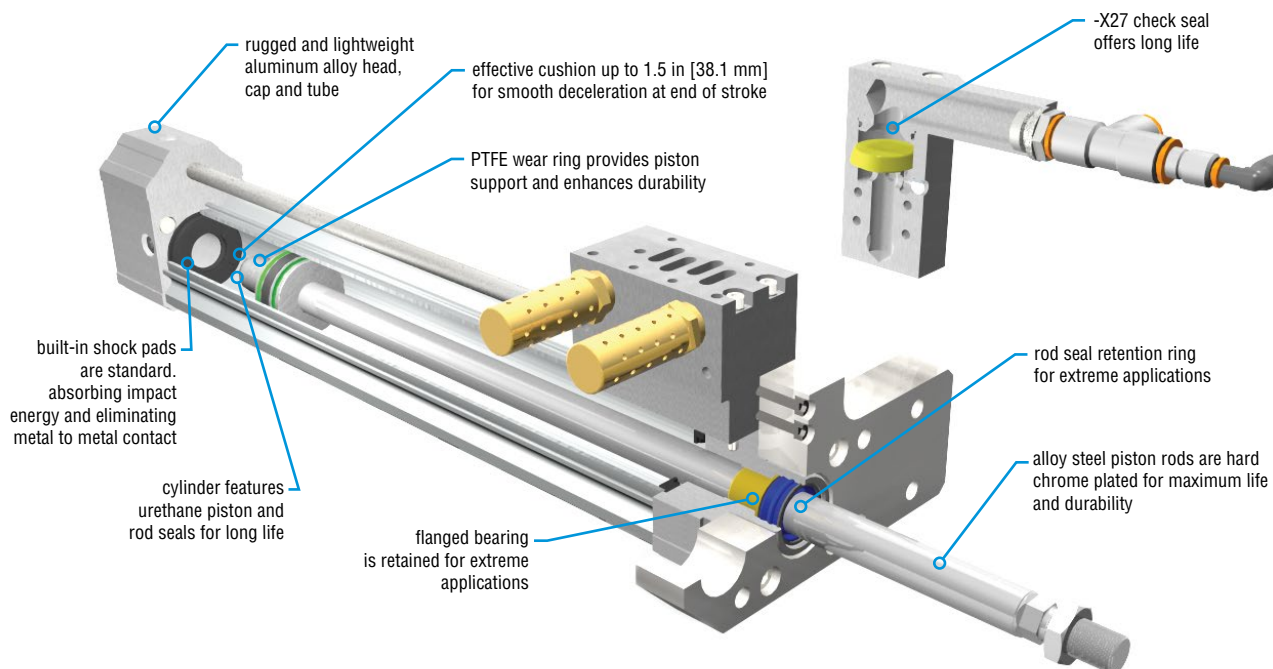
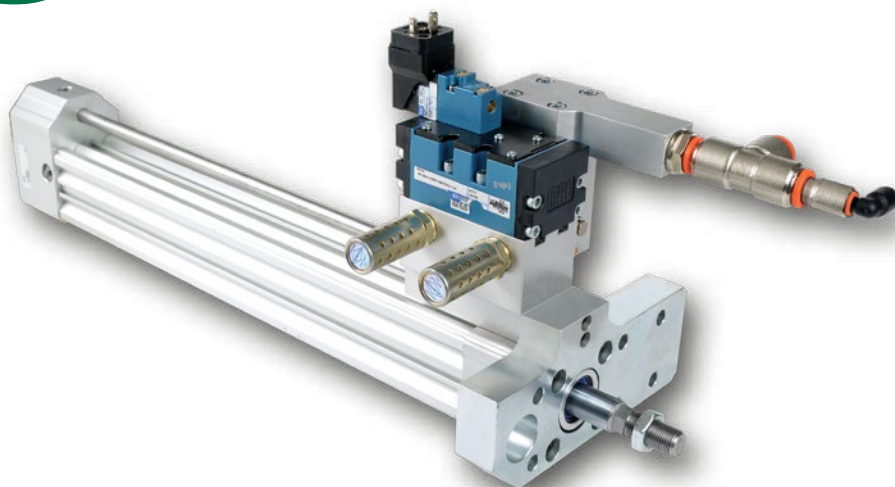


# BCSU

## STRETCHING CYLINDER

### Major Benefits

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



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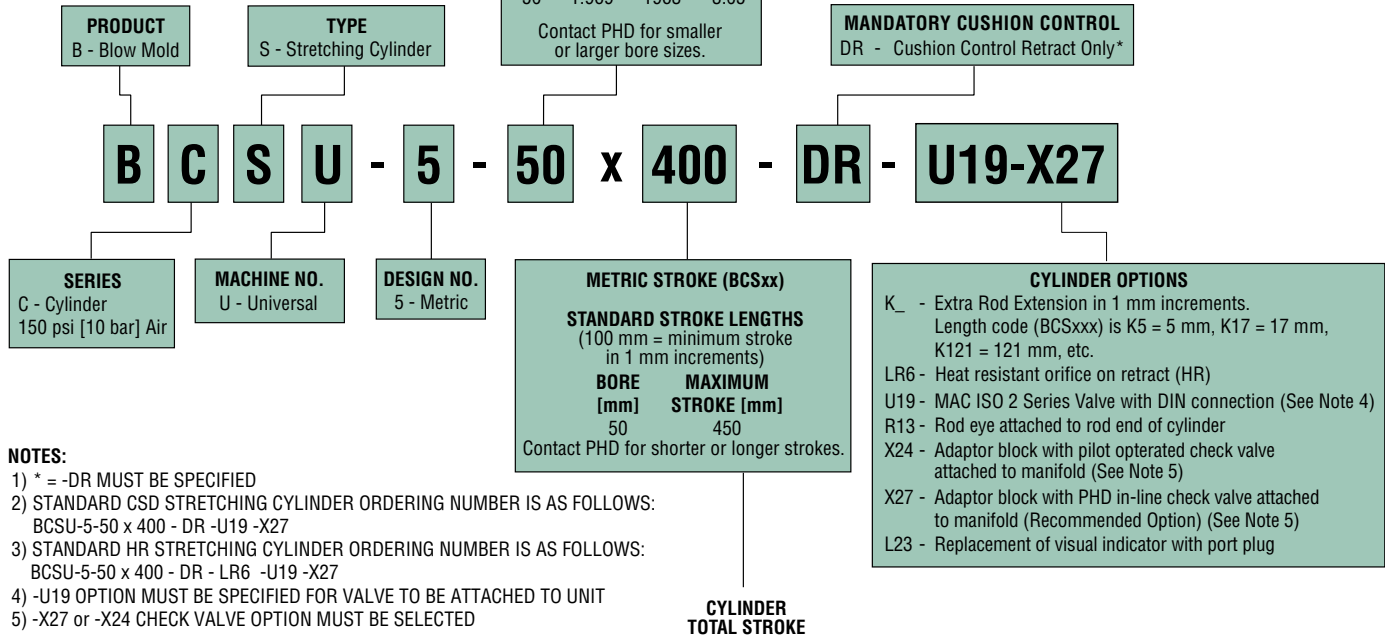
# ORDERING DATA: SERIES BCSU STRETCHING CYLINDER

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

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

**TO ORDER, SPECIFY:**

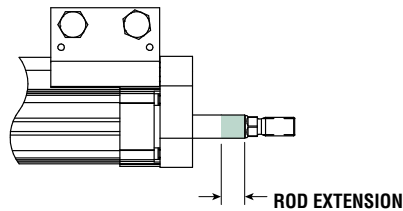
Product, Series, Type, Machine No., Design No., Bore Size, Stroke, any Options.



**NOTES:**

- 1) \* = -DR MUST BE SPECIFIED
- 2) STANDARD CSD STRETCHING CYLINDER ORDERING NUMBER IS AS FOLLOWS:  
BCSU-5-50 x 400 - DR -U19 -X27
- 3) STANDARD HR STRETCHING CYLINDER ORDERING NUMBER IS AS FOLLOWS:  
BCSU-5-50 x 400 - DR - LR6 -U19 -X27
- 4) -U19 OPTION MUST BE SPECIFIED FOR VALVE TO BE ATTACHED TO UNIT
- 5) -X27 or -X24 CHECK VALVE OPTION MUST BE SELECTED

CYLINDER TOTAL STROKE



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

# ENGINEERING DATA: SERIES BCSU STRETCHING CYLINDER

SPECIFICATIONS	IMPERIAL	METRIC
TYPE	Pneumatic Cylinder	
SERIES	Universal <sup>®</sup> Machines Stretching Cylinder	
BORE SIZE	1.969 in	50 mm
BORE AREA		
EXTEND	3.04 in <sup>2</sup>	1963 mm <sup>2</sup>
RETRACT	2.56 in <sup>2</sup>	1649 mm <sup>2</sup>
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 21CFR 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 21CFR 178.3570
FILTRATION	40 Micron
OPERATING PRESSURE RANGE	20 to 150 psi [1.37 to 10 bar]
AMBIENT FLUID TEMPERATURE	0° to 120°F [-18° to 50°C]

## LUBRICATION

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

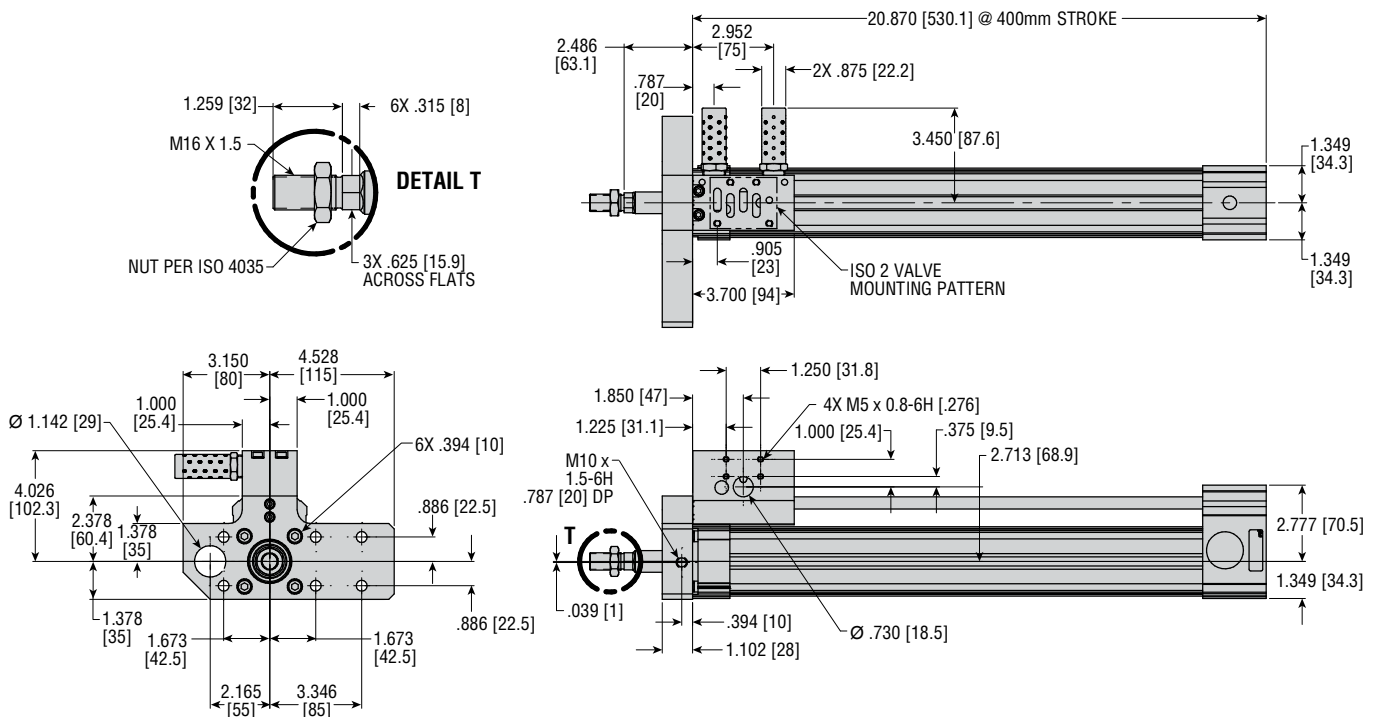
## MAINTENANCE

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

## LIFE EXPECTANCY

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

# DIMENSIONS: SERIES BCSU STRETCHING CYLINDERS

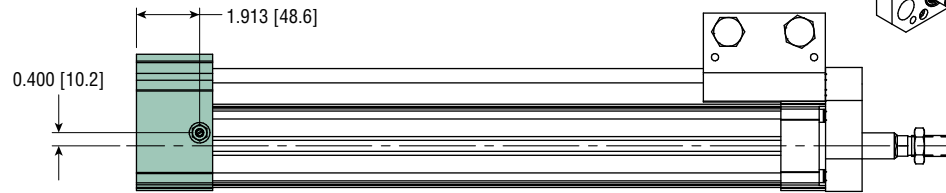


All dimensions are reference only unless specifically toleranced.

# OPTIONS: SERIES BCSU STRETCHING CYLINDER

## DR CUSHION CONTROL ON RETRACT ONLY (MANDATORY OPTION)

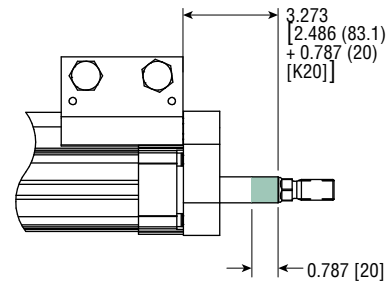
PHD cushions are designed for smooth deceleration at the end of stroke. When the cushion is activated, the remaining volume in the cylinder must exhaust past an adjustable needle which controls the amount of deceleration.



## K\_ EXTRA ROD EXTENSION

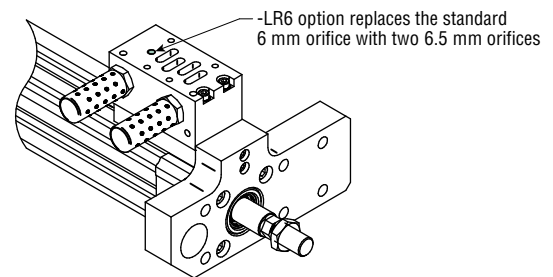
Extra rod extension can be achieved by specifying the option -K followed by the length code. Rod extension is available in 1 mm increments. Contact PHD for other combinations.

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



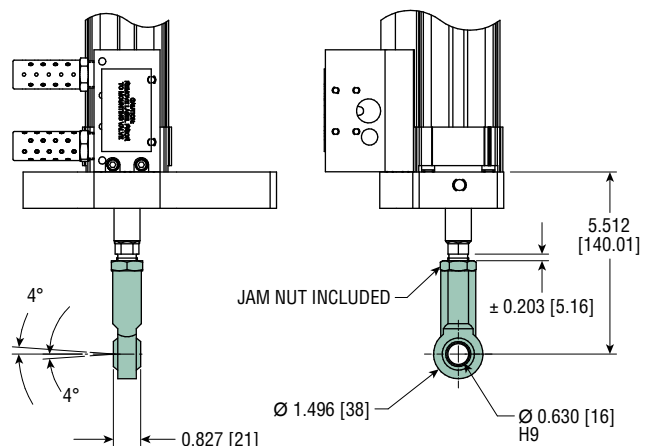
## LR6 ORIFICE ON RETRACT (HR - HEAT RESISTANT UNITS)

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.

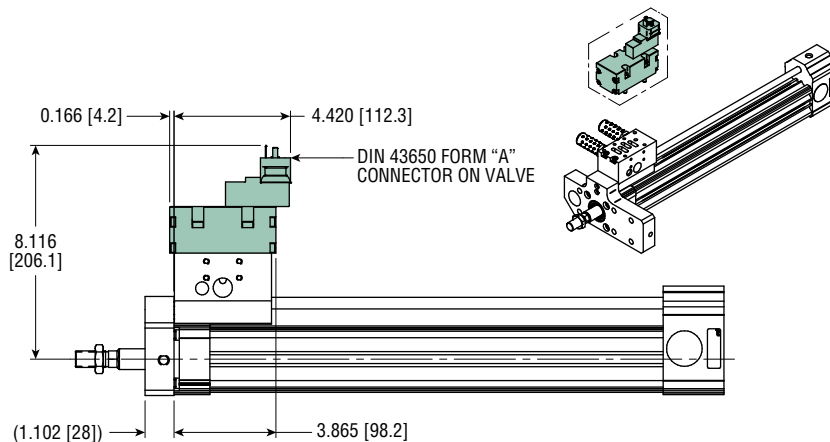


All dimensions are reference only unless specifically toleranced.

# OPTIONS: SERIES BCSU STRETCH CYLINDER

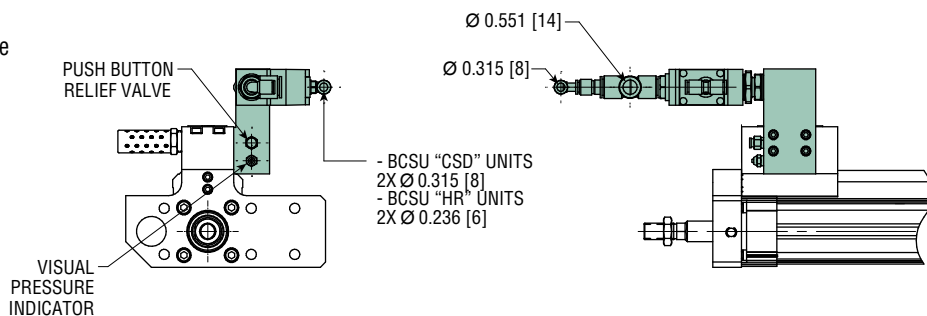
## U19 MAC ISO 2 SERIES VALVE DIN CONNECTION

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 21CFR 178.3570 food grade lubrication.



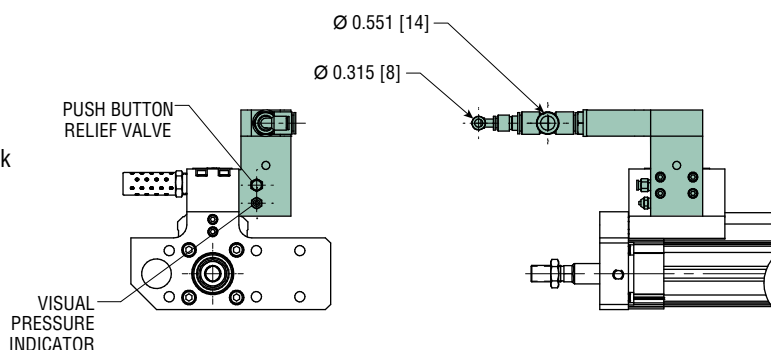
## X24 ADAPTOR BLOCK WITH IN-LINE PILOTT-OPERATED CHECK VALVE ATTACHED TO MANIFOLD

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



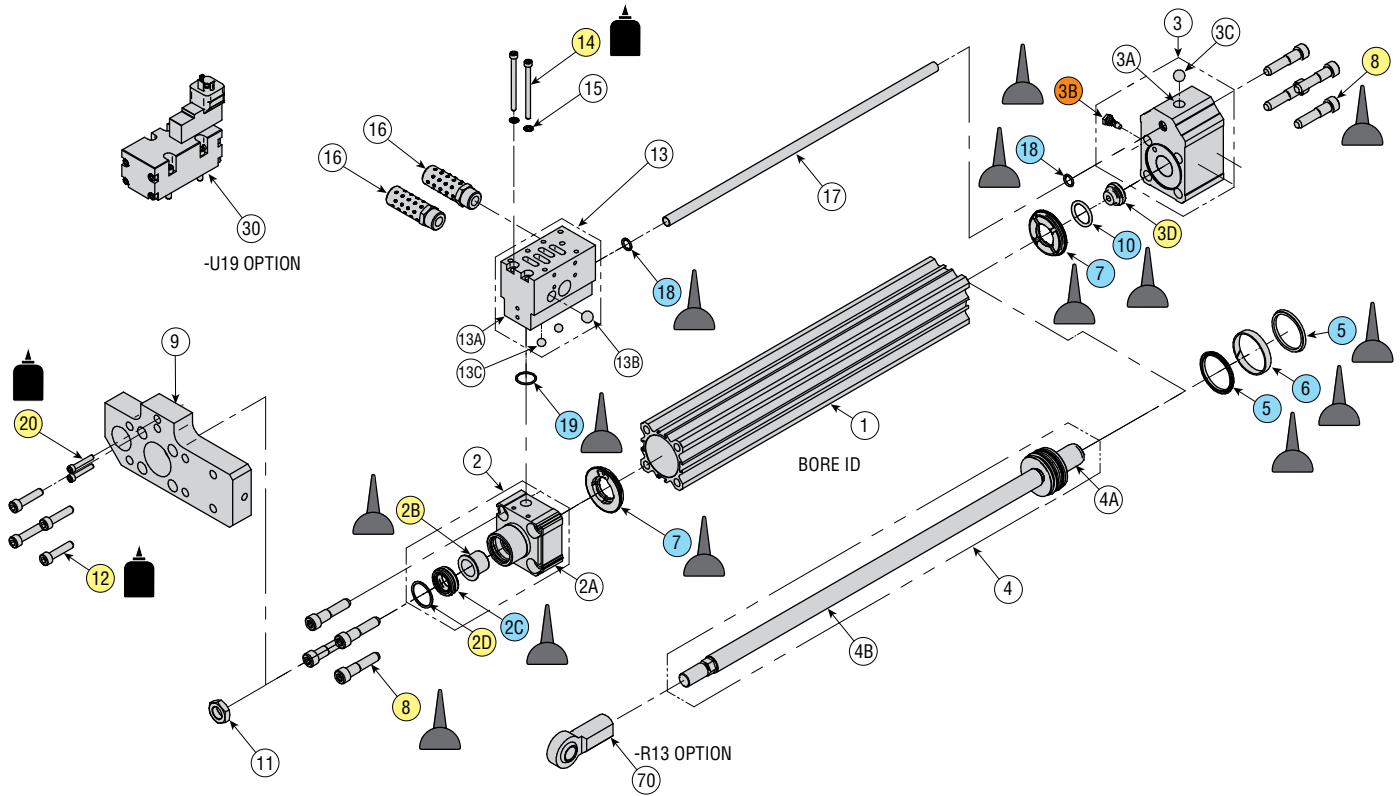
## X27 ADAPTOR BLOCK WITH PHD IN-LINE CHECK VALVE ATTACHED TO MANIFOLD RECOMMENDED OPTION

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

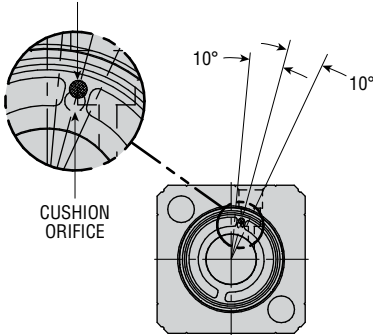


All dimensions are reference only unless specifically toleranced.

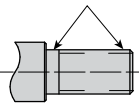
# EXPLODED VIEW & REPAIR KITS: SERIES BCSU STRETCHING CYLINDER



MULTI-FUNCTION SEAL ORIFICE

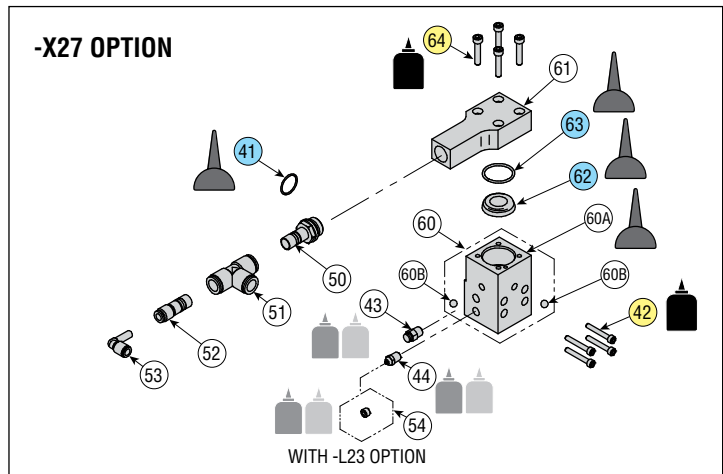


APPLY ADHESIVE TO BOTH SHOULDER & THREADS



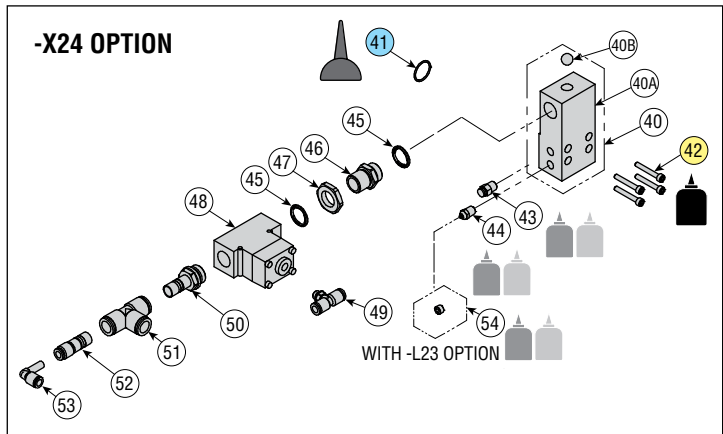
ALIGN CUSHION ORIFICE IN CAP WITH CUSHION ORIFICE HOLE IN MULTI-FUNCTION SEAL SO THAT CUSHION ORIFICE HOLE IS NOT BLOCKED. MUST BE FREE FLOW THRU ORIFICE.

-X27 OPTION



WITH -L23 OPTION

-X24 OPTION



WITH -L23 OPTION

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

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

# PARTS LIST: SERIES BCSU STRETCHING CYLINDER

## CYLINDER ONLY PARTS LIST

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*) and 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
3D	Shock Pad	Sold as part of Repair Kit (-H9010*)
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 Repair Kit (-H9010*)
7	Multi-function Impact Seal	Sold as part of Seal kit (-H9000*) and 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) and 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*) and Repair Kit (-H9010*)
19	O-ring Seal	Sold as part of Seal kit (-H9000*) and Repair Kit (-H9010*)
20	SHCS	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*) and Repair Kit (-H9010*)
42	SHCS	Sold as part of Repair Kit (-H9010)
43	Push Button Bleed Valve	85084-02
44	Mini Pneumatic Indicator	85083
45	Sealing Washer	77629-004
46	Male to Male Nipple	81525
47	BSP Nut	87476
48	Pilot Operated Check Valve	77187
49	Branch Tee Fitting	Full unit description required followed by -H4250
50	Threaded Adaptor Fitting	74345-020
51	Intermediate Tee Fitting	74345-040
52	Fitting Reducer	74345-141
53	Compact Elbow Fitting	61734-150

## -X27 OPTION PARTS LIST

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

## -R13 OPTION PARTS LIST

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)

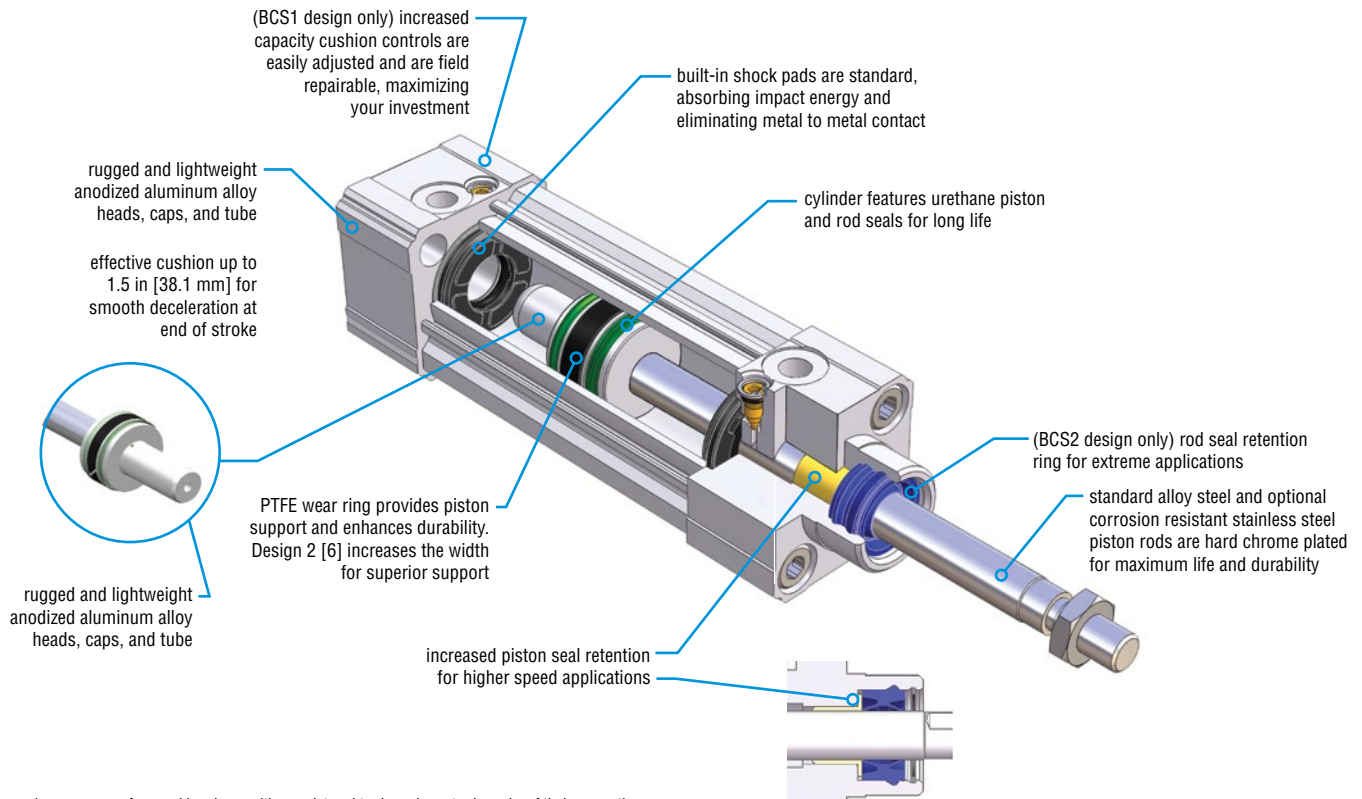
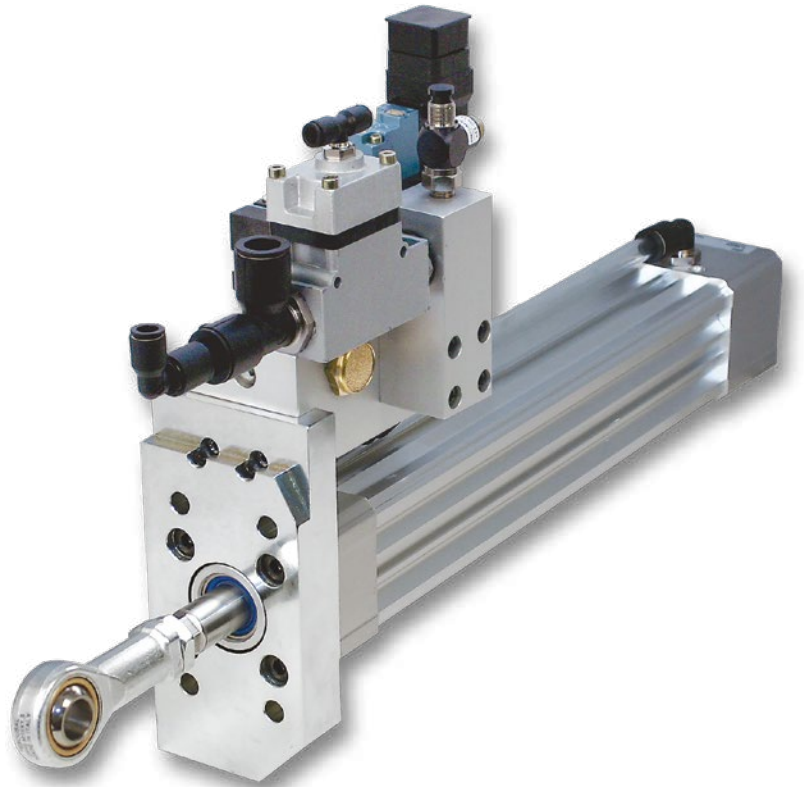
# Universal® Stretching Cylinder

ML309734, ML310058, ML311138, ML310060, & ML310061

**SBO34 ONLY**

## Major Benefits

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



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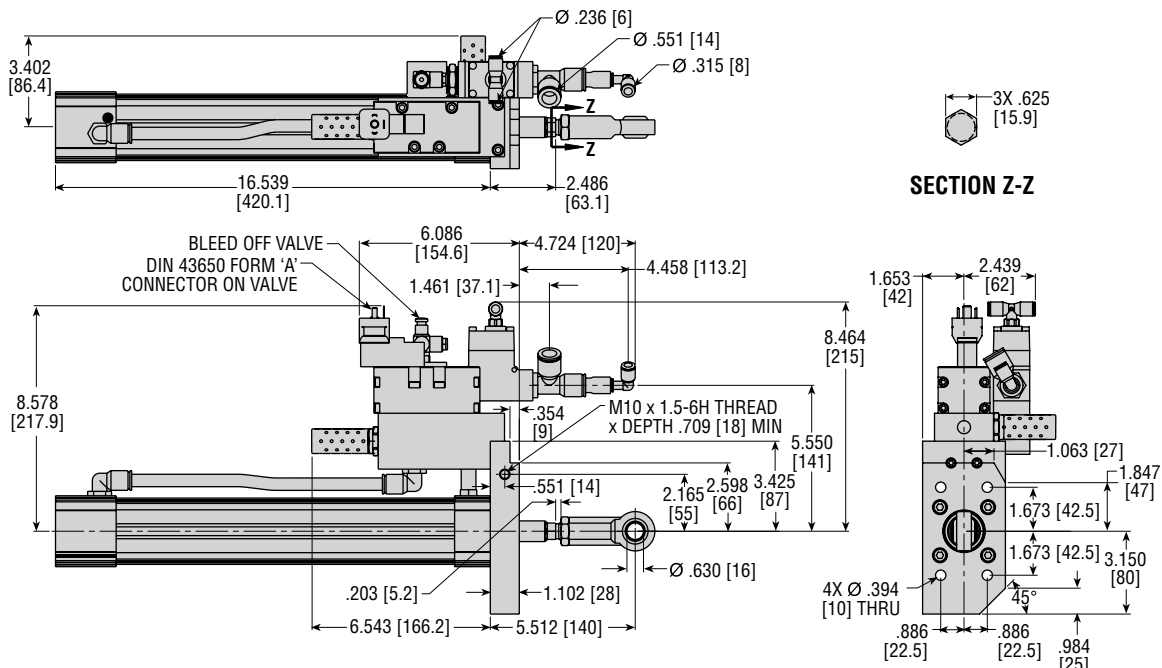
# ENGINEERING DATA: ML309734 & ML310058

SPECIFICATIONS	IMPERIAL	METRIC
TYPE	Pneumatic Cylinder	
SERIES	BCS Stretching Cylinder	
BORE SIZE	1.969 in	50 mm
BORE AREA		
EXTEND	3.04 in <sup>2</sup>	1963 mm <sup>2</sup>
RETRACT	2.56 in <sup>2</sup>	1649 mm <sup>2</sup>
THEORETICAL OUTPUT	264.5 lb @ 87 psi	1176.6 N @ 6 bar
OPERATION	Double Acting	
OPERATING PRESSURE RANGE	7.5 - 150 psi	0.5 - 10 bar
AMBIENT TEMPERATURE	-20 to +180°F	-29 to +82°C
MAX. OPERATING PISTON SPEED	80 in/sec	2.03 m/sec
ADJUSTABLE CUSHION - RETRACT	Standard	
LUBRICATION; FOOD GRADE	FDA Regulation 21CFR 178.3570	
MAXIMUM STROKE	17.72 in	450 mm
STROKE TOLERANCE	+0.079/-0.000 in	+2.0/-0.0 mm
WEIGHT	15.1 lb	5.6 kg
ALLOWABLE KINETIC ENERGY		
RETRACT	181.5 in-lb	20.5 Nm
EXTEND	8.7 in-lb	0.98 Nm
SHOCK PAD	Thermoplastic Polyester Elastomer (TPE)	
HEADS & CAPS	Anodized Aluminum	
CYLINDER TUBE	Anodized Aluminum	
PISTON ROD	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 21CFR 178.3570
FILTRATION	40 Micron
OPERATING PRESSURE RANGE	20 to 150 psi [1.37 to 10 bar]
AMBIENT FLUID TEMPERATURE	0° to 120°F [-18° to 50°C]

## DIMENSIONS: ML309734 & ML310058

**ML309734 with valve, ML310058 without valve**  
50x290 Model SBO34 machines only

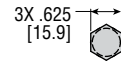
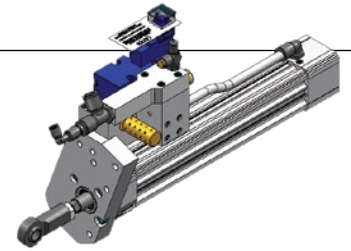
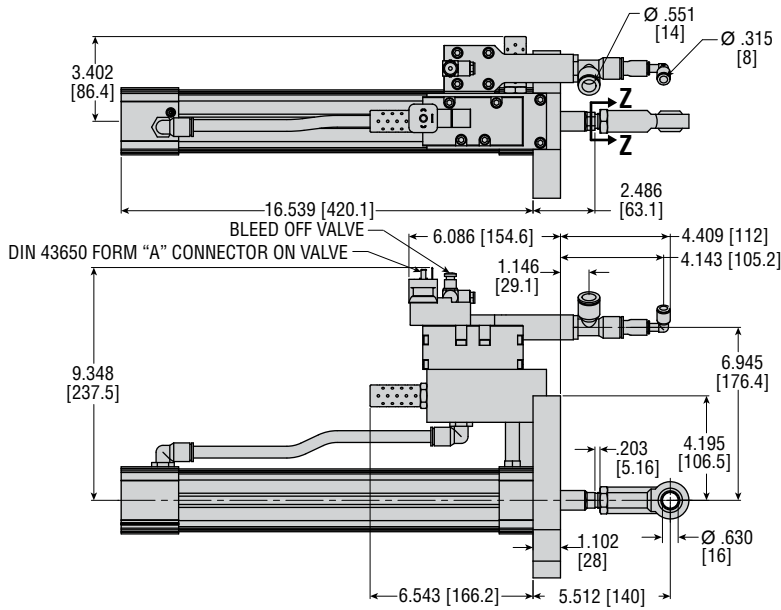


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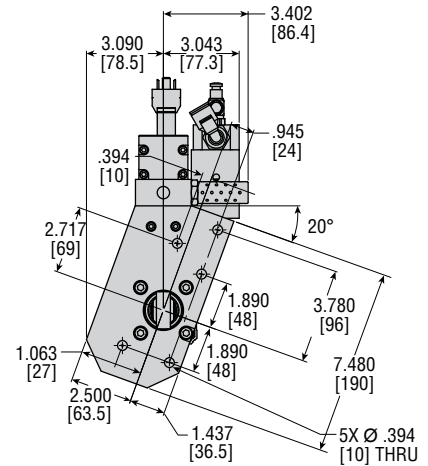
# DIMENSIONS: ML311138

## ML311138

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



SECTION Z-Z



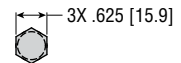
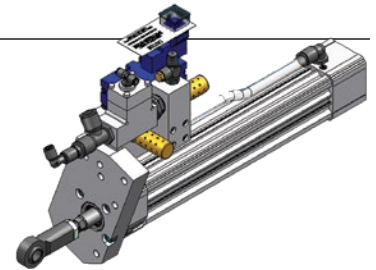
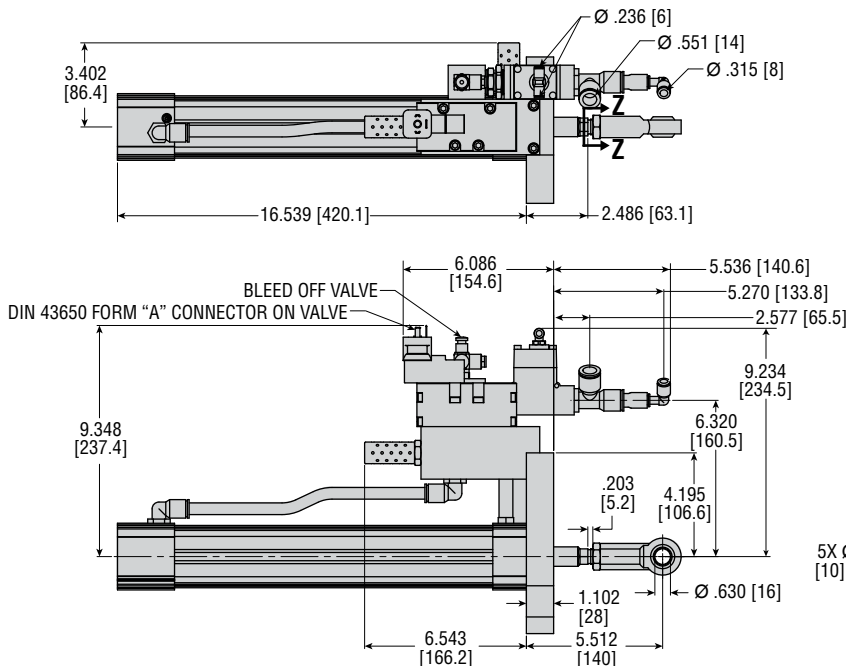
# DIMENSIONS: ML310060 & ML310061

## ML310060 with valve

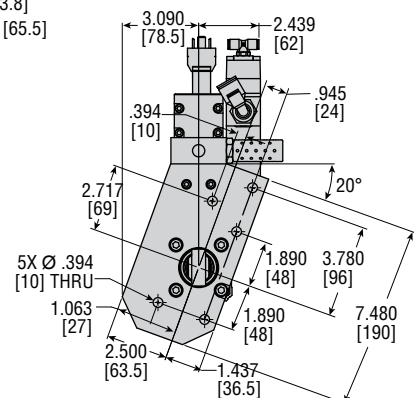
50x290 Model SBO34 machines only 70° flange with pilot operated check valve

## 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.