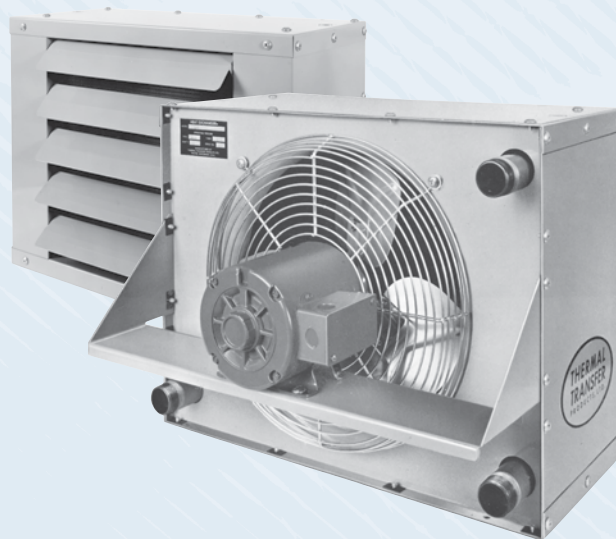


# FLUID COOLING | Industrial AO Series

AIR COOLED AO/AOR

## FEATURES

- Young Interchange – OCH
- Adjustable Louvers
- Medium Flow Rates
- Moderate Heat Removal
- One or Two Pass
- Fluid Power Systems
- Gear Drives
- Injection Molding Machines
- Machine Tools
- Torque Converters
- Hydraulic Presses



## OPTIONS

- SAE & Metric Connections
- Relief Bypass
- Foot Brackets
- Corrosive Resistant
- Marine Coating

## Ratings

**Operating Pressure** - 300 psi  
**Test Pressure** - 300 psi  
**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 baked enamel finish  
**Manifolds** Steel  
**Connections** Steel

## Weights

| MODEL | Net Weight (LBS) |
|-------|------------------|
| A0-5  | 47               |
| A0-10 | 62               |
| A0-15 | 72               |
| A0-20 | 86               |
| A0-25 | 120              |
| A0-30 | 135              |
| A0-35 | 160              |
| A0-40 | 185              |

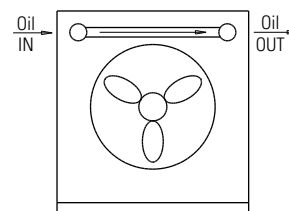
## One Pass (Medium to High Oil Flows)

| Model Number | 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              |

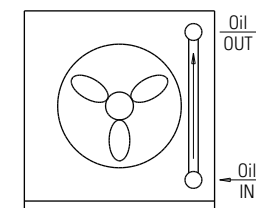
## Two Pass (Low to Medium Oil Flows)

| Model Number | 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               |

## One Pass



## Two Pass



## How to Order

|                                                                                     |   |                                                                                     |   |                                                                                     |   |                                                                                     |   |                                                                                      |   |                                                                                       |   |                                                                                                                                             |
|-------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------|---|--------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------|
|  | - |  | - |  | - |  | - |  | - |  | - |                                                        |
| <b>Model Series</b><br>A0                                                           |   | <b>Model Size Selected</b>                                                          |   | <b>Number of Passes*</b><br>Blank - No Bypass<br>1 - One Pass<br>2 - Two Pass       |   | <b>Connection Type</b><br>Blank - NPT<br>S - SAE<br>M - Metric                      |   | <b>Relief Bypass Setting*</b><br>30-30 psi<br>60 - 60 psi                            |   | <b>Foot Mounted Brackets</b><br>Blank - No Brackets<br>FB - Foot Brackets             |   | <b>Specify Motor Required</b><br>Single Phase<br>Single Phase Expl. Proof<br>Three Phase<br>Three Phase 575 Volt<br>Three Phase Expl. Proof |

\*ADD FOR AOR MODELS ONLY: Relief Bypass Setting & Number of Passes

Sales@SouthwestThermal.com

www.YoungHeatExchanger.com

1-888-226-8522

# Specifications

## Electric motor & Fan data\*

| Model | CFM              | Sound dB(A)** at 7 ft. | Horse Power | Volts                      | Phase  | Full Load Amps            | Hz          | Nema Frame | RPM               | Type         | Circuit | Thermal Overload | Bearing B-Bal S-Sleeve |
|-------|------------------|------------------------|-------------|----------------------------|--------|---------------------------|-------------|------------|-------------------|--------------|---------|------------------|------------------------|
| A0-5  | 401/487<br>494   | 68<br>70               | 1/12<br>1/4 | 110/115<br>208-230/460     | 1<br>3 | 1.2/1.2<br>1.4-1.3/.65    | 50/60<br>60 | 48         | 1400/1700<br>1725 | TEAO<br>TEFC | A<br>D  | No               | B                      |
| A0-10 | 576/700<br>710   | 68<br>70               | 1/12<br>1/4 | 110/115<br>208-230/460     | 1<br>3 | 1.2/1.2<br>1.4-1.3/.65    | 50/60<br>60 | 48         | 1400/1700<br>1725 | TEAO<br>TEFC | A<br>D  | No               | B                      |
| A0-15 | 824/1000<br>1015 | 69<br>71               | 1/12<br>1/4 | 110/115<br>208-230/460     | 1<br>3 | 1.2/1.2<br>1.4-1.3/.65    | 50/60<br>60 | 48         | 1400/1700<br>1725 | TEAO<br>TEFC | A<br>D  | No               | B                      |
| A0-20 | 1555             | 70<br>72               | 1/6<br>1/4  | 115/208-230<br>208-230/460 | 1<br>3 | 4/2.1-2<br>1.4-1.3/.65    | 60<br>60    | 48         | 1725              | TEFC<br>TEFC | C<br>D  | No               | B                      |
| A0-25 | 2240             | 72<br>73               | 1/6         | 115/208-230<br>208-230/460 | 1<br>3 | 4.6/2.2<br>1.3-1.2/.6     | 60          | 48         | 1140              | TEFC         | C<br>D  | No               | B                      |
| A0-30 | 3100             | 75<br>76               | 1/6         | 115/208-230<br>208-230/460 | 1<br>3 | 5.2/2.7-2.6<br>1.3-1.2/.6 | 60          | 48         | 1140              | TEFC         | C<br>D  | No               | B                      |
| A0-35 | 4370             | 76<br>77               | 1/2         | 115/208-230<br>208-230/460 | 1<br>3 | 8/4.2-4<br>2.5-2.4/1.2    | 60          | 56         | 1140              | TEFC         | C<br>D  | No               | B                      |
| A0-40 | 5450             | 78<br>79               | 1/2         | 115/208-230<br>208-230/460 | 1<br>3 | 8/4.2-4<br>2.5-2.4/1.2    | 60          | 56         | 1140              | TEFC         | C<br>D  | No               | B                      |

\*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 GP.D & Class II GP.F, G)\*

| Model | CFM  | Sound dB(A)** at 7 ft. | Horse Power | Volts                  | Phase  | Full Load Amps         | Hz | Nema Frame | RPM  | Type | Circuit | Thermal Overload | Bearing B-Bal S-Sleeve |
|-------|------|------------------------|-------------|------------------------|--------|------------------------|----|------------|------|------|---------|------------------|------------------------|
| A0-5  | 494  | 68<br>70               | 1/4         | 115/230<br>208-230/460 | 1<br>3 | 5.8/2.9<br>1.4-1.3/.65 | 60 | 48         | 1725 | FC   | C<br>D  | Yes              | B                      |
| A0-10 | 710  | 68<br>70               | 1/4         | 115/230<br>208-230/460 | 1<br>3 | 5.8/2.9<br>1.4-1.3/.65 | 60 | 48         | 1725 | FC   | C<br>D  | Yes              | B                      |
| A0-15 | 1015 | 69<br>71               | 1/4         | 115/230<br>208-230/460 | 1<br>3 | 5.8/2.9<br>1.4-1.3/.65 | 60 | 48         | 1725 | FC   | C<br>D  | Yes              | B                      |
| A0-20 | 1555 | 70<br>72               | 1/4         | 115/230<br>208-230/460 | 1<br>3 | 5.8/2.9<br>1.4-1.3/.65 | 60 | 48         | 1725 | FC   | C<br>D  | Yes              | B                      |
| A0-25 | 2240 | 72<br>73               | 1/3         | 115/230<br>208-230/460 | 1<br>3 | 6.8/3.4<br>1.8-1.6/.8  | 60 | 56         | 1140 | FC   | C<br>D  | Yes              | B                      |
| A0-30 | 3100 | 75<br>76               | 1/3         | 115/230<br>208-230/460 | 1<br>3 | 6.8/3.4<br>1.8-1.6/.8  | 60 | 56         | 1140 | FC   | C<br>D  | Yes              | B                      |
| A0-35 | 4370 | 76<br>77               | 1/2         | 115/230<br>208-230/460 | 1<br>3 | 8/4<br>2.5-2.4/1.2     | 60 | 56         | 1140 | FC   | C<br>D  | Yes              | B                      |
| A0-40 | 5450 | 78<br>79               | 1/2         | 115/230<br>208-230/460 | 1<br>3 | 8/4<br>2.5-2.4/1.2     | 60 | 56         | 1140 | FC   | C<br>D  | Yes              | B                      |

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

## 575 Volt

| Model | CFM  | Sound dB(A)** at 7 ft. | Horse Power | Volts | Phase | Full Load Amps | Hz | Nema Frame | RPM  | Type | Circuit | Thermal Overload | Bearing B-Bal S-Sleeve |
|-------|------|------------------------|-------------|-------|-------|----------------|----|------------|------|------|---------|------------------|------------------------|
| A0-5  | 494  | 70                     | 1/4         | 575   | 3     | .52            | 60 | 48         | 1725 | TEFC | D       | No               | B                      |
| A0-10 | 710  | 70                     | 1/4         | 575   | 3     | .52            | 60 | 48         | 1725 | TEFC | D       | No               | B                      |
| A0-15 | 1015 | 71                     | 1/4         | 575   | 3     | .52            | 60 | 48         | 1725 | TEFC | D       | No               | B                      |
| A0-20 | 1555 | 72                     | 1/4         | 575   | 3     | .52            | 60 | 48         | 1725 | TEFC | D       | No               | B                      |
| A0-25 | 2240 | 73                     | 1/2         | 575   | 3     | .88            | 60 | 56         | 1140 | TEFC | D       | No               | B                      |
| A0-30 | 3100 | 76                     | 1/2         | 575   | 3     | .88            | 60 | 56         | 1140 | TEFC | D       | No               | B                      |
| A0-35 | 4370 | 77                     | 1/2         | 575   | 3     | .88            | 60 | 56         | 1140 | TEFC | D       | No               | B                      |
| A0-40 | 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.

## Lubrication Notes

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

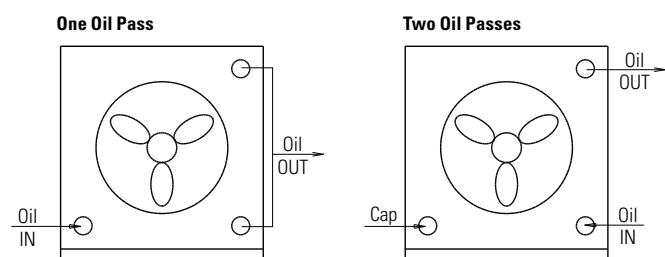
|                                                                       |                        |
|-----------------------------------------------------------------------|------------------------|
| 5,000 Hours/Year                                                      | 5 Year Grease Interval |
| Continuous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

# Dimensions

| Model | A     | B     | C     | D     | E     | F     | G     | H     | J     | K     | L     | M<br>NPT | M<br>SAE                            | N     | P     | T     |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------------------------------------|-------|-------|-------|
| AO-5  | 7.40  | 14.81 | 5.90  | 11.81 | 20.00 | 9.19  | 8.31  | 6.47  | 12.94 | 3.78  | 7.56  | 1"       | #16 SAE<br>1-5/16-12UN-2B<br>Thread | 5.84  | 11.69 | —     |
| AO-10 | 9.50  | 19.00 | 6.56  | 13.12 | 19.25 | 10.50 | 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 | 13.12 | 13.88 | 9.25  | 18.50 | 5.75  | 11.50 | 1"       |                                     | 8.62  | 17.25 | —     |
| AO-20 | 11.91 | 23.81 | 9.19  | 18.38 | 19.25 | 15.75 | 17.91 | 10.90 | 21.81 | 7.00  | 14.00 | 1-1/4"   | #20 SAE<br>1-5/8-12UN-2B<br>Thread  | 10.28 | 20.56 | —     |
| AO-25 | 13.34 | 26.68 | 11.81 | 23.62 | 19.25 | 21.00 | 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 | 24.94 | 25.12 | 14.87 | 29.75 | 11.59 | 23.19 | 1-1/4"   |                                     | 14.25 | 28.50 | 11.00 |
| AO-35 | 16.90 | 33.81 | 15.09 | 30.19 | 21.50 | 27.56 | 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 | 34.12 | 35.12 | 19.87 | 39.75 | 16.19 | 32.38 | 1-1/4"   |                                     | 19.25 | 38.50 | 13.25 |

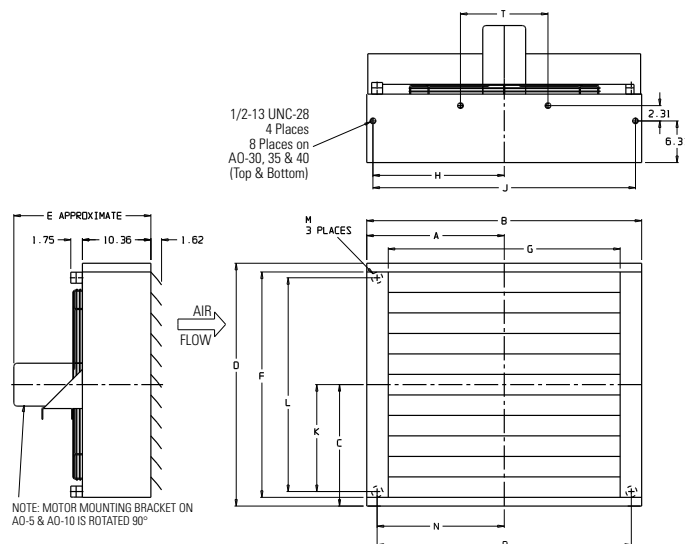
NOTE: All dimensions in inches.

## Installation Piping Diagram



\*See dimension chart for NPT or optional internal SAE connection size.

## Fan Rotation Clockwise/Facing Motor Shaft

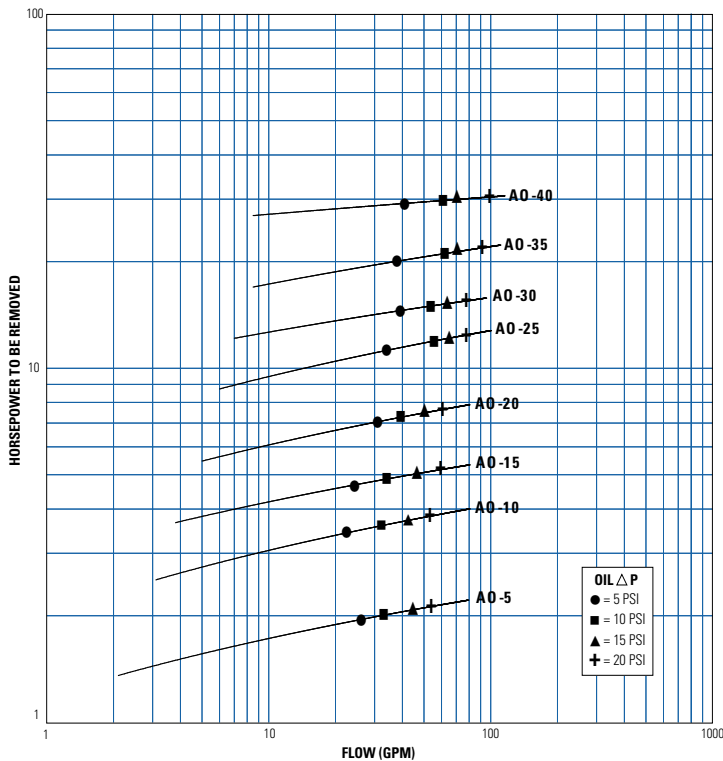


## C<sub>v</sub> Viscosity Correction

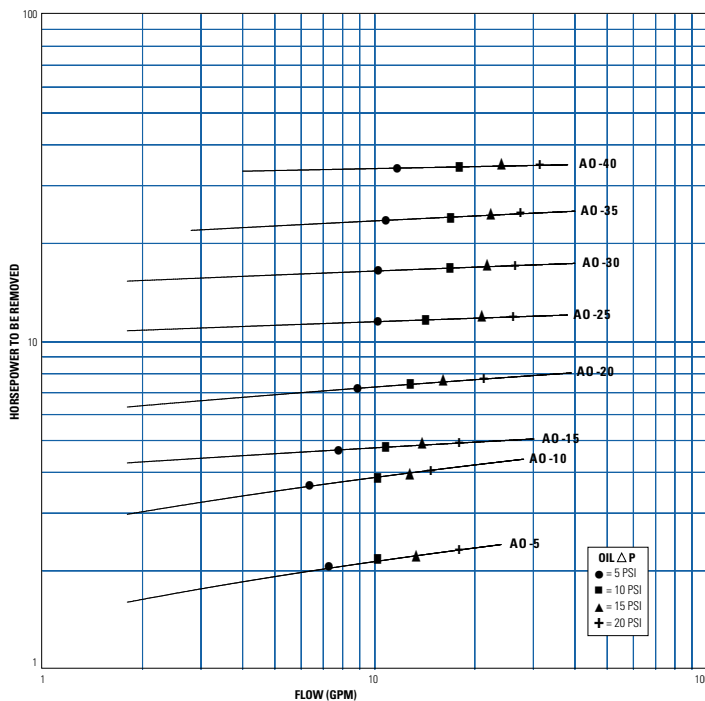
| Average<br>Oil Temp °F | OIL                                          |                                               |                                               |                                               |                                               |                                     |
|------------------------|----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-------------------------------------|
|                        | SAE 5<br>110 SSU at 100°F<br>40 SSU at 210°F | SAE 10<br>150 SSU at 100°F<br>43 SSU at 210°F | SAE 20<br>275 SSU at 100°F<br>50 SSU at 210°F | SAE 30<br>500 SSU at 100°F<br>65 SSU at 210°F | SAE 40<br>750 SSU at 100°F<br>75 SSU at 210°F | 50-50<br>Ethylene Glycol<br>& 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                                 |

# Performance Curves

## One Pass Oil



## Two Pass Oil



# 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.)

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

**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:

$$\text{Horsepower heat load} \times \frac{40 \times C_v}{\text{Actual Approach}} = \text{Curve Horsepower}$$

**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:**

● = 5 PSI; ■ = 10 PSI; ▲ = 14 PSI; + = 20 PSI. Multiply pressure drop from curve by correction factor found in oil ΔP correction curve.

## 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.

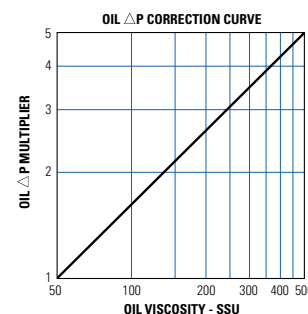
**Off-Line Recirculation Cooling Loop:** Desired temperature is the oil temperature entering the cooler. In this case, the oil temperature change must be determined so that the actual oil leaving temperature can be found. Calculate the oil temperature change (oil ΔT) with this formula:

$$\text{Oil } \Delta T = (\text{BTU's/Hr.}) / (\text{GPM Oil Flow} \times 210).$$

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 |