



AIR FORCE ONE® COMPACT CYLINDER



Clippard Instrument Laboratory, Inc. Air Force One compact cylinders are available in double acting, spring return, spring extend and double rod models. GMR 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.

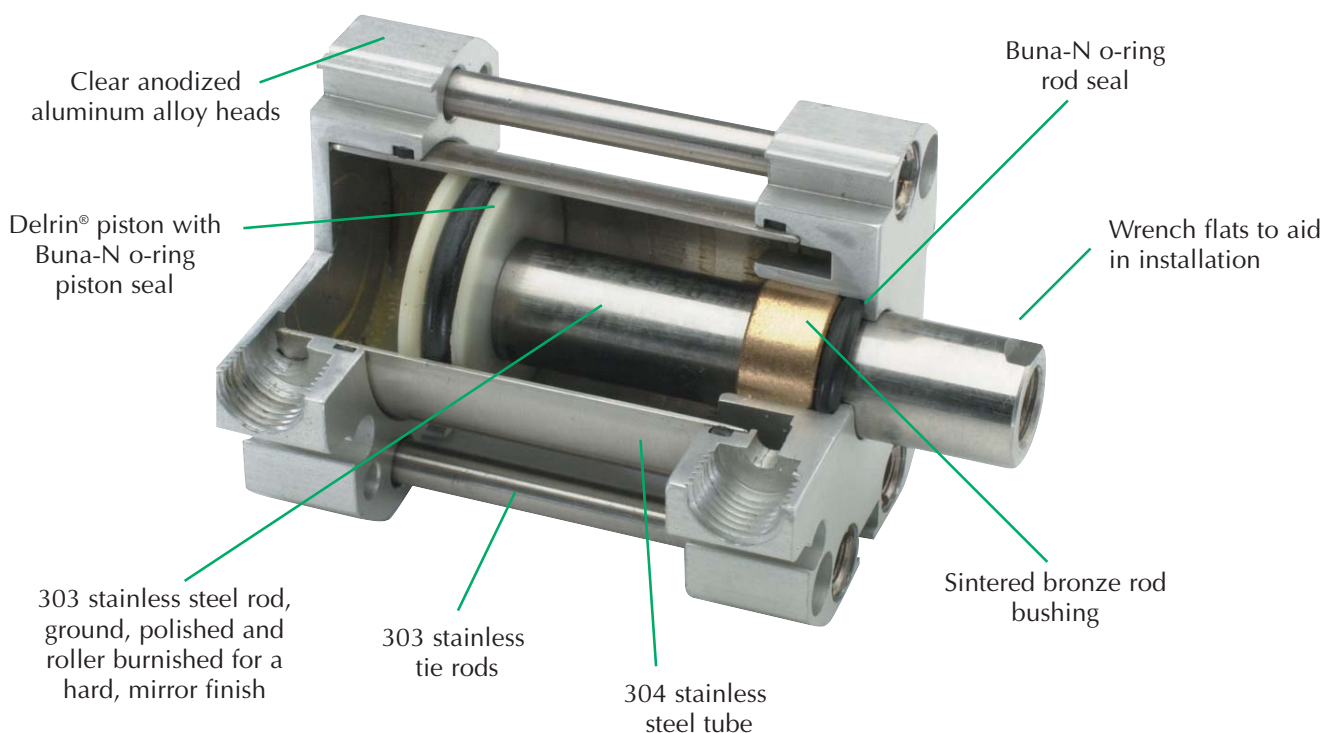


AIR FORCE ONE® COMPACT CYLINDER



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

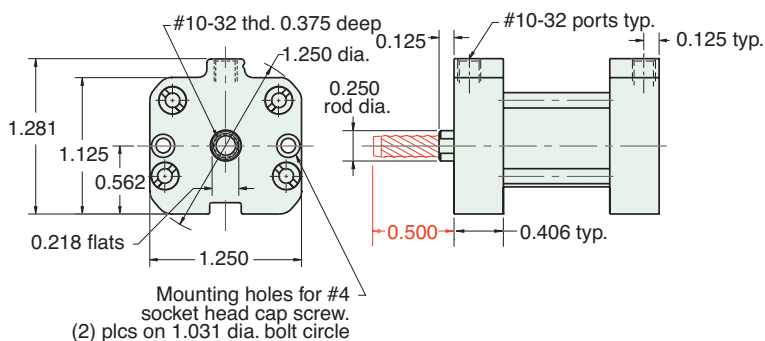


Delrin® is a registered trademark of E.I. DuPont Co.

NUMBERING SYSTEM

A	F	-				-		-		-	
Air Force One® Compact Cylinder			Rod Type			Bore			Options		
Mounting Type			Cylinder Type			Stroke					
B - Bottom Mount F - Front Mount R - Rear Mount U - Universal T - Thread			D - Double Acting S - Single Acting (Spring Return) R - Reverse Acting (Spring Extend)			10 - 5/8" 12 - 3/4" 17 - 1 1/16" 24 - 1 1/2" 32 - 2" 40 - 2 1/2"			Blank - No Options V - Viton Seals M - Magnetic Piston T - Threaded Rod		
						in 1/8" increments					

A F - □ □ □ - 1 0 - □

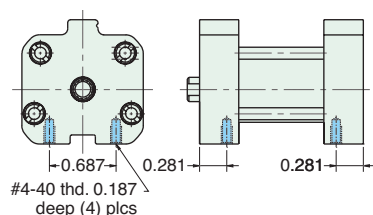


For rod with male thread option, add -T to the end of the part number after Stroke

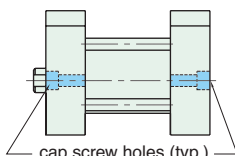
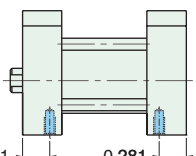
See page 76 for Air Force One numbering system

MOUNTING STYLES

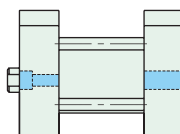
Five mounting styles give you versatility and fast, easy installation.



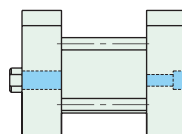
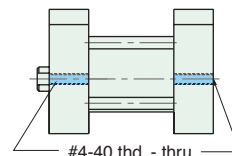
Bottom Mount
AF-Bxx-10-x



Universal Mount
AF-Uxx-10-x



Front Mount
AF-Fxx-10-x

Rear Mount
AF-Rxx-10-x

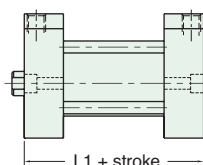
Thread Mount
AF-Txx-10-x

CYLINDER LENGTHS

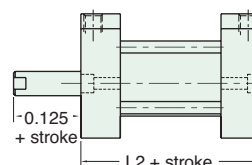
"L"	Stroke	Spring Return	Spring Extend
L1	1/4" - 1"	13/16"	
L1	1 1/8" - 2"	1 3/8"	
L1	2 1/8" - 3"	1 15/16"	
L1	3 1/8" - 4"	2 1/2"	
L2	1/4" - 1"		1 1/16"
L2	1 1/8" - 2"		1 5/8"
L2	2 1/8" - 3"		2 3/16"
L2	3 1/8" - 4"		2 3/4"

Overall length of body is stroke plus "L"

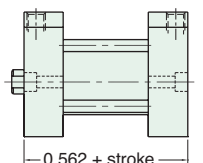
Add 7/8" for Magnetic Piston



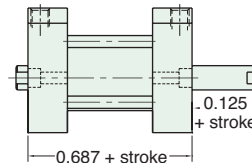
Spring Return
AF-xSR-10-x



Spring Extend
AF-xRR-10-x



Double Acting
Single Rod
AF-xDR-10-x

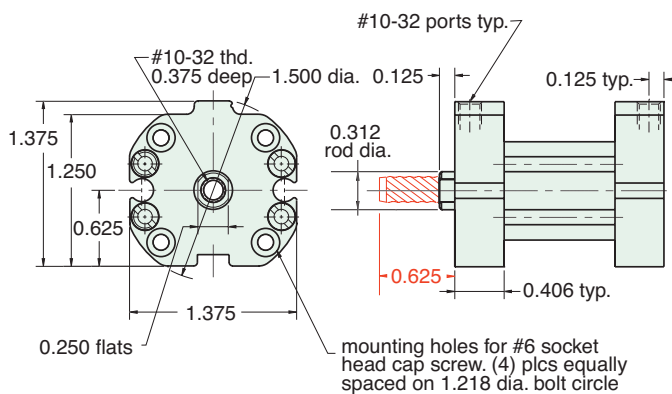


Double Acting
Double Rod
AF-xDD-10-x

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 - 12 -

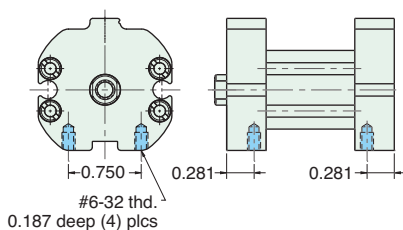


For rod with male thread option, add -T to the end of the part number after Stroke

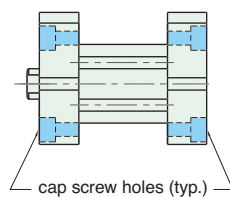
See page 76 for Air Force One numbering system

MOUNTING STYLES

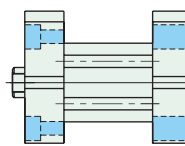
Five mounting styles give you versatility and fast, easy installation.



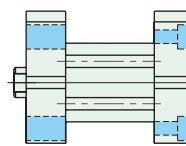
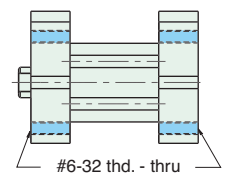
Bottom Mount
AF-Bxx-12-x



Universal Mount
AF-Uxx-12-x



Front Mount
AF-Fxx-12-x

Rear Mount
AF-Rxx-12-x

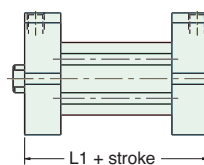
Thread Mount
AF-Txx-12-x

CYLINDER LENGTHS

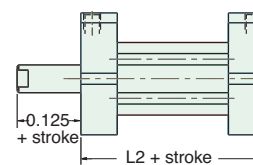
"L"	Stroke	Spring Return	Spring Extend
L1	1/4" - 1"	13/16"	
L1	1 1/8" - 2"	1 3/8"	
L1	2 1/8" - 3"	1 15/16"	
L1	3 1/8" - 4"	2 1/2"	
L2	1/4" - 1"		1 1/16"
L2	1 1/8" - 2"		1 5/8"
L2	2 1/8" - 3"		2 3/16"
L2	3 1/8" - 4"		2 3/4"

Overall length of body is stroke plus "L"

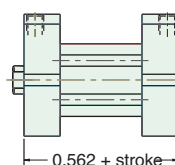
Add 7/8" for Magnetic Piston



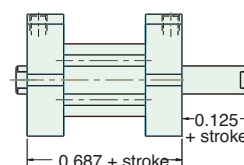
Spring Return
AF-xSR-12-x



Spring Extend
AF-xRR-12-x



Double Acting
Single Rod
AF-xDR-12-x



Double Acting
Double Rod
AF-xDD-12-x

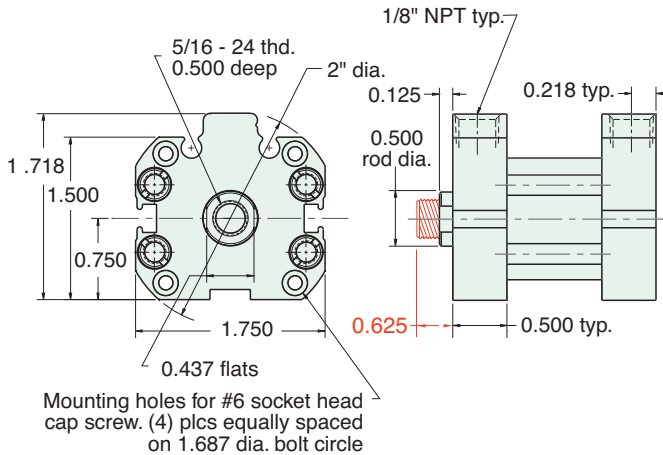
Spring Forces	
Spring Return	
Compressed	At Rest
10 lbs.	4 lbs.
Spring Extend	
Compressed	At Rest
10 lbs.	4 lbs.



1 1/16" BORE AFO COMPACT CYLINDER



AF - □□□ - 17 - □

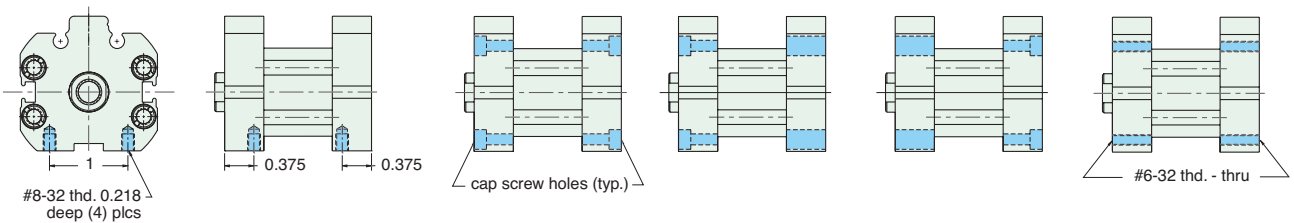


For rod with male thread option, add -T to the end of the part number after Stroke

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

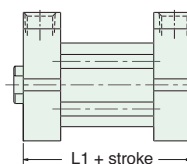
Thread Mount
AF-Txx-17-x

CYLINDER LENGTHS

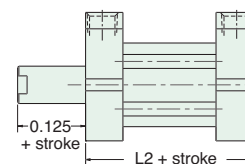
"L"	Stroke	Spring Return	Spring Extend
L1	1/4" - 1"	7/8"	
L1	1 1/8" - 2"	1 1/2"	
L1	2 1/8" - 3"	2 1/8"	
L1	3 1/8" - 4"	2 3/4"	
L2	1/4" - 1"		1 3/8"
L2	1 1/8" - 2"		2"
L2	2 1/8" - 3"		2 5/8"
L2	3 1/8" - 4"		3 1/4"

Overall length of body is stroke plus "L"

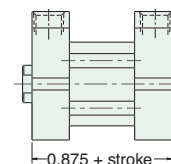
Add 7/8" for Magnetic Piston



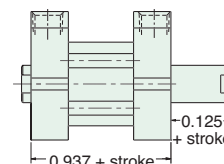
Spring Return
AF-xSR-17-x



Spring Extend
AF-xRR-17-x



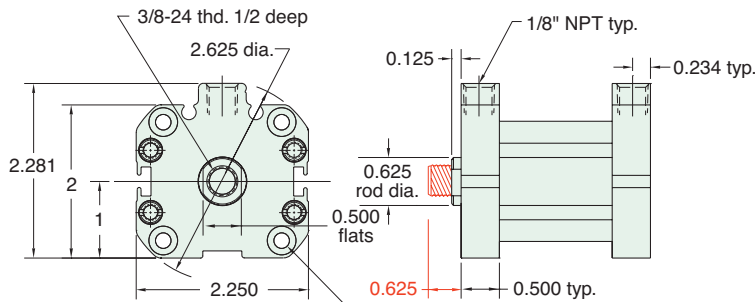
Double Acting
Single Rod
AF-xDR-17-x



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.

AF - □□□ - 24 - □



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

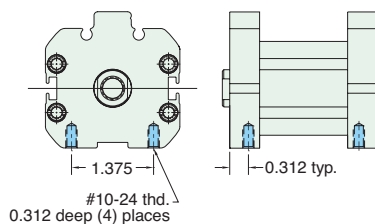


For rod with male thread option, add -T to the end of the part number after Stroke

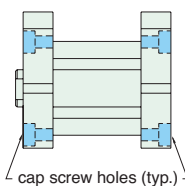
See page 76 for Air Force One numbering system

MOUNTING STYLES

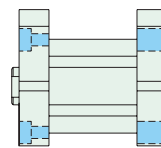
Five mounting styles give you versatility and fast, easy installation.



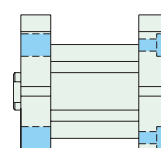
Bottom Mount
AF-Bxx-24-x



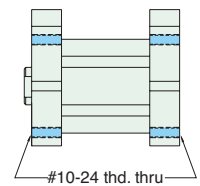
Universal Mount
AF-Uxx-24-x



Front Mount
AF-Fxx-24-x



Rear Mount
AF-Rxx-24-x



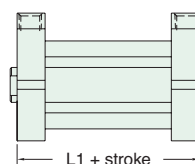
Thread Mount
AF-Txx-24-x

CYLINDER LENGTHS

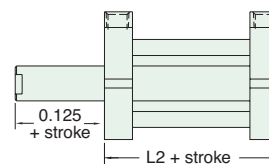
"L"	Stroke	Spring Return	Spring Extend
L1	1/4" - 1"	7/8"	
L1	1 1/8" - 2"	1 1/2"	
L1	2 1/8" - 3"	2 1/8"	
L1	3 1/8" - 4"	2 3/4"	
L2	1/4" - 1"		1 3/8"
L2	1 1/8" - 2"		2"
L2	2 1/8" - 3"		2 5/8"
L2	3 1/8" - 4"		3 1/4"

Overall length of body is stroke plus "L"

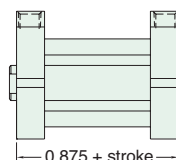
Add 7/8" for Magnetic Piston



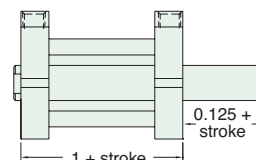
Spring Return
AF-xSR-24-x



Spring Extend
AF-xRR-24-x



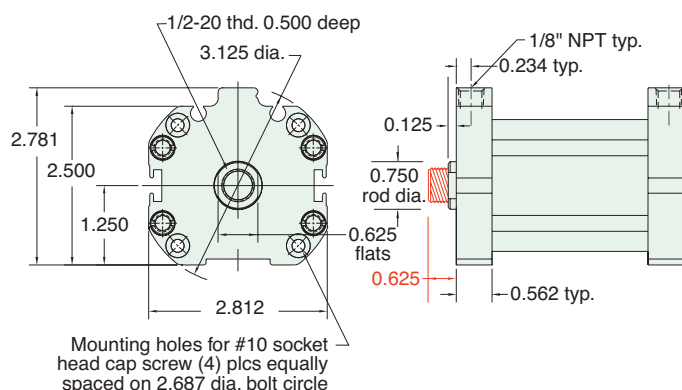
Double Acting
Single Rod
AF-xDR-24-x



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 - □

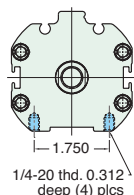


For rod with male thread option, add -T to the end of the part number after Stroke

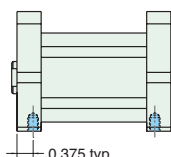
See page 76 for Air Force One numbering system

MOUNTING STYLES

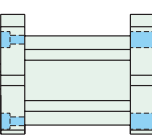
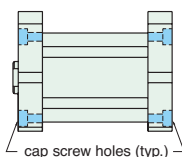
Five mounting styles give you versatility and fast, easy installation.



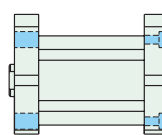
Bottom Mount
AF-Bxx-32-x



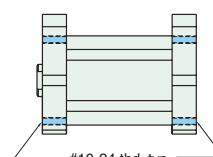
Universal Mount
AF-Uxx-32-x



Front Mount
AF-Fxx-32-x



Rear Mount
AF-Rxx-32-x



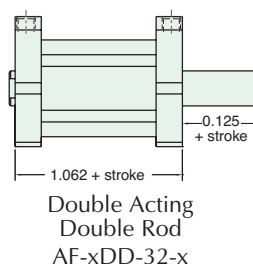
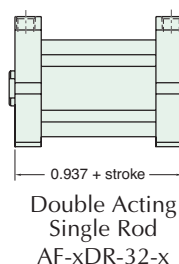
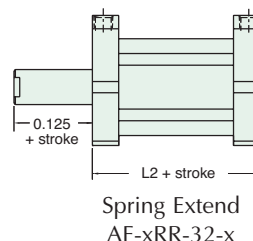
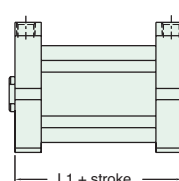
Thread Mount
AF-Txx-32-x

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"

Add 7/8" for Magnetic Piston



Spring Forces

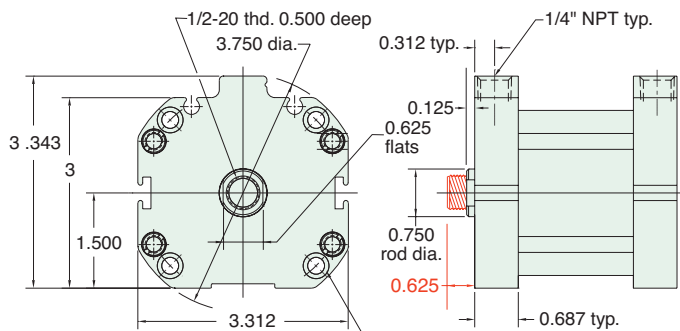
Spring Return	
Compressed	At Rest
13 lbs.	7.500 lbs.
Spring Extend	
Compressed	At Rest
13 lbs.	7.500 lbs.



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 0.875 for Magnetic Piston

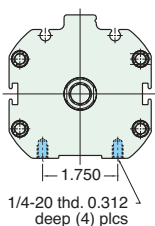


For rod with male thread option, add -T to the end of the part number after Stroke

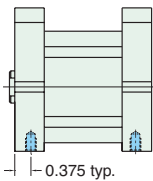
See page 76 for Air Force One numbering system

MOUNTING STYLES

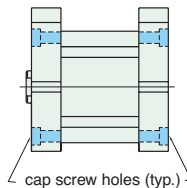
Five mounting styles give you versatility and fast, easy installation.



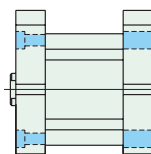
Bottom Mount
AF-Bxx-40-x



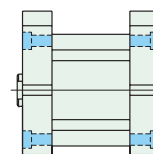
Universal Mount
AF-Uxx-40-x



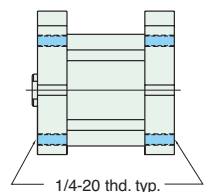
Front Mount
AF-Fxx-40-x



Rear Mount
AF-Rxx-40-x



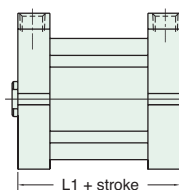
Thread Mount
AF-Txx-40-x



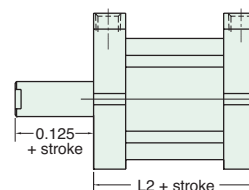
CYLINDER LENGTHS

"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"

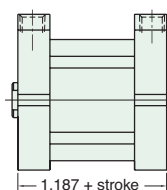
Overall length of body is stroke plus "L"



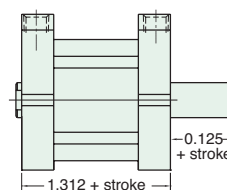
Spring Return
AF-xSR-40-x



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 0.875 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 GMR sensors.

Magnetic Piston

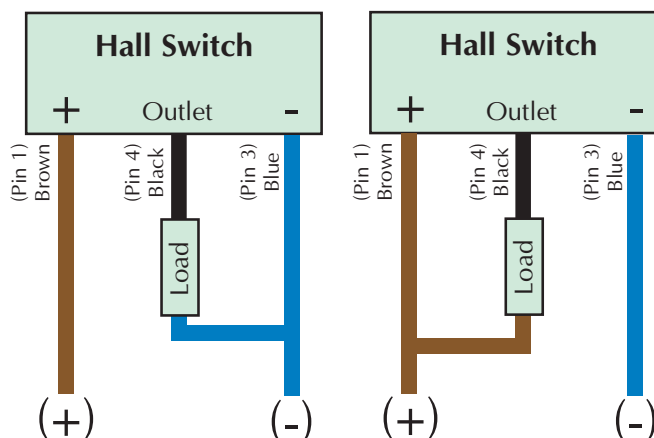
A specialized magnet is attached to the piston that will actuate the Clippard GMR sensors. This allows one or more of these dependable electronic sensor/switches to accurately determine the position of the cylinder rod. To order cylinders with magnetic pistons, specify model numbers that end with -M.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

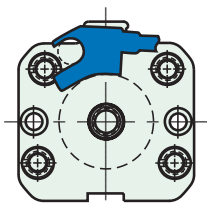
Sourcing PNP

Sinking NPN

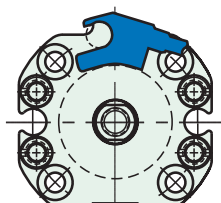


MAGNETIC PISTON & GMR SENSORS

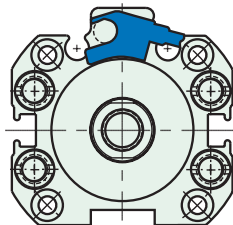
When ordered with the M option, an extra rod is added to the AFO for mounting and positioning the switch.



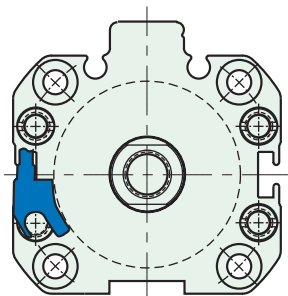
5/8" Bore



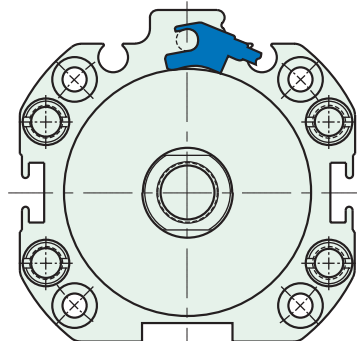
3/4" Bore



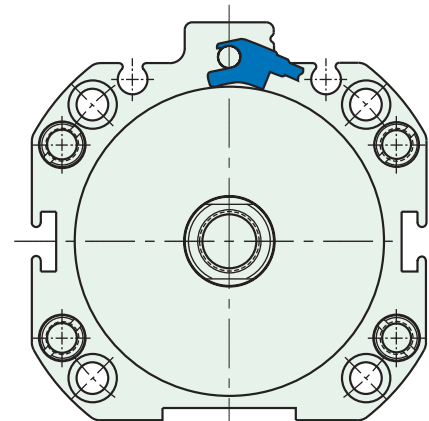
1 1/16" Bore



1 1/2" Bore



2" Bore



2 1/2" Bore

GMR SENSORS

Position Sensing Switch

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

Locating GMR Sensors on Cylinders

Cylinders ordered with magnetic pistons come with an additional attached rod* on which the GMR 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 GMR Switch in place.

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

