Fluid Cooling Industrial RM Series

Performance Notes

- Mounts behind existing TEFC motor for compact, low cost application
- Utilizes electric motor fan air flow
- Ideal for case drain and low flow applications
- Protected core
- Compact, efficient design
- Low flow & heat removal
- SAE, NPT or metric conversion
- Mounting brackets included

Ratings

Maximum Operating Pressure
300 PSI

Test Pressure
300 PSI

Maximum Operating Temperature
350°F

Materials

Tubes Copper

Fins Aluminum

Turbulators Aluminum

Cabinet Steel with powder coat finish

Filter Stainless frame with washable media

Manifolds Copper (RM-08)
Steel (RM-19 & RM-24)

Connections Brass (RM-08)
Steel (RM-19 & RM-24)

Nameplate Aluminum

How to Order (RM-08 models only)

RM	–	0	8	–			–	
Model Series		**Model Size Selected**			**Number of Passes** **1** - 1 Pass **2** - 2 Pass **4** - 4 Pass	**Connection Type** **1** - NPT **2** - SAE **3** - BSPP		**Optional Bypass*** **Blank** - No Bypass **30** - 30 PSI **60** - 60 PSI

*Available on One Pass only.
This is a partial flow pressure bypass only. It is not designed to be a full flow system bypass.

How to Order (All models except RM-08 size)

RM	–			–			–	
Model Series		**Model Size Selected**			**Number of Passes** **1** - 1 Pass **2** - 2 Pass	**Connection Type** **1** - NPT **2** - SAE **3** - BSPP		**Optional Bypass*** **Blank** - No Bypass **30** - 30 PSI **60** - 60 PSI

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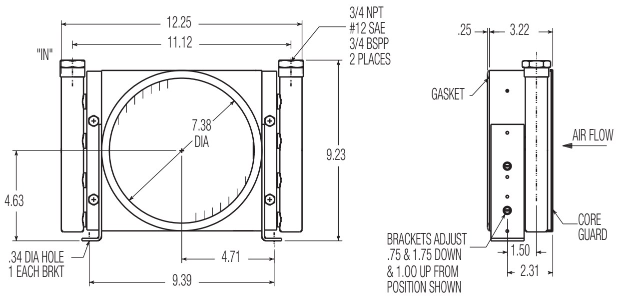
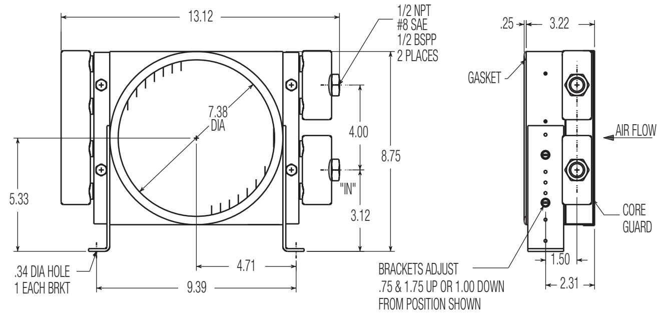
Dimensions

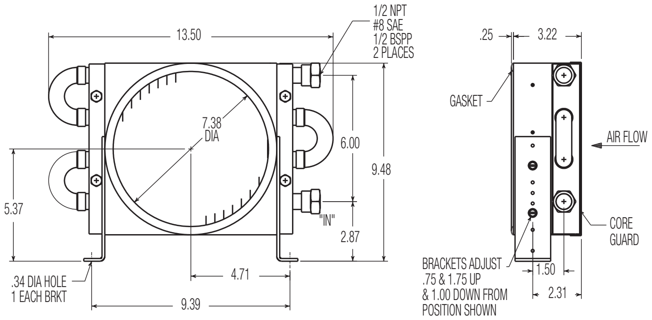
RM-08-1
One Pass



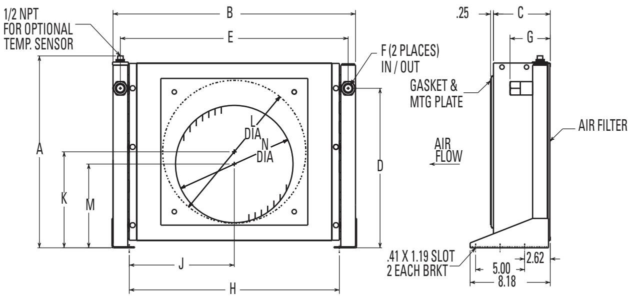
RM-08-2
Two Pass



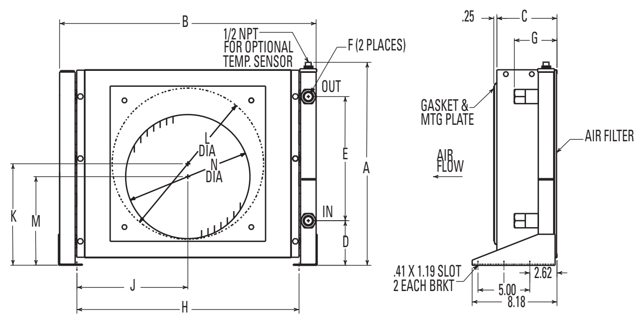
RM-08-4
Four Pass



RM-19-1, RM-24-1
One Pass



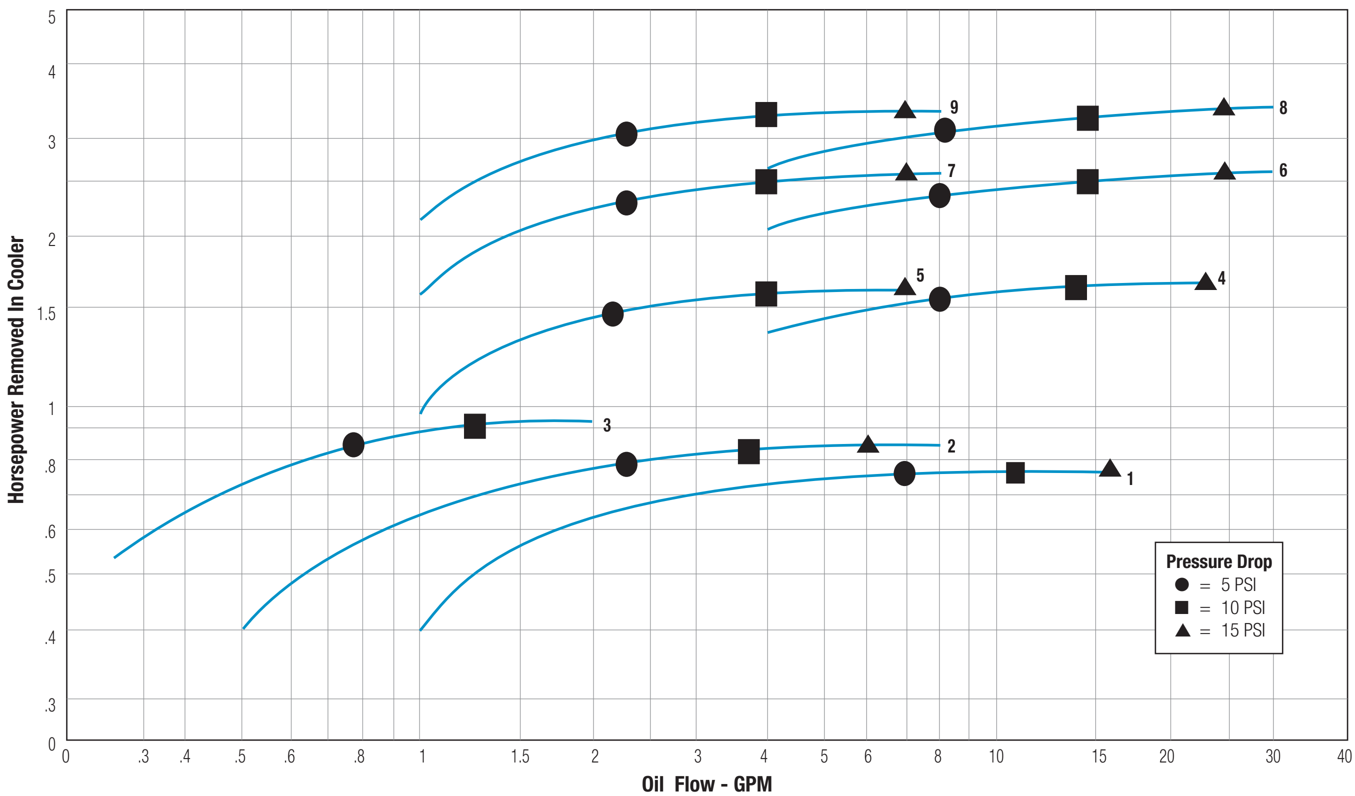
RM-19-2, RM-24-2
Two Pass



Model	A	B	C	D	E	F		G		H	J	K	L	M	N	Weight LBS
						SAE	NPT & BSPP	SAE	NPT & BSPP							
RM-19-1	13.62	16.00	5.11	10.31	15.00	#12	.75	3.05	4.12	13.96	7.38	6.81	10.38	5.81	7.50	16
RM-19-2	13.62	16.50	5.11	4.31	6.00	#12	.75	3.05	4.12	13.96	7.38	6.81	10.31	5.81	7.50	16
RM-24-1	19.62	24.75	5.85	16.31	23.25	#12	.75	3.05	4.12	21.44	10.72	9.81	14.62	8.56	12.00	31
RM-24-2	19.62	24.75	5.85	4.31	12.00	#12	.75	3.05	4.12	21.44	10.72	9.81	14.62	8.56	12.00	31

NOTE: All dimensions in inches. We reserve the right to make reasonable design changes without notice.

Performance Curves



Selection Procedure

Performance Curves are based on 50SSU oil leaving the cooler 40°F higher than the ambient air temperature used for cooling and 1800 RPM motor speed. This is also referred to as a 40°approach temperature.

STEP 1 **Determine the Heat Load.** This will vary with different systems, but typically coolers are sized to remove 25 to 50% of the input nameplate horsepower.
(Example: 100 HP Power Unit x .33 = 33 HP Heat load. For 1200 RPM motors, multiply Heat Load by 1.5.)

If BTU/HR is known: $HP = \frac{BTU/HR}{2545}$

STEP 2 **Determine Approach Temperature.**
Desired oil leaving cooler °F – Ambient air temp.
°F = Actual Approach

STEP 3 **Determine Curve Horsepower Heat Load.** Enter the information from above:

$$\text{Horsepower heat load} \times \frac{40 \times Cv}{\text{Actual Approach}} = \text{Curve Horsepower}$$

STEP 4 **Enter curves** at oil flow through cooler and curve horsepower. 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 △P correction curve.

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

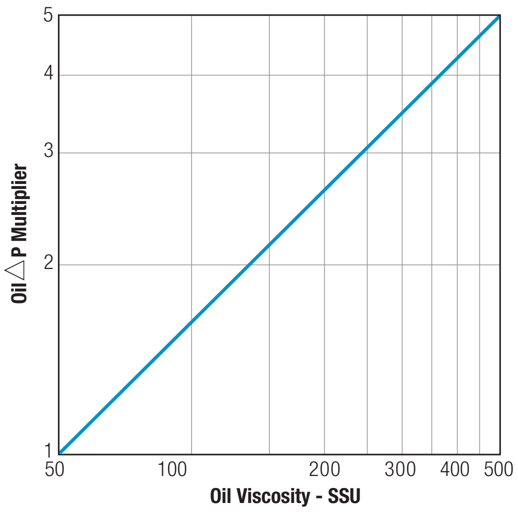
Selection Procedure

C_V Viscosity Correction

Average Oil Temp °F	OIL 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

Curve	Model	TEFC Motor Frame Size
1	RM-08-1	48-184
2	RM-08-2	48-184
3	RM-08-4	48-184
4	RM-19-1	213-256
5	RM-19-2	213-256
6	RM-24-1	254-286
7	RM-24-2	254-286
8	RM-24-1	324-365
9	RM-24-2	324-365

Oil Pressure Correction



RM Series

Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Description

RM series forced air oil coolers are used for high-efficiency oil cooling in hydraulic systems. Units utilize the latest in heat transfer technology to reduce the physical size and provide the ultimate in cooling capacity. By maintaining a lower oil temperature, hydraulic components and fluids work better and have a longer life expectancy.

General Safety Information

1. Do not exceed the pressure rating of the oil cooler, nor any other component in the hydraulic system.
2. Do not exceed the published maximum flow rates as the potential can result in damage to the hydraulic system.
3. Release all oil pressure from the system before installing or servicing the oil cooler.
4. These oil coolers are not suitable for use in hydraulic systems operating with water-glycol or high water base fluids without a corrosion inhibitor suitable for aluminum and copper component protection.

Unpacking

After unpacking the unit, inspect for any loose, missing or damaged parts. Any minor damage to the cooling fins can generally be corrected by gently straightening them.

WARNING

Do not exceed the maximum pressure of 300 PSI, or the maximum temperature of 350°F as oil cooler failure can occur.

1. These hydraulic oil coolers should be installed on either the low pressure return line, or a dedicated recirculation cooling loop.
2. Turn off the hydraulic system and drain any oil from the return lines before installing these coolers.
3. A strainer located ahead of the cooler inlet should be installed to trap scale, dirt, or sludge that may be present in piping and equipment, or that may accumulate with use. A thermostatic or spring loaded bypass/relief valve installed ahead of the cooler may be helpful to speed warm-up and relieve the system of excessive pressures.

   CAUTION

   Use of a back-up wrench is recommended to prevent twisting of the manifolds when installing the oil piping.

   If pipe sealant is used on threads, the degree of resistance between mating parts is less, and there is an increased chance for cracking the heat exchanger fittings. Do not over tighten.
4. Piping must be properly supported to prevent excess strain on the heat exchanger ports.

Maintenance

Inspect the unit regularly for loose bolts and connections, rust and corrosion, and dirty or clogged heat transfer surfaces (cooling coil).

Heat Transfer Surfaces

Dirt and dust should be removed by brushing the fins and tubes and blowing loose dirt off with compressed air. Should the surface be greasy, the cooler should be brushed or sprayed with a mild alkaline solution, or a non-flammable degreasing fluid. Follow with hot water rinse and dry thoroughly. A steam cleaner may also be used effectively. **Do not use caustic cleaners.**

Casing

Dirt and grease should be removed. Rusty or corroded surfaces should be sanded clean and repainted.

Internal Cleaning

At least once a year piping should be disconnected and decreasing agent or flushing oil circulated through the unit to remove sludge form turbulators and internal tube surfaces to return the unit to full thermal capacity. A thorough cleaning of the entire system in the same manner is preferable to avoid carry-over from uncleaned piping, pumps and accessories. The strained or any filtering devices should be removed and serviced following this cleaning operation.

Trouble Shooting Chart

Symptom	Possible Cause	Corrective Action
Not cooling adequately	Not enough air flow	Consult specifications and adjust if required
	Unit is fouled	Clean exchanger (see maintenance)
	Unit is undersized	Check specifications and change size if necessary
Leaking at connections	Not tight	Tighten carefully
	No thread sealant	Remove pipe, apply thread sealant and reinstall