BRAZED ALUMINUM CONSTRUCTION

Features
- Bar and Plate Brazed Aluminum Core
- Rugged, lightweight, and compact
- Provides the best heat transfer per given envelope size while minimizing pressure drop
- Air-side fin design minimizes fouling and static pressure ensuring long-term, reliable performance
- Fan motor assembly has an IP68 with AMP-#180908 connection
- Welded aluminum fittings/ports and manifolds ensure structural integrity
- Standard SAE ports – NPT and BSPP ports available
- Customized units are available to meet your specific performance requirements
- Additional capabilities for radiators, charge-air-coolers, condensers, and multi-circuit units

Materials

Core Brazed Aluminum Bar and Plate
- Tanks – 5052 Aluminum
- Nose Bar & Little Bar – 3003-H Aluminum
- Air Fin, Plate, Turbulator & End Plate – 3003-O Aluminum

Connections Aluminum

Core Mounting Brackets Brazed Aluminum

Ratings

Maximum Operating Pressure
250 psi (17 BAR)

Maximum Operating Temperature
300°F (150°C)

How to Order

Model Series MA (MAR)
Model Size Selected 3, 3.5, 4, 12, 18, 32, 48, 232, 248

Connection Type* 1 - NPT, 2 - SAE, 3 - BSPP

Specify Motor Required 4A - 12 VDC, 4B - 24 VDC

Bypass* 30 - 30 PSI, 60 - 60 PSI

* Bypass available on MA-12, MA-18, MA-32, MA-48, MA-232, MA-248 only. (MAR)
MA-8, MA-14, MA-20, MA-86, MA-32 do not have fan option.
MA 3.5 available with fan only.
### Dimensions - Fan/Core

**MA-3-4**

- See diagram above
- DC Amp Draw: 5.7, 3.6
- CFM: 300, 16
- Wt. lbs: 6, 2.72

**MA-3.5-4**

- See diagram above
- DC Amp Draw: 12.5, 6.3
- CFM: 363, 16
- Wt. lbs: 501, 19

**MA-4-4**

- See diagram above
- DC Amp Draw: 12.5, 6.3
- CFM: 363, 16
- Wt. lbs: 501, 19

**MA-12-4, MA-18-4, MA-32-4**

- MA-12-4: 13.78, 11.73, 6.26, 9.96, 10.97, 4.96, 4.41, 1.00
- MA-18-4: 15.75, 13.58, 6.04, 9.96, 12.80, 5.87, 4.96, 1.00
- MA-32-4: 19.69, 18.43, 5.95, 15.75, 17.32, 12.20, 3.86, 1.14
- DC Amp Draw: 22.2, 11.1
- CFM: 1368, 28
- Wt. lbs: 1637, 28

**MA-48-4**

- See diagram above
- DC Amp Draw: 22.2, 11.1
- CFM: 1368, 28
- Wt. lbs: 1637, 28

**MA-232-4**

- See diagram above
- DC Amp Draw: 22.2, 11.1
- CFM: 1368, 28
- Wt. lbs: 1637, 28

**MA-248-4**

- See diagram above
- DC Amp Draw: 22.2, 11.1
- CFM: 1368, 28
- Wt. lbs: 1637, 28

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**Model** | **A** | **B** | **C** | **D** | **E** | **F** | **G** | **H** | **J** | **K** | **L** | **DC Amp Draw** | **CFM** | **Approx. Ship Wt. lbs (Kg)**
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
MA-3-4 | See diagram above | — | — | — | — | — | — | — | — | — | — | 5.7, 3.6 | 300, 16 | 6, 2.72
MA-3.5-4 | See diagram above | — | — | — | — | — | — | — | — | — | — | 12.5, 6.3 | 363, 16 | 501, 19
MA-4-4 | See diagram above | — | — | — | — | — | — | — | — | — | — | 12.5, 6.3 | 363, 16 | 501, 19
MA-12-4 | 13.78 (350.01) | 11.73 (297.44) | 6.26 (158.00) | 9.96 (249.94) | 10.97 (276.10) | 4.96 (145.00) | 4.41 (120.01) | 1.00 (25.40) | — | — | — | 5.7 | 300 | 6, 2.72
MA-18-4 | 15.75 (400.05) | 13.58 (349.93) | 5.04 (128.02) | 9.96 (249.94) | 12.80 (325.12) | 5.87 (149.10) | 4.96 (125.98) | 1.00 (25.40) | — | — | — | 12.5 | 363 | 16, (7.26)
MA-32-4 | 19.69 (500.15) | 18.43 (468.12) | 5.95 (151.13) | 15.75 (400.05) | 17.32 (439.93) | 12.20 (304.8) | 3.86 (98.04) | 1.14 (28.96) | 8.07 (204.98) | 22.2 | 11.1 | 1368 (387.4) | 28 | 12.70
MA-48-4 | See diagram above | — | — | — | — | — | — | — | — | — | — | 22.2 | 11.1 | 1637 (46.40) | 45 | 20.40
MA-232-4 | See diagram above | — | — | — | — | — | — | — | — | — | — | 22.2 | 11.1 | 1637 (46.40) | 45 | 20.40
MA-248-4 | See diagram above | — | — | — | — | — | — | — | — | — | — | 22.2 | 11.1 | 1637 (46.40) | 45 | 20.40

**Note:** We reserve the right to make reasonable design changes without notice. Dimensions are in inches and (millimeters). *AMP draw listed as per FAN.*
Dimensions - Core Only

MA-3

MA-8, MA-14, MA-20

MA-232

MA-248

MA-4

MA-12 thru MA-120

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>Approx. Ship Wt. lbs (Kg)</th>
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<td>MA-4</td>
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<td>–</td>
<td>–</td>
<td>7 (3.16)</td>
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<tr>
<td>MA-8</td>
<td>3.00 (76.2)</td>
<td>5.67 (144.02)</td>
<td>6.65 (168.9)</td>
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<td>–</td>
<td>–</td>
<td>–</td>
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<td>10 (4.54)</td>
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<td>MA-12</td>
<td>13.78 (350.01)</td>
<td>11.73 (297.94)</td>
<td>9.96 (252.98)</td>
<td>9.84 (294.94)</td>
<td>10.87 (276.10)</td>
<td>4.41 (112.01)</td>
<td>4.96 (125.98)</td>
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<td>14 (6.35)</td>
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<td>MA-14</td>
<td>6.00 (152.4)</td>
<td>10.00 (254.0)</td>
<td>10.98 (278.89)</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<td>18 (8.16)</td>
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<td>MA-18</td>
<td>15.75 (400.05)</td>
<td>13.58 (344.93)</td>
<td>11.81 (299.97)</td>
<td>11.81 (299.97)</td>
<td>12.80 (325.12)</td>
<td>4.96 (125.98)</td>
<td>5.87 (149.10)</td>
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<td>28 (12.7)</td>
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<td>MA-20</td>
<td>10.00 (254.0)</td>
<td>14.33 (363.98)</td>
<td>15.31 (388.87)</td>
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<td>MA-32</td>
<td>19.69 (500.13)</td>
<td>18.43 (468.12)</td>
<td>16.14 (409.98)</td>
<td>15.75 (400.05)</td>
<td>17.32 (439.93)</td>
<td>3.86 (98.04)</td>
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<td>MA-48</td>
<td>23.62 (599.95)</td>
<td>22.13 (562.10)</td>
<td>19.84 (500.94)</td>
<td>19.89 (500.13)</td>
<td>21.02 (533.91)</td>
<td>3.82 (97.03)</td>
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<td>MA-66</td>
<td>27.56 (700.02)</td>
<td>25.83 (656.08)</td>
<td>23.54 (597.92)</td>
<td>23.82 (599.95)</td>
<td>24.72 (627.89)</td>
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<td>65 (29.48)</td>
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<td>MA-82</td>
<td>31.50 (800.1)</td>
<td>27.68 (703.07)</td>
<td>25.39 (644.91)</td>
<td>27.56 (700.02)</td>
<td>26.57 (674.68)</td>
<td>5.75 (146.05)</td>
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<td>MA-120</td>
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<td>39.49 (1003.05)</td>
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<td>27.56 (700.02)</td>
<td>38.39 (975.11)</td>
<td>5.75 (146.05)</td>
<td>10.00 (254.0)</td>
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<td>88 (39.92)</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>55 (24.95)</td>
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<td>MA-248</td>
<td>See diagram above</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>80 (36.29)</td>
</tr>
</tbody>
</table>

Note: We reserve the right to make reasonable design changes without notice. All dimensions are in inches and (millimeters).
Performance Curves

MA Models with DC Fan Assemblies

Selection Procedure

**Step 1** Determine Heat Load. Typical Rule of Thumb, - size cooler for 1/3 of the input horsepower. Heat load may be expressed as either Horsepower or BTU/HR or KW/°C.

\[ \text{HP} = \text{BTU/HR} \times \frac{2545}{1000} = \frac{KW}{°C} \]

**Step 2** Determine Entering Temperature Difference (Actual E.T.D.)

(E.T.D. = Entering oil temperature – Entering Ambient air temperature)

The entering oil temperature is generally the maximum desired system oil temperature.

Entering air temperature is the highest Ambient Air temperature the application will see, plus – add any pre-heating of the air prior to its entering the cooler. Pay special attention if air is drawn from the engine compartment for cooling.

**Step 3** Find Air Velocity Correction Factor

(Skip to Step 4 if using our DC Fan Assembly)

Calculate actual SFPM Air Velocity or SCFM (Standard Cubic Feet per Minute) for selection using the Face Area from the table.

\[ \text{SFPM Air Velocity}^* = \frac{\text{SCFM Air Flow}}{\text{Square Feet Cooler Face Area}} \]

\[ \text{SMPM} = \frac{\text{SCFM}}{\text{Square Meter Cooler Face Area}} \]

\[(\text{SCFM Air Flow=} \text{ SFPM Air Velocity} \times \text{Square Feet Cooler Face Area)}\]

*If the Air Velocity calculated is different than the value in Step 4, then recheck Corrected oil Pressure drop.

**Step 4** Determine the Corrected Heat Dissipation to use the Curves

**ENGLISH Version**

Corrected Heat Rejection = \((\text{BTU/HR}) \times \text{Heat Load} \times \frac{100°F}{\text{E.T.D.} \times \text{Air Velocity} \times \text{Correction Factor}}\)

**Step 5** Select Model From Curves Enter the Performance Curves at the bottom with the GPM oil flow and proceed upward to the adjusted Heat Rejection from Step 4. Any Model or Curve on or above this point will meet these conditions.

**Step 6** Calculate Oil Pressure Drop

Find the oil pressure drop correction factor and multiply it by the Oil Pressure Drop found on performance curve.

Listed Performance Curves are based on:

- 50 SSU (11 cSt) oil
- 1000 Standard Feet per Minute (SFPM) (304.8 MPM) Air Velocity
- 100° F (55.56° C) Entering Temperature Difference (E.T.D.)

*If your application conditions are different, then continue with the selection procedure.

**MA Models (No Fan, Core Only)**