

# Norgren Rotary Actuators

## Fixed and Variable Angle, Compressed Air Rotary Actuators

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**ACT-9-2 –  
Fixed Oscillating  
Angle Actuators**



**ACT-9-6 –  
Variable Oscillating  
Angle Actuators**



**ACT-9-10 –  
Standard Rotary Actuator**



**ACT-9-16 –  
M/40, M/40/C, TM/40,  
& M/40/P Switches**



**ACT-9-18 –  
M/41, M/42, M/42/P  
Switches**

- Suitable for torques from 0.5 to 144 in. lbs (0.058 to 16.27 Nm)
- Rotation angles from 90° to 270°
- Modern compact design

**Specifications**
**Medium:**

Lubricated or non-lubricated, filtered, compressed air

**Operation:**

Double acting rotary vane with buffer cushioning

M/60280/IE to C/60284/IE: single vane

C/60284/TI: double vane

**Operating Pressure:**

M/60280, M/60281: 44 to 102 psig (3 to 7 bar)

M/60282, C/60283: 29 to 102 psig (2 to 7 bar)

C/60284, C/60284/TI: 29 to 145 psig (2 to 10 bar)

**Operating Temperature:**

40° to 140° F (5° to 60°C)

**Porting:**

M5: M/60280, M/60281, M/60282

1/8 NPT: C/60283, C/60284, C/60284A/TI

**Rotation Angle:**

90°, 180°: M/60280 to C/60283

90°, 180°, 270°: C/60284

90°: C/60284/TI

**Rotation Angle Tolerance:**

0 to +4° M/60280 to C/60283

0 to +3° C/60284, C/60284A/TI

**Other Features:**

Drive-key is standard.

**Materials:**

Cast aluminium housing, steel shaft, sintered bronze shaft bearings, nitrile rubber seals.


**Ordering Information**

To order a Rotary Vane Actuator with torque up to 8 in. lbs. at 87 psig (0.9 Nm at 6 bar) and a 180° rotation, order:

M/60282A/180

To order a Rotary Vane Actuator with torque up to 80 in. lbs. at 87 psig (9 Nm at 6 bar) and a 90° rotation order:

C/60284A/TI/90

To order mounting brackets refer to appropriate actuator mounting table.

End position detection available on request.

Model	Max Theoretical Torque at 87 psig (6 bar) in. lbs. (Nm)	Permissible Axial Forces* lbs. Force (N)	Radial Force lbs. Force (N)	Permissible Rotation Energy** In. lbs (Nm)	Maximum Frequency*** (1/min)	Air Consumption cu. in. (cm <sup>3</sup> )			Wt. Wt lbs. (kg)	Wt. Styles B, G lbs. (kg)	Style C lbs. (kg)
						90°	180°	270°			
M/60280	1.15 (0.13)	0.22 (1.0)	2.21 (9.8)	0.03 (0.0003)	180 (at 180°)	0.03 (0.5)	0.06 (1.0)	—	0.09 (0.04)	0.02 (0.01)	0.04 (0.02)
M/60281	3.10 (0.35)	0.88 (3.9)	8.82 (39.2)	0.12 (0.001)	160 (at 180°)	0.15 (2.4)	0.16 (2.6)	—	0.15 (0.07)	0.04 (0.02)	0.09 (0.04)
M/60282	9.20 (1.04)	0.88 (3.9)	11.03 (49.0)	0.32 (0.003)	150 (at 180°)	0.31 (5.0)	0.52 (8.5)	—	0.31 (0.14)	0.07 (0.03)	0.11 (0.05)
C/60283	16.90 (1.91)	5.51 (24.5)	66.15 (294.0)	1.59 (0.015)	120 (at 180°)	0.73 (12.0)	—	—	0.79 (0.36)	0.11 (0.05)	0.20 (0.09)
C/60284	35.58 (4.02)	6.62 (29.4)	88.20 (392.0)	2.66 (0.025)	70 (at 170°)	2.26 (37.0)	—	2.62 (43.0)	1.04 (0.47)	0.22 (0.10)	0.44 (0.20)
C/60284A/TI	82.39 (9.31)	6.62 (29.4)	88.20 (392.0)	2.66 (0.025)	200 (at 90°)	2.07 (34.0)	—	—	1.06 (0.48)	0.22 (0.10)	0.44 (0.20)

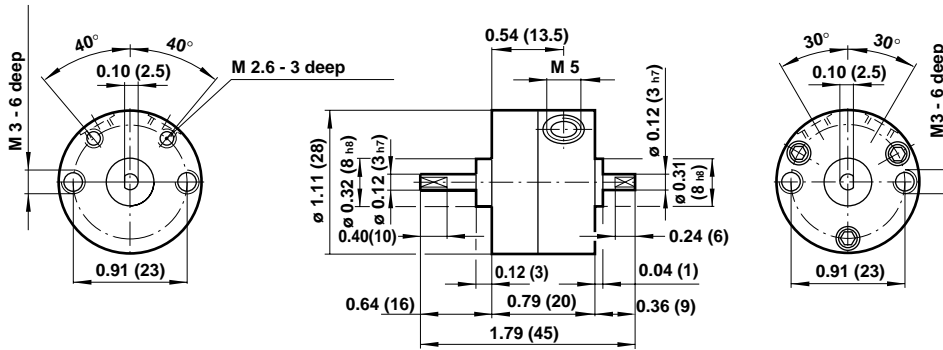
\* Permissible load on rotary vane shaft

\*\* Permissible rotational energy in psig (Nm) which may be applied to shaft. It can be calculated as follows: Permissible rotational energy  $\geq 1/2 I \omega^2$ , I = Angular moment,  $\omega$  = Mean angular velocity.

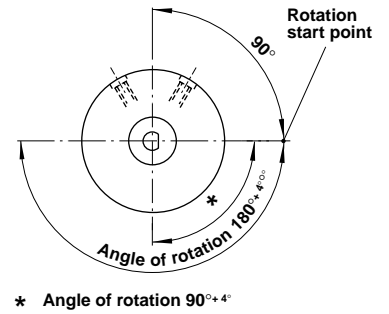
\*\*\* Maximum frequency at 73 psig (5 bar) pressure, no load.



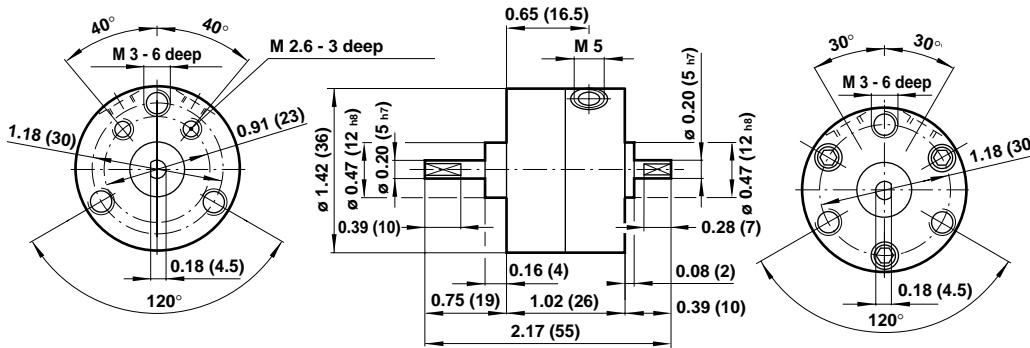
## Basic Dimensions for M/60280



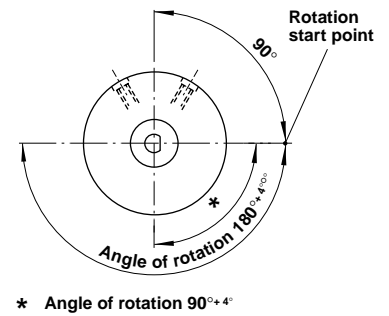
## Rotation Starting Point



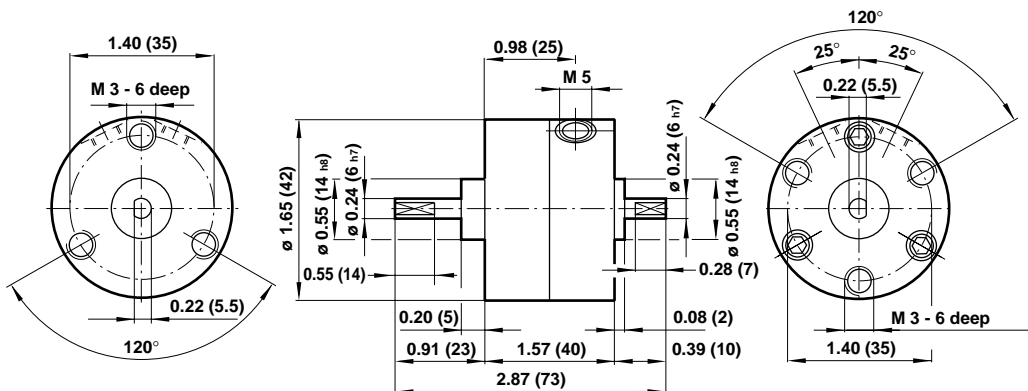
## Basic Dimensions for M/60281



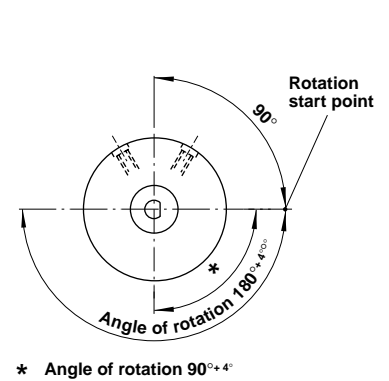
## Rotation Starting Point



## Basic Dimensions for M/60282



## Rotation Starting Point

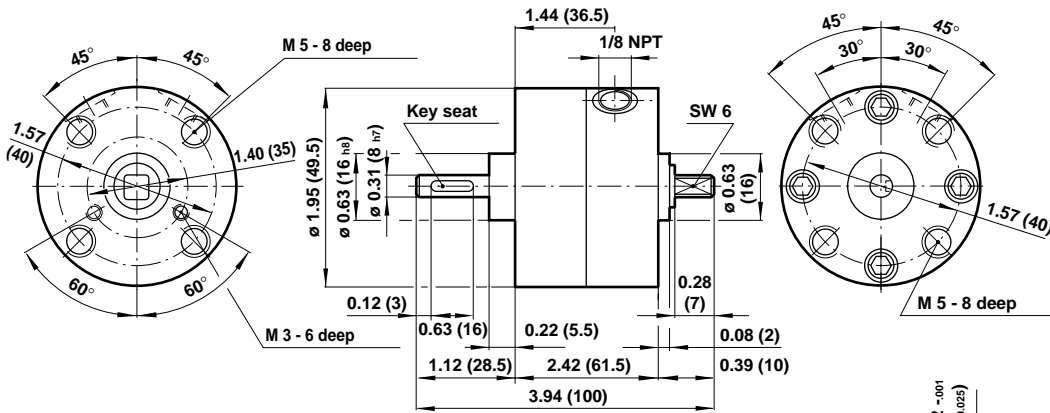




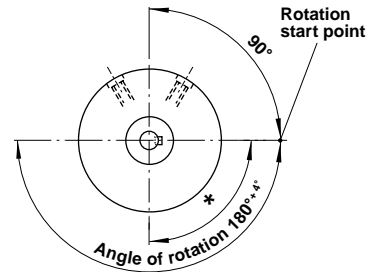
# Rotary Actuators

All Dimensions in Inches (mm)

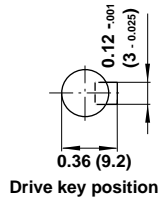
## Basic Dimensions for C/60283



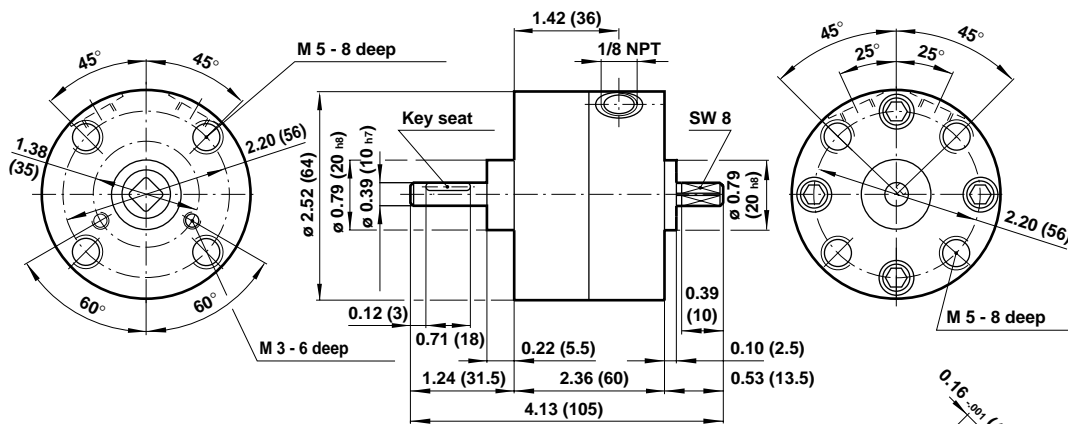
## Rotation Start Point



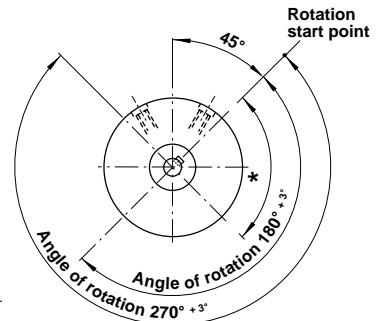
\* Angle of rotation 90° ± 4°



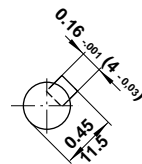
## Basic Dimensions for C/60284 and C/60284A/TI



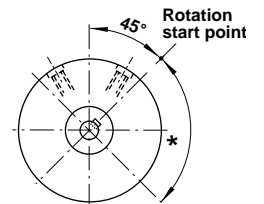
## Rotation Start Point C/60284



\* Angle of rotation 90° ± 3°



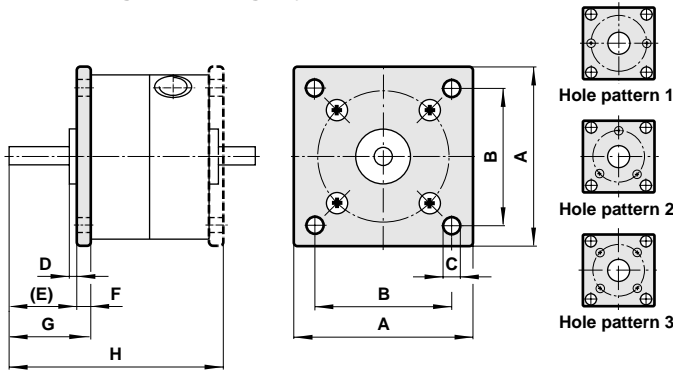
## C/60284/TI



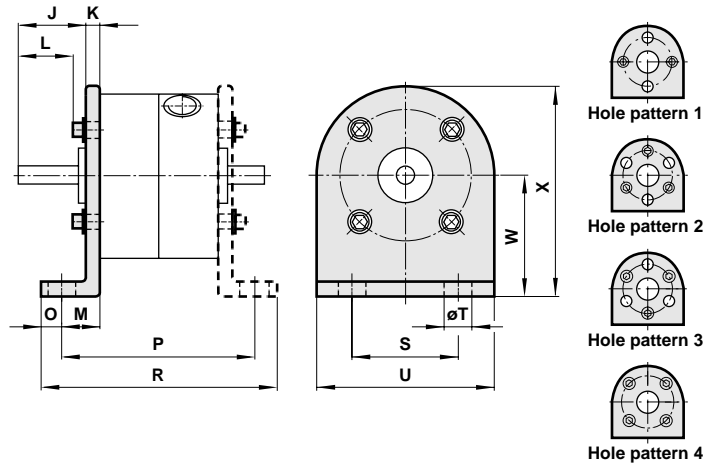
\* Angle of rotation 90° ± 4°



## Rear Flange Mounting Style B Front Flange Mounting Style G



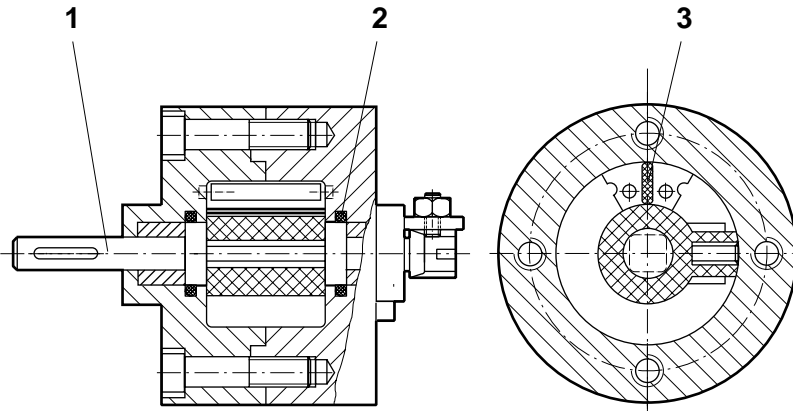
## Foot Mounting Style C



Model B,G Actuator	QM/60280A/22 60280	QM/60281A/22 60281	QM/60282A/22 60282	QM/60283A/22 60283	QM/60284A/22 60284	Model C Actuator	QM/60280A/21 60280	QM/60281A/21 60281	QM/60282A/21 60282	QM/60283A/21 60283	QM/60284A/21 60284
<b>A</b>	1.18 (30.0)	1.46 (37.0)	1.65 (42.0)	1.97 (50.0)	2.52 (64.0)	<b>J</b>	0.55 (14.0)	0.65 (16.5)	0.79 (20.0)	0.98 (25.0)	1.06 (27.0)
<b>B</b>	0.94 (24.0)	1.18 (30.0)	1.34 (34.0)	1.61 (41.0)	2.05 (52.0)	<b>K</b>	0.08 (2.0)	0.10 (2.5)	0.12 (3.0)	0.14 (3.5)	0.18 (4.5)
<b>ØC</b>	0.13 (3.4)	0.13 (3.4)	0.14 (3.5)	0.22 (5.5)	0.22 (5.5)	<b>L</b>	0.41 (10.5)	0.49 (12.5)	0.63 (16.0)	0.73 (18.5)	0.81 (20.5)
<b>D</b>	0.04 (1.0)	0.06 (1.5)	0.08 (2.0)	0.08 (2.0)	0.08 (2.0)	<b>M</b>	0.39 (10.0)	0.43 (11.0)	0.47 (12.0)	0.59 (15.0)	0.71 (18.0)
<b>E</b>	0.55 (14.0)	0.65 (16.5)	0.79 (20.0)	0.98 (25.0)	1.10 (28.0)	<b>O</b>	0.20 (5.0)	0.28 (7.0)	0.31 (8.0)	0.39 (10.0)	0.47 (12.0)
<b>F</b>	0.08 (2.0)	0.10 (2.5)	0.12 (3.0)	0.14 (3.5)	0.14 (3.5)	<b>P</b>	1.57 (40.0)	1.89 (48.0)	2.52 (64.0)	3.60 (91.5)	3.78 (96.0)
<b>G</b>	0.63 (16.0)	0.75 (19.0)	0.91 (23.0)	1.12 (28.5)	1.24 (31.5)	<b>R</b>	1.97 (50.0)	2.44 (62.0)	3.15 (80.0)	4.39 (111.5)	4.72 (120.0)
<b>H</b>	1.50 (38.0)	0.20 (5.0)	2.56 (65.0)	3.68 (93.5)	3.74 (95.0)	<b>S</b>	0.79 (20.0)	1.02 (26.0)	1.18 (30.0)	1.42 (36.0)	1.89 (48.0)
<b>Hole Pattern Rotation*</b>	1 180°	2 120°	2 120°	3 90°	3 90°	<b>ØT</b>	0.19 (4.8)	0.19 (4.8)	0.23 (5.8)	0.28 (7.0)	0.26 (6.5)
						<b>U</b>	1.18 (30.0)	1.42 (36.0)	1.65 (42.0)	1.93 (49.0)	2.60 (66.0)
						<b>W</b>	0.87 (22.0)	0.98 (25.0)	1.18 (30.0)	1.34 (34.0)	1.65 (42.0)
						<b>X</b>	1.46 (37.0)	1.69 (43.0)	2.01 (51.0)	2.30 (58.5)	2.95 (75.0)
						<b>Hole Pattern Rotation*</b>	1 90°	2 60°	3 60°	4 90°	4 90°

\*The mountings can be rotated through the angle shown

## Spares



Model	Spares kit	Model	Spares kit	Item	Kit Consists of Description	Quantity
M/60280	QM/60280A/00	C/60283	QM/60283A/00	1	Shaft with vane	1
M/60281	QM/60281A/00	C/60284	QM/60284A/00	2	O-ring	2
M/60282	QM/60282A/00	C/60284A/TI	QM/60284A/TI/00	3	Seal	1 (2)

( ) for .../TI

## Adjustable Oscillating Angle Mini Rotary Actuators

- Suitable for torques from 1.33 to 144 in. lbs (0.15 to 16.27 Nm)
- Angle of rotation infinitely adjustable between 30° to 270°
- Modern compact design

### Specifications

#### Medium:

Lubricated or non-lubricated, filtered, compressed air

#### Operation:

Double acting rotary vane with buffer cushioning and adjustable rotation angles

M/60281A/IE to C/60284A/IE: single vane

C/60284A/TE: double vane

#### Operating Pressure:

44 to 102 psig (3 to 7 bar) M/60281A/IE

29 to 102 psig (2 to 7 bar) M/60282A/IE

29 to 145 psig (2 to 10 bar) C/60283A/IE, C/60284A/IE, C/60284A/TE

#### Operating Temperature:

40° to 140°F (5° to 60°C)

#### Porting:

M5: M/60281A/IE, M/60282A/IE

1/8 NPT: C/60283A/IE, C/60284A/IE, C/60284A/TE

#### Rotation Angle:

180°: (30 to 180° adjustable) M/60281A/IE, M/60282A/IE, C/60283A/IE

270°: (30 to 270° adjustable) C/60284A/IE

90°: (30 to 90° adjustable) C/60284A/TE

#### Rotation Angle Tolerance (fine adjustment):

-9° to +3° range and maximum angle setting

±3° rotation reference point

#### Other Features:

Drive-key is standard.

#### Materials:

Cast aluminium housing, steel shaft, sintered bronze shaft bearings, nitrile rubber seals.



### Ordering Information

To order a Rotary Vane Actuator with torque up to 8 in. lbs. at 87 psig (0.9 Nm at 6 bar) and a 180° rotation quote: M/60282A/IE

To order a Rotary Vane Actuator with torque up to 80 in. lbs. at 87 psig. (9 Nm at 6 bar) and a 270° rotation quote: C/60284A/TE

To order mounting brackets refer to appropriate actuator mounting table.

End position detection available on request.

Model	Max. Theoretical Torque at 87 psig (6 bar) in. lbs. (Nm)	Permissible Axial Forces* lbs. Force (N)	Radial Force lbs. Force (N)	Permissible Rotation Energy** In. lbs (Nm)	Maximum Frequency*** (cycles per min)	Air Consumption cu. in. (cm <sup>3</sup> )Wt per cycle	Styles B,G lbs. (kg)	Wt. Style C lbs. (kg)	Wt. lbs. (kg)
M/60281A/IE	3.10 (0.35)	0.88 (3.9)	8.82 (39.2)	0.12 (.001)	160 (at 180°)	0.16 (2.6)	0.15 (0.07)	0.04 (0.02)	0.09 (0.04)
M/60282A/IE	9.20 (1.04)	0.88 (3.9)	11.03 (49.0)	0.21 (.002)	150 (at 180°)	0.52 (8.5)	0.37 (0.17)	0.07 (0.03)	0.11 (0.05)
C/60283A/IE	16.90 (1.91)	5.51 (24.5)	66.15 (294.0)	0.32 (.003)	120 (at 180°)	0.98 (16.0)	0.86 (0.39)	0.11 (0.05)	0.20 (0.09)
C/60284A/IE	35.58 (4.02)	6.62 (29.4)	88.20 (392.0)	0.74 (.007)	70 (at 270°)	2.62 (43.0)	1.12 (0.51)	0.22 (0.10)	0.44 (0.20)
C/60284A/TE	82.39 (9.31)	6.62 (29.4)	88.20 (392.0)	0.74 (.007)	200 (at 90°)	2.07 (34.0)	1.17 (0.53)	0.22 (0.10)	0.44 (0.20)

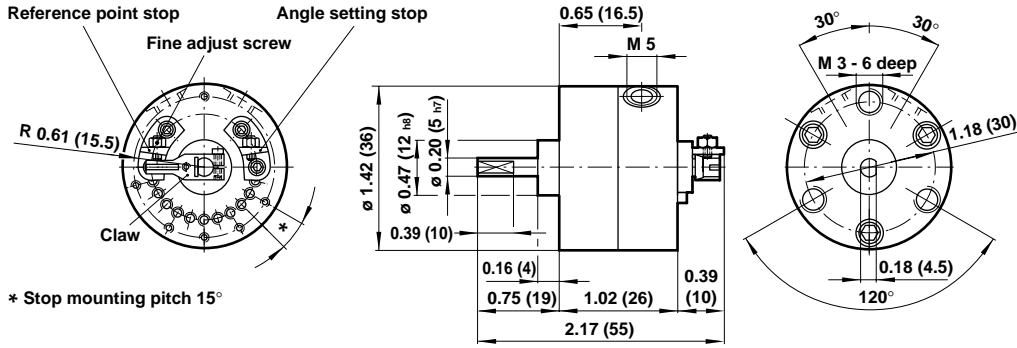
\* Permissible load on rotary vane shaft

\*\* Permissible rotational energy in psig (Nm) which may be applied to shaft. It can be calculated as follows: Permissible rotational energy  $\geq 1/2 I \omega^2$ , I = Angular moment,  $\omega$  = Mean angular velocity.

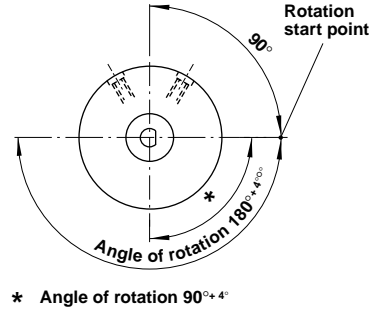
\*\*\* Maximum frequency at 73 psig (5 bar) pressure, no load.



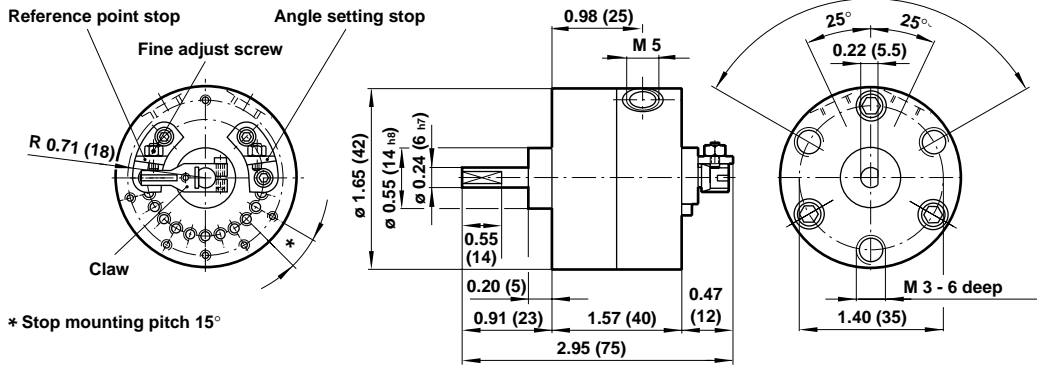
## Basic Dimensions for M/60281A/IE (30° to 180°)



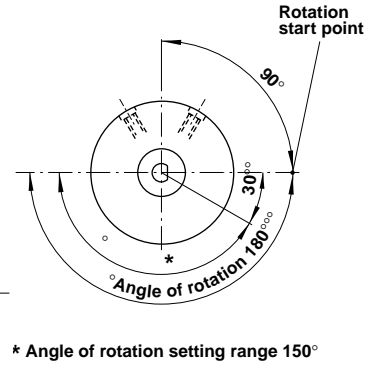
## Rotation Start Point



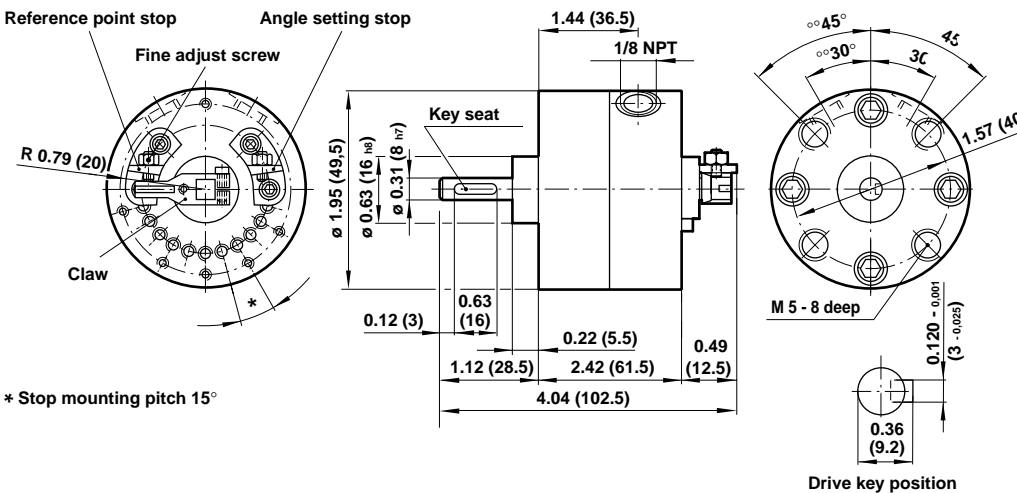
## Basic Dimensions for M/60282A/IE (30° to 180°)



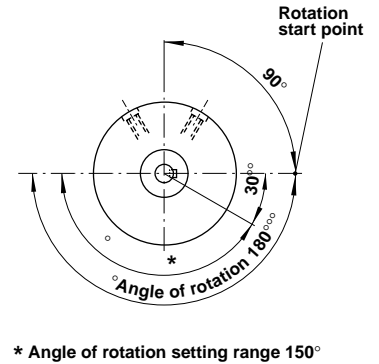
## Rotation Start Point



## Basic Dimensions for C/60283A/IE (30° to 180°)



## Rotation Start Point



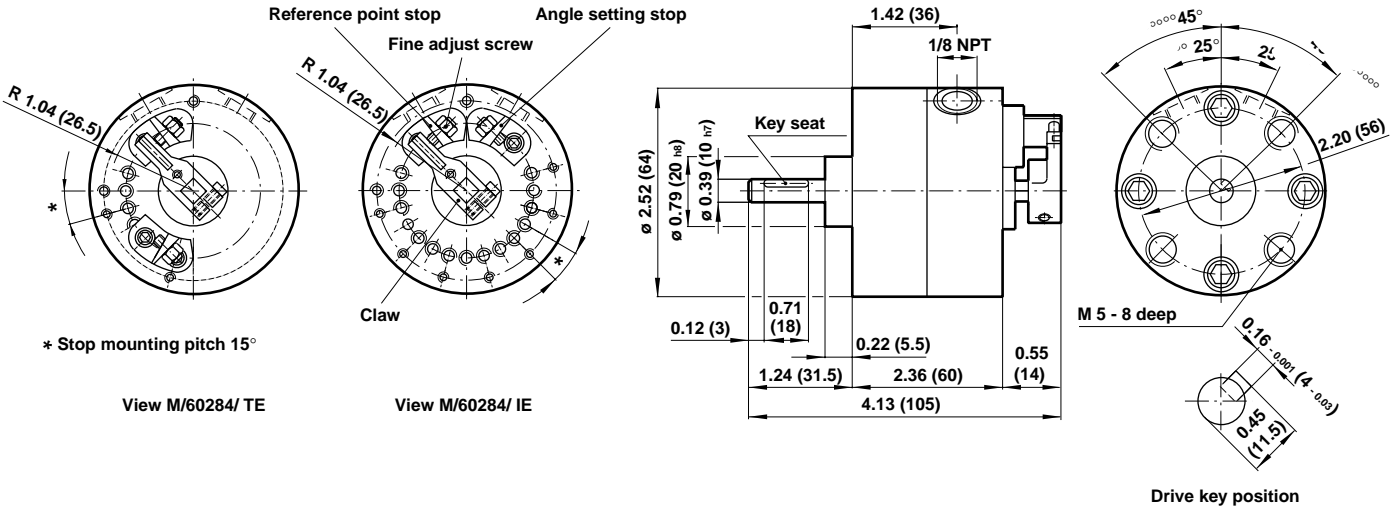
Drive key position



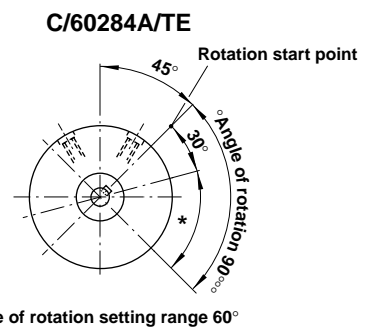
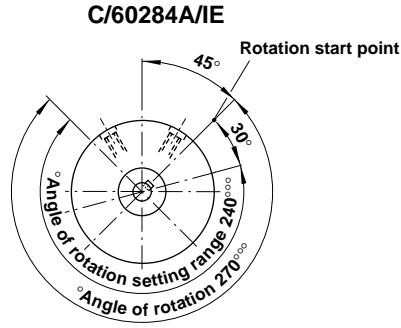
# Rotary Actuators

All Dimensions in Inches (mm)

## Basic Dimensions for C/60284A/IE (30° to 270°) and C/60284A/TE (30° to 90°)

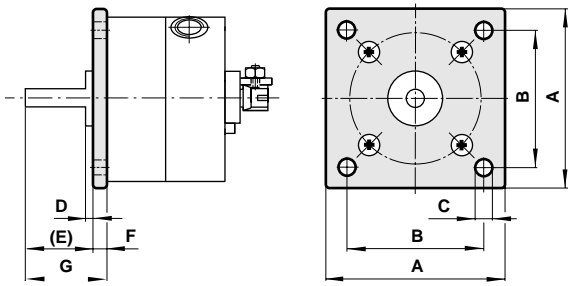


## Rotation Start Point





## Front Flange Mounting Style G

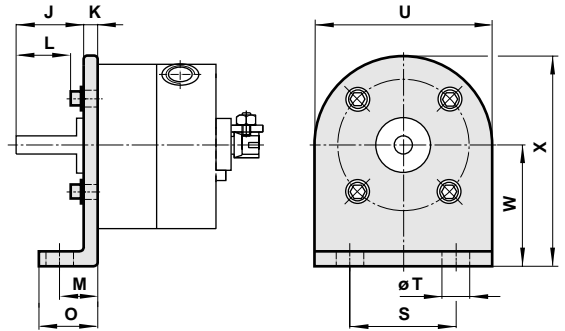


Hole pattern 2



Hole pattern 3

## Foot Mounting Style C



Hole pattern 2



Hole pattern 3

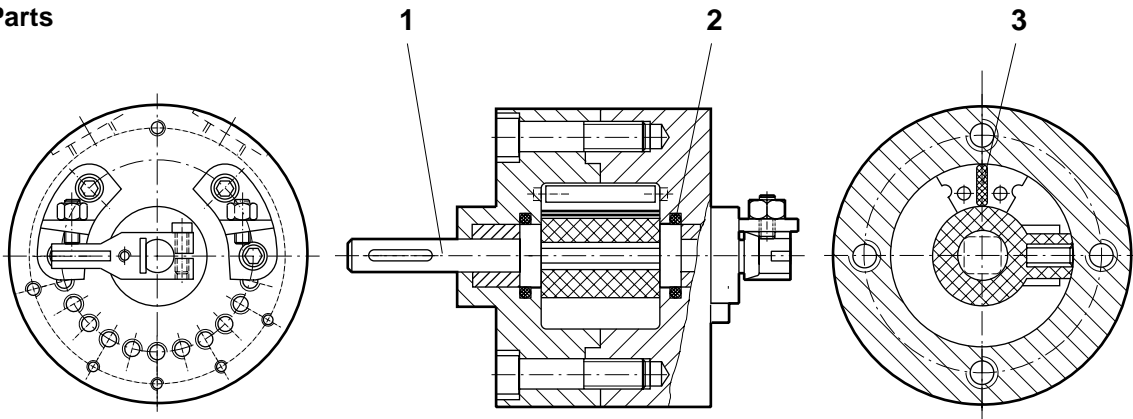


Hole pattern 4

Model G Actuator	QM/60281A/22 60281	QM/60282A/22 60282	QM/60283A/22 60283	QM/60284A/22 60284	Model C Actuator	QM/60281A/21 60281	QM/60282A/21 60282	QM/60283A/21 60283	QM/60283A/21 60284
A	1.46 (37.0)	1.65 (42.0)	1.97 (50.0)	2.52 (64.0)	J	0.65 (16.5)	0.79 (20.0)	0.98 (25.0)	1.06 (27.0)
B	1.18 (30.0)	1.34 (34.0)	1.61 (41.0)	2.05 (52.0)	K	0.10 (2.5)	0.12 (3.0)	0.14 (3.5)	0.18 (4.5)
ØC	0.13 (3.4)	0.14 (3.5)	0.22 (5.5)	0.22 (5.5)	L	0.49 (12.5)	0.63 (16.0)	0.73 (18.5)	0.81 (20.5)
D	0.06 (1.5)	0.08 (2.0)	0.08 (2.0)	0.08 (2.0)	M	0.43 (11.0)	0.47 (12.0)	0.59 (15.0)	0.71 (18.0)
E	0.65 (16.5)	0.79 (20.0)	0.98 (25.0)	1.10 (28.0)	O	0.71 (18.0)	0.79 (20.0)	0.98 (25.0)	1.18 (30.0)
F	0.10 (2.5)	0.12 (3.0)	0.14 (3.5)	0.14 (3.5)	S	1.02 (26.0)	1.18 (30.0)	1.42 (36.0)	1.89 (48.0)
G	0.75 (19.0)	0.91 (23.0)	1.12 (28.5)	1.24 (31.5)	ØT	0.19 (4.8)	0.23 (5.8)	0.28 (7.0)	0.26 (6.5)
Hole Pattern	2	2	3	3	U	1.42 (36.0)	1.65 (42.0)	1.93 (49.0)	2.60 (66.0)
Rotation*	120°	120°	90°	90°	W	0.98 (25.0)	1.18 (30.0)	1.34 (34.0)	1.65 (42.0)
					X	1.69 (43.0)	2.01 (51.0)	2.30 (58.5)	2.95 (75.0)
					Hole Pattern	2	3	4	4
					Rotation*	60°	60°	90°	90°

\*These mountings can be rotated through the angle shown

## Repair Parts



Model	Spares kit	Item	Kit Consists of Description	Quantity
M/60281A/IE	QM/60281A/00	1	Shaft with vane	1
M/60282A/IE	QM/60282A/00	2	O-ring	2
C/60283A/IE	QM/60283A/00	3	Seal	1 (2)
C/60284A/IE	QM/60284A/00			
C/60284A/TE	QM/60284A/TE/00			

( ) for .../TE

- Suitable for torques from 11 to 3562 in. lbs (1.23 to 402.46 Nm)
- Rotation angles from 90° to 270°
- High torque from compact units



### Specifications

#### Medium:

Lubricated or non-lubricated, filtered, compressed air

#### Operation:

Double acting rotary vane with buffer cushioning

C/60285 to C/60288 single vane

C/60285A/TI to C/60288A/TI double vane

#### Operating Pressure:

29 to 145 psig (2 to 10 bar)

#### Operating Temperature:

40° to 140° F (5° to 60°C)

#### Porting:

1/8 NPT: C/60285, C/60285A/TI

1/4 NPT: C/60286, C/60286A/TI

3/8 NPT: C/60287, C/60287A/TI

1/2 NPT: C/60288, C/60288A/TI

#### Rotation Angle:

90°, 180°, 270°: single vane

90°: double vane

#### Rotation Angle Tolerance:

0° to +3°

#### Other Features:

Drive-key is standard.

#### Materials:

Cast aluminum housing, steel shaft, sintered bronze shaft bearings, nitrile rubber seals.

### Ordering Information

To order a Rotary Vane Actuator with torque up to 150 in. lbs. at 87 psig (17 Nm at 6 bar) and a 90° rotation quote: C/60286/90

To order a Rotary Vane Actuator with torque up to 2133 in. lbs. at 87 psig (241 Nm at 6 bar) and a 90° rotation quote: C/60288A/TI/90

To order mounting brackets refer to appropriate actuator mounting table. Order magnetically operated switches separately.



## Technical Data for C/60285 to C/60288

Model	Max. Theoretical Torques at 87 psig (6 bar) in. lbs. (Nm)	Permissible forces*		Permissible rotation energy** ft. lbs. (Nm)	Maximum frequency*** (cycles per min)			Air consumption cu. in. (cm <sup>3</sup> ) per cycle			Weight lbs. (kg)			Wt. lbs. (kg)	
		axial lbs. force (N)	radial lbs. force (N)		90°	180°	270°	90°	180°	270°	90°	180°	Style 270°	Style B, G	C
<b>C/60285</b>	51.15 (5.8)	9.9 (44)	132.3 (588)	0.43 (0.049)	180	90	60	3.11 (51)	3.11 (51)	3.72 (61)	1.81 (0.8)	1.74 (0.8)	1.61 (0.7)	0.44 (0.2)	0.57 (0.3)
<b>C/60285A/TI</b>	111.07 (12.6)				180	-	-	2.56 (42)	-	-	1.81 (0.8)	-	-		
<b>C/60286</b>	156.20 (17.7)	19.8 (88)	264.6 (1176)	1.99 (0.225)	120	80	50	8.91 (146)	8.91 (146)	10.92 (179)	4.41 (2.0)	4.19 (1.9)	3.75 (1.7)	1.12 (0.5)	2.51 (1.1)
<b>C/60286A/TI</b>	360.11 (40.7)				120	-	-	7.75 (127)	-	-	4.41 (2.0)	-	-		
<b>C/60287</b>	299.40 (33.8)	33.1 (147)	441 (1960)	9.54 (1.078)	90	60	40	14.88 (244)	17.26 (283)	21.47 (352)	8.16 (3.7)	8.16 (3.7)	8.16 (3.7)	-	2.73 (1.2)
<b>C/60287A/TI</b>	720.30 (81.4)				90	-	-	14.88 (244)	-	-	9.48 (4.3)	-	-		
<b>C/60288</b>	1070.05 (120.9)	110.3 (490)	1102.5 (4900)	34.7 (3.920)	65	45	30	45.99 (754)	53.01 (869)	63.20 (1036)	28.00 (12.7)	26.90 (12.2)	24.70 (11.2)	-	9.81 (4.5)
<b>C/60288A/TI</b>	2139.31 (241.7)				65	-	-	45.99 (754)	-	-	28.00 (12.7)	-	-		

\* Permissible load on rotary vane shaft

\*\*Permissible rotational energy in in. lbs. (Nm) which may be applied to shaft. It can be calculated as follows:  
Permissible rotational energy  $\geq 1/2 I \omega^2$ , I = Angular moment,  $\omega$  = Mean angular velocity

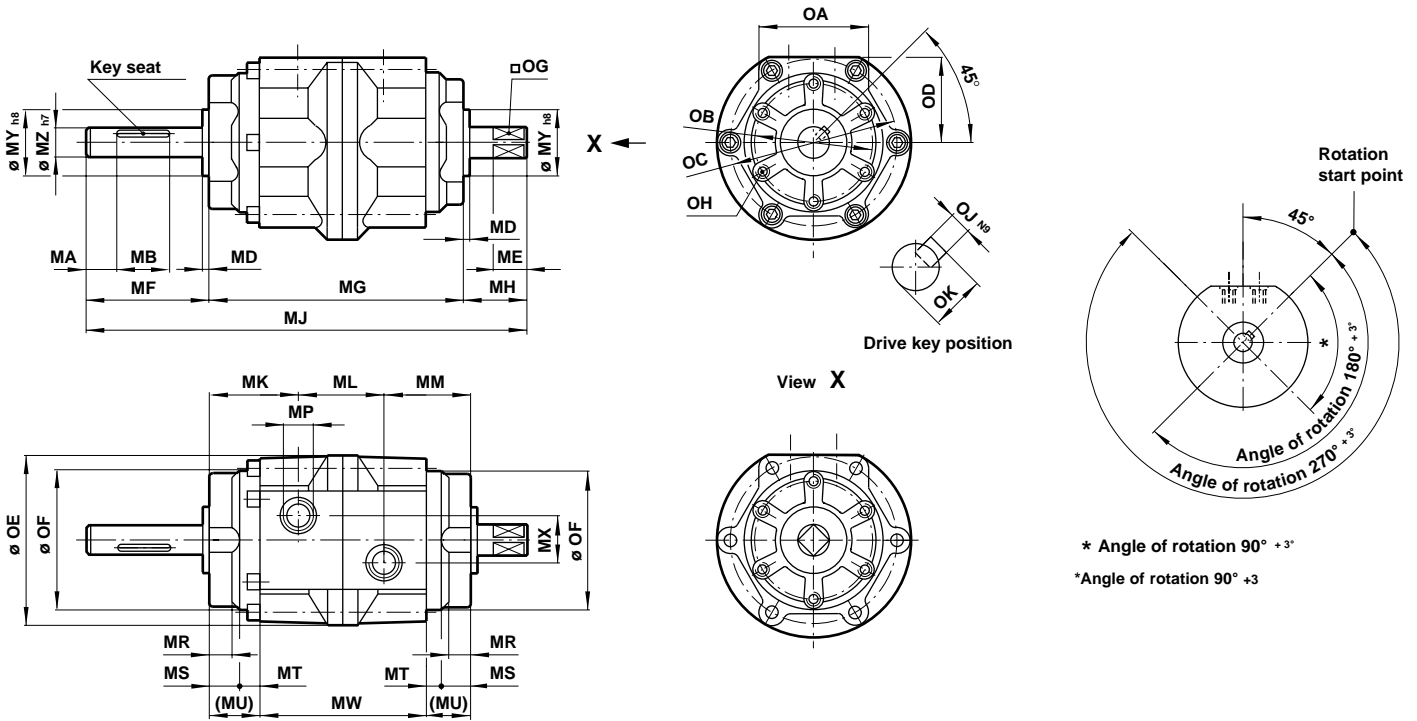
\*\*\*Maximum frequency at 73 psig (5 bar) pressure, no load.



# Rotary Actuators

All Dimensions in Inches (mm)

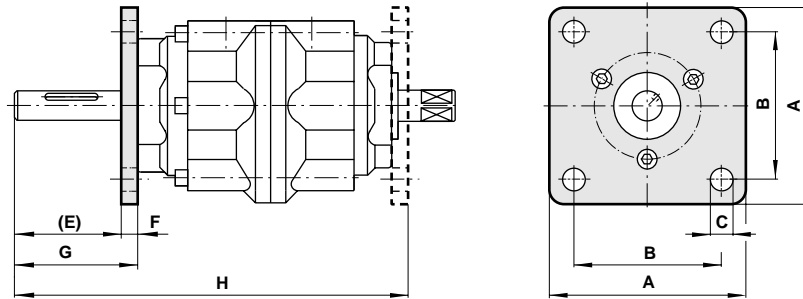
## Basic Dimensions for C/60285 to C/60288



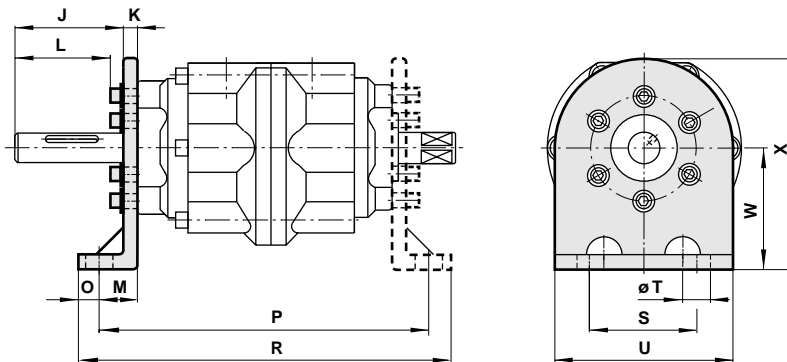
Model	MA	MB	MD	ME	MF	MG	MH	MJ	MK	ML
<b>60285</b>	0.20 (5.0)	0.79 (20.0)	0.10 (2.5)	0.51 (13.0)	1.56 (39.5)	2.20 (56.0)	0.77 (19.5)	5.71 (145.0)	1.14 (29.0)	1.10 (28.0)
<b>60286</b>	0.20 (5.0)	1.42 (36.0)	0.12 (3.0)	0.63 (16.0)	2.11 (53.5)	4.06 (103.0)	0.93 (23.5)	7.09 (180.0)	1.36 (34.5)	1.34 (34.0)
<b>60287</b>	0.20 (5.0)	1.57 (40.0)	0.14 (3.5)	0.87 (22.0)	2.56 (65.0)	4.92 (125.0)	1.18 (30.0)	8.66 (220.0)	1.63 (41.5)	1.65 (42.0)
<b>60288</b>	0.39 (10.0)	1.57 (40.0)	0.18 (4.5)	1.38 (35.0)	2.74 (69.5)	6.73 (171.0)	1.75 (44.5)	11.22 (285.0)	2.11 (53.5)	2.52 (64.0)
Model	MM	MP	MR	MS	MT	MU	MW	MX	ØMYH8	ØMZH7
<b>60285</b>	1.14 (29.0)	1/8 NPT	0.43 (11.0)	0.55 (14.0)	0.24 (6.0)	0.79 (20.0)	1.81 (46.0)	0.63 (16.0)	0.98 (25.0)	0.47 (12.0)
<b>60286</b>	1.36 (34.5)	1/4 NPT	0.41 (10.5)	0.61 (15.5)	0.31 (8.0)	0.93 (23.5)	2.09 (53.0)	0.94 (24.0)	1.18 (30.0)	0.67 (17.0)
<b>60287</b>	1.63 (41.5)	3/8 NPT	0.51 (13.0)	0.69 (17.5)	0.39 (10.0)	1.08 (27.5)	2.76 (70.0)	1.26 (32.0)	1.77 (45.0)	0.98 (25.0)
<b>60288</b>	2.11 (53.5)	1/2 NPT	0.57 (14.5)	0.83 (21.0)	0.45 (11.5)	1.28 (32.5)	4.17 (106.0)	1.73 (44.0)	2.76 (70.0)	1.57 (40.0)
Model	OA	Ø08	Ø0C	OD	ØOE	ØOF	OG-0.1	OH	OJN9	OK
<b>60285</b>	1.73 (44.0)	1.77 (45.0)	2.68 (68.0)	1.42 (36.0)	3.11 (79.0)	2.28 (58.0)	0.39 (10.0)	M6-9 deep	0.16 (4.0)	0.53 (13.5)
<b>60286</b>	2.40 (61.0)	2.76 (70.0)	3.82 (97.0)	2.01 (51.0)	4.33 (110.0)	3.37 (85.5)	0.51 (13.0)	M8-12 deep	0.20 (5.0)	0.75 (19.0)
<b>60287</b>	3.07 (78.0)	3.15 (80.0)	4.92 (125.0)	2.60 (66.0)	5.57 (141.5)	4.33 (110.0)	0.75 (19.0)	M10-15 deep	0.28 (7.0)	1.10 (28.0)
<b>60288</b>	4.33 (110.0)	4.72 (120.0)	6.81 (173.0)	3.54 (90.0)	7.72 (196.0)	5.98 (152.0)	1.26 (32.0)	M12-18 deep	0.47 (12.0)	1.69 (43.0)



## Rear Flange Mounting Style 'B' Front Flange Mounting Style 'G'



## Foot Mounting Style 'C'



Model B, G Actuator	QM/60285A/22 60285	QM/60286A/22 60286	Model C Actuator	QM/60285A/21 60285	QM/60286A/21 60286	QM/60287A/21 60287	QM/60288A/21 60288
<b>A</b>	3.15 (80.0)	4.33 (110.0)	<b>J</b>	1.38 (35.0)	1.71 (43.5)	2.09 (53.0)	2.15 (54.5)
<b>B</b>	2.52 (64.0)	3.46 (88.0)	<b>K</b>	0.18 (4.5)	0.39 (10.0)	0.47 (12.0)	0.59 (15.0)
<b>ØC</b>	0.28 (7.0)	0.35 (9.0)	<b>L</b>	1.08 (27.5)	1.32 (33.5)	1.59 (40.5)	1.56 (39.5)
<b>E</b>	1.38 (35.0)	1.87 (47.5)	<b>M</b>	6.00 (25.0)	1.10 (28.0)	1.26 (32.0)	1.38 (35.0)
<b>F</b>	0.18 (4.5)	0.24 (6.0)	<b>O</b>	0.39 (10.0)	0.47 (12.0)	0.51 (13.0)	0.59 (15.0)
<b>G</b>	1.56 (39.5)	2.11 (53.5)	<b>P</b>	5.35 (136.0)	6.26 (159.0)	7.44 (189.0)	9.49 (241.0)
<b>H</b>	5.12 (130.0)	6.40 (162.5)	<b>R</b>	6.14 (156.0)	7.20 (183.0)	8.46 (215.0)	10.67 (271.0)
<b>Rotation*</b>	60°	60°	<b>S</b>	2.17 (55.0)	3.15 (80.0)	3.94 (100.0)	5.51 (140.0)
			<b>ØT</b>	0.43 (11.0)	0.51 (13.0)	0.59 (15.0)	0.59 (15.0)
			<b>U</b>	2.95 (75.0)	4.33 (110.0)	5.51 (140.0)	7.87 (200.0)
			<b>W</b>	1.77 (45.0)	2.56 (65.0)	3.15 (80.0)	4.33 (110.0)
			<b>X</b>	3.25 (82.5)	4.53 (115.0)	5.31 (135.0)	7.28 (185.0)
			<b>Rotation*</b>	60°	60°	60°	60°

\*The mountings can be rotated through the angle shown.



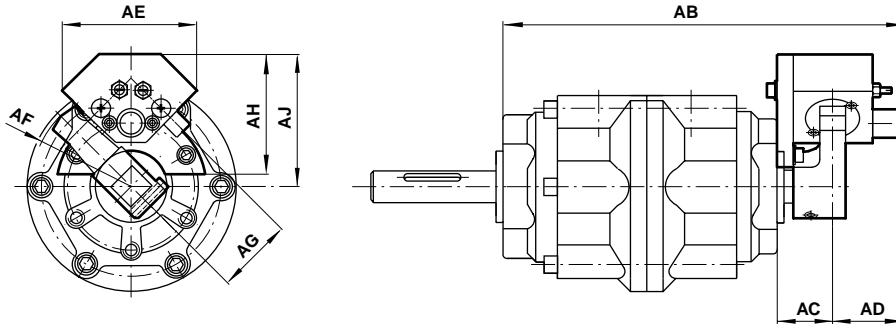
# Rotary Actuators

All Dimensions in Inches (mm)

## Technical Data for Hydro-Cushion

Model	Minimum operating pressure psig (bar)	Operating temperature F° (C°)	Load range cu. in. (kg x cm <sup>2</sup> )	Maximum absorption energy ft. lbs. (Nm)	Maximum absorption energy ft. lbs./min (Nm/min)	Absorbing angle	Maximum collision angular Velocity (°/s)	wt. lbs. (kg)
QM/60285A/60	44 (3)	40 to 120 F° (5 to 50 C°)	5.98 (98.1)	25.7 (2.9)	177.0 (20)	11°	850	0.53 (0.24)
QM/60286A/60	44 (3)	40 to 120 F° (5 to 50 C°)	17.9 (294.2)	86.7 (9.8)	628.4 (71)	11°	750	0.93 (0.42)
QM/60287A/60	44 (3)	40 to 120 F° (5 to 50 C°)	35.89 (588.4)	173.5 (19.6)	1212.5 (137)	11°	650	1.72 (0.78)

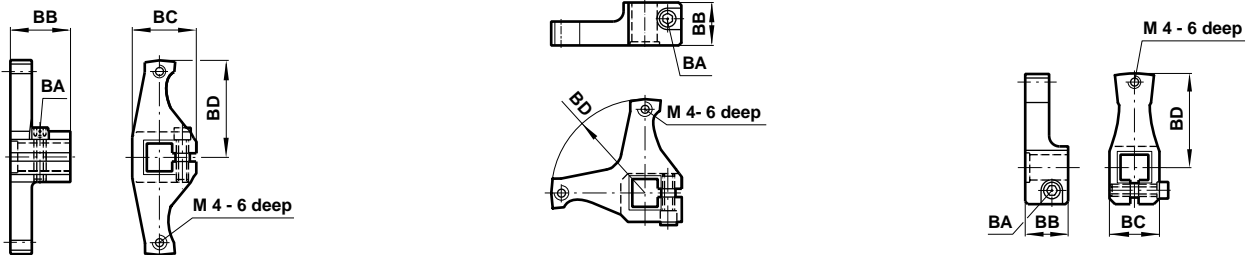
### Dimensional Information for Hydro-cushion kit



Model	AB	AC	AD	AE	AF	AG	AH	AJ
QM/60285A/60	5.37 (136.5)	0.81 (20.5)	1.18 (30.0)	2.20 (56.0)	1.50 (38.0)	1.34 (34.0)	1.97 (50.0)	2.13 (54.0)
QM/60286A/60	6.28 (159.5)	0.89 (22.5)	1.34 (34.0)	3.15 (80.0)	2.01 (51.0)	1.81 (46.0)	2.44 (62.0)	2.81 (71.5)
QM/60287A/60	7.38 (187.5)	1.00 (25.5)	1.46 (37.0)	3.74 (95.0)	2.68 (68.0)	2.44 (62.0)	3.43 (87.0)	3.74 (95.0)

### Claw

(for hydro-cushion, magnetic and non-magnetic sensing)

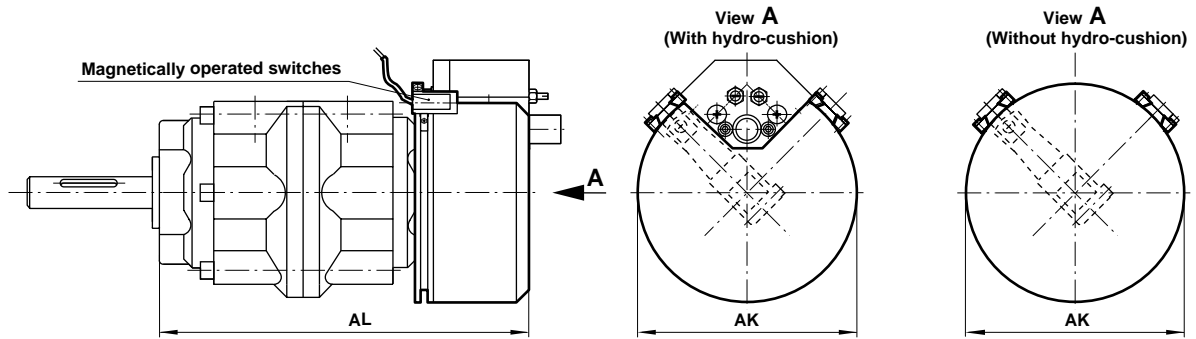


Model	Actuator	BA (A/F)	BB	BC	BD
M/P70088 (90°), M/P70089 (180°), M/P70090 (270°)	60285	0.16 (4)	0.71 (18)	0.91 (23)	1.50 (38)
M/P70091 (90°), M/P70092 (180°), M/P70093 (270°)	60286	0.20 (5)	0.79 (20)	1.10 (28)	2.01 (51)
M/P70094 (90°), M/P70095 (180°), M/P70096 (270°)	60287	0.24 (6)	0.93 (24)	1.57 (40)	2.68 (68)

**NOTE:** Hydro-cushion kits, switch mounting kits, and claws are all ordered separately. For reed switches see ACT-9-16 thru 19.



## Mounting kit for switches



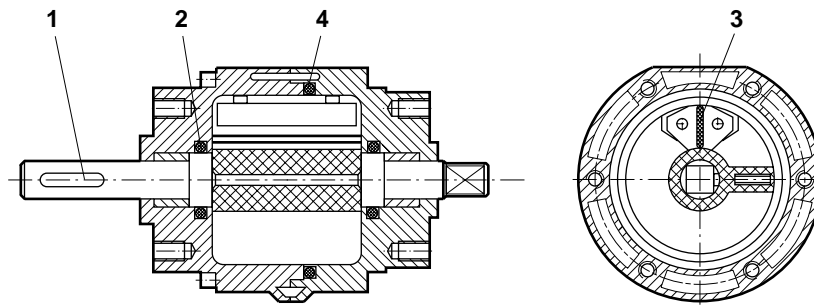
Mounting kit for two Switches (without hydro-cushion)	Mounting kit for two Switches (with hydro-cushion)	øAK	AL
QM/60285A/22/64	QM/60285A/23/64	3.35 (85)	4.84 (123)
QM/60286A/22/64	QM/60286A/23/64	4.37 (111)	5.63 (143)
QM/60287A/22/64	QM/60287A/23/64	5.71 (145)	6.65 (169)

Note: Order claws and magnetically operated switches separately

### Mounting Kit Components

Description	Quantity
Plastic Cover	1
Mounting Plate	1
Reed Switch Mounting Plate	2
Reed Switch Mounting Nuts	4
Reed Switch Mounting Screws	7
Mounting Plate Screws	3
Mounting Plate Washers	3
Magnet and Screw Assembly	1

### Repair Parts



Model	Spares kit	Model	Spares kit	Consisting of Item	Description	Quantity
C/60285	QM/60285A/00	C/60285A/TI	QM/60285A/TI/00	1	Shaft with rotary vane	1
C/60286	QM/60286A/00	C/60286A/TI	QM/60286A/TI/00	2	O-ring	2
C/60287	QM/60287A/00	C/60287A/TI	QM/60287A/TI/00	3	Seal	1(2)
C/60288	QM/60288A/00	C/60288A/TI	QM/60288A/TI/00	4	O-ring	1

- Compact, low profile solid state reed switches
- M/40 and M/40/P feature LED indicators
- Simple, reliable switching for fast response times
- TM/40 high temperature model
- M/40/P features a plug-in cable connection
- Reed switches are used on the Standard Actuator in conjunction with the switch mounting kit and claw. See ACT-9-14/15.

### Specifications

#### Form:

M/40 M/40/P - Normally open with LED  
M/40/C - Normally open/normally closed  
TM/40 - Normally open

#### Switching Voltage:

M/40, M/40/C, TM/40 - 110 V a.c. or 100 V d.c. maximum  
M/40/P - 60 V a.c. and 75 V d.c. maximum

#### Switching Current:

M/40, M/40/P - 180 mA (temperature dependent), see ACT-9-17.  
M/40/C, TM/40 - 250 mA

#### Contact Rating:

M/40, TM/40, M/40/P - 10 VA  
M/40/C - 5 VA

#### Response Time:

M/40, M/40/C, M/40/P - 0.6 ms  
TM/40 - 1.0 ms

#### Operating Temperature:

32° to 158°F ( 0° to 70°C)  
TM/40 - 32° to 248°F (0° to 120°C)

#### Protection Rating:

I.P.67

#### Vibration Resistance:

M/40, TM/40, M/40/P - 10 to 2000Hz 0.11 lbs. (50g) (Resonant Frequency = 3 kHz)  
M/40/C - 10 to 2000Hz 0.11 lbs. (50g) (Resonant Frequency = 13 kHz)

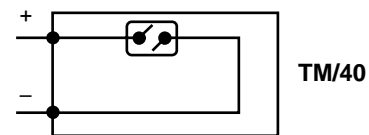
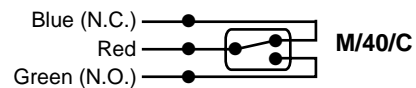
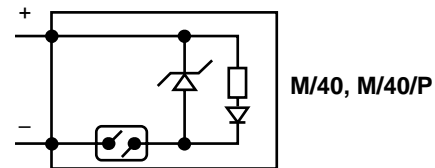
#### Cable Length:

M/40 - 79" (2m) of P.V.C. covered two core cable  
M/40/C - 79" (2m) of P.V.C. covered three core cable  
TM/40 - 79" (2m) of silicon rubber. covered two core cable  
M/40/P - 16' (5m) of P.V.C. or Polyurethane covered three core cable with plug-in connection

### Materials

M/40, M/40/C, M/40/P - Nylon 66 body  
TM/40 - 30% Glass filled Nylon 66 body

**NOTE:** When used to switch inductive loads such as solenoids, relays etc., arcing can occur across the switch contacts depending on the current and voltage involved. This arcing can be eliminated on d.c. loads by connecting a suitably rated diode across the load or switch.  
On a.c. loads arcing is more difficult to eliminate but the contact life can be greatly extended by reducing the peak voltages by connecting a suitable non-linear resistor (V.D.R.) across the load or switch.



### Alternative Models

- M/41 Solid state model with hardwired cable - see ACT-9-18
- M/42 Solid state model with hardwired cable - see ACT-9-18
- M/42/P Solid state model with plug-in cable - see ACT-9-18



## General Information

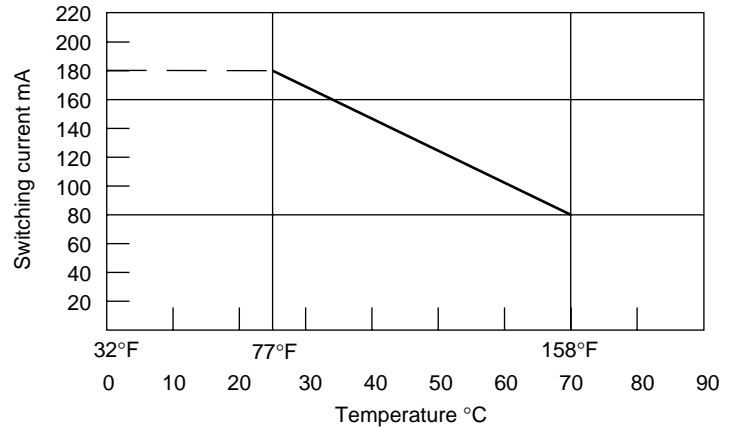
Model	Switch type	Cable length
M/40	LED, Normally open, hardwired	79" (2)
M/40/C	Normally open/Normally closed - changeover, hardwired	79" (2)
TM/40	Normally open, high temperature, hardwired	79" (2)
M/40/P	Normally open with LED, plug-in cable	16' (5)

**NOTE:** Switches are ordered separately

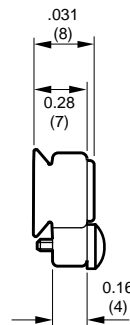
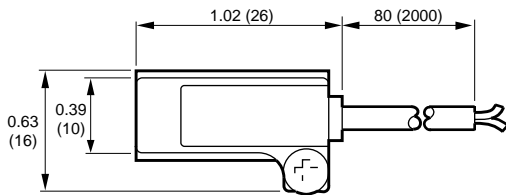
## Effect of High Temperatures - M/40 and M/40/P with LED

When using Reed Switches that incorporate LED's, the maximum switching current should be reduced in direct proportion to the rise in temperature above 77°F (25°C).

At maximum temperature of 158°F (70°C) the maximum switching current must be derated to 80mA.



## M/40, M/40/C, TM/40 Magnetically Operated Switches, with hardwired cable



Switches are attached to the actuator using the switch mounting kits on ACT-9-15.

**Polarity:**

Red +

Blue -

Polarity is important on the M/40

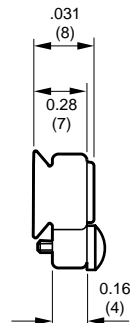
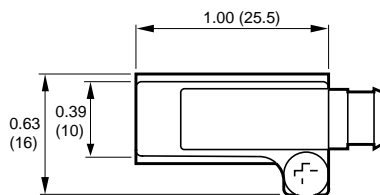
**Normally open/normally closed:**

Red common

Blue normally closed

Green normally open

## M/40/P Magnetically Operated Switches, with plug-in cable\*



Switches are attached to the actuator using the switch mounting kits on ACT-9-15.

**Polarity:**

Brown +

Blue -

Polarity is important.

\*Cable must be ordered separately

Cable No.	Connector type	Outer cover
M/P34595A/5	Straight	Polyurethane
M/P34596A/5	Angled 90°	Polyurethane
M/P34614A/5	Straight	P.V.C.
M/P34615A/5	Angled 90°	P.V.C.

- Compact, low profile solid state reed switches
- LED indicator is standard
- Simple, reliable switching with fast response times
- Particularly suited for use where high levels of vibration are present
- M/42/P features a plug-in cable connection
- Reed switches are used on the Standard Actuator in conjunction with the switch mounting kit and claw. See ACT-9-14/15.

**Specifications**
**Form:**

M/41 - Solid state with LED (NPN, sinking, grounded emitter output)

M/42, M/42/P - Solid state with LED (PNP, sourcing, open collector output)

**Switching Voltage:**

10V to 28V d.c. only

M/42/P - 10V to 30V d.c. only

**Switching Current:**

M/41 - 20 mA

M/42, M/42/P - 300 mA

**Response Time:**

1.5  $\mu$ s

**Operating Temperature:**

32° to 158°F (0° to 70°C)

**Protection Rating:**

I.P.67

**Vibration Resistance:**

Immune to shock loads

**Cable Length:**

M/41, M/42 - 79" (2m) of P.V.C. covered three core cable

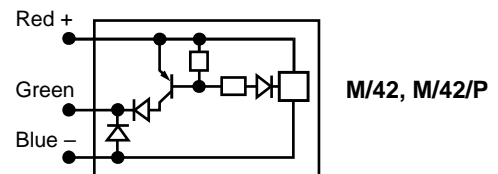
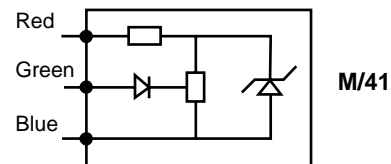
M/42/P - 16' (5m) of P.C.V. or Polyurethane covered three core cable with plug-in connection.

**Switch Protection:**

Diode protection must be used with inductive loads

**Materials**

Nylon 66 body.


**Alternative Models**

M/40 Hardwired cable model - see ACT-9-16

M/40/C Normally open/normally closed model with integral cable - see ACT-9-16

M/40/P Plug-in cable model - see ACT-9-16

TM/40 High temperature model - see ACT-9-16

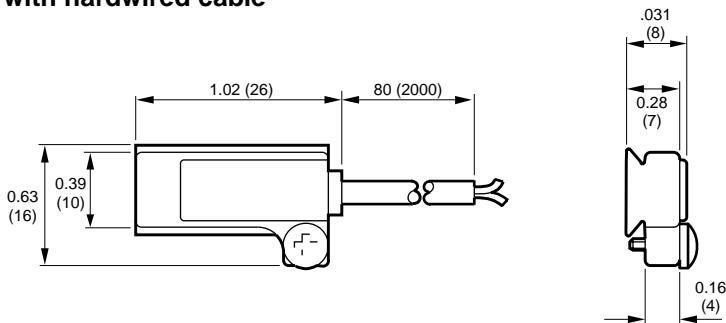


## General Information

Model	Switch type	Cable length
M/41	Solid State with LED. sinking, NPN, hardwired cable	79" (2)
M/42	Solid State with LED. sourcing, PNP, hardwired cable	79" (2)
M/42/P	Solid State with LED. sourcing, PNP, plug-in cable	16' (5)

**NOTE:** Switches are ordered separately

### M/41, M/42 Magnetically Operated Switches, with hardwired cable



Switches are attached to the actuator using the switch mounting kits on ACT-9-15.

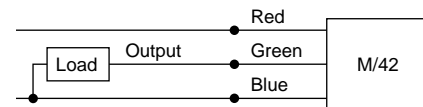
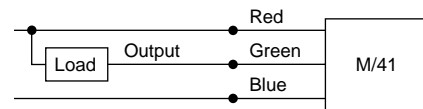
Polarity:

Red +

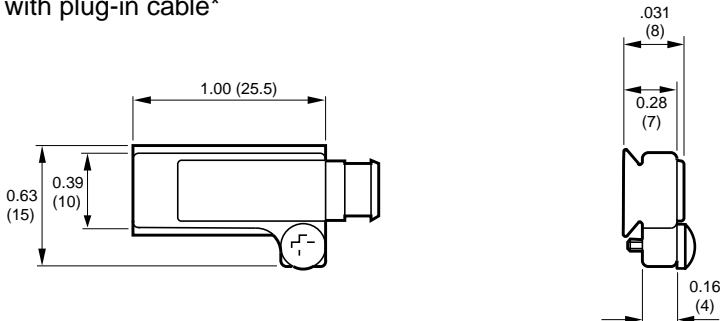
Blue -

Green Output

Polarity is important



### M/42/P Magnetically Operated Switches, with plug-in cable\*



Switches are attached to the actuator using the switch mounting kits on ACT-9-15.

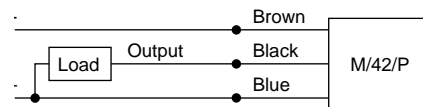
Polarity:

Brown +

Blue -

Black Output

Polarity is important



\*Cable must be ordered separately

Cable No.	Connector type	Outer cover
M/P34595A/5	Straight	Polyurethane
M/P34596A/5	Angled 90°	Polyurethane
M/P34614A/5	Straight	P.V.C.
M/P34615A/5	Angled 90°	P.V.C.