

cylinders

B Square Series

Compact, Flat-Square Cylinder Line



numatics®

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Air-Oil Systems, Inc. www.airoil.com



The **B Square Series** is an extremely efficient and lightweight compact, square end cap cylinder line. It is designed for maximizing space without sacrificing quality. Our square end cap design provides flexibility for either flush-face or horizontal (side) mounting. The B Square Series also significantly reduces the centerline distance when cylinders are mounted side-by-side.

Tube

The type 304 stainless steel **tube** is drawn and polished to a micro-inch finish on the inner diameter. This ensures low friction and longevity.

End Caps

The **end caps** are accurately machined from aluminum alloy. They are anodized for corrosion resistance. Additionally, a recess on the piston-mating surface (at both ends) enables the air to work on a larger piston area for effortless breakaway.

Rod Bushing

The B Square Series includes split style bronze **rod bushing** for maximum load bearing support.

Rod Seal

The quad type **rod seal** is used for double sealing efficiency.

Piston Rod

High strength steel **piston rod** is roller burnished for long, trouble free life.

Piston Seal

The Buna-N O-Ring **piston seal** ensures proper sealing even at low pressures.

Piston

The solid aluminum alloy **piston** is strong and durable.

Tie Rods

The stainless steel **tie rods** provide high strength and corrosion resistance.

Tube End Seal

The **tube end seals** are compression type and reusable.

Standard Specifications:

- Variety of mounts
- Bore sizes from 3/4" through 4"
- Piston rod diameters from 5/16" to 1"
- Nominal pressure rating is 150 psi air
- Standard temperature -10°F to 165°F (-23°C to 74°C)





B Square Series Compact, Flat-Square

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How to Order

X Z B C 02 A 3 A A AA 0

Mounting

- P = Pivot Mount
- R = Pivot Mount Rotated 90 Deg.
- X = Basic Mount

Type

- Z = Double Acting
- Y = Reverse Acting (Spring Extend)
- X = Single Acting (Spring Return)
- W = Double Acting Double Rod

Series

- B = B Square Series

Bore

- C = 3/4"
- E = 1-1/16"
- K = 1-1/2"
- L = 2"
- M = 2-1/2"
- N = 3"
- R = 4"

Full Inch of Stroke

- 00 = 0" Stroke
 - 01 = 1" Stroke
 - 02 = 2" Stroke
 - 03 = 3" Stroke
 - 04 = 4" Stroke
- Consult factory for strokers greater than 4".

Fractional Inches of Stroke

- | | |
|-----------|------------|
| A = 0" | I = 1/2" |
| B = 1/16" | J = 9/16" |
| C = 1/8" | K = 5/8" |
| D = 3/16" | L = 11/16" |
| E = 1/4" | M = 3/4" |
| F = 5/16" | N = 13/16" |
| G = 3/8" | O = 7/8" |
| H = 7/16" | P = 15/16" |

Magnet Piston

- 0 = No Magnet
 - 2* = Magnet
- * Affects cylinder OAL. See overall length adder chart on page 9

Options

- AA = No Option
 - DH = Double Hollow Rod
 - LB* = Low Breakaway Piston
 - FS = Fail Safe
 - LT = Low Temperature Seals
 - VA = Viton Seals
 - WA* = Wear Band
 - WI = Rod Wiper
 - 1A** = Rod Extension
(One End Only on Double Rods)
 - 2A** = Thread Extension (Male Threads)
 - 3A = Studded Rod End
- * Affects cylinder OAL. See overall length adder chart on page 9
** Specify Length

Cushions

- A = N/A

Ports

- A = 10-32 Port for 3/4" Bore
- B = 1/8 NPTF for 1-1/16" to 2" Bore
- C = 1/4 NPTF for 2-1/2" to 3" Bore
- D = 3/8 NPTF for 4" Bore

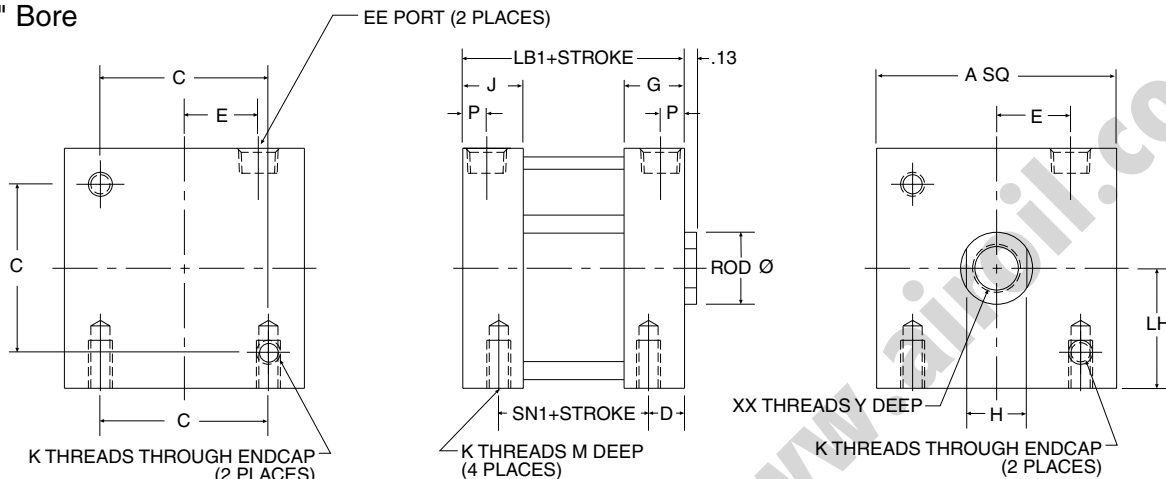
Rod End Codes

- 1 = Male Fine Thread
 - 2* = Non-Threaded Rod
 - 3 = Female Fine Thread
 - 6 = Male Coarse Thread
 - 8 = Female Coarse Thread
- * Same length as female rod.

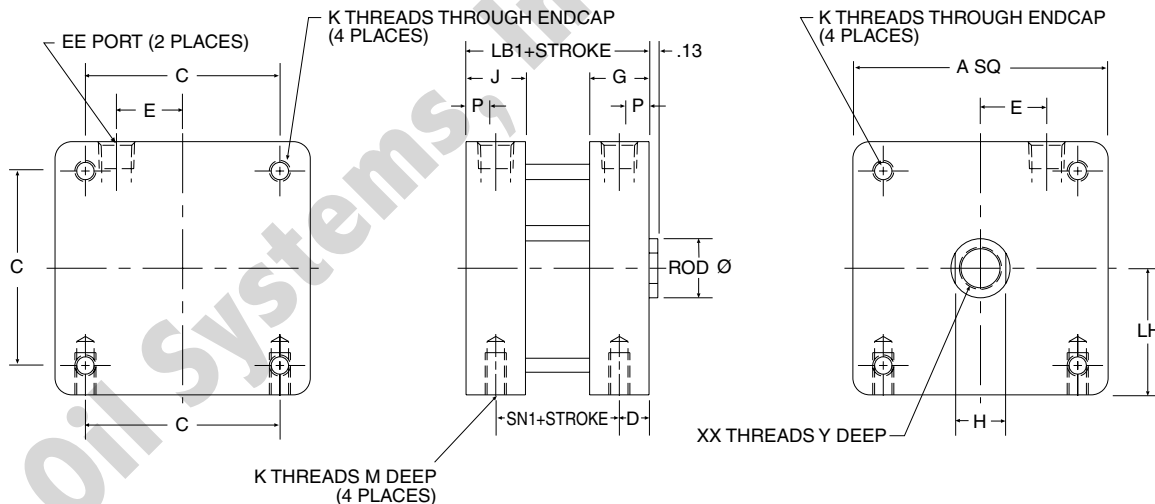


Basic Cylinder Models

Double Acting
Single Rod
3/4" to 2" Bore



Double Acting Single
Rod
2-1/2" to 4" Bore



X Mount Dimensions

BORE	ROD Ø	A	C	D	E	EE	G	H	J	K	LB1	LH	M	P	SN1	XX (FINE)	XX (COARSE)	Y
0.750	0.313	1.25	0.75	0.28	0.30	10-32	0.42	0.25	0.42	6-32	0.75	0.625	0.25	0.14	0.19	10-32	10-24	0.46
1.063	0.500	1.50	1.00	0.38	0.50	1/8	0.58	0.44	0.50	8-32	1.25	0.750	0.25	0.25	0.49	5/16-24	5/16-18	0.70
1.500	0.625	2.00	1.38	0.31	0.65	1/8	0.58	0.50	0.50	10-24	1.25	1.00	0.35	0.25	0.63	3/8-24	3/8-16	0.70
2.000	0.750	2.50	1.75	0.38	0.77	1/8	0.63	0.63	0.63	1/4-20	1.31	1.25	0.38	0.25	0.55	1/2-20	1/2-13	0.70
2.500	0.750	3.25	2.38	0.42	0.78	1/4	0.84	0.63	0.84	5/16-18	1.66	1.625	0.52	0.42	0.82	1/2-20	1/2-13	0.70
3.000	0.875	3.75	2.88	0.44	0.95	1/4	0.88	0.75	0.88	5/16-18	1.71	1.875	0.52	0.44	0.83	5/8-18	5/8-11	0.73
4.000	1.000	5.00	3.63	0.50	1.25	3/8	1.00	0.88	1.00	7/16-14	2.00	2.50	0.79	0.50	1.00	3/4-16	3/4-10	0.83

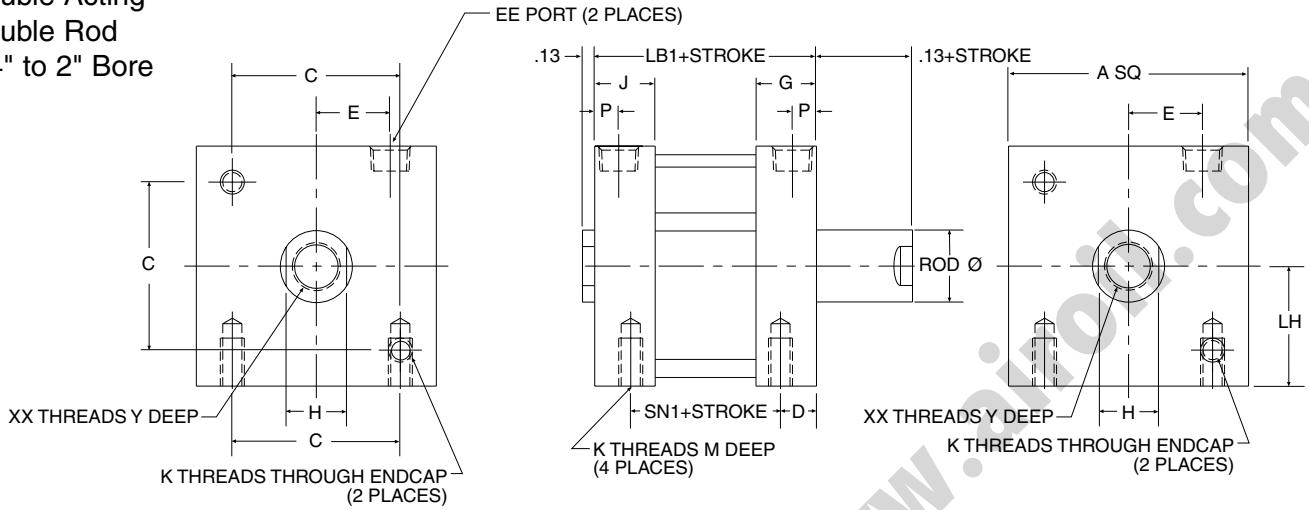


B Square Series Compact, Flat-Square

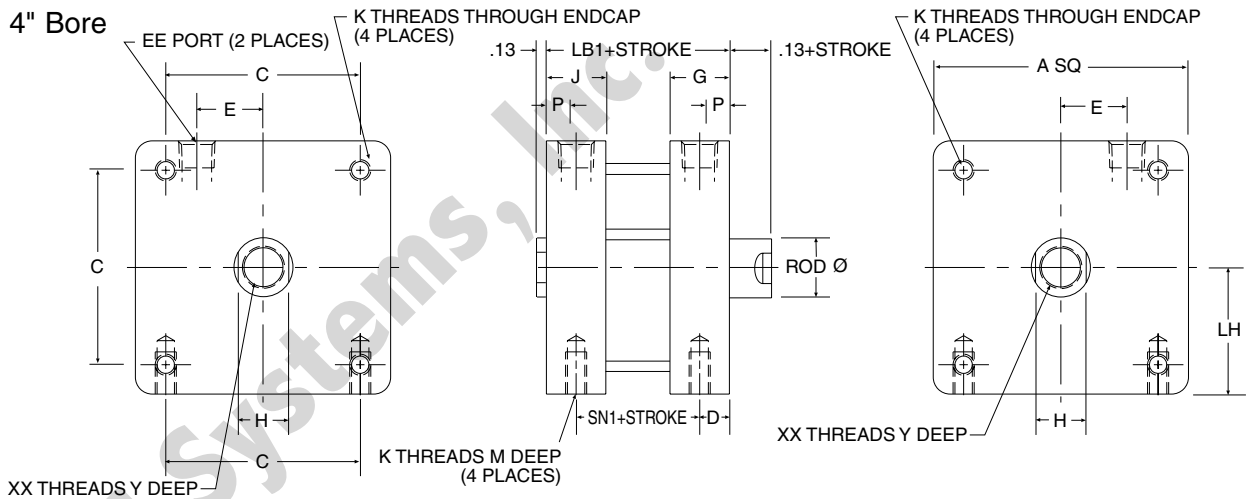
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Basic Cylinder Models (continued)

Double Acting
Double Rod
3/4" to 2" Bore



Double Acting
Double Rod
2-1/2" to 4" Bore



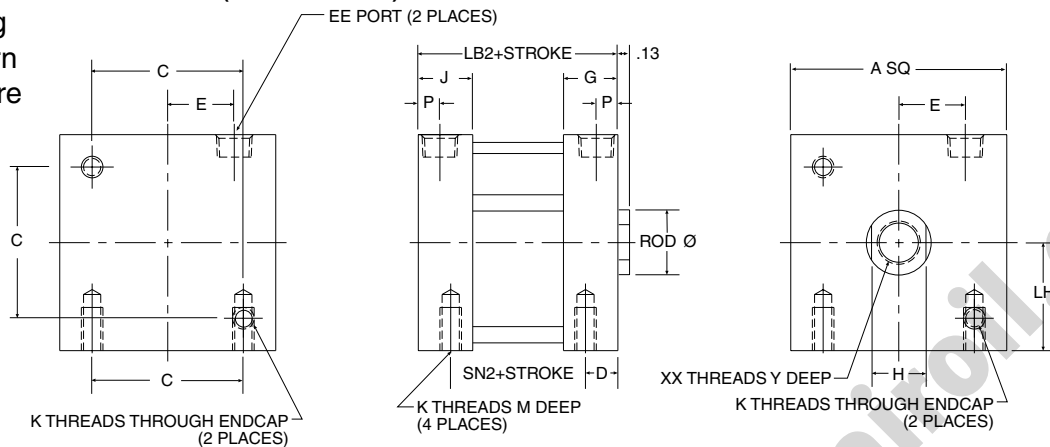
X Mount Dimensions

BORE	ROD Ø	A	C	D	E	EE	G	H	J	K	LB1	LH	M	P	SN1	XX (FINE)	XX (COARSE)	Y
0.750	0.313	1.25	0.75	0.28	0.30	10-32	0.42	0.25	0.42	6-32	0.75	0.625	0.25	0.14	0.19	10-32	10-24	0.46
1.063	0.500	1.50	1.00	0.38	0.50	1/8	0.58	0.44	0.50	8-32	1.25	0.750	0.25	0.25	0.49	5/16-24	5/16-18	0.70
1.500	0.625	2.00	1.38	0.31	0.65	1/8	0.58	0.50	0.50	10-24	1.25	1.00	0.35	0.25	0.63	3/8-24	3/8-16	0.70
2.000	0.750	2.50	1.75	0.38	0.77	1/8	0.63	0.63	0.63	1/4-20	1.31	1.25	0.38	0.25	0.55	1/2-20	1/2-13	0.70
2.500	0.750	3.25	2.38	0.42	0.78	1/4	0.84	0.63	0.84	5/16-18	1.66	1.625	0.52	0.42	0.82	1/2-20	1/2-13	0.70
3.000	0.875	3.75	2.88	0.44	0.95	1/4	0.88	0.75	0.88	5/16-18	1.71	1.875	0.52	0.44	0.83	5/8-18	5/8-11	0.73
4.000	1.000	5.00	3.63	0.50	1.25	3/8	1.00	0.88	1.00	7/16-14	2.00	2.50	0.79	0.50	1.00	3/4-16	3/4-10	0.83

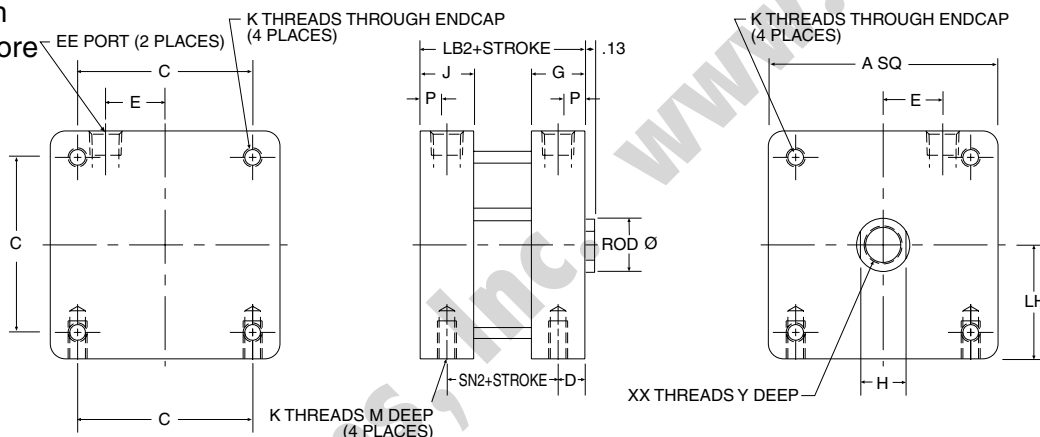


Basic Cylinder Models (continued)

Single Acting
Spring Return
3/4" to 2" Bore



Single Acting
Spring Return
2-1/2" to 4" Bore



Spring Data

BORE	MAX FORCE (lbf)	SPRING RATE	
		0.13"-1" STROKE (lbf/in)	1.13"-2" STROKE (lbf/in)
3/4"	10.0	6.00	2.50
1-1/16"	11.5	6.00	2.50
1-1/2"	13.0	5.50	2.25
2"	13.0	5.50	2.25
2-1/2"	25.0	6.75	2.75
3"	25.0	6.75	2.75
4"	25.0	6.75	2.75

X Mount Dimensions

BORE	ROD Ø	A	C	D	E	EE	G	H	J	K	LB2		LH	M	P	SN2		XX (FINE)	XX (COARSE)	Y
											0.13"-1" STROKE	1.13"-2" STROKE				0.13"-1" STROKE	1.13"-2" STROKE			
0.750	0.313	1.25	0.75	0.28	0.30	10-32	0.42	0.25	0.42	6-32	1.00	1.56	0.625	0.25	0.14	0.44	1.00	10-32	10-24	0.46
1.063	0.500	1.50	1.00	0.38	0.50	1/8	0.58	0.44	0.50	8-32	1.25	1.88	0.750	.025	0.25	0.49	1.12	5/16-24	5/16-18	0.70
1.500	0.625	2.00	1.38	0.31	0.65	1/8	0.58	0.50	0.50	10-24	1.25	1.88	1.00	.035	0.25	0.63	1.26	3/8-24	3/8-16	0.70
2.000	0.750	2.50	1.75	0.38	0.77	1/8	0.63	0.63	0.63	1/4-20	1.31	1.94	1.25	.038	0.25	0.55	1.18	1/2-20	1/2-13	0.70
2.500	0.750	3.28	2.38	0.42	0.78	1/4	0.84	0.63	0.84	5/16-18	1.66	2.54	1.625	.052	0.42	0.82	1.70	1/2-20	1/2-13	0.70
3.000	0.875	3.78	2.88	0.44	0.95	1/4	0.88	0.75	0.88	5/16-18	1.71	2.58	1.875	.052	0.44	0.83	1.70	5/8-18	5/8-11	0.73
4.000	1.000	5.04	3.63	0.50	1.25	3/8	1.00	0.88	1.00	7/16-14	2.00	2.88	2.50	.079	0.50	1.00	1.88	3/4-16	3/4-10	0.83

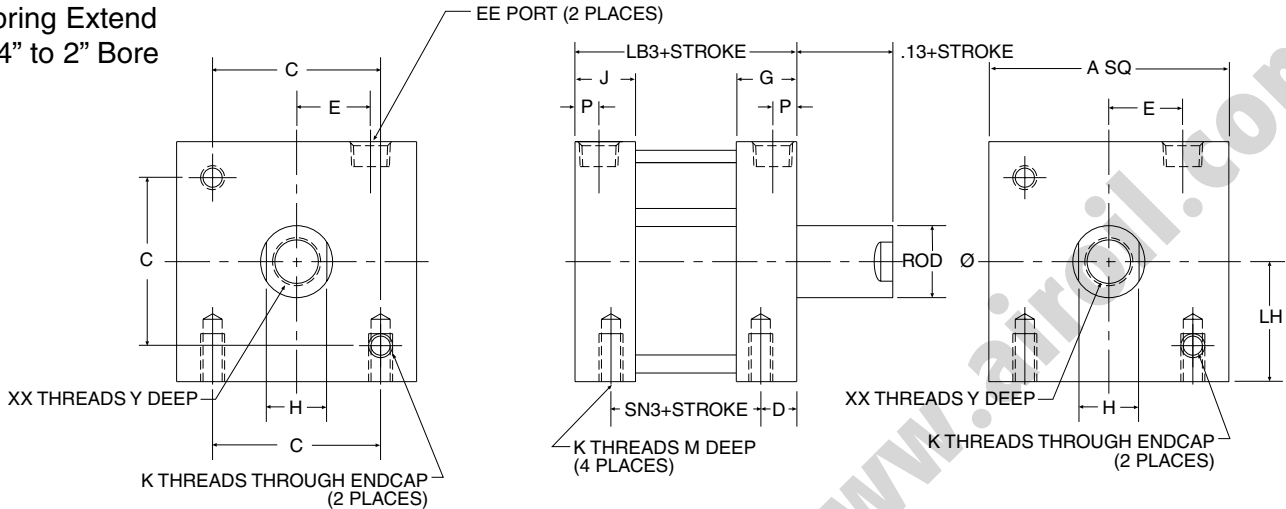


B Square Series Compact, Flat-Square

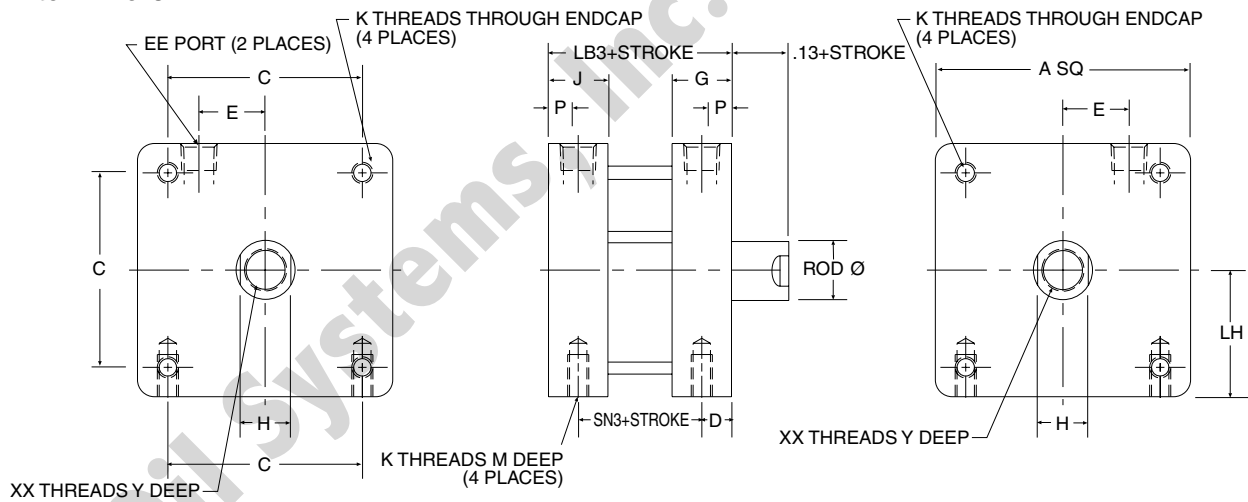
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Basic Cylinder Models (continued)

Reverse Acting
Spring Extend
3/4" to 2" Bore



Reverse Acting
Spring Extend
2-1/2" to 4" Bore



Dimensions

BORE	ROD Ø	A	C	D	E	EE	G	H	J	K	LB3		LH	M	P	SN3		XX (FINE)	XX (COARSE)	Y
											0.13"-1" STROKE	1.13"-2" STROKE				0.13"-1" STROKE	1.13"-2" STROKE			
0.750	0.313	1.25	0.75	0.28	0.30	10-32	0.42	0.25	0.42	6-32	1.25	1.81	0.625	0.25	0.14	0.69	1.25	10-32	10-24	0.46
1.063	0.500	1.50	1.00	0.38	0.50	1/8	0.58	0.44	0.50	8-32	1.75	2.38	0.750	0.25	0.25	1.00	1.63	5/16-24	5/16-18	0.70
1.500	0.625	2.00	1.38	0.31	0.65	1/8	0.58	0.50	0.50	10-24	1.75	2.38	1.00	0.35	0.25	1.13	1.76	3/8-24	3/8-16	0.70
2.000	0.750	2.50	1.75	0.38	0.77	1/8	0.63	0.63	0.63	1/4-20	1.81	2.44	1.25	0.38	0.25	1.05	1.68	1/2-20	1/2-13	0.70
2.500	0.750	3.25	2.38	0.42	0.78	1/4	0.84	0.63	0.84	5/16-18	2.39	3.27	1.625	0.52	0.42	1.55	2.43	1/2-20	1/2-13	0.70
3.000	0.875	3.75	2.88	0.44	0.95	1/4	0.88	0.75	0.88	5/16-18	2.44	3.31	1.875	0.52	0.44	1.56	2.43	5/8-18	5/8-11	0.73
4.000	1.000	5.00	3.63	0.50	1.25	3/8	1.00	0.88	1.00	7/16-14	2.74	3.61	2.50	0.79	0.50	1.74	2.61	3/4-16	3/4-10	0.83



Length Adders Weights

Basic Cylinder Models Length Adders

BORE	LOW BREAKAWAY	WEAR BAND	MAGNETIC PISTON
3/4"	0.25	0.16	0.75
1-1/16"	0.38	0.19	0.50
1-1/2"	0.38	0.19	0.63
2"	0.38	0.19	0.63
2-1/2"	0.38	0.19	0.88
3"	0.50	0.19	0.88
4"	0.50	0.19	0.88

Weights (oz.)

BORE	SINGLE ROD DOUBLE ACTING		DOUBLE ROD DOUBLE ACTING		SINGLE ROD SINGLE ACTING		SINGLE ROD REVERSEACTING	
	BASE	PER ADDITIONAL 1/8" STROKE	BASE	PER ADDITIONAL 1/8" STROKE	BASE	PER ADDITIONAL 1/8" STROKE	BASE	PER ADDITIONAL 1/8" STROKE
3/4"	2.2	0.1	2.4	0.2	2.2	0.1	2.2	0.1
1-1/16"	5.1	0.2	5.7	0.4	5.1	0.2	5.5	0.2
1-1/2"	10.1	0.3	10.5	0.6	10.1	0.3	10.4	0.3
2"	14.2	0.4	16.0	0.8	14.2	0.4	15.0	0.4
2-1/2"	28.6	0.4	34.2	0.6	28.6	0.4	31.2	0.4
3"	40.2	0.6	49.3	0.9	40.2	0.6	43.8	0.6
4"	71.6	0.6	87.7	0.9	71.6	0.6	77.7	0.6

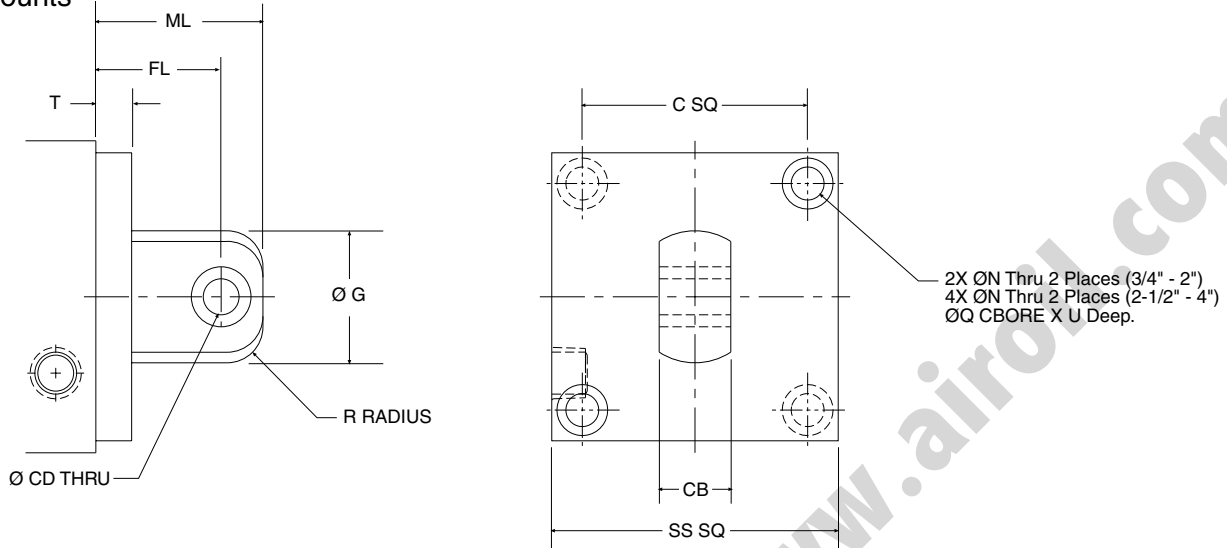


B Square Series Compact, Flat-Square

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Accessories

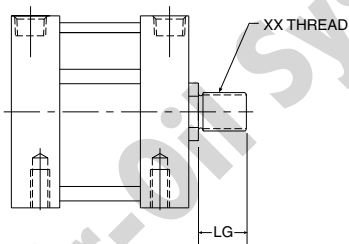
Pivot Mounts



NOTE: The standard pivot mount, code "P" is shown in its relationship to the port. If the 90° rotation pivot mount, code "R" is specified, then the pivot hole will be oriented 90° from the port.

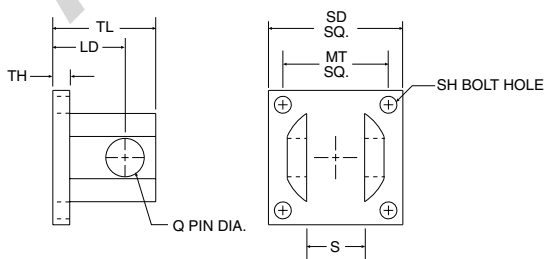
BORE	C	CB	CD	FL	G	ML	N	Q	R	SS	T	U
3/4"	0.75	0.38	0.188	0.75	0.75	1.00	0.17	0.28	-	1.13	0.19	0.12
1-1/16"	1.00	0.38	0.188	0.81	1.75	1.00	0.19	0.31	-	1.25	0.25	0.14
1-1/2"	1.38	0.75	0.375	1.19	1.38	1.63	0.22	0.38	-	1.75	0.25	0.16
2"	1.75	0.75	0.375	1.38	1.38	1.81	0.28	0.44	-	2.25	0.31	0.17
2-1/2"	2.36	0.75	0.375	1.31	1.38	1.75	0.34	0.53	0.38	3.00	0.38	0.26
3"	2.88	1.00	0.625	1.69	1.88	2.25	0.34	0.53	0.38	3.50	0.38	0.26
4"	3.62	1.00	0.625	1.75	1.88	2.31	0.47	0.72	0.38	4.50	0.44	0.43

Male Rod Ends



BORE	XX FINE	XX COARSE	LG
3/4"	10-32	10-24	0.38
1-1/16"	5/16-24	5/16-18	0.50
1-1/2"	3/8-24	3/8-16	0.50
2"	1/2-20	1/2-13	0.63
2-1/2"	1/2-20	1/2-13	0.63
3"	5/8-18	5/8-11	0.75
4"	3/4-16	3/4-10	0.75

Clevis Bracket

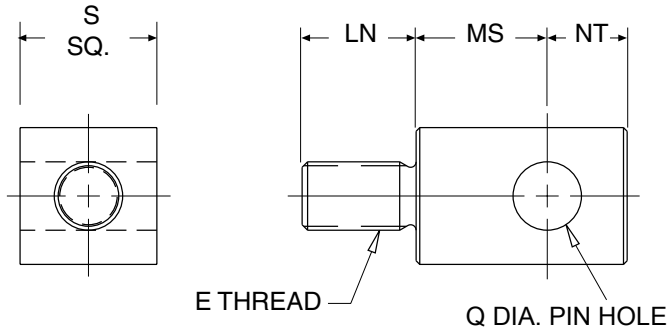


PART #	BORE	LD	MT	Q	S	SH	SD	TH	TL
B513-B01	3/4" 1-1/8"	0.56	0.75	0.19	0.39	#6	1.00	0.16	0.78
B513-K01	1-1/2" 2" 2-1/2"	0.94	1.38	0.38	0.75	#10	1.75	0.22	1.34
B513-N01	3" 4"	1.25	2.00	0.63	1.00	0.25	2.50	0.25	1.81



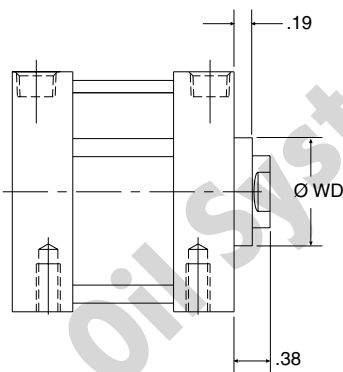
Accessories

Rod Pivot



PART #	BORE	E	LN	MS	NT	Q	S
B511-C01	3/4"	10-32	0.38	0.47	0.25	0.19	0.38
B511-G01	1-1/8"	5/16-24	0.63	0.47	0.25	0.19	0.38
B511-K01	1-1/2"	3/8-24	0.63	0.72	0.44	0.38	0.75
B511-L01	2" 2-1/2"	1/2-20	0.75	0.72	0.44	0.38	0.75
B511-N01	3"	5/8-18	0.88	1.00	0.63	0.63	1.00
B511-R01	4"	3/4-16	0.88	1.00	0.63	0.63	1.00

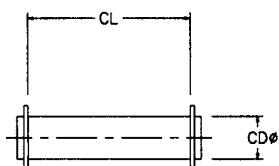
Wiper Option



BORE	WD
3/4"	0.69
1-1/16"	0.88
1-1/2"	1.00
2"	1.13
2-1/2"	1.13
3"	1.25
4"	1.38

Clevis Pins

1 1/2" to 4" Bores



PART NO.	ØCD	CL
B531-B01	0.188	0.750
B531-K01	0.500	1.313
B531-N01	0.625	1.813



B Square Series Compact, Flat-Square

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B Square Series Global Switch Information

Cylinders	Bore	Part Number
B Square	2 1/2"-3" Bore	N199-1017
B Square	4" Bore	N199-1018

Stock Switch Assembly Numbers

Part Number	Type	Connection	Package Contains
940-G00-031	Electronic Sourcing (PNP)	9 ft cable	Switch & mounting adapter 3/4"-2" bore B-Square (part# SB6-C01)
940-G00-331	Electronic Sourcing (PNP)	8mm Quick Connect Pigtail	
940-G00-032	Electronic Sinking (NPN)	9 ft cable	
940-H00-332	Electronic Sinking (NPN)	8mm Quick Connect Pigtail	
940-H00-031	Electronic Sourcing (PNP)	9 ft cable	Switch & mounting adapter 2-1/4"-4" bore B-Square (part# SB6-M01)
940-H00-331	Electronic Sourcing (PNP)	8mm Quick Connect Pigtail	
940-H00-032	Electronic Sinking (NPN)	9 ft cable	
940-H00-332	Electronic Sinking (NPN)	8mm Quick Connect Pigtail	

Stock Switch Only Part Numbers

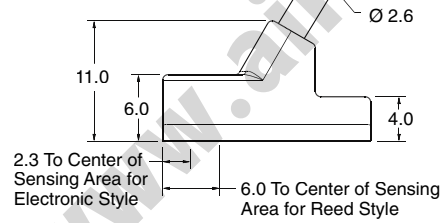
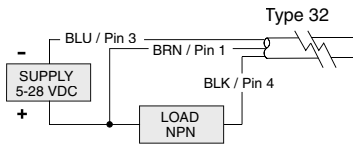
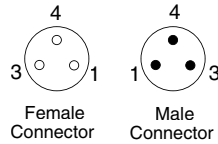
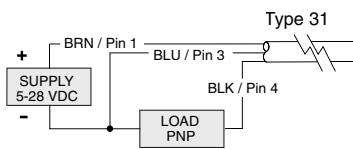
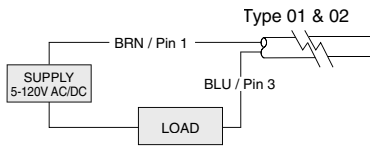
Part Number	Type	Connection	Package Contains
940-100-031	Electronic Sourcing (PNP)	9 ft cable	Switch only (includes dovetail adapter not used in B Square Series)
940-100-331	Electronic Sourcing (PNP)	8mm Quick Connect Pigtail	
940-100-032	Electronic Sinking (NPN)	9 ft cable	
940-100-332	Electronic Sinking (NPN)	8mm Quick Connect Pigtail	
940-100-031	Electronic Sourcing (PNP)	9 ft cable	
940-100-331	Electronic Sourcing (PNP)	8mm Quick Connect Pigtail	
940-100-032	Electronic Sinking (NPN)	9 ft cable	
940-100-332	Electronic Sinking (NPN)	8mm Quick Connect Pigtail	



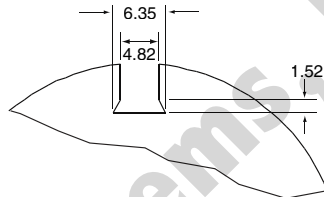
B Square Series 9000 Series Switch Information

Cylinders	Bore	Part Number
B Square	3/4"-2" Bore	SB6-C01
B Square	2 1/2"-4" Bore	SB6-M01

Series 9000 Type 02, 31 & 32 Wiring Diagrams



Groove Dimension

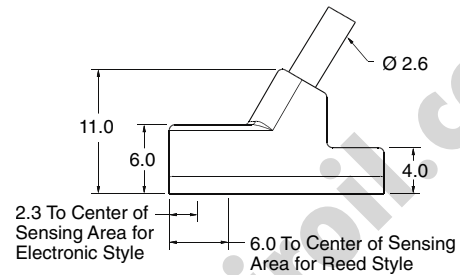
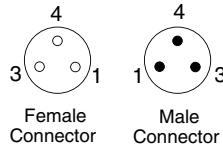
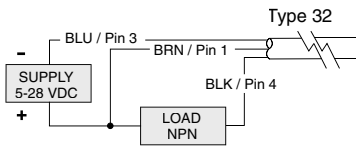
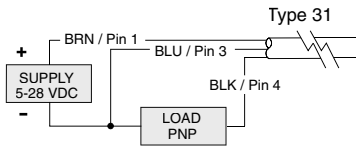
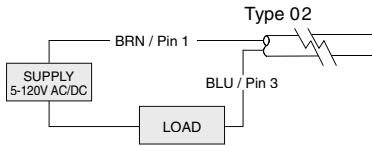




B Square Series Compact, Flat-Square

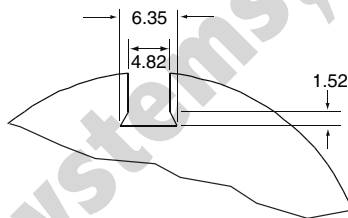
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Series 9000 Type 02, 31 & 32 Wiring Diagrams



Type Code	Description	Function	Switching Voltage	Switching Current	Switching Power	Switching Speed	Voltage Drop
940-100-002	Reed Switch for PLC's, LED (current limiting)	SPST Normally Open	5-120V AC/DC 50/60 Hz	0.03 Amps max. 0.001 Amps min.	4 Watts max.	0.4 ms operate 0.1 ms release	3.5 Volts @ 5 mA
940-100-031	Electronic for Reed Magnet, LED & Sourcing	PNP Normally Open	5-28 VDC	0.2 Amps max.	4.8 Watts max.	4 µs operate 4 µs release	1.0 Volts max
940-100-032	Electronic for Reed Magnet, LED & Sourcing	NPN Normally Open	5-28 VDC	0.2 Amps max.	4.8 Watts max.	4 µs operate 4 µs release	1.0 Volts max

Groove Dimension



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