

# phd<sup>®</sup> START-UP AND INFORMATION SHEET: SERIES BCZ2S NOZZLE CYLINDER

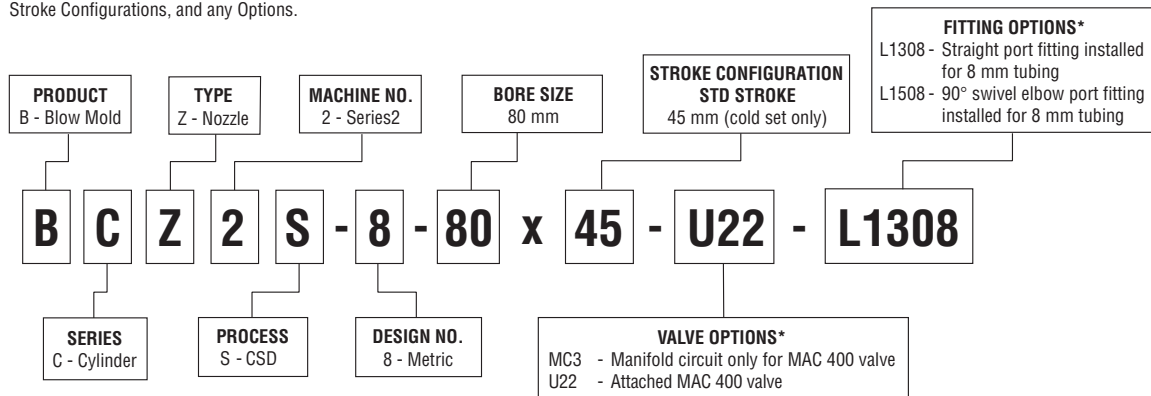
## IMPORTANT INFORMATION DO NOT DISCARD!

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.

### Recommended kits and tooling required for disassembly and assembly of unit:

- Flat blade screwdriver (Not included)
- Pick tool (Not included, see Figure 21)
- Side cutters or equivalent
- Tool 75682
- Tooling kit 75536 (Includes tools 75509, 75511, 75565, 75610 and tooling kit 80828)
- Tooling kit 80828 (Includes tools 80827 and 80826)

| CYLINDER SPECIFICATIONS       | IMPERIAL                      | METRIC                |
|-------------------------------|-------------------------------|-----------------------|
| TYPE                          | Pneumatic                     |                       |
| SERIES                        | BCZ CSD Nozzle Cylinder       |                       |
| CYLINDER BORE SIZE            | 3.149 in                      | 80 mm                 |
| PISTON ROD DIAMETER           | 1.965 in                      | 50 mm                 |
| CYLINDER - LOW PRESSURE       |                               |                       |
| BORE AREA - EXTEND            | 4.109 in <sup>2</sup>         | 26.51 cm <sup>2</sup> |
| BORE AREA - RETRACT           | 4.748 in <sup>2</sup>         | 30.63 cm <sup>2</sup> |
| THEORETICAL EXTEND OUTPUT     | 357 lb @ 87 psi               | 1588 N @ 6 bar        |
| THEORETICAL RETRACT OUTPUT    | 413 lb @ 87 psi               | 1837 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                      | 55 mm                 |
| BORE AREA                     | 3.094 in <sup>2</sup>         | 19.96 cm <sup>2</sup> |
| OPERATING PRESSURE            | 600 psi                       | 41.4 bar              |
| THEORETICAL CLAMP FORCE       | 1856 lb @ 600 psi             | 8256 N @ 41.4 bar     |
| AMBIENT AND FLUID TEMPERATURE | -20° to 180° F                | -29° to 82° C         |
| STROKE TIME (TYPICAL)         | Extend 93 ms, Retract 78 ms   |                       |
| LUBRICATION                   | FDA Regulation 21CFR 178.3570 |                       |
| PORT SIZE                     | G 1/8                         |                       |
| STROKE                        | 1.772 in (+.079 / -.000)      | 45 mm (+2.0 / -1.0)   |

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# phd<sup>®</sup> DISASSEMBLY PROCEDURES: SERIES BCZ2S NOZZLE CYLINDER

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## 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 low pressure piston and rod seals. A pick type tool is suggested for removal of blow air seals. See Figure 21 for tool example.

3) Remove nozzle and locking nut from piston rod.

4) 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)

5) 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)

6) Separate tube from body and remove piston rod from assembly. (Figure 3)

7) Remove cap from tube. (Figure 4)

8) Remove retaining ring from cap. (Figure 5)

9) Using a small flat blade screwdriver (not included), pry rod wiper out of the cap. (Figure 6)

10) Remove rod seal and cap seal from cap being careful not to scratch sealing surface and discard. (Figure 7)

11) Using small diameter of tool 75511 and arbor press, press bushing out of cap. (Figure 8)

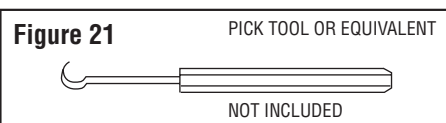
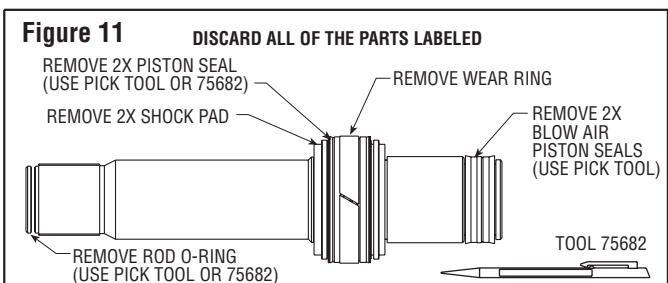
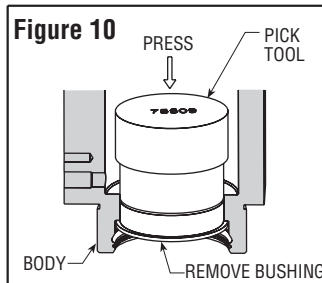
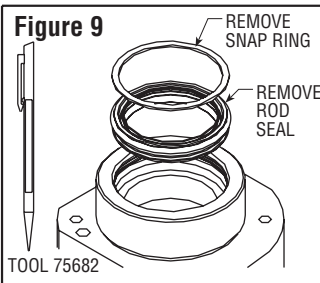
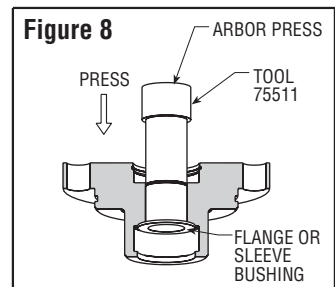
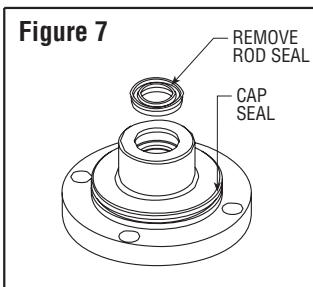
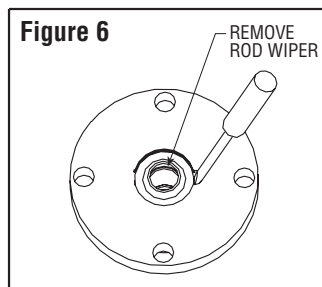
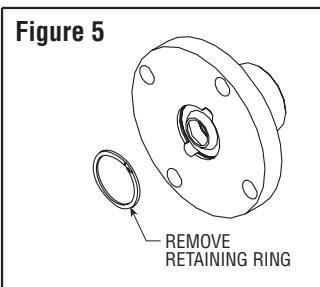
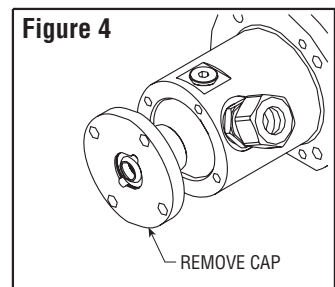
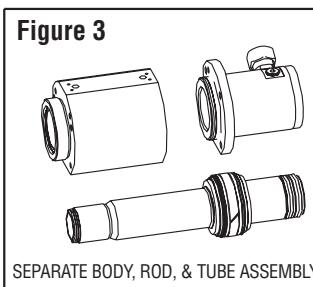
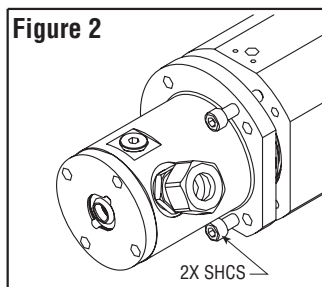
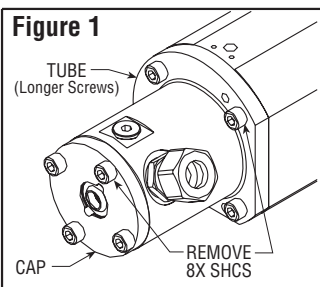
12) Pry large rod seal from body using tool 75682. (Figure 9)

13) Using small diameter of tool 75509 and arbor press, press bushing out of body. (Figure 10)

14) Remove wear ring, shock pads and piston seals from piston rod. (Figure 11)

15) To remove blow air piston seals, use pick tool (Figure 21, not included) to lift up under the seals and cut seals using a pair of side cutters. (Figure 11)

16) 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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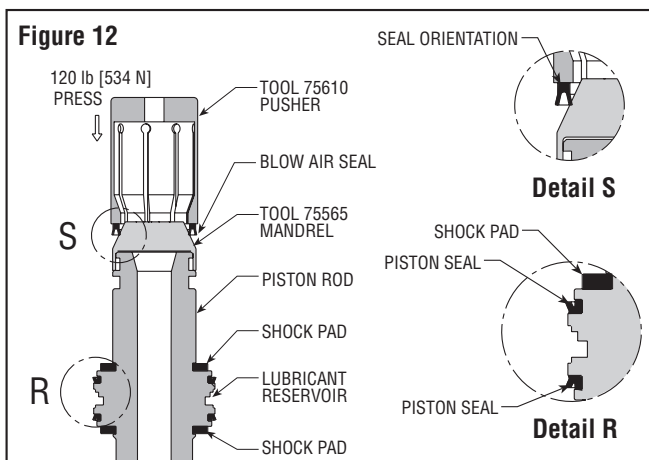
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## ASSEMBLY PROCEDURE:

- 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 thread locker for all threaded fasteners.
- 3) Place piston seals onto piston rod. (Figure 12, Detail R)
- 4) Press shock pads onto piston rod. (Figure 12, Detail R)
- (Steps 5 and 6 are designed and intended not to use lubrication.)**
- 5) Place 75565 mandrel onto end of piston rod. Place a blow air seal with lip orientation shown in Figure 12, Detail S on 75565 mandrel. Using tool 75610 and an arbor press, provide a constant force of approximately 120 lb [534 N]. The seal should slide down the tool and into the second piston seal groove. **Warning: Do not use impact force such as a hammer to install piston seal.**

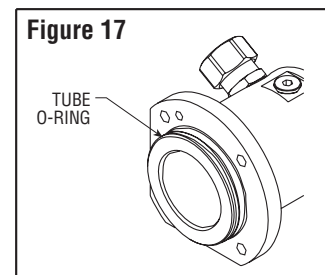
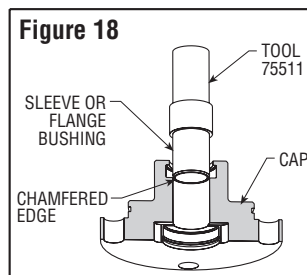
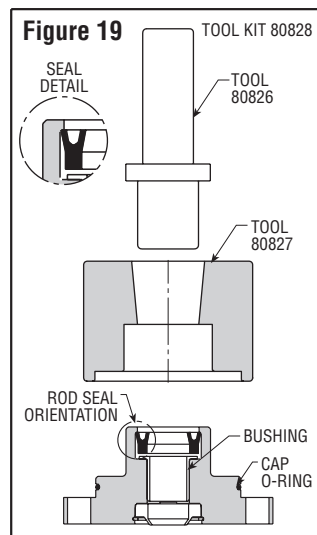
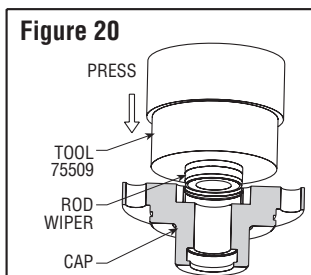
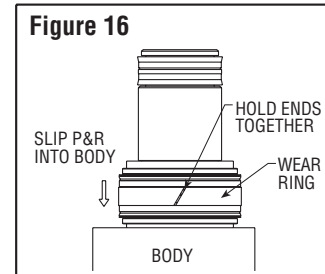
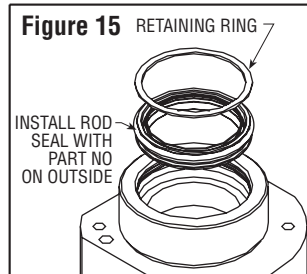
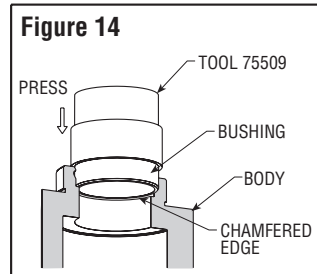
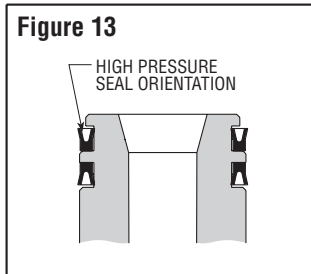


- 6) Place second blow air piston seal on piston rod with lip orientation as shown. (Figure 13)
- 7) Fill lubricant reservoir groove in the piston rod with lubricant. (Figure 12)
- 8) Install new rod o-ring onto piston rod end. (Figure 11)
- 9) Using large diameter of tool 75509 and arbor press, press bushing with chamfered side down into body. (Figure 14)
- 10) Install rod seal into body with part number of seal located on outside of body. (Figure 15)
- 11) Install retaining ring into body. (Figure 15)
- 12) Wrap wear ring around piston rod and while holding wear ring ends, slip piston rod into body. (Figure 16)
- 13) Place o-ring onto tube and lubricate tube bore. (Figure 17)
- 14) Work tube over blow air seals and seat tube fully against body aligning all flat sides. (Figure 1)

## BLOW AIR SECTION:

**The following steps are designed and intended not to use lubrication.**

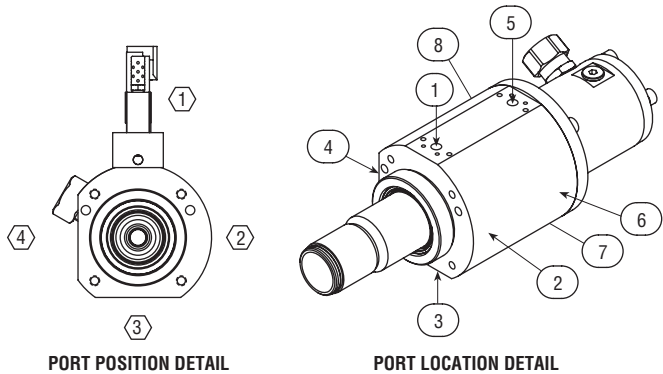
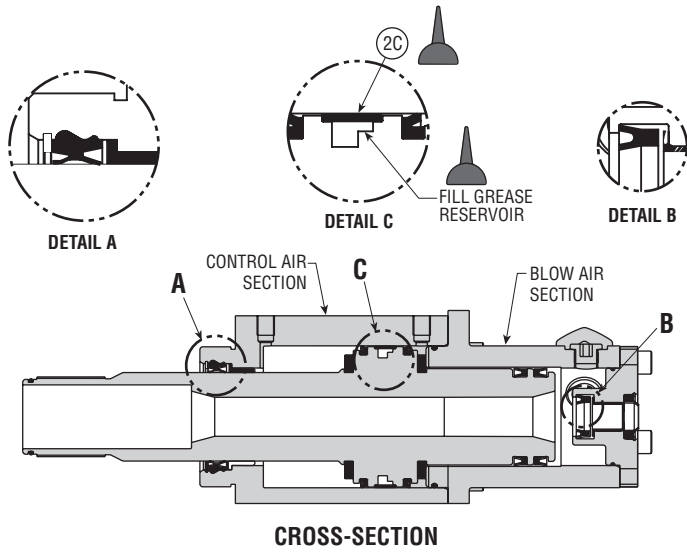
- 15) Using recommended thread locker, torque tube screws to 200 in-lb [23 Nm]. (Figure 1)
- 16) Using large diameter of tool 75511 and arbor press, install cap bushing until seated by tool depth. (Figure 18)
- 17) Install rod seal into cap using tooling 80826 and 80827 (Kit 80828) with orientation as shown. (Figure 19)
- 18) Place o-ring onto cap. (Figure 19)
- 19) Using tool 75509 and an arbor press, press rod wiper into cap until fully seated. (Figure 20)
- 20) Install retaining ring by separating coils and working retaining ring in a circle around groove. (Figure 5)
- 21) Work cap assembly onto tube until fully seated. (Figure 1)
- 22) Using recommended thread locker, torque cap screws to 200 in-lb [23 Nm]. (Figure 1)



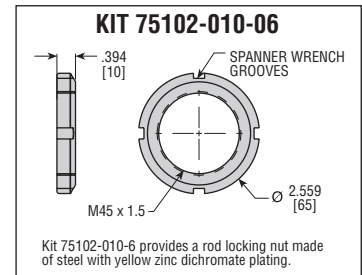
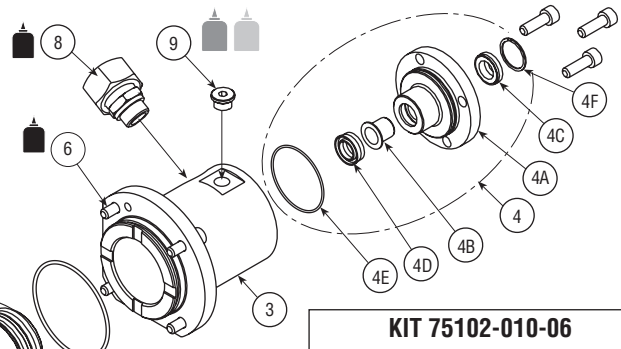
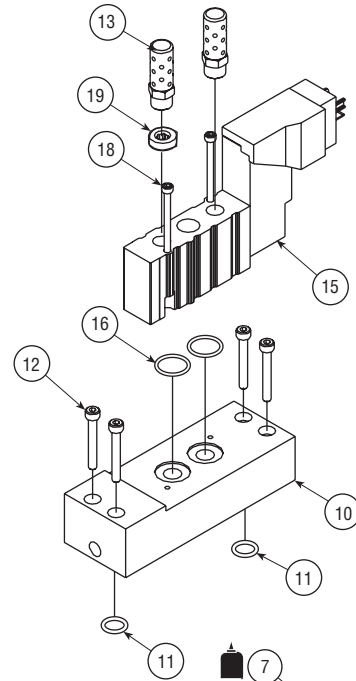
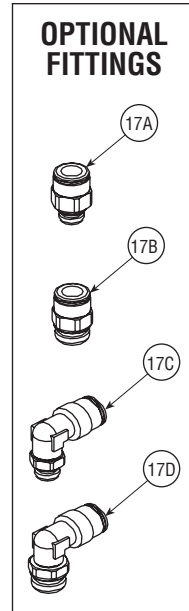
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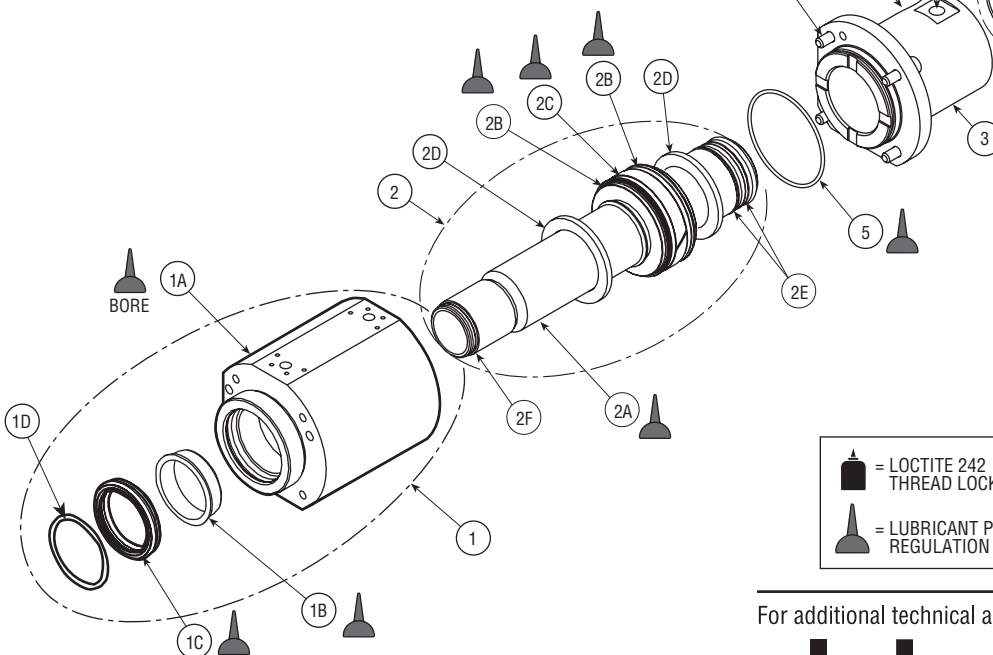
# phd<sup>®</sup> EXPLODED VIEW: SERIES BCZ2S NOZZLE CYLINDER



**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



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# phd PARTS LIST: SERIES BCZ2S NOZZLE CYLINDER

| KEY | PART DESCRIPTION                                      | BCZ2S-8-80x45                                     |
|-----|---|---|
| 1   | Body Assembly   | Full unit description required followed by -H2400 |
| 1A  | Body  | 75824-00  |
| 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  | Piston and Rod  | 75063   |
| 2B  | Piston Seal   | Sold as part of Repair Kit -H9010                 |
| 2C  | Wear Ring   | Sold as part of Repair Kit -H9010                 |
| 2D  | Shock Pad   | Sold as part of Repair Kit -H9010                 |
| 2E  | High Pressure Piston Seal                             | Sold as part of Repair Kit -H9010                 |
| 2F  | Rod O-Ring  | Sold as part of Repair Kit -H9010                 |
| 3   | 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>5</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   | Tube Standard Head Cap Screws                         | Sold as part of Fastener Kit -H9020               |
| 7   | Cap Standard Head Cap Screws                          | Sold as part of Fastener Kit -H9020               |
| 8   | High Pressure Fitting                                 | 12135-024   |
| 9   | Plug  | 59144-002   |
| 10  | Manifold Plate Assembly                               | 75078   |
| 11  | Manifold O-Ring                                       | Sold As Part of Manifold Kit                      |
| 12  | Manifold SHCS   | Sold As Part of Manifold Kit                      |
| 13  | Muffler   | Sold As Part of Manifold Kit                      |
| 15  | Mac 400 Series Valve                                  | MAC 411A-B0A-DM-DDAJ-1JM =4357                    |
| 16  | Valve Manifold O-Ring                                 | Sold As Part of Manifold Kit                      |
| 17A | Straight Port Fitting (-L1308)                        | 62195-024   |
| 17B | Straight Port Fitting<br>(-L1308-U22 OR -L1308-MC3)   | 61734-130   |
| 17C | 90° Swivel Port Fitting (-L1508)                      | 62195-007   |
| 17D | 90° Swivel Port Fitting<br>(-L1508-U22 OR -L1508-MC3) | 61734-014   |
| 18  | Valve SHCS  | Sold As Part of Manifold Kit                      |
| 19  | Valve Orifice   | 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 |
| Cap Repair Kit <sup>2</sup>       | 87121   |
| Cap Seal Only Kit <sup>3</sup>    | 87122   |
| Tooling Kit <sup>4</sup>          | 75536   |
| Cap Seal Tooling Kit <sup>5</sup> | 80828   |
| Rod Locking Nut                   | 75102-010-06                                      |
| Fastener Kit                      | Full unit description required followed by -H9020 |
| Manifold Kit                      | 75103   |
| 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 rod seal and grease to replace cap seal only.
- 4) Includes all specialized tools required to rebuild unit.
- 5) Includes tools to rebuild cap. Tools in this kit are also included in Kit #75536.

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