



Clippard 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.

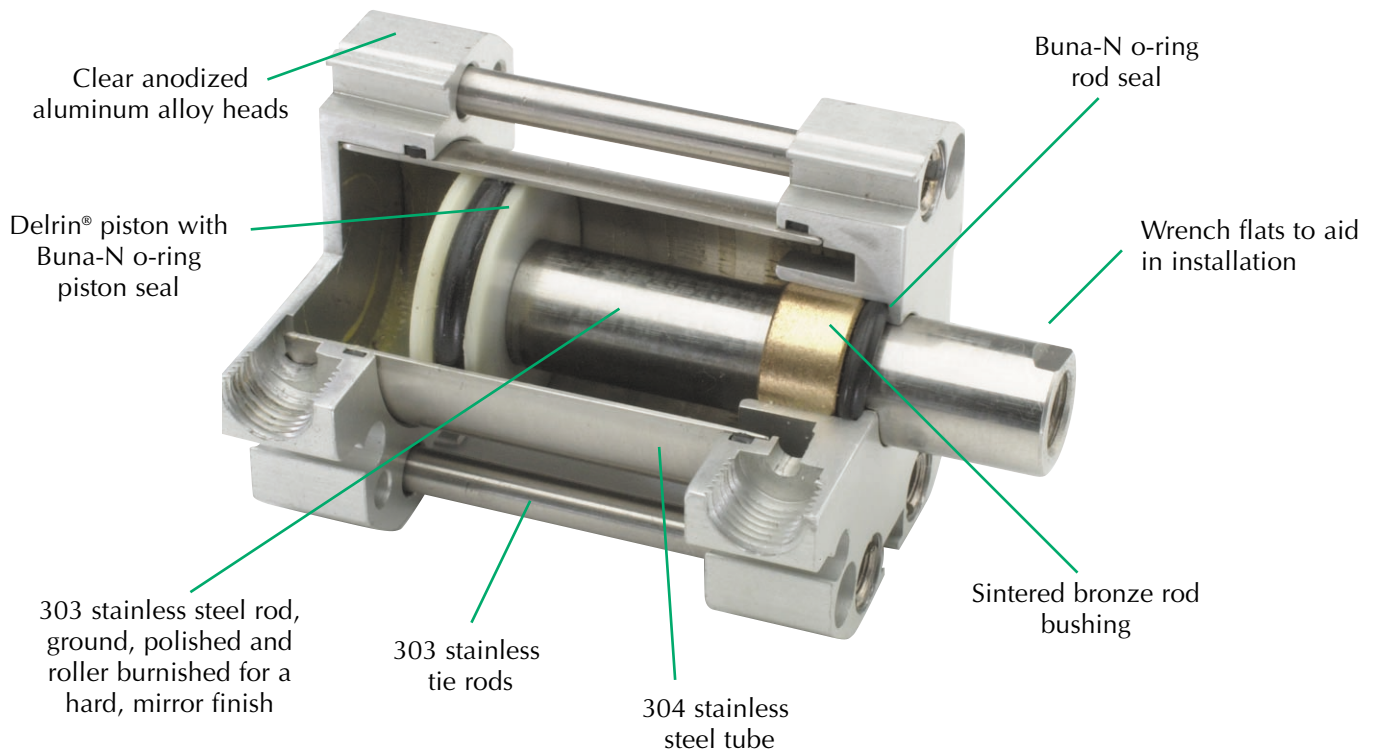


AIR FORCE ONE COMPACT CYLINDER



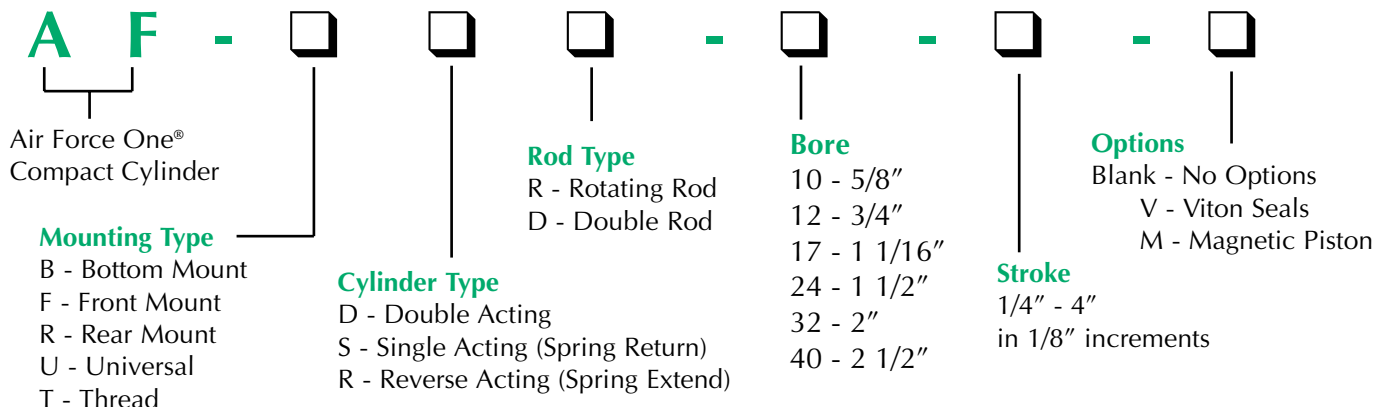
FEATURES

- 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 sube
- Temperature range: 30° F to 180° F
- Anodized aluminum heads
- Air pressure rating to 250 psig

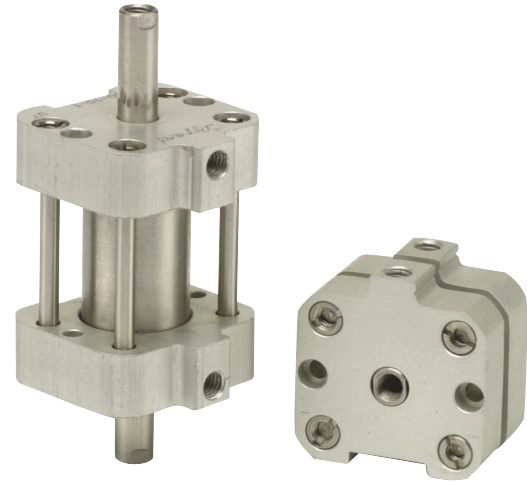
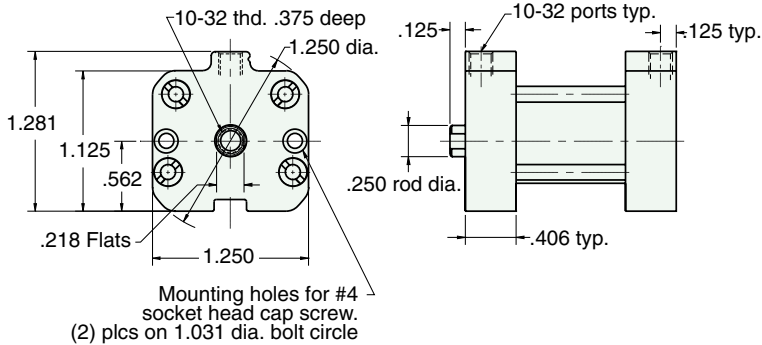


Delrin® is a registered trademark of E.I. DuPont Co.

NUMBERING SYSTEM



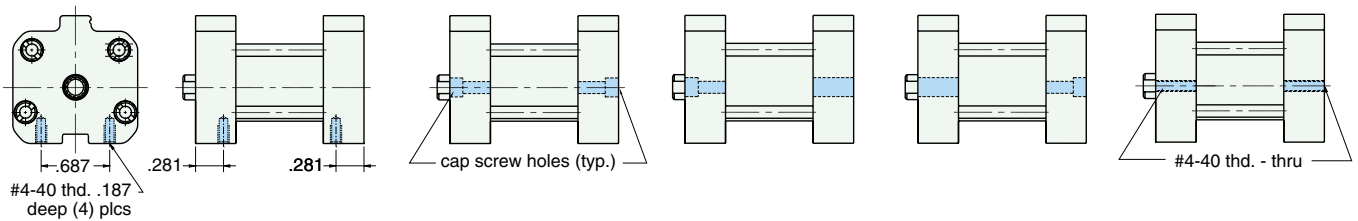
AF - □□□ - 10 - □



See page 71 for Air Force One numbering system

MOUNTING STYLES

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



Bottom Mount
AF-Bxx-10-x

Universal Mount
AF-Uxx-10-x

Front Mount
AF-Fxx-10-x

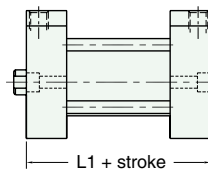
Rear Mount
AF-Rxx-10-x

Thread Mount
AF-Txx-10-x

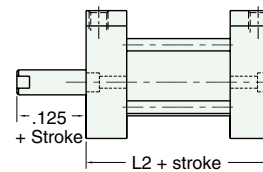
CYLINDER LENGTHS

| "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 |

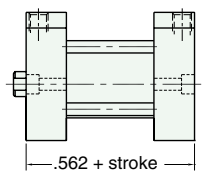
Overall length of body is stroke plus "L"



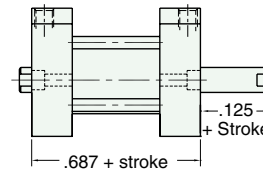
Spring Return
AF-xSR-10-x



Spring Extend
AF-xRR-10-x



Double Acting
Single Rod
AF-xDR-10-x



Double Acting
Double Rod
AF-xDD-10-x

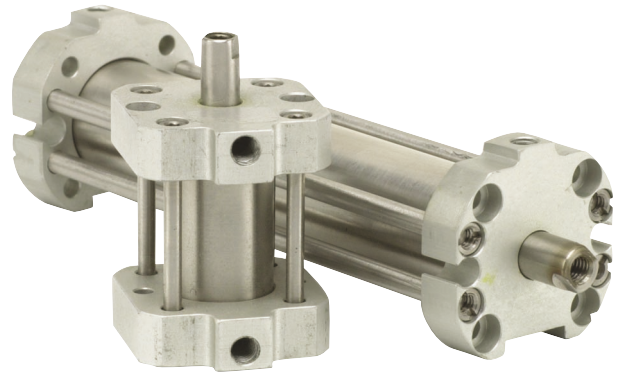
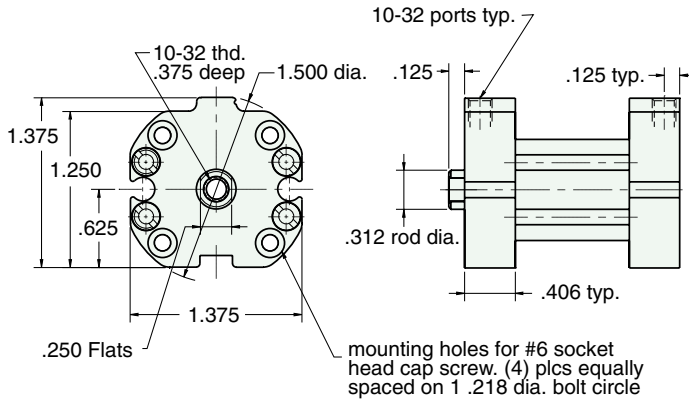
| Spring Forces | |
|---------------|------------|
| Spring Return | |
| Compressed | At Rest |
| 5.750 lbs. | 1.500 lbs. |
| Spring Extend | |
| Compressed | At Rest |
| 5.750 lbs. | 1.500 lbs. |



3/4" BORE AFO COMPACT CYLINDER



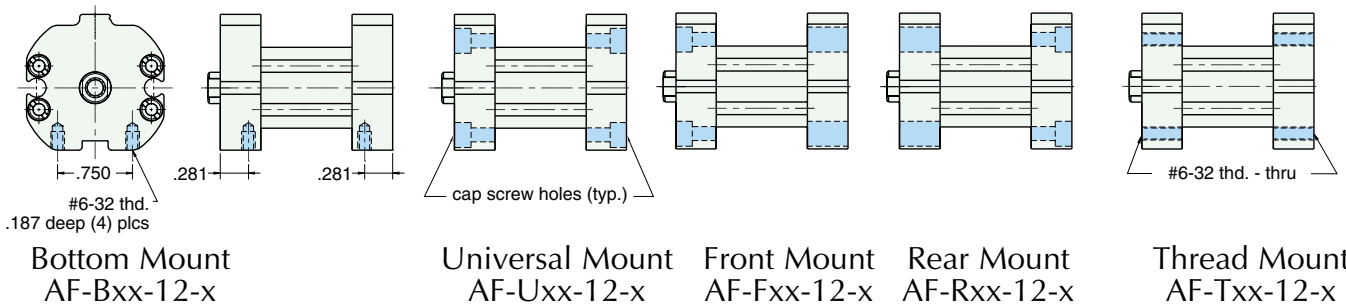
AF-□□□-12-□



See page 71 for Air Force One numbering system

MOUNTING STYLES

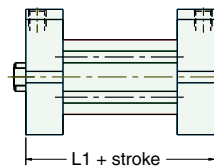
Five mounting styles give you versatility and fast, easy installation.



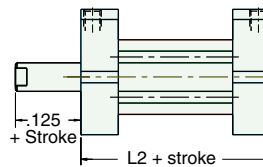
CYLINDER LENGTHS

| "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 |

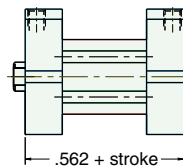
Overall length of body is stroke plus "L"



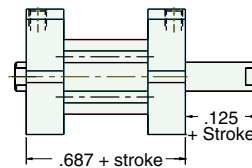
Spring Return
AF-xSR-12-x



Spring Extend
AF-xRR-12-x



Double Acting
Single Rod
AF-xDR-12-x



Double Acting
Double Rod
AF-xDD-12-x

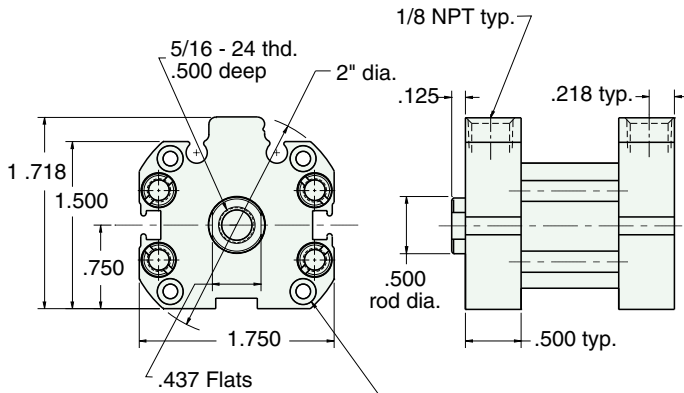
| Spring Forces | |
|---------------|---------|
| Spring Return | |
| Compressed | At Rest |
| 10 lbs. | 4 lbs. |
| Spring Extend | |
| Compressed | At Rest |
| 10 lbs. | 4 lbs. |



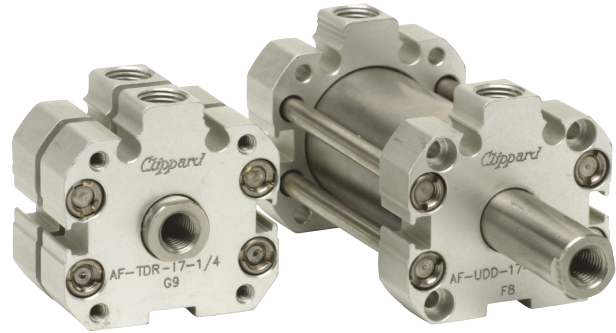
1 1/16" BORE AFO COMPACT CYLINDER



AF-□□□-17-□



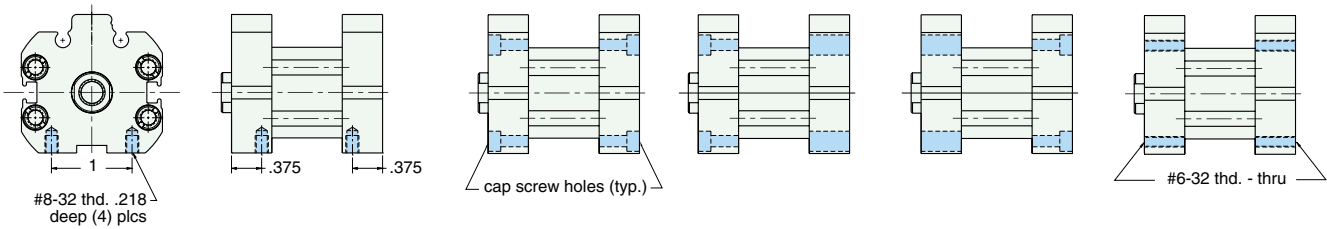
Mounting holes for #6 socket head cap screw. (4) plcs equally spaced on 1 .687 dia. bolt circle



See page 71 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

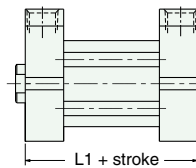
Rear Mount
AF-Rxx-17-x

Thread Mount
AF-Txx-17-x

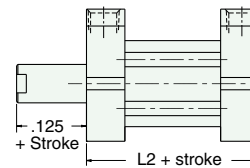
CYLINDER LENGTHS

| "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 |

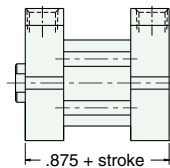
Overall length of body is stroke plus "L"



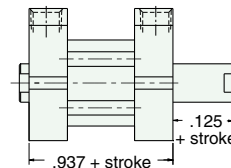
Spring Return
AF-xSR-17-x



Spring Extend
AF-xRR-17-x



Double Acting
Single Rod
AF-xDR-17-x



Double Acting
Double Rod
AF-xDD-17-x

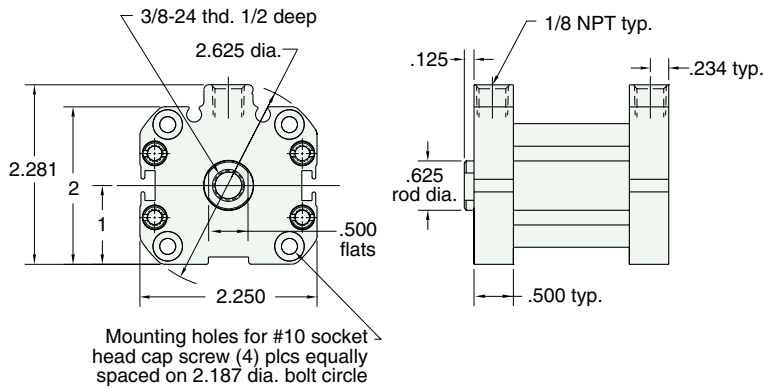
| Spring Forces | |
|---------------|------------|
| Spring Return | |
| Compressed | At Rest |
| 11.500 lbs. | 5.500 lbs. |
| Spring Extend | |
| Compressed | At Rest |
| 11.500 lbs. | 5.500 lbs. |



1 1/2" BORE AFO COMPACT CYLINDER



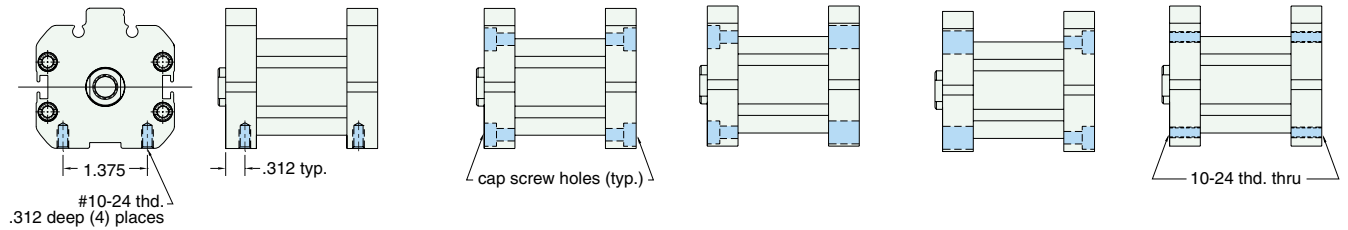
AF-□□□-24-□



See page 71 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

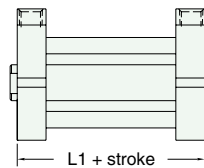
Rear Mount
AF-Rxx-24-x

Thread Mount
AF-Txx-24-x

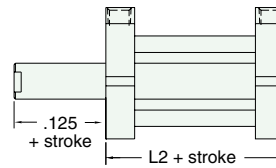
CYLINDER LENGTHS

| "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 |

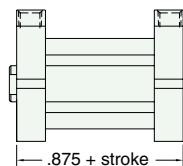
Overall length of body is stroke plus "L"



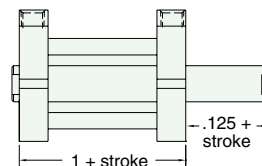
Spring Return
AF-xSR-24-x



Spring Extend
AF-xRR-24-x



Double Acting
Single Rod
AF-xDR-24-x



Double Acting
Double Rod
AF-xDD-24-x

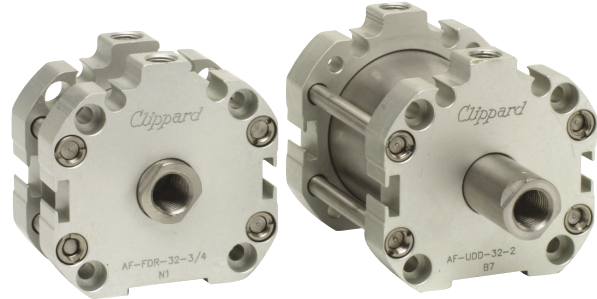
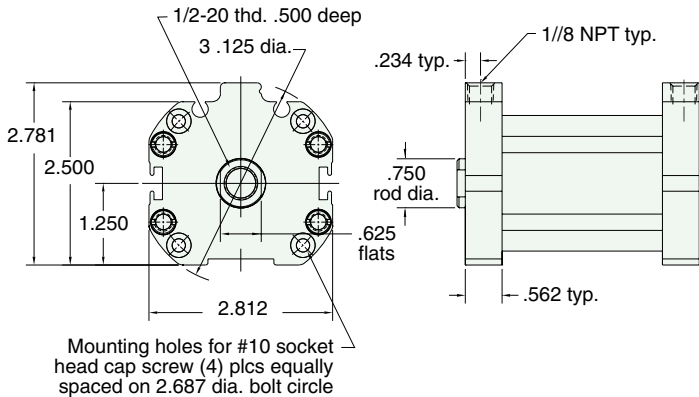
| Spring Forces | |
|---------------|------------|
| Spring Return | |
| Compressed | At Rest |
| 13 lbs. | 7.500 lbs. |
| Spring Extend | |
| Compressed | At Rest |
| 13 lbs. | 7.500 lbs. |



2" BORE AFO COMPACT CYLINDER



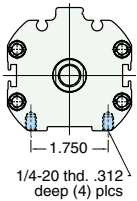
AF - □□□ - 3 2 - □



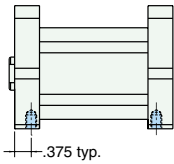
See page 71 for Air Force One numbering system

MOUNTING STYLES

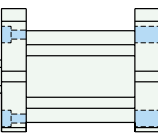
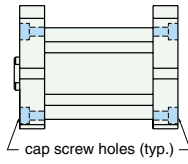
Five mounting styles give you versatility and fast, easy installation.



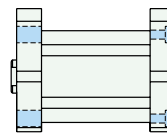
Bottom Mount
AF-Bxx-32-x



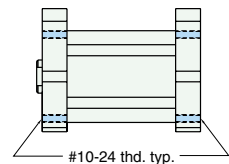
Universal Mount
AF-Uxx-32-x



Front Mount
AF-Fxx-32-x



Rear Mount
AF-Rxx-32-x

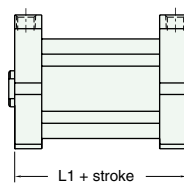


Thread Mount
AF-Txx-32-x

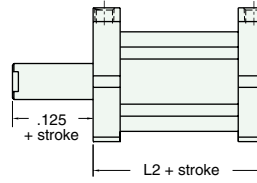
CYLINDER LENGTHS

| "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 |

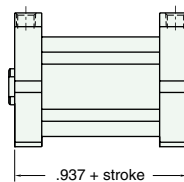
Overall length of body is stroke plus "L"



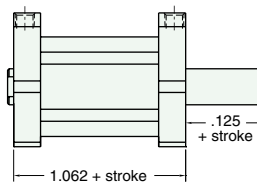
Spring Return
AF-xSR-32-x



Spring Extend
AF-xRR-32-x



Double Acting
Single Rod
AF-xDR-32-x



Double Acting
Double Rod
AF-xDD-32-x

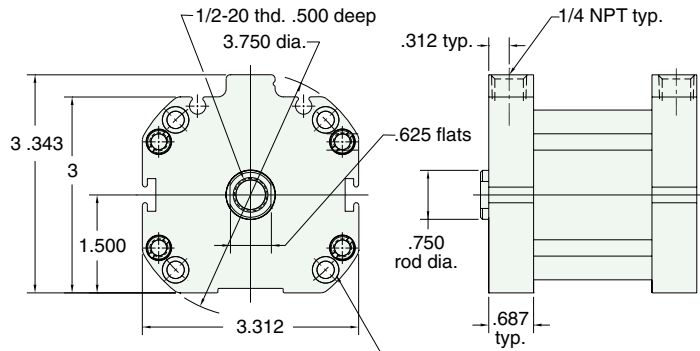
| Spring Forces | |
|---------------|------------|
| Spring Return | |
| Compressed | At Rest |
| 13 lbs. | 7,500 lbs. |
| Spring Extend | |
| Compressed | At Rest |
| 13 lbs. | 7 1/2 lbs. |



2 1/2" BORE AFO COMPACT CYLINDER



AF-□□□-40-□



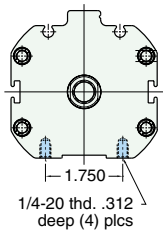
Mounting holes for .250 socket head cap screw (4 plcs equally spaced on 3.250 dia. bolt circle)



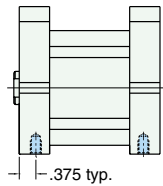
See page 71 for Air Force One numbering system

MOUNTING STYLES

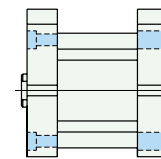
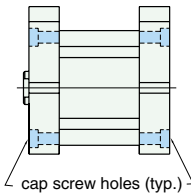
Five mounting styles give you versatility and fast, easy installation.



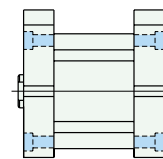
Bottom Mount
AF-Bxx-40-x



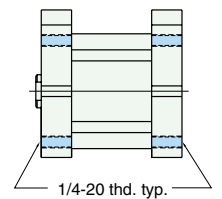
Universal Mount
AF-Uxx-40-x



Front Mount
AF-Fxx-40-x



Rear Mount
AF-Rxx-40-x

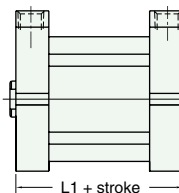


Thread Mount
AF-Txx-40-x

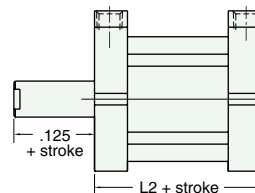
CYLINDER LENGTHS

| "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 |

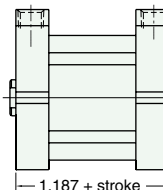
Overall length of body is stroke plus "L"



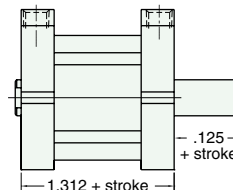
Spring Return
AF-xSR-40-x



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

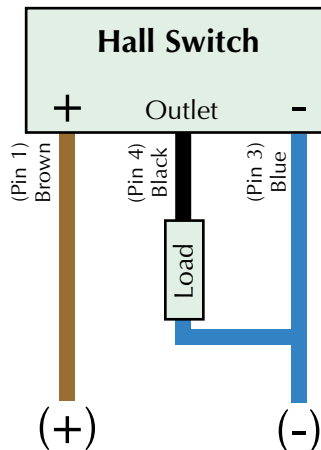
Magnetic Piston

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.

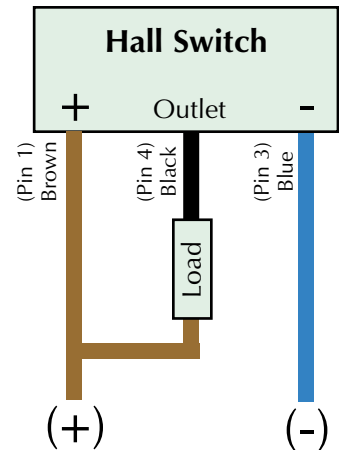
ELECTRICAL SPECIFICATIONS

| | |
|-------------------------|---|
| Output Type: | Sinking or Sourcing |
| Input Voltage: | 6 to 28 VDC |
| Input Current:(no load) | 15 mA maximum |
| Voltage Drop: | .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

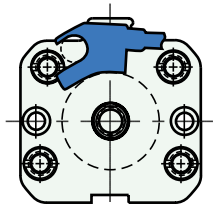


Sinking NPN

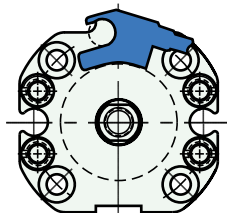


MAGNETIC PISTON & HALL EFFECT SENSORS

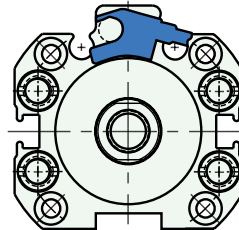
When ordered with the M option an extra rod is added to the AFO for mounting and positioning the switch.



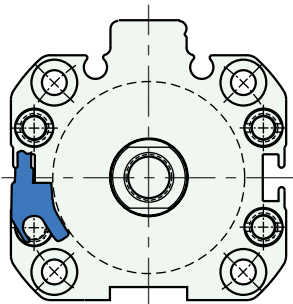
5/8" Bore



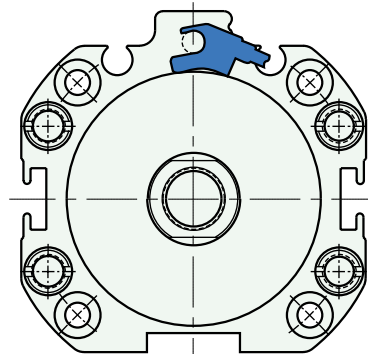
3/4" Bore



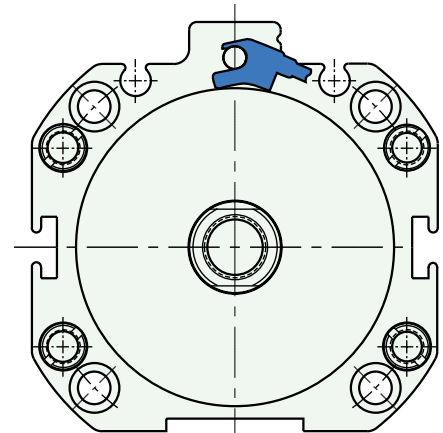
1 1/16" Bore



1 1/2" Bore



2" Bore



2 1/2" Bore

HALL EFFECT SENSORS

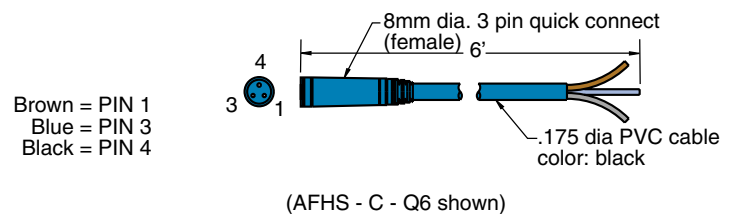
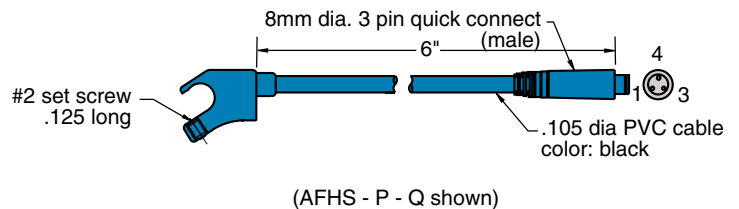
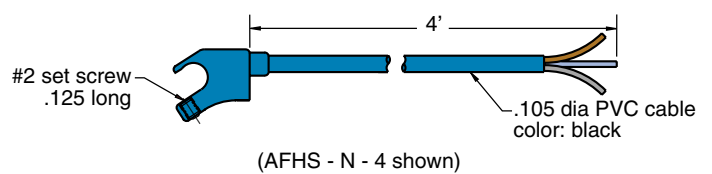
Position Sensing Switch

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

