

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

Page 61



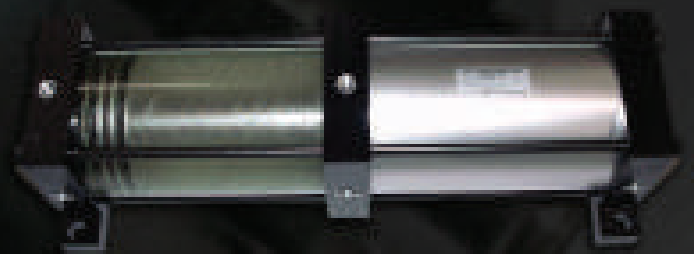
3P - 3 Position

Page 68



TM - Tandem

Page 74



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

BACK-TO-BACK CYLINDERS:

You can back-to-back **any** series of cylinder together—mixed or matched, to provide unlimited design possibilities.

Back-to-back cylinders consist of two (2) individual cylinders having common bore sizes, built as one unit utilizing common tie-rods. Mounts include a full range of base, tie-rod and head or cap trunnions for pivot mounting.

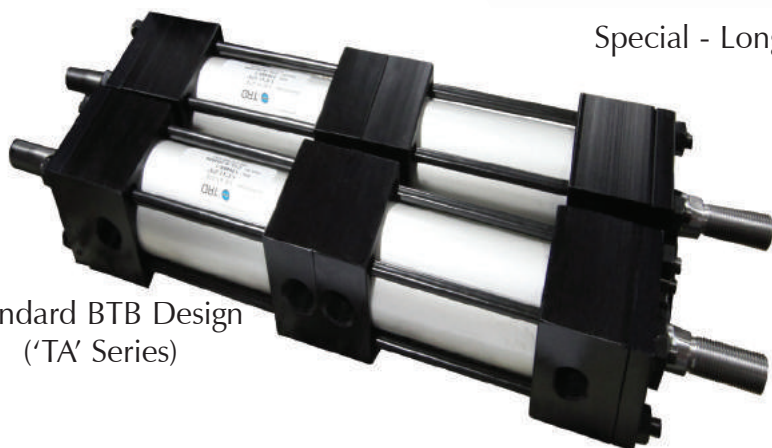
(Tip: You can use a rod clevis on each piston rod to create additional pivot mounting styles. Refer to pages 201-202 for stop tube considerations in combined strokes over 40 inches).

BACK-TO-BACK BENEFITS:

- **MULTIPLE POSITION CYLINDER** – The back-to-back design creates a true four-position cylinder. By varying stroke lengths, a multitude of positions can be created. (Example: CYL 1 has a 1" stroke; CYL 2 has a 2" stroke. The stroke positions would be: 0", 1", 2" and 3" depending on how the cylinder is cycled).
- **HARD POSITION STOPS** – Unlike a three-position cylinder, a back-to-back cylinder provides hard stop positioning (Note: Three-position cylinders rely on the back piston rod to push against the front piston rod to create the intermediate position. Care must be used to prevent the front piston rod from extending in the intermediate position).
- **ECONOMICAL DESIGN** – The back-to-back design uses standard parts, reducing overall costs.



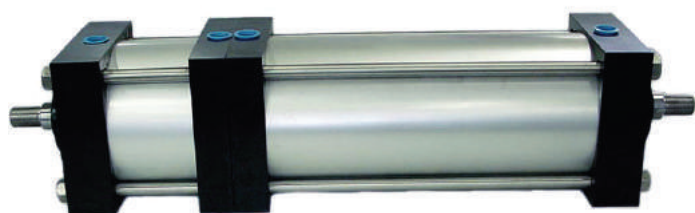
Special - Long Cap & Common Cap Port ('FM' Series)



Standard BTB Design ('TA' Series)



Special - One Cap & Common Cap Port ('TRA' Series)



Standard BTB Design ('TA' Series)

HOW TO ORDER: BACK-TO-BACK CYLINDERS

CYL. #1

BTB - TA - MS4 - 2 x 10 - HC

WITH

CYL. #2

TA - MX0 - 2 X 5 - MPR - HC

SERIES	
TA	250 PSI AIR
TD	250 PSI AIR, TOUGH-DUTY
SS	STAINLESS STEEL
FM	FLUSH MOUNT (Add-A-Mount)
TRA	TRIPLE ROD

NFFA MOUNTS	
MX0	NO MOUNT
MT1	FRONT TRUNNION
MT2	REAR TRUNNION
MX1	EXTENDED TIE RODS - HEAD & CAP
MX3	EXTENDED TIE RODS - HEAD
MF1	FRONT FLANGE (1.50"-6.00" Bore)
ME3	FRONT MOUNTING HOLES (6.00" Bore)
MS1	FRONT & REAR END ANGLE
MS2	SIDE LUG (1.50"-4.00" STD., 5.00" AND ABOVE CONSULT FACTORY)
MS4	BOTTOM TAPPED HOLES

BORE
1.50
2.00
2.50
3.25
4.00
5.00
6.00
8.00

STROKE (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)

NOT AVAILABLE ON 'TRA' SERIES

Note: "L" AND "EL" CUSHION OPTIONS CAN BE ORDERED AS FIXED CUSHIONS.
Example: FCHL, FCELH

OPTIONS	
A=	EXTENDED PISTON ROD THREAD (EXAMPLE: A= 2")
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	STUDD 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
MPR	MAGNETIC PISTON FOR REED OR SOLID STATE SWITCHES - TRD MODELS: R10, R10R, 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 (CONSULT FACTORY)
X SP	SPACER PLATE
X SR	SPRING RETURN (CONSULT FACTORY)
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 (IN 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)

STANDARD PORT AND CUSHION ADJUSTMENT POSITIONS

- Ports - Positions 1 and 5
- Cushion Adjustment - Positions 2 and 6 on both cylinders (opposite sides from one another)
- Specify Non-Standard Positions When Ordering

About our Part Number System

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

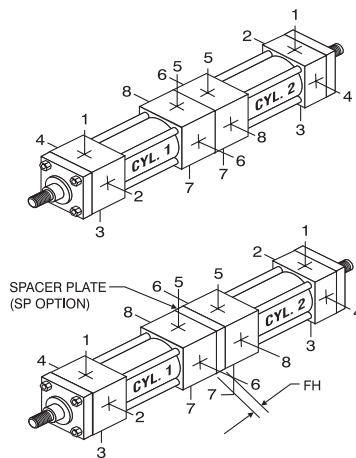
Example: Back-To-Back

Cyl. 1 is a 'TA' series, MS4 mount, 2.00" bore X 10" stroke.

Cyl. 2 is a 'TA' series, MX0 (no mount), 2.00" bore X 5" stroke, with a magnet (for Reed Switches), and Head & Cap cushions.

Part Number:

BTB-TA-MS4-2 x 10 with
TA-MX0-2 x 5-MPR-HC



Ports are in-line when using standard port locations. To add space between ports (for larger air fittings), a spacer plate can be added as an option (**"SP" OPTION**).

"SP" OPTION WILL INCREASE OVERALL LENGTH BY "FH" DIMENSION (See Back-to-Back Flip-Out for "FH" dimensions).

Tip: If overall length is tight, specify rotating the ports on one of the cylinders in lieu of a spacer plate.

BACK-TO-BACK DIMENSIONS: BASIC CYLINDER (NO MOUNT)

EASY FLIP OUT PAGE FOR REFERENCE

About Rod End Styles

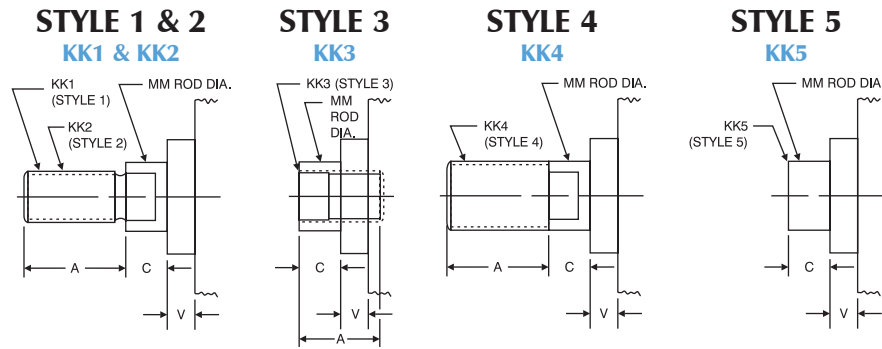
Style 1 Male Rod End is STANDARD

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).

NEED SOMETHING NOT LISTED? Just send us a sketch. In most cases, quotes are turned around in one day!

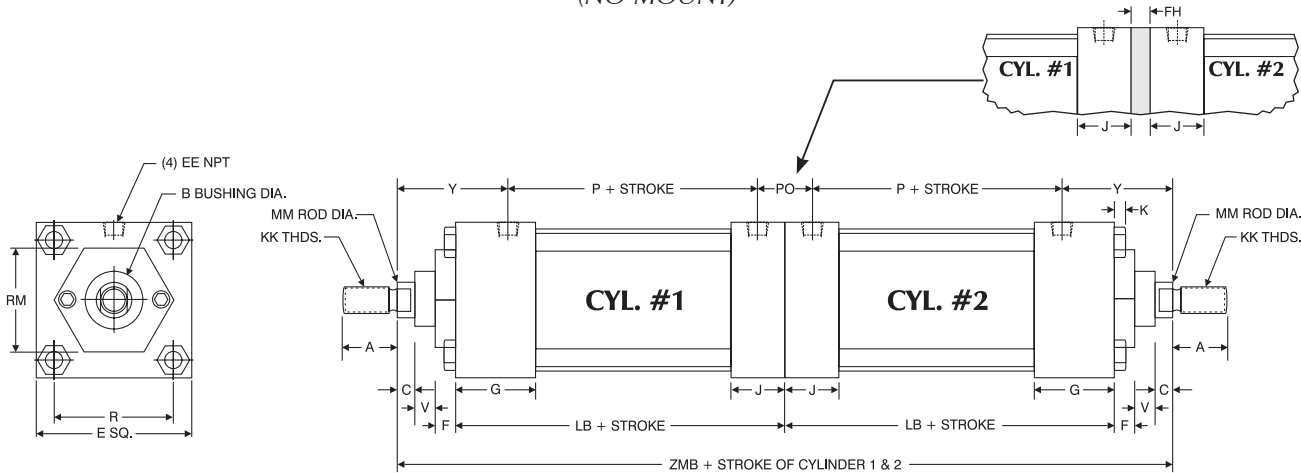
PISTON ROD END STYLES



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)

OPTION "SP" SPACER PLATE (DETAIL)



BACK-TO-BACK BASIC DIMENSIONS 'MX0' STANDARD & OVERSIZE RODS																					
BORE	ROD DIAMETER	A	B	C	E	EE	F	FH	G	J	K	KK	LB	MM	P	PO	R	RM	V	Y	ZMB*
1.50	0.625 Standard	0.750	1.125	0.375	2.000	0.375	0.375	0.375	1.500	1.000	0.250	7/16-20	3.625	0.625	2.375	0.750	1.438	2.00 SQ.	0.250	1.875	9.250
	1.000 Oversize	1.125	1.500	0.500								3/4-16	1.000					0.500	2.250	10.000	
2.00	0.625 Standard	0.750	1.125	0.375	2.500	0.375	0.375	0.375	1.500	1.000	0.313	7/16-20	3.625	0.625	2.375	0.750	1.844	1.75 HEX	0.250	1.875	9.250
	1.000 Oversize	1.125	1.500	0.500								3/4-16	1.000					2.50 SQ.	0.500	2.250	10.000
2.50	0.625 Standard	0.750	1.125	0.375	3.000	0.375	0.375	0.375	1.500	1.000	0.313	7/16-20	3.750	0.625	2.500	0.750	2.188	1.75 HEX.	0.250	1.875	9.500
	1.000 Oversize	1.125	1.500	0.500								3/4-16	1.000					3.00 SQ.	0.500	2.250	10.250
3.25	1.000 Standard	1.125	1.500	0.500	3.750	0.500	0.625	0.625	1.750	1.250	0.375	3/4-16	4.250	1.000	2.750	1.000	2.760	2.75 DIA.	0.250	2.375	11.250
	1.375 Oversize	1.625	2.000	0.625								1-14	1.375					3.75 SQ.	0.375	2.625	11.750
4.00	1.000 Standard	1.125	1.500	0.500	4.500	0.500	0.625	0.625	1.750	1.250	0.375	3/4-16	4.250	1.000	2.750	1.000	3.320	2.75 DIA.	0.250	2.375	11.250
	1.375 Oversize	1.625	2.000	0.625								1-14	1.375					3.50 DIA.	0.375	2.625	11.750
5.00	1.000 Standard	1.125	1.500	0.500	5.500	0.500	0.625	0.625	1.750	1.250	0.438	3/4-16	4.500	1.000	3.000	1.000	4.100	2.75 DIA.	0.250	2.375	11.750
	1.375 Oversize	1.625	2.000	0.625								1-14	1.375					3.50 DIA.	0.375	2.625	12.250
6.00	1.375 Standard	1.625	2.000	0.625	6.500	0.750	0.625	0.750	2.000	1.500	0.438	1-14	5.000	1.375	3.250	1.250	4.875	3.50 DIA.	0.375	2.750	13.250
	1.750 Oversize	2.000	2.375	0.750								1 1/4-12	1.750						0.500	3.000	13.750
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	1.375	3.375	1.250	6.438	3.50 DIA.	0.375	2.750	13.500
	1.750 Oversize	2.000	2.375	0.750								1 1/4-12	1.750						0.500	3.000	14.000

*Overall length of "ZMB" will increase by "FH" dimension when using spacer plate option "SP."

BACK-TO-BACK DIMENSIONS: BASIC CYLINDER (NO MOUNT)

About Rod End Styles

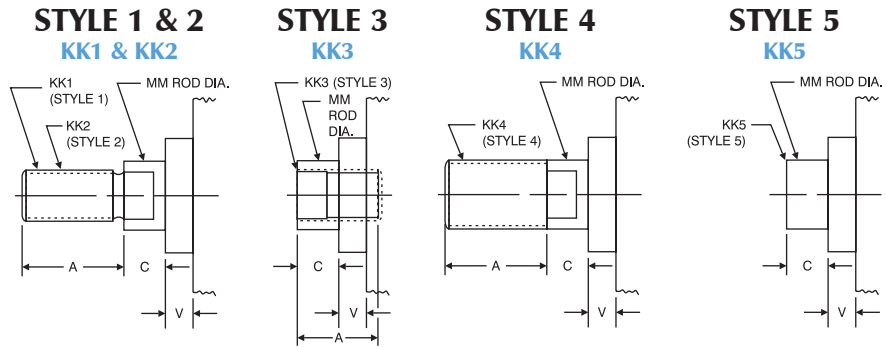
Style 1 Male Rod End is STANDARD

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).

NEED SOMETHING NOT LISTED? Just send us a sketch. In most cases, quotes are turned around in one day!

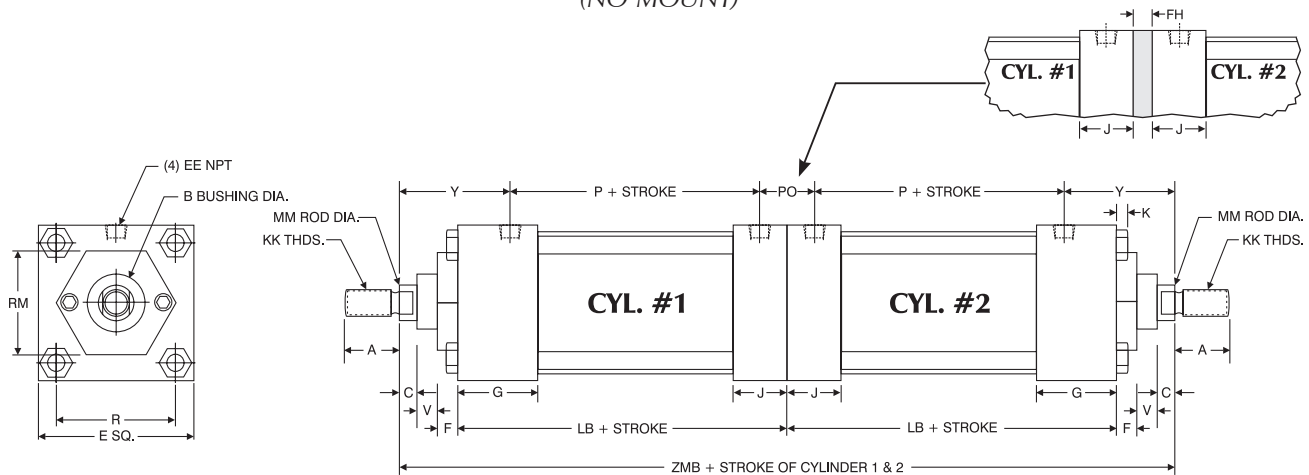
PISTON ROD END STYLES



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)

OPTION "SP" SPACER PLATE (DETAIL)

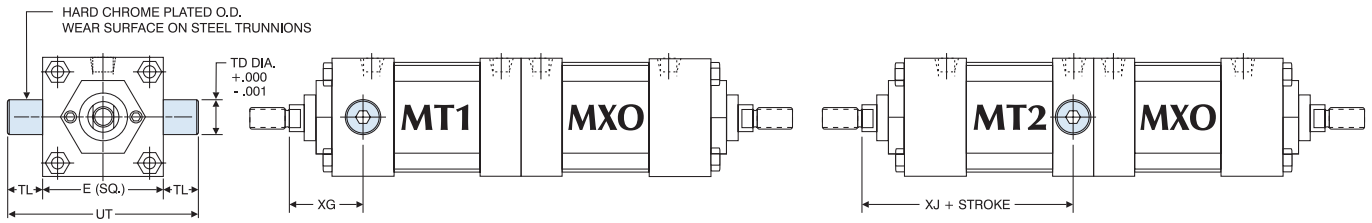


BACK-TO-BACK BASIC DIMENSIONS 'MX0' STANDARD & OVERSIZE RODS

BORE	ROD DIAMETER	A	B	C	E	EE	F	FH	G	J	K	KK	LB	MM	P	PO	R	RM	V	Y	ZMB*
1.50	0.625 Standard	0.750	1.125	0.375	2.000	0.375	0.375	0.375	1.500	1.000	0.250	7/16-20	3.625	0.625	2.375	0.750	1.438	2.00 SQ.	0.250	1.875	9.250
	1.000 Oversize	1.125	1.500	0.500	2.500	0.375	0.375	0.375	1.500	1.000	0.313	3/4-16	3.625	1.000	2.375	0.750	1.844	1.75 HEX	0.500	2.250	10.000
2.00	0.625 Standard	0.750	1.125	0.375	2.500	0.375	0.375	0.375	1.500	1.000	0.313	7/16-20	3.625	0.625	2.375	0.750	1.844	1.75 SQ.	0.250	1.875	9.250
	1.000 Oversize	1.125	1.500	0.500	3.000	0.375	0.375	0.375	1.500	1.000	0.313	3/4-16	3.750	0.625	2.500	0.750	2.188	2.50 SQ.	0.500	2.250	10.250
2.50	0.625 Standard	0.750	1.125	0.375	3.000	0.375	0.375	0.375	1.500	1.000	0.313	7/16-20	3.750	0.625	2.500	0.750	2.188	1.75 HEX.	0.250	1.875	9.500
	1.000 Oversize	1.125	1.500	0.500	3.750	0.500	0.625	0.625	1.750	1.250	0.375	3/4-16	4.250	1.000	2.750	1.000	2.760	2.75 DIA.	0.250	2.375	11.250
3.25	1.375 Oversize	1.625	2.000	0.625	3.750	0.500	0.625	0.625	1.750	1.250	0.375	1 -14	4.250	1.375	2.750	1.000	2.760	3.75 SQ.	0.375	2.625	11.750
	1.000 Standard	1.125	1.500	0.500	4.500	0.500	0.625	0.625	1.750	1.250	0.375	3/4-16	4.250	1.000	2.750	1.000	3.320	2.75 DIA.	0.250	2.375	11.250
4.00	1.375 Oversize	1.625	2.000	0.625	4.500	0.500	0.625	0.625	1.750	1.250	0.375	1 -14	4.250	1.375	2.750	1.000	3.320	3.50 DIA.	0.375	2.625	11.750
	1.000 Standard	1.125	1.500	0.500	5.500	0.500	0.625	0.625	1.750	1.250	0.438	3/4-16	4.500	1.000	3.000	1.000	4.100	2.75 DIA.	0.250	2.375	11.750
5.00	1.375 Oversize	1.625	2.000	0.625	5.500	0.500	0.625	0.625	1.750	1.250	0.438	1 -14	4.500	1.375	3.000	1.000	4.100	3.50 DIA.	0.375	2.625	12.250
	1.375 Standard	1.625	2.000	0.625	6.500	0.750	0.625	0.750	2.000	1.500	0.438	1 -14	5.000	1.375	3.250	1.250	4.875	3.50 DIA.	0.375	2.750	13.250
6.00	1.750 Oversize	2.000	2.375	0.750	6.500	0.750	0.625	0.750	2.000	1.500	0.438	1 1/4-12	5.000	1.750	3.250	1.250	4.875	3.50 DIA.	0.500	3.000	13.750
	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	1.375	3.375	1.250	6.438	3.50 DIA.	0.375	2.750	13.500
8.00	1.750 Oversize	2.000	2.375	0.750	8.500	0.750	0.625	—	2.000	1.500	0.563	1 1/4-12	5.125	1.750	3.375	1.250	6.438	3.50 DIA.	0.500	3.000	14.000

*Overall length of "ZMB" will increase by "FH" dimension when using spacer plate option "SP"

BACK-TO-BACK DIMENSIONS: PIVOT MOUNTS



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
							XJ
1.50	0.625 Standard	2.000	1.000	1.000	4.000	1.750	4.125
	1.000 Oversize						N/A*
2.00	0.625 Standard	2.500	1.000	1.000	4.500	1.750	4.125
	1.000 Oversize						2.125
2.50	0.625 Standard	3.000	1.000	1.000	5.000	1.750	4.250
	1.000 Oversize						2.125
3.25	1.000 Standard	3.750	1.000	1.000	5.750	2.250	5.000
	1.375 Oversize						2.500
4.00	1.000 Standard	4.500	1.000	1.000	6.500	2.250	5.000
	1.375 Oversize						2.500
5.00	1.000 Standard	5.500	1.000	1.000	7.500	2.250	5.250
	1.375 Oversize						2.500
6.00	1.375 Standard	6.500	1.375	1.375	9.250	2.625	5.875
	1.750 Oversize						2.875
8.00	1.375 Standard	8.500	1.375	1.375	11.250	2.625	6.000
	1.750 Oversize						2.875

*No oversize rod available on 1.50" bore MT1.

BACK-TO-BACK CYLINDERS: SCHEMATICS

The following schematic is commonly used for back-to-back applications.

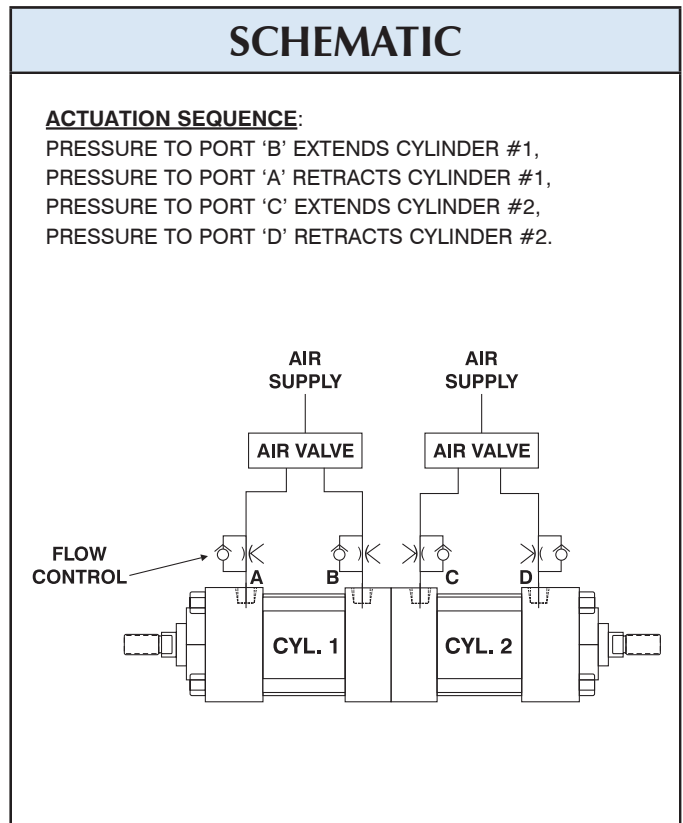
Cylinder strokes can be the same or different.

Back-to-Back cylinders are designed and built with two (2) separate piston rods. Cylinders operate independently of one another.

Tip: Before ordering, check the air fitting sizes to be sure you have adequate room at the ports "B" and "C" to install fittings. Ports can be rotated on one cylinder or a spacer plate can be added (between cylinder caps) to provide clearance for fittings.

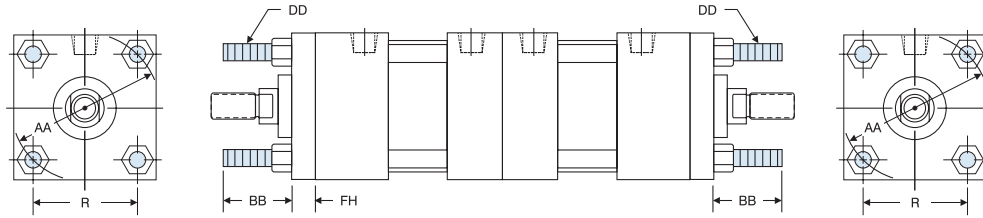
EXAMPLE:

Shown is a back-to-back cylinder with each cylinder operated with an independent air valve & two (2) flow controls used to regulate cylinder speed.

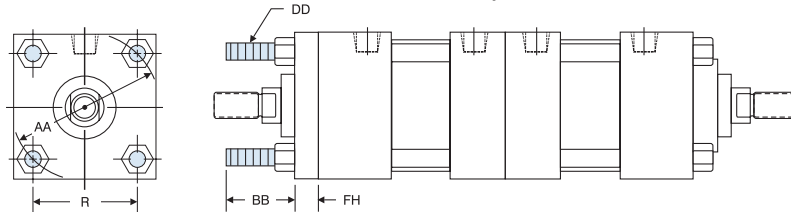


BACK-TO-BACK DIMENSIONS: TIE ROD & FLANGE MOUNTS

MX1



MX3/MXO



TIE ROD EXTENDED 'MX1' & 'MX3' MOUNT DIMENSIONS						
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	2.760
	1.375 Oversize					

TIE ROD EXTENDED 'MX1' & 'MX3' MOUNT DIMENSIONS						
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					

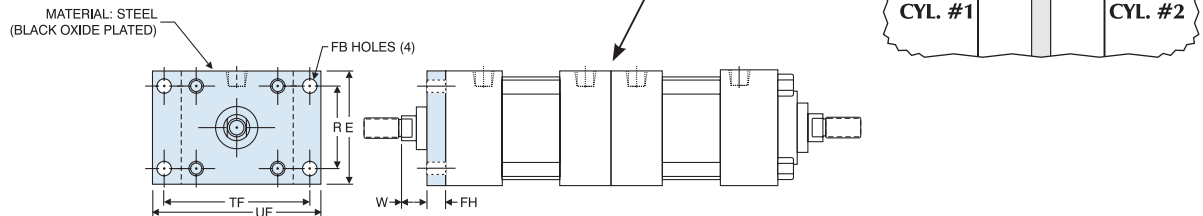
*Round retainer used to retain bushing, not a full front plate as other bores.

**"BB" dimension from head on 8" bore.

MF1/MXO

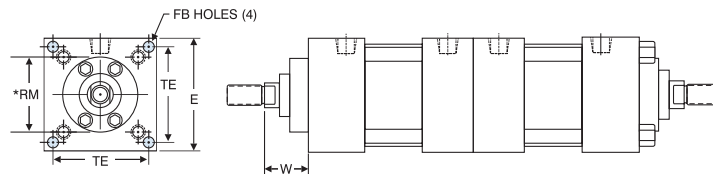
1.50" - 6.00" BORES

OPTION "SP" SPACER PLATE (DETAIL)



ME3/MXO

8.00" BORE ONLY



'MF1' FLANGE & 'ME3' CAP MOUNT DIMENSIONS										
BORE	ROD DIAMETER	E	FB	FH	R	RM	TE	TF	UF	W
1.50	0.625 Standard	2.000	0.313	0.357	1.438	—	—	2.750	3.375	0.625
	1.000 Oversize									1.000
2.00	0.625 Standard	2.500	0.375	0.375	1.844	—	—	3.375	4.125	0.625
	1.000 Oversize									1.000
2.50	0.625 Standard	3.000	0.375	0.375	2.188	—	—	3.875	4.625	0.625
	1.000 Oversize									1.000
3.25	1.000 Standard	3.750	0.438	0.625	2.760	—	—	4.688	5.500	0.750
	1.375 Oversize									1.000

'MF1' FLANGE & 'ME3' CAP MOUNT DIMENSIONS										
BORE	ROD DIAMETER	E	FB	FH	R	RM	TE	TF	UF	W
4.00	1.000 Standard	4.500	0.438	0.625	3.320	—	—	5.438	6.250	0.750
	1.375 Oversize									1.000
5.00	1.000 Standard	5.500	0.563	0.625	4.100	—	—	6.625	7.625	1.000
	1.375 Oversize									1.000
6.00	1.375 Standard	6.500	0.563	0.750	4.875	—	—	7.625	8.625	0.875
	1.750 Oversize									1.125
8.00	1.375 Standard	8.500	0.688	N/A	N/A	3.500*	7.570	N/A	N/A	1.625
	1.750 Oversize									1.875

*Round retainer used to retain bushing.

BACK-TO-BACK DIMENSIONS: BASE MOUNTS

Back-to-Back
Cylinders

3-Position
Cylinders

Tandem
Cylinders

Options
Page 189

Accessories
Page 227

Switches
Page 241

Technical Data
Page 277

'MS1' ANGLE MOUNT DIMENSIONS									
BORE	ROD DIAMETER	AB	AH	AL	AO	AT	FH	S	ADD STROKE SAB
1.50	0.625 Standard	0.438	1.188	1.000	0.375	0.125	0.375	1.250	10.000
	1.000 Oversize								
2.00	0.625 Standard	0.438	1.438	1.000	0.375	0.125	0.375	1.750	10.000
	1.000 Oversize								
2.50	0.625 Standard	0.438	1.625	1.000	0.375	0.125	0.375	2.250	10.250
	1.000 Oversize								
3.25	1.000 Standard	0.563	1.938	1.250	0.500	0.125	0.625	2.750	12.250
	1.375 Oversize								
4.00	1.000 Standard	0.563	2.250	1.250	0.500	0.125	0.625	3.500	12.250
	1.375 Oversize								
5.00	1.000 Standard	0.688	2.750	1.375	0.625	0.188	0.625	4.250	13.000
	1.375 Oversize								
6.00	1.375 Standard	0.813	3.250	1.375	0.625	0.188	0.750	5.250	14.250
	1.750 Oversize								
8.00	1.375 Standard	0.813	4.250	1.813	0.688	0.250	0.625*	7.125	13.875
	1.750 Oversize								

*3.50" diameter round retainer on 8.00" bore.

'MS2' SIDE LUG MOUNT DIMENSIONS											
BORE	ROD DIAMETER	SB	E/2	ST	SU	SW	SZ	TS	US	XS	ADD STROKE SS
1.50	0.625 Standard	0.438	1.000	0.500	1.125	0.375	0.625	2.750	3.500	1.375	2.875
	1.000 Oversize									1.750	
2.00	0.625 Standard	0.438	1.250	0.500	1.125	0.375	0.625	3.250	4.000	1.375	2.875
	1.000 Oversize									1.750	
2.50	0.625 Standard	0.438	1.500	0.500	1.125	0.375	0.625	3.750	4.500	1.375	3.000
	1.000 Oversize									1.750	
3.25	1.000 Standard	0.563	1.875	0.750	1.250	0.500	0.750	4.750	5.750	1.875	3.250
	1.375 Oversize									2.125	
4.00	1.000 Standard	0.563	2.250	0.750	1.250	0.500	0.750	5.500	6.500	1.875	3.250
	1.375 Oversize									2.125	
5.00	1.000 Standard	0.813	2.750	1.000	1.063	0.688	0.563	6.875	8.250	2.063	3.125
	1.375 Oversize									2.313	
6.00	1.375 Standard	0.813	3.250	1.000	1.313	0.688	0.813	7.875	9.250	2.313	3.625
	1.750 Oversize									2.563	
8.00	1.375 Standard	0.813	4.250	1.000	1.313	0.688	0.813	9.875	11.250	2.313	3.750
	1.750 Oversize									2.563	

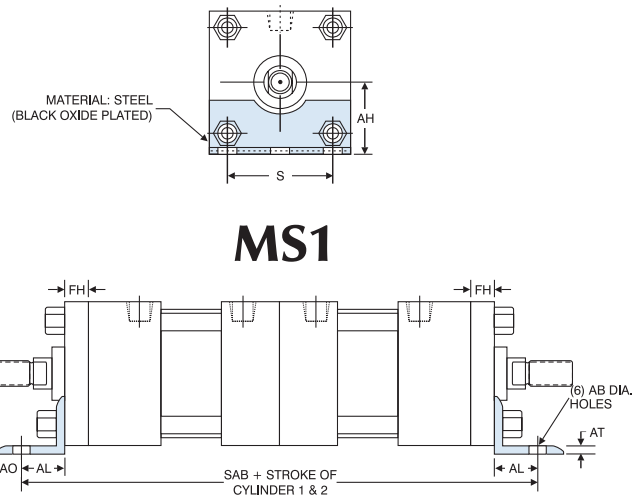
Note: The option not to have side lugs on center two (2) caps is available. Use the "XX" option in the "How To Order" section (specify).

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

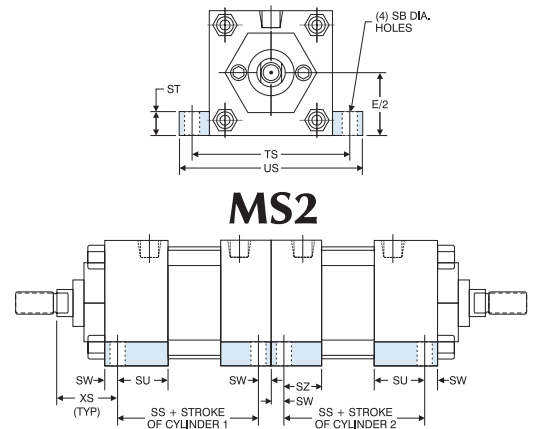
'MS4' BOTTOM TAPPED MOUNT DIMENSIONS								
BORE	ROD DIAMETER	E/2	NT	TK	TN	XT	SNB	ADD STROKE SN
1.50	0.625 Standard	1.000	1/4-20	0.375	0.625	1.938	0.875	2.250
	1.000 Oversize					2.313		
2.00	0.625 Standard	1.250	5/16-18	0.500	0.875	1.938	0.875	2.250
	1.000 Oversize					2.313		
2.50	0.625 Standard	1.500	3/8-16	0.625	1.250	1.938	0.875	2.375
	1.000 Oversize					2.313		
3.25	1.000 Standard	1.875	1/2-13	0.750	1.500	2.438	1.125	2.625
	1.375 Oversize					2.688		
4.00	1.000 Standard	2.250	1/2-13	0.750	2.063	2.438	1.125	2.625
	1.375 Oversize					2.688		
5.00	1.000 Standard	2.750	5/8-11	1.000	2.688	2.438	1.125	2.875
	1.375 Oversize					2.688		
6.00	1.375 Standard	3.250	3/4-10	1.125	3.250	2.813	1.375	3.125
	1.750 Oversize					3.063		
8.00	1.375 Standard	4.250	3/4-10	1.125	4.500	2.813	1.375	3.250
	1.750 Oversize					3.063		

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).

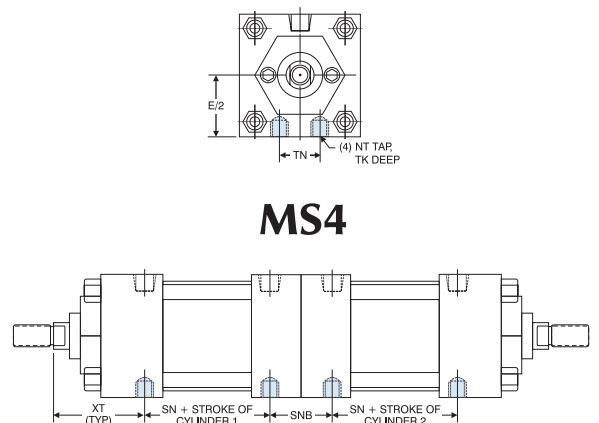
Example: BTB-TA-MS4-6 X 7-H with TA-MS4-6 X 4-C-"XX"
"XX" = No 'MS4' taps on center two (2) caps



MS1



MS2



MS4

NOTES

Back-to-Back
Cylinders

3-Position
Cylinders

Tandem
Cylinders

Options
Page 189

Accessories
Page 227

Switches
Page 241

Technical Data
Page 277