

NFPA Interchangeable Cylinder: Standard Type Double Acting, Single Rod (Medium Duty) Series **NCA1**

Inch size: $\varnothing 1.5''$, $\varnothing 2''$, $\varnothing 2.5''$, $\varnothing 3.25''$, $\varnothing 4''$

How to Order

NC D A1 [] B 150-04 00 [] [] -A54 [] -XB5

Built-in magnet

Nil	None
D	W/ auto switch (Magnetic piston)

Style

Nil	Standard cylinder
K	Non-rotating cylinder
W	Double rod
M	Male rod stud

Mounting style

B	MX0	Basic style
L	MS1	Foot style
F	MF1	Rod side flange style
G	MF2	Head side flange style
R	MS4	Side tapped style
D	MP2	Double detachable head side clevis style
T	MT4	Center trunnion style
C	MP4	Single detachable head side clevis style
X	MP1	Double head side clevis style
S	MS2	Side lug style
U	MT1	Rod side trunnion style
J	MT2	Head side trunnion style

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

Option

-XB5	Oversized rod
-XB6	High temperature
-XB7	Low temperature
-XB9	Low speed
-XC6	Stainless steel piston rod
-XC8	Adjustable stroke/Extend
-XC9	Adjustable stroke/Return
-XC10	Dual operation/Double rod
-XC11	Dual operation/Single rod
-XC22	Fluoro rubber seals
-XC35	With coil scraper

For special rod end modifications, please see page 6-15-33.

Number of auto switches

Nil	2 pcs.
S	1 pcs.
3	3 pcs.
n	"n" pcs.

Rod boot

Nil	None
J	Nylon
K	Neoprene

Air cushion

Nil	Both ends
N	None
H	Head end
R	Rod end

Auto switch

Nil	Without auto switch
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* For the applicable auto switch model, refer to the table on page 6-15-7.
* Auto switches are shipped together, (but not assembled.)

Mounting Bracket Part No.

Mounting bracket / Bore size	Part no.				
	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 tube 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 (1.75 MPa)	250 psi (1.75 MPa)	250 psi (1.75 MPa) *
Min. operating pressure	8 psi (0.06 MPa)	8 psi (0.06 MPa)	15 psi (0.1 MPa)
Ambient & fluid temperature	40 to 140°F (5 to 60°C)	40 to 140°F (5 to 60°C)	0 to 140°F (5 to 60°C)
Piston speed	2 to 20 in/s (50 to 500 mm/s)	2 to 20 in/s (50 to 500 mm/s)	2 to 20 in/s (50 to 500 mm/s)
Cushion	Air cushion standard		
Mounting	Basic style, Foot style, Rod side flange style, Head side flange style, Clevis style, Side tapped style, Center trunnion style, Head side trunnion style, Side lug style, Rod side trunnion style	Basic style, Foot style, Flange style, Center trunnion style, Side tapped style, Rod side trunnion style	Basic style, Foot style, Clevis style, Rod side flange style, Head side flange style, Center trunnion style, Side tapped style, Side lug style
Non-rotating accuracy	N/A	N/A	N/A

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

Base Material/Surface Treatment

Description	Material	Note
Cover	Aluminum alloy	Silver paint
Tube	Aluminum alloy	Hard alumite
Seal	Nitrile rubber	PLD, PLP
Piston rod	Carbon steel	Hard chrom plating
Piston	Aluminum alloy	Chromate

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.

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 read 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.

Standard Stroke

Bore size (in)	Standard stroke	Maximum stroke
1.5"	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20,	
2", 2.5"	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24	Please consult with SMC.
3.25", 4"	1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28,	

Weight/Aluminum Tube

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

Cylinder Bore and Force: Push Stroke

Bore size (in)	Piston area (in)	Force (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

Cylinder Bore and Force: Pull Stroke

Piston rod diameter (in)	Piston rod area (in)	Force (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

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

C76

C85

C95

CP95

NCM

NCA

D-

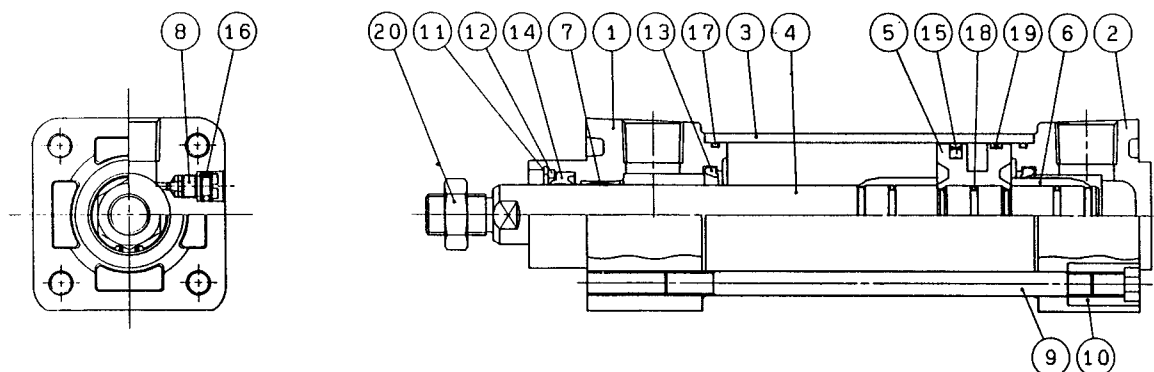
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Data

Series NCA1

Construction



Replacement Parts

No.	Description	Material
①	Rod cover	Aluminum alloy
②	Head cover	Aluminum alloy
③	Cylinder tube	Aluminum alloy
④	Piston rod	Carbon steel
⑤	Piston	Aluminum alloy
⑥	Cushion ring	Brass
⑦	Rod bushing	Bronze casted
⑧	Cushion valve	Carbon steel
⑨	Tie-rod	Carbon steel
⑩	Tie-rod nut	Carbon steel
⑪	Retaining ring	Carbon steel
⑫	Rod seal retainer	Carbon steel
⑬*	Cushion seal	Urethan rubber
⑭*	Rod seal	NBR
⑮*	Piston seal	NBR
⑯*	Cushion valve seal	NBR
⑰*	Cylinder tube gasket	NBR
⑱	Piston gasket	NBR
⑲	Wear ring	Resin
⑳	Rod jam nut	Carbon steel

* Components included in a seal kit.

How to Order Seal Kit

NCA1 **W** **150** — **PS**

Option

—	Single rod
W	Double rod
K*	Non-rotating

Bore

150
200
250
325
400

Option

-XB5***	Oversized rod
-XB6***	High temperature
-XB7***	Low temperature
-XC11	Dual operation/Single rod**

* Available for 150, 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 W and K option

Series NCA1

Auto Switch Specifications

Applicable Auto Switch/Refer to page 6-16-1 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model	Lead wire length (m) ^(Note)			Connector	Applicable load					
					DC	AC		0.5 (Nil)	3 (L)	5 (Z)							
Reed switch	—	Grommet	Yes	2-wire	24 V	12 V	—	A53	●	●	●	—	—	PLC			
				3-wire (Equiv. NPN)	—	5 V	—	A56	●	●	—	—	IC circuit	—			
	Diagnosis indication (2-color)		—	—	24 V	—	—	100 V, 200 V	A54	●	●	●	—	—	Relay, PLC		
	—					12 V	200 V or less	A59W	●	●	—	—	—	—	Relay, PLC		
Solid state switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	A67	●	●	—	—	—	PLC			
				3-wire (PNP)		5 V, 12 V	—	F59	●	●	○	○	○	IC circuit	—		
	2-wire			—	—	100 V, 200 V	—	—	J51	●	●	○	—	—	—		
	3-wire (NPN)						12 V	—	J59	●	●	○	○	○	—	—	
	Diagnosis indication (2-color)			—	—	24 V	5 V, 12 V	—	—	F59W	●	●	○	○	○	IC circuit	Relay, PLC
	3-wire (PNP)						5 V, 12 V	—	F5PW	●	●	○	○	○	—	—	
	Water resistant (2-color)			—	—	24 V	12 V	—	—	J59W	●	●	○	○	○	—	—
	Diagnosis output (2-color)						12 V	—	F5BAL	—	●	○	○	○	—	—	
	With timer			—	—	24 V	5 V, 12 V	—	—	F59F	●	●	○	○	○	IC circuit	—
	—						5 V, 12 V	—	F5NTL	—	●	○	○	○	—	—	

Note) Lead wire length symbols: 0.5 m Nil (Example) A53
 3 m L (Example) A53L
 5 m Z (Example) A53Z

* Solid state auto switches marked with "○" are produced upon receipt of order.

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

C76

C85

C95

CP95

NCM

NCA

D-

-X

20-

Data

NFPA Interchangeable Cylinder: Standard Type Double Acting, Double Rod (Medium Duty)

Series *NCA1W*

Inch size: $\varnothing 1.5''$, $\varnothing 2''$, $\varnothing 2.5''$, $\varnothing 3.25''$, $\varnothing 4''$

How to Order

NCDA1W **Mounting** **Bore** — **Stroke** **Suffix**

Ex: NCDA1WB 150-400

Auto switch capable — Double rod



- Standard with air cushion
- Auto switch mounting available

Specifications

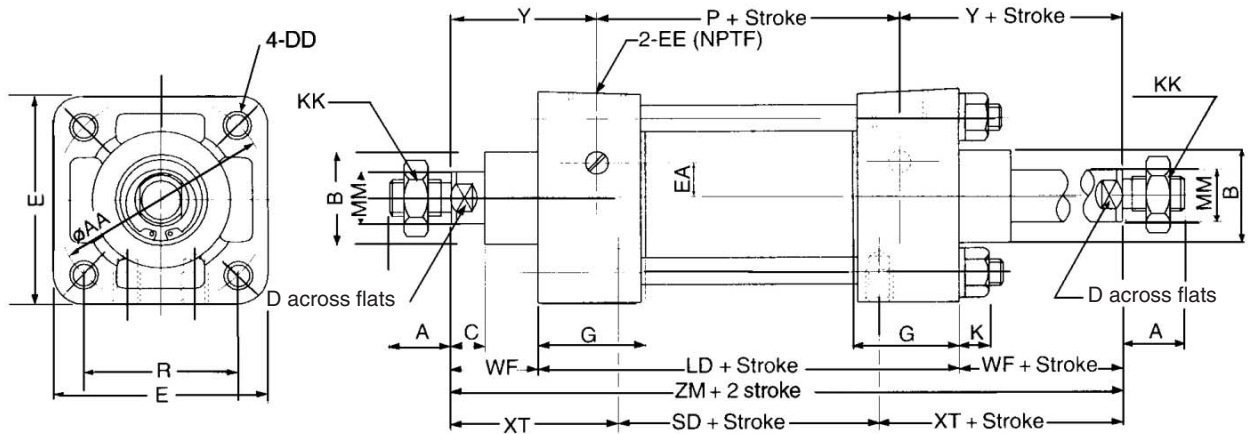
Bore size (inch)	1.5	2	2.5	3.25	4
Fluid	Air				
Max. operating pressure	250 psi (1.75 MPa)				
Min. operating pressure	8 psi (0.06 MPa)				
Ambient & fluid temperature	40 to 140°F (5 to 60°C)				
Piston speed	2 to 20 inch/sec (50 to 500 mm/sec)				
Cushion	Air cushion standard				
Mounting	Basic style, Foot style, Flange style Center trunnion style, Rod side trunnion style, Side tapped style				

Standard Stroke

Bore size (in)	Standard stroke
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

NFPA Interchangeable Air Cylinder Medium Duty Series **Series NCA1W**

**Double Rod-Basic Style/Side Tapped Style:
NC□A1WB (MX0 mounting style)/NC□A1WR (MX4 mounting style)**



Bore size (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 15/16	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 15/16	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 15/16	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

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

C76

C85

C95

CP95

NCM

NCA

D-

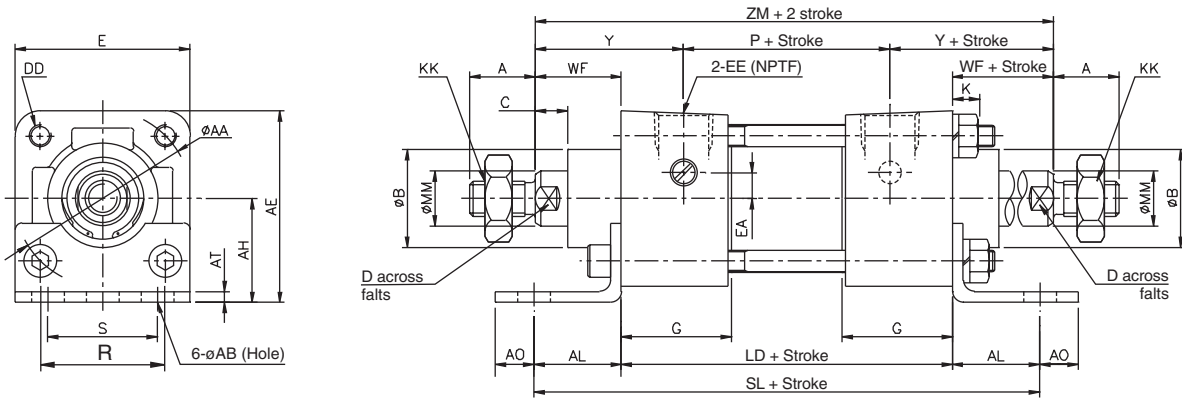
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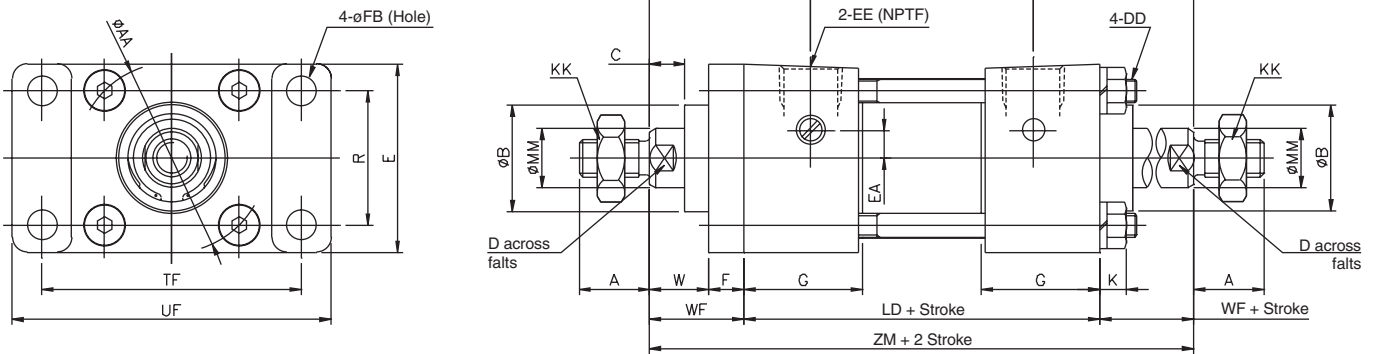
Series NCA1W

Double Rod-Foot Style: NC□A1WL (MS1 mounting style)



Bore size (in)	MM	KK	A	AA	AB	AE	AH	AL	AO	TA	B	C	D	DD	E	EA	EE	G	R	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	1.43	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	1.84	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	2.19	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 1/4	3/4	11/64	1 1/2	1/2	7/8	3/8-24	3.75	0	1/2	1.57	2.76	0.42	2 3/4	13/8	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 1/2	1/2	7/8	3/8-24	4.5	0	1/2	1.57	3.32	0.42	3 1/2	13/8	2.34	2.72	4.64	7.14	7.40

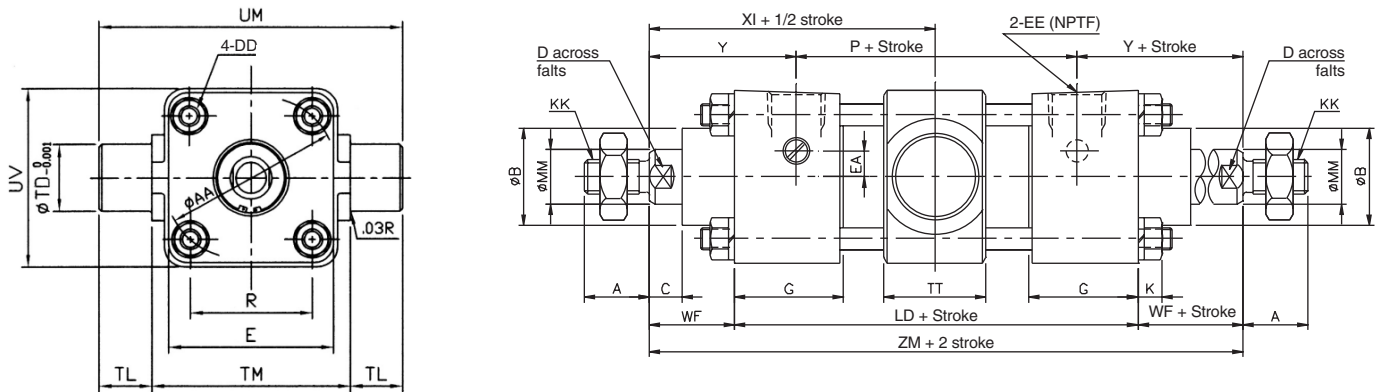
Double Rod-Rod Side Flange Style: NC□A1WF (MF1 mounting style)



Bore size (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	5/8	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	5/8	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

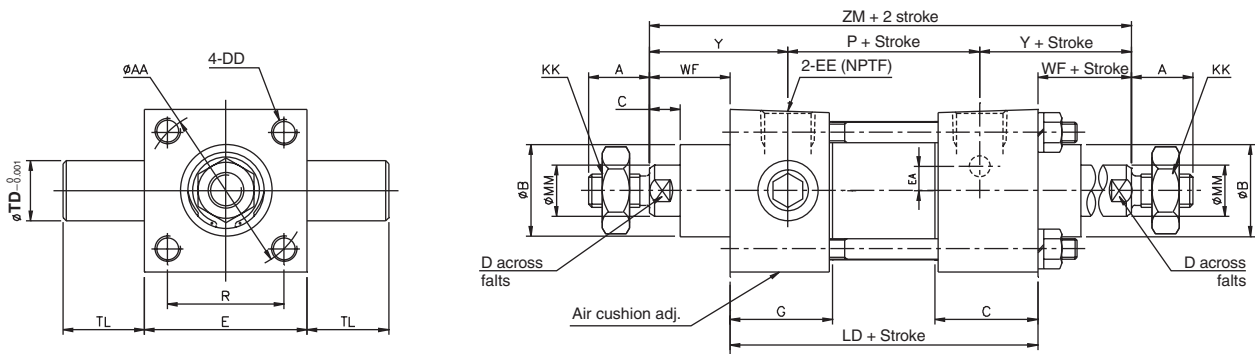
NFPA Interchangeable Air Cylinder Medium Duty Series **Series NCA1W**

Double Rod-Center Trunnion Style: NC□A1WT (MT4 mounting style)



Bore size (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 1/2	1/2	7/8	3/8-24	3.75	0	1/2	1.57	0.42	2.76	1	1	4.5	1.34	6.5	4.33	13/8	2.34	2.72	4.64	3.70	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	1.57	0.42	3.32	1	1	5.25	1.57	7.25	5.12	13/8	2.34	2.72	4.64	3.74	7.40

Double Rod - Rod Side Trunnion Style: NC□A1WU (MT1 mounting style)



Bore size (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	2.5	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	3.75	0	1/2	1.57	0.42	2.76	1	1	13/8	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	1.57	0.42	3.32	1	1	13/8	2.34	4.64	2.72	7.40

CJ1

CJP

CJ2

CM2

CG1

MB

MB1

CA2

CS1

C76

C85

C95

CP95

NCM

NCA

D-

-X

20-

Data

Auto Switch Specifications

How to Order Auto Switches

Grommet type



For standard part number please refer to applicable auto switches on page 6-15-7.

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 refer to applicable auto switches on page 6-15-7.

Lead wire length	
S	0.5 (m) (1.64 ft)
M	1.0 (m) (3.28 ft)

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

Auto Switch Mounting Bracket Part No.

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

Unit : mm
() : ft

