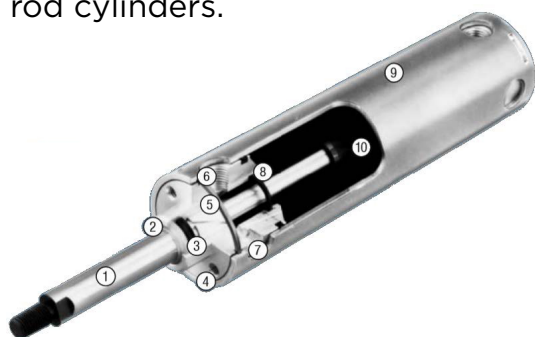


# NFPA INTERCHANGEABLE CYLINDER



## Only the Tie Rods are missing

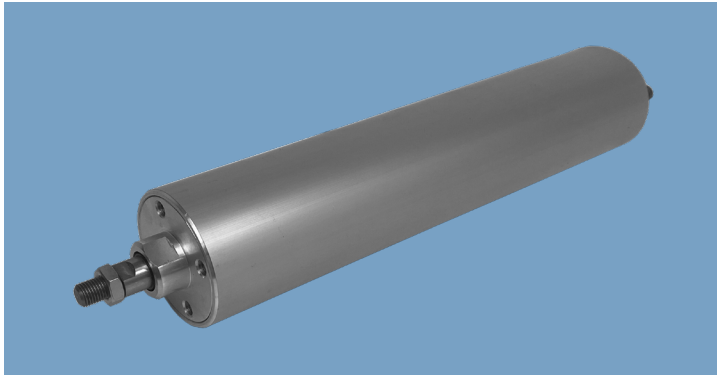
NFPA Interchangeable Cylinders are round body cylinders compatible with NFPA mounts. These cylinders offer a lightweight, low maintenance alternative to standard NFPA cylinders with tie rods. Heavy-duty features provide millions of cycles trouble-free with a reduced cost compared to standard NFPA tie rod cylinders.



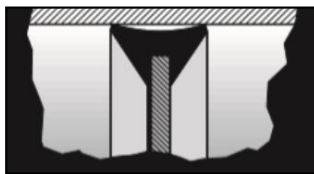
- 1 Chrome-plated, high-strength, steel **Piston Rods** are corrosion resistant, rugged and durable. Three NFPA rod end options are offered. Optional stainless steel is available upon request.
- 2 High-quality elastomer **Rod Wiper** protects **Rod Seal** by preventing contaminants from entering cylinder during retract stroke. Resilient synthetic rubber will not scratch rod.
- 3 Pressure-energized, U-cup type **Rod Seal** is wear compensating, low friction provides positive sealing.

- 4 Lightweight aluminum **Head** and **Caps** for long corrosion-resistant life.
- 5 Extra-long, low-friction nylon **Rod Bearing** 'gives' rather than wears under normal side loading. When necessary, service is easy; only the bearing is replaced, not the head.
- 6 **Heads** and **Caps** are held to tube by means of a **Circumflex Key**. The larger square steel locking device requires no special installation tools. Services to **Head** or **Cap** can be one without disassembling the entire cylinder.
- 7 **Adjustable Cushions** available on 2" bore and larger. Under 2" bore cylinders have fixed cushions.
- 8 **Cushion Seal** "check valve" offers fast break-away, self-aligning, positive cushioning for faster stroking and reduced cylinder wear.
- 9 Precision-drawn, lightweight aluminum **Barrels** are hard-anodized inside and out for corrosion and abrasion resistance. Fine I.D. micro-finish provides long life and positive sealing.
- 10 Several **Piston** styles are offered for various application requirements.

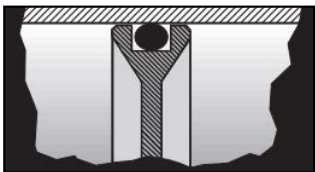
# NFPA INTERCHANGEABLE DOUBLE-ACTING CYLINDERS



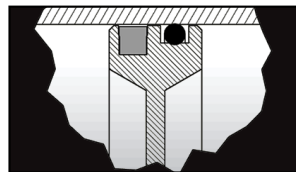
## AVAILABLE IN THREE PISTON TYPES



**F TYPE**



**O TYPE**



**OIM TYPE**

## Features

- Standard Bore Sizes: 1 1/2, 2, 2 1/2, 3 1/4, 4
- Stroke Sizes: Any stroke up to 130"
- Cushions available
- OIM available with magnetic switches

## Information

Flairline NFPA interchangeable double-acting cylinders can be used as drop-in replacements for NFPA tie-rod cylinders. Dimensions, mounting options, and performance are identical to NFPA products.

- Operating systems can be pneumatic or low pressure hydraulic
- OILF cylinders provide low friction pneumatic service for use in low-pressure applications where a low minimum breakaway is required
- OIM model feature magnetic piston cylinders with hall/reed effect switches

## Specifications

- Maximum Pressure:  
Pneumatic: 150 psi  
Hydraulic: 200 psi
- Operating Temperature:  
0-200°F (Buna Seals)  
-18-93°C (Buna Seals)  
0-275°F (Viton Seals)  
-18-135°C (Viton Seals)

**\*Note:** Viton seals are for OI series only

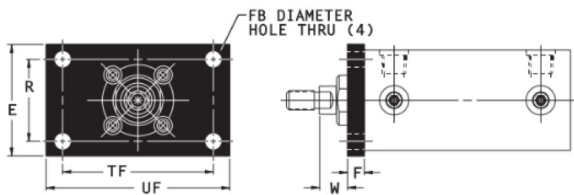
## FLAIRLINE WARRANTY

Flairline warrants each product against defects in material and workmanship for a period of one year from the date of manufacturing providing its use was in accordance with Flairline recommendations. If the product fails to perform as warranted, Flairline will, at its option, repair or replace the product free of charge. The company will not be liable for incidental or consequential damages. We make no other warranty, expressed or implied, including warranties of merchantability or fitness for a particular purpose.

# NFPA INTERCHANGEABLE DOUBLE-ACTING CYLINDERS

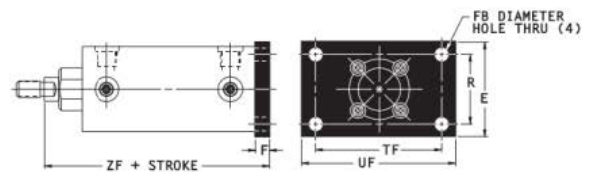
**FLAIRLINE**

## MOUNTING STYLES FOR NFPA INTERCHANGE CYLINDERS



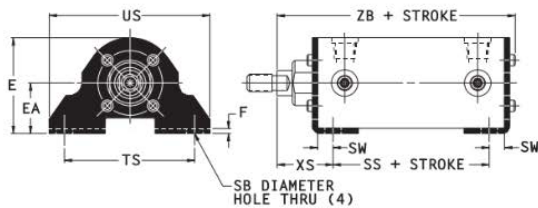
Front Flange Mount (NFPA MF1)

BORE SIZE	DIMENSIONS						
	E	F	FB	R	TF	UF	W
1½	2	3/8	9/32	1.43	2.75	3 3/8	5/8
2	2½	3/8	11/32	1.84	3.38	4 1/8	5/8
2½	3	3/8	11/32	2.19	3.88	4 5/8	5/8
3¼	3 3/4	5/8	13/32	2.76	4.69	5 1/2	3/4
4	4½	5/8	13/32	3.32	5.44	6 1/4	3/4



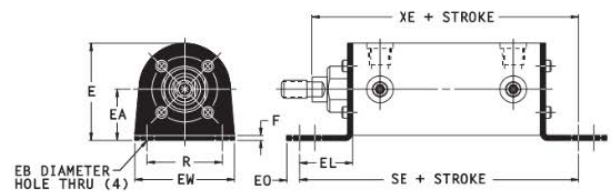
Rear Flange Mount (NFPA MF2)

BORE SIZE	DIMENSIONS						
	E	F	FB	R	TF	UF	ZF
1½	2	3/8	9/32	1.43	2.75	3 3/8	5
2	2½	3/8	11/32	1.84	3.38	4 1/8	5
2½	3	3/8	11/32	2.19	3.88	4 5/8	5 1/8
3¼	3 3/4	5/8	13/32	2.76	4.69	5 1/2	3 1/2
4	4½	5/8	13/32	3.32	5.44	6 1/4	4 1/4



Side Lug Mounts (NFPA MS2)

BORE SIZE	DIMENSIONS									
	E	EA	F	SB	SS	SW	TS	US	XS	ZB
1½	1 7/8	1	1/8	13/32	2 7/8	3/8	2 3/4	3 1/2	1 3/8	4.92
2	2 3/8	1 1/4	1/8	13/32	2 7/8	3/8	3 1/4	4	1 3/8	4.95
2½	2 7/8	1 1/2	3/16	13/32	3	3/8	3 3/4	4 1/2	1 3/8	5.19
3¼	3 5/8	1 7/8	1/4	17/32	3 1/4	1/2	4 3/4	5 3/4	1 7/8	6.19
4	4 3/8	2 1/4	5/16	17/32	3 1/4	1/2	5 1/2	6 1/2	1 7/8	6.25



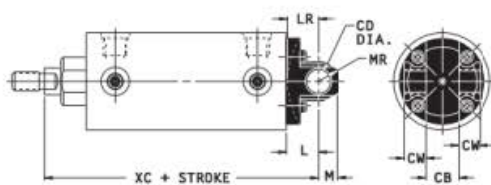
End Lug Mounts (NFPA MS7)

BORE SIZE	DIMENSIONS									
	E	EA	EB	EL	EO	EW	F	R	SE	XE
1½	1 7/8	1	9/32	1 1/8	1/4	2	1/8	1.43	5 1/2	5 3/8
2	2 3/8	1 1/4	11/32	1 5/16	5/16	2 7/16	1/8	1.84	5 7/8	5 9/16
2½	2 7/8	1 1/2	11/32	1 7/16	7/16	3	3/16	2.19	6 1/4	6 13/16
3¼	3 5/8	1 7/8	13/32	1 1/2	3/8	3 1/2	1/4	2.76	6 5/8	6 1/2
4	4 3/8	2 1/4	13/32	1 5/8	3/8	4 1/4	5/16	3.32	6 7/8	6 5/8

# NFPA INTERCHANGEABLE DOUBLE-ACTING CYLINDERS

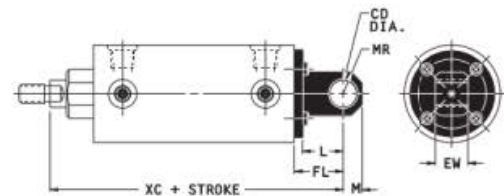


## MOUNTING STYLES FOR NFPA INTERCHANGE CYLINDERS



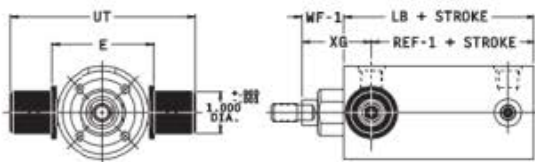
Clevis Mount (NFPA MP1)

BORE SIZE	DIMENSIONS							
	CB	CD	CW	L	LR	M	MR	XC
1½	¾	½	½	¾	9/16	7/16	½	5¾
2	¾	½	½	¾	¾	7/16	½	5¾
2½	¾	½	½	¾	¾	7/16	½	5½
3¼	1¼	¾	5/8	1¼	1⅛	5/8	¾	6⅞
4	1¼	¾	5/8	1¼	1⅛	5/8	¾	6⅞



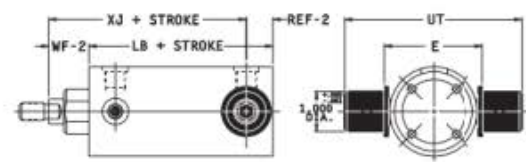
Pivot Mount (NFPA MP4)

BORE SIZE	DIMENSIONS						
	CD	EW	FL	L	M	MR	XC
1½	½	¾	1⅛	15/16	7/16	½	5¾
2	½	¾	1⅛	15/16	7/16	½	5¾
2½	½	¾	1⅛	15/16	7/16	½	5¾
3¼	¾	1¼	1⅞	1⅜	5/8	¾	5⅞
4	¾	1¼	1⅞	1⅜	5/8	¾	7½



Head Trunnion Mount (NFPA MT1)

BORE SIZE	DIMENSIONS					
	E	LB	REF-1	UT	WF-1	XG
2	2½	3⅝	2.96	4½	1.08	1¾
2½	3	3¾	3.08	5	1.08	1¾
3¼	3¾	4¼	3.41	5¾	1.41	2¼
4	4½	4¼	3.41	6½	1.41	2¼



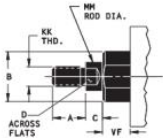
Head Trunnion Mount (NFPA MT2)

BORE SIZE	DIMENSIONS					
	E	LB	REF-2	UT	WF-2	XJ
2	2½	3⅝	.66	4½	1.16	4¼
2½	3	3¾	.66	5	1.16	4¼
3¼	3¾	4¼	.91	5¾	1.66	5
4	4½	4¼	.91	6½	1.66	5

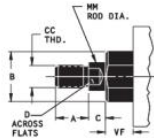
# NFPA INTERCHANGEABLE DOUBLE-ACTING CYLINDERS



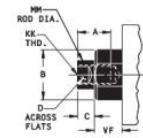
## ROD END STYLES FOR NFPA INTERCHANGE CYLINDERS



**SMALL MALE (NFPA SM)\***



**INTERMEDIATE MALE (NFPA IM)\***



**SHORT FEMALE (NFPA SF)\***

BORE SIZE	DIMENSIONS						
	A	B	C	D	KK	MM	VF
1 1/2, 2, 2 1/2	3/4	1 1/8	3/8	1/2	7/16-20	5/8	5/8
3 1/4, 4	1 1/8	1 1/2	1/2	7/8	3/4-16	1	7/8

\*Standard on all Flairline NFPA interchangeable cylinders. When ordering, if no rod end style is specified, style SM will be supplied. Rod eye and rod clevis for style SM. Rod nut included.

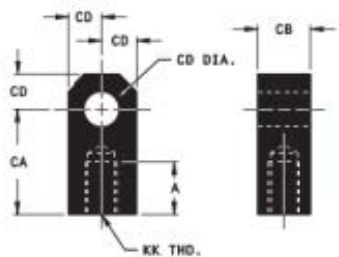
BORE SIZE	DIMENSIONS						
	A	B	C	CC	D	MM	VF
1 1/2, 2, 2 1/2	3/4	1 1/8	3/8	1/2-20	1/2	5/8	5/8
3 1/4, 4	1 1/8	1 1/2	1/2	7/8-14	7/8	1	7/8

\*Optional. Rod Nut Included.

BORE SIZE	DIMENSIONS						
	A	B	C	D	KK	MM	VF
1 1/2, 2, 2 1/2	3/4	1 1/8	3/8	1/2	7/16-20	5/8	5/8
3 1/4, 4	1 1/8	1 1/2	1/2	7/8	3/4-16	1	7/8

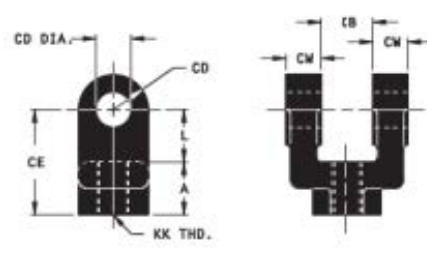
\*Optional.

## ACCESSORIES FOR NFPA INTERCHANGEABLE CYLINDERS



**ROD EYE**

BORE SIZE	DIMENSIONS					
	NO.	A	CA	CB	CD	KK
1 1/2, 2, 2 1/2	4-36-3	3/4	1 1/2	3/4	1/2	7/16-20
3 1/4, 4	4-36-65	1 1/8	2 1/16	1 1/4	3/4	3/4-16



**ROD CLEVIS\***

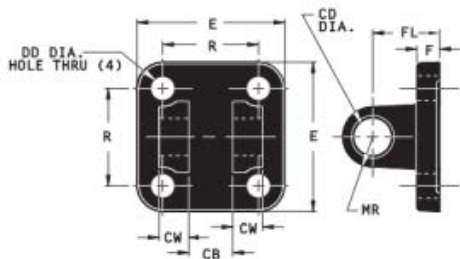
BORE SIZE	DIMENSIONS							
	NO.	A	CB	CD	CE	CW	L	KK
1 1/2, 2, 2 1/2	4-35-3	3/4	3/4	1/2	1 1/2	1/2	3/4	7/16-20
3 1/4, 4	4-35-65	1 1/8	1 1/4	3/4	2 3/8	5/8	1 3/4	3/4-16

\*Pivot Pin Included.

# NFPA INTERCHANGEABLE DOUBLE-ACTING CYLINDERS



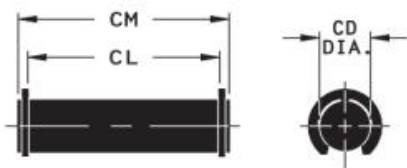
## ACCESSORIES FOR NFPA INTERCHANGEABLE CYLINDERS



CLEVIS BRACKET

BORE SIZE	DIMENSIONS									
	NO.	CB	CD	CW	DD	E	F	FL	MR	R
1 1/2, 2, 2 1/2	4-34-3	3/4	1/2	1/2	13/32	2 1/2	3/8	1 1/8	1/2	1 5/8
3 1/4, 4	4-34-65	1 1/8	3/4	5/8	17/32	3 1/2	5/8	1 7/8	3/4	2 9/16

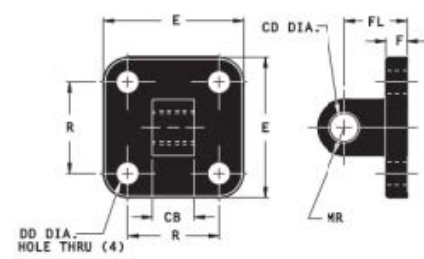
Pivot Pin included.



PIVOT PIN

BORE SIZE	DIMENSIONS			
	NO.	CD	CL	CM
1 1/2, 2, 2 1/2	BKT. PIN F 3 1/4, 4	1/2	1 7/8	2 1/16
3 1/4, 4	PIVOT PIN FI 3 1/4, 4	3/4	2 9/16	2 7/8

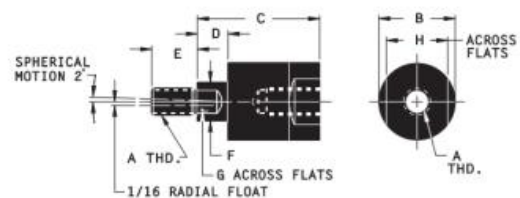
Snap Rings included.



PIVOT BRACKET

BORE SIZE	DIMENSIONS								
	NO.	CB	CD	DD	E	F	FL	MR	R
1½, 2 2½	4-37 -3	¾	½	13/32	2½	¾	1⅛	½	1⅝
3¼, 4	4-37 -65	1⅛	¾	17/32	3½	⅝	1⅞	¾	2⅞

See Optional Pivot Pin below



ALIGNMENT COUPLER\*

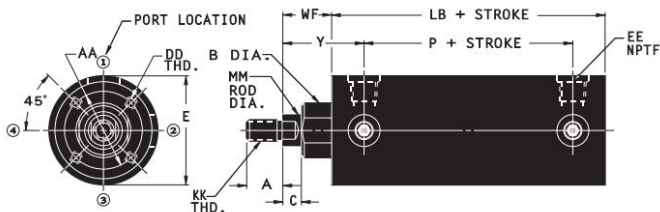
PART NO.	DIMENSIONS								Max. Pull at Yield
	A	B	C	D	E	F	G	H	
4-39-3	7/16 -20	1 1/4	2	1/2	3/4	5/8	1/2	1	10,000
4-39-3A	1/2 -20	1 1/4	2	1/2	3/4	5/8	1/2	1	14,000
4-39-65	3/4 -16	1 3/4	2 5/16	1/2	1 1/8	31/32	3/16	1 1/2	34,000
4-39-65A	7/8 -14	1 3/4	2 5/16	1/2	1 1/8	31/32	3/16	1 1/2	39,000

\*Alignment couplers improve bearing and seal life by preventing excessive binding and friction caused by misalignment. Flairline alignment couplers also allow a greater assembly tolerances then would typically be required which help simplify cylinder installation. Alignment couplers work equally well in "push or "pull" applications and are available for all Flairline cylinders.

# NFPA INTERCHANGEABLE DOUBLE-ACTING CYLINDERS



## Dimensions



DIMENSION REFERENCE	CYLINDER BORE				
	1 1/2	2	2 1/2	3 1/4*	4*
A	3/4	3/4	3/4	1 1/8	1 1/8
AA	1.21	1.60	2.00	2.62	2.62
B	1 1/8	1 1/8	1 1/8	1 1/2	1 1/2
C	3/8	3/8	3/8	1/2	1/2
DD	6-32	1/4-20	5/16-18	3/8-16	3/8-16
E	1 3/4	2 1/4	2 3/4	3 1/2	4 1/4
EE-NPTF	1/4-18	1/4-18	1/4-18	1/2-14	1/2-14
KK	7/16-20	7/16-20	7/16-20	3/4-16	3/4-16
LB	3 1/2	3 5/8	3 3/4	4 1/4	4 1/4
LD	4 1/8	4 1/8	4 1/4	4 3/4	4 3/4
MM	5/8	5/8	5/8	1	1
P	2.29	2.29	2.42	2.44	2.44
PI	2.79	2.79	2.92	2.94	2.94
WF	1	1	1	1 3/8	1 3/8
Y	1.67	1.67	1.67	2.28	2.28
ZM	6 1/8	6 1/8	6 1/4	7 1/2	7 1/2

## Ordering Information

**FI 2 x 6 MF1 T = 5 1/2 H NT**

### PISTON

FI  
OI  
OILF  
FIDE  
OIDE

### BORE SIZE

1 1/2  
2  
2 1/2  
3 1/4  
4

### STROKE LENGTH

Any length in inch  
increments or fraction  
thereof up to and  
including 130"

### MOUNTING STYLES

Front Flange Mount **MF1**  
Rear Flange Mount **MF2**  
Side Lug Mount **MS2**  
End lug Mount **MS7**  
Clevis Mount **MP1**  
Pivot Mount **MP4**  
Head Trunnion Mount **MT1**  
Head Trunnion Mount **MT2**

### SPECIAL OPTIONS

Cushions  
Head Only **H**  
Cap Only **C**  
Both **HC**  
Metal Rod Scraper (respectively) **MRS**  
(not available on 3 1/4 or 4" bore)  
Extra Inlet Port(s) **Indicate location(s) (PP2, PP3, PP4) in cap or head end**  
Inlet ports **Indicate location(s) (PP2, PP3, PP4) in cap or head end**  
Stainless Steel **SS Keys**  
Circumflex Keys  
Viton Packing (OI and OIDE only) **Viton**  
Stop Tubes **Consult Factory**  
Rod End Styles **IM or SF**  
Intermediate Male or Short Female  
Rod Extension "C" **C = Dimension**  
Thread Length "A" **A = Dimension**  
Male Thread Size **XX = (size or plain rod end)**  
Female Thread Size **XX = (size and depth - unless otherwise specified, all other dimensions will be Short Female)**  
Stainless Steel Rods **SS Rod**

\*MT1 and MT2 not available on 1 1/2 bore cylinders.

**Note:** See next page for OIM cylinder.

## Replacement Parts

**PK KIT FI 2**

### PISTON

FI  
OI  
OILF  
FIDE  
OIDE

### BORE SIZE

1 1/2  
2  
2 1/2  
3 1/4  
4

# NFPA INTERCHANGEABLE DOUBLE-ACTING CYLINDERS



## Ordering Information

OIM 2-CR 2 x 6 MF1 T = 5 1/2 H NT

PISTON		BORE SIZE		MOUNTING STYLES		SPECIAL OPTIONS	
OIM		1 1/2 2 2 1/2 3 1/4 4		FRONT FLANGE MOUNT MF1 REAR FLANGE MOUNT MF2 SIDE LUG MOUNT MS2 END LUG MOUNT MS7 CLEVIS MOUNT MP1 PIVOT MOUNT MP4 HEAD TRUNNION MOUNT MT1 HEAD TRUNNION MOUNT MT2		CUSHIONS HEAD ONLY H CAP ONLY C BOTH HC METAL ROD SCRAPER (respectively) (NOT AVAILABLE ON MRS 3 1/4 OR 4" BORE) EXTRA INLET PORT(S)  INLET PORTS  STAINLESS STEEL CIRCUMFLEX KEYS VITON PACKING (OI ONLY) STOP TUBES ROD END STYLES INTERMEDIATE MALE OR SHORT FEMALE ROD EXTENSION "C" THREAD LENGTH "A" MALE THREAD SIZE  FEMALE THREAD SIZE  STAINLESS STEEL RODS	
SWITCHES				STROKE LENGTH		Indicate location(s) (PP2, PP3, PP4) in cap or head end Indicate location(s) (PP2, PP3, PP4) in cap or head end SS Keys  Viton Consult Factory IM or SF  C = Dimension A = Dimension XX = (size or plain rod end) XX = (size and depth - unless otherwise specified, all other dimensions will be Short Female SS Rod	
REED SWITCH Indicate Quantity HALL EFFECT - CR SWITCH Indicate Quantity (SOURCING) - HP HALL EFFECT Indicate Quantity SWITCH (SINKING) - HN				Any length in inch increments or fraction thereof up to and including 130"			

\*MT1 and MT2 not available on 1 1/2 bore cylinders.

## Replacement Parts

PK KIT OIM 2

PISTON	BORE SIZE
OIM	1 1/2 2 2 1/2 3 1/4 4

PROUD TO BE  
**MADE IN AMERICA**

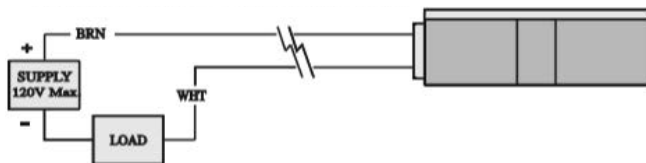


# NFPA INTERCHANGEABLE DOUBLE-ACTING CYLINDERS



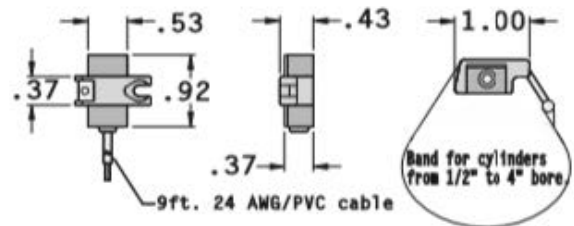
## Series **FI**, **OI** & **OLF** Magnetic Switch Options:

### REED SWITCH: PART NO. 43-CR

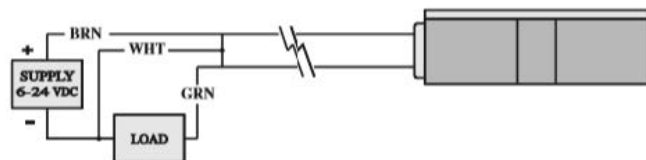


WARNING: DO NOT EXCEED RATINGS.  
Permanent damage to sensor may occur.

### MOUNTING BAND - Included with Switches



### HALL EFFECT SWITCH - SOURCING PART NO. 43-HP

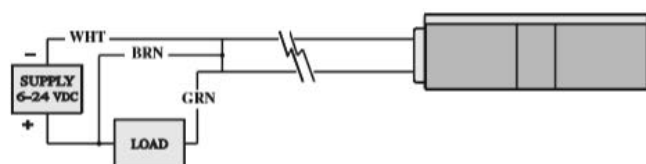


WARNING: DO NOT EXCEED 24 VDC.  
Permanent damage to sensor may occur.

## SENSOR TYPES & TECHNICAL DATA

PART NO.	43-CR	43-HP	43-HN
Description	Reed Switch MOV, LED	Half Effect, LED, Sourcing	Half Effect, LED, Sinking
Function	SPTS Normally Open	Normally Open PNP Output	Normally Open NPN Output
Switching Voltage	5 - 120 VDC/VAC 50/60 Hz	6 - 24 VDC	6 - 24 VDC
Switching Current	0.5 Amp Max 0.005 Amp Min	0.5 Amp Max	0.5 Amp Max
Switching Power	10 Watts Max	12 Watts Max	12 Watts Max
Switching Speed	0.5ms operate 0.1ms release	1.5p operate 0.5p release	1.5p operate 0.5p release
Max Volt Drop	3.5 Volts	0.5 Volts	0.5 Volts
Sensitivity	85 Gauss	85 Gauss	85 Gauss

### HALL EFFECT SWITCH - SINKING PART NO. 43-HN



WARNING: DO NOT EXCEED 24 VDC.  
Permanent damage to sensor may occur.