

FLUID POWER COOLING

MOBILE HYDRAULIC COOLERS



www.AmericanCoolingSolutions.com

BALANCE YOUR HEAT LOAD

Generally speaking, hydraulic systems work very hard, which is why we design and build our Fluid Power Coolers with the toughest possible working conditions in mind. Whether your application is mobile, such as moving, processing or delivering materials, or stationary, such as power generation, manufacturing or oil & gas extraction, our coolers are designed to perform and engineered to survive.

Heat in the hydraulic systems is created by friction from the use of pumps, hydraulic lines, fittings, valves, motors, and actuators. If this heat is not rejected, the system will overheat, significantly reducing efficiency and causing premature failure of system components. Heat created by the system must be balanced by a properly sized oil cooler.

So how do you know which cooler you need? Read on...

STEP 1 CHOOSE A SERIES

All hydraulic oil coolers work by transferring heat from the oil to the atmosphere. As oil travels through the tubes, the heat is transferred to the fins. Air passing over the fins transfers this heat to the sky - heat transfer cannot occur without proper air flow.

OC SERIES

Oil Cooler only. OC Series coolers require outside air flow to function, typically from vehicle movement or an engine driven fan already in place for other engine cooling components.

DC SERIES

DC Series coolers are equipped with one or more electrically powered fans, available in 12V or 24V configurations. The fans create powered air flow in stationary or slow moving mobile applications.

HC SERIES

HC Series coolers are equipped with a hydraulically powered fan, for use in applications where a 12 or 24 volt electrical system is not accessible. The HC fans can be powered by the same hydraulic circuit they are cooling.

STEP 2 DETERMINE IF YOU NEED 'RELIEF'

Fluid Power Coolers are designed, built and tested to operate efficiently within a given range of pressure. Too much pressure within the system will reduce the life of the cooler and potentially cause a catastrophic failure of the cooler and/or the entire system.

Several of our coolers offer an optional bypass or pressure relief valve system. When hydraulic pressure spikes above the rated pressure, the pop-it valve opens allowing the fluid to divert around the cooler instead of through it, thus protecting it from excessive wear and potential failure.

Having a bypass option is especially important when the system experiences consistent hydraulic pressure surges from fluctuations in the load, such as with a loader or backhoe.

Bypass is also important when the equipment will be operated in winter air temperatures, which can thicken the fluid so that it can't flow freely and oil starvation can occur. The increased pressure opens the valve and diverts the cold fluid around the cooler until it comes up to operation temperature, returning the flow to normal.

For more and important information on bypass options and considerations, please refer to the Technical

STEP 3 CHOOSE YOUR SIZE

If you are replacing an OEM cooler, use the Dimensional Guide to choose one that best fits the mounting area and has at least the same surface area as the cooler you are replacing. It is always best to error in favor of a larger size if mounting space allows for it.

Review the Performance Metrics for each of our products to determine the oil cooler size needed based on oil flow and heat load*.

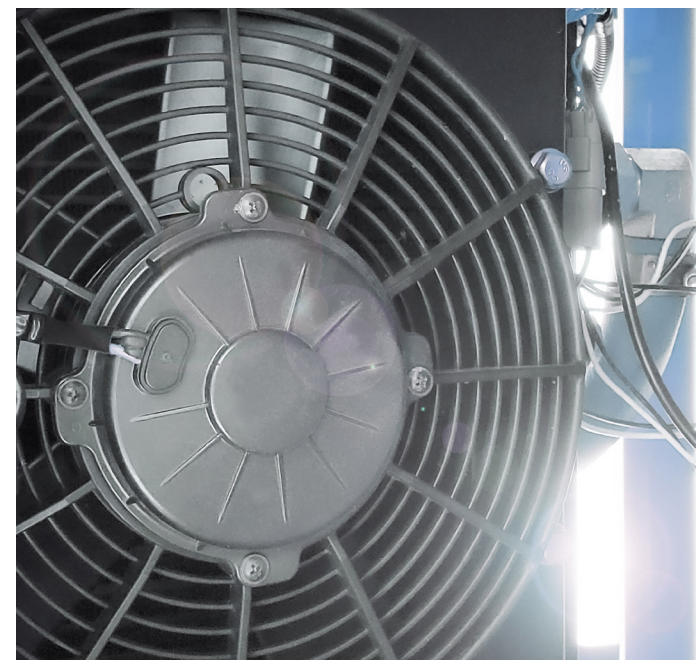
The performance metrics are based on the following:

- ♦ 1000 Standard Feet Per Minute (SFPM) Air Velocity
- ♦ 50 SUS Oil
- ♦ 100°F Inlet Temperature Difference

A rule of thumb for estimating the heat load for a simple hydraulic circuit is 25% of the of the input power. For example a 20hp motor generates a 5hp heat load (12700 BTU/Hour).

For more complex hydraulic systems, please refer to the Technical Selection Guide in this document.

**Heat Load is the amount of heat energy that the hydraulic system introduces in to the oil and is measured as horsepower (HP)*



ACS DC-60 Cooler Mounted in a Robotic Snowplow

DESIGNED TO PERFORM



ENGINEERED TO SURVIVE



- ♦ High Performance Aluminum
- ♦ Durable Bar & Plate Construction
- ♦ Low Clogging, High Performance Air Fin Design
- ♦ Standard Sizes with SAE Ports
- ♦ Industrial Powder-coat Finish
- ♦ Factory Tested Prior to Delivery

FLUID POWER COOLING SOLUTIONS

- ♦ Construction Equipment
 - ♦ Mining Equipment
 - ♦ Oil & Gas Equipment
 - ♦ Agriculture Equipment
 - ♦ Turf and Lawn Care Equipment
- ♦ On Highway Equipment
 - ♦ Off Highway Equipment
 - ♦ Material Handling Equipment
 - ♦ Forestry Equipment

OC-40 SERIES



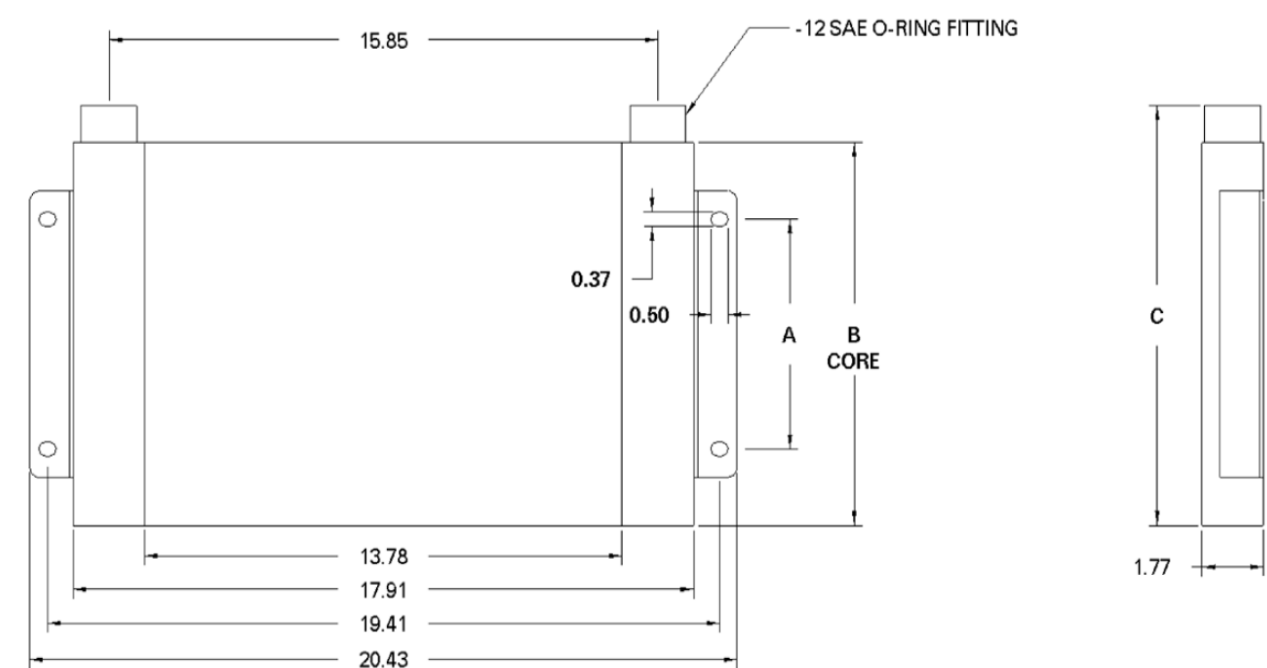
Small and versatile, the OC-40 series is Ideal for small to medium sized equipment such as:

Air Compressors
Turf and Lawn Care Equipment
Mini Skid Steer / Excavators

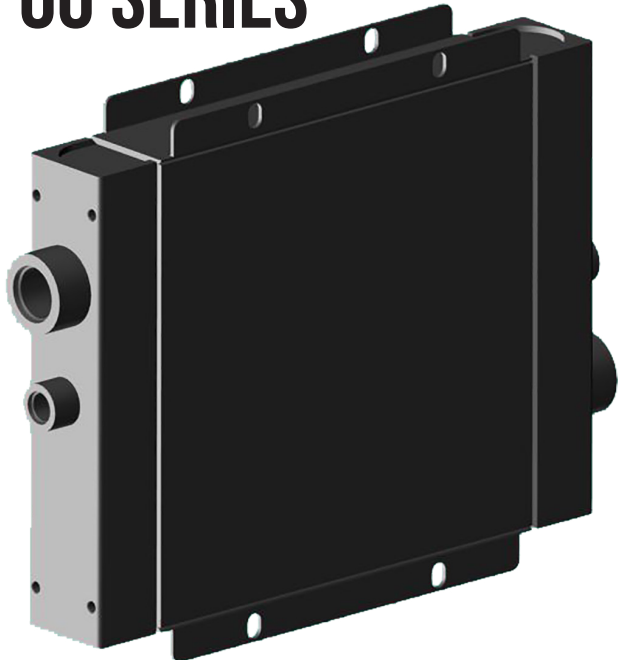
- ♦ Compact design
- ♦ Inlet and outlet ports on the same side
- ♦ Universal mounting using rigid mounting flanges
- ♦ Use with 7" or 10" fans if required

Dimensions (inches)

Model Number	A	B	C
OC-41	3	5.7	6.7
OC-42	6	10	11
OC-43	10	14.3	15.3



OC-60 SERIES



Our most versatile cooler family, the OC-60 is available in a wide range of sizes for all types of applications including, but not limited to:

- Skid Steers**

Paving Equipment

Cement Mixers

Hydraulic Conveyor Systems

Concrete Pumping Equipment
- Material Handlers**

Pull Behind Farming Implements

Sanitation Trucks

Street Sweepers

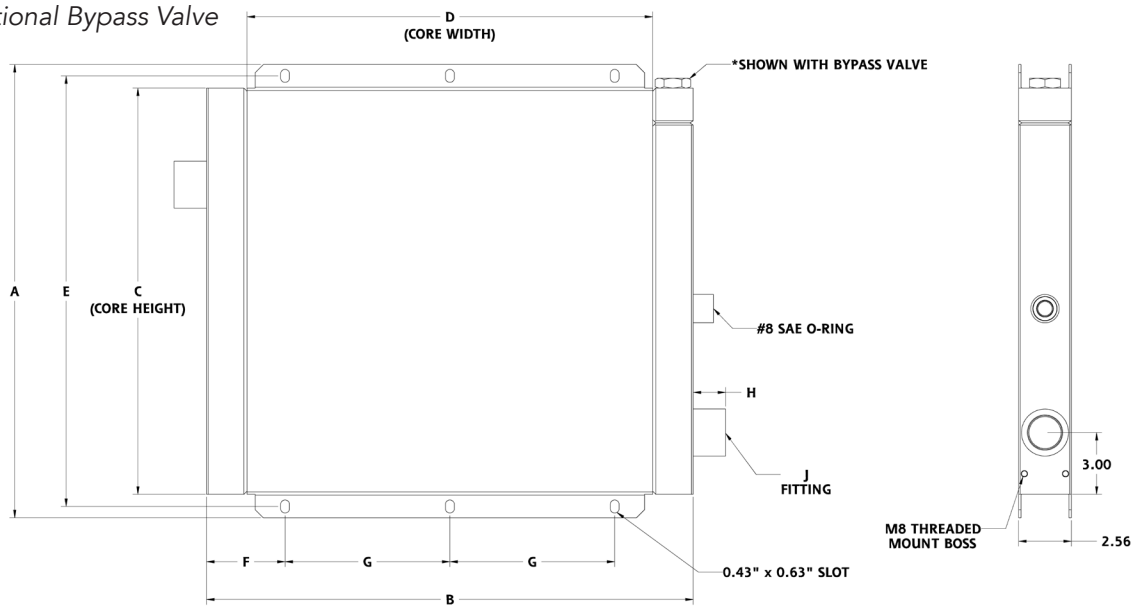
Wood Chippers

- ♦ Eliminates the need for a large hydraulic oil reservoir
- ♦ Universal mounting off of the flanges, or off of the tanks ends. Optional bracket kit available

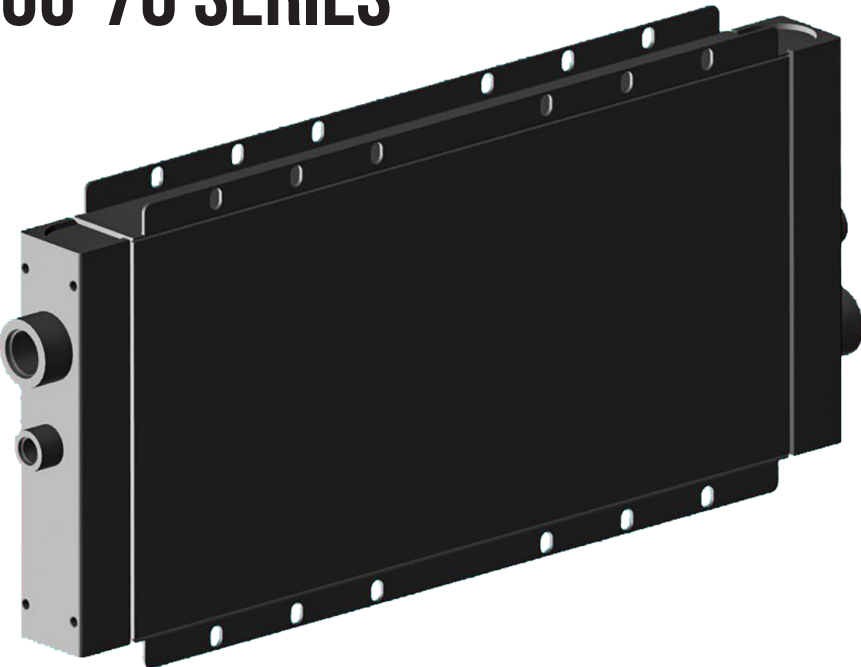
Dimensions (inches)

Model Number	A	B	C	D	E	F	G	H	J
OC-61	11.6	13.8	9.9	9.8	10.7	4.4	2.5	1	#12 SAE O-RING
* OC-62	13.5	15.8	11.7	11.8	12.7	5	2.9	1	#16 SAE O-RING
* OC-63	18.3	19.7	16	15.8	17.2	3.9	6	1.6	#20 SAE O-RING
* OC-64	22	23.6	19.7	19.7	20.9	3.8	8	1.6	#20 SAE O-RING
OC-65	25.7	27.6	23.5	23.6	24.7	3.8	10	1.6	#20 SAE O-RING
OC-66	27.6	31.5	25.4	27.6	26.5	5.8	10	1.6	#24 SAE O-RING
OC-67	38.7	31.5	36.4	27.6	37.6	5.8	10	1.6	#24 SAE O-RING

*Available with Optional Bypass Valve



OC-70 SERIES



The OC-70 Series is the optimal hydraulic cooling solution for high flow applications with large heat loads, such as:

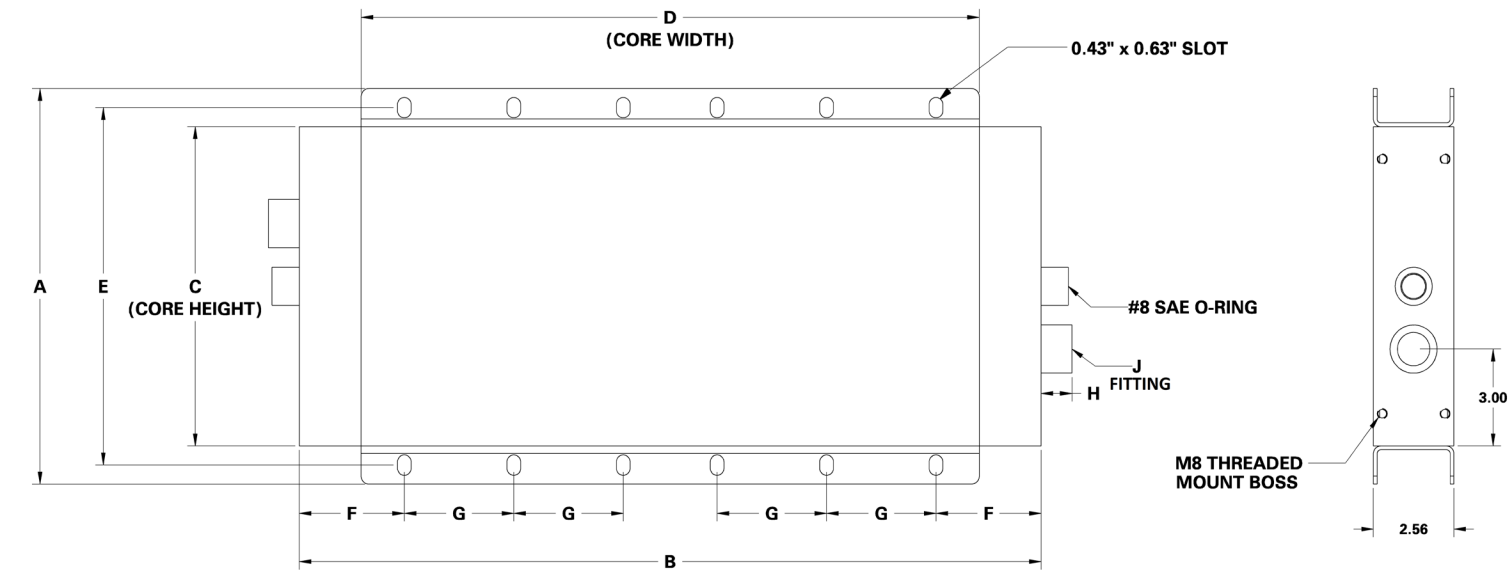
- Forestry Machinery
- Paving Equipment
- Mining Equipment
- Oil & Gas Rigs

- ♦ Eliminates the need for multiple coolers on the same application
- ♦ Available with dual DC powered fans
- ♦ Universal mounting off of the flanges, or off of the tanks ends. Optional bracket kit available

Dimensions (Inches)

Model Number	A	B	C	D	E	F	G	H	J
OC-71*	13.5	27.8	11.7	23.9	12.7	5.0	5.9	1.0	#16 SAE O-RING
OC-72*	18.3	35.7	16.0	31.8	17.2	3.9	6.0	1.6	#20 SAE O-RING
OC-73*	22.0	43.6	19.7	39.7	20.9	3.8	8.0	1.6	#20 SAE O-RING

*Available with Optional Bypass Valve



DC-60 SERIES



The DC-60 Series starts with our popular OC-60 coolers with on-board fans for applications with limited air flow.

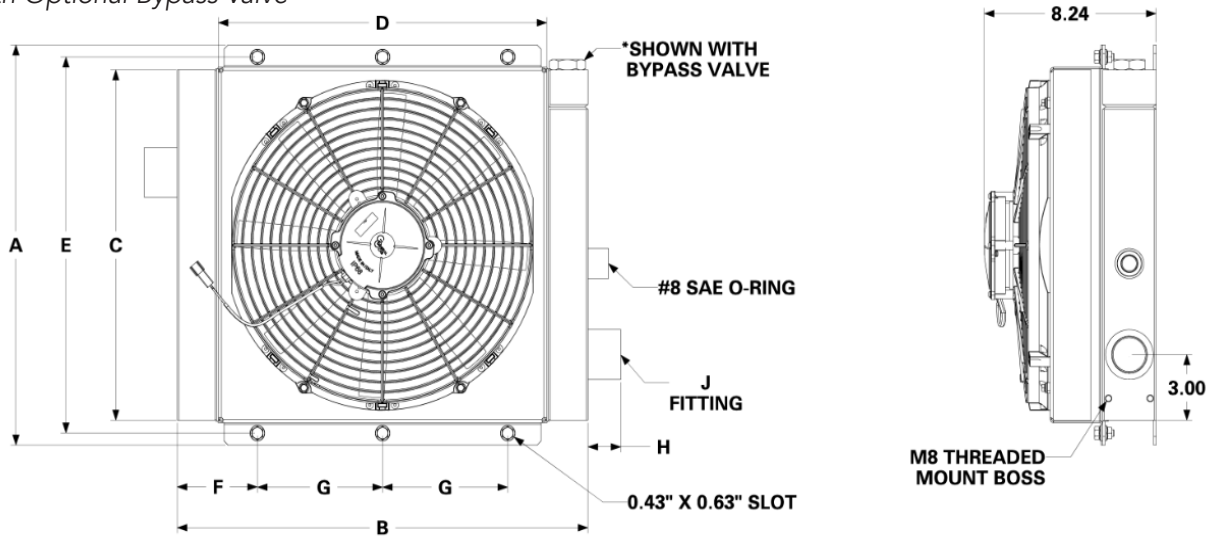
- Paving Equipment
- Cement Mixers
- Hydraulic Conveyor Systems
- Concrete Pumping Equipment

- ♦ Includes DC electric fan
- ♦ Available for 12V or 24V electrical systems.
- ♦ Fans are IP68 compliant with sealed connections
- ♦ Steel fan shroud installed to optimize air flow through the core
- ♦ Optional fan controller with temperature sensor available to control the fan

Dimensions (Inches)

Model Number	Oil Cooler	A	B	C	D	E	F	G	H	J
DC-12*	OC-62	13.5	15.8	11.7	11.8	12.7	4.92	5.91*	1	#16 SAE O-RING
DC-20*	OC-63	18.3	19.7	16.0	15.8	17.2	3.9	6.00	1.6	#20 SAE O-RING
DC-35*	OC-64	22.0	23.6	19.7	19.7	20.9	3.78	8.00	1.6	#20 SAE O-RING

*Available with Optional Bypass Valve



Technical Specifications

Model Number	Motor Voltage	Current Draw (Amps)	Approximate Weight (lbs)
DC-12	12 / 24	13 / 7	28
DC-20	12 / 24	22 / 10	35
DC-35	12 / 24	22 / 10	49

DC-70 SERIES

Our DC-70 Series is built on the workhorse OC-70 coolers with dual on-board fans for applications with limited air flow or high heat generation.

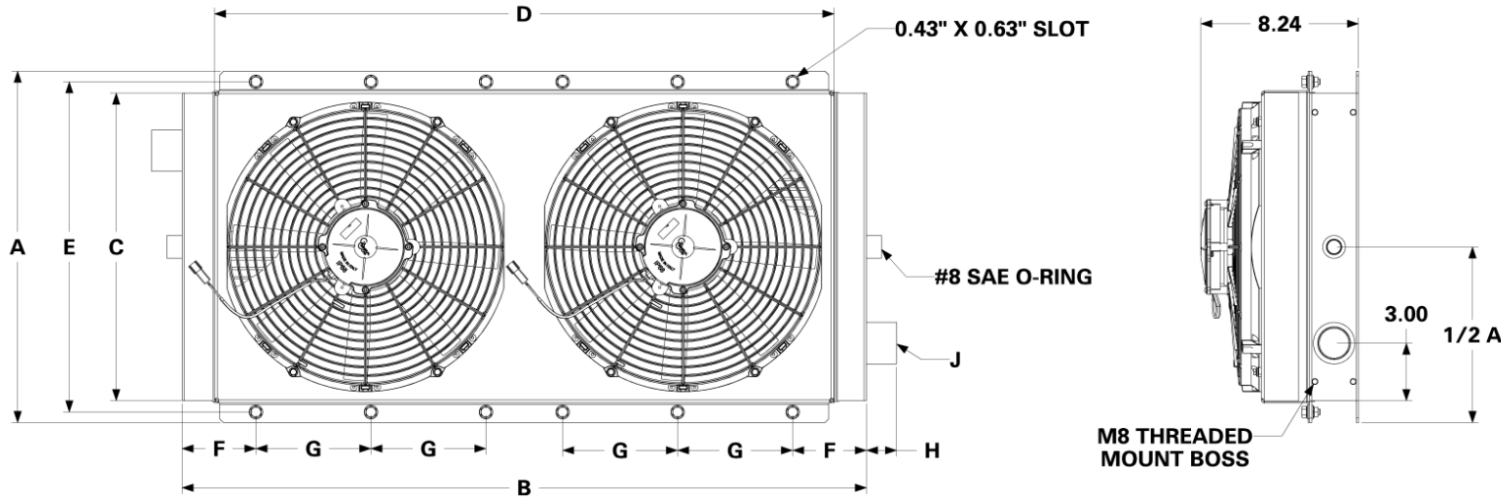
- Forestry Machinery
- Paving Equipment
- Mining Equipment
- Oil & Gas Rigs

- Available for 12V or 24V electrical systems
- Fans are IP68 compliant with sealed connections
- Steel fan shroud installed to optimize air flow through the core
- Optional fan controller with temperature sensor available to control the fan

Dimensions (inches)

Model Number	A	1/2 A	B	C	D	E	F	G	H	J
DC-30*	13.5	6.7	27.8	11.7	24.4	12.7	5.0	5.9	1.0	#16 SAE O-RING
DC-50*	18.3	9.2	35.7	16.0	32.3	17.2	3.9	6.0	1.6	#20 SAE O-RING
DC-60*	22.0	11.0	43.6	19.7	40.2	20.9	3.8	8.0	1.6	#20 SAE O-RING

*Available with Optional Bypass Valve



Technical Specifications

Model Number	Motor Voltage	Current Draw Each Fan (Amps)	Approximate Weight (lbs)
DC-30	12 / 24	13 / 7	56
DC-50	12 / 24	22 / 10	70
DC-60	12 / 24	22 / 10	100

HC-60 SERIES

The HC-60 Series also starts with our popular OC-60 coolers but feature hydraulically driven on-board fans for applications with minimal electrical capacity.

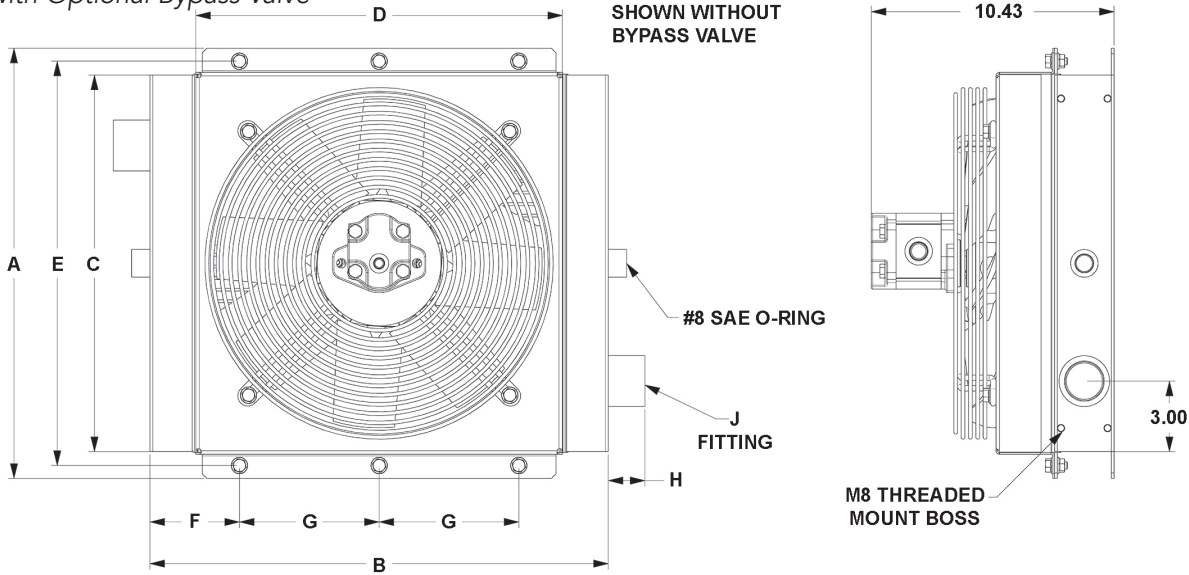
- Industrial Manufacturing Equipment
- PTO Driven Equipment
- Mining Equipment
- Oil and Gas Equipment
- Concrete Crusher

- Remote mount in locations without running electrical wiring
- May utilize the oil circuit it is cooling to operate the fan
- Includes mounting bracket kit

Dimensions (inches)

Model Number	Oil Cooler	A	B	C	D	E	F	G	H	J
HC-12*	OC-62	13.5	15.8	11.7	11.8	12.7	4.92	5.91*	1	#16 SAE O-RING
HC-20*	OC-63	18.3	19.7	16.0	15.8	17.2	3.9	6.00	1.6	#20 SAE O-RING
HC-35*	OC-64	22.0	23.6	19.7	19.7	20.9	3.78	8.00	1.6	#20 SAE O-RING

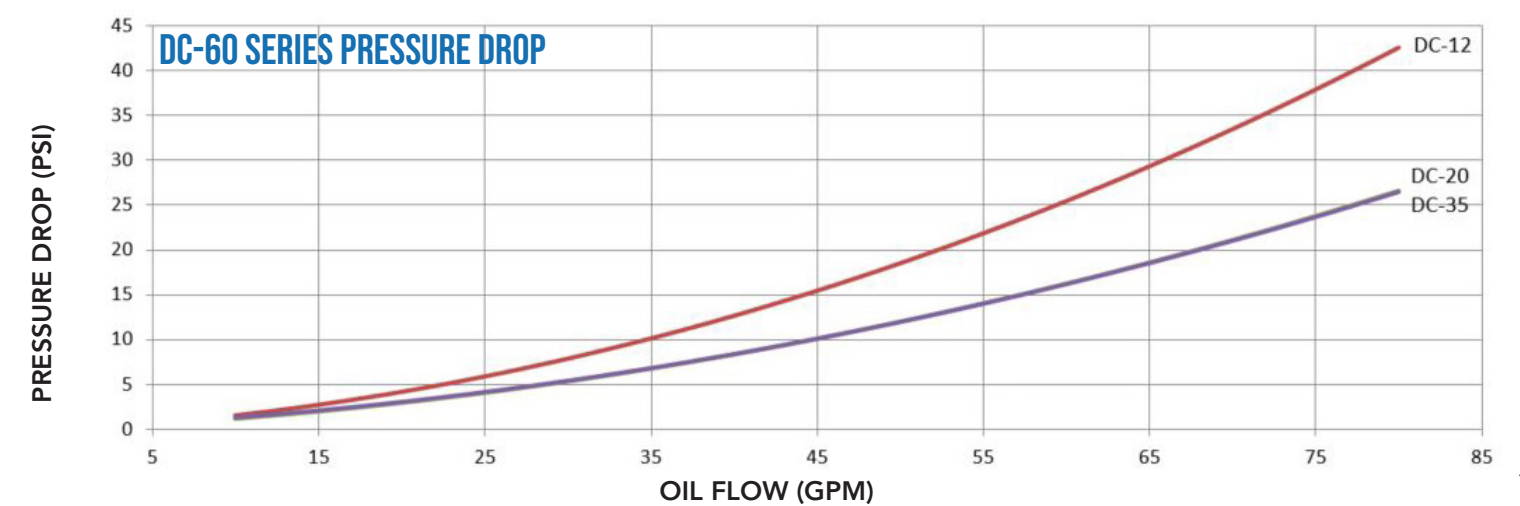
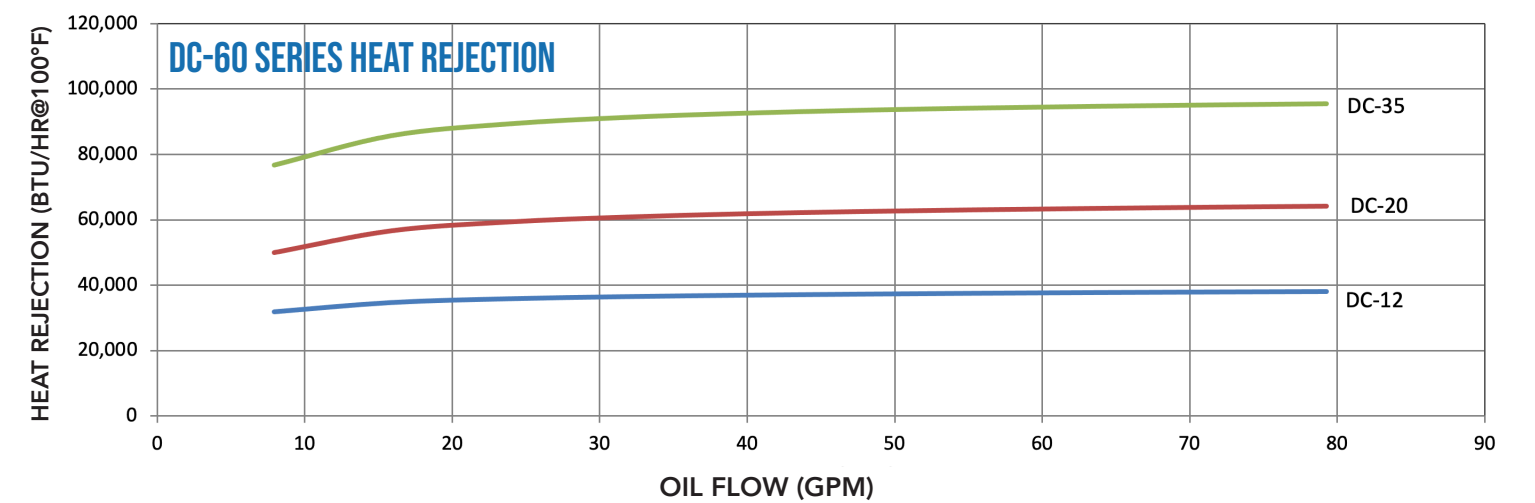
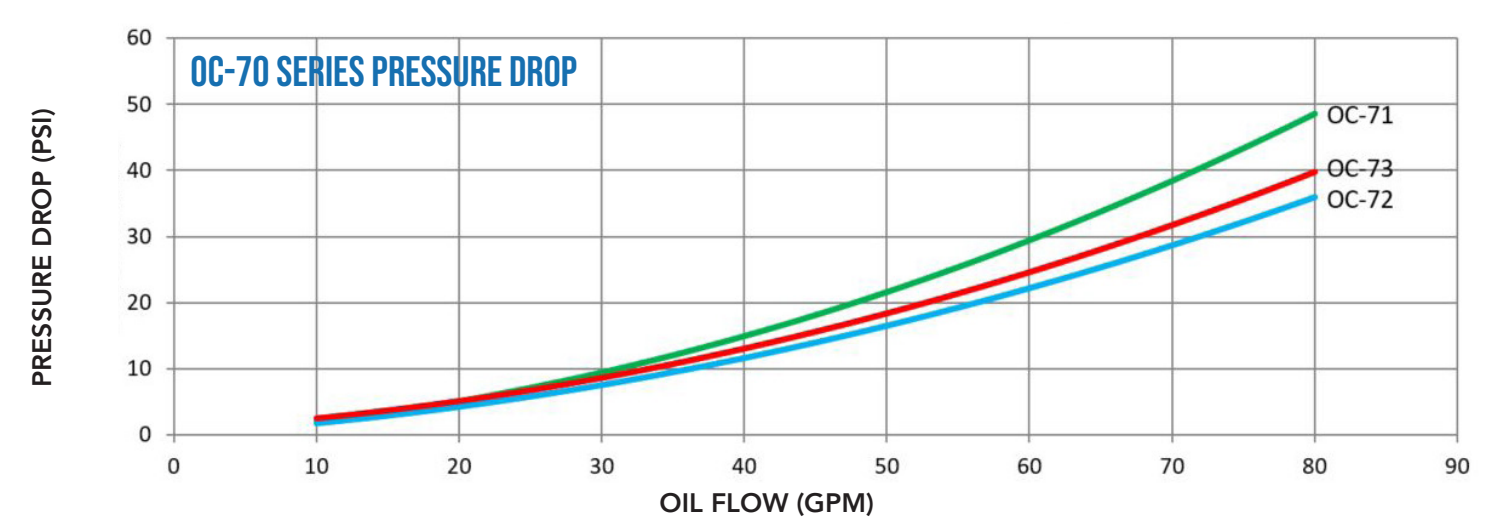
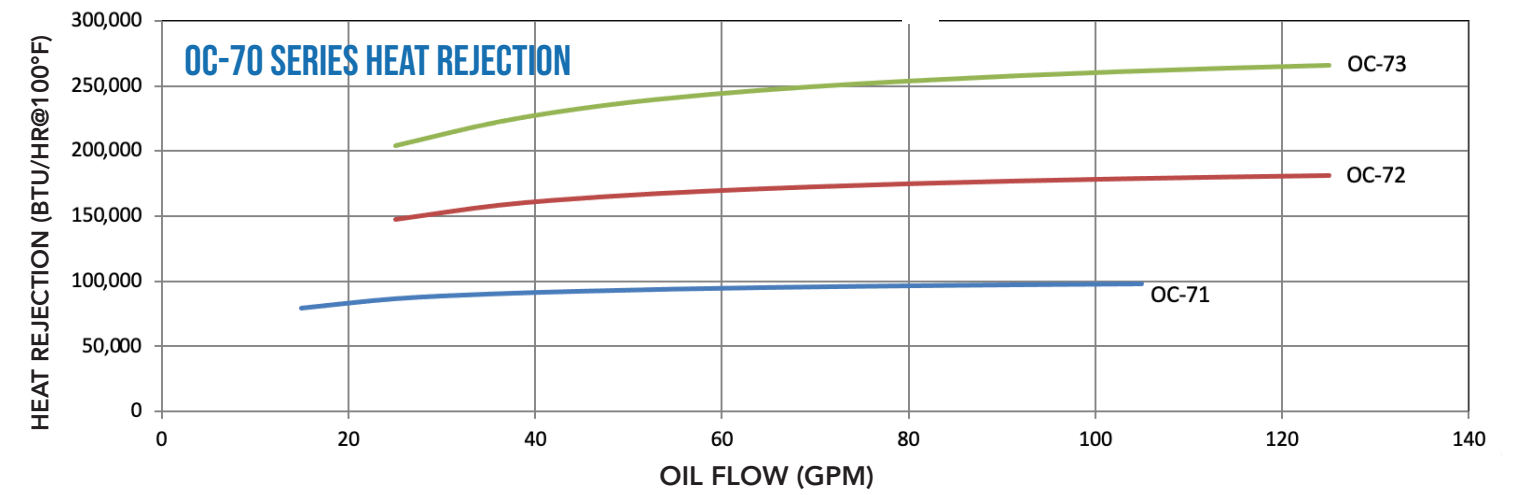
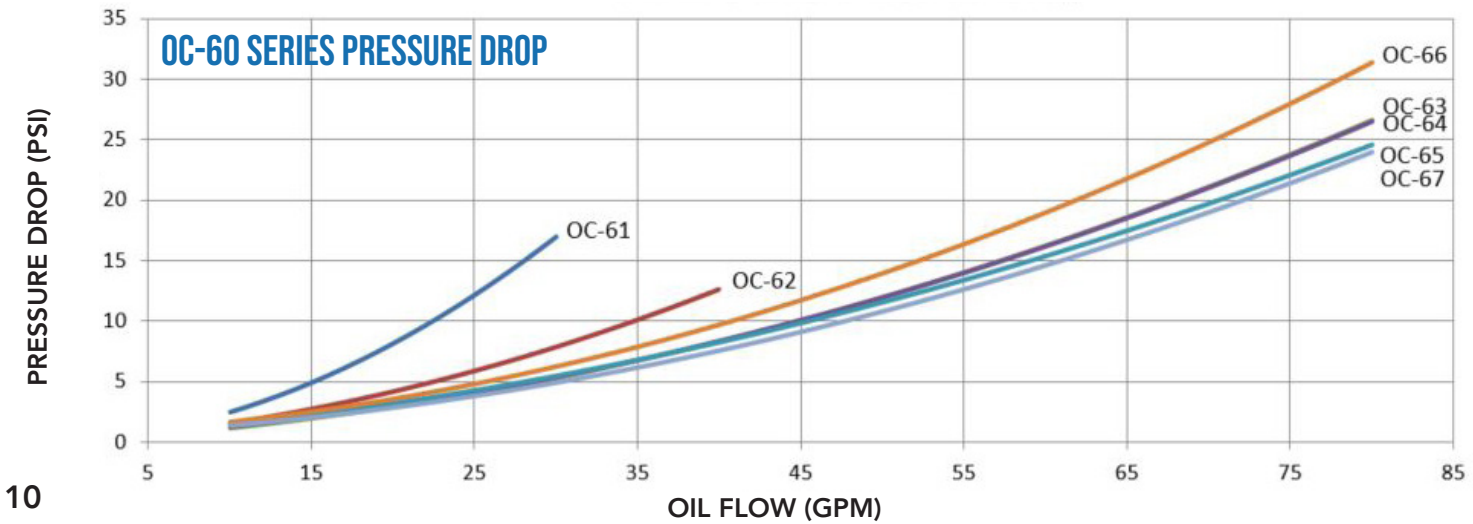
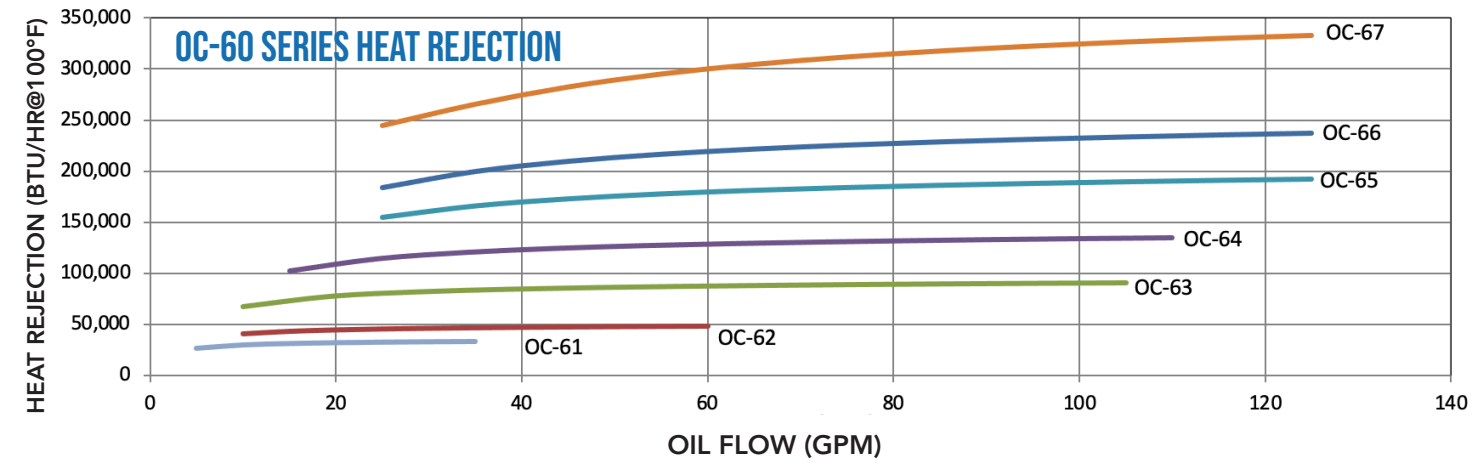
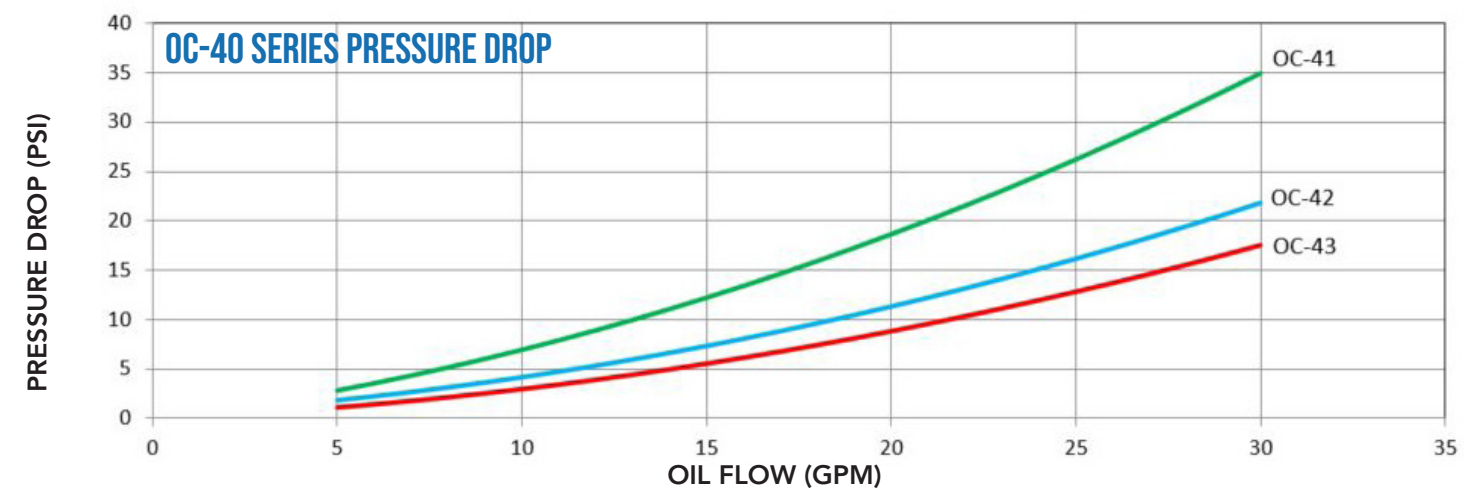
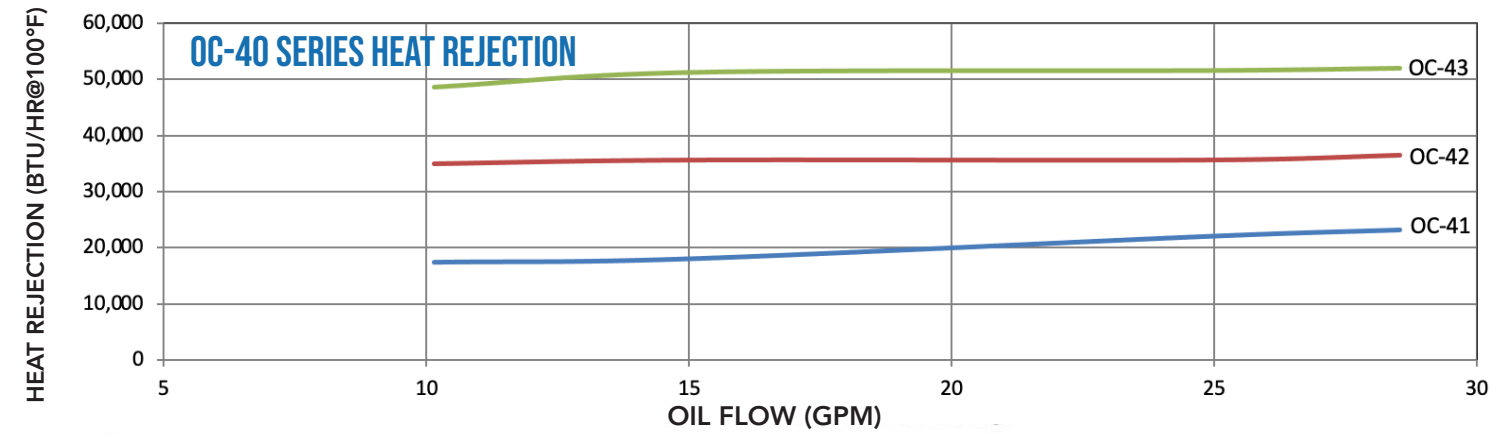
*Available with Optional Bypass Valve

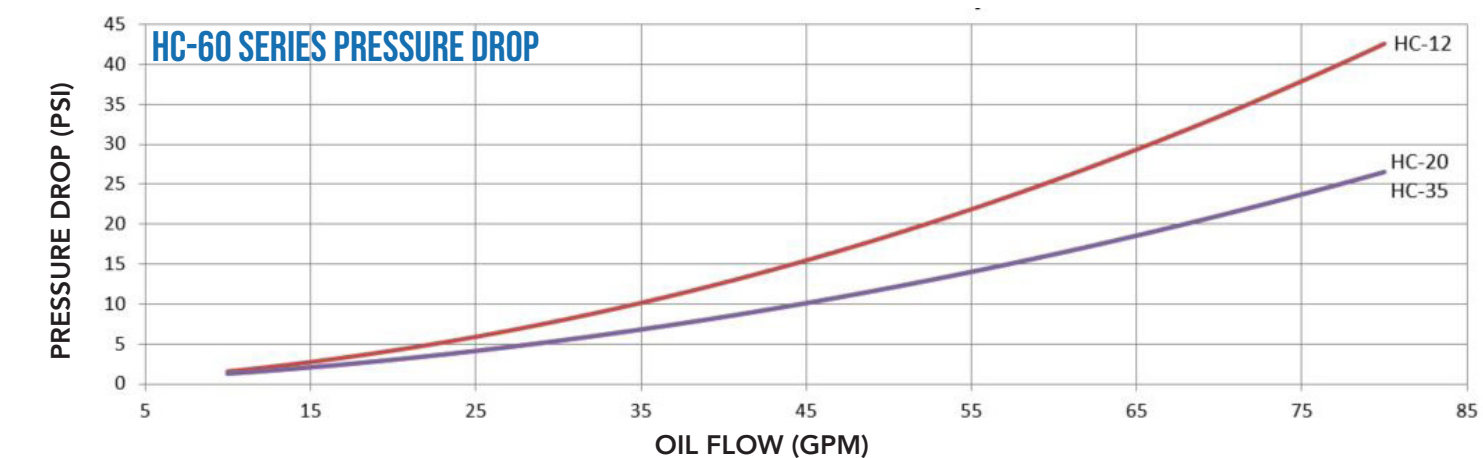
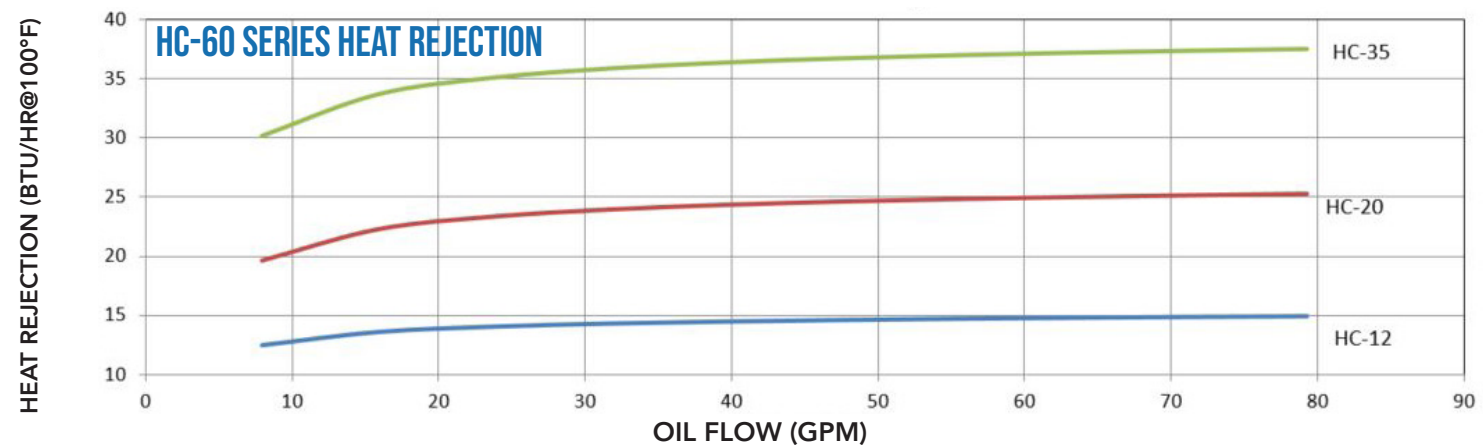
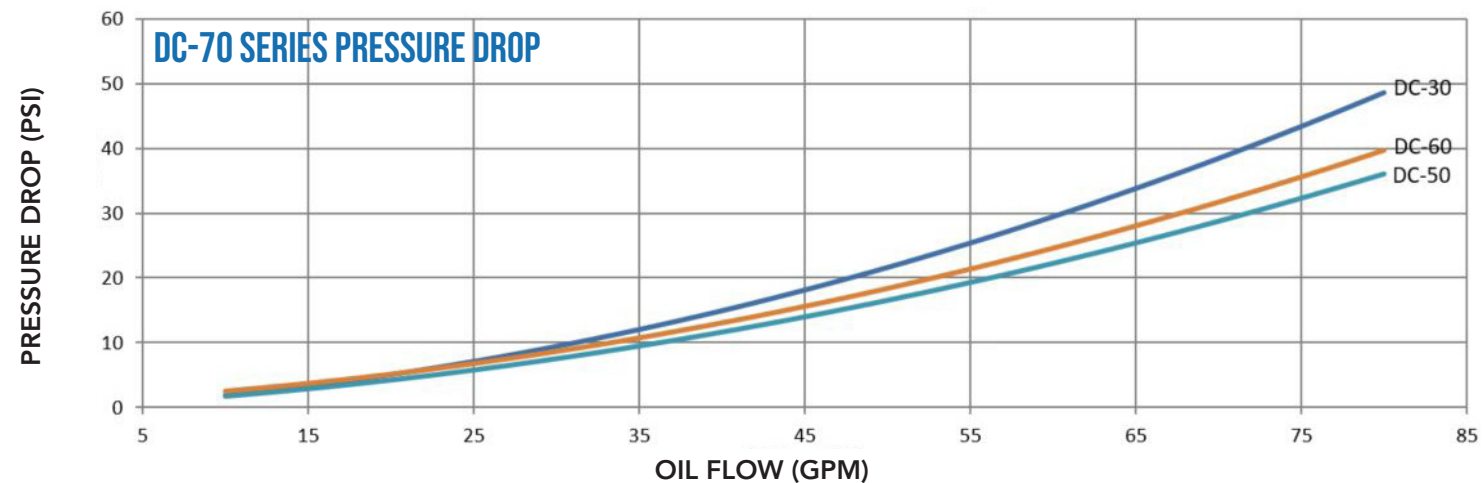
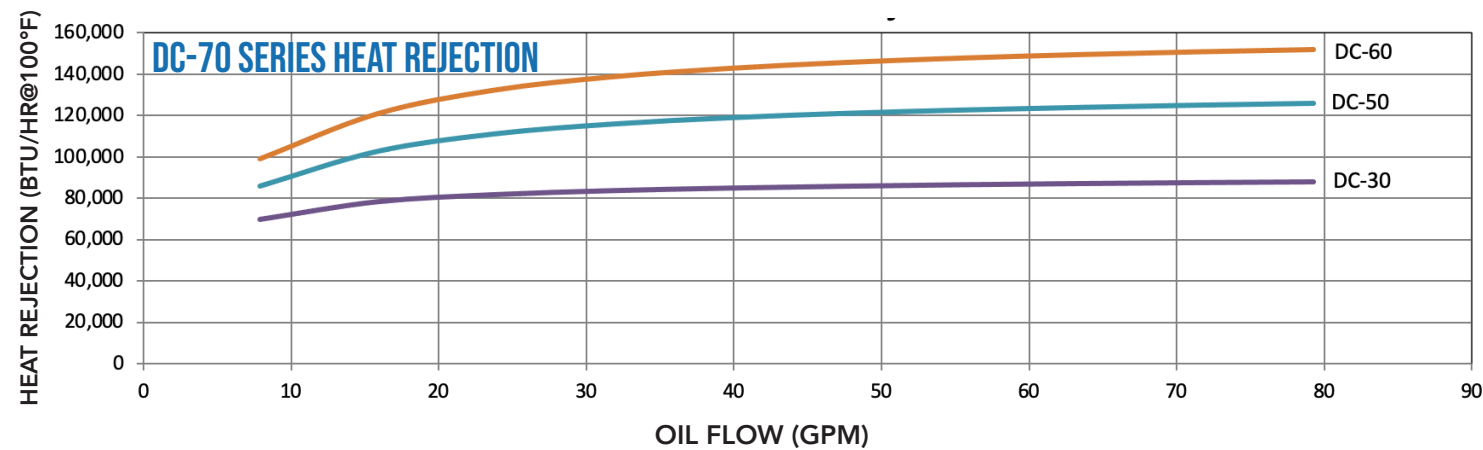


Technical Specifications

Model Number	Motor Size (in3)	Motor Flow Rate @ Operating Speed (gpm)	Motor Operating Speed (RPM)	Motor Operating Pressure (psi)	Motor Inlet / Outlet Ports
HC-12	0.218	2.64	2,800	500	#8 SAE O-RING
HC-20	0.218	1.89	2,000	500	#8 SAE O-RING
HC-35	0.372	3.22	2,000	500	#8 SAE O-RING

PERFORMANCE METRICS





TECHNICAL SELECTION GUIDE

STEP 1 DETERMINE THE HEAT LOAD

If the system heat load is already known in HP, convert HP into BTU/hour using the following conversion:

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

Actual heat load of the hydraulic system can be calculated by measuring the rise in temperature under full load conditions and using the following equation:

$$P = \frac{(V \times \Delta T \times C_p \times \rho)}{(\Delta t \times 317.3)}$$

$$P = ((V \times \Delta T \times C_p \times \rho)) / ((\Delta t \times 317.3))$$

P = Heat Load (Hp)

V = Fluid Volume of the Hydraulic System (Gal)

ΔT = Measured Temperature Increase (°F)

C_p = Specific Heat of Hydraulic Oil (Btu/lb °F)

ρ = Density of Hydraulic Oil (lb/ft³)

Δt = Time of test (min)

STEP 2 DETERMINE THE ACTUAL ITD DESIRED

ITD = Inlet Oil Temperature — Inlet Air Temperature

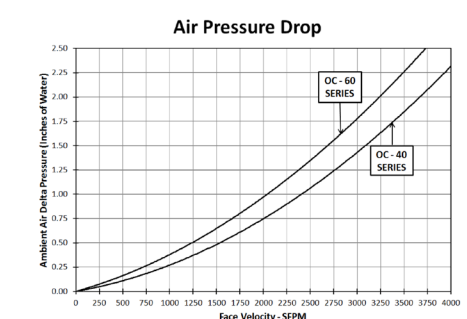
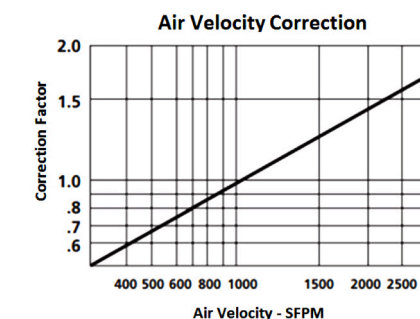
STEP 3 FIND THE AIR VELOCITY CORRECTION FACTOR

$$\frac{\text{SCFM Air Flow Across Cooler}}{\text{Cooler Face Area (Feet}^2\text{)}} = \text{SFPM AIR VELOCITY}$$

SCFM = Standard Cubic Feet per Minute (from fan data)

SFPM = Standard Feet per Minute (velocity of air over the cooler)

Once you have calculated the SFPM Velocity, enter the air velocity correction curve to determine the correction factor.



STEP 4 CALCULATE ADJUSTED BTU/HOUR FOR SELECTION

$$HP \text{ Heat Load} \times \left(\frac{100}{\text{Desired ITD} \times \text{Correction Factor}} \right) = HP \text{ for use with Selection Chart}$$

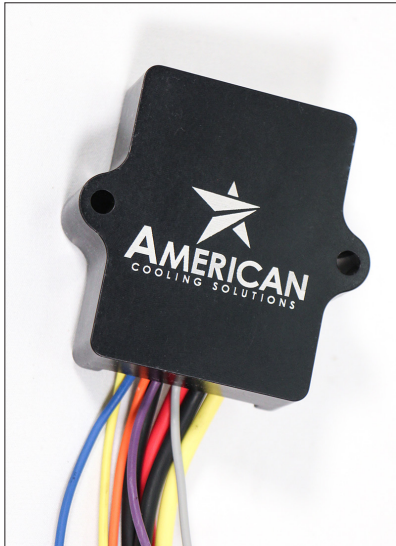
STEP 5 SELECT THE MODEL FROM THE CURVES

Refer to the Performance Metrics on pages 10-12, and read up from the GPM to the required heat rejection. Select any model on or above this point.

PARTS & ACCESORIES

FAN CONTROLLER WITH TEMP SENSOR

Programmed specifically for hydraulic oil applications.
Works with single and dual fan applications.
Ramped power control reduces the electrical load on the system.
In dual fan applications the second fan will engage only after the first fan has reached 100%.
Control module is designed for remote mounting and includes long lead wires for the fans and temperature sensor.
Temperature sensor comes with an adapter to mount directly into the oil cooler tank. **Part Number: 25310**



BYPASS VALVES

For use in applications that may experience low temperature startup.
Increases the cooler life for applications with frequent pressure fluctuation.
Protects system components from unexpected high pressure spikes.
Available in 29psi (2Bar), 73psi (5Bar), and 116psi (8Bar).



DC FANS

Long life DC electric fans available in both 12V and 24V.
Can be added to coolers without fans for added air flow.
Increases the efficiency in oil coolers relying on only vehicle movement for air flow.
Available in 7", 10", 14" and 16" models.



UNIVERSAL MOUNTING KIT

Powder coated steel for increased strength and corrosion resistance.
Includes (2) heavy duty brackets and (4) M8 bolts.
Part Number: 25063



ADD-ON / REPLACEMENT FANS

12 V Electric

Part #	Size	Applications	DC Draw	Dimensions	Air Flow
838778	7"	Can be mounted to any cooler for added air flow	6.1 AMP	7.25" x 2"	335.7 CFM
836758	10"	DC-12 (1 per) / DC12 V-30 (2 per)	19 AMP	11.25" x 9.7"	1,043 CFM
834660	14"	DC-20 (1 per) / DC12V-50 (2 per)	19 AMP	15" x 3.5"	1,731 CFM
834662	16"	DC-35 (1 per) / DC12V-60 (2 per)	20 AMP	16.3" x 3.2"	2,068 CFM

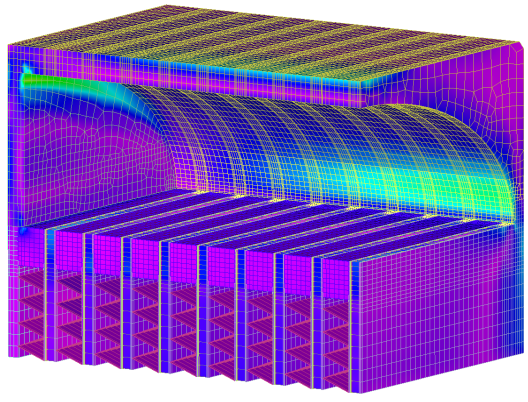
24 V Electric

Part #	Size	Applications	DC Draw	Dimensions	Air Flow
838779	7"	Can be mounted to any cooler for added air flow	4 AMP	7.25" x 2"	335.7 CFM
836759	10"	DC-12 (1 per) / DC24V-30 (2 per)	10 AMP	11.25" x 9.7"	1,043 CFM
836095	14"	DC-20 (1 per) / DC24V-50 (2 per)	10 AMP	15" x 3.5"	1,731 CFM
836096	16"	DC-35 (1 per) / DC24V-60 (2 per)	10 AMP	16.3" x 3.2"	2,068 CFM

ACS EXPERIENCE & EXPERTISE

Complex system requirements and new product development projects often require specialized expertise. The Design and Engineering Team at American Cooling Solutions is at your disposal to assist in virtually all aspects of your project. Our teams are equipped with state-of-the-art equipment and applications technology to insure quality world class quality products.

- ◆ Computer Aided Design
- ◆ Product Research & Development
- ◆ Digital 3D Rendering
- ◆ Prototype Construction
- ◆ Testing & Analysis
- ◆ Design for Manufacturing
- ◆ Manufacturing Integration



Finite Element Analysis (FEA)



Proudly Providing OEM Quality Replacement Parts For These Brands:

AGCO ♦ Allis Chalmers ♦ Allison ♦ Bluebird ♦ BMW ♦ Bobcat ♦ Case ♦ Case IH ♦ Chrysler
Caterpillar ♦ Cummins ♦ Detroit Diesel ♦ Farmall ♦ Ford ♦ Freightliner ♦ GM ♦ HumVee ♦ International
Isuzu ♦ John Deere ♦ Kenworth ♦ Kubota ♦ Mack ♦ Massey Ferguson ♦ Mopar ♦ Navistar
New Holland ♦ Oliver/White ♦ Peterbilt ♦ Sterling ♦ Thomas Bus ♦ Toro ♦ Volvo ♦ Workhorse



Fluid Power Coolers



Radiators



Charge-Air Coolers



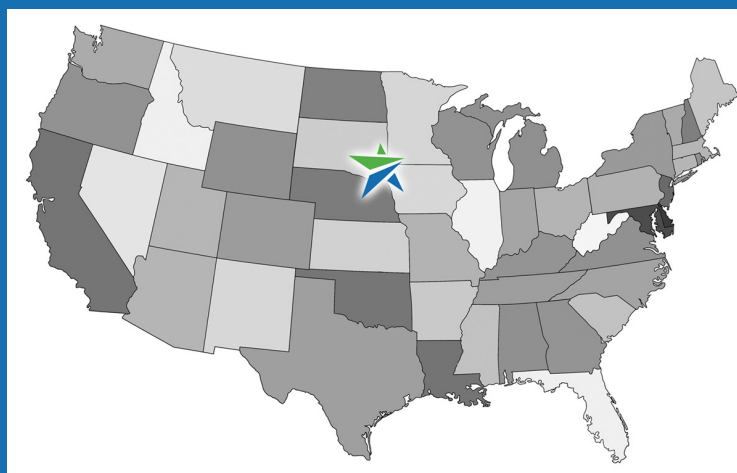
Oil Coolers



Condensers



Evaporators



40+ Years of Experience & Expertise

At American Cooling Solutions, thermal transfer is in our blood. We've been designing and manufacturing heavy duty, OEM quality engine cooling products for over 40 years. Our state-of-the-art engineering, fabrication and manufacturing facilities are located in Canton, SD, USA. All of our products are engineered and built for optimal performance and quality.

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