TRA Series NFPA
TRIPLE PISTON ROD
Aluminum Cylinders
1.50″ to 8.00″ Bore

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

SERIES 'TRA' TRIPLE ROD

'HEAVY-DUTY' TRIPLE ROD DESIGN

TRD's 'TR' Series has been redesigned. The new series, 'TRA' is a *Heavy-Duty* version of the 'TR' Series. The new series is a drop-in replacement of the previous model. Overall dimensions are not affected.

Universal mount, sleeve nut design
Same overall materials as 'TA' & 'FM' Series

Benefits

- **Extended Heavy-Duty Rod Bearings —** Cast iron material is rated at 150,000 PSI compressive strength. Extended bearing design maximizes load handling abilities without compromising design.
- **Piston Wear Band Standard —** PTFE material rated for high loads and non-lube service.
- **Non Lube Service —** PTFE coated bushings, Carboxilated Nitrile Seal material and PTFE based lube provide permanent lubrication for long life.
- **Longer Strokes Available —** The heavy-duty design allows for longer strokes *(see page 94 for details)*.
- **Load and End Play Charts Available —** Refer to pages 95-99 for charts.
- **'TRA' Series is a Drop-In Replacement to 'TR' Series —** New design does not require a redesign by customers since the overall dimensions are not affected.
- **Existing 'TR' Series units can be upgraded to the 'TRA' Series —** Replacement parts can be ordered to field upgrade an existing 'TR' model to the new 'TRA' Series *(see page 103 for details)*.

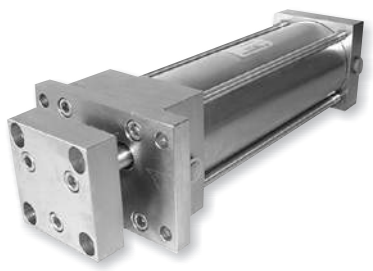
'TR' Series — Design Upgrade

'TR' Series (250 PSI Air) is obsolete and super-ceded by 'TRA' Series (effective 5-12-03).

'TR-TH' Series (400 PSI Hyd.) is obsolete and super-ceded by 'TRA' Series with 'TH' option (effective 5-12-03).

Other Models Available:

'TRA' with 'EN' Option
Electroless Nickel Plated with Stainless Steel fasteners, Tie-Rods and Sleeve Nuts



'SS-TRA'
303/304 or 316 Stainless Steel
(Consult factory for details and delivery)

(Optional Delrin® Rod Bushings Shown)

'MA' Option (Micro-Adjust)

Available on all "D1" Double Rod End models.

Allows for extended stroke adjustment in .001" increments.

(Note: up to 6" strokes)

HOW TO ORDER: SERIES 'TRA' (TRIPLE PISTON ROD)

TRA - MF1 ___ - 3.25 x 10 - HC - MPR

SERIES	
TRA	250 PSI AIR

NFPA MOUNTS	
MX0	NO MOUNT
MS4	BOTTOM TAPPED HOLES (1 .50"-8.00" BORE)
MS2	SIDE LUG (1.50"-8.00" BORE)
BASE BAR	SIDE LUG (1.50"-4.00" BORE)
MP1	REAR PIVOT CLEVIS (EXTRUDED)
MP2	REAR PIVOT CLEVIS (CASTING) (1.50"-6.00" BORE)
MP4	REAR PIVOT EYE (CASTING) (1.50"-4.00" BORE)
MF1	FRONT FLANGE (1.50"-6.00" BORE)
MF2	REAR FLANGE (1.50"-6.00" BORE)
ME4	REAR MOUNTING HOLES (8.00" BORE)
ME5	FRONT MOUNTING HOLES (8.00" BORE)

STYLE	
SINGLE END (LEAVE BLANK)	
D3	DOUBLE END - 3 RODS
D1	DOUBLE END - 1 ROD (KK1 STANDARD ROD END - SEE OPTIONS FOR OTHER ROD END STYLES)

BORE	
1.50	2.00
2.50	3.25
4.00	5.00
6.00	8.00

STROKE
SEE STROKE OPTIONS ON PAGE 94 MADE-TO-ORDER

CUSHIONS	
H	HEAD CUSHION POSITION 2 IS *STANDARD SPECIFY* FOR POSITIONS: 1 & 4
C	CAP CUSHION POSITION 6 IS STANDARD SPECIFY FOR POSITIONS: 5, 7 & 8

	OPTIONS (ADDS LENGTH TO CYLINDER - SEE "OPTION LENGTH ADDER" CHART BELOW.)	
	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
	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
	MA	MICRO-ADJUST (12" MAX STROKE)
	MAB	MICRO-ADJUST WITH SOUND DAMPENING BUMPER (12" MAX STROKE)
	MPR*	MAGNETIC PISTON FOR REED OR SOLID STATE SWITCHES - MODELS: R10, R10P, RAC, RHT & MSS
X	MPR-WB	COMBINATION MAGNETIC PISTON & WEAR-BAND (SPECIFY ON 1.50"-2 .50" BORES ONLY)
	OP	OPTIONAL PORT LOCATION (EXAMPLE: PORTS @ 2 & 6)
	SAE	SAE PORTS (SPECIFY SIZE, EXAMPLE: SAE #10)
	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
	AS	ADJUSTABLE STROKE (RETRACT) (SPECIFY LENGTH, EXAMPLE: AS = 3")
	XX	SPECIAL VARIATION (SPECIFY)

Note: Refer to Options for specifications.

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

About our Part Number System

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

Example: A Triple Rod Cylinder with a 3.25" Bore, 10" Stroke, Front Flange Mount, Head & Cap Cushions, Magnetic Piston for TRD Reed or Solid State Switches.

Part Number: TRA-MF1-3.25 x 10-HC-MPR

OPERATING TEMPERATURE

Carboxilated Nitrile: -20°F to 200°F (-29°C to 93°C)
Fluorocarbon: 0°F to 400°F (-18°C to 204°C)

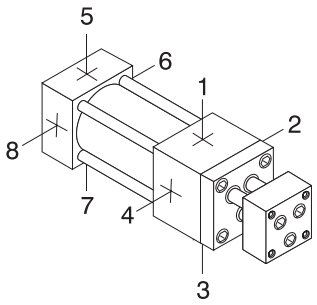
OPTIONS FOR "D1" DOUBLE ROD END MODEL - SINGLE ROD		
	KK2	LARGE MALE ROD THREAD
	KK3	FEMALE ROD THREAD
	KK3S	STUDDED PISTON ROD (KK3 WITH STUD, LOCTITE IN PLACE)
	KK4	FULL DIAMETER MALE ROD THREAD
	KK5	BLANK ROD END (NO THREADS, "A" = 0")

*If "MPR" option is ordered on 1.50"-2.50" bore models, the wear-band is eliminated and must be ordered separately if needed (see "MPR-WB" option).

STANDARD PORT AND CUSHION ADJUSTMENT POSITIONS

- Ports - Positions 1 and 5
  (Ports not available at position 3)
- Cushion Adjustment - Positions 2 and 6
  (Cushions not available at position 3)
- Specify Non-Standard Positions When Ordering

PORT & CUSHION POSITIONS



Note: Ports or Cushions NOT available at position 3

OPTION LENGTH ADDER (ADD TO CATALOG BASIC OVERALL LENGTH DIMENSIONS)						
	OPTION					
BORE	B	BC	BH	MPR (WITHOUT "WB" WEARBAND)	MPR-WB (MAGNET & WEARBAND)	ST* (STOP TUBE) EXAMPLE: ST=2
1.50	0.500	0.250	0.250	0	0.500	2
2.00	0.500	0.250	0.250	0	0.500	2
2.50	0.500	0.250	0.250	0	0.500	2
3.25	0.500	0.250	0.250	NOTE: There is no length adder for MPR Option and Wear Band on 3 .25" - 8.00" Bore.		2
4.00	0.500	0.250	0.250			2
5.00	0.500	0.250	0.250			2
6.00	0.500	0.250	0.250			2
8.00	0.500	0.250	0.250			2

*The desired Stop Tube length adds directly to the overall cylinder length.

Note: If a stop tube is used on 1.50" - 2.50" bore, there is no length adder for "MPR-WB" option other than the stop tube length.

STAINLESS STEEL 'TRA'

Consult factory for available models and delivery.

'TRA-MSE' & 'TRA-MSR'

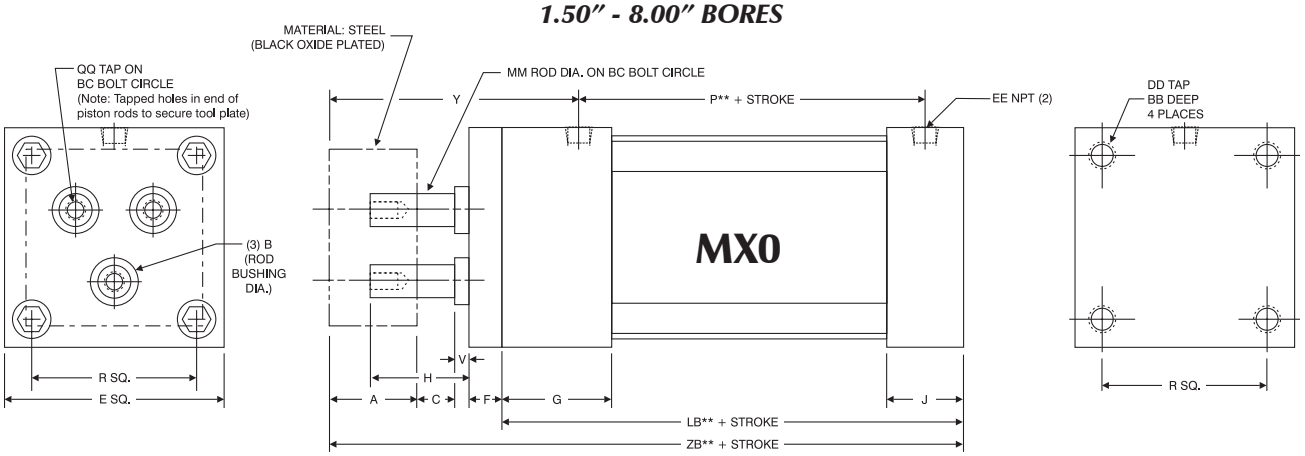
Triple Rod Cylinders can be furnished in multi-stage designs.
(Consult factory for available models and delivery)

SERIES 'TRA' HEAVY-DUTY: TRIPLE PISTON ROD

EASY FLIP OUT PAGE FOR REFERENCE

MXO (NO MOUNT)

1.50" - 8.00" BORES

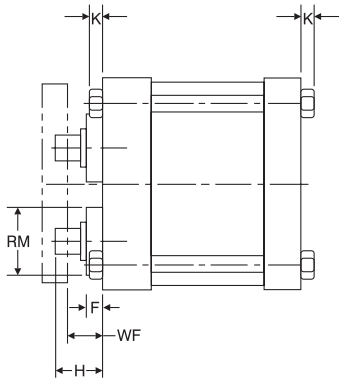


'TRA' SERIES BASIC DIMENSIONS 'MX0'																			
BORE	A	B	BB	BC	C	DD	E	EE	F	G	H	J	LB	MM	P	QQ	R	V	Y	ZB
1.50	0.750	0.563	0.500	0.891	0.500	1/4 -28	2.000	0.250	0.375	1.500	1.100	1.000	3.625**	0.313	2.375**	10-32	1.438	0.250	2.750	5.500**
2.00	0.750	0.813	0.500	1.195	0.500	5/16-24	2.500	0.250	0.375	1.500	1.100	1.000	3.625**	0.500	2.375**	1/4 -28	1.844	0.250	2.750	5.500**
2.50	1.000	1.016	0.500	1.500	0.500	5/16-24	3.000	0.250	0.375	1.500	1.350	1.000	3.750**	0.625	2.500**	5/16-24	2.188	0.250	3.000	5.875**
3.25	1.000	1.125	0.625	2.075	0.500	3/8-24	3.750	0.375	0.625	1.750	1.100	1.250	4.250	0.625	2.750	3/8 -24	2.766	0.250	3.375	6.625
4.00	1.000	1.125	0.625	2.825	0.500	3/8-24	4.500	0.375	0.625	1.750	1.100	1.250	4.250	0.625	2.750	3/8 -24	3.320	0.250	3.375	6.625
5.00	1.000	1.500	0.625	3.375	1.000	1/2-20	5.500	0.375	0.625	1.750	1.844	1.250	4.500	1.000	3.000	1/2 -20	4.100	0.250	3.875	7.375
6.00	1.000	1.500	0.750	3.938	1.000	1/2-20	6.500	0.500	0.750	2.000	1.844	1.500	5.000	1.000	3.250	1/2 -20	4.875	0.250	4.125	8.000
8.00	1.000	1.500	—	5.750	1.375	—	8.500	0.750	—	2.000	2.844	1.500	5.125	1.000	3.375	1/2 -20	6.438	0.250	4.375	8.375*

*"ZB" does not include "K" hex nut dimension (see below for dimensions).
**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

MXO (NO MOUNT)

8.00" BORE



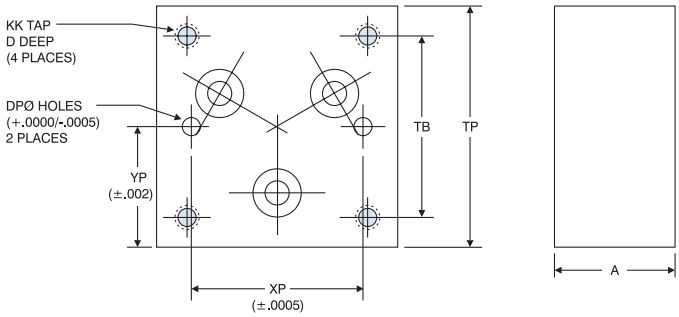
'TRA' SERIES BASIC DIMENSIONS 'MX0'					
BORE	F	H	K	RM	WF
8.00	0.625	2.844	0.563	2.750	2.250

*8.00" bore has three (3) round retainers, 0.625" thick, 2.75" dia. and uses hex nuts on both ends for MX0 mount.

Tooling Plate

Material: Steel (Black Oxide Plated)

Note: Standard Tool Plate includes (2) dowel pin holes included with cylinder (dowel pins not included)



'TRA' SERIES TOOLING PLATE DIMENSIONS									
STANDARD						DOWEL PIN DIMENSIONS			
BORE	A	D	KK	TB	TP	BORE	DP Ø	XP	YP
1.50	0.750	0.750	10-32	1.125	1.500	1.50	0.125	1.125	0.750
2.00	0.750	0.750	1/4 -28	1.438	2.000	2.00	0.125	1.375	1.000
2.50	1.000	1.000	5/16 -24	1.844	2.500	2.50	0.188	1.750	1.250
3.25	1.000	1.000	3/8 -24	2.188	3.250	3.25	0.250	2.250	1.625
4.00	1.000	1.000	3/8 -24	2.766	4.000	4.00	0.250	2.750	2.000
5.00	1.000	1.000	1/2 -20	3.313	5.000	5.00	0.313	3.250	2.500
6.00	1.000	1.000	1/2 -20	4.100	6.000	6.00	0.313	4.000	3.000
8.00	1.000	1.000	1/2 -20	4.875	8.000	8.00	0.375	4.875	4.000

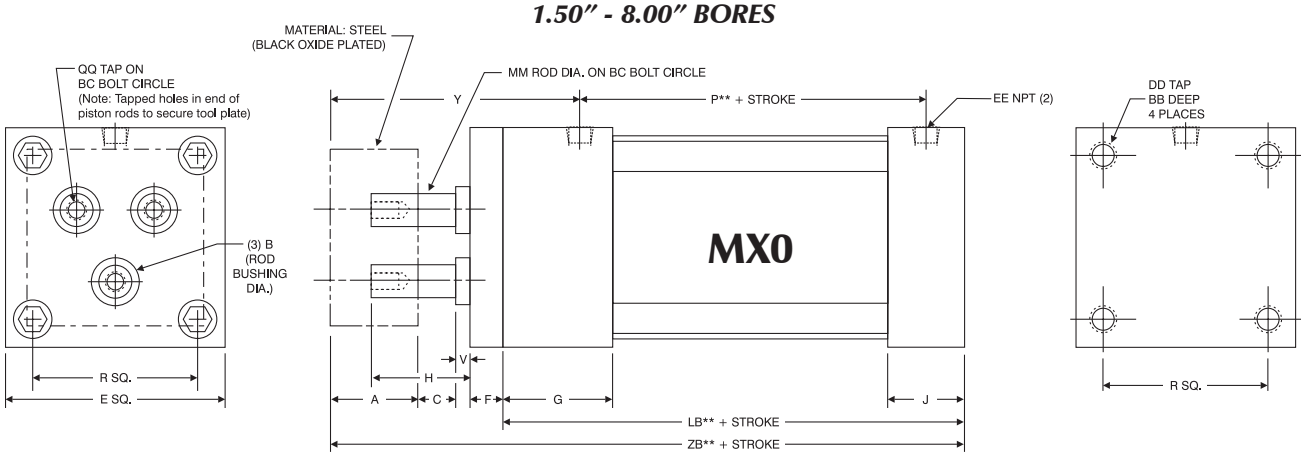
'TRA' SERIES HEAVY-DUTY BASE DIMENSIONS FLIP-OUT (PAGE 84)

EASY FLIP OUT PAGE FOR REFERENCE

SERIES 'TRA' HEAVY-DUTY: TRIPLE PISTON ROD

MXO (NO MOUNT)

1.50" - 8.00" BORES

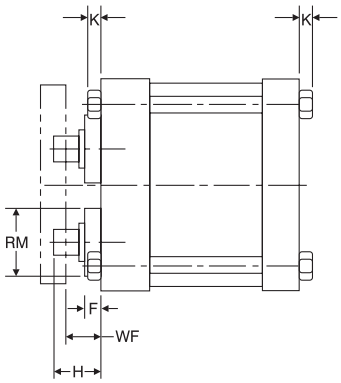


'TRA' SERIES BASIC DIMENSIONS 'MX0'																			
BORE	A	B	BB	BC	C	DD	E	EE	F	G	H	J	LB	MM	P	QQ	R	V	Y	ZB
1.50	0.750	0.563	0.500	0.891	0.500	1/4-28	2.000	0.250	0.375	1.500	1.100	1.000	3.625**	0.313	2.375**	10-32	1.438	0.250	2.750	5.500**
2.00	0.750	0.813	0.500	1.195	0.500	5/16-24	2.500	0.250	0.375	1.500	1.100	1.000	3.625**	0.500	2.375**	1/4-28	1.844	0.250	2.750	5.500**
2.50	1.000	1.016	0.500	1.500	0.500	5/16-24	3.000	0.250	0.375	1.500	1.350	1.000	3.750**	0.625	2.500**	5/16-24	2.188	0.250	3.000	5.875**
3.25	1.000	1.125	0.625	2.075	0.500	3/8-24	3.750	0.375	0.625	1.750	1.100	1.250	4.250	0.625	2.750	3/8-24	2.766	0.250	3.375	6.625
4.00	1.000	1.125	0.625	2.825	0.500	3/8-24	4.500	0.375	0.625	1.750	1.100	1.250	4.250	0.625	2.750	3/8-24	3.320	0.250	3.375	6.625
5.00	1.000	1.500	0.625	3.375	1.000	1/2-20	5.500	0.375	0.625	1.750	1.844	1.250	4.500	1.000	3.000	1/2-20	4.100	0.250	3.875	7.375
6.00	1.000	1.500	0.750	3.938	1.000	1/2-20	6.500	0.500	0.750	2.000	1.844	1.500	5.000	1.000	3.250	1/2-20	4.875	0.250	4.125	8.000
8.00	1.000	1.500	—	5.750	1.375	—	8.500	0.750	—	2.000	2.844	1.500	5.125	1.000	3.375	1/2-20	6.438	0.250	4.375	8.375*

*"ZB" does not include "K" hex nut dimension (see below for dimensions).
**Option "MPR-WB" will add .50" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

MXO (NO MOUNT)

8.00" BORE



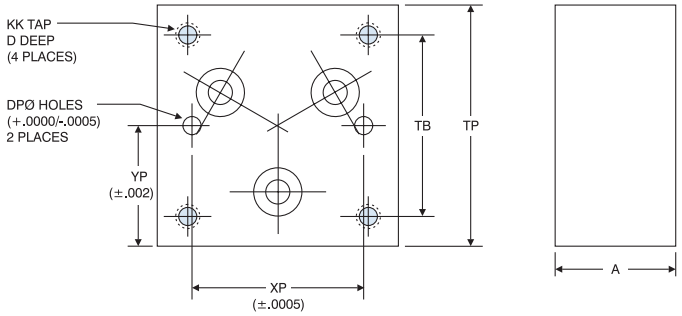
'TRA' SERIES BASIC DIMENSIONS 'MX0'					
BORE	F	H	K	RM	WF
8.00	0.625	2.844	0.563	2.750	2.250

*8.00" bore has three (3) round retainers, 0.625" thick, 2.750" dia. and uses hex nuts on both ends for MX0 mount.

Tooling Plate

Material: Steel (Black Oxide Plated)

Note: Standard Tool Plate includes (2) dowel pin holes included with cylinder (dowel pins not included)



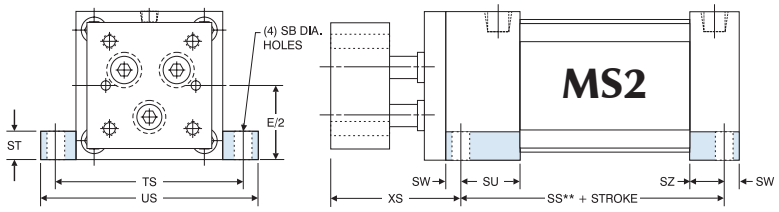
'TRA' SERIES TOOLING PLATE DIMENSIONS									
STANDARD						DOWEL PIN DIMENSIONS			
BORE	A	D	KK	TB	TP	BORE	DP Ø	XP	YP
1.50	0.750	0.750	10-32	1.125	1.500	1.50	0.125	1.125	0.750
2.00	0.750	0.750	1/4-28	1.438	2.000	2.00	0.125	1.375	1.000
2.50	1.000	1.000	5/16-24	1.844	2.500	2.50	0.188	1.750	1.250
3.25	1.000	1.000	3/8-24	2.188	3.250	3.25	0.250	2.250	1.625
4.00	1.000	1.000	3/8-24	2.766	4.000	4.00	0.250	2.750	2.000
5.00	1.000	1.000	1/2-20	3.313	5.000	5.00	0.313	3.250	2.500
6.00	1.000	1.000	1/2-20	4.100	6.000	6.00	0.313	4.000	3.000
8.00	1.000	1.000	1/2-20	4.875	8.000	8.00	0.375	4.875	4.000

'TRA' SERIES HEAVY-DUTY BASE DIMENSIONS FLIP-OUT (PAGE 84)

SERIES 'TRA' DIMENSIONS: BASE & PIVOT MOUNTS

BASE MOUNTS *(1.50" - 8.00" BORE)*

MS2

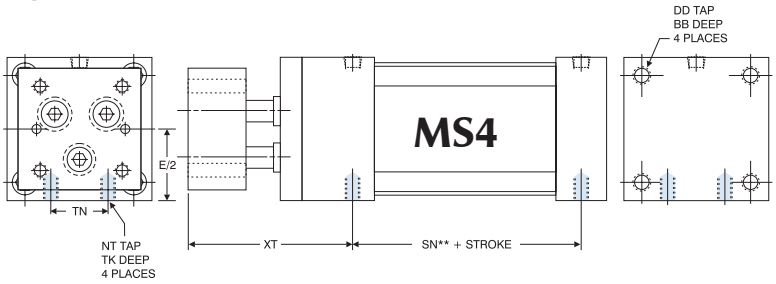


'TRA' SERIES 'MS2' DIMENSIONS										
BORE	SB	E/2	SS	ST	SU	SW	SZ	TS	US	XS
1.50	0.438	1.000	2.875**	0.500	1.125	0.375	0.625	2.750	3.500	2.250
2.00	0.438	1.250	2.875**	0.500	1.125	0.375	0.625	3.250	4.000	2.250
2.50	0.438	1.500	3.000**	0.500	1.125	0.375	0.625	3.750	4.500	2.500
3.25	0.563	1.875	3.250	0.750	1.250	0.500	0.750	4.750	5.750	2.875
4.00	0.563	2.250	3.250	0.750	1.250	0.500	0.750	5.500	6.500	2.875
5.00	0.813	2.750	3.125	1.000	1.063	0.688	0.563	6.875	8.250	3.563
6.00	0.813	3.250	3.625	1.000	1.313	0.688	0.813	7.875	9.250	3.688
8.00	0.813	4.250	3.750	1.000	1.313	0.688	0.813	9.875	11.250	3.938

**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For dimensions not shown, see page 84.

MS4

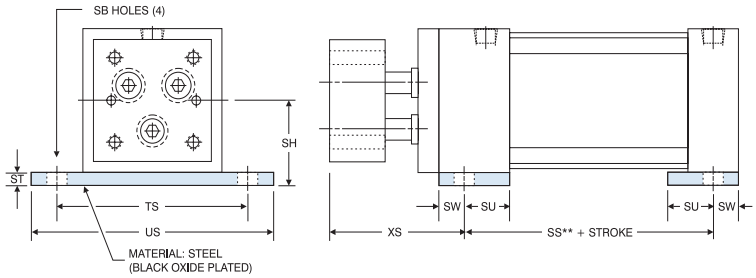


'TRA' SERIES 'MS4' DIMENSIONS						
BORE	E/2	NT	TK	TN	XT	SN
1.50	1.000	1/4 -20	0.375	0.625	2.813	2.250**
2.00	1.250	5/16 -18	0.500	0.875	2.813	2.250**
2.50	1.500	3/8 -16	0.625	1.250	3.063	2.375**
3.25	1.875	1/2 -13	0.750	1.500	3.438	2.625
4.00	2.250	1/2 -13	0.750	2.063	3.438	2.625
5.00	2.750	5/8 -11	1.000	2.688	3.938	2.875
6.00	3.250	3/4 -10	1.125	3.250	4.188	3.125
8.00	4.250	3/4 -10	1.125	4.500	4.438	3.250

**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For dimensions not shown, see page 84.

BASE BAR (Non-NFPA)



'TRA' SERIES BASE BAR (Non-NFPA) DIMENSIONS									
BORE	SB	SH	SS	ST	SU	SW	TS	US	XS
1.50	0.438	1.250	2.875**	0.250	1.125	0.375	2.750	3.500	2.250
2.00	0.438	1.500	2.875**	0.250	1.125	0.375	3.250	4.000	2.250
2.50	0.438	1.875	3.000**	0.375	1.125	0.375	3.750	4.500	2.500
3.25	0.563	2.375	3.250	0.500	1.250	0.500	4.750	5.750	2.875
4.00	0.563	2.750	3.250	0.500	1.250	0.500	5.500	6.500	2.875

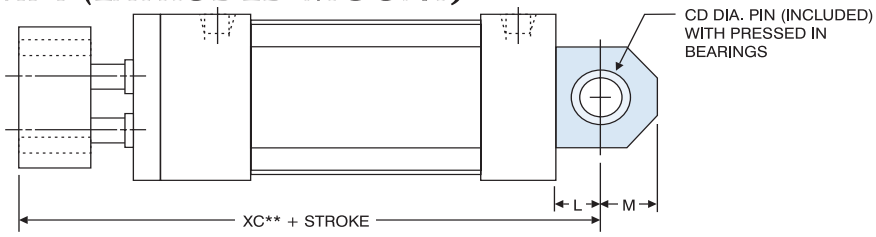
**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

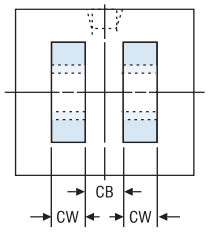
For dimensions not shown, see page 84.

SERIES 'TRA' DIMENSIONS: BASE & PIVOT MOUNTS

PIVOT MOUNTS *(1.50" - 8.00" BORE)*

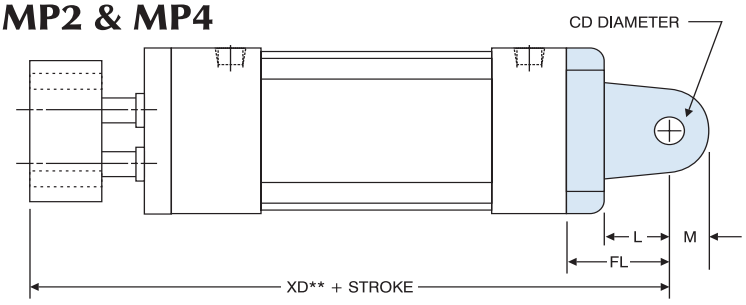
MP1 *(EXTRUDED MOUNT)*

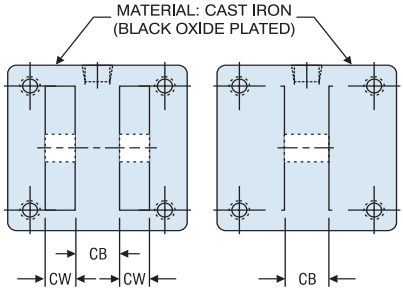




MP1

MP2 & MP4





MP2
IRON CASTING:
1.50"-6.00" BORES

MP4
IRON CASTING:
1.50"- 4.00" BORES
WELDMENT:
5.00"-6.00" BORES

Clevis Pin included with MP1, MP2 & MP4 mounts

'TRA' SERIES 'MP1'-'MP2'-'MP4' DIMENSIONS ⚠								
BORE	CB	CD	CW	FL	L	M	XC	XD
1.50	0.750	0.500	0.500	1.125	0.750	0.625	6.250**	6.625**
2.00	0.750	0.500	0.500	1.125	0.750	0.625	6.250**	6.625**
2.50	0.750	0.500	0.500	1.125	0.750	0.625	6.625**	7.000**
3.25	1.250	0.750	0.625	1.875	1.250	0.875	7.875	8.500
4.00	1.250	0.750	0.625	1.875	1.250	0.875	7.875	8.500
5.00	1.250	0.750	0.625	1.875	1.250	0.875	8.625	9.250
6.00	1.500	1.000	0.750	2.250	1.500	1.000	9.500	10.250
8.00	1.500	1.000	0.750	N/A	1.500	1.000	9.875	N/A

**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

Note: 8.00" bore is a welded mount with through holes and tie rod nuts.

⚠ MP4 available as specials in 5.00", 6.00" & 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).

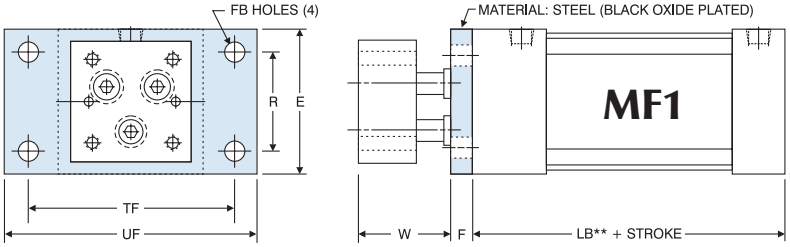
For dimensions not shown, see page 84.

SERIES 'TRA' DIMENSIONS: FLANGE MOUNTS

FLANGE MOUNTS

(1.50" - 6.00" BORE)

MF1

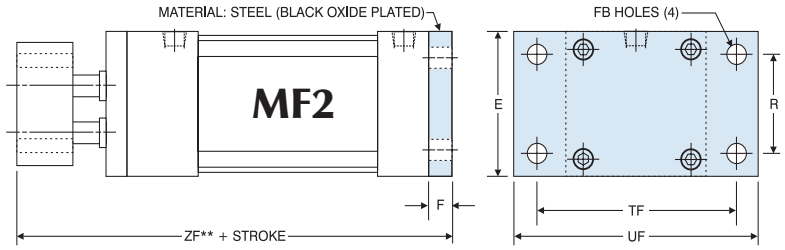


'TRA' SERIES 'MF1' & 'MF2' DIMENSIONS									
BORE	E	F	FB	LB	R	TF	UF	W	ZF
1.50	2.000	0.375	0.313	3.625**	1.430	2.750	3.375	1.500	5.875**
2.00	2.500	0.375	0.375	3.625**	1.844	3.375	4.125	1.500	5.875**
2.50	3.000	0.375	0.375	3.750**	2.188	3.875	4.625	1.750	6.250**
3.25	3.750	0.625	0.438	4.250	2.760	4.688	5.500	1.750	7.250
4.00	4.500	0.625	0.438	4.250	3.320	5.438	6.250	1.750	7.250
5.00	5.500	0.625	0.563	4.500	4.100	6.625	7.625	2.250	8.000
6.00	6.500	0.750	0.563	5.000	4.875	7.625	8.625	2.250	8.750

**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For dimensions not shown, see 'TRA' SERIES HEAVY-DUTY FLIP-OUT.

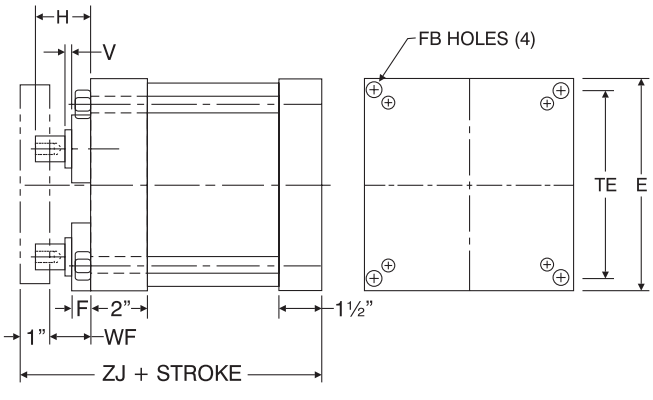
MF2



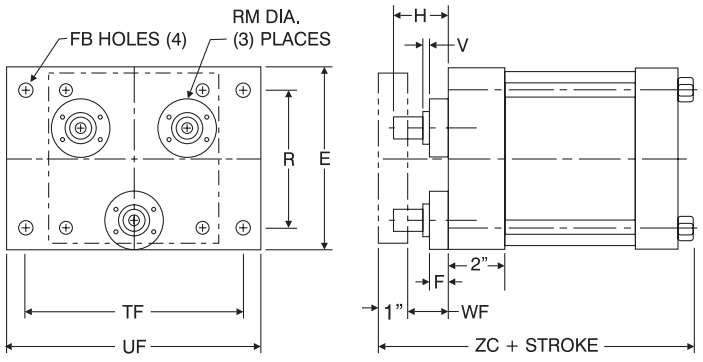
FLANGE MOUNTS

(8.00" BORE)

ME4



ME5 (Non-NFPA)



'TRA' SERIES 'ME4' & 'ME5' DIMENSIONS													
BORE	E	F	FB	H	R	RM	TE	TF	UF	V	WF	ZC	ZJ
8.00	8.500	0.625	0.688	2.844	6.438	2.750	7.570	10.250	12.000	0.250	2.250	8.938	8.375

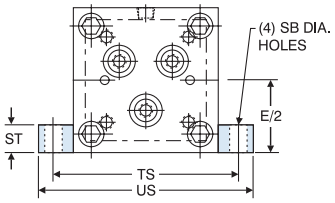
Note: Three (3) 1.00" diameter rods on 5.750 B.C.

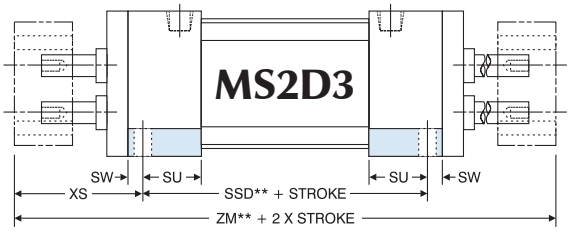
For dimensions not shown, see page 84.

SERIES 'TRA': DOUBLE ROD END

MODELS

SERIES 'TRA' DIMENSIONS: DOUBLE ROD END
BASE MOUNTS

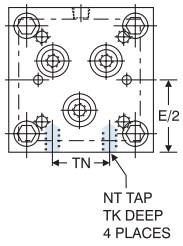


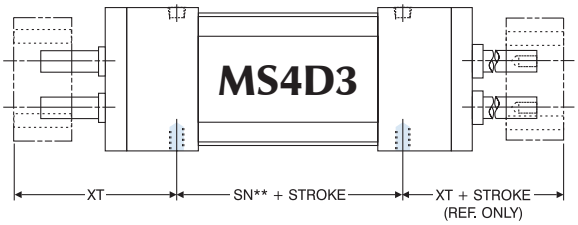


'TRA' SERIES 'MS2D3' DIMENSIONS										
BORE	SB	E/2	SSD	ST	SU	SW	TS	US	XS	ZM
1.50	0.438	1.000	3.375**	0.500	1.125	0.375	2.750	3.500	2.250	7.875**
2.00	0.438	1.250	3.375**	0.500	1.125	0.375	3.250	4.000	2.250	7.875**
2.50	0.438	1.500	3.500**	0.500	1.125	0.375	3.750	4.500	2.500	8.500**
3.25	0.563	1.875	3.750	0.750	1.250	0.500	4.750	5.750	2.875	9.500
4.00	0.563	2.250	3.750	0.750	1.250	0.500	5.500	6.500	2.875	9.500
5.00	0.813	2.750	3.625	1.000	1.063	0.688	6.875	8.250	3.563	10.750
6.00	0.813	3.250	4.125	1.000	1.313	0.688	7.875	9.250	3.688	11.500
8.00	0.813	4.250	4.250	1.000	1.313	0.688	9.875	11.250	3.938	12.125

**Option 'MPR-WB' will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For dimensions not shown, see page 84.



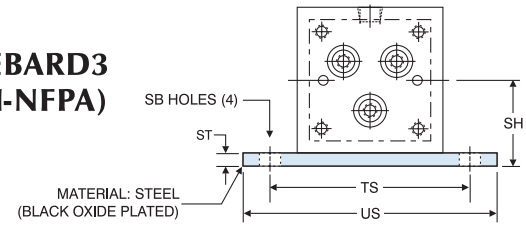


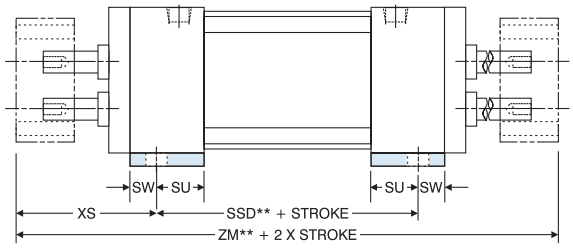
'TRA' SERIES 'MS4D3' DIMENSIONS						
BORE	E/2	NT	TK	TN	XT	SN
1.50	1.000	1/4 -20	0.375	0.625	2.813	2.250**
2.00	1.250	5/16 -18	0.500	0.875	2.813	2.250**
2.50	1.500	3/8 -16	0.625	1.250	3.063	2.375**
3.25	1.875	1/2 -13	0.750	1.500	3.438	2.625
4.00	2.250	1/2 -13	0.750	2.063	3.438	2.625
5.00	2.750	5/8 -11	1.000	2.688	3.938	2.875
6.00	3.250	3/4 -10	1.125	3.250	4.188	3.125
8.00	4.250	3/4 -10	1.125	4.500	4.438	3.250

**Option 'MPR-WB' will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For dimensions not shown, see page 84.

BASEBARD3 (NON-NFPA)





'TRA' SERIES 'BASEBARD3' (NON-NFPA) DIMENSIONS										
BORE	SB	SH	SSD	ST	SU	SW	TS	US	XS	ZM
1.50	0.438	1.250	3.375**	0.250	1.125	0.375	2.750	3.500	2.250	7.875**
2.00	0.438	1.500	3.375**	0.250	1.125	0.375	3.250	4.000	2.250	7.875**
2.50	0.438	1.875	3.500**	0.375	1.125	0.375	3.750	4.500	2.500	8.500**
3.25	0.563	2.375	3.750	0.500	1.250	0.500	4.750	5.750	2.875	9.500
4.00	0.563	2.750	3.750	0.500	1.250	0.500	5.500	6.500	2.875	9.500

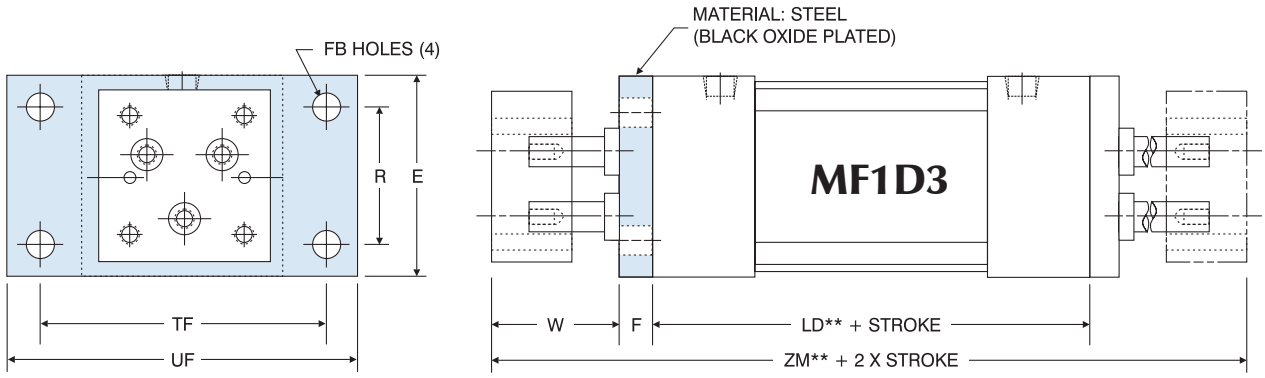
**Option 'MPR-WB' will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For dimensions not shown, see page 84.

SERIES 'TRA' DIMENSIONS: DOUBLE ROD END

FLANGE MOUNTS

(1.50" - 6.00" BORE)



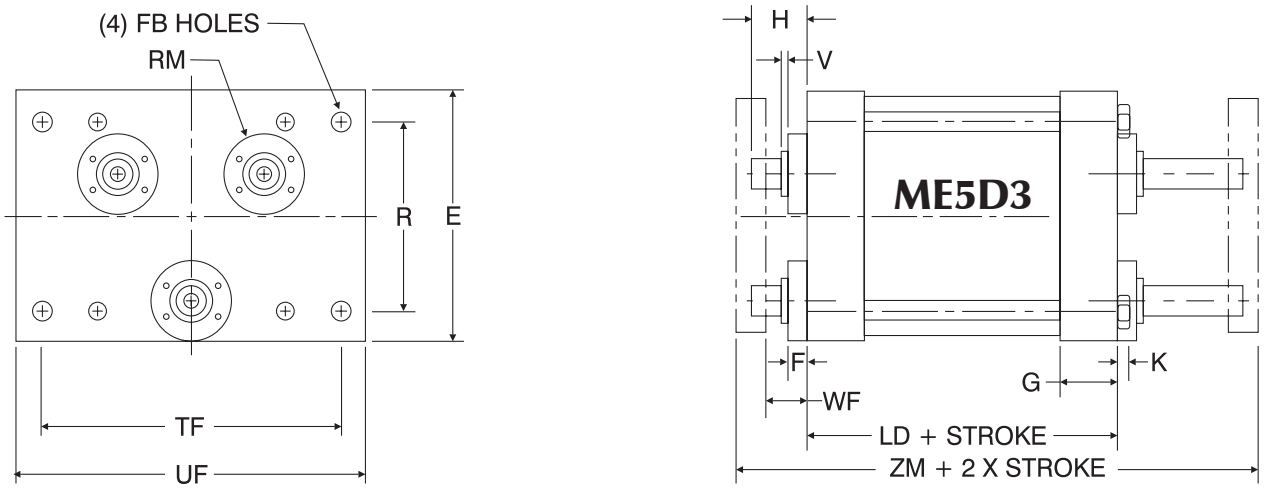
'TRA' SERIES 'MF1D3' DIMENSIONS									
BORE	E	F	FB	LD	R	TF	UF	W	ZM
1.50	2.000	0.375	0.313	4.125**	1.438	2.750	3.375	1.500	7.875**
2.00	2.500	0.375	0.375	4.125**	1.844	3.375	4.125	1.500	7.875**
2.50	3.000	0.375	0.375	4.250**	2.188	3.875	4.625	1.750	8.500**
3.25	3.750	0.625	0.438	4.750	2.760	4.688	5.500	1.750	9.500
4.00	4.500	0.625	0.438	4.750	3.320	5.438	6.250	1.750	9.500
5.00	5.500	0.625	0.563	5.000	4.100	6.625	7.625	2.250	10.750
6.00	6.500	0.750	0.563	5.500	4.875	7.625	8.625	2.250	11.500

**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For dimensions not shown, see page 84.

FLANGE MOUNTS

(8.00" BORE)



'TRA' SERIES 'ME5D3' DIMENSIONS															
BORE	E	F	FB	G	H	K	LD	R	RM	TE	TF	UF	V	WF	ZM
8.00	8.500	0.625	0.688	2.000	2.844	0.563	5.625	6.438	2.750	7.563	10.250	12.000	.250	2.250	12.125

Note: Three (3) 1.00" diameter rods on 5.750 B.C.

For dimensions not shown, see page 84.

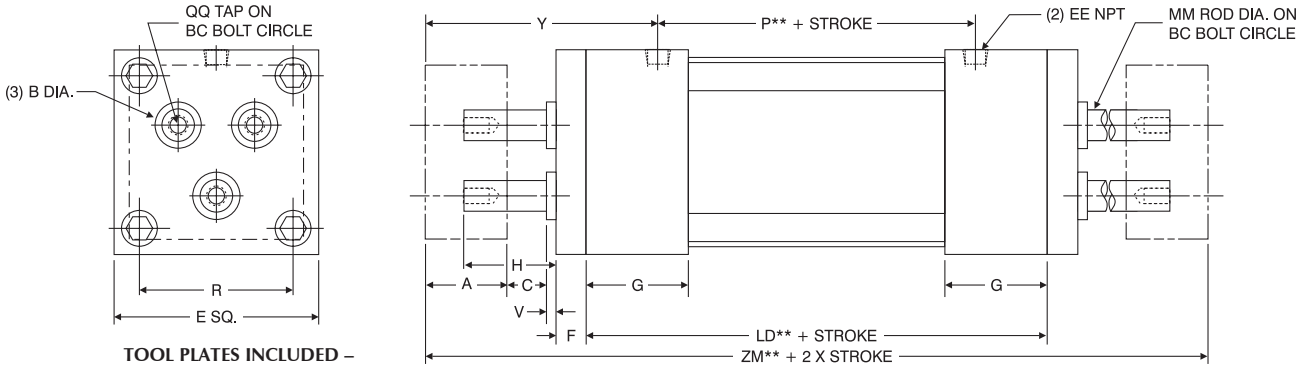
SERIES 'TRA' DIMENSIONS: DOUBLE ROD END

Benefits

- Durable Design. Full rod bearing(s) at each end of cylinder.
- Single Rod (D1) and Triple Rod (D3) models available.
- Full range of options available.
- Reduces Tool Plate End Play
- Increases Load Ratings

MX0D3 (TRIPLE ROD BOTH ENDS) BASIC DIMENSIONS

(NO MOUNT)



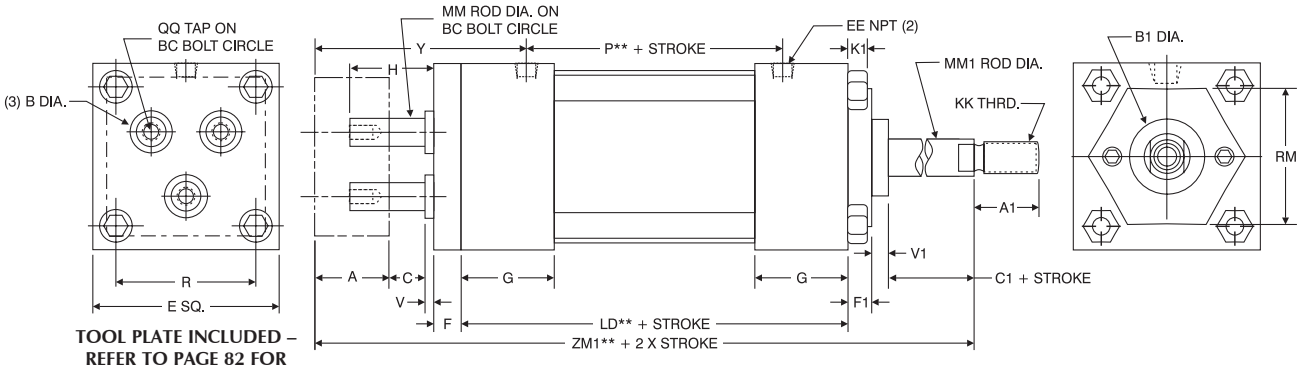
TOOL PLATES INCLUDED – REFER TO 'TRA' SERIES HEAVY DUTY FLIP-OUT **FOR TOOL PLATE DETAIL**

'TRA' SERIES TWIN TOOLING PLATE BASIC DIMENSIONS 'MX0D3'																	
BORE	A	B	BC	C	E	EE	F	G	H	LD	MM	P	QQ	R	V	Y	ZM
1.50	0.750	0.563	0.891	0.500	2.000	0.250	0.375	1.500	1.100	4.125**	0.313	2.375**	10-32	1.430	0.250	2.750	7.875**
2.00	0.750	0.813	1.195	0.500	2.500	0.250	0.375	1.500	1.100	4.125**	0.500	2.375**	1/4-28	1.844	0.250	2.750	7.875**
2.50	1.000	1.016	1.500	0.500	3.000	0.250	0.375	1.500	1.350	4.250**	0.625	2.500**	5/16-24	2.188	0.250	3.000	8.500**
3.25	1.000	1.125	2.075	0.500	3.750	0.375	0.625	1.750	1.100	4.750	0.625	2.750	3/8-24	2.760	0.250	3.375	9.500
4.00	1.000	1.125	2.825	0.500	4.500	0.375	0.625	1.750	1.100	4.750	0.625	2.750	3/8-24	3.320	0.250	3.375	9.500
5.00	1.000	1.500	3.375	1.000	5.500	0.375	0.625	1.750	1.844	5.000	1.000	3.000	1/2-20	4.100	0.250	3.875	10.750
6.00	1.000	1.500	3.937	1.000	6.500	0.500	0.750	2.000	1.844	5.500	1.000	3.250	1/2-20	4.875	0.250	4.125	11.500
8.00	1.000	1.500	5.750	1.375	8.500	0.750	0.625*	2.000	2.844	5.625	1.000	3.375	1/2-20	6.438	0.250	4.375	12.125

*8.00" bore has three (3) round retainers, 0.625" thick, 2.750" dia. and uses hex nuts on ends (see 'TRA' SERIES HEAVY DUTY FLIP-OUT).
**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

MX0D1 (TRIPLE ROD WITH SINGLE ROD) BASIC DIMENSIONS

(NO MOUNT)



TOOL PLATE INCLUDED – REFER TO PAGE 82 FOR TOOL PLATE DETAIL

'TRA' SERIES TWIN TOOLING PLATE BASIC DIMENSIONS 'MX0D1'																									
BORE	A	A1	B	B1	BC	C	C1	E	EE	F	F1	G	H	K1	KK	LD	MM	MM1	P	QQ	R	RM	V	V1	Y	ZM1
1.50	0.750	0.750	0.563	1.125	0.891	0.500	0.375	2.000	0.250	0.375	0.375	1.500	1.100	0.250	7/16-20	4.125**	0.313	0.625	2.375**	10	1.438	2.00 Sq.	0.250	0.250	2.750	7.000**
2.00	0.750	0.750	0.816	1.125	1.195	0.500	0.375	2.500	0.250	0.375	0.375	1.500	1.100	0.313	7/16-20	4.125**	0.500	0.625	2.375**	1/4-28	1.844	1.75 Hex.	0.250	0.250	2.750	7.000**
2.50	1.000	0.750	1.016	1.125	1.500	0.500	0.375	3.000	0.250	0.375	0.375	1.500	1.350	0.313	7/16-20	4.250**	0.625	0.625	2.500**	5/16-24	2.188	1.75 Hex.	0.250	0.250	3.000	7.375**
3.25	1.000	1.125	1.125	1.500	2.075	0.500	0.500	3.750	0.375	0.625	0.625	1.750	1.100	0.375	3/4-16	4.750	0.625	1.000	2.750	3/8-24	2.760	2.75 Dia.	0.250	0.250	3.375	8.500
4.00	1.000	1.125	1.125	1.500	2.825	0.500	0.500	4.500	0.375	0.625	0.625	1.750	1.100	0.375	3/4-16	4.750	0.625	1.000	2.750	3/8-24	3.320	2.75 Dia.	0.250	0.250	3.375	8.500
5.00	1.000	1.125	1.500	1.500	3.375	1.000	0.500	5.500	0.375	0.625	0.625	1.750	1.844	0.438	3/4-16	5.000	1.000	1.000	3.000	1/2-20	4.100	2.75 Dia.	0.250	0.250	3.875	9.250
6.00	1.000	1.625	1.500	2.000	3.937	1.000	0.625	6.500	0.500	0.750	0.625	2.000	1.844	0.438	1-14	5.500	1.000	1.375	3.250	1/2-20	4.875	3.50 Dia.	0.250	0.375	4.125	10.125
8.00	1.000	1.625	1.500	2.000	5.750	1.375	0.625	8.500	0.750	0.625*	0.625	2.000	2.844	0.563	1-14	5.625	1.000	1.375	3.375	1/2-20	6.438	3.50 Dia.	0.250	0.375	4.375	10.500

*8.00" bore has three (3) round retainers, 0.625" thick, 2.750" dia. and uses hex nuts on ends (see 'TRA' SERIES HEAVY DUTY FLIP-OUT).
**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

'TRA' SERIES DOUBLE ROD END DIMENSIONS FLIP-OUT (PAGE 91)

EASY FLIP OUT PAGE FOR REFERENCE

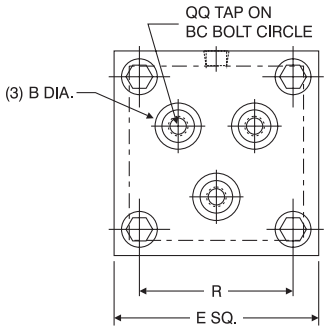
SERIES 'TRA' DIMENSIONS: DOUBLE ROD END

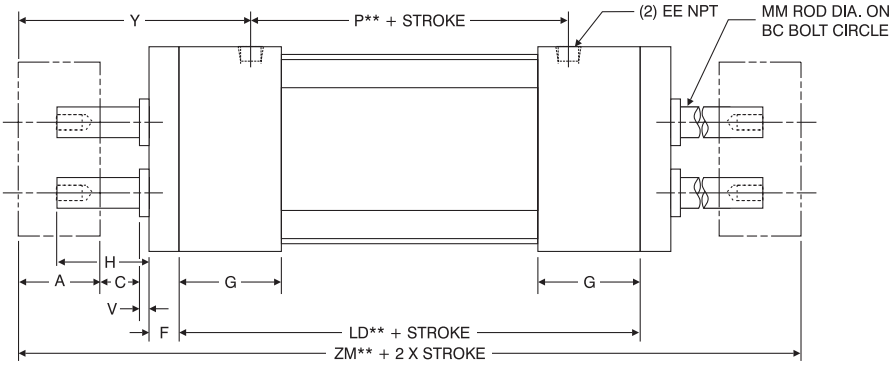
Benefits

- Durable Design. Full rod bearing(s) at each end of cylinder.
- Single Rod (D1) and Triple Rod (D3) models available.
- Full range of options available.
- Reduces Tool Plate "End Play"
- Increases Load Ratings.

MX0D3 (TRIPLE ROD BOTH ENDS) BASIC DIMENSIONS

(NO MOUNT)





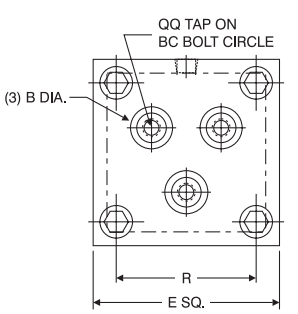
TOOL PLATES INCLUDED – REFER TO 'TRA' SERIES HEAVY-DUTY FLIP-OUT FOR TOOL PLATE DETAIL

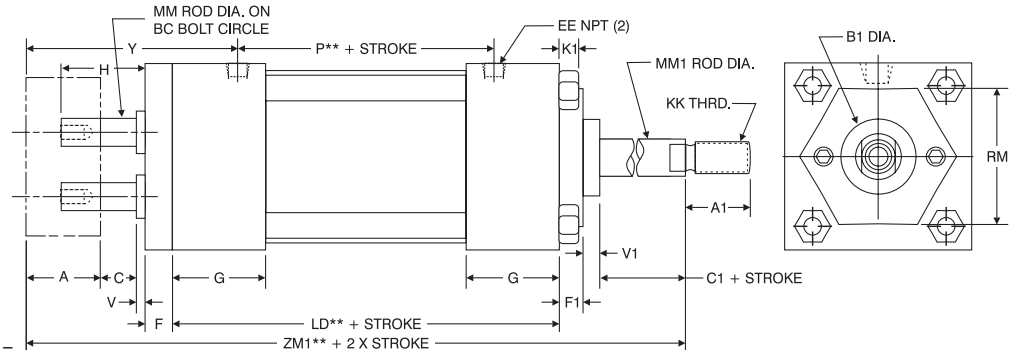
'TRA' SERIES TWIN TOOLING PLATE BASIC DIMENSIONS 'MX0D3'																
BORE	A	B	BC	C	E	EE	F	G	H	LD	MM	P	QQ	R	V	Y	ZM
1.50	0.750	0.563	0.891	0.500	2.000	0.250	0.375	1.500	1.100	4.125**	0.313	2.375**	10-32	1.430	0.250	2.750	7.875**
2.00	0.750	0.813	1.195	0.500	2.500	0.250	0.375	1.500	1.100	4.125**	0.500	2.375**	1/4-28	1.844	0.250	2.750	7.875**
2.50	1.000	1.016	1.500	0.500	3.000	0.250	0.375	1.500	1.350	4.250**	0.625	2.500**	5/16-24	2.188	0.250	3.000	8.500**
3.25	1.000	1.125	2.075	0.500	3.750	0.375	0.625	1.750	1.100	4.750	0.625	2.750	3/8-24	2.760	0.250	3.375	9.500
4.00	1.000	1.125	2.825	0.500	4.500	0.375	0.625	1.750	1.100	4.750	0.625	2.750	3/8-24	3.320	0.250	3.375	9.500
5.00	1.000	1.500	3.375	1.000	5.500	0.375	0.625	1.750	1.844	5.000	1.000	3.000	1/2-20	4.100	0.250	3.875	10.750
6.00	1.000	1.500	3.937	1.000	6.500	0.500	0.750	2.000	1.844	5.500	1.000	3.250	1/2-20	4.875	0.250	4.125	11.500
8.00	1.000	1.500	5.750	1.375	8.500	0.750	0.625*	2.000	2.844	5.625	1.000	3.375	1/2-20	6.438	0.250	4.375	12.125

*8.00" bore has three (3) round retainers, .625" thick, 2.75" dia. and uses hex nuts on ends (see 'TRA' SERIES HEAVY-DUTY FLIP-OUT).
**Option "MPR-WB" will add .500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

MX0D1 (TRIPLE ROD WITH SINGLE ROD) BASIC DIMENSIONS

(NO MOUNT)





TOOL PLATES INCLUDED – REFER TO 'TRA' SERIES HEAVY-DUTY FLIP-OUT FOR TOOL PLATE DETAIL

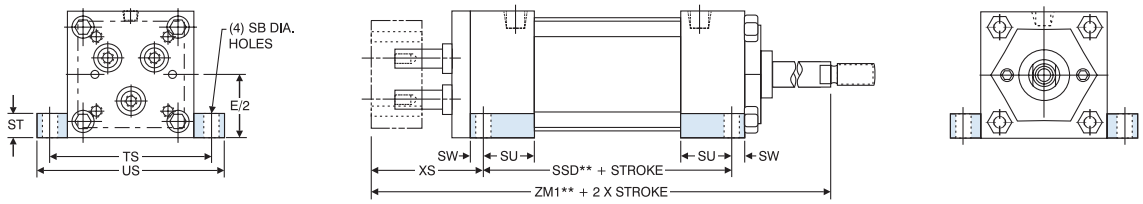
'TRA' SERIES TWIN TOOLING PLATE BASIC DIMENSIONS 'MX0D1'																									
BORE	A	A1	B	B1	BC	C	C1	E	EE	F	F1	G	H	K1	KK	LD	MM	MM1	P	QQ	R	RM	V	V1	Y	ZM1
1.50	0.750	0.750	0.563	1.125	0.891	0.500	0.375	2.000	0.250	0.375	0.375	1.500	1.100	0.250	7/16-20	4.125**	0.313	0.625	2.375**	10	1.438	2.00 Sq.	0.250	0.250	2.750	7.000**
2.00	0.750	0.750	0.816	1.125	1.195	0.500	0.375	2.500	0.250	0.375	0.375	1.500	1.100	0.313	7/16-20	4.125**	0.500	0.625	2.375**	1/4-28	1.844	1.75 Hex.	0.250	0.250	2.750	7.000**
2.50	1.000	0.750	1.016	1.125	1.500	0.500	0.375	3.000	0.250	0.375	0.375	1.500	1.350	0.313	7/16-20	4.250**	0.625	0.625	2.500**	5/16-24	2.188	1.75 Hex.	0.250	0.250	3.000	7.375**
3.25	1.000	1.125	1.125	1.500	2.075	0.500	0.500	3.750	0.375	0.625	0.625	1.750	1.100	0.375	3/4-16	4.750	0.625	1.000	2.750	3/8-24	2.760	2.75 Dia.	0.250	0.250	3.375	8.500
4.00	1.000	1.125	1.125	1.500	2.825	0.500	0.500	4.500	0.375	0.625	0.625	1.750	1.100	0.375	3/4-16	4.750	0.625	1.000	2.750	3/8-24	3.320	2.75 Dia.	0.250	0.250	3.375	8.500
5.00	1.000	1.125	1.500	1.500	3.375	1.000	0.500	5.500	0.375	0.625	0.625	1.750	1.844	0.438	3/4-16	5.000	1.000	1.000	3.000	1/2-20	4.100	2.75 Dia.	0.250	0.250	3.875	9.250
6.00	1.000	1.625	1.500	2.000	3.937	1.000	0.625	6.500	0.500	0.750	0.625	2.000	1.844	0.438	1-14	5.500	1.000	1.375	3.250	1/2-20	4.875	3.50 Dia.	0.250	0.375	4.125	10.125
8.00	1.000	1.625	1.500	2.000	5.750	1.375	0.625	8.500	0.750	0.625*	0.625	2.000	2.844	0.563	1-14	5.625	1.000	1.375	3.375	1/2-20	6.438	3.50 Dia.	0.250	0.375	4.375	10.500

*8.00" bore has three (3) round retainers, 0.625" thick, 2.750" dia. and uses hex nuts on ends (see 'TRA' SERIES HEAVY-DUTY FLIP-OUT).
**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

'TRA' SERIES DOUBLE ROD END DIMENSIONS FLIP-OUT (PAGE 91)

SERIES 'TRA' DIMENSIONS: DOUBLE ROD END (WITH SINGLE ROD) BASE MOUNTS

MS2D1 (TRIPLE ROD WITH SINGLE ROD)

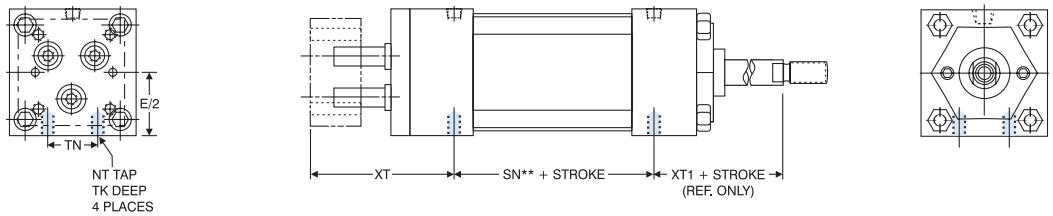


'TRA' SERIES 'MS2D1' DIMENSIONS										
BORE	SB	E/2	SSD	ST	SU	SW	TS	US	XS	ZM1
1.50	0.438	1.000	3.375**	0.500	1.125	0.375	2.750	3.500	2.250	7.000**
2.00	0.438	1.250	3.375**	0.500	1.125	0.375	3.250	4.000	2.250	7.000**
2.50	0.438	1.500	3.500**	0.500	1.125	0.375	3.750	4.500	2.500	7.375**
3.25	0.563	1.875	3.750	0.750	1.250	0.500	4.750	5.750	2.875	8.500
4.00	0.563	2.250	3.750	0.750	1.250	0.500	5.500	6.500	2.875	8.500
5.00	0.813	2.750	3.625	1.000	1.063	0.688	6.875	8.250	3.563	9.250
6.00	0.813	3.250	4.125	1.000	1.313	0.688	7.875	9.250	3.688	10.125
8.00	0.813	4.250	4.250	1.000	1.313	0.688	9.875	11.250	3.938	10.500

**Option 'MPR-WB' will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For single rod end dimensions not shown, see page 91 or page 94.

MS4D1 (TRIPLE ROD WITH SINGLE ROD)

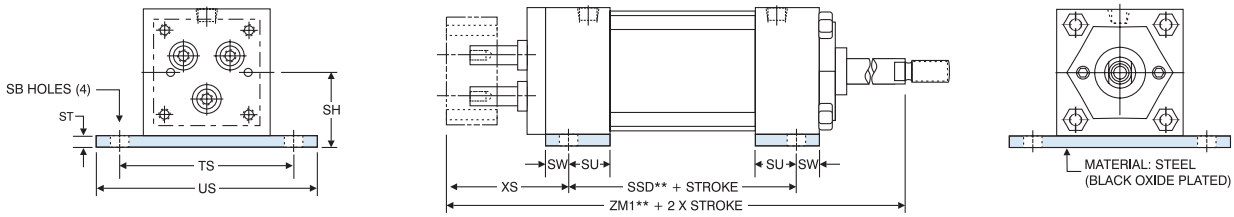


'TRA' SERIES 'MS4D1' DIMENSIONS							
BORE	E/2	NT	TK	TN	XT	SN	XT1
1.50	1.000	1/4 -20	0.375	0.625	2.813	2.250**	1.938
2.00	1.250	5/16 -18	0.500	0.875	2.813	2.250**	1.938
2.50	1.500	3/8 -16	0.625	1.250	3.063	2.375**	1.938
3.25	1.875	1/2 -13	0.750	1.500	3.438	2.625	2.438
4.00	2.250	1/2 -13	0.750	2.063	3.438	2.625	2.438
5.00	2.750	5/8 -11	1.000	2.688	3.938	2.875	2.438
6.00	3.250	3/4 -10	1.125	3.250	4.188	3.125	2.813
8.00	4.250	3/4 -10	1.125	4.500	4.438	3.250	2.813

**Option 'MPR-WB' will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For single rod end dimensions not shown, see page 91 or page 94.

BASEBARD1 (TRIPLE ROD WITH SINGLE ROD) (NON-NFPA)



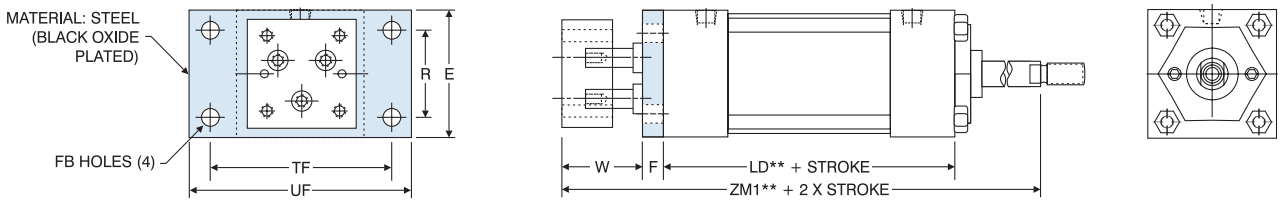
'TRA' SERIES 'BASEBARD1' (NON-NFPA) DIMENSIONS										
BORE	SB	SH	SSD	ST	SU	SW	TS	US	XS	ZM1
1.50	0.438	1.250	3.375**	0.250	1.125	0.375	2.750	3.500	2.250	7.000**
2.00	0.438	1.500	3.375**	0.250	1.125	0.375	3.250	4.000	2.250	7.000**
2.50	0.438	1.875	3.500**	0.375	1.125	0.375	3.750	4.500	2.500	7.375**
3.25	0.563	2.375	3.750	0.500	1.250	0.500	4.750	5.750	2.875	8.500
4.00	0.563	2.750	3.750	0.500	1.250	0.500	5.500	6.500	2.875	8.500

**Option 'MPR-WB' will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For single rod end dimensions not shown, see page 91 or page 94.

SERIES 'TRA' DIMENSIONS: DOUBLE ROD END (WITH SINGLE ROD) BASE MOUNTS

MF1D1 (TRIPLE ROD WITH SINGLE ROD)

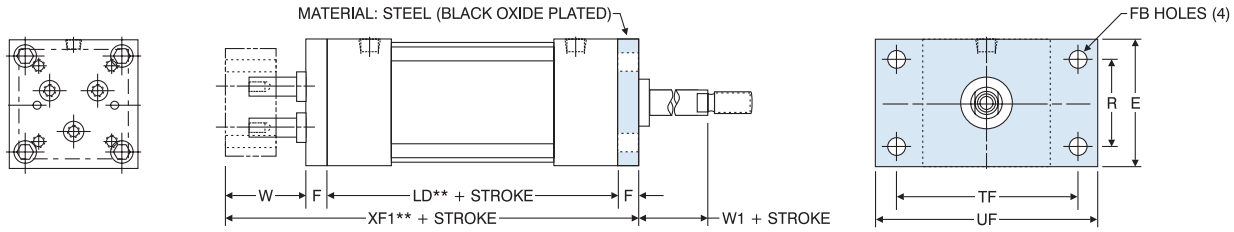


'TRA' SERIES 'MF1D1' DIMENSIONS									
BORE	E	F	FB	LD	R	TF	UF	W	ZM1
1.50	2.000	0.375	0.313	4.125**	1.438	2.750	3.375	1.500	7.000**
2.00	2.500	0.375	0.375	4.125**	1.844	3.375	4.125	1.500	7.000**
2.50	3.000	0.375	0.375	4.250**	2.188	3.875	4.625	1.750	7.375**
3.25	3.750	0.625	0.438	4.750	2.760	4.688	5.500	1.750	8.500
4.00	4.500	0.625	0.438	4.750	3.320	5.438	6.250	1.750	8.500
5.00	5.500	0.625	0.563	5.000	4.100	6.625	7.625	2.250	9.250
6.00	6.500	0.750	0.563	5.500	4.875	7.625	8.625	2.250	10.125

**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For single rod end dimensions not shown, see page 91 or page 94.

MF2D1 (TRIPLE ROD WITH SINGLE ROD)

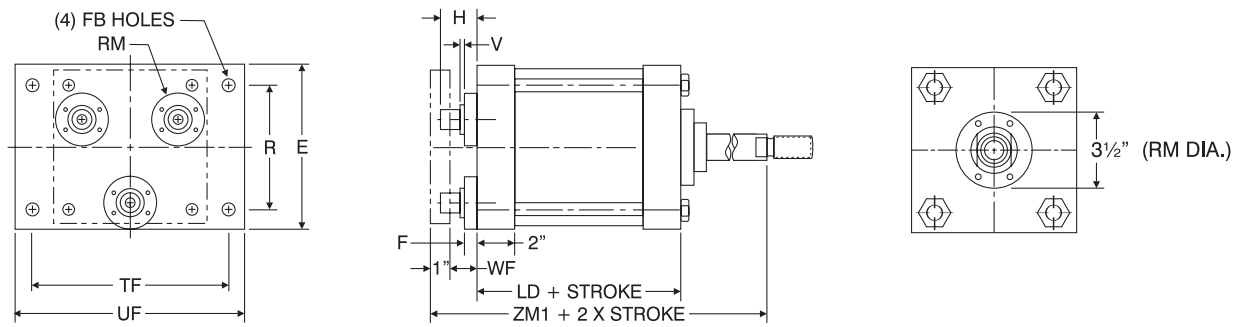


'TRA' SERIES 'MF2D1' DIMENSIONS										
BORE	E	F	FB	LD	R	TF	UF	W	XF1	W1
1.50	2.000	0.375	0.313	4.125**	1.438	2.750	3.375	1.500	6.375**	0.625
2.00	2.500	0.375	0.375	4.125**	1.844	3.375	4.125	1.500	6.375**	0.625
2.50	3.000	0.375	0.375	4.250**	2.188	3.875	4.625	1.750	6.750**	0.625
3.25	3.750	0.625	0.438	4.750	2.760	4.688	5.500	1.750	7.750	0.750
4.00	4.500	0.625	0.438	4.750	3.320	5.438	6.250	1.750	7.750	0.750
5.00	5.500	0.625	0.563	5.000	4.100	6.625	7.625	2.250	8.500	0.750
6.00	6.500	0.750	0.563	5.500	4.875	7.625	8.625	2.250	9.250	0.875

**Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

For single rod end dimensions not shown, see page 91 or page 94.

ME5D1 (TRIPLE ROD WITH SINGLE ROD)



'TRA' SERIES 'ME5D1' DIMENSIONS												
BORE	E	F	FB	H	R	RM	TF	UF	V	WF	LD	ZM1
8.00	8.500	0.625	0.688	2.844	6.438	2.750	10.250	12.000	0.250	2.250	5.625	10.500

Note: Three (3) 1.00" diameter rods on 5.750 B.C.

For single rod end dimensions not shown, see page 91 or page 94.

SERIES 'TRA': OPTIONS

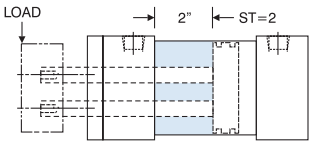
ST=2 ST=4 Stop Tubes

Stop Tubes are designed to reduce the piston rod bushing stress to within the designed range of the bearing material. This will insure proper cylinder performance, in any given application. Stop Tubes lower cylinder bearing stress by adding length to the piston, which increases the overall length of the cylinder.

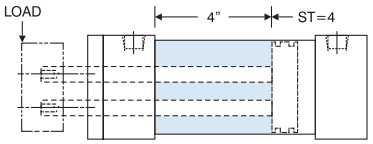
Ordering Example: TRA MS4 2.00 x 10ES-ST=2

The effective stroke (ES) must be included when ordering.

ST=2



ST=4



STROKES Recommended Maximum* Stroke Lengths

BORE	SINGLE ROD END MODELS			DOUBLE ROD END MODELS		
	TRA	TRA ST=2"	TRA ST=4"	TRA "D"	TRA "D" ST=2"	TRA "D" ST=4"
1.50	10	12	14	12	14	16
2.00	14	18	24	18	24	30
2.50	20	24	30	30	38	40
3.25	24	28	36	34	42	46
4.00	24	30	38	36	44	48
5.00	26	34	42	40	52	56
6.00	28	36	44	42	54	58
8.00	30	38	46	42	54	60

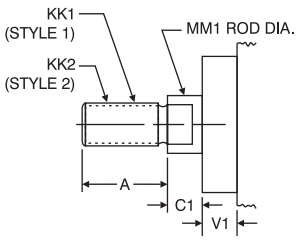
*MAXIMUM STROKE FOR HORIZONTAL APPLICATIONS.

"D1" ROD END OPTIONS

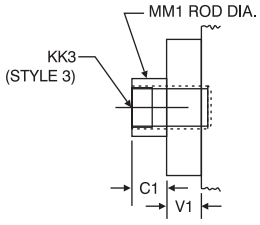
KK1 is standard (leave blank). Specify at end of part number for -KK2, -KK3, -KK4 or -KK5.

Piston rod end styles apply to single rod end of cylinder only.

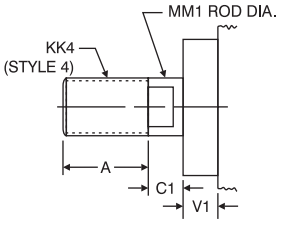
STYLE 1 & 2



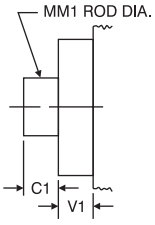
STYLE 3



STYLE 4



STYLE 5
(BLANK ROD END)



BORE	MM1 ROD DIAMETER	STANDARD Style 1 - Male		OPTIONAL Style 2 - Male		Style 3 - Female		Style 4 - Male		Style 5 - Blank	C1*	V1
		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
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
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

*Dimension is with single rod fully retracted.

CUSTOM SOLUTIONS

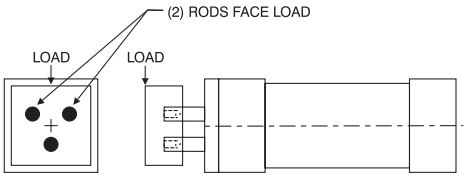
Still don't see what you need? No Problem! With our extensive machining abilities, our engineering staff can assist with the design of a cylinder for your application. Call, fax or e-mail your specifications for a quick response! When it comes to delivery, TRD Manufacturing has the reputation as being one of the fastest. *No more long waits for your customized products!*

SERIES 'TRA': TECHNICAL DATA
LOAD CHARTS: 1.50" - 4.00" BORE

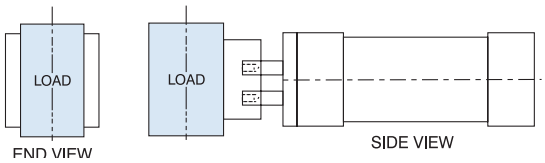
How to use LOAD CHARTS:

1.) Determine weight of LOAD (pounds)
2.) Refer to Load Charts for model selection

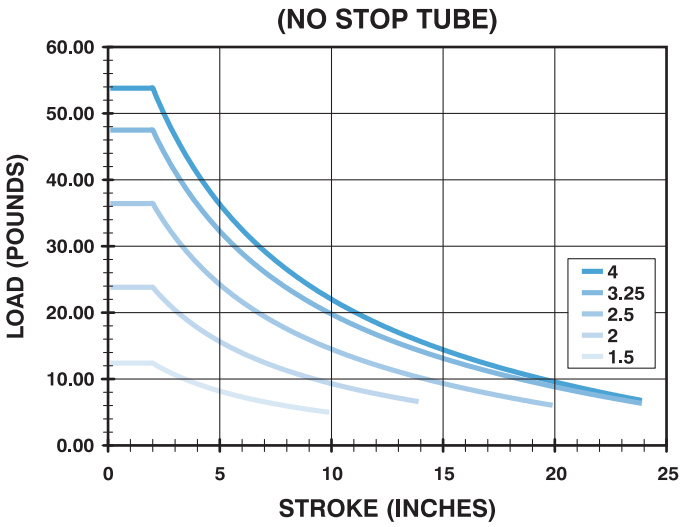
Triple Rod mounting to LOAD:

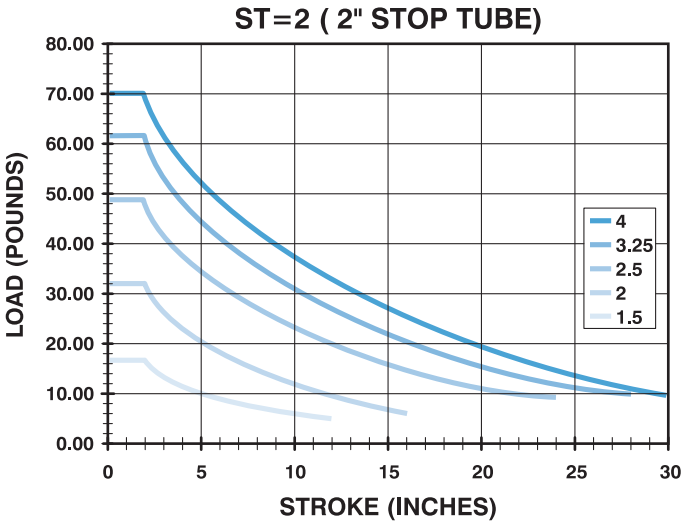


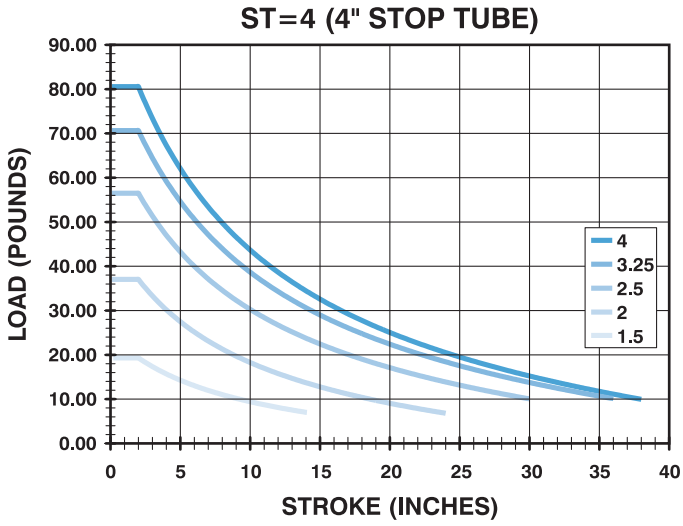
EXAMPLE 1



SINGLE ROD END: 1.50" - 4.00" Bore MAXIMUM RECOMMENDED LOAD





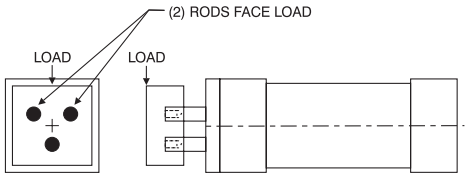


SERIES 'TRA': TECHNICAL DATA
LOAD CHARTS: 5.00" - 8.00" BORE

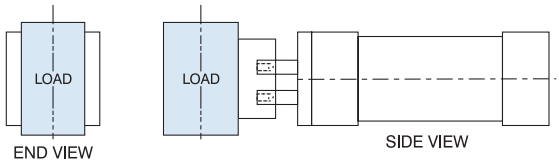
How to use LOAD CHARTS:

1.) Determine weight of LOAD (pounds)
2.) Refer to Load Charts for model selection

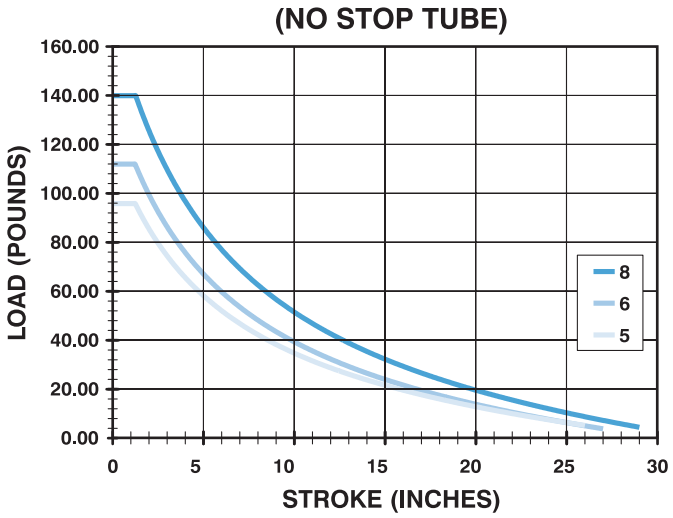
Triple Rod mounting to LOAD:

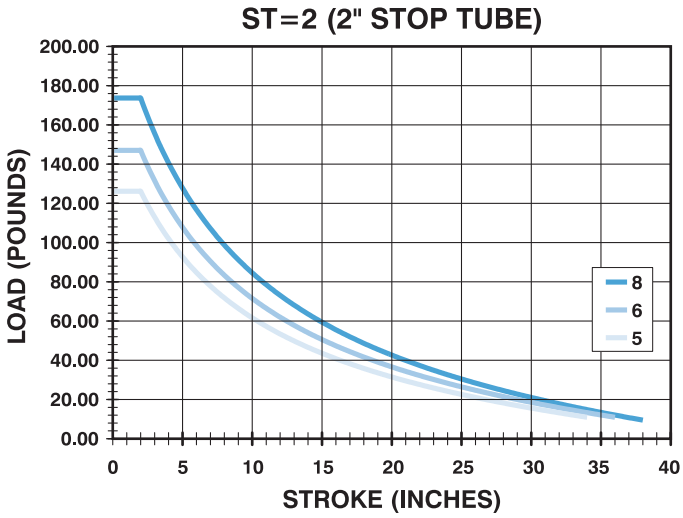


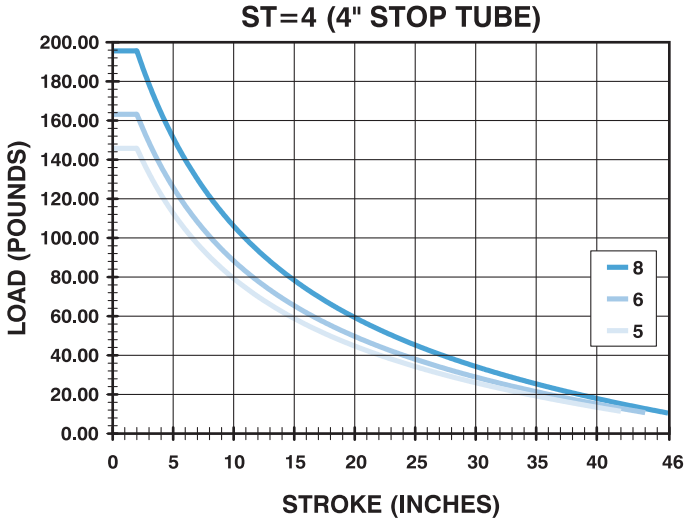
EXAMPLE 1



SINGLE ROD END: 5.00" - 8.00" Bore MAXIMUM RECOMMENDED LOAD





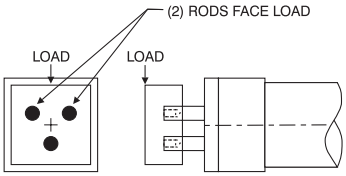


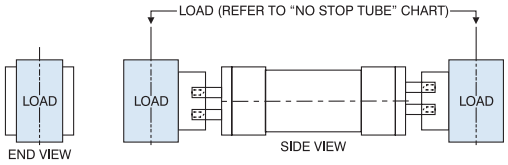
SERIES 'TRA': TECHNICAL DATA (D3 MODELS)
LOAD CHARTS: 1.50" - 4.00" BORE – DOUBLE ROD END

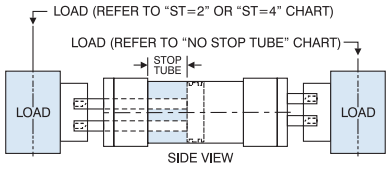
How to use LOAD CHARTS:

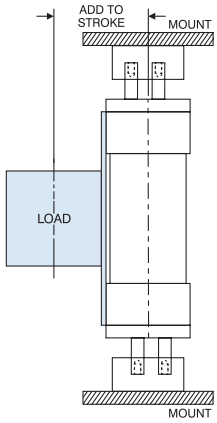
1.) Determine weight of LOAD (pounds)
2.) Refer to Load Charts for model selection

Triple Rod mounting to LOAD:

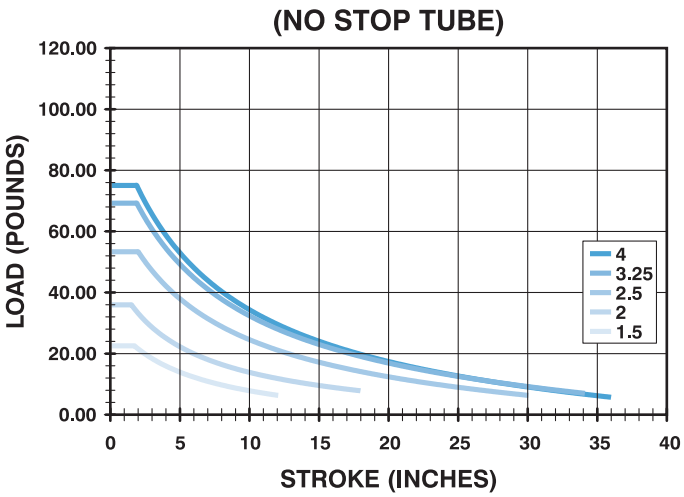


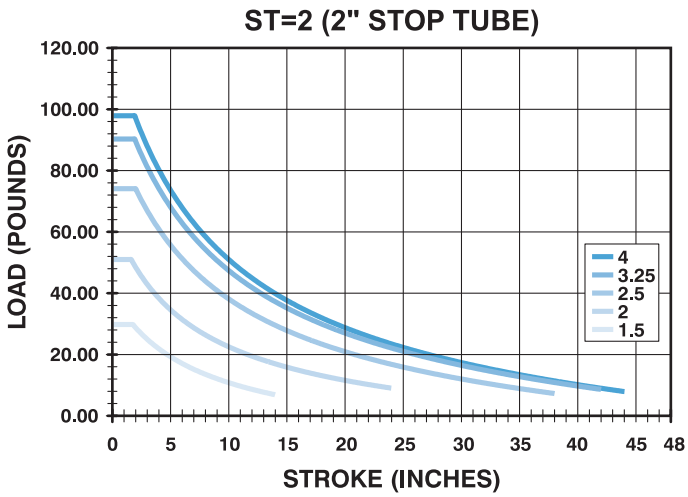


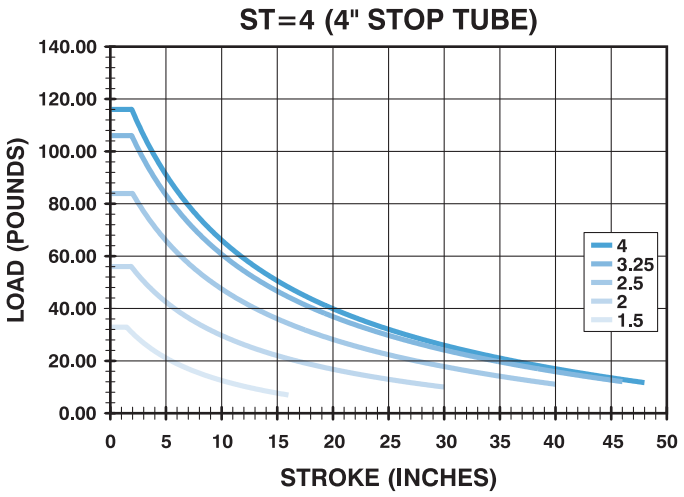




DOUBLE ROD END: 1.50" - 4.00" Bore MAXIMUM RECOMMENDED LOAD





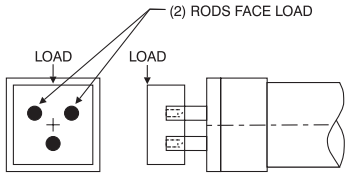


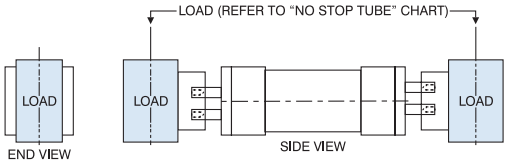
SERIES 'TRA': TECHNICAL DATA (D3 MODELS)
LOAD CHARTS: 5.00" - 8.00" BORE – DOUBLE ROD END

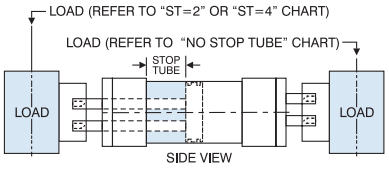
How to use LOAD CHARTS:

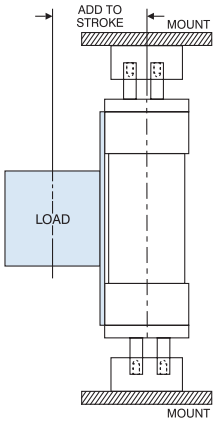
1.) Determine weight of LOAD (pounds)
2.) Refer to Load Charts for model selection

Triple Rod mounting to LOAD:

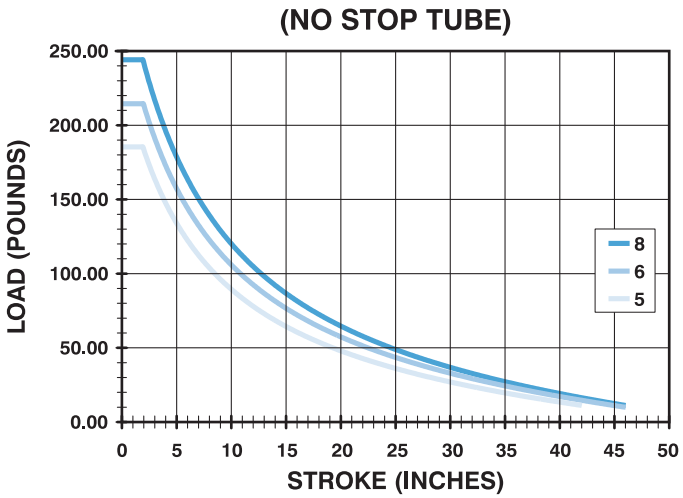


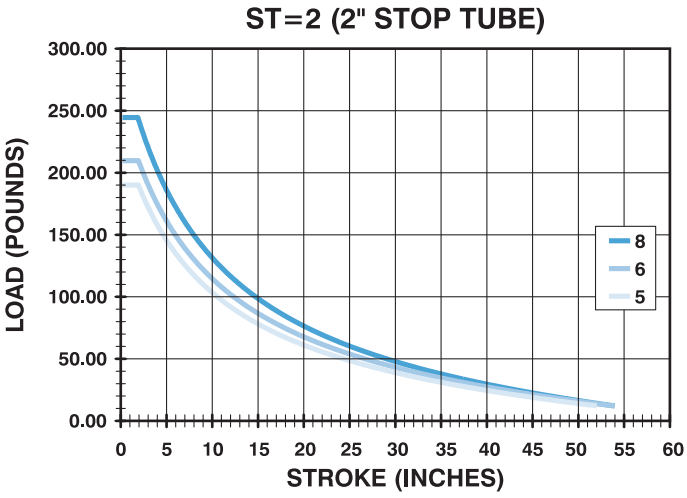


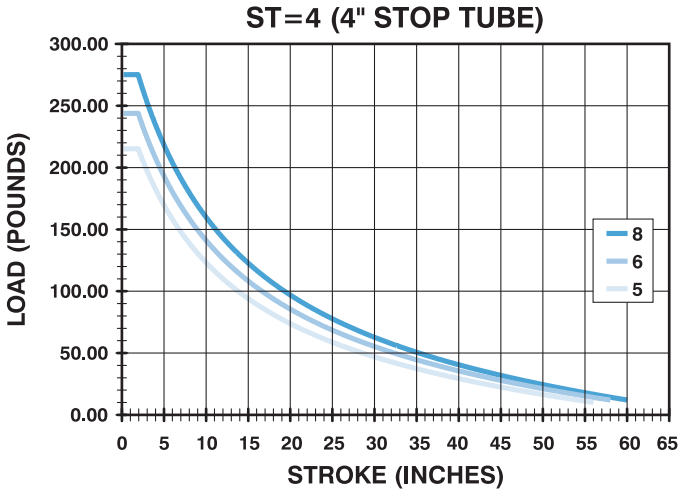




DOUBLE ROD END: 5.00" - 8.00" Bore MAXIMUM RECOMMENDED LOAD







SERIES 'TRA': TECHNICAL DATA
TORQUE CHARTS

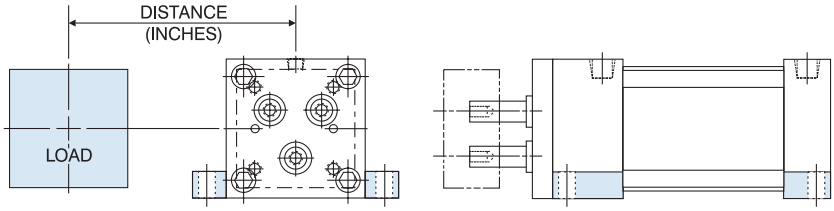
How to use TORQUE CHARTS:

1.) Determine weight of LOAD (pounds)

2.) Determine DISTANCE (inches) of LOAD off center of Cylinder

3.) Multiply:
LOAD (in pounds) X DISTANCE (inches) = Inch-Pounds of TORQUE

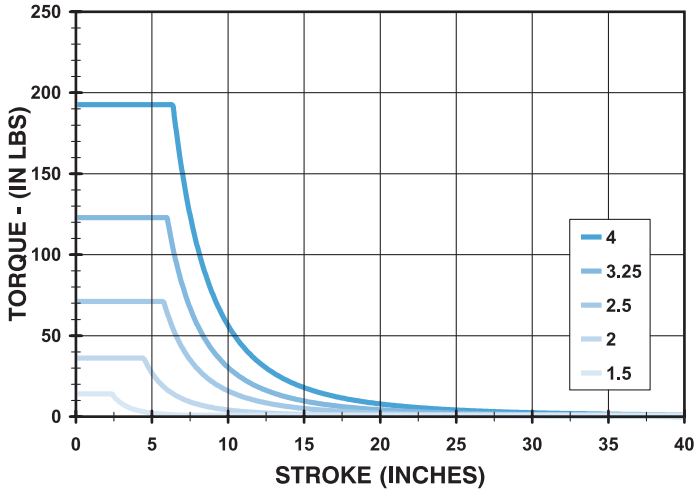
4.) Refer to Torque Charts for model selection



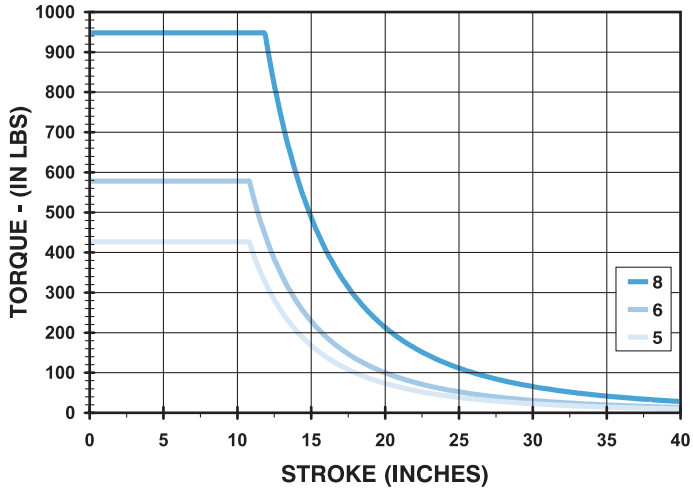
TORQUE (INCH-POUNDS)

(FOR NO STOP TUBE, ST=2" & ST=4" MODELS)

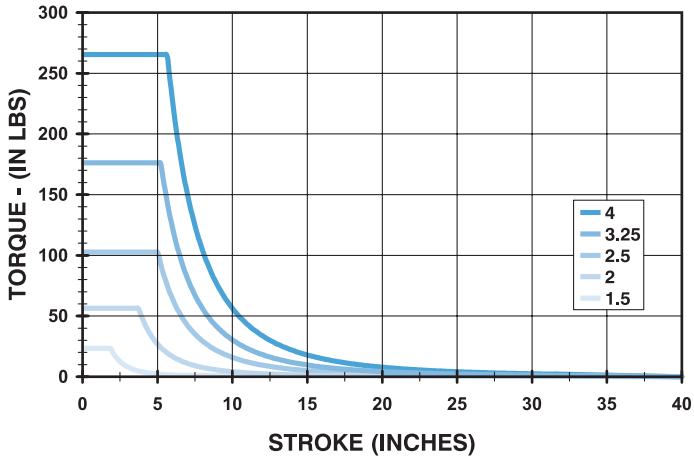
SINGLE ROD END TORQUE (1.50"- 4")



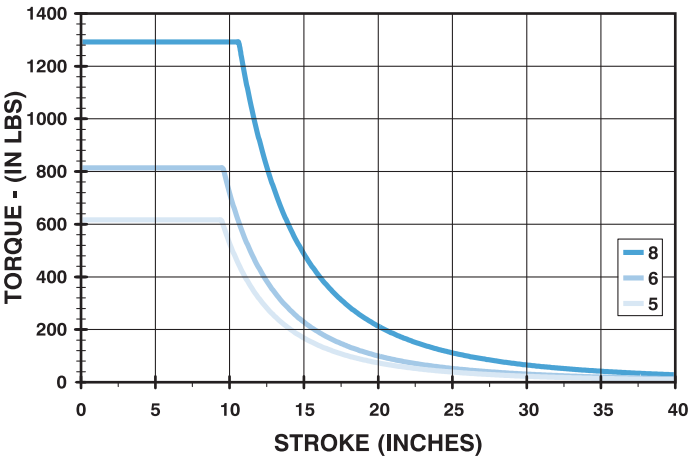
SINGLE ROD END TORQUE (5"-8")



DOUBLE ROD END TORQUE (1.50" - 4")



DOUBLE ROD END TORQUE (5"-8")

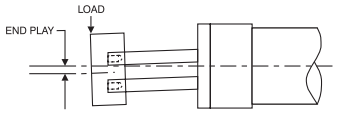


SERIES 'TRA': TECHNICAL DATA

TOOLING PLATE "END PLAY" CHARTS

(Note: Tooling Plate "End Play" values include rod deflection due to weight of rods and tool plate, parts clearance and maximum manufacturing tolerances)

TOOLING PLATE END PLAY



SINGLE ROD END CYLINDERS - NO STOP TUBE

1.50" - 8.00" BORE SINGLE ROD END CYLINDERS - NO STOP TUBE								
STROKE	1.50	2.00	2.50	3.25	4.00	5.00	6.00	8.00
0	0.006	0.006	0.006	0.006	0.009	0.010	0.010	0.007
2	0.015	0.017	0.013	0.013	0.022	0.024	0.023	0.018
4	0.024	0.027	0.021	0.021	0.034	0.038	0.037	0.030
6	0.033	0.037	0.029	0.028	0.047	0.051	0.051	0.042
8	0.042	0.047	0.037	0.036	0.059	0.065	0.065	0.053
10	0.051	0.058	0.044	0.044	0.071	0.079	0.079	0.065
12	—	0.068	0.052	0.051	0.084	0.092	0.093	0.077
14	—	0.078	0.060	0.059	0.096	0.106	0.106	0.088
16	—	—	0.067	0.066	0.109	0.120	0.120	0.100
18	—	—	0.075	0.074	0.121	0.133	0.134	0.112
20	—	—	0.083	0.081	0.134	0.147	0.148	0.123
22	—	—	—	0.089	0.146	0.161	0.162	0.135
24	—	—	—	0.097	0.158	0.174	0.176	0.147
26	—	—	—	—	—	0.188	0.190	0.158
28	—	—	—	—	—	—	0.203	0.170
30	—	—	—	—	—	—	—	0.182

SINGLE ROD END CYLINDERS - 2" STOP TUBE

1.50" - 8.00" BORE SINGLE ROD END CYLINDERS - 2.00" STOP TUBE								
STROKE	1.50	2.00	2.50	3.25	4.00	5.00	6.00	8.00
0	0.006	0.004	0.004	0.004	0.007	0.008	0.008	0.007
2	0.009	0.011	0.009	0.009	0.016	0.019	0.019	0.016
4	0.014	0.017	0.014	0.015	0.026	0.030	0.031	0.026
6	0.019	0.024	0.019	0.020	0.035	0.041	0.042	0.036
8	0.024	0.030	0.024	0.026	0.044	0.052	0.054	0.047
10	0.030	0.037	0.029	0.031	0.054	0.063	0.065	0.057
12	0.035	0.043	0.035	0.036	0.063	0.074	0.076	0.067
14	—	0.049	0.040	0.042	0.072	0.084	0.088	0.077
16	—	0.056	0.045	0.047	0.082	0.095	0.099	0.088
18	—	0.062	0.050	0.053	0.091	0.106	0.111	0.098
20	—	—	0.055	0.058	0.100	0.117	0.122	0.108
22	—	—	0.060	0.064	0.110	0.128	0.134	0.118
24	—	—	0.065	0.069	0.119	0.139	0.145	0.129
26	—	—	—	0.074	0.128	0.150	0.156	0.139
28	—	—	—	0.080	0.138	0.161	0.168	0.149
30	—	—	—	—	0.147	0.172	0.179	0.159
32	—	—	—	—	—	0.183	0.191	0.170
34	—	—	—	—	—	0.193	0.202	0.180
36	—	—	—	—	—	—	0.214	0.190
38	—	—	—	—	—	—	—	0.200

SINGLE ROD END CYLINDERS - 4" STOP TUBE

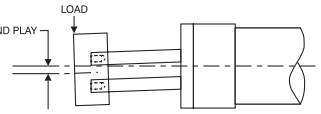
1.50" - 8.00" BORE SINGLE ROD END CYLINDERS - 4.00" STOP TUBE								
STROKE	1.50	2.00	2.50	3.25	4.00	5.00	6.00	8.00
0	0.002	0.003	0.003	0.003	0.005	0.006	0.008	0.005
2	0.006	0.007	0.006	0.007	0.012	0.015	0.015	0.014
4	0.009	0.012	0.010	0.011	0.019	0.023	0.025	0.022
6	0.013	0.016	0.014	0.015	0.026	0.032	0.034	0.031
8	0.016	0.021	0.017	0.019	0.033	0.040	0.043	0.039
10	0.020	0.025	0.021	0.023	0.040	0.049	0.052	0.048
12	0.024	0.030	0.024	0.027	0.047	0.057	0.061	0.057
14	0.027	0.035	0.028	0.031	0.054	0.066	0.070	0.065
16	—	0.039	0.032	0.035	0.061	0.074	0.080	0.074
18	—	0.044	0.035	0.039	0.068	0.083	0.089	0.083
20	—	0.048	0.039	0.043	0.075	0.091	0.098	0.091
22	—	0.053	0.043	0.047	0.082	0.100	0.107	0.100
24	—	0.057	0.046	0.050	0.089	0.108	0.116	0.109
26	—	—	0.050	0.054	0.096	0.117	0.125	0.117
28	—	—	0.053	0.058	0.103	0.125	0.135	0.126
30	—	—	0.057	0.062	0.110	0.134	0.144	0.135
32	—	—	—	0.066	0.117	0.142	0.153	0.143
34	—	—	—	0.070	0.124	0.151	0.162	0.152
36	—	—	—	0.074	0.131	0.159	0.171	0.161
38	—	—	—	—	0.138	0.168	0.180	0.169
40	—	—	—	—	—	0.176	0.190	0.178
42	—	—	—	—	—	0.185	0.199	0.187
44	—	—	—	—	—	—	0.208	0.195
46	—	—	—	—	—	—	—	0.204

SERIES 'TRA': TECHNICAL DATA

TOOLING PLATE "END PLAY" CHARTS (D3 MODELS)

(Note: Tooling Plate "End Play" values include rod deflection due to weight of rods and tool plate, parts clearance and maximum manufacturing tolerances)

TOOLING PLATE END PLAY



DOUBLE ROD END CYLINDERS - NO STOP TUBE

1.50" - 8.00" BORE DOUBLE ROD END CYLINDERS - NO STOP TUBE								
STROKE	**1.50**	**2.00**	**2.50**	**3.25**	**4.00**	**5.00**	**6.00**	**8.00**
0	0.003	0.003	0.003	0.003	0.004	0.005	0.005	0.004
2	0.007	0.008	0.006	0.006	0.011	0.012	0.011	0.009
4	0.012	0.013	0.010	0.010	0.017	0.019	0.018	0.015
6	0.017	0.018	0.014	0.014	0.023	0.025	0.025	0.021
8	0.021	0.023	0.018	0.018	0.029	0.032	0.032	0.026
10	0.026	0.029	0.022	0.022	0.035	0.039	0.039	0.032
12	0.031	0.034	0.026	0.025	0.042	0.046	0.046	0.038
14	—	0.038	0.030	0.029	0.048	0.053	0.053	0.044
16	—	0.044	0.033	0.033	0.054	0.060	0.060	0.050
18	—	0.050	0.037	0.037	0.060	0.066	0.067	0.056
20	—	—	0.041	0.040	0.067	0.073	0.074	0.061
22	—	—	0.045	0.044	0.073	0.080	0.081	0.067
24	—	—	0.049	0.048	0.079	0.087	0.088	0.073
26	—	—	0.053	0.052	0.085	0.094	0.095	0.079
28	—	—	0.057	0.056	0.091	0.100	0.101	0.085
30	—	—	0.060	0.059	0.098	0.107	0.108	0.091
32	—	—	—	0.063	0.104	0.114	0.115	0.096
34	—	—	—	—	0.110	0.121	0.122	0.102
36	—	—	—	—	0.116	0.128	0.129	0.108
38	—	—	—	—	—	0.135	0.136	0.114
40	—	—	—	—	—	—	0.143	0.120
42	—	—	—	—	—	—	0.150	0.126

DOUBLE ROD END CYLINDERS - 2" STOP TUBE

1.50" - 8.00" BORE DOUBLE ROD END CYLINDERS - 2.00" STOP TUBE								
STROKE	**1.50**	**2.00**	**2.50**	**3.25**	**4.00**	**5.00**	**6.00**	**8.00**
0	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.003
2	0.005	0.005	0.005	0.005	0.008	0.009	0.009	0.008
4	0.007	0.009	0.007	0.008	0.013	0.015	0.015	0.013
6	0.009	0.012	0.009	0.010	0.017	0.020	0.021	0.018
8	0.012	0.015	0.012	0.013	0.022	0.026	0.027	0.023
10	0.015	0.018	0.014	0.015	0.027	0.031	0.032	0.028
12	0.018	0.021	0.017	0.018	0.031	0.037	0.038	0.033
14	0.020	0.025	0.020	0.021	0.036	0.042	0.044	0.038
16	—	0.028	0.022	0.023	0.041	0.047	0.049	0.044
18	—	0.031	0.025	0.026	0.045	0.053	0.055	0.049
20	—	0.034	0.027	0.029	0.050	0.058	0.061	0.054
22	—	0.037	0.030	0.032	0.055	0.064	0.067	0.059
24	—	0.041	0.032	0.034	0.059	0.069	0.072	0.064
26	—	—	0.035	0.037	0.064	0.075	0.078	0.069
28	—	—	0.037	0.040	0.069	0.080	0.084	0.074
30	—	—	0.040	0.042	0.073	0.086	0.089	0.079
32	—	—	0.043	0.045	0.078	0.091	0.095	0.085
34	—	—	0.045	0.048	0.083	0.096	0.101	0.090
36	—	—	0.048	0.050	0.088	0.102	0.107	0.095
38	—	—	0.051	0.053	0.092	0.107	0.112	0.100
40	—	—	—	0.056	0.097	0.113	0.118	0.105
42	—	—	—	0.059	0.101	0.118	0.124	0.110
44	—	—	—	—	0.106	0.124	0.129	0.115
46	—	—	—	—	—	0.129	0.135	0.120
48	—	—	—	—	—	0.135	0.141	0.126
50	—	—	—	—	—	0.140	0.147	0.131
52	—	—	—	—	—	0.145	0.152	0.136
54	—	—	—	—	—	—	0.158	0.141

DOUBLE ROD END CYLINDERS - 4" STOP TUBE

1.50" - 8.00" BORE DOUBLE ROD END CYLINDERS - 4.00" STOP TUBE								
STROKE	**1.50**	**2.00**	**2.50**	**3.25**	**4.00**	**5.00**	**6.00**	**8.00**
0	0.002	0.003	0.003	0.003	0.004	0.004	0.004	0.003
2	0.003	0.004	0.004	0.004	0.006	0.007	0.007	0.007
4	0.004	0.006	0.005	0.005	0.009	0.011	0.012	0.011
6	0.006	0.008	0.007	0.007	0.013	0.016	0.017	0.015
8	0.008	0.010	0.008	0.009	0.016	0.020	0.021	0.019
10	0.010	0.012	0.010	0.011	0.020	0.024	0.026	0.024
12	0.012	0.015	0.012	0.013	0.023	0.028	0.030	0.028
14	0.014	0.017	0.014	0.015	0.027	0.033	0.035	0.032
16	0.016	0.020	0.016	0.017	0.030	0.037	0.040	0.037
18	—	0.022	0.017	0.019	0.034	0.041	0.044	0.041
20	—	0.024	0.019	0.021	0.038	0.045	0.049	0.045
22	—	0.026	0.021	0.023	0.041	0.050	0.053	0.050
24	—	0.028	0.023	0.025	0.044	0.054	0.058	0.054
26	—	0.031	0.025	0.027	0.048	0.058	0.062	0.058
28	—	0.033	0.026	0.029	0.051	0.062	0.067	0.063
30	—	0.035	0.028	0.031	0.055	0.067	0.072	0.067
32	—	—	0.030	0.033	0.058	0.071	0.076	0.071
34	—	—	0.032	0.035	0.062	0.075	0.081	0.076
36	—	—	0.034	0.037	0.065	0.079	0.085	0.080
38	—	—	0.036	0.039	0.069	0.084	0.090	0.084
40	—	—	0.038	0.041	0.072	0.088	0.095	0.089
42	—	—	—	0.043	0.076	0.092	0.099	0.093
44	—	—	—	0.045	0.079	0.096	0.104	0.097
46	—	—	—	0.047	0.083	0.101	0.108	0.102
48	—	—	—	—	0.086	0.105	0.113	0.106
50	—	—	—	—	—	0.109	0.117	0.110
52	—	—	—	—	—	0.113	0.122	0.115
54	—	—	—	—	—	0.117	0.127	0.119
56	—	—	—	—	—	0.122	0.131	0.123
58	—	—	—	—	—	—	0.136	0.128
60	—	—	—	—	—	—	—	0.132

SERIES 'TRA': TECHNICAL DATA

WEIGHT CHART - TRIPLE ROD BASIC CYLINDERS

(WEIGHT IN POUNDS)

BORE	MX0	MS4	MS2 BASE BAR	* MP1	* MP2	* MP4	MF1 ME4	MF2	ME5	ADD PER INCH OF STROKE
1.50	2.2	2.2	2.5	2.7	2.8	2.8	2.8	2.9	N/A	0.19
2.00	3.7	3.7	4.0	4.5	4.6	4.6	4.5	4.7	N/A	0.34
2.50	6.0	6.0	6.5	7.0	7.2	7.2	7.1	7.4	N/A	0.45
3.25	10.1	10.1	11.0	12.8	13.7	13.7	13.1	13.5	N/A	0.52
4.00	15.0	15.0	16.2	18.3	19.5	19.5	19.3	19.7	N/A	0.55
5.00	24.0	24.0	25.3	28.6	30.7	N/A	30.5	31.1	N/A	1.10
6.00	35.2	35.2	36.6	43.4	45.9	N/A	45.8	46.7	N/A	1.15
8.00	50.8	50.8	N/A	58.9	N/A	N/A	50.8 (ME4)	N/A	56.7	1.50

All weights are in pounds & include tooling plate.
*Weight includes clevis pins.

WEIGHT CHART - TRIPLE ROD DOUBLE END (D3 MODELS)

(WEIGHT IN POUNDS)

BORE	MX0D	MS4D	MS2D BASE BAR	MF1D ME4D	ADD PER INCH OF STROKE
1.50	4.3	4.3	4.6	4.9	0.30
2.00	6.2	6.2	6.5	7	0.55
2.50	11.2	11.2	11.7	12.3	0.75
3.25	18.5	18.5	19.4	21.5	0.82
4.00	26.4	26.4	27.6	30.7	0.85
5.00	42.9	42.9	44.3	49.4	1.83
6.00	59.8	59.8	61.4	70.4	1.95
8.00	75.8	75.8	N/A	75.0 (ME4D)	2.45

All weights are in pounds & include tooling plate.

WEIGHT CHART - TOOLING PLATE

(WEIGHT IN POUNDS)

BORE	WEIGHT	BORE	WEIGHT	BORE	WEIGHT	BORE	WEIGHT
1.50	0.45	2.50	1.5	4.00	4.16	6.00	9.30
2.00	0.70	3.25	2.7	5.00	6.25	8.00	17.0

TORQUE CHART - CYLINDER TIE RODS

BORE	TIE ROD THREAD SIZE	TORQUE IN FT. - LBS.
1.50	1/4 -28	7
2.00	5/16 -24	12
2.50	5/16 -24	14
3.25	3/8 -24	30
4.00	3/8 -24	35
5.00	1/2 -20	45
6.00	1/2 -20	50
8.00	5/8 -18	125

Tighten cylinders using an "X" tightening pattern on tie rods.

TORQUE CHART - RETAINER SCREWS

BORE	RETAINER SCREW THREAD SIZE	TORQUE IN FT. - LBS.
1.50	1/4 -28	7
2.00	5/16 -24	12
2.50	5/16 -24	12
3.25	3/8 -24	22
4.00	3/8 -24	22
5.00	1/2 -20	35
6.00	1/2 -20	35
8.00	1/4 -28	7

1.50" - 6.00" bore have full square retainer plate, 8.00" bore has three (3) separate round retainer plates.

TRIPLE ROD FORCE/VOLUME CHART

BORE	STROKE TYPE	EFFECTIVE PISTON AREA	POUNDS OF FORCE AT PSI						CU. FT. DISPLACEMENT PER IN. OF STROKE
			60	80	100	200	250	400	
1.50	PUSH	1.767	106	142	177	353	442	706	.00102
	PULL	1.536	92	123	154	308	384	614	.00089
2.00	PUSH	3.142	188	251	314	628	785	1256	.00182
	PULL	2.553	153	204	255	510	638	1021	.00147
2.50	PUSH	4.909	295	393	491	982	1227	1962	.00284
	PULL	3.989	239	319	399	798	997	1595	.00231
3.25	PUSH	8.296	498	664	830	1660	2074	3318	.00480
	PULL	7.376	442	590	738	1476	1844	2950	.00427
4.00	PUSH	12.566	754	1005	1257	2514	3141	5026	.00727
	PULL	11.646	699	932	1165	2330	2911	4658	.00674
5.00	PUSH	19.635	1178	1571	1964	3928	4908	7854	.01136
	PULL	17.279	1037	1382	1728	3456	4320	6911	.00999
6.00	PUSH	28.274	1696	2262	2827	5654	7068	11310	.01636
	PULL	25.918	1555	2073	2592	5184	6479	10367	.01499
8.00	PUSH	50.265	3016	4021	5026	10052	12566	20106	.02908
	PULL	47.909	2874	3832	4791	9582	11977	19163	.02773

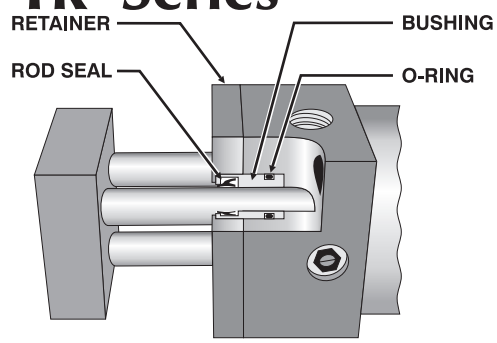
'TR' SERIES: DESIGN ENHANCEMENT

'TR' Series (250 PSI Air) is super-ceded by 'TRA' Series *(effective 5/01/03).*
'TR-TH' (400 PSI Hyd.) Series is super-ceded by 'TRA' Series with 'TH' option *(effective 5/01/03).*

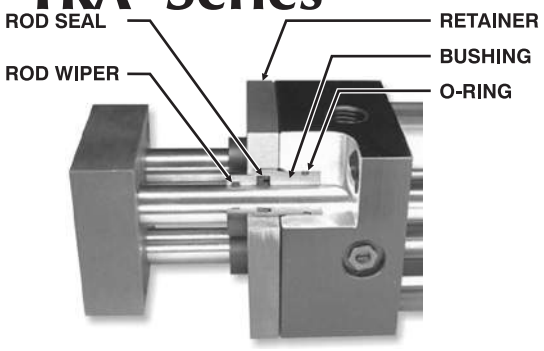
TRD's 'TR' Series has been redesigned. The new 'TRA' Series is a ***Heavy-Duty*** version of the obsoleted 'TR' Series. The new series is a drop-in replacement of the previous model. *Overall dimensions are not affected. The affected service parts are listed below for reference. Any existing 'TR' Series in service can be fitted with the new 'TRA' Series ***Heavy-Duty*** Bushing design. A new set of three (3) Bushings, three (3 sets) Seals and one (1) Retainer are required.

(Note: A 'TR' model fitted with the ***heavy-duty*** bushings will not be rated for the same load capacity as the 'TRA' Series. A new Piston & Rod assembly with wear band is required to receive the same load capacity rating as the 'TRA' Series).
*Option "MPR-WB" will add 0.500" to overall cylinder length - 1.50", 2.00" & 2.50" bores only.

'TR' Series



'TRA' Series



'TR' SERIES PARTS				
BORE	BUSHING (3 Req'd)	O-RING (3 Req'd)	ROD SEAL (3 Req'd)	RETAINER (1 Req'd)
1.50	TR-B-30-1	TR/BO-312	TR/RW-312	TR-36-15
2.00	TR-B-30-2	TR/BO-500	TR/RW-500	TR-36-20
2.50	TR-B-30-3	TR/BO-625	TR/RW-625	TR-36-25
3.25	TR-B-30-3	TR/BO-625	TR/RW-625	TR-36-32
4.00	TR-B-30-3	TR/BO-625	TR/RW-625	TR-36-40
5.00	TR-B-30-4	TR/BO-1000	TR/RW-1000	TR-36-50
6.00	TR-B-30-4	TR/BO-1000	TR/RW-1000	TR-36-60
8.00	TR-B-30-BZ	BO-2	RW-1000 RS-1000	A-35-2 (3 Req'd)

'TRA' SERIES PARTS						
BORE	BUSHING (3 Req'd)	O-RING (3 Req'd)	ROD SEAL (3 Req'd)	ROD WIPER (3 Req'd)	RETAINER (1 Req'd)	RETAINER KIT (RK) (3) Bushings w/ Seals & (1) Retainer Plate
1.50	TRHD-30-1	TR-BO-312	RS-312	RW-312	TRHD-36-15	TRA-15-RK
2.00	TRHD-30-2	TR-BO-500	RS-500	RW-500	TRHD-36-20	TRA-20-RK
2.50	TRHD-30-3	TR-BO-625	RS-625	RW-625	TRHD-36-25	TRA-25-RK
3.25	TRHD-30-4	TR-BO-625	RS-625	RW-625	TRHD-36-32	TRA-32-RK
4.00	TRHD-30-4	TR-BO-625	RS-625	RW-625	TRHD-36-40	TRA-40-RK
5.00	TRHD-30-5	TR-BO-1000	RS-1000	RW-1000	TRHD-36-50	TRA-50-RK
6.00	TRHD-30-6	TR-BO-1000	RS-1000	RW-1000	TRHD-36-60	TRA-60-RK
8.00	A-30-2	BO-2	RS-1000	RW-1000	A-35-2 (3 Req'd)	N/A

'TR-TH' SERIES PARTS				
BORE	BUSHING (3 Req'd)	O-RING (3 Req'd)	ROD SEAL (3 Req'd)	RETAINER (1 Req'd)
1.50	TH/TR-B-30-1	TR/BO-312	TR/TH-312	TR-36-15
2.00	TH/TR-B-30-2	TR/BO-500	TR/TH-500	TR-36-20
2.50	TH/TR-B-30-3	TR/BO-625	TR/TH-625	TR-36-25
3.25	TH/TR-B-30-3	TR/BO-625	TR/TH-625	TR-36-32
4.00	TH/TR-B-30-3	TR/BO-625	TR/TH-625	TR-36-40
5.00	TH/TR-B-30-4	TR/BO-1000	TR/TH-1000	TR-36-50
6.00	TH/TR-B-30-4	TR/BO-1000	TR/TH-1000	TR-36-60
8.00	TH-30-2	BO-2	RS-1000 TH-1000	A-35-2 (3 Req'd)

'TRA' SERIES - WITH 'TH' OPTION - PARTS						
BORE	BUSHING (3 Req'd)	O-RING (3 Req'd)	ROD SEAL (3 Req'd)	ROD WIPER (3 Req'd)	RETAINER (1 Req'd)	RETAINER KIT (RK) (3) Bushings w/ Seals & (1) Retainer Plate
1.50	TRHD-30-1	TR-BO-312	RS-312	RW-312	TRHD-36-15	TRH-15-RK
2.00	TRHD-30-2	TR-BO-500	RS-500	RW-500	TRHD-36-20	TRH-20-RK
2.50	TRHD-30-3	TR-BO-625	RS-625	RW-625	TRHD-36-25	TRH-25-RK
3.25	TRHD-30-4	TR-BO-625	RS-625	RW-625	TRHD-36-32	TRH-32-RK
4.00	TRHD-30-4	TR-BO-625	RS-625	RW-625	TRHD-36-40	TRH-40-RK
5.00	TRHD-30-5	TR-BO-1000	RS-1000	RW-1000	TRHD-36-50	TRH-50-RK
6.00	TRHD-30-6	TR-BO-1000	RS-1000	RW-1000	TRHD-36-60	TRH-60-RK
8.00	TH-30-2	BO-2	RS-1000	RW-1000	A-35-2 (3 Req'd)	N/A