

# Make Up Air Unit CLEAR AIR MAU Series



### Model Code:

|     |    |    |   |     |     |
|-----|----|----|---|-----|-----|
| MAU | 48 | 20 | 1 | ECM | SSR |
| A   | B  | C  | D | E   | F   |

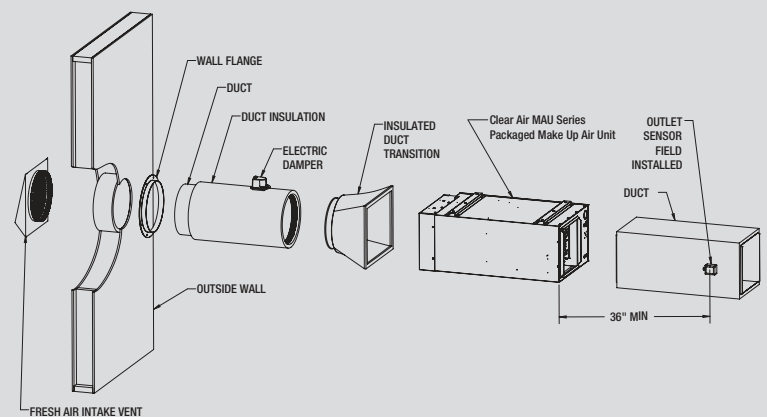
- A: Series
- B: 20 - 208V 24 - 240V
- C: Kilowatts
- D: 1 or 3-phase
- E: ECM Motor
- F: Solid State Relay

Shown with MAUFH FILTER HOUSING. (sold separately)



- Packaged, all-in-one make up air solution
- 700-1770 CFM @ 0.2" static pressure
- Plenum rated for concealed spaces
- Compact design, vertical or horizontal mounting
- Fully modulating electric heat using solid state relay (SSR) technology
- Built-in electronic proportional thermostat, 0-10V DC or 4-20ma
- Includes field installed remote duct sensor connected to thermostat
- Thermostat can be relocated to be used as a wall mounted room thermostat
- Energy efficient ECM motor, 1/3, 1/2HP & 3/4HP
- 5 motor torque settings for field adjustments to meet CFM and temperature rise requirements
- Detailed CFM/static pressure/temperature rise tables to design a perfect trouble-free solution
- Available in 208V, 240V and 480V – single or three phase
- 4KW to 35KW
- Integrated control circuit for connection to: damper, exhaust fans, outside thermostat & humidistat, ect.
- Separate 40VA control power transformer for auxiliary devices
- Side access panel for easy wiring & maintenance
- 20-gauge electro galvanized steel cabinet with corrosion resistant textured paint finish
- Replaceable 1" or 2" filter
- 3-year limited warranty

**The King Clear Air Make-Up Air Unit** is a plenum rated unit, designed to “make up” the air in your interior space that has been removed due to process exhaust fans. The building ventilation and the make-up air system work together to ensure the building pressure is maintained, while eliminating temperature fluctuations and a number of air quality issues. Clear Air MAU preheats the incoming fresh air at the lowest cost, thus continuously providing comfortable ventilation throughout the building. Featuring an energy efficient ECM motor, the Clear Air combines a fan driven fully modulating electric heating unit with a fresh air relay logic control circuit providing an extremely versatile all-in-one packaged unit. The MAU is approved for use in concealed areas of buildings such as an area between a finished ceiling and drop ceiling. It is designed to work with HVAC equipment to provide indoor air quality into a return side or supply side of the ductwork system or alternatively directly into the building space.



The King Clear Air MAU includes the Packaged Make Up Air Unit and Duct Sensor. Other components are common and are purchased separately by the installer.

# Make Up Air Unit CLEAR AIR MAU Series

## Ordering Information

|                        | MODEL                  | VOLTS             | kilo watts | BTUH  | AMPS | PHASE | # of ELEMENTS | INTERNAL C/B | MOTOR HP | MOTOR FLA | WT. (lbs) |
|------------------------|------------------------|-------------------|------------|-------|------|-------|---------------|--------------|----------|-----------|-----------|
| <b>208V</b><br>1-Phase | MAU2004-1-ECM-SSR      | 208               | 3.8        | 12.8  | 18   | 1     | 1             | 60           | 1/3      | 2.7       | 57        |
|                        | MAU2005-1-ECM-SSR      | 208               | 5.0        | 17.1  | 24   | 1     | 1             | 60           | 1/3      | 2.7       | 57        |
|                        | MAU2008-1-ECM-SSR      | 208               | 8.0        | 27.3  | 38   | 1     | 2             | 60           | 1/3      | 2.7       | 57        |
|                        | MAU2010-1-ECM-SSR      | 208               | 10.0       | 34.1  | 48   | 1     | 2             | 60           | 1/3      | 2.7       | 65        |
|                        | MAU2012-1-ECM-SSR      | 208               | 12.0       | 41.0  | 58   | 1     | 3             | 60           | 1/3      | 2.7       | 74        |
|                        | MAU2015-1-ECM-SSR      | 208               | 15.0       | 51.2  | 72   | 1     | 3             | 60+60        | 1/3      | 2.7       | 74        |
|                        | MAU2018-1-ECM-SSR      | 208               | 17.3       | 58.9  | 83   | 1     | 4             | 60+60        | 1/3      | 3.9       | 76        |
|                        | MAU2020-1-ECM-SSR      | 208               | 20.0       | 68.3  | 96   | 1     | 4             | 60+60        | 1/2      | 3.9       | 76        |
|                        | MAU2025-1-ECM-SSR      | 208               | 25.0       | 85.3  | 120  | 1     | 5             | 60+60+60     | 1/2      | 6.0       | 81        |
|                        | MAU2030-1-ECM-SSR      | 208               | 30.0       | 102.4 | 144  | 1     | 6             | 60+60+60     | 3/4      | 6.0       | 85        |
| <b>240V</b><br>1-Phase | MAU2404-1-ECM-SSR      | 240               | 4.0        | 13.7  | 17   | 1     | 1             | 60           | 1/3      | 2.9       | 57        |
|                        | MAU2405-1-ECM-SSR      | 240               | 5.0        | 17.1  | 21   | 1     | 1             | 60           | 1/3      | 2.9       | 57        |
|                        | MAU2408-1-ECM-SSR      | 240               | 8.0        | 27.3  | 33   | 1     | 2             | 60           | 1/3      | 2.9       | 57        |
|                        | MAU2410-1-ECM-SSR      | 240               | 10.0       | 34.1  | 42   | 1     | 2             | 60           | 1/3      | 2.9       | 65        |
|                        | MAU2412-1-ECM-SSR      | 240               | 11.5       | 41.0  | 50   | 1     | 2             | 60           | 1/3      | 2.9       | 74        |
|                        | MAU2415-1-ECM-SSR      | 240               | 15.0       | 51.2  | 63   | 1     | 3             | 60+60        | 1/3      | 2.7       | 74        |
|                        | MAU2418-1-ECM-SSR      | 240               | 17.3       | 58.9  | 72   | 1     | 3             | 60+60        | 1/3      | 2.7       | 74        |
|                        | MAU2420-1-ECM-SSR      | 240               | 20.0       | 68.3  | 83   | 1     | 4             | 60+60        | 1/2      | 4.2       | 76        |
|                        | MAU2425-1-ECM-SSR      | 240               | 25.0       | 85.3  | 104  | 1     | 5             | 60+60+60     | 1/2      | 4.2       | 81        |
|                        | MAU2430-1-ECM-SSR      | 240               | 30.0       | 102.4 | 125  | 1     | 6             | 60+60+60     | 3/4      | 6.2       | 85        |
| <b>480V</b><br>1-Phase | MAU2435-1-ECM-SSR      | 240               | 34.5       | 117.8 | 144  | 1     | 6             | 60+60+60     | 3/4      | 6.2       | 85        |
|                        | MAU4804-1-ECM-SSR      | 480               | 4.0        | 13.7  | 8    | 1     | 1             | NO           | 1/3      | 0.7       | 57        |
|                        | MAU4805-1-ECM-SSR      | 480               | 5.0        | 17.1  | 10   | 1     | 1             | NO           | 1/3      | 0.7       | 57        |
|                        | MAU4808-1-ECM-SSR      | 480               | 8.0        | 27.3  | 17   | 1     | 2             | NO           | 1/3      | 0.7       | 57        |
|                        | MAU4810-1-ECM-SSR      | 480               | 10.0       | 34.1  | 21   | 1     | 2             | NO           | 1/3      | 0.7       | 65        |
|                        | MAU4812-1-ECM-SSR      | 480               | 12.0       | 41.0  | 25   | 1     | 3             | NO           | 1/3      | 0.7       | 74        |
|                        | MAU4815-1-ECM-SSR      | 480               | 15.0       | 51.2  | 31   | 1     | 3             | NO           | 1/3      | 0.7       | 74        |
|                        | MAU4818-1-ECM-SSR      | 480               | 17.3       | 58.9  | 36   | 1     | 3             | NO           | 1/3      | 0.7       | 74        |
|                        | MAU4820-1-ECM-SSR      | 480               | 20.0       | 68.3  | 42   | 1     | 4             | NO           | 1/2      | 1.1       | 76        |
|                        | MAU4825-1-ECM-SSR      | 480               | 25.0       | 85.3  | 52   | 1     | 5             | NO           | 1/2      | 1.1       | 81        |
| <b>208V</b><br>3-Phase | MAU4830-1-ECM-SSR      | 480               | 30.0       | 102.4 | 63   | 1     | 6             | NO           | 3/4      | 1.1       | 85        |
|                        | MAU4835-1-ECM-SSR      | 480               | 34.5       | 117.7 | 72   | 1     | 6             | NO           | 3/4      | 1.1       | 85        |
|                        | MAU2005-3-ECM-SSR      | 208               | 5.0        | 17.1  | 14   | 3     | 1             | 60           | 1/3      | 2.7       | 57        |
|                        | MAU2007-3-ECM-SSR      | 208               | 7.5        | 25.6  | 21   | 3     | 2             | 60           | 1/3      | 2.7       | 57        |
|                        | MAU2010-3-ECM-SSR      | 208               | 10.0       | 34.1  | 28   | 3     | 2             | 60           | 1/3      | 2.7       | 65        |
|                        | MAU2012-3-ECM-SSR      | 208               | 12.5       | 42.7  | 34   | 3     | 3             | 60           | 1/3      | 2.7       | 65        |
|                        | MAU2015-3-ECM-SSR      | 208               | 15.0       | 51.2  | 42   | 3     | 3             | 60           | 1/3      | 2.7       | 74        |
|                        | MAU2020-3-ECM-SSR      | 208               | 20.0       | 68.3  | 56   | 3     | 4             | 60           | 1/2      | 3.9       | 76        |
|                        | MAU2025-3-ECM-SSR      | 208               | 25.0       | 85.3  | 69   | 3     | 5             | 60+60        | 3/4      | 6.0       | 81        |
|                        | MAU2030-3-ECM-SSR      | 208               | 30.0       | 102.4 | 83   | 3     | 6             | 60+60        | 3/4      | 6.0       | 85        |
| <b>240V</b><br>3-Phase | MAU2405-3-ECM-SSR      | 240               | 5.0        | 17.1  | 12   | 3     | 1             | 60           | 1/3      | 2.9       | 57        |
|                        | MAU2410-3-ECM-SSR      | 240               | 10.0       | 34.1  | 24   | 3     | 2             | 60           | 1/3      | 2.9       | 65        |
|                        | MAU2412-3-ECM-SSR      | 240               | 12.0       | 41    | 29   | 3     | 3             | 60           | 1/3      | 2.9       | 74        |
|                        | MAU2415-3-ECM-SSR      | 240               | 15.0       | 51.2  | 36   | 3     | 3             | 60           | 1/3      | 2.9       | 74        |
|                        | MAU2418-3-ECM-SSR      | 240               | 17.3       | 58.9  | 42   | 3     | 3             | 60           | 1/3      | 2.9       | 74        |
|                        | MAU2420-3-ECM-SSR      | 240               | 20.0       | 68.3  | 48   | 3     | 4             | 60           | 1/2      | 4.2       | 76        |
|                        | MAU2425-3-ECM-SSR      | 240               | 25.0       | 85.3  | 60   | 3     | 5             | 60           | 1/2      | 4.2       | 81        |
|                        | MAU2430-3-ECM-SSR      | 240               | 30.0       | 102.4 | 72   | 3     | 6             | 60+60        | 3/4      | 6.2       | 85        |
|                        | MAU2435-3-ECM-SSR      | 240               | 34.5       | 117.7 | 83   | 3     | 6             | 60+60        | 3/4      | 6.2       | 85        |
|                        | <b>480V</b><br>3-Phase | MAU4805-3-ECM-SSR | 480        | 5.0   | 17.1 | 6     | 3             | 1            | NO       | 1/3       | 0.8       |
| MAU4810-3-ECM-SSR      |                        | 480               | 10.0       | 34.1  | 12   | 3     | 2             | NO           | 1/3      | 0.8       | 65        |
| MAU4815-3-ECM-SSR      |                        | 480               | 15.0       | 51.2  | 18   | 3     | 3             | NO           | 1/3      | 0.8       | 74        |
| MAU4818-3-ECM-SSR      |                        | 480               | 17.3       | 58.9  | 21   | 3     | 3             | NO           | 1/3      | 0.8       | 74        |

# Make Up Air Unit CLEAR AIR MAU Series

## Ordering Information

| MODEL             | VOLTS | kilo watts | BTUH  | AMPS | PHASE | # of ELEMENTS | INTERNAL C/B | MOTOR HP | MOTOR FLA | WT. (lbs) |
|-------------------|-------|------------|-------|------|-------|---------------|--------------|----------|-----------|-----------|
| MAU4820-3-ECM-SSR | 480   | 20.0       | 68.3  | 24   | 3     | 4             | NO           | 1/2      | 1.2       | 76        |
| MAU4825-3-ECM-SSR | 480   | 25.0       | 85.3  | 30   | 3     | 5             | NO           | 1/2      | 1.2       | 81        |
| MAU4830-3-ECM-SSR | 480   | 30.0       | 102.4 | 36   | 3     | 6             | NO           | 3/4      | 1.7       | 85        |
| MAU4835-3-ECM-SSR | 480   | 34.5       | 117.7 | 42   | 3     | 6             | NO           | 3/4      | 1.7       | 85        |

## Accessories

| MODEL  | UPC   | DESCRIPTION  | WEIGHT(lbs.) |
|--------|-------|--|--------------|
| KFS-DT | 20186 | Transition from 14" x 14" Outlet to 12" round, discharge side      | 2.5          |
| MAUFH  | 14478 | Filter housing for MAU series heaters (must be ordered separately) | 6.5          |

## Controls Accessories

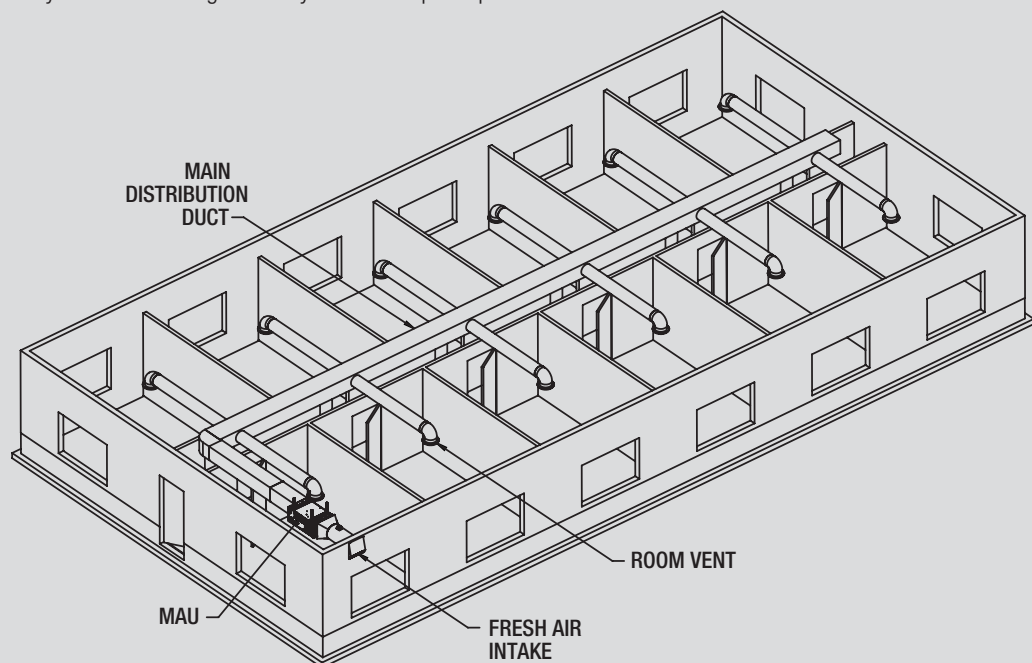
| MODEL   | UPC   | DESCRIPTION   | WEIGHT(lbs.) |
|---------|-------|---|--------------|
| DFC120V | 33445 | Digital Fan Control, 5 Modes of Operation - 120V (Requires -CR120 Factory Installed Option) | 1.0          |

## Factory Installed Options

| ADD SUFFIX: | DESCRIPTION   |
|-------------|---|
| -CR120      | 10 Amp Relay, SPDT w/10-30 Vac/dc/120 Vac Coil that switches the 24V heater control circuit |
| -DS32       | 32 Amp, 3-Pole Disconnect Switch w/ Padlock Provision                                       |
| -DS63       | 63 Amp, 3-Pole Disconnect Switch w/ Padlock Provision                                       |
| -DS100      | 100 Amp, 3-Pole Disconnect Switch w/ Padlock Provision                                      |
| -3/4HP      | Sub 3/4 HP Motor & Blower - 20 kW to 25 kW Model Only                                       |

## Direct Ducting Installation

The Clear Air MAU can be installed to have its own dedicated outdoor fresh air duct system that is filtered, pre-heated and then is distributed DIRECTLY to each room and hallway through register grills. In this way, it acts independently to the primary heating system that could be hydronic, electric zonal heat or a centralized HVAC system. When installed as a direct system, make sure the Temperature rise is sufficient to bring adequate warm tempered air into the building. For example, in a cold climate when the outside air is at 0°F the Temperature rise would need to be at least 70°F to warm the air adequately before delivering it directly to the occupied space.



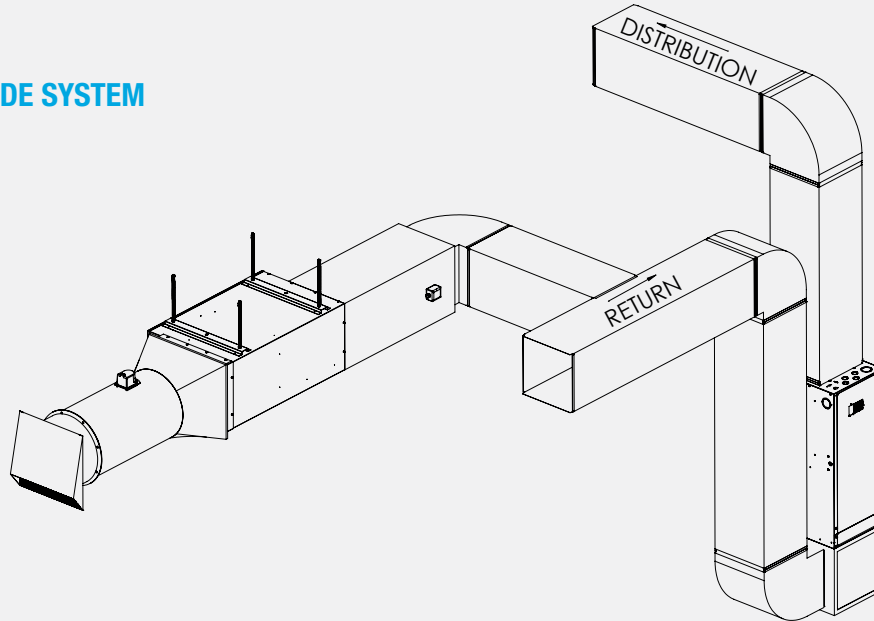


# Make Up Air Unit CLEAR AIR MAU Series

## HVAC Return and Supply Air Ducting Connection

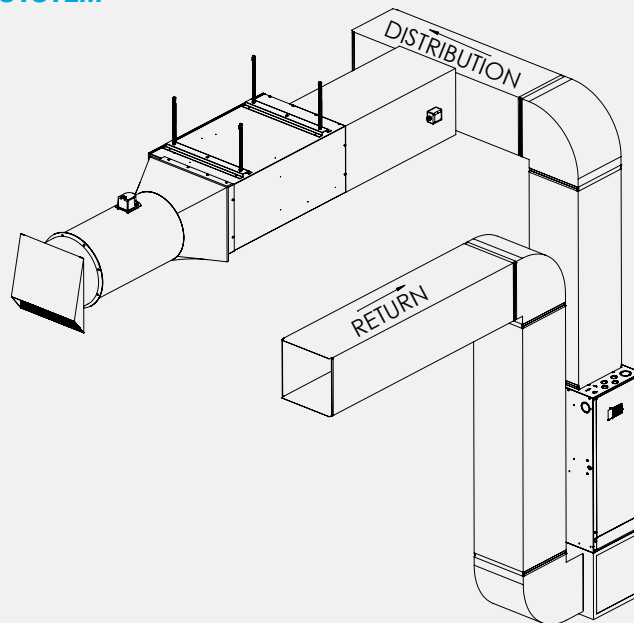
The second method consists of using the furnace distribution system to distribute fresh air. There are two methods of connecting the device to the furnace: Supply air side connection or Return air side connection.

### RETURN AIR SIDE SYSTEM



**Return Connection:** Cut an opening in the return air duct at least 3 feet from the furnace. Connect this opening to the Clear Air MAU.

### DISTRIBUTION AIR SIDE SYSTEM



**Supply Connection:** Cut an opening in the supply air duct, at least 2 ft. from the furnace. Connect this opening to the Clear Air MAU.

# Make Up Air Unit CLEAR AIR MAU Series

**Air Flow Chart** (For 4 to 17.25kW Units with 1/3HP ECM Motor)

| MODEL   | KW    | TORQUE | 0.1"WC |      | 0.2"WC |      | 0.3"WC |      | 0.4"WC |      | 0.5"WC |      | 0.6"WC |      | 0.7"WC |      | 0.8"WC |      | 0.9"WC |      | 1.0"WC |      |     |      |
|---------|-------|--------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|-----|------|
|         |       |        | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM | RISE |
| MAU**04 | 4     | 6.8    | 832    | 15   | 708    | 18   | 593    | 21   | 510    | 25   | 442    | 29   | 374    | 34   | 320    | 39   | 278    | 46   |        |      |        |      |     |      |
|         |       | 9.4    | 1,030  | 12   | 919    | 14   | 826    | 15   | 739    | 17   | 658    | 19   | 594    | 21   | 546    | 23   | 494    | 26   |        |      |        |      |     |      |
|         |       | 12.0   | 1,168  | 11   | 1,085  | 12   | 992    | 13   | 902    | 14   | 835    | 15   | 783    | 16   | 736    | 17   | 700    | 18   |        |      |        |      |     |      |
|         |       | 17.0   | 1,376  | 9    | 1,320  | 10   | 1,259  | 10   | 1,189  | 11   | 1,116  | 11   | 1,060  | 12   | 1,016  | 12   | 987    | 13   |        |      |        |      |     |      |
|         |       | 20.0   | 1,582  | 8    | 1,536  | 8    | 1,462  | 9    | 1,380  | 9    | 1,275  | 10   | 1,192  | 11   | 1,107  | 11   | 1,043  | 12   |        |      |        |      |     |      |
| MAU**05 | 5     | 6.8    | 832    | 19   | 708    | 22   | 593    | 27   | 510    | 31   | 442    | 36   | 374    | 42   | 320    | 49   | 278    | 57   |        |      |        |      |     |      |
|         |       | 9.4    | 1,030  | 15   | 919    | 17   | 826    | 19   | 739    | 21   | 658    | 24   | 594    | 27   | 546    | 29   | 494    | 32   |        |      |        |      |     |      |
|         |       | 12.0   | 1,168  | 14   | 1,085  | 15   | 992    | 16   | 902    | 18   | 835    | 19   | 783    | 20   | 736    | 21   | 700    | 23   |        |      |        |      |     |      |
|         |       | 17.0   | 1,376  | 11   | 1,320  | 12   | 1,259  | 13   | 1,189  | 13   | 1,116  | 14   | 1,060  | 15   | 1,016  | 16   | 987    | 16   |        |      |        |      |     |      |
|         |       | 20.0   | 1,582  | 10   | 1,536  | 10   | 1,462  | 11   | 1,380  | 11   | 1,275  | 12   | 1,192  | 13   | 1,107  | 14   | 1,043  | 15   |        |      |        |      |     |      |
| MAU**08 | 8     | 6.8    | 832    | 30   | 708    | 36   | 593    | 43   | 510    | 50   | 442    | 57   | 374    | 68   | 320    | 79   | 278    | 91   |        |      |        |      |     |      |
|         |       | 9.4    | 1,030  | 25   | 919    | 27   | 826    | 31   | 739    | 34   | 658    | 38   | 594    | 43   | 546    | 46   | 494    | 51   |        |      |        |      |     |      |
|         |       | 12.0   | 1,168  | 22   | 1,085  | 23   | 992    | 25   | 902    | 28   | 835    | 30   | 783    | 32   | 736    | 34   | 700    | 36   |        |      |        |      |     |      |
|         |       | 17.0   | 1,376  | 18   | 1,320  | 19   | 1,259  | 20   | 1,189  | 21   | 1,116  | 23   | 1,060  | 24   | 1,016  | 25   | 987    | 26   |        |      |        |      |     |      |
|         |       | 20.0   | 1,582  | 16   | 1,536  | 16   | 1,462  | 17   | 1,380  | 18   | 1,275  | 20   | 1,192  | 21   | 1,107  | 23   | 1,043  | 24   |        |      |        |      |     |      |
| MAU**10 | 10    | 6.8    | 832    | 38   | 708    | 45   | 593    | 53   | 510    | 62   | 442    | 71   | 374    | 84   | 320    | 99   | 278    | NR   |        |      |        |      |     |      |
|         |       | 9.4    | 1,030  | 31   | 919    | 34   | 826    | 38   | 739    | 43   | 658    | 48   | 594    | 53   | 546    | 58   | 494    | 64   |        |      |        |      |     |      |
|         |       | 12.0   | 1,168  | 27   | 1,085  | 29   | 992    | 32   | 902    | 35   | 835    | 38   | 783    | 40   | 736    | 43   | 700    | 45   |        |      |        |      |     |      |
|         |       | 17.0   | 1,376  | 23   | 1,320  | 24   | 1,259  | 25   | 1,189  | 27   | 1,116  | 28   | 1,060  | 30   | 1,016  | 31   | 987    | 32   |        |      |        |      |     |      |
|         |       | 20.0   | 1,582  | 20   | 1,536  | 21   | 1,462  | 22   | 1,380  | 23   | 1,275  | 25   | 1,192  | 27   | 1,107  | 29   | 1,043  | 30   |        |      |        |      |     |      |
| MAU**12 | 12    | 6.8    | 832    | 46   | 708    | 54   | 593    | 64   | 510    | 74   | 442    | 86   | 374    | 101  | 320    | NR   | 278    | NR   |        |      |        |      |     |      |
|         |       | 9.4    | 1,030  | 37   | 919    | 41   | 826    | 46   | 739    | 51   | 658    | 58   | 594    | 64   | 546    | 69   | 494    | 77   |        |      |        |      |     |      |
|         |       | 12.0   | 1,168  | 32   | 1,085  | 35   | 992    | 38   | 902    | 42   | 835    | 45   | 783    | 48   | 736    | 52   | 700    | 54   |        |      |        |      |     |      |
|         |       | 17.0   | 1,376  | 28   | 1,320  | 29   | 1,259  | 30   | 1,189  | 32   | 1,116  | 34   | 1,060  | 36   | 1,016  | 37   | 987    | 38   |        |      |        |      |     |      |
|         |       | 20.0   | 1,582  | 24   | 1,536  | 25   | 1,462  | 26   | 1,380  | 27   | 1,275  | 30   | 1,192  | 32   | 1,107  | 34   | 1,043  | 36   |        |      |        |      |     |      |
| MAU**15 | 15    | 6.8    | 832    | 57   | 708    | 67   | 593    | 80   | 510    | 93   | 442    | 107  | 374    | NR   | 320    | NR   | 278    | NR   |        |      |        |      |     |      |
|         |       | 9.4    | 1,030  | 46   | 919    | 52   | 826    | 57   | 739    | 64   | 658    | 72   | 594    | 80   | 546    | 87   | 494    | 96   |        |      |        |      |     |      |
|         |       | 12.0   | 1,168  | 41   | 1,085  | 44   | 992    | 48   | 902    | 53   | 835    | 57   | 783    | 61   | 736    | 64   | 700    | 68   |        |      |        |      |     |      |
|         |       | 17.0   | 1,376  | 34   | 1,320  | 36   | 1,259  | 38   | 1,189  | 40   | 1,116  | 42   | 1,060  | 45   | 1,016  | 47   | 987    | 48   |        |      |        |      |     |      |
|         |       | 20.0   | 1,582  | 30   | 1,536  | 31   | 1,462  | 32   | 1,380  | 34   | 1,275  | 37   | 1,192  | 40   | 1,107  | 43   | 1,043  | 45   |        |      |        |      |     |      |
| MAU**18 | 17.25 | 6.8    | 832    | 66   | 708    | 77   | 593    | 92   | 510    | 107  | 442    | NR   | 374    | NR   | 320    | NR   | 278    | NR   |        |      |        |      |     |      |
|         |       | 9.4    | 1,030  | 53   | 919    | 59   | 826    | 66   | 739    | 74   | 658    | 83   | 594    | 92   | 546    | 100  | 494    | 110  |        |      |        |      |     |      |
|         |       | 12.0   | 1,168  | 47   | 1,085  | 50   | 992    | 55   | 902    | 60   | 835    | 65   | 783    | 70   | 736    | 74   | 700    | 78   |        |      |        |      |     |      |
|         |       | 17.0   | 1,376  | 40   | 1,320  | 41   | 1,259  | 43   | 1,189  | 46   | 1,116  | 49   | 1,060  | 51   | 1,016  | 54   | 987    | 55   |        |      |        |      |     |      |
|         |       | 20.0   | 1,582  | 34   | 1,536  | 35   | 1,462  | 37   | 1,380  | 40   | 1,275  | 43   | 1,192  | 46   | 1,107  | 49   | 1,043  | 52   |        |      |        |      |     |      |

**Air Flow Chart** (For 20 to 25kW Units with 1/2HP ECM Motor)

| MODEL   | KW | TORQUE | 0.1"WC |      | 0.2"WC |      | 0.3"WC |      | 0.4"WC |      | 0.5"WC |      | 0.6"WC |      | 0.7"WC |      | 0.8"WC |      | 0.9"WC |      | 1.0"WC |      |     |      |
|---------|----|--------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|-----|------|
|         |    |        | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM    | RISE | CFM | RISE |
| MAU**20 | 20 | 15.0   |        |      | 1,258  | 50   | 1,262  | 50   | 1,193  | 53   | 1,132  | 56   | 1,054  | 60   | 910    | 69   | 834    | 76   | 821    | 77   | 705    | 90   |     |      |
|         |    | 19.0   |        |      | 1,466  | 43   | 1,419  | 45   | 1,300  | 49   | 1,285  | 49   | 1,218  | 52   | 1,180  | 54   | 1,015  | 62   | 979    | 65   | 934    | 68   |     |      |
|         |    | 22.5   |        |      | 1,575  | 40   | 1,570  | 40   | 1,564  | 40   | 1,363  | 46   | 1,347  | 47   | 1,284  | 49   | 1,256  | 50   | 1,200  | 53   | 1,152  | 55   |     |      |
|         |    | 26.0   |        |      | 1,690  | 37   | 1,679  | 38   | 1,640  | 39   | 1,546  | 41   | 1,472  | 43   | 1,430  | 44   | 1,378  | 46   | 1,358  | 47   | 1,315  | 48   |     |      |
|         |    | 30.0   |        |      | 1,771  | 36   | 1,766  | 36   | 1,723  | 37   | 1,728  | 37   | 1,569  | 40   | 1,542  | 41   | 1,522  | 42   | 1,487  | 43   | 1,415  | 45   |     |      |
| MAU**25 | 25 | 15.5   |        |      | 1,258  | 63   | 1,262  | 63   | 1,193  | 66   | 1,132  | 70   | 1,054  | 75   | 910    | 87   | 834    | 95   | 821    | 96   | 705    | NR   |     |      |
|         |    | 19.0   |        |      | 1,466  | 54   | 1,419  | 56   | 1,300  | 61   | 1,285  | 61   | 1,218  | 65   | 1,180  | 67   | 1,015  | 78   | 979    | 81   | 934    | 85   |     |      |
|         |    | 22.5   |        |      | 1,575  | 50   | 1,570  | 50   | 1,564  | 51   | 1,363  | 58   | 1,347  | 59   | 1,284  | 62   | 1,256  | 63   | 1,200  | 66   | 1,152  | 69   |     |      |
|         |    | 26.0   |        |      | 1,690  | 47   | 1,679  | 47   | 1,640  | 48   | 1,546  | 51   | 1,472  | 54   | 1,430  | 55   | 1,378  | 57   | 1,358  | 58   | 1,315  | 60   |     |      |
|         |    | 30.0   |        |      | 1,771  | 45   | 1,766  | 45   | 1,723  | 46   | 1,728  | 46   | 1,569  | 50   | 1,542  | 51   | 1,522  | 52   | 1,487  | 53   | 1,415  | 56   |     |      |

A \*\* Represents the voltage, 20=208V, 24=240V, 48=480V. Voltage of the MAU unit does not affect the data in this table.

B NR= Not Recommended, Temperature Rise is above maximum design parameter.

C The highlighted cells are the factory default torque setting for each model. The ECM motor has 5 field adjustable torque settings, allowing for a wide range of design choices.

E Blower: 10" diameter, 8" wide

# Make Up Air Unit CLEAR AIR MAU Series

**Air Flow Chart** (For 20 to 25kW Units with OPTIONAL 3/4HP ECM Motor)

| MODEL   | KW | 0.1"WC |       | 0.2"WC |       | 0.3"WC |       | 0.4"WC |       | 0.5"WC |       | 0.6"WC |       | 0.7"WC |       | 0.8"WC |       | 0.9"WC |       | 1.0"WC |       |      |
|---------|----|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|------|
|         |    | TORQUE | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE |
| MAU**20 | 20 |        |       | (F)    |       |        |       |        |       |        |       |        |       |        |       |        |       |        |       |        |       |      |
|         |    | 26.0   |       |        | 1,592 | 40     | 1,592 | 40     | 1,581 | 40     | 1,551 | 41     | 1,529 | 41     | 1,496 | 42     | 1,432 | 44     | 1,353 | 47     | 1,231 | 51   |
|         |    | 30.0   |       |        | 1,789 | 35     | 1,758 | 36     | 1,716 | 37     | 1,650 | 38     | 1,598 | 40     | 1,552 | 41     | 1,451 | 41     | 1,451 | 44     | 1,282 | 49   |
|         |    | 35.0   |       |        | 1,814 | 35     | 1,819 | 35     | 1,828 | 35     | 1,866 | 34     | 1,849 | 34     | 1,794 | 35     | 1,688 | 37     | 1,561 | 40     | 1,316 | 48   |
|         |    | 40.5   |       |        | 2,080 | 30     | 2,122 | 30     | 2,082 | 30     | 2,054 | 31     | 1,916 | 33     | 1,814 | 35     | 1,700 | 37     | 1,482 | 43     | 1,230 | 51   |
| MAU**25 | 25 | 45.0   |       |        | 2,174 | 29     | 2,154 | 29     | 2,148 | 29     | 2,138 | 30     | 2,094 | 30     | 1,928 | 33     | 1,671 | 38     | 1,471 | 43     | 1,232 | 51   |
|         |    | 26.0   |       |        | 1,592 | 50     | 1,592 | 50     | 1,581 | 50     | 1,551 | 51     | 1,529 | 52     | 1,496 | 53     | 1,432 | 55     | 1,353 | 58     | 1,231 | NR   |
|         |    | 30.0   |       |        | 1,789 | 44     | 1,758 | 45     | 1,716 | 46     | 1,692 | 47     | 1,650 | 48     | 1,598 | 49     | 1,552 | 51     | 1,451 | 54     | 1,282 | 62   |
|         |    | 35.0   |       |        | 1,814 | 44     | 1,819 | 43     | 1,828 | 43     | 1,866 | 42     | 1,849 | 43     | 1,794 | 44     | 1,688 | 47     | 1,561 | 51     | 1,316 | 60   |
|         |    | 40.5   |       |        | 2,080 | 38     | 2,122 | 37     | 2,082 | 38     | 2,054 | 38     | 1,916 | 41     | 1,814 | 44     | 1,700 | 46     | 1,482 | 53     | 1,230 | 64   |
|         |    |        | 2,174 | 36     | 2,154 | 37     | 2,139 | 37     | 2,138 | 37     | 2,094 | 38     | 1,928 | 41     | 1,671 | 47     | 1,471 | 54     | 1,232 | 64     |       |      |

**Air Flow Chart** (For 30 to 35kW Units with 3/4HP ECM Motor)

| MODEL      | KW | 0.1"WC |       | 0.2"WC |       | 0.3"WC |       | 0.4"WC |       | 0.5"WC |       | 0.6"WC |       | 0.7"WC |       | 0.8"WC |       | 0.9"WC |       | 1.0"WC |       |      |
|------------|----|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|--------|-------|------|
|            |    | TORQUE | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE   | CFM   | RISE |
| KF/KFS**30 | 30 |        |       | (F)    |       |        |       |        |       |        |       |        |       |        |       |        |       |        |       |        |       |      |
|            |    | 26.0   |       |        | 1,592 | 60     | 1,592 | 60     | 1,581 | 60     | 1,551 | 61     | 1,529 | 62     | 1,496 | 63     | 1,432 | NR     | 1,353 | NR     | 1,231 | NR   |
|            |    | 30.0   |       |        | 1,789 | 53     | 1,758 | 54     | 1,716 | 55     | 1,692 | 56     | 1,650 | 57     | 1,598 | 59     | 1,552 | 61     | 1,451 | 65     | 1,282 | 74   |
|            |    | 35.0   |       |        | 1,814 | 52     | 1,819 | 52     | 1,828 | 52     | 1,866 | 51     | 1,849 | 51     | 1,794 | 53     | 1,688 | 56     | 1,561 | 61     | 1,316 | 72   |
|            |    | 40.5   |       |        | 2,080 | 46     | 2,122 | 45     | 2,082 | 46     | 2,054 | 46     | 1,916 | 49     | 1,814 | 52     | 1,700 | 56     | 1,482 | 64     | 1,230 | 77   |
| KF/KFS**35 | 35 | 45.0   |       |        | 2,174 | 44     | 2,154 | 44     | 2,148 | 44     | 2,138 | 44     | 2,094 | 45     | 1,928 | 49     | 1,671 | 57     | 1,471 | 64     | 1,232 | 77   |
|            |    | 26.0   |       |        | 1,592 | 69     | 1,592 | 69     | 1,581 | 60     | 1,551 | 71     | 1,529 | 72     | 1,496 | NR     | 1,432 | NR     | 1,353 | NR     | 1,231 | NR   |
|            |    | 30.0   |       |        | 1,789 | 62     | 1,758 | 63     | 1,716 | 64     | 1,692 | 65     | 1,650 | 67     | 1,598 | 69     | 1,552 | 71     | 1,451 | NR     | 1,282 | NR   |
|            |    | 35.0   |       |        | 1,814 | 61     | 1,819 | 61     | 1,828 | 60     | 1,866 | 59     | 1,849 | 60     | 1,794 | 62     | 1,688 | 66     | 1,561 | 71     | 1,316 | 84   |
|            |    | 40.5   |       |        | 2,080 | 53     | 2,122 | 52     | 2,082 | 53     | 2,054 | 54     | 1,916 | 58     | 1,814 | 61     | 1,700 | 65     | 1,482 | 75     | 1,230 | 90   |
|            |    |        | 2,174 | 51     | 2,154 | 51     | 2,148 | 52     | 2,138 | 52     | 2,094 | 53     | 1,928 | 57     | 1,671 | 66     | 1,471 | 75     | 1,232 | 90     |       |      |

A \*\* Represents the voltage, 20=208V, 24=240V, 48=480V. Voltage of the MAU unit does not affect the data in this table.  
 B NR= Not Recommended, Temperature Rise is above maximum design parameter.  
 C The highlighted cells are the factory default torque setting for each model. The ECM motor has 5 field adjustable torque settings, allowing for a wide range of design choices.  
 E Blower: 10" diameter, 8" wide

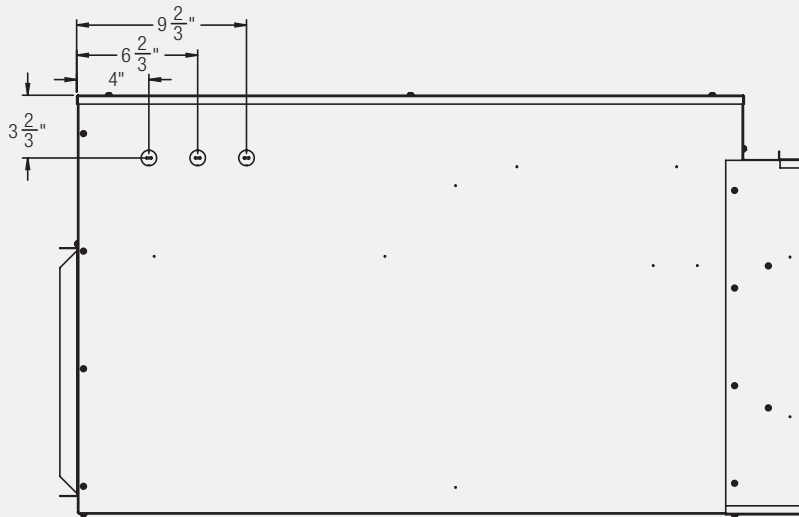
## Airflow Design Considerations

The King Clear Air MAU has a wide range of airflow options that can be field adjusted to match the needs of a specific installation. Providing fresh air into a building has several design parameters that must be taken into consideration:

1. The amount of fresh air required is normally calculated as Cubic Feet per Minute (CFM) per person or CFM per square feet of the building or a room. The required CFM can also be designed to meet a specific exhaust air condition such as in a commercial kitchen where the MAU is set to match the exhaust air of the cooking hoods.
2. Static pressure is one of the most important factors in HVAC design. Simply put, static pressure refers to the resistance to airflow in a heating and cooling system's components and duct work. To determine operating total external static pressure, measure pressures where air enters and leaves the MAU equipment. Add the two readings together to find total external static pressure. Make sure not to exceed the external static pressures listed in the design tables, doing so will cause harm the equipment.
3. Temperature rise or Delta T is the difference between the incoming air temperature and the discharge temperature of the MAU. In make-up air applications the required temperature rise is influenced by the geographic territory where colder climates require much more heat capacity to temper cold incoming air into the building. Another factor to consider is whether the fresh air is delivered directly such as to a room, hallway or delivered to the supply side of an HVAC system where the conditioned air might need to be 70F versus the fresh air being delivered to the return air intake where the design temperature could be 55F. Under sizing the MAU could lead to insufficient delivery temperatures causing colder than desired air to enter the building.

# Make Up Air Unit CLEAR AIR MAU Series

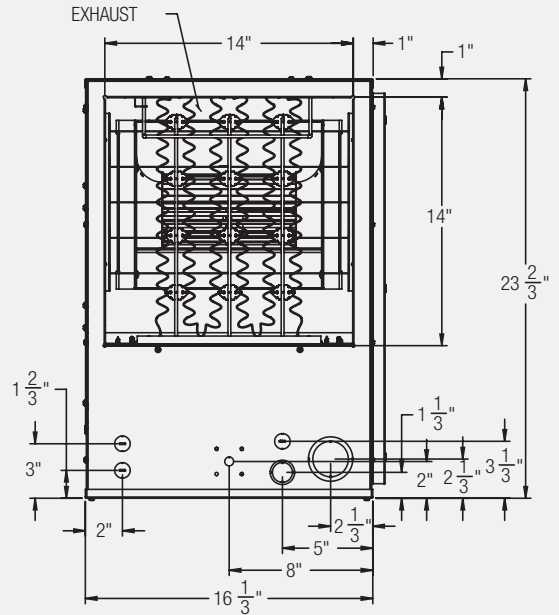
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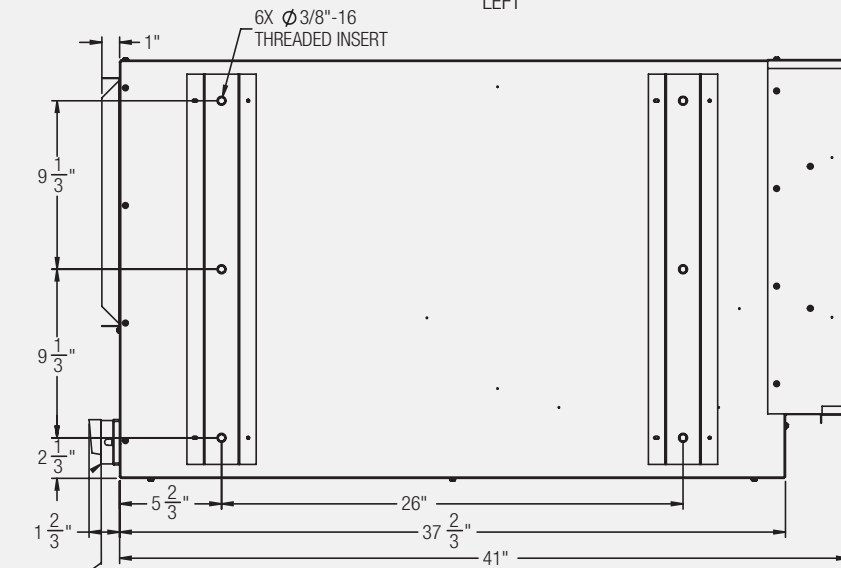
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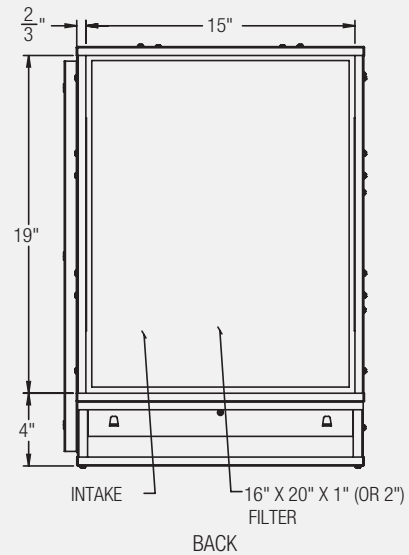
LEFT



FRONT



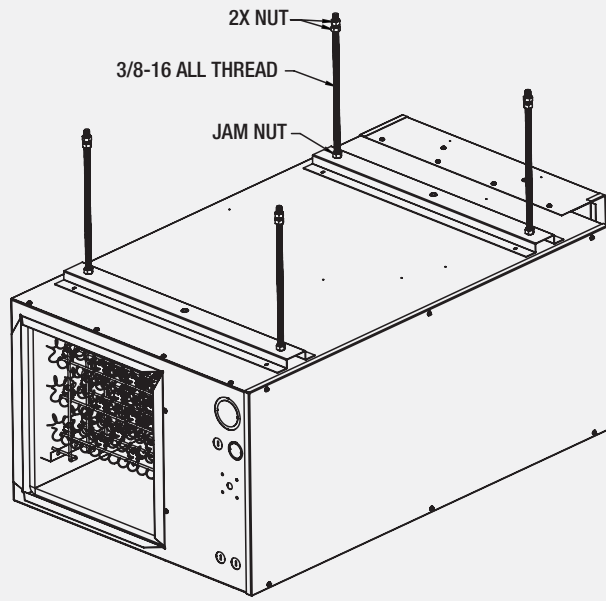
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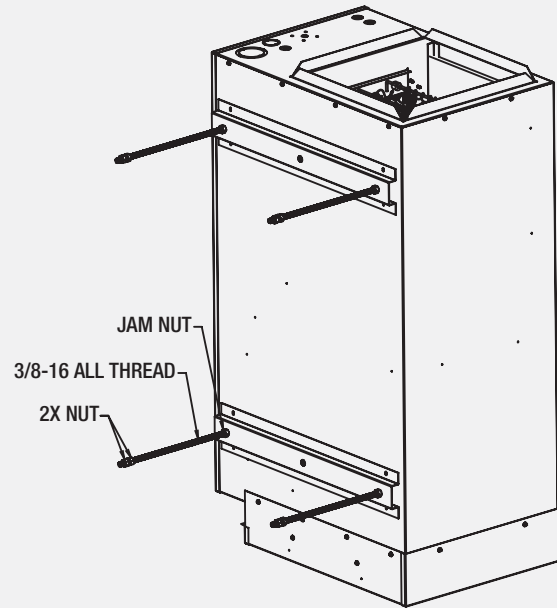
BACK

# Make Up Air Unit CLEAR AIR MAU Series

## Horizontal/Vertical Mounting Illustration



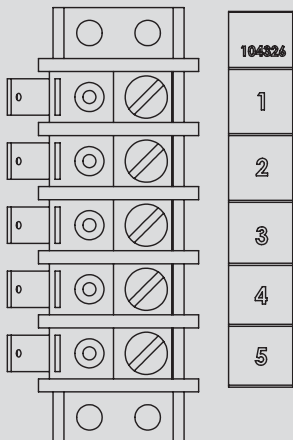
**Horizontal**



**Vertical**

## Motor Torque Field Adjustment

The versatility of the King Clear Air MAU allows for the ECM motor torque to be adjusted in the field. Pressure test the system to find the actual external static pressure, then fine tune the system by adjusting the motor torque setting. The goal is to meet the CFM/Temperature rise combination for the intended design criteria. The ECM motor is pre-programmed with 5 torque values and terminated at the 5-point terminal strip as shown below.



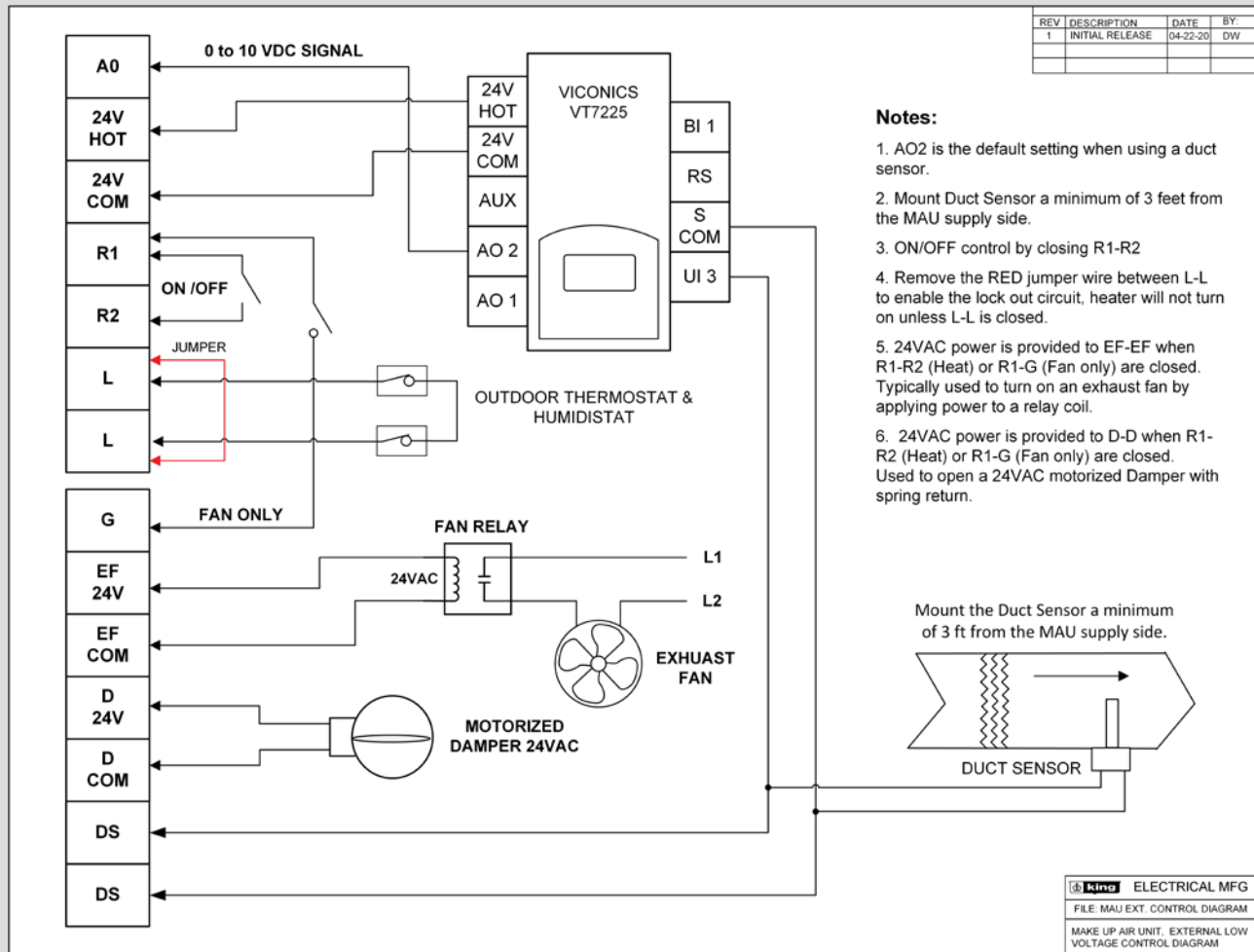
| Motor Tap# | 1/3 HP Torque | 1/2 HP Torque | 3/4 HP Torque | Wire Color   |
|------------|---------------|---------------|---------------|--------------|
| 1          | 6.8 in-lb.    | 15.0 in-lb.   | 26.0 in-lb.   | RED          |
| 2          | 9.4 in-lb.    | 19.0 in-lb.   | 30.0 in-lb.   | ORANGE       |
| 3          | 12.0 in-lb.   | 22.5 in-lb.   | 35.0 in-lb.   | BLACK        |
| 4          | 17.0 in-lb.   | 26.0 in-lb.   | 40.5 in-lb.   | ORANGE/BLACK |
| 5          | 20.0 in-lb.   | 30.0 in-lb.   | 45.0 in-lb.   | BROWN/BLACK  |



**ECM Motor**



# Make Up Air Unit CLEAR AIR MAU Series



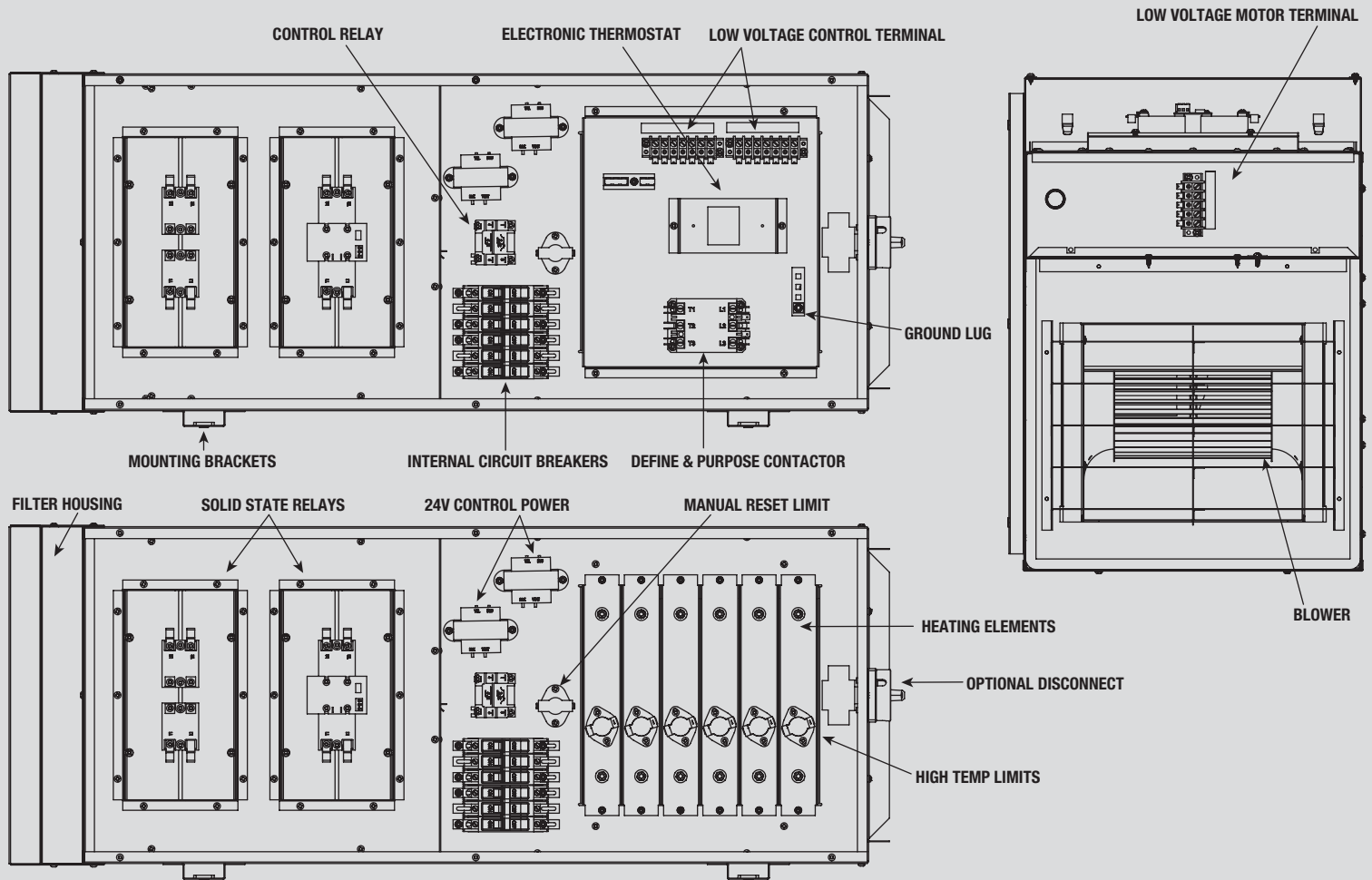
## Low Voltage Control Wiring

The King Clear Air MAU has a built-in relay logic control circuit enabling other make up air components to be controlled directly by the MAU. Review all the system components such as the damper, exhaust fans, outside thermostat and humidistat. All the control options are prewired to a 14-point terminal strip making them easy to integrate by the installer. The control circuit does not require any programming, simply enabled the control features by wiring the external components directly to the MAU low voltage terminal strip. List of control features:

1. R1-R2, ON/OFF control of the MAU. Closing this circuit via a dry contact will turn on the fan and the modulating heating circuit. This is often done by a building management system, but other common methods are to be activated by a current transformer (CT) on an exhaust fan, a timer, or a manual switch. Once on, the Solid-State Relay (SSR) regulates the wattage to the heating elements to accurately control the discharge air temperature from the MAU regardless of the incoming outdoor air temperature.
2. AO, proportional signal from the built-in thermostat (0-10VDC) that drives the SSR to modulate the heat output.
3. DS-DS, DUCT SENSOR, the field installed duct sensor is connected to thermostat for controlling and maintaining the output temperature, type 2 NTC thermistor, 10K ohms.
4. 24V HOT - 24V COM, these are the 24VAC connections to the modulating thermostat.
5. L-L, LOCKOUT CIRCUIT, the controller can be wired to an optional outdoor thermostat and/or a humidistat by using the 'L-L' terminals to prevent the MUA from turning on. Remove the factory set jumper to activate this feature. This feature can also be used to monitor indoor activity such as an occupancy sensor and CO2 sensor.
6. G, FAN ONLY, closing G-R1 will turn on the fan and bypass the modulating heating circuit. No heat in this mode.
7. EF-EF, EXHAUST FAN, provides a switched 24VAC circuit to connect a fan relay that will turn on an exhaust fan relay or other auxiliary device.
8. D-D, DAMPER, provides a switched 24VAC circuit to connect to a motorized damper with spring return. Note: 40VA maximum for the sum of EF-EF and D-D.

**Note:** If the design calls for a room thermostat, the inbuilt thermostat and duct sensor can be removed. Place the thermostat in the new room location and extend the wiring connections from the MAU low voltage terminal strip, connect AO on the terminal strip to AO 2 on the thermostat when used as a room thermostat without a duct sensor.

# Make Up Air Unit CLEAR AIR MAU Series



## Engineering Specifications

Contractor shall furnish and install King Make up air unit (MAU) manufactured by King Electrical Manufacturing.

**Motor:** Direct drive high efficiency, thermally protected, permanently lubricated ECM motor, no belts to adjust or maintain.

**Motor Terminal:** The MAU shall have a 5-point terminal block to easily field adjust the motor torque setting of the ECM motor.

**Modulating Heat:** 100% fully modulating heating control through Solid State Relay (SSR) technology. The SSR relays shall be mounted in the blower compartment to allow the free flow of incoming air to cool the heat sinks.

**Thermostat:** The MAU shall be controlled by an electronic proportional thermostat using a 0 to 10VDC of 4 to 20ma signal. The inbuilt thermostat can be removed and relocated to room and used as a wall mounted thermostat.

**Duct Sensor:** The MAU shall be provided with a field installed duct sensor, type 2 NTC thermistor, 10K ohms.

**Heating Elements:** Quick heating, long life Ni-Chrome elements supported by a steel frame and insulated with ceramic holders.

**LV Terminal Block:** All low voltage wires are terminated at a 14-point block with factory side quick connects and field side screw terminals.

**Control Circuit:** The MAU shall have a relay logic control circuit providing a dedicated 24V power supply that is switched to activate external devices such as: a damper, exhaust fan, etc..

**Lockout Circuit:** The MAU shall have a lockout circuit for auxiliary devices such as an outside thermostat or humidistat to prevent the MUA from turning on unless predetermined conditions are met.

**Overcurrent Protection:** The MAU shall have a 24V high temperature limit circuit wired in series to protect each individual heating element. In addition, it shall have one electrically held manual limit monitoring the condition of entire unit. If tripped, this limit must be manually reset by shutting off the power, waiting several minutes and then turning the power back on. This provides an extra level of overheating protection to the unit.

**Enclosure:** The MAU shall be constructed from 20GA electrogalvanized sheet metal of welded construction and finished with a corrosion resistant gray finished. Unpainted sheet steel is not acceptable. Access to the wiring compartment shall be from the side for easy wiring and maintenance. The unit shall have welded brackets with 6 - 3/8" weld nuts for sturdy mounting either vertically or horizontally. Provide both Line voltage and Low voltage knockouts to speed contractor installation. Provide knockouts for an optional disconnect.

**Blower:** Centrifugal dual inlet blower shall be used, axial fans not permitted. Blower shall be rigidly mounted to the enclosure with internal welded mounting brackets.

**Optional Disconnect:** The unit shall have the option to mount an internal Supply Power Disconnect.

**Approvals:** UL: The MAU shall be Underwriters Laboratory (UL) approved and labeled. Meets UL1995 standards and stringent City of Chicago codes for plenum use.