

MA / MAR Series – Mobile Air Cooled Brazed Aluminum Cores and DC Fan Drive Cooler

The MA Series mobile coolers provides rugged high performance for demanding mobile equipment oil cooling applications. Select from a broad line of standard units all featuring proven brazed aluminum bar and plate core technology, engineered with an aggressive turbulator that produces ultra-high heat transfer. Available with axial fans equipped with either standard DC fans or brushless DC electric motors for extended life, minimal electrical load.

MAR units come with 25 or 60 PSI pressure bypass or 110F/60 PSI thermal/pressure bypass valve arrangement. Built in bypass reduces plumbing and decreases the time that the cooler is in bypass in cold start conditions.

TTP's XSelector® sizing program can be used to help optimize the sizing of the cooler for better performance and value.



How to Order

Model Series

MA
MAR - Internal Bypass model

Model Size Selected

Core Only:
MA - 3, 4, 8, 12, 14, 18, 20, 32, 48, 66, 82, 120, 232, 248
MAR - 12, 18, 32, 48, 66, 82, 120, 232, 248
With Fan:
MA - 3, 3.5, 4, 12, 18, 32, 48, 232, 248
MAR - 12, 18, 32, 48, 232, 248

(See Performance Curve Chart on page 3 or XSelector® sizing program)

Connection Type

1 - NPT
2 - SAE
3 - BSPP

Bypass Setting*

Blank - No Bypass
25 -25 PSI (1.7 Bar) Pressure Bypass
60 - 60 PSI (4.1 Bar) Pressure Bypass
110 - 110F/60 PSI (43C/4.1 Bar) Thermal/pressure relief bypass

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

Specify Motor Required

Blank - Core Only
4A - 12 VDC
4B - 24 VDC
4ABL - 12 VDC Brushless Fan**
4BBL - 24 VDC Brushless Fan**

**Dimensions on MA coolers with brushless fans are different from brushed fans. Brushless fan available on MA/MAR-12 thru 248 models.

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
- Fans compliant with IP 68 (brushed) and IP6k9k (brushless) with fully sealed motors

- Welded aluminum fitting/ports and manifolds ensure structural integrity
- Standard SAE ports – NPT or BSPP ports available
- Customized units are available to meet your specific performance requirements
- Now available with brushless DC fan motors

Ratings

- Maximum Operating Pressure**
250 PSI (17 BAR)
- Maximum Operating Temperature**
300°F (150°C)

- Heat Removal**
MA cores only 19,000 to 375,000 BTU/HR
MA w/ fan(s) 5,000 to 160,000 BTU/HR
- Flow Rates**
Up to 160 GPM (350L/min)

Fluid Compatibility

- Petroleum/mineral oils
- Oil/water emulsion

Water/ethylene glycol

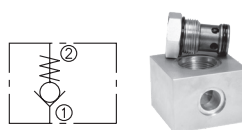
Materials

- Core** Aluminum
- Connections** Aluminum

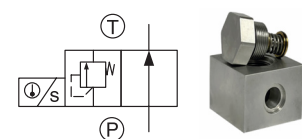
- Core Mounting Bracket** Aluminum
- Bypass** Aluminum/Steel

Internal Bypass Options

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



Pressure Bypass



Temperature Controlled Bypass with Integrated Pressure Relief

* To register for XSelector® please go to www.thermaltransfer.com/get-in-touch/ and complete the XSelector® Inquiry form and submit. Download the XSelector® for both Apple and Android formats by searching for XSelector® in their App Stores. You must first register for XSelector® before using it on mobile devices.

Selection Procedure

STEP 1 Determine Heat Load. Typical applications size cooler for 1/3 of the input horsepower. Heat load may be expressed as either Horsepower or BTU/HR or KW.

$$HP = BTU/HR \div 2545 \quad KW = HP \times .745$$

$$BTU/HR = HP \times 2545$$

STEP 2 Determine Entering Temperature Difference. (Actual ETD)
(ETD= 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.

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

$$SMPM = \frac{SCMM}{\text{Square Meter Cooler Face Area}}$$

(SCFM Air Flow= SFPM Air Velocity x 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

$$\text{Corrected Heat Rejection} = \frac{(\text{BTU/HR})}{\text{Heat Load}} \times \left[\frac{100^\circ\text{F}}{\text{Desired E.T.D}} \times \frac{\text{Air Velocity}^\dagger}{\text{Correction Factor}} \right]$$

(BTU/HR) to use with selection chart

(Air Factor value not needed if using provided DC Fan assembly; omit in formula.)

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.

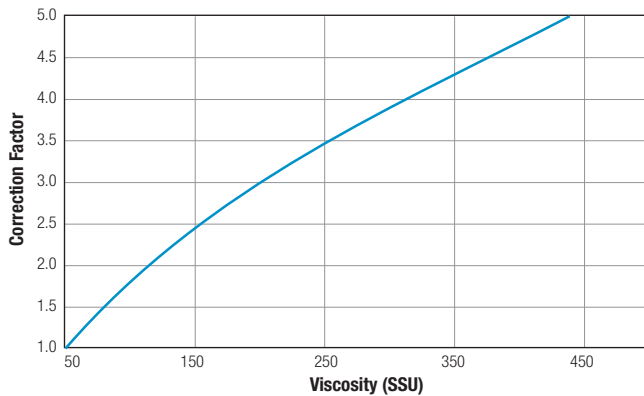
STEP 6 Calculate Oil Pressure Drop Find the oil pressure drop correction factor and multiply it by the Oil Pressure Drop found on performance curve.

Listed Performance Curves are based on:

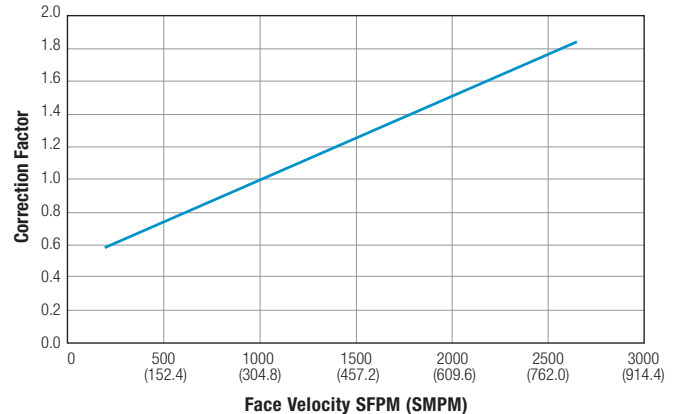
- 50 SSU (11 cSt) oil
- 1000 Standard Feet per Minute (SPFM) (304.8 MPM) Air Velocity
- 100°F (55.56°C) Entering Temperature Difference (ETD)

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

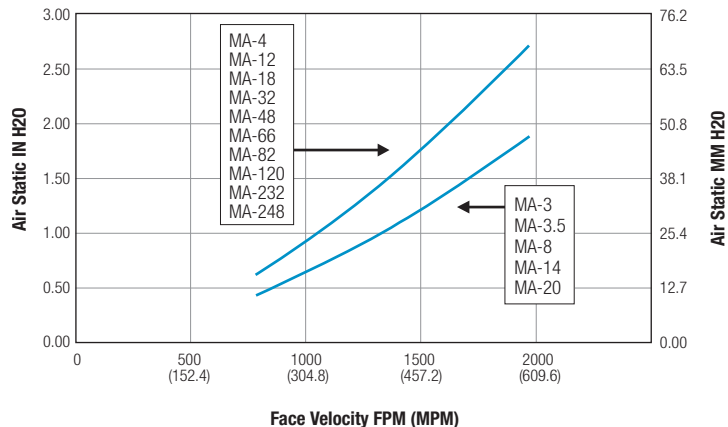
Oil Pressure Drop Correction



Air Static Correction



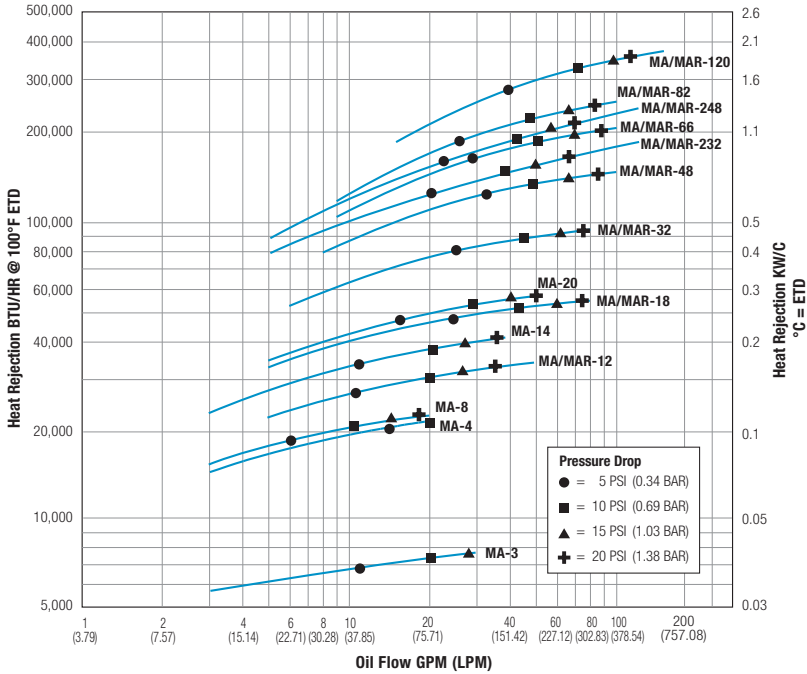
Air Static Pressure Drop



Performance Curves

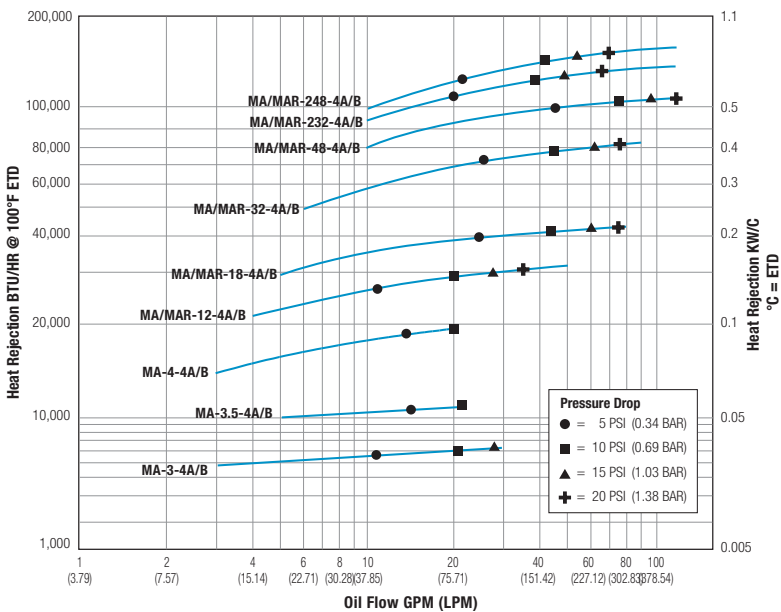
For additional sizing information consider using TTP's **XSelector®** online sizing Program.*

MA Models - Core only (No Fan)



Model	Approx. Shipping Weight LBS (KG)
MA-3	4 (1.81)
MA-4	7 (3.18)
MA-8	10 (4.54)
MA-12	15 (6.8)
MA-14	14 (6.35)
MA-18	18 (8.16)
MA-20	18 (8.16)
MA-32	28 (12.7)
MA-48	41 (18.60)
MA-66	50 (22.68)
MA-82	65 (29.48)
MA-120	88 (39.92)
MA-232	55 (24.95)
MA-248	80 (36.29)

MA Models - DC Fan Assemblies



Model	DC Amp Draw		Approx. Shipping Weight LBS (KG)
	12V	24V	
MA-3	5.7	3.6	6 (2.72)
MA-3.5	12.5	6.3	9 (4.08)
MA-4	12.5	6.3	16 (7.26)
MA-12	12.5	6.3	19 (8.62)
MA-18	10.6	5.3	23 (10.43)
MA-32	22.2	11.1	28 (12.70)
MA-48	22.2	11.1	45 (20.40)
MA-232	19.3*	9.7*	65 (29.48)
MA-248	19.3*	9.7*	90 (40.80)

*AMP draw listed as per FAN.

* To register for **XSelector®** please go to www.thermaltransfer.com/get-in-touch/ and complete the **XSelector®** Inquiry form and submit. Download the **XSelector®** for both Apple and Android formats by searching for **XSelector®** in their App Stores. You must first register for **XSelector®** before using it on mobile devices.

