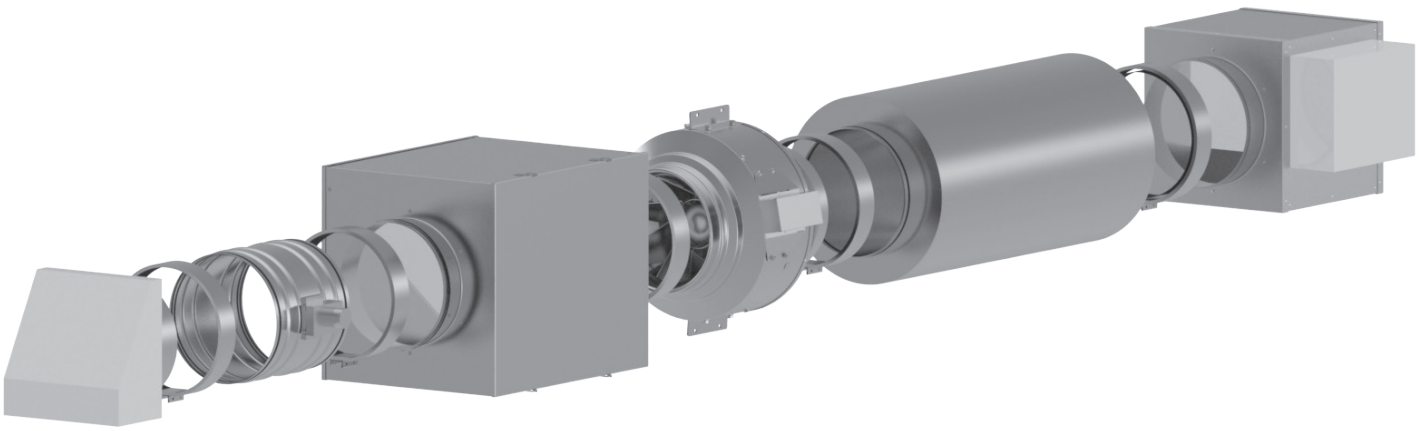
Installation Manual

Item #: 497868
Rev Date: 2017-09-27

MUAS Series

Makeup Air System & Controller



Technical / Customer Support:

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fantech®
a systemair company

				
Note	Warning / Important note	Information	Technical information	Practical tip

Warnings

TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

1. Installation work and electrical wiring must be done by a qualified person(s) in accordance with national electric codes, local electric codes, ordinances and regulations, including fire-rated construction codes and standards.
2. This system is not designed to provide combustion air for fuel-burning appliances.
3. Do not connect the system directly to a combustion appliance of any type.
4. Before servicing or cleaning any system component, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.
5. When performing installation, servicing or cleaning of the system, it is recommended to wear safety glasses and gloves.
6. Locate the outside air inlet hood above any anticipated snow drift level and away from any architectural and landscape features to ensure that the intake area for the outside air duct is not blocked and provides a clear pathway for outside air to enter the system.
7. When cutting or drilling into wall or ceiling, do not damage electrical wiring or other hidden utilities.
8. When notching or drilling into framing including floor supports, rim joists, and wall studs, comply with code and manufacturer limitations on allowable modifications to these structural members.
9. This system can only be used for its intended design. Any internal wiring changes, modifications or bypass of any controls, or installation practices not according to the details of the instruction manual will void the product warranty. Follow all installation, wiring and setup instructions indicated in the manufacturer's manual.

Caution

1. Do not locate outside air inlet near hazardous materials or explosives.
2. System shall not be installed to introduce air from crawlspaces, garages, attics, adjacent dwelling units, or other locations within the building shell. System shall be installed to introduce air directly from outdoors.
3. Do not install the makeup air system and supply ductwork directly above or closer than a distance of two feet to any furnace or its supply plenum, boiler, or other heat producing appliance.
4. Any ductwork used in conjunction with the system must be installed in compliance with all local and national codes that are applicable.
5. Do not operate the system until all system filters have been installed per the system design.
6. Please read the specification label on each system component for further information and requirements.
7. Each system component, including filters, should be inspected and maintained on a regular basis.
8. This system is intended for installation in a dry location protected from moisture.
9. This system must be installed in an accessible location which allows for system inspection and maintenance.
10. This system will automatically provide outdoor air into a building. Coordinate with the HVAC designer/contractor the effects that the supply of outdoor air will have on the building's comfort and mechanical systems. The HVAC designer should take into consideration the makeup air system's frequency and duration of use as well as the outdoor air flow quantity.
11. Use this system only in the manner intended by the manufacturer. If you have questions, contact the manufacturer at the address or telephone number provided in this document.
12. When federal, provincial or state legislation comprises more restrictive installation and/or certification requirements, the aforementioned requirements prevail over those of this document and the installer agrees to conform to these at his own expense.
13. Do not supply outdoor air to a space or duct system where water pipes or water coils might be susceptible to freezing due to the supply of outdoor air.

Application

The Fantech Exhaust Makeup Air System is a low voltage controlled assembly of components which provides the automatic supply of outdoor air into a building. When controlled by the current sensing Fantech Makeup Air Controller "FMAC", the system is suitable as compensation for single speed, multi-speed, and variable speed exhaust fans.

The FMAC initiates the makeup air system upon sensing the exhaust fan motor current, and controls the supply of outside air into the building in proportion to that being exhausted.

This system may be used to replace air being removed by a kitchen hood exhaust fan or other continuously or intermittently operating powered exhaust system. Mechanical replacement of exhaust air allows an exhaust system to function more effectively, helps to maintain pressure equilibrium between the building interior and the exterior, and allows for management (quantity, cleaning, tempering and location) of the introduction of outside air to the building's interior space. An electric heater (optional) may be included as a system component. The heater is not intended to provide heating to the interior space, but rather to temper the supply of cold outdoor air before it is delivered to the building.

Due to its component-based, field-assembled nature, the Fantech Makeup Air System offers flexibility as to where and how it can be installed into a building. The installation location should be suitable for periodic inspection and maintenance. It is not required that the individual system components be installed in a linear (straight line) arrangement. System components may be connected by duct work (by others) to permit lengths and elbows for accommodating the physical space available for installation. It is important to adhere to all instructions included with each system component for proper installation, however, keeping service clearances and straight duct lengths upstream and downstream of components as required.

The air discharged from the Fantech Makeup Air System will almost always be contained in duct work (by others), so that the supply of makeup air may be routed to a suitable location for delivery to the interior space.

The Fantech Makeup air system components and the system's duct work must be insulated to prevent the formation of condensation.

Fantech recommends that makeup air be ducted to the space from where the compensated exhaust is being removed. For example, makeup air used to compensate a kitchen exhaust hood should be delivered directly to the kitchen space. For this same example, it is advisable that the air be delivered to the kitchen in such a way as to not disturb the exhaust air pattern at the hood. In general, this can be accomplished by locating the makeup air supply grille at least a few feet away from the footprint of the kitchen hood, and ensuring that no streams of makeup air supply are directed toward the area between the range top and the hood. Depending on the makeup air flow rate, grilles might be suitably located above kitchen cabinets, behind refrigerators, or simply at a convenient location on a wall or the ceiling.

Depending upon the version of the building code that governs the installation, there are potentially many code-compliant methods of introducing the makeup air into the building.

Realizing this, **Fantech deems it unacceptable to use central HVAC system equipment and duct work for treatment and conveyance of makeup air.**

Reasons for this include:

- Furnace manufacturers often limit the temperature of air entering the heat exchanger to no less than 50-55ºF. The equipment warranty could be voided if the limit is broken.
- Residential HVAC heating and cooling systems typically cycle on/off with one or two stages of capacity on a signal from the space thermostat. To put it another way, the central HVAC system is intended to maintain a condition in the living space, and it only operates when the living space condition becomes uncomfortable. Since makeup air comes directly from outdoors, it is often quite uncomfortable. The uncomfortable makeup air would be conditioned only when the space thermostat is calling for action.
- The temperature difference between the indoor condition and the outdoor condition can at times be significant. Cold makeup air could cause the formation of condensation on the exterior of poorly insulated duct work and equipment. Very humid makeup air could result in condensation on the interior of poorly insulated duct work and equipment.

Exhaust Makeup Air System Components

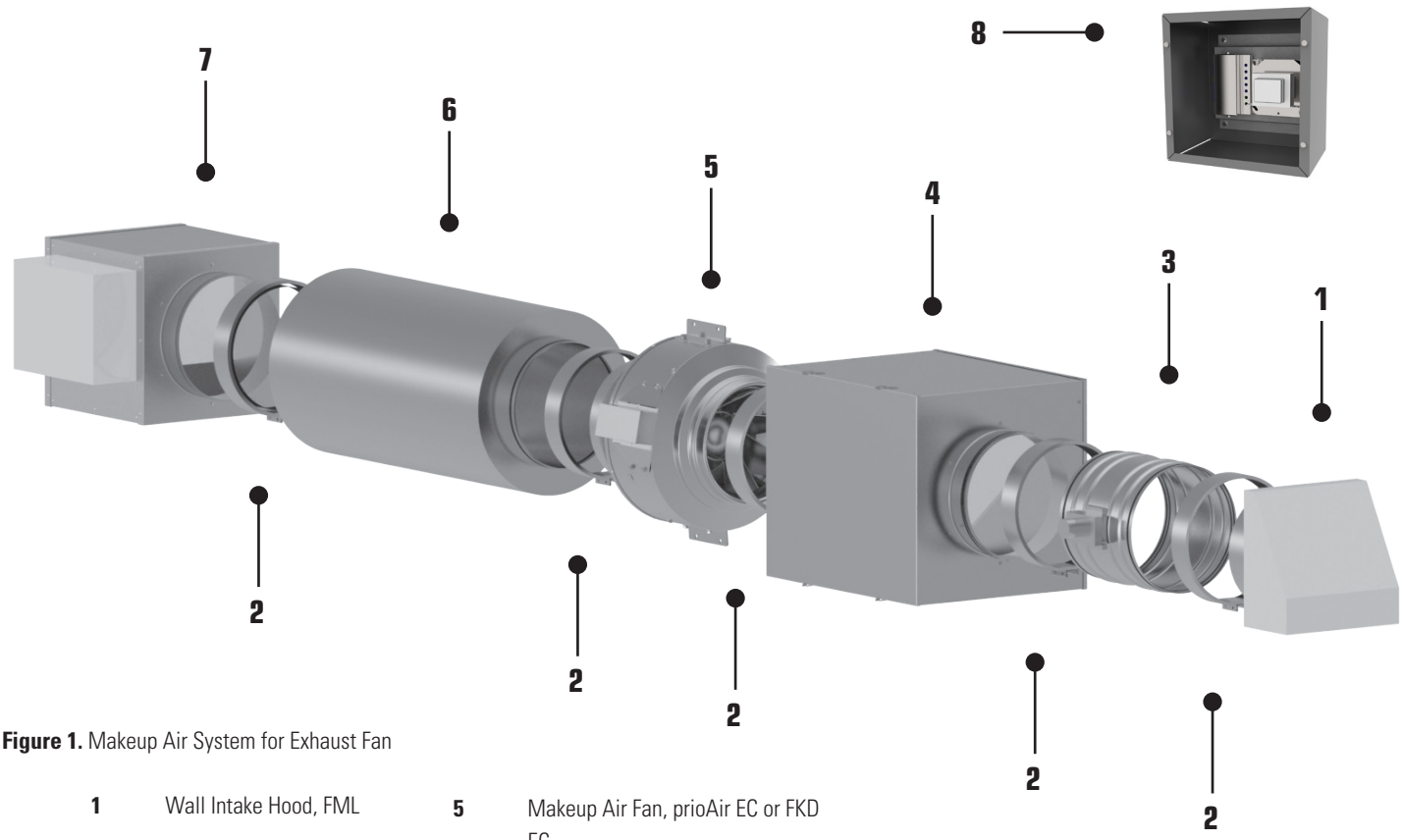


Figure 1. Makeup Air System for Exhaust Fan

1	Wall Intake Hood, FML	**5**	Makeup Air Fan, prioAir EC or FKD EC
2	Fast Clamp, FC	**6**	Silencer, LD
3	Shut-off Damper, ADC	**7**	Duct Heater, Stelpro (optional)
4	Filter cassette, FGR HV	**8**	Controller, FMAC*

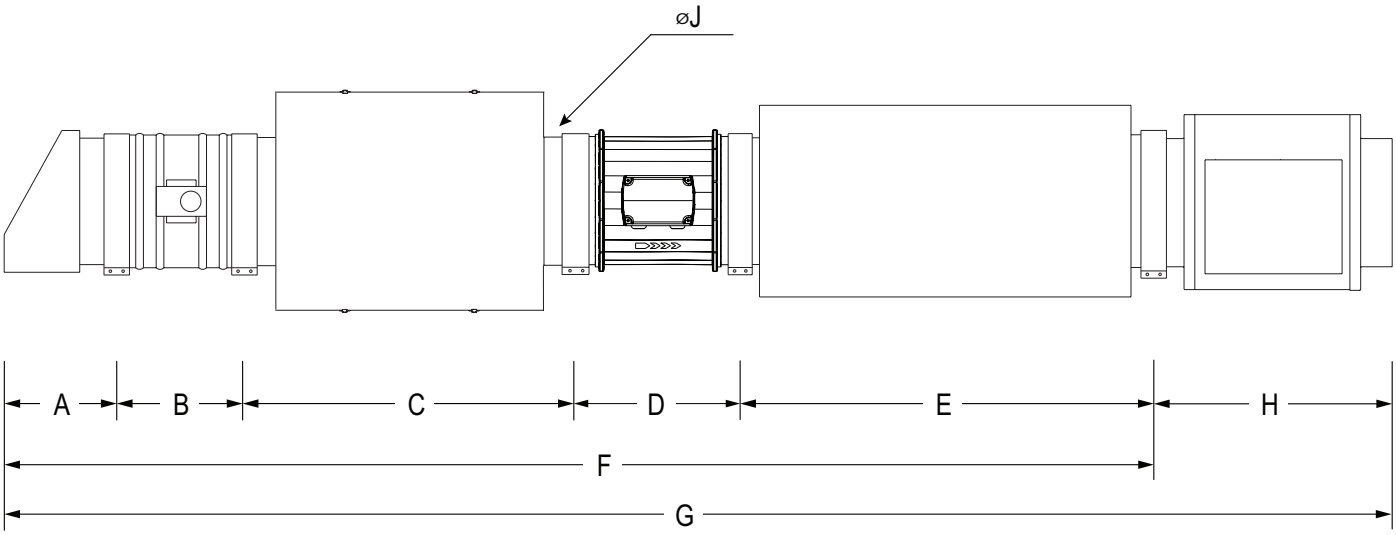
*The FMAC Controller includes a transducer, system control board, 24V transformer, NEMA enclosure, enclosure back plate for mounting transformer and controller, 4" x 4" electrical box for supporting the transformer.

Items Which Must Be Furnished By Others:

a. Insulation
b. Wiring
c. Electrical Wiring Boxes
d. Equipment Supports/Hangers
e. Duct work
f. Electrical Disconnect Means
g. Miscellaneous Hardware and Any Other Items not described in this document

Dimensions

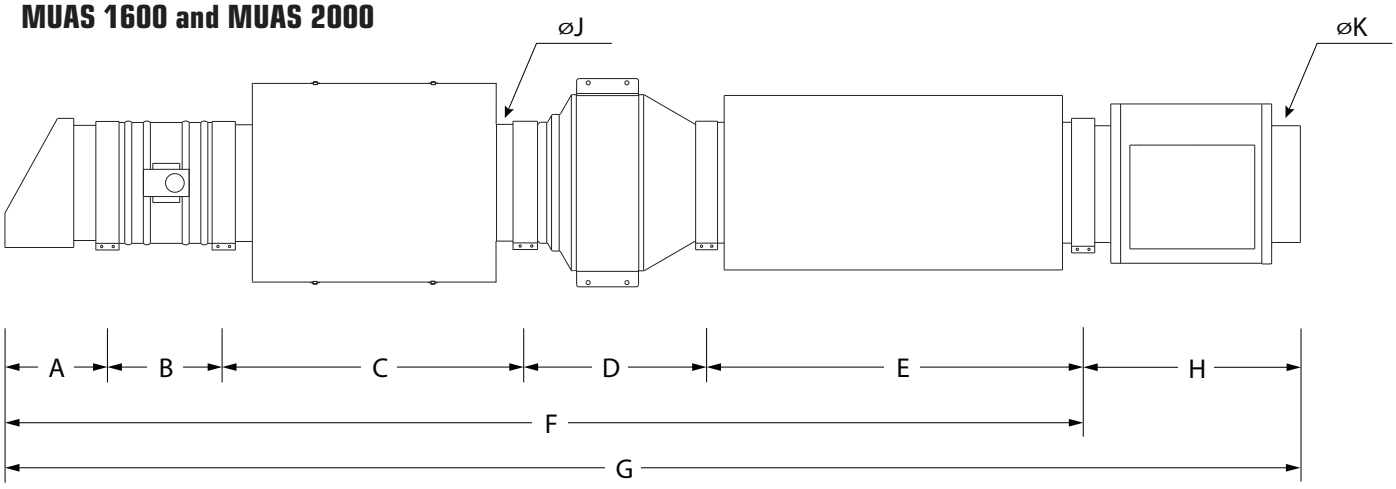
MUAS 750 & MUAS 1200



Model	A	B	C	D	E	F	H (optional)	G	J
MUAS 750	10	10	30 1/2	7 7/8	26 5/8	85	14	99	8
MUAS 1200	10	10	30 1/2	9 13/16	38 1/2	98 13/16	14	112 13/16	10

Dimensions are in inches.

MUAS 1600 and MUAS 2000



Model	A	B	C	D	E	F	H (optional)	G	J	K
MUAS 1600	10 1/2	12	30 1/2	18 7/8	38 1/2	110 3/8	14	124 3/8	12	12
MUAS 2000	10 3/4	14	30 1/2	20 /8	38 1/2	114 1/8	24*	138 1/8	14	12

All dimensions are in inches.
* This dimension includes a 14"-12" duct size reducer (not shown), not provided.

Makeup Air System Installation

Read all instructions before starting installation.

Low voltage wiring should be routed the shortest distance possible to avoid unnecessary voltage drop.

The current transducer wire shall be a minimum 20 AWG twisted pair. The current transducer and all control wires shall be kept away from high voltage wiring to avoid signal interference.

Recommended ambient operating temperature range for the makeup air system is -20^{0}F (28.8^{0}C) to 140^{0}F (60^{0}C). We recommend that the installer insulate the entire length of the makeup air system and all duct work connected to the system to prevent condensation from forming.

The installer is responsible to ensure that air entering gas/oil heat exchangers is 55^{0}F (12.8^{0}C) or greater and that air contacting water pipes or water coils will not cause freezing

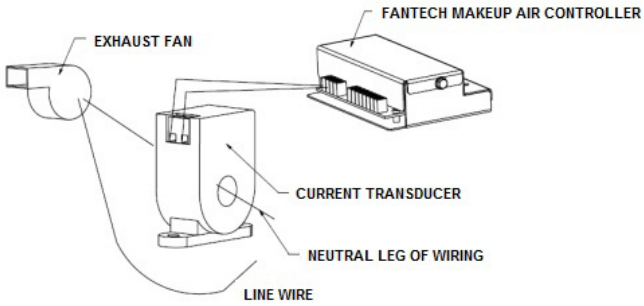
The 240V electric heater component (optional) must be installed on a properly sized, dedicated electrical circuit. The supply fan and FMAC transformer may be powered via a shared electrical circuit.
Installation Steps:

Each system component must be individually secured to the building structure.

DO NOT ENERGIZE THE POWER TO ANY SYSTEM COMPONENT UNTIL THE ENTIRE SYSTEM HAS BEEN INSTALLED AND IS READY FOR SETUP AND STARTUP.

1. Install intake hood component per its instructions. Take care to locate the intake appropriately on an exterior wall. Mind the warning and caution statements in this document.
2. Install the motorized damper component per its instructions, and connect it to the intake hood with a fast clamp. The damper is furnished with a 24V AC motor, the damper control method is power open and spring closed.
3. Install the filter module component per its instructions. Connect the filter module to the motorized damper with a fast clamp. Make sure the filter is accessible for cleaning and replacement.
4. Install the supply fan component per its instructions. Connect the supply fan to the filter module with a fast clamp and a duct transition (if necessary). The supply fan should be installed and mechanically supported to reduce the transmission of fan/motor vibration to the building structure.
5. Install the duct silencer component connecting to the supply fan with a fast clamp.
6. Install the optional electric heater component (if included) per its instructions. Instructions which are located in the optional heater box carton.
7. 8 / 6 kW heater is Stelpro model SDHR8-6K-240VIP-CIR017-OTDD-OEMK-1
   10 / 10 kW heater is Stelpro model SDHR10-10K-240VIP-CIR017-OTDD-OEMK-1
   12 / 10 kW heater is Stelpro model SDHR12-10K-240VIP-CIR017-OTDD-OEMK
   12 / 20 kW heater is Stelpro model SDHR12-20K-240VIP-CIR017-LOTDD-OEMK-1
   Default operating mode Setting is W1.
   Default temperature setting is 60 ^{0}F.
8. Install additional supply ductwork (if necessary). Other suitable supply duct systems exist. It is recommended that the supply makeup air not be provided directly to an occupied living space where thermal discomfort and objectionable noise could result. Be mindful of the effect that the newly installed quantity of outdoor air will have on the central HVAC system. Coordinate efforts with the HVAC contractor to ensure compatibility.
9. Insulate all makeup air system components located where condensation could form on cold surfaces, including all duct work connected to the system.
10. Install the FMAC's 24V transformer onto the included 4"x 4" electrical box. Install the FMAC's controller and transformer w/ 4 x 4 box onto the included back plate. Install the back plate into the included NEMA enclosure. Secure the NEMA enclosure to the building structure in a convenient, moisture-free, interior location near the makeup air system.
11. Install the FMAC's current transducer onto the neutral leg of the wiring for the compensated exhaust fan (by others). The current transducer must be installed close to the exhaust fan if not a dedicated circuit. Install low voltage wire between the current transducer and the FMAC's makeup air controller. Reference the wiring diagram in Figure 5 for wiring termination locations.

Figure 2. Current Transducer Wiring & Installation



12. Install low voltage wire between the transformer and FMAC's makeup air controller. Reference the wiring diagram in Figure 5 for wiring termination locations. Provide 120/1/60 electrical power to the transformer.
13. Provide 240/1/60 electrical power to the heater (optional, if included) on a dedicated circuit. Reference the wiring diagram in Figure 5 for wiring termination locations. The 10 kW heater uses 41.7 Amps and the 20 kW heater uses 83.3 Amps.
14. Provide 120/1/60 electrical power to the supply fan. Install wiring per all applicable codes. Refer to the wiring diagram in Figure 5 for wiring termination locations.
15. Remove the 3-pronged potentiometer from the wiring terminal block of the makeup air fan. The 3-pronged potentiometer will not be used for the makeup air system. Install low voltage wiring between the FMAC's makeup air controller and the makeup air fan. Refer to the wiring diagram in Figure 5 for wiring termination locations.
16. Install low voltage wiring between the FMAC's makeup air controller and the ADC shut-off damper. Refer to the wiring diagram in Figure 5 for wiring termination locations.

Makeup Air Controller and System Startup:

Prior to beginning the setup and startup procedure, verify that the makeup air system is completely installed and wired, and verify that the compensated exhaust system is completely installed and wired.

a. Install a clean panel filter into the makeup air system's filter cassette.
b. Energize the power circuits to;
   - Makeup air fan.
   - Transformer. A power indicator and heart pulse LED will illuminate when the FMAC is energized and ready for programming.
   - Electric heater (if included).
   - The compensated exhaust system.
c. Operate the compensated exhaust fan on high speed.
d. Press "HI" Button on makeup air controller.
e. Operate compensated exhaust fan on low speed.
f. Press "LO" Button on makeup air controller.
g. Operate the compensated exhaust fan at high speed and adjust the makeup air fan controller "HT" trim pot to produce the desired CFM from the makeup air fan. If the desired max CFM is not known; just set the pot to max at this point. You will have an opportunity to fine tune later.
h. Operate the compensated exhaust fan at low speed and adjust the makeup air fan controller "LT" trim pot to produce the desired CFM from the makeup air fan. If the desired min CFM is not known; just set the pot to min at this point. You will have an opportunity to fine tune later.

The FMAC is now ready for tuning.

Once the estimated required CFM of makeup air has been set it is time to verify the house is correctly balanced.

During setup and balancing it is necessary that all of the building's exterior openings are tightly closed. Openings include windows, doors, flue dampers, etc. Also, de-energize any systems that employ exhaust or supply air communication with the outdoors. Such systems include clothes dryers, heating appliances, HRV's or ERV's, and bathroom ventilation fans.

Energize both the makeup air system and the compensated exhaust system. Operate the compensated exhaust system's fan on high speed.

Adjust the exhaust makeup air system airflow by following one of the following two methods:

1. Using a pressure differential gauge (either digital or analog, as used for blower door testing), measure the house pressure with respect to the outdoors across a door or window. If the house pressure is positive with respect to the outdoors, slow down the exhaust makeup air fan using the high speed trim pot "HT". If the house pressure is negative with respect to the outdoors, speed up the exhaust makeup air fan using the high speed trim pot "HT". Repeat this procedure with the compensated exhaust fan on low speed and using the "LT" trim pot.

If a slightly positive or negative (recommended no more than 5 Pa [0.02" w.g.] indoor pressure is desired, such a scheme can be employed by this method, balancing to the desired pressure scheme.

After adjusting the high and low speed trim the first time, repeat the procedure as necessary until the system automatically operates sufficiently according to the desired pressure scheme at low, high and all intermediate speeds.

2. If a pressure differential gauge is not available, slightly open a window approximately 1/2" (12mm) in the center of a building wall and check if the airflow is moving in or out. This can be done by feel, or by using a light piece of tissue or paper, or one could use an anemometer. If the flow is going out, the house is under positive pressure and the exhaust makeup air fan needs to be slowed down using the high speed trim pot "HT". If the airflow is coming in, the house is under negative pressure and the exhaust makeup air fan speed needs to be increased using the high speed trim pot "HT". Repeat this procedure with the compensated exhaust fan on low speed and using the "LT" trim pot. With both the "HT" and "LT" trim pots adjusted the air pressure in the house will be stabilized throughout the compensated exhaust fan range.

The FMAC is now ready for service. At this point the makeup air system is controlled by the FMAC. As the exhaust fan speed is changed depending on use, the makeup air fan will sense the current draw and supply the proper amount of filtered fresh air into the house to compensate for the exhaust air. If the optional electric heater is installed, the supply air will be warmed to the desired set point.

Figure 4. FMAC Circuit Board

Controller Operation and System Wiring

When the FMAC's controller receives a signal from the current transducer that the compensated exhaust fan is operating, the FMAC controller's outputs will be activated.

The controller will provide a 24VAC signal to power the motorized damper to the open position.

The controller will provide a 0-10VDC signal to the makeup air supply fan to operate the fan at a speed proportional to the compensated exhaust fan's speed.

The controller will provide a 24VAC signal to enable the optional duct heater (if included). Note that the duct heater includes its own operational sequence, and will only operate if first enabled by the FMAC controller, and then only if the supply air temperature requires that heat be added.

Heater (Optional) Default Settings

Fantech recommends that the default mode be set on W1 and the default temperature be set at 60°F.

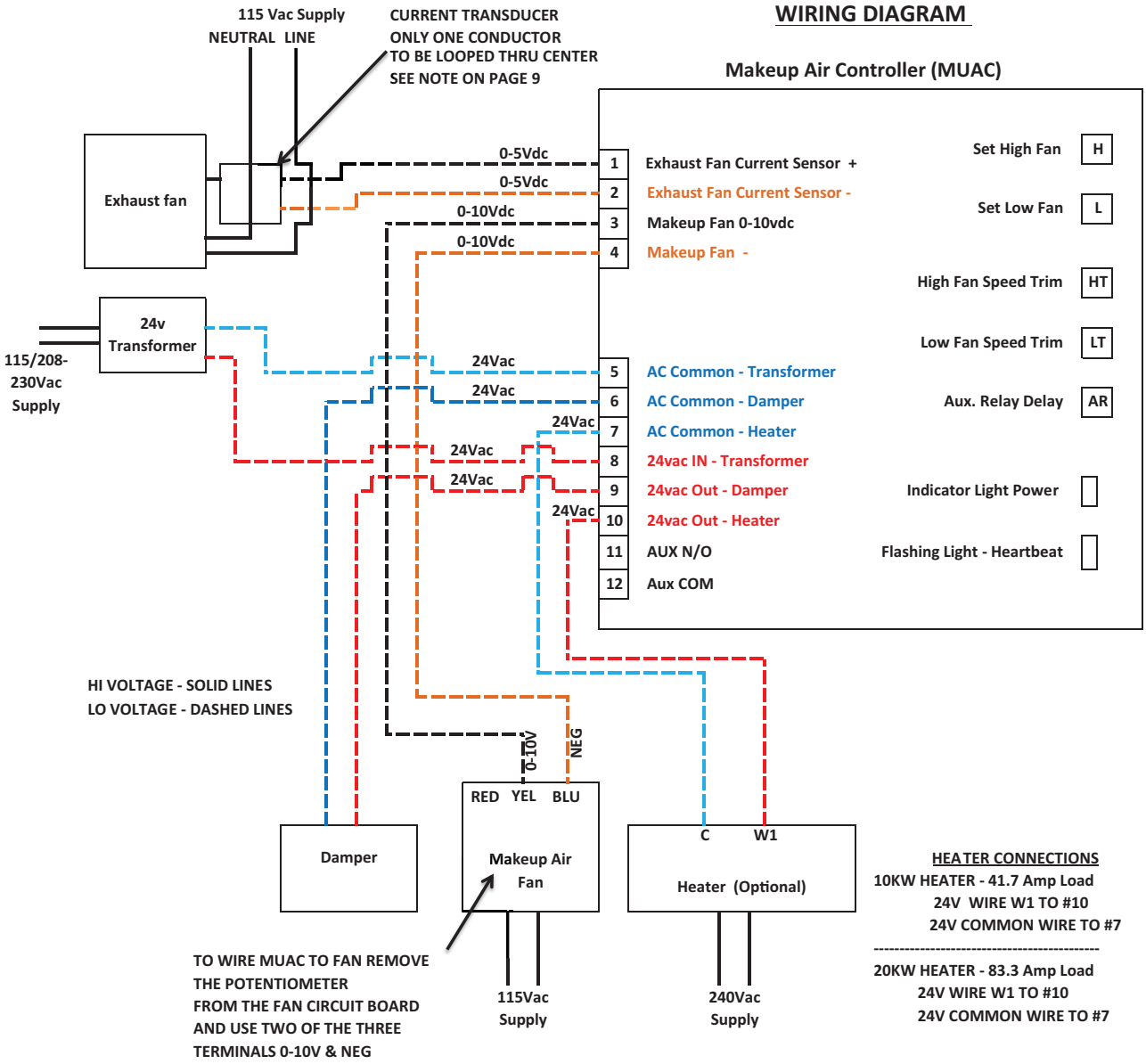
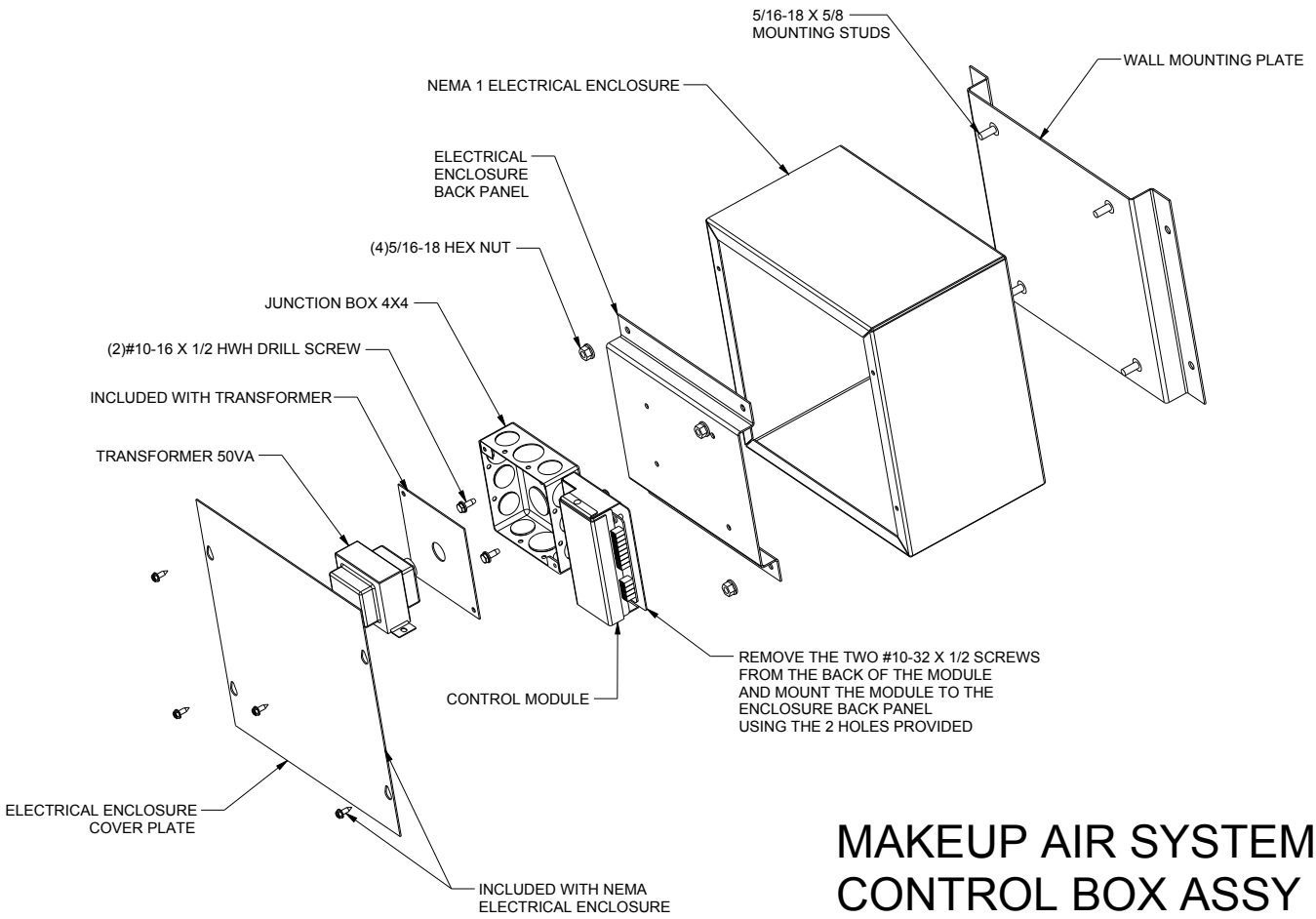


Figure 5. System Wiring Diagram

MUAS Control Enclosure



MAKEUP AIR SYSTEM
CONTROL BOX ASSY

Notes

All wiring is by others. Wiring terminations for each component are contained in their respective installation instructions.

Placement of components is up to the discretion of the installing contractor.

For applications with small current loads (such as less than 2 Amps), wrap the monitored conductor through the sensor aperture several times to increase the current measured by the sensor.

Example: Exhaust fan amperage rating of 2 amps.

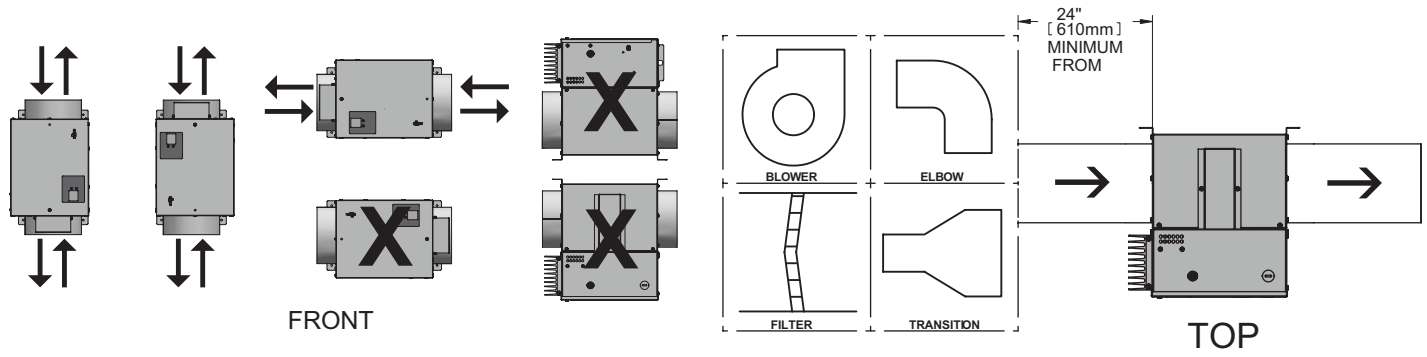
One pass through the CS650-10 aperture V output is approx. 1Vdc
Five passes through the CS650-10 aperture V output is approx. 5 V DC
Keeping the amperage reading close to 10 Amps, will increase your systems accuracy.

Always monitor the neutral wire of the exhaust fan motor. This will allow proper amperage readings of variable as well as multi-speed exhaust fans.

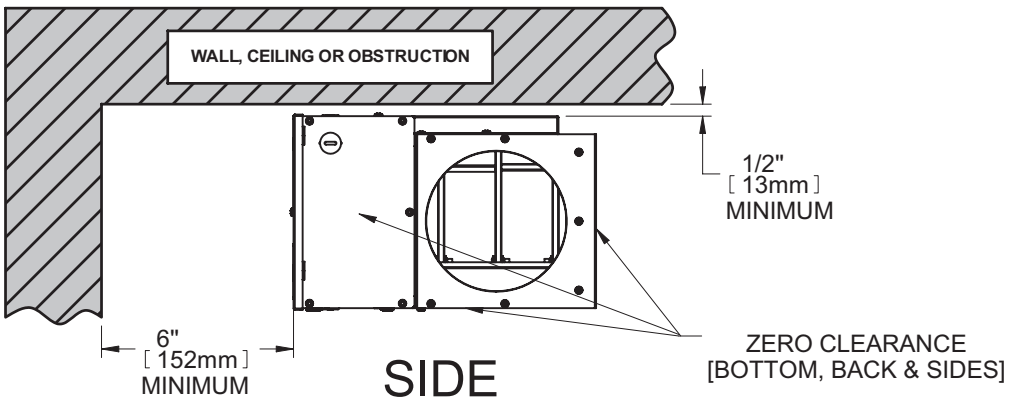
Optional Heater

Installation Configuration & Clearances

Vertical Flow **Horizontal Flow** **Minimum distance to avoid overheating of the elements**

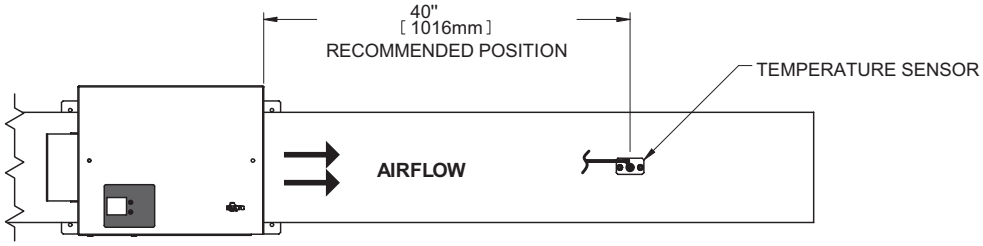


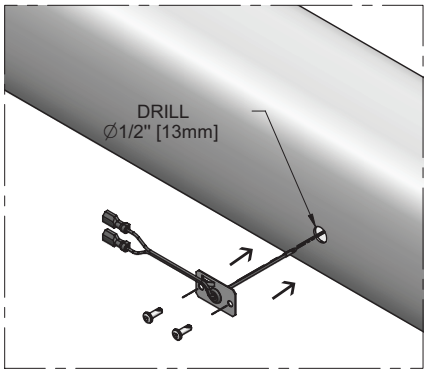
Clearance

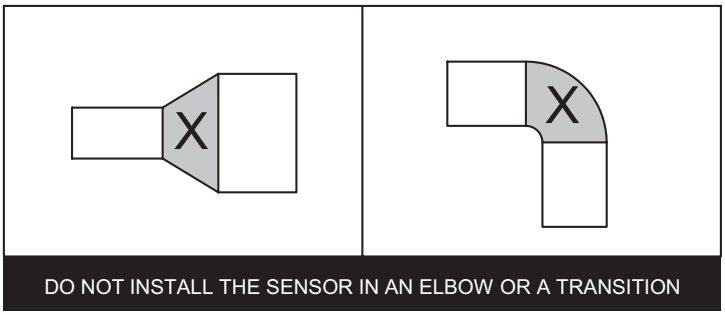


Do not install an access panel in the duct any closer than 24" before or after the heater element. Follow local codes for installing this heater.

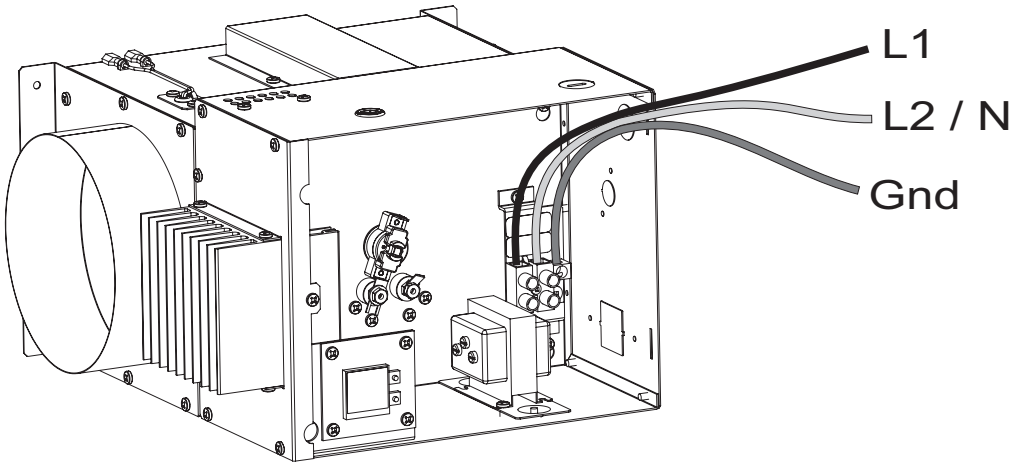
Sensor - Temperature Sensor Installation







Electrical Connection



The heater does not come with a disconnect switch, the power should be turned off from the main electrical panel (circuit breaker) before servicing the unit.

Warranty

Five (5) Year Warranty

This warranty supersedes all prior warranties

DURING ENTIRE WARRANTY PERIOD:
Fantech will repair or replace any part which has a factory defect in workmanship or material. Product may need to be returned to the Fantech factory, together with a copy of the bill of sale and identified with RMA number.

FOR FACTORY RETURN YOU MUST:

- Have a Return Materials Authorization (RMA) number. This may be obtained by calling Fantech either in the USA at 1.800.747.1762 or in CANADA at 1.800.565.3548. Please have bill of sale available.
- The RMA number must be clearly written on the outside of the carton, or the carton will be refused.
- All parts and/or product will be repaired/replaced and shipped back to buyer; no credit will be issued.

OR

The Distributor may place an order for the warranty part and/or product and is invoiced. The Distributor will receive a credit equal to the invoice only after product is returned prepaid and verified to be defective.

FANTECH WARRANTY TERMS DO NOT PROVIDE FOR REPLACEMENT WITHOUT CHARGE PRIOR TO INSPECTION FOR A DEFECT. REPLACEMENTS ISSUED IN ADVANCE OF DEFECT INSPECTION ARE INVOICED, AND CREDIT IS PENDING INSPECTION OF RETURNED MATERIAL. DEFECTIVE MATERIAL RETURNED BY END USERS SHOULD NOT BE REPLACED BY THE DISTRIBUTOR WITHOUT CHARGE TO THE END USER, AS CREDIT TO DISTRIBUTOR'S ACCOUNT WILL BE PENDING INSPECTION AND VERIFICATION OF ACTUAL DEFECT BY FANTECH.

THE FOLLOWING WARRANTIES DO NOT APPLY:

- Damages from shipping, either concealed or visible. Claim must be filed with freight company.
- Damages resulting from improper wiring or installation.
- Damages or failure caused by acts of God, or resulting from improper consumer procedures, such as:
    1. Improper maintenance
    2. Misuse, abuse, abnormal use, or accident, and
    3. Incorrect electrical voltage or current.
- Removal or any alteration made on the Fantech label control number or date of manufacture.
- Any other warranty, expressed, implied or written, and to any consequential or incidental damages, loss or property, revenues, or profit, or costs of removal, installation or reinstallation, for any breach of warranty.

WARRANTY VALIDATION

- The user must keep a copy of the bill of sale to verify purchase date.
- These warranties give you specific legal rights, and are subject to an applicable consumer protection legislation. You may have additional rights which vary from state to state.

Limitation of Warranty and Liability

This warranty does not apply to any Fantech product or part which has failed as a result of faulty installation or abuse, incorrect electrical connections or alterations made by others, or use under abnormal operating conditions or misapplication of the product or parts. We will not approve for payment any repair not made by us or our authorized agent without prior written consent. The foregoing shall constitute our sole and exclusive warranty and our sole exclusive liability, and is in lieu of any other warranties, whether written, oral, implied or statutory. There are no warranties which extend beyond the description on the page hereof. In no event, whether as a result of breach of contract, or warranty or alleged negligence, defect incorrect advice or other causes, shall Fantech be liable for special or consequential damages, including, but not limited to, loss of profits or revenue, loss of use of equipment or any other associated equipment, cost of capital, cost of substitute equipment, facilities or services, downtime costs, or claims of customers of purchase for such damages. Fantech neither assumes or authorizes any person to assume for it any other liability in connection with the sale of product(s) or part(s). Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages so the above limitations and exclusions may not apply to you.

Warning

Fantech products are designed and manufactured to provide reliable performance, but they are not guaranteed to be 100% free from defects. Even reliable products will experience occasional failures and this possibility should be recognized by the user. If these products are used in a life support ventilation system where failure could result in loss or injury, the user should provide adequate backup ventilation, supplementary natural ventilation, failure alarm system, or acknowledge willingness to accept the risk of such loss or injury.

Notes

Notes

Notes

Fantech reserves the right to make technical changes.
For updated documentation please refer to www.fantech.net

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