# FLEX13 Motor

## Installation Guide

Read the entire manual prior to installation of the FLEX13 motor.
Follow instructions contained therein.

**Replacement Components**

B7181600S

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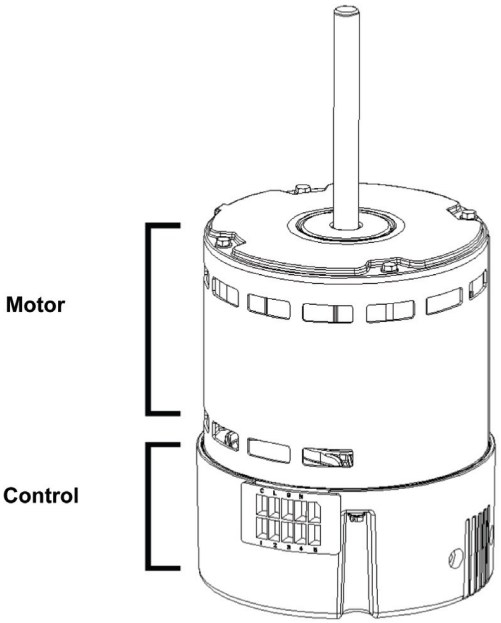
# About the FLEX13 Motor

The FLEX13 Motor is a high efficiency variable speed replacement motor for Electronic Commutated Motor (ECM) applications. This motor will enable the homeowner to continue to enjoy many of the benefits of variable speed motors.

**Features:**

- Energy-efficient ECM design
- Easily integrated in high SEER applications
- Multi-speed operations with five, 24 Volt-programmable taps
- Designed as a replacement for SelectTech® and X13® motors.*
- Automatically determines rotation direction using rotation sensing technology

*SelecTech® is a registered trademark of Nidec Motor Corporation.
*X13® is a registered trademark of Regal-Beloit Corporation.



# General Information

## Materials Enclosed

- FLEX13 Motor
- FLEX13 Motor Installation Guide
- FLEX13 Motor Warranty Statement

## Initial Inspection

Check the motor to verify that:

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

**WARNING**

Use only specially designed motors where explosive atmospheric hazards exist. See the National Electrical Code (NEC) Article 500 or check with local codes for 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**

**The FLEX13 motor may look visually different from the motor it is replacing.**

The FLEX13 motor is designed as a replacement for SelecTech® and X13® motors. It's external appearance is not an exact replica of the motor it is replacing; however, when properly installed, FLEX13 motor will fit in the blower housing and function according to specifications.

**Handling & Care**

- Motor should be stored indoors in a clean, dry location.
- Proper selection, installation and maintenance will assure longer life and more dependable service.

## NOTICE

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

- The FLEX13 motor is designed for direct-drive centrifugal blower applications only.
- The FLEX13 motor is designated for continous, air-over duty, and must be mounted in the air stream of an air moving device, such as a fan. DO NOT operate the FLEX13 motor outside of the air stream as that may overheat and damage the motor.
- Temperature around the motor should not exceed 104° F (40° C) or be less than -20° F (-29° C).

## WARNING

**SHOCK HAZARD.**

- **Do NOT expose the motor or control unit to rain or moisture.**
- **Do NOT separate the motor and control unit while the motor is in operation.**

## WARNING

- Only trained and qualified professionals familiar with ECM products should install or service the motor and control unit.
- Before connecting or disconnecting cables or other electrical connections, verify power is shut off to the system. Failure to comply may cause serious damage to the motor or HVAC system or injury to personnel.
- Always check testing equipment for proper operation before use.
- Do not operate the motor without 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 Class I & II). Use only totally enclosed motors in NEC Class III locations where airborne lint or fiber flyings are present.
- Do not connect 230v power to a 115v motor or 115v power to a 230v motor.
- All aspects of the installation must conform to the requirements of the NEC, including Article 430 (Motor Circuits and Controllers), and all local codes.

## WARNING

**Safe installation, operation and maintenance must be performed by qualified personnel.**

Familiarization with and adherence to the NEC, National Fire Protection Association (NFPA) standards and local codes are required. It is important to observe safety precautions to protect personnel from possible injury. Personnel should be instructed with respect to handling each of the following:

- Insulate all connections carefully to prevent grounding or short circuits. Reinstall all conduit and terminal box covers.
- Make sure the unit is electrically grounded and that electrical installation, wiring, and controls are consistent with local and national electric codes. Refer to “National Electrical Code Handbook” & NFPA No. 70. Employ qualified electricians.
- Code requirements differ from state to state. Install equipment in accordance with applicable codes and ordinances in your area and in accordance with the NEC. All electrical connections should be made and maintained by a qualified or licensed electrician.
- Avoid contact with energized circuits or rotating parts.
- These instructions provide field technicians a guide for installing a FLEX13 motor and are intended for a typical air handler furnace equipment system. THESE INSTRUCTIONS DO NOT OVER RIDE OR REPLACE ANY INSTRUCTIONS PROVIDED BY THE HVAC SYSTEM MANUFACTURER.

# Motor Installation

**WARNING**

Always disconnect electrical power at the fuse box or circuit breaker before handling electrical connections or performing maintenance on this unit. Allow the motor to come to a complete stop. Double check to make sure power is OFF, and that it cannot be turned ON while you are working on the equipment. Wait 4 minutes before handling the wiring harness. This allows the bus capacitors to fully discharge.

**WARNING**

A poor electrical connection can overheat and cause terminal and/or terminal board failures. Because of this possibility, wiring harness quick-disconnect terminals should be examined carefully for any signs of physical deterioration or loose fit to the terminals on the motor terminal board.

## STEP 1:
## Turn OFF Power

1. These instructions provide field technicians a guide for installing a FLEX13 motor and are intended for a typical air handler/furnace equipment sytem. THESE INSTRUCTIONS DO NOT OVERRIDE OR REPLACE INSTRUCTIONS BY THE HVAC SYSTEM MANUFACTURER.

**WARNING**

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

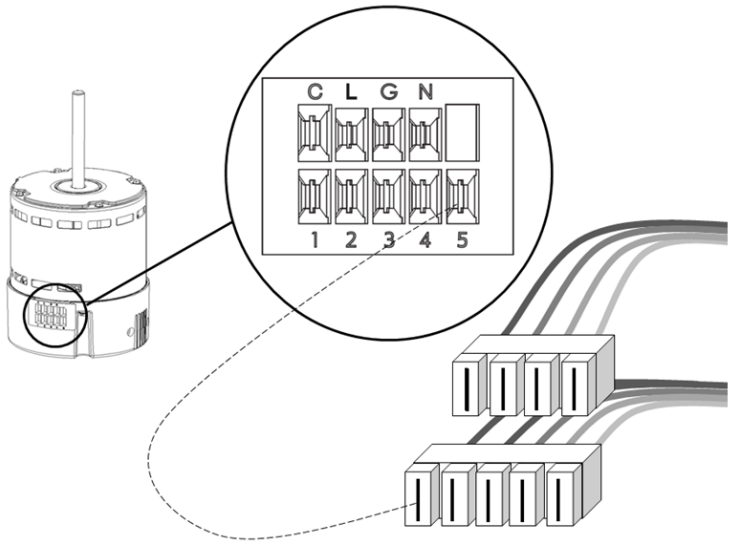
## STEP 2:
## Remove the blower housing from the HVAC equipment

1. Disconnect the furnace wiring harness to the motor.
2. Remove the blower housing from the air handling unit. Refer to the manufacturer's installation manual for blower removal instructions.

## STEP 3:
## Locate and verify connector

1. Connect the furnace wiring harness to the FLEX13 replacement motor to ensure proper fit, aligning it as shown in Figure 3.
2. Disconnect the furnace wiring harness from the new motor and set aside.

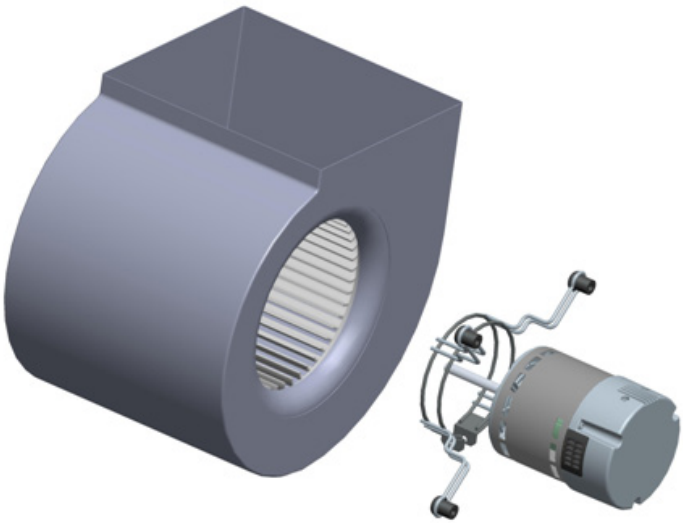
### Figure 3



## STEP 4:
## Remove the original ECM motor from its belly-band mounting bracket

1. Loosen the set screw on the motor shaft.
2. Remove the screw that secures the belly-band mounting bracket to the original motor and set aside.
3. Remove the original motor from the belly-band.
4. Verify that the FLEX13 motor has the same horsepower and voltage rating as the original ECM motor.

### Figure 4



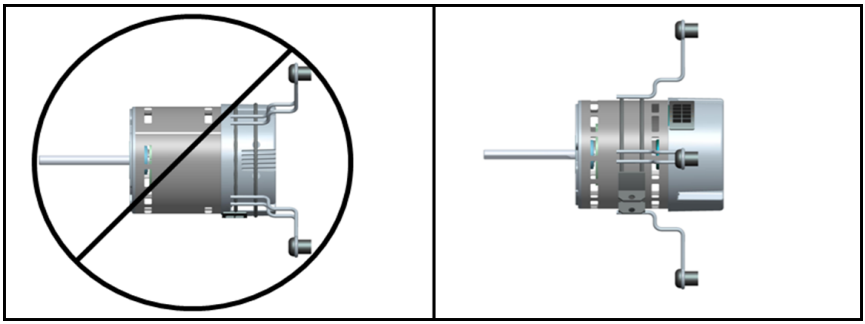
## STEP 5:
## Install the FLEX13 replacement motor in the belly-band

1. Insert the FLEX13 motor into a belly-band style mounting bracket. The belly band can be positioned anywhere on the motor shell EXCEPT the end bell (control). The preferred position is at the midpoint between the vents (See Figure 5).

**NOTICE**

The FLEX13 motor can be installed on the mounting bracket used with the original ECM motor.

### Figure 5



**NOTICE**

Placing belly-band on control housing can damage the motor.

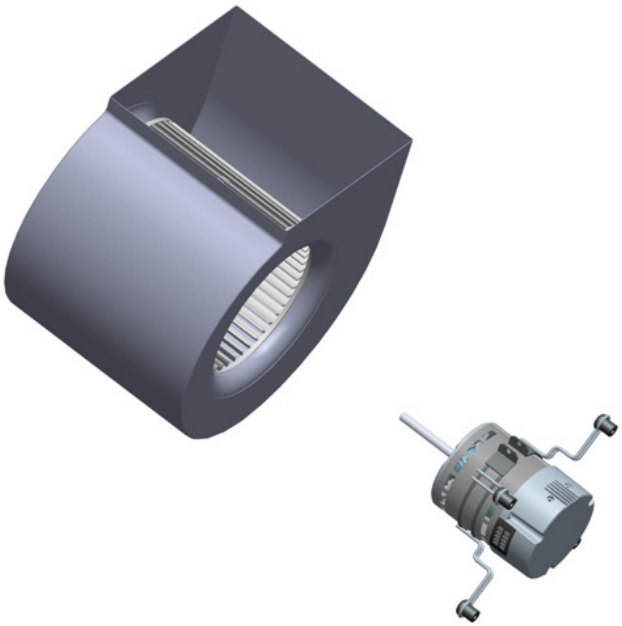
2. Secure the bracket to the motor by tightening the bracket mounting screw.

**NOTICE**

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

## STEP 6:
## Install the FLEX13 motor in the air handling unit

1. Insert the motor shaft into the blower wheel, securing the motor to the blower housing with the connector at the 6 o'clock position.
2. Align the blower wheel so it is properly centered in the blower housing, aligning the wheel's set screw to the flat of the motor shaft.
3. Secure the blower wheel to the motor shaft by tightening the set screw to a torque setting of 157 in-lbs.



## STEP 7:
## Install the blower assembly back into the HVAC equipment

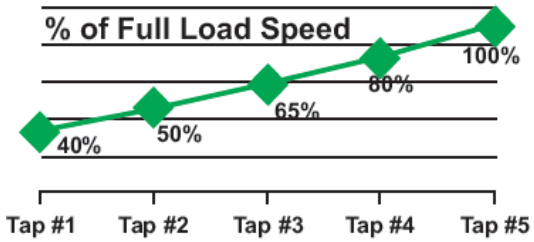
1. Follow the manufacturer's installation manual for blower installation instructions.
2. Plug the furnace wiring harness into the replacement motor.

## STEP 8:
## Wiring

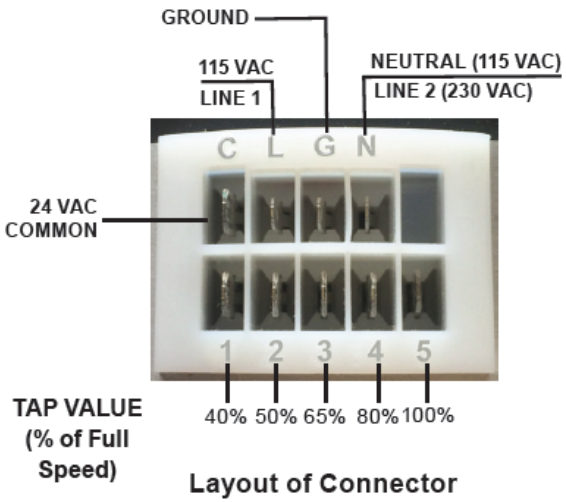
The FLEX13 EC blower motor has been preprogrammed with 5 discrete speed settings designed to provide contractors with a FLEX13ible aftermarket solution for replacing X13 and SelecTech constant torque EC Blower motors. The FLEX13 speed profiles are NOT a direct OEM replacement. The speed at each tap may vary from the original OEM motor.

### Adjusting Speed Taps During Installation

- Each motor has 5 taps programmed to a specific speed
  - The speed increases from low to high moving across taps 1 through 5. Each tap increases speed by approximately 10% to 20%.




**Speed Profile of FLEX13 Motor**
Note: Some OEMs set the speed values in reverse order, High to Low, 1 thru 5)




Layout of Connector

- Adjustment to airflow can be achieved by selecting the next higher or lower tap number.

**Notice:** ***Verify airflow meets OEM equipment specification in all modes of operation.***_Temperature rise is a calculated difference between the temperatures in the supply air inlet and outlet of the HVAC system. The temperature reading should be taken inside the air ducts as close to the HVAC system as possible. Refer to the furnace/air handler manufacturer's manual for detailed temperature rise specifications.

# Motor Start-Up & Operation

**WARNING**

**ELECTRIC SHOCK HAZARD!**

**Motor must be properly grounded through the furnace wiring harness.**

**WARNING**

Be careful when touching the exterior of an operating motor. It 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 mode to run continually. A motor that operates continually in motor protection mode may be overloaded, or the supply voltage or frequency may be incorrect.

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

# Start Up & Operation Checklist

Following installation, motor operation should be tested in all system modes for the following:

• **Rotation Sensing** - The first time the FLEX13 motor is powered on and receives a run signal from the system control board, it will perform a rotation sensing process. The motor will run for approximately 20 seconds in each direction in order to determine the proper direction for the application. Once the motor determines the proper operating direction, this information is stored and the motor will not require this process for subsequent run signals. In the event of system power loss exceeding 60 seconds, the rotation sensing process will be re-initiated at the next run signal after power is restored.

• **Shut-off delays** - Once it is powered **ON**, it is normal for a FLEX13 motor to experience a 10-12 second delay before beginning operation and to take 30 seconds before reaching full speed. When it is turned **OFF**, it is normal for the motor to experience a 30 second delay before turning **OFF**.

• **Unusual noises and vibration** - If unusual noises or vibration is detected, see troubleshooting guide on page 16.

• **Motor amperage** - Amp reading at the highest speed setting should be within 10% of the specification shown on the nameplate.

## WARNING

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

Voltage and moving parts around motors and motor driven equipment can cause serious or fatal injuries.Turn **OFF** power before connecting or servicing the motor.

• Air flow - Verify that the correct airflow is present in all operating modes.
• Temperature rise - Verify that temperature rise measurements in all operating modes conform to the specifications provided by the original equipment manufacturer.

**Measuring Temperature Rise**
Temperature rise is the 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 the return air and supply air ducts as close to the HVAC system as possible. If there is no access to the ductwork, the measurement should be taken in the return and supply grill closest to the HVAC system. Refer to the furnace/air handler manufacturer's rating plate for temperature rise specifications.

**NOTICE**

To prevent damage to HVAC system, verify temperature rise is within the original equipment manufacturer's specifications in all modes of operation.

**Example:**
If 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.

# Final Checks

- Check mounting and fastening of motor and control unit. Make sure control unit and motor are securely attached together and mounted tightly in HVAC system.
- Check all wiring harness, inspecting for shorts and detached wiring. Make sure wiring harness is securely connected to control unit connector.
- Check wiring harness and signal connections. Make sure both are securely connected to control unit connectors.
- Check blower motor and verify wheel rotation. Make sure it spins freely manually without effort or assisted means in both directions. Verify set screw on blower wheel has been properly tightened.
- Check circuit breaker is **ON**.

# Troubleshooting

| SYMPTON | CORRECTIVE ACTION |
|---|---|
| Motor is not spinning or runs abnormally | • Verify thermostat is issuing call for activity.<br>• Check circuit breaker for trips or accidental shutoff.<br>• Verify wiring harnesses are securely connected to control unit connectors.<br>• Inspect for shorts or detached wiring.<br>• Inspect control unit for broken or loose connectors, moisture, excessive dirt or other damage. |
| Motor rattles or makes excessive noise | • Inspect motor and blower for accumulated dirt, internal debris or other signs of damage.<br>• Inspect blower fan for bent or missing blades, misaligned shaft, or unsecured mounting to shaft.<br>• Inspect blower housing for cracks, dents, or corrosion.<br>• Inspect blower housing for secure mounting to system chassis.<br>• Inspect shaft, verify motor shaft spins freely without effort, by hand, in both directions. |

# Maintenance

| WARNING | |
|---|---|
|  | Before performing any maintenance on the FLEX13 motor, disconnect power and allow motor to come to a complete stop and wait 2 minutes. This will allow the capacitors to discharge any residual voltage, for safety. |

- Periodically inspect the installation. Check for dirt accumulations, 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 vent openings, by vacuuming. Dirt accumulations can cause motor overheating and 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**

Carrier Corporation 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 CARRIER CORPORATION OR THE CARRIER CORPORATION DEALER/RETAILER.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 Carrier Corporation or the dealer from whom the motor was purchased in writing, Carrier Corporation 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 Carrier Corporation 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 Carrier Corporation 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 Carrier Corporation.

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 CARRIER CORPORATION'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 CARRIER CORPORATION'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.

Replacement
Components