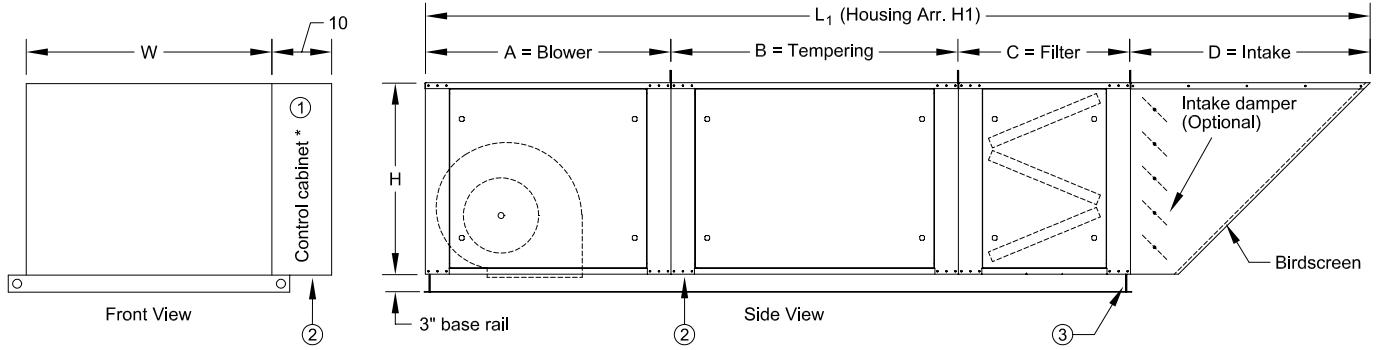


# MODEL MUA TEMPERED MAKE-UP AIR UNIT



\* See note 10 below

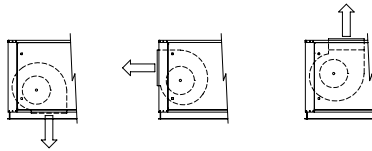
- ① Electrical connection
- ② Heater connection(s)
- ③ Lifting lugs (4)

Select type:

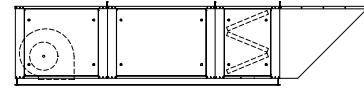
- EC - Electric heater
- HW - Hot Water Coil
- ST - Steam Coil
- CW - Chilled Water Coil
- DX - Dx Cooling Coil

Select one:

- Down Discharge
- End Discharge
- Top Discharge



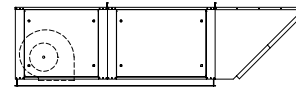
H1 Housing  
V-bank filters with intake hood



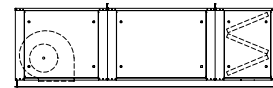
Select one:

- H1 Housing
- H2 Housing
- H3 Housing

H2 Housing  
Flat filters in the intake hood



H3 Housing  
V-bank filters, no intake hood




\* Optional intake damper adds 8" to the L<sub>3</sub> length.

## Notes:

1. Intake hood ships loose.
2. Access doors typical on both sides.
3. Refer to SD-MUA-INFO for CFM ranges, filter sizes, weights, curb cap sizes, blower openings, and a bottom view.
4. Consult the factory for drawings of vertical or return air units.
5. Refer to SD-MUA-CURB for curb options and dimensions.
6. Refer to SD-IFG for Indirect Fired Make-up Air Heaters.
7. Refer to SD-DFG for Direct Fired Make-up Air Heaters.
8. Refer to SD-NTS for Non-tempered Supply Units.
9. Refer to SD-EVAP for Evaporative Coolers.
10. The control cabinet is a part of the tempering section. It extends out 10" to one side as shown in the front view. It may contain the electric heater controls or the coil headers. It may also contain any other optional controls included with the unit.

| Model   | Housing | A  | B  | C  | D  | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> * | H  | W    |
|---------|---------|----|----|----|----|----------------|----------------|------------------|----|------|
|         |         |    |    |    |    | H1 Hsg.        | H2 Hsg.        | H3 Hsg.          |    |      |
| MUA-109 | #1      | 33 | 48 | 28 | 34 | 143            | 115            | 109              | 26 | 33   |
| MUA-110 |         |    |    |    |    |                |                |                  |    |      |
| MUA-110 | #2      | 41 | 48 | 29 | 40 | 158            | 129            | 118              | 32 | 41   |
| MUA-112 |         |    |    |    |    |                |                |                  |    |      |
| MUA-115 |         |    |    |    |    |                |                |                  |    |      |
| MUA-115 | #3      | 57 | 48 | 28 | 54 | 187            | 159            | 133              | 46 | 52.5 |
| MUA-118 |         |    |    |    |    |                |                |                  |    |      |
| MUA-120 |         |    |    |    |    |                |                |                  |    |      |
| MUA-215 | #4      | 57 | 48 | 28 | 54 | 187            | 159            | 133              | 46 | 101  |
| MUA-218 |         |    |    |    |    |                |                |                  |    |      |
| MUA-220 |         |    |    |    |    |                |                |                  |    |      |

To maintain KEES' policy of continuous product improvement, we reserve the right to change prices, specifications, ratings, or dimensions without prior notice or obligation.

|                   |  |  |                 |               |   |  |
|-------------------|--|--|-----------------|---------------|---|--|
| <b>Project</b>    |  |  | <b>Location</b> |               |   |  |
| <b>Engineer</b>   |  |  |                 |               |  <b>KEES INCORPORATED</b><br>400 S. Industrial Dr. • P.O. Box L<br>Elkhart Lake, WI 53020<br>Phone: (920) 876-3391<br>Fax: (920) 876-3065<br>Website: www.kees.com |  |
| <b>Architect</b>  |  |  | <b>Dwg No.</b>  | <b>SD-MUA</b> |   |  |
| <b>Contractor</b> |  |  | <b>Date</b>     | <b>08/09</b>  |   |  |
|                   |  |  |                 |               |   |  |

# MODEL MUA TEMPERED MAKE-UP AIR UNIT

| Qty. | Model | CFM | S.P. | BHP | RPM | HP | Volts | Ph. | BTU (KW) | Tag |
|------|-------|-----|------|-----|-----|----|-------|-----|----------|-----|
|      |       |     |      |     |     |    |       |     |          |     |
|      |       |     |      |     |     |    |       |     |          |     |

## General Construction

### Housing

- Galvanized steel
- 1" fiberglass insulation
- Weatherproof construction
- Large access panels

### Housing Options

- Painted housing - machinery grey
- Painted housing - special color: \_\_\_\_\_
- Double wall insulation
- Foil faced insulation
- Hinged access doors

### Blower Section

- Forward curved, DWDI blower
- Precision machined steel shaft
- Blower wheels statically and dynamically balanced
- Adjustable V-belt drives
- Pulleys and belts selected for not less than 165% of driven HP
- Fan and motor mounted on vibration isolators
- Self-aligning pre-lubricated bearings
- EPACT rated motor
  - ODP (standard)
  - TEFC
  - Two speed
  - Other \_\_\_\_\_

### Electrical

- Unit is field wired (standard)
- Optional
  - Disconnect switch only (mounted and wired to motor)
    - \_\_\_\_\_ NEMA1
    - \_\_\_\_\_ NEMA3R
  - Motor control center with disconnect switch, one motor starter, fuse blocks and control transformer; single point wiring.
  - Extra motor starters:
    - \_\_\_\_\_ HP
    - \_\_\_\_\_ HP
  - Other \_\_\_\_\_

### Tempering Section

- Electric heater** - UL listed, open coil heating elements, non-fused door interlocking disconnect switch, de-energizing contactors, fused control transformer, circuit fusing per NEC, air flow switch. Separate power source is required.
  - Step controller with ductstat \_\_\_\_\_ # of steps
  - Other \_\_\_\_\_
- Heating/cooling coil** - Factory tested and rated in accordance with ARI 410, copper tubes and aluminum fins. Drain pan on coiling coils. All controls, valves, compressors, etc. are to be supplied by others.
  - Hot water    Steam    Chilled water    Direct expansion
  - \_\_\_\_\_ Rows
  - \_\_\_\_\_ Fins per inch
  - Face and bypass dampers for heating coil (controls by others)

## Optional Accessories

### Damper Options

- Motorized intake damper (mounted)
- Motorized discharge damper (field installed)
- End switch on damper
- Return air (requires drawing from factory)

### Curb Options \_\_\_\_\_ Height

- Modular curb and rail (Arrangement A1)
- Roof curb and rail (Arrangement A2)
- Two support rails (Arrangement A3)
- Full perimeter curb (Arrangement A4)

### Filter Options \_\_\_\_\_ Thickness

- Aluminum cleanable
- Fiberglass throw-away (V-bank only)
- 30% efficient pleated (V-bank only)
- Other \_\_\_\_\_

### Other Options

- Remote control panel
- Enclosure - surface mounted
  - NEMA12 plastic enclosure (standard)
  - Metal enclosure (NEMA rating: \_\_\_\_\_)
- 2-Position switches
  - Fan    Heat    Cool    Hood lights
- Indicator lights
  - Fan    Heat    Cool    Hood lights
  - Alarm    Filter    Other \_\_\_\_\_
- 3-Position switches
  - Heat-Off-Cool    Summer-Off-Winter
  - Fan-Off-Auto    Other \_\_\_\_\_
- Mild weather thermostat (inlet air sensor)
- Low temperature limit (freezestat)
- Clogged filter switch
- Convenience outlet (115V service receptacle)
- Time clock
- Occupied/Unoccupied (Night setback)
- Discharge diffuser (3-way or 4-way)
- Evaporative cooling (refer to SD-EVAP)
- Other \_\_\_\_\_

To maintain KEES' policy of continuous product improvement, we reserve the right to change prices, specifications, ratings, or dimensions without prior notice or obligation.

|                   |  |                 |   |  |  |               |
|-------------------|--|-----------------|---|--|--|---------------|
| <b>Project</b>    |  | <b>Location</b> |   |  |  |               |
| <b>Engineer</b>   |  |                 | <b>KEES INCORPORATED</b><br>400 S. Industrial Dr. • P.O. Box L<br>Elkhart Lake, WI 53020<br>Phone: (920) 876-3391<br>Fax: (920) 876-3065<br>Website: www.kees.com |  |  |               |
| <b>Architect</b>  |  | <b>Dwg No.</b>  |   |  |  | <b>SD-MUA</b> |
| <b>Contractor</b> |  | <b>Date</b>     |   |  |  | <b>08/09</b>  |

# MODEL MUA GENERAL INFORMATION

## CFM Information

| Model      | Housing Size | Blower CFM Limits |         | Dx or Chilled<br>Water Coil | Maximum CFM, Size and Area |                       |                    |
|------------|--------------|-------------------|---------|-----------------------------|----------------------------|-----------------------|--------------------|
|            |              | Minimum           | Maximum |                             | Steam or Hot<br>Water Coil | Evaporative<br>Cooler | Electric<br>Heater |
| MUA-109-SM | #1           | 600               | 1,600   | 2,200                       | 3,300                      | 2,700                 | No Limitations     |
| MUA-109    |              | 1,000             | 2,600   | 21" x 31"                   | 21" x 31"                  | 24" x 29"             |                    |
| MUA-110    |              | 1,200             | 3,600   | 4.4 Sqft.                   | 4.4 Sqft.                  | 4.9 Sqft.             |                    |
| MUA-110    | #2           | 1,200             | 3,600   | 3,700                       | 5,500                      | 4,300                 | No Limitations     |
| MUA-112    |              | 1,800             | 5,000   | 27" x 39"                   | 27" x 39"                  | 30" x 37"             |                    |
| MUA-115    |              | 3,000             | 7,000   | 7.3 Sqft.                   | 7.3 Sqft.                  | 7.8 Sqft.             |                    |
| MUA-115    | #3           | 3,000             | 7,000   | 7,200                       | 11,000                     | 8,200                 | No Limitations     |
| MUA-118    |              | 4,000             | 10,000  | 42" x 50"                   | 42" x 50"                  | 44" x 49"             |                    |
| MUA-120    |              | 5,000             | 12,000  | 14.6 Sqft.                  | 14.6 Sqft.                 | 14.9 Sqft.            |                    |
| MUA-120-HD | #4           | 5,000             | 15,000  |                             |                            |                       |                    |
| MUA-215    |              | 6,000             | 14,000  | 13,000                      | 20,000                     | 16,500                | No Limitations     |
| MUA-218    |              | 8,000             | 20,000  | 42" x 89"                   | 42" x 89"                  | 44" x 97"             |                    |
| MUA-220    |              | 10,000            | 30,000  | 26.0 Sqft.                  | 26.0 Sqft.                 | 30.0 Sqft.            |                    |

## Filter Information


| Model      | Housing Size | V-bank Filters    |                  | Filters in Intake Hood |                  | Special Filters*  |                  |
|------------|--------------|-------------------|------------------|------------------------|------------------|-------------------|------------------|
|            |              | Quantity/<br>Area | CFM @<br>500 FPM | Quantity/<br>Area      | CFM @<br>500 FPM | Quantity/<br>Area | CFM @<br>500 FPM |
| MUA-109-SM | #1           | (4) 16" x 20"     | 4,400            | (2) 16" x 25"          | 2,800            | (2) 16" x 20"     | 2,200            |
| MUA-109    |              | 8.9 Sqft.         |                  | 5.6 Sqft.              |                  | 4.4 Sqft.         |                  |
| MUA-110    |              |                   |                  |                        |                  |                   |                  |
| MUA-110    | #2           | (6) 20" x 20"     | 8,300            | (4) 20" x 20"          | 5,600            | (2) 20" x 25"     | 3,500            |
| MUA-112    |              | 16.7 Sqft.        |                  | 11.1 Sqft.             |                  | 6.9 Sqft.         |                  |
| MUA-115    |              |                   |                  |                        |                  |                   |                  |
| MUA-115    | #3           | (8) 16" x 20"     | 14,400           | (6) 20" x 25"          | 10,400           | (4) 20" x 25"     | 6,900            |
| MUA-118    |              | (4) 20" x 20"     |                  | 20.8 Sqft.             |                  | 13.9 Sqft.        |                  |
| MUA-120    |              | 28.9 Sqft.        |                  |                        |                  |                   |                  |
| MUA-120-HD | #4           |                   |                  |                        |                  |                   |                  |
| MUA-215    |              | (16) 20" x 25"    | 27,800           | (12) 20" x 25"         | 20,800           | (8) 20" x 25"     | 13,900           |
| MUA-218    |              | 55.6 Sqft.        |                  | 41.7 Sqft.             |                  | 27.8 Sqft.        |                  |
| MUA-220    |              |                   |                  |                        |                  |                   |                  |

\* Examples of special filters would include 6" and 12" deep high efficiency filters. These would be located in a flat bank in the standard filter section.

## Weight Information

| Model      | Housing Size | Housing Arrangement |        |        | Intake Damper | Modular<br>Curb & Rail | Full Perimeter<br>Curb |
|------------|--------------|---------------------|--------|--------|---------------|------------------------|------------------------|
|            |              | H1                  | H2     | H3     |               |                        |                        |
| MUA-109-SM | #1           | 690#                | 610#   | 620#   | 50#           | 170#                   | 130#                   |
| MUA-109    |              | 700#                | 620#   | 630#   |               |                        |                        |
| MUA-110    |              | 720#                | 640#   | 650#   |               |                        |                        |
| MUA-110    | #2           | 980#                | 890#   | 880#   | 60#           | 190#                   | 140#                   |
| MUA-112    |              | 1,000#              | 910#   | 900#   |               |                        |                        |
| MUA-115    |              | 1,040#              | 950#   | 940#   |               |                        |                        |
| MUA-115    | #3           | 1,360#              | 1,260# | 1,180# | 70#           | 220#                   | 160#                   |
| MUA-118    |              | 1,400#              | 1,300# | 1,220# |               |                        |                        |
| MUA-120    |              | 1,500#              | 1,400# | 1,320# |               |                        |                        |
| MUA-120-HD | #4           | 1,520#              | 1,420# | 1,340# |               |                        |                        |
| MUA-215    |              | 2,520#              | 2,400# | 2,230# | 100#          | 280#                   | 200#                   |
| MUA-218    |              | 2,600#              | 2,480# | 2,310# |               |                        |                        |
| MUA-220    |              | 2,700#              | 2,580# | 2,410# |               |                        |                        |

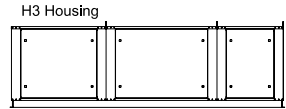
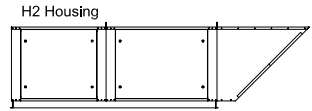
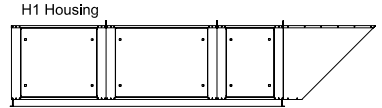
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|                   |  |  |              |                    |
|-------------------|--|--|--------------|--------------------|
| <b>Project</b>    |  | <b>Location</b>  |              |                    |
| <b>Engineer</b>   |  |  <b>KEES INCORPORATED</b><br>400 S. Industrial Dr. • P.O. Box L<br>Elkhart Lake, WI 53020<br>Phone: (920) 876-3391<br>Fax: (920) 876-3065<br>Website: www.kees.com |              |                    |
| <b>Architect</b>  |  |  | <b>Drwg.</b> | <b>SD-MUA-INFO</b> |
| <b>Contractor</b> |  |  | <b>Date:</b> | <b>03/07</b>       |

# MODEL MUA GENERAL INFORMATION

## Base Rail / Curb Cap Information

| Model      | Housing Size | A     | B     | H1, H3 Housing Arrangement |        | H2 Housing Arrangement |
|------------|--------------|-------|-------|----------------------------|--------|------------------------|
|            |              |       |       | C                          | C      |                        |
| MUA-109-SM | #1           | 32.00 | 32.00 | 108.00                     | 80.00  |                        |
| MUA-109    |              |       |       |                            |        |                        |
| MUA-110    |              |       |       |                            |        |                        |
| MUA-110    | #2           | 40.00 | 40.00 | 116.75                     | 88.00  |                        |
| MUA-112    |              |       |       |                            |        |                        |
| MUA-115    |              |       |       |                            |        |                        |
| MUA-115    | #3           | 51.50 | 56.25 | 132.50                     | 104.25 |                        |
| MUA-118    |              |       |       |                            |        |                        |
| MUA-120    |              |       |       |                            |        |                        |
| MUA-120-HD |              |       |       |                            |        |                        |
| MUA-215    | #4           | 99.50 | 56.25 | 132.50                     | 104.25 |                        |
| MUA-218    |              |       |       |                            |        |                        |
| MUA-220    |              |       |       |                            |        |                        |



Note: All of the dimensions are measured to the inside of the base rail / curb cap. Undersize the O.D. of the curb by 1".

Dimension B is the curb cap measurement for Curb Arrangements A1 and A2 where the curb is under the blower section only.

Dimension C is the curb cap measurement for Curb Arrangement A4 where the curb is around the full perimeter of the unit.

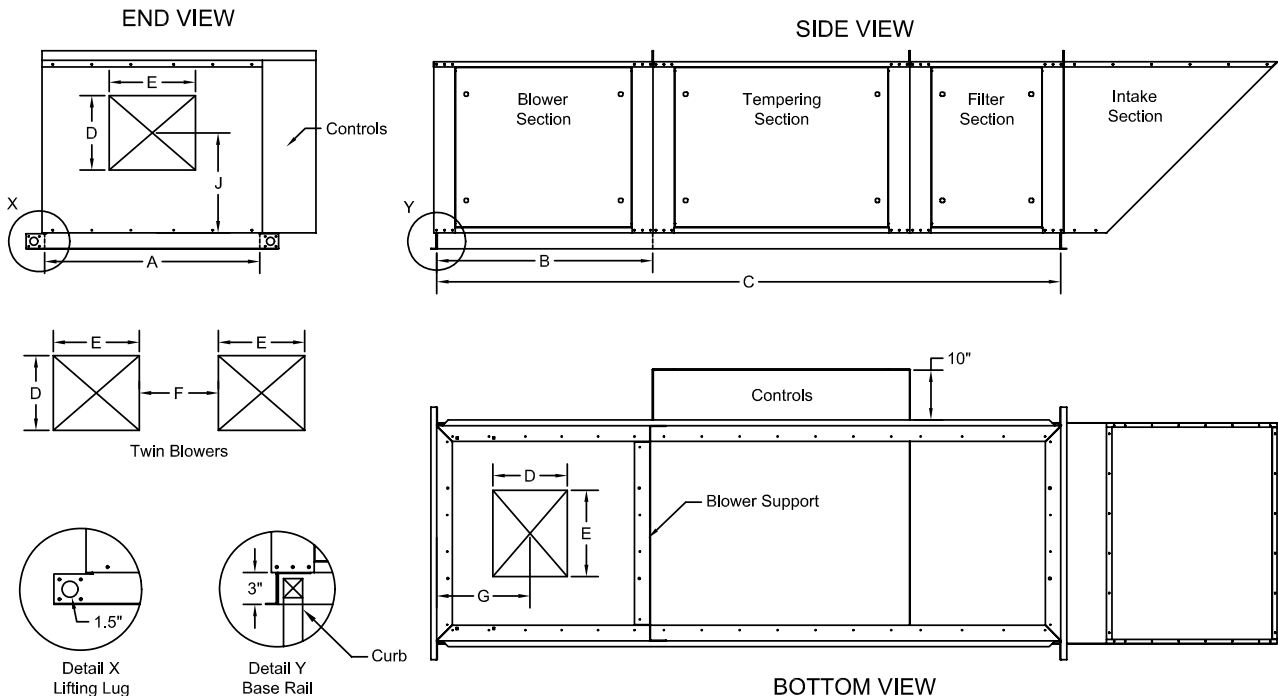
The first dimension C listed is for Housing Arrangements H1 and H3 that have the V-bank filter section.

The second dimension C is for Housing Arrangement H2. It is smaller since the V-bank filter section is replaced by flat filters in the intake section.

## Blower Opening Information

| Model      | Housing Size | D     | Blower Opening |       |       | Down Discharge | End Discharge |
|------------|--------------|-------|----------------|-------|-------|----------------|---------------|
|            |              |       | E              | F     | G     | J              |               |
| MUA-109-SM | #1           | 10.25 | 7.00           | NA    | 12.50 | 15.50          |               |
| MUA-109    |              | 10.25 | 12.00          | NA    | 12.50 | 15.50          |               |
| MUA-110    |              | 11.50 | 13.25          | NA    | 12.50 | 15.50          |               |
| MUA-110    | #2           | 11.50 | 13.25          | NA    | 17.50 | 20.50          |               |
| MUA-112    |              | 13.50 | 15.75          | NA    | 17.50 | 20.50          |               |
| MUA-115    |              | 16.00 | 18.75          | NA    | 17.50 | 20.50          |               |
| MUA-115    | #3           | 16.00 | 18.75          | NA    | 25.00 | 24.50          |               |
| MUA-118    |              | 19.00 | 22.00          | NA    | 25.00 | 24.50          |               |
| MUA-120    |              | 24.75 | 22.75          | NA    | 25.00 | 24.50          |               |
| MUA-120-HD |              | 24.75 | 24.75          | NA    | 25.00 | 24.50          |               |
| MUA-215    | #4           | 16.00 | 18.75          | 15.00 | 25.00 | 17.50          |               |
| MUA-218    |              | 19.00 | 22.00          | 18.00 | 25.00 | 20.75          |               |
| MUA-220    |              | 24.75 | 24.75          | 20.00 | 25.00 | 24.50          |               |

Note: Blower openings are centered on the width of the unit. Dim. G is from the inside of the curb cap. Dim. J is measured from the bottom of the unit.



Note: The Controls Box extends out 10" from the tempering section. It can hold the electrical controls, coil header and/or electric heater controls.

The views shown above are of Housing Arrangement H1.