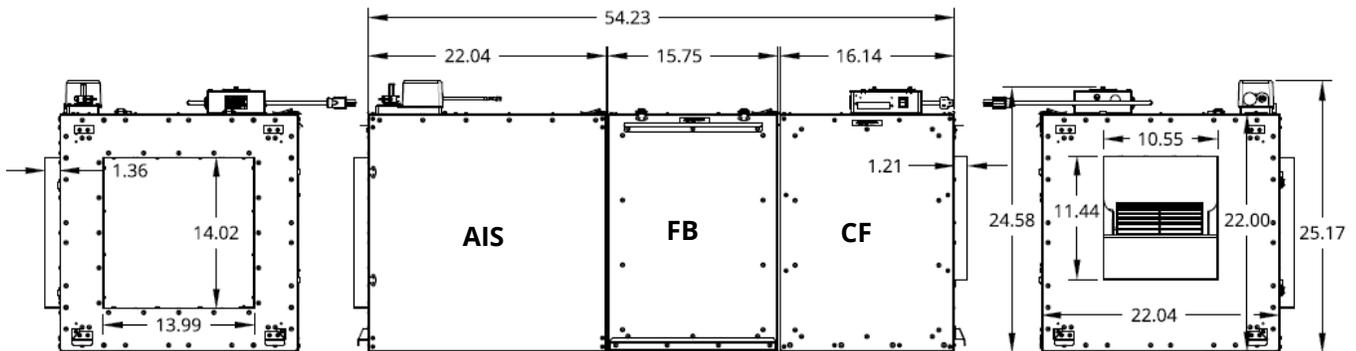
IF MORE THAN 1200 CFM IS NEEDED FOR MAKE-UP AIR USE OUR AH4 MAU UNIT INSTEAD although not all options will be available for that unit.

AH2-CF-FB-AIS Make-Up Air Unit

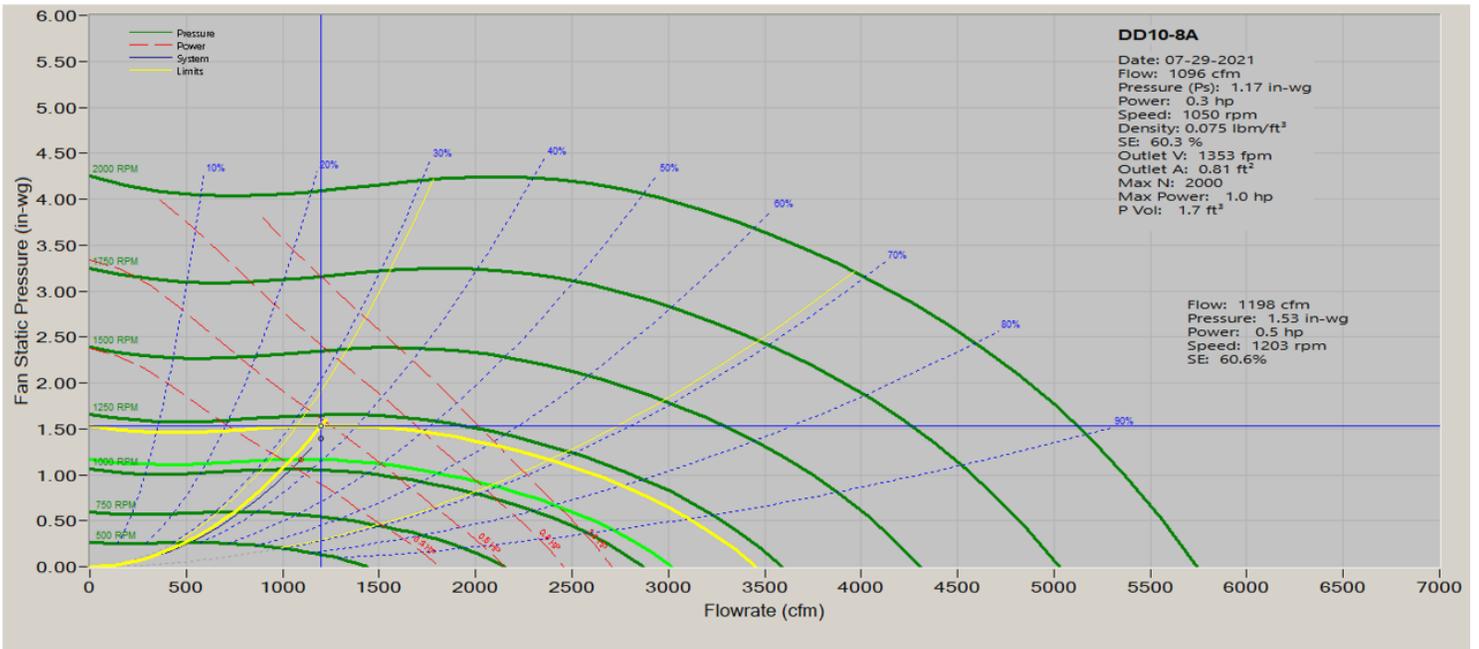
Fan: (CF)	Lau DD10-8A	Fan Size/Weight:	22.1"x22.1"x16.2" (WxHxL) 49 lbs
Motor:	1/3-1/2HP ECM, 115VAC, PWM modulation. RJ-45 Connection	Fan Outlet:	10.55"x11.44" (WxH)
Construction:	All Aluminum construction with steel inner braces and corner mounts. Access panel on one side	Insulation R-Value:	R-4.3 Fiberglass
V-bank Filter: (FB)	Two MERV 13 Filters in V-Bank formation, 3.66 sq.ft. of filtration. 2 Static Pressure Ports.	Filter Box Size/Weight:	22.1"x22.1"x15.75" (WxHxL) 18 lbs
Filter Quality:	MERV 13, but can hold any.	Filter Size:	14"x20"x2" (nominal) 13.5"x 19.5"x1.75" (actual)
Construction:	All Aluminum construction with steel inner braces and corner mounts. Access panel on one side	Insulation R-Value:	R-4.3 Fiberglass
Air Inlet Selector (AIS)	AIS Actuator 24VDC, 6VA with directional switch and moxex.	AIS Size/Weight:	22.1"x22.1"x22.1" (WxHxL) 25 lbs R4.3 Fiberglass
Construction:	All Aluminum construction with steel inner braces and corner mounts. Replaceable door seals	Air Inlet Size	14.02 x14.02 removable rectangular collars Also fits round 18" duct adapter
Controller:	MUA Controller: phone, tablet, PC interface. Controls fan depending on pressure in the room. Fully customizable to your installation. Capable of throttling a valve based on Settings and measured Air Temperature. Includes Fire and Hood interlocks. Optional filter pressure sensor (filters dirty delta P = High), Heating Assist and Whole House Fan.		

INDEX

Standard Unit Dimensions:

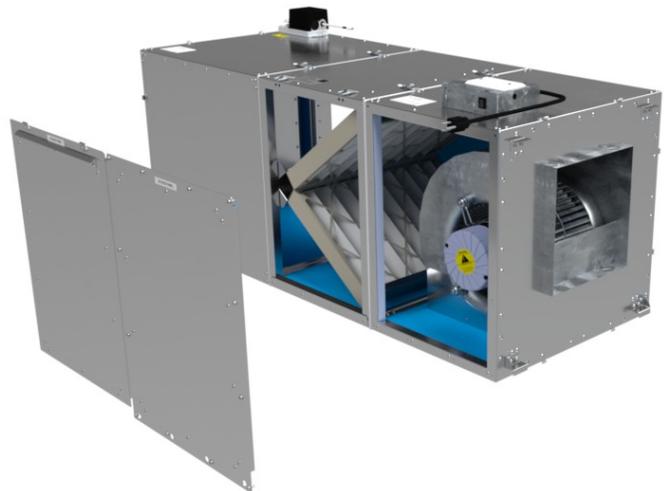
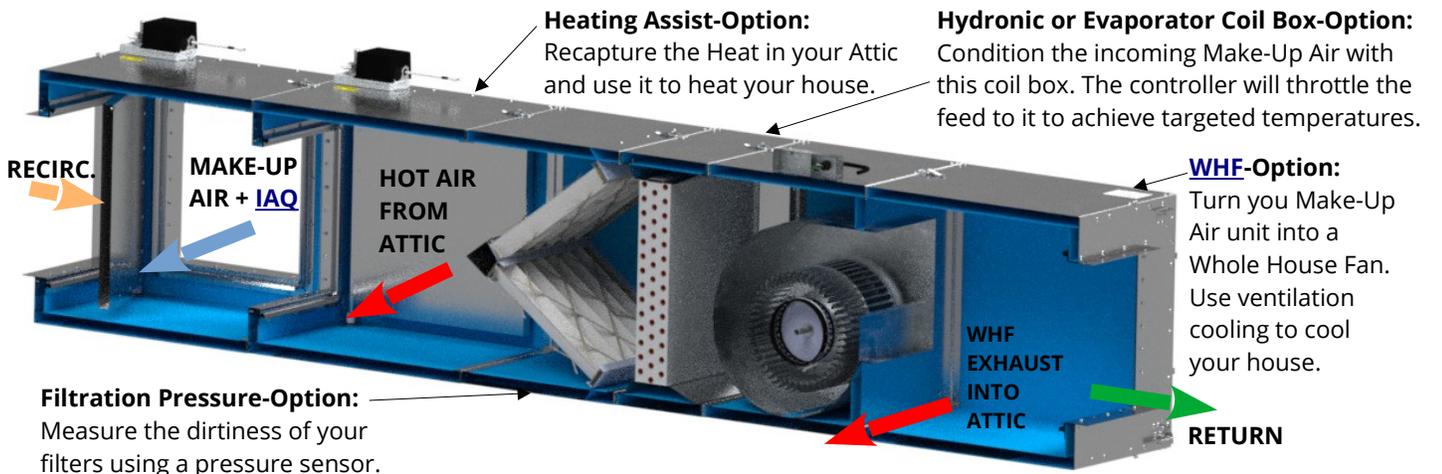


Fan Curve (fan only):

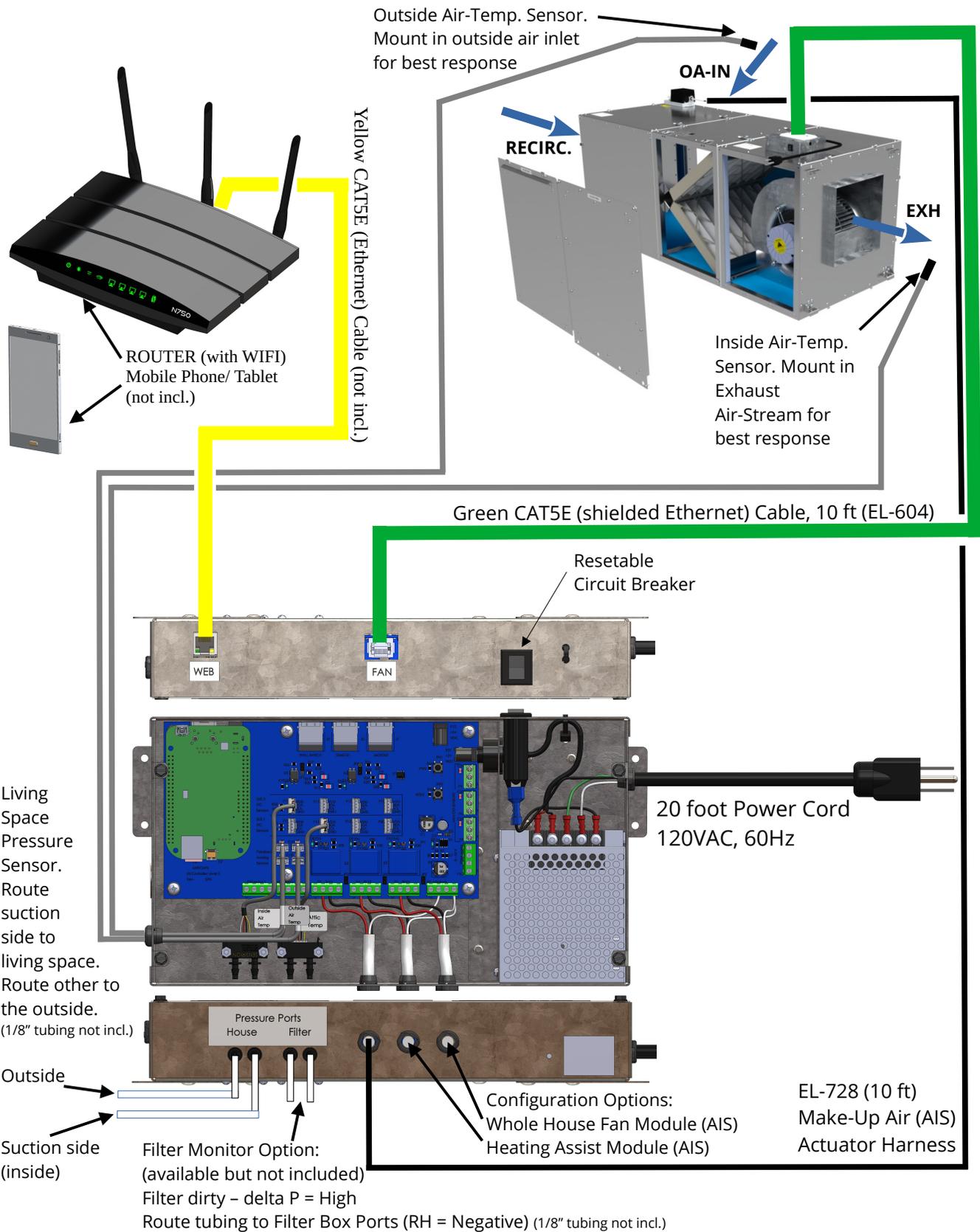


Make-Up Air Configuration Options:

INDEX



ELECTRICAL SCHEMATIC



INDEX