


# RESCUE EcoTech® Motor

## Installation Guide

Nidec Motor Corporation

For Technical Assistance or Questions
Related to Your RESCUE EcoTech® Motor,
Call the RESCUE EcoTech Motor Hotline:

**1-888-540-5540**

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## About the RESCUE EcoTech® Motor

The RESCUE EcoTech® Motor is a high efficiency, direct-drive blower motor replacement for PSC blower motor applications. The RESCUE EcoTech® motor provides an easy drop-in solution for a wide variety of applications with no system control changes and minimal wiring modifications.

With Nidec's exclusive speed control technology, the RESCUE EcoTech® motor connects just like a PSC while providing the efficiency and comfort benefits of an electronically controlled motor.

- High Efficiency - Up to 82% efficient.
- 5 Speeds - Including a low 600 RPM circulate speed.
- Drop-in Installation - Connects directly to PSC controls, no complex wiring modifications or signal wires required.


## Features

- 82% efficient ECM design
- Easy installation to control board
- Easy-to-use voltage change device
- Reversible rotation
- No capacitor required
- Class B insulation
- 40°C ambient rated
- Electronically protected motor
- 36” leads
- Belly-band mounting
- Ball bearings

# General Information

## Enclosed Materials

- RESCUE EcoTech® Motor
- 5 Speed Connector and Harness
- Reversing Connector and Harness
- "Y" - Harness Adapter
- RESCUE EcoTech® Motor Installation Guide
- RESCUE EcoTech® Motor System Label
- 115V Voltage Change Plug

## Initial Inspection

- The shaft should turn freely by hand.
- Check the nameplate to verify that data conforms to specifications of the motor ordered.

## Storage

- The motor should be stored indoors in a clean, dry location.
- Proper selection, installation, and maintenance will assure long life and dependable service.

**WARNING**

Use only specially designed motors where explosive atmospheric hazards exist. See the National Electric Code (NEC), Article 500, or check with local codes agency for an explanation of hazardous or classified atmospheres and locations. Unless the motor is specifically marked "ELECTRIC MOTOR FOR HAZARDOUS LOCATIONS", it is not suitable for use in Class I or II hazardous locations as defined by the NEC.

**NOTICE**

**Use motors only in the applications that they are designed for.**

- The RESCUE EcoTech® motor is designed for direct-drive centrifugal blower applications only.
- The RESCUE EcoTech® motor is designated for continuous, air-over duty. As such, the motor must be mounted in the air stream of an air moving device, such as a fan. Do **NOT** operate the RESCUE EcoTech® motor outside of the air stream as that may overheat and damage the motor.
- The temperature around the motor should not exceed 104°F (40°C), or be less than -20°F (-29°C).

## Safety Requirements

**WARNING**

**SHOCK HAZARD.**

To reduce the risk of electrical shock, do **NOT** separate motor and control unit while motor is in operation.

**WARNING**

**SHOCK HAZARD.**

To reduce the risk of fire or electrical shock, do **NOT** expose the motor or control unit to rain or moisture.

- Only trained and qualified professionals familiar with RESCUE EcoTech® motors should install or service the motor and control unit.
- Before connecting or disconnecting cables or other electrical connections, verify that electrical power is shut off to the system. Failure to comply may cause serious damage to the motor, HVAC system, or injury to personnel.
- Always check testing equipment for proper operation before use.
- Do **NOT** operate the motor without the blower wheel attached. Without the blower wheel, the motor will run continuously to a maximum speed and then may stop and restart operation.
- Do **NOT** use this motor in locations where explosive vapors, or airborne dusts are present (NEC Classifications I & II). Use only totally enclosed motors in NEC Class III locations, where airborne lint, fiber, or flyings are present.
- Do **NOT** connect 230V to a motor connected for 115V.

# Motor Installation

**WARNING**

- These instructions provide field technicians with a guide for installing a RESCUE EcoTech® motor and are intended for a typical air handler/ furnace equipment system. It does not override or replace instructions suggested by the manufacturer of the HVAC system.
- All aspects of the installation must conform to the requirements of the NEC, including Article 430 (Motor Circuits and Controllers), and all applicable local and national codes.
- It is good practice to label all wires and connectors prior to disconnection. Wiring errors can cause significant damage to equipment or serious injury or death. Verify proper operation after servicing.

**To prevent electric shock, personal injury, or death, turn OFF electric power at the disconnect or the main service panel before making any electrical connections.**

## Removing the PSC Motor

1. Disconnect the main power to the HVAC system.
2. Label wires and connectors between the motor and equipment control board. Also, note existing PSC equipment system settings:
   - Motor lead connections to system control board
   - Equipment system voltage (115V or 230V)
   - Blower motor HP (nameplate)
   - Motor amp rating (nameplate)
   - Blower wheel rotation direction (nameplate)
   - Motor mounting configuration
3. Disconnect the existing motor wiring harness from the control board.
4. Remove the blower assembly from the HVAC equipment. Refer to the manufacturer's installation manual for blower removal instructions.
5. Remove the mounting bracket, old motor, and capacitor (if applicable) from the blower assembly.

## Installing the RESCUE EcoTech® Motor

**NOTICE**

The motor must be securely fastened to minimize noise and prevent vibration. For secure mounting, use high-quality bolts of the largest possible diameter.

**CAUTION**

Do **NOT** strike the motor shaft with a hammer or other kind of tool. This may cause serious damage to the bearings.

**Important:** Verify that the RESCUE EcoTech® motor is of an equivalent horsepower and voltage rating as that of the prior PSC motor.

1. Install the RESCUE EcoTech® motor using a belly-band style mounting bracket. If the RESCUE EcoTech® motor is replacing a motor mounted by Flex (Torsion) mounting or Hub Ring mounting, the Kit #44 Flex Mounting Kit will allow easy installation of the RESCUE EcoTech® Motor in most applications.

**If the OEM Blower Motor is mounted with:**

Flex (Torsion) Mounted PSC Motor

or

Hub Ring Mounted PSC Motor

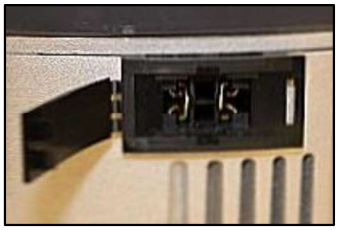
use

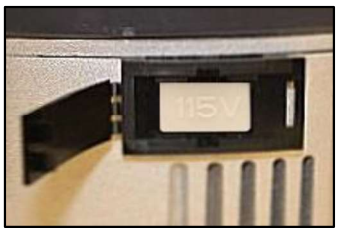
Catalog #44 Flex Mount Kit

**Important:** To minimize the chance of moisture entering the motor through the connector, the motor should be installed with the wire harness exit as shown in Figure 1.

Figure 1

2. Set the voltage on the Rescue EcoTech® motor to match that of the replaced PSC motor. The motor ships connected for 208-230V systems. If 115V is required, disconnect electrical power to the motor and locate the voltage change device as shown below. Open the "door" marked "230V" by unlatching the right side and remove the door. Locate the 115V plug in the accessory bag. Insert the 115V plug into the mating connector.



3. Position the blower wheel on the motor shaft so it is properly centered in the blower housing and tighten the blower wheel set screw.
4. Connect the 5 speed and reversing harness to the motor connector as shown in Figure 2. See page 14 for the positioning of the reversing connector to specify rotation.

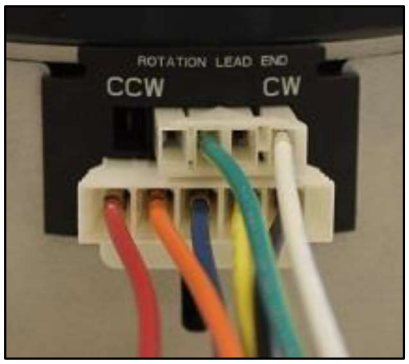



Figure 2

5. Connect the ground wire (Green lead) to the metal blower housing using a sheet metal screw.
6. Install the blower assembly back into the HVAC equipment.
7. Connect the supplied wiring harness to the system control. Use the motor lead connections comparable to the existing PSC lead connections as outlined in the Connecting the RESCUE EcoTech® Motor section (page 12).
8. Verify that airflow meets the OEM equipment specifications in all modes of operation.
9. Place the RESCUE EcoTech® motor decal (Figure 3) on the outside of the furnace or air handler, noting the date of installation and providing relevant contact information.

**The RESCUE EcoTech®** motor is an electronically controlled, high efficiency blower motor that connects directly to standard PSC controls featuring:

- Up to 75% improvement in energy efficiency compared to conventional PSC blower motors
- Low 600 RPM fan speed continuously circulates the air quietly and efficiently, supporting improved filtration and temperature control

Upon energizing a speed tap, it is normal for the motor to experience a 2 to 3 second delay before beginning operation and take 10 to 15 seconds before reaching full speed.

**For Questions or Concerns visit:**

http://acim.nidec.com/motors/usmotors/industry-applications/hvac/hvac-rescue-motors

or

Call our RESCUE EcoTech Hotline: **1-888-540-5540**

This unit upgraded with a

RESCUE EcoTech

**High Efficiency Blower Motor**

**Installed as HP:** _____

**Installed Voltage:** _____

**Date of Installation:** _____

Figure 3

## Connecting RESCUE EcoTech® Motor

Connect the leads from the RESCUE EcoTech® motor to the system control board using the wiring diagram below (Figure 4). Connect the speed taps using similar speeds as noted when removing the PSC blower motor.

For various methods of connecting the RESCUE EcoTech® motor's low circulation speed, refer to the Continuous Fan Options section (page 15). If further adjustment of the motor speed is required after checking the airflow, refer to the Adjusting Speed Settings section (page 14).

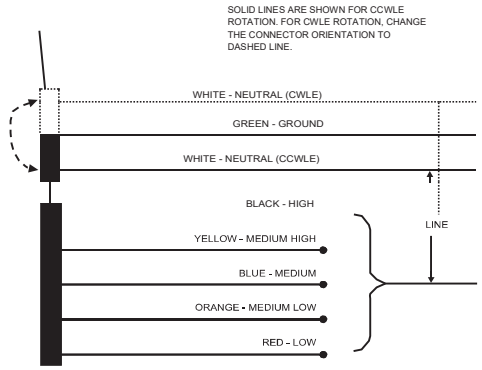



Figure4

**Note:** Lead colors on PSC motors can vary depending on the system and motor manufacturer. Refer to the OEM motor label or system documentation to determine the original speed connections.

| Rescue EcoTech# | Motor HP | Cooling | Heating | Cont. Fan |
|---|---|---|---|---|
| 5552ET | 1HP | High | Med-Hi | Low |
| | 3/4HP | Med-Hi | Med | Low |
| | 1/2HP | Med | Med-Low | Low |
| 5542ET | 3/4HP | High | Med-Hi | Low |
| | 1/2HP | Med-HI | Med | Low |
| | 1/3HP | Med | Med-Low | Low |
| 5532ET | 1/2HP | High | Med-Hi | Low |
| | 1/3HP | Med-HI | Med | Low |
| | 1/4HP | Med | Med-Low | Low |
| 5522ET | 1/3HP | High | Med-Hi | Low |
| | 1/4HP | Med-Hi | Med | Low |
| | 1/5HP | Med | Med-Low | Low |

For typical applications, select the EcoTech motor and HP replacement you want to install. Select the suggested speed taps from the wire harness for your cooling and heating speeds. For constant fan / circulation, use the low (Red) speed tap.

For technical assistance, call the Rescue EcoTech help line at 888-540-5540.

# Motor Operation

## Starting the Motor

**WARNING**

**Electric Shock Hazard!**
The motor must be properly grounded.

Once installed, briefly test the Motor operation in all system modes. Check for unusual noises and vibration (see Troubleshooting, page 22).

Upon energizing a speed tap, it is normal for the motor to experience a 2 to 3 second delay before beginning operation and take 10 to 15 seconds before reaching full speed.

Check motor amperage. Amp reading at the highest speed setting should be within 10% of the nameplate specification.

**NOTICE**

For air moving applications, all enclosure covers and panels must be in place before measuring the amperage.

## Operating the Motor

**WARNING**

Be careful when touching the exterior of an operating motor! The motor may be hot enough to cause serious injury. This condition is normal for most motors when operated at rated load and voltage.

A motor should **NOT** be operated under conditions that cause the motor protection to continually operate. The motor may be overloaded or the supply voltage or frequency may be incorrect.

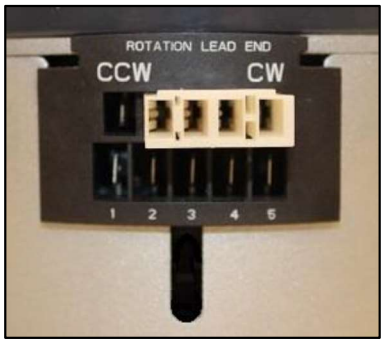
Actual operating speed is determined only with the load applied. In general, if the motor is properly sized and connected to its load, there will be a detectable speed difference when different speed taps are energized. However, when operating the motor without a load, the motor will run continuously to a maximum speed and then may stop and restart operation.

## Checking Operation

Verify that the correct airflow is present in all operating modes. Verify that temperature rise measurements in all operating modes conform to the specifications provide by the original equipment manufacturer. If not, refer to the Adjusting Speed Settings section.

If the motor operates at high speed with very little or no airflow, the motor may be rotating the wrong direction. Disconnect electrical power to the furnace or air handler. Then, flip the motor direction connector (Figure 5).


Counter Clockwise Rotation




Clockwise Rotation

Figure 5
Note: Wire leads have been omitted for clarity.

## Adjusting Speed Settings

The motor lead connections should be comparable to the existing PSC motor lead connections. If an adjustment is needed to meet the airflow requirements outlined by the system OEM, adjust the leads connected until correct airflow is met.

If the motor operates at the same speed on the lower speed connections as on the highest speed, the motor may be under loaded and therefore reaching the maximum speed limit. Continue choosing a lower speed lead to obtain the correct airflow for each operating mode. Many OEM motors are stronger than the HP label indicates. An usual combination of the amp draw and capacitor size can be an indicator of this.

## Measuring Temperature Rise

Temperature rise is a calculated difference between the temperatures in the supply air outlet and the return air inlet of the HVAC system. The temperature reading should be taken inside of the return air and supply air ducts as close to the HVAC system as possible. If there is no access to the ductwork, then take the measurement in a return and supply grill closest to the HVAC system. Refer to the furnace/air handler manufacturer's rating plate for temperature rise specifications.

**CAUTION**

To prevent damage to HVAC system, verify temperature rise is within OEM specifications in all operation modes.

**Example:**

A furnace rating plate specifies a temperature rise of 35°F (19°C) to 55°F (31°C) and the actual measured rise is 60°F, the blower speed will need to be increased to reduce the temperature rise.

If the temperature rise is below the lower limit specified on the rating plate, decrease the blower speed to increase the temperature rise.

## Continuous Fan Options

The RESCUE EcoTech® motor's low speed connection is designed to operate at approximately 50% of the full load speed, providing efficient continuous fan operation with low noise or draft.

### System Controls Featuring a Discrete Fan Speed:

Some system control boards provide a connection point (Figure 6) to operate the fan in a mode other than heat or cool. In these instances, connect the Low speed motor lead (Red) to the appropriate provided connection point. Fan operation can be controlled by the user from the thermostat.

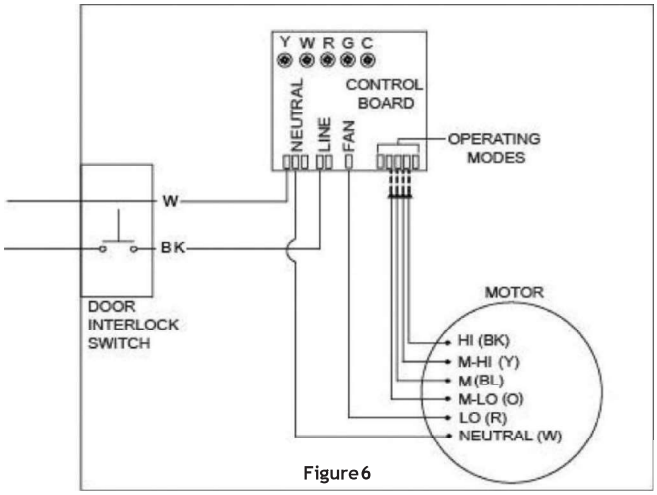



Figure 6

**Note:** The diagram is for illustration purposes. Actual connections and components will vary depending on system type and manufacturer.

## System Controls with No Discrete Fan Setting:

The RESCUE EcoTech® motor allows the low speed connections to be energized at the same time as a higher speed connection, operating at the higher speeds. This feature allows use of the low circulate speed, even if the furnace or air handler system control board is not equipped with a dedicated fan mode connection point.

The following are three different methods of operating the motor in continuous fan mode without a fan mode connection point on the system control board. A special "Y"-harness adapter has been supplied with the RESCUE EcoTech® motor to facilitate connection of the lowest speed setting. All three options below use the "Y"-harness adapter to provide the low circulation speed in systems when no dedicated continuous fan speed connection is available.

**NOTICE**

Connect only the Low speed motor lead to the Red lead of the "Y"- harness adapter. Do **NOT** connect any of the higher speed motor leads to the harness. Do **NOT** connect the Red lead of the "Y"-harness adapter in line with the system power supply. Doing this may result in permanent damage to the "Y"-harness adapter itself.

**See the following pages for examples of wiring in the motor this way.**

**Option 1: Connecting directly to the system power supply:**

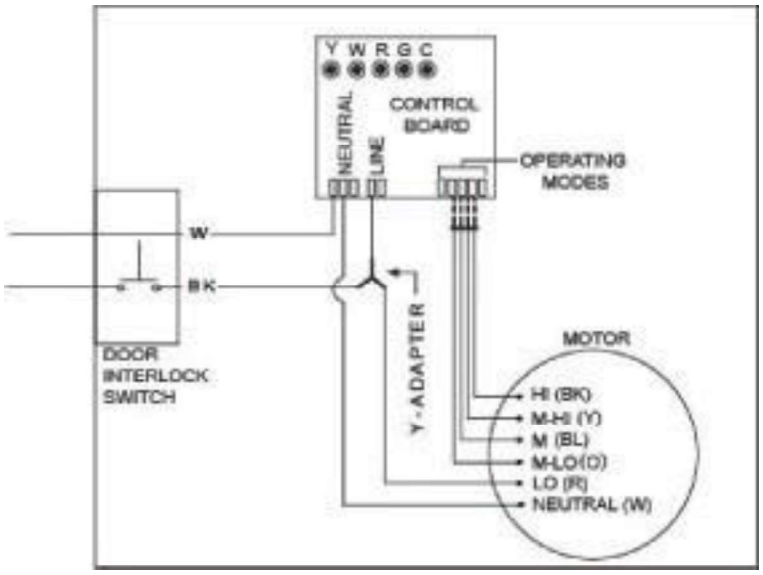



Figure 7

**Note:**

Using the supplied "Y"-harness adapter, connect the Low speed (Red) motor lead in parallel to the lead supplying electrical power to the system control (Figure 7).

The black leg of the "Y"-harness adapter should be connected in line with the power supply to the control board. The Red lead of the harness should be connected to the Low speed (Red) lead from the motor.

- Safety protection should **NOT** be disabled in this configuration, i.e., the door interlock switch.
- In this configuration, the blower motor will operate continuously at low speed any time electrical power is supplied to the system until a higher speed connection is energized.

**Option 2: Installing an external switch in series with low speed motor lead:**

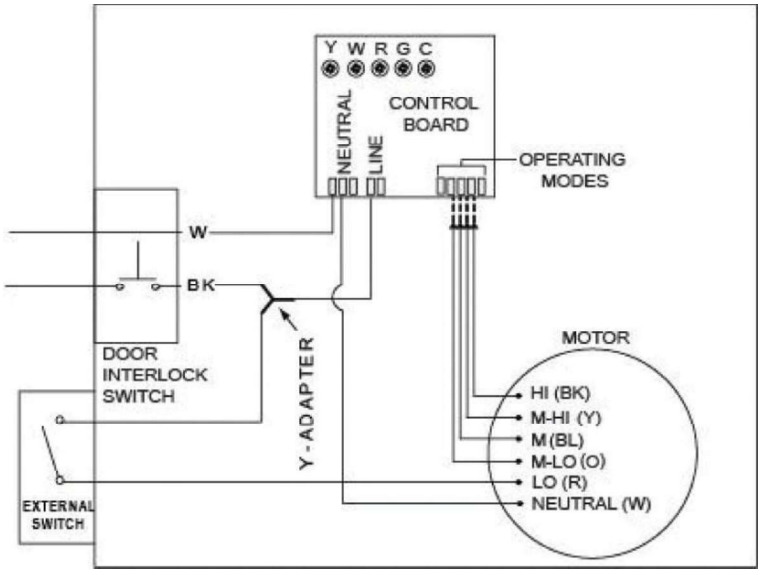



Figure 8

**Note:** The diagram is for illustration purposes. Actual connections and components will vary, depending on the system type and manufacturer.

Using the supplied "Y"-harness adapter, connect the Low speed (Red) motor lead in parallel to the lead supplying electrical power to the system control (Figure 8).

The black leg of the "Y"-harness adapter should be connected in line with the electrical power supply to the control board. The Red lead of the harness should be connected to the Low speed (Red) lead from the motor with a switch mounted in series with the Low speed lead.

- Safety protection should **NOT** be disabled in this configuration, i.e., the door interlock switch.
- The switch should be a 15Amp, UL rated device mounted to the equipment system housing.
- In this configuration, the continuous fan operation may be enabled/ disabled by the user at the external switch. When enabled, the blower motor will operate continuously at low speed any time electrical power is supplied to the system until a higher speed connection is energized. The fan switch should remain on "Auto".

**Option 3: Install a 24V relay connected to the thermostat G wire:**

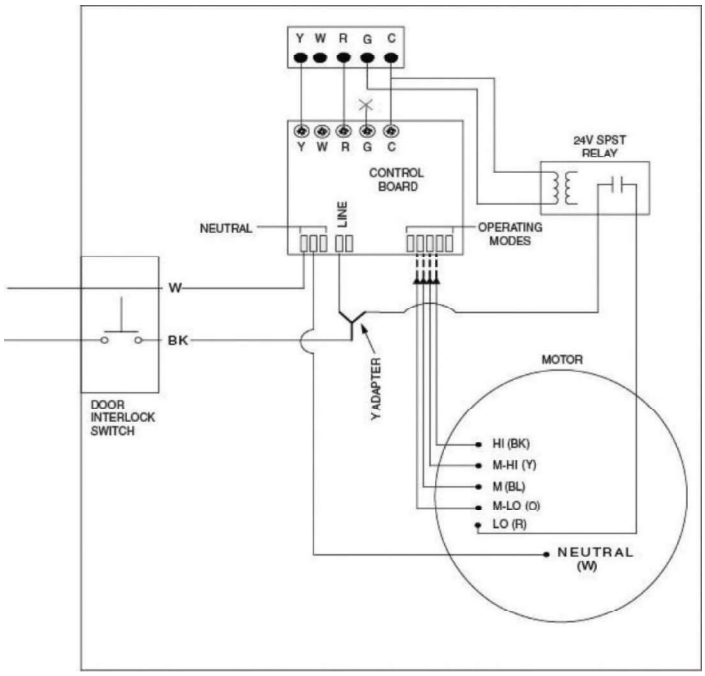



Figure 9

**Note:** The diagram is for illustration purposes. Actual connections and components will vary depending on system type and manufacturer.

Using the supplied "Y"-harness adapter, connect electrical power to the system control board and relay. Connect the Low speed motor lead to the relay (Figure 9).

The black leg of the "Y"-harness adapter should be connected in line with the electrical power supply to the control board. The Red lead of the harness should be connected to the relay.

- Safety protection should **NOT** be disabled in this configuration, i.e., the door interlock switch.
- The green 24V wire should remain disconnected from the system control board.
- In this configuration, the continuous fan option is enabled/disabled at the thermostat. You can switch the fan on or auto as desired, or program the fan to be on for different modes and times as the programmable thermostat is configured.

## NOTICE

- Voltage, frequency, and the number of power supply phases must correspond to that shown on the motor nameplate. If the number of phases is not shown on the nameplate, the motor is single phase. Voltages that are too low can reduce the performance of the motor.
- Insulate all connections carefully to prevent grounding or short circuits. Reinstall all conduit and terminal box covers. Do **NOT** force connections into the conduit box.
- Multi-Speed Fan Motors may have leads that will not be used. Exposed terminals or copper wire of these unused lead ends must be individually insulated. In addition, bare wire ends must **NOT** be connected to either of the leads where voltage will be applied.
- Any switching device used to control a motor must have a horsepower rating equal to or greater than the motor.
- An electronic adjustable speed control must **NOT** be used with the RESCUE EcoTech® motor.

## CAUTION

- The motor must be securely and adequately grounded by wiring with a grounded metallic conduit, or other grounding method approved by the NEC and local codes.
- Voltage and moving parts around motors and motor driven equipment can cause serious or fatal injuries. Turn **OFF** electrical power before connecting or servicing the motor.

## Final Checks

- Check the mounting and fastening of the motor and control unit. Make sure the control unit and motor are securely attached together and mounted tightly in HVAC system.
- Check control unit connectors. Inspect for shorts, detached wiring, or loose connections.
- Check all wiring harness connections. Make sure they are securely connected to control unit connectors.
- Check the blower motor and verify wheel rotation. Make sure it spins freely manually without effort or assisted means in both directions. Verify that the set screw on blower wheel has been properly tightened.
- Check that all leads have been properly connected to the control board and any unconnected leads are properly insulated and secured.
- Check the circuit breaker.

| Symptom | Possible Causes | Corrective Action |
|---|---|---|
| Motor fails to start | Blown fuses | Turn off motor. Replace fuses with time a delay type. If the problem persists, contact a qualified technician. |
| | Incorrect voltage | Verify that motor voltage matches the system voltage. |
| | Improper connections | Turn off motor. Verify connections. |
| | Blower wheel obstruction | Verify that the blower wheel is not in contact with the blower housing. Re-adjust the blower wheel position on the motor shaft. |
| Motor does not come up to full speed | Not applied properly | Call a service technician. A larger HP motor may be required. |
| Motor stalls during operation | Overloaded motor | Reduce the load or replace the motor with one of a higher HP rating. |
| Motor vibrates or is excessively noisy | Loose or defective fan | Turn off motor. Tighten the fan set screw or replace the fan. |

Here is the Tap Hierarchy when two taps are energized at the same time.

| Taps Energized | Runs at Tap |
|---|---|
| 1-2 | 2 |
| 1-3 | 3 |
| 1-4 | 4 |
| 1-5 | 5 |
| 2-3 | 2 |
| 2-4 | 5 |
| 2-5 | 5 |
| 3-4 | 4 |
| 3-5 | 4 |
| 4-5 | 4 |

**For Technical Assistance call the Hotline: 1-888-540-5540**

## Maintenance

**WARNING**

Before performing any maintenance, disconnect electrical power and allow the motor to come to a complete stop. This will allow the capacitors to discharge any residual voltage, if any, for safety.

- Periodically inspect the installation. Check for dirt accumulation, unusual noises or vibration, overheating, worn or loose couplings, high motor amps, poor wiring or overheated connections, loose mounting bolts or guards, and worn motor starter contacts. Check control unit connectors. Inspect for shorts, detached wiring, or loose connections.
- Remove dirt accumulation, particularly in and around the vent openings, by vacuuming. Dirt accumulation can cause motor overheating and is a fire hazard.
- Do **NOT** use solvents! Some solvents may attack motor insulation, finish, or bearing lubricants. Solvents are highly flammable.
- Ball bearing motors are permanently lubricated. No maintenance is required.

## Warranty Information

**LIMITED WARRANTY**

Nidec Motor Corporation ("Nidec"). extends the following LIMITED WARRANTY to the purchaser and to its customers (collectively referred to as the "Purchaser") of the enclosed motor and components: the motor and components are free from defects in materials and workmanship under normal use, service and maintenance FOR A PERIOD OF 24 MONTHS FROM THE DATE OF ORIGINAL PURCHASE FROM NIDEC OR THE NIDEC DEALER/RETAILER, NOT TO EXCEED 30 MONTHS FROM THE DATE OF MANUFACTURE BY NIDEC. THE FOREGOING WARRANTY IS THE ONLY WARRANTY GIVEN AND NO OTHER WARRANTY IS PROVIDED, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Certain aspects of disclaimers are not applicable to consumer products, i.e., motors and components acquired by individuals and used for personal, family or household purposes (as distinguished from industrial or other purposes). Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

Certain repairs or services are the responsibility of the Purchaser and the Purchaser is expected to pay for them. This warranty does not extend to any losses or damages due to misuse, accident, abuse, neglect, negligence, unauthorized modification or alteration, use beyond rated capacity, or improper installation, maintenance, application or use, including, without limitation, use in a manner contrary to the accompanying instructions or applicable codes.

If within thirty (30) days after Purchaser's discovery of any warranty defects within the above stated warranty period, Purchaser notifies Nidec or the dealer from whom the motor was purchased in writing, Nidec shall, at its option and as Purchaser's exclusive remedy, repair or replace or refund the purchase price for, that portion of the motor and components found by Nidec to be defective. Failure by Purchaser to give such written notice within the applicable time period shall be deemed an absolute and unconditional waiver of Purchaser's claim for such defects. Purchaser must write or call the dealer from whom the motor was purchased for directions regarding the shipment of the motor, with freight prepaid by the Purchaser, to an authorized service location for warranty service. If Purchaser is unable to contact the dealer to obtain sufficient instructions regarding the handling of the motor, Purchaser should write Nidec at the address below, giving the motor model number, the dealer's name, address and number of dealer's invoice; and describing the nature of the alleged defect. Arrangements for warranty service will then be made by Nidec.

If the motor is damaged in transit, Purchaser should file a claim directly with the carrier. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL NIDEC'S LIABILITY TO PURCHASER OR ITS CUSTOMER EXCEED THE PRICE PAID BY PURCHASER FOR THE SPECIFIC MOTOR OR OTHER GOODS PROVIDED BY GIVING RISE TO THE CAUSE OF ACTION. IN NO EVENT SHALL NIDEC'S LIABILITY TO PURCHASER OR ITS CUSTOMER EXTEND TO INCLUDE INCIDENTAL CONSEQUENTIAL OR PUNITIVE DAMAGES. WITH RESPECT TO CONSUMER PRODUCTS, SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

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Nidec Motor Corporation