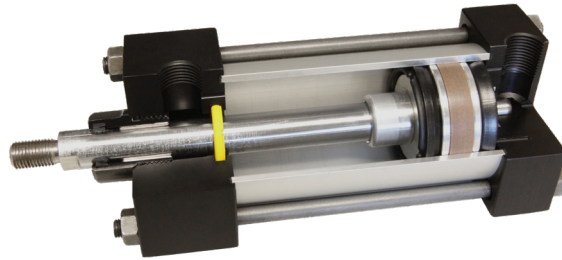


IMI Norgren Ecology Seal...

Where Cylinder Speed meets Quieter Cycles

The Ecology seal, in conjunction with a fixed cushion, provides faster and quieter cycles, without the undesirable high impact forces at the end of stroke!

The Ecology Seal is designed to work in conjunction with standard air cushion technology, and contributes up to 80% of the deceleration required at the end of stroke.



IMI Norgren Ecology Seal Benefits

Machine Reliability

Eliminates end of stroke impact forces, reducing vibration and component failures
 Eliminate potential pneumatic bounce

Increased Productivity

Travel at higher speeds
 Up to 75% less travel time through cushion (25ms versus 100ms)
 Pre-engineered fixed cushion means no cushion screw to be adjusted or tampered with
 Reduce down time

Reduce System Costs

Eliminate flow controls
 Ecology seal cylinder with fixed cushions is less expensive than conventional cushioned cylinder
 Reduce cylinder bore size
 Reduce set up time

Safe Work Environment

Noise reduction - meets OSHA specifications
 Reduced equipment failures, minimizing injury risk

Industry Conformance

Conforms to industry standard dimensions, does not add length
 Available in FPM
 Widely proven and desired throughout the industry

"By eliminating the cushion needle, the Ecology Seal Cylinder saves us 1-1/2 hours set up per machine." - A leading packaging OEM

Cylinder Order Information

EJ 01 7 7 A 1-2.00 x 6.000 - L(14)-PS-V

Series	
Series A Cylinder (Aluminum)	A
Series A Double Rod End Cylinder	DA
Series EA Cylinder	EA
Series EA Double Rod End Cylinder	EDA
Series J Cylinder (Steel)	J
Series J Double Rod End Cylinder	DJ
Series EJ Cylinder	EJ
Series EJ Double Rod End Cylinder	EDJ

Mounting Options	
Side Tapped (MS4)	01
Head Rectangular Flange (MF1)	03
Head Square (ME3) – 7" & 8" Bores	03
Cap Rectangular Flange (MF2)	04
Cap Square (ME4) – 7" & 8" Bores	04
Basic Cylinder No Mounting (MX0)	05
Both Ends (4) Tie Rods Ext. (MX1)	06
Both Ends (2) Tie Rods Ext. (MX4)	6B
Cap Tie Rods Ext. (MX2)	6C
Head Tie Rods Ext. (MX3)	6R
Removable Head Trunnion (MT1) - A & EA	7R
Head Trunnion (MT1) - J & EJ	07
Removable Cap Trunnion (MT2) - A & EA	8R
Cap Trunnion (MT2) - J & EJ	08
Side Lugs (MS2)	09
Center Trunnion (MT4)	10
Side End Angles (MS1)	11
Cap Fixed Clevis (MP1)	12
Side End Lugs (MS7)	15
Sleeve Nut Construction (Universal)	16
Head Square Flange (MF5)	20
Cap Square Flange (MF6)	21
Detachable Cap Clevis (MP2)	22
Cap Fixed Eye (MP3)	32
Detachable Cap Eye (MP4)	42
Spherical Bearing	52
Base Bar (Not NFPA A & EA Only)	60

Cushion in Head	
None	3
Non-Adjustable Cushion	†5
Adjustable Cushion (Position 2)	7
Decel Cushion	9

† Standard with EA & EJ

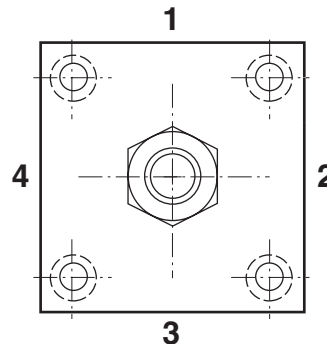
Cushion in Cap	
None	3
Non-Adjustable Cushion	†5
Adjustable Cushion (Position 2)	7
Decel Cushion	9

† Standard with EA & EJ

Port and Cushion Adjustment Positions

(As viewed from rod end: Port standard position 1, Cushion Adjustment standard position 2.)

NOTE: A Port and a Cushion Adjustment cannot be in the same position.



Bore x Stroke

Options

Additional Standard Options - See next page for full listing	
Stroke Adjustment	A
Case Hardened (50 Rc)	HR
Port Location position 1 standard: L(Head Cap) (specify position 1 thru 4 for head and/or cap)	L(_)
Rod Lock (passive)	LE
Low Friction	LF
Metal Rod Scraper	MS
Cushion Adjust Screw Location position 2 standard: N(Head Cap) (specify position 1 thru 4 for head and/or cap)	N(_)
Non-Standard Port Sizes: [specify port size for P(_H) head only, P(_C) cap only, or P(_L) both head & cap]	*P(_)
Inducted Hardened Piston	PMC
Magnetic Piston – includes aluminum tube option - J & EJ	PS
Rod Stud	RS
Rod Extensions (specify length of additional rod extension)	RX
Stainless Steel tie-rods	S
303 Stainless Steel (Hard Chrome Plated)	SS
Stainless Steel bushing	SB
Stop Tube (specify stop tube length)	ST(_)
Special Rod Threads (specify rod thread)	T
Thread Extensions (specify length of thread extension)	TX
FPM Seals	V

* Oversized ports may increase the overall length by 1/8". Consult factory for impacted models.

Piston Rod Threads	Type	Dim ref
Small Male (Solid) (std)	1	KK
Intermediate Thread Male (Solid)	2	CC
Female	3	KK
Full Thread Male (Solid)	6	FF
Plain Rod End	7	-

Cyl bore	rod itr.	rod dia. (mm)	Cyl bore	rod itr.	rod dia. (mm)
1-1/2	A	5/8	6	C	1-3/8
	B+	1		D	1-3/4
2	A	5/8		E	2
	B	1	7	F	2-1/2
	C+	1-3/8		C	1-3/8
2-1/2	A	5/8		D	1-3/4
	B	1		E	2
	C	1-3/8		F	2-1/2
	D+	1-3/4	8	C	1-3/8
3-1/4	B	1		D	1-3/4
	C	1-3/8		E	2
	D	1-3/4	10	F	2-1/2
	E	2		D	1-3/4
	F	2-1/2		E	2
4	B	1		F	2-1/2
	C	1-3/8	12	E	2
	D	1-3/4		F	2-1/2
	E	2		F	2-1/2
	F	2-1/2			
5	B	1			
	C	1-3/8			
	D	1-3/4			
	E	2			
	F	2-1/2			

Notes
 + Head cushion not available on these bore and piston rod combinations.
 Additional rod sizes available upon request.
 Dimensions for thread sizes available on following pages.

A, EA, J, and EJ Standard and special cylinder options

Option Code, (list alphabetically)	Description
A(-)	Stroke adjustment single piston (specify adjustment length)
AA(-)	Stroke adjustment double piston (specify adjustment length)
BL	Removable piston rod stud (installed with removable adhesive sealant)
HR	Case hardened piston rod
L(- -)	Non-standard port location position 1 standard: L (Head Cap) (specify position 1 thru 4 for head and/or cap)
LA	Low friction cylinder (Pak-Lap™ style seals)
LE	Rodlock
LF	Low friction cylinder (Nitrile compounded with PTFE rod and piston seals) (Not available with Ecology series)
MS	Metal scraper
N(- -)	Cushion adjust screw location position 2 standard:N(Head Cap) (specify position 1 thru 4 for head and/or cap)
P(-)*	Non-standard port sizes – [specify port size for P(-H) head only, P(-C) cap only, or P(-) both head & cap]
PP	Seals in cylinder O-ring loaded U-cups (rod and piston seals) – (A & J Only)
PN	Pinned piston and rod assembly
PS	Magnetic piston modification
RS	Studded male piston rod end
RX(-)	Piston rod extension over standard (specify additional "C" length)
S	303/304 Stainless steel tie rods & nuts
SB	Stainless steel rod bushing nut
SC†	Single acting spring extend cap end of cylinder
SL	Steel cylinder tubing
SR†	Single acting spring retract rod end of cylinder
SS	303 Stainless steel piston rod
ST(-)	Stop tube on rod end of cylinder: ST
SV(- -)	Stroke signal valve(s): SV (head cap)
T(-)	Non-standard piston rod thread (specify thread)
TF(-)	Piston rod thread depth over standard (Female) (specify additional "A" length)
TS	Stainless steel cylinder tubing
TX(-)	Piston rod thread extension over standard (Male) (specify additional "A" length)
UB	Head and cap bumpers (Adds 1/4" per bumper to overall length)
V	FPM seals in cylinder
XI(-)	Type #10 trunnion set dimension (MT4 model only) (customer must specify length)

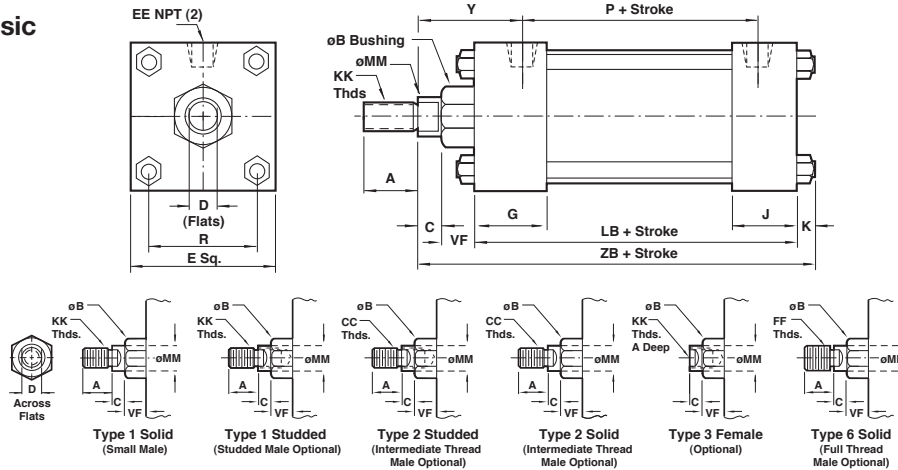
†Standard available for 1 1/2", 2", 2-1/2" bores, 12" max stroke. 12 lbs. force preload, 30 lbs. force compressed. Cushions not available on spring end. For other spring forces, bore sizes or longer strokes, consult factory.
 *Oversized ports may increase the overall length by 1/8", consult factory for impacted models.

Consult Factory for These Special Options:

Option Code	Description
AP	Air/Oil piston (piston supplied with O-ring hooded U-cup on cap end for air/oil operation)
BB	Cylinders mounted back to back
EN*	Electroless nickel plated cylinder
H	Piston rod seals O-ring loaded U-cups – (A & J Only)
RB	Rod boot over piston rod
UA	Unit-Air assembly (valve mounted to cylinder)
UC	Cap bumper (Adds 1/4" per bumper to overall length)
UH	Head bumper (Adds 1/4" per bumper to overall length)
TK	Thrust key plate mounting – [01 (MS4), 09 (MS2), and 15 (MS7)]
VM	Valve mounting only

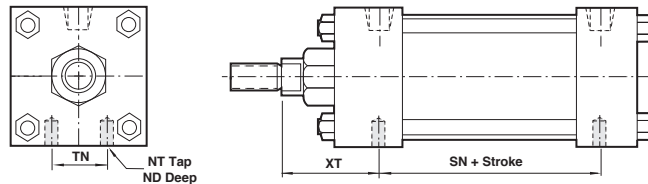
* When ordering "EN" option specify S, SS, TS options.

NFPA (MX0) 05 Basic Mount



Bore		1-1/2"	2"	2-1/2"	3-1/4"	4"	5"	6"	7"	8"	10"	12"
∅ Rod	Std.	5/8"	5/8"	5/8"	1"	1"	1"	1-3/8"	1-3/8"	1-3/8"	1-3/4"	2"
MM	O.S.	1"	1"	1"	1-3/8"	1-3/8"	1-3/8"	1-3/4"	1-3/4"	1-3/4"	2"	2-1/2"
A	Std.	.750	.750	.750	1.125	1.125	1.125	1.625	1.625	1.625	2.000	2.250
	O.S.	1.125	1.125	1.125	1.625	1.625	1.625	2.000	2.000	2.000	2.250	3.000
B +.000	Std.	1.124	1.124	1.124	1.499	1.499	1.499	1.999	1.999	1.999	2.374	2.624
	O.S.	1.499	1.499	1.499	1.999	1.999	1.999	2.374	2.374	2.374	2.624	3.124
C	Std.	.375	.375	.375	.500	.500	.500	.625	.625	.625	.750	.875
	O.S.	.500	.500	.500	.625	.625	.625	.750	.750	.750	.875	1.000
CC	Std.	1/2 - 20	1/2 - 20	1/2 - 20	7/8 - 14	7/8 - 14	7/8 - 14	1-1/4 - 12	1-1/4 - 12	1-1/4 - 12	1-1/2 - 12	1-3/4 - 12
	O.S.	7/8 - 14	7/8 - 14	7/8 - 14	1-1/4 - 12	1-1/4 - 12	1-1/4 - 12	1-1/2 - 12	1-1/2 - 12	1-1/2 - 12	1-3/4 - 12	2-1/4 - 12
D	Std.	.500	.500	.500	.813	.813	.813	1.125	1.125	1.125	1.500	1.688
	O.S.	.813	.813	.813	1.125	1.125	1.125	1.500	1.500	1.500	1.688	2.063
E	Std.	2.000	2.500	3.000	3.750	4.500	5.500	6.500	7.500	8.500	10.625	12.750
EE	Std.	.375	.375	.375	.500	.500	.500	.750	.750	.750	1.000	1.000
FF	Std.	5/8 - 18	5/8 - 18	5/8 - 18	1 - 14	1 - 14	1 - 14	1-3/8 - 12	1-3/8 - 12	1-3/8 - 12	1-3/4 - 12	2 - 12
	O.S.	1 - 14	1 - 14	1 - 14	1-3/8 - 12	1-3/8 - 12	1-3/8 - 12	1-3/4 - 12	1-3/4 - 12	1-3/4 - 12	2 - 12	2-1/2 - 12
G	Std.	1.500	1.500	1.500	1.750	1.750	1.750	2.000	2.000	2.000	2.250	2.250
J	Std.	1.000	1.000	1.000	1.250	1.250	1.250	1.500	1.500	1.500	2.000	2.000
K	Std.	.250	.313	.313	.375	.375	.438	.438	.563	.563	.688	.688
KK	Std.	7/16 - 20	7/16 - 20	7/16 - 0	3/4 - 16	3/4 - 16	3/4 - 16	1 - 14	1 - 14	1 - 14	1-1/4 - 12	1-1/2 - 12
	O.S.	3/4 - 16	3/4 - 16	3/4 - 16	1 - 14	1 - 14	1 - 14	1-1/4 - 12	1-1/4 - 12	1-1/4 - 12	1-1/2 - 12	1-7/8 - 12
LB	Std.	3.625	3.625	3.750	4.250	4.250	4.500	5.000	5.125	5.125	6.375	6.875
P	Std.	2.340	2.340	2.470	2.690	2.690	2.940	3.125	3.250	3.250	4.125	4.625
R	Std.	1.428	1.838	2.192	2.758	3.323	4.101	4.87	5.730	6.442	8.004	9.4069
VF	Std.	.625	.625	.625	.875	.875	.875	1.000	1.000	1.000	1.125	1.125
	O.S.	.875	.875	.875	1.000	1.000	1.000	1.125	1.125	1.125	1.125	1.250
Y	Std.	1.840	1.840	1.840	2.380	2.380	2.380	2.813	2.813	2.813	3.125	3.250
	O.S.	2.220	2.220	2.220	2.630	2.630	2.630	3.063	3.063	3.063	3.250	3.500
ZB	Std.	4.875	4.938	5.063	6.000	6.000	6.313	7.063	7.313	7.313	8.938	9.563
	O.S.	5.250	5.313	5.438	6.250	6.250	6.563	7.313	7.563	7.563	9.063	9.813

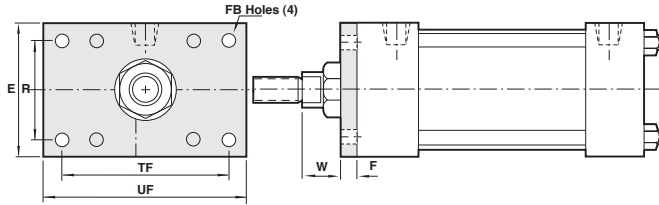
NFPA (MS4) 01 Side Tapped Mount



Bore		1-1/2"	2"	2-1/2"	3-1/4"	4"	5"	6"	7"	8"	10"	12"
ND	Std.	.375	.375	.500	.750	.750	.938	1.125	1.125	1.125	1.500	1.500
NT	Std.	1/4 - 20	5/16 - 18	3/8 - 16	1/2 - 13	1/2 - 13	5/8 - 11	3/4 - 10	3/4 - 10	3/4 - 10	1 - 8	1 - 8
SN	Std.	2.250	2.250	2.375	2.625	2.625	2.875	3.125	3.250	3.250	4.125	4.625
TN	Std.	.625	.875	1.250	1.500	2.063	2.688	3.250	3.500	4.500	5.500	7.250
XT	Std.	1.938	1.938	1.938	2.438	2.438	2.438	2.813	2.813	2.813	3.125	3.250
	O.S.	2.313	2.313	2.313	2.688	2.688	2.688	3.063	3.063	3.063	3.250	3.500

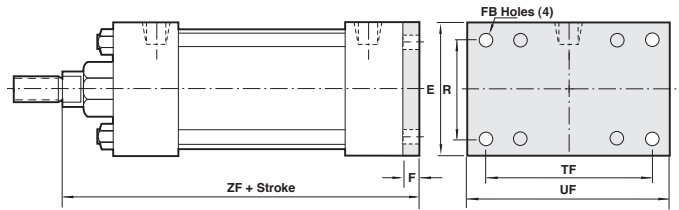
All dimensions ± .015 unless otherwise noted.

NFPA (MF1) 03 Head Rectangular Flange Mount



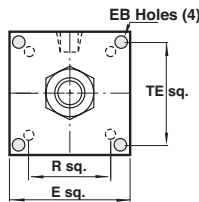
Bore	1-1/2"	2"	2-1/2"	3-1/4"	4"	5"	6"
E	2.000	2.500	3.000	3.750	4.500	5.500	6.500
F	.375	.375	.375	.625	.625	.625	.750
FB	.313	.375	.375	.438	.438	.563	.563
R	1.428	1.838	2.192	2.758	3.323	4.101	4.879
TF	2.750	3.375	3.875	4.688	5.438	6.625	7.625
UF	3.375	4.125	4.625	5.500	6.250	7.625	8.625
W	Std. .625	.625	.625	.750	.750	.750	.875
O.S.	1.000	1.000	1.000	1.000	1.000	1.000	1.125

NFPA (MF2) 04 Cap Rectangular Flange Mount



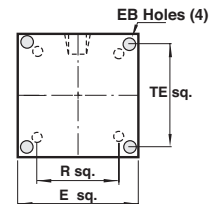
Bore	1-1/2"	2"	2-1/2"	3-1/4"	4"	5"	6"
E	2.000	2.500	3.000	3.750	4.500	5.500	6.500
F	.375	.375	.375	.625	.625	.625	.750
FB	.313	.375	.375	.438	.438	.563	.563
R	1.428	1.838	2.192	2.758	3.323	4.101	4.879
TF	2.750	3.375	3.875	4.687	5.438	6.625	7.625
UF	3.375	4.125	4.625	5.500	6.250	7.625	8.625
ZF	Std. 5.000	5.000	5.125	6.250	6.250	6.500	7.375
O.S.	5.375	5.375	5.500	6.500	6.500	6.750	7.625

NFPA (ME3) 03 Head Square Mount



Bore	7"	8"	10"	12"
E	7.500	8.500	10.625	12.750
EB	.563	.688	.813	.813
R	5.730	6.442	8.004	9.406
TE	6.750	7.570	9.406	11.109

NFPA (ME4) 04 Cap Square Mount

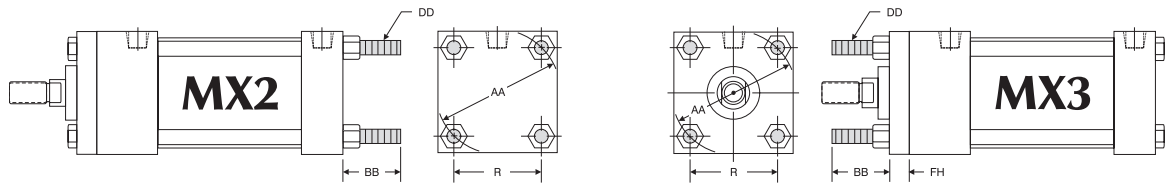
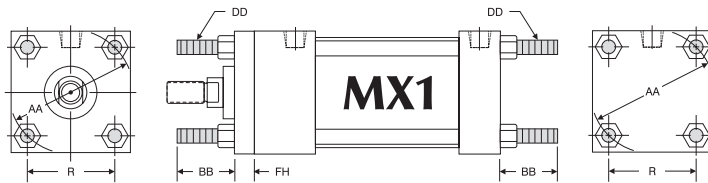


Bore	7"	8"	10"	12"
E	7.500	8.500	10.625	12.750
EB	.563	.688	.813	.813
R	5.730	6.442	8.004	9.406
TE	6.750	7.570	9.406	11.109

NFPA (MX1) 06 (4) Extended Tie Rods Both Ends Mount

NFPA (MX2) 6C Cap Tie Rods Extended Mount

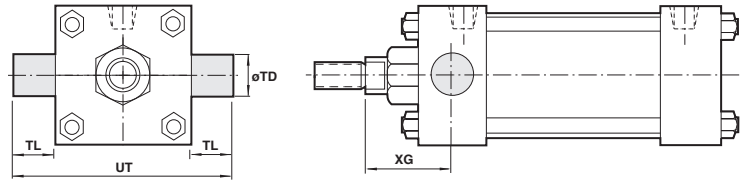
NFPA (MX3) 6R Head Tie Rods Extended Mount



Bore	1-1/2"	2"	2-1/2"	3-1/4"	4"	5"	6"	7"	8"	10"	12"
AA	2.020	2.600	3.100	3.900	4.700	5.800	6.900	8.100	9.100	11.313	13.313
BB	1.000	1.125	1.125	1.375	1.375	1.813	1.813	2.313	2.313	2.688	2.688
C	Std. .375	.375	.375	.500	.500	.500	.625	.625	.625	.750	.875
O.S.	.500	.500	.500	.625	.625	.625	.750	.625	.750	.875	1.000
DD	1/4 - 28	5/16 - 24	5/16 - 24	3/8 - 24	3/8 - 24	1/2 - 20	1/2 - 20	5/8 - 18	5/8 - 18	3/4 - 16	3/4 - 16
F	.375	.375	.375	.625	.625	.625	.750	—	—	—	—
K	.250	.313	.313	.375	.375	.438	.438	.563	.563	.688	.688
R	1.428	1.838	2.192	2.758	3.323	4.101	4.879	5.730	6.442	8.004	9.406
VF	Std. .625	.625	.625	.875	.875	.875	1.000	1.000	1.000	1.125	1.125
O.S.	.875	.875	.875	1.000	1.000	1.000	1.125	1.125	1.125	1.125	1.250
ZB	Std. 4.875	4.938	5.063	6.000	6.000	6.313	7.063	7.313	7.313	8.938	9.563
O.S.	5.250	5.313	5.438	6.250	6.250	6.563	7.313	7.563	7.563	9.063	9.813

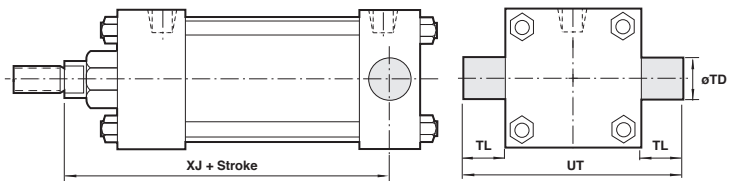
All dimensions ± .015 unless otherwise noted.

NFPA (MT1) 7R & 07 Head Trunnion Mount



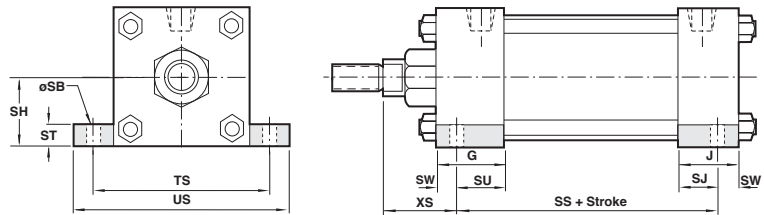
Bore	1-1/2"	2"	2-1/2"	3-1/4"	4"	5"	6"	7"	8"	10"	12"
TD +.000 -.001	1.000	1.000	1.000	1.000	1.000	1.000	1.375	1.375	1.375	1.750	1.750
TL	1.000	1.000	1.000	1.000	1.000	1.000	1.375	1.375	1.375	1.750	1.750
UT	4.000	4.500	5.000	5.750	6.500	7.500	9.250	10.250	11.250	14.125	16.250
XG Std.	1.750	1.750	1.750	2.250	2.250	2.250	2.625	2.625	2.625	3.000	3.125
O.S.	2.125	2.125	2.125	2.500	2.500	2.500	2.875	2.875	2.875	3.125	3.375

NFPA (MT2) 8R & 08 Cap Trunnion Mount



Bore	1-1/2"	2"	2-1/2"	3-1/4"	4"	5"	6"	7"	8"	10"	12"
TD +.000 -.001	1.000	1.000	1.000	1.000	1.000	1.000	1.375	1.375	1.375	1.750	1.750
TL	1.000	1.000	1.000	1.000	1.000	1.000	1.375	1.375	1.375	1.750	1.750
UT	4.000	4.500	5.000	5.750	6.500	7.500	9.250	10.250	11.250	14.125	16.250
XG Std.	4.125	4.125	4.250	5.000	5.000	5.250	5.875	6.000	6.000	7.250	7.875
O.S.	4.500	4.500	4.625	5.250	5.250	5.500	6.125	6.250	6.250	7.375	8.125

NFPA (MS2) 09 Side Lug Mount



Bore	1-1/2"	2"	2-1/2"	3-1/4"	4"	5"	6"	7"	8"	10"	12"
G	1.500	1.500	1.500	1.750	1.750	1.750	2.000	2.000	2.000	2.250	2.250
J	1.000	1.000	1.000	1.250	1.250	1.250	1.500	1.500	1.500	2.000	2.000
SB	.438	.438	.438	.563	.563	.813	.813	.813	.813	1.063	1.063
SH	1.000	1.250	1.500	1.875	2.250	2.750	3.250	3.750	4.250	5.313	6.375
SJ	.625	.625	.625	.750	.750	.813	.813	.813	.813	2.000	2.000
SS	2.875	2.875	3.000	3.250	3.250	3.125	3.625	3.750	3.750	4.625	5.125
ST	.500	.500	.500	.750	.750	1.000	1.000	1.000	1.000	1.250	1.250
SU	1.125	1.125	1.125	1.250	1.250	1.063	1.563	1.563	1.563	2.000	2.000
SW	.375	.375	.375	.500	.500	.688	.688	.688	.688	.875	.875
TS	2.750	3.250	3.750	4.750	5.500	6.875	7.875	8.875	9.875	12.375	14.500
US	3.500	4.000	4.500	5.750	6.500	8.250	9.250	10.250	11.250	14.125	16.250
XS Std.	1.375	1.375	1.375	1.875	1.875	2.062	2.313	2.313	2.313	2.750	2.875
O.S.	1.750	1.750	1.750	2.125	2.125	2.313	2.562	2.563	2.563	2.875	3.125

All dimensions ± .015 unless otherwise noted.