

PSD04 Owner's Manual



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1 Introduction

Thank You for Purchasing White Knight Products

You have purchased a White Knight product that has been designed to our exacting specifications and built by a team of technicians with the highest commitment to quality!

White Knight is the world leader in zero-metal, ultra-high purity pumps and continues to drive the industry with new technology and products. Since the inception of White Knight in 1995, we have been awarded over 14 US design patents and have multiple other patents pending! White Knight currently produces over 30 sizes/models of pumps in varying materials to meet our customers' stringent requirements in numerous applications, including ultra-high temperature re-circulation; high pressure chemical delivery systems, slurry, industrial chemical, and industrial applications.

White Knight has received many prestigious awards for its designs and continues to lead the industry in quality because White Knight controls the manufacturing process from raw materials to finished goods in our facility located in Kamas, UT. This allows us to rigorously manage our quality control process to ensure that our strict cleanliness procedures are always followed and that components are built under consistent methods and conditions for maximum reliability.

Our strict manufacturing process controls include assembling and testing White Knight products in a clean environment. White Knight products also pass a battery of functional tests to ensure operational integrity.

Before installing your White Knight product, please carefully review the product manual. There are many helpful hints and ways to optimize the setup and use of your White Knight product as well as instructions and requirements for installation. In addition, you will also find many accessories in the manual that will enhance the functionality of your White Knight product.

Our team has gone to great lengths to provide you with the highest quality products at the best value and we back them up with excellent warranties and world class support! We hope you agree our products will serve your exacting needs and meet your stringent requirements every time you purchase a White Knight Product.

Sincerely,

White Knight Fluid Handling

2 Specifications & Performance

2.1 Pump Specifications

PSD04 Pump Performance Specification ¹								
Flow Rate	Theoretical Displacement Per Cycle	Suction Lift Wet	Suction Lift Dry	Sound Pressure ³ dB(a)	Sound Power ³ dB(a)	Max. Size of Passible Solids ⁴	Max Operating Temperature	Air Supply Pressure Limits ⁵
14 lpm (3.6 gpm)	0.03 L (0.008 gal)	9.5 L (31.2 ft ³)	2 m (6.5 ft)	60.1 70.6	60.7 64.2	3 mm 0.12 in	100°C TE 70°C UH	30 psi (100 psi)

All tests performed with water at ambient temperatures and PTFE check balls

1. Pump Specifications are subject to change based on configuration ordered
2. Suction lift diminishes with wear of pump, minimize suction lift to maximize performance
3. dB Level at 100 psi 50CPM (top) and 100 psi maximum CPM (bottom).
4. The passing of solids may shorten the life of a pump
5. Minimum startup pressure (Max supply pressure)

STORAGE

PSD pumps that are not put into operation upon delivery must be stored in an environment where they are protected from moisture, extreme temperatures, UV radiation, vibration, and should be kept clean. White Knight recommends an environment of ambient temperature (between 60° F (15°C) and 80°F (25°C)) with a humidity level below 65%.

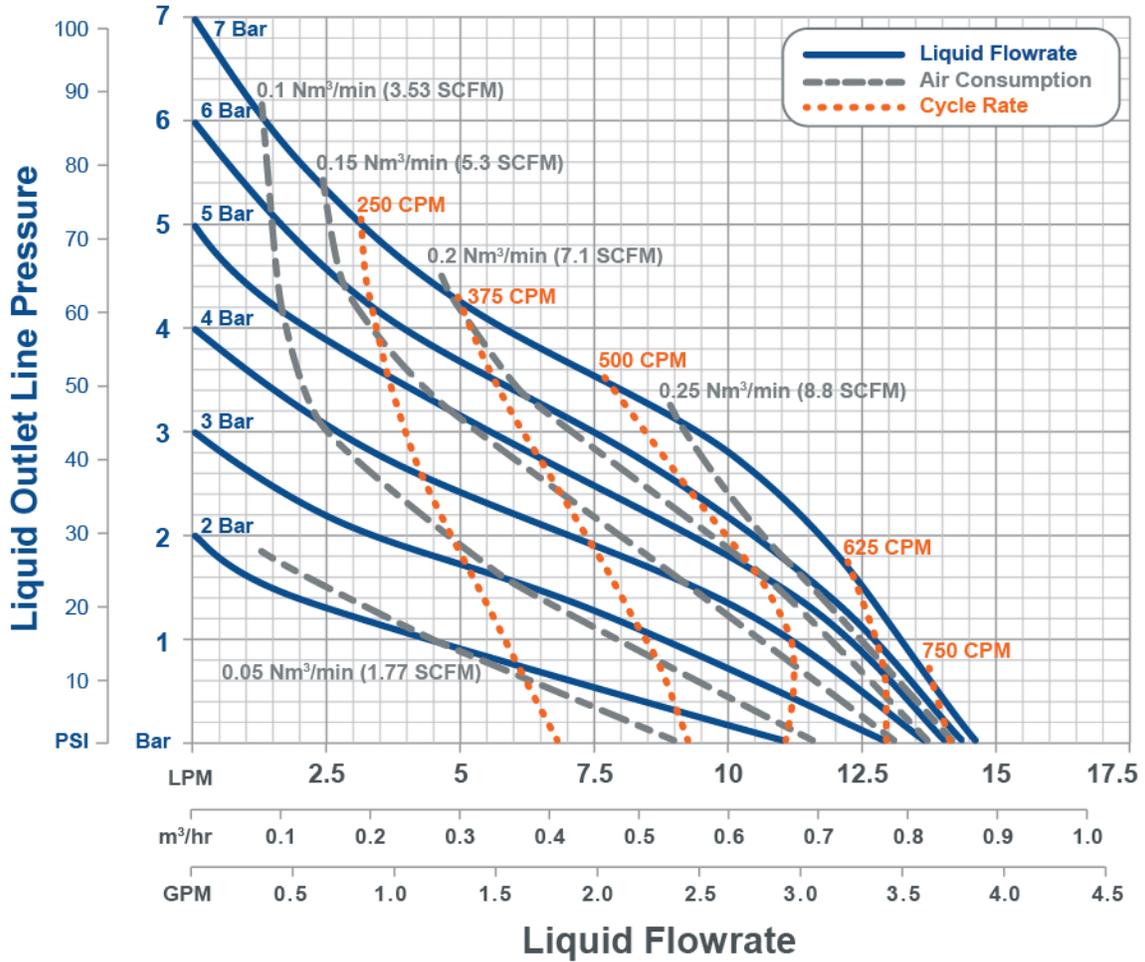
Maintenance and Torque Values

Upon installation of the pump, as well as after a few hours of operating the pump, the head and manifold bolts must be re-torqued. Tie bolts and manifold bolts must be re-torqued to values specified in the table below. Re-torqueing will be required after the pump has set for extended periods of time, run in thermal cycling applications, been dismantled, or when there is a large difference between environmental and fluid temperatures. See torqueing instructions on page 15.

	Assembly Torque in-lbs. (kg-cm)
Tie Bolts	20 (23.0)
Manifold Bolts	20 (23.0)

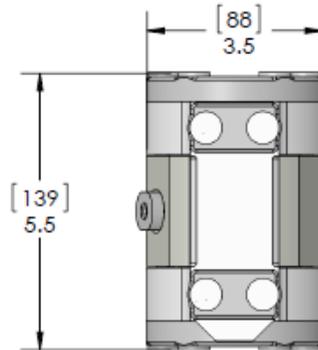
2.2 PSD04 Performance Curves

PSD04 Performance Curves

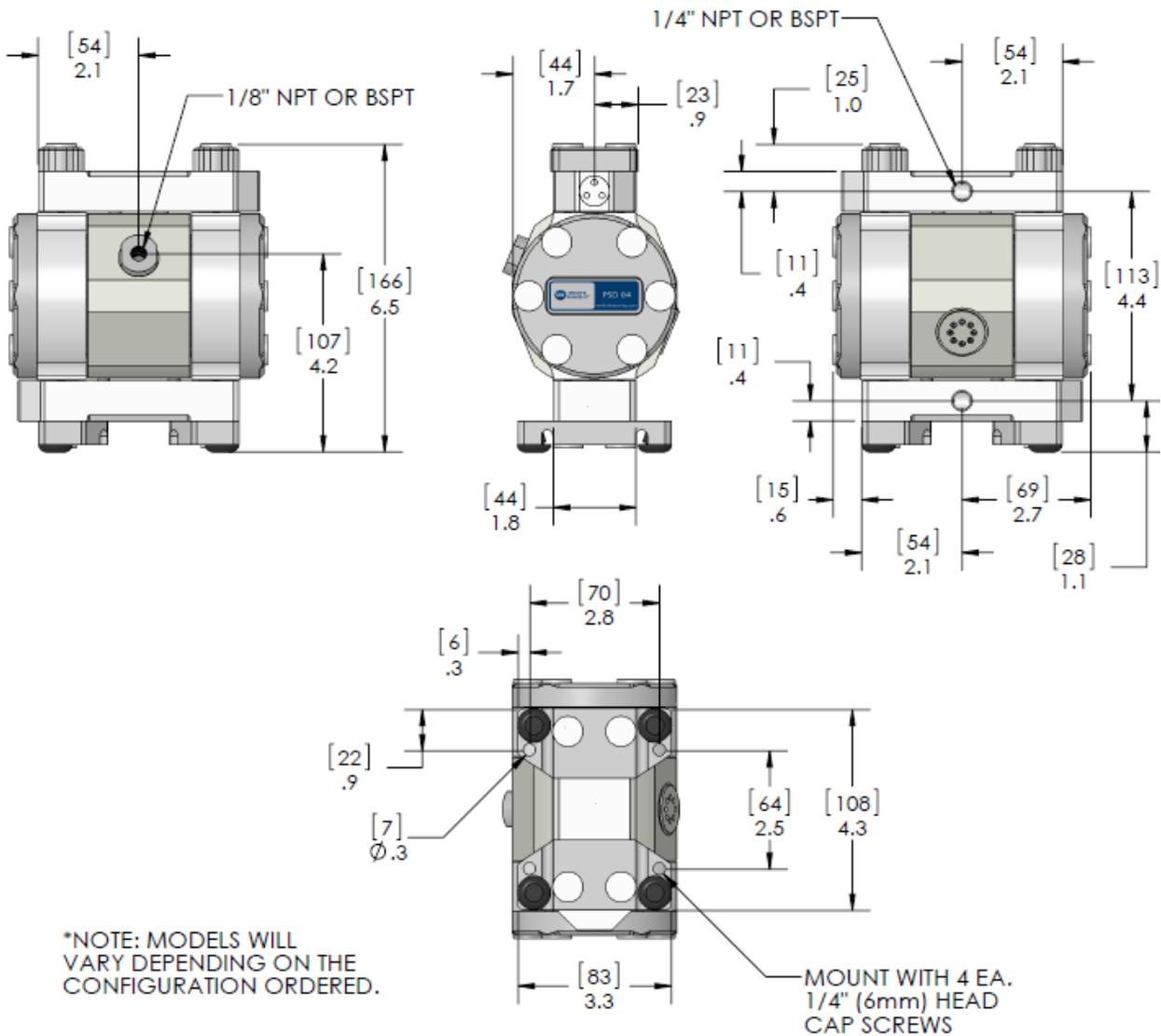


2.3 PSD04 Dimensional Drawing

PSD04



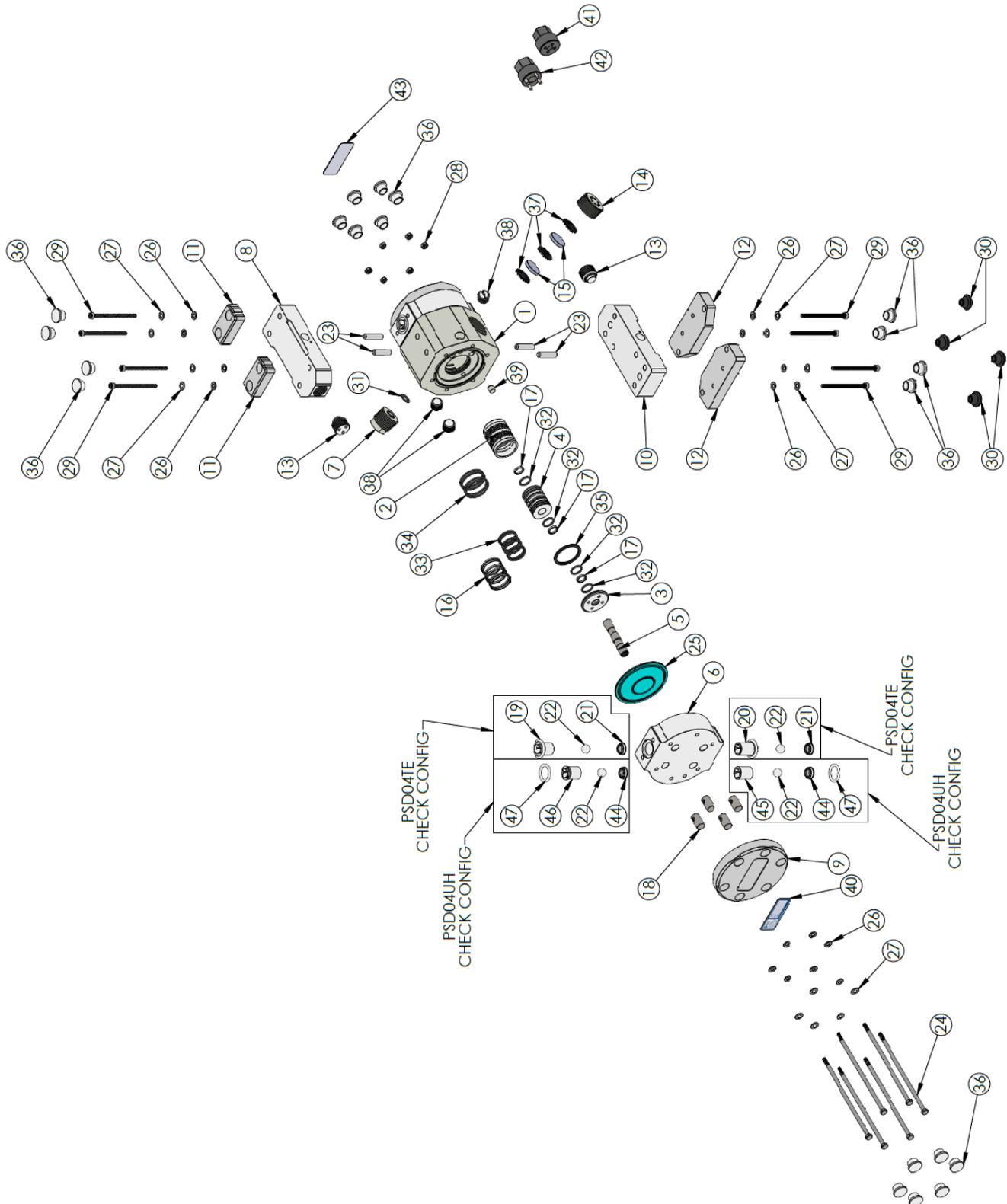
MAIN DIMENSIONS ARE INCHES
 [BRACKETED] DIMENSIONS ARE mm.



*NOTE: MODELS WILL VARY DEPENDING ON THE CONFIGURATION ORDERED.

MOUNT WITH 4 EA. 1/4" (6mm) HEAD CAP SCREWS

2.4 PSD04 Exploded View Drawing



PSD04 BILL OF MATERIALS							
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	1125-NP-0005	BODY	1	22	4100-SS-0004	3/8" CHECK BALL, ST. ST.	
2	6550-PT-0004	MAIN SLEEVE	1	22	4100-EM-0004	3/8" CHECK BALL, EPDM	
3	6600-PT-0001	SLEEVE CAP	2	22	4100-NB-0004	3/8" CHECK BALL, NBR	
4	6550-PT-0005	CENTER SLEEVE	1	23	10020-WC-0001	GUIDE PIN, ϕ .25	4
5	5144-SS-0004	SHAFT	1	24	10010-SS-0104	TIE BOLT, HEX	6
6	2127-TE-0069	HEAD, PTFE	2	25	3200-TE-0004	DIAPHRAGM, PTFE	2
6	2127-UH-0004	HEAD, UHMW		25	3200-EM-0004	DIAPHRAGM, EPDM	
7	6060-NP-0003	ADAPTER, INLET, 1/8" NPT	1	25	3200-BN-0004	DIAPHRAGM, BUNA	
7	6060-NP-0004	ADAPTER, INLET, 1/8" BSPT		26	10050-SS-0008	4 mm WASHER	20
8	7500-TE-0014	OUTLET MANIFOLD, NPT, PTFE	1	27	10050-SS-0009	BELL WASHER	20
8	7500-TE-0016	OUTLET MANIFOLD, BSPT, PTFE		28	10010-SS-0029	HEX NUT, M4 x 0.7	6
8	7500-UH-0014	OUTLET MANIFOLD, NPT, UHMW		29	10010-SS-0030	BOLT, M4 X 0.7	8
8	7500-UH-0016	OUTLET MANIFOLD, BSPT, UHMW		30	10040-NB-0001	FEET RUBBER	4
9	2129-PV-0007	HEAD RETAINER	2	31	10080-EM-012-70	-012 O-RING	1
10	7500-TE-0013	INLET MANIFOLD, NPT, PTFE	1	32	10080-EM-013-50	-013 O-RING	4
10	7500-TE-0015	INLET MANIFOLD, BSPT, PTFE		33	10080-EM-018-50	-018 O-RING	6
10	7500-UH-0013	INLET MANIFOLD, NPT, UHMW		34	10080-EM-020-70	-020 O-RING	7
10	7500-UH-0015	INLET MANIFOLD, BSPT, UHMW		35	10050-EM-0001	EDPM RING, .0625 THICK	2
11	2129-PV-0008	MANIFOLD RETAINER	2	36	10040-PE-0006	CAP PLUG	20
12	1146-PV-0004	BASE PLATE	2	37	6140-PP-0004	SPACER, BAFFLE, .800"	3
13	10040-TE-0018	1/4" PLUG	2	38	10040-TE-0003	1/4"NPT PLUG	3
14	6150-NP-0007	CAP, MUFFLER	1	39	10020-NP-0011	PIN, ϕ .26 x .27 LONG	3
15	6140-FP-0002	BAFFLE POROUS	2	40	19100-PP-0059	CE LABEL FOR PSD04/06	1
16	10050-UH-0009	GLIDE SEAL	6	41	12100-PV-0043	MUFFLER TOOL	1
17	10050-UH-0010	GLIDE SEAL, SHAFT	4	42	12100-PV-0030	Sleeve Wrench Tool	1
18	10011-SS-0004	HEAD NUT	8	43	19100-PP-0057	PSD04 LABEL	1
19	4142-TE-0009	TOP CHECK CAGE	2	44	4135-UH-0012	CHECK SEAT, PSD04	2
20	4137-TE-0007	BOTTOM CHECK CAGE	2	45	4137-UH-0006	CHECK CAGE, PSD04	1
21	4135-MP-0010	CHECK SEAT	4	46	4142-UH-0001	TOP CHECK CAGE, PSD04	1
22	4100-TE-0007	3/8" CHECK BALL, PTFE	4	47	10080-TE-114-55	O-RING	2

3 Installation

3.1 Installation Precautions

Required Air Flow and Operating Pressure
Required Air Flow for the PSD04 is 3/16" minimum orifice unrestricted, up to 10 feet. Beyond ten feet a larger ID may be required. An adaptor is included for 1/4" NPT or 1/4" BSPT with all pumps, NPT or BSPT is decided on based on the liquid fittings requested. Max air supply for the PSD04 is 7 Bar (100 PSI).
Restriction of Liquid Inlet Line
Restricting the liquid supply of the pump forces the pump to work harder than normal and should be avoided whenever possible, especially when pumping viscous liquids. Attempting to operate the pump against a closed liquid inlet will cause serious damage to the pump, and will void the warranty. If you wish to slow or stop your pump this may be done by closing off the liquid outlet.
Supply Pressure Recommendations
The life of your pump may be extended significantly by operating your pump 30%-40% below redline operating supply pressures. The use of undersized regulators, valves, and supply lines can decrease pump performance and longevity significantly.
Orientation
White Knight does not recommend installing your pump in any position other than its upright position. Check valves within White Knight PSD pumps are actuated by gravity and/or flow and perform optimally in the upright position.
Failure Potential
It is possible that the diaphragm may fail. In such a situation it is possible that chemical could enter the air side of the pump, and may even escape through the muffler. In such a situation the muffler media must be replaced and the air side purged. White Knight recommends the implementation of a one-way valve on the air side to protect air lines from contamination in the event of a diaphragm failure.
Muffler
Pump performance may be restricted in the event of a clogged muffler. Regular inspection of air lines and muffler media is recommended to maintain performance.
Product Testing
Each pump is tested before being packaged for shipment. White Knight recommends the flushing of each pump before servicing if water can contaminate the process.

3.2 PSD Installation Advantages

Head Pressure / Dead-Head
White Knight PSD pumps may be controlled by opening and closing the outlet of the pump and may be installed in any head pressure situation up to dead-head. Dead-head occurs when air supply pressure and the liquid line (head) pressure are equal. Dead-head conditions allow for no flow. Under dead-head conditions the PSD will cease to cycle (limiting wear) until conditions change allowing for flow.
Running Dry
White Knight PSD pumps are capable of running dry without damage other than normal wear to the pump. When a pump is run dry it cycles faster than normal, accelerating the rate of normal wear.
Passing Solids
All damage caused by passing solids (wafer shards, etc.) is coverable under warranty when your pump is used in conjunction with a White Knight Catcher™ pre-pump filter.

3.3 System and Pump Environment

Clean Dry Supply Air (CDA)
Operation of the point of 5 PSD08 requires class 4 quality air for particles, moisture, and oils. (maximum particle size 15 microns, 3° C Dew 5 mg/m³) per ISO8573 – 1.
Flammable Solvents
Any system used to pump flammable solvents should be properly grounded. A test from River's Edge on using isolative pumps to pump flammable liquids indicated that the liquid itself must be grounded and that other procedures should be followed. A copy of the test is available upon request from White Knight.
Abrasive Slurries
For slurry applications White Knight recommends use of the PSD UH pump.
Pumping Liquids Near Boiling Point
The boiling point of a liquid is reduced under vacuum (suction) conditions. Due to the vacuum caused by a pump, liquid could boil in the inlet line of the pump when it is not boiling in the tank (or other supply reservoir). Placing the pump as close as possible to the tank and with as little vertical lift as possible (the pump being flooded by gravity is ideal) minimizes boiling in the inlet line. Boiling of the liquid in the inlet line causes a pump to "race" and accelerates the wear of the pump. Boiling liquids may cause cavitation to occur. Damage to wearable or non-wearable components of the pump caused by cavitation is not covered under warranty.
Running a Submerged Pump
When running the PSD in submerged mode, the exhaust air must be sealed and redirected above the surface of the media. Take care that all pump parts (air side and wet side) are resistant to the media being used. It may be necessary to mount the pump to the bottom of the tank. Operating this pump while submerged requires use of a remote muffler adaptor kit.
Temperature
The PSD may be operated safely in low temperature applications. Take care to avoid freezing or crystallization of the fluid inside or outside of the pump. Running the pump at temperatures below freezing may accelerate the wear of the elastomer components within the pump. In applications where the media or pump temperature varies, torque values (tension) of the manifold and head bolts must be monitored. TE versions of the PSD Series pumps can be operated at temperatures up to 100°C (212° F). UH versions of the PSD Series pumps can be operated at temperatures up to 70°C (158°F).

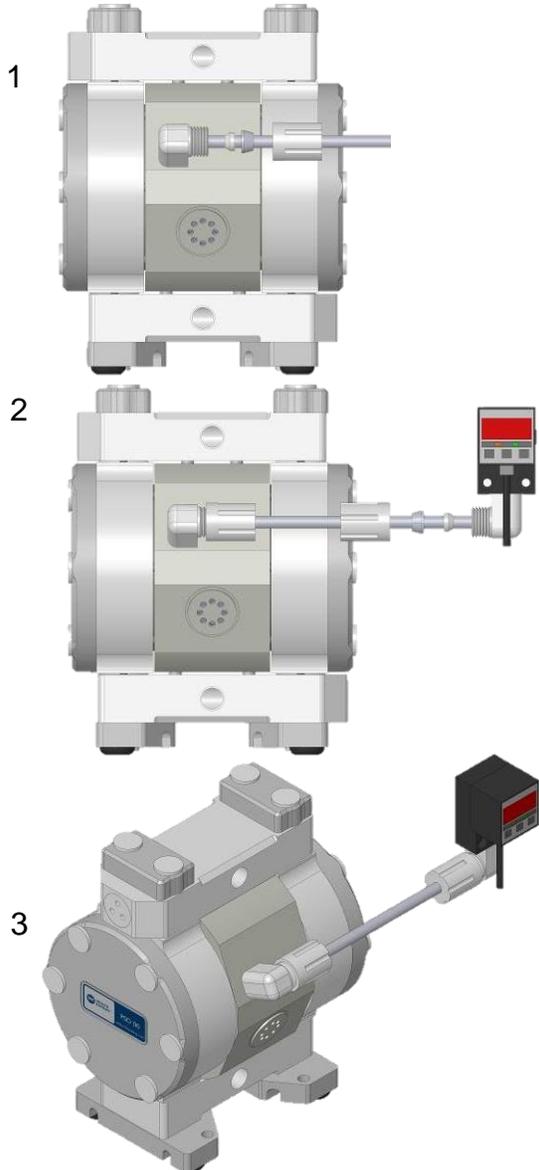
3.4 Control and Monitoring Connections

PUMP MONITORING: Pump monitoring can be performed by solid state pressure switch monitoring. This option is described on our website in the accessories section and is available for new orders and for retrofits in the field.

Conductivity Leak Detection



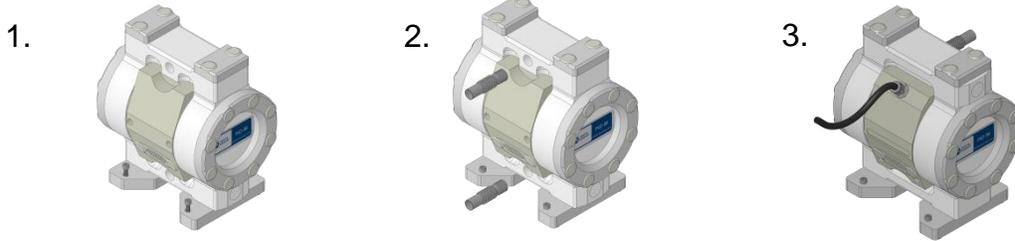
Pressure Switch Stroke



Pump Control: Run mode and flow rate are two of the items which the CPT-1 can control/monitor.



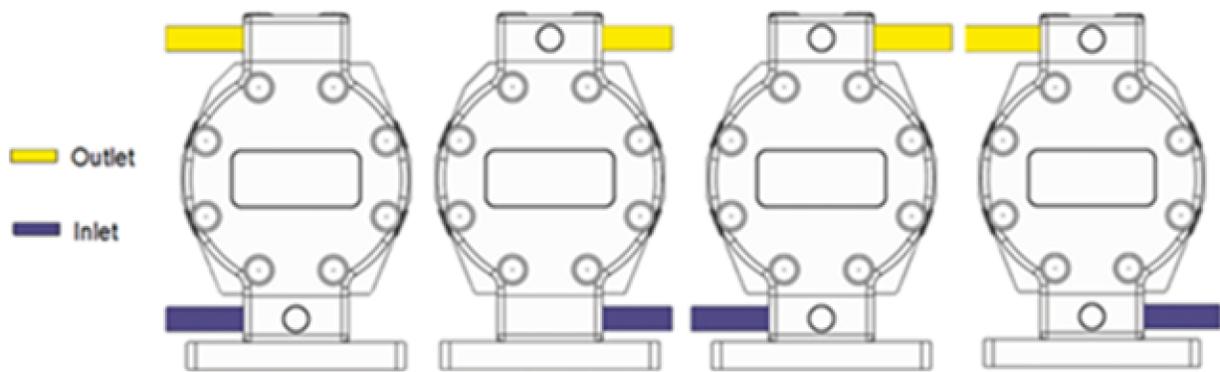
3.5 PSD 04 Installation Instructions



Adaptor is included for 1/4" NPT or 1/4" BSPT

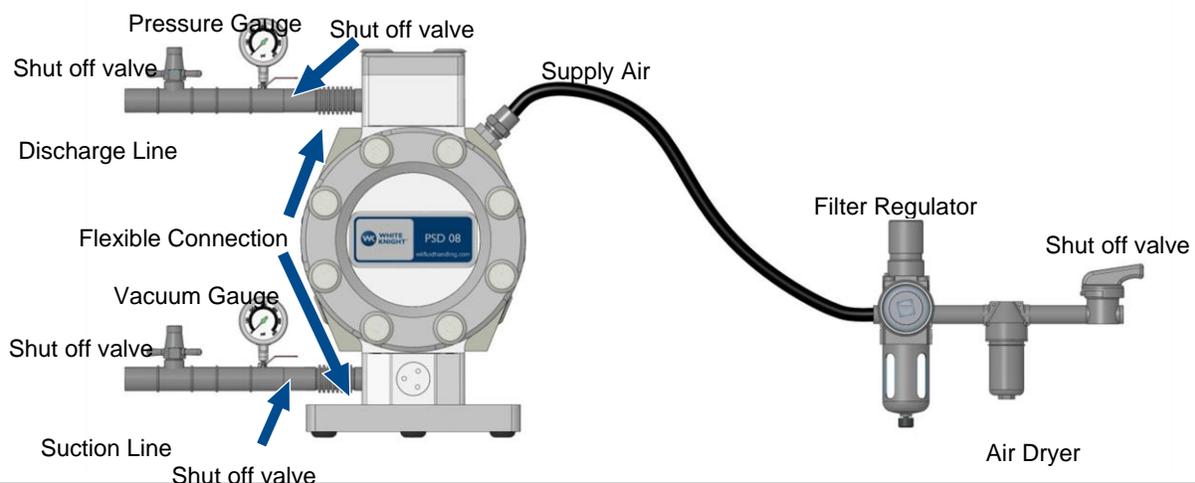
- Fix base plate to work station with four 3/8" or 10 mm bolts. (Bolts not included.)
- Attach 1/4" liquid fittings to pump. Excessive force may damage threads.
- Ensure airline is free of solids before attaching. Supply air via 1/8" NPT air fitting with flexible connection.

Inlet/Outlet Configurations



Some configurations require re-orientation of crossover manifolds. See Disassembly and Assembly Instructions.

Recommended Set Up

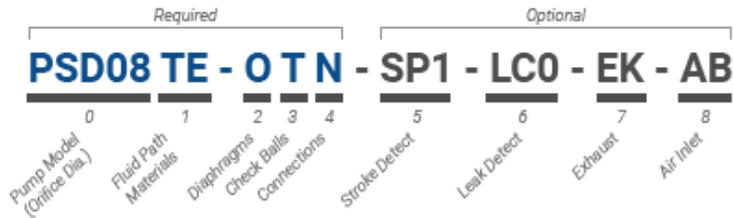


Caution: Closing suction line while pump is operating will cause irreversible damage to the pump.

4 Pump Service & Rebuilds

4.1 PSD Ordering instructions

Configuration



Instructions

Options 0-4 are required. Options 5-8 are not required.
 Contact support for revision or copy exact information.

Standard options are highlighted

0. Pump Model <i>(determined by orifice diameter)</i>	
1/4-inch orifice	PSD04
3/8-inch orifice	PSD06
1/2-inch orifice	PSD08
1-inch orifice	PSD16
1-1/2-inch orifice	PSD24

1. Fluid Path	
PTFE	TE
PE (UHMW)	UH

2. Diaphragms	
Over-Molded PTFE/EPDM	O
EPDM	E
NBR	N

3. Check Balls	
PTFE	T

			Connection Compatibility				
4. Connections			PSD04	PSD06	PSD08	PSD16	PSD24
 NPT (same diameter as orifice) N BSPT (same diameter as orifice) B Flaretek Compatible  Pillar S-300  Primelock  Tube Adapter  Weldable 	1/4 in.	F04	✓	✓	-	-	-
	3/8 in.	F06	✓	✓	-	-	-
	1/2 in.	F08	-	✓	✓	✓	-
	3/4 in.	F12	-	✓	✓	✓	-
	1 in.	F16	-	-	✓	✓	-
	1-1/4 in.	F20	-	-	✓	✓	-
	1/4 in.	P04	✓	✓	-	-	-
	3/8 in.	P06	✓	✓	✓	-	-
	1/2 in.	P08	-	✓	✓	✓	-
	3/4 in.	P12	-	✓	✓	✓	-
	1 in.	P16	-	-	✓	✓	-
	1-1/4 in.	P20	-	-	✓	✓	-
	1-1/2 in.	P24	-	-	-	✓	-
	1/2 in.	L08	-	✓	✓	-	-
3/4 in.	L12	-	✓	✓	-	-	
1 in.	L16	-	-	✓	✓	-	
1-1/4 in.	L20	-	-	-	✓	-	
3/8 in.	T06	-	✓	-	-	-	
1/2 in.	T08	-	✓	✓	-	-	
3/4 in.	T12	-	✓	✓	✓	-	
1 in.	T16	-	-	✓	✓	-	
1-1/4 in.	T20	-	-	✓	✓	-	
1-1/2 in.	T24	-	-	-	✓	-	
1/2 in.	W08	-	✓	-	-	-	
3/4 in.	W12	-	✓	✓	✓	-	
1 in.	W16	-	-	✓	✓	-	

5. Stroke Detection	
No Stroke Detection	blank
Pressure Switch (NPN)	SP1
Pressure Switch (PNP)	SP4

6. Leak Detection	
No Lead Detection	blank
15 ft. Conductivity Cable	LC0
25 Ft. Conductivity Cable	LC1

7. Exhaust	
Standard Exhaust	blank
Remote Exhaust Kit	EK

8. Air Inlet	
NPT Air Inlet	blank
BSPT Air Inlet	AB

4.2 PSD04 Rebuild Kit Ordering Instructions

Standard Rebuild Kits

PSD04 Rebuild Kits

Part Name	Part Number
PSD04 Dry Rebuild Kit	RBPSD04-1
PSD04TE-OT Wet Rebuild Kit	RBPSD04TE-OT
PSD04TE-ET Wet Rebuild Kit	RBPSD04TE-ET
PSD04TE-NT Wet Rebuild Kit	RBPSD04TE-NT
PSD04UH-OT Wet Rebuild Kit	RBPSD04UH-OT
PSD04UH-ET Wet Rebuild Kit	RBPSD04UH-ET
PSD04UH-NT Wet Rebuild Kit	RBPSD04UH-NT
PSD04TE-OT Combined Rebuild Kit*	RBPSD04TE-OT-1*
PSD04TE-ET Combined Rebuild Kit*	RBPSD04TE-ET-1*
PSD04TE-NT Combined Rebuild Kit*	RBPSD04TE-NT-1*
PSD04UH-OT Combined Rebuild Kit*	RBPSD04UH-OT-1*
PSD04UH-ET Combined Rebuild Kit*	RBPSD04UH-ET-1*
PSD04UH-NT Combined Rebuild Kit*	RBPSD04UH-NT-1*

*Contains all parts for a wet-side and dry-side rebuild

Parts Included in RBPSD04-1:

Part Number	Description	Quantity
10300-XX-0001	PTFE Lubricant, Squeeze Tube	1
5144-SS-0004	Diaphragm Shaft for WK Pump, PSD04	1
6140-FP-0002	Baffle, Porous Poly	2
14850-PT-0007	PSD04/06 Main Sleeve Assembly	1
14850-PT-0006	PSD04/06 Center Sleeve Assembly	1
10050-EM-0001	Ring, 0.0625 Thick, PSD04/06	2
10050-UH-0010	Glide Seal for PSD04 Shaft	2
10080-EM-013-50	#13 O-ring Seal	4

Parts Included in RBPSD04TE-OT:

Part Number	Description	Quantity
3200-TE-0004	PTFE Overmolded Diaphragm for WK Pump, PSD04	2
10040-PE-0006	Cap Plug for WK Pump, PSD04/06	20
4142-TE-0009	Retainer, Ball, 3/8" PTFE, Top	2
4135-MP-0010	PSD04TE Check Seat	4
4100-TE-0007	3/8" Check Ball for WK Pump, PSD04, PTFE	4
4137-TE-0007	Retainer, Ball, 3/8" PTFE, Bottom	2

Parts Included in RBPSD04TE-ET:

Part Number	Description	Quantity
3200-EM-0004	EPDM Diaphragm for WK Pump, PSD04	2
10040-PE-0006	Cap Plug for WK Pump, PSD04/06	20
4142-TE-0009	Retainer, Ball, 3/8" PTFE, Top	2
4135-MP-0010	PSD04TE Check Seat	4
4100-TE-0007	3/8" Check Ball for WK Pump, PSD04, PTFE	4
4137-TE-0007	Retainer, Ball, 3/8" PTFE, Bottom	2

Parts Included in RBPSD04TE-NT:

Part Number	Description	Quantity
3200-BN-0004	Nitrile Diaphragm for WK Pump, PSD40	2
10040-PE-0006	Cap Plug for WK Pump, PSD04/06	20
4142-TE-0009	Retainer, Ball, 3/8" PTFE, Top	2
4135-MP-0010	PSD04TE Check Seat	4
4100-TE-0007	3/8" Check Ball for WK Pump, PSD04, PTFE	4
4137-TE-0007	Retainer, Ball, 3/8" PTFE, Bottom	2

Parts Included in RBPSD04UH-OT:

Part Number	Description	Quantity
3200-TE-0004	PTFE Overmolded Diaphragm for WK Pump, PSD04	2
10040-PE-0006	Cap Plug for WK Pump, PSD04/06	20
4142-TE-0009	Retainer, Ball, 3/8" PTFE, Top	2
4135-MP-0010	PSD04TE Check Seat	4
4100-TE-0007	3/8" Check Ball for WK Pump, PSD04, PTFE	4
4137-TE-0007	Retainer, Ball, 3/8" PTFE, Bottom	2

Parts Included in RBPSD04UH-ET:

Part Number	Description	Quantity
3200-EM-0004	EPDM Diaphragm for WK Pump, PSD04	2
10040-PE-0006	Cap Plug for WK Pump, PSD04/06	20
4142-TE-0009	Retainer, Ball, 3/8" PTFE, Top	2
4135-MP-0010	PSD04TE Check Seat	4
4100-TE-0007	3/8" Check Ball for WK Pump, PSD04, PTFE	4
4137-TE-0007	Retainer, Ball, 3/8" PTFE, Bottom	2

Parts Included in RBPSD04UH-NT:

Part Number	Description	Quantity
3200-BN-0004	Nitrile Diaphragm for WK Pump, PSD40	2
10040-PE-0006	Cap Plug for WK Pump, PSD04/06	20
4142-TE-0009	Retainer, Ball, 3/8" PTFE, Top	2
4135-MP-0010	PSD04TE Check Seat	4
4100-TE-0007	3/8" Check Ball for WK Pump, PSD04, PTFE	4
4137-TE-0007	Retainer, Ball, 3/8" PTFE, Bottom	2

4.3 Alternative Wet Kit Ordering Instructions

Listed on page 12, are the standard rebuild kits offered by White Knight. Configurable wet kits are available for purchase. To configure an alternative rebuild kit use the graphical ordering instructions shown below.

PSD Wet Side Rebuild Kit Ordering Instructions

Required Fields					
RBPSD	08	TE	O	T	N
	①	②	③	④	⑤

Please select one option from each of the required fields (1 - 5). To configure your pump with options such as stroke detection, please select options from the appropriate additional options (6-8).

① ② ③ ④ Pump Size and Wetted Components

① Pump/orifice size		② Wetted Material*		③ Diaphragm Material		④ Check Ball Material	
04	= 1/4"	TE	PTFE	O	Over molded PTFE/EPDM	T	PTFE Ball
06	= 3/8"	UH	PE (UHMW)	E	EPDM		
08	= 1/2"			N	NBR		
16	= 1"						
24	= 1-1/2"						



* Option C is only available for 04 and 06 size pumps
 * Performance may change between ball materials

4.4 Tools

Part Name	Part Number	QTY.
Sleeve Cap Wrench	12100-PV-0030	1
Muffler Cap Wrench	12100-PV-0043	1



Four pin wrench used to remove/install the Sleeve Cap (included with pump). Hex is for use with a 19mm or 3/4"



Four pin wrench used to remove/install the muffler cap (included with pump). Hex is for use with a 19mm or 3/4" socket

4.5 Torque Instructions

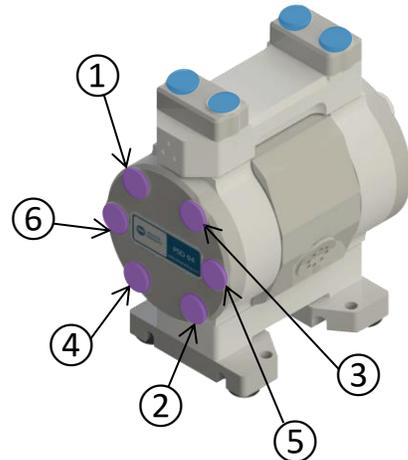
● Manifold ● Tie Bolts

Tie bolts (purple) on both sides must be torqued **before** manifold bolts (blue) on top and bottom.

Torquing of tie bolts should be done in a crossing fashion such as: 1, 2, 3, 4, 5, 6.

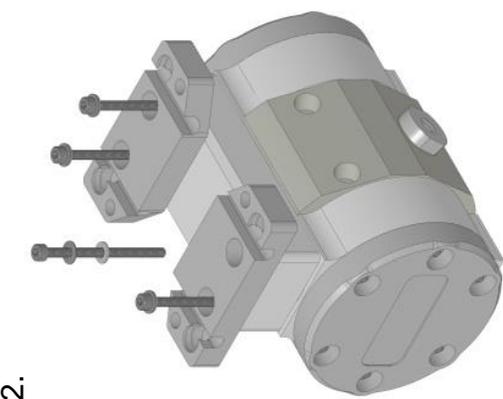
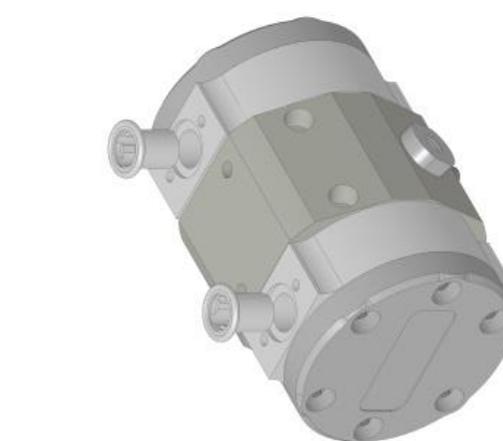
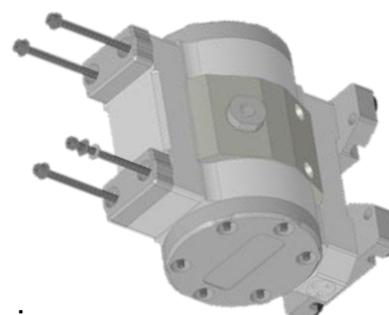
There is no particular order for Torquing manifold bolts other than they must be done after head bolts.

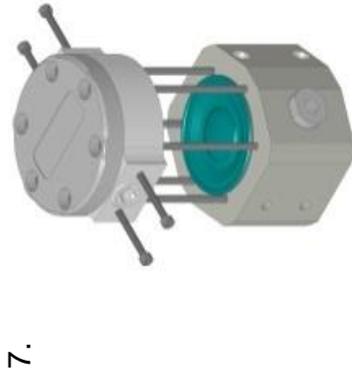
Apply Loctite Antiseize Lubricant LB 8012 (or equivalent) to all bolts. This procedure must be followed for assembly and re-torquing of bolts.



	Rebuild Torque in-lbs. (kg-cm)
Tie Bolts	20 (23.0)
Manifold Bolts	20 (23.0)

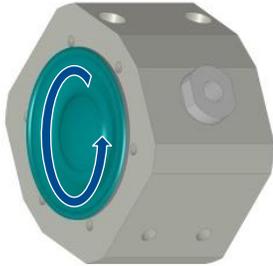
4.6 Disassembly Instructions

1. 
 - Remove all plastic caps.
2. 
 - Use 3 mm Allen wrench to remove pump base feet and inlet manifold
3. 
 - Remove bottom O-ring, and check valve parts. Without scratching the inner bore, use a hook to remove the check cages.
4. 
 - Use 3 mm Allen Wrench to remove outlet manifold.
5. 
 - Remove top check valve parts following the same process described in step 3.
6. 
 - Reattach manifold bolts to heads, to keep the manifold nuts aligned.



7.

- Use 7 mm socket to remove nuts from bolts on one side of head. Remove both retainer rings and heads.



8.

- Remove diaphragms by peeling one back and turning it counter-clockwise. Slide the second diaphragm out with the shaft.



9

- Use the appropriate PVC tool to remove the muffler from the pump body.



10

- Remove the Sleeve Caps using the PVC Tool included with the pump. Remove the Glide Seal and O-ring on the ID of the Caps



11.

- Press out the Main Sleeve Assembly; Remove any debris from the pump body.

Service of Pump

Before servicing the pump verify that the pump has been drained and purged so as to minimize the potential of physical damage and maximize the safety of service personnel.

4.7 Assembly Instructions



3.

2.

1.

- Assemble Top Check; first insert top check seat, then ball, then top check cage. Repeat for both heads
- Place O-ring into ID of Sleeve Caps. Follow by inserting the glide seal. Fold glide seal into a kidney bean and insert into the id. Press flat on all diameters. Replace O-ring in face of Caps
- Replace muffer media and attach to pump body. Order of muffer media is critical.



4.

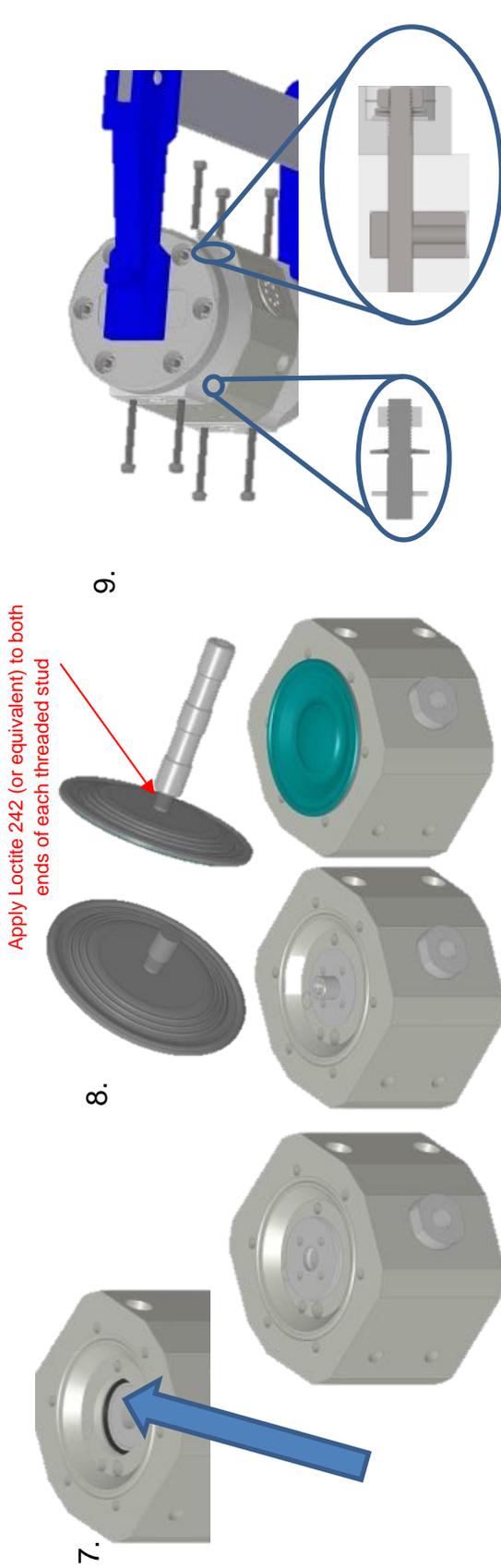
5.

6.

- Replace O-ring in seat for Air Sleeve Cap. Apply Loctite 425 or equivalent to threads on cap. Attach a cap to the pump using the appropriate PVC tool

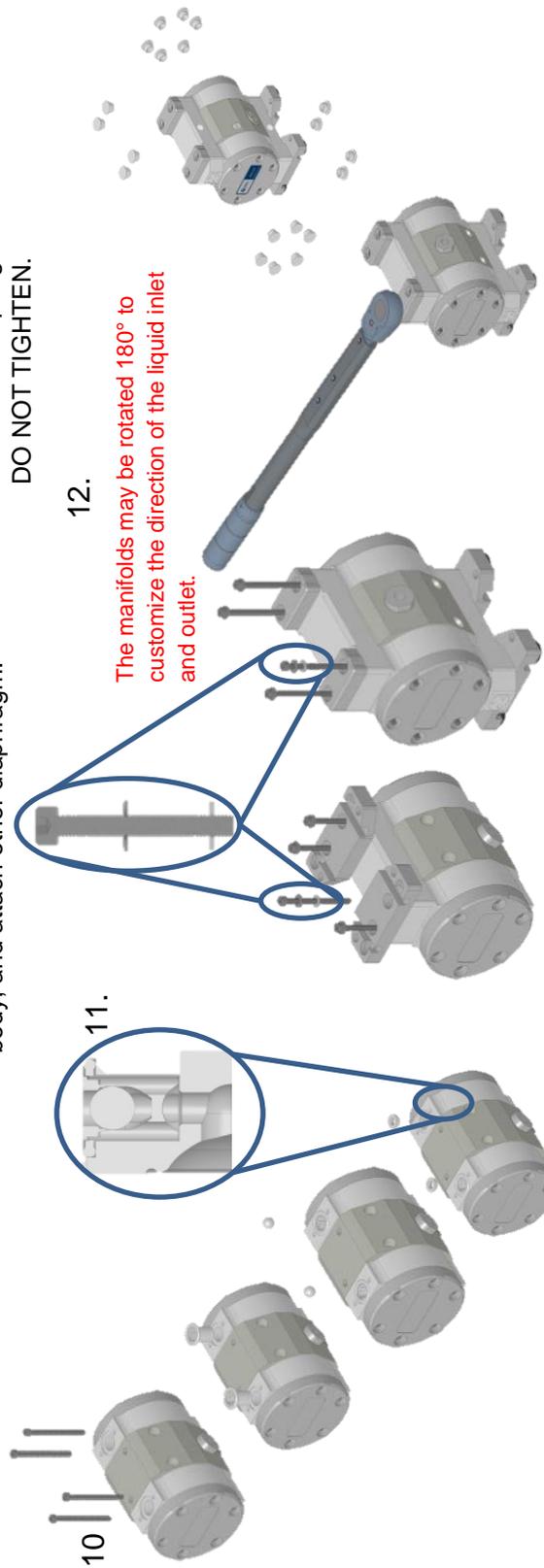
- Lubricate O-rings on main sleeve assembly. Spread lubricant evenly across the O-rings. Clear any holes blocked with lubricant.

- Press Main Shaft Assembly into Body. Take care that the O-rings do not displace themselves from the main sleeve assembly.



Apply Loctite 242 (or equivalent) to both ends of each threaded stud

- Replace O-ring in groove for the second cap, and attach the second cap per instructions in step 4. Tighten until cap bottoms out.
- Remove thread cover on diaphragm, and attach to the pump shaft. Verify that the shaft is firmly attached—no gap. Pass into pump body, and attach other diaphragm.
- Apply antiseize lubricant to each tie bolt. Thread tie bolts onto head retaining rings, align head side 1, body, head side 2, and retaining ring 2 onto tie bolts and clamp together. Washer order is critical. **DO NOT TIGHTEN.**



- Remove the manifold bolts from the heads, and insert bottom check cages, balls, and seats. In that order.
- Align the bottom manifold, and bottom manifold retainers, and attach with manifold bolts (apply antiseize lubricant to each bolt). Note order and direction of washers. Repeat for top manifold. **DO NOT TIGHTEN**
- Return to page 15 and follow torque instructions. Replace all bolt covers.

5 Accessories

Tools

Sleeve Cap Wrench- 12100-PV-0042

Muffler Cap Wrench- 12100-PV-0030

Remote Muffler Adaptor Kit- (Not included with pump.) Required if pump is to be submerged.

Pump Catcher™

- Inline options available.
- Large through holes to avoid loading.
- Filter may be removed without removing the Catcher™ from the pump or the line.
- If a pump were damaged by passing solids while using the Catcher™ it would be repaired under warranty.

Control & Monitoring Options

Stroke Detection

Solid State Pressure Switch SP1

Leak Detection

Conductivity Leak Detection LC0

Control Options – Run mode and flow rate are a few of the items which the CPT-1 can control/monitor.

6 Warranty

White Knight Fluid Handling, Inc. follows strict procedures in all phases of manufacturing, assembly, and testing to ensure reliability of its products. Each pump is individually tested to assure its functional operation integrity.

White Knight Fluid Handling, Inc. warrants the PSD04 pump, subassemblies and components to be free from defects in materials and workmanship to one year from date of start-up or 18 months from the date of shipment whichever applies. Failures due to misuse, abuse or any unauthorized disassembly of a White Knight[®] pump will nullify this warranty.

The PSD04 pump is warranted for up to 100 PSI air supply pressures. It is not covered under dry run condition. Wearable parts are not covered.

Due to the broad and ever-evolving applications for usage of White Knight[®] pumps we cannot guarantee the suitability of any pump component or subassembly for any particular or specific application. White Knight Fluid Handling, Inc. shall not be liable for any consequential damage or expense arising from the use or misuse of its products in any application. Responsibility is limited solely to the replacement or repair of defective White Knight[®] pumps, components or subassemblies. All options to rebuild or replace aforementioned items shall remain under the judgment of White Knight Fluid Handling, Inc. Decisions as to the cause of failure shall be solely determined by White Knight Fluid Handling, Inc.

Prior written, faxed or emailed approval must be obtained from White Knight Fluid Handling, Inc. before returning any pump component or subassembly for warranty consideration.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING ANY WARRANTIES OF SUITABILITY FOR ANY PARTICULAR PURPOSE. NO VARIATIONS OF THIS WARRANTY BY ANYONE OTHER THAN THE PRESIDENT OF WHITE KNIGHT FLUID HANDLING; IN A SELF-SIGNED AGREEMENT, SHALL BE HONORED OR CONSIDERED LEGALLY BINDING.

7 Certificate & Declaration of Conformity



CERTIFICATE & DECLARATION OF CONFORMITY FOR CE MARKING

Company contact details:

White Knight Fluid Handling Inc.
 187 E. 670 S., Kamas, Utah, 84036, USA

White Knight Fluid Handling Inc. declares that their:

Bellows Pump Line

PSA030, PSA060, PSA140, PSH030, PSH060, PSH140, PSU030, PSU060, PSU140, PSA025, PSA050, PFA030, PFA060, PFA140, PFH030, PFH060, PFH140, PFU030, PFU060, PFU140, PXA030, PXA060, PXA140, PXH030, PXH060, PXH140, PXU030, PXU060, PXU140

Diaphragm Pump Line (Non Conductive)

PSD04TE, PSD06TE, PSD08TE, PSD16TE, PSD24TE, PSD04UH, PSD06UH, PSD08UH, PSD16UH, PSD24UH

Diaphragm Pump Line (Conductive)

PSD04TC, PSD06TC, PSD08TC, PSD16TC, PSD24TC, PSD04UC, PSD06UC, PSD08UC, PSD16UC, PSD24UC

Legacy Pump Line

PLS30, PLS60, PLS120, PLX30, PLX60, PLX120, PX30, PX60, PX120, PLF30, PLF60, PLF120

Metering Pumps

PPM100, PEM100, PEM050

Plastic Pumps

PHC40-2, PPMC300

are classified within the following EU Directives as applicable:

Machinery Directive 2006/42/EC
 Low Voltage Directive 2014/35/EU
 Electromagnetic Compatibility Directive 2014/30/EU
 RoHS 2 Directive 2011/65/EU

and further conform with the following EU Harmonized Standards as applicable:

EN 809:1998+A1:2009 EN 60204-1:2006 + A1:2009 EN 61000-6-2:2005 EN 61000-6-4:2007+A1:2011

Dated: 16 January 2017

Position of signatory: Product Manager **Name of Signatory:** Cory Ammon Simmons

Signed below: on behalf of White Knight Fluid Handling Inc.

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