



Evergreen® EM Indoor Blower Motor Installation Guide

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**FORM
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⚠ WARNING Indicates a hazard which, if not avoided, could result in serious injury or death.

⚠ CAUTION Indicates a hazard which, if not avoided, could result in minor or moderate personal injury.

NOTICE Indicates information considered important, but not hazard-related (e.g. messages relating to property damage).

GENERAL SAFETY INSTRUCTIONS

⚠ WARNING

- Read and follow all instructions carefully.
- Disconnect and lock out the main power from the unit being serviced before installing the Evergreen EM motor. It is also a good practice to confirm that the power is disconnected with a voltmeter.
- Do not operate equipment without guards in place.
- Improper installation, adjustment, alteration, service, maintenance, or use could cause explosion, fire, electrical shock, or other conditions. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use the supplied or recommended parts when installing or servicing this product.
- Installation and service of this Evergreen EM motor should be performed only by trained service technicians familiar with these products.

- After installing the Evergreen EM motor, it is the responsibility of the installing technician to verify the HVAC system matches the manufacturer's requirements for proper operation, capacity, efficiency and safety.

⚠ CAUTION

- Periodic inspections should be performed. Failure to perform proper maintenance could result in premature product failure, in addition to minor or moderate injury.
- This Evergreen EM motor should be installed in accordance with accepted practices and installation instructions, and in compliance with all national and local codes.



This installation guide covers Evergreen EM models 6203X, 6205X, 6207X and 6210X.

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- Genteq models X13, Endura® Pro or Ensité® Air motors
- US Motors®* SelecTech®* and RESCUE SELECT®* motors
- Broad Ocean®* motors

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APPLICATION NOTES

1. The Evergreen® EM motor is designed to replace constant torque Electronically Commutated Motors (ECM). This motor is also designed for use in direct drive indoor blower motor applications with forward curved (squirrel cage) blower wheels.
 - This motor is not designed to replace Permanent Split Capacitor (PSC) motors or constant airflow (variable speed) communicated motors. It is also not designed for outdoor applications. To find an Evergreen motor for any of the other applications that this motor does not apply to, please visit ECMMadeEasy.com.
2. For proper replacement, match the horsepower (HP) and voltage (VAC) ratings of the new motor to the motor being replaced. It is not necessary for the RPM or the amperage (FLA) to match.

NOTE: This is a dual voltage motor capable of replacing both 115 and 208-230 VAC rated motors. Install the correct voltage plug from the parts bag before connecting to line voltage. The WHITE plug is for 115 VAC and the YELLOW plug is for 208-230 VAC.
3. **The Evergreen EM motor is pre-programmed. There is no programming necessary at the time of installation.**

CONSTANT TORQUE ECM REPLACEMENT MOTOR

INDOOR BLOWER MOTOR

EVERGREEN™ EM MOTOR

Genteq™ motors

- X13
- Endura™ Pro
- EnSite™ Air
- Evergreen™ EM
- EnSite



US Motors™*

- SelecTech™*
- RESCUE SELECT™*



Broad Ocean™* motors

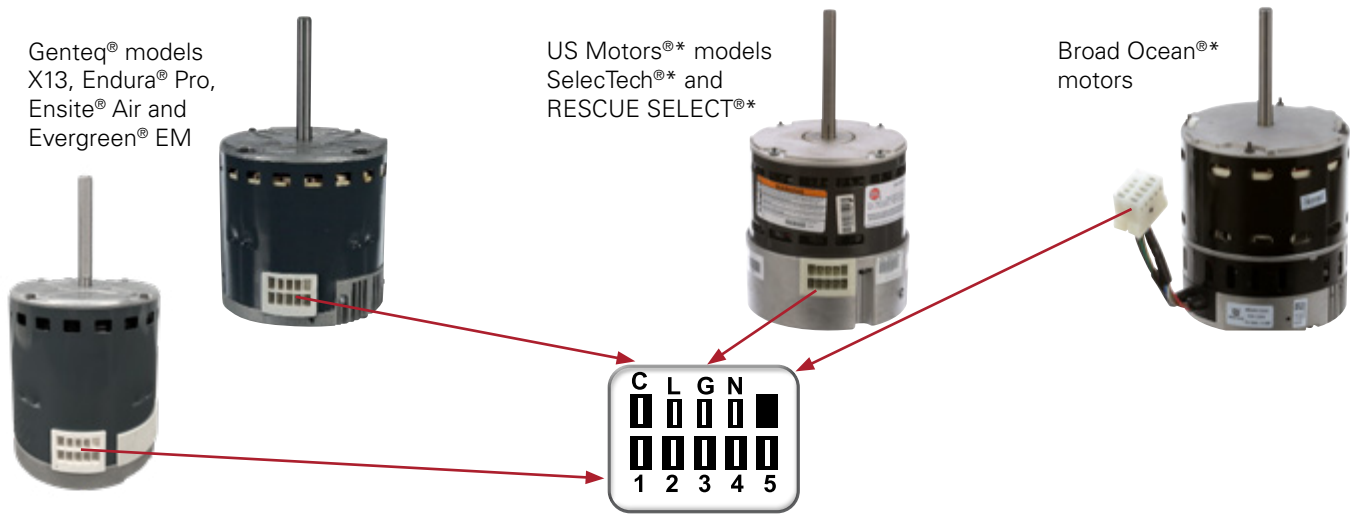


Evergreen™ EM

- Compatible with OEM harness
- Compatible with 5-speed and PWM motors
- **Pre-programmed ready to install out of the box**

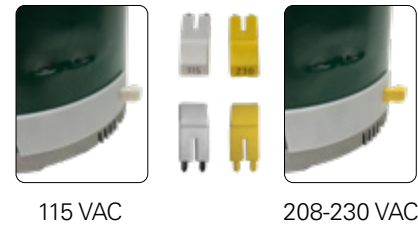
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Instructions for replacing constant torque ECM motors built with standard 9-pin plugs.



Evergreen® EM Motor: Pre-Installation

Before installing the new Evergreen EM motor, install the voltage plug from the parts bag to match the voltage rating of the motor being replaced. For 115 VAC applications install the WHITE plug. For 208-230 VAC applications, install the YELLOW plug.



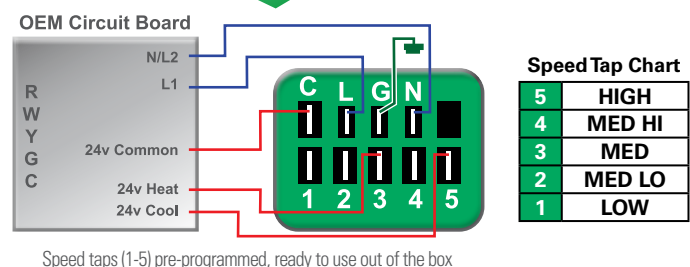
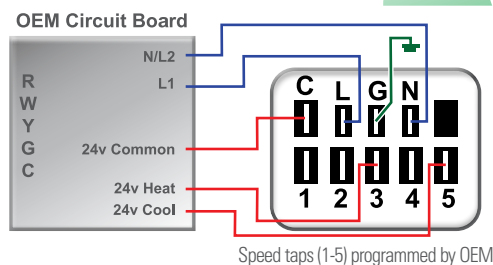
Evergreen EM Motor: Installation and Connection

1. Disconnect AC power from the HVAC system. **WARNING!** Using a voltmeter, confirm the power is disconnected.
2. Disconnect the wires or plugs connected to the motor being replaced. If the wires are connected individually to the motor, note each wire color according to the terminal designation on the motor and/or HVAC system.
3. Install the new motor. See page 9 "MECHANICAL INSTALLATION" for mounting information, if needed.
4. Reconnect the wires or plugs from the HVAC system to the Evergreen EM motor (see diagram and information below, if needed).
5. See page 6 "START-UP AND COMMISSIONING" for information about rotation sensing and airflow selections before energizing the motor.

EASY AS 1, 2 DONE

1. Transfer wires or plugs to same connections

2. Adjust speed taps for proper demand airflow



Speed Tap Chart	
5	HIGH
4	MED HI
3	MED
2	MED LO
1	LOW

Motor Being Replaced

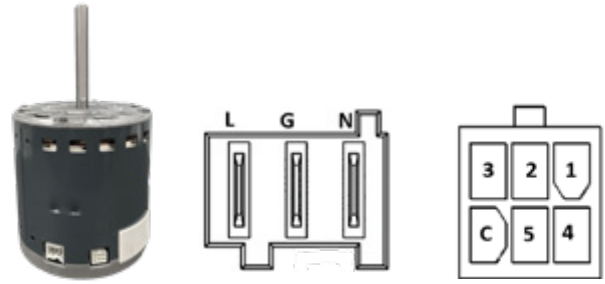
Evergreen® EM

NOTE:

The terminal size and location in the new Evergreen EM motor is identical to the motors listed on the top of this page. The original wires and/or plugs will connect to this motor in the same location they were in on the control being replaced.

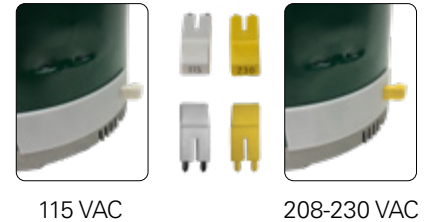
Instructions for replacing Genteq® Ensite® constant torque ECM motors built with individual line voltage and low voltage plugs.

NOTE: This process uses the OEM wires. The wire colors and designations will still match the OEM schematic with the new motor.



Evergreen® EM Motor: Pre-Installation

Before installing the new Evergreen EM motor, install the voltage plug from the parts bag to match the voltage rating of the motor being replaced. For 115 VAC applications, install the WHITE plug. For 208-230 VAC applications, install the YELLOW plug.

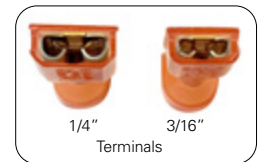


Evergreen EM Motor: Installation and Connection

1. Disconnect AC power from the HVAC system.
WARNING! Using a voltmeter, confirm the power is disconnected.
2. Remove the 3-pin and 6-pin plugs from the motor being replaced.
3. Install the new motor. See page 9 "MECHANICAL INSTALLATION" for mounting information, if needed.
4. Using the images and diagram below (see Step 4), view the harness plugs (3-pin and 6-pin) from the wire side of the plugs. Identify the wire color related to the pin designation. Write the wire color in the chart related to the pin designation.

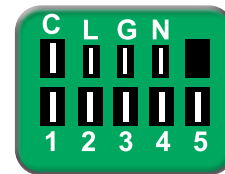
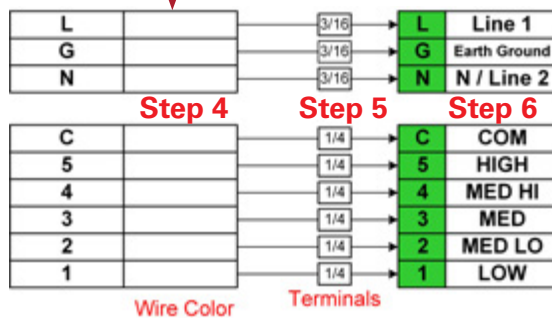
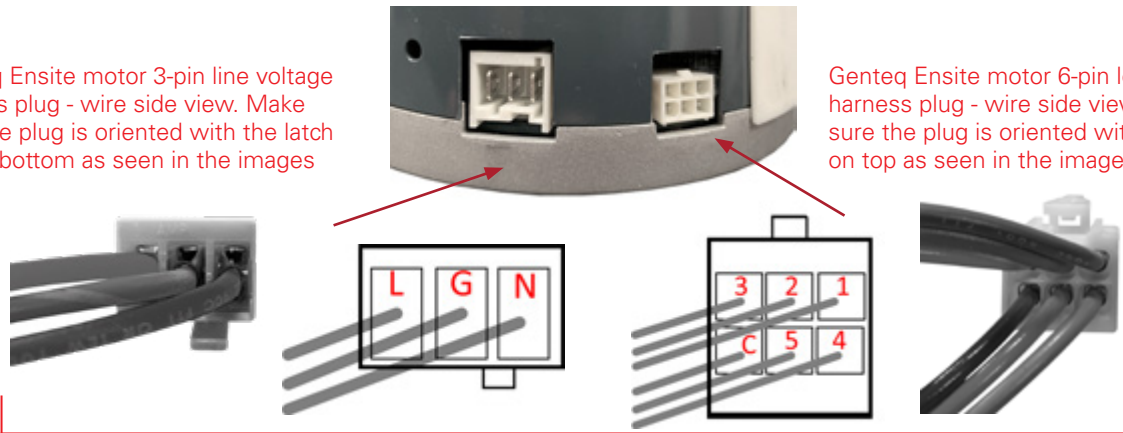
NOTICE! DO NOT SKIP THIS STEP. IT IS VERY IMPORTANT TO PROPERLY IDENTIFY EACH WIRE COLOR WITH THE CORRECT PIN DESIGNATION.

5. Cut the wires approximately 1" from the plugs. Make sure there is enough wire length to reach the new motor. Install the provided terminals on the wires according to the diagram below (see Step 5). The terminals are provided in the parts bag. *Note the correct terminal size for each wire.*
6. Connect the wires to the Evergreen EM motor according to the diagram below (see Step 6).
7. See page 6 "START-UP AND COMMISSIONING" for information about rotation sensing and airflow selections before energizing the motor.



Genteq Ensite motor 3-pin line voltage harness plug - wire side view. Make sure the plug is oriented with the latch on the bottom as seen in the images below.

Genteq Ensite motor 6-pin low voltage harness plug - wire side view. Make sure the plug is oriented with the latch on top as seen in the images below.



Evergreen® EM



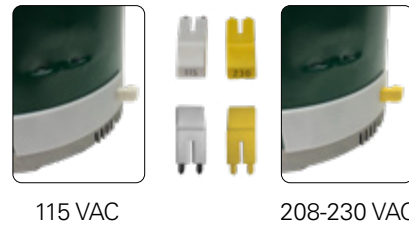
Instructions for replacing Broad Ocean®* constant torque ECM motors built with 24 VAC speed taps and individual wires that connect directly to the HVAC control board.

NOTE: This process uses the OEM wires. The wire colors and designations will still match the OEM schematic with the new motor.



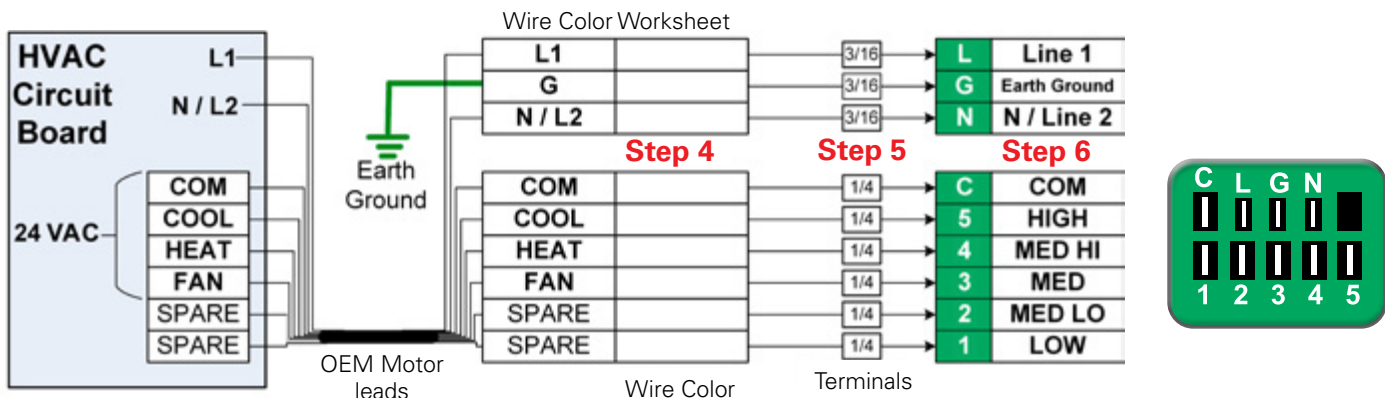
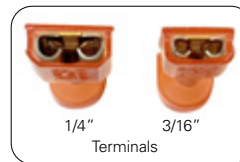
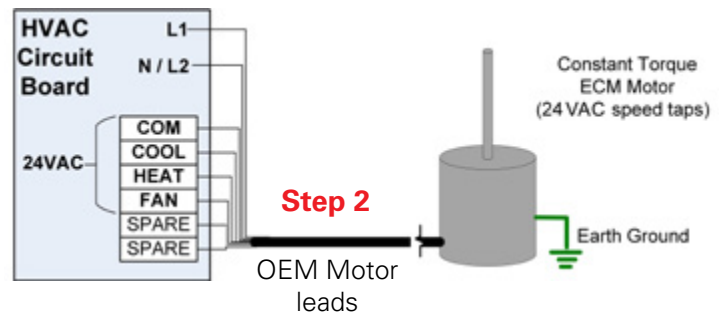
Evergreen® EM Motor: Pre-Installation

Before installing the new Evergreen EM motor, install the voltage plug from the parts bag to match the voltage rating of the motor being replaced. For 115 VAC applications, install the WHITE plug. For 208-230 VAC applications, install the YELLOW plug.



Evergreen EM Motor: Installation and Connection

1. Disconnect AC power from the HVAC system.
WARNING! Using a voltmeter, confirm the power is disconnected.
2. Cut the existing motor leads from the OEM motor being replaced as close to the motor as possible, so they can be repurposed for connection to the new motor (see Step 2 - image to the right).
3. Install the new motor. See page 9 "MECHANICAL INSTALLATION" for mounting information, if needed.
4. Using the diagram below (see Step 4), identify each wire color from the motor harness of the motor being replaced with its terminal designation on the **HVAC Circuit Board**. Write the corresponding wire color in the diagram below to be used as a worksheet for connection to the new motor.
5. Install the provided terminals on the wires according to the diagram below (see Step 5). The terminals are provided in the parts bag. **Note the correct terminal size for each wire.**
6. Connect the wires to the Evergreen EM motor according to the diagram below (see Step 6).
7. See page 6 "START-UP AND COMMISSIONING" for information about rotation sensing and airflow selections before energizing the motor.



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Evergreen® EM



START-UP AND COMMISSIONING

Rotation Sensing

The first time the Evergreen® EM motor is powered up and receives a low voltage signal on one of the speed taps, it will perform the rotation sensing process. With this feature, the motor will automatically determine the proper operating direction of the blower wheel.

NOTE: Do not bench test this motor. The first time it is energized, it should be mounted in the blower housing. Do not disconnect the power from the HVAC unit until the motor continues to run in one direction for more than a minute.

During the rotation sensing process, the motor will run in both directions, up to four times if necessary, to determine the proper direction of rotation. If the proper direction cannot be determined after the fourth sequence, the motor will operate in the default direction of Counter Clockwise (CCW) as viewed from the lead end.

When the motor continues to run in one direction for more than one minute, the rotation sensing process is complete and the feature is locked out. The motor will also noticeably increase speed (related to the tap that is currently energized). The motor will now operate in this direction without performing rotation sensing even if the line voltage power is disconnected. If the motor needs to be reversed after the rotation sensing process is complete, see page 8 "CHANGING ROTATION".

Airflow Performance

Industry best practices dictate measuring and adjusting airflow, as needed, to match the system performance guidelines in the HVAC system's manual or unit rating plate, any time the motor is replaced.

This motor is capable of three modes of operation:

- **5-speed mode** using 24 VAC inputs (this is the most common use of constant torque ECM in HVAC equipment). The Evergreen EM motor is pre-programmed for 5-speed mode. In 5-speed mode the motor is typically connected to the HVAC system control board on taps labeled HEAT, COOL or FAN. To adjust airflow in this mode of operating, simply move input to the motor to a higher value for more airflow or a lower value for less airflow. Tap 1 is LOW speed and Tap 5 is HIGH speed. See page 7 "ELECTRICAL CONNECTIONS AND OPERATION OVERVIEW" for the complete tap values chart.
- **Pulse Width Modulation (PWM) mode** is commonly identified by a single input to Tap 1. See the HVAC system manual if this mode is suspected. The voltage used for PWM is measured as DCV. In this mode of operation, the input stays on Tap 1 at the motor. See the HVAC system manual if airflow adjustment is required. The Evergreen EM motor is pre-programmed to auto-recognize PWM on Tap 1.

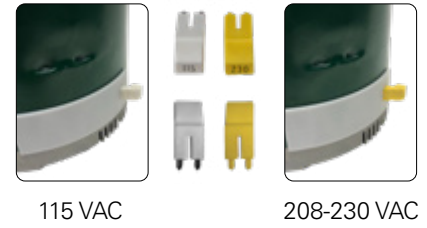
If using the information above, the motor has been adjusted to its highest airflow value and there is insufficient airflow, follow the instructions below.

- Measure the Total External Static Pressure (TESP). If it is higher than the HVAC manufacturer's guidelines, correct the airside issue.
- There will be significantly low airflow if the motor is operating in the wrong direction of rotation. See page 8 "CHANGING ROTATION."
- There will be significantly low airflow if the motor is connected to a 115 VAC power supply with the YELLOW (208-230 VAC) voltage plug installed or if no voltage plug is installed. See page 7 "ELECTRICAL CONNECTIONS AND OPERATION OVERVIEW" for information on the voltage plugs.
- Confirm the horsepower (HP) rating of the new motor matches the HP rating of the motor being replaced. If it does not, replace the motor with the correct HP rating.
- If all of the issues covered here have been corrected or ruled out and there is still insufficient airflow, please call our tech support (see page 10).

ELECTRICAL CONNECTIONS AND OPERATION OVERVIEW

This motor is designed to be operated with continuous line voltage power. This voltage powers the electronic controls and the mechanical motor. However, the motor takes its ON/OFF commands from the low voltage inputs listed below on taps 1-5.

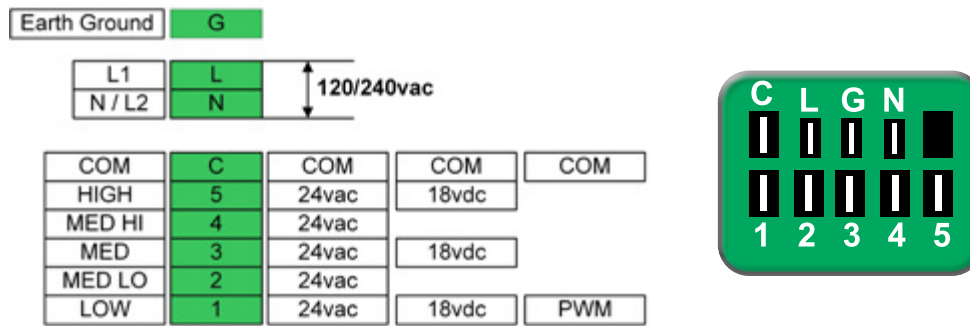
This motor can be operated at 115 VAC or 208-230 VAC. Install the voltage plug from the parts bag to match the voltage rating of the motor being replaced. For 115 VAC applications, install the WHITE plug. For 208-230 VAC applications, install the YELLOW plug.



NOTE: If the original ECM motor is rated 3/4 or 1 horsepower (HP) and is installed in a 115 VAC application, there may or may not be a power factor correction (PFC) choke wired in series with the line voltage to the motor. If applicable, this device should be left in the system as connected by the HVAC OEM.

This motor is pre-programmed to auto-recognize three different voltage/signal inputs. See the chart below.

NOTE: In PWM mode the voltage measured on the input to Tap 1 is DCV.



DIAGNOSTICS

If the motor does not operate:

The Evergreen® EM motor will only operate if it is receiving line voltage AND a low voltage input (see diagram above).

- Confirm the voltage plug installed in the motor matches the voltage rating of the application.
 - The WHITE plug should be installed for 115 VAC applications.

NOTICE: If the WHITE plug is installed and motor is operated at 208-230 VAC, the motor will fail.
 - The YELLOW plug should be installed for 208-230 VAC applications. The YELLOW voltage plug is a dummy plug. If neither voltage plug is installed, the motor will operate properly if connected to 208-230 VAC line voltage.

NOTE: Always install the YELLOW voltage plug for 208-230 applications. If the YELLOW plug is installed or neither voltage plug is installed and motor is operated at 115 VAC, the motor will not be damaged. However, the airflow will be significantly decreased.
- Measure the voltage between terminals (L) & (N). If proper voltage is not present, solve the issue with the HVAC system controls. If proper voltage is present (voltage matching the voltage plug installed), go to the next step.
- Measure the voltage between terminal (C) and the demand input to Taps 1-5. See chart above.
 - If the motor is receiving PWM input on Tap 1, the voltage measured should be equal to or greater than 2 VDC. Reference the HVAC equipment manual for the specific DCV per demand in PWM mode. See page 6 "AIRFLOW PERFORMANCE" for more information on PWM mode.
 - If the correct voltage IS NOT present, solve the issue with the HVAC system controls.
 - If the correct voltage IS present and the motor does not operate, the motor is failed. Before replacing the motor, please call our tech support (see page 10) if possible to confirm your diagnosis.

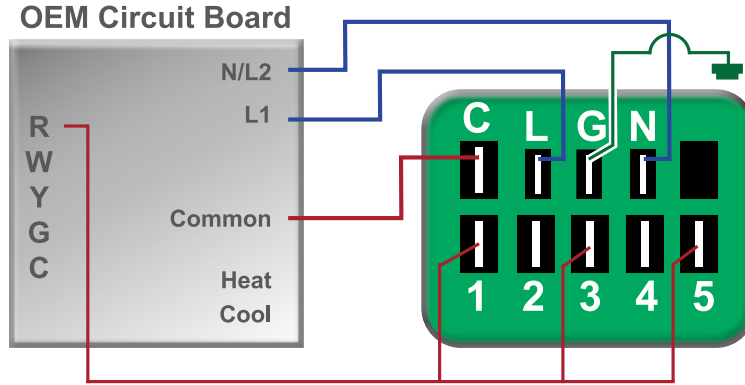
CHANGING ROTATION

If the motor has not been operating continuously for more than one minute, energize the motor and wait for it to complete the rotation sensing process described on page 6 "START-UP AND COMMISSIONING." If the motor has been operating continuously in one direction for more than one minute and is not operating in the correct direction of rotation, see instructions below.

Change rotation with onboard feature.

1. Disconnect the line voltage power to the HVAC system. **WARNING!** Using a voltmeter, confirm the power is disconnected.
2. Remove the wire(s) connected to tap numbers 1-5.
3. Create a jumper wire harness that connects taps 1, 3, and 5 only to a continuous 24 VAC power supply. Example: the thermostat R terminal.

NOTE: Do not disconnect the wires from terminals C, L, G, and N. See diagram below.



Evergreen® EM

4. Restore the line voltage power to the HVAC system.
 - Line voltage power must remain on for a minimum of 1 minute but not more than 6 minutes. Use a watch to confirm time.**NOTE:** The motor should operate during this step.
5. Disconnect the line voltage power to the HVAC system. **WARNING!** Using a voltmeter, confirm the power is disconnected.
 - The line voltage power must remain disconnected for a minimum of 1 minute. Use a watch to confirm time. During this time remove the jumper from taps 1, 3, and 5 and reinstall the wire(s) from the OEM control board to taps 1-5.
6. Restore the line voltage power to the HVAC system. Provide any demand call to confirm that the motor has now changed direction.

Change rotation with the reversing harness. The Evergreen rotation reversing harness is available wherever Evergreen products are sold, catalog # 5K016. The installation instructions are included with the part.



Rotation Reversing
Harness # 5K016

MECHANICAL INSTALLATION

The Evergreen® EM motor is built with a NEMA®* 48 (5.6" diameter) frame for installation in a belly band mount. If the motor being replaced is the same frame size and the motor mount is a belly band mount, it can be reused to mount the Evergreen EM motor.

If the existing motor mount has 4 welded legs, it is likely that the Evergreen belly band motor mount stock # 5K002 will match the bolt hole configuration.



Motor Mount
5K002

The belly band should be located on the motor between the motor vents and the dimples that identify the end of the stator stack. Do not block the vents or allow the motor mount to come in contact with the electrical connection block. The 1 HP motor is built with vents on both ends of the stator stack. The motor mount should be located between the vents on the 1 HP model.

Orient the motor in the mount so that the electrical connections are facing down or at least between the 4 and 8 o'clock position, when installed in the HVAC system. When the wires are connected to the motor, try to form a drip loop near the motor. This will help prevent moisture from running into the electrical connections.

NOTE: Center the blower wheel in the blower housing before tightening the hub locking bolt. Tighten the hub locking bolt on the flat area of the motor shaft.

EVERGREEN EM SPECIFICATIONS

Voltage: 115/208-230 VAC

- Allowable voltage range 90-132 VAC when operated with the WHITE voltage plug
- Allowable voltage range 180-264 VAC when operated with the YELLOW voltage plug

Horsepower: 1/3, 1/2, 3/4, 1

Speeds: 5/PWM

RPM: 1050 (range 600-1400)

Rotation: CW/CCW (dual rotation) rotation viewed from lead end

Bearing: Permanently lubricated ball bearing

Ambient Rating: -20°C to 55°C on 1/3 HP and 1/2 HP (non-icing conditions)
-20°C to 45°C on 3/4 HP and 1 HP (non-icing conditions)

Enclosure: Open Air Over (OAO)

Frame: NEMA®* 48 (5.6" diameter)

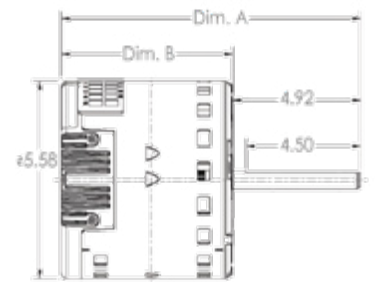
Shaft: Single, 1/2" diameter, 5" length, 4.5" single flat

Mounting: Belly band

UL Recognized Component

6 kV surge protection

STOCK	HP	VOLTS	ROTATION	RPM	MAX CURRENT	SHAFT	DIM A	DIM B
6203X	1/3	115/208-230	CW/CCW	1050	4.1/2.8	.5" x 5" (4.5" SF)	10.67"	5.74"
6205X	1/2	115/208-230	CW/CCW	1050	6.4/4.1	.5" x 5" (4.5" SF)	10.91"	5.99"
6207X	3/4	115/208-230	CW/CCW	1050	8.4/6.0	.5" x 5" (4.5" SF)	11.41"	6.49"
6210X	1	115/208-230	CW/CCW	1050	12.2/9.0	.5" x 5" (4.5" SF)	12.45"	7.53"



TECHNICAL SUPPORT

Contractor Hotline (1-866-503-8566)

Hours M-F 8am-5pm CST

Technical support is available for Evergreen products that are installed or serviced by trained and qualified technicians familiar with the Evergreen EM motor and the HVAC system into which it will be installed.

For more information about Evergreen EM motors, scan this code with your smart phone or go to:

www.EvergreenEM-motors.com



Terms & Conditions of Sale & Limited Warranty

Sales of the products described in this Installation Manual are subject to the "Regal Rexnord Terms and Conditions of Sale" current at the time of sale. They are accessible on RegalRexnord.com – <https://www.regalrexnord.com> (click "Terms and Conditions of Sale").

The full Limited Warranty, including the scope and period, remedies, exclusions and disclaimers, is described in Section 10 "Limited Warranty" of the Regal Rexnord Terms and Conditions of Sale and applies except as described below:

Section 10(a)(1) is replaced with the following: Seller warrants that the Products shall be delivered free from defects in material, workmanship and title. This warranty shall expire twenty-four (24) months from first use of the Product or thirty (30) months from date of shipment of the Product, whichever occurs first.