ACCESSORIES

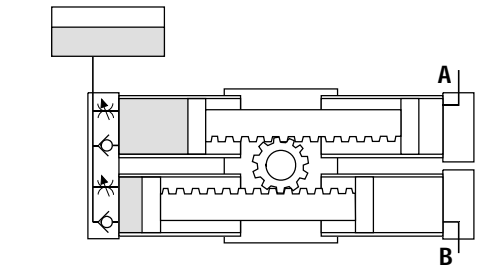
TANDEM OIL, AIR/OIL TANKS & RESERVOIRS

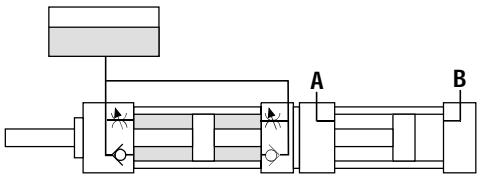
INDEX:

TANDEM OIL

BENEFITS

- Available in convenient half gallon containers for easy storage.
- Ensures proper oil is used when maintenance is done on PHD Air/Oil Tandem Actuators.
- Ideal for use with PHD Air/Oil Tanks for air over oil applications.
- Oil is shipped with all government required material safety data sheets.
- A video tape on tandem unit maintenance is available from PHD. Consult your local distributor or call 1-800-624-8511 to receive a copy.
- For use with PHD Tom Thumb® Air/Oil Tandem Cylinders and PHD Air/Oil Tandem Rotary Actuators, Multi-Motion Actuators, and Powered Slides.



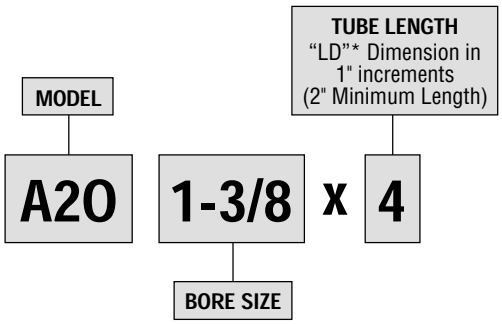


SPECIFICATIONS	TANDEM OIL
ORDER NUMBER	PHD Number 17811
CONTAINER SIZE	64 fluid oz (1.9 liters)
OIL TYPE	Paraffinic Petroleum Oil
VISCOSITY	150-160 SSU at 100°F
VISCOSITY INDEX	110 Minimum
POUR POINT	-30°F
FLASH POINT	380°F

AIR/OIL TANKS AND RESERVOIRS

ORDERING DATA

TO ORDER SPECIFY:
Model, Bore Size, and Tank Length ("LD" Dimension).

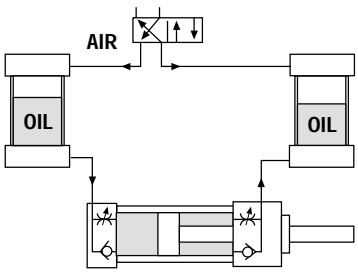


BENEFITS

- Air/Oil Tanks, pressurized by shop air, provide a simple source of power for low pressure hydraulic cylinders. They may be used as reservoirs and in conjunction with air/oil boosters.
- Systems of this type also offer the advantage of being self purging because the tanks must be mounted vertically at the highest point of the circuit.
- Tanks are capable of moderately fast cycle rates without foaming when care is taken to size the tank to the maximum expected flow rate.

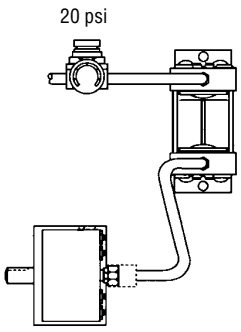
SPECIFICATIONS	A20 TANKS
BARREL	Transparent, Shatterproof Fiberglass
END CAPS	Aluminum Alloy
BAFFLES	Included on both caps
PORTS	NPT
MOUNTING	Bracket on each cap
FILL PORT	Included on top cap (NPT)

TYPICAL AIR/OIL TANK CIRCUIT



Circuit shows typical air/oil application*. Four-way valve feeds air alternately to tanks which in turn supply pressurized oil to hydraulic cylinder. Piston speed on hydraulic cylinder can be regulated as desired with Port Controls as shown, or external flow control valves.

***NOTE:** PHD recommends the use of an air/oil piston on units for this type of application. The standard piston and seal configuration will allow oil to transfer from one tank to the other.

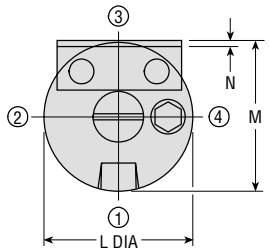


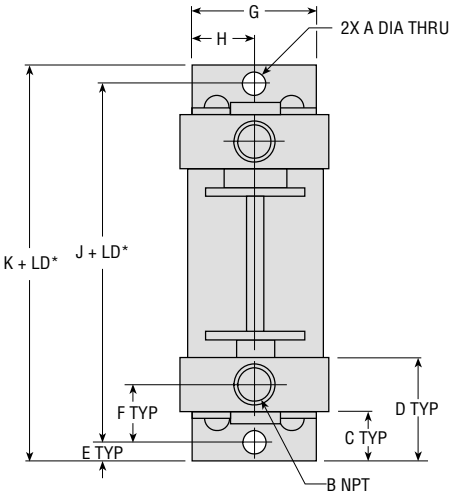
The reservoir serves as an accumulator to compensate for oil volume changes due to temperature variation. The reservoir should have 20 psi [1.3 bar] pressure at all times to ensure the system remains purged.

	RESERVOIRS	
SPECIFICATIONS	13459-xx-1	68397-xx-1
BARREL	Transparent, Shatterproof Fiberglass	
END CAPS	Aluminum Alloy	Aluminum
BAFFLES	Included on both caps	—
PORTS	NPT	BSP Connection
MOUNTING	Bracket on each cap	
FILL PORT	Included on top cap (NPT)	BSP

DIMENSIONS: AIR/OIL TANKS AND RESERVOIRS

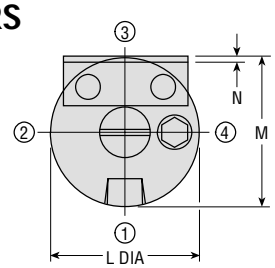
AIR/OIL TANKS

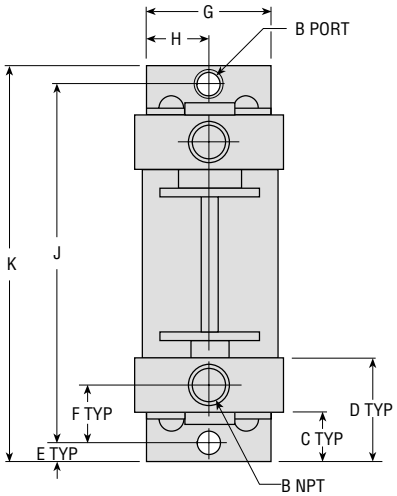




NOTES:
1) PORT POSITION INDICATED BY CIRCLED NUMBERS
2) TANKS ARE USED IN AIR/OIL APPLICATIONS AND ARE STROKE OR VOLUME CHANGE SENSITIVE.
3) *SEE TANK SELECTION AND SIZING FOR LD DIMENSION.

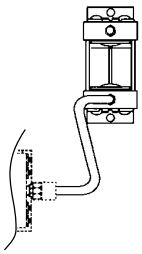
RESERVOIRS





NOTES:
1) PORT POSITION INDICATED BY CIRCLED NUMBERS
2) RESERVOIRS ARE USED WITH TANDEM UNITS AND FOR SMALL VOLUME CHANGES DUE TO TEMPERATURE OR LOSS OR GAIN FACTOR.
3) RESERVOIR ASSEMBLY INCLUDES FITTINGS AND TUBING TO CONNECT TO TANDEM UNITS.

RESERVOIR TANK ASSEMBLY



AIR/OIL TANK DIMENSIONS

TANK BORE	TANK AREA in^2	MAX. FLOW in^3/sec	LETTER DIMENSION												
			A	B	C	D	E	F	G	H	J	K	L	M	N
1-1/8	.967	4.90	.219	1/8	.500	1.062	.187	.545	1.250	.625	1.500	1.875	1.500	1.531	.062
1-3/8	1.438	7.35	.219	1/4	.500	1.250	.187	.647	1.250	.625	2.000	2.375	1.875	1.906	.062
2	3.091	9.14	.219	1/4	.500	1.312	.187	.647	1.250	.625	2.125	2.500	2.500	2.531	.062
3	6.959	18.92	.406	3/8	1.000	2.062	.375	1.115	2.250	1.125	3.250	4.000	3.500	3.531	.125

RESERVOIR TANK ASSEMBLY DIMENSIONS

RESERVOIR PART NO.		LETTER DIMENSION													PRIMARY USE
IMPERIAL	METRIC	A	B	C	D	E	F	G	H	J	K	L	M	N	
13459-01-1	68397-01-1	.219	1/8 NPT [1/8 BSP]	.500	1.062	.187	.545	1.250	.625	3.500	3.875	1.500	1.531	.062	3/4" - 1-1/8" BORE SERIES TD CYLINDERS
13459-02-1	68397-02-1	.219	1/4 NPT [1/4 BSP]	.500	1.312	.187	.647	1.250	.625	5.125	5.500	2.500	2.531	.062	SERIES 8000 TANDEM ROTARY ACTUATORS
13459-03-1	68397-03-1	.219	1/8 NPT [1/8 BSP]	.500	1.062	.187	.545	1.250	.625	3.500	3.875	1.500	1.531	.062	SERIES 2000-6000 TANDEM ROTARY ACTUATORS
13459-04-1	68397-04-1	.219	1/8 NPT [1/8 BSP]	.500	1.062	.187	.545	1.250	.625	3.500	3.875	1.500	1.531	062	1-3/8" BORE SERIES TD CYLINDERS

All dimensions are reference only unless specifically toleranced.

TANK SELECTION

TANK CAPACITIES AND FLOW RATES (CONTINUOUS DUTY)

AIR/OIL TANK BORE SIZE	TANK AREA in^2	MAXIMUM FLOW RATE in^3/sec
1-1/8	.967	4.99
1-3/8	1.438	7.35
2	3.091	9.14
3	6.959	18.92

*Maximum flow rates determined with cylinders operating continuously without external loads using hydraulic oil. (45.1 SSU; viscosity 158.)
Test pressures: 1-1/8" Bore – 100 psig
1-3/8", 2", and 3" Bore – 80 psig
Operating with flow rates beyond stated values may cause excessive foaming in tanks.

TANK SELECTION AND SIZING

Calculate the time required to fully extend the piston rod and the time required to fully retract the piston rod.

The shorter of the two times is called the STROKE TIME.

Calculate the cylinder volume and the cylinder flow rate from the following two equations:

$$\text{CYL. VOLUME } (in^3) = \text{CYL. AREA } (in^2) \times \text{STROKE (in)}$$

$$\text{CYL. FLOW RATE} = \frac{\text{CYL. VOLUME } (in^3)}{\text{STROKE TIME (sec)}}$$

Select a tank from the table above which has a larger flow rate than the calculated CYL. FLOW RATE.

Using the tank size from the table above and the formula below, calculate the tank length (LD). Order the next highest tank length (in 1" increments).

$$*LD = 2" + \frac{\text{CYL. VOLUME}}{\text{TANK AREA}}$$

NOTE: The above calculations provide the minimum tank required. This size tank does not allow for foaming or for the transferring of oil across the actuator's piston over time. The use of a larger tank will cut down on potential problems with foaming and provide more room for oil transfer.