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Hydraulic Oil Cooler Selection sheet: Plate & Bar Aluminum SER Series



Many machines use Hydraulic power for their Drives as it is continuously variable and easy to deliver to any location in the machine.

In hydraulic systems, oil transfers power and motion and also acts as a lubricant. In both applications the oil is heated by friction, resulting in loss of viscosity. Since the viscosity of the oil reduces with temperature increase, temperature control using oil coolers is a vital requirement for systems and drives for consistent power and breakdown free operation.

Due to the unlimited supply of ambient as air as the cooling agent for heat dissipation, forced draft plate and bar oil coolers are a very efficient and compact means of cooling oil and maintaining its temperature. However, these must be carefully configured based on oil flow, input power and ambient temperature.

The SERCK SER Series OIL COOLERS feature efficient cooling matrics and heavy duty energy-efficient fan motors and come in various sizes and options to meet specific requirements.

Features

- High quality Plate and Bar Brazed Aluminum Core
- Efficient and robust design which extends operation lifetime and reduces service and maintenance cost
- Provides the best heat transfer per given cooler size while minimizing pressure drop
- Welded fittings/ports ensure structural integrity
- Standard SAE ports – NPT and BSPP ports available
- Compact installation dimensions
- Customized units are available to meet your specific performance requirements

Technical Data

Ratings

Maximum Operating Pressure:
290 PSI (20 BAR)

Maxumum Operating Temperature:
320°F (160°C)

Materials

Mounting Feet: Steel
High Efficiency Core: Brazed Aluminum
Tanks: Aluminum
Fan Guard: Steel
Connectors: Alumiun
Fan: Aluminum Hub, Plastic Blades
Shroud: Steel

Electric Motor

IEC 380V, 50 Hz, IP55 Or Any special Requirement

Ambient Temperature

-15 to 55° C

Applications

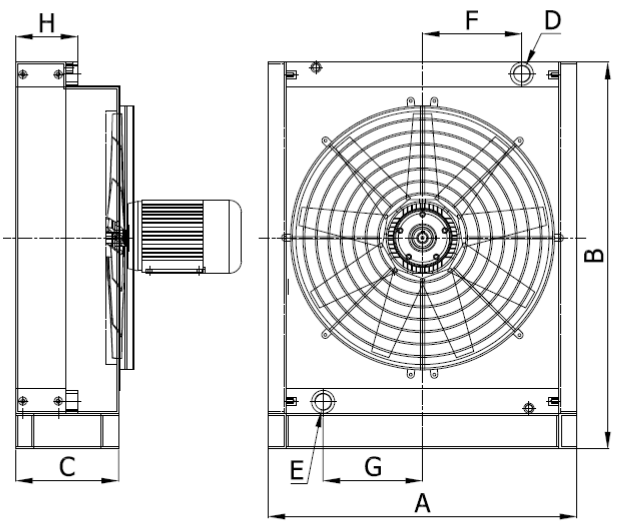
Industrial Power Units, Lubrication Systems, Machine Tools, Marine cranes, Tunnel boring machines, Wind Turbines etc.

Model Key

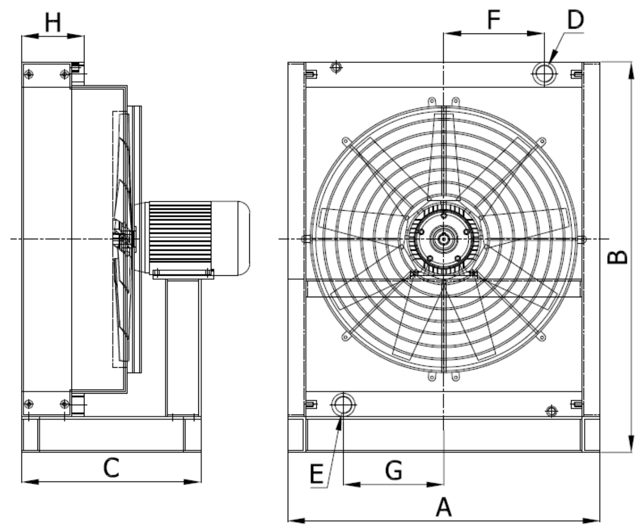
Model Series	Model Size Selected	Specify Motor Required	Connection Type	Core	Noise Level
SER	**400**	**1**- IEC ThreePhase	**3** - NPT	**Blank** - Standard Plate and Bar	**Blank** - Standard Noise Level
	500	**2** - Hydraulic	**4** - SAE		
	600		**5** - BSPP		
	700				
	800				
	900				
	1000				
	1200				

Dimensions

SER 400-SER 500



SER 600- SER 1200



Model	A	B	C	D	E	F	G	H
SER 400	510	670	425	3/4" NPT	3/4" NPT	140	140	100
SER 500	610	825	460	1 1/4" NPT	1 1/4" NPT	150	150	135
SER 600	720	900	460	1 1/4" NPT	1 1/4" NPT	205	205	135
SER 700	780	1005	460	1 1/4" NPT	1 1/4" NPT	235	235	135
SER 800	870	1090	500	1 1/2" NPT	1 1/2" NPT	280	280	175
SER 900	980	1190	500	1 1/2" NPT	1 1/2" NPT	335	335	175
SER 1000	1060	1320	500	2" NPT	2" NPT	375	375	175
SER 1200	1270	1520	500	2" NPT	2" NPT	480	480	175

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Specifications

Electric Motor Information (50 Hz, IEC Frame)

Model	CMM	CFM	HP	Voltage	Phase	Frequency	RPM	Frame
SER 400	58.56	2068	0.75	380	3	50	2800	71
SER 500	100.8	3560	1.5	380	3	50	2800	80
SER 600	135	4767	2	380	3	50	2800	90S
SER 700	167.4	5912	2	380	3	50	2800	90S
SER 800	216.6	7649	3	380	3	50	1440	100L
SER 900	276	9747	5.5	380	3	50	1440	112M
SER 1000	332.4	11739	5.5	380	3	50	1440	112M
SER 1200	484.2	17099	7.5	380	3	50	1440	132S

Hydraulic Motor Information

Model	Oil Flow Required GPM (LPM)	Min. Pressure Required PSI (BAR)	Motor IN^3/REV (CM^3/REV) Displacement
SER 400	2.64 (10)	480 (33.1)	0.218 (3.57)
SER 500	5.61 (21.24)	480 (33.1)	0.45 (7.37)
SER 600	5.61 (21.24)	610 (42.06)	0.45 (7.37)
SER 700	5.61 (21.24)	610 (42.06)	0.45 (7.37)
SER 800	7.73 (29.26)	670 (46.2)	1.24 (20.32)
SER 900	7.73 (29.26)	1110 (76.53)	1.24 (20.32)
SER 1000	7.73 (29.26)	1110 (76.53)	1.24 (20.32)
SER 1200	7.73 (29.26)	1670 (115.14)	1.24 (20.32)
SER 1200	21.51 (81.42)	610 (42.06)	3.45 (56.53)

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Cooler Selection Procedure

Step 1: Determine Heat Load

Determine the heat rejection on the existing units and machinery. Heat load may be expressed as either Horsepower or KW.

From the performance curve,
KW = KW/^{O}C x E.T.D (°C)
HP = KW/^{O}C x 0.74444 x E.T.D.(°F)

Step 2: Determine Entering Temperature Difference (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.

Step 3: Determine the Corrected Heat Dissipation to use the Curves

Heat Rejection in kW per Degree Celsius
KW/°C = Heat load (kW) / Desired E.T.D. (°C)

Step 4: Select Model From Curves

Enter the Performance Curves from the bottom with the LPM oil flow and move upward to meet the Heat Rejection calculated from Step 3. Any Model or Curve on or above this specific point will meet these required conditions.

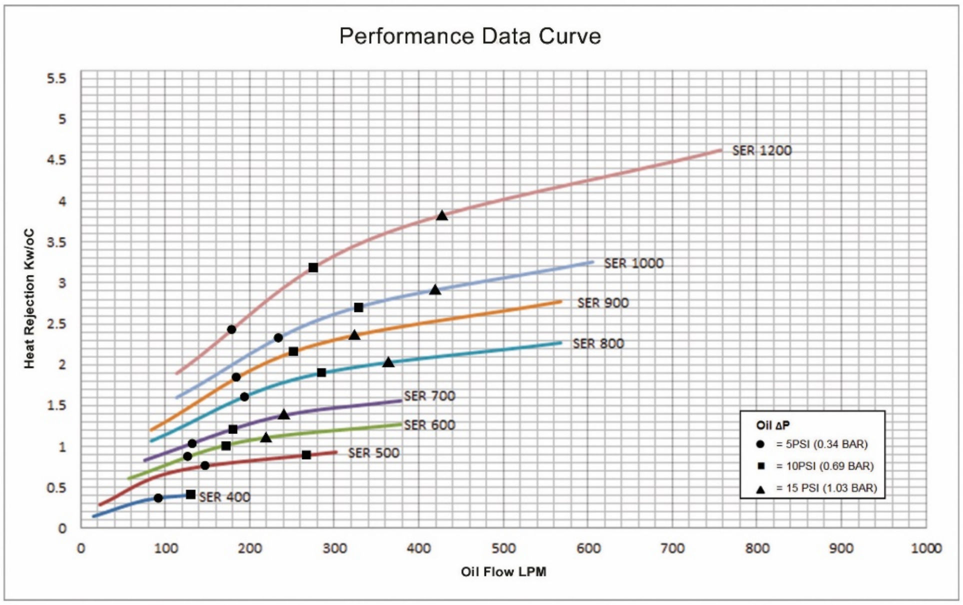
Step 5: Calculate Oil Pressure Drop

Find out the oil pressure drop correction factor from the graph and multiply the factor with Oil Pressure Drop found on performance data curve.

Listed Performance Curves are based on:
• ISO 68 (8.7 cSt) Grade oil
• 45°C Entering Temperature Difference (E.T.D)

Performance Curves

SER Models with Standard Plate and Bar Core



Desired Oil Temperature

Oil Temperatures: Oil Coolers can be selected using entering or leaving oil temperatures

Oil Inline Cooling: Desired reservoir temperature is the oil temperature entering the cooler

Return Line Temperature: Desired oil temperature is the oil temperature leaving the cooler. In this case, the oil temperature change must be calculated to get the actual oil leaving temperature. Calculate the change in oil temperature (oil ΔT) using the below formula:

Oil ΔT = (HP x 2545) / (GPM Oil Flow x 210) , 1 GPM = 3.7854 LPM

To calculate the oil leaving temperature from the cooler:
Oil Leaving Temperature = Oil Entering Temperature - Oil ΔT

Oil Pressure Drop: Most systems will permit a pressure drop of 30 to 40 PSI through the heat exchanger. Excessive pressure drop on the cooler should be avoided.