



# *MotorPro*

## ECM

### Troubleshooting Guide



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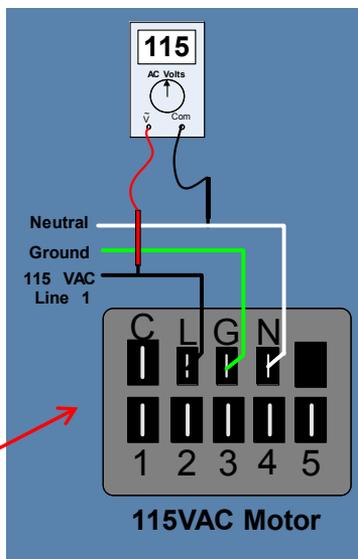
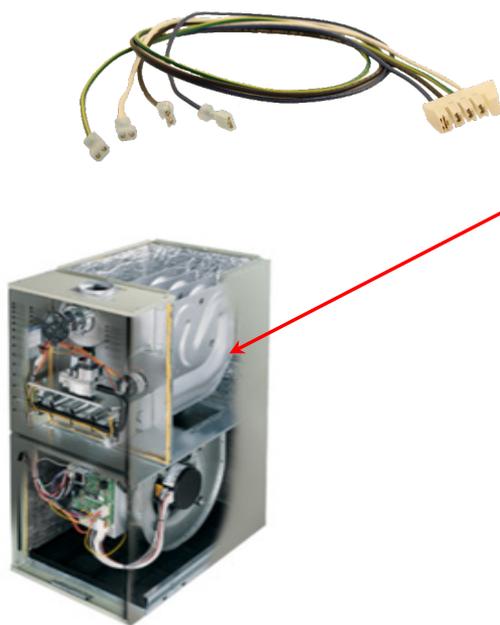
## Troubleshooting

- **If the motor is running**
  - Noisy operation, limit or safety faults, frozen coils
  - Motor may not be the problem
    - Check airflow settings with HVAC OEM guide
    - Check for dirt load on air distribution system components
    - Check for closed dampers, registers and grilles
    - Measure total external static pressure (ESP)
    - Make repairs if total ESP is above HVAC OEM recommended
  
- **If the motor is not running**
  - Diagnose motor
  - **Always disconnect the power to the HVAC system before disconnecting or reconnecting any connectors to these motors.**
  - Two inputs needed for motor operation
    - High voltage constant power source
      - Voltage can be  $\pm 10\%$  of rating
      - Always check for proper grounding
- Communication (Low Voltage)



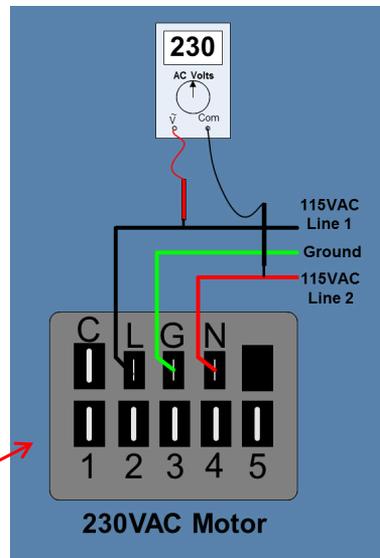
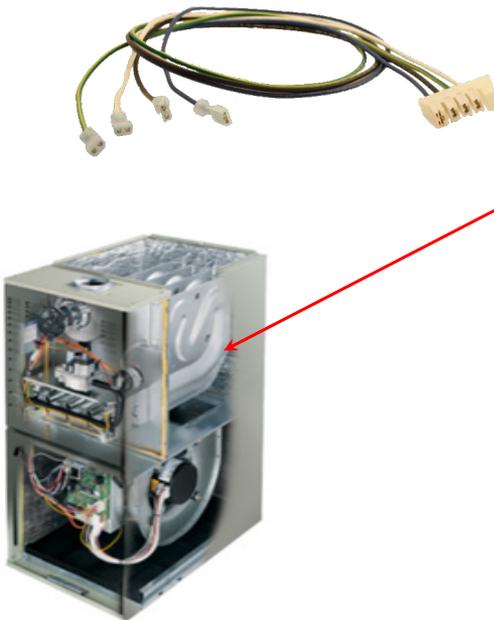
## Troubleshooting

- With power back confirm voltage from control board to motor via motor leads
  - High voltage input
    - 115VAC systems
    - 115VAC required at all times between terminals (L) and (N)



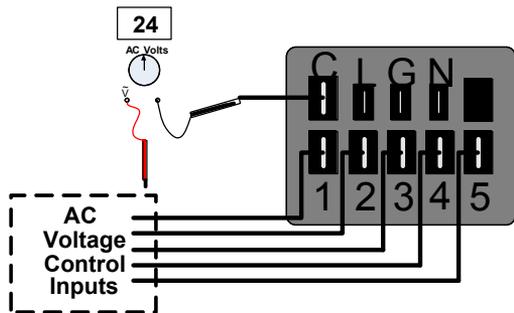
## Troubleshooting

- With power back confirm voltage from control board to motor via motor leads
  - High voltage input
    - 230VAC systems
    - 230VAC required at all times between terminals (L) and (N)



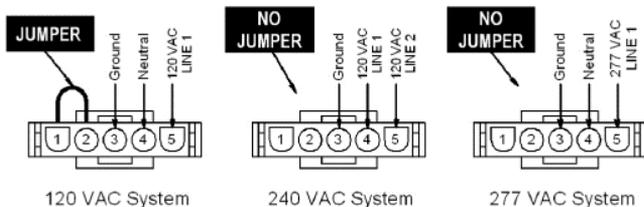
## Troubleshooting

- With power back confirm voltage from control board to motor via motor leads
  - Low voltage input
    - Check for proper low voltage signals 18-30 VAC
    - Always check voltage between taps 1-5 and (C)
      - Check all modes of operations, **only one tap will be energized per mode of Operation (Give time for Delays)**



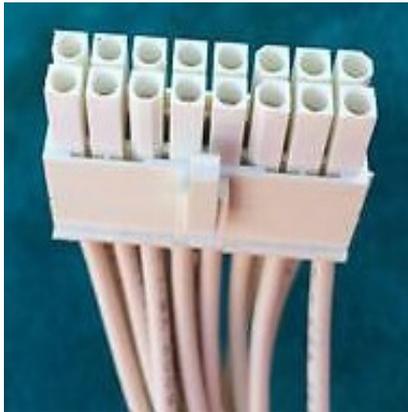
## Troubleshooting

- Check the voltage between position 4 and 5 of the power cord connector Contact HVAC manufacturer if system is rated for 120 VAC power, and the measured voltage between positions 4 and 5 is not 120 VAC.
- Contact HVAC manufacturer if system is rated for 240 VAC power, and the measured voltage between positions 4 and 5 is not 240 VAC.
- Contact HVAC manufacturer if system is rated for 277 VAC power, and the measured voltage between positions 4 and 5 is not 277 VAC.
- If the measured voltages are correct between positions 4 and 5 for the 120 VAC, 240 VAC or 277 VAC system



## Troubleshooting

- Refer to the OEM Service Guide to determine correct supply layout
- **With power back on check** the voltage between **common(s) supply(s)** of the power cord connector and the respective signal(s)
- If voltage is not detected recheck at the board.



# 16x4 Wire Low Voltage Check

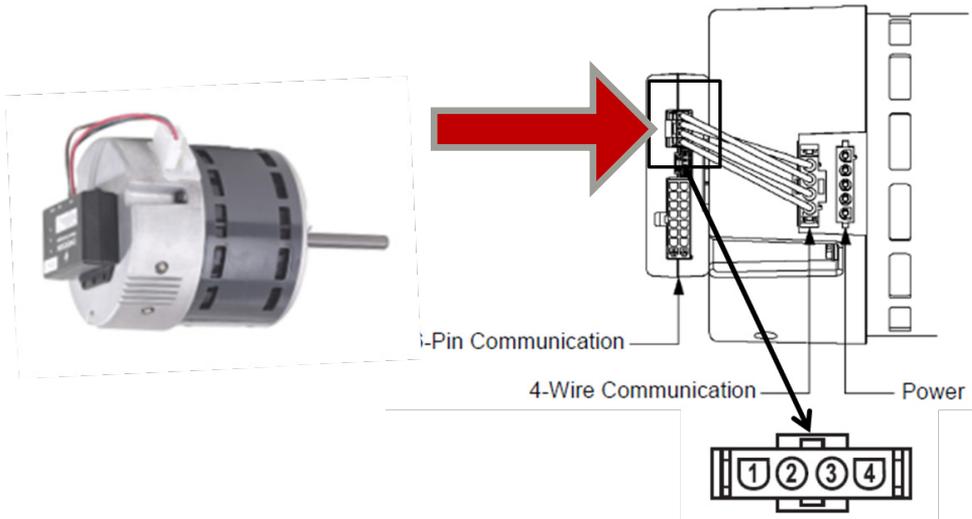
- In this illustration the commons are at the 1 and 3 positions
- Check for 24V between a common and the stage being called for.
- Example: for single stage heat you should detect 24V between 1 and 13.

"O" - ORANGE	<u>9</u>	<u>1</u>	BLACK - common
"HUM" - BLACK	10	2	WHITE - "W2"
Heat input - BROWN	11	3	BLACK - common
"R" - RED	12	4	RED - delay programmed input WHITE - cool programmed input
"W1" - BROWN	13	5	
"Y2" - YELLOW	14	6	YELLOW - "Y1"
"G" - GREEN	15	7	PURPLE - adjust programmed input
YELLOW/ BLACK	<u>16</u>	<u>8</u>	BLACK - common



# US Motors 16x4W Low Voltage Check

- Specific to US Motors 16 Pin
- **Reconnect line voltage to motor module**
  - Turn off power to system before reconnecting line voltage
- Check the voltage between positions 1 and 4 of the communication cable connector
- Voltage between positions 1 and 4 should be 9-15 Vdc
- Recheck 16 pin connections
- Note: Based on space limitations, the Interface Control Module may be remotely located.

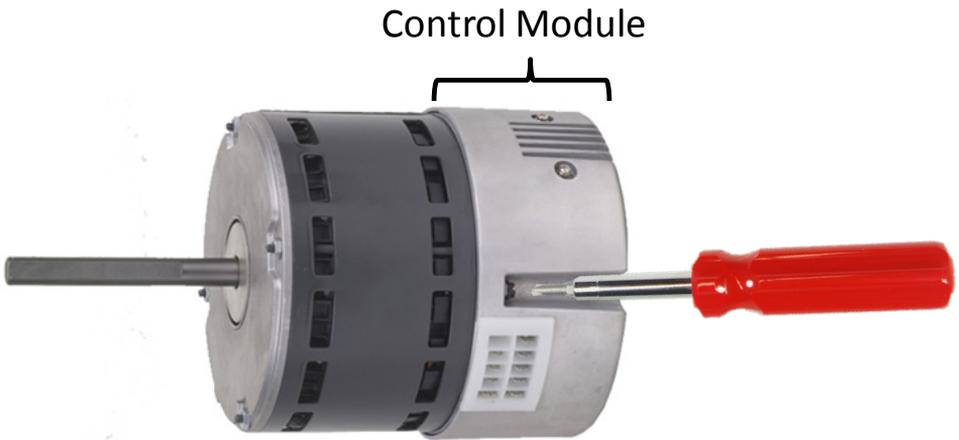


- Check the voltage between positions 1 and 4 of the communication cable connector
- Voltage between positions 1 and 4 should be 9-15 vdc
- Repeat steps for each mode of operation (Heat, Cool, Fan/Circ, etc.).

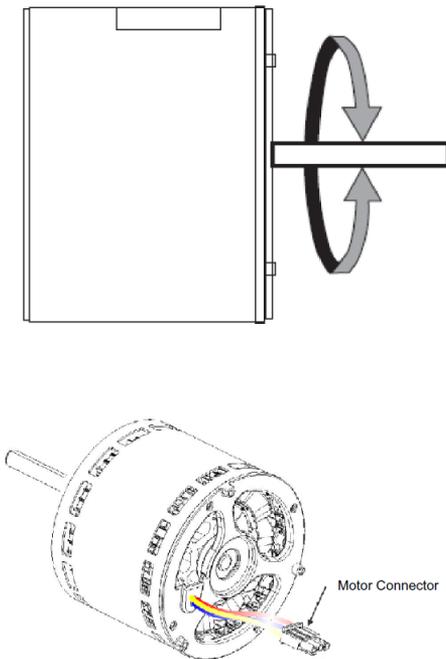


# Motor Troubleshooting

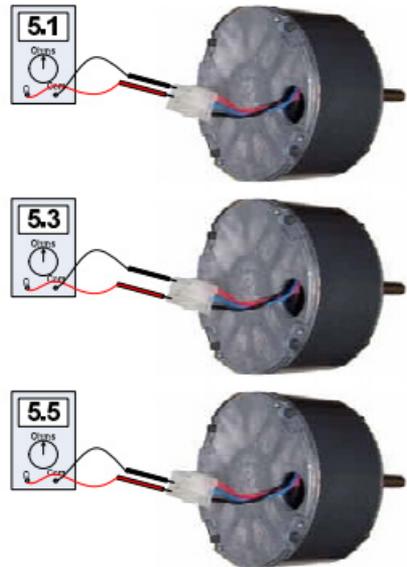
- Remove Control Module from motor based on manufacturers' instructions



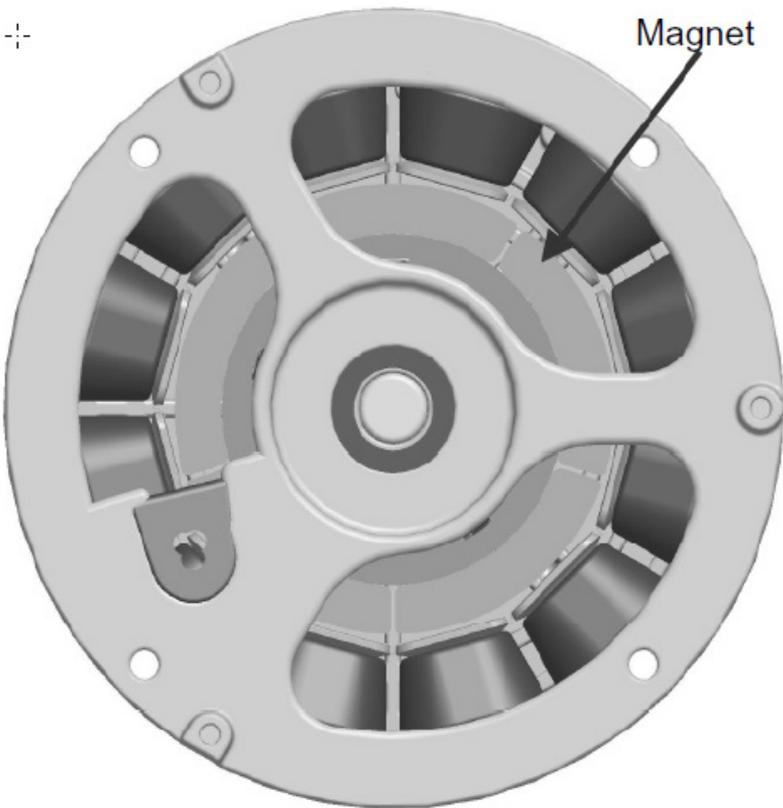
- **Make sure the motor shaft spins freely, without effort, manually in both directions**
  - Replace motor if the shaft does not spin freely without effort manually.
- **Inspect connector on back side of motor for bent, damaged, or recessed wires and terminals**
- **Check phase to phase resistance between each of the three phase terminals in the motor connector**
  - **Resistance levels between any two contacts should be equal (less than 20 ohms)**
    - Resistance between lead 1 and lead 2
    - Resistance between Lead 1 and Lead 3
    - Resistance between Lead 2 and Lead 3
  - If resistance levels are equal the motor is functioning properly
  - Replace motor if the resistance levels are not equal
  - Replace motor if the resistance levels are open circuited or short circuited



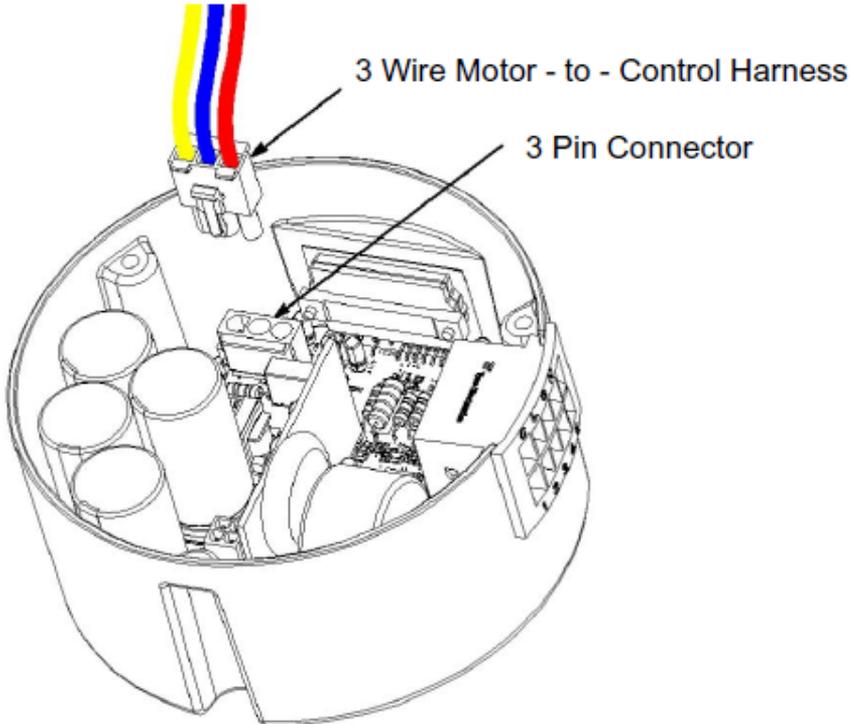
## Test pin to pin resistance < 20 ohms +/-10%



- Inspect the magnets through the back side of motor for broken or chipped magnets on the rotor core
  - Replace motor if magnets on the rotor core are broken or chipped

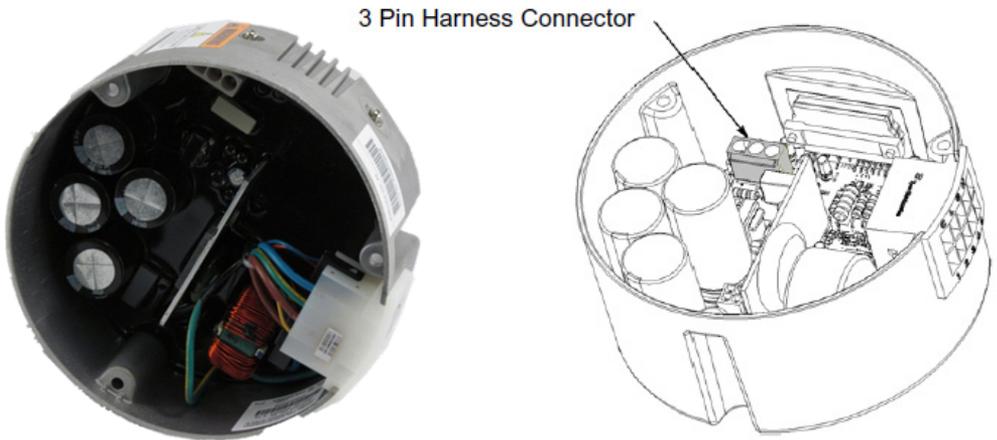


- **Disconnect the three-wire motor - to - control harness from the control and remove control unit**
  - Inspect for bent, damaged, or recessed wires and terminals inside of connector
  - Replace control unit if 3 pin connector contains bent, damaged or recessed terminals



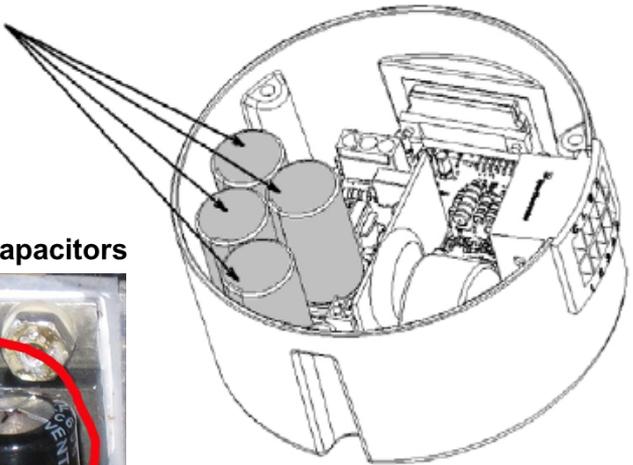
# Control Unit Verification

- Check phase to phase resistance between each of the three phase pins in the harness connector
  - Check the resistance between any 2 of the 3 pins
- If the multi-meter indicates resistance levels greater than 100K ohms Motors, Control unit is functioning properly
- If the multi-meter indicates resistance levels are less than 100K ohms for US Motors, others may be different (refer to OEM manual for correct reading)
  - Replace control unit



- **Inspect capacitors inside of control unit**
  - Replace control unit if capacitors are bulging or swollen
  - Control unit may have 2 or 4 Capacitors

Capacitors

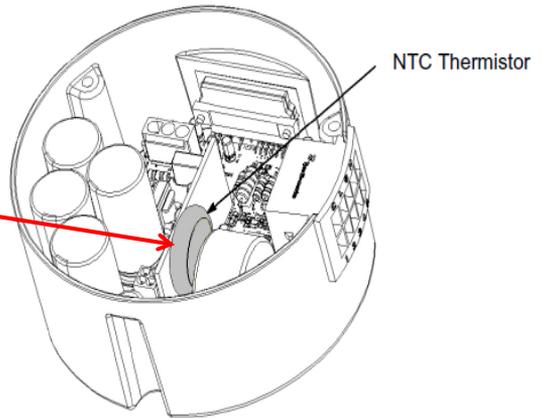


Example of damaged capacitors



- **Inspect the NTC thermistor**

- Inside of control unit for any cracks or breakage
- Not all control units have a NTC Thermistor
- Replace control unit if NTC thermistor is cracked or broken

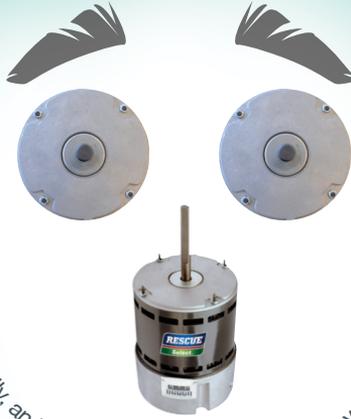


- Check mounting and fastening of motor and control
  - Make sure control unit and motor are securely attached together and mounted tightly in HVAC system
- Check control unit connectors
  - Inspect for shorts, detached wiring, or loose connections.
- Check power cord and signal connections
  - Make 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
- Check circuit breakers



# Notes





### The First Multi-Brand ECM Replacement.

RESCUE Select™ is the new EC motor engineered to replace the X13™ or SelecTech™ OEM motors. Preprogrammed with the option of programming to match the OEM profile. If you need a replacement, **ASK US – we've got your motor.**



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