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.

Now offering axial fans



Options
Brushless DC fan motor
Temperature sensors
Serviceable internal bypass

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.

MAGHEX 2 Temp Controller

MH - MAGHEX 2 DC Fan Controller

MH - MAGHEX 2 Temp Controller



- 12 or 24 VDC
- All in one sensor and switch
- Programmable temp setting
- Low voltage protection
- Can run 1 or 2 fans
- PN: 600181
- See pages 4 and 5 for more details

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 Compatability

Petroleum/mineral oils

Oil/water emulsion

Water/ethylene glycol

Materials

Core Aluminum

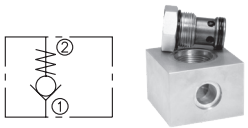
Connections Aluminum

Core Mounting Bracket Aluminum

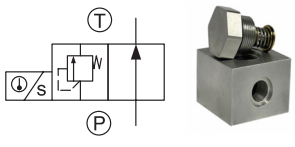
Bypass Aluminum/Steel

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 ÷ 2545 KW = HPx .745

BTU/HR = HP x 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.

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

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

(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

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

(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.

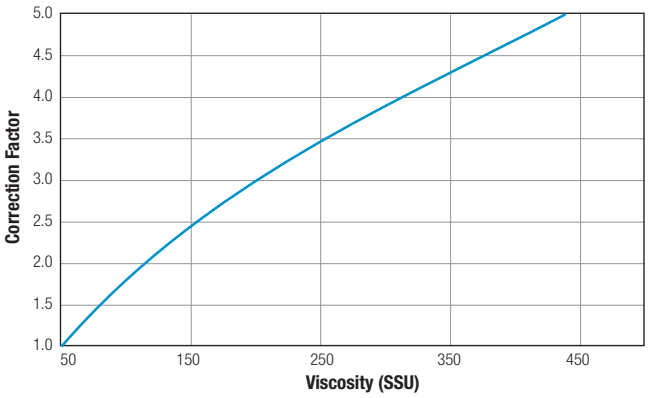
STEP 6 **Calculate Oil Pressure Drop** Find the oil pressure drop correction factor and multiply it by the Oil Pressure Drop found on performance curve.

Listed Performance Curves are based on:

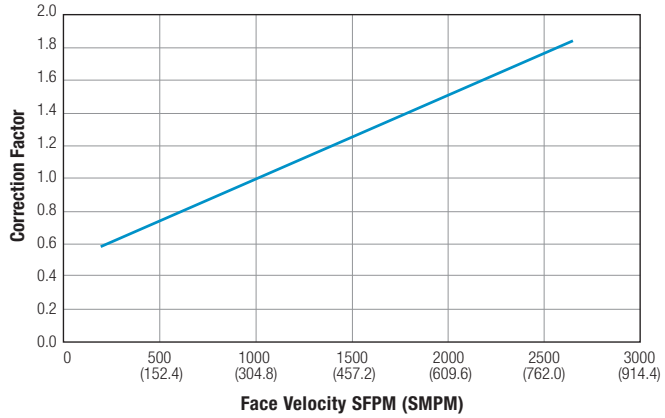
- 50 SSU (11 cSt) oil
- 1000 Standard Feet per Minute (SPFM) (304.8 MPM) Air Velocity
- 100°F (55.56°C) Entering Temperature Difference (ETD)

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

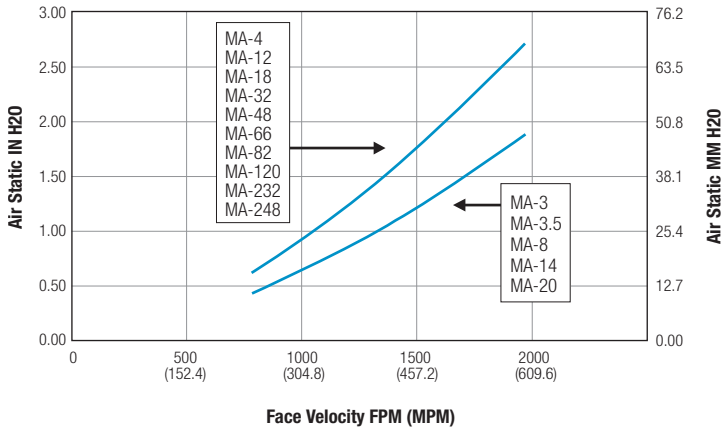
Oil Pressure Drop Correction



Air Static Correction



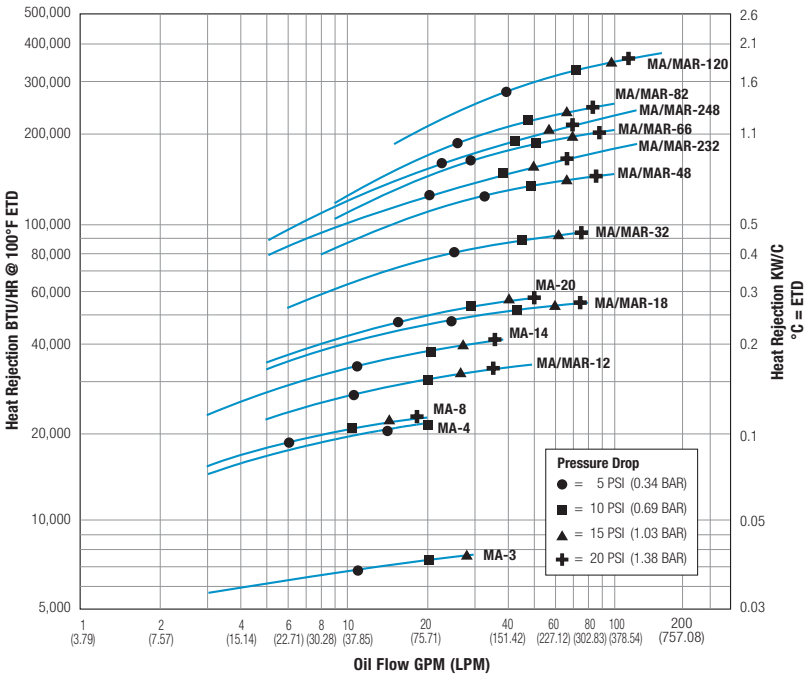
Air Static Pressure Drop



Performance Curves

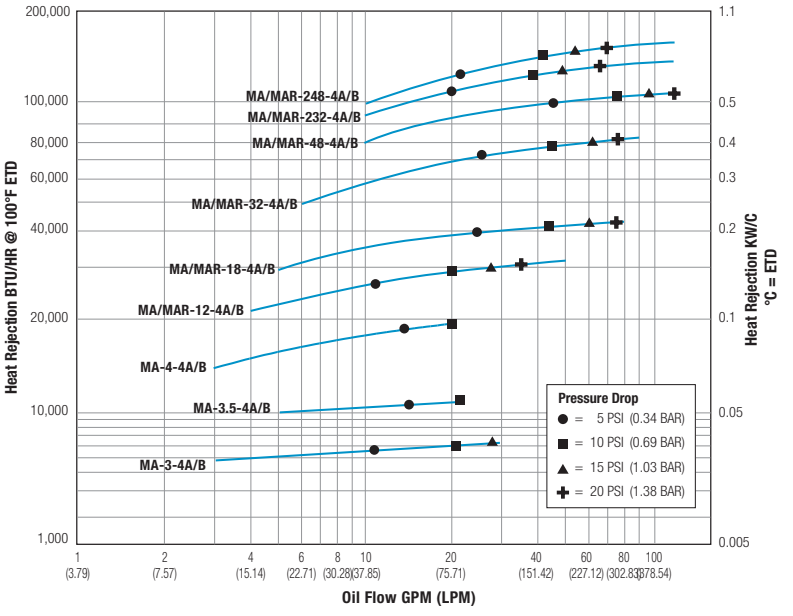
For additional sizing information consider using TTP's XSelector® online sizing Program.*

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 12V	DC Amp Draw 24V	Approx. Shipping Weight LBS (KG)
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)

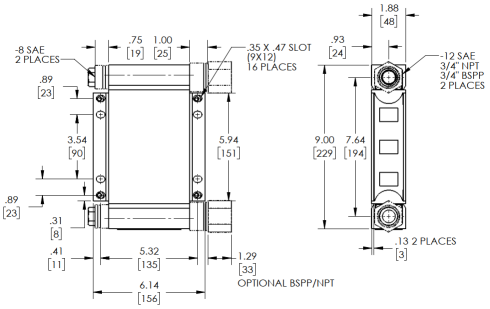
*AMP draw listed as per FAN.

* 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.

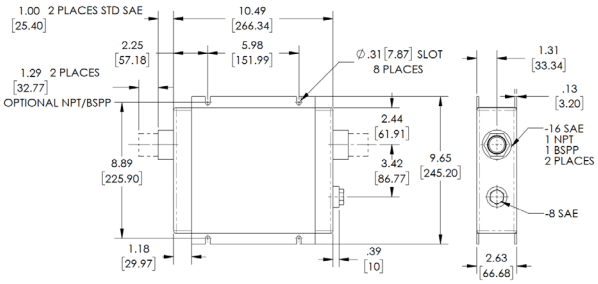
Dimensions - Core Only

For 3D models and spec sheets visit the MA product page on our website.
https://www.thermaltransfer.com/product/ma-series

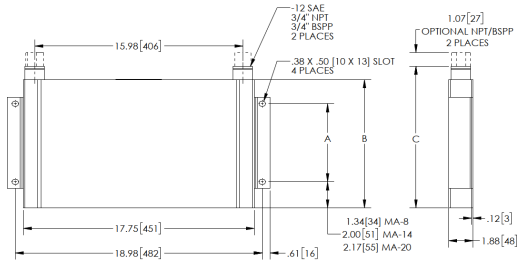
MA-3



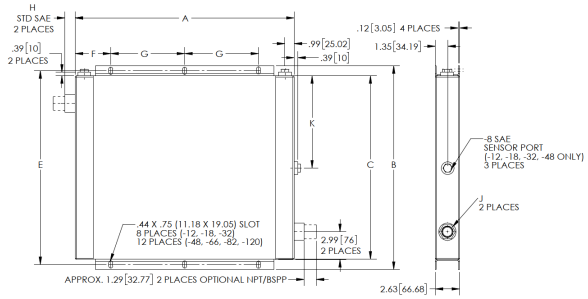
MA-4



MA-8, MA-14, MA-20



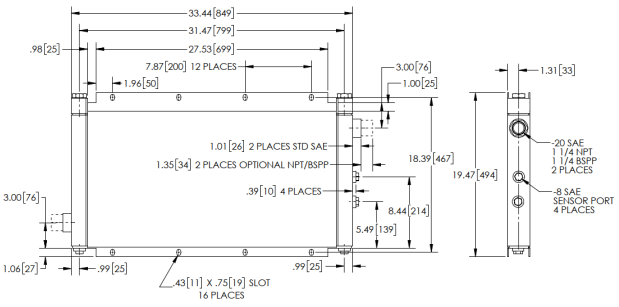
MA-12 thru MA-120



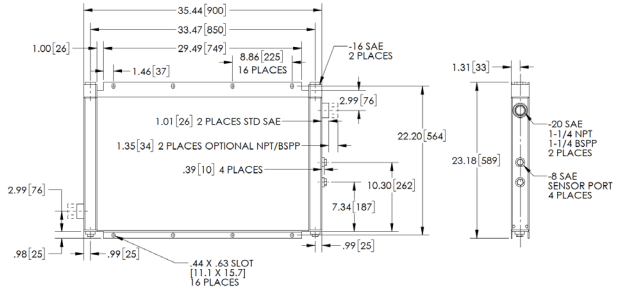
Model	A	B	C		E	F	G	H	J		K
			Without Bypass Valve	With Bypass Valve					SAE	NPT & BSPP	
MA-8	3.00 (76)	5.53 (141)	6.53 (166)								
MA-12	13.82 (351)	11.97 (304)	9.85 (250)	12.8 (325)	10.98 (279)	4.06 (103)	5.71 (145)	1.00 (25)	#12	3/4"	5.00 (127)
MA-14	6.00 (152)	9.86 (250)	10.86 (276)								
MA-18	15.84 (402)	14.14 (359)	12.01 (305)	14.6 (371)	12.96 (329)	4.99 (127)	5.87 (149)	1.00 (25)	#12	3/4"	5.91 (150)
MA-20	10.00 (254)	14.19 (360)	15.19 (386)								
MA-32	19.69 (500)	18.46 (469)	16.34 (415)	18.9 (480)	17.40 (442)	3.84 (98)	12.00 (305)	1.10 (28)	#16	1"	8.07 (205)
MA-48	23.69 (602)	22.09 (561)	20.12 (511)	22.7 (577)	21.02 (534)	3.85 (98)	8.00 (203)	1.10 (28)	#16	1"	10.00 (254)
MA-66	27.56 (700)	25.83 (656)	23.39 (594)	26.5 (673)	24.72 (628)	3.78 (96)	10.00 (254)	1.58 (40)	#20	1¼"	
MA-82	31.46 (799)	27.80 (706)	25.43 (646)	28.6 (726)	26.57 (675)	5.70 (145)	10.00 (254)	2.00 (51)	#24	1½"	
MA-120	31.46 (799)	39.6 (1006)	37.44 (951)	40.0 (1016)	38.38 (975)	5.73 (146)	10.00 (254)	2.00 (51)	#24	1½"	

Note: We reserve the right to make reasonable design changes without notice. All dimensions are in inches (millimeters) unless noted otherwise.

MA-232



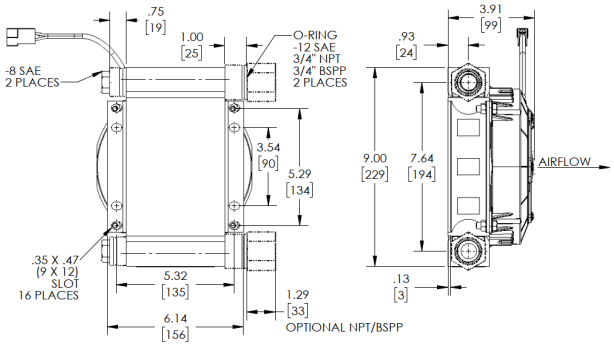
MA-248



Dimensions - Fan/Core

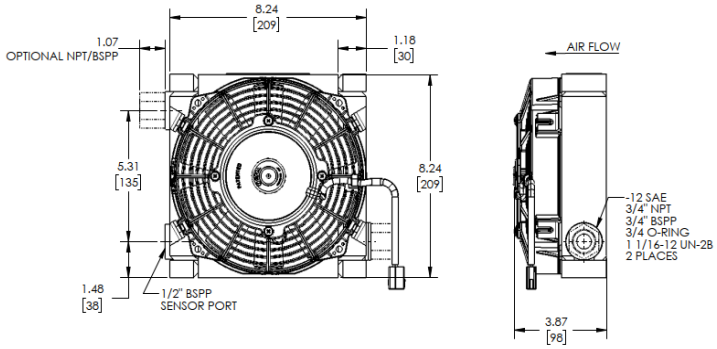
For 3D models and spec sheets visit the MA product page on our website.
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MA-3



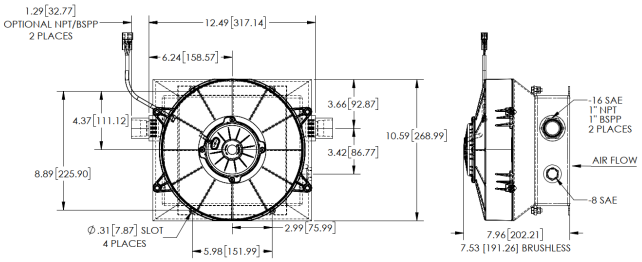
Brushless fan option not available for MA-3.

MA-3.5



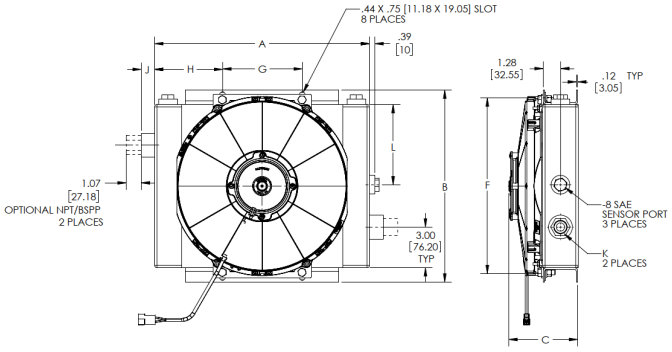
Brushless fan option not available for MA-3.5.

MA-4



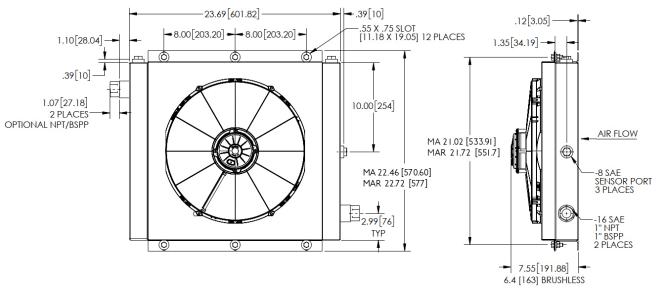
Brushless fan option has different dimensions. Consult factory.

MA-12, MA-18, MA-32



Brushless fan option has different dimensions. Consult factory.

MA-48



Model	A	B	C		F		G	H	J	K		L
			Standard	Brushless	Without Bypass Valve	With Bypass Valve				SAE	NPT & BSPP	
MA-12	13.82 (351)	11.97 (304)	6.36 (162)	6.06 (154)	10.98 (279)	11.86 (301)	5.71 (145)	4.06 (103)	1.00 (25)	#12 SAE	3/4"	4.88 (124)
MA-18	15.84 (402)	14.14 (359)	5.12 (130)	6.2 (157)	12.96 (329)	13.4 (341)	5.87 (149)	4.99 (127)	1.00 (25)	#12 SAE	3/4"	5.91 (150)
MA-32	19.69 (500)	18.46 (469)	6.15 (156)	6.28 (160)	17.30 (439)	17.9 (454)	12.00 (305)	3.84 (98)	1.10 (28)	#16 SAE	1"	8.07 (205)

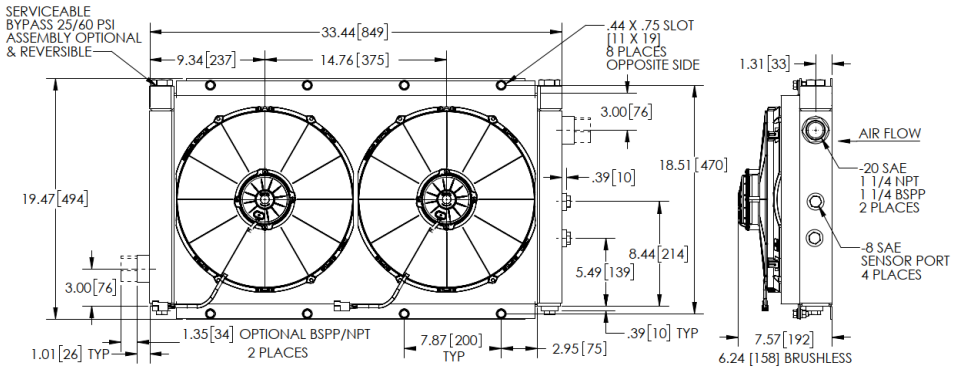
Note: We reserve the right to make reasonable design changes without notice. All dimensions are in inches (millimeters) unless noted otherwise.

Brushless fan option has different dimensions. Consult factory.
Note: We reserve the right to make reasonable design changes without notice. All dimensions are in inches (millimeters) unless noted otherwise.

Dimensions - Fan/Core

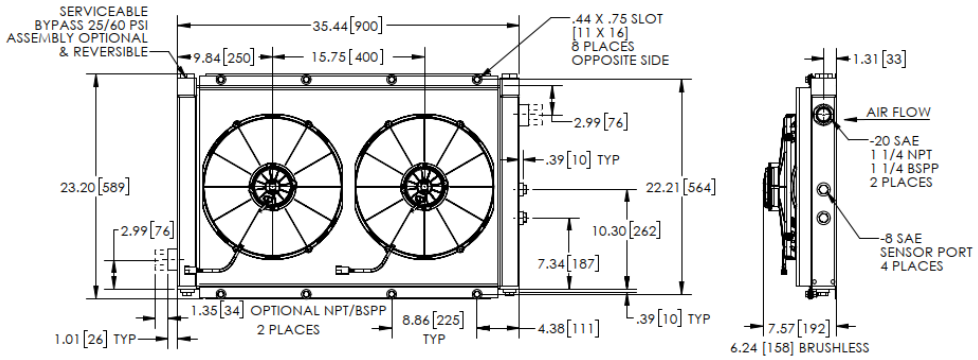
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https://www.thermaltransfer.com/product/ma-series

MA-232



Brushless fan option has different dimensions. Consult factory.

MA-248



Brushless fan option has different dimensions. Consult factory.

Note: We reserve the right to make reasonable design changes without notice. All dimensions are in inches (millimeters) unless noted otherwise.

MAGHEX 2
FAN CONTROLLER



This combined sensor and controller is designed to mount directly to the heat exchanger. It provides accurate temperature control by cycling the electric cooling fan to maintain desired oil temperature. A single housing reduces wiring and mechanical installation. The MAGHEX 2 magnetic wand is used to set up and program the sensor. Not needed for operation. LEDs indicate the oil temperature setting.

PN 59649 - SAE -8 (M) Connection Thread

MA Series cooler of any SAE -8 port or cavity

Features

- Easy installation and integration into any SAE #8 port or cavity
- Creates a simple drive circuit with minimal programming
- Low cost alternative to complex control systems
- Utilize built-in temperature sensor to activate the fan based upon current set point
- Oil temperature status shown with LED indicator
- 12 or 24 volt DC operation controlling up to 60 amps
- Temperature sensor and operation controller in single aluminum housing
- Select from 10 temperature settings from 100° to 200°F (38° to 93°C)
- Solid-state design, fully sealed microprocessor
- Manual override feature built-in
- Shuts off 7 degrees below set point
- Improved circuitry to accommodate higher amperage applications
- Housing is used as a heat sink for internal components
- Automatic low voltage shut down



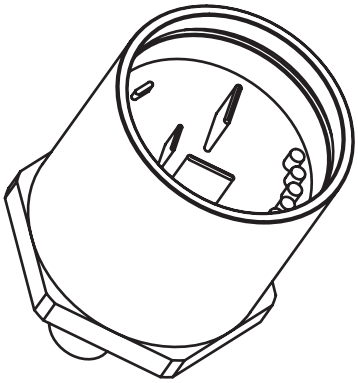
MAGHEX 2 Programming Wand

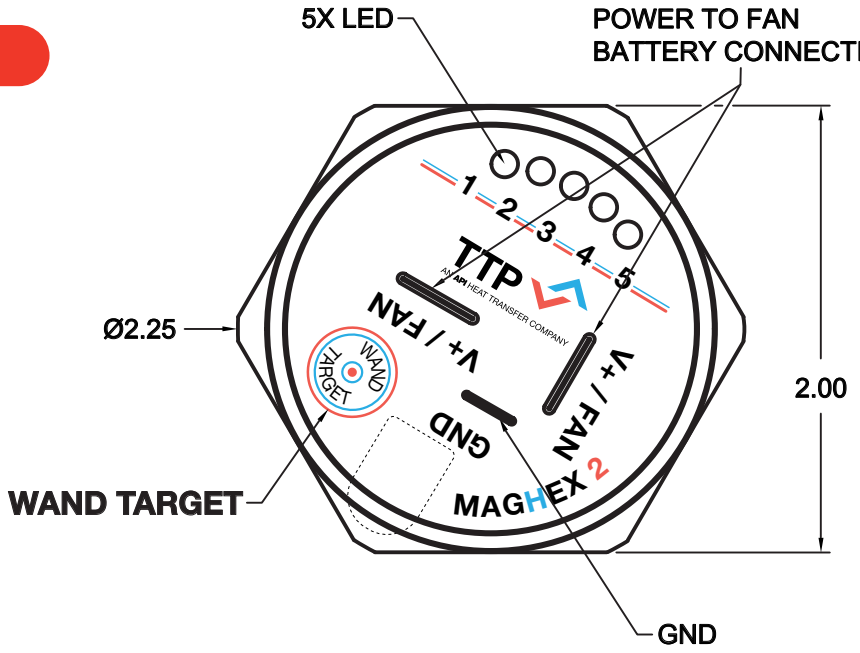
Specifications

Operating Voltage	12 or 24 VDC Systems
Min/Max Voltage	9 VDC / 32 VDC
Current Rating	60 AMPS
Switch Type	Normally open
Ambient Operating Temperature	-40° to +185°F (-40° to +85°C)
Measurement Temperature Range	100°F to 200°F (38 to 93°C)
Current Draw MAGHEX	20 mA
Set point Selections	10 set points in 10 degree increments from 100°F to 200°F (38 to 93°C)
Selection Method	Magnetic programming wand
Enclosure Rating	IP69K
Sealed Housing	High-grade automotive potting compound
Housing Material	Anodized aluminum
Weight	Approx 8 oz. (.23 kg) incl. wire
Mounting	#8 SAE Thread
Fan Connector	3 Conductor receptacle

MAGHEX 2
FAN CONTROLLER

Top View





Side View

