American Industrial
Heat Transfer Inc.

Manufacturer of Quality Heat Exchangers

EOC and EOCF SERIES

INDUSTRIAL & MOBILE AIR COOLED

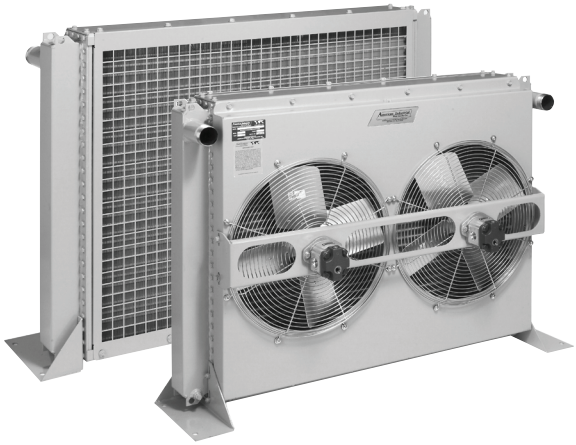
LIQUID COOLERS

- Standard NPT or SAE models in stock.
- AC - DC or hydraulic fan drives.
- High quality serviceable air filter.
- Operating temperature of 300°F & pressure of 300 PSI.
- Can be customized to fit any applications.
- Cores available in both brazed or serviceable construction
- Computer generated data sheet available for any application
- Adjustable mounting brackets included for easy installation.
- Cools: fluid power systems, injection molding machines, hydraulic presses, gear drives, torque convertors, machine tools, etc...

EOC Series *overview*

EOC & EOCF with electric drive

Mobile & industrial air-cooled liquid coolers. 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 300°F at 300 PSIG. Standard flow rates to 160 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 liquid coolers. 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 300°F at 300 PSIG. Standard flow rates to 160 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

HIGH PERFORMANCE TURBULATOR

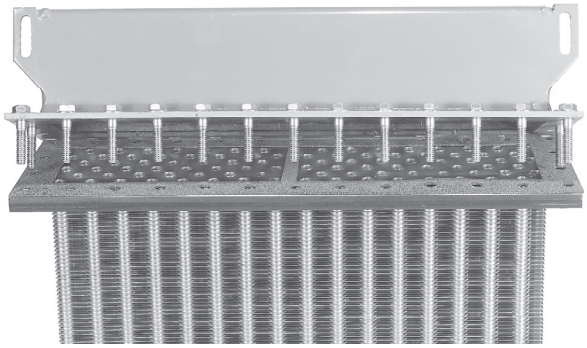
Exclusive American Industrial Turbulators (installed in every flow tube) increase heat transfer by more than 100%.

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.

SERVICEABLE CORE ®

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.



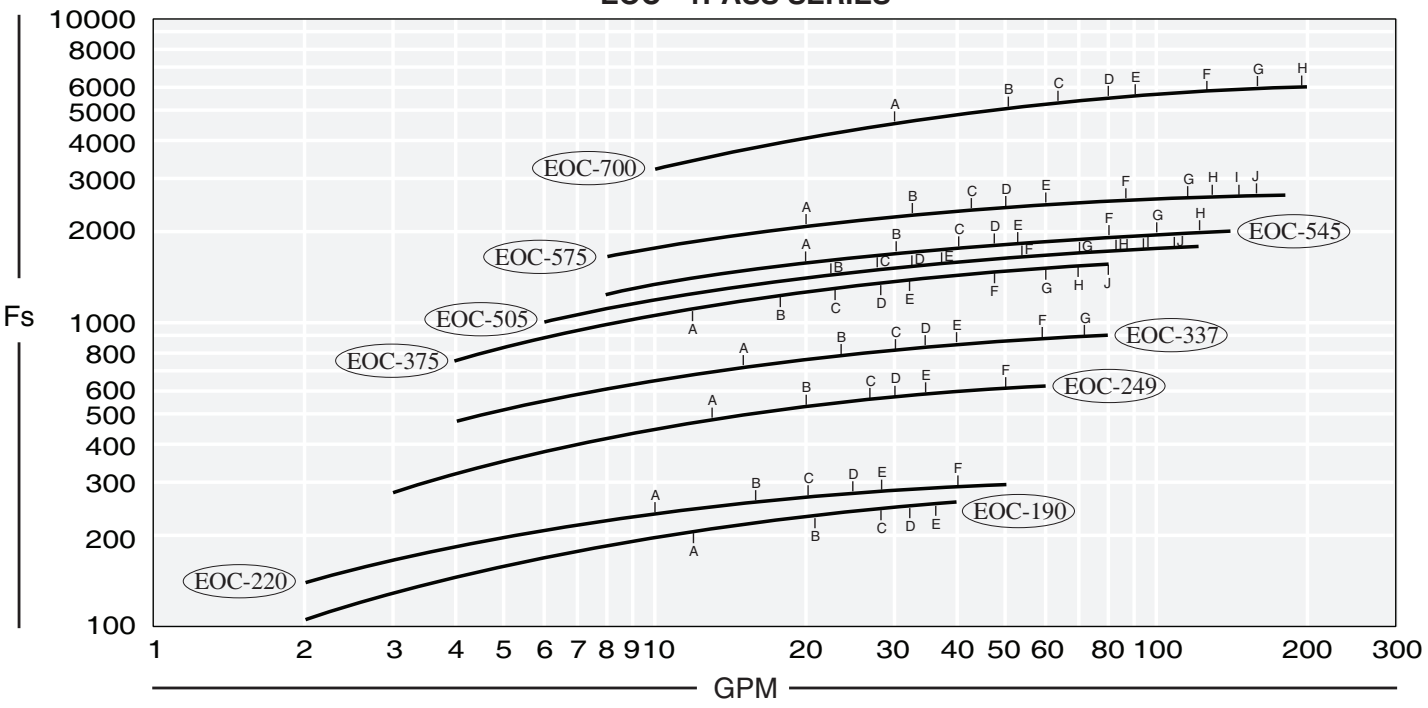
CONSTRUCTION MATERIALS & RATINGS

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

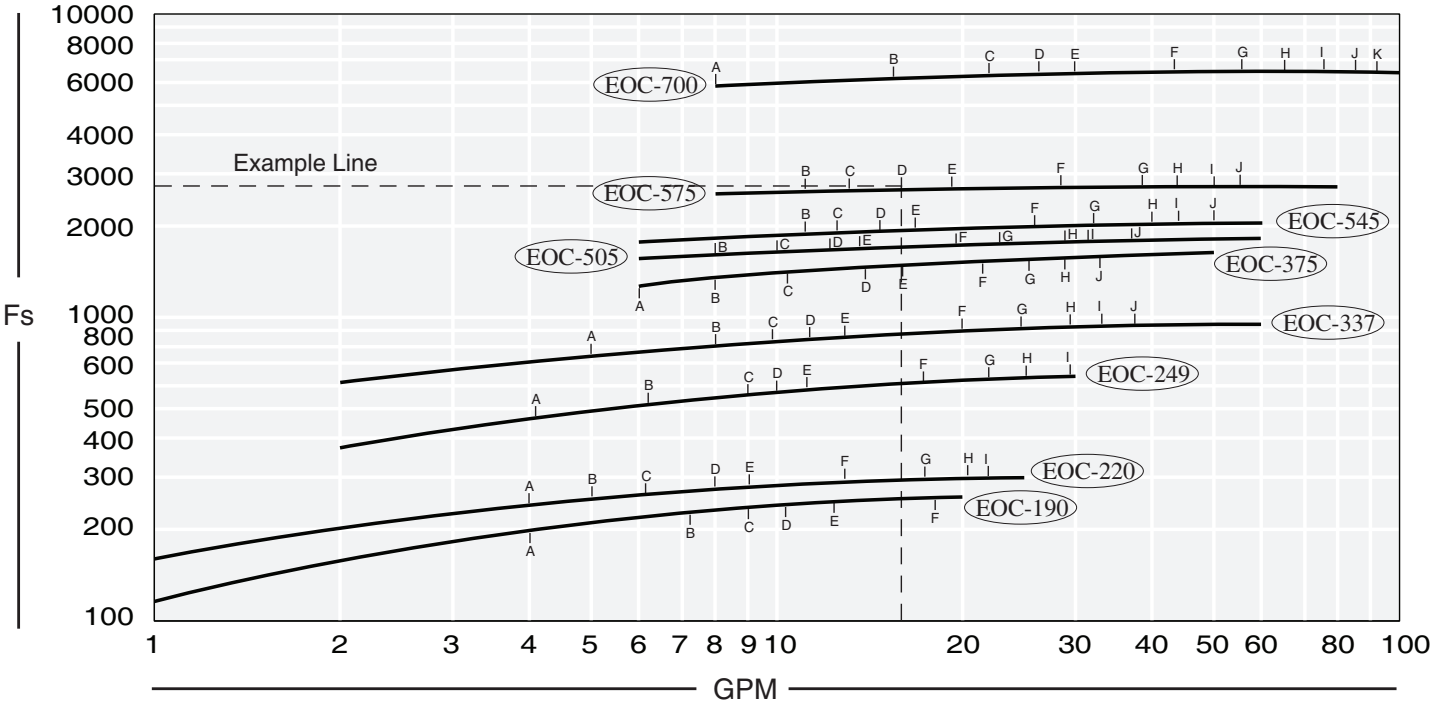
FOR HIGHER PRESSURE AND TEMPERATURE RATING
CONSULT FACTORY

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 D = 4 PSI G = 15 PSI J = 30 PSI B = 2 PSI E = 5 PSI H = 20 PSI K = 35 PSI C = 3 PSI F = 10 PSI I = 25 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.

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

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

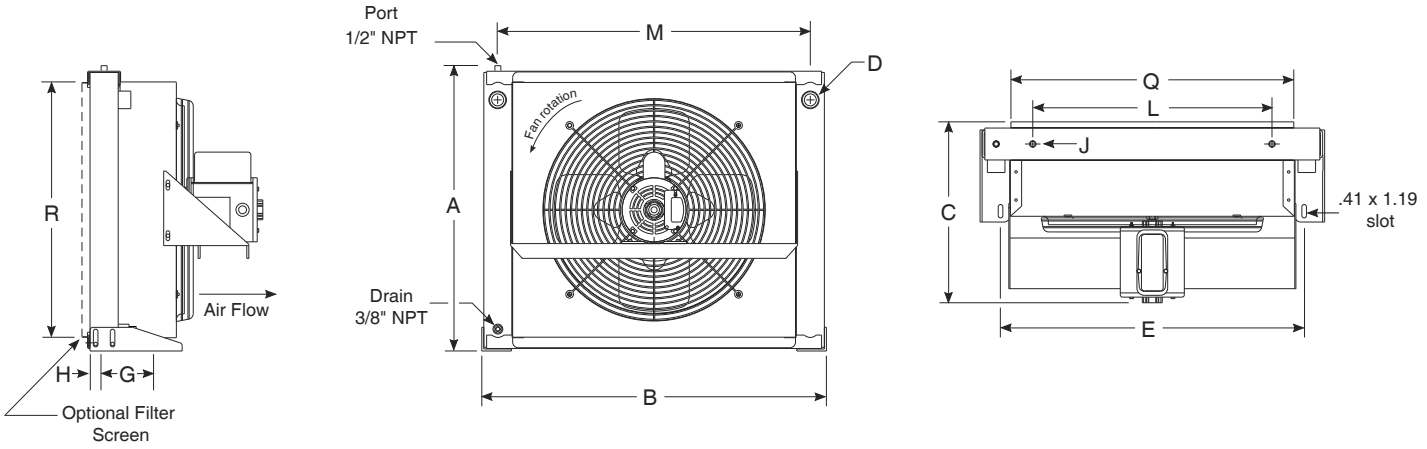
Bypass*
R65 = 65psi
R30 = 30psi

Tubing
blank = Copper
C = Carbon Steel

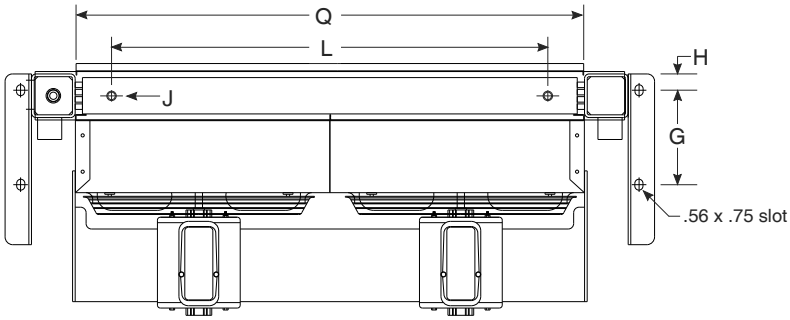
Coating
blank = Enamel (standard)
G = Galvanize (cabinet)
T = Heresite (core)
X = Epoxy (cabinet)
STS = Stainless Steel (cabinet)

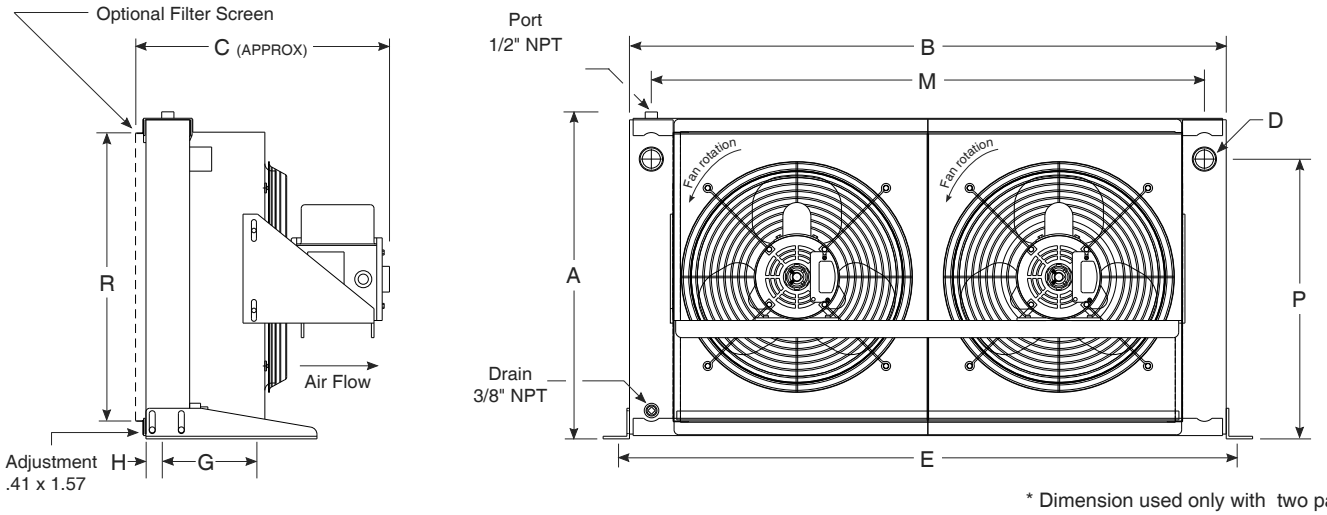
EOC & EOCF Series *dimensions with electric drive Single Pass*

MODEL EOC - 190 through EOC - 337



MODEL EOC - 375
through EOC - 700



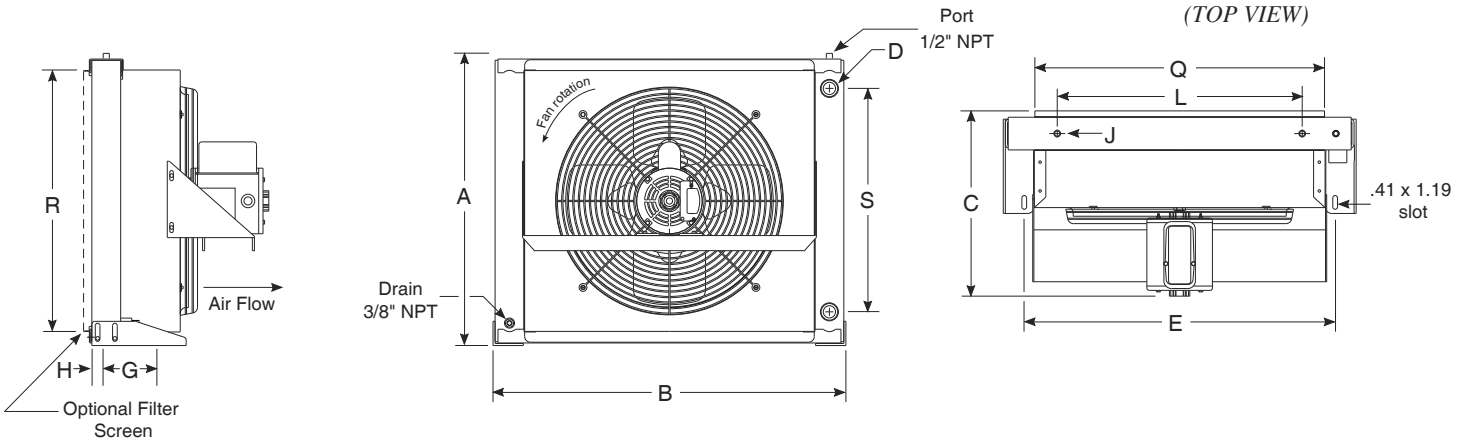


* Dimension used only with two pass units

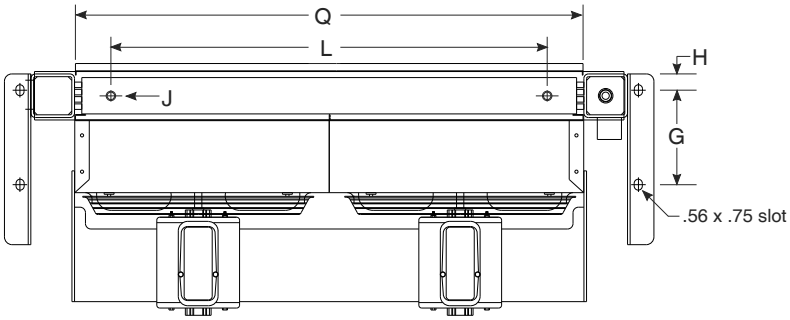
Model	A	B	C	D NPT	D SAE	E	G	H	J 1/2-13 tab	L	M	P	Q	R
EOC - 190 - ✱	13.62	16.50	14.21	.75	#12	14.75	5.00	5.00		8.00	15.00	10.31	11.38	10.38
EOC - 220 - ✱	15.62	22.00	16.32	.75	#12	18.69	5.00	5.00		14.00	20.50	12.31	16.88	12.25
EOC - 249 - ✱	19.62	24.75	16.32	.75	#12	21.44	5.00	5.00		14.00	23.25	16.31	20.00	16.25
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
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
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
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
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
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

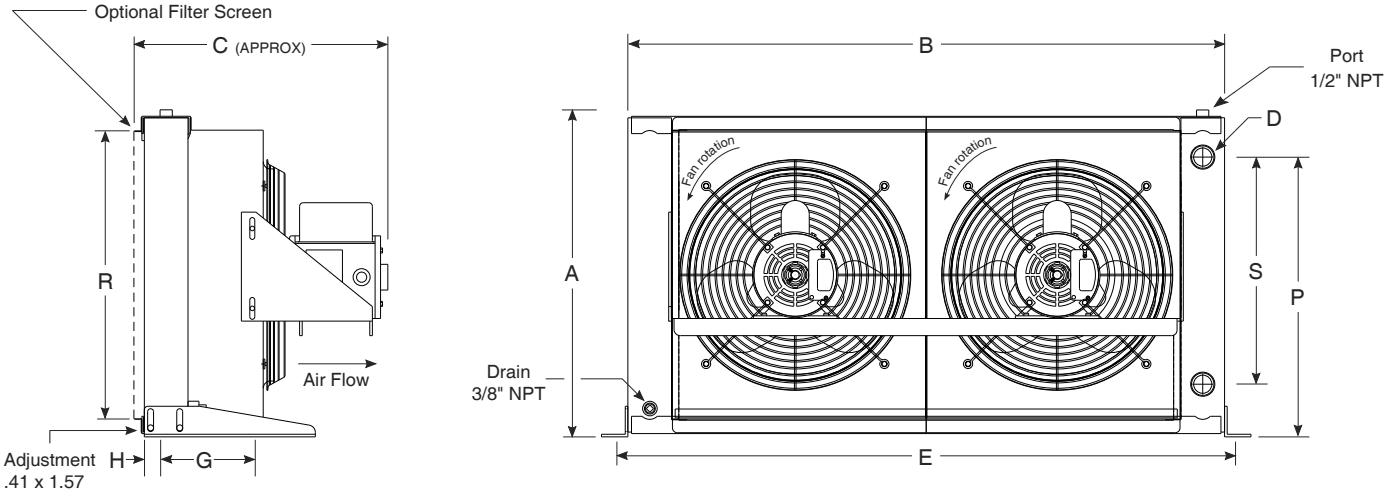
EOC & EOCF Series *dimensions with electric drive - Two Pass*

MODEL EOC - 190 Through EOC - 337



MODEL EOC - 375
Through EOC - 700





Model	A	B	C	D NPT	D SAE	E	G	H	J 1/2-13 tab	L	P	Q	R	S
EOC - 190 - ✱	13.62	16.50	14.21	.75	#12	14.75	5.00	5.00	(4)	8.00	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	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	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	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		30.00	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	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	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	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)	–	34.00	43.50	34.50	32.50

EOC & EOCF ELECTRIC MOTOR @ 60 Hz. DATA

Model	Horse Power	No. of Motors	Phase	Hz	Volts	RPM	NEMA Frame	Type	Full Load Amperes	Service Factor	Thermal Overload
EOC-190 thru EOC-337	1/4	1	1	60	115/230	1800	48	TEFC	1.3	1.15	NO
EOC-190 thru EOC-337	1/4	1	3	60	208-230/460	1800	48	TEFC	0.7	1.0	NO
EOC-190 thru EOC-337	1/3	1	3	60	575	1800	56	TEFC	0.6	1.15	NO
EOC-375 thru EOC-575	1/4	2	1	60	115/230	1800	48	TEFC	1.3	1.15	NO
EOC-375 thru EOC-575	1/4	2	3	60	208-230/460	1800	48	TEFC	0.7	1.0	NO
EOC-375 thru EOC-575	1/3	2	3	60	575	1800	56	TEFC	0.6	1.15	NO
EOC - 700	1.0	2	1	60	115-208/230	1800	56	TEFC	6.4	1.0	NO
EOC - 700	1.0	2	3	60	208-230/460	1800	56	TEFC	1.5	1.15	NO
EOC - 700	1.0	2	3	60	575	1800	56	TEFC	1.45	1.15	NO

EOC & EOCF ELECTRIC MOTOR @ 50 Hz. DATA

Model	Horse Power	Phase	Hz	Volts	RPM	NEMA Frame	Type	Full Load Amperes	Service Factor	Thermal Overload
EOC - 190 thru EOC - 575	Available as a single phase 50hz motor upon request as a special									
EOC - 190 thru EOC - 575	1 / 4	3	50	230/380	1500	48	TEFC	1.7/1.0	1 . 15	NO
EOC - 700	1.0	1	50	110/220	1500	56	TEFC	12.8/6.4	1 . 0	NO
EOC - 700	1.0	3	50	220/380	1500	56	TEFC	3.5/2.0	1 . 15	NO

NOTE: EOC-190 thru EOC-575 quarter horse power single phase / 50 hz available upon request as a special

DC ELECTRIC MOTOR DATA

Model	Horse Power	Current	Volts	RPM	NEMA Frame	Enclosure Type	Full Load Amperes	Service Factor	Thermal Overload
EOC - 190 thru EOC - 575	1 / 4	DC	12	1800	48	TENV	21	1.0	NO
EOC - 190 thru EOC - 575	1 / 4	DC	24	1800	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 EOC - 575	1 / 4	1	60	115-208/230	1800	48	X-PROOF	2.5	1 . 0	YES
EOC - 190 thru EOC - 575	1 / 4	3	60	208-230/460	1800	48	X-PROOF	0.7	1 . 0	YES
EOC - 700	1	1	60	115/230	1800	56	X-PROOF	6.5	1 . 0	YES
EOC - 700	1	3	60	208-230/460	1800	56	X-PROOF	1.8	1 . 0	YES

NOTE: All of the EOC & EOCF Series explosion proof motors are available in 50hz upon request as a special

ELECTRIC MOTOR NOTES:

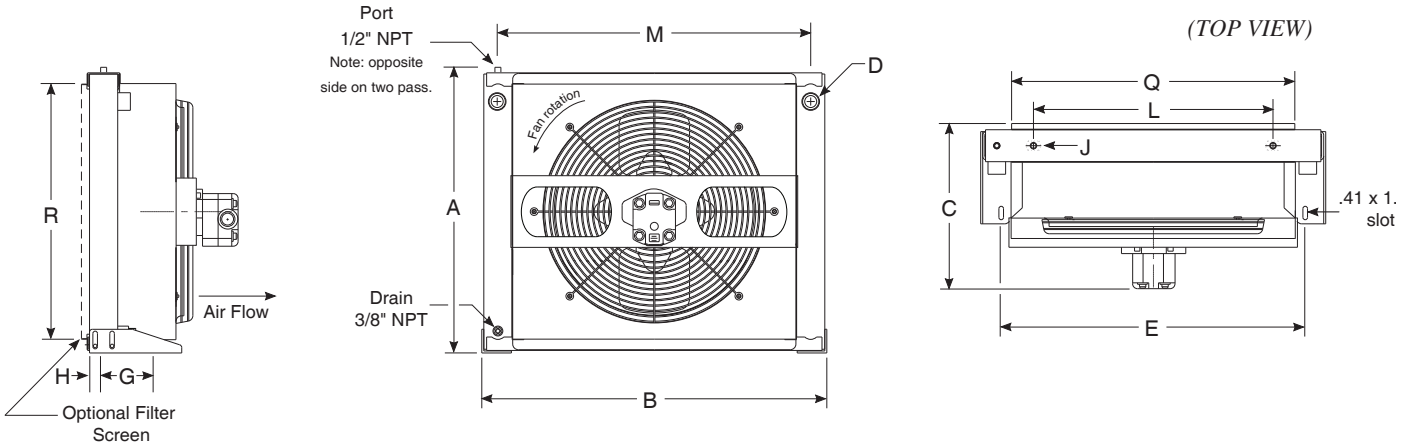
1) All motors are NEMA, high efficiency
2) TEFC motors are available for all models.
3) Motor electrical ratings are an approximate guide and may vary between motor manufacturers. Consult ratings on motor data plate prior to installation and operation.
4) Explosion proof, high temperature, severe duty, chemical, IEC, Canadian Standards Association, and Underwriters Laboratory recognized motors are available upon request.
5) 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.
6) Fan rotation is clockwise when facing the motor shaft.
7) The above motors contain factory lubricated shielded ball bearings.
8) **Abbreviation Index**

TEFC ..... Totally Enclosed, Fan Cooled

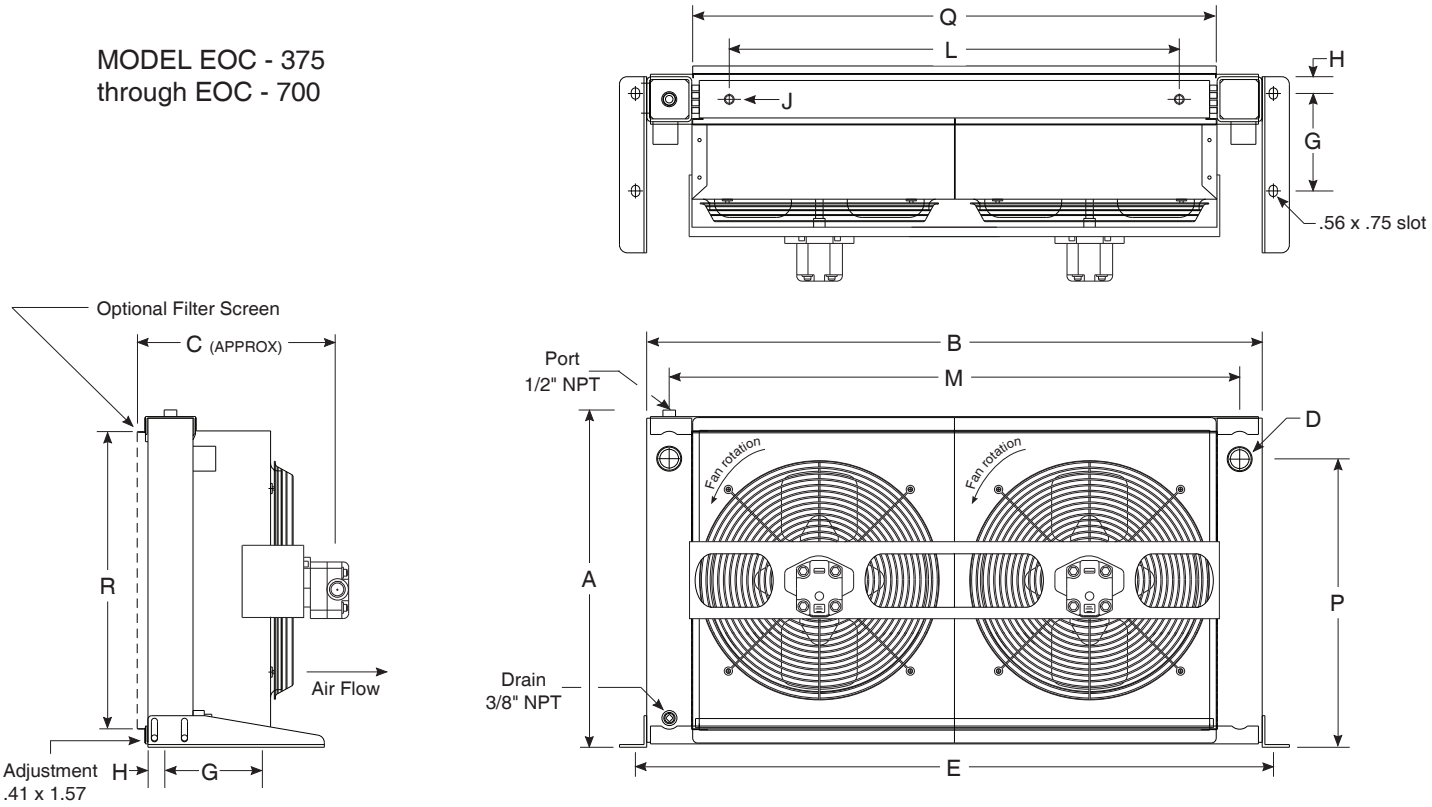
X-PROOF ..... Explosion Proof

EOC & EOCF Series *dimensions with hydraulic drive - Single Pass*

MODEL EOC - 190 Through EOC - 337



MODEL EOC - 375
through EOC - 700

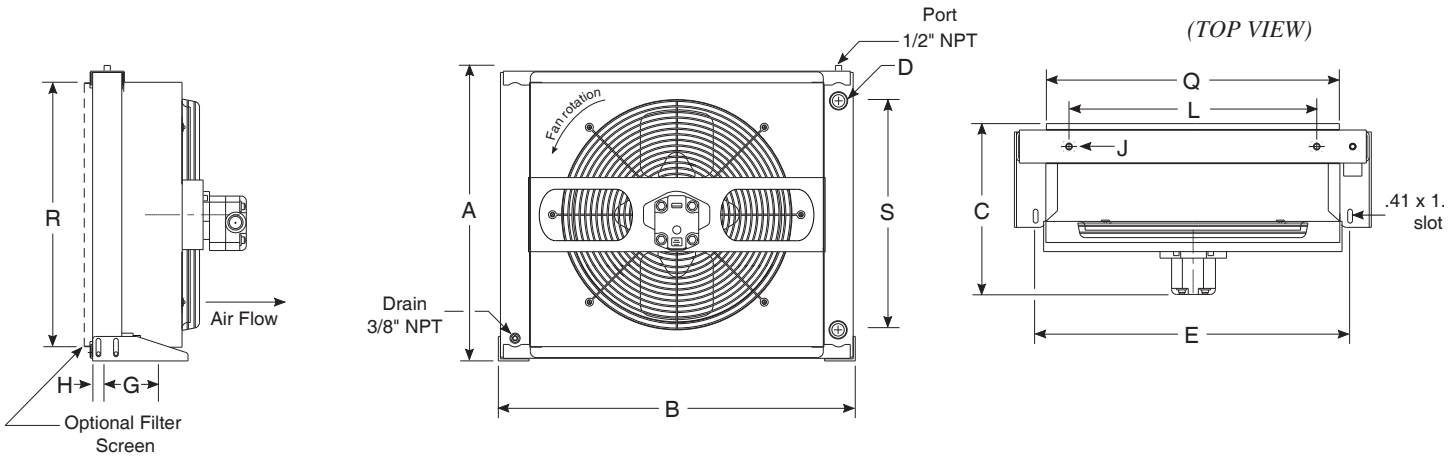


COMMON DIMENSIONS

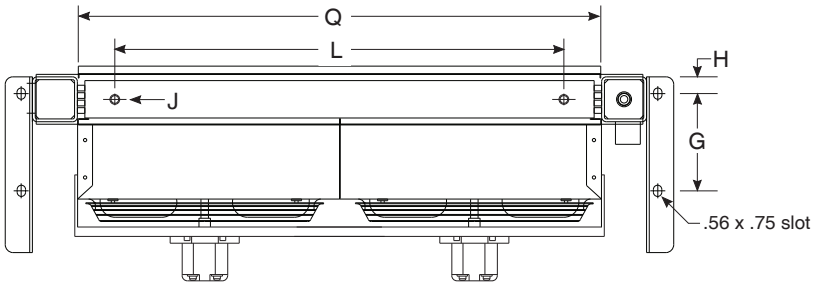
Model	A	B	C	D NPT	D SAE	E	G	H	J 1/2-13 tab	L	M	P	Q	R
EOC - 190 - ✱	13.62	16.50	12.20	.75	#12	14.75	5.00	5.00		8.00	15.00	10.31	11.38	10.38
EOC - 220 - ✱	15.62	22.00	14.64	.75	#12	18.69	5.00	5.00		14.00	20.50	12.31	16.88	12.25
EOC - 249 - ✱	19.62	24.75	14.19	.75	#12	21.44	5.00	5.00		14.00	23.25	16.31	20.00	16.25
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
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
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
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
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
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

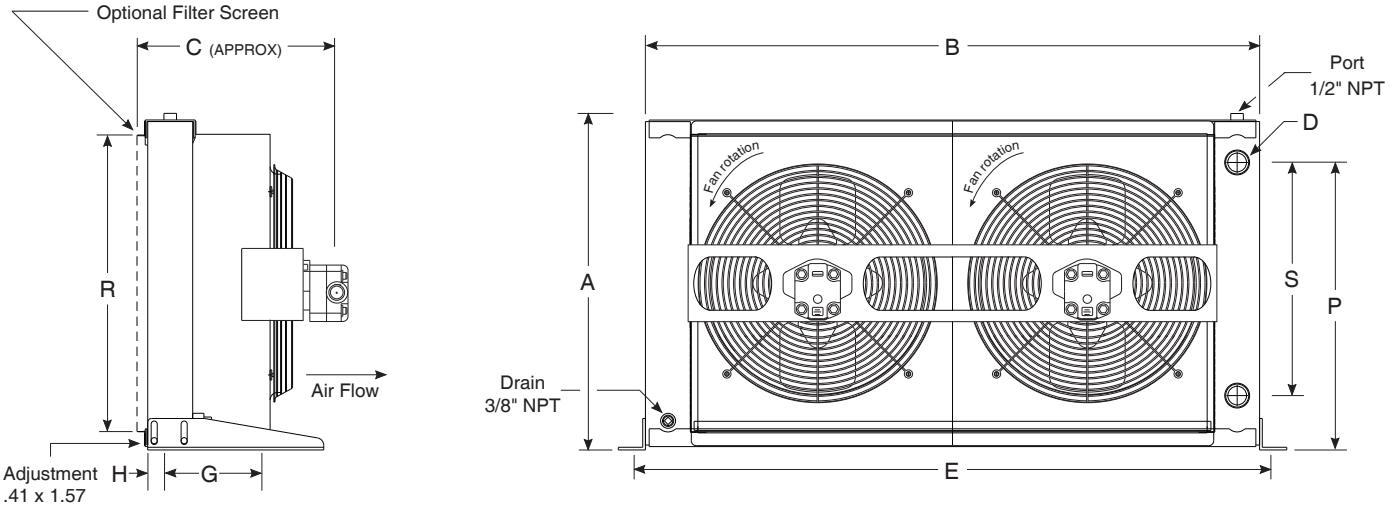
EOC & EOCF Series *dimensions with hydraulic drive - Two Pass*

MODEL EOC - 190 Through EOC - 337



MODEL EOC - 375
through EOC - 700





COMMON DIMENSIONS

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EOC - 190 - ✱	13.62	16.50	12.20	.75	#12	14.75	5.00	5.00		8.00	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	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	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	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	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	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	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	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)	–	34.00	43.50	34.50	32.50

EOC & EOCF Series *motor data*

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	Liquid Volume		Weight Electric		Weight Hydraulic		Bypass Valve Adder (lbs)	Serviceable Core
	CFM	m^3/s	dB(A) @ 7ft	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.

Electrical Temperature controller with Bulb Well Assembly (for Air / Liquid Coolers)

Part Number	Description
310-4011	TC-511 with 6-Foot Capallary Tube & Bulb Well
310-4002	TC-511 with 20-Foot Capallary Tube & Bulb Well
310-2025	Replacement Bulb Well TC-511