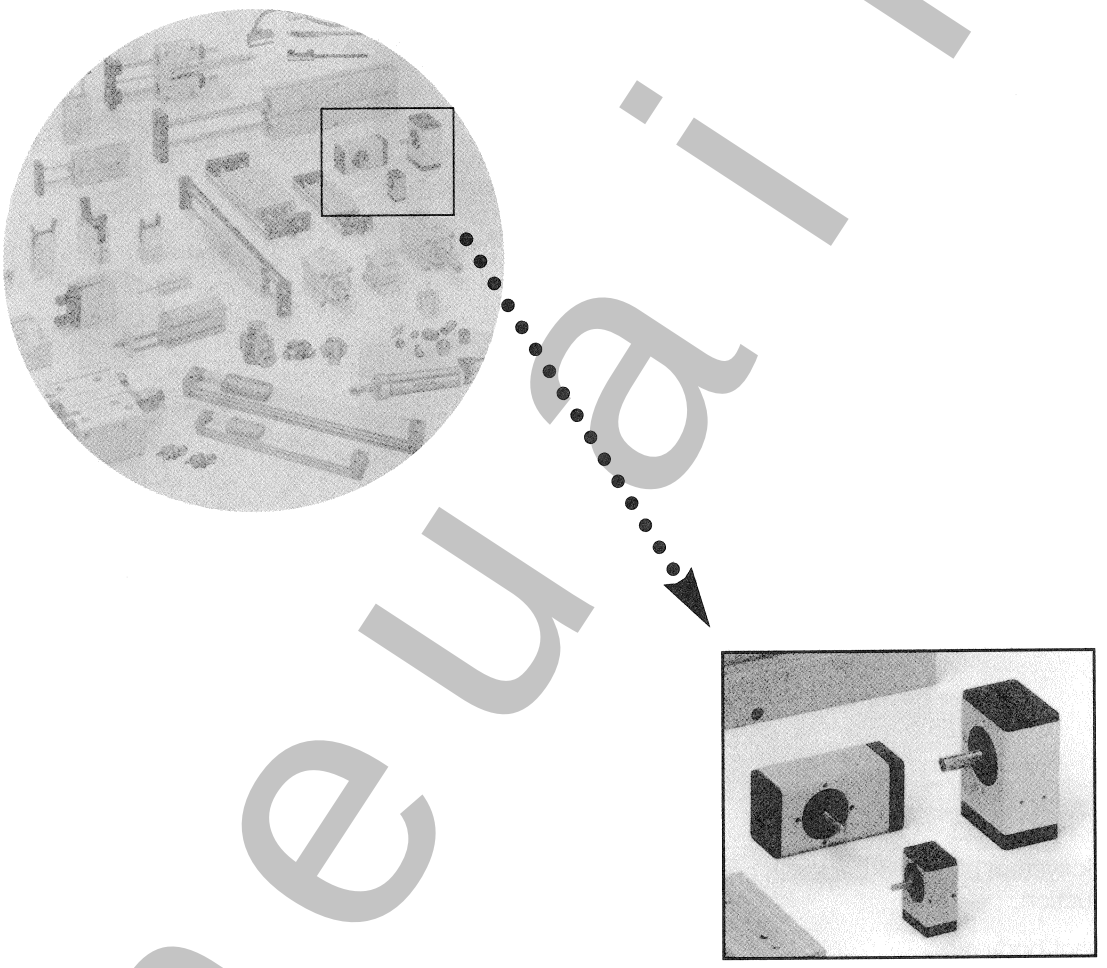
HRAP Series Rotary Actuators

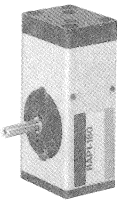


HUMPHREY HRAP SERIES ROTARY ACTUATORS

- Rotary actuator – piston type offers maximum space saving, easy piping.
- Rotation from 90° to a full 360°.
- Ultra compact sensor switch can be used.

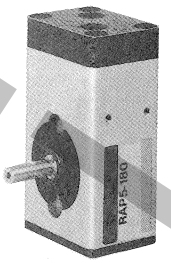
HRAPS1

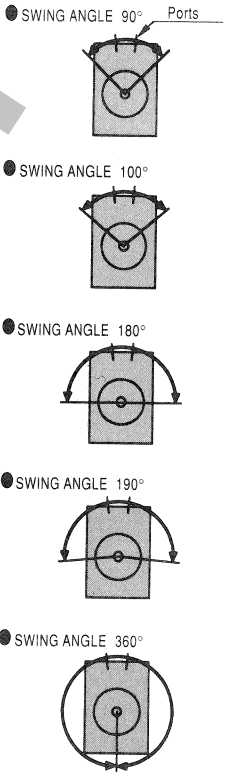
Nominal torque
.87 lb.•in.
(1 kgf•cm)



HRAPS5

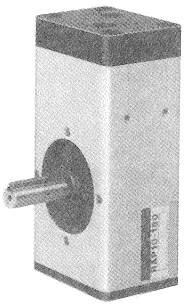
Nominal torque
4.3 lb.•in.
(5 kgf•cm)





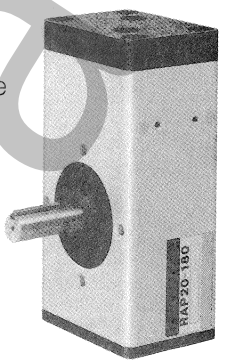
HRAPS10

Nominal torque
8.7 lb.•in.
(10 kgf•cm)

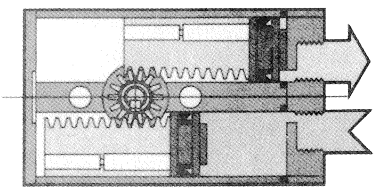


HRAPS20

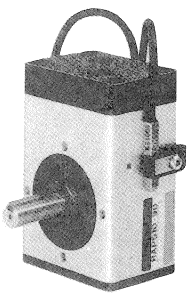
Nominal torque
17.4 lb.•in.
(20 kgf•cm)



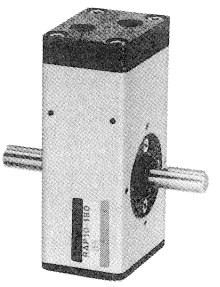
- Double rack system offers no backlash and no leak construction.
- Slim, compact body.
- One end porting allows greater space saving.
- Double rod model available.



OPTIONS



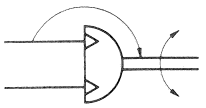
Ultra compact sensor 0.157 in. (4mm), including hall effect or reed switch types.

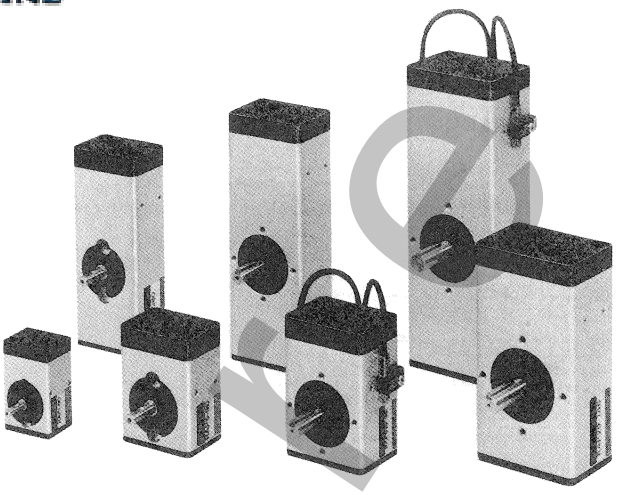


Double rod and stainless rod.

SPECIFICATIONS

SYMBOL





SPECIFICATIONS

Item		Basic model			
		HRAPS1	HRAPS5	HRAPS10	HRAPS20
Actual torque[NOTE 1] – lb.•in. (kgf•cm)		0.69 (0.8)	3.30 (3.8)	7.81 (9)	16.49 (19)
Angle (tolerance +10°/–0°)	HRAPS□-90	90°			
	HRAPS□-100	100°			
	HRAPS□-180	180°			
	HRAPS□-190	190°			
	HRAPS□-360	360°			
Media		Air			
Port size		10-32 UNF	1/8" NPT		
Shaft or rod diameter – in. (mm)		0.157 (4)	0.236 (6)	0.313 (7.9)	0.375 (9.5)
Operating pressure range – psig (kgf/cm^2)		20 ~ 100 (1.5 ~ 7)		9 ~ 100 (0.6 ~ 7)	
Operating temperature range – °F (°C)		32 ~ 122 (0 ~ 50)			
Allowable kinetic energy – lb.•in. (kgf•cm)		0.009 (0.01)	0.026 (0.03)	0.069 (0.08)	0.130 (0.15)
Lubrication		None required			
Cushion		None			

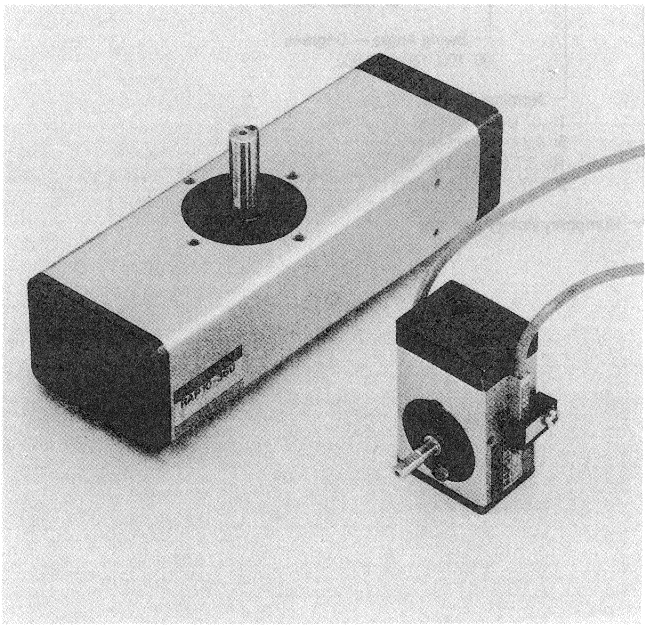
NOTE 1: Air pressure 71 psig (5 kgf/cm^2.)

WEIGHT oz. (gf)

Model	Body weight	Additional weight	
		Double rod	Sensor switch
HRAPS1-90, 100	2.93 (83)	0.07 (2)	1 pc: 0.85 (24) 2 pcs: 1.62 (46)
HRAPS1-180, 190	3.56 (101)		
HRAPS1-360	5.22 (148)		
HRAPS5-90, 100	7.48 (212)	0.14 (4)	
HRAPS5-180, 190	9.17 (260)		
HRAPS5-360	13.23 (375)		
HRAPS10-90, 100	10.58 (300)	0.35 (10)	
HRAPS10-180, 190	13.40 (380)		
HRAPS10-360	18.98 (538)		
HRAPS20-90, 100	17.64 (500)	0.56 (16)	
HRAPS20-180, 190	21.66 (614)		
HRAPS20-360	30.69 (870)		

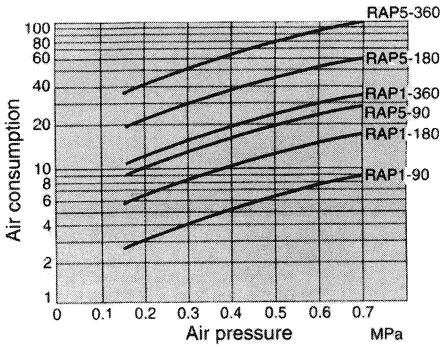
Calculation example: Weight of HRAPS1-180 with double rod and one sensor switch is 3.56 + 0.07 + 0.85 = 4.48 oz.

NOTE 1: Sensor switch weight includes switch holder, but not lead wire.
NOTE 2: Weight of the rod is the same for hard steel or stainless steel material.

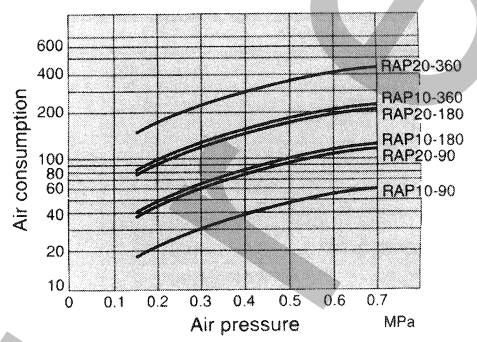


TORQUE CHARACTERISTICS (actual torque)

HRAPS1, HRAPS5



HRAPS10, HRAPS20



ACTUAL TORQUE

lb.•in. (kgf•cm)

Model	Air pressure – psig (kgf/cm2)					
	28 (2)	43 (3)	57 (4)	71 (5)	85 (6)	100 (7)
HRAPS1	0.23 (0.26)	0.37 (0.43)	0.53 (0.61)	0.69 (0.8)	0.85 (0.98)	1.0 (1.1)
HRAPS5	1.0 (1.1)	1.7 (2.0)	2.5 (2.9)	3.3 (3.8)	4.0 (4.6)	4.8 (5.5)
HRAPS10	2.6 (3.0)	3.9 (4.5)	5.8 (6.7)	7.8 (9.0)	9.8 (11.3)	11.8 (13.6)
HRAPS20	5.2 (6.0)	8.7 (10.0)	12.6 (14.5)	16.6 (19.0)	20.3 (23.4)	24.3 (28.0)

HOW TO ORDER

HRAPS [5] — [190] — [ ] [S]

Rod Material
Blank: Hard steel (chrome-plated)
S: Stainless steel)

Rod Types
Blank: Single rod
D: Double rod

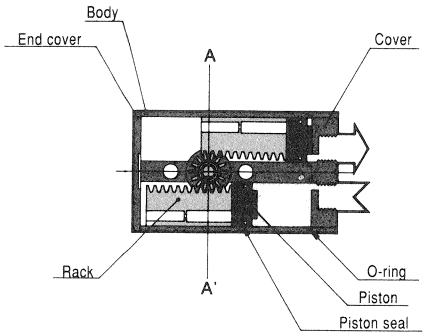
Swing Angle — Degrees
90, 100, 180,190, 360

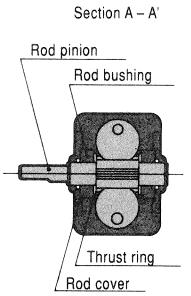
Nominal Torque
1: .87 lb•in (1 kgf•cm)
5: 4.3 lb•in (5 kgf•cm)
10: 8.7 lb•in (10 kgf•cm)
20: 17.4 lb•in (20 kgf•cm)

Humphrey Rotary Actuator

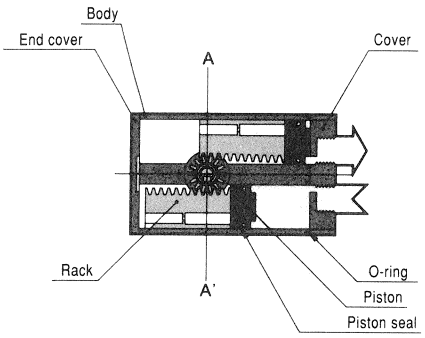
INNER CONSTRUCTION AND MAJOR PARTS

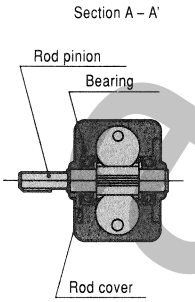
HRAPS1, HRAPS5





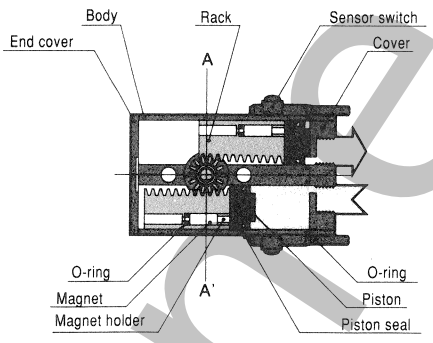
HRAPS10, HRAPS20

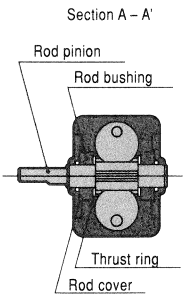




Sensor switch

HRAPS□

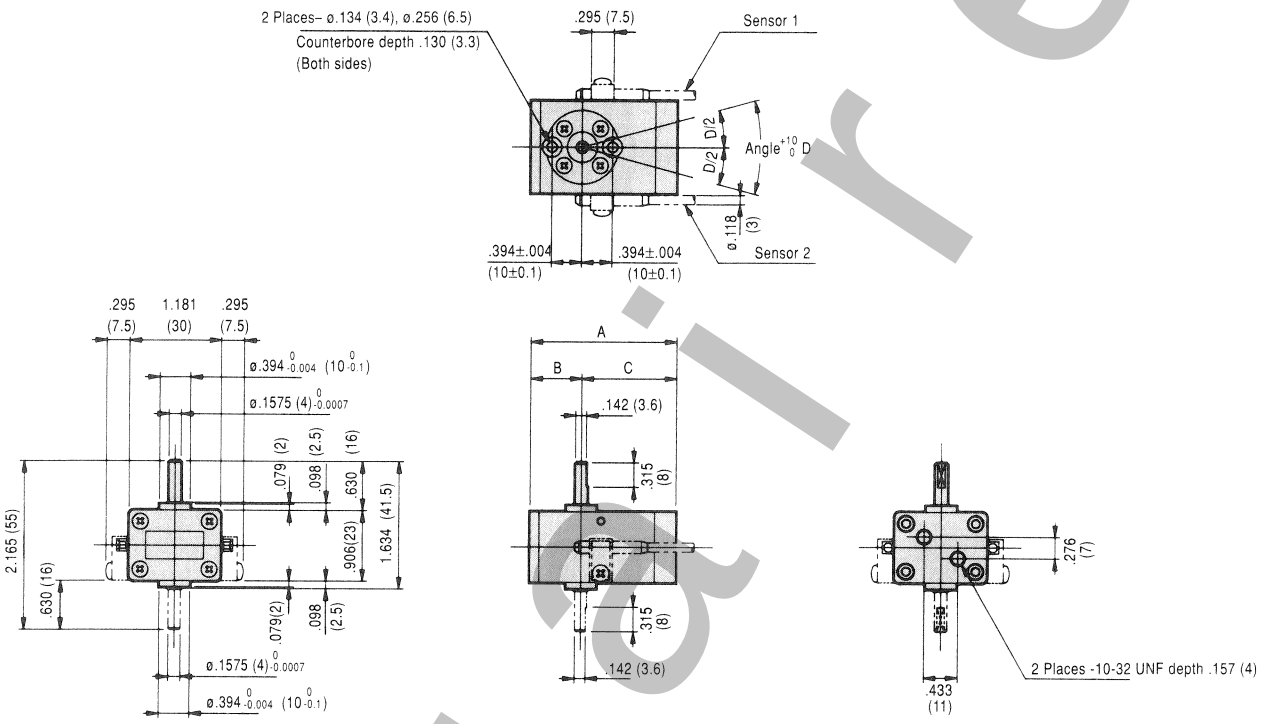




MAJOR PARTS AND MATERIALS OF CONSTRUCTION

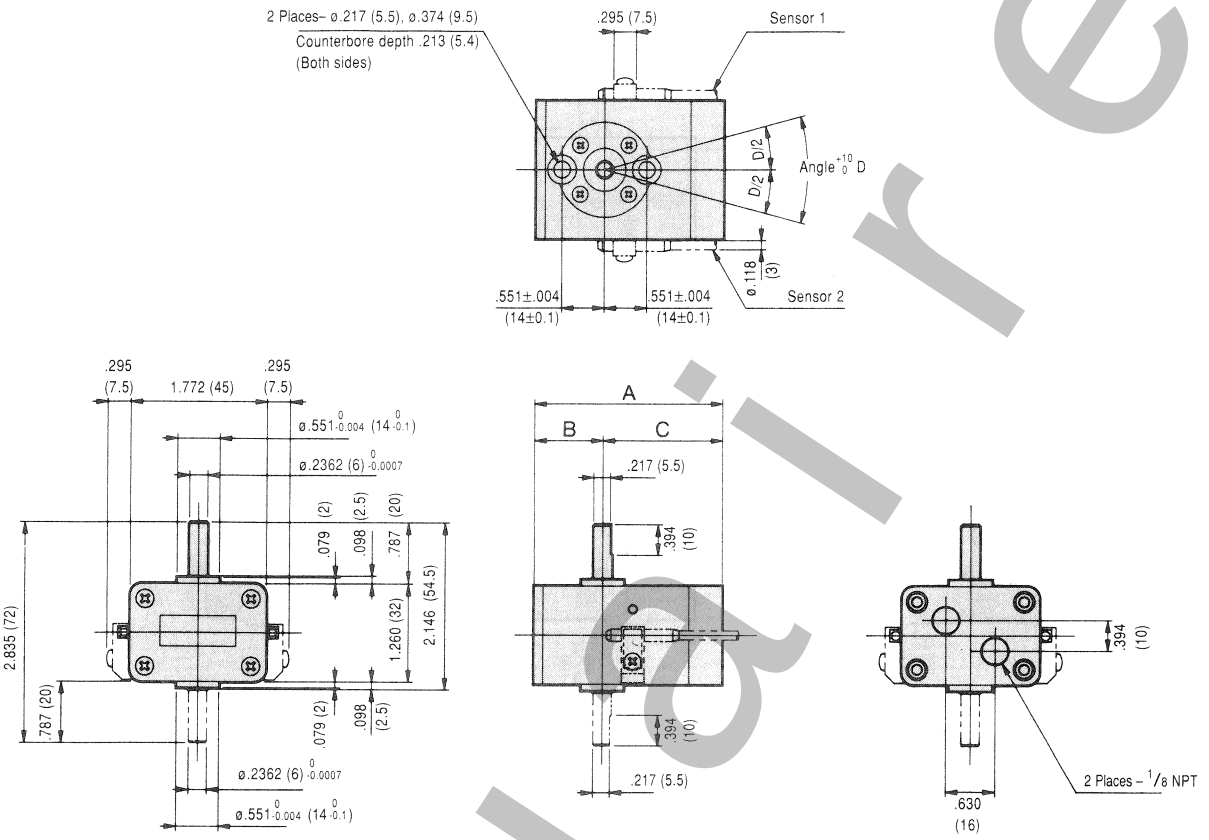
Name	Material
Main body	Aluminum (anodized)
Rod and pinion	Hard steel (chrome-plated) or stainless
Rack	Plastic
Piston	Plastic
Piston seal	Buna

HRAPS1



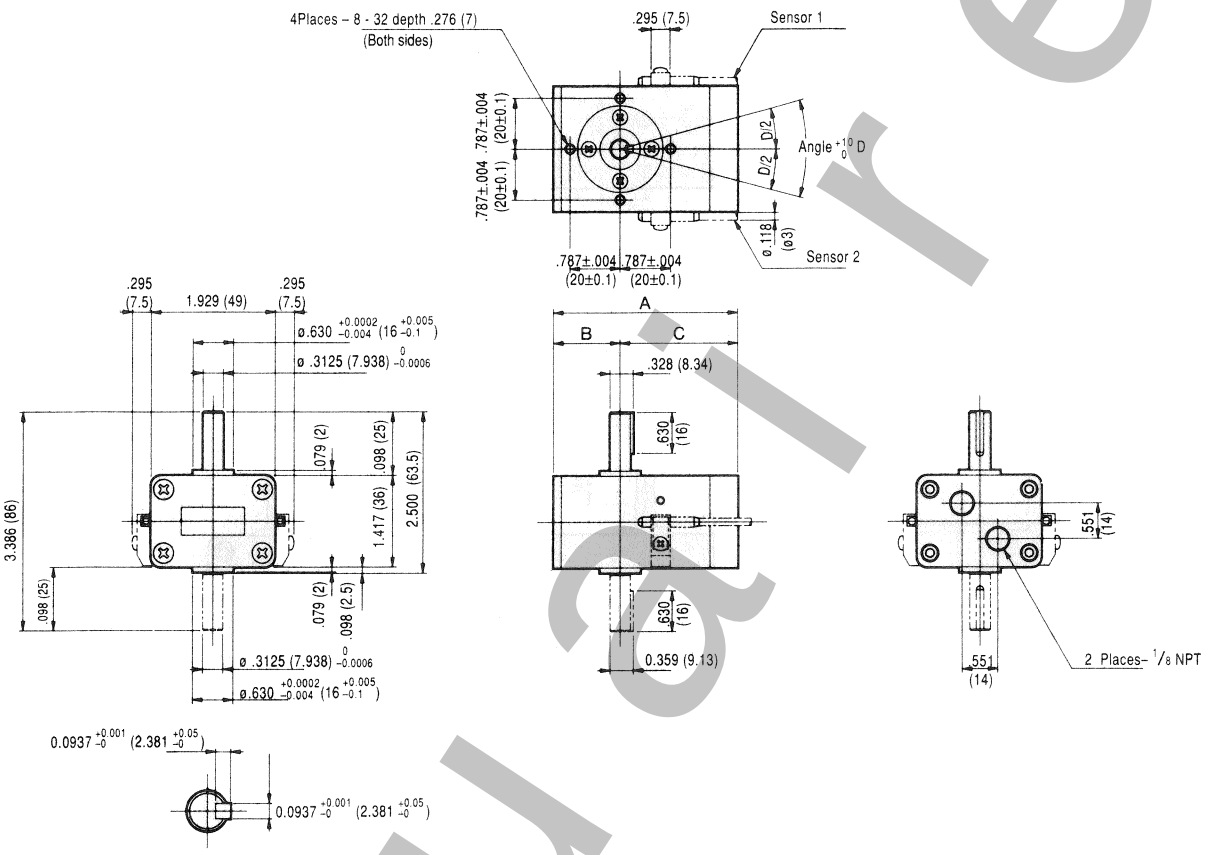
Model	Dimensions – in. (mm)			
	A	B	C	D
HRAPS1-90	1.890 (48)	0.669 (17)	1.220 (31)	90
HRAPS1-100				100
HRAPS1-180	2.362 (60)	0.906 (23)	1.457 (37)	180
HRAPS1-190				190
HRAPS1-360	3.465 (88)	1.457 (37)	2.008 (51)	360

HRAPS5



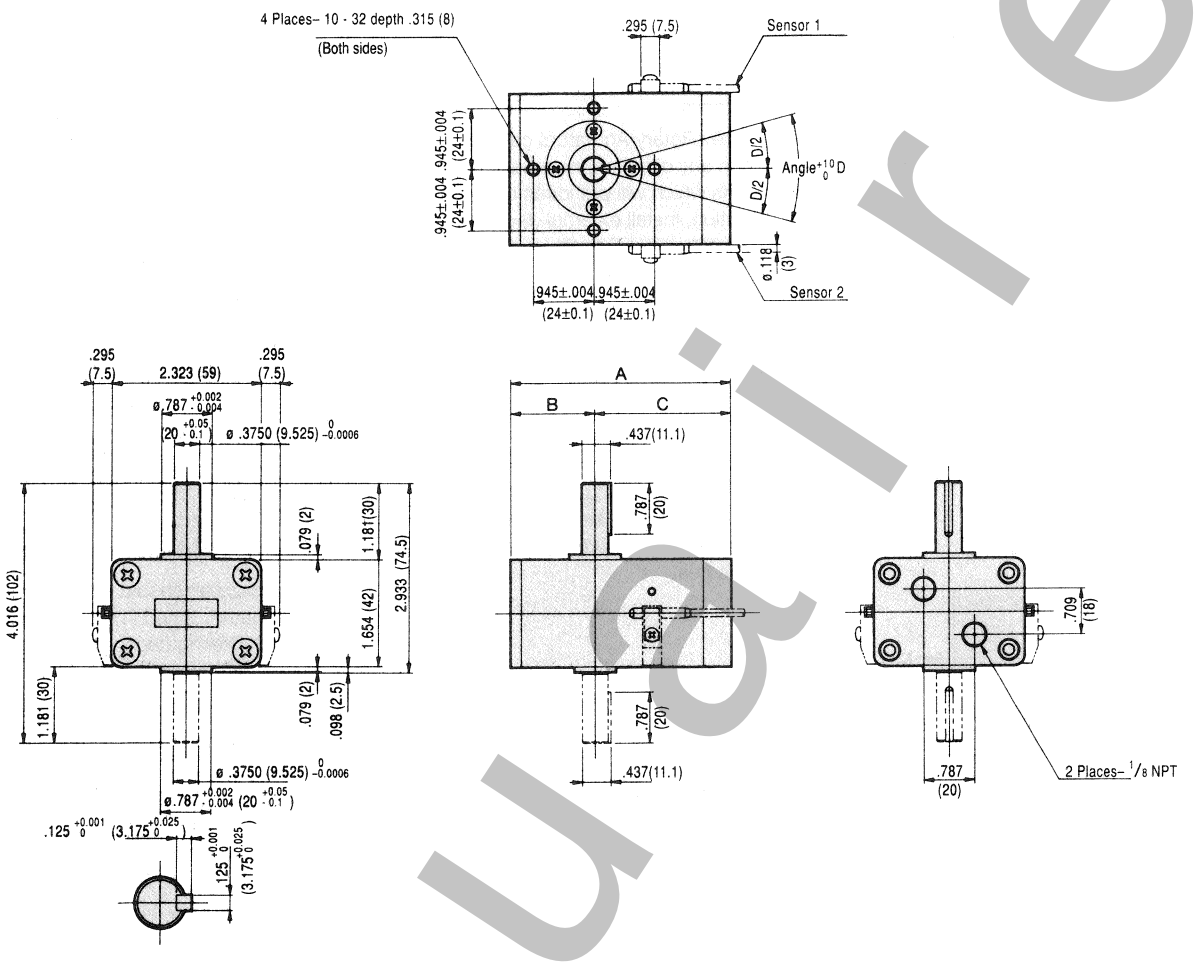
Model	Dimensions – in. (mm)			
	A	B	C	D
HRAPS5-90	2.441 (62)	0.886 (22.5)	1.555 (39.5)	90
HRAPS5-100				100
HRAPS5-180	3.071 (78)	1.083 (27.5)	1.988 (50.5)	180
HRAPS5-190				190
HRAPS5-360	4.567 (116)	1.850 (47)	2.717 (69)	360

HRAPS10



Model	Dimensions – in. (mm)			
	A	B	C	D
HRAPS10-90	2.874 (73)	1.043 (26.5)	1.831 (46.5)	90
HRAPS10-100				100
HRAPS10-180	3.740 (95)	1.413 (35.9)	2.327 (59.1)	180
HRAPS10-190				190
HRAPS10-360	5.630 (143)	2.323 (59)	3.307 (84)	360

HRAPS20



Model	Dimensions – in. (mm)			
	A	B	C	D
HRAPS20-90	3.425 (87)	1.303 (33.1)	2.122 (53.9)	90
HRAPS20-100				100
HRAPS20-180	4.449 (113)	1.772 (45)	2.677 (68)	180
HRAPS20-190				190
HRAPS20-360	6.772 (172)	2.874 (73)	3.898 (99)	360

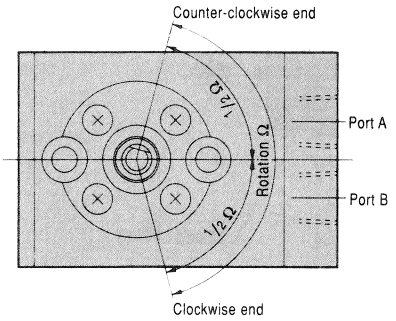
HANDLING TIPS AND POINTS TO BE CONSIDERED

SELECTION AND MOUNTING

SELECTION

1. Select a rotary actuator so that the effective torque-to-load ratio is less than 80% of maximum specifications. On fluctuating loads, the ratio should be less than 50%. When operating heavy loads at high speed, the load's inertia could exceed the allowable kinetic energy. If this occurs, install shock absorbers.

2. The diagram below shows the degree of rotary motion and the position of the shaft key (or flat surface). The error of degrees is within the specifications. If accurate positioning is required, install external stoppers.



Supply air to port A and the shaft rotates counter-clockwise.

Supply air to port B and the shaft rotates clockwise.

3. The swinging time for full rotation of Humphrey Rotary Actuators is shown in the chart below. It should be used for reference only, as actual applications may differ:

sec.

Model	Rotation		
	90°, 100°	180°, 190°	360°
HRAPS1	0.2 ~ 0.5	0.3 ~ 1.0	0.3 ~ 0.6
HRAPS5			0.3 ~ 0.8
HRAPS10			0.3 ~ 1.0
HRAPS20	0.2 ~ 2.0	0.3 ~ 2.0	0.4 ~ 1.2

NOTE 1: High kinetic energy may cause breakage of the shaft. Be sure to operate within the allowable kinetic energy.

NOTE 2: For detail information in kinetic energy, consult factory.

MOUNTING

1. Humphrey Rotary Actuators can be mounted in any direction; however, avoid applications which will put loads on the shaft direction. Install external devices, such as bearings, to support loads.

2. Install so that the rotary actuator shaft and the load's center of gravity are centered. When the load cannot be centered on the shaft, install external devices, such as a flexible coupling, to limit forces to rotating forces only.

NOTE: Thrust loads, load moments, eccentricity of the rotating shaft and extreme inertial loads will cause inaccurate operation or shaft breakage. Be sure to take preventative measures.

GENERAL INFORMATION

CAUTION

Compressed air is powerful and may be dangerous. Before attempting to remove a component from an air line or system, *always* disconnect the supply air and thoroughly exhaust the line or system. *Never* attempt to construct, operate, or service anything using compressed air unless you have been properly trained to do so. Failure to heed this warning could result in SERIOUS, EVEN FATAL, PERSONAL INJURY.

MEDIA

1. Humphrey Rotary Actuators are designed for use with compressed air at the pressures indicated in the specifications. Consult factory if using any other media.

2. Compressed air should be clean and uncontaminated. When in doubt, install an air filter with filtering capacity of 40 microns. Periodically remove and clean or replace filter element.

LUBRICATION

No lubrication is required when compressed air is dry and free of water and oil. If lubricating oil is used, it must be chemically compatible with Buna N elastomers and of sufficient viscosity to assure adequate lubrication. Thin or low viscosity oils (spindle oil, machine oil, etc.) do not provide a good residual film of lubrication.

AMBIENT CONDITIONS

Do not use Humphrey Rotary Actuators in the presence of organic solvents, phosphoric acid, ester-type machine oil, sulfurous acid gas, chlorine gas, or acids.