

BTB Series NFPA - Back to Back 3P Series NFPA - 3 Position TM Series NFPA - Tandem Aluminum Cylinders 1.50" to 8.00" Bore



BTB - Back to Back

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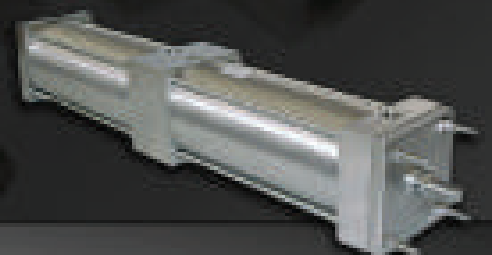
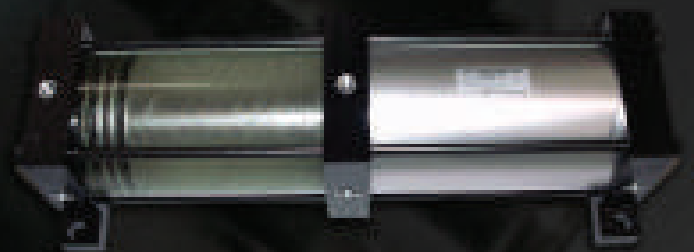
3P - 3 Position

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TM - Tandem

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**95% OF OUR CYLINDERS SHIP IN 2-3 DAYS!
ONE DAY RUSH SERVICE AVAILABLE ON ALL CATALOGED CYLINDER MODELS!**

3-POSITION CYLINDERS:

You can create a 3-Position cylinder from *any* single stage series of cylinder (Note: not available on multi-stage products).

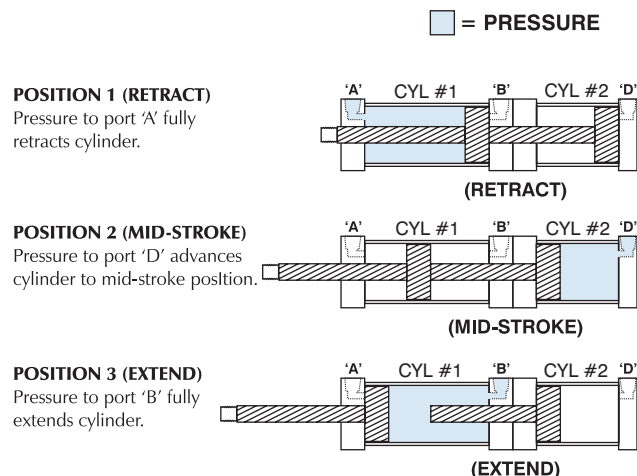
3-Position cylinders consist of multiple cylinders built as one unit having ONE exposed working rod end, capable of delivering three rod positions.

3-POSITION BENEFITS:

- **3-POSITIONS IN ONE CYLINDER** — One cylinder produces three different rod end positions. By varying stroke lengths, a multitude of positions can be created.
- **SIMPLIFIES MACHINE DESIGNS** — Eliminates the need for an additional cylinder to create a third position. Three-Position cylinders reduce space and the cost to mount multiple cylinders.

3-POSITION CYLINDERS

HOW THEY WORK



DESIGN TIPS & SCHEMATIC

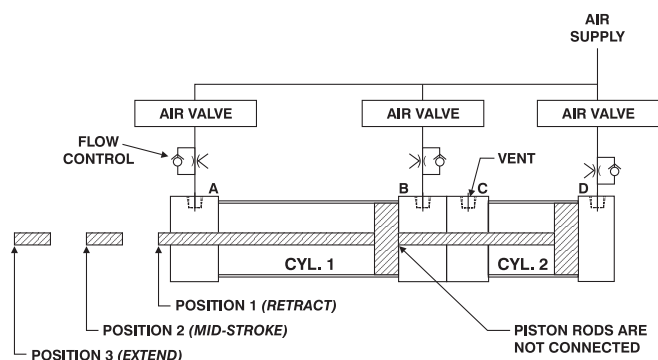
Design Tips

- Order CYL 1 with “MPR” (magnetic piston option) and use three (3) switches to sense each stroke position. See *Switches for switch ordering information*.
- You can use “MA” (micro-adjust option) on CYL 2 to create an adjustable mid-stroke position cylinder.
- During the mid-stroke position, the piston rod on CYL 1 is held in place by seal friction and can “extend” in vertical applications when the cylinder rod end is mounted down. To prevent this from happening, a lower air pressure can be applied to cylinder port “A” to offset cylinder rod or tooling weight. See your local TRD distributor for help in designing on air circuit that’s right for your application.
- For non-rotating applications, you can use a “NR” (non-rotating) or “TR” (triple rod) Series cylinder as CYL 1 and a standard “TA” Series as CYL 2.

3-POSITION CYLINDER SCHEMATIC

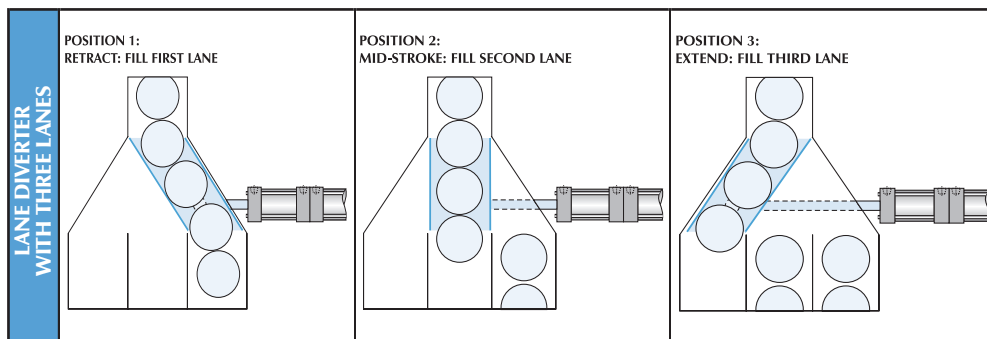
ACTUATION SEQUENCE:

PRESSURE TO PORT 'A' RETRACTS THE CYLINDER TO POSITION 1
 PRESSURE TO PORT 'D' EXTENDS THE CYLINDER TO POSITION 2
 PRESSURE TO PORT 'B' EXTENDS THE CYLINDER TO POSITION 3



The above basic schematic demonstrates how three-way air solenoid valves and flow controls can operate a three-position cylinder. See your local TRD distributor for help in designing an air circuit that’s right for your application.

Application Possibilities:



HOW TO ORDER: 3-POSITION CYLINDERS

CYL. #1
CYL. #2

3P - TA - MS4 - 2 x 10 - H - MPR WITH TA - MX0 - 2 x 5 - MPR

SERIES	
TA	250 PSI AIR
TD	250 PSI AIR, TOUGH-DUTY
SS	STAINLESS STEEL
FM	FLUSH MOUNT (ADD-A-MOUNT)
TRA	TRIPLE ROD (CYL. #1 ONLY)

BORE
1.50
2.00
2.50
3.25
4.00
5.00
6.00
8.00

TOTAL STROKE EXTEND (CYL. #1)
0" to 50"
MADE-TO-ORDER

CUSHIONS	
H	HEAD CUSHION POSITION 2 IS STANDARD SPECIFY FOR POSITIONS: 1, 3 & 4
LH	LONG HEAD CUSHION POSITION 2 IS STANDARD SPECIFY FOR POSITIONS: 1, 3 & 4
ELH	EXTRA LONG HEAD CUSHION POSITION 2 IS STANDARD SPECIFY FOR POSITIONS: 1, 3 & 4
C	CAP CUSHION POSITION 6 IS STANDARD SPECIFY FOR POSITIONS: 5, 7 & 8
LC	LONG CAP CUSHION POSITION 6 IS STANDARD SPECIFY FOR POSITIONS: 5, 7 & 8
ELC	EXTRA LONG CAP CUSHION POSITION 6 IS STANDARD SPECIFY FOR POSITIONS: 5, 7 & 8
FIXED CUSHIONS	
FCH	FIXED HEAD CUSHION (NON-ADJUSTABLE, NO ADJUSTMENT NEEDLE)
FCC	FIXED CAP CUSHION (NON-ADJUSTABLE, NO ADJUSTMENT NEEDLE)
FC	FIXED HEAD AND CAP CUSHION (NON-ADJUSTABLE, NO ADJUSTMENT NEEDLE)

OPTIONS	
A=	EXTENDED PISTON ROD THREAD (EXAMPLE: A= 2")
AS	ADJUSTABLE STROKE - RETRACT (SPECIFY LENGTH, EXAMPLE: AS = 4")
A/O	AIR / OIL PISTON
X B	.25" URETHANE BUMPER BOTH ENDS
X BC	.25" URETHANE BUMPER CAP ONLY
X BH	.25" URETHANE BUMPER HEAD ONLY
BP	BUMPER PISTON SEALS (1.50" - 8.00" BORE)
BSP	BSP PORTS (SPECIFY SIZE, EXAMPLE: BSP = .25")
C=	EXTENDED PISTON ROD (EXAMPLE: IF C= 0.50" THEN 1" ROD EXTENSION IS C= 1.50")
EN	ELECTROLESS NICKEL PLATED
KK2	LARGE MALE ROD THREAD
KK3	FEMALE ROD THREAD
KK3S	STUDED PISTON ROD (KK3 WITH STUD, LOCTITE IN PLACE)
KK4	FULL DIAMETER MALE ROD THREAD
KK5	BLANK ROD END (NO THREADS, "A" = 0")
LF	LOW FRICTION SEALS
MA	MICRO-ADJUST (12" MAX STROKE) AVAILABLE ON DOUBLE ROD END MODELS
MAB	MICRO-ADJUST WITH SOUND DAMPENING BUMPER (12" MAX STROKE)
MPR	MAGNETIC PISTON FOR REED OR SOLID STATE SWITCHES - TRD MODELS: R10, R10P, RAC, RHT & MSS
MS	METALLIC ROD SCRAPER (BRASS CONSTRUCTION)
NR	NON-ROTATING
OP	OPTIONAL PORT LOCATION (EXAMPLE: PORTS @ 3 & 7)
OS	OVERSIZE ROD DIAMETER (SPECIFY SIZE, EXAMPLE: OS = 1.375")
SAE	SAE PORTS (SPECIFY SIZE, EXAMPLE: SAE #10)
X SE	SPRING EXTEND (1.50", 2.00, 2.50" BORE)
X SR	SPRING RETURN (1.50", 2.00, 2.50" BORE)
SSA	STAINLESS STEEL PISTON ROD, TIE RODS & NUTS AND FASTENERS
SSF	STAINLESS STEEL FASTENERS
SSN	STAINLESS STEEL TIE ROD NUTS
SSR	STAINLESS STEEL PISTON ROD
SST	STAINLESS STEEL TIE RODS
X ST	STOP TUBE - SPECIFY STOP TUBE LENGTH (INCHES) SPECIFY STROKE AS ES (EFFECTIVE STROKE) (EXAMPLE: TA MS4 2 X 24ES-ST=3)
TMS	STEEL CYLINDER TUBE, BLACK EPOXY PAINT FINISH
TH	400 PSI HYDRAULIC NON-SHOCK
VS	FLUOROCARBON SEALS
XX	SPECIAL VARIATION (SPECIFY)

NFPA MOUNTS	
MX0	NO MOUNT
MP1	REAR PIVOT CLEVIS (CYL. 2 ONLY)
MP2	REAR PIVOT CLEVIS (1.50"-6.00" BORE) (CYL. 2 ONLY)
MP4	REAR PIVOT EYE (1.50" - 4.00" BORE) (CYL. 2 ONLY)
MT1	FRONT TRUNNION (SPECIFY CYL. 1 OR 2)
MT2	REAR TRUNNION (SPECIFY CYL. 1 OR 2)
MX1	EXTENDED TIE RODS (HEAD & CAP)
MX2	EXTENDED TIE RODS (CAP END)
MX3	EXTENDED TIE RODS (HEAD END)
MF1	FRONT FLANGE (1.50"-6.00") (CYL. 1 ONLY)
MF2	REAR FLANGE (1.50"-6.00") (CYL. 2 ONLY)
ME3	FRONT MOUNTING HOLES (8.00") (CYL. 1 ONLY)
ME4	REAR MOUNTING HOLES (8.00") (CYL. 2 ONLY)
MS1	FRONT & REAR END FOOT
MS2	SIDE LUG (1.50"-8.00")
MS4	BOTTOM TAPPED HOLES

About our Part Number System

- Simple, easy to understand
- No excessive codes!
- Eliminates mistakes when ordering

Example: 3-Position
Application calls for a 2.00" bore cylinder with stroke positions of 0", 5" and 10" base mount on rod end cylinder only, with magnetic piston for position (switch) sensors.

Part Number:
3P-TA-MS4-2 x 10-H-MPR with TA-MX0-2 x 5-MPR

HOW TO ORDER:

3 Position Cylinder:
Position 1 (Full Retract) - This position is always 0.00"
Position 2 (Mid-Stroke) - Total stroke of Cyl. #2
Position 3 (Full-Extend) - Total stroke of Cyl. #1
Multi-Position Model Available

- 3 Position (Model 3P)
- 4 Position (Model 4P)
- 5 Position (Model 5P)

(Consult factory for dimensions on 4P & 5P)

STANDARD PORT AND CUSHION ADJUSTMENT POSITIONS

- Ports - Positions 1 and 5
- Cushion Adjustment - Positions 2 and 6 (Cushions not available on CYL. 1 Cap)
- Specify Non-Standard Positions When Ordering

⚠ Note: The "Head" port of CYL. 2 can be used as a vent (Single Acting) or powered (Double Acting).

Note: Refer to Options for specifications.
*Steel tubes do not work with MPR magnetic pistons. Refer to Balluff end of stroke sensors within Switches.

3-POSITION DIMENSIONS: BASIC CYLINDER (NO MOUNT)

EASY FLIP OUT PAGE FOR REFERENCE

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3-Position
Cylinders

Tandem
Cylinders

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About Rod End Styles

Style 1 Male Rod End is STANDARD

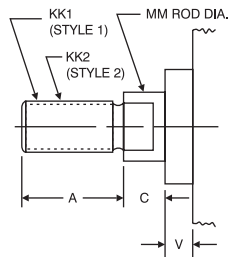
Other NFPA Styles can be specified (see chart).

Need a rod end not listed?
NO PROBLEM! Each Piston Rod is made-to-order and does not delay shipment. Coarse UNC threads, Metric threads or just plain rod ends are common. Thread lengths are also made-to-order (Specify: "A"=Length).

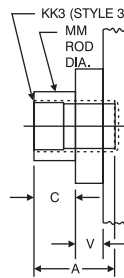
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PISTON ROD END STYLES

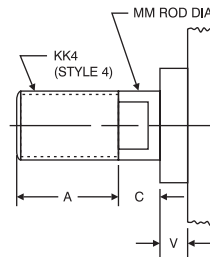
STYLE 1 & 2 KK1 & KK2



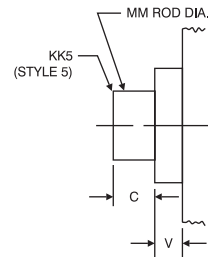
STYLE 3 KK3



STYLE 4 KK4

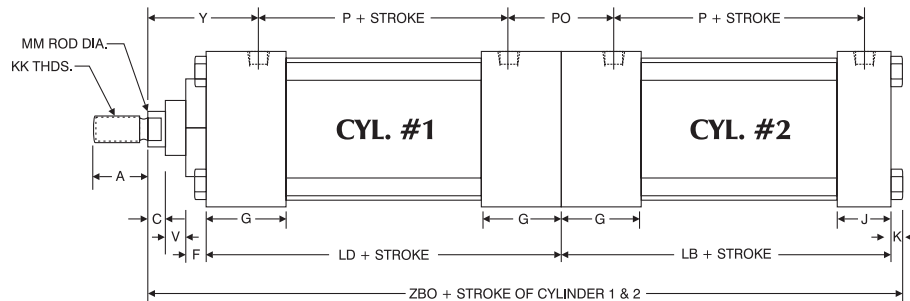
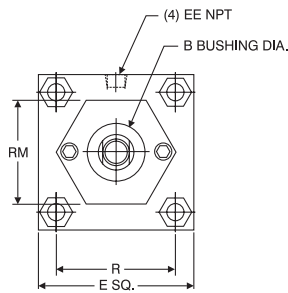


STYLE 5 KK5



BORE	MM ROD DIAMETER	STANDARD		OPTIONAL							C	V
		Style 1 - Male		Style 2 - Male		Style 3 - Female		Style 4 - Male		Style 5 - Blank		
		KK1	A	KK2	A	KK3	A	KK4	A	KK5		
1.50, 2.00, 2.50	0.625 Standard	7/16 -20	0.750	1/2 -20	0.750	7/16 -20	0.750	5/8 -18	0.750	No Threads	0.375	0.250
	1.000 Oversize	3/4 -16	1.125	7/8 -14	1.125	3/4 -16	1.125	1-14	1.125	No Threads	0.500	0.500
3.25, 4.00, 5.00	1.000 Standard	3/4 -16	1.125	7/8 -14	1.125	3/4 -16	1.125	1-14	1.125	No Threads	0.500	0.250
	1.375 Oversize	1-14	1.625	1 1/4 -12	1.625	1-14	1.625	1 3/8 -12	1.625	No Threads	0.625	0.375
6.00 & 8.00	1.375 Standard	1-14	1.625	1 1/4 -12	1.625	1-14	1.625	1 3/8 -12	1.625	No Threads	0.625	0.375
	1.750 Oversize	1 1/4 -12	2.000	1 1/2 -12	2.000	1 1/4 -12	2.000	1 3/4 -12	2.000	No Threads	0.750	0.500

MX0/MX0 (NO MOUNT)



3-POSITION BASIC DIMENSIONS 'MX0' STANDARD & OVERSIZE RODS																					
BORE	ROD DIA.	A	B	C	E	EE	F	G	J	K	KK	LB	LD	MM	P	PO	R	RM	V	Y	ZBO
1.50	0.625 Standard	0.750	1.125	0.375	2.000	0.375	0.375	1.500	1.000	0.250	7/16-20	3.625	4.125	0.625	2.375	1.750	1.438	2.00 SQ.	0.250	1.875	9.000
	1.000 Oversize	1.125	1.500	0.500							3/4-16			0.500					2.250	9.375	
2.00	0.625 Standard	0.750	1.125	0.375	2.500	0.375	0.375	1.500	1.000	0.313	7/16-20	3.625	4.125	0.625	2.375	1.750	1.844	1.75 HEX	0.250	1.875	9.063
	1.000 Oversize	1.125	1.500	0.500							3/4-16			0.500				2.250	9.438		
2.50	0.625 Standard	0.750	1.125	0.375	3.000	0.375	0.375	1.500	1.000	0.313	7/16-20	3.750	4.250	0.625	2.500	1.750	2.188	1.75 HEX	0.250	1.875	9.313
	1.000 Oversize	1.125	1.500	0.500							3/4-16			0.500				2.250	9.688		
3.25	1.000 Standard	1.125	1.500	0.500	3.750	0.500	0.625	1.750	1.250	0.375	3/4-16	4.250	4.750	1.000	2.750	2.000	2.760	2.75 DIA.	0.250	2.375	10.750
	1.375 Oversize	1.625	2.000	0.625							1-14			0.375				2.625	11.000		
4.00	1.000 Standard	1.125	1.500	0.500	4.500	0.500	0.625	1.750	1.250	0.375	3/4-16	4.250	4.750	1.000	2.750	2.000	3.320	2.75 DIA.	0.250	2.375	10.750
	1.375 Oversize	1.625	2.000	0.625							1-14			0.375				2.625	11.000		
5.00	1.000 Standard	1.125	1.500	0.500	5.500	0.500	0.625	1.750	1.250	0.438	3/4-16	4.500	5.000	1.000	3.000	2.000	4.100	2.75 DIA.	0.250	2.375	11.313
	1.375 Oversize	1.625	2.000	0.625							1-14			0.375				2.625	11.563		
6.00	1.375 Standard	1.625	2.000	0.625	6.500	0.750	0.625	2.000	1.500	0.438	1-14	5.000	5.500	1.375	3.250	2.250	4.875	3.50 DIA.	0.375	2.750	12.563
	1.750 Oversize	2.000	2.375	0.750							1 1/4-12			0.500				3.000	12.813		
8.00	1.375 Standard	1.625	2.000	0.625	8.500	0.750	0.625	2.000	1.500	0.563	1-14	5.125	5.625	1.375	3.375	2.250	6.438	3.50 DIA.	0.375	2.750	12.813
	1.750 Oversize	2.000	2.375	0.750							1 1/4-12			0.500				3.000	13.188		

3-POSITION DIMENSIONS: BASIC CYLINDER (NO MOUNT)

About Rod End Styles

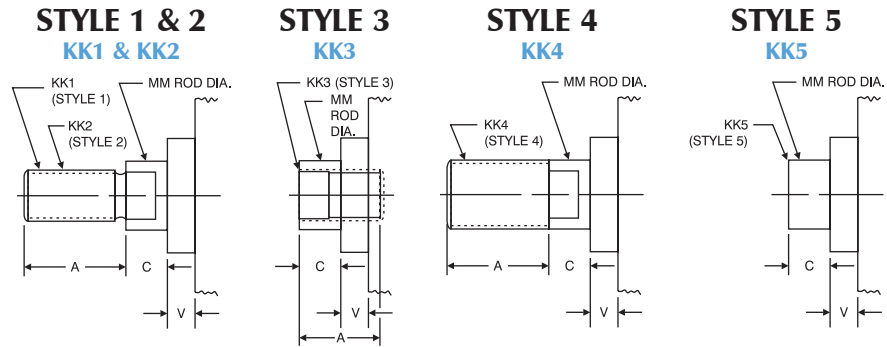
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Other NFPA Styles can be specified (see chart).

Need a rod end not listed? NO PROBLEM! Each Piston Rod is made-to-order and does not delay shipment. Coarse UNC threads, Metric threads or just plain rod ends are common. Thread lengths are also made-to-order (Specify: "A"=Length).

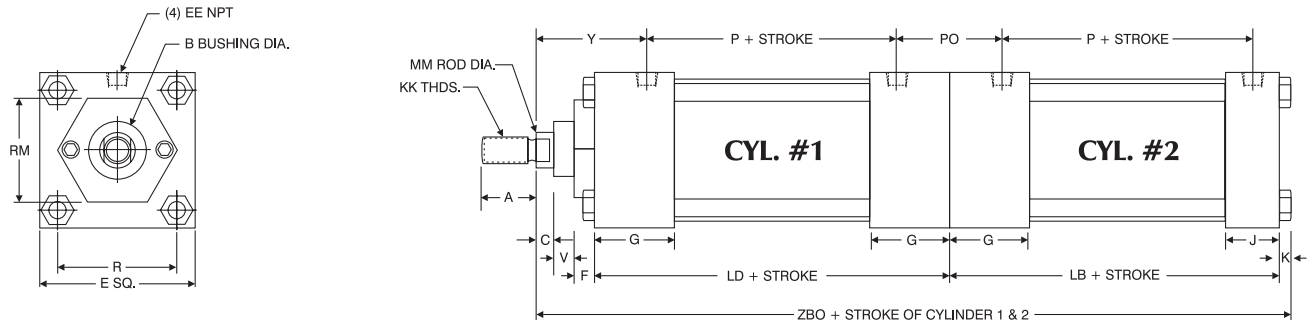
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PISTON ROD END STYLES



BORE	MM ROD DIAMETER	STANDARD		OPTIONAL							C	V
		Style 1 - Male		Style 2 - Male		Style 3 - Female		Style 4 - Male		Style 5 - Blank		
		KK1	A	KK2	A	KK3	A	KK4	A	KK5		
1.50, 2.00, 2.50	0.625 Standard	7/16 -20	0.750	1/2 -20	0.750	7/16 -20	0.750	5/8 -18	0.750	No Threads	0.375	0.250
	1.000 Oversize	3/4 -16	1.125	7/8 -14	1.125	3/4 -16	1.125	1-14	1.125	No Threads	0.500	0.500
3.25, 4.00, 5.00	1.000 Standard	3/4 -16	1.125	7/8 -14	1.125	3/4 -16	1.125	1-14	1.125	No Threads	0.500	0.250
	1.375 Oversize	1-14	1.625	1 1/4 -12	1.625	1-14	1.625	1 3/8 -12	1.625	No Threads	0.625	0.375
6.00 & 8.00	1.375 Standard	1-14	1.625	1 1/4 -12	1.625	1-14	1.625	1 3/8 -12	1.625	No Threads	0.625	0.375
	1.750 Oversize	1 1/4 -12	2.000	1 1/2 -12	2.000	1 1/4 -12	2.000	1 3/4 -12	2.000	No Threads	0.750	0.500

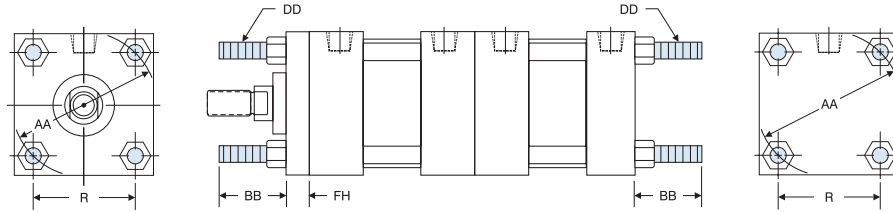
MX0/MX0 (NO MOUNT)



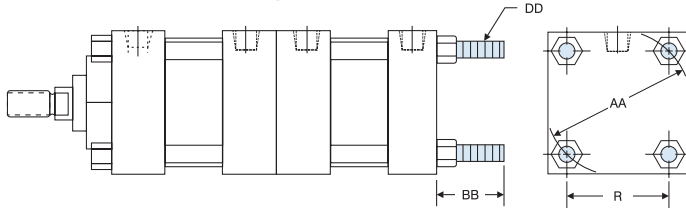
3-POSITION BASIC DIMENSIONS 'MX0' STANDARD & OVERSIZE RODS																					
BORE	ROD DIA.	A	B	C	E	EE	F	G	J	K	KK	LB	LD	MM	P	PO	R	RM	V	Y	ZBO
1.50	0.625 Standard	0.750	1.125	0.375	2.000	0.375	0.375	1.500	1.000	0.250	7/16 -20	3.625	4.125	0.625	2.375	1.750	1.438	2.00 SQ.	0.250	1.875	9.000
	1.000 Oversize	1.125	1.500	0.500	0.500	0.375	0.375	1.500	1.000	0.313	3/4 -16			1.000					0.500		
2.00	0.625 Standard	0.750	1.125	0.375	2.500	0.375	0.375	1.500	1.000	0.313	7/16 -20	3.625	4.125	0.625	2.375	1.750	1.844	1.75 HEX	0.250	1.875	9.063
	1.000 Oversize	1.125	1.500	0.500							3/4 -16			1.000				2.50 SQ.	0.500		
2.50	0.625 Standard	0.750	1.125	0.375	3.000	0.375	0.375	1.500	1.000	0.313	7/16 -20	3.750	4.250	0.625	2.500	1.750	2.188	1.75 HEX	0.250	1.875	9.313
	1.000 Oversize	1.125	1.500	0.500							3/4 -16			1.000				3.00 SQ.	0.500		
3.25	1.000 Standard	1.125	1.500	0.500	3.750	0.500	0.625	1.750	1.250	0.375	3/4 -16	4.250	4.750	1.000	2.750	2.000	2.760	2.75 DIA.	0.250	2.375	10.750
	1.375 Oversize	1.625	2.000	0.625							1-14			1.375				3.75 SQ.	0.375		
4.00	1.000 Standard	1.125	1.500	0.500	4.500	0.500	0.625	1.750	1.250	0.375	3/4 -16	4.250	4.750	1.000	2.750	2.000	3.320	2.75 DIA.	0.250	2.375	10.750
	1.375 Oversize	1.625	2.000	0.625							1-14			1.375				3.50 DIA.	0.375		
5.00	1.000 Standard	1.125	1.500	0.500	5.500	0.500	0.625	1.750	1.250	0.438	3/4 -16	4.500	5.000	1.000	3.000	2.000	4.100	2.75 DIA.	0.250	2.375	11.313
	1.375 Oversize	1.625	2.000	0.625							1-14			1.375				3.50 DIA.	0.375		
6.00	1.375 Standard	1.625	2.000	0.625	6.500	0.750	0.625	2.000	1.500	0.438	1-14	5.000	5.500	1.375	3.250	2.250	4.875	3.50 DIA.	0.375	2.750	12.563
	1.750 Oversize	2.000	2.375	0.750							1 1/4 -12			1.750				0.500	3.000		
8.00	1.375 Standard	1.625	2.000	0.625	8.500	0.750	0.625	2.000	1.500	0.563	1-14	5.125	5.625	1.375	3.375	2.250	6.438	3.50 DIA.	0.375	2.750	12.813
	1.750 Oversize	2.000	2.375	0.750							1 1/4 -12			1.750				0.500	3.000		

3-POSITION DIMENSIONS: TIE ROD & FLANGE MOUNTS

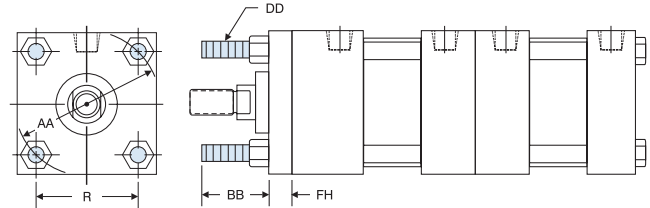
MX1



MXO/MX2



MX3/MXO



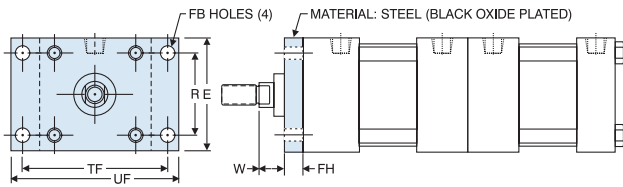
BORE	ROD DIAMETER	AA	BB	DD	FH	R
1.50	0.625 Standard	2.020	1.000	1/4-28	0.375	1.438
	1.000 Oversize					
2.00	0.625 Standard	2.600	1.125	5/16-24	0.375	1.844
	1.000 Oversize					
2.50	0.625 Standard	3.100	1.125	5/16-24	0.375	2.188
	1.000 Oversize					
3.25	1.000 Standard	3.900	1.375	3/8-24	0.625	2.766
	1.375 Oversize					

BORE	ROD DIAMETER	AA	BB	DD	FH	R
4.00	1.000 Standard	4.700	1.375	3/8-24	0.625	3.320
	1.375 Oversize					
5.00	1.000 Standard	5.800	1.813	1/2-20	0.625	4.100
	1.375 Oversize					
6.00	1.375 Standard	6.900	1.813	1/2-20	0.750	4.875
	1.750 Oversize					
8.00	1.375 Standard	9.100	2.313**	5/8-18	0.625*	6.438
	1.750 Oversize					

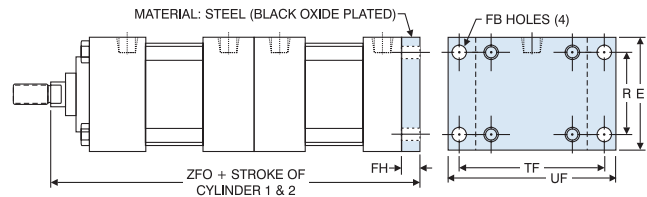
*MX1 & MX3 have full square bushing retainer on 1.50" - 6.00" bores, round retainers on 8.00" bores.

**BB dimension from head on 8.00" bore.

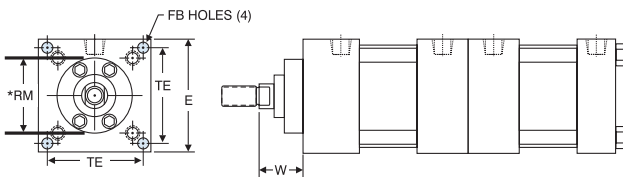
MF1/MXO 1.50" - 6.00" BORES



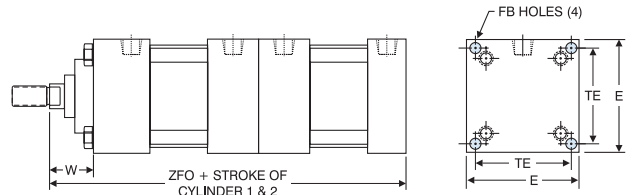
MXO/MF2 1.50" - 6.00" BORES



ME3/MXO 8.00" BORE ONLY



MXO/ME4 8.00" BORE ONLY



BORE	ROD DIAMETER	E	FB	FH	R	RM	TE	TF	UF	W	ZFO
1.50	0.625 Standard	2.000	0.313	0.375	1.438	—	—	2.750	3.375	0.625	9.125
	1.000 Oversize									1.000	9.500
2.00	0.625 Standard	2.500	0.375	0.375	1.844	—	—	3.375	4.125	0.625	9.125
	1.000 Oversize									1.000	9.500
2.50	0.625 Standard	3.000	0.375	0.375	2.188	—	—	3.875	4.625	0.625	9.375
	1.000 Oversize									1.000	9.750
3.25	1.000 Standard	3.750	0.438	0.625	2.766	—	—	4.688	5.500	0.750	11.000
	1.375 Oversize									1.000	11.250

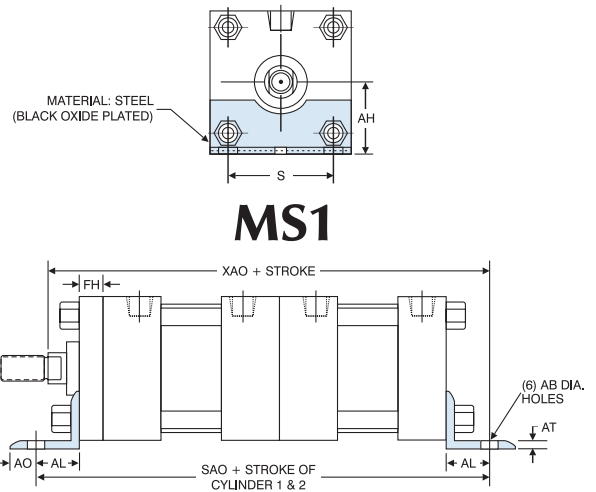
BORE	ROD DIAMETER	E	FB	FH	R	RM	TE	TF	UF	W	ZFO
4.00	1.000 Standard	4.500	0.438	0.625	3.320	—	—	5.438	6.250	0.750	11.000
	1.375 Oversize									1.000	11.250
5.00	1.000 Standard	5.500	0.563	0.625	4.100	—	—	6.625	7.625	0.750	11.500
	1.375 Oversize									1.000	11.750
6.00	1.375 Standard	6.500	0.563	0.750	4.875	—	—	7.625	8.625	0.875	12.875
	1.750 Oversize									1.125	13.125
8.00	1.375 Standard	8.500	0.688	N/A	N/A	3.500*	7.500	N/A	N/A	1.625	12.375
	1.750 Oversize									1.875	12.625

*Round retainer used to retain bushing.
For dimensions not shown, see page 70.

3-POSITION DIMENSIONS: BASE MOUNTS

'MS1' ANGLE MOUNT DIMENSIONS										
BORE	ROD DIAMETER	AB	AH	AL	AO	AT	FH	S	ADD STROKE	
									SAO	XAO
1.50	0.625 Standard	0.438	1.188	1.000	0.375	0.125	0.375	1.250	10.125	9.750
	1.000 Oversize									10.125
2.00	0.625 Standard	0.438	1.438	1.000	0.375	0.125	0.375	1.750	10.125	9.750
	1.000 Oversize									10.125
2.50	0.625 Standard	0.438	1.625	1.000	0.375	0.125	0.375	2.250	10.375	10.000
	1.000 Oversize									10.375
3.25	1.000 Standard	0.563	1.938	1.250	0.500	0.125	0.625	2.750	12.125	11.625
	1.375 Oversize									11.875
4.00	1.000 Standard	0.563	2.250	1.250	0.500	0.125	0.625	3.500	12.125	11.625
	1.375 Oversize									11.875
5.00	1.000 Standard	0.688	2.750	1.375	0.625	0.188	0.625	4.250	12.875	12.250
	1.375 Oversize									12.500
6.00	1.375 Standard	0.813	3.250	1.375	0.625	0.188	0.750	5.250	14.000	13.500
	1.750 Oversize									13.750
8.00	1.375 Standard	0.813	4.250	1.813	0.688	0.250	0.625*	7.125	14.375	14.188
	1.750 Oversize									14.438

*Round retainer on 8.00" bore.
For dimensions not shown, see page 70.

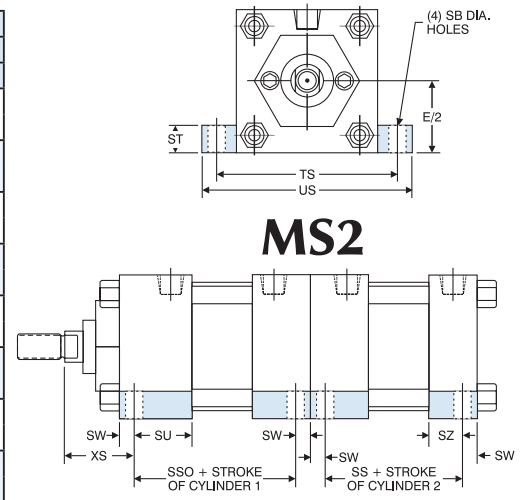


'MS2' SIDE LUG MOUNT DIMENSIONS												
BORE	ROD DIAMETER	SB	E/2	ST	SU	SW	SZ	TS	US	XS	ADD STROKE	
											SSO	SS
1.50	0.625 Standard	0.438	1.000	0.500	1.125	0.375	0.625	2.750	3.500	1.375	3.375	2.875
	1.000 Oversize											
2.00	0.625 Standard	0.438	1.250	0.500	1.125	0.375	0.625	3.250	4.000	1.375	3.375	2.875
	1.000 Oversize											
2.50	0.625 Standard	0.438	1.500	0.500	1.125	0.375	0.625	3.750	4.500	1.375	3.500	3.000
	1.000 Oversize											
3.25	1.000 Standard	0.563	1.875	0.750	1.250	0.500	0.750	4.750	5.750	1.875	3.750	3.250
	1.375 Oversize											
4.00	1.000 Standard	0.563	2.250	0.750	1.250	0.500	0.750	5.500	6.500	1.875	3.750	3.250
	1.375 Oversize											
5.00	1.000 Standard	0.813	2.750	1.000	1.063	0.688	0.563	6.875	8.250	2.063	3.625	3.125
	1.375 Oversize											
6.00	1.375 Standard	0.813	3.250	1.000	1.313	0.688	0.813	7.875	9.250	2.313	4.125	3.625
	1.750 Oversize											
8.00	1.375 Standard	0.813	4.250	1.000	1.313	0.688	0.813	9.875	11.250	2.313	4.250	3.750
	1.750 Oversize											

Note: The option not to have side lugs on center two (2) caps is available. Use the "XX" option in the "How To Order" section (specify).

Example: 3P-TA-MS2-4 X 5-MPR with TA-MS2-4 X 3-BP-"XX"
"XX" = No side lugs on center two (2) caps

For dimensions not shown, see page 70.

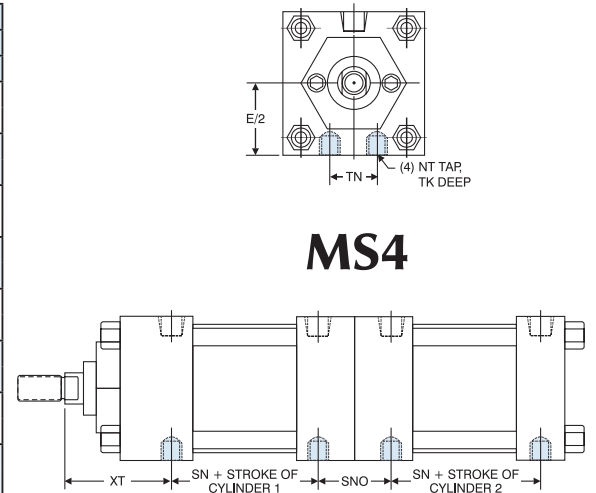


'MS4' BOTTOM TAPPED MOUNT DIMENSIONS								
BORE	ROD DIAMETER	E/2	NT	TK	TN	XT	SNO	ADD STROKE
								SN
1.50	0.625 Standard	1.000	1/4-20	0.375	0.625	1.938	1.875	2.250
	1.000 Oversize							
2.00	0.625 Standard	1.250	5/16-18	0.500	0.875	1.938	1.875	2.250
	1.000 Oversize							
2.50	0.625 Standard	1.500	3/8-16	0.625	1.250	1.938	1.875	2.375
	1.000 Oversize							
3.25	1.000 Standard	1.875	1/2-13	0.750	1.500	2.438	2.125	2.625
	1.375 Oversize							
4.00	1.000 Standard	2.250	1/2-13	0.750	2.063	2.438	2.125	2.625
	1.375 Oversize							
5.00	1.000 Standard	2.750	5/8-11	1.000	2.688	2.438	2.125	2.875
	1.375 Oversize							
6.00	1.375 Standard	3.250	3/4-10	1.125	3.250	2.813	2.375	3.125
	1.750 Oversize							
8.00	1.375 Standard	4.250	3/4-10	1.125	4.500	2.813	2.375	3.250
	1.750 Oversize							

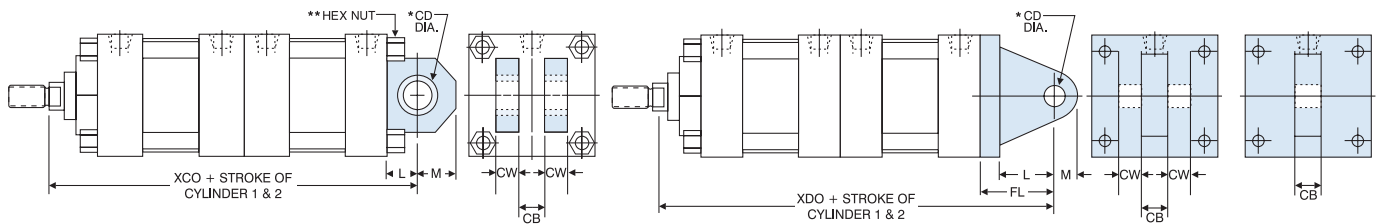
Note: The option not to have 'MS4' taps on center two (2) caps is available. Use the "XX" option in the "How To Order" section (specify).

Example: 3P-TA-MS4-6 X 7-H with TA-MS4-6 X 4-C-"XX"
"XX" = No 'MS4' taps on center two (2) caps

For dimensions not shown, see page 70.



3-POSITION DIMENSIONS: PIVOT MOUNTS



**MXO/
MP1**
Extruded,
1.50" - 8.00" bore

**MXO/
MP2** **MXO/
MP4**
Casting,
1.50" - 6.00" bore 1.50" - 4.00" bore

'MP1' & 'MP2' CLEVIS AND 'MP4' ROD EYE MOUNT DIMENSIONS

BORE	ROD DIAMETER	CB	CD	CW	FL	L	M	ADD STROKE	
								XCO	XDO
1.50	0.625 Standard	0.750	0.500	0.500	1.125	0.750	0.625	9.500	9.875
	1.000 Oversize							9.875	10.250
2.00	0.625 Standard	0.750	0.500	0.500	1.125	0.750	0.625	9.500	9.875
	1.000 Oversize							9.875	10.250
2.50	0.625 Standard	0.750	0.500	0.500	1.125	0.750	0.625	9.750	10.125
	1.000 Oversize							10.125	10.500
3.25	1.000 Standard	1.250	0.750	0.625	1.875	1.250	0.875	11.625	12.250
	1.375 Oversize							11.875	12.500
4.00	1.000 Standard	1.250	0.750	0.625	1.875	1.250	0.875	11.625	12.250
	1.375 Oversize							11.875	12.500
5.00	1.000 Standard	1.250	0.750	0.625	1.875	1.250	0.875	12.125	12.750
	1.375 Oversize							12.375	13.000
6.00	1.375 Standard	1.500	1.000	0.750	2.250	1.500	1.000	13.625	14.500
	1.750 Oversize							13.875	14.750
8.00	1.375 Standard	1.500	1.000	0.750	N/A	1.500	1.000	13.875	N/A
	1.750 Oversize							14.125	

For dimensions not shown, see page 70.

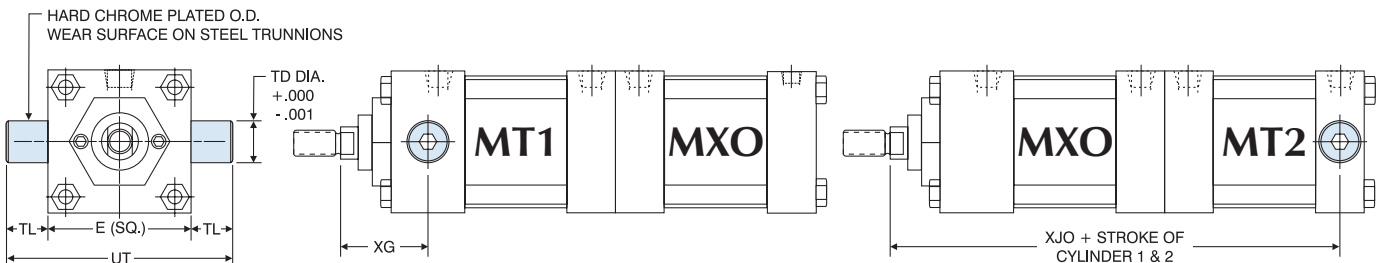
*Pin included, two (2) pressed in bearings.

**Hex nuts are located on cap end (3.25"-8.00" bores).

Note: Extruded MP1 mounts are standard (1.50" - 8.00" bores).

Cast iron removable mounts are optional and must be requested when ordering (1.50" - 6.00" bores).

MP4 mount is not available as standard on 5.00" bores and above.



MT1/MT2

Note: MT1 and MT2 trunnions are bolt on, non-removable design.
Optional: One-piece solid steel trunnion available.

'MT1' HEAD TRUNNION AND 'MT2' CAP TRUNNION MOUNT DIMENSIONS

BORE	ROD DIAMETER	E	TD	TL	UT	XG	ADD STROKE
							XJO
1.50	0.625 Standard	2.000	1.000	1.000	4.000	1.750	8.250
	1.000 Oversize						N/A*
2.00	0.625 Standard	2.500	1.000	1.000	4.500	1.750	8.250
	1.000 Oversize						2.125
2.50	0.625 Standard	3.000	1.000	1.000	5.000	1.750	8.500
	1.000 Oversize						2.125
3.25	1.000 Standard	3.750	1.000	1.000	5.750	2.250	9.750
	1.375 Oversize						2.500
4.00	1.000 Standard	4.500	1.000	1.000	6.500	2.250	9.750
	1.375 Oversize						2.500
5.00	1.000 Standard	5.500	1.000	1.000	7.500	2.250	10.250
	1.375 Oversize						2.500
6.00	1.375 Standard	6.500	1.375	1.375	9.250	2.625	11.375
	1.750 Oversize						2.875
8.00	1.375 Standard	8.500	1.375	1.375	11.250	2.625	11.625
	1.750 Oversize						2.875

*No oversize rod available on 1.50" bore MT1.

For dimensions not shown, see page 70.