

Direct Drive Upblast Roof Ventilator 5DDU-EC

Installation and Operation Manual



Fantech, Inc. certifies that the models shown are licensed to bear the AMCA Seal. The ratings are based on the tests and procedures performed in accordance with AMCA Publication 211 and Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. Performance certified is for installation type A- Free inlet, Free outlet. Performance ratings include the effects of the bird screen.



EN

Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

1. Always disconnect, lock and tag out power source before installing or servicing. The 3.0 Genteq motor operates on a 2-10V active signal. The motor/fan may appear off due to a 0-1.9V "off" signal but high voltage may still exist at the motor. In addition, engage the motor service disconnect at the fan. Always allow the motor to cool before servicing.
2. Only qualified technicians experienced with this product should provide services.
3. Electrical power source must conform to the requirements of this product.
4. Follow all local and national electrical, building and safety codes. Motor and fan must be suitably grounded.
5. Correct rotation of the centrifugal wheel must be verified after installation and wiring. (CCW from motor shaft end).
6. Before start-up, verify wheel freely rotates without striking or rubbing any object.
7. Motor software changes will negatively affect the fan performance, decrease motor life and void the warranty of this product.
8. Control cables and power cables must not be run in the same conduit

Description

Refer to Systemair Power Roof Ventilators (bulletin/item# 481806) for complete ventilator installation and maintenance information. Please read and save these instructions for future reference. For additional safety and installation tips go to www.amca.org and reference "Safety Practices for Users and Installers of Industrial and Commercial Fans – Publication 410-96". Failure to comply with all instructions may result in personal injury, death and/or equipment/property damage.

Genteq ECM 3.0 Motor

Genteq 3.0 motors are advanced premium ECM motor featuring BlaKBox Technologies and the AirKom operating system which allows for flexible control options, quiet operation, low cost, efficiency ratings up to 80% and the high dependability.

Surge Protection: 6kv line to line and 6kv line to ground transient withstand.

Voltage: motors are all rated for 120/208/240/Vac 50-60Hz/single phase power.

Motor and fan sizes: There are 5 fans sizes (10, 12, 13, 15 and 18) with 3/4 and 1hp rated motors as listed below.

UL: The motors are compliant with all required UL standard listings for power conversion, electric motors, automated electrical controls and overheating protection.

See page 7 for more details

Motor Information

Model	HP	Max RPM	Min RPM	Max Amps 120Vac	Max Amps 240Vac
5DDU18FN	1	1200	750	12.8	7.4
5DDU15FN2	1	1650	750	11.5	7.0
5DDU-13EN	3/4	1650	950	10.1	6.1
5DDU-12EN	3/4	1700	1000	10.1	6.1
5DDU-10EN	3/4	1700	1000	10.1	6.1

Controls

With the 3.0 ECM motor or “communicating motor”, information is transferred between the Automated Building Control System through the Control Module and motor in a manner equal to two computers or a computer connected to a peripheral such as a printer. The standard control card will accept a 0-10VDC signal from a building automation system. The standard control card provided gives the motor a 0-22VDC signal from a 24Vac source to change the motor speed to optimally load the motor. The motor will operate within the 2-22VDC signal range. The motor will cut off in the 0-1.9VDC signal range. Automated Building Controls provided by others may require a 4 conductor control wire. As shipped, the Control Module requires a 4 conductor cable (minimum 3 conductor). Keep high voltage wiring away from the controller circuitry or wiring. Follow electrical code requirements for separation of high and low voltage wiring and components. See chart for control wire specifications.

The standard controller provided with this fan assures the correct rpm controllability range designed and required for the optimum fan performance. The factory programmed motor rpm software range should never be changed to increase or decrease this range outside of the manufacturer settings. Damages caused by changing software rpm settings will void the warranty and may dramatically reduce the life of the motor. Call Systemair technical support at 1.800.747.1762 for any additional fan questions.



Factory shipped fans meet requirements for UL 705 Listed for Power Roof Ventilators. Fan must be used ONLY in clean, non-tempered (non-heated) air applications. Maximum air temperatures are not to exceed 120° F.

UL-762 Power Roof Ventilator for Grease Laden Air (restaurant) applications, installer MUST use the additional parts specified. The addition parts can be ordered from the factory or provided in the field. If purchasing in the field, the exact equal specified will simplify the field installation. (See Parts List below for specifications.). Codes require the remote installation of the motor control card and transformer – referred to as the Control Module. Fan may fail without this module change. Maximum air stream temperature must not exceed 300°F.



The UL-762 fan construction requirements may be used in place of the UL-705 Listed fan construction/model. Use minimum 3/8” liquid tight connections for the remote mounting of the Control Module and connect to fan through the fan breather tube.

Control Option 1 – Fan Mounted Controls (UL705 Listed) Clean Air

Fan is shipped from the factory with this Control Module (transformer and control card). It is pre-mounted for 1/120Vac/60Hz inside the fan motor compartment, ready for field hook-up.

Control Option 2 – Remote Mounted Controls (UL705 Listed) Clean Air

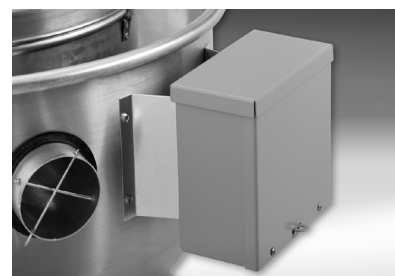
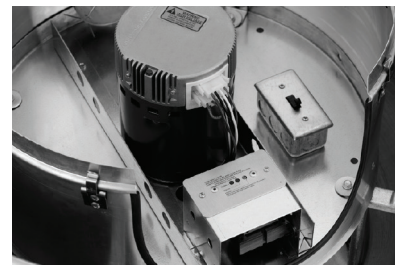
The Control Module may be easily removed and mounted inside the building as required. The control cable (by other) minimum size is 22 ga. and should not exceed 200 feet in length to avoid possible signal distortion or loss. For distances up to 350 feet the control cable must be a minimum size of 18 ga.



Do not run control cable in the same conduit as the power supply wire.

Control Option 3 – Restaurant/Grease Laden Air (UL-762 Listed)

The Control Module MUST be removed from inside the fan and mounted exterior of the fan. For fan exterior mount, NEMA 3R box is required or provided “by other”. (See Parts List on page 5.). A mounting bracket to attach the NEMA 3R enclosure is also available as a factory option (See Parts List page 5.).



Wiring

Wiring: Supply Power



For 240Vac power, the red jumper wire on the motor 5 pin connector plug **MUST** be cut and capped off.

Permanent motor failure will occur if not done and warranty will be voided. Motor ships from factory wired for 120Vac operation (red jumper intact). Factory motor is rated 120/208/240VAC/1/60Hz.

Transformer Connections for Clean Air Applications

Transformer should match the motor supply voltage 240Vac or 120Vac to 24Vac. (See Parts List on page 5 for transformer specs.)



If using with an existing building automation system transformer, be sure the transformer is rated/sized for the addition of the fan(s).

Transformer Connections for Restaurant Applications

The transformer should match the motor supply voltage and is included as part of the Control Module. Remove the Module and mount it remote from the fan interior. This can be the fan exterior with a NEMA 3R box or mount in the building utility closet or mechanical room. If inside building, the NEMA 3R enclosure box is not required but may be desired and simplify the installation. Use minimum 3/8" liquid tight connections and connect from the Control Module to fan through the fan breather tube.

Follow all local building and electrical codes.

Wiring: Control Cable/Control Module

Keep high voltage wiring away from the controller circuitry or wiring. Follow electrical code requirements for separation of high and low voltage wiring and components. When Control Module is remotely mounted, use 22 ga. control wire for distances up to 200 feet. For longer distances (up to 350 feet) use 18 ga. control wire. The proper control cable must be provided or the fan will not work properly. Control cables must NOT be run in the same conduit as the supply power wiring. If fan is being installed with an existing building automated system, confirm correct wire size and conductors. Fan requires 4 conductor control cable (minimum 3). See wiring diagram for control card.

Before Start-up

1. Verify all power connections and grounds are correct and secure.
2. Verify that centrifugal wheel freely rotates without striking any object. Proper rotation is CCW viewed from the motor shaft end.
3. Be certain red jumper wire on motor control plug is intact for 120Vac power OR red jumper wire is cut and capped for 240Vac power.
4. Restaurant or tempered/hot air installations: Control Module must be remotely mounted.
5. Restaurant fans with curb hinge kit – with power off, tilt fan off curb cap and verify motor and control cables length do not prevent full extension.

Maintenance

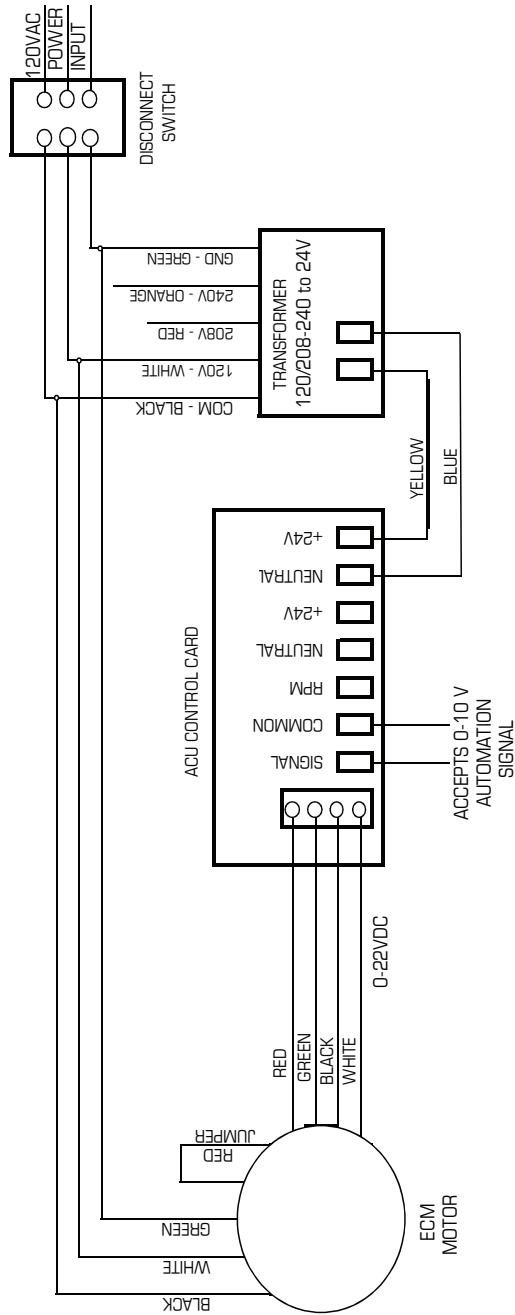
The motor bearings are sealed. The motor and pin connectors should be kept clean. Follow the standard fan maintenance procedures as shown in the Power Roof Ventilator OIPM (bulletin # 481806) included with the fan.

Parts list

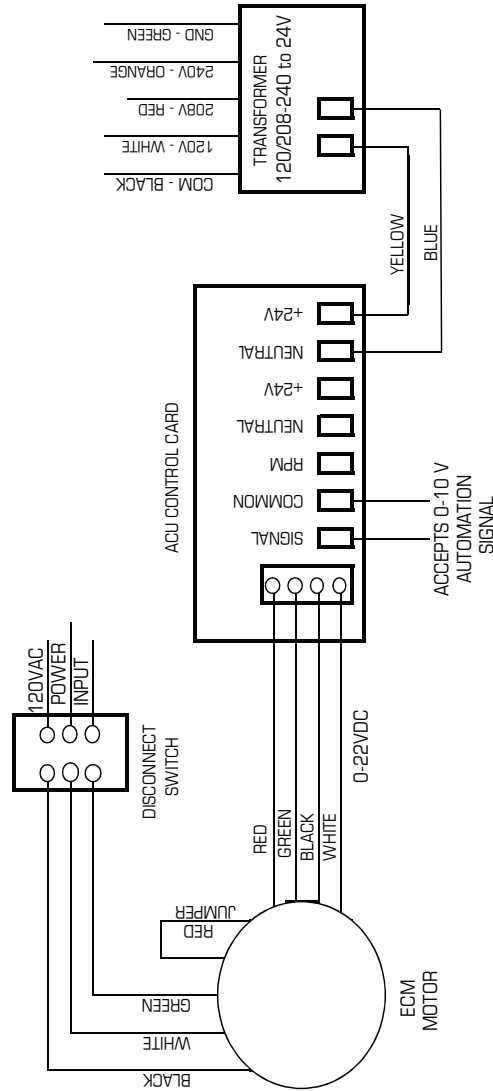
Parts	Item Number	Commercial/Clean Air Applications UL-705 Listed	Restaurant/Grease Laden/Tempered Air UL-762 Listed
Control Module	483339	Provided with fan	Provided with fan
Control Cable (4 pin)	483342	Provided with fan	Provided with fan
Power cable (5 pin) Control card	483343	Provided with fan	Provided with fan
Control cable for remote location	N/a	Cable must be furnished by others; 22 ga. 4 conductor type per NEC.	Cable must be furnished by others; 22 ga. 4 conductor type per NEC.
Use 22 gauge cable for max 200 ft. or 18 ga. cable for max 350 ft. Must confirm required wire stand number if Automated Building Control in use.			
Factory Accessory Kit (Kit includes NEMA 3R box and fan mounting bracket)	483340	Required when motor control is moved to a location outside the fan's motor compartment.	Required when motor control is moved to a location outside the fan's motor compartment.
Transformer 120/208/240Vac Spec: Size 40Va/primary: 120/208/240Vac 50/60Hz Secondary: 24 Vac Classe II only	483331	Provided with fan	Provided with fan

Troubleshooting

1. Verify live, correct voltage to motor connections. Voltage should be plus/minus 10% of the line voltage.
2. Confirm the primary input voltage to transformer is correct.
3. Confirm the secondary transformer voltage is 24Vac. Replace transformer as needed (See transformer spec in Parts List on page 2.).
4. Check for loose or broken control wires or cables. Connector pins may be keyed- do not remove by pulling on wires...
5. If the motor overloads, it will slow itself down automatically to avoid overheating. Check for excessive static pressure conditions such as blocked filters, malfunctioning dampers/grilles or other duct obstructions. Dampers cannot be used with UL-762 (restaurant) applications. Check/verify external static pressure at the fan inlet and fix/correct any flow restrictions if they exceed design fan air flow. The fan motor will not be damaged by an automatic reduced speed but reduced airflow will occur.
6. IMPORTANT: On 240Vac, the red jumper wire on the motor controller plug must be cut and capped off. Permanent damage will result if the jumper is not cut and warranty will be voided. On 120Vac, the red jumper should be connected. Fan ships in the 120Vac configuration.
7. Do not assume the motor has failed before a complete service check has been performed.
8. When making voltage checks use thin wire leads to prevent terminal damage.
9. It is normal for motor "rocking" on start-up due to the Soft Start feature of the motor. If excessive movement persists, verify centrifugal wheel is properly cleaned and balanced. Also, check that all fasteners are tight.
10. Do not run the control cables in the same conduit as the power supply wire. Be sure control cable is the correct size (See Parts List .



WIRING SCHEMATIC FOR FAN MOUNTED CONTROL



WIRING SCHEMATIC WITH REMOTE MOUNTED CONTROL

WARNING: CUT RED JUMPER WIRE AND CAP ENDS FOR A 208-240V POWER SUPPLY

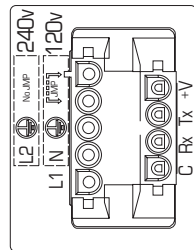


Figure 1: Control Connector

Table 3: Control Connector

Connector ID	Description
L1	AC Line
L2 / N	AC Line
Ground	Ground
Jumper 1 and Jumper 2 for 120V ONLY	
C	Common
Rx	Data In
Tx	Data Out
+V	12 VDC Input

ECM MOTOR CONNECTIONS

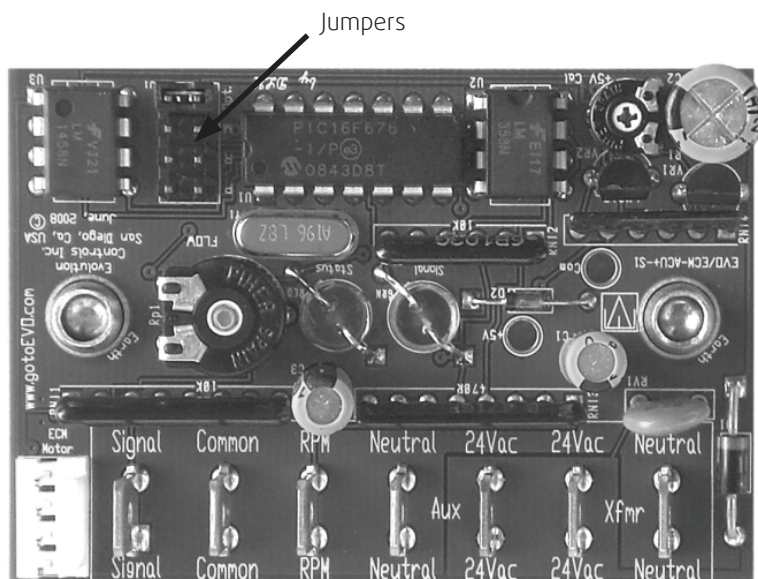
WARNING: CUT RED JUMPER WIRE AND CAP ENDS FOR A 208-240V POWER SUPPLY

Application

The EVO/ECM-ACU+ interface allows industry standard 0-10Vdc automation signals to adjust and monitor Genteq's ECM 3.0 Motor. These feature an internal microprocessor based drive. The design provides exceptional efficiency, performance and motor life.

The ACU+ provides adjustment of the ECM output from 0% to 100% of the programmed control range. A signal lamp on the control continuously flashes out the flow index¹. Instruments are not required to read the flow index. A 0-10Vdc signal connects RPM to the automation control.

Jumpers allow the ACU+ to be configured for 0-10Vdc automation signal, 2-10Vdc automation signal, and manual/override control. The ACU+ can also be used for stand-alone manual control.



Control card - Front

Signal Lamp

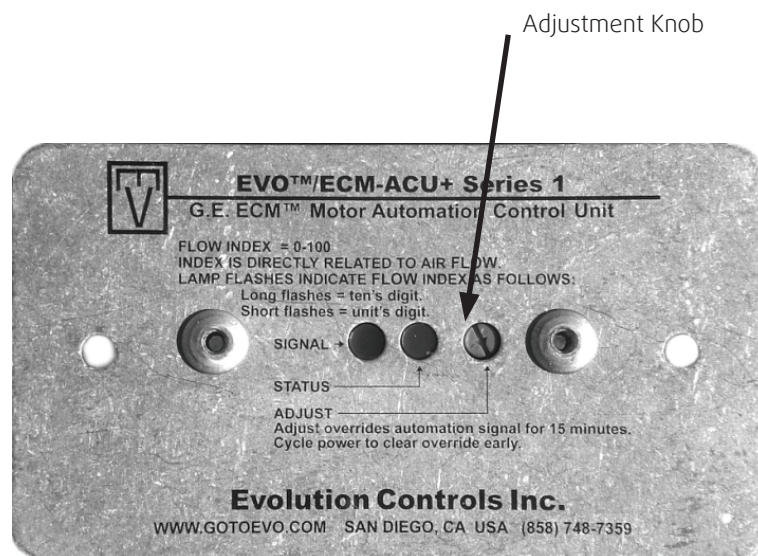
The green lamp continuously indicates the flow index. After a pause, the lamp flashes out the tens digit, then the units digit of a number between 1 and 99. Long flashes represent the tens digit, and short flashes represent the units digit. For example, a flow index of 23 flashes two longs, then three shorts. Two extra long flashes indicate a flow index of 0. An extra long flash and ten short flashes indicates a flow index of 100. The lamp flashes the signal that was present when the flash sequence started.

Turning Adjust controls the ECM motor to the manually adjusted setting. The manual setting has authority for 15 minutes.

Manual Override

Manual override causes Adjust to control the motor when the automation signal is less than 0.1Vdc. If the "M" jumper is in place, manual override is always enabled. Without the "M" jumper, manual override is invoked whenever the 15 minute Adjust time expires. It ends after the ACU+ turns the motor off/on 5 times while the automation signal is greater than 0.1Vdc.

¹Flow Index = percent of the programmed control range.



Control card - Rear

Jumpers

"P" The "P" jumper provides ON/OFF control by switching the motor's "GO" control line when the input signal drops below the 2 volt (4 mA) operating point. Without the jumper, turn power to the ACU+ On/Off to control motor On/Off.

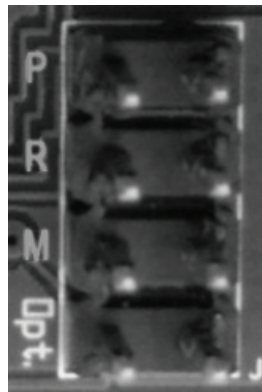
Rotating Adjust changes the Flow Index from 0 to 100. The "P" jumper also allows manual on/off control.

"M" The "M" jumper enables manual override. Manual override is overridden when the 0-10V automation signal exceeds 0.2Vdc. Manual override controls the motor before automation is installed, or when automation fails.

Without the "M" jumper, manual override is enabled whenever Adjust is turned. It is disabled by causing the ACU+ to turn the motor off/on 5 times while signal is greater than 0.1Vdc.

"R" The "R" jumper reverses Adjust rotation so adjustment is correct from the component side of the board.

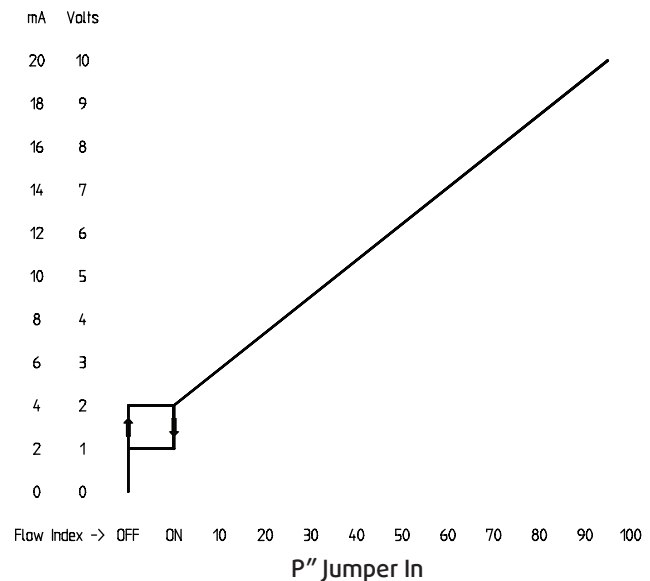
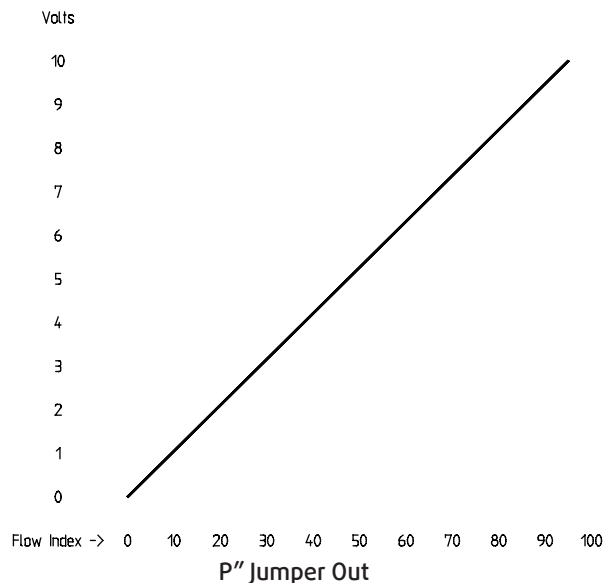
"Opt" The Opt. space has no function. The space may be used to store an unused jumper.



Specifications

Power	NEC Class II or equal 24 Vac $\pm$ 20% 50/60 Hz 2 W, 4 VA + 1VA/Motor
Control Signal	"O" Configuration 0-10 Vdc = 1% to 100% P" Configuration 2-10Vdc = 0-100% 4-20mA = 0-100% ON/OFF Control Between 1 & 2 Vdc (2 & 4 mA)
RPM Signal	0-10 Vdc, 5 mA max. = 0 to 2,000 RPM in 10 RPM steps
Outputs	Go & VSpd 22 Vdc @ 20 mA 2 motor loads RPM from 1 motor only
Vspd Supports ECM Autoswitch Function	
Thermal Stability	>0.01%/°F
Operating Environment	0°F to 130 °F (-18°C to 55°C) 10-80% rh
Connections	1/4 Tabs

Signal



Wiring

Power the EVO/ECM-ACU+ with a 24Vac NEC Class II USA power limited transformer² (Provided with fan.). Observe all code requirements and follow all safety practices regarding low voltage power supplies and circuits to insure a safe, reliable installation.

Some applications may require an isolated power supply or alternative earthing scheme. Follow code requirements and carefully observe all safety practices concerning unearthed low voltage circuits.

Earth one lead of the 24 Vac side of the power transformer³. Connect the ACU+ neutral connection to the earthed lead.

Connect the 24Vac 50/60Hz connection to the hot side of the 24 Vac Class II power source. With the "P" jumper out, you may interrupt this connection as a means to stop the ECM Motor. Most automation controllers will power the ACU+ directly from a 24 Vac on/off output, eliminating the fan relay. Automation controllers that switch neutral may require a fan relay.

The signal input is single-ended, so power neutral and signal common are internally connected.

Connect the 0-10 Vdc control signal to the Signal connection. Connect the control signal common to the Neutral connection.

The input presents a 21K ohm load to the signal source. Include this resistance when calculating a dropping resistor for 4-20 Ma operation. A 511 ohm 1% resistor⁴ provides a 500 ohm dropping resistance.

Connect to the motor using an EVO/ECM-CBL motor control cable.

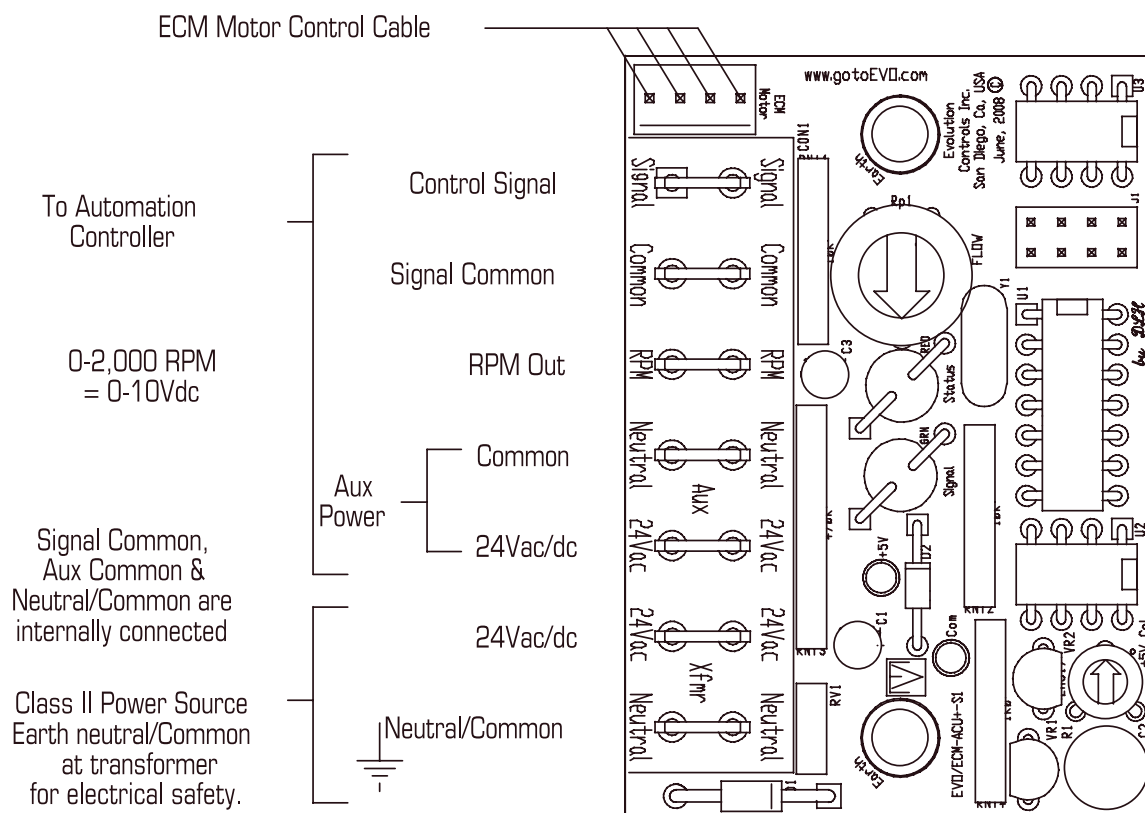
(Provided with fan.)

² See NECUSA 725.41

³ NECUSA 250.20.a.

⁴ www.Mouser.com pn. 271-511-RC

Wiring Diagram



During Construction

The equipment manufacturer may have set Adjust to allow heating equipment to operate during construction. If not, Adjust can be set on site to provide a flow to safely operate heating.

Automation Air Balance

If Automation is already installed, air balance can be achieved using automation tools. Please notice that a control signal less than 0.2Vdc may put the ACU+ into manual override. Avoid setting the automation signal to less than 0.2Vdc. Caution: turning Adjust locks out the automation signal for 15 minutes. Cycle power on/off 5 times for faster lockout removal.

Manual Air Balance

The ACU+ can be manually adjusted before automation is available. The balancer's manual adjustment has authority until automation is connected.

Factory Setup

Automation

Permanent Manual Override?

- Y Install the "M" jumper
- N Remove the "M" Jumper

On/Off control using the 2-10Vdc Signal?

- Y Install the "P" Jumper
- N Remove the "P" Jumper

Manual Adjust from the component side?

- Y Install the "S" jumper
- N Remove the "S" Jumper

Air Balancer:

1. Use Adjust to set the air flow. This adjustment will have authority for at least 15 minutes.
2. Read the flashing green light and record the flow index on the air balance report.

Automation Integrator:

1. Set the Signal to 0Vdc to invoke manual override.
2. Record the RPM on the air balance report.
3. Enter the flow index the air balancer entered on the air balance report.
4. Observe the RPM is at or near the RPM observed in step 2.
5. Cycle the motor on/off 5 times. This clears the manual override function unless the "M" jumper is in place. Signal must be greater than 0.1Vdc for 0-10Vdc applications.

Manual Adjust

Manual Adjust Only?

- Y Install the "M" jumper
- N Remove the "M" Jumper

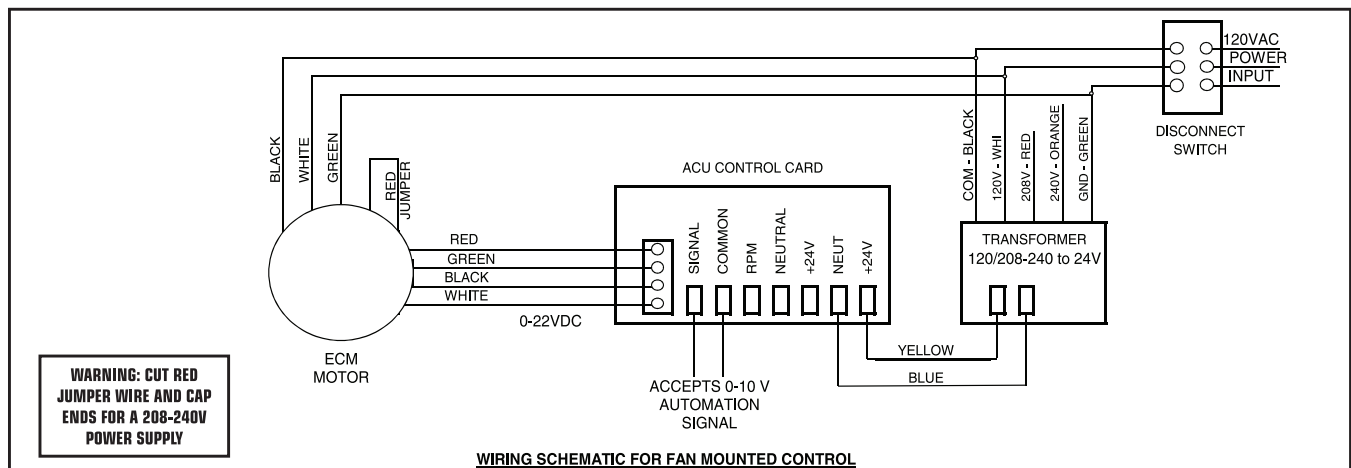
On/Off control using the Manual Adjust?

- Y Install the "P" Jumper
- N Remove the "P" Jumper

Manual Adjust from the component side?

- Y Install the "S" jumper
- N Remove the "S" Jumper

Wiring Diagram



Warranty

Systemair, Inc. warrants to the original purchaser that our products will be free from defects in material and workmanship for a period of one (1) year from the date of shipment. THIS IS OUR SOLE AND EXCLUSIVE PRODUCT WARRANTY AND IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHETHER OR NOT THE PURPOSE OR USE HAS BEEN DISCLOSED TO US IN SPECIFICATIONS, DRAWINGS OR OTHERWISE, AND WHETHER OR NOT OUR PRODUCTS ARE SPECIFICALLY DESIGNED AND/OR MANUFACTURED BY US FOR PURCHASER'S USE OR PURPOSE.

This warranty does not cover any losses or damages due to misuse, accident, abuse, neglect, normal wear and tear, negligence [other than ours], unauthorized alteration, use beyond rated capacity, or improper installation, maintenance or application. This warranty shall be null and void to the extent that purchaser supplied incorrect information to us about the necessary product specifications or the environment in which the products were to be used, and our selection or design of the products for the purchaser was based in part on such information.

Limitation of Warranty and Liability

THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY WARRANTY HEREUNDER SHALL BE LIMITED TO REPAIR, CORRECTION OR REPLACEMENT, OR REFUND OF THE PURCHASE PRICE UNDER THE PRECEDING PARAGRAPH ENTITLED "LIMITED WARRANTY". SYSTEMAIR VENTILATION PRODUCTS SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE AND IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION, SHALL OUR LIABILITY TO PURCHASER AND/OR ITS CUSTOMERS EXCEED THE PRICE PAID BY PURCHASER FOR THE SPECIFIC PRODUCT PROVIDED BY US THAT GAVE RISE TO THE CLAIM OR CAUSE OF ACTION. PURCHASER AGREES THAT IN NO EVENT SHALL

If within thirty (30) days after purchaser's discovery of any warranty defects within the warranty period, purchaser notifies us thereof in writing, we shall, at our option, repair, correct or replace F.O.B. point of manufacture, or refund the purchase price for, the products that we have found to be defective. Failure by purchaser to give such written notice within the 30-day time period shall be deemed an absolute and unconditional waiver of purchaser's claim for such defects. Products repaired or replaced shall be covered by this warranty for the remainder of the original warranty period or ninety (90) days from the date of shipment, whichever is longer.

Warranty claims should be sent to Systemair, Inc., Attn: Quality Department, 10048 Industrial Blvd., Lenexa, KS 66215.

Included in the claim should be Order Number, Model Numbers, Serial Numbers and a detailed description of the issues.

Purchaser assumes all other responsibility for any loss, damage or injury to persons or property arising out of the use of our products, either alone or in combination with other products or components.

OUR LIABILITY TO PURCHASER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. The term "consequential damages" shall include, but not be limited to, loss of anticipated profits, business interruption, loss of use or revenue, cost of capital, or loss or damage to property or equipment.

It is expressly understood that any technical advice furnished by us with respect to the use of our products is given without charge, and we assume no obligation or liability for the advice given, or results obtained, all such advice being given and accepted.

Warning

Systemair 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.

For Customer/Technical Support call (800) 747-1762

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