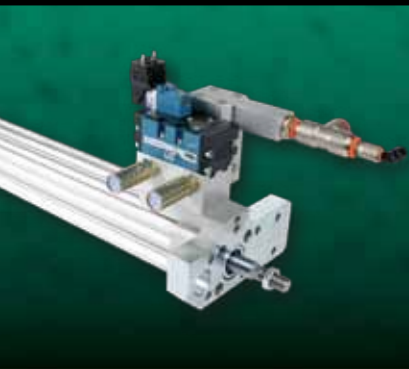




SIDEL®

DIRECT REPLACEMENTS

phdinc.com (800) 624-8511



INCREASE PRODUCTION • REDUCE MAINTENANCE • REDUCE DOWNTIME • REDUCE SCRAP



STRETCHING CYLINDERS

NOZZLE CYLINDERS

TRANSFER ARMS

BOTTLE EJECT SLIDES

UNIQUE SOLUTIONS®

SIDEL01

phd® 
SOLUTIONS FOR INDUSTRIAL AUTOMATION



We understand

your unique requirements

Focused on the specific needs of the plastic packaging industry, PHD offers many direct replacements for Sidel® and Krones® 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.

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With longer life,
reduced maintenance,
and reduced downtime

We offer a wide variety of direct replacement components for Sidel®, Krones® and other machines. Our drop-in 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.

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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 70 for more information.



STRETCHING CYLINDERS

Replacement Reference Chart 4

BCS Stretching Cylinder 5

Series1 and Series2 direct replacement with X27 PHD check valve option

BCSU Universal Stretching Cylinder 19

Universal direct replacement with X27 PHD check valve option

Universal Stretching Cylinder 27

Universal SBO34 direct replacement

NOZZLE CYLINDERS

Series1 Nozzle Cylinders 31

Series1 Pneumatic (SB02-SB06 HR) and CSD direct replacements

BCZ2 Nozzle Cylinder 35

Series2 CSD & HR direct replacement

BCZU Universal Nozzle Cylinder 45

Universal direct replacement

TRANSFER ARMS

BST1 Transfer Arm 51

Series1 direct replacement with more robust and precise design

BST2 Transfer Arm 57

Series2 direct replacement with vertical height adjustment

PREFORM/ BOTTLE EJECT SLIDES

ML308222 & ML308876 65

Series1 replacement

ML304450 & ML305278 67

Series2 direct replacement

ML308956 68

Series2 and 2+ direct replacement

OTHER

Mold Base Cylinder 69

Series1 SB02 and SB04 direct replacement

Rebuild Program 70

Return your unit to service and get a 12 month "like new" warranty

Unique Solutions® 71

PHD offers unlimited design capabilities to fit your needs

Krones®/Other Solutions 72

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Replacement Reference Chart

SIDEL® SERIES1

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

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

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

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 - Preferential Head	BST1 Transfer Arm
	ML309814

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

SIDEL® SERIES2 & SERIES2+

SBO MODELS	PHD MODEL
Stretching Cylinders	BCS2 Stretching Cylinder
Nozzle Cylinders	BCZ2 Nozzle Cylinder
Preform/Eject Slides	ML304450, ML305278, ML308956, ML312136
Series2 Transfer Arm -Fixed Head Standard and Adjustable - Head Only - Preferential Head	BST2xx-5
	BST2x25-1x90-xxxx
	ML311319 Preferential Head Only

UNIVERSAL

SBO MODELS	PHD MODEL
Stretching Cylinders	BCSU Universal Stretching Cylinder
Nozzle Cylinders	BCZU Universal Nozzle Cylinder
Eject Slide	ML311924

MATRIX

SBO MODELS	PHD MODEL
Eject Slide	ML311924

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.



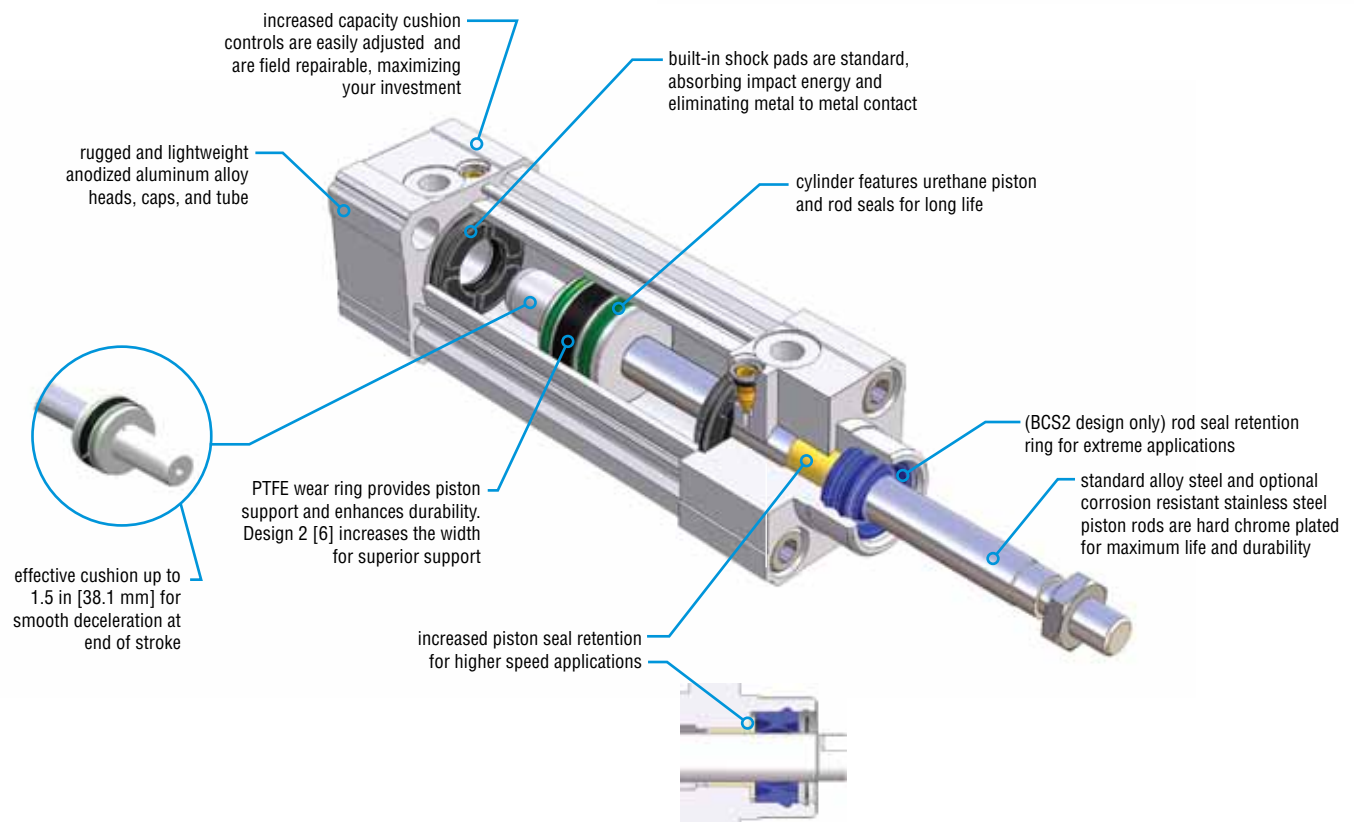
Series BCS2 Cylinder
shown with recommended
options X27 and LM

Series2 Replacement



Series BCS1 Cylinder

Series1 Replacement



ORDERING DATA: SERIES BCS STRETCHING CYLINDER

FOR SERIES1 MACHINES SB01, SB02, SB04 CONSULT FACTORY

TO ORDER, SPECIFY:

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

PRODUCT	TYPE	BORE SIZE				MANDATORY CUSHION CONTROL	
B - Blow Mold	S - Stretching	BORE	PISTON AREA	mm	in	mm ²	in ²
		50	1.969	1963	3.05	DB - Cushion Controls Both Ends Series1 only* DR - Cushion Control Retract Only Series2 only** No other cushion option can be Specified See notes 1, 2 & 3.	

SERIES	MACHINE NO.	DESIGN NO.	METRIC STROKE (BCSxx)	STANDARD STROKE LENGTHS	BORE	MAXIMUM STROKE	CYLINDER OPTIONS						
C - Cylinder 150 psi [10 bar] Air	1 - Series1 Machine (without Manifold) 2 - Series2 Machine (with Manifold)	6 - Metric		(100 mm = minimum stroke in 1 mm increments)	[mm]	[mm]							
B	C	S	2	-	6	-	50	x	400	-	DR	-	U19-LM-X27

NOTES:

- Cushions and ports are in positions 1 and 5.
 * -DB Cushions in both directions is required on Series1 units only. (BCS1)
 ** -DR Cushion on retract only is required on Series2 units only. (BCS2)
- Standard Series1 Stretching Cylinder ordering number is as follows:
BCS1-6-50x406-DB (Stroke may vary)
- Standard Series2 Stretching Cylinder ordering number is as follows:
BCS2-6-50x400-DR (-U19) For CSD machines
BCS2-6-50x400-DR (-U19) -**LR6** For HR machines
 -U19 option needs to be specified for valve to be attached to unit.
- Options not available on Series1 units: (BCS1)
 -U19, -LR6, -L12, -X25, -X26, -X27 and -R12.
- Not compatible with SB04 or SB014 Series2.
 Check with PHD before ordering.

CYLINDER TOTAL STROKE

POSITION 2 Full Extend POSITION 1 Full Retract

ROD EXTENSION

RETRACT END

EXTEND END

MACHINE NO. 1 DESIGN 6 **MACHINE NO. 2 DESIGN 6**

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 ²	1963 mm ²
BORE AREA - RETRACT	2.56 in ²	1649 mm ²
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	Standard	
LUBRICATION	FDA Regulation 21 CFR 1789.3570	
PORT SIZE	1/4 BSPP	
MAXIMUM STROKE	17.72 in	450 mm
STROKE TOLERANCE	+ .079/- .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	Urethane	

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 Cylinders are lubricated internally at the factory for the life of the cylinder. PHD uses FDA food grade lubrication per regulation 21 CFR 1789.3570. Any other lubrication to the cylinder may decrease the life expectancy.

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 ²	1963 mm ²
BORE AREA - RETRACT	2.56 in ²	1649 mm ²
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 21 CFR 1789.3570	
MAXIMUM STROKE	17.72 in	450 mm
STROKE TOLERANCE	+ .079/- .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	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 21 CFR 1789.3570
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

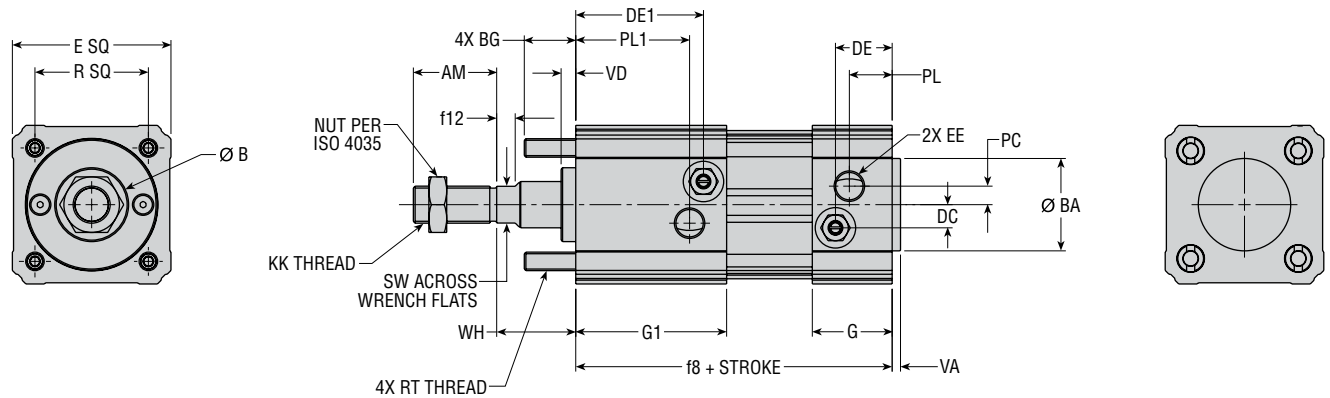
Series BCS2 Cylinders are lubricated internally at the factory for the life of the cylinder. PHD uses FDA food grade lubrication per regulation 21 CFR 1789.3570. Any other lubrication to the cylinder may decrease the life expectancy.

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:

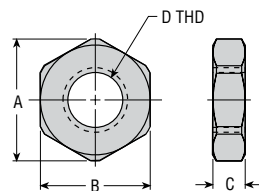
- 1) DIMENSIONS SHOWN IN [] ARE IN mm.
- 2) DESIGNATED CENTERLINE IS CENTERLINE OF CYLINDER.
- 3) UNLESS OTHERWISE DIMENSIONED, MOUNTING HOLE PATTERNS ARE CENTERED ON DESIGNATED CYLINDER CENTERLINE.

BORE SIZE [mm]	B	B ±TOL	RT	WH	R	BG	VD	VA MAX.	G	G1	f8	E	f12
50	1.2565 [31.92]	.0025 [0.06]	M8 x 1.25	1.340 [34.0]	1.929 [49.0]	.875 [22.2]	.249 [6.3]	.157 [4.0]	1.358 [34.5]	2.566 [65.2]	5.381 [136.7]	2.697 [68.5]	.315 [8.0]

BORE SIZE [mm]	SW (WRENCH FLAT)	BA	KK	AM	EE PORT	EE PORT DEPTH	PL	PL1	PC	DE	DE1	DC
50	.630 [16.0]	1.5709 [39.9]	M16 x 1.5	1.417 [36.0]	G 1/4	.354 [9.0]	.728 [18.5]	1.936 [49.2]	.315 [8.0]	.965 [24.5]	2.173 [55.2]	.394 [10.0]

HEX NUT DIMENSIONS PER ISO 4035 (DIN 4398)

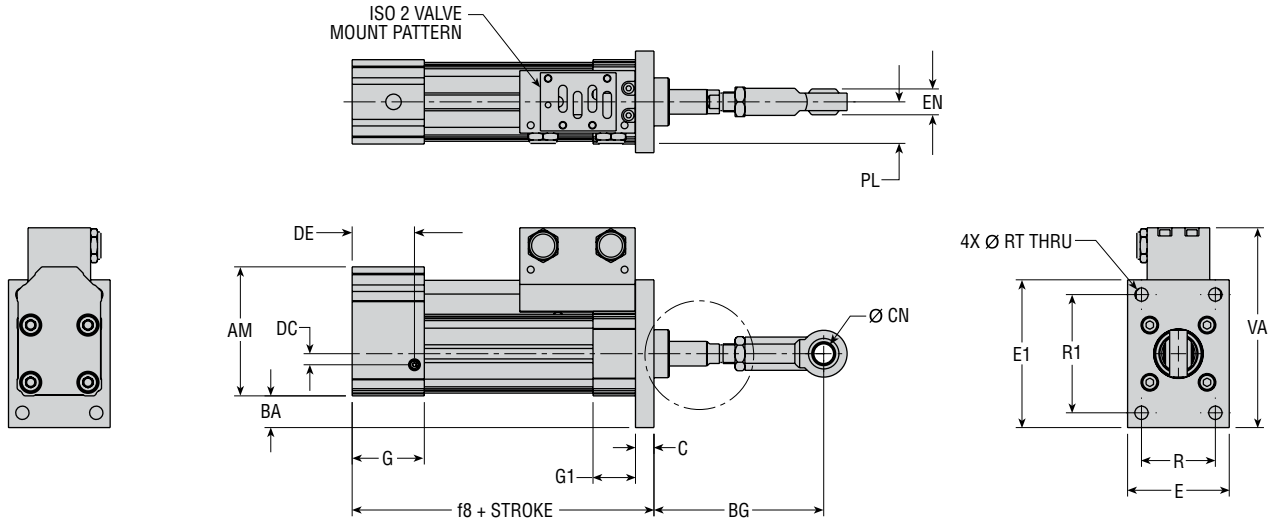
BORE SIZE [mm]	A MIN	B	C	D THD	PHD PART NUMBER	PHD PART NUMBER (-Z1)
50	1.053 [26.75]	.945 [24.0]	.315 [8.0]	M16 x 1.5	3204-003-01	19735-003



All dimensions are reference only unless specifically toleranced.

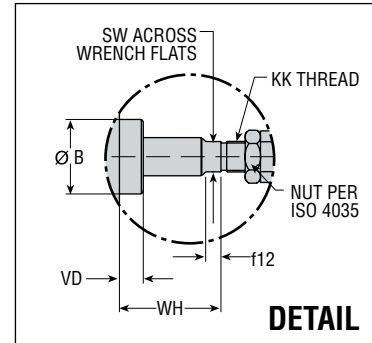
DIMENSIONS: SERIES BCS2 STRETCHING CYLINDER

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 f8 IS AT 0 mm STROKE.

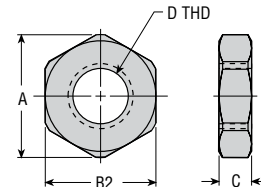


BORE SIZE [mm]	B	B ±TOL	C	RT	WH	R	R1	BG	VD	VA	G	G1	f8
50	1.5350 [38.99]	.0050 [0.13]	.591 [15.0]	.425 [10.8]	2.091 [53.1]	2.362 [60.0]	3.780 [96.0]	5.427 [137.8]	.491 [12.5]	6.388 [162.3]	1.806 [45.9]	1.358 [34.5]	5.212 [132.4]

BORE SIZE [mm]	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]	.315 [8.0]	.630 [16.0]	1.014 [25.8]	M16 x 1.5	4.125 [104.8]	1.330 [33.8]	1.491 [37.9]	.354 [9.0]	.630 [16.0]	.827 [21.0]

HEX NUT DIMENSIONS PER ISO 4035 (DIN 4398)

BORE SIZE [mm]	A MIN	B2	C	D THD	PHD PART NUMBER	PHD PART NUMBER (-Z1)
50	1.053 [26.75]	.945 [24.0]	.315 [8.0]	M16 x 1.5	3204-003-01	19735-003



All dimensions are reference only unless specifically toleranced.

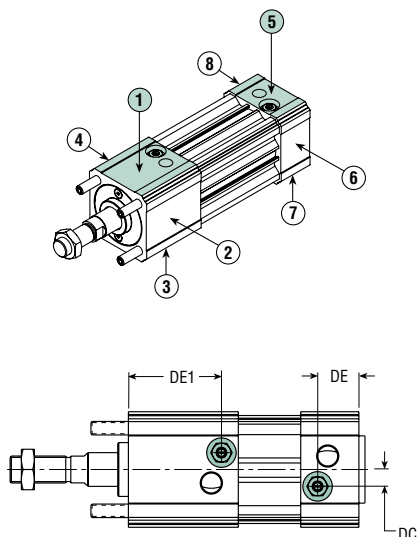
OPTIONS: SERIES BCS STRETCHING CYLINDER

DB CUSHION CONTROL IN BOTH DIRECTIONS (BCS1 ONLY)

(standard location 1 & 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.



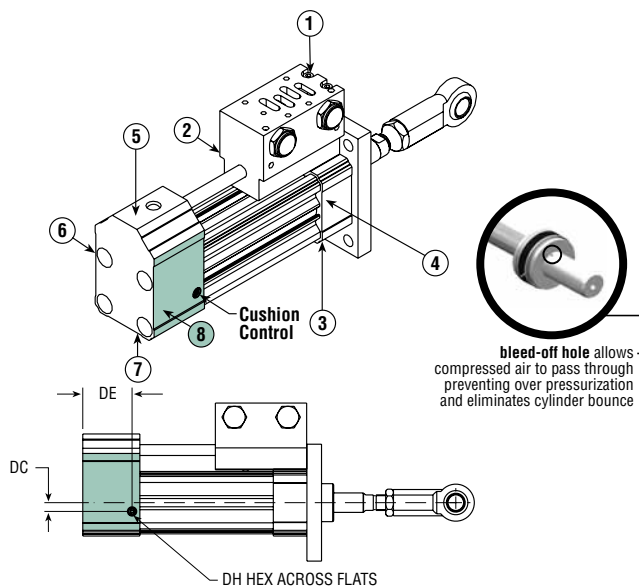
BORE SIZE [mm]	DE1	DC	DE	EFFECTIVE CUSHION LENGTH
50	2.173 [55.2]	.394 [10.0]	.965 [24.5]	.930 [23.6]

DR 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.

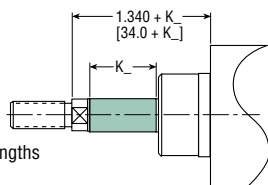


BORE SIZE [mm]	DE	DC	DH	EFFECTIVE CUSHION LENGTH
50	1.992 [50.6]	.354 [9.0]	— [2.5]	1.496 [29.2]

K_ EXTRA ROD EXTENSION

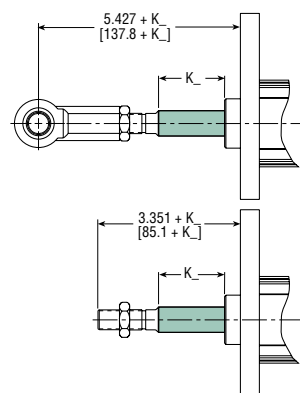
Extra rod extension can be achieved by specifying the option -K followed by the length code. Rod extension is available in 1 mm increments. Contact PHD for other combinations.

SERIES BCS1

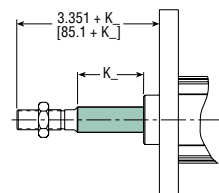


NOTE: -K_ = Extra rod extension in 1 mm increment lengths
code examples: -K5 = 5 mm extension
-K15 = 15 mm extension

SERIES BCS2

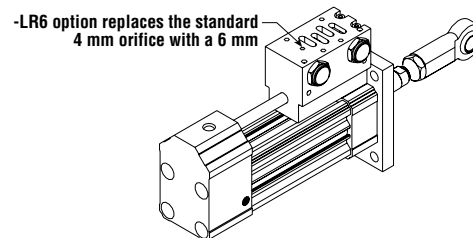


SERIES BCS2 with -R12 Option



LR6 6 mm ORIFICE ON RETRACT (BCS2 ONLY)

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).

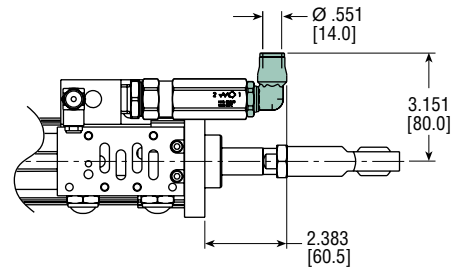


All dimensions are reference only unless specifically toleranced.

OPTIONS: SERIES BCS STRETCHING CYLINDER

L12 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).

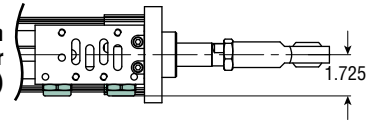


-L12 option with -X26 option

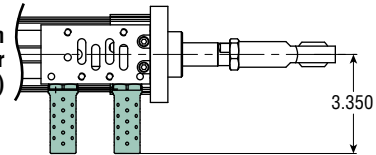
LM HIGH FLOW MUFFLER (BCS2 ONLY) Recommended Option

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).

Current BCS2-6-50 with
Compressed Ball Muffler
(Part# 77511-04)

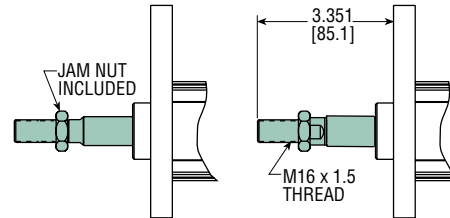


BCS2-6-50 with
High Flow Muffler
(Part# 73616)



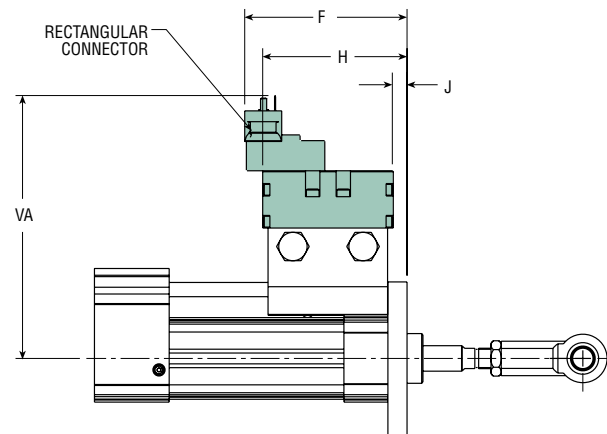
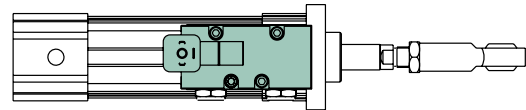
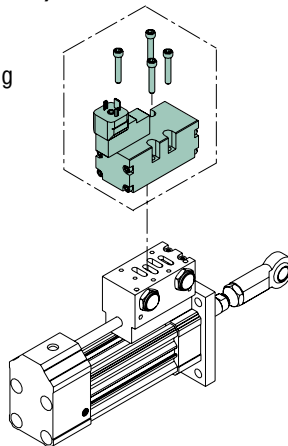
R12 UNIT WITHOUT SPHERICAL ROD END (BCS2 ONLY)

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 21 CFR 1789.3570 food grade lubrication. Reference valve specification chart page 8.

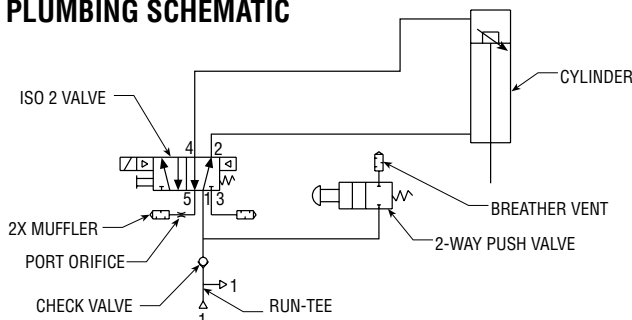


BORE SIZE [mm]	F	H	J	VA
50	5.011 [127.3]	4.456 [113.2]	.424 [10.8]	8.135 [206.6]

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.

PLUMBING SCHEMATIC



All dimensions are reference only unless specifically tolerated.

OPTIONS: SERIES BCS STRETCH CYLINDER

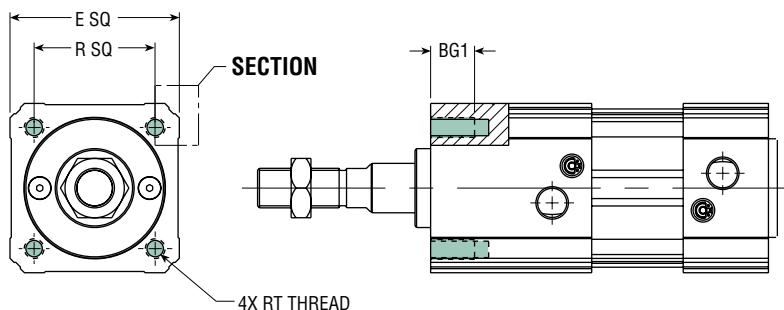
XD

4 THREADED HOLES FRONT (BCS1 ONLY)

BORE SIZE [mm]	RT	R	BG1 MIN.	E
50	M8 x 1.25	1.929 [49.0]	.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.



X25

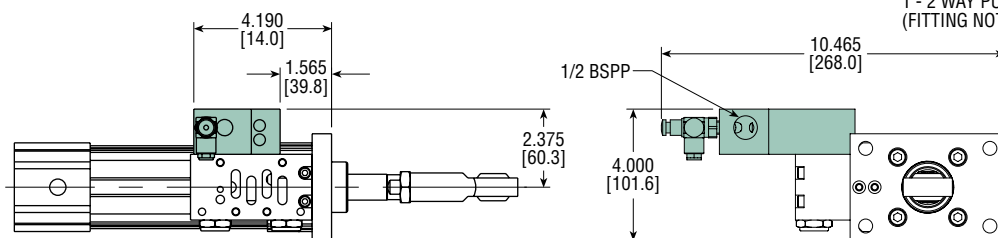
ADAPTOR BLOCK ONLY ATTACHED TO MANIFOLD (BCS2 ONLY)

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#
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)



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.

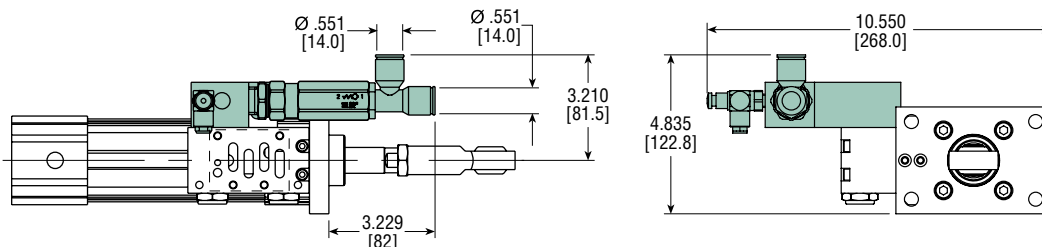


THE PHD WARRANTY COVERS THE CYLINDER, ISO VALVE, MANIFOLD AND ALL OTHER COMPONENTS ON THE CYLINDER WITH THE EXCEPTION OF THE CHECK VALVE. THE CHECK VALVE IS PROVIDED AS A SERVICE TO THE CUSTOMER, BUT DOES NOT CARRY THE PHD WARRANTY.

UNIT	INLINE CHECK VALVE KIT#
BCS2650	80138

NOTE:

- KIT INCLUDES -
- 1 - INLINE CHECK VALVE
 - 1 - BSPP MALE TO NPT MALE NIPPLE
 - 1 - SEALING RING (FITTING NOT INCLUDED)



All dimensions are reference only unless specifically toleranced.

OPTIONS & ACCESSORIES: SERIES BCS STRETCHING CYLINDER

X27

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

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.

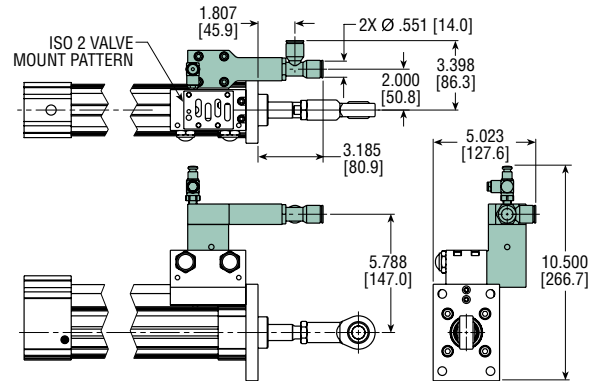
NOTE: OPTION INCLUDES -

- 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#	DESCRIPTION
BCS2650	H9166	83551	(INLINE CHECK VALVE KIT)
	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

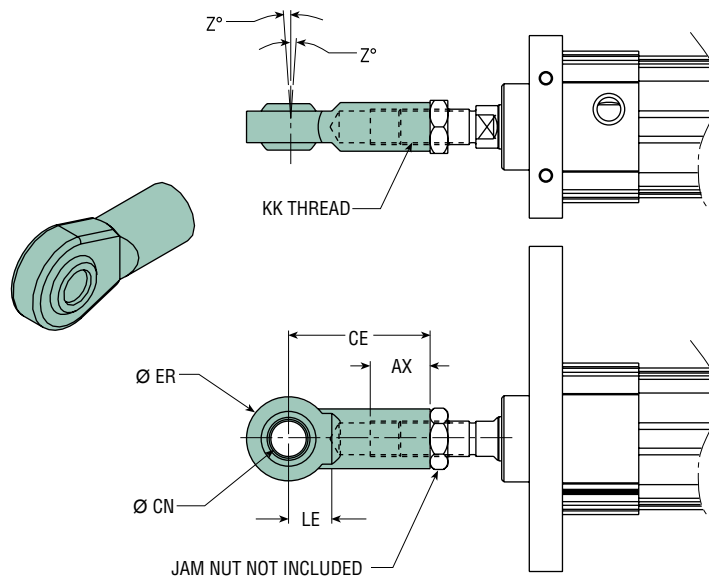
Recommended Option



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]	.630 [16.0]	.827 [21.0]	2.520 [64.0]	.866 [22.0]	.827 [21.0]	4°	52493-03-1

NOTE: * KIT DOES NOT INCLUDE JAM NUT.

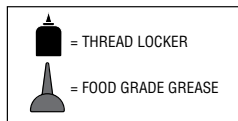
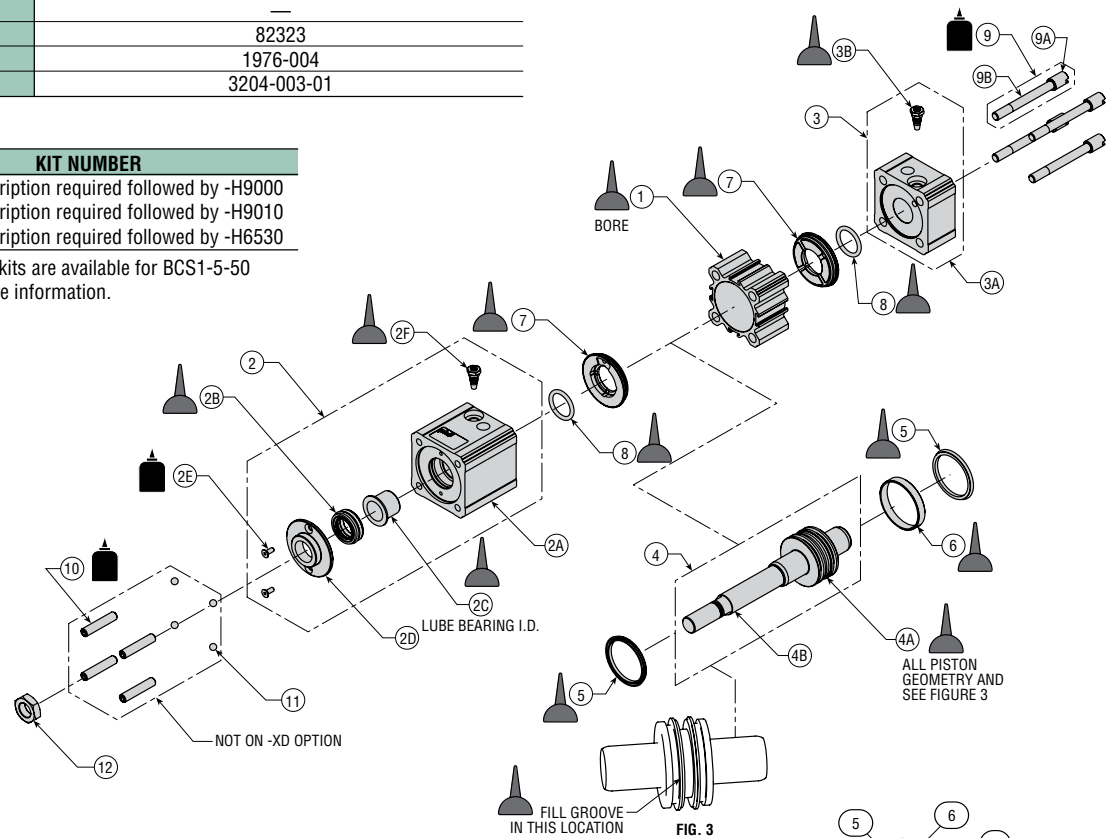
All dimensions are reference only unless specifically toleranced.

EXPLODED VIEW: SERIES BCS1 STRETCHING CYLINDER

KEY	PART DESCRIPTION	BCS1-6-50
1	Tube	Full unit description required followed by -H1300
2	Head Assembly (Extend End)	Full unit description required followed by -H1100
2A	Head	Full unit description required followed by -H1105
2B	Rod Seal	Sold as part of Seal and Repair Kit
2C	Flange Bearing	Sold as part of Repair Kit (Full unit description -H9010)
2D	Locator	73624
2E	SFHCS	Sold as part of Repair Kit (Full unit description -H9010)
2F	Needle Assembly	Sold as part of Cushion Kit (Full unit description -H6530)
3	Cap Assembly	Full unit description required followed by -H1200
3A	Cap	Full unit description required followed by -H1205
3B	Needle Assembly	Sold as part of Cushion Kit (Full unit description -H6530)
4	Piston and Rod Assembly	Full unit description required followed by -H1000
4A	Piston	—
4B	Rod	—
5	Piston Seal	Sold as part of Seal and Repair Kit
6	Wear Ring	Sold as part of Repair Kit (Full unit description -H9010)
7	Multi-Function Impact Seal	Sold as part of Seal and Repair Kit
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
9A	Tierod Nut	—
9B	Tierod	—
10	Socket Set Screw	82323
11	Ball (4 per unit)	1976-004
12	Nut (1 per unit)	3204-003-01

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

NOTE: General repair, seal and cushion kits are available for BCS1-5-50 (old design units). Contact PHD for more information.



TORQUE CHART 1

PART DESCRIPTION	TORQUE in-lb [Nm]
TIEROD AND NUT ASSEMBLIES	110 [12.4]
FLAT HEAD CAP SCREWS (LOCATOR TO HEAD)	20 [2.3]

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

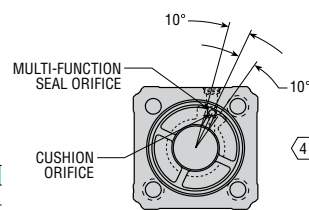


FIG. 1 CUSHION UNITS (-DB)

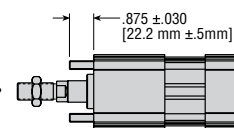
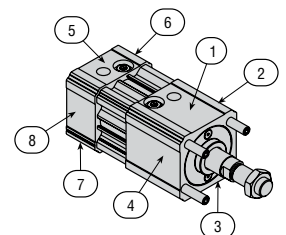


FIG. 2 Not on -XD option (No thread extension)

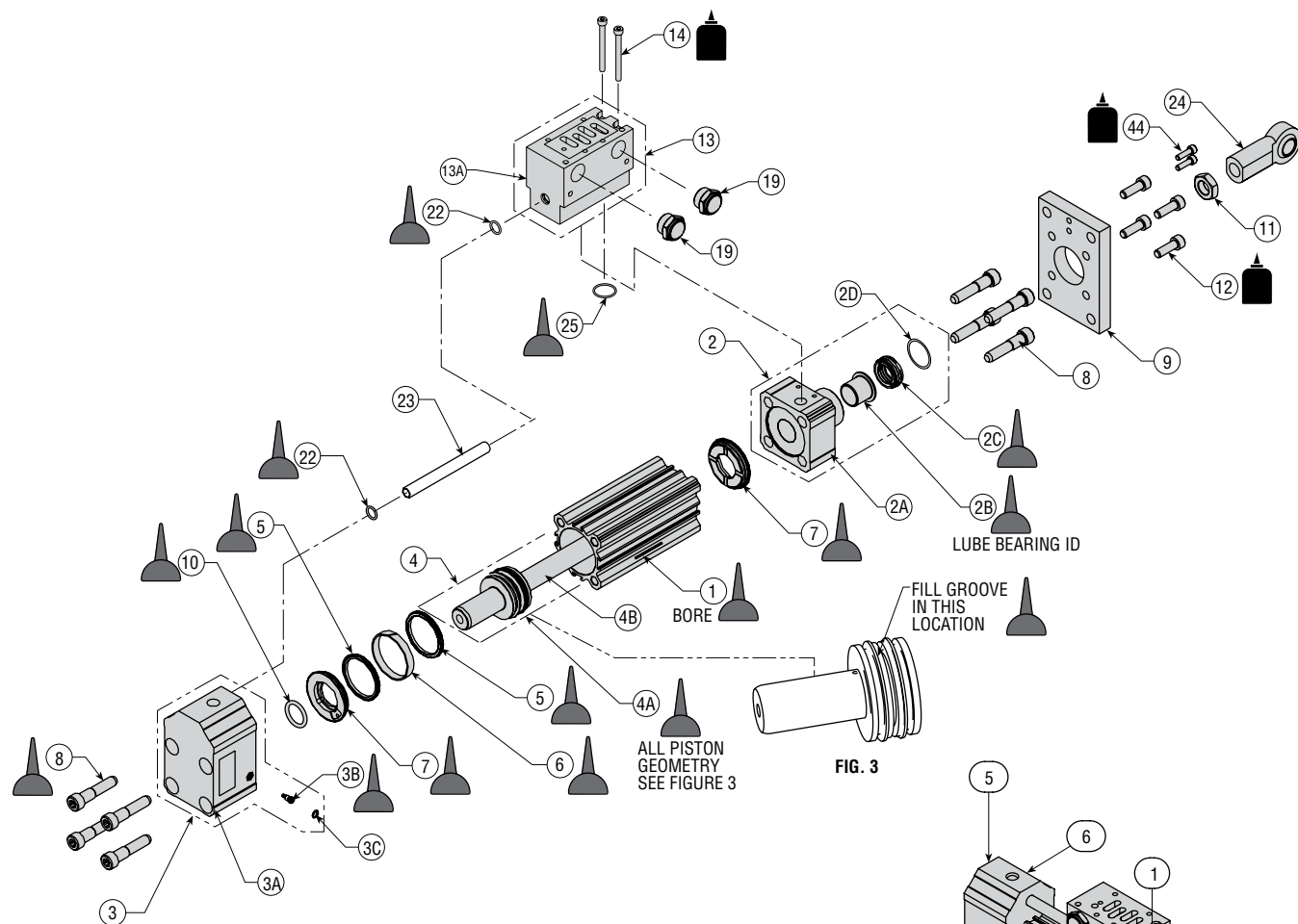


PORT LOCATION DEFINITION See Note 2

NOTES:
1) NUMBERS ENCLOSED BY A HEX REPRESENT PORT POSITIONS
2) LOCATION DEFINITION OF PORTS, CUSHION CONTROLS, AND PORT CONTROLS

All dimensions are reference only unless specifically toleranced.

EXPLODED VIEW: SERIES BCS2 STRETCHING CYLINDER



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

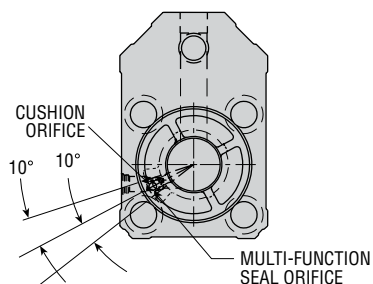


FIG. 1
CUSHION UNITS (-DR)

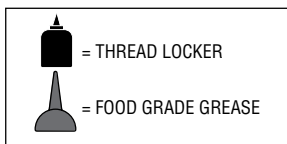


FIG. 3

PORT LOCATIONS
See Note 2

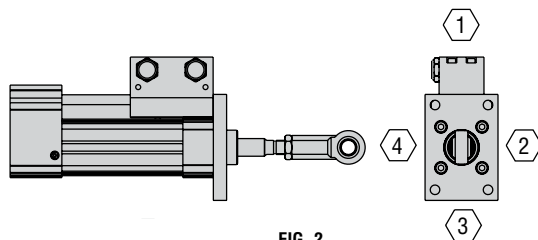


FIG. 2

TORQUE CHART 1

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]

NOTES:

- 1) NUMBERS ENCLOSED BY A HEX REPRESENT PORT POSITIONS
- 2) LOCATION DEFINITION OF PORTS, CUSHION CONTROLS, AND PORT CONTROLS

PARTS LIST AND 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 Seal Kit (-H9000*) and 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*), Sold as part of Seal Kit (-H9000*)
32	1/2 NPT O-Ring Seal	Sold as part of Inlet Adaptor Kit (-H9150*), Sold as part of Seal Kit (-H9000*)
33	Inlet Adaptor to Manifold Cap Screw	Sold as part of Inlet Adaptor Kit (-H9150*), Sold 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*)

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

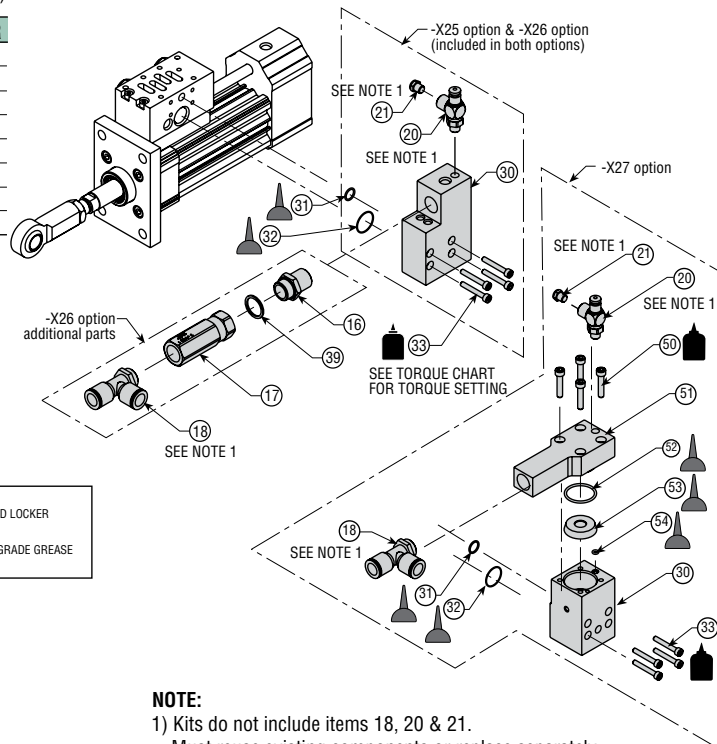
KIT DESCRIPTION	KIT NUMBER
Seal Kit	-H9000*
Repair Kit	-H9010*
Cushion Kit	-H6530*
Inlet Adaptor Assembly Kit	-H9150*
Manifold Assembly Kit	-H9090*
Inline Check Valve -X23 to -X26 Conversion Kit	-H9160*
Inline Check Valve -X26 Kit	-H9165*
Inline Check Valve -X27 Kit	-H9166*

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

CHART 1			
KEY	OPTION CODE		
	-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 - Item #18		
OPTION	OPTION CODE	
	-X26	-X27
STANDARD	61734-040	61734-040
-L12	74345-070	74345-070



NOTE:

1) Kits do not include items 18, 20 & 21.
Must reuse existing components or replace separately.

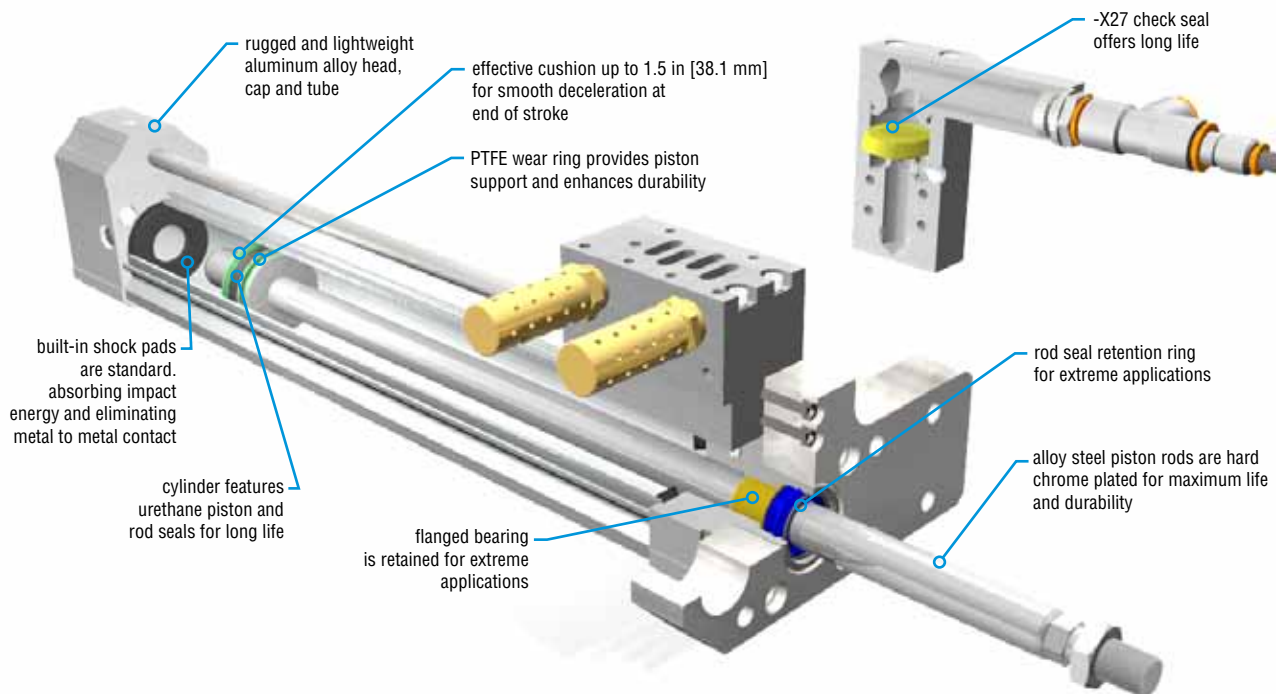
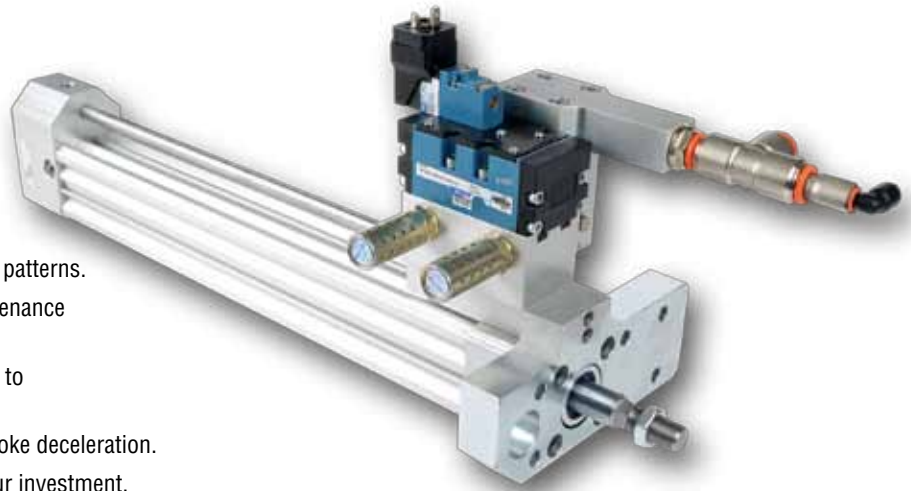
BCSU

Sidel® Universal Direct Replacement

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.



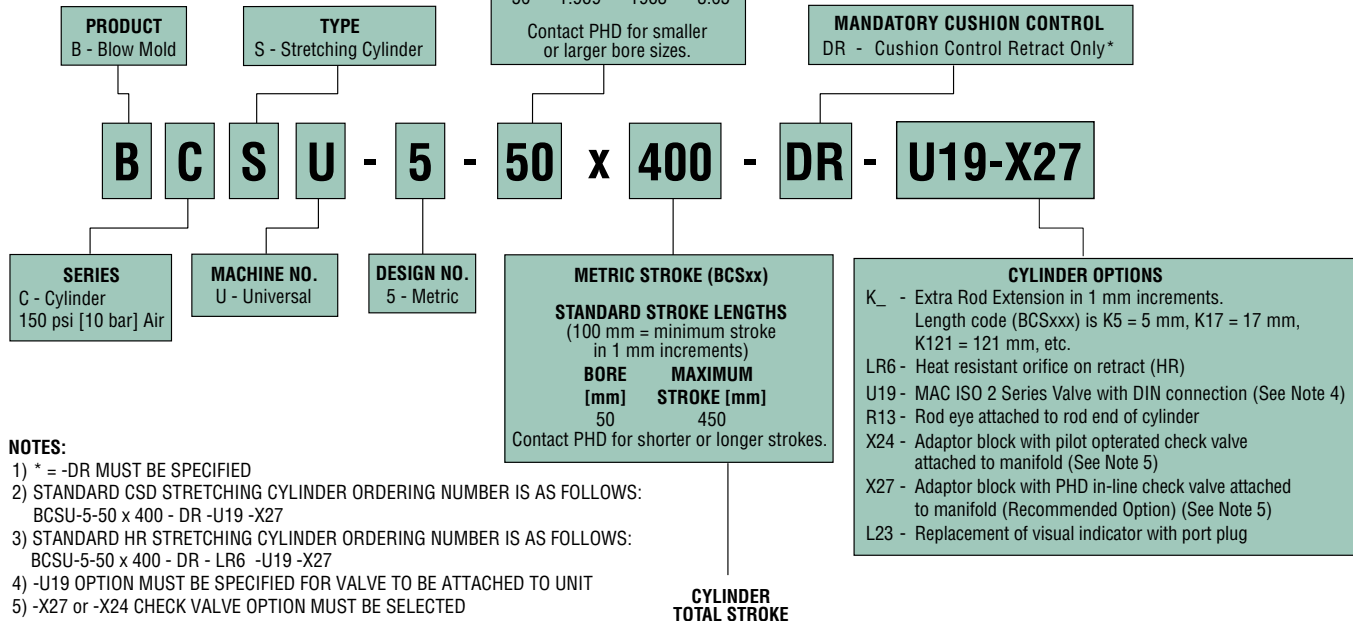
ORDERING DATA: SERIES BCSU STRETCHING CYLINDER

THE FOLLOWING IS A CROSS REFERENCE LISTING OF PHD TO SIDEL® UNITS:

PHD	SIDEL	REPLACES PHD ML#
BCSU-5-50 x 400-DR-U19-X24	1129149801 & 1137662801	ML308217
BCSU-5-50 x 400-DR-X24		ML306987
BCSU-5-50 x 400-DR-LR6-U19-X24	1129263701 & 1137662701	ML309326
BCSU-5-50 x 400-DR-LR6-X24		ML307364
BCSU-5-50 x 400-DR-LR6-X27		ML313256

TO ORDER, SPECIFY:

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



ENGINEERING DATA: SERIES BCSU STRETCHING CYLINDER

SPECIFICATIONS	IMPERIAL	METRIC
TYPE	Pneumatic Cylinder	
SERIES	Universal Machines Stretching Cylinder	
BORE SIZE	1.969 in	50 mm
BORE AREA - EXTEND	3.04 in ²	1963 mm ²
BORE AREA - RETRACT	2.56 in ²	1649 mm ²
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	Standard	
LUBRICATION; FOOD GRADE	FDA Regulation 21 CFR 178.3570	
STROKE	15.692 in	400 mm
STROKE TOLERANCE	+0.079/-0.000 in	+2.0/-0.0 mm
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	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 21 CFR 1789.3570
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]

ENGINEERING DATA: SERIES BCSU STRETCHING CYLINDER

LIFE EXPECTANCY

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

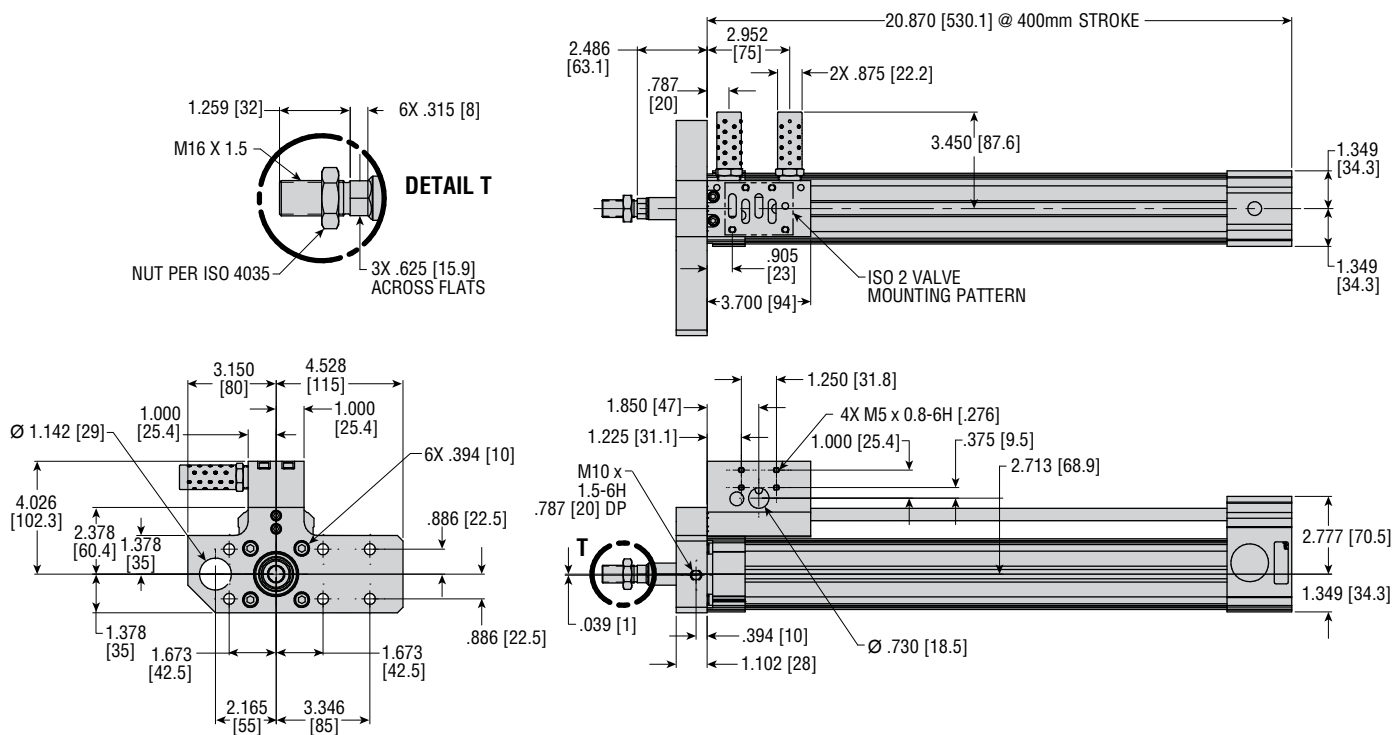
LUBRICATION

Series BCSU Cylinders are lubricated internally at the factory for the life of the cylinder. PHD uses FDA food grade lubrication per regulation 21 CFR 1789.3570. Any other lubrication to the cylinder may decrease the life expectancy.

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



All dimensions are reference only unless specifically toleranced.

OPTIONS: SERIES BCSU STRETCHING CYLINDER

DR CUSHION CONTROL ON RETRACT ONLY (Mandatory Option)

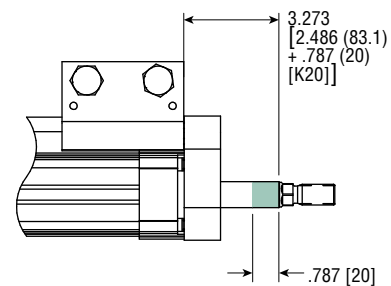
PHD cushions are designed for smooth deceleration at the end of stroke. When the cushion is activated, the remaining volume in the cylinder must exhaust past an adjustable needle which controls the amount of deceleration.



K_ EXTRA ROD EXTENSION

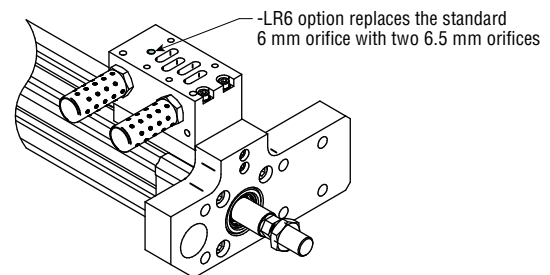
Extra rod extension can be achieved by specifying the option -K followed by the length code. Rod extension is available in 1 mm increments. Contact PHD for other combinations.

NOTE: -K_ = Extra rod extension in 1 mm increment lengths
code examples: -K5 = 5 mm extension
-K15 = 15 mm extension
-K20 = 20 mm extension



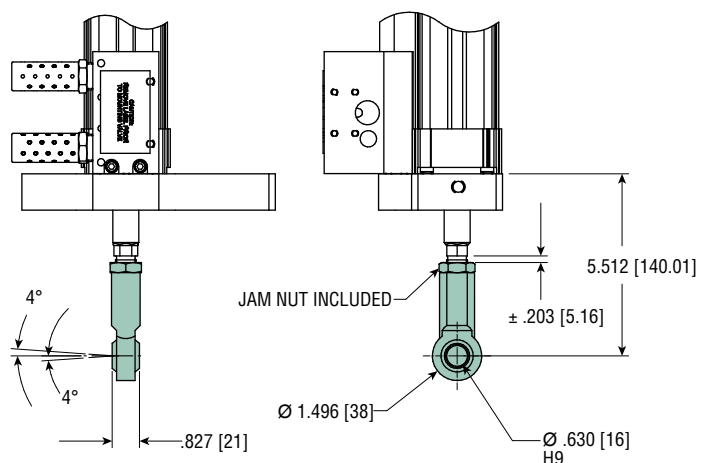
LR6 ORIFICE ON RETRACT (HR - Heat Resistant Units)

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.)



R13 ROD EYE MOUNTING WITH SPHERICAL BEARING (DIN 8193)

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

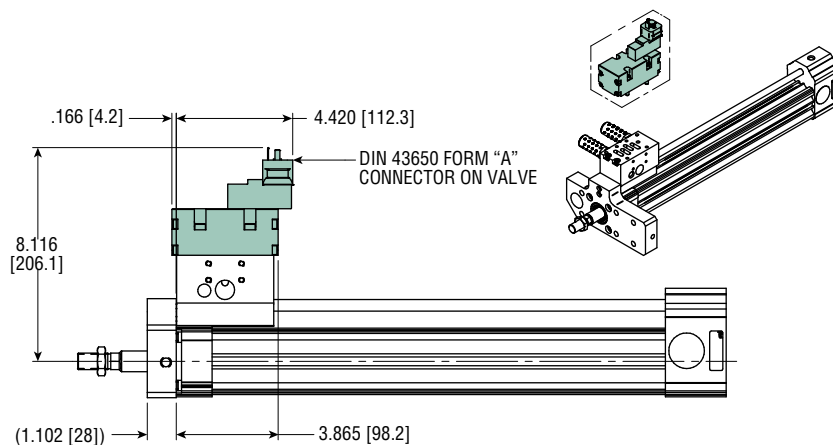


All dimensions are reference only unless specifically toleranced.

OPTIONS: SERIES BCSU STRETCH CYLINDER

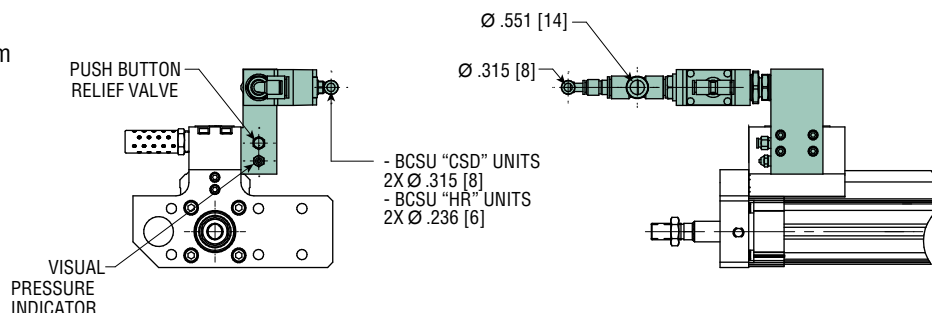
U19 MAC ISO 2 SERIES VALVE DIN CONNECTION

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 21 CFR 1789.3570 food grade lubrication.



X24 ADAPTOR BLOCK WITH IN-LINE PILOT-OPERATED CHECK VALVE ATTACHED

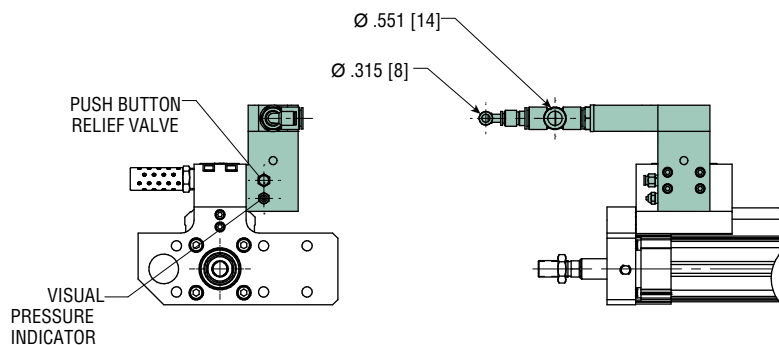
The inline check valve with adaptor block assembly is provided with an inline poppet-style check valve to prevent incoming air from exhausting through the inlet pressure supply tube during maintenance and is designed to prevent the stretch rod from dropping. This option is assembled at the factory.



X27 ADAPTOR BLOCK WITH PHD IN-LINE CHECK VALVE ATTACHED TO MANIFOLD

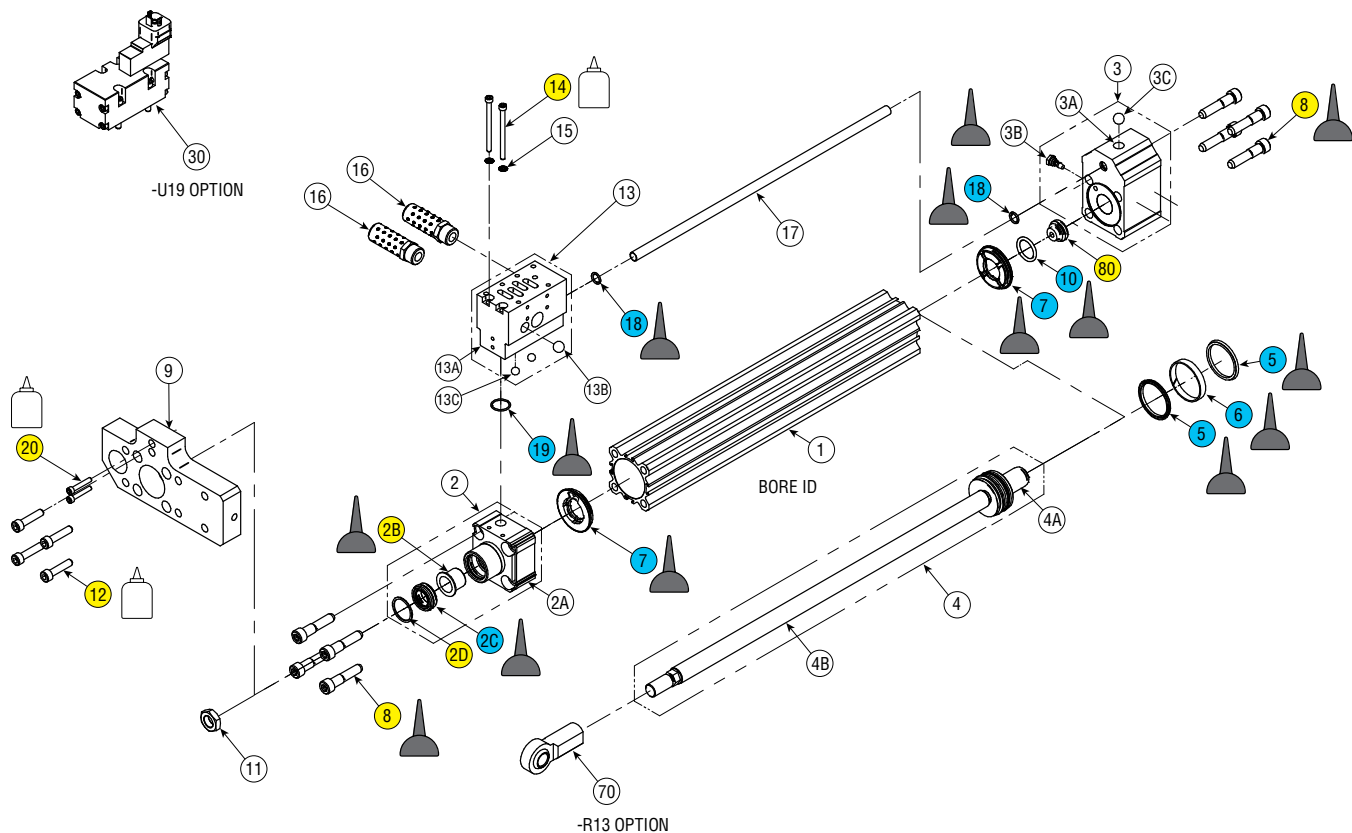
The PHD inline check valve with adaptor block assembly is provided with an inline check seal designed to prevent incoming air from exhausting through the inlet pressure supply tube during maintenance and prevent the stretch rod from dropping. This option is assembled at the factory. The -X27 check valve does not require the use of the tubing for the pilot operated check valve system that comes standard on your universal machine.

Recommended Option

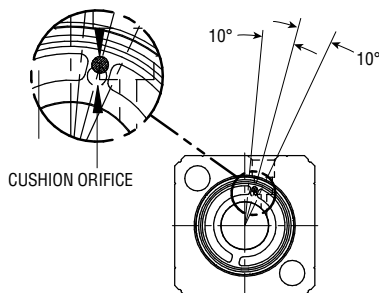


All dimensions are reference only unless specifically toleranced.

EXPLODED VIEW: SERIES BCSU STRETCHING CYLINDER

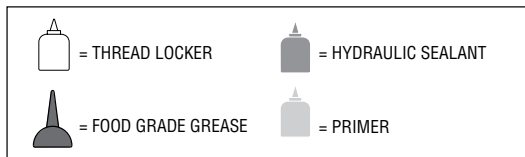
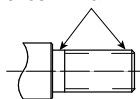


MULTI-FUNCTION SEAL ORIFICE

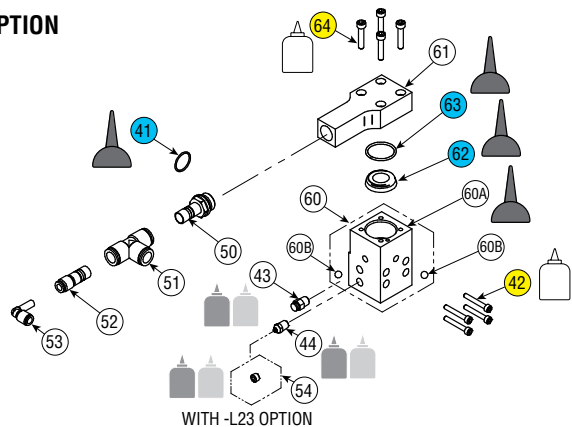


ALIGN CUSHION ORIFICE IN CAP WITH CUSHION ORIFICE HOLE IN MULTI-FUNCTION SEAL SO THAT CUSHION ORIFICE HOLE IS NOT BLOCKED MUST BE FREE FLOW THRU ORIFICE

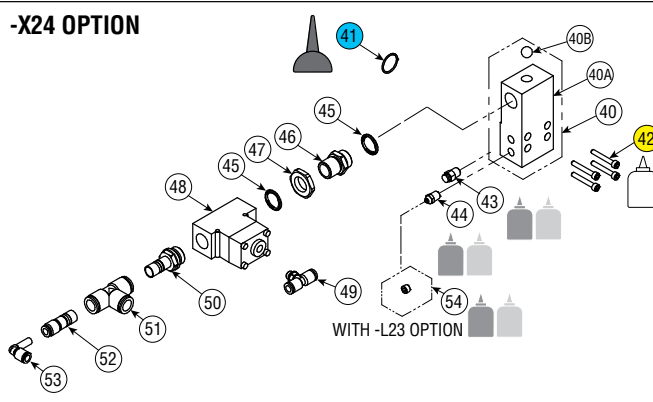
APPLY ADHESIVE TO BOTH SHOULDER & THREADS



-X27 OPTION



-X24 OPTION



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 AND REPAIR KITS: SERIES BCSU STRETCHING CYLINDER

CYLINDER ONLY PARTS LIST

KEY	PART DESCRIPTION	PART NO.
1	Finished Tube	Full unit description required followed by -H1300
2	Head Assembly	Full unit description required followed by -H1100
2A	Finished Head	Sold as part of Head Assembly
2B	Rod Bushing	Sold as part of Repair Kit (-H9010*)
2C	Rod Seal	Sold as part of Seal kit (-H9000*) & Repair Kit (-H9010*)
2D	Retaining Ring	Sold as part of Repair Kit (-H9010*)
3	Cap Assembly	Full unit description required followed by -H1200
3A	Finished Cap	Sold as part of Cap Assembly
3B	Needle Assembly	Sold as part of Cap Assembly, Sold as part of Cushion Kit -6530
3C	Steel Ball	Sold as part of Cap Assembly
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) & Repair Kit (-H9010*)
6	Wear Ring	Sold as part of Repair Kit (-H9010*)
7	Multi-function Impact Seal	Sold as part of Seal kit (-H9000*) & Repair Kit (-H9010*)
8	Custom Shoulder Bolt	Sold as part of Repair Kit (-H9010*)
9	Mounting Plate	87474
10	O-ring Cushion Seal	Sold as part of Seal kit (-H9000) & Repair Kit (-H9010*)
11	Jam Nut	Full unit description required followed by -H2001
12	SHCS	Sold as part of Repair Kit (-H9010*)
13	Manifold Assembly	Full unit description required followed by -H9090
13A	Manifold	Sold as part of Manifold Assembly
13B	Steel Ball	Sold as part of Manifold Assembly
13C	Steel Ball	Sold as part of Manifold Assembly
14	SHCS	Sold as part of Repair Kit (-H9010)
15	Serrated Safety Washer	84141-007-02
16	Muffler	73616
17	Finished Steel Tube	Full unit description required followed by -H1310
18	O-ring Seal	Sold as part of Seal kit (-H9000*) & Repair Kit (-H9010*)
19	O-ring Seal	Sold as part of Seal kit (-H9000*) & Repair Kit (-H9010*)
20	SHCS	Sold as part of Repair Kit (-H9010*)
80	Shock Pad	Sold as part of Repair 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*) & 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*) & Repair Kit (-H9010*)
41	O-ring Seal	Sold as part of Seal kit (-H9000*) & 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

KEY	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)

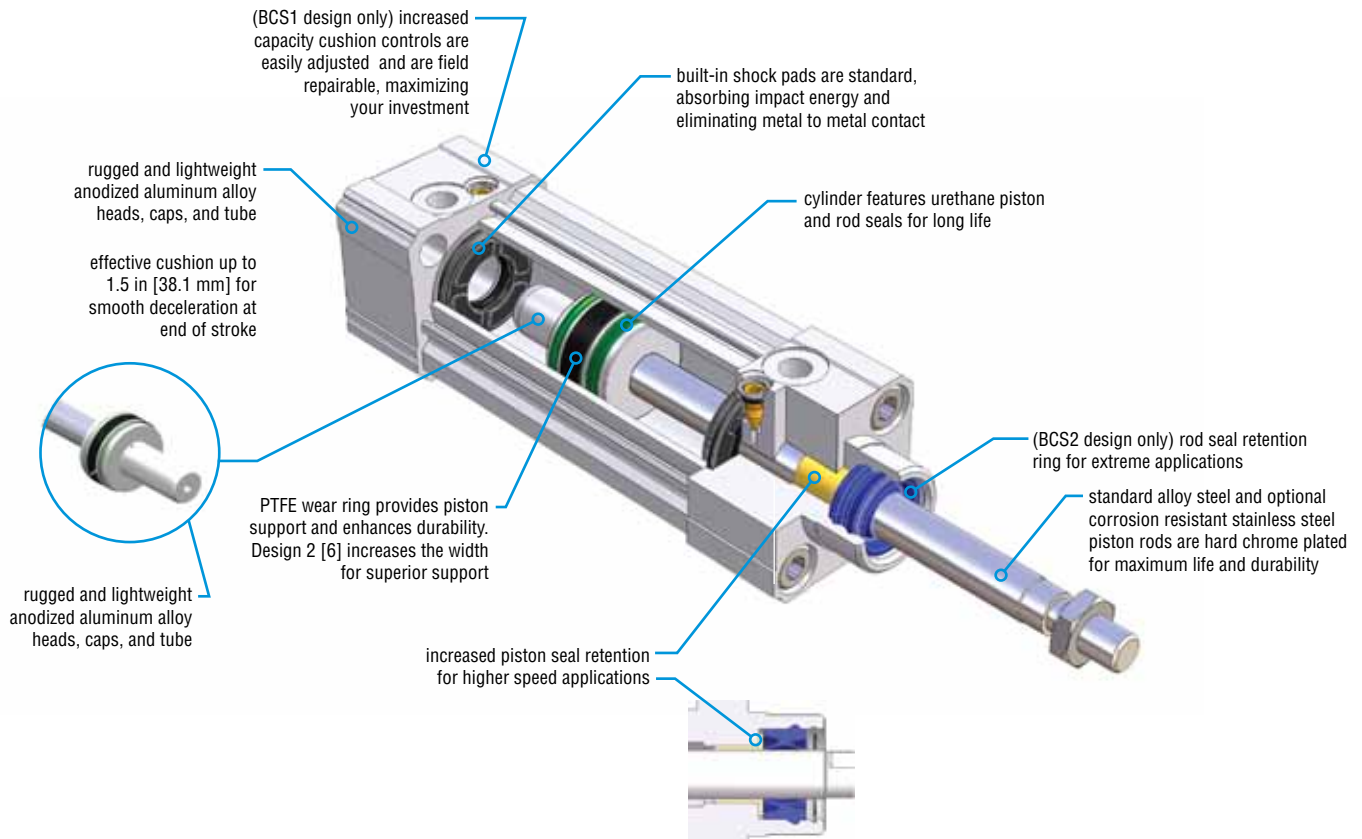
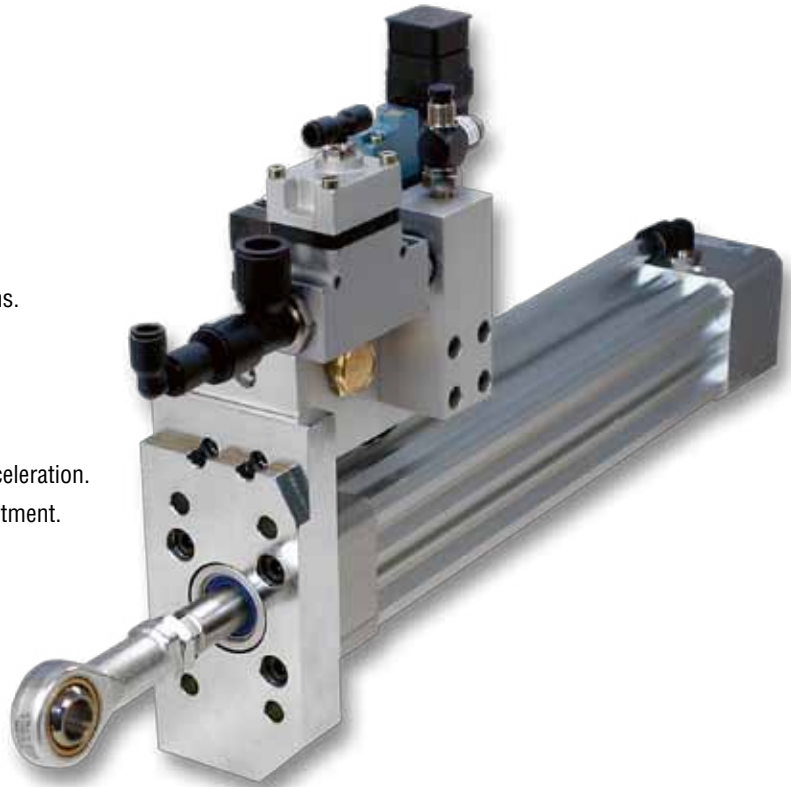
Universal Stretching Cylinder

ML309734, ML310058, ML311138, ML310060 & ML310061

SB034 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

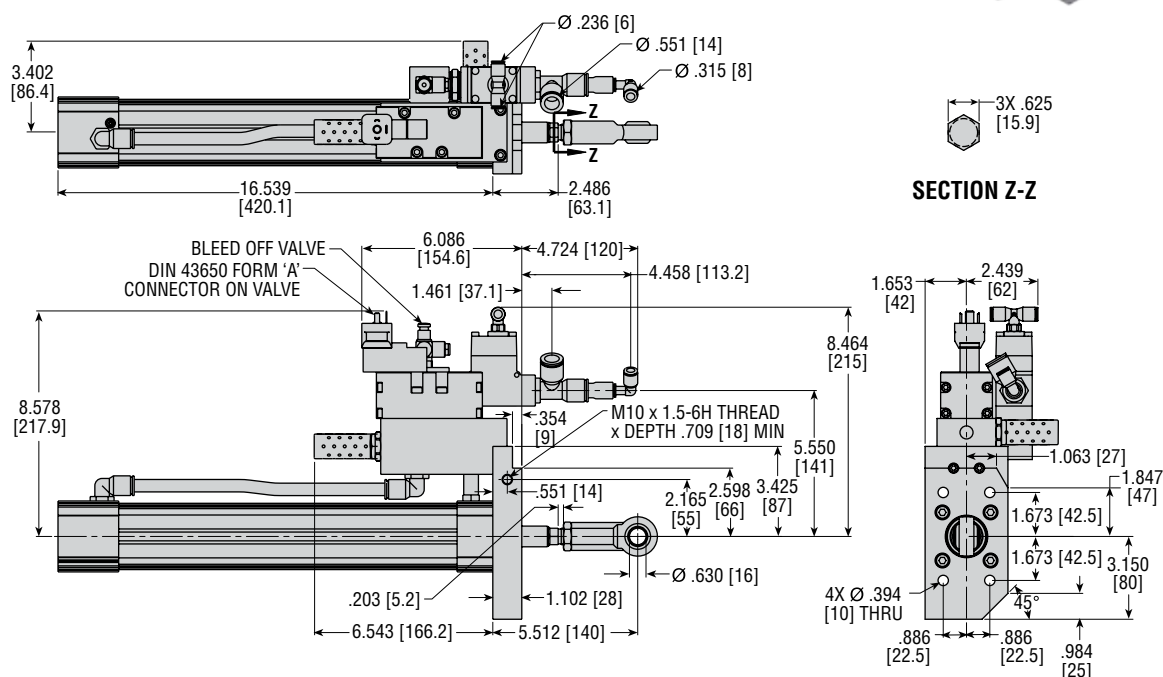
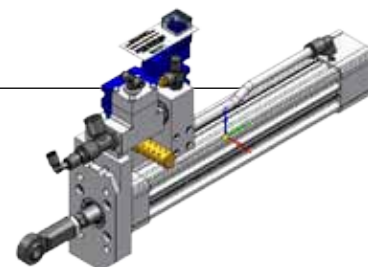
SPECIFICATIONS	IMPERIAL	METRIC
TYPE	Pneumatic Cylinder	
SERIES	BCS Stretching Cylinder	
BORE SIZE	1.969 in	50 mm
BORE AREA - EXTEND	3.04 in ²	1963 mm ²
BORE AREA - RETRACT	2.56 in ²	1649 mm ²
THEORETICAL OUTPUT	264.5 lb @ 87 psi	1176.6 N @ 6 bar
OPERATION	Double Acting	
OPERATING PRESSURE RANGE	7.5 - 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 21 CFR 1789.3570	
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	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 21 CFR 1789.3570
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

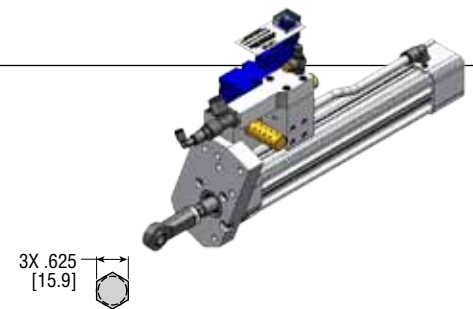
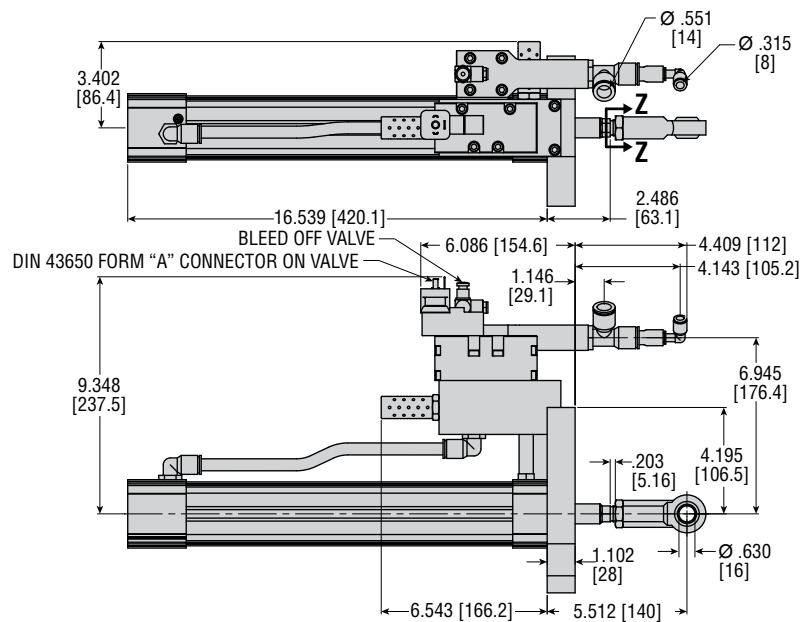
50x290 Model SBO34 machines only



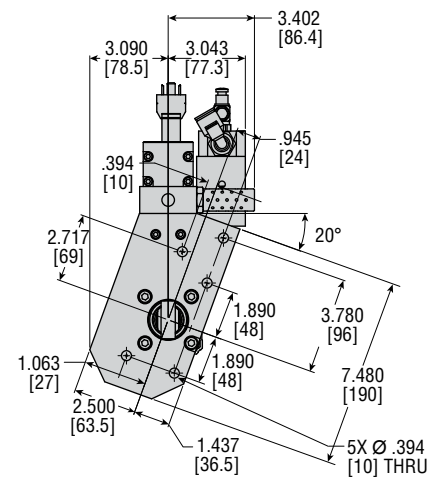
All dimensions are reference only unless specifically toleranced.

DIMENSIONS: ML311138

ML311138 50x290 Model SBO34 machines only 70° flange with PHD check valve



SECTION Z-Z



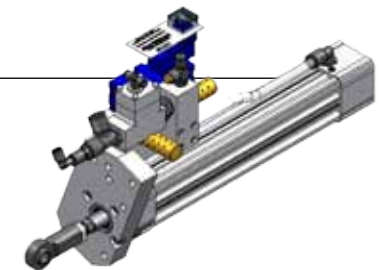
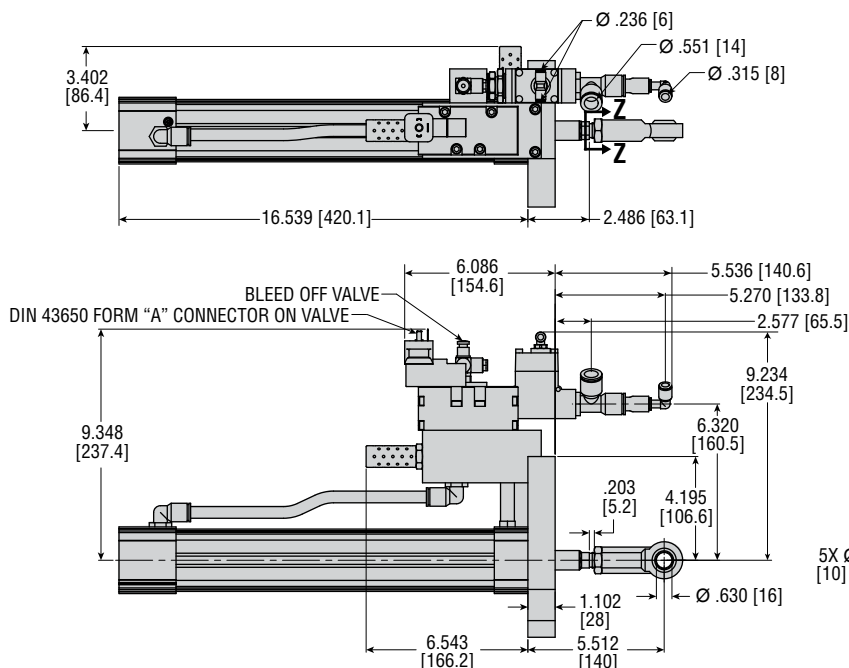
DIMENSIONS: ML310060 & ML310061

ML310060 with valve

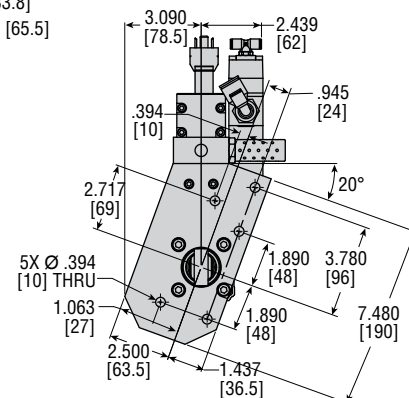
50x290 Model SBO34 machines only 70° flange with pilot operated check valve

ML310061 without valve

50x290 Model SBO34 machines only 70° flange with pilot operated check valve



SECTION Z-Z



All dimensions are reference only unless specifically toleranced.

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 Direct Replacements

ML305665 & ML307217 (require plumbing modifications)
ML308364



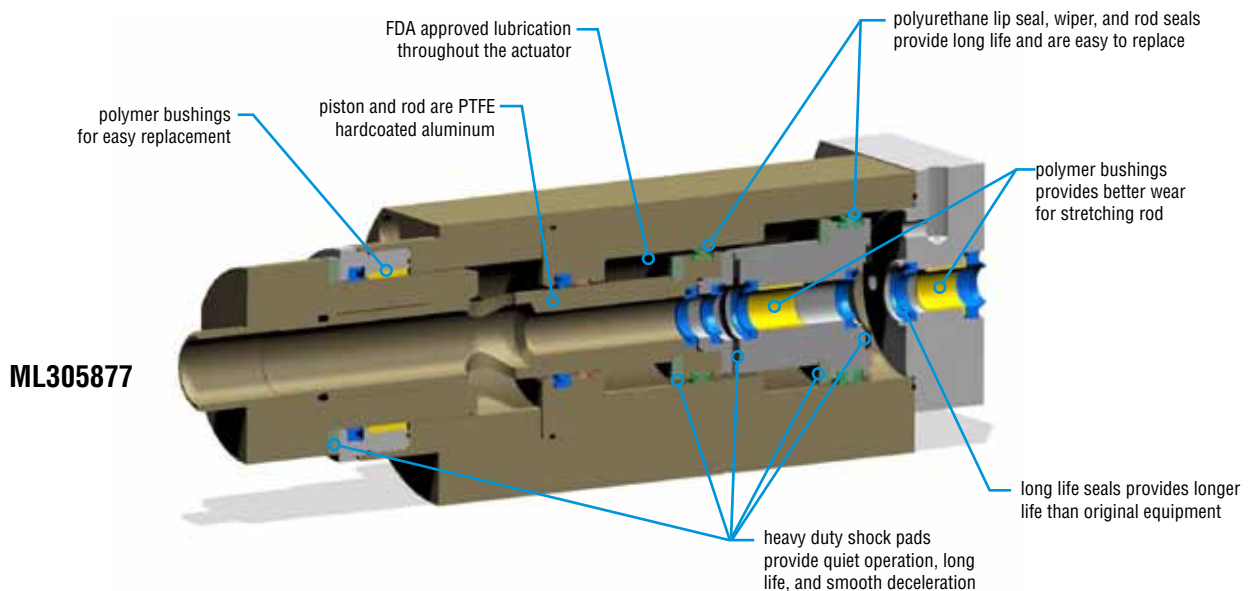
Series1 SB02, SB04, SB06
 HR Direct Replacements



ML305877

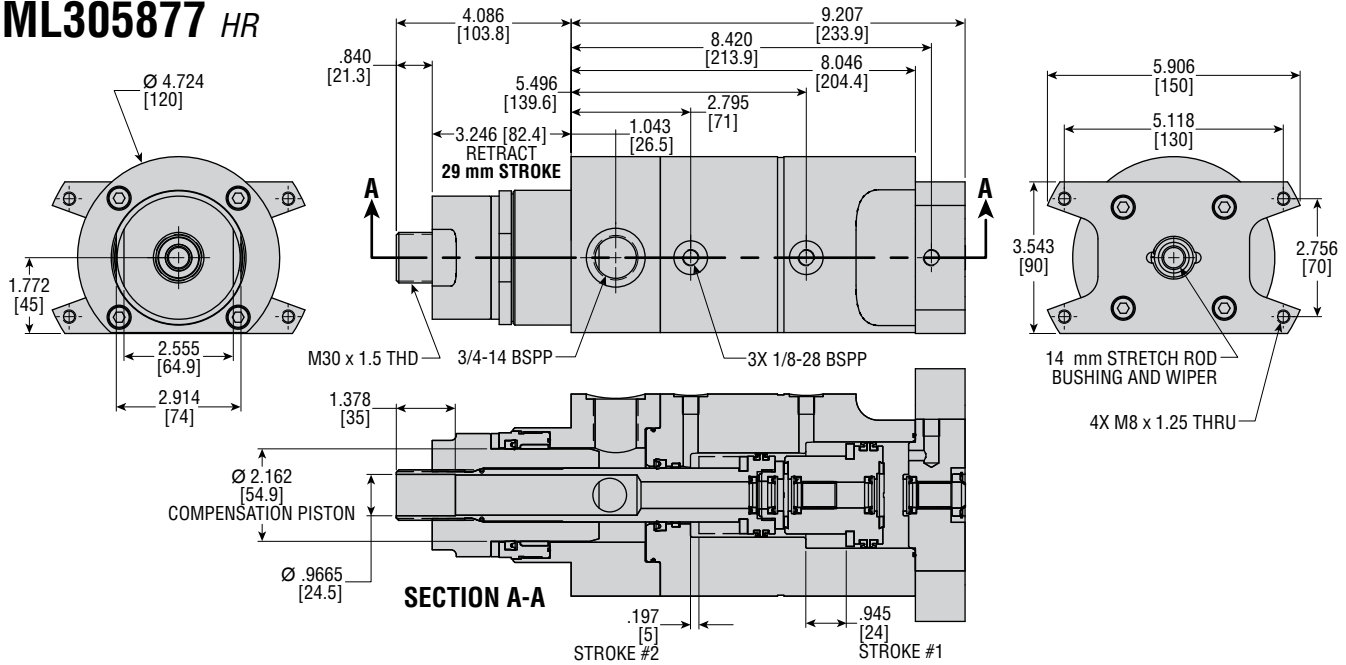


ML306930

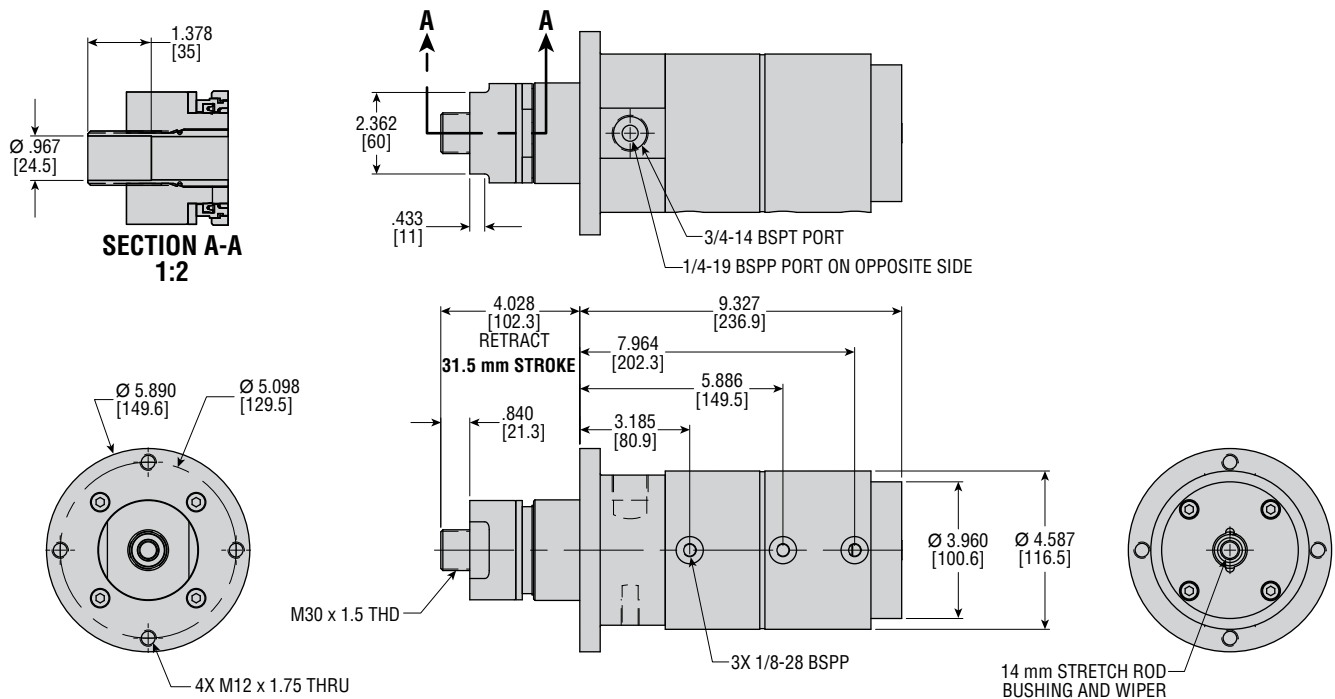


DIMENSIONS: SERIES1 PNEUMATIC NOZZLE CYLINDER

ML305877 HR



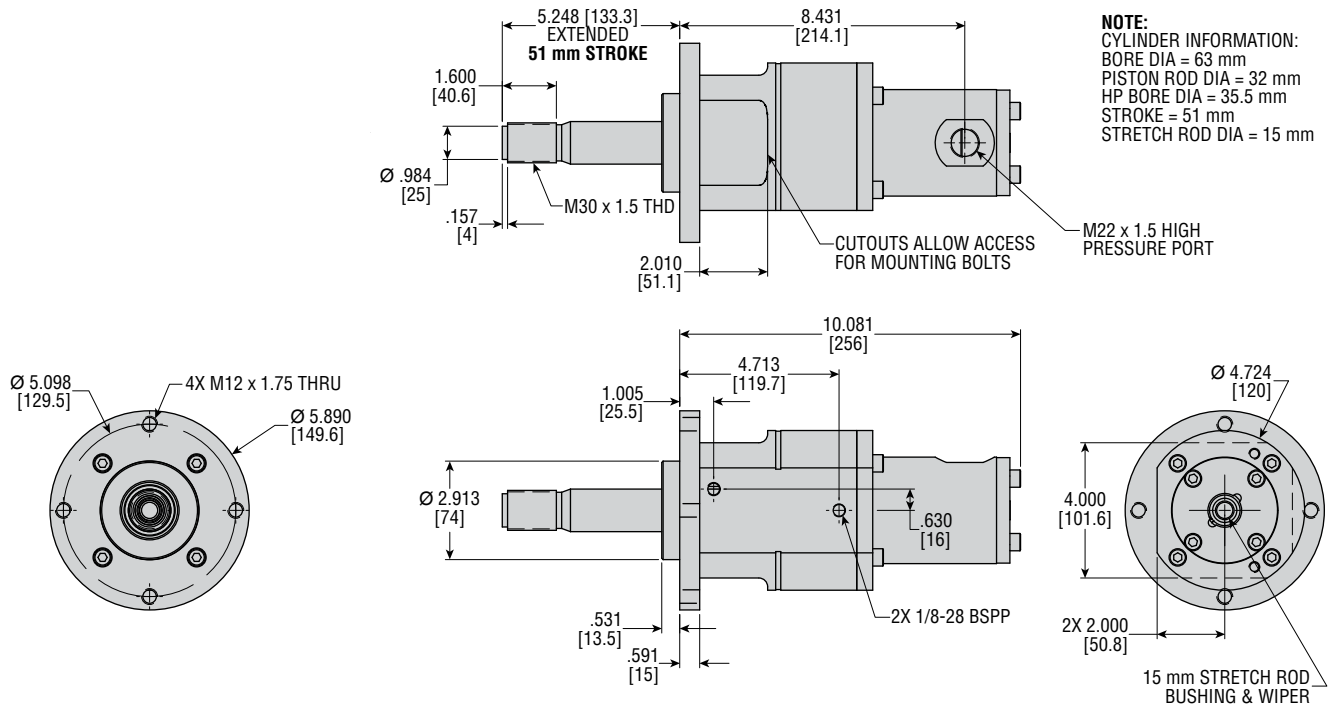
ML306930 HR



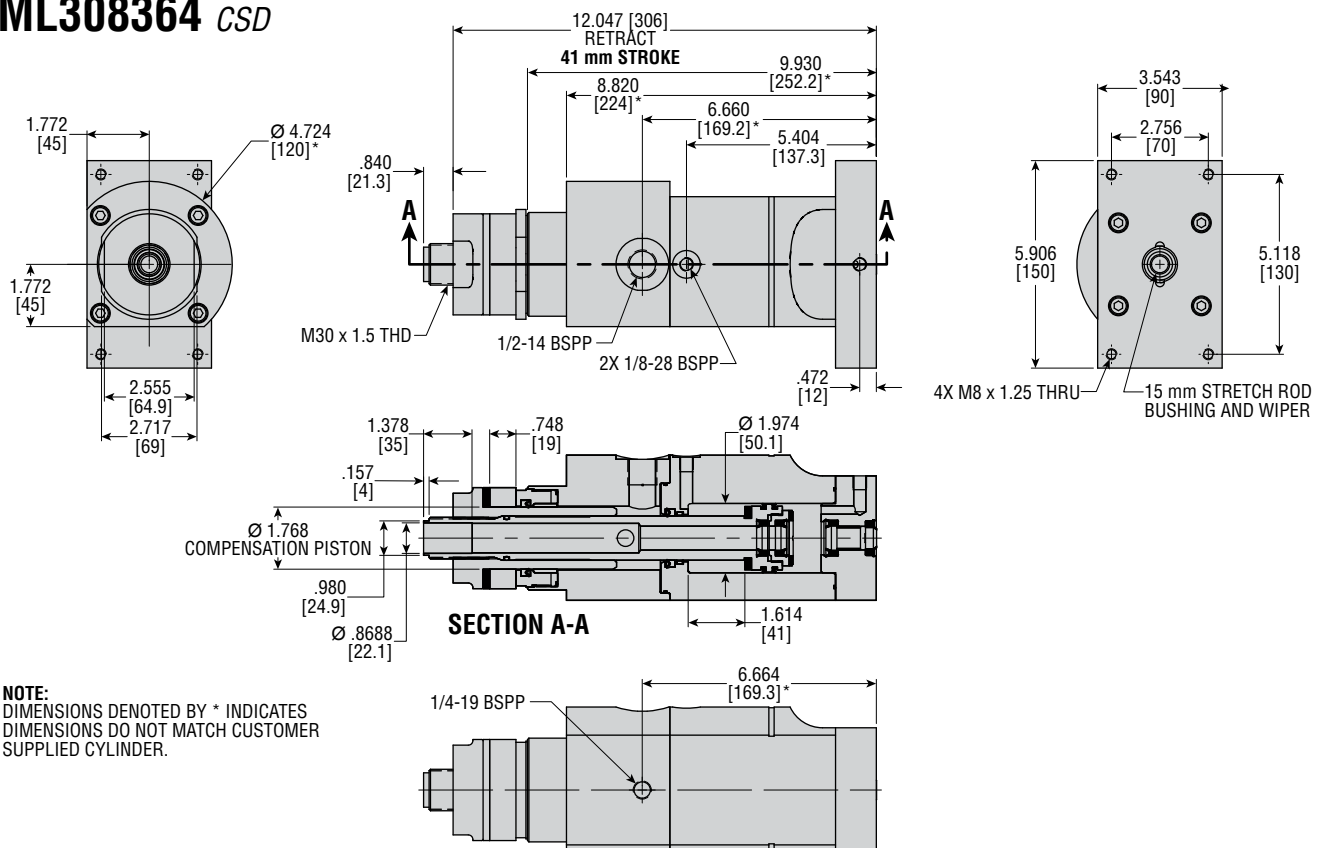
All dimensions are reference only unless specifically tolerated.

DIMENSIONS: SERIES1 PNEUMATIC NOZZLE CYLINDER

ML307217 CSD (Requires plumbing modification)



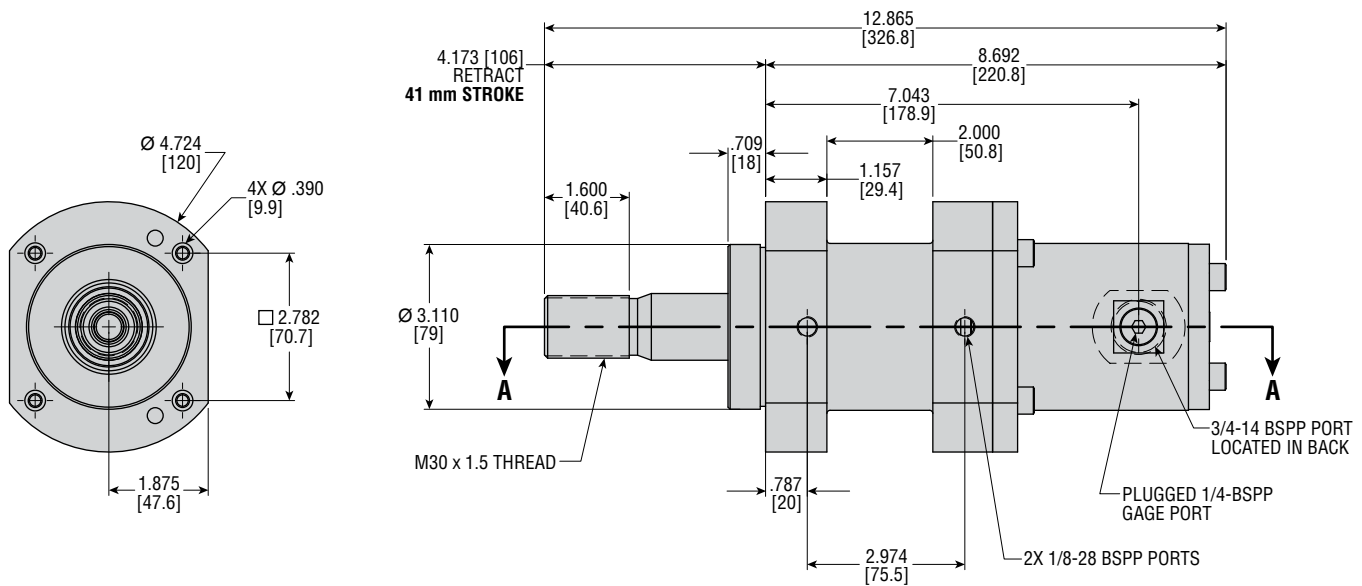
ML308364 CSD



All dimensions are reference only unless specifically toleranced.

DIMENSIONS: SERIES1 PNEUMATIC NOZZLE CYLINDER

ML305665 CSD (Requires plumbing modification)



All dimensions are reference only unless specifically tolerated.

BCZ2

CSD & 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-7-80x45 CYLINDER

Replacement for Sidel® Model Series2 Machines.



MODEL BCZ2S-7-80x45-U22 CYLINDER

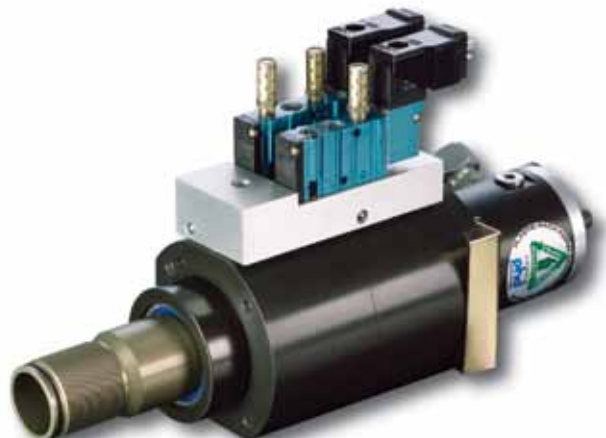
Replacement for Sidel® Model Series2 Machines.
Valve manifold provides exceptional response time.

HR Nozzle Cylinder



MODEL BCZ2D-7-80x43 CYLINDER

Replacement for Sidel® Model Series2 Machines.

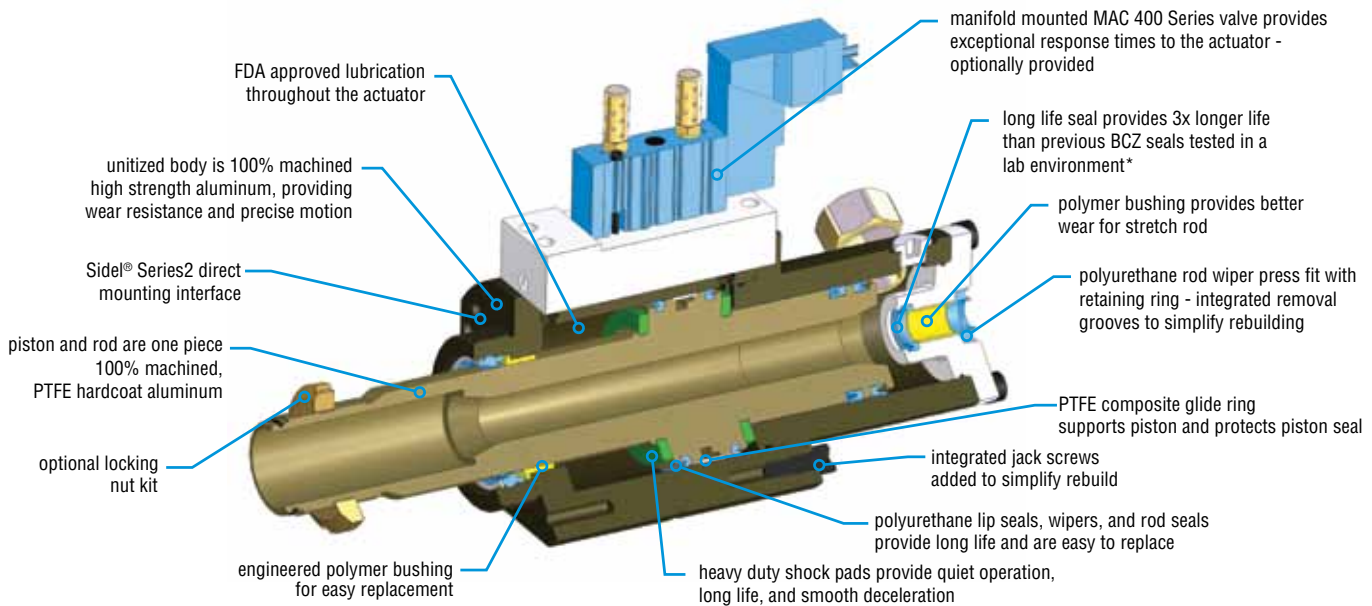


MODEL BCZ2D-7-80x43-U22 CYLINDER

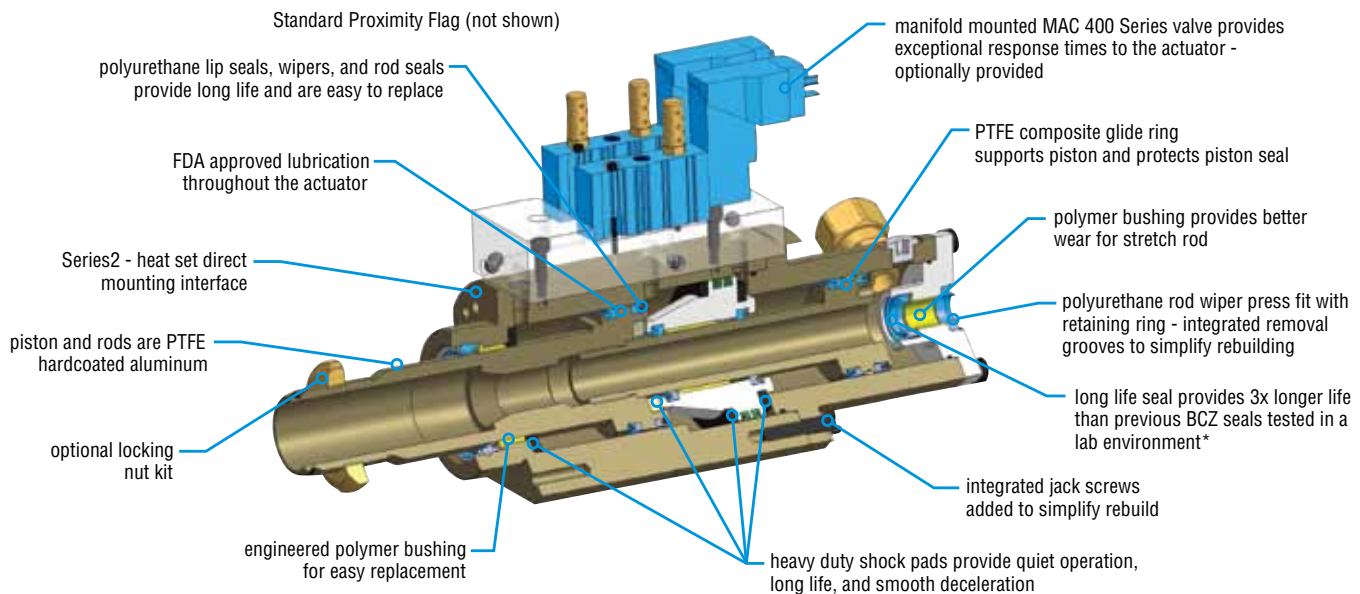
Replacement for Sidel® Model Series2 Machines.
Valve manifold provides exceptional response time.

CUTAWAY VIEWS: SERIES BCZ2 NOZZLE CYLINDER

CSD Nozzle Cylinder



HR Nozzle Cylinder



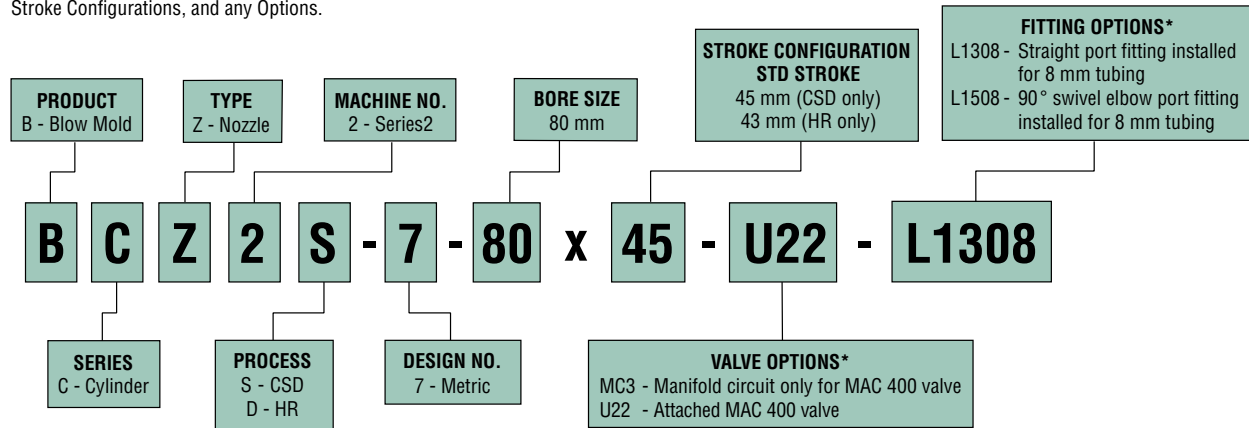
*For maximum life, PHD recommends lubricating all seals which come in contact with the stretch rod every 3 months with FDA food grade lubricant.

*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.



NOTES:

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

CYLINDER SPECIFICATIONS	BCZ2S		BCZ2D	
	IMPERIAL	METRIC	IMPERIAL	METRIC
TYPE	Pneumatic		Pneumatic	
SERIES	BCZ CSD Nozzle 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	4.109 in ²	26.51 cm ²	2.368 in ²	15.28 cm ²
BORE AREA - RETRACT	4.748 in ²	30.63 cm ²	3.011 in ²	19.43 cm ²
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 Acting		Double Acting	
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	55mm	2.165 in	55mm
BORE AREA	3.094 in ²	19.96 cm ²	3.437 in ²	22.17 cm ²
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		57 ms	
RETRACT	78 ms		75 ms	
FULL RETRACT TO MID POSITION			113 ms	
MID POSITION TO FULL EXTEND			90 ms	
FULL EXTEND TO MID POSITION				
MID POSITION TO FULL RETRACT				
LUBRICATION	Food Grade Lubricant		Food Grade Lubricant	
PORT SIZE	G1/8		G1/8	
STROKE	1.772 in (+.079 -.000)	45 mm (+2.0 -0.0)	1.693 in (+.098 -.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.

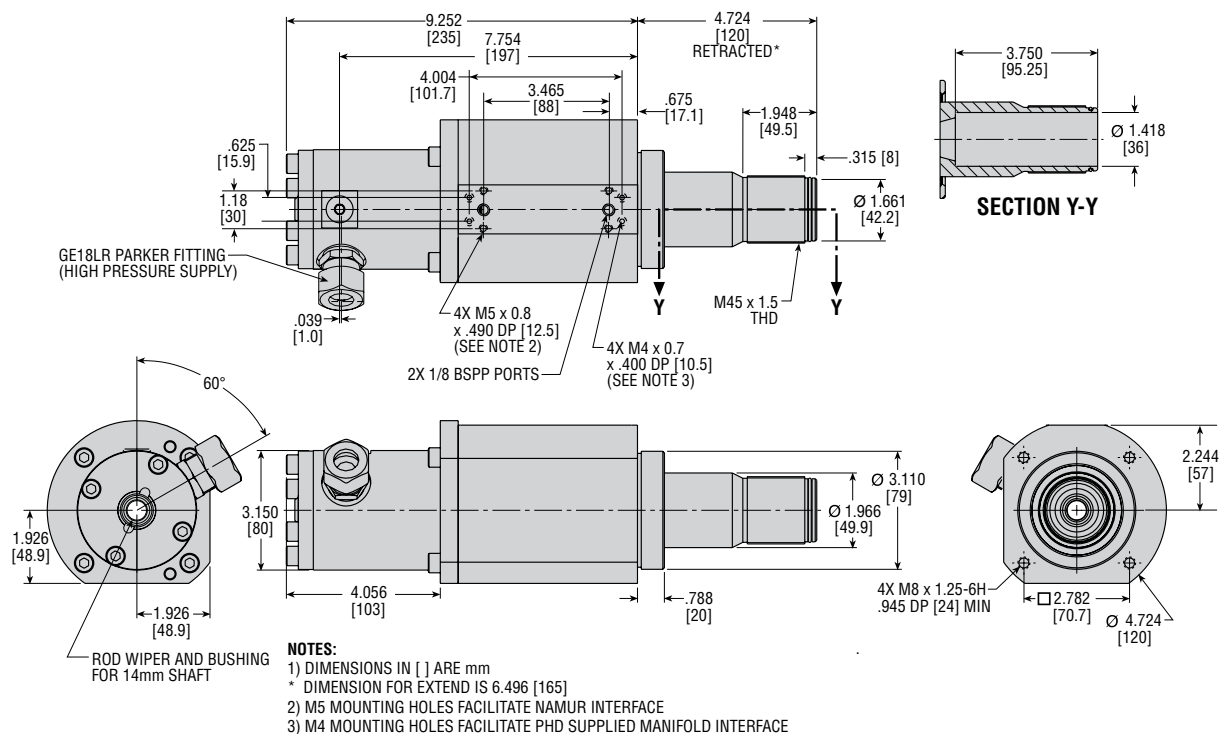
LUBRICATION

Series BCZ Nozzle Cylinders are lubricated with FDA approved food grade lube which provides extended life and better performance. For maximum stretch rod seal life (item 4D in exploded view on pages 38 & 39), PHD recommends lubricating every 3 months.

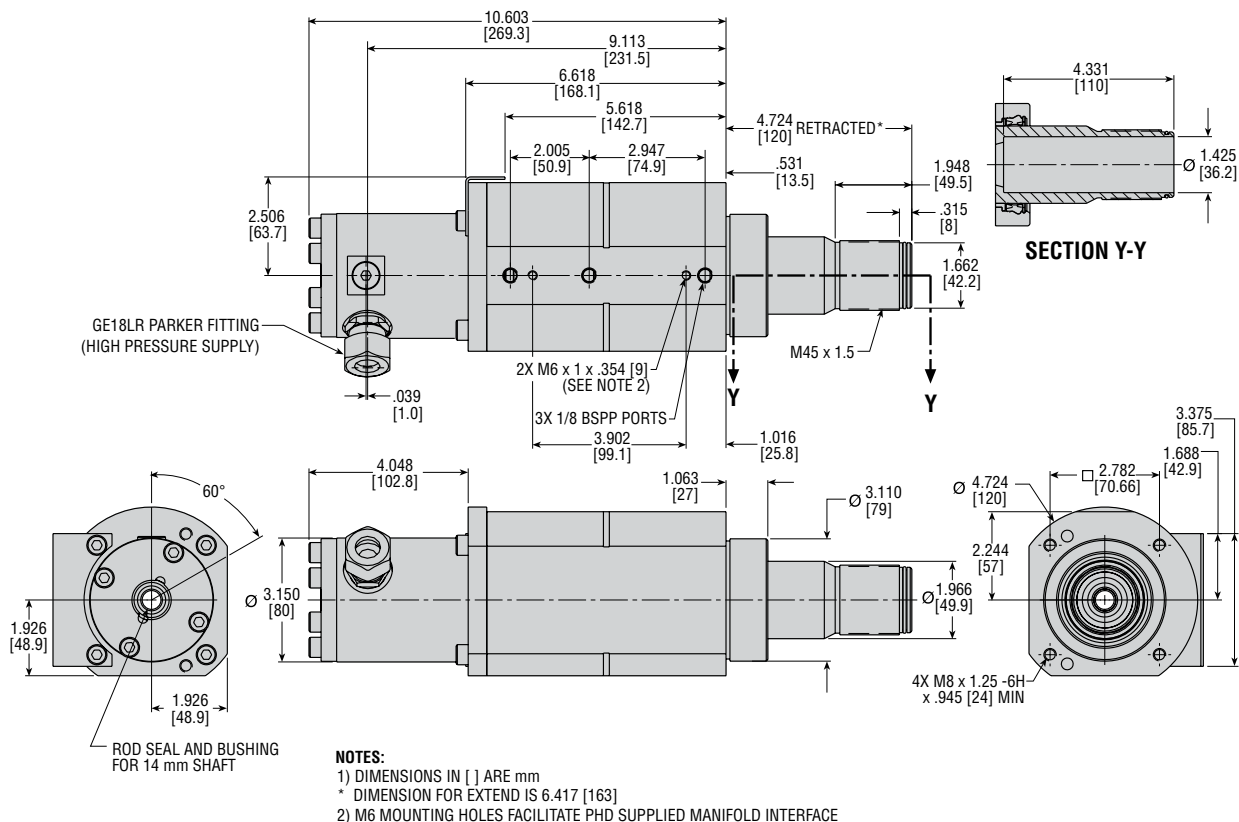
As machine set-ups and conditions vary, PHD Inc. cannot guarantee the same extended life will be seen as that resulting from PHD's own lab testing of the stretch rod seal.

DIMENSIONS: SERIES BCZ2 NOZZLE CYLINDER

MODEL BCZ2S-7-80x45 CSD CYLINDER



MODEL BCZ2D-7-80x43 HR CYLINDER



All dimensions are reference only unless specifically toleranced.

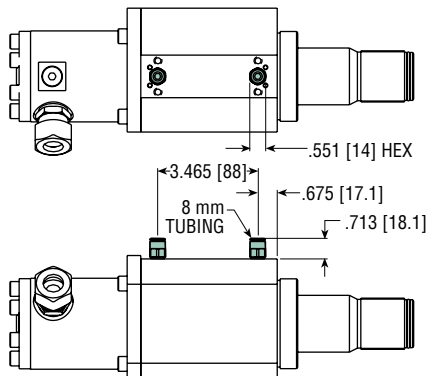
OPTIONS: SERIES BCZ2 NOZZLE CYLINDER

L1308 STRAIGHT PORT FITTING INSTALLED FOR 8 mm TUBING

This option provides straight fittings for 8 mm tubing. See page 37 for dimensions of fittings with valve options.

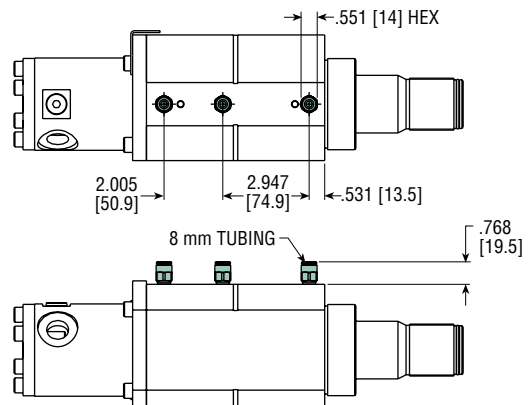
MODEL BCZ2S CSD CYLINDER

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.

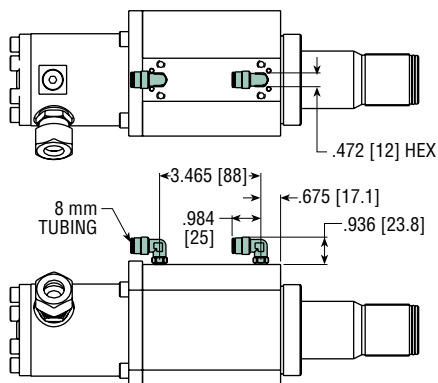


L1508 90° ELBOW PORT FITTING INSTALLED FOR 8 mm TUBING

This option provides 90° swivel elbow fittings for 8 mm tubing. See page 9 for dimensions of fittings with valve options.

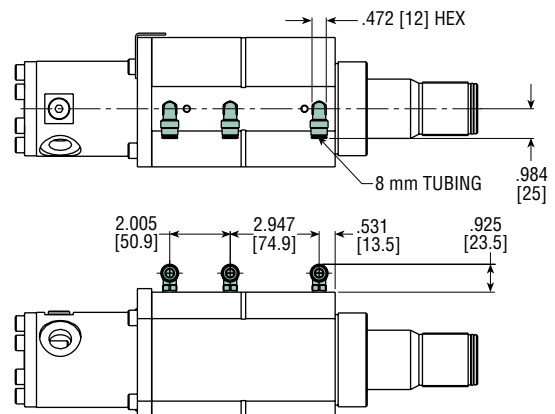
MODEL BCZ2S CSD CYLINDER

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.



All dimensions are reference only unless specifically toleranced.

OPTIONS: SERIES BCZ2 NOZZLE CYLINDER

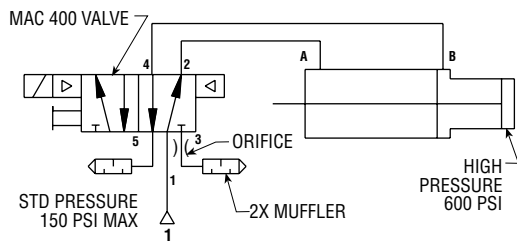
U22 ATTACHED MAC 400 VALVE

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.

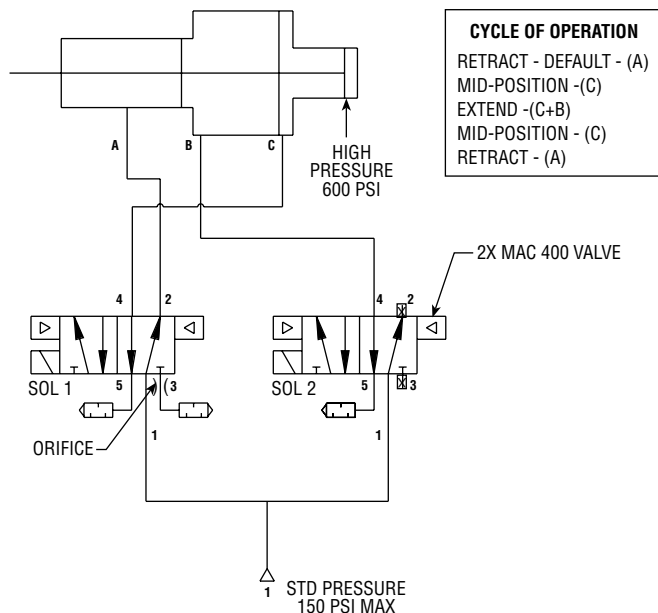
VALVE SPECIFICATIONS	
TYPE	MAC Series 400 411A-BOA-DM-DDAJ-1JM=4357
PRESSURE (MAX)	125 psi
FLOW (MAX)	1.0 Cv
FUNCTION	5/2
OPERATOR	Single
PILOT	Internal
SPOOL	4-Way Pilot
SOLENOID	24 VDC, (5.4 W)
ELECTRICAL CONNECTOR	Rectangular, DIN 43650 Form B Style
MANUAL OPERATOR	Non-locking Recessed
PILOT EXHAUST	Muffled

PLUMBING SCHEMATICS

BCZ2S CSD CYLINDER

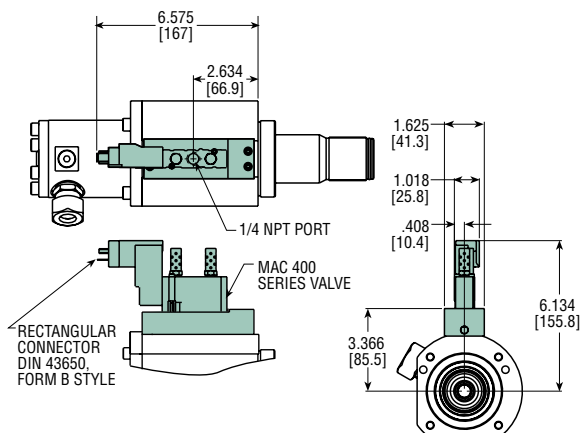


BCZ2D HR CYLINDER

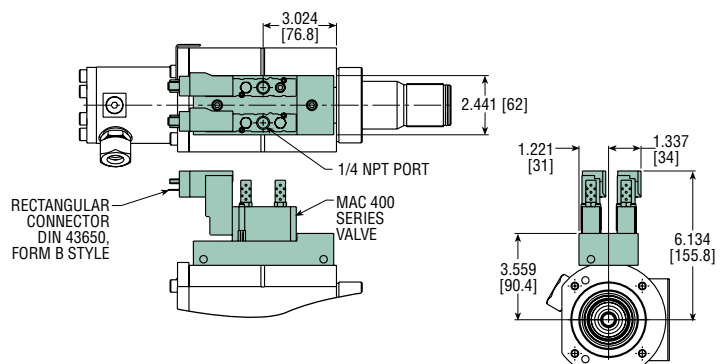


-U22

MODEL BCZ2S CSD CYLINDER



MODEL BCZ2D HR CYLINDER

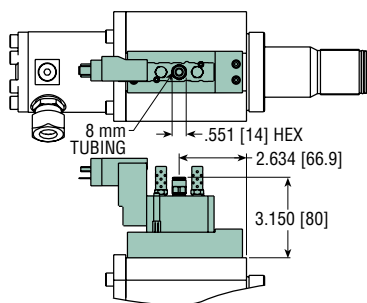


All dimensions are reference only unless specifically tolerated.

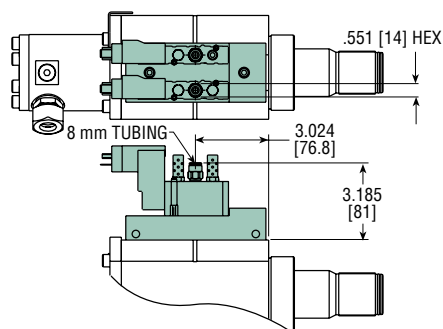
OPTIONS: SERIES BCZ2 NOZZLE CYLINDER

-L1308-U22

MODEL BCZ2S CSD CYLINDER

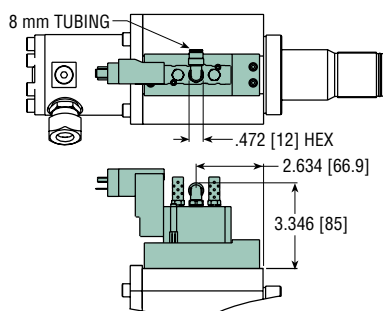


MODEL BCZ2D HR CYLINDER

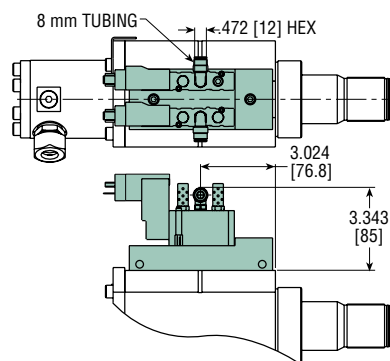


-L1508-U22

MODEL BCZ2S CSD CYLINDER



MODEL BCZ2D HR CYLINDER

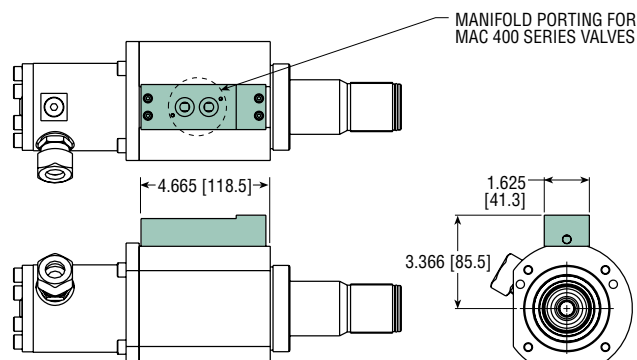


MC3

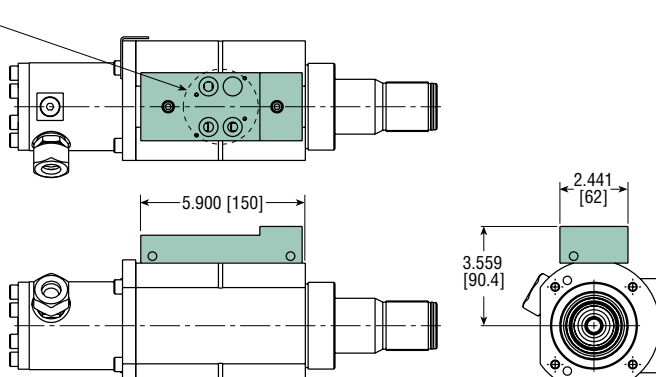
MANIFOLD CIRCUIT ONLY FOR MAC 400 VALVE

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



MODEL BCZ2D HR CYLINDER



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

All dimensions are reference only unless specifically toleranced.

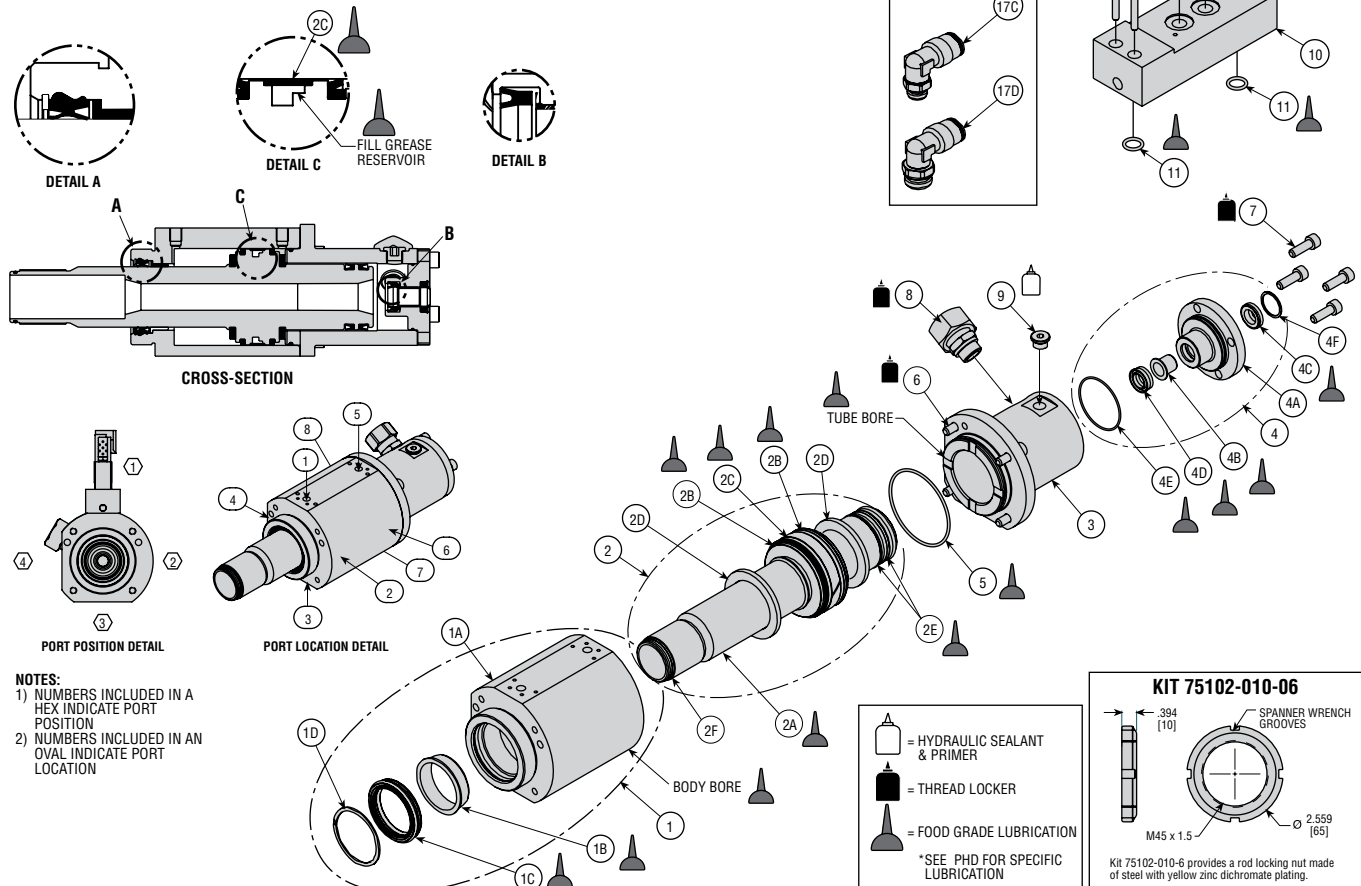
EXPLODED VIEW: SERIES BCZ2S NOZZLE CYLINDER

KEY	PART DESCRIPTION	BCZ2S-7-80x45
1	Body Assembly	Full unit description required followed by -H2400
1A	Body	75824-00
1B	Bushing	Sold as part of Repair Kit -H9010
1C	Rod Seal	Sold as part of Repair Kit -H9010
1D	Retaining Ring	Sold as part of Repair Kit -H9010
2	Piston and Rod Assembly	Full unit description required followed by -H1000
2A	Piston and Rod	75063
2B	Piston Seal	Sold as part of Repair Kit -H9010
2C	Wear Ring	Sold as part of Repair Kit -H9010
2D	Shock Pad	Sold as part of Repair Kit -H9010
2E	High Pressure Piston Seal	Sold as part of Repair Kit -H9010
2F	Rod O-Ring	Sold as part of Repair Kit -H9010
3	Tube	75065
4	Cap Assembly	Full unit description required followed by -H1200
4A	Cap	77169
4B	Bushing	Sold as part of Cap Repair Kit
4C	Rod Wiper	Sold as part of Cap Repair Kit
4D	Rod Seal ⁵	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 (-L1308-U22 OR -L1308-MC3)	61734-130
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

KIT DESCRIPTION	KIT NUMBER
Unit Repair Kit ¹	Full unit description required followed by -H9010
Cap Repair Kit ²	76249
Cap Seal Only Kit ³	76676
Tooling Kit ⁴	75536
Cap Seal Tooling Kit ⁶	80828
Rod Locking Nut	75102-010-06
Fastener Kit	Full unit description required followed by -H9020
Manifold Kit	75103
Orifice Kit	75677

NOTES:

- 1) Includes all parts to repair the full unit excluding cap parts.
- 2) Includes all hardware to completely repair cap.
- 3) Includes rod seal and grease to replace cap seal only.
- 4) Includes all specialized tools required to rebuild unit.
- 5) For maximum life, PHD recommends lubricating all seals which come in contact with the stretch rod every 3 months with the following lubrication: FDA food grade lubricant.
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.
- 6) Includes tools to rebuild cap. Tools in this kit are also included in Kit #75536.



EXPLODED VIEW: SERIES BCZ2D NOZZLE CYLINDER

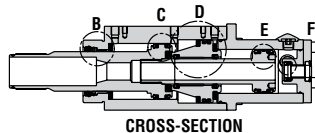
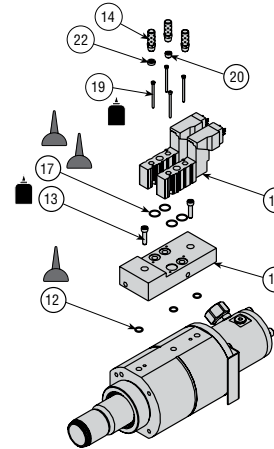
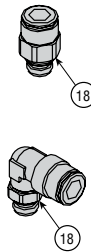
KEY	PART DESCRIPTION	BCZ2D-7-80x43
1	Body Assembly	Full unit description required followed by -H2400
1A	Double Stage Body	75084-00
1B	Bushing	Sold as part of Repair Kit -H9010
1C	Rod Seal	Sold as part of Repair Kit -H9010
1D	Retaining Ring	Sold as part of Repair Kit -H9010
2	Piston and Rod Assembly	Full unit description required followed by -H1000
2A	Double Stage Cylinder 1 Piston & Rod	75087
2B	Piston Seal	Sold as part of Repair Kit -H9010
2C	Shock Pad	Sold as part of Repair Kit -H9010
2D	Intermediate Piston Assembly	Full unit description required followed by -H1010
2D1	Piston	75089
2D2	Bushing	Sold as part of Repair Kit -H9010
2D3	Rod Seal	Sold as part of Repair Kit -H9010
2D4	Piston Seal	Sold as part of Repair Kit -H9010
2D5	Shock Pad	Sold as part of Repair Kit -H9010
2D6	Shock Pad	Sold as part of Repair Kit -H9010
2E	Double Stage Cylinder 2 Piston & Rod	75090
2F	High Pressure Piston Seal	Sold as part of Repair Kit -H9010
2G	Wear Ring	Sold as part of Repair Kit -H9010
2H	Rod O-Ring	Sold as part of Repair Kit -H9010
3	Double Stage Tube	75065
4	Cap Assembly	Full unit description required followed by -H1200
4A	Cap	77169
4B	Bushing	Sold As Part of Cap Repair Kit
4C	Rod Wiper	Sold As Part of Cap Repair Kit
4D	Rod Seal ⁴	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	8mm Tube Fitting (-L1308)	62195-024
18	8mm Tube Fitting (-L1508)	62195-007
18	8mm Tube Fitting (-L1308-U22 OR -L1308-MC3)	61734-130
18	8mm Tube Fitting (-L1508-U22 OR -L1508-MC3)	61734-014
19	Valve Screw	Sold As Part of Manifold Kit
20	PTF Port Plug	1992-001
21	Proximity Flag	76232-02
22	Orifice Disk	Sold As Part of Orifice Kit or Manifold Kit

KIT DESCRIPTION	KIT NUMBER
Unit Repair Kit ¹	Full unit description required followed by -H9010
Rod Locking Nut	75102-010-06
Tooling Kit ²	75537
Cap Seal Tooling Kit ³	80828
Fastener Kit	Full unit description required followed by -H9020
Manifold Kit	75696
Cap Repair Kit ²	76249
Stretch Rod Seal Repair Kit	76676
Orifice Kit	75677

NOTES:

- 1) Includes all parts to repair the full unit excluding cap parts.
- 2) Includes all hardware to completely repair cap.
- 3) Includes all specialized tools required to rebuild unit.
- 4) For maximum life, PHD recommends lubricating all seals which come in contact with the stretch rod every 3 months with the following lubrication: FDA food grade lubrication. 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.
- 5) Includes tools to rebuild cap. Tools in this kit are also included in Kit #75536.

OPTIONAL FITTINGS



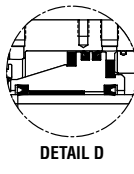
CROSS-SECTION



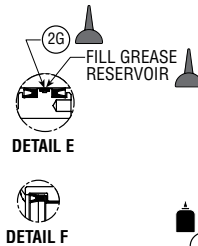
DETAIL B



DETAIL C

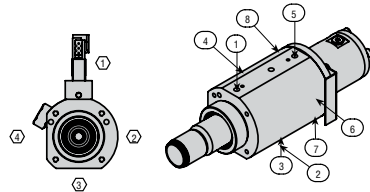


DETAIL D



DETAIL E

DETAIL F

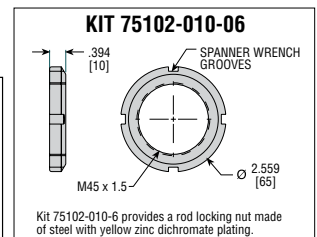
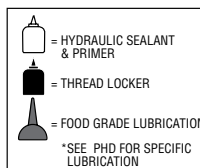
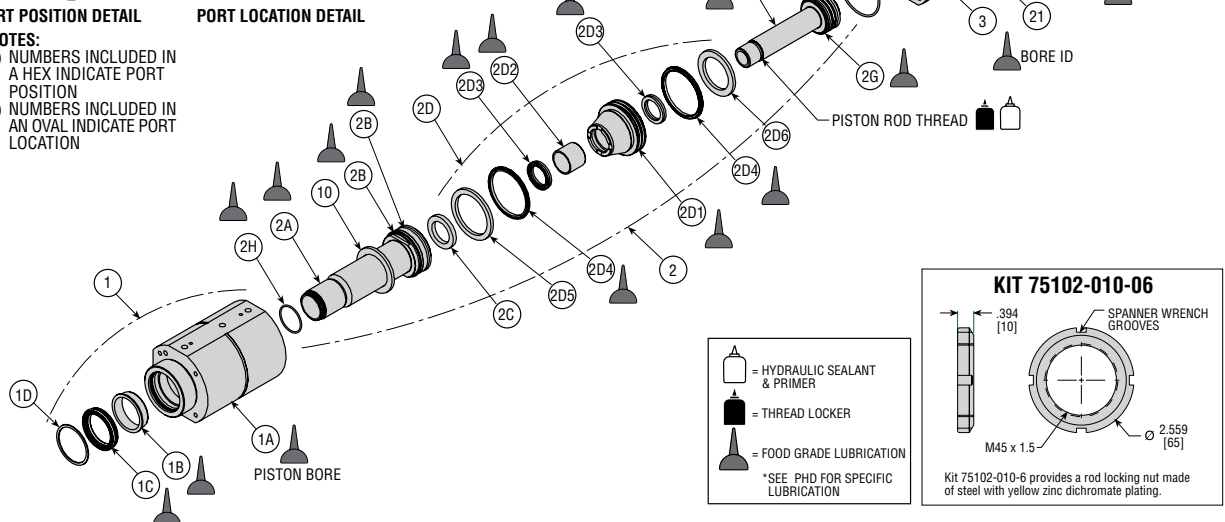


PORT POSITION DETAIL

PORT LOCATION DETAIL

NOTES:

- 1) NUMBERS INCLUDED IN A HEX INDICATE PORT POSITION
- 2) NUMBERS INCLUDED IN AN OVAL INDICATE PORT LOCATION



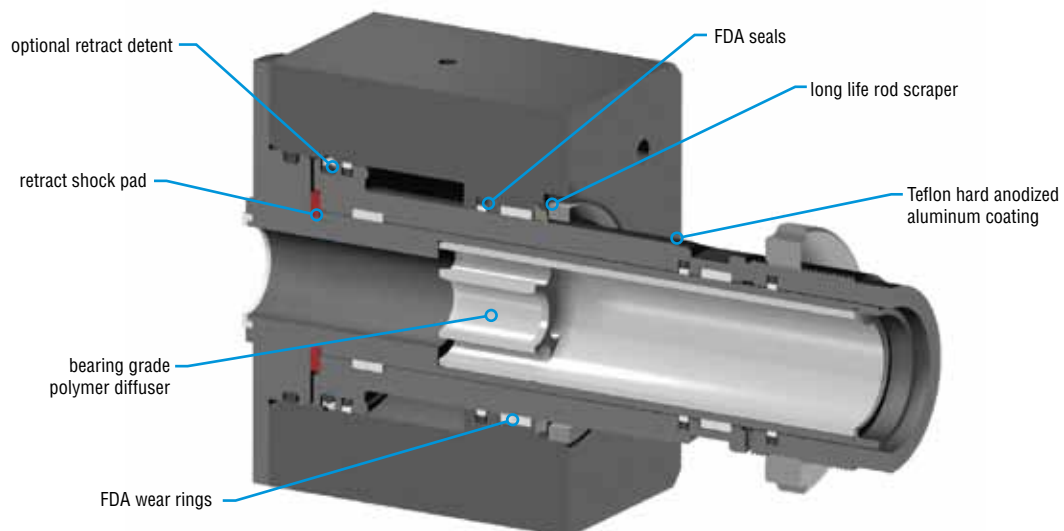
BCZU

Nozzle Cylinder

Sidel® Universal Direct Replacement

MAJOR BENEFITS

- Unit is designed to operate for 20 million cycles
- Direct replacement 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



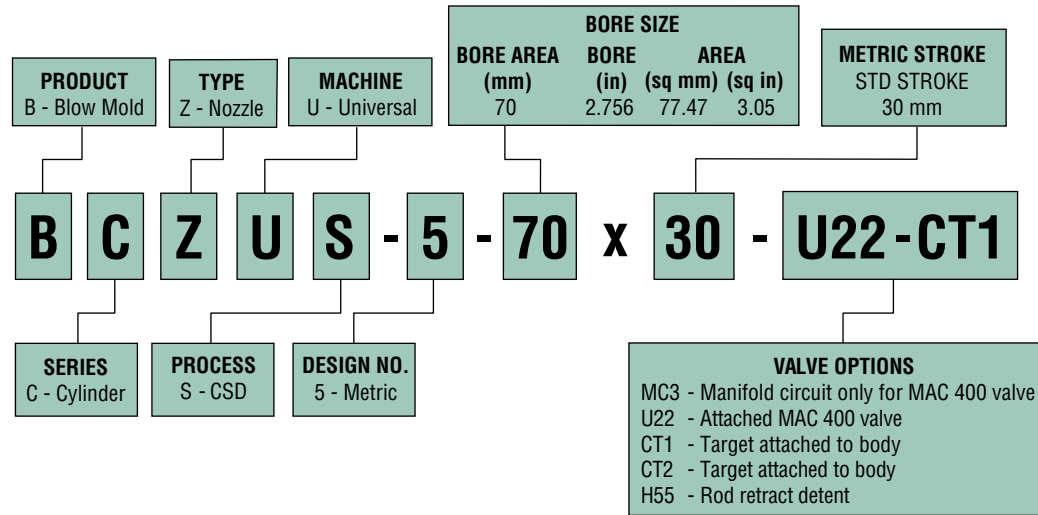
ORDERING & ENGINEERING DATA: SERIES BCZU UNIVERSAL NOZZLE CYLINDER

THE FOLLOWING IS A CROSS REFERENCE LISTING OF PHD TO SIDEL® UNITS:

PHD	SIDEL
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 in²	23.74 cm²
BORE AREA RETRACT	2.147 in²	13.85 cm²
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°F to +180°F	-29°C 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	N/A	
PORT SIZE	N/A	
GLIDE RING	FDA Internally Lubricated Engineered Polymer	
PISTON & ROD SEALS	FDA Internally Lubricated Engineered Polymer	
BUMPER	FDA Polyurethane	
CAP	Teflon Hard Anodized Aluminum	
CYLINDER BODY	Teflon Hard Anodized Aluminum	
PISTON ROD	Teflon Hard Anodized Aluminum	
ROD BEARING	FDA Internally Lubricated 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	24Vdc, 0.15W
ELECTRICAL CONNECTOR	Form "B"
MANUAL OPERATOR	Non-locking Recessed
PILOT EXHAUST	Muffled

LIFE EXPECTANCY

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

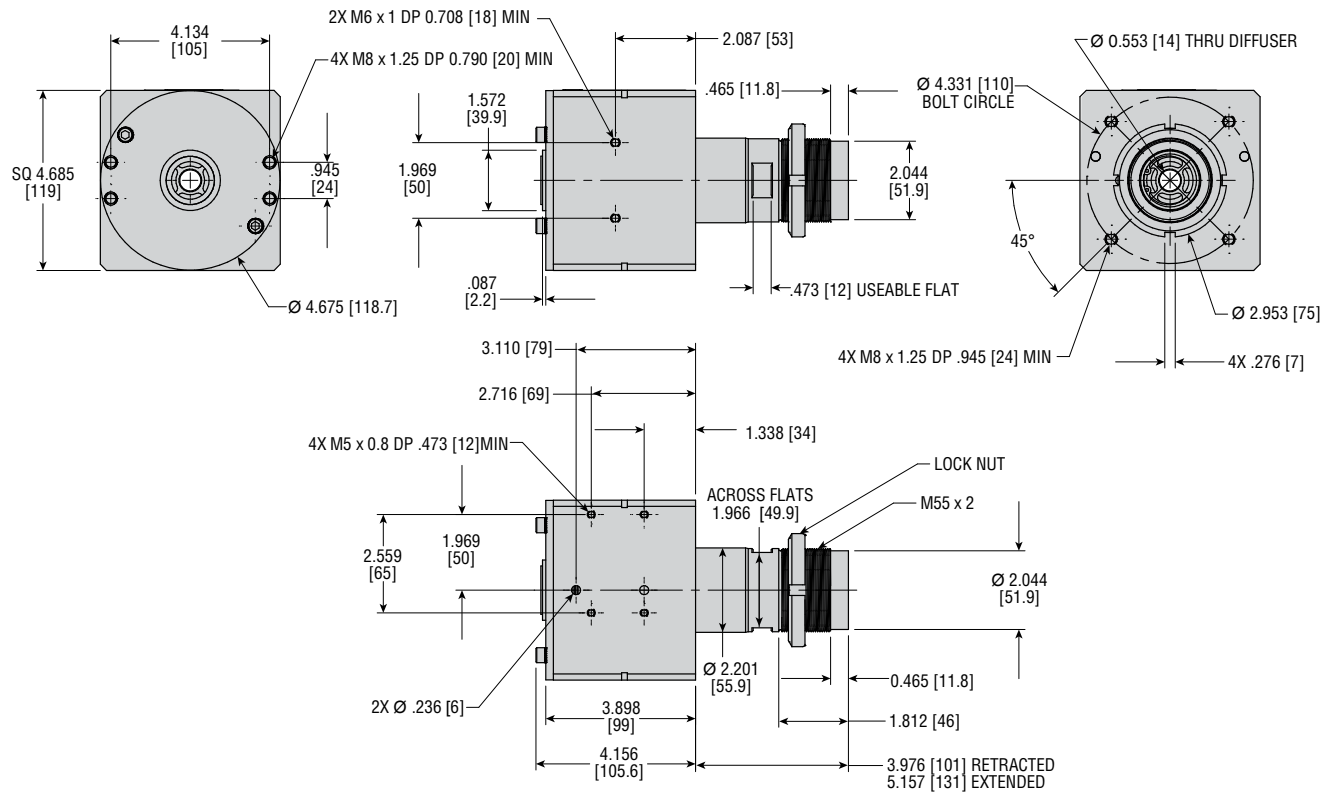
CYCLE RATE

Series BCZU 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.

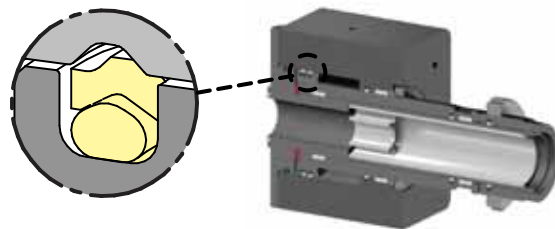
DIMENSIONS: SERIES BCZU UNIVERSAL NOZZLE CYLINDER



OPTIONS: SERIES BCZU UNIVERSAL NOZZLE CYLINDERS

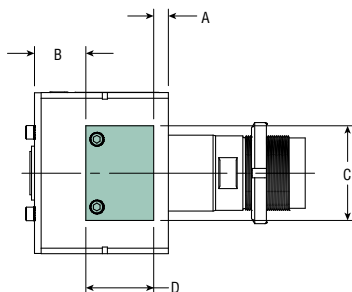
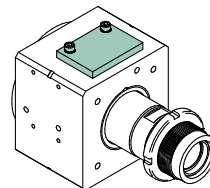
H55 ROD RETRACT DETENT

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.



CT1 CT2 TARGET ATTACHED TO BODY

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



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

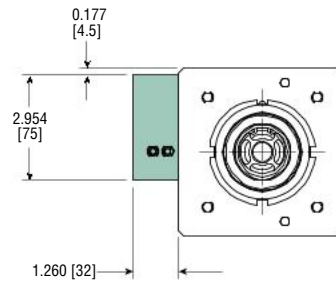
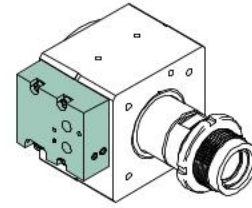
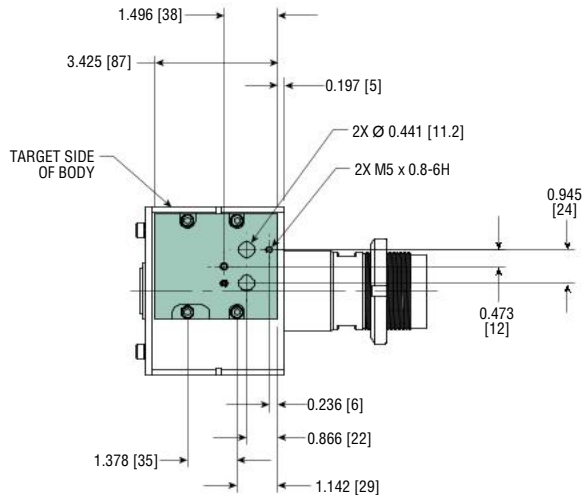
UNIT SIZE	-CT2 OPTION LETTER DIMENSIONS			
	A	B	C	D
BCZUS-5-70-CT2	0.826 [21.0]	1.103 [28.0]	2.756 [70.0]	1.969 [50.0]

All dimensions are reference only unless specifically toleranced.

OPTIONS: SERIES BCZU UNIVERSAL NOZZLE CYLINDER

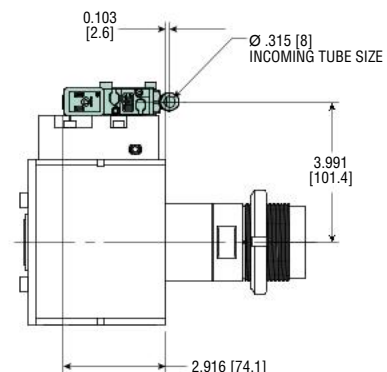
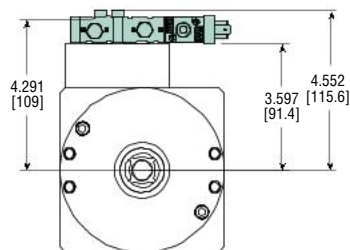
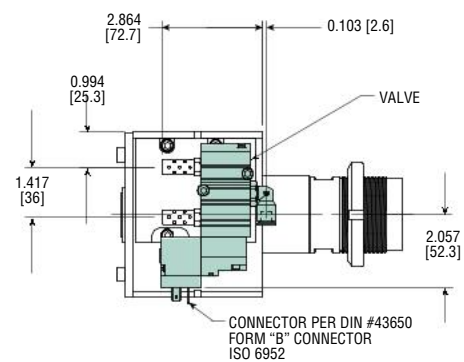
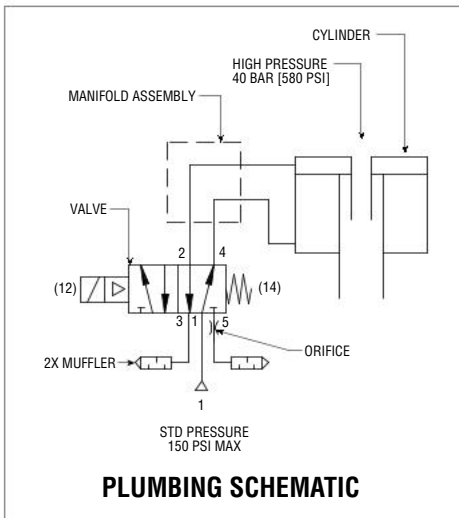
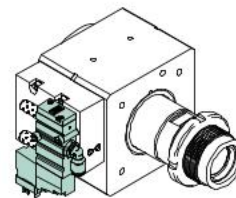
MC3 MANIFOLD CIRCUIT ONLY FOR MAC 400 SERIES VALVE

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



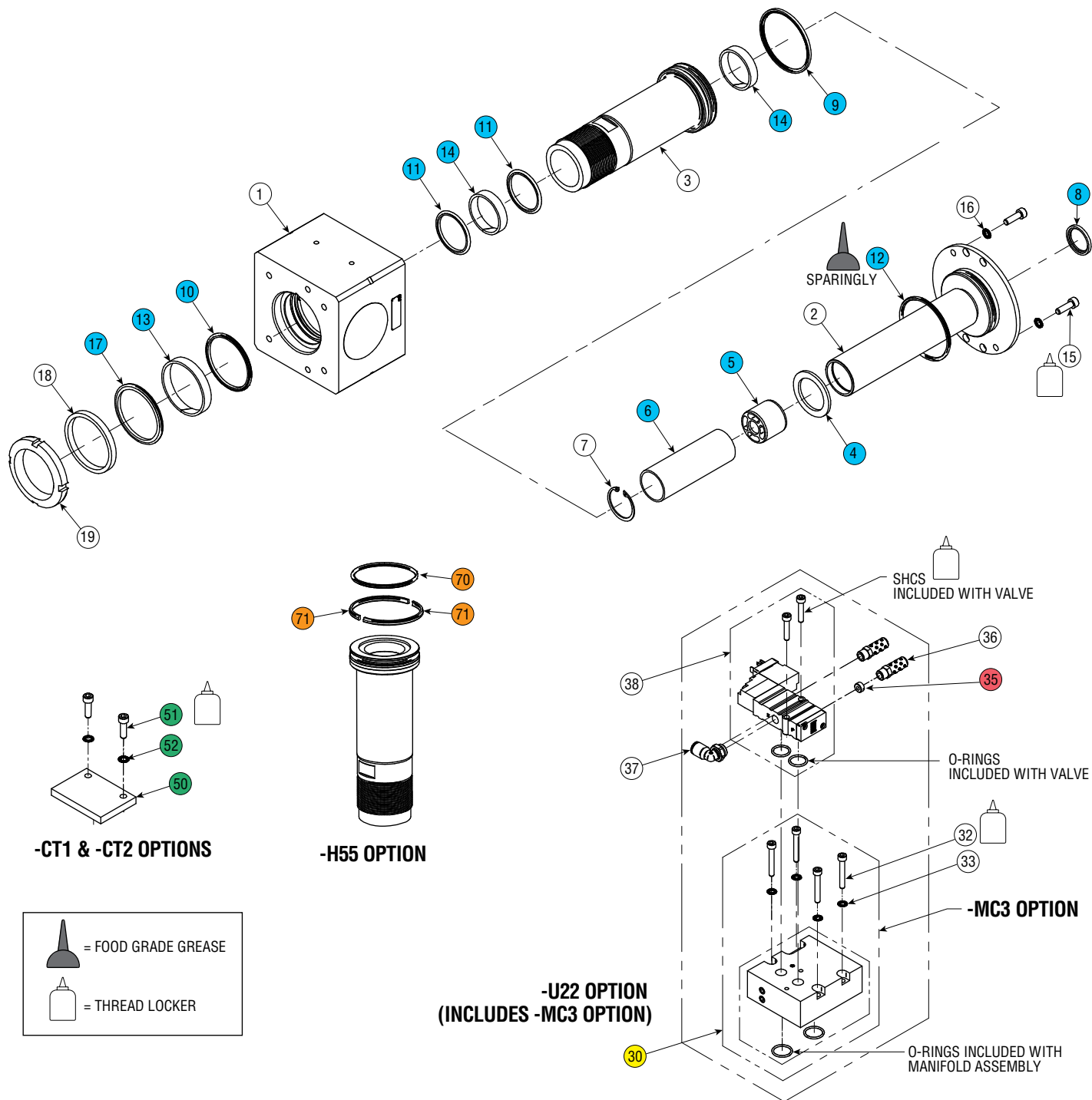
U22 ATTACHED MAC 400 SERIES VALVE

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.



All dimensions are reference only unless specifically tolerated.

EXPLODED VIEW: SERIES BCZU UNIVERSAL NOZZLE CYLINDER



KIT DESCRIPTION	KIT NUMBER	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	
Repair Tooling	86257	Not Shown

PARTS LIST: SERIES BCZU UNIVERSAL NOZZLE CYLINDER

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	70mm Piston Seal	Sold as part of Repair Kit (-H9010*)
10	56mm Rod Seal	Sold as part of Repair Kit (-H9010*)
11	40mm Rod Seal	Sold as part of Repair Kit (-H9010*)
12	O-Ring Seal	Sold as part of Repair Kit (-H9010*)
13	56mm Wear Ring	Sold as part of Repair Kit (-H9010*)
14	40mm Wear Ring	Sold as part of Repair Kit (-H9010*)
15	Fastener	61054-118
16	Serrated Safety Washer	84141-008-02
17	56mm 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

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

-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

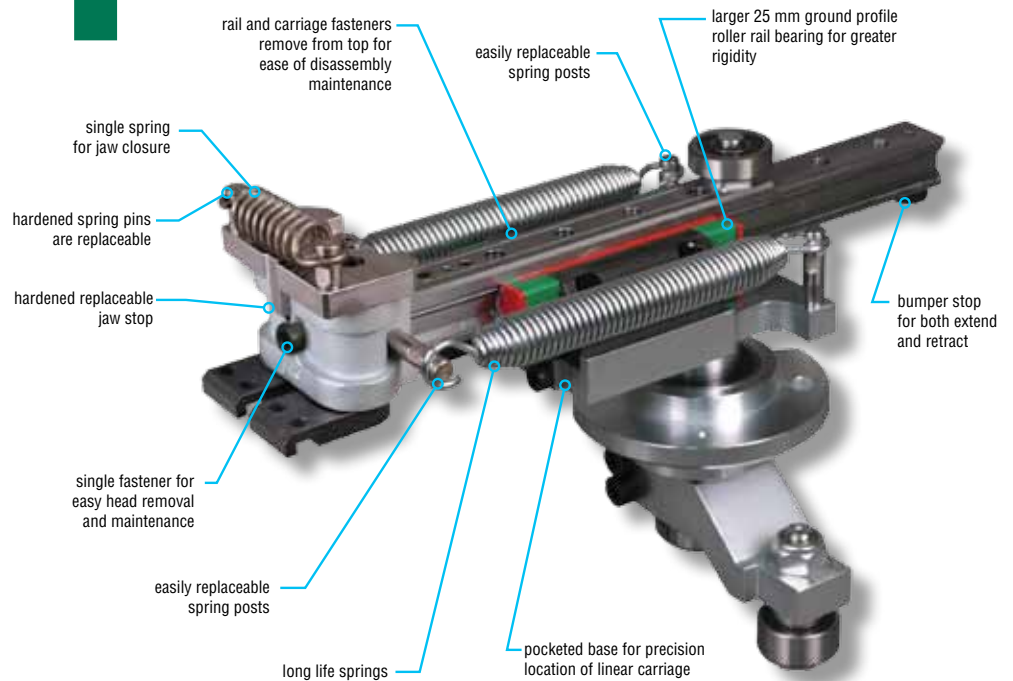
KEY	PART DESCRIPTION	PART NO.
70	O-Ring Seal	1950-143-14
71	Detent Ring	87095

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

BST1

Transfer Arm

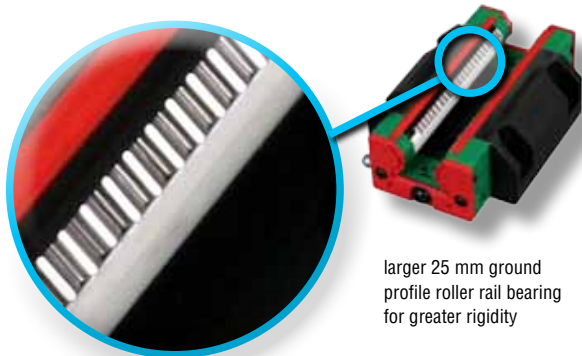
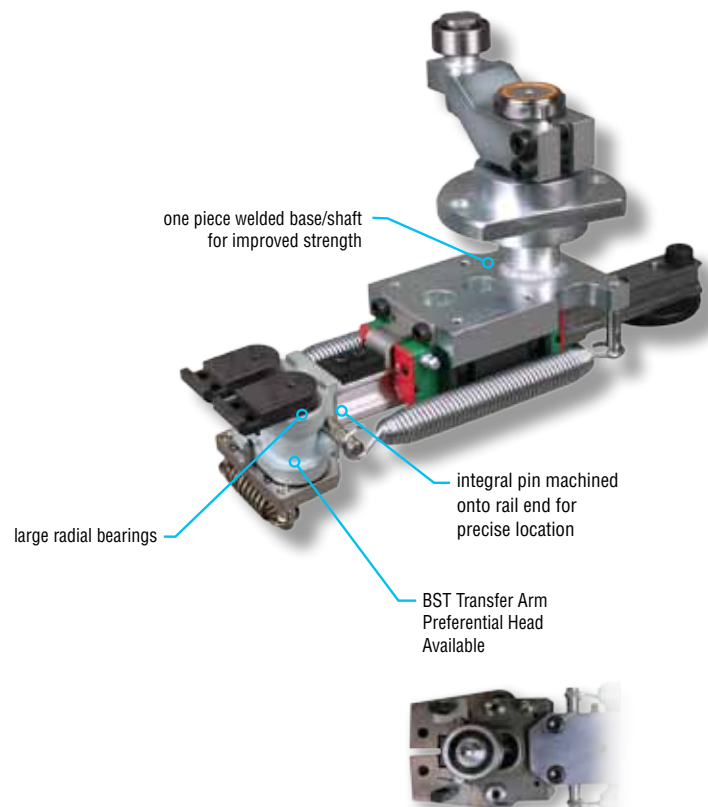
Sidel® Series1 Direct Replacement



MAJOR BENEFITS

- Linear rail and carriage bearing has increased in size and upgraded to a roller bearing style assembly when compared to PHD's previous design
- Base and shaft have been incorporated into a 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 are manufactured especially for PHD, providing greater life
- All spring return pins are hardened and replaceable for ease of repair and cost considerations
- Unit is designed to operate over 20 million cycles
- Lighter in overall weight than OEM arm

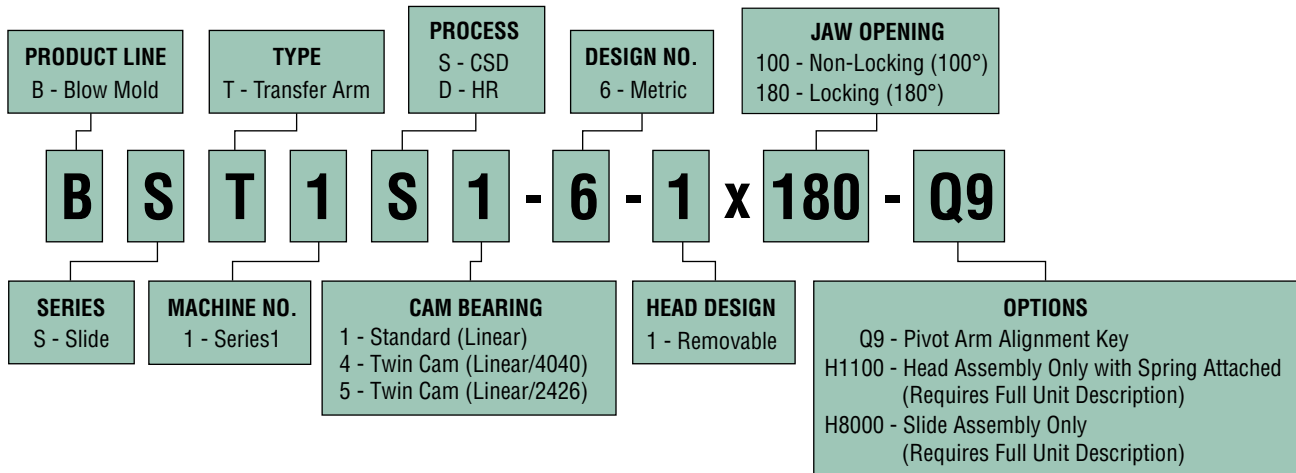
100°/180° JAW OPENING



ORDERING DATA: SERIES BST1 TRANSFER ARM

TO ORDER SPECIFY:

Product Line, Series, Type, Machine No., Process, Cam Bearing, Design No., Head Design, Jaw Opening and Options if required.



RECOMMENDATIONS

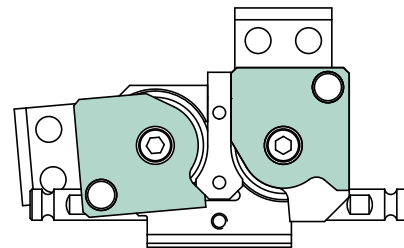
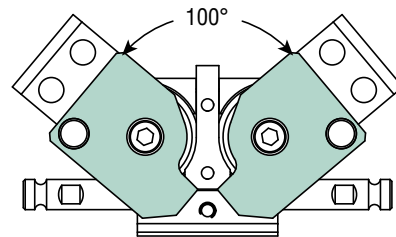
Care must be taken with the newer style preforms to ensure that the fingers match the profile of the finish being processed.

100° JAW OPENING (NON-LOCKING)

The gripper head utilizes an external extension spring and has a maximum opening angle of 100°. This head design is non-locking in the full open position. The unit can be converted to a 190° locking design simply by replacing the left and right jaws.

180° JAW OPENING (LOCKING)

The gripper head utilizes an external extension spring and has a maximum opening angle of 190°. This head design will cause the jaws to lock open once they are rotated past 180°. This jaw design can make performing maintenance easier by allowing the jaw to stay open while manually rotating the transfer arm table. The unit can be converted to a 100° non-locking design simply by replacing the left and right jaws.



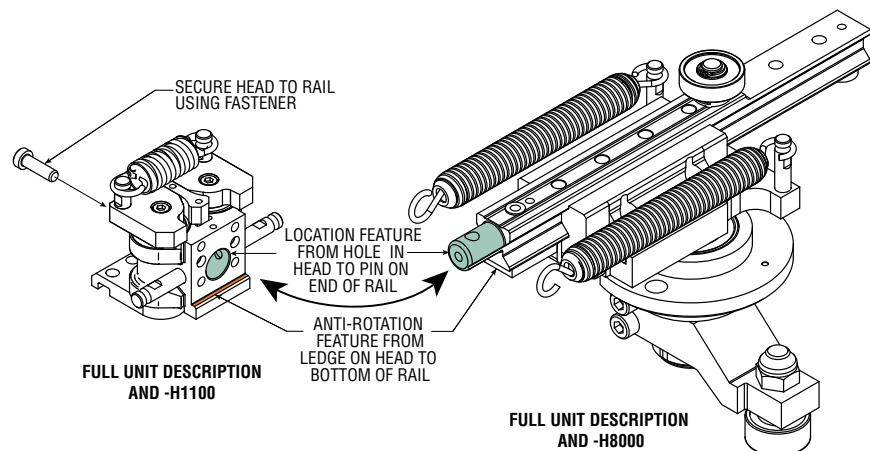
WARNING: See maximum open length on page 55. Jaws may be rotated only until the spring reaches the maximum open length. Exceeding this length will weaken or damage the spring.

REMOVABLE HEAD DESIGN HEAD TO ARM POSITIONING

The BST1xx1-6 head to rail arm design consists of a precision rail arm dowel pin that interfaces with and accurately positions the transfer arm head axially onto the rail arm assembly.

A locating edge on the bottom of the head radially orients and keeps it from rotating.

This quick head change feature allows the head and arm to be easily and quickly maintained.



ENGINEERING DATA: SERIES BST1 TRANSFER ARM

SPECIFICATIONS	IMPERIAL	METRIC
SERIES	SideI® Series1 Replacement	
OPERATION	Cam Operated, Spring Return	
LINEAR BEARING SYSTEM	Steel Ground Profile Rail with Recirculating Roller Bearings	
LUBRICATION	FDA Regulation 21 CFR 1789.3570 on Linear Rail	
AMBIENT TEMPERATURE	-20° to 180° F	-29° to 82° C
GRIP FORCE AT TOOLING*		
CSD	6.7 lb	29.8 N
HR	11.9 lb	52.9 N
EXTENSION SPRING FORCE**		
FULL RETRACT	20 lb	89.0 N
FULL EXTEND	47.4 lb	210.9 N
WEIGHT	11.4 lb	4.3 kg
STROKE	3.576 in	90.0 mm

*See page 55 for alternate grip force springs.

**Each spring provides 1/2 of total retract force.

LIFE EXPECTANCY

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

MAINTENANCE

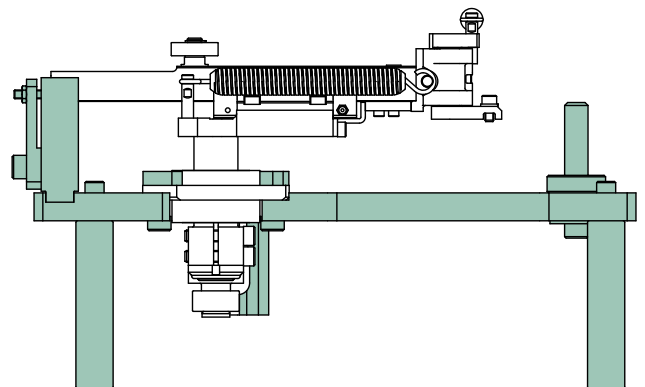
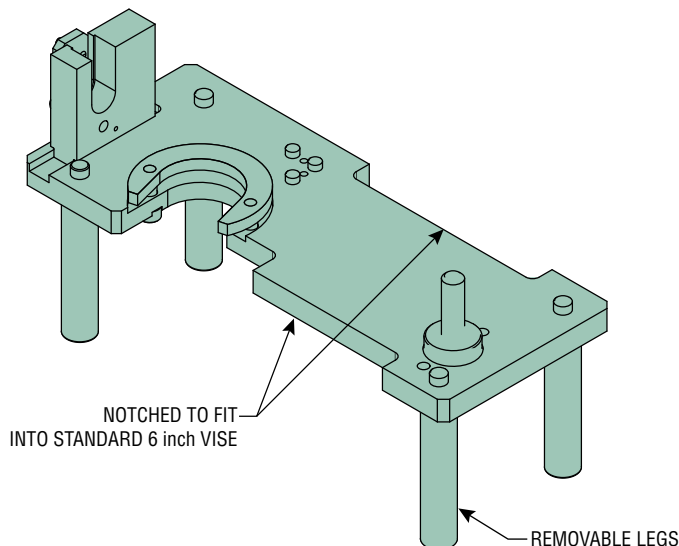
As with most PHD products, these transfer arms are field repairable. Repair kits, jig, and main structural components are available as needed for extended service.

LUBRICATION

The Series BST Transfer Arm linear bearing system is lubricated with FDA-approved food grade lube which provides extended life. Lubrication of the bearing system every six months is recommended. Lubricant is available from PHD. Refer to repair procedures.

SETUP TOOLING

Optional jig kits are available to verify and re-align transfer arms as needed in the field.

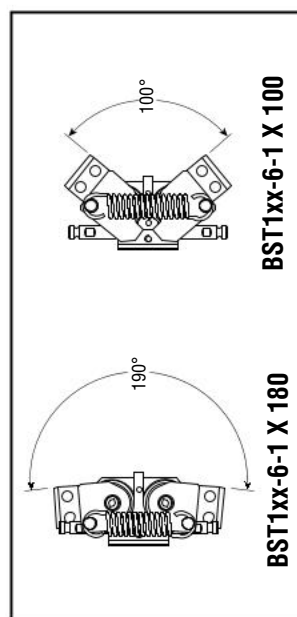
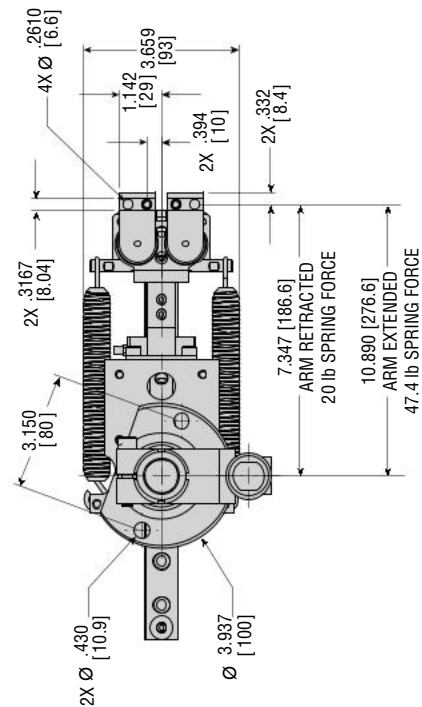
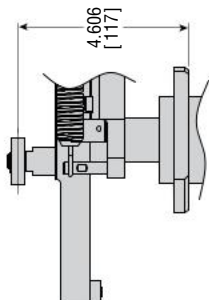
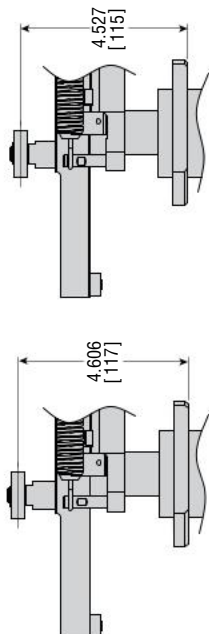
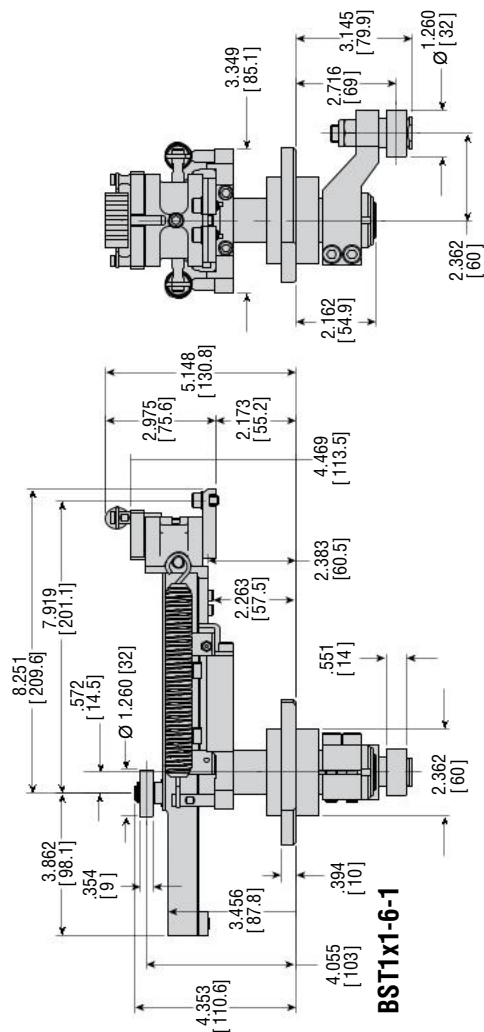


Jig part number - 84306

Retrofit Jig part number - 85306

Allows updating Design 5 jig to work with Design 6 transfer arms.

DIMENSIONS: SERIES BST1 TRANSFER ARM - 100°/ 180° HEAD



NOTES:
 1) DIMENSIONS IN [] INDICATE VALUES IN mm
 2) NOMINAL TRAVEL OF SLIDE IS 3.731 [94.8]

All dimensions are reference only unless specifically tolerated.

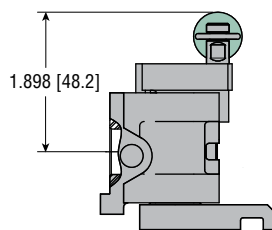
PROCESSES & OPTIONS: SERIES BST1 TRANSFER ARM

S

COLD SET (CSD) PROCESS

100°/180° JAW OPENING

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



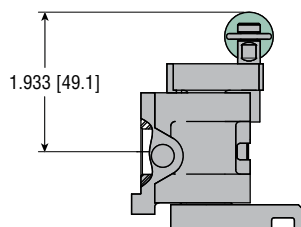
For forces, see engineering data page or alternate head spring at bottom of page.

D

HEAT RESISTANT (HR) PROCESS

100°/180° JAW OPENING

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



For forces, see engineering data page or alternate head spring at bottom of page.

Q9

FACTORY INSTALLED PIVOT ARM ALIGNMENT KEY

Factory installation of the key provides locking of pivot arm.

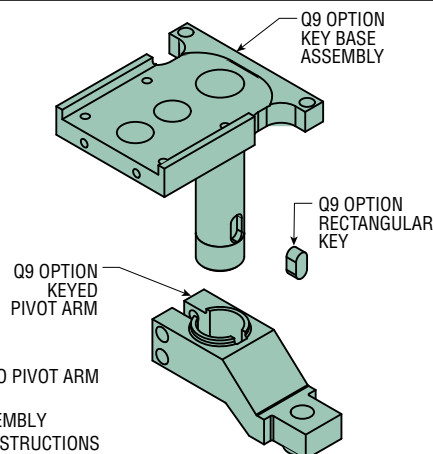


WARNING: Pivot arm alignment key is for alignment purposes only and is not intended as a safety shear coupling. If the Sidel® machine's torque limiter is set incorrectly, damage to the transfer arm may occur if the arm is contacted during machine operation.

NOTE:

KEYWAY IS NOT PROVIDED AS STANDARD. IF -Q9 OPTION IS NOT ORDERED, THE TRANSFER ARM MUST BE JIG SET. THE KIT CAN BE ORDERED SEPARATELY FOR FIELD RETROFIT IF REQUIRED. SEE "KIT INCLUDES" FOR COMPONENTS.

* KIT 84505 INCLUDES: 1 - RECTANGULAR KEY - SHAFT TO PIVOT ARM
1 - KEYED PIVOT ARM
1 - KEYED BASE WELDMENT ASSEMBLY
1 - DISASSEMBLY / ASSEMBLY INSTRUCTIONS



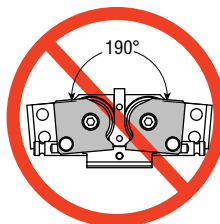
ALTERNATE HEAD SPRINGS

Listed in the chart below are alternative PHD designed springs for BST1xx-6 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 for ease of identification with NSF registered DYKEM®.

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 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 that shown, grip force will vary from the list given.

Consult PHD for grip force other than listed.



WARNING: See maximum open length "A" in chart below. Jaws may be rotated only until the spring reaches the maximum open length "A". Exceeding this length will weaken or damage the spring.

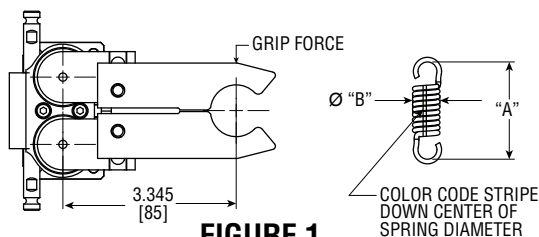


FIGURE 1

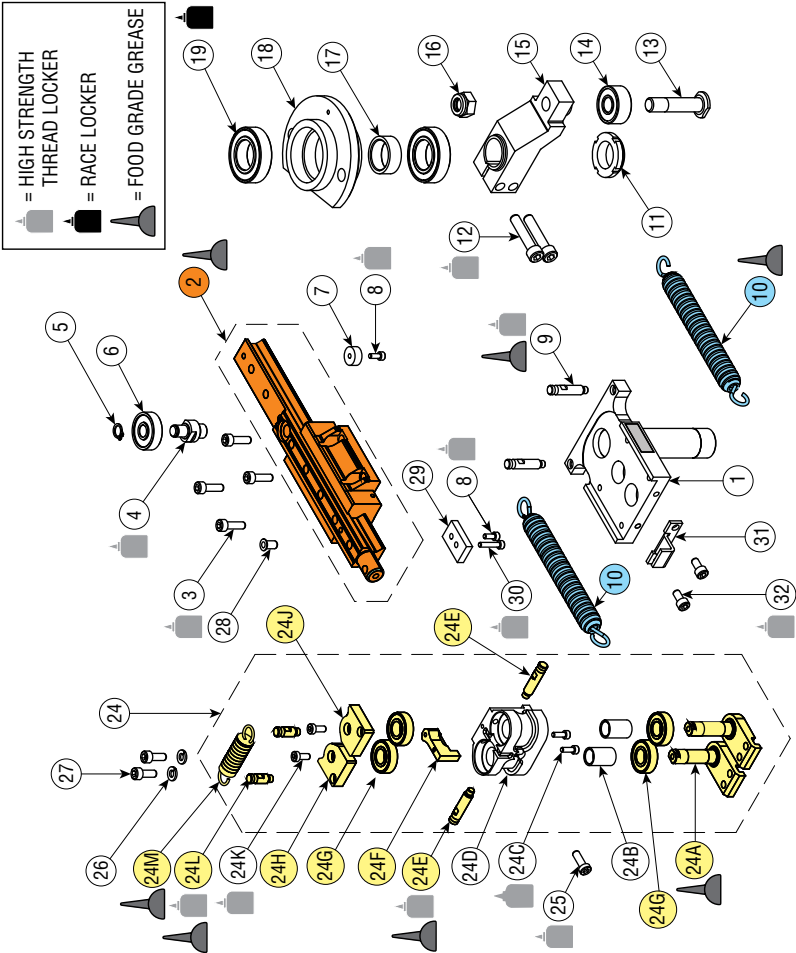
PHD Part #	Grip Force		Stripe Color	Stripe Qty	Standard PHD Use	Free State Dimension "A"		Maximum Open Length "A"		Dimension "Ø B"	
	lbs	N				Inch	mm	Inch	mm	Inch	mm
83884	3.4	15.1	Yellow	1	—	2.179	55.3	2.450	62.2	0.748	19.0
76655	5.1	22.7	Green	2	—	1.935	49.1	2.684	68.2	0.554	14.1
77602	6.7	29.8	White	1	BST1 CSD	1.721	43.7	2.935	74.6	0.600	15.2
84491	9.4	41.8	Yellow	2	—	2.061	52.3	2.450	62.2	0.663	16.8
77603	11.9	52.9	White	2	BST1 HR	1.855	47.1	2.935	74.6	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.

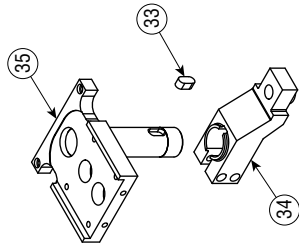
All dimensions are reference only unless specifically tolerated.

PARTS LIST & REPAIR KITS: SERIES BST1 TRANSFER ARM

KEY	PART DESCRIPTION	PART NO.		
		BST1x1-6	BST1x4-6	BST1x5-6
1	Weldment Base Assembly		83780	
2	Rail & Carriage Assembly	Sold as part of Rail & Carriage Assembly Repair Kit		
3	Carriage to Base SHCS		14308-118	
4	Bearing Mounting Shaft	83783	84313	84686
5	Retaining Ring		63462-008	
6	Upper Cam Bearing		2334-047	
7	Bumper		83796	
8	Bumper to Carriage Rail SHCS		14308-019	
9	Spring Holder Pin		83784	
10	Extension Spring	Sold as part of Extension Spring Kit		
11	Lock Nut		75556	
12	Pivot Arm SHCS		14308-031	
13	Lower Cam Bearing Shaft		75552	
14	Lower Cam Bearing		2334-041	
15	Pivot Arm		85004	
16	Nylon Insert Locking Nut		65759-007	
17	Bearing Spacer		75548	
18	Mounting Flange		75544	
19	Mounting Flange Bearing		2334-013	
24	Head Assembly	Full unit description required followed by -H1100		
24A	Jaw Shaft		84667	
24B	Bearing Spacer		81393	
24C	Body to Tang SHCS		14308-019	
24D	Body		83789	
24E	Body Spring Holder Pin		86120	
24F	Jaw Stop		83794	
24G	Jaw Bearing		2334-050-01	
24H	Left Jaw	Full unit description required followed by -H1100		
24J	Right Jaw	Full unit description required followed by -H1100		
24K	Left / Right Jaw to Shaft LHCS		59716-009	
24L	Jaw Spring Holder Pin		83795	
24M	Jaw Extension Spring	Full unit description required follow ed by -H1610		
25	Head to Rail LHCS		14308-436	
26	Split Lock Washer		61745-002	
27	Finger to Jaw SHCS		14308-033	
28	Metric Rivit Nut		84771	
29	Shock Pad		84772	
30	SHCS		14308-091	
31	Shock Pad Stop Bracket		84773	
32	SHCS		14308-115	
33	Shaft Key	Sold as part of Pivot Arm Alignment Kit		
34	Keyed Pivot Arm		85511	
35	Keyed Weldment Base Assembly		84504	



KITS	
KIT DESCRIPTION	KIT NUMBER
Pivot Arm Alignment Key Kit	84505 (See page 55)
Jig Kit	84306 (See page 53)
Rail & Carriage Assembly Repair Kit	84307
Head Repair Kit - Cold Set (CSD), 180°	84308-01
Head Repair Kit - Heat Resistant (HD), 180°	84308-02
Head Repair Kit - Cold Set (CSD), 100°	84308-03
Head Repair Kit - Heat Resistant (HD), 100°	84308-04
Spring Extension Spring Kit	77304
Cam Shaft Bearing Replacement Kit	84311
Twin Cam Shaft Bearing Replacement Kit (4040)	84312
Twin Cam Shaft Bearing Replacement Kit (2426)	84700
Jig Conversion Kit	85306



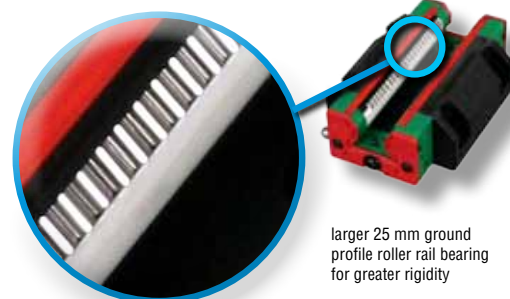
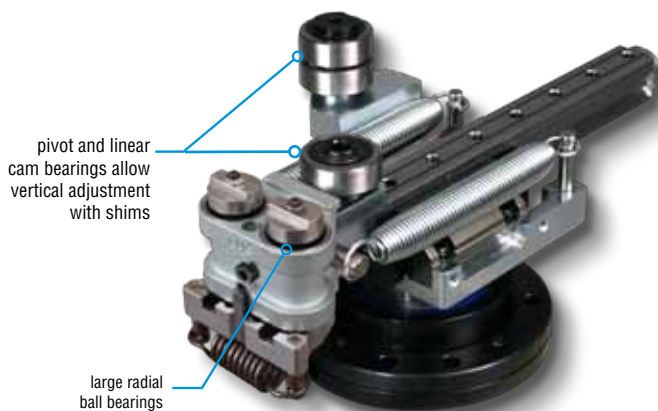
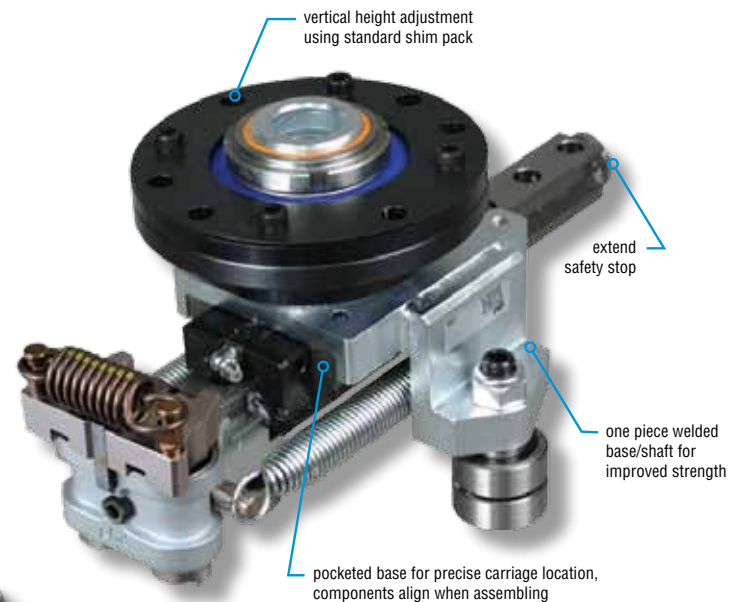
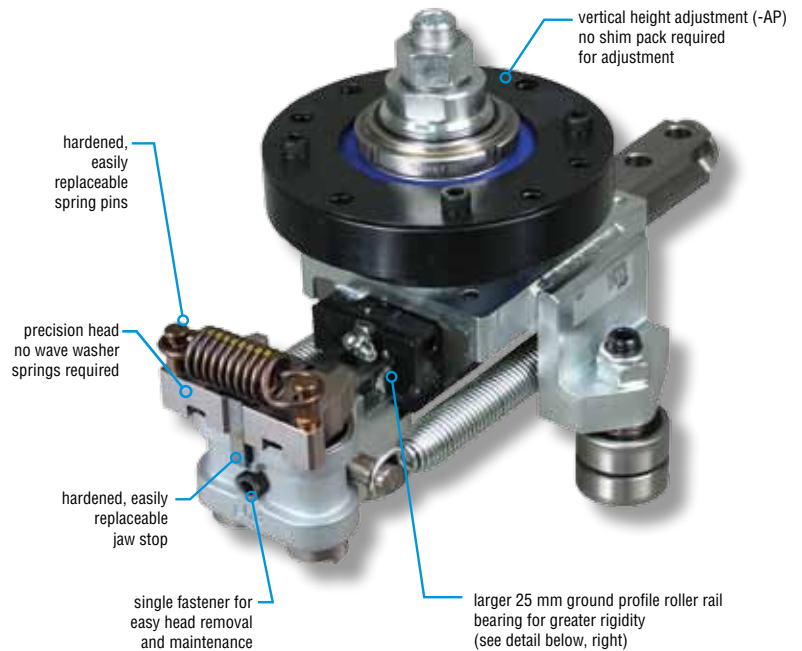
BST2

Transfer Arm

Sidel® Series2 Direct Replacement

MAJOR BENEFITS

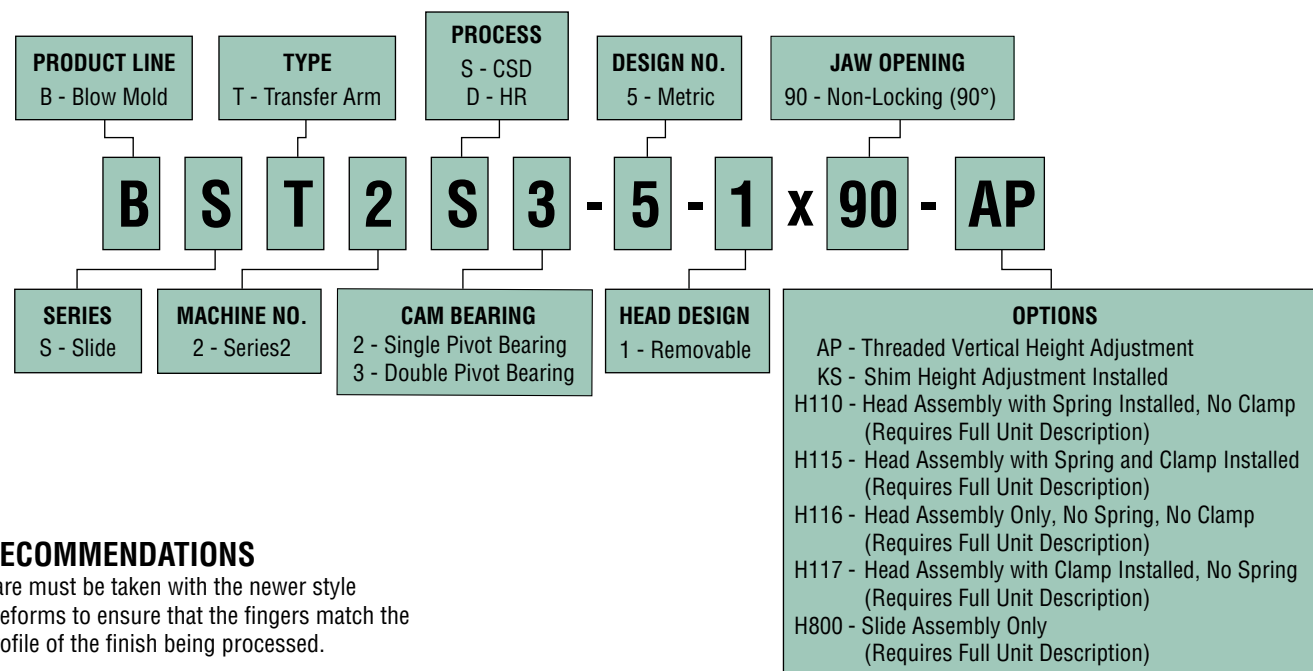
- Threaded vertical height adjustment eliminates need for shim pack, which greatly reduces setup adjustment time (-AP option).
- Linear rail and carriage bearing has increased in size and upgraded to roller bearing style assembly.
- Base, shaft, and pivot incorporated into one piece weldment.
- Head 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.



ORDERING & ENGINEERING DATA: SERIES BST2 TRANSFER ARM

TO ORDER SPECIFY:

Product Line, Series, Type, Machine No., Process, Cam Bearing, Design No., Head Design, Jaw Opening and Options if required.



RECOMMENDATIONS

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

SPECIFICATIONS	IMPERIAL	METRIC
SERIES	Sidel® Series2 Replacement	
OPERATION	Cam Operated, Spring Return	
LINEAR BEARING SYSTEM	Steel Ground Profile Rail with Recirculating Roller Bearings	
LUBRICATION	FDA Regulation 21 CFR 1789.3570	
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 +.472/- .551 in	90 +12/-14 mm

*See page 63 for alternate grip force springs.

LIFE EXPECTANCY

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

MAINTENANCE

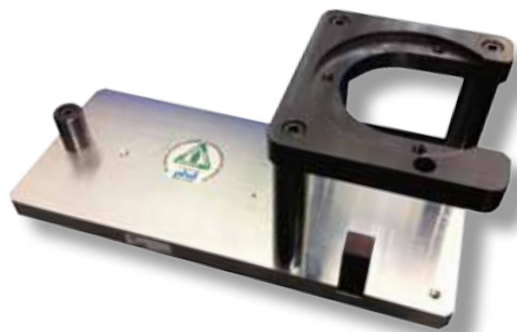
As with most PHD products, these transfer arms are field repairable. Repair kits and main structural components are available as needed for extended service.

LUBRICATION

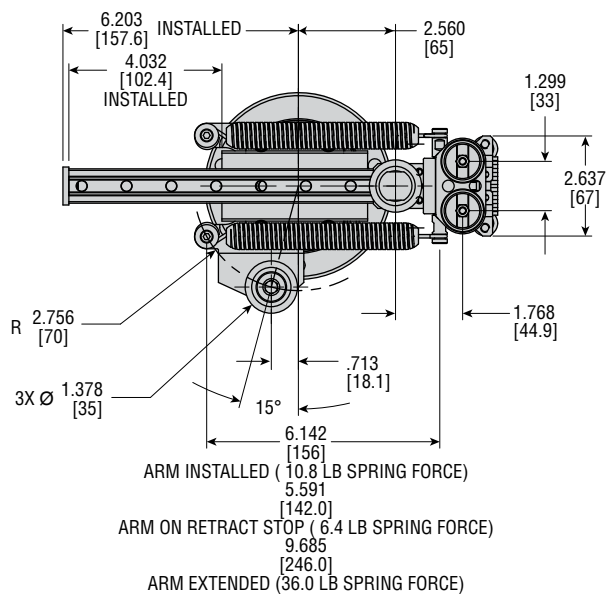
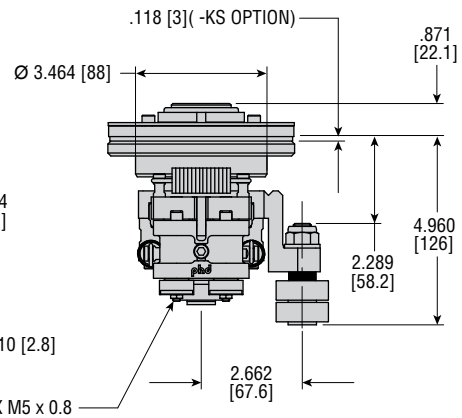
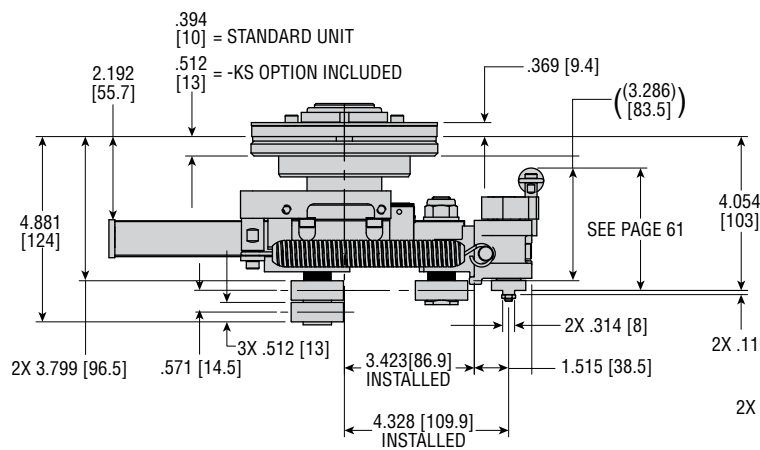
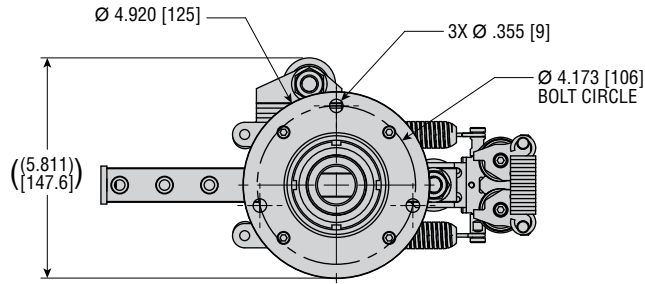
The Series BST Transfer Arm linear bearing system is lubricated with FDA-approved food grade lube which provides extended life. Lubrication of the bearing system every six months is recommended. Lubricant is available from PHD. Refer to repair procedures.

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.



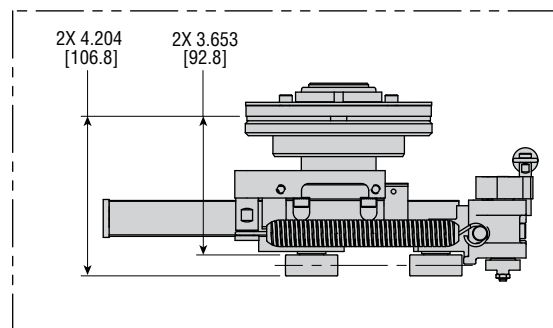
DIMENSIONS: SERIES BST2xx-5 TRANSFER ARM



ARM INSTALLED (10.8 LB SPRING FORCE)

ARM ON RETRACT STOP (6.4 LB SPRING FORCE)

ARM EXTENDED (36.0 LB SPRING FORCE)



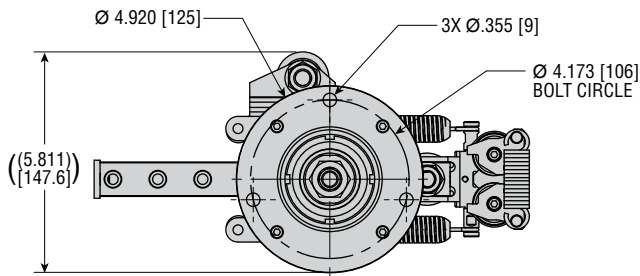
FOR BST2X2-5 UNITS

NOTES:

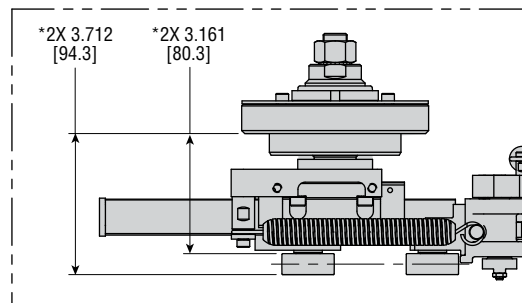
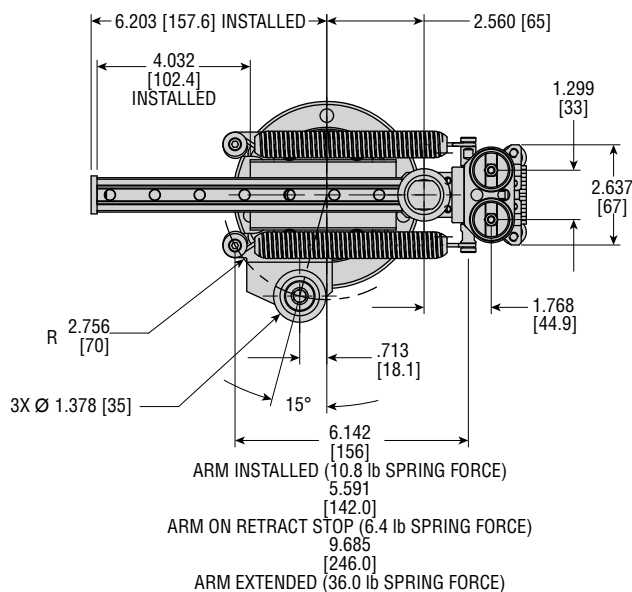
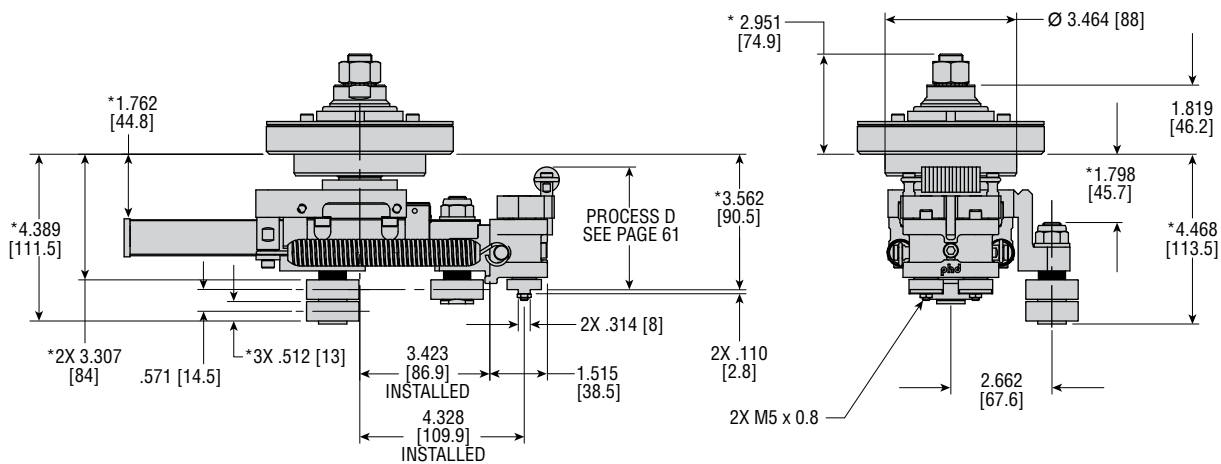
- 1) DIMENSIONS IN [] INDICATE VALUES IN mm
- 2) JAW ROTATION IS 90° TOTAL, 45° EACH JAW
- 3) MAXIMUM TRAVEL OF SLIDE IS 4.567 [116.0]
- 4) UNIT DESIGNED FOR STROKE OF 3.543 [90.0]
- 5) RETRACT OVERTRAVEL IS .551 [14.0]
- 6) EXTEND OVERTRAVEL IS .472 [12.0]

All dimensions are reference only unless specifically toleranced.

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



* = VERTICAL HEIGHT ADJUSTMENT DIMENSIONS
THAT WILL CHANGE + / - .1575 [4mm]
(ONE FULL TURN IS EQUAL TO .0394 [1mm])



FOR BST2X2-5 UNITS

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 .551 [14.0]
- 6) EXTEND OVERTRAVEL IS .472 [12.0]

All dimensions are reference only unless specifically toleranced.

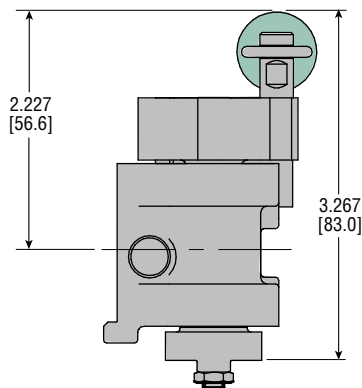
PROCESSES & OPTIONS: SERIES BST2 TRANSFER ARM

S

COLD SET (CSD) PROCESS

90° JAW OPENING

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



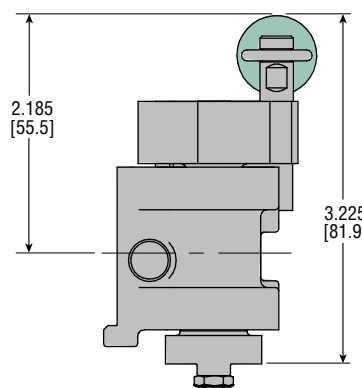
For forces, see engineering data on page 58 or alternate head spring at top of page 63.

D

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 on page 58 or alternate head spring at top of page 63.

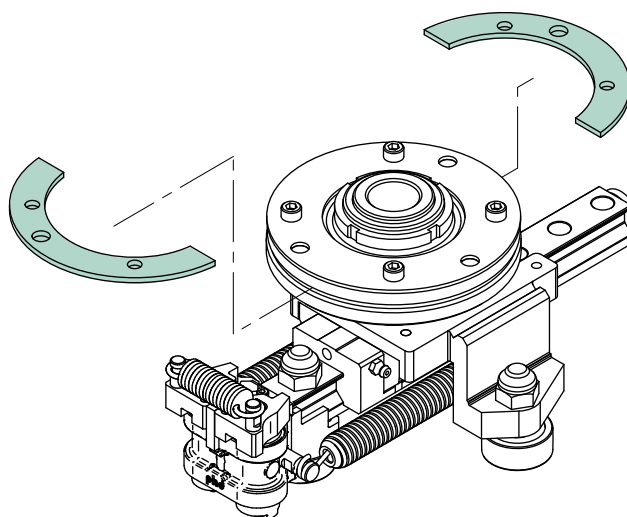
KS

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). Sidel® shims are interchangeable with the PHD transfer arm.

KIT DESCRIPTION	KIT NUMBER
Flange Base Shim Kit	84916



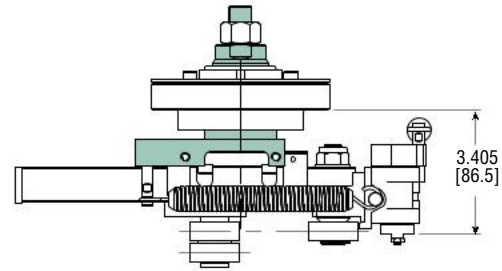
PROCESSES & OPTIONS: SERIES BST2 TRANSFER ARM

AP

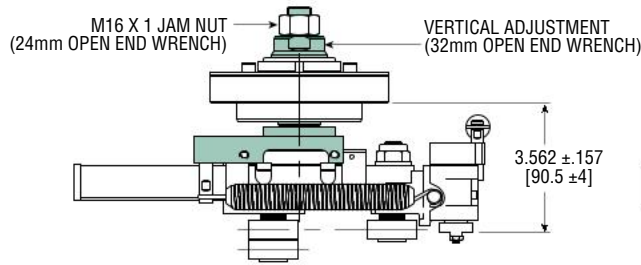
THREADED VERTICAL HEIGHT ADJUSTMENT

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.

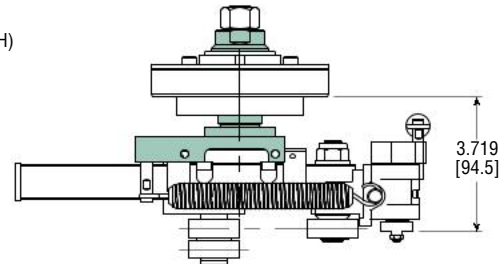
NOTE: One full turn is equal to .0394 in [1mm] adjustment.



UNIT SHOWN AT HIGHEST POSITION



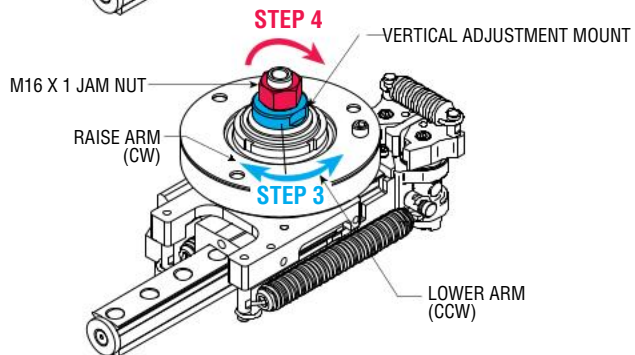
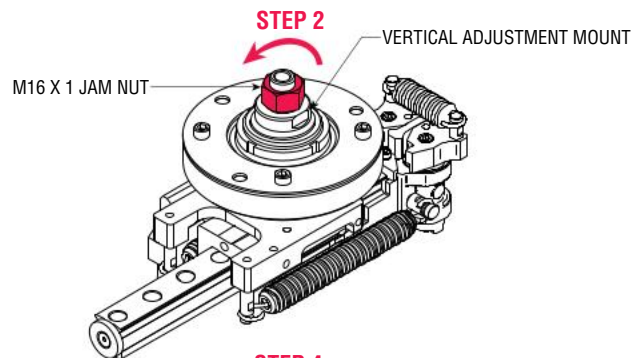
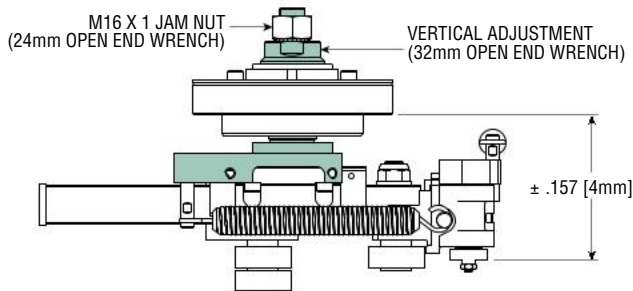
UNIT SHOWN AT MID POSITION



UNIT SHOWN AT LOWEST POSITION

HEIGHT ADJUSTMENT PROCEDURES

- 1) Install the arm into the machine.
- 2) Using a 24mm box end wrench, loosen the locking nut.
- 3) Using a 32mm 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 $\pm .157$ [4mm].
- 4) Tighten the lock nut while holding the vertical adjustment mount stationary to ensure that the height does not change.



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.

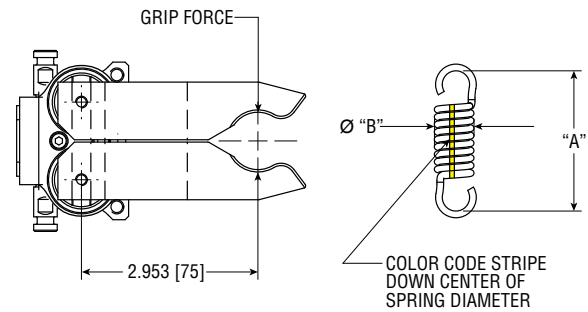


FIGURE 1

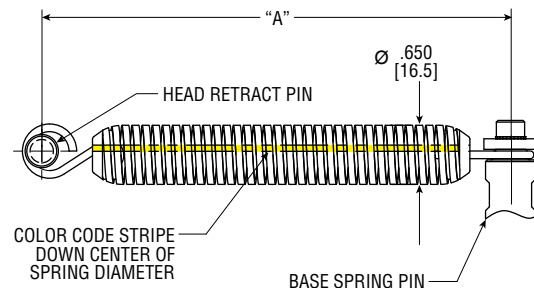
PHD Part #	Grip Force		Stripe Color	Stripe Qty	Standard PHD Use	Free State Dimension "A"		Dimension "Ø B"	
	lb	N				Inch	mm	Inch	mm
83884	3.4	15.1	Yellow	1	BST2 CSD	2.179	55.3	0.748	19.0
76655	5.1	22.7	Green	2	—	1.935	49.1	0.554	14.1
77602	6.7	29.8	White	1	—	1.721	43.7	0.600	15.2
84491	9.4	41.8	Yellow	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.



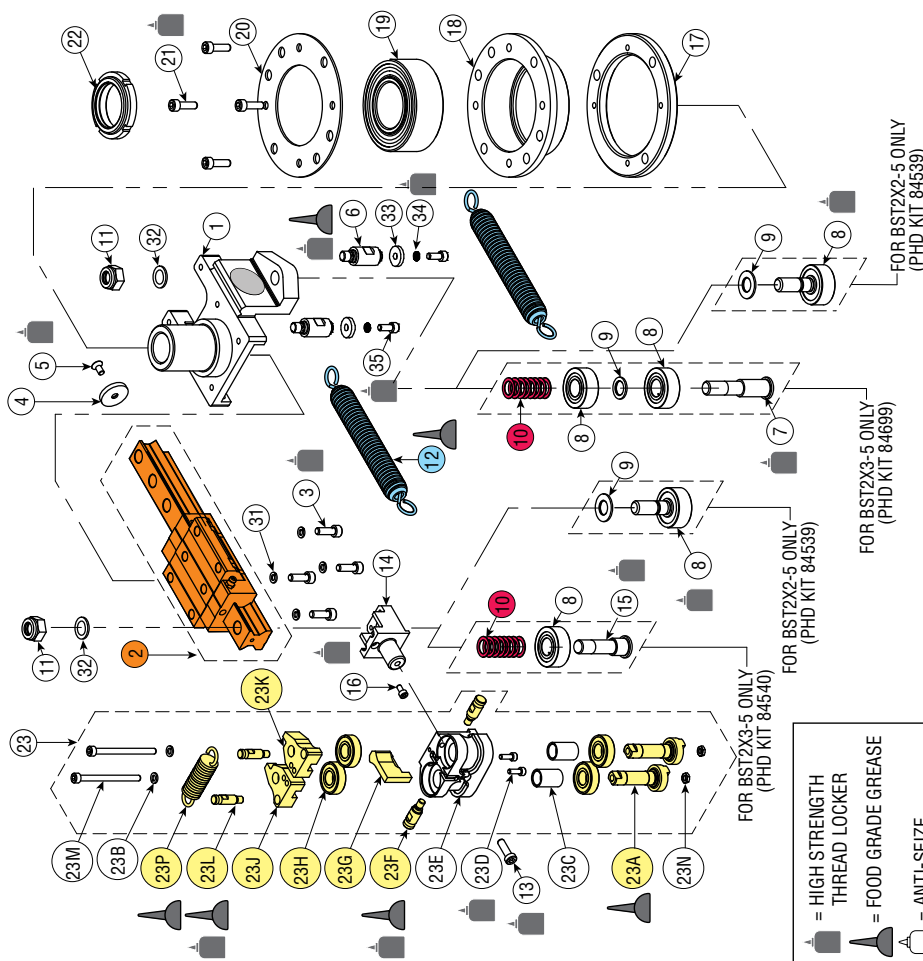
PHD Part #	Stripe Color	Stripe Qty	Standard PHD Use	Dimension "A" Arm On Stop		Total Force (lbs) Arm On Stop		Dimension "A" Arm Out Min		Total Force (lbs) Arm Out Min		Dimension "A" Arm Out Max		Total Force (lbs) Arm Out Min	
				Inch	mm	lb	N	Inch	mm	lb	N	Inch	mm	lb	N
85051	Yellow	1	BST2	5.591	142.0	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:

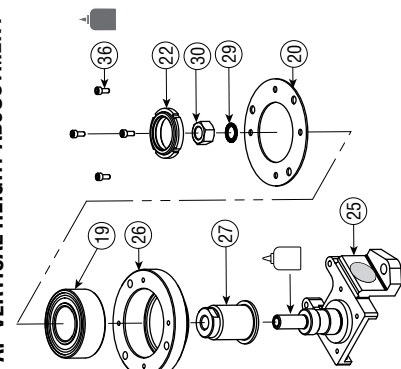
- 1) Pull out forces are related to grip forces, but will vary depending on finger tooling design. These spring options allow process refinement for both bottle and preform transfer.
- 2) Total retract forces are two times the above charted forces, as two springs are required per unit.

PART & REPAIR KITS: SERIES BST2 TRANSFER ARM

KEY	PART DESCRIPTION	Part NO.	BST2x3-5	BST2x2-5
1	Weldment Base Assembly	84300		
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 FHCS	14308-584		
6	Spring Holder Body Pin	85291		
7	Linear Cam Bearing Shaft	82889		
8	Bearing	2334-052-02		84536-01
9	Bearing to Bearing Spacer	85364		83714
10	Commercial Shim Washer	77430-05-004-0		-----
11	Nylon insert Lock Nut	65759-007		65759-013
12	Extension Spring	Sold as Part of Extension Spring Kit		
13	Head to Arm SHCS	14308-436		
14	Arm Mount	83858		
15	Bearing Mount	83713		-----
16	Mounting Arm to Rail SHCS	14308-401		
17	Lower Bearing Ring Mount	82888		
18	Mid Bearing Ring Mount	82884		
19	Bearing	2334-051-01		
20	Upper Bearing Ring Mount	82885		
21	Upper Bearing Ring Mount 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 Spring 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 Mount	83990		
27	Vertical Adjustment Mount	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	61054-115		



-AP VERTICAL HEIGHT ADJUSTMENT



KITS

KIT DESCRIPTION	BST2x3-5	BST2x2-5	KIT NO.
Rail & Carriage Assembly Repair Kit	84317	85895	
Head Repair Kit - Heat Resistant (HR)	84318-01		
Head Repair Kit - Cold Set (OSD)	84318-02		
Spring Extension Spring Kit	84319		
BST2x2 Cam Bearing Replacement Kit	84539		
BST2x3 Cam Bearing Replacement Kit	84540		
BST2x3 Pivot Bearing Replacement Kit	84699		
Flange Base Shim Kit	84916		
Cam Bearing Shim Kit	84917		

Preform/Bottle Eject Slide

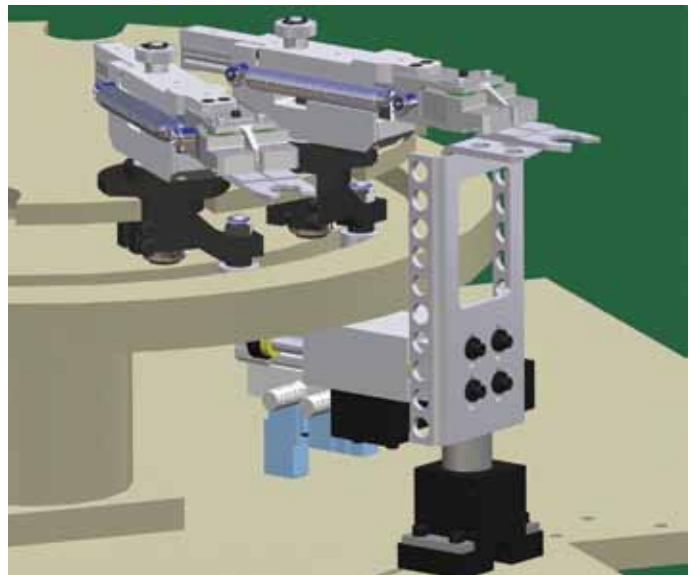
ML308222 & ML308876**MAJOR BENEFITS**

- Provides consistent preform/bottle ejection.
- Minimizes stress on transfer arm jaws with straight and faster eject as on the Sidel® 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**

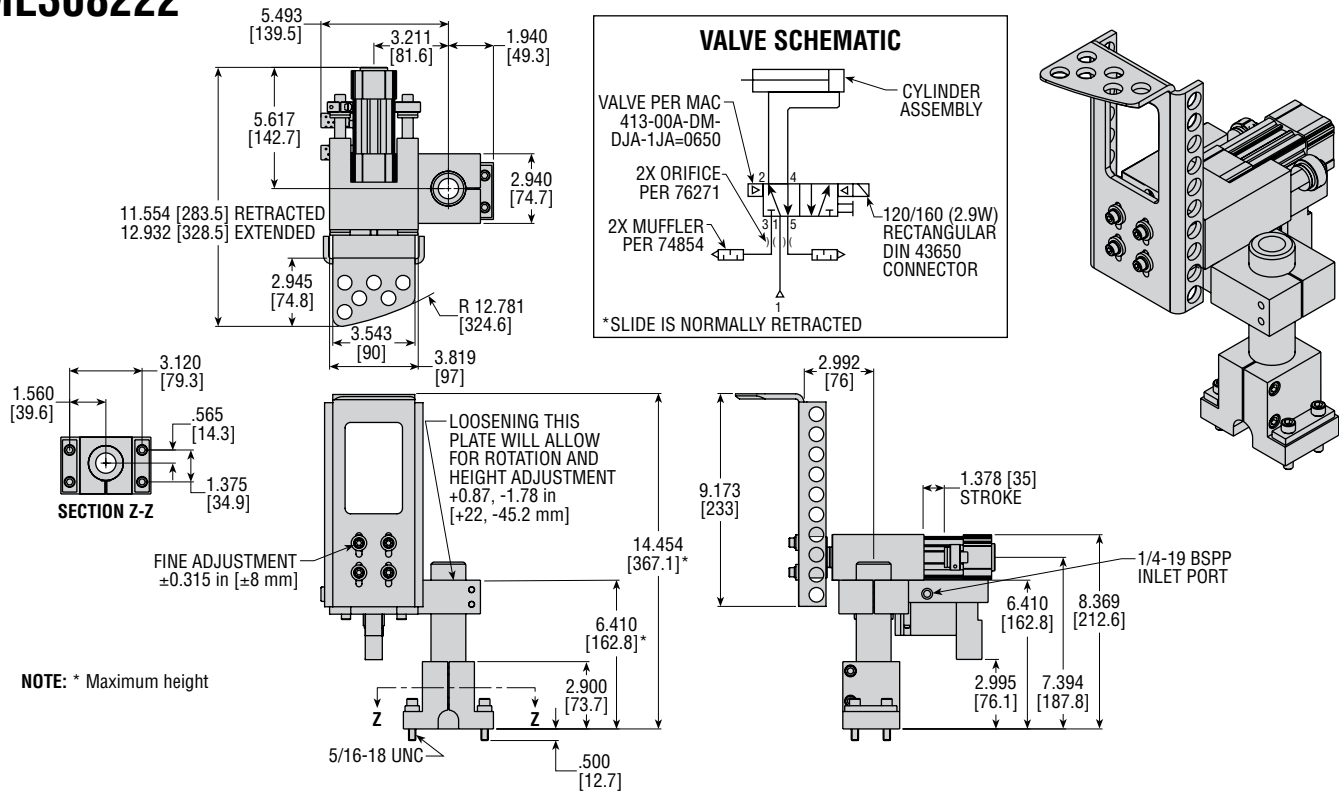
- Order per machine maximum height requirements.*
- Remove existing eject system.
- Mount eject slide (drill and tap four mounting holes).
- Align eject slide position.
- Route electric cable to valve.
- Adjust eject slide height (max. per dimensions*).
- Adjust sabre height (max per dimensions*).
-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

NOTE: * See next page for maximum height dimensions.

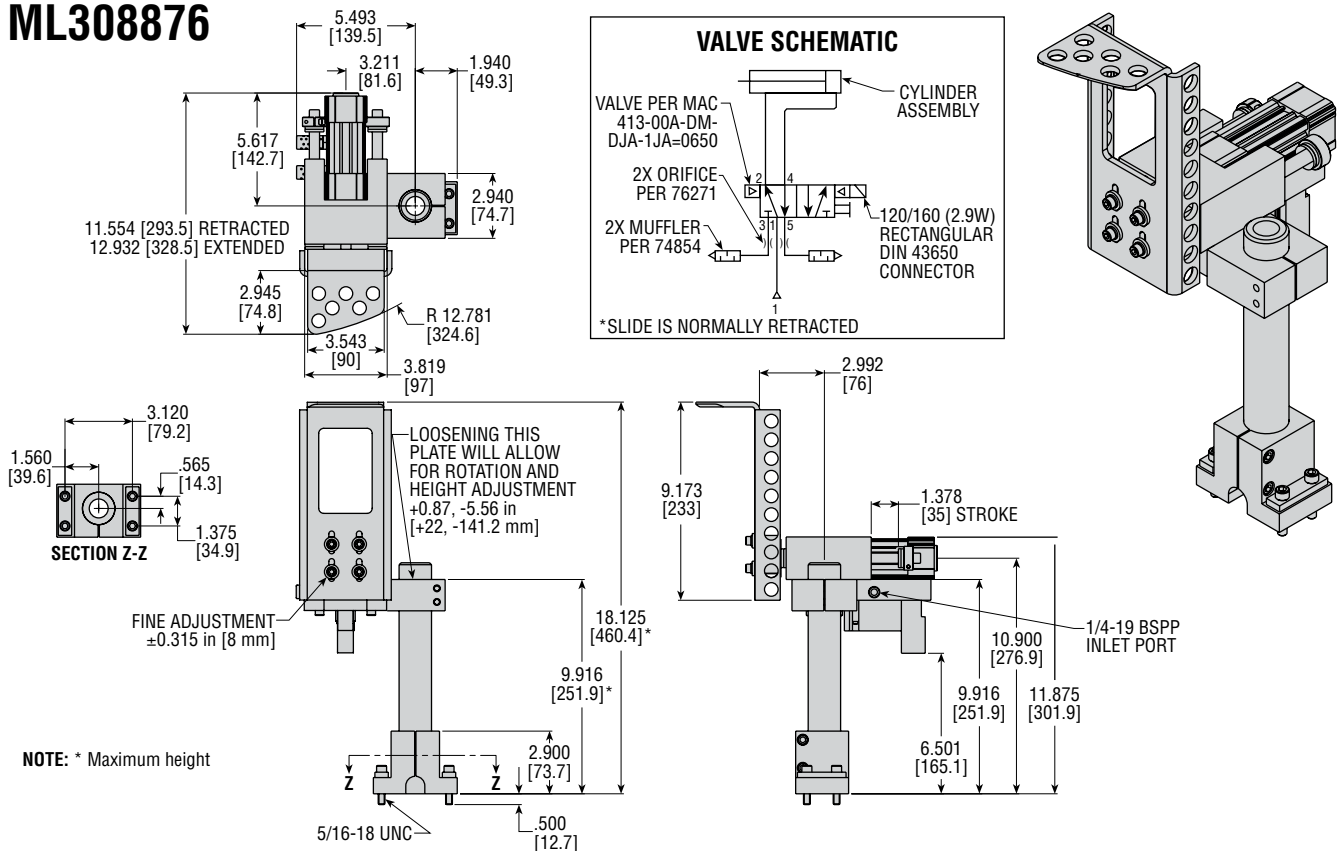


DIMENSIONS: ML308222 & ML308876

ML308222



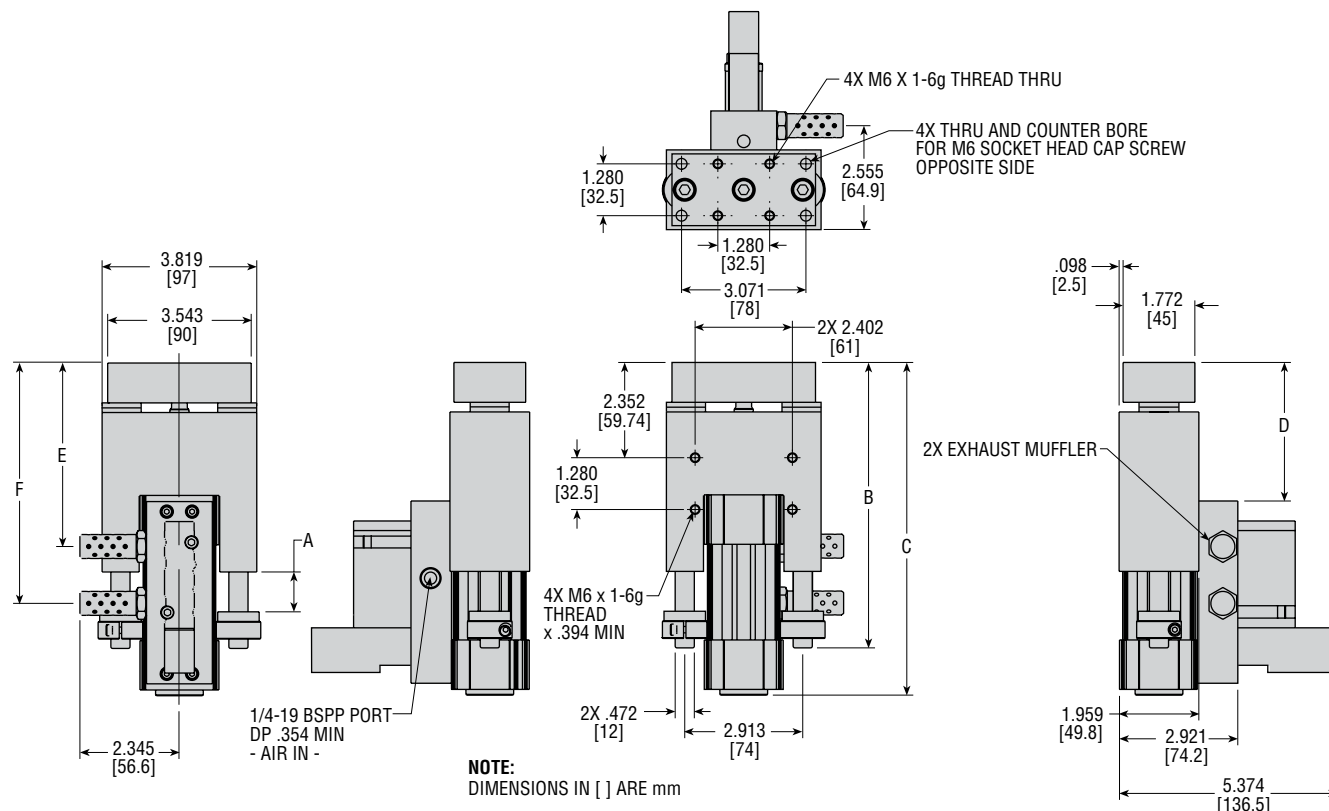
ML308876



All dimensions are reference only unless specifically tolerated.



- Direct replacement for Festo® FENG-32-25 slide and DNC-32-25-P cylinder assembly on Sidel® 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.



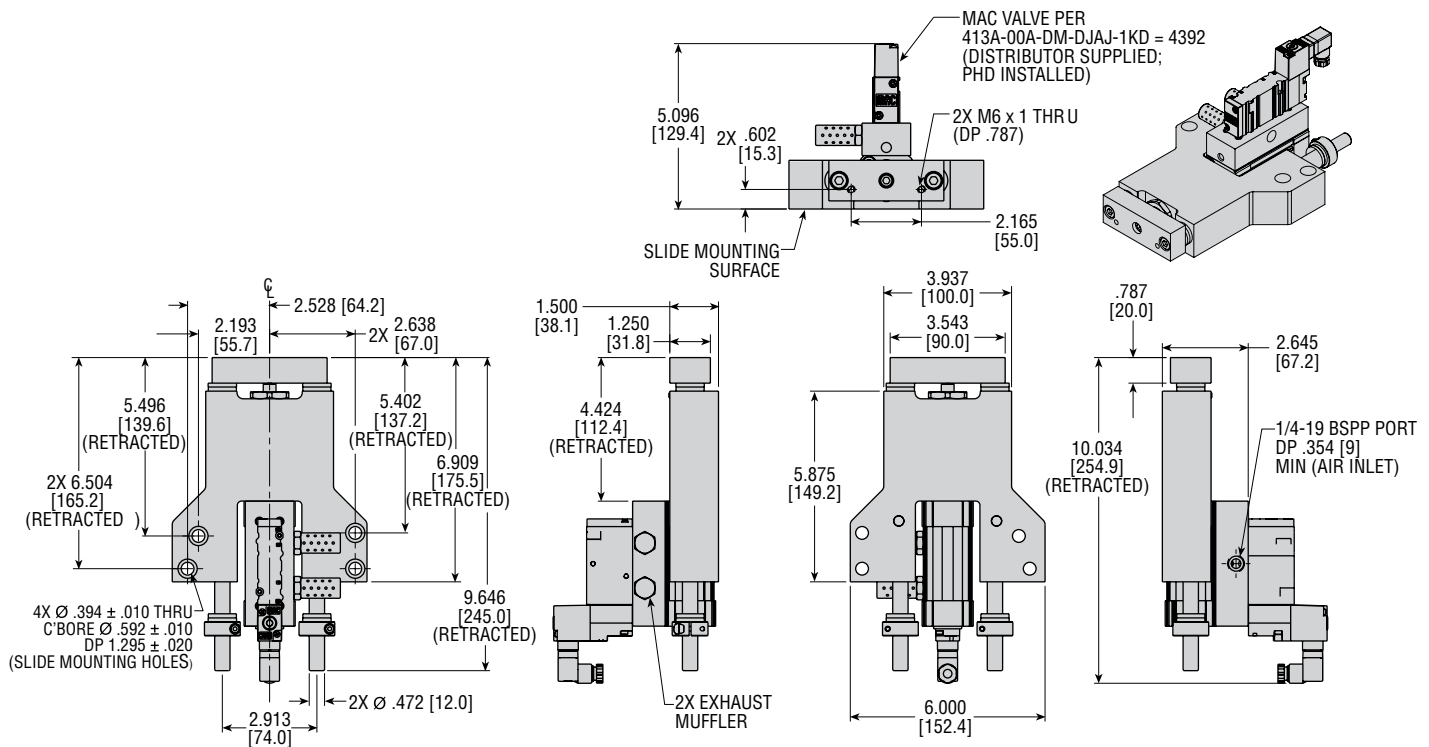
UNIT	LETTER DIMENSIONS					
	A	B	C	D	E	F
ML# 304450	.984 [25]	7.047 [179]	8.215 [208.7]	3.421 [86.9]	4.541 [115.3]	5.927 [150.5]
ML# 305278	1.378 [35]	7.441 [189]	8.609 [218.7]	3.618 [91.9]	4.738 [120.3]	6.124 [155.5]

Preform/Bottle Eject Slide

ML308956

MAJOR BENEFITS

- Direct replacement for Bosch® unit 0821401080-slide, 0822034202-cylinder, and 0820038155-valve on Sidel® 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 25MM BORE X 25MM 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

All dimensions are reference only unless specifically toleranced.

SIDEI 01

Rebuild Program

REBUILD REPAIR RECYCLE

**Return your old
units for rebuilding**

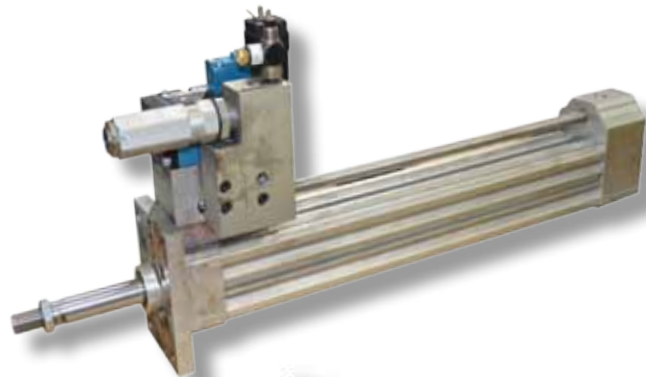


**Get a 12 Month
"Like New"
Warranty**

*Plastic Packaging Components
such as Stretching Cylinders,
Transfer Arms, Blow Nozzles,
Filler Cylinders, Slip Sheet
Grippers, and Eject Slides
are rebuildable.*

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.



Before:



*After: This stretching
cylinder was rebuilt and
returned to service.*

- ➡ PHD's Rebuild Program refurbishes your existing PHD products with all new wear items.
- ➡ Rebuilt units offer the same PHD quality that you're used to, but for a fraction of the cost of a new unit, reducing your total cost of ownership.
- ➡ Rebuilt units are placed back into service, thus reducing your total cost and saving valuable components from scrap.
- ➡ All PHD factory rebuilt units receive a 12 month "like new" warranty.

SPECIAL REQUIREMENTS

MADE SIMPLE



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.

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



**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



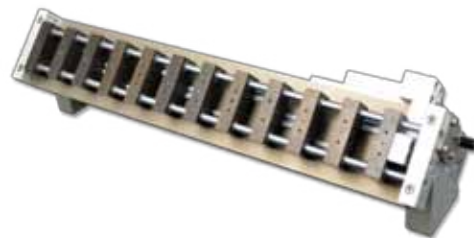
**ML312857
Quick Change
Volumetric
Pump**

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**

Direct replacement
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

www.phdinc.com/unlimited/quote

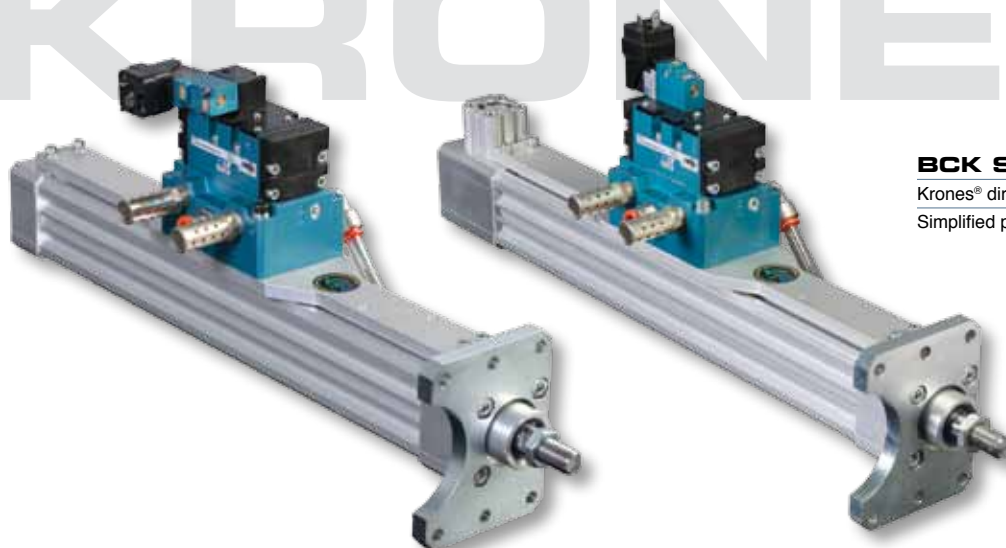
Capabilities

- Most quotes delivered within eight working hours
- Dedicated application assistance
- 24 hours a day, 7 days a week service
- Fast delivery and competitive pricing
- Separate unique solutions engineering and manufacturing areas dedicated to our customers, ensuring prompt quotes and dependable delivery
- Over 30,000 unique solutions provided and over 100,000 quotes in our database

Quotes Online

- Available 24 hours a day, 7 days a week
- Enter and edit order prior to contact information
- Submit your quote and an MDN representative will contact you with a quote
- No minimum quantities are required
- CAD files available prior to ordering
- Geared towards short-run requests
- All units receive an "ML" number when ordered. This number, along with all specifications, is kept on permanent record at PHD for future reference and reorders.

KRONES®



BCK Stretching Cylinders

Krones® direct replacement
Simplified pneumatic system



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

Eject Cylinder

ML309880 and ML310656

Krones® direct replacement

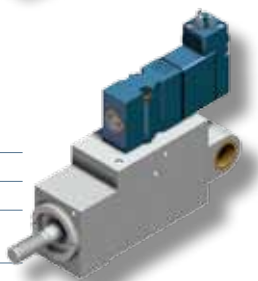
Provides rapid repeatable ejection function due to MAC valve design and PHD cylinder.

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

Krones® direct replacement

BCN Needle Cylinder

Continuous extrusion blow molding needle actuators direct replacement

Significantly longer life

Reduces maintenance and downtime



CT 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

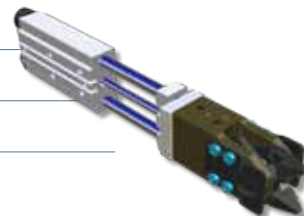


Slip Sheet Gripper

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

