

# 'S' STYLE

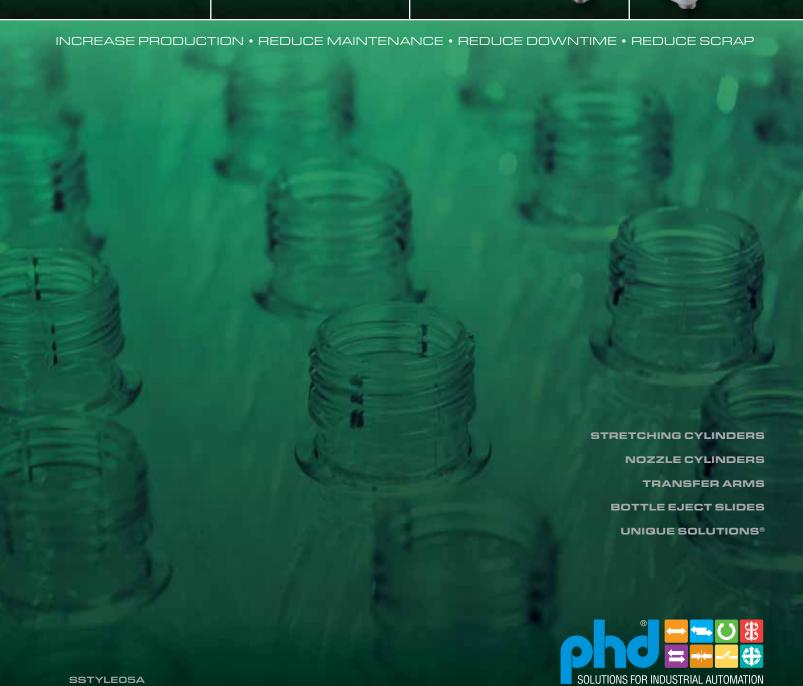
### **BLOW MOLDING MACHINES COMPONENTS**











# We understand



# your unique requirements

Focused on the specific needs of the plastic packaging industry, PHD offers many components for 'S' style and 'K' style machines such as stretching cylinders, nozzle and needle cylinders, and transfer arms. PHD also provides the added benefit of unique designs. Our built-to-need designs address your specific application issues.

Our components are the actuators of choice. Designed for long life, PHD products keep your blow molding lines running while increasing productivity and reducing downtime and scrap.

We also offer the added benefit of our rebuild program which refurbishes your existing PHD components, enabling even longer service life and savings.

To request more literature, visit www.phdinc.com/resources/inforequest

#### Easy Drop-in

With longer life, reduced maintenance, and reduced downtime

We offer a wide variety of components that match size and mounting for 'S' style, 'K' style, and other machines. Our components save you money by reducing costly production downtime and maintenance costs.

Many of our components provide up to twice the life of the original unit. This means longer up time for higher production and higher profits.

#### Superior Delivery

FASTER delivery than competitor Excellent delivery saves you money by getting you back to business faster.

#### **Unique Solutions**

Special Requirements

PHD offers a variety of components already designed to fit unique requirements. If your application requires a modified component from outside our large database of designs, our team is ready to help. We welcome special requests, regardless of quantity or frequency of order.

#### **Rebuild Program**

Return to service

Our products can be rebuilt and put back in service for continued savings. Plus you will receive a "like new" warranty. See page 83 for more information.

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# 'S' STYLE

	Component Reference Chart4	
STRETCHING CYLINDERS	BCS Stretching Cylinder	
NOZZLE CYLINDERS	Series 1 Nozzle Cylinders	
TRANSFER ARMS	BST2 Transfer Arm	
PREFORM/ BOTTLE EJECT SLIDES	ML308222 and ML308876	
OTHER	Mold Base Cylinder	

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#### **Component Reference Chart**

#### **'S' STYLE SERIES1**

SBO2	PHD Model
Stretching Cylinders	Series BCS1 Stretching Cylinder
	ML305877 HR (Heat Resistant)
	ML306930 HR (Heat Resistant)
Nozzle Cylinders	ML305665 CSD (Cold Set)
	ML307217 CSD (Cold Set)
	ML308364 CSD (Cold Set)
Rotary Transfer Arms	ML312140, ML311880
Mold Base Cylinders	ML304151
Mold Base Cylinders	ML307576 (for oversized rod end)

SBO4	PHD Model
Stretching Cylinders	ML312148
	ML305877 HR (Heat Resistant)
	ML306930 HR (Heat Resistant)
Nozzle Cylinders	ML305665 CSD (Cold Set)
	ML307217 CSD (Cold Set)
	ML308364 CSD (Cold Set)
Eject Slides	ML308222, ML308876
Transfer Arm - Fixed Head	Formerly BST1 - see Chart 1 below

SBO6	PHD Model
Stretching Cylinders	BCS1 Stretching Cylinder
	ML305877 HR (Heat Resistant)
	ML306930 HR (Heat Resistant)
Nozzle Cylinders	ML305665 CSD (Cold Set)
	ML307217 CSD (Cold Set)
	ML308364 CSD (Cold Set)
Eject Slides	ML308222, ML308876
Series1 Transfer Arm - Fixed Head	Formerly BST1 - see Chart 1 below

SBO10, SBO16, SBO24, SBO32 (Dual Cavity) SBO40	PHD Model
Stretching Cylinders	BCS1 Stretching Cylinder
Eject Slides	ML308222, ML308876, ML311797, ML310350, ML309535
Series1 Transfer Arm - Fixed Head	Formerly BST1 - see Chart 1 below
- Preferential Head	ML309814

<sup>✓</sup> Several models were produced in a cam-driven version in relation to the stretching process. Opportunities are also available for transfer arms and ejectors.

#### 'S' STYLE SERIES2 and SERIES2+

SBO MODELS	PHD Model	
Stretching Cylinders	BCS2 Stretching Cylinder	
Nozzle Cylinders	BCZ2 CSD and HR	
Preform/Eject Slides	ML304450, ML305278, ML308956, ML312136	
Series2 Transfer Arm - Fixed Head Standard and Adjustable	BST2xx-5	
- Head Only	BST2x25-1x90-xxxx	
- Preferential Head	ML311319 Preferential Head Only	
- Articulated	ML313644	
- SBO4, SBO6, and SBO8 Cold Set	ML315825 (BST2S2-5-1 x 90 -AP)	
- SBO4, SBO6, and SBO8 Heat Set	ML315912 (BST2D2-5-1 x 90 -AP)	
- SBO28 Cold Set	ML314723 (BST2S3-5-1 x 90 -AP), retract spring force 76 lbs [34.5 kg]	
- SBO28 Heat Set	ML315545 (BST2S3-5-1 x 90 -AP), retract spring force 59.2 lbs [26.9 kg]	

#### UNIVERSAL®

OHIVEROAL		
SBO Models	PHD Model	
Otrostoleiro ar Ordinado no	BCSU Universal® Stretching	
Stretching Cylinders	Cylinder	
Nozzle Cylinders	BCZUS, BCZUD Universal® Nozzle Cylinders	
Eject Slide	ML316228	
MATRIX®		

MAINIX	
SBO Models	PHD Model
Eject Slide	ML316228
Transfer Arm	ML317519
Transfer Arm Extracting Tool	ML317895
Nozzle Cylinder	ML317558

#### Chart 1

Unique Solution Part #	Former BST1 Part #	Description
ML318688	BST1S1-6-1 x 100	Cold set, 100° non-locking jaw opening
ML318689	BST1S1-6-1 x 100-Q9	Cold set, 100° non-locking jaw opening, pivot arm alignment key
ML318690	BST1S1-6-1 x 180	Cold set, 180° locking jaw opening
ML318691	BST1S1-6-1 x 180-Q9	Cold set, 180° locking jaw opening, pivot arm alignment key
ML318692	BST1D1-6-1 x 100	Hot set, 100° non-locking jaw opening
ML318693	BST1D1-6-1 x 100-Q9	Hot set, 100° non-locking jaw opening, pivot arm alignment key
ML318694	BST1D1-6-1 x 180	Hot set, 180° locking jaw opening
ML318695	BST1D1-6-1 x 180-Q9	Hot set, 180° locking jaw opening, pivot arm alignment key
Needs quoted	Any other combination	

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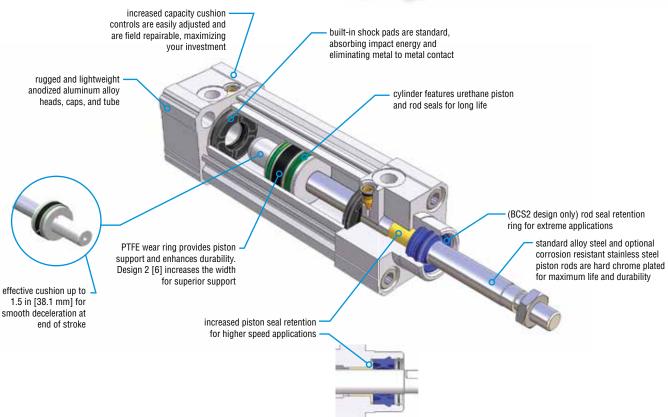
# BCS

# STRETCHING CYLINDER

#### **Major Benefits**

- PHD cylinder mounts into the same space and bolt pattern.
- Provides significantly longer life and reduces maintenance and downtime.
- Internal shock pads are standard, eliminating metal-to-metal contact.
- Cushion controls are standard for end of stroke deceleration on Series1 and Series2 on retract.
- Cylinders are easily field repairable, maximizing your investment.
- Optional Remote Bleed Off Kit available to safely and conveniently release the stretching rod/cylinder at the mold level without having to release the valve at the top of the machine. See page 18.

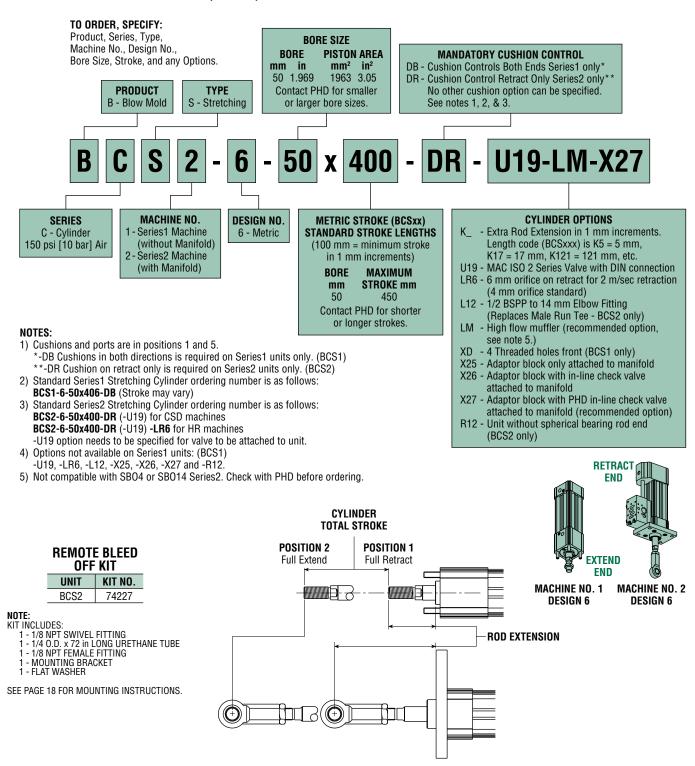






# ORDERING DATA: SERIES BCS STRETCHING CYLINDER

#### FOR SERIES1 MACHINES SB01, SB02, SB04 CONSULT FACTORY





# ENGINEERING DATA: SERIES BCS1 STRETCHING CYLINDER

SPECIFICATIONS	IMPERIAL	METRIC
TYPE	Pneumatic Cylinder	
SERIES	BCS Stretching Cylinder	
BORE SIZE	1.969 in	50 mm
BORE AREA		
EXTEND	3.04 in <sup>2</sup>	1963 mm <sup>2</sup>
RETRACT	2.56 in <sup>2</sup>	1649 mm²
THEORETICAL OUTPUT	264.5 lb @ 87 psi	1176.6 N @ 6 bar
OPERATION	Double Acting	
OPERATING PRESSURE RANGE	7.5 - 150 psi	0.5 - 10 bar
AMBIENT TEMPERATURE	-20 to +180°F	-29 to +82°C
MAX. OPERATING PISTON SPEED	80 in/sec	2.03 m/sec
ADJUSTABLE CUSHION	CUSHION Standard	
LUBRICATION	FDA Regulation 21CFR 178.3570	
PORT SIZE	1/4 BSPP	
MAXIMUM STROKE	17.72 in	450 mm
STROKE TOLERANCE	+0.079/-0.000 in	+2.0/-0.0 mm
BASE WEIGHT	4.28 lb	1.94 kg
STROKE ADDER WEIGHT PER 1 in (25 mm)	0.38 lb	0.17 kg
ALLOWABLE KINETIC ENERGY WITH CUSHION	60.5 in-lb	6.84 Nm
SHOCK PAD	Thermoplastic Polyester Elastomer (TPE)	
HEADS & CAPS	Anodized Aluminum	
CYLINDER TUBE	Anodized Aluminum	
PISTON ROD	Hard Chrome Plated Steel	
ROD BEARING	Internally Lubricated Polymer	
PISTON & ROD SEALS	Uret	hane

#### **ACTUATOR SPEEDS**

Cylinder speed is up to 80 in/sec [2.03 m/sec].

#### MAXIMUM ALLOWABLE KINETIC ENERGY

Series BCS1 is provided with cushions on both extend and retract. Its maximum kinetic energy rating is 60.5 in-lb  $[6.84\ Nm]$ .

#### **LIFE EXPECTANCY**

Series BCS1 Cylinders have been lab tested over 20 million trouble-free cycles.

#### **LUBRICATION**

Series BCS1 Stretching Cylinders are lubricated internally at the factory for the life of the cylinder using lubrication per FDA Regulation 21CFR 178.3570.

#### **MAINTENANCE**

As with most PHD products, these cylinders are field repairable. Repair kits, piston and rod assemblies, cushion control cartridge assemblies, and main structural components are available as needed for extended service.



# ENGINEERING DATA: SERIES BCS2 STRETCHING CYLINDER

SPECIFICATIONS	IMPERIAL	METRIC
TYPE	Pneumatic Cylinder	
SERIES	BCS Stretching Cylinder	
BORE SIZE	1.969 in	50 mm
BORE AREA		
EXTEND	3.04 in <sup>2</sup>	1963 mm²
RETRACT	2.56 in <sup>2</sup>	1649 mm²
THEORETICAL OUTPUT	264.5 lb @ 87 psi	1176.6 N @ 6 bar
OPERATION	Double	Acting
OPERATING PRESSURE RANGE	7.5 - 150 psi	0.5 - 10 bar
AMBIENT TEMPERATURE	-20 to +180°F	-29 to +82°C
MAX. OPERATING PISTON SPEED	80 in/sec	2.03 m/sec
ADJUSTABLE CUSHION - RETRACT	Stan	dard
LUBRICATION; FOOD GRADE	FDA Regulation	21CFR 178.3570
MAXIMUM STROKE	17.72 in	450 mm
STROKE TOLERANCE	+0.079/-0.000 in	+2.0/-0.0 mm
WEIGHT	15.1 lb	5.6 kg
ALLOWABLE KINETIC ENERGY		
RETRACT	181.5 in-lb	20.5 Nm
EXTEND	8.7 in-lb	0.98 Nm
SHOCK PAD	Thermoplastic Polyester Elastomer (TPE	
HEADS & CAPS	Anodized Aluminum	
CYLINDER TUBE	Anodized Aluminum	
PISTON ROD	Hard Chrome Plated Steel	
ROD BEARING	Internally Lubricated Polymer	
PISTON & ROD SEALS	Uret	hane

VALVE SPECIFICATIONS		
SERIES	ISO 2 (ISO 5599/1)	
	/	
FUNCTION	5/2	
OPERATOR	Single	
PILOT	Internal	
SPOOL RETURN	Spring	
SOLENOID	24 VDC (5.4 W)	
VOLTAGE RANGE -15% to +10% from Non		
ELECTRICAL CONNECTOR	DIN 43650, Form A	
MANUAL OPERATOR Non-locking Recessed		
PILOT EXHAUST	Muffled	
FLOW	3.0 Cv	
LUBRICATION	FDA Regulation 21CFR 178.3570	
FILTRATION	40 Micron	
OPERATING PRESSURE RANGE	20 to 150 psi [1.37 to 10 bar]	
AMBIENT FLUID TEMPERATURE	0° to 120°F [-18° to 50°C]	

#### **ACTUATOR SPEEDS**

Typical extension cylinder speed is 80 in/sec [2.03 m/sec] but is controlled by the blow mold mechanical cam to provide 63.04 in/sec [1.6 m/sec]. Retract speed has been restricted to provide 39.4 in/sec [1.0 m/sec]. An optional orifice (LR6) can be ordered to provide a velocity of 78.7 in/sec [2.0 m/sec].

#### MAXIMUM ALLOWABLE KINETIC ENERGY

The Series BCS2 is provided with a cushion on retract. Its maximum kinetic energy rating is 181.5 in-lb [20.5 Nm].

The BCS2 maximum kinetic energy capacity on extend is 8.7 in-lb [0.98 Nm] which is provided by the bumper only.

**NOTE:** Cushions are adjustable for 1 m/sec operation. External shock absorbers are required with cushions adjusted for 2 m/sec operation.

#### LIFE EXPECTANCY

Series BCS2 Cylinders have been lab tested over 20 million trouble-free cycles.

#### LUBRICATION

Series BCS2 Stretching Cylinders are lubricated internally at the factory for the life of the cylinder using lubrication per FDA Regulation 21CFR 178.3570.

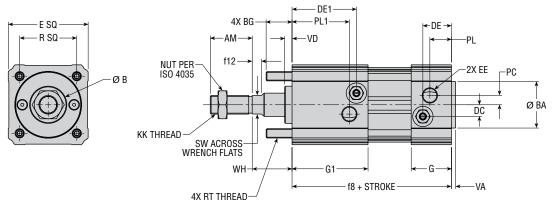
#### **MAINTENANCE**

As with most PHD products, these cylinders are field repairable. Repair kits, piston and rod assemblies, cushion control cartridge assemblies, and main structural components are available as needed for extended service.



# **DIMENSIONS:** SERIES BCS1 STRETCHING CYLINDER

#### **BCS1-6-50 (NON-MANIFOLD UNIT - SERIES1)**

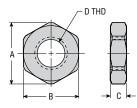




NOTES:
1) DIMENSIONS SHOWN IN [ ] ARE IN mm.
2) DESIGNATED CENTERLINE IS CENTERLINE OF CYLINDER.
3) UNLESS OTHERWISE DIMENSIONED, MOUNTING HOLE PATTERNS ARE CENTERED ON DESIGNATED CYLINDER CENTERLINE.

BORE SIZE (mm)	В	B ±TOL	RT	WH	R	BG	VD	VA Max.	G	G1	f8	E	f12
50	1.2565 [31.92]	0.0025 [0.06]	M8 x 1.25	1.340 [34.0]	1.929 [49.0]	0.875 [22.2]	0.249 [6.3]	0.157 [4.0]	1.358 [34.5]	2.566 [65.2]	5.381 [136.7]	2.697 [68.5]	0.315 [8.0]

BORE SIZE (mm)	SW (WRENCH FLAT)	ВА	KK	AM	EE PORT	EE PORT DEPTH	PL	PL1	PC	DE	DE1	DC
50	0.630 [16.0]	1.5709 [39.9]	M16 x 1.5	1.417 [36.0]	G 1/4	0.354 [9.0]	0.728 [18.5]	1.936 [49.2]	0.315 [8.0]	0.965 [24.5]	2.173 [55.2]	0.394 [10.0]



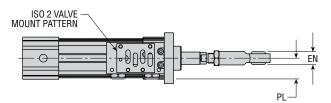
#### **HEX NUT DIMENSIONS PER ISO 4035 (DIN 4398)**

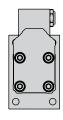
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BORE SIZE (mm)	A MIN	В	C	D THD	PHD PART Number	PHD PART Number (-Z1)
50	1.053	0.945	0.315	M16 x 1.5	3204-003-01	19735-003

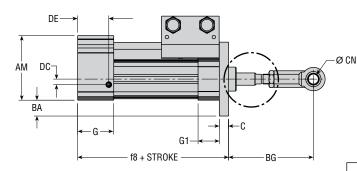


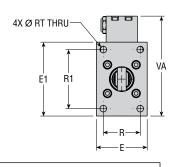
# **DIMENSIONS:** SERIES BCS2 STRETCHING CYLINDER

#### **BCS2-6-50 (MANIFOLD UNIT - SERIES2)**

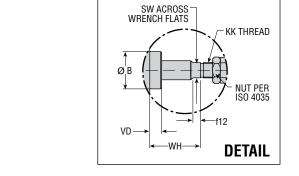








- NOTES:
  1) DIMENSIONS SHOWN IN [ ] ARE IN mm.
  2) DESIGNATED CENTERLINE IS CENTERLINE OF CYLINDER.
  3) UNLESS OTHERWISE DIMENSIONED, MOUNTING HOLE PATTERNS ARE CENTERED ON DESIGNATED CYLINDER CENTERLINE.
  4) 100 mm MINIMUM STROKE REQUIRED FOR STANDARD, CONSULT PHD FOR OTHER LENGTHS.
  5) FOR ILLUSTRATION PURPOSES, UNIT SHOWN IS AT 100 mm OF STROKE, BUT CHARTED DIMENSION 18 IS AT 0 mm STROKE.

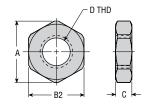


BORE SIZE (mm)	В	B ±TOL	C	RT	WH	R	R1	BG	VD	VA	G	G1	f8
50	1.5350	0.0050	0.591	0.425	2.091	2.362	3.780	5.427	0.491	6.388	1.806	1.358	5.212
	[38.99]	[0.13]	[15.0]	[10.8]	[53.1]	[60.0]	[96.0]	[137.8]	[12.5]	[162.3]	[45.9]	[34.5]	[132.4]

BORE SIZ (mm)	E E	E1	f12	SW (WRENCH FLAT)	BA	KK	AM	PL	DE	DC	CN H9 TOL.	EN h12 TOL.
50	3.250 [82.6]	4.724 [120.0]	0.315 [8.0]	0.630 [16.0]	1.014 [25.8]	M16 x 1.5	4.125 [104.8]	1.330 [33.8]	1.491 [37.9]	0.354 [9.0]	0.630 [16.0]	0.827 [21.0]

#### **HEX NUT DIMENSIONS PER ISO 4035 (DIN 4398)**

					(=	
BORE SIZE (mm)	A MIN	B2	С	D THD	PHD PART Number	PHD PART Number (-Z1)
50	1.053 [26.75]	0.945 [24.0]	0.315 [8.0]	M16 x 1.5	3204-003-01	19735-003





### **OPTIONS:** SERIES BCS STRETCHING CYLINDER

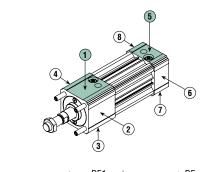


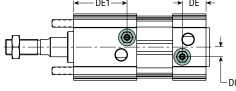
#### **CUSHION CONTROL IN BOTH DIRECTIONS (BCS1 ONLY)**

(standard location 1 and 5)

PHD cushions are designed for smooth deceleration at the end of stroke. When the cushion is activated, the remaining volume in the cylinder must exhaust past an adjustable needle which controls the amount of deceleration. The effective cushion lengths for each bore size are shown in the table below.

**NOTE:** Cushion controls are standard in locations 1 and 5 only.





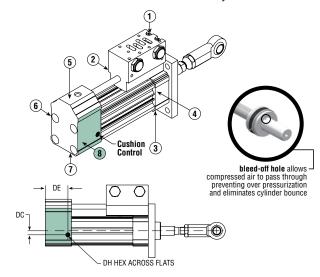
BORE SIZE (mm)	DE1	DC	DE	EFFECTIVE CUSHION LENGTH
50	2.173	0.394	0.965	0.930
	[55.2]	[10.0]	[24.5]	[23.6]

#### **CUSHION CONTROL ON RETRACT ONLY (BCS2 ONLY)** (standard location 8)

PHD cushions are designed for smooth deceleration at the end of stroke. When the cushion is activated, the remaining volume in the cylinder must exhaust past an adjustable needle which controls the amount of deceleration. The effective cushion lengths for each bore

size are shown in the table below.

**NOTE:** Cushion control is standard in location 8 only.



BORE SIZE (mm)	DE	DC	DH	EFFECTIVE CUSHION LENGTH
50	1.992	0.354		1.496
	[50.6]	[9.0]	[2.5]	[29.2]



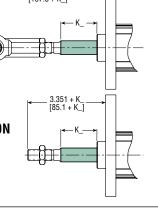
#### EXTRA ROD EXTENSION

Extra rod extension can be achieved by specifying the option -K followed by the length code. Rod extension is available in 1 mm increments. Contact PHD for other combinations.





**SERIES BCS2** 

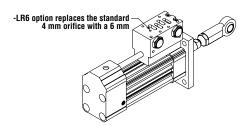




#### 6 mm ORIFICE ON RETRACT (BCS2 ONLY)

code examples: -K5 = 5 mm extension

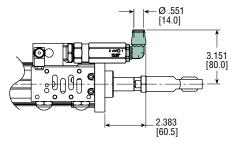
The LR6 option is required on all BCS2 HR units and replaces the standard 4 mm orifice which provides 39.4 in/sec [1.0 m/sec] retract velocity with a 6 mm orifice that increases retract velocity to 78.7 in/sec [2.0 m/sec]. (Required for HR applications.)





#### 1/2 BSPP TO 14 mm **ELBOW FITTING (BCS2 ONLY)**

The L12 option is required on all BCS2 HR units and replaces the standard 1/2 BSPP male run tee pressure inlet fitting with a 1/2 BSPP to 14 mm elbow fitting. **NOTE**: The L12 option is only available if combined with the X26 option. See the X26 option for more information. (Required for HR applications.)

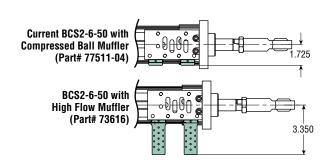


-L12 option with -X26 option

# LM

# HIGH FLOW MUFFLER (BCS2 ONLY) RECOMMENDED OPTION

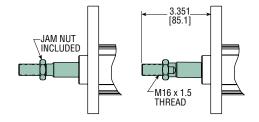
The LM option provides a high flow muffler to replace the standard compressed ball muffler. This high flow muffler reduces the potential for contamination slowing down cylinder velocity. As the high flow muffler is longer, the dimension must be verified to ensure adequate clearance. The high flow muffler may be purchased separately (Part# 73616).



# **R12**

#### **UNIT WITHOUT SPHERICAL ROD END** (BCS2 ONLY)

This option is for a cylinder without a spherical rod end.

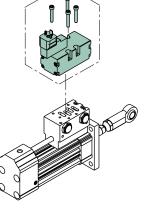


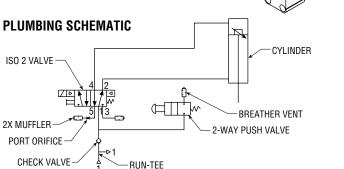
# **U19**

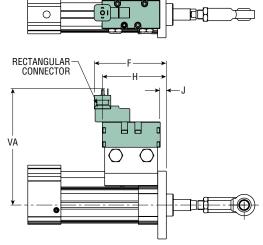
# MAC ISO 2 SERIES VALVE DIN CONNECTION (BCS2 ONLY)

A MAC ISO 2 Series valve is optionally provided assembled to the unit by specifying the -U19 option. The valve is equipped with a DIN 43650, shape A connector, and is lubricated with FDA Regulation 21CFR 178.3570 food grade lubrication.

Reference valve specification chart page 8.







- 1) DIMENSIONS SHOWN IN [ ] ARE IN mm.
  2) DESIGNATED CENTERLINE IS CENTERLINE OF CYLINDER.
  3) UNLESS OTHERWISE DIMENSIONED, MOUNTING HOLE PATTERNS ARE CENTERED ON DESIGNATED CYLINDER CENTERLINE.

BORE SIZE (mm)	F	Н	J	VA
50	5.011 [127.3]	4.456 [113.2]	0.424 [10.8]	8.135 [206.6]



### **OPTIONS:** SERIES BCS STRETCHING CYLINDER

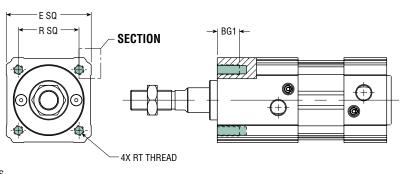
# XD

#### **4 THREADED HOLES FRONT** (BCS1 ONLY)

BORE SIZE (mm)	RT	R	BG1 MIN.	E
50	M8 x 1.25	1.929 [49.0]	0.875 [22.2]	2.697 [68.5]

#### NOTES:

1) DIMENSIONS SHOWN IN [ ] ARE IN mm. 2) DESIGNATED CENTERLINE IS CENTERLINE OF CYLINDER. 3) UNLESS OTHERWISE DIMENSIONED, MOUNTING HOLE PATTERNS ARE CENTERED ON DESIGNATED CYLINDER CENTERLINE.



#### ADAPTOR BLOCK ONLY ATTACHED TO MANIFOLD (BCS2 ONLY)

This option omits the check valve completely allowing the customer to provide the check valve of choice. See the drawing for thread and port sizing required. This option is assembled at the factory, or a kit is available for quick and easy field retrofit. See kit ordering number.

UNIT	INLET ADAPTOR KIT NO.
BCS2650	76066

#### NOTE: KIT INCLUDES:

- 1 INLET ADAPTOR ASSEMBLY
- 1 1/8 NPT O-RING SEAL
- 1 1/2 NPT O-RING SEAL
- 4 INLET ADAPTOR TO MANIFOLD SHCS
- 1 1/8 NPT BREATHER VENT
- 1 2 WAY PUSH BUTTON VALVE (FITTING NOT INCLUDED)
- 4.190 10.465 [268.0] 1/2 BSPP [39.8] 2.375 [60.3] 4.000 [101.6] 0 0

# **X26**

### ADAPTOR BLOCK WITH IN-LINE CHECK VALVE ATTACHED TO MANIFOLD (BCS2 ONLY)

The inline check valve with adaptor block assembly is provided with an inline poppet style check valve to keep incoming air from exhausting through the inlet pressure supply tube during maintenance and keeps the stretch rod from dropping. This option is assembled at the factory, or a kit is available for quick and easy field retrofit. See kit ordering number. NOTE: Comes standard from factory with male run tee. Option -L12 replaces the male run tee with elbow fitting.

UNIT	INLINE CHECK VALVE KIT NO.
BCS2650	80138

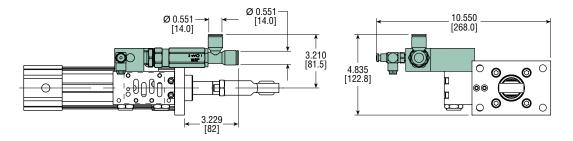
#### NOTE: KIT INCLUDES:

- 1 INLINE CHECK VALVE
- 1 BSPP MALE TO NPT MALE NIPPLE
- 1 SEALING RING

(FITTING NOT INCLUDED)



THE PHD WARRANTY COVERS THE CYLINDER, ISO VALVE, MANIFOLD AND ALL OTHER COMPONENTS ON THE CYLINDER WITH THE EXCEPTION OF THE CHECK VALVE. THE CHECK VALVE IS PROVIDED AS A SERVICE TO THE CUSTOMER, BUT DOES NOT CARRY THE PHD WARRANTY.





# **OPTIONS & ACCESSORIES:** SERIES BCS STRETCHING CYLINDER

# **X27**

#### ADAPTOR BLOCK WITH PHD IN-LINE **CHECK VALVE ATTACHED TO MANIFOLD** (BCS2 ONLY) RECOMMENDED OPTION

The PHD inline check valve with adaptor block assembly is provided with an inline check seal to keep incoming air from exhausting through the inlet pressure supply tube during maintenance and keeps the stretch rod from dropping. This option is assembled at the factory, or a kit is available for quick and easy field retrofit. See kit ordering number below.

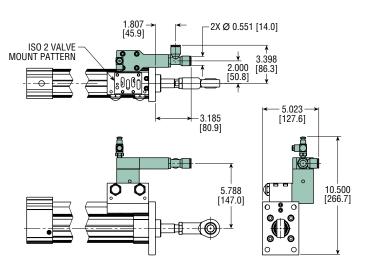
NOTE: Comes standard from factory with male run tee. Option -L12 replaces the male run tee with elbow fitting.

#### **NOTE:** OPTION INCLUDES:

- 1 INLET ADAPTOR ASSEMBLY
- 1 1/8 NPT O-RING SEAL
- 1 1/2 NPT O-RING SEAL
- 4 INLET ADAPTOR TO MANIFOLD SHCS
- 1 1/8 NPT BREATHER VENT
- 1 2 WAY PUSH BUTTON VALVE
- 1 INLET CAP ADAPTOR
- 4 INLET CAP ADAPTOR MTG SHCS
- 2 INLET CAP O-RING SEALS
- 1 QUICK EXHAUST SEAL

UNIT	-H CODE	KIT NO.	DESCRIPTION
DOCOCEO	H9166	83551	(INLINE CHECK VALVE KIT)
BCS2650	H9170	83558	(CHECK VALVE SEAL KIT)

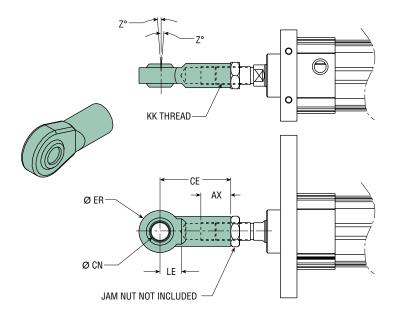
KIT DOES NOT INCLUDE THE FOLLOWING ITEMS: MALE RUN TEE FITTING, 2 WAY PUSH BUTTON VALVE, 1/8 NPT BREATHER VENT



- NOTES:

  1) DIMENSIONS SHOWN IN [ ] ARE mm
  2) DESIGNATED CENTERLINE IS CENTERLINE OF CYLINDER
  3) UNLESS OTHERWISE DIMENSIONED, MOUNTING HOLE PATTERNS ARE CENTERED ON DESIGNATED CYLINDER CENTERLINE
  4) 100 mm MINIMUM STROKE REQUIRED FOR STANDARD UNITS, CONSULT PHD FOR OTHER LENGTHS

#### **ROD EYE MOUNTING WITH SPHERICAL BEARING (DIN 8139)**



BORE SIZE (mm)	KK	AX Min.	CN H9	EN h12	CE	LE Min.	ER Max.	Z°	*KIT
50	M16 x 1.5	1.102 [28.0]	0.630 [16.0]	0.827 [21.0]	2.520 [64.0]	0.866	0.827 [21.0]	4°	52493-03-1

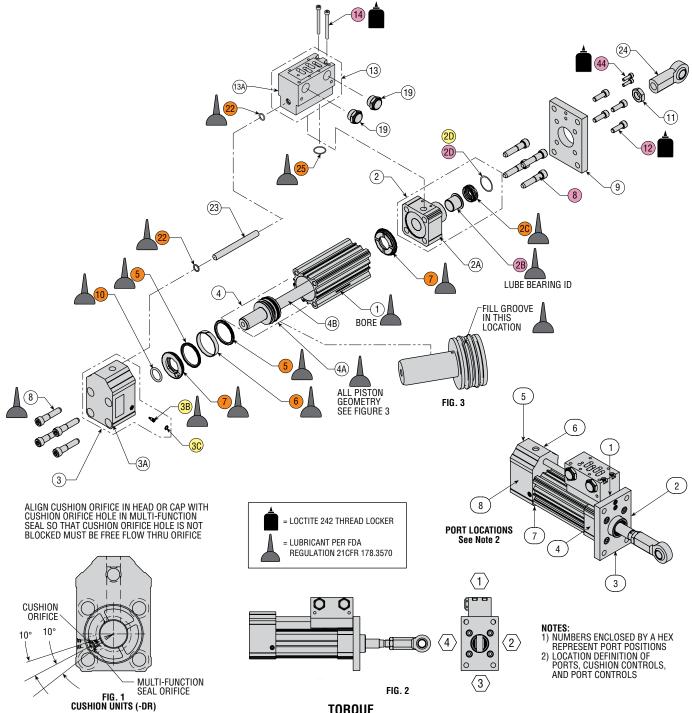
NOTE: \*KIT DOES NOT INCLUDE JAM NUT.



# **EXPLODED VIEW:** SERIES BCS1 STRETCHING CYLINDER

KEY	PART DESCRIPTION	BCS1-6-50	KIT	KIT NO.	COLOR
1	Tube	Full unit description required followed by -H1300	DESCRIPTION		CODE
2	Head Assembly (Extend End)	Full unit description required followed by -H1100	Seal Kit	Full unit description required	
2A	Head	Full unit description required followed by -H1105	-	followed by -H9000	
2B	Rod Seal	Sold as part of Seal and Repair Kit	Repair Kit	Full unit description required	
2C	Flange Bearing	Sold as part of Repair Kit (Full unit description -H9010)	-	followed by -H9010	
2D	Locator	73624	Cushion Kit	Full unit description required	
2E	SFHCS	Sold as part of Repair Kit (Full unit description -H9010)		followed by -H6530	
2F	Needle Assembly	Sold as part of Cushion Kit (Full unit description -H6530)		repair, seal and cushion kits are	
3	Cap Assembly	Full unit description required followed by -H1200		CS1-5-50 (old design units). or more information.	
3A	Cap	Full unit description required followed by -H1205		or more imormation.	
3B 4	Needle Assembly	Sold as part of Cushion Kit (Full unit description -H6530)	-		
4 4A	Piston and Rod Assembly Piston	Full unit description required followed by -H1000	-		
4B	Rod	_	-		
5	Piston Seal	Sold as part of Seal and Repair Kit	-		
6	Wear Ring	Sold as part of Sear and Nepair Kit  Sold as part of Repair Kit (Full unit description -H9010)	=	A 📥 -	
7	Multi-Function Impact Seal	Sold as part of Nepali Kit (I dil dilit description -119010)	-		
8	Cushion O-Ring Seal	Sold as part of Seal and Repair Kit	-		·\$
9	Tierod and Nut Assembly	Full unit description required followed by -H1400	-	95	
9A	Tierod Nut	—	-	3- ( )	
9B	Tierod	_	-		S
10	Socket Set Screw	82323	- 1		5
11	Ball (4 per unit)	1976-004			
12	Nut (1 per unit)	3204-003-01	BORE		
	, , ,		DOTE		
	TORQUE	A A		3A	
PAI	RT DESCRIPTION TORQU			8	
TIFRO	DD AND NUT				
ASSEI	MBLIES 110 [12.	4]		Λ -	
	HEAD CAP SCREWS 20 [2.3	1 28	- <u>8</u> \[ \]	5	
(LOCA	ATOR TO HEAD)		8		
			``\		
		2A)		6	
	<del>\(\big(10\)</del>				
		20			
		LUBE BEARING I.D.			
				4B ALL PISTON	
				GEOMETRY AND SEE FIGURE 3	
		(11)	-0.40	SEE FIGURE 3	
		NOT ON -XD OPTION			
	(12)	Δ.		5 6	
	<u> </u>				١
	ΔΙΙ	IGN CUSHION ORIFICE IN HEAD OR CAP WITH IN THIS LOCA			,
	CU	SHION ORIFICE HOLE IN MULTI-FUNCTION	illa. u		
		AL SO THAT CUSHION ORIFICE HOLE IS NOT OCKED MUST BE FREE FLOW THRU ORIFICE	(	8)	
		400			
	NAI	JLTI-FUNCTION — J. /		7	
	IVIC	SEAL ORIFICE		3	
		-10° (1)	.875 ±.030 [22.2 mm ±.5mm]	PORT LOCATION DEFINITION	
	= LOCTITE 242 THREAD LOCKER		[	See Note 2	
		Sushion 4 (0) 2 CDD		OTES:	
		SUSHION ORIFICE		) NUMBERS ENCLOSED BY A HEX	
	REGULATION 21CFR 178.3570			REPRESENT PORT POSITIONS ) LOCATION DEFINITION OF	
		FIG. 1	FIG. 2 Not on -XD option	PORTS, CUSHION CONTROLS, AND PORT CONTROLS	
		CUSHION UNITS (-DB)	(No thread extension)	5 . 5 501111020	





#### **TORQUE**

KEY	PART DESCRIPTION	TORQUE in-lb [Nm]
12	FLANGE TO HEAD SHCS	200 [22.6]
44	FLANGE TO MANIFOLD SHCS	80 [9.0]
8	SHOULDER BOLT	250 [28.2]
29A	-U19 OPTION VALVE ASSEMBLY	100 [11.3]
4A & 4B	PISTON TO ROD	325 [36.7]
14	MANIFOLD SHCS	80 [9.0]
19	MUFFLER TO MANIFOLD ASSEMBLY	HAND TIGHTEN PLUS 1/4 TURN
33	INLET ADAPTOR TO MANIFOLD SHCS	50 [5.6]
50	CAP MOUNTING (SHCS)	125 [14.1]



# PARTS LIST & REPAIR KITS: SERIES BCS2 STRETCHING CYLINDER

KEY	PART DESCRIPTION	BCS2-6-50
1	Finished Tube	Full unit description required followed by -H1300
2	Head Assembly	Full unit description required followed by -H1100
2A	Head	Sold as part of Head Assembly
2B	Rod Bearing	Sold as part of Head Assembly, Sold as part of Repair Kit (-H9010*)
2C	Rod Seal	Sold as part of Head Assembly, Sold as part of Seal Kit (-H9000*) and Repair Kit (-H9010*)
2D	Retaining Ring	Sold as part of Head Assembly, Sold as part of Repair Kit (-H9010*)
3	Cap Assembly	Full unit description required followed by -H1200
3A	Cap	Sold as part of Cap Assembly
3B	Cushion Needle Assembly	Sold as part of Cap Assembly, Sold as part of Cushion Kit (-H6530*)
3C	Retaining Ring	Sold as part of Cap Assembly, Sold as part of Cushion Kit (-H6530*)
4	Piston & Rod Assembly	Full unit description required followed by -H1000
4A	Piston	Sold as part of Piston & Rod Assembly
4B	Rod	Sold as part of Piston & Rod Assembly
5	Piston Seal	Sold as part of Seal Kit (-H9000*) and Repair Kit (-H9010*)
6	Wear Ring	Sold as part of Seal Kit (-H9000*) and Repair Kit (-H9010*)
7	Multi-Function Impact Seal	Sold as part of Seal Kit (-H9000*) and Repair Kit (-H9010*)
8	Shoulder Bolt w/Female Thread	Sold as part of Repair Kit (-H9010*)
9	Flange	Full unit description required followed by -H2005
10	Cushion O-Ring Seal	Sold as part of Seal Kit (-H9000*) and Repair Kit (-H9010*)
11	Jam Nut	Full unit description required followed by -H2001
12	Flange to Head Cap Screw	Sold as part of Repair Kit (-H9010*)
13	Manifold Block Assembly	Full unit description required followed by -H9090
13A	Manifold Block	Sold as part of Manifold Block Assembly
14	Manifold to Head Cap Screw	Sold as part of Repair Kit (-H9010*) or Manifold Assembly Kit (-H9090*)
16	Fitting Adaptor	See Chart #1
17	Check Valve	See Chart #1
18	Male Run Tee Fitting	See Chart #1
20	2 Way Push Button Valve	See Chart #1
21	Breather Vent	See Chart #1
22	Steel Tubing O-Ring Seal	Sold as part of Seal Kit (-H9000*) and Repair Kit (-H9010*)
23	Steel Tube	Full unit description required followed by -H1310
24	Rod Eye	Sold as part of Kit (52493-03-1)
25	Manifold to Head O-Ring Seal	Sold as part of Seal Kit (-H9000*) and Repair Kit (-H9010*)
30	Inlet Adaptor Assembly	Sold as part of Inlet Adaptor Kit (-H9150*)
31	1/8 NPT O-Ring Seal	Sold as part of Inlet Adaptor Kit (-H9150*) and as part of Seal Kit (-H9000*)
32	1/2 NPT O-Ring Seal	Sold as part of Inlet Adaptor Kit (-H9150*) and as part of Seal Kit (-H9000*)
33	Inlet Adaptor to Manifold Cap Screw	Sold as part of Inlet Adaptor Kit (-H9150*) and as part of Repair Kit (-H9010*)
39	Sealing Ring	See Chart #1
44	Flange to Manifold Cap Screw	Sold as part of Repair Kit (-H9010*)

#### CHART 1

	OPTION CODE						
KEY	-X25	-X26	-X27				
16	-	77235	_				
17	_	80010	_				
18	-	See Chart #2	See Chart #2				
20	73660	73660	73660				
21	2804-23	2804-23	2804-23				
39	-	77629-004	_				
50	-	-	14308-025				
51	-	-	80104				
52	-	-	*				
53	-	-	*				
54	_	_	*				

**NOTE:** \*Sold as part of inlet adaptor kit (-H9150\*) Sold as part of seal kit (-H9000\*)

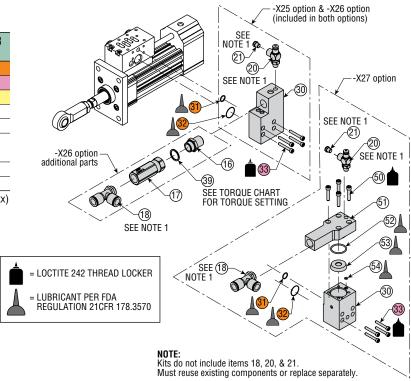
#### **CHART 2**

OPTION	-X26	-X27
STANDARD	61734-040	61734-040
-L12	74345-070	74345-070

NOTE: \*Full unit description required (followed by -Hxxxx)

KIT DESCRIPTION	KIT NO.	COLOR CODE
Seal Kit	-H9000*	
Repair Kit	-H9010*	
Cushion Kit	-H6530*	
Inlet Adaptor Assembly Kit	-H9150*	
Manifold Assembly Kit	-H9090*	
Inline Check Valve -X23 to -X26 Conversion Kit	-H9160*	
Inline Check Valve -X26 Kit	-H9165*	
Inline Check Valve -X27 Kit	-H9166*	

NOTE: \*Full unit description required (followed by -Hxxxx)





### KIT NO. 74227

#### REMOTE BLEED OFF KIT KIT NO.

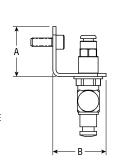
74227

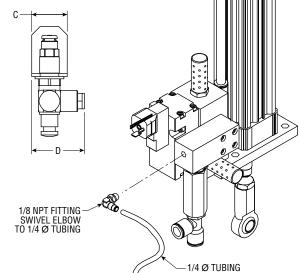
BCS2

#### KIT INCLUDES:

- I INCLUDES: 1 1/8 NPT SWIVEL FITTING 1 1/4 O.D. x 72 in LONG URETHANE TUBE 1 1/8 NPT FEMALE FITTING 1 MOUNTING BRACKET

	IVIO	OIVII	IIVG	וט
1 -	FI A	T W/	4SH	FR





1/8 NPT FEMALE TO 1/4 Ø TUBING

MOUNTING BRACKET

CUSTOMER SUPPLIED

FASTENER

DUMP VALVE

		LETTER DIMENSION								
UNIT	A		В		C		D		<b>FASTENER SIZE</b>	
	in	mm	in	mm	in	mm	in	mm	in	mm
BCS2	1.410	35.1	1.500	38.1	1.000	25.4	1.482	37.6	1/4	M6

#### REMOTE BLEED OFF VALVE MOUNTING INSTRUCTIONS:

- 1) Remove Bleed Off Valve from unit's manifold.
- Insert 1/8 NPT Swivel Elbow into unit's manifold block in place of Bleed Off Valve.
- Fasten Bleed Off Valve Bracket in a remote, easy-to-access location (Ø 0.281 hole in bracket).
- Secure Bleed Off Valve Bracket with customer-supplied fastener.
- Place flat washer between bottom of bracket and NPT thread.
- Apply teflon tape to NPT male thread.
- Attach 1/8 NPT Female to 1/4 Ø tubing to threaded end of Bleed Off Valve. 7)
- Insert NPT threaded end of Bleed Off Valve into large diameter thru hole, so that button is pointing down.
- Press 1/4 Ø tubing into fitting on unit's manifold block.
- 10) Trim tubing to comfortable length (if tubing is not trimmed, coil excess).
- 11) Tie down any extra length (or coil) of tubing.
- 12) Press other end of 1/4 Ø tubing into 1/8 NPT fitting at Bleed Off Valve.
- 13) Test operation.



WASHER



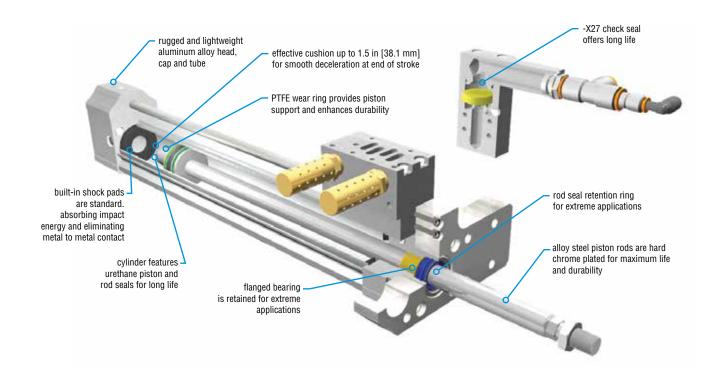
# BCSU

### STRETCHING CYLINDER

#### **Major Benefits**

- PHD cylinder mounts into the same space and bolt patterns.
- Provides significantly longer life and reduces maintenance and downtime.
- Internal shock pads are standard, eliminating metal-to-metal contact.
- Cushion controls are standard for retract end of stroke deceleration.
- Cylinders are easily field repairable, maximizing your investment.
- -X27 PHD inline check option provides long life check seal and is designed to prevent the stretch rod from dropping during maintenance.





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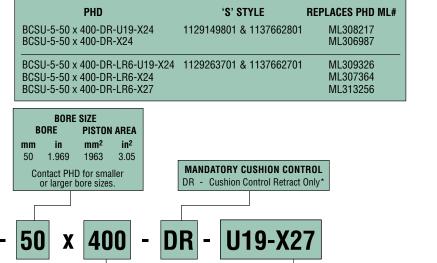
TO ORDER, SPECIFY:

Product, Series, Type, Machine No.,

Design No., Bore Size, Stroke, any

# ORDERING DATA: SERIES BCSU STRETCHING CYLINDER

THE FOLLOWING IS A CROSS REFERENCE LISTING OF PHD TO 'S' STYLE UNITS:



**CYLINDER OPTIONS** 

Length code (BCSxxx) is K5 = 5 mm, K17 = 17 mm,

U19 - MAC ISO 2 Series Valve with DIN connection (See Note 4)

Adaptor block with PHD in-line check valve attached

to manifold (Recommended Option) (See Note 5)

- Extra Rod Extension in 1 mm increments.

R13 - Rod eye attached to rod end of cylinder

attached to manifold (See Note 5)

X24 - Adaptor block with pilot opterated check valve

L23 - Replacement of visual indicator with port plug

K121 = 121 mm, etc.LR6 - Heat resistant orifice on retract (HR)

Options. **PRODUCT TYPE** B - Blow Mold S - Stretching Cylinder

DESIGN NO. MACHINE NO. **SERIES** U - Universal 5 - Metric C - Cylinder 150 psi [10 bar] Air

METRIC STROKE (BCSxx)

#### STANDARD STROKE LENGTHS

(100 mm = minimum stroke in 1 mm increments) BORE MAXIMUM

STROKE [mm] [mm] 450

Contact PHD for shorter or longer strokes.

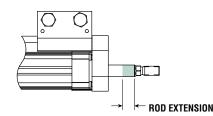
2) STANDARD CSD STRETCHING CYLINDER ORDERING NUMBER IS AS FOLLOWS:

BCSU-5-50 x 400 - DR -U19 -X27 3) STANDARD HR STRETCHING CYLINDER ORDERING NUMBER IS AS FOLLOWS: BCSU-5-50 x 400 - DR - LR6 -U19 -X27

4) -U19 OPTION MUST BE SPECIFIED FOR VALVE TO BE ATTACHED TO UNIT

5) -X27 or -X24 CHECK VALVE OPTION MUST BE SELECTED

**CYLINDER** TOTAL STROKE





NOTES:

1) \* = -DR MUST BE SPECIFIED

Stroke lengths set on machine of less than 165 mm [6.5 in], consult PHD for proper needle settings.



# ENGINEERING DATA: SERIES BCSU STRETCHING CYLINDER

SPECIFICATIONS	IMPERIAL	METRIC			
TYPE	Pneumati	c Cylinder			
SERIES	Universal® Machines Stretching Cylinde				
BORE SIZE	1.969 in	50 mm			
BORE AREA					
EXTEND	3.04 in <sup>2</sup>	1963 mm²			
RETRACT	2.56 in <sup>2</sup>	1649 mm²			
THEORETICAL OUTPUT	264.5 lb @ 87 psi	1176.6 N @ 6 bar			
OPERATION	Double Acting				
OPERATING PRESSURE RANGE	7.5 - 150 psi	0.5 - 10 bar			
AMBIENT TEMPERATURE	-20 to +180°F	-29 to +82°C			
ADJUSTABLE CUSHION - RETRACT	Stan	dard			
LUBRICATION; FOOD GRADE	FDA Regulation	21CFR 178.3570			
STROKE	15.692 in	400 mm			
STROKE TOLERANCE	+0.079/-0.000 in	+2.0/-0.0 mm			
SHOCK PAD	Thermoplastic Polye	ster Elastomer (TPE)			
HEADS & CAPS	Anodized .	Aluminum			
CYLINDER TUBE	Anodized Aluminum				
PISTON ROD	Hard Chrome Plated Steel				
ROD BEARING	Internally Lubr	icated Polymer			
PISTON & ROD SEALS	Uret	hane			

Ш	FF	FX	PF	CT/	١N	CY
	_	-		<b>u</b> 11	717	vı

Series BCSU Cylinders have been lab tested over 20 million trouble-free cycles.

VALVE SPECIFICATIONS	
SERIES	ISO 2 (ISO 5599/1)
FUNCTION	5/2
OPERATOR	Single
PILOT	Internal
SPOOL RETURN	Spring
SOLENOID	24 VDC (5.4 W)
VOLTAGE RANGE	-15% to +10% from Nominal
ELECTRICAL CONNECTOR	DIN 43650, Form A
MANUAL OPERATOR	Non-locking Recessed
PILOT EXHAUST	Muffled
FLOW	3.0 Cv
LUBRICATION	FDA Regulation 21CFR 178.3570
FILTRATION	40 Micron
OPERATING PRESSURE RANGE	20 to 150 psi [1.37 to 10 bar]
AMBIENT FLUID TEMPERATURE	0° to 120°F [-18° to 50°C]

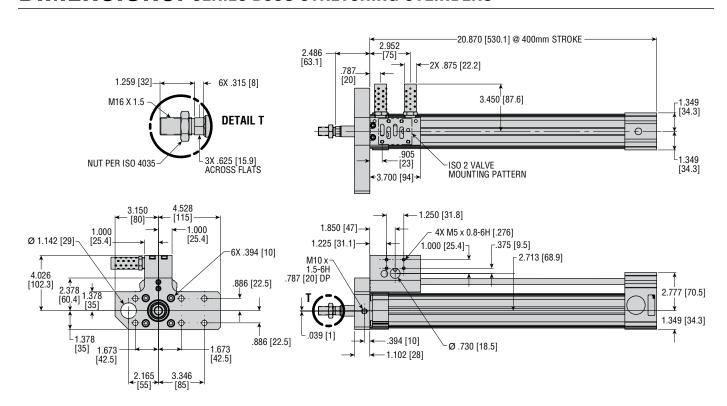
#### **LUBRICATION**

Series BCSU Stretching Cylinders are lubricated internally at the factory for the life of the cylinder using lubrication per FDA Regulation 21CFR 178.3570.

#### **MAINTENANCE**

As with most PHD products, these cylinders are field repairable. Repair kits, piston and rod assemblies, cushion control cartridge assemblies, and main structural components are available as needed for extended service.

# **DIMENSIONS:** SERIES BCSU STRETCHING CYLINDERS



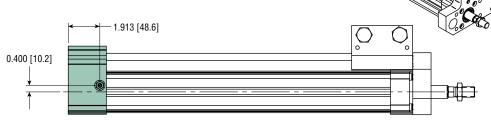


# **OPTIONS:** SERIES BCSU STRETCHING CYLINDER

DR

# CUSHION CONTROL ON RETRACT ONLY (MANDATORY OPTION)

PHD cushions are designed for smooth deceleration at the end of stroke. When the cushion is activated, the remaining volume in the cylinder must exhaust past an adjustable needle which controls the amount of deceleration.



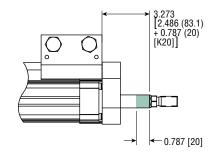


#### **EXTRA ROD EXTENSION**

Extra rod extension can be achieved by specifying the option -K followed by the length code. Rod extension is available in 1 mm increments. Contact PHD for other combinations.

NOTE: -K\_ = Extra rod extension in 1 mm increment lengths code examples: -K5 = 5 mm extension

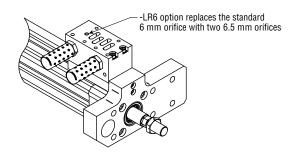
-K15 = 15 mm extension -K20 = 20 mm extension





# ORIFICE ON RETRACT (HR - HEAT RESISTANT UNITS)

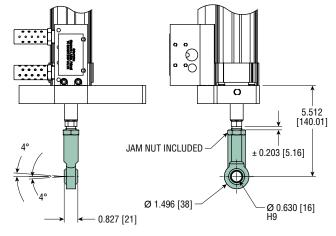
The LR6 option is required on all heat resistant units and replaces the standard 6 mm orifice which provides 39.4 in/sec [1.0 m/sec] retract velocity with two 6.5 mm orifices that increases retract velocity to 78.7 in/sec [2.0 m/sec]. (Required for HR applications.)





# ROD EYE MOUNTING WITH SPHERICAL BEARING (DIN 8193)

This option includes a rod eye attached to the rod end of the cylinder.



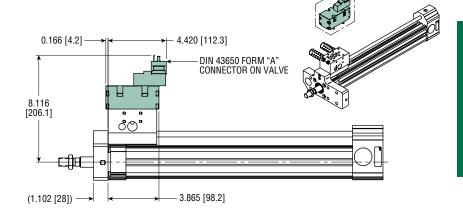


# **OPTIONS:** SERIES BCSU STRETCHING CYLINDER

# U19

# MAC ISO 2 SERIES VALVE DIN CONNECTION

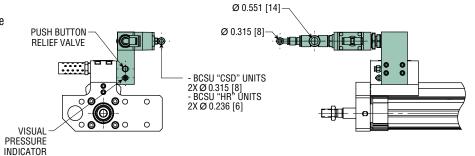
A MAC ISO 2 Series valve is optionally provided assembled to the unit by specifying the -U19 option. The valve is equipped with a DIN 43650, shape B connector, and is lubricated with FDA Regulation 21CFR 178.3570 food grade lubrication.



# X24

# ADAPTOR BLOCK WITH IN-LINE PILOT-OPERATED CHECK VALVE ATTACHED TO MANIFOLD

The inline check valve with adaptor block assembly is provided with an inline poppet-style check valve to prevent incoming air from exhausting through the inlet pressure supply tube during maintenance and is designed to prevent the stretch rod from dropping. This option is assembled at the factory.

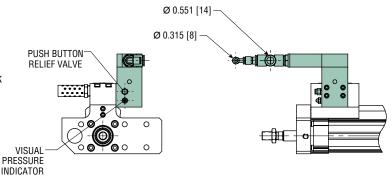




# ADAPTOR BLOCK WITH PHD IN-LINE CHECK VALVE ATTACHED TO MANIFOLD RECOMMENDED OPTION

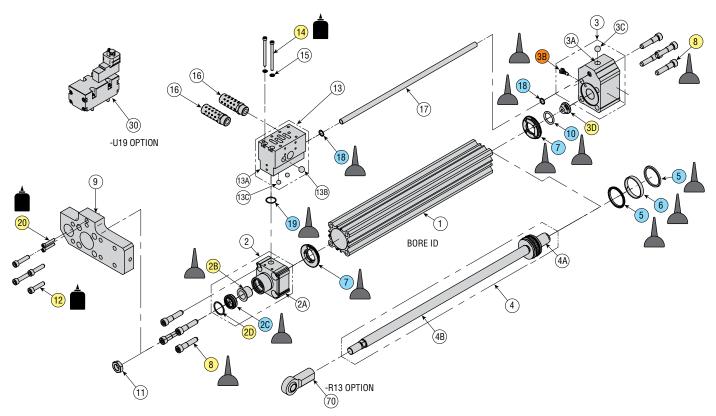
The PHD inline check valve with adaptor block assembly is provided with an inline check seal designed to prevent incoming air from exhausting through the inlet pressure supply tube during maintenance and prevent the stretch rod from dropping.

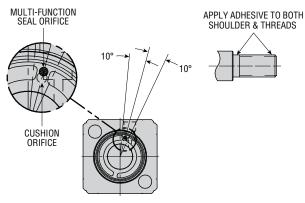
This option is assembled at the factory. The -X27 check valve does not require the use of the tubing for the pilot operated check valve system that comes standard on your Universal® machine.



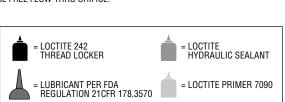


# EXPLODED VIEW & REPAIR KITS: SERIES BCSU STRETCHING CYLINDER

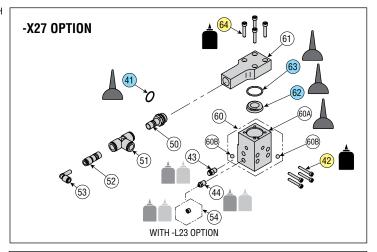


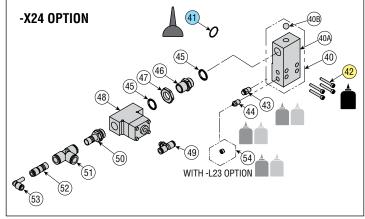


ALIGN CUSHION ORIFICE IN CAP WITH CUSHION ORIFICE HOLE IN MULTI-FUNCTION SEAL SO THAT CUSHION ORIFICE HOLE IS NOT BLOCKED. MUST BE FREE FLOW THRU ORIFICE.



KIT DESCRIPTION	KIT NUMBER	COLOR	CODE
Seal Kit	Full unit description required followed by -H9000		
Repair Kit	Full unit description required followed by -H9010		
Cushion Needle Kit	Full unit description required followed by -H6530		







# PARTS LIST: SERIES BCSU STRETCHING CYLINDER

#### **CYLINDER ONLY PARTS LIST**

ART NO.	
required followed by -H1300	
Full unit description required followed by -H1100	
Sold as part of Head Assembly	
Sold as part of Repair Kit (-H9010*)	
of Seal kit (-H9000*)	
nir Kit (-H9010*)	
Repair Kit (-H9010*)	
required followed by -H1200	
t of Cap Assembly	
t of Cap Assembly,	
of Cushion Kit -6530	
t of Cap Assembly	
Repair Kit (-H9010*)	
required followed by -H1000	
Piston & Rod Assembly	
Piston & Rod Assembly	
of Seal kit (-H9000)	
nir Kit (-H9010*)	
Sold as part of Repair Kit (-H9010*)	
of Seal kit (-H9000*)	
nir Kit (-H9010*)	
Repair Kit (-H9010*)	
87474	
of Seal kit (-H9000)	
nir Kit (-H9010*)	
required followed by -H2001	
Repair Kit (-H9010*)	
required followed by -H9090	
f Manifold Assembly	
f Manifold Assembly	
f Manifold Assembly	
Sold as part of Repair Kit (-H9010)	
84141-007-02	
73616	
required followed by -H1310	
of Seal kit (-H9000*)	
nir Kit (-H9010*)	
of Seal kit (-H9000*)	
nir Kit (-H9010*)	

NOTE: \* Full unit description required (followed by -Hxxxx)

#### -U19 OPTION PARTS LIST

KEY	PART DESCRIPTION	PART NO.
30	Mac ISO 2 Valve	78212

#### -X24 OPTION PARTS LIST

KEY	PART DESCRIPTION	PART NO.	
40	Inlet Adaptor Assembly	87473	
40A	Inlet Adaptor	Sold as part of Inlet Adaptor Assembly	
40B	Steel Ball	Sold as part of Inlet Adaptor Assembly	
41	O-ring Seal	Sold as part of Seal kit (-H9000*) and Repair Kit (-H9010*)	
42	SHCS	Sold as part of Repair Kit (-H9010)	
43	Push Button Bleed Valve	85084-02	
44	Mini Pneumatic Indicator	85083	
45	Sealing Washer	77629-004	
46	Male to Male Nipple	81525	
47	BSP Nut	87476	
48	Pilot Operated Check Valve	77187	
49	Branch Tee Fitting	Full unit description required followed by -H4250	
50	Threaded Adaptor Fitting	74345-020	
51	Intermediate Tee Fitting	74345-040	
52	Fitting Reducer	74345-141	
53	Compact Elbow Fitting	61734-150	

#### -X27 OPTION PARTS LIST

KEY	PART DESCRIPTION	PART NO.	
60	Inlet Adaptor Assembly	87471	
60A	Inlet Adaptor	Sold as part of Inlet Adaptor Assembly	
60B	Steel Ball	Sold as part of Inlet Adaptor Assembly	
61	Inlet Adaptor Cap	87469	
62	Check Seal	85662	
63	O-ring Seal	Sold as part of Seal kit (-H9000*) and Repair Kit (-H9010*)	
41	O-ring Seal	Sold as part of Seal kit (-H9000*) and Repair Kit (-H9010*)	
42	SHCS	Sold as part of Repair Kit (-H9010)	
43	Push Button Bleed Valve	85084-02	
44	Mini Pneumatic Indicator	85083	
50	Threaded Adaptor Fitting	74345-020	
51	Intermediate Tee Fitting	74345-040	
52	Fitting Reducer	74345-141	
53	Compact Elbow Fitting	61734-150	
64	SHCS	Sold as part of Repair Kit (-H9010*)	

#### -R13 OPTION PARTS LIST

<b>KEY</b>	PART DESCRIPTION	PART NO.
70	Rod Eye	63429-003-01

#### -L23 OPTION PARTS LIST

KEY	PART DESCRIPTION	PART NO.
54	Port Plug	1992-001-01

NOTE: \* Full unit description required (followed by -Hxxxx)



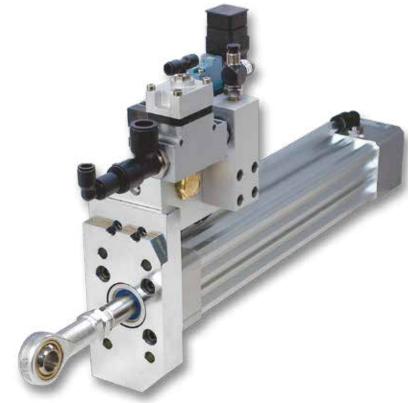


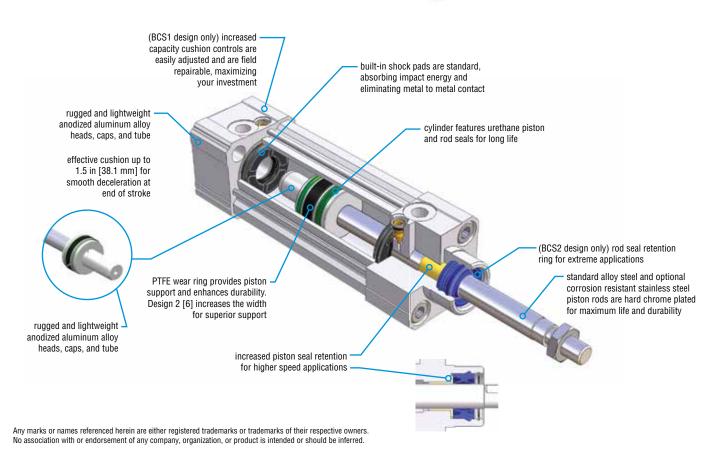
# **Universal® Stretching Cylinder**

ML309734, ML310058, ML311138, ML310060, & ML310061 SBO34 ONLY

#### **Major Benefits**

- PHD cylinder mounts into the same space and bolt patterns.
- Provides significantly longer life and reduces maintenance and downtime.
- Internal shock pads are standard, eliminating metal-to-metal contact.
- Cushion controls are standard for retract end of stroke deceleration.
- Cylinders are easily field repairable, maximizing your investment.





# ENGINEERING DATA: ML309734 & ML310058

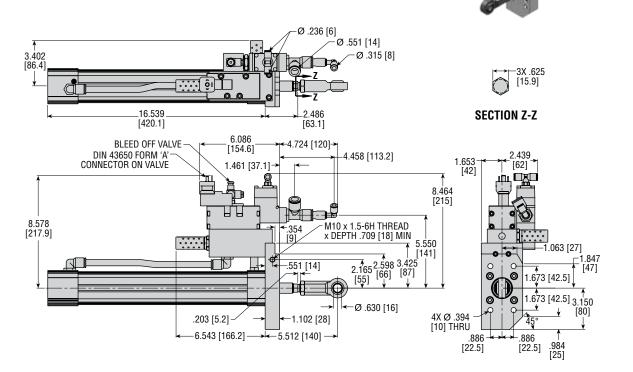
SPECIFICATIONS	IMPERIAL	METRIC
TYPE	Pneumatic Cylinder	
SERIES	BCS Stretching Cylinder	
BORE SIZE	1.969 in	50 mm
BORE AREA		
EXTEND	3.04 in <sup>2</sup>	1963 mm <sup>2</sup>
RETRACT	2.56 in <sup>2</sup>	1649 mm²
THEORETICAL OUTPUT	264.5 lb @ 87 psi	1176.6 N @ 6 bar
OPERATION	Double	Acting
OPERATING PRESSURE RANGE	7.5 - 150 psi	0.5 - 10 bar
AMBIENT TEMPERATURE	-20 to +180°F	-29 to +82°C
MAX. OPERATING PISTON SPEED	80 in/sec	2.03 m/sec
ADJUSTABLE CUSHION - RETRACT	Standard	
LUBRICATION; FOOD GRADE	FDA Regulation 21CFR 178.3570	
MAXIMUM STROKE	17.72 in	450 mm
STROKE TOLERANCE	+0.079/-0.000 in	+2.0/-0.0 mm
WEIGHT	15.1 lb	5.6 kg
ALLOWABLE KINETIC ENERGY		
RETRACT	181.5 in-lb	20.5 Nm
EXTEND	8.7 in-lb	0.98 Nm
SHOCK PAD	Thermoplastic Polyester Elastomer (TPE)	
HEADS & CAPS	Anodized Aluminum	
CYLINDER TUBE	Anodized Aluminum	
PISTON ROD		e Plated Steel
ROD BEARING	Internally Lubr	icated Polymer
PISTON & ROD SEALS	Urethane	

VALVE SPECIFICATIONS	
SERIES	ISO 2 (ISO 5599/1)
FUNCTION	5/2
OPERATOR	Single
PILOT	Internal
SPOOL RETURN	Spring
SOLENOID	24 VDC (5.4 W)
VOLTAGE RANGE	-15% to +10% from Nominal
ELECTRICAL CONNECTOR	DIN 43650, Form A
MANUAL OPERATOR	Non-locking Recessed
PILOT EXHAUST	Muffled
FLOW	3.0 Cv
LUBRICATION	FDA Regulation 21CFR 178.3570
FILTRATION	40 Micron
OPERATING PRESSURE RANGE	20 to 150 psi [1.37 to 10 bar]
AMBIENT FLUID TEMPERATURE	0° to 120°F [-18° to 50°C]

# DIMENSIONS: ML309734 & ML310058

#### ML309734 with valve, ML310058 without valve

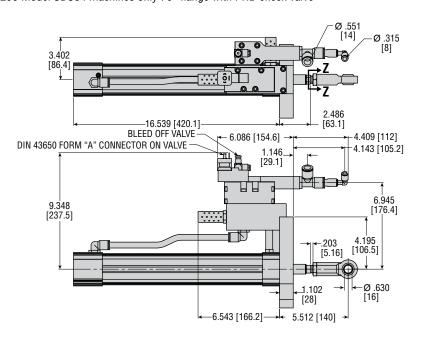
50x290 Model SB034 machines only

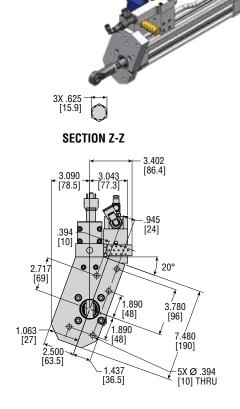




# **DIMENSIONS:** ML311138

#### ML311138 50x290 Model SB034 machines only 70° flange with PHD check valve





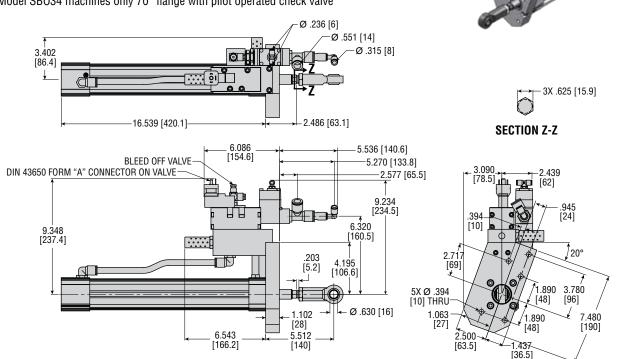
# DIMENSIONS: ML310060 & ML310061

#### ML310060 with valve

50x290 Model SB034 machines only 70° flange with pilot operated check valve

#### ML310061 without valve

50x290 Model SB034 machines only 70° flange with pilot operated check valve







# **Series1 Nozzle Cylinders**

ML305877 ML306930 ML305665 ML307217 ML308364

#### **MAJOR BENEFITS**

- · Mounts into the same space and bolt patterns.
- Provides significantly longer life and reduces maintenance and downtime.
- Simplified design and maintenance
- Internal shock pads are standard, eliminating metal-to-metal contact.
- Cylinders are easily field repairable, maximizing your investment.
- Provides energy savings with enhanced sealing technology.
- Consult PHD for other standard and custom options available.

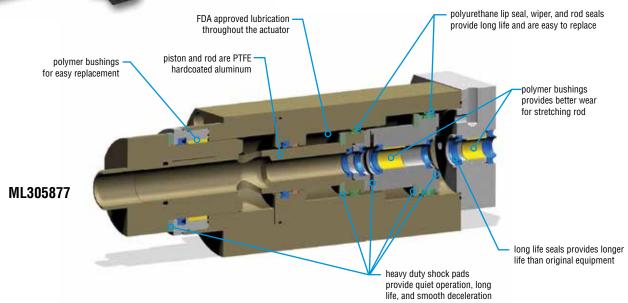
#### **CSD** Components

 $\begin{array}{ll} \textbf{ML305665 \& ML307217} \ (\text{require plumbing modifications}) \\ \textbf{ML308364} \end{array}$ 



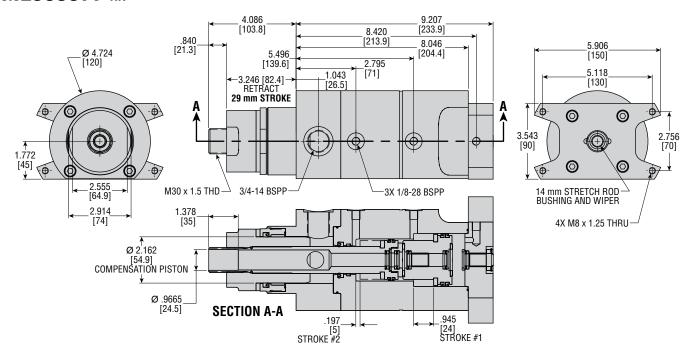




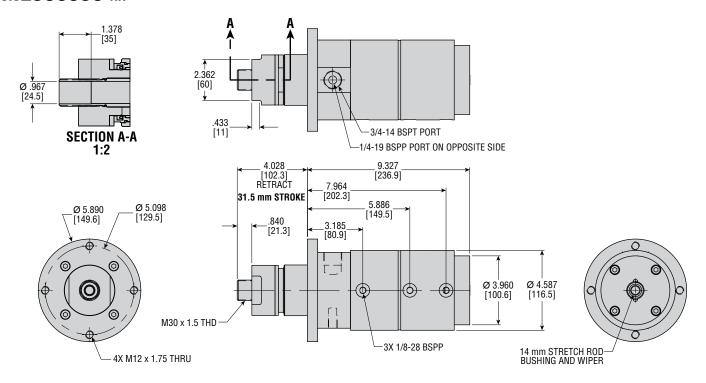


# **DIMENSIONS:** SERIES1 PNEUMATIC NOZZLE CYLINDER

#### ML305877 HR



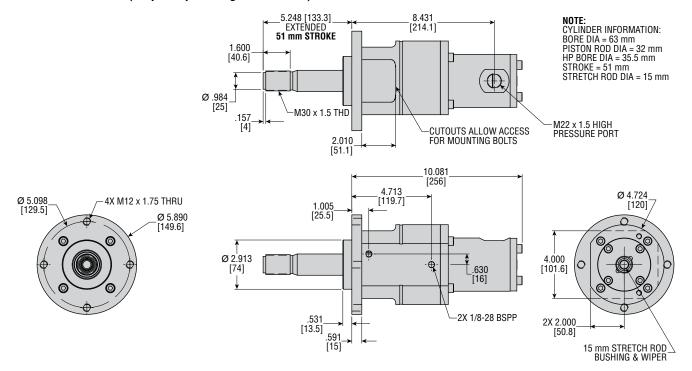
### ML306930 HR



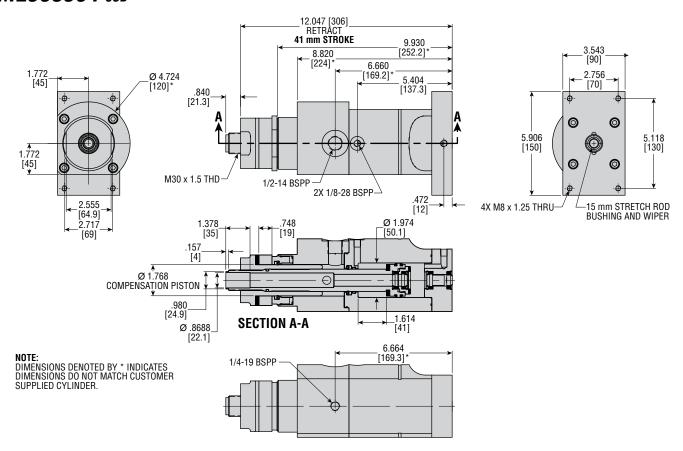


# **DIMENSIONS:** SERIES1 PNEUMATIC NOZZLE CYLINDER

# ML307217 CSD (Requires plumbing modification)



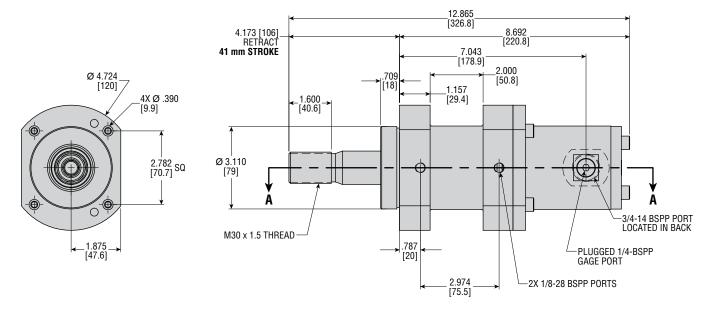
### ML308364 csd





# **DIMENSIONS:** SERIES1 PNEUMATIC NOZZLE CYLINDER

# ML305665 CSD (Requires plumbing modification)





SSTYLE05A

# BCZ2

### CSD AND HR NOZZLE CYLINDER

#### **Major Benefits**

- PHD Cylinder mounts into the same space and bolt patterns.
- Provides significantly longer life and reduces maintenance and downtime.
- Internal shock pads are standard, eliminating metal-to-metal contact.
- Cylinders are easily field repairable, maximizing your investment.
- Consult PHD for other standard and custom options available

# **CSD Nozzle Cylinder**



**MODEL BCZ2S-8-80x45 CYLINDER** Component for 'S' style model Series2 machines.



**MODEL BCZ2S-8-80x45-U22 CYLINDER** Component for 'S' style model Series2 machines. Valve manifold provides exceptional response time.

# **HR Nozzle Cylinder**



MODEL BCZ2D-8-80x43 CYLINDER Component for 'S' style model Series2 machines.

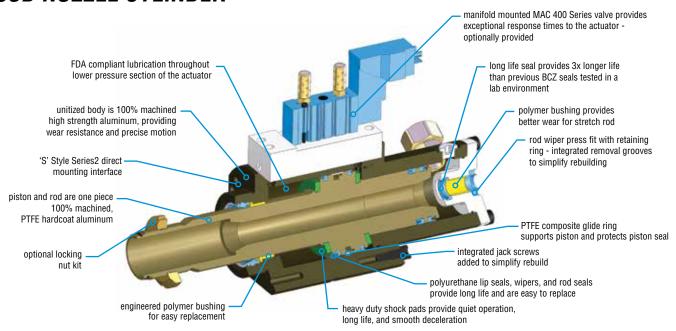


**MODEL BCZ2D-8-80x43-U22 CYLINDER** Component for 'S' style model Series2 machines. Valve manifold provides exceptional response time.

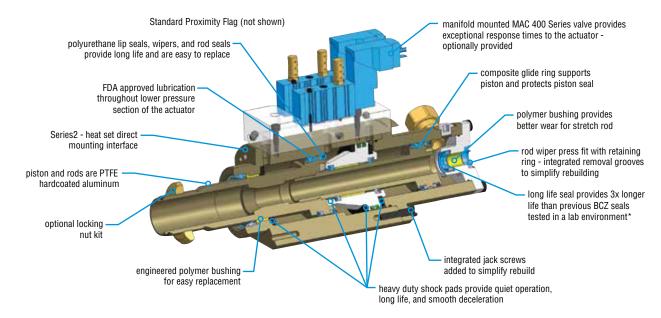
**NOZZLE CYLINDERS** 

# CUTAWAY VIEWS: SERIES BCZ2 NOZZLE CYLINDER

#### CSD NOZZLE CYLINDER



#### HR NOZZLE CYLINDER



\*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.



### ORDERING & ENGINEERING DATA: SERIES BCZ2 NOZZLE CYLINDER

### TO ORDER, SPECIFY:

Product, Series, Type, Machine No., Process, Design No., Bore Size, Stroke Configurations, and any Options. STROKE CONFIGURATION STD STROKE **VALVE OPTIONS\* PRODUCT** TYPE **MACHINE NO. BORE SIZE** 45 mm (CSD only) MC3 - Manifold circuit only for MAC 400 valve B - Blow Mold 43 mm (HR only) U22 - Attached MAC 400 valve Z - Nozzle 2 - Series2 80 mm **SERIES PROCESS DESIGN NO.** LUBRICATION FITTING OPTIONS\* C - Cylinder S - CSD 8 - Metric Y13 - High Performance Non-FDA Seals L1308 - Straight port fitting installed with FDA Compliant Lubrication D-HR for 8 mm tubing (must be specified) 90° swivel elbow port fitting NOTES: installed for 8 mm tubing

- 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.

	BCZ2S		BCZ2D	
CYLINDER SPECIFICATIONS	IMPERIAL	METRIC	IMPERIAL	METRIC
TYPE	Pneumatic		Pneumatic	
SERIES	BCZ CSD Nozzl	e Cylinder	BCZ HR Nozzle Cylinder	
CYLINDER BORE SIZE	3.149 in	80 mm	3.149 in	80 mm
PISTON ROD DIAMETER	1.965 in	50 mm	1.965 in	50 mm
CYLINDER - LOW PRESSURE				
BORE AREA - EXTEND	4.748 in <sup>2</sup>	30.63 cm <sup>2</sup>	2.368 in <sup>2</sup>	15.28 cm <sup>2</sup>
BORE AREA - RETRACT	4.748 in <sup>2</sup>	30.63 cm <sup>2</sup>	3.011 in <sup>2</sup>	19.43 cm <sup>2</sup>
THEORETICAL EXTEND OUTPUT	357 lb @ 87 psi	1588 N @ 6 bar	206 lb @ 87 psi	916 N @ 6 bar
THEORETICAL RETRACT OUTPUT	413 lb @ 87 psi	1837 N @ 6 bar	262 lb @ 87 psi	1165 N @ 6 bar
OPERATION	Double Ad		Double Ad	, ,
OPERATING PRESSURE RANGE	7.5 - 150 psi	0.5 - 10 bar	7.5 - 150 psi	0.5 - 10 bar
BLOW CYLINDER - HIGH PRESSURE				
BORE SIZE	2.165 in	55 mm	2.165 in	55 mm
BORE AREA	3.094 in <sup>2</sup>	19.96 cm <sup>2</sup>	3.437 in <sup>2</sup>	22.17 cm <sup>2</sup>
OPERATING PRESSURE	600 psi	41.4 bar	600 psi	41.4 bar
THEORETICAL CLAMP FORCE	1856 lb @ 600 psi	8256 N @ 41.4 bar	2062 lb @ 600 psi	9172 N @ 41.4 bar
AMBIENT & FLUID TEMPERATURE	-20 to +180°F	-29 to +82°C	-20 to +180°F	-29 to +82°C
STROKE TIME (TYPICAL)				
EXTEND	93 ms			
RETRACT	78 ms	3		
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 210	CFR 178.3570	FDA Regulation 210	CFR 178.3570
PORT SIZE	G1/8		G1/8	
STROKE	1.772 in (+0.079 -0.000)	45 mm (+2.0-0.0)	1.693 in (+0.098-0.000)	43 mm (+2.5-0.0)

### LIFE EXPECTANCY

Series BCZ Cylinders have been designed for 15 million trouble-free cycles except for high pressure stretch rod seal. Long life stretch rod seal provides three times longer life than previous Series BCZ seals tested in a lab environment. Operation with lubricated air can extend cylinder life.

### **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.

### CYCLE RATE

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

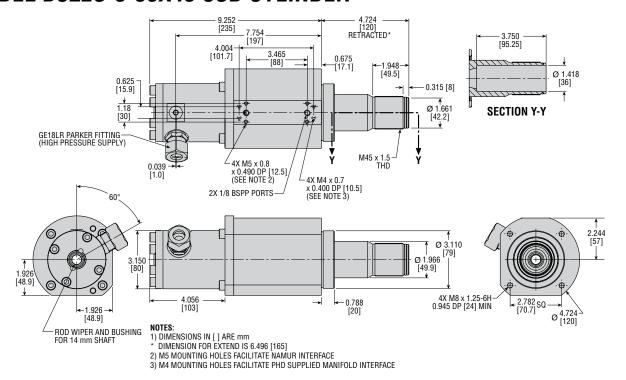
### LUBRICATION

Series BCZ Nozzle Cylinders are lubricated using lubrication per FDA Regulations 21CFR 178.3570 which provides extended life and better performance.

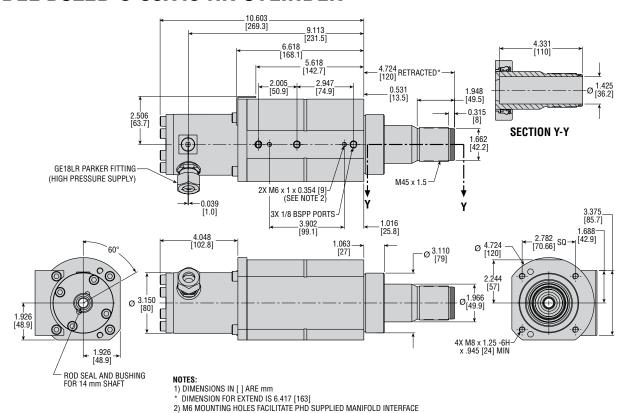
As machine set-ups and conditions vary, PHD, Inc. cannot guarantee the same extended life will be seen as that resulting from PHD's own lab testing of the stretch rod seal.



### **MODEL BCZ2S-8-80X45 CSD CYLINDER**



### MODEL BCZ2D-8-80X43 HR CYLINDER





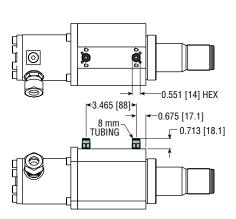
### L1308

# STRAIGHT PORT FITTING INSTALLED FOR 8 mm TUBING

This option provides straight fittings for 8 mm tubing. See page 41 for dimensions of fittings with valve options.

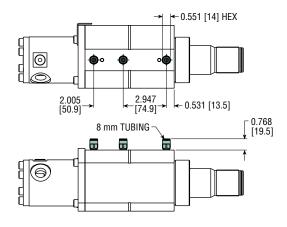
### **MODEL BCZ2S CSD CYLINDER**

For standard units without manifold and/or valve options, two fittings will be supplied. For manifold and valve circuit options, only one fitting will be supplied.



### **MODEL BCZ2D HR CYLINDER**

For standard units without manifold and/or valve options, three fittings will be supplied. For manifold and valve circuit options, only two fittings will be supplied.



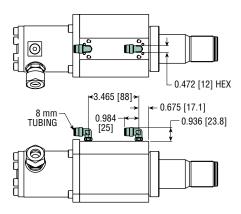
### L1508

# 90° ELBOW PORT FITTING INSTALLED FOR 8 mm TUBING

This option provides 90° swivel elbow fittings for 8 mm tubing. See page 41 for dimensions of fittings with valve options.

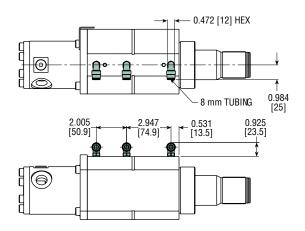
### **MODEL BCZ2S CSD CYLINDER**

For standard units without manifold and/or valve options, two fittings will be supplied. For manifold and valve circuit options, only one fitting will be supplied.



### **MODEL BCZ2D HR CYLINDER**

For standard units without manifold and/or valve options, three fittings will be supplied. For manifold and valve circuit options, only two fittings will be supplied.







# HIGH PERFORMANCE NON-FDA SEALS WITH FDA-COMPLIANT LUBRICATION

This option contains high performance seals with extended life and wear.

# U22

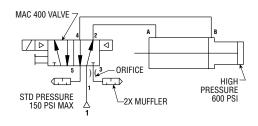
### ATTACHED MAC 400 VALVE

This option provides a manifold mounted valve combination that uses a MAC 400 Series valve. This option improves reaction time and simplifies plumbing issues. An exhaust orifice is installed in the valve so that the cylinder will achieve cycle rates of an OEM cylinder. Removing this orifice will decrease actuation time.

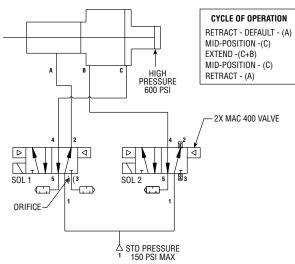
VALVE SPECIFICATIONS	
TVDE	MAC Series
TYPE	400411A-BOA-DM-DDAJ-1JM=4357
PRESSURE (MAX)	125 psi
FLOW (MAX)	1.0 Cv
FUNCTION	5/2
OPERATOR	Single
PILOT	Internal
SP00L	4-Way Pilot
SOLENOID	24 VDC, (5.4 W)
ELECTRICAL	Rectangular,
CONNECTOR	DIN 43650, Form B Style
MANUAL OPERATOR	Non-locking Recessed
PILOT EXHAUST	Muffled

### **PLUMBING SCHEMATICS**

### **BCZ2S CSD CYLINDER**

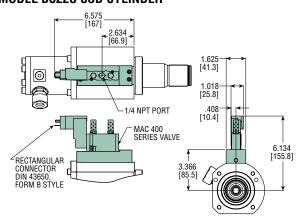


### **BCZ2D HR CYLINDER**

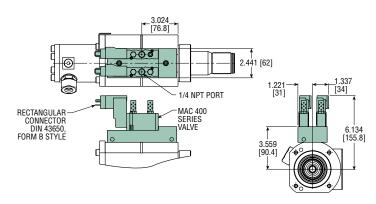


### *-U22*

### **MODEL BCZ2S CSD CYLINDER**



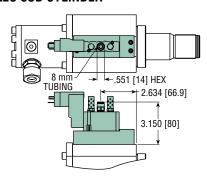
### **MODEL BCZ2D HR CYLINDER**





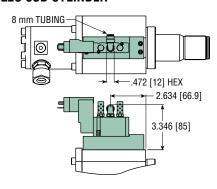
### -L1308-U22

### **MODEL BCZ2S CSD CYLINDER**

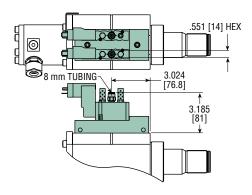


### -L1508-U22

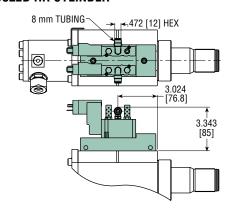
### **MODEL BCZ2S CSD CYLINDER**



### **MODEL BCZ2D HR CYLINDER**



### **MODEL BCZ2D HR CYLINDER**

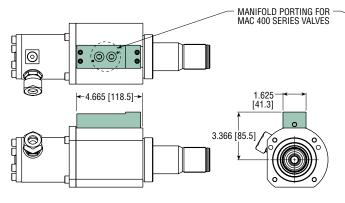


### MC3

# MANIFOLD CIRCUIT ONLY FOR MAC 400 VALVE

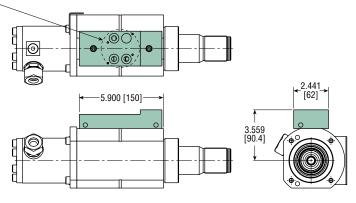
The MC3 option provides a manifold circuit only for use with MAC 400 Series valves. All hardware relating to mounting the valve such as mufflers and seals will be provided in kit form. An exhaust orifice is supplied with the kit so that the cylinder will achieve cycle rates of an OEM cylinder. Removing this orifice will decrease actuation time.

### **MODEL BCZ2S CSD CYLINDER**



### NOTE: MUFFLERS, SCREWS AND MANIFOLD O-RINGS WILL BE PROVIDED IN SEPARATE BAG FOR INSTALLATION OF VALVES

### MODEL BCZ2D HR CYLINDER





### EXPLODED VIEW & 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 Seal⁵	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	61734-130
	(-L1308-U22 OR -L1308-MC3)	
17C	90° Swivel Port Fitting (-L1508)	62195-007
17D	90° Swivel Port Fitting (-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
20		

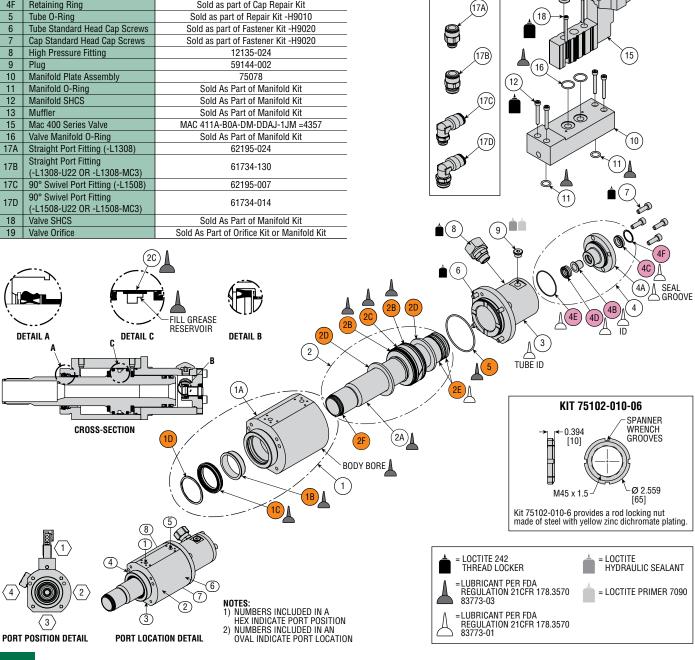
KIT DESCRIPTION	KIT NO.	COLOR CODE
Unit Repair Kit <sup>1</sup>	Full unit description required followed by -H9010	
Cap Repair Kit <sup>2</sup>	76249	
Cap Seal Only Kit <sup>3</sup>	76676	
Tooling Kit⁴	75536	
Cap Seal Tooling Kit <sup>5</sup>	80828	
Rod Locking Nut	75102-010-06	
Fastener Kit	Full unit description required followed by -H9020	
Manifold Kit	75103	
Orifice Kit	75677	

- 1) Includes all parts to repair the full unit excluding cap parts.
- 2) Includes all hardware to completely repair cap.

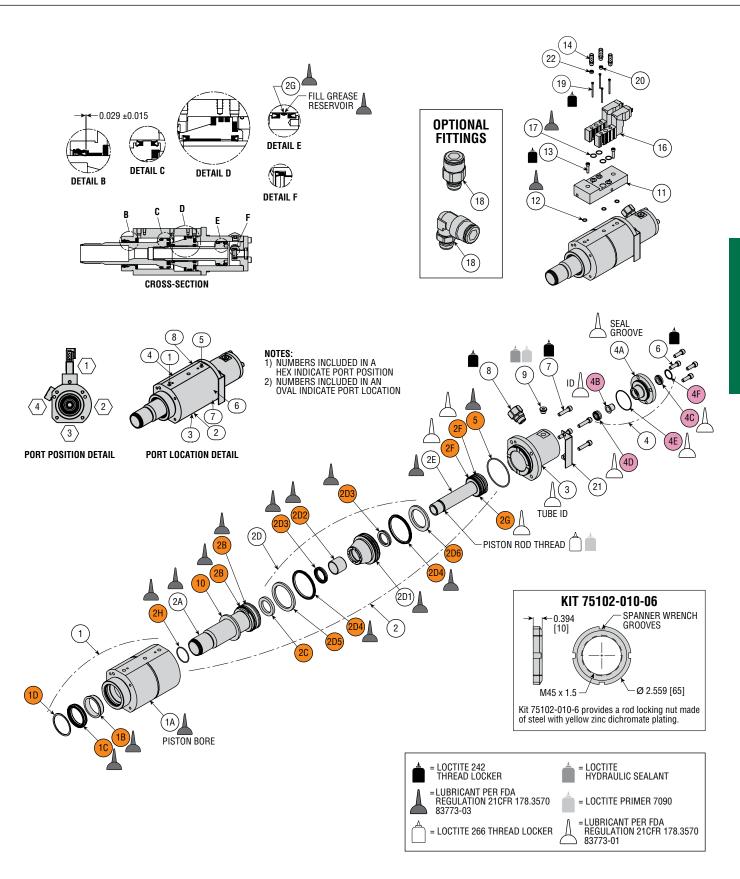
**OPTIONAL** 

**FITTINGS** 

- 3) Includes rod seal and grease to replace cap seal only.
- 4) Includes all specialized tools required to rebuild unit.









# PARTS LIST: SERIES BCZ2D NOZZLE CYLINDER

KEY	PART DESCRIPTION	BCZ2D-8-80x43
1 1A	Body Assembly Double Stage Body	Full unit description required followed by -H2400 75084-00
1B		
1C	Bushing Rod Seal	Sold as part of Repair Kit -H9010
		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 Piston Seal	75087
2B		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-BOA-DM-DDAJ-1 JM = 4357
17	Valve Manifold O-Ring	Sold As Part of Manifold Kit
18	8 mm Tube Fitting (-L1308)	62195-024
18	8 mm Tube Fitting (-L1508)	62195-007
18	8 mm Tube Fitting (-L1308-U22 OR -L1308-MC3)	61734-130
18	8 mm 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 NO.	COLOR CODE
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 Kit4	80828	
Fastener Kit	Full unit description required followed by -H9020	
Manifold Kit	75696	
Cap Repair Kit <sup>2</sup>	76249	
Cap Seal Repair Kit	76676	
Orifice Kit	75677	

### NOTES:

- Includes all parts to repair the full unit excluding cap parts.
   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 #75536.



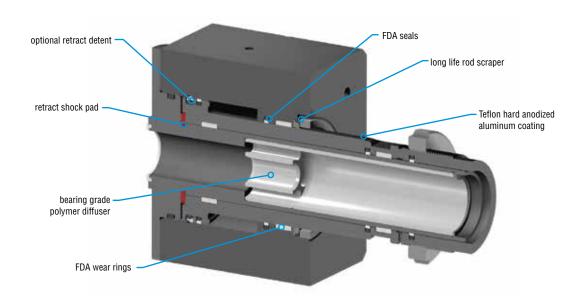
# BCZUS

### **NOZZLE CYLINDER**

### **Major Benefits**

- · Unit is designed to operate for 20 million cycles
- Components for OEM cylinder
- FDA materials used on all soft components inside unit
- Lube-free high pressure section
- Improved geometry over OEM to reduce component fatigue
- Optional internal detent to keep unit in the retract position with loss of air pressure and during service reducing chance of damaged transfer arms
- · Composite, high wear resistant, rod scraper
- · Tooling kit available for in field rebuild





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### ORDERING & ENGINEERING DATA: SERIES BCZUS

THE FOLLOWING IS A CROSS REFERENCE LISTING OF PHD TO 'S' STYLE UNITS:

PHD 'S' STYLE

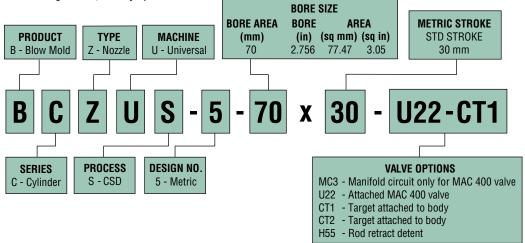
BCZUS-5-7 X 30-U22-CT1 15.01124520804A

BCZUS-5-7 X 30-U22-CT2 15.01131571501
15.01131444603
15.01124638605A

#### TO ORDER, SPECIFY:

 $Product,\,Series,\,Type,\,Machine\,\,No.,\,Process,\,Design\,\,No.,\,Bore\,\,Size,$ 

Stroke Configurations, and any Options.



CYLINDER SPECIFICATIONS	IMPERIAL	METRIC
TYPE	Pneumatic Cylinder	
SERIES	BCZU Two Step Nozzle Cylinder	
OPERATION	Double	Acting
BORE SIZE - ACTUATOR	2.756 in	70 mm
STROKE	1.181 in	30 mm
PISTON ROD DIAMETER	2.205 in	56 mm
BORE AREA EXTEND	3.680 in <sup>2</sup>	23.74 cm <sup>2</sup>
BORE AREA RETRACT	2.147 in <sup>2</sup>	13.85 cm <sup>2</sup>
OPERATING PRESSURE RANGE	30 - 145 psi	2.1 - 10 bar
BLOW PRESSURE	580 psi	40 bar
THEORETICAL EXTEND OUTPUT @ 87 PSI (6 BAR)	320.2 lbf	1424.4 N
THEORETICAL RETRACT OUTPUT @ 87 PSI (6 BAR)	186.7 lbf	830.5 N
AMBIENT AND FLUID TEMPERATURE	-20° to +180°F	-29° to +82°C
STROKE TIME - APPLIED POWER TO END OF STROKE	Extend 50 ms, Retract 110 ms	
STROKE TIME - START OF MOVEMENT TO END OF STROKE	Extend 32 ms, Retract 65 ms	
LUBRICATION	FDA Regulation 21CFR 178.3570	
PORT SIZE	N/A	
GLIDE RING	FDA Engineered Polymer	
PISTON & ROD SEALS	FDA Engineered Polymer	
BUMPER	FDA Polyurethane	
CAP	Teflon Hard Ano	dized Aluminum
CYLINDER BODY	Teflon Hard Ano	dized Aluminum
PISTON ROD	Teflon Hard Anodized Aluminum	
ROD BEARING	FDA Engineered Polymer	

VALVE SPECIFICATIONS	
SERIES	Mac 400 series
PRESSURE [MAX]	125 psi
FLOW [MAX]	1.0 Cv
FUNCTION	5/2
OPERATOR	Single
PILOT	Internal
SPOOL RETURN	4 way Pilot
SOLENOID	24 VDC (0.15 W)
ELECTRICAL CONNECTOR	Form "B"
MANUAL OPERATOR	Non-locking Recessed
PILOT EXHAUST	Muffled

### LIFE EXPECTANCY

Series BCZUS Cylinders have been designed for 20 million trouble-free cycles.

### **CYCLE RATE**

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

### **MAINTENANCE**

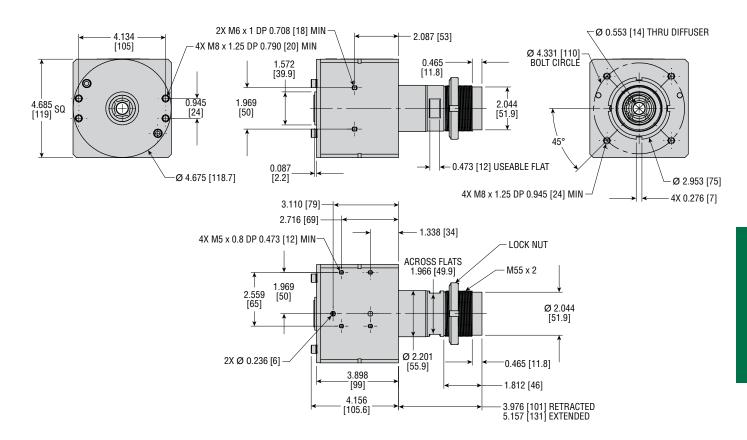
As with most PHD products, these cylinders are field repairable. Repair kits, tooling kits, and main structural components are available as needed for extended service. Rebuild service is available.

### **LUBRICATION**

Series BCZUS Nozzle Cylinders are designed and intended not to require lubrication. Static seals may be lubricated for assembly purposes using lubrication per FDA Regulation 21CFR 178.3570.



### **DIMENSIONS:** SERIES BCZUS UNIVERSAL® NOZZLE CYLINDER

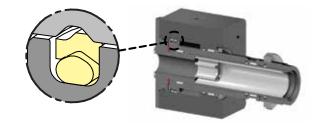


## **OPTIONS:** SERIES BCZU UNIVERSAL® NOZZLE CYLINDERS



### **ROD RETRACT DETENT**

The H55 option provides additional retract position retention force. This additional retention force reduces the potential for nozzle dropping when the air pressure is removed.

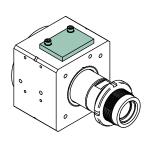


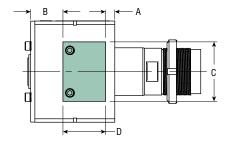




### TARGET ATTACHED TO BODY

The CT1 and CT2 target option is required for sensing of the cylinder on the machine.





UNIT SIZE	-CT1 OPTION LETTER DIMENSIONS			
UNII SIZE	A	В	C	D
BCZUS-5-70-CT1	0.433	1.496	2.756	1.969
	[11.0]	[38.0]	[70.0]	[50.0]

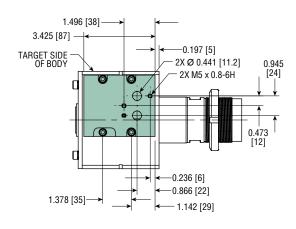
UNIT SIZE	-CT2 OPTION LETTER DIMENSIONS			
UNIT SIZE	A	В	C	D
BCZUS-5-70-CT2	0.826	1.103	2.756	1.969
	[21.0]	[28.0]	[70.0]	[50.0]

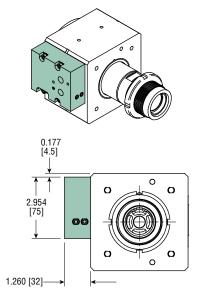




# MANIFOLD CIRCUIT ONLY FOR MAC 400 SERIES VALVE

The MC3 option provides a manifold circuit only for use with MAC 400 Series valves. All hardware relating to mounting the manifold such as fasteners and seals will be provided in kit form.

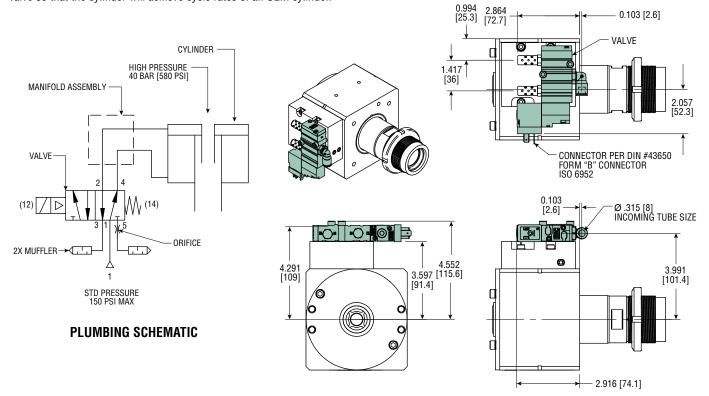




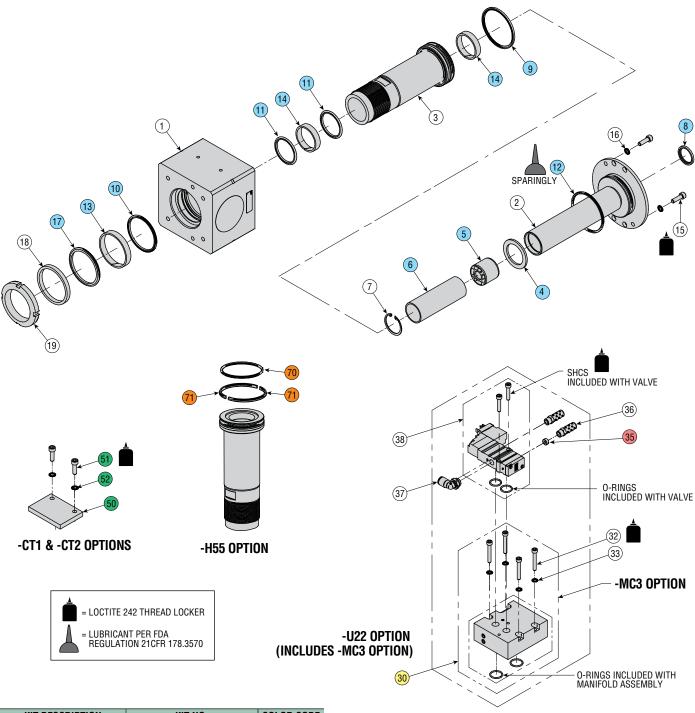
# **U22**

### **ATTACHED MAC 400 SERIES VALVE**

The U22 option provides a manifold mounted valve combination that uses a MAC 400 Series valve. An exhaust orifice is installed in the valve so that the cylinder will achieve cycle rates of an OEM cylinder.







KIT DESCRIPTION	KIT NO.	COLOR CODE
Repair Kit	Full unit description required followed by -H9010	
Detent Kit	85082	
Manifold Kit	86255	
Orifice Kit	86256	
-CT1 Target Kit	86291	
-CT2 Target Kit	86292	
Panair Tooling (not chown)	86257	



### **CYLINDER ONLY PARTS LIST**

KEY	PART DESCRIPTION	PART NO.
1	Body	86225
2	Cap	86226
3	Piston	86227
4	Shock Pad	86228
5	Diffuser	86229
6	Spacer Tube	86230
7	Retaining Ring	Full unit description required followed by -H7101
8	Compression Seal	Sold as part of Repair Kit (-H9010*)
9	70 mm Piston Seal	Sold as part of Repair Kit (-H9010*)
10	56 mm Rod Seal	Sold as part of Repair Kit (-H9010*)
11	40 mm Rod Seal	Sold as part of Repair Kit (-H9010*)
12	0-Ring Seal	Sold as part of Repair Kit (-H9010*)
13	56 mm Wear Ring	Sold as part of Repair Kit (-H9010*)
14	40 mm Wear Ring	Sold as part of Repair Kit (-H9010*)
15	Fastener	61054-118
16	Serrated Safety Washer	84141-008-02
17	56 mm Rod Scraper	Sold as part of Repair Kit (-H9010*)
18	Rod Scraper Retainer	86237
19	Locking Nut	Full unit description required followed by -H3600

NOTE: \* Full unit description required (followed by -Hxxxx)

### -MC3 OPTION PARTS LIST

PART DESCRIPTION	PART NO.		
Manifold Assembly	86240		
Fastener	61054-106		
Serrated Safety Washer	84141-007-02		
Orifice Plug	86242		
Muffler	86957		
Elbow Fitting	61734-053		
	Manifold Assembly Fastener Serrated Safety Washer Orifice Plug Muffler		

### **-U22 OPTION PARTS LIST**

KEY	PART DESCRIPTION	PART NO.
30	Manifold Assembly	86240
32	Fastener	61054-106
33	Serrated Safety Washer	84141-007-02
35	Orifice Plug	86242
36	Muffler	86957
37	Elbow Fitting	61734-053
38	400 Series Mac Valve	86243

### -CT1 OPTION PARTS LIST

KEY	PART DESCRIPTION	PART NO.
50	Target	86239
51	Fastener	61054-118
52	Serrated Safety Washer	84141-008-02

### -CT2 OPTION PARTS LIST

KEY	PART DESCRIPTION	PART NO.
50	Target	86259
51	Fastener	61054-118
52	Serrated Safety Washer	84141-008-02

### -H55 OPTION PARTS LIST

KEY	PART DESCRIPTION	PART NO.
70	0-Ring Seal	1950-143-14
71	Detent Ring	87095

**NOTE:** \*Full unit description required (followed by -Hxxxx)



# BCZUD

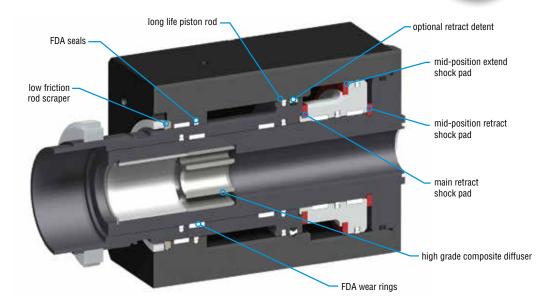
### 3 POSITION HR NOZZLE CYLINDER

### **Major Benefits**

- · Unit is designed to operate for 20 million cycles
- Components for 'S' style Universal® OEM Nozzle Cylinder on heat set machines
- · FDA materials used on all internal components
- Completely non-lubed unit
- Improved geometry over OEM to reduce component fatigue
- Optional internal detent to keep unit in the retract position with loss of air pressure
- · Composite, high wear resistant, rod scraper
- · Tooling kit available for in field rebuild
- · Factory rebuild available







Any marks or names referenced herein are either registered trademarks or trademarks of their respective owners. No association with or endorsement of any company, organization, or product is intended or should be inferred.



### ORDERING & ENGINEERING DATA: SERIES BCZUD

THE FOLLOWING IS A CROSS REFERENCE LISTING OF PHD TO 'S' STYLE UNITS:

'S' STYLE

15.01127918004

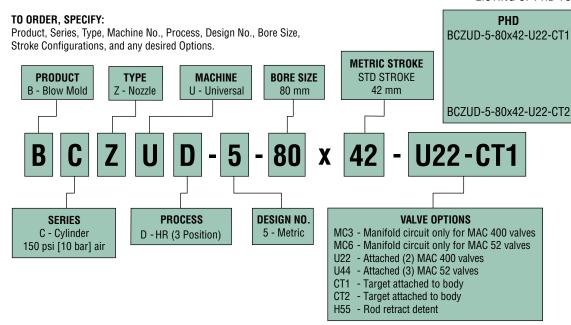
15.01127989501B

15.01143009102

113754604

1137546403A

15.01143009101



CYLINDER SPECIFICATIONS	IMPERIAL METRIC		
TYPE	Pneumatic		
SERIES	BCZU Three Step I	HR Nozzle Cylinder	
OPERATION	Double	Acting	
MAIN BORE SIZE - ACTUATOR	3.150 in	80 mm	
INTERMEDIATE BORE SIZE - ACTUATOR	3.543 in	90 mm	
TOTAL STROKE	1.654 in	42 mm	
INTERMEDIATE STROKE	0.787 in	20 mm	
PISTON ROD DIAMETER	2.598 in	66 mm	
BORE AREA EXTEND	4.240 in <sup>2</sup>	27.35 cm <sup>2</sup>	
BORE AREA RETRACT (UNIT RETRACTED)	3.730 in <sup>2</sup>	24.06 cm <sup>2</sup>	
BORE AREA INTERMEDIATE (UNIT RETRACTED)	0.730 in <sup>2</sup>	4.71 cm <sup>2</sup>	
OPERATING PRESSURE RANGE	35 - 145 psi	2.4 - 10 bar	
HIGH PRESSURE	580 psi max	40 bar max	
AMBIENT AND FLUID TEMPERATURE	-20° to +180°F -29° to +8		
GLIDE RING	FDA Engineered Polymer		
PISTON & ROD SEALS	FDA Engineered Polymer		
BUMPER	FDA Polyurethane		
CAP, CYLINDER BODY, MAIN PISTON ROD	Teflon Hard Anodized Aluminum		
INTERMEDIATE PISTON ROD	Anodized Aluminum		

### LIFE EXPECTANCY

Series BCZUD Cylinders have been designed for 20 million trouble-free cycles.

### **CYCLE RATE**

Series BCZUD 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 all components are available as needed for extended service. Rebuild service is available.

### **LUBRICATION**

Series BCZUD Nozzle Cylinders are designed and intended not to require lubrication. Static seals may be lubricated for assembly purposes using lubrication per FDA Regulation 21CFR 178.3570.

### **MAC 400 SERIES**

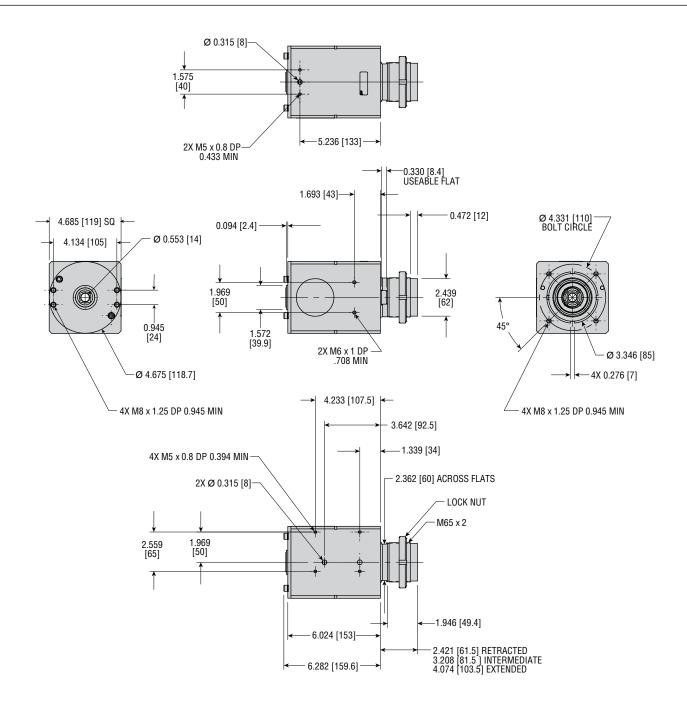
MAC 400 SLITES			
VALVE SPECIFICATIONS	EXTEND/RETRACT	INTERMEDIATE	
MAXIMUM PRESSURE	120	psi	
MAXIMUM FLOW	1.0	Cv	
FUNCTION	5,	/2	
OPERATOR	Single		
PILOT	Internal		
SPOOL RETURN	4 way Pilot		
SOLENOID	24VDC	, 5.4W	
ELECTRICAL	Form "B" Form "B"		
CONNECTOR	Style ISO 6952 Industry Standard		
MANUAL OPERATOR	Non-locking Recessed		
PILOT EXHAUST	Muffled		

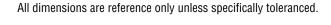
#### **MAC 52 SERIES**

MINO DE DEFINED			
<b>VALVE SPECIFICATIONS</b>	EXTEND	RETRACT	INTERMEDIATE
MAXIMUM PRESSURE		120 psi	
MAXIMUM FLOW		1.5 Cv	
FUNCTION		3/2	
OPERATOR	Single / N.C. Main   Single / N.O. Main   Single / N.C. Main		
PILOT	Internal		
SPOOL RETURN	3 way Pilot		
SOLENOID	24VDC, 5.4W		
ELECTRICAL	Form "B" Form "B" Form "B"		
CONNECTOR	Style ISO 6952 Style ISO 6952 Industry Standard		
MANUAL OPERATOR	Non-locking Recessed		
PILOT EXHAUST	Muffled		



## **DIMENSIONS:** SERIES BCZUD UNIVERSAL® NOZZLE CYLINDER





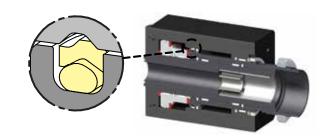


## **OPTIONS:** SERIES BCZUD UNIVERSAL® NOZZLE CYLINDER



### **ROD RETRACT DETENT**

The H55 option provides additional retract position retention force. This additional retention force reduces the potential for nozzle dropping when the air pressure is removed.

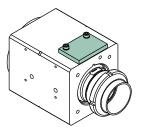


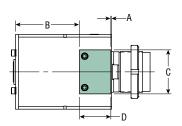


### CT2

### TARGET ATTACHED TO BODY

The CT1 and CT2 target option is required for sensing of the cylinder on the machine.





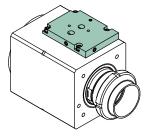
UNIT SIZE	-CT1 OPTION LETTER DIMENSIONS			
UNIT SIZE	A	В	C	D
BCZUD-5-80-CT1	0.039	4.016	2.756	1.969
	[1.0]	[102.0]	[70.0]	[50.0]

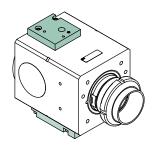
UNIT SIZE	-CT2 OPTION LETTER DIMENSIONS			
UNII SIZE	A	В	C	D
BCZUD-5-80-CT2	0.432	3.622	2.756	1.969
	[11.0]	[92.0]	[70.0]	[50.0]

### MC3

# MANIFOLD CIRCUIT ONLY FOR MAC 400 SERIES VALVE

The MC3 option provides a manifold circuit only for use with MAC 400 Series valves. All hardware relating to mounting the valve such as mufflers and seals will be provided in kit form. An exhaust orifice (Item #35 on page 56) is supplied with the kit so that the cylinder will achieve cycle rates of an OEM cylinder. Removing this orifice will change actuation time

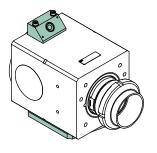


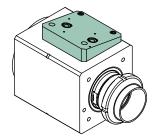




# MANIFOLD CIRCUIT ONLY FOR MAC 52 SERIES VALVE

The MC6 option provides a manifold circuit only for use with MAC 52 Series valves. All hardware relating to mounting the valve such as seals will be provided in kit form. An exhaust orifice (Item #96 on page 56) is supplied with the kit so that the cylinder will achieve cycle rates of an OEM cylinder. Removing this orifice will change actuation time.



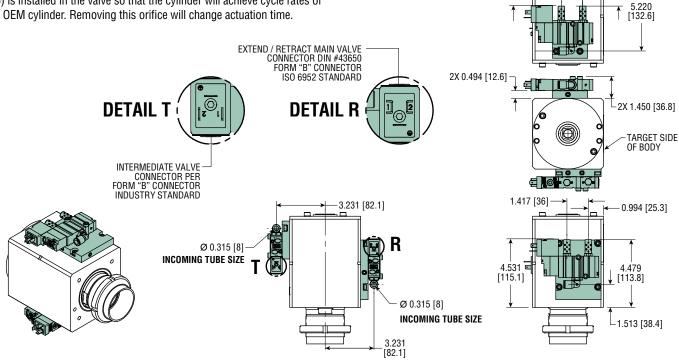




# U22

### **ATTACHED MAC 400 SERIES VALVES**

The U22 option provides a manifold-mounted valve combination that uses two MAC 400 Series valves. An exhaust orifice (Item #35 on page 56) is installed in the valve so that the cylinder will achieve cycle rates of an OEM cylinder. Removing this orifice will change actuation time.



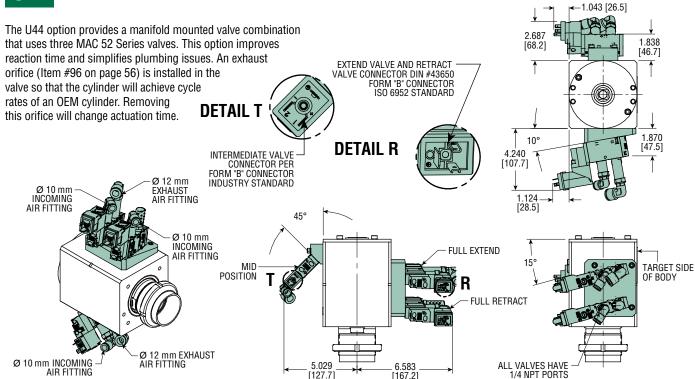
1.417 [36]

2.202 [55.9] 1.368 [34.8]

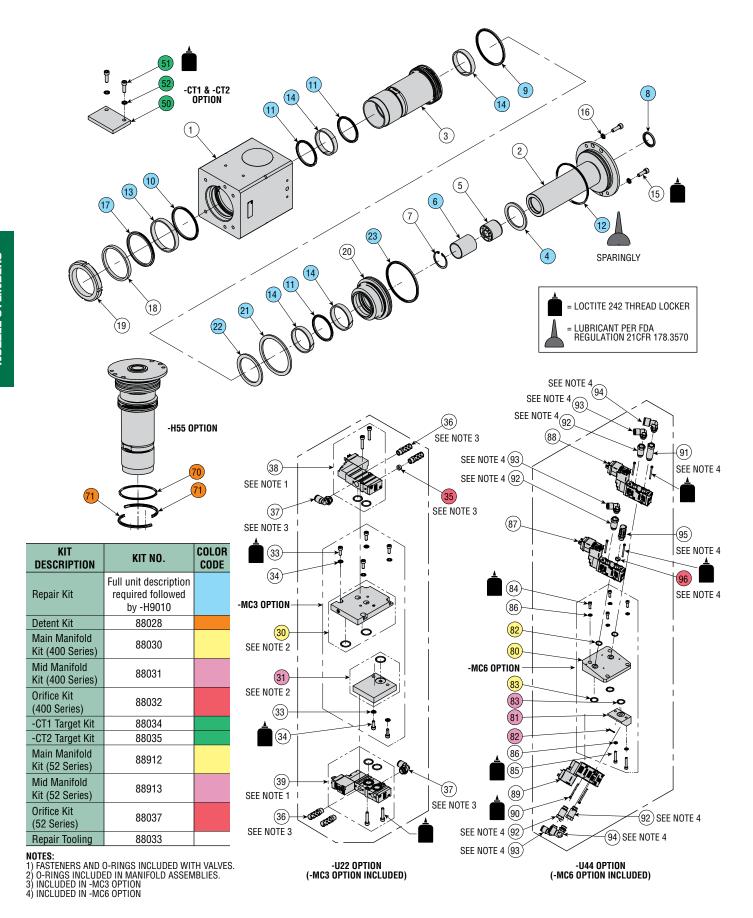
2.253 [57.2]

## U44

### **ATTACHED MAC 52 SERIES VALVES**









# PARTS LIST: SERIES BCZUD UNIVERSAL® NOZZLE CYLINDER

### **CYLINDER ONLY**

	GI LINDLII ONLI			
KEY	PART DESCRIPTION	PART NUMBER		
1	Body	87174		
2	Cap	87175		
3	Piston	87176		
4	Shock Pad	86263		
5	Diffuser	86229		
6	Spacer Tube	87186		
7	Retaining Ring	Full unit description required followed by -H1200		
8	Compression Seal	Sold as part of Repair Kit (-H9010*)		
9	80 mm Piston Seal	Sold as part of Repair Kit (-H9010*)		
10	66 mm Rod Seal	Sold as part of Repair Kit (-H9010*)		
11	50 mm Rod Seal	Sold as part of Repair Kit (-H9010*)		
12	0-Ring Seal	Sold as part of Repair Kit (-H9010*)		
13	66 mm Wear Ring	Sold as part of Repair Kit (-H9010*)		
14	50 mm Wear Ring	Sold as part of Repair Kit (-H9010*)		
15	Fastener	61054-118		
16	Serrated Safety Washer	84141-008-02		
17	66 mm Rod Scraper	Sold as part of Repair Kit (-H9010*)		
18	Rod Scraper Retainer	87196		
19	Locking Nut	Full unit description required followed by -H2001		
20	Intermediate Piston	87177		
21	Shock Pad	87178		
22	Shock Pad	87179		
23	90 mm Piston Seal	Sold as part of Repair Kit (-H9010*)		

NOTE: \*Full unit description required (followed by -Hxxxx)

### -MC3 OPTION

KEY	PART DESCRIPTION	PART NUMBER
30	Main Manifold Assembly	87187
31	Intermediate Manifold Assembly	87190
32	Fastener	61054-100
33	Serrated Safety Washer	84141-007-02
35	Orifice Plug	87189
36	Muffler	86957
37	Elbow Fitting	61734-053

### -MC6 OPTION

KEY	PART DESCRIPTION	PART NUMBER
80	Main Manifold Plate	88907
81	Intermediate Manifold Plate	88908
82	O-Ring Seal	3642-117-1
83	O-Ring Seal	3642-015-1
84	Fastener	61054-100
85	Fastener	61054-105
86	Serrated Safety Washer	84141-007-02
91	Long Extension	74345-231
92	Short Extension	74345-230
93	Ø 10 mm Tube Elbow Fitting	74345-072
94	Ø 12 mm Tube Elbow Fitting	74345-071
95	Bantum Muffler	74854
96	Orifice Plug	88038

### -CT1 OPTION

KEY	PART DESCRIPTION	PART NUMBER
50	Target	86239
51	Fastener	61054-118
52	Serrated Safety Washer	84141-008-02

### -CT2 OPTION

KEY	PART DESCRIPTION	PART NUMBER
50	Target	86259
51	Fastener	61054-118
52	Serrated Safety Washer	84141-008-02

### -H55 OPTION

KEY	PART DESCRIPTION	PART NUMBER
70	O-Ring Seal	1950-149-14
71	Detent Ring	86334

**NOTE:** \*Full unit description required (followed by -Hxxxx)

### -U22 OPTION

KEY	PART DESCRIPTION	PART NUMBER
30	Main Manifold Assembly	87187
31	Intermediate Manifold Assembly	87190
32	Fastener	61054-100
33	Serrated Safety Washer	84141-007-02
35	Orifice Plug	87189
36	Muffler	86957
37	Elbow Fitting	61734-053
38	400 Series Mac Valve	86243
39	400 Series Mac Valve	87192

### -U44 OPTION

KEY	PART DESCRIPTION	PART NUMBER
80	Main Manifold Plate	88907
81	Intermediate Manifold Plate	88908
82	O-Ring Seal	3642-117-1
83	O-Ring Seal	3642-015-1
84	Fastener	61054-100
85	Fastener	61054-105
86	Serrated Safety Washer	84141-007-02
87	52 Series Mac Valve	88909
88	52 Series Mac Valve	88910
89	52 Series Mac Valve	88911
90	Manifold to Body Fastener	61054-084
91	Long Extension	74345-231
92	Short Extension	74345-230
93	Ø 10 mm Tube Elbow Fitting	74345-072
94	Ø 12 mm Tube Elbow Fitting	74345-071
95	Bantum Muffler	74854
96	Orifice Plug	88038



### **Major Benefits**

- PHD cylinder mounts into the same space and bolt patterns.
- Provides significantly longer life and reduces maintenance and downtime.
- Cylinders are easily field repairable, maximizing your investment.
- Stretching assembly housing uses recognized PHD's long life seals and bushing.
- Shaft bearing housing utilizes PHD manufactured fluoropolymer composite bearing cartridge for dimensional control.
- Shaft assembly housing incorporates top and bottom PTFE Excluder for better bearing protection.

5.275 [134]

2.284-

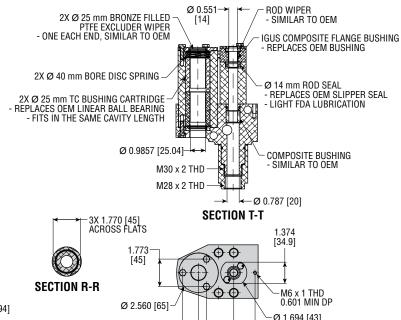
[58]

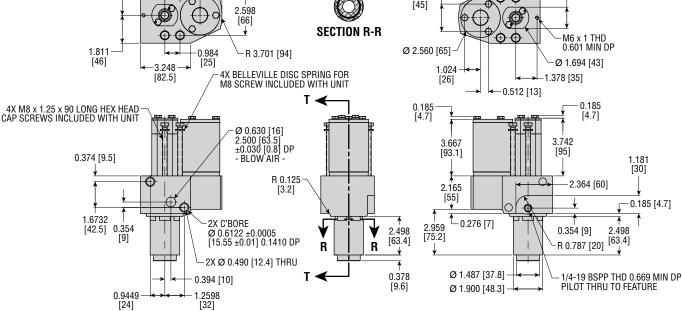
 All fasteners are zinc plated to reduce the possibility of corrosion.

1.575 [40]

1.656 [42]







All dimensions are reference only unless specifically toleranced.



# BST2

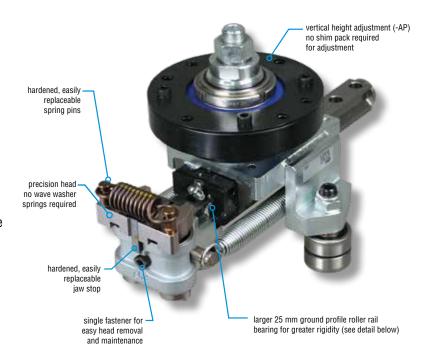
### TRANSFER ARM

### **Major Benefits**

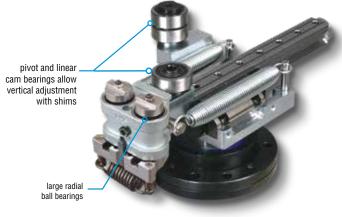
- Threaded vertical height adjustment eliminates need for shim pack, which greatly reduces setup adjustment time (-AP option).
- Linear rail and carriage bearing has increased in size and upgraded to roller bearing style assembly.
- Base, shaft, and pivot incorporated into one piece weldment.
- Head is designed with large radial bearings for increased rigidity and long life.
- Hardened replaceable jaw stop for ease of repair and cost considerations.
- Jaw and retract springs manufactured especially for PHD, providing greater life.
- All spring return pins hardened and replaceable for ease of repair and cost considerations.
- Unit is designed to operate over 20 million cycles.

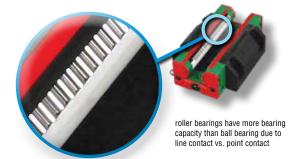
**NOTE:** Standard Series BST2 Transfer Arms are not designed for 'S' style SB04-SB08 or SB028 machines. See chart below.

SBO MODEL	PHD MODEL
SB04, SB06, SB08 Cold Set	ML315825
SB04, SB06, SB08 Heat Set	ML315912
SB028 Cold Set	ML314723
SB028 Heat Set	ML315545





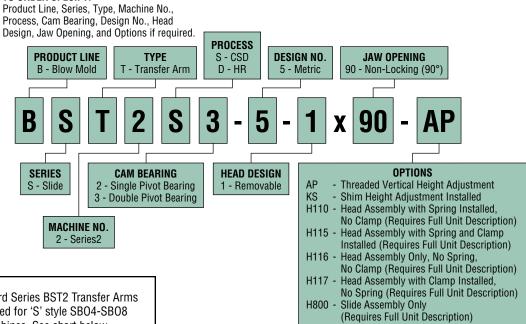






### ORDERING & ENGINEERING DATA: SERIES BST2 TRANSFER ARM

### TO ORDER SPECIFY:



**NOTE:** Standard Series BST2 Transfer Arms are not designed for 'S' style SB04-SB08 or SB028 machines. See chart below.

SBO MODEL	PHD MODEL
SB04, SB06, SB08 Cold Set	ML315825
SB04, SB06, SB08 Heat Set	ML315912
SB028 Cold Set	ML314723
SB028 Heat Set	ML315545

SPECIFICATIONS	IMPERIAL	METRIC				
SERIES	'S' Style Series2 Replacement					
OPERATION	Cam Operated,	Spring Return				
LINEAR BEARING SYSTEM	Steel Ground Profile Rail with	Recirculating Roller Bearings				
LUBRICATION	FDA Regulation	21CFR 178.3570				
AMBIENT TEMPERATURE	-20° to +180°F	-29° to +82°C				
GRIP FORCE AT TOOLING*	3.4 to 9.4 lb	15.1 to 41.8 N				
EXTENSION SPRING FORCE						
FULL RETRACT	14 lb	62.3 N				
FULL EXTEND	45 lb	200.2 N				
WEIGHT - STANDARD UNIT	13.1 lb	4.9 kg				
WEIGHT - AP ADJUSTABLE UNIT	13.8 lb	5.2 kg				
STROKE	3.543 +0.472/-0.551 in	90 +12/-14 mm				

<sup>\*</sup>See page 73 for alternate grip force springs.

### RECOMMENDATIONS

Care must be taken with the newer style preforms to ensure that the fingers match the profile of the finish being processed.

### LIFE EXPECTANCY

Series BST Transfer Arms are designed for over 20 million trouble-free cycles with proper maintenance.

### **MAINTENANCE**

As with most PHD products, these transfer arms are field repairable. Repair kits and main structural components are available as needed for extended service.

### LUBRICATION

The Series BST Transfer Arm bearing systems are factory lubricated and designed to use lubrication per FDA Regulation 21CFR 178.3570 and may not need further lubrication for the life of the unit depending on the duty cycle of the machine. However, lubrication of the bearing system every six months is recommended. Also the application of anti-seize to the Weldment Base Assembly (-AP option only) every 4-6 months will provide extended life and keep adjustment components working properly.

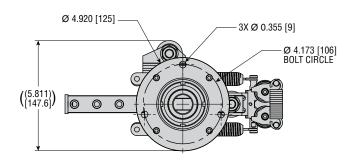
### JIG FOR SERIES BST2 - ML312709

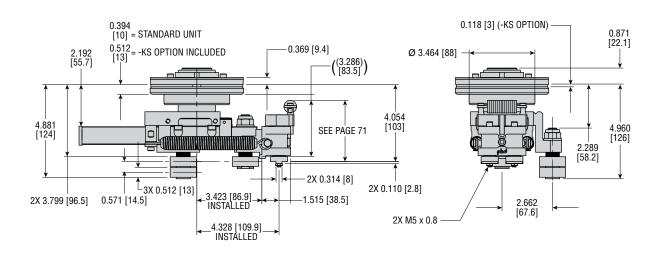
This jig is designed to verify and assist in rebuilding transfer arms as needed in the field. This jig is designed to fit in a standard 6 inch vise.

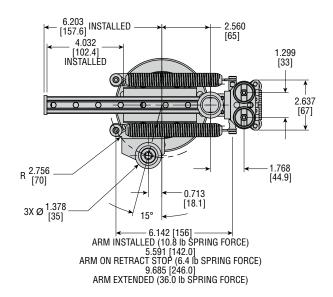


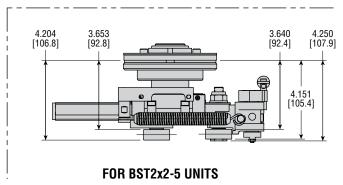


# **DIMENSIONS:** SERIES BST2xx-5 TRANSFER ARM







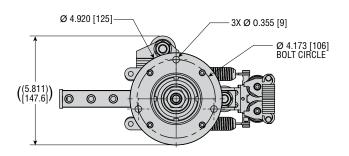


### NOTES:

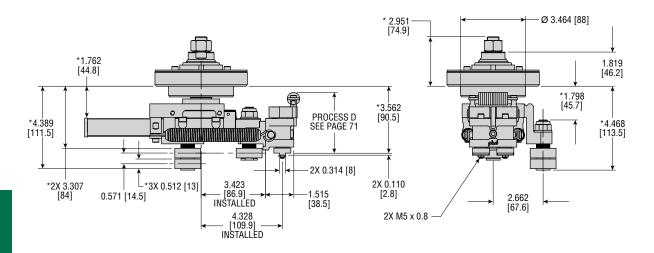
- 1) DIMENSIONS IN [ ] INDICATE VALUES IN mm
- 2) JAW ROTATION IS 90° TOTAL, 45° EACH JAW
- 3) MAXIMUM TRAVEL OF SLIDE IS 4.567 [116.0] 4) UNIT DESIGNED FOR STROKE OF 3.543 [90.0]
- 5) RETRACT OVERTRAVEL IS 0.551 [14.0] 6) EXTEND OVERTRAVEL IS 0.472 [12.0]

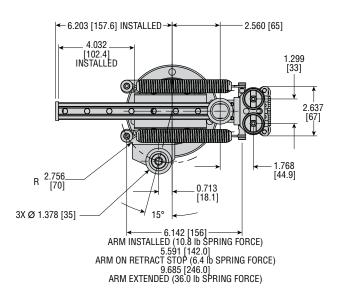


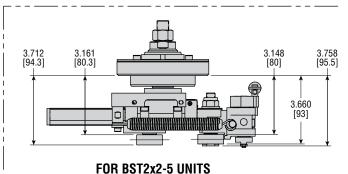
### **DIMENSIONS:** SERIES BST2xx-5 TRANSFER ARM WITH-AP OPTION



\* = VERTICAL HEIGHT ADJUSTMENT DIMENSIONS THAT WILL CHANGE + / - 0.1575 [4 mm] (ONE FULL TURN IS EQUAL TO 0.0394 [1 mm])







#### NOTES:

- 1) DIMENSIONS IN [ ] INDICATE VALUES IN mm 2) JAW ROTATION IS 90° TOTAL, 45° EACH JAW
- 3) MAXIMUM TRAVEL OF SLIDE IS 4.567 [116.0]
- 4) UNIT DESIGNED FOR STROKE OF 3.543 [90.0]
- 5) RETRACT OVERTRAVEL IS 0.551 [14.0]
- 6) EXTEND OVERTRAVEL IS 0.472 [12.0]



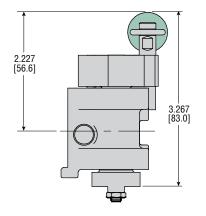
# PROCESSES & OPTIONS: SERIES BST2 TRANSFER ARM



### **COLD SET (CSD) PROCESS**

### 90° JAW OPENING

External extension springs provide the necessary grip force for Cold Set (CSD) bottle processes.



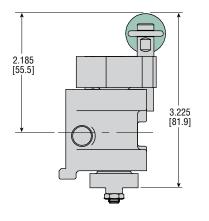
For forces, see engineering data or alternate head spring on page 65.



### **HEAT RESISTANT (HR) PROCESS**

### 90° JAW OPENING

External extension springs with heavier spring force provide the necessary grip force for Heat Resistant (HR) bottle processes.



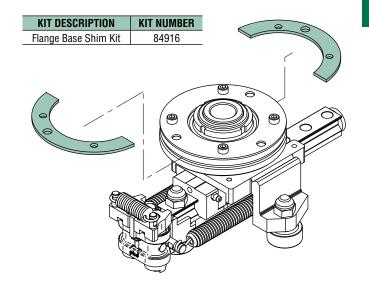
For forces, see engineering data or alternate head spring on page 65.

### KS

# SHIM HEIGHT ADJUSTMENT FACTORY INSTALLED FLANGE BASE SHIM PACK

A factory installed flange base shim pack is required for transfer height setup in the machine. This option allows for vertical adjustment of the unit.

**NOTE:** Standard unit does not include flange shim spacers. PHD offers this in kit form (see below). 'S' style shims are interchangeable with the PHD transfer arm.



All dimensions are reference only unless specifically toleranced.



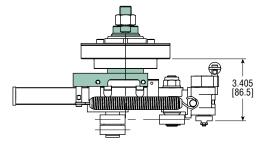
SSTYLE05A

### PROCESSES & OPTIONS: SERIES BST2 TRANSFER ARM

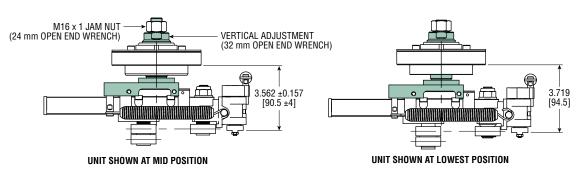
# AP THREADED VERTICAL HEIGHT ADJUSTMENT

This option allows for fast and easy vertical height adjustment once the unit is positioned in the machine. There is no need to remove the unit from the machine while adjusting the height. This option eliminates the need for a shim pack.

NOTE: One full turn is equal to 0.0394 in [1 mm] adjustment.



**UNIT SHOWN AT HIGHEST POSITION** 



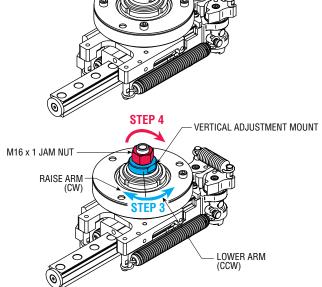
M16 x 1 JAM NUT

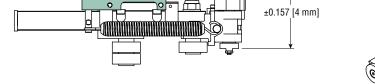
### **HEIGHT ADJUSTMENT PROCEDURES**

1) Install the arm into the machine.

M16 x 1 JAM NUT (24 mm OPEN END WRENCH)

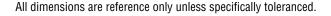
- 2) Using a 24 mm box end wrench, loosen the locking nut.
- 3) Using a 32 mm open end wrench, rotate the vertical adjustment mount to adjust the arm height until the jaw fingers are at the proper height over the mold. Clockwise (CW) movement will raise the arm, counterclockwise (CCW) will lower the arm. The arm has a range of ± 0.157 [4 mm].
- 4) Tighten the lock nut while holding the vertical adjustment mount stationary to ensure that the height does not change.





VERTICAL ADJUSTMENT

(32 mm OPEN END WRENCH)





VERTICAL ADJUSTMENT MOUNT

### ACCESSORIES & KITS: SERIES BST2 TRANSFER ARM

### **ALTERNATE HEAD SPRINGS**

Listed are alternative PHD designed springs for BST2 jaws. This list provides the customer with a variety of differing force springs that fit onto the posts of the transfer arm head. The springs are color coded with NSF registered DYKEM® per the chart below for ease of identification.

**NOTE:** PHD highly recommends the application of lubrication applied to the inside of the spring hooks and the post grooves for maximum life.

Forces are calculated based on the dimension from the center of the shafts to the center of the preform/bottle as shown in Figure 1. If tooling is longer or shorter than what is shown, the grip force will vary from the list given.

Consult PHD for grip force adjustments other than listed.

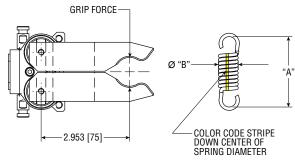


FIGURE 1

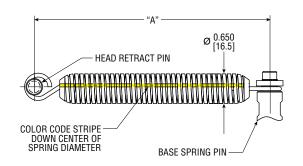
PHD	GRIP	FORCE	STRIPE	STRIPE	STANDARD	FREE STATE DI	MENSION "A"	DIMENSI	ON "Ø B"
PART #	lb	N	COLOR	QTY	PHD USE	in	mm	in	mm
83884	3.4	15.1	Yellow	1	BST2 CSD	2.179	55.3	0.748	19.0
76655	5.1	22.7	Green	2	_	1.935	49.1	0.554	14.1
77602	6.7	29.8	White	1	_	1.721	43.7	0.600	15.2
84491	9.4	41.8	Yellow	2	BST2 HR	2.061	52.3	0.663	16.8
77603	11.9	52.9	White	2	_	1.855	47.1	0.670	17.0

NOTE: Pull out forces are related to grip forces, but will vary depending on finger tooling design. PHD springs will allow process refinement for both bottle and preform transfer.

### **ALTERNATE RETRACT SPRINGS**

Listed are alternative PHD designed springs for BST2 retraction. This list provides the customer with alternative force spring that fits onto the posts of both the head and base spring pins. The springs are color coded with NSF registered DYKEM® per the chart below for ease of identification.

**NOTE:** PHD highly recommends the application of lubrication applied to the inside of the spring hooks and the post grooves for maximum life.



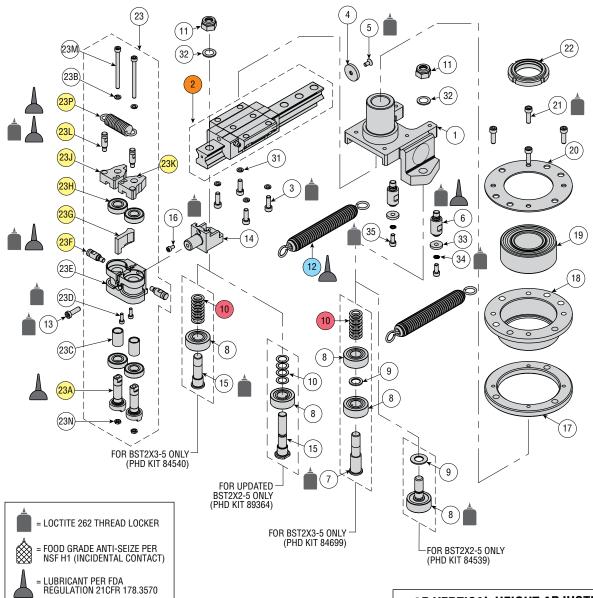
PHD PART #	STRIPE COLOR	STRIPE QTY	STANDARD PHD USE	DIMENSION "A" ARM ON STOP						_			TOTAL FORCE (Ibs) ARM OUT MIN				TOTAL FORCE (lbs) ARM OUT MIN	
rani #	GOLON	Q11	FIID USE	in	mm	lb	N	in	mm	lb	N	in	mm	lb	N			
85051	Yellow	1	BST2	5.591	142.0	3.2	14.2	6.142	156.0	5.4	24.0	9.685	246.0	18.0	80.1			
82892	Yellow	2	_	5.591	142.0	3.4	15.1	6.142	156.0	5.0	22.2	9.685	246.0	15.1	67.2			

#### NOTES:

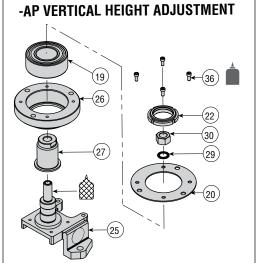
- 1) Pull out forces are related to grip forces, but will vary depending on finger tooling design. These spring options allow process refinement for both bottle and preform transfer.
- 2) Total retract forces are two times the above charted forces, as two springs are required per unit.



# EXPLODED VIEW & REPAIR KITS: SERIES BST2 TRANSFER ARM



KIT DESCRIPTION	KIT	KIT NO.			
KII DESCRIFTION	BST2x3-5	BST2x2-5	CODE		
Rail & Carriage Assembly Repair Kit	84317				
Head Repair Kit - Heat Resistant (HR)	8431				
Head Repair Kit - Cold Set (CSD)	8431				
Spring Extension Spring Kit	843				
BST2x2 Pivot Cam Bearing Replacement Kit	84				
BST2x2 Linear Cam Bearing Replacement Kit	893				
BST2x3 Linear Cam Bearing Replacement Kit	840				
Flange Base Shim Kit	849				
Cam Bearing Shim Kit	849	917			





# PARTS LIST: SERIES BST2 TRANSFER ARM

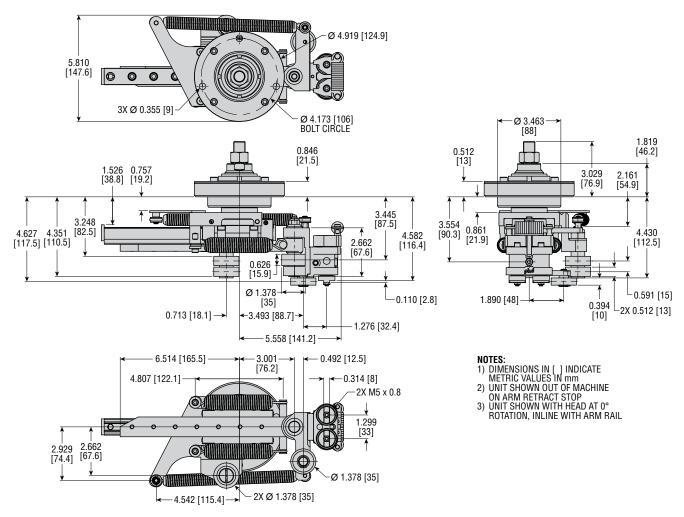
VEV	DADT DECORIDATION	PART NO.			
KEY	PART DESCRIPTION	BST2x3-5 BST2x2-5			
1	Weldment Base Assembly	83000			
2	Rail & Carriage Assembly	Sold as Part of Rail Repair Kit			
3	Carriage to Base SHCS	14308-117			
4	Extend Stop	83867			
5	Extend Stop SHCS	14308-584			
6	Spring Holder Body Pin	85291			
7	Pivot Cam Bearing Shaft	82889 —			
8	Bearing (Linear Cam)	2334-052-02			
8	Bearing (Pivot Cam)	<del></del>			
9	Bearing to Bearing Spacer	85364 83714			
10	Commercial Shim Washer	77430-05-004-0			
11	Nylon insert Lock Nut (Linear / Pivot Cam)	65759-007			
11	Nylon insert Lock Nut (Pivot Cam)	<del></del>			
12	Extension Spring	Sold as Part of Extension Spring Kit			
13	Head to Arm SHCS	14308-436			
14	Arm Mount	82858			
15	Bearing Mount	83713			
16	Mounting Arm to Rail SHCS	14308-401			
17	Lower Bearing Ring Mnt	82888			
18	Mid Bearing Ring Mnt	82884			
19	Bearing	2334-051-01			
20	Upper Bearing Ring Mnt	82885			
21	Upper Bearing Ring Mnt SHCS	61054-117			
22	Locking Nut	82887			
23	Total Head Assembly	Full Unit Description followed by -H11x			
23A	Shaft	81388-01 or Sold as Part of Head Assembly			
23B	Split Lock Washer	61745-008 or Sold as Part of Head Assembly			
23C	Bearing Spacer	81393 or Sold as Part of Head Assembly			
23D	Body to Tang SHCS	14308-019 or Sold as Part of Head Assembly			
23E	Body	81332 or Sold as Part of Head Assembly			
23F	Body Sprint Holder Pin	84683 or Sold as Part of Head Assembly			
23G	Tang	81394 or Sold as Part of Head Assembly			
23H	Bearing	2334-050-01 or Sold as Part of Head Assembly			
23J	Left Jaw	84475 or Sold as Part of Head Assembly			
23K	Right Jaw	84476 or Sold as Part of Head Assembly			
23L	Jaw Spring Holder Pin	82883 or Sold as Part of Head Assembly			
23M	Jaw to Nut SHCS	14308-111 or Sold as Part of Head Assembly			
23N	Metric Nut	3204-023 or Sold as Part of Head Assembly			
23P	Jaw Extension Spring	Full Unit description followed by -H1600 or Sold as Part of Head Assembly			
25	Weldment Base Assembly	84301			
26	Mid Bearing Ring Mnt	83990			
27	Vertical Adjustment Mnt	83871			
29	Serrated Washer	84141-017			
30	Metric Nut	3204-083-1			
31	Serrated Washer	84141-008			
32	Flat Metric Washer	64398-11-1-02			
33	Spring Base Washer	85290			
34	Serrated Washer	84141-007			
35	Washer to Spring Post SHCS	61054-099			
36	Upper Bearing Ring Mount SHCS	61054-115			



### **Major Benefits**

- Threaded vertical height adjustment eliminates need for shim pack, which greatly reduces setup adjustment time
- Linear rail and carriage bearing has increased in size and upgraded to roller bearing style assembly
- · Base, shaft, and pivot incorporated into one piece weldment
- Head is designed with large radial bearings for increased rigidity and long life
- Hardened replaceable jaw stop for ease of repair and cost considerations
- Jaw and retract springs manufactured specifically for PHD provide greater life
- All spring return pins hardened and replaceable for ease of repair and cost considerations
- Unit is designed to operate over 20 million cycles.

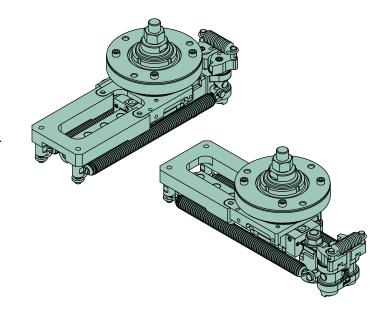


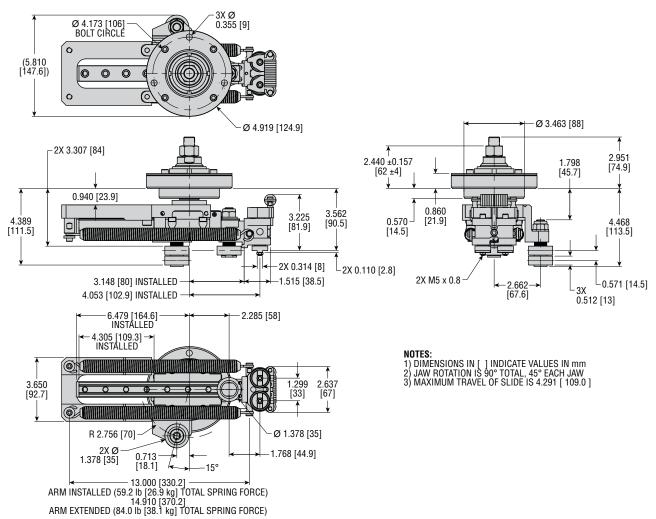




### **Major Benefits**

- Threaded vertical height adjustment eliminates need for shim pack, which greatly reduces setup adjustment time (-AP option).
- Linear rail and carriage bearing has increased in size and upgraded to roller bearing style assembly.
- Base, shaft, and pivot incorporated into one piece weldment.
- Head is designed with large radial bearings for increased rigidity and long life.
- Hardened replaceable jaw stop for ease of repair and cost considerations.
- Jaw and retract springs manufactured specifically for PHD, providing greater life.
- All spring return pins hardened and replaceable for ease of repair and cost considerations.
- · Unit is designed to operate more than 20 million cycles.



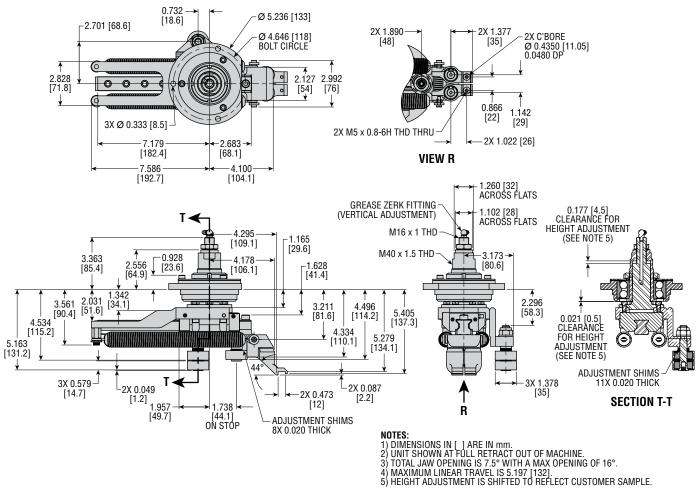




### **Major Benefits**

- Threaded vertical height adjustment eliminates need for shim pack, which greatly reduces setup adjustment time (-AP option).
- Linear rail and carriage bearing has been increased in size and upgraded to roller bearing style assembly.
- Base, shaft, and pivot incorporated into one piece weldment.
- Head is designed with large radial bearings for increased rigidity and long life.
- Hardened replaceable jaw stop for ease of repair and cost considerations.
- Jaw and retract springs manufactured specifically for PHD, providing greater life.
- All spring return pins hardened and replaceable for ease of repair and cost considerations.
- · Unit is designed to operate over 20 million cycles.



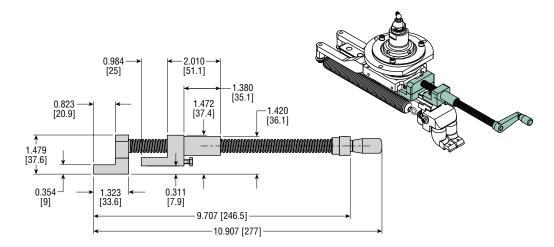


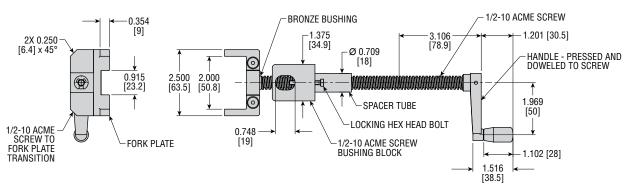


### **Major Benefits**

- SB024 Matrix transfer arm extraction jig (used with PHD SB024 Matrix transfer arm)
- ACME 1/2"-10 threaded adjustment shaft
- Unit comes with a crank handle cross pinned to the ACME threaded shaft
- Arm comes with a stainless steel fork and drive block attached to ACME threaded shaft
- · Bronze bushing in stainless steel drive block











# ML308222 & ML308876

### **Major Benefits**

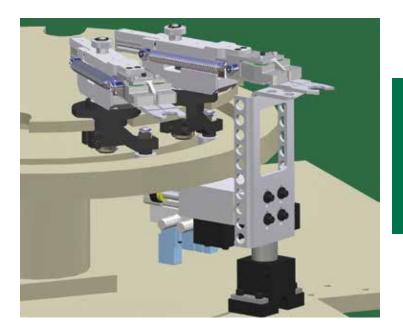
- Provides consistent preform/bottle ejection.
- Minimizes stress on transfer arm jaws with straight and faster eject as on the 'S' style Series1 machines.
- Reduces preventative maintenance and maintenance time.
- · Manifold mounted valve provides faster response.
- Valve provided with DIN 43650 connector to plug into existing machine plug. Rewiring not necessary.

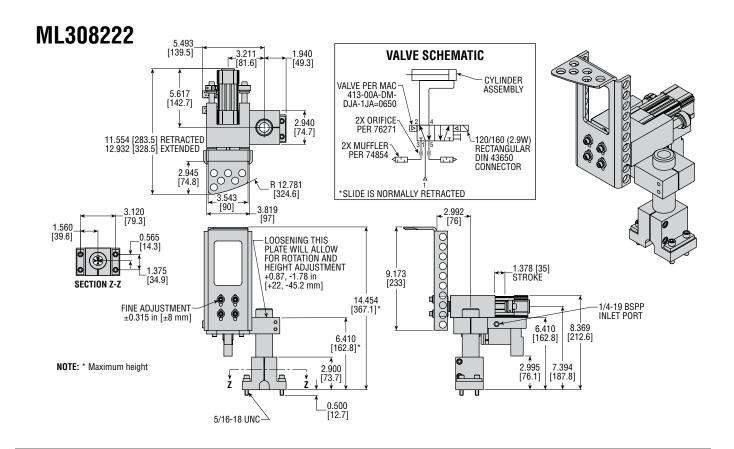


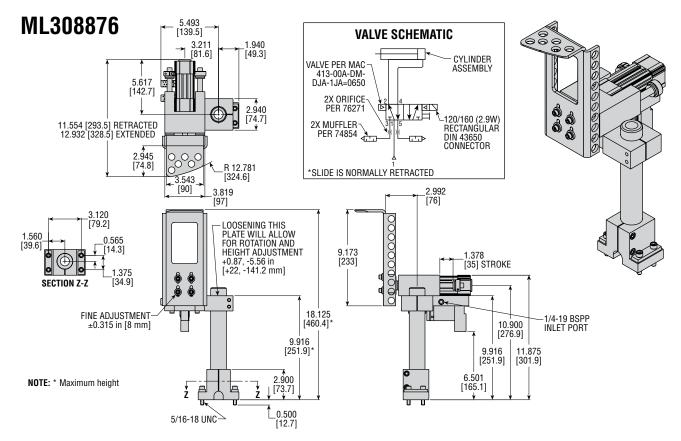
### **Conversion Requirements**

- Order per machine maximum height requirements.\*
- · Remove existing eject system.
- Mount eject slide (drill and tap four mounting holes).
- Align eject slide position.
- · Route electric cable to valve.
- Adjust eject slide height (max. per dimensions\*).
- · Adjust sabre height (max. per dimensions\*).
- Adjust eject chute if required (not in picture).

**NOTE:** \*See next page for maximum height dimensions.







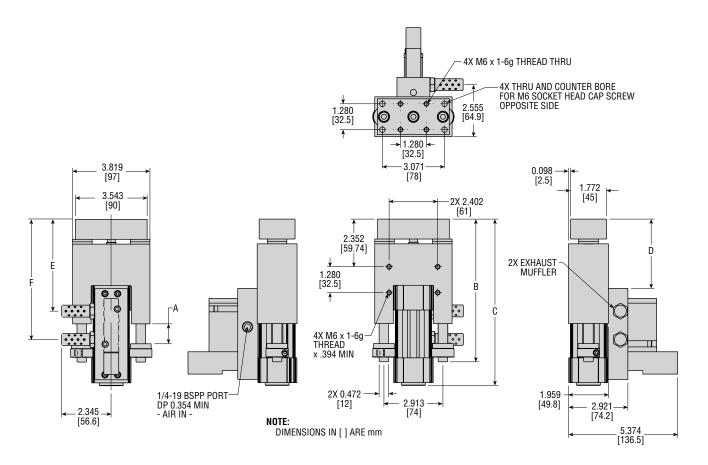


# ML304450 & ML305278

### **Major Benefits**

- Components for Festo® FENG-32-25 slide and DNC-32-25-P cylinder assembly on 'S' style model, Series2 machines.
- PHD slide mounts into the same space and bolt patterns.
- Direct valve manifold provides quicker response time with higher kinetic energy capacity.





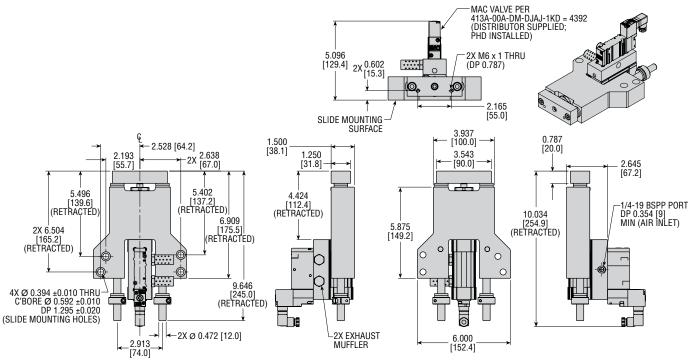
	LETTER DIMENSIONS						
UNIT	Α	В	C	D	E	F	
ML# 304450	0.984 [25]	7.047 [179]	8.215 [208.7]	3.421 [86.9]	4.541 [115.3]	5.927 [150.5]	
ML# 305278	1.378 [35]	7.441 [189]	8.609 [218.7]	3.618 [91.9]	4.738 [120.3]	6.124 [155.5]	



### **Major Benefits**

- Components for Bosch® unit 0821401080-slide, 0822034202-cylinder, and 0820038155-valve on 'S' style model, Series2 and 2+ machines.
- · PHD slide mounts into the same space and bolt patterns of the Bosch slide assembly and customer's slide mounting plate.
- · Direct valve manifold provides quicker response time with higher kinetic energy capacity.





#### NOTES:

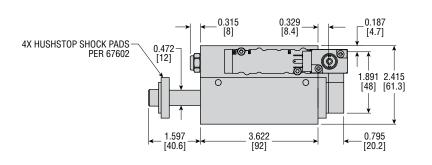
1) UNIT IS A 25 mm BORE X 25 mm STROKE EJECT SLIDE 2) EJECT SLIDE IS NORMALLY RETRACTED AND POWERED BY A 400 SERIES MAC VALVE 3) MAC VALVE PART NUMBER PER: 413A-00A-DM-DJAJ-1KD = 4392

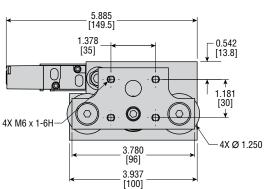


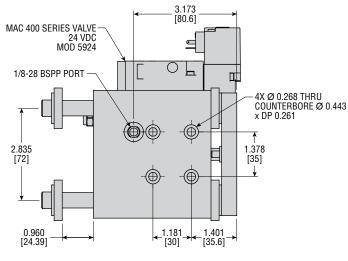
### **Major Benefits**

- Direct drop in on 'S' style Universal® and Matrix® machines
- · High speed
- Integral travel stops for controlled eject
- · Dual durometer shock pads for kinetic energy control and longer life









NOTES: 1) COMPONENT FOR 'S' STYLE UNIVERSAL® BOTTLE/PREFORM EJECT SLIDE 2) UNIT NORMALLY EXTENDED. ENERGIZING VALVE RETRACTS SLIDE 3) UNIT STROKE =  $0.960 \pm 0.030$  [24.4  $\pm 0.75$ ]

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# ML304151, ML307576, & ML311848

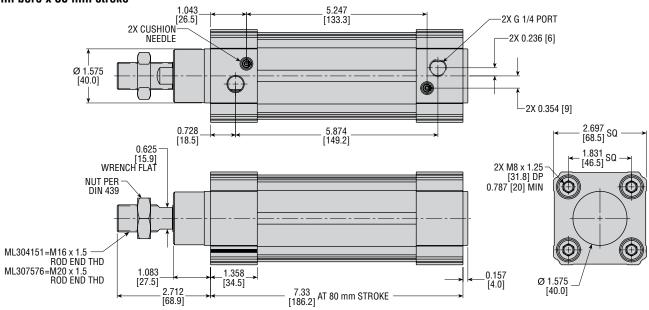
### **Major Benefits**

- Components for OEM supplied mold base cylinder on 'S' style model SBO Series1 machines SBO2 and SBO4 allowing the cylinder to mount into the same space and bolt pattern.
- High tensile strength, replaceable rod end significantly reduces cylinder rod end breakage.
- · Heavy duty cylinder designed for long life.
- ML307576 has an oversized rod end M20 x 1.5.



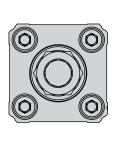
### ML304151 AND ML307576

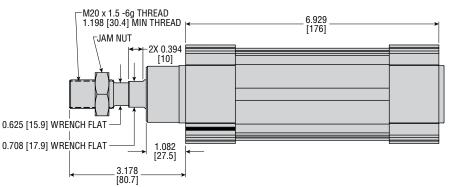
50 mm bore x 80 mm stroke



### ML311848

50 mm bore x 70 mm stroke (shorter stroke for increased life)



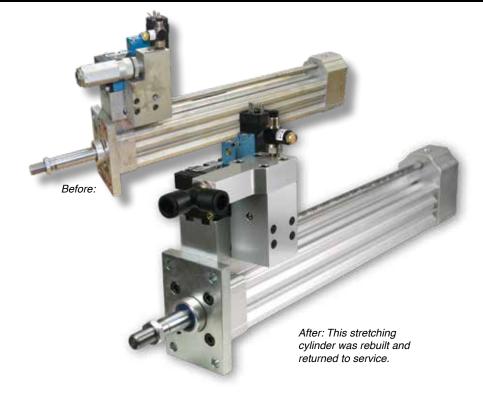




# Rebuild Program

### REBUILD IT YOURSELF OR ALLOW PHD?

PHD's rebuild program can save your facility training, additional work load, possible tool requirements, and facility space to perform the rebuilds. In addition, you will receive a 12 month "like new" warranty.



Get a 12 Month "Like New" Warranty



To request a free brochure, visit www.phdinc.com/resources/inforequest

PHD Unlimited Unique Solutions® designs and manufactures units to meet the special requirements of our customers. We welcome and encourage requests for specialized products, regardless of quantity or frequency of order. Our solutions range from one-time-only units to high quantity requirements. With over 30,000 designs and over 100,000 quotes already in our database, we can provide most quotes within eight working hours. When it comes to delivery, PHD is the best. Give us a call or go online and see how we can become your engineering partner.



#### ML313421 OCVS5 40 x 80 with Manifolded MAC 400 Series Valve

High speed, low cost OEM solution



#### ML313008 Air Docking Station

Fully field-repairable
Internal parts are all in
bushings for wear resistance
Black oxide finish for
corrosion resistance



### ML312857 Quick Change Volumetric Pump

Quick change for easy cleaning
Adjustable volume

Clear pump for visual confirmation

Easy 90° turn of the

pump to remove

Slide off piston design Corrosion resistant and designed for autoclave



### ML312447 Hydraulic Die Retention Cylinder

50 to 4,000 psi operating pressure range - hydraulic Field repairable, increases value and provides longer life PHD offers rebuild program providing same warranty as new unit

Spring extend for ease of setup



#### ML313108 Pneumatic Pick Head

Pneumatically changes pitch

Lower cost than electric pick head

Easy installation

Customer specified pitch and number of heads Reference ML306079 and ML310426 for other pick heads

Contact PHD for additional solutions or request to see a video



### OTHER SOLUTIONS

### 2 Position Filler Cylinder

'K' style components

55 & 60 mm bolt spacing

Replaces failure-prone diaphragm with simple piston design

### Series FCB Filler Cylinder

'K' style components

Reliable, field-tested design provides consistent performance

Food grade seal

### **Eject Cylinder**

ML309880 and ML310656

'K' style components

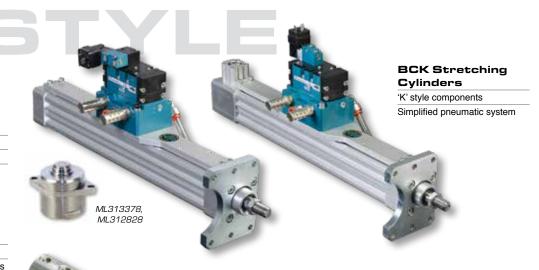
Provides rapid repeatable ejection function due to MAC valve design and PHD cylinder.

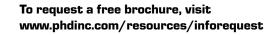
High kinetic energy capacity

Provides faster delivery times than OEM product

In many cases lower cost solution than OEM product

Intended for high speed part rejection







#### Transfer Arm Head

ML311628

'K' style components

### ADDITIONAL SOLUTIONS

#### **BCN Needle Cylinder**

Continuous extrusion blow molding needle actuators components

Significantly longer life

Reduces maintenance and downtime



#### **BCT Needle Cylinder**

Needle Cylinders for Continuous Extrusion Bottle Blow Molding

PHD Cylinder mounts into the same space and bolt patterns

Also available - EPET capable designs



### CV & AV

#### **Knockout Cylinders**

Significantly longer life

Reduces maintenance and downtime



#### PHD, Inc. 9009 Clubridge Drive Fort Wayne, Indiana 46809 U.S.A. Phone (260) 747-6151 • Fax (260) 747-6754 www.phdinc.com • phdinfo@phdinc.com

#### Slip Sheet Gripper

Modular assembly consisting of a clamp, slide and transition plate Clamp provides a wide opening so slip sheets are not missed

Quick installation and easy maintenance



### Fill Line Eject Slide

Repeatable ejection

High kinetic energy capacity Uses proven PHD thruster slide technology



#### Cam Follower Wheels

Competitive pricing

Longer life than OEM

Available in variety of material



PHDinEurope GmbH Zum Carl-Alexander-Park 6 52499 Baesweiler, Germany Tel. +49 (0)2401-619 77 0 • Fax. +49 (0)2401-619 77 99 www.phdinc.com • info@PHDinEurope.de

