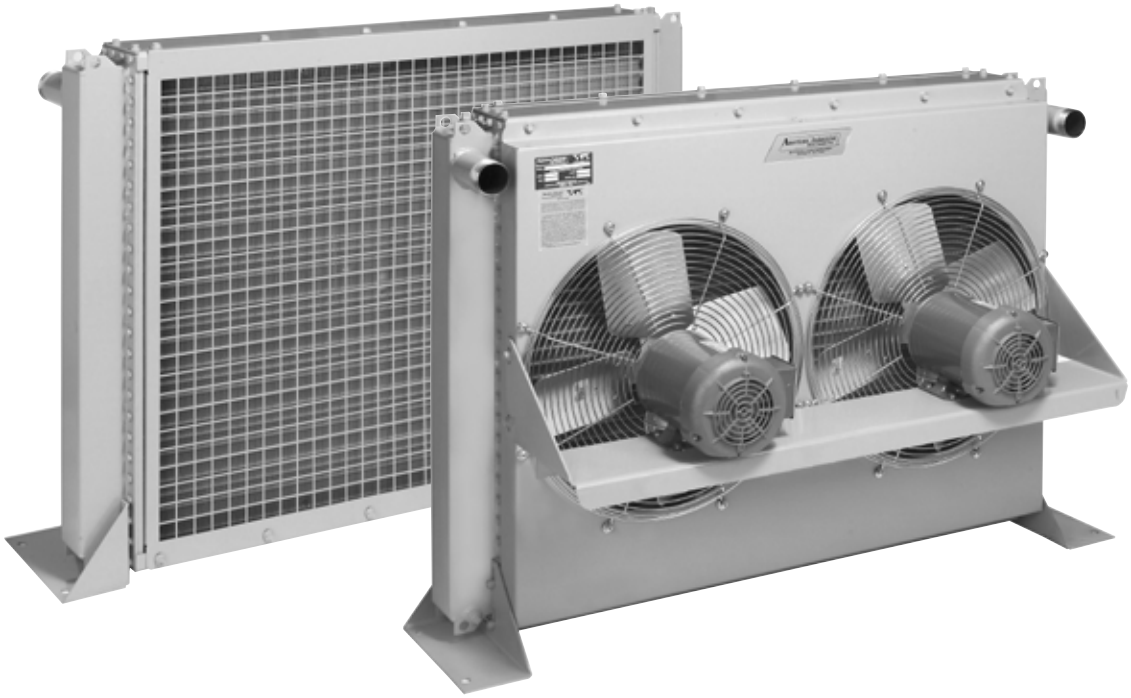
American Industrial Heat Transfer Inc.®

Manufacturer of Quality Heat Exchangers

EOC SERIES

Fit to Screen



Click here to see unit schematic and parts

INDUSTRIAL & MOBILE
AIR COOLED

OIL COOLERS

- Standard NPT or SAE models in stock.
- AC - DC or hydraulic fan drives.
- High quality serviceable air filter.
- Operating temperature of 300ºF & pressure of 300 PSI.
- Can be customized to fit your needs.
- Adjustable mounting brackets included for easy installation.
- Cools: fluid power systems, injection molding machines, hydraulic presses, gear drives, torque convertors, machine tools, etc...

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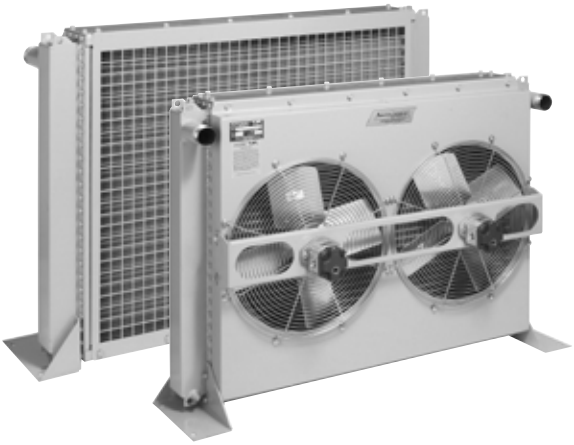
EOC Series *overview*

EOC & EOCF with electric drive

Mobile & industrial air-cooled oil coolers. Brazed or serviceable core ®, mobile and industrial series heat exchangers available with optional washable filter and integral relief valve, 30 PSI or 65 PSI. Standard single phase, three phase, 12 volt DC (21amp) or 24 volt DC (10.5 amp) motors with single or dual cooling fans. Rated operating temperature of 400°F at 300 PSIG. Standard flow rates to 180 GPM. Thermal capacity up to 225 hp (168 Kw). N PT or SAE strait thread O-ring port connections. Can be modified to meet your requirements. Suitable for most hydraulic oils, lubrication oils, synthetic compressor oils, ethylene glycol, and many other fluids compatible with listed materials.



EOC & EOCF with hydraulic drive

Mobile & industrial air-cooled oil coolers. Brazed or serviceable core ®, mobile and industrial series heat exchangers available with optional washable filter and integral relief valve, 30 PSI or 65 PSI. Standard hydraulic drive motor(s) with single or dual cooling fans. Rated operating temperature of 400°F at 300 PSIG. Standard flow rates to 180 GPM. Thermal capacity up to 225 hp (168 Kw). N PT or SAE strait thread O-ring port connections. Can be modified to meet your requirements. Suitable for most hydraulic oils, lubrication oils, synthetic compressor oils, ethylene glycol, and many other fluids compatible with listed materials.

EOC 375 thru EOC 700

EOC 190 thru EOC 337

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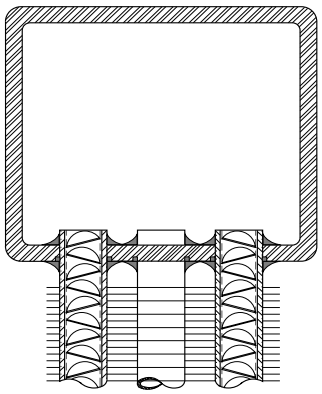
HIGH PERFORMANCE TURBULATOR

Exclusive American Industrial Turbulators (installed in every flow tube) increase heat transfer by more than 100%.

American Industrial Turbulators eliminate the laminar flow condition normally associated with other smooth tube heat exchangers. High viscosity hydraulic and lubricating oils are easily cooled by this new state-of-the-art turbulator.



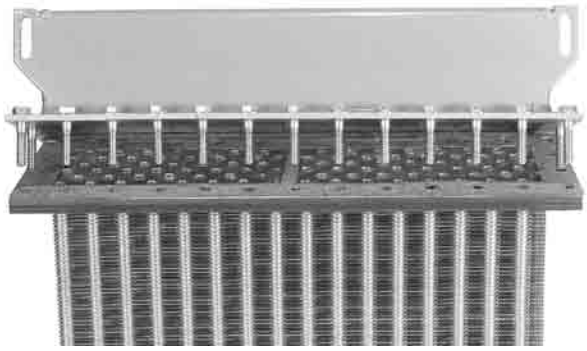
TANKS EOC-190 - EOC-575

State-of-the-art 21st century high temperature brazing method insures permanent bond and positive contact of tube to manifold, eliminating leaks and providing maximum service life.

SERVICEABLE CORE ® EOC-700 only

Core covers disassemble for easy access and cleaning. Repairable design for applications that require limited down time. Roller expanded tube to tube-sheet joint.

100% mechanical bond. Positive gasket seal is field replaceable for field maintenance or repair.



CONSTRUCTION MATERIALS & RATINGS

Standard Construction Materials		Optional Construction Materials	Standard Unit Ratings	
Tubes	Copper	Carbon Steel	Operating Pressure	300 psig
Fins	Aluminum	Copper	Operating Temperature	300 °F
Turbulators	Steel	Brass	Max. Flow Internal Relief	38 gpm
Tank	Steel	Brass	Max. Fan Over-speed	10 %
Connection pipes	Steel	Brass	Max. Ambient Conditions	104 °F
Cabinet & frame	Steel	316L Stainless Steel, Galvanized Steel	Altitude	0-3300 ft.
Fan Blade	Aluminum with steel hub	Plastic, Non-sparking		
Fan Guard	Zinc plated steel	Zinc plated steel		

note: AIHTI reserves the right to make reasonable design changes without notice.

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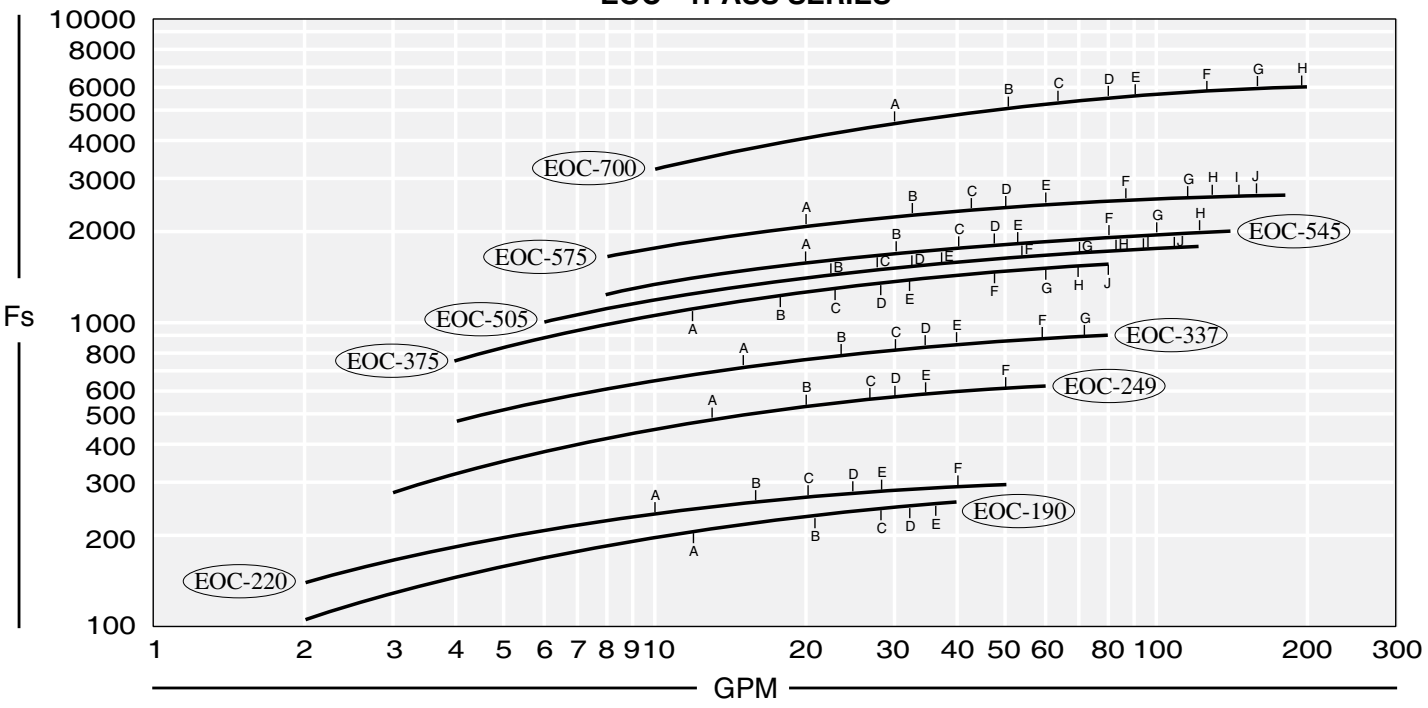
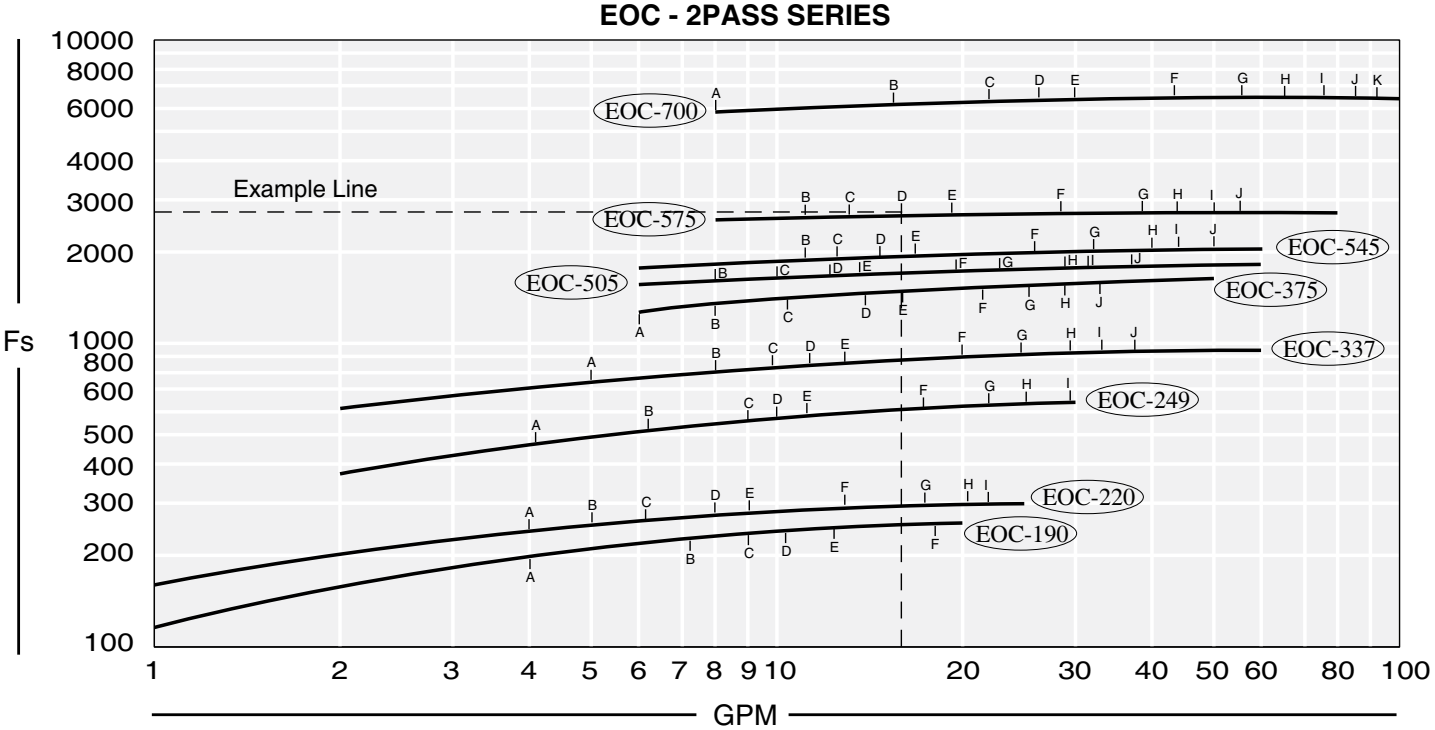
EOC Series *performance*

EOC - 1PASS SERIES



EOC - 2PASS SERIES



PERFORMANCE CALCULATION	OIL PRESSURE DROP (PSI) CODE
$F_s = \frac{\text{Horsepower to be removed (HP) x 2545 x Cv}}{\text{°F (Oil Leaving* - Ambient Air Entering)}} = \frac{\text{BTU}}{\text{hr °F}}$	A = 1 PSI, B = 2 PSI, C = 3 PSI, D = 4 PSI, E = 5 PSI, F = 10 PSI, G = 15 PSI, H = 20 PSI, I = 25 PSI, J = 30 PSI, K = 35 PSI

*Represents desired fluid leaving the cooler.

Note: When a model selection has been made, record whether the selection was from the one pass curve or the two pass curve so that the unit can be properly plumbed. Incorrect installation can seriously affect the performance.

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SIZING

To properly size a DC fan drive air-cooled oil cooler for mobile equipment, you should first determine some basic parameters associated with the system.

HEAT LOAD

There are some system parameters that will be required to properly accomplish the sizing calculations. Without system parameters, it is difficult to determine the optimal heat exchanger size. Normally many of the system parameters can be found on hydraulic schematics or on tags located on the actual equipment. Following are some basic param-eters that you should try to acquire before attempting the sizing calculations. However, it is not necessary to have every parameter listed below.

- Main system flow rate (gpm) & working pressure (psi).
- Electric motor HP driving hydraulic pump (if more than one add up the HP for all).
- Desired temperature (°F).
- Fluid type (SAE 10, 20, 30, etc....).
- Ambient air temperature (warmest day).
- Desired fan drive (hydraulic, electric, 12-24V DC, etc...).
- BTU's or HP to be cooled (normally given for lubrication systems).
- Maximum pressure drop allowed through the heat exchanger.
- Space available for heat exchanger (LxWxH).
- External air condition (dirty, papers,etc…).

In many instances the heat load must be determined by using a "total potential" method. This total potential or horse power method is the most common method, and is the simplest way to determine basic heat rejection requirements for mobile hydraulic systems. The total potential is equal to the maximum operating flow and pressure that are generated by the system under full load. To determine the total potential (HP) use the following formula.

HP = [System Pressure (PSI) x System flow (GPM)] / 1714

Example:
HP = (3000 PSI x 40 GPM) / 1714 = 70 HP or the total input potential

To determine the system heat load in BTU / HR we must use a percentage *(v)* of the system potential HP. The factor *(v)* can be calculated by adding up the actual inefficiencies of a system; however, for most applications a *(v)* value of 25% - 30% can be used.

Example:
70 HP x .25 = 17.5 HP heat

To convert the horsepower of heat into BTU/HR use the formula below:
HP x 2542 = BTU/HR

Example:
17.5 HP x 2545 = 44,538 BTU/HR

Applying into a return line

For most open loop systems with a vane or gear type fixed delivery pumps. To calculate the Fs value required when applying the air/oil cooler into a return line use the formula.

$$Fs = \frac{\text{Btu/ hr x Cv}}{T - t_{ambient}} \qquad \frac{44{,}538_{\text{Btu/hr}} \times 1.13_{\text{Cv}}}{140^{\circ}\text{F} - 100^{\circ}\text{F}_{ambient}} = 1258\ Fs$$

T = Desired system oil temperature leaving the cooler °F
$t_{ambient}$ = Ambient air temperature entering the cooler °F
Cv = Correction factor for oil viscosity.
Example: ISO68 oil @ 150°F = 1.13 *(see chart below)*

Average Liquid Temperature	Cp PRESSURE DROP CORRECTION FACTORS																
	SAE 5	SAE 10	SAE 20	SAE 30	SAE 40	ISO 22	ISO 32	ISO 46	ISO 68	ISO 100	ISO 150	ISO 220	ISO 320	MIL-L-7808	POLYGLYCOL	PHOSPHATE ESTER	50% ETHYLENE GLYCOL & WATER
100	2.00	2.40	4.40	6.40	8.80	1.07	1.53	1.82	2.54	4.19	6.44	9.38	13.56	1.26	3.00	3.50	0.730
110	1.70	2.10	3.60	5.10	6.70	1.04	1.45	1.72	2.35	3.73	5.70	8.33	11.63	1.20	2.40	2.90	0.720
120	1.50	1.80	3.00	4.20	5.60	1.02	1.38	1.60	2.15	3.26	4.91	7.23	9.73	1.14	2.10	2.50	0.709
130	1.40	1.60	2.60	3.40	4.50	0.99	1.30	1.49	1.94	2.80	4.14	6.19	7.80	1.08	1.90	2.20	0.698
140	1.30	1.50	2.23	2.90	3.70	0.97	1.23	1.38	1.75	2.38	3.47	5.20	6.11	1.03	1.90	2.00	0.686
150	1.20	1.30	1.90	2.50	3.10	0.95	1.17	1.30	1.61	2.04	2.90	4.35	4.77	0.98	1.70	1.90	0.676
200	0.93	0.96	1.20	1.40	1.60	0.89	0.99	1.08	1.18	1.33	1.59	1.74	1.95	0.90	1.20	1.30	0.635
250	0.81	0.82	0.92	0.97	1.05	0.85	0.93	0.96	1.03	1.11	1.21	1.22	1.23	0.83	1.00	1.05	0.556

Average Liquid Temperature	Cv VISCOSITY CORRECTION FACTORS																
	SAE 5	SAE 10	SAE 20	SAE 30	SAE 40	ISO 22	ISO 32	ISO 46	ISO 68	ISO 100	ISO 150	ISO 220	ISO 320	MIL-L-7808	POLYGLYCOL	PHOSPHATE ESTER	50% ETHYLENE GLYCOL & WATER
100	1.11	1.15	1.25	1.38	1.45	1.08	1.14	1.18	1.26	1.37	1.43	1.56	1.84	1.19	0.92	0.83	0.85
110	1.09	1.12	1.20	1.32	1.40	1.06	1.13	1.16	1.25	1.31	1.39	1.48	1.67	1.14	0.89	0.80	0.84
120	1.06	1.10	1.17	1.27	1.35	1.04	1.11	1.14	1.20	1.27	1.35	1.40	1.53	1.09	0.88	0.79	0.84
130	1.04	1.08	1.13	1.24	1.29	1.03	1.09	1.13	1.17	1.24	1.30	1.34	1.44	1.05	0.85	0.77	0.83
140	1.03	1.05	1.11	1.19	1.25	1.02	1.08	1.10	1.16	1.20	1.26	1.30	1.39	1.03	0.84	0.76	0.82
150	1.01	1.04	1.09	1.16	1.22	1.02	1.06	1.09	1.13	1.17	1.22	1.27	1.33	1.01	0.83	0.74	0.82
200	0.98	0.99	1.01	1.04	1.07	0.98	0.99	1.00	1.01	1.02	1.08	1.09	1.14	0.98	0.79	0.71	0.80
250	0.95	0.96	0.97	0.98	0.99	0.95	0.96	0.96	0.96	0.97	0.99	1.01	1.02	0.97	0.76	0.69	0.79

EOC Series *selection*

APPLYING INTO A CASE DRAIN LINE

In circumstances where the system is a closed loop or when return line flow is not available, the case drain flow can be utilized to help cool the system However, in many instances, the case drain flow alone will not be enough to reject all of the heat generated by the system. Case drain lines should not be treated as a normal return lines since the pressure drop allowable usually can vary from 2-10 PSI max. Check with your pump manufacturer for the appropriate pressure drop tolerance before applying any cooler. To size the system for case flow or case flow plus any additional flushing loops, please use the following method.

Formula:
Tc_{exit} = The corrected temperature of the oil exiting the cooler.

$$Tc_{exit} = \{ T - [Q / (\text{case flow gpm} \times 210)]\}$$

Example:

$$Tc_{exit} = \{ 150 - [44{,}538 / (8 \times 210)]\} = 123.5$$

$$Fs = \frac{Q \times Cv}{Tc_{exit} - t_{ambient}} \qquad \frac{44{,}538_{Btu/hr} \times 1.13_{Cv}}{123.5^{o}F\text{-}100^{o}F} = 2{,}142$$

Re-circulation Cooling Application (Kidney Loop)

When applying any American Industrial air-cooled heat exchanger into a re-circulation (filtration loop) some important differences should be noted. The standard air-cooled heat transfer calculation can be used however some preliminary calculations must be done prior to using the formula. Before applying the standard air-cooled heat transfer formula, the air oil cooler exiting temperature must be derived from.

Example Re-circulation Loop Application
Fluid - Oil SAE 5w
Flow - 15 GPM re-circulating
Desired Reservoir Temp - 125°F
Ambient Temp - 90°F
Input potential 60 HP
Heat to be removed 1/3 x 60HP = 20HP
Fan drive requirements 3/60/230-460 motor.

Step 1

Formula 1

$$\triangle T = \frac{\text{HP (to be removed)} \times 2545}{\text{Loop Flow (GPM)}}$$

Example

$$\triangle T = \frac{20HP \times 2545}{15gpm \times 210} = 16.6^{o}F$$

Step 2

Formula 2

$$Fs = \frac{HP(\text{to be removed}) \times 2545 \times CV}{(T1\text{-}\triangle T) - \text{Ambient } ^{o}F}$$

Example

$$Fs = \frac{220HP \times 2545 \times 1.06}{(125\text{-}16.2) - 90^{o}F} = 2{,}869.9\ Fs$$

Step 3

Selection from the heat energy dissipation chart (page 172.) EOC-575-3-2P
See example line 2pass curve.

SELECTION

To select a model, locate the flow rate (GPM) at the bottom of the flow vs Fs graph. Proceed upward until the GPM intersects with the calculated Fs. The curve closest above the intersection point will meet these conditions.
Examples:

Return Line	Case Line	Recirculation Loop
Fs = 1,258	Fs = 2,142	Fs = 2,869.9
GPM = 40 "return flow"	GPM = 8 "case flow"	GPM = 15 "loop flow"
Model = EOC-375-4	Model = EOC-575-4-2P	Model = EOC-575-3-2P

PRESSURE DROP

Determine the oil pressure drop from the curves as indicated. For viscosities other than 50 ssu, multiply the actual indicated pressure drop (psi) for your GPM by the Cp value in the pressure differential curve for your viscosity value.

Examples:	EOC-375 @GPM = 40	EOC-575-2P @GPM = 8
Indicated pressure drop	7.8 PSI	4 PSI
Cp correction factor (pg.173)	1.61	1.45
Corrected Pressure drop	12.56 PSI	5.8 PSI

EXAMPLE OF A MODEL

EOC - 337 - 1 - __ - S - R65 - ____ - ____

Model
EOC = standard
EOCF = with washable filter

Size

Motor
blank = no motor
1 = single phase
1EXP = explosion proof
3 = three phase
3EXP = explosion proof
5 = 575 volt
4 = 12v DC
6 = 24v DC
9 = hydraulic

Passes
blank = one pass
2P = two pass

Connection Type
blank = NPT
S = SAE

Bypass*
R65 = 65psi
R30 = 30psi

Tubing
blank = Copper
C = Carbon Steel

Coating
blank = Enamel (standard)
G = Galvanize (cabinet)
T = Heresite (core)
X = Epoxy (cabinet)

*EOC-190 thru EOC-575 series releif valve available only on one pass unit.
EOC-700 series relief valve available only on two pass unit.

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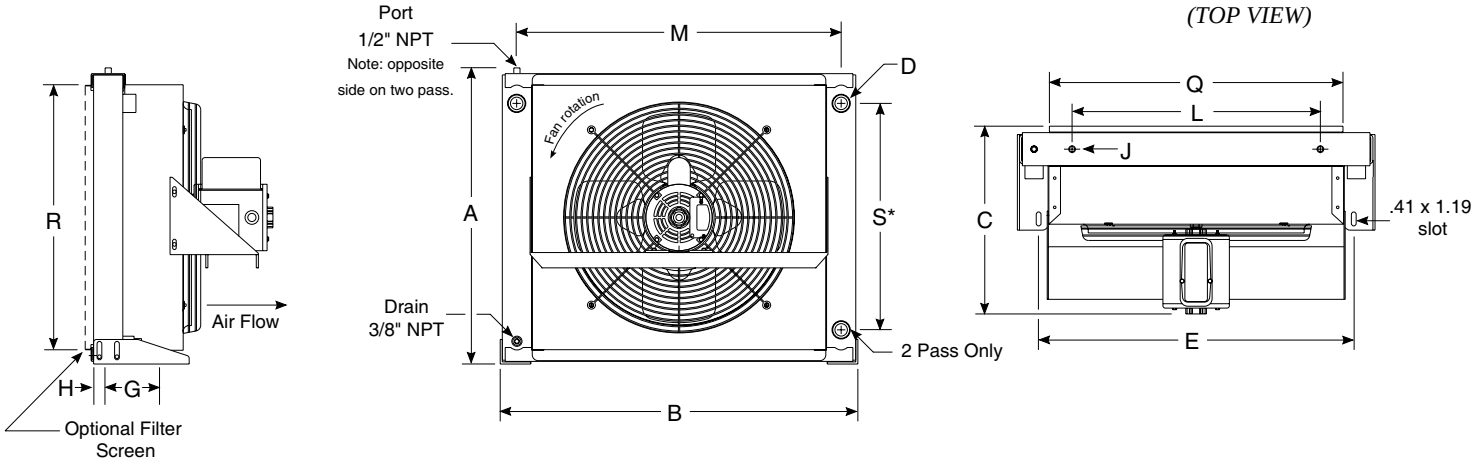
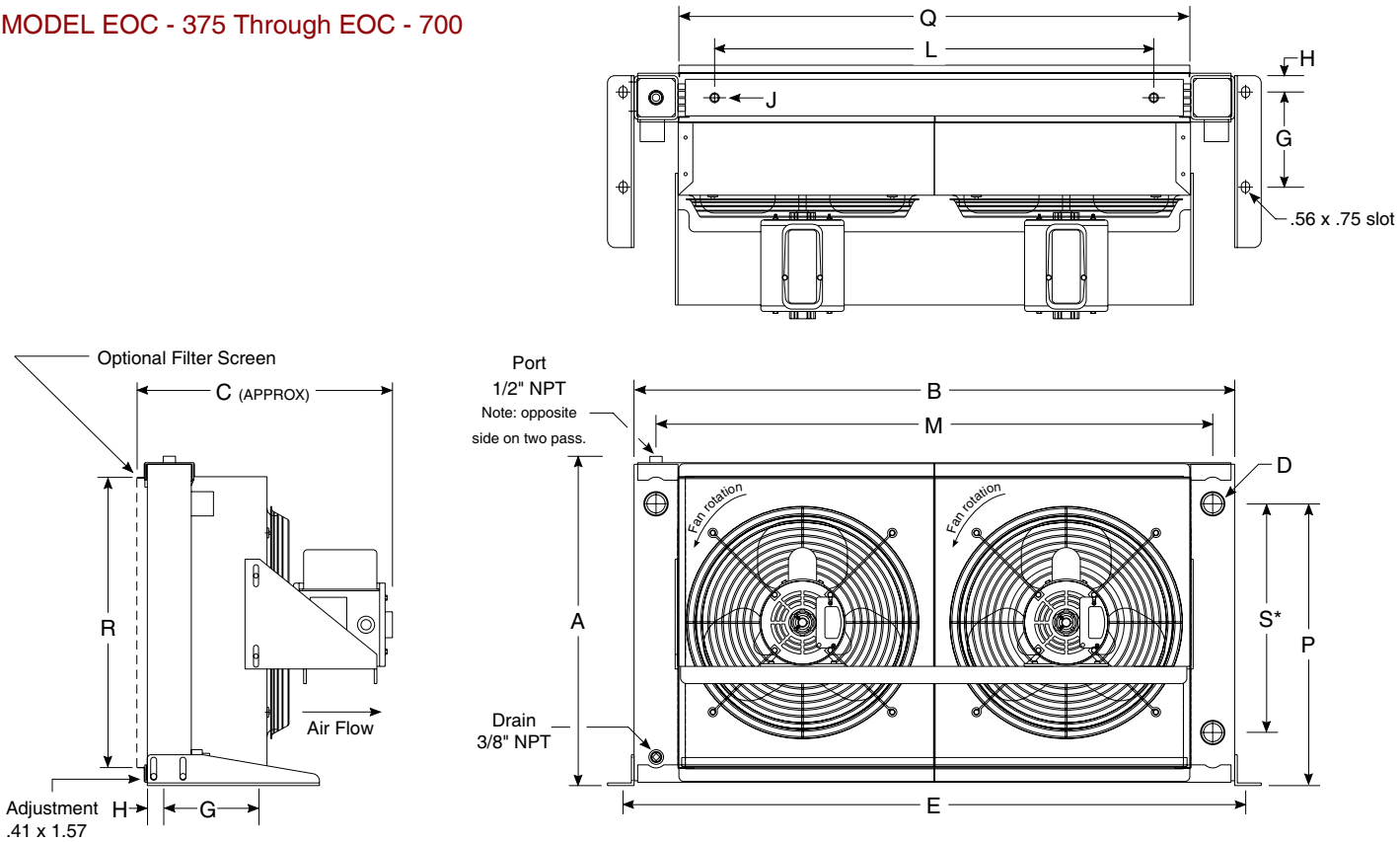
MODEL EOC - 190 Through EOC - 337



MODEL EOC - 375 Through EOC - 700



* Dimension used only with two pass units

COMMON DIMENSIONS

Model	A	B	C	D NPT	D SAE	E	G	H	J 1/2-13 tab	L	M	P	Q	R	S*
EOC - 190 - ✱	13.62	16.50	14.21	.75	#12	14.75	5.00	5.00		8.00	15.00	10.31	11.38	10.38	7.65
EOC - 220 - ✱	15.62	22.00	16.32	.75	#12	18.69	5.00	5.00		14.00	20.50	12.31	16.88	12.25	10.25
EOC - 249 - ✱	19.62	24.75	16.32	.75	#12	21.44	5.00	5.00		14.00	23.25	16.31	20.00	16.25	15.00
EOC - 337 - ✱	25.62	30.25	16.32	1.00	#16	26.97	5.00	5.00		21.25	28.75	22.31	25.00	22.38	19.38
EOC - 375 - ✱	18.50	39.00	17.75	1.25	#20	40.50	6.50	6.50	(4)	30.00	36.50	15.25	33.00	15.13	12.50
EOC - 505 - ✱	22.50	41.0	17.13	1.25	#20	42.50	6.50	6.50		30.00	38.50	19.25	34.75	19.63	16.50
EOC - 545 - ✱	30.50	42.00	17.32	1.50	#24	43.75	9.00	9.00		30.00	39.50	27.25	35.75	27.50	24.63
EOC - 575 - ✱	36.50	48.00	17.32	2.00	#32	49.75	9.00	9.00		36.00	45.50	32.75	41.75	33.50	29.25
EOC - 700 - ✱	38.38	51.00	21.23	2.00	#32	52.75	9.00	9.00	(8)	–	48.50	34.00	43.50	34.50	32.50

note: AIHTI reserves the right to make reasonable design changes without notice.

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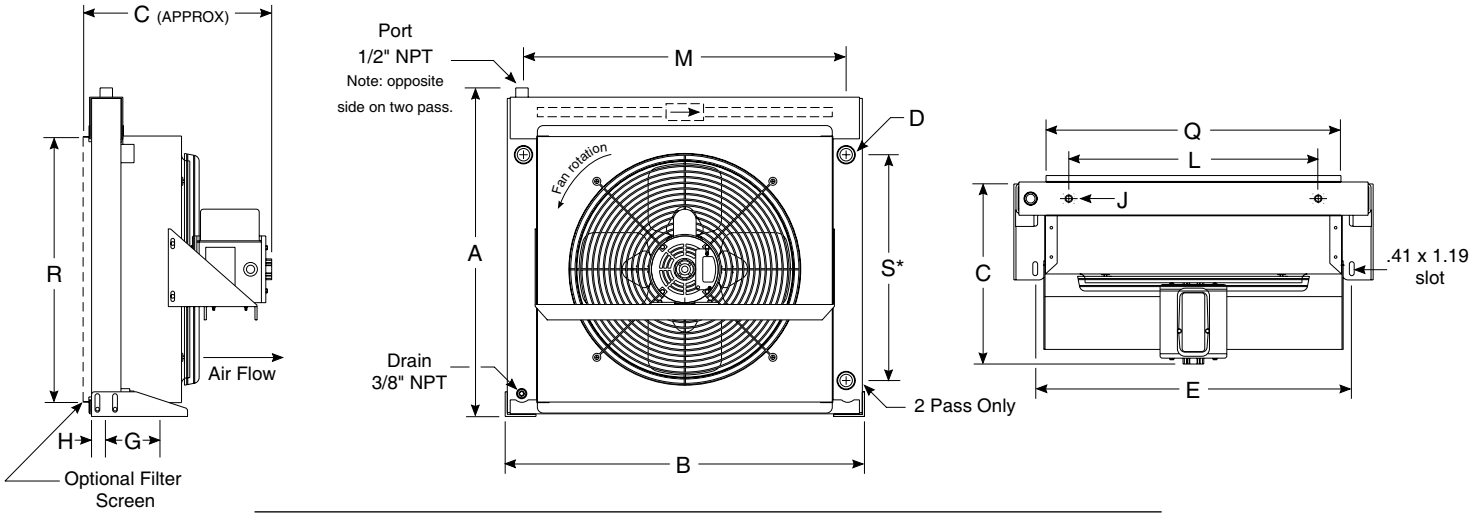
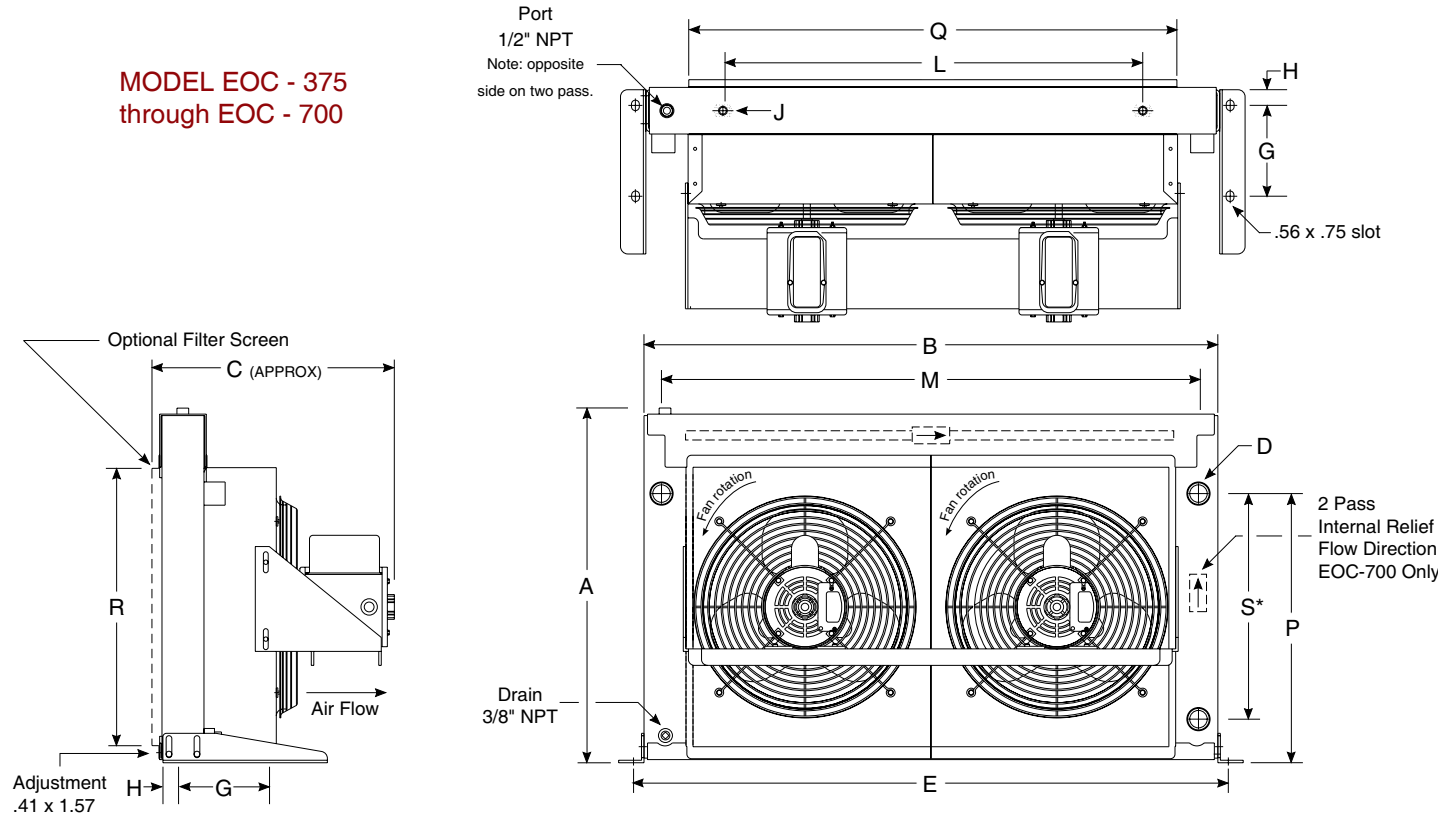
EOC & EOCF Series *dimensions with bypass relief valve*

MODEL EOC - 190 through EOC - 337



MODEL EOC - 375 through EOC - 700



* Dimension used only with two pass units

Model	A	B	C electric	C hydraulic	D NPT	D SAE	E	G	H	J 1/2-13 tab	L	M	P	Q	R	S*
EOC - 190 - ✱	16.00	16.50	14.21	12.20	.75	#12	14.75	5.00	5.00		8.00	15.00	10.31	11.38	10.38	7.65
EOC - 220 - ✱	18.00	22.00	16.32	14.64	.75	#12	18.69	5.00	5.00		14.00	20.50	12.31	16.88	12.25	10.25
EOC - 249 - ✱	22.00	24.75	16.32	14.19	.75	#12	21.44	5.00	5.00		14.00	23.25	16.31	20.00	16.25	15.00
EOC - 337 - ✱	28.00	30.25	16.32	14.64	1.00	#16	26.97	5.00	5.00		21.25	28.75	22.31	25.00	22.38	19.38
EOC - 375 - ✱	21.38	39.00	17.75	15.14	1.25	#20	40.50	6.50	6.50	(4)	30.00	36.50	15.25	33.00	15.13	12.50
EOC - 505 - ✱	25.38	41.0	17.13	15.14	1.25	#20	42.50	6.50	6.50		30.00	38.50	19.25	34.75	19.63	16.50
EOC - 545 - ✱	33.28	42.00	17.32	15.14	1.50	#24	43.75	9.00	9.00		30.00	39.50	27.25	35.75	27.50	24.63
EOC - 575 - ✱	39.38	48.00	17.32	15.29	2.00	#32	49.75	9.00	9.00		36.00	45.50	32.75	41.75	33.50	29.25
EOC - 700 - ✱	38.39	51.00	21.23	15.40	2.00	#32	52.75	9.00	9.00	(8)	–	48.50	34.00	43.50	34.50	32.50

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EOC & EOCF ELECTRIC MOTOR DATA

Model	Horse Power	No. of Motors	Phase	Hz	Volts	RPM	NEMA Frame	Type	Full Load Amperes	Service Factor	Thermal Overload
EOC - 190 - 1	1 / 4	1	1	60 / 50	115/230 - 90/190	1725 - 1425	48	TEFC	3.2/1.6 - 2.8/1.4	1.15	NO
EOC - 190 - 3	1 / 4	1	3	60 / 50	230/460 - 190/380	1725 - 1425	48	TENV	1.3/.65 - 1.1/.55	1.15	YES
EOC - 190 - 5	1 / 4	1	3	60 / 50	575	1725 - 1425	48	TEFC	.65 - .60	1.15	NO
EOC - 220 - 1	1 / 4	1	1	60 / 50	115/230 - 90/190	1725 - 1425	48	TEFC	3.2/1.6 - 2.8/1.4	1.15	NO
EOC - 220 - 3	1 / 4	1	3	60 / 50	230/460 - 190/380	1725 - 1425	48	TENV	1.3/.65 - 1.1/.55	1.15	YES
EOC - 220 - 5	1 / 4	1	3	60 / 50	575	1725 - 1425	48	TEFC	.65 - .60	1.15	NO
EOC - 249 - 1	1 / 4	1	1	60 / 50	115/230 - 90/190	1725 - 1425	48	TEFC	3.2/1.6 - 2.8/1.4	1.15	NO
EOC - 249 - 3	1 / 4	1	3	60 / 50	230/460 - 190/380	1725 - 1425	48	TENV	1.3/.65 - 1.1/.55	1.15	YES
EOC - 249 - 5	1 / 4	1	3	60 / 50	575	1725 - 1425	48	TEFC	.65 - .60	1.15	NO
EOC - 337 - 1	1 / 4	1	1	60 / 50	115/230 - 90/190	1725 - 1425	48	TEFC	3.2/1.6 - 2.8/1.4	1.15	NO
EOC - 337 - 3	1 / 4	1	3	60 / 50	230/460 - 190/380	1725 - 1425	48	TENV	1.3/.65 - 1.1/.55	1.15	YES
EOC - 337 - 5	1 / 4	1	3	60 / 50	575	1725 - 1425	48	TEFC	.65 - .60	1.15	NO
EOC - 375 - 1	1 / 4	2	1	60 / 50	115/230 - 90/190	1725 - 1425	48	TEFC	3.2/1.6 - 2.8/1.4	1.15	NO
EOC - 375 - 3	1 / 4	2	3	60 / 50	230/460 - 190/380	1725 - 1425	48	TENV	1.3/.65 - 1.1/.55	1.15	YES
EOC - 375 - 5	1 / 4	2	3	60 / 50	575	1725 - 1425	48	TEFC	.65 - .60	1.15	NO
EOC - 505 - 1	1 / 4	2	1	60 / 50	115/230 - 90/190	1725 - 1425	48	TEFC	3.2/1.6 - 2.8/1.4	1.15	NO
EOC - 505 - 3	1 / 4	2	3	60 / 50	230/460 - 190/380	1725 - 1425	48	TENV	1.3/.65 - 1.1/.55	1.15	YES
EOC - 505 - 5	1 / 4	2	3	60 / 50	575	1725 - 1425	48	TEFC	.65 - .60	1.15	NO
EOC - 545 - 1	1 / 4	2	1	60 / 50	115/230 - 90/190	1725 - 1425	48	TEFC	3.2/1.6 - 2.8/1.4	1.15	NO
EOC - 545 - 3	1 / 4	2	3	60 / 50	230/460 - 190/380	1725 - 1425	48	TENV	1.3/.65 - 1.1/.55	1.15	YES
EOC - 545 - 5	1 / 4	2	3	60 / 50	575	1725 - 1425	48	TEFC	.65 - .60	1.15	NO
EOC - 575 - 1	1 / 4	2	1	60 / 50	115/230 - 90/190	1725 - 1425	48	TEFC	3.2/1.6 - 2.8/1.4	1.15	NO
EOC - 575 - 3	1 / 4	2	3	60 / 50	230/460 - 190/380	1725 - 1425	48	TENV	1.3/.65 - 1.1/.55	1.15	YES
EOC - 575 - 5	1 / 4	2	3	60 / 50	575	1725 - 1425	48	TEFC	.65 - .60	1.15	NO
EOC - 700 - 1	1	2	1	60	115 - 208/230	1725	56	TEFC	13.4/6.8 - 6.7	1.15	NO
EOC - 700 - 3	1	2	3	60 / 50	230/460 - 190/380	1725 - 1425	56	TEFC	3.5/3.6 - 1.8/3.4	1.15	YES
EOC - 700 - 5	1	2	3	60 / 50	575	1725 - 1425	56	TEFC	1.45	1.15	NO

DC ELECTRIC MOTOR DATA

Model	Horse Power	Current	Volts	RPM	NEMA Frame	Enclosure Type	Full Load Amperes	Service Factor	Thermal Overload
EOC - 190 thru 575 - 4	1 / 4	DC	12	1750	48	TENV	21	1.0	NO
EOC - 190 thru 575 - 6	1 / 4	DC	24	1750	48	TENV	10.5	1.0	NO

CLASS I,DIV.1, GROUP D or CLASS II,DIV.2, GROUP F & G EXPLOSION PROOF MOTOR DATA

Model	Horse Power	Phase	Hz	Volts	RPM	NEMA Frame	Enclosure Type	Full Load Amperes	Service Factor	Thermal Overload
EOC - 190 thru 575 - 1EXP	1 / 4	1	60	115 / 230	1725	48	X-PROOF	5.8 / 2.9	1 . 0	YES
EOC - 190 thru 575 - 3EXP	1 / 4	3	60	208-230 / 460	1725	48	X-PROOF	1.4-1.3 / .65	1 . 0	YES
EOC - 700 - 1EXP	1	1	60	115 / 230	1725	56	X-PROOF	13.4 / 6.7	1 . 0	YES
EOC - 700 - 3EXP	1	3	60	208-230 / 460	1725	56	X-PROOF	3.6 / 1.8	1 . 0	YES

ELECTRIC MOTOR NOTES:

1) TEFC motors are available for all models.
2) Motor electrical ratings are an approximate guide and may vary between motor manufacturers. Consult ratings on motor data plate prior to installation and operation.
3) Explosion proof, high temperature, severe duty, chemical, IEC, Canadian Standards Association, and Underwriters Laboratory recognized motors are available upon request.
4) American Industrial reserves the right to enact changes to motor brand, type and ratings regarding horsepower, RPM,FLA,and service factor for standard products without notice. All specific requirements will be honored without change.
5) Fan rotation is clockwise when facing the motor shaft.
6) The above motors contain factory lubricated shielded ball bearings.
7) **Abbreviation Index**
   TEFC ..... Totally Enclosed, Fan Cooled
   TEAO..... Totally Enclosed, Air Over

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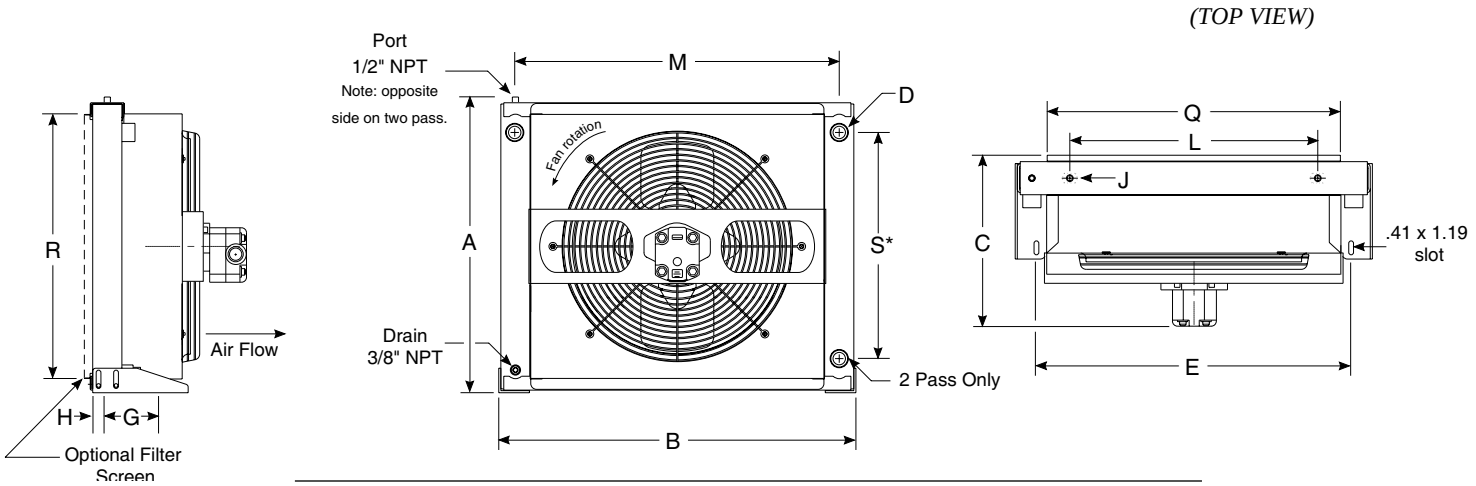
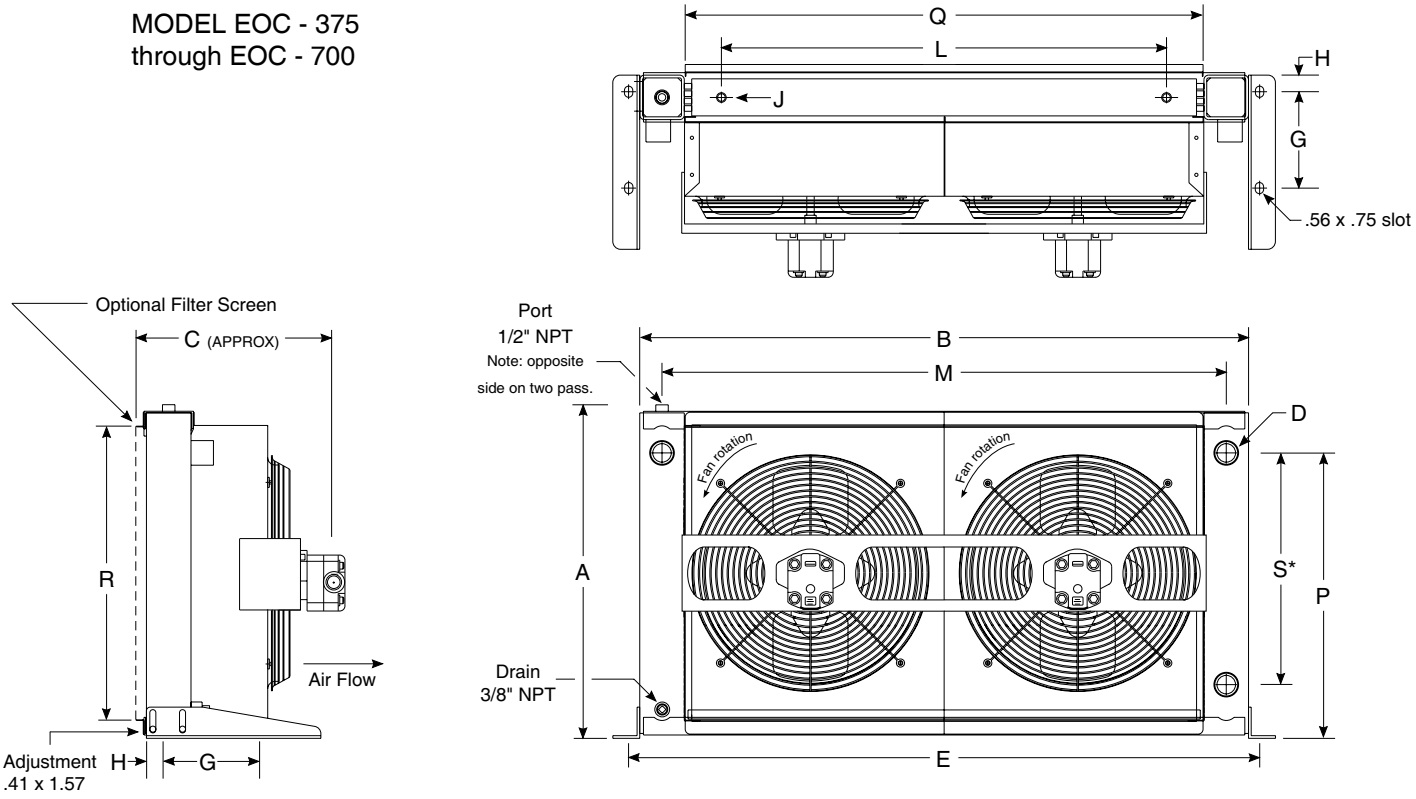
EOC & EOCF Series *dimensions with hydraulic drive*

MODEL EOC - 190 Through EOC - 337



MODEL EOC - 375 through EOC - 700



* Dimension used only with two pass units

COMMON DIMENSIONS

Model	A	B	C	D NPT	D SAE	E	G	H	J 1/2-13 tab	L	M	P	Q	R	S*
EOC - 190 - ✱	13.62	16.50	12.20	.75	#12	14.75	5.00	5.00		8.00	15.00	10.31	11.38	10.38	7.65
EOC - 220 - ✱	15.62	22.00	14.64	.75	#12	18.69	5.00	5.00		14.00	20.50	12.31	16.88	12.25	10.25
EOC - 249 - ✱	19.62	24.75	14.19	.75	#12	21.44	5.00	5.00		14.00	23.25	16.31	20.00	16.25	15.00
EOC - 337 - ✱	25.62	30.25	14.64	1.00	#16	26.97	5.00	5.00		21.25	28.75	22.31	25.00	22.38	19.38
EOC - 375 - ✱	18.50	39.00	15.14	1.25	#20	40.50	6.50	6.50	(4)	30.00	36.50	15.25	33.00	15.13	12.50
EOC - 505 - ✱	22.50	41.0	15.14	1.25	#20	42.50	6.50	6.50		30.00	38.50	19.25	34.75	19.63	16.50
EOC - 545 - ✱	30.50	42.00	15.14	1.50	#24	43.75	9.00	9.00		30.00	39.50	27.25	35.75	27.50	24.63
EOC - 575 - ✱	36.50	48.00	15.29	2.00	#32	49.75	9.00	9.00		36.00	45.50	32.75	41.75	33.50	29.25
EOC - 700 - ✱	38.38	51.00	15.40	2.00	#32	52.75	9.00	9.00	(8)	–	48.50	34.00	43.50	34.50	32.50

note: AIHTI reserves the right to make reasonable design changes without notice.

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HYDRAULIC MOTOR DATA

Model	No. of Motors	Motor Connections	RPM	Displacement IN^3/Rev	Min.Oil Flow Required (GPM)	Min.Operation Pressure (PSI)	Maximum Pressure (PSI)	Size	Shaft
EOC-190	1	SAE-12 1 - 1/16 -12	1725	.43	3.75	200	3000	SAE A 2 Bolt	.625 Keyed Short
EOC-220									
EOC-249									
EOC-337									
EOC-375	2								
EOC-505									
EOC-545									
EOC-575									
EOC-700				.68	6.00	400			

HYDRAULIC MOTOR NOTES:

1) Standard units are supplied with a bi-directional hydraulic gear motor for the fan drive. The gear motor requires an external case drain be used during operation. The external case drain should be connected directly to hydraulic reservoir or a return line with not greater than 10PSIG back pressure. (NOTE: *Failure to properly connect and use the external case drain during motor operation could result in motor failure and external leakage of hydraulic fluid.*
2) Hydraulic motor flow requirements are provided with an efficiency rating of approximately 85%. Pressure requirements are calculated theoretical minimum operating requirements.
3) Shaft adapters are used to bridge the differences in length between the fan and hydraulic motor.
4) Maximum degree of fluid contamination, class 18/15 according to ISO 4406. Therefore, it is recommended to use a filter with retention rating of B20>. For longer life, it iscommended to use class 17/14 achievable with filter B10>-100.
5) Fan rotation is clockwise when facing the motor shaft.
6) Optional displacement motors available upon request.
7) American industrial reserves the right to enact changes to hydraulic motor, brand, type, ratings, port sizes, or any additional non-specified attribute for standard products without notice. All specific requirements will be honored without change pending availability.

Model	Total Air Flow		Sound Level dB(A) @ 7ft	Liquid Volume		Weight Electric		Weight Hydraulic		Bypass Valve Adder (lbs)	Serviceable Core
	CFM	m^3/s		gal.	cm^3	lb	kg	lb	kg		
EOC-190	800	.376	68	.76	2877	49	22	44	20	5	NO
EOC-220	800	.376	68	.85	3217	64	29	59	27	5	NO
EOC-249	2000	.942	71	1.28	4845	87	39	82	37	5	NO
EOC-337	2500	1.177	81	1.85	7003	102	46	97	44	6	NO
EOC-375	4000	1.884	73	1.94	7343	142	64	130	59	6	NO
EOC-505	4000	1.884	73	2.50	9464	151	68	139	63	7	NO
EOC-545	4000	1.884	73	3.51	13287	163	74	151	68	7	NO
EOC-575	5000	2.355	83	4.34	16428	241	109	227	103	8	NO
EOC-700	9500	4.475	87	7.53	28504	428	194	414	188	8	YES

NOTES: To estimate the sound level at distances other than 7 feet (2.1 meters) from the cooler, add 6 db for each halving of distance, or substract 6 db for each doubling of the distance.

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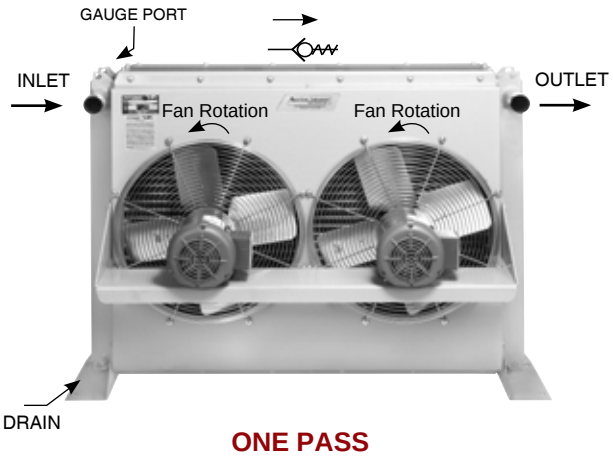
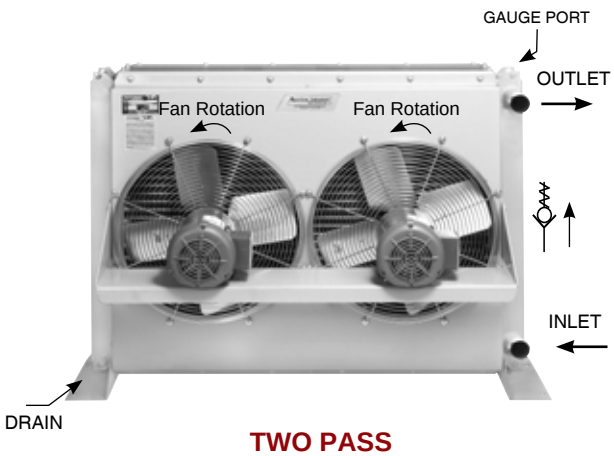
PIPING HOOK UP



ONE PASS



TWO PASS

Receiving / Installation

a) Inspect unit for any shipping damage before uncrating. Indicate all damages to the trucking firms' delivery person and mark it on the receiving bill before accepting the freight. Make sure that the core and fan are not damaged. Rotate the fan blade to make sure that it moves freely. The published weight information located in this brochure is approximate. True shipment weights are determined at the time of shipping and may vary. Approximate weight information published herein is for engineering approximation purposes and should not be used for exact shipping weight. *Since the warranty is based upon the unit date code located on the model identification tag, removal or manipulation of the identification tag will void the manufacturers warranty.*

b) When handling the heat exchanger, special care should be taken to avoid damage to the core and fan. All units are shipped with wood skids for easy forklift handling

c) Standard Enamel Coating: American Industrial provides its standard products with a normal base coat of oil base air cure enamel paint. The enamel paint is applied as a temporary protective and esthetic coating prior to shipment. While the standard enamel coating is durable, American Industrial does not warranty it as a long-term finish coating. It is strongly suggested that a more durable final coating be applied after installation or prior to long-term storage in a corrosive environment to cover any accidental scratches, enhance esthetics, and further prevent corrosion. It is the responsibility of the customer to provide regular maintenance against chips, scratches, etc... and regular touch up maintenance must be provided for long-term benefits and corrosion prevention.

d) Special Coatings: American Industrial offers as customer options, Air-Dry Epoxy, and Heresite (Air-Dry Phenolic) coatings at additional cost. American Industrial offers special coatings upon request, however American Industrial does not warrantee coatings to be a permanent solution for any equipment against corrosion. It is the responsibility of the customer to provide regular maintenance against chips, scratches, etc... and regular touch up maintenance must be provided for long-term benefits and corrosion prevention.

e) American Industrial recommends that the equipment supplied should be installed by qualified personnel who have solid understanding of system design, pressure and temperature ratings, and piping assembly. Verify the service conditions of the system prior to applying any air cooled heat exchanger series cooler. If the system pressure or temperature does not fall within the parameters on model rating tag located on the heat exchanger, contact our factory prior to installation or operation.

g) Heat exchanger should be securely fastened using the mounting foot brackets (included). All mounting holes should be used to secure unit into place. Optional horizontal mounting with vertical airflow is allowable. Heat exchanger unit must be set into a fabricated channel type frame with provision for additional motor support for heavy motors. Since the units are normally operated in the vertical position (horizontal airflow) reinforced motor support is suggested.

h) Connections should be made in "one pass" or "two pass" configurations exactly as indicated in the "piping hook up" illustration above. The process flow entering the "Fluid IN" port and exiting the "Fluid OUT" port eliminates air pockets and assures that the unit will stay completely flooded. Flexible hose can be applied to reduce the risk of core failure due to thermal expansion or system vibration. Piping alignment and support is required for hoses longer than four feet in length and for piping exerting more than 20 lbs of dynamic force. It is recommended that filtration be located ahead of the heat exchanger to prevent excessive backpressure and clogging.

i) With respect to the heat exchangers nozzle size, flow line sizes should be sized to handle the appropriate flow rate and system pressure drop requirements, normally

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flow line rates of about 8-12 feet per second and inlet pressure less than 100psig are experienced. If the flow line size is larger than the heat exchanger nozzle size, additional pressure loss beyond the published pressure loss data may occur.

j) Electric motors should be connected only to supply source of the same characteristics as indicated on the electric motor information plate. Prior to starting, verify that the motor and fan spin freely without obstruction. Check carefully that the fan turns in the correct rotation direction (normally counter clockwise) from the motor side (fan direction arrow). Failure to operate the fan in the proper direction could reduce performance or cause serious damage to the heat exchanger or other components.

k) It is important to apply the catalog recommended flow rate for the hydraulic motor that corresponds with the specific model being used. A case drain is required for hydraulic motor installation. Failure to connect case drain can result in motor failure. The proper flow rate and direction to the hydraulic motor are critical to ensure fan direction and RPM. Exceeding the recommended RPM could result in fan failure and cause severe damage to the heat exchanger. See fan rotation (page 180)

Maintenance

Regular maintenance intervals based upon the surrounding and operational conditions should be maintained to verify equipment performance and to prevent premature component failure. Since some of the components such as, motors, fans, fan guards, etc... are not manufactured by American Industrial, maintenance requirements provided by the manufacture must be followed.

a) Inspect the entire heat exchanger and motor/fan assembly for loosened bolts, loose connections, broken components, rust spots, corrosion, fin/coil clogging, or external leakage. Make immediate repairs to all affected areas prior to restarting and operating the heat exchanger or its components.

b) Heat exchangers operating in oily or dusty environments will often need to have the coil cooling fins cleaned. Oily or clogged fins should be cleaned by carefully brushing the fins and tubes with water or a non-aggressive degreasing agent mixture *(Note: Cleaning agents that are not compatible with copper, brass, aluminum, steel or stainless steel should not be used).* A compressed air or a water stream can be used to dislodge dirt and clean the coil further. Any external dirt or oil on the electric motor and fan assembly should be removed. *Caution: Be sure to disconnect the electric motor from its power source prior to doing any maintenance.*

c) In most cases it is not necessary to internally flush the coil. In circumstances where the coil has become plugged or has a substantial buildup of material, flushing the coil with water or a solvent may be done. Flushing solvents should be non-aggressive suitable for the materials of construction. Serviceable Core® models can be disassembled and inspected or cleaned if required.

d) Most low horsepower electric motors do not require any additional lubrication. T.E.F.C. air ventilation slots should be inspected and cleaned regularly to prevent clogging and starving the motor of cooling air. To maintain the electric motor properly see the manufactures requirements and specifications.

e) Fan blades should be cleaned and inspected for tightness during the regular maintenance schedule when handling a fan blade care must be given to avoid bending or striking any of the blades. Fan blades are factory balanced and will not operate properly if damaged or unbalanced. Damaged fan blades can cause excessive vibration and severe damage to the heat exchanger or drive motor. Replace any damaged fan with an American industrial suggested replacement.

f) Air cooled exchanger cabinets are constructed using 7ga. through 18ga. steel that may be bent back into position if damaged. Parts that are not repairable can be purchased through American Industrial.

g) Coil fins that become flattened can be combed back into position. This process may require removal of the coil from the cabinet.

h) It is not advisable to attempt repairs to brazed joints of a brazed construction coil unless it will be done by an expert in silver solder brazing. Brazed coils are heated uniformly during the original manufacturing process to prevent weak zones from occurring. Uncontrolled reheating of the coil may result in weakening of the tube joints surrounding the repair area. In many instances brazed units that are repaired will not hold up as well to the rigors of the system as will a new coil. American Industrial will not warranty or be responsible for any repairs done by unauthorized sources. Manipulation in any way other than normal application will void the manufactures warranty.

i) Solely at the request of customers, American Industrial provides direct acting internal inlet port to outlet port bypass relief valves as an additional safe guard against excessive flow and over pressurization of the heat exchanger. American Industrial purchases and applies high quality hydraulic system cartridge valves and components made available for hydraulic system use. However, American Industrial does not specify, recommend, suggest, guarantee, or warrantee the internal relief valve or its performance to safe guard the heat exchanger from damage or prevent failure due to excessive flow or over pressurization. It is the ultimately the sole responsibility of the customer/user to verify with the original equipment manufacture all conditions associated with applying an additional system relief valve prior to application.

Serviceable Core® Maintenance

Units containing a Serviceable Core® have bolted manifold covers that can be removed for cleaning or repair purposes.

Servicing Sequence

American Industrial has gone to great lengths to provide components that are repairable. If the heat exchanger core requires internal cleaning or attention the following steps will explain what must be done to access the internal tubes. Be sure to order gasket kits or repair parts prior to removal and disassembly to minimize down time.

a) To clean the internal tubes first remove all connection plumbing from the unit.

b) Be sure the unit is drained of all water etc...

c) Place the heat exchanger in an area that it can be accessed from all sides. Remove the core from the cabinet if required. (EOC, AOCH, AOCS).

d) Mark the cover ① and tube-sheet ③ for both covers so that they can be replaced into the same position when finished. Remove the manifold cover bolts ② and hardware and place them into a secure place.

e) The manifold covers are tightly compressed and may need some prying to separate them from the gasket ⑥, physically remove the cover assemblies ① from both sides.

f) The tubes ④ and turbulators ⑤ are now accessible for cleaning. Note: turbulators are installed on EOC, AOCH & AOCS cores only. If you need to remove the turbulator that runs through the tubing, it will be necessary to first squeeze the flattened end of the protruding turbulator ⑤, so that on end will fit through the tube. From the opposite end pull the turbulator ⑤ out. You may need to use pliers to grip and pull the turbulators ⑤ out, especially if there is debris lodged inside. As the turbulators ⑤ come out, most of the dirt will too, so be prepared. *It is suggested that gloves be worn when handling the turbulators ⑤ as they may be sharp.*

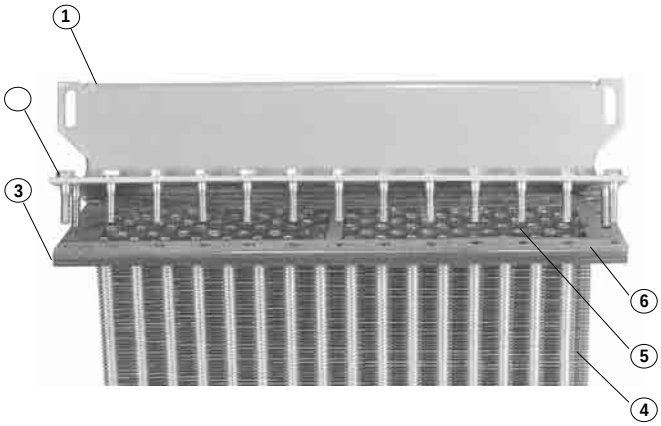
We suggest a mild water-soluble degreaser be used with a brush. Tubing I.D. is aproximatley .325 a plastic bristle brush on a rod will work best for cleaning the tubes ④. Steel brushes should be avoided since the steel is harder than the copper tubing and may heavily score the tubes ④ if used.

g) If there are any leaking tubes ④ you may plug them by carefully forcing a soft metal plug into the hole and tapping it tight. You may in some cases weld the leaking tube shut however, care should be taken since excessive heat may cause surrounding tube joints to loosen and leak.

h) When finished cleaning or repairing, be sure to replace ALL of the turbulators ⑤ back into any open tubes ④. When the turbulators ⑤ protrude from the opposite end flatten them again so they are tight and cannot be removed.

i) When finished reattach the manifold covers ① in the same position they were removed, using new gaskets ⑥, bolts ②, and hardware. We suggest using a torque wrench to final tighten the bolts ②.

j) *Torque Specifications: For 5/16" bolts 22-23 ft-lbs, for 3/8" bolts to 38-42 ft-lbs. Since bolts and hardware can physically fatigue during application we suggest new bolt kits be used when reassembling.*



American Industrial's state-of-the-art manufacturing facility.

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