

Series N Actuators 1-1/8" to 4" bore sizes NFFPA Interchangeable



- Cylinders rated to 250 PSI air,
- Designed for non-lube service.
- Switches available on all bore sizes.

Technical features

Medium:

Filtered compressed air to 250 psi

Operating Temperatures:

-20°F to 200°F
(-29°C to 93°C)

Operating Pressure:

250 psig (17.2 bar)
1-1/8" Bore pressure rating:
150 psi

Bore Sizes:

1-1/8", 1-1/2", 2", 2-1/2",
3-1/4", 4"

Materials:

Head and end caps - black anodised aluminum alloy
Tube: Aluminum, clear anodised O.D., hard coat anodised I.D.
Piston Rod: Hard chrome plated steel

Piston: Machined, high-strength aluminum alloy
Rod Bearings: Oil impregnated sintered iron
Seals: nitrile
Tie Rods: High tensile strength steel

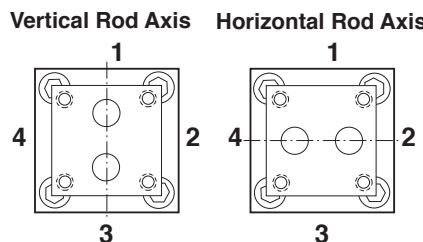
Options selector

N C 0 4 J - E 0 2 - A M C 0 0

Series	Substitute	
Series N	N	
Series Q Electroless Nickel	Q	
Bore	Single Rod End	Double Rod End
1-1/8"	B	P
1-1/2"	C	Q
2"	D	R
2-1/2"	E	S
3-1/4"	F	T
4"	G	U
Strokes in inches	Substitute	
0" Stroke	00	
1" Stroke	01	
2" Stroke	02	
3" Stroke	03	
4" Stroke	04	
5" Stroke	05	
6" Stroke	06	
...	...	
30" Stroke	30	
Fractional Increments of Stroke	Substitute	
0"	A	1/2" J
1/16"	B	9/16" K
1/8"	C	5/8" M
3/16"	D	11/16" N
1/4"	E	3/4" P
5/16"	F	13/16" R
3/8"	G	7/8" S
7/16"	H	15/16" T
Rod Axis	Substitute	
Horizontal Rod Axis	E	
Vertical Rod Axis	N	
Blank Rod End - Horizontal Rod**	C	
Blank Rod End - Vertical Rod**	D	

Options	Substitute			
No Options	O			
Air/Oil Piston	P			
Double Rod W/OS Cap Rod	R			
Stainless Piston Rods	S			
FPM Seals	V			
Magnetic Option	Substitute			
No Magnet	O			
Magnetic Piston	M			
Design Level	Substitute			
Design Level	C			
Cushions†	Substitute			
Needle Position	1	2**	3	4
No Cushions	A			
Head Only	B	C	D	E
Cap Only	G	H	J	K
Head and Cap	N	M	P	R
Ports	Substitute			
Position	1**	2	3	4
Standard	A	B	C	D
Mounting Options	Substitute			
No Mounts (MX0)	01			
Bottom Tap (MS4)	02			
Front Flange (MF1)	04			
Rear Flange (MF2)	05			
Det. Clevis (MP2)	07			
Det. Eye (MP4)	18			
Base Bar	20			

Note: Double Rod with Oversize Cap Rod not available on 1-1/2" bore.
†Cushions not available on 1-1/8" Bore.
**Standard position

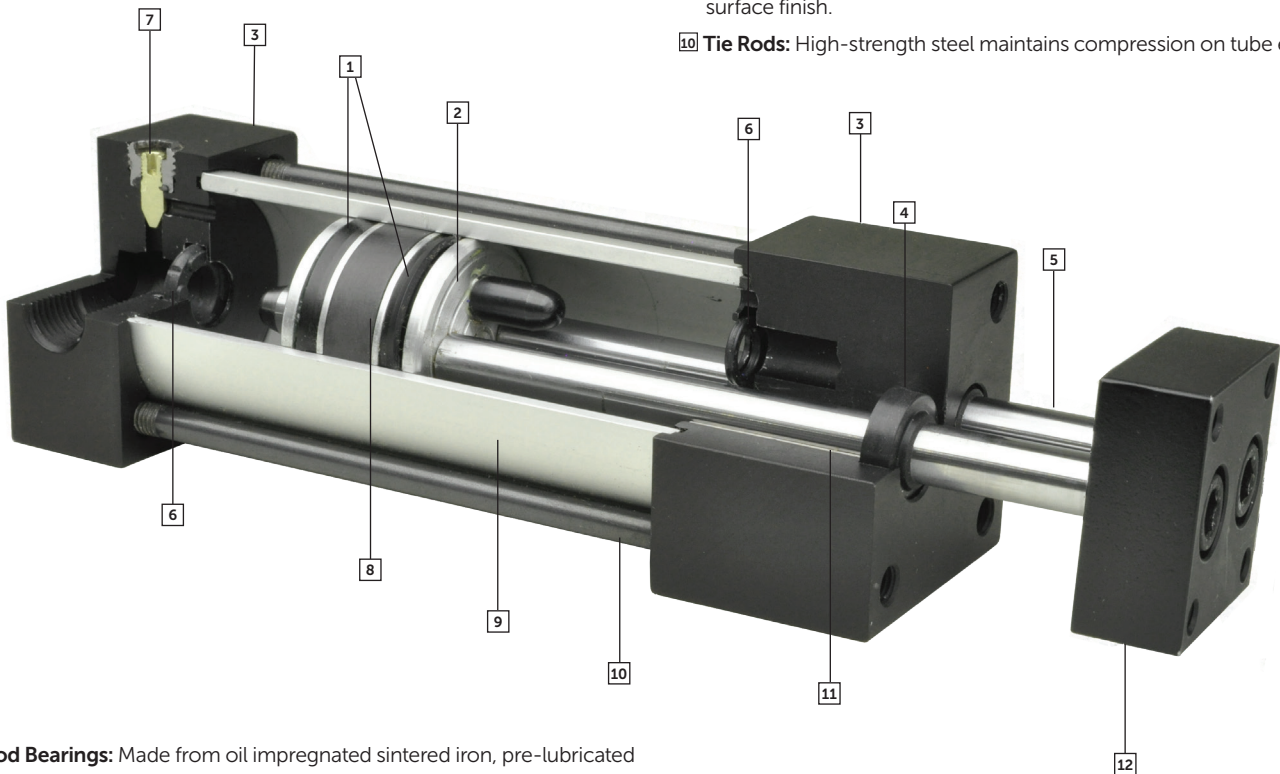


Port, and Cushion Needle Positions
(As viewed from twin rod end)

* Double Rod End has two Piston Rods on one end and one Piston Rod on opposite end.
** Does not include tooling plate

- 1 **Piston Seals:** Lip-type nitrile seals are pressure energized and wear compensating. Their excellent lubrication retention characteristics lower seal friction to ensure long life.
- 2 **Piston:** Solid aluminum alloy, light-weight for low inertia, yet strong.
- 3 **Head/Cap:** Precision machined from solid aluminum bar, anodised for corrosion resistance.
- 4 **Rod Seal/Wiper:** Combination rod seal & wiper in one. One end is a lip-type seal that is pressure energized and wear compensating. The opposite side is a lip-type wiper designed to keep contaminants from getting into the cylinder by aggressively wiping foreign materials from the piston rod, enhancing the rod seal life. Made from a long-wearing nitrile material and is suitable for "no lube added" operation.
- 5 **Piston Rods:** High-strength, hard-chrome plated, ground and polished steel.

- 6 **Ultra Cushion®:** State-of-the-art design features a unique, one-piece, nitrile compound seal, captured within a precision machined groove. Linear and radial "float" of cushion seal eliminates misalignment. Ultra Cushions provide exceptionally fast "out of cushion" stroke reversal. (Head and Cap Cushions are optional.)
- 7 **Adjustable Captive Cushion Needle:** A one-piece, precision threaded stainless steel cushion adjustment screw with a threaded stainless steel capture. It provides a safe and precise cushion adjustment.
- 8 **Wear Strip:** PTFE and graphite composition for minimum friction, maximum wear and side load resistance. (Magnetic band under wear strip optional.)
- 9 **Tube:** Aluminum alloy ideally suited for air service. Tube is clear anodised on the O.D. and "hard anodic coated" on the I.D. resulting in a smooth, file-hard (60RC), corrosion-resistant and score-resistant surface finish.
- 10 **Tie Rods:** High-strength steel maintains compression on tube end seals.



- 11 **Rod Bearings:** Made from oil impregnated sintered iron, pre-lubricated for extremely long life.
- 12 **Tooling Plate:** Machined from one piece solid steel. Modular and pilot adaptor plates are available to add to the tooling plate mounting. (Use of modular and pilot adapter plates adds to overall length.)

Series Q

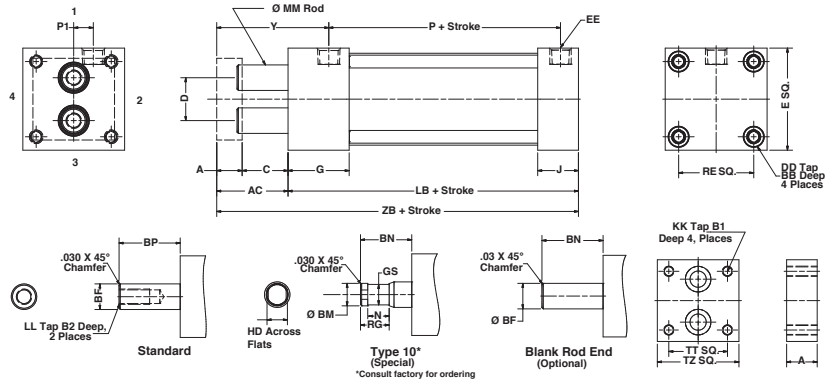
Series Q cylinders are designed for corrosive environments. They are identical to the Series N in design, function, and dimensions, but have electroless nickel plating and stainless steel components to create significant resistance to corrosion.

Features:

Head, cap, mounts, tooling plate, tie rod nuts, and screws are plated with electroless nickel to a minimum thickness of .0005". Piston rod, tie rods, tube, and cushion needles are made from 300 series stainless steel.

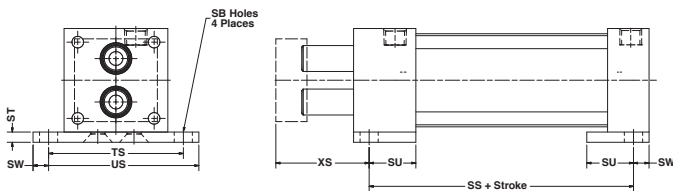
Basic Actuator 01 (MX0)

*Head Port is off center on vertical rod axis with port in position 1 or 3, horizontal rod axis with port in position 2 or 4.



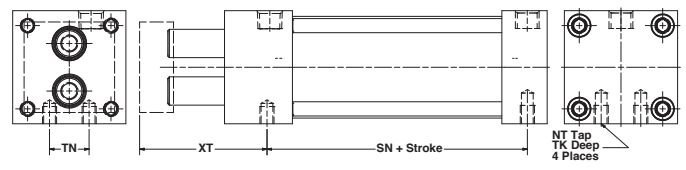
Bore	A	AC	B1	B2	BB	BF	BM	BN	BP	C	D	DD	E	EE	G	GS
1-1/8"	0.625	1.5	0.5	0.5	0.188	0.313	0.27	1.5	1.063	0.875	0.627	10 - 32	1.5	1/8	0.875	0.19
1-1/2"	0.625	1.875	Thru	0.625	0.312	0.375	0.33	1.875	1.375	1.25	0.75	1/4 - 28	2	1/4	1.5	0.25
2"	0.75	1.875	Thru	0.625	0.312	0.625	0.55	1.875	1.25	1.125	1.052	5/16 - 24	2.5	1/4	1.5	0.5
2-1/2"	0.75	2.125	Thru	0.75	0.312	0.625	0.55	2.125	1.5	1.375	1.398	5/16 - 24	3	1/4	1.5	0.5
3-1/4"	1.25	2.375	Thru	1	0.437	1	0.99	2.375	1.25	1.125	2	3/8 - 24	3.75	3/8	1.75	0.75
4"	1.25	2.375	Thru	1	0.437	1	0.99	2.375	1.25	1.125	2.36	3/8 - 24	4.5	3/8	1.75	0.75
Bore	N	HD	J	KK	LB	LL	MM	P	P1	RE	RG	TT	TZ	Y	ZB	
1-1/8"	0.4	0.25	0.625	6 - 32	2.25	1/4 - 28	0.312	1.469	0.241	1.125	0.58	0.75	1.25	2.031	3.75	
1-1/2"	0.4	0.312	1	10 - 32	3.625	5/16 - 24	0.375	2.125	0.303	1.428	0.58	1.125	1.5	2.875	5.5	
2"	0.526	0.5	1	1/4 - 28	3.625	5/16 - 24	0.625	2.125	0.48	1.84	0.705	1.43	2	2.875	5.5	
2-1/2"	0.526	0.5	1	5/16 - 24	3.75	3/8 - 24	0.625	2.25	0.635	2.192	0.705	1.84	2.5	3.125	5.875	
3-1/4"	0.784	0.812	1.25	3/8 - 24	4.25	1/2 - 20	1	2.625	0.845	2.758	1.205	1.76	3.25	3.437	6.625	
4"	0.784	0.812	1.25	3/8 - 24	4.25	1/2 - 20	1	2.625	0.875	3.323	1.205	3.44	4	3.437	6.625	

Cylinder with 20 (not NFPA) Base Bar



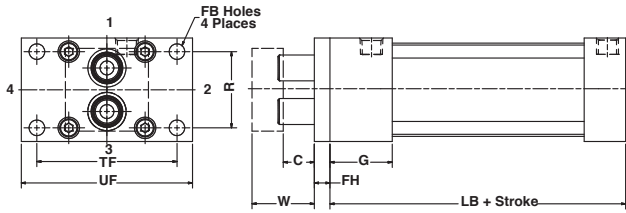
Bore	F	G	LB	SB	SS	ST	SU	SW	TS	US	XS
1-1/8"	0.25	1	2.25	0.203	1.75	0.25	0.75	0.25	1.875	2.375	1.75
1-1/2"	0.375	1.5	3.625	0.437	2.875	0.25	1.125	0.375	2.75	3.5	2.25
2"	0.375	1.5	3.625	0.437	2.875	0.25	1.125	0.375	3.25	4.0	2.25
2-1/2"	0.375	1.5	3.75	0.437	3	0.375	1.125	0.375	3.75	4.5	2.5
3-1/4"	0.625	1.75	4.25	0.563	3.25	0.5	1.25	0.5	4.75	5.75	2.875
4"	0.625	1.75	4.25	0.563	3.25	0.5	1.25	0.5	5.5	6.5	2.875

Cylinder with 02 (MS4) Bottom Tap Mount



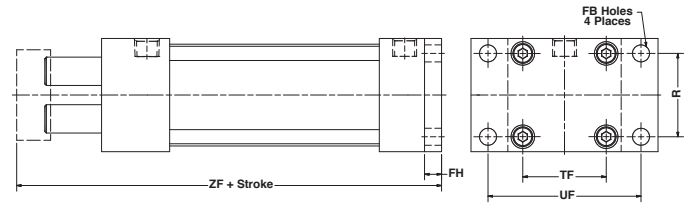
Bore	NT	SN	TK	TN	XT
1-1/8"	10 - 32	1.5	0.25	0.5	2
1-1/2"	1/4 - 20	2.25	0.375	0.625	2.812
2"	5/16 - 18	2.25	0.375	0.875	2.812
2-1/2"	3/8 - 16	2.375	0.625	1.25	3.063
3-1/4"	1/2 - 13	2.625	0.625	1.5	3.437
4"	1/2 - 13	2.625	0.75	2.063	3.437

Cylinder with 04 (MF1) Front Flange



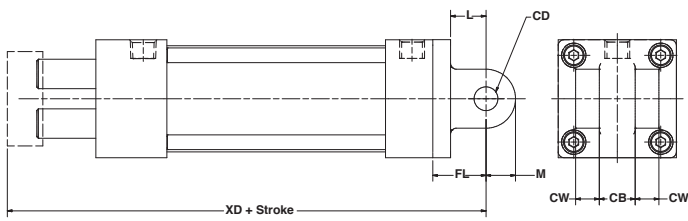
Bore	C	FB	FH	R	TF	UF	W
1-1/8"	0.625	0.219	0.25	1	2	2.5	1.25
1-1/2"	0.875	0.312	0.375	1.43	2.75	3.75	1.5
2"	0.75	0.375	0.375	1.84	3.375	4.125	1.5
2-1/2"	1	0.375	0.375	2.19	3.875	4.625	1.75
3-1/4"	0.5	0.437	0.625	2.76	4.688	5.5	1.75
4"	0.5	0.437	0.625	3.32	5.437	6.25	1.75

Cylinder with 05 (MF2) Rear Flange



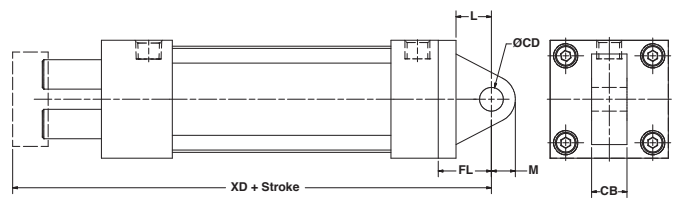
Bore	FB	FH	TF	UF	ZF
1-1/8"	0.219	0.25	2	2.5	4
1-1/2"	0.312	0.375	2.75	3.75	5.875
2"	0.375	0.375	3.375	4.125	5.875
2-1/2"	0.375	0.375	3.875	4.625	6.25
3-1/4"	0.437	0.625	4.688	5.5	7.25
4"	0.437	0.625	5.437	6.25	7.25

Cylinder with 07 (MP2) Detachable Clevis



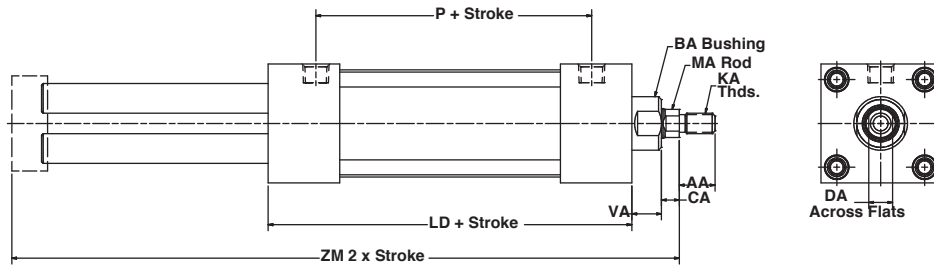
Bore	CB	CD	CW	FL	L	M	XD
1-1/8"	0.375	0.375	0.25	1.125	0.625	0.375	4.875
1-1/2"	0.75	0.5	0.5	1.125	0.75	0.625	6.625
2"	0.75	0.5	0.5	1.125	0.75	0.625	6.625
2-1/2"	0.75	0.5	0.5	1.125	0.75	0.625	7
3-1/4"	1.25	0.75	0.625	1.875	1.25	0.875	8.5
4"	1.25	0.75	0.625	1.875	1.25	0.875	8.5

Cylinder with 18 (MP4) Detachable Cap Eye



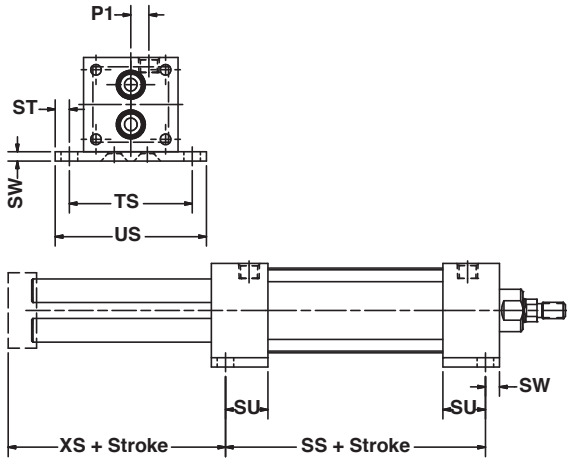
Bore	CB	CD	FL	L	M	XD
1-1/8"	0.375	0.375	1.125	0.625	0.375	4.875
1-1/2"	0.75	0.5	1.125	0.75	0.625	6.625
2"	0.75	0.5	1.125	0.75	0.625	6.625
2-1/2"	0.75	0.5	1.125	0.75	0.625	7
3-1/4"	1.25	0.75	1.875	1.25	0.875	8.375
4"	1.25	0.75	1.875	1.25	0.875	8.375

Double Rod End Cylinder with 01 (MX0) Basic



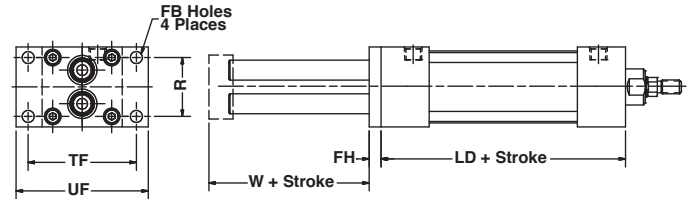
Bore	AA	BA	CA	DA	KA	LD	MA	P	VA	ZM	
1-1/8"	Standard	0.625	0.75	0.25	0.312	3/8 - 24	12.875	0.375	11.844	0.125	14.625
	Oversize	0.75	1.00	0.25	0.437	1/2 - 20		0.5		0.125	
1-1/2"	Standard	0.75	1.125	0.375	0.5	7/16 - 20	4.125	0.625	2.125	0.625	7.00
2"	Standard	0.75	1.125	0.375	0.5	7/16 - 20	4.125	0.625	2.125	0.625	7.00
	Oversize	1.125	1.5	0.5	0.812	3/4 - 16		1.00		0.875	
2-1/2"	Standard	.75	1.125	0.375	0.5	7/16 - 20	4.25	0.625	2.25	0.625	7.35
	Oversize	1.125	1.5	0.5	0.812	3/4 - 16		1.00		0.875	
3-1/4"	Standard	1.125	1.5	0.5	0.812	3/4 - 16	4.75	1.00	2.625	0.875	8.50
	Oversize	1.625	2	0.625	1.125	1 - 14		1.375		1	
4"	Standard	1.125	1.5	0.5	0.812	3/4 - 16	4.75	1.00	2.625	0.875	8.5
	Oversize	1.625	2	0.625	1.125	1 - 14		1.375		1	

Double Rod End w/20 (not NFPA) base bar

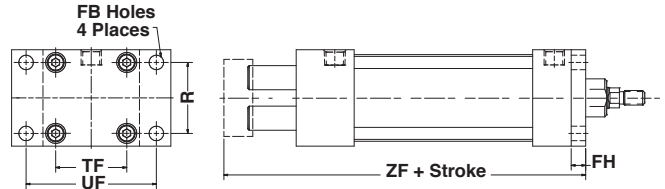


Bore	F	SB	SS	ST	SU	SW	TS	US	XS
1-1/8"	0.25	0.203	2.25	0.25	0.75	0.25	1.875	2.375	1.75
1-1/2"	0.375	0.437	3.375	0.25	1.125	0.375	2.75	3.5	2.25
2"	0.375	0.437	3.375	0.25	1.125	0.375	3.25	4	2.25
2-1/2"	0.375	0.437	3.5	0.375	1.125	0.375	3.75	4.5	2.25
3-1/4"	0.625	0.563	3.75	0.5	1.25	0.5	4.75	5.75	2.875
4"	0.625	0.563	3.75	0.5	1.25	0.5	5.5	6.5	2.875

Double Rod End w/04 (MF1) Front Flange

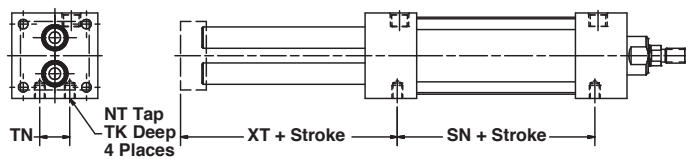


Double Rod End w/05 (MF2) Rear Flange



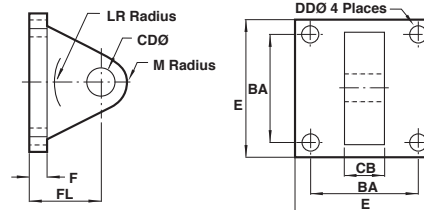
Bore	FB	FH	LD	R	TF	UF	W
1-1/8"	0.219	0.250	2.875	1	2	2.5	1.25
1-1/2"	0.312	0.375	4.125	1.43	2.75	3.75	1.5
2"	0.375	0.375	4.125	1.84	3.375	4.125	1.5
2-1/2"	0.375	0.375	4.25	2.19	3.875	4.625	1.75
3-1/4"	0.437	0.625	4.75	2.76	4.688	5.5	1.75
4"	0.437	0.625	4.75	3.32	5.437	6.25	1.75

Double Rod End w/02 (MS4) bottom tap



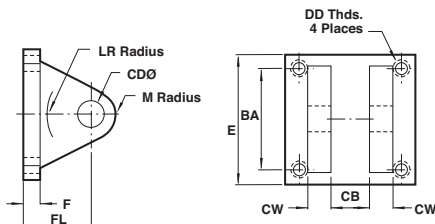
Bore	NT	SN	TK	TN	XT
1-1/8"	10 - 32	1.875	0.25	0.5	2
1-1/2"	1/4 - 20	2.25	0.375	0.625	2.812
2"	5/16 - 18	2.25	0.375	0.875	2.812
2-1/2"	3/8 - 16	2.375	0.625	1.25	3.063
3-1/4"	1/2 - 13	2.625	0.625	1.5	3.437
4"	1/2 - 13	2.625	0.75	2.063	3.437

NFPA Eye Bracket Dimensions



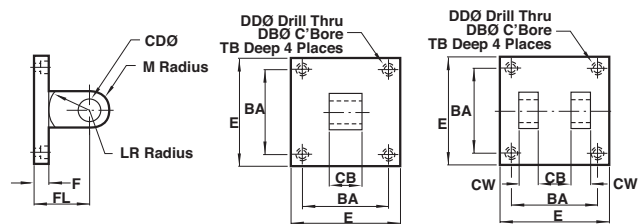
Bore	BA	CB	CD	DD	E	F	FL	LR	M
49021	1.625	.750	.500	.406	2.500	.375	1.125	.750	.50
49020	2.562	1.250	.750	.531	3.500	.625	1.875	1.250	.750
49019	3.250	1.500	1.000	.656	4.500	.750	2.250	1.500	1.000

NFPA Clevis Bracket Dimensions



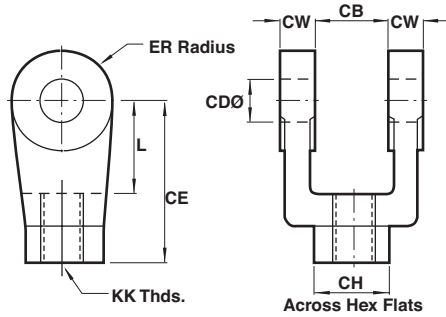
BA	CB	CD	CW	DD	E	F	FL	LR	M
49250	1.625	.750	.50	3/8-24	2.50	.375	1.125	.750	.500
49251	2.562	1.250	.750	1/2-20	3.500	.625	1.875	1.250	.812
49252	3.250	1.500	1.000	5/8-18	4.500	.750	2.250	1.500	1.000

1-1/8" Bore Eye & Clevis Bracket Dimensions



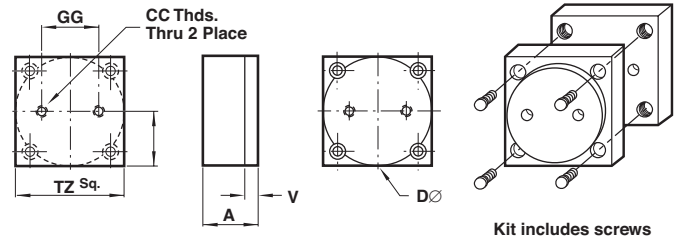
BA	CB	CD	CW	DB	DD	E	F	FL	LA	M	TB	
W-89-225K Eye	1.125	.375	.375	-	.328	.203	1.500	.500	1.125	.625	.375	.312
W-91-225K Clevis	1.150	.375	.375	.250	.328	.203	1.500	.500	1.125	.625	.375	.312

Rod Clevis Dimensions



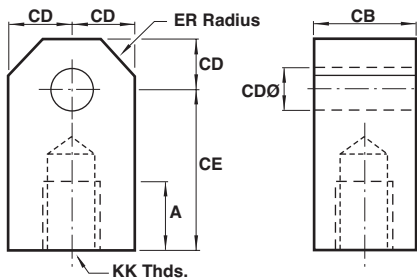
Bore	CB	CD	CE	CH	CW	ER	KK	L
49029	.750	.500	1.500	1.000	.500	.500	1/2-20	.750
49030	1.250	.750	2.375	1.250	.625	.750	3/4-16	1.250
49032	1.500	1.000	3.125	1.500	.750	1.000	1-14	1.500

Pilot Adaptor Plate Dimensions



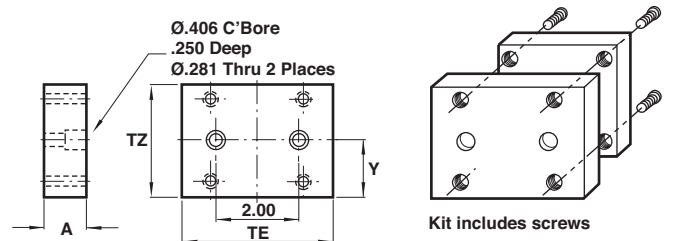
Bore	A	CC	D	GG	TZ	V	Y
NB-171-225K (1-1/8)	.625	1/4-20	1.260	.750	1.25	.160	.625
NB-171-03K (1-1/2")	.625	5/16-18	1.575	.860	1.500	.160	.750
NB-171-04K(2")	.625	5/16-18	1.969	1.180	2.000	.200	1.000
NB-171-05K (2-1/2")	.625	3/8-16	2.480	1.500	2.500	.200	1.250
NB-171-065K (3/4")	.875	1/2-13	3.150	1.970	3.250	.200	1.625
NB-171-08K (4")	.875	1/2-13	3.937	2.760	4.000	.200	2.000

Rod Eye Dimensions



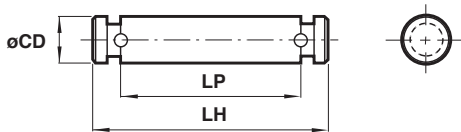
	CB	CD	CE	ER	KK
49014	.750	.500	1.500	.562	1/2-20
49013	1.250	.750	2.062	.937	3/4-16
49011	1.500	1.000	2.812	1.125	1-14

Modular Adaptor Plate Dimensions



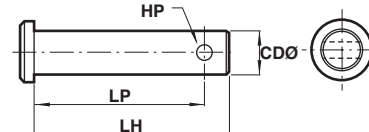
Bore	A	TE	TZ	Y
NB-172-225K (1-1/8")	0.625	3.00	1.25	0.625
NB-172-03K (1-1/2")	0.625	3.00	1.50	0.75
NB-172-04K (2")	0.625	3.00	2.00	1.00
NB-172-05K (2-1/2")	0.625	3.00	2.50	1.25

NFPA Pin Dimensions

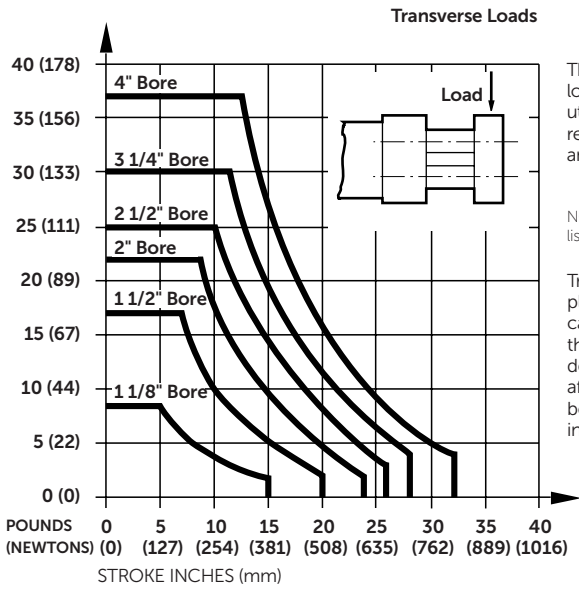


	CD	LH	LP
49006-R	.500	2.219	1.875
49005-R	.750	3.125	2.750
49004-R	1.000	3.750	3.250

Standard Pin Dimensions



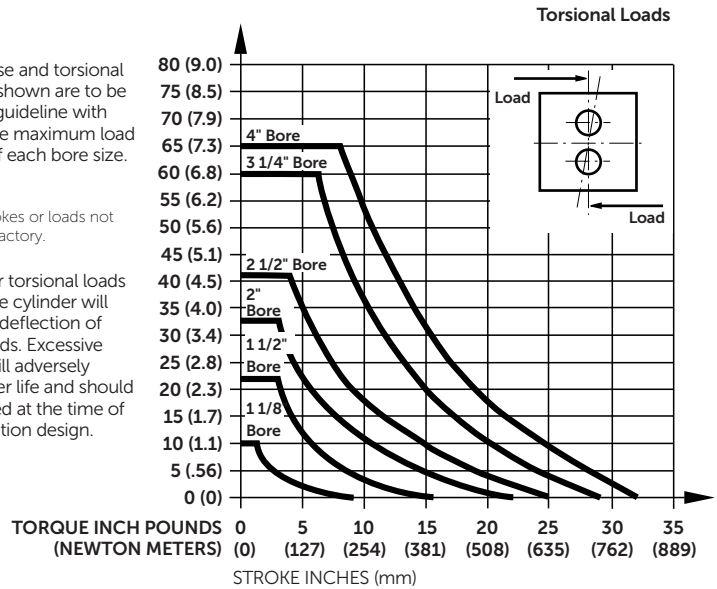
	CD	HP	LH	LP
49206	.500	.156	2.250	2.093
49205	.750	.156	3.000	2.843
49204	1.000	.203	3.500	3.297



The transverse and torsional load graphs shown are to be utilized as a guideline with respect to the maximum load and stroke of each bore size.

NOTE: For strokes or loads not listed consult factory.

Transverse or torsional loads placed on the cylinder will cause some deflection of the piston rods. Excessive deflection will adversely affect cylinder life and should be considered at the time of initial application design.



Theoretical Extend and Retract Forces in pounds (newtons)

Bore	Movement	Effective Piston Area In ² (cm ²)	PSI (bar)																Cu Ft (cm ³) Displacement Per In of Stroke
			20	(1)	40	(3)	50	(3)	60	(4)	80	(6)	100	(7)	125	(9)	150	(10)	
1-1/8"	Extend	.99 (6.41)	20 (88)	40 (177)	50 (221)	60 (265)	80 (354)	99 (442)	124 (553)	149 (664)	.00058 (16)								
	Retract	.84 (5.43)	17 (75)	34 (150)	42 (187)	50 (225)	67 (299)	84 (374)	105 (468)	126 (561)	.00049 (14)								
1-1/2"	Extend	1.77 (11.40)	35 (157)	71 (315)	88 (393)	106 (472)	141 (629)	177 (786)	221 (983)	265 (1179)	.00102 (29)								
	Retract	1.55 (9.97)	31 (138)	62 (275)	77 (344)	93 (413)	124 (550)	155 (688)	193 (860)	232 (1032)	.00089 (25)								
2"	Extend	3.14 (20.27)	63 (280)	126 (559)	157 (699)	189 (839)	251 (1119)	314 (1398)	393 (1748)	471 (2097)	.00182 (52)								
	Retract	2.53 (16.31)	51 (225)	101 (450)	126 (562)	152 (675)	202 (900)	253 (1125)	316 (1406)	379 (1687)	.00146 (41)								
2-1/2"	Extend	4.91 (31.67)	98 (437)	196 (874)	245 (1092)	295 (1311)	393 (1748)	491 (2185)	614 (2731)	736 (3277)	.00284 (80)								
	Retract	4.30 (27.71)	86 (382)	172 (765)	215 (956)	258 (1147)	344 (1529)	430 (1911)	537 (2389)	644 (2867)	.00249 (71)								
3-1/4"	Extend	8.30 (53.32)	166 (738)	332 (1477)	415 (1846)	498 (2215)	664 (2953)	830 (3692)	1037 (4615)	1244 (5538)	.00480 (136)								
	Retract	7.51 (48.45)	150 (668)	300 (1337)	376 (1671)	451 (2005)	601 (2674)	751 (3342)	939 (4177)	1127 (5013)	.00435 (123)								
4"	Extend	12.57 (81.07)	251 (1118)	503 (2237)	628 (2796)	754 (3355)	1005 (4473)	1257 (5592)	1571 (6990)	1885 (8388)	.00727 (206)								
	Retract	11.78 (76.01)	236 (1049)	471 (2097)	589 (2621)	707 (3146)	943 (4194)	1178 (5243)	1473 (6553)	1767 (7864)	.00682 (193)								
Extend Double Rod Forces																			
1-1/8"	Standard	.88 (5.69)	18 (79)	35 (157)	44 (196)	53 (235)	71 (314)	88 (392)	110 (491)	132 (589)	.00051 (14)								
	Oversize	.80 (5.15)	16 (71)	32 (142)	40 (178)	48 (213)	64 (284)	80 (355)	100 (444)	120 (533)	.00047 (13)								
1-1/2"	Standard	1.46 (9.42)	29 (130)	58 (260)	73 (325)	88 (390)	117 (520)	146 (650)	183 (812)	219 (975)	.00084 (24)								
	Oversize	.98 (6.34)	20 (87)	39 (175)	49 (218)	59 (262)	79 (350)	98 (437)	123 (546)	147 (655)	.00057 (16)								
2"	Standard	2.84 (18.29)	57 (252)	113 (505)	142 (631)	170 (757)	227 (1009)	284 (1262)	354 (1577)	425 (1892)	.00164 (46)								
	Oversize	2.36 (15.21)	47 (210)	94 (420)	118 (524)	141 (629)	189 (839)	236 (1049)	295 (1311)	354 (1573)	.00137 (39)								
2-1/2"	Standard	4.60 (29.69)	92 (410)	184 (819)	230 (1024)	276 (1229)	368 (1638)	460 (2048)	575 (2560)	690 (3072)	.00266 (75)								
	Oversize	4.12 (26.61)	82 (367)	165 (734)	206 (918)	247 (1101)	330 (1468)	412 (1835)	516 (2294)	619 (2753)	.00239 (68)								
3-1/4"	Standard	7.51 (48.46)	150 (668)	300 (1337)	376 (1671)	451 (2005)	601 (2674)	751 (3342)	939 (4178)	1127 (5014)	.00435 (123)								
	Oversize	6.81 (43.94)	136 (606)	272 (1212)	341 (1515)	409 (1819)	545 (2425)	681 (3031)	851 (3789)	1022 (4546)	.00394 (112)								
4"	Standard	11.78 (76.01)	236 (1049)	471 (2097)	589 (2621)	707 (3146)	942 (4194)	1178 (5243)	1473 (6553)	1767 (7864)	.00682 (193)								
	Oversize	11.08 (71.49)	222 (986)	443 (1972)	554 (2466)	665 (2959)	886 (3945)	1108 (4931)	1385 (6164)	1662 (7397)	.00641 (181)								