

A3V, H3V, A3

tom thumb®

3/4", 1", 1-1/8", 1-3/8" Bore

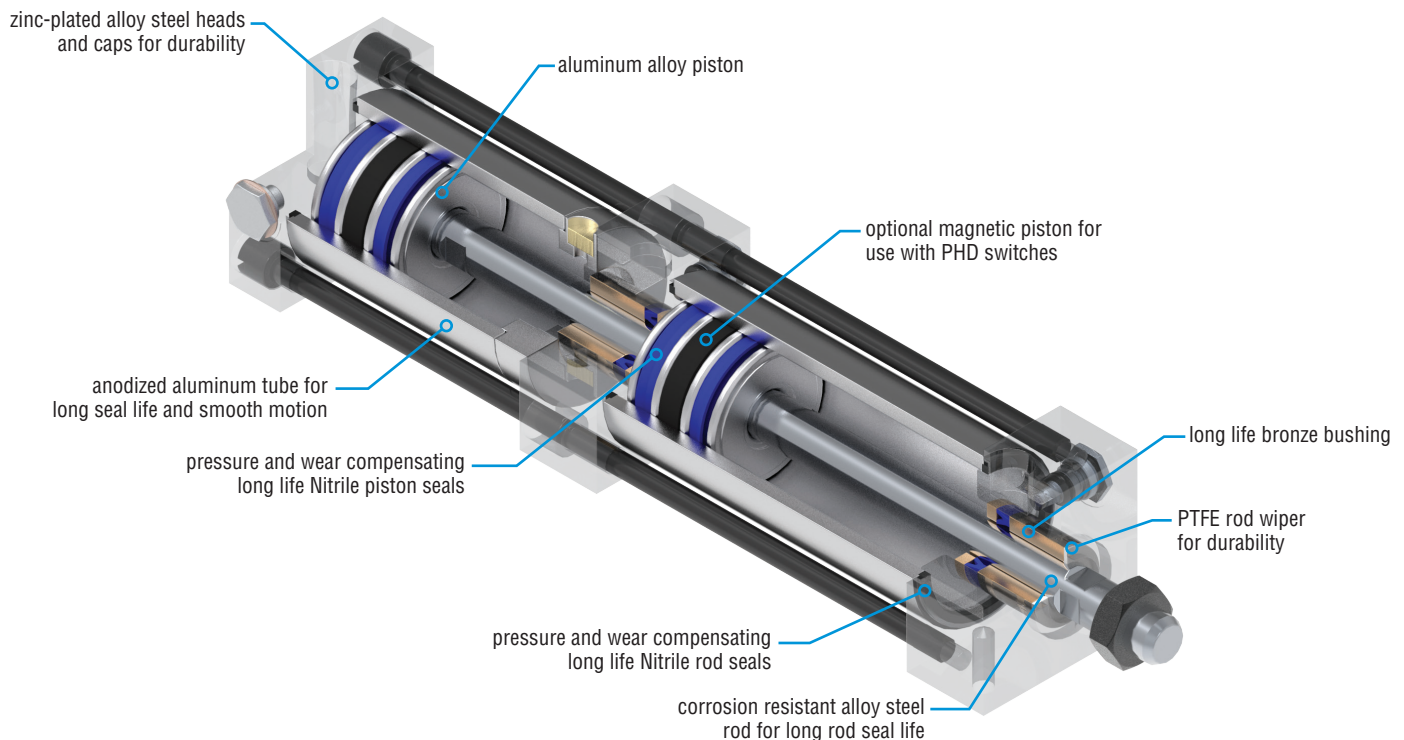
Major Benefits

- Three linear positions from piston rod
- Long life design for low maintenance
- NFPA repairable for extended life providing long term savings
- Wide range of options for easy application and reduced design time
- Wide range of mounting styles for easy installation
- Simple three position operation



SERIES A3V

Cutaway depicts
a 1-1/8" bore A3V unit.

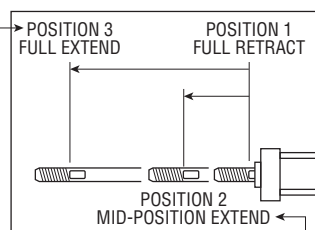


ORDERING DATA: Series A3V, H3V, A3 Cylinders - 3/4", 1", 1-1/8", 1-3/8" Bore

TO ORDER SPECIFY:

Series, Type, Mounting Style, Bore Size, Cylinder 1 Stroke, Cylinder 2 Stroke, and Options.

CAUTION: HYDRAULIC THREE POSITION CYLINDER (H3V) MUST BE VALVED PROPERLY TO PREVENT BLOCKING OF FLOW FROM THE CENTER PORT WHEN PRESSURIZING THE REAR (CAP) PORT. FAILURE TO DO SO MAY RESULT IN AN INTENSIFICATION OF PRESSURE IN CYLINDER NUMBER 1 CAUSING TIEROD FAILURE.



CYLINDER SERIES
AV - 1500 psi Air
HV - 1500 psi Hyd.
*A - 1500 psi Air
*Not available in 1-3/8" bore

BORE SIZE
3/4" BORE
1/4" Rod Dia.
1/4-28 Thread

1" BORE
5/16" Rod Dia.
5/16-24 Thread

1-1/8" BORE
3/8" Rod Dia.
3/8-24 Thread

1-3/8" BORE
1/2" Rod Dia.
3/8-24 Thread

STANDARD STROKE CYLINDER 1 (TOTAL STROKE)
3/4" BORE SIZE
1/4" to 6"
1" and 1-1/8" BORE SIZES
1/4" to 9"
in 1/4" increments

1-3/8" BORE SIZE
1/2" to 12"
in 1/2" increments
For longer strokes, consult PHD.

STANDARD STROKE CYLINDER 2 (FROM RETRACT TO MID POSITION)
3/4" BORE SIZE
1/4" to 6"
1" and 1-1/8" BORE SIZES
1/4" to 9"
in 1/4" increments

1-3/8" BORE SIZE
1/2" to 12"
in 1/2" increments
For longer strokes, consult PHD.

A 3 V R - 3/4 x 1 x 1/2 - P-M

TYPE
3 - Three Position Cylinder

MOUNTING STYLE
F - Foot Mount, c'bored through holes
B - Bottom Mount, tapped holes in head and cap
R - Rod Mount, tapped holes on front face of head
T - Thread Mount, threaded snout on head (shipped with mounting nut)
RF - Rod End Flange
CF - Cap End Flange
*L - Pilot Mount, threaded snout and pilot diameter on head (shipped with mounting nut)
*P - Pivot Mount, pivot on cap
**K - Clevis Mount, clevis on cap
*Available on 3/4", 1", and 1-1/8" bore only
**Available on 1-3/8" bore only

OPTIONS
B - Shock Pads on full extension and retraction only (not available on Series HV)
D - Cushion on full extension and retraction only (Cushions available, but not warranted, on Series HV 3/4", 1", or 1-1/8" sizes)
E - Magnetic Pistons on both cylinders for Series JC1 radial sensing switches (not available on Series A)
M - Magnetic Pistons on both cylinders for Series JC1 reed and teachable switches (not available on Series A)
P - Port Controls® on all heads and cap, full extension and retraction only, not on mid-position extension
V - Fluoroelastomer Seals



Options may affect unit length. See dimensional pages and option information details.

SERIES JC1xDx MAGNETIC SWITCHES

PART NO.	DESCRIPTION
JC1RDU-5	PNP or NPN DC Reed, 5 meter cable
JC1RDU-K	PNP or NPN DC Reed, Quick Connect
JC1ADU-K	AC Reed, Quick Connect (M12)
JC1HDP-5	PNP (Source), Radial Sensing, 5 meter cable
JC1HDP-K	PNP (Source), Radial Sensing, Quick Connect
JC1HDN-5	NPN (Sink), Radial Sensing, 5 meter cable
JC1HDN-K	NPN (Sink), Radial Sensing, Quick Connect

NOTE: Switches must be ordered separately.

CORDSETS FOR SERIES JC1xDx SWITCHES

PART NO.	DESCRIPTION
63549-02	M8, 3 pin, Straight Female Connector, 2 meter cable
63549-05	M8, 3 pin, Straight Female Connector, 5 meter cable
81284-1-010	M12, 4 pin, Straight Female Connector, 2 meter cable

NOTE: Cordsets are ordered separately.

SERIES JC1ST TWO POSITION TEACHABLE MAGNETIC SWITCHES

PART NO.	DESCRIPTION
JC1STP-2	PNP (Source), Solid State, 12-30 VDC, 2 meter cable
JC1STP-K	PNP (Source), Solid State, 12-30 VDC, Quick Connect

NOTE: Switches must be ordered separately.

CORDSET FOR SERIES JC1ST SWITCHES

PART NO.	DESCRIPTION
81284-1-001	M8, 4 pin, Straight Female Connector, 5 meter cable

NOTE: Cordsets are ordered separately.

SWITCH MOUNTING BRACKET

CYLINDER SIZE	BRACKET NO.	DESCRIPTION
3/4	92100	Mounts Series JC1 Switch to Tie Rod
1		
1-1/8		
1-3/8	92101	

NOTE: Brackets are ordered separately.



SPECIFICATIONS	SERIES A3V	SERIES H3V	SERIES A3
OPERATING PRESSURE	20 to 150 psi air	40 to 1500 psi hyd*	20 to 150 psi air
OPERATING TEMPERATURE	-20° to +180°F [-29° to +82°C]	-20° to +180°F [-29° to +82°C]	-20° to +180°F [-29° to +82°C]
STROKE TOLERANCE	±0.032	±0.032	±0.032
LUBRICATION	Permanently lubricated	—	Permanently lubricated
MAINTENANCE	Field repairable	Field repairable	Field repairable

*Hydraulic rating is based on non-shock hydraulic service.

CYLINDER FORCE TABLE

SERIES	CYLINDER BORE	ROD DIAMETER	ROD DIRECTION	EFFECTIVE AREA FORCE lb/psi	AIR CONSUMPTION at 80 psi CUBIC ft/in OF STROKE*	DISPLACEMENT gal/in OF STROKE*
A3V H3V A3	3/4	1/4	EXTEND	0.442	0.0016	0.0019
			RETRACT	0.393	0.0014	0.0017
	1	5/16	EXTEND	0.785	0.0029	0.0034
			RETRACT	0.709	0.0026	0.0031
	1-1/8	3/8	EXTEND	0.994	0.0037	0.0043
			RETRACT	0.883	0.0032	0.0038
	1-3/8	1/2	EXTEND	1.485	0.0055	0.0064
			RETRACT	1.289	0.0048	0.0056

*Value per cylinder (Cyl 1 or Cyl 2). Total = 2X value.

MAXIMUM ALLOWABLE EXTEND STROKE

SERIES	ROD DIAMETER	CYLINDER FORCE (lb)							
		100	200	500	1000	1500	2000	3000	5000
3/4", 1", 1-1/8" A3V, H3V, A3	1/4	12"	9"	6"	4"	3"	—	—	—
	5/16	18"	13"	8"	6"	5"	—	—	—
	3/8	26"	18"	12"	9"	7"	—	—	—
1-3/8" A3V, H3V	1/2	48"	34"	21"	15"	12"	—	—	—

SERIES	CYLINDER BORE	UNIT WEIGHTS (lb)	
		ZERO STROKE	ADDER PER INCH OF STROKE*
AVR	3/4	0.67	0.04
	1	1.39	0.07
	1-1/8	1.52	0.10
	1-3/8	4.12	0.12

*Total Stroke = Stroke Cylinder 1 (Total) + Stroke Cylinder 2 (3 Position Stroke)

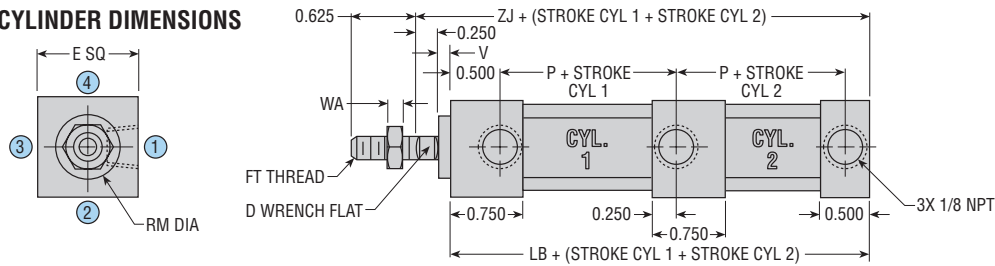
CYLINDER FORCE CALCULATIONS

Imperial
F = P x A

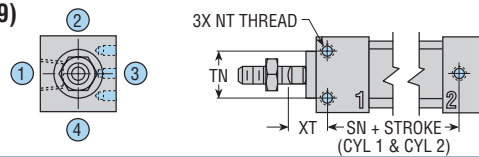
F = Cylinder Force lbs
P = Operating Pressure psi
A = Effective Area in²
(Extend or Retract)

DIMENSIONS: Series A3V, H3V, A3 Cylinders - 3/4", 1", 1-1/8" Bore

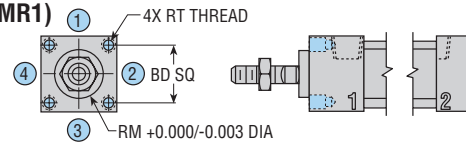
BASIC CYLINDER DIMENSIONS



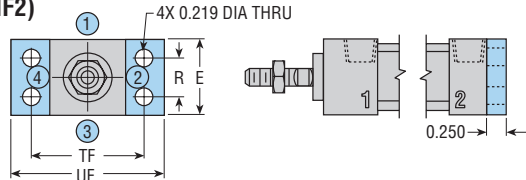
B (MS9)



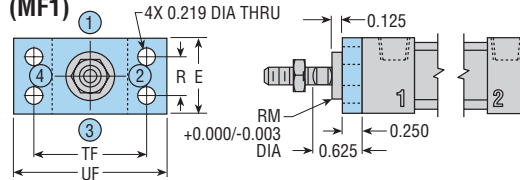
R (MR1)



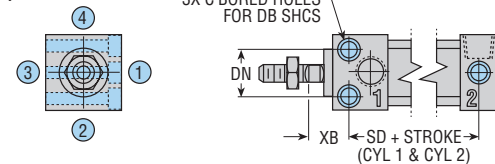
CF (MF2)



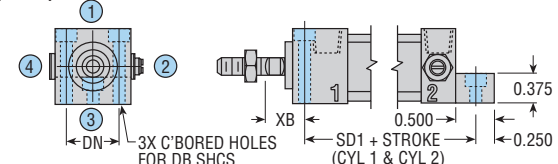
RF (MF1)



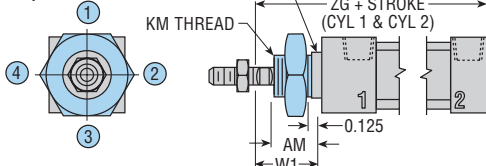
F (MS8)



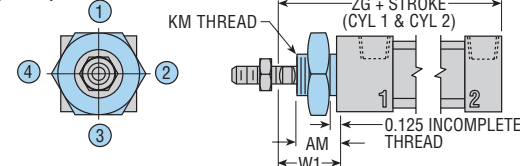
F (MS8) - WITH PORT CONTROL® ON CAP END



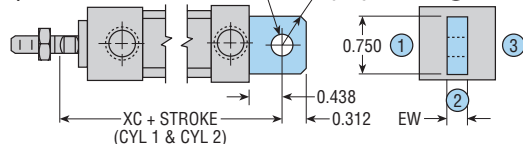
L (MNR1)



T (MN1)



P (MP3)



All standard rod ends have four wrench flats (two wrench flats with "I" option).

PORT POSITIONS: INDICATED BY CIRCLED NUMBERS

CUSHIONS: ADD 0.500 in TO (+ STROKE) DIMENSIONS OF CYLINDER 1 AND CYLINDER 2 FOR CUSHIONS (ADD TOTAL OF 1.000 in TO OVERALL LENGTH)

SHOCK PADS: ADD 0.250 in TO (+ STROKE) DIMENSIONS OF CYLINDER 1 AND CYLINDER 2 FOR SHOCK PADS (ADD TOTAL OF 0.500 in TO OVERALL LENGTH)

DIMENSIONS COMMON TO ALL SERIES

BORE SIZE	BD	D	DB	DF	DN	E	EW	FT	NT
3/4	0.750	3/16	#8	1.375	0.625	1.000	0.250	1/4-28	8-32 x 0.18 DP
1	1.000	1/4	#10	1.750	0.875	1.375	0.375	5/16-24	10-32 x 0.25 DP
1-1/8	1.125	5/16	#10	1.875	1.000	1.500	0.375	3/8-24	10-32 x 0.25 DP

DIMENSIONS COMMON TO ALL SERIES

BORE SIZE	R	RM	RT	TF	TN	UB	UF	WA
3/4	0.500	0.625	8-32 x 0.25 DP	1.500	0.625	1.750	2.000	0.156
1	0.875	0.750	8-32 x 0.25 DP	1.875	0.875	2.125	2.375	0.188
1-1/8	1.000	0.750	10-32 x 0.25 DP	2.000	1.000	2.250	2.500	0.219

SERIES A3 CYLINDERS

BORE SIZE	AM	CD	KM	LB	P	P1	RM1	SD	SD1	SN	V	W1	XB	XC	XT	ZG	ZJ
3/4	0.625	0.250	5/8-18	3.312	1.000	1.562	0.687	2.875	3.375	2.875	0.125	0.875	0.562	4.125	0.562	4.187	3.687
1	0.625	0.250	3/4-16	3.312	1.000	1.562	0.812	2.812	3.312	2.812	0.125	0.875	0.625	4.125	0.625	4.187	3.687
1-1/8	0.625	0.250	3/4-16	3.312	1.000	1.562	0.812	2.812	3.312	2.812	0.125	0.875	0.625	4.125	0.625	4.187	3.687

SERIES A3V CYLINDERS

BORE SIZE	AM	CD	KM	LB	P	P1	RM1	SD	SD1	SN	V	W1	XB	XC	XT	ZG	ZJ
3/4	0.625	0.250	5/8-18	4.312	1.500	2.062	0.687	3.875	4.375	3.875	0.125	0.875	0.562	5.125	0.562	5.187	4.687
1	0.625	0.375	3/4-16	4.312	1.500	2.062	0.812	3.812	4.312	3.812	0.125	0.875	0.625	5.125	0.625	5.187	4.687
1-1/8	0.875	0.375	1-14	4.312	1.500	2.062	1.062	3.812	4.312	3.812	0.125	1.125	0.625	5.125	0.625	5.437	4.687

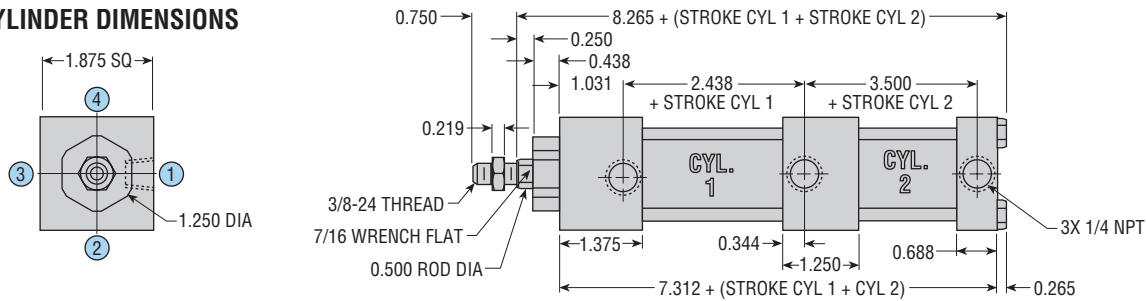
SERIES H3V CYLINDERS

BORE SIZE	AM	CD	KM	LB	P	P1	RM1	SD	SD1	SN	V	W1	XB	XC	XT	ZG	ZJ
3/4	0.625	0.250	5/8-18	4.312	1.500	2.062	0.687	3.875	4.375	3.875	0.375	0.875	0.812	5.375	0.812	5.187	4.937
1	0.625	0.375	3/4-16	4.312	1.500	2.062	0.812	3.812	4.312	3.812	0.375	0.875	0.875	5.375	0.875	5.187	4.937
1-1/8	0.875	0.375	1-14	4.312	1.500	2.062	1.062	3.812	4.312	3.812	0.375	1.125	0.875	5.375	0.875	5.437	4.937

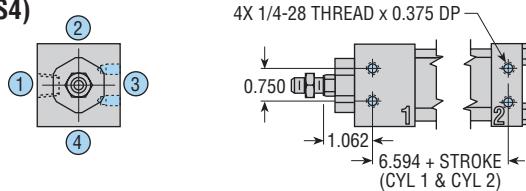
All dimensions are reference only unless specifically tolerated.

DIMENSIONS: Series A3V, H3V Cylinders - 1-3/8" Bore

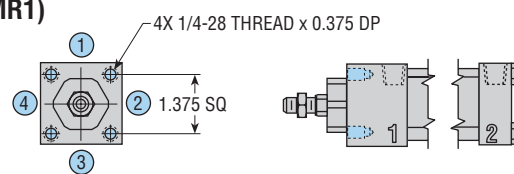
BASIC CYLINDER DIMENSIONS



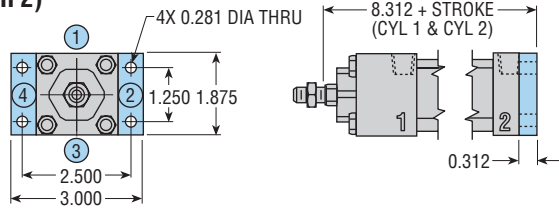
B (MS4)



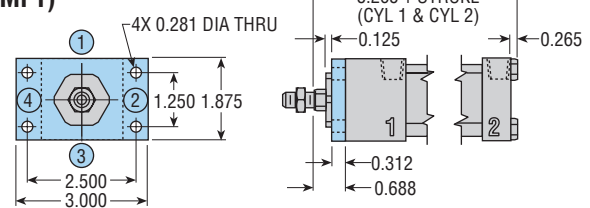
R (MR1)



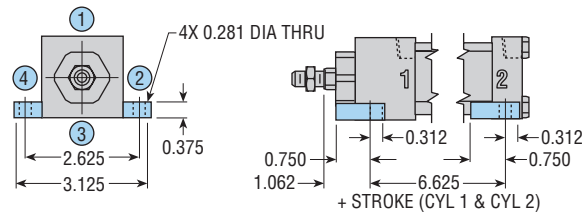
CF (MF2)



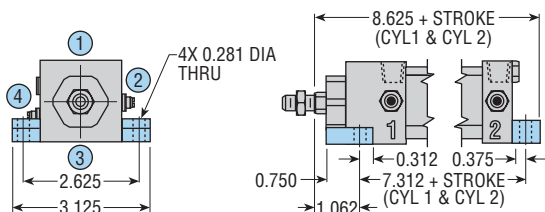
RF (MF1)



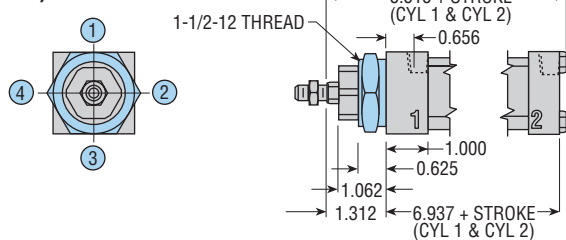
F (MS2)



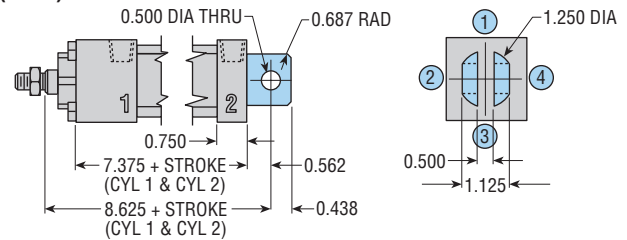
F (MS2)-WITH PORT CONTROL® & CUSHION ON CAP END



T (MN1)



K (MP1)



All standard rod ends have four wrench flats (two wrench flats with "I" option).

PORT POSITIONS: INDICATED BY CIRCLED NUMBERS

CUSHIONS: CYLINDER LENGTH IS NOT AFFECTED BY ADDITION OF CUSHIONS

SHOCK PADS: ADD 0.250 in TO (+ STROKE) DIMENSIONS OF EACH CYLINDER 1 AND CYLINDER 2 (ADD A TOTAL OF 0.500 in TO OVERALL LENGTH)

All dimensions are reference only unless specifically tolerated.

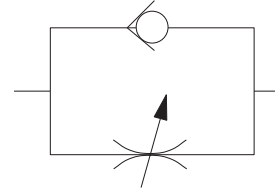
P

PORT CONTROL®

The exclusive PHD Port Control®, based on the “meter-out” principle, features an adjustable needle and a separate ball check. Both are built into the cylinder end cap and are used to control the speed of the cylinder over its entire stroke.

The self-locking needle has micrometer threads and is adjustable under pressure. It determines the orifice size which controls the exhaust volume. The separate ball check is closed while fluid

is exhausting from the cylinder, but opens to permit full flow of incoming fluids. The PHD Port Control® provides the optimum in speed control for small bore cylinders. It saves space and eliminates the cost of installation and fittings for external flow control valves.



D

ADJUSTABLE CUSHION

PHD Cushions are designed for smooth deceleration at the end of stroke. When the cushion is activated the remaining volume in the cylinder must exhaust past an adjustable needle which controls the amount of deceleration.

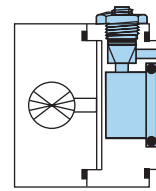
See dimension pages for dimensional information.

3/4", 1", 1-1/8" Series A3, A3V, H3V = Cushion Block
1-3/8" Series A3V, H3V = Poppet Style

Effective cushion length 1/2"

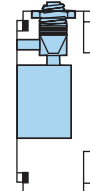
Not warranted on Series H3V 3/4", 1", 1-1/8" units

CUSHION BLOCK



3/4", 1", 1-1/8" BORE

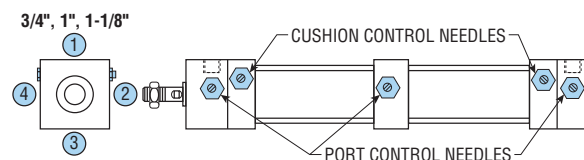
POPPET STYLE



1-3/8" BORE

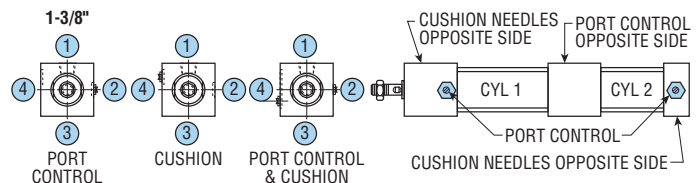
STANDARD PORT CONTROL® & CUSHION NEEDLE POSITIONS (3/4", 1", 1-1/8" Bore Series A3, AV3, and HV3 Cylinders)

Port Control® and cushion needles are located in position 2 on standard cylinders. They may be located at position 4 when specified on all Series A3, A3V, and H3V. Consult PHD for special Port Control® or cushion needle positions.



STANDARD PORT CONTROL® & CUSHION NEEDLE POSITIONS (1-3/8" Bore Series A3V and H3V Cylinders)

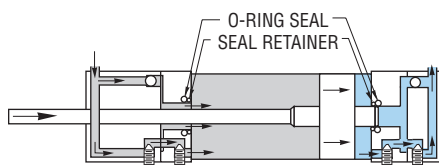
Port Control® and cushion needles are located on opposite sides adjacent to port. Please consult distributor or PHD to check availability of special Port Control® or cushion needle positions.



PORT CONTROL® AND ADJUSTABLE CUSHION COMBINATION (3/4", 1", 1-1/8" Bore Series A2, A3V, and H3V Cylinders)

Cushion and Port Control® combination arranged in series provides a compact efficient control system for maximum space weight and cost savings. The cushion is activated when the piston extension enters a seal in the cushion block. The remaining volume in the cylinder exhausts past an adjustable needle. A check seal in the adjusting needle is closed during deceleration, but opens to permit full flow for immediate reversing. The cushion seal in the block is an o-ring for air units.

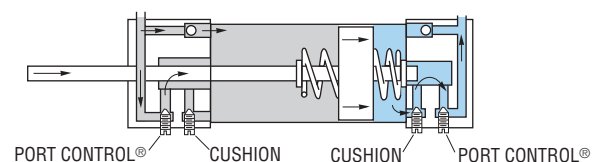
CUSHION BLOCK STYLE



PORT CONTROL® AND ADJUSTABLE CUSHION COMBINATION (1-3/8" Bore Series A3V and H3V Cylinders)

The cushion and Port Control® combination is also available on the 1-3/8" bore. This cushion is activated when a seal, which is traveling with the piston, seals against the cylinder end cap. This causes the remaining volume in the cylinder to exhaust past an adjustable needle which controls the amount of deceleration. The spring, which extends the seal from the piston, permits the seal to act as a check valve to allow full flow back into the cylinder for immediate reversing. The cushion seal for air units is made of urethane while seals for oil units are close tolerance metal.

POPPET STYLE



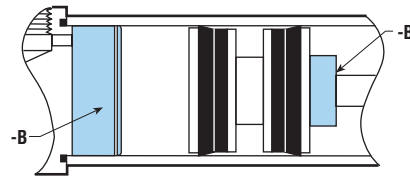
B

SHOCK PADS

Polyurethane pads for absorption of shock and noise (not available on hydraulic units). Reducing shock permits higher piston velocities for shorter cycle times. Reducing noise levels provides improved environment for increased productivity. Eliminates metal to metal contact between piston and end caps.

Available together with all options EXCEPT:

- Same end as Cushion (-D)



E

MAGNETIC PISTON FOR SERIES JC1 RADIAL SENSING SWITCHES

PHD Cylinders can include a magnetic band (-E) on the piston to trigger external radial sensing solid state switches. These switches enable Tom Thumb® air or hydraulic cylinders to connect with different logic systems and work with the switches listed below.

See Series JC1 Switches at phdinc.com for more information.

M

MAGNETIC PISTON FOR SERIES JC1 REED & TEACHABLE SWITCHES

A magnetic band (-M) on the piston triggers externally mounted PHD Reed Switches and Two Position Teachable Switches. Reed switches use a physical element to close the circuit, whereas solid-state switches utilize magnetoresistive principles.

The Teachable Switch enables two programmable positions with one device – no fine tuning needed. Simply align the switch, position the actuator, and program the two positions.

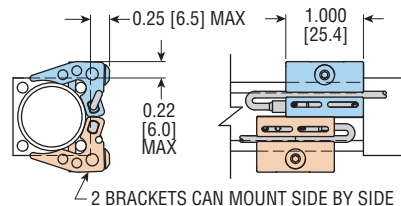
SERIES JC1 MAGNETIC SWITCHES AND CORDSETS

MAGNET OPTION	SENSING TYPE	OUTPUT / VOLTAGE	CABLE	SWITCH PART NO.	CORDSETS	
					2 METER	5 METER
-E [Radial]	Solid State	NPN / DC	5 m, 3 Conductor	JC1HDN-5	—	—
			.3 m, M8 3-Pin	JC1HDN-K	63549-02	63549-05
		PNP / DC	5 m, 3 Conductor	JC1HDP-5	—	—
			.3 m, M8 3-Pin	JC1HDP-K	63549-02	63549-05
-M [Axial]	Reed	PNP or NPN / AC	.3 m, M12 4-Pin	JC1ADU-K	81284-1-010	—
			5 m, 3 Conductor	JC1RDU-5	—	—
		PNP or NPN / DC	.3 m, M8 3-Pin	JC1RDU-K	63549-02	63549-05
			2 m, 4 Conductor	JC1STP-2	—	—
	Solid State	PNP / DC Two Position Teachable	2 m, M8 4-Pin	JC1STP-K	—	81284-1-001

SWITCH MOUNTING BRACKET

CYLINDER SIZE	BRACKET NO.
3/4	92100
1	
1-1/8	
1-3/8	92101

NOTE: Brackets are ordered separately.



V

FLUOROELASTOMER SEALS

Fluoroelastomer seals are available to achieve seal compatibility with certain fluids. Seal compatibility should be checked with the fluid manufacturer for proper application. Consult PHD for high temperature use.

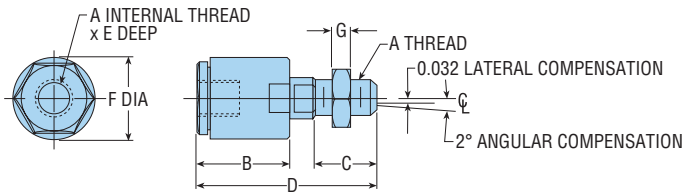
All dimensions are reference only unless specifically toleranced.

ACCESSORIES: Series A3V, H3V, A3 Cylinders - 3/4", 1", 1-1/8", 1-3/8" Bore

SELF-ALIGNING PISTON ROD COUPLERS

Rod Couplers eliminate expensive precision machining for mounting fixed or rigid cylinder on guide or slide applications.

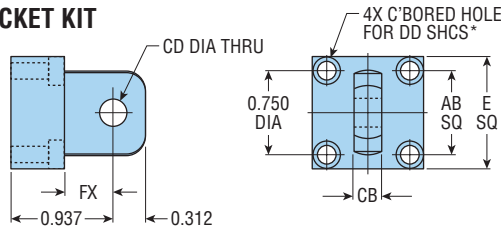
Cylinder efficiency is increased by eliminating friction caused by misalignment. Couplers compensate for 2° angular error and 1/32" lateral misalignment on push and pull stroke.



MODEL NO.	LETTER DIMENSION						
	A	B	C	D	E	F	G
250	1/4-28	1.000	0.625	1.875	0.500	0.875	0.156
312	5/16-24	1.000	0.625	1.875	0.500	0.875	0.187
375	3/8-24	1.000	0.625	1.875	0.500	0.875	0.219
437	7/16-20	1.125	0.650	2.187	0.500	1.000	0.250

To order, specify the model number.

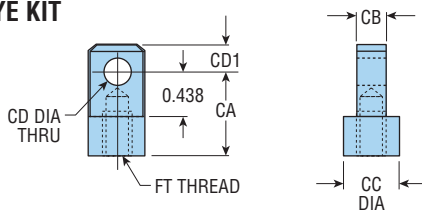
EYE BRACKET KIT



BORE SIZE	CYLINDER SERIES	PART NO.	LETTER DIMENSION					
			AB	CB	CD	DD*	E	FX
3/4	A3, A3V, H3V	1077-01	0.750	0.248	0.250	#6	1.000	0.577
1 &	A3	1077-02	1.000	0.373	0.250	#10	1.375	0.437
1-1/8	A3V, H3V	1077-03	1.000	0.373	0.375	#10	1.375	0.437

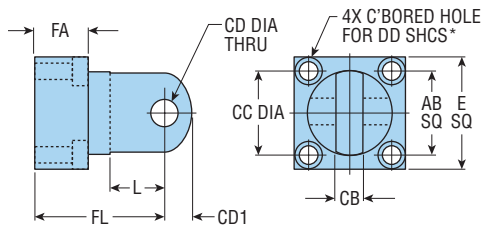
*For 3/4 bore thru hole only.

ROD EYE KIT



BORE SIZE	CYLINDER SERIES	PART NO.	LETTER DIMENSION					
			CA	CB	CC	CD	CD1	FT
3/4	A3, A3V, H3V	1075-01	0.750	0.248	0.500	0.250	0.250	1/4-28 x 0.375 DP
1	A3	1075-02	0.875	0.373	0.750	0.250	0.375	5/16-24 x 0.375 DP
	A3V, H3V	1075-04	0.875	0.373	0.750	0.375	0.375	5/16-24 x 0.375 DP
1-1/8	A3	1075-03	0.875	0.373	0.750	0.250	0.375	3/8-24 x 0.312 DP
	A3V, H3V	1075-05	0.875	0.373	0.750	0.375	0.375	3/8-24 x 0.312 DP

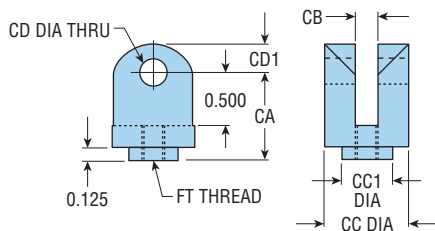
CLEVIS BRACKET KIT - PIN INCLUDED



BORE SIZE	CYLINDER SERIES	PART NO.	LETTER DIMENSION									
			AB	CB	CC	CD	CD1	DD*	E	FA	FL	L
3/4	A3, A3V, H3V	12901	0.750	0.254	0.750	0.250	0.250	#6	1.000	0.360	1.187	0.500
1 &	A3	12902	1.000	0.379	0.875	0.250	0.375	#10	1.375	0.500	1.250	0.531
1-1/8	A3V, H3V	12903	1.000	0.379	0.875	0.375	0.375	#10	1.375	0.500	1.250	0.531

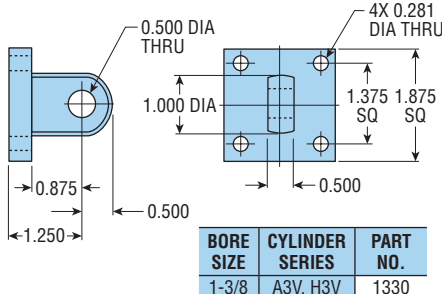
*For 3/4 bore thru hole only.

ROD CLEVIS KIT - PIN INCLUDED



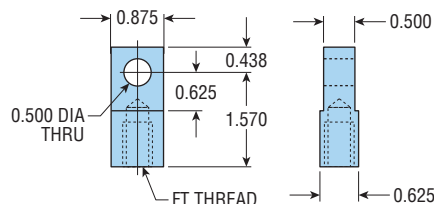
BORE SIZE	CYLINDER SERIES	PART NO.	LETTER DIMENSION						
			CA	CB	CC	CC1	CD	CD1	FT
3/4	A3, A3V, H3V	12904	0.812	0.254	0.750	0.437	0.250	0.250	1/4-28 TO SLOT
1	A3	12905	0.875	0.379	0.875	0.562	0.250	0.375	5/16-24 TO SLOT
	A3V, H3V	12906	0.875	0.379	0.875	0.562	0.375	0.375	5/16-24 TO SLOT
1-1/8	A3	12907	0.875	0.379	0.875	0.562	0.250	0.375	3/8-24 TO SLOT
	A3V, H3V	12908	0.875	0.379	0.875	0.562	0.375	0.375	3/8-24 TO SLOT

EYE BRACKET KIT



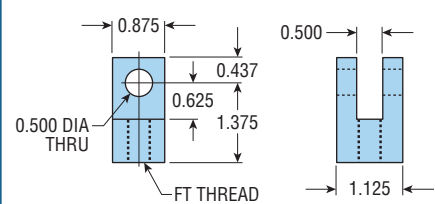
BORE SIZE	CYLINDER SERIES	PART NO.
1-3/8	A3V, H3V	1330

ROD EYE KIT



BORE SIZE	CYLINDER SERIES	PART NO.	LETTER DIMENSION FT
1-3/8	A3V, H3V	1375-01	3/8-24 x 0.750 DP

ROD CLEVIS KIT - PIN INCLUDED



BORE SIZE	CYLINDER SERIES	PART NO.	LETTER DIMENSION FT
1-3/8	A3V, H3V	12909	3/8-24 TO SLOT

All dimensions are reference only unless specifically tolerated.