

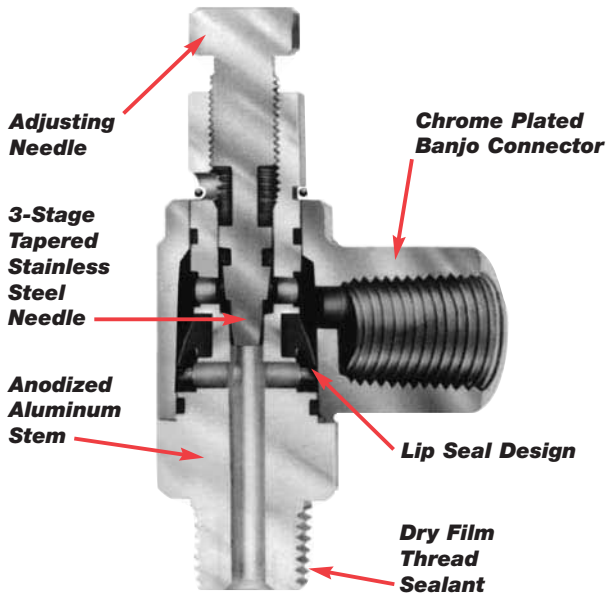
Related Products

Flow Controls	10.2-10.10
Air-to-Air Boosters	10.11-10.12
Air Reservoirs	10.13
Manual Valves	10.14
Shock Absorbers	10.15-10.21
Transition Plates	10.22-10.35
Application Checklist	10.36
Alignment Couplers	10.37-10.38
Appendix	10.39

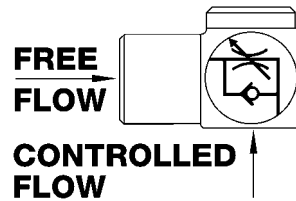
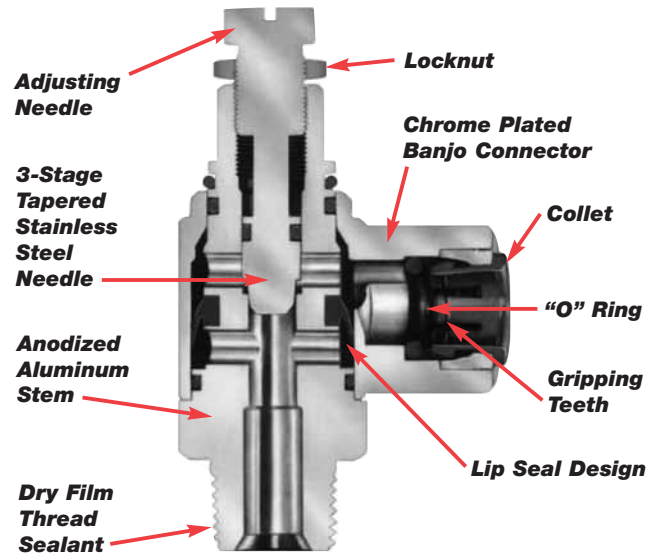


Bimba Flow Controls

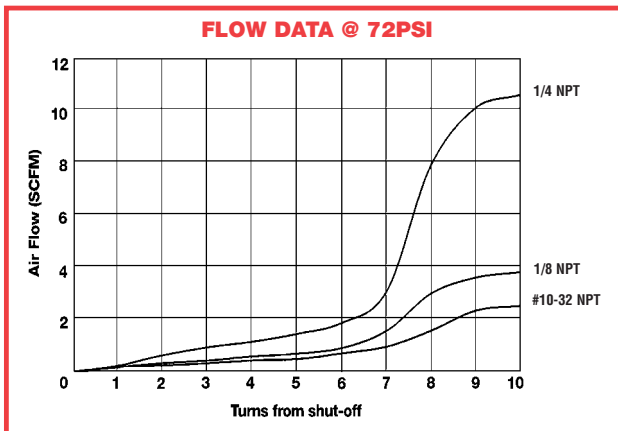
FCP



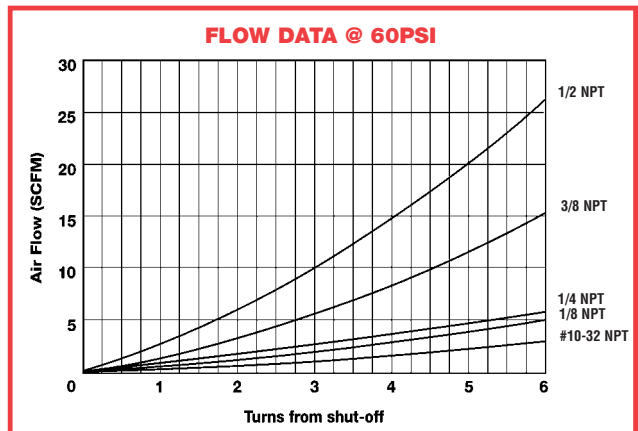
FQP



FQPS Series



FQP & FCP Series

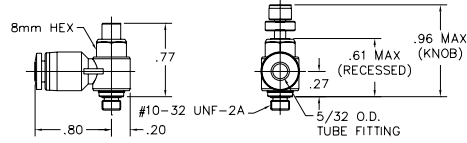


Bimba Miniature Quik-Flo® Flow Controls- FQPS Series

For 10-32 port,
5/32" OD tubing

FQPS1
\$12.85

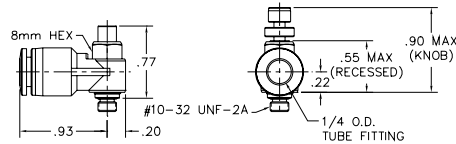
FQPS1K
\$12.85



For 10-32 port,
1/4" OD tubing

FQPS12
\$14.05

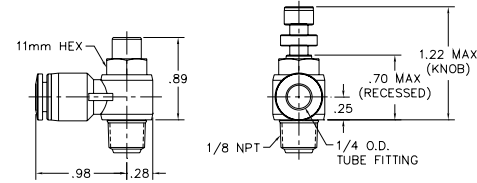
FQPS12K
\$14.05



For 1/8 port,
1/4" OD tubing

FQPS2
\$15.05

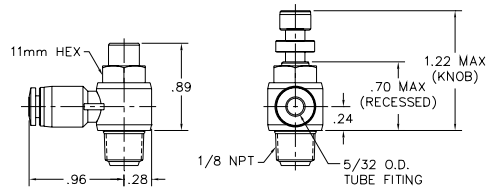
FQPS2K
\$15.05



For 1/8 port,
5/32" OD tubing

FQPS21
\$13.75

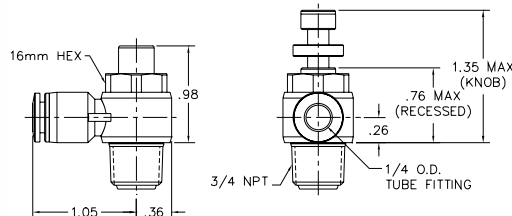
FQPS21K
\$13.75



For 1/4 port,
1/4" OD tubing

FQPS44
\$19.30

FQPS44K
\$19.30



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



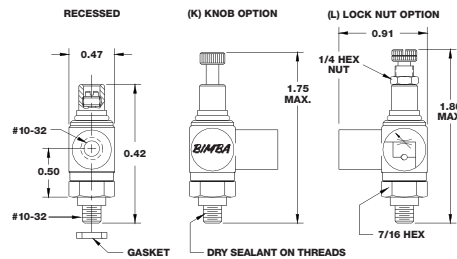
FCP1K
\$13.30



FCP1L
\$13.65



For 10-32 port



FCP2
\$14.20



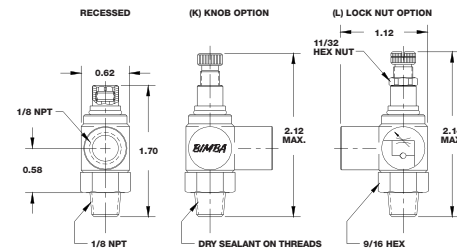
FCP2K
\$15.55



FCP2L
\$15.90



For 1/8 port



FCP4
\$18.15



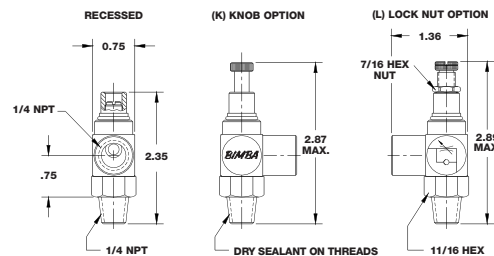
FCP4K
\$20.25



FCP4L
\$20.65



For 1/4 port



FCP6
\$22.55



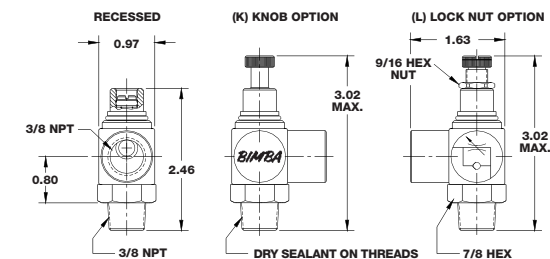
FCP6K
\$24.80



FCP6L
\$25.00



For 3/8 port



FCP8
\$29.85



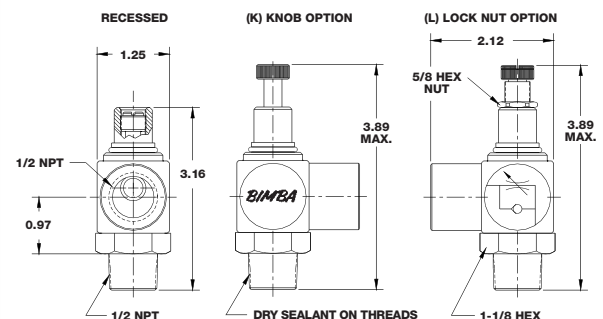
FCP8K
\$33.00



FCP8L
\$33.30



For 1/2 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

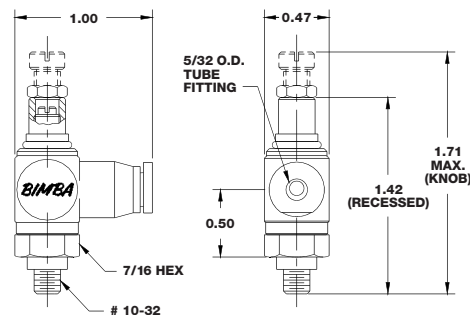
**Operating
Temperature
Range:**
-20 degrees
to +200 degrees F
(-25°C to +95°C)

Bimba Quik-Flo® Flow Controls- FQP Series

For 10-32 port,
5/32" OD tubing

FQP1
\$13.20

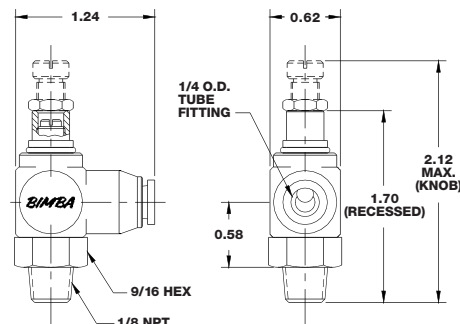
FQP1K
\$15.15



For 1/8 port,
1/4" OD tubing

FQP2
\$15.70

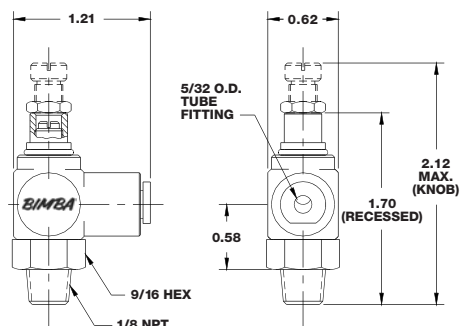
FQP2K
\$17.95



For 1/8 port,
5/32" OD tubing

FQP21
\$15.70

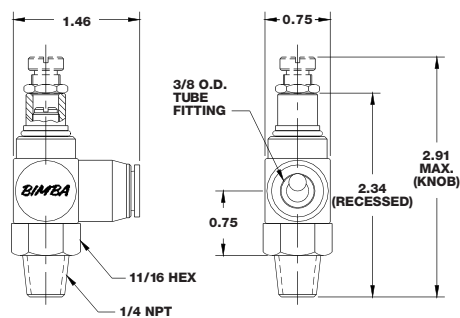
FQP21K
\$17.95



For 1/4 port,
3/8" OD tubing

FQP4
\$20.00

FQP4K
\$22.95



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

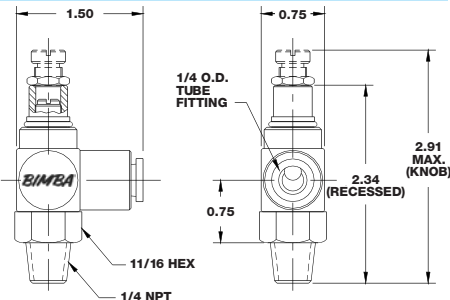
FQP44
\$20.00



FQP44K
\$22.95



For 1/4 port,
1/4" OD tubing



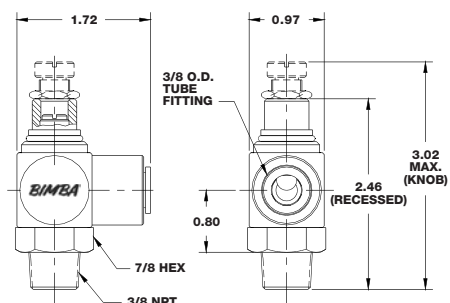
FQP6
\$24.80



FQP6K
\$28.15



For 3/8 port,
3/8" OD tubing



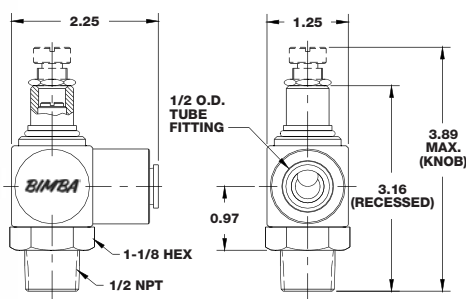
FQP8
\$32.25



FQP8K
\$36.05



For 1/2 port,
1/2" 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° 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.

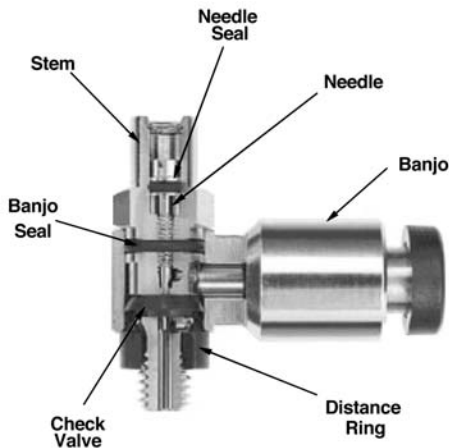
For additional dimensional information, reference Quik-Flo® Flow Controls on pages 10.2 and 10.3. For example, reference FQP1 for QNV1 dimensions.

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

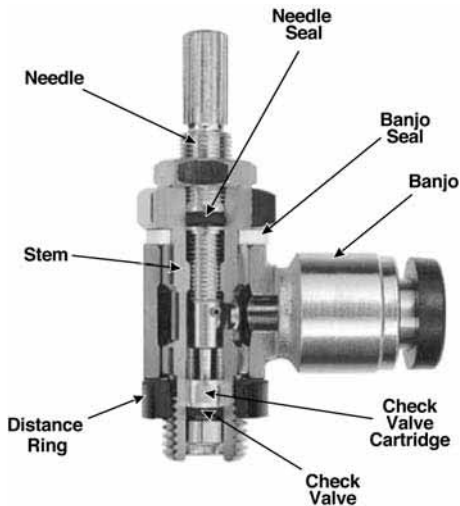
Bimba Metric Flow Controls- FCPM Series

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

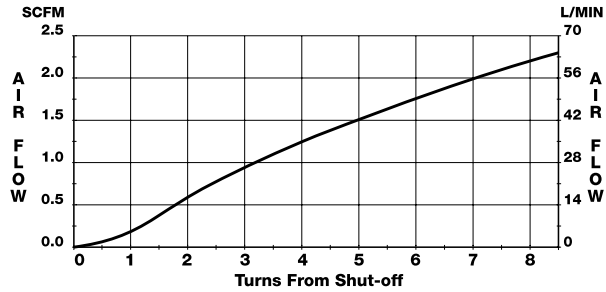
Appendix

Bimba Metric Flow Controls- FCPM Series

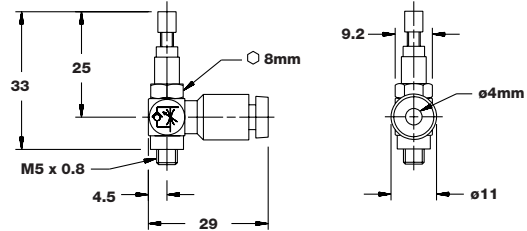
M5 Port Mounted Flow Control Valves



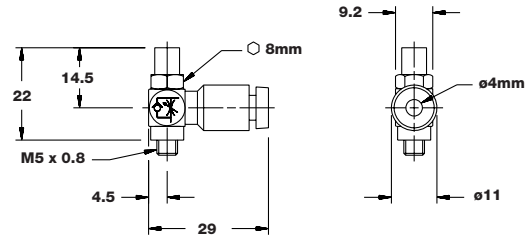
M5 Controlled Flow Chart (at 5 Bar)
Maximum Free Flow Capacity 91-122 l/min



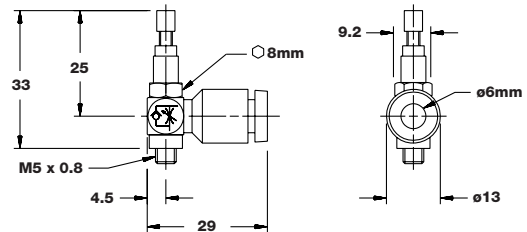
For M5 port,
FCPM-1-Q4-L
4mm OD tubing
2mm ID tubing
\$21.90



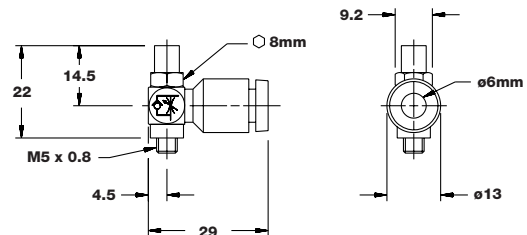
For M5 port,
4mm OD tubing
2mm ID tubing
FCPM-1-Q4-R
\$18.70



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



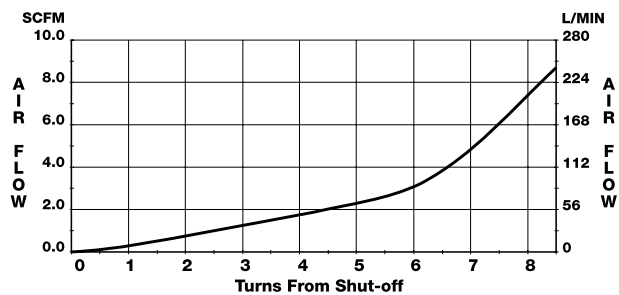
For M5 port,
6mm OD tubing
4mm ID tubing
FCPM-1-Q6-R
\$18.70



G1/8 Port Mounted Flow Control Valves

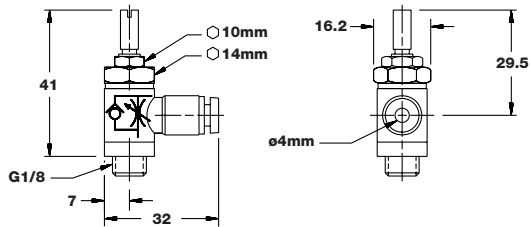


G1/8 Controlled Flow Chart (at 5 Bar)
Maximum Free Flow Capacity 110-334 l/min

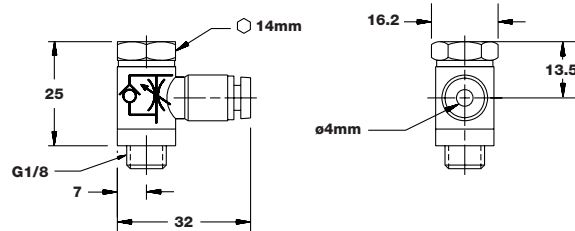


Bimba Metric Flow Controls- FCPM Series

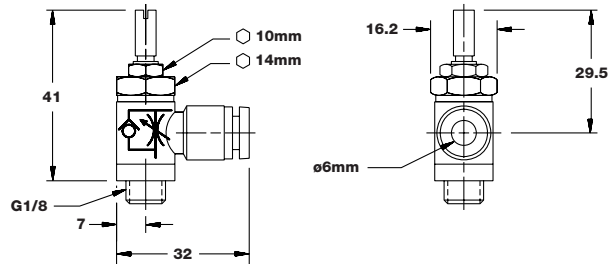
For G¹/₈ port,
FCPM-2-Q4-L
4mm OD tubing
2mm ID tubing
\$22.70



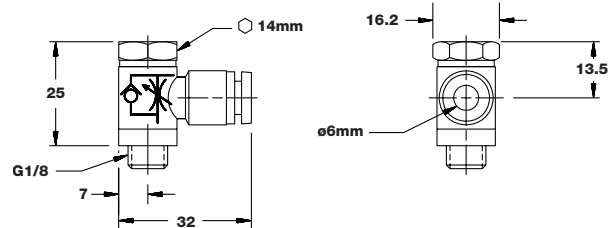
For G¹/₈ port,
4mm OD tubing
2mm ID tubing
FCPM-2-Q4-R
\$22.70



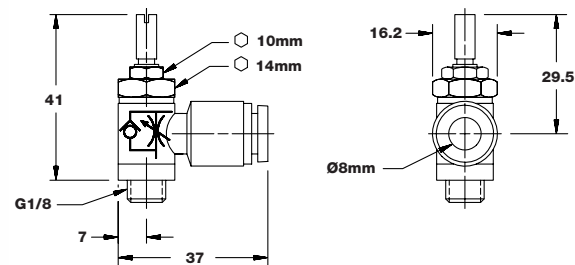
For G¹/₈ port,
FCPM-2-Q6-L
6mm OD tubing
4mm ID tubing
\$22.85



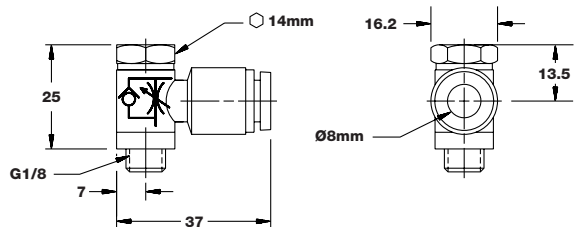
For G¹/₈ port,
6mm OD tubing
4mm ID tubing
FCPM-2-Q6-R
\$22.85



For G¹/₈ port,
FCPM-2-Q8-L
8mm OD tubing
6mm ID tubing
\$23.15



For G¹/₈ port,
8mm OD tubing
6mm ID tubing
FCPM-2-Q8-R
\$23.15



Flow Controls

Air Booster
Cylinders

Air Reservoirs

Manual
Valves

Shock
Absorbers

Transition
Plates

Application
Checklist

Alignment
Couplers

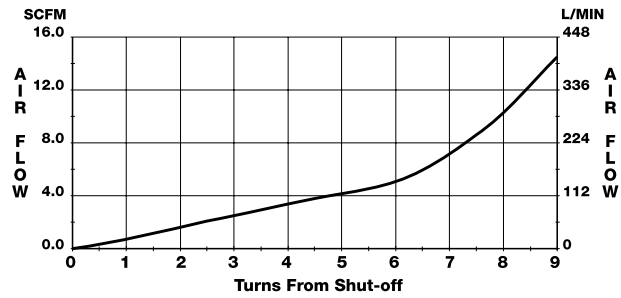
Appendix

Bimba Metric Flow Controls- FCPM Series

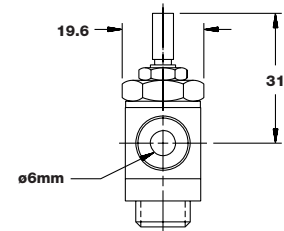
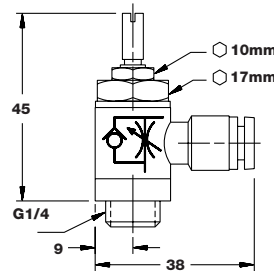
G1/4 Port Mounted Flow Control Valves



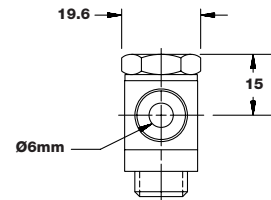
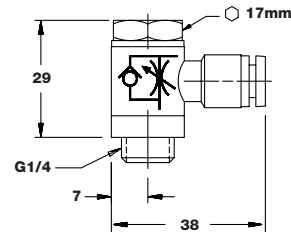
G1/4 Controlled Flow Chart (at 5 Bar)
Maximum Free Flow Capacity 394-634 l/min



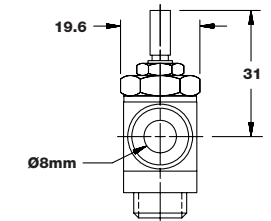
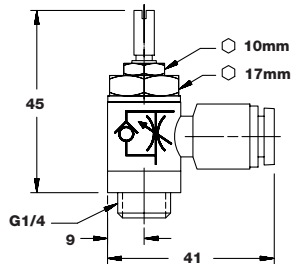
For G1/4 port,
FCPM-4-Q6-L
6mm OD tubing
4mm ID tubing
\$29.70



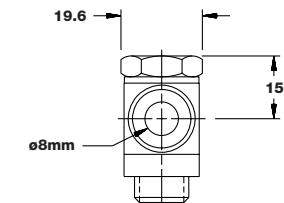
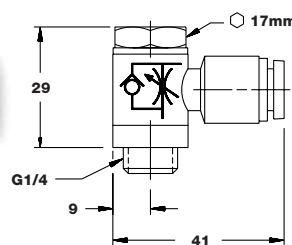
For G1/4 port,
6mm OD tubing
4mm ID tubing
FCPM-4-Q6-R
\$29.70



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



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.

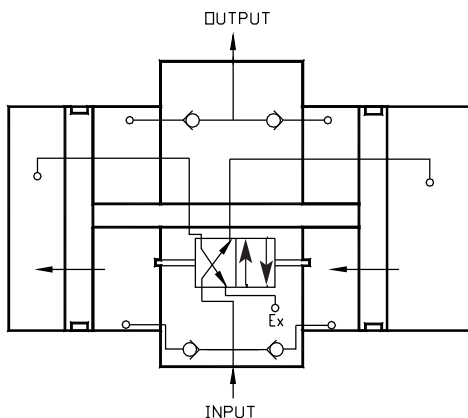
How to Order and List Prices

Model/Price	Dimensions (inch)
Model Number: CSS-00118-A List Price: \$401.90 Availability: Stock Item	

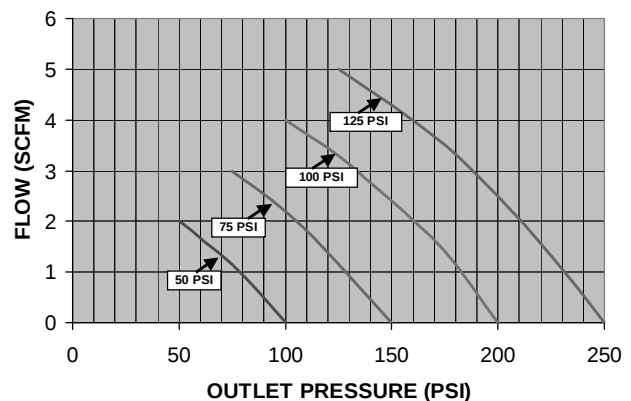
Engineering Specifications

- 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: \$1,041.80 Availability: Stock Item	

Engineering Specifications

Maximum Input Pressure: 125 psi

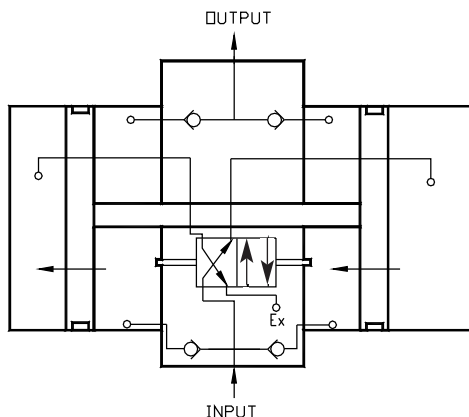
Operating Temperature: 15° to 160° F

Lubrication: HT-99 oil

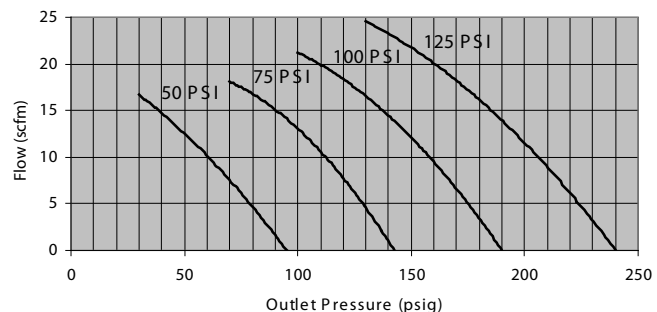
Bodies and Center Section: Aluminum; Hard-Coat with PTFE

Mounting Plate: Anodized Aluminum

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



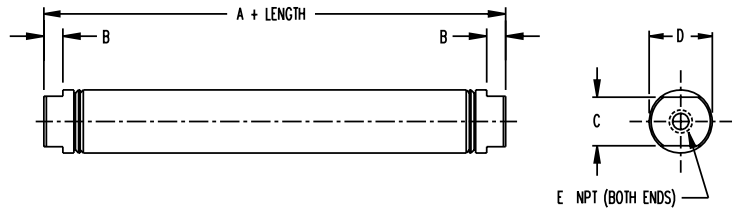
FLOW DATA



Bimba Air Reservoirs

- Type 304 Stainless Steel Body
- Rated 250 PSI
- Aluminum Alloy Porting Ends

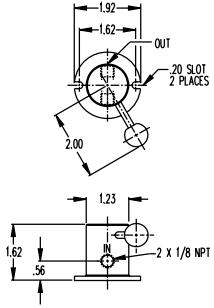
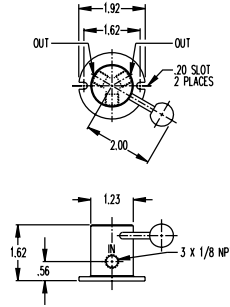
☐ Enter Stroke Length as 3rd Digit



BORE	MODEL NO.	VOL. (CU. IN.)	A	B	C	D	E	PRICE
3/4"	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	1.938	.187	.625	.813	1/8" NPT	\$8.25 BASE PRICE Add \$1.00 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	2.375	.187	.875	1.125	1/8" NPT	\$9.05 BASE PRICE Add \$1.20 per inch of stroke
1-1/4"	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	.250	.875	1.333	1/8" NPT	\$17.30 BASE PRICE Add \$1.40 per inch of stroke
1-1/2"	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	2.250	.250	.875	1.562	1/8" NPT	\$20.30 BASE PRICE Add \$1.85 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	2.875	.312	1.250	2.080	1/4" NPT	\$26.45 BASE PRICE Add \$2.20 per inch of stroke
2-1/2"	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	2.875	.312	1.750	2.610	1/4" NPT	\$42.60 BASE PRICE Add \$2.90 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	.312	2.00	3.125	3/8" NPT	\$55.85 BASE PRICE Add \$3.60 per inch of stroke

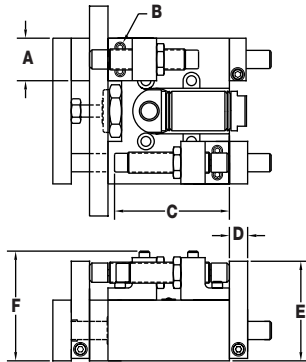
Bimba Manual Valves

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 $\frac{1}{8}$ " orifice – $\frac{1}{8}$ " 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 – $\frac{1}{8}$ " NPT ports are located 120° apart – orifice $\frac{1}{8}$ " diameter. To repair, remove handle and retaining ring. Weight: .22	

Shock Absorber Dimensions

Linear Thruster Cylinders



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.

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

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

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

$$E_T = E_K + E_W \dots\dots\dots \text{(Total energy per stroke, in-lbs)}$$

$$E_TC = E_T \times C \dots\dots\dots \text{(Total energy per hour, in-lbs/hr)}$$

E_T and E_TC 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 3/4" bore "T" series Thruster

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

Checking specifications chart: both E_T and E_TC 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.

Bimba Shock Absorbers

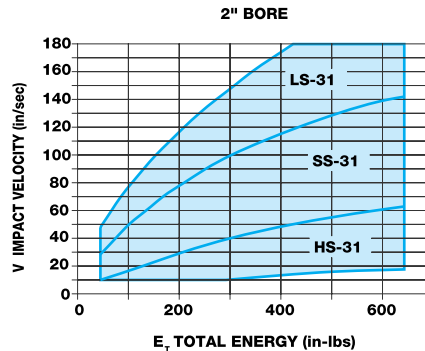
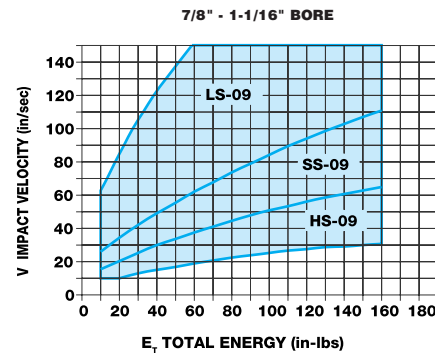
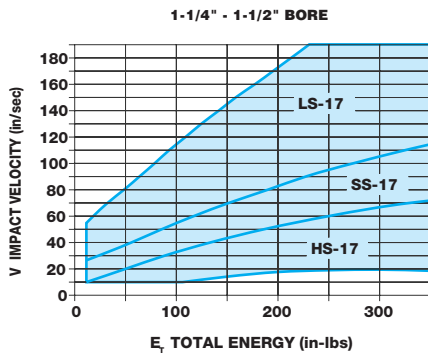
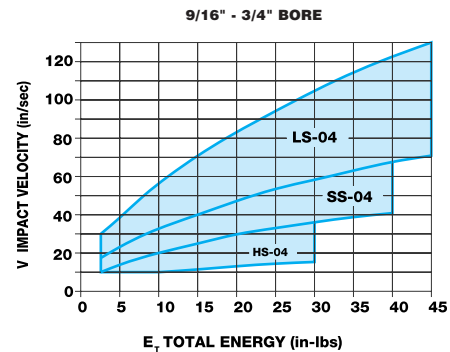
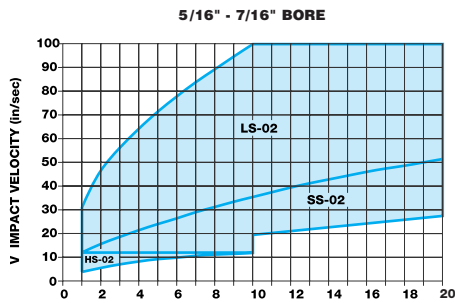
T Series Thruster Calculation Constants

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 _r) Max. in.-lbs. per cycle	20	45	190	400	650
(E _r - 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 _r) Max. in.-lbs. per cycle	20	45	190	400	650
(E _r - C) max. in.-lbs. per hour	36,000	125,000	300,000	475,000	622,000

Velocity vs. Load for Shock Absorbers



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

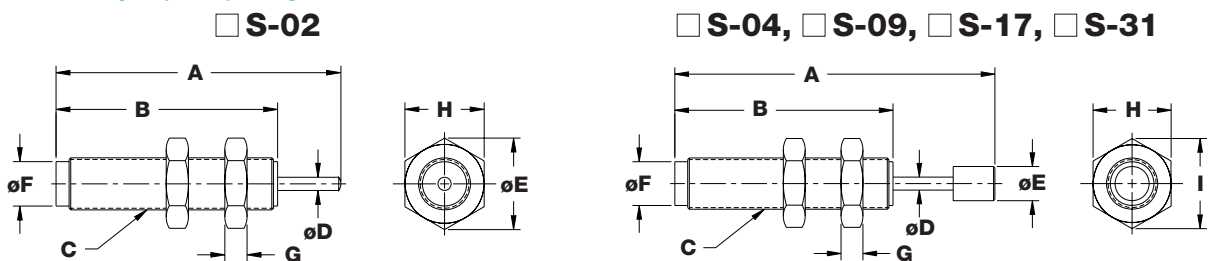
Bore	Ultran	Ultran Slide
5/16" (007)	N/A	□ S-02
7/16" (01)		
9/16" (02)	□ S-02	□ S-04
3/4" (04)	□ S-04	
7/8" (06)	□ S-09	□ S-09
1-1/16" (09)		
1-1/4" (12)	□ S-17	□ S-17
1-1/2" (17)		
2" (31)	□ S-31	□ S-31

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	3.24	1/2-20 UNF	0.16	0.44	0.43	0.12	0.63	0.72
□ S-17	5.38	3.89	3/4-16 UNF	0.19	0.50	0.64	0.18	0.94	1.08
□ S-31	7.93	5.00	1-12 UNF	0.31	0.88	1.22	0.18	1.30	1.30

Model (LS, SS, HS)



Engineering Specifications

Model	Shock Absorber Bore	(S) Stroke Inches	Thread Type	(E _T) Max. In-Lbs. Per Cycle	(E _T -C) Max. In-Lbs. Per Hour	(F _p) Max Shock Force Lbs.	Nominal Coil Spring Force		(F _b) 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

Bimba Shock Absorbers

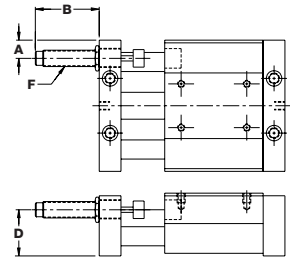
Shock Absorber Dimensions

Shock Absorber/Stroke Adjustment (in.)

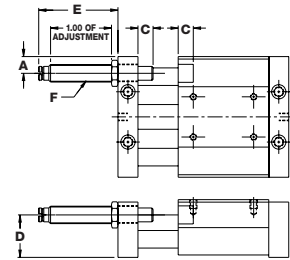
Bore	A	B	C	D	E	F
5/16" (007)	0.215	0.750	0.000	0.785	1.093	3/8-32 UNEF
7/16" (01)	0.218	0.750	0.000	0.780	1.093	3/8-32 UNEF
9/16" (02)	0.406	1.460	0.375	1.094	1.594	7/16-28 UNEF
3/4" (04)	0.406	1.335	0.375	1.438	1.469	7/16-28 UNEF
7/8" (06)	0.500	2.490	0.375	1.562	1.438	1/2-20 UNF
1-1/16" (09)	0.594	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 Ultram 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 Ultram mounting plate (lbs.)
- C = Cycles per hour
- SF = Shock factor
- UF1 = Ultram factor #1
- UF2 = Ultram 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.

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

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

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

Example: determine the proper shock absorber for a model Ultram 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 Ultram Slide

$$\begin{aligned} SF &= 0.410 \\ UF1 &= 0.442 \\ UF2 &= 1.565 \\ E_K &= ((15 \text{ lbs} + 1.565) / 772) \times (20 \text{ in/sec})^2 \dots\dots\dots E_K = 8.56 \text{ in-lbs} \\ E_{WV} &= ((0.442 \times 80 \text{ PSI}) + 15 \text{ lbs} + 1.565 \times 0.410) \dots\dots\dots E_{WV} = 21.29 \text{ in-lbs} \\ E_T &= E_K + E_{WV} = 29.85 \text{ in-lbs} \dots\dots\dots E_T C = E_T \times C = 107,457 \text{ in-lbs/hr} \end{aligned}$$

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

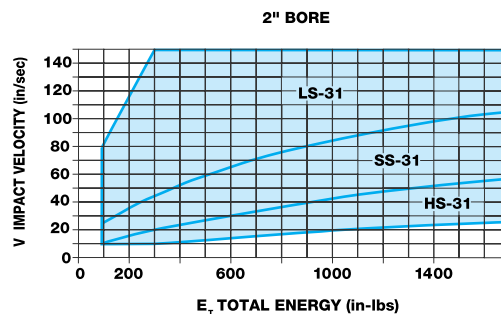
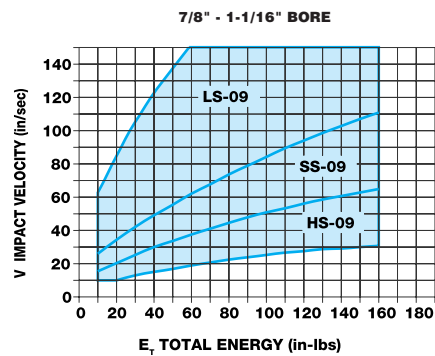
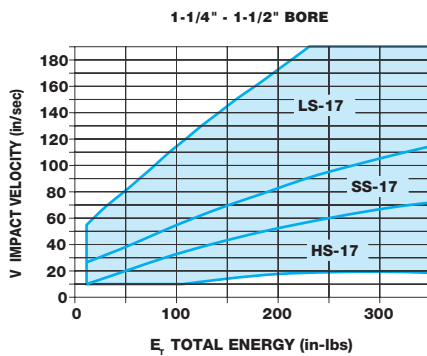
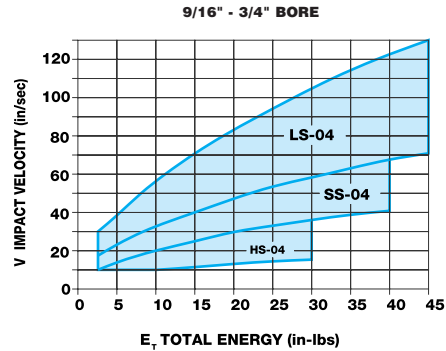
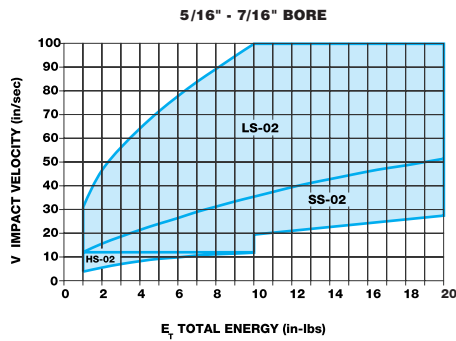
Ultram Slide

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

Ultram 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



*Ultram Maximum Velocity
20 inches per second or cycle rate
not to exceed 15 per minute

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, $KE = 1/2 mV^2$.

$$m = (W + \text{weight of carriage})/g =$$

$$(7.5 + 100)/32.179 = 3.34 \text{ lbm}$$

$$V = 10 \text{ in/sec} = 0.833 \text{ feet per second}$$

$$KE = 1/2 * 3.34 * 0.833^2 = 1.16 \text{ foot-pounds or}$$

$$13.92 \text{ inch-pounds } (1.16 \times 12 \text{ inches})$$

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.

$$\text{Force (F)} = \text{piston area} * \text{air pressure} = 1.76 * 60 = 106 \text{ pounds}$$

$$\text{Energy (E)} = F * \text{stroke of shock} = 106 * 0.5 = 53 \text{ inch-pounds}$$

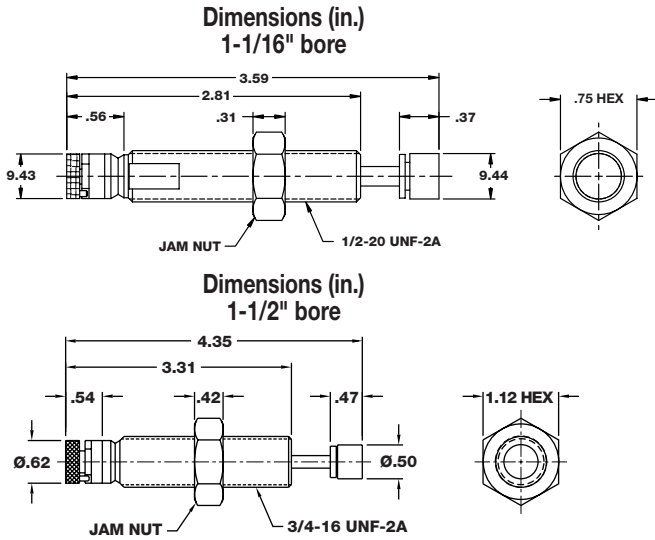
3. Total Energy (E_T) = 53 + 13.92 = 66.92 inch-pounds

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



Shock Absorber Adjustment Range

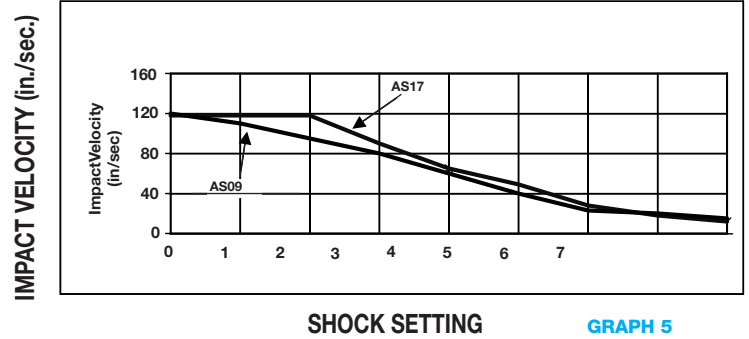
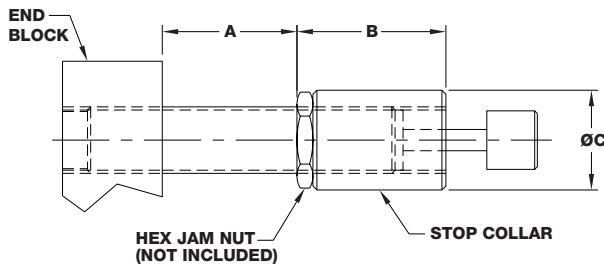


Table 3. Shock Absorber Ratings

Model	Shock Absorber Bore	(S) Stroke	Thread Type	(E _r) Max. In-Lb. Per Cycle	(E _r -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

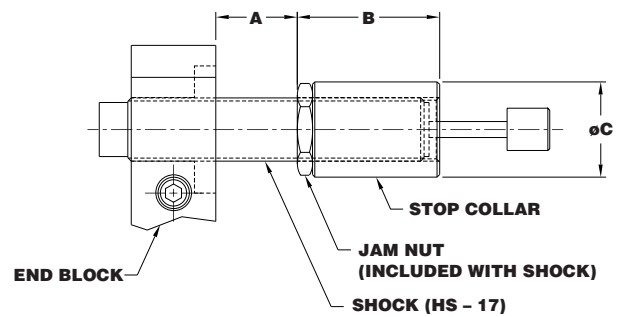
Ultran Slide & Ultran Rodless Cylinders



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

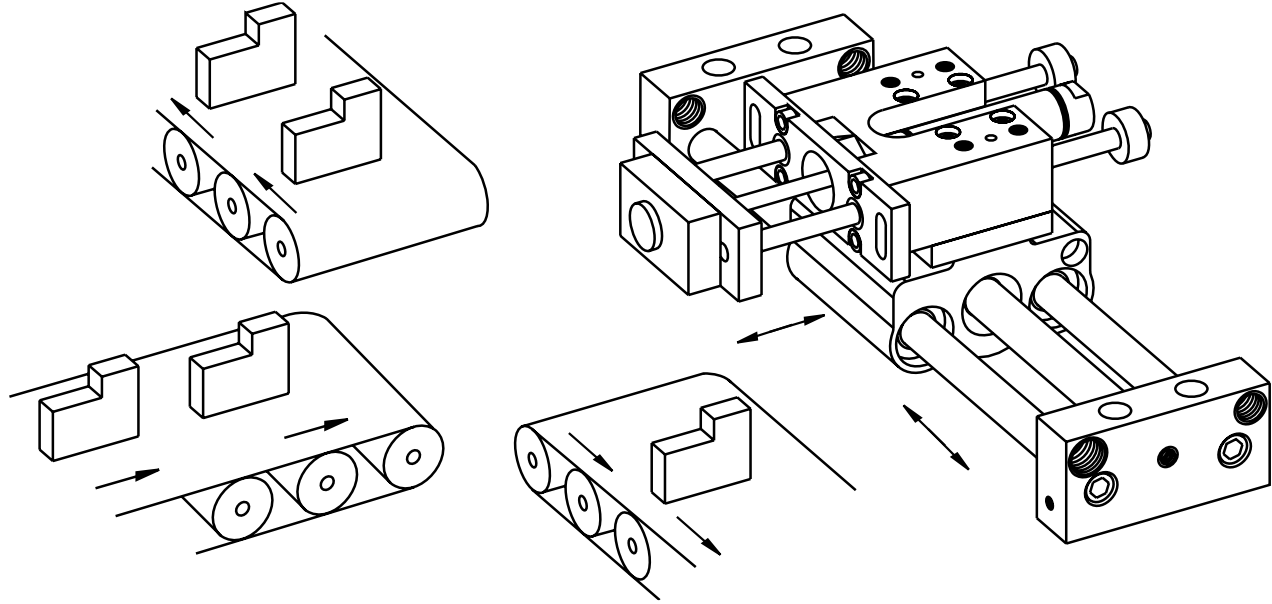


Model	A	B	ØC
USC-09	.96	1.12	Ø1.69
USC-17	.96	1.68	Ø1.12

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.

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.

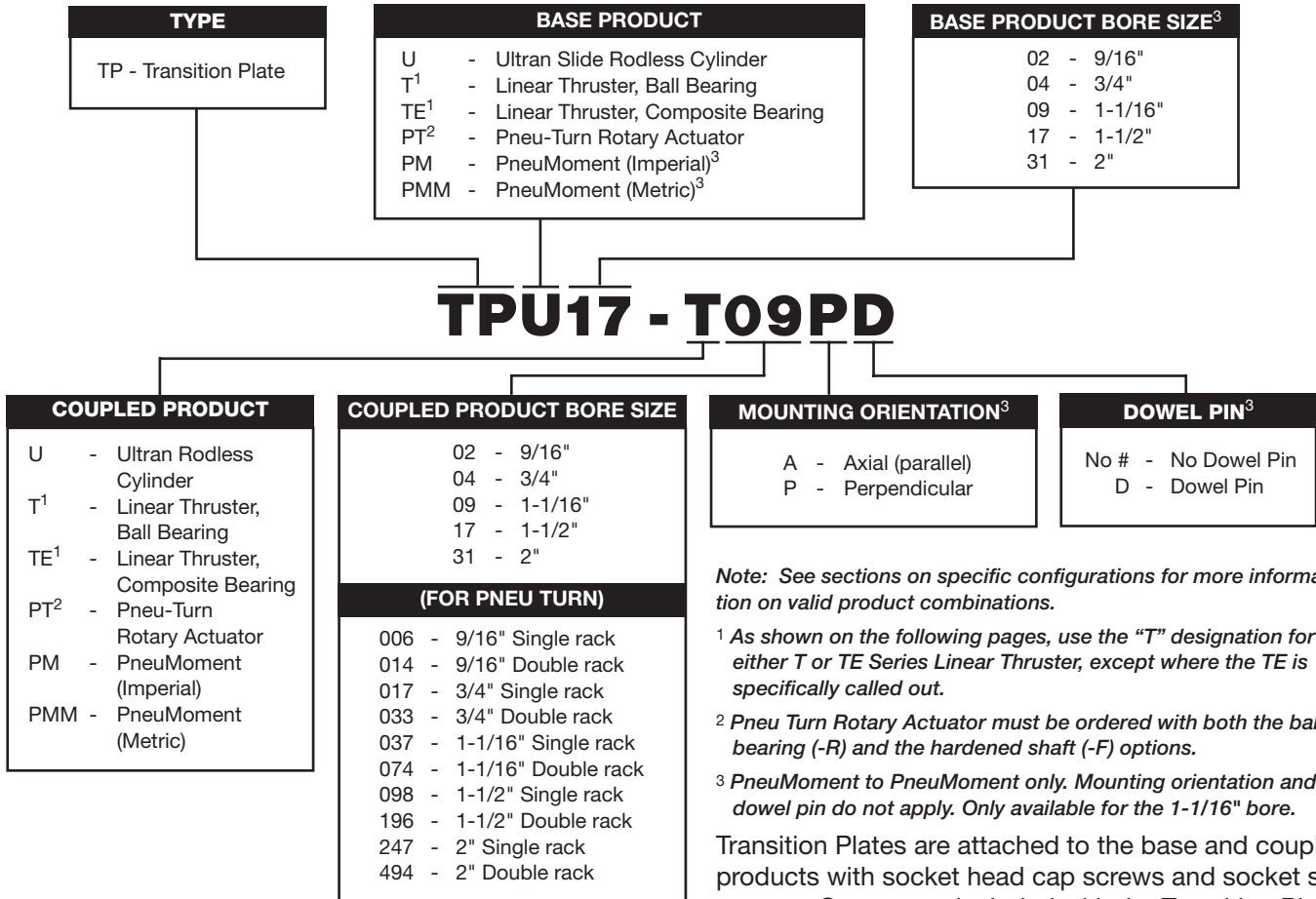
Note: Actuators can be coupled together in the bore size combinations noted in each section. However, critical engineering specifications must be met for each specific application. In addition, for a precision positioning system, the deflection of the components should be compensated for by incorporating 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

How to Order

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 Ultram rodless cylinder that will be coupled to a 1-1/16" bore Linear Thruster (ball bearing), in a perpendicular orientation, with dowel pins.



Bimba Transition Plates

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

SHAFT PARALLEL *

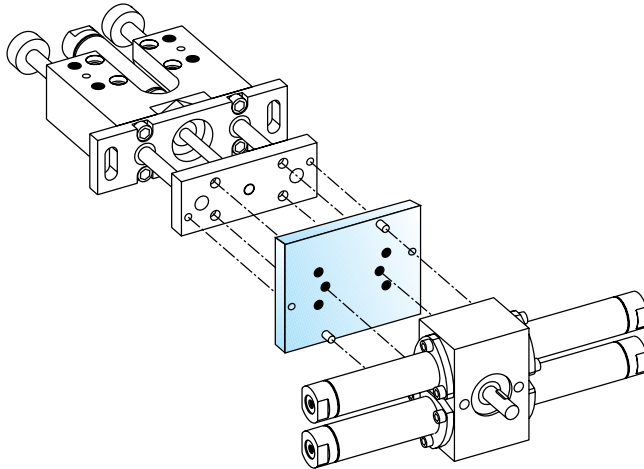
Pneu-Turn Rotary Actuator	Linear Thruster					
		9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
	9/16" single rack (006) double rack (014)	TPT02-PT006A TPT02-PT014A	TPT04-PT006A TPT04-PT014A			
	3/4" single rack (017) double rack (033)		TPT04-PT017A TPT04-PT033A	TPT09-PT017A TPT09-PT033A		
	1-1/16" 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

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

SHAFT PARALLEL *



Dowel Pins

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.

Bimba Transition Plates

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

SHAFTS PERPENDICULAR *

Linear Thruster	Pneu-Turn Rotary Actuator					
		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	
	1-1/2" (17)				TPPT17-T17P	TPPT31-T17P
	2" (31)					TPPT31-T31P 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.

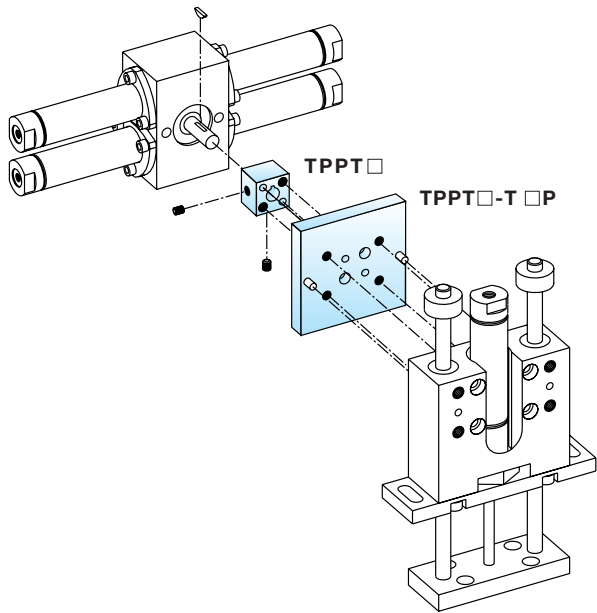
Note: Screws and dowel pins (if ordered) are included with the Transition Plate.

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	\$64.40	\$70.60
(includes TPPT02)	0.62	0.62	0.50	0.04	38.20	
TPPT04-T04P	2.50	2.25	0.36	0.28	81.60	89.50
(includes TPPT04)	0.75	0.75	0.75	0.08	57.10	
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.

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

SHAFTS PERPENDICULAR*



*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, 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:

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

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.

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.

Bimba Transition Plates

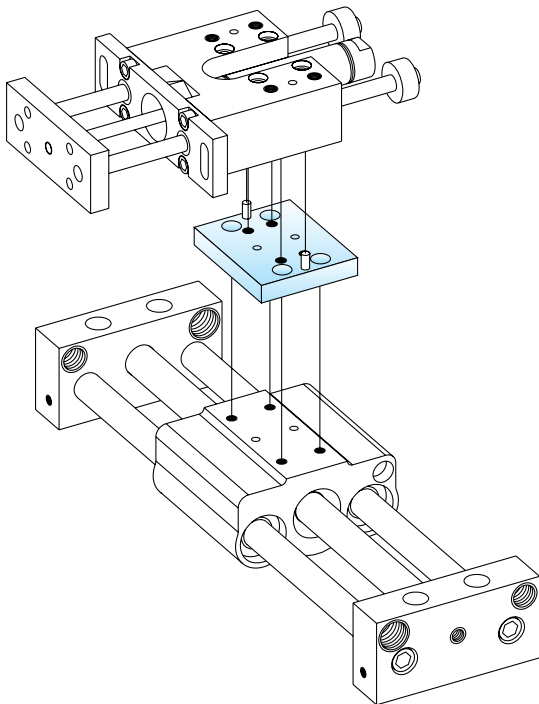
Ultran Rodless Cylinder (Base Product) to Linear Thruster (Coupled Product)

MOUNTED PERPENDICULAR*

Linear Thruster	Ultran Rodless Cylinder				
		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: a 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

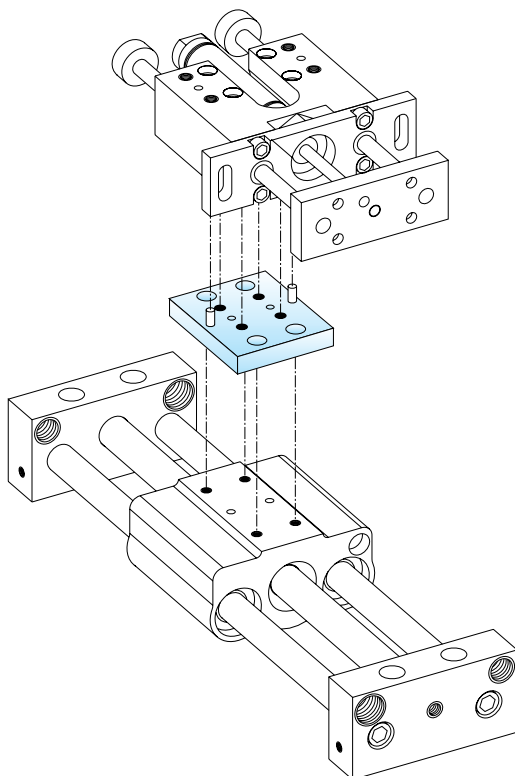
Ultran Rodless Cylinder (Base Product) to Linear Thruster (Coupled Product)

MOUNTED PARALLEL *

Linear Thruster	Ultran Rodless Cylinder				
		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: a 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

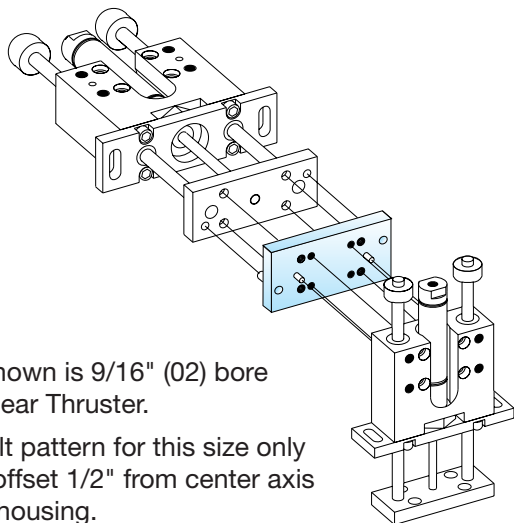
Linear Thruster(Base Product) to Linear Thruster (Coupled Product)

MOUNTED PERPENDICULAR*

Linear Thruster	Linear Thruster					
		9/16" (02)	3/4" (04)	1-1/16" (09)	1-1/2" (17)	2" (31)
	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

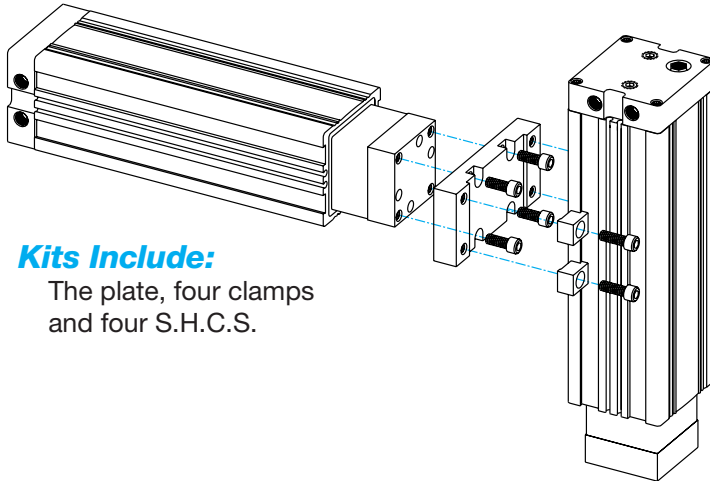
In addition to ordering a Transition Plate with dowel pin option, dowel pin options must be selected for your Linear Thrusters (-D option). For example, your order would include:

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



Kits Include:

The plate, four clamps
and four S.H.C.S.

Mounting Kits

Model Number	List Price	
TPPM09-PM09	Imperial	\$72.60
TPPMM09-PMM09	Metric	72.60

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

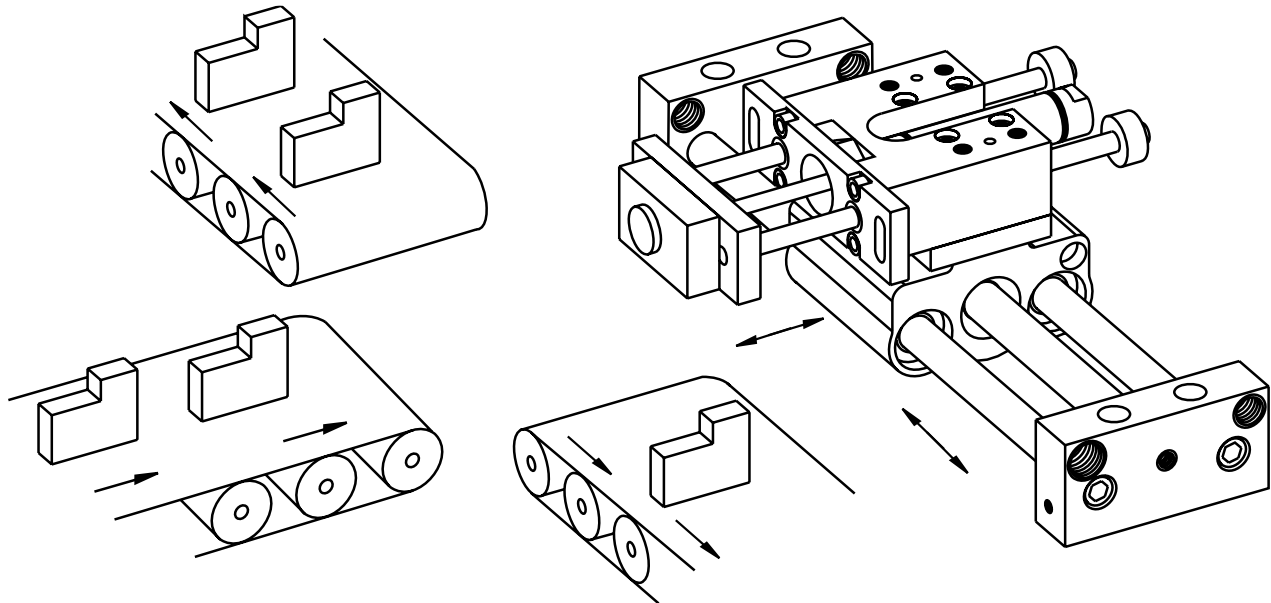
General Comments:

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:



Sizing a Multi-Axis Configuration

An example of a motion system is shown on page 10.32 using an Ultram 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 Ultram 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 3/4 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 3/4 inch bore Linear Thruster will be chosen as the coupled unit.

An Ultram Slide was chosen to move the Linear Thruster, vacuum gripper and product into position on an outgoing conveyor. The 3/4 inch bore Linear Thruster will be fastened to the center of the Ultram Slide carriage by means of a Transition Plate. The Ultram 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 Ultram Slide will move is 9.02 lbs. Comparing this to the maximum allowable radial loads for 16-inch stroke Ultram Slides, a 3/4 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 Ultram begins to move toward an out-going conveyor. In this case, the dynamic side loading conditions on the Ultram 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.

Flow Controls

Air Booster
Cylinders

Air Reservoirs

Manual
Valves

Shock
Absorbers

Transition
Plates

Application
Checklist

Alignment
Couplers

Appendix

Bimba Transition Plates Checklist

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: ☐ ☐

_____ : ☐ ☐

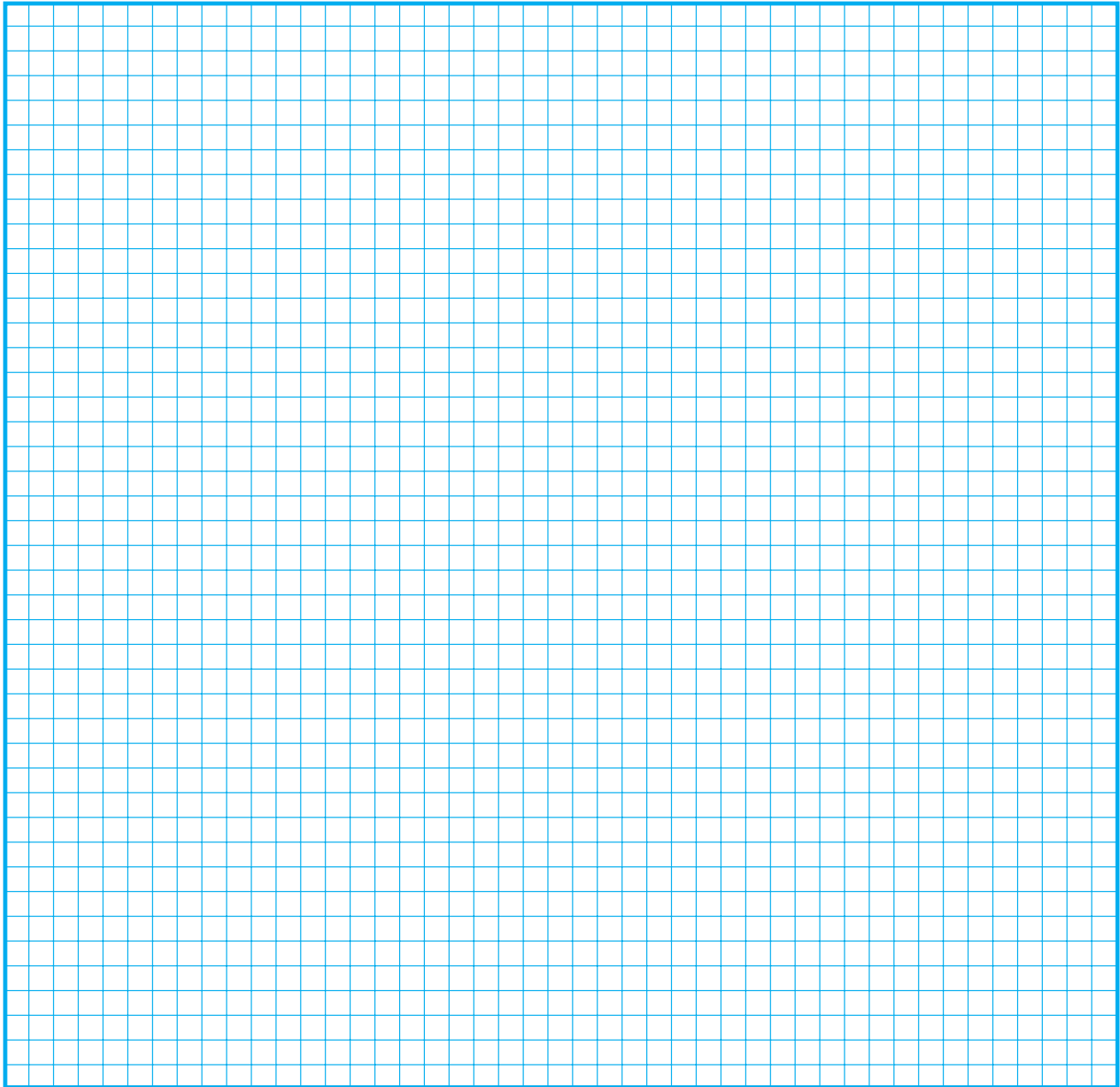
8. Explain the sequence of movement you have in mind for the system.

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

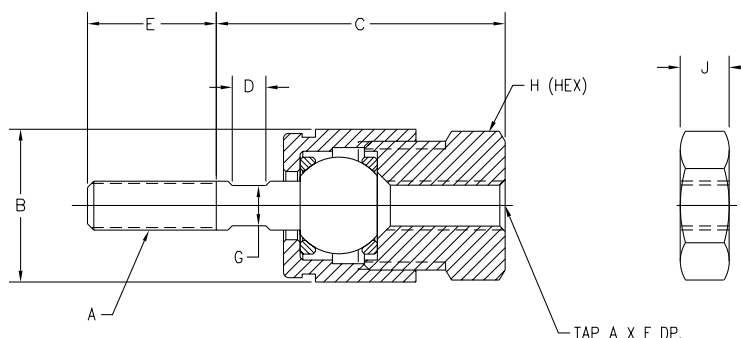
Features and Advantages

- 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 a 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	\$15.15	\$30.20
AC8-32	1/8"	7/16"	1/8"	650	0.02	10°	0.5	18.35	37.65
AC10-32	5/32"	1/2"	1/8"	1200	0.02	10°	0.8	20.10	45.15

List price includes one jam nut

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

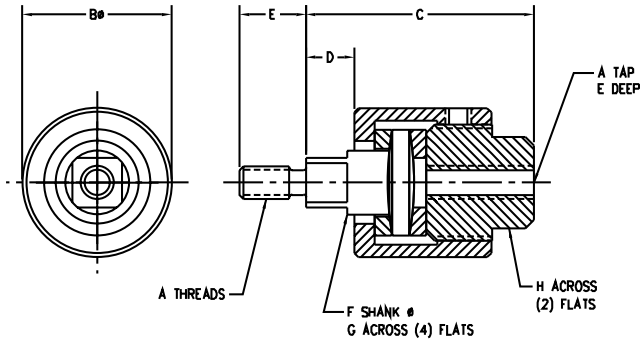
Additional Jam Nuts

Size	Part Number	Price	Stainless Steel Part No.	Price
#5-40	D-3745	\$.50	D-3745-SS	\$.65
#8-32	D-D0737	.60	D-D0737-SS	.65
#10-32	D-5288	.50	D-5288-SS	.65

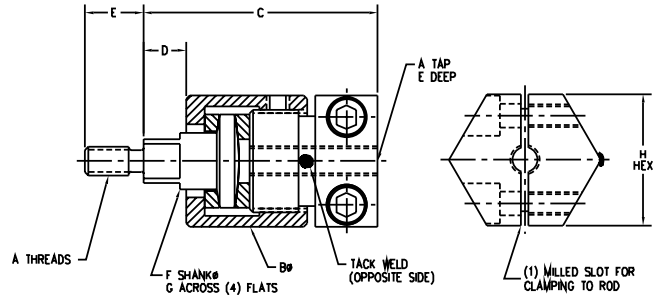
Bimba Alignment Couplers

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 Prices Standard		List Price Stainless Steel
												AC	ACH	*SS
AC250	1/4"-28	1-1/8"	1-3/4"	--	3/8"	1/2"	1/2"	3/8"	11/16"	--	6,000	\$28.55	--	\$60.20
AC312	5/16"-24	1-1/8"	1-3/4"	2"	3/8"	1/2"	1/2"	3/8"	11/16"	1-1/8"	8,300	33.95	\$67.95	71.90
AC375	3/8"-24	1-1/8"	1-3/4"	2"	3/8"	1/2"	1/2"	3/8"	11/16"	1-1/8"	8,300	33.95	67.95	77.05
AC437	7/16"-20	1-1/4"	2"	2-5/32"	7/16"	3/4"	5/8"	1/2"	13/16"	1-1/8"	10,000	43.65	73.35	94.00
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	73.35	94.00
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	73.35	100.20
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	102.55	123.75
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	102.55	123.75
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	138.50	193.60

Please specify AC, ACH coupler when ordering AC750 (Standard Coupler) ACH-750 (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

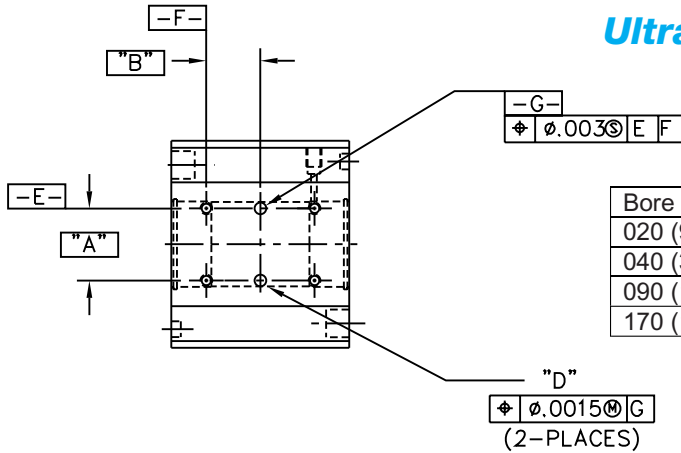
Jam Nuts

Size	Part Number Standard	Price	Stainless Steel Part No.	Price
1/4"-28	D-344	\$.50	D-344-SS	\$1.15
5/16"-24	D-746	.50	D-746-SS	1.15
3/8"-24	D-801	.50	D-801-SS	1.15
7/16"-20	D-154	.50	D-154-SS	1.55
1/2"-20	D-98	.60	D-98-SS	1.65
5/8"-18	D-9	.60	D-9-SS	2.25
3/4"-16	D-3556	.90	D-3556-SS	2.90
7/8"-14	D-2545	1.30	D-2545-SS	5.35
1"-14	D-1331	2.55	D-1331-SS	3.55

Transition Plate Data

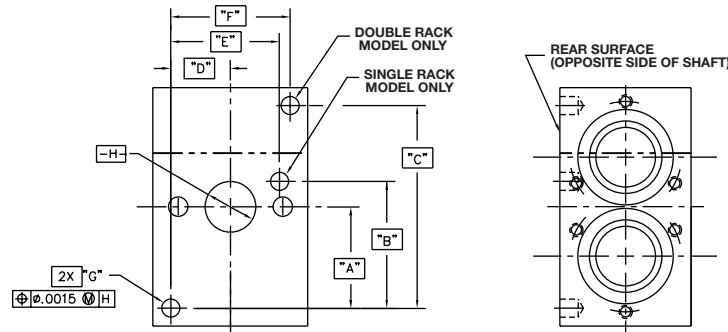
Dowel Pin Hole Locations

Ultran



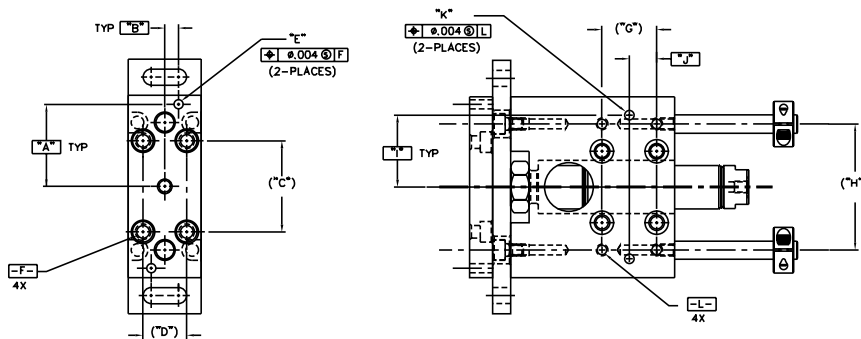
Bore	A	B	D
020 (9/16")	1.000	.750	.1270/.1280 x .240/.260 DP.
040 (3/4")	1.375	.876	.1895/.1905 x .410/.430 DP.
090 (1-1/16")	1.750	1.250	.2520/.2530 x .410/.430 DP.
170 (1-1/2")	2.500	1.750	.3145/.3155 x .560/.580 DP.

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.

Notes

Notes

Notes