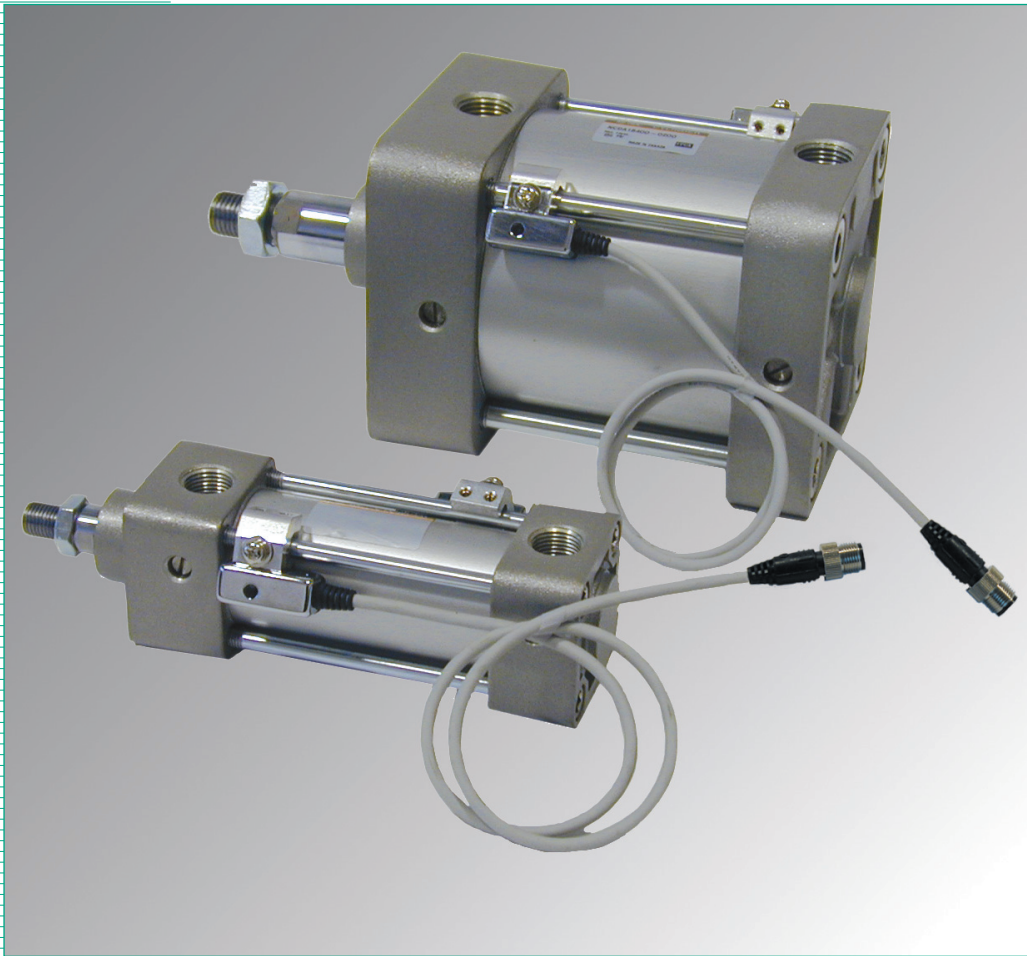




Air Cylinder
NCA1 Series

NFPA Interchangeable



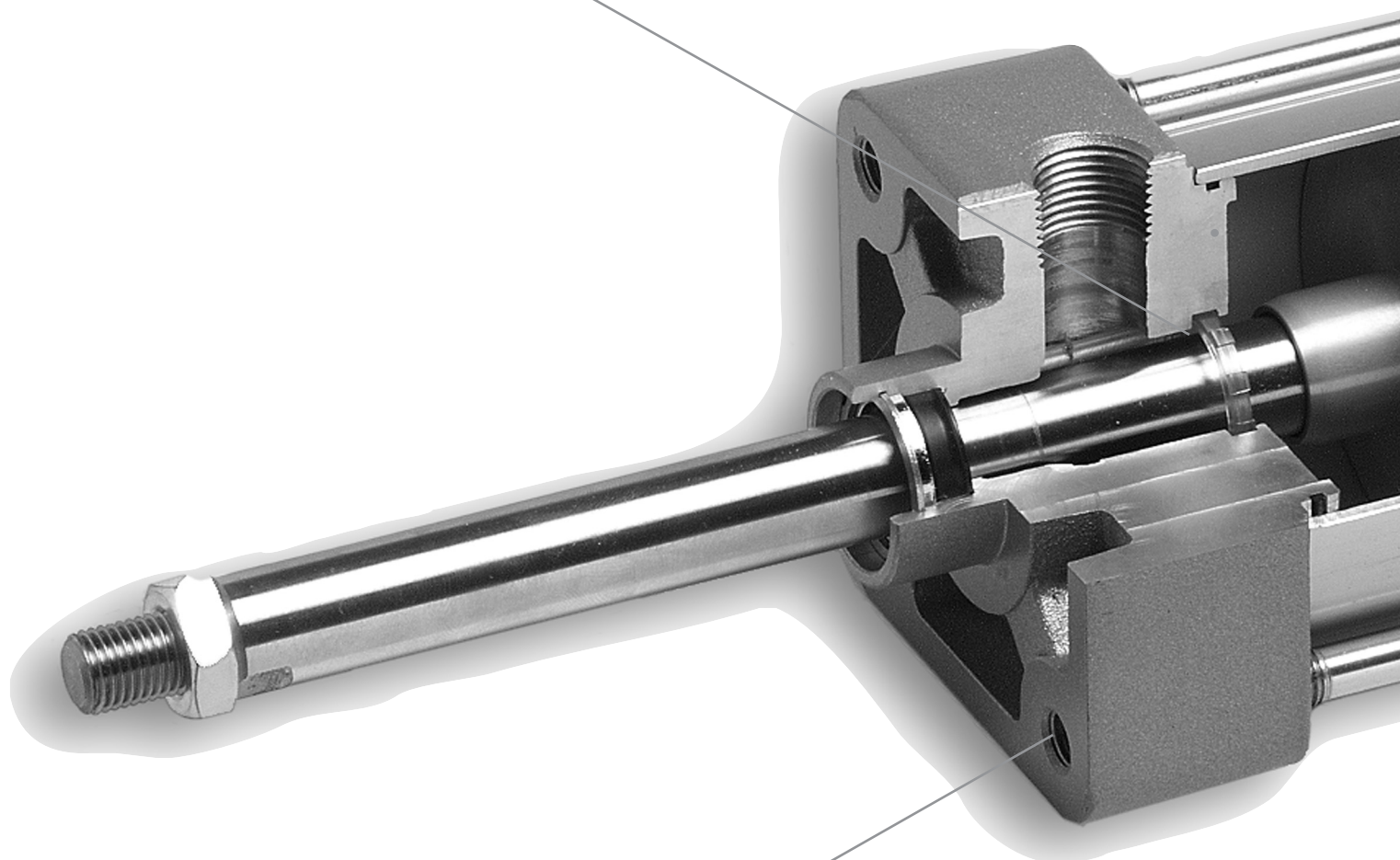
Medium Duty 1.5 ~ 4" Bore
12 Different NFPA Mounting Options
Non-Rotating Option
Tandem Cylinder Option
Auto Switch Capable

NFPA Interchangable Air Cylinder

Series NCA1

Improved cushion capacity

“Floating” cushion seal design eliminates piston rod “bouncing” due to cracking pressure at beginning of stroke.



Compact and lightweight design

The square covers are made of an aluminum die casting and provide a lower cost, lighter weight product

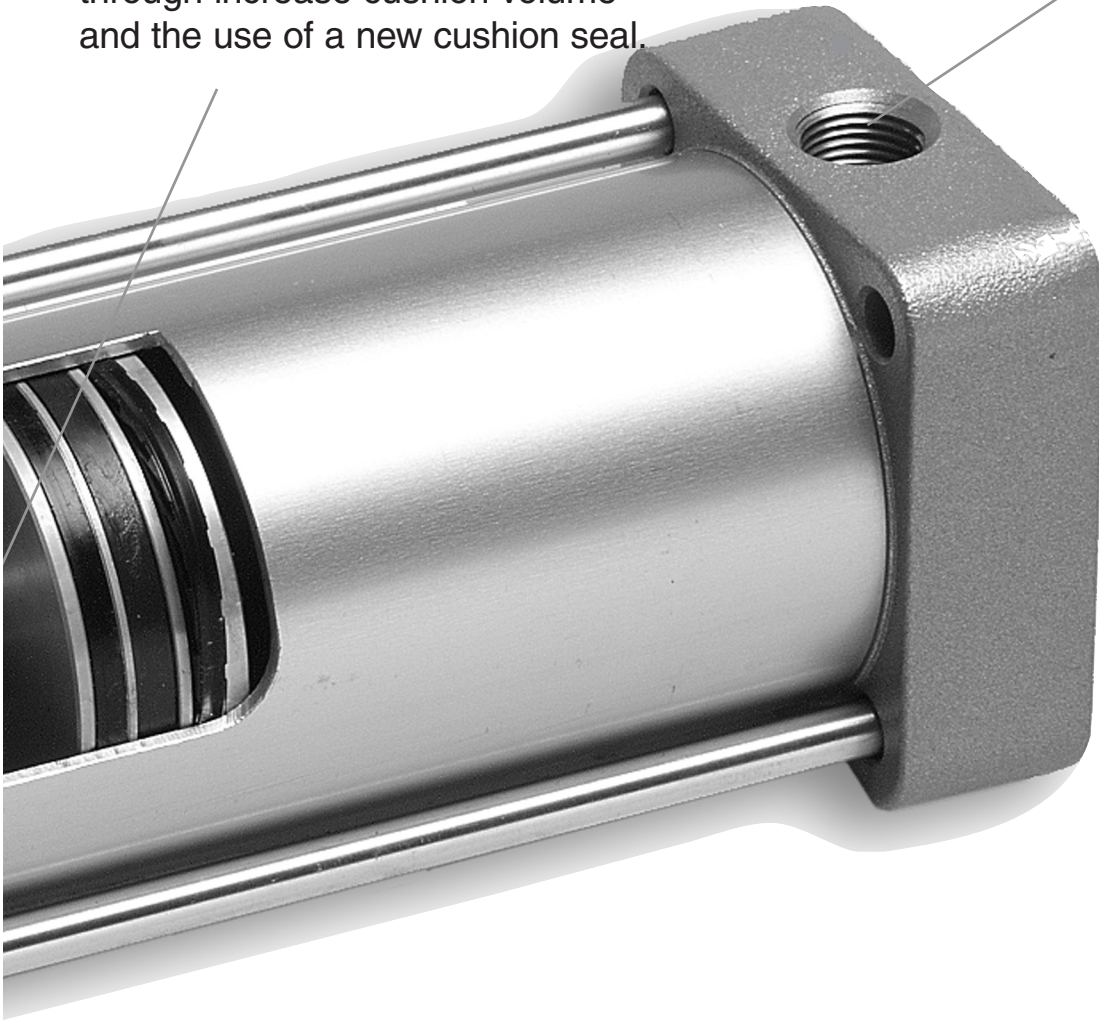
ø1.5", ø2", ø2.5", ø3.25", ø4"

Increased kinetic energy absorption

The absorption of kinetic energy had been increase by nearly 30% through increase cushion volume and the use of a new cushion seal.

Full port design

Allows for improved piston breakaway.



Full range of NFPA interchangeable mounting configurations

Mounting Dimensions are in accordance with ANSI (NFPA) T3.6.7 R2-1996, Fluid Power Systems and products - Square Head Industrial Cylinders - Mounting Dimensions.

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How To Order

NC D A1 [] B 150 - 04 00 [] [] - A51 [] - XB5

Auto Switch •

—	Standard
D	w/Auto Switch (Magnetic Piston)

Style •

—	Standard Cylinder
K	Non-Rotating Cylinder
W	Double Rod
M	Male Rod Stud

Mounting •

B	MX0	Basic
L	MS1	Foot
F	MF1	Front Flange
G	MF2	Rear Flange
R	MS4	Side-Tapped
D	MP2	Double Detachable Rear Clevis
T	MT4	Center Trunnion
C	MP4	Single Detachable Rear Clevis
X	MP1	Double Rear Clevis
S	MS2	Side Lug
U	MT1	Rod Trunnion
J	MT2	Head Trunnion

Bore Size •

150	1.5"
200	2"
250	2.5"
325	3.25"
400	4"

For larger bore sizes up to 32" bore. Please consult CAT: N304-EX

Standard Stroke •

Inches

Stroke •

Hundredths Of An Inch

Options •

XB5	Oversized Rod
XB6	High Temperature
XB7	Low Temperature
XB9	Low Speed
XC6	Stainless Steel Piston Rod
XC8	Adjustable Stroke Extended
XC9	Adjustable Stroke Return
XC10	Dual Operation/Double Rod
XC11	Dual Operation/Single Rod
X46US	Special Trunnion Location
X119US	Non-Rotating Oversize Rod
X130US	Stainless Steel Piston Rod, Tie Rod, Tie Rod Nut, Cushion Valve Needle

For special rod end modifications please see page 41.

• No. of Switches

—	2 Pieces
S	1 Piece
n	n Pieces

• See Auto Switch Options pages ...

• Rod Boot

—	Without Boot
J	Nylon Boot
K	Neoprene Boot

• Air Cushion

—	Both Ends
N	None
H	Head End
R	Rod End

Mounting Bracket Part Numbers

Mounting Bracket / Bore	Part Number				
	150(1.5")	200(2")	250(2.5")	325(3.25")	400 (4")
*Foot	NCA1-L150	NCA1-L200	NCA1-L250	NCA1-L325	NCA1-L400
Flange	NCA1-F150	NCA1-F200	NCA1-F250	NCA1-F325	NCA1-F400
Double Clevis (MP2)	NCA1-D150	NCA1-D200	NCA1-D250	NCA1-D325	NCA1-D400
Single Clevis	NCA1-C150	NCA1-C200	NCA1-C250	NCA1-C325	NCA1-C400
*Side Lug	NCA1-S150	NCA1-S200	NCA1-S250	NCA1-S325	NCA1-S400
Double Clevis (MP1)	NCA1-X150	NCA1-X200	NCA1-X250	NCA1-X325	NCA1-X400

* These Kits are for Standard Single Rod/Double Acting Cylinders without Options. For Option Kits, please contact your local SMC Sales office. One Kit required per cylinder.



The SMC NCA1 expanded series NFPA Industrial Interchangeable Pneumatic Cylinders are now available in bore sizes ranging from 5"-8" Medium Duty, and 1.5"-14" Heavy Duty.

The NCA1 Expanded Series Cylinders offer:

- Replaceable Rod Gland
- A full range of NFPA interchangeable mounting configurations.
- Available in three construction types:
 - Aluminum, Steel, and Stainless Steel
- Composite fiber tubel optional.
- Fully adjustable cushion

For further information please consult CAT: N304-EX or contact your local SMC sales office.

Specifications



Type	Standard	Double Rod	Non-Rotating Rod
Fluid	Air	Air	Air
Lubrication	Non-lube	Non-lube	Non-lube
Max Operating Pressure	250 psi (1.75MPa)	250 psi (1.75MPa)	250 psi*(1.75MPa)
Min Operating Pressure	8 psi (0.06MPa)	8 psi (0.06MPa)	15 psi (0.1MPa)
Ambient & Fluid Temp.	40~140°F (5~60°C)	40~140°F (5~60°C)	0~140°F (5~60°C)
Piston Speed	2~20in/s (50~500mm/s)	2~20in/s (50~500mm/s)	2~20in/s (50~500mm/s)
Mounting	Basic, foot rear flange,clevis side tapped center trunnion head trunnion, side lug rod trunnion	Basic, foot center trunnion side tapped	Basic, foot, front flange, center trunnion, side tapped, side lug
Non-Rotating Accuracy	n/a	n/a	± 0.50c

*Rod and head trunnion maximum operating pressure for 325 and 400 bore is up to 150 psi

Standard Strokes

Bore Size	Standard Stroke	Maximum Stroke
1.5"	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24	
2", 2.5"	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24	Consult SMC
3.25", 4"	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28, 30	

Base Material / Surface Treatment

Description	Material	Note
Cover	Aluminum alloy	Silver paint
Tube	Aluminum alloy	Hard alumite
Seals	Nitrile rubber	PLD, PLP
Piston Rod	Carbon steel	Hard chromate
Piston	Aluminum alloy	Hard alumite

Weight / Aluminum Tube

Bore Inch		150 (1.5")	200 (2")	250 (2.5")	325 (3.25")	400 (4")
Basic Weight	Basic type	1.58	2.35	3.19	6.03	7.79
	Foot mounting	1.95	2.86	3.80	7.45	10.12
	Flange mounting	2.30	3.22	4.45	8.85	11.66
	Clevis mounting	2.27	3.23	4.28	8.95	11.41
	Trunnion mounting	2.79	3.81	5.50	10.05	3.50
Add'l weight per 2" stroke	For all mountings	0.38	0.48	0.51	0.97	1.06

Cylinder Bores and Forces: Push Stroke

Bore (in)	Piston Area (in)	Forces (lbs); Push Stroke Operating medium Pressure (PSI)					
		50	60	80	100	200	250
1.5	1.767	88	106	141	177	353	442
2	3.142	157	188	251	314	628	785
2.5	4.909	245	295	393	491	982	1227
3.25	8.296	415	498	664	830	1659	2074
4	12.566	628	754	1005	1257	2513	3142

To calculate thrust forces not shown in the table, multiply operating pressure by piston area.

How to use this table

- 1 Locate column with desired operating pressure.
- 2 Move down that column and locate the thrust value which is equal (or the next larger to the force to be delivered by the cylinder.)
- 3 On that same line, locate in the first (left) column the bore size recommended for your application.

Note: These are *guide lines only*, which must be substantiated using additional data specific to your application.

Cylinder Bores and Forces: Pull Stroke

Piston Rod Diameter (in)	Piston Rod Area (in)	Forces (lbs); Pull Stroke (Deduct the listed thrusts corresponding to the rod size from push stroke pressure) Operating medium Pressure (psi)					
		50	60	80	100	200	250
0.625	0.307	15	18	25	31	61	77
1	0.785	39	47	63	79	157	196
1.375	1.485	74	89	119	148	297	371

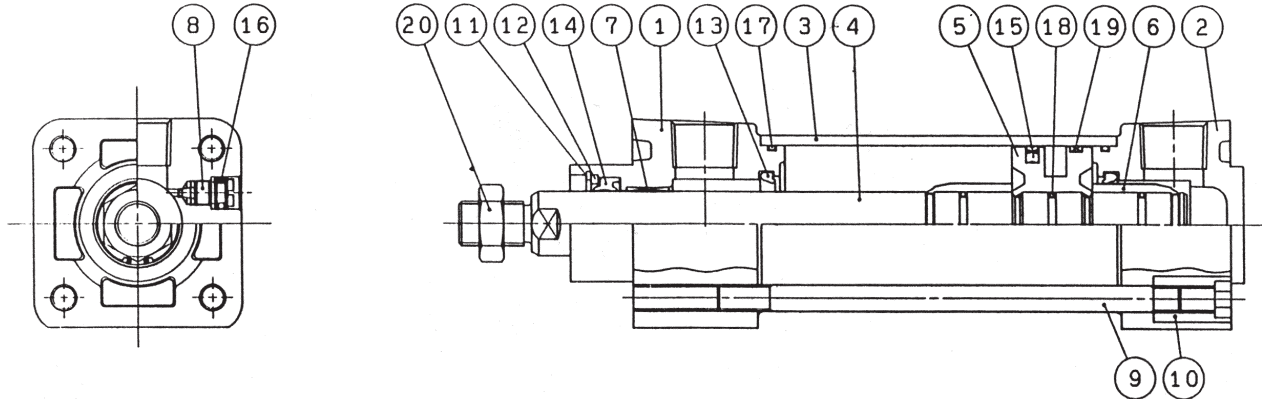
To calculate pull forces not shown in the table, use the following formula:

$$\text{Pull Force} = (\text{Piston Area} - \text{Rod Area}) \times \text{Working Pressure}$$

How to use this table

- 1 To find the force on the pull stroke, locate the required piston rod diameter in the left most column.
- 2 Moving to the right, locate the required working pressure
- 3 Deduct the value shown at the intersection from the push stroke force value determined from the Push Stroke table. The resultant is the available pull stroke table.

Construction / Parts List



Parts List

No.	Description	Material	150	200	250	325	400	
1	Rod Cover	Aluminum alloy	NCA150-02AQ3608-S	NCA200-02AQ3609-S	NCA250-02AQ3610-S	NCA325-02AQ3611-S	NCA400-02AQ3612-S	
2	Head Cover	Aluminum alloy	NCA150-03-Q3608-S	NCA200-03-Q3609-S	NCA250-03-Q3610-S	NCA325-03-Q6311-S	NCA400-03-Q6312-S	
3	Cylinder Tube	Aluminum alloy	Please See below for How to order Cylinder Tube					
4	Piston Rod	Carbon steel	Available only as an Assembled Item. Please See Below for How to Order Piston Rod Assembly					
5	Piston	Aluminum alloy	Available only as an Assembled Item. Please See Below for How to Order Piston Rod Assembly					
6	Cushion Sphere	Aluminum alloy	Available only as an Assembled Item. Please See Below for How to Order Piston Rod Assembly					
7	Rod Bushing	Bronze casting	Available only as an Assembly Please See Rod/Head Cover					
8	Cushion Valve	Carbon steel	NC1A150-10-124	NC1A200-10-124	NC1A250-10-124	NC1A325-10-124	NC1A400-10-124	
9	Tie Rod	Carbon steel	Please See Below for How to Order Tie Rod					
10	Tie Rod Nut	Carbon steel	NCA150-13-Q6308	NCA200-13-Q6309	NCA250-13-Q6309	NCA325-13-Q6311	NCA400-13-Q6311	
11	Retaining Ring	Carbon steel	5008-93	5008-93	5008-93	5008-131	5008-131	
12	Rod Seal Retainer	Resin	NCA150-31-Q6308	NCA150-31-Q6308	NCA150-31-Q6308	NCA325-31-Q6311	NCA325-31-Q6311	
13*	Cushion Seal	NBR	Available only as an Assembled Item. Please See Below for How to Order Seal Kit					
14*	Rod Seal	NBR	Available only as an Assembled Item. Please See Below for How to Order Seal Kit					
15*	Piston Seal	NBR	Available only as an Assembled Item. Please See Below for How to Order Seal Kit					
16*	Cushion Valve Seal	NBR	Available only as an Assembled Item. Please See Below for How to Order Seal Kit					
17*	Cylinder Tube Gasket	NBR	Available only as an Assembled Item. Please See Below for How to Order Seal Kit					
18	Piston Gasket	NBR	Available only as an Assembled Item. Please See Below for How to Order Piston Rod Assembly					
19	Wear Ring	Resin	Available only as an Assembled Item. Please See Below for How to Order Piston Rod Assembly					
20	Jam Nut	Carbon steel	JM-045	JM-045	JM-045	JM-10	JM-10	

* Components included in a seal kit.

How To Order Seal Kits

NC1A **W** **150** - **PS** -

Option Bore Special Options

- Single rod
- W** Double rod
- K*** Non-rotating

- 150
- 200
- 250
- 325
- 400

- XB5***** Over sized rod
- XB6***** High temperature
- XB7***** Low temperature
- XB5B6***** Oversized w/ high temperature*
- XC11** Dual Operation/Single Rod**

* available for 200 and 250 bores only

** use single rod designation when ordering XC11 kit

Note: XC10 seal kit order 2 single rod kits

*** not available with K option

How To Order Piston Rod Assembly Double Acting Single Rod

NC1A **150** - **26A** - **0400**

Bore Stroke

(In Inches and Hundredths of Inches)

- 150
- 200
- 250
- 325
- 400

How To Order Tie Rods

NC1A **150** - **11** - **2759** - **0400**

Applicable Bore Bore Tie Rod Size Stroke

(In Inches and Hundredths of Inches)

150	150	2759	
200	200	2760	
250	200	2760	
325	325	2761	
400	325	2761	

Note: Quantity is one piece. Not applicable for types: Double rod (W), Trunnion (T), XC8, XC9, XC10, XC11, Over sized rod (XB5) with front mounts. Please consult your local SMC sales office.

How To Order Cylinder Tube Double Acting Single Rod

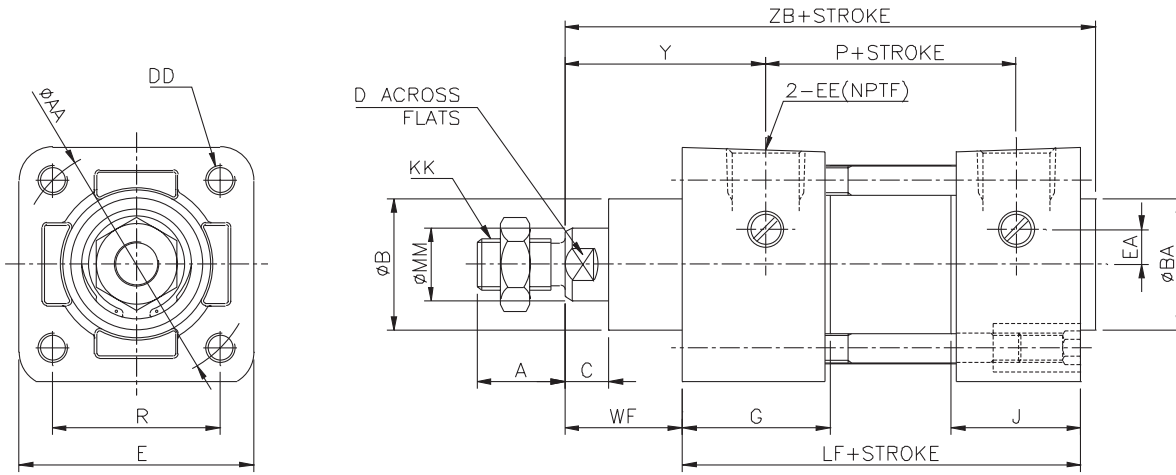
NC1A **150** - **04** - **0400**

Bore Stroke

(In Inches and Hundredths of Inches)

- 150
- 200
- 250
- 325
- 400

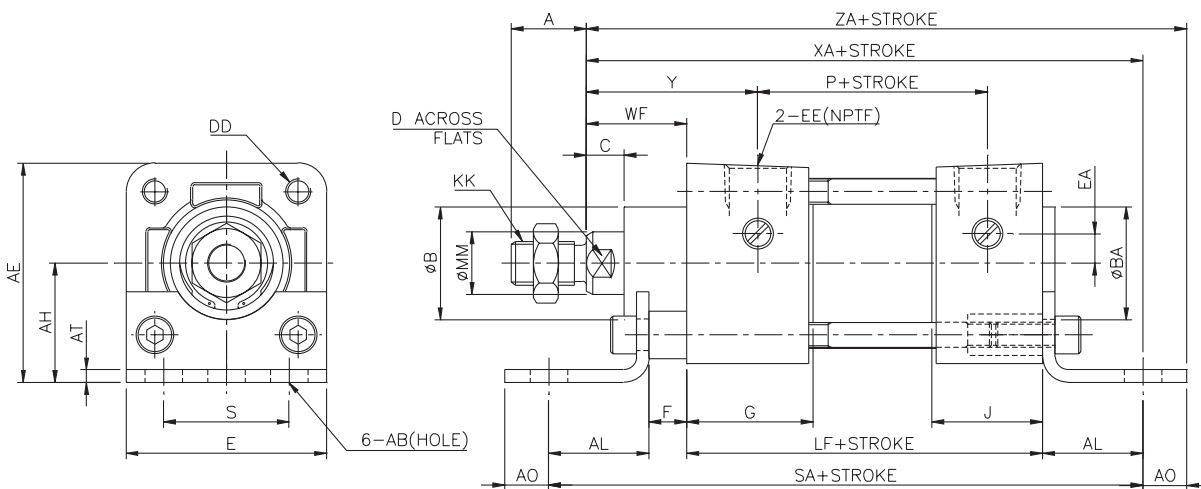
Basic Type NC A1B (MX0 Mounting Style)



(in)

Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	R	WF	Y	LF	P	ZB
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	1.71	3 5/8	2.36	4 3/4
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2 1/2	0.3	3/8	1.26	1.06	1.84	1	1.71	3 5/8	2.4	4 3/4
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	1.75	3 3/4	2.48	4 7/8
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1 1/2	1/2	7/8	3/8-24	3 3/4	0	1/2	1.57	1.18	2.76	1 3/8	2.34	4 1/4	2.72	5 53/64
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1 1/2	1/2	7/8	3/8-24	4 1/2	0	1/2	1.57	1.18	3.32	1 3/8	2.34	4 1/4	2.72	5 53/64

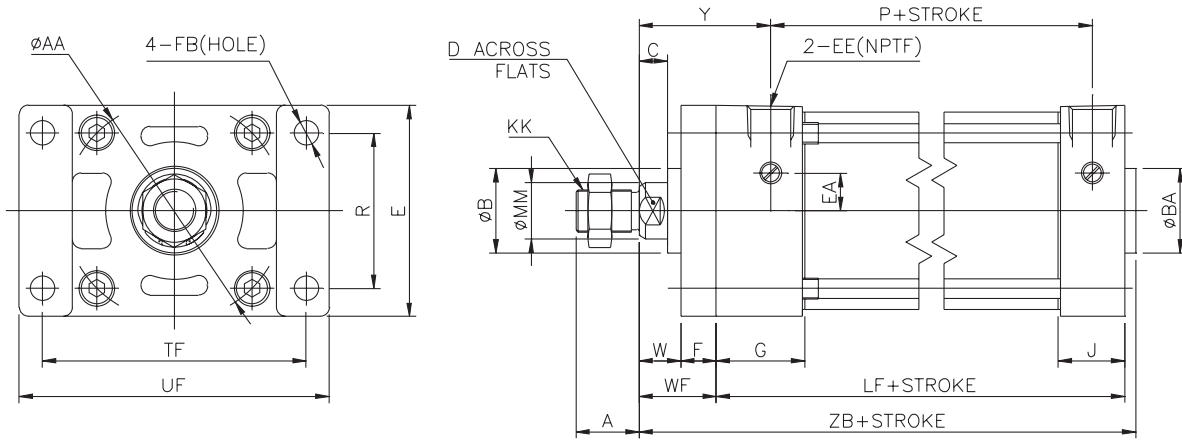
Foot Mounting Type NC A1L (MS1 Mounting Style)



(in)

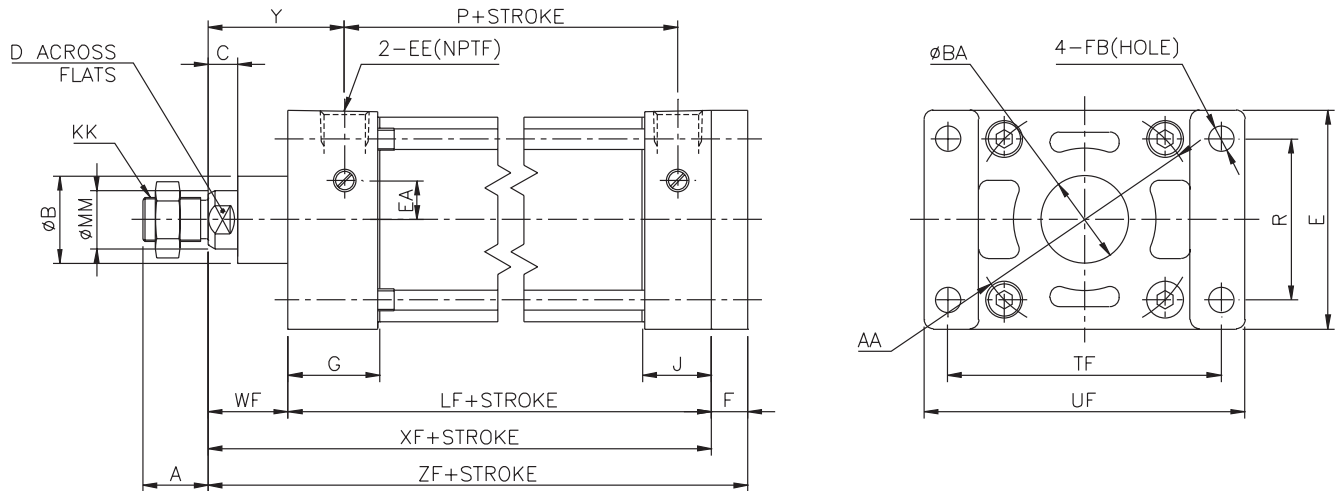
Bore (in)	MM	KK	A	AA	AB	AE	AH	AL	A0	AT	B	BA	C	D	DD	E	EA	EE	F	G	J	S	WF	Y	P	LF	SA	XA	ZA
150 (1.5")	5/8	7/16-20	3/4	2.02	3/8	2 3/16	1 3/16	1	7/16	1/8	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	3/8	1.26	1.1	1 1/4	1	1.71	2.36	3 5/8	6	5 5/8	6 1/16
200 (2")	5/8	7/16-20	3/4	2.6	3/8	2 11/16	1 7/16	1	9/16	1/8	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	3/8	1.26	1.06	1 3/4	1	1.71	2.4	3 5/8	6	5 5/8	6 3/16
250 (2.5")	5/8	7/16-20	3/4	3.1	3/8	3 1/8	1 5/8	1	9/16	1/8	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	3/8	1.3	1.06	2 1/4	1	1.75	2.48	3 3/4	6 1/8	5 3/4	6 5/16
325 (3.25")	1	3/4-16	1 1/8	3.9	1/2	3 13/16	1 15/16	1.25	3/4	11/64	1.5	1.5	1/2	7/8	3/8-24	3.75	0	1/2	5/8	1.57	1.18	2.75	1 3/8	2.34	2.72	4.25	7 3/8	6 7/8	7 5/8
400 (4")	1	3/4-16	1 1/8	4.7	1/2	4 1/2	2 1/4	1 1/4	3/4	15/64	1.5	1.5	1/2	7/8	3/8-24	4.5	0	1/2	5/8	1.57	1.18	3.5	1 3/8	2.34	2.72	4.25	7 3/8	6 7/8	7 5/8

Front Flange Type NC \square A1F (MF1 Mounting Style)



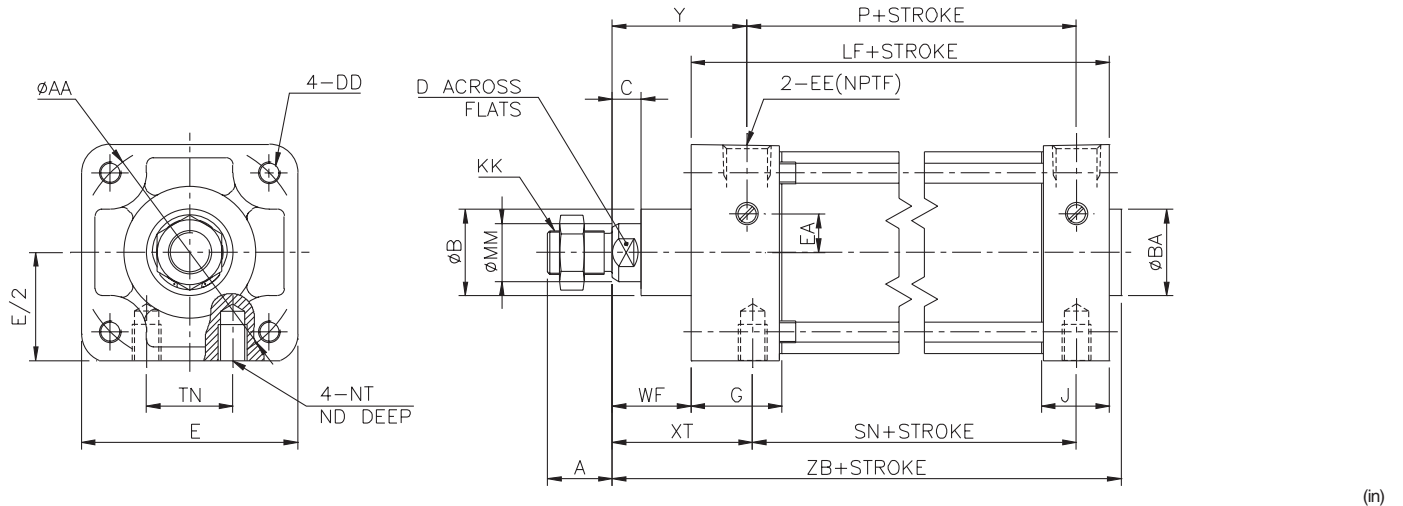
Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	F	FB	G	J	R	TF	UF	W	WF	Y	LF	P	ZB
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	3/8	5/16	1.26	1.1	1.43	2 3/4	3 3/8	5/8	1	1.71	3 5/8	2.36	4 3/4
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	3/8	3/8	1.26	1.06	1.84	3 3/8	4 1/8	5/8	1	1.71	3 5/8	2.4	4 3/4
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	3/8	3/8	1.3	1.06	2.19	3 7/8	4 5/8	5/8	1	1.75	3 3/4	2.48	4 7/8
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1 1/2	1/2	7/8	3/8-24	3.75	0	1/2	1/2	7/16	1.57	1.18	2.76	4 11/16	5 1/2	3/4	1 3/8	2.34	4 1/4	2.72	5 53/64
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1 1/2	1/2	7/8	3/8-24	4.5	0	1/2	1/2	7/16	1.57	1.18	3.32	5 7/16	6 1.4	3.4	1 3/8	2.34	4 1/4	2.72	5 53/64

Rear Flange Type NC \square A1G (MF2 Mounting Style)



Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	F	FB	G	J	R	TF	UF	WF	Y	P	XF	ZF
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	3/8	5/16	1.26	1.1	1.43	2 3/4	3 3/8	1	1.71	2.36	4 5/8	5
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	3/8	3/8	1.26	1.06	1.84	3 3/8	4 1/8	1	1.71	2.4	4 5/8	5
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	3/8	3/8	1.3	1.06	2.19	3 7/8	4 5/8	1	1.75	2.48	4 3/4	5 1/8
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1 1/2	1/2	7/8	3/8-24	3.75	0	1/2	5/8	7/16	1.57	1.18	2.76	4 11/16	5 1/2	1 3/8	2.34	2.72	5 5/8	6 1/4
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1 1/2	1/2	7/8	3/8-24	4.5	0	1/2	5/8	7/16	1.57	1.18	3.32	5 7/16	6 1.4	1 3/8	2.34	2.72	5 5/8	6 1/4

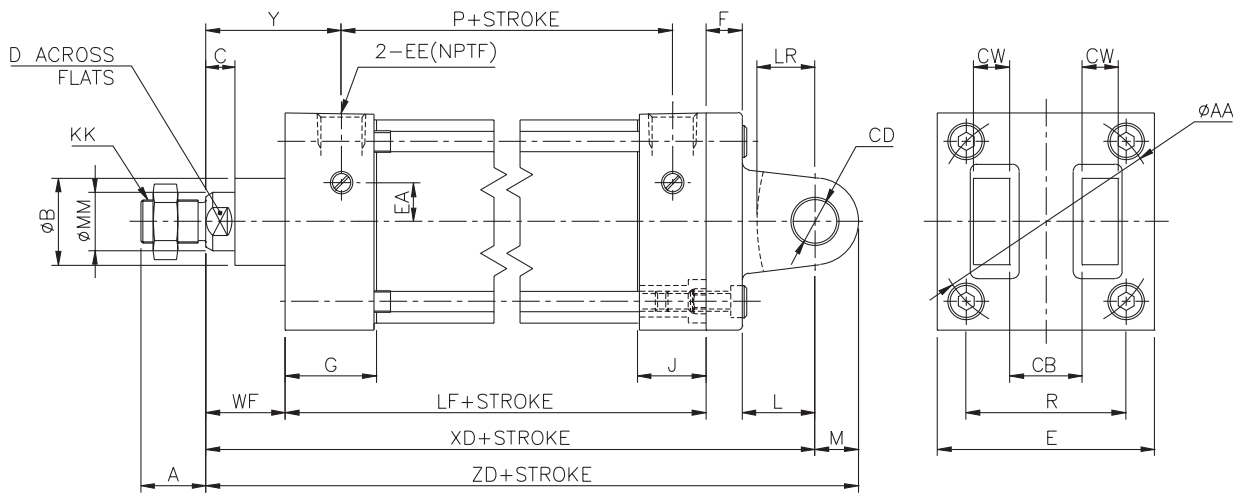
Side Tapped Type NC A1R (MS4 Mounting Style)



(in)

Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	E/2	EA	EE	G	J	ND	NT	TN	WF	XT	Y	LF	P	SN	ZB
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	1	0.3	3/8	1.26	1.1	9/32	1/4-20	5/8	1	1 15/16	1.71	3 5/8	2.36	2 1/4	4 3/4
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	1 1/4	0.3	3/8	1.26	1.06	7/16	5/16-18	7/8	1	1 15/16	1.71	3 5/8	2.4	2 1/4	4 3/4
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	1 1/2	0	3/8	1.3	1.06	19/32	3/8-16	1 1/4	1	1 15/16	1.75	3 3/4	2.48	2 3/8	4 7/8
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1 1/2	1/2	7/8	3/8-24	3.75	1 7/8	0	1/2	1.57	1.18	5/8	1/2-13	1 1/2	1 3/8	2 7/16	2.34	4 1/4	2.72	2 5/8	5 53/64
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1 1/2	1/2	7/8	3/8-24	4.5	2 1/4	0	1/2	1.57	1.18	5/8	1/2-13	2 1/16	1 3/8	2 7/16	2.34	4 1/4	2.72	2 5/8	5 53/64

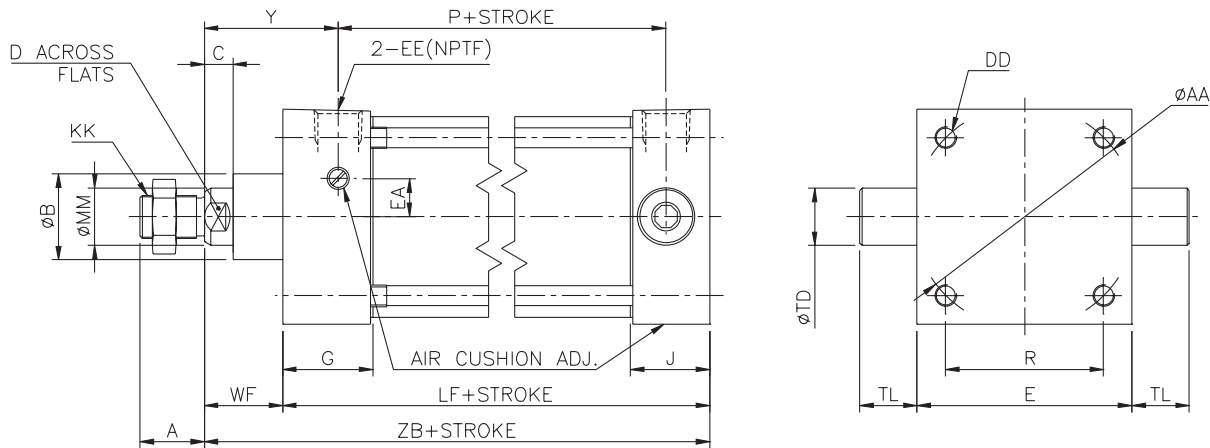
Detachable Rear Clevis Type NC A1D (MP2 Mounting Style)



(in)

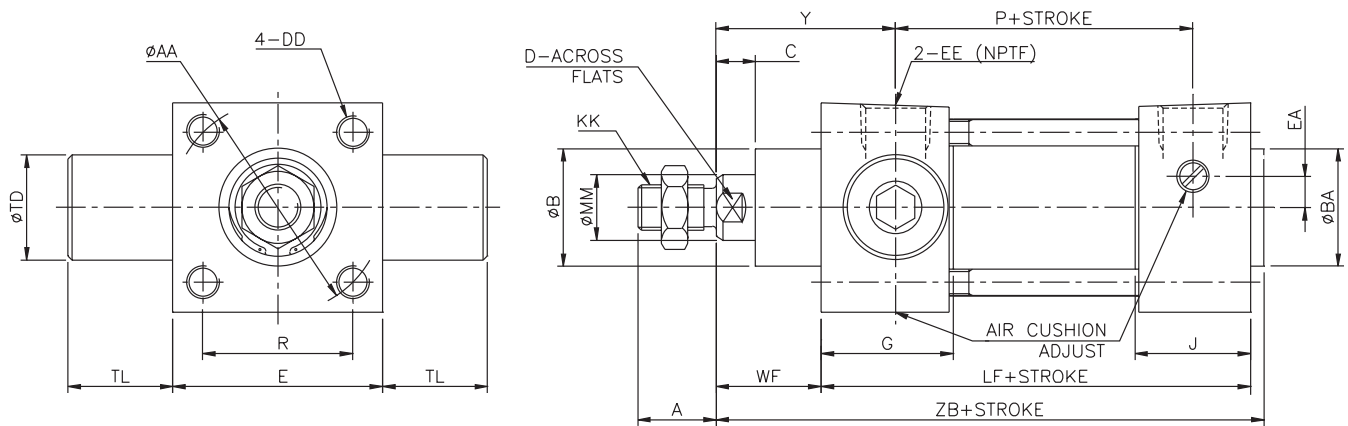
Bore (in)	MM	KK	A	AA	B	C	CB	CD	CW	D	DD	E	EA	EE	F	G	J	L	LR	M	WF	XD	Y	LF	P	ZD
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	3/4	1/2	1/2	9/16	1/4-28	2	0.3	3/8	3/8	1.26	1.1	3/4	5/8	1/2	1	5 3/4	1.71	3 5/8	2.36	6 1/4
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	3/4	1/2	1/2	9/16	5/16-24	2.5	0.3	3/8	3/8	1.26	1.06	3/4	5/8	1/2	1	5 3/4	1.71	3 5/8	2.4	6 1/4
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	3/4	1/2	1/2	9/16	5/16-24	3	0	3/8	3/8	1.3	1.06	3/4	5/8	1/2	1	5 7/8	1.75	3 3/4	2.48	6 1/4
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	1 1/4	3/4	5/8	7/8	3/8-24	3.75	0	1/2	5/8	1.57	1.18	1 1/4	1	3/4	1 3/8	7 1/2	2.34	4 1/4	2.72	8 1/4
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	1 1/4	3/4	5/8	7/8	3/8-24	4.5	0	1/2	5/8	1.57	1.18	1 1/4	1	3/4	1 3/8	7 1/2	2.34	4 1/4	2.72	8 1/4

Head Trunnion Type NC A1J (MT2 Mounting Style)



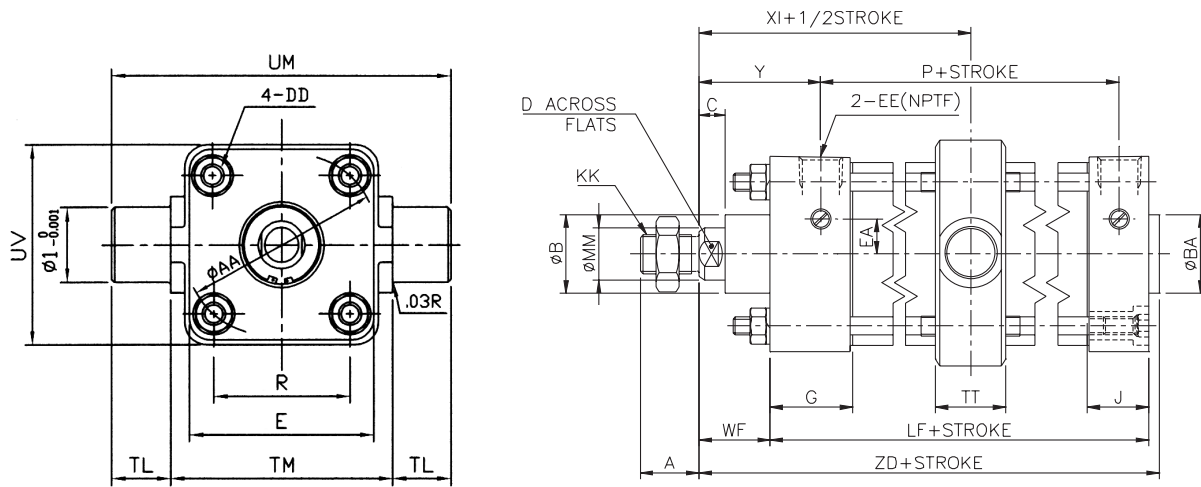
Bore (in)	MM	KK	A	AA	B	C	D	DD	E	EA	EE	G	J	R	TD ^{0.001}	TL	WF	Y	LF	P	ZB
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	1	1	1.71	3 5/8	2.36	4.75
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	9/16	5/16-24	2 1/2	0.3	3/8	1.26	1.06	1.84	1	1	1	1.71	3 5/8	2.4	4.75
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	1	1	1.75	3 3/4	2.48	4.88
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	7/8	3/8-24	3 3/4	0	1/2	1.57	1.18	2.76	1	1	1 3/8	2.34	4 1/4	2.72	5.83
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	7/8	3/8-24	4 1/2	0	1/2	1.57	1.18	3.32	1	1	1 3/8	2.34	4 1/4	2.72	5.83

Rod Trunnion Type NC A1U (MT1 Mounting Style)



Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	R	TD ^{0.001}	TL	WF	Y	LF	P	ZB
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	1	1	1.71	3 5/8	2.36	4.75
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2 1/2	0.3	3/8	1.26	1.06	1.84	1	1	1	1.71	3 5/8	2.4	4.75
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	1	1	1.75	3 3/4	2.48	4.88
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1 1/2	1/2	7/8	3/8-24	3 3/4	0	1/2	1.57	1.18	2.76	1	1	1 3/8	2.34	4 1/4	2.72	5.83
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1 1/2	1/2	7/8	3/8-24	4 1/2	0	1/2	1.57	1.18	3.32	1	1	1 3/8	2.34	4 1/4	2.72	5.83

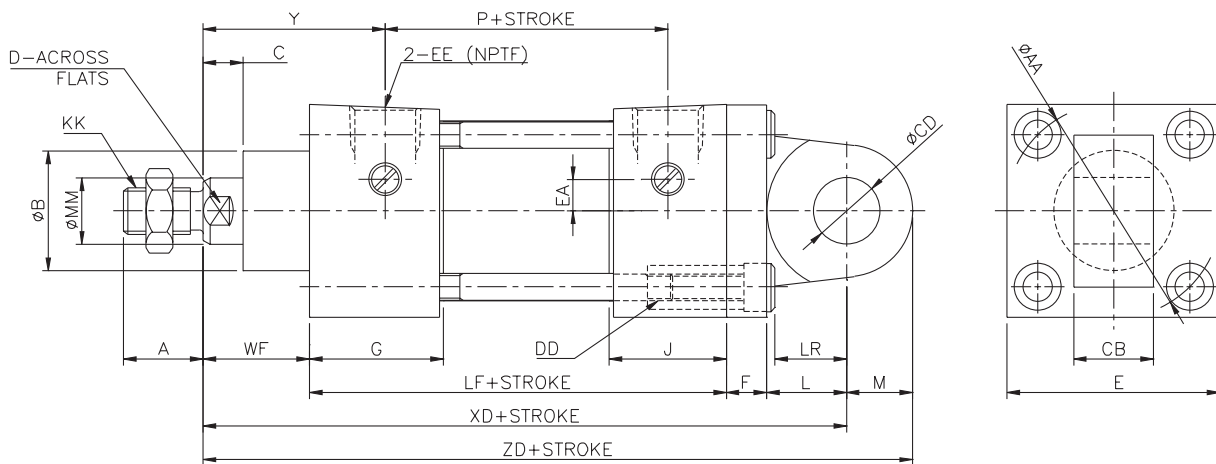
Center Trunnion Type NC A1T (MT4 Mounting Style)



(in)

Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	R	TD _{0.001}	TL	TM	TT	UM	UV	WF	Y	P	LF	XI	ZD
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	1	2.5	1.18	4.5	2	1	1.71	2.36	3 5/8	2.89	4 3/4
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	1.06	1.84	1	1	3	1.18	5	2.56	1	1.71	2.4	3 5/8	2.91	4 3/4
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	1	3.5	1.18	5.5	3.39	1	1.75	2.48	3 3/4	2.99	4 7/8
325 (3.25")	1	3/4-16	1 1/8	3.9	1.5	1.5	1/2	7/8	3/8-24	3.75	0	1/2	1.57	1.18	2.76	1	1	4.5	1.34	6.5	4.33	1 3/8	2.34	2.72	4.25	3.7	5 53/64
400 (4")	1	3/4-16	1 1/8	4.7	1.5	1.5	1/2	7/8	3/8-24	4.5	0	1/2	1.57	1.18	3.32	1	1	5.25	1.57	7.25	5.12	1 3/8	2.34	2.72	4.25	3.74	5 53/64

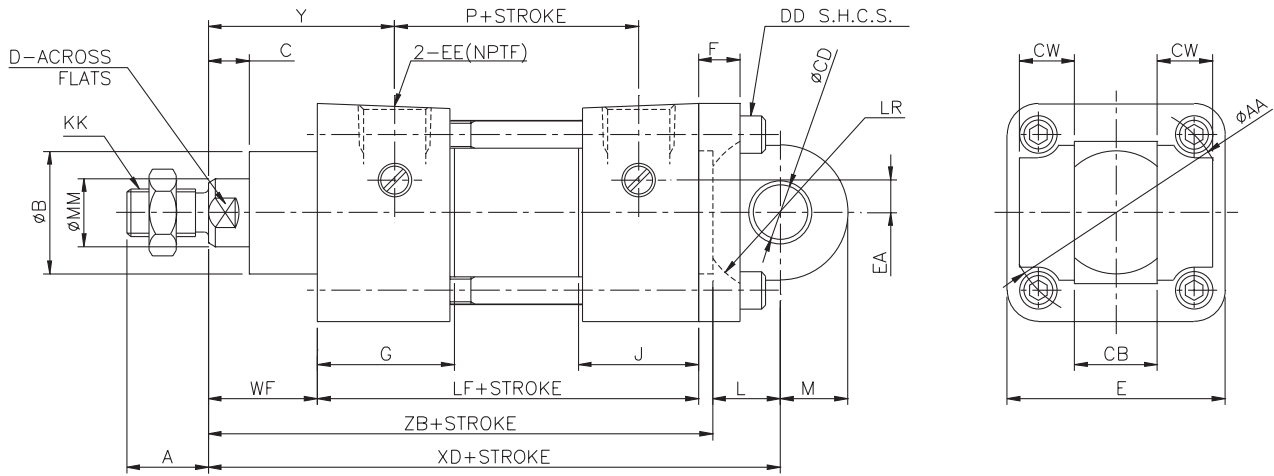
Single Rear Clevis Type NC A1C (MP4 Mounting Style)



(in)

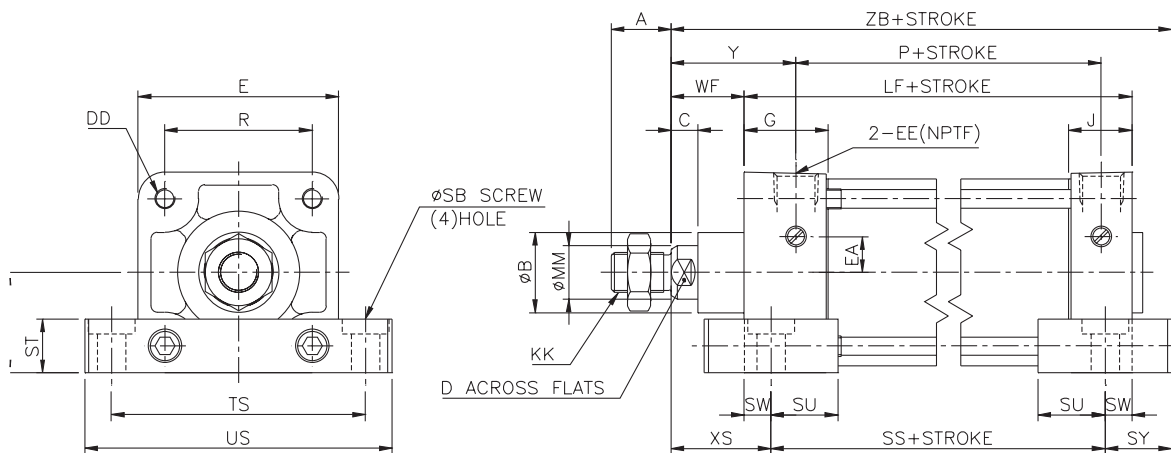
Bore (in)	MM	KK	A	AA	B	C	CB	CD	D	DD	E	EA	EE	F	G	J	L	LR	M	WF	XD	Y	LF	P	ZD
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	3/4	1/2	9/16	1/4-28	2	0.3	3/8	3/8	1.26	1.1	3/4	5/8	1/2	1	5 3/4	1.71	3 5/8	2.36	6 1/4
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	3/4	1/2	9/16	5/16-24	2.5	0.3	3/8	3/8	1.26	1.06	3/4	5/8	1/2	1	5 3/4	1.71	3 5/8	2.4	6 1/4
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	3/4	1/2	9/16	5/16-24	3	0	3/8	3/8	1.3	1.06	3/4	5/8	1/2	1	5 7/8	1.75	3 3/4	2.48	6 1/4
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	1 1/4	3/4	7/8	3/8-24	3.75	0	1/2	5/8	1.57	1.18	1 1/4	1	3/4	1 3/8	7 1/2	2.34	4 1/4	2.72	8 1/4
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	1 1/4	3/4	7/8	3/8-24	4.5	0	1/2	5/8	1.57	1.18	1 1/4	1	3/4	1 3/8	7 1/2	2.34	4 1/4	2.72	8 1/4

Double Rear Clevis Type NC A1X (MP1 Mounting Style)



Bore (in)	MM	KK	A	AA	B	C	CB	CD	CW	D	DD	E	EA	EE	F	G	J	L	LR	M	WF	XD	Y	LF	P	ZB
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	3/4	1/2	1/2	9/16	1/4-28	2	0.3	3/8	3/8	1.26	1.1	0.62	.75	0.62	1	5 3/4	1.71	3 5/8	2.36	4.75
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	3/4	1/2	1/2	9/16	5/16-24	2.5	0.3	3/8	3/8	1.26	1.06	0.62	.75	0.62	1	5 3/4	1.71	3 5/8	2.4	4.75
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	3/4	1/2	1/2	9/16	5/16-24	3	0	3/8	3/8	1.30	1.06	0.62	.75	0.62	1	5 7/8	1.75	3 3/4	2.48	4.88
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	1 1/4	3/4	5/8	7/8	3/8-24	3.75	0	1/2	5/8	1.57	1.18	1.05	1.25	0.87	1 3/8	7 1/2	2.34	4 1/4	2.72	5.83
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	1 1/4	3/4	5/8	7/8	3/8-24	4.5	0	1/2	5/8	1.57	1.18	1.05	1	0.87	1 3/8	7 1/2	2.34	4 1/4	2.72	5.83

Side Lug Mounting Type NC A1S (MS2 Mounting Style)



Bore (in)	MM	KK	A	B	C	D	DD	E	EA	EE	G	J	LF	P	R	SB	SS	ST	SU	SW	SY	TS	US	WF	XS	Y	ZB
150 (1.5")	5/8	7/16-20	3/4	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	3.63	2.36	1.43	3/8	2.88	5/8	0.94	3/8	0.94	2.75	3.50	1	1.38	1.71	5.19
200 (2")	5/8	7/16-20	3/4	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	1.06	3.63	2.4	1.84	3/8	2.88	5/8	0.94	3/8	0.94	3.25	4	1	1.38	1.71	5.19
250 (2.5")	5/8	7/16-20	3/4	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	3.75	2.48	2.19	3/8	3	3/4	0.94	3/8	0.94	3.75	4.50	1	1.38	1.75	5.31
325 (3.25")	1	3/4-16	1 1/8	1.5	1/2	7/8	3/8-24	3.75	0	1/2	1.57	1.18	4.25	2.72	2.76	1/2	3.25	1	1.25	1/2	1.25	4.75	5.75	1.38	1.88	2.34	6.38
400 (4")	1	3/4-16	1 1/8	1.5	1/2	7/8	3/8-24	4.5	0	1/2	1.57	1.18	4.25	2.72	3.32	1/2	3.25	1	1.25	1/2	1.25	5.50	6.50	1.38	1.88	2.34	6.38

Specifications



- Standard with air cushion
- Auto-switch mounting available

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Ambient & Media Temperature	40 ~ 140°F (5 ~ 60°C)				
Piston Speed	2 ~ 20 inch/sec (50 ~ 500mm/sec)				
Cushion	Air Cushion Standard				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped				

Standard Stroke List

Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28

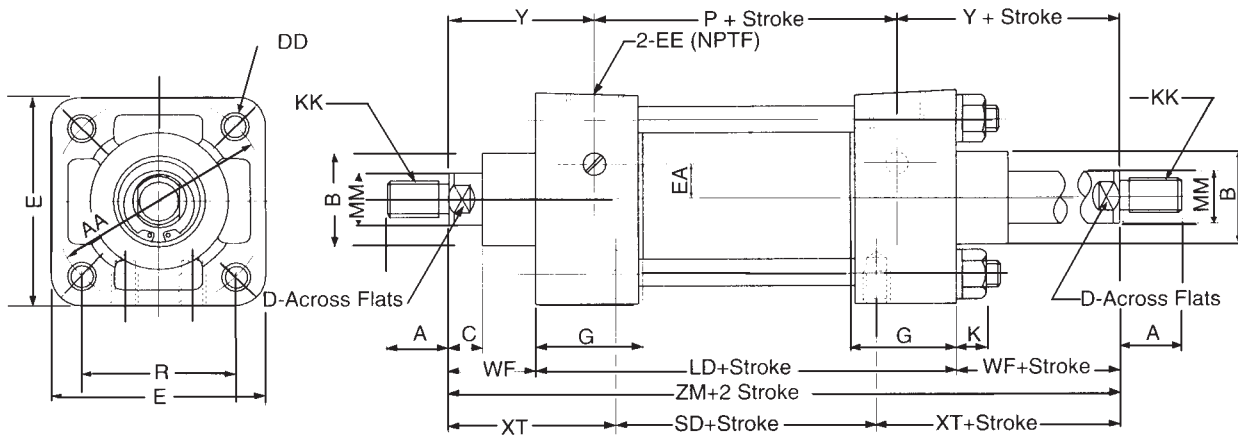
How To Order

NCDA1 W MOUNTING BORE - STROKE - SUFFIX

Ex: NCDA1WB 150-400

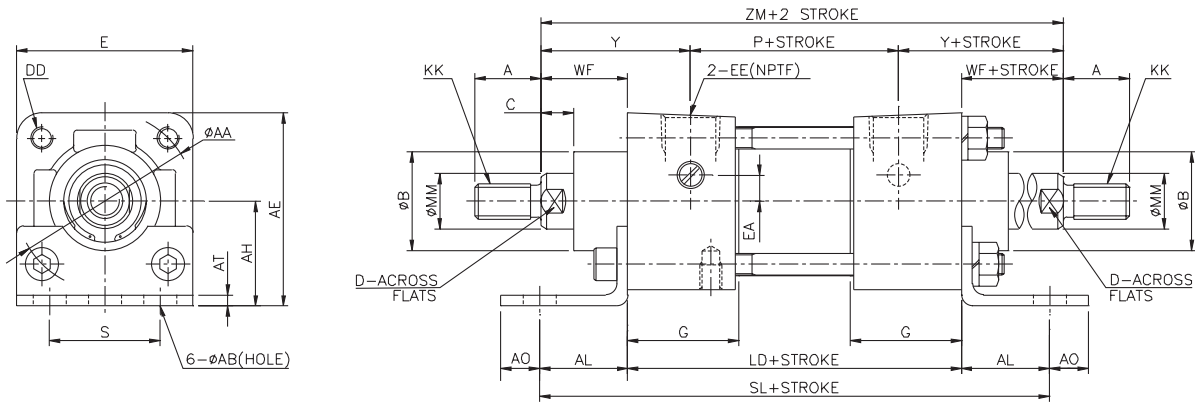
Auto-switch capable Double Rod

Double Rod Basic Type NC A1WB



Bore (in)	MM	KK	A	AA	B	C	D	DD	E	EA	EE	G	K	LD	P	R	WF	Y	ZM	XT	SD
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	0.28	3.78	2.36	1.43	1	1.71	5.78	1 15/26	1.9
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	9/16	5/16-24	2 1/2	0.3	3/8	1.26	0.34	3.82	2.4	1.84	1	1.71	5.82	1 15/26	1.94
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	0.34	3.98	2.48	2.19	1	1.75	5.98	1 15/26	2.1
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	7/8	3/8-24	3 3/4	0	1/2	1.57	0.42	4.64	2.72	2.76	1 3/8	2.34	7.4	2 7/16	2.52
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	7/8	3/8-24	4 1/2	0	1/2	1.57	0.42	4.64	2.72	3.32	1 3/8	2.34	7.4	2 7/16	2.52

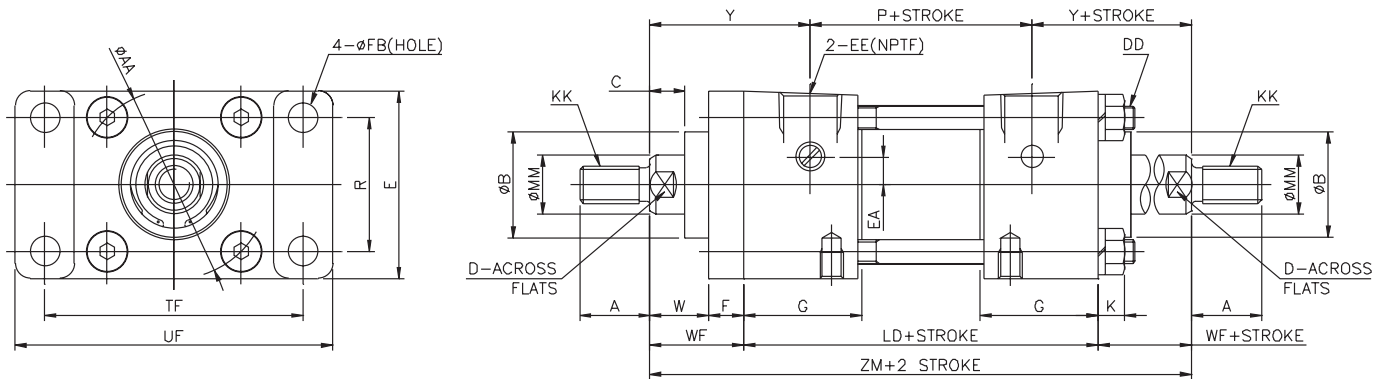
Double Rod Foot Mounting Type NC A1WL



(In)

Bore (in)	MM	KK	A	AA	AB	AE	AH	AL	AO	AT	B	C	D	DD	E	EA	EE	G	K	S	WF	Y	P	LD	SL	ZM
150 (1.5")	5/8	7/16-20	3/4	2.02	3/8	2 3/16	1 3/16	1	7/16	1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	0.28	1 1/4	1	1.71	2.36	3.78	5.78	5.78
200 (2")	5/8	7/16-20	3/4	2.6	3/8	2 11/16	1 7/16	1	9/16	1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	0.34	1 3/4	1	1.71	2.4	3.82	5.82	5.82
250 (2.5")	5/8	7/16-20	3/4	3.1	3/8	3 1/8	1 5/8	1	9/16	1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	0.34	2 1/4	1	1.75	2.48	3.98	5.98	5.98
325 (3.25")	1	3/4-16	1 1/8	3.9	1/2	3 13/16	1 15/16	1.25	3/4	11/64	1.5	1/2	7/8	3/8-24	3.75	0	1/2	1.57	0.42	2.75	1 3/8	2.34	2.72	4.64	7.14	7.40
400 (4")	1	3/4-16	1 1/8	4.7	1/2	4 1/2	2 1/4	1 1/4	3/4	15/64	1.5	1/2	7/8	3/8-24	4.5	0	1/2	1.57	0.42	3.5	1 3/8	2.34	2.72	4.64	7.14	7.40

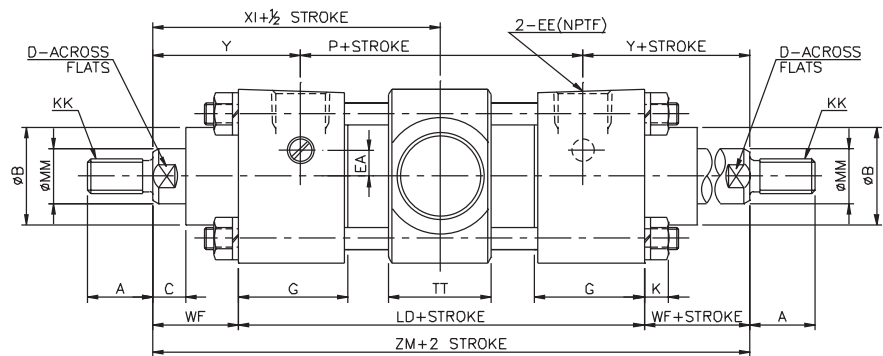
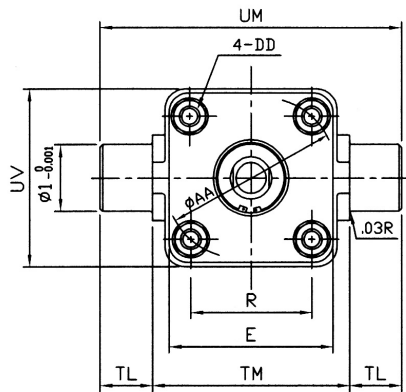
Double Rod Front Flange Type NC A1WF



(In)

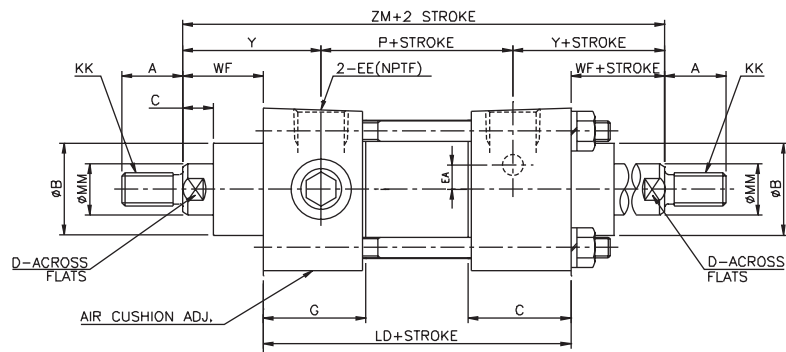
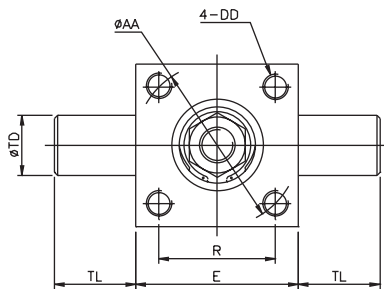
Bore (in)	MM	KK	A	AA	B	C	D	DD	E	EA	EE	F	FB	G	K	R	TF	UF	W	WF	Y	LD	P	ZM
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	3/8	5/16	1.26	0.28	1.43	2 3/4	3 3/8	5/8	1	1.71	3.78	2.36	5.78
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	3/8	3/8	1.26	0.34	1.84	3 3/8	4 1/8	5/8	1	1.71	3.82	2.40	5.82
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	9/16	5/16-24	3	0	3/8	3/8	3/8	1.3	0.34	2.19	3 7/8	4 5/8	5/8	1	1.75	3.98	2.48	5.98
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	7/8	3/8-24	3.75	0	1/2	1/2	7/16	1.57	0.42	2.76	4 11/16	5 1/2	3/4	1 3/8	2.34	4.64	2.72	7.40
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	7/8	3/8-24	4.5	0	1/2	1/2	7/16	1.57	0.42	3.32	5 7/16	6 1/4	3/4	1 3/8	2.34	4.64	2.72	7.40

Double Rod Center Trunnion Type NC A1WT



		(in)																								
Bore (in)	MM	KK	A	AA	B	C	D	DD	E	EA	EE	G	K	R	TD ^{0.001}	TL	TM	TT	UM	UV	WF	Y	P	LD	XI	ZM
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	0.28	1.43	1	1	2.5	1.18	4.5	2	1	1.71	2.36	3.78	2.89	5.78
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	0.34	1.84	1	1	3	1.18	5	2.56	1	1.71	2.40	3.82	2.91	5.82
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	0.34	2.19	1	1	3.5	1.18	5.5	3.39	1	1.75	2.48	3.98	2.99	5.98
325 (3.25")	1	3/4-16	1 1/8	3.9	1.5	1.5	1/2	7/8	3/8-24	3.75	0	1/2	0.42	1.18	1	1	4.5	1.34	6.5	4.33	1 3/8	2.34	2.72	4.64	3.70	7.40
400 (4")	1	3/4-16	1 1/8	4.7	1.5	1.5	7/8	3/8-24	4.5	0	1/2	1.57	0.42	3.32	1	1	5.25	1.57	7.25	5.12	1 3/8	2.34	2.72	4.64	3.74	7.40

Double Rod - Rod Trunnion Type NC A1WU



		(in)																			
Bore (in)	MM	KK	A	AA	B	C	D	DD	E	EA	EE	G	K	R	TD ^{0.001}	TL	WF	Y	LD	P	ZM
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	0.28	1.43	1	1	1	1.71	3.78	2.36	5.78
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	9/16	5/16-24	2 1/2	0.3	3/8	1.26	0.34	1.84	1	1	1	1.71	3.82	2.4	5.82
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	0.34	2.19	1	1	1	1.75	3.98	2.48	5.98
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	7/8	3/8-24	3 3/4	0	1/2	1.57	0.42	2.76	1	1	1 3/8	2.34	4.64	2.72	7.40
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	7/8	3/8-24	4 1/2	0	1/2	1.57	0.42	3.32	1	1	1 3/8	2.34	4.64	2.72	7.40

Specifications



- Non-rotating rod accuracy: $\pm 0.5^\circ$
- Auto switch mounting available

Bore size (inch)	1.5	2	2.5
Media	Air		
Max. Operating Pressure	250 psi (1.75 kgf/cm)		
Min. Operating Pressure	15 psi (0.06 kgf/cm)		
Ambient and Media Temperature	40 ~ 140°F (5 ~ 60°C)		
Piston Speed	2 ~ 20 inch/sec (50 ~ 500mm/sec)		
Cushion	Air Cushion Standard		
Rotation Torque Range	3.9 Lbs. in or less		
Non-Rotating Rod Accuracy	$\pm 0.5^\circ$		
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped Rear Clevis, Center Trunnion, Side Lug		

Standard Stroke List

Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24

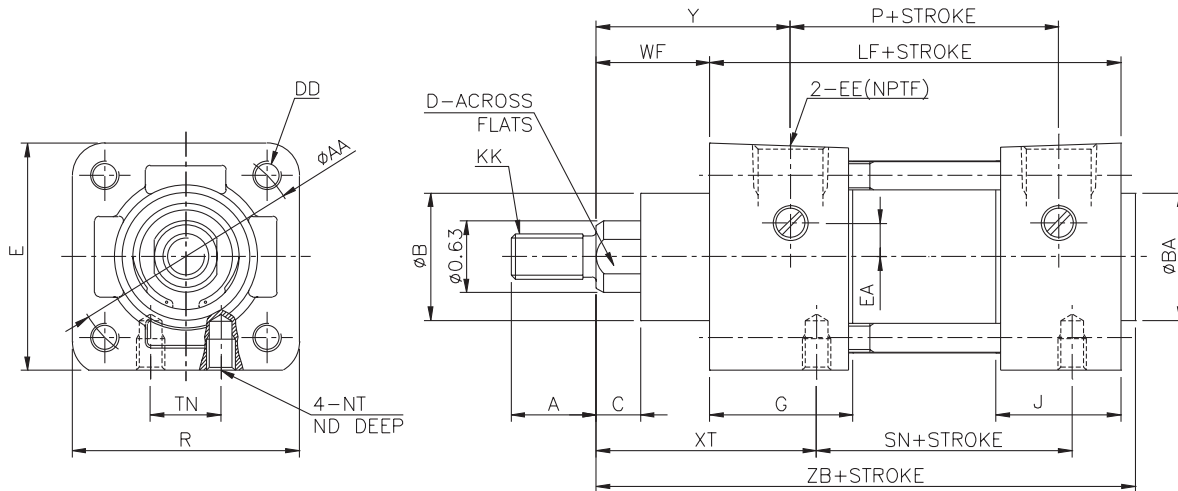
How To Order

NCDA1 K MOUNTING BORE - STROKE - SUFFIX

Ex: NCDA1KB150-0400

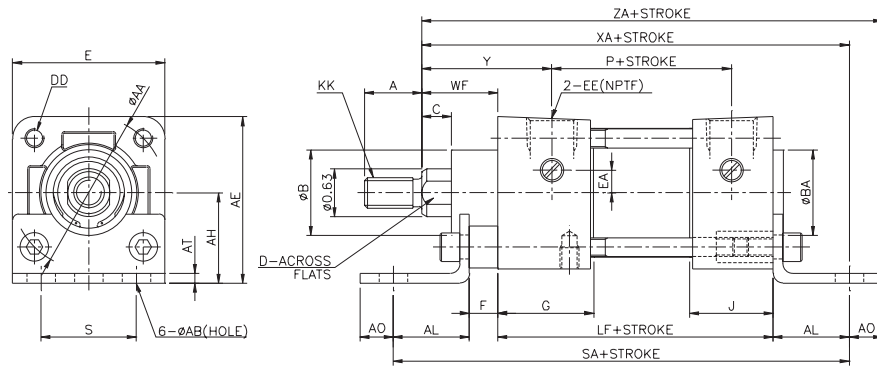
Auto-switch capable

Non-Rotating Rod - Basic Type NC A1KB



Bore (in)	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	ND	NT	R	WF	Y	LF	P	ZB	TN	XT	SN
150 (1.5")	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	0.551	1/4-28	2	0.3	3/8	1.26	1.1	9/32	1/4-20	1.43	1	1.71	3 5/8	2.36	4 3/4	5/8	1 15/16	2 1/4
200 (2")	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	0.551	5/16-24	2 1/2	0.3	3/8	1.26	1.06	7/16	5/16-18	1.84	1	1.71	3 5/8	2.4	4 3/4	7/8	1 15/16	2 1/4
250 (2.5")	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	0.551	5/16-24	3	0	3/8	1.3	1.06	19/32	3/8-16	2.19	1	1.75	3 3/4	2.48	4 7/8	1 1/4	1 15/16	2 3/8

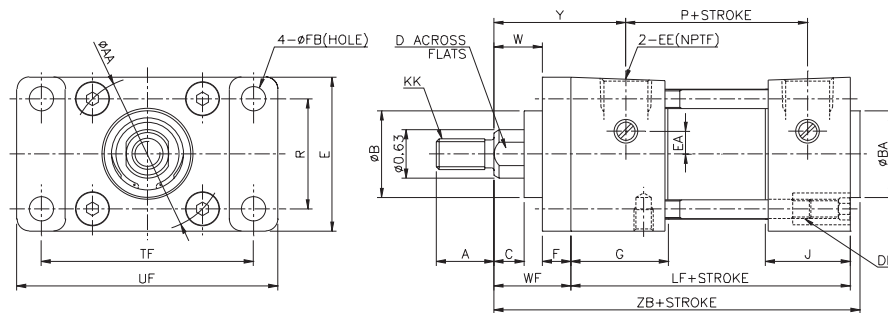
Non-Rotating Rod Foot Mounting Type NC□A1KL



(in)

Bore (in)	KK	A	AA	AB	AE	AH	AL	AO	AT	B	BA	C	D	DD	E	EA	EE	F	G	J	S	WF	Y	P	LF	SA	XA	ZA
150 (1.5")	7/16-20	3/4	2.02	3/8	2 3/16	1 3/16	1	7/16	1/8	1 1/8	1 1/8	3/8	0.551	1/4-28	2	0.3	3/8	3/8	1.26	1.1	1 1/4	1	1.71	2.36	3 5/8	6	5 5/8	6.062
200 (2")	7/16-20	3/4	2.6	3/8	2 11/16	1 7/16	1	9/16	1/8	1 1/8	1 1/8	3/8	0.551	5/16-24	2.5	0.3	3/8	3/8	1.26	1.06	1 3/4	1	1.71	2.4	3 5/8	6	5 5/8	6.197
250 (2.5")	7/16-20	3/4	3.1	3/8	3 1/8	1 5/8	1	9/16	1/8	1 1/8	1 1/8	3/8	0.551	5/16-24	3	0	3/8	3/8	1.3	1.06	2 1/4	1	1.75	2.48	3 3/4	6 1/4	5 3/4	6.321

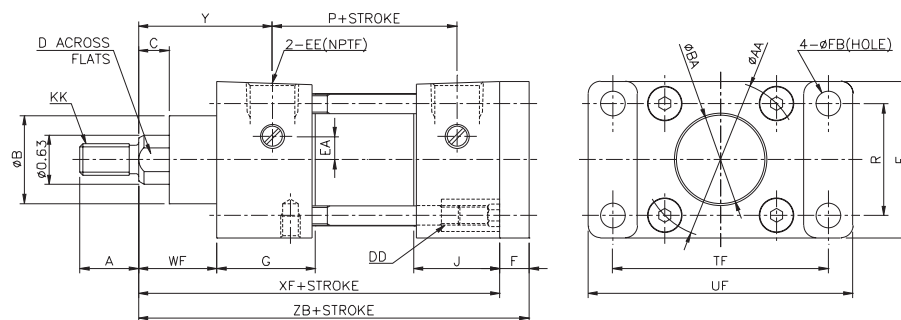
Non-Rotating Rod Front Flange Mounting Type NC□A1KF



(in)

Bore (in)	KK	A	AA	B	BA	C	D	DD	E	EA	EE	F	FB	G	J	R	TF	UF	W	WF	Y	LF	P	ZB
150 (1.5")	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	0.551	1/4-28	2	0.3	3/8	3/8	5/16	1.26	1.1	1.43	2 3/4	3 3/8	5/8	1	1.71	3 5/8	2.36	4 3/4
200 (2")	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	0.551	5/16-24	2.5	0.3	3/8	3/8	3/8	1.26	1.06	1.84	3 3/8	4 1/8	5/8	1	1.71	3 5/8	2.4	4 3/4
250 (2.5")	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	0.551	5/16-24	3	0	3/8	3/8	3/8	1.3	1.06	2.19	3 7/8	4 5/8	5/8	1	1.75	3 3/4	2.48	4 7/8

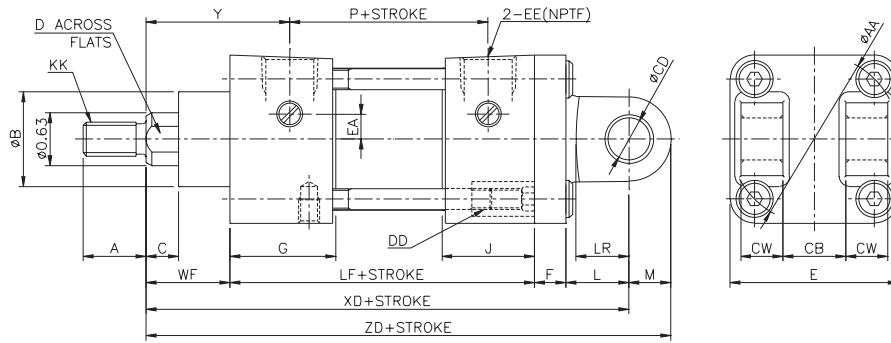
Non-Rotating Rod Rear Flange Mounting Type NC□A1KG



(in)

Bore (in)	KK	A	AA	B	BA	C	D	DD	E	EA	EE	F	FB	G	J	R	TF	UF	WF	Y	P	XF	ZF
150 (1.5")	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	0.551	1/4-28	2	0.3	3/8	3/8	5/16	1.26	1.1	1.43	2 3/4	3 3/8	1	1.71	2.36	4 5/8	5
200 (2")	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	0.551	5/16-24	2.5	0.3	3/8	3/8	3/8	1.26	1.06	1.84	3 3/8	4 1/8	1	1.71	2.4	4 5/8	5
250 (2.5")	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	0.551	5/16-24	3	0	3/8	3/8	3/8	1.3	1.06	2.19	3 7/8	4 5/8	1	1.75	2.48	4 3/4	5 1/8

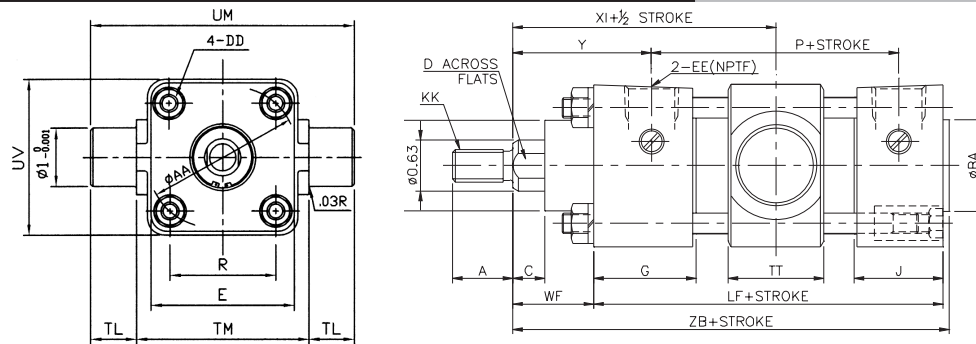
Non-Rotating Rod Detachable Rear Clevis Mounting Type NC□A1KD



Bore (in)	KK	A	AA	B	C	CB	CD	CW	D	DD	E	EA	EE	F	G	J	L	LR	M	WF	XD	Y	LF	P	ZD
150 (1.5")	7/16-20	3/4	2.021	1/8	3/8	3/4	1/2	1/2	0.551	1/4-28	2	0.3	3/8	3/8	1.26	1.1	3/4	5/8	1/2	1	5 3/4	1.71	3 5/8	2.36	6 1/4
200 (2")	7/16-20	3/4	2.6	1 1/8	3/8	3/4	1/2	1/2	0.551	5/16-24	2.5	0.3	3/8	3/8	1.26	1.06	3/4	5/8	1/2	1	5 3/4	1.71	3 5/8	2.4	6 1/4
250 (2.5")	7/16-20	3/4	3.1	1 1/8	3/8	3/4	1/2	1/2	0.551	5/16-24	3	0	3/8	3/8	1.3	1.06	3/4	5/8	1/2	1	5 7/8	1.75	3 3/4	2.48	6 1/4

(in)

Non-Rotating Rod Center Trunnion Mounting Type NC□A1KT



Bore (in)	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	R	TD _{0.001} ⁰	TL	TM	TT	UM	UV	WF	Y	P	LF	XI	ZB
150 (1.5")	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	0.551	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	1	2.5	1.18	4.5	2	1	1.71	2.36	3 5/8	2.89	4 3/4
200 (2")	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	0.551	5/16-24	2.5	0.3	3/8	1.26	1.06	1.84	1	1	3	1.18	5	2.56	1	1.71	2.4	3 5/8	2.91	4 3/4
250 (2.5")	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	0.551	5/16-24	3	0	3/8	1.3	1.06	2.19	1	1	3.5	1.18	5.5	3.39	1	1.75	2.48	3 3/4	2.99	4 7/8

(in)

Stainless Steel Rod



- Stainless Steel piston rod is used to protect in harsh or wet environments.
- Auto-switch mounting available.

Specifications

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Rod Material	SUS304				
Ambient & Media Temperature	40 ~ 140°F (5 ~ 60°C)				
Piston Speed	2 ~ 20 inch/sec (50 ~ 500mm/sec)				
Stroke Tolerance (mm)	~10.0: ±1.0				
Cushion	Air Cushion Standard				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped, Clevis, Rod Trunnion, Head Trunnion, Center Trunnion, Side Lug				

Standard Stroke List

Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28

How To Order

NCDA1 MOUNTING BORE - STROKE SUFFIX - XC6

Ex: NCDA1B 150-0400-XC6
 ↑ Auto-switch capable ↑ Stainless Steel Rod

Low Speed



- Smooth movements even at 0.4~2 inch/sec
- Auto switch mounting available.

Specifications

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Ambient & Media Temperature	40 ~ 140°F (5 ~ 60°C)				
Piston Speed	0.4 ~ 2 inch/sec (10 ~ 50mm/sec)				
Cushion	None				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped, Clevis, Rod Trunnion, Head Trunnion, Center Trunnion, Side Lug				

Standard Stroke List

Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28

How To Order

NC D A1 MOUNTING BORE - STROKE N - XB9

Ex: NCDA1B 150-0400-XB9
 ↑ Auto-switch capable ↑ Low Friction/Low Speed ↑ Standard

High Temperature



- Use at high temperature up to 300°F.

Specifications

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Ambient & Media Temperature	14 ~ 300°F (-10 ~ -150°C)				
Seal Material	Fluro Rubber				
Piston Speed	2 ~ 20 inch/sec (50 ~ 500mm/sec)				
Stroke Tolerance (mm)	~10.0: ±1.0				
Cushion	Air Cushion Standard				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped, Clevis, Rod Trunnion, Head Trunnion, Center Trunnion, Side Lug				

Standard Stroke List

Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28

How To Order

NCA1 W MOUNTING BORE - STROKE SUFFIX - XB6

Ex: NCA1B 150-0400-XB6

Auto-switch capable not available

High Temperature

Low Temperature



- Use at low temperature up to -22°F.

Specifications

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Ambient & Media Temperature	-22 ~ 140°F (-30 ~ 60°C)				
Seal Material	Low Durometer Nitril Rubber				
Piston Speed	2 ~ 20 inch/sec (10 ~ 50mm/sec)				
Cushion	Air Cushion Standard				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped, Clevis, Rod Trunnion, Head Trunnion, Center Trunnion, Side Lug				

Standard Stroke List

Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28

How To Order

NCA1 MOUNTING BORE - STROKE N - XB7

Ex: NCA1B 150-0400-XB7

Auto-switch capable not available

Low Temperature

Standard

Special Trunnion Location



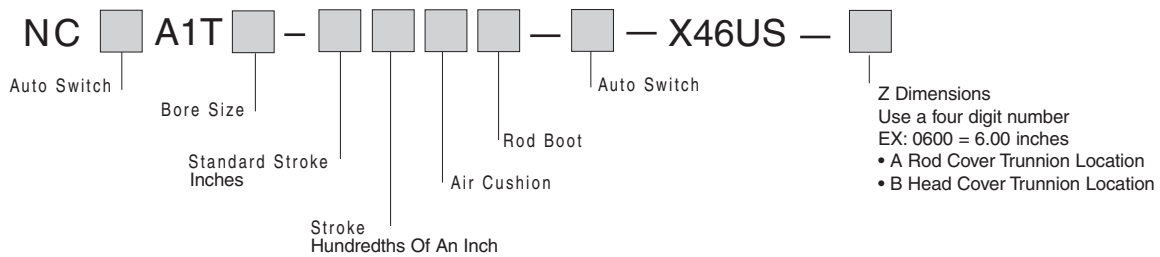
Specifications

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Ambient & Media Temperature	40 ~ 140°F (5 ~ 60°C)				
Seal Material	FLURO Rubber				
Piston Speed	2 ~ 20 inch/sec (50 ~ 500mm/sec)				
Cushion	Air Cushion Standard				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped, Clevis, Rod Trunnion, Head Trunnion, Center Trunnion, Side Lug				

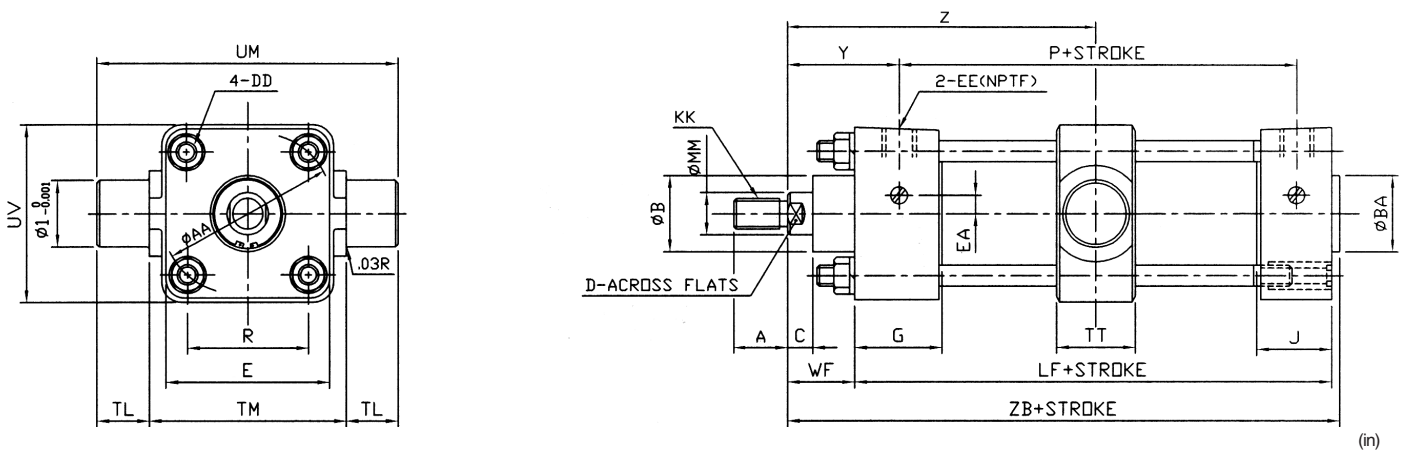
Standard Stroke List

Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28

How To Order

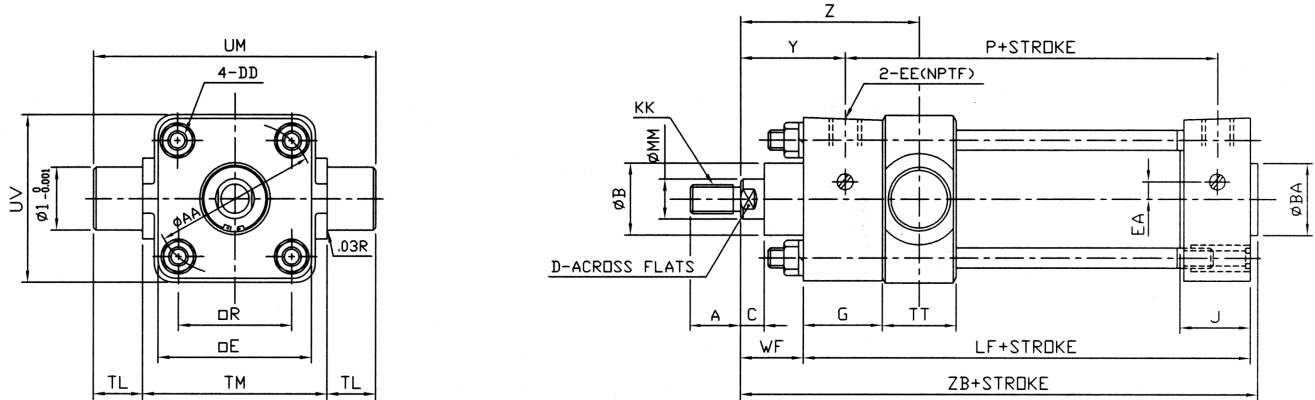


Special Rod Trunnion Location NC A1T (150 ~ 400) - **** - X46US - ****



Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	R	TL	TM	TT	UM	UV	WF	Y	P	LF	XI	ZB	Z RANGE Min	Max
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	2.5	1.18	4.5	2	1	1.71	2.36	3 5/8	2.89	4 3/4	2.87	2.92+stroke
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	1.06	1.84	1	3	1.18	5	2.56	1	1.71	2.4	3 5/8	2.91	4 3/4	2.87	2.96+stroke
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	3.5	1.18	5.5	3.39	1	1.75	2.48	3 3/4	2.99	4 7/8	2.91	3.08+stroke
325 (3.25")	1	3/4-16	1 1/8	3.9	1.5	1.5	1/2	7/8	3/8-24	3.75	0	1/2	1.57	1.18	2.76	1	4.5	1.34	6.5	4.33	1 3/8	2.34	2.72	4.25	3.7	5 53/64	3.63	3.76+stroke
400 (4")	1	3/4-16	1 1/8	4.7	1.5	1.5	1/2	7/8	3/8-24	4.5	0	1/2	1.57	1.18	3.32	1	5.25	1.57	7.25	5.12	1 3/8	2.34	2.72	4.25	3.74	5 53/64	3.75	3.64+stroke

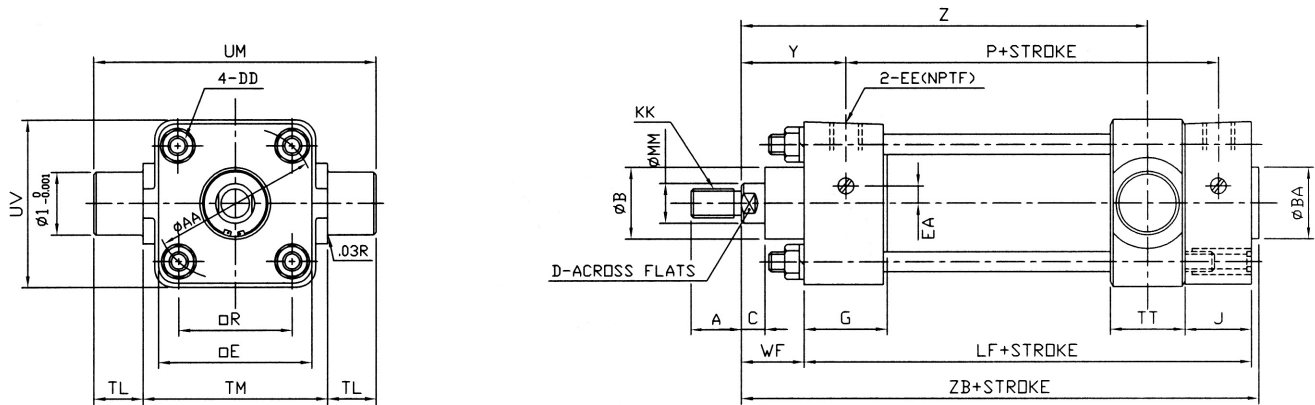
Special Rod Trunnion Location NC \square A1T (150 ~ 400) - **** - X46US - A



(in)

Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	R	TL	TM	TT	UM	UV	WF	Y	P	LF	Z	ZB	Z RANGE	
																											Min	Max
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	2.5	1.18	4.5	2	1	1.71	2.36	3 5/8	2.81	4 3/4	2.81	+stroke
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	1.06	1.84	1	3	1.18	5	2.56	1	1.71	2.4	3 5/8	2.81	4 3/4	2.81	+stroke
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	3.5	1.18	5.5	3.39	1	1.75	2.48	3 3/4	2.85	4 7/8	2.85	+stroke
325 (3.25")	1	3/4-16	1 1/8	3.9	1.5	1.5	1/2	7/8	3/8-24	3.75	0	1/2	1.57	1.18	2.76	1	4.5	1.34	6.5	4.33	1 3/8	2.34	2.72	4.25	3.58	5 53/64	3.58	+stroke
400 (4")	1	3/4-16	1 1/8	4.7	1.5	1.5	1/2	7/8	3/8-24	4.5	0	1/2	1.57	1.18	3.32	1	5.25	1.57	7.25	5.12	1 3/8	2.34	2.72	4.25	3.70	5 53/64	3.70	+stroke

Special Head Side Trunnion Location NC \square A1T (150 ~ 400) - **** - X46US - B



(in)

Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	R	TL	TM	TT	UM	UV	WF	Y	P	LF	Z	ZB	Z Range
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	2.5	1.18	4.5	2	1	1.71	2.36	3 5/8	2.81	4 3/4	2.97 + stroke
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	1.06	1.84	1	3	1.18	5	2.56	1	1.71	2.4	3 5/8	2.81	4 3/4	3.01 + stroke
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	3.5	1.18	5.5	3.39	1	1.75	2.48	3 3/4	2.85	4 7/8	3.14 + stroke
325 (3.25")	1	3/4-16	1 1/8	3.9	1.5	1.5	1/2	7/8	3/8-24	3.75	0	1/2	1.57	1.18	2.76	1	4.5	1.34	6.5	4.33	1 3/8	2.34	2.72	4.25	3.58	5 53/64	3.81 + stroke
400 (4")	1	3/4-16	1 1/8	4.7	1.5	1.5	1/2	7/8	3/8-24	4.5	0	1/2	1.57	1.18	3.32	1	5.25	1.57	7.25	5.12	1 3/8	2.34	2.72	4.25	3.70	5 53/64	3.70 + stroke

Oversized Rod with Special Trunnion Location



Standard Stroke List

Bore size	Standard Stroke (in)
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28

How To Order

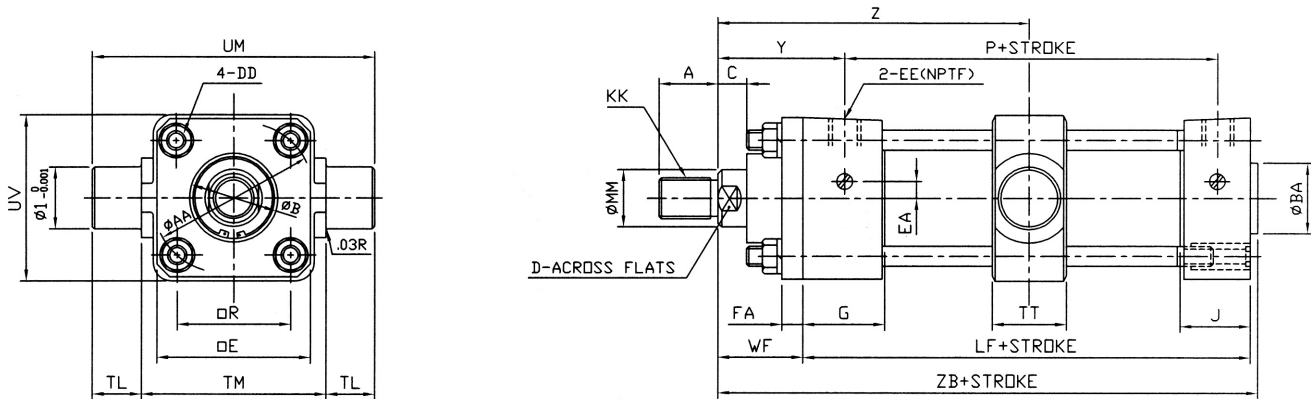
NC
D
A1
T
BORE
-STROKE
XB5
-X46US
-Z

Ex: NCDA1T 250-0400-XB5-X46US-0700

Auto-switch capable Oversized Rod Z Dimension

Z-Dimension use a four digit number

Special Trunnion Location NC A1T (200 ~ 400) - **** - XB5 - X46US - ****



Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	R	TL	TM	TT	UM	UV	WF	Y	P	LF	XI	ZB	Z RANGE Min	Max
200 (2")	1	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	1.06	1.84	1	3	1.18	5	2.56	1	1.71	2.4	3 5/8	2.91	5 1/8	3.28	3.92+stroke
250 (2.5")	1	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	3.5	1.18	5.5	3.39	1	1.75	2.48	3 3/4	2.99	5 1/4	3.32	3.42+stroke
325 (3.25")	1 3/8	3/4-16	1 1/8	3.9	1.5	1.5	1/2	7/8	3/8-24	3.75	0	1/2	1.57	1.18	2.76	1	4.5	1.34	6.5	4.33	1 3/8	2.34	2.72	4.25	3.7	6 5/64	3.92	3.97+stroke
400 (4")	1 3/8	3/4-16	1 1/8	4.7	1.5	1.5	1/2	7/8	3/8-24	4.5	0	1/2	1.57	1.18	3.32	1	5.25	1.57	7.25	5.12	1 3/8	2.34	2.72	4.25	3.74	6 5/64	4.04	3.85+stroke

Stainless Steel Tie Rods/Tie Rod Nuts



- Stainless steel piston rod is used to protect in harsh or wet environments
- Auto-switch mounting available

Specifications

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Ambient & Media Temperature	40 ~ 140°F (5 ~ 60°C)				
Seal Material	Low Durometer Rubber				
Piston Speed	2 ~ 20 inch/sec (50 ~ 500mm/sec)				
Stroke Tolerance	~10.0: ±1.0				
Cushion	Air Cushion Both Ends				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped, Clevis, Rod Trunnion, Head Trunnion, Center Trunnion, Side Lug				

Standard Stroke List

Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28

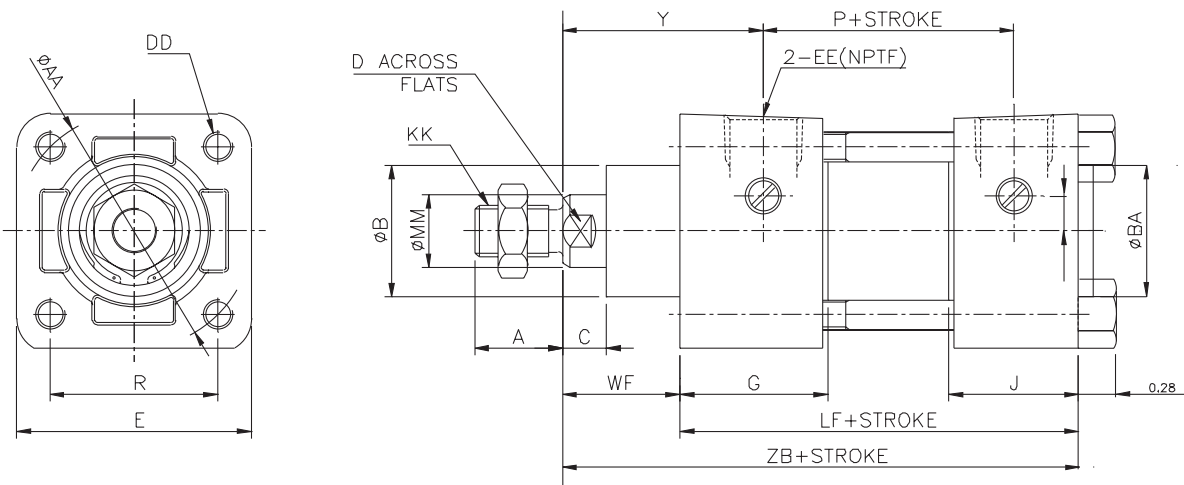
How To Order

NCDA1 MOUNTING BORE - STROKE SUFFIX - X130US

Ex: NCDA1B 150-0100-X130US

Stainless Steel Piston Rod,
Tie Rods, Tie Rod Nuts,
and Cushion Valve Needle

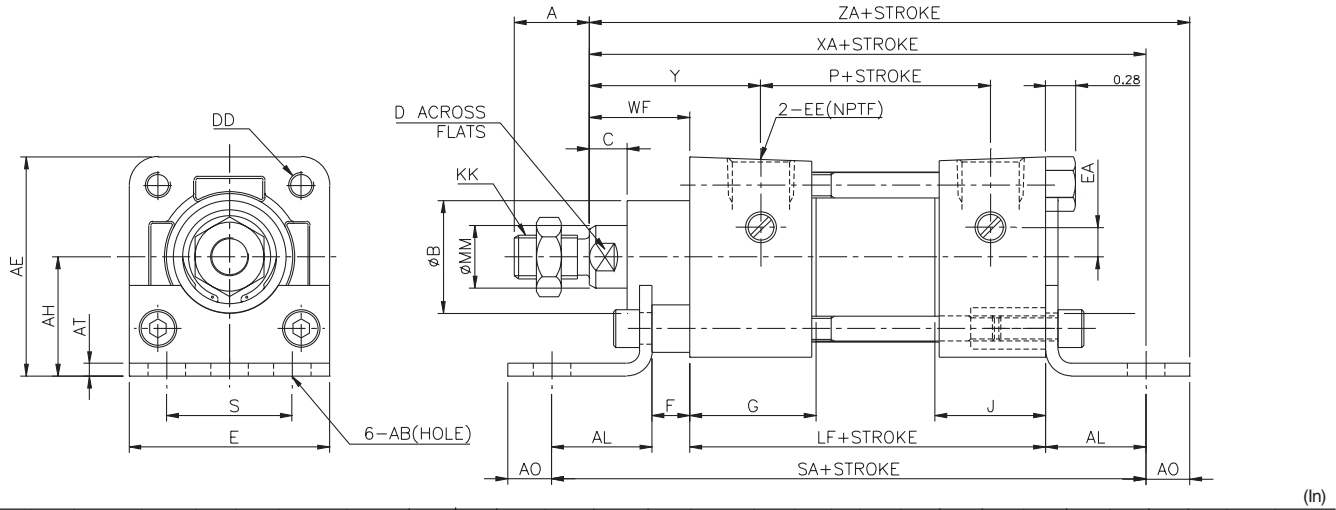
Basic Type NC A1B (MXO Mounting Style) - X130US



(in)

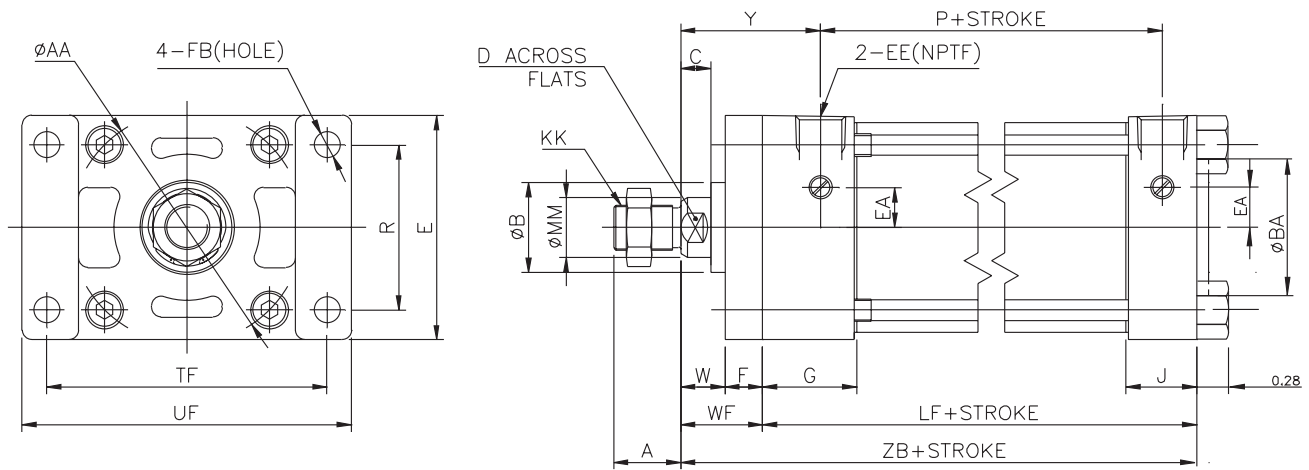
Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	R	WF	Y	P	LF	ZB
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	1.71	2.36	3 5/8	4 5/8
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	1.06	1.84	1	1.71	2.4	3 5/8	4 5/8
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	1.75	2.48	3 3/4	4 3/4
325 (3.25")	1	3/4-16	1 1/8	3.9	1.5	1.5	1/2	7/8	3/8-24	3.75	0	1/2	1.57	1.18	2.76	1 3/8	2.34	2.72	4.25	5 5/8
400 (4")	1	3/4-16	1 1/8	4.7	1.5	1.5	1/2	7/8	3/8-24	4.5	0	1/2	1.57	1.18	3.32	1 3/8	2.34	2.72	4.25	5 5/8

Foot Mounting Type NC A1L (MS1 Mounting Style)-X130US



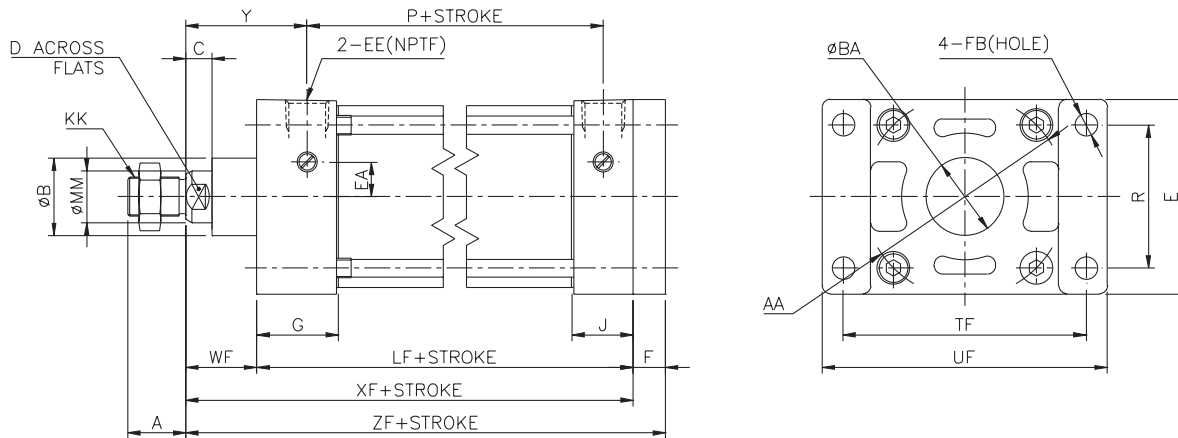
Bore (in)	MM	KK	A	AA	AB	AE	AH	AL	AO	AT	B	C	D	DD	E	EA	EE	F	G	J	S	WF	Y	P	LF	SA	XA	ZA
150 (1.5")	5/8	7/16-20	3/4	2.02	3/8	2 3/16	1 3/16	1	7/16	1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	3/8	1.26	1.1	5	1	1.71	2.36	3 5/8	6	5 5/8	6 1/16
200 (2")	5/8	7/16-20	3/4	2.6	3/8	2 11/16	1 7/16	1	9/16	1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	3/8	1.26	1.06	5	1	1.71	2.4	3 5/8	6	5 5/8	6 3/16
250 (2.5")	5/8	7/16-20	3/4	3.1	3/8	3 1/8	1 5/8	1	9/16	1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	3/8	1.3	1.06	5 1/8	1	1.75	2.48	3 3/4	6 1/8	5 3/4	6 5/16
325 (3.25")	1	3/4-16	1 1/8	3.9	1/2	3 13/16	1 15/16	1 1/4	3/4	11/64	1.5	1/2	7/8	3/8-24	3.75	0	1/2	5/8	1.57	1.18	6 1/4	1 3/8	2.34	2.72	4.25	7 3/8	6 7/8	7 5/8
400 (4")	1	3/4-16	1 1/8	4.7	1/2	4 1/2	2 1/4	1 1/4	3/4	15/64	1.5	1/2	7/8	3/8-24	4.5	0	1/2	5/8	1.57	1.18	6 1/4	1 3/8	2.34	2.72	4.25	7 3/8	6 7/8	7 5/8

Front Flange Type NC A1F (MF1 Mounting Style)-X130US



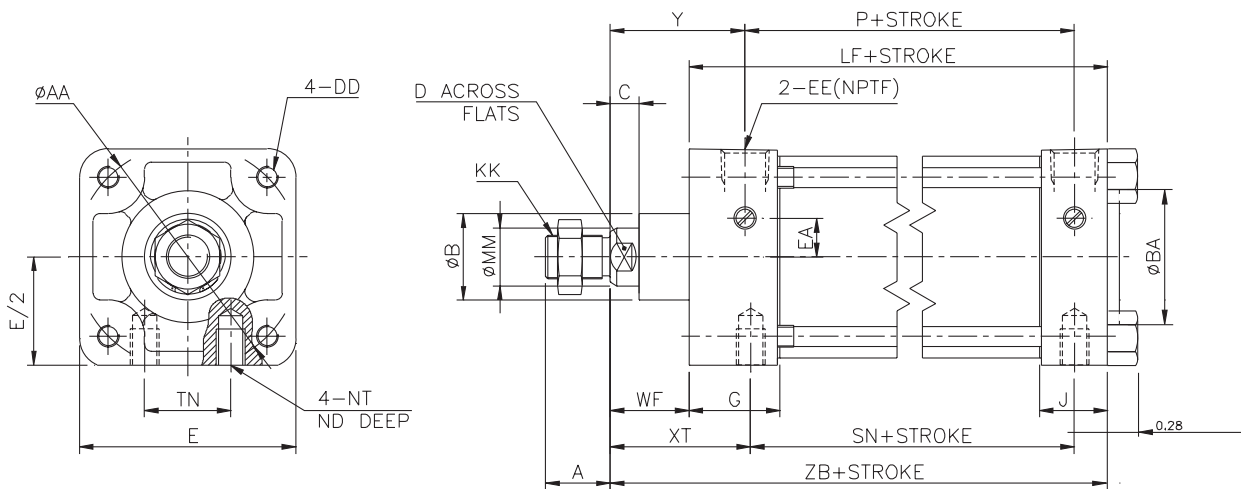
Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	F	FB	G	J	R	TF	UF	W	WF	Y	LF	P	ZB
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	3/8	5/16	1.26	1.1	1.43	2 3/4	3 3/8	5/8	1	1.71	3 5/8	2.36	4 5/8
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	3/8	3/8	1.26	1.06	1.84	3 3/8	4 1/8	5/8	1	1.71	3 5/8	2.4	4 5/8
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	3/8	3/8	1.3	1.06	2.19	3 7/8	4 5/8	5/8	1	1.75	3 3/4	2.48	4 3/4
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1 1/2	1/2	7/8	3/8-24	3.75	0	1/2	1/2	7/16	1.57	1.18	2.76	4 11/16	5 1/2	3/4	1 3/8	2.34	4 1/4	2.72	5 5/8
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1 1/2	1/2	7/8	3/8-24	4.5	0	1/2	1/2	7/16	1.57	1.18	3.32	5 7/16	6 1/4	3/4	1 3/8	2.34	4 1/4	2.72	5 5/8

Rear Flange Type NC A1G (MF2 Mounting Style) - X130US



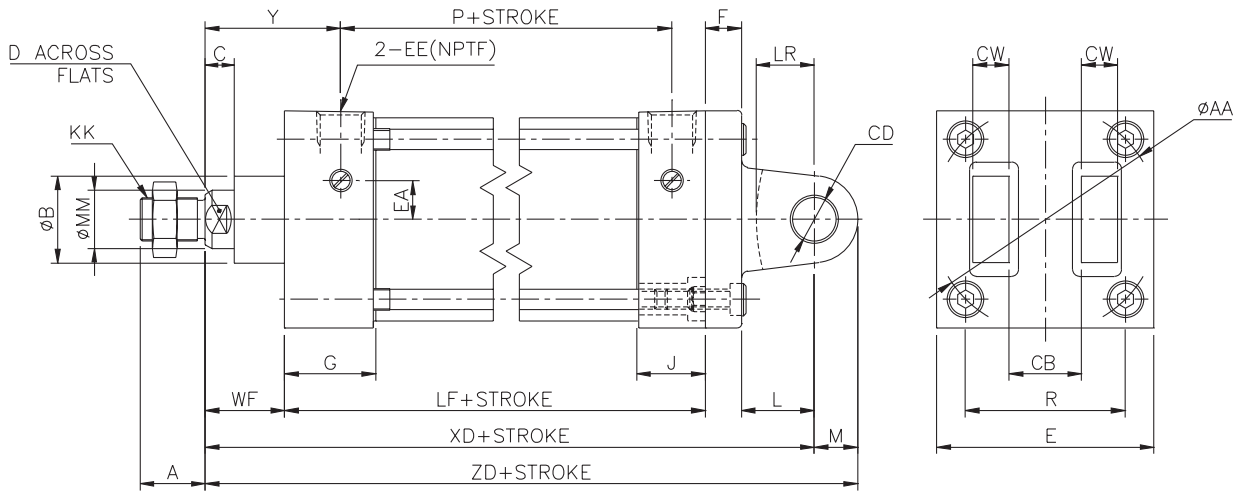
																							(in)	
Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	F	FB	G	J	R	TF	UF	WF	Y	P	XF	ZF
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	3/8	5/16	1.26	1.1	1.43	2 3/4	3 3/8	1	1.71	2.36	4 5/8	5
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	3/8	3/8	1.26	1.06	1.84	3 3/8	4 1/8	1	1.71	2.4	4 5/8	5
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	3/8	3/8	1.3	1.06	2.19	3 7/8	4 5/8	1	1.75	2.48	4 3/4	5 1/8
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1 1/2	1/2	7/8	3/8-24	3.75	0	1/2	5/8	7/16	1.57	1.18	2.76	4 11/16	5 1/2	1 3/8	2.34	2.72	5 5/8	6 1/4
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1 1/2	1/2	7/8	3/8-24	4.5	0	1/2	5/8	7/16	1.57	1.18	3.32	5 7/16	6 1/4	1 3/8	2.34	2.72	5 5/8	6 1/4

Side Tapped Type NC A1R (MS4 Mounting Style) - X130US



																									(in)
Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	E/2	EA	EE	G	J	ND	NT	TN	WF	XT	Y	LF	P	SN	ZB
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	1	0.3	3/8	1.26	1.1	9/32	1/4-20	5/8	1	1 15/16	1.71	3 5/8	2.36	2 1/4	4 5/8
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	1 1/4	0.3	3/8	1.26	1.06	7/16	5/16-18	7/8	1	1 15/16	1.71	3 5/8	2.4	2 1/4	4 5/8
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	1 1/2	0	3/8	1.3	1.06	19/32	3/8-16	1 1/4	1	1 15/16	1.75	3 3/4	2.48	2 3/8	4 3/4
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1 1/2	1/2	7/8	3/8-24	3.75	1 7/8	0	1/2	1.57	1.18	5/8	1/2-13	1 1/2	1 3/8	2 7/16	2.34	4 1/4	2.72	2 5/8	5 5/8
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1 1/2	1/2	7/8	3/8-24	4.5	2 1/4	0	1/2	1.57	1.18	5/8	1/2-13	2 1/16	1 3/8	2 7/16	2.34	4 1/4	2.72	2 5/8	5 5/8

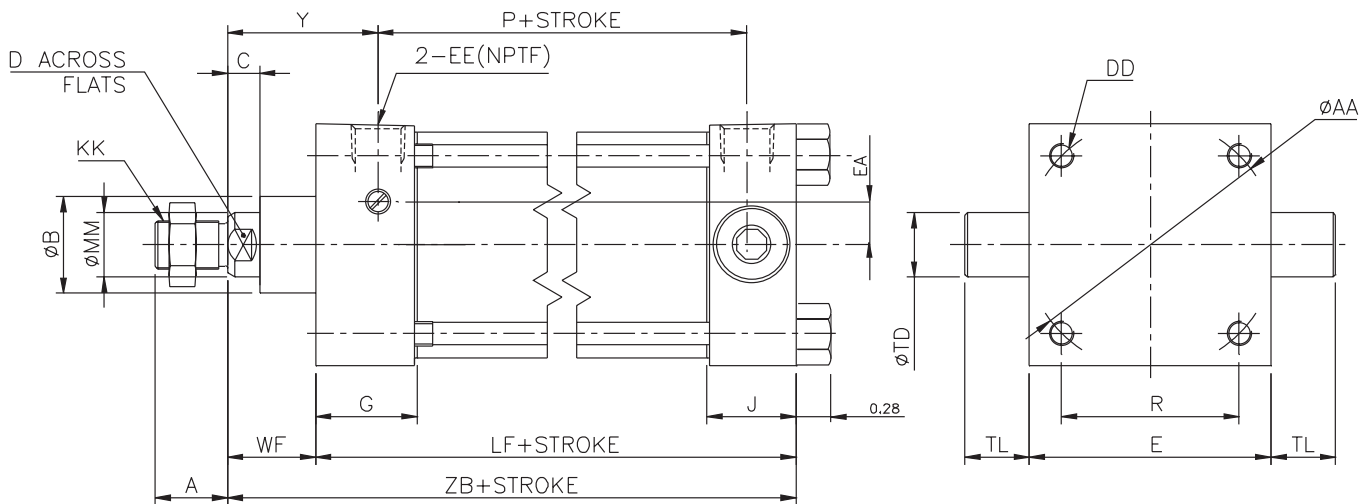
Detachable Rear Clevis Type NC A1D (MP2 Mounting Style) - X130US



(in)

Bore (in)	MM	KK	A	AA	B	C	CB	CD	CW	D	DD	E	EA	EE	F	G	J	L	LR	M	WF	XD	Y	LF	P	ZD
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	3/4	1/2	1/2	9/16	1/4-28	2	0.3	3/8	3/8	1.26	1.1	3/4	5/8	1/2	1	5 3/4	1.71	3 5/8	2.36	6 1/4
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	3/4	1/2	1/2	9/16	5/16-24	2.5	0.3	3/8	3/8	1.26	1.06	3/4	5/8	1/2	1	5 3/4	1.71	3 5/8	2.4	6 1/4
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	3/4	1/2	1/2	9/16	5/16-24	3	0	3/8	3/8	1.3	1.06	3/4	5/8	1/2	1	5 7/8	1.75	3 3/4	2.48	6 1/4
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	1 1/4	3/4	5/8	7/8	3/8-24	3.75	0	1/2	5/8	1.57	1.18	1 1/4	1	3/4	1 3/8	7 1/2	2.34	4 1/4	2.72	8 1/4
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	1 1/4	3/4	5/8	7/8	3/8-24	4.5	0	1/2	5/8	1.57	1.18	1 1/4	1	3/4	1 3/8	7 1/2	2.34	4 1/4	2.72	8 1/4

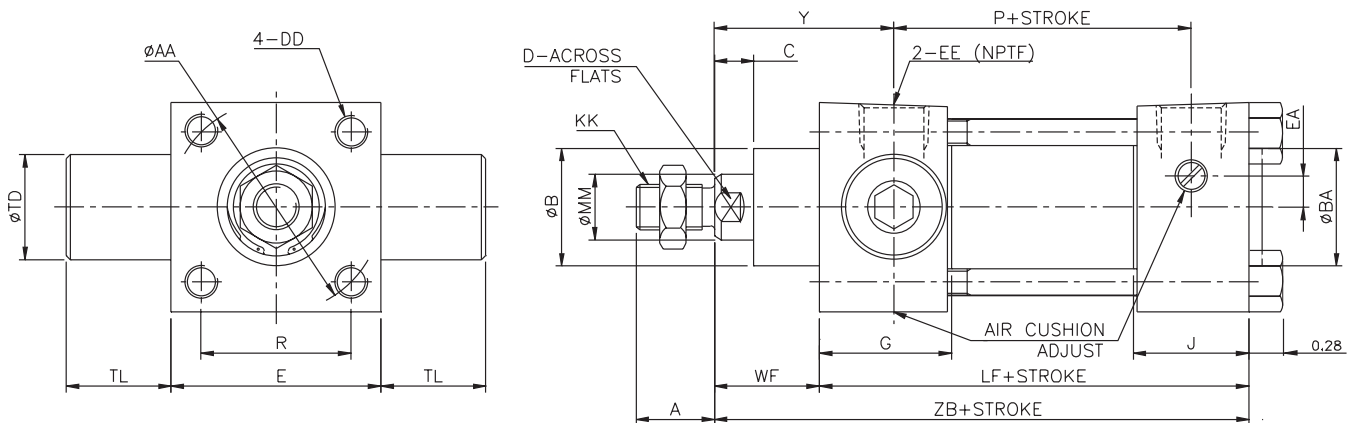
Head Trunnion Type NC A1J (MT2 Mounting Style) - X130US



(in)

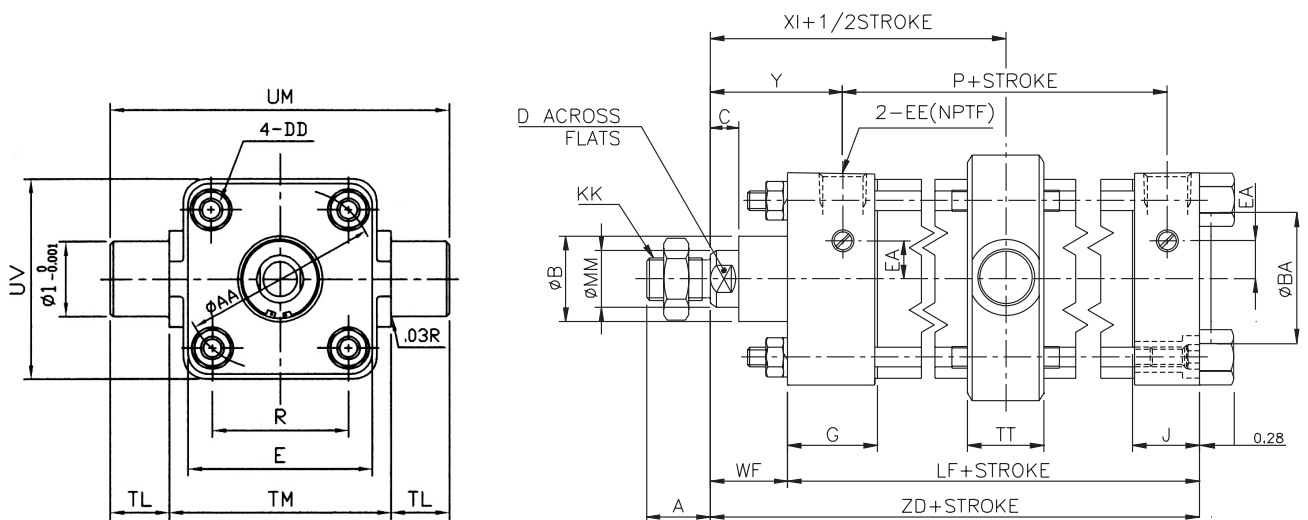
Bore (in)	MM	KK	A	AA	B	C	D	DD	E	EA	EE	G	J	R	TD _{0.001}	TL	WF	Y	LF	P	ZB
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	1	1	1.71	3.37	2.36	4 3/4
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	9/16	5/16-24	2 1/2	0.3	3/8	1.26	1.06	1.84	1	1	1	1.71	3.37	2.44	3/4
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	1	1	1.75	3.88	2.48	4 7/8
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	7/8	3/8-24	3 3/4	0	1/2	1.57	1.18	2.76	1	1	1 3/8	2.34	4.45	2.72	5.83
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	7/8	3/8-24	4 1/2	0	1/2	1.57	1.18	3.32	1	1	1 3/8	2.34	4.45	2.72	5.83

Rod Trunnion Type NC A1U (MT1 Mounting Style) - X130US



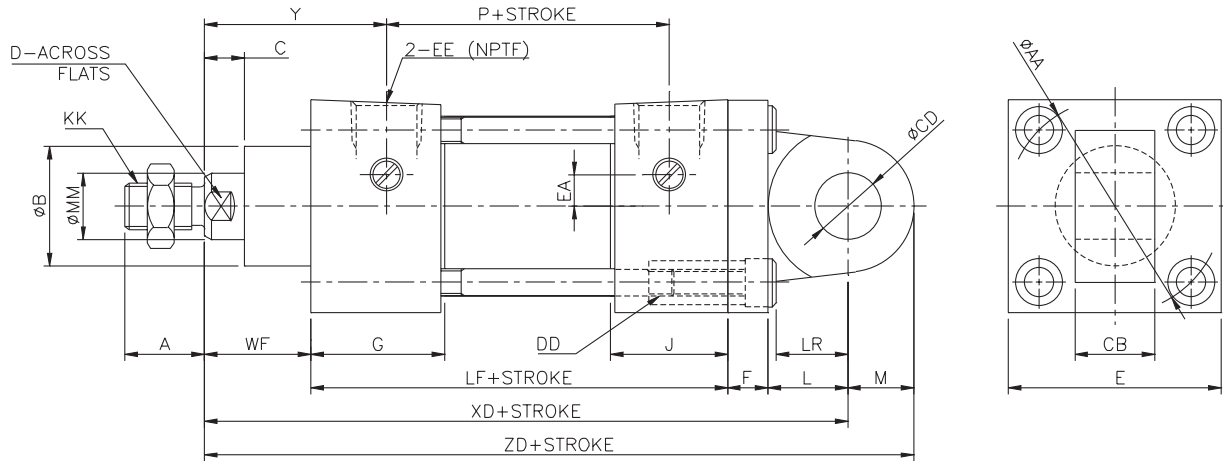
(in)																						
Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	R	TD ^{0.001}	TL	WF	Y	LF	P	ZB
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	1	1	1.71	3 5/8	2.36	4 5/8
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2 1/2	0.3	3/8	1.26	1.06	1.84	1	1	1	1.71	3 5/8	2.4	4 5/8
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	1	1	1.75	3 3/4	2.48	4 3/4
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1 1/2	1/2	7/8	3/8-24	3 3/4	0	1/2	1.57	1.18	2.76	1	1	1 3/8	2.34	4 1/4	2.72	5 5/8
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1 1/2	1/2	7/8	3/8-24	4 1/2	0	1/2	1.57	1.18	3.32	1	1	1 3/8	2.34	4 1/4	2.72	5 5/8

Center Trunnion Type NC A1T (MT4 Mounting Style) - X130US



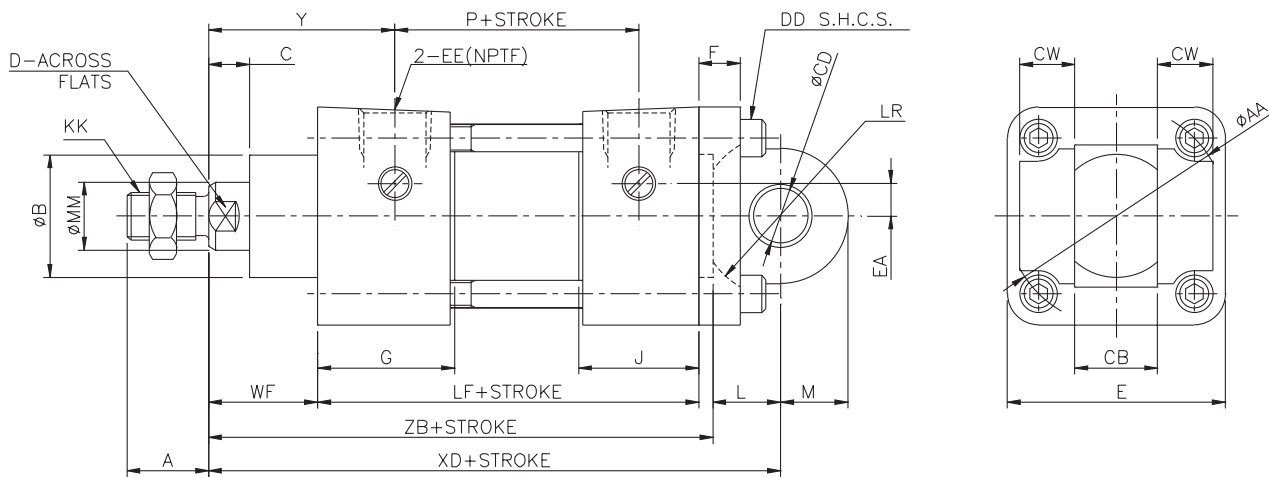
(in)																											
Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	R	TD ^{0.001}	TL	TM	TT	UM	UV	WF	Y	P	LF	XI	ZD
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1.43	1	1	2.5	1.18	4.5	2	1	1.71	2.36	3 5/8	2.89	4 5/8
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	1.06	1.84	1	1	3	1.18	5	2.56	1	1.71	2.4	3 5/8	2.91	4 5/8
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	2.19	1	1	3.5	1.18	5.5	3.39	1	1.75	2.48	3 3/4	2.99	4 3/4
325 (3.25")	1	3/4-16	1 1/8	3.9	1.5	1.5	1/2	7/8	3/8-24	3.75	0	1/2	1.57	1.18	2.76	1	1	4.5	1.34	6.5	4.33	1 3/8	2.34	2.72	4.25	3.7	5 5/8
400 (4")	1	3/4-16	1 1/8	4.7	1.5	1.5	1/2	7/8	3/8-24	4.5	0	1/2	1.57	1.18	3.32	1	1	5.25	1.57	7.25	5.12	1 3/8	2.34	2.72	4.25	3.74	5 5/8

Single Rear Clevis Type NC A1C (MP4 Mounting Style) - X130US



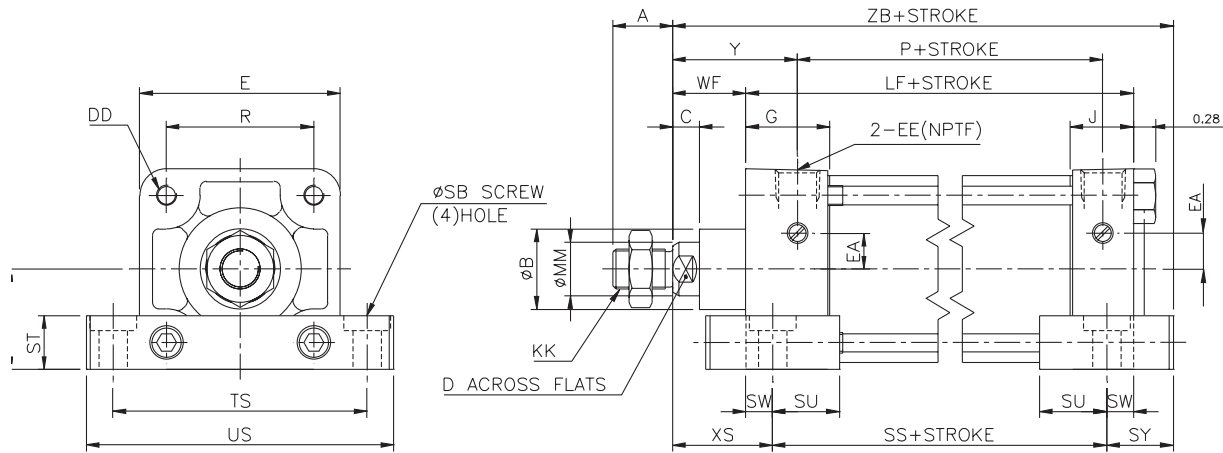
																								(in)	
Bore (in)	MM	KK	A	AA	B	C	CB	CD	D	DD	E	EA	EE	F	G	J	L	LR	M	WF	XD	Y	LF	P	ZD
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	3/4	1/2	9/16	1/4-28	2	0.3	3/8	3/8	1.26	1.1	3/4	5/8	1/2	1	5 3/4	1.71	3 5/8	2.36	6 1/4
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	3/4	1/2	9/16	5/16-24	2.5	0.3	3/8	3/8	1.26	1.06	3/4	5/8	1/2	1	5 3/4	1.71	3 5/8	2.4	6 1/4
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	3/4	1/2	9/16	5/16-24	3	0	3/8	3/8	1.3	1.06	3/4	5/8	1/2	1	5 7/8	1.75	3 3/4	2.48	6 3/8
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	1 1/4	3/4	7/8	3/8-24	3.75	0	1/2	5/8	1.57	1.18	1 1/4	1	3/4	1 3/8	7 1/2	2.34	4 1/4	2.72	8 1/4
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	1 1/4	3/4	7/8	3/8-24	4.5	0	1/2	5/8	1.57	1.18	1 1/4	1	3/4	1 3/8	7 1/2	2.34	4 1/4	2.72	8 1/4

Double Rear Clevis Type NC A1X (MP1 Mounting Style) - X130US



																										(in)	
Bore (in)	MM	KK	A	AA	B	C	CB	CD	CW	D	DD	E	EA	EE	F	G	J	L	LR	M	WF	XD	Y	LF	P	ZB	
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	3/4	1/2	1/2	9/16	1/4-28	2	0.3	3/8	3/8	1.26	1.1	3/4	.75	0.62	1	5 3/4	1.71	3 5/8	2.36	4 5/8	
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	3/4	1/2	1/2	9/16	5/16-24	2.5	0.3	3/8	3/8	1.26	1.06	0.62	.75	0.62	1	5 3/4	1.71	3 5/8	2.4	4 5/8	
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	3/4	1/2	1/2	9/16	5/16-24	3	0	3/8	3/8	1.30	1.06	0.62	.75	0.62	1	5 7/8	1.75	3 3/4	2.48	4 3/4	
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	1 1/4	3/4	5/8	7/8	3/8-24	3.75	0	1/2	5/8	1.57	1.18	1.05	1.25	0.87	1 3/8	7 1/2	2.34	4 1/4	2.72	5 5/8	
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	1 1/4	3/4	5/8	7/8	3/8-24	4.5	0	1/2	5/8	1.57	1.18	1.05	1	0.87	1 3/8	7 1/2	2.34	4 1/4	2.72	5 5/8	

Side Lug Mounting Type NC A1S (MS2 Mounting Style) - X130US



(in)

Bore (in)	MM	KK	A	B	C	D	DD	E	EA	EE	G	J	LF	P	R	SB	SS	ST	SU	SW	SY	TS	US	WF	XS	Y	ZB
150 (1.5")	5/8	7/16-20	3/4	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	3.36	2.36	1.43	3/8	2.88	5/8	0.94	3/8	5/8	2.75	3.50	1	1.38	1.71	5.19
200 (2")	5/8	7/16-20	3/4	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	1.06	3.63	2.4	1.84	3/8	2.88	5/8	0.94	3/8	5/8	3.25	4	1	1.38	1.71	5.19
250 (2.5")	5/8	7/16-20	3/4	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	3.75	2.48	2.19	3/8	3	3/4	0.94	3/8	3/4	3.75	4.50	1	1.38	1.75	5.31
325 (3.25")	1	3/4-16	1 1/8	1.5	1/2	7/8	3/8-24	3.75	0	1/2	1.57	1.18	4.25	2.72	2.76	1/2	3.25	1	1.25	1/2	1	4.75	5.75	1.38	1.88	2.34	6.38
400 (4")	1	3/4-16	1 1/8	1.5	1/2	7/8	3/8-24	4.5	0	1/2	1.57	1.18	4.25	2.72	3.32	1/2	3.25	1	1.25	1/2	1	5.50	6.50	1.38	1.88	2.34	6.38

Rod Boot



Boot Material

Suffix Code	Material	Max. Temperature
J	Nylon	140°F (60°C)
K	Neoprene	230°F (110°C)*

*Max Temperature is for boot only

How To Order

NCA1 MOUNTING BORE – STROKE CUSHION BOOT

Ex: NCA1B150-0200J

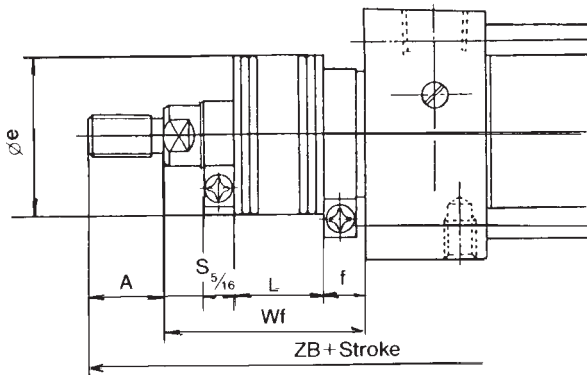
Auto-switch capable

Rod Boot

J-Nylon Rod Boot

K-Neoprene Rod Boot

Rod boots are used to protect the surface of a piston rod in harsh environments.



Rod Boot Dimensions

Bore	A	ØE	F	L (in)												
				0-2	2.1-4	4.1-6	6.1-8	8.1-10	10.1-12	12.1-14	14.1-16	16.1-20	20.1-24	24.1-28		
150 (1.5")	0.75	1.375	0.734													
200 (2")	0.75	1.375	0.734											6	—	
250 (2.5")	0.75	1.375	0.734	0.5	1	1.5	2	2.5	3	3.5	4	5		6	—	
325 (2.25")	1.125	1.968	0.984											6	7	
400 (4")	1.125	1.968	0.984											6	7	

Bore	WF (in)										
	0-2	2.1-4	4.1-6	6.1-8	8.1-10	10.1-12	12.1-14	14.1-16	16.1-20	20.1-24	24.1-28
150 (1.5")	1.937	2.437	2.937	3.437	3.937	4.437	4.937	5.437	6.437	—	—
200 (2")	1.937	2.437	2.937	3.437	3.937	4.437	4.937	5.437	6.437	7.437	—
250 (2.5")	1.937	2.437	2.937	3.437	3.937	4.437	4.937	5.437	6.437	7.437	—
325 (2.25")	2.312	2.812	3.312	3.812	4.312	4.812	5.312	5.812	6.812	7.812	8.812
400 (4")	2.312	2.812	3.312	3.812	4.312	4.812	5.312	5.812	6.812	7.812	8.812

Bore	ZB (in)										
	0-2	2.1-4	4.1-6	6.1-8	8.1-10	10.1-12	12.1-14	14.1-16	16.1-20	20.1-24	24.1-28
150 (1.5")	5.689	6.187	6.687	7.187	7.687	8.187	8.687	9.187	10.187	—	—
200 (2")	5.689	6.187	6.687	7.187	7.687	8.187	8.687	9.187	10.187	11.187	—
250 (2.5")	5.812	6.312	6.812	7.312	7.812	8.312	8.812	9.937	10.312	11.312	—
325 (2.25")	6.765	7.265	7.765	8.265	8.765	9.265	9.765	10.265	11.265	12.265	13.265
400 (4")	6.765	7.265	7.765	8.265	8.765	9.265	9.765	10.265	11.265	12.265	13.265

Oversized Rod (Standard Rod and Non-Rotating)



Specifications

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Ambient & Media Temperature	40 ~ 140°F (5 ~ -60°C)				
Piston Speed	2 ~ 20 inch/sec (50 ~ 500mm/sec)				
Cushion	Air Cushion Standard				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped				

Standard Stroke List

Bore size	Standard Stroke (in)
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28

How To Order Oversized Rod/Non-Rotating

NCA1 K MOUNTING BORE - STROKE - X119US

Ex: NCDA1KB 200-0100-X119US

Auto-switch capable

Oversized / Non-Rotating Rod

How To Order Oversized Rod/Standard

NCA1 MOUNTING BORE - STROKE - XB5

Ex: NCDA1B 250-0200-XB5

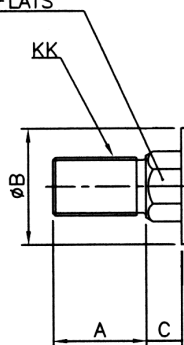
Auto-switch capable

Oversized / Standard Rod

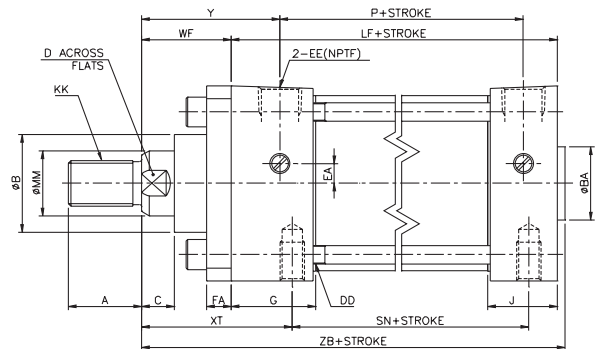
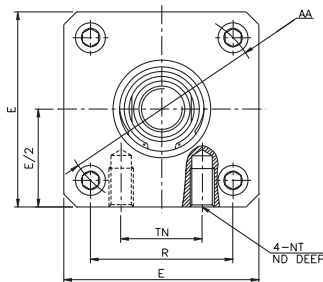
Oversized Rod Basic Type NC A1B (XB5)

S WIDTH ACROSS FLATS

Bore	S
200	3/4
250	3/4
325	1-1/16
400	1-1/16



X119 Option



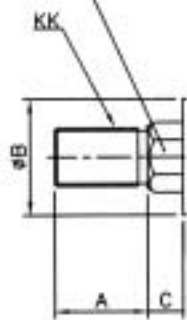
(in)

Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	FA	G	J	R	ND	NT	TN	WF	XT	Y	LF	P	SN	ZB
200 (2")	1	3/4-16	1 1/8	2.6	1.5	1 1/8	1/2	7/8	5/16-24	2 1/2	0.3	3/8	3/8	1.26	1.06	1.84	7/16	5/16-18	7/8	1 3/8	2 5/16	2.09	3 5/8	2.40	2 1/4	5 1/8
250 (2.5")	1	3/4-16	1 1/8	3.1	1.5	1 1/8	1/2	7/8	5/16-24	3	0	3/8	3/8	1.30	1.06	2.19	19/32	3/8-18	1 1/4	1 3/8	2 5/16	2.13	3 3/4	2.48	2 3/8	5 1/4
325 (3.25")	1 3/8	1-14	1 5/8	3.9	2	1 1/2	5/8	1 1/4	3/8-24	3 3/4	0	1/2	5/8	1.57	1.18	2.76	5/8	1/2-13	1 1/2	1 5/8	2 11/16	2.59	4 1/4	2.72	2 5/8	6 5/64
400 (4")	1 3/8	1-14	1 5/8	3.9	2	1 1/2	5/8	1 1/4	3/8-24	3 3/4	0	1/2	5/8	1.57	1.18	2.76	5/8	1/2-13	1 1/2	1 5/8	2 11/16	2.59	4 1/4	2.72	2 5/8	6 5/64

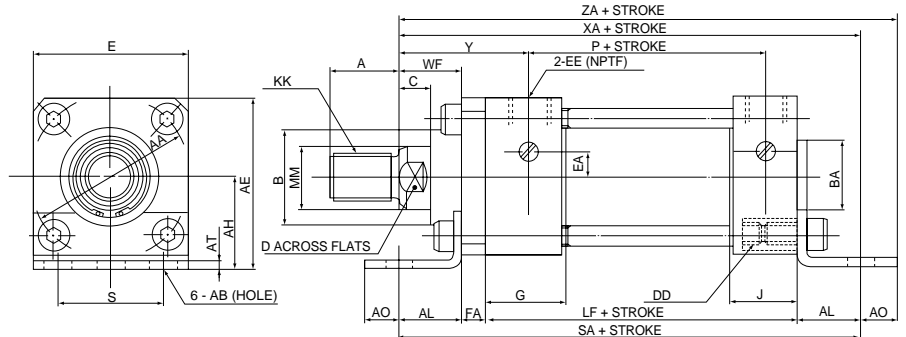
Oversized Rod Foot Mounting Type NC A1L (XB5)

S WIDTH ACROSS FLATS

Bore	S
200	3/4
250	3/4
325	1-1/16
400	1-1/16



X119 Option



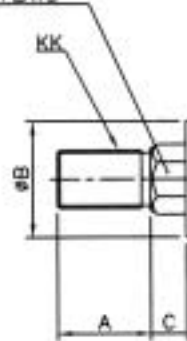
Bore (in)	MM	KK	A	AA	AB	AE	AH	AL	AO	AT	B	BA	C	D	DD	E	EA	EE	FA	G	J	S	WF	Y	P	LF	SA	XA	ZA
200 (2")	1	3/4-16	1 1/8	2.6	3/8	2 11/16	1 7/16	1	9/16	1/8	1.5	1 1/8	1/2	7/8	5/16-24	2 1/2	0.3	3/8	3/8	1.26	1.06	1 3/4	1 3/8	2.09	2.40	3 5/8	6	6	6 9/16
250 (2.5")	1	3/4-16	1 1/8	3.1	3/8	3 1/8	1 5/8	1	9/16	1/8	1.5	1 1/8	1/2	7/8	5/16-24	3	0	3/8	3/8	1.30	1.06	2 1/4	1 3/8	2.13	2.48	3 3/4	6 1/8	6 1/8	6 11/16
325 (3.25")	1 3/8	1-14	1 5/8	3.9	1/2	3 13/16	1 15/16	1 1/4	3/4	11/64	2	1 1/2	5/8	1 1/4	3/8-24	3 3/4	0	1/2	5/8	1.57	1.18	2 3/4	1 5/8	2.59	2.72	4 1/4	7 3/8	7 3/8	7 7/8
400 (4")	1 3/8	1-14	1 5/8	4.7	1/2	4 1/2	2 1/4	1 1/4	3/4	11/64	2	1 1/2	5/8	1 1/4	3/8-24	4 1/2	0	1/2	5/8	1.57	1.18	3 1/2	1 5/8	2.59	2.72	4 1/4	7 3/8	7 3/8	7 7/8

(in)

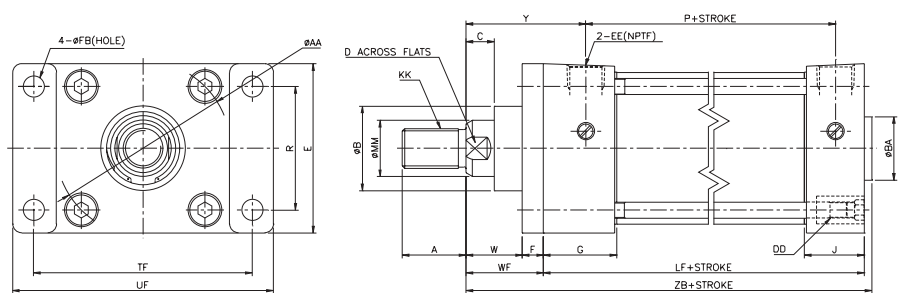
Oversized Rod Front Flange Mounting Type NC A1F (XB5)

S WIDTH ACROSS FLATS

Bore	S
200	3/4
250	3/4
325	1-1/16
400	1-1/16



X119 Option



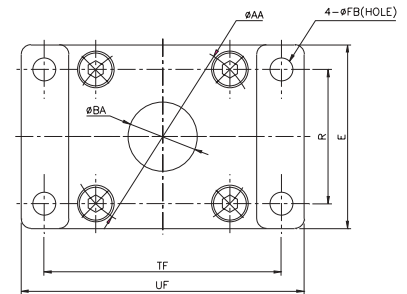
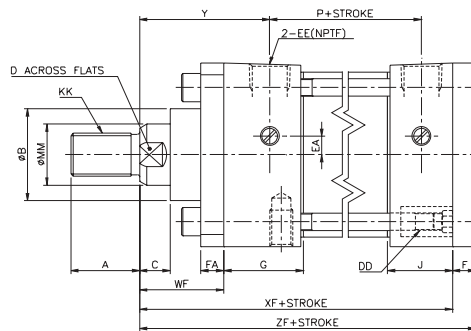
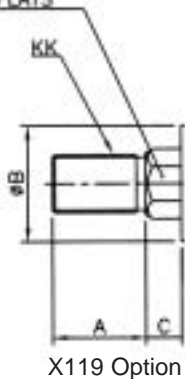
Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	F	FB	G	J	R	TF	UF	W	WF	LF	Y	P	ZB
200 (2")	1	3/4-16	1 1/8	2.6	1.5	1 1/8	1/2	7/8	5/16-24	2.5	0.3	3/8	3/8	3/8	1.26	1.06	1.84	3 3/8	4 1/8	1	1 3/8	3 5/8	2.09	2.40	5 1/8
250 (2.5")	1	3/4-16	1 1/8	3.1	1.5	1 1/8	1/2	7/8	5/16-24	3	0	3/8	3/8	3/8	1.30	1.06	2.19	3 7/8	4 5/8	1	1 3/8	3 3/4	2.13	2.48	5 1/4
325 (3.25")	1 3/8	1-14	1 5/8	3.9	2	1 1/2	5/8	1 1/4	3/8-24	3.25	0	1/2	5/8	7/16	1.57	1.18	2.76	4 11/16	5 1/2	1	1 5/8	4 1/4	2.59	2.72	6 5/64
400 (4")	1 3/8	1-14	1 5/8	4.7	2	1 1/2	5/8	1 1/4	3/8-24	4.5	0	1/2	5/8	7/16	1.57	1.18	3.32	5 7/16	6 1/4	1	1 5/8	4 1/4	2.59	2.72	6 5/64

(in)

Oversized Rod Rear Flange Type NC A1G (XB5)

S WIDTH ACROSS FLATS

Bore	S
200	3/4
250	3/4
325	1-1/16
400	1-1/16



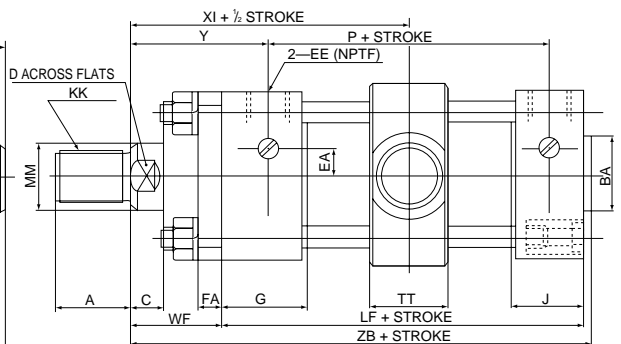
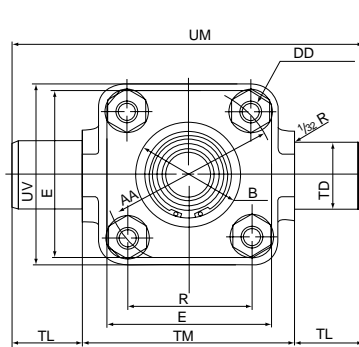
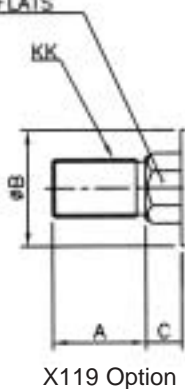
Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	F	FA	G	J	R	TF	UF	WF	Y	P	XF	ZF
200 (2")	1	3/4-16	1 1/8	2.6	1 1/2	1 1/8	1/2	7/8	5/16-24	2.5	0.3	3/8	3/8	3/8	1.26	1.06	1.84	3 3/8	4 1/8	1 3/8	2.09	2.40	5	5 3/8
250 (2.5")	1	3/4-16	1 1/8	3.1	1 1/2	1 1/8	1/2	7/8	5/16-24	3	0	3/8	3/8	3/8	1.30	1.06	2.19	3 7/8	4 5/8	1 3/8	2.13	2.48	5 1/8	5 1/2
325 (3.25")	1 3/8	1-14	1 5/8	3.9	2	1 1/2	5/8	1 1/4	3/8-24	3.75	0	1/2	5/8	5/8	1.57	1.18	2.76	4 11/16	5 1/2	1 5/8	2.59	2.72	5 7/8	6 1/2
400 (4")	1 3/8	1-14	1 5/8	4.7	2	1 1/2	5/8	1 1/4	3/8-24	4.5	0	1/2	5/8	5/8	1.57	1.18	3.32	5 7/16	6 1/4	1 5/8	2.59	2.72	5 7/8	6 1/2

(in)

Oversized Rod Center Trunnion Mounting Type NC A1T (XB5)

S WIDTH ACROSS FLATS

Bore	S
200	3/4
250	3/4
325	1-1/16
400	1-1/16



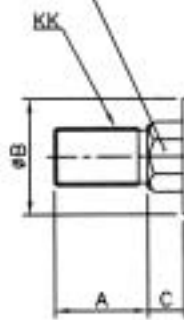
Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	FA	G	J	R	TD _{0.001}	TL	TM	TT	UM	UV	WF	Y	LF	P	XI	ZB
200 (2")	1	3/4-16	1 1/8	2.6	1.5	1 1/8	1/2	7/8	5/16-24	2 1/2	0.3	3/8	3/8	1.26	1.06	1.84	1	1	3	1.18	5	2.56	1 3/8	2.09	3 5/8	2.40	3.29	5 1/8
250 (2.5")	1	3/4-16	1 1/8	3.1	1.5	1 1/8	1/2	7/8	5/16-24	3	0	3/8	3/8	1.30	1.06	2.19	1	1	3 1/2	1.18	5 1/2	3.39	1 3/8	2.13	3 3/4	2.48	3.37	5 1/4
325 (3.25")	1 3/8	1-14	1 5/8	3.9	2	1 1/2	5/8	1 1/4	3/8-24	3 3/4	0	1/2	5/8	1.57	1.18	2.76	1	1	4 1/2	1.34	6 1/2	4.33	1 5/8	2.59	4 1/4	2.72	3.95	6 5/64
400 (4")	1 3/8	1-14	1 5/8	4.7	2	1 1/2	5/8	1 1/4	3/8-24	3 3/4	0	1/2	5/8	1.57	1.18	3.32	1	1	5 1/4	1.57	7 1/4	5.12	1 5/8	2.59	4 1/4	2.72	3.99	6 5/64

(in)

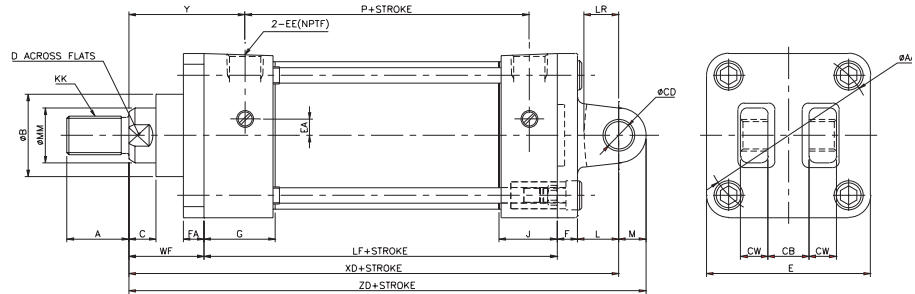
Oversized Rod Detachable Rear Clevis Type NC A1D (XB5)

S WIDTH ACROSS FLATS

Bore	S
200	3/4
250	3/4
325	1-1/16
400	1-1/16



X119 Option



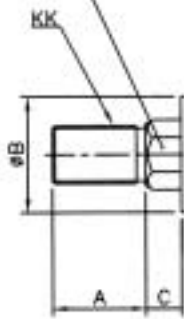
(in)

Bore (in)	MM	KK	A	AA	B	C	CB	CD	CW	D	DD	E	EA	EE	F	FA	G	J	L	LR	M	WF	XD	Y	LF	P	ZD
200 (2")	1	3/4-16	1 1/8	2.6	1 1/2	1/2	3/4	1/2	1/2	7/8	5/16-24	2.5	0.3	3/8	3/8	3/8	1.26	1.06	3/4	5/8	1/2	1 3/8	6 1/8	2.09	3 5/8	2.40	6 5/8
250 (2.5")	1	3/4-16	1 1/8	3.1	1 1/2	1/2	3/4	1/2	1/2	7/8	5/16-24	3	0	3/8	3/8	3/8	1.30	1.06	3/4	5/8	1/2	1 3/8	6 1/4	2.13	3 3/4	2.48	6 3/4
325 (3.25")	1 3/8	1-14	1 5/8	3.9	2	5/8	1 1/4	3/4	3/4	1 1/4	3/8-24	3.75	0	1/2	5/8	5/8	1.57	1.18	1 1/4	1	3/4	1 5/8	7 3/4	2.59	4 1/4	2.72	8 1/2
400 (4")	1 3/8	1-14	1 5/8	4.7	2	5/8	1 1/4	3/4	3/4	1 1/4	3/8-24	4.5	0	1/2	5/8	5/8	1.57	1.18	1 1/4	1	3/4	1 5/8	7 3/4	2.59	4 1/4	2.72	8 1/2

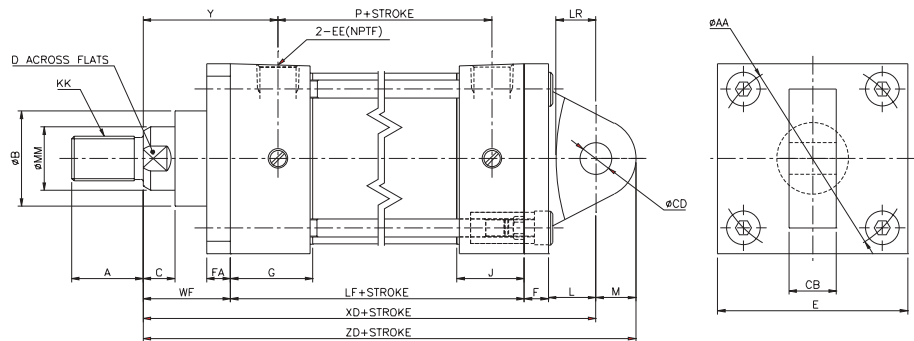
Oversized Rod Single Detachable Rear Clevis Type NC A1C (XB5)

S WIDTH ACROSS FLATS

Bore	S
200	3/4
250	3/4
325	1-1/16
400	1-1/16



X119 Option



(in)

Bore (in)	MM	KK	A	AA	B	C	CB	CD	CW	D	DD	E	EA	EE	F	FA	G	J	L	LR	M	WF	XD	Y	LF	P	ZD
200 (2")	1	3/4-16	1 1/8	2.6	1 1/2	1/2	3/4	1/2	1/2	7/8	5/16-24	2.5	0.3	3/8	3/8	3/8	1.26	1.06	3/4	5/8	1/2	1 3/8	6 1/8	2.09	3 5/8	2.40	6 5/8
250 (2.5")	1	3/4-16	1 1/8	3.1	1 1/2	1/2	3/4	1/2	1/2	7/8	5/16-24	3	0	3/8	3/8	3/8	1.30	1.06	3/4	5/8	1/2	1 3/8	6 1/4	2.13	3 3/4	2.48	6 3/4
325 (3.25")	1 3/8	1-14	1 5/8	3.9	2	5/8	1 1/4	3/4	3/4	1 1/4	3/8-24	3.75	0	1/2	5/8	5/8	1.57	1.18	1 1/4	1	3/4	1 5/8	7 3/4	2.59	4 1/4	2.72	8 1/2
400 (4")	1 3/8	1-14	1 5/8	4.7	2	5/8	1 1/4	3/4	3/4	1 1/4	3/8-24	4.5	0	1/2	5/8	5/8	1.57	1.18	1 1/4	1	3/4	1 5/8	7 3/4	2.59	4 1/4	2.72	8 1/2

Adjustable Stroke - Extended



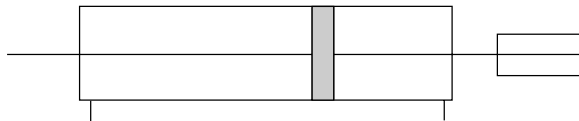
Specifications

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Ambient & Media Temp.	40 ~ 140°F (5 ~ 60°C)				
Piston Speed	2 ~ 20 inch/sec (50 ~ 500mm/sec)				
Cushion	Air Cushion Standard				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped				

- The extended stroke stop position is infinitely adjustable within the adjustable range.
- Auto switch capable

Standard Stroke List

Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28

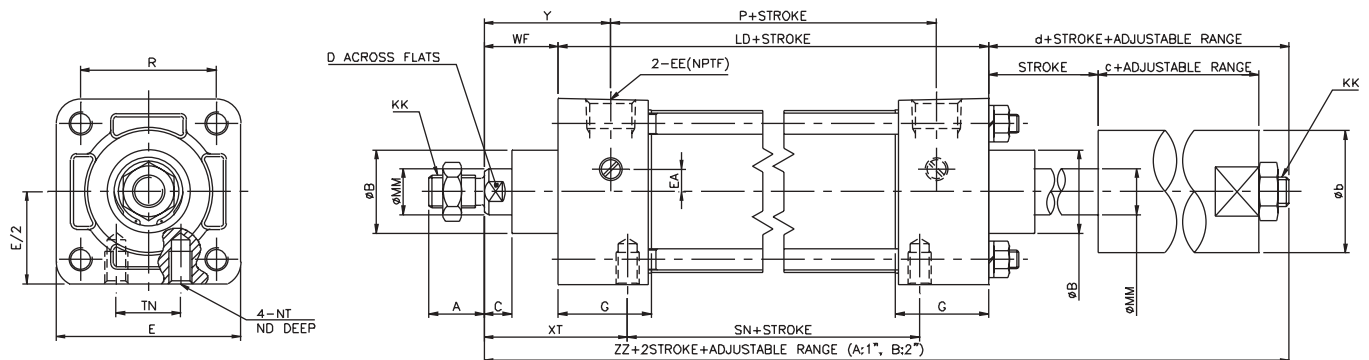


How To Order

NC **D** A1 **B** 150 — 0400 **A** — XC8

Auto Switch Mounting Bore Stroke Adjustment Range
 A: 0~1" B: 0~2" Adjustable Stroke

Dimensions



Bore (in)	MM	KK	A	AA	B	C	D	DD	E	EA	EE	G	K	R	WF	Y	LD	P	ZZ
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	9/32	1.43	1	1.71	3.78	2.36	6.58
200 (2")	5/8	7/16-20	3/4	2.60	1 1/8	3/8	9/16	5/16-24	2 1/2	0.3	3/8	1.26	11/32	1.84	1	1.71	3.82	2.40	7.01
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.30	11/32	2.19	1	1.75	3.98	2.48	7.17
325 (3.25")	1	3/4-16	1 1/8	3.90	1 1/2	1/2	7/8	3/8-24	3 3/4	0	1/2	1.57	27/64	2.76	1 3/8	2.34	4.64	2.72	9.38
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	7/8	3/8-24	4 1/2	0	1/2	1.57	27/64	3.32	1 3/8	2.34	4.64	2.72	9.38

(in)

Bore (in)	b	c	d	SN	NT	ND	TN
150 (1.5")	1 1/2	1.25	1.80	2 1/4	1/4-20	9/32	5/8
200 (2")	1 21/32	1.64	2.19	2 1/4	5/16-18	7/16	7/8
250 (2.5")	1 21/32	1.64	2.19	2 3/8	3/8-16	19/32	1 1/4
325 (3.25")	2 9/32	2.48	3.37	2 5/8	1/2-13	5/8	1 1/2
400 (4")	2 9/32	2.48	3.37	2 5/8	1/2-13	5/8	1 3/8

Adjustable Stroke - Return



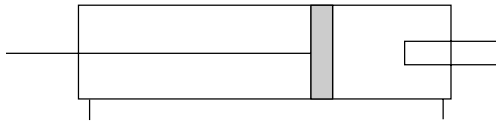
Specifications

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Ambient & Media Temp.	40 ~ 140°F (5 ~ 60°C)				
Piston Speed	2 ~ 20 inch/sec (50 ~ 500mm/sec)				
Cushion	Air Cushion Standard				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped				

- The return stroke stop position is infinitely adjustable within the adjustable range.
- Auto switch capable

Standard Stroke List

Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28



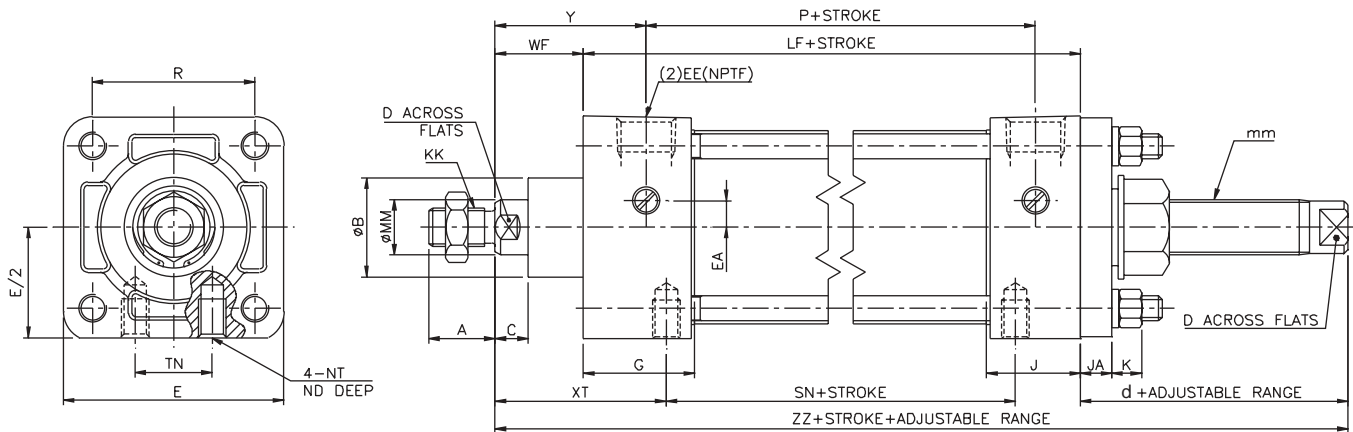
How To Order

NC **D** A1 **B** 150 — 0400 **A** — XC9

Auto Switch Mounting Bore Stroke Adjustment Range
 A: 0~1" B: 0~2"

Adjustable Stroke Retract

Dimensions



Bore (in)	MM	KK	A	AA	B	C	D	DD	E	EA	EE	G	J	JA	K	R	WF	Y	LF	P	ZZ	TN	XT	SN	d	mm
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.10	11/32	9/32	1.43	1	1.71	3 5/8	2.36	6.44	5/8	1 15/16	2 1/4	1.81	M16x1.5
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	3/8	9/16	5/16-24	2 1/2	0.3	3/8	1.26	1.06	11/32	11/32	1.84	1	1.71	3 5/8	2.40	6.44	7/8	1 15/16	2 1/4	1.81	M16x1.5
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.30	1.06	11/32	11/32	2.19	1	1.75	3 3/4	2.48	6.44	1 1/4	1 15/16	2 3/8	1.69	M16x1.5
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1/2	7/8	3/8-24	3 3/4	0	1/2	1.57	1.10	5/8	27/64	2.76	1 3/8	2.34	4 1/4	2.72	8.02	1 1/2	2 7/16	2 5/8	2.40	M24x1.5
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	7/8	3/8-24	4 1/2	0	1/2	1.57	1.10	5/8	27/64	3.32	1 3/8	2.34	4 1/4	2.72	8.02	2 1/16	2 7/16	2 5/8	2.40	M24x1.5

Bore (in)	TN	XT	SN	d	mm	NT	ND
150 (1.5")	5/8	1 15/16	2 1/4	1.81	M16x1.5	1/4-20	9/32
200 (2")	7/8	1 15/16	2 1/4	1.81	M16x1.5	5/16-18	7/16
250 (2.5")	1 1/4	1 15/16	2 3/8	1.69	M16x1.5	3/8-16	19/32
325 (3.25")	1 1/2	2 7/16	2 5/8	2.40	M24x1.5	1/2-13	5/8
400 (4")	2 1/16	2 7/16	2 5/8	2.40	M24x1.5	1/2-13	5/8

Dual Operation - Double Rod



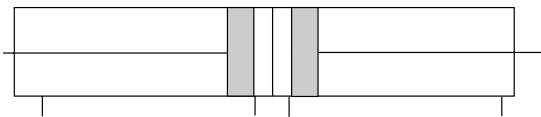
Specifications

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Ambient & Media Temp.	40 ~ 140°F (5 ~ 60°C)				
Piston Speed	2 ~ 20 inch/sec (50 ~ 500mm/sec)				
Cushion	Air Cushion Standard				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped				

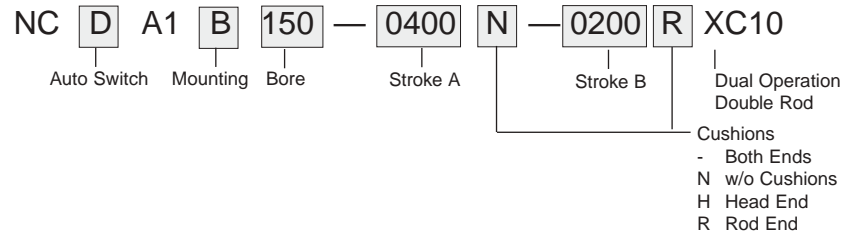
- 4 positions available from a single cylinder
- Auto switch capable

Standard Stroke List

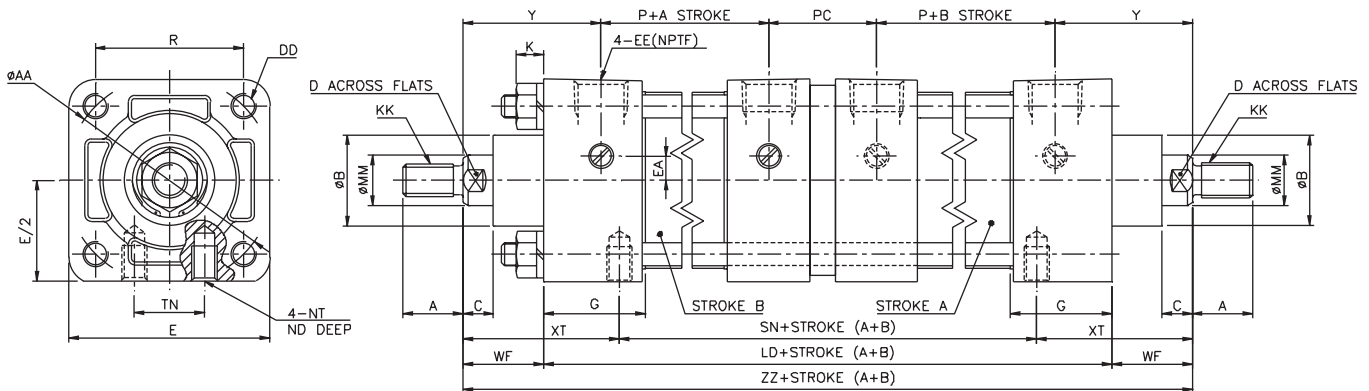
Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28



How To Order



Dimensions



Bore (in)	MM	KK	A	AA	B	C	D	DD	E	EA	EE	G	K	R	WF	Y	LD	P	PC	ZZ	SN
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	9/32	1.43	1	1.71	7.44	2.36	1.30	9.44	5.56
200 (2")	5/8	7/16-20	3/4	2.60	1 1/8	3/8	9/16	5/16-24	2 1/2	0.3	3/8	1.26	11/32	1.84	1	1.71	7.52	2.40	1.30	9.52	5.64
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.30	11/32	2.19	1	1.75	7.76	2.48	1.30	9.76	5.88
325 (3.25")	1	3/4-16	1 1/8	3.90	1 1/2	1/2	7/8	3/8-24	3 3/4	0	1/2	1.57	27/64	2.76	1 3/8	2.34	8.94	2.72	1.57	11.69	6.82
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1/2	7/8	3/8-24	4 1/2	0	1/2	1.57	27/64	3.32	1 3/8	2.34	8.94	2.72	1.57	11.69	6.82

Bore (in)	TN	XT	NT	ND
150 (1.5")	5/8	1 15/16	1/4-20	9/32
200 (2")	7/8	1 15/16	5/16-18	7/16
250 (2.5")	1 1/4	1 15/16	3/8-16	19/32
325 (3.25")	1 1/2	2 7/16	1/2-13	5/8
400 (4")	2 1/16	2 7/16	1/2-13	5/8

Dual Operation - Single Rod



- 3 positions can be obtained from a single cylinder.
- Twice the force is available for the extended stroke
- Auto switch capable

Specifications

Bore size (inch)	1.5	2	2.5	3.25	4
Media	Air				
Max. Operating Pressure	250 psi (1.75 kgf/cm)				
Min. Operating Pressure	8 psi (0.06 kgf/cm)				
Ambient & Media Temp.	40 ~ 140°F (5 ~ 60°C)				
Piston Speed	2 ~ 20 inch/sec (50 ~ 500mm/sec)				
Cushion	Air Cushion Standard				
Mounting types	Basic, Foot, Flange, Center Trunnion, Side Tapped				

Standard Stroke List

Bore size	Standard Stroke (in)
1.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20
2, 2.50	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24
3.25, 4	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28

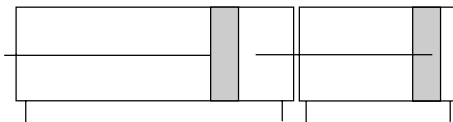
Example: NCA1B150-0200R+0300-XC11 will stroke 2" then an additional 3" for a total stroke of 5". The front cylinder B (rod end) must be equal to 5" to allow the full stroke.

How To Order

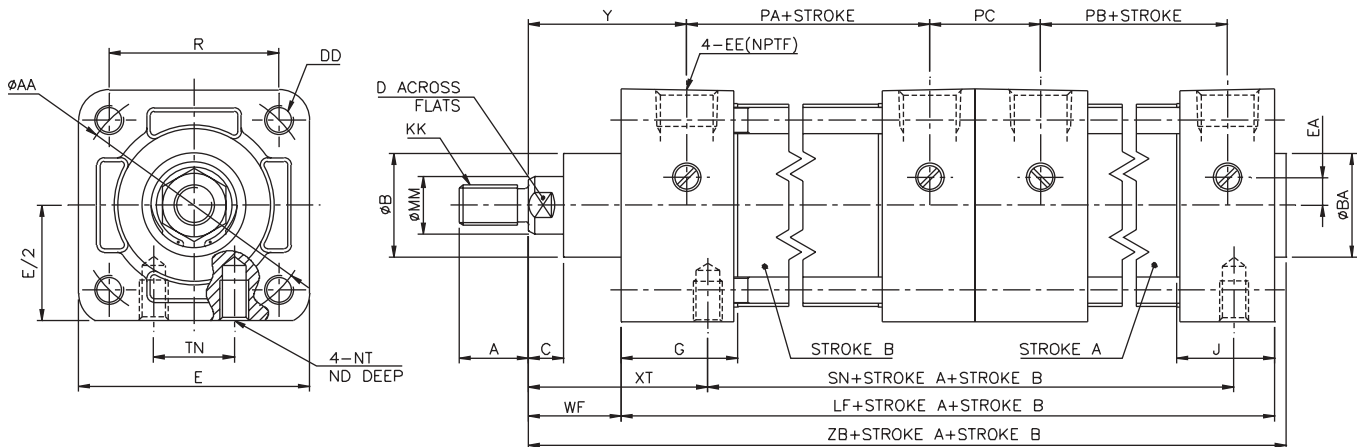
NC **D** **A1** **B** **150** — **0400** **R** + **0200** **H** **XC11**

Auto Switch Mounting Bore Stroke B-A Stroke B Dual Operation Single Rod

Cushions
 - Both Ends
 N w/o Cushions
 H Head End
 R Rod End



Dimensions



Bore (in)	MM	KK	A	AA	B	BA	C	D	DD	E	EA	EE	G	J	NT	TN	WF	XT	Y	LF	PA	PB	PC
150 (1.5")	5/8	7/16-20	3/4	2.02	1 1/8	1 1/8	3/8	9/16	1/4-28	2	0.3	3/8	1.26	1.1	1/4-20	5/8	1	1 15/16	1.71	7.26	2.36	2.40	1.24
200 (2")	5/8	7/16-20	3/4	2.6	1 1/8	1 1/8	3/8	9/16	5/16-24	2.5	0.3	3/8	1.26	1.06	5/16-18	7/8	1	1 15/16	1.71	7.26	2.40	2.44	1.20
250 (2.5")	5/8	7/16-20	3/4	3.1	1 1/8	1 1/8	3/8	9/16	5/16-24	3	0	3/8	1.3	1.06	3/8-16	1 1/4	1	1 15/16	1/75	7.38	2.48	2.52	1.12
325 (3.25")	1	3/4-16	1 1/8	3.9	1 1/2	1 1/2	1/2	7/8	3/8-24	3.75	0	1/2	1.57	1.18	1/2-13	1 1/2	1 3/8	2 7/16	2.34	8.52	2.72	2.76	1.51
400 (4")	1	3/4-16	1 1/8	4.7	1 1/2	1 1/2	1/2	7/8	3/8-24	4.5	0	1/2	1.57	1.18	1/2-13	2 1/16	1 3/8	2 7/16	2.34	8.52	2.72	2.76	1.51

Bore (in)	SN	ZB	NT	ND
150 (1.5")	5.89	8.39	1/4-20	9/32
200 (2")	5.89	8.39	5/16-18	7/16
250 (2.5")	6.01	8.50	3/8-16	19/32
325 (3.25")	6.89	10.1	1/2-13	5/8
400 (4")	6.89	10.1	1/2-13	5/8

Special Rod End Modifications

How To Order

The NCA1 series cylinders are available with a variety of special rod end modifications to suit your application through our simple special ordering process. The Simple Special System is a global effort to quickly and efficiently respond to our customer requests for a non standard catalog option. The chart below outlines the applicable types available. To order the correct rod end modification please contact your local SMC Sales Office or SMC Technical Sales Representative.

Rod End Shape

<p>Symbol: A1</p>	<p>Symbol: A2</p>	<p>Symbol: A3</p>	<p>Symbol: A4</p>	<p>Symbol: A5</p>
<p>Symbol: A6</p>	<p>Symbol: A7</p>	<p>Symbol: A8</p>	<p>Symbol: A9</p>	<p>Symbol: A10</p>
<p>Symbol: A11</p>	<p>Symbol: A12</p>	<p>Symbol: A13</p>	<p>Symbol: A14</p>	<p>Symbol: A15</p>
<p>Symbol: A16</p>	<p>Symbol: A17</p>	<p>Symbol: A18</p>	<p>Symbol: A19</p>	<p>Symbol: A20</p>
<p>Symbol: A21</p>	<p>Symbol: A22</p>	<p>Symbol: A23</p>	<p>Symbol: A24</p>	<p>Symbol: A25</p>
<p>Symbol: A26</p>	<p>Symbol: A27</p>	<p>Symbol: A28</p>	<p>Symbol: A29</p>	<p>Symbol: A30</p>

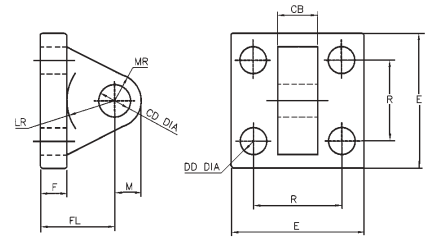
Note) Series CQ2 is not available.

Note) Series CQ2 is not available.

Eye Brackets

Part No	CB	CD	DD	E	F	FL	LR	M	MR	R
NCA1-P150	3/4	1/2	13/32	2 1/2	3/8	1 1/8	3/4	1/2	9/16	1.63
NCA1-P325	1 1/4	3/4	17/32	3 1/2	5/8	1 7/8	1 1/4	3/4	7/8	2.56
NCA1-P800	1 1/2	1	21/32	4 1/2	3/4	2 1/4	1 1/2	1	1 1/4	3.25
NCA1-P1000	2	1 3/8	21/32	5	7/8	3	2 1/8	1 3/8	1 5/8	3.81
NCA1-P1200	2 1/2	1 3/4	29/32	6 1/2	7/8	3 1/8	2 1/4	1 3/4	2 1/8	4.95
NCA1-P1400	2 1/2	2	1 1/16	7 1/2	1	3 1/2	2 1/2	2	2 7/16	5.75
NCA1-P1401	3	2 1/2	1 3/16	8 1/2	1 3/4	4 3/4	2 5/8	2 1/2	3	6.58
NCA1-P1402	3	3	1 5/16	9 1/2	2	5 1/4	2 7/8	2 3/4	3 1/4	7.50

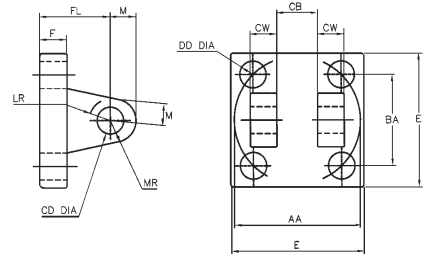
Note) Pivot Pin not included



Clevis Brackets

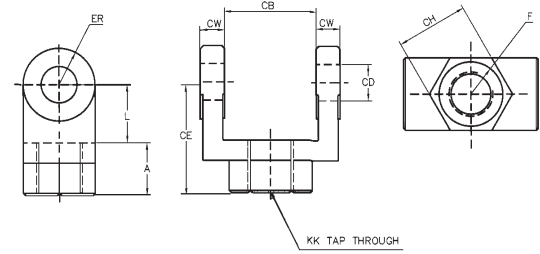
Part No	AA	BA	CB	CD	CW	DD	E	F	FL	LR	M	MR
NCA1-CB150	2.3	1 5/8	0.785	1/2	1/2	3/8 -24	2 1/2	3/8	1 1/8	1/2	1/2	9/16
NCA1-CB325	3.6	2 9/16	1.265	3/4	5/8	1/2 -20	3 1/2	5/8	1 7/8	1 1/16	3/4	1 1/16
NCA1-CB800	4.6	3 1/4	1.515	1	3/4	5/8 -18	4 1/2	3/4	2 1/4	1 1/4	1	1 1/8
NCA1-CB1000	5.4	3 13/16	2.032	1 3/8	1	5/8 -18	5	7/8	3	1 7/8	1 3/8	1 3/4
NCA1-CB1200	7	4 15/16	2.531	1 3/4	1 1/4	7/8 -14	6 1/2	7/8	3 1/8	2	1 3/4	1 7/8
NCA1-CB1400	8.1	5 3/4	2.531	2	1 1/4	1-14	7 1/2	1	3 1/2	2 1/8	2	2 1/8
NCA1-CB1401	9.3	6 19/32	3.032	2 1/2	1 1/2	1 1/8-12	8 1/2	1	4	2 5/8	2 1/2	2 1/2
NCA1-CB1402	10.6	7 1/2	3.032	3	1 1/2	1 1/4-12	9 1/2	1	4 1/4	2 7/8	2 3/4	2 3/4

Note) Pivot Pin not included



Rod Clevises

Part No	CB	CD	CE	CH	CW	F	L	A	KK	ER
NY-150	0.765	0.5	1 1/2	1	1/2	1	3/4	3/4	7/16-20	1/2
NY-325	1.265	0.75	2 3/8	1 3/8	5/8	1 1/4	1 1/4	1 1/8	3/4-16	3/4
NY-800	1.515	1	3 1/8	1 1/2	3/4	1 1/2	1 1/2	1 5/8	1 -14	1
NY-1000	2.032	1 3/8	4 1/8	2	1	2	2 1/8	2	1 1/4 -12	1 3/8
NY-1200	2.531	1 3/4	4 1/2	2 3/8	1 1/4	2 3/8	2 1/4	2 1/4	1 1/2 -12	1 3/4
NY-1400	2.531	2	5 1/2	2 15/16	1 1/4	2 15/16	2 1/2	3	1 7/8 -12	2
NY-1401	3.032	2 1/2	6 1/2	3 1/2	1 1/2	3 1/2	3	3 1/2	2 1/4 -12	2 1/2
NY-1402	3.032	3	6 3/4	3 7/8	1 1/2	3 7/8	3 1/4	3 1/2	2 1/2 -12	2 3/4



Order to Match Rod Thread

Rod Eyes

Part No	A	CA	CB	CD	ER	KK
NI-150	3/4	1 1/2	3/4	1/2	5/8	7/16 20
NI-325	1 1/8	2 1/16	1 1/4	3/4	7/8	3/4 -16
NI-800	1 5/8	2 13/16	1 1/2	1	1 3/16	1 -14
NI-1000	2	3 7/16	2	1 3/8	1 9/16	1 1/4 -12
NI-1200	2 1/4	4	2 1/2	1 3/4	2	1 1/2 -12
NI-1400	3	5	2 1/2	2	2 1/2	1 7/8 -12
NI-1401	3 1/2	5 13/16	3	2 1/2	2 13/16	2 1/4 -12
NI-1402	3 1/2	6 1/8	3	3	3 1/4	2 1/2 -12

Pivot Pin

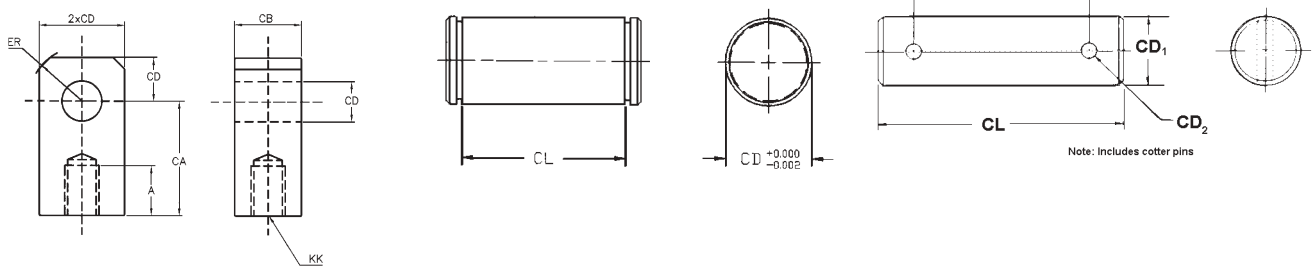
Part No	CD	CL
NCA1-150	1/2	1 7/8
NCA1-325	3/4	2 5/8
NCA1-800	1	3 1/8
NCA1-1000	1 3/8	4 1/8
NCA1-1200	1 3/4	5 1/8
NCA1-1400	2	5 1/8
NCA1-1401	2.5	6.19
NCA1-1402	3	6.25

Note) Retainer Rings are included

Pivot Pin

Part No	CD ₁	CD ₂	CL	CP
NCDP-150	.500 ⁰ / _{-.002}	.106	2.28	1.94
NCDP-325	.750 ⁰ / _{-.002}	.140	3.10	2.72

Note) Cotter Pins are included



How to Order Auto Switches

Wire Lead Type



For standard part number please see applicable auto switches on page 44 - 50

Lead wire length	
-	0.5 (m) (1.64 ft)
L	3 (m) (9.84 ft)
Z	5 (m) (16.4 ft)

Connector Type



For standard part number please see applicable auto switches on page 44 - 50

Lead wire length	
S	0.5 (m)
M	1.0 (m)
L	3.0 (m)

Connector type	
A	M8-3 pins
B	M8-4 Pins
D	M12-4 Pins

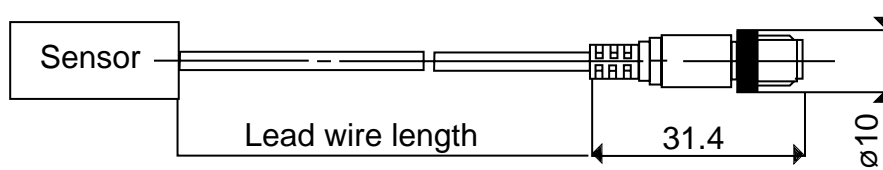
Auto Switch Mounting Bracket/Part No.

Bore	150 (1.5")	200 (2")	250 (2.5")	325 (3/25")	400 (4")
Model No.					
D-A5, D-F5	NBT-150	NBT-200	NBT-200	NBT-325	NBT-325
D-A6, D-J5					

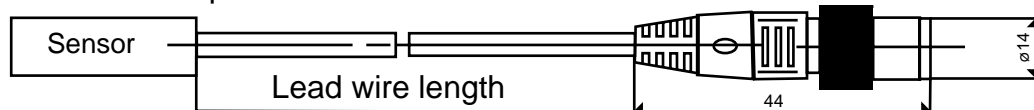
Connector Style	M8-3pin	M8-4pin	M12-4pin
Pin arrangement			
Applicable standards	JIS C 4524, JIS C 4525, IEC 947-5-2, NECA 0402		
Impact resistant	300m/s ²		
IP degree of protection	IP-67 (IEC529 standard)		
Insulation resistance	100MΩ or more at 500VDC meg.		
Withstand voltage	1500VAC 1 minute (between contacts), leakage current 1mA or less.		

Sensor type	Lead wire color				Meaning of contact No.			
	1 pin	2 pin	3 pin	4 pin	1 pin	2 pin	3 pin	4 pin
DC 2 wire	Brown	-	-	Blue	OUT (+)	-	-	OUT (-)
DC2 wire non-polar	-	-	Brown	Blue	-	-	OUT (+)	OUT (±)
DC 3 wire	Brown	-	Blue	Black	DC (+)	-	DC (-)	OUT
DC 4 wire	Brown	Orange	Blue	Black	DC (+)	Diagnostic Output	DC (-)	OUT

- Connector
M8-3 pin / 4 pin



- M12-4 pin

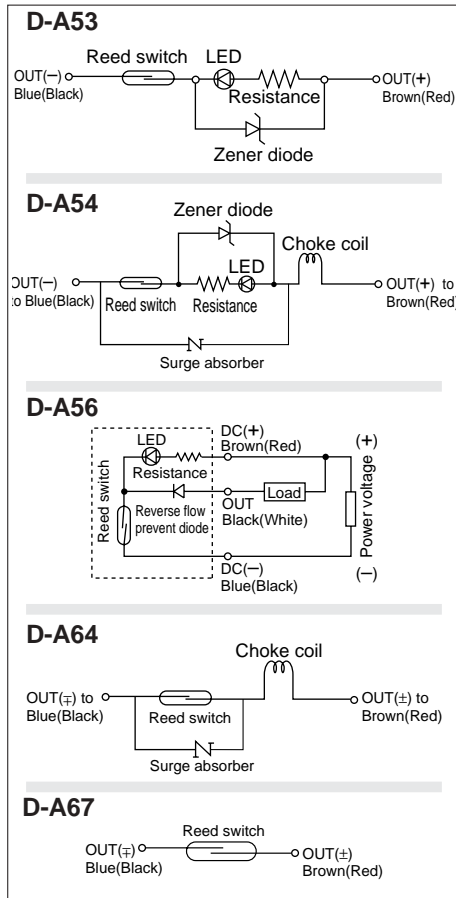


Grommet



Internal Circuit

() : If not applicable for IEC Standard



Specifications

PLC: Programmable Logic Controller

D-A5 (With indicator light)					
Auto switch model number	D-A53	D-A54			D-A56
Application	PLC	Relay/PLC			IC circuit
Load voltage	24V DC	24V DC	100V AC	200V AC	4 to 8V DC
Max. load current and range	5 to 50mA	5 to 50mA	5 to 25mA	5 to 12.5mA	20mA
Contact protection circuit	None	Built-in			None
Internal voltage drop	2.4V				0.8V or less
Indicator light	ON: When red light emitting diode				

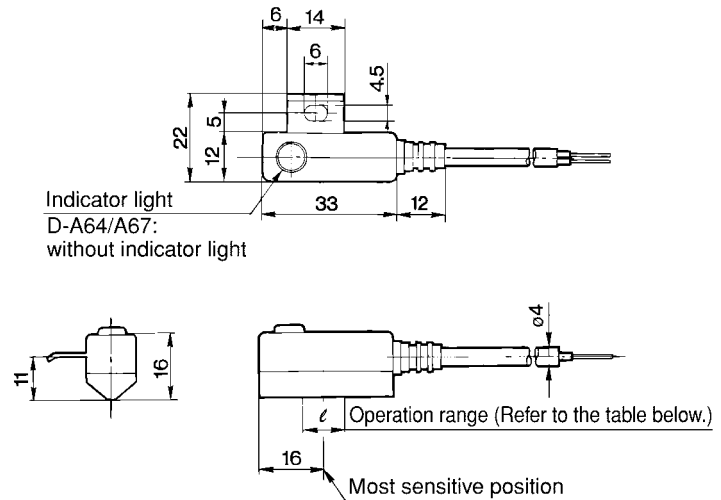
D-A6 (Without indicator light)				
Auto switch model number	D-A64			D-A67
Application	Relay/PLC			PLC/IC circuit
Load voltage	† 24V AC/DC	100V AC	200V AC	MAX. 24V DC
Max. load current	50mA	25mA	12.5mA	30mA
Contact protection circuit	Built-in			None
Internal resistance	† 10‰			† 1‰ (Including 3m lead wire)

• Lead wire — Oilproof vinyl heavy insulation cable, ϕ 4, 0.3mm², 2 cores (Brown, Blue), 0.5m or ϕ 4, 0.2mm², 3 cores (Brown, Black, Blue), 0.5m

Note 1) Refer to common specifications on p.5.3-5.

Note 2) Refer to p.5.3-5 for lead wire length.

Dimensions



Operation Range (/ Dimension) (IN)

Actuator series	Bore size				
	1 1/2	2	2 1/2	3 1/4	4
NCA1	.354	.393	.433	.433	.433

Note) Average value at normal temperature including hysteresis. (Tolerance - 30%)

Grommet

The suitable operating point can be indicated with a green light.
(Red → Green ← Red)



Specifications

PLC: Programmable Logic Controller

D-A59W (With indicator light)

Auto switch model number	D-A59W
Application	Relay/PLC
Load voltage	24V DC
Load current range	5 to 40mA
Contact protection circuit	Built-in
Internal voltage drop	4V
Indicator light	Operating point: Red light emitting diode Suitable operating point: Green light emitting diode

● Lead wire — Oilproof vinyl heavy insulation cable, $\phi 4$, 0.3mm², 2 cores (Brown, Blue), 0.5m

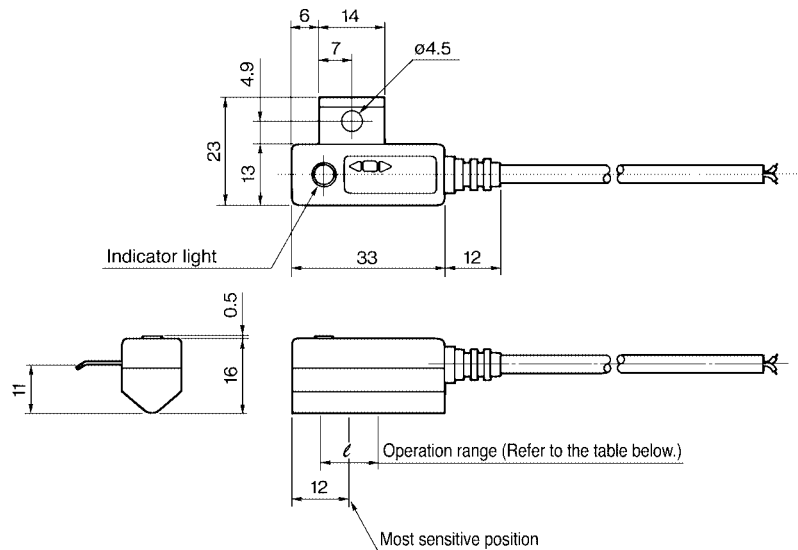
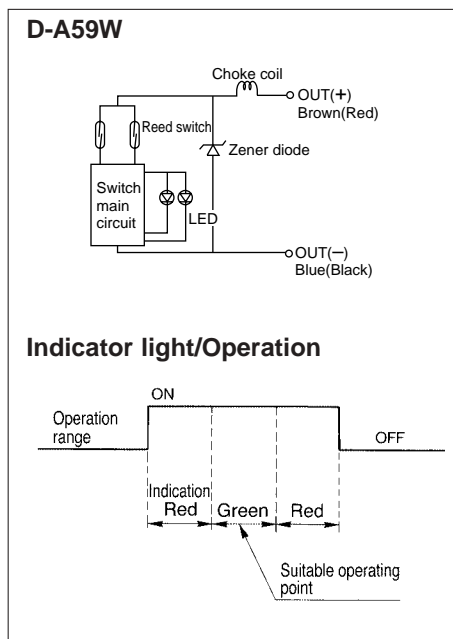
Note 1) Refer to common specifications on p.5.3-5.

Note 2) Refer to p.5.3-5 for lead wire length.

Dimensions

Internal Circuit

(): If not applicable for IEC Standard



Operation Range (/ Dimension) (IN)

Actuator series	Bore size				
	1 1/2	2	2 1/2	3 1/4	4
NCA1	.354	.393	.433	.433	.433

Note) Average value at normal temperature including hysteresis. (Tolerance $\pm 30\%$)

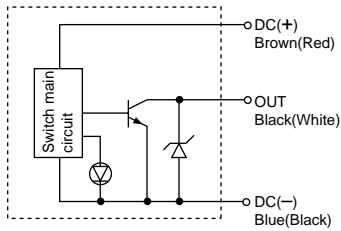
Grommet



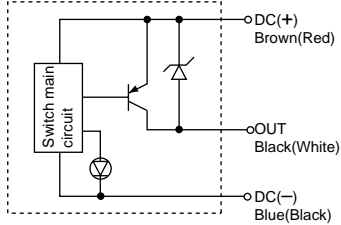
Internal Circuit

(): If not applicable for IEC Standard

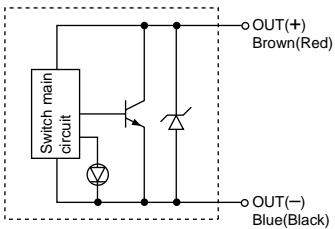
D-F59



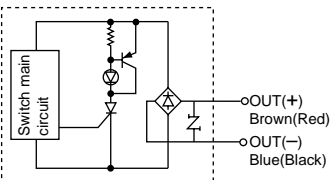
D-F5P



D-J59



D-J51



Specifications

PLC: Programmable Logic Controller

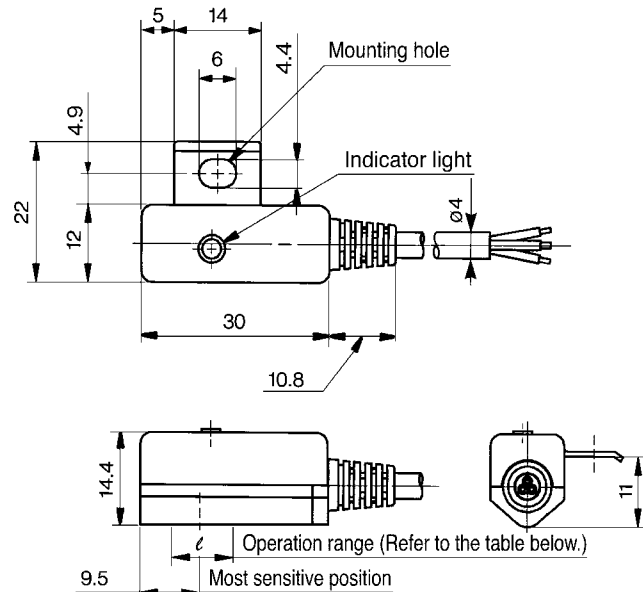
D-F5 /D-J5

Auto switch model number	D-F59	D-F5P	D-J59	D-J51
Wiring	3 wire		2 wire	
Output	NPN	PNP	—	—
Application	IC circuit/Relay/PLC		24V DC Relay/PLC	AC Relay/PLC
Power voltage	5/12/24V DC (4.5 to 28V DC)		—	—
Current consumption	10mA		—	—
Load voltage	28V DC	—	24V DC (10 to 28V DC)	80 to 260V AC
Load current	40mA	80mA	5 to 40mA	5 to 80mA
Internal voltage drop	1.5V or less (0.8V or less at 10mA of load current)	0.8V or less	4V or less	14V or less
Current leakage	100μA at 24V DC		0.8mA at 24V DC	1mA at 100 V DC 1.5mA at 200V DC
Indicator light	ON: When red light emitting diode			

● Lead wire — Oilproof vinyl heavy insulation cable, $\phi 4$, 0.3mm², 3 cores (Brown, Black, Blue), 2 cores (Brown, Blue), 0.5m
 Note 1) Refer to common specifications on the p.5.3-5.
 Note 2) Refer to the p.5.3-5 for lead wire length.

Dimensions

*D-J51 differs in the shape, most sensitive position and operation range from other switches.
 Contact SMC for the details.



Operation Range (/ Dimension) (IN)

Actuator series	Bore size				
	1 1/2	2	2 1/2	3 1/4	4
NCA1	.354	.393	.433	.433	.433

Note) Average value at normal temperature including hysteresis. (Tolerance $\pm 30\%$)

Grommet

The output signal can be detected in an unsteady detecting area.



Specifications

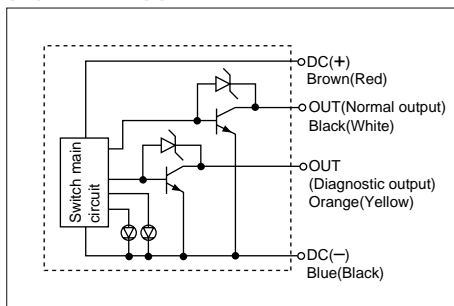
PLC: Programmable Logic Controller

D-F59F	
Auto switch model number	D-F59F
Wiring	4 wire
Output	NPN
Diagnostic output	Normal operation
Application	IC circuit/Relay/PLC
Power voltage	5/12/24V DC (4.5 to 28V DC)
Current consumption	10mA
Load voltage	28V DC
Load current	40mA
Internal voltage drop	1.5V (0.8V at 10mA)
Current leakage	100μA at 24V DC
Indicator light	Operating point: Red light emitting diode Suitable operating point: Green light emitting diode

Lead wire — Oilproof vinyl heavy insulation cable, $\phi 4$, 0.2mm², 4 cores (Brown, Black, Orange, Blue), 0.5m
 Note 1) Refer to common specifications on p.5.3-5.
 Note 2) Refer to p.5.3-5 for lead wire length.

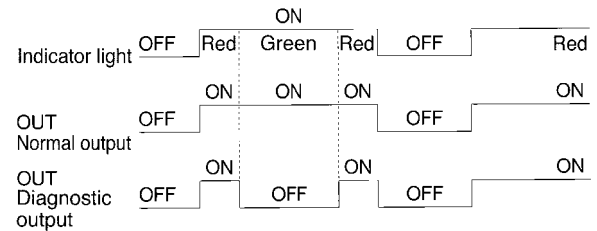
Internal Circuit

() : If not applicable for IEC Standard

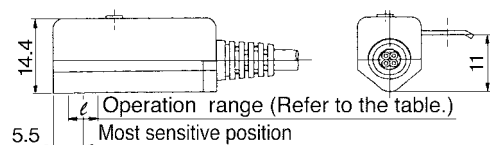
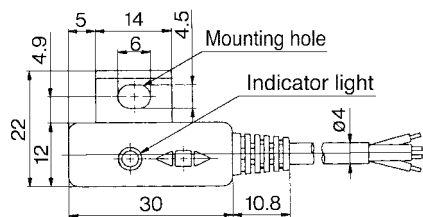


Diagnostic Output Operation

The diagnostic output is detected when detecting position remains at unsteady area only, not available at the most suitable operating area, that is to say, diagnostic signal can be output only when the detecting position is far from the suitable position for normal operation.



Dimensions



Operation Range (/ Dimension) (IN)

Actuator series	Bore size				
	1 1/2	2	2 1/2	3 1/4	4
NCA1	.354	.393	.433	.433	.433

Note) Average value at normal temperature including hysteresis. (Tolerance - 30%)

Grommet

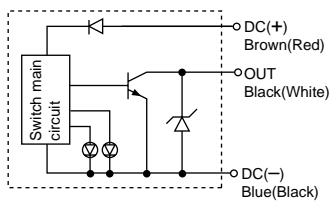
The suitable operating point can be indicated with a green light. (Red→Green←Red)



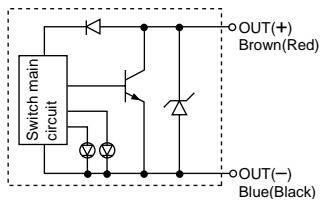
Internal Circuit

(): If not applicable for IEC Standard

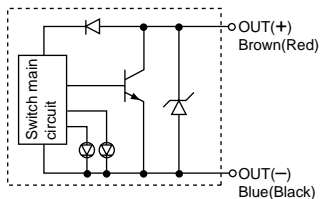
D-F59W



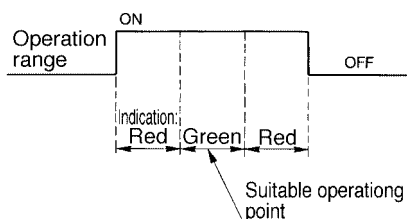
D-F5PW



D-J59W



Indicator light/Operation



Specifications

PLC: Programmable Logic Controller

D-F5 W/D-J59W (With indicator light)

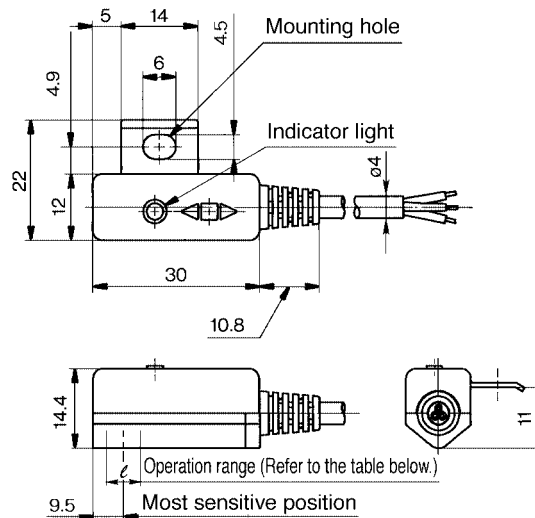
Auto switch model number	D-F59W	D-F5PW	D-J59W
Wiring	3 wire		2 wire
Output	NPN	PNP	—
Application	IC circuit/Relay/PLC		24V DC Relay/PLC
Power voltage	5/12/24V DC (4.5 to 28V DC)		—
Current consumption	10mA		—
Load voltage	28V DC	—	24V DC (10 to 28V DC)
Load current	40mA	80mA	5 to 40mA
Internal voltage drop	(0.8V at 10mA load current) 1.5V	0.8V	4V
Current leakage	100μA at 24V DC		0.8mA at 24V DC
Indicator light	Operating point: Red light emitting diode Suitable operating point: Green light emitting diode		

Lead wire — Oilproof vinyl heavy insulation cable, $\phi 4$, 0.3mm², 3 cores (Brown, Black, Blue), 2 cores (Brown, Blue), 0.5m

Note 1) Refer to common specifications on p.5.3-5.

Note 2) Refer to p.5.3-5 for lead wire length.

Dimensions



Operation Range (/ Dimension) (IN)

Actuator series	Bore size				
	1 1/2	2	2 1/2	3 1/4	4
NCA1	.354	.393	.433	.433	.433

Note) Average value at normal temperature including hysteresis. (Tolerance $\pm 30\%$)

Grommet

Water (coolant) resistant performance



Caution

Precautions

Consult SMC if using coolant liquid other than water based solution.

Specifications

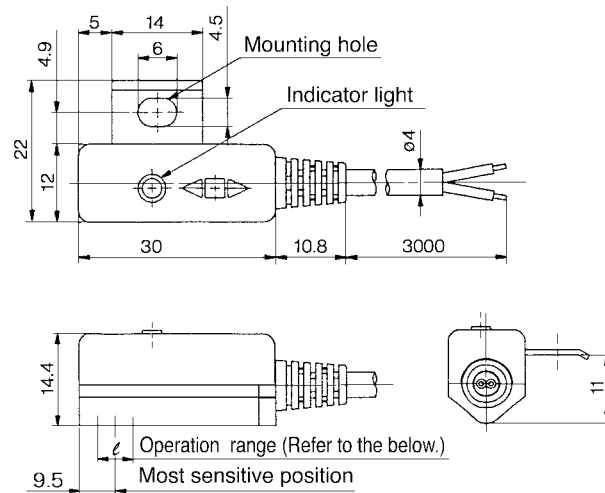
PLC: Programmable Logic Controller

D-F5BAL (With indicator light)

Auto switch model number	D-F5BAL
Wiring	2 wire
Output	—
Application	24V DC Relay/PLC
Power voltage	—
Current consumption	—
Load voltage	24V DC (10 to 28V DC)
Load current	5 to 40mA
Internal voltage drop	4V
Current leakage	0.8mA at 24V DC
Indicator light	Operating point: Red light emitting diode Suitable operating point: Green light emitting diode

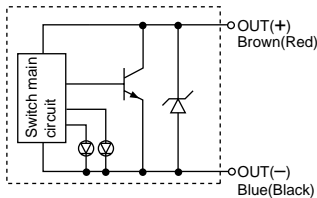
Lead wire— Oilproof vinyl heavy insulation cable, $\phi 4$, 0.3mm^2 , 2 cores (Brown, Blue), 3m (Standard)
 Note 1) Refer to common specifications on p.5.3-5.
 Note 2) Refer to p.5.3-5 for lead wire length.

Dimensions

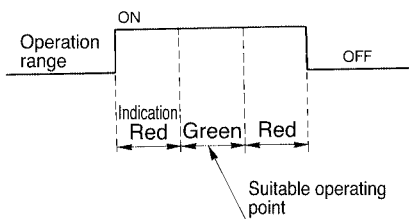


Internal Circuit

(): If not applicable for IEC Standard



Indicator light/Operation



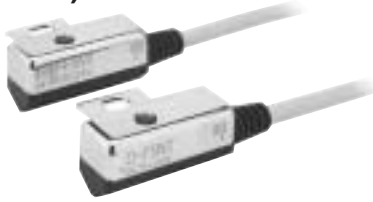
Operation Range (/ Dimension) (IN)

Actuator series	Bore size				
	1 1/2	2	2 1/2	3 1/4	4
NCA1	.354	.393	.433	.433	.433

Note) Average value at normal temperature including hysteresis. (Tolerance $\pm 30\%$)

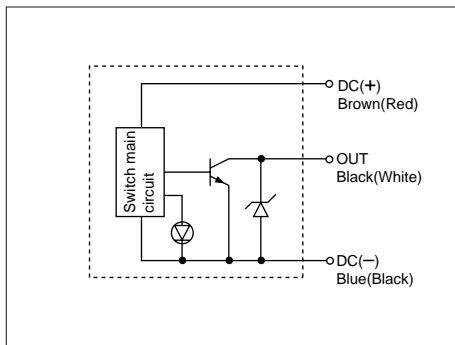
Grommet

With built-in OFF-delay timer (200ms)



Internal Circuit

(): If not applicable for IEC Standard



Specifications

PLC: Programmable Logic Controller

D-F5NTL (With indicator light)	
Auto switch model number	D-F5NTL
Wiring	3 wire
Output	NPN
Output operation	Off-delay
Operation time	1ms
Off-delay time	200±50ms
Application	IC circuit/Relay/PLC
Power voltage	5/12/24V DC (4.5 to 28V DC)
Current consumption	10mA
Load voltage	28V DC
Load current	80mA
Internal voltage drop	1.5V (0.8V at 10mA)
Current leakage	100µA at 24V DC
Indicator light	ON: When red light emitting diode

Lead wire — Oilproof vinyl heavy insulation cable, ø4, 0.3mm², 3 cores (Brown, Black, Blue), 3m (Standard)

Note 1) Refer to common specifications on p.5.3-5.

Note 2) Refer to p.5.3-5 for lead wire length.

Timer Operation

Detection of immediate positioning for high-speed cylinder

Detecting point dispersion occurs due to response time of PLC (sequencer);

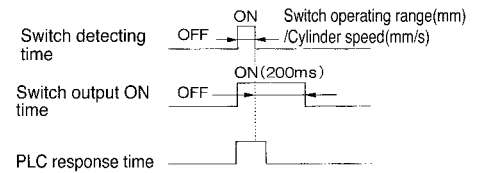
e. g. scanning.

Ex.) Cylinder speed-1000 mm/sec.

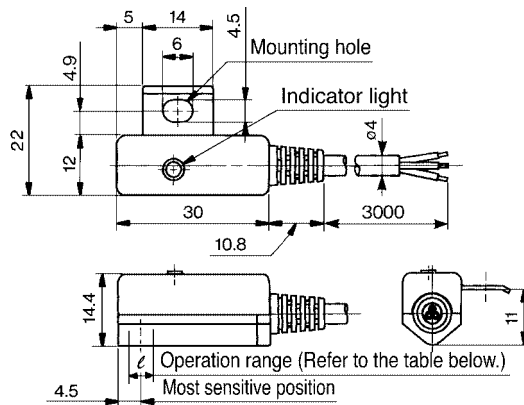
Sequencer response time-0.1 sec.

Detecting point dispersion-Within 100mm (=1000mm/sec. X 0.1sec.)

Take PLC response time into consideration when using.



Dimensions



Operation Range (/ Dimension) (IN)

Actuator series	Bore size				
	1 1/2	2	2 1/2	3 1/4	4
NCA1	.354	.393	.433	.433	.433


Note) Average value at normal temperature including hysteresis. (Tolerance ± 30%)


Series NCA1


Actuator Precautions 1

Be sure to read before handling.

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by a label of "**Caution**", "**Warning**" or "**Danger**". To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

 **Caution** : Operator error could result in injury or equipment damage.

 **Warning** : Operator error could result in serious injury or loss of life.

 **Danger** : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power – Recommendations for the application of equipment to transmission and control systems

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

Warning

1. The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if handled incorrectly. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. Do not service machinery/equipment or attempt to remove components until safety is confirmed.

1. Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc. (Bleed air into the system gradually to create back pressure.)

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

Series NCA1

Actuator Precautions 2

Be sure to read before handling.

⚠Warning

1. There is a danger of sudden action by air cylinders if sliding parts of machinery are twisted, etc., and changes in forces occur.

In such cases, human injury may occur; e.g., by catching hands or feet in the machinery, or damage to the machinery itself may occur. Therefore, the machine should be designed to avoid such dangers.

2. Install a protective cover when there is a risk of human injury.

If a driven object and moving parts of a cylinder pose a danger of human injury, design the structure to avoid contact with the human body.

3. Securely tighten all stationary parts and connected parts so that they will not become loose.

Especially when a cylinder operates with high frequency or is installed where there is a lot of vibration, ensure that all parts remain secure.

4. A deceleration circuit may be required.

When a driven object is operated at high speed or the load is heavy, a cylinder's cushion will not be sufficient to absorb the impact. Install a deceleration circuit to reduce the speed before cushioning to relieve the impact. In this case, the rigidity of the machinery should also be examined.

5. Consider a possible drop in operating pressure due to a power outage, etc.

When a cylinder is used in a clamping mechanism, there is a danger of work pieces dropping if there is a decrease in clamping force due to a drop in circuit pressure caused by a power outage, etc. Therefore, safety equipment should be installed to prevent damage to machinery and/or human injury. Suspension mechanisms and lifting devices also require consideration for drop prevention.

6. Consider a possible loss of power source.

Measures should be taken to protect against human injury and equipment damage in the event that there is a loss of power to equipment controlled by air pressure, electricity or hydraulics, etc.

7. Design circuitry to prevent sudden lurching of driven objects.

When a cylinder is driven by an exhaust center type directional control valve or when starting up after residual pressure is exhausted from the circuit, etc., the piston and its driven object will lurch at high speed if pressure is applied to one side of the cylinder because of the absence of air pressure inside the cylinder. Therefore, select equipment and design circuits to prevent sudden lurching, because there is a danger of human injury and/or damage to equipment when this occurs.

8. Consider emergency stops.

Design so that human injury and/or damage to machinery and equipment will not be caused when machinery is stopped by a safety device under abnormal conditions, such as a power outage or a manual emergency stop.

9. Consider the action when operation is restarted after an emergency stop or abnormal stop.

Design the machinery so that human injury or equipment damage will not occur upon restart of operation. When the cylinder has to be reset at the starting position, install safe manual control equipment.

⚠Warning

1. Confirm the specifications.

The products advertised in this catalog are designed according to use in industrial compressed air systems. If the products are used in conditions where pressure, temperature, etc., are out of specification, damage and/or malfunction may be caused. Do not use in these conditions. (Refer to specifications.)

Consult SMC if you use a fluid other than compressed air.

2. Intermediate stops

When intermediate stopping of a cylinder piston is performed with a 3 position closed center type directional control valve, it is difficult to achieve stopping positions as accurate and precise as with hydraulic pressure due to the compressibility of air.

Furthermore, since valves and cylinders, etc., are not guaranteed for zero air leakage, it may not be possible to hold a stopped position for an extended period of time. Contact SMC in case it is necessary to hold a stopped position for an extended period.

⚠Caution

1. Operate within the limits of the maximum usable stroke.

The piston rod will be damaged if operated beyond the maximum stroke. Refer to the air cylinder model selection procedure for the maximum useable stroke.

2. Operate the piston within a range such that collision damage will not occur at the stroke end.

Operate within a range such that damage will not occur when the piston having inertial force stops by striking the cover at the stroke end. Refer to the cylinder model selection procedure for the range within which damage will not occur.

3. Use a speed controller to adjust the cylinder drive speed, gradually increasing from a low speed to the desired speed setting.

4. Provide intermediate supports for long stroke cylinders.

Provide intermediate supports for cylinders with long strokes to prevent rod damage due to sagging of the rod, deflection of the tube, vibration and external loads, etc.

It is assumed the persons determining the stroke requirements have technical training and expertise in the design limitations of pneumatic equipment and are aware that death, personal injury, and property damage may result from the improper use of these products. Proper use is the users responsibility.

Series NCA1 Actuator Precautions 3

Be sure to read before handling.

Mounting

⚠ Caution

1. Be certain to align the rod axis with the load and direction of movement when connecting.

When not properly aligned, the rod and tube may be twisted, and damage may be caused due to wear on areas such as the inner tube surface, bushings, rod surface and seals.

2. When an external guide is used, connect the rod end and the load in such a way that there is no interference at any point within the stroke.

3. Do not scratch or gouge the sliding parts of the cylinder tube or piston rod, etc., by striking or grasping them with other objects.

Cylinder bores are manufactured to precise tolerances, so that even a slight deformation may cause malfunction. Also, scratches or gouges, etc., in the piston rod may lead to damaged seals and cause air leakage.

4. Prevent the seizure of rotating parts.

Prevent the seizure of rotating parts (pins, etc.) by applying grease.

5. Do not use until you can verify that equipment can operate properly.

Verify correct mounting by appropriate function and leakage inspections after compressed air and power are connected following mounting, maintenance or conversions.

6. Instruction manual

The product should be mounted and operated after thoroughly reading the manual and understanding its contents.

Keep the instruction manual where it can be referred to as needed.

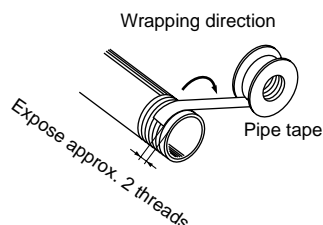
1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

2. Wrapping of pipe tape

When screwing together pipes and fittings, etc., be certain that chips from the pipe threads and sealing material do not get inside the piping.

Also, when pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



Cushion

⚠ Caution

1. Readjust using the cushion needle.

Cushion is adjusted at the factory, however, the cushion needle on the cover should be readjusted when the product is put into service, based upon factors such as the size of the load and the operating speed. When the cushion needle is turned clockwise, the restriction becomes smaller and the cushion's effectiveness is increased. Tighten the lock nut securely after adjustment is performed.

2. Do not operate with the cushion needle in a fully closed condition.

This will cause damage to the seals.

⚠ Warning

1. Use clean air.

Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

⚠ Caution

1. Install air filters.

Install air filters at the upstream side of valves. The filtration degree should be 5µm or finer.

2. Install an after cooler, air dryer or water separator, etc.

Air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an after cooler, air dryer or water separator, etc.

3. Use the product within the specified range of fluid and ambient temperature.

Take measures to prevent freezing, since moisture in circuits can be frozen under 5°C, and this may cause damage to seals and lead to malfunction.

Refer to SMC's "Air Cleaning Equipment" catalog for further details on compressed air quality.

Maintenance

⚠ Warning

1. Removal of equipment, and supply/exhaust of compressed air.

When equipment is removed, first check measures to prevent dropping of driven objects and run-away of equipment, etc. Then cut off the supply pressure and electric power, and exhaust all compressed air from the system.

When machinery is restarted, proceed with caution after confirming measures to prevent cylinder lurching.

⚠ Caution

1. Drain flushing

Remove drainage from air filters regularly. (Refer to specifications.)

Series NCA1 Auto Switch Precautions 1

Be sure to read before handling.

Design & Selection

⚠ Warning

1. Confirm the specifications.

Read the specifications carefully and use this product appropriately. The product may be damaged or malfunction if it is used outside the range of specifications for current load, voltage, temperature or impact.

2. Take precautions when multiple cylinders are used close together.

When multiple auto switch cylinders are used in close proximity, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40mm.

3. Pay attention to the length of time that a switch is ON at an intermediate stroke position.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate, but if the speed is too great the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is:

$$V \text{ (mm/s)} = \frac{\text{Auto switch operating range (mm)}}{\text{Time load applied (ms)}} \times 1000$$

4. Keep wiring as short as possible.

<Reed switches>

As the length of the wiring to a load gets longer, the rush current at switching ON becomes greater, and this may shorten the product's life. (The switch will stay ON all the time.)

Use a contact protection box when the wire length is 5m or longer.

<Solid state switches>

Although wire length should not affect switch function, use a wire 100m or shorter.

5. Pay attention to the internal voltage drop of the switch.

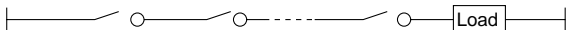
<Reed switches>

1) Switches with an indicator light (Except D-Z76)

- If auto switches are connected in series as shown below, take note that there will be a large voltage drop because of internal resistance in the light emitting diodes. (Refer to internal voltage drop in the auto switch specifications.)

[The voltage drop will be "n" times larger when "n" auto switches are connected.]

Even though an auto switch operates normally, the load may not operate.



⚠ Warning

- In the same way, when operating under a specified voltage, although an auto switch may operate normally, the load may not operate. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

$$\text{Supply voltage} - \text{Internal voltage drop of switch} > \text{Minimum operating voltage of load}$$

- 2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (Model D-Z80).

<Solid state switches>

- 3) Generally, the internal voltage drop will be greater with a 2 wire solid state auto switch than with a reed switch. Take the same precautions as in 1).

Also, note that a 12VDC relay is not applicable.

6. Pay attention to leakage current.

<Solid state switches>

With a 2 wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

$$\text{Operating current of load (OFF condition)} > \text{Leakage current}$$

If the criteria given in the above formula are not met, it will not reset correctly (stays ON). Use a 3 wire switch if this specification will not be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel.

7. Do not use a load that generates surge voltage.

<Reed switches>

If driving a load such as a relay that generates a surge voltage, use a contact protection box.

<Solid state switches>

Although a zener diode for surge protection is connected at the output side of a solid state auto switch, damage may still occur if the surge is applied repeatedly. When a load, such as a relay or solenoid which generates surge is directly driven, use a type of switch with a built-in surge absorbing element.

8. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch.

Also perform periodic maintenance and confirm proper operation.

9. Ensure sufficient clearance for maintenance activities.

When designing an application, be sure to allow sufficient clearance for maintenance and inspections.

Series NCA1

Auto Switch Precautions 2

Be sure to read before handling.

Mounting & Adjustment

Warning

1. Do not drop or bump.

Do not drop, bump or apply excessive impacts (300m/s² or more for reed switches and 1000m/s² or more for solid state switches) while handling. Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

2. Do not carry a cylinder by the auto switch lead wires.

Never carry a cylinder by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

3. Mount switches using the proper tightening torque.

If a switch is tightened beyond the range of tightening torque, the mounting screws or switch may be damaged.

On the other hand, tightening below the range of tightening torque may allow the switch to slip out of position. (Refer to switch mounting instructions for each series for switch mounting, moving, and tightening torque, etc.)

4. Mount a switch at the center of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the center of the operating range (the range in which a switch is ON). (The mounting position shown in the catalog indicates the optimum position at stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), operation will be unstable.

Wiring

Warning

1. Avoid repeatedly bending or stretching lead wires.

Broken lead wires will result from repeatedly applying bending stress or stretching force to the lead wires.

2. Be sure to connect the load before power is applied.

<2 wire type>

If the power is turned ON when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.

3. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.

4. Do not wire with power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits containing auto switches may malfunction due to noise from these other lines.

Wiring

Warning

5. Do not allow short circuit of loads.

<Reed switches>

If the power is turned ON with a load in a short circuited condition, the switch will be instantly damaged because of excess current flow into the switch.

<Solid state switches>

All models of PNP output type switches do not have built-in short circuit protection circuits.

Note that if a load is short circuited, the switch will be instantly damaged as in the case of reed switches.

*Take special care to avoid reverse wiring with the brown (red) power supply line and the black (white) output line on 3 wire type switches.

6. Avoid incorrect wiring.

<Reed switches>

A 24VDC switch with indicator light has polarity. The brown (red) lead wire is (+), and the blue (black) lead wire is (-).

1) If connections are reversed, a switch will operate, however, the light emitting diode will not light up.

Also note that a current greater than that specified will damage a light emitting diode and it will no longer operate.

Applicable models: D-Z73

<Solid state switches>

1) If connections are reversed on a 2 wire type switch, the switch will not be damaged if protected by a protection circuit, but the switch will always stay in an ON state. However, it is still necessary to avoid reversed connections, since the switch could be damaged by a load short circuit in this condition.

*2) If connections are reversed (power supply line + and power supply line -) on a 3 wire type switch, the switch will be protected by a protection circuit. However, if the power supply line (+) is connected to the blue (black) wire and the power supply line (-) is connected to the black (white) wire, the switch will be damaged.

* Lead wire color changes

Lead wire colors of SMC switches and related products have been changed in order to meet NECA (Nippon Electric Control Equipment Industries Association) Standard 0402 for production beginning September, 1996 and thereafter. Please refer to the tables provided.

Special care should be taken regarding wire polarity during the time that the old colors still coexist with the new colors.

2 wire

	Old	New
Output (+)	Red	Brown
Output (-)	Black	Blue

3 wire

	Old	New
Power supply	Red	Brown
GND	Black	Blue
Output	White	Black

Solid state with diagnostic output

	Old	New
Power supply	Red	Brown
GND	Black	Blue
Output	White	Black
Diagnostic output	Yellow	Orange

Solid state with latch type diagnostic output

	Old	New
Power supply	Red	Brown
GND	Black	Blue
Output	White	Black
Latch type diagnostic output	Yellow	Orange

Series NCA1

Auto Switch Precautions 3

Be sure to read before handling.

Operating Environment

Warning

1. Never use in an atmosphere of explosive gases.

The structure of auto switches is not intended to prevent explosion. Never use in an atmosphere with an explosive gas since this may cause a serious explosion.

2. Do not use in an area where a magnetic field is generated.

Auto switches will malfunction or magnets inside cylinders will become demagnetized. (Consult SMC regarding the availability of a magnetic field resistant auto switch.)

3. Do not use in an environment where the auto switch will be continually exposed to water.

Although switches satisfy IEC standard IP67 construction (JIS C 0920: watertight structure), do not use switches in applications where continually exposed to water splash or spray. Poor insulation or swelling of the potting resin inside switches may cause malfunction.

4. Do not use in an environment with oil or chemicals.

Consult SMC if auto switches will be used in an environment with coolant, cleaning solvent, various oils or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by improper insulation, malfunction due to swelling of the potting resin, or hardening of the lead wires.

5. Do not use in an environment with temperature cycles.

Consult SMC if switches are used where there are temperature cycles other than normal temperature changes, as there may be adverse effects inside the switches.

6. Do not use in an environment where there is excessive impact shock.

<Reed switches>

When excessive impact (300m/s² or more) is applied to a reed switch during operation, the contact point will malfunction and generate or cut off a signal momentarily (1ms or less). Consult SMC regarding the need to use a solid state switch depending upon the environment.

7. Do not use in an area where surges are generated.

<Solid state switches>

When there are units (solenoid type lifter, high frequency induction furnace, motor, etc.) which generate a large amount of surge in the area around cylinders with solid state auto switches, this may cause deterioration or damage to the switch. Avoid sources of surge generation and disorganized lines.

8. Avoid accumulation of iron waste or close contact with magnetic substances.

When a large amount of iron waste such as machining chips or spatter is accumulated, or a magnetic substance (something attracted by a magnet) is brought into close proximity with an auto switch cylinder, it may cause the auto switch to malfunction due to a loss of the magnetic force inside the cylinder.

Maintenance

Warning

1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.

1) Secure and tighten switch mounting screws.

If screws become loose or the mounting position is dislocated, retighten them after readjusting the mounting position.

2) Confirm that there is no damage to lead wires.

To prevent faulty insulation, replace switches or repair lead wires, etc., if damage is discovered.

3) Confirm the lighting of the green light on the 2 color indicator type switch.

Confirm that the green LED is on when stopped at the established position. If the red LED is on, the mounting position is not appropriate. Readjust the mounting position until the green LED lights up.

Other

Warning

1. Consult SMC concerning water resistance, elasticity of lead wires, and usage at welding sites, etc.

Limited Cylinder Warranty - Terms and Conditions of Sale....

SMC warrants that for **18 months or 1800 service miles***, whichever occurs first from date of purchase, it will replace or make adjustment at SMC's option, of any defective cylinder sold if the cylinder product is returned with SMC's prior written consent, transportation prepaid by the original buyer, and received by SMC at its place of business within the warranty period.

SMC shall have the right to inspect, prior to return, at the buyer's facility, any products claimed to be defective.

This warranty is limited exclusively to cylinder products which, in the opinion of SMC, have not been subjected to modification, misuse, negligence, misapplication, repairs or alterations. Damage caused by fire, theft, riot, explosion or acts of Gods are excluded

from this warranty. The foregoing constitutes the sole exclusive remedy of the buyer and the only liability of SMC and is in lieu of any and all other warranties, expressed or implied, or statutory as to merchantability, fitness for purpose sold, description, quality, productiveness or any other matter. SMC shall not be liable for loss of use, or profit, or special or consequential damages.

SMC assumes no responsibility for engineering technical advice pertaining to any manufactured item to which SMC's products or goods have been attached. No agent, employee, distributor, or representative of SMC has the authority to extend the scope of this warranty or to make any other promises, warranties or guarantees concerning the manufacture, sale or application of SMC's products.

**Service Miles = (inches/stroke) x (2 strokes/cycle) x (no of cycles) x [1 mile / 63,360 inches]*

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