Related Products

Related Products

Bimba Flow Controls

FCP

Adjusting Needle

3-Stage Tapered Stainless Steel Needle

Anodized Aluminum Stem

Chrome Plated Banjo Connector

Lip Seal Design

Dry Film Thread Sealant

FQP

Adjusting Needle

3-Stage Tapered Stainless Steel Needle

Anodized Aluminum Stem

Dry Film Thread Sealant

Locknut

Chrome Plated Banjo Connector

Collet

"O" Ring

Gripping Teeth

Lip Seal Design

FREE FLOW

CONTROLLED FLOW

FQPS Series

FLOW DATA @ 72PSI

Air Flow (SCFM)

12
10
8
6
4
2
0

0 1 2 3 4 5 6 7 8 9 10

Turns from shut-off

1/4 NPT
1/8 NPT
#10-32 NPT

FQP & FCP Series

FLOW DATA @ 60PSI

Air Flow (SCFM)

30
25
20
15
10
5

0 1 2 3 4 5 6

Turns from shut-off

1/2 NPT
3/8 NPT
1/4 NPT
1/8 NPT
#10-32 NPT

10.2

Flow Controls

Air Booster Cylinders

Air Reservoirs

Manual Valves

Shock Absorbers

Transition Plates

Application Checklist

Alignment Couplers

Appendix

For 10-32 port, 5⁄32" OD tubing	FQPS1 $12.35	FQPS1K $12.35

8mm HEX .77
.80 #10−32 UNF−2A .20
.96 MAX (KNOB)
.61 MAX (RECESSED)
.27
5/32 O.D. TUBE FITTING
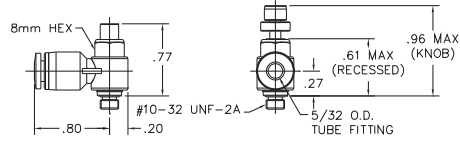
For 10-32 port, ¼" OD tubing	FQPS12 $13.50	FQPS12K $13.50

8mm HEX .77
.93 #10−32 UNF−2A .20
.90 MAX (KNOB)
.55 MAX (RECESSED)
.22
1/4 O.D. TUBE FITTING
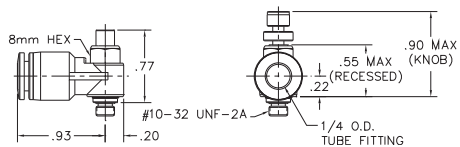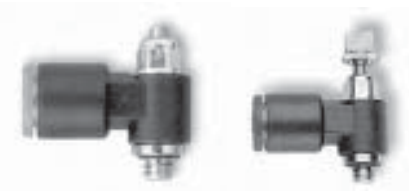
For 1⁄8 port, ¼" OD tubing	FQPS2 $14.50	FQPS2K $14.50

11mm HEX .89
.98 .28
1/8 NPT
1.22 MAX (KNOB)
.70 MAX (RECESSED)
.25
1/4 O.D. TUBE FITTING
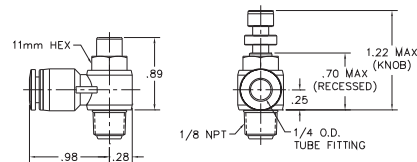
For 1⁄8 port, 5⁄32" OD tubing	FQPS21 $13.20	FQPS21K $13.20

11mm HEX .89
.96 .28
1/8 NPT
1.22 MAX (KNOB)
.70 MAX (RECESSED)
.24
5/32 O.D. TUBE FITTING
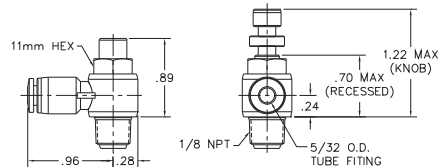
For ¼ port, ¼" OD tubing	FQPS44 $18.55	FQPS44K $18.55

16mm HEX .98
1.05 .36
1/4 NPT
1.35 MAX (KNOB)
.76 MAX (RECESSED)
.26
1/4 O.D. TUBE FITTING
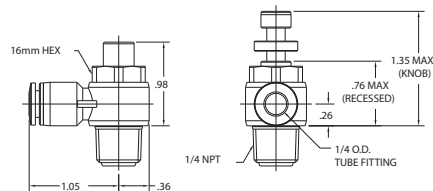
Materials:

Adjusting knob and thread: brass (RoHS approved)

Body: Thermoplastic Polymer

Tubing: Nylon and polyurethane tubing

Maximum Operating Pressure: 150 PSI air only

Operating Temperature Range: 30°F to 140°F (0°C to 60°C)

Bimba Flow Controls – FCP Series

FCP1 $12.10	FCP1K $13.30	FCP1L $13.65	*For 10-32 port*

FCP2 $14.20	FCP2K $15.55	FCP2L $15.90	*For 1/8 port*
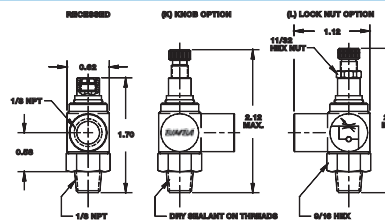
FCP4 $18.15	FCP4K $20.25	FCP4L $20.65	*For ¼ port*

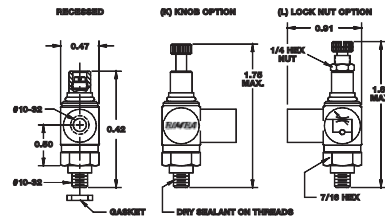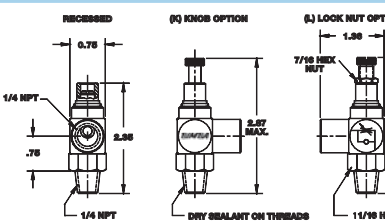| FCP6 $22.55	FCP6K $24.80	FCP6L $25.00	*For 3/8 port*
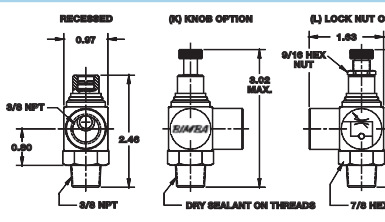
FCP8 $29.85	FCP8K $33.00	FCP8L $33.30	*For ½ port*
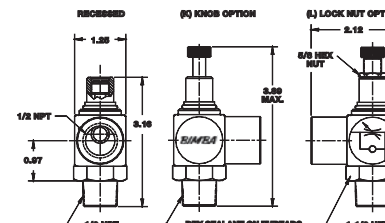
Materials:

Banjo Connector:
Chrome plated, zinc die cast

Banjo Retaining Ring:
Zinc plated steel

Stem:
High strength anodized aluminum alloy

Adjusting Needle:
Stainless steel

"O" Rings and Lip Seal:
Buna N

Maximum Operating Pressure:
150 PSI air only

Operating Temperature Range:
-20 degrees to +200 degrees F
(-25°C to +95°C)

Bimba Quik-Flo® Flow Controls – FQP Series

Flow Controls

Air Booster Cylinders

Air Reservoirs

Manual Valves

Shock Absorbers

Transition Plates

Application Checklist

Alignment Couplers

Appendix

For 10-32 port, 5⁄32" OD tubing

FQP1	FQP1K
$13.20	$15.15
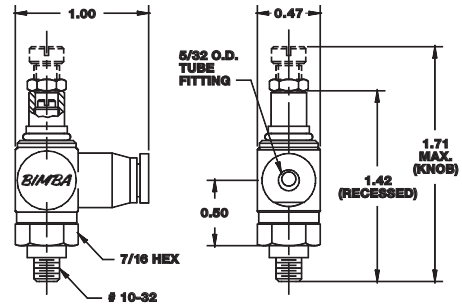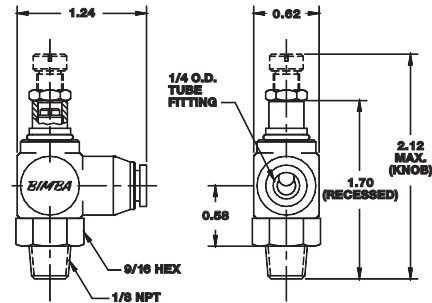
1.00   0.47

5/32 O.D. TUBE FITTING

1.71 MAX. (KNOB)

1.42 (RECESSED)

0.50

7/16 HEX

10-32

For 1⁄8 port, ¼" OD tubing

FQP2	FQP2K
$15.70	$17.95

1.24   0.62

1/4 O.D. TUBE FITTING

2.12 MAX. (KNOB)

1.70 (RECESSED)

0.58

9/16 HEX

1/8 NPT

For 1⁄8 port, 5⁄32" OD tubing

FQP21	FQP21K
$15.70	$17.95

1.21   0.62

5/32 O.D. TUBE FITTING

2.12 MAX. (KNOB)

1.70 (RECESSED)

0.58

9/16 HEX

1/8 NPT

For ¼ port, 3⁄8" OD tubing

FQP4	FQP4K
$20.00	$22.95

1.46   0.75

3/8 O.D. TUBE FITTING

2.91 MAX. (KNOB)

2.34 (RECESSED)

0.75

11/16 HEX

1/4 NPT
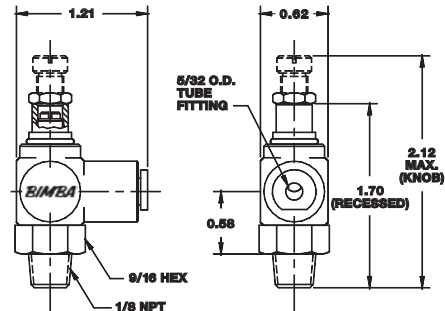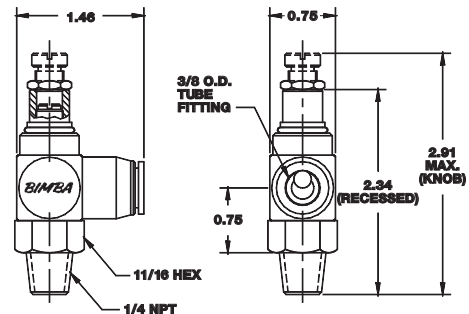
CV Factors for Bimba Flow Controls

The following estimated CV factors apply to Bimba Flow Controls in both the FCP and FQP Series.

Models	Free Flow	Controlled Flow
FCP1, FCP1K, FCP1L, FQP1, FQP1K	0.12	0.09
FCP2, FCP2K, FCP2L, FQP21L, FQP2, FQP2K, FQP21K	0.24	0.21
FCP4, FCP4K, FCP4L, FQP4, FQP4K, FQP44, FQP44K	0.50	0.44
FCP6, FCP6K, FCP6L, FQP6, FQP6K	0.91	0.73
FCP8, FCP8K, FCP8L, FQP8, FQP8K	1.33	1.19

Bimba Quik-Flo® Flow Controls – FQP Series

FQP44
$20.00

FQP44K
$22.95

**For ¼ port,
¼" OD tubing**
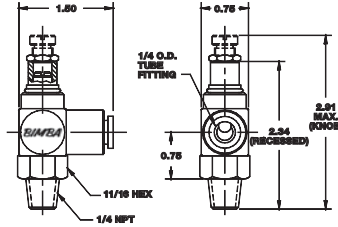
FQP6
$24.80

FQP6K
$28.15

**For 3/8 port,
3/8" OD tubing**
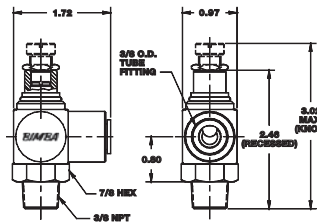
FQP8
$32.25

FQP8K
$36.05

**For ½ port,
½" OD tubing**

Materials:

Banjo Connector:
Chrome plated, zinc die cast

Banjo Retaining Ring:
Zinc plated steel

Stem:
High strength anodized aluminum alloy

Adjusting Needle:
Stainless steel

"O" Rings and Lip Seal:
Buna N

Collet:
Acetal copolymer

Gripping teeth:
Stainless steel

Collet Retainer:
(if applicable):
Brass

Locknut:
416 Stainless steel

Tube Types:
All plastic tubing, including nylon and polyethylene

Maximum Operating Pressure:
150 PSI air only

Operating Temperature Range:
14 degrees to +167 degrees F
(-25°C to +75°C)

Bimba Needle Valves

Bimba offers a range of Quik-Flo® Needle Valves, allowing for controlled flow of both the air intake and exhaust through the same valve. A needle valve can control a double acting cylinder's extension and retraction by controlling the volume of air entering the cylinder and the volume of air leaving the cylinder.

For additional dimensional information, reference Quik-Flo® Flow Controls on pages 10.2 and 10.3. For example, reference FQP1 for QNV1 dimensions.

Model	Price	Tube Size	Port Size	Cv
QNV1	$13.00	5/32"	#10-32	.09
QNV1K	15.05	5/32"	#10-32	.09
QNV2	15.50	1/4"	1/8" NPT	.21
QNV2K	17.85	1/4"	1/8" NPT	.21
QNV44	19.80	1/4"	1/4" NPT	.44
QNV44K	22.60	1/4"	1/4" NPT	.44
QNV6	24.55	3/8"	3/8" NPT	.73
QNV6K	27.90	3/8"	3/8" NPT	.73

Bimba Metric Flow Controls - FCPM Series

Specifications

Fluid:	Air
Maximum Operating Pressure:	10 bar (145 PSI)
Minimum Operating Pressure:	0.1 bar (1.5 PSI)
Temperature Range:	-10° to +80°C
	(-14° to +176°F)
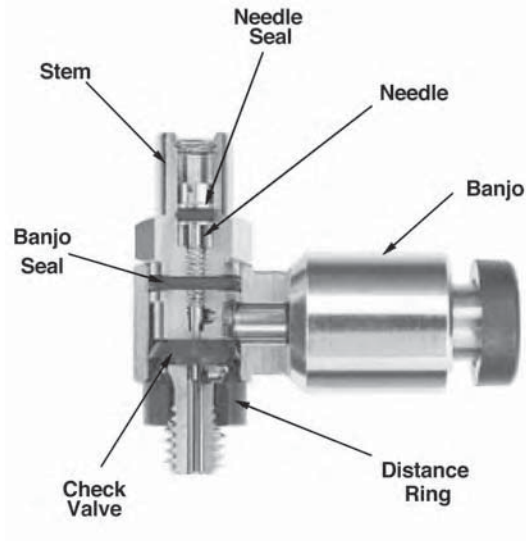
Material Specifications For M5	
Banjo	Nickel Plated Brass
Stem	Nickel Plated Brass
Needle	Nickel Plated Brass
Check Valve	NBR (Buna-N)
Needle Seal	NBR (Buna-N)
Banjo Seal	NBR (Buna-N)
Distance Ring	Reinforced Nylon
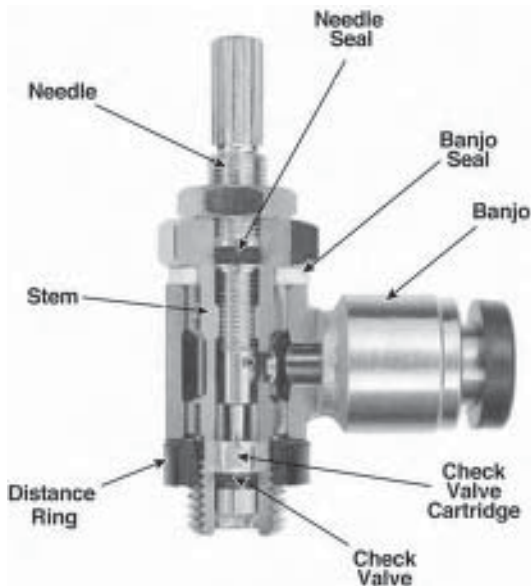
Material Specifications For G1/8" & G1/4"	
Banjo	Nickel Plated Brass
Stem	Nickel Plated Brass
Needle	Nickel Plated Brass
Check Valve	NBR (Buna-N)
Check Valve Cartridge	Brass
Needle Seal	NBR (Buna-N)
Banjo Seal	Reinforced Nylon
Distance Ring	Reinforced Nylon

Flow Controls

Air Booster Cylinders

Air Reservoirs

Manual Valves

Shock Absorbers

Transition Plates

Application Checklist

Alignment Couplers

Appendix

For Technical Assistance: 800-442-4622

Bimba Metric Flow Controls – FCPM Series

M5 Port Mounted Flow Control Valves

M5 Controlled Flow Chart (at 5 Bar)
Maximum Free Flow Capacity 91-122 1/min

For M5 port,
FCPM-1-Q4-L
4mm OD tubing
2mm ID tubing
$21.90

For M5 port,
4mm OD tubing
2mm ID tubing
FCPM-1-Q4-R
$18.70

For M5 port,
FCPM-1-Q6-L
6mm OD tubing
4mm ID tubing
$21.90

For M5 port,
6mm OD tubing
4mm ID tubing
FCPM-1-Q6-R
$18.70
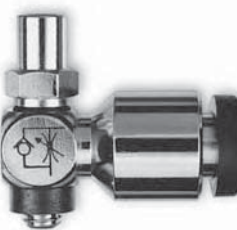
G1/8 Port Mounted Flow Control Valves
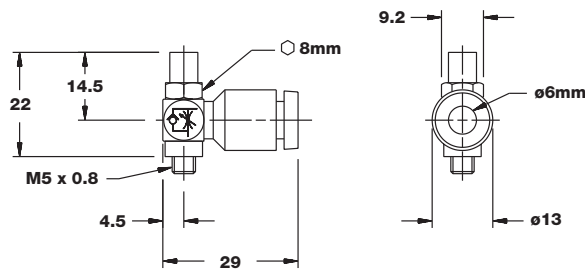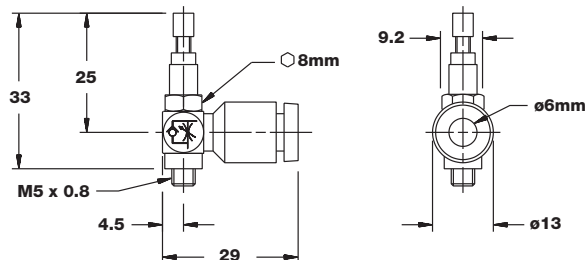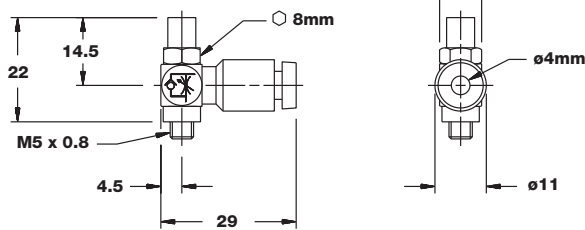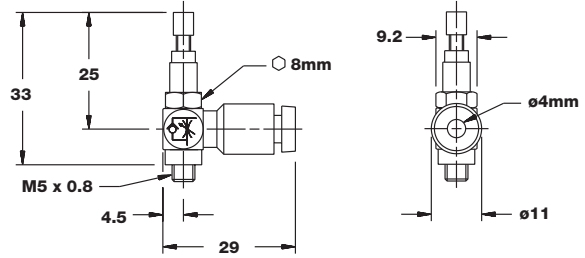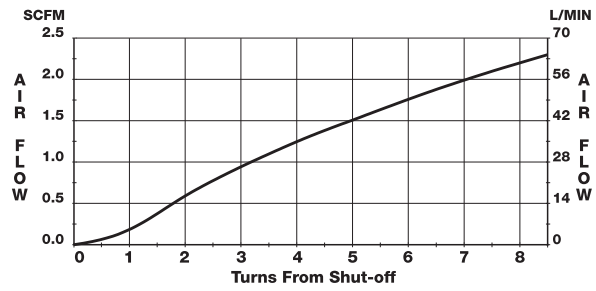
G1/8 Controlled Flow Chart (at 5 Bar)
Maximum Free Flow Capacity 110-334 l/min

10.8
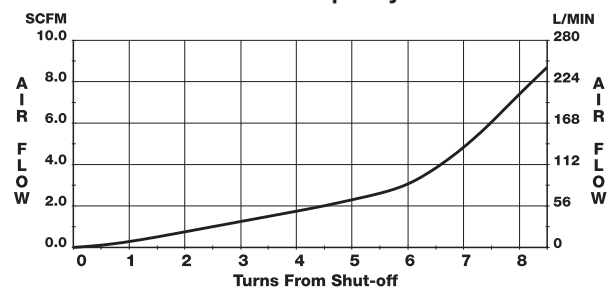
For G-1/8 port,
FCPM-2-Q4-L
4mm OD tubing
2mm ID tubing
$22.70

10mm
14mm
41
G1/8
7
32
16.2
29.5
ø4mm
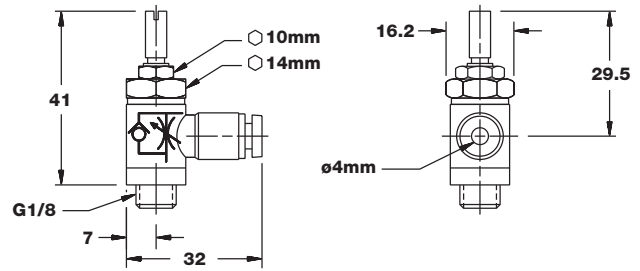
For G-1/8 port,
4mm OD tubing
2mm ID tubing
FCPM-2-Q4-R
$22.70

14mm
25
G1/8
7
32
16.2
13.5
ø4mm
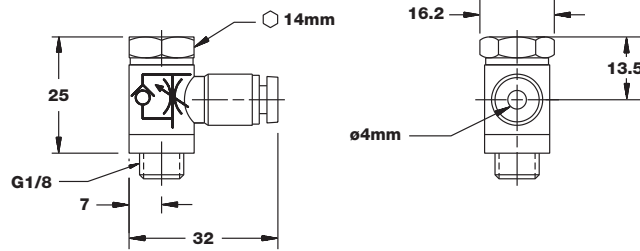
For G-1/8 port,
FCPM-2-Q6-L
6mm OD tubing
4mm ID tubing
$22.85

10mm
14mm
41
G1/8
7
32
16.2
29.5
ø6mm
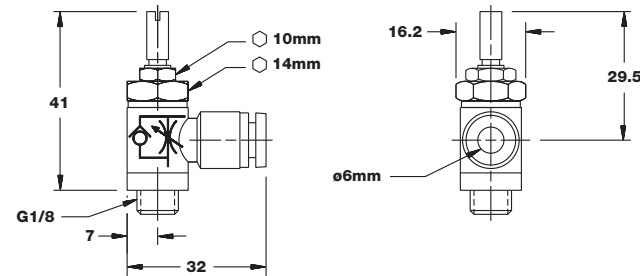
For G-1/8 port,
6mm OD tubing
4mm ID tubing
FCPM-2-Q6-R
$22.85

14mm
25
G1/8
7
32
16.2
13.5
ø6mm
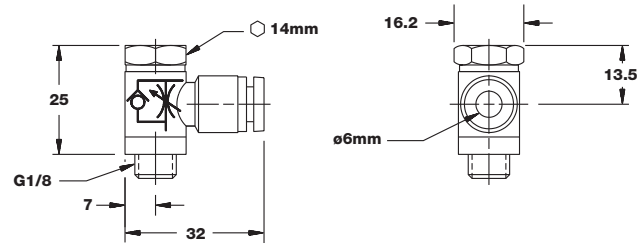
For G-1/8 port,
FCPM-2-Q8-L
8mm OD tubing
6mm ID tubing
$23.15

10mm
14mm
41
G1/8
7
37
16.2
29.5
Ø8mm
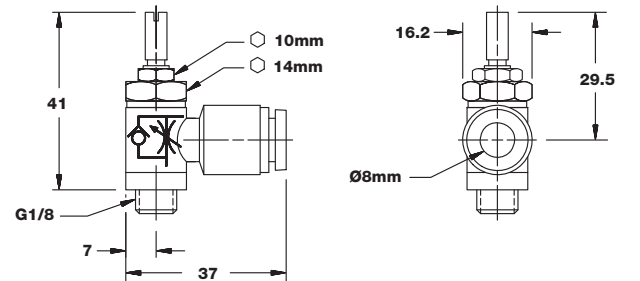
For G-1/8 port,
8mm OD tubing
6mm ID tubing
FCPM-2-Q8-R
$23.15
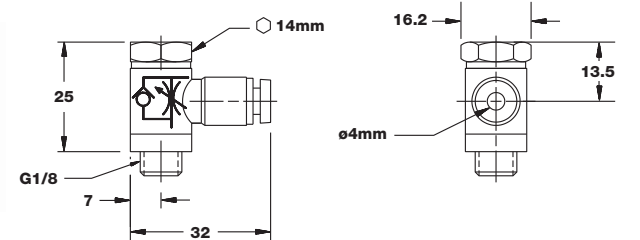
14mm
25
G1/8
7
32
16.2
13.5
ø4mm

Flow Controls

Air Booster Cylinders

Air Reservoirs

Manual Valves

Shock Absorbers

Transition Plates

Application Checklist

Alignment Couplers

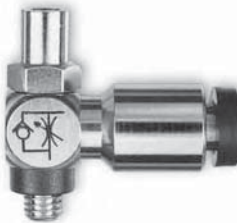Appendix

Bimba Metric Flow Controls – FCPM Series

G1/4 Port Mounted Flow Control Valves

G1/4 Controlled Flow Chart (at 5 Bar)
Maximum Free Flow Capacity 394-634 l/min

Chart axes: SCFM (16.0, 12.0, 8.0, 4.0, 0.0) on left — AIR FLOW; L/MIN (448, 336, 224, 112, 0) on right — AIR FLOW. Horizontal axis: Turns From Shut-off (0–9).

For G1/4 port,
FCPM-4-Q6-L
6mm OD tubing
4mm ID tubing
$29.70

For G1/4 port,
6mm OD tubing
4mm ID tubing
FCPM-4-Q6-R
$29.70
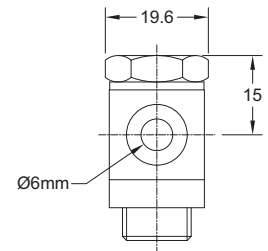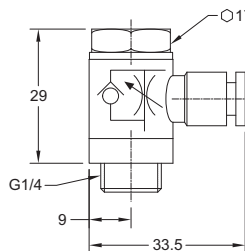
For G1/4 port,
FCPM-4-Q8-L
8mm OD tubing
6mm ID tubing
$30.10
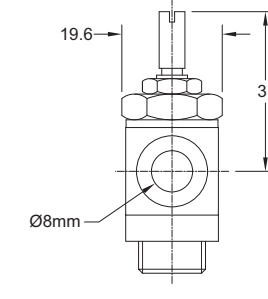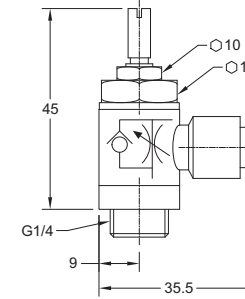
For G1/4 port,
8mm OD tubing
6mm ID tubing
FCPM-4-Q8-R
$30.10

Bimba Air-to-Air Boosters

Flow Controls

Air Booster Cylinders

Air Reservoirs

Manual Valves

Shock Absorbers

Transition Plates

Application Checklist

Alignment Couplers

Appendix
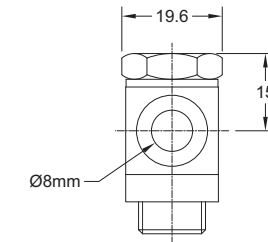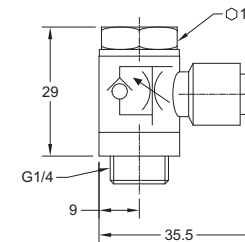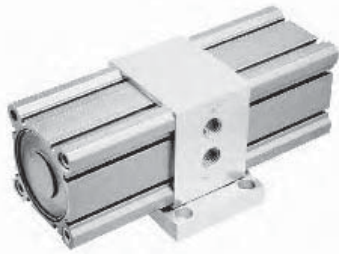
Basic 2:1 Air Booster

Bimba Basic 2:1 Air Boosters are designed to amplify inadequate air pressure applications. The unit is a self-contained design of integral valve components that reciprocate pistons to double the output pressure. Increasing the output air pressure will increase the output force of a pneumatic cylinder where space constraints exist.

How to Order and List Prices

Model/Price	Dimensions (inch)
Model Number: CSS-00118-A List Price: $442.10 Availability: Stock Item	

Engineering Specifications

Maximum Input Pressure:	125 psi
Operating Temperature:	15° to 160°F
Lubrication:	HT-99 oil
Bodies and Center Section:	Aluminum; Hard Coat with PTFE
Mounting Plate:	Anodized Aluminum
Estimated Charge Time:	28 seconds per 1 gallon reservoir

Note: Bimba Air Boosters are designed for intermittent duty usage such as maintaining pressure in an air reservoir. Continuous cycling decreases seal life.

FLOW DATA
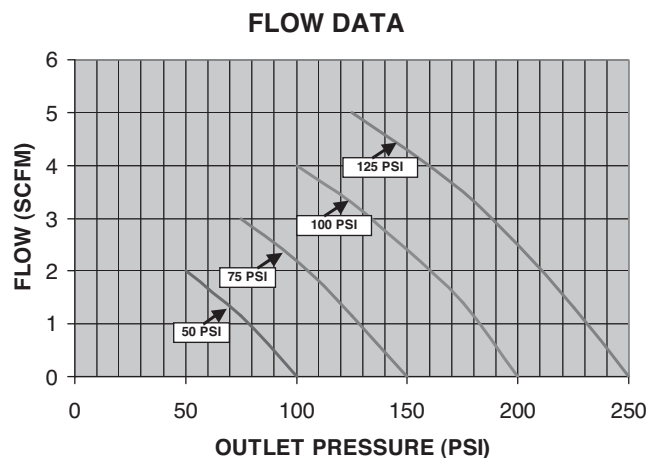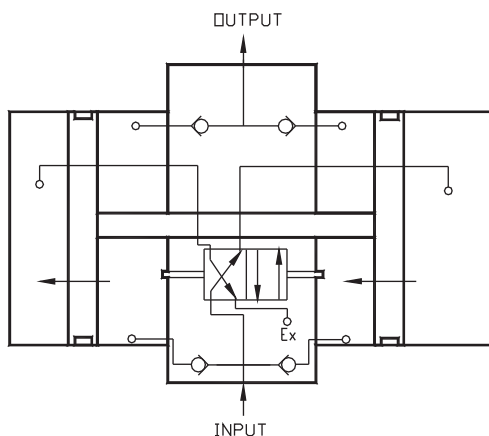
Bimba Air-to-Air Boosters

High Flow 2:1 Air Booster

The Bimba High Flow 2:1 Air Booster doubles the air pressure at a greater flow rate than our basic booster model. The unit is a self-contained system of integral valve components that reciprocate pistons to increase the output pressure. This is a compact solution to deliver the output force required of a pneumatic cylinder under limited space conditions.

How to Order and List Prices

Model/Price	Dimensions (inch)
Model Number: CSS-00416-A List Price: $1,250.20 Availability: Stock Item	

Dimension callouts: 7.00, 5.95, 3.58, 5.00, 4x DRILLED & C'BORED FOR 1/2 SHCS, 5.00, 6.00, 3.50, 1.00, 14.20, 7.10, 4.09, 4.58, 2.82, OUT, IN

(2) 1/2" NPT PORTS
(1) 1/2" NPT EXHAUST PORT (OTHER SIDE)

Engineering Specifications

Maximum Input Pressure:	125 psi
Operating Temperature:	15° to 160°F
Lubrication:	HT-99 oil
Bodies and Center Section:	Aluminum; Hard Coat with PTFE
Mounting Plate:	Anodized Aluminum

Note: Bimba Air Boosters are designed for intermittent duty usage such as maintaining pressure in an air reservoir. Continuous cycling decreases seal life.

OUTPUT

INPUT

Ex

FLOW DATA

Flow (scfm) vs Outlet Pressure (psig)

50 PSI, 75 PSI, 100 PSI, 125 PSI

10.12
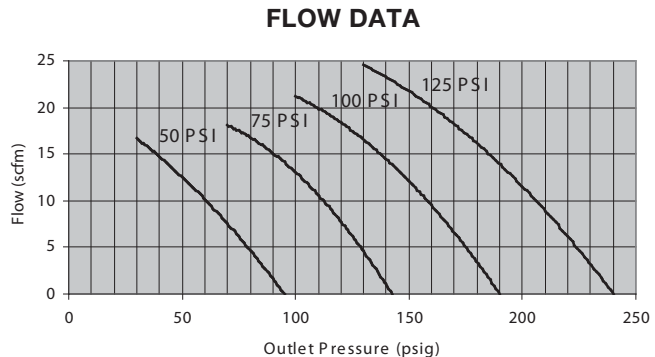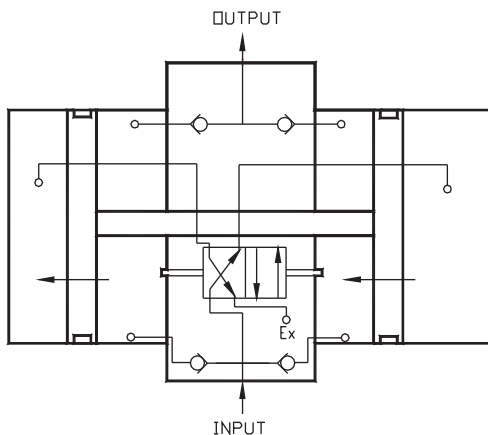
Bimba Air Reservoirs

- Type 304 Stainless Steel Body
- Rated 250 PSI
- Aluminum Alloy Porting Ends
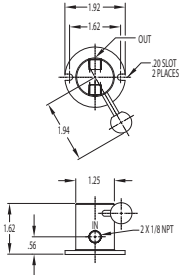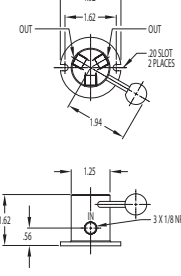
☐ Enter Stroke Length as 3rd Digit
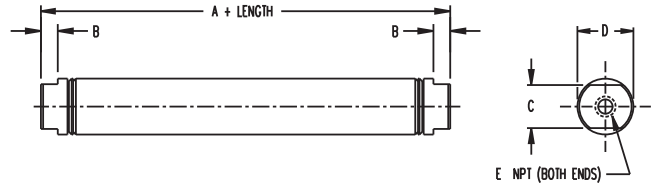
BORE	MODEL NO.	VOL. (CU. IN.)	A	B	C	D	E	PRICE
¾"	**D-1022-A-☐** *Standard Lengths:* 1", 2", 3", 4" Maximum Length – 32" *Base Weight: .10* *Adder Per Inch of Stroke: .015*	.39 cu. in. plus .44 per inch of length	1.94	.18	.63	.81	1/8" NPT	**$8.60** *BASE PRICE* *Add $1.05 per inch of stroke*
1-1/16"	**D-1500-A-☐** *Standard Lengths:* 1", 2", 3", 4", 5", 6" Maximum Length – 32" *Base Weight: .13* *Adder Per Inch of Stroke: .025*	.99 cu. in. plus .89 per inch of length	2.38	.19	.88	1.13	1/8" NPT	**$9.45** *BASE PRICE* *Add $1.25 per inch of stroke*
1-¼"	**D-27715-A-☐** *Standard Lengths:* 1", 2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12", 13", 14", 15", 16" Maximum Length – 32" *Base Weight: .20* *Adder Per Inch of Stroke: .04*	1.38 cu. in. plus 1.22 per inch of length	1.38	.25	.88	1.33	1/8" NPT	**$18.00** *BASE PRICE* *Add $1.50 per inch of stroke*
1-½"	**D-5096-A-☐** *Standard Lengths:* 1", 2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12", 13", 14", 15", 16" Maximum Length – 32" *Base Weight: .30* *Adder Per Inch of Stroke: .04*	1.91 cu. in. plus 1.77 per inch of length	2.25	2.25	.88	1.56	1/8" NPT	**$21.15** *BASE PRICE* *Add $1.95 per inch of stroke*
2"	**D-2485-A-☐** *Standard Lengths:* 1", 2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12", 13", 14", 15", 16" Maximum Length – 32" *Base Weight: .60* *Adder Per Inch of Stroke: .075*	4.22 cu. in. plus 3.14 per inch of length	2.88	.31	1.25	2.08	1/4" NPT	**$27.55** *BASE PRICE* *Add $2.30 per inch of stroke*
2-½"	**D-11846-A-☐** *Standard Lengths:* 1", 2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12", 13", 14", 15", 16", 17", 18", 19", 20", 21", 22", 23", 24" Maximum Length – 32" *Base Weight: .90* *Adder Per Inch of Stroke: .09*	7.04 cu. in. plus 4.91 per inch of length	2.88	.31	1.75	2.61	1/4" NPT	**$44.35** *BASE PRICE* *Add $3.05 per inch of stroke*
3"	**D-17469-A-☐** *Standard Lengths:* 1", 2", 3", 4", 5", 6", 7", 8", 9", 10", 11", 12", 13", 14", 15", 16", 17", 18", 19", 20", 21", 22", 23", 24" Maximum Length – 32" *Base Weight: 1.7* *Adder Per Inch of Stroke: .13*	9.90 cu. in. plus 7.07 per inch of length	3.19	.31	2.00	3.13	3/8" NPT	**$58.10** *BASE PRICE* *Add $3.75 per inch of stroke*

For Technical Assistance: 800-442-4622

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Air Booster Cylinders

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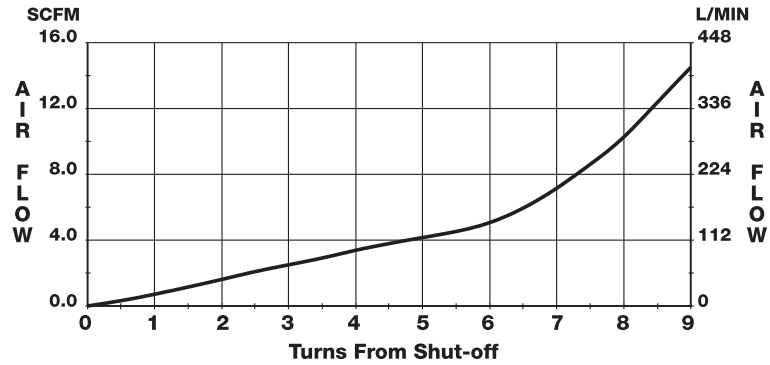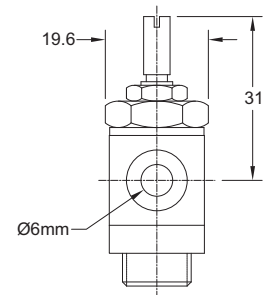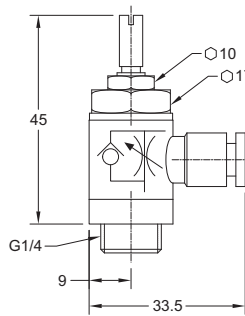
Appendix

Bimba Manual Valves

3 and 4 Way Disc Air Valves

MODEL/PRICE	DESCRIPTION/WEIGHT (lbs.)	DIMENSIONS
MODEL 3MV8 **$40.55** BASE PRICE	*3 Way Disc Air Valve* – Operates single acting cylinders. Full 1/8" orifice - 1/8" NPT inlet and outlet ports. To operate, a precision lapped disc is rotated through 60° by means of a ball handle which will hold set position. To repair, remove handle and retaining ring. *Weight: .22*	
MODEL 4MV8 **$49.65** BASE PRICE	*4 Way Disc Air Valve* – Operates double acting cylinders. Ball handle will rotate through 120° and will hold set position – 1/8" NPT ports are located 120° apart – orifice 1/8" diameter. To repair, remove handle and retaining ring. *Weight: .22*	

Bimba Shock Absorbers

Shock Absorber Dimensions

Linear Thruster Cylinders

Flow Controls

Air Booster Cylinders

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Appendix
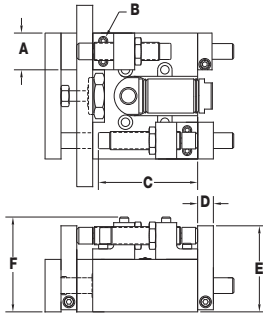
Bore	A	B	C	D	E	F
9/16" (02)	0.75	#6-32	1.14	0.25	1.65	1.88
3/4" (04)	0.88	#6-32	2.37	0.38	2.05	2.13
1-1/16" (09)	1	#8-32	3.68	0.38	2.87	3
1-1/2" (17)	1.25	#10-32	4.47	0.5	3.75	4
2" (31)	1.5	1/4-20	4.75	0.75	4.50 (TE) 5.50 (T)	4.75 (TE) 5.75 (T)

How to Size a Shock Absorber

Selecting the proper shock absorber model is accomplished using the shock absorber graph given for each Thruster bore. The intersection of the total energy per stroke "E_T", and velocity at shock absorber contact "V", indicates the proper shock absorber model. E_T is calculated by the equation given below using values determined for:

P = Air pressure (PSI)
V = Velocity at impact (in/sec)
S = Stroke of the Thruster (in)
W_U = Load attached to the Thruster mounting plate (lbs.)
C = Cycles per hour
SF = Shock factor
TF1 = Thruster factor #1
TF2 = Thruster factor #2
TF3 = Thruster factor #3

E_T (Total energy) equals the sum of E_K (Kinetic energy) and E_W (Work energy)
Note the Work energy calculation varies with mounting position, E_{WH} Horizontal, or E_{WV} Vertical.

$E_K = ((W_U + (TF2 + (TF3 \times S))) / 772) \times V^2$ .... (Kinetic energy, in-lbs)

$E_{WH} = TF1 \times SF \times P$ .... (Work energy, in-lbs) **HORIZONTAL**

$E_{WV} = ((TF1 \times P) + W_U + (TF2 + (TF3 \times S))) \times SF$... (Work energy, in-lbs) **VERTICAL**

$E_T = E_K + E_W$ .... (Total energy per stroke, in-lbs)

$E_T C = E_T \times C$ ....(Total energy per hour, in-lbs/hr)

E_T and $E_T C$ .... must not exceed maximum listed in specifications

Example: determine the proper shock absorber for a model T-046 Thruster mounted vertically with an attached load of 15 lbs., operating air pressure of 80 PSI, and a velocity of 20 in/sec., at a cycle rate of 3,600 per hour.

P = 80 PSI
V = 20 in/sec
S = 6 in
W_U = 15 lbs
C = 3,600 cycles/hr

From the charts for a ¾" bore "T" series Thruster

SF = 0.410
TF1 = 0.442
TF2 = 0.632
TF3 = 0.063
E_K = $((15 \text{ lbs} + (0.632 + (0.063 \times 6 \text{ in}))) / 772) \times (20 \text{ in/sec})^2$ .... $E_K = 8.30$ in-lbs
E_{WV} = $((0.442 \times 80 \text{ PSI}) + 15 \text{ lbs} + (0.632 + (0.063 \times 6 \text{ in}))) \times 0.410$ ....$E_{WV} = 21.06$ in-lbs
E_T = $E_K + E_{WV} = 29.36$ in-lbs...$E_T C = E_T \times C = 105,685$ in-lbs/hr

Checking specifications chart: both E_T and $E_T C$ are less than maximum.

And per sizing graph for a model T-04: 29.36 in-lbs total energy at 20 in/sec velocity, use a heavy duty model HS-04 shock absorbers.

For Technical Assistance: 800-442-4622

Bimba Shock Absorbers

T Series Thruster Calculation Constants

Model T					
Factor	9/16"	3/4"	1-1/16"	1-1/2"	2"
SF	0.250	0.410	0.630	0.880	1.000
TF1	0.249	0.442	0.887	1.767	3.142
TF2	0.310	0.632	1.675	3.874	7.444
TF3	0.028	0.063	0.111	0.174	0.250
(E_T) Max. in.-lbs. per cycle	20	45	190	400	650
$(E_T - C)$ max. in.-lbs. per hour	36,000	125,000	300,000	475,000	622,000

TE Series Thruster Calculation Constants

Model TE					
Factor	9/16"	3/4"	1-1/16"	1-1/2"	2"
SF	0.250	0.410	0.630	0.880	1.000
TF1	0.249	0.442	0.887	1.767	3.142
TF2	0.434	0.905	2.075	4.033	6.754
TF3	0.063	0.111	0.174	0.250	0.340
(E_T) Max. in.-lbs. per cycle	20	45	190	400	650
$(E_T - C)$ max. in.-lbs. per hour	36,000	125,000	300,000	475,000	622,000

Velocity vs. Load for Shock Absorbers

5/16" - 7/16" BORE

9/16" - 3/4" BORE

1-1/4" - 1-1/2" BORE

7/8" - 1-1/16" BORE

2" BORE
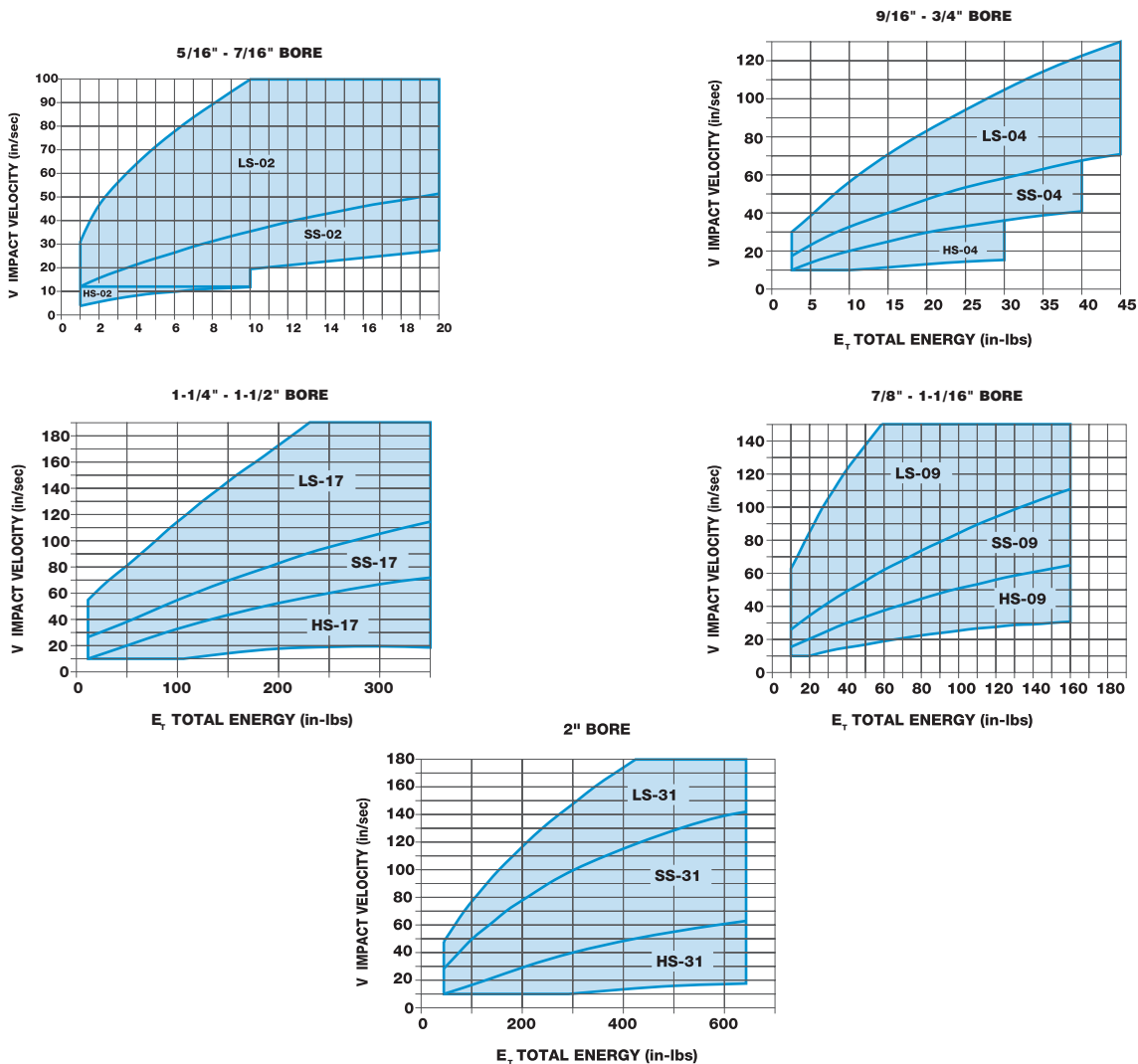
Bimba Shock Absorbers

Shock Absorber Dimensions

Ultran Slide and Ultran Rodless Cylinders

For each model, dimensions and engineering specifications are the same for Light, Standard, and Heavy Duty Shock Absorbers. (LS, SS and HS model numbers).

Shock Absorber Selection Guide

Bore	Ultran	Ultran Slide
5/16" (007)	N/A	☐ S-02
7/16" (01)		
9/16" (02)	☐ S-02	☐ S-04
3/4" (04)	☐ S-04	
7/8" (06)	☐ S-09	☐ S-09
1-1/16" (09)		
1-1/4" (12)	☐ S-17	☐ S-17
1-1/2" (17)		
2" (31)	☐ S-31	☐ S-31

Note: Do not let shock absorbers bottom out. The shock should not be used as a stroke adjuster. A stop collar is needed for the shock if stroke adjustment is required.

Dimensions (in.)

Model	A	B	C	D	E	F	G	H	I
☐ S-02	1.39	1.13	3/8-32 UNEF	0.12	N/A	0.32	0.09	0.50	0.58
☐ S-04	2.74	1.96	7/16-28 UNEF	0.12	0.40	0.39	0.16	0.56	0.65
☐ S-09	4.25	3.20	1/2-20 UNF	0.16	0.44	0.43	0.12	0.63	0.72
☐ S-17	5.13	3.76	3/4-16 UNF	0.19	0.50	0.64	0.18	0.94	1.08
☐ S-31	7.93	5.21	1-12 UNF	0.31	0.88	N/A	0.18	1.13	1.30

Model (LS, SS, HS)

☐ S-02

☐ S-04, ☐ S-09, ☐ S-17, ☐ S-31
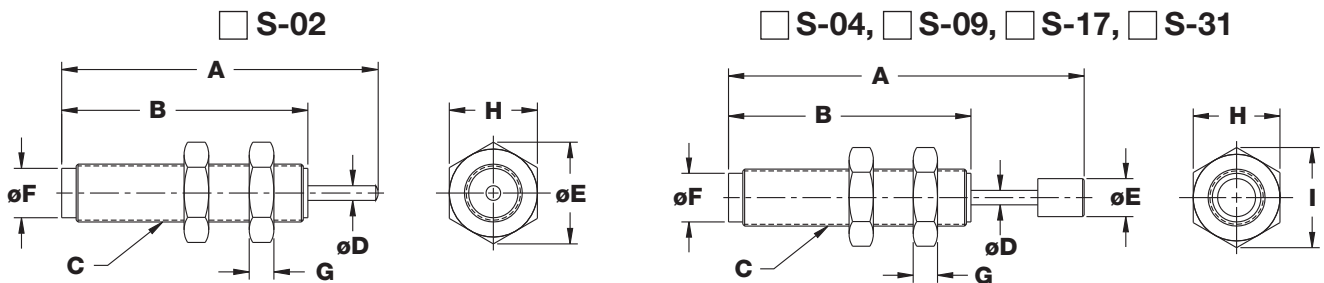
Engineering Specifications

Model	Shock Absorber Bore	(S) Stroke Inches	Thread Type	(E_T) Max. In-Lbs. Per Cycle	$(E_T\text{-}C)$ Max. In-Lbs. Per Hour	(F_P) Max. Shock Force Lbs.	Nominal Coil Spring Force		(F_D) Max. Propelling Force (Lbs.)	Model Weight (Oz.)
							Extension (Lbs.)	Compression (Lbs.)		
☐ S-02	0.28	0.25	3/8-32 UNEF	20	36,000	160	0.65	1.13	20	0.4
☐ S-04	0.25	0.41	7/16-28 UNEF	45	125,000	225	0.7	1.6	50	2
☐ S-09	0.28	0.63	1/2-20 UNF	190	300,000	500	1	3.6	120	3
☐ S-17	0.44	0.88	3/4-16 UNF	400	475,000	700	2	6.8	200	7
☐ S-31	0.56	1.56	1-12 UNF	1,700	670,000	1,700	4	11	500	16

For Technical Assistance: 800-442-4622

Flow Controls

Air Booster Cylinders

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Bimba Shock Absorbers

Shock Absorber Dimensions

Shock Absorber/Stroke Adjustment (in.)

Bore	A	B	C	D	E	F
5/16" (007)	0.215	0.750	0.000	0.785	1.093	3/8-32 UNEF
7/16" (01)	0.218	0.750	0.000	0.780	1.093	3/8-32 UNEF
9/16" (02)	0.406	1.460	0.375	1.094	1.594	7/16-28 UNEF
3/4" (04)	0.406	1.335	0.375	1.438	1.469	7/16-28 UNEF
7/8" (06)	0.500	2.490	0.375	1.562	1.438	1/2-20 UNF
1-1/16" (09)	0.594	2.490	0.375	1.875	1.438	1/2-20 UNF
1-1/4" (12)	0.656	2.890	0.500	2.062	1.500	3/4-16 UNF
1-1/2" (17)	1.000	2.890	0.562	2.219	1.438	3/4-16 UNF
2" (31)	1.125	3.500	0.562	3.312	1.563	1-12 UNF

Note: Do not let the shock absorbers bottom out. The shock should not be used as a stroke adjuster. A stop collar is needed for the shock if stroke adjustment is required.

Shock Absorber
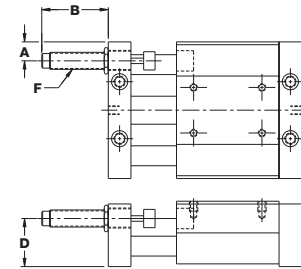
Stroke Adjustment
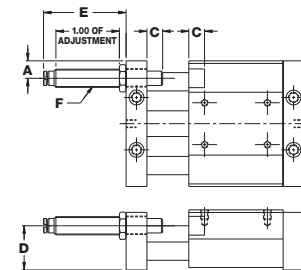
How to Size a Shock Absorber

Selecting the proper shock absorber model is accomplished using the shock absorber graph given for each Ultran bore. The intersection of the total energy per stroke "E_T", and velocity at shock absorber contact "V", indicates the proper shock absorber model. E_T is calculated by the equation given below using values determined for:

P	=	Air pressure (PSI)
V	=	Velocity at impact (in/sec)
W_U	=	Load attached to the Ultran mounting plate (lbs.)
C	=	Cycles per hour
SF	=	Shock factor
UF1	=	Ultran factor #1
UF2	=	Ultran factor #2

E_T (Total energy) equals the sum of E_K (Kinetic energy) and E_W (Work energy)
Note the Work energy calculation varies with mounting position, E_{WH} Horizontal, or E_{WV} Vertical.

$E_K = ((W_U + UF2) / 772) \times V^2$ .... (Kinetic energy, in-lbs)

$E_{WH} = UF1 \times SF \times P$ .... (Work energy, in-lbs) **HORIZONTAL**

$E_{WV} = ((UF1 \times P) + W_U + UF2) \times SF$ .... (Work energy, in-lbs) **VERTICAL**

Example: determine the proper shock absorber for a model Ultran Slide mounted vertically with an attached load of 15 lbs., operating air pressure of 80 PSI, and a velocity of 20 in/sec., at a cycle rate of 3,600 per hour.

P	=	80 PSI
V	=	20 in/sec
S	=	6 in
W_U	=	15 lbs
C	=	3,600 cycles/hr

From the charts for a 3/4" bore Ultran Slide

SF	=	0.410
UF1	=	0.442
UF2	=	1.565
E_K	=	(15 lbs + 1.565) / 772) x (20 in/sec)^2 .... E_K = 8.56 in-lbs
E_{WV}	=	((0.442 x 80 PSI) + 15 lbs + 1.565 x 0.410 ....E_{WV} = 21.29 in-lbs
E_T	=	$E_K + E_{WV}$ = 29.85 in-lbs..E_TC = E_T x C = 107,457 in-lbs/hr

Checking specifications chart: both E_T and E_TC are less than maximum.

And per sizing graph for a model UGS-04: 21.29 in-lbs total energy at 20 in/sec velocity, use a heavy duty model HS-04 shock absorbers.

Bimba Shock Absorbers

Ultran Slide

Bore	007	01	02	04	06	09	12	17	31
SF	0.250	0.250	0.410	0.410	0.630	0.630	0.880	0.880	1.560
UF1	0.077	0.150	0.249	0.442	0.601	0.887	1.227	1.767	3.142
UF2	0.285	0.385	0.805	1.565	2.195	3.140	4.750	7.530	24.380
E_T	20	20	45	45	190	190	400	400	1,700
E_T-C	36,000	36,000	125,000	125,000	300,000	300,000	475,000	475,000	670,000

Ultran Standard

Bore	007	01	02	04	06	09	12	17	31
SF	N/A	N/A	0.250	0.410	0.630	0.630	0.880	0.880	1.560
UF1	N/A	N/A	0.249	0.442	0.601	0.887	1.227	1.767	3.142
UF2	N/A	N/A	0.485	1.060	1.585	2.285	3.500	5.845	16.965
E_T	N/A	N/A	20	45	190	190	400	400	1,700
E_T-C	N/A	N/A	36,000	125,000	300,000	300,000	475,000	475,000	670,000

Velocity vs. Load for Shock Absorbers
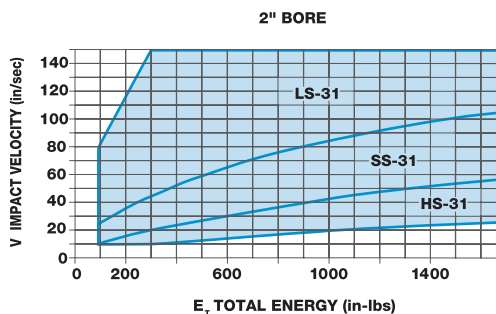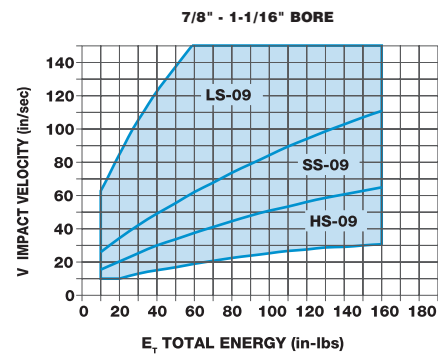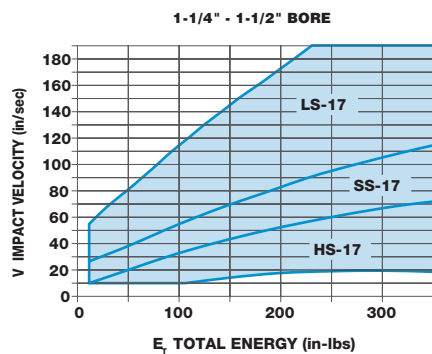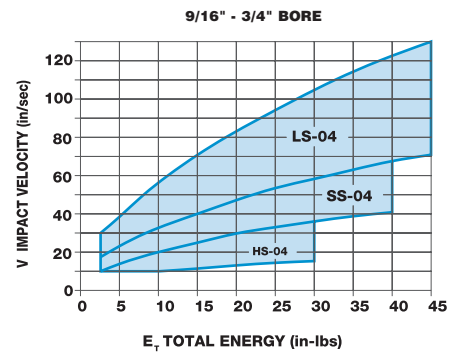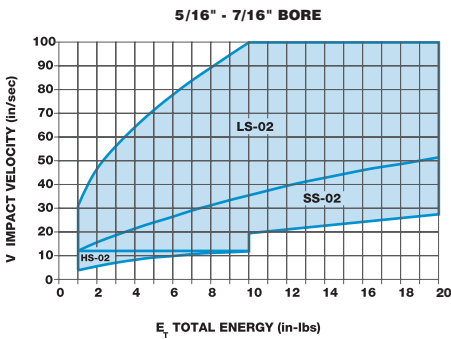
*Ultran Maximum Velocity
20 inches per second or cycle rate
not to exceed 15 per minute

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For Technical Assistance: 800-442-4622

Bimba Shock Absorbers

Shock Absorbers

High Load Ultran Cylinders

Shock Absorbers
Shock Absorbers can be used to decelerate loads or to absorb excess Kinetic Energy.

Calculating Kinetic Energy
When a load is being moved by the High Load Ultran, kinetic energy is generated. This energy must be absorbed either by the High Load Ultran or by some external device. If the energy is to be absorbed by the High Load Ultran, then the energy must not exceed 3.5 foot-pounds (42 inch-pounds).

Kinetic energy is defined by the formula $1/2mV^2$, where **m** is the mass of the load being moved and **V** is the speed at which the load is moving upon impact.

m is defined as **W/g,** where **W** is the known weight of the load including the weight of the carriage, and **g** is acceleration due to gravity. **V** is defined in feet per second.

Considering total Energy
In addition to the energy generated by the moving load, other external (propelling) forces must be considered to ensure the proper use of the shock absorber. See Table 3 (page 10.21) for maximum force information. Propelling forces are those forces generated by cylinder air pressure, springs, gravity, etc. Once the energy generated by these forces is determined, it must be added to the kinetic energy generated by the moving load to determine total energy (E_T) to be absorbed by the shock (see example below).

Selecting Shock Absorber Setting
The shock absorber offered for the High Load Ultran Slide is adjustable. This means that the shock absorber is capable of decelerating loads over a range of velocities. Use Graph 5 to determine the appropriate setting for your application. Some adjustment to this setting may be required to achieve the desired deceleration rate. Table 3 shows the shock absorber ratings.

For Example (Total Energy):
Operating a UHL-17 at 60 psi in a horizontal application, carrying a 100-pound load at 10 inches per second end-of-stroke velocity, the total energy, E_T, is determined as follows.

1. **Determine kinetic energy generated by the moving load using the formula, KE = 1/2 mV².**

   m = (W + weight of carriage)/g =

   (7.5 + 100)/32.179 = 3.34 lbm

   V = 10 in/sec = 0.833 feet per second

   KE = $1/2 * 3.34 * 0.833^2$ = 1.16 foot-pounds or

   13.92 inch-pounds (1.16 x 12 inches)

Table 2.

Bore	Carriage Weight
1-1/4" (12)	3.9 lbs.
1-1/2" (17)	7.5 lbs.

2. **Determine the propelling forces and their respective energy.**

   Force (F) = piston area * air pressure = 1.76 * 60 = 106 pounds

   Energy (E) = F * stroke of shock = 106 * 0.5 = 53 inch-pounds

3. **Total Energy (E_T) = 53 + 13.92 = 66.92 inch-pounds**

Note: If the total energy (E_T) of your application exceeds the allowable maximum of 100 inch-pounds for the adjustable shock absorber, the standard HS-17 shock absorber may be used. Refer to page 10.19 for specifications.

Bimba Shock Absorbers

Shock Absorber
High Load Ultran

Dimensions (in.) 1-1/16" bore

3.59
2.81
.56 .31 .37
ỹ.43 ỹ.44
.75 HEX
JAM NUT
1/2-20 UNF-2A

Dimensions (in.) 1-1/2" bore

4.35
3.31
.54 .42 .47
Ø.62 Ø.50
1.12 HEX
JAM NUT
3/4-16 UNF-2A
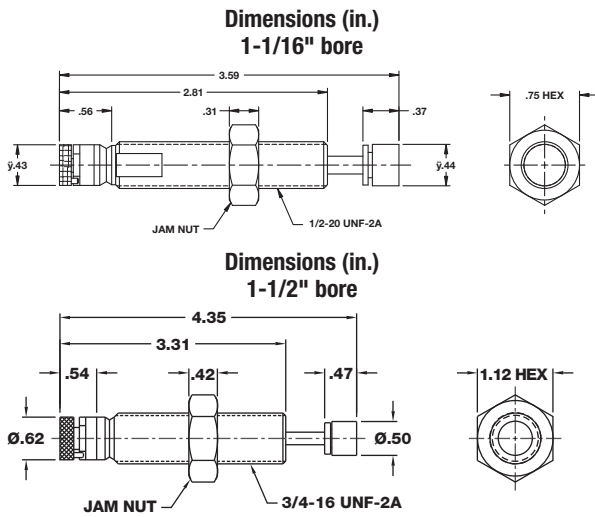
Shock Absorber Adjustment Range

IMPACT VELOCITY (in./sec.)

Impact Velocity (in/sec)

160
120
80
40
0

AS-17
AS-09

0 1 2 3 4 5 6 7

SHOCK SETTING   GRAPH 5
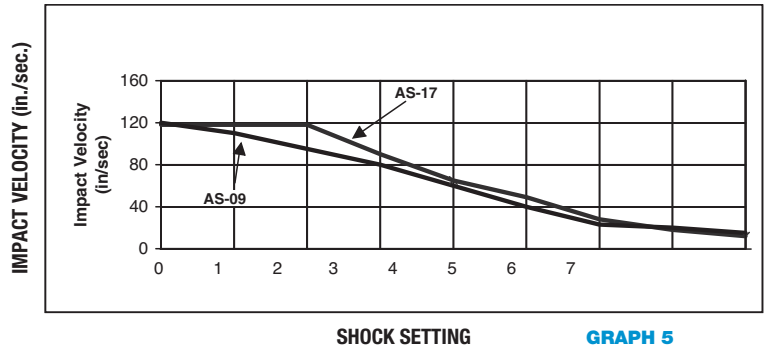
Table 3. Shock Absorber Ratings

Model	Shock Absorber Bore	(S) Stroke	Thread Type	(E_T) Max. In-Lb. Per Cycle	$(E_T - C)$ Max. In-Lb. Per Cycle	(F_P) Max. Shock Force	Normal Coil Spring Force		(F_D) Max. Propelling Force	Weight
							Extension	Compression		
AS-09	.25	.38	1/2"-20 UNF	50	178,000	200	.8	1.7	8	2
AS-17	.28	.5	3/4"-16 UNF	100	284,000	300	1.5	2.0	150	5

Stop Collar

Ultran Slide & Ultran Rodless Cylinders

END BLOCK
A B
øC
HEX JAM NUT (NOT INCLUDED)
STOP COLLAR
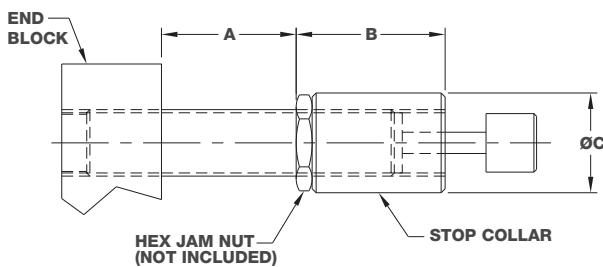
Model	A	B	øC
USC-04	1.0	.91	.63
USC-09	1.5	1.12	.69
USC-17	2.0	1.68	1.12
USC-31	3.0	1.93	1.50

Note: The Ultran Stroke Length needs increased by the B dimension in order to maintain intended stroke length. The overall length increases by the same amount. The A dimension indicates maximum amount of stroke adjustment attainable. The Hex Jam Nut is included with the shock absorber.

High Load Ultran

A B
øC
END BLOCK
STOP COLLAR
JAM NUT (INCLUDED WITH SHOCK)
SHOCK (HS – 17)
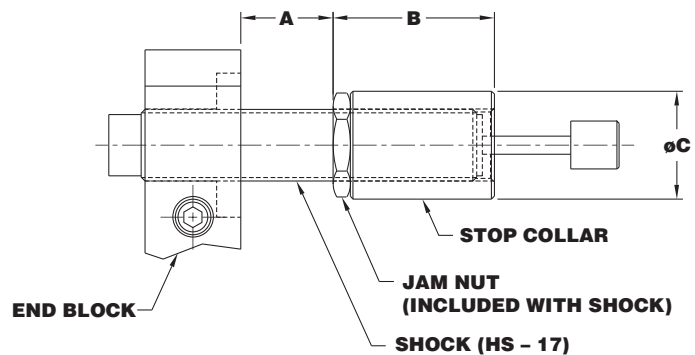
Model	A	B	øC
USC-09	.96	1.12	ø1.69
USC-17	.96	1.68	ø1.12

Note: The High Load Ultran Slide needs increased by the B dimension in order to maintain intended stroke length. The overall length increases by the same amount. The A dimension indicates maximum amount of stroke adjustment attainable.

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Bimba Transition Plates

*Aluminum plates that couple Bimba actuators –
Ultran® rodless cylinders, Pneu-Turn® rotary actuators,
and Linear Thrusters – into a variety of multi-axis configurations.*
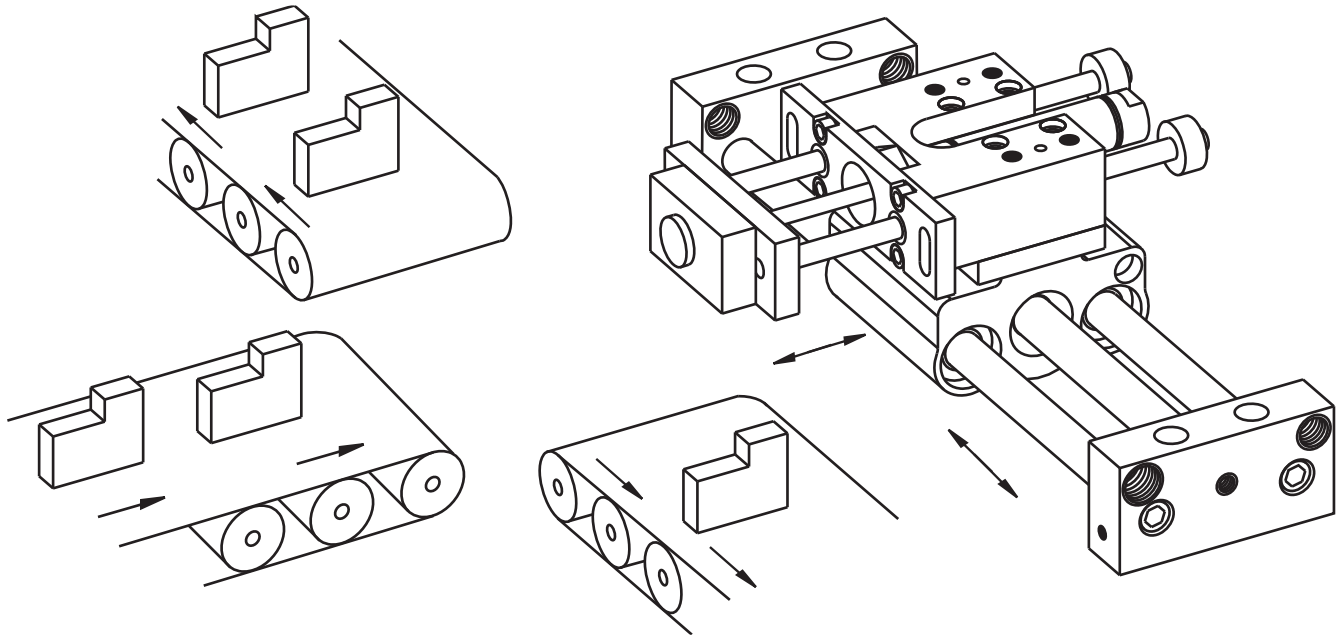
The customer's attachment reads a bar code on the product to determine the required paint scheme. The Ultran Slide Rodless Cylinder and Linear Thruster picks the item off the incoming conveyor and places it on the appropriate out-going one.

How to Choose a Transition Plate

Page 10.23 shows how to build the Transition Plate model numbers.

Choose the configuration (base product and coupled product) that best suits your application and turn to that section. It will describe the valid bore size combinations and provide basic dimensions, weights and prices for those Transition Plates. It will also show alignment of the products to help you determine the outside dimensions of your configuration, and provide information on the options you may need to include when ordering your actuators. Unless otherwise noted, all Transition Plates are designed for mounting hole center to center alignment.

Note: Actuators can be coupled together in the bore size combinations noted in each section. However, critical engineering specifications must be met for each specific application. In addition, for a precision positioning system, the deflection of the components should be compensated for by incorporating external adjustments into the system design. See page 10.32 and the engineering specifications for the individual actuators for more information. Or, complete the Application Checklist on page 10.35 and fax it to your Bimba distributor if you'd like us to size your application.

Bimba Transition Plates

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The model number of all Transition Plates consists of two alphanumeric clusters. The first cluster designates product type, base product and bore size of the base product. The second cluster designates coupled product and bore size of the coupled product, mounting orientation, and an optional character for dowel pins. Please refer to the charts below for an example of model number TPU17-T09PD. This is a transition plate for a 1-1/2" bore Ultran rodless cylinder that will be coupled to a 1-1/16" bore Linear Thruster (ball bearing), in a perpendicular orientation, with dowel pins.

TYPE
TP - Transition Plate

BASE PRODUCT
U   - Ultran Slide Rodless Cylinder
T[1]   - Linear Thruster, Ball Bearing
TE[1] - Linear Thruster, Composite Bearing
PT[2] - Pneu-Turn Rotary Actuator
PM   - PneuMoment (Imperial)[3]
PMM - PneuMoment (Metric)[3]

BASE PRODUCT BORE SIZE[3]
02   - 9/16"
04   - 3/4"
09   - 1-1/16"
17   - 1-1/2"
31   - 2"

TPU17 - T09PD

COUPLED PRODUCT
U   - Ultran Rodless Cylinder
T[1]   - Linear Thruster, Ball Bearing
TE[1]   - Linear Thruster, Composite Bearing
PT[2]   - Pneu-Turn Rotary Actuator
PM   - PneuMoment (Imperial)
PMM - PneuMoment (Metric)

COUPLED PRODUCT BORE SIZE
02   - 9/16"
04   - 3/4"
09   - 1-1/16"
17   - 1-1/2"
31   - 2"

(FOR PNEU TURN)
006 - 9/16" Single rack
014 - 9/16" Double rack
017 - 3/4" Single rack
033 - 3/4" Double rack
037 - 1-1/16" Single rack
074 - 1-1/16" Double rack
098 - 1-1/2" Single rack
196 - 1-1/2" Double rack
247 - 2" Single rack
494 - 2" Double rack

MOUNTING ORIENTATION[3]
A - Axial (parallel)
P - Perpendicular

DOWEL PIN[3]
No # - No Dowel Pin
D   - Dowel Pin

Note: See sections on specific configurations for more information on valid product combinations.

1 *As shown on the following pages, use the "T" designation for either T or TE Series Linear Thruster, except where the TE is specifically called out.*

2 *Pneu-Turn Rotary Actuator must be ordered with both the ball bearing (-R) and the hardened shaft (-F) options.*

3 *PneuMoment to PneuMoment only. Mounting orientation and dowel pin do not apply. Only available for the 1-1/16" bore.*

Transition Plates are attached to the base and coupled products with socket head cap screws and socket set screws. Screws are included with the Transition Plate. Dowel pins can be ordered as an option for ease of assembly and/or improved shear loading.

For Technical Assistance: 800-442-4622

Bimba Transition Plates

Linear Thruster (Base Product)
to Pneu-Turn Rotary Actuator (Coupled Product)
SHAFT PARALLEL*

		Linear Thruster				
		9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
Pneu-Turn Rotary Actuator	9/16" single rack (006) double rack (014)	TPT02-PT006A TPT02-PT014A	TPT04-PT006A TPT04-PT014A			
	3/4" single rack (017) double rack (033)		TPT04-PT017A TPT04-PT033A	TPT09-PT017A TPT09-PT033A		
	1-1/16" single rack (037) double rack (074)			TPT09-PT037A TPT09-PT074A	TPT17-PT037A TPT17-PT074A	
	1-1/2" single rack (098) double rack (196)				TPT17-PT098A TPT17-PT196A	TPT31-PT098A TPTE31-PT098A TPT31-PT196A TPTE31-PT196A
	2" single rack (247) double rack (494)					TPT31-PT247A TPTE31-PT247A TPT31-PT494A TPTE31-PT494A

Note: Use model numbers shown for both T and TE Series Linear Thrusters through 1-1/2" bore; 2" bore requires specific call-out of TE as shown. Screws and dowel pins (if ordered) are included with the Transition Plate.

Model Number	Dimensions			Weight (includes screws) (lbs)	List Price	List Price with Dowel Pins (-D Option)
	Length (in)	Width (in)	Thickness (in)			
TPT02-PT006A TPT02-PT014A	2.50	2.00	0.28	0.14	$29.60	$36.80
TPT04-PT006A TPT04-PT014A	3.00	2.00	0.28	0.17	34.90	42.80
TPT04-PT017A TPT04-PT033A	3.00	2.50	0.36	0.26	34.90	42.80
TPT09-PT017A TPT09-PT033A	4.00	2.50	0.36	0.35	39.10	49.30
TPT09-PT037A TPT09-PT074A	4.00	3.12	0.47	0.58	39.10	49.30
TPT17-PT037A TPT17-PT074A	5.38	3.00	0.47	0.74	49.80	60.20
TPT17-PT098A TPT17-PT196A	5.38	4.25	0.72	1.61	49.80	60.20
TPT31-PT098A TPT31-PT196A	6.75	4.25	0.72	2.02	63.10	75.20
TPT31-PT247A TPT31-PT494A	6.75	5.00	0.72	2.38	63.10	75.20
TPTE31-PT098A TPTE31-PT196A	5.75	4.25	0.72	1.72	63.10	75.20
TPTE31-PT247A TPTE31-PT494A	5.75	5.00	0.72	2.03	63.10	75.20

Bimba Transition Plates

Linear Thruster (Base Product) to Pneu-Turn Rotary Actuator (Coupled Product)

SHAFT PARALLEL*

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In addition to ordering a Transition Plate with dowel pin option, dowel pin options must be selected for your Linear Thruster (-D option); and the ball bearing (-R) and hardened shaft (-F) options must be selected for your Pneu-Turn Rotary Actuator (the ball bearing option includes dowel pin holes). For example, your order would include:

**T-096-DM
PT-033180-FMR
TPT09-PT017AD**

This provides: a 1-1/16" bore, 6" stroke Linear Thruster with dowel pin holes and a magnetic piston; a single rack 3/4" bore, 180° Pneu-Turn with hardened shafts, magnetic piston, and ball bearing (with dowel pin holes); and the appropriate Transition Plate with dowel pins. Refer to individual actuator sections for dowel pin option pricing.

For Technical Assistance: 800-442-4622

Bimba Transition Plates

Pneu-Turn Rotary Actuator (Base Product) to Linear Thruster (Coupled Product)

SHAFT PERPENDICULAR*

	Pneu-Turn Rotary Actuator				
Linear Thruster	9/16" (006 or 014)	3/4" (017 or 033)	1-1/16" (037 or 074)	1-1/2" (098 or 196)	2" (247 or 494)
9/16" (02)	TPPT02-T02P				
3/4" (04)		TPPT04-T04P	TPPT09-T04P		
1-1/16" (09)			TPPT09-T09P	TPPT17-T09P	TPPT31-T17P
1-1/2" (17)				TPPT17-T17P	TPPT31-T31P
2" (31)					TPPT31-TE31P

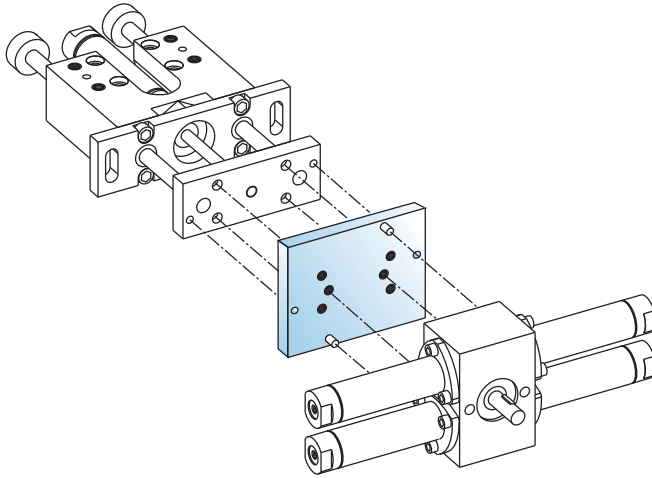*Note: Two plates are needed for this configuration. Both plates will be included if part number TPPT □ - T □P is ordered. If needed, part TPPT □ can be ordered separately. Use model numbers shown for both T and TE Series Linear Thrusters through 1-1/2" bore; 2" bore requires specific call-out of TE as shown.*

Note: Screws and dowel pins (if ordered) are included with the Transition Plate.

Model Number	Dimensions			Weight (includes screws) (lbs)	List Price	List Price with Dowel Pins (-D Option)
	Length (in)	Width (in)	Thickness (in)			
TPPT02-T02P	2.00	2.00	0.28	0.15	$112.60	121.90
(includes TPPT02)	0.62	0.62	0.50	0.04	74.40	
TPPT04-T04P	2.50	2.25	0.36	0.28	112.60	121.90
(includes TPPT04)	0.75	0.75	0.75	0.08	74.40	
TPPT09-T04P	3.50	3.00	0.47	0.67	112.60	121.90
(includes TPPT09)	1.00	1.00	0.94	0.19	74.40	
TPPT09-T09P	3.50	3.00	0.47	0.67	112.60	121.90
(includes TPPT09)	1.00	1.00	0.94	0.19	74.40	
TPPT17-T09P	4.50	4.25	0.72	1.82	123.60	134.10
(includes TPPT17)	1.50	1.50	0.94	0.47	82.30	
TPPT17-T17P	4.50	4.25	0.72	1.84	123.60	134.10
(includes TPPT17)	1.50	1.50	0.94	0.47	82.30	
TPPT31-T17P	4.50	4.25	0.72	1.84	130.20	143.40
(includes TPPT31)	1.50	1.50	1.12	0.47	86.00	
TPPT31-T31P	6.00	3.00	0.72	1.76	129.40	143.40
(includes TPPT31)	1.50	1.50	1.12	0.47	86.00	
TPPT31-TE31P	5.25	3.00	0.72	1.60	130.20	143.40
(includes TPPT31)	1.50	1.50	1.12	0.47	86.00	

Note: The key on the Pneu-Turn shaft is mounted in the 12 o'clock position, therefore, rotation of the Linear Thruster will be equal in the clockwise and counterclockwise directions. Please order sufficient angle of rotation, angle adjustment option or a Pneu-Turn rotary actuator with the key mounted in a special position as required for your application.

Bimba Transition Plates

Pneu-Turn Rotary Actuator (Base Product) to Linear Thruster (Coupled Product)

SHAFTS PERPENDICULAR*
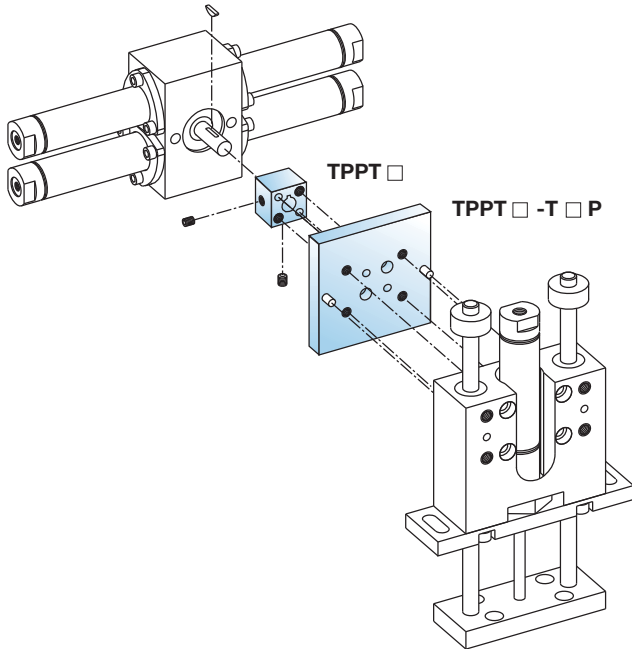
TPPT ☐

TPPT ☐ -T ☐ P

Dowel Pins

In addition to ordering a Transition Plate with dowel pin option, the ball bearing (-R) and hardened shaft (-F) options must be selected for your Pneu-Turn Rotary Actuator (the -R option includes dowel pin holes), and the dowel pin option (-D) must be selected for your Linear Thruster. For example, your order would include:

<div align="center">

PT-247180-FMR
T-096-DM
TPPT31-T17PD

</div>

This provides: a single rack 2" bore, 180° Pneu-Turn with hardened shafts magnetic piston, and ball bearing (with dowel pin holes); a 1-1/2" bore, 6" stroke Linear Thruster with dowel pin holes and magnetic piston; and the appropriate Transition Plate with dowel pins. Refer to individual actuator sections for dowel pin option pricing.

*Shown is 9/16" (02) bore Linear Thruster. Bolt pattern for this size only is offset 1/2" from center axis of housing.

Toleranced Clearance Hole Sizes	
TPPT02	.1270/.1280
TPPT04	.1895/.1905
TPPT09	.2520/.2530
TPPT17	.3145/.3155
TPPT31	.3145/.3155

Note: Dowel pins to attach part TPPT ☐ are not provided, although clearance holes are available for dowel pins.

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For Technical Assistance: 800-442-4622

Bimba Transition Plates

Ultran Rodless Cylinder (Base Product) to Linear Thruster (Coupled Product)

MOUNTED PERPENDICULAR*

	Ultran Rodless Cylinder			
Linear Thruster	9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)
9/16" (02)	TPU02-T02P			
3/4" (04)		TPU04-T04P	TPU09-T04P	
1-1/16" (09)			TPU09-T09P	TPU17-T09P
1-1/2" (17)				TPU17-T17P

Note: Use model numbers shown for both T and TE Series Linear Thrusters.
Screws and dowel pins (if ordered) are included with the Transition Plate.

Model Number	Dimensions			Weight (includes screws) (lbs)	List Price	List Price with Dowel Pins (-D Option)
	Length (in)	Width (in)	Thickness (in)			
TPU02-T02P	2.00	2.00	0.28	0.11	$28.30	$35.60
TPU04-T04P	2.50	2.25	0.36	0.20	31.00	39.10
TPU09-T04P	3.50	3.00	0.47	0.48	36.00	44.80
TPU09-T09P	3.50	3.00	0.47	0.48	36.00	44.80
TPU17-T09P	4.50	4.25	0.72	1.35	42.60	53.10
TPU17-T17P	4.50	4.25	0.72	1.35	42.60	53.10
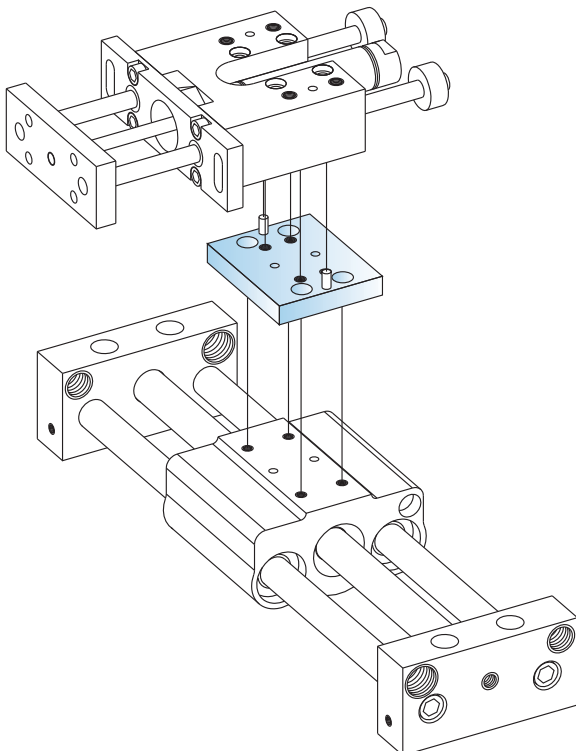
Dowel Pins

In addition to ordering a Transition Plate with dowel pin option, dowel pin options must be selected for your Ultran rodless cylinder and Linear Thruster (-D option). For example, your order would include:

UGS-0915-ADT
T-096-DM
TPU09-T09PD

This provides: 1-1/16" bore, 15" stroke Ultran Slide with gold coupling strength, stroke adjustment on both ends, dowel pin holes and switch track; a 1-1/16" bore, 6" stroke, Linear Thruster with dowel pin holes and a magnetic piston; and the appropriate Transition Plate with dowel pins. Refer to individual actuator sections for dowel pin option pricing.

*Shown is 9/16" (02) bore Linear Thruster. Bolt pattern for this size only is offset 1/2" from center axis of housing.
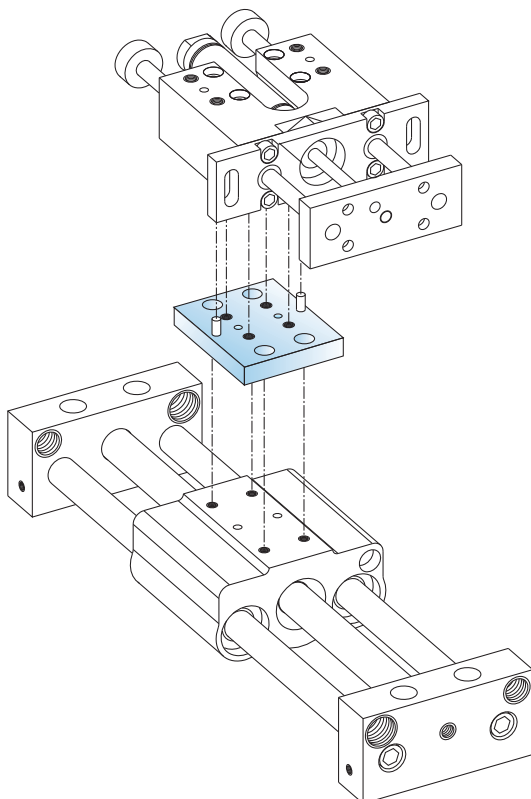
Bimba Transition Plates

Ultran Rodless Cylinder (Base Product) to Linear Thruster (Coupled Product)

MOUNTED PARALLEL*

	Ultran Rodless Cylinder			
Linear Thruster	9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)
9/16" (02)	TPU02-T02A			
3/4" (04)		TPU04-T04A	TPU09-T04A	
1-1/16" (09)			TPU09-T09A	TPU17-T09A
1-1/2" (17)				TPU17-T17A

Note: Use model numbers shown for both T and TE Series Linear Thrusters.
Screws and dowel pins (if ordered) are included with the Transition Plate.

Model Number	Dimensions			Weight (includes screws) (lbs)	List Price	List Price with Dowel Pins (-D Option)
	Length (in)	Width (in)	Thickness (in)			
TPU02-T02A	2.00	2.00	0.28	0.11	$28.30	$35.60
TPU04-T04A	2.50	2.25	0.36	0.20	31.00	39.10
TPU09-T04A	3.50	3.00	0.47	0.48	36.00	44.80
TPU09-T09A	3.50	3.00	0.47	0.48	36.00	44.80
TPU17-T09A	4.50	4.25	0.72	1.35	42.60	53.10
TPU17-T17A	4.50	4.25	0.72	1.35	42.60	53.10

Dowel Pins

In addition to ordering a Transition Plate with dowel pin option, dowel pin options must be selected for your Ultran rodless cylinder and Linear Thruster (-D option). For example, your order would include:

UGS-0915-ADT
T-096-DM
TPU09-T09AD

This provides: 1-1/16" bore, 15" stroke Ultran Slide with gold coupling strength, stroke adjustment on both ends, dowel pin holes and switch track; a 1-1/16" bore, 6" stroke, Linear Thruster with dowel pin holes and a magnetic piston; and the appropriate Transition Plate with dowel pins. Refer to individual actuator sections for dowel pin option pricing.

*Shown is 9/16" (02) bore Linear Thruster. Bolt pattern for this size only is offset 1/2" from center axis of housing.

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Linear Thruster (Base Product) to Linear Thruster (Coupled Product)

MOUNTED PERPENDICULAR*

	Linear Thruster				
	9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
Linear Thruster 9/16" (02)	TPT02-T02P	TPT04-T02P			
3/4" (04)		TPT04-T04P	TPT09-T04P		
1-1/16" (09)			TPT09-T09P	TPT17-T09P	
1-1/2" (17)				TPT17-T17P	TPT31-T17P TPTE31-T17P
2" (31)					TPT31-T31P TPTE31-TE31P

Note: Use model numbers shown for both T and TE Series Linear Thrusters through 1-1/2" bore; 2" bore requires specific call-out of TE as shown. Screws and dowel pins (if ordered) are included with the Transition Plate.

Model Number	Dimensions			Weight (includes screws) (lbs)	List Price	List Price with Dowel Pins (-D Option)
	Length (in)	Width (in)	Thickness (in)			
TPT02-T02P	2.50	1.50	0.28	0.10	$27.10	$34.30
TPT04-T02P	3.00	1.50	0.36	0.16	33.40	41.30
TPT04-T04P	3.00	1.50	0.36	0.16	33.40	41.30
TPT09-T04P	4.25	2.00	0.47	0.39	39.40	48.40
TPT09-T09P	4.25	2.00	0.47	0.39	39.40	48.40
TPT17-T09P	5.50	3.00	0.72	1.16	46.50	57.00
TPT17-T17P	5.50	3.00	0.72	1.16	46.50	57.00
TPT31-T17P	7.00	3.00	0.97	2.00	59.90	71.90
TPT31-T31P	7.00	4.50	0.97	2.99	59.90	71.90
TPTE31-T17P	6.00	3.00	0.97	1.71	59.90	71.90
TPTE31-TE31P	6.00	4.50	0.97	2.57	59.90	71.90

*Shown is 9/16" (02) bore Linear Thruster.

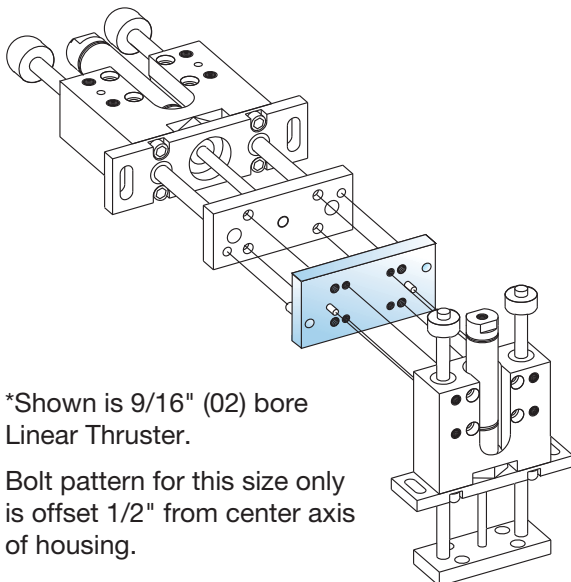Bolt pattern for this size only is offset 1/2" from center axis of housing.

Dowel Pins

In addition to ordering a Transition Plate with dowel pin option, dowel pin options must be selected for your Linear Thrusters (-D option). For example, your order would include:

**T-096-DM
T-042-DM
TPT09-T04PD**

This provides: a 1-1/16" bore, 6" stroke Linear Thruster with dowel pin holes and a magnetic piston; a 3/4" bore, 2" stroke Linear Thruster with dowel pin holes and magnetic piston; and the appropriate Transition Plate with dowel pins. Refer to individual actuator sections for dowel pin option pricing.

Bimba Transition Plates

PneuMoment to PneuMoment

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Mounting Kits

Model Number	List Price	
TPPM09-PM09	Imperial	$72.60
TPPMM09-PMM09	Metric	72.60
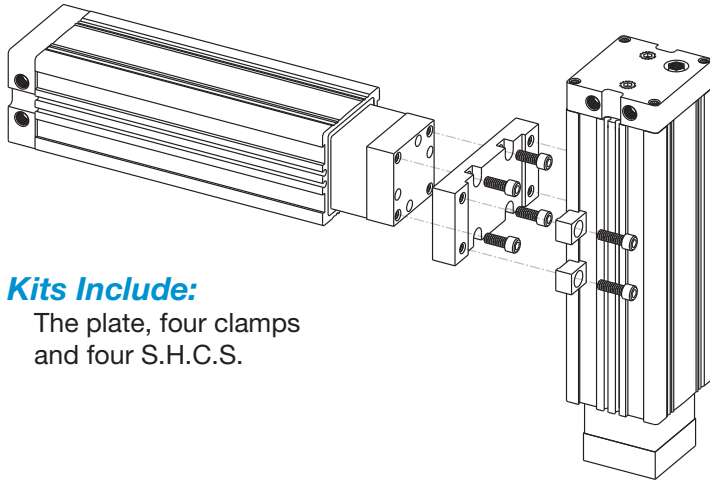
Kits Include:
The plate, four clamps and four S.H.C.S.

Components

Plates:
Anodized aluminum alloy.
Part TPPT□, for Rotary Actuator to Linear Thruster configuration, is 303 stainless steel.

Socket head cap screws and socket set screws:
Heat treated high alloy Grade 8 carbon steel with black oxide coating.

Dowel pins:
Hardened and ground carbon steel alloy with black oxide coating.

Recommended Seating Torque

Recommended Seating Torque in inch/Pounds		
Nominal Diameter-Threads per Inch	Socket Head Cap Screws	Socket Set Screws
8-32	20	15
10-24	35	25
1/4-20	60	50
5/16-18	125	100
3/8-16	225	N/A

List Prices for Dowel Pin Options for Actuators

Pneu-Turn Rotary Actuator Hardened Shaft* (-F Option)	
9/16"	$11.00
3/4"	11.90
1-1/16"	12.70
1-1/2"	13.30
2"	14.30

Will include dowel pin holes.
*Must also be ordered with Ball Bearing -R Option

Ultran Slide Dowel Pin Holes (-D Option)	
9/16"	$10.50
3/4"	12.15
1-1/16"	14.05
1-1/2"	16.65

Linear Thruster Dowel Pin Holes (-D Option) T or TE Series		
	Standard Tooling Plate	Stainless Steel Tooling Plate Option
9/16"	$6.40	$10.10
3/4"	8.25	11.90
1-1/16"	11.90	19.95
1-1/2"	15.95	25.85
2"	16.25	27.95

Bimba Transition Plates
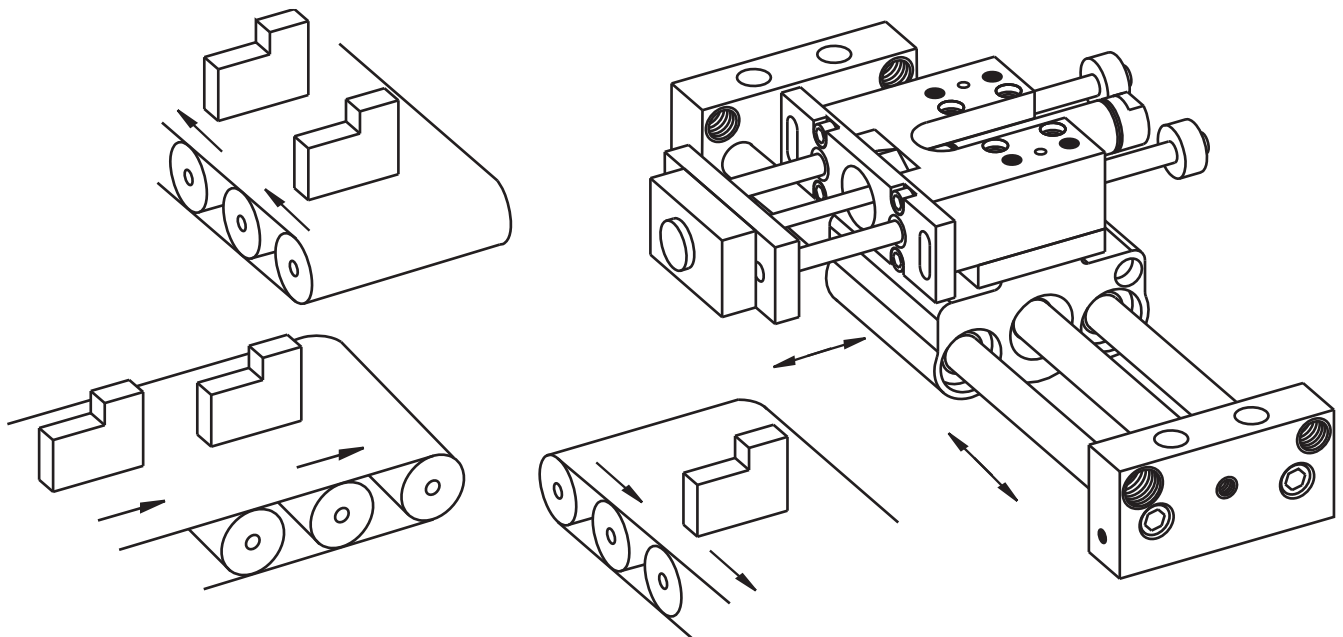
Sizing a Multi-Axis Configuration

General Comments:

Selection of the actuators and the transition plates that connect them is the most important part of engineering a motion system. To begin the sizing of individual actuators into a complete motion system, you should begin at your attachment or item to move. As you select the type of Bimba product to use, be sure to reference the size and engineering data in this bulletin and in the individual product catalogs. We recommend the following method:

1. Determine the weight and center of gravity of your attachment or item to move.
2. Determine the best actuator to be connected to your attachment or item to create the desired movement.
3. Determine the size of the actuator by referencing the engineering data in this catalog and in the specific product catalog. Select the product by its load, moment, torque, and speed capability as compared to those required by your application. Remember to add in any loads, moments or torques created by any attached actuators.
4. Select the next actuator that will create movement you need.
5. Continue with steps 3 through 5 until all the motion requirements are satisfied.

In the case of a precision positioning system, the deflection of the components should be compensated for by incorporating external adjustments into the system design.

Sizing Example:

Bimba Transition Plates

Sizing a Multi-Axis Configuration

An example of a motion system is shown on page 10.32 using an Ultran Slide rodless cylinder combined with a Linear Thruster by means of a Transition Plate. The application requires a product to be painted in one of two paint colors. The product coming down the conveyor is identified by a bar code which indicates the required paint color. The Linear Thruster extends to the end of its six inch stroke and picks the product by means of a vacuum system. The Linear Thruster retracts three inches before the Ultran Slide begins to move in the direction of one of the two outgoing conveyors. The slide must move eight inches in either direction from its center position to place the product on an outgoing conveyor which will send it to a specific paint booth.

To begin the sizing, we will start with the item that is to be moved. Each product weighs 5 lbs. and has flat surfaces that allow a vacuum gripper to grasp and lift it from the incoming conveyor. The center of gravity of the product is three inches from the grip surface and in the middle of the product width and height. The vacuum gripper weighs 1 lb. and has a center of gravity that is .75 inch from the tooling plate surface and in the middle of its width and height. The gripper is mounted on the center of the Linear Thruster tooling plate. A Linear Thruster with a six-inch stroke is chosen to move the product. The combined weight of the product and gripper is 6 lbs. Comparing the 6-lb. load to the maximum side load table for a standard Linear Thruster with a six-inch stroke, a ¾ inch bore unit has the capability of 11.09 lbs. This should be sufficient to handle the 6 lb. load and take into account any light, unforeseen loads. Since the product and gripper will be centered on the tooling plate, there are no radial moments. The ¾ inch bore Linear Thruster will be chosen as the coupled unit.

An Ultran Slide was chosen to move the Linear Thruster, vacuum gripper and product into position on an outgoing conveyor. The ¾ inch bore Linear Thruster will be fastened to the center of the Ultran Slide carriage by means of a Transition Plate. The Ultran Slide must carry the load of the Transition Plate (0.20 lb.), Linear Thruster (2.82 lbs.), the gripper (1 lb.), and the product (5 lbs.) The total weight the Ultran Slide will move is 9.02 lbs. Comparing this to the maximum allowable radial loads for 16-inch stroke Ultran Slides, a ¾ inch bore unit can carry approximately a 20-lb. load. The Linear Thruster is fully extended when it picks the product from the incoming conveyor, then retracts three inches before the Ultran begins to move toward an out-going conveyor. In this case, the dynamic side loading conditions on the Ultran Slide will be determined when the Linear Thruster has retracted three inches (see drawing on page 10.34). Since the Linear Thruster has retracted to half of its stroke length, the guide shafts are extending the same amount from each side of the Linear Thruster body. In this case there is no side load because of the guide rods. The actual side load created by the product, gripper, and Linear Thruster are found by rearranging and solving the equation found on page 10.34 and then comparing the result to the 20 lb. limit.

Bimba Transition Plates

Sizing a Multi-Axis Configuration

(Calculations for page 10.33 example)

Side Load $=$ ΣActual Load* $[2* [(Y_1/Z+ 1]]$

Actual Loads: product - 5 lbs.

           gripper - 1 lb.

           Linear Thruster tooling plate - .40 lb.

Side Load $=$ 5 lbs. *[2* [(8.25 in./2.518 in.) + 1]] +

           1 lb. * [2* [(4.50 in./2.518 in.) + 1]] +

           .40 lb. * [2* [(3.56 in./2.518 in.) + 1]]

Side Load 3/4" bore $=$ 50.25 lbs.

This side load is greater than the 20-lb. maximum for a side loading condition on a 3/4 bore Ultran Slide. The next larger Ultran Slide, 1-1/16" inch bore, has a side load capability of approximately 55 lbs. This Slide will be reviewed for the side load condition using the equation above.

Side Load 1-1/16 bore $=$ 42.48 lbs.

This side load is within the capability of an 1-1/16 inch bore Ultran Slide and this unit will be chosen as the base unit.

Other considerations in choosing a model include:

1. The need for a Hall Effect switch that will signal a controller when the Linear Thruster has retracted three inches. Also, external bumpers will be used to soften the impact at end-of-stroke.
2. Hall Effect Switches will be used for end-of-stroke and mid-stroke signalling on the Ultran Slide rodless cylinder.
3. Dowel pins will be used with the Transition Plate.

Thus the products selected will be:

Linear Thruster   T-046-EB2MD

Ultran Slide rodless cylinder   USS-0916-TD

Transition Plate   TPU09-T04PD
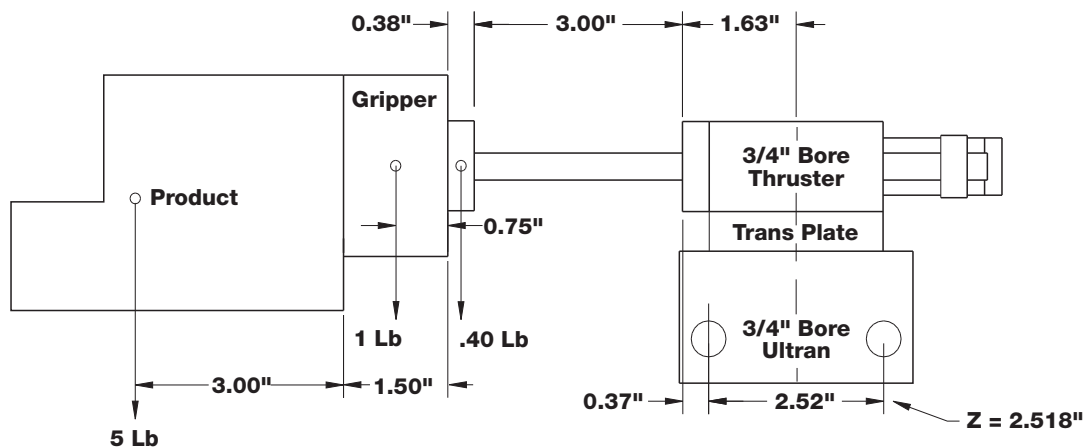
Bimba Transition Plates

Actuators Coupled with Transition Plates
Application Checklist

This checklist makes sizing and selecting Bimba actuators easier. Bimba's Engineering Department will assist you by providing a detailed analysis of your application and, based on the information in the application checklist, will help you choose the actuators best suited to your needs.

Step 1. Photocopy the sketch and checklist sheets.

Step 2. Complete the sketch and checklist.

Step 3. Mail or fax the sketch and checklist to your local stocking distributor.

Date: _____

Your Name: _____

Company: _____

Address: _____

Phone: _____

Fax: _____

1. Bimba actuators selected.

Base:_____

Coupled:_____

Coupled:_____

_____ :_____

2. What is the weight of the load being moved?

_____

3. What will be the speed of the actuators at the end of their movement?

Base:_____in./sec._____

Coupled:_____in./sec._____

Coupled:_____in./sec._____

4. What air pressure is available for the system?

_____PSI_____

5. In what kind of environment will the system be used (clean industrial, outdoor, wood dust, temperature, etc.)?

_____

_____

_____

_____

_____

_____

6. How fast will the actuators be cycling?

Base:_____cycles/sec._____

Coupled:_____cycles/sec._____

Coupled:_____cycles/sec._____

_____ :_____cycles/sec._____

7. Will you need magnetic position sensing of the products?

	Yes	No
Base:	☐	☐
Coupled:	☐	☐
Coupled:	☐	☐
_____ :	☐	☐

8. Explain the sequence of movement you have in mind for the system?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Flow Controls

Air Booster Cylinders

Air Reservoirs

Manual Valves

Shock Absorbers

Transition Plates

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Alignment Couplers

Appendix

For Technical Assistance: 800-442-4622

Bimba – Application Checklist

Application Sketch

Please include in your sketch:

1. Your choice of Bimba actuators.

2. How you intend to combine them.

3. The item you intend to attach or move.

4. The distance you want the items to move.

5. The location of any external stops or cushioning devices.

6. The weight and approximate center of gravity of the attachments.

7. Any additional forces, moment arms, or torques that the system will encounter.
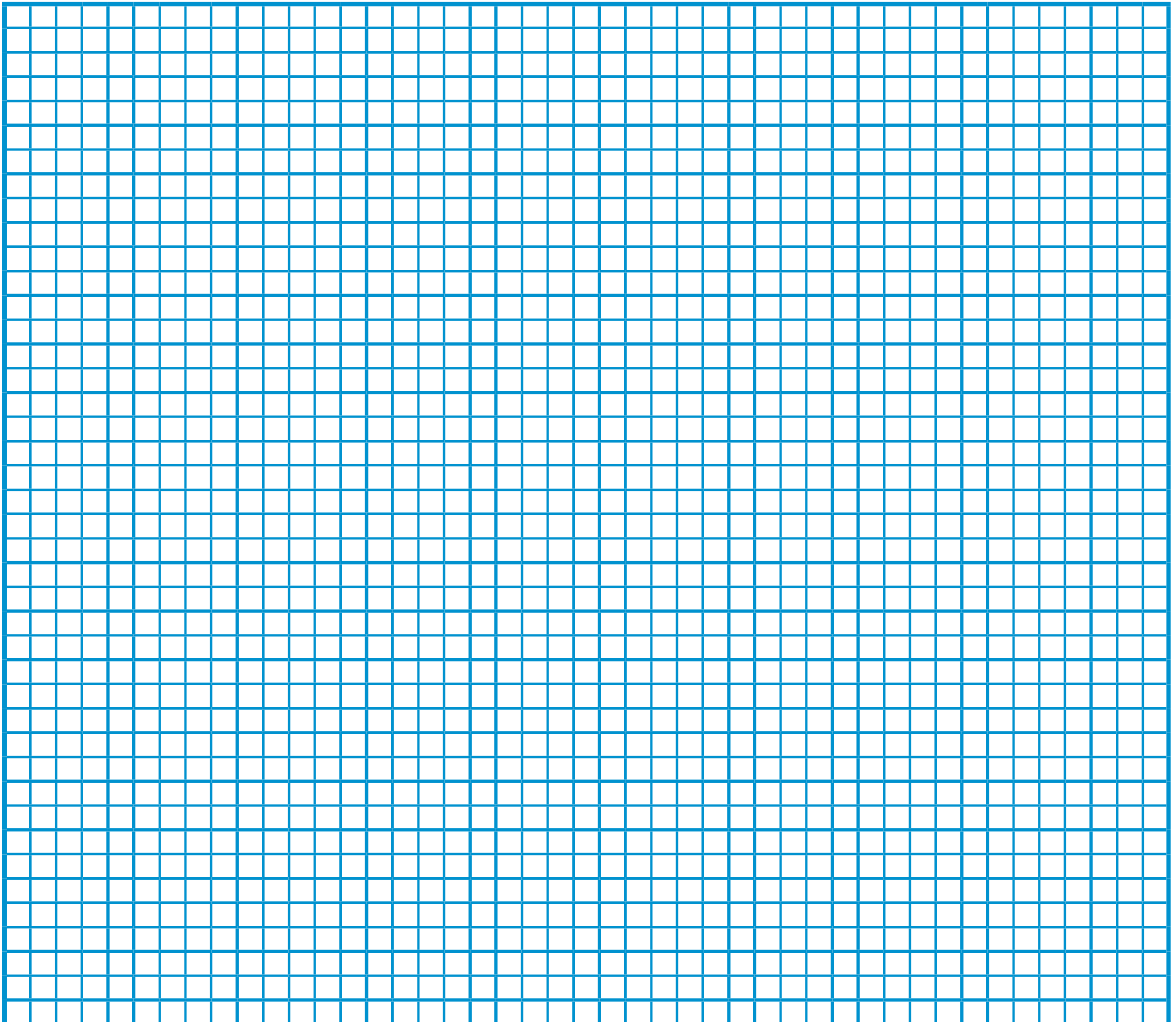
Bimba Alignment Couplers

Features and Advantages

- Bimba's miniature coupler design allows excellent freedom of movement on the three new, miniature sizes; #5-40 through #10-32 sizes.

- The miniature couplers allow up to 20 degrees of spherical movement and 0.02" lateral allowance with only .002" of axial play and are manufactured from high tensile, hardened and blackened steel components.

- Larger sizes are available, from 1/4"-28 to 1"-14, with 1 degree of spherical movement and 1/16" of lateral allowance.

- The alignment allowances can eliminate the need for expensive precision machining in rigidly mounted applications.

- Alignment couplers help reduce binding and simplify field alignment problems, enhancing cylinder performance and reducing seal and bearing wear.

- An innovative design to resist vibrational loosening is available on sizes 5/16"-24 and larger. In the ACH style coupler, a slot is milled through the tapped mounting threads. Two socket head cap screws are strategically placed to allow the coupler to be clamped to the rod, offering superior strength connection.

Dimensions

Models #5-40 through #10-32
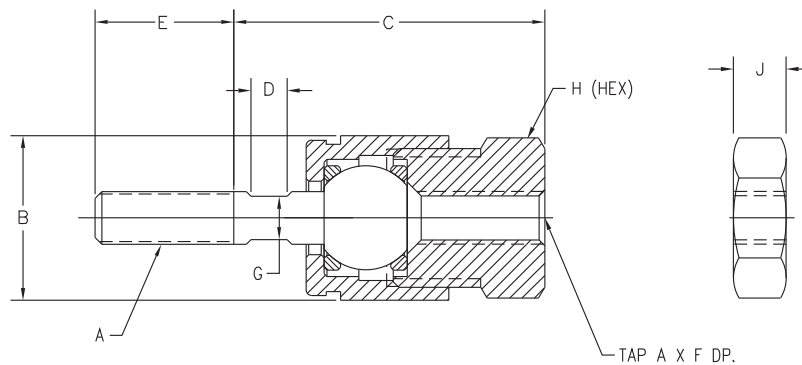
Model*	A	B	C	D	E	F
AC5-40	#5-40	15/32"	31/32"	1/8"	3/8"	3/8"
AC8-32	#8-32	17/32"	31/32"	1/8"	3/8"	3/8"
AC10-32	#10-32	19/32"	1-1/8"	1/8"	1/2"	1/2"

Model*	G	H	J	Maximum Pull at Yield (lbs.)	Alignment Allowance		Weight (oz.)	List Price Standard	List Price Stainless Steel
					Lateral	Spherical			
AC5-40	1/8"	3/8"	1/8"	200	0.02	20°	0.3	$15.80	$31.45
AC8-32	1/8"	7/16"	1/8"	650	0.02	10°	0.5	19.10	39.20
AC10-32	5/32"	1/2"	1/8"	1200	0.02	10°	0.8	20.95	47.00

List price includes one jam nut

* Specify SS at the end of the part number for Stainless Steel.

Additional Jam Nuts

Size	Part Number	Price	Stainless Steel Part No.	Price
#5-40	D-3745	$ 0.55	D-3745-SS	$ 0.70
#8-32	D-D0737	0.65	D-D0737-SS	0.65
#10-32	D-5288	0.55	D-5288-SS	0.70

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Bimba Alignment Couplers

Models 1/4"-28 through 1"-14

Standard Coupler
AC250-AC1000
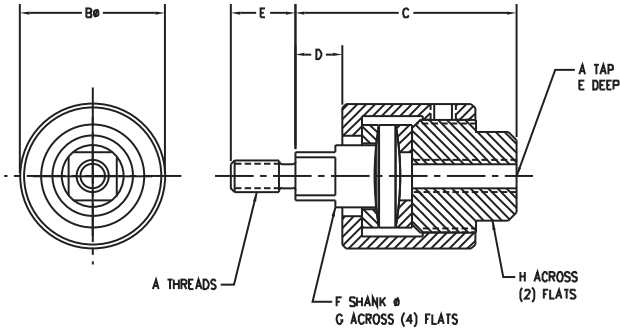
ACH Coupler
ACH312-ACH1000

1/16" of lateral allowance
1° spherical movement

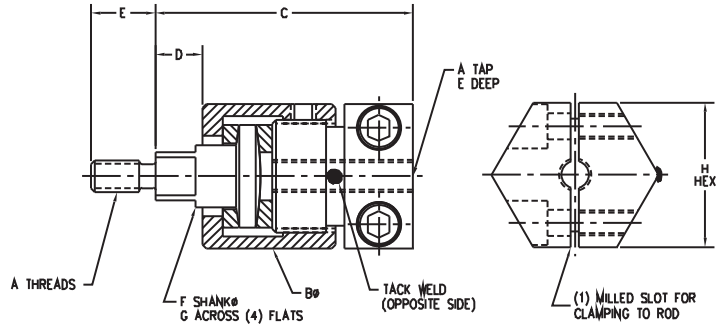| Part Number	A	B	C	C Hex	D	E	F	G	H	H Hex	Maximum Pull at Yield (lbs.)	List Price Standard AC	List Price Stainless Steel *SS	List Price Standard ACH
AC250	1/4"-28	1-1/8"	1-3/4"	--	3/8"	1/2"	1/2"	3/8"	11/16"	--	6,000	$28.55	$63.80	--
AC312	5/16"-24	1-1/8"	1-3/4"	2"	3/8"	1/2"	1/2"	3/8"	11/16"	1-1/4"	8,300	33.95	76.20	$67.95
AC375	3/8"-24	1-1/8"	1-3/4"	2"	3/8"	1/2"	1/2"	3/8"	11/16"	1-1/4"	8.300	33.95	81.65	67.95
AC437	7/16"-20	1-1/4"	2"	2-5/32"	7/16"	3/4"	5/8"	1/2"	13/16"	1-1/4"	10,000	43.65	99.65	73.35
AC500	1/2"-20	1-1/4"	2"	2-5/32"	7/16"	3/4"	5/8"	1/2"	13/16"	1-1/8"	14,000	43.65	99.65	73.35
AC625	5/8"-18	1-1/4"	2"	2-5/32"	7/16"	3/4"	5/8"	1/2"	13/16"	1-1/4"	19,000	46.40	106.20	73.35
AC750	3/4"-16	1-3/4"	2-5/16"	2-1/2"	7/16"	1-1/8"	31/32"	13/16"	1-1/8"	1-3/4"	34,000	56.70	131.20	102.55
AC875	7/8"-14	1-3/4"	2-5/16"	2-1/2"	7/16"	1-1/8"	31/32"	13/16"	1-1/8"	1-3/4"	39,000	56.70	131.20	102.55
AC1000	1"-14	2-1/2"	2-15/16"	2-15/16"	7/16"	1-5/8"	1-11/32"	1-5/32"	1-5/8"	2-1/2"	64,000	89.15	205.20	138.50

Please specify AC, ACH coupler when ordering AC750 (Standard Coupler) ACH750 (Hex Coupler)
Please specify – SS at the end of the part number for Stainless Steel.
Jam nut sold separately for 1/4"-28 through 1"-14 size
*SS valid for AC models only

Jam Nuts

Size	Part Number Standard	Price	Stainless Steel Part No.	Price
1/4"-28	D-344	$ 0.55	D-344-SS	$ 1.20
5/16"-24	D-746	0.55	D-746-SS	1.20
3/8"-24	D-801	0.55	D-801-SS	1.15
7/16"-20	D-154	0.55	D-154-SS	1.65
1/2"-20	D-98	0.65	D-98-SS	1.65
5/8"-18	D-9	0.65	D-9-SS	2.35
3/4"-16	D-3556	0.95	D-3556-SS	3.05
7/8"-14	D-2545	1.40	D-2545-SS	5.60
1"-14	D-1331	2.70	D-1331-SS	3.70

Bimba – Appendix

Transition Plate Data

Dowel Pin Hole Locations

Ultran
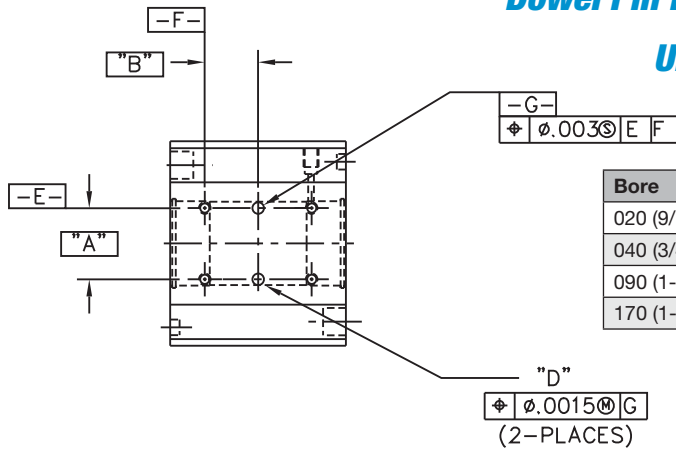
Bore	A	B	D
020 (9/16")	1.000	.750	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.375	.876	.1895/.1905 x .410/.430 DP.
090 (1-1/16")	1.750	1.250	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	2.500	1.750	.3145/.3155 x .560/.580 DP.

Pneu-Turn
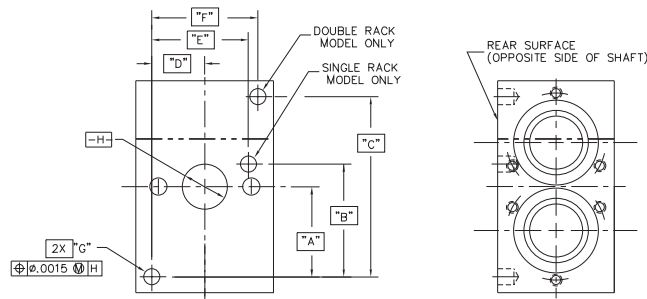
Bore	A	B	C	D	E	F	G
020 (9/16")	.874	1.101	1.754	.500	.928	1.000	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.061	1.330	2.125	.623	1.139	1.250	.1895/.1905 x .410/.430 DP.
090 (1-1/16")	1.311	1.730	2.625	.718	1.437	1.437	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	1.811	2.281	3.625	.905	1.812	1.812	.3145/.3155 x .560/.580 DP.
310 (2")	2.187	3.000	4.375	.625	1.813	1.250	.3770/.3780 x .560/.580 DP.

Linear Thruster
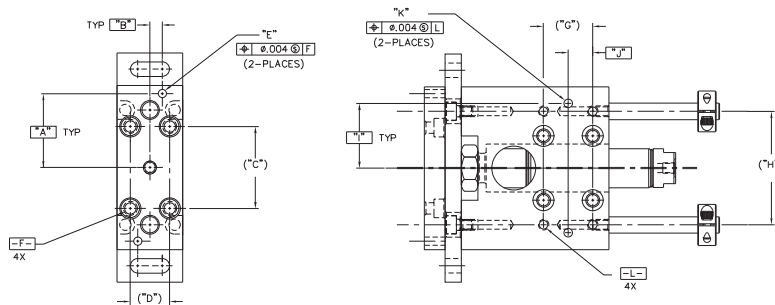
Bore	A	B	C	D	E	G	H	I	J	K
020 (9/16")	1.125	.188	1.250	.600	.1270/.1280 THRU.	.750	1.750	.8750	.375	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.313	.250	1.500	.750	.1895/.1905 THRU.	.938	2.125	1.1250	.469	.1895/.1905 x .290/.310 DP.
090 (1-1/16")	1.813	.375	2.000	1.000	.2520/.2530 THRU.	1.375	3.125	1.5625	.688	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	2.375	.500	3.000	1.500	.3145/.3155 THRU.	1.750	4.000	2.0000	.875	.3145/.3155 x .560/.580 DP.
310 (2")	3.000	.625	4.000	2.000	.3770/.3780 THRU.	2.125	5.000	2.5000	1.063	.3770/.3780 x .810/.830 DP.
310 (2") TE	2.500	.625	3.000	2.000	.3770/.3780 THRU.	2.000	4.250	2.1250	1.000	.3770/.3780 x .810/.830 DP.
500 (2-1/2")	3.750	1.000	4.750	3.000	.3770/.3780 THRU.	2.630	6.250	3.1250	1.312	.3770/.3780 x .1.000/1.020 DP.
500 (2-1/2") TE	3.250	.750	3.750	2.250	.3770/.3780 THRU.	2.500	5.375	2.6875	1.250	.3770/.3780 x .1.000/1.020 DP.
700 (3")	4.750	1.000	6.000	3.000	.5020/.5030 THRU.	4.000	8.000	4.0000	2.000	.5020/.5030 x .1.250/1.270 DP.
700 (3") TE	4.000	1.000	4.500	2.750	.5020/.5030 THRU.	3.000	6.500	3.2500	1.500	.5020/.5030 x .1.250/1.270 DP.

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