

# Installation, Operation and Service Manual

# Conforto Electric Furnace

KHE 10 TO 27kW





INSTALLATIONS MUST MEET ALL LOCAL AND FEDERAL CODES THAT MAY DIFFER FROM THIS MANUAL

Please read the manual in its entirety before beginning installation. This manual must be kept with the furnace for future reference. For maintenance or question, please refer to your installer – contractor directly.

# TABLE OF CONTENTS

| 1.0  | IMPORTANT SAFETY ADVICE                              | 3   |
|------|--|-----|
| 2.0  | PRODUCT INFORMATION                                  | 3   |
| П    | ISTALLATION OVERVIEW                                 | 4   |
| 11   | ISPECTION  | 4   |
| 3.0  | INSTALLATION   | 4   |
| e    | ENERAL   | 4   |
| S    | ELECTING A LOCATION                                  | 5   |
| C    | LEARANCES TO COMBUSTIBLE MATERIALS                   | 6   |
| A    | IR FILTERS   | 6   |
| 4.0  | ELECTRICAL CONNECTIONS                               | 6   |
| F    | IGH VOLTAGE CONNECTIONS                              | 6   |
| F    | AN MOTOR CONNECTIONS                                 | 6   |
| L    | DW VOLTAGE CONNECTIONS                               | 7   |
| 5.0  | PANEL DISPLAY, SWITCHES AND CIRCUIT BREAKER          | 7   |
| L    | ED INDICATIONS                                       | 7   |
| C    | PERATION OPTIONS DIP SWITCHES 1, 2, 3 AND 4          | 7   |
| C    | PERATION OPTIONS DIP SWITCHES A, B, C                | 8   |
| C    | PERATION OPTION DIP SWITCH D - QUIET COMFORT FEATURE | 8   |
| D    | EICING MODE (WITH HEAT PUMP ONLY)                    | 8   |
| C    | RCUIT BREAKERS                                       | 8   |
| C    | OMFORTMAX MODE                                       | 9   |
| 6.0  |  | .10 |
| К    | HE SERIES WITH 230V PSC MOTOR                        | .10 |
| K    | HE SERIES WITH ECM ECOTECH MOTOR                     | .11 |
| 7.0  | IEATING OUTPUT RATES BY STAGES                       | .12 |
| 8.0  | COMMISIONING CHECKLIST                               | .12 |
| 9.0  | KHE SERIES ELECTRICAL DIAGRAMS                       | .13 |
| 10.0 | EXPLODED VIEW KHE (SPARE PARTS)                      | .15 |

# **1.0 IMPORTANT SAFETY ADVICE**

Please read and understand this manual before installing, operating or servicing the furnace. To ensure you have a clear understanding of the operation of the unit please take the time to read the IMPORTANT SAFETY ADVICE section of this manual.

### WARNING – BASIC SAFETY WARNINGS

**KNOW** the location of the emergency disconnect switch for the unit.

**EXAMINE** the package before installation to ensure it did not get damaged during shipping. **ENSURE** that the unit is connected to a properly sized duct system before controller is powered. Failure to do so will result in damage to the heating elements, voiding the warranty.

### WARNING – BEST PRACTICES FOR OPTIMAL OPERATION

**DO NOT** ATEMPT DO INSTALL YOURSELF OR MAKE ANY REPAIRS IF YOU ARE NOT A QUALIFIED TECHNICIAN, CALL A QUALIFIED HEATING TECHNICIAN.

### **DANGER**

Do not use this furnace as a construction heater. Use of this furnace as a construction heater exposes it to abnormal conditions, contaminated circulating air and air filtering. Failure to follow this warning can lead to premature furnace failure which could result in a fire hazard and/or bodily harm and/or material damage and will void its manufacturer's warranty.

### **IMPORTANT**

This manual is intended to inform the installer of installation, operation and maintenance procedures for trouble free operation of the Conforto KHE electric furnace. It is essential that the service technician carefully reads this manual to fully understand the furnace and its installation, operation and maintenance procedures before servicing the furnace or the heating system as operating procedures may vary depending on furnaces manufacturers. The Conforto KHE electric furnace is designed and manufactured with quality components for maximum life expectancy, durability and requires minimum maintenance and service. To insure a satisfactory installation, it is imperative that the instructions in this manual be followed carefully before operating the heating system. Failure to do so may result in breach of warranty.

# 2.0 PRODUCT INFORMATION

The Conforto KHE warm air electric furnace is a multi-positional design allowing for an installation in the up flow, down flow or horizontal flow positions. This appliance may be used with a central heat-pump or central cooling system.

#### INSTALLATION OVERVIEW

Install this appliance in accordance with these instructions and all national and local building/safety codes and requirements.

Only connect this furnace to a duct system with a maximum static pressure of 0.60" W.C. Static pressures in excess will result in reduced air flow and potential elevated discharge air temperatures during heating cycles and reduced discharge air temperatures during cooling cycles.

Do not operate this furnace without both supply and return air ducts installed with air filters in place or with less than 0.20" W.C, external static pressure.

#### INSPECTION

As soon as you receive this unit, unpackage and inspect it thoroughly to ensure that no damage has resulted during the shipping process.

### 3.0 INSTALLATION

#### General

These furnaces must be properly installed in compliance with all national and local safety standard codes. This appliance requires 240Vac single phase, 60Hz voltage.

The supply power lead shall enter the control enclosure of the furnace through the knockout provided on the right-hand side of the furnace. This will ensure the required separation between the low voltage and high voltage leads.

Knockouts are provided for 115Vac and 24Vac connections for humidifiers and electronic air cleaners on both sides of the furnace.

Always ensure that the installation protects all electrical components from exposure to water. Attention must be given to the placement of A/C coils and drains.

A non-combustible base is needed for counter flow installations on combustibles floors. Adequate access must be provided at the front of this furnace for service.

**ATTENTION:** the front of the appliance must always remain accessible to allow maintenance and service.

For horizontal installations, it is recommended to use steel angle support brackets with threaded rods supporting the unit from the bottom. Refer to Figure 1.

Due to the hazardous nature of electrical and mechanical requirements only trained and qualified personnel should install and service heating and cooling equipment.

### WARNING

It is important to check airflow and make sure that the furnace does not operate above the temperature rise specified in the specifications, Section 6. This is particularly important if a cooling or heat pump coil has been installed. High limit thermal protectors should never engage during normal operation of the furnace. The high limit protectors are designed to engage during the improper functioning of the blower or when the air filter has not been kept clean.



#### Selecting a location

This furnace shall be centrally located in relation to the outlet registers. All ductwork shall be suitably sized with external static pressure in mind to ensure adequate air distribution.

These furnaces are suited for vertical up flow, down flow and horizontal installations. This furnace shall not be installed on its front or back. To install this unit on its front or back would result in inadequate access for servicing. Always ensure that when suspending this furnace that suitable structural support is available and provides adequate access to the control and fan compartments for service.

#### **Clearances to combustible materials**

**The Furnace** - The furnace is approved for zero clearance to combustible materials regardless of the heating capacity. It is recommended that 24" (60cm) be provided at the front of the furnace for clear access for servicing.

**Supply Air Ducts** - Supply ducts for furnaces with a heating capacity up to and including 20kW may be installed with 0" (0 cm) clearance to combustibles. Heating ducts for furnaces with heating capacities greater than 20kW must have a 1" (25 mm) clearance to combustibles for the first 36" (91.4 cm) of duct. Thereafter the clearance can be 0" (0 cm).

**Duct connections to the furnace -** The duct connection to the furnace is a critical aspect to ensure the satisfactory performance of this furnace. To reduce the transmission of noise and vibrations it is recommended to use non-flammable flexible isolation collars. Correct duct sizing and installation methods will ensure proper airflow providing comfortable balanced delivery of the air. All duct work should be designed, fabricated and installed in accordance with all national and/or local codes.

#### Air Filters

Included with this furnace is a 20" x 20" x 1" disposable air filter and supporting filter rack. This filter rack shall be secured to the furnace casing on either side or the bottom. Do not install this filter rack on the front or back of the furnace, doing so will result in inadequate air flows. When cutting the return air opening in the furnace casing, use the square knockouts in the side and bottom panels as reference. This will provide a free area opening of 18" x 18". The use of pleated filters is not recommended unless sized to suit the airflow requirements for the installation. Pleated air filters tend to increase total system static pressures. This may result in reduced airflow. As a result, the heating elements may operate at increased temperatures resulting in an overheat situation. Airflow reductions may also occur during cooling cycles resulting in unacceptably low delivered air temperatures.

# 4.0 ELECTRICAL CONNECTIONS

#### **HIGH VOLTAGE CONNECTIONS**

Line power 240Vac single phase 60Hz must be brought in to the furnace control compartment via the knockout provided on the right hand or left hand side of the furnace. The use of any other entry point may result in the high voltage leads encountering low voltage circuit components resulting in potentially hazardous conditions. Power lines must be connected to the furnace main terminal block.

Refer to Section 6 to determine proper wire sizing. A ground connection is provided in this compartment. Always ensure that the ground circuit is installed to meet the requirements of all local and national codes.

#### Fan motor connections

All furnaces are provided with multi speed direct drive PSC or ECM motors. Furnaces up to and including 23kW outputs are provided with 1/3hp PSC or 1/2hp ECM, 5 speed motors. 27kW furnaces are provided with 3/4hp 5 speed motors. Only 3 speeds are connected to the controller (the 4<sup>th</sup> and 5<sup>th</sup> speed motor lead is not connected.)

#### Low voltage connections

Contained within the control enclosure is the low voltage transformer. This is 240Vac primary with 24Vac secondary, 40VA class 2 transformer. It provides power to the furnace controller, thermostat, A/C or heat pump compressor relay and 24Vac external devices. Always ensure that:

- The load imposed by external devices does not exceed 40 VA (1A);
- The low voltage wires connected to the board (on the front of the unit) **do not make contact with the cabinet**.

| Terminal | Description               | Purpose                                     |
|----------|---------------------------|---|
| G        | THERMOSTAT INPUT          | FAN ON                                      |
| W        | THERMOSTAT INPUT          | STAGE 1 HEATING                             |
| W2       | THERMOSTAT INPUT          | STAGE 2 HEATING                             |
| R        | OUTPUT TO THERMOSTAT ONLY | 24Vac GENERAL POWERING OF THE<br>THERMOSTAT |
| Y/Y1     | THERMOSTAT INPUT          | STAGE 1 COOLING                             |
| Y2       | THERMOSTAT INPUT          | STAGE 2 COOLING                             |
| C        | OUTPUT TO THERMOSTAT      | 24Vac COMMON                                |

Figure 2 Low Voltage Control Connections

# 5.0 PANEL DISPLAY, SWITCHES AND CIRCUIT BREAKER

Located in the upper front right-hand side of the furnace is the control panel indicating LED light.

#### **LED Indications**

A multi-color LED is located directly above the thermostat connections terminal strip. A solid Green LED indicates that the furnace is in standby mode. A slow flashing (once per second) Green LED indicates that the furnace is either in a heating or a cooling cycle. A quick flashing (5 times per second) Green LED indicates that the unit is in the cool down cycle. A solid Amber LED indicates that the furnace is in Quiet Comfort mode. A solid Red LED indicates that a qualified service technician should inspect the appliance.

#### Operation options DIP switches 1, 2, 3 and 4 (refer to wiring diagram on page 13)

Should the LED light located at the top of the thermostat terminal strip display RED, this is an indication that the switch positions on the options DIP switches on the controller have either been changed of position or that the control board itself has failed.

Confirm correct DIP switches position setting: DIP 1 - OFF, DIP 2 - OFF, DIP 3 - OFF, DIP 4 - OFF

If the switch positions are correct and fully seated and the LED remains constant Red, replace controller.

#### Operation options DIP switches A, B, C

| BTU SETTING TABLE (DIP OPTION SWITCHES) |     |      |      |      |      |      |      |  |  |  |
|---|-----|------|------|------|------|------|------|--|--|--|
| DIP                                     | 5KW | 10KW | 15KW | 18KW | 20KW | 23KW | 27KW |  |  |  |
| А                                       | OFF | ON   | OFF  | ON   | OFF  | ON   | OFF  |  |  |  |
| В                                       | OFF | OFF  | ON   | ON   | OFF  | OFF  | ON   |  |  |  |
| С                                       | OFF | OFF  | OFF  | OFF  | ON   | ON   | ON   |  |  |  |

These switches are used to select the correct kW/H output of the furnace. See chart below.

#### **Operation option DIP switch D - Quiet Comfort Feature**

When the Quiet Comfort Feature has been activated at DIP switch D and the continuous circulation fan switch is in the ON position, the LED light on the front of the furnace will flash AMBER. This feature will activate one of the heating elements at 50% of its capacity for a maximum period of three (3) hours unless a call for heat is made by the thermostat, which will reset the three (3) hour timer. The feature allows for preheated continuous circulating air to provide added comfort in the home.

#### Deicing mode (with heat pump only)

When this unit is installed in accordance with a heat pump and presence of ice on the outside condenser is detected by the heat pump control, the heat control will go into its deicing mode. During this period, the furnace will go into the heating mode to mitigate to the cooling of circulating air caused by the heat pump deicing cycle. The front LED will then flash AMBER 2 times per second.

#### Circuit breakers

The 16A furnace mounted circuit breaker on the front of the appliance provides fan motor over amp protection. This circuit protection only applies to the fan motor.

The higher amperage heating element circuit breaks provide overload circuit protection in the event one or more of the heating elements should fail. Should this happen, one or more of the circuit breakers will trip to the off position. Do not attempt to reset the breaker or access the control panel. Call a licensed servicing contractor immediately.

### Warning

Do not use these circuit breakers the power off to the furnace. Prior to removing any of the furnace access panels ensure that the power has been safely turned off at the main electrical disconnect switch.

#### ComfortMAX Mode

The *ComfortMax* exclusive feature is designed to provide automatic system kW/H output sizing when operated by a single stage thermostat. When using a 2 stages thermostat, the 2nd stage of the thermostat heat call takes priority. To activate The *ComfortMax* feature, set the *ComfortMax* switch on the furnace to ON. This will provide automatic kW/H output of the furnace up to the maximum output of the furnace.

*ComfortMax* is a unique feature of the Conforto KHE electric furnace control. Using a singlestage heating thermostat, the furnace control will determine the ideal number of elements to engage during each heating cycle. Comfort is maximized by ensuring that the perfect level of heat is supplied to satisfy the call for heat in regular intervals. On the coldest of days all available heating elements will be activated, but on those milder days only a few will come on, thus finding the perfect balance between energy use and homeowner comfort.

The *ComfortMax* option for heating is selected by a switch on the front panel of the appliance. When the switch is activated during a call for heat the control will only activate the number of elements that are estimated to be needed to satisfy the call for heat within a 13 to 18-minute period.

If the call for heat is satisfied in less than 13 minutes the number of heating elements activated during the next cycle will be reduce by one. If the last heat cycle has been activated for more than 18 minutes an additional heating element will be energized and this number of elements will be energized during the next heating cycle.

If the heating cycle is still not satisfied after 23 minutes then all remaining heating elements are energized and a further heating element is added to the next heating cycle.



9

# **6.0 TECHNICAL INFORMATION**

| KHE SERIES WITH 230V PSC MOTOR   |                   |             |                   |              |         |                |
|----------------------------------|-------------------|-------------|-------------------|--------------|---------|----------------|
|                                  | KHE-01-           | KHE-01-     | KHE-01-           | KHE-01-      | KHE-01- | KHE-01-G027-05 |
| MODEL NUMBER                     | G010-03           | G015-03     | G018-03           | G020-03      | G023-03 |                |
| POWER, total (kW)                | 10                | 15          | 18                | 20           | 23      | 27             |
| POWER, first stage (kW)          | 5                 | 10          | 9                 | 10           | 15      | 15             |
| OUTPUT – BTU/h                   | 34140             | 51216       | 61460             | 68288        | 78530   | 92190          |
| Temperature rise – range °F **** | 30-45             | 45-60       | 55-75             | 60-80        | 65-80   | 50-80          |
| ELECTRICAL                       |                   |             |                   |              |         |                |
| ELEMENT NO. 1 (kW/h)             | 5                 | 5           | 5                 | 5            | 5       | 5              |
| ELEMENT NO, 2 (kW/h)             | 5                 | 5           | 4                 | 5            | 5       | 5              |
| ELEMENT NO. 3 (kW/h)             | -                 | 5           | 5                 | 5            | 5       | 5              |
| ELEMENT NO. 4 (kW/h)             | -                 | -           | 4                 | 5            | 4       | 4              |
| ELEMENT NO. 5 (kW/h)             | -                 | -           | -                 | -            | 4       | 4              |
| ELEMENT NO. 6 (kW/h)             | -                 | -           | -                 | -            | -       | 4              |
| HEATING ELEMENT AMPS             | 40                | 60          | 80                | 89           | 92      | 108            |
| TOTAL AMPS                       | 42                | 62          | 82                | 91           | 94      | 114            |
| MINIMUM CIRCUIT AMPS             | 60                | 85          | 100               | 110          | 125     | 150            |
| BREAKER SIZE AMPS (MAX) ***      | 60                | 90          | 100               | 125          | 125     | 150            |
| WIRE SIZE (AWG)**                | 4                 | 4           | 3                 | 3            | 2       | 1              |
| MOTOR                            |                   | 1/          | 3/4 HP - 4 speeds |              |         |                |
| MOTOR VOLTAGE / AMPS.            |                   |             | 230V - 5.8A       |              |         |                |
| BLOWER DATA                      | (Factory          | adjusted to | 0.5 E.S.P.        | )            |         |                |
| BLOWER SPEED @ 0.50" E.S.P.      | MED               | MED         | MED               | MED          | HIGH    | MED            |
| BLOWER SPEED @ 0.20" E.S.P.      | MED               | MED         | MED               | MED          | HIGH    | MED            |
| NOM. BLOWER SIZE (dia. x width)  |                   |             | 10 x 8            |              |         | 12 x 10        |
| GENERAL INFORMATION              |                   |             |                   |              |         |                |
| DIMENSIONS (W x D x H)           | 20" x 21" x 36"   |             |                   |              |         |                |
| WARM AIR PLENUM                  | 15" x 18"         |             |                   |              |         |                |
| RETURN AIR PLENUM                | 18 1/2" x 18 1/2" |             |                   |              |         |                |
| AIR FILTER – 1 SUPPLIED          |                   |             |                   | 20" x 20" x  | 1''     |                |
| SHIPPING WEIGHT                  |                   |             |                   | 48 KG (105lb | os.)    |                |
| MAXIMUM COOLING CAP.             |                   |             | up to 3 tor       | าร           |         | up to 5 tons   |

### \*\*\*\* Adjust blower speed or plenum restriction to generate temperature rise within specified range.

\*\*\* Suggested circuit breaker or fuse size only, check with local codes for proper circuit breaker or fuse sizing. \*\* Suggested wire size only, check with local codes for proper wire sizing.

| Blower Speed | Motor      | External Static Pressure |      |      |     |     |  |  |
|--------------|------------|--------------------------|------|------|-----|-----|--|--|
|              | Wire Color | 0.2                      | 0.3  | 0.4  | 0.5 | 0.6 |  |  |
| HIGH, Black  | BLACK      | 1100                     | 1050 | 1000 | 950 | 875 |  |  |
| MEDIUM, Blue | BLUE       | 925                      | 875  | 850  | 825 | 775 |  |  |
| LOW, Red     | RED        |                          |      |      |     |     |  |  |

Airflow (CFM) - 10 x 8 Blower with 1/3 PSC motor

|              |            | , |      |      | 1110101 |      |
|--------------|------------|---|------|------|---------|------|
| Blower Speed | Motor Wire | External Static Pressure                |      |      |         |      |
|              | Color      | 0.2                                     | 0.3  | 0.4  | 0.5     | 0.6  |
| HIGH         | BLACK      | 1775                                    | 1725 | 1650 | 1600    | 1550 |
| MED-HIGH     | YELLOW     | 1600                                    | 1575 | 1550 | 1500    | 1450 |
| MEDIUM       | BLUE       | 1450                                    | 1425 | 1400 | 1350    | 1325 |
| LOW          | RED        |   |      |      |         |      |

#### Airflow (CFM) - 12 x 10 Blower with 3/4 PSC motor

Note: Maximum discharge air temperature: 93°C (200°F)

| KHE                              | KHE SERIES WITH ECM ECOTECH MOTOR |                    |                    |                    |                    |                |
|----------------------------------|-----------------------------------|--------------------|--------------------|--------------------|--------------------|----------------|
| MODEL NUMBER                     | KHE-01-<br>G010-H3                | KHE-01-<br>G015-H3 | KHE-01-<br>G018-H3 | KHE-01-<br>G020-H3 | KHE-01-<br>G023-H3 | KHE-01-G027-H5 |
| POWER, total (kW)                | 10                                | 15                 | 18                 | 20                 | 23                 | 27             |
| POWER, first stage (kW)          | 5                                 | 10                 | 9                  | 10                 | 15                 | 15             |
| OUTPUT – BTU/h                   | 34140                             | 51216              | 61460              | 68288              | 78530              | 92190          |
| Temperature rise – range °F **** | 25-55                             | 35-80              | 45-75              | 50-80              | 55-80              | 55-80          |
| ELECTRICAL                       |                                   |                    |                    |                    |                    |                |
| ELEMENT NO. 1 (kW/h)             | 5                                 | 5                  | 5                  | 5                  | 5                  | 5              |
| ELEMENT NO, 2 (kW/h)             | 5                                 | 5                  | 4                  | 5                  | 5                  | 5              |
| ELEMENT NO. 3 (kW/h)             | -                                 | 5                  | 5                  | 5                  | 5                  | 5              |
| ELEMENT NO. 4 (kW/h)             | -                                 | -                  | 4                  | 5                  | 4                  | 4              |
| ELEMENT NO. 5 (kW/h)             | -                                 | -                  | -                  | -                  | 4                  | 4              |
| ELEMENT NO. 6 (kW/h)             | -                                 | -                  | -                  | -                  | -                  | 4              |
| HEATING ELEMENT AMPS             | 40                                | 60                 | 80                 | 89                 | 92                 | 108            |
| TOTAL AMPS                       | 44                                | 64                 | 84                 | 93                 | 97                 | 114            |
| MINIMUM CIRCUIT AMPS             | 60                                | 85                 | 100                | 110                | 125                | 150            |
| BREAKER SIZE AMPS (MAX) ***      | 60                                | 90                 | 100                | 125                | 125                | 150            |
| WIRE SIZE (AWG)**                | 4                                 | 4                  | 3                  | 3                  | 2                  | 1              |
| MOTOR                            |                                   | 1/                 | 3/4 HP - 5 speeds  |                    |                    |                |
| MOTOR VOLTAGE / AMPS.            |                                   | 230V - 3.9A        |                    |                    |                    | 230V - 5.2A    |
| BLOWER DATA                      | (Factory                          | adjusted to        | 0.5 E.S.P.         | )                  |                    |                |
| BLOWER SPEED @ 0.50" E.S.P.      | M-LOW                             | M-LOW              | MED                | MED                | M-HIGH             | M-HIGH         |
| BLOWER SPEED @ 0.20" E.S.P.      | M-LOW                             | M-LOW              | MED                | MED                | M-HIGH             | M-HIGH         |
| NOM. BLOWER SIZE (dia. x width)  |                                   |                    | 10 x 8             |                    |                    | 12 x 10        |
| GENERAL INFORMATION              |                                   |                    |                    |                    |                    |                |
| DIMENSIONS (W x D x H)           | 20" x 21" x 36"                   |                    |                    |                    |                    |                |
| WARM AIR PLENUM                  | 15" x 18"                         |                    |                    |                    |                    |                |
| RETURN AIR PLENUM                |                                   |                    |                    | 18 1/2" x 18 ′     | 1/2''              |                |
| AIR FILTER – 1 SUPPLIED          |                                   |                    |                    | 20" x 20" x        | 1"                 |                |
| SHIPPING WEIGHT                  |                                   |                    |                    | 48 KG (105lk       | os.)               |                |
| MAXIMUM COOLING CAP.             |                                   |                    | up to 3 tor        | าร                 |                    | up to 5 tons   |

\*\*\*\* Adjust blower speed or plenum restriction to generate temperature rise within specified range. \*\*\* Suggested circuit breaker or fuse size only, check with local codes for proper circuit breaker or fuse sizing. \*\* Suggested wire size only, check with local codes for proper wire sizing.

#### Airflow (CFM) - 10 x 8 Blower with 1/2 ECM Ecotech Motor

| Blower   | Motor Wire | External Static Pressure |      |      |      |      |
|----------|------------|--------------------------|------|------|------|------|
| Speed    | Color      | 0.2                      | 0.3  | 0.4  | 0.5  | 0.6  |
| HIGH     | BLACK      | 1275                     | 1250 | 1225 | 1200 | 1150 |
| MED-HIGH | YELLOW     | 1050                     | 1025 | 1000 | 975  | 950  |
| MEDIUM   | BLUE       | 900                      | 875  | 850  | 825  | 800  |
| MED-LOW  | ORANGE     | 700                      | 675  | 625  | 600  | 575  |
| LOW      | RED        |                          |      |      |      |      |

#### Airflow (CFM) - 12 x 10 Blower with 3/4 ECM Ecotech Motor

| Blower   | Motor Wire | External Static Pressure |      |      |      |      |
|----------|------------|--------------------------|------|------|------|------|
| Speed    | Color      | 0.2                      | 0.3  | 0.4  | 0.5  | 0.6  |
| HIGH     | BLACK      | 1575                     | 1550 | 1500 | 1475 | 1450 |
| MED-HIGH | YELLOW     | 1275                     | 1250 | 1200 | 1175 | 1150 |
| MEDIUM   | BLUE       | 1150                     | 975  | 925  | 900  | 850  |
| MED-LOW  | ORANGE     | 875                      | 825  | 775  | 725  | 675  |
| LOW      | RED        |                          |      |      |      |      |

Note: Maximum discharge air temperature: 93°C (200°F)

# 7.0 HEATING OUTPUT RATES BY STAGES

| Figure 4                    |       |           |       |          |           |           |  |  |  |  |  |
|-----------------------------|-------|-----------|-------|----------|-----------|-----------|--|--|--|--|--|
| Stage 1 Stage 2 Stage 1 + 2 |       |           |       |          |           |           |  |  |  |  |  |
| Furnace                     | W1 B  | TU Output | W2 BT | U Output | W1 + W2 B | TU Output |  |  |  |  |  |
| Model Voltage               | Tota  | al Heat   | Tota  | l Heat   | Total H   | Heat      |  |  |  |  |  |
| Power                       | 208   | 240       | 208   | 240      | 208       | 240       |  |  |  |  |  |
| 10kW                        | 12975 | 17072     | -     | 17072    | 25950     | 34144     |  |  |  |  |  |
| 15kW                        | 25950 | 34144     | 12975 | 17072    | 38925     | 51216     |  |  |  |  |  |
| 18kW                        | 20760 | 27315     | 25950 | 34144    | 46710     | 61460     |  |  |  |  |  |
| 20kW                        | 25950 | 34144     | 25950 | 34144    | 51890     | 68288     |  |  |  |  |  |
| 23kW                        | 25950 | 34144     | 33734 | 44387    | 59682     | 78530     |  |  |  |  |  |
| 27kW                        | 25950 | 34144     | 44114 | 58045    | 70064     | 92190     |  |  |  |  |  |

# **8.0 COMMISIONING CHECKLIST**

#### Ensure the following things:

- 1) Thermostat is not connected to controller
- 2) A/C condenser is connected.
- 3) Ground is securely connected at furnace ground lug and main panel.
- 4) Incoming power lines are connected and secure at main terminal block.
- 5) Continuous fan switch is set to OFF
- 6) ComfortMax switch on furnace side panel is set to OFF.

#### Sequence:

- 1) a) Install a jumper across thermostat terminals R and W1 on control board terminal strip. Heating cycle starts and fan turns on.
  - b) Allow this cycle to turn on all elements.
  - c) Remove jumper. All elements turn OFF.
- 2) Place a jumper across R, Y/Y2 & G, fan starts on Cool speed and A/C starts.
- 3) Remove jumper, fan cycles down and A/C stops.
- 4) Power furnace down, connect thermostat, turn power to furnace on.

## 9.0 KHE SERIES ELECTRICAL DIAGRAMS



SELECTS WARM AIR MODE WITH ECM MOTOR

| Furnace Model  | Wire #1          | Wire #2           | Wire #3 | Wire #4 | JUMPER "J" |
|----------------|------------------|-------------------|---------|---------|------------|
| KHE-01-G010-03 | BLUE - MEDIUM    | UNUSED            | N/A     | N/A     | YES        |
| KHE-01-G015-03 | BLUE - MEDIUM    | UNUSED            | N/A     | N/A     | YES        |
| KHE-01-G018-03 | BLUE - MEDIUM    | UNUSED            | N/A     | N/A     | YES        |
| KHE-01-G020-03 | BLUE - MEDIUM    | UNUSED            | N/A     | N/A     | YES        |
| KHE-01-G023-03 | BLUE - MEDIUM    | BLACK - HIGH      | N/A     | N/A     | NO         |
| KHE-01-G027-03 | BLUE - MEDIUM    | UNUSED            | UNUSED  | N/A     | YES        |
| KHE-01-G010-H3 | ORANGE - MED LOW | UNUSED            | UNUSED  | UNUSED  | YES        |
| KHE-01-G015-H3 | ORANGE - MED LOW | UNUSED            | UNUSED  | UNUSED  | YES        |
| KHE-01-G018-H3 | ORANGE - MED LOW | BLUE - MEDIUM     | UNUSED  | UNUSED  | NO         |
| KHE-01-G020-H3 | ORANGE - MED LOW | BLUE - MEDIUM     | UNUSED  | UNUSED  | NO         |
| KHE-01-G023-H3 | ORANGE - MED LOW | YELLOW - MED HIGH | UNUSED  | UNUSED  | NO         |
| KHE-01-G027-H3 | ORANGE - MED LOW | YELLOW - MED HIGH | UNUSED  | UNUSED  | NO         |

To increase airflow under W2 or Y2 conditions:

- 1. If jumper "J" is installed between FAN-H and FAN-M, remove it, make sure wire #1 is connected to FAN-M and connect one of the unused motor wires corresponding to a greater motor speed to the FAN-H terminal.
- 2. If jumper "J" is not installed, replace wire #2 with one of the unused motor wires corresponding to a greater motor speed.

Refer to unit's corresponding airflow table for more details.



# **10.0EXPLODED VIEW KHE (spare parts)**



| ITEM NO | PART NUMBER     | DESCRIPTION  |
|---------|-----------------|--|
| 1       | 6EF-FE-04KW-00, | 4KW ELEMENT C/W #10 STUD CON & NUT                 |
| I.      | 6EF-FE-05KW-00  | 5KW ELEMENT C/W #10 STUD CON & NUT                 |
| 2       | 4SW-00-RA90-10  | ROCKER SWITCH SP/ST 15AMP MARKED ON/OFF            |
| 3       | 4SW-00-RA90-10  | ROCKER SWITCH SP/ST 15AMP MARKED ON/OFF            |
| 4       | 6EF-CI-BRKS-00  | 16A THERMAL CIRCUIT BREAKER T9-611P-16A            |
| 5       | 6EF-RY-DC24-00  | 30A 24VDC SPST MINI POWER RELAY                    |
| 6       | 6EF-CB-SEI0-00  | KHE CONTROL BOARD CM189 V1_18                      |
| 7       | 6EF-CV-R940-00  | CONTROL COVER WHITE NYLON 1/2X1X6                  |
| 8       | 6EF-TF-230V-00  | 230/24/40VA TRANSFORMER CLASS 2 INH.LIM            |
|         | 6EF-33-3SPD-00  | 1/3HP 230V 1075/3SP DD MOTOR                       |
| ٥       | 6EF-75-4SPD-00  | 3/4HP 208-230 1PH, 4SPD MOTOR EMERSON #5846A (6.1) |
| 9       | 3BM-50-ECM0-03  | MOTOR M055CYA0372012B NIDEC 1/2 HP DD ECM          |
|         | 3BM-75-4SDD-02  | MOTOR M055CWT0366012B NIDEC ECOTECH 3/4 HP DD ECM  |
| 10      | 4CA-00-705M-00  | CAPACITOR 7.5uF 370VAC 70C 60Hz                    |
| 10      | 4CA-00-156M-2B  | CAPACITOR 15.0uF 370VAC 70C 60Hz                   |
| 11      | 1SB-10-BRKT-00  | 10" BLOWER BELLY BAND                              |
| 11      | 1SB-12-BRKT-00  | 12" BLOWER BELLY BAND                              |
| 10      | 3BU-10-08DD-00  | G10 X 8" DD BLOWER 9010582                         |
| 12      | 3BU-12-00DD-00  | GT12 X 10" DD BLOWER 9010236                       |
| 13      | 6EF-BR-KR50-00  | 50 AMP BRKR, DOUBLE POLE, BRACKET MOUNT            |
| 14      | 6EF-BR-KR25-00  | 25 AMP BRKR, DOUBLE POLE, BRACKET MOUNT            |
| 15      | 6EF-SD-MCON-00  | THERMAL SNAP DISC OPEN@120 CLOSE@100DEG            |
| 16      | 9EL-AE-0200-90  | ELECTRIC BLOCK 3 POSITIONS 300V, 120AMP            |



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Thank you for choosing Granby