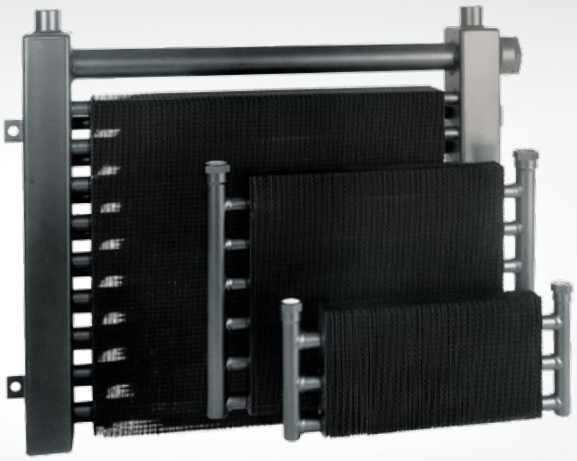
Fluid Cooling Mobile DH Series

Performance Notes

- Hayden interchange
- Excellent for radiator face mount cooling
- 3/4" tube size
- Steel or aluminum fin
- Copper manifolds – one row
- Steel manifolds – two row
- High performance oil turbulators
- Rugged off-highway steel designs available
- Oil flows to 150 GPM, heat removal to 175,000 BTU/HR



Options
Steel components
Internal pressure bypass
Custom sizes/mounting brackets
Connection sizes/locations
Corrosion resistant marine coating

Ratings

Maximum Operating Pressure
300 PSI

Test Pressure
300 PSI

Maximum Operating Temperature
350°F

Materials

Tubes Copper

Fins Aluminum / Steel (optional)

Turbulators Aluminum

Manifolds Copper (DH-051 – DH-447)
Steel (DH-513 – DH-670)

Connections Brass (DH-051 – DH-447)
Steel (Models DH-513 – DH-670)

Internal Pressure Bypass Options

DH-051 through DH-447
Available in either 30 PSI or 60 PSI settings. Relief valve is built into tubes and does not effect 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 through DH-670
Available in either 30 PSI or 60 PSI settings. 1½", external, all steel valve. May be removed for servicing.

How to Order

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Model Series
DH
DHR - Internal pressure bypass included

Model Size Selected

Connection Type*
1 - NPT
2 - SAE

Fin Material
1 - Aluminum
2 - Steel

Bypass
Blank - No Bypass
30 - 30 PSI
60 - 60 PSI

ADD FOR DHR MODELS ONLY

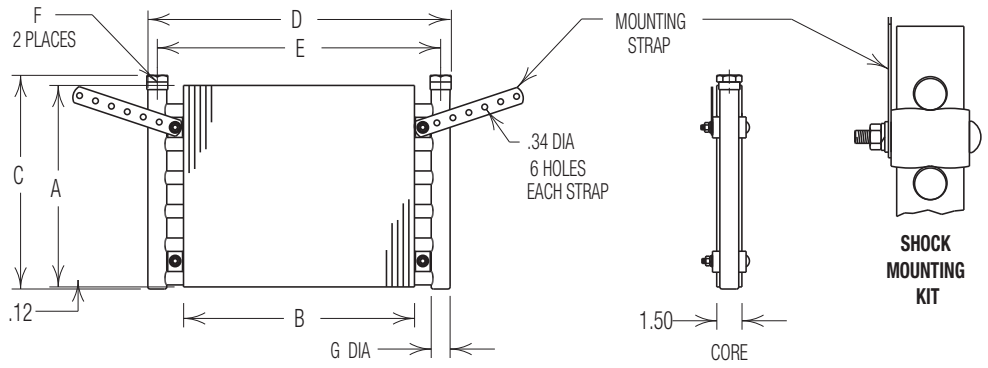
Examples: DH-051-1-1 or DHR-062-2-2-30

Note: All positions must be filled. Mounting Kits (where needed) must be ordered separately, by part number and specified quantity.

*Other connection types available. Please consult factory for assistance.
This is a partial flow pressure bypass only. It is not designed to be a full flow system bypass.

Dimensions

DH-051 thru DH-447



Mounting Kits

Optional Mounting Kits are available with or without straps.

	Part Number
With strap	L-84741
Without strap	L-84740

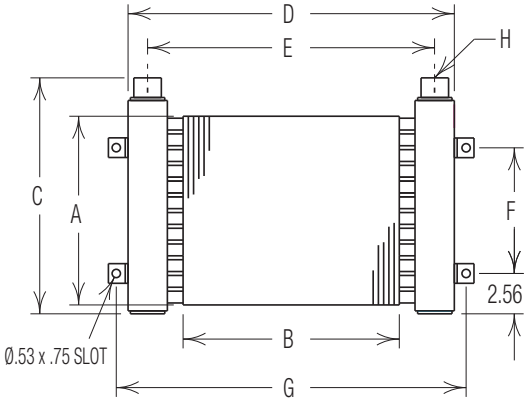
Model	A	B	C	D	E	F		G Diameter	Quantity Mounting Kits	Face Area (SQ FT)	Weight (LBS)
						NPT	SAE				
DH-051	4.00	11.25	4.50	15.00	14.12	0.50	#10	0.88	2	0.31	2
DH-062	6.00	11.25	6.50	15.00	14.12	0.50	#10	0.88	4	0.47	3
DH-073	6.00	14.25	6.50	18.00	17.12	0.50	#10	0.88	4	0.60	3
DH-084	6.00	20.25	6.50	24.00	23.12	0.50	#10	0.88	4	0.84	4
DH-095	8.00	14.25	8.50	18.00	17.12	0.50	#10	0.88	4	0.79	4
DH-106	8.00	17.25	8.50	21.00	20.12	0.50	#10	0.88	4	0.96	5
DH-117	8.00	20.25	8.50	24.00	23.12	0.50	#10	0.88	4	1.12	5
DH-194	12.00	13.75	12.73	18.00	16.88	0.75	#12	1.12	4	1.15	6
DH-205	12.00	16.75	12.73	21.00	19.88	0.75	#12	1.12	4	1.40	7
DH-216	12.00	19.75	12.73	24.00	22.88	0.75	#12	1.12	4	1.64	8
DH-227	14.00	19.75	14.73	24.00	22.88	0.75	#12	1.12	4	1.92	9
DH-249	18.00	19.75	18.73	24.00	22.88	0.75	#12	1.12	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	24.00	25.25	25.00	30.00	28.62	1.00	#16	1.38	8	4.21	20
DH-348	30.00	19.25	31.00	24.00	22.62	1.00	#16	1.38	8	4.00	19
DH-359	30.00	25.25	31.00	30.00	28.62	1.00	#16	1.38	8	5.26	24
DH-370	30.00	31.25	31.00	36.00	34.62	1.00	#16	1.38	8	6.51	28
DH-425	36.00	24.75	37.41	30.00	28.38	1.25	#20	1.62	8	6.19	32
DH-447	40.00	36.75	41.41	42.00	40.38	1.25	#20	1.62	8	10.21	43

All dimensions in inches. Weights are for aluminum fins.
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.

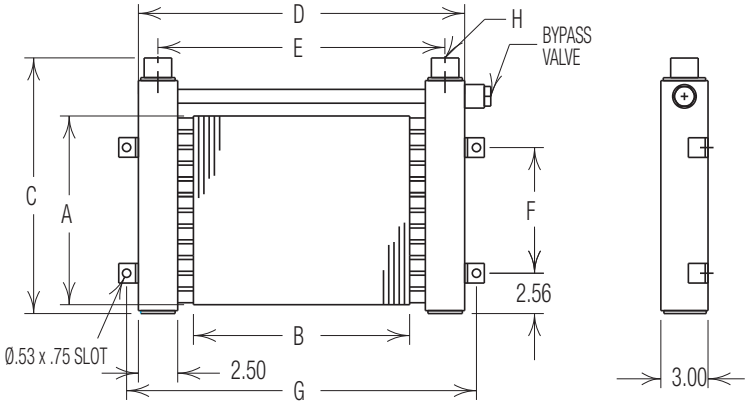
Dimensions

DH-513 thru DH-670

DH Series



DHR Series



Model	A	B	C		D		E	F	G	H		Face Area (SQ FT)	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	0.75	#12	1.15	16
DH-524	18.00	19.75	21.00	23.25	26.75	28.13	24.25	14.00	28.25	0.75	#12	2.47	27
DH-535	24.00	19.25	27.00	29.25	26.75	27.63	23.75	20.00	27.75	1.00	#16	3.21	53
DH-626	36.00	22.75	39.03	41.20	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	2.00	#32	9.65	115

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

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.

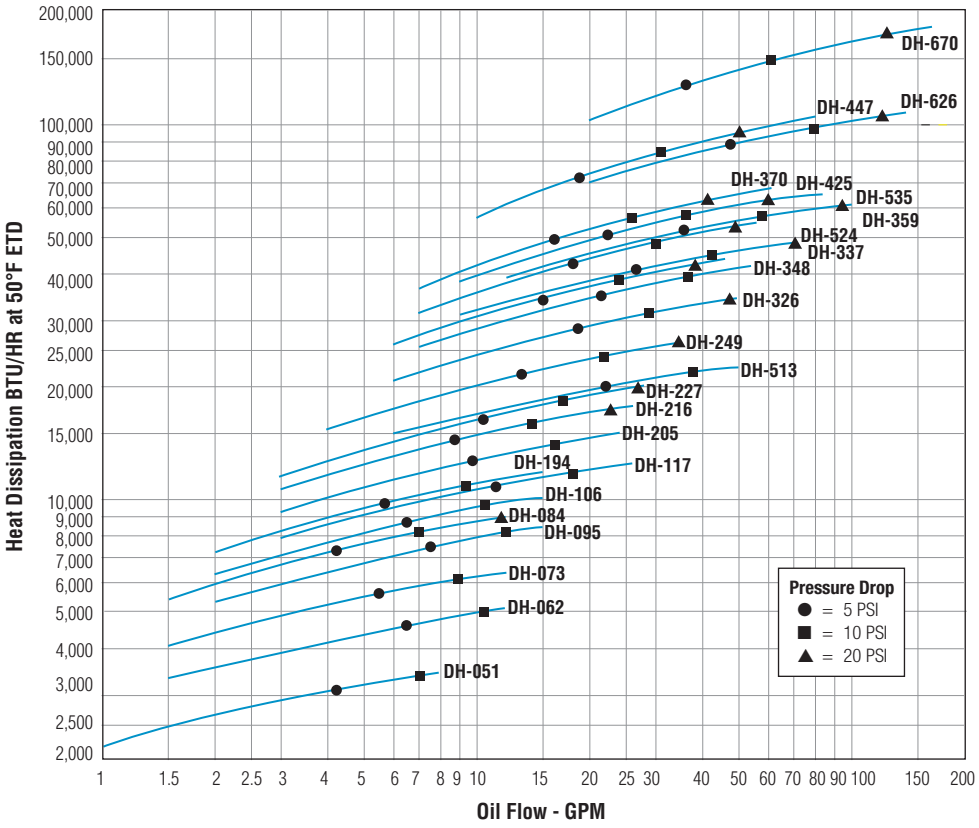
Oil Temperature

Typical operating temperature ranges are:

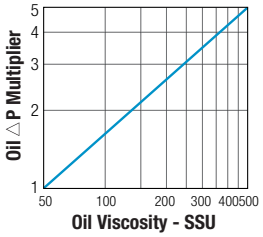
Hydraulic Motor Oil	110°- 130°F
Hydrostatic Drive Oil	130°- 180°F
Bearing Lube Oil	120°- 160°F
Lube Oil Circuits	110°- 130°F

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

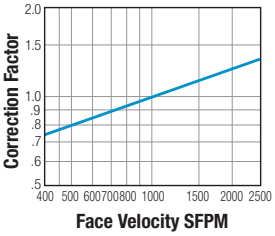
Performance Curves



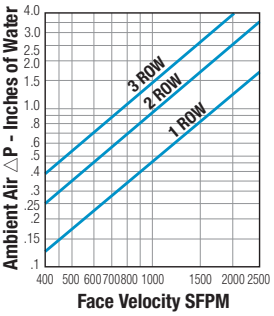
Oil Pressure Correction



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 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:**

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

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.

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

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.

*Note: If air velocity is unknown assume 750 SFPM.

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

DH 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

DH series mobile 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.

Installation

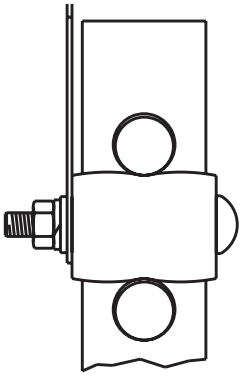
WARNING Do not exceed the maximum pressure of 300 PSI, or the maximum temperature of 350°F as oil cooler failure can occur.

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. Installation of a fast acting relief/bypass valve is recommended to protect the oil cooler from excessive pressure and/or oil flow rates.
4. These coolers are normally installed in front of the engine radiator to obtain the coolest possible air flow.
5. There are no restrictions as to how the unit may be mounted; however, the unit must be flooded with oil to obtain the full cooling potential.
6. Mount the unit with the brackets* by installing them between any two adjacent exchanger tubes. Use the most convenient tubes for your specific location. See figure 1 below for details.

Figure 1

Shock Mounting Kit

**(brackets are optional)*



CAUTION 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 overtighten.

Operation

Once unit is installed, the system may be operated normally. If the source of cooling air is other than the main engine fan, be sure that the fan is running.

Maintenance

1. Performance information should be noted on newly installed units so that any reduction in effectiveness can be detected.
2. Inspect the unit regularly for corrosion and dirty or clogged heat transfer surfaces. Dirt and dust can be removed by washing, brushing, or blowing out with compressed air. A steam cleaner is also effective in cleaning dirty or greasy surfaces. **Do not use caustic cleaners**.
3. The oil chamber may become filled with sludge accumulation and require cleaning. It is recommended that the unit be flooded with a commercial solvent, and left to soak for one-half hour. Repeated soakings and back flowing may be required, depending on the amount of sludge accumulated.

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