

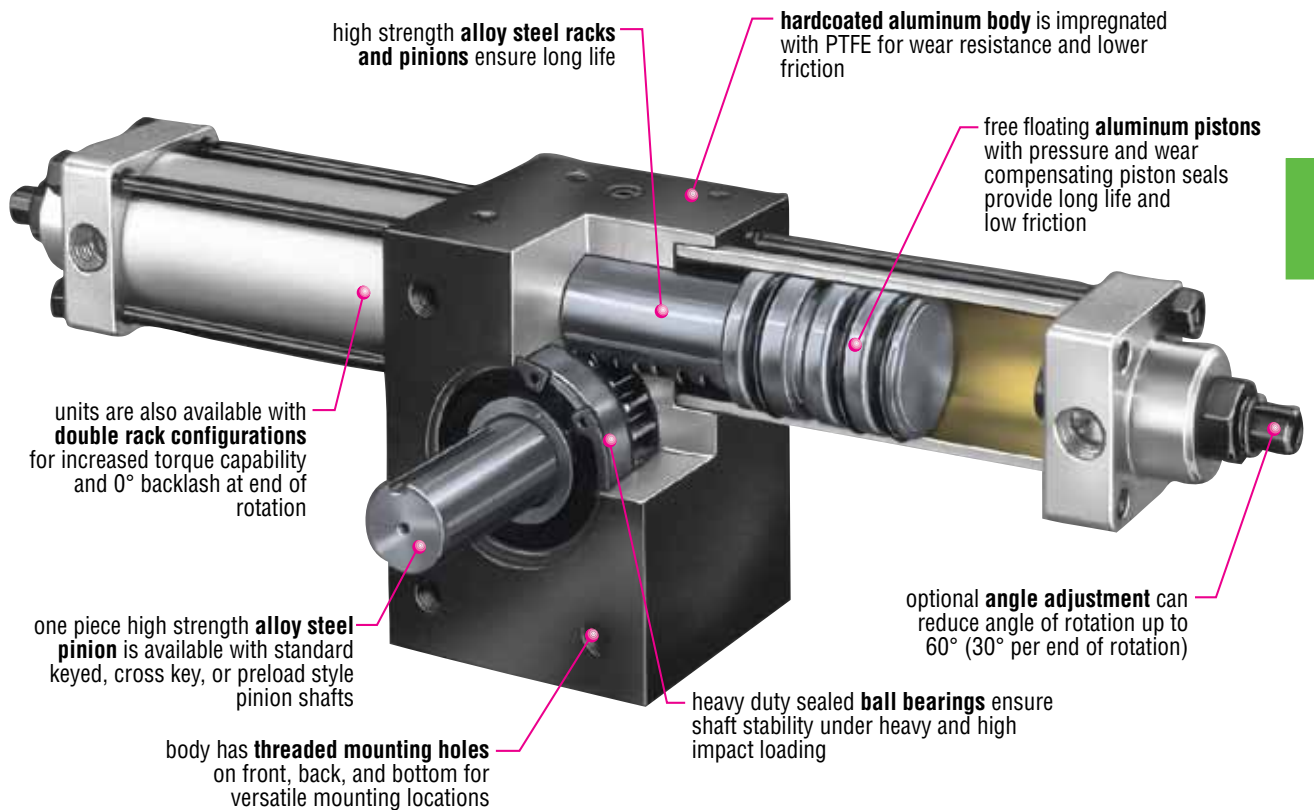
1000-8000



**HEAVY DUTY
HIGH TORQUE**



OUTPUT TORQUES TO 31,800 in-lb [3595 Nm]



1000-8000

Major Benefits

- Heavy duty
- Wide variety of options and accessories
- Versatile design
- High torque

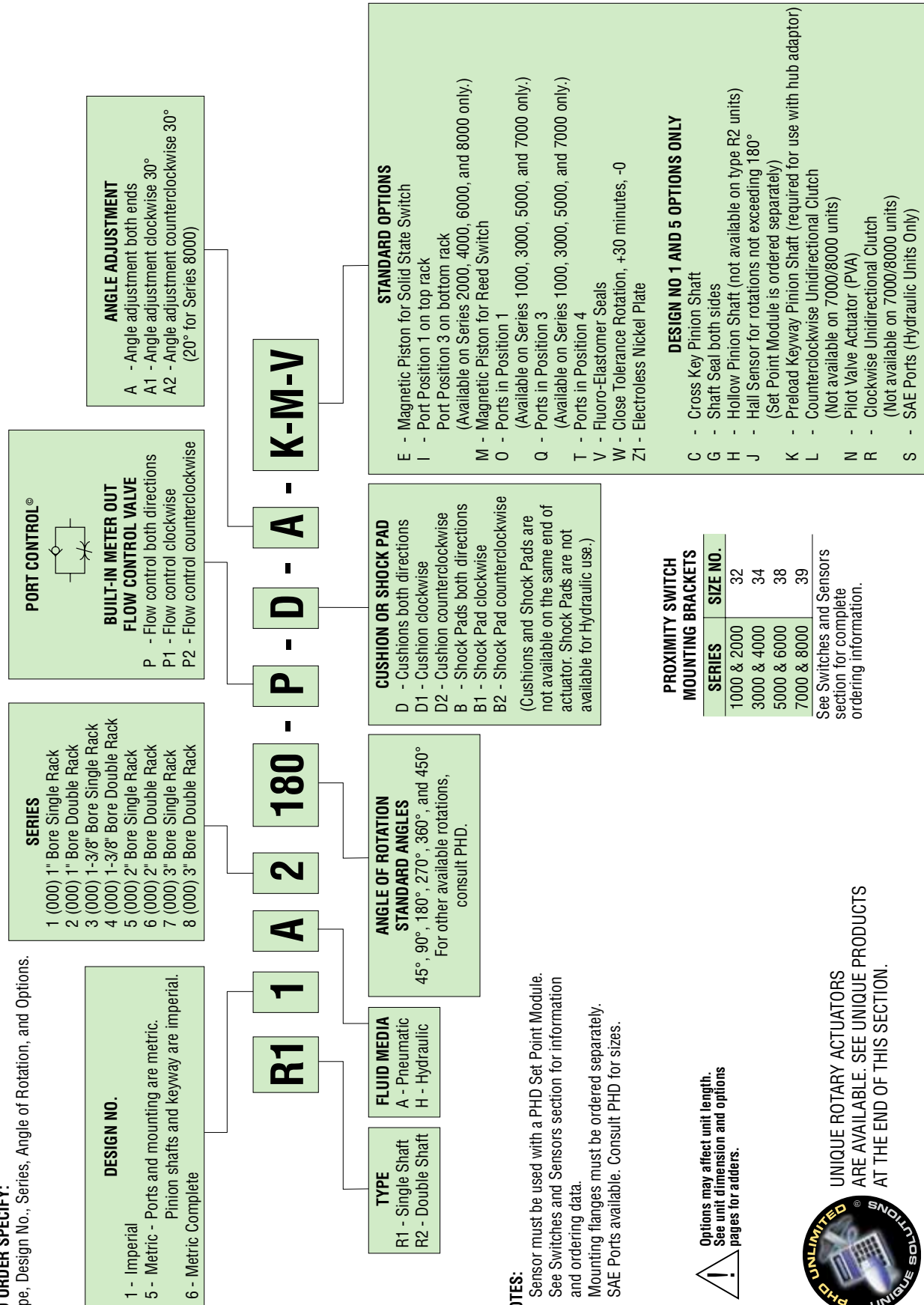
Industry Uses

- Automotive
- General machine builders

UNITS WITH IMPERIAL SHAFTS AND KEYWAY

TO ORDER SPECIFY:

Type, Design No., Series, Angle of Rotation, and Options.



DESIGN NO.

- 1 - Imperial
- 5 - Metric - Ports and mounting are metric. Pinion shafts and keyway are imperial.
- 6 - Metric Complete

SERIES

- 1 (000) 1" Bore Single Rack
- 2 (000) 1" Bore Double Rack
- 3 (000) 1-3/8" Bore Single Rack
- 4 (000) 1-3/8" Bore Double Rack
- 5 (000) 2" Bore Single Rack
- 6 (000) 2" Bore Double Rack
- 7 (000) 3" Bore Single Rack
- 8 (000) 3" Bore Double Rack

PORT CONTROL®

BUILT-IN METER OUT FLOW CONTROL VALVE

- P - Flow control both directions
- P1 - Flow control clockwise
- P2 - Flow control counterclockwise

ANGLE ADJUSTMENT

- A - Angle adjustment both ends
- A1 - Angle adjustment clockwise 30°
- A2 - Angle adjustment counterclockwise 30° (20° for Series 8000)

TYPE

- R1 - Single Shaft
- R2 - Double Shaft

FLUID MEDIA

- A - Pneumatic
- H - Hydraulic

ANGLE OF ROTATION STANDARD ANGLES

45°, 90°, 180°, 270°, 360°, and 450°
For other available rotations, consult PHD.

CUSHION OR SHOCK PAD

- D - Cushions both directions
 - D1 - Cushion clockwise
 - D2 - Cushion counterclockwise
 - B - Shock Pads both directions
 - B1 - Shock Pad clockwise
 - B2 - Shock Pad counterclockwise
- (Cushions and Shock Pads are not available on the same end of actuator. Shock Pads are not available for Hydraulic use.)

STANDARD OPTIONS

- E - Magnetic Piston for Solid State Switch
- I - Port Position 1 on top rack
- I - Port Position 3 on bottom rack (Available on Series 2000, 4000, 6000, and 8000 only.)
- M - Magnetic Piston for Reed Switch
- O - Ports in Position 1 (Available on Series 1000, 3000, 5000, and 7000 only.)
- Q - Ports in Position 3 (Available on Series 1000, 3000, 5000, and 7000 only.)
- T - Ports in Position 4
- V - Fluoro-Elastomer Seals
- W - Close Tolerance Rotation, +30 minutes, -0
- Z1 - Electroless Nickel Plate

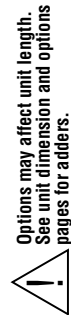
PROXIMITY SWITCH MOUNTING BRACKETS

SERIES	SIZE NO.
1000 & 2000	32
3000 & 4000	34
5000 & 6000	38
7000 & 8000	39

See Switches and Sensors section for complete ordering information.

DESIGN NO 1 AND 5 OPTIONS ONLY

- C - Cross Key Pinion Shaft
- G - Shaft Seal both sides
- H - Hollow Pinion Shaft (not available on type R2 units)
- J - Hall Sensor for rotations not exceeding 180° (Set Point Module is ordered separately)
- K - Preload Keyway Pinion Shaft (required for use with hub adaptor)
- L - Counterclockwise Unidirectional Clutch (Not available on 7000/8000 units)
- N - Pilot Valve Actuator (PVA)
- R - Clockwise Unidirectional Clutch (Not available on 7000/8000 units)
- S - SAE Ports (Hydraulic Units Only)



Options may affect unit length. See unit dimension and options pages for adders.



UNIQUE ROTARY ACTUATORS ARE AVAILABLE. SEE UNIQUE PRODUCTS AT THE END OF THIS SECTION.

NOTES:

- 1) Sensor must be used with a PHD Set Point Module. See Switches and Sensors section for information and ordering data.
- 2) Mounting flanges must be ordered separately.
- 3) SAE Ports available. Consult PHD for sizes.

ENGINEERING DATA: SERIES 1000-8000 ROTARY ACTUATORS

SPECIFICATIONS	SERIES 1000-8000
PNEUMATIC OPERATING PRESSURE	20 to 150 psi [1.4 to 10 bar]
HYDRAULIC OPERATING PRESSURE**	40 to 1500 psi [2.8 to 103 bar]
OPERATING TEMPERATURE	-20° to 180°F [-29° to 82°C]
ROTATIONAL TOLERANCE	Nominal rotation +10° to -0°
BACKLASH AT ANY MID-ROTATION POINT AND AT END OF ROTATION WITHOUT -A (DOUBLE RACK)	1° (2000), 0°30' (4000, 6000), 0°15' (8000)
BACKLASH AT END OF ROTATION WITH -A* (DOUBLE RACK)	0° (2000, 4000, 6000, 8000)
BACKLASH ON ALL SINGLE RACK UNITS (END AND ANY MID-ROTATION)	1° (1000), 0°30' (3000, 5000), 0° 15' (7000)
LUBRICATION	Factory lubricated for rated life
MAINTENANCE	Field repairable

NOTE: *-A angle adjustment screw must be engaged or adjusted to achieve 0° backlash

SIZE	WEIGHT		BORE		DISPLACEMENT		THEORETICAL		MAX AXIAL BEARING LOAD		MAX RADIAL BEARING LOAD		DISTANCE BETWEEN SHAFT BEARINGS			
			DIAMETER		VOLUME/DEG		TORQUE OUTPUT									
	lb	kg	lb/°	kg/°	in	mm	in ³ /°	cm ³ /°	in-lb/psi	Nm/bar	lb	N	lb	N	in	mm
1(000)	2.3	1.0	.0022	.0010	1.000	25.4	.007	.115	.39	.64	120	534	300	1334	1.375	34.9
2(000)	3.3	1.5	.0043	.0020	1.000	25.4	.014	.229	.78	1.28						
3(000)	6.9	3.1	.0064	.0029	1.375	34.9	.019	.312	1.11	1.21	240	1068	600	2669	2.188	55.6
4(000)	9.7	4.4	.0127	.0058	1.375	34.9	.038	.623	2.22	3.64						
5(000)	10.7	4.8	.0093	.0042	2.000	50.8	.041	.672	2.36	3.87	370	1646	925	4114	2.235	56.8
6(000)	15.7	7.1	.0185	.0084	2.000	50.8	.082	1.344	4.72	7.74						
7(000)	34.4	15.6	.0289	.0131	3.000	76.2	.185	3.032	10.60	17.37	800	3558	2000	8896	3.750	95.3
8(000)	42.2	19.1	.0578	.0262	3.000	76.2	.370	6.064	21.20	34.75						

HYD SERIES	OPTION psi [bar]				
	PLAIN	-P	-D	-E OR -M	
1000	—	—	—	—	—
2000	1000 [69]	750 [52]	750 [52]	—	—
3000	—	—	—	—	—
4000	—	750 [52]	750 [52]	—	—
5000	—	—	—	—	750 [52]
6000	—	750 [52]	750 [52]	—	750 [52]
7000	—	—	—	—	500 [35]
8000	—	750 [52]	750 [52]	—	500 [35]

NOTE: **All hydraulic ratings are based on non-shock hydraulic service.

PRESSURE RATINGS FOR OPTIONS

All pneumatic rotary actuators have a maximum pressure rating of 150 psi [10 bar] air. Most hydraulic rotary actuators have a maximum pressure rating of 1500 psi [100 bar], except as noted in the chart.

Minimum factor of safety at maximum rated hydraulic pressure for output shaft is 2:1, and for hydraulic chambers is 3:1. Consult PHD for proof pressure data. Hydraulic ratings based on non-shock, hydraulic service.

SIZING AND APPLICATION ASSISTANCE

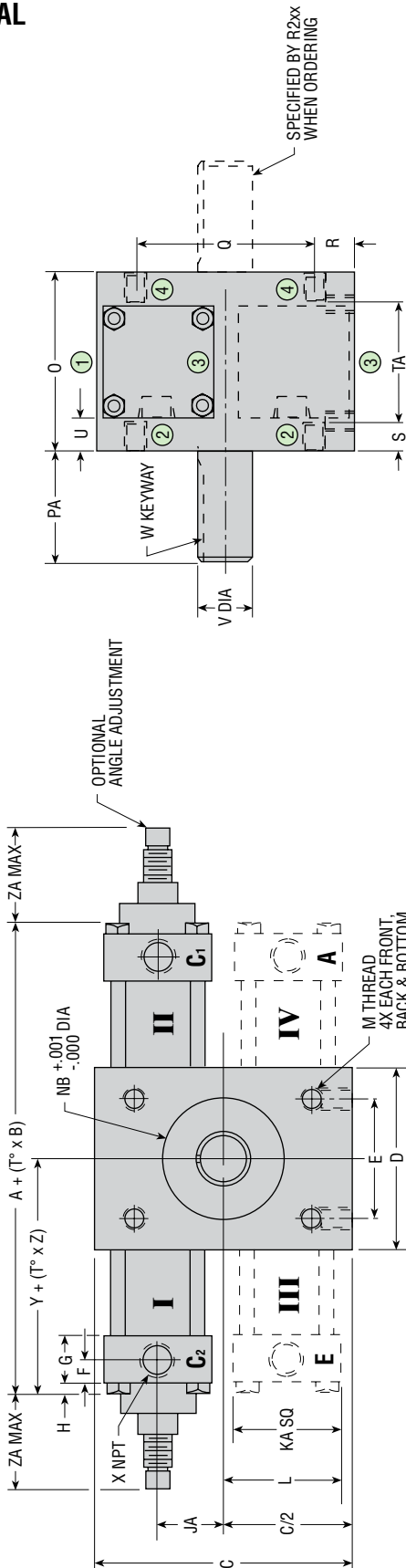
See PHD Product Sizing Catalog for specific and complete sizing information.

Online sizing assistance is available at: www.phdinc.com/apps/sizing

1000-8000

DIMENSIONS: SERIES 1000-8000 ROTARY ACTUATORS

IMPERIAL



CAP STYLE	SERIES	LETTER DIMENSION																									
		A	B	C	D	E	F	G	H	JA	KA	L	M	NB	O	PA	Q	R	S	TA	U	V	W	X	Y	Z	ZA
PLAIN	1000 & 2000	5.698	.0174	3.000	2.000	1.500	.250	.500	0.00	.750	1.375	1.437	1/4-20 x .312 DP	1.125 x .056 DP	2.000	.875	2.000	.500	.250	1.500	.312	.4998/5.003	1/8 x 1/16 x .625	1/8	2.849	.0087	0.00
-A	1000 & 2000	6.198	.0174	3.000	2.000	1.500	.500	.750	0.00	.750	1.375	1.437	1/4-20 x .312 DP	1.125 x .056 DP	2.000	.875	2.000	.500	.250	1.500	.312	.4998/5.003	1/8 x 1/16 x .625	1/8	3.099	.0087	1.125
BOTH	3000 & 4000	7.906	.026	4.250	3.000	2.000	.344	.688	.250	1.156	1.875	2.094	5/16-18 x .500 DP	2.000 x .039 DP	3.000	1.875	3.000	.625	.500	2.000	.562	.8748/8.753	3/16 x 3/32 x 1.500	1/4	3.953	.013	1.500
BOTH	5000 & 6000	9.126	.026	5.000	4.000	2.500	.375	.750	.203	1.156	2.250	2.281	3/8-16 x .625 DP	2.1654 x .052 DP	3.000	1.875	3.500	.750	.500	2.000	.375	1.124/1.125	1/4 x 1/8 x 1.500	1/4	4.563	.013	1.875
BOTH	7000 & 8000	12.160	.052	8.000	5.000	3.000	.469	1.062	.437	1.875	3.500	3.625	3/4-10 x 1.250 DP	3.3465 x .120 DP	5.000	3.500	5.000	1.500	1.250	2.500	.750	1.749/1.750	3/8 x 3/16 x 3.000	3/8	6.080	.026	2.875

OPTION LOCATION REFERENCE

ACTUATOR TYPE	LETTER OPTION REFERENCED BY TUBE NUMBER										PORT & NEEDLE LOCATIONS REFERENCED BY CIRCLED NUMBERS																					
	-A	-B	-B1	-B2	-D1	-D2	-P1	-P2	-P	-Q	STANDARD	-O	-Q	-I	-J	-K	-L	-M	-N	-O	-P	-Q	-R	-S	-T	-U	-V	-W	-X	-Y	-Z	
R1xA & R2xA	II	I	II	I	II	I	II	I	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II
R1xH & R2xH	II	I	II	I	II	I	II	I	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II	I & II

QUICK REFERENCE FOR: A + (T° x B)

SERIES	DEGREE OF ROTATION					
	45	90	180	270	360	450
*1000 & 2000	6.481	7.264	8.830	10.396	11.962	13.528
3000 & 4000	9.076	10.246	12.586	14.926	17.266	19.606
5000 & 6000	10.296	11.466	13.806	16.146	18.486	20.826
7000 & 8000	14.500	16.840	21.520	26.200	30.880	35.560

*Dimensions calculated using plain cap style. Add .250 to dimension for each -A style cap used on Series 1000/2000 only.

SHAFT KEYWAY: SHOWN AT MID-ROTATION

PORT POSITION: INDICATED BY CIRCLED NUMBERS

TUBES III & IV: INCLUDED ON SERIES 1000, 3000, 5000, & 7000 ONLY

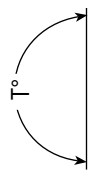
MTG. HOLES: CENTERED ON CENTERLINE OF ACTUATOR BODY

CUSHIONS: SERIES 1000 & 2000 ACTUATORS

ADD 1/2" TO RESPECTIVE "A" AND "Y" DIMENSIONS FOR EACH CUSHION

PORT PRESSURIZED - FULL CCW POSITION
C1 ON SERIES 1000, 3000, 5000, & 7000
OR C1 & E ON SERIES 2000, 4000, 6000, & 8000

PORT PRESSURIZED - FULL CW POSITION
C2 ON SERIES 1000, 3000, 5000, & 7000
OR C2 & A ON SERIES 2000, 4000, 6000, & 8000



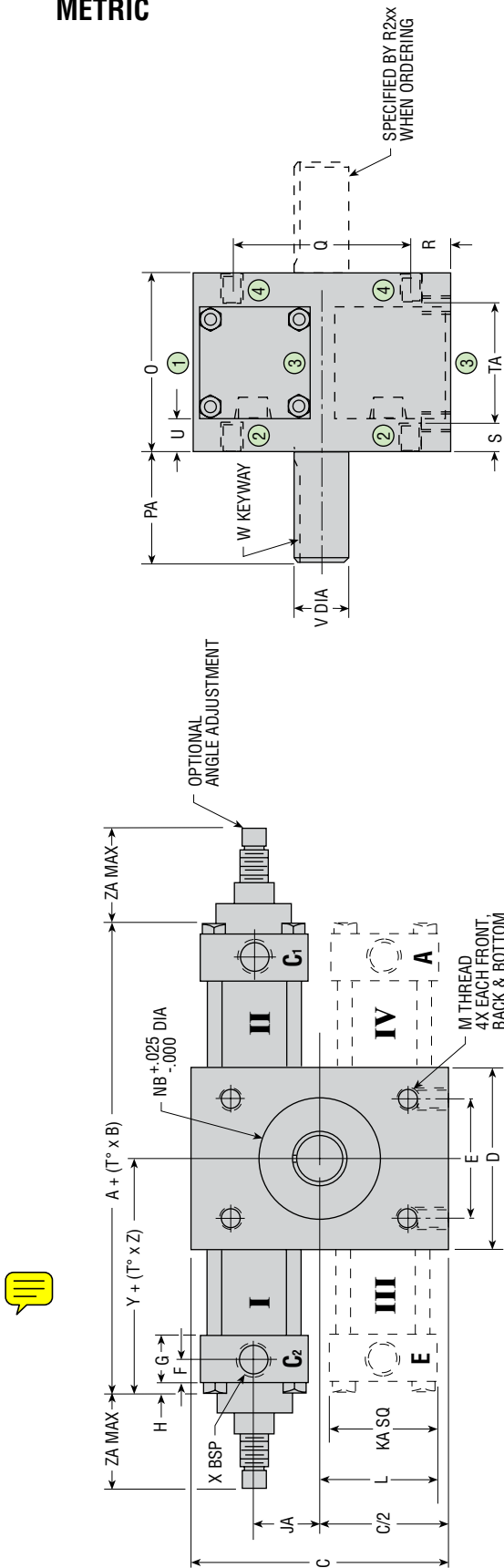
All dimensions are reference only unless specifically toleranced.

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DIMENSIONS: SERIES 1000-8000 ROTARY ACTUATORS

METRIC



CAP STYLE	SERIES	LETTER DIMENSION																IMPERIAL SHAFTS*						METRIC SHAFTS*					
		A	B	C	D	E	F	G	H	JA	KA	L	M	NB	O	PA	Q	R	S	TA	U	V	W	X	Y	Z	ZA		
PLAIN	1000 & 2000	145	044	76	51	38.1	6	13	0	19	35	36	M6 x 1.0 x 8	28.58 x 1.4 DP	50.8	22	50.8	13	6	38.1	8	12.69/12.71	3.15 x 1.59 x 16	12.00/11.97	4 x 2.5 x 15	1/8	72	0.22	0
-A	1000 & 2000	157	044	76	51	38.1	13	19	0	19	35	36	M6 x 1.0 x 8	28.58 x 1.4 DP	50.8	22	50.8	13	6	38.1	8	12.69/12.71	3.15 x 1.59 x 16	12.99/11.97	4 x 2.5 x 15	1/8	78	0.22	29
BOTH	3000 & 4000	201	066	108	76	50.8	9	17	6	29	48	53	M8 x 1.25 x 13	50.80 x 1.0 DP	76.2	48	76.2	16	13	50.8	14	22.22/22.23	4.75 x 2.36 x 38	22.00/21.96	6 x 3.5 x 32	1/4	100	0.33	38
BOTH	5000 & 6000	232	066	127	102	63.5	10	19	5	29	57	58	M10 x 1.5 x 16	55.00 x 1.3 DP	76.2	48	88.9	19	13	50.8	10	28.55/28.58	6.35 x 3.18 x 38	28.00/27.96	8 x 5 x 40	1/4	116	0.33	48
BOTH	7000 & 8000	309	1.33	203	127	76.2	12	27	11	48	89	92	M20 x 2.5 x 32	85.00 x 3.0 DP	127.0	89	127.0	38	32	63.5	19	44.42/44.45	9.53 x 2.36 x 78	44.00/43.96	12 x 5 x 56	3/8	154	0.66	73

OPTION LOCATION REFERENCE

ACTUATOR TYPE	LETTER OPTION REFERENCED BY TUBE NUMBER				PORT & NEEDLE LOCATIONS REFERENCED BY CIRCLED NUMBERS			
	-A	-B	-D	-P	STANDARD	-Q	-T	-I
R1XA & R2XA	II	I	II	II	I & II	I & II	I & II	I
R1XH & R2XH	II	I	II	II	I & II	I & II	I & II	I

* BOTH IMPERIAL AND METRIC SHAFT OPTIONS AVAILABLE ON METRIC BODY (IMPERIAL SHAFT = DESIGN 5, AND METRIC SHAFT = DESIGN 6). NUMBERS ARE FOR METRIC UNITS AND ARE IN mm.

SHAFT KEYWAY: SHOWN AT MID-ROTATION

PORT POSITION: INDICATED BY CIRCLED NUMBERS

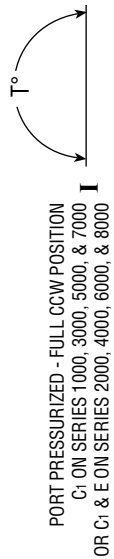
-O & -Q AVAILABLE ON SERIES 1000, 3000, 5000, & 7000 ONLY

TUBES III & IV: INCLUDED ON SERIES 2000, 4000, 6000, & 8000 UNITS ONLY

MTG. HOLES: CENTERED ON CENTERLINE OF ACTUATOR BODY

CUSHIONS: SERIES 1000 & 2000 ACTUATORS

ADD 13 mm TO RESPECTIVE "A" AND "Y" DIMENSIONS FOR EACH CUSHION



PORT PRESSURIZED - FULL CCW POSITION
C1 ON SERIES 1000, 3000, 5000, & 7000
OR C1 & E ON SERIES 2000, 4000, 6000, & 8000

PORT PRESSURIZED - FULL CW POSITION
C2 ON SERIES 1000, 3000, 5000, & 7000
OR C2 & A ON SERIES 2000, 4000, 6000, & 8000

QUICK REFERENCE FOR: A + (T° x B)

SERIES	DEGREE OF ROTATION					
	45	90	180	270	360	450
*1000 & 2000	164.6	184.5	224.3	264.1	303.8	343.6
3000 & 4000	230.5	260.2	319.7	379.1	438.6	498.0
5000 & 6000	261.5	291.1	351.4	410.1	469.5	529.0
7000 & 8000	368.3	427.7	548.0	665.5	784.4	903.2

*Dimensions calculated using plain cap style. Add 6.3 to dimension for each -A style cap used on Series 1000/2000 only.

1000-8000

All dimensions are reference only unless specifically toleranced.

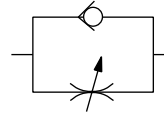
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OPTIONS: SERIES 1000-8000 ROTARY ACTUATORS

P PORT CONTROL®
BOTH DIRECTIONS

P1 PORT CONTROL®
CLOCKWISE

P2 PORT CONTROL®
COUNTERCLOCKWISE



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

The self-locking needle has micrometer threads and is adjustable under pressure. It determines the orifice size which controls the exhaust volume only of the actuator proper. The separate ball check is closed while fluid is exhausting from the actuator, but opens to permit full flow of incoming fluids. The PHD Port Control® provides the optimum in speed control for rotary actuators. It saves space and eliminates the cost of fittings and installation for external flow control valves.

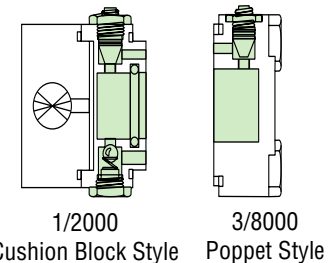
D ADJUSTABLE CUSHIONS
BOTH DIRECTIONS

D1 ADJUSTABLE CUSHIONS
CLOCKWISE

D2 ADJUSTABLE CUSHIONS
COUNTERCLOCKWISE

PHD Cushions are designed for smooth deceleration at the end of rotation. When the cushion is activated, the remaining volume in the cylinder must exhaust past an adjustable needle which controls the amount of deceleration. Effective cushion length is approximately 30° of rotation.

Cushions on Series 2000, 4000, 6000, and 8000 are furnished on one of two racks only.



1000-8000

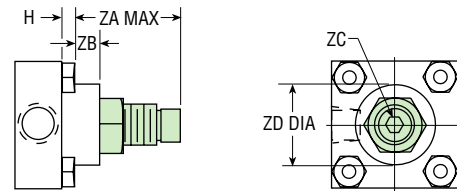
A ANGLE ADJUSTMENT
BOTH DIRECTIONS

A1 ANGLE ADJUSTMENT
CLOCKWISE

A2 ANGLE ADJUSTMENT
COUNTERCLOCKWISE

Adjusting screw(s) for reducing angle of rotation in either or both directions for use where exact degree of desired rotation cannot be predetermined or where requirements may vary during operation. Standard adjusting screw will reduce angle of rotation up to 30°. Available in conjunction with all other optional features.

Cushions are normally engaged over the last 30° of angle. The use of angle adjusting screws to reduce angle of rotation has a direct effect on the length of cushion engagement. Example: 10° angle reduction will reduce cushion engagement by 10°.



SERIES	LETTER DIMENSION				
	H	ZA	ZB	ZC	ZD
1000 & 2000	0.00 [0]	1.125 [29]	.312 [8]	3/16 HEX —	.875 [22]
3000 & 4000	.250 [6]	1.500 [38]	.375 [10]	1/4 HEX —	1.250 [32]
5000 & 6000	.203 [5]	1.875 [48]	.750 [19]	1/4 HEX —	1.250 [32]
7000 & 8000	.437 [11]	2.875 [73]	.937 [24]	3/4 FLAT [19 mm]	1.750 [45]

NUMBERS IN [] ARE FOR METRIC UNITS AND ARE IN mm.

OPTIONS: SERIES 1000-8000 ROTARY ACTUATORS



**B SHOCK PADS
BOTH DIRECTIONS**

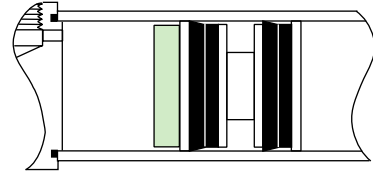


B1 SHOCK PADS CLOCKWISE



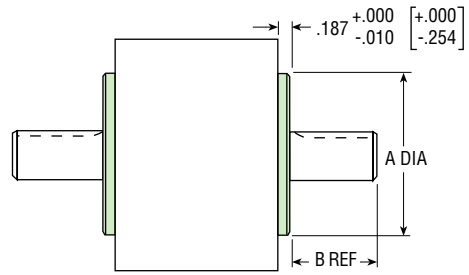
**B2 SHOCK PADS
COUNTERCLOCKWISE**

Polyurethane pads for absorption of shock and noise are available on each end of Series 1000-8000 Rotary Actuators. Reducing shock permits higher piston velocities for shorter cycle times. Reducing noise levels provides improved environment for increased productivity. Pads eliminate metal-to-metal contact between piston and end caps. **NOTE:** Air application only.



G SHAFT SEAL COVERS
Not available on Rx6x models

Fits all PHD Series 1000-8000, except when ordering hollow shafts. Isolates internal or external pressures. Maximum pressure differential is 500 psi [34.4 bar]. Furnished installed on actuator only (both sides). Covers are made of hard anodized aluminum. Not to be used as a pilot.



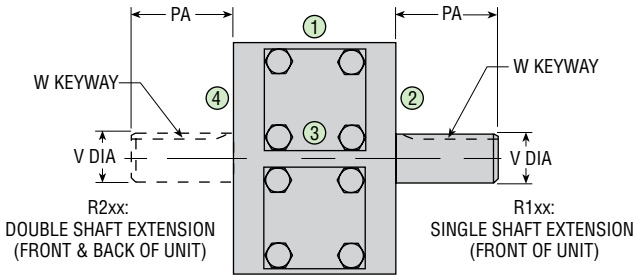
SERIES	LETTER	
	A	B
2000	1.875 [47.63]	.688 [17.5]
4000	3.000 [76.20]	1.688 [42.9]
6000	3.250 [82.55]	1.688 [42.9]
8000	4.480 [113.79]	3.312 [84.1]

NUMBERS IN [] ARE FOR METRIC UNITS AND ARE IN mm.

1000-8000

OPTIONS: SERIES 1000-8000 ROTARY ACTUATORS

BASIC SHAFT DIMENSIONS: R1xx and R2xx



SERIES	LETTER DIMENSION				
	PA	IMPERIAL*		METRIC**	
		V	W	V	W
1000 & 2000	.875 [22]	.4998/.5003 [12.69/12.71]	1/8 x 1/16 x .625 [3.18 x 1.56 x 16]	— [12.00/11.97]	— [4 x 2.5 x 15]
3000 & 4000	1.875 [48]	.8748/.8753 [22.22/22.23]	3/16 x 3/32 x 1.500 [4.75 x 2.36 x 38]	— [22.00/21.96]	— [6 x 3.5 x 32]
5000 & 6000	1.875 [48]	1.124/1.125 [28.55/28.58]	1/4 x 1/8 x 1.500 [6.35 x 3.18 x 38]	— [28.00/27.96]	— [8 x 5 x 40]
7000 & 8000	3.500 [89]	1.749/1.750 [44.42/44.45]	3/8 x 3/16 x 3.000 [9.53 x 2.36 x 76]	— [44.00/43.96]	— [12 x 5 x 56]

NOTES:

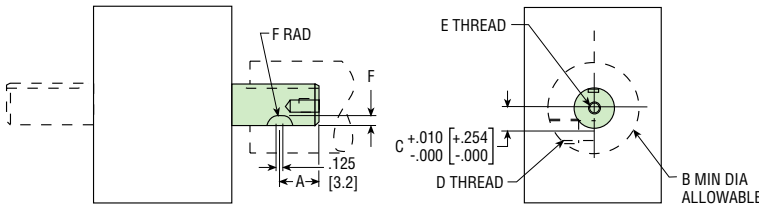
- 1) SHAFT KEYWAY: SHOWN AT MID-ROTATION
- 2) *IMPERIAL SHAFT UNITS (Rx1x, Rx5x)
- 3) **METRIC SHAFT UNITS (Rx6x)



PRELOADED KEYWAY SHAFT

Not available on Rx6x

Required when use with hub adaptor is desired.



SHAFT KEYWAY: SHOWN AT MID-ROTATION
R2xx UNITS: WHEN ORDERING SPECIFY -K-K FOR PRELOAD ON BOTH SHAFT EXTENSIONS. PRELOAD WILL BE ON OPPOSITE SIDES OF SHAFT.
SET SCREW: INCLUDED WITH UNIT

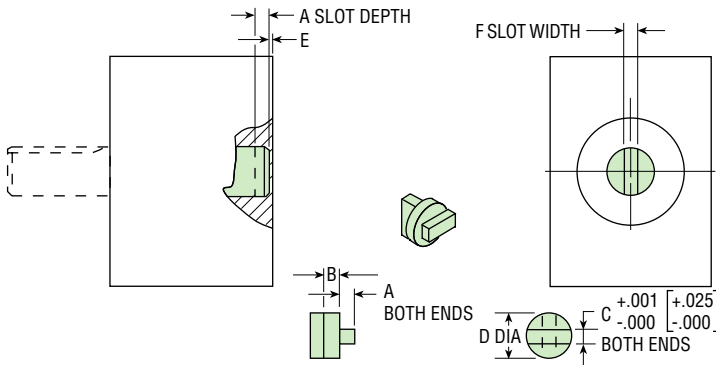
SERIES	LETTER DIMENSION					
	A	B	C	D	E	F
1000 & 2000	.375 [9.5]	1.500 [38.1]	.250 [6.35]	3/8-24 [M10]	10-32 x .312 DP [M5 x 8]	.156 [4]
3000 & 4000	.812 [20.6]	2.000 [50.8]	.437 [11.11]	1/2-20 [M12]	5/16-24 x .440 DP [M8 x 11]	.220 [6]
5000 & 6000	.812 [20.6]	3.000 [76.2]	.563 [14.28]	5/8-11 [M16]	3/8-24 x .560 DP [M10 x 14]	.251 [6]
7000 & 8000	1.500 [38.1]	4.000 [101.6]	.875 [22.22]	1-8 [M24]	1/2-20 x .687 DP [M12 x 17.5]	.438 [11]

1000-8000



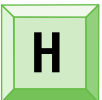
CROSS KEY SHAFT

Not available on Rx6x



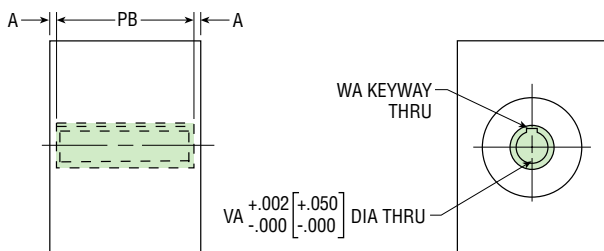
SERIES	LETTER DIMENSION					
	A	B	C	D	E	F
1000 & 2000	.250 [6.4]	.215 [5.5]	.230 [5.8]	.500 [12.7]	.118 [3]	.250 [6.3]
3000 & 4000	.250 [6.4]	.265 [6.7]	.248 [6.3]	.875 [22.2]	.120 [3]	.248 [6.3]
5000 & 6000	.437 [11]	.485 [12.3]	.500 [12.7]	1.125 [28.6]	.150 [3.8]	.5002 [12.7]
7000 & 8000	.437 [11]	.805 [20.4]	.875 [22.2]	1.750 [44.5]	.245 [6.2]	.8752 [22.2]

SHAFT KEYWAY: SHOWN AT MID-ROTATION
R2xx UNITS: WHEN ORDERING SPECIFY -C-C FOR CROSSKEY ON BOTH SHAFT EXTENSIONS
CROSSKEY: INCLUDED WITH UNIT



HOLLOW SHAFT

Not available on Rx6x



SERIES	LETTER DIMENSION			
	A	PB	VA	WA
1000 & 2000	.042 [1.1]	1.920 [48.76]	.250 [6.35]	—
3000 & 4000	.042 [1.1]	2.917 [74.09]	.500 [12.7]	1/8 x 1/16 [3.18 x 1.58]
5000 & 6000	.135 [3.4]	2.730 [69.34]	.687 [17.46]	3/16 x 3/32 [4.76 x 2.38]
7000 & 8000	.240 [6.1]	4.520 [114.80]	1.125 [28.57]	1/4 x 1/8 [6.35 x 3.18]

SHAFT KEYWAY: SHOWN AT MID-ROTATION

All dimensions are reference only unless specifically toleranced.

OPTIONS: SERIES 1000-8000 ROTARY ACTUATORS

MAGNETIC PISTON FOR USE WITH PHD PROXIMITY SWITCHES

See engineering data page for Hydraulic Pressure Ratings with these options. See ordering data for magnetic piston ordering information. Switches and brackets must be ordered separately. See Switches and Sensors section for complete switch information.



SOLID STATE SWITCHES

Series 1000-8000 Rotary Actuators may be equipped with a magnetic band (specify -E) on the pistons which activates externally mounted Solid State Switches. These switches allow the interfacing of the PHD Actuators to various logic systems. This option is for use with the following switches.

SERIES 1750 SOLID STATE SWITCHES

PART NO.	COLOR	DESCRIPTION
17503-2-06	Yellow	NPN (Sink) Type 4.5-24 VDC, 6 foot cable
17504-2-06	Red	PNP (Source) Type 4.5-24 VDC, 6 foot cable
17523-2	Yellow	NPN (Sink) Type 4.5-24 VDC, Quick Connect
17524-2	Red	PNP (Source) Type 4.5-24 VDC, Quick Connect

SWITCH BRACKETS

SERIES	PART NO.
	SERIES 1750 SWITCH
1000 & 2000	17000-32-5
3000 & 4000	17000-34-5
5000 & 6000	17000-38-0
7000 & 8000	17000-39-0



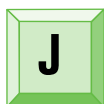
REED SWITCHES

The PHD Magnetic Reed Switches may be used in situations where the Solid State Switches are not applicable. As with the Solid State Switches, a magnetic band (specify -M) on the pistons activates the externally mounted PHD Reed Switches. The Reed Switches may be used to signal a programmable controller, sequencer, relay, or in some cases, a valve solenoid. This option is for use with the following switches.

SERIES 1750 REED SWITCHES

PART NO.	DESCRIPTION
17502-2-06	White NPN (Sink) or PNP (Source) 4.5-24 VDC, 6 foot cable
17509-3-06	Green AC Type 110-120 VAC with Current Limit, 6 foot cable
17522-2	White NPN (Sink) or PNP (Source) 4.5-24 VDC, Quick Connect
17529-3	Green AC Type 110-120 VAC, Quick Connect with Current Limit

1000-8000

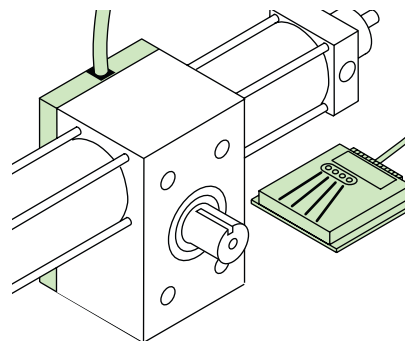


SENSOR/SET POINT MODULE

Not available on Rx6x

PHD offers a solid state sensor transducer along with a Set Point Module which provides up to four adjustable sensing positions throughout the 180° maximum sensing range. These signals can be used as inputs to a programmable controller to signal ends of rotation in addition to multiple signals during rotation for indication of arc traveled.

The Set Point Module allows independent adjustment of each sensing position and is available for 4.5 to 24 VDC current sinking or current sourcing.



SET POINT MODULE

PART NO.	DESCRIPTION
9800-01-0300	NPN (Sink) 4.5-24 VDC
9800-01-0400	PNP (Source) 4.5-24 VDC

See Switches and Sensors section for information.

All dimensions are reference only unless specifically toleranced.

OPTIONS: SERIES 1000-8000 ROTARY ACTUATORS



COUNTERCLOCKWISE UNIDIRECTIONAL CLUTCH

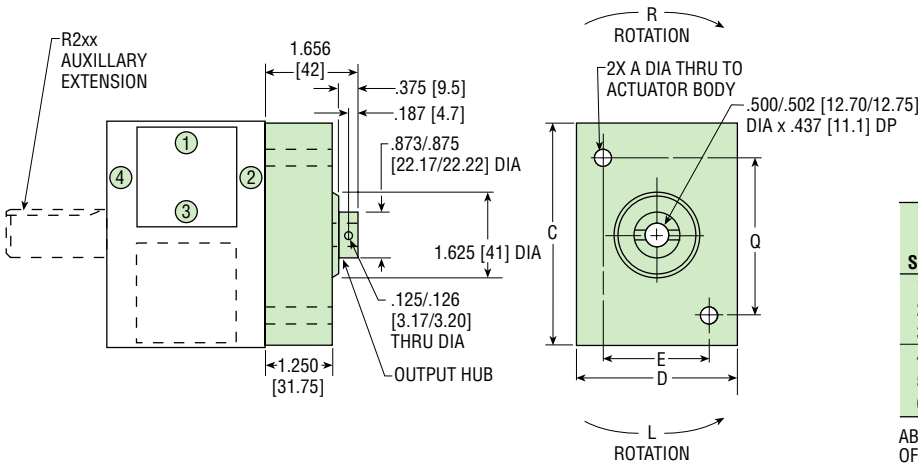
Not available on Rx6x or 7/8000 units
Output hub will only rotate in counterclockwise direction at specific rotation ordered.



CLOCKWISE UNIDIRECTIONAL CLUTCH

Not available on Rx6x or 7/8000 units
Output hub will only rotate in clockwise direction at specific rotation ordered.

Overrun clutch for intermittent unidirectional shaft output, available for Series 1000 through 6000.



SERIES	LETTER DIMENSION				
	A	C	D	E	Q
1000 & 2000	.281	2.938	2.000	1.500	2.000
	[7.2]	[74.6]	[51]	[38]	[50.8]
3000 & 4000	.344	4.188	3.000	2.000	3.000
	[8.7]	[106.3]	[76]	[50.8]	[76.2]
5000 & 6000	.406	4.938	4.000	2.500	3.500
	[10.3]	[125.4]	[102]	[63.5]	[88.9]

SERIES	LIMITING FACTORS			
	MAX. INLET PRESSURE(PSI)[bar]	MAX. RADIAL OR AXIAL LOAD (lb) [N]		
1000	1052 [72]	5	[22]	
2000	526 [36]	5	[22]	
3000	372 [25]	10	[44]	
4000	186 [13]	10	[44]	
5000	174 [12]	15	[66]	
6000	87 [6]	15	[66]	

ABOVE INLET PRESSURES PROVIDE A MAXIMUM TORQUE OF 414 in-lb [46.8 Nm] ALLOWED BY THE CLUTCH



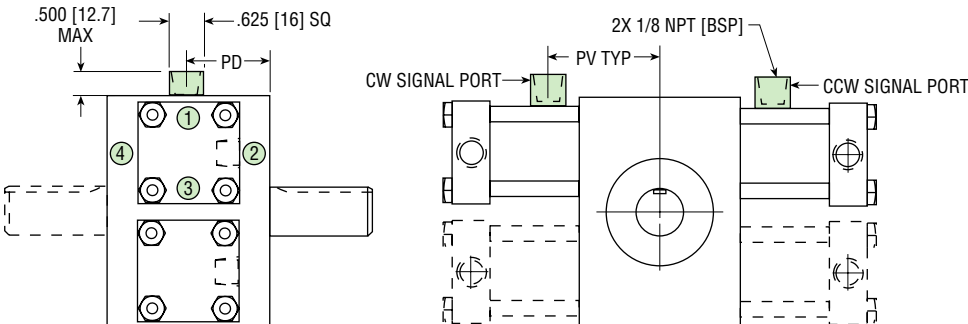
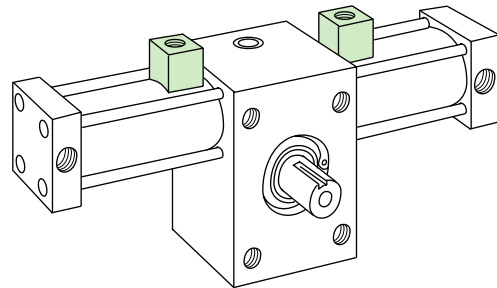
PILOT VALVE ACTUATOR

Not available on Rx6x

The PVA functions as a built-in pneumatic limit switch. An air pressure signal is provided at the end-of-piston travel as the piston seal uncovers an orifice in the block. Upon reversal of piston travel, the pilot pressure is shut off and the pilot line is vented through the rotary actuator housing.

Air pilot signal is provided approximately .03 inch [1 mm] prior to end of piston travel (or 10 to 15 degrees prior to end of rotation). For pneumatic use only.

PVA ports are located in position 1 unless otherwise specified.
Not available in conjunction with angle adjustment -A option.



SERIES	LETTER DIMENSION PV		
	PD	STANDARD	W/B
1000 & 2000	1.000	2.191	1.848
	[25.4]	[55.7]	[46.9]
3000 & 4000	1.500	2.847	2.410
	[38.1]	[72.3]	[61.2]
5000 & 6000	1.500	3.436	2.978
	[38.1]	[87.3]	[75.6]
7000 & 8000	2.500	4.409	3.770
	[63.5]	[112]	[95.8]

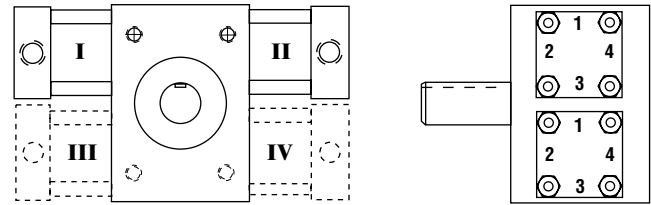
PVA UNITS WILL REQUIRE A MINIMUM ROTATION OF 45°

OPTIONS: SERIES 1000-8000 ROTARY ACTUATORS

PORT & PORT CONTROL® LOCATIONS

Standard port location on all Series 1000-8000 Actuators is position 2. Standard PVA (-N) Locations are tubes I and II in position 1. Standard Port Control® and cushion adjustment needles are located in end caps I and II in position 1. Other port and adjusting needle locations are available as specified.

Needles may not be located in same position as ports.



I PORT POSITION 1 TOP RACK PORT POSITION 3 BOTTOM RACK

This option positions the ports in position 1 on tubes I and II and in position 3 on tubes III and IV. This allows access to the ports on the "Top" and "Bottom" sides of the actuator.

Q PORTS POSITION 3 (N/A on 2, 4, 6, and 8000 units)

This option positions the ports in position 3 on tubes I and II.

O PORTS POSITION 1 (N/A on 2, 4, 6, and 8000 units)

This option positions the ports in position 1.

T PORTS POSITION 4

This option positions the ports in position 4. This allows access to ports from the back.

V FLUORO-ELASTOMER SEALS

Fluoro-Elastomer seals are available to achieve seal compatibility with certain fluids. Seal compatibility should be checked with the fluid manufacturer for proper application.

W CLOSE TOLERANCE ROTATION

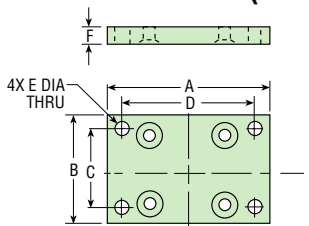
This option may be specified when a precise rotation is required and angle adjustment (see page 5-62) is not acceptable. By specifying this option, rotation will be within a tolerance of +30, -0 minutes. Standard tolerance is -0°, +10° of rotation.

Z1 ELECTROLESS NICKEL PLATING

Electroless nickel plating is done on all externally exposed ferrous parts except the pinion shaft. This optional plating treatment gives an alternative method of protecting the unit from severe environments.

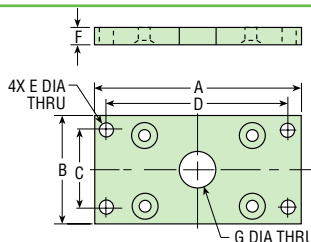
NOTE: Standard plating is Zinc and Black Oxide.

MOUNTING FLANGE (HARDWARE INCLUDED)



BOTTOM MOUNTING FLANGE

SERIES	KIT NO.		LETTER DIMENSION					
	IMPERIAL	METRIC	A	B	C	D	E	F
1000 & 2000	13756	14320	3.250 [82.6]	2.000 [51]	1.500 [38.1]	2.625 [66.7]	.281 [7.1]	.250 [6.3]
3000 & 4000	13757	14321	4.500 [114]	3.000 [76]	2.375 [60.3]	3.875 [98.4]	.406 [10.3]	.437 [11.1]
5000 & 6000	13758	14322	4.500 [114]	4.000 [102]	3.375 [85.7]	3.875 [98.4]	.406 [10.3]	.437 [11.1]



SIDE MOUNTING FLANGE

SERIES	KIT NO.		LETTER DIMENSION						
	IMPERIAL	METRIC	A	B	C	D	E	F	G
1000 & 2000	13759	14316	4.250 [108]	2.000 [51]	1.375 [34.9]	3.625 [92.1]	.281 [7.1]	.250 [6.3]	.758 [19.2]
3000 & 4000	13760	14317	5.750 [146]	3.000 [76]	2.125 [54.0]	5.125 [130.2]	.406 [10.3]	.437 [11.1]	1.070 [27.2]
5000 & 6000	13761	14318	6.500 [165]	4.000 [102]	3.375 [85.7]	5.875 [149.2]	.406 [10.3]	.437 [11.1]	1.325 [33.3]
7000 & 8000	13762	14319	12.000 [305]	5.000 [127]	3.000 [76.2]	10.000 [254.0]	.781 [19.8]	.750 [19.1]	2.000 [50.8]

All dimensions are reference only unless specifically toleranced.

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OPTIONS: SERIES 1000-8000 ROTARY ACTUATORS

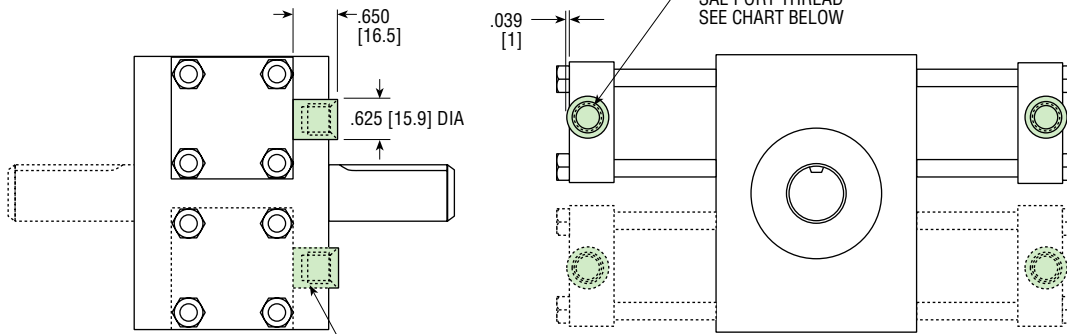


SAE PORTS FOR HYDRAULIC FLUID

Not available on Rx6x or RxxA

SAE Ports are available on most PHD hydraulic Rotary Actuators. The Series 1000 and 2000 Rotary Actuators require a boss which is brazed to the caps.

Dimensions for this boss are shown below. Consult PHD for optional port position or units with Port Controls.



SERIES	PORT SIZE
1000 & 2000	7/16 - 20 SAE
3000 & 4000	7/16 - 20 SAE
5000 & 6000	9/16 - 18 SAE
7000 & 8000	3/4 - 16 SAE

PORT BOSS REQUIRED TO EXTEND ABOVE CAP SURFACE ON SERIES 1000 & 2000 ONLY

1000-8000