

AO Series – Industrial Air Cooled Copper Tube/Aluminum Fins

0124

The Industrial AO Series features an AC fan drive and is ideal for medium flow rates and moderate heat removal. This series is available with an optional internal pressure bypass. Cabinet louvers allow the user to regulate the direction of heated exhaust air. This versatile design allows for a one or two pass configuration.

TTP's XSelector® sizing program can be used to help optimize the sizing of the cooler for better performance and value.



How to Order

Model Series

AO
AOR - with Bypass

Model Size Selected

5, 10, 15, 20, 25, 30, 35, 40
(See Performance Curve Charts on page 2 for sizes or XSelector® sizing program)

Number of Passes*

Blank - No Bypass
1 - One Pass*
2 - Two Pass*

*ADD FOR **AOR** MODELS ONLY: Number of passes

Connection Type

Blank - NPT
S - SAE
M - Metric

Bypass Setting*

Blank - No Bypass
30-30 PSI
60 - 60 PSI
ADD FOR **AOR** MODELS ONLY: Bypass setting
This is a partial flow pressure bypass only.
It is not designed to be a full flow system bypass.

Foot Mounted Brackets

Blank - No Brackets
FB - Foot Brackets

Specify Motor Required

1PH - Single Phase
1PH EXP - Single Phase Expl. Proof
3PH - Three Phase
575V - Three Phase 575 Volt
3PH EXP - Three Phase Expl. Proof
NM - No Motor

* To register for XSelector® please go to www.thermaltransfer.com/get-in-touch/ and complete the XSelector® Inquiry form and submit.

Download the XSelector® for both Apple and Android formats by searching for XSelector® in their App Stores. You must first register for XSelector® before using it on mobile devices.

Options

Internal pressure bypass

Foot brackets

SAE & metric connections

Corrosive resistant marine coating

Ratings

Maximum Operating Pressure 300 PSI

Test Pressure 300 PSI

Maximum Operating Temperature 400°F

Materials

Tubes Copper

Fins Aluminum

Turbulators Steel

Fan Blade Aluminum with steel hub

Fan Guard Zinc plated steel

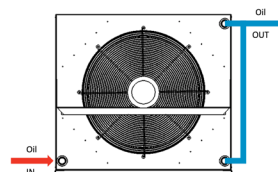
Cabinet Steel with powder coat finish

Manifolds Steel

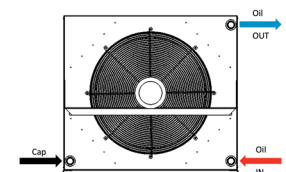
Connections Steel

Piping Diagram

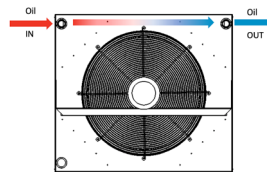
AO - One Pass



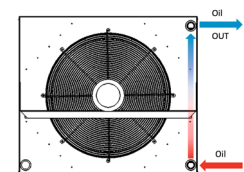
AO - Two Pass



AOR - One Pass with Bypass



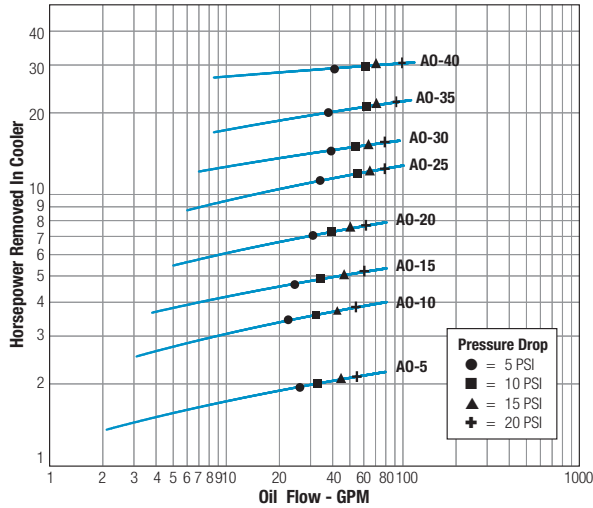
AOR - Two Pass with Bypass



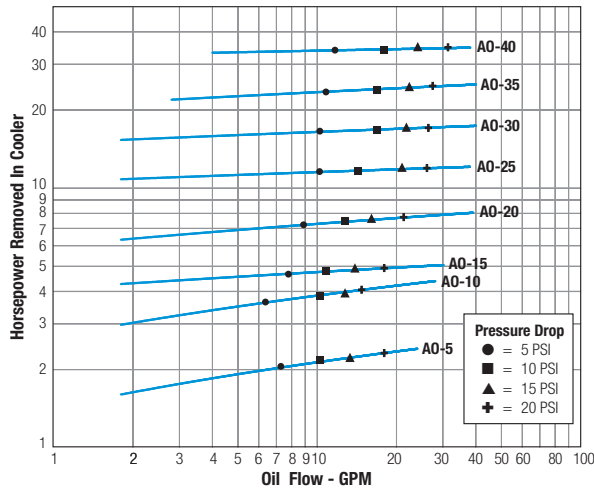
Performance Curves

For additional sizing information consider using TTP's **XSelector®** online sizing Program.*

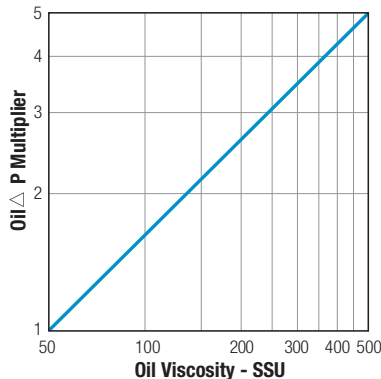
One Pass Oil



Two Pass Oil



Oil Pressure Correction



Selection Procedure

Performance Curves are based on 50SSU oil leaving the cooler 40°F higher than the ambient air temperature used for cooling. This is also referred to as a 40°F approach temperature.

STEP 1 Determine the Heat Load. This will vary with different systems, but typically coolers are sized to remove 25 to 50% of the input nameplate horsepower.

(Example: 100 HP Power Unit x .33 = 33 HP Heat load.)

$$\text{If BTU/HR is known: } \text{HP} = \frac{\text{BTU/HR}}{2545}$$

STEP 2 Determine Approach Temperature. Desired oil leaving cooler °F – Ambient air temp. °F = Actual Approach

STEP 3 Determine Curve Horsepower Heat Load. Enter the information from above:

$$\text{Horsepower heat load} \times \frac{40 \times \text{Cv}^1}{\text{Actual Approach}} = \text{Curve Horsepower}$$

STEP 4 Enter curves at oil flow through cooler and curve horsepower. Any curve above the intersecting point will work.

STEP 5 Determine Oil Pressure Drop from Curves:

l = 5 PSI n = 10 PSI s = 14 PSI = 20 PSI Multiply pressure drop from curve by correction factor found in oil ΔP correction curve.

¹ Cv correction chart found on page 4.

Desired Reservoir Temperature

Return Line Cooling: Desired temperature is the oil temperature leaving the cooler. This will be the same temperature that will be found in the reservoir.

Off-Line Recirculation Cooling Loop: Desired temperature is the oil temperature entering the cooler. In this case, the oil temperature change must be determined so that the actual oil leaving temperature can be found. Calculate the oil temperature change (oil ΔT) with this formula:
Oil ΔT = (BTU's/HR) / (GPM Oil Flow x 210).

To calculate the oil leaving temperature from the cooler, use this formula:
Oil Leaving Temp. = Oil Entering Temp. – Oil ΔT.

This formula may also be used in any application where the only temperature available is the entering oil temperature.

Oil Pressure Drop: Most systems can tolerate a pressure drop through the heat exchanger of 20 to 30 PSI. Excessive pressure drop should be avoided. Care should be taken to limit pressure drop to 5 PSI or less for case drain applications where high back pressure may damage the pump shaft seals.

Oil Temperature

Typical operating temperature ranges are:

| | |
|-----------------------|--------------|
| Hydraulic Motor Oil | 110° - 130°F |
| Hydrostatic Drive Oil | 130° - 180°F |
| Bearing Lube Oil | 120° - 160°F |
| Lube Oil Circuits | 110° - 130°F |

* To register for XSelector® please go to www.thermaltransfer.com/get-in-touch/ and complete the XSelector® Inquiry form and submit. Download the XSelector® for both Apple and Android formats by searching for XSelector® in their App Stores. You must first register for XSelector® before using it on mobile devices.

Specifications

Electric Motor & Fan Data*

| Model | CFM | Sound dB(A)* at 7 FT | HP | Volts | Phase | Full Load Amps | HZ | Nema Frame | RPM | Type | Circuit | Thermal Overload | Bearing B-Ball |
|-------|---------|-------------------------|------|-------------|-------|-------------------|-------|---------------|-----------|------|---------|---------------------|-------------------|
| AO-5 | 401/187 | 68 | 1/12 | 110/115 | 1 | 1.2/1.2 | 50/60 | 48 | 1400/1700 | TEAO | A | No | B |
| | 494 | 70 | 1/4 | 208-230/460 | 3 | 1.4-1.3/.65 | 60 | | 1725 | TEFC | D | | |
| AO-10 | 576/700 | 68 | 1/12 | 110/115 | 1 | 1.2/1.2 | 50/60 | 48 | 1400/1700 | TEAO | A | No | B |
| | 710 | 70 | 1/4 | 208-230/460 | 3 | 1.4-1.3/.65 | 60 | | 1725 | TEFC | D | | |
| AO-15 | 949 | 69 | 1/6 | 115/208-230 | 1 | 4/2.1-2 | 60 | 48 | 1725 | TEFC | C | No | B |
| | | 71 | 1/4 | 208-230/460 | 3 | 1.4-1.3/.65 | | | | | D | | |
| AO-20 | 1555 | 70 | 1/6 | 115/208-230 | 1 | 4/2.1-2 | 60 | 48 | 1725 | TEFC | C | No | B |
| | | 72 | 1/4 | 208-230/460 | 3 | 1.4-1.3/.65 | | | | | D | | |
| AO-25 | 2240 | 72 | 1/6 | 115/208-230 | 1 | 4.6/2.1 | 60 | 48 | 1140 | TEFC | C | No | B |
| | | 73 | | 208-230/460 | 3 | 1.3-1.2/.6 | | | | | D | | |
| AO-30 | 3100 | 75 | 1/6 | 115/208-230 | 1 | 5.2/2.7-2.6 | 60 | 48 | 1140 | TEFC | C | No | B |
| | | 76 | | 208-230/460 | 3 | 1.3-1.2/.6 | | | | | D | | |
| AO-35 | 4370 | 76 | 1/2 | 115/208-230 | 1 | 8/4.2-4 | 60 | 56 | 1140 | TEFC | C | No | B |
| | | 77 | | 208-230/460 | 3 | 2.5-2.4/1.2 | | | | | D | | |
| AO-40 | 5450 | 78 | 1/2 | 115/208-230 | 1 | 8/4.2-4 | 60 | 56 | 1140 | TEFC | C | No | B |
| | | 79 | | 208-230/460 | 3 | 2.5-2.4/1.2 | | | | | D | | |

Published electrical ratings are approximate, and may vary because of motor brand. Actual ratings are on motor nameplate.

*Catalog dB(A) sound levels are at seven (7) feet. dB(A) sound levels increase by six (6) dB(A) for halving this distance and decrease by six (6) dB(A) for doubling this distance.

Explosion Proof Motors (Class I G.P.D & Class II G.P.F, G)*

| Model | CFM | Sound dB(A)* at 7 FT | HP | Volts | Phase | Full Load Amps | HZ | Nema Frame | RPM | Type | Circuit | Thermal Overload | Bearing B-Ball |
|-------|------|-------------------------|-----|-------------|-------|-------------------|----|---------------|------|------|---------|---------------------|-------------------|
| AO-5 | 494 | 68 | 1/4 | 115/230 | 1 | 5.8/2.9 | 60 | 48 | 1725 | FC | C | Yes | B |
| | | 70 | | 208-230/460 | 3 | 1.4-1.3/.65 | | | | | D | | |
| AO-10 | 710 | 68 | 1/4 | 115/230 | 1 | 5.8/2.9 | 60 | 48 | 1725 | FC | C | Yes | B |
| | | 70 | | 208-230/460 | 3 | 1.4-1.3/.65 | | | | | D | | |
| AO-15 | 1015 | 69 | 1/4 | 115/230 | 1 | 5.8/2.9 | 60 | 48 | 1725 | FC | C | Yes | B |
| | | 71 | | 208-230/460 | 3 | 1.4-1.3/.65 | | | | | D | | |
| AO-20 | 1555 | 70 | 1/4 | 115/230 | 1 | 5.8/2.9 | 60 | 48 | 1725 | FC | C | Yes | B |
| | | 72 | | 208-230/460 | 3 | 1.4-1.3/.65 | | | | | D | | |
| AO-25 | 2240 | 72 | 1/3 | 115/230 | 1 | 6.8/3.4 | 60 | 56 | 1140 | FC | C | Yes | B |
| | | 73 | | 208-230/460 | 3 | 1.8-1.6/.8 | | | | | D | | |
| AO-30 | 3100 | 75 | 1/3 | 115/230 | 1 | 6.8/3.4 | 60 | 56 | 1140 | FC | C | Yes | B |
| | | 76 | | 208-230/460 | 3 | 1.8-1.6/.8 | | | | | D | | |
| AO-35 | 4370 | 76 | 1/2 | 115/230 | 1 | 8/4 | 60 | 56 | 1140 | FC | C | Yes | B |
| | | 77 | | 208-230/460 | 3 | 2.5-2.4/1.2 | | | | | D | | |
| AO-40 | 5450 | 78 | 1/2 | 115/230 | 1 | 8/4 | 60 | 56 | 1140 | FC | C | Yes | B |
| | | 79 | | 208-230/460 | 3 | 2.5-2.4/1.2 | | | | | D | | |

Published electrical ratings are approximate, and may vary because of motor brand. Actual ratings are on motor nameplate.

*Catalog dB(A) sound levels are at seven (7) feet. dB(A) sound levels increase by six (6) dB(A) for halving this distance and decrease by six (6) dB(A) for doubling this distance.

575 Volt

| Model | CFM | Sound dB(A)** at 7 FT | HP | Volts | Phase | Full Load Amps | HZ | Nema Frame | RPM | Type | Circuit | Thermal Overload | Bearing B-Ball |
|-------|------|--------------------------|-----|-------|-------|-------------------|----|---------------|------|------|---------|---------------------|-------------------|
| AO-5 | 494 | 70 | 1/4 | 575 | 3 | .52 | 60 | 48 | 1725 | TEFC | D | No | B |
| AO-10 | 710 | 70 | 1/4 | 575 | 3 | .52 | 60 | 48 | 1725 | TEFC | D | No | B |
| AO-15 | 1015 | 71 | 1/4 | 575 | 3 | .52 | 60 | 48 | 1725 | TEFC | D | No | B |
| AO-20 | 1555 | 72 | 1/4 | 575 | 3 | .52 | 60 | 48 | 1725 | TEFC | D | No | B |
| AO-25 | 2240 | 73 | 1/2 | 575 | 3 | .88 | 60 | 56 | 1140 | TEFC | D | No | B |
| AO-30 | 3100 | 76 | 1/2 | 575 | 3 | .88 | 60 | 56 | 1140 | TEFC | D | No | B |
| AO-35 | 4370 | 77 | 1/2 | 575 | 3 | .88 | 60 | 56 | 1140 | TEFC | D | No | B |
| AO-40 | 5450 | 79 | 1/2 | 575 | 3 | .88 | 60 | 56 | 1140 | TEFC | D | No | B |

*D Squirrel Cage

**Catalog dB (A) sound levels at seven (7) feet. dB (A) sound levels increase by six (6) dB (A) for halving this distance, and decrease by six (6) dB (A) for doubling this distance.

Specifications

Net Weight (LBS)

| Model | Weight |
|-------|--------|
| AO-5 | 47 |
| AO-10 | 62 |
| AO-15 | 72 |
| AO-20 | 86 |
| AO-25 | 120 |
| AO-30 | 135 |
| AO-35 | 160 |
| AO-40 | 185 |

One Pass (Medium to High Oil Flows)

| Model | Flow Range GPM (USA) |
|------------|----------------------|
| AOR - 5-1 | 2 - 80 |
| AOR - 10-1 | 3 - 80 |
| AOR - 15-1 | 4 - 80 |
| AOR - 20-1 | 5 - 80 |
| AOR - 25-1 | 6 - 100 |
| AOR - 30-1 | 7 - 100 |
| AOR - 35-1 | 8 - 112 |
| AOR - 40-1 | 9 - 118 |

Two Pass (Low to Medium Oil Flows)

| Model | Flow Range GPM (USA) |
|------------|----------------------|
| AOR - 5-2 | 2 - 25 |
| AOR - 10-2 | 2 - 30 |
| AOR - 15-2 | 2 - 30 |
| AOR - 20-2 | 2 - 40 |
| AOR - 25-2 | 2 - 40 |
| AOR - 30-2 | 2 - 40 |
| AOR - 35-2 | 3 - 40 |
| AOR - 40-2 | 4 - 40 |

C_v Viscosity Correction

| Average Oil Temp °F | OIL | | | | | |
|---------------------|--|---|---|---|---|-------------------------------------|
| | SAE 5 110 SSU at 100°F 40 SSU at 210°F | SAE 10 150 SSU at 100°F 43 SSU at 210°F | SAE 20 275 SSU at 100°F 50 SSU at 210°F | SAE 30 500 SSU at 100°F 65 SSU at 210°F | SAE 40 750 SSU at 100°F 75 SSU at 210°F | 50-50 Ethylene Glycol & Water |
| 100 | 1.14 | 1.22 | 1.35 | 1.58 | 1.77 | 1.11 |
| 150 | 1.01 | 1.05 | 1.11 | 1.21 | 1.31 | 1.02 |
| 200 | .99 | 1.00 | 1.01 | 1.08 | 1.10 | .96 |
| 250 | .95 | .98 | .99 | 1.00 | 1.00 | .95 |

Lubrication Notes

Caution: Do not over oil or over grease. **Ball bearings** – No grease needed at start up. Grease as follows:

| | |
|--|------------------------|
| 5,000 Hours/Year | 5 Year Grease Interval |
| Continuous — Normal Applications | 2 Years |
| Seasonal Service — Motor is idle for 6 months or more | 1 Year |
| Continuous — High ambients, dirty or moist locations, high vibration | 6 Months |

Dimensions

| Model | A | B | C | D | E | F | G | H | J | K | L | M NPT | M SAE | N | P | T |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------------------------|---|-------|-------|-------|
| AO-5 | 7.40 | 14.81 | 5.90 | 11.81 | 20.00 | 9.08 | 8.31 | 6.47 | 12.94 | 3.78 | 7.56 | 1" | -16 1 ¹ / ₁₆ -12 | 5.84 | 11.69 | — |
| AO-10 | 9.50 | 19.00 | 6.56 | 13.12 | 19.25 | 10.39 | 12.50 | 8.56 | 17.12 | 4.44 | 8.88 | 1" | | 7.94 | 15.88 | — |
| AO-15 | 10.19 | 20.38 | 7.87 | 15.75 | 19.25 | 13.02 | 13.88 | 9.25 | 18.50 | 5.75 | 11.50 | 1" | | 8.62 | 17.25 | — |
| AO-20 | 11.84 | 23.69 | 9.19 | 18.38 | 19.25 | 15.64 | 17.19 | 10.90 | 21.81 | 7.00 | 14.00 | 1 ¹ / ₄ " | -20 1 ⁵ / ₈ -12 | 10.28 | 20.56 | — |
| AO-25 | 13.34 | 26.68 | 11.81 | 23.62 | 19.25 | 20.89 | 20.19 | 12.40 | 24.81 | 9.62 | 19.25 | 1 ¹ / ₄ " | | 11.78 | 23.56 | — |
| AO-30 | 15.81 | 31.62 | 13.78 | 27.56 | 19.50 | 24.83 | 25.12 | 14.87 | 29.75 | 11.59 | 23.19 | 1 ¹ / ₄ " | | 14.25 | 28.50 | — |
| AO-35 | 16.90 | 33.81 | 15.09 | 30.19 | 21.50 | 27.45 | 27.31 | 15.97 | 31.94 | 12.90 | 25.81 | 1 ¹ / ₄ " | | 15.34 | 30.69 | 11.00 |
| AO-40 | 20.81 | 41.62 | 18.37 | 36.75 | 20.50 | 34.01 | 35.12 | 19.87 | 39.75 | 16.19 | 32.38 | 1 ¹ / ₄ " | 19.25 | 38.50 | 13.25 | |

NOTE: All dimensions in inches.

Fan Rotation Clockwise/Facing Motor Shaft

