Make-up Air Fan Configurations

**Standard**
Make-Up Air Unit with: (Configuration 1)
- Fan Section
- V-Bank Filter Section
- Outside Air In / Recirc. Air In (Selector Box, AIS 1)
- MUA Controller
- Cat5 Fan Cable

**Make-Up Air Unit with: (Configuration 2)**
- Fan Section
- V-Bank Filter Section
- Outside Air In / Recirc. Air In (Selector Box, AIS 1)
- Recirc. Air In / Attic Air In (Selector Box, AIS 2)
- MUA Controller
- Cat5 Fan Cable

**Make-Up Air Unit with: (Configuration 3)**
- Fan Section
- V-Bank Filter Section
- Outside Air In / Recirc. Air In (Selector Box, AIS 1)
- Recirc. Air in /Attic Air In (Selector Box, AIS 2)
- Fan Return Air Out / WHF Air Out to Attic, (Selector Box, AIS 3)
- MUA Controller
- Cat5 Fan Cable

**Make-Up Air Unit with: (Configuration 4)**
- Fan Section
- V-Bank Filter Section
- MUA Controller
- Cat5 Fan Cable

**Make-Up Air Unit Addition (for all configurations)**
- Coil Box
Use Hot Water or Glycol to heat air
Must be installed between Fan and Filter

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Your 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".

Message to Installers:
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 ductwork, 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 or experts@airscapefans.com

Make-up Air Unit IOM Message to System Designers and End-Users:
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.

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.

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.

The AirScape® Make-up Air Unit ("MUA") is designed to mechanically supply make-up air in residential applications. Once properly installed, the MUA uses pressure sensors to continuously monitor indoor and outdoor air pressure. When the relative indoor pressure drops below the programmed target, a damper opens and the unit’s fan dynamically engages, supplying the living space with filtered fresh air from outdoors.

Secondary functions include: continuously or periodically recirculating indoor air through the unit’s filters, periodically supplying the home with fresh air from outdoors; reducing the load on the home’s primary cooling system by drawing cool air from outdoors into the home and, with the addition of an optional second damper module, reducing the load on the home’s primary heating system by drawing warm air from the attic into the living space With the addition of an optional third damper module, mounted to the fan exit, a traditional wholehouse fan mode is possible (exhaust only). Furthermore, we have added the option of a coil box applicable to any of the previous configurations, allowing the homeowner to heat the incoming air using a hot water or glycol system.

Once connected to any local area network, the unit can be easily configured and, if necessary, manually operated through a straightforward interface accessible by any tablet or computer. 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.

Maintenance:
Your Make-up Air Unit has a set of filters installed. If you have the optional filter pressure sensor installed, you should replace the filters when the pressure exceeds a maximum of 125 pascals / 0.5" water column (earlier is better) as shown on the web interface. Otherwise replace filters every 2-3 months. The pleated media size is 14" x 20" x 2" (undercut). The flat filter media is approximately 22" x 22" x 1.5". All filter media is available from www.airscapefans.com or 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.
Electrical:
Install the Make-Up Air System in accordance with this manual and all local codes and standard
Disconnect power whenever working in or near the fan compartment. The fan may come on at any time based on control sequence requirements.
Disconnect power when working on the electrical control panel
The Green Ethernet Cable (Cat5) provided is to be plugged into the fan's RJ45 and the control panel Fan Jack.
NOTE: CAT-5e cable is unshielded, do not run it parallel to high-voltage wiring. Building codes require low-voltage wiring to be run through conduit.

Mechanical:
Install the Make-Up Air System in accordance with this manual and all local codes and standards

WARNING: Fans and actuators have rotating parts you can get caught in
Manually changing the door position is possible ONLY when you press the actuator clutch (yellow button) otherwise the actuator and / or door may be damaged
The 1/8" ID vinyl tubing needed to measure the air pressure inside the house, atmospheric pressure and differential pressure over the filter must be heated to be installed 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.
Select a measuring point outside that is shaded from prevailing winds and inside the house a point away from vents and fans. It maybe a good idea to install the outside pressure hose in the attic, but only if there are no other sources venting into the attic which could create inaccurate readings.

Operational:
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. to locate the Make-Up Air Unit on the network, which shows up as a "Texas Instruments" device. It can take up to several minutes for the Make-Up Air Unit to turn on, depending on the settings. Be sure to operate the Whole House Fan Mode with at least one window open.

Glossary:
AIS: Air Inlet Selector
BB: BeagleBone
CAT: Conditioned Air Temperature
CF: Cabinet Fan
CP: Control Panel
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.
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
IAT: Inside Air Temperature
I.D.: Inner Diameter
MUA unit: Make Up Air unit
OA IN: Outside Air In
OAT: Outside Air Temperature
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
SF: Simple Fan
Target: Also know as Setpoint is the desired value that a control system is working to achieve.
W.C.: Water Column
Locating Your Make-Up Air Unit

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, accessability and routing to ensure an efficient installation.

Picking the place to measure the pressure in the kitchen (area) and outside air pressure will influence the MAU units operation. For the outside pick a place that is protected from prevailing winds. For the inside place the pressure tube within the room with the largest exhaust source, most likely the kitchen.

Note: The installation should comply to local building codes. Mounting the unit to a frame can cause vibrational noise to be conducted through the structure and the ducting, so we recommend a rubber isolator between the unit and the mounting frame. If a unit with Heating Assist and/or Whole House Fan was purchased, make sure the inlets are free to take in air. We recommend applying a bead of silicone between the unit's segments or taping the seams with aluminum tape. (Note: Tape under the access panels/doors)

Required connections: (not included with the unit)
- Return Air (recirc.) Inlet with grill and duct or adaptor 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 or adaptor and 18" flex duct
- Supply (make-up air) Fan outlet with grill and duct or adaptor and 18" flex duct
- Heat assist (attic-air) make sure inlet is free
- Whole house fan make sure outlet is free
- Two standard electrical sockets (single 15A)
- Hood and Fire Interlock dry contacts and wiring (not incl)
- Vinyl tubing (1/8" ID): (Not Supplied)
  one from control panel to Inside of the house
  one from control panel to Outside of the house
  optional (if purchased) tubing for Filter condition measurements.
- Coil Box requires a hot water or glycol plumbing system and a valve to control the volume including wiring to control the valve
- Unit installation:
  Mount the unit on ceiling frame, or on top of a frame. You can hang the unit with a support frame and threaded rod.

Mechanical Installation Options:
- Attic Installation,
- Crawl Space Installation,
- Unit can be mounted vertically as well.
Electrical & Controls Installation

**Electrical:**
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 boxe(s)
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 temperature sensors inside the air path inside the duct. Route the OA temp sensor to the Outside Air Duct, Route the IA sensor to the Fan (return) Duct and seal around the wiring.
E - Route and connect the wiring from the Hood relay dry contacts (not incl) to P5-1 of the MUA CPPCBoard (see detail, optional depending on building codes)
F - Route and connect the wiring from the Fire Alarm relay dry contacts (not incl) to P5-2 of the MUA CPPCBoard (see detail, optional depending on building codes)
G - Plug two 10 Ft power cords into a socket

*Note: Control Signal Wires can be routed through the Control Panel Box wall knock-out, using provided strain relief and adaptor*

**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

**Coil Box:**
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)

**Safety Interlocks:** (Detail C:)
Fire Interlock: If triggered (connects P5-1 to P5-2), all dampers to default, Fan OFF, Overrides all other modes
Hood Interlock: If triggered (connect P5-3 to P5-4) Force Enable Make-up Air mode, maintains at least min speed, Overrides all modes EXCEPT Fire Interlock

**Coil Box Diagram:**
- **G2:** Filter
- **G2:** Fan
- **Pos. P5 - 1:** Press tube to Inside
- **Pos. P23 -1:** Press tube to Outside
- **Web Wire:** (route & connect)
- **FAN Wire:** (route & connect)
- **Circuit Breaker**
- **BB:** Main Board
- **PSU**
- **AIS Actuator wire Box 3 (Attic = WHF)**
- **AIS Actuator wire Box 2 (Attic = HT/Cool Assist)**
- **AIS Actuator wire Box 1 (OA = MUA)**

**General Table**

<table>
<thead>
<tr>
<th>Name</th>
<th>Pos.</th>
<th>Appl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input High 0-10VDC</td>
<td>P5-1</td>
<td>Fire</td>
</tr>
<tr>
<td>Input Low Ground</td>
<td>P5-3</td>
<td>Hood</td>
</tr>
<tr>
<td>Input Gnd Ground</td>
<td>P5-4</td>
<td>Ground</td>
</tr>
</tbody>
</table>

**Diagram Notes:**
- Hot Water / Glycol Flow Control
  - NOTE: this is a Control Signal ONLY
- Temp Sensors
  - (route)
- Mounting holes
- 10 foot power cord
  - (route & connect)
- AIS Box 1
  - default door position
- AIS Box 2
  - default door position
- AIS Box 3
  - default door position
- TP1
- AIS Actuator wire Box 1 (OA = MUA)
- AIS Actuator wire Box 2 (Attic = HT/Cool Assist)
- AIS Actuator wire Box 3 (Attic = WHF)
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 between the control panel and your LAN router (see diagram below)
  NOTE: CAT-5e cable is 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 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 controller.
  An easy way to find the MUA 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"

- 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 status of the MUA controller.
Software Configuration

The main pages (see screenshots) has three tabs:
Controls / Graphs / Settings

NOTE: The top of the controls tab shows important system messages and any sensor failures

For information regarding options click the blue " I " tooltips

**Make-Up Air Mode:**
Balances the pressure in the house
On the Settings Tab, the make-up depressurization limit sets the maximum negative pressure before the unit activates to make up air
(NOTE: "Confirm" must be pressed to save changes)
(NOTE: any warnings)

**Cooling Assist Mode:**
Cool the living space by bringing in Outside Air, if the Outside Air is cooler than the Inside Air
Target temperature, deadband and fan speed can be set on the Settings Tab.
(NOTE: "Confirm" must be pressed to save changes)

**Filtration Mode:**
Inside Air is filtered and recirculated
The filtration Fan Speed can be set using the slider under the Settings Tab
(NOTE: "Confirm" must be pressed to save changes)

**IAQ Mode:**
Outside Air is used to increase the air quality inside the house
Outside Air Ventilation Rate and Ventilation Fan Speed can be set for the Inside Air Quality mode using the sliders (Settings Tab)
(NOTE: "Confirm" must be pressed to save changes)
The main pages (see screenshot) has three tabs: Control / Graphs / Settings

For information regarding options click the blue "I" tooltips

Heating Assist Mode: (see screenshot)
Attic air is used to heat living space by filtering attic air and blowing this air inside
Target temperature and deadband and fan speed can be set on the Settings Tab
(NOTE: "Confirm" must be pressed to save changes)

Whole House Fan (WHF) Mode: (see screenshot)
Inside Air is pushed into the Attic (and then outside, ventilation cooling)
Once selected the Fan speed and the timer, on the Controls Tab, can be used to set your Whole House Fan as desired. (see screenshot partial)

Hot Water Heating Mode: (see screenshot on previous page)
Uses hot water to heat incoming air. Target temperature can be set in the settings tab.
(NOTE: "Confirm" must be pressed to save changes)
Coil Box required.

Manual Mode: (see screenshot)
Manually adjust fan speed and dampers (air inlet selectors)
Click "Source" to select desired damper. If the hot water heating module is connected, the output signal can be controlled as well.
Troubleshooting

NOTE: before you start trouble shooting 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.