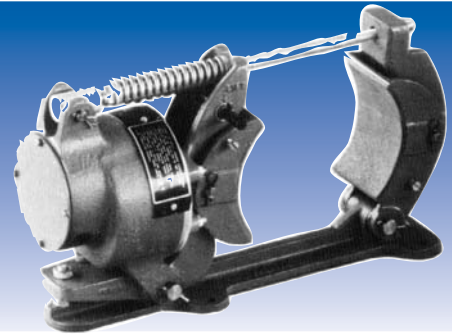


**Witton Kramer
AC - DC Brakes
Thrustors**



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Witton Kramer Products

HISTORY

Witton Kramer manufacture Brakes and Thrusters in their Blackheath site near Birmingham in England. They supply product on a worldwide basis and have a long history of providing products going back over 100 years.

In 1909 the product scope included separator magnets, brakes, clutches and solenoids and was expanded shortly to include cranes and hoists. Over the years continued product development added product permutations to the range.

The 1950's brought amalgamation with AEI and English Electric in the UK resulting in the addition of the Perigrip Brake and Thrustor designs to the already developed PMA, PMD and MTWK brakes.

Witton Kramer has been an integral part of Brook Crompton in the UK since 1989 and continues to manufacture the product in the Blackheath factory.

APPLICATIONS

- CRANES
- CONVEYORS
- PROCESS LINES
- HOISTS:
Theatre Scenery
Furnace Skip
Dockside
Building Site
- MINING
- ORE UNLOADERS
- ROLLING MILLS
- VEHICLE WASH PLANT
- SKI LIFTS
- WINCHES
- GENERAL MACHINERY DRIVES

DESCRIPTION OF MAGNETIC BRAKES

Magnetic brakes are used for a wide variety of applications. they are simple to use and maintain, and their operation can be controlled in a variety of different ways by means of external control equipment.

Short Stroke Magnetic Brakes (Types PM, PMD, and PMA)

This is the most popular general purpose drum brake in use.

The short stroke brake has a DC magnet, and is operated on AC supplies by an integral or separate rectifier.

The short stroke give a fast, precise action. Impact forces and noise are greatly reduced (especially on the smaller size) compared to the long stroke solenoid brake, which it has now almost entirely superseded. The brake design is simplified, with a direct linkage, as the magnet force and stroke is equal to the force and (total) stroke of the brake shoes. Wear of pivot pins and linkage is greatly reduced, even at high rates of operation, thus reducing maintenance and spare requirements.

Brakes can be made suitable for use in adverse environment, eg, high humidity, harsh chemicals, very low temperature and very high temperatures, including smoke spill and where flames may envelope the brake. High Integrity versions (category A) are available.

A wide range of control is possible to provide a wide variation of brake application and release times, for example on a process line the application and release times of brakes from 200mm to 500mm dia. can be matched for computer control of the line.

Typical Application

Cranes, hoists, process lines, mill machinery, transfer lines (automotive industry) and general machinery use.

AC Magnetic Brake (Perigrip Brake)

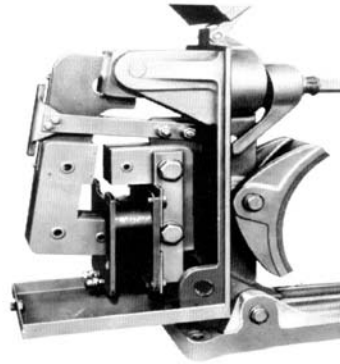
This is a direct acting brake with a laminated magnet system for direct connection to the AC supply. It has a very fast action in both release and application, and can be connected direct to a 4 pole direct-on-line cage induction motor without any additional control gear. This long established design is very simple to adjust for lining wear, without tools. Its main intention is that the fast acting magnet clapper can wear at high rates of operation.

Perigrip AC Shoe Brakes 4" - 12"

Features

Perigrip magnetic brakes are suitable for operation on a.c. supplies from 110V to 650V. The coils are continuously rated and insulated to Class B standard. The design incorporates the following features:

- 1) Spring applied; electrically released.
- 2) Self-adjusting spring-loaded shoe movement balancing.
- 3) Adjustment for brake lining wear without using wrenches.
- 4) Self-aligning brake shoes replaceable in a minutes without disturbing the drum.
- 5) A welded steel hinged cover protects the complete magnet assembly against dust and damage.
- 6) Pivot and brake shoe pins are secured by circlips which are easily removed and replaced when necessary.



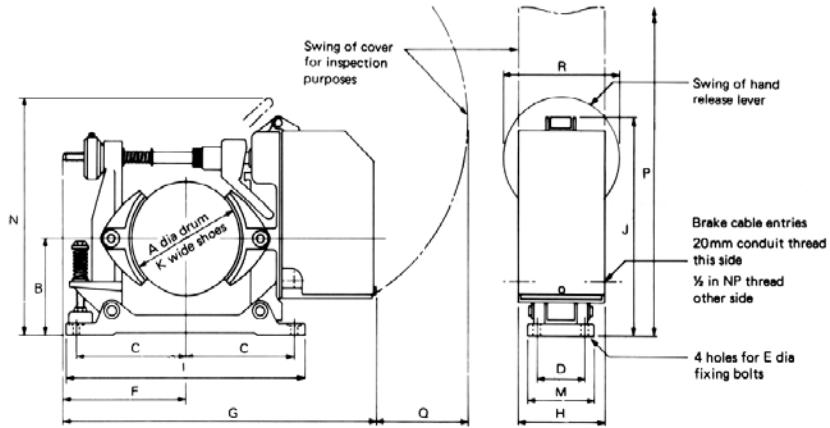
A Perigrip brake with the hinged cover lifted to show the magnet assembly.

- 7) Retaining spring limits the release fitted as standard.
- 8) Retarding torque can be reduced without producing hammer blows between magnet and armature.
- 9) Double springs fitted as an extra.
- 10) Fibre linings fitted as standard. Heavy duty asbestos free linings available if required - 680%.
- 11) CSA approved (No. LR10747).

Construction

The main components are of good quality cast iron.

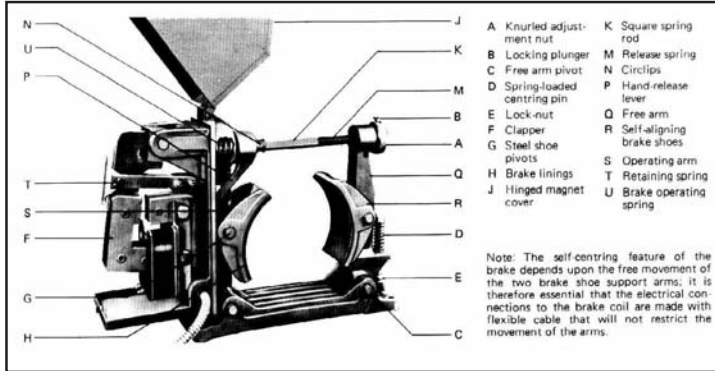
The springs and all machined steel parts are plated. All pins are of rolled steel and are secured by circlips. Brake linings are cotton fibre based, bonded to the shoes. Cable entry: 20mm conduit entry to BS4568 on one side and 1/2 in American National Pipe thread on the other. Brake drums are available as an extra.



A (dia) inch	Ret torque lbf ft	Dimensions in inches									
		B	C	D	E	F	G	H	J	K	L
4	18	4.0	4.5	2.5	0.312	5.25	14.625	4.875	9.375	1.9	10
6	60	5.5	6.125	3.0	0.375	6.5	19.25	6.0	12.625	2.5	13.5
8	120	6.75	8.0	3.5	0.5	8.625	22.875	6.375	15.375	3.25	17.5
10	250	8.5	9.5	4.5	0.5	10.25	28.5	6.5	18.5	4.0	20.5
12	400	10.25	11	5.0	0.625	12.25	32.0	7.0	22.0	2.75	24

A (dia) inch	M	N	P	Q	R	T	Nett Mass lb	Gross Mass lb	Volume packed Cubic feet	Consumption VA	Inrush VA
4	3.5	9.625	18.875	5.0	4.75	10	27	35	0.7	170	Approx 10 times consumption figures
6	4.25	13	24.875	5.25	6.0	13.5	55	70	1.1	270	
8	5.0	16.75	28.125	7.25	8.5	17.5	82	100	2.5	300	
10	6.0	19.5	37.0	9.0	8.5	20.5	150	185	3.2	380	
12	7.0	23.25	43.0	10.5	10	24	210	265	5.3	770	

AC Perigrip Brake Installation & Maintenance



Installation

Mounting Details

a) When the brake is to be mounted on a drum on an open-ended shaft (such as the non-drive end shaft of a double-shaft-extension motor), rotate the hand release lever to compress the spring and release the brake.

Open out the brake shoes by rotating the knurled adjusting nut A in a counter-clockwise direction. The locking plunger B must be held withdrawn while turning the nut.

b) When the brake drum is between a motor and gearbox already mounted on a baseplate, it may be necessary in some cases to remove the free arm Q to slide the base under the drum.

To do this loosen lock-nut E then remove the centering screw D together with its spring. With the plunger B withdrawn, turn the knurled nut A in a counter-clockwise direction and finally remove it.

Remove pivot C and lift out the free arm Q. Slide the brake under the drum and replace the free arm, pivot, knurled nut and centering screw. Operate the hand release lever P so that the brake shoes grip the drum.

Position the brake correctly in relation to the drum, ensure the correct centre height ($\pm 1/32$ inch or 1 mm) and bolt down.

Initial setting of shoe clearances

With the brake de-energized and with the shoes gripping the brake drum, rotate the knurled adjusting nut A until the clapper F can be just closed with light finger pressure.



Check that the spring rod is properly seated in the recess machined in the clapper bearing block. Now unscrew the nut A half a turn and proceed until the plunger B enters a milled slot. The clapper gap is now set approximately midway between the home position and the position of maximum lining wear, thus ensuring clearance will exist between the shoes and drum when the magnet closes on energization of the coil

Equalizing the shoe clearances

Release the brake either electrically or by driving a wedge between the retaining spring and the clapper, to close the air gap. Measure the distance between each shoe and the

adjacent side of the drum.

If necessary adjust the screw D, loosen off the lock-nut E, until the clearances are equal. Tighten the lock-nut.

Switch off the brake or remove the wedge and check that the clapper can now move freely over approximately half its full stroke.

This free movement, providing that the clapper moves the spring rod through the operating arm sufficiently to release the brake when the coil is energized, indicates that the brake is correctly set. It is advisable to check the setting of shoe clearances after an initial period of work to ensure that the brake operates correctly at the working temperature of the brake drum, and during the bedding-in period of the brake linings.

Adjustment for lining wear

As the linings wear, the length of the clapper air-gap will increase and this will become evident by a progressive reduction in the clearance between the back of the clapper arm and the retaining spring when the brake is de-energized.

The position of the retaining spring is set during manufacture so that even under a neglected condition of extreme brake lining wear, the clapper-gap cannot reach a dimension so large that the brake will fail to release, provided that the braking torque has not been increased from the original setting.

It should, however, be emphasized that for correct operation, the brake should be adjusted before the clapper arm presses against the retaining spring when the brake is in the un-energized condition, otherwise braking torque will be reduced.

To re-adjust the brake, tighten nut A until clapper F can just be closed with light finger pressure. Now unscrew nut A half a turn and proceed until the plunger B enters a milled slot.

Torque adjustment

The brake is set at the works to give the required torque and the main spring should not need adjusting.

The brake operating coil is designed to release the brake with a spring setting corresponding to the nominal torque stated on the nameplate and as shown in the following table:

Brake size	Torque		Spring length		Max clapper gap	
	in	mm	lbf ft	Nm	in	mm
4	102	18	24	1.53	39	0.8
6	152	60	80	2.32	59	1.0
8	203	120	160	2.89	73	1.0
10	254	250	340	2.81	71	1.2
12	305	400	540	3.08	78	1.3

When checking the main spring, measure the length between the collars.

An ample margin is allowed between the nominal operating voltage and the minimum voltage at which the clapper will close; this allows for normal lowering of the supply voltage.

Attempts to alter the torque are not recommended

because:

A) If the spring pressure is increased there is the danger that the clapper will not close when the coil is energized.

B) If the spring pressure were to be unduly decreased, the excess energy previously absorbed by the spring during closing then becomes expended in the impact between the stationary and the moving parts of the magnet, thereby causing excessive hammering at the face.

Brake shoe replacement

To change a shoe, first loosen off the knurled nut A to allow for the increased thickness of the new lining, operate the hand lever to release the brake, and remove the shoe pivot.

Rotate the shoe through 45 degrees upwards. Withdraw the shoe horizontally and replace it with a newly lined one.

Lubrication

For the successful and continued operation of the brake, it is essential that the various components are able to move freely.

During assembly all pivots are well greased and it is recommended that this grease be cleaned off and replaced occasionally.

Whenever the brake is examined and adjusted, a few drops of light machine oil should be applied to all working parts.

Take care not to allow any lubricant to touch the brake drum or linings.

Weatherproof brakes are fitted with lubricators on external pivot pins, these should be greased with Shell Alvania R3 or equivalent grease.

Adjustment for spring rod wear

If the clapper end of the spring rod becomes worn owing to hammering, the clearance between the hand-release lever P and the magnet arm projection which it engages will decrease until the brake will be held permanently in the OFF position.

The necessary adjustment should be made by removing one or more of the circlips N, located on the spring rod adjacent to the hand release lever. This clearance should be as large as possible provided that full movement of the hand-release lever will release the brake.

Check the top air-gap

An examination of the construction of the magnet laminations will show that when the clapper is closed electrically there is still a small permanent air-gap between the upper part of the fixed and moving portions of the laminations.

The air gap is located in the section of the magnetic circuit visible above the coil.

This permanent air-gap is set during manufacture to a dimension of 0.015 to 0.020 inches (0.4 to 0.5 mm), but as the contacting faces between the moving and fixed positions will become worn by constant use, the permanent air-gap will gradually be reduced.

This dimension must never be allowed to decrease below 0.005 inches (0.13 mm). When this occurs, a new magnet assembly should be fitted.

Spares

1) Magnet assembly (clapper, retaining spring and operating arm supplied complete; retaining spring supplied separately).

2) Coil of required voltage range. Standard voltages are 210/230, 380/415, 400/440 and 500/550 all at 50 Hz

When the supply frequency is 60 Hz, the exact voltage must be specified, as brakes cannot work over a range of voltage at this frequency. The common ratings are 460 and 575 volt 60 Hz.

3) Pair of shoes complete with linings. Standard lining materials are Ferodo FF, Mintex Fibre or equivalent.

When ordering spares or new parts, full nameplate details should be included, together with the number marked on the coil if a new coil is required.

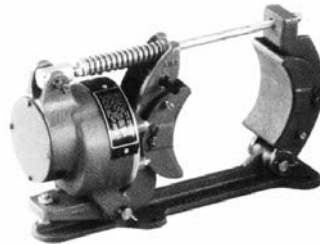
PM Magnetic Brakes

4" - 24"

Features

PM short-stroke magnetic brakes are suitable for operation on AC supplies from 110 to 575 volt and on all DC supplies up to 550 volts. The brakes are 8 hour rated in any period of 24 hours and the AC versions are fitted with internal silicon-diode rectifiers. Series-wound DC brakes give full torques at the one hour rating, pulling in at 60% or 40% of the full-load current. The design incorporates a number of advanced features which reduce maintenance to a minimum.

- 1) Adjustments to spring pressure, armature cap and shoe-stops can all be made with the same wrench.
- 2) Brake shoes can be removed and replaced quickly, without dismantling the brake.
- 3) The pins securing the brake shoes are retained by large spring clips which are easily removed and replaced.
- 4) Correct armature-gap can be set quickly and accurately to a simple gauge. This gauge also indicates when re-setting is required.
- 5) Setting instructions are printed on the aluminum armature guard plate.
- 6) Low centre-height and overall height helps reduce headroom on crane cabs.



- 7) Retarding torques can be reduced without producing hammer-blows between magnet and armature.
- 8) Friction device prevents brake shoes from dragging on the drum when the brake is off.
- 9) Weatherproof construction, with encapsulated magnet coil. The pivot pins are treated with molybdenum disulphide grease when assembled.
- 10) Brake are CSA approved (no. 1074).

Construction

The main components are of cast steel, or good quality cast iron. The spring and all machined steel parts are plated. All pins are stainless steel and are secured by clips.

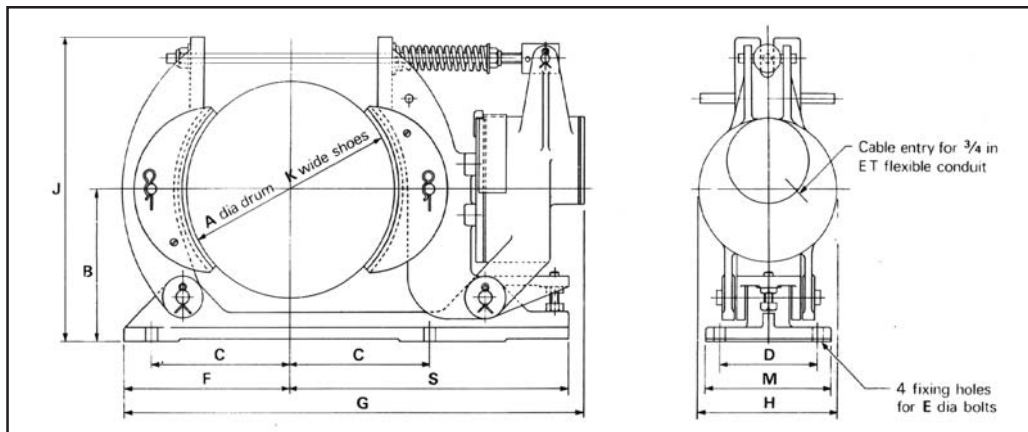
The terminal box is fitted with a substantial lid and gasket.

PM brakes are fitted with DC coils encapsulated in epoxy resin. Brakes to be used on AC supplies are energized through a silicon-diode rectifier pack mounted in the terminal box. Standard brakes are arranged for operation on 230/460 volts, 60 Hz AC supply or 90 volt DC. Alternatively a 575 volt version which is fitted with a rectifier is available.

They can be used in ambient temperatures up to 40 deg. C without derating.

The brake shoes are self-aligning and are easily removed when worn linings need to be replaced. Linings are bonded to the shoes.

Short, direct movement through a steel rod released the brake and a heavy-duty compression spring applies the retarding torque.



A (dia) inch	Ret torque lbf ft	Dimensions in inches											Nett Mass lb	Gross Mass lb	Volume packed Cubic feet	Consumption VA
		B	C	D	E	F	G	H	J	K	M	S				
4	22	3.375	3.0	3.0	0.312	3.75	12.0	3.875	6.0	2.0	4.0	5.75	16	25	1.5	65
6	60	4.75	4.0	4.0	0.375	5.0	14.875	5.5	9.0	3.0	5.0	8.0	36	56	1.75	80
8	155	6.0	5.5	4.5	0.375	6.5	19.75	6.875	11.5	4.0	5.625	12.5	75	110	3.0	150
10	265	7.0	6.5	5.0	0.5	8.0	23.75	7.625	13.5	4.0	7.0	14.125	110	150	3.75	200
12	405	8.75	8.5	6.0	0.625	10.25	28.625	8.125	17.0	5.0	8.0	17.125	170	220	6.0	250
15	960	10.5	10.0	7.0	0.75	12.0	33.25	10.125	21.0	6.0	9.0	22.0	320	400	10.5	350
18	1680	13.0	12.0	9.0	0.75	15.0	39.5	12.125	25.25	8.0	11.5	24.0	530	660	15.0	460
21	2900	15.0	14.0	10.0	0.75	17.5	42.75	15.625	28.25	9.0	13.0	25.5	800	950	27.0	600
24	4800	15.5	15.0	11.0	1.0	17.5	43.0	20.75	30.625	10.0	13.5	28.375	1120	1375	35.0	700

A hand-release mechanism, delayed operation, proving switches, brake drums and double springs are optional extras. Brakes for operation from DC supplies may need surge suppressors. Control gear can be supplied to give quicker operating times.

PM - Brake Extras, Accessories & Modifications

4" - 15"

The basic PM brake range is suitable for many uses without modification. But it is also made to accept a number of carefully designed accessories and modifications which turn it into one of the most versatile brake ranges available. This leaflet lists the main ones.

Ceiling or wall mounting

By the addition of one or two balancing springs, the brakes can be arranged to operate in any position round a horizontal shaft. Brakes for use on a vertical shaft may require more modification; please refer to the factory.

Double springs

Double springs giving a total pressure equal to the standard spring are available. These springs are obligatory in parts of Australia, and each spring will provide half the braking torque if the other fails. As they are mounted concentrically they do not noticeably increase the overall dimensions of the brake.

Delayed application

A delay in applying the brake after switch-off can be achieved by removing the anti-sticking stud. A greater delay can be provided by fitting a thick armature.

Approximate period of delay in seconds

Diameter	Standard brake (Anti-sticking Stud removed)		Special Brake (Thick armature fitted)	
	Full Torque	Half Torque	Full Torque	Half Torque
4 in. 102 mm	-	-	-	-
6 152	-	1	1	1½
8 203	1	1½	1½	3
10 254	1	1½	2	4
12 305	1	2	2½	5
15 381	1	2	2½	5

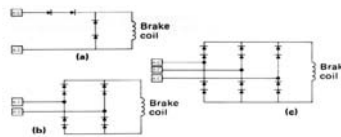
Quick application

Depending on the type of motor with which the brake operates, the time between switching off and the brake being applied may vary between 100 and 200ms for a 4in (102mm) dia brake, and 0.7 to 1.25s for a 15in (381mm) dia brake.

Where a faster application of the brake is required, 8in (203mm) to 18in (457mm) dia brakes can be provided with a quick application contactor which switches the brake on the d.c. side of the rectifier and improves the time to approximately 90ms. For larger brakes, special control gear is available.

Quick release

Standard brakes are supplied with single-phase silicon diode rectifiers to suit any site voltage. Where a particularly fast release is required, for example on hoist duties, 3-phase rectifiers can be fitted with a matched d.c. coil as shown in the schematic diagram below.



Schematic diagrams of rectifiers

(a) Half wave (b) Full-wave (c) Three-phase full wave. For sizes above 18in (457 mm) diameter, special control gear is available.

Series-wound d.c. brakes

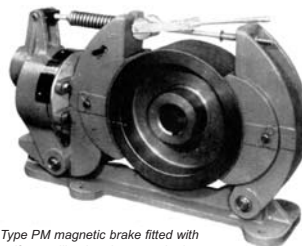
Windings can be provided to suit the standard ratings. Full retarding torque is obtainable for both half-hour and one-hour rated brakes to lift at either 40% or 60% of full load motor current.

Hand operated release

Two types are available: (a) self-cancelling where the handle must be held in the released position, and (b) non-self-cancelling where the handle stays in the released position until returned by the operator.

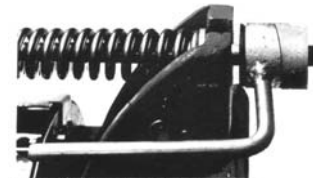
Anti-sticking stud

This is fitted at the top of the armature and may have



Type PM magnetic brake fitted with self-cancelling hand operated release

washers fitted behind the head to vary the operating times, or compensate for alterations to torque settings. Reducing the washers will speed-up brake release and adding washers will speed-up the brake



Non-self cancelling hand operated release mechanism.

application. The 'home' position of the pointer must be reset when alterations are made. Brakes arranged for d.c. switching may not be fitted with this device.

Hydraulic over-ride

Equipment similar to that already described can be provided to apply braking torque, even though the electrical supply is on and is holding the brake off. This is used particularly on cab-controlled electric overhead traveling cranes where the emergency long travel brake is energized all the working day and is used as a parking brake at night. The foot pedal gives the crane driver controlled braking up to the full load torque of the brake when traveling up and down the trackway. In applications where there is a travel motor on each end carriage, two brakes can be supplied operated by a single foot pedal.

Hydraulic operation

Brakes can be supplied without electrical equipment for hydraulic application or hydraulic release. When brakes are hydraulically applied, a mechanical and/or hydraulic screwdown can be fitted to provide a holding torque, for example on crane long travel for overnight parking.

Mechanical operation

Brakes can be supplied without electrical equipment for operation by mechanical means.

Proving switches

Proof that the brake has applied or released can be obtained by switched fitted to the brake magnet. These are weather-protected microswitches capable of switching up to 10A at 480V a.c. Either single-pole changeover or one normally-open and one normally-closed contacts can be supplied.

24-hour rating

Full 24-hour rating can be achieved by using a special coil. Where this is used, the torque figures given must be reduced by 10%

Brake Diameter	Electrical ratings AC 25-60 Hz.			DC Shunt Wound		
	in	mm	Normal Duty* Heavy Duty** 8 hr continuous In 24 hrs	Normal Duty* Heavy Duty** 8 hr continuous In 24 hrs	Normal Duty* Heavy Duty** 8 hr continuous In 24 hrs	Normal Duty* Heavy Duty** 8 hr continuous In 24 hrs
4	102	220/280V	220/280V 220/240V	220/250V	220/230V	180V
6	152	380/550V	380/550V 380/440V			
8	203					
10	254	380/550V	380/550V 380/440V	380/500V	380/460V	380V
12	305					
15	381					

4 in and 6 in dia brakes are also available for 220/240V 25-60Hz supplies.

*Normal duty - Not more than 5 min. Switched on in every 15min.

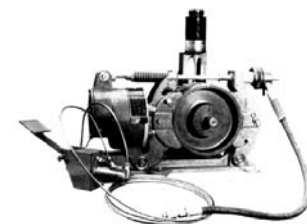
**Heavy duty - Not more than 7½ min. Switched on in every 15 min.

Actual supply voltage to be specified by the customer.

PM brakes can also be supplied with special epoxy paint finish,

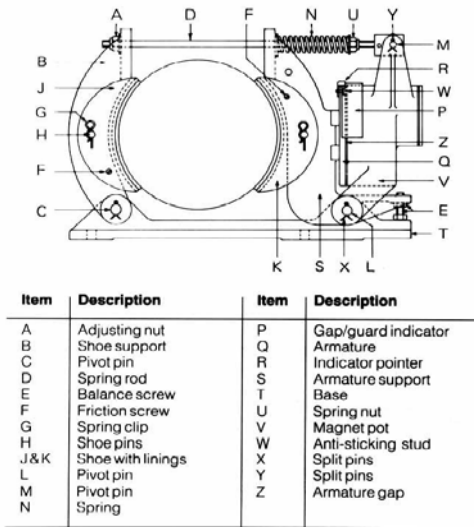
and lubricated pivot pins.

Should you have any requirements which are not detailed here please contact us.



PM brake fitted with hydraulic override.

PM Brake Installation & Maintenance



Brake Diameter		Gap 'Z' Magnet Movement		Base to Screw E	
in	mm	in	mm	in	mm
4	102	0.015	0.39	0.005	0.13
6	152	0.015	0.39	0.005	0.13
8	203	0.015	0.39	0.007	0.17
10	254	0.020	0.51	0.010	0.25
12	305	0.025	0.635	0.010	0.25
15	381	0.030	0.79	0.010	0.25
18	457	0.030	0.79	0.010	0.25
21	533	0.035	0.9	0.010	0.25
24	610	0.040	1.03	0.010	0.25

Note that the maximum torque is not achieved until the linings are bedded in. (See 'Bedding-in brake linings' below).

Bedding-in brake linings

Bedding-in of brake linings is recommended with a new brake, with new or relined shoes, or when a new brake drum is fitted. The brake shoes will not make full contact with the drum initially and braking torque may be less than the rated value. Before putting a brake into service, or carrying out overload tests, it is necessary to carry out a number of stops from running speed to bed-in the linings. Care must be taken not to overheat the brake drum. This is particularly important for emergency brakes, or on drives with dynamic braking, where the brake only has to stop the drive under abnormal conditions. The speed of the drum during bedding-in is not usually critical, but should be kept low initially on high speed or high energy drives. In general a drum peripheral speed of up to 1500 m/min is satisfactory.

$$\text{Drum peripheral speed} = \frac{3.14 \times \text{drum dia. (mm)} \times \text{r/min}}{1000}$$

Bedding-in may be checked by testing the brake, or by inspection of the shoes. The contact area should be at least 40% and 60% is typically required for full torque. It is recommended that the brake adjustment is no closer than MAX during bedding-in due to the extra clearance required for new shoes. After bedding-in tighten nut A until the pointer indicates NORMAL.

Hydraulic over-ride brakes

The mounting and setting up of these brakes is similar to the standard type. Separate instructions are provided for the installing and bleeding the hydraulic system. When replacing shoes, the spring rod is too long to allow the shoe support B to be hinged back. It is therefore necessary to remove the shoe support B as described in 'Mounting Details' 2) above.

Hand release

A non self-canceling hand release lever can be fitted to brakes from 4in to 15in dia. and a self-canceling hand release to brakes from 6in to 15in dia. With both types, a gap must be left between the armature support S and the moving cams when de-energizes, and the pointer set to MAX. This gap must not be allowed to reduced to zero as this would result in a loss of braking torque. Separate instructions are provided for both types of hand release.

Anti-sticking stud

This is fitted at the top of the armature and may have washers fitted behind the head to vary the operating times, or compensate for alterations to torque settings. Reducing the washers will speed-up brake release and adding washers will speed-up the brake application. The 'home' position of the pointer must be reset when alterations are made. Brakes arranged for d.c. switching may not be fitted with this device.

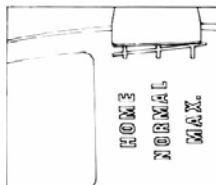
Installation

Mounting Details

- When the brake is to be mounted on a drum on an open ended shaft (such as the NDE of a double shaft extension motor), loosen nut A until the shoes will slide over the drum. Position the brake correctly in relation to the drum, tighten nut A until the shoes clamp the drum, ensure correct centre height ($\pm 1/32"$ or $\pm 1\text{mm}$), check that the head of screw E is not touching the base and bolt down.
- When the brake is between a motor and gearbox already mounted on a baseplate, it may be necessary to remove shoe support B to slide the base under the drum. To do this, remove nut A and one of the split pins (or circlips) on pin C. Slide out pin C and remove shoe support B. Mount the brake then re-assemble the shoe support, pin C and nut A. Replace any damaged split pins or circlips.
- Ensure that all the pivot pins on the brake are properly secured after brake installation has been completed.
- Electrical connections must be made through flexible conduit using flexible cable to allow free movement of the magnet pot.

Setting up

- The pointer R and indicator grid on the gap guard P are shown opposite. Tighten nut 'A' until the magnet pot 'V' meets the anti-sticking stud 'W' and check that the indicator pointer 'R' indicates HOME. If it does not do so, release the 3 self tapping screws holding the gap guard 'P' and position the HOME mark under the pointer. Carefully hold the gap guard in position whilst retightening the screws. Then loosen nut A until the pointer indicates 'MAX'.
- Equalize the shoe clearances by energizing the brake and adjusting screw E to give equal shoe movement. This screw must not be allowed to bear on the brake base T when the brake is de-energized. Lock screw E with the lock nut. Tighten friction screws F just sufficiently to prevent the shoes dragging on the drum when the brake is released. Large brakes are fitted with a spring loaded support under each shoe, in place of screws F, which is set at the works to balance the weight of the shoe and needs no further adjustment.
- An alternative method of setting is by measurement, and the table below gives the measured movement at the centre line of the magnet pot at 'NORMAL' setting, and the gap between the base T and screw head E. Non magnetic feeler gauges are recommended, and the setting should be checked after the brake has been operated a few times, due to the initial bedding in of the linings. When the brake is energized, there will be an air gap at Z. The magnet movement given below is extra to this.



PM Brake Installation & Maintenance

Maintenance

Brakes are often used in safety critical applications, and regular inspection is essential to ensure they are operating correctly, that the mechanism is free and not excessively worn and that it has not been damaged.

Adjustment for lining wear

Check for wear at regular intervals. Because maximum torque is not achieved until the brake linings are fully bedded-in, this check should be made more frequently when linings are new. When linings wear, the pointer will move to the MAX position, as this will slow-down the release time of the brake. To reset, tighten nut A until the pointer indicated NORMAL. It may be necessary to adjust screw E to equalize shoe clearance.

Torque adjustment

The length of the brake spring is set at the Factory to provide maximum retarding torque, or any specified lower value of torque; the spring length and torque values are marked on the rating plate. The spring length is measured between the spring flanges. Setting the spring to less than the specified minimum length may increase the release time and may even prevent the brake from releasing completely. Reducing the torque by increasing the spring length may increase the brake application time; this can be compensated for by fitting additional washers 0.5 mm thick behind the anti-sticking stud. (See paragraph "Anti-sticking stud" above).

Brake shoe replacement

(For hydraulic override brakes, see paragraph overleaf). Loosen screws F, remove nut A, and swing shoe support B carefully down. This can be done without adjusting the spring length. Remove clips G from one side of the brake only, and remove pins H. Shoe J can be removed directly; shoe K must be moved round to the top of the drum for removal. The head of screw E must be raised before fitting the new shoe K, as the clearance will have been reduced during the wear time of the old shoe. Reassemble in reverse sequence, setting nut A & screw E as described in Setting up and Bedding-in overleaf.

Lubrication

Ensure that no lubricant gets onto the brake shoes or drum surface. Pivot pins are stainless steel and are treated on assembly with Molybdenum Disulphide grease (Rocol MTS2000 or equivalent). Pivot pins should be inspected every 12 months then cleaned and re-greased if necessary. Longer or shorter intervals are acceptable and are dependent on service conditions. Pin L should be greased one half at a time and never completely withdrawn from the base lug. Split pins with lubricators should be greased with Esso Unirex N3 or equivalent every 12 months or more frequently if environmental or operating conditions are severe. Hand release cams should be greased lightly with Esso Unirex N3.

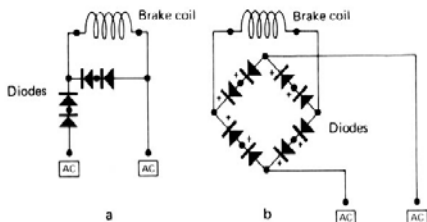
Spares

- a) Recommended spares
The recommended spares are one pair of lined brake shoes, and for a.c. brakes only, one rectifier pack.
- b) Ordering spares
When ordering spares it is essential to quote the serial number on the rating plate. The type grade of brake lining used is indicated by a Code Letter which is the last digit in the serial number, typically BB123456/G. The grade of lining should not be changed without prior approval from the factory.

Code Letter	Grade	
G	3908F	
F	FF	High coefficient of friction

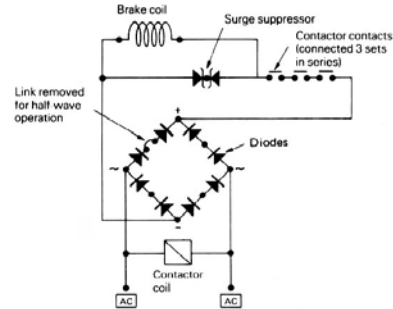
Electrical details

Schematic diagram with (a) half wave & (b) full wave 1-phase rectifiers



Quick application contactor

A Quick Application Contactor (QAC) can be used to reduce brake application time by switching the brake coil on the dc side of the rectifier. With a 3 phase rectifier, the release time is also reduced. For a faster release time A Quick Release Relay (QRR) is used to reduce an initial high voltage to a lower holding value. A QRR may also be used on long stroke brakes, and with full torque brakes operating in a high ambient temperature. Separate QAC & QRR instructions are provided; a typical QAR diagram



PMA Magnetic Brakes

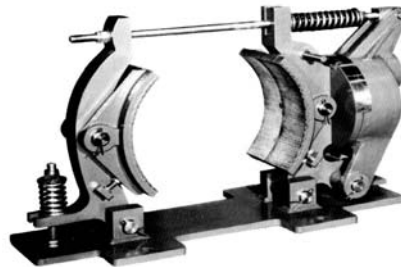
8" - 30" AC Rectified & DC AISE Shoe Brakes

Features

The Witton Kramer type PMA brakes comply with the requirements of AISE Standard No. 11, covering d.c. Mill Motor Brakes. The design enables operation on all d.c. supplies up to 600 volts, shunt and series wound, with ratings in accordance with the standard. For a.c. operation up to 575 volts the brakes can be supplied with integral or separate rectifier units.

A number of advanced features are incorporated in the brake design, the robust reliable construction ensuring trouble free operation and reducing maintenance to an absolute minimum.

- 1) Adjustments for lining wear, shoe clearance and main spring pressure can all be made with the same wrench.
- 2) Brake shoes can be removed and replaced quickly.
- 3) The actuating magnet pot is independently pivoted so that it can be hinged back for inspection or cleaning when necessary or removed completely without loss of braking torque.
- 4) Lining wear can be checked by a visual gauge on the gap guard which indicates when resetting is required. Adjustment is quick and accurate to simple instructions printed on the guard plate.
- 5) Only one adjustment is required for lining wear. Equalization of shoe movement is achieved by means of a spring at the base of the shoe support. The adjustment of this spring is not critical, and needs to be made only if the shoe movement is unbalanced.
- 6) Heavy duty, semi-rigid, asbestos free linings are fitted as standard.
- 7) Retarding torque can be reduced, to give the right brake performance for the application, by adjustment to the



length of the readily accessible external spring.

- 8) Weatherproof construction, with encapsulated magnet coil, Class B insulation for operation in an ambient temperature up to 40°C.
- 9) CSA approved (No. LR10747).

Construction

The brake construction is entirely of fabricated or cast steel. The main spring and all fasteners are plated. All pilot pins are stainless steel. The terminal box is fitted with a substantial lid and gasket, to IP66 (CSA Encl. 4) The brake shoes are self-aligning and are easily removed when worn lining need to be replaced. Linings are bonded to the shoes. Short, direct movement through a steel rod releases the brake, and a heavy-duty compression spring applies the retarding torque.

Molybdenum disulphide grease is applied to all pins during assembly. For particularly arduous environments, brakes can be supplied with pivot pins drilled, and fitted with lubricators.

Many extras are available including self-cancelling and non-self-cancelling hand release, delayed operation, proving switches, hydraulic override, hydraulic release, double springs and bellows to prevent ingress of magnetic dust between the magnet and armature. For further information refer to page covering PM Brake Extras/Accessories/Modification

Control Gear

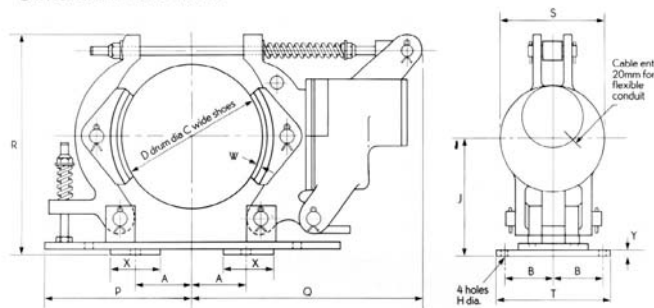
Various types of control gear can be supplied with all brakes to give faster response times.

In the case of operating on a d.c. supply, quick brake release is obtained by fitting a brake coil wound for less than the system voltage. On initial application of full voltage the brake releases quickly and then an economy resistance is inserted in series with the brake coil to reduce the current. The economy resistance is inserted by operation of the economy contactor which is fitted with a current sensitive coil or, alternatively, by a timer. The low holding current results in a quick brake application at switch off and low coil heating. The use of this circuit enables the intermittent shunt brake torque ratings to be obtained on a continuous basis.

For a.c. operation an integral rectifier can be fitted in the brake terminal box or, for improved response times, including in the economy resistance circuit.

In addition, rectifier panels are available for operation on either single or three phase supplies which when used with the appropriate brake coil, on an intermittent duty cycle, will give quick brake release. Quick application can be achieved by incorporating a contactor to switch the d.c. output of the rectifier, with appropriate surge suppression, across the brake coil. For continuous operation this circuit can be used with the addition of a timer, switching the rectifier from full-wave to half-wave operation once the brake has released.

Dimensions and mass



D drum dia inches	Torque ratings lb ft.			Coil power 8 hr rated Watts	Dimensions in inches													Nett Weight Lbs
	1/2 HR. series 1 hr. shunt	1 hr series	8 hr shunt		A.I.S.E.									Overall				
					A	B	C	H	J	P	Q	R	S	T	W	X	Y	
8	100	65	75	150	3.25	2.875	3	0.6875	7	8.25	13	12.625	7.125	7.25	0.3125	3.25	0.8125	85
10	200	130	150	200	4	3.125	3.5	0.6875	8.375	9.25	15.375	15.125	7.625	7.75	0.3125	4	1	125
13	550	365	400	250	5.75	4.5	5.5	0.8125	9.875	12.5	18.5	18.625	8.625	11	0.4063	4	1	205
16	1000	650	750	350	7.5	5.375	6.5	1.0625	12.125	14.75	20.5	23.25	10.25	12.75	0.4063	4	1	325
19	2000	1300	1500	460	9.25	6.5	8.5	1.0625	13.25	17.5	25	26.5	12.25	15.5	0.4688	6	1	565
23	4000	2600	3000	700	11.75	8	11	1.3125	15.875	21.5	28.25	31.25	20.75	19	0.4688	8	1.25	1300
30	9000	6000	6750	1000	15	9.5	14	1.5625	20.75	23.5	37.625	42	23	25	0.75	11	2	2605

NOTE: 30 inch brake shoe movement equalization is by means of adjusting screws under the magnet pot.

PMD Magnetic Brakes

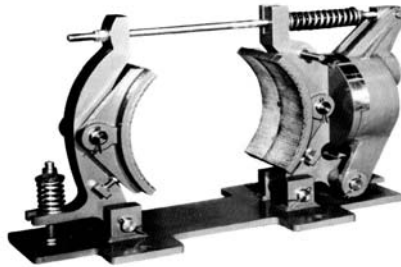
160 - 500mm AC Rectified Shoe Brakes

Features

The Witton Kramer type PMD range of brakes has been designed to meet the dimensional specifications in DIN 15435. This standard was introduced primarily for thruster-operated brakes at a time when these were the only alternative to AC electromagnetic brakes.

The introduction of reliable silicon diode rectifiers made possible development of self-contained DC brakes equally suitable for DC shunt or series windings and AC supply, giving the advantages of smaller unit size at a much lower cost, and of eliminating the maintenance associated with thrusters. Witton Kramer has over 35 years experience of the manufacture and successful performance of this type of brake on all crane motions, conveyors and mechanical handling equipment.

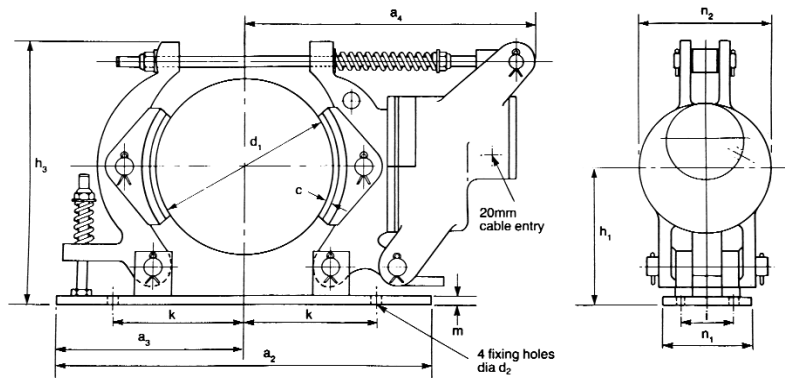
Most of the advantages of thruster-operated brakes are retained in the PMD range, together with many unique features. They act quietly and gently and are spring applied and electrically released so the at the brake applies automatically in case of electrical failure. They can be modified for delayed application when required or for quicker application or release. Hand release and hydraulic override or release are available. The brakes can be mounted in any position round a horizontal shaft, an important feature when limited space is available. Dust-protective bellows can be fitted between the magnet and armature, and special finishes for hostile environments can be supplied.



The brakes are suitable for operation on AC supplies up to 575 volts and on DC supplies up to 570 volts. They are 8 hour rated in any period of 24 hours as standard, and full 24 hour rating can be obtained using special coils, with a 10% reduction in torque.

Basic data for all sizes up to 500mm is shown below, and Witton Kramer will be pleased to advise on applications requiring larger sizes.

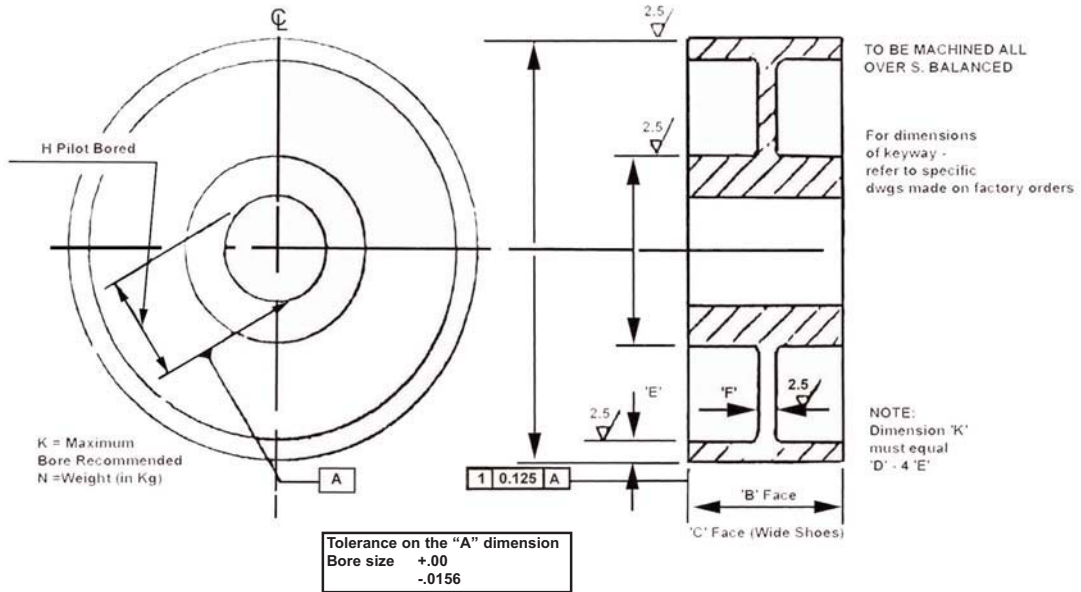
The main PMD brake components are made entirely of steel, and with the magnet coil fully encapsulated in epoxy resin the brake has a very high degree of strength and durability. It is also exceptionally easy to maintain. Shoe equalization is by means of a spring located at the base of the shoe support; this adjustment is non-critical and needs only to be made occasionally throughout the life of the heavy duty asbestos free brake linings. Wider shoes can be fitted if required for particular duties. The magnet pot is independently pivoted and can be hinged back for cleaning or inspection, or remove altogether with the brake still applied with no loss of braking torque. Adjustments to spring pressure and armature gap can be made quickly and easily using only one size of wrench.



Drum dia d1 mm	Torque Nm	VA (8 hour rated)	Dimensions in millimetres (DIN Dimensions in bold)														Nett mass kg
			a2	a3	a4	b1 Drum width	b2 Shoe width	c	d2	h1	h2	i	k	m	n1	n2	
160	88	80	380	180	270	60	55	6	14	135	250	55	125	10	100	140	25
200	210	150	420	210	335	75	70	8	14	160	305	55	145	15	100	175	38
250	390	200	470	235	370	95	90	8	18	190	360	65	180	15	110	195	55
315	610	250	640	310	440	118	110	10	18	230	450	80	220	25	130	210	90
400	1375	350	825	375	500	150	140	10	22	280	560	100	270	25	150	260	145
500	2500	460	1025	475	650	190	180	12	22	340	670	130	325	30	200	310	255

* Shoes also available 50% wider than b₂. Terminal box enclosure to IP66, High Integrity (Cat. A) brakes can be supplied

Permissible Drum Brake Boring Information



DRUMS FOR PG & PM BRAKES									
Dimensions in Inches								Wt. (Kg)	
Brake Dia.	'A' Dia.*	B	D Dia.	E	F	H Dia.*	K	N	Part Number
4"	4"	2.25	1.5	0.25	0.375	0.375	0.5	1.6	A3.21040-02
6"	6"	3.25	2.5	0.3125	0.4375	0.5	1.25	4.6	A3.21040-03
8"	8"	4.25	3.5	0.375	0.5	0.75	2	11.5	A3.21040-04
10"	10"	4.25	4	0.4375	0.625	0.75	2.25	16.9	A3.21040-05
12"	12"	5.25	4.5	0.5	0.75	0.75	2.5	28.2	A3.21040-06
15"	15"	6.25	5.5	0.5625	0.875	1.5	3.25	50	A3.21040-07
18"	18"	8.25	6.25	0.75	1.125	1.75	3.25	95.4	A3.21040-08
21"	21"	9.25	7.5	0.875	1.25	2	4	145.3	A3.21040-09
24"	24"	10.25	9	0.875	1.25	2.25	5.5	204.3	A3.21040-10

AEWK Thrustor Operated Drum Brakes

8" - 30"

Features

The AEWK Disc Brake have their torque springs(s) protected from the environment in an enclosed steel tube, which is fitted with a torque indicator.

They operate with special versions of the Witten Kramer HD thrustor which is interchangeable with other European thrustors – these can be fitted without modifying the brake. The brakes are a.c. operated from supplies up to 660V, 50/60 Hz and are designed for arduous applications such as on heavy duty cranes, conveyors and process lines.

The brakes comply with the British standard BS 466 and the requirement of the American AISE No. 11 in respect of drum diameter and width, fixing centres and centre height, and fixing bolt holes.

The brake is a simple and robust design, easily adjusted and maintained. Automatic adjustment for lining wear can be provided.

The brake is suitable for high rates of operation, or for continuous duty without any control gear.

Heavy duty asbestos-free brake linings are fitted as standard.

Brake shoes can be removed and replaced quickly, and the brake drum can be removed vertically without disturbing the major brake parts.

The Witton Kramer HD thrustor with single push rod is fitted. This unit is sealed to IP65.

The HD thrustor incorporates an adjustable time lag device to control the brake application and/or release times if required.

50% torque can be achieved by re-positioning the top rod



in the operating lever.

The brake can be used on moving jibs or platforms as the thrustor can be operated at any angle up to 90° from the vertical. Some sizes can also be supplied for wall mounting on a horizontal or vertical shaft.

Stainless steel is used as standard for all pivot pins, and thrustor push rods. Special paint finishes are available for aggressive environments, and lubricators can be provided if grease is required to exclude excessive dust.

Shoe supports are spring balanced so that shoe clearance is equalized automatically throughout the life of the linings. The weight of the shoes is also taken by springs so they do not drag on the drum; these can be fitted on either side of the brake.

High integrity (Category A) brakes can be supplied. Eg. For use in the Nuclear Industry.

Options

Thrustors: AEWK brakes can be fitted with any make or type of thrustor. Torque figures will vary, depending on the thrustor force.

Dual concentric springs (high integrity brakes)

Self adjusting mechanism

Proving switches: brake 'on', brake 'off' and lining wear.

Hydraulic over-ride or release.

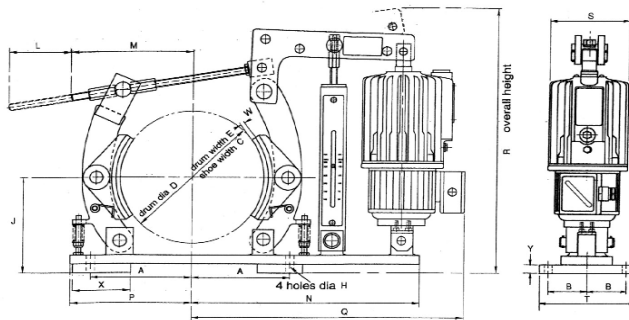
Self cancelling hand release.

Controlled braking.

Additional control springs are fitted to the brake and, by supplying the thrustor from a variable frequency supply, the braking torque can be varied. A typical system is STACREEP hoist speed control where the thrustor takes its supply from the hoist motor slip rings. The speed of the thrustor motor reduces as the hoist motor speed increases and the brake is thus gradually applied until a stable speed is produced by a balance between the motor torque and the combined torque of the load and brake.

Construction

The main components of the brake are of fabricated or cast steel with a paint finish; pivot pins are stainless steel. All other bright steel parts are zinc plated. The terminal box can be fitted in any of 4 positions to suit the supply cable, which must be flexible. Conduit must also be flexible to allow the thrustor to pivot.



NOTES

1. AISE torque ratings are standard figures from AISE No. 11; these relate to thermal ratings of magnetic brakes. Thrustor brakes are not limited by these thermal ratings, and can be set to any required torque within their capacity.
2. * = 1/2 hour series rating, not relevant to a thrustor brake, but the AEWK brake can be set to this torque figure.
3. A blank line indicates that the dimensions are the same as the line above.

Brake Size	Thrustor Type	Torque lbf ft	AISE Duty	A	B	C	D	E	H	J	L	
8"	HD25/5	75	8 hr	3.25	2.875	3	8	3.25	.687	7	4	
		65	*									
		100	1 hr									
10"	HD25/5	150	8 hr	4	3.125	3.5	10	3.75	.687	8.375	4	
		130	*									
		200	1 hr									
13"	HD75/5	400	8 hr	5.75	4.25	5.5	13	5.75	.812	9.875	6	
		365	*									
		550	1 hr									
16"	HD75/5	750	8 hr	7.5	5.375	6.5	16	6.75	1.062	12.125	6	
		650	*									
		1000	1 hr									
19"	HD125/6	1500	8 hr	9.25	6.5	8.5	19	8.75	1.062	13.25	8	
		1300	*									
		2000	1 hr									
23"	HD200/12	3000	8 hr	11.75	8	11	23	11.25	1.312	15.875	8	
		2600	*									
		4000	1 hr									
30"	HD300/12	6750	8 hr	15	9.5	14	30	14.25	1.562	20.75	8	
		6000	*									
		9000	1 hr									
Brake Size	Thrustor Type	Mass Kg	M	N	P	Q	R	S	T	W	X	Y
8"	HD25/5	50	8	14.75	7.25	18.5	21.5	6	7.25	.312	4	1.5
10"	HD25/5	70	8.75	16.5	8.5	20	21.75	6	7.75	.312	4	1.875
13"	HD75/5	100	11	19.25	10.5	22.5	25.5	6.5	11	.406	4	1.625
16"	HD75/5	145	12.5	23.5	12	27.75	31.25	6.5	12.75	.406	4	2.125
13"	HD125/6	280	15.5	29.25	15.5	32	34.5	9.5	15.5	.468	6	.75
23"	HD200/12	370	19	34.75	18.5	39	38	9.5	19	.468	6	1.125
30"	HD300/12	550	22	37.5	21	41	46.5	11	23	.75	8	3.25

MEWK Thrustor Operated Drum Brakes

160mm - 710mm diameter

Features

Type MEWK Witton Kramer brakes have their torque spring(s) protected from the environment in an enclosed steel tube, which is fitted with a torque indicator.

They operate with special versions of the Witten Kramer HD thrustor which is interchangeable with other European thrustors - these can be fitted without modifying the brake.

The brakes are AC operated from supplies up to 660V, 50/60 Hz and are designed for arduous applications such as on heavy duty cranes, conveyors and process lines.

The brakes comply with the British standard BS 466 and with the requirements of the German standard DIN 15435 in respect of drum diameter and width, shoe clearance, fixing centres and centre height, and fixing bolt holes.

- 1) The brake is a simple and robust design, easily adjusted and maintained. Automatic adjustment for lining wear can be provided.
- 2) The brake is suitable for high rates of operation, or for continuous duty without any control gear.
- 3) Heavy duty asbestos-free brake linings are fitted as standard. Fibre linings giving 15% more torque can be fitted for lighter duties.
- 4) Brake shoes can be removed and replaced quickly, and the brake drum can be removed vertically without disturbing the major brake parts.
- 5) The Witton Kramer HD thrustor with single push rod is fitted. This unit is sealed to IP65.
- 6) The HD thrustor incorporates an adjustable time lag device to control the brake application and/or release times if required.
- 7) 50% torque can be achieved by repositioning the top rod in the operating lever.

- 8) The brake can be used on moving jibs or platforms as the thrustor can be operated at any angle up to 90° from the vertical. Some sizes can also be supplied for wall mounting on a horizontal or vertical shaft.
- 9) Stainless steel is used as standard for oil pivot pins and for the thrustor push rod. Maintenance free bushings are used in oil pivot pin holes. Special paint finishes are available for aggressive environments, and lubricators can be provided if grease is required to exclude excessive dust.
- 10) Shoe Supports are spring balanced so that shoe clearance is equalized automatically throughout the life of the linings. The weight of the shoes is also taken by springs so they do not drag on the drum; these can be fitted on either side of the brake.
- 11) Full shoe clearance as specified in DIN 15435 is provided, and the brake can be fitted with DIN shoes of any make.
- 12) High Integrity (Category A) brakes can be supplied.

Options

- Thrustors: MEWK brakes can be fitted with any make or type of thrustor. Torques figures will vary, depending on thrustor force.
- Dual concentric springs (high integrity brakes)
- Self adjusting mechanism.
- Proving Switches: brake 'on' brake 'off' and lining wear.
- Hydraulic over-ride or release.
- Self cancelling Hand Release.
- Extra wide shoes for increased energy dissipation.

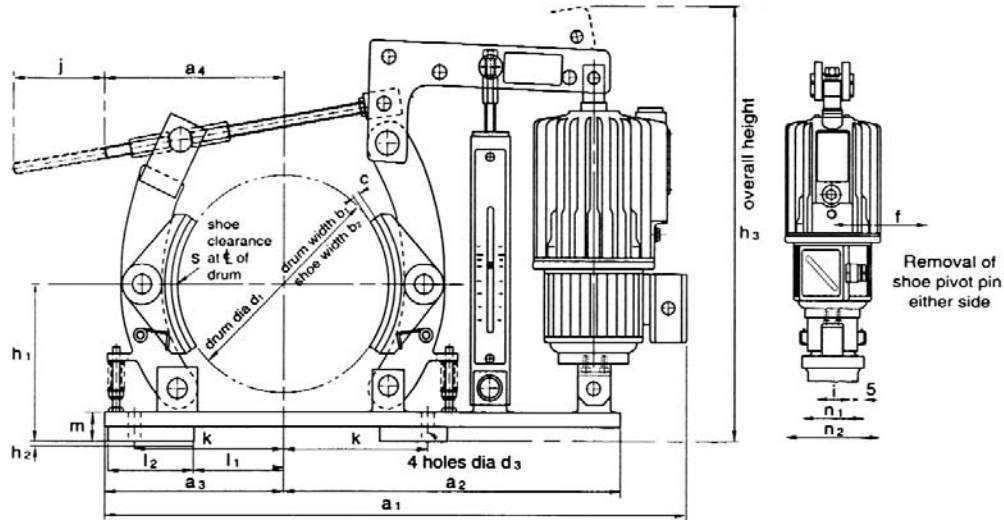
Controlled Braking:

Additional control springs are fitted to the brake and, by supplying the thrustor from a variable frequency supply, the braking torque can be varied. A typical system is STACREEP hoist speed control where the thrustor takes its supply from the hoist motor slip rings. The speed of the thrustor motor reduces as the hoist motor speed increases and the brake is thus gradually applied until a stable speed is produced by balance between the motor torques and the combined torque of the load and brake.

Construction

The main components are of fabricated or cast steel with a paint finish; pivot pins are stainless steel and bearing bushings are fitted throughout. All other bright steel parts are zinc plated. The terminal box can be fitted in any of 4 positions to suit the supply cable, which must be flexible. Conduit must also be flexible to all the thrustor to pivot.

MEWK Thrustor Operated Drum Brakes Dimensions & Performance



Brake dia d ₁	Thrustor Size HD	Max Torque Nm	Dimensions in millimetres											
			a ₁	a ₂	a ₃	a ₄	b ₁	b ₂	c	d ₃	f	h ₁	h ₂	h ₃
160	25/5	185	640	370	180	200	75	70	8	14	125	155	5	520
200	25/5	230	640	370	180	200	75	70	8	14	125	155	5	520
200	75/5	290	680	370	180	200	75	70	8	14	125	155	5	610
250	25/5	300	720	415	215	215	95	90	8	18	142	185	5	525
250	75/5	450	760	415	215	215	95	90	8	18	142	185	5	610
315	25/5	400	830	480	260	215	118	110	10	18	172	225	5	590
315	75/5	1050	870	480	260	260	118	110	10	18	172	225	5	610
315	125/6	1600	870	480	260	260	118	110	10	18	172	225	5	810
400	75/5	1350	1020	590	300	305	150	140	10	22	207	270	10	725
400	125/6	2200	1020	590	300	305	150	140	10	22	207	270	10	820
500	125/6	2500	1190	690	390	390	190	180	12	22	270	330	10	875
500	200/6	3900	1190	690	390	390	190	180	12	22	270	330	10	875
500	200/12	4500	1250	750	390	390	190	180	12	22	270	330	10	930
630	200/12	6500	1580	1000	470	470	236	225	12	27	330	410	10	1080
710	200/12	7300	1690	1070	510	510	265	255	15	27	365	460	10	1120

Brake dia d ₁	Thrustor Size HD	Dimensions in millimetres										Thrustor Mass kg	
		i	j	k	l ₁	l ₂	m	n ₁	n ₂	s	VA		
160	25/5	55	100	145	75	100	30	100	160	1.0	125	45	
200	25/5	55	100	145	75	100	30	100	160	1.0	125	45	
200	75/5	55	100	145	75	100	30	100	195	1.0	250	55	
250	25/5	65	100	180	110	100	35	100	160	1.25	125	60	
250	75/5	65	100	180	110	100	35	100	195	1.25	250	70	
315	25/5	80	150	220	147	100	40	130	195	1.25	250	85	
315	75/5	80	150	220	147	100	40	130	195	1.25	250	90	
315	125/6	80	150	220	147	100	40	130	240	1.25	750	120	
400	75/5	100	150	270	190	100	35	150	195	1.6	250	140	
400	125/6	100	150	270	190	100	35	150	240	1.6	750	160	
500	125/6	130	150	325	250	130	40	200	240	1.6	750	275	
500	200/6	130	150	325	250	130	40	200	240	1.6	750	275	
500	200/12	130	200	325	250	130	40	200	240	1.6	750	290	
630	200/12	170	200	400	315	150	45	250	240	2.0	750	370	
710	200/12	190	200	450	300	205	45	300	240	2.0	750	550	

HD Electro-Hydraulic Thrusters

The electro-hydraulic thruster is a linear actuator which can be used in many applications where a straight line pulling or pushing force is required.

The force is constant throughout the stroke and the push rod can be stopped at any point in its stroke without damage.

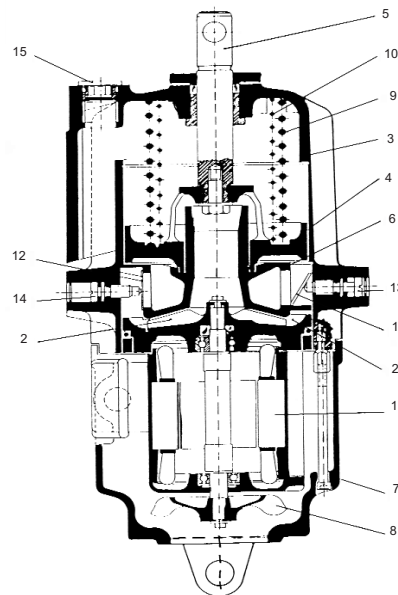
A particular feature is the quiet, gentle action, and the facility to adjust the operating rate of either, or both, the power and return strokes independently.



- Well established and proven design and construction
- Compact single push rod design
- Improved protection in harsh environments - double seals are fitted as standard and the push rod is stainless steel
- Operation at any angle between vertical and horizontal
- Motor is class F insulated as standard
- Internal springs are fitted as standard, so the force is in the return (pulling) direction. This means no separate springs are required on a thruster brake resulting in a simpler design with less maintenance and helping to ensure that the user cannot alter the torque setting. The thruster can be supplied without one or both internal springs.
- The HD thruster is available with alternative mounting for interchangeability with other makes and types
- Terminal box sides and cover are removable for ease of connection cables and flexible conduit

MODEL TYPE – HD		25/5	50/5	75/5	125/6	200/6	125/12	200/12
Rated Force (without internal spring)	N	245	500	735	1250	1960	1250	1960
	kgf	25	51	75	127	200	127	200
Stroke		50	50	50	60	60	120	120
Return force – springs fitted (at 15 mm stroke)	N	245	500	735	1250	1910	1250	1860
	kgf	25	51	75	127	195	127	190
Operating rate	Max	Ops/min	33	33	33	33	13	13
		KW	0.125	0.25	0.25	0.75	0.75	0.75
Input current	220/240V	A	0.7	1.1	1.1	3.1	3.1	3.1
	380/415V	A	0.4	0.4	0.65	1.8	1.8	1.8
Mass (without oil)		kg	16	23	23	50	65	65
Length between mounting centres (down)		mm	335	435	435	575	695	695

CUTAWAY VIEW OF THE THRUSTER



1. Three Phase electric motor
2. Pump impeller
3. Case
4. Piston
5. Piston rod
6. Valve cage
7. Lower case
8. External fan
9. Compressing ring
10. Compression spring
- 11-12. Valve
- 13-14. Tappet adjusting screw
15. Oil fitting and Oil draining pipes
20. Oil duct

Brake Selection

GENERAL NOTES

1.1 Basis of Selection

Calculate braking torque required and then choose brake size; decide whether it is necessary to calculate brake energy.

The size of brake depends primarily on the braking torque required, which will normally be calculated from the driving motor Full Load Torque (FLT) multiplied by a Service Factor.

For drives involving high inertias, high rates of operation, and high speed load movement, it is necessary to calculate the energy which the brake has to dissipate. If the standard brake is too small thermally, it will be necessary to increase the size, or provide 2 brakes working on adjacent drums or discs. Alternatively the customer may be able to install electric or dynamic braking so the drive slows to typically 20% speed before the brake has to apply- Braking energy is proportional to the square of speed, so this form of control keeps brake size down as well as reducing wear and tear of the brake.

1.2 Type of Braking

1.2.1 Service Brake

This is the most common brake application, in which the brake does dynamic work in stopping the motor and load every operating cycle. In some applications fast operating times are essential (eg. hoists) and in others (eg- conveyors), delayed application and/or release may be required-

1.2.2 Standby or Emergency Brake

The brake will normally be of the same type as the Service Brake, but with delayed application so the drive is stopped by the Service Brake. On some forms of drive when electric braking is used to bring the motion to a low percentage of full speed. the main brake is sometimes considered to be a Standby Brake.

In all cases, the Standby Brake must be capable of stopping the drive from full, or overspeed, for a specified number of stops. Test conditions will generally be specified; any test of a Standby Brake must only be carried out after bedding in the brake linings-

1.2.3 Parking Brake

The Parking brake has only to hold the load when not in normal use. The braking torque require will normally be specified, and may be considerably higher than required for Service duty, eg- to withstand wind loading. It is not necessary to calculate energy figures for a Parking Brake, and sometimes high friction but low temperature rating linings can be used to reduce the brake size. The brake linings of a Parking Brake must be bedded in before the brake is put into service.

1.3 Type of Brake

Refer to Data sheets for detailed features, Typical applications are listed below, but these are not rigid and customer may have their own preferences-

Thrustor: Conveyors, winches, larger and/or slow speed cranes, large drives.

Magnetic: Cranes, process lines, applications with high rates of operation.

2. BRAKE TORQUE

Brake torque = Motor full load torque (FLT) x Service Factor

$$\text{Motor FLT} = \frac{\text{Motor Power (kW)} \times 9550\text{Nm}}{\text{Motor Speed (rpm)}}$$

Typical induction motor speeds at full load (if not specified by customer):

4-pole = 1750 rpm, 6-pole = 1150 rpm, 8-pole = 875 rpm

3. SERVICE FACTORS

If customer specifies Service Factor, this should be used where possible.

Type of Drive	Service Factor (Typical)	Service Factor (Normal Range)
Hoist Motor up to 6 pole (1150 rpm)	1.5	1.5 – 2.5
Hoist motor 4 pole (1750 rpm and above) (and high hoisting speeds)	1.7	1.7 – 3.5
Hoist motor with Stacreep brake	2.25	2.0 – 2.5
Hoist motor with 2 Service brakes	1.0 each min	1.0 – 2.0 each
Standby brake	As service brake	As service brake
Crane Cross Traverse	0.75	0.75 – 1.0
Crane Long Travel (higher torque permissible if brake has delayed application/hydraulic over-ride)	0.75	0.5 – 1.0
Conveyors	1.3	1.0 – 1.5
Process Lines	1.0	0.8 – 1.3
Winches (higher torques may be required for holding; delayed/controlled braking may be required)	1.5	1.5 – 2.0

BASIC DRIVE QUESTIONNAIRE				
DRIVE	Ref.			
Make				
Type / Application				
Number of Brakes required				
Inertial of driven rotating parts (referred to motor)	kgm ²			
Drive Motor Type (cage, slip ring, dc shunt or series)				
Number of motors				
Make and Frame Size				
Rotor inertia	kgm ²			
Voltage 3 ph, 1 ph	V			
Frequency	Hz			
Power	kW/HP			
Speed	RPM			
Rated Starts per Hour (or actual no. of stops/hour from full speed)				
Percentage Duty Factor (CDF) Is Brake connected directly to motor or via separate Brake Relay?	%			
Are brake time relays required? 1) Delay in release while motor starts 2) Application delay as conveyor slows				
Coupling type Coupling inertia driven half (input) driving half (output)	kgm ² kgm ²			
Stopping time and/or revolutions required	SEC			

NOTE:

If the brake is not on the motor shaft, all inertias must be referred to the brake shaft.

CLIENT/USER COMMENTS AND REQUESTS

CRANE BRAKE QUESTIONNAIRE			
CRANE		Main Hoist	Aux. Hoist
Make			
Type (overhead, goliath etc.)			
Safe Working Load	Ton		
Tare Load (grab, magnet etc.)	Ton		
Control (cab, pendant, radio etc.)			
Type of work, load			
Environment (high temp. chemicals high humidity, metallic or other dust)			
How hard is the crane worked?			
Hoist Speed	m/min ft/min		
Cross Traverse Speed	m/min ft/min		
Long Traverse Speed	m/min ft/min		

HOIST		Main Hoist	Aux. Hoist
Hoist Motor Type (cage, slip ring, dc shunt or series)			
Number of motors per hoist			
Make and Frame Size			
AC Supply 3 ph, 1 ph Frequency	V Hz		
DC Supply Voltage Full load current Series or Shunt wound	V A		
Power			
Speed			
Rated starts per hour (or actual no. of stops/hour from full speed)			
Percentage Duty Factor (CDF)			

CRANE BRAKE QUESTIONNAIRE			
HOIST BRAKE(S)		Main Hoist	Aux. Hoist
Hoist Service Brake(s) Make Type (magnetic, thrustor, staycreep) Number Drum Diameter Drum Width	 mm or in. mm or in.		
AC Supply Voltage 3 ph, 1 ph Frequency DC Supply Voltage Full load current Series or Shunt wound	 V Hz V A		
CONTROL Is brake connected directly to motor or via separate Brake Relay?			
Hoist Standby Brake(s) Make Type (magnetic, thrustor, staycreep) Number Drum Diameter Drum Width	 mm or in. mm or in.		
AC Supply Voltage 3 ph, 1 ph Frequency DC Supply Voltage Full load current Series or Shunt wound	 V Hz V A		

What type of control is used for Hoist motion(s)?

eg. Direct on line cage motor, rotor resistance control of slip ring motor, electronic speed control. Opotor or similar counter torque control etc. If speed control is used, at approximately what speed does the brake apply?

Is the brake for 'Service' (ie. working) duty, or for standby or emergency use?

Is there an auxiliary (or pony) motor, eg. for slow speed? If so, how is it coupled to the main drive (clutch, gearbox etc)?

If Magnetic Brake is required, is Quick Application Contactor needed?

CLIENT / USER COMMENTS & REQUESTS

CRANE BRAKE QUESTIONNAIRE			
CROSS TRAVERSE			
CT Motor			
Number of motors on CT			
Make and Frame Size			
AC Supply 3 ph, 1 ph Frequency	V Hz		
DC Supply Voltage Full load current Series or Shunt wound	V A		
Power	kW/HP		
Speed	RPM		
Rated Starts per Hour and/or Duty			

CROSS TRAVERSE BRAKE(S)			
Make Type Number Drum Diameter Drum Width	kW/HP mm or in. mm or in.		
AC Supply Details Voltage 3 ph, 1 ph Frequency	V Hz		
DC Supply Details Voltage Full load current Series or Shunt wound	V A		

CRANE BRAKE QUESTIONNAIRE			
LONG TRAVEL			
LT Motor			
Number of motors on LT			
Make and Frame Size			
AC Supply 3 ph, 1 ph Frequency	V Hz		
DC Supply Voltage Full load current Series or Shunt wound	V A		
Power	kW/HP		
Speed	RPM		
Rated Starts per Hour and/or Duty			

LONG TRAVEL BRAKE(S)			
Make Type Number Drum Diameter Drum Width	kW/HP mm or in. mm or in.		
AC Supply Details Voltage 3 ph, 1 ph Frequency	V Hz		
DC Supply Details Voltage Full load current Series or Shunt wound	V A		

Specify if delay on application of brake is required (to give more gentle action)

Is Hydraulic Over-ride required? If so please specify:-

Span of Crane

Position of Brakes

Height from floor of Cab to LT brakes (reservoir must be above brakes)

If LT brakes are expected to work hard, please advise total mass of crane (tonne)

CLIENT / USER COMMENTS & REQUESTS

CRANE BRAKE QUESTIONNAIRE			
CONVEYOR			
Make			
Type (Uphill, level, downhill etc.)			
Capacity	Ton		
Belt Speed	m/min		
Conveyor Length	m		
Conveyor rise/fall height	m		
Mass of material per metre of length	kg		
Mass of belt per metre length	kg		
Diameter of driving drum	mm		
Speed of driving pulley	RPM		
Inertia of rotating parts (drums, idlers etc.)	kgm ²		
Drive Motor Type (cage, slip ring, dc shunt or series)			
Number of motors per conveyor			
Make and Frame Size			
Rotor Inertia	kgm ²		
Voltage 3 ph, 1 ph	V		
Frequency	Hz		
Power	kW/HP		
Speed	RPM		
Rated Starts per hour (or actual no. of stops/hour from full speed)			
Is Brake connected directly to motor or via separate Brake Relay?			
Percentage Duty Factor (CDF)	%		
Are brake time delays required? 1) Delay in release while motor starts 2) Application delay as conveyor slows			
Coupling type			
Coupling inertias driven half (input) driving half (output)	kgm ² kgm ²		
Stopping time and/or distance required	sec		

Customer Service

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1-800-463-8917

OR

1-800-668-6779

FAX:

416-675-6885

847-253-9880

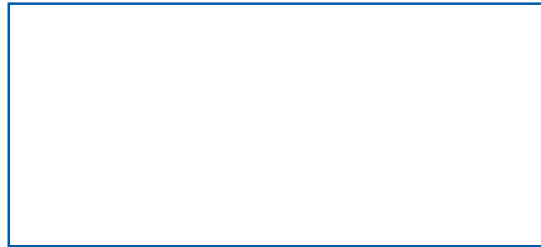
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