





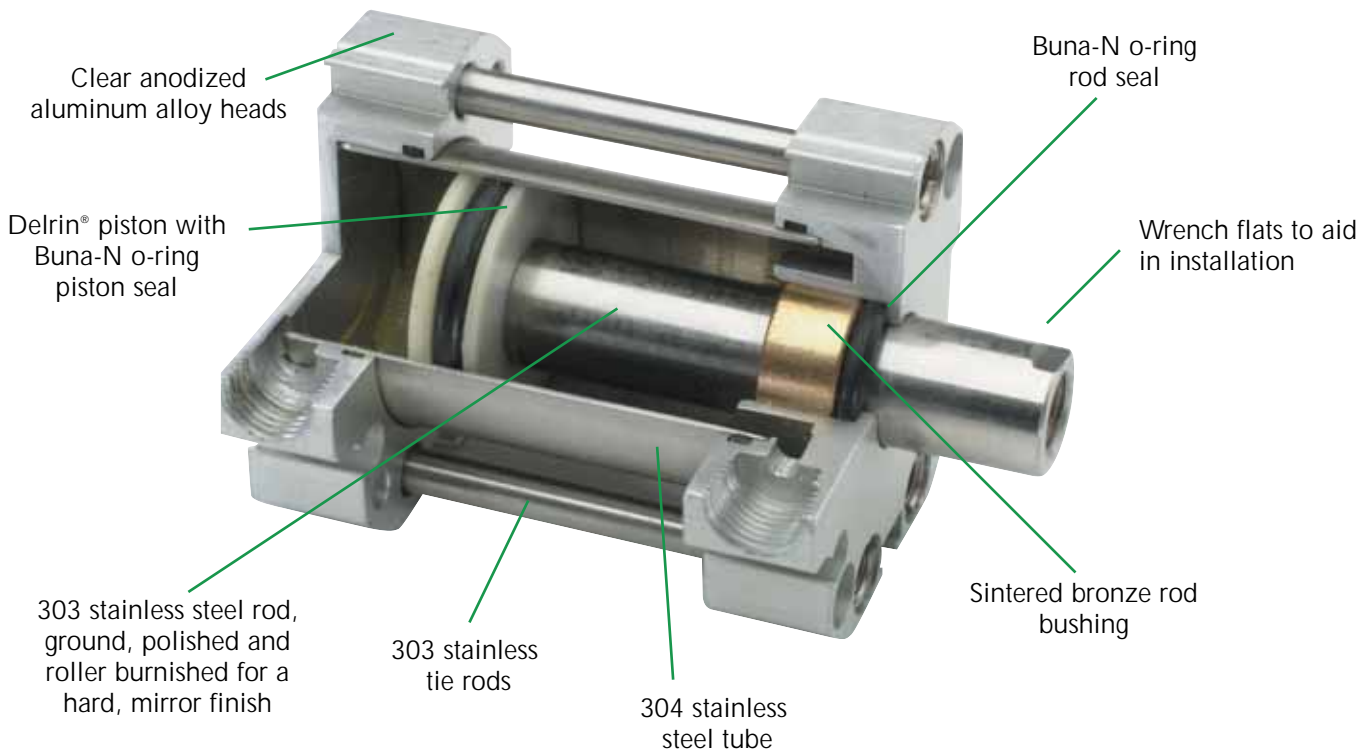
**C**lippard Instrument Laboratory, Inc. Air Force One® compact cylinders are available in double acting, spring return, spring extend and double rod models. Hall Effect sensors and magnetic piston versions are also available.

The AFO cylinder features include a stainless steel tube and roller burnished piston rod. This means longer rod and piston seal life. For corrosive environments, where dirt and abrasives may be ingested, and cause seals to wear faster than normally expected, the AFO offers the benefit of tie rod construction. This enables seals to be replaced, rather than replacing the entire cylinder. The non-corrosive construction of the AFO cylinder body is reliable in abrasive environments, able to withstand the toughest conditions.

The various mounting configurations available in the AFO cylinders assure freedom to interchange with most cylinders on the market. This means most systems can be upgraded to include quality AFO cylinders.

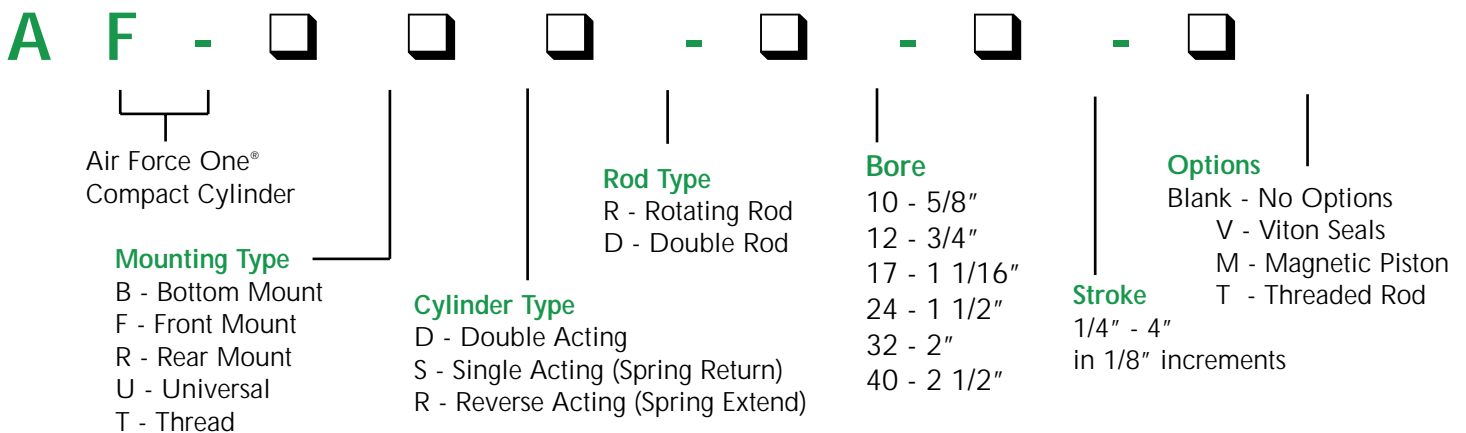
## FEATURES

- Oil impregnated sintered bronze rod bushing
- Available with magnetic pistons
- 303 stainless steel ground, polished and roller burnished piston rods
- Double acting, spring return, spring extend & double rod cylinders
- 304 stainless steel tube
- Temperature range: 30° F to 180° F
- Anodized aluminum heads
- Air pressure rating to 250 psig



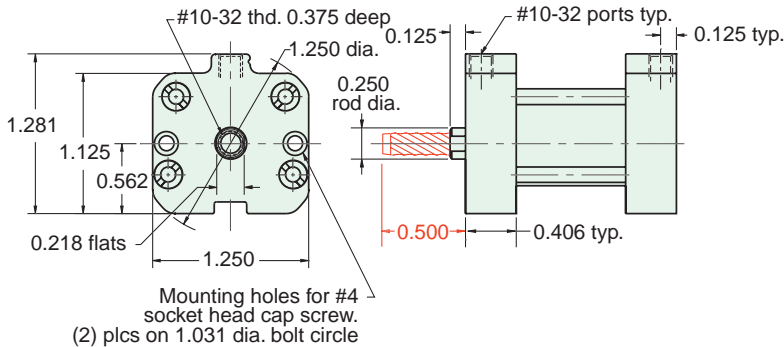
Delrin® is a registered trademark of E.I. DuPont Co.

## NUMBERING SYSTEM



**AF - □□□ - 10 - □**

Add 7/8" for Magnetic Piston

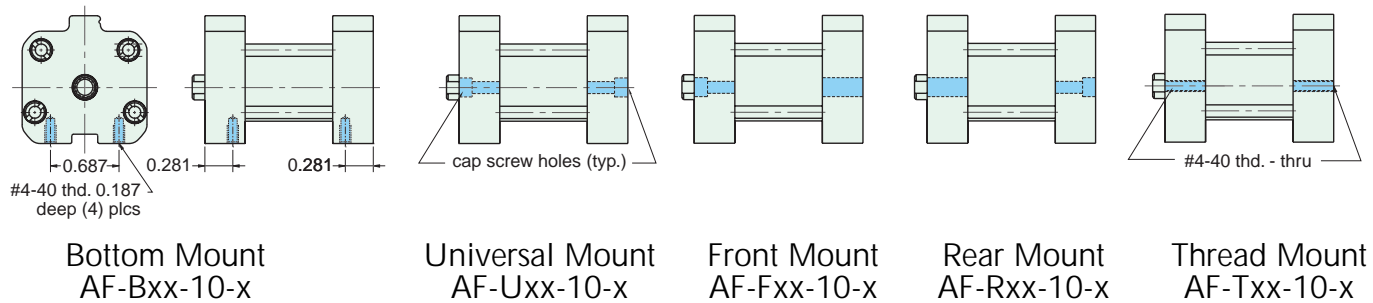


For rod with male thread option, add -T to the end of the part number after Stroke

See page 76 for Air Force One numbering system

## MOUNTING STYLES

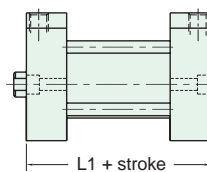
Five mounting styles give you versatility and fast, easy installation.



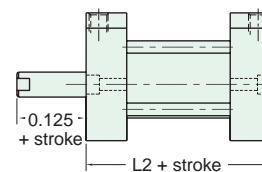
## CYLINDER LENGTHS

"L"	Stroke	Spring Return	Spring Extend
L1	1/4" - 1"	13/16"	
L1	1 1/8" - 2"	1 3/8"	
L1	2 1/8" - 3"	1 15/16"	
L1	3 1/8" - 4"	2 1/2"	
L2	1/4" - 1"		1 1/16"
L2	1 1/8" - 2"		1 5/8"
L2	2 1/8" - 3"		2 3/16"
L2	3 1/8" - 4"		2 3/4"

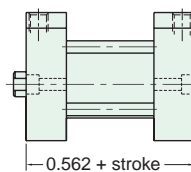
Overall length of body is stroke plus "L"



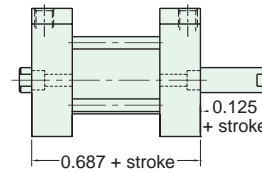
Spring Return  
AF-xSR-10-x



Spring Extend  
AF-xRR-10-x



Double Acting  
Single Rod  
AF-xDR-10-x

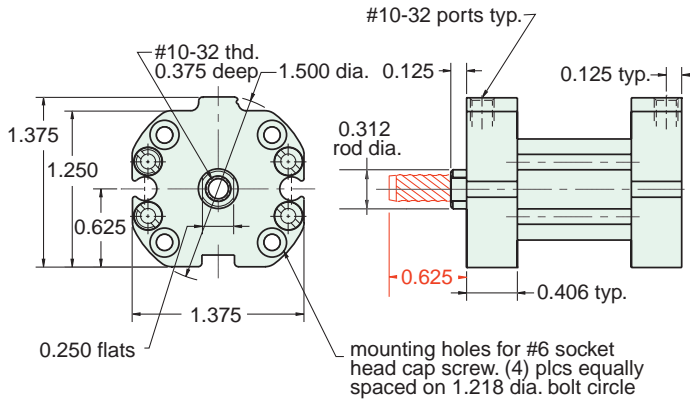


Double Acting  
Double Rod  
AF-xDD-10-x

Spring Forces	
Spring Return	
Compressed	At Rest
5.750 lbs.	1.500 lbs.
Spring Extend	
Compressed	At Rest
5.750 lbs.	1.500 lbs.

**AF - □□□ - 1 2 - □**

Add 7/8" for Magnetic Piston

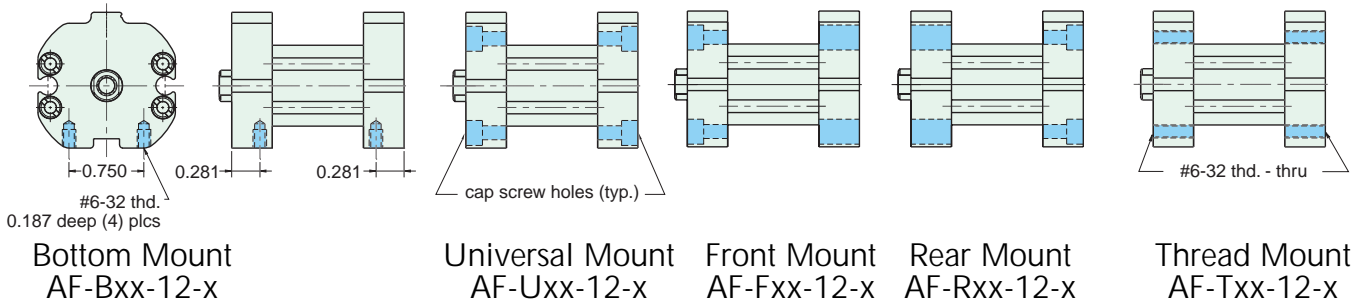


For rod with male thread option, add -T to the end of the part number after Stroke

See page 76 for Air Force One numbering system

## MOUNTING STYLES

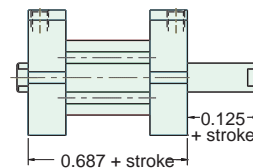
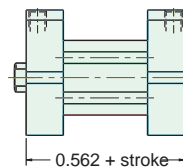
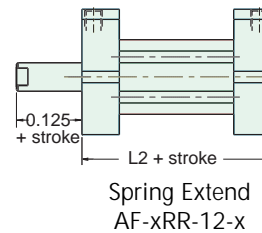
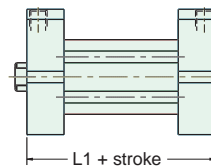
Five mounting styles give you versatility and fast, easy installation.



## CYLINDER LENGTHS

"L"	Stroke	Spring Return	Spring Extend
L1	1/4" - 1"	13/16"	
L1	1 1/8" - 2"	1 3/8"	
L1	2 1/8" - 3"	1 15/16"	
L1	3 1/8" - 4"	2 1/2"	
L2	1/4" - 1"		1 1/16"
L2	1 1/8" - 2"		1 5/8"
L2	2 1/8" - 3"		2 3/16"
L2	3 1/8" - 4"		2 3/4"

Overall length of body is stroke plus "L"



Spring Forces	
Spring Return	
Compressed	At Rest
10 lbs.	4 lbs.
Spring Extend	
Compressed	At Rest
10 lbs.	4 lbs.

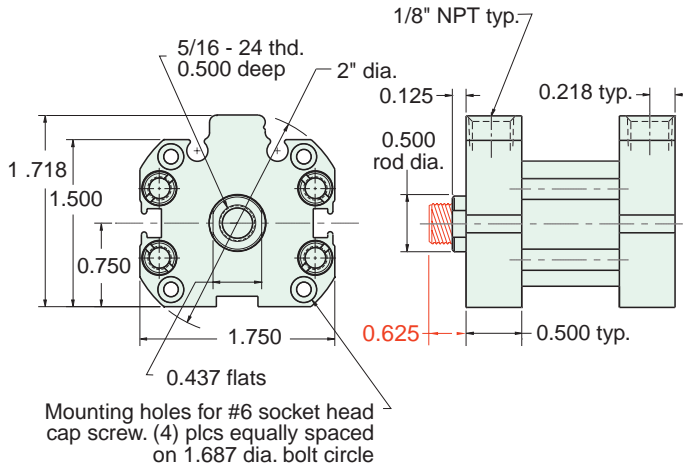


# 1 1/16" BORE AFO COMPACT CYLINDER



**AF - □□□ - 17 - □**

Add 7/8" for Magnetic Piston

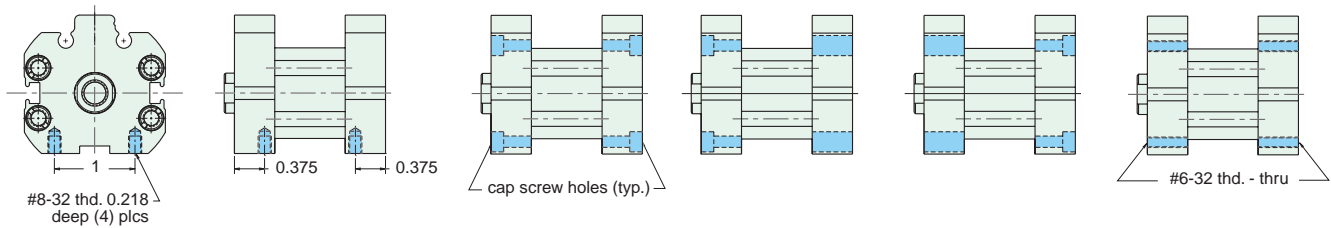


For rod with male thread option, add -T to the end of the part number after Stroke

See page 76 for Air Force One numbering system

## MOUNTING STYLES

Five mounting styles give you versatility and fast, easy installation.



Bottom Mount  
AF-Bxx-17-x

Universal Mount  
AF-Uxx-17-x

Front Mount  
AF-Fxx-17-x

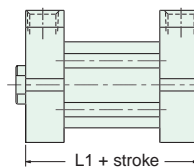
Rear Mount  
AF-Rxx-17-x

Thread Mount  
AF-Txx-17-x

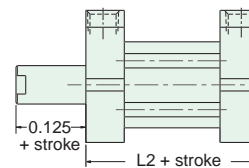
## CYLINDER LENGTHS

"L"	Stroke	Spring Return	Spring Extend
L1	1/4" - 1"	7/8"	
L1	1 1/8" - 2"	1 1/2"	
L1	2 1/8" - 3"	2 1/8"	
L1	3 1/8" - 4"	2 3/4"	
L2	1/4" - 1"		1 3/8"
L2	1 1/8" - 2"		2"
L2	2 1/8" - 3"		2 5/8"
L2	3 1/8" - 4"		3 1/4"

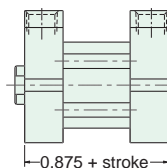
Overall length of body is stroke plus "L"



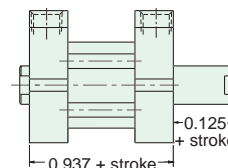
Spring Return  
AF-xSR-17-x



Spring Extend  
AF-xRR-17-x



Double Acting  
Single Rod  
AF-xDR-17-x



Double Acting  
Double Rod  
AF-xDD-17-x

Spring Forces	
Spring Return	
Compressed	At Rest
11.500 lbs.	5.500 lbs.
Spring Extend	
Compressed	At Rest
11.500 lbs.	5.500 lbs.

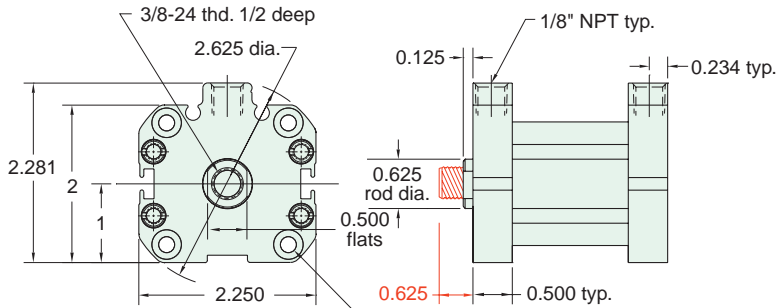


# 1 1/2" BORE AFO COMPACT CYLINDER



**AF - □□□ - 24 - □**

Add 7/8" for Magnetic Piston



Mounting holes for #10 socket head cap screw (4) plcs equally spaced on 2.187 dia. bolt circle

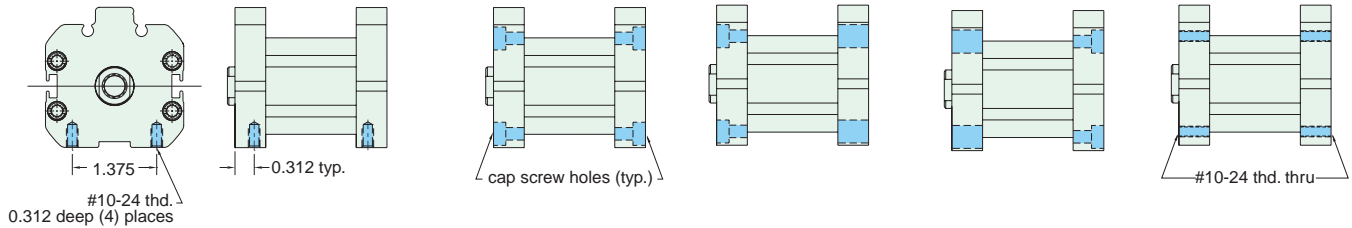


For rod with male thread option, add -T to the end of the part number after Stroke

See page 76 for Air Force One numbering system

## MOUNTING STYLES

Five mounting styles give you versatility and fast, easy installation.



Bottom Mount  
AF-Bxx-24-x

Universal Mount  
AF-Uxx-24-x

Front Mount  
AF-Fxx-24-x

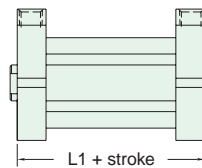
Rear Mount  
AF-Rxx-24-x

Thread Mount  
AF-Txx-24-x

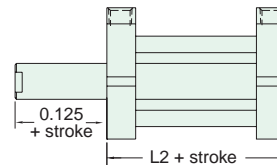
## CYLINDER LENGTHS

"L"	Stroke	Spring Return	Spring Extend
L1	1/4" - 1"	7/8"	
L1	1 1/8" - 2"	1 1/2"	
L1	2 1/8" - 3"	2 1/8"	
L1	3 1/8" - 4"	2 3/4"	
L2	1/4" - 1"		1 3/8"
L2	1 1/8" - 2"		2"
L2	2 1/8" - 3"		2 5/8"
L2	3 1/8" - 4"		3 1/4"

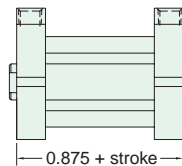
Overall length of body is stroke plus "L"



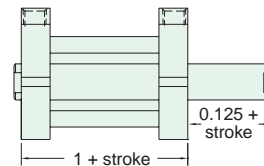
Spring Return  
AF-xSR-24-x



Spring Extend  
AF-xRR-24-x



Double Acting  
Single Rod  
AF-xDR-24-x

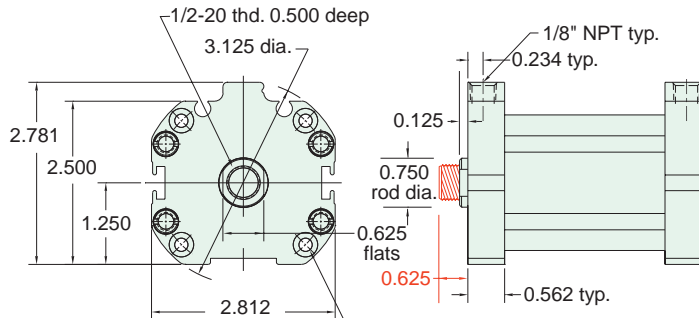


Double Acting  
Double Rod  
AF-xDD-24-x

Spring Forces	
Spring Return	
Compressed	At Rest
13 lbs.	7.500 lbs.
Spring Extend	
Compressed	At Rest
13 lbs.	7.500 lbs.

**AF - □□□ - 32 - □**

Add 7/8" for Magnetic Piston



Mounting holes for #10 socket head cap screw (4) plcs equally spaced on 2.687 dia. bolt circle

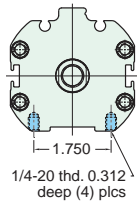


For rod with male thread option, add -T to the end of the part number after Stroke

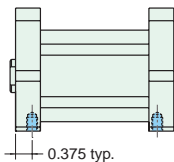
See page 76 for Air Force One numbering system

## MOUNTING STYLES

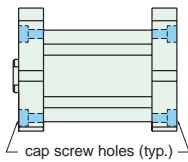
Five mounting styles give you versatility and fast, easy installation.



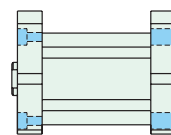
Bottom Mount  
AF-Bxx-32-x



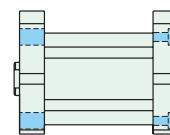
Universal Mount  
AF-Uxx-32-x



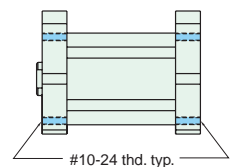
Front Mount  
AF-Fxx-32-x



Rear Mount  
AF-Rxx-32-x



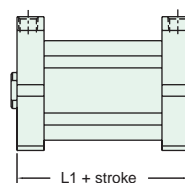
Thread Mount  
AF-Txx-32-x



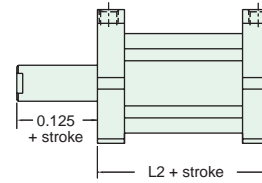
## CYLINDER LENGTHS

"L"	Stroke	Spring Return	Spring Extend
L1	1/4" - 1"	15/16"	
L1	1 1/8" - 2"	1 9/16"	
L1	2 1/8" - 3"	2 3/16"	
L1	3 1/8" - 4"	2 13/16"	
L2	1/4" - 1"		1 7/16"
L2	1 1/8" - 2"		2 1/16"
L2	2 1/8" - 3"		2 11/16"
L2	3 1/8" - 4"		3 5/16"

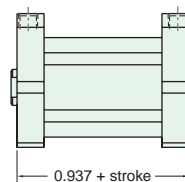
Overall length of body is stroke plus "L"



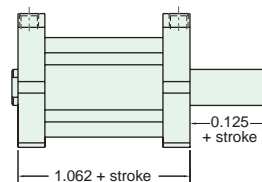
Spring Return  
AF-xSR-32-x



Spring Extend  
AF-xRR-32-x



Double Acting  
Single Rod  
AF-xDR-32-x



Double Acting  
Double Rod  
AF-xDD-32-x

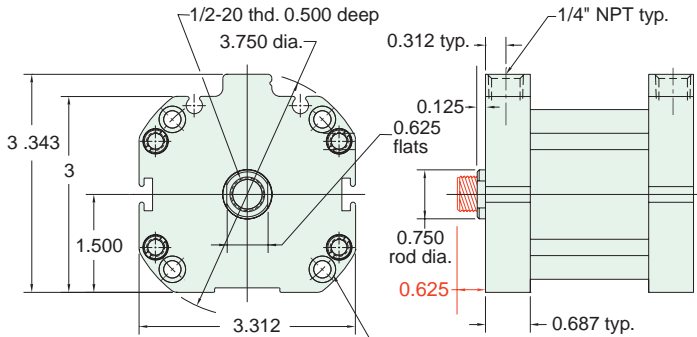
Spring Forces	
Spring Return	
Compressed	At Rest
13 lbs.	7.500 lbs.
Spring Extend	
Compressed	At Rest
13 lbs.	7.500 lbs.



# 2 1/2" BORE AFO COMPACT CYLINDER



**AF - □□□ - 40 - □**



Mounting holes for 0.250 socket head cap screw (4) plcs equally spaced on 3.250 dia. bolt circle



Add 7/8" for Magnetic Piston

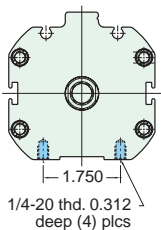


For rod with male thread option, add -T to the end of the part number after Stroke

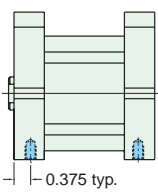
See page 76 for Air Force One numbering system

## MOUNTING STYLES

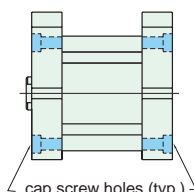
Five mounting styles give you versatility and fast, easy installation.



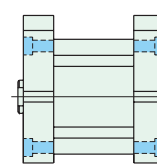
Bottom Mount  
AF-Bxx-40-x



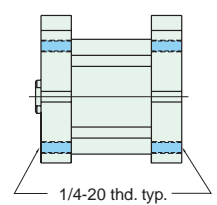
Universal Mount  
AF-Uxx-40-x



Front Mount  
AF-Fxx-40-x



Rear Mount  
AF-Rxx-40-x

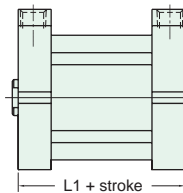


Thread Mount  
AF-Txx-40-x

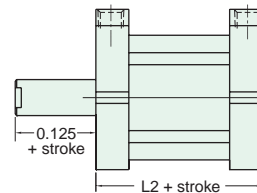
## CYLINDER LENGTHS

"L"	Stroke	Spring Return	Spring Extend
L1	1/4" - 1"	1 3/16"	
L1	1 1/8" - 2"	2 1/16"	
L1	2 1/8" - 3"	2 15/16"	
L1	3 1/8" - 4"	3 13/16"	
L2	1/4" - 1"		1 15/16"
L2	1 1/8" - 2"		2 13/16"
L2	2 1/8" - 3"		3 11/16"
L2	3 1/8" - 4"		4 9/16"

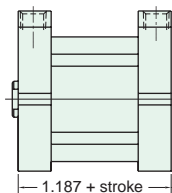
Overall length of body is stroke plus "L"



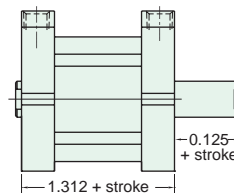
Spring Return  
AF-xSR-40-x



Spring Extend  
AF-xRR-40-x



Double Acting  
Single Rod  
AF-xDR-40-x



Double Acting  
Double Rod  
AF-xDD-40-x

Spring Forces	
Spring Return	
Compressed	At Rest
25 lbs.	18,500 lbs.
Spring Extend	
Compressed	At Rest
25 lbs.	18,500 lbs.



## AIR FORCE ONE® HALL SENSORS NUMBERING SYSTEM

### A F H S -

**AFHS**  
 Air  
 Force  
 Hall  
 Switch

**Switch Type**  
 N - Sinking (NPN)  
 P - Sourcing (PNP)  
 C - Mating Cable Only  
 (No hall sensors, available with  
 Q6 & Q16 options only)

### Connection

- 4 - 4' Wire Lead
- 12 - 12' Wire Lead
- Q - 8 mm dia. 3 pin Quick Connect
- Q6 - 8 mm dia. 3 pin Quick Connect with 6' mating cable
- Q16 - 8 mm dia. 3 pin Quick Connect with 16' mating cable

## MAGNETIC PISTONS

### Additional Length Required for Magnetic Piston

Add 7/8" to all bore sizes and mounting styles to accommodate the magnetic piston. Low friction U-Cup style piston seals are standard on all magnetic pistons. A minimum stroke of 3/8" is required for effective use of Hall Effect sensors.

### Magnetic Piston

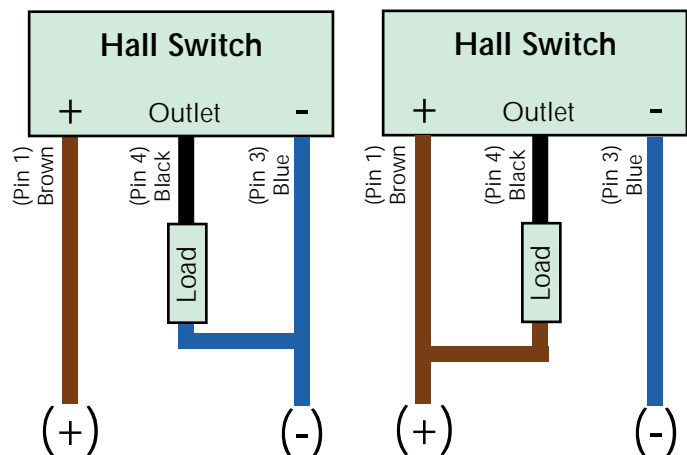
A specialized magnet is attached to the piston that will actuate the Clippard Hall Effect sensors. This allows one or more of these dependable electronic sensor/switches to accurately determine the position of the cylinder rod. To order cylinders with magnetic pistons, specify model numbers that end with -M. Hall Effect sensors must be ordered separately.

## ELECTRICAL SPECIFICATIONS

Output Type:	Sinking or Sourcing
Input Voltage:	6 to 28 VDC
Input Current:(no load)	15 mA maximum
Voltage Drop:	0.5 VDC maximum
Output Current:	300 mA maximum
Switching Power:	7.2 Watts maximum
Circuit Protection:	Reverse Polarity Protected Transient Voltage Protected
Temperature Range:	0 -175° F
LED Indicator	

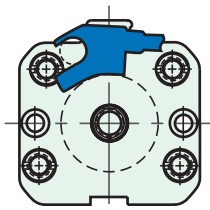
### Sourcing PNP

### Sinking NPN

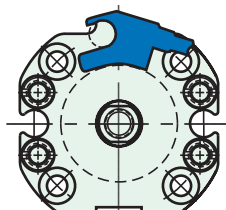


## MAGNETIC PISTON & HALL EFFECT SENSORS

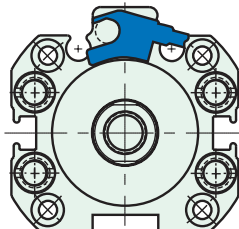
When ordered with the M option an extra rod is added to the AFO for mounting and positioning the switch.



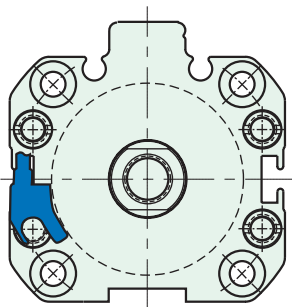
5/8" Bore



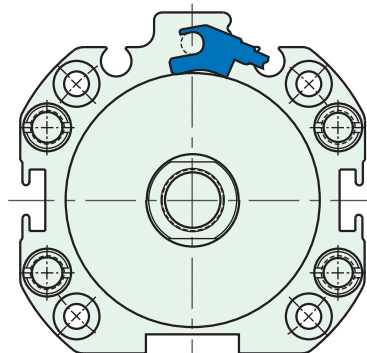
3/4" Bore



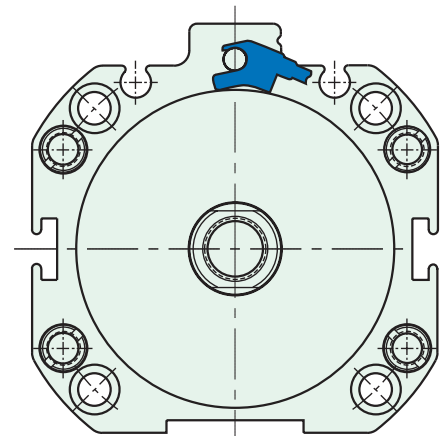
1 1/16" Bore



1 1/2" Bore



2" Bore



2 1/2" Bore

## HALL EFFECT SENSORS

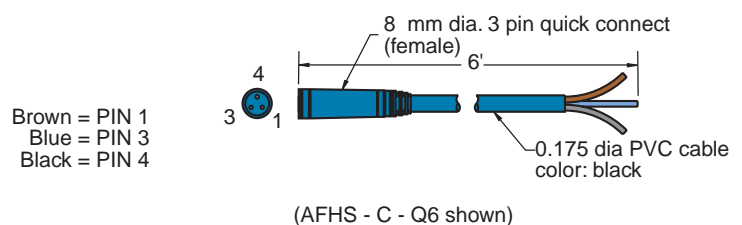
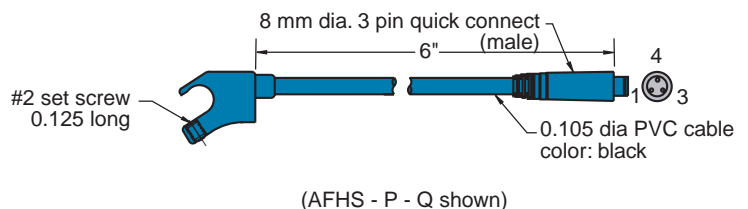
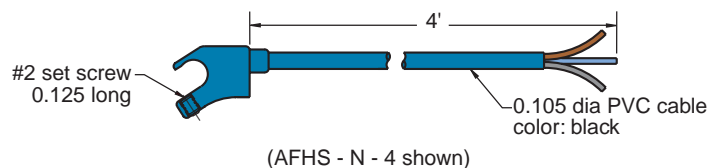
### Position Sensing Switch

Clippard offers the solid state circuitry of the Hall Effect Switch to reliably detect the presence of a magnet attached to the piston. Clippard's Hall Effect Switch incorporates an LED to visually show switch actuation. The Hall Effect Switch is offered in sinking (NPN) and sourcing (PNP) and with a variety of cable configurations.

### Locating Hall Effect Sensors on Cylinders

Cylinders ordered with magnetic pistons come with an additional attached rod\* on which the Hall Effect Switch can be attached. The Switch snaps onto the rod and can be slid into the desired location. A set screw is used to lock the Hall Effect Switch in place.

\* Additional rod is not used on 1 1/2" Bore Cyl. Hall Effect Switch can mount directly to any tie rod.



Brown = PIN 1  
Blue = PIN 3  
Black = PIN 4

## Miniature Swing-In Press Fixture

