

Position Control System Products

Position Feedback Cylinders	7.3-7.9
Position Feedback Cylinder Rod Lock	7.10-7.11
Position Feedback Cylinder Accessories	7.12-7.15
Position Feedback Pneu-Turn	7.16-7.24
Position Control System	7.25-7.36
Digital Panel Meter	7.37-7.42
Electronic Controller	7.43-7.45
PFC/PCS Application Checklist	7.46-7.48



Bimba Position Feedback Cylinders

The Bimba Position Feedback Cylinder provides continuous position sensing in a lightweight, small-bore air cylinder.

Ideal for applications where magnetic position sensing is impractical, where variations in cylinder speed or stroke are needed, or where an operation requires constant monitoring of cylinder position.

Hard chrome-plated carbon steel piston rod with blackened threads and wrench flats

Sintered bronze rod bushing

Internally lubricated piston seal and rod wiper

304 stainless steel cylinder body

Anodized aluminum alloy end caps

Standard 6" lead or optional 3-pin connector

Advantages

- Highly accurate: infinite resolution, linearity of ± 1 percent of full stroke, ± 0.001 " mechanical repeatability.
- Less than 0.75" longer than conventional magnetic piston cylinders.
- Reduces weight and size.
- Repairable.
- Internally-lubricated seals.
- Standard wipers and piston bearing strips for long cylinder life.
- Optional bumpers.
- Choice of standard 6" lead wire or 3-pin connector.
- Electronic controllers available for dual set point and scalable analog output applications.
- Rear head cap can be rotated for optimal positioning of lead or connector.



Bimba Position Feedback Cylinders

This section contains Bimba's Position Feedback Products. These products are ideal for applications that require increased flexibility and adaptability. They are perfect for automated assembly processes that require quick changeovers or for mass customized product assembly.

The Position Feedback Cylinder (Model PFC) is a linear pneumatic actuator that contains an internal LRT (Linear Resistive Transducer). The PFC can be used for measuring and gauging, positioning, and "on-the-fly" applications. Combine the PFC with the Bimba Pneumatic Control System Model PCS, Digital Panel Meter Model DPM, or the Electronic Controller described below to maximize performance.

The PneuTurn rotary actuator with position feedback (Model PTF) is a rotary rack and pinion actuator that has a rotary potentiometric feedback transducer attached to the output shaft. The PTF can be combined with Bimba's Pneumatic Control System Model PCS described below for closed loop rotary positioning.

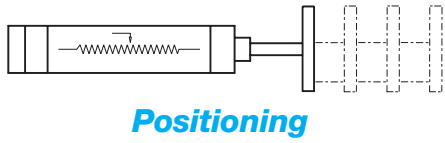
The Pneumatic Control System (PCS) is a closed loop pneumatic motion control system that controls the position of the PFC rod or the PTF shaft. The system includes the control electronics and valves necessary to accurately control any Bimba position feedback actuator.

The Digital Panel Meter (Model DPM) is a digital panel meter that has a 16 bit A/D converter and built in microprocessor. When combined with the PFC, the repeatability is 0.001 inch per inch of stroke. The DPM is great for accurate measuring and gauging applications. It is easily calibrated to indicate actual displacement and includes multiple programmable set point outputs. Recommended applications include Go/No Go in-process quality control verification, part identification, and dimensional verification.

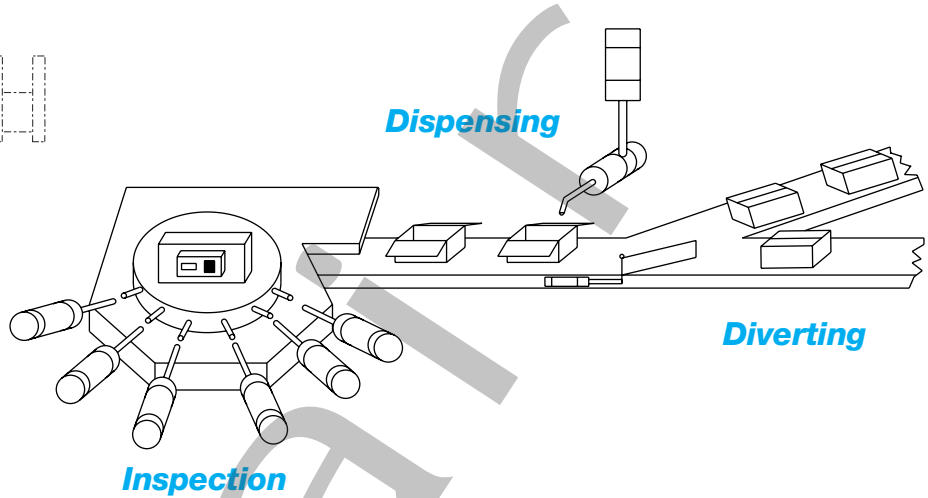
The Electronic Controllers can be used for applications that require accuracy larger than ± 0.030 ". It has 10 VDC transducer excitation and fast responding scalable analog output capability. It is good for applications that use controllers that do not have the required PFC input impedance of 1 Mohm.

Bimba Position Feedback Cylinders

Applications



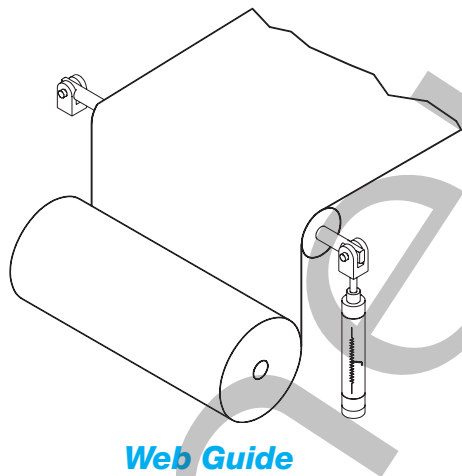
Positioning



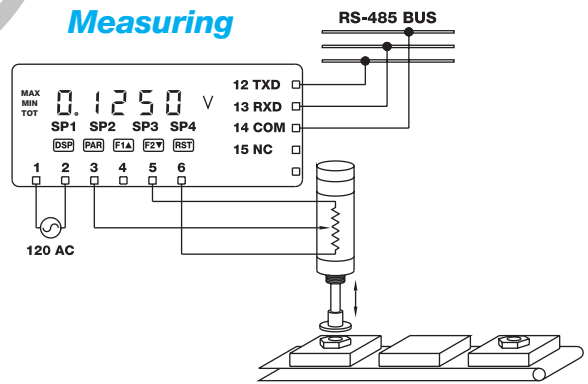
Dispensing

Diverting

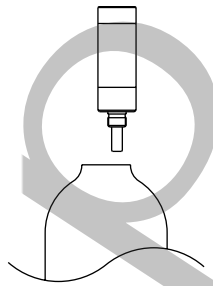
Inspection



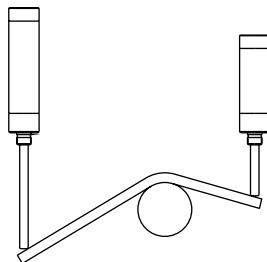
Web Guide



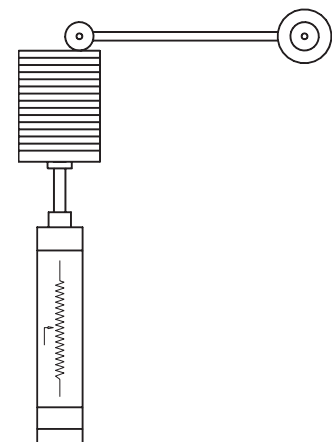
Measuring



Verification



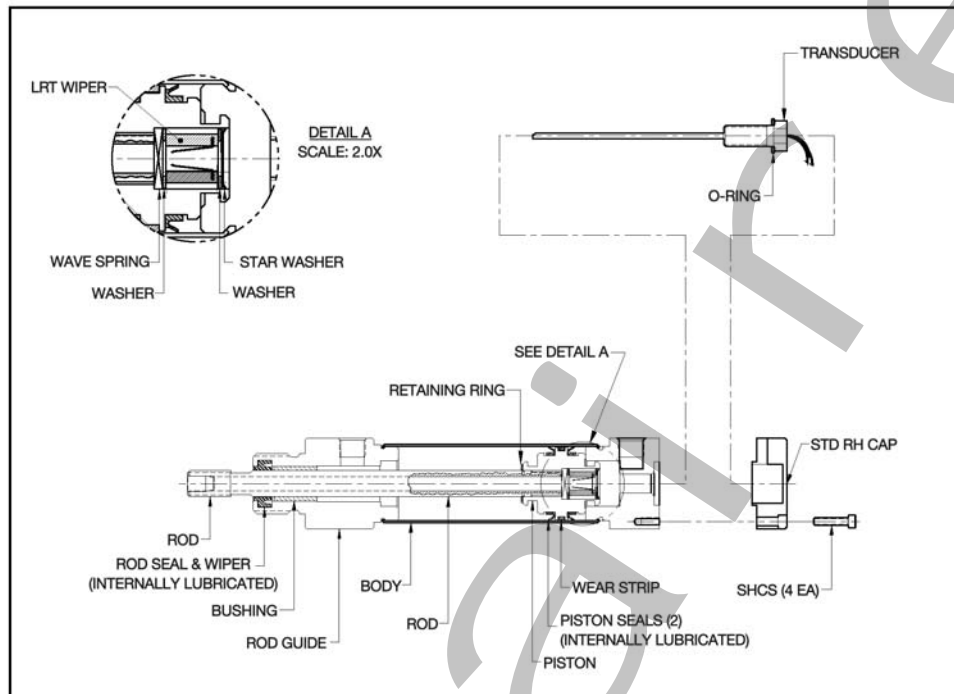
Process Acceptance



Stacker

Bimba Position Feedback Cylinders

How it Works



The *Bimba Position Feedback Cylinder* contains a Linear Resistive Transducer (LRT) or potentiometer mounted in the cylinder rear head. The LRT probe, which has a resistive element on one side and a collector strip on the other, is inside the cylinder rod. A wiper assembly is installed in the piston. As the piston moves, an electrical circuit is created between the resistive element and collector strip. A variable resistance (approximately 1K Ω per inch of stroke) proportional to piston position in the cylinder is produced by the cylinder. Consult www.bimba.com/techctr/techcenter.htm for a table of nominal resistance values at full extend and full retract for various strokes and options.

The cylinder can be easily setup to produce an analog signal compatible with 0-10 VDC PLC analog inputs.

The accuracy of an LRT is determined by three factors: resolution, linearity and repeatability.

Resolution refers to the smallest change that can be detected on the LRT. The Bimba LRT has infinite resolution, and can be divided into as many parts as the electronics allow. For example, with a 12-bit, 4096-part controller, the stroke could be divided into 4096 parts. When 10 VDC are placed on a 10" cylinder, the smallest detectable increment would be $10 \text{ VDC} \div 4096 = 2.4 \text{ millivolts}$ or $0.0024"$. Resolution is stroke sensitive, i.e., the longer the stroke, the less resolution.

Linearity refers to the maximum deviation of the output voltage to a straight line. The Bimba LRT's linearity is ± 1 percent of stroke.

Repeatability is the ability of the LRT to provide the same output voltage relative to a unique cylinder position each time the cylinder is cycled. Mechanical repeatability of the Bimba Position Feedback Cylinder is $\pm 0.001"$.

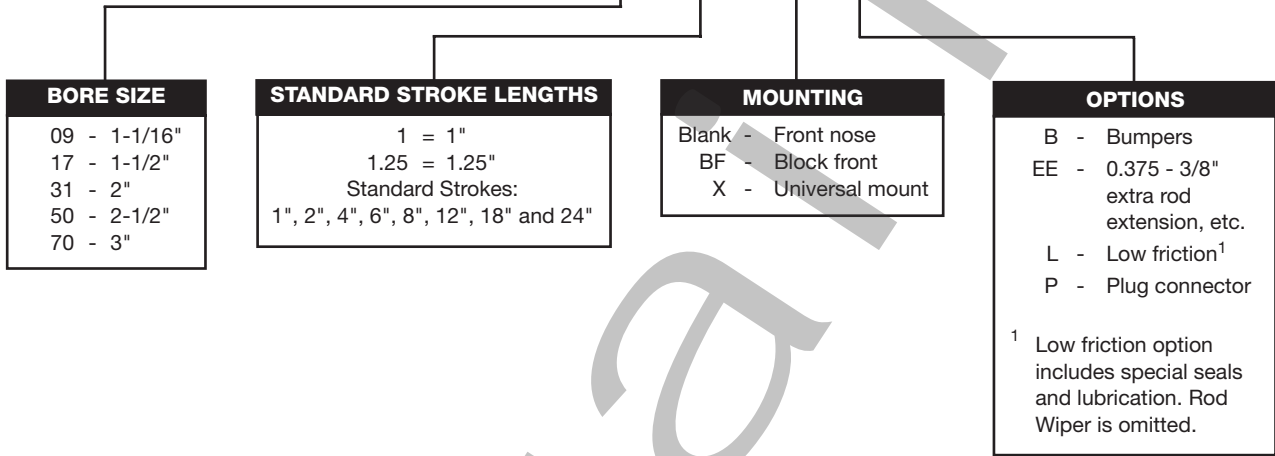
Bimba Position Feedback Cylinders

How to Order

The model number of all Position Feedback Cylinders consists of three alphanumeric clusters. These designate product type, bore size and stroke length, and mounting style and options. Please refer to the charts

below for an example of model number **PFC-0912-BFP**. This is an 1-1/16" bore, 12" stroke Position Feedback Cylinder with block front mounting and a plug connector.

PFC-0912-BFP

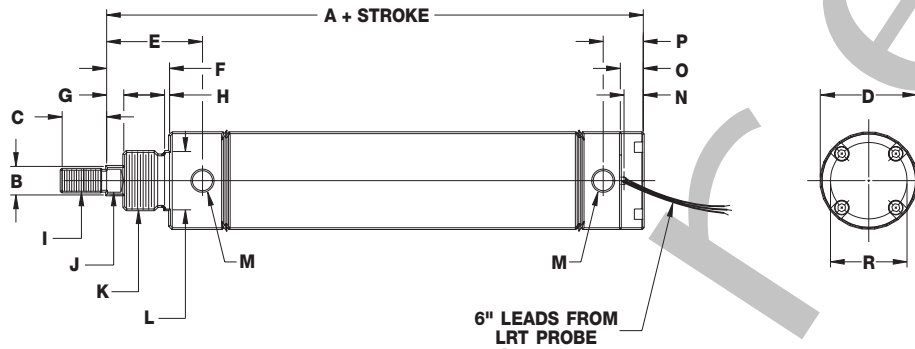


Approximate Power Factors

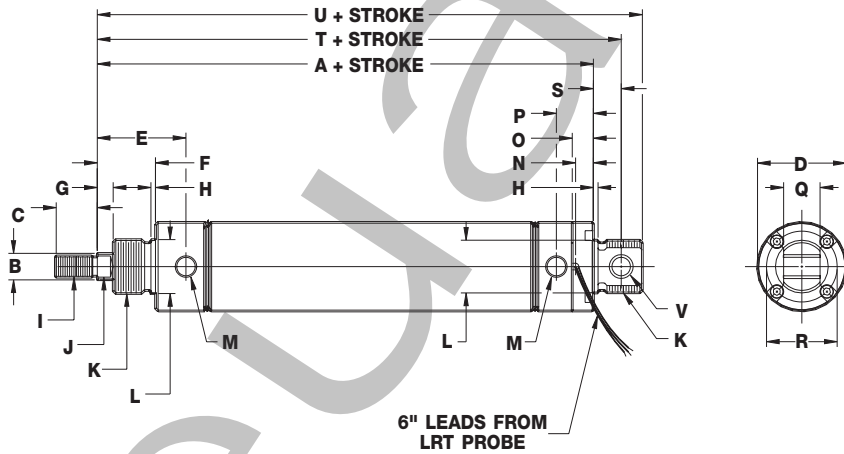
1-1/16" = 0.9	For example, a PFC-0912-BFP will exert a force of 0.9 times the air line pressure; a PFC-506-XB will exert a force of 5.0 times the air line pressure, etc.
1-1/2" = 1.7	
2" = 3.1	
2-1/2" = 5.0	
3" = 7.0	

Bimba Position Feedback Cylinders

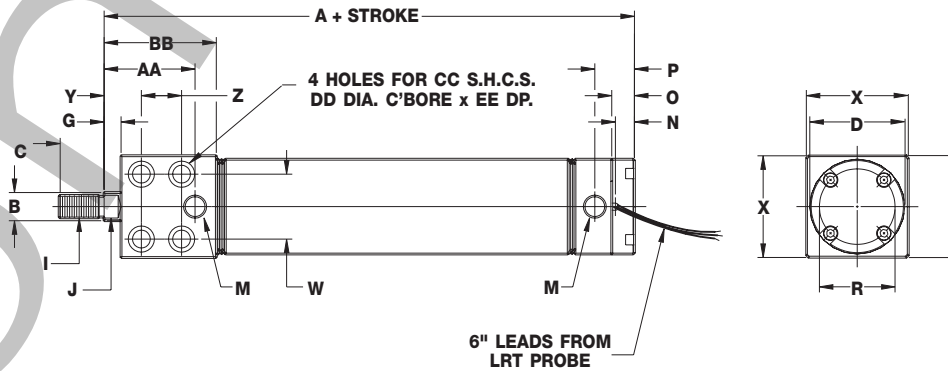
Nose Mount



Universal Mount (for stud or pivot). Includes bushing.



Block Mount



Note: Mounting holes farthest from rod end are omitted for -L option for 11/16" bore.

Bimba Position Feedback Cylinders

Dimensions (in.)

	1-1/16" Bore (09)		1-1/2" Bore (17)	2" Bore (31)	2-1/2" Bore (50)	3" Bore (70)
A	4.59		4.88	5.72	6.41	6.78
B	Ø 0.38		Ø 0.50	Ø 0.63	Ø 0.75	Ø 0.75
C	0.63		0.88	1.00	1.25	1.25
D	Ø 1.31		Ø 1.58	Ø 2.09	Ø 2.58	Ø 3.13
E	1.75	Option L 1.52	1.72	2.10	2.28	2.53
F	1.06		1.13	1.38	1.50	1.69
G	0.31		0.31	0.38	0.44	0.44
H	0.08		0.09	0.11	0.13	0.13
I	3/8-24 UNF		7/16-20 UNF	1/2-20 UNF	5/8-18 UNF	5/8-18 UNF
J	0.31		0.44	0.50	0.63	0.63
K	7/8-14 UNF		1-1/8-12 UNF	1-1/4-12 UNF	1-3/8-12 UNF	1-1/2-12 UNF
L	Ø 0.87		Ø 1.12	Ø 1.25	Ø 1.37	Ø 1.62
M	1/8 NPT		1/4 NPT	1/4 NPT	3/8 NPT	3/8 NPT
N	0.36		0.36	0.42	0.48	0.55
O	0.44		0.44	0.50	0.56	0.63
P	0.84		0.81	0.88	1.12	1.88
Q	0.62		0.74	0.86	0.99	0.99
R	Ø 1.09		Ø 1.36	Ø 1.67	Ø 2.06	Ø 2.44
S	0.47		0.56	0.66	0.75	0.81
T	5.06		5.44	6.38	7.16	7.60
U	5.44		5.91	6.88	7.78	8.22
V	Ø 0.31		Ø 0.38	Ø 0.44	Ø 0.50	Ø 0.50
W	0.88		1.25	1.44	1.88	2.25
X	1.38		1.75	2.25	2.75	3.25
Y	0.75		0.69	0.75	0.88	0.94
Z	0.88		0.75	1.00	1.25	1.38
AA	1.63	Option L 1.52	1.68	1.75	2.13	2.31
BB	2.03		2.00	2.41	2.72	2.91
CC	#10		1/4	3/8	7/16	1/2
DD	Ø 0.33		Ø 0.41	Ø 0.58	Ø 0.67	Ø 0.77
EE	0.20		0.25	0.39	0.45	0.52

Bumper Length Adder: 0.25"

Position Feedback
Cylinders

Position Feedback
Cylinder Rod Lock

Position Feedback
Cylinder Accessories

Position Feedback
Pneu-Turn

Position
Control System

Digital Panel Meter

Electronic Controller

PLC/PCS
Application Checklist

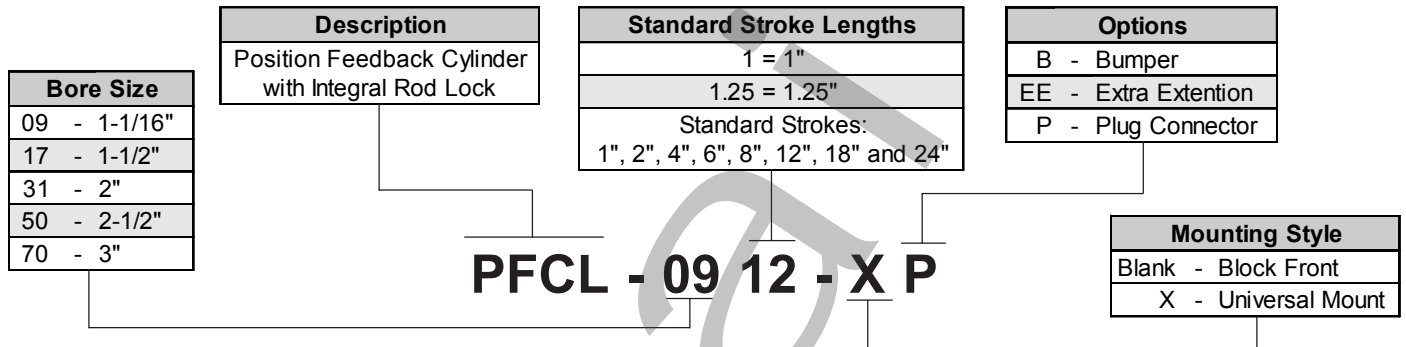
Bimba Position Feedback Cylinder Rod Lock



How to Order

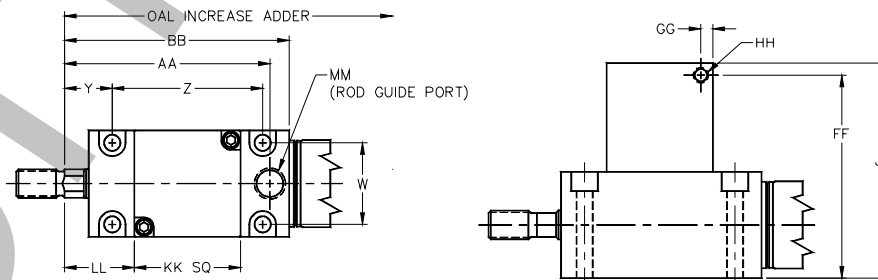
The model number for all Position Feedback Cylinder Rod Lock actuators consists of three alphanumeric clusters. These designate product type, bore size and stroke length, and mounting style and options.

Please refer to the charts below for an example of model number PFCL-0912-XP. This is a 1-1/16" bore by 12 inch stroke with an Optional Plug Connector and Low Friction seals.



Notes: Low Friction seals on the piston are standard on the PFCL. Rod Wiper is included on PFCL to keep out any contaminants. Only available in Block Front Mounting on the Rod Guide.

Dimensions*



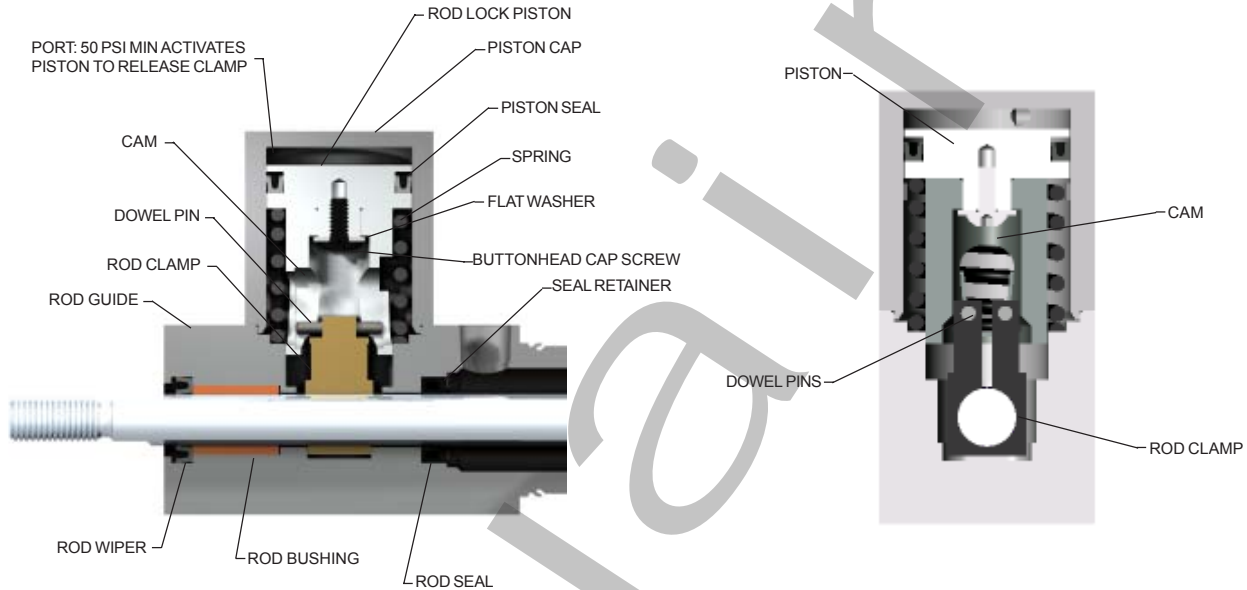
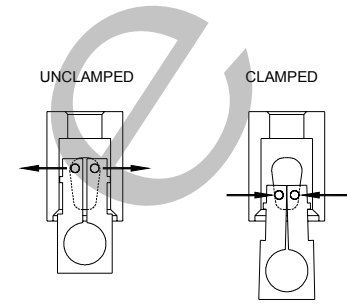
Bore	W	Y	Z	AA	BB	FF	GG	HH	JJ	KK	LL	MM	OAL Increase Adder
1-1/16" (09)	1.06	.62	1.95	2.66	2.91	2.62	.16	#10-32	2.78	1.38	.90	1/8 NPT	1.08
1-1/2" (17)	1.25	.64	2.75	3.36	3.68	3.13	.25	1/8 NPT	3.38	1.75	1.14	1/4 NPT	1.68
2" (31)	1.62	.82	3.13	3.97	4.34	4.20	.38	1/8 NPT	4.45	2.25	1.26	1/4 NPT	1.94
2-1/2" (50)	1.88	.87	3.62	4.62	5.05	5.34	.33	1/4 NPT	3.67	2.75	1.31	3/8 NPT	2.33
3" (70)	2.25	.90	4.17	5.17	5.59	5.86	.50	1/4 NPT	6.28	3.25	1.35	3/8 NPT	2.69

*All other dimensions are same as standard PFC.

Bimba Position Feedback Cylinder Rod Lock

How it Works

- Dowel pins ride in the cam groove.
- When air pressure is present, piston actuates and dowel pins follow cam to open position, allowing piston rod to travel freely through clamp.
- In absence of pressure, the spring actuates piston and dowels follow to closed position, activating the rod clamp.



Engineering Specifications*

- Operating Medium: Air
- Operating Pressure: 50psi minimum (to actuate lock piston)
125psi maximum
- Temperature Range: -20 to +200 degrees F
- Lubrication: HT-99
- Cylinder Body: 304 stainless steel
- Rod Guide: Aluminum
- Cap: Anodized aluminum
- Piston and Rod Seal: Buna-N
- Rod and Pivot Bushing: Sintered bronze
- Piston Rod: Hard chrome plated carbon steel
- Expected Service Life: 5 million cylinder actuations
1 million lock actuations

*PFC specifications are on page 7.15.

Rod Lock Holding Forces

Bore	Holding Force (Pounds)
3/4" (04)	40
1-1/16" (09)	90
1-1/2" (17)	170
2" (31)	310
2-1/2" (50)	500
3" (70)	700

Operating Guidelines/Product Precautions

- The Rod Lock is not a safety device.
- Do not use for intermediate stopping; the cylinder is designed to prevent drift from a stationary position.
- Load weight must not exceed the stated holding force for the cylinder.
- Do not release rod lock if full pressure is present on either extend or retract. Uncontrolled motion will result that could damage internal components or cause personal harm.

Bimba Position Feedback Cylinder Accessories

Options

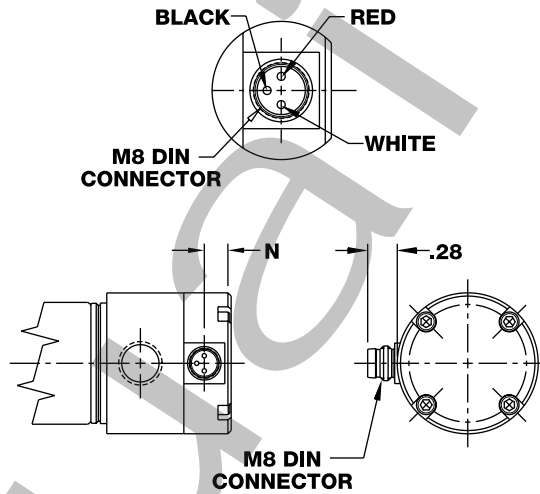
3-pin Connector

Wire Colors

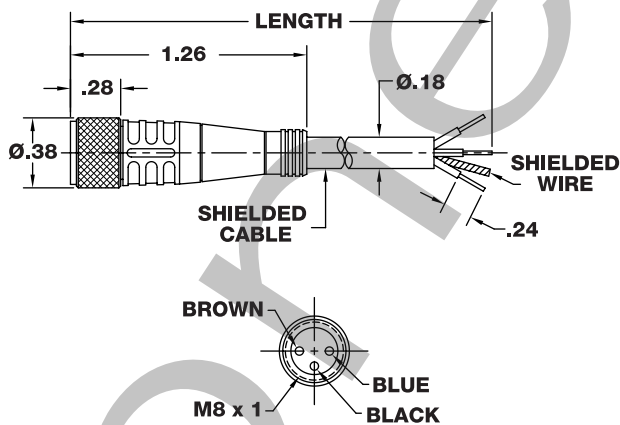
WIRES	6" LEADS	PLUG
Input	Red	Blue
Ground	Black	Black
Output	White	Brown

Dimensions (in.)

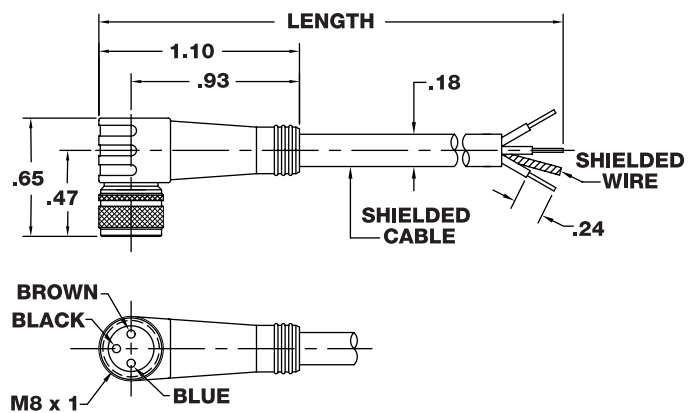
Bore	N
09	0.25
17	0.25
31	0.31
50	0.38
70	0.44



Straight-Models C4-S (2m), C4X-S (5m)



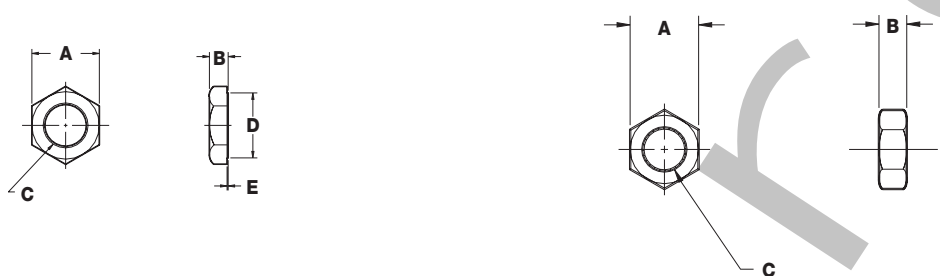
Right Angle-Models C5 (2m), C5X (5m)



Cable: 24 AWG PVC insulated, fine stranded copper conductors, with Gray PVC jacket

Accessories (in.)

Mounting Nuts

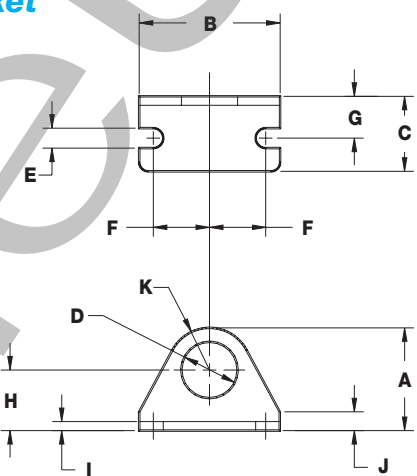


Model D-2540

**Models D-2545
D-8484
D-508
D-5379**

Bore	Model	A	B	C	D	E
1-1/16" (09)	D-2545	1.31	0.48	7/8-14 UNF-2B	N/A	N/A
1-1/2" (17)	D-8484	1.69	0.61	1-1/8-12 UNF-2B	N/A	N/A
2" (31)	D-508	1.88	0.50	1-1/4-12 UNF-2B	1.81	0.03
2-1/2" (50)	D-2540	1.88	0.50	1-3/8-12 UNF-2B	1.81	0.03
3" (70)	D-5379	2.25	0.50	1-1/2-12 UNF-2B	2.25	0.02

Mounting Bracket



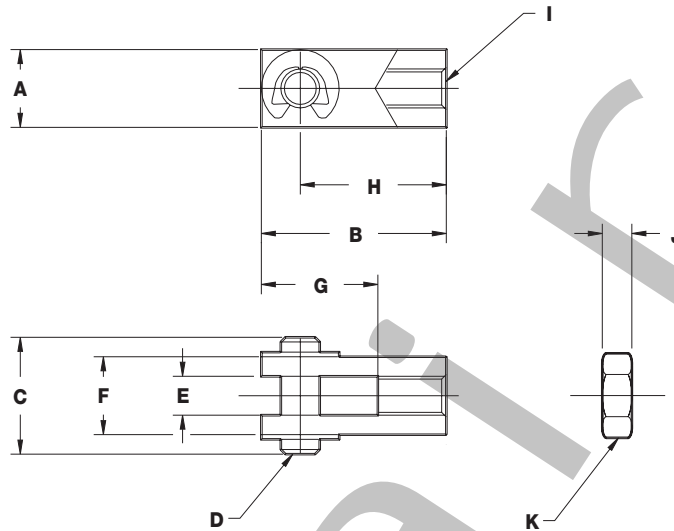
Bore	Model	A	B	C	D	E	F	G	H	I	J
1-1/16" (09)	D-8316	1.75	2.12	1.16	0.875	0.28	0.78	0.66	1.00	0.16	0.32
1-1/2" (17)	D-8318	2.19	2.75	1.44	1.125	0.34	1.06	0.81	1.25	0.19	0.38
2" (31)	D-8319	2.44	3.00	1.59	1.25	0.34	1.19	0.91	1.38	0.22	0.44
2-1/2" (50)	D-8320	2.81	3.75	1.88	1.312	0.41	1.50	1.06	1.62	0.25	0.50
3" (70)	D-19127	3.14	4.38	1.62	1.625	0.34	1.75	1.00	1.89	0.25	0.89

- Position Feedback Cylinders
- Position Feedback Cylinder Rod Lock
- Position Feedback Cylinder Accessories
- Position Feedback Pneu-Turn
- Position Control System
- Digital Panel Meter
- Electronic Controller
- PFC/PGS Application Checklist

Bimba Position Feedback Cylinder Accessories

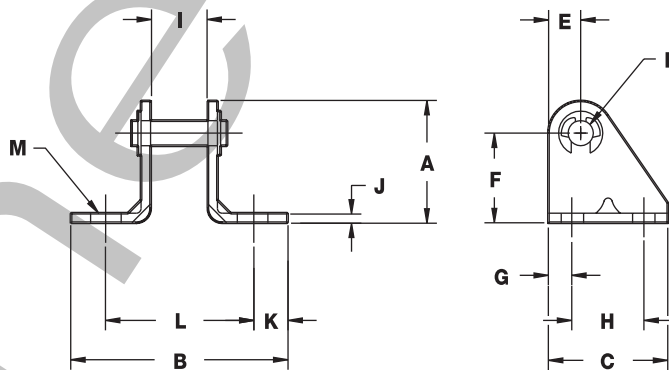
Accessories (in.)

Rod Clevis



Bore	Model	A	B	C	D	E	F	G	H	I	J	K
1-1/16" (09)	D-8310-A	0.62	1.69	0.88	0.312	0.31	0.62	0.94	1.38	3/8-24 THD	0.22	3/8-24 HEX NUT
1-1/2" (17)	D-8311-A	0.75	2.00	1.03	0.375	0.38	0.75	1.12	1.62	7/16-20 THD	0.25	7/16-20 HEX NUT
2" (31)	D-8313-A	0.88	2.31	1.14	0.438	0.44	0.88	1.31	1.88	1/2-20 THD	0.31	1/2-20 HEX NUT
2-1/2" (50) & 3" (70)	D-8314-A	1.00	2.75	1.38	0.50	0.50	1.00	1.50	2.25	5/8-18 THD	0.38	5/8-18 HEX NUT

Pivot Bracket



Bore	Model	A	B	C	D	E	F	G	H	I	J	K	L	M
1-1/16" (09)	D-8322-A	1.31	2.38	1.31	0.312	0.31	1.00	0.25	0.81	0.62	0.16	0.31	1.75	0.28
1-1/2" (17)	D-8324-A	1.62	3.00	1.62	0.375	0.38	1.25	0.31	1.00	0.75	0.19	0.44	2.13	0.34
2" (31)	D-8325-A	1.81	3.25	1.81	0.438	0.44	1.38	0.31	1.19	0.88	0.25	0.44	2.38	0.34
2-1/2" (50) & 3" (70)	D-8326-A	2.12	4.00	2.12	0.50	0.50	1.62	0.38	1.38	1.00	0.25	0.62	2.75	0.41

Bimba Position Feedback Cylinder Accessories

ORDER
ONLINE

Engineering Specifications

Repeatability:	±0.001" Cylinder Only. <i>Refer to specifications in the following sections for positioning or measuring repeatability. Power supply ripple and A/D error may reduce repeatability when PFC is utilized with industrial control systems.</i>
Nonlinearity:	± 1 percent of full stroke
Resolution:	Infinite
Signal Input:	10 VDC typical
Input Impedance Required:	1 MOhm
Signal Output:	> 0 to slightly less than FS signal input <i>(The internal electrical stroke is slightly larger than the mechanical stroke of cylinder)</i>
Maximum speed:	25 in./sec.
Rated Life of LRT Wiper:	1,000 ¹ miles of travel
Rated Life of Probe:	10 million cycles ¹
Air Requirements:	Filtered to 5 micron with 0 degree dewpoint recommended. Moisture inside cylinder will cause output signal fluctuation.
Pressure Rating:	150 psi
Temperature Rating:	0° to 200°F ²
Interface:	6" standard leads or optional 8mm DIN connector
Cylinder Body:	304 stainless steel
Piston Rod:	Hard chrome plated carbon steel with blackened threads and wrench flats
Rod Bushing:	Sintered bronze
End Caps:	Anodized Aluminum alloy
Piston Seal:	Internally lubricated urethane (standard) Internally lubricated Buna (L option)
Rod Wiper:	Internally lubricated Buna N (omitted on L option)
Rod Seal:	Internally lubricated Buna N (N/A on standard model)

¹ Higher velocities increase wear rate.

² Special low temperature lubrication is required for positioning applications using option L seals below 35°F.

ESTIMATED CYLINDER WEIGHTS (LBS)					
	1-1/16"	1-1/2"	2	2-1/2"	3
PFC-	0.44	0.88	2.02	2.78	3.62
PFC-X	0.49	0.96	2.14	2.96	3.85
PFC-BF	0.54	1.07	2.28	3.02	4.08
ADDER WT/IN	0.06	0.10	0.15	0.20	0.29

Repair Parts

PART	DESCRIPTION
RPFC-Bore Stroke-Options*	Replacement Cylinder
RD-53129-Stroke-Options**	Replacement Probe

* Only options required are BF, B, and L as Rear Cap is not included.

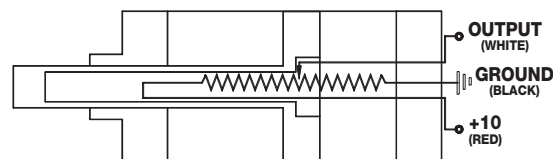
** Only option required for replacement probe is Option P.

How to Order

Add the bore size, stroke and options needed to the basic model number shown above for a replacement cylinder.

Add the stroke length to the basic model number shown above for a replacement probe. For example, a replacement probe for a 6" stroke Position Feedback Cylinder would be ordered as a RD-53129-6.

LRT CIRCUIT DIAGRAM



STROKE = 0; OUTPUT VOLTAGE = 0 VOLTS
STROKE = FULL; OUTPUT VOLTAGE = 10 VOL

Position Feedback
Cylinders

Position Feedback
Cylinder Rod Lock

Position Feedback
Cylinder Accessories

Position Feedback
Pneu-Turn

Position
Control System

Digital Panel Meter

Electronic Controller

PFC/PGS
Application Checklist