

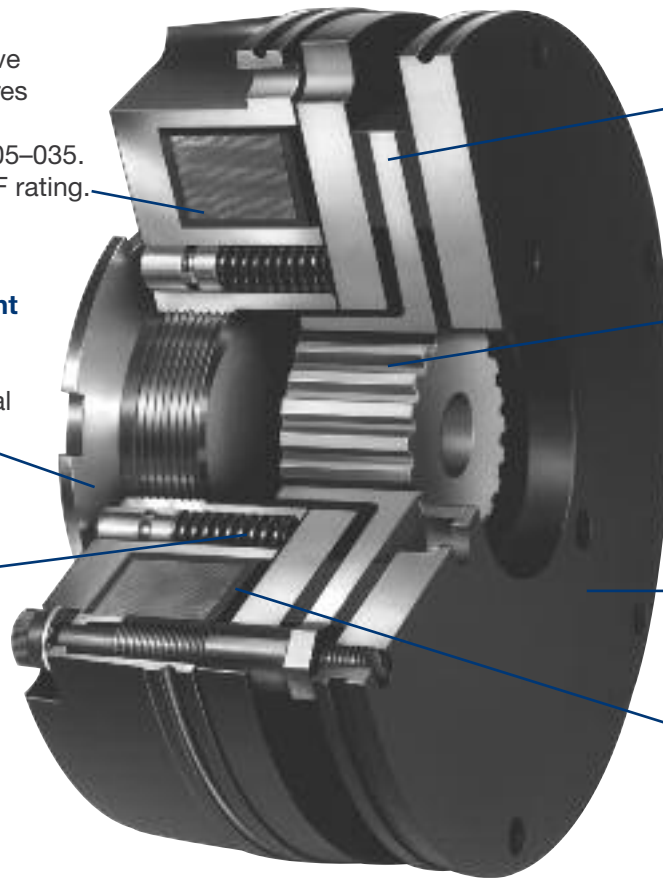
ERD Series Electrically Released Brakes

The Inside Story

Continuous duty coil is epoxy-sealed; windings have Class F insulation. Lead wires have standard Class B insulation rating on sizes 005–035. Sizes 060–300 have Class F rating.

Central Torque Adjustment (VAR 02) allows braking torque adjustment down to 50% of nominal rating; ideal for controlling stopping distances.

Compression Springs are used to provide balanced armature plate loading.



Friction Disc has double friction surfaces for increased torque in small package size.

Splined Center Hub is steel for wear resistance and available in a variety of bore sizes and keyways.

Friction Flange can easily be modified to suit unique bolt patterns. In special cases, brakes may be mounted directly to the motor without the need for the flange.

Air Gap is factory pre-set and easy to adjust during field maintenance.

ERD Series brakes are designed to safely keep the load in position in the event of a power or motor failure, whether intentional or accidental.

By applying voltage to the ERD, an electromagnetic field is created which causes the armature plate to pull-in against helical compression springs, thus releasing the brake. When power is removed, the springs force the armature to compress the friction carrier against the mounting flange, thus stopping and holding the load. Fully dynamic friction material on the carrier allows for repeated braking cycles from full motor speed with no torque fade.

An optional manual release allows the operator to safely move the load even when no power is available.

Brakes are available in eight different sizes ranging from 3.3 inches to 9.9 inches in diameter with torque capacities from 4 to 220 lb.ft.

Features/Benefits

- Dynamic friction material can stop loads from motor speeds up to 3600 RPM.
- Few moving parts means quiet operation.
- Lead and asbestos free, dynamic friction material is suited for high cycle rates.
- Variety of voltages available.
- Simple DC control (or AC with available rectifiers).
- Low power requirements for energy savings.
- Bi-directional stopping capability.
- Epoxy encapsulated coil for uniform heat transfer.
- Corrosion resistant.
- Low inertia rotating parts.
- Splined hub for quiet dependable operation.
- Metric and inch standard bore sizes.

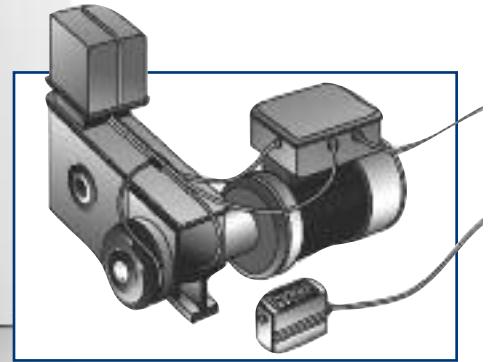
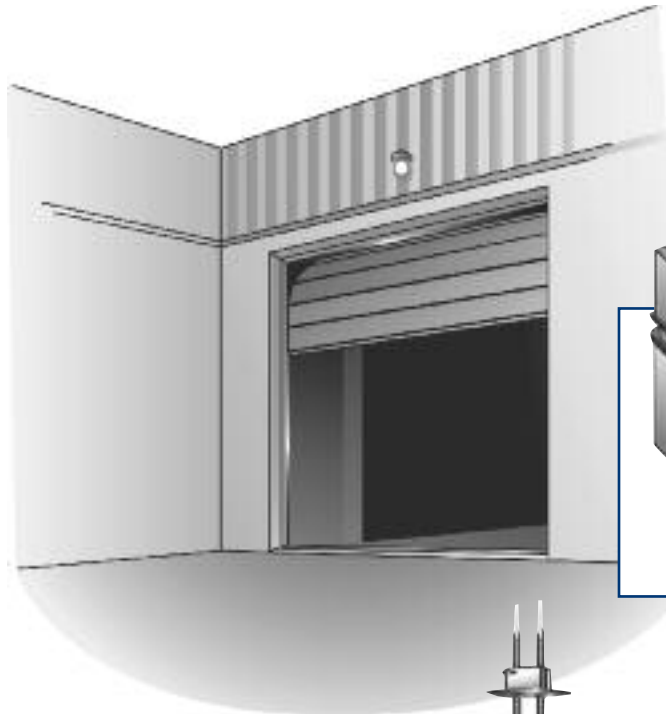
WARNING For general use in horizontal shaft applications only. For possible vertical applications, contact technical support.

ERD Series Electrically Released Brakes

Applications

As a fail-safe, power-off brake, the ERD family is ideally suited for such load-stopping and holding applications as:

- Conveyors
- Machine Tools
- Robotics
- Medical X-Y Positioning
- Scooters
- Floor Sweepers/Cleaners
- Motor Brakes
- Overhead Doors
- Hoist/Winch
- Fork Lift

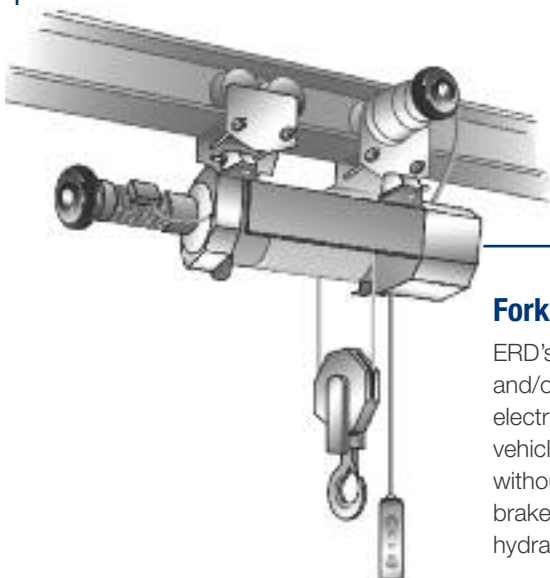
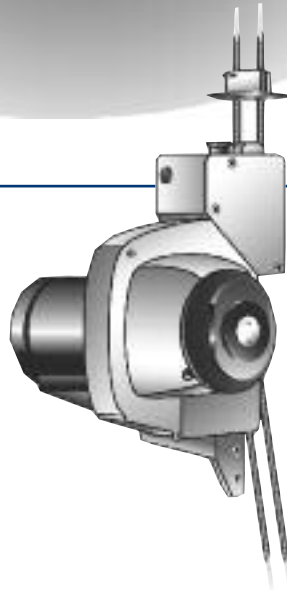


Overhead Door

The ERD can be used in conjunction with a photo eye. In this application, whenever the light beam is broken, voltage to the brake is removed. The brake then applies and holds the door in position. Further, the manual release feature allows the operator to open/close the door in the event of a power failure.

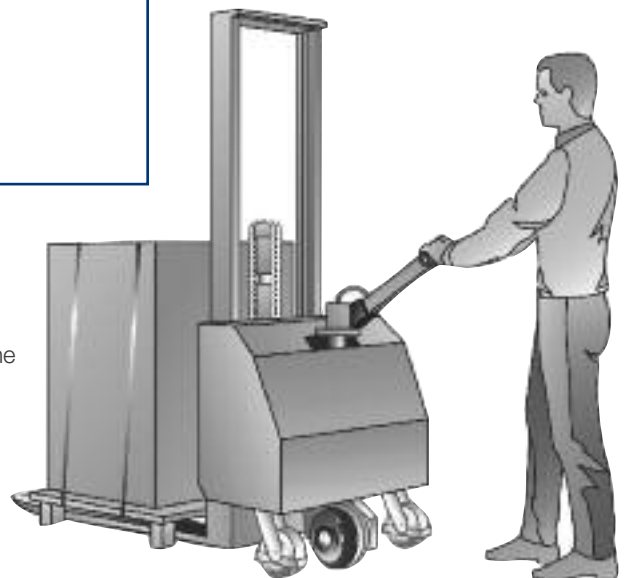
Hoist/Winch

The ERD with central torque adjustment can be used to consistently stop the rated load within a fixed distance by dialing-in the proper torque level on each production hoist. The addition of a manual release allows the load to be gradually and safely lowered to the ground in the event of power failure.



Fork Lift

ERD's are used as safety and/or parking brakes on electric fork trucks to hold the vehicle on inclines etc. without the need for manual brake linkage or expensive hydraulic brakes.



ERD Series Electrically Released Brakes

Selection Procedure

Proper fail-safe brake selection involves determining, in order:

1. Static Holding Torque

The ERD brake nominal holding torque should exceed the torque from the load by a minimum safety factor of 2.0.

2. Dynamic Torque

This is determined from the equation:

$$T = \frac{5250 P K}{N}$$

where:

- T = Dynamic Torque, ft.lb.
- N = Motor Speed, RPM
- P = Motor Horsepower
- K = Momentary Peak Torque Factor (Typically 2.5)

Once the dynamic torque has been calculated, check the dynamic torque curves (to the right) at the required operating speed to determine the suitable brake.

3. Energy Capacity (Heat Dissipation)

Sizing of the ERD by energy capacity is a function of the cycling frequency (cycles per hour) and the single cycle energy put into the brake as determined from the equation:

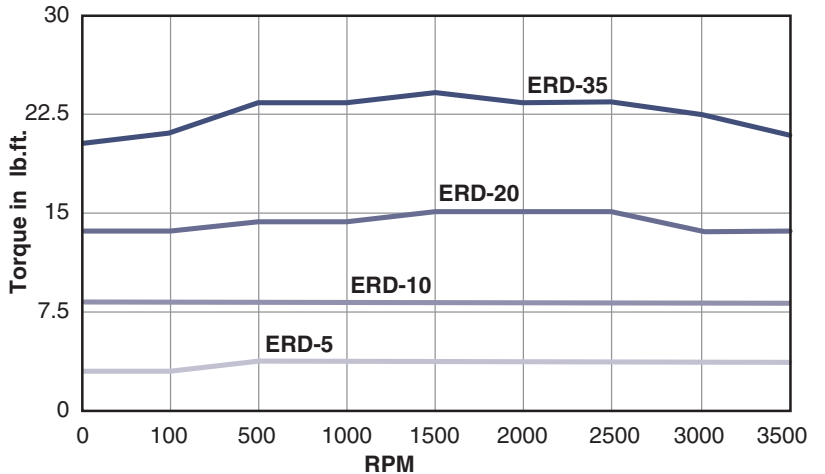
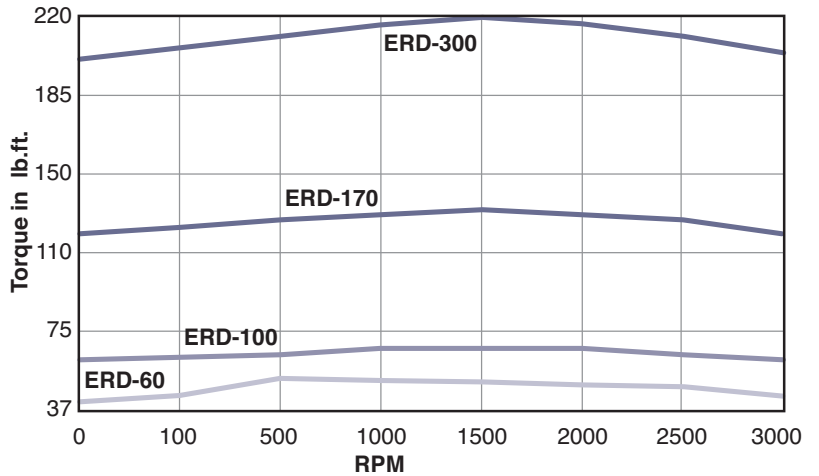
$$E = 1.7 WR^2 \left(\frac{N}{100} \right)^2$$

where:

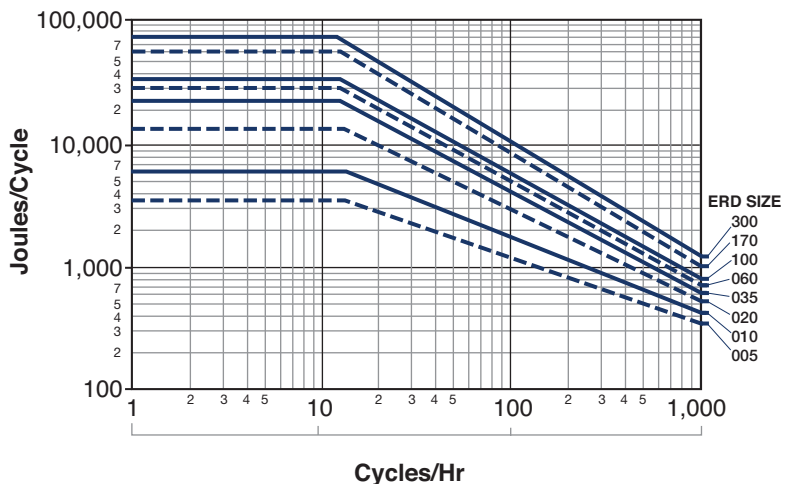
- E = Single Cycle Energy, ft.lb.
- WR² = Load Inertia, lb.ft²
- N = Speed, RPM

Applying the energy per cycle with the cycle rate to the energy curve, the brake selection is verified.

Dynamic Torque



Energy Capacity (Heat Dissipation)



Note: To convert Joules/min. to ft.lbs./min, multiply times .7376

ERD Series Electrically Released Brakes

Specifications

Options		Units	ERD 5	ERD 10	ERD 20	ERD 35	ERD 60	ERD 100	ERD 170	ERD 300
Holding Torque		in.lb.	45	85	175	310	530	890	1500	2650
		ft.lb.	4	7	15	26	44	75	125	221
Maximum Speed		RPM	3600	3600	3600	3600	3600	3600	3600	3600
Rotating Inertia	S	lb.in. ²	0.041	0.137						
	M	lb.in. ²	0.103	0.321	0.957	2.529	7.415	12.472	14.010	29.386
Current Draw		Amps								
	24 VDC		0.83	1.03	1.22	1.61	1.94	2.35	2.73	4.11
	103.5 VDC*		0.21	0.26	0.31	0.41	0.49	0.57	0.69	1.122
	207 VDC*		0.09	0.12	0.14	0.18				
Resistance at Ambient Temperature	24 VDC	Ohms	28.9	23.4	19.6	14.9	12.4	10.22	8.78	5.83
	103.5 VDC*		454	372	310	233	166.2	168.6	139.2	85.63
	207 VDC*		2380	1813	1545	1175				
Weight		lbs	2	4	7	10	14	22	34	57

* The controls designed on pages 130 and 131 provide output voltages to operate these brakes.

Ordering Procedure

Specify:

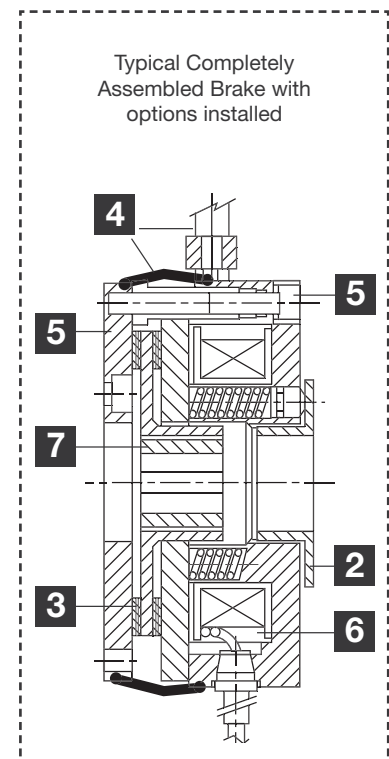
- Size: upon sizing criteria, select a size.
5, 10, 20, 35, 60, 100, 170, or 300
- Variation:
0 – No torque adjustment
2 – With central torque adjusting ring
- Friction Disc:
Metallic carrier is standard.
Thermoplastic carrier is available on sizes 5 & 10.
High torque carrier available on sizes 060 through 300.
- Options:
Dust Cover
Manual Release
- Friction Flange & Mounting Screws:
Thick Flange is standard – Requires Short Screws.
Intermediate Flange available up to Size 35 – Requires Long Screws.
No Mounting Flange is an option – Requires Long Screws.

- Voltage:
24 DC is standard.
96, 103.5 (90)* & 207/215* DC are modifications.
- Bore Size:
Pilot bored hubs available in all sizes.
See table for US-English and Metric bore sizes available by ERD size.
Special bores available on request.
- Detection Kit – Micro Switch
For Service Manual, request catalog P-229. This option not retrofittable. Requires a 25 piece minimum order for sizes 005 thru 035.

Caution:

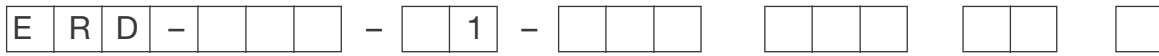
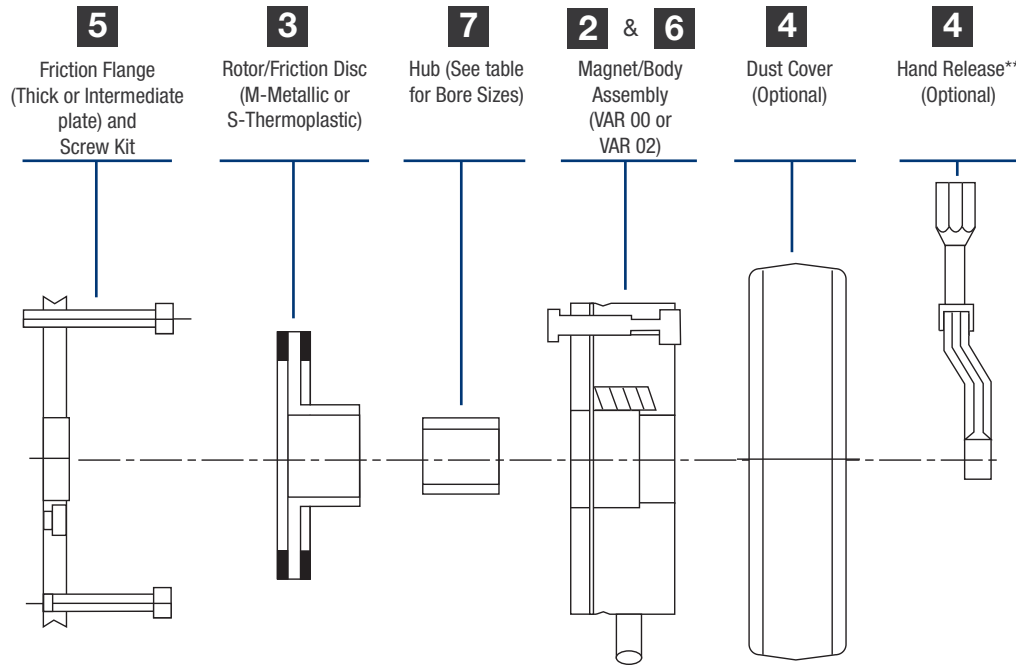
These units are designed for dry operation. The brake must be free from oil and grease. Exceeding the maximum rotation speed listed in the catalog will invalidate the guarantee.

* Coil voltages can vary slightly depending on unit size.



ERD Series Electrically Released Brakes

Product Configuration



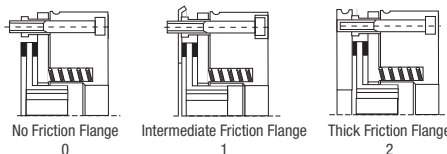
1
Size:
 005, 010, 020, 035, 060, 100, 170, 300

2
Variation:
 0 – VAR 00 – No torque adjustment
 2 – VAR 02 – With central torque adjusting ring

3
Friction Disc:
 M– Metallic carrier is standard
 S– Thermoplastic carrier is available on sizes 5 & 10
 H– High torque carrier available on sizes 060 through 300

4
Options:
 0– None
 1– Dust Cover
 2– Hand Release**
 3– Dust Cover and Hand Release

5
Friction Flange and Screw Kits:
 0– No Friction Flange
 1– Intermediate Friction Flange
 2– Thick Friction Flange



Cable Std.

8
Detection kit:
 0–None
 1–With

7
Bore Size:
 See Bore Size Table

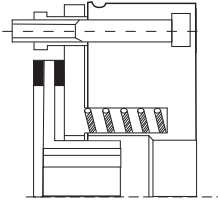
6
Voltage:
 24 DC is standard
 96, 103.5 (90)* & 207/215* DC are modifications

* Coil voltages can vary slightly depending on unit size.

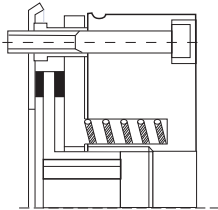
** Manual release available on variation 02 only.

ERD Series Electrically Released Bakes

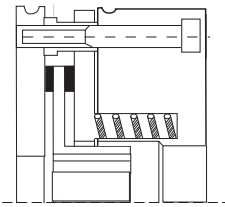
4 Mounting Options (by customer)



No Friction Flange
Requires long screw kit

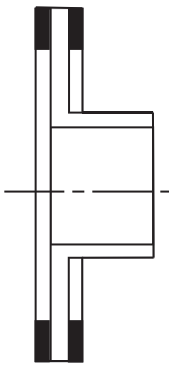


Intermediate Friction Flange
Requires long screw kit
Available on sizes 005 thru 035 only.



Thick Friction Flange (Standard)
Requires short screw kit

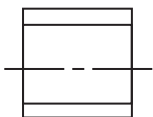
3 Rotor/Friction Disc



Available in two styles
M – Metallic (Standard)
S – Thermoplastic (Low inertia)
Sizes 005 & 010 only

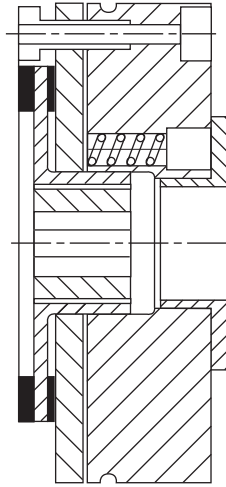
- Large thermoplastic bore hubs (Available in sizes 005 and 010 only)
- Large bore metallic disc (Available in sizes 005 thru 035)
- High torque metallic discs (Available in sizes 060 thru 300. Requires lower speed of rotation.)

7 Hub



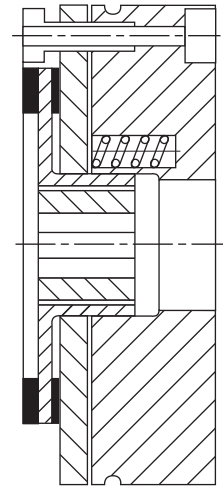
See Table for hub, bore and keyway size availability by ERD size.

2 Magnet Assembly Variations



VAR 02

- Torque reduction up to 50% by loosening one nut.
- Available in all sizes.
- Central nut has several “Detents” per turn allowing accurate torque adjustment.
- The brake is factory set at the minimum torque (50% of max. torque).

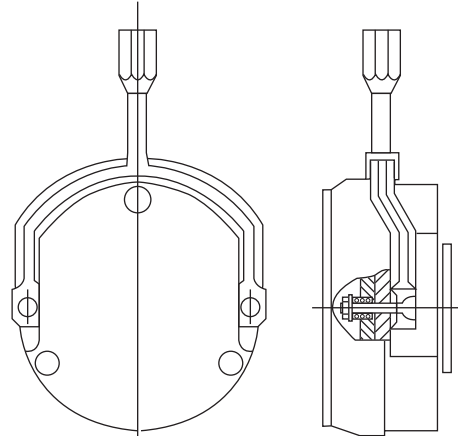


VAR 00

No torque adjustment possible

- Available in all sizes.
- No hand release option available.

4 Manual Release (Optional)



Automatically returns to “neutral position” when released, thereby restoring holding torque to the brake.

Designed to be retrofitted, except to VAR 00.

4 Dust Cover (Optional)

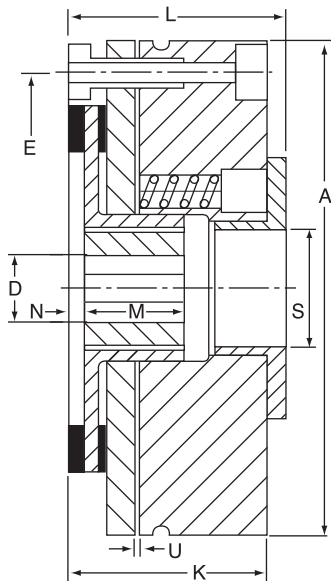
Available in all sizes.



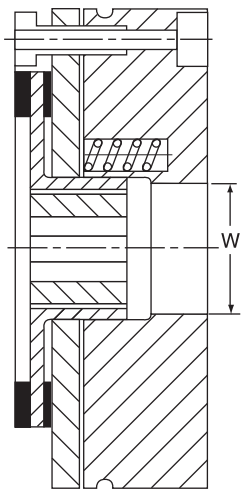
ERD Series Electrically Released Brakes

Brakes

VAR 02



VAR 00



Dimensions

All dimensions are nominal, unless otherwise noted.

ERD Size	A	D Max.	E	K	L Max.	M +0.000/-0.008
5	3.307 (84)	0.5 (12)	2.835 (72)	1.378 (35)	1.575 (40)	0.709 (18)
10	4.016 (102)	0.625 (15)	3.543 (90)	1.614 (41)	1.831 (46.5)	0.787 (20)
20	5.000 (127)	1.0 (24)	4.409 (112)	1.870 (47.5)	2.185 (55.5)	0.787 (20)
35	5.787 (147)	1.125 (28)	5.197 (132)	2.146 (54.5)	2.559 (65)	0.984 (25)
60	6.378 (162)	1.25 (32)	5.709 (145)	2.520 (64)	2.933 (74.5)	1.181 (30)
100	7.402 (188)	1.500 (41)	6.693 (170)	2.795 (71)	3.209 (81.5)	1.181 (30)
170	8.465 (215)	1.95 (50)	7.717 (196)	3.268 (83)	3.780 (96)	1.378 (35)
300	9.921 (252)	2.125 (54)	9.055 (230)	3.819 (97)	4.528 (115)	1.575 (40)

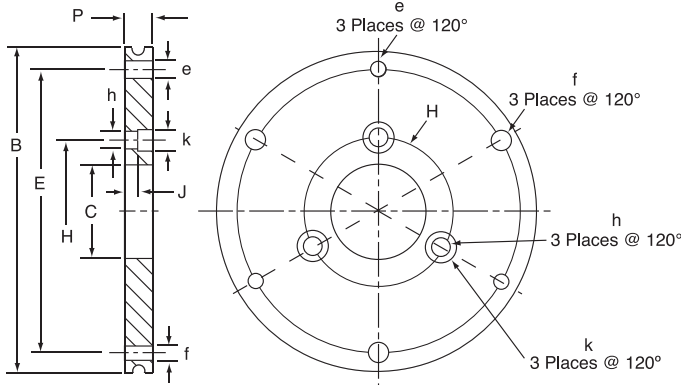
ERD Size	N	S	U +/-0.002	W
5	0.079 (2)	0.748 (19)	0.008 (0.2)	0.925 (23.5)
10	0.118 (3)	0.945 (24)	0.008 (0.2)	1.122 (28.5)
20	0.157 (4)	1.378 (35)	0.008 (0.2)	1.594 (40.5)
35	0.118 (3)	1.575 (40)	0.012 (0.3)	1.909 (48.5)
60	0.118 (3)	1.890 (48)	0.012 (0.3)	2.303 (58.5)
100	0.118 (3)	2.047 (52)	0.012 (0.3)	2.500 (63.5)
170	0.177 (4.5)	2.362 (60)	0.012 (0.3)	2.894 (73.5)
300	0.197 (5)	2.874 (73)	0.012 (0.3)	3.484 (88.5)

1. Concentricity of field mounting pilot diameter with rotor mounting shaft within .006 T.I.R.
2. Squareness of field mounting face with rotor mounting shaft within .006 T.I.R. measured at field mounting bolt circle.
3. Rotor mounting shaft concentric with armature center of rotation within .006 T.I.R.
4. Armature hub pilot diameter to be concentric with armature center of rotation within .010 T.I.R.
5. If customer does not use a friction flange, the mating surface must be square to their mounting shaft within .006" and flat within .002".

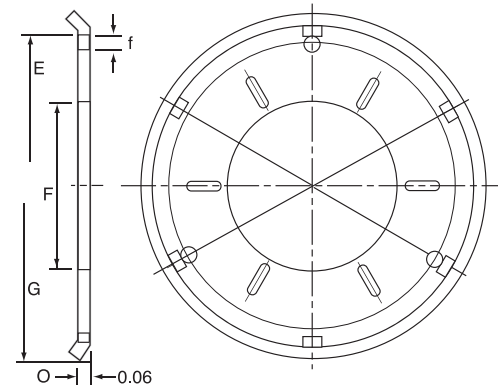
ERD Series Electrically Released Bakes

Friction Plates

Thick friction plate



Intermediate friction plate



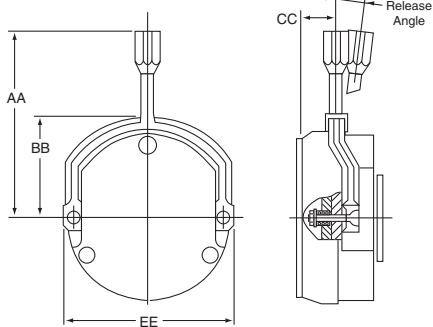
Dimensions

All dimensions are nominal, unless otherwise noted.

ERD Size	B	C	E	e Bolt Pattern	f Bolt Clearance Holes	F	G	H	h	k Bolt Clearance Holes	J	P	O
5	3.268 (83)	0.787 (20)	2.835 (72)	3xM4	3x0.177 3(4.5)	1.654 (42)	3.425 (87)	1.181 (30)	3x0.177 (4.5)	3x0.315 (8)	0.079 (2)		0.125 (3.2)
10	3.937 (100)	1.181 (30)	3.543 (90)	3xM5	3x0.217 3(5.5)	2.126 (54)	4.213 (107)	1.772 (45)	3x0.217 (5.5)	3x0.394 (10)	0.079 (2)		0.125 (3.2)
20	4.921 (125)	1.575 (40)	4.409 (112)	3xM6	3x0.256 3(6.5)	2.362 (60)	5.217 (132.5)	2.205 (56)	3x0.260 (6.5)	3x0.433 (11)	0.118 (3)		0.141 (3.6)
35	5.709 (145)	1.772 (45)	5.197 (132)	3xM6	3x0.256 3(6.5)	2.755 (70)	6.004 (152.5)	2.441 (62)	3x0.260 (6.5)	3x0.433 (11)	0.118 (3)		0.181 (4.6)
60	6.299 (160)	2.165 (55)	5.709 (145)	3xM8	3x0.335 3(8.3)			2.913 (74)	3x0.327 (8.3)	3x0.551 (14)	0.118 (3)	0.433 (11)	
100	7.283 (185)	2.559 (65)	6.693 (170)	3xM8	3x0.335 3(8.3)			3.307 (84)	3x0.327 (8.3)	3x0.551 (14)	0.118 (3)	0.433 (11)	
170	8.346 (212)	2.953 (75)	7.717 (196)	6xM8	6x0.335 6(8.3)			3.937 (100)	3x0.327 (8.3)	6x0.551 (14)	0.118 (3)	0.433 (11)	
300	9.843 (250)	3.543 (90)	9.055 (230)	6xM10	6x0.413 6(10.3)			4.724 (120)	3x0.406 (10.3)	6x0.670 (17)	0.118 (3)	0.433 (11)	

The thick mounting flange provides the proper material and mounting tolerances for the brake. The intermediate mounting flange provides the proper material in applications where flatness, squareness and concentricity requirements are met on the machine already.

Manual Release



ERD Size	AA	BB	CC	DD	EE	Release Angle
5	3.86 (98)	2.09 (53)	0.67 (17)	3.46 (88)	3.46 (88)	10°
10	4.21 (107)	2.44 (62)	0.71 (18)	4.17 (106)	4.17 (106)	9°
20	5.08 (129)	2.99 (76)	0.98 (25)	5.20 (132)	5.20 (132)	8°
35	5.47 (139)	3.39 (86)	0.87 (22)	5.98 (152)	5.98 (152)	8°
60	7.44 (189)	4.09 (104)	1.57 (40)	6.53 (166)	6.54 (166)	15°
100	8.07 (205)	4.72 (120)	1.73 (44)	7.56 (192)	7.36 (187)	15°
170	9.45 (240)	5.51 (140)	2.09 (53)	8.62 (219)	8.78 (228)	15°
300	12.32 (313)	6.38 (162)	2.40 (61)	10.8 (256)	10.33 (262.5)	20°

Dust Cover



ERD Series Electrically Released Brakes

How To Order

Hub Bore and Keyway Sizes

U.S. English

Bore in.	Keyway		Available Bores							
	Width	Depth	5	10	20	35	60	100	170	300
3/8	3/32	3/64	Std.							
1/2	1/8	1/16	*	Std.	Std.					
5/8	3/16	3/32	*(Max.)	*	Std.	Std.	Std.	Std.		
3/4	3/16	3/32		*(Max.)	Std.	Std.				
7/8	3/16	3/32			Std.(Max.)	Std.			Std.	
1	1/4	1/8			*(Max.)	Std.	Std.	Std.		Std.
1-3/8	5/16	5/32				*(1-1/8Max.)		Std.	Std.	Std.
1-3/4	3/8	3/16							Std.	Std.

Metric

Bore (mm)	Keyway		Available Bores							
	Width	Depth	5	10	20	35	60	100	170	300
8			P.B.							
10			Std.	P.B.	P.B.					
11	4	2	Std.	Std.	Std.					
14	5	2.5	*	Std.	Std.	P.B.	P.B.			
15	5	2.5	*		Std.	Std.		P.B.		
18				*	Std.	Std.				
20	6	3		*(20Max.)	Std.	Std.			P.B.	
22	6	3			Std.	Std.				
24	8				*	Std.				
25	8	3.5				Std.	Std.	Std.		P.B.
28	8	3.5			*(28Max.)	*				
30	8	3.5				*(32Max.)	Std.	Std.		
35	10	4					(32Max.)	Std.	Std.	Std.
40	12	4						Max.	Std.	Std.
45	14	4.5							Std.	Std.
50	14	4.5							Max.	(54 Max.)

P.B. = Pilot Bore, * = Large Bore Hub, which requires use of a large bore friction disc.

Design Considerations/Limitations

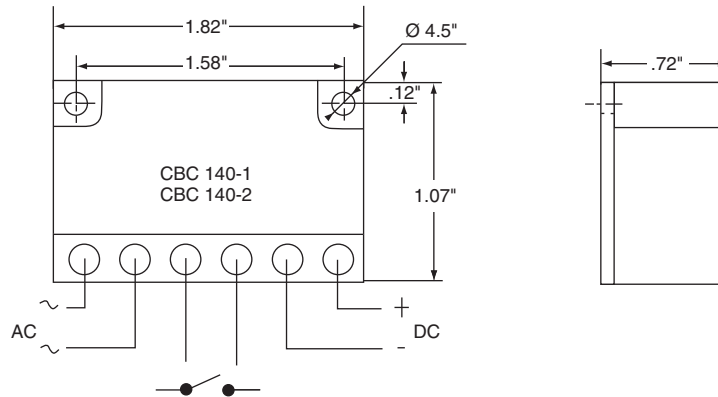
1. Check the airgap periodically and reset as required per instructions found on page 4 of the service manual P-229. Inspection interval(s) depend on the frequency of brake application.
2. Check friction material thickness periodically per dimension N (see page 127) and replace when below the minimum shown below.

Inches (mm) millimeters

ERD Size	5	10	20	35	60	100	170	300
Min. Thickness	0.009 (0.22)	0.008 (0.21)	0.012 (0.31)	0.009 (0.22)	0.010 (0.24)	0.010 (0.24)	0.012 (0.31)	0.013 (0.32)

ERD Control Units

Dimensions

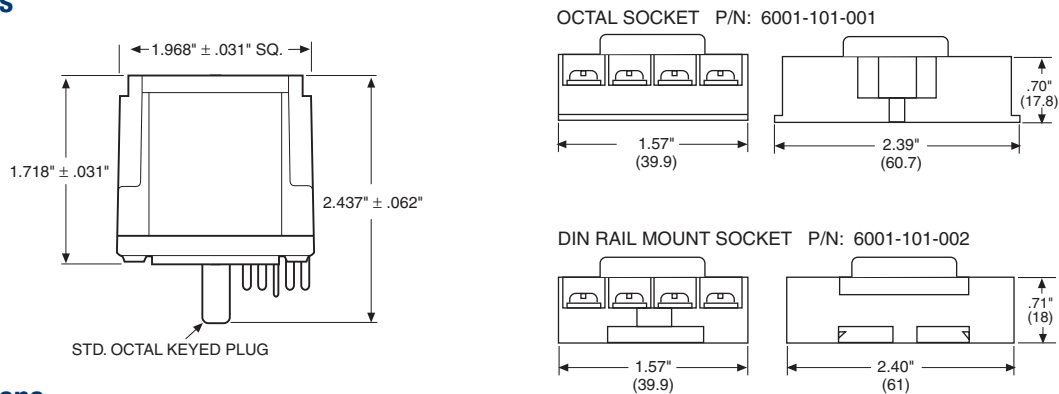


Specifications

	CBC-141-1	CBC-141-2		
Part Number	ACG830A1P1	ACG830A1P2		
Frequency (Hz)	50/60	50/60		
Input Voltage	230 VAC	30	115	230
Output Voltage	103.5 VDC	24	103.5	207
Max. Current (A)	1	2	2	2

CBC-141-1: Supply unit with single wave rectification for low current.
 CBC-141-2: Supply unit with dual wave rectification for low current.

Dimensions

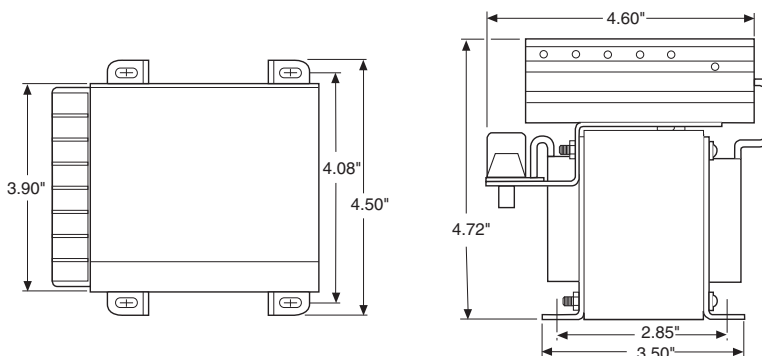


Specifications

	CBC-801-1	CBC-801-2
Part No.	6001-448-004	6001-448-006
Input Voltage	120 VAC, 50/60 Hz	220/240 VAC, 50/60 Hz
Output Voltage	90 VDC, 1.25 A max.	90 VDC, 1.25 A max.
Circuit Protection	Fused 1.6 Amp, 250 V fast-blo	Fused 1.6 Amp, 250 V fast-blo
Ambient Temperature	-23° to 116°F (-31° to 47°C)	
Max. Cycle Rate	Limited by the clutch or brake, variable with application	
Switching	Single pole, double throw Minimum contact rating: 10 Amp, 28 VDC resistive or 10 Amp, 120 VAC inductive	
Status Indicator	Red LED indicates brake is energized, Green LED indicates clutch is energized	
Mounting	Two versions of octal socket are available: 6001-101-001 foot mount 6001-101-002 DIN rail mount	

All dimensions nominal unless otherwise specified.

Dimensions



Specifications

	CBC-450-90	CBC-450-24
Part No.	6006-448-006	6006-448-005
Input Voltage	120/220/240/380/480 VAC	120/220/240/380/480 VAC
Output Voltage	90 VDC	24 VDC
Output Current	1 Amp/Channel 1.2 Amps Total	4 Amps/Channel 4 Amps Total
Auxiliary Supply	12 VDC 250 mA	12 VDC 250 mA
Circuit Protection	Fused 1.5 Amp	Fused 5 Amp
Ambient Temperature	+32° to 122°F (0° to 50°C)	+32° to 122°F (0° to 50°C)
Status Indicators	Red LED indicates channel is energized.	Red LED indicates channel is energized.
Adjustments	Jumper for single or dual operation.	Jumper for single or dual operation.
Inputs	3 Optically isolated, 10-30 VDC, 3-9 mA for Channel 1, Channel 2 and Channel 2 override (E-stop).	3 Optically isolated, 10-30 VDC, 3-9 mA for Channel 1, Channel 2 and Channel 2 override (E-stop).