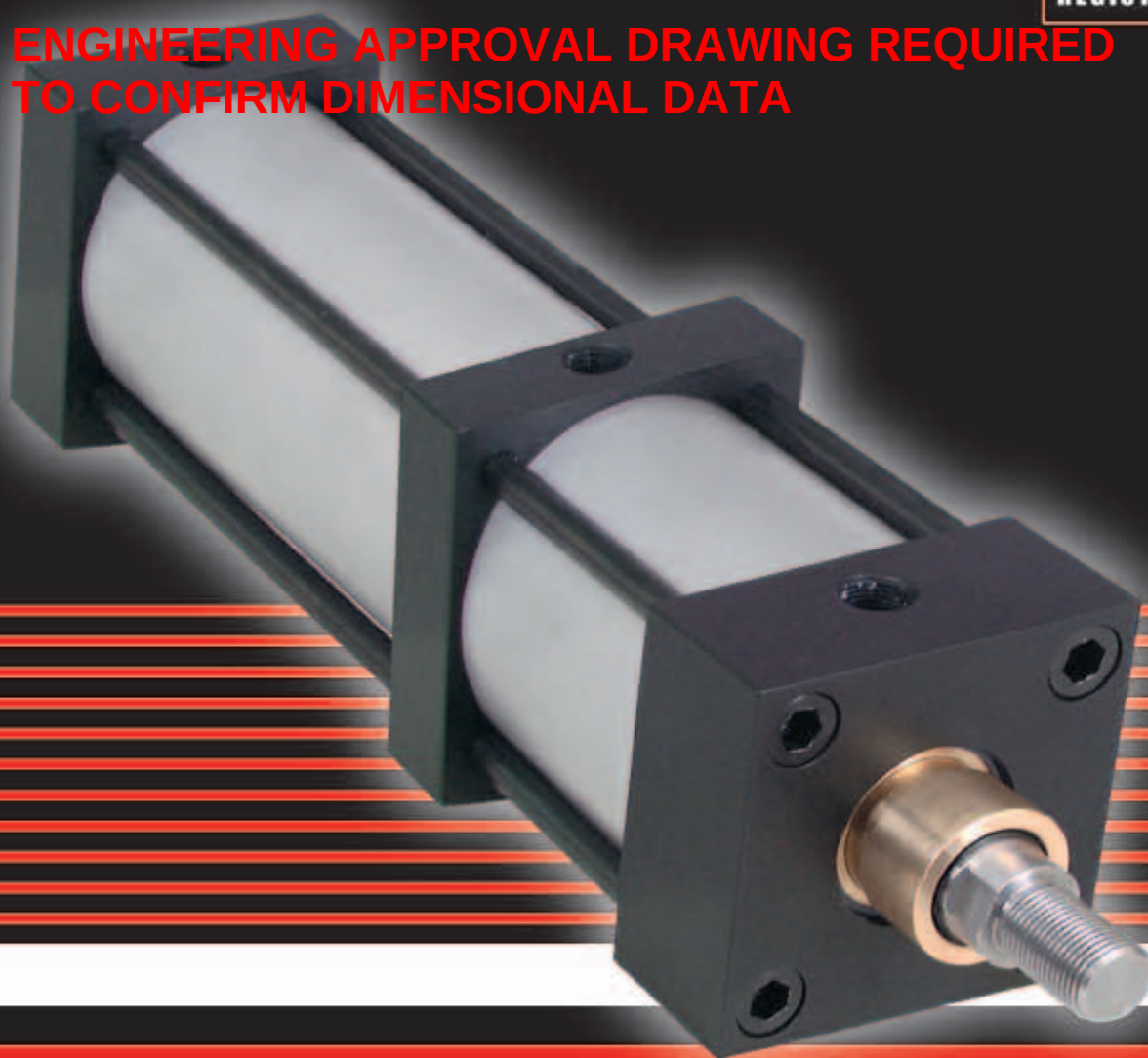


Advanced Locking Cylinders®

ISO-9001:2000
REGISTERED

**ENGINEERING APPROVAL DRAWING REQUIRED
TO CONFIRM DIMENSIONAL DATA**



**Series CCA: 1 1/2" - 6" Bores 250 PSI Air
Available with NFPA Detachable Mounting as Standard**

Series CCA Air Cylinder with Integral Rod Clamp

1 1/2" - 6" Bores

Ask about Stainless Steel & Electroless Nickel-Plated Cylinders for corrosive environments.

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Warranty: Advanced Cylinders® with Integral AMLOK® are warranted for a period of one (1) year from date of shipment, to be free from defects of materials and workmanship. Provided said items are properly applied.

The Seller must be notified and a Return Goods Authorization issued prior to returning product for warranty evaluation. A complete explanation of defects is required with the returned product. The Seller, at their discretion, will repair or replace, free of charge, any product returned to the factory (transportation costs prepaid) within twelve (12) months of shipment that is proven to be defective in materials and/or workmanship.

The Seller shall not be liable for any incidental or consequential damages, including, but not limited to, down time, breach of any expressed or implied warranty, and shall not be liable for any labor costs incurred in the removal of a defective part or the installation of any replacement parts.

Products not manufactured by the Seller are furnished subject only to the Supplier's warranties, if any, and without warranties, expressed or implied, by the Seller.

Safety of Product Applications: The products listed in this catalog can be applied in various ways, requiring technical knowledge to avoid consequences of injury due to improper application. It is the user's full responsibility to analyze and test the design and assure that proper performance and safety requirements are met and that warning instructions are shown.

DESIGN FEATURES OF ADVANCED CYLINDERS®

CYLINDER IS PERMANENTLY LUBRICATED WITH MOLYCOAT "G"
ADDITIONAL LUBRICATION NOT REQUIRED

Piston - Solid aluminum alloy piston, threaded on the piston rod and secured and sealed with an aerobic adhesive.

Cushions - The cushion is designed to provide the maximum deceleration time for the piston and rod assembly.

Tie Rods - Alloy steel, pre-stressed for maximum fatigue strength. Roll threaded for added strength on 1 1/2" - 6" bores.

Piston Rod - Piston rods have a minimum yield of 100,000 psi. They are hard chrome plated for wear and corrosion resistance.

Sleeve Nut Design - Provides for direct mounting of cylinder, or allows attaching a choice of NFPA detachable mounting styles.

Piston Groove - The piston groove is provided for optional anti-friction wear ring in heavy side load applications or for magnetic piston ring (MPR) for end of stroke switches.

Cushion Control - The captive design allows safe and precise adjustments for deceleration at end of stroke while cylinder is under pressure. They are made of brass for corrosion resistance.

Head and Cap - Solid aluminum blocks precision machined for accurate alignment. Black anodized for appearance and corrosion resistance.

NPTF Ports - Fully formed dryseal threads achieve seal in tapped holes without need for sealing compounds.

Lip-type Piston Seals - Pressure activated lip seal is wear compensated for effective sealing at all pressures. The seal is internally lubricated, reducing friction and extending life.

Tube - 1 1/2" thru 6" bore cylinders have high-tensile, special aluminum alloy with a hard anodized finish. The internal file-hard finish offers long life and excellent lubrication holding properties. Piloted tube ends provide positive alignment and concentricity. 8" thru 12" bores use high strength, light weight, corrosion resistant composite tube material.

Tube Seal - O-ring seal provides positive sealing.

Cushion Seals - Floating and self-centering polyurethane seals operate as a cushion seal and check valve.

Rod Seal - Pressure activated lip seal is wear compensated for effective sealing at all pressures. Standard seals are carboxylated nitrile and are internally lubricated, reducing friction and extending seal life.

Retaining Ring - Retains the rod bearing and allows for easy exchange of bearing without disassembly of the cylinder.

Rod Bearing - The bearing provides maximum piston rod support, reduces friction and resists wear abrasion (galling and seizing) under high compressive loads.

Rod Wiper - The wiper is designed to wipe off abrasive dust and contamination on the retract stroke to ensure long life for the seals, bearing, and piston rod. The standard wiper is a carboxylated nitrile and is internally lubricated to reduce friction and extend life.

CCA CYLINDERS WITH INTEGRAL AMLOK® ROD CLAMPS

Tie Rods - Alloy steel, pre-stressed for maximum fatigue strength. Roll threaded for added strength on 1 1/2" - 6" bores.

Head and Cap - Solid aluminum blocks precision machined for accurate alignment. Black anodized for appearance and corrosion resistance.

Tube - 1 1/2" thru 6" bore cylinders have high-tensile, special aluminum alloy with a hard anodized finish. The internal file-hard finish offers long life and excellent lubrication holding properties. Piloted tube ends provide positive alignment and concentricity. 8" thru 12" bores use high strength, light weight, corrosion resistant composite tube material.

Anti-Friction Wear Ring - Provides long life, low breakaway and low release pressure.

Tube Seal - O-ring seal provides positive sealing.

Rod Bearing - The bearing provides maximum piston rod support, reduces friction, and resists wear abrasion (galling and seizing) under high compressive loads.

Rod Wiper - The wiper is designed to wipe off abrasive dust and contamination on the retract stroke to ensure long life for the seals, bearing and piston rod. The standard wiper is a carboxylated nitrile and is internally lubricated to reduce friction and extend seal life.

Coil Spring - Heavy duty coil spring designed for long fatigue life.

Locking Mechanism - Oversized hardened and ground locking mechanism with antifriction amplification action of locking forces to guarantee millions of cycles at low release pressure.

Lip-type Piston Seals - Pressure activated lip seal is wear compensated for effective sealing at all pressures. The seal is internally lubricated, reducing friction and extending life.

Piston Rod - Piston rods have a minimum yield of 100,000 psi. They are hard chrome plated for wear and corrosion resistance.

Mounting - See pages 7-13.

Sleeve Nut Design - Provides for direct mounting of cylinder, or allows attaching a choice of NFPA detachable mounting styles.

SERIES CCA ADVANCED CYLINDERS® with INTEGRAL AMLOK® ROD CLAMP

The AMLOK® Power Off Rod Clamp has been developed by the leaders of rod clamps as a solution to control problems inherent to pneumatics — over travel, drifting, bouncing and reverse traveling.

The patented oversized intensifier is a mechanical design, guaranteeing a long service life, even under severe operating conditions. The high locking force will hold the rod in any mid-stroke position. Since the clamping is accomplished through spring force, any drifting caused by a lack of air pressure is not possible. The AMLOK® ROD CLAMP is offered as an integral unit with the Advanced Cylinder® Series CCA, or can be added as a separate unit to an NFPA-MF1 style cylinder. Please refer to our AMLOK® Rod Clamp Catalogs when a separate unit is required.

Since the locking of the AMLOK® Rod Clamp is accomplished mechanically by a spring and unlocked by air pressure, loss of air pressure will cause the unit to lock. The holding force depends upon the rod and piston diameter. The available holding forces can be multiplied by adding additional AMLOK® clamps to the same rod or by exchanging springs and increasing the release pressure.

AMLOK® Rod Clamps are designed for locking reciprocating motions only. Special AMLOK® Clamps are available upon customer request.

If your application requires a personal safety or braking device, please consult the factory for additional information on other models such as the **SITEMA** Safety Catchers and Power On Rod Clamps.

Common Applications Include:

Press (cutting, stamping, punching, forming) - Holds platens secure for die changes.

Machining - Locks and precisely holds work piece for long periods of machining, without using any energy.

Scissor and platform lifts - Holds work platforms of varying loads constant at any level.

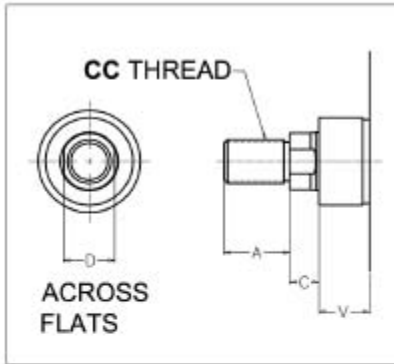
Valve actuators - Locks gates, eliminating any possible drifting without using energy.

Hopper bin doors - Locks doors, keeping them from drifting without using energy.

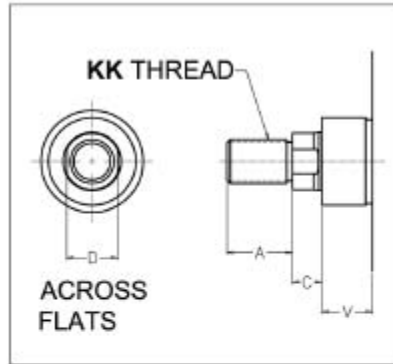
“E” Stop/Cycle Stop - Positive mechanical lock of linear motions when pneumatic pressure is lost or removed from lock port (EE-1).

OPTIONAL ROD END STYLES

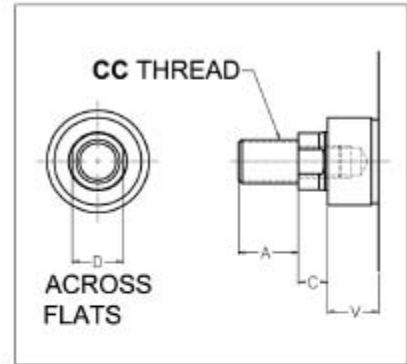
Style 1 - Large Male Thread



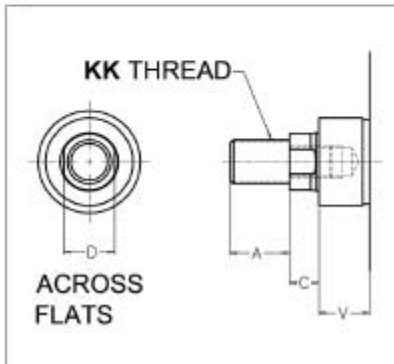
Style 2 - Small Male Thread (Standard)



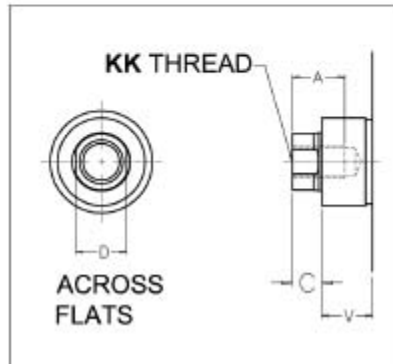
Style 1S - Large Male Thread Studded



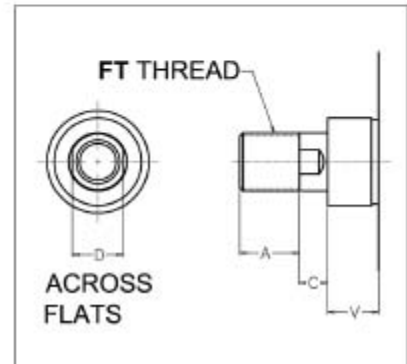
Style 2S - Small Male Thread Studded



Style 4 - Small Female Thread



Style 1F - Full Rod Diameter Thread



MM1 - Standard Rod Diameter

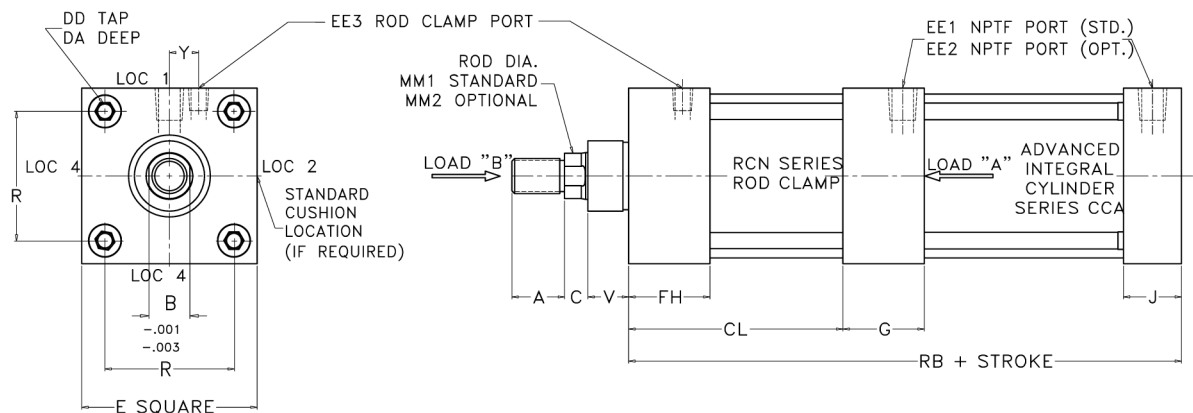
Bore	MM1	A	B	C	D	CC	FT	KK	V
1 1/2	5/8	3/4	1 1/8	3/8	17/32	1/2 - 20	5/8 -18	7/16 -20	5/8
2	5/8	3/4	1 1/8	3/8	17/32	1/2 - 20	5/8 -18	7/16 -20	5/8
2 1/2	5/8	3/4	1 1/8	3/8	17/32	1/2 - 20	5/8 -18	7/16 -20	5/8
3 1/4	1	1 1/8	1 1/2	1/2	7/8	7/8 -14	1 -14	3/4 -16	7/8
4	1	1 1/8	1 1/2	1/2	7/8	7/8 -14	1 -14	3/4 -16	7/8
5	1	1 1/8	1 1/2	1/2	7/8	7/8 -14	1 -14	3/4 -16	7/8
6	1 3/8	1 5/8	2	5/8	1 1/8	1 1/4 -12	1 3/8 -12	1 -14	1

MM2 - Optional Rod Diameter

Bore	MM2	A	B	C	D	CC	FT	KK	V
2	1	1 1/8	1 1/2	1/2	7/8	7/8 - 14	1 -14	3/4 -16	7/8
2 1/2	1	1 1/8	1 1/2	1/2	7/8	7/8 - 14	1 -14	3/4 -16	7/8
3 1/4	1 3/8	1 5/8	2	5/8	1 1/8	1 1/4 -12	1 3/8 - 12	1 - 14	1
4	1 3/8	1 5/8	2	5/8	1 1/8	1 1/4 -12	1 3/8 - 12	1 - 14	1
5	1 3/8	1 5/8	2	5/8	1 1/8	1 1/4 -12	1 3/8 - 12	1 - 14	1
6	1 3/4	2	2 3/8	3/4	1 1/2	1 1/2 -12	1 3/4 -12	1 1/4 - 12	1 1/8

CCA Integrated Locking Air Cylinder

CCA INTEGRATED LOCKING AIR CYLINDER

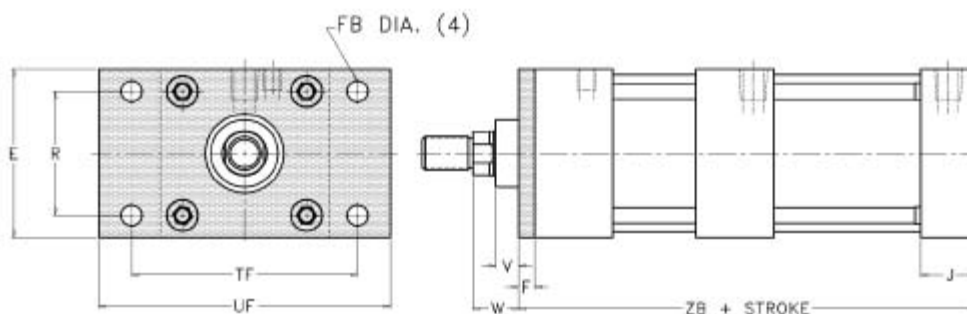


Bore	Rod Dia.	E	R	G	J	FH	RB	Y	EE1 NPT	EE2 NPT	EE3 NPT	CL	DD	DA	
														Head	Cap
1.500	0.625	2.0	1.430	1.49	1.0	1.24	7.72	0.35	1/4	3/8	1/8	4.09	1/4-28	3/8	3/8
2.000	0.625	2.5	1.84	1.49	1.0	1.24	7.72	N/A	1/4	3/8	1/8	4.09	5/16-24	3/8	3/8
2.000	1.000	2.5	1.84	1.49	1.0	1.24	7.72	0.38	1/4	3/8	1/8	4.09	5/16-24	3/8	3/8
2.500	0.625	3.0	2.190	1.49	1.0	1.24	7.84	N/A	1/4	3/8	1/8	4.09	5/16-24	3/8	3/8
2.500	1.000	3.0	2.190	1.49	1.0	1.24	7.84	0.38	1/4	3/8	1/8	4.09	5/16-24	3/8	3/8
3.250	1.000	3.75	2.760	1.74	1.24	1.74	8.84	N/A	3/8	1/2	1/4	4.59	3/8-24	1/2	1/2
3.250	1.375	3.75	2.760	1.74	1.24	1.74	8.84	N/A	3/8	1/2	1/4	4.59	3/8-24	1/2	1/2
4.000	1.000	4.5	3.320	1.74	1.24	1.74	8.84	N/A	3/8	1/2	1/4	4.59	3/8-24	1/2	1/2
4.000	1.375	4.5	3.320	1.74	1.24	1.74	8.84	N/A	3/8	1/2	1/4	4.59	3/8-24	1/2	1/2
5.000	1.000	5.5	4.100	1.74	1.24	1.74	9.09	N/A	3/8	1/2	1/4	4.59	1/2-20	1/2	1/2
5.000	1.375	5.5	4.100	1.74	1.24	1.74	9.09	N/A	3/8	1/2	1/4	4.59	1/2-20	1/2	1/2
6.000	1.375	6.5	4.880	1.99	1.49	1.74	9.59	N/A	3/4	3/4	1/4	4.59	1/2-20	1/2	1/2
6.000	1.750	6.5	4.880	1.99	1.49	1.99	9.84	N/A	3/4	3/4	1/4	4.59	1/2-20	1/2	1/2

Bore		1 1/2	2	2 1/2	3 1/4	4	5	6
Holding Force (lbs)	MM1-Rod	200	400	650	950	1550	2150	2650
	MM2-Rod	N/A	300	450	750	1550	1950	2450

NOTE: Some linear movement may occur after clamp is fully engaged.
Special units to minimize movement available on request. Please contact factory.

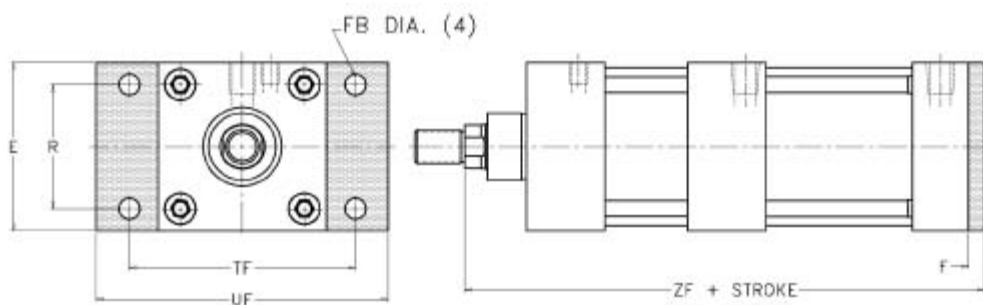
MODEL CCAF
FRONT FLANGE MOUNT (NFPA STYLE MF1)



Bore	F	FB*	R	TF	UF	MM1			MM2		
						V	W	ZB	V	W	ZB
1 1/2	3/8	5/16	1.430	2.75	3 3/8	1/4	5/8	8.09	1/2	N/A	N/A
2	3/8	3/8	1.840	3.375	4 1/8	1/4	5/8	8.09	1/2	1	8.09
2 1/2	3/8	3/8	2.190	3.875	4 5/8	1/4	5/8	8.22	1/2	1	8.22
3 1/4	5/8	7/16	2.760	4.687	5 1/2	1/4	3/4	9.47	3/8	1	9.47
4	5/8	7/16	3.320	5.437	6 1/4	1/4	3/4	9.47	3/8	1	9.47
5	5/8	9/16	4.100	6.625	7 5/8	1/4	3/4	9.72	3/8	1	9.72
6	3/4	9/16	4.880	7.625	8 5/8	1/4	7/8	10.34	3/8	1 1/8	10.59

* Mounting bolt to be 1/16" smaller.

MODEL CCAR
REAR FLANGE MOUNT (NFPA STYLE MF2)

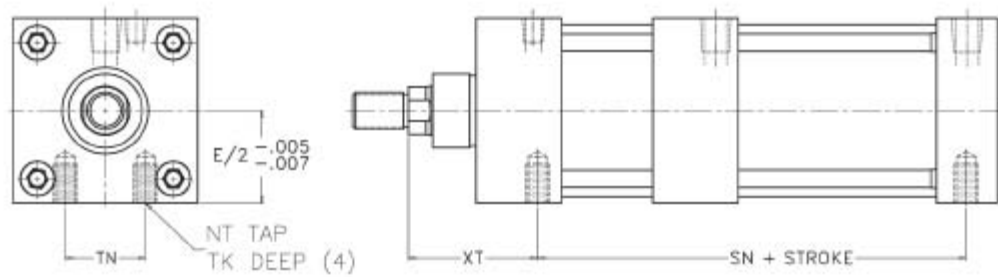


Bore	F	FB*	R	TF	UF	MM1	MM2
						ZF	ZF
1 1/2	3/8	5/16	1.430	2.75	3 3/8	9.09	N/A
2	3/8	3/8	1.840	3.38	4 1/8	9.09	9.47
2 1/2	3/8	3/8	2.190	3.88	4 5/8	9.22	9.59
3 1/4	5/8	7/16	2.760	4.69	5 1/2	10.84	11.09
4	5/8	7/16	3.320	5.44	6 1/4	10.84	11.09
5	5/8	9/16	4.100	6.63	7 5/8	11.09	11.34
6	3/4	9/16	4.880	7.63	8 5/8	11.97	12.22

* Mounting bolt to be 1/16" smaller.

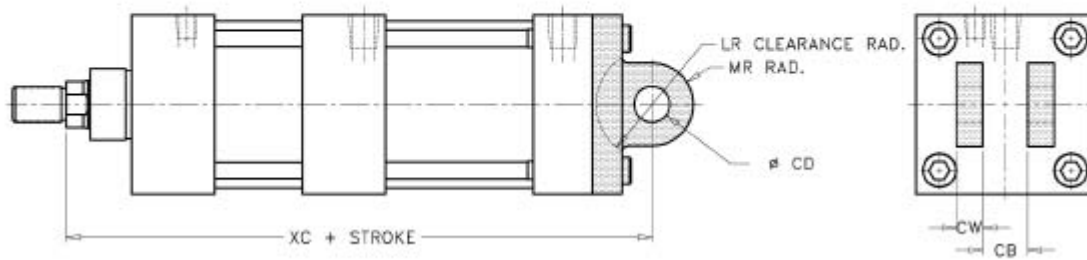
MODEL CCAB

BOTTOM TAP MOUNT (NFPA STYLE MS4) 1 1/2" - 6" BORE



Bore	NT	SN	TN	MM1		MM2	
				TK	XT	TK	XT
1 1/2	1/4-20	2 1/4	5/8	3/8	5.78	N/A	N/A
2	5/16-18	2 1/4	7/8	1/2	5.78	1/2	5.78
2 1/2	3/8-16	2 3/8	1 1/4	5/8	5.78	5/8	5.78
3 1/4	1/2-13	2 5/8	1 1/2	3/4	7.03	11/16	7.28
4	1/2-13	2 5/8	2 1/16	3/4	7.03	3/4	7.28
5	5/8-11	2 7/8	2 11/16	1	7.03	1	7.28
6	3/4-10	3 1/8	3 1/4	1 1/8	7.65	1 1/8	7.9

MODEL CCAC
CLEVIS MOUNT (NFPA STYLE MP1)

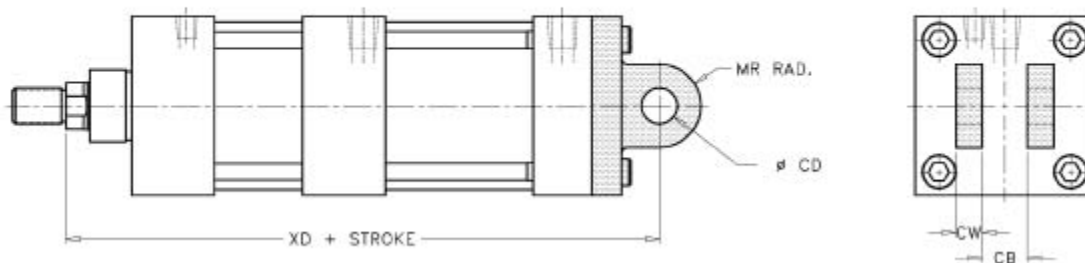


Bore	CB*	CD*	CW	LR	MR	MM1	MM2
						XC	XC
1 1/2	3/4	1/2	1/2	3/4	5/8	9.48	N/A
2	3/4	1/2	1/2	3/4	5/8	9.48	9.85
2 1/2	3/4	1/2	1/2	3/4	5/8	9.60	9.98
3 1/4	1 1/4	3/4	5/8	1 1/4	7/8	11.47	11.72
4	1 1/4	3/4	5/8	1 1/4	7/8	11.47	11.72
5	1 1/4	3/4	5/8	1 1/4	7/8	11.72	11.96
6	1 1/2	1	3/4	1 1/2	1 1/8	12.72	13.22

* Max width of mating part is CB.

Recommended diameter (CD) for mating part should be -.002/-.004

MODEL CCADC
DETACHABLE CLEVIS MOUNT (NFPA STYLE MP2)

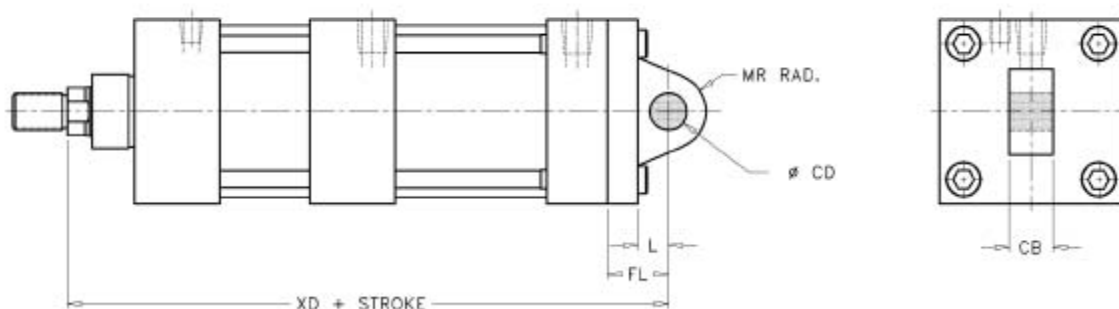


Bore	CB*	CD*	CW	FL	L	MR	MM1	MM2
							XD	XD
1 1/2	3/4	1/2	1/2	1 1/8	3/4	5/8	9.84	N/A
2	3/4	1/2	1/2	1 1/8	3/4	5/8	9.84	10.22
2 1/2	3/4	1/2	1/2	1 1/8	3/4	5/8	9.97	10.34
3 1/4	1 1/4	3/4	5/8	1 7/8	1 1/4	7/8	12.09	12.34
4	1 1/4	3/4	5/8	1 7/8	1 1/4	7/8	12.09	12.34
5	1 1/4	3/4	5/8	1 7/8	1 1/4	7/8	12.34	12.59
6	1 1/2	1	3/4	2 1/4	1 1/2	1 1/8	13.47	13.97

* Max width of mating part is CB.

Recommended diameter (CD) for mating part should be -.002/-.004

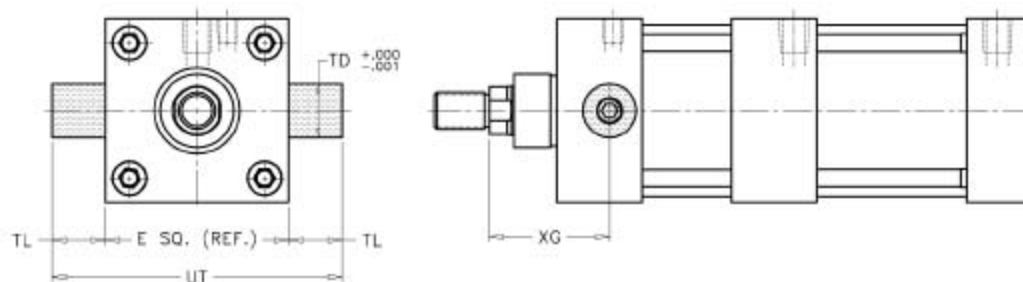
MODEL CCADE
DETACHABLE EYE MOUNT (NFPA STYLE MP4)



Bore	CB*	CD*	FL	L	MR	MM1	MM2
						XD	XD
1 1/2	3/4	1/2	1 1/8	3/4	5/8	9.84	N/A
2	3/4	1/2	1 1/8	3/4	5/8	9.84	10.22
2 1/2	3/4	1/2	1 1/8	3/4	5/8	9.97	10.34
3 1/4	1 1/4	3/4	1 7/8	1 1/4	7/8	12.09	12.34
4	1 1/4	3/4	1 7/8	1 1/4	7/8	12.09	12.34
5	1 1/4	3/4	1 7/8	1 1/4	7/8	12.34	12.59
6	1 1/2	1	2 1/4	1 1/2	1 1/8	13.47	13.97

* CD tolerance is $\pm 0.004/\pm 0.002$

MODEL CCAHT
HEAD TRUNION MOUNT (NFPA STYLE MT1)

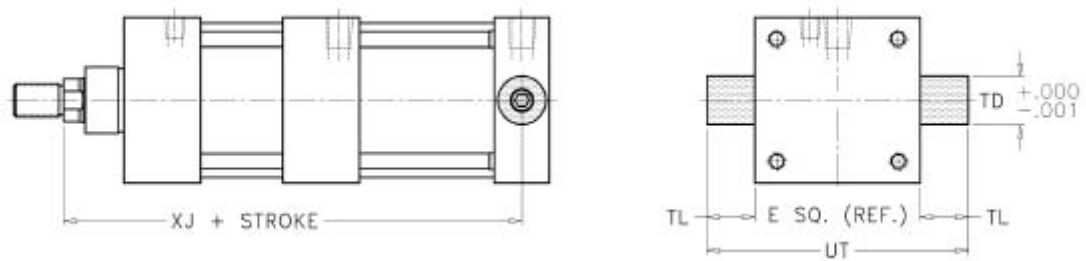


Bore	E	TD	TL	UT	MM1	MM2
					XG	XG
1 1/2	2	1	1	4	1 5/8	N/A
2	2 1/2	1	1	4 1/2	1 5/8	2
2 1/2	3	1	1	5	1.63	2
3 1/4	3 3/4	1	1	5 3/4	2 1/4	2 1/2
4	4 1/2	1	1	6 1/2	2 1/4	2 1/2
5	5 1/2	1	1	7 1/2	2 1/4	2 1/2
6	6 1/2	1 3/8	1 3/8	9 1/4	2 1/2	2 7/8

* CD tolerance is $\pm 0.004/\pm 0.002$

MODEL CCACT

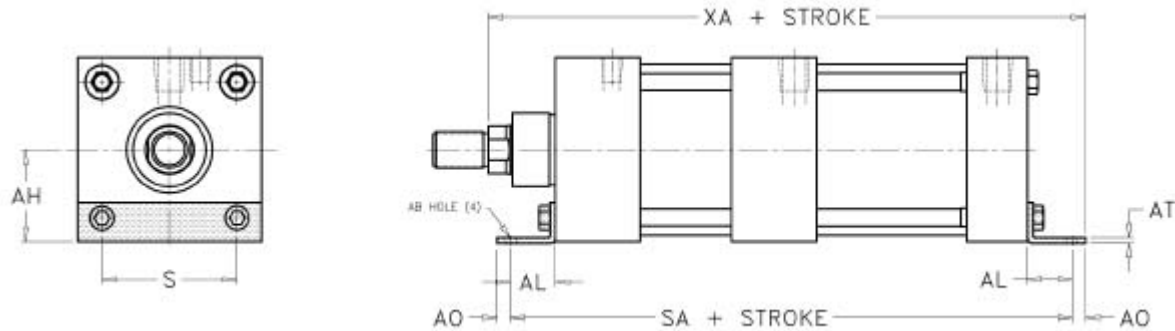
CAP TRUNION MOUNT (NFPA STYLE MT2)



Bore	E	TD	TL	UT	MM1	MM2
					XJ	XJ
1 1/2	2	1	1	4	8.22	N/A
2	2 1/2	1	1	4 1/2	8.22	9
2 1/2	3	1	1	5	8.35	9
3 1/4	3 3/4	1	1	5 3/4	9.60	9.85
4	4 1/2	1	1	6 1/2	9.60	9.85
5	5 1/2	1	1	7 1/2	9.85	1010.00
6	6 1/2	1 3/8	1 3/8	9 1/4	10.47	10.97

MODEL CCAA

ANGLE MOUNT (NFPA STYLE MS1)

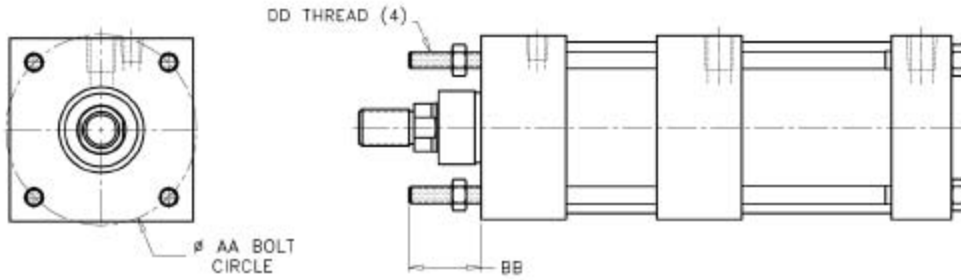


Bore	AB	AH	AL	AO	AT	S	SA	MM1	MM2
								XA	XA
1 1/2	7/16	1 3/16	1	3/8	1/8	1 1/4	9.72	10.09	N/A
2	7/16	1 7/16	1	3/8	1/8	1 3/4	9.72	10.09	10.47
2 1/2	7/16	1 5/8	1	3/8	1/8	2 1/4	9 5/6	10.22	10.59
3 1/4	9/16	1 15/16	1 1/4	1/2	1/8	2 3/4	11.34	11.97	12.22
4	9/16	2 1/4	1 1/4	1/2	1/8	3 1/2	11.34	11.97	12.22
5	11/16	2 3/4	1 3/8	5/8	3/16	4 1/4	11.84	12.47	12.72
6	13/16	3 1/4	1 3/8	5/8	3/16	5 1/4	12.34	13.22	13.72

* Mounting bolt to be 1/16" smaller.

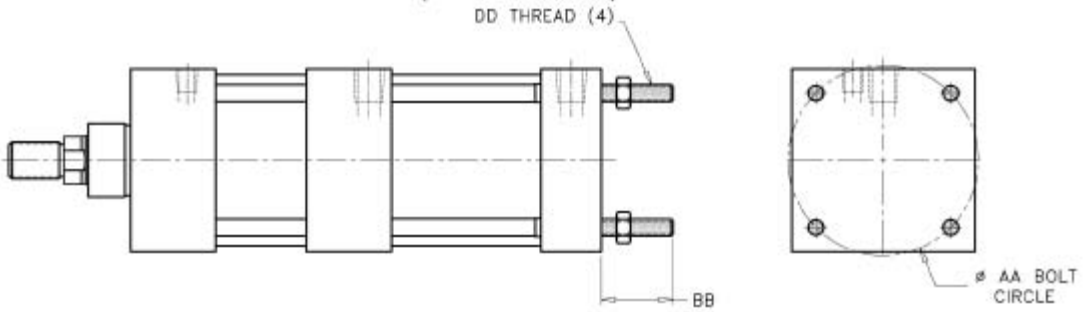
MODEL CCAM

EXTENDED TIE ROD MOUNT HEAD END (NFPA STYLE MX3)



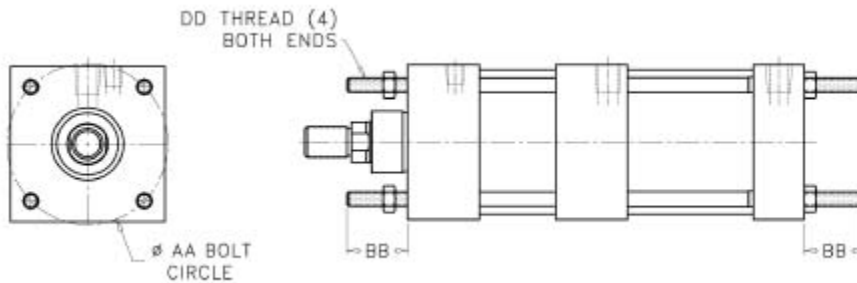
MODEL CCAN

EXTENDED TIE ROD MOUNT CAP END (NFPA STYLE MX2)



MODEL CCAL

EXTENDED TIE ROD MOUNT BOTH ENDS (NFPA STYLE MX1)

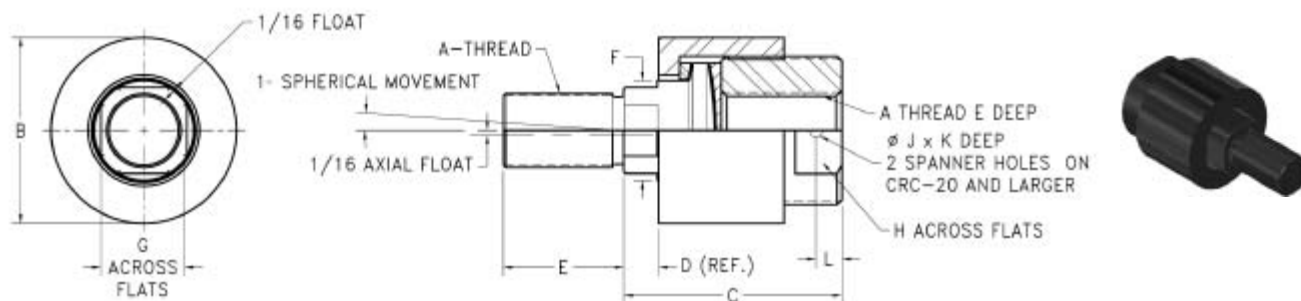


Bore	AA	BB	DD
1 1/2	2.02	1	1/4-28
2	2.60	1 1/8	5/16-24
2 1/2	3.10	1 1/8	5/16-24
3 1/4	3.90	1 3/8	3/8-24
4	4.70	1 3/8	3/8-24
5	5.80	1 13/16	1/2-20
6	6.90	1 13/16	1/2-20

LINEAR ALIGNMENT ROD COUPLERS

The Linear Alignment Rod Coupler allows for a greater tolerance between the cylinder centerline and the mating assembly. An Alignment Coupler will also extend the life of the major cylinder components (such as the Tube, Rod Bearing, Piston Rod, Piston, and Rod Seals) by preventing binding and erratic movement caused by misalignment. The Alignment Couplers work equally well in "push and pull" applications.

Consult your distributor if you have special requirements or for sizes not shown.



Part #	A	B	C	D	E	F	G	H	Max Pull at Yield
CRC-07	7/16-20	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	10,000
CRC-08	1/2-20	1 1/4	2	1/2	3/4	5/8	9/16	1 1/8	14,000
CRC-10	5/8-18	1 1/4	2	1/2	3/4	5/8	1/2	1 1/8	14,000
CRC-12	3/4-16	1 3/4	2 15/16	5/16	1 1/8	31/32	7/8	1 1/2	34,000
CRC-14	7/8-14	1 3/4	2 15/16	5/16	1 1/8	31/32	7/8	1 1/2	34,000
CRC-16	1-14	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	64,000
CRC-20	1 1/4-12	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	64,000
CRC-22	1 3/8-12	2 1/2	2 15/16	1/2	1 5/8	1 3/8	1 1/4	2 1/4	64,000
CRC-24	1 1/2-12	3 1/4	4 3/8	13/16	2 1/4	1 3/4	1 1/2	3	120,000
CRC-28	1 3/4-12	3 1/4	4 3/8	13/16	2 1/4	1 3/4	1 1/2	3	120,000

SWITCH INFORMATION

The switches are designed to sense the position of the Piston on CCA cylinders. Two types of Reed switches and two types of Hall Effect switches are available as standard. The standard switch mounts easily to the tie rods with a clamp that allows the switch to be positioned along the tie rod, giving you infinite position capabilities through the entire cylinder stroke. Multiple switches can be mounted for sequencing. All switches have an LED indicator light which illuminates when the switch circuit is closed by the presence of a magnet, see switch specifications below.

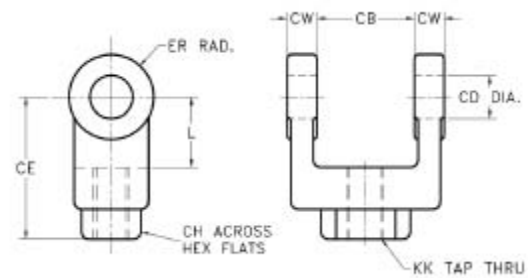
SWITCH SPECIFICATIONS

Part #	Description	Function	Switching Voltage	Switching Current	Switching Power	Switching Speed	Voltage Drop	Shock	Vibration
A1-951-04-9	Reed Mov 2 Wire	Normally Open SPST	5-240 VDC/VAC 50/60 Hz	1 Amp Max .005 Amp Min	30 Watts Max	0.6ms Operate 0.05ms Release	3 Volts	30G Max (11 MSEC)	30G Max (10-55 Hz)
A1-951-24-9	Reed Mov 3 Wire	Normally Open Triac Output	24-240 VAC 50/60 Hz	4 Amp Max 50 Amp Inrush .005 Amp Min	100 Watts Max	0.6ms Operate 0.05ms Release	1 Volt		
A1-951-31-9	Hall Effect Reed Magnet Sourcing 3 Wire	Normally Open PNP Output	6-24 VDC	1 Amp Max	24 Watts Max	1.5ms Operate 0.5ms Release	0.5 Volts	N/A For Hall Effect Switches	N/A For Hall Effect Switches
A1-951-32-9	Hall Effect Reed Magnet Sinking 3 Wire	Normally Open NPN Output	6-24 VDC	1 Amp Max	24 Watts Max	1.5ms Operate 0.5ms Release	0.5 Volts		

NFPA ACCESSORIES FOR CCA SERIES ADVANCED LOCKING CYLINDERS®

ROD CLEVIS

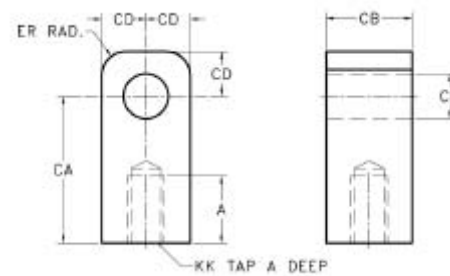
PART NO.	CB	CD	CE	CH	CW	ER	KK	L
A1-850-63	.765	1/2	1 1/2	1	1/2	1/2	7/16-20	3/4
A1-850-63-1	.765	1/2	1 1/2	1	1/2	1/2	1/2-20	3/4
A1-850-100	1.265	3/4	2 3/8	1 1/4	5/8	3/4	3/4-16	1 1/4
A1-850-138	1.515	1	3 1/8	1 1/2	3/4	1	1-14	1 1/2
A1-850-138-1	1.515	1	3 1/8	1 1/2	3/4	1	1 1/4-12	1 1/2
A1-850-175	2.032	1 3/8	4 1/8	2	1	1 3/8	1 1/4-12	2 1/8
A1-850-200	2.531	1 3/4	4 1/2	2 3/8	1 1/4	1 3/4	1 1/2-12	2 1/4
A1-850-250	2.531	2	5 1/2	2 15/16	1 1/4	2	1 7/8-12	2 1/2



ROD EYE

PART NO.	A	CA	CB	CD*	ER	KK
A1-851-63	3/4	1 1/2	3/4	1/2	5/8	7/16-20
A1-851-63-1	3/4	1 1/2	3/4	1/2	5/8	1/2-20
A1-851-100	1 1/8	2 1/16	1 1/4	3/4	7/8	3/4-16
A1-851-138	1 5/8	2 13/16	1 1/2	1	1 3/16	1-14
A1-851-138-1	2	2 13/16	1 1/2	1	1 3/16	1 1/4-12
A1-851-175	2	3 7/16	2	1 3/8	1 9/16	1 1/4-12
A1-851-200	2 1/4	4	2 1/2	1 3/4	2	1 1/2-12
A1-851-250	3	5	2 1/2	2	2 1/2	1 7/8-12

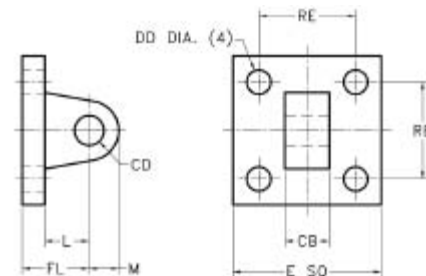
* CD Tolerance is +.004 / +.002.



EYE BRACKET

PART NO.	CB	CD*	DD	E	FL	L	M	RE
A1-852-63	3/4	1/2	13/32	2 1/2	1 1/8	3/4	1/2	1.63
A1-852-100	1 1/4	3/4	17/32	3 1/2	1 7/8	1 1/4	3/4	2.56
A1-852-138	1 1/2	1	21/32	4 1/2	2 1/4	1 1/2	1	3.25
A1-852-175	2	1 3/8	21/32	5	3	2 1/8	1 3/8	3.81
A1-852-200	2 1/2	1 3/4	29/32	6 1/2	3 1/8	2 1/4	1 3/4	4.94

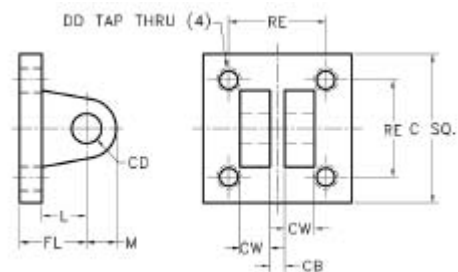
* CD Tolerance is +.004 / +.002.



CLEVIS BRACKET

PART NO.	CB	CD*	CW	DD	E	FL	L	M	RE
A1-853-63	3/4	1/2	1/2	3/8-24	2 1/2	1 1/8	3/4	1/2	1.63
A1-853-100	1 1/4	3/4	5/8	1/2-20	3 1/2	1 7/8	1 1/4	3/4	2.56
A1-853-138	1 1/2	1	3/4	5/8-18	4 1/2	2 1/4	1 1/2	1	3.25
A1-853-175	2	1 3/8	1	5/8-18	5	3	2 1/8	1 3/8	3.81
A1-853-200	2 1/2	1 3/4	1 1/4	7/8-14	6 1/2	3 1/8	2 1/4	1 3/4	4.94

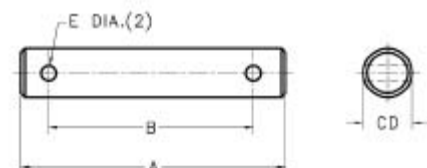
* CD Tolerance is +.004 / +.002.



PIVOT PIN

PART NO.	A	B	CD*	D	E
A1-854-63	2 9/32	1 15/16	1/2	11/64	7/64
A1-854-100	3 3/32	2 23/32	3/4	3/16	9/64
A1-854-138	3 19/32	3 7/32	1	3/16	9/64
A1-854-175	4 21/32	4 1/4	1 3/8	13/64	11/64
A1-854-200	5 21/32	5 1/4	1 3/4	13/64	11/64
A1-854-250	5 23/32	5 9/32	2	7/32	13/64

* CD Tolerance is +.001 / -.002.



TECHNICAL INFORMATION

The proper selection of cylinder bore size, rod diameter, and stop tube specifications require full consideration of the following factors: Operating Pressures, Mounting Style, Length of Stroke, Type of Rod Connection to the Load, and Mounting Attitude. The following data is provided to assist in your selection.

TO DETERMINE BORE SIZE:

Determine the load, available air pressure, and speed of the load.

Air cylinders must always be overpowered to move a load.

To balance a load would require the same force as the load.

To move the load slowly, multiply the load by 1.3.

To move the load quickly, multiply the load by 2.

Example: If you have a 750 lb load, and want to move it fast, and have 80 P.S.I. air pressure available:

750 lbs x 2 = 1500 lbs. Force required. From Table A, find 80 P.S.I. and read down to find 1571 which indicates that a 5" bore cylinder is required.

Net Area x Operating Pressure = Pounds of Force

For PUSH applications, Net Area and Piston Area are the same

For PULL applications, Piston Area minus Rod Area = Net Area.

See the Force Table below for predetermined Pounds of Force.

TO DETERMINE ROD DIAMETER:

1. Determine the distance the load is to be moved. For this example 30" will be used.
2. Determine what Mounting Style Cylinder will be used. For this example, a Model CAC NFPA Style MP1 (page 9) will be used. Find the base length from the pivot pin centerline to the reference point on the rod. For a 5" Bore Cylinder with a 1" Rod (Rod MM1), the base dimension XC = 7.125".
3. For the example, an additional 5" of Rod Extension is required to make the final Rod connection to the mating load.

4. From the Stroke Factor Chart, (Chart A on page 17), find a factor of 2 for the CAC Mounting Style calculation.

7.125	Base Cylinder — CAC mounting style - XC dimension
+ 30.0	30" Stroke
+ 5.0	The additional length of rod extension required
42.125	Total
x 2	The determined stroke factor
84.250	Total "D" value

5. Refer to the Rod Diameter and Stop Tube Selection Chart, page 17.

Find the intersection of D value of 84.25 and the 1500 lbs of force required.

The diagonal line above the intersection determines the Rod Diameter required. Reading from the chart, find that the 1" diameter Rod is not adequate for this application. A 1 3/8" diameter rod must be used. Use oversize rod diameter MM2 in the tables for rod and mounting dimensions (XC=7.375).

TO DETERMINE STOP TUBE:

Refer to Chart B on page 17. Use the same intersection of "D" Value and Pounds of Force and follow the band to the right (our example requires a 5" stop tube).

In General:

- If "D" Value is less than 40", no stop tube is required.
- If "D" Value is more than 100", consult your distributor and submit the following information:
Cylinder Series, Bore, Stroke, Length of Rod Extension (include additional rod), Mounting Style, Rod End Connection, Method of Guiding Load, Operating Pressure, and Mounting Position (rod up, rod down, angle).

For vertical applications with Rod in PULL, consult your distributor.

FORCE TABLE - POUNDS OF FORCE													
BORE	ROD DIA.	AREA	NET AREA	OPERATING PRESSURE - PSI									
				40	50	60	80	100	125	150	175	200	250
1 1/2		1.767	1.767	71	88	106	141	177	221	265	309	353	442
	5/8	0.307	1.460	58	73	88	117	146	183	219	256	292	365
	1	0.785	0.982	39	49	59	79	98	123	147	172	196	245
2		3.142	3.142	126	157	188	251	314	393	471	550	628	785
	5/8	0.307	2.835	113	142	170	227	283	354	425	496	567	709
	1	0.785	2.356	94	118	141	188	236	295	353	412	471	589
2 1/2		4.909	4.909	196	245	295	393	491	614	736	859	982	1227
	5/8	0.307	4.602	184	230	276	368	460	575	690	805	920	1150
	1	0.785	4.123	165	206	247	330	412	515	619	722	825	1031
3 1/4		8.296	8.296	332	415	498	664	830	1037	1244	1452	1657	2074
	1	0.785	7.510	300	376	451	601	751	939	1127	1314	1502	1878
	1 3/8	1.485	6.811	272	341	409	545	681	851	1022	1192	1362	1703
4		12.566	12.566	503	628	754	1005	1257	1571	1855	2199	2513	3142
	1	0.785	11.781	471	589	707	942	1178	1473	1767	2062	2356	2945
	1 3/8	1.485	11.082	443	554	665	887	1108	1385	1662	1939	2216	2770
5		19.635	19.635	785	982	1178	1571	1964	2454	2945	3436	3927	4909
	1	0.785	18.850	754	942	1131	1508	1885	2356	2827	3299	3770	4712
	1 3/8	1.485	18.150	726	908	1089	1452	1815	2269	2723	3176	3630	4538
6		28.274	28.274	1131	1414	1696	2262	2827	3534	4241	4948	5655	7069
	1 3/8	1.485	26.790	1072	1339	1607	2143	2679	3349	4018	4688	5358	6697
	1 3/4	2.405	25.869	1035	1293	1552	2070	2587	3234	3880	4527	5174	6467

CHART A

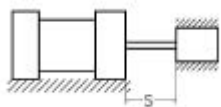
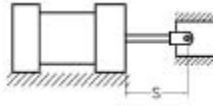
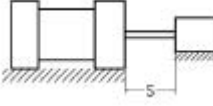
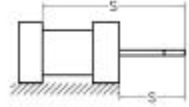
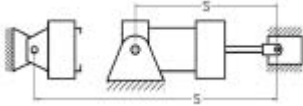
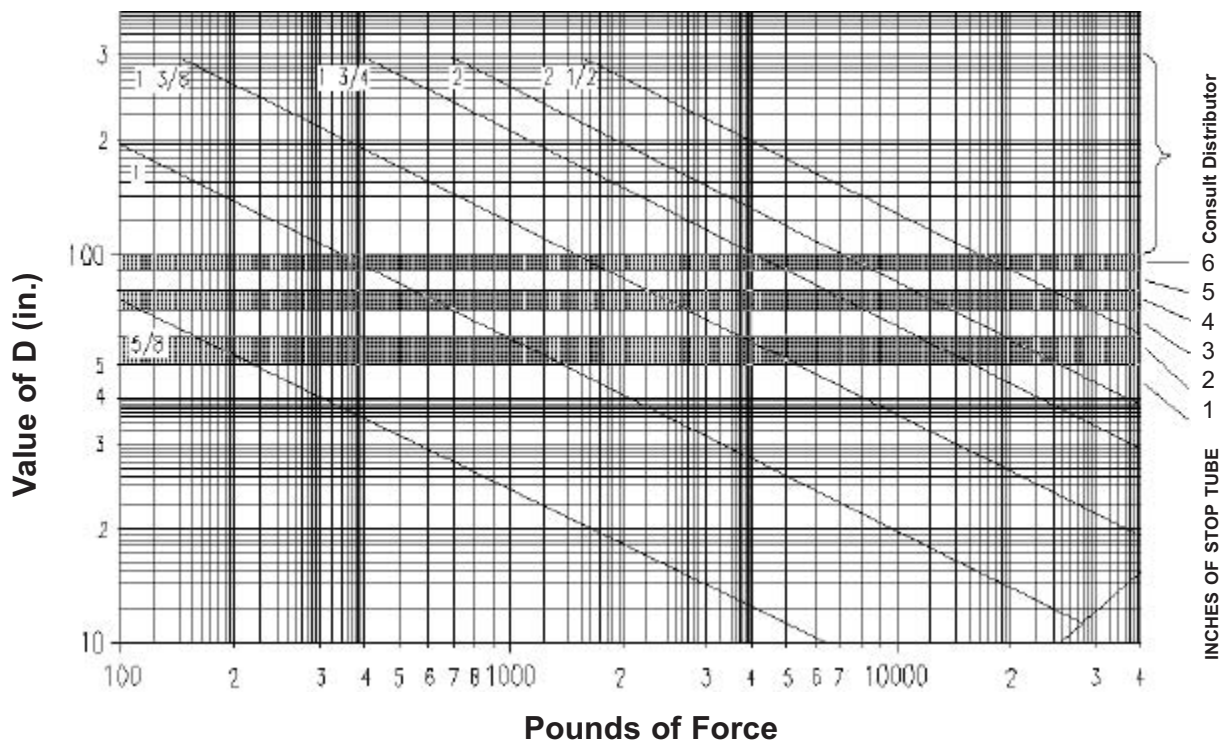
STROKE FACTOR CHART				
Mounting Styles	Reference Dimensions for Calculating "S"	Rod End Connection	S = Value from Mounting Face and/or Pivot Point with Rod Fully Extended.	Stroke Factor
CCA	$S = \text{Stroke}$	FIXED AND RIGIDLY GUIDED		.50
CCAB (MS4)	$S = \text{Stroke}$			
CCAF (MF1)	$S = \text{Stroke}$	PIVOTED AND RIGIDLY GUIDED		.70
CCAR (MF2)	$S = ZF + 2 \times \text{Stroke}$			
CCAM (MX3)	$S = \text{Stroke}$	SUPPORTED BUT NOT RIGIDLY GUIDED		2.00
CCAN (MX2)	$S = BB + LB + 2 \times \text{Stroke}$			
CCAA (MS1)	$S = \text{Stroke}$	NONE		4.00
CCACF (ME4)	$S = ZJ + 2 \times \text{Stroke}$			
CCAHT (MT1)	$S = XG + \text{Stroke}$	PIVOTED AND RIGIDLY GUIDED		1.00
CCACT (MT2) CCAC (MP1)	$S = XJ + 2 \times \text{Stroke}$ $S = XC + 2 \times \text{Stroke}$	PIVOTED AND RIGIDLY GUIDED		2.00

CHART B

Rod Diameter & Stop Tube Selection Chart



ORDERING INSTRUCTIONS

The Order Sheet on page 19 is supplied for your convenience. It is designed for a specific integrated cylinder model and any accessories for that particular model. It can also be used as a Quote Sheet. If a standard unit is requested, only the first column needs to be completed unless modified items have been indicated. For your convenience, you may circle each feature or fill in the box for each feature in each category.

For Double End Cylinders, the Mount, Rod Style and Rod Diameter must be specified for both ends. There is a box for end #1 and end #2 to be used for double ends. If the second end box (end #2) is not specified for the Mounting Style on the opposite end, the face tap mount will be supplied. If the box for end #2 is not specified for the rod diameter, style, and additional rod, the same will be supplied as for end #1.

Standard CCA Series Includes:

- EE1 Ports at Location 1.
- Rod Style 2 Small Male Thread.
- LFN Piston & Rod Seals (low friction carboxylated nitrile).
- Temperature standard of -20° F to 225° F.
- Standard Cushion Location 2 (except models CAHT and CACT would be location 3).
- Port and Cushion Location will be Designated Looking at Rod End #1 on Double End Cylinders.
- On Double End Cylinders, Cushion and Bumpers on "Cap End" will be Rod End #2.

Example: #1

CCA

C

325

X

6.25

2

100

N

2.00

Example: #2

CCA

D

F

325

X

6.25

4

100

C

1.00

Series

Double Rod End

Mount

Bore

Stroke

Rod Style

Rod Diameter

Cushion

Additional "C"
Rod Extension

Example: #1

CCAC 325 x 6.25 2 100 N 2.00
CCA Series single end cylinder with an integral rod clamp, C mount 3.25" bore, 6.25" stroke, style 2, 1.00" diameter rod, non-cushion, with 2.00" additional rod extension.

Example: #2

CCADF 325 X 6.25 2 4 100 100 N C 2.00 1.00
CAC Series double end 3.25" bore with a 6.25" stroke, F (flange) mount at one end with the 1st rod a style 2, 1.00" diameter rod, non-cushioned, with 2.00" additional "C" dimension. The opposite end will have standard face tap mount with the 2nd rod a style 4, 1.00" diameter, cushioned cap, with 1.00" additional rod extension.

DESIGN AND APPLICATION CONSIDERATION CHECKLIST:

To assist in ordering products to meet your application needs.

BORE SIZE:

Pressure Available
Load #
How Fast is Load Moved - Inches per Minute
Force Required Push Pull
Ref. Table A, page 16

ROD DIAMETER AND STOP TUBE REQUIREMENTS:

Distance Load is Moved
Mounting Attitude- Vertical / Horizontal
Rod End and Type Cylinder Mounting - Firmly Guided / Supported / Unsupported
Ref. Charts A and B, page 17

CUSHION AND BUMPER CONSIDERATION:

Stopping the Piston and Rod Assembly \ Cylinder Cushion or External Stop
Noise

CYLINDER COMPONENT MATERIALS AND SURFACE COATINGS:

Environment
Standard Factory - Clean / Dirty
Corrosive Washdowns
Outside
Temperature: High / Low / Typical
Operating Media Being Used
Ref. Design Features, page 4 and 5

ORDER SHEET

ORDER / QUOTE: _____ ITEM _____ of _____ Qty: _____ P.O. No.: _____

STANDARD FEATURES	DESCRIPTION	SYMBOL Circle or write in	MODIFIED FEATURES	DESCRIPTION	SYMBOL Circle or write in
1 MODEL	CCA-STANDARD AIR SERIES CYLINDER w/ROD CLAMP	CCA	10 SPECIAL ROD	Diameter Style Thread 'A' Dim. Rod 1 Rod 2	
2 DOUBLE ROD END	INCLUDE ONLY FOR DOUBLE END CYLINDERS	D	11 HEAD PORT SIZE	NPTF - ONE SIZE UNDER NFPA - STANDARD EE1 NPTF - STANDARD NFPA SIZE - OPTIONAL EE2 SPECIAL MOD	
3 MOUNTING STYLE	BLANK - STANDARD FACE TAP MOUNT BOTH ENDS ANGLE MOUNT (NFPA MS1) A BOTTOM TAP MOUNT (NFPA MS4) B CLEVIS MOUNT (NFPA MP1) C CAP FLANGE 8" BORE AND LARGER (NFPA ME4) CF CAP TRUNNION MOUNT (NFPA MT2) CT DETACHABLE CLEVIS MOUNT (NFPA MP2) DC DETACHABLE EYE MOUNT (NFPA MP4) DE FRONT FLANGE MOUNT (NFPA MF1) F HEAD TRUNNION MOUNT (NFPA MT1) HT TIE RODS EXTEND BOTH ENDS (NFPA MX1) L TIE RODS EXTEND HEAD END (NFPA MX3) M TIE RODS EXTEND CAP END (NFPA MX2) N REAR FLANGE MOUNT (NFPA MF2) R	END 1 END 2	12 HEAD PORT LOCATION	HEAD PORT LOCATION 1 L1 HEAD PORT LOCATION 2 L2 HEAD PORT LOCATION 3 L3 HEAD PORT LOCATION 4 L4	
4 BORE	1.50 BORE 150 2.00 BORE 200 2.50 BORE 250 3.25 BORE 325 4.00 BORE 400 5.00 BORE 500 6.00 BORE 600		13 CAP PORT SIZE	NPTF - ONE SIZE UNDER NFPA - STANDARD EE1 NPTF - STANDARD NFPA SIZE - OPTIONAL EE2 SPECIAL MOD	
			14 CAP PORT LOCATION	CAP PORT LOCATION 1 L1 CAP PORT LOCATION 2 L2 CAP PORT LOCATION 3 L3 CAP PORT LOCATION 4 L4 CAP PORT LOCATION 5 L5	
			15 PISTON SEALS	LOW FRICTION CARBOXYLATED NITRILE STD. LFN NITRILE N VITON V	
			16 ROD SEALS	LOW FRICTION CARBOXYLATED NITRILE STD. LFN NITRILE N VITON V LOW FRICTION CARBOXYLATED NITRILE - ROUNDED LIPS LFRL	
			17 STOP TUBE	SPECIFY LENGTH IN INCHES	ST
5 STROKE	SPECIFY IN INCHES (2 POSITION DECIMAL)		18 PISTON	MAGNETIC PISTON RING	MPR
6 ROD STYLE	LARGE MALE THREAD 1 FULL ROD DIAMETER THREAD 1F LARGE MALE THREAD — STUDDED 1S SMALL MALE THREAD — STANDARD 2 SMALL MALE THREAD — STUDDED 2S SMALL FEMALE THREAD 4	END 1 END 2	19 QUANTITY	TOTAL OF SWITCHES REQUIRED	
			20 SWITCH	REED - 1 AMP S1 REED - 4 AMP S2 HALL EFFECT - SOURCING S3 HALL EFFECT - SINKING S4	
			21 BUMPER	BUMPER - HEAD END BH BUMPER - CAP END Add 1/4" per End. BC BUMPER - BOTH ENDS BB	
7 ROD DIAMETER	0.625 DIAMETER ROD 63 1.000 DIAMETER ROD 100 1.375 DIAMETER ROD 138 1.750 DIAMETER ROD 175	END 1 END 2	22 PLATING	ELECTROLESS NICKEL PLATED CYLINDER	EN
8 CUSHION	NONE N HEAD Cushion not available on Head End of 1-1/2" Bore with 1" Rod H CAP C BOTH B		23 ACCESSORIES P/N	A _____ B _____ C _____	
9 ADDITIONAL ROD EXT.	ADDITIONAL 'C' DIMENSION END 1 (SPECIFY IN INCHES (2 POSITION DECIMAL)) END 2		24 ADDITIONAL MODIFICATIONS	_____ _____ _____ _____ _____	
STOP HERE IF ALL FEATURES ARE STANDARD					
Requested by: _____					
Customer / Distributor: _____					
Phone #: _____ Date: ____/____/____					

Advanced Machine
Plant 1



Advanced Machine
Plant 2



Heanig



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