Features
- Same as M Series with DC Fan or Hydraulic Motor
- 3/8” Tube Size
- Aluminum Fins
- Low AMP Draw 12 or 24 Volt DC Motor
- Heavy Duty Construction
- Optional Serviceable Relief Bypass Valve
- Optional Fan Control Switch
- Long Life Hydraulic Motors
- Heat Removal TO 50,000 BTU/Hr.
- Oil Flows to 150 GPM
- Mounting Brackets Included
- SAE, NPT or 37° Flare Oil Connections
- Rugged Steel Manifolds

Materials
- **Tubes** Copper
- **Fins** Aluminum
- **Turbulators** Steel
- **Manifolds** Steel
- **Fan Assembly** High Impact Plastic
- **Motor Displacement** .22in³/Rev. (Hydraulic)
- **Maximum Pressure** 2000 PSI (Hydraulic)
- **Allowable Backpressure** 1000 PSI (Hydraulic)

Ratings
- **Operating Pressure** 300 psi
- **Operating Temperature** 350° F

Relief Bypass Valve Option
- **MODEL**  MFR-15
  - 3/4”, external, all steel valve. Available in either 30 PSI or 60 PSI settings. May be removed for servicing.
- **MODEL**  MFR-30
  - 1-1/2”, external, all steel valve. Available in either 30 PSI or 60 PSI settings. May be removed for servicing.
- **MODEL**  MFR-60

<table>
<thead>
<tr>
<th>Number of Fans</th>
<th>DC current required (amps)</th>
<th>Oil Flow Required (GPM)</th>
<th>Minimum Operating Pressure (PSI)</th>
<th>Maximum Fan Speed (RPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12 Volt</td>
<td>24 Volt</td>
<td>12 Volt</td>
<td>24 Volt</td>
</tr>
<tr>
<td>1</td>
<td>12.5</td>
<td>6.3</td>
<td>2.1</td>
<td>300</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>12.6</td>
<td>4.2</td>
<td>300</td>
</tr>
</tbody>
</table>
### Dimensions - 12 & 24 Volt DC Motors

#### Models MF-15 and MF-30

Units shown with optional bypass valve.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A (IN)</th>
<th>B (IN)</th>
<th>C (IN)</th>
<th>D (IN)</th>
<th>E (IN)</th>
<th>F (IN)</th>
<th>G (IN)</th>
<th>H (IN)</th>
<th>J (IN)</th>
<th>SHIPPING WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF-15</td>
<td>13.88</td>
<td>15.88</td>
<td>15.75</td>
<td>17.41</td>
<td>4.99</td>
<td>17.25</td>
<td>14.25</td>
<td>1.50 SQ</td>
<td>9.00</td>
<td>1.88 #16 27</td>
</tr>
</tbody>
</table>

Note: All dimensions are in inches. We reserve the right to make reasonable design changes without notice. *Inlet and outlet oil connections can be reversed when the bypass valve is not used.

#### Model MF-60

Units shown with optional bypass valve.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A (IN)</th>
<th>B (IN)</th>
<th>C (IN)</th>
<th>D (IN)</th>
<th>E (IN)</th>
<th>F (IN)</th>
<th>G (IN)</th>
<th>H (IN)</th>
<th>J (IN)</th>
<th>SHIPPING WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF-60</td>
<td>30.83</td>
<td>33.08</td>
<td>17.41</td>
<td>27</td>
<td>6.10</td>
<td>21.25</td>
<td>17.25</td>
<td>2.50 SQ</td>
<td>18.00</td>
<td>5.88 #24 78</td>
</tr>
</tbody>
</table>

### Dimensions - Hydraulic Motors

#### Models MF-15 and MF-30

Units shown with optional bypass valve.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A (IN)</th>
<th>B (IN)</th>
<th>C (IN)</th>
<th>D (IN)</th>
<th>E (IN)</th>
<th>F (IN)</th>
<th>G (IN)</th>
<th>H (IN)</th>
<th>J (IN)</th>
<th>SHIPPING WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MF-15</td>
<td>13.88</td>
<td>15.88</td>
<td>15.75</td>
<td>17.41</td>
<td>4.99</td>
<td>17.25</td>
<td>14.25</td>
<td>1.50 SQ</td>
<td>9.00</td>
<td>1.88 #16 27</td>
</tr>
</tbody>
</table>

Note: All dimensions are in inches. We reserve the right to make reasonable design changes without notice. *Inlet and outlet oil connections can be reversed when the bypass valve is not used.
Performance Curves

Performance Curves are based on 50 SSU oil entering the cooler 50°F higher than the ambient air temperature used for cooling. This is referred to as a 50°F E.T.D.

**Step 1** Determine the Heat Load. Heat load may be expressed as either horsepower or BTU/Hr. To convert horsepower to BTU/Hr.: 
BTU/HR = Horsepower × 2545

**Step 2** Determine Entering Temperature Difference. The entering oil temperature is generally the maximum desired oil temperature. Entering oil temperature – Ambient air temperature = E.T.D.

**Step 3** Determine the Corrected Heat Dissipation to use the curves. 
Corrected Heat Dissipation = BTU/HR heat load × \(50°F \times C_v\) / E.T.D.

**Step 4** Enter curves at oil flow through cooler and curve heat dissipation. Any curve above the intersecting point will work.

**Step 5** Determine Oil Pressure Drop from Curves: 
- ● = 5 PSI
- ■ = 10 PSI
- ▲ = 20 PSI. Multiply pressure drop from curve by correction factor found in oil \(\Delta P\) correction curve.

**Oil Temperature**

Typical operating temperature ranges are:
- Hydraulic Motor Oil: 120°F - 180°F
- Hydrostatic Drive Oil: 160°F - 180°F
- Engine Lube Oil: 180°F - 200°F
- Automatic Transmission Fluid: 200°F - 300°F

**C_v Viscosity Correction**

<table>
<thead>
<tr>
<th>Average Oil Temp °F</th>
<th>SAE 5 110 SSU at 100°F</th>
<th>SAE 10 150 SSU at 100°F</th>
<th>SAE 20 275 SSU at 100°F</th>
<th>SAE 30 500 SSU at 100°F</th>
<th>SAE 40 750 SSU at 100°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1.14</td>
<td>1.22</td>
<td>1.35</td>
<td>1.58</td>
<td>1.77</td>
</tr>
<tr>
<td>150</td>
<td>.99</td>
<td>1.05</td>
<td>1.11</td>
<td>1.21</td>
<td>1.31</td>
</tr>
<tr>
<td>200</td>
<td>.95</td>
<td>1.00</td>
<td>1.01</td>
<td>1.08</td>
<td>1.10</td>
</tr>
<tr>
<td>250</td>
<td>.95</td>
<td>.98</td>
<td>.99</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Thermostatic Temperature Control Option (DC)

This controller was designed to mount on the cooler without requiring extensive wiring or plumbing. It provides accurate temperature control by cycling the cooling fan(s) to maintain desired oil temperature.

- 12 or 24 volt operation
- Adjustable temperature settings range from 100°F thru 210°F in 20°F increments
- For use with one or two fan models
- Temperature sensor provided
- Wiring provided for remote manual override
- Mounting hardware included

### Part Number Description

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>96171</td>
<td>Electronic Fan Control Kit</td>
</tr>
<tr>
<td>68790</td>
<td>Replacement Control Only</td>
</tr>
<tr>
<td>67699</td>
<td>Replacement Sensor Only</td>
</tr>
</tbody>
</table>

#### Side View

#### Top View

#### Connection Assembly

#### Electrical Schematic

*NOTE: This switch should be fused to prevent damage if ground is lost. A 30 amp fuse is required in the power supply.*