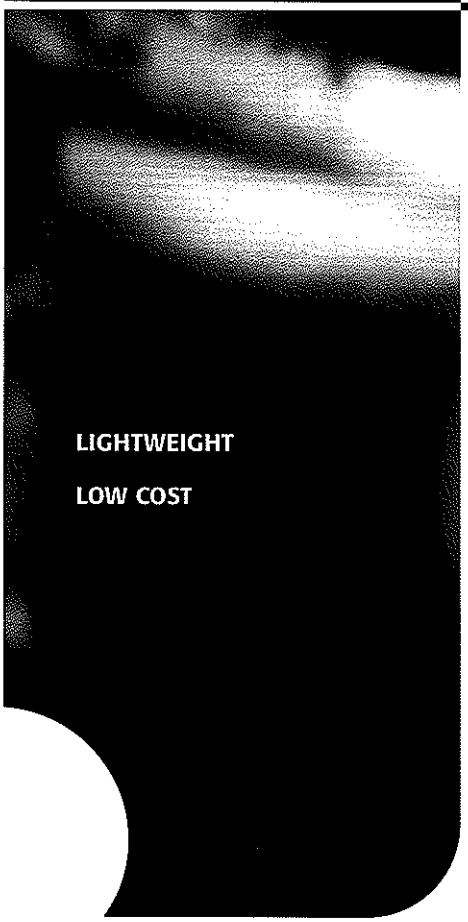
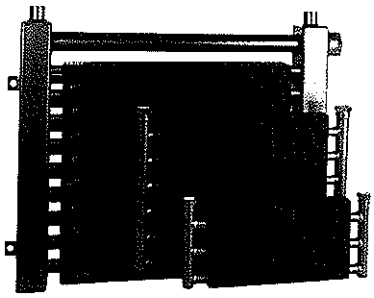
AIR COOLED MOBILE/DH SERIES



LIGHTWEIGHT

LOW COST



- High Performance Oil Turbulators
- Rugged Off-Highway Steel Designs Available
- Oil Flows to 150 GPM, Heat Removal to 175,000 BTU/HR

OPTIONS:

Built-in Relief Bypass
Steel Components
Custom Sizes/Mounting Brackets
Connection Sizes/Locations
Marine Coating

MATERIALS

Tubes - Copper
Fins - Aluminum or Steel
Turbulator - Aluminum

Manifolds - Copper; Models DH-051–DH-447
Steel; Models DH-513–DH-670
Connections - Brass; Models DH-051–DH-447
Steel; Models DH-513–DH-670

RATINGS

Operating pressure - 300 psi
Test pressure - 300 psi
Operating temperature - 350°F

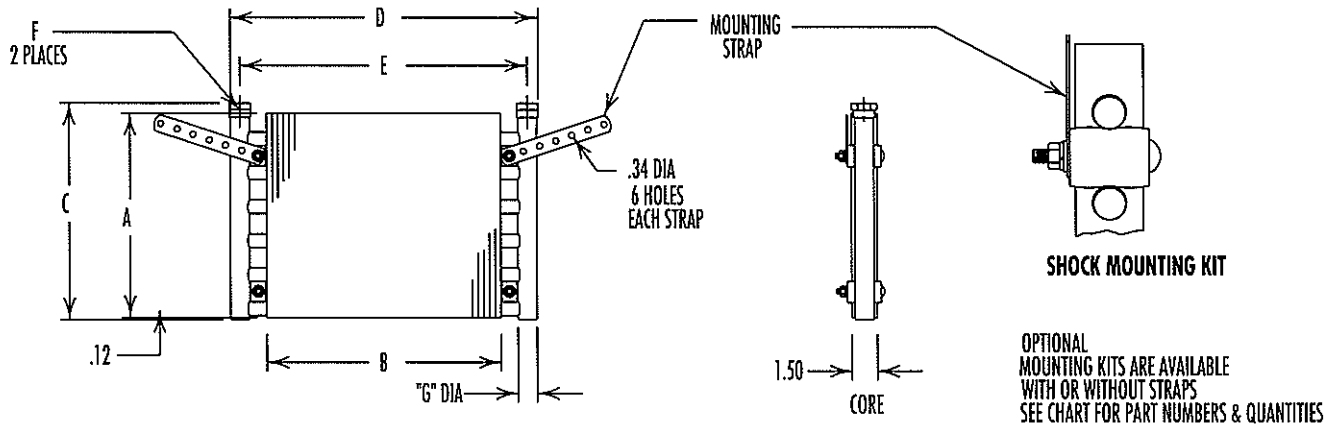
HOW TO ORDER

MODEL SERIES	UNIT SIZE SELECTED	*CONNECTION TYPE	FIN MATERIAL	BYPASS PRESSURE SETTING
DH		1 - NPT	1 - ALUMINUM	BLANK - NO BYPASS
DHR - RELIEF BYPASS INCLUDED		2 - SAE	2 - STEEL	30 - 30 PSI
				60 - 60 PSI

Examples: DH-051-1-1 or DHR-062-2-2-30
Note: All positions must be filled. Mounting Kits (where needed) must be ordered separately, by part number.

*Other connection types available. Please consult factory for assistance.

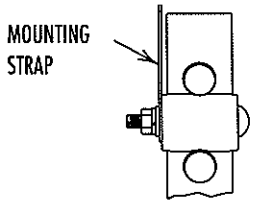
DIMENSIONS & WEIGHTS FOR DH-051 THROUGH DH-447 (COPPER MANIFOLD, 1 ROW)



MODEL	A	B	C	D	E	F NPT	F SAE	G DIA	QTY MTG KITS	FACE AREA FT²	WEIGHT LBS.
DH-051	4.00	11.25	4.50	15.00	14.12	.50	#10	.88	2	.31	2
DH-062	6.00		6.50	15.00	14.12				4	.47	3
DH-073		14.25		18.00	17.12					.60	3
DH-084		20.25		24.00	23.12					.84	4
DH-095	8.00	14.25	8.50	18.00	17.12					.79	4
DH-106		17.25		21.00	20.12					.96	5
DH-117		20.25		24.00	23.12					1.12	5
DH-194	12.00	13.75	12.73	18.00	16.88	.75	#12	1.12		1.15	6
DH-205		16.75		21.00	19.88					1.40	7
DH-216		19.75		24.00	22.88					1.64	8
DH-227	14.00		14.73	24.00	22.88					1.92	9
DH-249	18.00		18.73	24.00	22.88				6	2.47	12
DH-326	24.00	19.25	25.00	24.00	22.62	1.00	#16	1.38	8	3.21	16
DH-337		25.25		30.00	28.62					4.21	20
DH-348	30.00	19.25	31.00	24.00	22.62					4.00	19
DH-359		25.25		30.00	28.62					5.26	24
DH-370		31.25		36.00	34.62					6.51	28
DH-425	36.00	24.75	37.41	30.00	28.38	1.25	#20	1.62		6.19	32
DH-447	40.00	36.75	41.41	42.00	40.38					10.21	43

All dimensions in inches.
After making your base model selection with the connection of your choice, please refer to the How To Order section.
Note: We reserve the right to make reasonable design changes without notice.
Weights are for Aluminum fins.

MOUNTING KITS

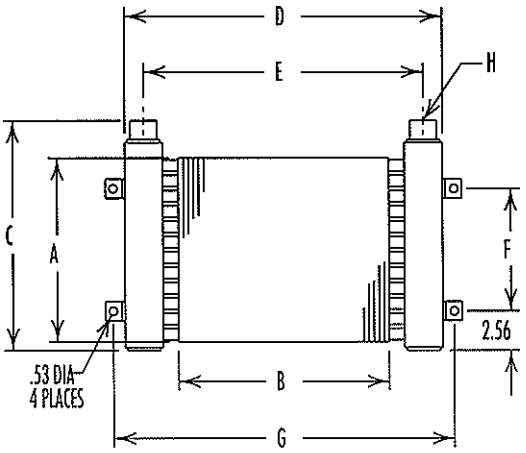


	SHOCK MOUNTING KIT PART NUMBERS
With Strap	L-84741
Without Strap	L-84740

DIMENSIONS & WEIGHTS FOR DH-513 THROUGH DH-670 (STEEL MANIFOLD, 12 ROW)

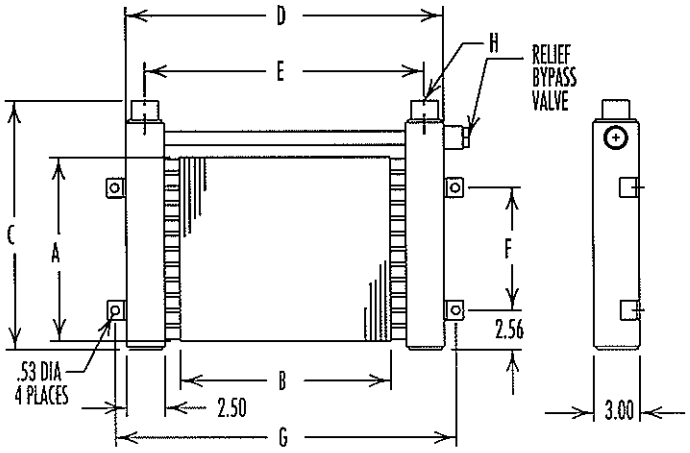
DH Series

DH-SERIES



DHR Series

DHR-SERIES



MODEL	A	B	C		D		E	F	G	H		FACE AREA FT²	WEIGHT LBS.
			DH	DHR	DH	DHR				NPT	SAE		
DH-513	12.00	13.75	15.00	16.25	20.75	22.41	18.25	8.00	22.25	.75	#12	1.15	16
DH-524	18.00	19.75	21.00	23.25	26.75	28.13	24.25	14.00	28.25			2.47	27
DH-535	24.00	19.25	27.00	29.25	26.25	27.63	23.75	20.00	27.75	1.00	#16	3.21	53
DH-626	36.00	22.75	39.03	41.28	29.75	31.13	27.25	32.00	31.25	2.00	#32	5.69	60
DH-670	40.00	34.75	43.03	45.28	41.75	43.13	39.25	36.00	43.25			9.65	115

All dimensions in inches. After making your base model selection with the connection of your choice, please refer to the How To Order section. Weights are for aluminum fins.

Oil Temperature: Oil coolers can be selected using *entering* or *leaving* oil temperatures. Typical operating temperature ranges are:
Hydraulic Oil: 110°F - 130°F, Hydrostatic Drive Oil: 130°F - 180°F,
Bearing Lube Oil: 120°F - 160°F, Lube Oil Circuits: 110°F - 130°F.

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 $\triangle T$) with this formula:
Oil $\triangle T$ = (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 $\triangle T$.
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.

METHODS TO DETERMINE HEAT LOADS

The heat load may be determined by:

A. Hydraulic oil cooling: Assume 30% of the input horsepower will be rejected to heat. If the input horsepower is unknown, this formula may be used:
BTU/HR = (System PSI) x (GPM Flow) x 1.8 x .3

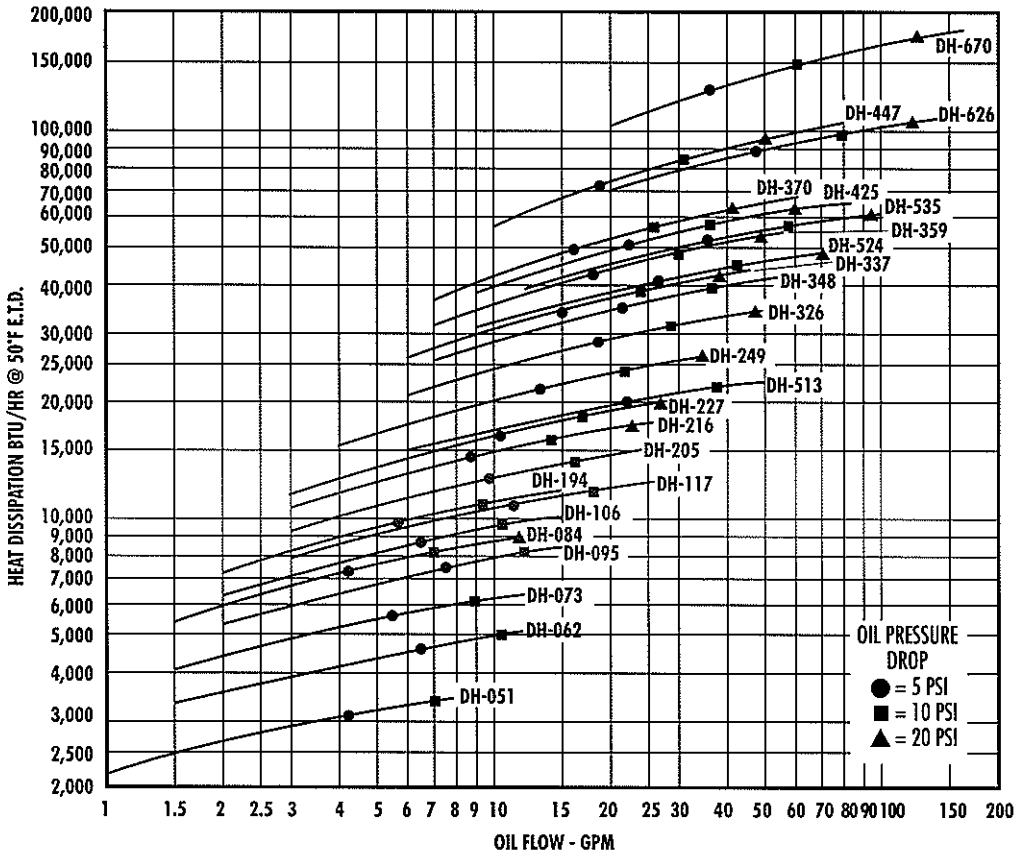
B. Hydrostatic oil cooling: Assume 25% of the input horsepower will be rejected to heat.

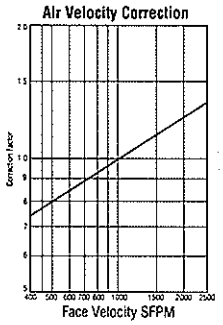
C. Automatic transmission: Assume 30% of the engine horsepower will be rejected to heat.

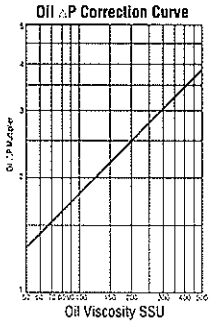
D. Engine oil cooling: Assume 10% of the engine horsepower will be rejected to heat.

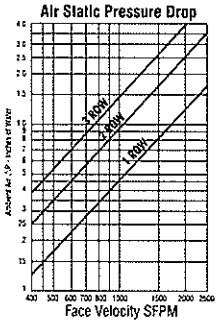
Oil Temp °F	TYPICAL OIL VISCOSITY, SSU				
	SAE 5	SAE 10	SAE 20	SAE 30	SAE 40
100	110	150	275	500	750
150	60	70	100	135	190
210	40	43	50	65	75

PERFORMANCE CURVES









RELIEF BYPASS OPTION

MODEL	DESCRIPTION
DH-051 thru DH-447	Available in 30psi or 60psi settings. Bypass valve is built into tubes and does not affect external dimensions. All steel valves. Not serviceable.
DH-513	Available in either 30 psi or 60 psi settings. 3/4", external all steel valve. May be removed for servicing.
DH-524 thru DH-670	Available in either 30 psi or 60 psi settings. 1-1/2", external all steel valve. May be removed for servicing.

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 (E.T.D.)
E.T.D. = Entering oil temperature - Ambient air temperature

Step 1: Determine Heat Load:
Heat load may be expressed as either Horsepower or BTU/Hr.
BTU/Hr. = Horsepower x 2545

Step 2: Determine entering temperature difference:
The entering oil temperature is generally the maximum desired system temperature.
ETD = Entering oil temperature - Ambient air temperature .

Step 3: Determine the corrected heat dissipation to use the curves:

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

Note: If air velocity is unknown assume 750 SFPM.

Step 4: Enter the Performance Curves at the bottom with the GPM oil flow and proceed upward to the adjusted heat load from step 3. Any curve on or above this point will meet these conditions.

Step 5: Calculate actual SFPM Air Velocity or SCFM (Standard Cubic Feet Per Minute) using the Face Area from the table.

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

B.) SCFM Air Flow = SFPM Air Velocity x Square Feet Face Area

*If the Air Velocity calculated is different than the value in Step 3, recheck Corrected oil Pressure Drop.

Step 6: Multiply Oil Pressure Drop from curve by correction factor found in Oil △P Correction Curve.

AIR COOLED MOBILE/DF SERIES

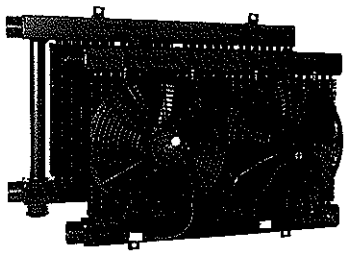
LOW AMP DRAW
12 OR 24 VOLT DC MOTORS

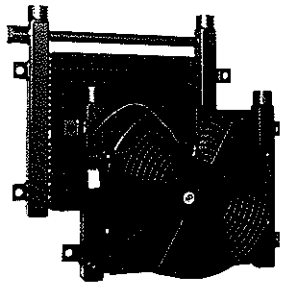
HEAVY DUTY CONSTRUCTION

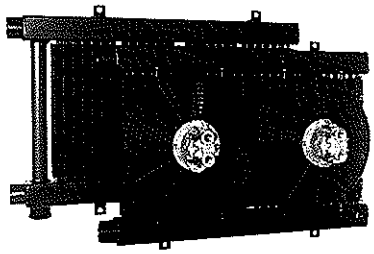
OPTIONAL SERVICEABLE
RELIEF BYPASS VALVE

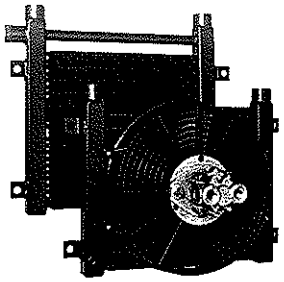
OPTIONAL FAN
CONTROL SWITCH

LONG LIFE HYDRAULIC
MOTORS









- Heat Removal TO 35,000 BTU/Hr.
- Oil Flows to 110 GPM
- Mounting Brackets Included
- SAE, NPT or 37° Flare Oil Connections
- Damage Resistant Steel Fins
- Rugged Steel Manifolds

MATERIALS

Fins - Steel
Tubes - Copper
Manifolds - Steel
Turbulators - Aluminum

Fan Assembly - High Impact Plastic
Motor Displacement - .22in^3/Rev. (Hydraulic)
Maximum Pressure - 2000 PSI (Hydraulic)
Allowable Backpressure - 1000 PSI (Hydraulic)

RATINGS

Operating pressure - 300 psi
Test pressure - 300 psi
Operating temperature - 350°F

NUMBER OF FANS	DC CURRENT REQUIRED	
	12 VOLT	24 VOLT
1	12.5 AMPS	6.3 AMPS
2	25 AMPS	12.6 AMPS

HYDRAULIC MOTOR DATA			
NUMBER OF FANS	OIL FLOW REQUIRED (GPM)	MIN. OPERATING PRESS. (PSI)	MAX. FAN SPEED (RPM)
1	2.1	300	2200
2	4.2	300	2200

RELIEF BYPASS OPTION

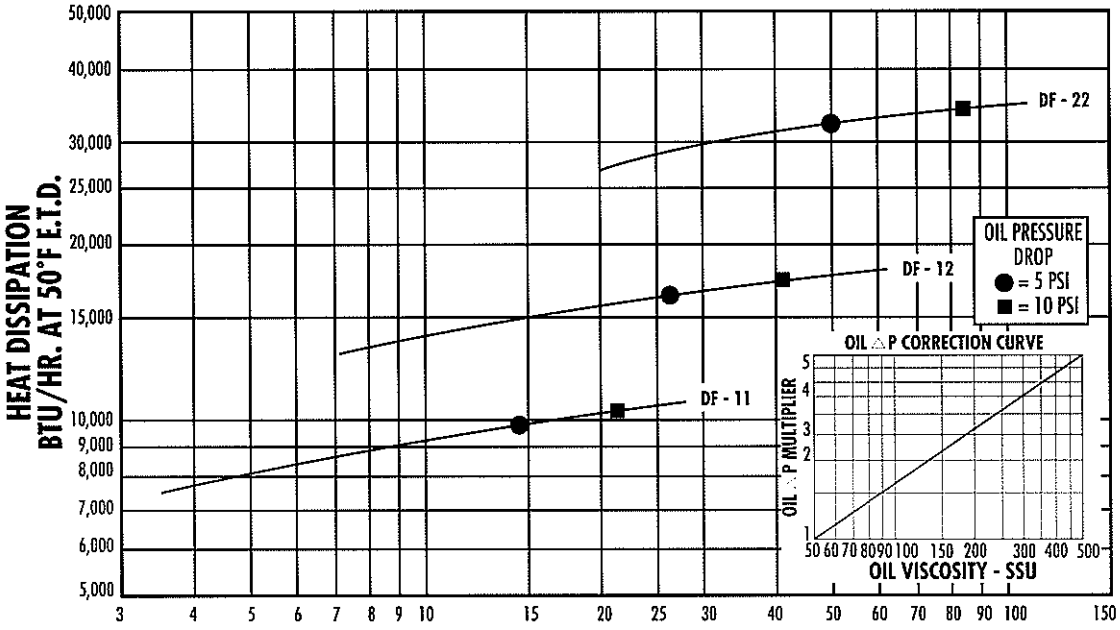
MODEL	DESCRIPTION
DFR-11	3/4", external, all steel valve. Available in either 30 PSI or 60 PSI settings. May be removed for servicing.
DFR-12, 22	1-1/2", external, all steel valve. Available in either 30 PSI or 60 PSI settings. May be removed for servicing.

HOW TO ORDER

MODEL SERIES	MODEL SIZE SELECTED	*CONNECTION TYPE	MOTOR SPECIFICATION	RELIEF BYPASS
DF DFR - RELIEF BYPASS INCLUDED		1 - NPT 2 - SAE 7 - 37° MALE FLARE	NM - NO MOTOR 4A - 12 VOLT DC 4B - 24 VOLT DC 9 - HYDRAULIC MOTOR	BLANK - NO BYPASS 30 - 30 PSI 60 - 60 PSI

*Other connection types available. Please consult factory for assistance.

PERFORMANCE CURVES



SELECTION PROCEDURE

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 x 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.

$$\text{Corrected Heat Dissipation} = \text{BTU/HR heat load} \times \frac{50°F}{\text{E.T.D.}}$$

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; Multiply pressure drop from curve by correction factor found in oil △P correction curve.

METHODS TO DETERMINE HEAT LOADS

The heat load may be determined by:

A. Hydraulic oil cooling: Assume 30% of the input horsepower will be rejected to heat. If the input horsepower is unknown, this formula may be used:
BTU/HR = (System PSI) x (GPM Flow) x 1.8 x .3

B. Hydrostatic oil cooling: Assume 25% of the input horsepower will be rejected to heat.

C. Automatic transmission: Assume 30% of the engine horsepower will be rejected to heat.

D. Engine oil cooling: Assume 10% of the engine horsepower will be rejected to heat.

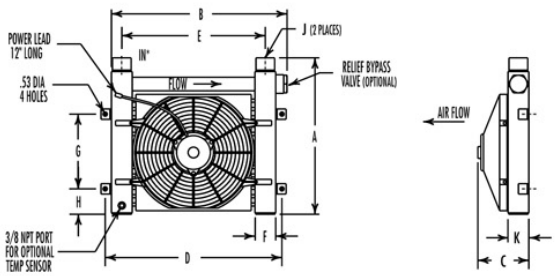
OIL TEMPERATURE

Typical operating temperature ranges are:

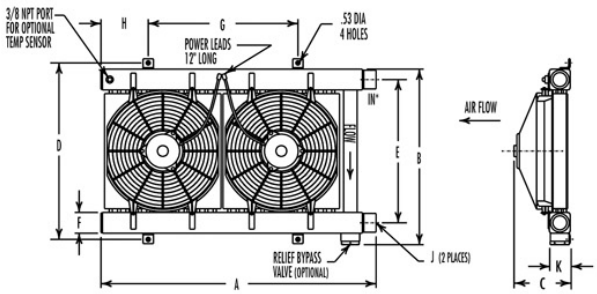
Hydraulic Motor Oil	120° - 180°F
Hydrostatic Drive Oil	160° - 180°F
Engine Lube Oil	180° - 200°F
Automatic Transmission Fluid	200° - 300°F

DIMENSIONS–12 & 24 VOLT DC MOTORS

MODELS DF-11 AND DF-12



MODEL DF-22



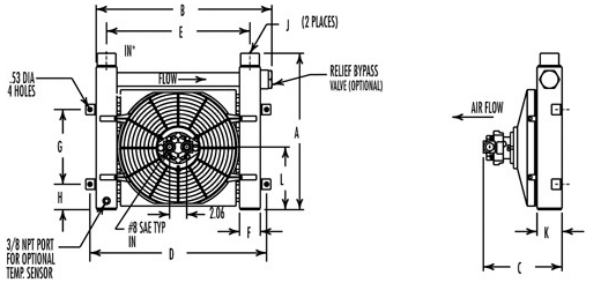
UNITS SHOWN WITH OPTIONAL BYPASS VALVE

MODEL	A		B		C	D	E	F	G	H	J		K	LBS
	DF	DFR	DF	DFR							NPT	SAE		
DF-11	16.12	18.00	19.25	20.91	5.51	20.75	17.75	1.50	7.50	3.69	1.00	#16	1.50	38
DF-12	17.00	18.25	21.25	22.91	7.01	22.75	18.75	2.50					3.00	57
DF-22	31.47	33.73		22.62					14.25	7.69	1.50	#24		110

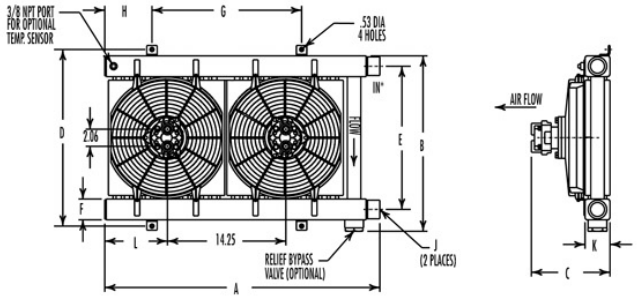
Note: All dimensions are in inches. We reserve the right to make reasonable design changes without notice. *Inlet and outlet oil connections can be reversed when the bypass valve is not used.

DIMENSIONS–HYDRAULIC MOTORS

MODELS DF-11 AND DF-12



MODEL DF-22

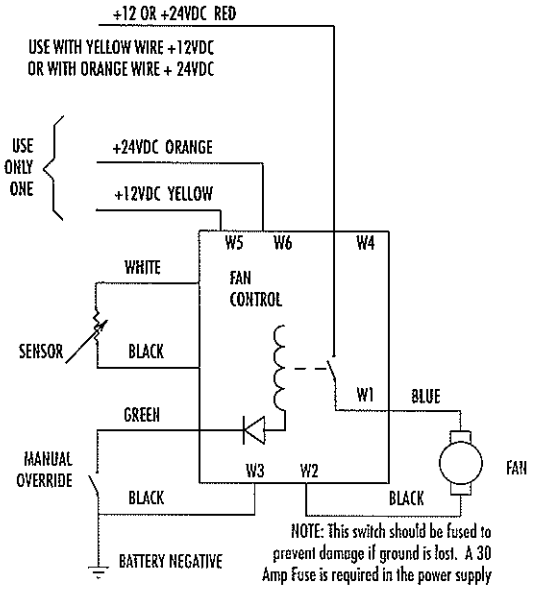


UNITS SHOWN WITH OPTIONAL BYPASS VALVE

MODEL	A		B		C	D	E	F	G	H	J		K	L	LBS
	DF	DFR	DF	DFR							NPT	SAE			
DF-11	16.12	18.00	19.25	20.91	7.47	20.75	17.75	1.50	7.50	3.69	1.00	#16	1.50	7.56	38
DF-12	17.00	18.25	21.25	22.91	9.46	22.75	18.75	2.50					3.00		57
DF-22	31.47	33.73		22.62					14.25	7.69	1.50	#24		7.60	110

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.

ELECTRICAL SCHEMATIC



THERMOSTATIC TEMPERATURE CONTROLLER OPTION

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
96171	ELECTRONIC FAN CONTROL KIT

DIMENSIONS

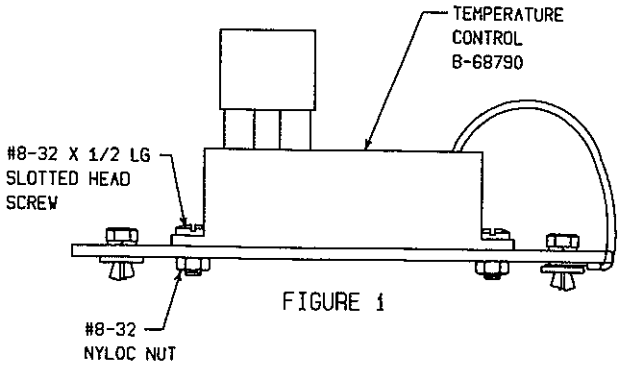


FIGURE 1

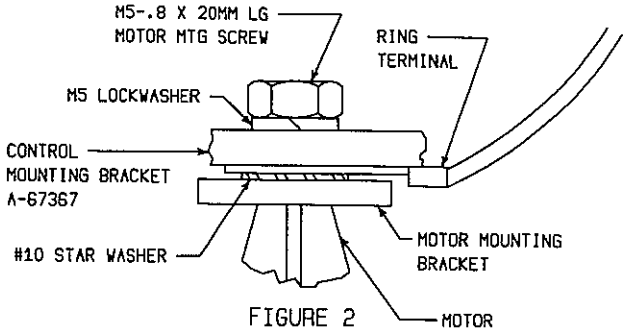


FIGURE 2

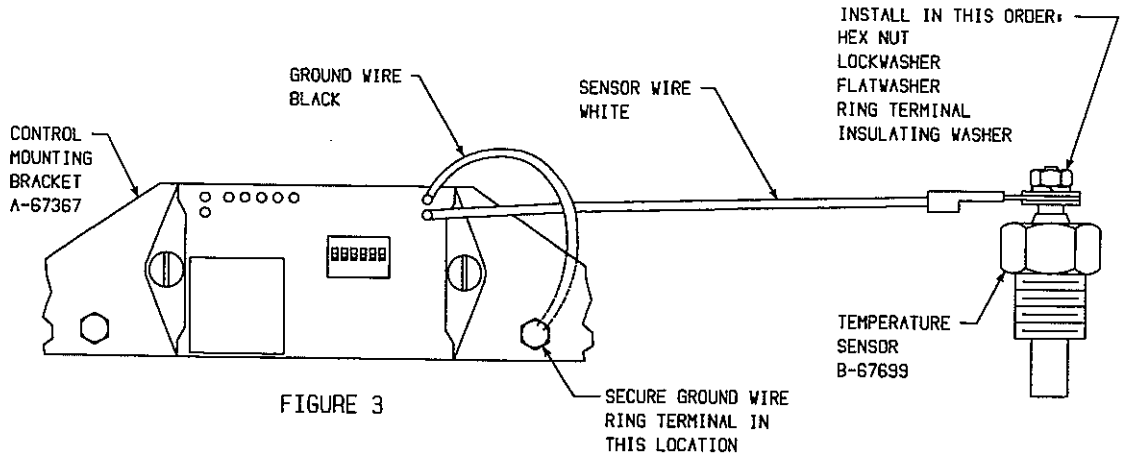


FIGURE 3

For more information or to purchase these products, please contact:

HYDROTHRIFT CORPORATION
(800) 772-0493

www.hydrothrift.com
sales@hydrothrift.com