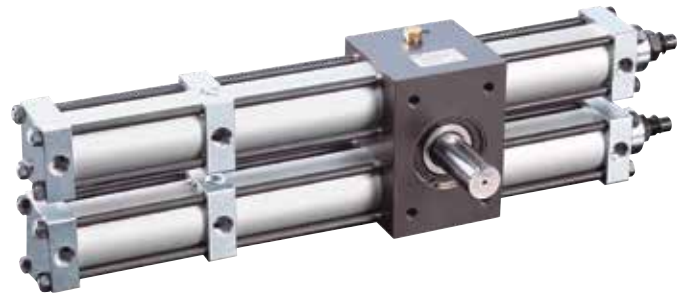


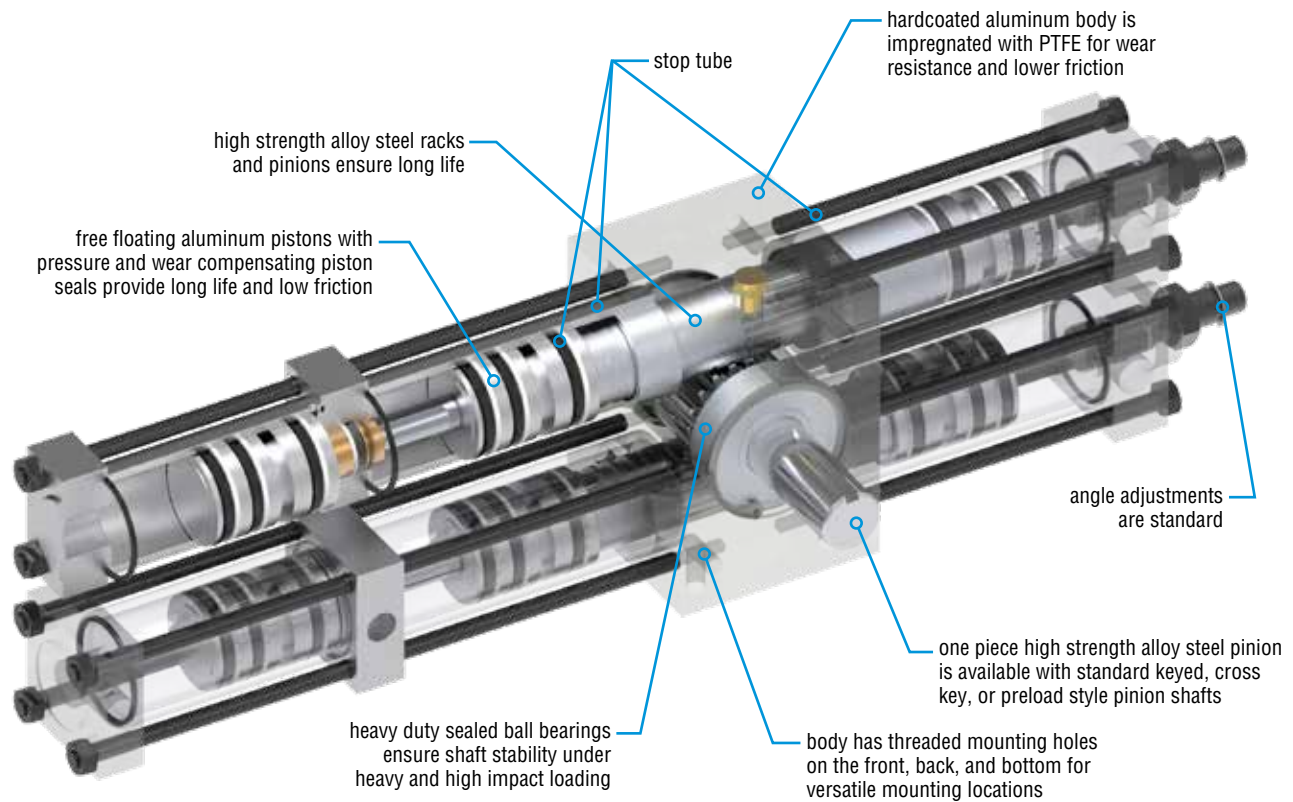
2000-8000

Major Benefits

- Three, four, or five rotary positions



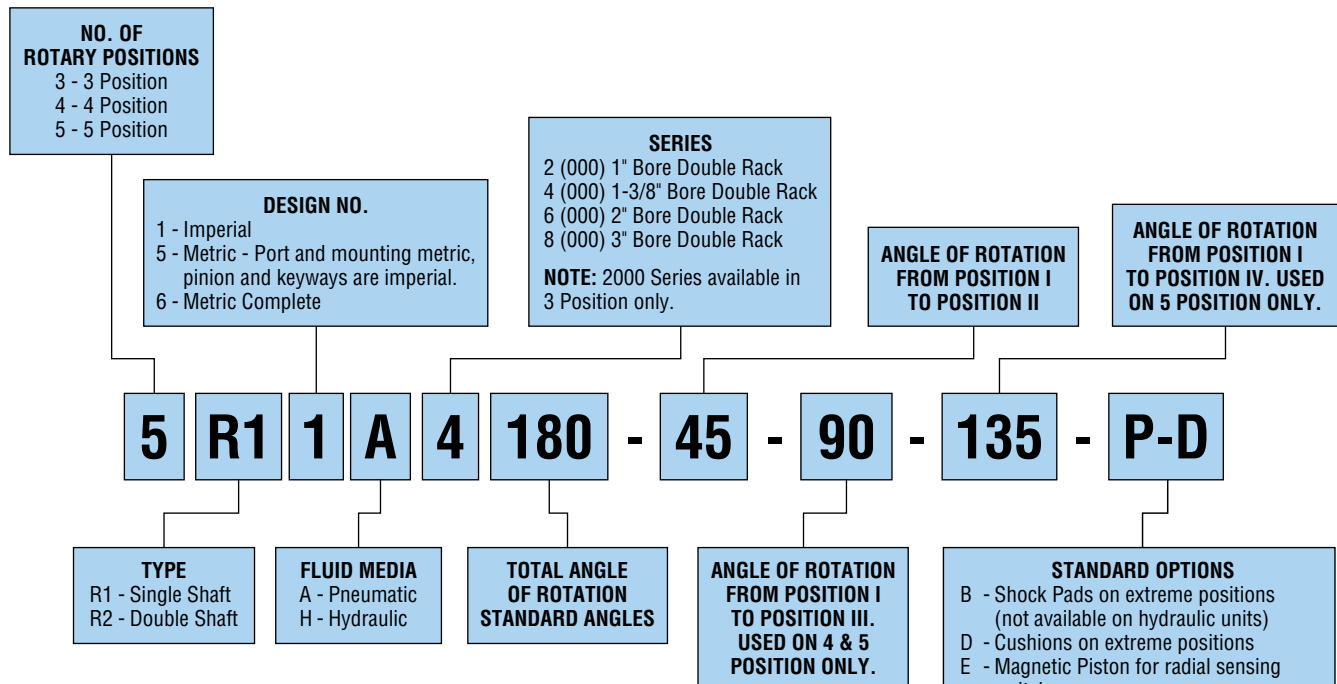
4 POSITION UNIT



ORDERING DATA: Series 2000-8000 Rotary Actuators - Multi-Position

TO ORDER SPECIFY:

No. of Rotary Positions, Type, Design No., Fluid Media, Series, and Options.



NOTE:

1) Angle Adjustments are standard on all Multi-Position Rotary Actuators.



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

JC1 SWITCH MOUNTING BRACKETS

SERIES	ROTARY SECTION
1000, 2000	92100
3000, 4000	92101
5000, 6000	92101
7000, 8000	92102

NOTE: Brackets are ordered separately.

SERIES JC1xDx MAGNETIC SWITCHES

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

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.

SPECIFICATIONS	MULTI-POSITION SERIES 2000-8000
PNEUMATIC OPERATING PRESSURE	20 to 150 psi [1.4 to 10 bar]
HYDRAULIC OPERATING PRESSURE**	40 to 1500 psi [2.8 to 103 bar] (see option table below)
OPERATING TEMPERATURE	-20° to 180°F [-29° to 82°C]
FULL (TOTAL) ROTATIONAL TOLERANCE	Nominal rotation +10°/-0°
MID-POSITION ROTATIONAL TOLERANCES (ALL MID-POSITIONS 2, 3, 4)	(see chart below for mid-position tolerance)
BACKLASH AT ANY MID-ROTATION POINT, ALL UNITS AND 4 POSITION, END OF ROTATIONS	1° (2000), 0° 30' (4000, 6000), 0° 15' (8000)
BACKLASH AT END OF ROTATIONS ON 3 AND 5 POSITIONS*	0° (2000, 4000, 6000, 8000)
BACKLASH AT MID-POSITION LOCATIONS (ALL MID-POSITIONS 2, 3, 4)	(see chart below for mid-position backlash)
LUBRICATION	Factory lubricated for rated life
MAINTENANCE	Field repairable

NOTE: *Angle adjustment screw must be engaged or adjusted to achieve 0° backlash.

SIZE	BORE DIAMETER		DISPLACEMENT VOLUME/deg		THEORETICAL TORQUE OUTPUT		MAX AXIAL BEARING LOAD		MAX RADIAL BEARING LOAD		DISTANCE BETWEEN SHAFT BEARINGS	
	in	mm	in³	mm³	in-lb/psi	Nm/bar	lb	N	lb	N	in	mm
2000	1.000	25.4	0.014	0.229	0.39	0.64	120	534	300	1334	1.375	34.9
4000	1.375	34.9	0.038	0.623	1.11	1.82	240	1068	600	2669	2.188	55.6
6000	2.000	50.8	0.082	13.44	2.36	3.87	370	1646	925	4114	2.235	56.8
8000	3.000	76.2	0.370	6.06	10.60	17.37	800	3558	2000	8896	3.750	95.3

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 chart below.

HYD SERIES	OPTION psi [bar]		
	-P	-D	-E OR -M
2000	—	—	—
4000	—	—	—
6000	—	—	750 [52]
8000	—	—	500 [35]

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

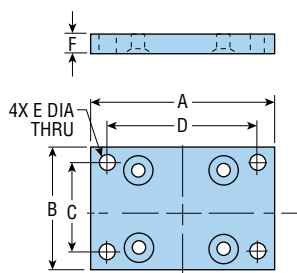
Minimum factor of safety at maximum rated hydraulic pressure for output shaft is 2:1, and for hydraulic chambers is 3:1. Consult PHD for proof of pressure data. All ratings based on non-shock hydraulic service and with full rotation tubes not being double powered.

BACKLASH & INTERMEDIATE POSITION TOLERANCES

SERIES	ROTATIONAL TOLERANCE**	BACKLASH
2000	±1°	1° 30'
4000 & 6000	±0° 30'	1° 15'
8000	±0° 15'	1°

**Rotational position from one intermediate position to another (measured at centers of backlash).

MOUNTING FLANGE (HARDWARE INCLUDED)



BOTTOM MOUNTING FLANGE

SERIES	KIT NO.		LETTER DIMENSION											
			A		B		C		D		E		F	
	Imperial	Metric	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2000	13756	14320	3.250	82.6	2.000	51	1.500	38.1	2.625	66.7	0.281	7.1	0.250	6.3
4000	13757	14321	4.500	114	3.000	76	2.375	60.3	3.875	98.4	0.406	10.3	0.437	11.1
6000	13758	14322	4.500	114	4.000	102	3.375	85.7	3.875	98.4	0.406	10.3	0.437	11.1

SIDE MOUNTING FLANGE

SERIES	KIT NO.		LETTER DIMENSION													
			A		B		C		D		E		F		G	
	Imperial	Metric	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
2000	13759	14316	4.250	108	2.000	51	1.375	34.9	3.625	92.1	0.281	7.1	0.250	6.3	0.758	19.2
4000	13760	14317	5.750	146	3.000	76	2.125	54.0	5.125	130.2	0.406	10.3	0.437	11.1	1.070	27.2
6000	13761	14318	6.500	165	4.000	102	3.375	85.7	5.875	149.2	0.406	10.3	0.437	11.1	1.325	33.3
8000	13762	14319	12.000	305	5.000	127	3.000	76.2	10.000	254.0	0.781	19.8	0.750	19.1	2.000	50.8

All dimensions are reference only unless specifically tolerated.

CAUTION:

Rotary actuators require back pressure in opposite ports before rotating from one position to another. Lack of back pressure or governing media causes uncontrolled angular velocity and improper function of cushions and port controls.

Review the following for typical valve sequencing for controlling standard multi-position actuators. (Disregard for tandem units.)

Starting at full CW position (port A pressurized):

3 POSITION UNITS:

- Rotate from CW to CCW (S3 valve is activated). Energize S1 and S2 valves, then de-energize S2 and S3 valves. Unit will rotate to full CCW position.
- Rotate from CCW to CW (S1 valve is activated). Energize S2 and S3 valves, then de-energize S2 and S1 valves. Unit will rotate to full CW position.
- Rotate from CW to mid-position (S3 valve is activated). Energize S1 and S2 valves, then de-energize S1 and S3 valves. Unit will rotate to mid-position.
- Rotate from mid-position to full CCW (S2 valve is activated). Energize S1 and S3 valves, then de-energize S2 and S3. Unit will rotate to full CCW.

4 POSITION UNITS

(same as above plus):

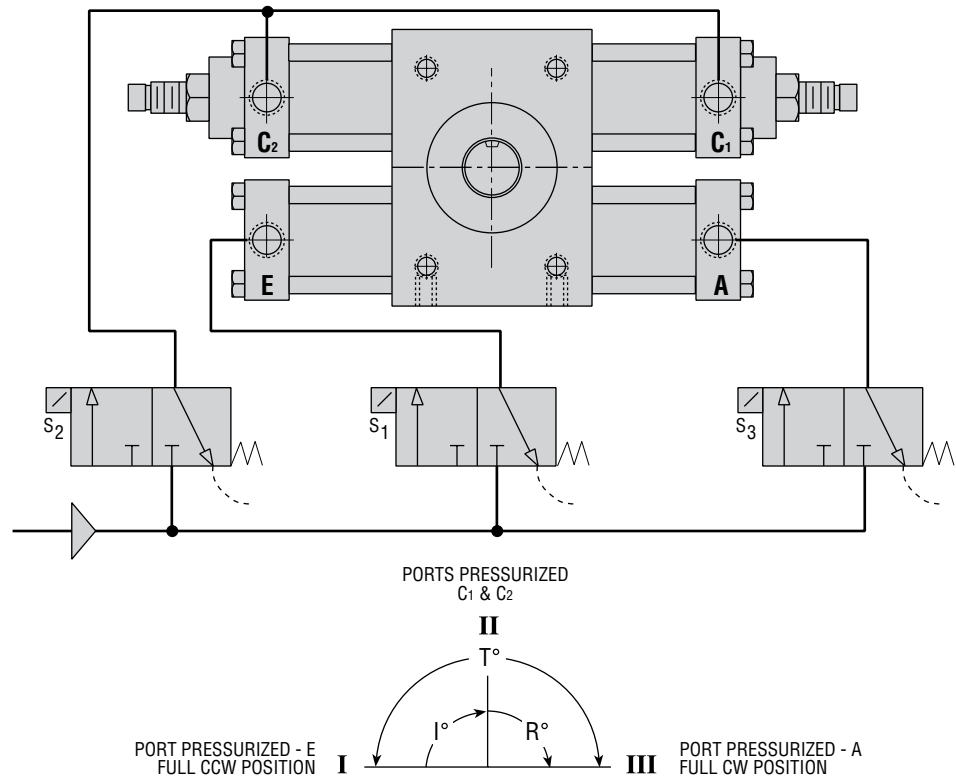
- Rotate from CCW to intermediate position II. (S1 valve is activated). Energize S2, S3, and S4 valves, then de-energize S1, S2, and S3. Unit will rotate to intermediate position II.

5 POSITION UNITS

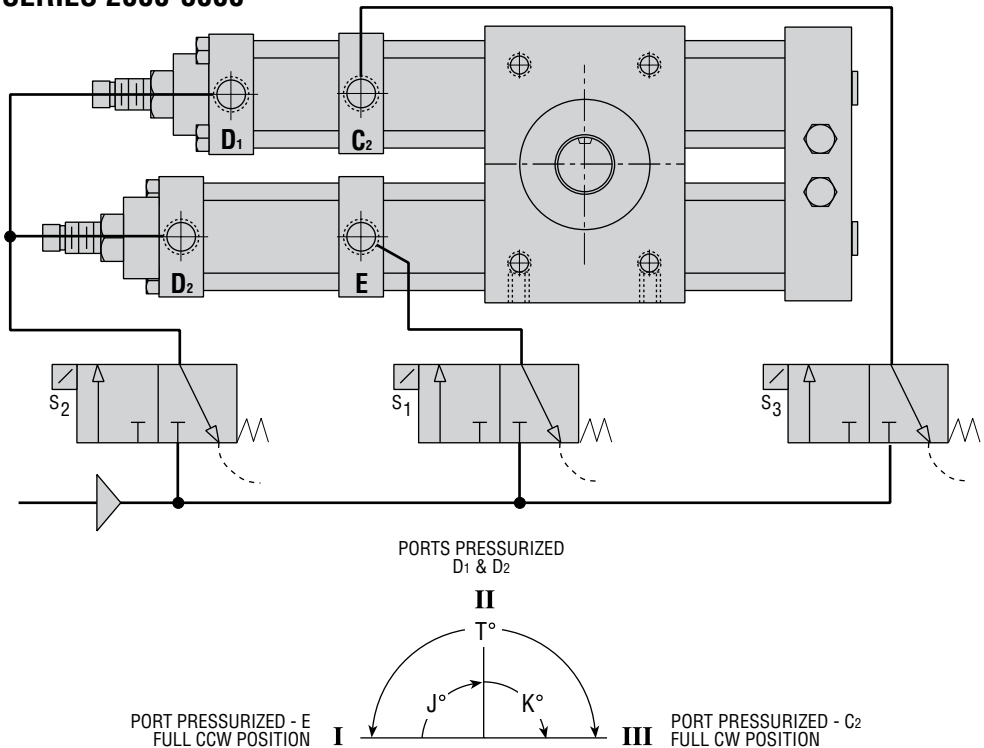
(same as above plus):

- Rotate from CCW to intermediate position IV. (S1 valve is activated). Energize S2, S3, and S5 valves, then de-energize S1, S2, and S3. Unit will rotate to intermediate position IV.

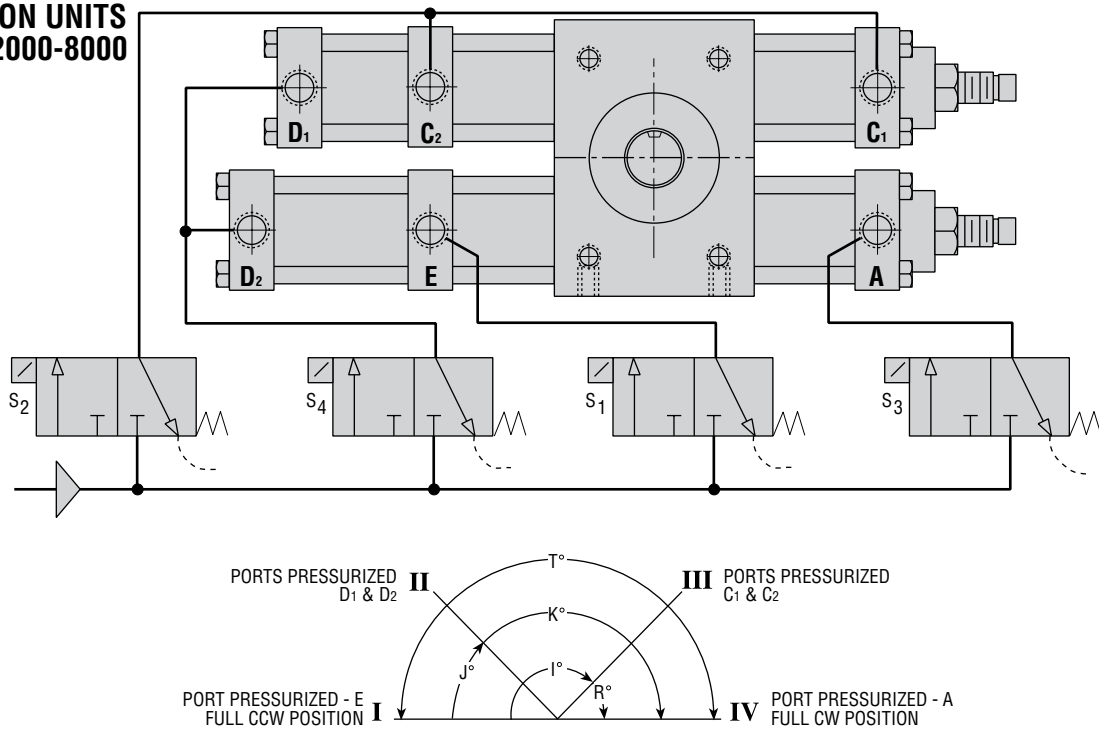
3 POSITION UNITS SERIES 2000-8000



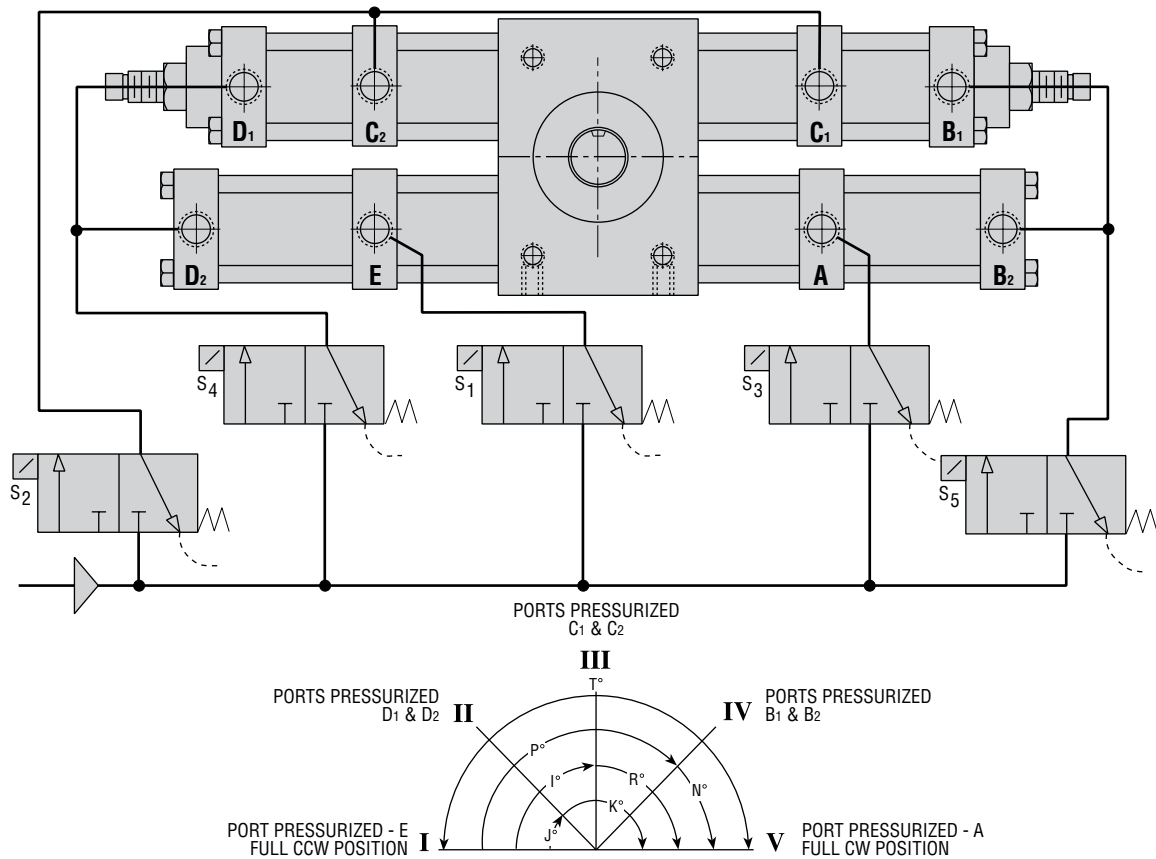
3 POSITION TANDEM UNITS SERIES 2000-8000



4 POSITION UNITS SERIES 2000-8000

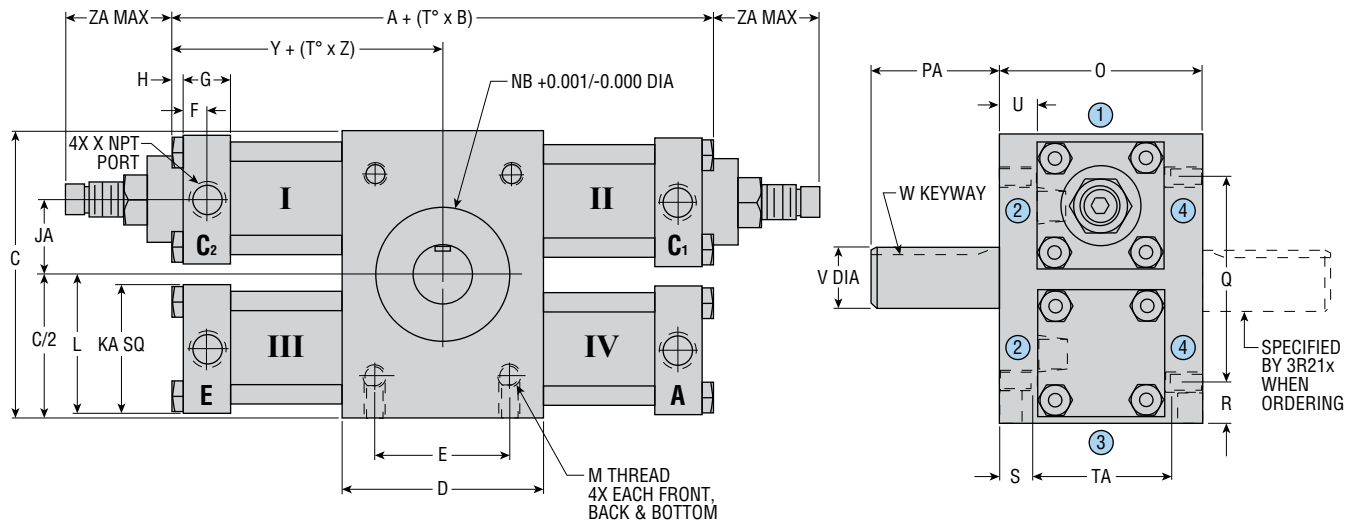


5 POSITION UNITS SERIES 2000-8000



DIMENSIONS: Series 2000-8000 Rotary Actuators - 3-Position

IMPERIAL



CAP STYLE	SERIES	LETTER DIMENSION												
		A	B	C	D	E	F	G	H	JA	KA	L	M	NB
PLAIN	2000	5.698	0.0174	3.000	2.000	1.500	0.250	0.500	0.00	0.750	1.375	1.437	1/4-20 x 0.312 DP	1.125 x 0.056 DP
-A	2000	6.198	0.0174	3.000	2.000	1.500	0.500	0.750	0.00	0.750	1.375	1.437	1/4-20 x 0.312 DP	1.125 x 0.056 DP
BOTH	4000	7.906	0.026	4.250	3.000	2.000	0.344	0.688	0.250	1.156	1.875	2.094	5/16-18 x 0.500 DP	2.000 x 0.039 DP
BOTH	6000	9.126	0.026	5.000	4.000	2.500	0.375	0.750	0.203	1.156	2.250	2.281	3/8-16 x 0.625 DP	2.1654 x 0.052 DP
BOTH	8000	12.160	0.052	8.000	5.000	3.000	0.469	1.062	0.437	1.875	3.500	3.625	3/4-10 x 1.250 DP	3.3465 x 0.120 DP

CAP STYLE	SERIES	LETTER DIMENSION												
		O	PA	Q	R	S	TA	U	V	W	X	Y	Z	ZA
PLAIN	2000	2.000	0.875	2.000	0.500	0.250	1.500	0.312	0.4998/0.5003	1/8 x 1/16 x 0.625	1/8	2.849	0.0087	0
-A	2000	2.000	0.875	2.000	0.500	0.250	1.500	0.312	0.4998/0.5003	1/8 x 1/16 x 0.625	1/8	3.099	0.0087	1.125
BOTH	4000	3.000	1.875	3.000	0.625	0.500	2.000	0.562	0.8748/0.8753	3/16 x 3/32 x 1.500	1/4	3.953	0.013	1.500
BOTH	6000	3.000	1.875	3.500	0.750	0.500	2.000	0.375	1.124/1.125	1/4 x 1/8 x 1.500	1/4	4.563	0.013	1.875
BOTH	8000	5.000	3.500	5.000	1.500	1.250	2.500	0.750	1.749/1.750	3/8 x 3/16 x 3.000	3/8	6.080	0.026	2.875

OPTION LOCATION REFERENCE

SERIES	LETTER OPTION REFERENCED BY TUBE NUMBER						PORT & NEEDLE LOCATIONS REFERENCED BY CIRCLED NUMBERS								
							STANDARD			-T			-I		
	-A	-B	-D	-P	-M	-E	PORT	-P	-D	PORT	-P	-D	PORT	-P	-D
3R11A & 3R21A	Standard	I & II	I & II	ALL	ALL	ALL	2	1 & 3	1	4	1 & 3	1	1 & 3	4	4
3R11H & 3R21H	Standard	N/A	I & II	ALL	ALL	ALL	2	1 & 3	1	4	1 & 3	1	1 & 3	4	4

SHAFT KEYWAY: SHOWN AT MID-ROTATION

PORT POSITIONS: INDICATED BY CIRCLED NUMBERS

CUSHIONS: SERIES 2000 ACTUATORS:

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

MTG. HOLES: CENTERED ON CENTERLINE OF ACTUATOR BODY

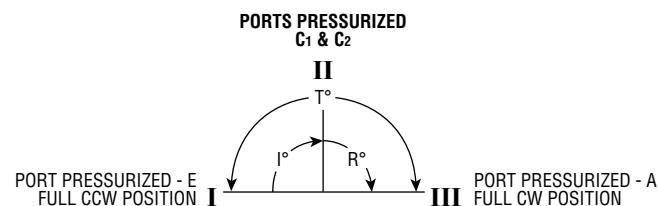
STOP TUBES: LOCATED IN TUBES I & II

PLUMBING SCHEMATIC: SEE PAGES 85 AND 86

QUICK REFERENCE FOR: A + (T° x B)

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

*Dimensions calculated using plain cap style. Add 0.250 to dimension for each -A style cap used on Series 2000 only.



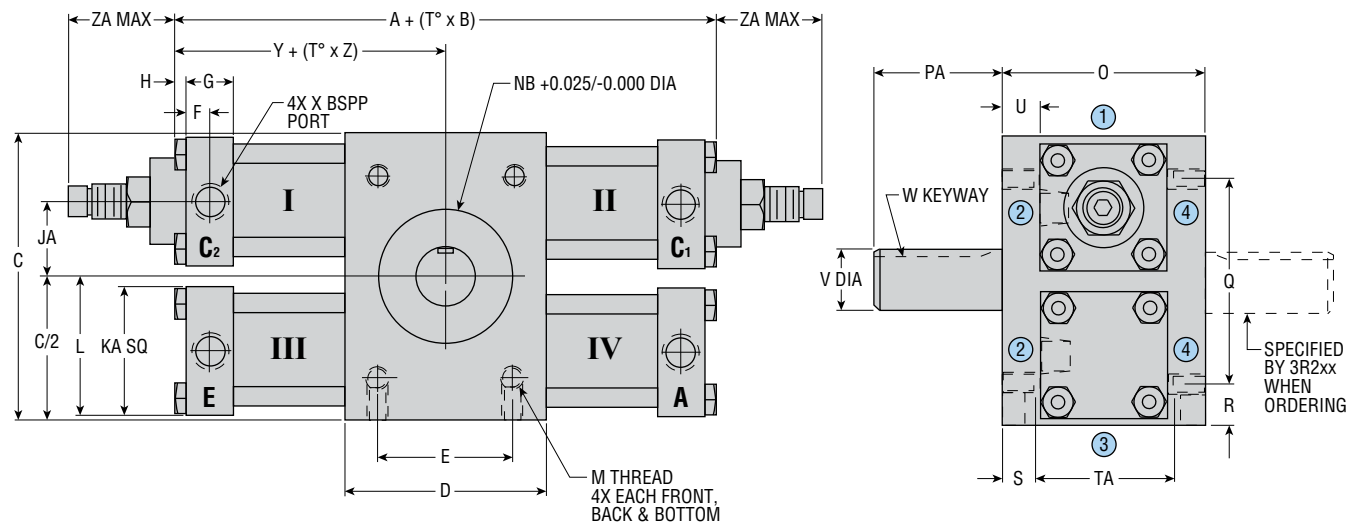
CAD & Sizing Assistance

Use PHD's free online Product Sizing and CAD Configurator at phdinc.com/myphd

All dimensions are reference only unless specifically toleranced.

DIMENSIONS: Series 2000-8000 Rotary Actuators - 3-Position

METRIC



CAP STYLE	SERIES	LETTER DIMENSION																	
		A	B	C	D	E	F	G	H	JA	KA	L	M	NB	O	PA	Q	R	S
PLAIN	2000	145	0.44	76	51	38.1	6	13	0	19	35	36	M6 x 1.0 x 8 DP	28.58 x 1.4 DP	50.8	22	50.8	13	6
-A	2000	157	0.44	76	51	38.1	13	19	0	19	35	36	M6 x 1.0 x 8 DP	28.58 x 1.4 DP	50.8	22	50.8	13	6
BOTH	4000	201	0.66	108	76	50.8	9	17	6	29	48	53	M8 x 1.25 x 13 DP	50.80 x 1.0 DP	76.2	48	76.2	16	13
BOTH	6000	232	0.66	127	102	63.5	10	19	5	29	57	58	M10 x 1.5 x 16 DP	55.00 x 1.3 DP	76.2	48	88.9	19	13
BOTH	8000	309	1.32	203	127	76.2	12	27	11	48	89	92	M20 x 2.5 x 32 DP	85.00 x 3.0 DP	127.0	89	127.0	38	32

CAP STYLE	SERIES	LETTER DIMENSION									
		TA	U	IMPERIAL SHAFTS*		METRIC SHAFTS*		X	Y	Z	ZA
				V	W	V	W				
PLAIN	2000	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	2000	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	78	0.22	29
BOTH	4000	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	6000	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	8000	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

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

OPTION LOCATION REFERENCE

SERIES	LETTER OPTION REFERENCED BY TUBE NUMBER						PORT & NEEDLE LOCATIONS REFERENCED BY CIRCLED NUMBERS								
	-A	-B	-D	-P	-M	-E	STANDARD			-T			-I		
							PORT	-P	-D	PORT	-P	-D	PORT	-P	-D
3R1xA & 3R2xA	Standard	I & II	I & II	ALL	ALL	ALL	2	1 & 3	1	4	1 & 3	1	1 & 3	4	4
3R1xH & 3R2xH	Standard	N/A	I & II	ALL	ALL	ALL	2	1 & 3	1	4	1 & 3	1	1 & 3	4	4

SHAFT KEYWAY: SHOWN AT MID-ROTATION

PORT POSITIONS: INDICATED BY CIRCLED NUMBERS

CUSHIONS: SERIES 2000 ACTUATORS:

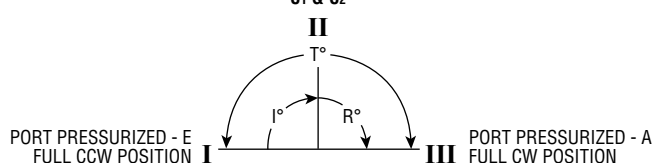
ADD 13 mm TO RESPECTIVE "A" AND "Y" DIMENSION FOR EACH CUSHION

MTG. HOLES: CENTERED ON CENTERLINE OF ACTUATOR BODY

STOP TUBES: LOCATED IN TUBES I & II

PLUMBING SCHEMATIC: SEE PAGES 85 AND 86

PORTS PRESSURIZED
C₁ & C₂



QUICK REFERENCE FOR: A + (T° x B)

SERIES	DEGREE OF ROTATION					
	45	90	180	270	360	450
*2000	164.6	184.5	224.2	264.1	303.8	343.6
4000	230.5	260.2	319.8	379.1	438.6	498.0
6000	261.5	291.1	410.8	350.7	469.5	529.0
8000	368.3	427.7	539.6	546.6	784.4	903.2

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

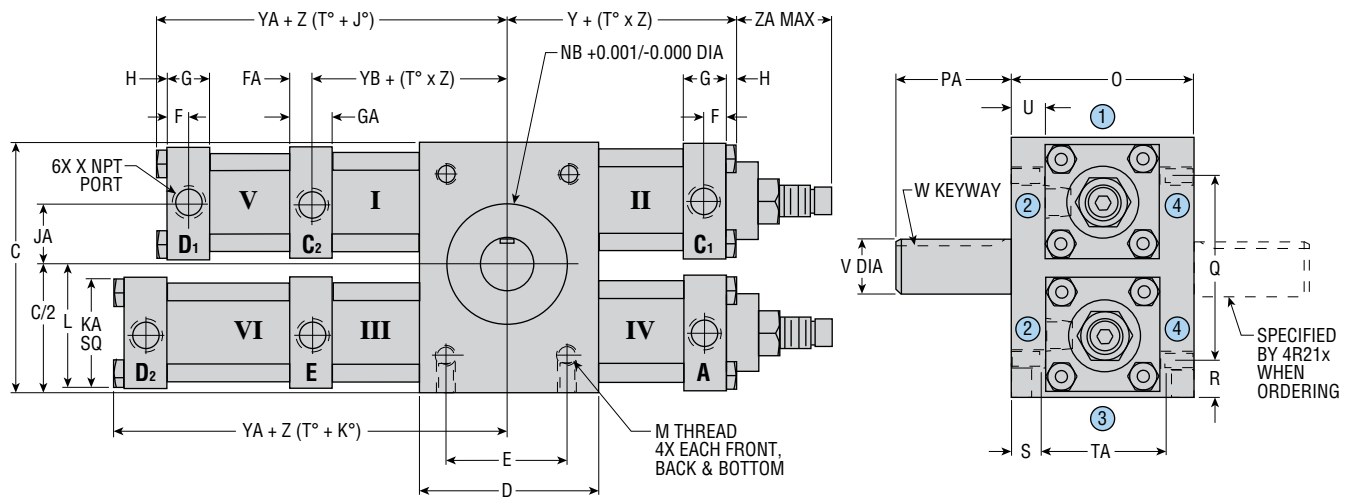
CAD & Sizing Assistance

Use PHD's free online Product Sizing and CAD Configurator at phdinc.com/myphd

All dimensions are reference only unless specifically toleranced.

DIMENSIONS: Series 2000-8000 Rotary Actuators - 4-Position

IMPERIAL



SERIES	LETTER DIMENSION													
	C	D	E	F	FA	G	GA	H	JA	KA	L	M	NB	O
4000	4.250	3.000	2.000	0.344	0.375	0.688	0.719	0.250	1.156	1.875	2.094	5/16-18 x 0.500 DP	2.000 x 0.039 DP	3.000
6000	5.000	4.000	2.500	0.375	0.344	0.750	0.719	0.203	1.156	2.250	2.281	3/8-16 x 0.625 DP	2.1654 x 0.052 DP	3.000
8000	8.000	5.000	3.000	0.469	0.469	1.062	1.062	0.437	1.875	3.500	3.625	3/4-10 x 1.250 DP	3.3465 x 0.120 DP	5.000

SERIES	LETTER DIMENSION													
	PA	Q	R	S	TA	U	V	W	X	Y	YA	YB	Z	ZA
4000	1.875	3.000	0.625	0.500	2.000	0.562	0.8748/0.8753	3/16 x 3/32 x 1.500	1/4	3.953	6.721	3.360	0.013	1.500
6000	1.875	3.500	0.750	0.500	2.000	0.375	1.124/1.125	1/4 x 1/8 x 1.500	1/4	4.563	7.325	3.980	0.013	1.875
8000	3.500	5.000	1.500	1.250	2.500	0.750	1.749/1.750	3/8 x 3/16 x 3.000	3/8	6.080	9.865	5.236	0.026	2.875

OPTION LOCATION REFERENCE

SERIES	LETTER OPTION REFERENCED BY TUBE NUMBER						PORT & NEEDLE LOCATIONS REFERENCED BY CIRCLED NUMBERS								
	-A	-B	-D	-P	-M	-E	STANDARD			-T			-I		
							PORT	-P	-D	PORT	-P	-D	PORT	-P	-D
4R11A & 4R21A	Standard	II & IV	II & IV	ALL	ALL	ALL	2	1 & 3	1 & 3	4	1 & 3	1 & 3	1 & 3	2 & 4	4
4R11H & 4R21H	Standard	N/A	II & IV	ALL	ALL	ALL	2	1 & 3	1 & 3	4	1 & 3	1 & 3	1 & 3	2 & 4	4

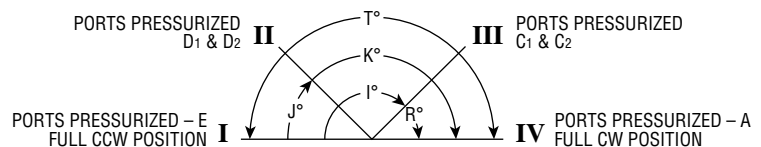
SHAFT KEYWAY: SHOWN AT MID-ROTATION

PORT POSITIONS: INDICATED BY CIRCLED NUMBERS

MTG. HOLES: CENTERED ON CENTERLINE OF ACTUATOR BODY

STOP TUBES: LOCATED IN TUBES I & II

PLUMBING SCHEMATIC: SEE PAGES 85 AND 86



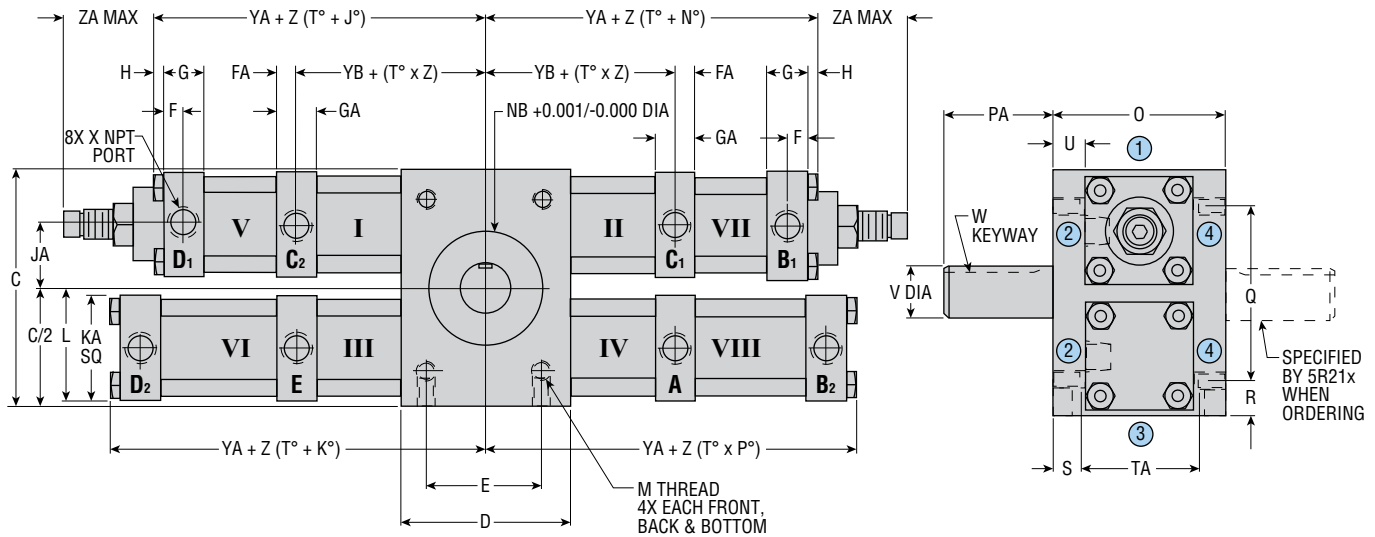
CAD & Sizing Assistance

Use PHD's free online Product Sizing and CAD Configurator at phdinc.com/myphd

All dimensions are reference only unless specifically toleranced.

DIMENSIONS: Series 2000-8000 Rotary Actuators - 5-Position

IMPERIAL



SERIES	LETTER DIMENSION												
	C	D	E	F	FA	G	GA	H	JA	KA	L	M	NB
4000	4.250	3.000	2.000	0.344	0.375	0.688	0.719	0.250	1.156	1.875	2.094	5/16-18 x 0.500 DP	2.000 x 0.039 DP
6000	5.000	4.000	2.500	0.375	0.344	0.750	0.719	0.203	1.156	2.250	2.281	3/8-16 x 0.625 DP	2.1654 x 0.052 DP
8000	8.000	5.000	3.000	0.469	0.469	1.062	1.062	0.437	1.875	3.500	3.625	3/4-10 x 1.250 DP	3.3465 x 0.120 DP

SERIES	LETTER DIMENSION												
	PA	Q	R	S	TA	U	V	W	X	YA	YB	Z	ZA
4000	1.875	3.000	0.625	0.500	2.000	0.562	0.8748/0.8753	3/16 x 3/32 x 1.500	1/4	6.721	3.360	0.013	1.500
6000	1.875	3.500	0.750	0.500	2.000	0.375	1.124/1.125	1/4 x 1/8 x 1.500	1/4	7.325	3.980	0.013	1.875
8000	3.500	5.000	1.500	1.250	2.500	0.750	1.749/1.750	3/8 x 3/16 x 3.000	3/8	9.865	5.236	0.026	2.875

OPTION LOCATION REFERENCE

SERIES	LETTER OPTION REFERENCED BY TUBE NUMBER						PORT & NEEDLE LOCATIONS REFERENCED BY CIRCLED NUMBERS								
	-A	-B	-D	-P	-M	-E	STANDARD			-T		-I			
							PORT	-P	-D	PORT	-P	-D	PORT	-P	-D
5R11A & 5R21A	Standard	VII & V	VII & V	ALL	ALL	ALL	2	1 & 3	1	4	1 & 3	1	1 & 3	4	4
5R11H & 5R21H	Standard	N/A	VII & V	ALL	ALL	ALL	2	1 & 3	1	4	1 & 3	1	1 & 3	4	4

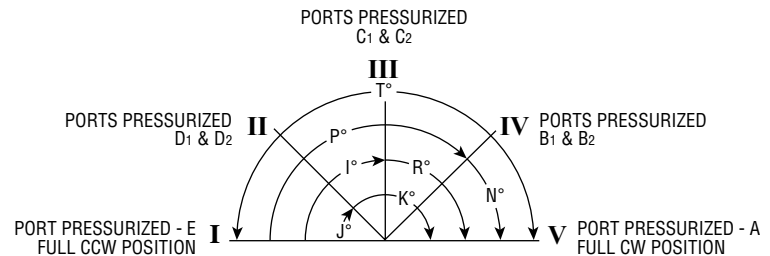
SHAFT KEYWAY: SHOWN AT MID-ROTATION

PORT POSITIONS: INDICATED BY CIRCLED NUMBERS

MTG. HOLES: CENTERED ON CENTERLINE OF ACTUATOR BODY

STOP TUBES: LOCATED IN TUBES I & II

PLUMBING SCHEMATIC: SEE PAGES 85 AND 86



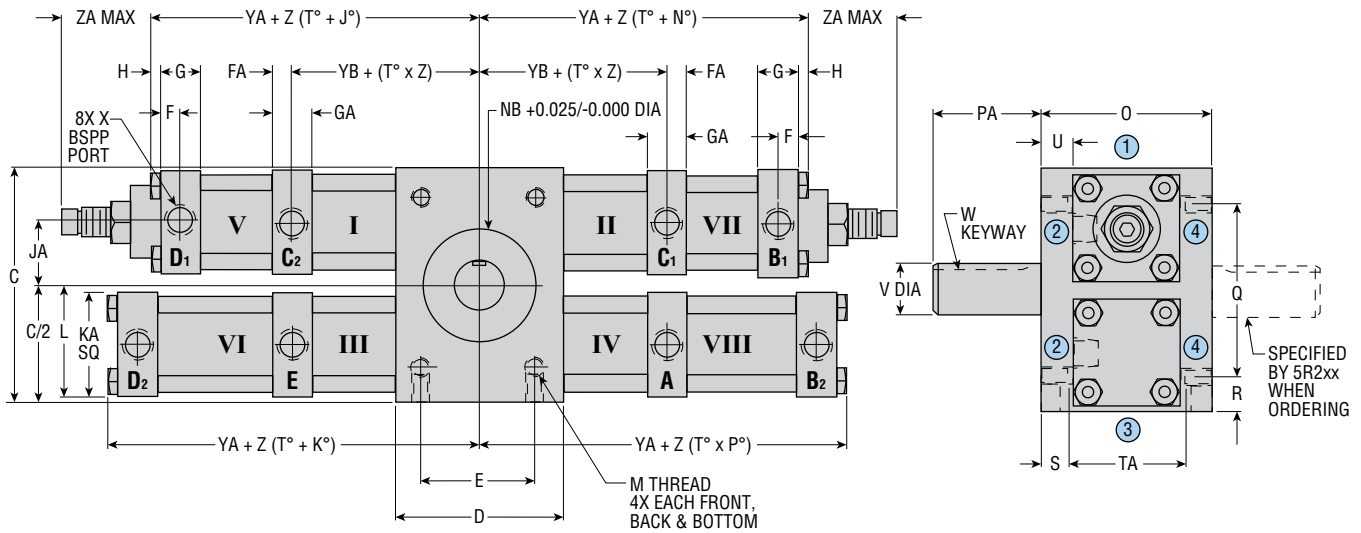
CAD & Sizing Assistance

Use PHD's free online Product Sizing and CAD Configurator at phdinc.com/myphd

All dimensions are reference only unless specifically toleranced.

DIMENSIONS: Series 2000-8000 Rotary Actuators - 5-Position

METRIC



SERIES	LETTER DIMENSION																	
	C	D	E	F	FA	G	GA	H	JA	KA	L	M	NB	O	PA	Q	R	S
4000	108	76	50.8	9	10	17	18	6	29	48	53	M8 x 1.25 x 13 DP	50.80 x 1.0 DP	76.2	48	76.2	16	13
6000	127	102	63.5	10	9	19	18	5	29	57	58	M10 x 1.5 x 16 DP	55.00 x 1.3 DP	76.2	48	88.9	19	13
8000	203	127	76.2	12	12	27	27	11	48	89	92	M20 x 2.5 x 32 DP	85.00 x 3.0 DP	127.0	89	127.0	38	32

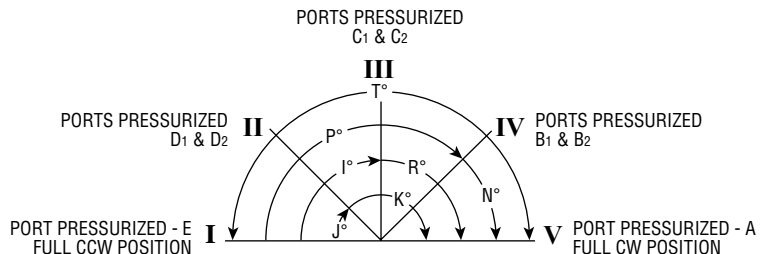
SERIES	LETTER DIMENSION									
	IMPERIAL SHAFTS*					METRIC SHAFTS*				
	V	W	V	W	X	YA	YB	Z	ZA	
4000	22.22/22.23	4.75 x 2.36 x 38	22.00/21.96	6 x 3.5 x 32	1/4	171	85	0.33	38	
6000	28.55/28.58	6.35 x 3.18 x 38	28.00/27.96	8 x 5 x 40	1/4	186	101	0.33	48	
8000	44.42/44.45	9.53 x 2.36 x 78	44.00/43.96	12 x 5 x 56	3/8	251	133	0.66	73	

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

OPTION LOCATION REFERENCE

SERIES	LETTER OPTION REFERENCED BY TUBE NUMBER						PORT & NEEDLE LOCATIONS REFERENCED BY CIRCLED NUMBERS								
	-A	-B	-D	-P	-M	-E	STANDARD			-T			-I		
							PORT	-P	-D	PORT	-P	-D	PORT	-P	-D
5R1xA & 5R2xA	Standard	VII & V	VII & V	ALL	ALL	ALL	2	1 & 3	1	4	1 & 3	1	1 & 3	4	4
5R1xH & 5R2xH	Standard	N/A	VII & V	ALL	ALL	ALL	2	1 & 3	1	4	1 & 3	1	1 & 3	4	4

SHAFT KEYWAY: SHOWN AT MID-ROTATION
PORT POSITIONS: INDICATED BY CIRCLED NUMBERS
MTG. HOLES: CENTERED ON CENTERLINE OF ACTUATOR BODY
STOP TUBES: LOCATED IN TUBES I & II
PLUMBING SCHEMATIC: SEE PAGES 85 AND 86



CAD & Sizing Assistance

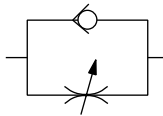
Use PHD's free online Product Sizing and CAD Configurator at phdinc.com/myphd

All dimensions are reference only unless specifically tolerated.

OPTIONS: Series 2000-8000 Rotary Actuators - Multi-Position

P

PORT CONTROL®



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.

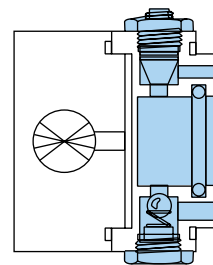
The self-locking needle has micrometer threads and is adjustable under pressure. It determines the orifice size which controls the exhaust volume only of the actuator proper. The separate ball check is closed while fluid is exhausting from the actuator, but opens to permit full flow of incoming fluids. 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

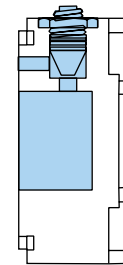
ADJUSTABLE CUSHIONS

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.



2000 Cushion
Block Style

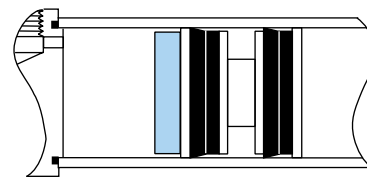


4000-8000
Poppet Style

B

SHOCK PADS

Polyurethane pads for absorption of shock and noise are available on each end of Series 2000-8000 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.

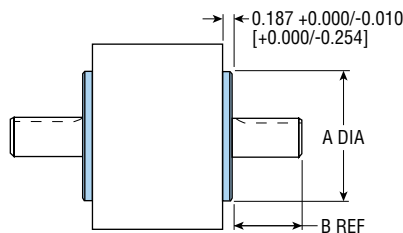


G

SHAFT SEAL COVERS

Not available on Rx6x

Fits all PHD Series 2000-8000, 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.



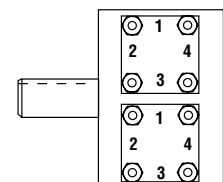
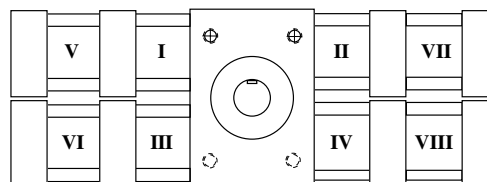
SERIES	LETTER	
	A	B
2000	1.875 [47.63]	0.688 [17.5]
4000	3.000 [76.20]	1.688 [42.9]
6000	3.250 [82.55]	1.688 [42.9]
8000	4.480 [113.79]	3.312 [84.1]

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

PORT & PORT CONTROL® LOCATIONS

Standard port location on all Multi-Position Actuators is position 2. Standard Port Control® and cushion adjustment needles are located in position 1 and 3. 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, II, V, and VII and in position 3 on tubes III, IV, VI, and VIII. This allows access to the ports on the “Top” and “Bottom” sides of the actuator.

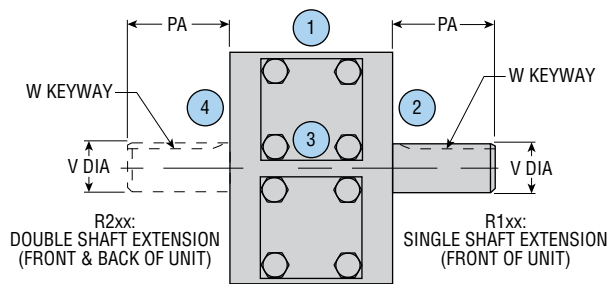
T

PORT POSITION 4

This option positions the ports in position 4 on all tubes.

All dimensions are reference only unless specifically toleranced.

BASIC SHAFT DIMENSIONS: R1xx and R2xx



SERIES	LETTER DIMENSION				
	PA	IMPERIAL *		METRIC **	
		V	W	V	W
2000	0.875 [22]	0.4998/0.5003 [12.69/12.71]	1/8 x 1/16 x 0.625 [3.18 x 1.56 x 16]	—	—
4000	1.875 [48]	0.8748/0.8753 [22.22/22.23]	3/16 x 3/32 x 1.500 [4.75 x 2.36 x 38]	—	—
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]	—	—
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]	—	—

NOTES:

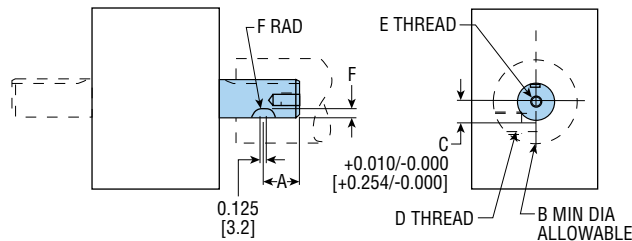
- 1) **SHAFT KEYWAY:** SHOWN AT MID-ROTATION
- 2) *IMPERIAL SHAFT UNITS (Rx1x, Rx5x)
- 3) **METRIC SHAFT UNITS (Rx6x)

K

PRELOADED KEYWAY SHAFT

Not available on Rx6x

Required when use of hub adaptor is desired.



SERIES	LETTER DIMENSION					
	A	B	C	D	E	F
2000	0.375 [9.5]	1.500 [38.1]	0.250 [6.35]	3/8-24 [M10]	10-32 x 0.312 DP [M5 x 8]	0.156 [4]
4000	0.812 [20.6]	2.000 [50.8]	0.437 [11.11]	1/2-20 [M12]	5/16-24 x 0.440 DP [M8 x 11]	0.220 [6]
6000	0.812 [20.6]	3.000 [76.2]	0.563 [14.28]	5/8-11 [M16]	3/8-24 x 0.560 DP [M10 x 14]	0.251 [6]
8000	1.500 [38.1]	4.000 [101.6]	0.875 [22.22]	1-8 [M24]	1/2-20 x 0.687 DP [M12 x 17.5]	0.438 [11]

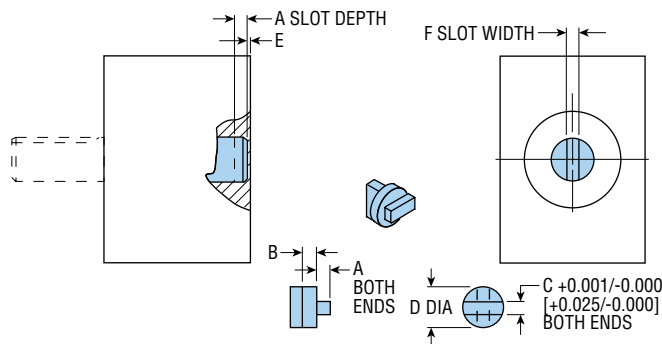
SHAFT KEYWAY: SHOWN AT MID-ROTATION

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

C

CROSS KEY SHAFT

Not available on Rx6x



SERIES	LETTER DIMENSION					
	A	B	C	D	E	F
2000	0.250 [6.4]	0.215 [5.5]	0.230 [5.8]	0.500 [12.7]	0.118 [3]	0.250 [6.3]
4000	0.250 [6.4]	0.265 [6.7]	0.248 [6.3]	0.875 [22.2]	0.120 [3]	0.248 [6.3]
6000	0.437 [11]	0.485 [12.3]	0.500 [12.7]	1.125 [28.6]	0.150 [3.8]	0.5002 [12.7]
8000	0.437 [11]	0.805 [20.4]	0.875 [22.2]	1.750 [44.5]	0.245 [6.2]	0.8752 [22.2]

SHAFT KEYWAY: SHOWN AT MID-ROTATION

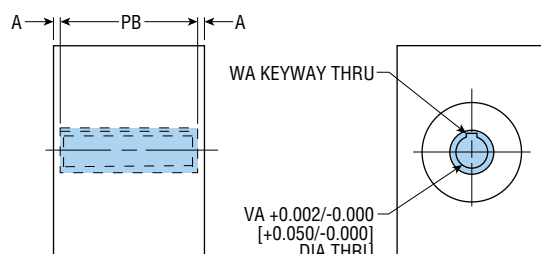
R2xx UNITS: WHEN ORDERING SPECIFY -C-C FOR CROSSKEY ON BOTH SHAFT EXTENSIONS

CROSSKEY: INCLUDED WITH UNIT

H

HOLLOW SHAFT

Not available on Rx6x



SERIES	LETTER DIMENSION			
	A	PB	VA	WA
2000	0.042 [1.1]	1.920 [48.76]	0.250 [6.35]	—
4000	0.042 [1.1]	2.917 [74.09]	0.500 [12.7]	1/8 x 1/16 [3.18 x 1.58]
6000	0.135 [3.4]	2.730 [69.34]	0.687 [17.46]	3/16 x 3/32 [4.76 x 2.38]
8000	0.240 [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 tolerated.

MAGNETIC PISTON FOR USE WITH PHD 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 catalog for complete switch information.**

E

MAGNETIC PISTON FOR SERIES JC1 RADIAL SENSING SWITCHES

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

PART NO.	DESCRIPTION
JC1HDP-5	PNP (Source), 5 meter cable
JC1HDP-K	PNP (Source), Quick Connect
JC1HDN-5	NPN (Sink), 5 meter cable
JC1HDN-K	NPN (Sink), 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.

M

MAGNETIC PISTON FOR SERIES JC1 REED & TEACHABLE SWITCHES

The PHD Series JC1 Reed Switches may be used in situations where the (-E) switches are not applicable. Actuators are equipped with a magnetic band (specify -M) on the pistons which activates externally mounted axial sensing JC1 Reed switches. The JC1 switches may be used to signal a programmable controller, sequencer, relay, or in some cases, a valve solenoid. This option to be used with the following 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)

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.

The PHD Series JC1 Teachable switch provides the ability to identify two separately programmable positions with a single switch. Programmable capability means no "fine tuning." With switch located centrally to the desired sensing positions, move actuator to desired positions and program. Recommended for use only when the two sensing positions are less than 1" [25 mm] apart. Solid state technology provides a highly reliable switch. Includes LED indicators on control module for positioning and programming.

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

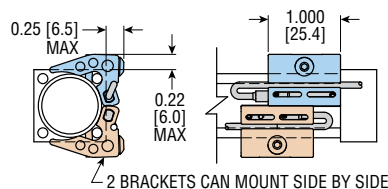
NOTE: Cordsets are ordered separately.

JC1 SWITCH MOUNTING BRACKETS

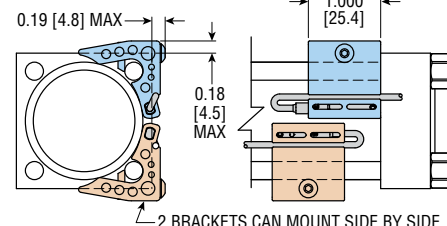
SERIES	ROTARY SECTION
1000, 2000	92100
3000, 4000	92101
5000, 6000	92101
7000, 8000	92102

NOTE: Brackets are ordered separately.

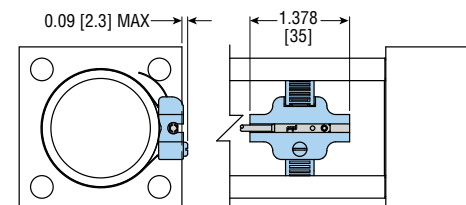
SWITCH BRACKET 92100



SWITCH BRACKET 92101



SWITCH BRACKET 92102



All dimensions are reference only unless specifically tolerated.

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.

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.