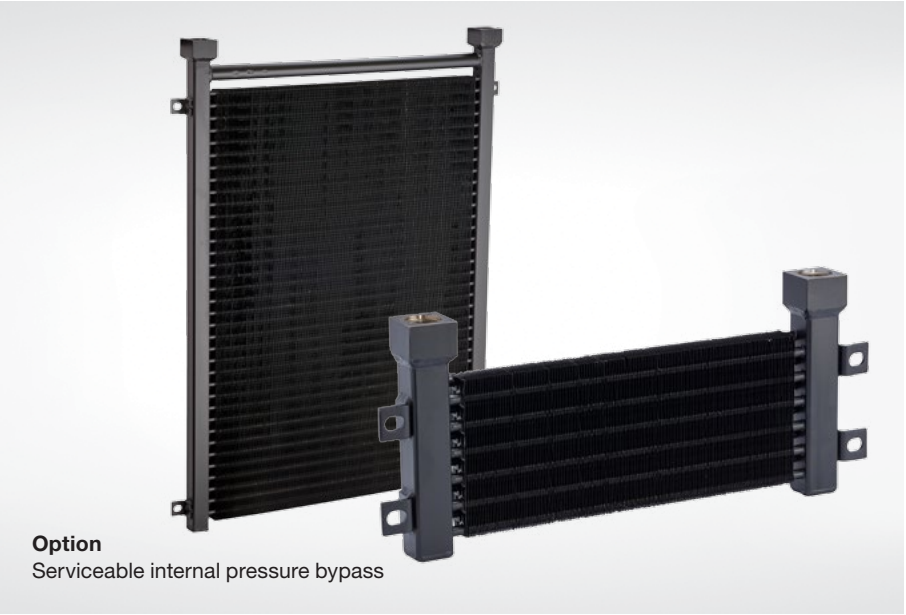
Fluid Cooling Mobile M Series

Performance Notes

- High strength construction
- 3/8" Tube size
- Eliminate piping, reduce cost with optional internal pressure bypass
- Aluminum fins
- Rugged steel manifolds
- Heat removal up to 90,000 BTU/HR
- Oil flows to 100 GPM
- Mounting brackets included
- SAE, NPT or 37° flair oil connections



Option
Serviceable internal pressure bypass

Ratings

Maximum Operating Pressure
300 PSI

Test Pressure
300 PSI

Maximum Operating Temperature
400°F

Materials

Tubes Copper

Fins Aluminum

Turbulators Steel

Manifolds Steel

Bypass Valve Steel

Connections Steel

How to Order

	-			-		-

Model Series
M
MR - Internal pressure bypass included

Model Size Selected

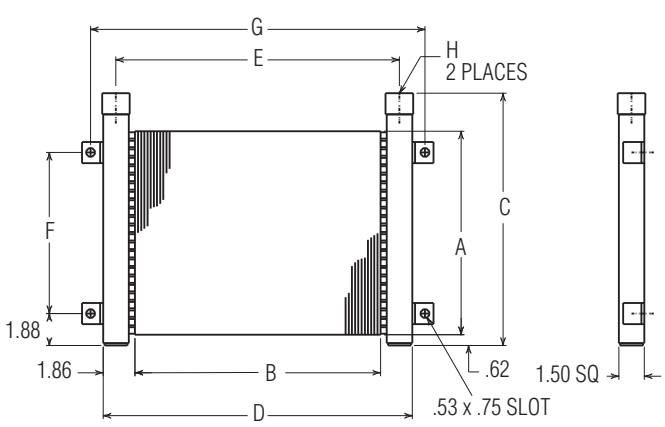
Connection Type*
Blank - NPT
S - SAE

Bypass
Blank - No Bypass
30 - 30 PSI
60 - 60 PSI
ADD FOR MR MODELS ONLY

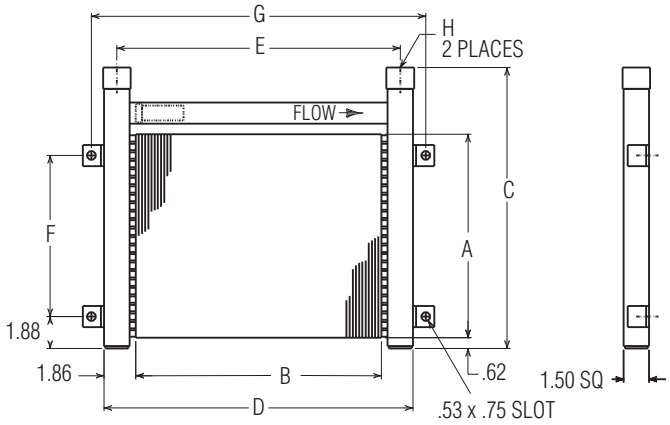
This is a partial flow pressure bypass only. It is not designed to be a full flow system bypass.

Dimensions

M Series



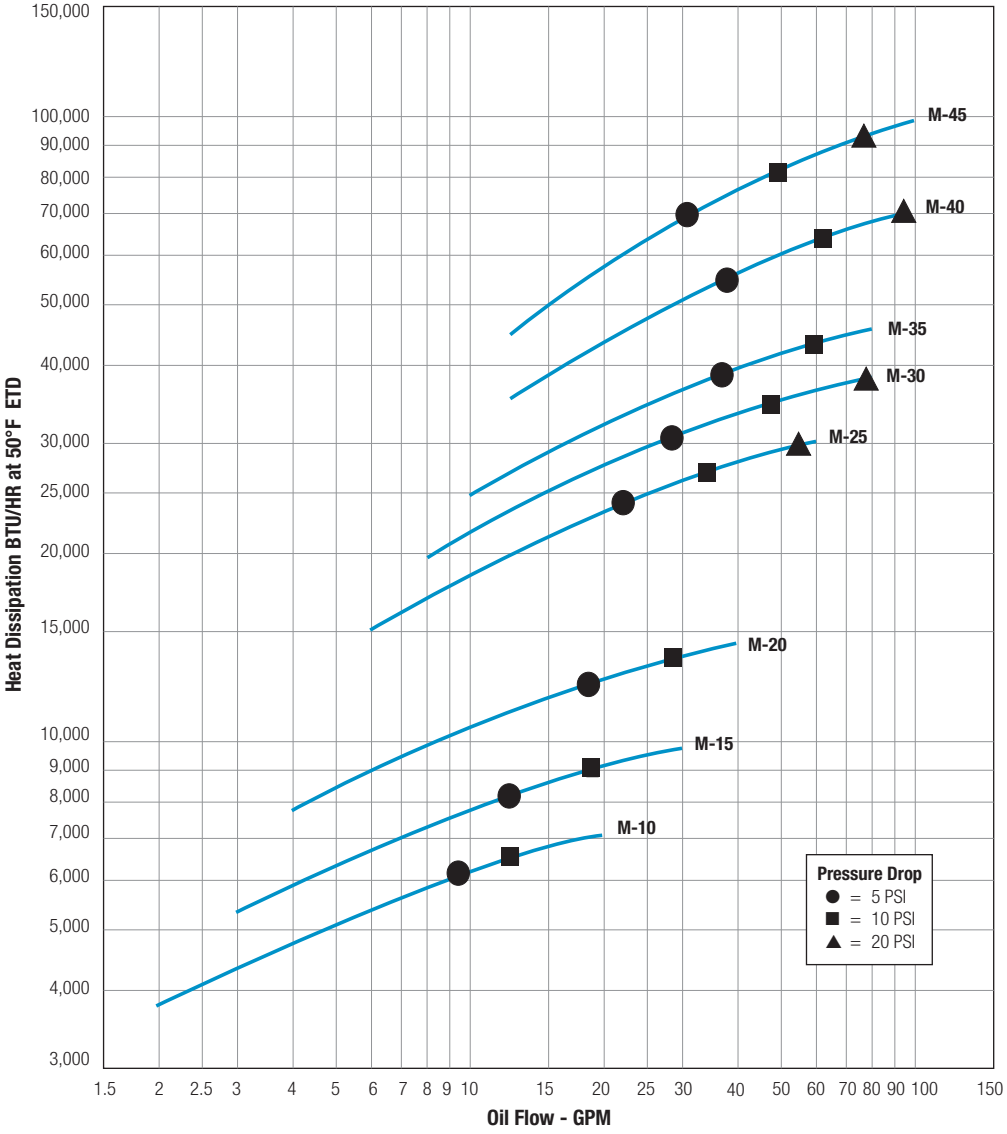
MR Series



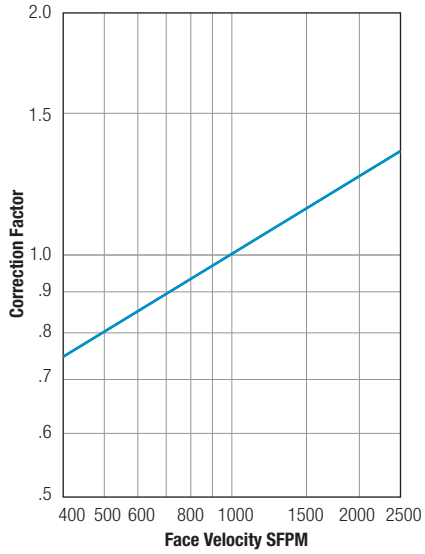
Units shown with optional internal pressure bypass

Model	A	B	C		D	E	F	G	H		Face Area (SQ FT)	Shipping Weight (LBS)
			M Series	MR Series					NPT	SAE		
M-10	6.00	14.50	8.88	10.56	18.22	16.72	3.50	19.72	1.00	#16	.60	11
M-15	8.00	14.50	10.88	12.56	18.22	16.72	5.50	19.72	1.00	#16	.81	12
M-20	12.00	14.50	14.88	16.56	18.22	16.72	9.50	19.72	1.00	#16	1.21	16
M-25	18.00	20.50	20.88	22.56	24.22	22.72	15.50	25.72	1.00	#16	2.56	28
M-30	24.00	19.50	26.88	28.62	23.22	21.72	21.50	24.72	1.25	#20	3.25	34
M-35	30.00	19.50	32.88	34.62	23.22	21.72	27.50	24.72	1.25	#20	4.06	40
M-40	36.00	25.00	38.62	40.69	28.72	27.22	33.50	30.22	1.25	#20	6.25	56
M-45	36.00	35.50	38.62	40.69	39.22	37.72	33.50	40.72	1.25	#20	8.88	73

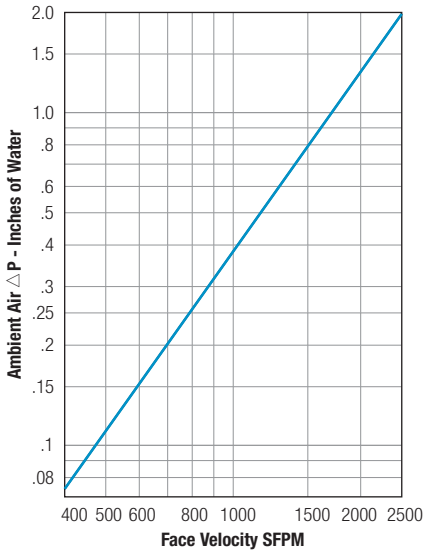
Performance Curves



Air Velocity Correction



Air Static Pressure Drop



Selection Procedure

Performance Curves are based on 50 SSU oil, 1000 Standard Feet per Minute (SFPM) Air Velocity, and a 50°F Entering Temperature Difference (ETD)
ETD = Entering oil temperature - Ambient air temperature

STEP 1 **Determine Heat Load:** Heat load may be expressed as either Horsepower or BTU/HR To convert Horsepower to BTU/Hr:
BTU/HR = Horsepower x 2545

STEP 2 **Calculate entering temperature difference:** The entering oil temperature is generally the maximum desired oil temperature.
ETD = Entering oil temperature - Ambient air temperature

STEP 3 **Determine Air Velocity Correction Factor:**

A. If SFPM (Standard Feet per Minute) air velocity is known, read value from curve above. A reasonable assumption for this value is 750 SFPM.

B. If SCFM (Standard Cubic Feet per Minute) air flow is known, calculate velocity as follows:

$$\text{SFPM Air Velocity} = \frac{\text{SCFM Air Flow}}{\text{Ft}^2 \text{ Face Area of Cooler}}$$

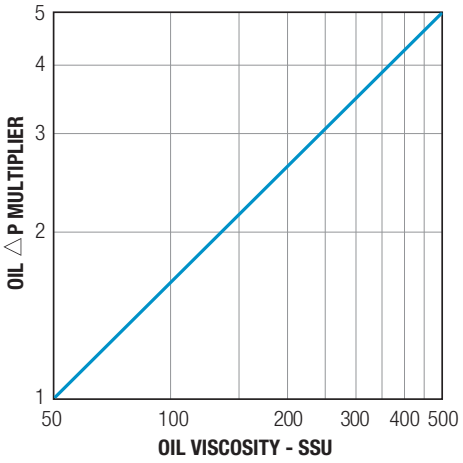
STEP 4 **Calculate corrected heat load to enter curves:**

$$\text{Corrected Heat Dissipation} = \text{BTU/HR (Heat Load)} \times \left[\frac{50°\text{F} \times \text{Cv}}{\text{Desired E.T.D} \times \text{Air Velocity Correction Factor}} \right]$$

STEP 5 **Enter the Performance Curves** at the bottom with the GPM oil flow and proceed upward to the adjusted heat load from Step 4. Any curve on or above this point will meet these conditions.

STEP 6 **Multiply oil Pressure Drop** from curve by correction factor found in Oil △ P Correction Curve.

Oil Pressure Correction



C_V Viscosity Correction

	OIL				
Average Oil Temp °F	**SAE 5** 110 SSU at 100°F 40 SSU at 210°F	**SAE 10** 150 SSU at 100°F 43 SSU at 210°F	**SAE 20** 275 SSU at 100°F 50 SSU at 210°F	**SAE 30** 500 SSU at 100°F 65 SSU at 210°F	**SAE 40** 750 SSU at 100°F 75 SSU at 210°F
100	1.14	1.22	1.35	1.58	1.77
150	1.01	1.05	1.11	1.21	1.31
200	.99	1.00	1.01	1.08	1.10
250	.95	.98	.99	1.00	1.00

Desired Reservoir Temperature

Return Line Cooling: Desired temperature is the oil temperature leaving the cooler. This will be the same temperature that will be found in the reservoir.

Off-Line Recirculation Cooling Loop: Desired temperature is the oil temperature entering the cooler. In this case, the oil temperature change must be determined so that the actual oil leaving temperature can be found. Calculate the oil temperature change (oil △ T) with this formula:
Oil △ T = (BTU's/HR) / (GPM Oil Flow x 210).

To calculate the oil leaving temperature from the cooler, use this formula:
Oil Leaving Temp. = Oil Entering Temp – Oil △ T.

This formula may also be used in any application where the only temperature available is the entering oil temperature.

Oil Pressure Drop: Most systems can tolerate a pressure drop through the heat exchanger of 20 to 30 PSI. Excessive pressure drop should be avoided. Care should be taken to limit pressure drop to 5 PSI or less for case drain applications where high back pressure may damage the pump shaft seals.

Oil Temperature

Typical operating temperature ranges are:

Hydraulic Motor Oil	110°- 130°F
Hydrostatic Drive Oil	130°- 180°F
Bearing Lube Oil	120°- 160°F
Lube Oil Circuits	110°- 130°F

M / MR Series

General Information

1. Air Cooled Mobile Series coolers are built for operation with maximum oil pressures to 300 PSI and temperatures to 400°F.
2. Care must be taken to reduce or eliminate dirt and debris from blocking the cooling surface as overheating could result.

Installation

1. Mobile Series coolers are designed for mounting by "L" shaped brackets attached to the sides of the manifolds.
2. It is recommended that these units be installed with the oil ports positioned, based on oil flow rates.
3. Units should **not** be located in corrosive atmospheres as rapid deterioration of cooling coil, and/or manifolds may take place resulting in reduced service life (corrosion resistant coatings available—consult factory).
4. Piping should be sized based on oil flow and pressure drop requirements, not on the oil coolers port sizes. It should also be properly supported to prevent excessive strain to connections, manifolds, etc.

NOTE: Oil port position is at customer option, however, the cooler must be flooded with oil to take full advantage of cooling potential.

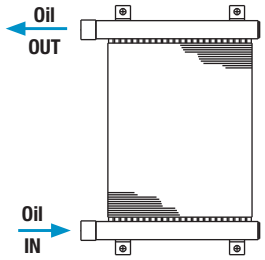
Maintenance

1. The unit should be inspected regularly for corrosion and dirty or clogged heat transfer surface. Dirt and dust can be removed by washing, brushing or blowing out with compressed air. Should the surface be greasy, the fins and tubes can be brushed or sprayed with a non-flammable degreasing fluid which is safe on copper, steel and aluminum. Follow with a hot water rinse and dry thoroughly. A steam cleaner can also be used effectively.
2. Once a year, or as required by the application, piping should be disconnected and a degreasing agent circulated through the unit to remove sludge from turbulators and internal tube surfaces to return the unit to full capacity. A thorough cleaning of the entire system in the same manner is preferable to avoid carry-over from uncleaned piping, pump and accessories. The strainer or any filtering devices should also be serviced following this operation.
3. When ordering replacement parts or inquiring on service, mention the model number, serial number and the original purchase order number.
4. Check valve cartridge (MR Series) is not serviceable. Install oil filter ahead of unit to keep foreign particles from rendering the cartridge ineffective.

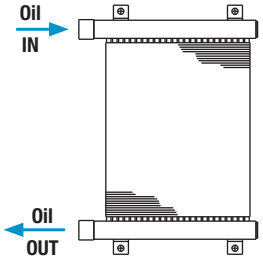
Piping Hook-up

M Series

Low to High Flow

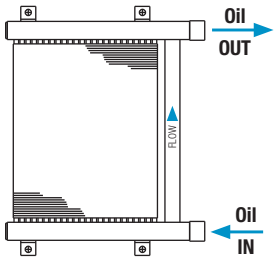


High Flow Only



MR Series

Low to High Flow



High Flow Only