

# **American Industrial Heat Transfer Inc.**

**Manufacturer of Quality Heat Exchangers**



## **AOCH - AOCHM SERIES**



**AOCHM SERIES**  
*with hydraulic motor*

**AOCH SERIES**  
*with electric motor*

**MADE IN USA**

### **AIR COOLED**

# **OIL COOLERS**

- Thermal capacity to 210hp (157Kw).
- Severe duty construction with OSHA guard.
- Serviceable Core™.
- Operating temperature of 300 °F at 300 PSI.
- Electric or hydraulic drive.
- Optional: internal built-in bypass relief valve.
- Can be customized to fit your needs.

Visit our Web Site at [www.aihti.com](http://www.aihti.com)

- Cools: Fluid power systems, rock crushers, presses, shears, lubrication equipment for paper machinery, gear drives, marine transmissions, etc.
- This brochure contains important user information such as: installation, serviceability, and warranty information.

# INTRODUCTION



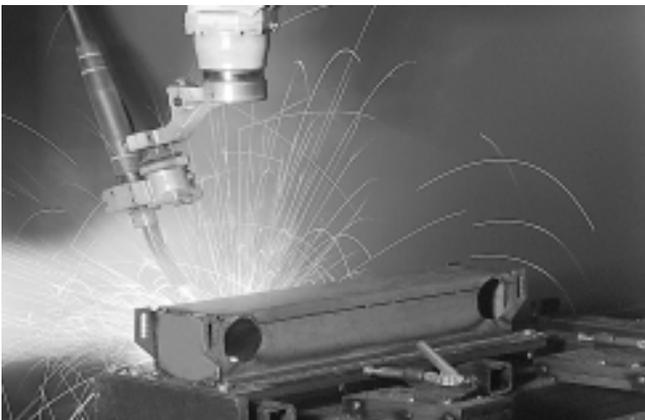
*American Industrial's state-of-the-art manufacturing facility.*



*CNC high accuracy mills and lathes produce precision parts.*



*Full line of engineering services.*



*CNC Automated robotic welding process delivers high quality leakproof welds.*



*One of three CNC sheet metal fabrication cells for standard and custom products.*



*High production capacity for quick delivery.*

## HIGH PERFORMANCE TURBULATOR



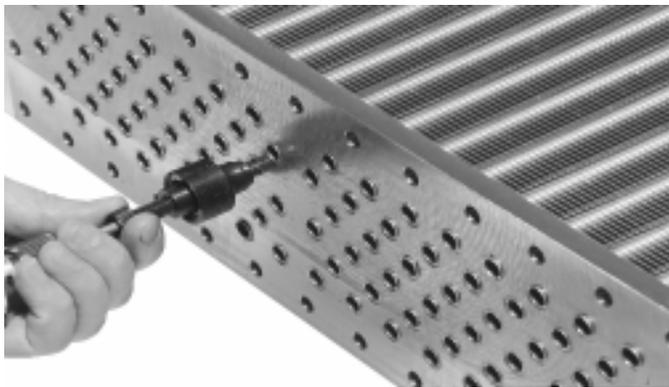
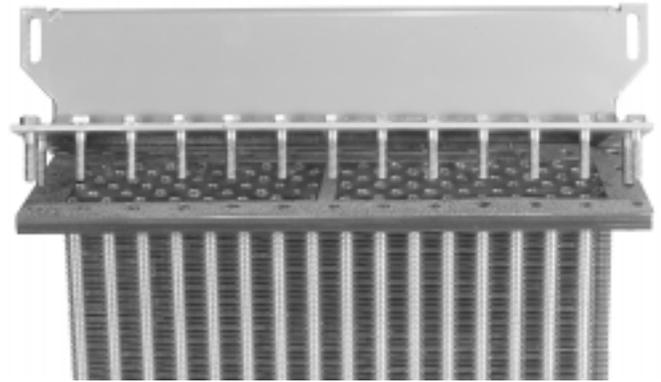
*Exclusive American Industrial Turbulators (installed in every flow tube) increase heat transfer by more than 100%.*

*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. No braze or solder joint to fatigue fail, corrode, crack, etc.. No rubber grommets to replace. Positive gasket seal is field replaceable for field maintenance or repair.*



## SUPERIOR COOLING FINNS

*Copper tubes are mechanically bonded to highly efficient aluminum cooling fins. Die-formed fin collars provide a durable precision fit for maximum heat transfer.*

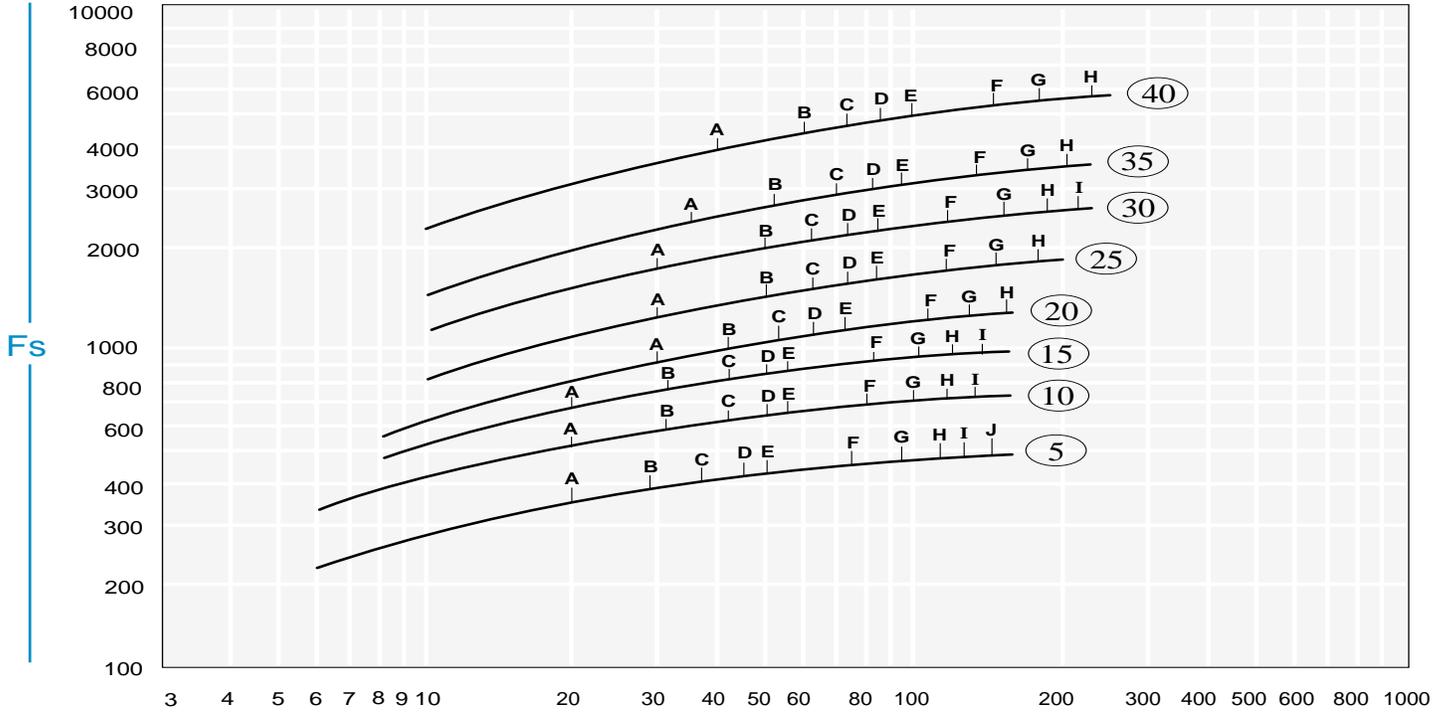
*Custom fin design forces air to become turbulent and carry heat away more efficiently than old flat fin designs.*

## CONSTRUCTION MATERIALS & RATINGS

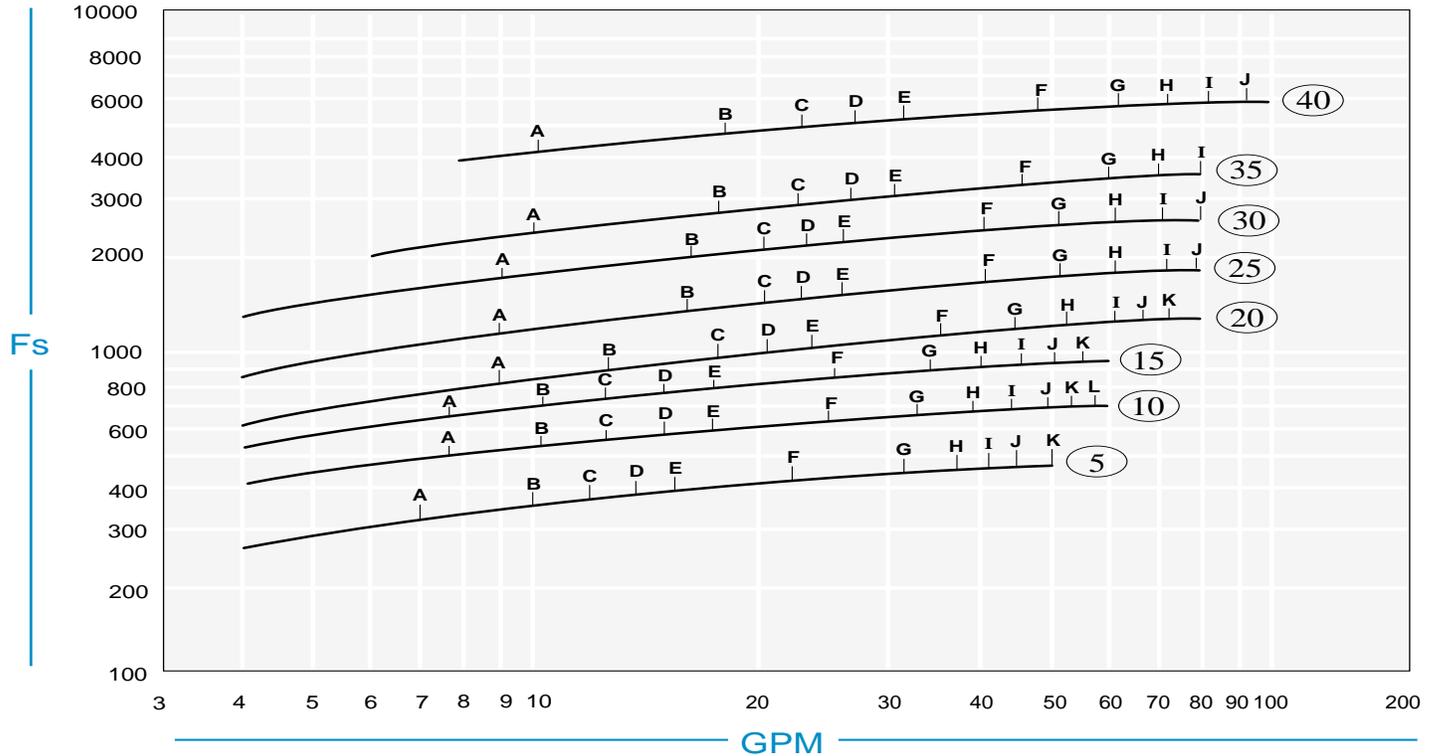
Standard Construction Materials		Optional Construction Materials	Standard Unit Ratings	
Tubes	Copper	Carbon Steel, 90/10 Cu.Ni, 316L Stainless Steel	Operating Pressure	300 psig
Fins	Aluminum	Copper		
Turbulators	Steel	Brass	Operating Temperature	300 °F
Tube sheet	Steel	Brass, 316L Stainless Steel	Max. Flow Internal Relief	50 gpm
Manifold cover	Steel	Brass, 316L Stainless Steel	Max. Fan Over-speed	10 %
Connection pipes	Steel	Brass, 316L Stainless Steel		
Cabinet & frame	Steel	316L Stainless Steel, Galvanized Steel	Max. Ambient Conditions	104 °F
Fan Blade	Aluminum	Plastic, Non-sparking, Steel		
Fan Guard	Zinc Plated		Altitude	0-3300 ft.
Gasket	Hypalon Composite	Viton, Nitrile, Composites		

# PERFORMANCE

## ONE PASS



## TWO PASS



PERFORMANCE CALCULATION		OIL PRESSURE DROP (PSI) CODE			
$F_s =$	$\frac{\text{Horsepower to be removed (HP)} \times 2545 \times C_v}{\text{°F (Oil Leaving* - Ambient Air Entering)}} = \frac{\text{BTU}}{\text{hr °F}}$	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	L = 40 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.

## Sizing

The performance curves provided are for petroleum oil at 50 ssu viscosity. However, fluids with characteristics other than the above mentioned may be used by applying a correction factor.

## Heat Load

If the heat load is unknown, a horsepower value can be calculated by first determining the systems total potential. For a basic hydraulic system, it is helpful to know whether the system is open loop (with a large reservoir) or closed loop (normally on mobile equipment, with a very small reservoir). System potentials may be calculated quickly by using one of the two methods below.

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 parameters 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) & operating 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).

## Method 1

Normally used for open loop circuits. Multiply the main hydraulic systems Electric Motor Name plate Horsepower by a heat removal factor (normally 30-50%).

Example: 50 HP motor x 0.3 = 15 HP heat load

## Method 2

Normally used when the HP input potential is unknown or for mobile applications where diesel engines operate the entire system.

Multiply system pressure by the flow rate of the main system divided by 1714 equals system potential (HP). Multiply the system HP by a heat removal factor (Normally 25-35%). Note: In some closed loop systems only a portion of the total system flow is directed through the heat exchanger. This may affect the cooler selection process substantially. You may contact our factory for additional technical assistance.

Example:  $\frac{(2000 \text{ psi} \times 60 \text{ gpm})}{1714} = [70 \text{ HP} \times .25] = 17.5 \text{ HP heat load}$

## Determining Fs value

To determine the proper size heat exchanger for your application, use the following equation to first determine the (Fs) factor:

$$F_s = \frac{\{\text{heat load (HP)} \times 2545 \times C_v\}}{\{\text{°F (oil leaving - air entering)}\}}$$

Example:

Heat load = 17.5 HP

Cv = 1.14 (SAE 20) determined from chart. [Located on page 5.]

Desired operating temperature = 120 °F

Ambient air temp. = 100 °F

$$F_s = \frac{\{17.5 \times 2545 \times 1.14\}}{\{120 \text{ °F} - 100 \text{ °F}\}} = 2539$$

## Selection

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

Example:  $F_s = 2539 = \text{Model} = \text{AOCH,AOCHM} - \text{35}$   
**GPM = 60**  
**PASSES = 1**

## Pressure differentials

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

Example: Model 35 @ 60 gpm & 50 ssu -1 pass curve-

Indicated pressure drop 2.4 psi (Approx)

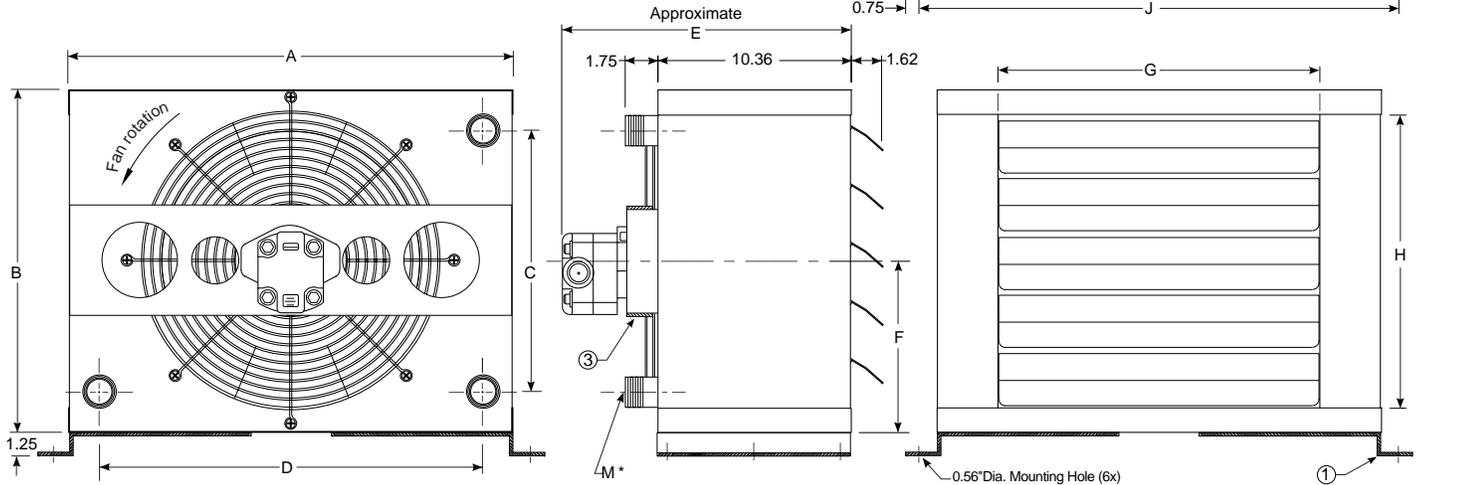
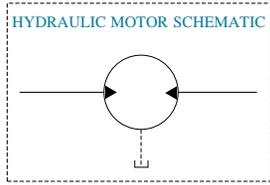
{ 2.4 psi x 2.8Cp (for SAE-20 oil) } = 6.72 corrected psi

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

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



## AOCHM Series



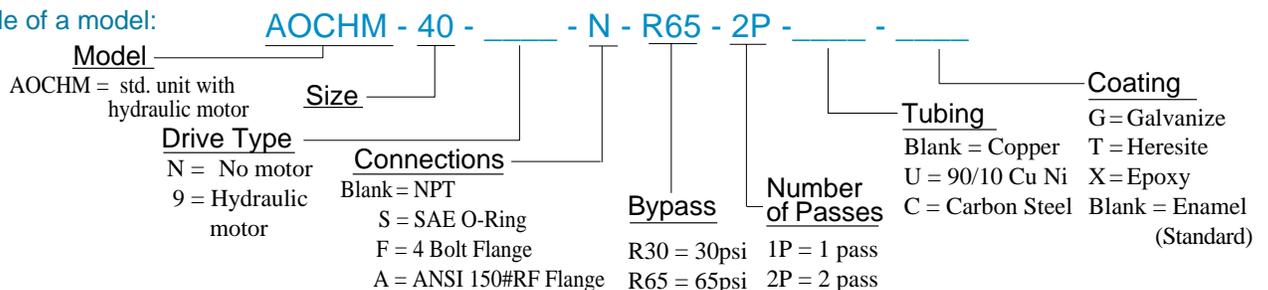
DIMENSIONS (inches)													
Model	A	B	C	D	E	F	G	H	J	K	L	M NPT	M SAE
AOCHM - 5 - *	14.81	11.81	7.69	11.69	15.21	5.90	8.31	9.19	16.81	12.94	—	1.50	24 SAE
AOCHM - 10 - *	19.00	13.13	8.88	15.88	15.21	6.56	12.50	10.50	21.00	17.13	—	1.50	1 7/8 -
AOCHM - 15 - *	20.38	15.75	11.50	17.25	15.21	7.88	13.88	13.12	22.38	18.50	—	1.50	12UN-2B
AOCHM - 20 - *	23.81	18.38	14.00	20.56	15.21	9.19	17.19	15.75	25.81	21.81	—	2.00	Thread
AOCHM - 25 - *	26.68	23.63	19.25	23.56	15.21	11.81	20.19	21.00	28.68	24.81	—	2.00	32 SAE
AOCHM - 30 - *	31.63	27.56	23.19	28.50	15.21	13.78	25.13	24.94	33.63	29.75	11.00	2.00	2 1/2 -
AOCHM - 35 - *	33.81	30.19	25.81	30.69	15.21	15.09	27.31	27.56	35.81	31.94	11.00	2.00	12UN-2B
AOCHM - 40 - *	41.63	36.75	32.38	38.50	15.21	18.38	35.13	34.12	43.63	39.75	13.25	2.00	Thread

\* Represents options.

### NOTES:

- 1) Removable base mounting brackets are supplied with unit at no additional charge.
- 2) 1/2-12 UNC-2B Tabs, 4 points, 8 points on models AOCHM - 30,35 & 40 (top & bottom) for optional mounting purposes.
- 3) Motor mounting bracket is rotated 90 degrees on AOCHM - 5 & 10 units.
- 4) Louvers are manually adjustable. However, all units are available with a screen front as an option (specify when ordering).
- 5) All units are available with an optional preset 30 or 65-psi pressure bypass valve.
- 6) All units can be connected in one or two pass configuration. Refer to piping instructions for detailed operating and maintenance information (page 10 and 11).

Example of a model:



# STANDARD FEATURES

## AOCH ELECTRIC MOTOR DATA

Model	Horse Power	Phase	Hz	Volts	RPM	NEMA Frame	Enclosure Type	Full Load Amperes	Service Factor	Thermal Overload	
AOCH - 5 - 1	1 / 2	1	60	115 / 208-230	3450	56	TEFC	8.4 / 4-4.2	1.15	NO	
AOCH - 5 - 3	1 / 2	3	60 / 50	208-230 / 460-190 / 380	3450	56	TEFC	2.1-2.2 / 1.1-2.0 / 1.0	1.15	NO	
AOCH - 10 - 1	1 / 2	1	60	115 / 208-230	3450	56	TEFC	8.4 / 4-4.2	1.15	NO	
AOCH - 10 - 3	1 / 2	3	60 / 50	208-230 / 460-190 / 380	3450	56	TEFC	2.1-2.2 / 1.1-2.0 / 1.0	1.15	NO	
AOCH - 15 - 1	1 / 2	1	60	115 / 208 / 230	1725	56	TEFC	8.8 / 4.2-4.4	1.15	NO	
AOCH - 15 - 3	1 / 2	3	60 / 50	230 / 460-190 / 380	1725	56	TEFC	2.4 / 1.2	1.15	NO	
AOCH - 20 - 1	1 / 2	1	60	115 / 208 / 230	1725	56	TEFC	8.8 / 4.2-4.4	1.15	NO	
AOCH - 20 - 3	1 / 2	3	60 / 50	230 / 460-190 / 380	1725	56	TEFC	2.4 / 1.2	1.15	NO	
AOCH - 25 - 1	1	1	60	115 / 208-230	1725	56	TEFC	13.4 / 6.8-6.7	1.15	NO	
AOCH - 25 - 3	1	3	60 / 50	208-230 / 460-190 / 380	1725	56	TEFC	3.5-3.6 / 1.8-3.4 / 1.7	1.15	NO	
AOCH - 30 - 1	1	1	60	115 / 208-230	1725	56	TEFC	13.4 / 6.8-6.7	1.15	NO	
AOCH - 30 - 3	1	3	60 / 50	208-230 / 460-190 / 380	1725	56	TEFC	3.5-3.6 / 1.8-3.4		NO	
AOCH - 35 - 1	CONSULT FACTORY										
AOCH - 35 - 3	3	3	60 / 50	208-230 / 460-190 / 380	1725	182T	TEFC	8 / 4-6.8 / 3.4	1.15	NO	
AOCH - 40 - 1	CONSULT FACTORY				N / A						
AOCH - 40 - 3	3	3	60 / 50	208-230 / 460-190 / 380	1725	182T	TEFC	8 / 4-6.8 / 3.4	1.15	NO	

NOTE: Basic electric drive units are supplied with one of the corresponding above listed motors.

### 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; no additional lubrication is required.

#### 7) Abbreviation Index

TEFC ..... Totally Enclosed, Fan Cooled

TEAO ..... Totally Enclosed, Air Over

X-PROOF ..... Explosion Proof

## 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
AOCH - 5 - 1	1 / 2	1	60	115 / 230	3450	56	X-PROOF	6.8 / 3.4	1.0	YES
AOCH - 5 - 3	1 / 2	3	60	230 / 460	3450	56	X-PROOF	1.6 / .8	1.0	YES
AOCH - 10 - 1	1 / 2	1	60	115 / 230	3450	56	X-PROOF	6.8 / 3.4	1.0	YES
AOCH - 10 - 3	1 / 2	3	60	230 / 460	3450	56	X-PROOF	1.6 / .8	1.0	YES
AOCH - 15 - 1	1 / 2	1	60	115 / 230	1725	56	X-PROOF	8.8 / 4.4	1.0	YES
AOCH - 15 - 3	1 / 2	3	60	230 / 460	1725	56	X-PROOF	2.4 / 1.2	1.0	YES
AOCH - 20 - 1	1 / 2	1	60	115 / 230	1725	56	X-PROOF	8.8 / 4.4	1.0	YES
AOCH - 20 - 3	1 / 2	3	60	230 / 460	1725	56	X-PROOF	2.4 / 1.2	1.0	YES
AOCH - 25 - 1	1	1	60	115 / 230	1725	56	X-PROOF	13.4 / 6.7	1.0	YES
AOCH - 25 - 3	1	3	60	230 / 460	1725	56	X-PROOF	3.6 / 1.8	1.0	YES
AOCH - 30 - 1	1	1	60	115 / 230	1725	56	X-PROOF	13.4 / 6.7	1.0	YES
AOCH - 30 - 3	1	3	60	230 / 460	1725	56	X-PROOF	3.6 / 1.8	1.0	YES
AOCH - 35 - 3	3	3	60	230 / 460	1725	182	X-PROOF	8.8 / 4.4	1.0	YES
AOCH - 40 - 3	3	3	60	230 / 460	1725	182	X-PROOF	8.8 / 4.4	1.0	YES

NOTE: Basic electric drive units are supplied with one of the corresponding above listed motors.

## COMMON DATA

Model	Air Flow		Sound Level dB(A) @ 7ft	Liquid Volume		Weight Electric		Weight Hydraulic		Serviceable Core
	CFM	m <sup>3</sup> /s		gal.	cm <sup>3</sup>	lb	kg	lb	kg	
Model - 5 - *	780	.368	85	.88	3331	82	37	64	29	NO
Model - 10 - *	1110	.523	85	1.09	4126	91	41	73	34	NO
Model - 15 - *	1590	.750	80	1.29	4883	103	47	85	39	NO
Model - 20 - *	2168	1.023	80	1.70	6735	152	69	134	61	Yes
Model - 25 - *	3000	1.42	81	2.27	8592	175	79	157	71	Yes
Model - 30 - *	4095	1.93	84	2.86	10826	218	99	200	91	Yes
Model - 35 - *	5921	2.79	89	3.46	13097	351	159	233	106	Yes
Model - 40 - *	9609	4.54	91	4.72	17865	432	196	314	142	Yes

NOTES: a) \* Represents the options for motor drive.

b) To estimate the sound level at distances other than 13 feet (4 meters) from the cooler, add 6 db for each halving of distance, or subtract 6 db for each doubling of the distance.

## HYDRAULIC MOTOR DATA

Model	Motor RPM	Displacement in <sup>3</sup> /Rev	Required Flow		Min. pressure start / run PSIG	Case Drain	SAE Size	Side Port SAE O-Ring	Max. Continuous Pressure PSIG
			GPM	LPM					
AOCHM - 5 - *	3000	0.43	6.5	24.6	300	INT	A	#12; 11/16-12	3000
AOCHM - 10 - *	3000	0.43	6.5	24.6	300	INT	A	#12; 11/16-12	3000
AOCHM - 15 - *	1725	0.68	6.0	22.7	400	INT	A	#12; 11/16-12	3000
AOCHM - 20 - *	1725	0.68	6.0	22.7	400	INT	A	#12; 11/16-12	3000
AOCHM - 25 - *	1725	0.68	6.0	22.7	400	INT	A	#12; 11/16-12	3000
AOCHM - 30 - *	1725	0.68	6.0	22.7	400	INT	A	#12; 11/16-12	3000
AOCHM - 35 - *	1725	0.68	6.0	22.7	1000	INT	A	#12; 11/16-12	3000
AOCHM - 40 - *	1725	0.68	6.0	22.7	1000	INT	A	#12; 11/16-12	3000

NOTES: \* Represents options.

## HYDRAULIC MOTOR NOTES:

- 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.)*
- Hydraulic motor flow requirements are provided with an efficiency rating of approximately 85%. Pressure requirements are calculated theoretical minimum operating requirements.
- Shaft adapters are used to bridge the differences in length between the fan and hydraulic motor.
- Maximum degree of fluid contamination, class 18/15 according to ISO 4406. Therefore, we recommend a filter with retention rating of B20>. For longer life, we recommend class 17/14 achievable with filter B10>-100.
- A motor/fan shaft adapter is used to connect the hydraulic motor to the fan.
- Fan rotation is clockwise when facing the motor shaft.
- Optional displacement motors available upon request.
- 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.

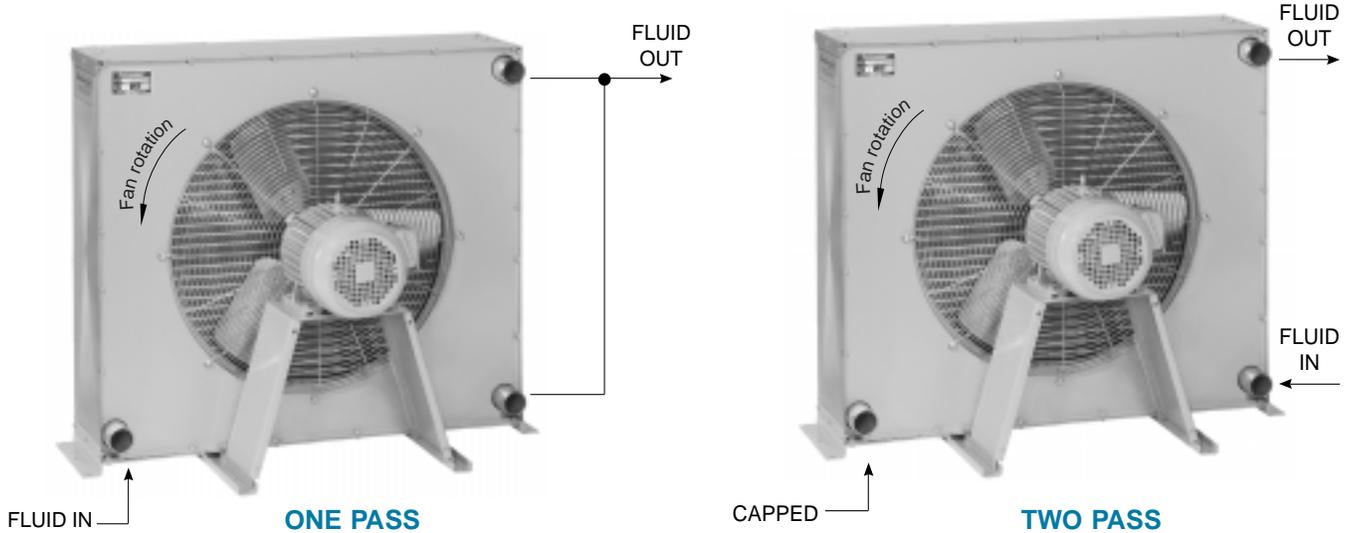
## 575V MOTOR DATA

Model	Horse Power	Phase	Hz	Volts	RPM	NEMA Frame	Enclosure Type	Full Load Amperes	Service Factor	Thermal Overload
AOCH - 5 - 5	1 / 2	3	60	575	3450	56	TEFC	.9	1.15	NO
AOCH - 10 - 5	1 / 2	3	60	575	3450	56	TEFC	.9	1.15	NO
AOCH - 15 - 5	1 / 2	3	60	575	1725	56	TEFC	.9	1.15	NO
AOCH - 20 - 5	1 / 2	3	60	575	1725	56	TEFC	.9	1.15	NO
AOCH - 25 - 5	1	3	60	575	1725	56	TEFC	1.45	1.15	NO
AOCH - 30 - 5	1	3	60	575	1725	56	TEFC	1.45	1.15	NO
AOCH - 35 - 5	3	3	60	575	1725	182T	TEFC	3.2	1.15	NO
AOCH - 40 - 5	3	3	60	575	1725	182T	TEFC	3.2	1.15	NO

NOTE: Basic electric drive units are supplied with one of the corresponding above listed motors.

# INSTALLATION & MAINTENANCE

## PIPING HOOK UP



### 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. *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 manufacturer's 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 sup-

plied 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 by removing the foot brackets and using the (4 or 8) 1/2"-13 screw hard points located on the top and bottom panel for fastening. Heat exchanger unit must be set into a fabricated channel type frame with provision for additional motor support for heavy motors in conjunction with 1/2" frame fastening bolt points. 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 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 pub-

lished 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. Fan blades should be rechecked for tightness after the first 100 hours of operation.

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 10)

## 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, load adapters, 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. However, larger motors must be lubricated with good quality grease as specified by the manufacture at least once every 6-9 months or as directed by the manufacture. 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 warrant 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. Most AOCB or AOCB cores manufactured after January 1, 1998 are Serviceable Cores®.

## Servicing Sequence

American Industrial has gone to great lengths to provide components that are repairable. If the heat exchanger core requires

# INSTALLATION & MAINTENANCE

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 (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 ≈, physically remove the cover assemblies ① from both sides.

f) The tubes √ and turbulators ⑤ are now accessible for cleaning. Note: turbulators are installed on 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.*

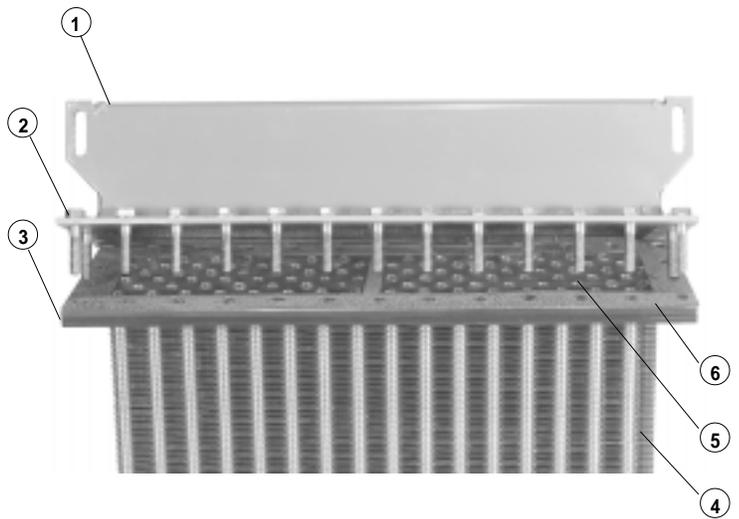
We suggest a mild water-soluble degreaser be used with a brush. Tubing I.D. is approximatley .325 a plastic bristle brush

on a rod will work best for cleaning the tubes √. Steel brushes should be avoided since the steel is harder than the copper tubing and may heavily score the tubes √ if used.

g) If there are any leaking tubes √ 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 √. 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 ≈, bolts ②, and hardware. We suggest using a torque wrench to final tighten the bolts ②. *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.



## AOCH SERIES SERVICEABLE

## REPLACEMENT PARTS

MODEL	CORE ASSEMBLY		COVER GASKET ( Per kit *)		FAN		FAN GUARD		1 PIPE COVER ASSY.		2 PIPE COVER ASSY.	
	PART NO.	REQ. QTY	PART NO.	REQ. QTY	PART NO.	REQ. QTY	PART NO.	REQ. QTY	PART NO.	REQ. QTY	PART NO.	REQ. QTY
AOCH - 5 - #	101-2001	1	199-0017	2	307-0002	1	308-0001	1	N/A	1	N/A	1
AOCH - 10 - #	102-2001	1	199-0010	2	307-0002	1	308-0001	1	N/A	1	N/A	1
AOCH - 15 - #	103-2001	1	199-0011	2	307-0061	1	308-0002	1	N/A	1	N/A	1
AOCH - 20 - #	104-2013	1	199-0012	2	307-0059	1	308-0003	1	104-1028	1	104-1029	1
AOCH - 25 - #	105-2014	1	199-0013	2	307-0008	1	308-0004	1	105-0046	1	105-0047	1
AOCH - 30 - #	106-2015	1	199-0014	2	307-0010	1	308-0005	1	106-0046	1	106-0047	1
AOCH - 35 - #	107-2014	1	199-0015	2	307-0012	1	308-0006	1	107-0046	1	107-0047	1
AOCH - 40 - #	108-2014	1	199-0016	2	307-0014	1	308-0007	1	108-0069	1	108-0070	1

# Represents motor phase or options added to the unit.

\* Two kits are required to replace both cover gaskets, bolts, washers, and nuts.



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

## MISSION STATEMENT

*To manufacture Heat Transfer products by applying state-of-the-art technologies, with the ability to serve a wide variety of industries through professional distribution affiliations throughout North America and abroad.*

Since 1985, American Industrial Heat Transfer, Inc. is pleased to offer more than thirty fully manufactured product lines to meet the requirements of most heat transfer needs. American Industrial manufactures all of the heat exchangers as advertised, so that your company is never compromised. Modern state-of-the-art CNC manufacturing machinery, top quality raw materials, and professional engineering services are all offered by American Industrial for the convenience of our customers.

Many innovative liquid and air-cooled heat exchanger designs are offered for a wide variety of mobile and industrial applications. The latest technology data processing, manufacturing, and engineering systems are employed throughout our company.

American Industrial is proud to offer one of the strongest authorized distribution networks in the industry with worldwide coverage. Direct access to professional engineering services, no service charge 24 hour expedite delivery, custom modifications, competitive pricing, etc... are just a few benefits of being an American Industrial customer.

We know that our future relies on the future of our customers. For that reason we have invested in high-technology automation and professional personnel to give us the competitive edge far into the future.

If you would like to know more about our products, please contact your local American Industrial distributor or contact our company. You can see us on the web at [www.aihti.com](http://www.aihti.com). We appreciate your business and we hope to share with you in your successes.



*Our courteous and professional staff is available to provide quality customer service assistance.*



*A full line of engineering services are available to assist with technical support, design, Cad drawings, etc...*

# ACCESSORIES

## ELECTRICAL TEMPERATURE CONTROLLER WITH BULB WELL ASSEMBLY (for Air/Oil Coolers)

### SPECIFICATIONS:

A) Material: Copper

B) Power Limits:

- 1) For three phase motor operation, use only with a magnetic starter, 125 VA max. (VA =volts x amps)
- 2) For pilot duty, 125 VA max.
- 3) For direct connection to motor:
 

120v AC/8.0 amps max	230v AC/5.1 amps max
277v AC/4.2 amps max	460v AC/2.0 amps max
- 4) Temperature operating range: 55°F to 175°F.

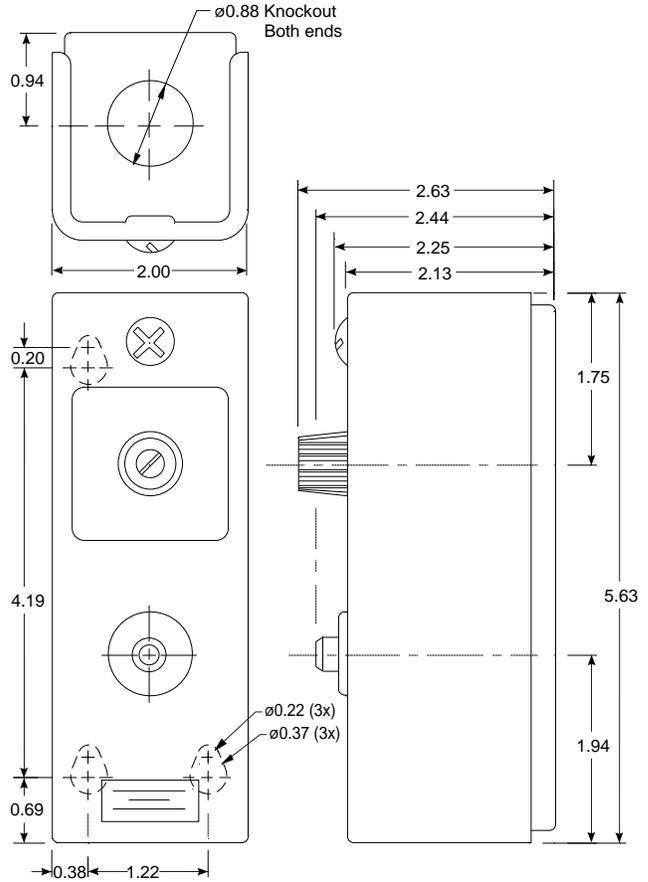
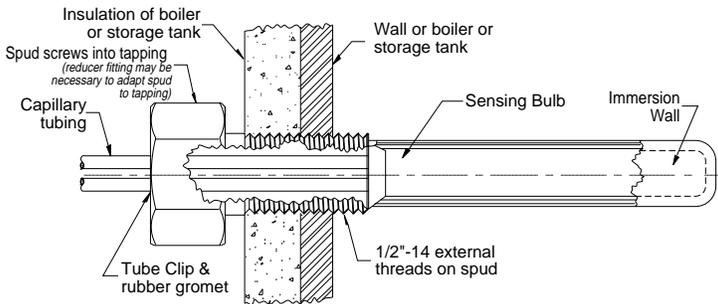
### APPLICATIONS (Temperature Controller)

The TC511 temperature controllers are designed to control the temperature of air or liquids in ducts, pipes, tanks, and boilers. Typical uses include control of dampers and valves in heating, cooling, or heating-cooling systems. The TC511 has 1 spdt switch. It makes or breaks a circuit on a change in temperature at the sensing bulb. Fast response models with adjustable differential are available for duct installation. They respond approximately 4 times faster than standard models.

### INSTALLATION

#### When installing this product:

1. Read instructions carefully. Failure to follow the instructions could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in the instructions.



### ELECTRICAL RATINGS:

TC511 models with adjustable differential:

TC511 models with fixed differential -125 VA at 120/208/240/277 Vac.

MAXIMUM BULB PRESSURE: 50 psi (344.7 kPa) for direct immersions.

### LOCATION AND MOUNTING.

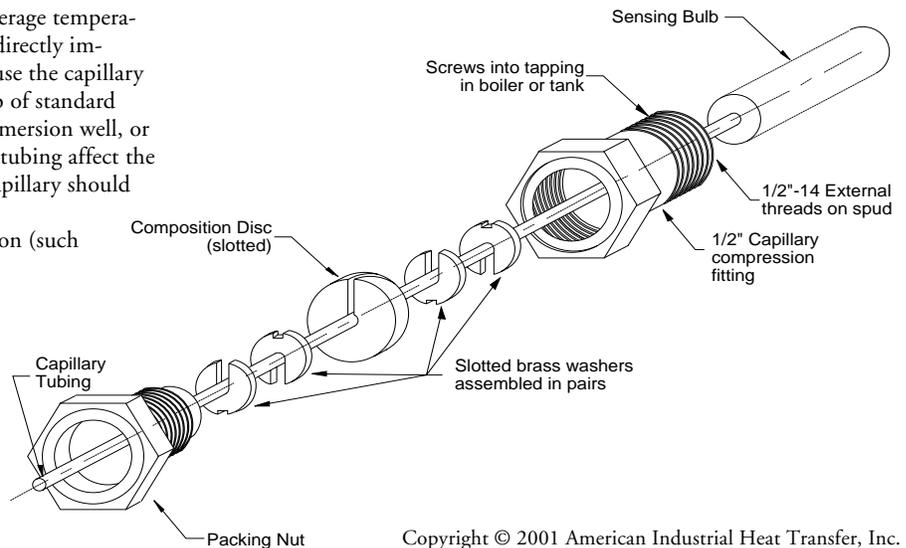
The controller may be installed in any convenient position. Mount it with 3 screws through the slotted holes in the back of the case. Be sure to consider the length of the capillary before mounting the controller.

Install the sensing element where it is exposed to the average temperature of the controlled medium. The sensing bulb may be directly immersed or mounted in a well. Fast response models must use the capillary holder furnished with the device. The remote sensing bulb of standard models should be held in place with a capillary holder, immersion well, or compression fitting. Sharp bends or kinks in the capillary tubing affect the efficiency of the controller and must be avoided. Excess capillary should be carefully coiled and left directly beneath the controller.

NOTE: When pressure fittings are used in areas of vibration (such as pipe lines) the bulb must be adequately supported.

### OPERATION

As the temperature of the controlled medium falls below the set point less differential, the TC511 switch makes terminal R to B and energizes a normally close solenoid valve to provide heat. In cooling applications, the TC511 makes terminal R to W as the temperature rises above the set point, energizing cooling equipment.



## Limited Warranty

Seller makes no warranties expressed or implied, including but not by way of limitation, any implied warranty of merchantability and any implied warranty of fitness for a particular purpose, on any order except that seller warrants title to all goods furnished by seller and except that seller warrants for a period of one year from the date mark located on the seller's identification tag that all goods described on seller's acknowledgment of purchaser's purchase order will be manufactured in accordance with the specifications, if any, set forth in said purchase order and expressly accepted in seller's acknowledgment subject to seller's standard manufacturing variations and practices. In the case of components or accessories furnished by suppliers to seller, purchaser's warranty from seller shall be limited to the warranty of the component or accessory supplier. The foregoing warranties are the sole and exclusive warranties applicable to the goods delivered under this order, and all other warranties, express or implied, including without limitation any warranty of merchantability, are hereby expressly disclaimed and negated. Without limiting the generality of the foregoing, purchaser acknowledges that seller's products are not packaged or protected for long periods of storage and thus may corrode or rust over time.

## Limitation of Purchaser's Remedies; Exclusive of Damages

Purchaser's remedies with respect to any claim arising out of any order, any goods delivered pursuant to any order and expressly accepted in seller's acknowledgment, or seller's performance in connection with any order, including, without limitation, any claim arising out of any recall, defect or alleged defect in any goods or services furnished by seller, shall be limited exclusively to the right of repair or replacement of such goods or services, at seller's option. Without in any way limiting the generality of the foregoing, in no event shall seller be liable for any consequential or incidental damages, including, without limitation, any loss of anticipated profits incurred by purchaser with respect to any goods or services furnished by seller, or any damages arising from injuries to persons as a result of purchaser's or a third party's negligence. Seller's warranty does not cover failures resulting from the improper installation, mounting design or application or from corrosion. The provisions of this paragraph are a material term of this transaction.

## Disputes

Seller and purchaser agree to submit any disputes regarding any order, any goods delivered pursuant to any order and expressly accepted in seller's acknowledgment, or seller's performance in connection with any order, including without limitation seller's limited warranty obligation, to mediation by an independent mediator to be mutually agreed upon by seller and purchaser. The cost of such mediation shall be borne equally by seller and purchaser. In the event such mediation does not resolve their dispute, seller and purchaser agree to submit such dispute to an independent arbitrator, to be mutually agreed upon by seller and purchaser or, otherwise, chosen by the mediator. Seller and purchaser agree that all mediation and arbitration shall be conducted in Zion, Illinois. The non-prevailing party at the arbitration

shall pay the prevailing party's attorneys' fees and costs incurred in participating in the arbitration.

## Governing Law

Seller and Purchaser's agreement shall be governed by and interpreted in accordance with the laws of the State of Illinois of the United States of America. Manufacture, shipment and delivery are subject to any prohibition, restriction, priority, allocation, regulation or condition imposed by or on behalf of the United States of America or any other governmental body with appropriate jurisdiction which may prevent or interfere with fulfillment of any order.

## Permissible Variations

Goods shipped by Seller shall be within the limits and sizes published by Seller, subject, however, to Seller's right to ship overages or underages in accordance with Seller's standard practices and goods shipped by Seller will be subject to standard variations provided such variations are non-functional or are not material in nature.

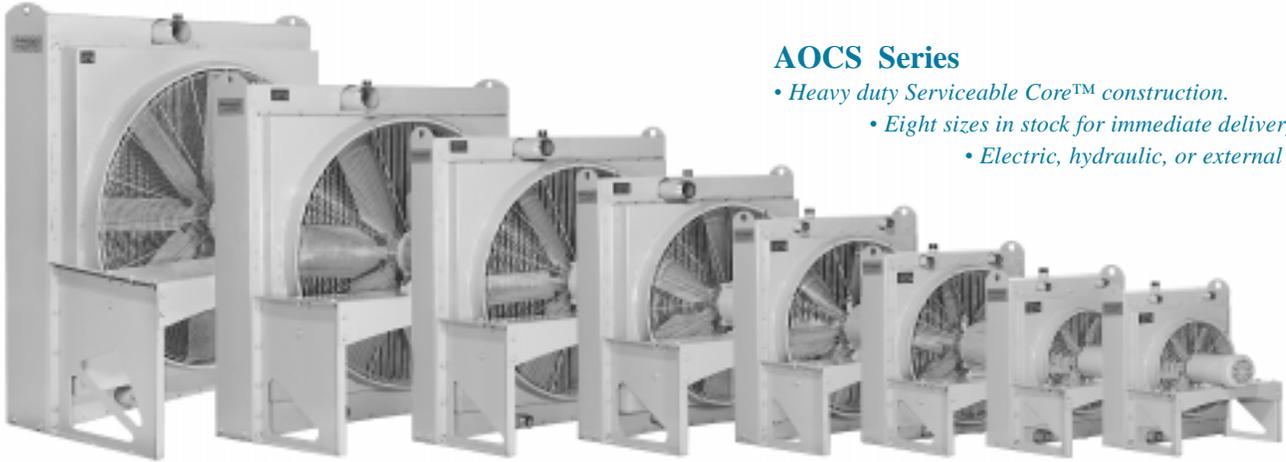
## Technical Assistance and Advice

Seller's warranty shall not be enlarged and no obligation or liability shall arise out of Seller's rendering of technical assistance, technical advice facilities, service or recommendations made by Seller in connection with Purchaser's purchases of the goods hereunder. Said technical services, advice, assistance or recommendations made by Seller or any representative of Seller concerning any use or application of any goods furnished hereunder is believed to be reliable, but SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, AND THE SAME ARE HEREBY EXPRESSLY DISCLAIMED as to the same and the results to be obtained. Purchaser assumes all responsibility for loss or damage resulting from the use of any such goods.

For standard dimensional information please refer to our corresponding product brochure. For information regarding a special engineered product please contact our company. All specially engineered products specifying a 5-digit suffix will be supplied with a drawing for customer approval at the time of purchase. Additional costs may be added if requirements should change from the original specifications, or have been initially overlooked. Please be aware that "normal shipping" lead-times are estimated based upon components in stock at the time of quotation, extended shipping time up to as much as two weeks or more may be required if changes to inventory availability occur. Cancellation charges will be incurred for special order equipment.

American Industrial Heat Transfer, Inc. provides a complete installation manual included with each unit sold containing a complete copy of our 3 page "*Terms and Conditions of Sale*". If an installation manual was not received or misplaced for your equipment additional copies may be acquired. To receive a copy of American Industrial Heat Transfer, Inc. Installation Manual including "*Standard Terms and Conditions of Sale*" please refer to the following sources. 1) The American Industrial product catalog. 2) Our Internet site [www.aihti.com](http://www.aihti.com), 3) Contact American Industrial directly at 1-847-731-1000.

# AVAILABLE PRODUCTS



## AOCS Series

- Heavy duty *Serviceable Core™* construction.
- Eight sizes in stock for immediate delivery.
- Electric, hydraulic, or external drive.



## AC, ACHM & ACF Series

- Industrial air/oil heat exchanger available in 8 standard sizes with electric or hydraulic drive.



## AOCH Series *with screen & Serviceable Core™*

- Industrial high capacity air/oil heat exchanger, available in 8 standard sizes with electric or hydraulic drive.



## AA Series

- Variety of sizes from 2"-8" diameters available in a wide range of materials.



## AB Series

- Variety of sizes from 2"-8" diameters available in brass and 316L Stainless Steel.



## URCS Series

- U-tube heat exchangers for steam services with removable tubes bundle in copper, 316L SS, or 90/10 Cu Ni.



## AB 2000-6000 Series

- High capacity shell & tube heat exchangers available in sizes from 10"-32" diameters.

3905 Route 173 Zion, Illinois 60099

Telephone: (800) 338-5959 or (847) 731-1000

FAX: (847) 731-1010

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