DELLNER BUBENZER

PNEUMATIC CLUTCHES & BRAKES

Type FKE FKR

2021.04

www.dellner-brakes.com

FKE

The FKE type elements are appropriate for low speed applications, where smooth starting and stopping loads are common. They can be used as slip clutches and tensioning brakes. The FKE elements have a design similar to the FK type elements, including their manufactured characteristics. A neoprene rubber tub which is reinforced by cord ply, is vulcanized to the outer part of a steel rim. Sets of friction shoes are held in place by a shoe pin and lock wire assembly on the outside diameter of the tube. Torque is transmitted by the sidewalls of the tube. When the tube is pressurized, this forces the friction shoes to expand and engage within the inside diameter of the drum that the element is acting upon.

This expanding design allows the element to function as a centrifugal clutch. The radial rigidness of the air tube determines the speed on which the friction shoes will retract from the inside diameter of the drum. The three smallest models have a tube that is vulcanized to the outside diameter of a solid hub, which can be keyed and bored, allowing for direct shaft mounting. The air passage can be provided in the hub face, or as a radial holes thru the hub. The other larger sizes are attached to the shaft via a separate element hub.

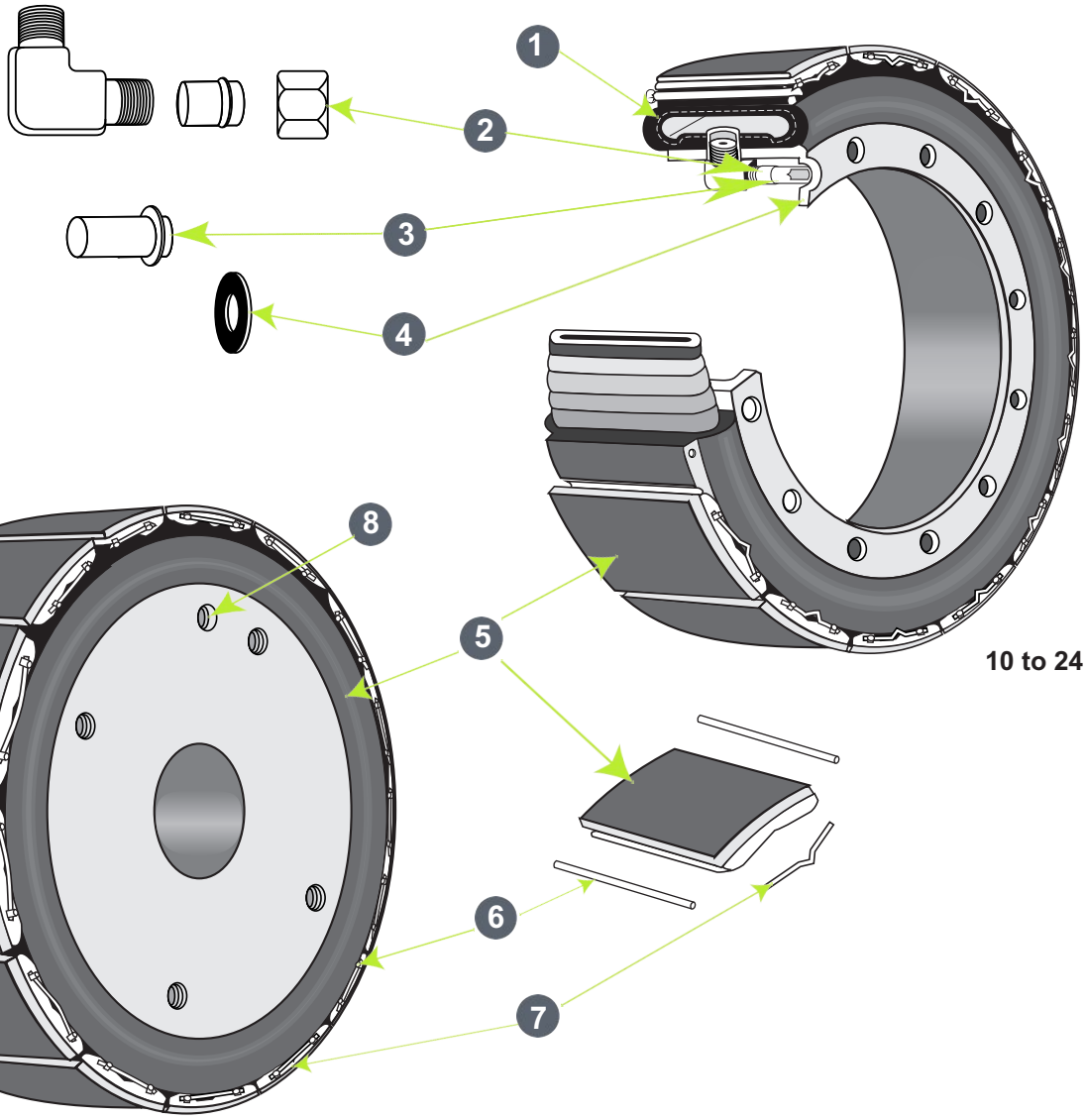
The elements capacity to transmit torque depends on the applied air pressure and operational speed. The values indicated in the catalogue are given at a pressure of 75 psi (5,2 bar) and zero r.p.m. 110 psi (7,6 bar) is the maximum recommended pressure. Adjustments and associated correction values for operating pressure and speed appear in the selection procedure section of the catalogue.

The FKE type elements are available in 7 sizes. They are identified in inches by the inside diameter of the drum to which they expand, and the width in inches of their friction linings. For example, a 16FKE475 element is designed to work inside a 16" drum that has friction lining width of 4,75". The smallest size of the FKE models works on a drum with an inner diameter of 4 inches (102 mm.) and the largest on a drum with an inner diameter of 16 inches (406 mm.). On the smallest size (4FKE125), the friction shoes are not replaceable because they are vulcanized directly to the tube.

FKR

The construction of the FKR elements is similar to the FKE element, with the exception of the friction shoes. The FKR elements engage the drum directly with the outer surface of the tube. This contact surface provides for a high torque in a relative small package; and also functions as insulation between the connecting shafts. The FKR type elements are usually used as shaft couplings, or holding breaks where there is zero speed differential between the shafts . They are ideal for applications where disconnection must be done without stopping the primary movement, or where the driving and or driven components connections are drawn from the drive on a frequent basis.

FKR elements are identified in the same way as FKE elements. They are available in 6 sizes. The smallest element expands on an inner diameter of 3 inches (76 mm.), while the largest to and inner diameter of 24 inches. They are used in Laundry, Pulp and Paper, Textile, Tire Fabrication and Marine Industries.



10 to 24 FKE

4, 6 and 8 FKE

SIZE	Torque rating	
	lb.in @ 75 psi	N.m @ 5,2 bar
4-FKE125	390	44.1
6-FKE-200	910	103
8-FKE-250	2220	251
9-FKE-325	3750	424
10FKE-300	4275	483
12-FKE-350	7500	848
14-FKE-400	12000	1360
16-FKE-475	18750	2120

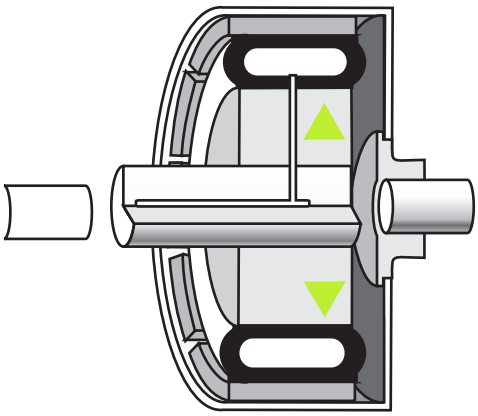
SIZE	Torque rating	
	lb.in @ 75 psi	N.m @ 5,2 bar
6-FKR-200	1540	174
8-FKR-250	3550	401
10FKR-300	6600	746
12-FKR-350	12300	1390
21.5-FKE-475	63000	7120
24-FKE-475	83500	9440

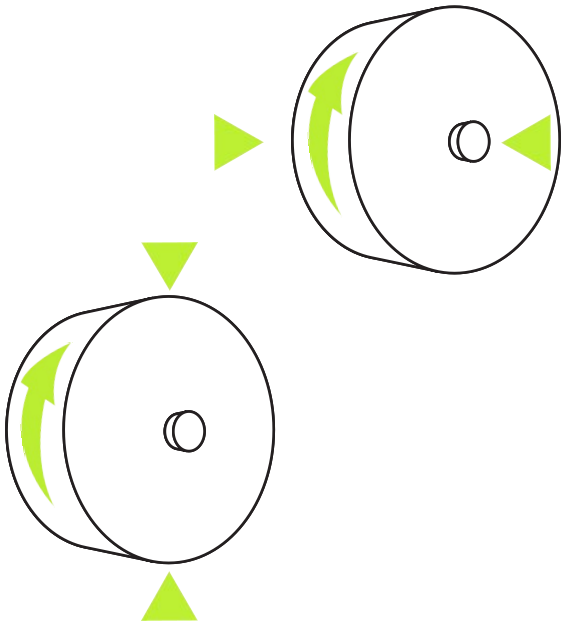
Components description

1 - Rim and Tube Assembly
2 - Elbow
3 - Air Connenction tube 4 - Air Connnection Gasket 5 - Friction Shoe
6 - Shoe Pin
7 - Lock wire
8 - Pipe Plug
5, 6, 7 - Replacement kit friction shoe

Drive principle

The FKE and FKR elements use a neoprene tube reinforced with cord ply´s, which expands in a radial way, when the element is perssurized. This action causes the contact surface to expand against the inner diameter on the drum. Its ability to transmit torque depens on the applied air pressure and velocity.



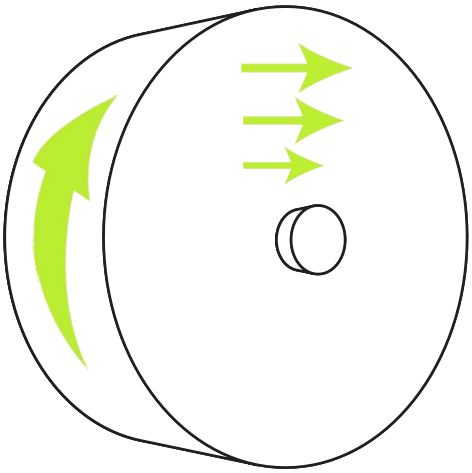


Force applied at maximum radius from axis

The FKE / FKR elements concetrate all the frictional force on the inter diameter of the drum, obtaining the maximum torque. The torque lever arm is the drum radius, not a reduced radius that is common in plate clutches. The force in not only generated through the optimal radius, but is also applied around the circumference of the drum.

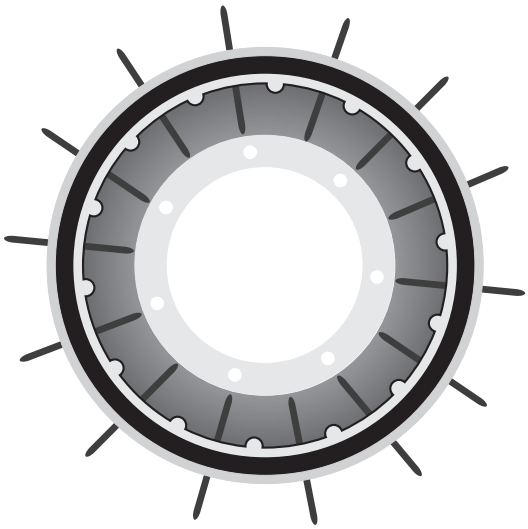
Uniform contact speeds

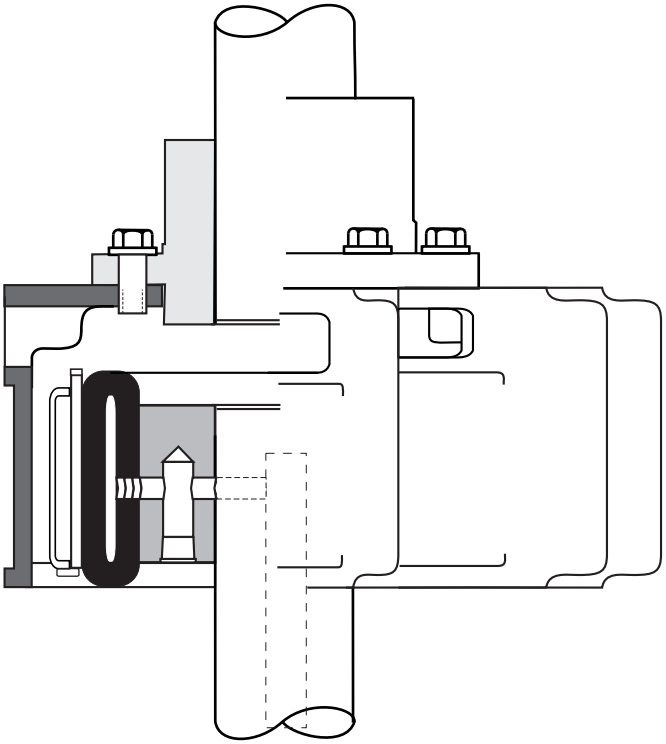
The contact velicty of the friction shoe to the across the interior diameter of the drum surface remains constant, unlike plate-types where the contact speed varies across the drum.



Temperature dissipation

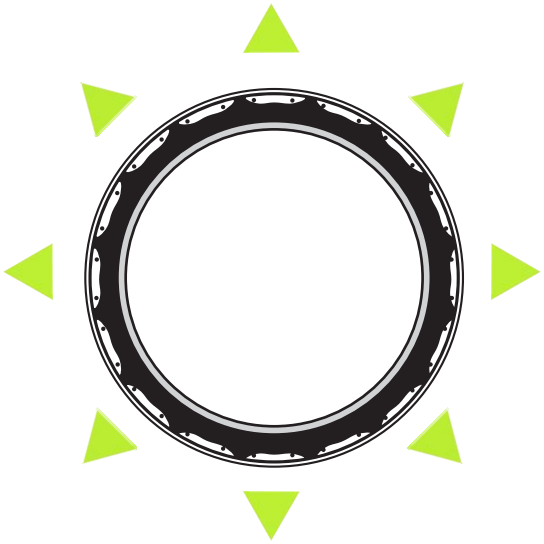
The temperature generated within the inner surface of the drum is quickly transmitted to the outer surface, where it disspates. This type of configuration is ideal for slip clutches and tensioning break applications where the temperature must be continuously dissipated away from the interior diameter or the drum.





It operates in any plane

The expanding design allows the element to work in any plane, unlike a plate type that can only function in a vertical plane.



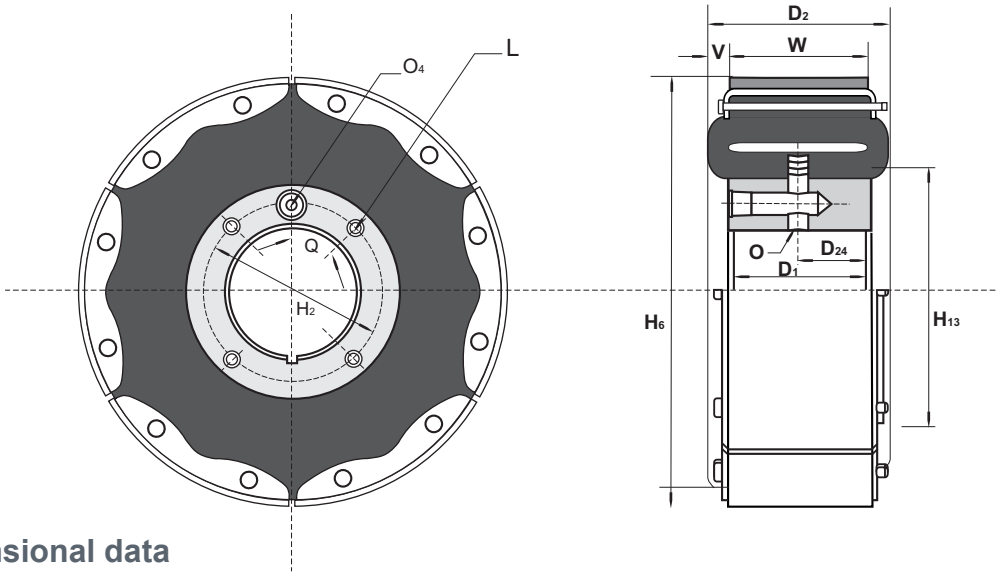
Automatic adjustment

The pneumatic element automatically compensates for the wear of the friction lining on the shoe assembly, eliminating the necessity of adjustment at normal wear, without reducing the capacity to transmit torque.

Without lubrication

This element does not require lubrication, because there are no close fitting sliding components.

Size 4 to 8



Dimensional data

ENGLISH		lb.pulg @ 75 psi	Dimensions in inches															
4FKE125	114000	390	0.88	1.50	1.50	1.75	0.75	2.12	3.94	2.75	4	5/16-18	0.31	1/4-18	45.0	0.25	10	1.25
6FKE200	114001	910	0.88	1.75	2.00	2.75	1.00	2.50	5.91	3.38	4	3/8-16	0.31	1/4-18	45.0	0.38	6	2.00
8FKE250	114002	2220	1.25	3.50	2.50	3.25	1.25	4.38	7.84	5.38	4	3/8-16	0.31	1/4-18	45.0	0.38	8	2.50
Size	Part number (1)	M. Torque rating (2)	Bore range min	Bore range max	D_1	D_2	D_{24}	H_2	H_6	H_{13}	N	L (3) size	O	O_4 (4)	Q (deg)	V	N	W width
											N	size					N	width
4FKE125	114000	44.1	22	38	38	44	19	54	100	70	4	5/16-18	8	1/4-18	45.0	6	10	32
6FKE200	114001	103	22	44	51	70	25	64	150	86	4	3/8-16	8	1/4-18	45.0	10	6	51
8FKE250	114002	251	32	89	64	83	32	111	199	137	4	3/8-16	8	1/4-18	22.5	10	8	64
SI		N.m @ 5,2 bar	Dimensions in millimeters															

Technical data

ENGLISH		lb.in @ 75 psi	rpm	psi/rpm²	lb.ft²	lb	in²	inches new	inches worn	in³	in
4FKE125	114000	390	1800	*	0.01	2.3	13	(6)	(6)	5	4.09
6FKE200	114001	910	1800	1.1	0.25	7	36	0.14	0.06	10	6.09
8FKE250	114002	2220	1800	1.2	1.00	19	60	0.12	0.06	15	8.09
Size	Part number (1)	M. Torque rating (2)	max. speed	aumento por fuerza centrifuga	Wk² J (5)	Weight Mass	Friction area	Lining Thickness		Air tube cavity (7)	Maximum drum diameter
4FKE125	114000	44.1	1800	*	0.004	1.0	84	6	6	0.08	104
6FKE200	114001	103	1800	0.1	0.01	3.2	232	4	2	0.16	155
8FKE250	114002	251	1800	0.1	0.04	8.6	387	3	2	0.25	205
SI		N.m @5,2 bar	rpm	bar/rpm²	kg.m²	kg	cm²	new / worn millimeters		dm³	mm

* The data displayed in this catalogue is current and subject to change without previous notice.

NOTES:

1- Reference by 10" of part. When ordering, please indicate which air entry hole 0 or 04.
2- The torque indicated is dynamic; wiht the static torque is being approximately 25% greater. The toruque in each application depends on the air pressure and speed.
3- UNC thread
4- NPT thread
5- Based on minimum holes.
6- In the modeles where the friction shoe is vulcanized on to the rubber tube, replace the complete element when the wear on the friction surpasses the 3,88 (98m) inches in diameter.
7- Drum Contact with worn shoes.

ENGLISH		lb.in @ 75 psi	rpm	psi/rpm²	lb.ft²	lb	in²	inches		in³	in
								new	worn		
9FKE325	114003	3750	1800	1.6	1	9	88	0.20	0.06	30	9.09
10FKE300	114004	4275	1800	2.2	1	10	91	0.20	0.06	47	10.09
12FKE350	114005	7500	1800	3.4	3	16	126	0.20	0.06	45	12.09
14FKE400	114006	12000	1500	4.3	5	23	167	0.20	0.06	55	14.09
16FKE475	114007	18750	1300	6.4	11	40	232	0.26	0.06	195	16.13

Size	Part number	M. Torque rating	Maximum speed	C_s Centrifugal Gain	Wk^2 J	Weight Mass	Friction area	Lining Thickness		Air tube cavity	Maximum drum diameter
9FKE325	114003	424	1800	0.1	0.042	4.1	568	5	2	0.49	231
10FKE300	114004	484	1800	0.2	0.042	4.5	587	5	2	0.77	256
12FKE350	114005	848	1800	0.2	0.126	7.2	813	5	2	0.74	307
14FKE400	114006	1356	1500	0.3	0.210	10	1077	5	2	0.90	358
16FKE475	114007	2120	1300	0.4	0.462	18	1496	7	2	3.20	410
SI		N.m @ 5,2 bar	rpm	bar/rpm²	kg.m²	kg	cm	new	worn	dm³	mm

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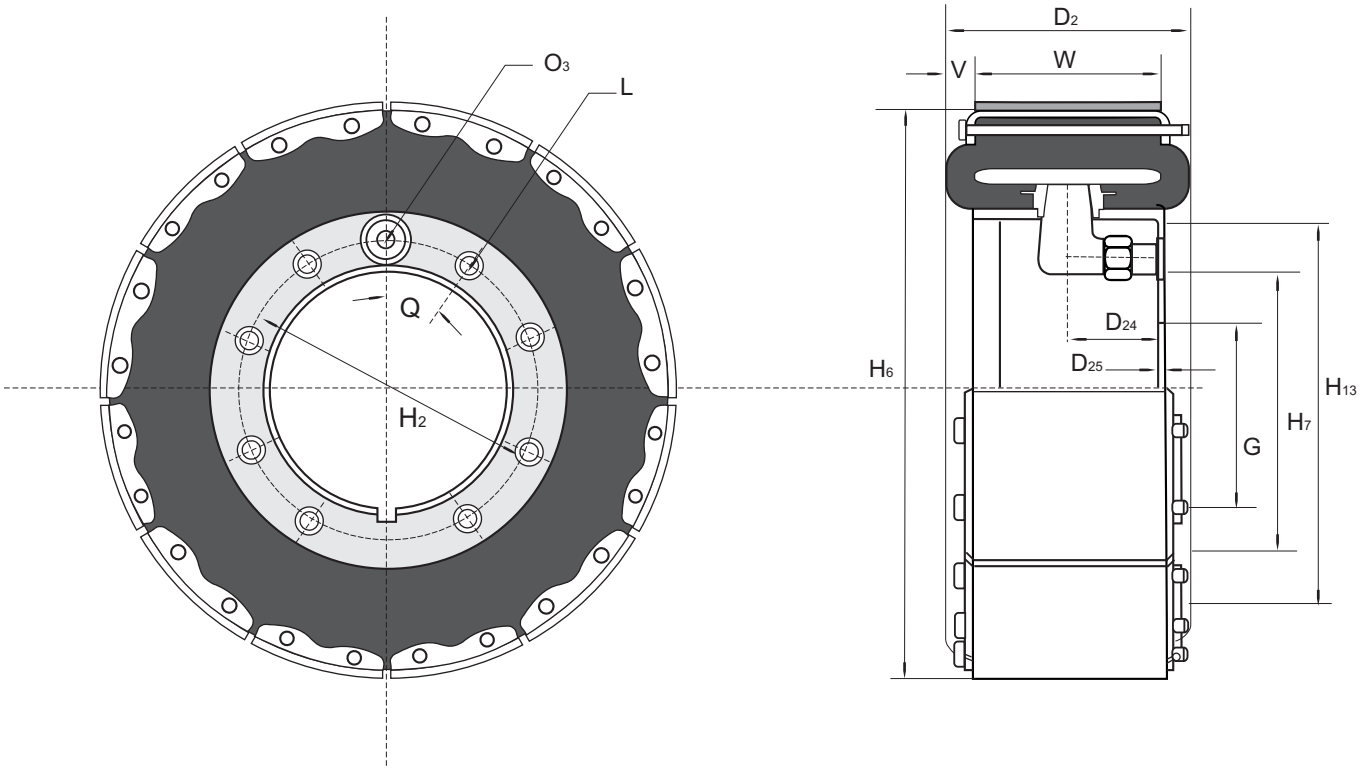
NOTES:

1- Refers only to the basic part number.

2 - The torque indicated is dynamic, while static torque is approximately 25% greater.
The torque in each application depends on the air pressure and the speed.

3- Tolerance by size:
4 to 14
+ 0.005 / - 0.000 inches (0.13 / - 0.00 mm)
16 to 24
+ 0.010 / - 0.000 inches (0.25 / -0.00 mm)

4- Drum Contact with worn shoes.



ENGLISH		lb.in @75 psi	Dimensions in inches														
9FKE325	114003	3750	4.13	1.86	0.19	3.500	4.62	8.84	4.62	6.00	8	0.50	0.31	22.5	0.44	9	3.25
10FKE300	114004	4275	3.88	1.56	0.16	4.250	5.25	9.84	5.25	7.00	8	0.50	0.31	22.5	0.44	10	3.00
12FKE350	114005	7500	4.38	1.88	0.19	6.250	7.25	11.84	7.25	9.00	12	0.50	0.31	15.0	0.44	12	3.50
14FKE400	114006	12000	4.88	1.88	0.19	8.250	9.25	13.84	9.25	11.00	12	0.50	0.38	15.0	0.44	14	4.00
16FKE475	114007	18750	6.38	2.50	0.25	8.250	9.63	15.81	9.63	11.38	8	0.50	0.38	22.5	0.81	12	4.75
Size	Part number (1)	M. Tourque rating (2)	D_2	D_{24}	D_{25}	G	H_2 (3)	H_6	H_7	H_{13}	L N	L Dia.	O_3	Q (deg)	V	W N	W width
											N	Dia.				N	width
9FKE325	114003	424	105	47	5	88.9	117	225	117	152	8	13	8	22.5	11	9	83
10FKE300	114004	484	99	40	4	108.0	133	250	141	178	8	13	8	22.5	11	10	76
12FKE350	114005	848	111	48	5	158.8	184	301	192	229	12	13	8	15.0	11	12	89
14FKE400	114006	1356	124	48	5	209.6	235	352	243	279	12	13	8	15.0	11	14	102
16FKE475	114007	2120	162	64	6	209.6	245	402	244	289	8	13	10	22.5	21	12	121
SI		N.m @ 5,2 bar	Dimensions in millimeters														

The information displayed in the catalog is subject to modification without previous warning.

ENGLISH		lb.in @75 psi	rpm	lb.ft²	lb	in³	in
3FKR125	114060	400	1800	0.01	1.1	4	3.09
6FKR200	114061	1540	1800	0.1	7	20	6.09
8FKR250	114062	3550	1800	0.5	18	35	8.09
Size	Part number (1)	M. Torque rating (2)	Maximum speed	Wk² J (6)	weight mass	Air tube cavity (5)	Maximum drum diameter
3FKR125	114060	45.2	1800	0.001	0.5	0.07	78
6FKR200	114061	174	1800	0.004	3.2	0.33	155
8FKR250	114062	401	1800	0.02	8.2	0.57	205
SI		N.m @5,2 bar	rpm	kg.m²	kg	dm³	mm

* The data displayed in this catalogue is current and subject to change without previous notice.

NOTES:

1- Refers onlyt to the basic part number, when ordering please specify which air entry hole, 0 or 04 should be used.

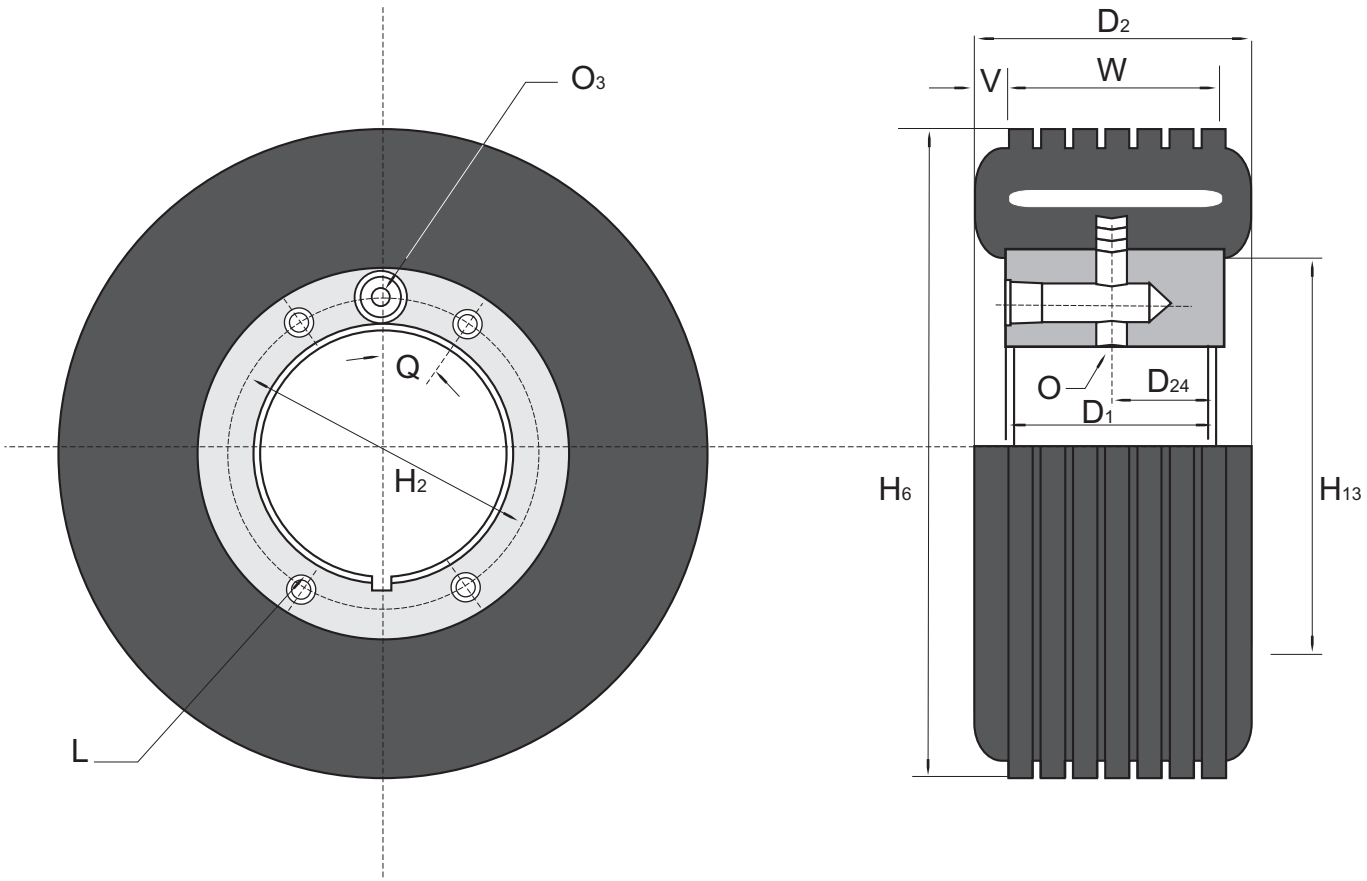
2- Static torque.

3- UNC threads.

4- NPT threads.

5- Contact with installed drum.

6- Based upon Minimum bores.



ENGLISH		lb.in @ 75 psi	Dimensions in inches															
6FKR200	114061	1540	0.88	1.75	2.00	3.06	1.00	2.50	5.91	3.38	4	3/8-16	0.62	0.31	1/4-18	45.0	0.53	2.00
8FKR250	114062	3550	1.25	3.50	2.50	3.56	1.25	4.38	7.91	5.38	4	3/8-16	0.62	0.31	1/4-18	22.5	0.53	2.50
Size	Part number (1)	M. Torque rating (2)	min	max	D_1	D_2	D_{24}	H_2	H_6	H_{13}	N	size	L (3)	O	O_4 (4)	Q	V	W
			Bore range								L (3)							
			min	max							N	size						
6FKR200	114061	174	22	44	51	78	25	64	150	86	4	3/8-16	16	8	1/4-18	45.0	13	51
8FKR250	114062	401	32	89	64	90	32	111	201	137	4	3/8-16	22	8	1/4-18	22.5	13	64
SI		N.m @ 5,2 bar	Dimensions in millimeters															

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ENGLISH		lb.in @75 psi	rpm	lb.ft²	lb	in³	in
10FKR300	114063	6600	1800	0.8	8	75	10.09
12FKR350	114064	12300	1800	2	13	80	12.09
21,5FKR475	114068	63000	1100	27	52	335	21.63
24FKR475	114069	83500	900	41	61	375	24.13
Size	Part number (1)	M. Torque rating (2)	Maximum speed	Wk² J (6)	weight mass	Air tube cavity (5)	Maximum drum diameter
10FKR300	114063	746	1800	0.03	3.6	1.23	256
12FKR350	114064	1390	1800	0.08	5.9	1.31	307
21,5FKR475	114068	7130	1100	1.13	24	5.49	549
24FKR475	114069	9440	900	1.72	28	6.15	613
SI		N.m @5,2 bar	rpm	kg.m²	kg	dm³	mm

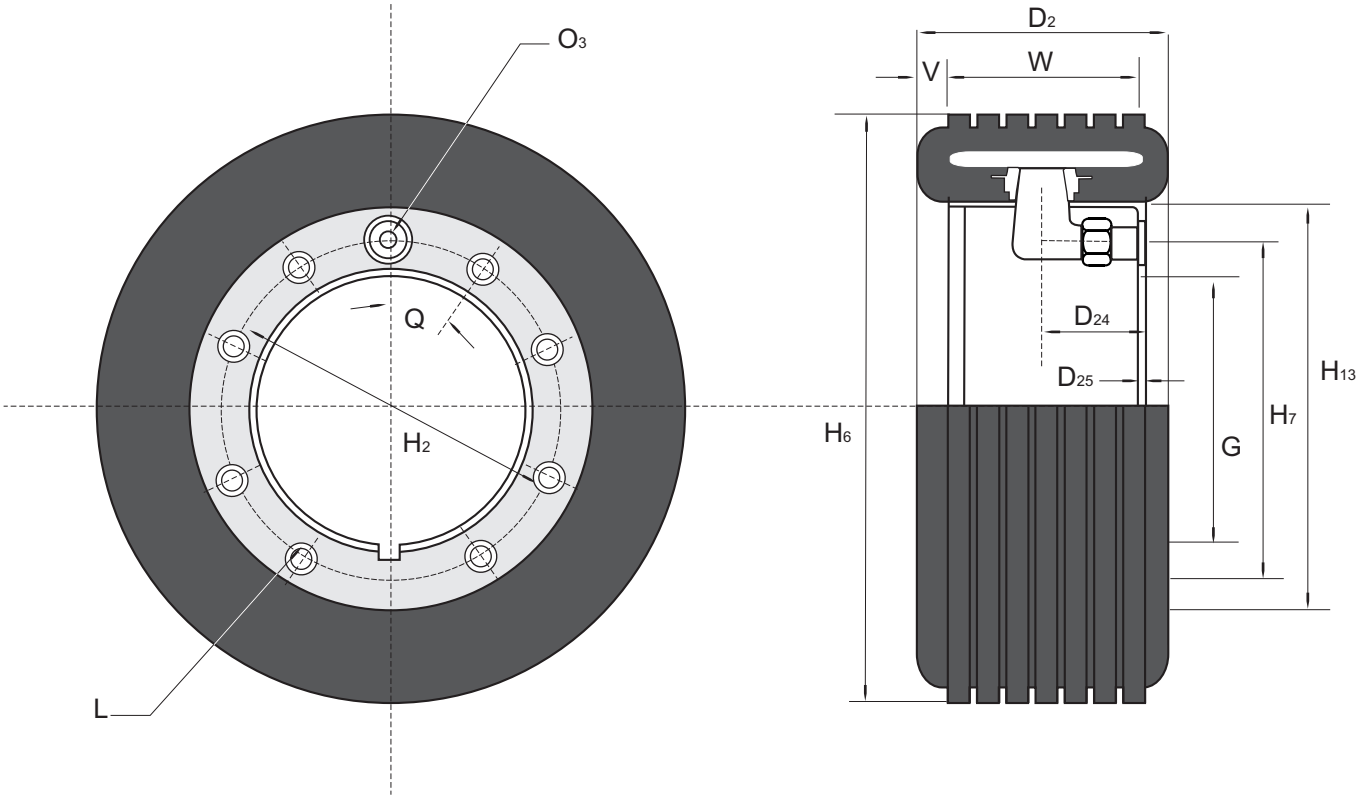
* The data displayed in this catalogue is current and subject to change without previous notice.

NOTES:

1- Refers only to the basic part number.

2- Static torque.

3- Contact with installed drum.



ENGLISH		lb.in @75 psi	Dimensions in inches													
10FKR300	114063	6600	4.25	1.56	0.16	4.250	5.25	9.90	5.56	7.00	8	0.50	0.31	22.5	0.63	3.00
12FKR350	114064	12300	4.75	1.88	0.19	6.250	7.25	11.90	7.56	9.00	12	0.50	0.31	15	0.63	3.50
21,5FKR475	114068	63000	6.63	2.50	0.31	12.125	13.50	21.31	13.50	16.88	8	0.75	0.38	22.5	0.94	4.75
24FKR475	114069	83500	6.63	2.50	0.31	14.625	16.00	23.81	16.00	19.38	8	0.75	0.38	22.5	0.94	4.75
Size	Part number (1)	M. Tourque rating (2)	D_2	D_{24}	D_{25}	G	H_2	H_6	H_7	H_{13}	N	Dia.	O_3	Q	V	W
											L					
											N	Dia.				
10FKR300	114063	746	108	40	4	108.0	133	251	141	178	8	13	8	22.5	16	76
12FKR350	114064	1390	121	48	5	158.8	184	302	192	229	12	13	8	15	16	89
21,5FKR475	114068	7130	168	64	8	308.0	343	541	343	429	8	19	10	22.5	24	121
24FKR475	114069	9440	168	64	8	371.5	406	605	406	492	8	19	10	22.5	24	121
SI		N.m @ 5,2 bar	Dimensions in millimeters													

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General

The technical section of the catalouge contains information that belongs to the selection of assembly, direction and control of brakes and clutches; in general the formulas, symbols and units are identified. It is recommended to review the technical ssection before trying to classify a specific product for an application.

Operation speed

The design of the expanding elements allows them work as centrifulgal clutches. In the FKE and FKR models the elasticity of the tube resists and counter act thefects of centrifugal force, which also allows them to idle while disengaged. The recommended element idle speed is indicated in the following table.

SIZE	RPM
4FKE125	1100
6FKE / FKR200	800
8FKE / FKR250	650
9FKE300	600
10FKE / FKR300	520
12FKE / FKR350	420
14FKE400	340
16FKE475	270
21,5FKR475	120
24FKR475	100

The FKR elements use a rubber friction surface that contacts the drum. They are made to be used as shaft couplings and or holding breaks, and should only be engaged at a zero speed differential between the drum and actual element.

Torque of adjustment of elements

The nominal torque of each element is indicated in the catalogue and is based upon an effective pressure **Pr** of 75 psi (5.2 bar). The nominal torque ratings must be adjusted by the operation pressure **P**o, parasitic loss **Pp** and operation speeds. The maximum permissible pressure depends on the construction of the element and the frequency of engagement. In general the pressures indicated in the following table, should not be exceeded.

Maximum recommended pressure		
Model	Psi	Bar
FKE & FKR	110	7.6

The elements have an inherent parasitic pressure **(Pp)** required to obtain contact between the friction break shoe and the drum, which represents the pressure to surpass the resistance of the actuating tube, and for the elements FKE-V and FKR-EV the pressure to surpass the resistance of the friction shoe release springs.
The parasitic pressure **Pp** is indicated in the following table and must be duducted from the operation pressure.

Parasitic pressure Pp		
Size	Psi	Bar
4 FKE125	20	1.38
6 & 8 FKR & FKR	7	0.48
10 & 12 FKE & FKR	6	0.41
All other FKE & FKR	4	0.28

Thermal capacity

Rotating elements must have their torque rating adjusted to compensate for the effects of the centrifugal force that is acting upon the friction break shoes. The method used to calculate the centrifugal pressuce **Pc** and to add its value to the applied pressure. **P**o.

Pc = Cs . n . E -06

Where:

Pc: compenesating pressure (psi or bar).

Cs: constant speed (obtained of page of the element catalogue).

n: r.p.m. of the element

The value of the adjustetd torque ME is calculated:

$$\mathbf{Me} = \frac{\mathbf{Po - Pp - Pc}}{\mathbf{Pr}} \mathbf{. Mr}$$

The adjusted torque **Me** must be equal or greater than the required clutch torque **Mc**, or brake torque **Mb**.

Example 1 illustrates the use of these formulas.

Continuous thermal capacity

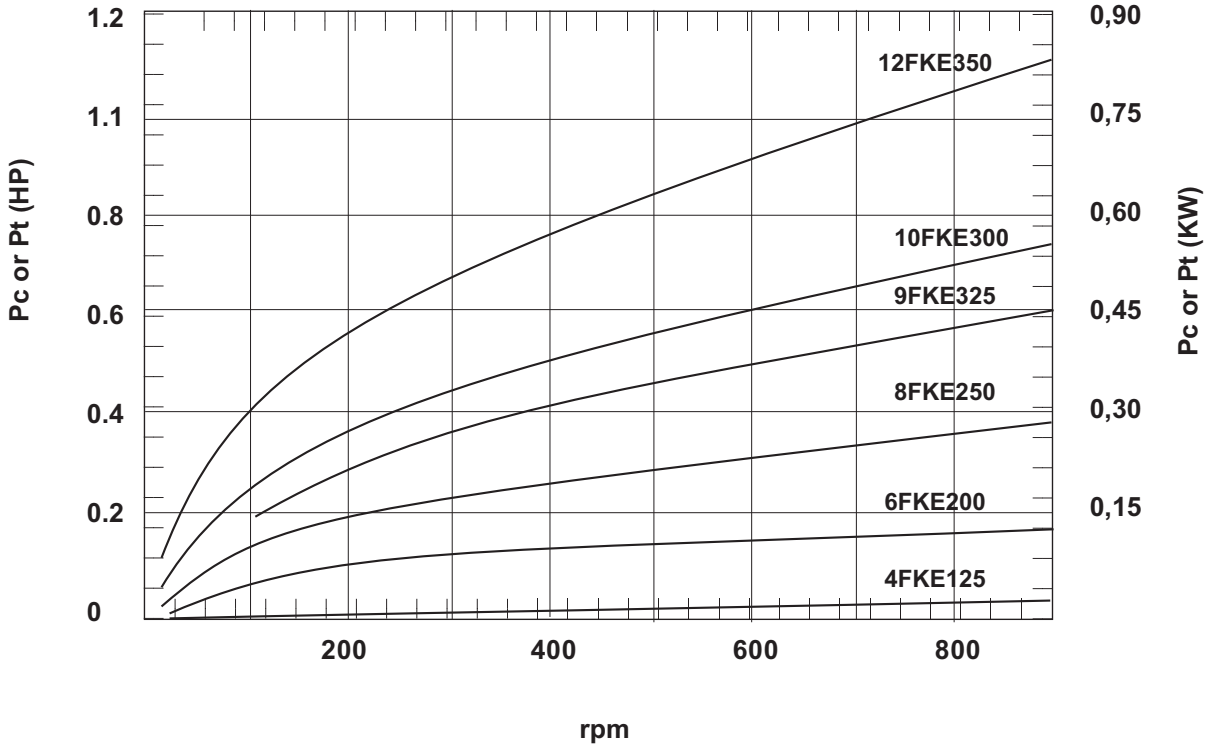
The expanding elements, when being used in combination with air agitating vaned drums, are ideal for applications suited for constant thermal dissipation. It´s recommended that the drum be located on the driving side within a clutch application and on the shaft side on a brake application.

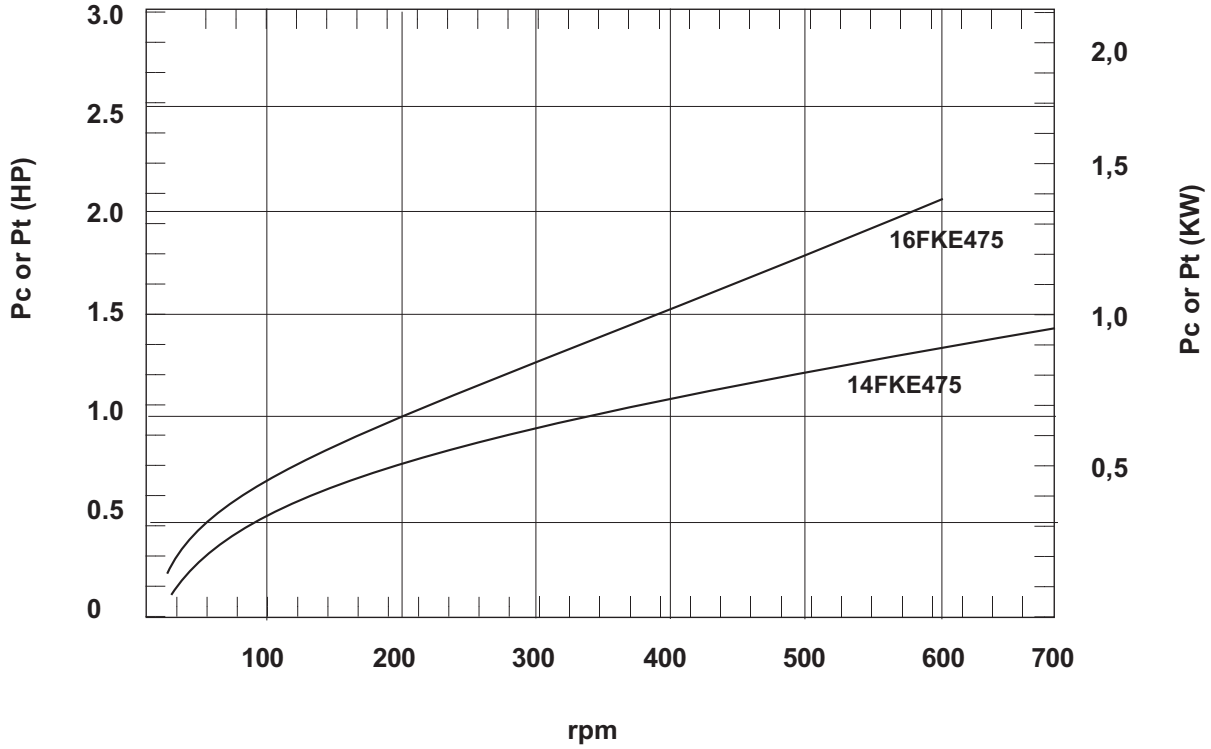
The thermal rank **Pt** varies according to the speed of operation, as it is demonstrated in the graphic.

For an ideal performance and operating life of the linings, the maximum pressure sholud be set at at limint of 20 psi (1.4 bar) and the slipping spped of 1600 fpm (8mps). For elements that will be used in continuous slip service, a LO-CO friction material must be specified.

Cyclical thermal capacity

Since expanding elements generally only have a single air inlet, they are limited at the rate at which they can be cycled. It is recommended to not allow rates greater than 10 cycles per minute. For extreme operations, consult with our technical department. Use the thermal power indicated in the graphs below for cyclical operations **Pc**.


Pc or Pt (HP)
1.2
1.1
0.8
0.6
0.4
0.2
0
0,90
0,75
0,60
0,45
0,30
0,15
Pc or Pt (KW)
12FKE350
10FKE300
9FKE325
8FKE250
6FKE200
4FKE125
200
400
600
800
rpm


Pc or Pt (HP)
3.0
2.5
2.0
1.5
1.0
0.5
0
2,0
1,5
1,0
0,5
Pc or Pt (KW)
16FKE475
14FKE475
100
200
300
400
500
600
700
rpm

Non-cyclical thermal capacity

The friction area of the element, the mass of the drum, thermal conductivity and heat capacity determine the non-cyclical capacity. The properties of our standard iron drums, results in the their limits represented in the graph.

The calculated thermal energy for the load is adjusted to include the energy associated with the acceleration and deceleration of the components of the clutches and/or brakes that have been tentatively selected.

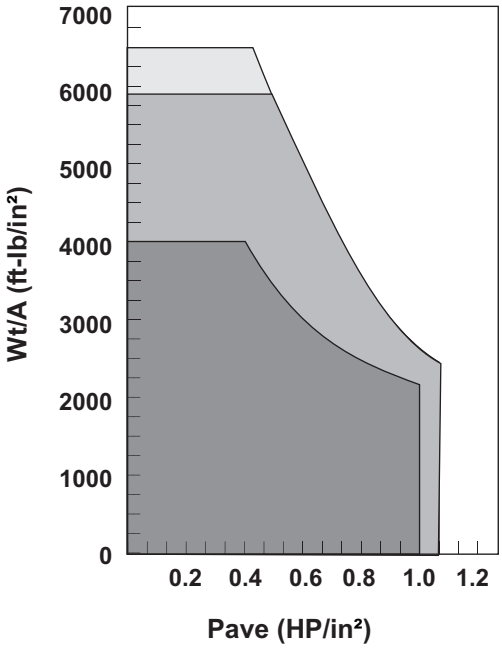
The adjustment of the termal energy Wt is divided by the friction area A of each element. Then the average power loading Pave is calculated by:

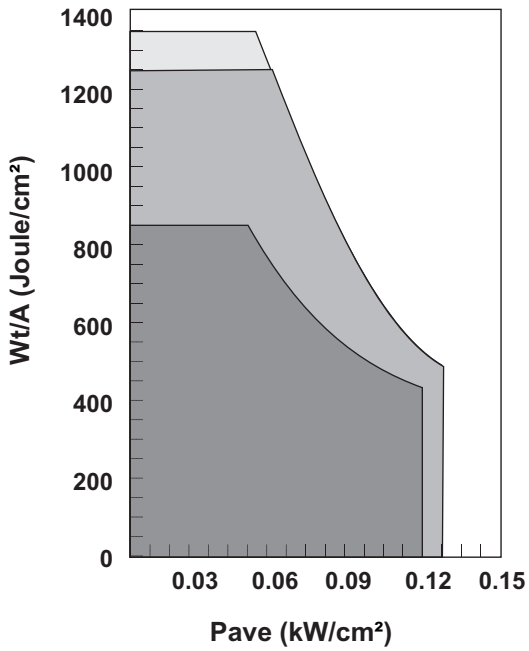
$$\text{Pave} = \frac{Pt}{A}$$

The point (Wt/A, Pave) so shown in the graph. If the point falls underneath the appropriate limint line of the product, the selection will be able to handle the thermal load. If not, an element with a greater friction surface area must be used.

Example 4 at the end of this section illustrates the use of the graph.

Non-Cyclical Thermal Capacity
(Gray Smelting Bell)





Pheripheral speed of bell:

The peripheral speed of the drum should not exceed 8500 fpm. (43 mps.). In some applications, the drums may need freewheel at speed that are greater than their engaged running speeds. This must be taken in consideration at the moment of calculating their speeds.

The speeds are calculated:

V (fpm) = 0,262. n.
D V (fpm) = 5,236E - 05. n. D

Where **D** is outside drum diameter (in inches or mm).

Method of selection:

There are two ways to arrive at hte selection. The analytical method, which is the optimal way to do it, whereas by the service factor method may result in a selecting an under or oversizes unit. Whenever possible, the analytical method should be used.

Analytical method:

The steps to follow are:

1- Determine the required torque.
2- Determine the thermal requirement.
3- Determine the arrangements of the mounting space and diameters of shafts.
4- Make a tentative selection attempt using steps 1, 2 and 3.
5- Adjust the nominal torque rating of the tentative selection to mirror the operating pressure and speed, and determine if it still meets the requirement.
6- Adjust the thermal requirement to include the energy of the components of the clutch or brake which are accelerated and decelerated and determine if it falls within the tentative selection capacity.
7- Check the peripheral speed of the spider and drum to determine if they are within the operational limits of the components given in the table.

Step 3 requires some measurements to assure that the arrangement will not be interfered with in regards to its surroundings. If the attempt selection does not meet the requirements fo the steps 5, 6 and 7; a smaller dual element or large single elements should be considered.

Steps 4 thru 7 will be repeated for the new selection. If the new selection still does not meet the requirements of step 5 and 6, a product from a different line needs to be considered. If the selection does not need the requirements of the step 7, it might be possible to fabricate the components of other materials which can resist the difficulties and stresses associated with the high speeds.

Method of selection by service factor fs:

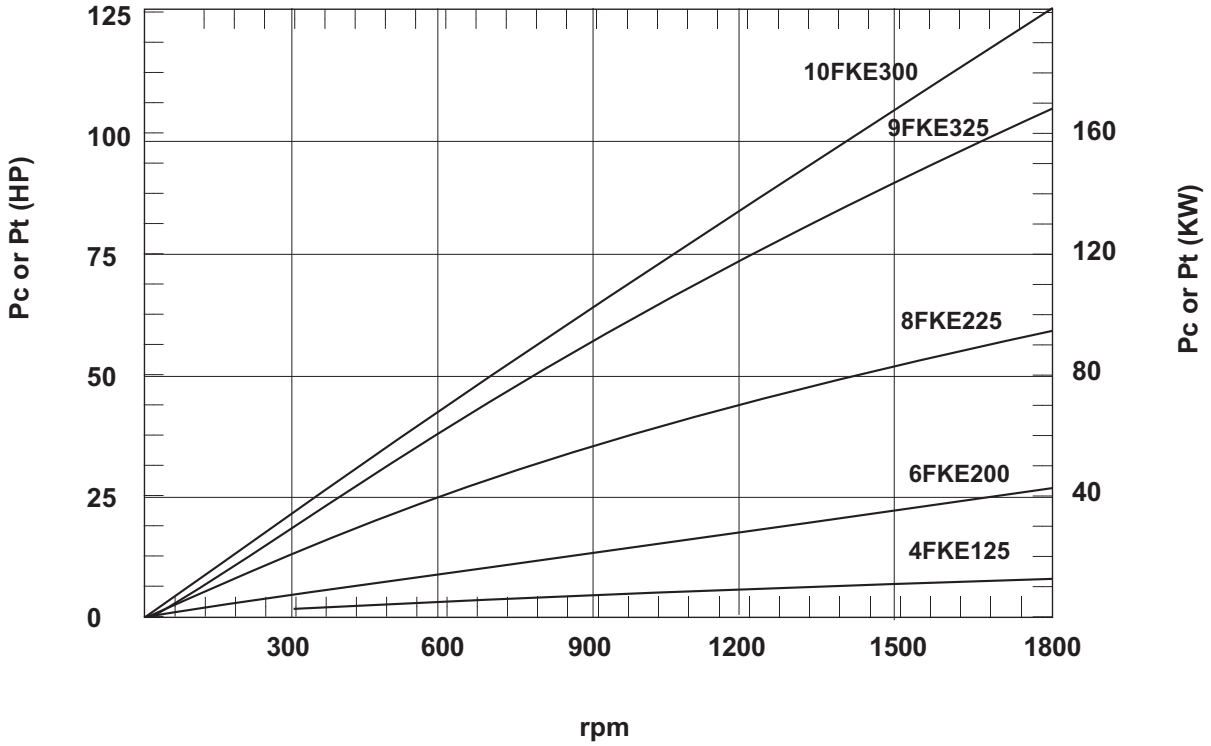
Select the Service factor **fs**, of the corresponding table; if you do not find the machine or equipment listed, select a Service Factor **fs** or a machine with similar characteristics and function. Multiply the primary mover power **Pp** by **fs** and you will obrain the calculated design power **Pd**.

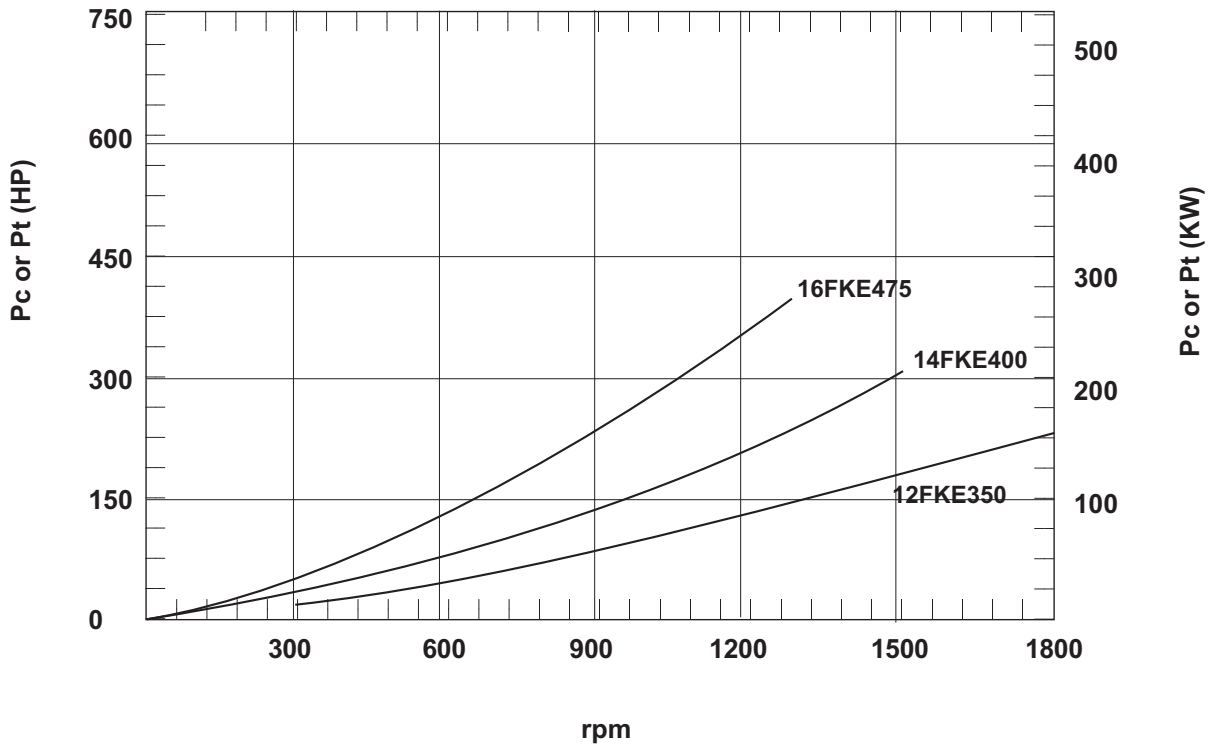
Pd = Pp.fs

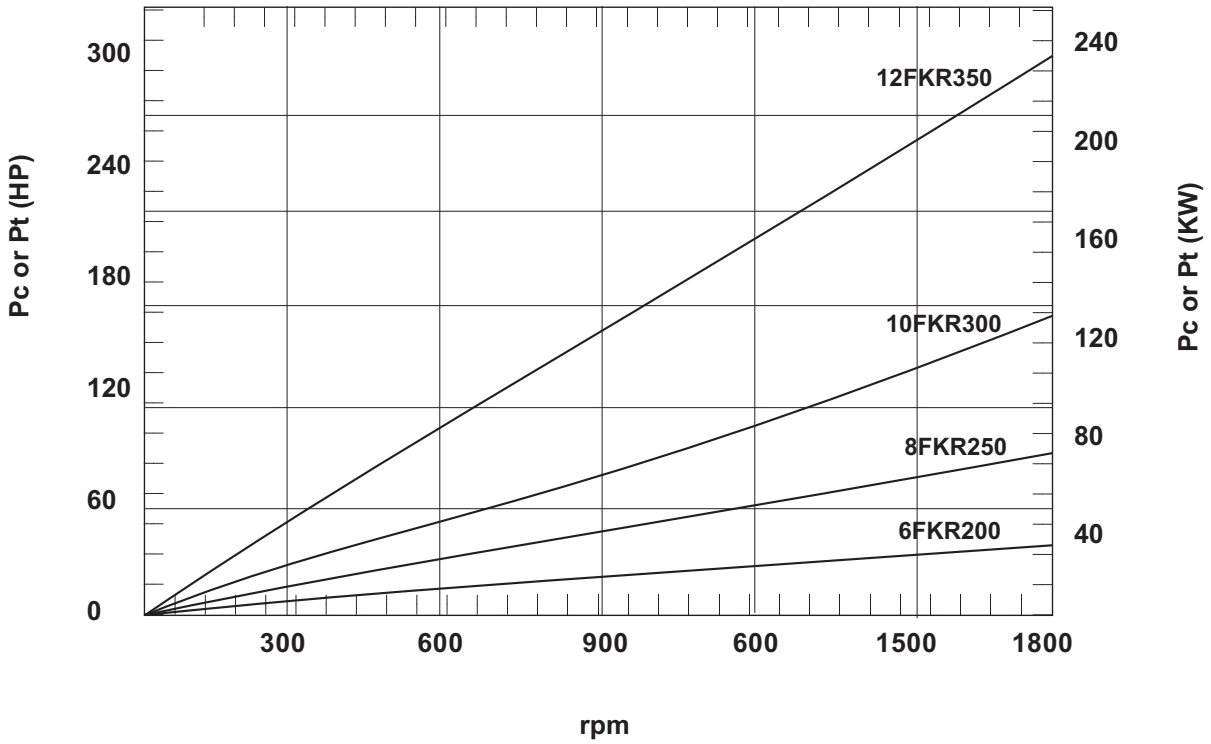
For clutch applications that will be operating at 75 psi (5.2 bar), use the graph with the to select the element which has the power capacity at the elements operating speed. These graphics are for single elements; for dual elements, the illustrated capacity is duplicated, having twice the capacity shown.

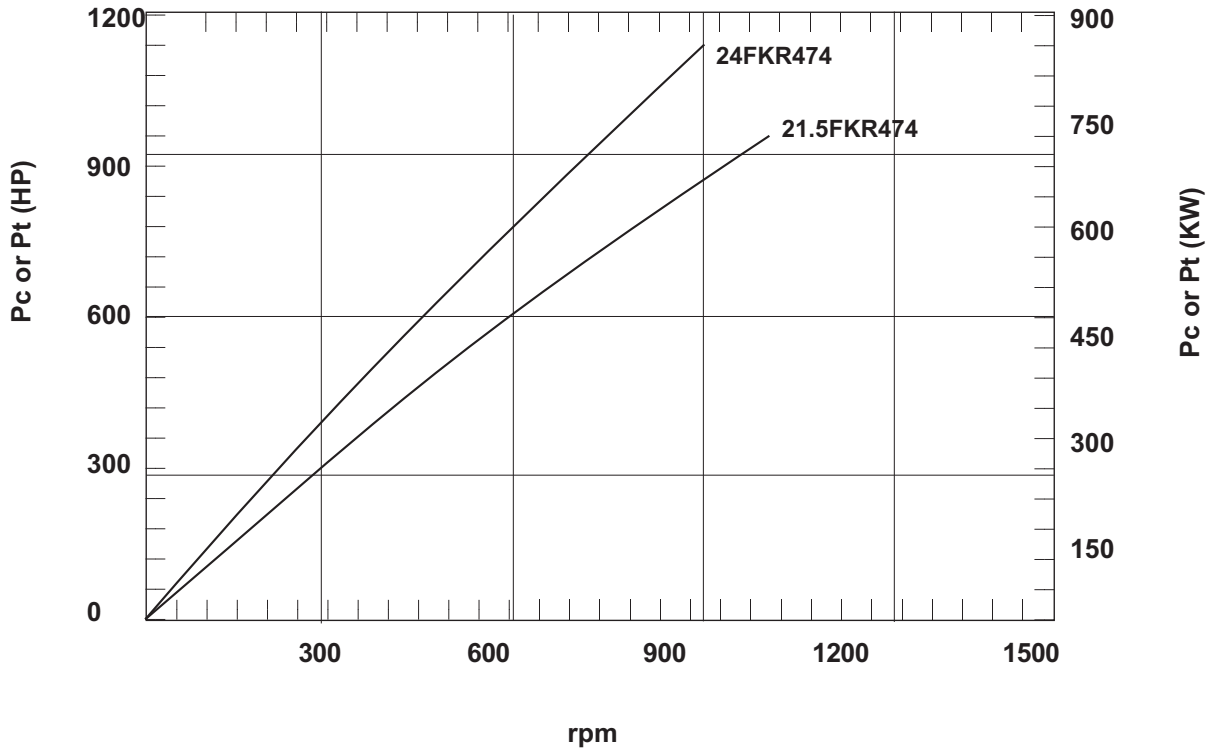
For clutches that operate at other pressures, or for stationary brakes, the service factor is applied to prime movers toque **Mp**, refered to the brake or clutch shaft.

The required torque for **Mc** clutch or **Mb** brakes is used to make an tenative selection for the element. The indicted **Mr** torque for a element is adjusted according to the operting velocity and the applied air pressure as explained earlier. The adjusted element torque **Me**, must be greater than **Mc** or **Mb**.


125
100
75
50
25
0
Pc or Pt (HP)
160
120
80
40
Pc or Pt (KW)
10FKE300
9FKE325
8FKE225
6FKE200
4FKE125
300
600
900
1200
1500
1800
rpm


750
600
450
300
150
0
Pc or Pt (HP)
500
400
300
200
100
Pc or Pt (KW)
16FKE475
14FKE400
12FKE350
300
600
900
1200
1500
1800
rpm


Pc or Pt (HP)
300
240
180
120
60
0
12FKR350
10FKR300
8FKR250
6FKR200
240
200
160
120
80
40
Pc or Pt (KW)
300
600
900
600
1500
1800
rpm


Pc or Pt (HP)
1200
900
600
300
0
24FKR474
21.5FKR474
900
750
600
450
300
150
Pc or Pt (KW)
300
600
900
1200
1500
rpm