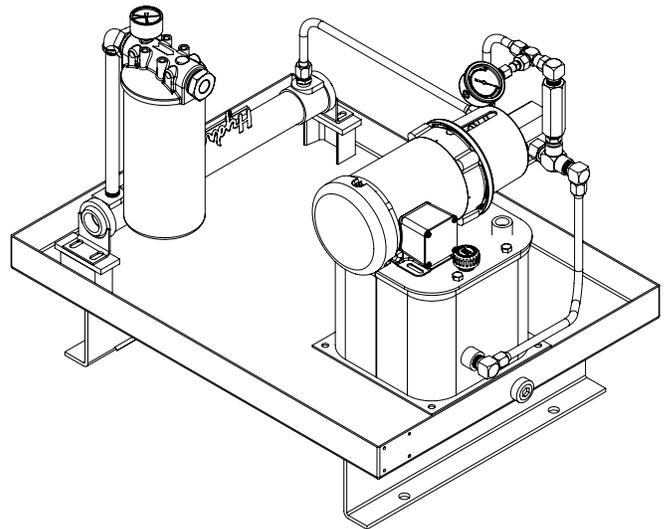
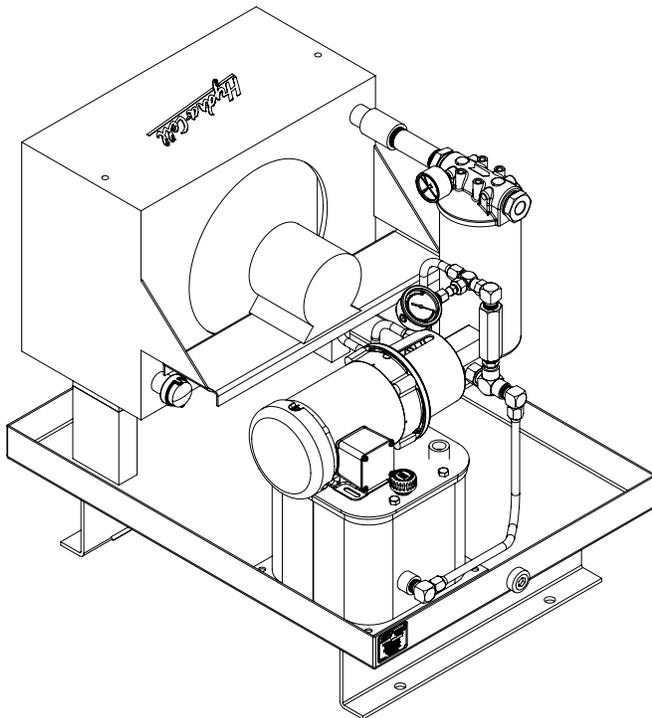


**Installation, Operation & Maintenance**  
142-991-2400 Rev D

# **Hydra-Cell<sup>®</sup>**

**Seal-less Pumps**

**Models:  
142-5XX, 6XX**



 **Wanner Engineering, Inc.**

1204 Chestnut Avenue, Minneapolis, MN 55403  
Tel: (612) 332-5681 Fax: (612) 332-6937  
Toll-free fax [US only]: (800) 332-6812  
www.hydra-cell.com  
email: sales@wannereng.com



# Contents

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**Manufacturer's Statement:** For technical reasons, Wanner Engineering, Inc., reserves the right to modify equipment design and specifications provided within this manual without any preliminary notice. Information provided "herein" is of a descriptive nature. Performance quality may depend on the equipment installation and operation. Install and operate equipment in accordance with the recommendations and instructions of Wanner Engineering, Inc.

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# Safety

## SAFETY

### General Safety Information



Safety Alert Symbol

This symbol with a warning statement means:  
“Warning, be alert! Your safety is involved!”  
Carefully read the message that follows.

 **CAUTION**

The signal word **CAUTION** on the equipment and in the manuals indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

 **DANGER**

The signal word **DANGER** on the equipment and in the manuals indicates a hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING**

The signal word **WARNING** on the equipment and in the manuals indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **IMPORTANT**

This notice identifies procedures which must be followed to avoid damage to the equipment.

### Use Safety Rules

- Read and follow instructions in this manual and the equipment's operator's manual before operating.
- In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the installation, operation, maintenance and storage of equipment.
- Verify that the equipment is securely fastened to a rigid base.
- Operate the equipment in accordance with the recommendations and instructions of Wanner Engineering, Inc.
- DO NOT pump at pressures higher than the maximum recommended pressure.
- DO NOT modify the equipment in any way. Unauthorized modification may impair the function and / or safety and could affect the life of the equipment and void warranty.
- DO NOT make any adjustments or repairs on the equipment while operating.
- Keep shields and guards in place.

### Liquid System



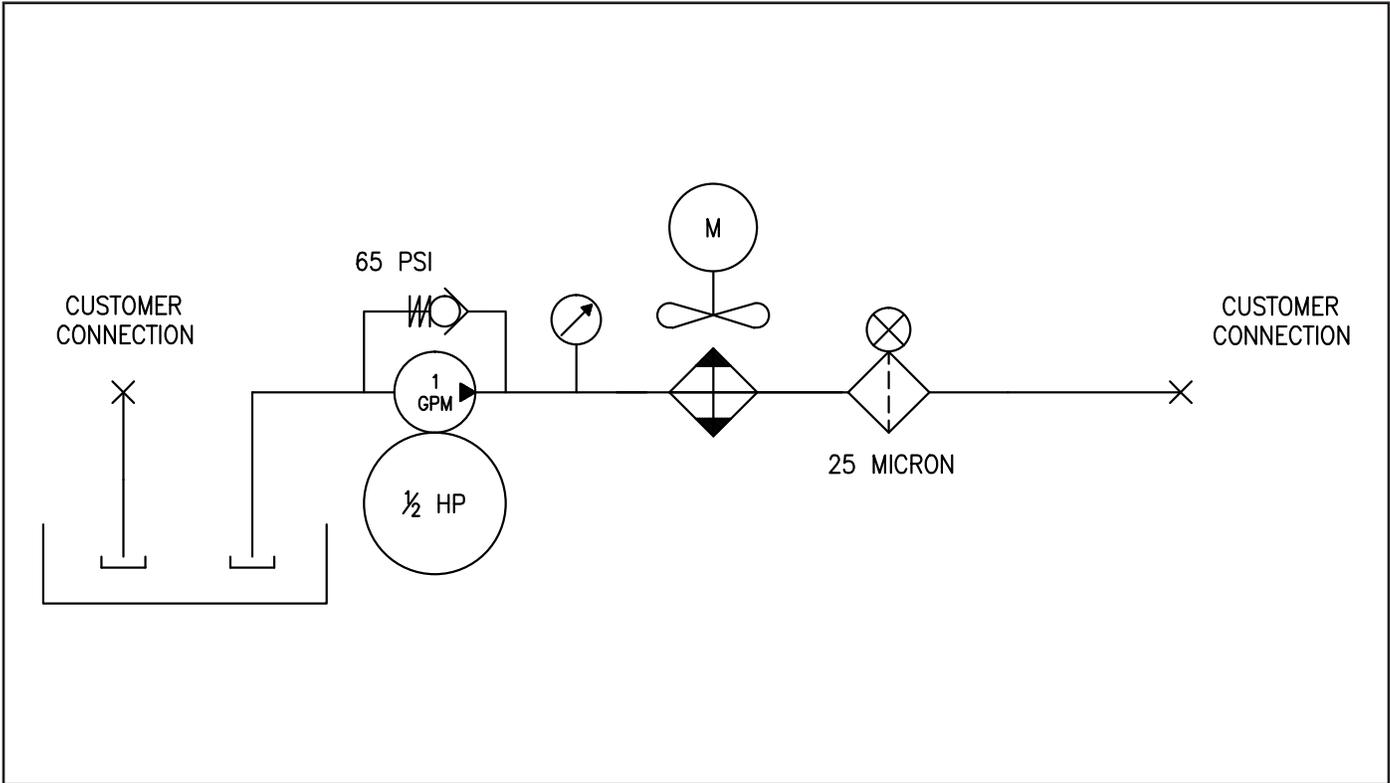
Check tubes, hoses and fittings for damage and leakage. Never use bare skin to check for leaks. Equipment tubes and hoses must be properly routed and have adequate support and secure clamps. Repair any leakage problems by adjusting or replacing parts as indicated upon inspection.

Fluid such as engine oil, coolants, grease, etc. must be disposed of in an environmentally safe manner. Some regulations require that certain spills and leaks on the ground must be cleaned in a specific manner. See local, state and federal regulations for the correct disposal method.

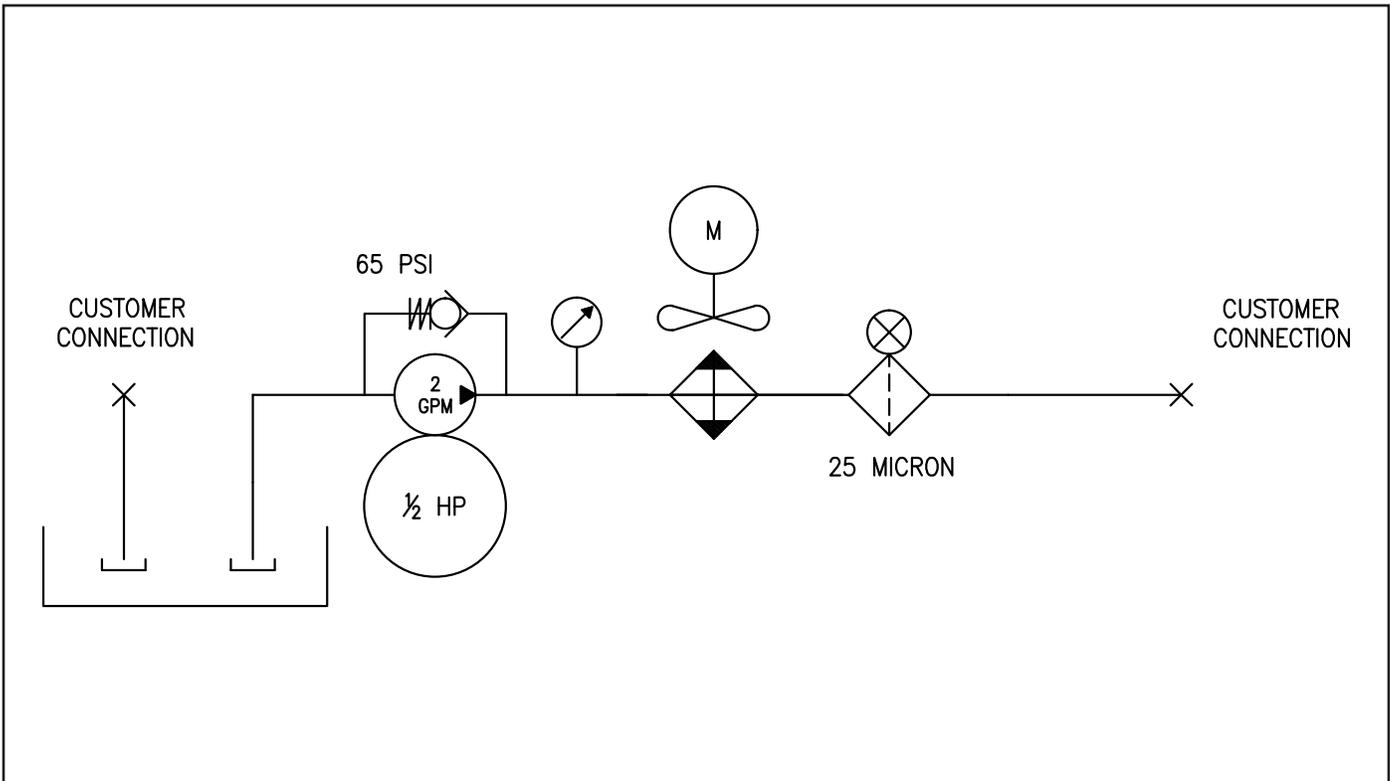
# Specifications

## AIR COOLED UNIT SCHEMATICS

### 1 GPM Air Cooled Units



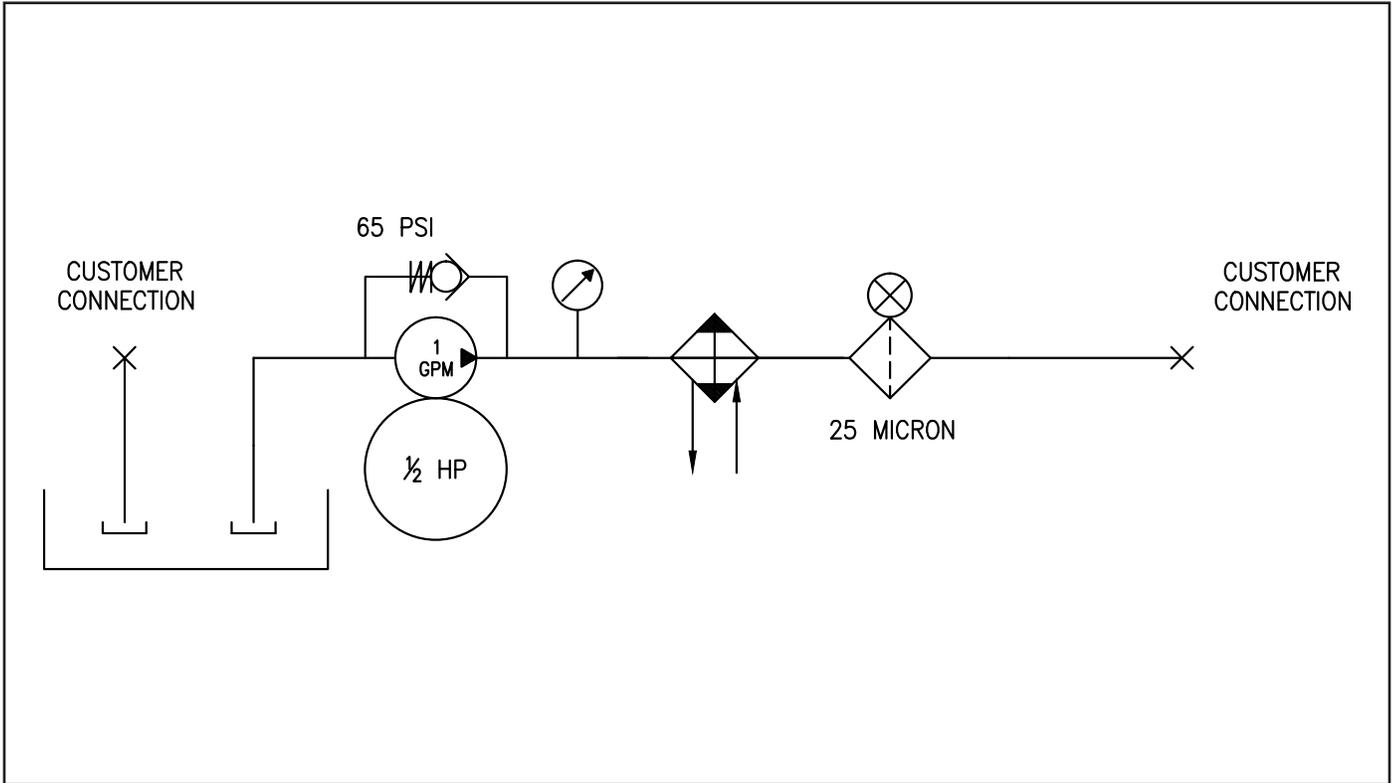
### 2 GPM Air Cooled Units



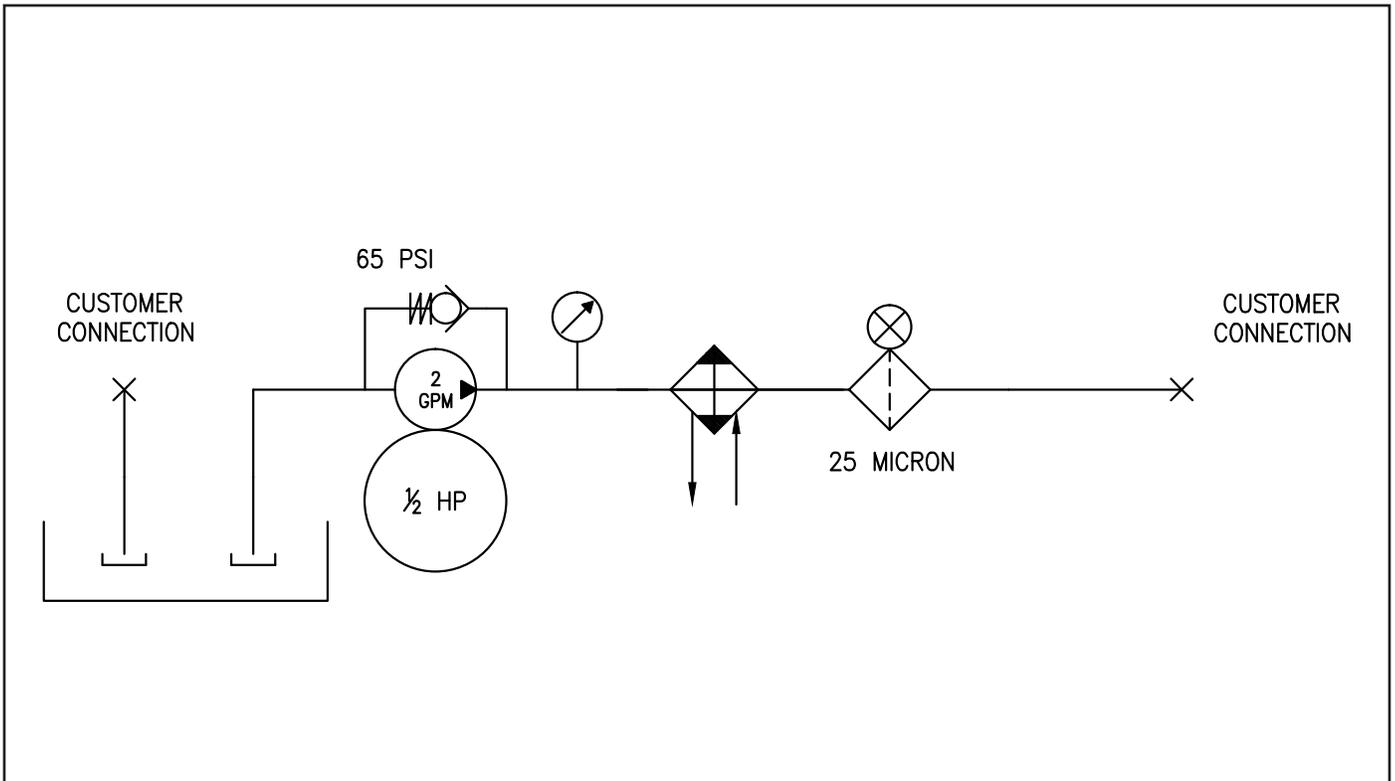
# Specifications

## WATER COOLED UNIT SCHEMATICS

### 1 GPM Water Cooled Units



### 2 GPM Water Cooled Units



# Specifications

## FLUID POWER FORMULAS

FORMULA FOR	FORMULA
<b>CYLINDER AREA</b> (IN SQUARE INCHES)	$A = \pi r^2$
<b>CYLINDER FORCE</b> (IN POUNDS, PUSH OR PULL)	$A = \frac{\pi}{4} \times D^2$
	$FORCE = PRESSURE (psig) \times NET AREA (sq inches)$
<b>CYLINDER VELOCITY OR SPEED</b> (IN FEET/SECOND)	$VELOCITY = \frac{231 \times FLOW RATE (gpm)}{12 \times 60 \times NET AREA (sq inches)}$
<b>CYLINDER VOLUME CAPACITY</b> (IN GALLONS OF FLUID)	$VOLUME = \frac{\pi r^2 (inches) \times STROKE (inches)}{231}$
	$VOLUME = \frac{NET AREA (sq inches) \times STROKE (inches)}{231}$
<b>CYLINDER FLOW RATE</b> (IN GALLONS PER MINUTE)	$FLOW RATE = \frac{12 \times 60 VELOCITY \left(\frac{feet}{sec}\right) \times NET AREA (sq inches)}{231}$
<b>FLUID MOTOR TORQUE</b> (IN INCH POUNDS)	$TORQUE = \frac{PRESSURE (psig) \times F.M. DISPLACEMENT (cu in/rev)}{2\pi}$
	$TORQUE = \frac{HORSEPOWER \times 63025}{RPM}$
	$TORQUE = \frac{FLOW RATE (gpm) \times PRESSURE (psig) \times 36.77}{RPM}$
<b>FLUID MOTOR TORQUE/100 PSIG</b> (IN INCH POUNDS)	$TORQUE/100 PSIG = \frac{F.M. DISPLACEMENT (cu inches/revolution)}{.0628}$
<b>FLUID MOTOR SPEED</b> (IN REVOLUTIONS/MINUTE)	$SPEED = \frac{231 \times FLOW RATE (gpm)}{FLUID MOTOR DISPLACEMENT (cu inches/revolution)}$
<b>FLUID MOTOR POWER</b> (IN HORSEPOWER OUTPUT)	$HORSEPOWER = \frac{TORQUE OUTPUT (inch pounds) \times RPM}{63025}$
<b>TORQUE REQUIRED</b> (IN INCH POUNDS)	$TORQUE = LEVER LENGTH (inches) \times PULL (pounds)$
<b>NET AREA OF PISTON</b> (IN SQUARE INCHES)	$AREA = ID^2 (inches) \times .7854$

# Specifications

## HYDRA-OIL LUBRICANT INFORMATION

Hydra-Oil is specially formulated to maximize performance of Hydra-Cell pumps.

- Reduce wear
- Withstand extreme temperature changes
- Improve pump performance
- Extend pump life
- Maintain consistent viscosity
- Withstand extreme pressures

### STANDARD GRADES

#### 10W30 (Order Code A)

For lower temperature and lighter loads; maintains viscosity over a wide temperature range and with repeated startups.

#### 40-Weight (Order Code B)

For continuous use at higher loads and temperatures; provides exceptional wear resistance and film thickness.

### SYNTHETIC GRADES

Hydra-Oil synthetic grades are a blend of synthesized hydrocarbon fluids that provide pure chemicals and a heavier, more protective oil film for bearings and pistons.

#### 5W30 (Order Code G)

For stable protection in cold temperatures or severe duty.

#### 15W50 (Order Code H)

For stable protection in high temperatures or severe duty.

### FOOD GRADE (Order Code E / F or K)

The Hydra-Oil food contact grade is specially formulated for food service industry applications. Hydra-Oil SFGO grade 100 is USDA H-I authorized, certified OU Kosher, and complies with the requirements of FDA 21 CFR 178.3570 and FDA 21 CFR 172.882. This lubricant is a polyalphaolephin based synthetic (PAO) and is suggested for use on equipment in which there may be incidental contact with an edible product.

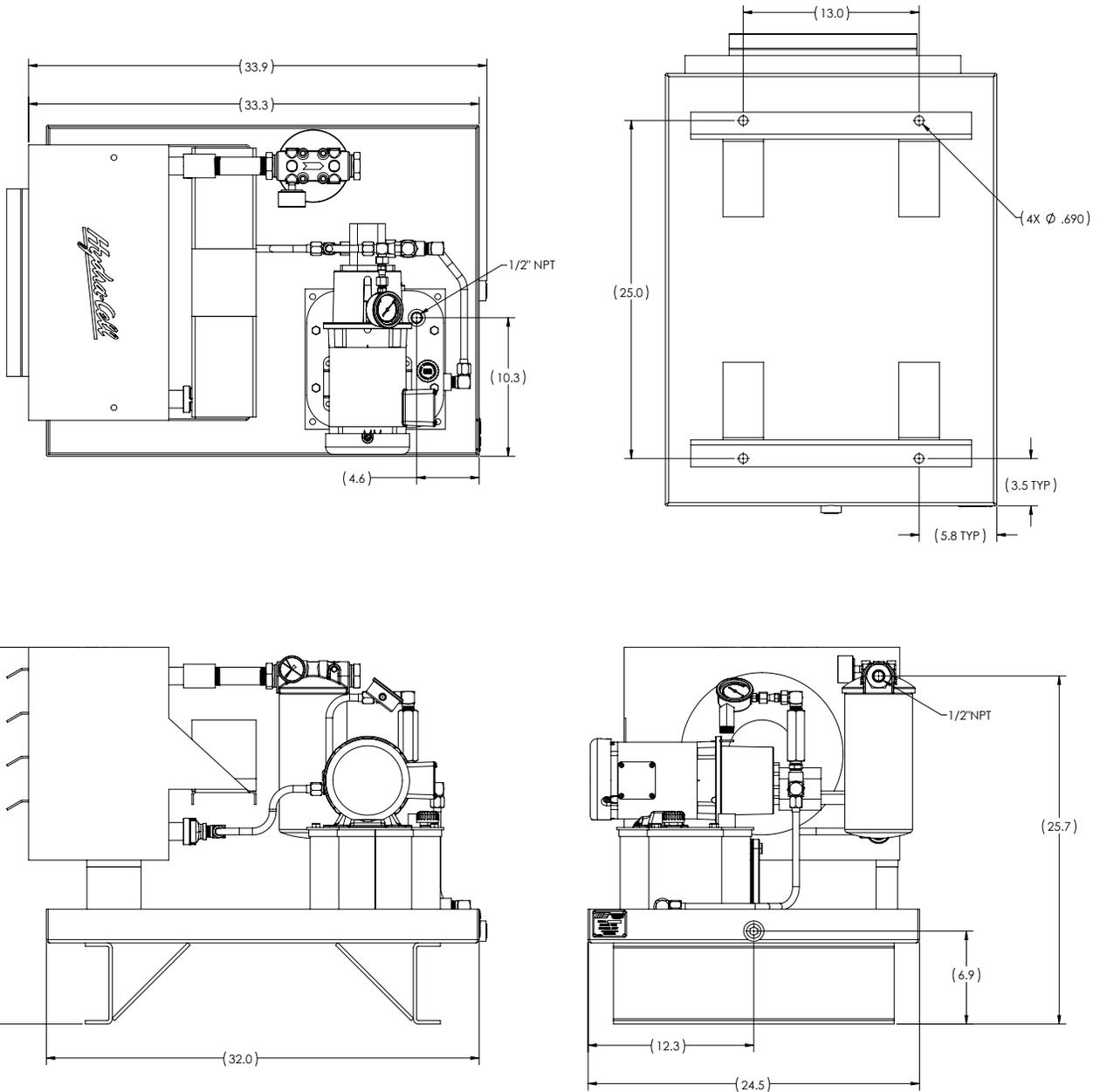
### EPDM-COMPATIBLE GRADES (Order Code J / C / D)

Hydra-Oil EPDM-compatible grades must be used in all Hydra-Cell pumps containing EPDM diaphragms. These CP-100/ 150F lubricants are a custom blend of polyalkylene glycols with additives for oxidation stability, corrosion protection, and high-viscosity index. Low solubility with many different hydrocarbons provides for excellent lubricity. Hydra-Oil EPDM-compatible grades are available in 20-weight (Order Code J) and 30/40- weight (Order Code C or D) and comply with FDA 21 CFR 178.3510 (lubricants with Incidental Food Contact).

HYDRA-OIL CHARACTERISTICS	STANDARD GRADE		SYNTHETIC GRADE		FOOD GRADE	EPDM GRADE
	10W30	40W	5W30	15W50	SFGO-100	20W
Order Code Letter	A	B	G	H	E / F or K	J / C / D
Gravity, API @60°F (16°C)	31.1	28.7	30.4	30.2	36.9	N/A
Flash Point °F (°C)	400 (204)	430 (221)	445 (229)	470 (243)	450 (232)	500 (262)
Fire Point ° F (°C)	440 (227)	470 (243)	N/A	N/A	500 (260)	530 (277)
Pour Point °F (°C)	30 (-34)	10 (-12)	-65 (-54)	-55 (-48)	-45 (-43)	-40 (-40)
Viscosity: SUS @ 100°F (38° C)	360	811	265	556	570	464
Viscosity: SUS @ 210°F (99° C)	63	85	60	90	71	94.3
Viscosity Index (99°F)	148	107	165	170	120	223
Specific Gravity	0.88	0.89	N/A	N/A	N/A	0.992

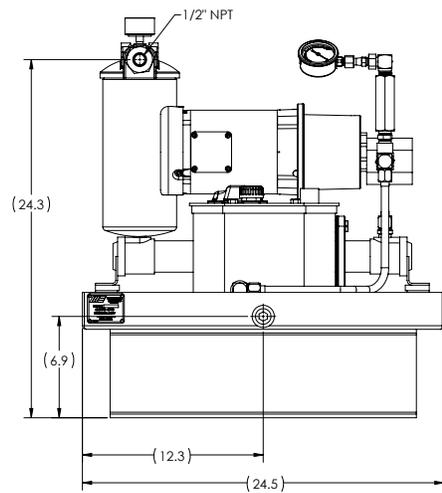
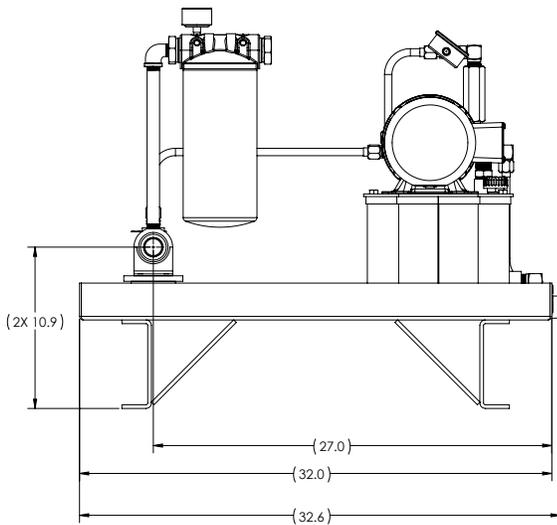
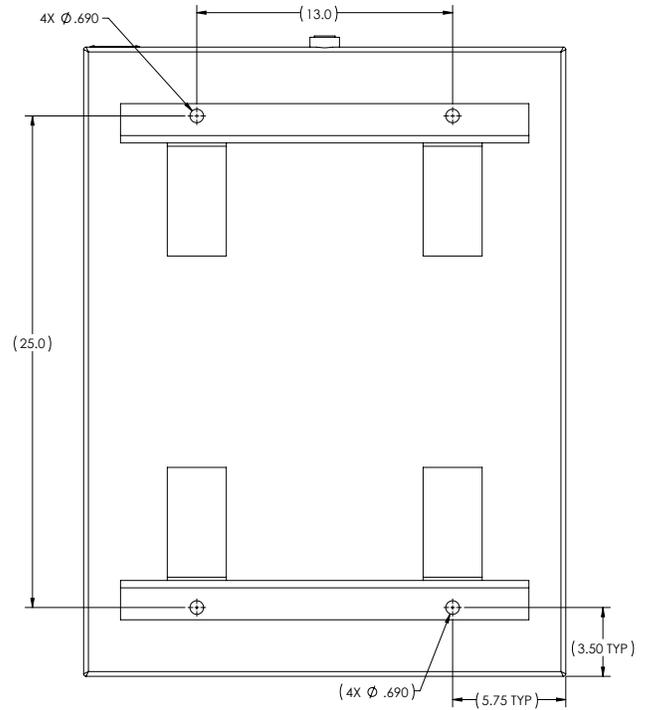
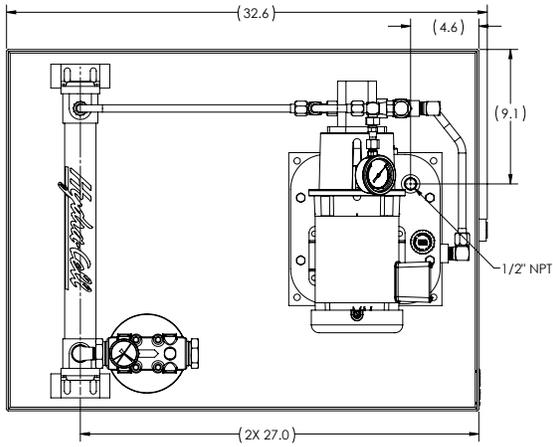
# Representative Drawings

## AIR COOLED UNIT REPRESENTATIVE DRAWINGS



# Representative Drawings

## WATER COOLED UNIT REPRESENTATIVE DRAWINGS



# Installation

## INSTALLATION

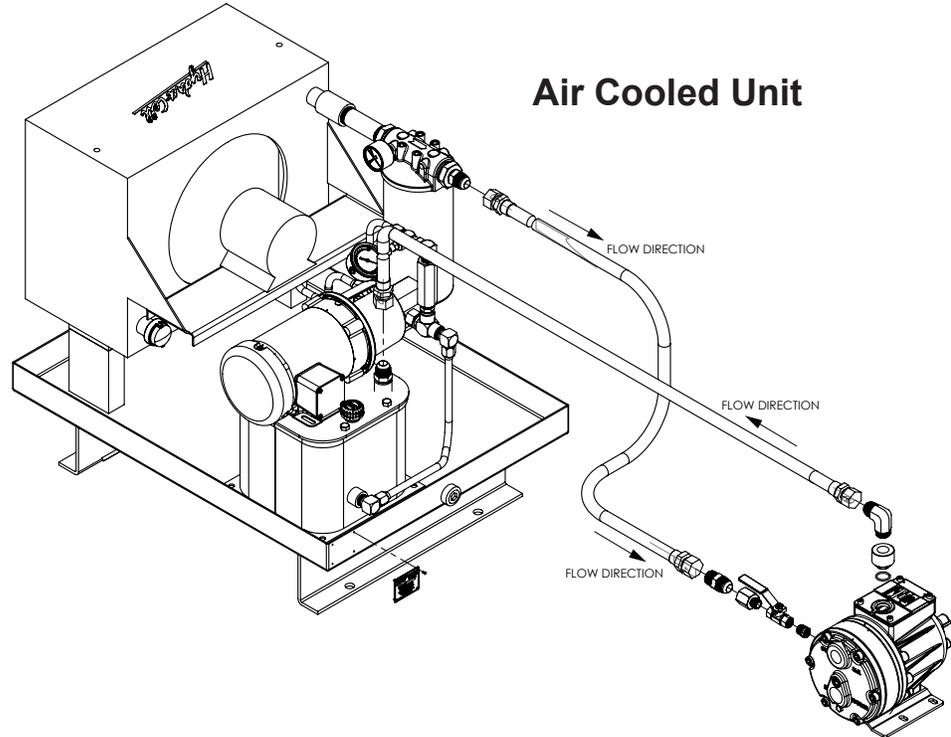
### Inspection

Visually inspect power unit components for possible damage from shipping and handling. Check mounting bolts, fittings, and hose connections for tightness.

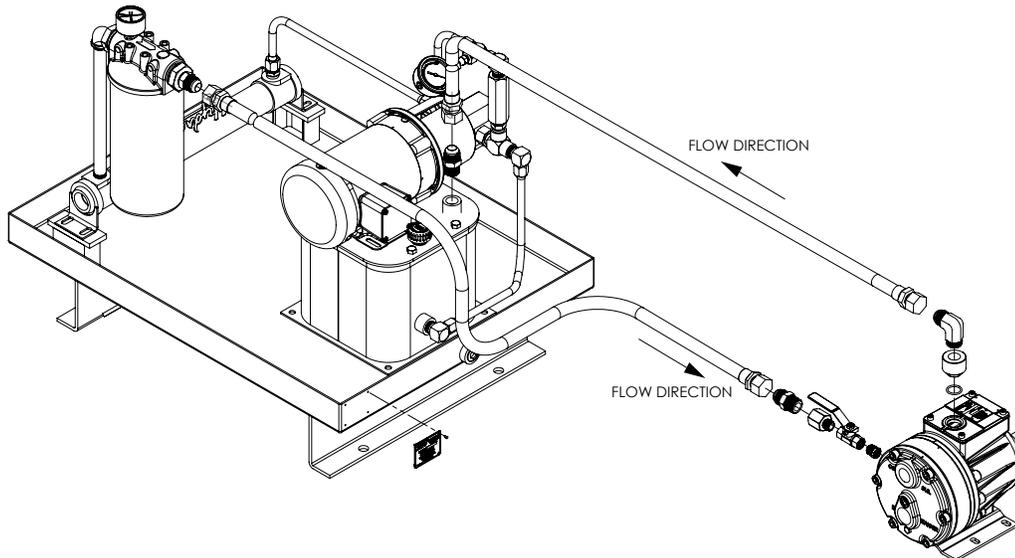
### Location

Install power unit allowing for free circulation of air around the tank at all times. The power unit and pump must be mounted at the same elevation, on a level foundation and securely anchored.

### Installation Diagram



### Water Cooled Unit



# Installation

## SPECIFICATIONS

OPTION	DESCRIPTION
1 GPM Gear Pump Option	D03, D04, D10, D15 & H25 Hydra-Cell Pumps
2 GPM Gear Pump Option	D35, D40, D66, T100 & Q155 Hydra-Cell Pumps
Motor Option	TEFC, 230/460V, 3PH, 60 Hz & 190/380 volt, 3 PH, 50 Hz: 1/2-hp pump; 1/4-hp fan (air cooled version only)
	Explosion-proof, 230/460V, 3 PH, 60 Hz, DIV 1, Class 1 Gr D & Class II Gr F & G: 1/2-hp pump; 1/4-hp fan (air cooled version only)
	65 PSI Check Valve
	200 PSI Pressure Gauge
	Drip Stand
	Dirty Filter Indicator
	25 Micron Filter Element
	2 Gallon Reservoir
	Oil Cooler
	Highly recommended tubing/hose internal diameter (I.D.) 3/4 inch

## START UP INFORMATION

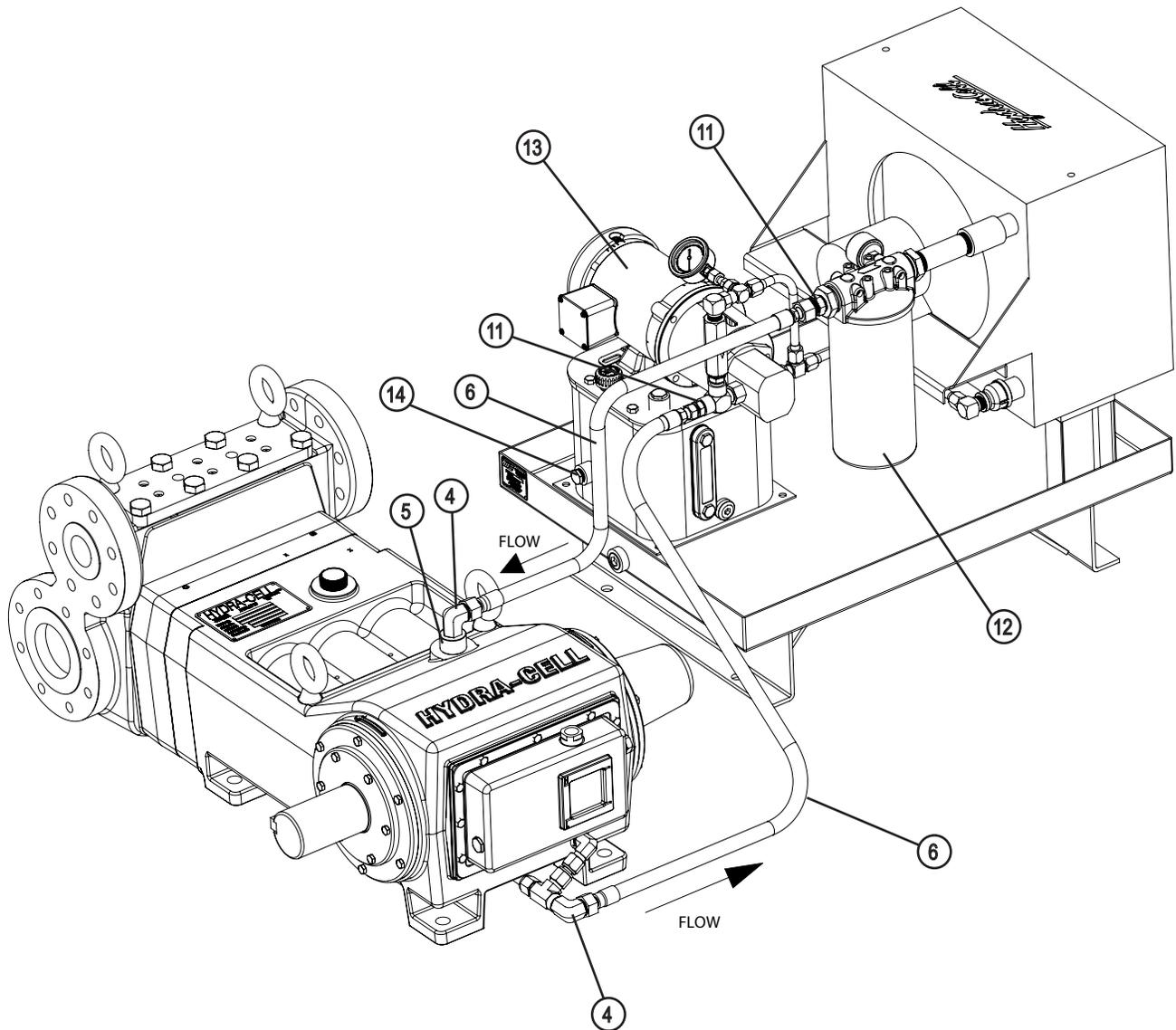
- Fill reservoir with proper oil fluid and maintain level within the visibility of sight gauge. Filter all hydraulic fluid when filling system reservoir and pump case drain to 10 micron or better.
- Open suction ball valve (handle in-line with piping) if applicable. The suction ball valve is located on pump outlet. Failure to open suction ball valve during start up will result in an overheated pump and premature pump bearing failure may result.
- Connect electric motors to proper electrical supply. Care should be taken to verify correct line voltage at this time. It is very helpful to wire the cooling motors separate from the pump to be cooled. This allows the cooling motors to run separately to purge the air from the cooling system prior to operating the pump requiring a cooler.
- Reduce system pressure settings. On fixed displacement pumps reduce pressure setting on relief valve. The unit should be started under a no-load condition with directional valves open to tank.
- Jog the electric motor to check pump rotation. The rotation is indicated on the pump motor adapter by means of a sticker displaying rotation or located on the pump nameplate. After establishing correct rotation, continue to jog the electric motor until primed.
- After priming, let the power unit continue to run eliminating entrapped air from pump. The pump will be noisy until all entrapped air is purged from pump.
- Verify the pressure gauge on the discharge of the gear/oil circulating pump is less than 60 psi. If the pressure is high, the plumbing lines between the cooler and the Hydra-Cell pump may be too small or a restriction in the line.
- Cycle machine to eliminate air in the complete hydraulic system.
- After cycling machine, turn off power unit and check oil level on reservoir sight gauge, adding oil as required.



# Parts Identification

## FOR T & Q SERIES AIR COOLED UNIT PARTS IDENTIFICATION

Ref. No.	Part Number	Description	Quantity/ Pump
4	142-916	Elbow.....	2
5	142-902	Fill Cap .....	1
6	142-914	Hose, 3/4" I.D. ....	2
11	142-915	Adapter, 3/4" JIC to 1/2" NPT .....	2
12	142-900	Filter, 25 micron.....	1
13	142-912	Motor, 1/2 HP .....	1
	142-913	Motor, 1/2 HP, Explosion Proof .....	1
14	142-918	Plug, Hex, 1/2" NPT .....	1

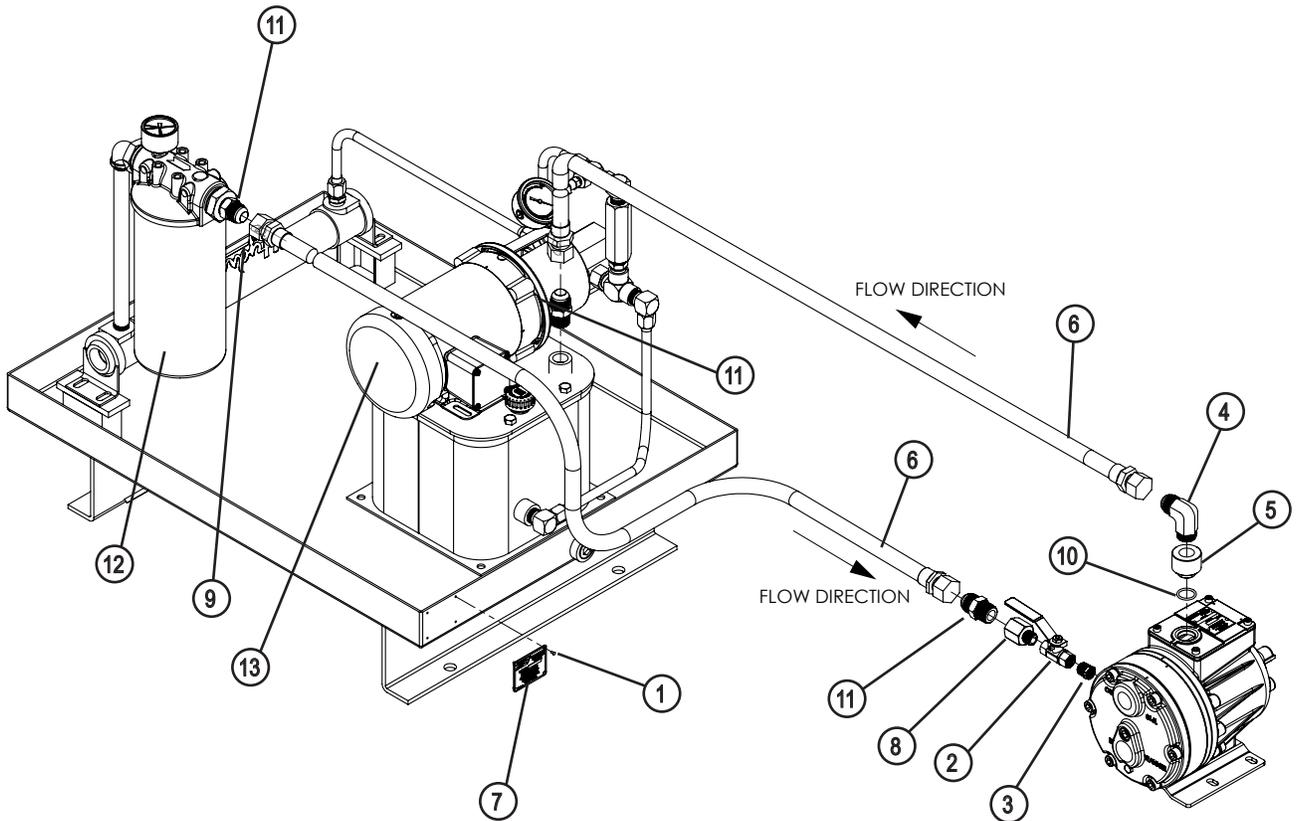


# Parts Identification

## WATER COOLED UNIT PARTS IDENTIFICATION

Ref. No.	Part Number	Description	Quantity/ Pump
1	D10-112-2200	Rivet .....	4
2	142-907	Valve.....	1
3	142-908	Adapter, 3/8" NPT to 1/4" NPT .....	1
4	142-916	Elbow.....	1
5	142-902	Fill Cap .....	1
6	142-914	Hose, 3/4" I.D .....	2
7	142-905	ID Plate.....	1
8	142-917	Reducer, 1/2" NPT to 3/8" NPT .....	1

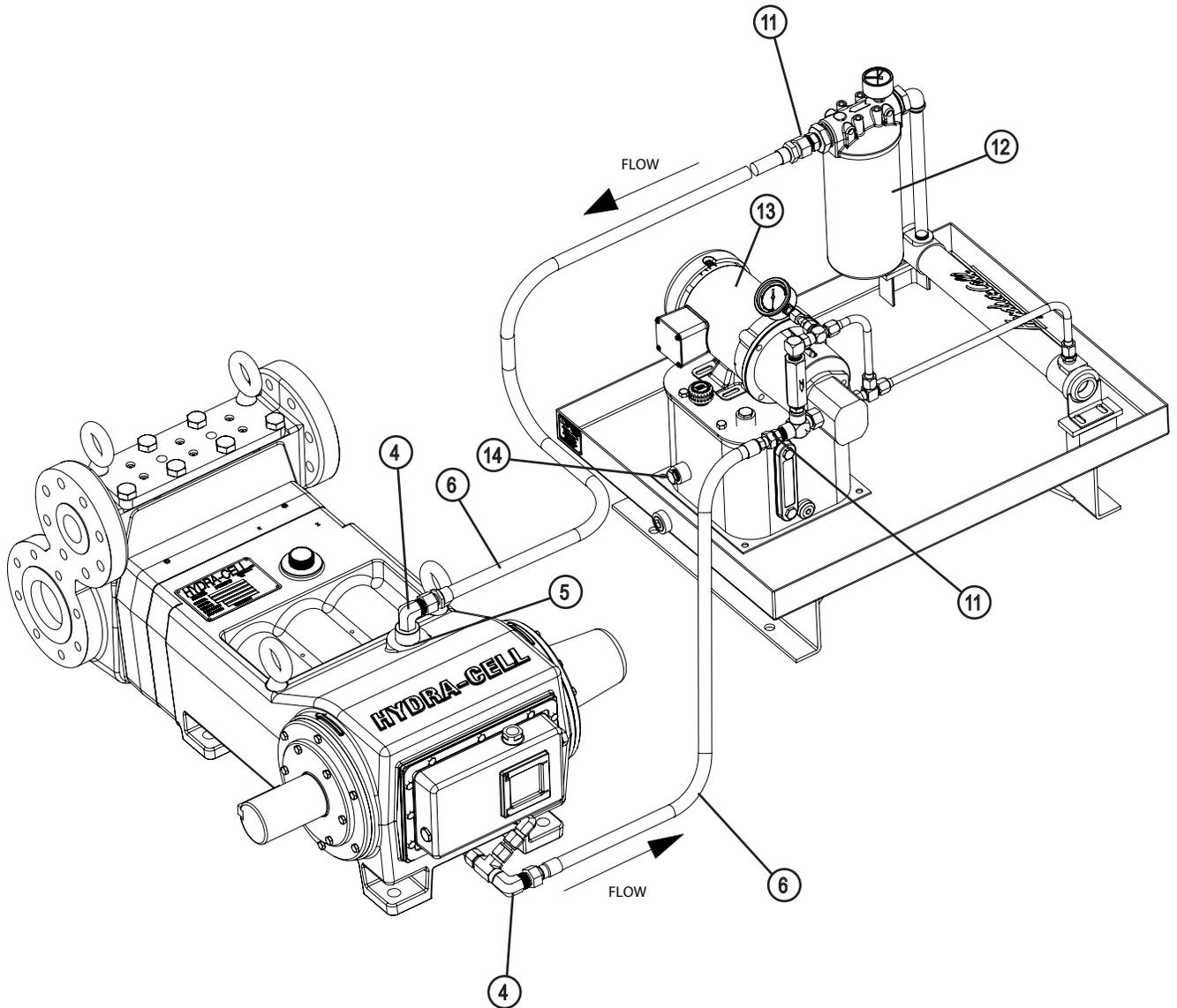
Ref. No.	Part Number	Description	Quantity/ Pump
9	142-901	Label.....	1
10	D10-080-2110	O-Ring.....	1
11	142-915	Adapter, 3/4" JIC to 1/2" NPT .....	3
12	142-900	Filter, 25 micron.....	1
13	142-912	Motor, 1/2 HP .....	1
	142-913	Motor, 1/2 HP, Explosion Proof .....	1



# Parts Identification

## FOR T & Q WATER COOLED UNIT PARTS IDENTIFICATION

Ref. No.	Part Number	Description	Quantity/ Pump
4	142-916	Elbow.....	2
5	142-902	Fill Cap .....	1
6	142-914	Hose, 3/4" I.D. ....	2
11	142-915	Adapter, 3/4" JIC to 1/2" NPT.....	2
12	142-900	Filter, 25 micron.....	1
13	142-912	Motor, 1/2 HP .....	1
	142-913	Motor, 1/2 HP, Explosion Proof .....	1
14	142-918	Plug, Hex, 1/2" NPT .....	1



# Maintenance

---

## LUBRICATION

### **IMPORTANT**

Fluid such as engine oil, hydraulic fluid, coolants, grease, etc. must be disposed of in an environmentally safe manner. Some regulations require that certain spills and leaks on the ground must be cleaned in a specific manner. See local, state and federal regulations for the correct disposal method.

---

Hydraulic pumps are self-lubricating.

Preventive maintenance is limited to keeping system fluid clean, by changing filters frequently. The below recommendations are a minimum requirement. Some applications dictate more frequent intervals due to environmental conditions.

#### *Return Line Filters And Pressure Filters*

All filters should be changed a minimum of two times per year or upon the visual or electrical indicator signaling otherwise.

#### *Suction Strainer*

The suction strainer (immersed below oil level in reservoir) should be cleaned once a year or every 4000 operating hours.

The suction strainer should be removed from reservoir and cleaned with compressed air, blowing from inside out. If there are holes in the mesh or if there is mechanical damage, the strainer should be replaced.

### **IMPORTANT**

Verify that all suction or inlet piping and fittings are tight and in good condition, to prevent air from being introduced to the pump.

---

#### *Reservoir Filler / Air Breather Assembly*

Change or clean the reservoir filler / air breather assembly once a year or every 4000 hours. The filler / air breather assembly filters all air drawn into the reservoir.

### **CAUTION**

Failure to change or clean this filter can result in pump failure.

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#### *Electric Motor*

Keep electric motor clean and dry.

**NOTE:** In the event the pump does not perform properly or a malfunction occurs, (See “TROUBLESHOOTING” on page 17).

# Maintenance

## TROUBLESHOOTING



Instructions are necessary before operating or servicing equipment. Read and understand this Installation & Service Manual. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.

**NOTE:** If a problem is encountered that is difficult to solve, even after having read through this troubleshooting section, please contact Wanner Engineering (612-332-5681) for more details. Before you call, please have this ISM and the serial number of your pump at hand.

Problem	Probable Cause	Fault Needing Remedy
Noisy pump.	Air in fluid.	Check suction line for leaks. Repair as needed.
	Shaft seal leaking.	Replace shaft seal.
	Low fluid level.	Check fluid level.
	Return lines above fluid level.	Lower return lines.
	Gas leak from accumulator.	Repair as needed.
	Excessive pressure drop in the inlet line from a pressured reservoir	Relieve pressure in reservoir.
	Suction line strainer acting as an air tap.	Replace strainer.
	Fluid too cold.	Allow fluid to warm up, prior to operating.
	Fluid too heavy.	Change fluid. See specifications.
	Shaft speed to high.	Decrease motor RPM.
	Suction line too small.	Replace suction line, 3/4" I.D.
	Suction line collapsed.	Replace suction line, 3/4" I.D.
	Suction strainer too small.	Replace strainer.
	Suction strainer too dirty.	Clean or replace strainer.
	Misaligned shaft.	Check shaft alignment.
	Faulty coupling.	Replace coupling.
	Piston & shoe looseness or failure.	Repair or replace pump.
	Bearing failure.	Replace bearing.
Incorrect port plate selection or index eroded or worn parts in the displacement control.	Check for worn or damaged parts. Repair or replace as needed.	

# Maintenance

## TROUBLESHOOTING

Problem	Probable Cause	Fault Needing Remedy
Erosion on barrel ports & port plate.	Air in fluid.	Refer to above.
	Cavitation.	Refer to above.
High wear in pump.	Excessive loads.	Reduce speeds or pressure settings.
	Contaminated fluid.	Drain and replace fluid.
	Dirty filters.	Replace filters.
	Fluid too thin or thick.	Drain and replace fluid.
	Water in fluid.	Replace breather / strainer.
		Check heat exchanger for leakage. Repair or replace as needed.
Replace make- up fluid.		
Pressure shocks.	Clogging.	Clear obstructions.
	Slow acting relief valve.	Replace relief valve.
	Worn relief valve.	Replace relief valve.
	Slow response in check valves.	Replace check valve.
	Faulty accumulator.	Replace accumulator.
Decrease in set pressure.	Defective function or relief valves.	Overhaul or replace.
	Lowering of tank oil level.	Repair or replace relief valve and fill fluid.
		Check drain flow (below 5% of discharge at rated pressure).
Pressure does not rise.	Pump rotating in wrong direction.	Change pump rotating direction.
	Fluid too low.	Add fluid.
	Strainer dirty.	Clean strainers.
Insufficient flow.	Fluid too low.	Add fluid.
	Suction line leaking.	Repair or replace suction line, 3/4" I.D.
	Pump operating too fast/ slow.	Adjust pump RPM.

# Maintenance

## TROUBLESHOOTING

<b>Problem</b>	<b>Probable Cause</b>	<b>Fault Needing Remedy</b>
Heating of fluids.	Excessive pump leakage.	Check case drain flow & repair as needed.
	Fluid too thin.	Drain and replace fluid.
	Improper assembly, port timing.	Check assembly and correct as needed.
	Relief valve set too low.	Reset relief valve.
	Worn or damaged parts.	Repair or replace as needed.
	Too little or no water flow.	Check water flow.
	Fan clogged or restricted.	Check fan and clean as needed.
	Mud or scale deposits.	Remove mud and scale from system.
	Too little fluid in reservoir.	Check fluid level.
	Air in fluid.	Bleed air from system.
	Improper baffles.	Check and replace baffles.
	Heat pickup from adjacent equipment.	Adjust oil cooler position.

# Reference

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## RADIATOR

### Standard Features:

- Young Interchange – OCH.
- Adjustable Louvers.
- Medium Flow Rates.
- Moderate Heat Removal.
- One or Two Pass.

### Materials:

- Copper Tubes.
- Aluminum Fins.
- Steel Turbulators.
- Aluminum Fan Blades W / Steel Hub.
- Zinc Plated Steel Fan Guard.
- Steel Cabinet W / Baked Enamel Finish.
- Steel Manifolds.
- Steel Connections.

### Standard Uses:

- 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.

# Reference

## GEAR PUMP (AP100)

### Product Range

Displacements range from 0.152 in<sup>3</sup>/rev to 0.262 in<sup>3</sup>/rev.

### Suction

The absolute suction pressure must be 11 PSI. It is also advisable to choose a filter of suitable size to minimize any pressure drop and to take measures to prevent gradual clogging over time.

### Recommended Fluids/Allowed Temperatures

Mineral oil based hydraulic fluids that comply with ISO/DIN standards is recommended.

### Optional Items

The following items are also available (consult factory).

- Spline Shafts
- Left Hand Rotation (CCW)
- Viton Seal Kits

### AP100 GEAR PUMP

#### Viscosity Range

Recommended	100 to 500 SUS
Permitted	up to 3000 SUS

#### Operating Temperature

Buna N Seal	5° to 176° F
	-15° to 80° C
Viton Seal	14° to 248° F
	-10° to 120° C

#### Displacement (in<sup>3</sup>/rev)

AP10025D880	.152
AP10043D880	.262

#### Flow (gpm)

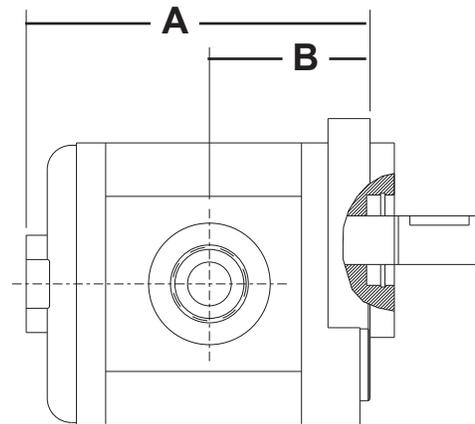
AP10025D880	@1725 rpm	1.136
	@3450 rpm	2.272
AP10043D880	@1725 rpm	1.136
	@3450 rpm	3.917

#### Maximum Pressure (psi)

AP10025D880	Continuous	3000
	Intermittent	3600
	Peak	4000
AP10043D880	Continuous	3000
	Intermittent	3300
	Peak	3600

#### Maximum Speed (rpm)

AP10025D880	5000
AP10043D880	4000



#### Dimensions

AP10025D880	A	in	3.50
		mm	89.00
	B	in	1.65
		mm	42.00
AP10043D880	A	in	3.82
		mm	97.00
	B	in	1.81
		mm	46.00

AP100 Gear pumps are widely used in modern hydraulic systems due to their high performance, long service life and low purchase and maintenance costs. The essential components of the AP100 series external gear pumps are an aluminum alloy body and two gearwheels, supported by plain bearings.

#### Standard Features

- High overall efficiency thanks to optimized hydraulic compensation.
- Design and materials that guarantee excellent technical specifications and long life service.
- Recommend using only mineral oil-based hydraulic fluids that comply with the ISO/DIN standards.
- Buna N Seal.

#### Suction

- Absolute suction pressure must be 11 PSI.
- It is also advisable to choose a filter of a suitable size to minimize any pressure drop and to take measures to prevent gradual clogging over time.

# Reference

## AIR COOLED SPECIFICATIONS

### 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



### Ratings

- \*Operating Pressure - 300 psi
- \*Test Pressure - 300 psi
- \*Operating Temperature - 400° F

### Materials

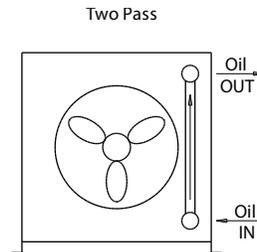
- Tubes Copper
- Fins Aluminum
- Turbulators Steel
- Fan Blade Aluminum with steel hub
- Fan Guard Zinc plated steel
- Cabinet Steel with baked enamel finish
- Manifolds Steel
- Connections Steel

### Weights

MODEL	Net Weight (LBS)
AO-15	72
AO-20	86

### Two Pass (Low to Medium Oil Flows)

MODEL NUMBER	Flow Range GPM (USA)
AOR-15-2	2 - 30
AOR-20-2	2 - 40



NOTE: Ratings for operating pressure, test pressure and operating temperature, apply to air cooled oil cooler ONLY.

\* Wanner Engineering does not imply running Hydracell pumps at above listed specifications. Refer to Hydracell manuals for correct running temperatures and specifications or call 1-800-332-6812 for further assistance.

# Reference

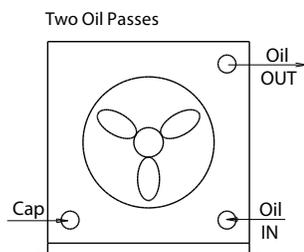
## AIR COOLED SPECIFICATIONS

### DIMENSIONS

Model	A	B	C	D	E	F	G	H	J	K	L	M NPT	M SAE	N	P	T
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"	#16 SAE 1-5/16-12UN-2B Thread	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 1-5/8-12UN-2B Thread	10.28	20.56	—

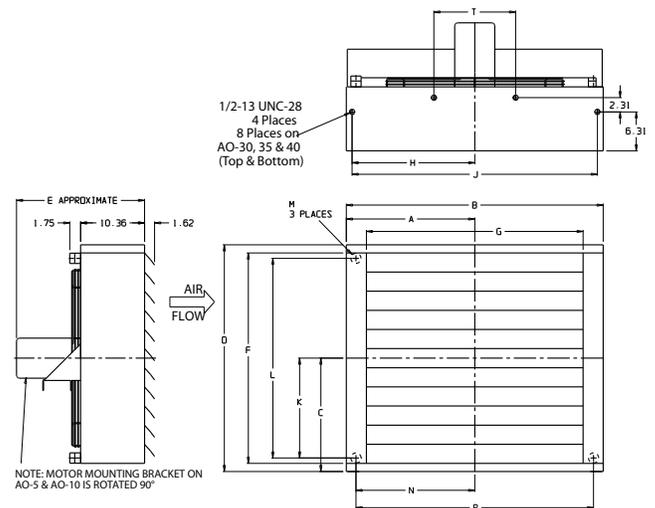
NOTE: All dimensions in inches.

### Installation Piping Diagram



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

### Fan Rotation Clockwise/Facing Motor Shaft



# Reference

## HEAT EXCHANGER SPECIFICATIONS

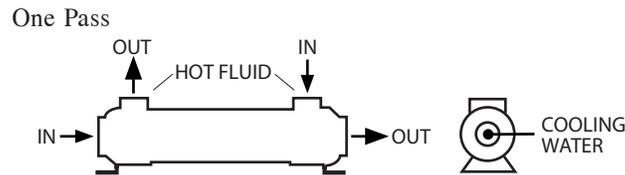
### Features:

- Young Touchstone thermal Interchange
- Competitively priced
- 1/4" or 3/8" tubes available
- Water to water applications
- Sea water applications
- NPT, SAE O-Ring, SAE flange or BSPPP shell side connections available
- End bonnets removable for servicing
- Mounting feet included (may be rotated in 90° increments)



Ratings	Materials	Weights	
Maximum Operating Pressure - Shell Side 250 PSI	Tubes Copper	MODEL	Net Weight (LBS)
Maximum Operating Pressure - Tube Side 150 PSI	Hubs & Tubesheets Steel or brass	SB-402-A4-0	10
Maximum Operating Temperature 350°F	Shell Steel or brass		
	Baffles Brass		
	End Bonnets Cast iron		
	Mounting Brackets Steel		
	Gaskets Nitrile rubber/cellulose fiber		
	Nameplate Aluminum foil		

### Piping Diagram

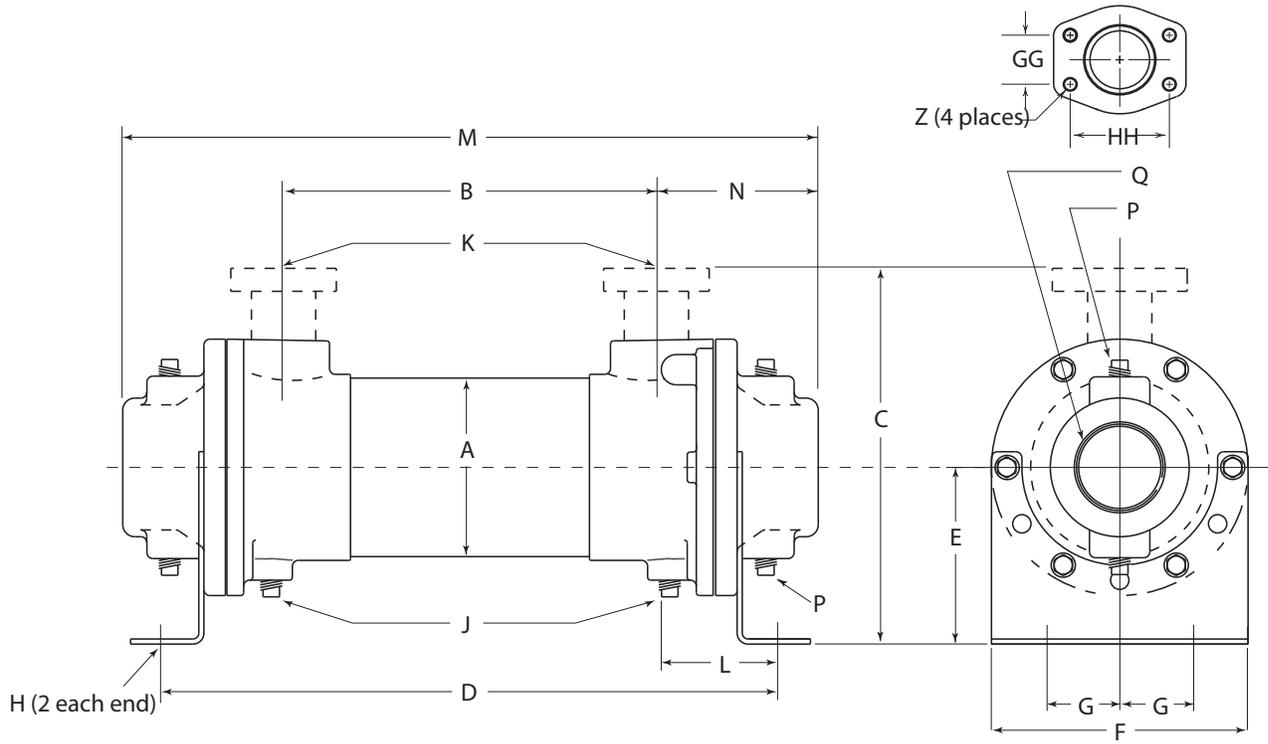


# Reference

## HEAT EXCHANGER SPECIFICATIONS

### DIMENSIONS

One Pass



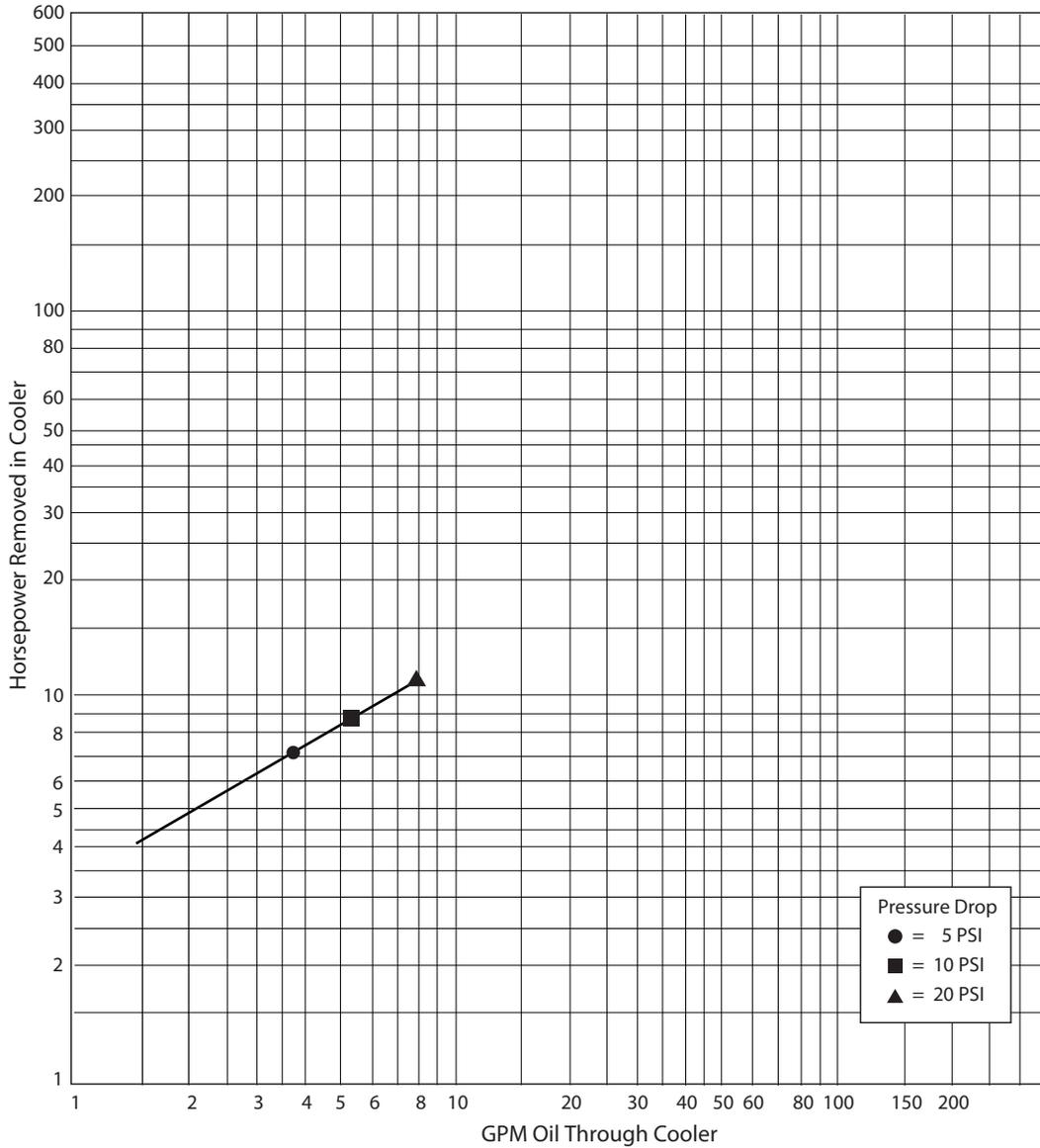
Flange Size	GG	HH	Z-CF	Z-CFM
1	1.03	2.06	3/8-16 UNC	M-10
1.50	1.41	2.75	1/2-13 UNC	M-12
2	1.69	3.06	1/2-13 UNC	M-12
3	2.44	4.19	5/8-11 UNC	M-16

Model	A	B	C		D	E	F	G	H	J	K		L	M	N	P NPT	Q NPT
			NPT/BSPP SAE O-RING	SAE Flange							NPT/ BSPP Flange	SAE O-Ring					
B-402	2.125	16.62	3.50	—	20.01	1.94	2.62	.88	.41 Dia.	—	*.50	UNF-2B	1.72	20.24	1.81	—	1.00

# Reference

## HEAT EXCHANGER SPECIFICATIONS

### PERFORMANCE CURVES



### Maximum Flow Rates

Example Model No.

B - 1003 - C4 - F

Unit Size	Shell Side (GPM)		Baffle Spacing		Tube Side (GPM)		
	A	B	C	D	O	T	F
400	9.6	—	—	—	25	—	—

Caution: Incorrect installation can cause this product to fail prematurely, causing the shell side and tube side fluids to intermix.

# Reference

## HEAT EXCHANGER SPECIFICATIONS

### SELECTION PROCEDURE

Performance Curves are based on 100SSU oil leaving the cooler 40 °F higher than the water temperature used for cooling. This is also referred to as a 40°F approach temperature. Curves are based on a 2:1 oil to water flow ratio. Curves are 1:1.

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.)

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

STEP 2. Determine Approach Temperature. Desired oil leaving cooler °F – Water Inlet temp. °F = Actual Approach (Max. reservoir temp.)

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

$$\text{Horsepower heat load} \times \frac{40}{\text{Actual Approach}} \times \frac{\text{Viscosity}}{\text{Correction A}} = \frac{\text{Curve Horsepower}}{\text{Horsepower}}$$

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 ▲ = 20 PSI Multiply pressure drop from curve by correction factor B found on oil viscosity correction curve.

### Oil Temperature

Oil coolers can be selected using entering or leaving oil temperatures.

Typical operating temperature ranges are:

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

### 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 (OilΔT) with this formula:

$$\text{Oil}\Delta\text{T} = (\text{BTUs/HR}) / (\text{GPM Oil Flow} \times 210).$$

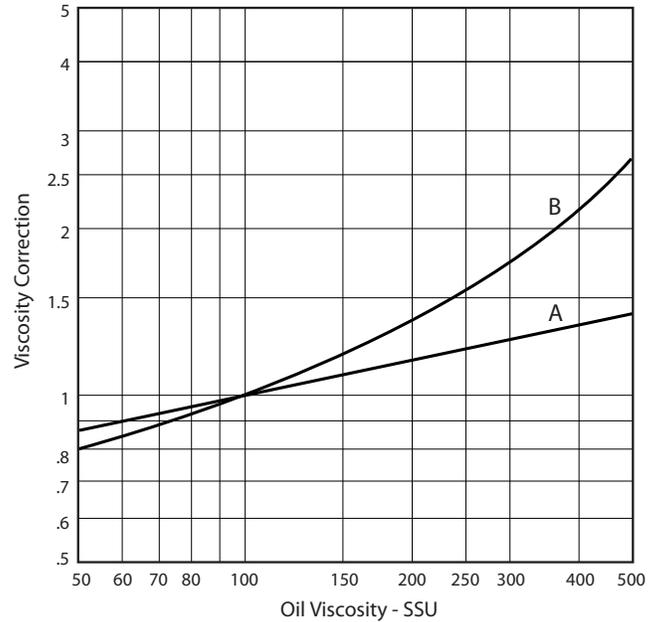
To calculate the oil leaving temperature from the cooler, use this formula:

$$\text{Oil Leaving Temp.} = \text{Oil Entering Temp.} - \text{Oil}\Delta\text{T}.$$

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.

### Viscosity Correction



## Limited Warranty

Wanner Engineering, Inc. ("Wanner") extends to the original purchaser of equipment supplied or manufactured by Wanner and bearing its name, a limited one-year warranty from the date of purchase against defects in material or workmanship, under normal use and service, and provided the equipment is installed, operated and maintained in accordance with instructions supplied by Wanner. Wanner will repair or replace, at its option, defective parts without charge if: (a) you provide written notice of any defect within thirty (30) days from the discovery of the defect; (b) the claim is received by Wanner before the expiration of the warranty period; and (c) such parts are returned with transportation charges prepaid to Wanner Engineering, Inc., 1204 Chestnut Avenue, Minneapolis, Minnesota 55403. A return goods authorization must be received prior to the return of the defective part. No allowance will be made for repairs undertaken without Wanner written consent or approval.

Notwithstanding anything to the contrary, this warranty does not cover:

1. Electric motors (if applicable) not manufactured by Wanner. The warranties, if any, on such equipment are assigned to you by Wanner (without recourse) at the time of purchase.
2. Normal wear and/or damage caused by or related to abrasion, corrosion, abuse, negligence, accident, faulty installation or tampering which impairs normal operation.
3. Transportation costs.

This limited warranty is exclusive, and is in lieu of any other warranties (oral, express, implied or statutory) including, but not limited to, implied warranties of merchantability and fitness for a particular purpose; warranties of non-infringement; warranties arising from course of dealing or usage of trade or any other matter. Any descriptions of the equipment, drawings, specifications, and any samples, models, bulletins, or similar material used in connection with the sale of equipment are for the sole purpose of identifying the equipment and are not to be construed as an express warranty that the equipment will conform to such description. Any field advisory or installation support is advisory only. Every form of liability for direct, special, incidental or consequential damages or loss is expressly excluded and denied. All liability of Wanner shall terminate one (1) year from the date of purchase of the equipment.



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