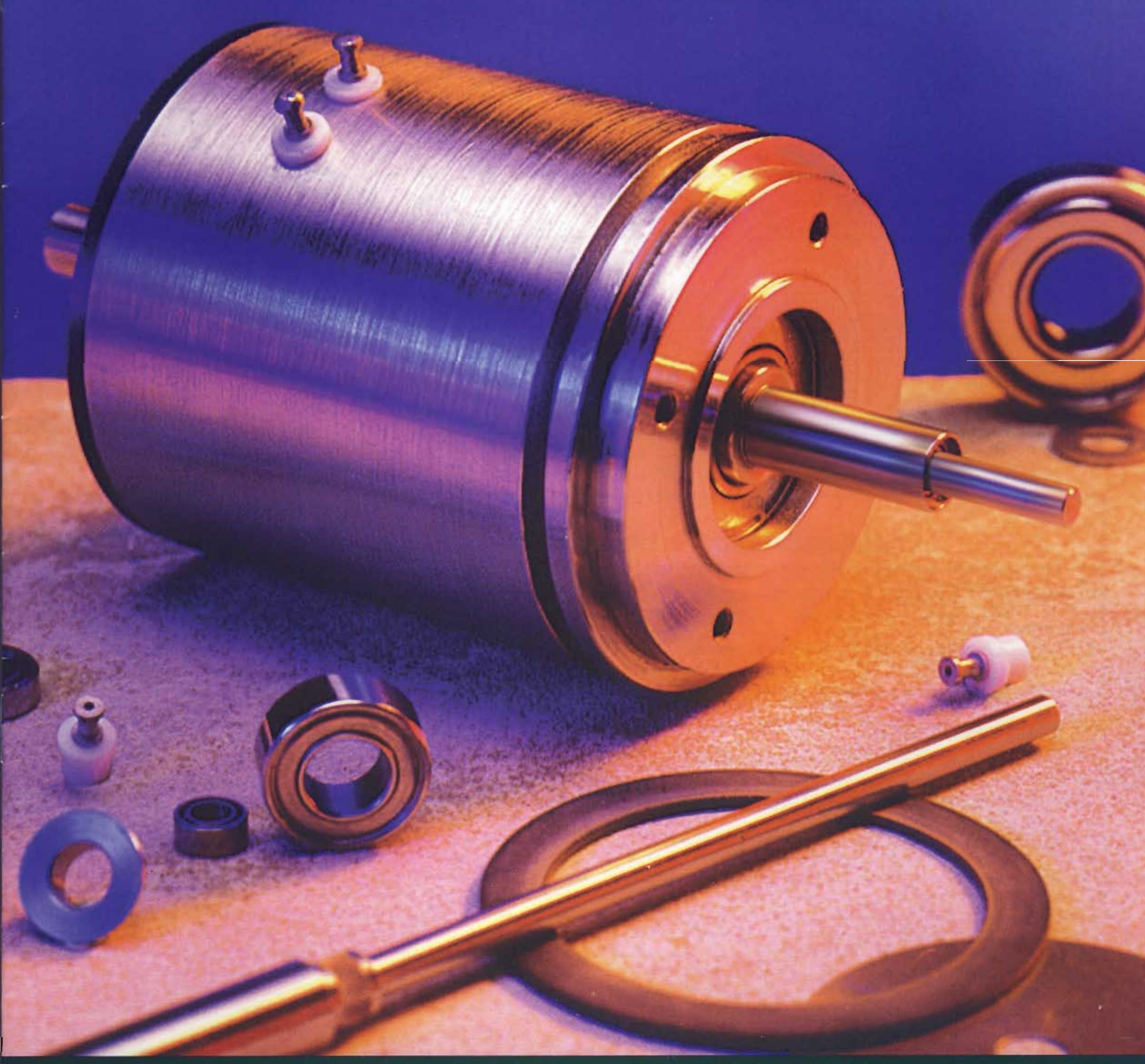
PRECISION BRAKES & CLUTCHES

D E P E N D A B L E . D U R A B L E



ISLAND COMPONENTS GROUP, INC.

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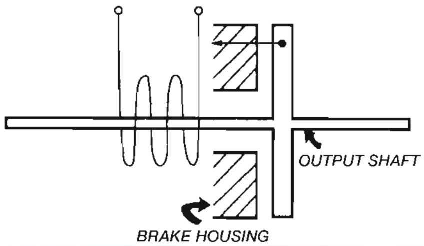
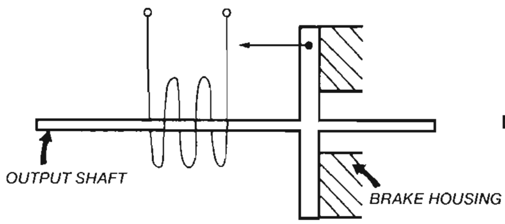
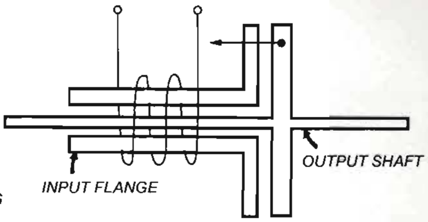
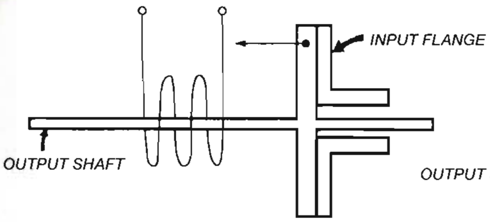
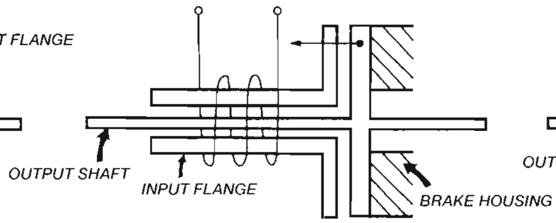
SCHEMATICS

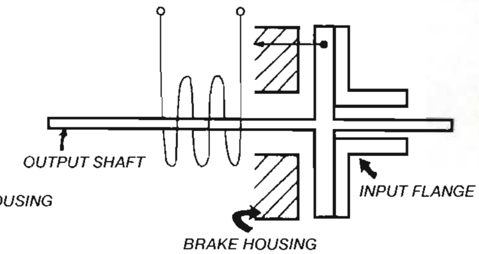


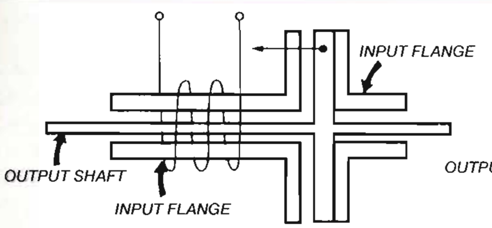


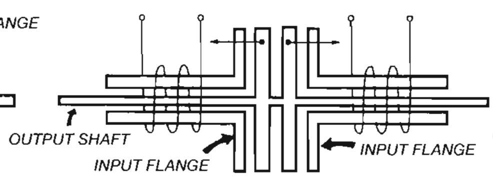


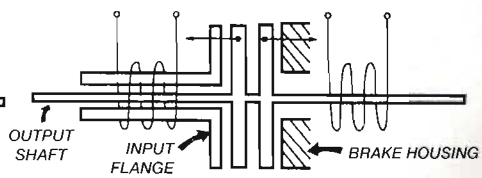












STANDARD LENGTHS

WAFER

GENERAL SPECIFICATIONS

STANDARD LENGTH & WAFER TYPE UNITS

ELECTRICAL

1. OPERATING VOLTAGE 24 - 48 V.D.C.
2. DIELECTRIC TEST - 500 VAC rms 60 Hz FROM TERMINAL TO CASE FOR 1 MINUTE.
3. INSULATION RESISTANCE - 500 MEGOHAMS MIN. AT 500 VOLTS D.C.
4. PULL IN AT 20C - 17.3 VOLTS D.C. MAX.

ENVIRONMENTAL

1. UNITS MEET ALL APPLICABLE MILITARY SPECIFICATIONS

MECHANICAL

1. RUNOUT OF SHAFT - .001 TOTAL INDICATOR READING.
2. END PLAY - .001 MAX. UNDER A I LB. REVERSING AXIAL LOAD.
3. BACKLASH - ZERO BACKLASH.
4. BEARINGS - A.B.E.C. CLASS 3 OR BETTER. BEARINGS SHIELDED WHERE EXPOSED. BEARINGS TO BE LUBRICATED WITH ANDEROL L-456 AND/OR MIL-S 81087A.
5. SPEED - 5000 R.P.M. MAXIMUM.
6. LIFE - DEPENDENT UPON SPEED & INERTIA OF OUTPUT LOAD.
7. DECAY TIME - APPROX. 50% OF RESPONSE TIME FOR SPRING TYPE UNITS AND 150% FOR MAGNETIC TYPE UNITS.
8. TERMINAL - WILL WITHSTAND A 5 LB. PULL TEST IN ANY OF 3 MUTUALLY PERPENDICULAR PLANES AND A 20 oz./in. TWISTING TORQUE ABOUT TERMINAL CENTERLINE.
9. MATERIAL - HOUSING - ARMCO IRON, OR SIMILAR MATERIAL PLATED PER MIL -QQ-P-416-A. TYPE 11, CLASS 2 CADMIUM PLATED & YELLOW DICHROMATE. END CAP - 303 STAINLESS STEEL OR ALUMINUM, BLACK ANODIZED PER MIL-A-8625 TYPE 2, INPUT FLANGE, AND OUTPUT SHAFT-STAINLESS STEEL.

Ordering Code Procedure *Used for Standard & Wafer Type Units*

MODEL CODE **MB** **11** **1-2-3** **SM**

For Example
Model No. — MB
Frame Size — 11
-1- Output Shaft on Both Ends / *-2- Output Shaft on "x" End* / *-3- Output Shaft on "y" End* — 1-2-3
Servo Mount (Optional) Magnetic Brake Only — SM

NOTE: Clutch or Brake Output Torques, Drag Torques, and Response Times can be increased or decreased by up to 100% depending on Duty Cycle and Speed of Engagement. Please contact our Engineering Dept. for assistance.

Response and Decay Time of Electro-Magnetic Clutches,Brakes and Clutch-Brakes

Island Components Group has adopted the following methods and definitions on the basis of their usefulness to the user of the clutch, brake, or clutch-brake unit.

The total response time (T) of an electromagnetic clutch or brake is defined as the interval of time from the closing of the electrical circuit until zero relative motion is obtained at the friction surfaces. This time (T) is composed of two elements: T= e + tm

In this relationship, te, the electrical response time is defined as the time interval between the closing of the switch and the full mating of the friction surfaces; tm, the mechanical response time, is defined as the time interval from the full mating of the surfaces until zero motion between the units friction surfaces is obtained.

The electrical response time (te) is a function of the clutch design and adjustment, as such, is directly under the manufacturer's control. The mechanical response time (tm), on the other hand, depends on the mechanical factors of the application, specifically, the angular velocity and the inertia involved.

The electrical response time is proportioned to the L/R of the actuating solenoid, and is, therefore, related to the mechanical forces produced within the device. For any given size of clutch or brake, the higher the torque, the longer the electrical response time. Electrical response time is also the function of the wattage dissipated in the solenoid. The higher the power that can be dissipated, the faster the response time. Since the mechanical response time is dependent on the torque produced by the device, it follows that a reduction of the design torque of a unit for any given application, will result in an increase in mechanical time (tm) with a corresponding decrease in electrical response time (te). As can be expected, the smallest total time (T) will be obtained when the mechanical response time and the electrical response time are approximately equal. An example here may be helpful. Let us assume that a clutch having an electrical response time of 16 milliseconds produces a torque of 20 inch-ounces, which results in a mechanical time of 1 millisecond. The total response time would be 17 milliseconds. If the device is adjusted to give a torque of half its original value, or 10 inch-ounces, the mechanical time would be doubled, or 2 milliseconds, but the electrical time would be reduced to half, or 8 milliseconds, giving now a total response time of 10 milliseconds. A minimum total time of 8 milliseconds will be obtained when electrical and mechanical time are equal. This factor of time equalization should be kept in mind when fast response is essential.

RESPONSE TIME

ELECTRICAL RESPONSE TIME (te)

Electrical response time can be readily measured by observing the rise of the current in the actuating circuit as a function of time. This rise is characteristic of an inductive circuit where the current rises to a maximum of E/R. Due to the fact that the mechanical displacement of the clutch or brake moving parts results in a sudden change in inductance, this displacement can be observed as blips or dips in the otherwise smooth current rise. This is shown in figure 1a. Complete mating of the friction parts occurs at the second blip. Figure 1b also shows the electrical connection for this measurement.

The electrical decay time or the "let-go" can be measured by observing the voltage induced in the solenoid by the collapse of the interrupted current. If the clutch or brake had a perfect lossless inductance with no distributed capacitance the let-go would coincide with the moment of current interruption. However, due to the eddy losses and capacitance in the inductive circuit the decay shows an appreciable slope. This slope is generally 3 to 10 times faster than the current rise. It should be noted, however, that some devices do not let go until the voltage has collapsed to nearly zero. This requires a passage of time equivalent to four (4) or more time constants. The decay time therefore has no fixed relationship to the rise time and depends on the characteristics of the unit and its adjustment. Figures 1c and 1d show decay time measurement and connections.

The electrical response time values shown in our catalog represent nominal values. Whenever response time is important in an application it should be brought to the attention of our Engineering Department. Response times in the order of fractions of a millisecond can be obtained by proper design of the clutch or brake and by the use of special actuating circuits.

MECHANICAL RESPONSE TIME (tm)

The mechanical response time is a function of the torque, the total inertia to be accelerated and the net change in velocity:

$$tm = \frac{I\Delta w}{Q}$$

In this relationship, I, the inertia, normally expressed in lb-ft-sec. Δw is the net change in angular velocity in radians per second and Q is the torque in lb-ft. It is sometimes more convenient to express this relation as follows:

$$tm = \frac{wR^2 \times \Delta RPM}{3.7Q}$$

Here is the inertia in oz-in . ΔRPM is the net change in revolutions per minute and Q is the torque in oz-in. The mechanical time (tm) will be given in milliseconds. It should be pointed out that the figure for inertia in either equation must be the total inertia to be accelerated or decelerated including the clutch or brake internal inertia. If the inertias are rotating at different speeds they must be transferred to the clutch or brake speed by the square of the gear ratios.

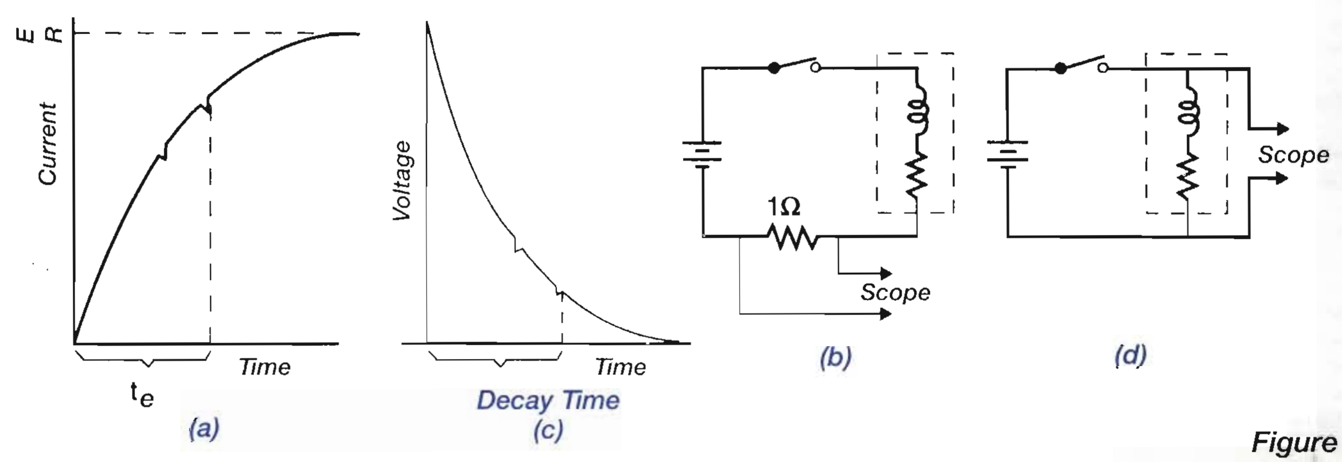
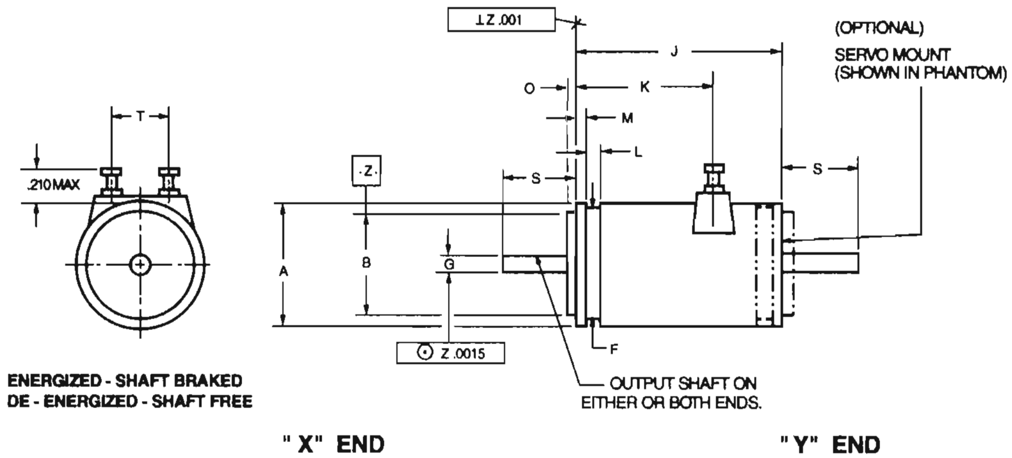


Figure 1

MODEL MB MAGNETIC BRAKE

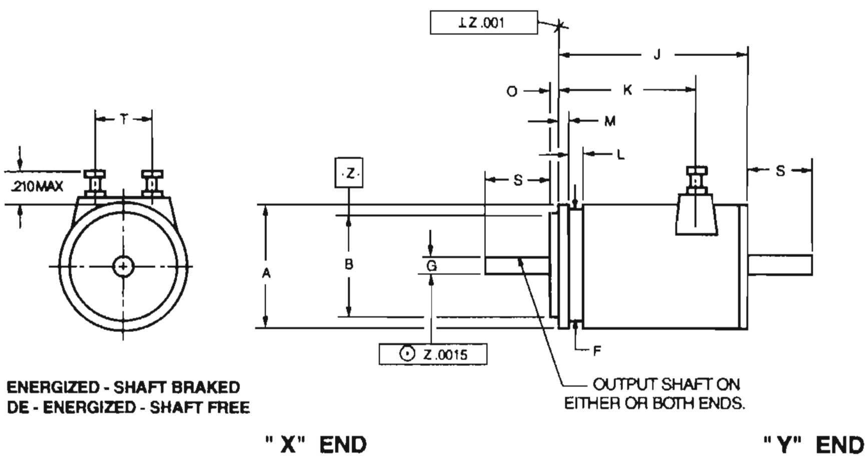


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U
	+ .000 − .005	+ .0000 − .0005	+ .005 − .005	+ .0000 − .0005	+ .0000 − .0003	+ .005 − .005	+ .0000 − .0003	+ .005 − .005	+ .0000 − .0003	+ .015 − .015	+ .015 − .015	+ .005 − .005	+ .003 − .000	+ .005 − .005	+ .005 − .005	+ .002 − .002	+ .005 − .005	+ .020 − .020	+ .005 − .005	
5	.594	.5000				.531	.0935			.810	.451	.060	.047		.060			.360	.275	
8	.827	.7500				.750	.1248			1.140	.652	.067	.060		.100			.400	.350	
11	1.090	1.0000				1.000	.1248			1.390	.798	.075	.060		.100			.475	.350	
13	1.370	1.2500				1.250	.1873			1.493	.831	.078	.060		.125			.500	.350	
18	1.750	1.5620				1.625	.1873			1.805	1.039	.078	.093		.172			.672	.350	

MB	FRAME SIZE	5	8	11	13	18
COIL RESISTANCE ± 10% OHMS		300	205	180	150	120
TORQUE- MAGNETIC BRAKE (OZ. IN. MIN.)		5	20	40	75	150
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)						
ENERGIZED		BRK	BRK	BRK	BRK	BRK
DE-ENERGIZED		.05	.10	.10	.10	.25

MB	FRAME SIZE	5	8	11	13	18
WEIGHT NOMINAL (OZ.)		.74	2.0	4.3	7.6	11.0
RESPONSE TIME AT 24 V.D.C. (ms)		5.0	10.0	28.0	34.0	40.0
INERTIA (IN. LB. SEC^2) OUTPUT SHAFT (10^{-6})		.27	1.2	3.4	11.7	35.0

MODEL SB SPRING BRAKE

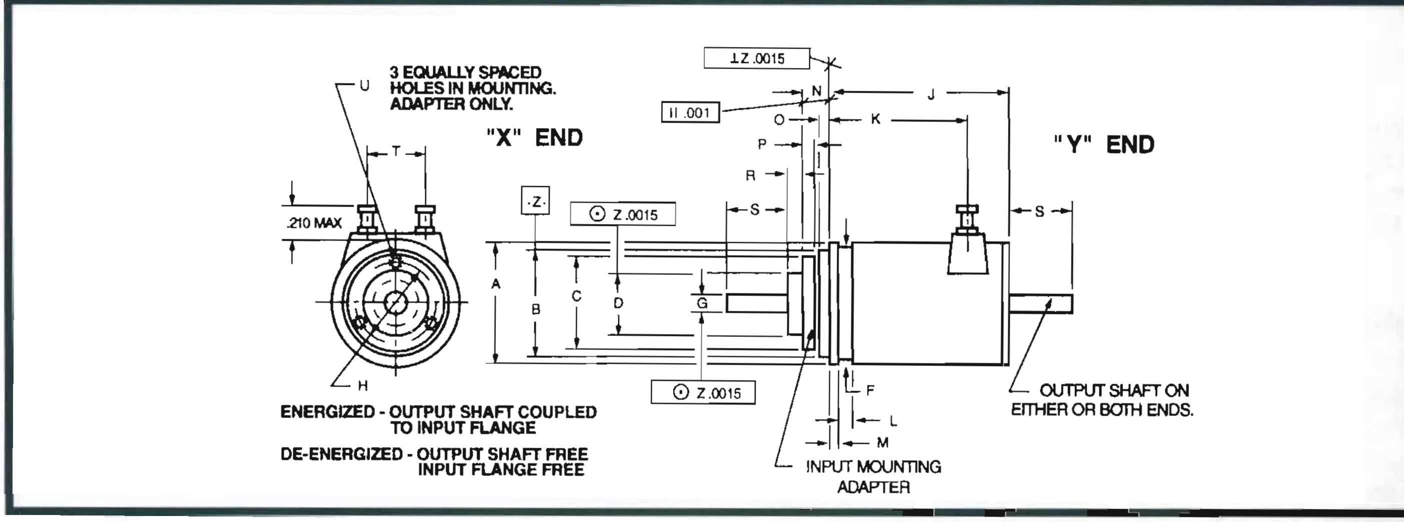


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U
	+ .000 − .005	+ .0000 − .0005	+ .005 − .005	+ .0000 − .0005	+ .0000 − .0003	+ .005 − .005	+ .0000 − .0003	+ .005 − .005	+ .0000 − .0003	+ .015 − .015	+ .015 − .015	+ .005 − .005	+ .003 − .000	+ .005 − .005	+ .005 − .005	+ .002 − .002	+ .005 − .005	+ .020 − .020	+ .005 − .005	
5	.594	.5000				.531	.0935			.882	.603	.060	.047		.060			.300	.275	
8	.827	.7500				.750	.1248			1.240	.844	.067	.060		.100			.300	.350	
11	1.090	1.0000				1.000	.1248			1.485	1.027	.075	.060		.100			.375	.350	
13	1.370	1.2500				1.250	.1873			1.620	1.070	.078	.060		.125			.375	.350	
18	1.750	1.5620				1.625	.1873			1.930	1.292	.078	.093		.172			.500	.350	

SB	FRAME SIZE	5	8	11	13	18
COIL RESISTANCE ± 10% OHMS		300	205	180	150	120
TORQUE- SPRING BRAKE (OZ. IN. MIN.)		2.25	9	18	35	70
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)						
ENERGIZED		.10	.15	.20	.25	.30
DE-ENERGIZED		BRK	BRK	BRK	BRK	BRK

SB	FRAME SIZE	5	8	11	13	18
WEIGHT NOMINAL (OZ.)		.86	2.4	5.0	8.1	15.5
RESPONSE TIME AT 24 V.D.C. (ms)		6.0	11.0	30.0	36.0	42.0
INERTIA (IN. LB. SEC^2) OUTPUT SHAFT (10^{-6})		.75	3.7	10.7	42.7	127.6

MODEL MC MAGNETIC CLUTCH

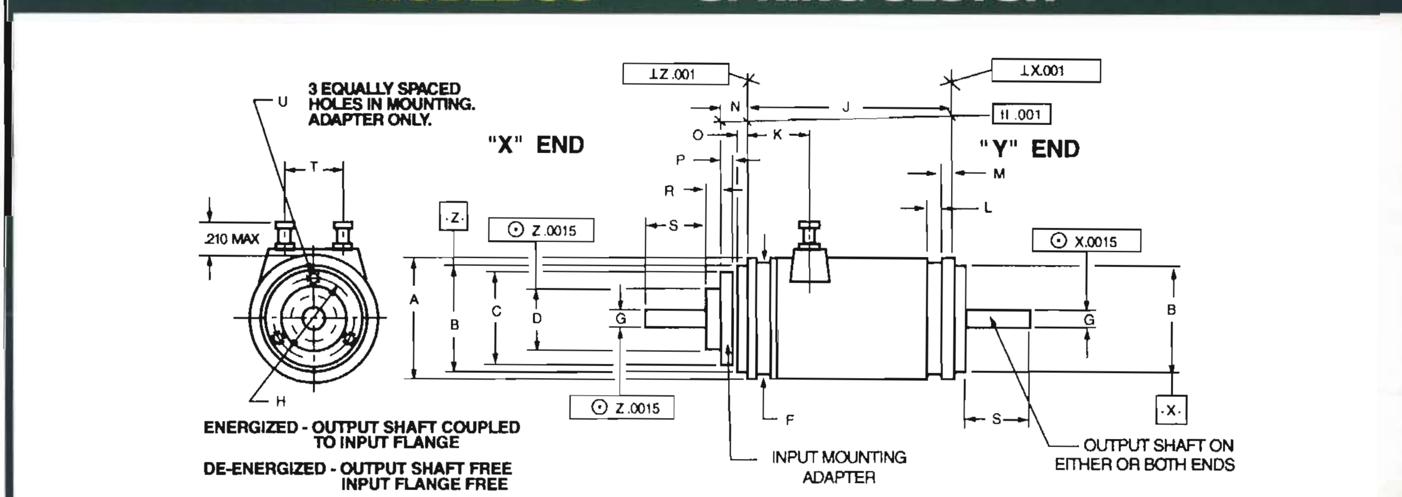


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U
	+.000 −.005	+.0000 −.0005	+.005 −.005	+.0000 −.0005		+.005 −.005	+.0000 −.0003	+.005 −.005	+.0000 −.0003	+.015 −.015	+.015 −.015	+.005 −.005	+.003 −.000	+.005 −.005	+.005 −.005	+.002 −.002	+.005 −.005	+.020 −.020	+.005 −.005	
5	.594	.5000	.450	.2190		.531	.0935	.344		.882	.603	.060	.047	.126	.060	.056	.079	.300	.275	#0-80
8	.827	.7500	.740	.3750		.750	.1248	.625		1.240	.844	.067	.060	.171	.100	.061	.120	.300	.350	#2-56
11	1.090	1.0000	.934	.5000		1.000	.1248	.750		1.485	1.027	.075	.060	.178	.100	.064	.177	.375	.350	#2-56
13	1.370	1.2500	.934	.5000		1.250	.1873	.750		1.620	1.070	.078	.060	.204	.125	.064	.177	.375	.350	#2-56
18	1.750	1.5620	.934	.5000		1.625	.1873	.750		1.930	1.292	.078	.093	.252	.172	.064	.177	.500	.350	#2-56

MC	FRAME SIZE	5	8	11	13	18
COIL RESISTANCE ± 10% OHMS		300	205	180	150	120
TORQUE- CLUTCH (OZ. IN. MIN.)		4.5	18	36	70	140
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)						
ENERGIZED – BOTH SHAFTS		.05	.15	.20	.25	.30
DE-ENERGIZED – OUTPUT SHAFT		.05	.10	.15	.20	.25
INPUT SHAFT		.05	.10	.15	.20	.25

MC	FRAME SIZE	5	8	11	13	18
WEIGHT NOMINAL (OZ.)		.88	2.4	5.1	8.7	16.1
RESPONSE TIME AT 24 V.D.C. (ms)		5.0	10.0	28.0	34.0	40.0
INERTIA (IN. LB. SEC^2)						
INPUT FLANGE (10^{-6})		.71	4.3	11.9	37.7	99.5
OUTPUT SHAFT (10^{-6})		0.50	2.2	6.5	22.0	65.0

MODEL SC SPRING CLUTCH

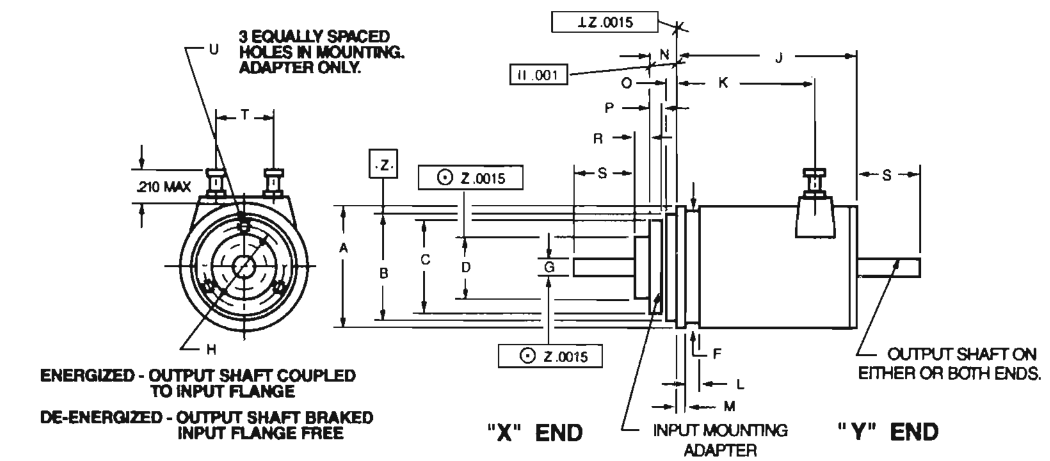


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U
	+.000 −.005	+.0000 −.0005	+.005 −.005	+.0000 −.0005		+.005 −.005	+.0000 −.0003	+.005 −.005	+.0000 −.0003	+.015 −.015	+.015 −.015	+.005 −.005	+.003 −.000	+.005 −.005	+.005 −.005	+.002 −.002	+.005 −.005	+.020 −.020	+.005 −.005	
5	.594	.5000	.450	.2190		.531	.0935	.344		.965	.362	.060	.047	.126	.060	.056	.079	.300	.275	#0-80
8	.827	.7500	.740	.3750		.750	.1248	.625		1.350	.506	.067	.060	.171	.100	.061	.120	.300	.350	#2-56
11	1.090	1.0000	.934	.5000		1.000	.1248	.750		1.620	.593	.075	.060	.178	.100	.064	.177	.375	.350	#2-56
13	1.370	1.2500	.934	.5000		1.250	.1873	.750		1.740	.670	.078	.060	.204	.125	.064	.177	.375	.350	#2-56
18	1.750	1.5620	.934	.5000		1.625	.1873	.750		2.042	.750	.078	.093	.252	.172	.064	.177	.500	.350	#2-56

SC	FRAME SIZE	5	8	11	13	18
COIL RESISTANCE ± 10% OHMS		300	205	180	150	120
SPRING- CLUTCH TORQUE (OZ. IN. MIN.)		2.25	9	18	35	70
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)						
ENERGIZED – OUTPUT SHAFT		.05	.20	.25	.35	.50
INPUT SHAFT		.05	.10	.25	.25	.38
DE-ENERGIZED – BOTH SHAFTS		.10	.20	.35	.55	.75

SC	FRAME SIZE	5	8	11	13	18
WEIGHT NOMINAL (OZ.)		.92	2.7	5.4	9.0	17.4
RESPONSE TIME AT 24 V.D.C. (ms)		6.0	11.0	30.0	36.0	42.0
INERTIA (IN. LB. SEC^2)						
INPUT FLANGE (10^{-6})		.19	1.1	3.6	9.8	18.7
OUTPUT SHAFT (10^{-6})		.75	3.7	10.7	42.7	127.6

MODEL MCSB MAGNETIC CLUTCH SPRING BRAKE

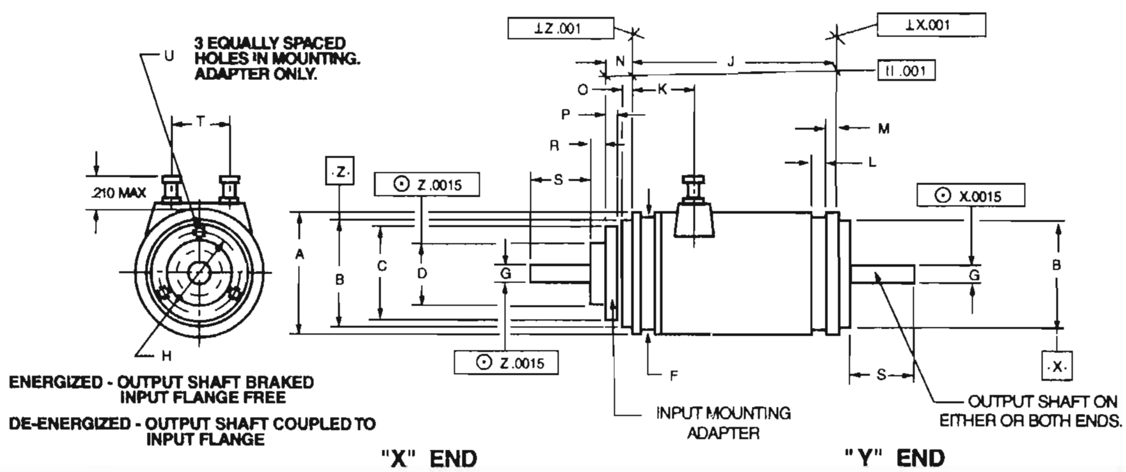


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U
	+.000 −.005	+.0000 −.0005	+.005 −.005	+.0000 −.0005		+.005 −.005	+.0000 −.0003	+.005 −.005	+.0000 −.0003	+.015 −.015	+.015 −.015	+.005 −.005	+.003 −.000	+.005 −.005	+.005 −.005	+.002 −.002	+.005 −.005	+.020 −.020	+.005 −.005	
5	.594	.5000	.450	.2190		.531	.0935	.344		.882	.603	.060	.047	.126	.060	.056	.079	.300	.275	#0-80
8	.827	.7500	.740	.3750		.750	.1248	.625		1.240	.844	.067	.060	.171	.100	.061	.120	.300	.350	#2-56
11	1.090	1.0000	.934	.5000		1.000	.1248	.750		1.485	1.027	.075	.060	.178	.100	.064	.177	.375	.350	#2-56
13	1.370	1.2500	.934	.5000		1.250	.1873	.750		1.620	1.070	.078	.060	.204	.125	.064	.177	.375	.350	#2-56
18	1.750	1.5620	.934	.5000		1.625	.1873	.750		1.930	1.292	.078	.093	.252	.172	.064	.177	.500	.350	#2-56

MCSB	FRAME SIZE	5	8	11	13	18
COIL RESISTANCE ± 10% OHMS		300	205	180	150	120
TORQUE- MAGNETIC CLUTCH (OZ. IN. MIN.) SPRING BRAKE (OZ. IN. MIN.)		2.5 2.25	10 9	20 18	38 35	75 70
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)						
ENERGIZED – BOTH SHAFTS DE-ENERGIZED – OUTPUT SHAFT INPUT FLANGE		.10 BRK .10	.15 BRK .15	.20 BRK .35	.25 BRK .55	.30 BRK .75

MCSB	FRAME SIZE	5	8	11	13	18
WEIGHT NOMINAL (OZ.)		.88	2.4	5.1	8.7	16.1
RESPONSE TIME AT 24 V.D.C. (ms)		6.0	11.0	30.0	36.0	42.0
INERTIA (IN. LB. SEC^2) INPUT FLANGE (10^{-6}) OUTPUT SHAFT (10^{-6})		.71 .27	4.3 1.2	11.9 3.4	37.7 11.7	99.5 35.0

MODEL SCMB SPRING CLUTCH MAGNETIC BRAKE

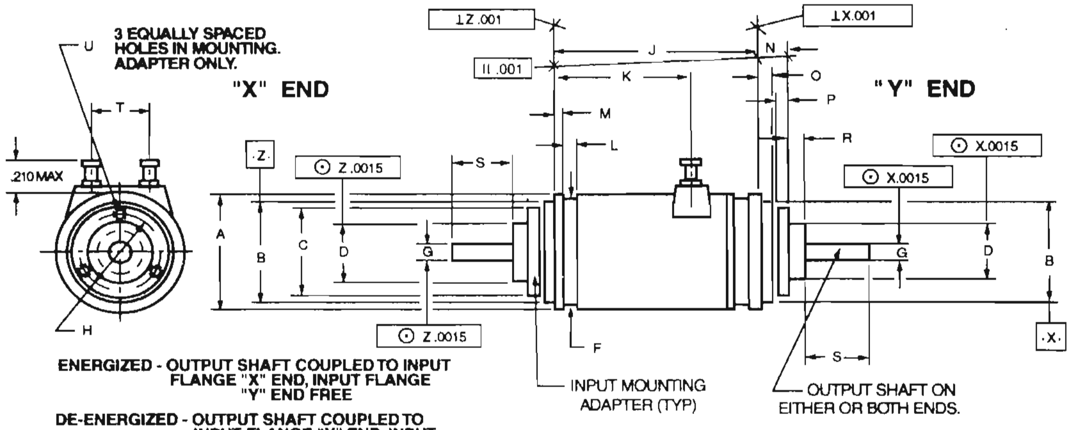


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U
	+.000 −.005	+.0000 −.0005	+.005 −.005	+.0000 −.0005		+.005 −.005	+.0000 −.0003	+.005 −.005	+.0000 −.0003	+.015 −.015	+.015 −.015	+.005 −.005	+.003 −.000	+.005 −.005	+.005 −.005	+.002 −.002	+.005 −.005	+.020 −.020	+.005 −.005	
5	.594	.5000	.450	.2190		.531	.0935	.344		.810	.359	.060	.047	.126	.060	.056	.079	.300	.275	#0-80
8	.827	.7500	.740	.3750		.750	.1248	.625		1.140	.486	.067	.060	.171	.100	.061	.120	.300	.350	#2-56
11	1.090	1.0000	.934	.5000		1.000	.1248	.750		1.390	.592	.075	.060	.178	.100	.064	.177	.375	.350	#2-56
13	1.370	1.2500	.934	.5000		1.250	.1873	.750		1.493	.662	.078	.060	.204	.125	.064	.177	.375	.350	#2-56
18	1.750	1.5620	.934	.5000		1.625	.1873	.750		1.805	.766	.078	.093	.252	.172	.064	.177	.500	.350	#2-56

SCMB	FRAME SIZE	5	8	11	13	18
COIL RESISTANCE ± 10% OHMS		300	205	180	150	120
TORQUE- SPRING CLUTCH (OZ. IN. MIN.) MAGNETIC BRAKE (OZ. IN. MIN.)		2.25 2.5	9 10	18 20	35 38	70 75
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)						
ENERGIZED – OUTPUT SHAFT INPUT FLANGE DE-ENERGIZED – BOTH SHAFTS		BRK .05 .10	BRK .10 .20	BRK .20 .40	BRK .25 .55	BRK .30 .75

SCMB	FRAME SIZE	5	8	11	13	18
WEIGHT NOMINAL (OZ.)		.80	2.3	4.8	8.4	12.3
RESPONSE TIME AT 24 V.D.C. (ms)		6.0	11.0	30.0	36.0	42.0
INERTIA (IN. LB. SEC^2) INPUT FLANGE (10^{-6}) OUTPUT SHAFT (10^{-6})		.19 .27	1.1 1.2	3.6 3.4	9.8 11.7	18.7 35.0

MODEL MCSC MAGNETIC CLUTCH SPRING CLUTCH



ENERGIZED - OUTPUT SHAFT COUPLED TO INPUT FLANGE "X" END, INPUT FLANGE "Y" END FREE

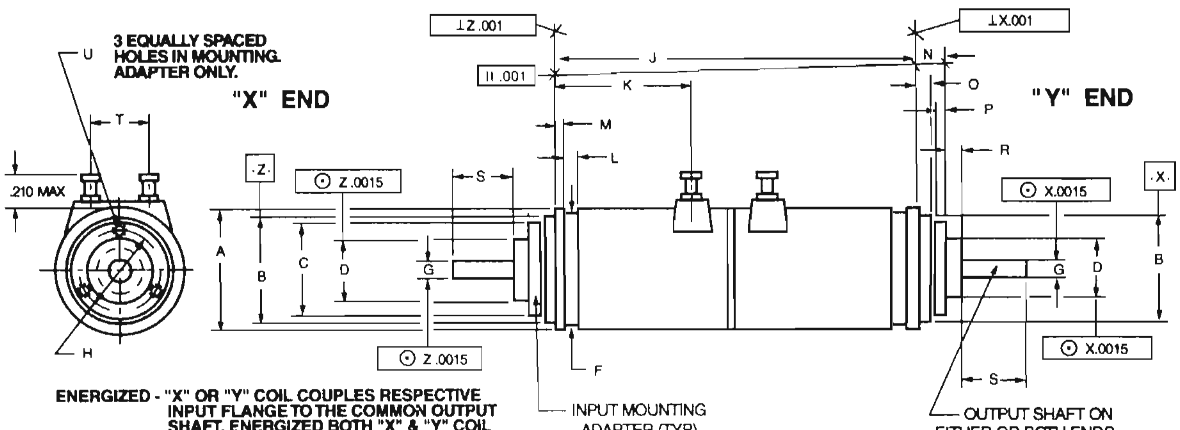
DE-ENERGIZED - OUTPUT SHAFT COUPLED TO INPUT FLANGE "Y" END, INPUT

FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U
	+ .000 − .005	+ .0000 − .0005	+ .005 − .005	+ .0000 − .0005		+ .005 − .005	+ .0000 − .0003	+ .005 − .005		+ .015 − .015	+ .015 − .015	+ .005 − .005	+ .003 − .000	+ .005 − .005	+ .005 − .005	+ .002 − .002	+ .005 − .005	+ .020 − .020	+ .005 − .005	
5	.594	.5000	.450	.2190		.531	.0935	.344		.965	.603	.060	.047	.126	.060	.056	.079	.300	.275	#0-80
8	.827	.7500	.740	.3750		.750	.1248	.625		1.350	.844	.067	.060	.171	.100	.061	.120	.300	.350	#2-56
11	1.090	1.0000	.934	.5000		1.000	.1248	.750		1.628	1.027	.075	.060	.178	.100	.064	.177	.375	.350	#2-56
13	1.370	1.2500	.934	.5000		1.250	.1873	.750		1.740	1.070	.078	.060	.204	.125	.064	.177	.375	.350	#2-56
18	1.750	1.5620	.934	.5000		1.625	.1873	.750		2.042	1.292	.078	.093	.252	.172	.064	.177	.500	.350	#2-56

MCSC FRAME SIZE	5	8	11	13	18
COIL RESISTANCE ± 10% OHMS	300	205	180	150	120
TORQUE- MAGNETIC CLUTCH (OZ. IN. MIN.)	2.5	10	20	38	75
SPRING CLUTCH (OZ. IN. MIN.)	2.25	9	18	35	70
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)					
ENERGIZED – ("X") BOTH SHAFTS	.10	.20	.30	.35	.50
("Y") INPUT SHAFT	.10	.15	.25	.30	.45
DE-ENERGIZED – ("Y") BOTH SHAFTS	.10	.20	.40	.55	.75
("X") SHAFT	.10	.15	.35	.50	.70

MCSC FRAME SIZE	5	8	11	13	18
WEIGHT NOMINAL (OZ.)	9.4	2.7	5.5	9.5	17.4
RESPONSE TIME AT 24 V.D.C. (ms)	6.0	11.0	30.0	36.0	42.0
INERTIA (IN. LB. SEC^2)					
INPUT FLANGE "X" (10^{-6})	.71	4.3	3.4	11.7	99.5
INPUT FLANGE "Y" (10^{-6})	.19	1.1	11.9	37.7	18.2
OUTPUT SHAFT (10^{-6})	.27	1.2	3.6	9.8	35.0

MODEL MCMC MAGNETIC CLUTCH MAGNETIC CLUTCH



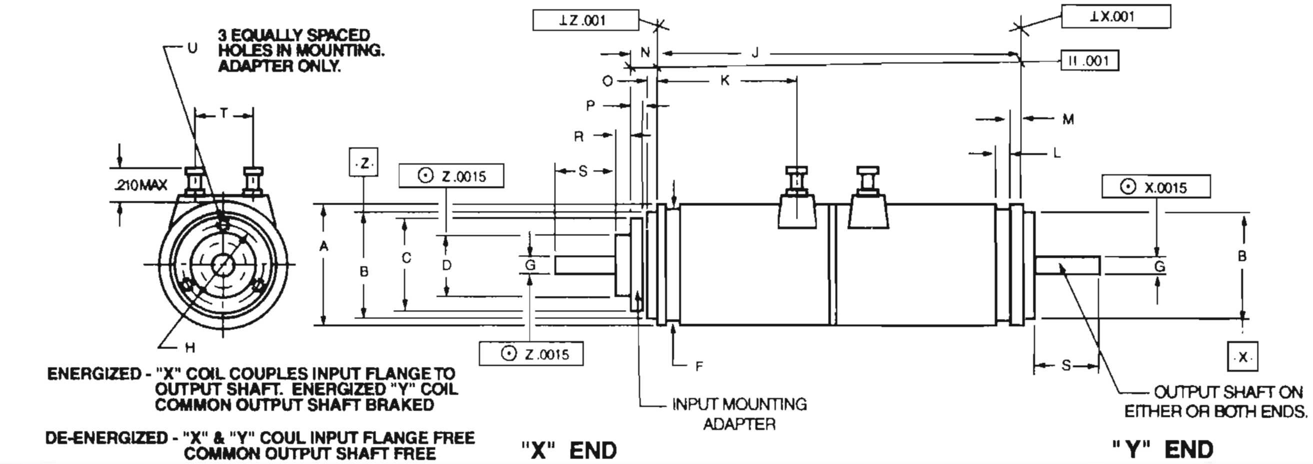
ENERGIZED - "X" OR "Y" COIL COUPLES RESPECTIVE INPUT FLANGE TO THE COMMON OUTPUT SHAFT. ENERGIZED BOTH "X" & "Y" COIL COUPLES INPUT FLANGES TO COMMON OUTUT SHAFT

FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U
	+ .000 − .005	+ .0000 − .0005	+ .005 − .005	+ .0000 − .0005		+ .005 − .005	+ .0000 − .0003	+ .005 − .005	+ .0000 − .0003	+ .015 − .015	+ .015 − .015	+ .005 − .005	+ .003 − .000	+ .005 − .005	+ .005 − .005	+ .002 − .002	+ .005 − .005	+ .020 − .020	+ .005 − .005	
5	.594	.5000	.450	.2190		.531	.0935	.344		1.581	.451	.060	.047	.126	.060	.056	.079	.300	.275	#0-80
8	.827	.7500	.740	.3750		.750	.1248	.625		2.271	.652	.067	.060	.171	.100	.061	.120	.300	.350	#2-56
11	1.090	1.0000	.934	.5000		1.000	.1248	.750		2.753	.798	.075	.060	.178	.100	.064	.177	.375	.350	#2-56
13	1.370	1.2500	.934	.5000		1.250	.1873	.750		2.986	.831	.078	.060	.204	.125	.064	.177	.375	.350	#2-56
18	1.750	1.5620	.934	.5000		1.625	.1873	.750		3.494	1.031	.078	.093	.252	.172	.064	.177	.500	.350	#2-56

MCMC FRAME SIZE	5	8	11	13	18
COIL RESISTANCE ± 10% OHMS	300	205	180	150	120
TORQUE (OZ. IN. MIN.) CLUTCH "X" OR "Y" END	4.5	18	36	70	140
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)					
ENERGIZED – BOTH SHAFTS	.05	.25	.25	.35	.35
DE-ENERGIZED – OUTPUT SHAFT	.05	.10	.15	.20	.50
INPUT FLANGE	.05	.10	.15	.20	.50

MCMC FRAME SIZE	5	8	11	13	18
WEIGHT NOMINAL (OZ.)	1.74	4.8	10.1	16.9	31.0
RESPONSE TIME AT 24 V.D.C. (ms)	5.0	10.0	28.0	34.0	40.0
INERTIA (IN. LB. SEC^2)					
INPUT FLANGE (10^{-6})	.71	4.3	11.9	37.7	99.5
OUTPUT SHAFT (10^{-6})	0.50	2.2	6.5	22.0	65.0

MODEL MCMB MAGNETIC CLUTCH MAGNETIC BRAKE

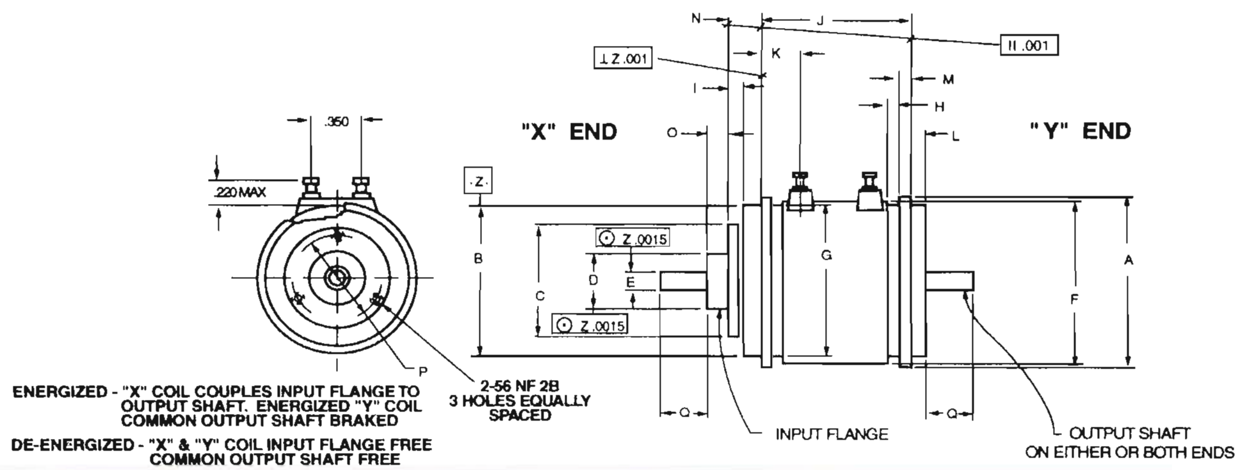


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U
	+ .000 − .005	+ .0000 − .0005	+ .005 − .005	+ .0000 − .0005		+ .005 − .005	+ .0000 − .0003	+ .005 − .005	+.0000 −.0003	+ .015 − .015	+ .015 − .015	+ .005 − .005	+ .003 − .000	+ .005 − .005	+ .005 − .005	+ .002 − .002	+ .005 − .005	+ .020 − .020	+ .005 − .005	
5	.594	.5000	.450	.2190		.531	.0935	.344		1.436	.451	.060	.047	.126	.060	.056	.079	.300	.275	#0-80
8	.827	.7500	.740	.3750		.750	.1248	.625		2.050	.652	.067	.060	.171	.100	.061	.120	.300	.350	#2-56
11	1.090	1.0000	.934	.5000		1.000	.1248	.750		2.516	.798	.075	.060	.178	.100	.064	.177	.375	.350	#2-56
13	1.370	1.2500	.934	.5000		1.250	.1873	.750		2.735	.831	.078	.060	.204	.125	.064	.177	.375	.350	#2-56
18	1.750	1.5620	.934	.5000		1.625	.1873	.750		3.222	1.039	.078	.093	.252	.172	.064	.177	.500	.350	#2-56

MCMB FRAME SIZE	5	8	11	13	18
COIL RESISTANCE ± 10% OHMS	300	205	180	150	120
TORQUE (OZ. IN. MIN.) MAGNETIC CLUTCH MAGNETIC BRAKE	4.5 5	18 20	36 40	70 75	140 150
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)					
ENERGIZED – BOTH SHAFTS DE-ENERGIZED – OUTPUT SHAFT INPUT FLANGE	.05 .05 .05	.15 .10 .10	.15 .15 .15	.25 .20 .20	.25 .35 .35

MCMB FRAME SIZE	5	8	11	13	18
WEIGHT NOMINAL (OZ.)	1.6	4.4	9.3	15.6	26.2
RESPONSE TIME AT 24 V.D.C. (ms)	5.0	10.0	28.0	34.0	40.0
INERTIA (IN. LB. SEC²) INPUT FLANGE (10-⁶) OUTPUT SHAFT (10-⁶)	 .71 .50	 4.3 2.2	 11.9 6.5	 37.7 22.0	 99.5 65.0

MODEL WMCMB WAFER MAGNETIC CLUTCH MAGNETIC BRAKE

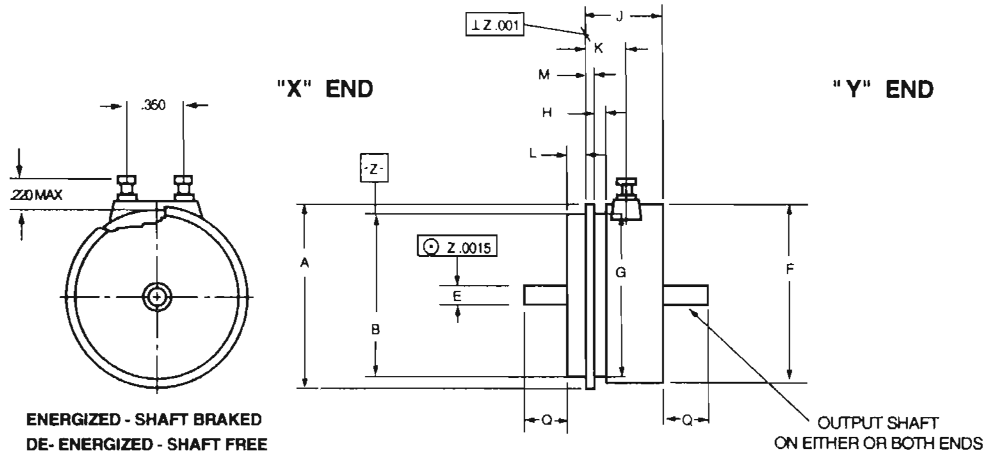


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	+ .000 − .005	+ .0000 − .0005	± .005	+ .0000 − .0005	+ .0000 − .0003	± .005	± .005	± .005	± .002	± .015	REF.	± .005	+ .003 − .000	± .005	± .005	± .005	± .020
8	.877	.7500	.740	.3750	.1248	.845	.800	.255	.061	.875	.190	.100	.047	.175	.120	.625	.300
11	1.115	1.0000	.740	.3750	.1248	1.105	1.025	.288	.061	.875	.180	.100	.060	.175	.120	.625	.300
13	1.370	1.2500	.934	.5000	.1873	1.350	1.255	.080	.064	1.020	.245	.125	.060	.203	.177	.750	.375
15	1.620	1.5000	1.200	.6250	.2498	1.600	1.505	.080	.090	1.234	.248	.125	.060	.230	.177	1.000	.500
18	1.740	1.5620	1.200	.6250	.2498	1.650	1.650		.090	1.743	.320	.125	.090	.230	.177	1.000	.500

WMCMB FRAME SIZE	8	11	13	15	18
COIL RESISTANCE ± 10% OHMS	275	169	165	151	138
TORQUE MAGNETIC CLUTCH (OZ. IN. MIN.) MAGNETIC BRAKE (OZ. IN. MIN.)	 6 6	 32 48	 40 50	 72 80	 180 200
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)					
ENERGIZED – "X" COIL BOTH SHAFTS (OZ. IN. MAX.)	.20	.25	.30	.35	.40
DE-ENERGIZED – BOTH COILS INPUT FLANGE OUTPUT SHAFT (OZ. IN.MAX.)	 .15 .20	 .15 .20	 .20 .25	 .25 .30	 .25 .30

WMCMB FRAME SIZE	8	11	13	15	18
WEIGHT NOMINAL (OZ.)	2.0	3.2	6.6	9.8	16.0
RESPONSE TIME AT 28 V.D.C. (ms)	4.0	5.0	7.0	9.0	12.0
INERTIA (IN. LB. SEC²) OUTPUT SHAFT (10-⁶) INPUT SHAFT "X" END (10-⁶)	 1.7 2.4	 3.9 5.0	 12. 12.	 33. 37.	 55. 51.

MODEL WMB WAFER MAGNETIC BRAKE

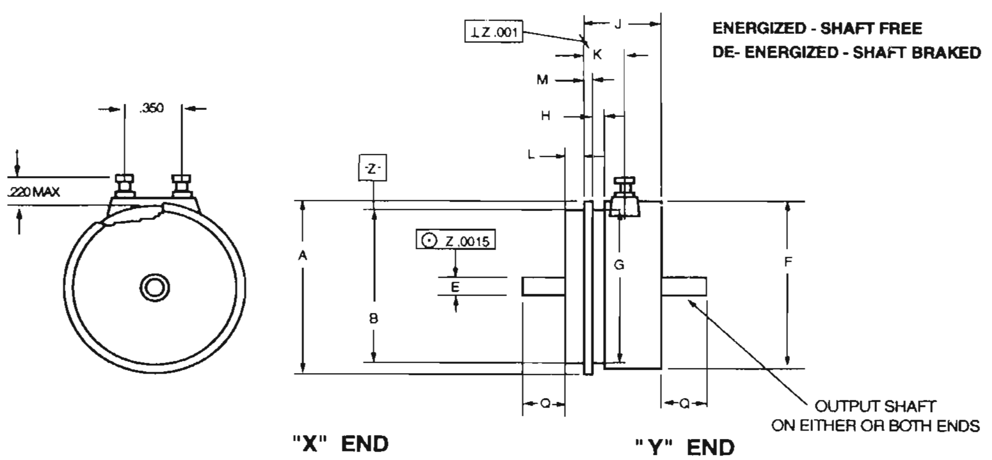


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	+.000 −.005	+.0000 −.0005			+.0000 −.0003	±.005	±.005	±.005		±.015	REF.	±.005	+.003 −.000				±.020
8	.877	.7500			.1248	.800	.800			.500	.190	.100	.047				.300
11	1.115	1.0000			.1248	1.025	1.025			.500	.180	.100	.060				.300
13	1.370	1.2500			.1873	1.350	1.255	.080		.625	.245	.125	.060				.375
15	1.620	1.5000			.2498	1.600	1.505	.080		.750	.248	.125	.060				.500
18	1.740	1.5620			.2498	1.650	1.650			1.000	.320	.125	.090				.500

WMB FRAME SIZE	8	11	13	15	18
COIL RESISTANCE ± 10% OHMS	275	169	165	151	138
TORQUE (OZ. IN. MIN.) MAGNETIC BRAKE	8	48	50	80	200
BREAKAWAY "DRAG" TORQUE					
ENERGIZED – BRAKED DE-ENERGIZED (OZ. IN. MAX.)	.10	.10	.15	.20	.20

WMB FRAME SIZE	8	11	13	15	18
WEIGHT NOMINAL (OZ.)	1.1	1.8	3.4	5.9	8.9
RESPONSE TIME AT 28 V.D.C. (ms)	4.0	5.0	7.0	9.0	12.0
INERTIA (IN. LB. SEC²) SHAFT (10⁻⁶)	.93	2.0	5.9	17.	27.

MODEL WSB WAFER SPRING BRAKE

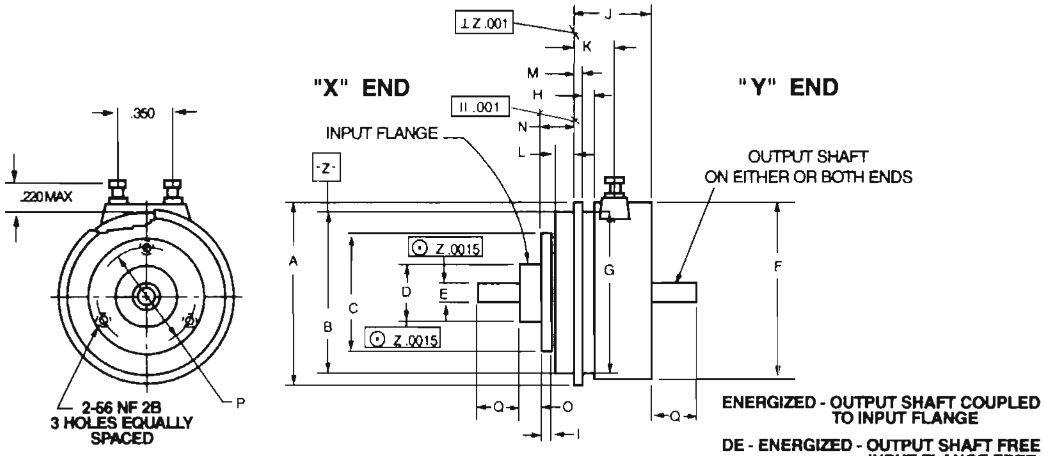


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	+.000 −.005	+.0000 −.0005			+.0000 −.0003	±.005	±.005	±.005		±.015	REF.	±.005	+.003 −.000				±.020
8	.877	.7500			.1248	.800	.800			.500	.190	.100	.047				.300
11	1.115	1.0000			.1248	1.025	1.025			.500	.180	.100	.060				.300
13	1.370	1.2500			.1873	1.350	1.255	.080		.625	.245	.125	.060				.375
15	1.620	1.5000			.2498	1.600	1.505	.080		.750	.248	.125	.060				.500
18	1.740	1.5620			.2498	1.650	1.650			1.000	.320	.125	.090				.500

WSB FRAME SIZE	8	11	13	15	18
COIL RESISTANCE ± 10% OHMS	275	169	165	151	138
TORQUE SPRING BRAKE (OZ. IN. MIN.)	5	12	16	32	100
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)					
ENERGIZED DE-ENERGIZED BRAKED	.10	.15	.20	.25	.30

WSB FRAME SIZE	8	11	13	15	18
WEIGHT NOMINAL (OZ.)	1.0	1.8	3.5	6.0	9.0
RESPONSE TIME AT 28 V.D.C. (ms)	7.0	7.0	10.0	14.0	20.0
INERTIA (IN. LB. SEC²) SHAFT (10⁻⁶)	.93	2.0	5.9	17.	27.

MODEL WMC WAFER MAGNETIC CLUTCH



ENERGIZED - OUTPUT SHAFT COUPLED TO INPUT FLANGE

DE - ENERGIZED - OUTPUT SHAFT FREE INPUT FLANGE FREE

FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	+ .000 − .005	+ .0000 − .0005	± .005	+ .0000 − .0005	+ .0000 − .0003	± .005	± .005	± .005	± .002	± .015	REF.	± .005	+ .003 − .000	± .005	± .005	± .005	± .020
8	.877	.7500	.740	.3750	.1248	.800	.800		.061	.500	.190	.100	.047	.175	.120	.625	.300
11	1.115	1.0000	.740	.3750	.1248	1.025	1.025		.061	.500	.180	.100	.060	.175	.120	.625	.300
13	1.370	1.2500	.934	.5000	.1873	1.350	1.255	.080	.064	.625	.245	.125	.060	.203	.177	.750	.375
15	1.620	1.5000	1.200	.6250	.2498	1.600	1.505	.080	.090	.750	.248	.125	.060	.230	.177	1.000	.500
18	1.740	1.5620	1.200	.6250	.2498	1.650	1.650		.090	1.000	.320	.125	.090	.230	.177	1.000	.500

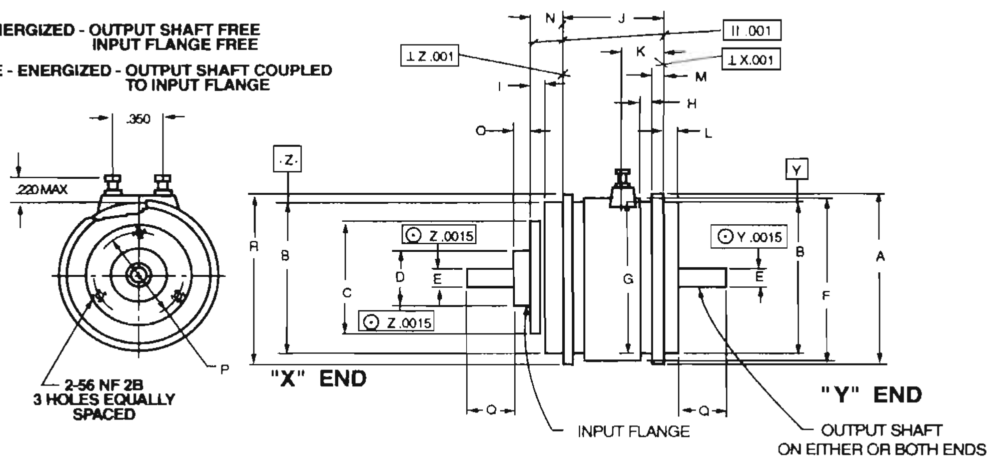
WMC FRAME SIZE	8	11	13	15	18
COIL RESISTANCE ± 10%	275	169	165	151	138
TORQUE MAGNETIC CLUTCH (OZ. IN. MIN.)	6	32	40	72	180
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)					
ENERGIZED – BOTH SHAFTS	.15	.20	.25	.30	.35
DE-ENERGIZED – OUTPUT SHAFT	.15	.15	.20	.25	.25
INPUT FLANGE	.15	.15	.20	.25	.25

WMC FRAME SIZE	8	11	13	15	18
WEIGHT NOMINAL (OZ.)	1.2	2.0	3.8	6.3	9.4
RESPONSE TIME AT 28 V.D.C. (ms)	4.0	5.0	7.0	9.0	12.0
INERTIA (IN. LB. SEC^2)					
OUTPUT SHAFT (10^{-6})	.93	2.0	5.8	17.	28.
INPUT SHAFT (10^{-6})	2.4	5.0	12.	36.	51.

MODEL WSC WAFER SPRING CLUTCH

ENERGIZED - OUTPUT SHAFT FREE INPUT FLANGE FREE

DE - ENERGIZED - OUTPUT SHAFT COUPLED TO INPUT FLANGE

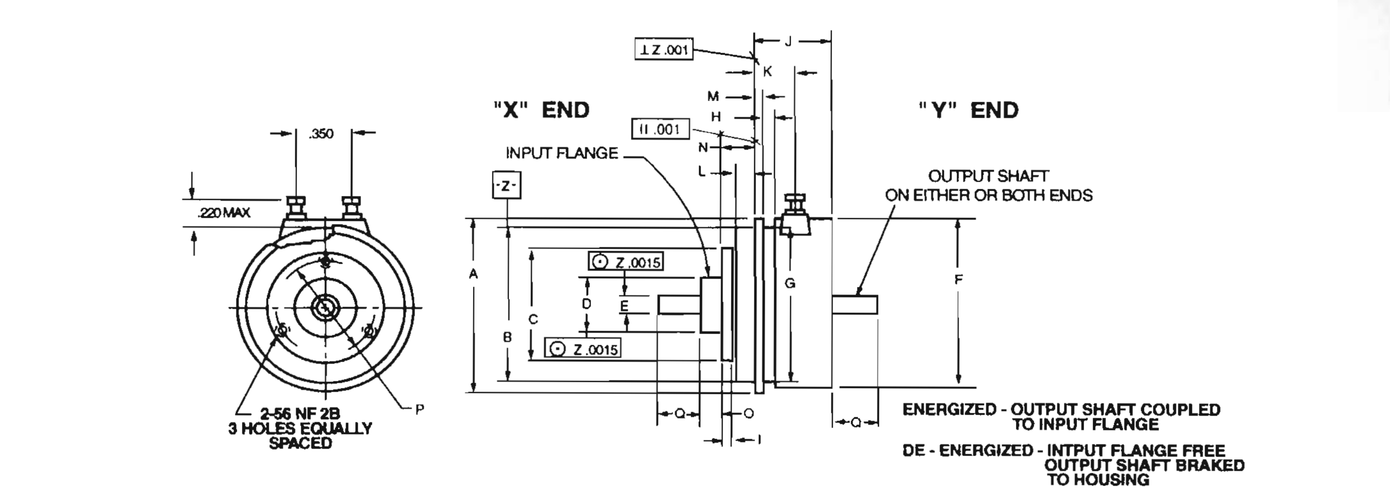


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	+ .000 − .005	+ .0000 − .0005	± .005	+ .0000 − .0005	+ .0000 − .0003	± .005	± .005	± .005	± .002	± .015	REF	± .005	+ .003 − .000	± .005	± .005	± .005	± .020	+ .000 − .005
8	.877	.7500	.740	.3750	.1248	.800	.800		.061	.532	.190	.100	.047	.175	.120	.625	.300	.920
11	1.115	1.0000	.740	.3750	.1248	1.025	1.025		.061	.532	.180	.100	.060	.175	.120	.625	.300	1.195
13	1.370	1.2500	.934	.5000	.1873	1.350	1.255	.080	.064	.659	.245	.125	.060	.203	.177	.750	.375	1.470
15	1.620	1.5000	1.200	.6250	.2498	1.600	1.505	.080	.090	.801	.248	.125	.060	.230	.177	1.000	.500	1.718
18	1.740	1.5620	1.200	.6250	.2498	1.650	1.650		.090	1.042	.320	.125	.090	.230	.177	1.000	.500	1.853

WSC FRAME SIZE	8	11	13	15	18
COIL RESISTANCE ± 10%	275	169	165	151	138
TORQUE (OZ. IN. MIN.) SPRING CLUTCH	5	12	16	32	100
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)					
ENERGIZED – OUTPUT SHAFT	.10	.15	.20	.25	.30
INPUT FLANGE	.20	.20	.25	.30	.35
DE-ENERGIZED – BOTH SHAFTS	.30	.35	.50	.75	1.0

WSC FRAME SIZE	8	11	13	15	18
WEIGHT NOMINAL (OZ.)	1.2	2.0	4.2	7.9	10.9
RESPONSE TIME AT 28 V.D.C. (ms)	7.0	7.0	10.0	14.0	20.0
INERTIA (IN. LB. SEC^2)					
OUTPUT SHAFT (10^{-6})	.94	2.0	5.9	17.	28.
INPUT SHAFT (10^{-6})	1.9	2.7	8.4	23.	28.

MODEL WMCSB WAFER MAGNETIC CLUTCH SPRING BRAKE

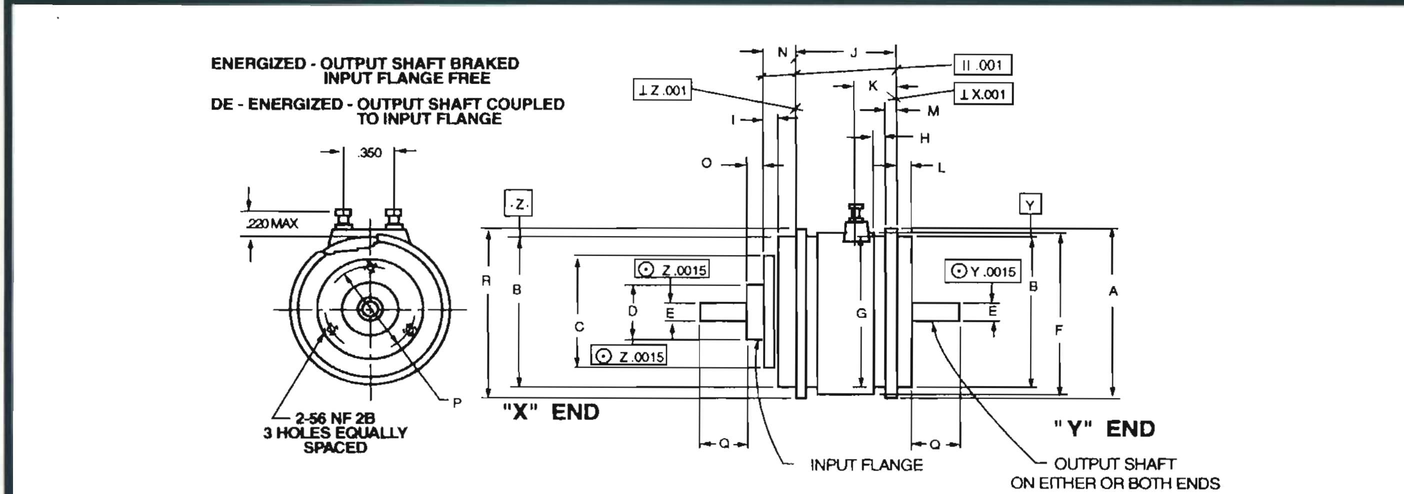


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	+.000 −.005	+.0000 −.0005	±.005	+.0000 −.0005	+.0000 −.0003	±.005	±.005	±.005	±.002	±.015	REF.	±.005	+.003 −.000	±.005	±.005	±.005	±.020
8	.877	.7500	.740	.3750	.1248	.800	.800		.061	.500	.190	.100	.047	.175	.120	.625	.300
11	1.115	1.0000	.740	.3750	.1248	1.025	1.025		.061	.500	.180	.100	.060	.175	.120	.625	.300
13	1.370	1.2500	.934	.5000	.1873	1.350	1.255	.080	.064	.625	.245	.125	.060	.203	.177	.750	.375
15	1.620	1.5000	1.200	.6250	.2498	1.600	1.505	.080	.090	.750	.248	.125	.060	.230	.177	1.000	.500
18	1.740	1.5620	1.200	.6250	.2498	1.650	1.650		.090	1.000	.320	.125	.090	.230	.177	1.000	.500

WMCSB FRAME SIZE	8	11	13	15	18
COIL RESISTANCE ± 10%	275	169	165	151	138
TORQUE					
MAGNETIC CLUTCH (OZ. IN. MIN.)	6	16	16	32	100
SPRING BRAKE (OZ. IN. MIN.)	5	12	16	32	80
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)					
ENERGIZED – BOTH SHAFTS	.15	.20	.25	.30	.30
DE-ENERGIZED – INPUT FLANGE OUTPUT SHAFT (BRAKED)	.25	.30	.45	.70	.95

WMCSB FRAME SIZE	8	11	13	15	18
WEIGHT NOMINAL (OZ.)	1.3	2.0	3.8	6.3	9.4
RESPONSE TIME AT 28 V.D.C. (ms)	7.0	7.0	10.0	14.0	20.0
INERTIA (IN. LB. SEC²)					
OUTPUT SHAFT (10-6)	.93	2.0	5.8	17.	28.
INPUT SHAFT (10-6)	2.4	5.0	12.	36.	51.

MODEL WSCMB WAFER SPRING CLUTCH MAGNETIC BRAKE

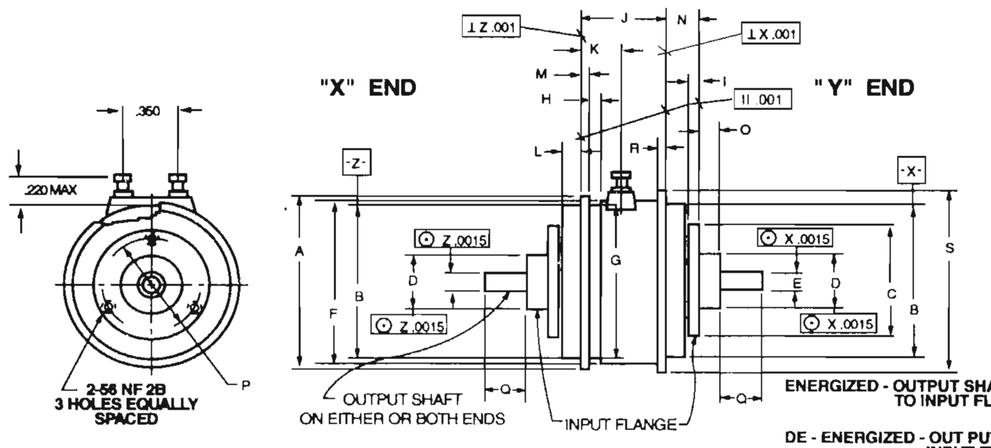


FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	+.000 −.005	+.0000 −.0005	±.005	+.0000 −.0005	+.0000 −.0003	±.005	±.005	±.005	±.002	±.015	REF.	±.005	+.003 −.000	±.005	±.005	±.005	±.020	+.000 −.005
8	.877	.7500	.740	.3750	.1248	.800	.800		.061	.532	.190	.100	.047	.175	.120	.625	.300	.920
11	1.115	1.0000	.740	.3750	.1248	1.025	1.025		.061	.532	.180	.100	.060	.175	.120	.625	.300	1.195
13	1.370	1.2500	.934	.5000	.1873	1.350	1.255	.080	.064	.659	.245	.125	.060	.203	.177	.750	.375	1.470
15	1.620	1.5000	1.200	.6250	.2498	1.600	1.505	.080	.090	.801	.248	.125	.060	.230	.177	1.000	.500	1.718
18	1.740	1.5620	1.200	.6250	.2498	1.650	1.650		.090	1.042	.320	.125	.090	.230	.177	1.000	.500	1.853

WSCMB FRAME SIZE	8	11	13	15	18
COIL RESISTANCE ± 10%	275	169	165	151	138
TORQUE					
MAGNETIC BRAKED (OZ. IN. MIN.)	6	16	16	32	100
SPRING CLUTCH (OZ. IN. MIN.)	5	12	16	32	80
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)					
ENERGIZED – INPUT FLANGE	.20	.20	.25	.30	.30
DE-ENERGIZED – BOTH SHAFTS	.30	.35	.50	.75	1.0

WSCMB FRAME SIZE	8	11	13	15	18
WEIGHT NOMINAL (OZ.)	1.3	2.4	3.9	7.4	10.5
RESPONSE TIME AT 28 V.D.C. (ms)	7.0	8.0	10.0	14.0	20.0
INERTIA (IN. LB. SEC²)					
OUTPUT SHAFT (10-6)	.93	2.0	5.8	17.	28.
INPUT FLANGE (10-6)	1.9	2.7	8.3	23.	28.

MODEL WMCSC WAFER MAGNETIC CLUTCH SPRING CLUTCH



ENERGIZED - OUTPUT SHAFT COUPLED TO INPUT FLANGE "X" END. INPUT FLANGE "Y" END FREE

DE - ENERGIZED - OUT PUT SHAFT COUPLED TO INPUT FLANGE "Y" END. INPUT FLANGE "X" END FREE

FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
	+.000 −.005	+.0000 −.0005	±.005	+.0000 −.0005	+.0000 −.0003	±.005	±.005	±.005	±.002	±.015	REF.	±.005	+.003 −.000	±.005	±.005	±.005	±.020	+.003 −.000	+.000 −.005
8	.877	.7500	.740	.3750	.1248	.800	.800		.061	.532	.190	.100	.047	.175	.120	.625	.300	.047	.920
11	1.115	1.0000	.740	.3750	.1248	1.025	1.025		.061	.532	.180	.100	.060	.175	.120	.625	.300	.060	1.195
13	1.370	1.2500	.934	.5000	.1873	1.350	1.255	.080	.064	.659	.245	.125	.060	.203	.177	.750	.375	.060	1.470
15	1.620	1.5000	1.200	.6250	.2498	1.600	1.505	.080	.090	.801	.248	.125	.060	.230	.177	1.000	.500	.060	1.718
18	1.740	1.5620	1.200	.6250	.2498	1.650	1.650		.090	1.042	.320	.125	.090	.230	.177	1.000	.500	.090	1.853

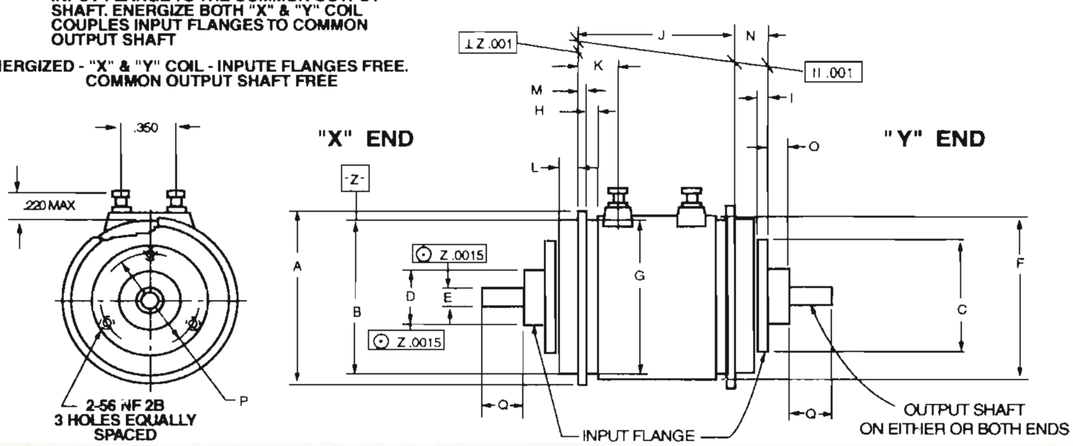
WMCSC FRAME SIZE	8	11	13	15	18
COIL RESISTANCE ± 10%	275	169	165	151	138
TORQUE					
MAGNETIC CLUTCH (OZ. IN. MIN.)	5	12	16	32	100
SPRING CLUTCH (OZ. IN. MIN.)	3	12	16	32	80
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)					
ENERGIZED – BOTH SHAFTS "X" END	.20	.25	.30	.35	.40
FLANGE "Y" END	.20	.20	.25	.30	.30
DE-ENERGIZED – BOTH SHAFTS "Y" END	.25	.30	.45	.70	.95
FLANGE "X" END	.30	.35	.50	.75	1.0

WMCSC FRAME SIZE	8	11	13	15	18
WEIGHT NOMINAL (OZ.)	1.6	2.6	4.5	9.0	12.0
RESPONSE TIME AT 28 V.D.C. (ms)	7.0	7.0	10.0	14.0	20.0
INERTIA (IN. LB. SEC^2)					
OUTPUT SHAFT (10^{-6})	.93	2.0	5.8	17.	28.
INPUT SHAFT "X" END (10^{-6})	2.4	5.0	12.	36.	51.
INPUT SHAFT "Y" END (10^{-6})	1.9	2.7	8.3	23.	28.

MODEL WMCMC WAFER MAGNETIC CLUTCH MAGNETIC CLUTCH

ENERGIZED - "X" OR "Y" COIL COUPLES RESPECTIVE INPUT FLANGE TO THE COMMON OUTPUT SHAFT. ENERGIZE BOTH "X" & "Y" COIL COUPLES INPUT FLANGES TO COMMON OUTPUT SHAFT

DE - ENERGIZED - "X" & "Y" COIL - INPUTE FLANGES FREE. COMMON OUTPUT SHAFT FREE



FRAME SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	+.000 −.005	+.0000 −.0005	±.005	+.0000 −.0005	+.0000 −.0003	±.005	±.005	±.005	±.002	±.015	REF.	±.005	+.003 −.000	±.005	±.005	±.005	±.020
8	.877	.7500	.740	.3750	.1248	.845	.800	.255	.061	.868	.190	.100	.047	.175	.120	.625	.300
11	1.115	1.0000	.740	.3750	.1248	1.105	1.025	.288	.061	.906	.180	.100	.060	.175	.120	.625	.300
13	1.370	1.2500	.934	.5000	.1873	1.350	1.255	.080	.064	1.054	.245	.125	.060	.203	.177	.750	.375
15	1.620	1.5000	1.200	.6250	.2498	1.600	1.505	.080	.090	1.285	.248	.125	.060	.230	.177	1.000	.500
18	1.740	1.5620	1.200	.6250	.2498	1.650	1.650		.090	1.785	.320	.125	.090	.230	.177	1.000	.500

WMCMC FRAME SIZE	8	11	13	15	18
COIL RESISTANCE ± 10%	275	169	165	151	138
TORQUE MAGNETIC CLUTCH (OZ. IN. MIN.)	6	32	40	72	180
BREAKAWAY "DRAG" TORQUE (OZ. IN. MAX.)					
ENERGIZED – BOTH SHAFTS	.20	25	30	35	35
DE-ENERGIZED – OUTPUT SHAFT	.20	.20	.25	.30	.30
INPUT FLANGE	.25	.25	.30	.35	.35

WMCMC FRAME SIZE	8	11	13	15	18
WEIGHT NOMINAL (OZ.)	2.6	3.3	7.6	10.2	16.8
RESPONSE TIME AT 28 V.D.C. (ms)	4.0	5.0	7.0	9.0	12.0
INERTIA (IN. LB. SEC^2) OUTPUT SHAFT (10^{-6})	1.7	3.9	12.	33.	55.
INPUT SHAFT "X" END OR "Y" END (10^{-6})	2.4	5.0	12.	37.	51.

APPLICATION DATA

The design of modular packages proceeds in much the same manner as with a conventional servo-mechanism. The main purpose, as with all systems of this type it to drive one or more output devices in accordance with input and accuracy specifications. Typical input requirements, such as, frequency, response bandwidth, response to constant velocity input signals, positioning accuracy, velocity lag, etc., must be met when varying the inertia and friction of the load. This, in effect, establishes the power input capacity of the drive-motor. Gear reducers are often required to act as mechanical "impedance matching devices" to provide the relatively low speed and high torques required by the load. The dynamic load, therefore, is very essential in selecting a suitable gear ratio.

The inclusion of the clutch-brake devices is established by the performance requirement of the overall package. In one instance, it may be required to drive the load rapidly in accordance with an input signal, and then bring it abruptly to a halt. This is accomplished by a clutch-brake which can couple the load to the motor when energized or decouple and brake the load when de-energized. These features are accomplished while the motor is spinning freely. Since the kinetic energy of the high speed drive motor most often constitutes the largest stored energy of the system, the clutch-brake method of stopping as described above, means that this stored energy need not be dissipated in the brake, because the brake only holds the load and does not stop the motor. This means the load can be quickly brought to a halt, which is an outstanding and often required design feature.

Another design feature of magnetic clutches and brakes is the clutch dissipation required for transmitting rotational energy from a motor to the load. Where the driven load is predominantly friction, acceleration is extremely rapid once the clutch torque builds up to exceed the load torque and clutch dissipation is relatively light. When the load is effectively of very high inertia, the energy dissipated by clutch during load acceleration equals the final kinetic energy of the load. The same holds true for brake dissipation during the stopping of a high inertia load. These relations are valid regardless of the time required for starting and stopping. In the most general case, the motor may require gearing before coupling to the clutching mechanism, while additional gearing is required between clutch and load. The selection of optimum gear ratios is a straight-forward servomechanism design problem: The principal point is the need for matching motor to clutch, and motor, through the clutch to the load.

Thus, we have chosen a motor, clutching mechanism, and suitable gearing to match the parameters and dynamic performance characteristics of the load.

Frequently, a spring-return mechanism is employed to restore a required zero condition of the output device when it is decoupled from the motor. ISLAND's line of modular spring-return devices is extensive in that it can provide the unidirectional or bidirectional return to a null position. Spring torque should be relatively uniform over the angular range of the output device and be sufficient to overcome friction. The spring should return to the reference position rapidly and alternate the underdamped oscillation of contact in a short time duration. The spring-return mechanism must not lead to excessive wear from impacts occurring on release of the holding device. The spring-return can be used integrally in a modular package with a commutator switch to provide return at a specific angular displacement. This is accomplished by de-activating a clutch with the conducting segment of the switch. The final package must be capable not only of performing as required, but also of meeting the requirements or ruggedness and reliability under severe operating and environmental conditions. ISLAND's in-line assemblies provide outstanding operation under various environments, such as excessive humidity salt spray, dust, etc., since there are less physical openings in the assembled package than with separate components.

In summary, the customer should provide detailed input, operational and output requirements for the components required. In cases where design information of various modules is required. ISLAND maintains a large force of competent sales engineers to offer experienced and technical know-how in any area required.

ISLAND COMPONENTS GROUP

OFFERS THE MOST COMPLETE LINE OF ELECTRO-MAGNETIC CLUTCHES & BRAKES

HYSTERESIS CLUTCHES AND BRAKES

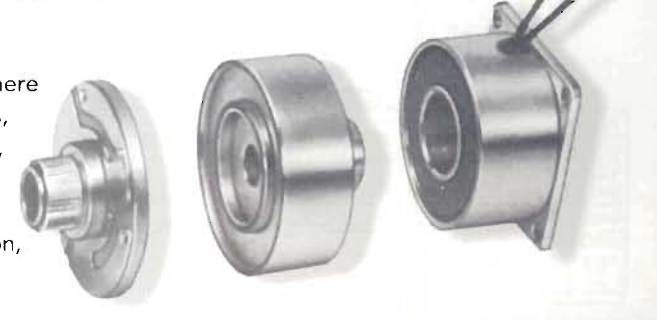
The most inherently, reliable and long lived variable torque control clutch or brake, designed for constant tension-slip type applications, is a hysteresis type unit. Hysteresis units, clutches and brakes, exhibit a directly proportioned torque rise in proportion to the applied current. The output torque of these units is independent of speed. Because the coupling action is purely magnetic there is no physical contact between the coupling members; therefore the unit exhibits no wear or fluctuation of torque with respect to life.

SILENT STOP FAIL-SAFE BRAKES (SERIES SBF)

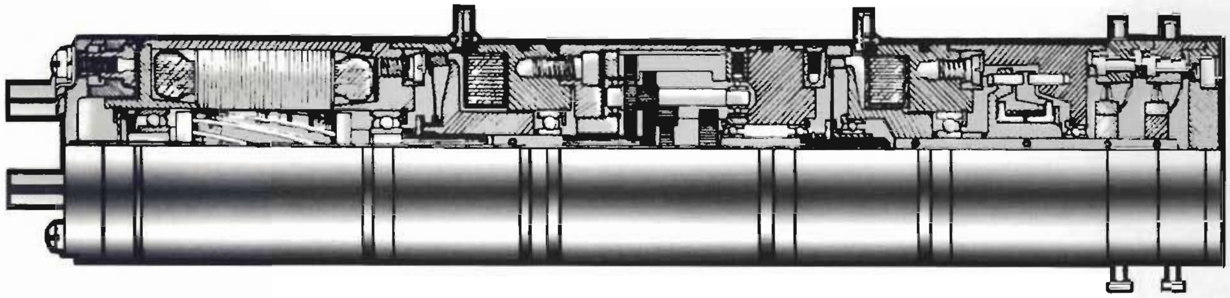
These brakes are designed for fast silent stop if the currents fails. These unique brakes offer several mounting options, less noise - asbestos free with fast response time, long life and high torque vs size and are available voltages. The brakes typically are used in machine tools, printers, copiers, and film drives. Agricultural applications such as irrigation and fertilize dispersion demonstrate the versatility of these units and their ability to function under different and adverse conditions.

INDUSTRIAL TYPE (Open Frame)

These clutches and brakes are manufactured for high volume utilization where cost is considered paramount. They are incorporated in copying machines, air conditioning equipment, sewing machines, automated machine tools, packaging equipment and a host of other devices. Write for our latest industrial Catalog illustrating a wide range of models & sizes for immediate delivery. A clutch/brake application is only limited by the designer's imagination, and not by a unit from ISLAND. If it can de done - we will do it!



UNITIZED MODULES/IN-LINE SERVO ASSEMBLIES



***THIS ASSEMBLY INCLUDES:* SERVO MOTOR, BRAKE, GEARHEAD, CLUTCH, SPRING RETURN, AND POTENTIOMETER**

■ SERVO MOTOR

ISLAND Standard Mark (MK) 14,400 cycle

FUNCTION: Main driver of united module

ADVANTAGES: Faster Response and Sensitivity due to elimination of gearing and it's related inertia and backlash

■ DC WAFER BRAKE

ISLAND Standard size 11

FUNCTION: Brake rotation of Servo Motor and Gearhead

ADVANTAGES: Longer Life - from ball bearings due to zero backlash coupling which eliminates inertial shocking of bearing during braking

■ GEARHEAD

ISLAND Standard size 11 (1000:1)

FUNCTION: Steps down R.P.M. of motor and increases output torque

ADVANTAGES: Faster Response- due to utilization of brake output shaft pinion as low inertia input pinion

■ DC WAFER CLUTCH

ISLAND Standard size 11

FUNCTION: Allows motor, brake and gearhead to override spring return; stops without damage

ADVANTAGES: Greater accuracy - full utilization of zero backlash feature of clutch allows closer "nulling" accuracies from spring return mechanism

■ NULL TYPE SPRING RETURN MECHANISM

ISLAND Standard size 11

FUNCTION: Allows potentiometer wiper element to bi-directionally return to a zero or null position

ADVANTAGES: Greater Accuracy - is possible because of the zero backlash coupling of both input and output shaft to their respective load

■ STANDARD NON-WIRE WOUND POTENTIOMETER

ISLAND Standard size 11

FUNCTION: Output voltage divider of unitized module

ADVANTAGES: Greater Accuracy - due to zero backlash coupling

IN-LINE ASSEMBLIES CAN CONSIST OF ANY OF THE FOLLOWING

- CLUTCHES and BRAKES*
- MOTORS*
- GEARHEADS*
- SPRING RETURNS*
- SYNCHROS*
- COMMUTATOR SWITCHES*
- POTENTIOMETERS*
- ENCODERS*
- TACHOMETERS*

** Manufactured by ISLAND COMPONENTS GROUP, INC.*

Advantages of In-Line Assemblies

The packaging of several electro-mechanical components on a common shaft results in increased system accuracy at lower cost.

The groupings of components such as magnetic clutches and brakes, spring returns, motors, potentiometers, gearheads, switches, synchros, etc., into a single housing with a common shaft line provides the following features:

LESS SPACE is required for the combined assemblies, since gearing associated with coupling between components is eliminated. For example, if a potentiometer is to be mechanically connected to the output shaft of a magnetic clutch, less space will be required by using a common shaft between the components. This feature can be readily applied to many other applications utilizing the many types of unitized modules available.

SYSTEM RELIABILITY is, in effect, a function of the number of mechanical and electrical failures that can occur. By using unitized modules, the number of mechanical connections between components is reduced. This in turn lessens failure probability, and greater reliability is achieved.

ACCURACIES and sensitivity are improved with unitized modules because backlash and phasing are less critical. For example, if the output shaft of a magnetic clutch is to be connected to a spring return and single pole commutator switch, the phasing of the switch contacts to the null position of the spring return can be held to closer accuracies if assembled as an integral unit. Also, the null position will not be affected by the gearing backlash if assembled to a common shaft.

LOWER COST The reduced number and complexity of parts and the reduction in customer assembly costs combine to make ISLAND COMPONENTS GROUP, INC. packaged system an economical alternative to individual component procurement.

MOTORS
DC BRUSHLESS MOTORS
STEPPER MOTORS
SERVOMOTORS
MOTOR GENERATORS
INERTIALLY DAMPED
HYSTERESIS
SYNCHRONOUS
TACHOMETERS
INTEGRATORS

BRAKES & CLUTCHES
ELECTROMAGNETIC BRAKES
SPRING BRAKES
ELECTROMAGNETIC CLUTCHES
SPRING CLUTCHES

GEARHEADS
PLANETARY
SPEED REDUCERS
SPUR GEARHEADS

IN-LINE ASSEMBLIES
ACTUATORS
IN-LINE PACKAGES
STATORS
ROTORS
CUSTOM ASSEMBLIES
SPEED CONTROLS
SHAFT SPRING RETURNS

ISLAND COMPONENTS GROUP

Putting Your Ideas Into Motion

Engineering & Design Assistance

In today's modern world, electromechanical components must meet exact specifications. Highly qualified engineers on staff is essential to achieve best project results. At ISLAND, when it comes to providing the expertise to get the job done, we wrote the book. Each engineering application provides us with a new challenge, whether it's enhanced performance, or trouble-shooting an intricate in-line assembly, we're ready. Talk to us about your next project or ideas and we'll get the gears into motion right away.

Special Applications

- *Gear Ratios*
- *Bearing & Lubrication*
- *Temperature Range*
- *Mechanical Configurations (Shaft, Body Diameter or Length)*
- *Reduced Backlash*
- *Anti-Backlash Systems*
- *Slip Clutches*
- *Inline-Assemblies can be Designed to Special Requirements*
- *Parallel plate actuators can be supplied for specific applications*
- *Specialty Motors*

Customer Service

From the moment you call, the friendly professionals at ISLAND are available to work with you. It is important to us that you are kept informed of each job's status, from the moment you place your order, through manufacturing, to final test and on-time delivery. Whatever your needs are, you'll receive the courteous service that's grown to be a trademark at ISLAND COMPONENTS GROUP, Inc.

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