

ECM MOTOR MANUAL SUPPLEMENT FOR RENEWAIRE LIGHT COMMERCIAL UNITS

Table of Contents

| | |
|---------------------------------|-------|
| Performance Specifications | Pg. 2 |
| Electrical Specifications | Pg. 2 |
| Airflow Performance | Pg. 2 |
| Principles of External Controls | Pg. 3 |
| Control Methods | Pg. 4 |

ECM Motors

RenewAire's EV450 and HE1X light commercial units are offered with optional electronically commutated motors (ECM). ECM motors have higher efficiencies with considerable energy savings over a standard permanent split capacitor motor. The ECM motors offered in RenewAire ERVs are constant torque with a variety of speed control options. The motors operate at fixed speed or variable speed with speed inputs from fixed resistors, potentiometer, or 0-10Vdc analog signal.

CAUTION

Maximum distance between ECM motor and 10VDC source control cannot exceed 33 feet (10m).

Operating Controls

A wide variety of low voltage (24VAC) control schemes may be selected to meet the ventilation needs of the facility. These include time clock, occupancy sensor, carbon dioxide sensor, and others. Building Management Systems (BMS) may also control the unit with external control by others.

⚠ WARNING

RISK OF FIRE, ELECTRIC SHOCK, OR INJURY. OBSERVE ALL CODES AND THE FOLLOWING:

1. Before servicing or cleaning the unit, switch power off at disconnect switch or service panel and lock-out/tag-out to prevent power from being switched on accidentally. More than one disconnect switch may be required to de-energize the equipment for servicing.
2. This installation manual shows the suggested installation method. Additional measures may be required by local codes and standards.
3. Installation work and electrical wiring must be done by qualified professional(s) in accordance with all applicable codes, standards and licensing requirements.
4. Any structural alterations necessary for installation must comply with all applicable building, health, and safety code requirements.
5. This unit must be grounded.
6. Sufficient air is needed for proper combustion and exhausting of gases through the flue (chimney) of fuel burning equipment that might be installed in the area affected by this equipment. If this unit is exhausting air from a space in which chimney-vented fuel burning equipment is located, take steps to assure that combustion air supply is not affected. Follow the heating equipment manufacturer's requirements and the combustion air supply requirements of applicable codes and standards.
7. Use the unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.
8. This unit is intended for general ventilating only. Do not use to exhaust hazardous or explosive materials and vapors. Do not connect this unit to range hoods, fume hoods or collection systems for toxics.
9. When cutting or drilling into wall or ceiling, do not damage electrical wiring and other hidden utilities.
10. If installed indoors this unit must be properly ducted to the outdoors.

CAUTION

To avoid motor bearing damage and noisy and/or unbalanced impellers, keep drywall spray, construction dust, etc., out of unit.



Intertek



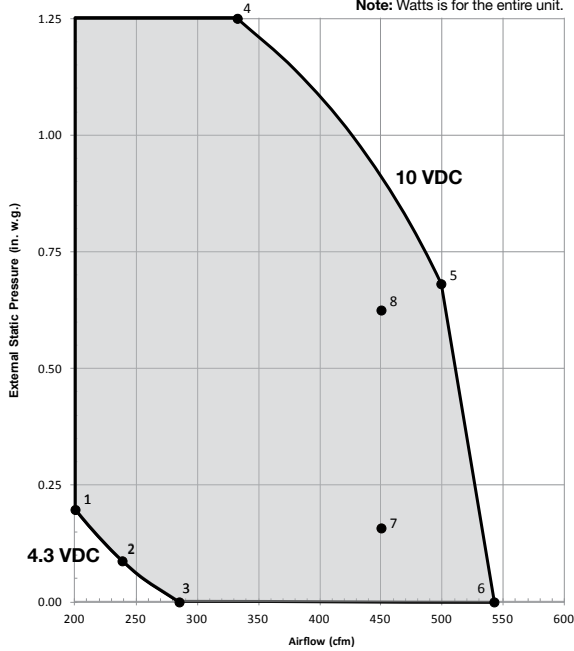
Globally Recognized. Industry Respected.

ECM Option Operating Ranges

EV450IN ECM

| Sample Points | | | |
|---------------|-----|------|-------|
| Point | CFM | ESP* | Watts |
| 1 | 200 | 0.20 | 88 |
| 2 | 238 | 0.09 | 81 |
| 3 | 285 | 0.00 | 123 |
| 4 | 333 | 1.25 | 327 |
| 5 | 496 | 0.70 | 519 |
| 6 | 539 | 0.00 | 520 |
| 7 | 450 | 0.16 | 324 |
| 8 | 450 | 0.64 | 407 |

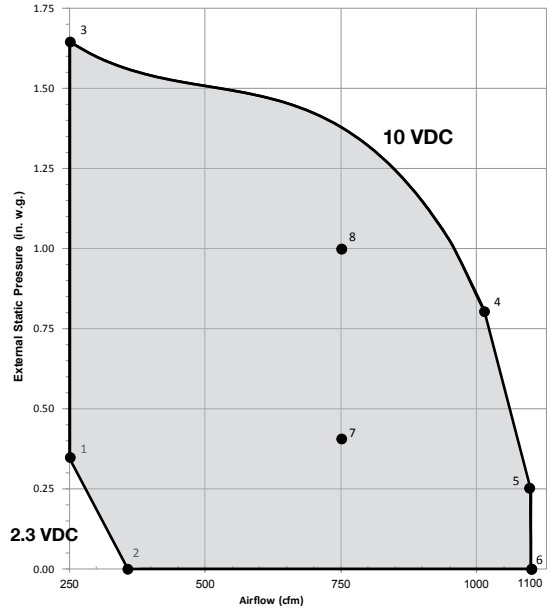
* Inches Water Column
Note: Watts is for the entire unit.



HE1XIN ECM (H or V)

| Sample Points | | | |
|---------------|------|------|-------|
| Point | CFM | ESP* | Watts |
| 1 | 250 | 0.35 | 115 |
| 2 | 352 | 0.00 | 84 |
| 3 | 250 | 1.65 | 545 |
| 4 | 1023 | 0.80 | 1100 |
| 5 | 1100 | 0.25 | 1160 |
| 6 | 1100 | 0.00 | 1010 |
| 7 | 750 | 0.41 | 486 |
| 8 | 750 | 1.00 | 655 |

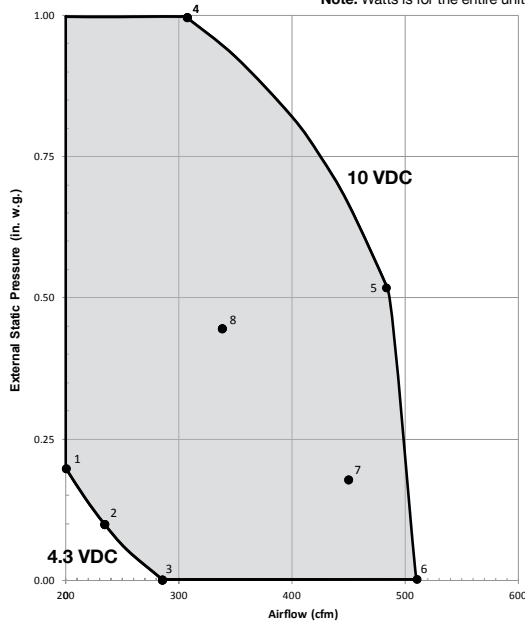
* Inches Water Column
Note: Watts is for the entire unit.



EV450RT ECM

| Sample Points | | | |
|---------------|-----|------|-------|
| Point | CFM | ESP* | Watts |
| 1 | 200 | 0.20 | 88 |
| 2 | 234 | 0.10 | 81 |
| 3 | 285 | 0.00 | 123 |
| 4 | 307 | 1.00 | 308 |
| 5 | 480 | 0.53 | 510 |
| 6 | 512 | 0.00 | 520 |
| 7 | 450 | 0.18 | 347 |
| 8 | 338 | 0.45 | 218 |

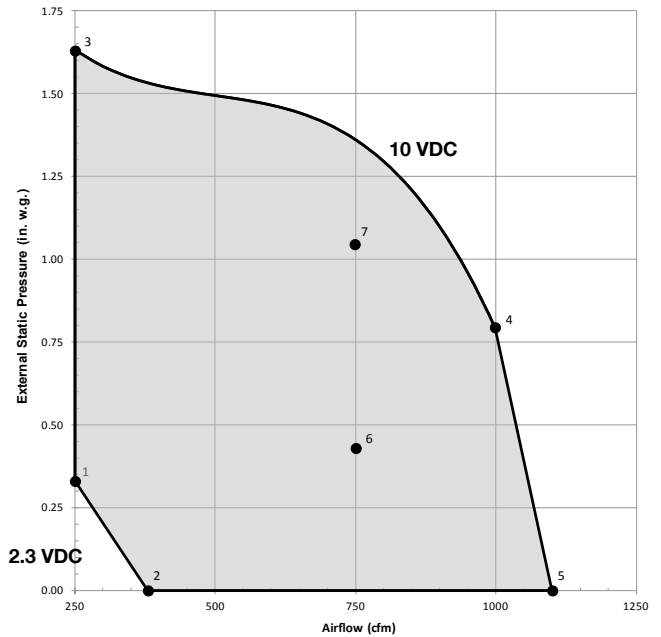
* Inches Water Column
Note: Watts is for the entire unit.



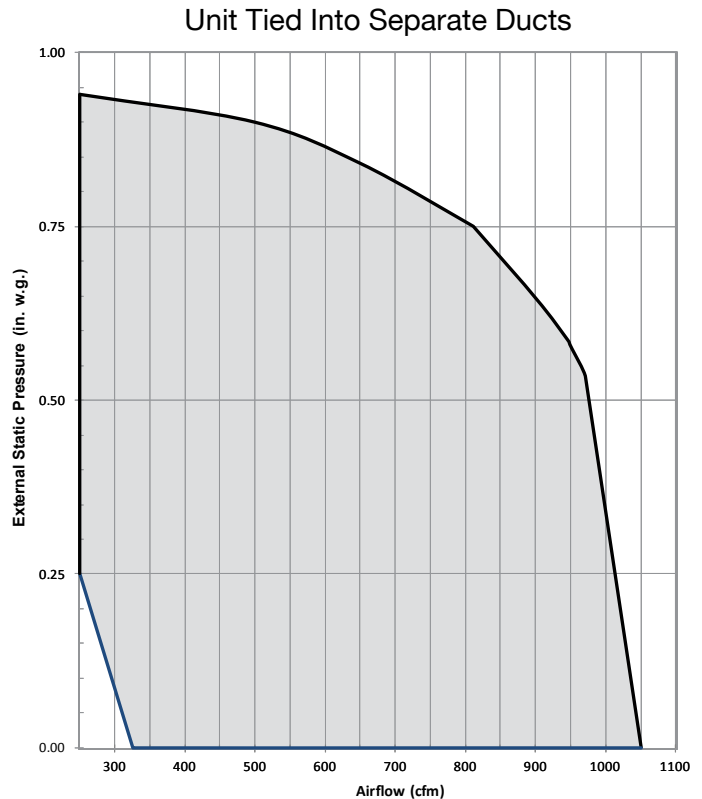
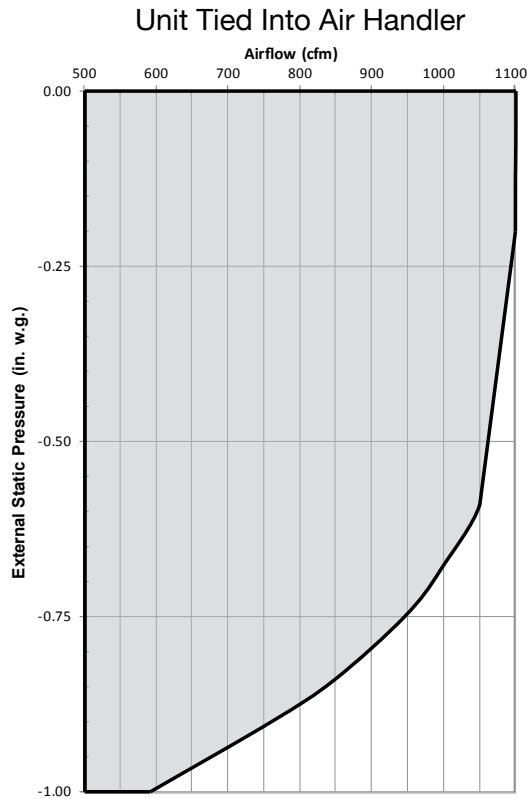
HE1XRT ECM

| Sample Points | | | |
|---------------|------|------|-------|
| Point | CFM | ESP* | Watts |
| 1 | 250 | 0.32 | 115 |
| 2 | 341 | 0.00 | 86 |
| 3 | 250 | 1.63 | 545 |
| 4 | 992 | 0.80 | 1080 |
| 5 | 1097 | 0.00 | 1010 |
| 6 | 750 | 0.43 | 473 |
| 7 | 750 | 1.04 | 655 |

* Inches Water Column
Note: Watts is for the entire unit.



HE1XRTC ECM



Electrical Specifications

| Electrical Ratings for ECM Units | | | | | | |
|----------------------------------|--------------|-------------|------------|------|-------------|------|
| Input Voltage | Phase (unit) | FLA (motor) | MCA (unit) | | MOPD (unit) | |
| | | | EV450 | HE1X | EV450 | HE1X |
| 115 VAC | 1 | 9 | 11.3 | 20.3 | 15 | 25 |
| 208-230 VAC | 1 | 5.1 - 4.9 | 6.4 | 11.5 | 15 | 15 |

Airflow Performance

The ERV is factory wired to operate at low fixed speed and high variable speed.

Airflows must be measured and the unit's potentiometers adjusted so that it operates at the airflow volumes specified for the installation.

Use the pressure taps in the core and filter doors to determine the airflow. Figure 1 translates the pressure drop across the energy recovery core to the actual airflow volume.

CAUTION

Make sure clean filters are installed before balancing airflow. Dirty or clogged filters reduce airflow through the unit.

CAUTION

Very low airflow rates may result in fouling of the energy exchanger core. Do not reduce airflow to below 250 cfm per core.

Measuring Airflow

Equipment Required

- Magnehelic gauge or other device capable of measuring 0-1.5 in. water of differential pressure.
- 2 pieces of flexible tubing, 1/8" ID, 1/16" wall works best. **NOTE:** Be sure to remove cap from pressure port before inserting tubing. Insure tubing is well seated in pressure ports. **NOTE:** The tubing should extend in the pressure port approximately 1 inch.

Cross Core Static Pressure Measurement Instructions

- The individual differential static pressures (DP) are measured using the installed pressure ports located in the front of the units core access doors. **NOTE:** These ports are carefully located on the unit to give the most accurate airflow measurement. **NOTE:** Do not relocate pressure ports.
- To read SCFM of Fresh Air (FA) install the "high" pressure side (+) of your measuring device to the Outside Air (OA) port and the "low" pressure side (-) to the Fresh Air (FA) port.
- To read SCFM of Room Air (RA) install the "high" pressure side (+) of your measuring device to the Room Air (RA) port and the "low" pressure side (-) to the Exhaust Air (EA) port.
- Use the reading displayed on your measurement device to cross reference the CFM output using the conversion chart. **NOTE:** Be sure to replace cap into pressure port when air flow measuring is completed.
- Adjust air flow by changing the potentiometer setting for the measured airstream. **NOTE:** For best performance the airflow rate for both the Fresh Air and the Exhaust Air should be roughly equal ("balanced"). In some facilities a slight positive or negative pressure in the building is desired. RenewAire energy recovery ventilators can generally operate with a flow imbalance of up to 20% without significant loss in energy recovery efficiency.

| AIRFLOW PREDICTED BY PRESSURE DROP ACROSS CORE (SCFM) | | | | | | | | | | |
|---|-------------|-----|-------------|------|-------------|------|------------|-----|-------------|------|
| DP ("H2O) | EV450IN ECM | | HE1XINV ECM | | HE1XINH ECM | | HE1XRT ECM | | HE1XRTC ECM | |
| | FA | RA | FA | RA | FA | RA | FA | RA | FA | RA |
| 0.20 | 200 | 200 | 280 | -- | 260 | -- | -- | -- | -- | -- |
| 0.25 | 225 | 225 | 330 | 270 | 310 | 290 | -- | -- | -- | -- |
| 0.30 | 245 | 245 | 380 | 320 | 360 | 340 | 280 | 250 | -- | -- |
| 0.35 | 265 | 265 | 425 | 375 | 415 | 390 | 325 | 290 | -- | -- |
| 0.40 | 285 | 285 | 470 | 430 | 470 | 440 | 370 | 330 | -- | -- |
| 0.45 | 305 | 305 | 520 | 480 | 520 | 490 | 415 | 370 | -- | -- |
| 0.50 | 330 | 330 | 570 | 530 | 570 | 540 | 460 | 410 | 650 | -- |
| 0.55 | 350 | 350 | 620 | 580 | 620 | 590 | 515 | 455 | 688 | -- |
| 0.60 | 370 | 370 | 670 | 630 | 670 | 640 | 550 | 500 | 725 | 555 |
| 0.65 | 390 | 390 | 720 | 680 | 720 | 690 | 595 | 540 | 770 | 610 |
| 0.70 | 410 | 410 | 770 | 730 | 770 | 740 | 640 | 580 | 815 | 665 |
| 0.75 | 430 | 430 | 815 | 785 | 820 | 790 | 690 | 620 | 853 | 720 |
| 0.80 | 455 | 455 | 860 | 840 | 870 | 840 | 740 | 660 | 890 | 775 |
| 0.85 | 475 | 475 | 910 | 890 | 920 | 890 | 785 | 700 | 933 | 828 |
| 0.90 | 495 | 495 | 960 | 940 | 970 | 940 | 830 | 740 | 975 | 880 |
| 0.95 | -- | -- | 1010 | 990 | 1020 | 990 | 875 | 785 | 1018 | 938 |
| 1.00 | -- | -- | 1060 | 1040 | 1070 | 1040 | 920 | 830 | 1060 | 995 |
| 1.05 | -- | -- | -- | 1090 | -- | 1090 | 965 | 870 | -- | 1048 |
| 1.10 | -- | -- | -- | -- | -- | -- | 1010 | 910 | -- | 1100 |

Figure 1.
CHART: AIRFLOW vs. PRESSURE DROPS

Principles of External Control

The EV450 and HE1X units with ECM motors are designed for control by a wide variety of low voltage (24VAC) controls to meet the ventilation needs of the facility. These include time clock, occupancy sensor, carbon dioxide sensor, building management system (BMS) and others. These devices are commonly known as 2-wire, 3-wire, and 4-wire devices.

RenewAire offers separately the following for standalone control of the ERV:

- Digital Time Clocks TC7D-W and TC7D-E
- Occupancy Sensors MC-C and MC-W
- Carbon Dioxide Sensor/Controllers CO2-W and CO2-D

HE1X ONLY

The external control device connects to the Light Commercial unit to operate each blower independently or for one blower to act as leader and the other blower to act as follower. When operating independently, a single external switch or relay calls for operation but each speed control motor can respond independently to switch or analog signal source.

When acting as leader-follower, again, a single external source calls for operation and then one motor responds to the input signal. The Light Commercial HE1X unit has the versatility that either the exhaust air (EA) motor or the fresh air (FA) motor can act as leader.

Connection of an external control device to the Light Commercial Unit is simple. All external control device wires connect to a terminal block(s) in the unit's electrical box.

Control Methods - Fixed Speed

EV450-ECM
MANUAL OFF/ON SWITCH.
SPEED 1 SET BY RESISTORS.
MANUAL SWITCH ACTIVATES SPEED 2.
10K POTENTIOMETER SETS SPEED 2

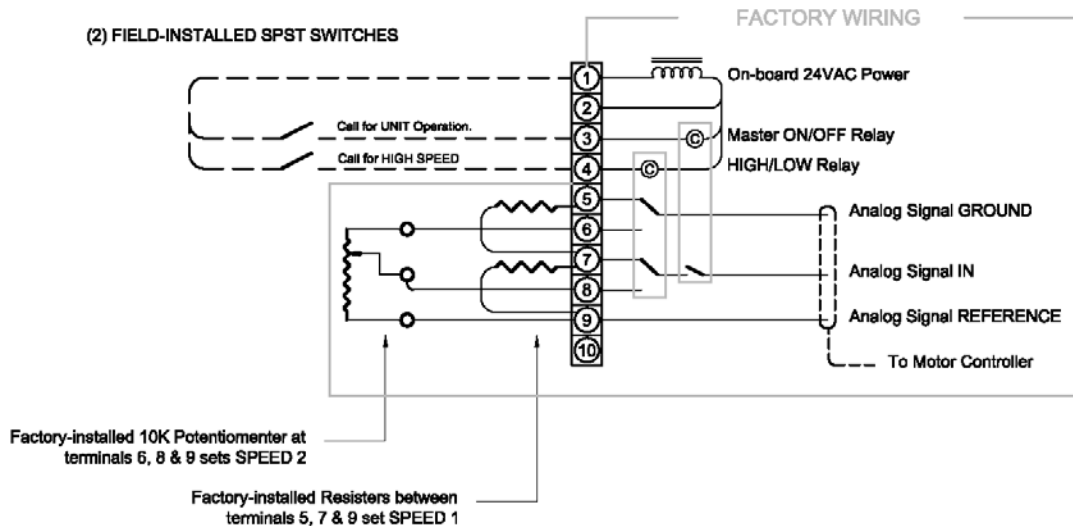


Figure 2. EV450 Fixed Speed Control

HE1X-ECM
MANUAL OFF/ON SWITCH.
SPEED 1 SET BY RESISTORS FOR EACH BLOWER.
MANUAL SWITCH ACTIVATES SPEED 2 (BOTH BLOWERS).
SPEED 2 SET FOR EACH BLOWER BY SEPARATE 10K POTENTIOMETERS.

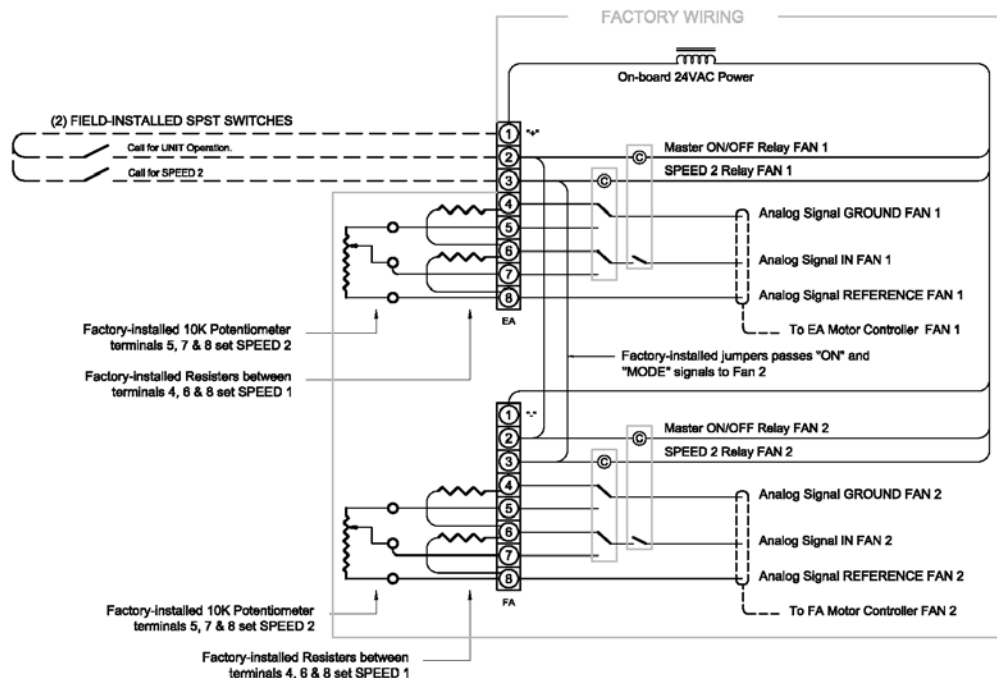


Figure 3. HE1X Fixed Speed Control

Control Methods - 0-10VDC SIGNAL FROM BMS

EV450-ECM
JUMPER FOR CONSTANT READINESS TO RUN.
SPEED 1 SET BY 0-10vdc INPUT FROM BUILDING MANAGEMENT SYSTEM (BMS).
SPEED 2 UNUSED.

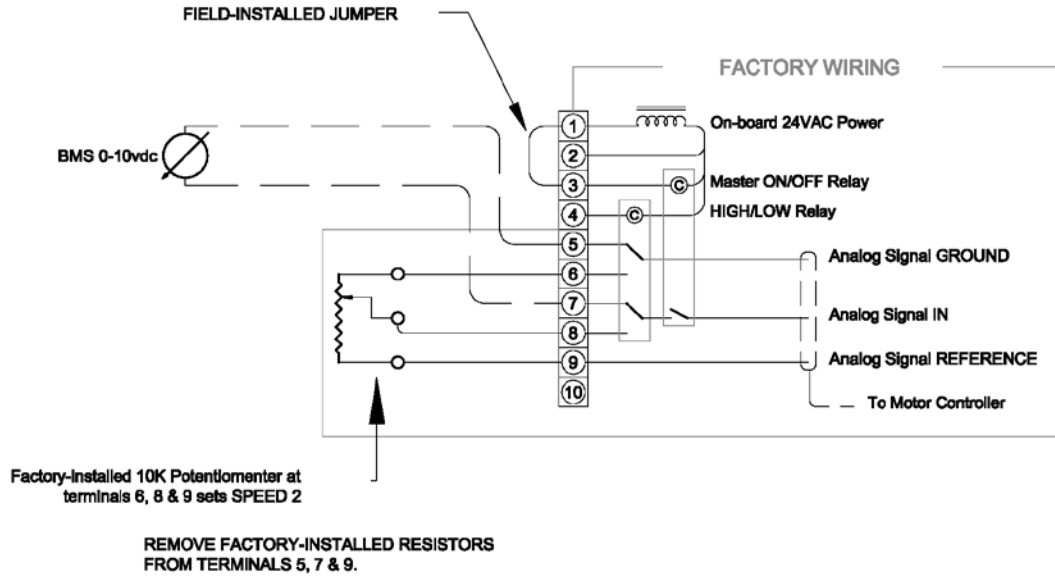


Figure 4. EV450 BMS Control

ALTERNATELY, TWO BMS OUTPUTS SEPARATELY SET SPEED 1 FOR BLOWER 1 (EA) AND SPEED 1 FOR BLOWER 2 (FA).

SINGLE BMS OUTPUT SETS SPEED 1 FOR BLOWER 1 (EA). LEADER-FOLLOWER JUMPERS BETWEEN TERMINALS EA-4 & FA-4, AND EA-6 & FA-6 SET EQUAL SPEED 1 FOR BLOWER 2 (FA).

HE1X-ECM
JUMPER FOR CONSTANT ON.
SPEED 1 SET BY 0-10vdc OUTPUT(S) OF BUILDING MANAGEMENT SYSTEM (BMS).
SPEED 2 UNUSED.

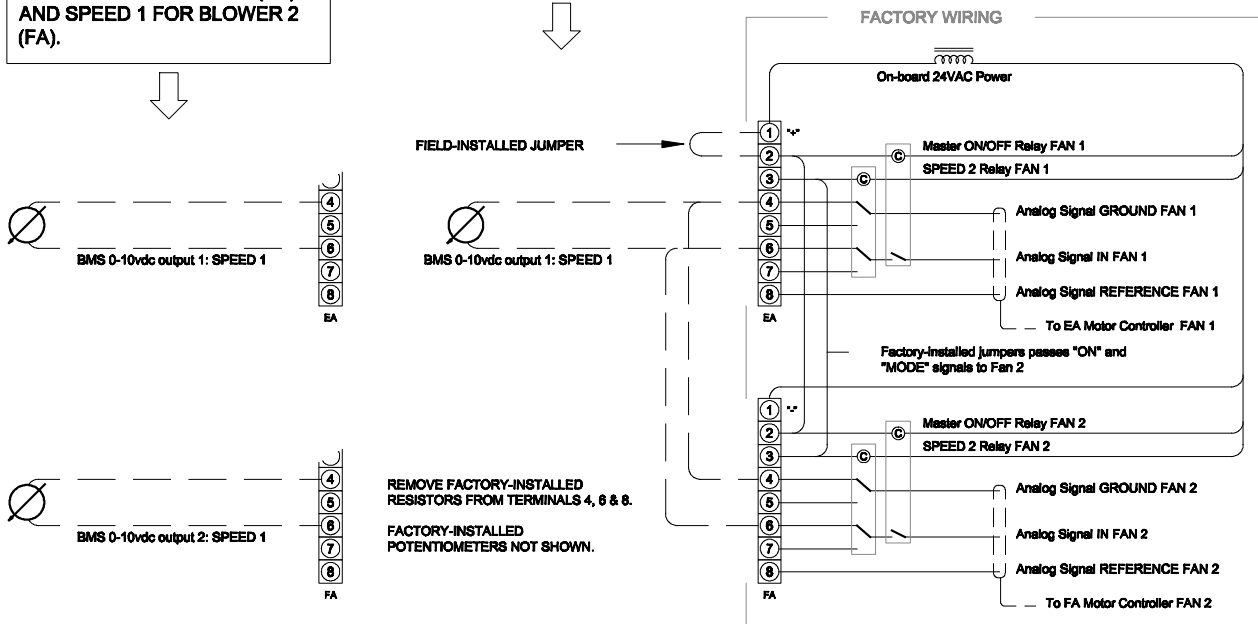


Figure 5. HE1X BMS Control

Control Methods - 0-10VDC SIGNAL FROM CO2 CONTROL

EV450-ECM
 JUMPER FOR CONSTANT ON.
 SPEED 1 SET BY RESISTORS.
 TIME CLOCK ACTIVATES SPEED 2.
 CO2 CONTROLLER SETS SPEED 2.

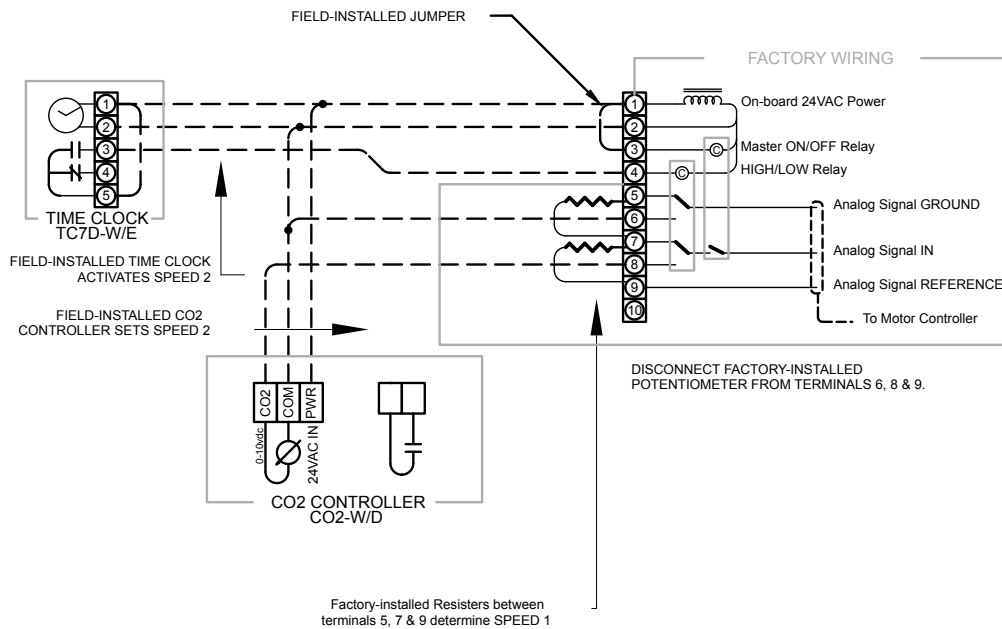


Figure 6. EV450 CO2 Control

HE1X-ECM
 JUMPER FOR CONSTANT UNIT ON.
 SPEED 1 SET BY 10K POTENTIOMETER (EACH BLOWER).
 TIME CLOCK ACTIVATES SPEED 2 DURING OCCUPANCY..
 CO2 CONTROL SETS SPEED 2.

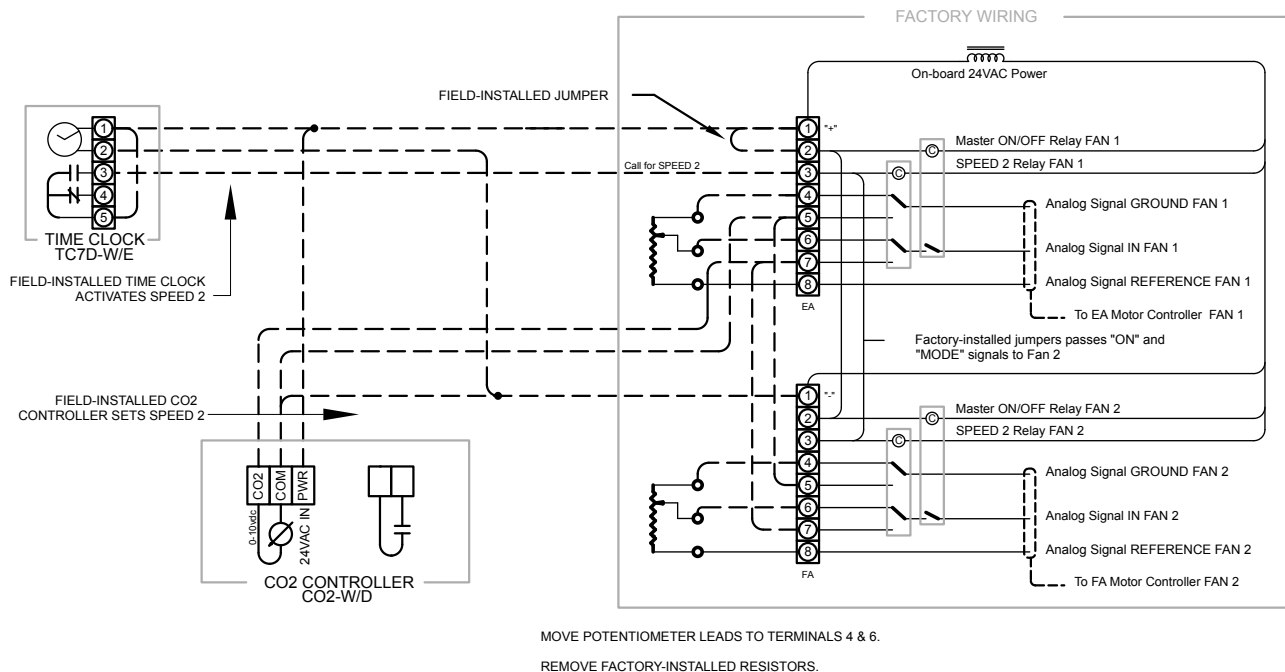


Figure 7. HE1X CO2 Control

Control Methods - SC-ECM ACCESSORY CONTROL

SC-ECM
 MANUAL OFF/ON SWITCH.
 SPEED 1 SET BY RESISTORS FOR EACH BLOWER.
 MANUAL SWITCH ACTIVATES SPEED 2 (BOTH BLOWERS).
 SPEED 2 SET FOR EACH BLOWER BY ECM ACCESSORY CONTROL

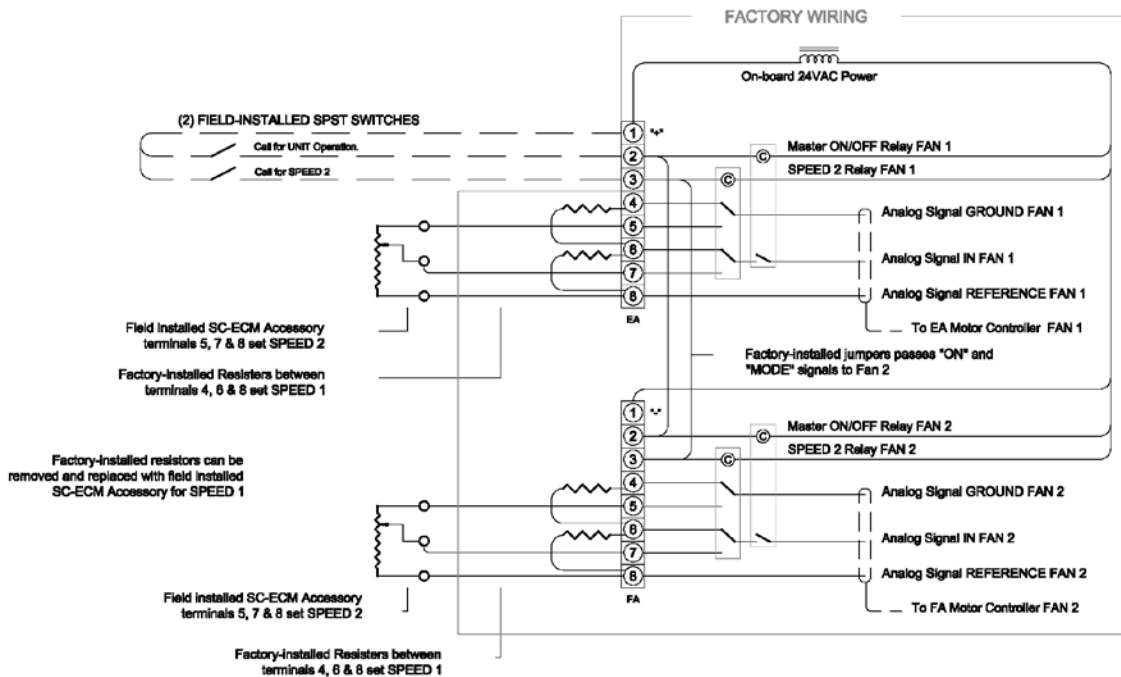


Figure 8. SC-ECM Accessory Control