

# phd<sup>®</sup> START-UP AND INFORMATION SHEET: SERIES BCZ2D NOZZLE CYLINDER

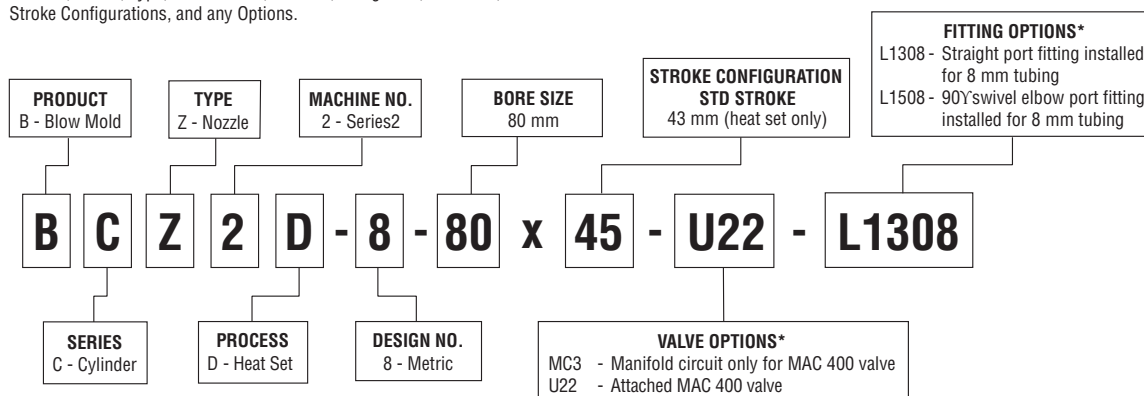
## IMPORTANT INFORMATION DO NOT DISCARD!

Use this information sheet to assist with cylinder installation and setup.  
File with maintenance or machine documentation.

### MODEL NUMBER DEFINITION

#### TO ORDER, SPECIFY:

Product, Series, Type, Machine No., Process, Design No., Bore Size, Stroke Configurations, and any Options.



#### NOTES:

- 1) Consult PHD for additional options such as magnetic piston, ISO/valve manifold combinations and alternative MAC 400 valve combinations.
- 2) \*If no fittings or valves are required, leave blank.

### LIFE EXPECTANCY

Series BCZ Cylinders have been designed for 15 million trouble-free cycles except for high pressure stretch rod seal.

### CYCLE RATE

Series BCZ Nozzle Cylinders meet or exceed cycle rate of competitor's unit when using optional manifold/valve combinations.

### MAINTENANCE

As with most PHD products, these cylinders are field repairable. Repair kits, tooling kits, and main structural components are available as needed for extended service. Optional rebuild service is available.

### LUBRICATION

Series BCZ Nozzle Cylinders are designed and intended not to use lubrication on the high pressure (blow air) section. Only the control air section is designed and intended to be lubricated using lubrication per FDA Regulation 21CFR 178.3570.

As machine set-ups and conditions vary, PHD Inc. cannot guarantee the same extended life will be seen as that resulting from PHD's own lab testing of the stretch rod seal.

CYLINDER SPECIFICATIONS	BCZ2D	
	IMPERIAL	METRIC
TYPE	Pneumatic	
SERIES	BCZ Heat Set Nozzle Cylinder	
CYLINDER BORE SIZE	3.149 in	80 mm
PISTON ROD DIAMETER	1.965 in	50 mm
CYLINDER - LOW PRESSURE		
BORE AREA - EXTEND	2.368 in <sup>2</sup>	15.28 cm <sup>2</sup>
BORE AREA - RETRACT	3.011 in <sup>2</sup>	19.43 cm <sup>2</sup>
THEORETICAL EXTEND OUTPUT	206 lb @ 87 psi	916 N @ 6 bar
THEORETICAL RETRACT OUTPUT	262 lb @ 87 psi	1165 N @ 6 bar
OPERATION	Double Acting	
OPERATING PRESSURE RANGE	7.5 - 150 psi	0.5 - 10 bar
BLOW CYLINDER - HIGH PRESSURE		
BORE SIZE	2.165 in	55mm
BORE AREA	3.437 in <sup>2</sup>	22.17 cm <sup>2</sup>
OPERATING PRESSURE	600 psi	41.4 bar
THEORETICAL CLAMP FORCE	2062 lb @ 600 psi	9172 N @ 41.4 bar
AMBIENT & FLUID TEMPERATURE	-20° to 180° F	-29° to 82° C
STROKE TIME (TYPICAL)		
FULL RETRACT TO MID POSITION		57 ms
MID POSITION TO FULL EXTEND		75 ms
FULL EXTEND TO MID POSITION		113 ms
MID POSITION TO FULL RETRACT		90 ms
LUBRICATION	FDA Regulation 21CFR 178.3570	
PORT SIZE	G1/8	
STROKE	1.693 in (+.098 -.000)	43 mm (+2.5 -0.0)

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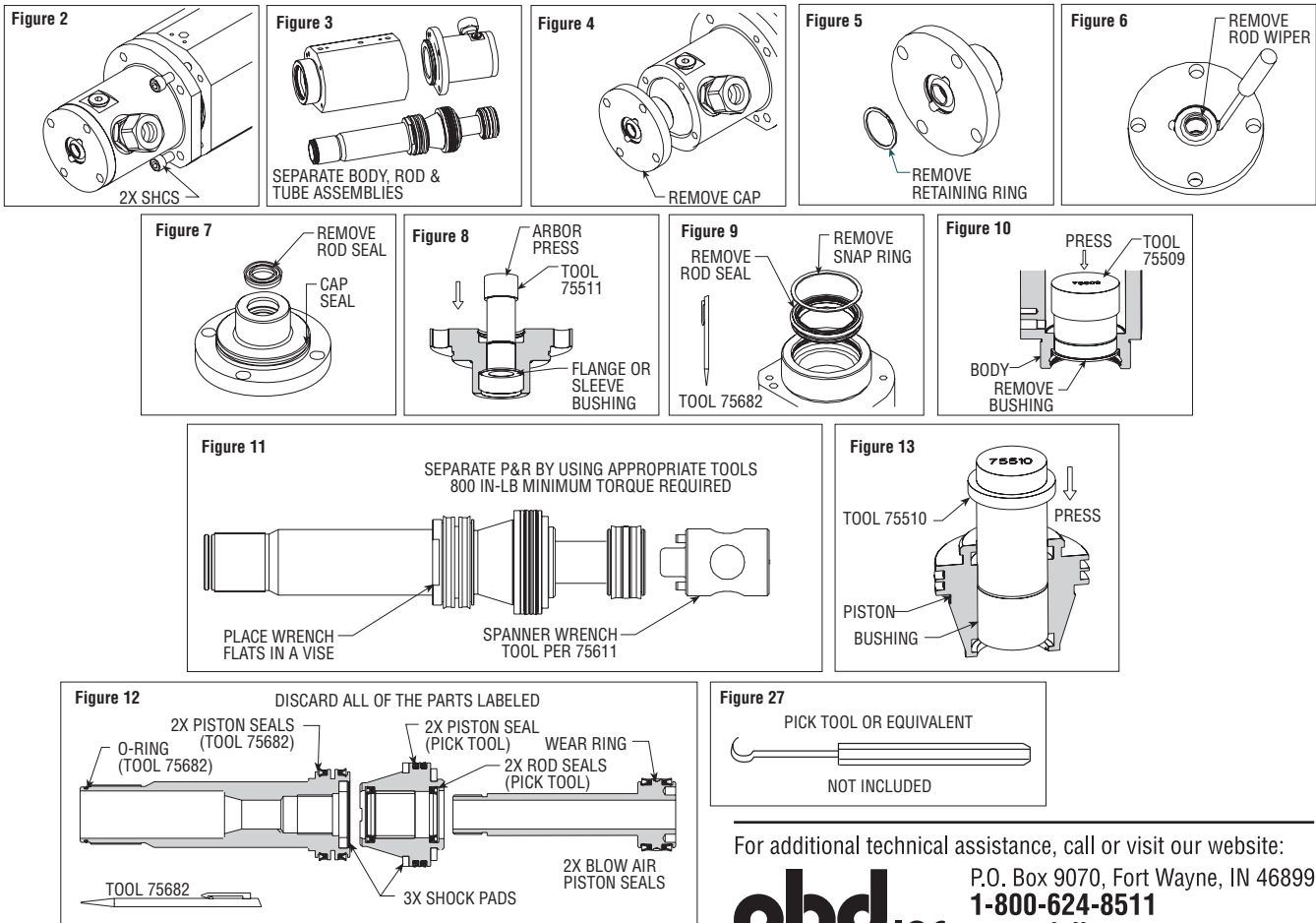
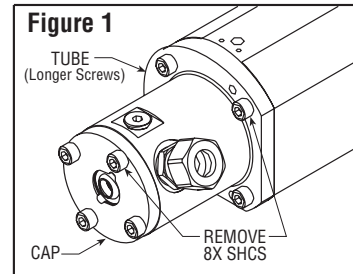
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# phd<sup>®</sup> DISASSEMBLY PROCEDURES: SERIES BCZ2D NOZZLE CYLINDER

PHD, Inc. makes no warranty as to the fitness of its products or as to the length of service life after being repaired or parts replaced by anyone other than authorized employees of PHD, Inc. In no event shall PHD, Inc. be liable for loss of profits, indirect, consequential, or incidental damages arising out of the use of PHD Products.

## DISASSEMBLY PROCEDURE

- 1) **WARNING: All air pressure in the unit must be exhausted prior to disassembly of nozzle cylinder.**
- 2) During disassembly, be careful to avoid scratching or damaging sealing surfaces. A non-metallic screwdriver (75682) is included with each repair kit to help prevent damage while removing control air piston and rod seals.
- 3) A pick type tool is suggested for removal of blow air seals. (Figure 27)
- 4) Remove nozzle and locking nut from piston rod.
- 5) Using 6mm hex wrench, remove all 8 SHCS from tube and cap. Notice that the tube screws are longer than the cap screws. (Figure 1)
- 6) Using 2 of the SHCS just removed, thread screws into the 2 threaded holes in the tube. Tightening these SHCS will separate tube from the body. (Figure 2)
- 7) Separate tube from body and remove piston rod from assembly. (Figure 3)
- 8) Remove cap from tube. (Figure 4)
- 9) Remove retaining ring from cap. (Figure 5)
- 10) Using a small flat blade screwdriver (not included), pry rod wiper out of the cap. (Figure 6)
- 11) Remove rod and cap seal from cap. (Figure 7)
- 12) Using small diameter of tool 75511 and arbor press, press bushing out of cap. (Figure 8)
- 13) Using a small screwdriver, remove snap ring from the body. (Figure 9)
- 14) Pry large rod seal from body using tool 75682. (Figure 9)
- 15) Using small diameter of tool 75509 and arbor press, press bushing out of body. (Figure 10)
- 16) Using spanner wrench 75611 and a vise, separate P & R assembly into three components. (Figure 11) Note: Place the P&R into a vise and clamp onto the flats on the front piston. Insert tool 75611 into the end of the smaller piston locating the dowels into the hole in the end. Using an aluminum or steel bar 1" in diameter and approximately 3' long (not supplied), slide it through the hole in the spanner wrench tool 75611 to aid in the disassembly. Once the smaller P&R is loosened from the larger P&R it may be possible to use a 1/2" drive breaker bar to complete the disassembly.
- 17) Remove wear ring, shock pads and all seals from piston rods. (Figure 12)
- 18) To remove blow air piston seals, use pick tool (not included) to lift up under the seals and cut seals using a pair of side cutters.
- 19) Using long side of tool 75510 and arbor press, press bushing out of intermediate piston. (Figure 13)
- 20) The repair kit provides new components for wear items to completely rebuild unit. Unless a fastener kit was also purchased, keep all SHCS to repair unit. Discard all old seals, shock pads and bushings and clean all remaining parts.



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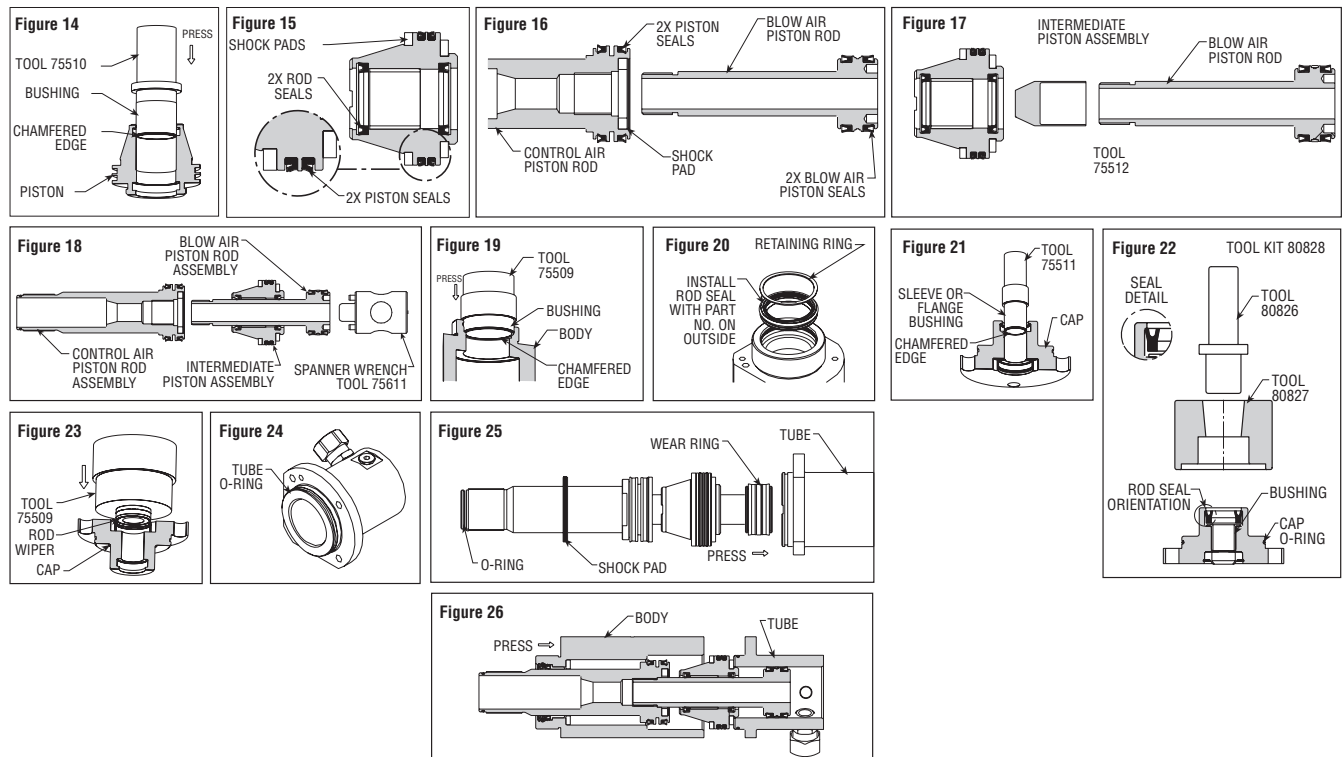
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## ASSEMBLY PROCEDURE

- 1) All seals and wear surfaces in the control air section are designed and intended to be lubricated using lubrication per FDA Regulation 21CFR 178.3570 prior to assembly. (See page 4) Recommended lubricant is provided in repair kit.
- 2) PHD recommends using adhesive primer and thread locker for all threaded interfaces.
- 3) Press bushing into intermediate piston using short side of tool 75510. (Figure 14)
- 4) Place piston seals onto intermediate piston noting seal lip orientation. (Figure 15)
- 5) Press shock pads onto intermediate piston. (Figure 15)
- 6) Place blow air piston seals onto high pressure piston rod noting lip orientation. (Figure 16) **Step 6 is designed and intended not to use lubrication.**
- 7) Press shock pad into control air piston rod. (Figure 16)
- 8) Slide tool 75512 over the threads on the blow air piston rod and slip intermediate piston assembly onto the blow air piston rod. (Figure 17)
- 9) Place wrench flats on the control air piston assembly into a vise and thread high pressure piston assembly into control air piston assembly. Using recommended primer and adhesive, torque to 800 in-lb [90 Nm] using spanner wrench tool 75611. (Figure 18)
- 10) Using large diameter of tool 75509 and arbor press, press bushing with chamfered side down into body until seated by tool depth. (Figure 19)
- 11) Install rod seal into body with part number of seal located on outside of body. (Figure 20)
- 12) Install retaining ring into body by separating coils and working retaining ring in a circle around groove. (Figure 20)

## BLOW AIR SECTION: The following steps are designed and intended not to use lubrication.

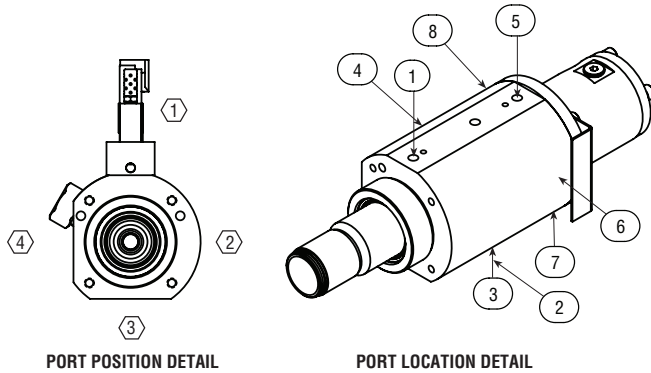
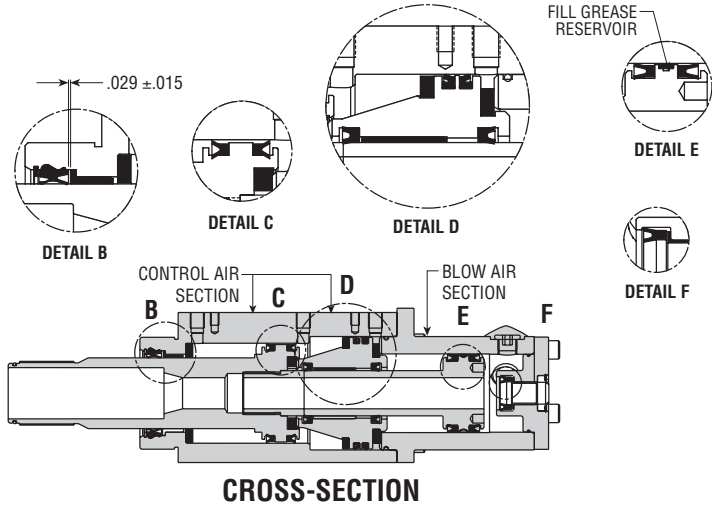
- 13) Using large diameter of tool 75511 and arbor press, install cap bushing until seated by tool depth. (Figure 21)
- 14) Install rod seal into cap using tool 80826 and 80827 with orientation as shown. (Figure 22)
- 15) Place o-ring onto cap. (Figure 22)
- 16) Using tool 75509 and an arbor press, press rod wiper into cap until fully seated. (Figure 23)
- 17) Install retaining ring into cap by separating coils and working retaining ring in a circle around groove. (Figure 5)
- 18) Place o-ring onto tube. (Figure 24)
- 19) Place o-ring onto control air piston rod assembly. (Figure 25)
- 20) Wrap wear ring around the blow air piston and while holding wear ring ends, slip tube over blow air piston rod assembly. (Figure 25)
- 21) Place shock pad onto control air piston rod assembly (Figure 25)
- 22) Work body over control air seals and seat body fully against tube aligning all flat sides. (Figure 26)
- 23) Using recommended thread locker, torque tube screws to 200 in-lb [23 Nm]. (Figure 1)
- 24) Work cap assembly onto tube until fully seated. (Figure 1)
- 25) Using recommended thread locker, torque cap screws to 200 in-lb [23 Nm]. (Figure 1)



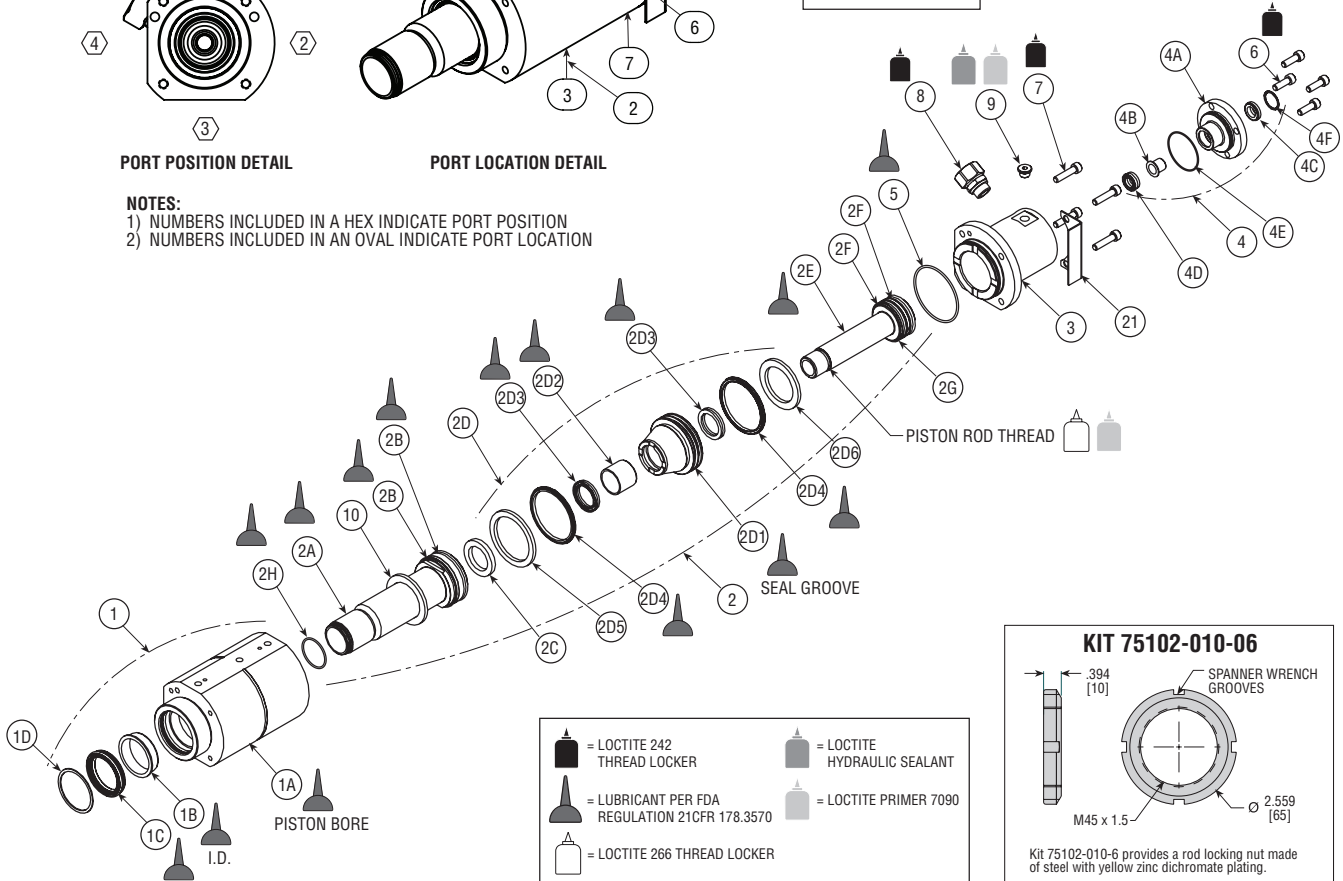
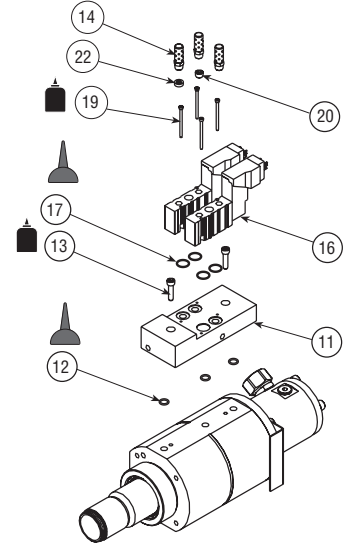
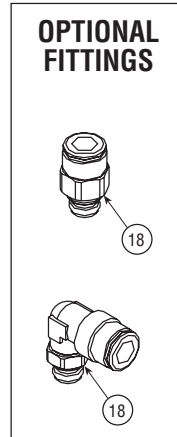
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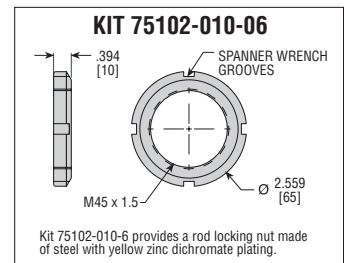
# phd<sup>®</sup> EXPLODED VIEW: SERIES BCZ2D NOZZLE CYLINDER



**NOTES:**  
 1) NUMBERS INCLUDED IN A HEX INDICATE PORT POSITION  
 2) NUMBERS INCLUDED IN AN OVAL INDICATE PORT LOCATION



- = LOCTITE 242 THREAD LOCKER
- = LOCTITE HYDRAULIC SEALANT
- = LUBRICANT PER FDA REGULATION 21CFR 178.3570
- = LOCTITE PRIMER 7090
- = LOCTITE 266 THREAD LOCKER



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# phd PARTS LIST: SERIES BCZ2D NOZZLE CYLINDER

KEY	PART DESCRIPTION	BCZ2D-8-80x43
1	Body Assembly	Full unit description required followed by -H2400
1A	Double Stage Body	75084-00
1B	Bushing	Sold as part of Repair Kit -H9010
1C	Rod Seal	Sold as part of Repair Kit -H9010
1D	Retaining Ring	Sold as part of Repair Kit -H9010
2	Piston and Rod Assembly	Full unit description required followed by -H1000
2A	Double Stage Cylinder 1 Piston & Rod	75087
2B	Piston Seal	Sold as part of Repair Kit -H9010
2C	Shock Pad	Sold as part of Repair Kit -H9010
2D	Intermediate Piston Assembly	Full unit description required followed by -H1010
2D1	Piston	75089
2D2	Bushing	Sold as part of Repair Kit -H9010
2D3	Rod Seal	Sold as part of Repair Kit -H9010
2D4	Piston Seal	Sold as part of Repair Kit -H9010
2D5	Shock Pad	Sold as part of Repair Kit -H9010
2D6	Shock Pad	Sold as part of Repair Kit -H9010
2E	Double Stage Cylinder 2 Piston & Rod	75090
2F	High Pressure Piston Seal	Sold as part of Repair Kit -H9010
2G	Wear Ring	Sold as part of Repair Kit -H9010
2H	Rod O-Ring	Sold as part of Repair Kit -H9010
3	Double Stage Tube	75065
4	Cap Assembly	Full unit description required followed by -H1200
4A	Cap	77169
4B	Bushing	Sold As Part of Cap Repair Kit
4C	Rod Wiper	Sold As Part of Cap Repair Kit
4D	Rod Seal <sup>4</sup>	Sold As Part of Cap Repair Kit
4E	Cap O-Ring	Sold As Part of Cap Repair Kit
4F	Retaining Ring	Sold As Part of Cap Repair Kit
5	Tube O-Ring	Sold as part of Repair Kit -H9010
6	Cap Screw	Sold as part of Fastener Kit -H9020
7	Tube Screws	Sold as part of Fastener Kit -H9020
8	High Pressure Fitting	12135-024
9	Plug	59144-002
10	Shock Pad	Sold as part of Repair Kit -H9010
11	Manifold Plate Assembly	75566
12	Manifold O-Ring	Sold As Part of Manifold Kit
13	Manifold Screw	Sold As Part of Manifold Kit
14	Muffler	Sold As Part of Manifold Kit
15	Label	6441-494
16	MAC 400 Series Valve	MAC 411A-B0A-DM-DDAJ-1 JM = 4357
17	Valve Manifold O-Ring	Sold As Part of Manifold Kit
18	8mm Tube Fitting (-L1308)	62195-024
18	8mm Tube Fitting (-L1508)	62195-007
18	8mm Tube Fitting (-L1308-U22 OR -L1308-MC3)	61734-130
18	8mm Tube Fitting (-L1508-U22 OR -L1508-MC3)	61734-014
19	Valve Screw	Sold As Part of Manifold Kit
20	PTF Port Plug	1992-001
21	Proximity Flag	76232-02
22	Orifice Disk	Sold As Part of Orifice Kit or Manifold Kit

KIT DESCRIPTION	KIT NUMBER
Unit Repair Kit <sup>1</sup>	Full unit description required followed by -H9010
Rod Locking Nut	75102-010-06
Tooling Kit <sup>3</sup>	75537
Cap Seal Tooling Kit <sup>4</sup>	80828
Fastener Kit	Full unit description required followed by -H9020
Manifold Kit	75696
Cap Repair Kit <sup>2</sup>	87121
Stretch Rod Seal Repair Kit	87122
Orifice Kit	75677

**NOTES:**

- 1) Includes all parts to repair the full unit excluding cap parts.
- 2) Includes all hardware to completely repair cap.
- 3) Includes all specialized tools required to rebuild unit.
- 4) Includes tools to rebuild cap. Tools in this kit are also included in Kit #75537.

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