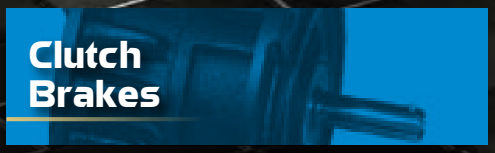
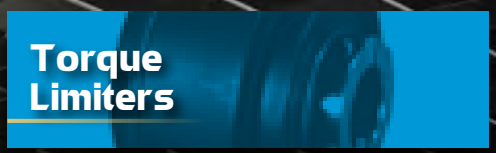
Carlson Industrial



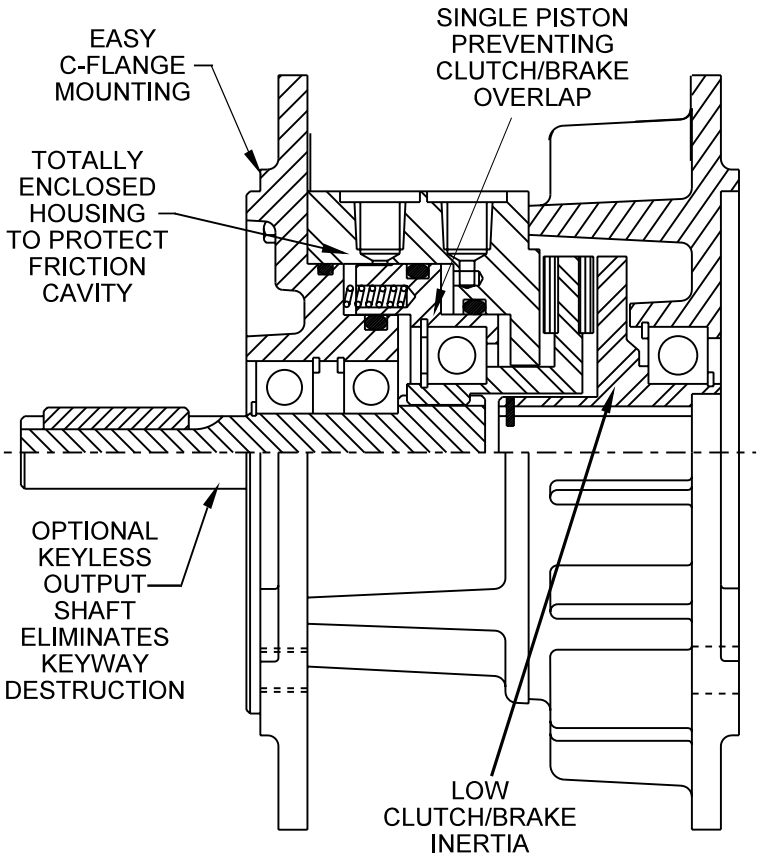


Serving Industrial Markets Since 1961:

Food Processing & Packaging • Material Handling • Printing & Die Cutting
Factory Automation • Metals • Forestry

ECB TOTALLY ENCLOSED CLUTCH AND CLUTCH/BRAKE

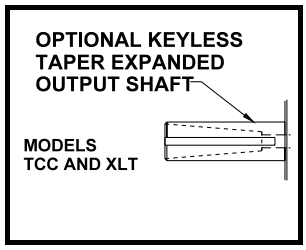
- Totally enclosed housing
- Optional stainless steel housing on SS models
- Protection against outside contaminants
- Used in washdown applications
- C-Flange mounted
- Single piston prevents clutch/brake overlap
- Low inertia clutch/brake rotor
- Fast cycle times
- Accurate starting/ stopping
- Hardened steel spline connections
- High temperature sealing materials
- Patented keyless output shaft
- Elimination of keyway destruction
- Bearing mounted Input shaft assembly and foot mount available

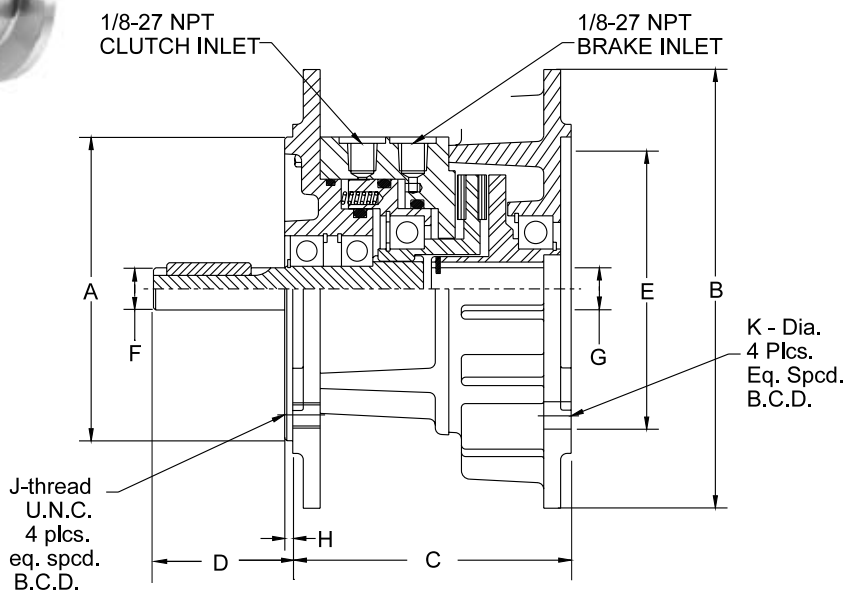


ECB PNEUMATIC CLUTCH & BRAKE COMBINATION

ECB clutch/brakes use o-rings as dynamic seals. Therefore adequate lubrication must be provided in the air actuating circuit to ensure the 0-rings do not run dry

ECB CLUTCH/BRAKE





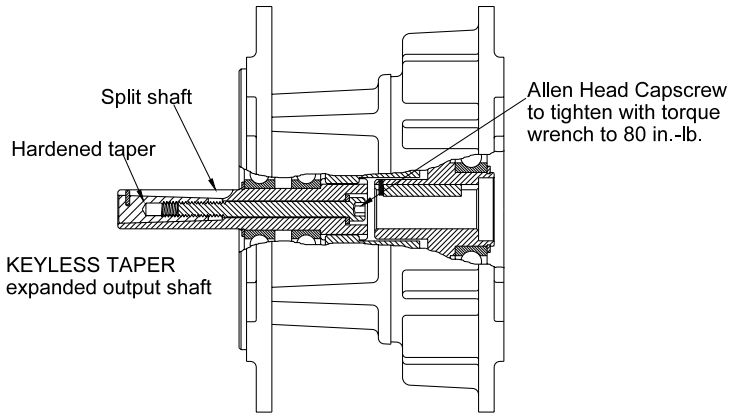
MODEL	ECB 625-XL ECB 625-XLT ECB 625-XL-SS ECB 625-XLT-SS	ECB 875-XL ECB 875-XLT ECB 875-XL-SS ECB 875-XLT-SS	ECB1125-CC ECB1125-TCC
A	4.499	4.499	8.498
B	6.5	6.5	9
C	3.875	4.25	6
D	2.063	2.125	2.875
E	4.501	5.501	8.502
F	.624 .625	.874 .875	1.124 1.125
G	.626 .627	.876 .877	1.126 1.127
H	0.12	0.12	0.25
J	.375-16	.375-16	.5-13
K	0.406	0.406	0.531
BCD	5.875	5.875	7.25
MAXIMUM RPM ALL UNITS 1800			

MODEL	ECB 625-XL ECB625-XLT ECB625-XL-SS ECB 625-XLT-SS	ECB 875-XL ECB 875-XLT ECB 875-XL-SS ECB 875-XLT-SS	ECB 1125-CC ECB 1125-TCC
TORQUE	CLUTCH @ 80PSI BRAKE @ 80PSI	CLUTCH @ 80PSI BRAKE @ 80PSI	CLUTCH @ 80PSI BRAKE @ 80PSI
STATIC	160 IN-LB	270 IN-LB	450 IN-LB
DYNAMIC	144 IN-LB	243 IN-LB	400 IN-LB
HEAT DISSIPATION	.12 HP	.15 HP	.3 HP
OUTPUT* SHAFT	75#	140#	275#
HEAT CAPACITY	12000 FT-LB	18000 FT-LB	25000 FT-LB
WK2 OF CYCLING PART	.70 IN2LB	1.90 IN2LB	7.90 IN2LB
KEY	0.188	0.188	.25
WEIGHT	15#	20#	49#
FRAME SIZE	56C	143TC/145TC	182TC/184TC

*Based on 10,000 hours bearing life with load 1" from bearing face
The initial torque on new units may be up to 40% less than torque values shown in the above chart until the friction lining is worn in.

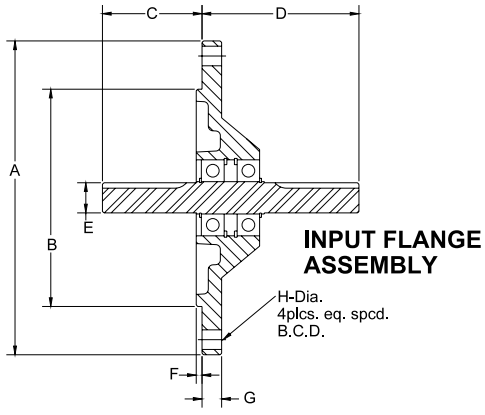
ECB REPAIR KITS	
MODEL	PART NUMBER
ECB625-XL ECB625-XLT ECB875-XL	5505K 5505K 5509K
ECB875-XLT ECB1125-CC ECB1125-TCC	5509K 4115K 4115K

ECB - TCC & XLT



ECB-TCC and XLT allows the optimum method of transmitting torque using complete 360 degree contact between the output shaft of the clutch/brake and the reducer shaft. All clearance is eliminated resulting in a connection having over three square inches contact area.
The ECB-TCC/XLT withstands constant start-stop action and completely eliminates key or keyway destruction
because of it's keyless taper.
SS Models feature STAINLESS STEEL housing and Fasteners.

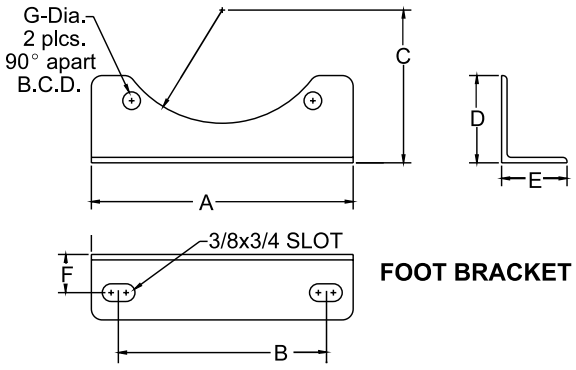
INPUT FLANGE



INPUT FLANGE ASSEMBLY

PART#	3971	3982	5004
MODEL	ECB 625	ECB 875	ECB 1125
A	6.5	6.5	9
B	4.499	4.499	8.496
C	2.063	2.125	2.875
D	3.25	3.688	45
E	0.624	0.874	1.124
F	0.12	0.12	0.25
G	0.406	0.406	0.73
H	0.406	0.406	0.531
BCD	5.875	5.875	7.25
WEIGHT	5#	6#	16.5#

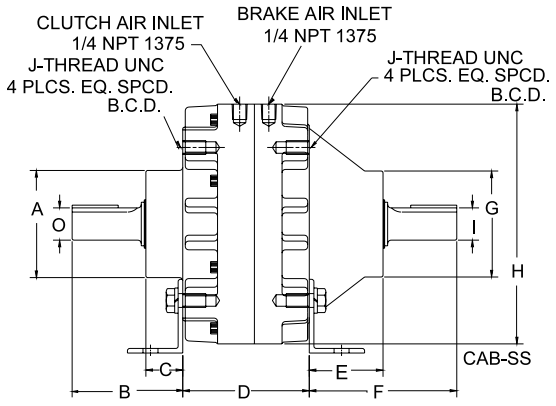
FOOT BRACKET

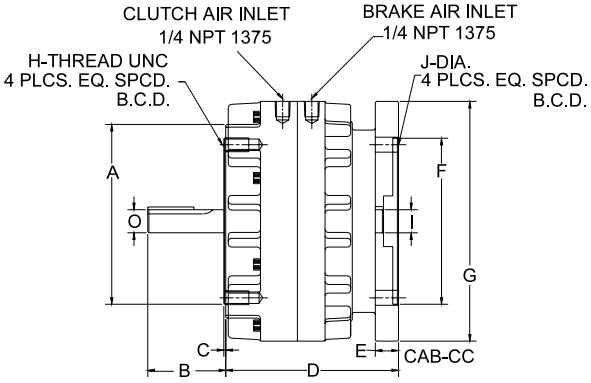


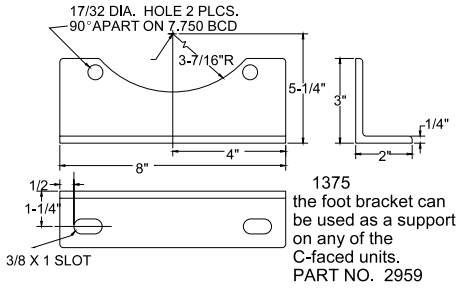
FOOT BRACKET

PART#	2815	4052
MODEL	625 or 875	1125
A	6	6
B	4.75	6
C	3.5	5.25
D	2	3
E	1.5	2
F	0.875	1.25
G	0.406	0.531
BCD	5.875	7.250

MODEL CAB-CC and CAB-SS CLUTCH/BRAKE





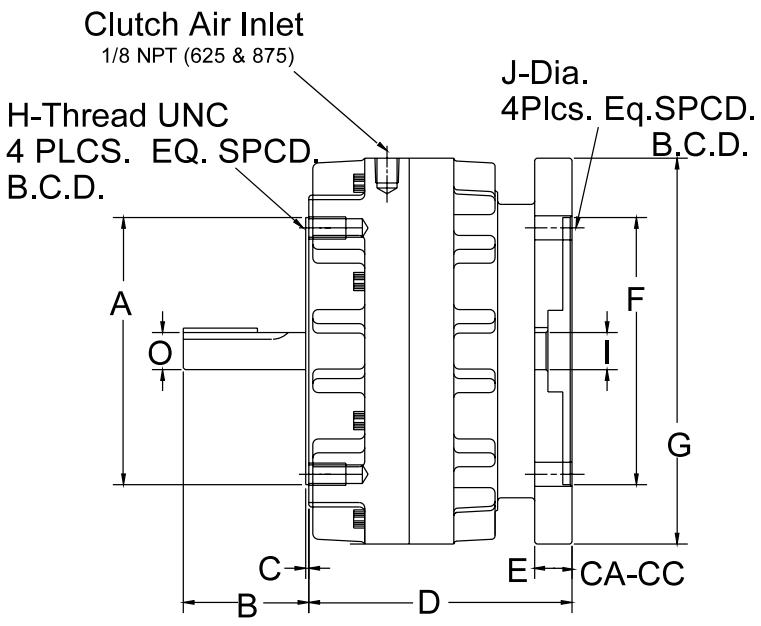


CAB REPAIR KITS	
MODEL	**PART NUMBER**
1375 CAB-CC	2961K
1375 CAB-SS	2966K
DIMENSIONS SHOWN ARE FOR GENERAL INFORMATION ONLY CERTIFIED PRINTS WILL BE FURNISHED UPON REQUEST FOR DESIGN AND INSTALLATION	

STANDARD ASSEMBLIES	1375CAB-CC	1375 CAB-SS
A	8.498	4
B	3.125	4 3/4
C	40546	1 5/8
D	6	4 3/4
E	1/2	2 11/16
F	8.502	5 13/16
G	9	4 1/4
H	1/2-13	9.00
J	17/32	1/2-13
BCD	7.25	7.75
I (INCHES)	1.376	1.375
O (INCHES)	1.376	1.375
INPUT SHAFT OHL*	0	275#
OUTPUT SHAFT OHL*	0	275#
NEMA FRAMES	213TC/215TC	NA

*Based on 10,000 hours bearing life with load 1 inch from face of bearing.

TORQUE (IN-LB)**	CLUTCH@80psi BRAKE@80psi	MAXIMUM RPM ALL UNITS 1800
STATIC	960 1400	
DYNAMIC	800 1180	
HEAT DISSIPATION	.44HP (50%CLUTCH 50% BRAKE)	
HEAT CAPACITY	60,000 FT-LB	
WK2 OF CYCLING PARTS	16 IN2-LB	
** The initial torque on new units may be up to 40% less than torque values shown until the friction lining is worn in.		



STANDARD ASSEMBLIES	625CA-CC	875CA-CC
A	4.499	4.499
B	2 1/16	2 1/8
C	1/8	1/8
D	3 7/8	3 7/8
E	5/8	5/8
F	4.501	4.501
G	6 ½	6 ½
H	3/8-16	3/8-16
J	13/32	13/32
I (inches)	0.626	0.876
O (inches)	0.625	0.875
B.C.D.	5.875	5.875
INPUT SHAFT OHL*	0	0
OUTPUT SHAFT OHL*	0	0
NEMA FRAMES	48Y/56C	143TC/145TC

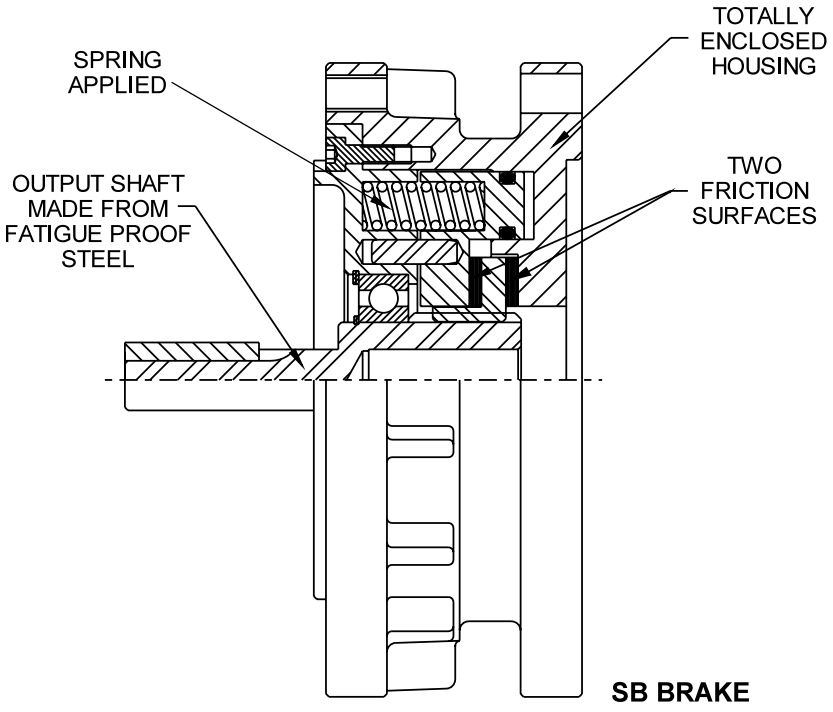
Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

MODEL	625 & 875 AIR CLUTCH	
TORQUE** (IN-LB)	@ 80 PSI	**MAXIMUM RPM ALL UNITS 1800**
STATIC	375	
DYNAMIC	300	
HEAT DISSI-PATION	.09 HP	
HEAT CA-PACITY	20,000 FT-LB	
WK2 OF CYCLING PARTS	1.1 IN2-LB	
REPAIR KIT	2869K(A)	

*Based on 10,000 hours bearing life with load 1 inch from bearing face.
**The initial torque on some units may be up to 40% less than torque values shown until the friction lining is worn in.

TOTALLY ENCLOSED SB BRAKE

- Spring applied / air release
- Optional stainless steel housing on ss models
- High static torque design
- Totally enclosed housing
- Protection against outside contaminants
- Used in washdown applications
- C-flange mounted

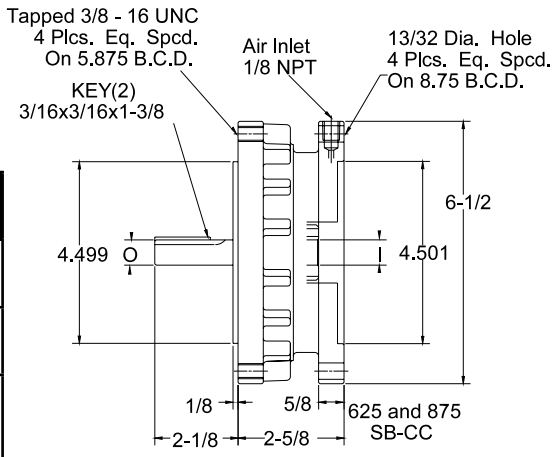


ENCLOSED SPRING APPLIED/AIR RELEASE C-FACE BRAKE

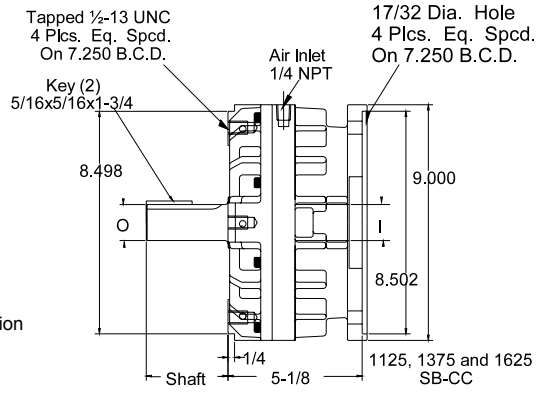
ENCLOSED SPRING APPLIED C-FACE BRAKE - features two friction surfaces to give high torque, better heat dissipation and longer service life. The brakes fit 56C, 143TC,145TC,184TC, 215TC and 245TC frame motors and reducers and are available in double C-face or C-face to the motor with a bearing mounted output shaft..

ALL C-FACE PRODUCTS USE O-RINGS AS DYNAMIC SEALS, THEREFORE, ADEQUATE LUBRICATION MUST BE PROVIDED IN THE ACTUATING AIR CIRCUIT TO ENSURE THESE O-RINGS DO NOT RUN DRY.

SPRING APPLIED/AIR RELEASE BRAKE



STANDARD ASSEMBLIES	625SB-CC 625SB-CC-SS	875SB-CC 875SB-CC-SS	1125SB-CC
I (INCHES)	0.626	0.876	1.126
O (INCHES)	0.625	0.875	1.125
NEMA FRAMES	48Y/56C 143TC/145TC		182TC/184TC 213TC/215TC 254TC
HEAT DISSIPATION	.12 HP		.30 HP
HEAT CAPACITY	20,000 FT-LBF		45,OOO FT-LBF
WEIGHT	14 LBS.		56 LBS.
SHAFT	2.125	2.125	2.625
OUTPUT SHAFT OHL*	0		



*Based on 10,000 hours bearing life with load 1 inch from bearing face.
**The initial torque on new units may be up to 40% less than torque values shown until the friction lining is worn in.

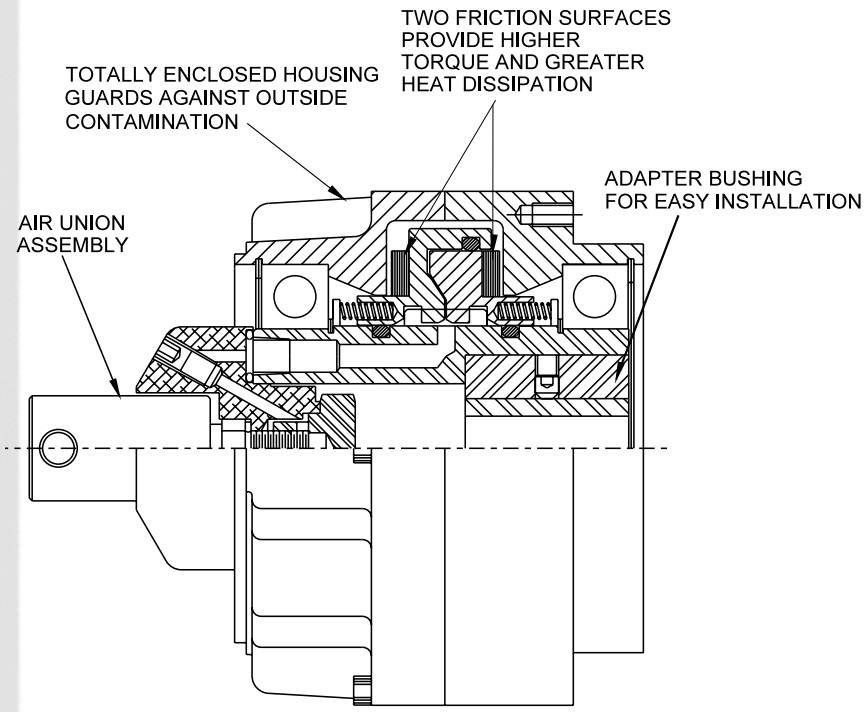
MODEL	625 AND 875 SPRING BRAKE	1125 SPRING BRAKE
WK2 OF ROTATING PARTS	.44 IN2-LBF	11.2 IN2-LBF
TORQUE** (IN-LBF)	BRAKE @ O psi FULL LINING	
STATIC	300	1200
DYNAMIC	250	1000
MAXIMUM RPM 1800		

SB-CC REPAIR KITS	
MODEL	PART NUMBER
625 SB-CC	2841K
875 SB-CC	2841K
1125 SB-CC	4917K

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

UC TOTALLY ENCLOSED END SHAFT MOUNTED AIR CLUTCHES

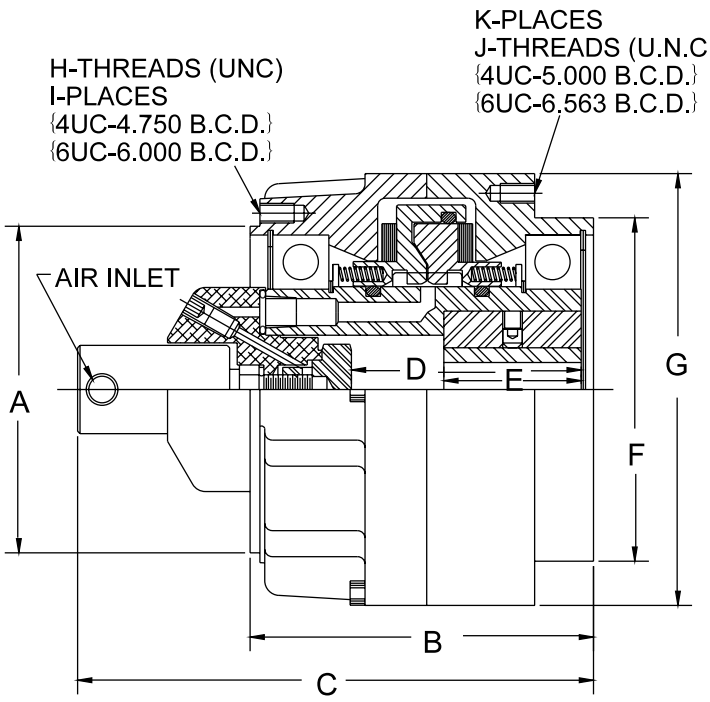
- Totally enclosed housing
- Protection against outside contaminants
- Used in washdown applications
- High torque ratings
- Easy bushing Installation
- Greater heat dissipation
- High RPM capabilities



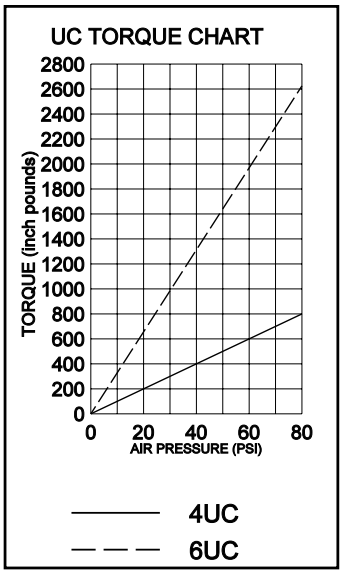
PILOT MOUNTED AND INTEGRAL MOUNTED TOTALLY ENCLOSED CLUTCHES

All UC products use O-rings as dynamic seals, therefore adequate lubrication must be provided in the actuating air circuit to ensure these O-rings do not run dry.

MODEL UC PM CLUTCH



MODEL	4UC	6UC
A	4.250	5.375
B	4 3/8	5 11/16
C	6 9/16	8 7/16
D	2 15/16	4 3/16
E	1 3/4	2 1/2
F	4.375	5.875
G	5 1/2	7 1/2
H	1/4-20	3/8-16
I	3	3
J	1/4-20	3/8-16
K	4	4
INNER HUB	.15	.48
OUTER HOUSING	.32	1.26
MAX. RPM	3200	2400
WT.	19	41
HP UP TO*	.75	1.5



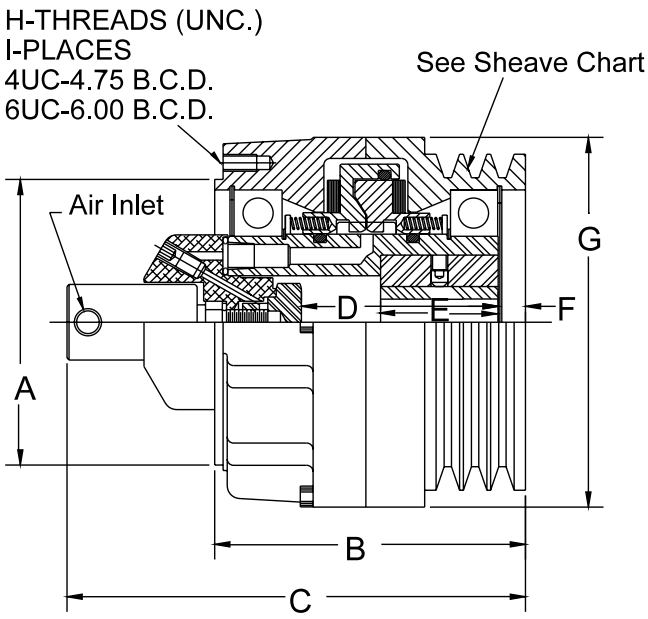
UNIT	4UC			6 UC			
PART NUMBER	2617-3	2617-4	2617-5	2580-3	2580-5	2580-6	2580-8
BORE INCHES	1.125	1.250	1.375	1.250	1.500	1.625	1.875
KEYWAY INCHES	1/4 X 1/8		5/16 X 5/32	1/4 X 1/8	3/8 X 3/16		1/2 X 1/4
AIR SUPPLY KIT	2600			2341			

Rotating air unions with adapter (necessary for end shaft mounting) are available for both the 4UC and 6UC. Hub to shaft adapter bushings (see chart for sizes) are also available and make the clutch easy to install.

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

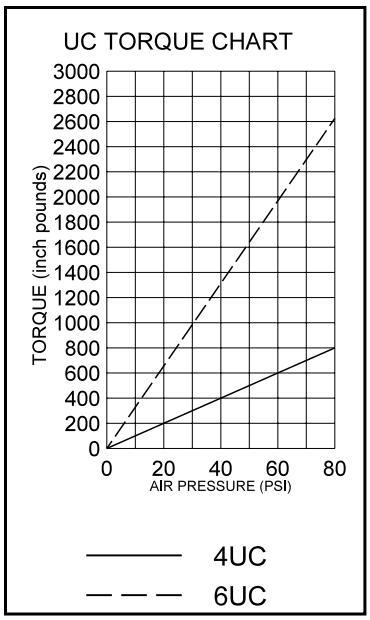
*Continuous thermal dissipation at 1750 RPM

MODEL UC IM CLUTCH



MODEL	4UC	6UC
A	4.250	5.375
B	4 5/8	5 29/32
C	6 3/4	8 21/32
D	3 5/32	4 3/16
E	1 3/4	2 1/2
F	5/16	15/16
G	5 1/2	7 1/2
H	1/4-20	3/8-16
I	3	3
WK2 (FT2LBF) INNER HUB	.15	.48
WK2 (FT2LBF) OUTER HOUSING	.38	1.60
MAX RPM	3200	2400
HP UP TO*	.75	1.5

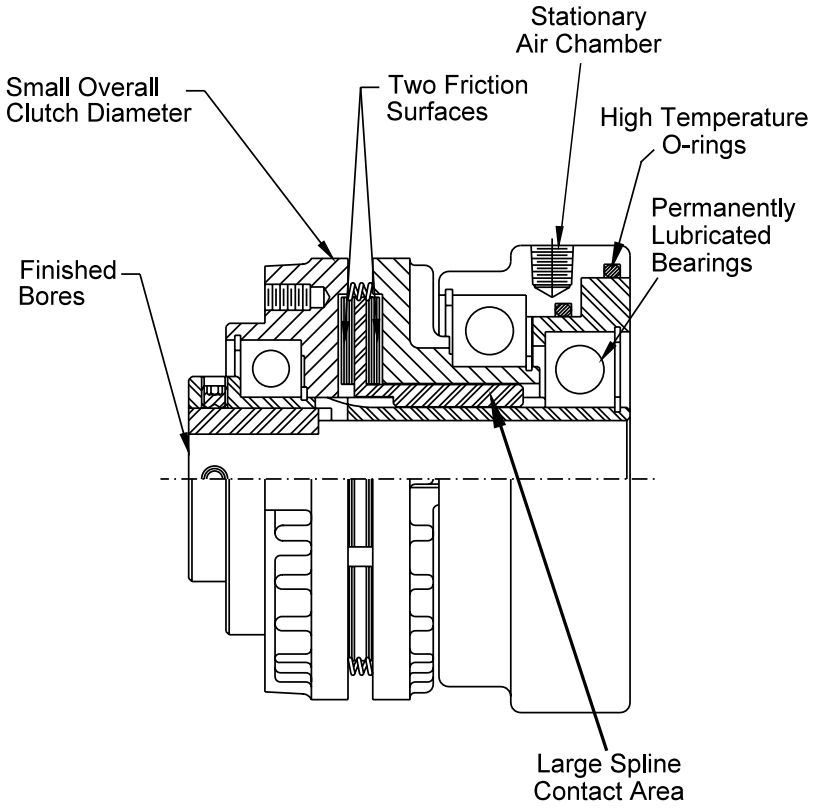
UNIT	PART NUMBER	BORE INCHES	KEYWAY INCHES	AIR SUPPLY KIT
4UC	2617-3	1.125	1/4 X 1/8	2600
	2617-4	1.250		
	2617-5	1.375	5/16 X 5/32	
6 UC	2580-3	1.250	1/4 X 1/8	2341
	2580-5	1.500	3/8 X 3/16	
	2580-6	1.625		
	2580-8	1.875	1/2 X 1/4	



SHEAVE CONFIGURATION	4UC 3 GROOVE 3V	4UC 2 GROOVE A-B	6UC 3 GROOVE 5V	
PART NUMBER	2614-1	2614-5	2574-3	2574-7
OUTSIDE DIAMETER	5.0		7.1	8.5
PITCH DIAMETER		5.0(A) 5.4(B)		
WEIGHT	18	19	39	49

UC SERIES REPAIR KITS KIT CONTAINS - Springs, O-Rings, Torque Plate Assemblies with Lining						
MODEL	4UCPM	4UCIM	4UCBK	6UCPM	6UCIM	6UCBK
PART NUMBER	4017-1	4017-1	4017-1	4017-2	4017-2	4017-2

- Air actuated clutch
- Pilot mount integral mount (backplate/sheave) models
- Mid shaft or end shaft mounting
- Straight bores
- High torque
- Compact design
- Permanently lubricated bearings
- High temperature sealing o-rings
- Torque range from 60 in/lbs to 2400 in/lbs
- Standard bore sizes from .625” to 1.625”



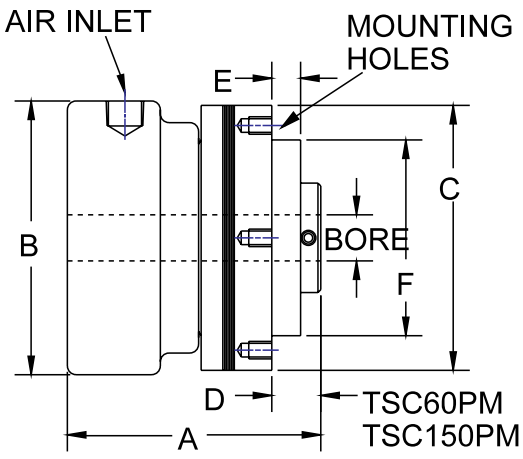
TSC
THROUGH SHAFT MOUNTED CLUTCHES

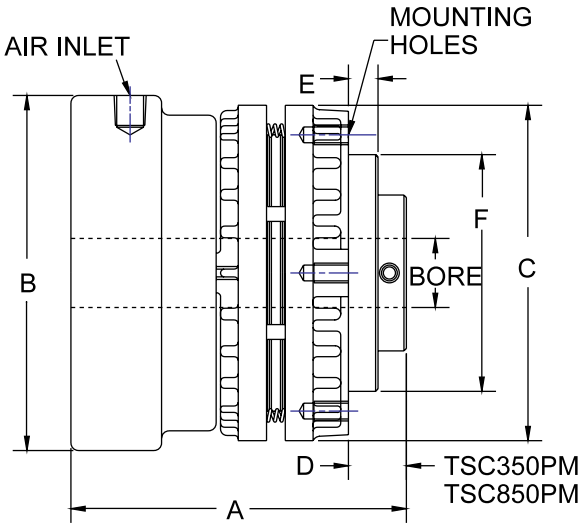
All TSC products use o-rings as dynamic seals. Therefore adequate lubrication must be provided in the actuating air circuit to ensure the 0-rings do not run dry

TSC PILOT MOUNT CLUTCH

MODEL		TSC60PM	TSC150PM	TSC350PM	TSC850PM
TORQUE @ 80 PSI	STATIC	60 IN-LB	150 IN-LB	350 IN-LB	850 IN-LB
	DYNAMIC	50 IN-LB	125 IN-LB	285 IN-LB	700 IN-LB
HEAT CAPACITY		7,500 FT-LB	15,000 FT-LB	30,000 FT-LB	60,000 FT-LB
HEAT DISSIPATION WITH BACKPLATE @ 1800		.10 HP	.14 HP	.22 HP	.50 HP
WK2 BACKPLATE		.8 IN^2LB	2.5 IN^2LB	9.4 IN^2LB	37.8 IN^2LB
WK2 HUB AND CLUTCH DISC		.65 IN^2LB	2.3 IN^2LB	1.9 IN^2LB	8.5 IN^2LB
WEIGHT		3 1/4	7	9	23

MINIMUM SPROCKET						
CHAIN SIZE	25	35	40	50	60	80
TSC60	40T	28T	22T	-	-	-
TSC150	49T	34T	27T	22T	-	-
TSC350	56T	38T	30T	25T	21T	-
TSC850	-	52T	39T	32T	27T	22T





MODEL	TSC60PM	TSC150PM	TSC350PM	TSC850PM
A	2 3/4	3 5/8	4 1/4	5 1/4
B	3	4	4 ½	5 5/8
C	2 7/8	3 3/4	4 1/4	5 7/8
D	11/32	9/16	3/4	3/4
E	5/16	1/4	3/8	3/8
F	2.124	2.499	2.999	3.999
MOUNTING HOLES (IN.)	10-24NC X 9/32 DEEP 4 PLACES EQUAL SPACED ON 2.437 BOLT CIRCLE DIAMETER	1/4 - 20NC X 7/16 DEEP 4 PLACES EQUAL SPACED ON 3.000 BOLT CIRCLE DIAMETER	1/4 - 20NC X 7/16 DEEP 4 PLACES EQUAL SPACED ON 4.750 BOLT CIRCLE DIAMETER	5/16 - 18 NC X ½ DEEP 4 PLACES EQUAL SPACED ON 4.750 BOLT CIRCLE DIAMETER

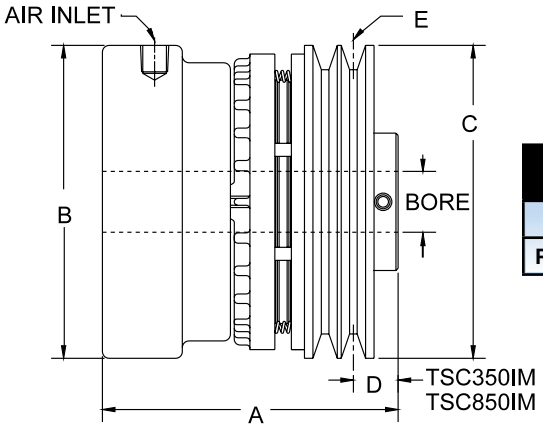
MAXIMUM RPM ALL UNITS 1800
Dimensions shown are for general information only.
Certified prints will be furnished for design and installation purposes.

C-2 Lubricated Air Required

TSC INTEGRAL MOUNT CLUTCH

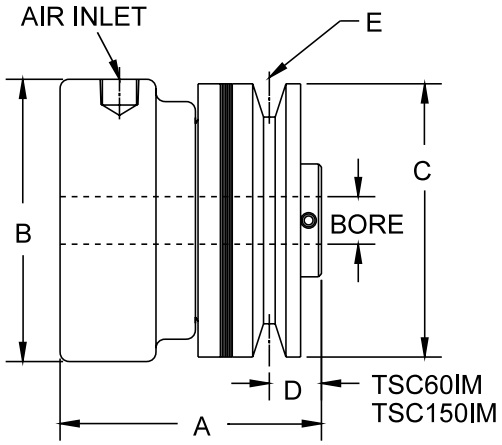
STANDARD BORE SIZES FOR TSC MODELS				
MODEL	**TSC60**	**TSC150**	**TSC350**	**TSC850**
ASSEMBLY	-2 -4	-1 -2 -7	-1 -2 -3 -8	-0 -1 -2 -3 -4 -9
BORE	.625	.750 .875	.875 1.000 1.125	1.125 1.250 1.375 1.500 1.625
KEYWAY	3/16 X 3/32	3/16 X 3/32	1/4 X 1/8	1/4 X 1/8 1/4 X 1/8 5/16 X 5/32 3/8 X 3/16 3/8 X 3/16

MODEL	TSC60IM	TSC150IM	TSC350IM	TSC850IM
A	2 3/4	3 5/8	4 1/4	5 1/4
B	3	4	4 1/2	5 5/8
C	2 7/8	3 21/32	4 1/2	5 5/16
D	35/64	21/32	21/32	29/64
E	1G3V	1G3V	2G3V	3G3V
MAXIMUM RPM ALL UNITS 1800				



TSC REPAIR KITS KIT CONTAINS - Retaining Rings, Bearings, O-Rings, Clutch Disc, Friction Lining, Springs				
MODEL	60IM and PM	150IM and PM	350IM and PM	850IM and PM
PART NUMBER	4228K	4179K	4175K	4182K

MODEL		TSC60IM	TSC150IM	TSC350IM	TSC850IM
TORQUE @ 80PSI	STATIC	60 IN-LB	150 IN-LB	350 IN-LB	850 IN-LB
	DYNAMIC	50 IN-LB	125 IN-LB	285 IN-LB	700 IN-LB
HEAT CAPACITY		7,500 FT-LB	15,000 FT-LB	30,000 FT-LB	60,000 FT-LB
HEAT DISSIPATION WITH BACKPLATE @ 1800		.10 HP	.14 HP	.22 HP	.50 HP
WK^2 BACKPLATE		.95 IN^2LB	3.9 IN^2LB	12.4 IN^2LB	39.5 IN^2LB
WK^2 HUB AND CLUTCH DISC		.65 IN^2LB	2.3 IN^2LB	1.9 IN^2LB	8.5 IN^2LB
WEIGHT		3 1/4 LB	7 LB	9 LB	23 LB

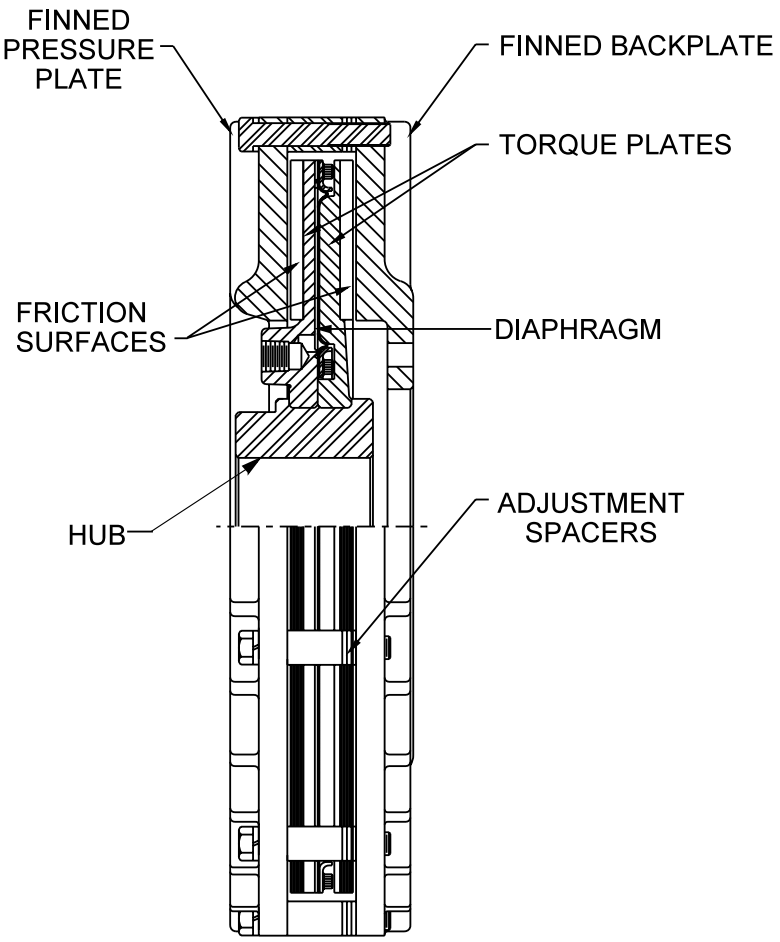


Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

Lubricated Air Required

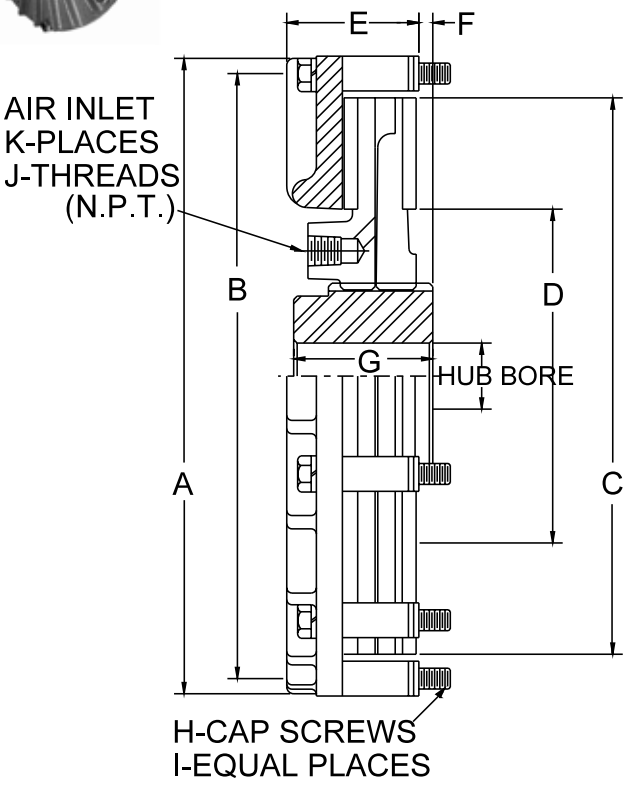
HEAVY DUTY INDUSTRIAL AIR CLUTCHES

- Two friction surfaces
- Greater torque capacity
- Low inertia design
- High temperature air diaphragm
- Quick engagement and disengagement
- Easy adjustment for lining wear



HIGH TEMPERATURE DIAPHRAGM CLUTCH

MODEL CW CLUTCH SIZE 8.5 - 10 - 12 - 14



MODEL		8.5	10	12	14
A		10.00	11.50	13.87	15.87
B		9.375	10.875	13.125	15.125
C		8.50	10.00	12.00	14.00
D		5.25	6.00	7.50	8.00
E		2.31	2.37	2.52	2.52
F		.25	.25	.25	.25
G		2.50	2.50	2.75	2.75
H		3/8-24	3/8-24	1/2-20	1/2-20
I		8	10	8	8
J		1/4	1/4	1/4	1/4
K		2	2	2	2
HUB BORE	Min. Bore	1.18	1.18	1.68	1.68
	Max. Bore Standard Keyway	2.000	2.000	2.875	2.875
	Max. Bore Shallow Keyway	2.125	2.125	3.250	3.250
PRESSURE PLATE* WK2 Lb-Ft²		0.92	1.59	3.80	6.90
TORQUE PLATE WK2 Lb-Ft²		0.70	1.35	2.79	5.90
Weight Lbs. Approx.		24	32	53	67

*Includes Pressure plate, Cap screws and Spacers.

MODEL	8.5	10	12	14
TORQUE IN-LBS** @ 60 PSI LOCO LINING	1045	2501	4232	8251
TORQUE IN-LBS** @ 80 PSI STANDARD LINING	4290	10169	17322	33548
MAXIMUM RPM	3000	2800	2500	2400

** The initial torque on new units may be up to 40% less than torque values shown until the friction lining is worn in.

REPAIR KITS

HARDWARE KITS
CONTAINS-
CAPSCREWS,LOCKWASHERS,SPACERS,
ADJUSTMENT SPACERS

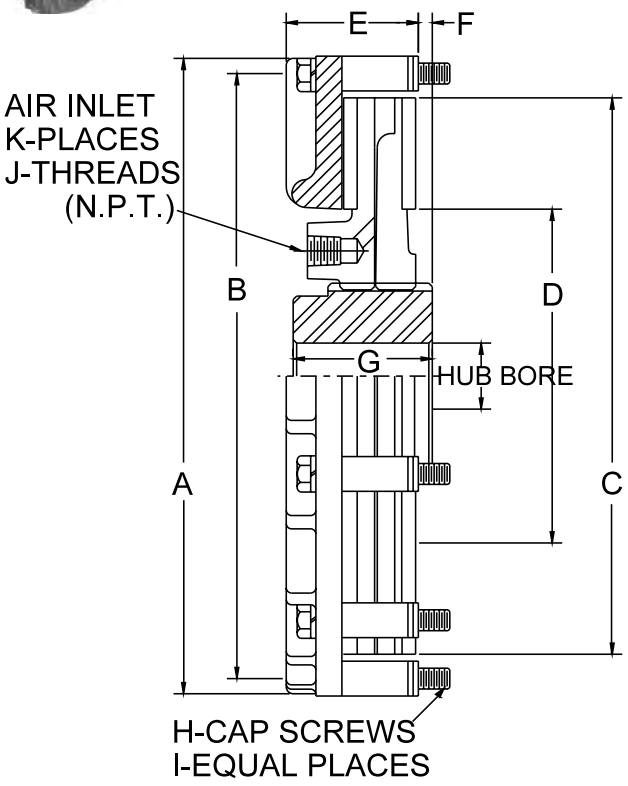
SIZE	8.5	10	12	14
PART NUMBER	4014-1	4014-2	4014-3	4014-4

CENTERING MECHANISM KITS
CONTAINS -
LOCKNUTS, STUDS, SPRINGS,
SCREWS, LOCKWASHERS,
CENTERING MECHANISM BRACKETS

SIZE	8.5	10	12	14
PART NUMBER	4013-2	4013-2	4013-4	4013-4

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

MODEL CW CLUTCH SIZE 16 - 18 - 20 - 22



MODEL		16	18	20	22
A		17.57	19.87	22.25	24.25
B		17.125	19.125	21.250	23.250
C		16.00	18.00	20.00	22.00
D		9.00	10.00	11.00	12.00
E		2.75	2.87	3.19	3.25
F		.37	.37	.50	.50
G		3.00	3.00	4.00	4.00
H		½-20	1/2-20	5/8-18	5/8-18
I		10	12	10	12
J		3/8	3/8	3/8	3/8
K		2	2	3	3
HUB BORE	Min. Bore	1.68	1.68	2.75	2.75
	Max. Bore Standard Keyway	3.500	3.500	4.625	4.625
	Max. Bore Shallow Keyway	3.875	3.875	5.125	5.125
PRESSURE PLATE* WK2 Lb-Ft²		12.40	20.57	37.74	54.02
TORQUE PLATE WK2 Lb-Ft²		9.57	14.64	26.30	40.10
Weight Lbs. Approx.		95	118	170	220

*Includes Pressure plate, Cap screws and Spacers.

MODEL	16	18	20	22
TORQUE IN-LBS** @ 60 PSI LOCO LINING	11792	19090	23879	35159
TORQUE IN-LBS** @ 80 PSI STANDARD LINING	48196	77684	97543	143120
MAXIMUM RPM	2200	2000	1800	1500

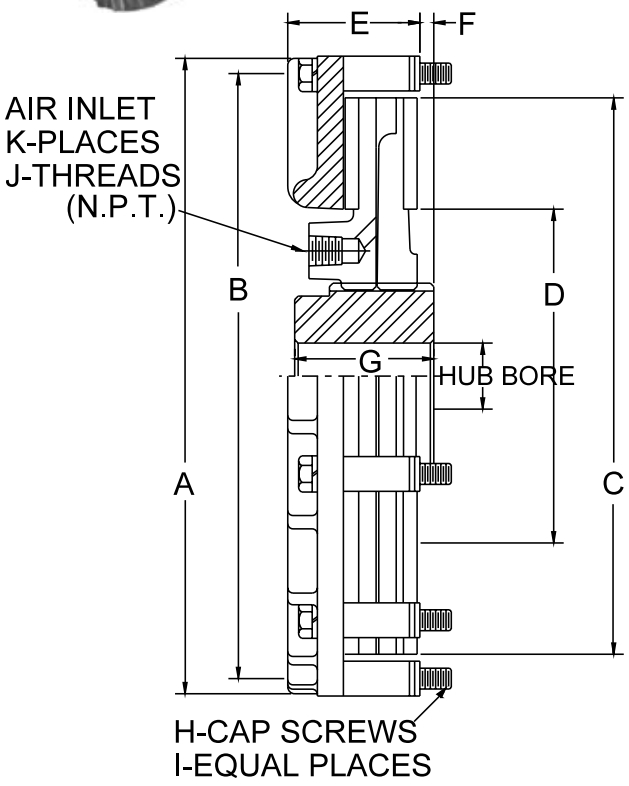
** The initial torque on new units may be up to 40% less than torque values shown until the friction lining is worn in.

REPAIR KIT

HARDWARE KITS CONTAINS- CAPSCREWS,LOCKWASHERS,SPACERS, ADJUSTMENT SPACERS				
SIZE	16	18	20	22
PART NUMBER	4014-5	4014-6	4014-7	4014-8
CENTERING MECHANISM KITS CONTAINS - LOCKNUTS, STUDS, SPRINGS, SCREWS, LOCKWASHERS, CENTERING MECHANISM BRACKETS				
SIZE	16	18	20	22
PART NUMBER	4013-6	4013-6	4013-8	4013-8

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

MODEL CW CLUTCH SIZE 25 - 28 - 32 - 36



MODEL		25	28	32	36
A		27.25	30.25	34.25	38.25
B		26.250	29.250	33.250	37.250
C		25.00	28.00	32.00	36.00
D		14.50	16.00	17.75	19.75
E		4.00	4.31	4.81	5.06
F		.62	.62	1.25	1.25
G		5.00	5.00	6.00	6.00
H		5/8-18	5/8-18	5/8-18	5/8-18
I		16	20	24	30
J		1/4	1/4	1/4	1/4
K		3	3	3	3
HUB BORE	Min. Bore	2.75	2.75	4.00	4.00
	Max. Bore Standard Keyway	5.625	5.625	8.000	8.000
	Max. Bore Shallow Keyway	6.250	6.250	8.500	8.500
PRESSURE PLATE* WK2 Lb-Ft²		110.29	182.80	334.60)	618.80
TORQUE PLATE WK2 Lb-Ft²		76.05	122.20	233.80	363.28
Weight Lbs. Approx.		320	410	670	880

*Includes Pressure plate, Cap screws and Spacers.

MODEL	25	28	32	36
TORQUE IN-LBS** @ 60 PSI LOCO LINING	51677	79730	108419	172387
TORQUE IN-LBS** @ 80 PSI STANDARD LINING	210200	323454	441370	699637
MAXIMUM RPM	1200	1000	800	600

** The initial torque on new units may be up to 40% less than torque values shown until the friction lining is worn in.

REPAIR KIT

HARDWARE KITS
CONTAINS-
CAPSCREWS,LOCKWASHERS,SPACERS,
ADJUSTMENT SPACERS

SIZE	25	28	32	36
PART NUMBER	4014-9	4014-10	4014-11	4014-12

CENTERING MECHANISM KITS
CONTAINS -
LOCKNUTS, STUDS, SPRINGS,
SCREWS, LOCKWASHERS,
CENTERING MECHANISM BRACKETS

SIZE	25	28	32	36
PART NUMBER	4013-10	4013-10	4013-12	4013-12

Dimensions shown are for general information only.
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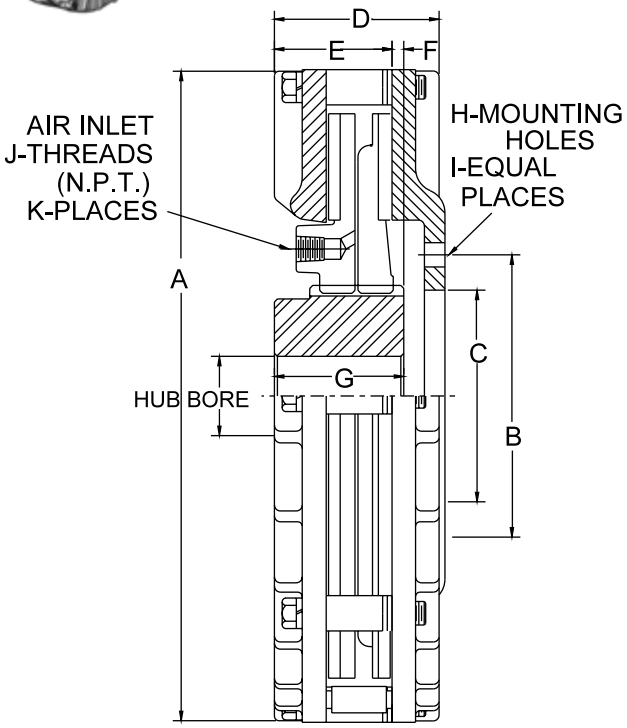
MODEL CR CLUTCH SIZE 8.5 - 10 - 12 - 14



MODEL		8.5	10	12	14
A		10.00	11.50	13.87	15.87
B		4.375	5.000	6.000	6.500
C		3.375	4.000	4.500	5.000
D		3.25	3.37	3.65	3.65
E		2.31	2.37	2.52	2.52
F		.25	.25	.25	.25
G		2.50	2.50	2.75	2.75
H		25/64	25/64	33/64	33/64
I		6	8	6	6
J		1/4	1/4	1/4	1/4
K		2	2	2	2
HUB BORE	Min. Bore	1.18	1.18	1.68	1.68
	Max. Bore Standard Keyway	2.000	2.000	2.875	2.875
	Max. Bore Shallow Keyway	2.125	2.125	3.250	3.250
PRESSURE PLATE* WK2 Lb-Ft²		2.10	3.43	8.47	12.45
TORQUE PLATE WK2 Lb-Ft²		.70	1.35	2.79	5.90
Weight Lbs. Approx.		34	44	78	95

*Includes Pressure plate, Cap screws and Spacers.

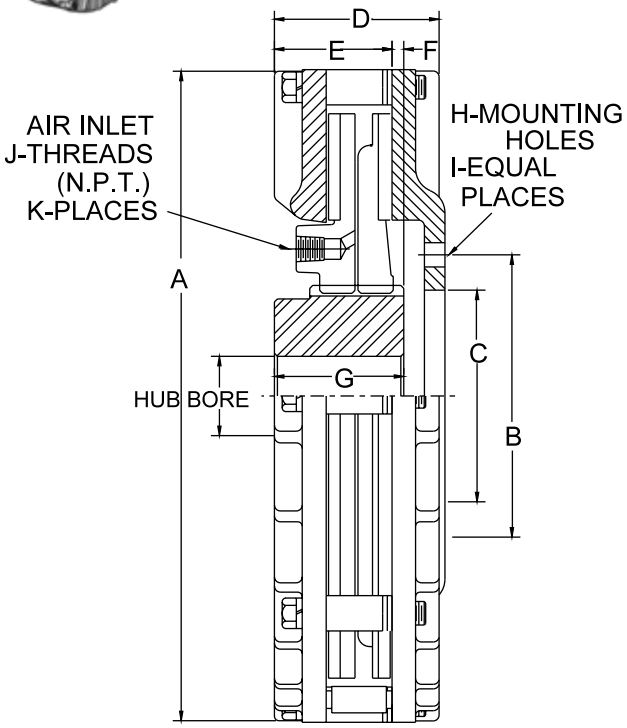
MODEL	8.5	10	12	14
TORQUE IN-LBS** @ 60 PSI LOCO LINING	1045	2501	4232	8251
TORQUE IN-LBS** @ 80 PSI STANDARD LINING	4290	10169	17322	33548
MAXIMUM RPM	3000	2800	2500	2400

** The initial torque on new units may be up to 40% less than torque values shown until the friction lining is worn in.

REPAIR KIT				
HARDWARE KITS CONTAINS- CAPSCREWS,LOCKWASHERS,SPACERS, ADJUSTMENT SPACERS				
SIZE	8.5	10	12	14
PART NUMBER	4014-1	4014-2	4014-3	4014-4
CENTERING MECHANISM KITS CONTAINS - LOCKNUTS, STUDS, SPRINGS, SCREWS, LOCKWASHERS, CENTERING MECHANISM BRACKETS				
SIZE	8.5	10	12	14
PART NUMBER	4013-2	4013-2	4013-4	4013-4

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

MODEL CR CLUTCH SIZE 16 - 18 - 20 - 22



MODEL		16	18	20	22
A		17.87	19.87	22.25	24.25
B		7.500	8.250	9.000	9.750
C		6.000	6.500	7.500	8.000
D		4.00	4.25	4.69	4.81
E		2.75	2.87	3.19	3.25
F		.37	.37	.50	.50
G		2.50	2.50	2.75	2.75
H		33/64	33/64	41/64	41/64
I		8	8	8	8
J		3/8	3/8	3/8	3/8
K		2	2	3	3
HUB BORE	Min. Bore	1.68	1.68	2.75	2.75
	Max. Bor Standard Keyway	3.500	3.500	4.625	4.625
	Max. Bor Shallow Keyway	3.875	3.875	5.125	5.125
PRESSURE PLATE* WK^2 Lb-Ft²		23.16	40.00	71.84	102.60
TORQUE PLATE WK^2 Lb-Ft²		9.57	14.64	26.30	40.10
Weight Lbs. Approx.		137	172	240	310

*Includes Pressure plate, Cap screws and Spacers.

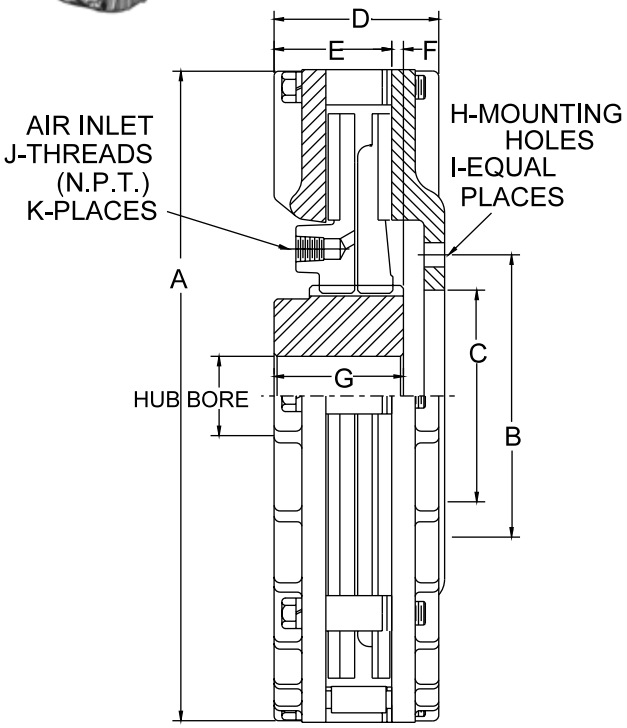
MODEL	16	18	20	22
TORQUE IN-LBS** @ 60 PSI LOCO LINING	11792	19090	23879	35159
TORQUE IN-LBS** @ 80 PSI STANDARD LINING	48196	77684	97543	143120
MAXIMUM RPM	2200	2000	1800	1500

** The initial torque on new units may be up to 40% less than torque values shown until the friction lining is worn in.

REPAIR KIT				
HARDWARE KITS CONTAINS- CAPSCREWS,LOCKWASHERS,SPACERS, ADJUSTMENT SPACERS				
SIZE	16	18	20	22
PART NUMBER	4014-5	4014-6	4014-7	4014-8
CENTERING MECHANISM KITS CONTAINS - LOCKNUTS, STUDS, SPRINGS, SCREWS, LOCKWASHERS, CENTERING MECHANISM BRACKETS				
SIZE	16	18	20	22
PART NUMBER	4013-6	4013-6	4013-8	4013-8

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

MODEL CR CLUTCH SIZE 25 - 28 - 32 - 36



MODEL		25	28	32	36
A		27.25	30.25	34.25	38.25
B		12.000	13.000	15.000	17.000
C		10.000	11.000	12.500	14.000
D		5.87	6.50	7.31	8.06
E		4.00	4.31	4.81	5.06
F		.62	.62	1.25	1.25
G		5.00	5.00	6.00	6.00
H		49/64	49/64	1-1/64	1-1/64
I		10	12	12	12
J		1/2	1/2	1/2	1/2
K		3	3	3	3
HUB BORE	Min. Bore	2.75	2.75	4.00	4.00
	Max. Bore Standard Keyway	5.625	5.625	8.000	8.000
	Max. Bore Shallow Keyway	6.250	6.250	8.500	8.500
PRESSURE PLATE* WK^2 Lb-Ft²		199.90	357.60	667.00	1208.40
TORQUE PLATE WK^2 Lb-Ft²		76.05	122.20	233.80	363.28
Weight Lbs. Approx.		440	580	925	1260

*Includes Pressure plate, Back plate, Cap screws and Spacers.

MODEL	25	28	32	36
TORQUE IN-LBS** @ 60 PSI LOCO LINING	51677	79730	108419	172387
TORQUE IN-LBS** @ 80 PSI STANDARD LINING	210200	323454	441370	699637
MAXIMUM RPM	1200	1000	800	600

** The initial torque on new units may be up to 40% less than torque values shown until the friction lining is worn in.

REPAIR KITS

HARDWARE KITS
CONTAINS- CAPSCREWS,LOCKWASHERS,SPACERS, ADJUSTMENT SPACERS

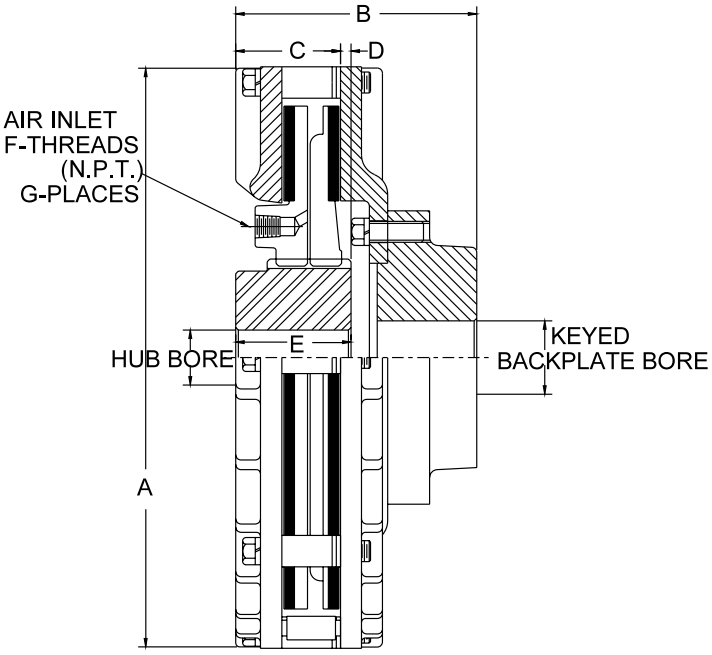
SIZE	25	28	32	36
PART NUMBER	4014-9	4014-10	4014-11	4014-12

CENTERING MECHANISM KITS
CONTAINS - LOCKNUTS, STUDS, SPRINGS, SCREWS, LOCKWASHERS, CENTERING MECHANISM BRACKETS

SIZE	25	28	32	36
PART NUMBER	4013-10	4013-10	4013-12	4013-12

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

MODEL CK CLUTCH SIZE 8.5 - 10 - 12 - 14



MODEL		8.5	10	12	14
A		10.00	11.50	13.87	15.87
B		4.56	5.12	5.77	6.27
C		2.31	2.37	2.52	2.52
D		.25	.25	.25	.25
E		2.50	2.50	2.75	2.75
F		1/4	1/4	1/4	1/4
G		2	2	2	2
HUB BORE	Min. Bore	1.18	1.18	1.68	1.68
	Max. Bore Standard Keyway	2.000	2.000	2.875	2.875
	Max. Bore Shallow Keyway	2.125	2.125	3.250	3.250
KEYED BACKPLATE BORE	Min. Bore	1.25	1.50	2.00	2.00
	Max. Bore Standard Keyway	2.625	2.625	3.625	4.125
	Max. Bore Shallow Keyway	3.000	3.000	4.000	4.500
PRESSURE PLATE* WK^2 Lb-Ft^2		2.23	3.69	9.01	13.43
TORQUE PLATE WK^2 Lb-Ft^2		0.70	1.35	2.79	5.90
Weight Lbs. Approx.		40	54	91	118

*Includes Pressure plate, Cap screws and Spacer.

MODEL	8.5	10	12	14
TORQUE IN-LBS** @ 60 PSI LOCO LINING	1045	2501	4232	8251
TORQUE IN-LBS** @ 80 PSI STANDARD LINING	4290	10169	17322	33548
MAXIMUM RPM	3000	2800	2500	2400

** The initial torque on new units may be up to 40% less than torque values shown Until the friction lining is worn in.

REPAIR KITS

HARDWARE KITS
CONTAINS- CAPSCREWS,LOCKWASHERS,SPACERS, ADJUSTMENT SPACERS

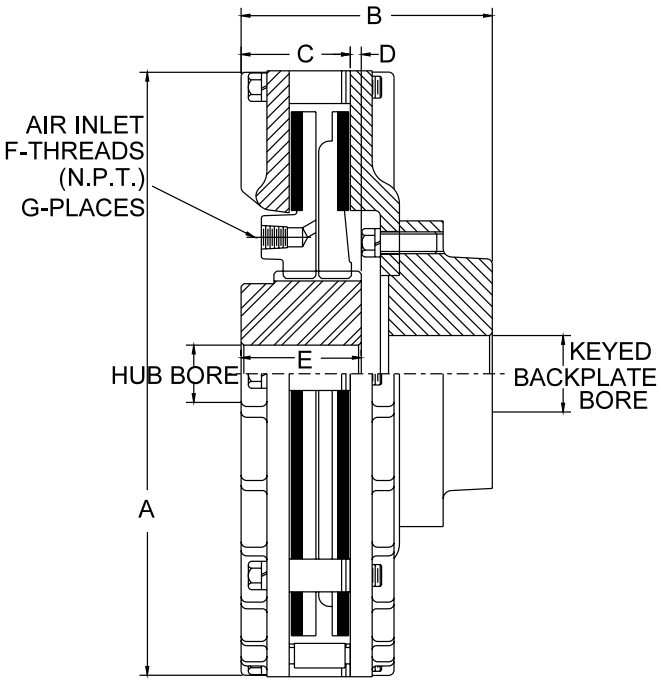
SIZE	8.5	10	12	14
PART NUMBER	4014-1	4014-2	4014-3	4014-4

CENTERING MECHANISM KITS
CONTAINS - LOCKNUTS, STUDS, SPRINGS, SCREWS, LOCKWASHERS, CENTERING MECHANISM BRACKETS

SIZE	8.5	10	12	14
PART NUMBER	4013-2	4013-2	4013-4	4013-4

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

MODEL CK CLUTCH SIZE 16 - 18 - 20 - 22



MODEL		16	18	20	22
A		17.87	19.87	22.25	24.25
B		7.00	7.87	8.69	9.25
C		2.75	2.87	3.19	3.25
D		.37	.37	.50	.50
E		3.00	3.00	4.00	4.00
F		3/8	3/8	3/8	3/8
G		2	2	3	3
HUB BORE	Min. Bore	1.68	1.68	2.75	2.75
	Max. Bore Standard Keyway	3.500	3.500	4.625	4.625
	Max. Bore Shallow Keyway	3.875	3.875	5.125	5.125
KEYED BACKPLATE BORE	Min. Bore	2.50	2.50	3.50	4.00
	Max. Bore Standard Keyway	4.500	5.00	5.250	5.500
	Max. Bore Shallow Keyway	4.500	5.500	6.000	6.500
PRESSURE PLATE* WK^2 Lb-Ft^2		25.16	42.95	76.44	108.90
TORQUE PLATE WK^2 Lb-Ft^2		9.57	14.64	26.30	40.10
Weight Lbs. Approx.		173	222	300	383

*Includes Pressure plate, Cap screws and Spacer.

MODEL	16	18	20	22
TORQUE IN-LBS** @ 60 PSI LOCO LINING	11792	19090	23879	35159
TORQUE IN-LBS** @ 80 PSI STANDARD LINING	48196	77684	97543	143120
MAXIMUM RPM	2200	2000	1800	1500

** The initial torque on new units may be up to 40% less than torque values shown Until the friction lining is worn in.

REPAIR KITS

HARDWARE KITS
CONTAINS - CAPSCREWS,LOCKWASHERS, SPACERS, ADJUSTMENT SPACERS

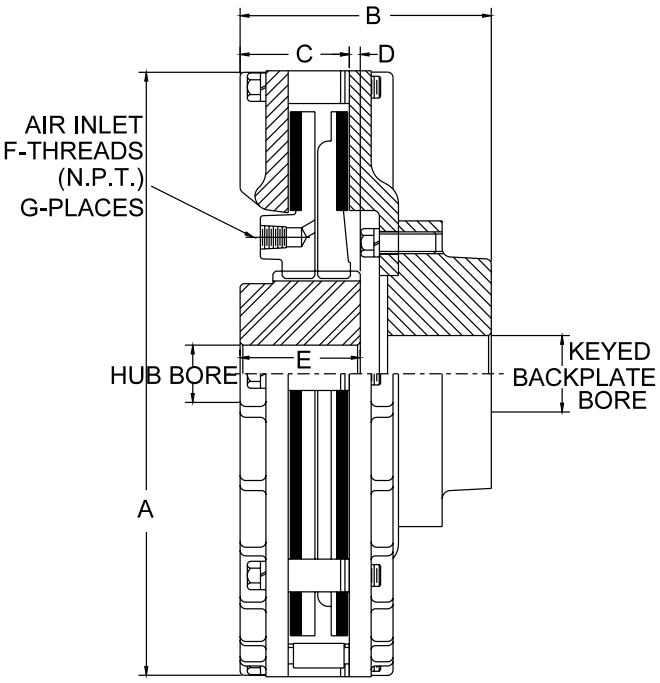
SIZE	16	18	20	22
PART NUMBER	4014-5	4014-6	4014-7	4014-8

CENTERING MECHANISM KITS
CONTAINS - LOCKNUTS, STUDS, SPRINGS, SCREWS, LOCKWASHERS,CENTERING MECHANISM BRACKETS

SIZE	16	18	20	22
PART NUMBER	4013-6	4013-6	4013-8	4013-8

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

MODEL CK CLUTCH SIZE 25 - 28 - 32 - 36



MODEL		25	28	32	36
A		27.25	30.25	34.25	38.25
B		10.62	11.81	13.06	13.56
C		4.00	4.31	4.81	5.06
D		.62	.62	1.25	1.25
E		5.00	5.00	6.00	6.00
F		1/2	1/2	1/2	1/2
G		3	3	3	3
HUB BORE	Min. Bore	2.75	2.75	4.00	4.00
	Max. Bore Standard Keyway	5.625	5.625	8.000	8.000
	Max. Bore Shallow Keyway	6.250	6.250	8.500	8.500
KEYED BACKPLATE BORE	Min. Bore	5.00	5.50	6.00	6.50
	Max. Bore Standard Keyway	7.250	7.750	9.250	10.250
	Max. Bore Shallow Keyway	8.000	8.500	10.000	11.000
PRESSURE PLATE* WK^2 Lb-Ft²		214.20	379.80	699.20	1263.60
TORQUE PLATE WK^2 Lb-Ft²		76.05	122.20	233.80	363.28
Weight Lbs. Approx.		550	720	1090	1480

*Includes Pressure plate, Cap screws and Spacer.

MODEL	25	28	32	36
TORQUE IN-LBS** @ 60 PSI LOCO LINING	51677	79730	108419	172387
TORQUE IN-LBS** @ 80 PSI STANDARD LINING	210200	323454	441370	699637
MAXIMUM RPM	1200	1000	800	600

** The initial torque on new units may be up to 40% less than torque values shown Until the friction lining is worn in.

REPAIR KITS

HARDWARE KITS
CONTAINS- CAPSCREWS,LOCKWASHERS,SPACERS, ADJUSTMENT SPACERS

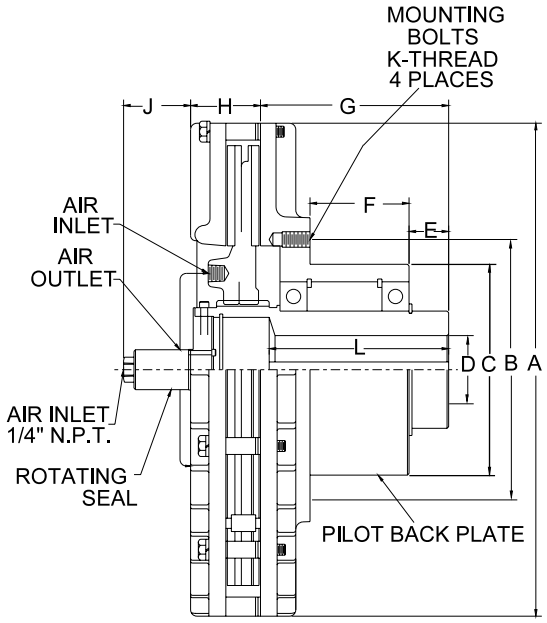
SIZE	25	28	32	36
PART NUMBER	4014-9	4014-10	4014-11	4014-12

CENTERING MECHANISM KITS
CONTAINS - LOCKNUTS, STUDS, SPRINGS, SCREWS, LOCKWASHERS, CENTERING MECHANISM BRACKETS

SIZE	25	28	32	36
PART NUMBER	4013-10	4013-10	4013-12	4013-12

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

MODEL PM CLUTCH SIZE 8.5 - 10 - 12 - 14



MODEL		8.5PM-1	8.5PM-2	10PM-1	10PM-2	12PM	14PM
A		10.00	10.00	11.50	11.50	13.887	15.87
B		6.00	8.50	6.00	8.50	9.00	9.00
C		4.75	6.75	4.75	6.75	7.25	7.25
D - BORE	Min.	1.25	2.00	1.25	2.00	1.75	1.75
	Max. Standard Keyway	1.750	2.750	1.750	2.750	2.750	2.750
	Max. Shallow Keyway	1.937	3.000	1.937	3.000	3.000	3.000
E		.50	.87	.50	.94	1.06	1.06
F		2.00	2.00	2.00	2.00	3.87	3.87
G		3.62	4.06	3.62	4.06	6.56	6.56
H		2.31	2.31	2.38	2.38	2.52	2.52
J		3.07	3.07	3.00	3.00	3.13	3.13
K		3/8"-16	1/2"-13	3/8"-16	1/2"-13	1/2"-13	1/2"-13
L		3.75	3.25	3.75	3.25	6.25	6.25
LOCK COLLAR*		2295-1	2295-2	2295-1	2295-2	2295-2	2295-2
Weight Lbs. Approx.		46	50 1/2	57	65	125	147

*LOCK COLLAR REQUIRED ON BORE SIZES WHICH ARE OVER "MAX. STD. KW" BUT ARE LESS THAN OR EQUAL TO "MAX SHALLOW KW"

MODEL	8.5	10	12	14
TORQUE IN-LBS** @ 60 PSI LOCO LINING	1045	2501	4232	8251
TORQUE IN-LBS** @ 80 PSI STANDARD LINING	4290	10169	17322	33548
MAXIMUM RPM	3000	2800	2500	2400

** The initial torque on new units may be up to 40% less than torque values shown Until the friction lining is worn in.

REPAIR KITS

HARDWARE KITS
CONTAINS-
CAPSCREWS, LOCKWASHERS,SPACERS,
ADJUSTMENT SPACERS

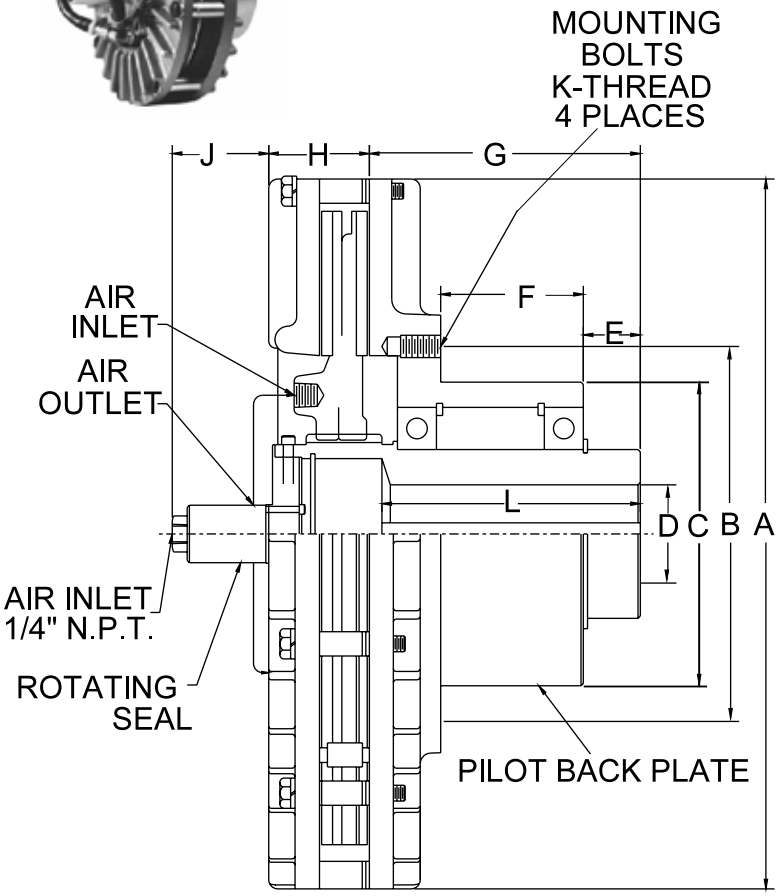
SIZE	8.5	10	12	14
PART NUMBER	4014-1	4014-2	4014-3	4014-4

CENTERING MECHANISM KITS
CONTAINS - LOCKNUTS, STUDS, SPRINGS,
SCREWS, LOCKWASHERS,
CENTERING MECHANISM BRACKETS

SIZE	8.5	10	12	14
PART NUMBER	4013-2	4013-2	4013-4	4013-4

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

MODEL PM CLUTCH SIZE 16 - 18



MODEL		16PM3	18PM3
A		17.87	19.87
B		10.50	10.50
C		9.50	9.50
D - BORE	Min.	2.75	2.75
	Max. Standard Keyway	3.250	3.250
	Max. Shallow Keyway	3.563	3.563
E		1.31	1.31
F		5.53	5.53
G		8.87	8.87
H		2.75	2.87
J		3.00	2.87
K		7/16"-14	7/16"-14
L		8.50	8.50
LOCK COLLAR*		2295-3	2295-3
Weight Lbs. Approx.		215	250

*LOCK COLLAR REQUIRED ON BORE SIZES WHICH ARE OVER "MAX. STD. KW" BUT ARE LESS THAN OR EQUAL TO "MAX SHALLOW KW"

MODEL	16	18
TORQUE IN-LBS** @ 60 PSI LOCO LINING	11792	19090
TORQUE IN-LBS** @ 80 PSI STANDARD LINING	48196	77684
MAXIMUM RPM	2200	2000

** The initial torque on new units may be up to 40% less than torque values shown Until the friction lining is worn in.

REPAIR KITS

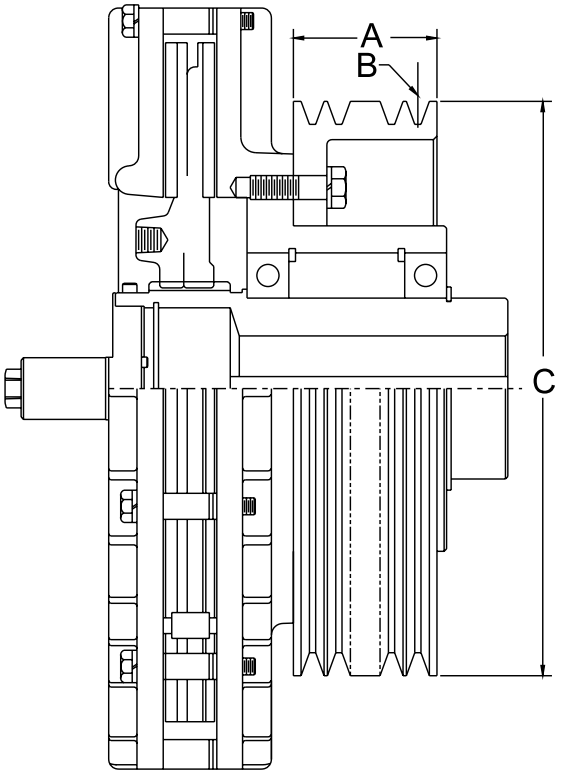
HARDWARE KITS
CONTAINS- CAPSCREWS,LOCKWASHERS, SPACERS, ADJUSTMENT SPACERS

SIZE	16	18
PART NUMBER	4014-5	4014-6

CENTERING MECHANISM KITS
CONTAINS - LOCKNUTS, STUDS, SPRINGS, SCREWS, LOCKWASHERS, CENTERING MECHANISM BRACKETS

SIZE	16	18
PART NUMBER	4013-6	4013-6

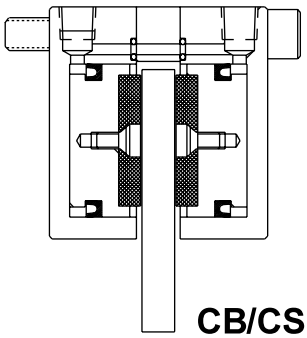
Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.



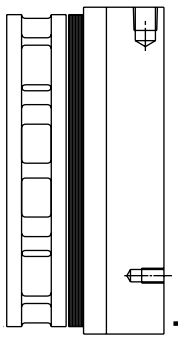
SHEAVE	2562	2565	3291	3290	2199
MODEL	8.5PM-1 10PM-1	8.5PM-2 10PM-2	12PM 14PM	16PM 18PM	20PM 22PM 25PM
A	2 3/8”	2 3/8”	2 3/8”	3 3/4”	7 1/8”
B	3G5V	3G5V	3G5V	5G5V	6G8V
C	8” OD	10.9” OD	12” OD	15” OD	20” OD

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

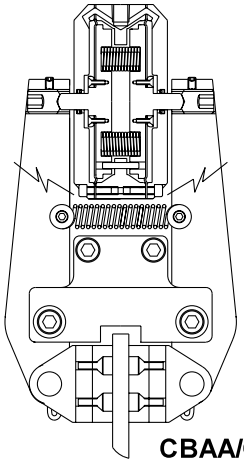
- Model CB air applied caliper brake
- Model CSB spring applied / air release caliper brake
- Model CBSA spring applied / air release caliper brake
- Model CBAA air applied / spring release caliper brake
- Model SB spring applied / air release shoebrake
- Model TSB air applied brake
- Model TSBL tension brake
- Model SAB spring applied / air release brake
- Model 9000 series hydraulic actuated and spring applied caliper brakes
- Model 7000 series spring applied / air release caliper brake



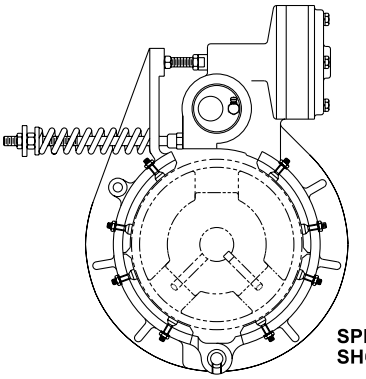
CB/CSB



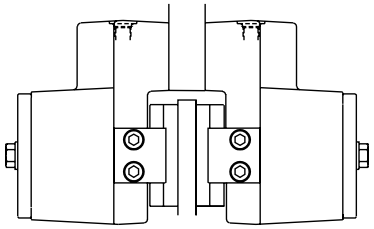
TSB/TSBL



CBAA/CBSA



SPRING APPLIED SHOE BRAKE



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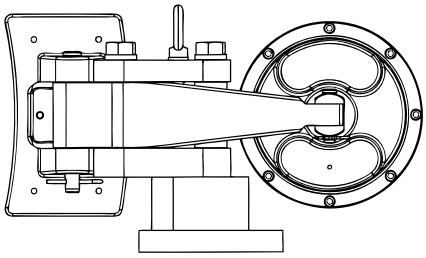
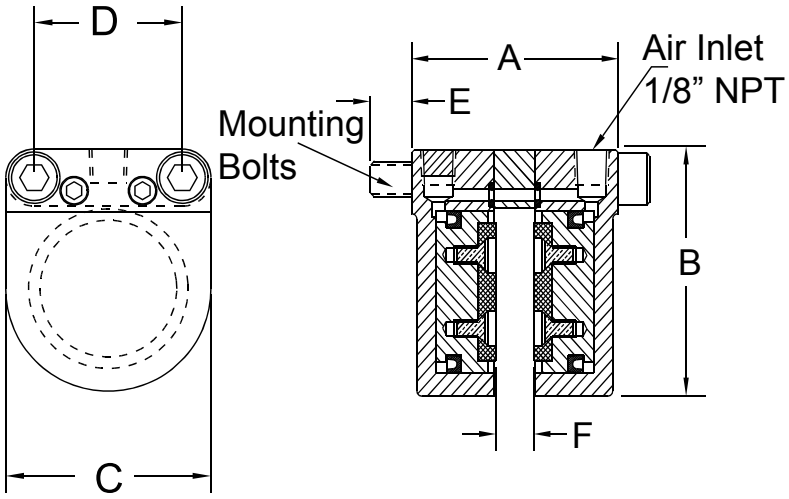


7503

CB PNEUMATIC CALIPER BRAKE



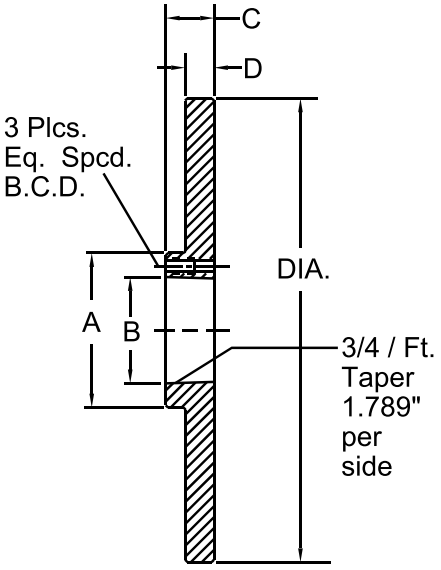
MODEL	CB100	CB200	CB500
A	2.5	2.875	4.75
B	2.625	3.750	6.88
C	2.25	3.125	5.0
D	1.625	2.250	*
E	.5	.625	*
F	.375	.406	.560
MOUNTING BOLTS	.375-16, NC	.5-13, NC	*
STATIC TANGENTIAL FORCE @ 80 PSI	125 Lbs	250 Lbs	600 Lbs
LINING AREA	3.3 sq in	8 sq in	20 sq in
WEARABLE LINING VOLUME	.33 cu in	1.0 cu in	5 cu in

* Ask for Certified Print

ROTOR SPECIFICATION STATIC TORQUE RATINGS @ 80 PSI

PART NUMBER		6161	6162	6163
DIA.		6"	9"	12"
A		2	2.688	3.875
B		1.375	1.871	2.813
C		0.625	0.875	1.25
D		0.375	0.375	0.375
B.C.D.		1.656	2.25	3.313
QD BUSHING BORE		"JA"* 1 1/4" MAX.	"SH"* 1 11/16" MAX.	"SK"* 2 3/8" MAX.
CB100	Static Torque Ratings @80PSI Air Pressure	270 IN-LB	460 IN-LB	650 IN-LB
CB200		440 IN-LB	810 IN-LB	1190 IN-LB
CB100	Static Torque Ratings @160PSI Hydraulic Pressure	540 IN-LB	920 IN-LB	1300 IN-LB
CB200		880 IN-LB	1620 IN-LB	2380 IN-LB

*Supplied by customer



Dimensions shown are for general information only.
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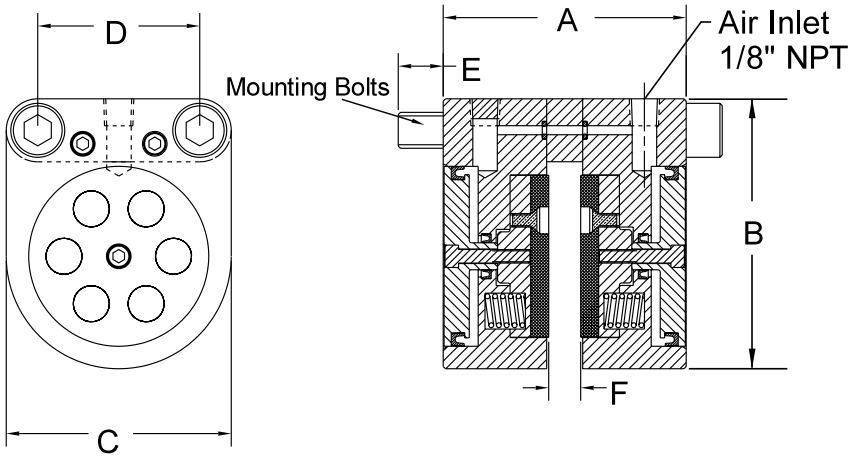
CSB SPRING APPLIED / AIR RELEASE CALIPER BRAKES

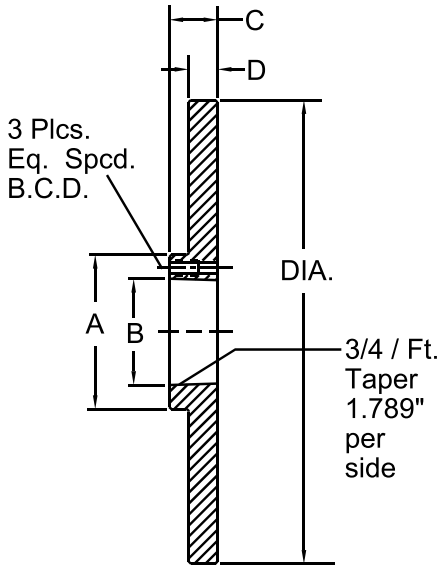


MODEL	CSB100	CSB200
A	3.125	3.375
B	2.65	3.75
C	2.25	3.13
D	1.625	2.250
E	.5	.625
F	.438	.438
MOUNTING BOLTS	.375-16, NC	.5-13, NC
STATIC TANGENTIAL FORCE @ 80 PSI	75 Lbs	150 Lbs
LINING AREA	3.3 sq in	8 sq in
WEARABLE LINING VOLUME	.30 cu in	.85cu in

SPECIFICATIONS
STATIC TORQUE RATINGS AT FULL LINING RELEASE PRESSURE 70 PSI

PART NUMBER		6161	6162	6163
DIA.		6”	9”	12”
A		2	2.688	3.875
B		1.375	1.871	2.813
C		0.625	0.875	1.25
D		0.375	0.375	0.375
B.C.D.		1.656	2.25	3.313
QD BUSHING BORE		“JA”* 1 1/4” MAX.	“SH”* 1 11/16” MAX.	“SK”* 2 3/8” MAX.
CSB100	Release Pressure @ 70PSI	160 IN-LB	275 IN-LB	390 IN-LB
CSB200		265 IN-LB	485 IN-LB	715 IN-LB

*Supplied by customer



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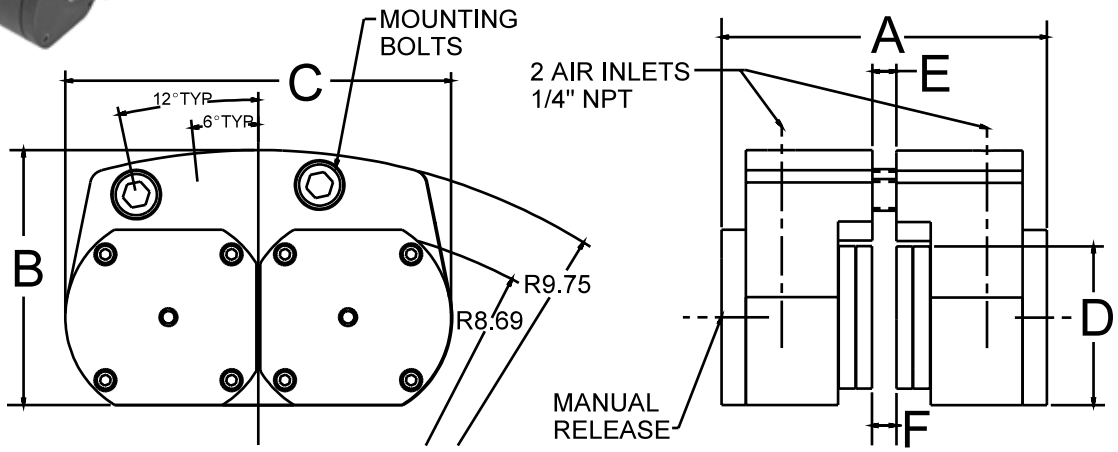
7301 SPRING APPLIED AIR RELEASE CALIPER BRAKE

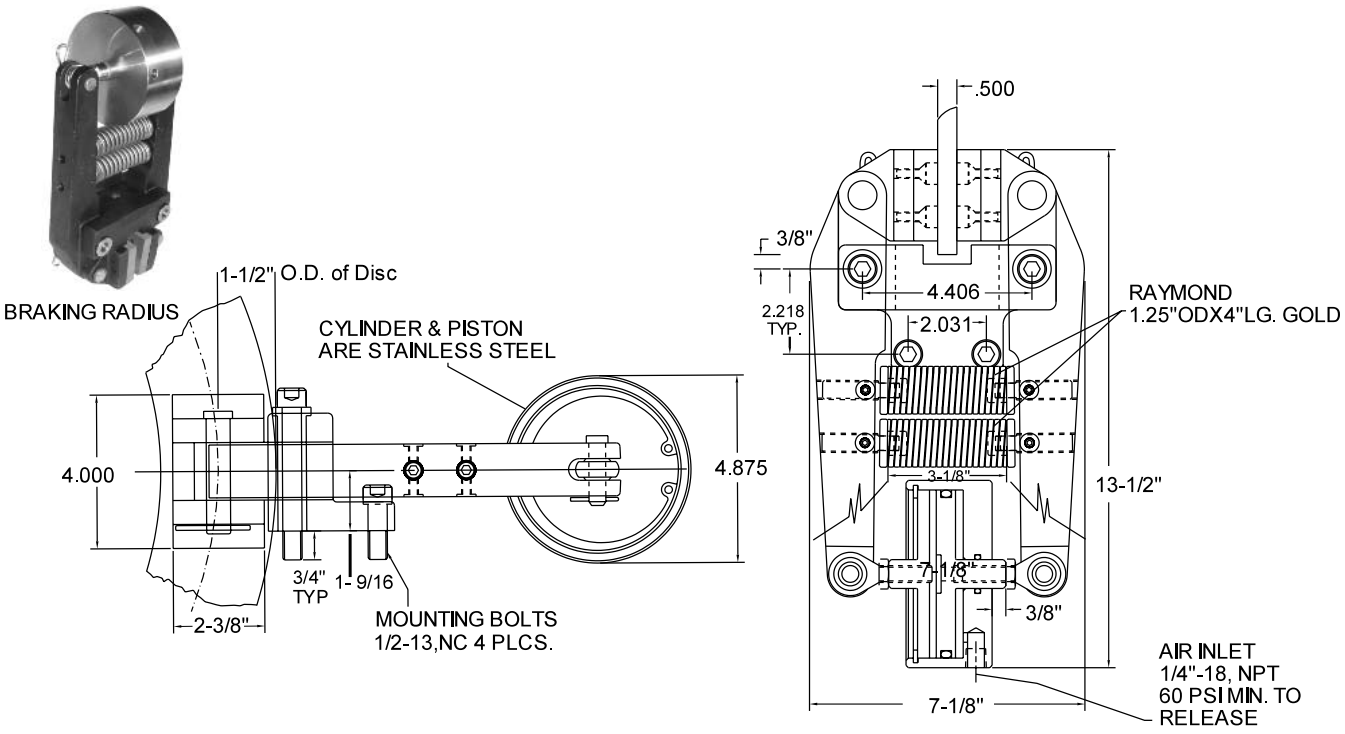


MODEL	7301
A	.5”
B	4”
C	6”
D	2.50”
E	.375”
F	.388”
MOUNTING BOLTS	1/2 - 13, NC 4 PLCS. On 9.250” R
STATIC FRICTION FORCE	560 Lbs (New Lining)
LINING AREA	16 IN^2
WEARABLE LINING VOLUME	2 IN^2

SPRING APPLIED / AIR RELEASE 7301
Weight: 8 Lbs
Mounting: Mounting Bolts 4 Places 1/2-13 NC On 9.250” Radius
Description: 4 Piston Single Spring Applied / Air Release
Actuation Method: Spring
Minimum Release Pressure: 90 PSI
Piston: Single Acting Spring Applied / Air Release

Corresponding Rotors: .375” Wide	
FRICTION LINING AREA: 16 IN^2	**Friction Lining:** High Temperature Non-Asbestos
Design: Open	**Wearable Lining Volume:** 2 in sq
Housing Construction: Aluminum	**Medium Volume:** 4.5 IN^3
Piston Construction: Stainless Steel	**Static Braking Tangential Force:** New Lining 560 lbs Worn Lining 460 lbs
Port Size: 1/4” NPT	**Manual Release:** Yes
Number of Ports: 2	**Surface Finish:** Paint

CBSA SPRING APPLIED / AIR RELEASE CALIPER BRAKE



CBSA20

The Model CBSA20 is spring applied, air released caliper brake which is used in stopping and holding applications of industrial equipment. It has a unique design, using an actuator located between two caliper arms. This allows the brake to have a compact physical size in relation to its high torque capacity. Friction linings are changed by pulling the clip pin and removing the caliper shoe. The CBSA20 unit comes assembled and ready for mounting.

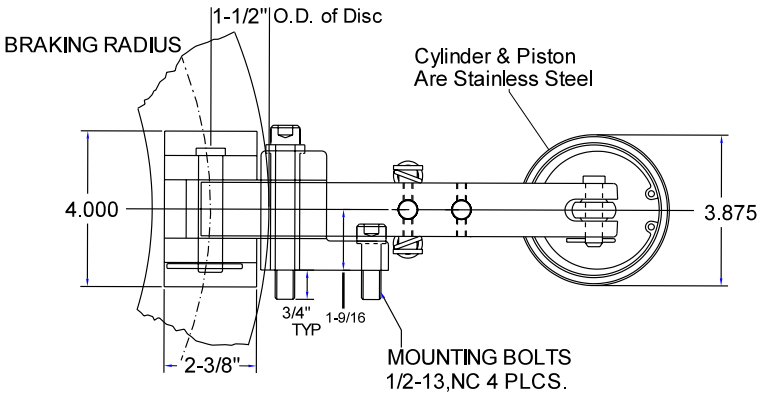
CBSA20 STATIC BRAKING FORCE
1900 LBS. WITH FULL LINING

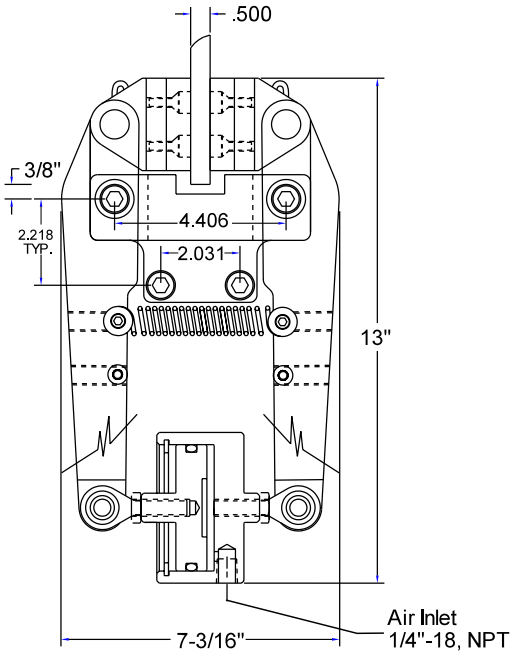
DISC SIZE	12”	14”	16”	18”	24”
STATIC TORQUE INCH POUNDS	8550	10450	12350	14250	20000
MINIMUM RELEASE PRESSURE	60 PSI	60 PSI	60 PSI	60 PSI	60 PSI
WEIGHT	30 LBS.				

NOTE: Dynamic torque is approximately 85% of static torque

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

CBAA AIR APPLIED / SPRING RELEASE CALIPER BRAKE





CBAA20

The Model CBAA20 is air applied, spring released caliper brake which is used in stopping applications of industrial equipment. It has a unique design, using an actuator located between two caliper arms. This allows the brake to have a compact physical size in relation to its high torque capacity. Friction linings are changed by pulling the clip pin and removing the caliper shoe.

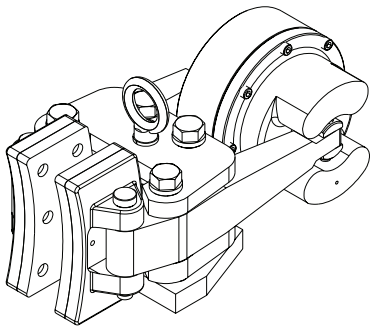
CBAA20 STATIC BRAKING FORCE
1900 LBS. AT 80 PSI

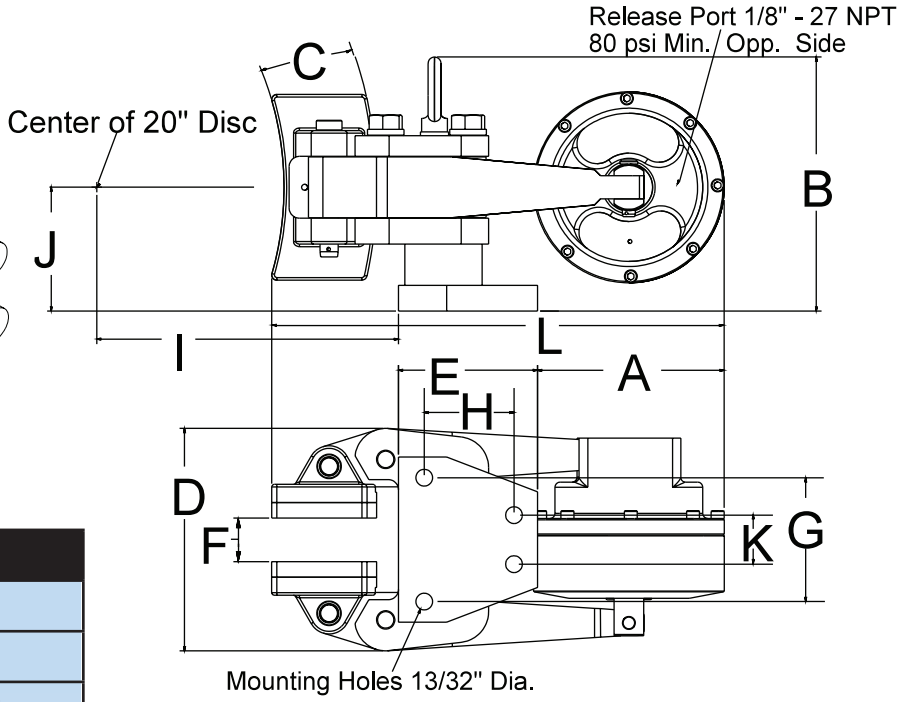
DISC SIZE	12"	14"	16"	18"	24"
STATIC TORQUE AT 80 PSI INCH POUNDS	8550	10450	12350	14250	20000
WEIGHT	30 LBS.				

NOTE: Dynamic torque is approximately 85% of static torque

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

7003 CALIPER BRAKE

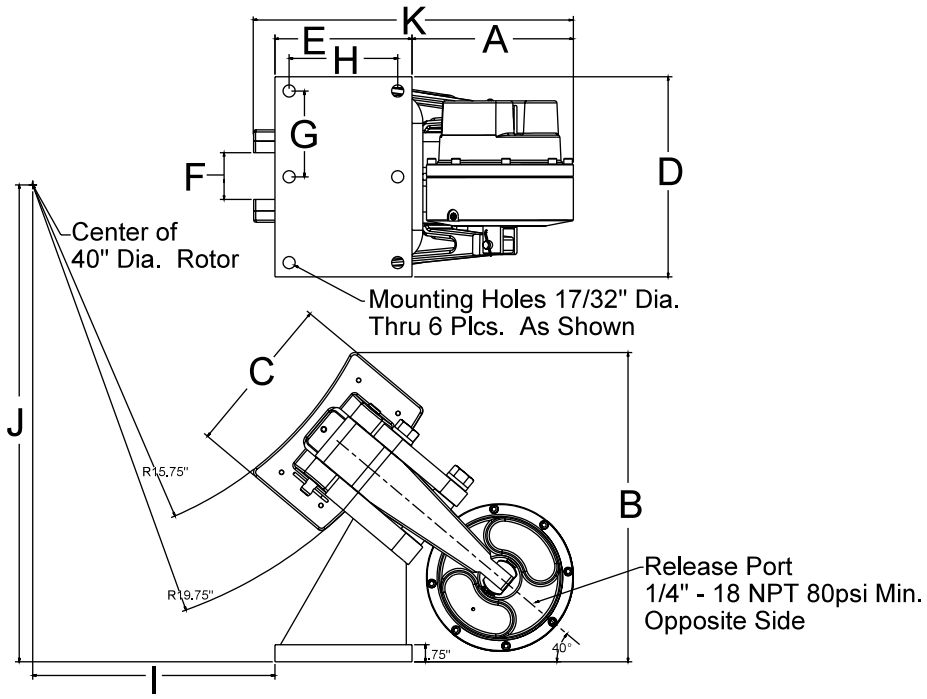




Model	7003
A	4.53”
B	6.16”
C	2.25"
D	5.39”
E	3.38”
F	1.040”
G	3.00”
H	2.180”
I	10.40”
J	3.00”
K	1.188”
L	10.99”

SPRING APPLIED / AIR RELEASE 7003
Weight: 32 Lbs
Mounting: Pedestal Mount
Description: Single Spring Applied / Air Release
Actuation Method: Spring
Minimum Release Pressure: 80 PSI
Piston: Single Acting Spring Applied/ Air Release

20” Diameter Rotors	
FRICTION LINING AREA: 20 IN^2	**Wearable Lining Volume:** 3.4 Cu Inches
Design: Open	**Medium Volume:** 4.5 IN^3
Housing Construction: Steel	**Static Braking Tangential Force:** New Lining 2500 lbs Worn Lining 1900 lbs
Piston/Cylinder Construction: Stainless Steel	**Clamp Force:** 6,000 Lbs.
Port Size: 1/8” NPT	**Static Torque using 20” Rotor Full Lining:** 21,900 in/Lbs.
Friction Lining: High Temperature Non-Asbestos	**Surface Finish:** Paint



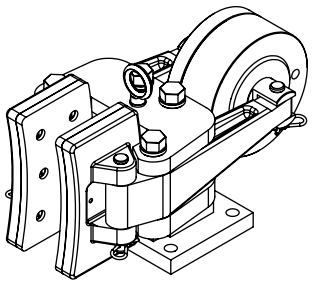
Model	7501
A	7.07”
B	13.50”
C	7.00"
D	8.75”
E	6.00”
F	2.040”
G	3.750”
H	4.750”
I	10.60”
J	20.85”
K	14.00”

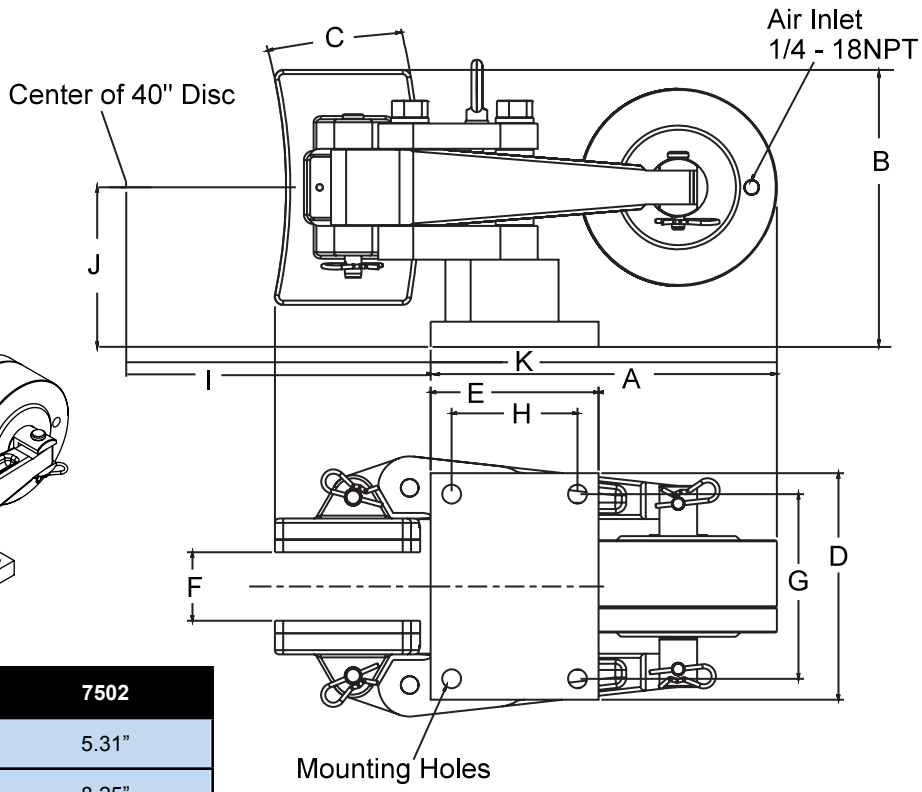
SPRING APPLIED / AIR RELEASE 7501
Weight: 85 Lbs
Mounting: Pedestal Mount
Description: Single Spring Applied / Air Release
Actuation Method: Spring
Minimum Release Pressure: 80 PSI
Piston: Single Acting Spring Applied/ Air Release

40” Diameter Rotors	
FRICTION LINING AREA: 56 IN^2	**Wearable Lining Volume:** 14 IN^3
Design: Open	**Medium Volume:** 22.5 IN^3
Housing Construction: Steel	**Static Brake Force:** New Lining 4700 lbs Worn Lining 3600 lbs
Piston/Cylinder Construction: Stainless Steel	**Dynamic Brake Force:** New Lining 3400 lbs Worn Lining 2600 lbs
Port Size: 1/4” NPT	**Static Torque using 40” Rotor Full Lining:** 83,000 in/Lbs.
Friction Lining: High Temperature Non-Asbestos	**Surface Finish:** Paint

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

7502 AIR APPLIED SPRING RELEASE CALIPER BRAKE



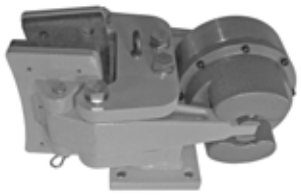


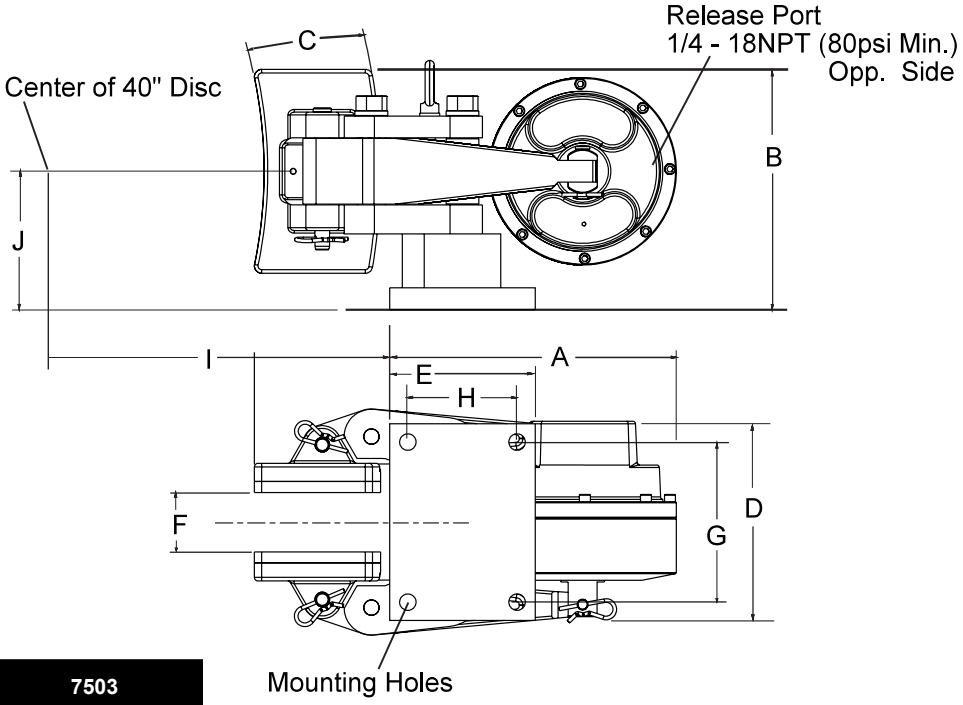
Model	7502
A	5.31”
B	8.25”
C	4"
D	6.75”
E	5”
F	2.04”
G	5.500”
H	3.750”
I	20.13”
J	4.75”
K	14.96”

AIR APPLIED / SPRING RELEASE 7502
Weight: 80 Lbs
Mounting: Pedestal Mount
Description: Air Applied / Spring Release
Actuation Method: Air
Maximum Pressure: 120 PSI
Piston: Air Applied / Spring Release

Corresponding Rotors: 6590 (35” Diameter) 6560 (40” Diameter)	
Friction Lining Area: 56 IN^2	**Wearable Lining Volume:** 14 IN^3
Design: Open	**Medium Volume:** 18 IN^3
Housing Construction: Steel	**Static Brake Force @ 80PSI:** 6800 lbs
Piston/Cylinder Construction: Stainless Steel	**Dynamic Brake Force @ 80PSI:** 4800 lbs.
Port Size: 1/4” NPT	**Static Torque using 40” Rotor @ 80 PSI:** 121,000 IN LBS
Friction Lining: High Temperature Non-Asbestos	**Surface Finish:** Paint

7503 SPRING APPLIED AIR RELEASE CALIPER BRAKE



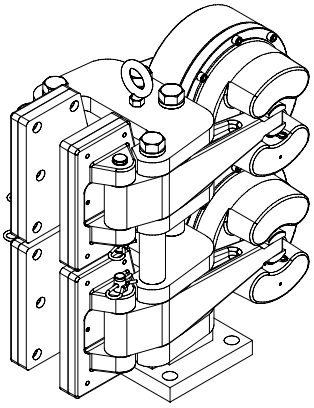


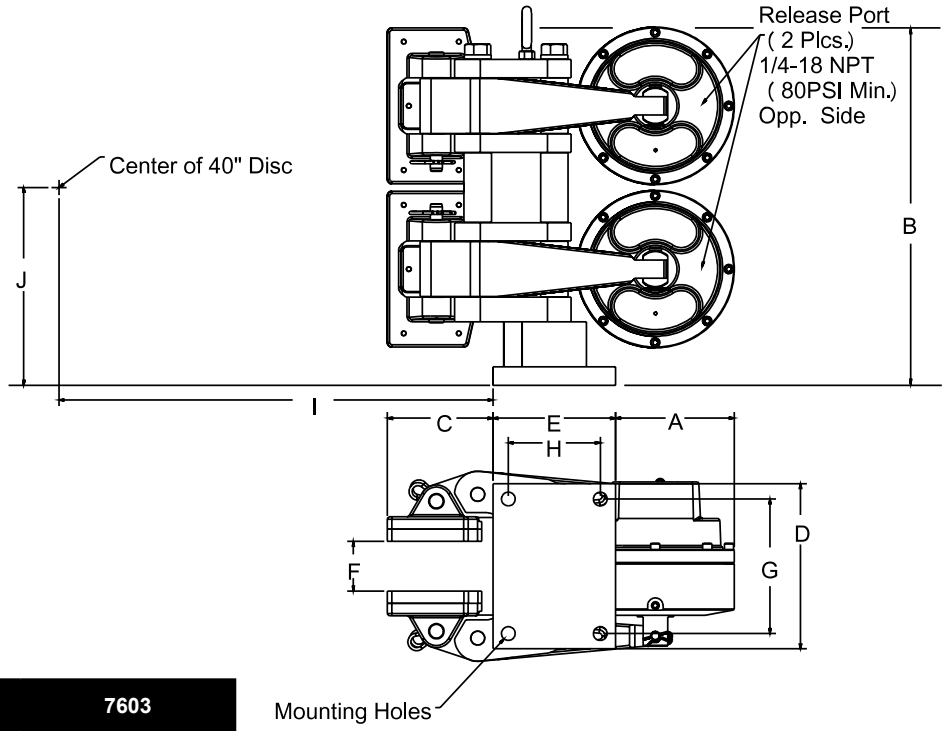
Model	7503
A	4.84”
B	8.25”
C	4"
D	6.75”
E	5”
F	2.05”
G	5.500”
H	3.750”
I	20.13”
J	4.75”

SPRING APPLIED / AIR RELEASE 7503
Weight: 80 Lbs
Mounting: Pedestal Mount
Description: Single Spring Applied / Air Release
Actuation Method: Spring
Minimum Release Pressure: 80 PSI
Piston: Single Acting Spring Applied/ Air Release

Corresponding Rotors: 6590 (35” Diameter) 6560 (40” Diameter)	
FRICTION LINING AREA: 56 IN^2	**Wearable Lining Volume:** 14 IN^3
Design: Open	**Medium Volume:** 22.5 IN^3
Housing Construction: Steel	**Static Brake Force:** New Lining 4700 Lbs. Worn Lining 3600 Lbs.
Piston/Cylinder Construction: Stainless Steel	**Dynamic Brake Force:** New Lining 3400 Lbs. Worn Lining 2600 Lbs.
Port Size: 1/4” NPT	**Static Torque using 40" Rotor Full Lining:** 83000 IN LBS
Friction Lining: High Temperature Non-Asbestos	**Surface Finish:** Paint

7603 SPRING APPLIED AIR RELEASE CALIPER BRAKE





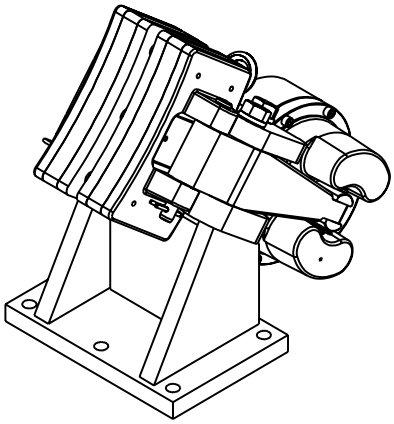
Model	7603
A	4.84”
B	14.61”
C	4.31"
D	6.75”
E	5.00”
F	2.054”
G	5.500”
H	3.750”
I	20”
J	8”

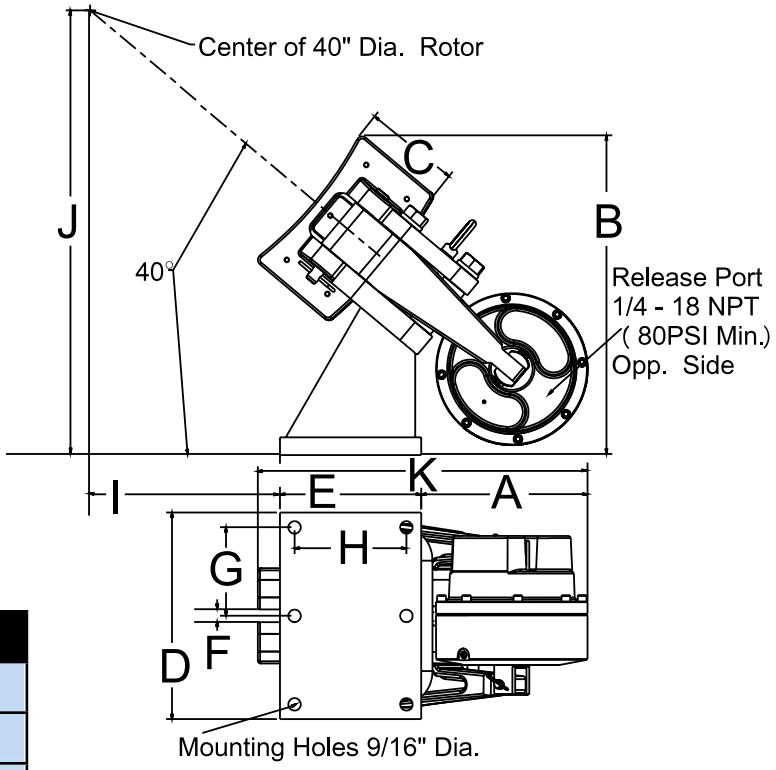
SPRING APPLIED / AIR RELEASE 7603
Weight: 135 Lbs
Mounting: Pedestal Mount
Description: Double Spring Applied / Air Release
Actuation Method: Spring
Minimum Release Pressure: 80 PSI
Piston: Single Acting Spring Applied/ Air Release

Corresponding Rotors: 6690 (40” Diameter)	
Friction Lining Area: 92 IN^2	**Wearable Lining Volume:** 23 IN^3
Design: Open	**Medium Volume:** 45 IN^3
Housing Construction: Steel	**Static Brake Force:** New Lining 9400 lbs Worn Lining 7200 lbs
Piston/Cylinder Construction: Stainless Steel	**Dynamic Brake Force:** New Lining 6800 lbs Worn Lining 5200 lbs
Port Size: 1/4” NPT (2 places)	**Static Torque** using 40” Rotor **New Lining:** 167,000 IN LBS
Friction Lining: High Temperature Non-Asbestos	**Surface Finish:** Paint

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

75011 SPRING APPLIED AIR RELEASE CALIPER BRAKE





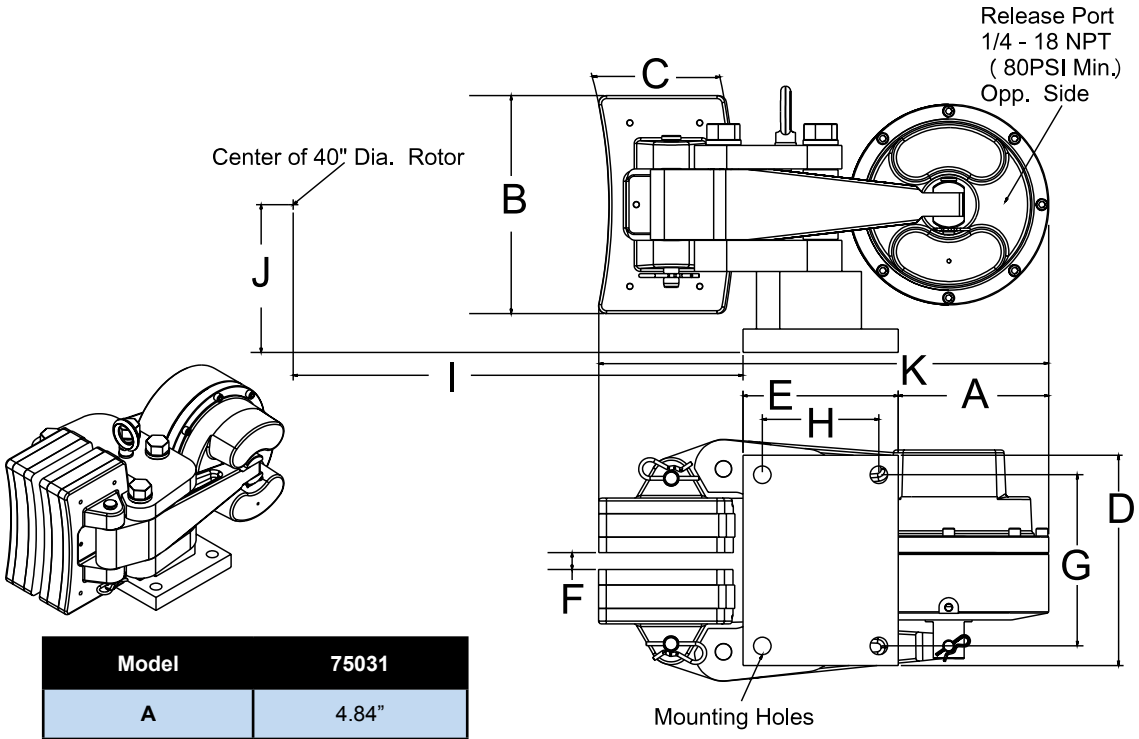
Model	75011
A	7.10”
B	13.50”
C	4”
D	8.75”
E	6”
F	.54”
G	3.750”
H	4.750”
I	10.60”
J	20.85”
K	14.00”

SPRING APPLIED / AIR RELEASE 75011
Weight: 90 Lbs
Mounting: Floor Mounted
Description: Single Spring Applied / Air Release Caliper Brake
Actuation Method: Spring
Minimum Release Pressure: 80 PSI
Piston: Single Acting Spring Applied/ Air Release

Corresponding Rotors: .500” Wide	
Friction Lining Area: 56 IN^2	**Wearable Lining Volume:** 14 IN^3
Design: Open	**Medium Volume:** 22.5 IN^3
Housing Construction: Steel	**Static Brake Force:** New Lining 4700 lbs Worn Lining 3600 lbs
Piston/Cylinder Construction: Stainless Steel	**Dynamic Brake Force:** New Lining 3400 lbs Worn Lining 2600 lbs
Port Size: 1/4” NPT	**Static Torque using 40” Rotor New Lining:** 83,000 IN LB
Friction Lining: High Temperature Non-Asbestos	**Surface Finish:** Paint

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

75031 SPRING APPLIED AIR RELEASE CALIPER BRAKE



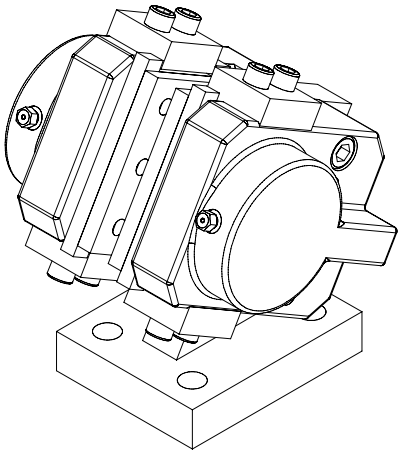
Model	75031
A	4.84”
B	8.25”
C	4"
D	6.75”
E	5”
F	.54”
G	5.500”
H	3.750”
I	20.13”
J	4.75”
K	14.48”

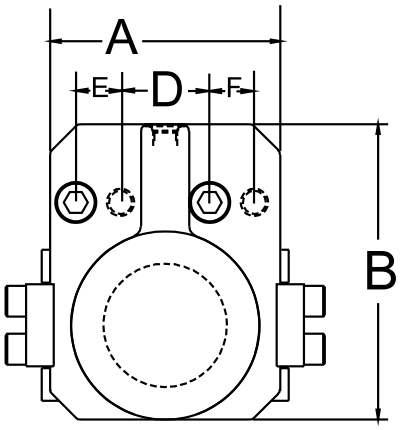
SPRING APPLIED / AIR RELEASE 75031
Weight: 77 Lbs
Mounting: Pedestal Mount
Description: Single Spring Applied / Air Release Caliper Brake
Actuation Method: Spring
Minimum Release Pressure: 80 PSI
Piston: Single Acting Spring Applied/ Air Release

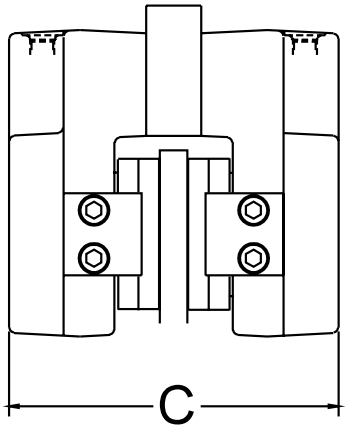
Corresponding Rotors: .500” Wide	
Friction Lining Area: 56 IN^2	**Wearable Lining Volume:** 14 IN^3
Design: Open	**Medium Volume:** 22.5 IN^3
Housing Construction: Steel	**Static Brake Force:** New Lining 4700 lbs Worn Lining 3600 lbs
Piston/Cylinder Construction: Stainless Steel	**Dynamic Brake Force:** New Lining 3400 lbs Worn Lining 2600 lbs
Port Size: 1/4” NPT	**Static Torque using 40” Rotor** **New Lining:** 83,000 IN LBS
Friction Lining: High Temperature Non-Asbestos	**Surface Finish:** Paint

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

9000 SERIES HYDRAULIC ACTUATED CALIPER BRAKE





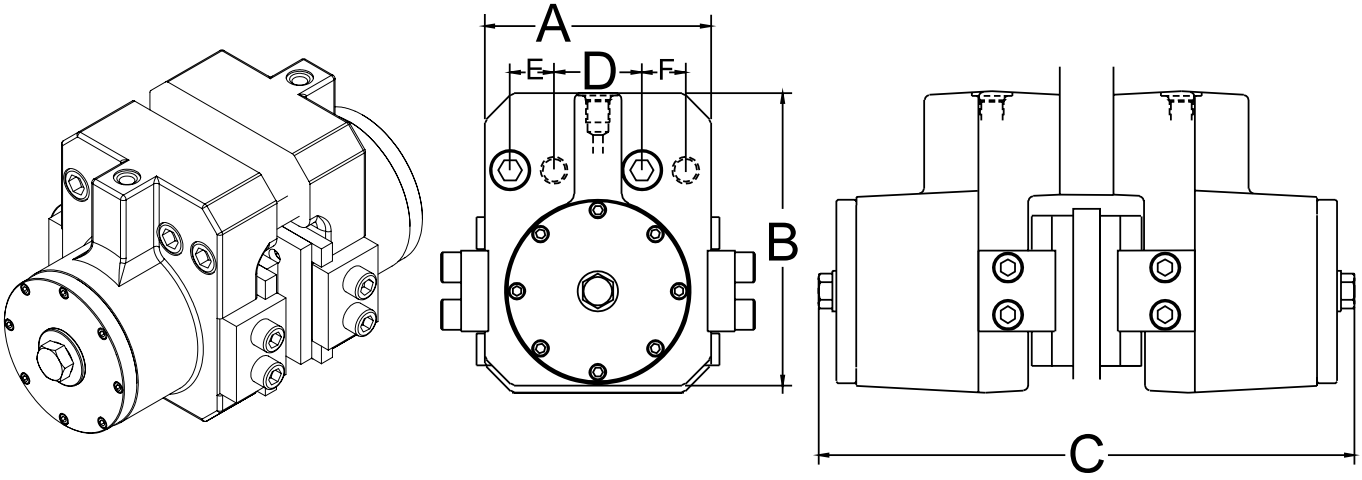


MODEL	A	B	C	D	E	F	MINIMUM ROTOR WIDTH
9001	4.25	5.37	6.50	1.750	.750	.750	.5”
9002	7.25	8.5	9.67	2.750	1.500	1.500	1”
9003	10.25	12.87	12.5	3.375	2.000	2.000	1.5”

Hydraulic Actuated Caliper Brake	Friction Lining: High Temperature, Non Asbestos		
	Medium Specification: Light Hydraulic Oil		
	Actuation Method: Hydraulic		
Design: Open	Piston Construction: Steel		
Housing Construction: Cast Ductile Iron	Surface Finish: Enamel Paint		
Maximum Hydraulic Pressure: 2,000 PSI	Torque: T = Braking Radius X Force IN LBS		
Model Number:	**9001**	**9002**	**9003**
Static Brake Force @ 2000 PSI:	5000 lbs.	15000 lbs.	35000 lbs.
Corresponding Rotors:	16”, 24” Diameter .500” Thick	16”, 30, 24” Diameter 1.000” Thick	36”, 42” Diameter 1.500” Thick
Medium Volume:	.75 IN^3	2.5 IN^3	7 IN^3
Friction Lining Area:	22 IN^2	62 IN^2	140 IN^2
Wearable Lining Volume:	4 IN^3	15 IN^3	40 IN^3
Port Size:	SAE AS5202-4	SAE AS5202-6	SAE AS5202-8
Weight:	25 lbs	95 lbs	260 lbs

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

9000 SERIES SPRING APPLIED CALIPER BRAKE

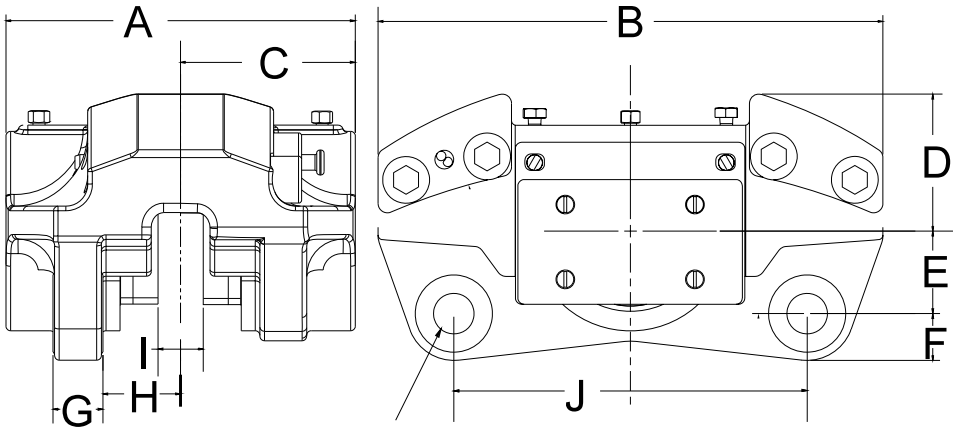


MODEL	A	B	C	D	E	F	MINIMUM ROTOR WIDTH
9050	4.25	5.37	9.87	1.750	.750	.750	.5”
9051	7.25	8.5	14.75	2.750	1.500	1.500	1”
9052	10.25	12.87	22.5	3.375	2.000	2.000	1.5”

Spring Applied/Hydraulic Release Caliper Brake	Friction Lining: High Temperature, Non Asbestos		
	Release Pressure: 2000 PSI		
	Surface Finish: Enamel Paint		
Design: Open	Actuation Method: Spring Force		
Housing Construction: Cast Ductile Iron	Piston Construction: Steel		
Model Number:	**9050**	**9051**	**9052**
Static Brake Force (New Lining):	3500 lbs	10000 lbs	25000 lbs
Corresponding Rotors:	16”, 24” Diameter .500” Thick	24”, 30”, 36” Diameter 1.000” Thick	36”, 42” Diameter 1.500” Thick
Torque IN LBS:	T = Braking Radius X Brake Force IN LBS		
Medium Volume:	.75 IN^3	2.5 IN^3	7 IN^3
Friction Lining Area:	22 IN^2	62 IN^2	140 IN^2
Wearable Lining Volume:	4 IN^3	15 IN^3	40 IN^3
Port Size:	SAE AS5202-4	SAE AS5202-6	SAE AS5202-8
Weight:	32 lbs	122 lbs	360 lbs

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

9004 SERIES HYDRAULIC ACTUATED CALIPER BRAKE



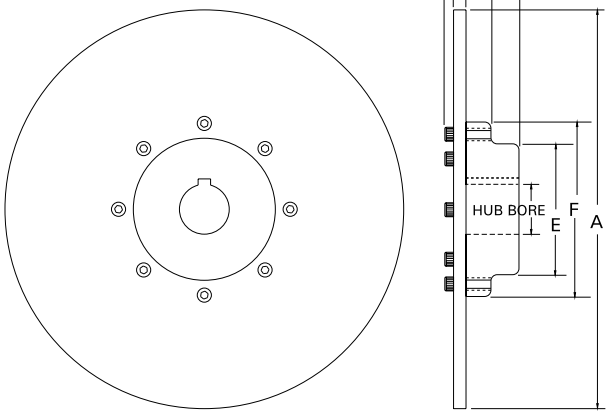
Mounting Holes 13/16" Dia. Thru
2 Plcs. As Shown

Model 9004	A 7”	B 10 1/8”	C 3.50”	D 2.75”	E 1.653”	F .94”	G 1”	H 1.56”	I .912”	J 7.086”
Braking Radius Inches	$\frac{\text{Rotor Diameter}}{2} - 1.4$									
Torque IN LBS	T = Braking Radius X 9500 LBS									
Weight	39 LBS									

Product: Caliper Brake 9004	Piston: Double Acting
Description: Hydraulic Actuated Caliper Brake	Piston Construction: Steel
Design: Open	Maximum Pressure: 2000 PSI
Housing Construction: Cast Ductile Iron	Static Brake Force @ 2000 PSI: 9500 LBS
Actuation Method: Hydraulic	Port Size: SAE AS5202-3
Medium Specification: Light Hydraulic Oil	Friction Lining: High Duty Organic, Non Asbestos Lining
Surface Finish: Enamel Paint	Friction Lining Area: 22 IN^2
Medium Volume: 2 IN^3	Wearable Lining Volume: 5.5 IN^3

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

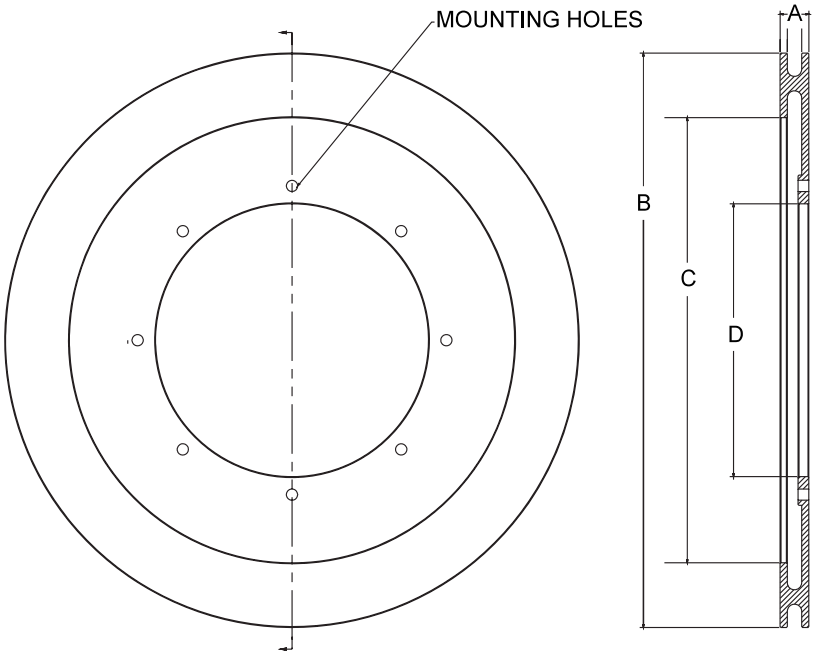
MODEL AA ROTOR



MODEL		12AA-1	14AA-1	16AA-1	18AA-1	24AA-1
A		12	14	16	18	24
B		0.5	0.5	0.5	0.5	0.5
C		2.13	2.19	2.63	2.63	3.13
D		1.25	1.25	1.63	1.63	2
E		2.5	3.88	4.5	4.5	5.25
F		3.5	5.25	5.88	5.88	7
HUB BORE	MIN.	1	1.5	1.5	1.5	2
	MAX STD KW	1.5	2.625	3	3	3.625
	MAX SHL KW	1.625	3	3.25	3.25	4
HEAT DISSIPATION (H.P.) @ 400 F	STATIONARY	0.48	0.6	0.71	0.83	1.18
	ADDITIONAL PER 100 RPM	0.075	0.116	0.167	0.226	0.456
MAX. RPM		2750	2200	1800	1600	1100

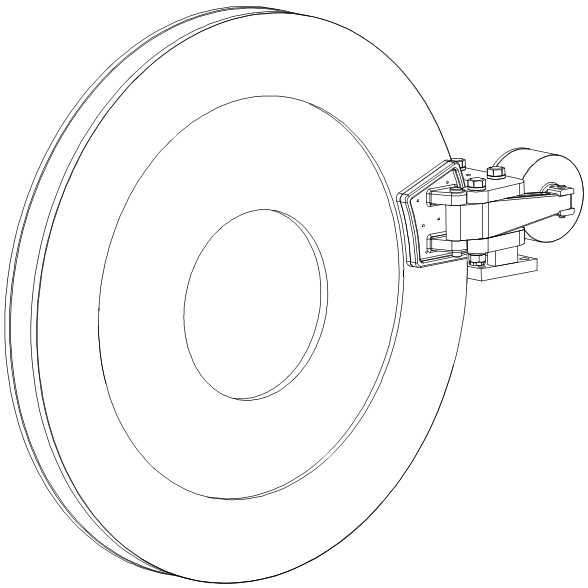
MODEL	12AA-1	14AA-1	16AA-1	18AA-1	24AA-1
HEAT SINK (106 FT-LBF)	0.39	0.49	0.59	0.69	0.98
WT (LBF.)	18	27	36	44	78
WK^2 (FT^2-LBF.)	2	3.8	6.5	10.3	32.6
BRAKING RADIUS	4.16	5.21	6.25	7.27	10.33

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

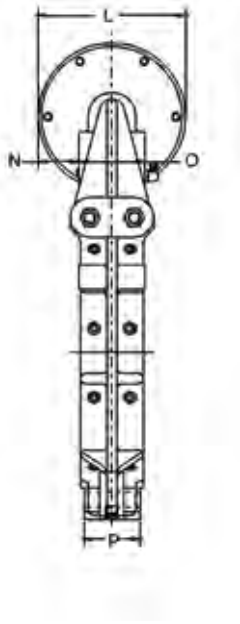


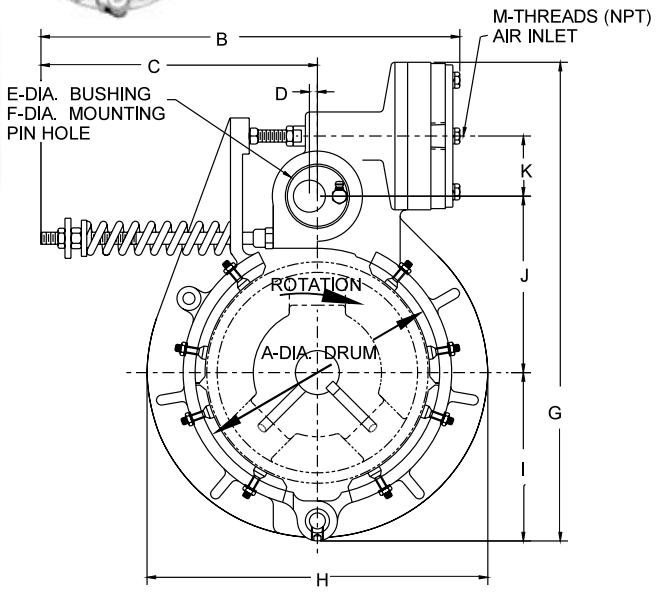
MODEL	A	B	C	D	WEIGHT	WK2	MAXIMUM RPM	HEAT DISSIPATION
6560	2”	40”	31”	6”	280 Lb.	500 Ft^2 Lbs	900	25 HP
656001	2”	40”	31”	19.005”	248 Lb.	450 Ft^2 Lbs	900	25 HP
656002	2”	40”	31”	23.510”	225 Lb.	435 Ft^2 Lbs	900	25 HP
6590	2”	35”	26”	6”	190 Lb.	200 Ft^2 Lbs	900	18 HP
659001	2”	35”	26”	19.005”	155 Lb.	200 Ft^2 Lbs	900	18 HP

Product: 6000 SERIES ROTOR	
Description:	Rotor for use with Series 7500 caliper brake
Design:	Open
Housing Construction:	Cast ductile iron disc



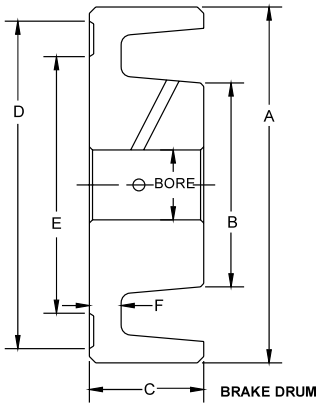
MODEL SB SHOE BRAKE





BRAKE MODEL	7SB200	10SB275	14SB350
A	7	10	14
B	12-7/8	13-1/4	15-1/2
C	8-1/8	8-3/8	9-5/8
D	1/4	3/8	5/8
E	2	2-1/2	3-1/4
F ±.002	1.002	1.252	1.502
G	15-1/8	19-1/2	25-1/2
H	10-7/8	15	19-3/4
I	5-3/8	7	9-3/4
J	5-1/2	7-7/16	10-1/8
K	1-7/8	2-7/16	2-5/8
L	4-1/2	5-1/4	5-1/4
M	3/8	3/8	3/8
N	1-3/8	1-5/16	1
O	1-3/4	2-5/8	3-1/4
P	2	2-3/4	3-1/2

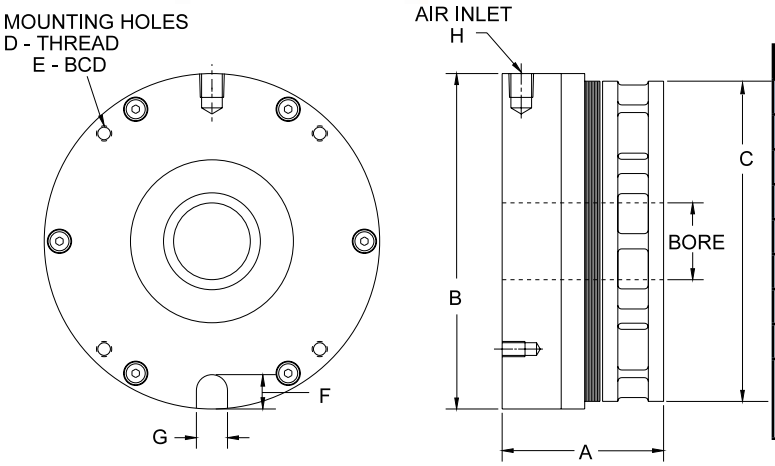
SHOE BRAKE MODEL	7SB200	10SB275	14SB350
DRUM PART NO.	3089-1	3089-2	3089-3
A	7	10	14
B	4	4-3/4	6-1/2
C	2.250	3.000	3.750
D	-	-	12-3/4
E	-	-	8-3/4
F	5/8	3/4	1-1/8
BORE MIN.	1.50	2.00	2.50
BORE MAX. STANDARD KEYWAY	2.750	3.250	4.375
BORE MAX. SHALLOW KEYWAY	3.000	3.500	5.000
Weight LBS. APPROX.	15	37	92
LINING KIT	2405K	2406K	2407K



BRAKE MODEL	7SB200	10SB275	14SB350
WEIGHT LBS APPROX.	24	39	70
TORQUE RATING IN - LB	4940	9530	15300
RELEASE PRESSURE PSI	50	50	50

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

TSB DYNAMIC STOPPING BRAKE



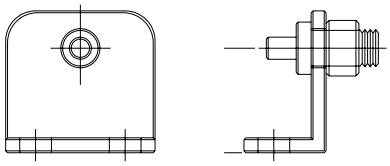
TSB BRAKES

MODEL	TSB450	TSB1000	TSB2400
A	2 5/8	3	3 ½
B	5 ½	6 3/4	9
C	5 1/4	6 ½	8 ½
D	1/4-20,NC	5/16-18,NC	3/8-16,NC
E	5.000	6.188	8.375
F	9/16	5/8	3/4
G	.500	.625	.750
H	1/8 NPT	1/8 NPT	1/4 NPT
BORE	QD BUSHING SIZE "JA"* 1 1/4" MAX.	QD BUSHING SIZE "SH"* 1 11/16" MAX.	QD BUSHING SIZE "SK"*2 3/8" MAX.

* Supplied by customer

REACTION BRACKET ASSEMBLY

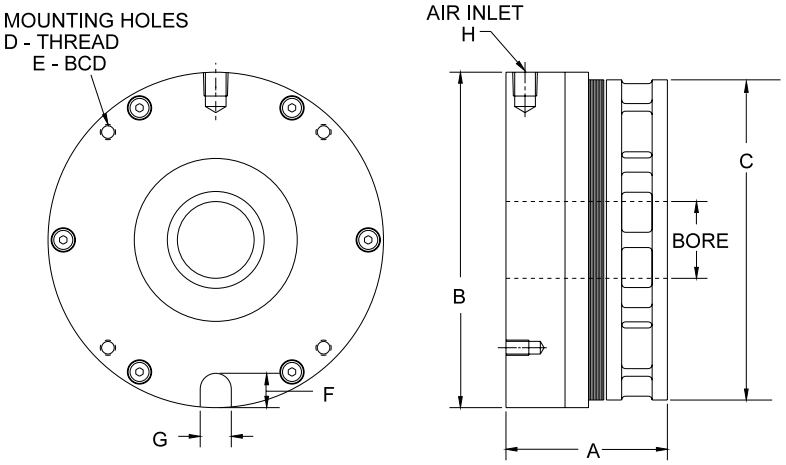
(Purchased seperately)



MODEL		TSB450	TSB1000	TSB2400
STATIC TORQUE @ 80 PSI	STANDARD	450 IN-LB	1000 IN-LB	2400 IN-LB
WK2 ROTOR IN^2-LB		12.0	32.5	120.0
CONTINUOUS HEAT DISSIPATION @	200 RPM	.26 HP	.40 HP	.65 HP
	1000 RPM	.41 HP	.71 HP	1.40 HP
WEIGHT		10 LB.	17 LB.	35 LB.
REPAIR KIT		5641K	5642K	5643K

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

TSBL TENSION BRAKE



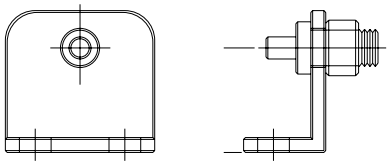
TSBL BRAKE

MODEL	TSBL450	TSBL1000	TSBL2400
A	2 5/8	3	3 ½
B	5 ½	6 3/4	9
C	5 1/4	6 ½	8 ½
D	1/4-20,NC	5/16-18,NC	3/8-16,NC
E	5.000	6.188	8.375
F	9/16	5/8	3/4
G	.500	.625	.750
H	1/8 NPT	1/8 NPT	1/4 NPT
BORE	QD BUSHING SIZE “JA”* 1 1/4” MAX.	QD BUSHING SIZE “SH”* 1 11/16” MAX.	QD BUSHING SIZE “SK”* 2 3/8” MAX.

* Supplied by Customer

REACTION BRACKET ASSEMBLY

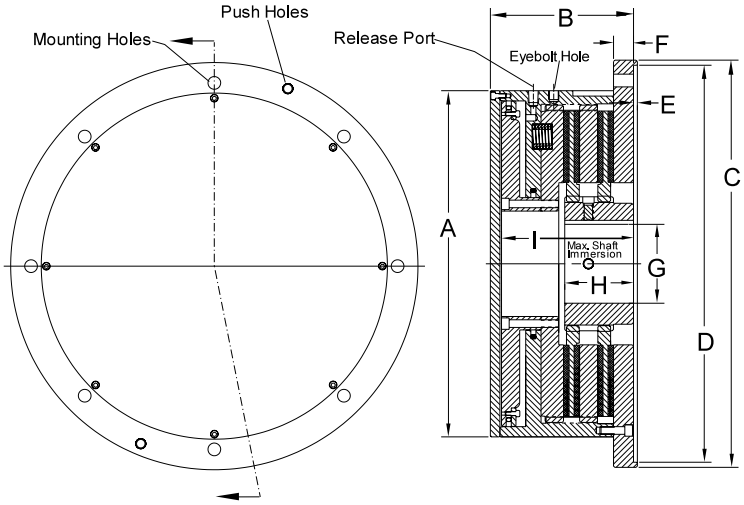
(Purchased seperately)



MODEL		TSBL450	TSBL1000	TSBL2400
TORQUE @ 80PSI	LOCO	150 IN-LB	330 IN-LB	800 IN-LB
WK2 ROTOR IN^2-LB		12.0	32.5	120.0
CONTINUOUS HEAT DISSIPATION @	200 RPM	.26 HP	.40 HP	.65 HP
	1000 RPM	.41 HP	.71 HP	1.40 HP
WEIGHT		10 LB.	17 LB.	35 LB.
REPAIR KIT		5641LK	5642LK	5643LK

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

SAB SPRING APPLIED / AIR RELEASED BRAKE



MODEL	SAB112	SAB212	SAB116	SAB216
A	14	14	18	18
B	5.75	6.781	6.5	7.5
C	16.5	16.5	20.25	20.25
D	16.003	16.003	19.753	19.753
E	0.188	0.188	0.188	0.188
F	0.75	0.75	1	1
G MAX. BORE	2.875	2.875	3.875	3.875
H	2.5	3.125	2.75	3.625
I	5.25	6.3	5.5	6.5
MOUNTING HOLES	.65 DIA. 8 PLCS. 15.250 BCD	.65 DIA. 8 PLCS. 14.000 BCD	.53 DIA. 8 PLCS. 18.875 BCD	.53 DIA. 8 PLCS. 18.875 BCD
RELEASE PORT	1/4-18, NPT	1/4-18, NPT	1/2-14,NPT	1/2-14,NPT

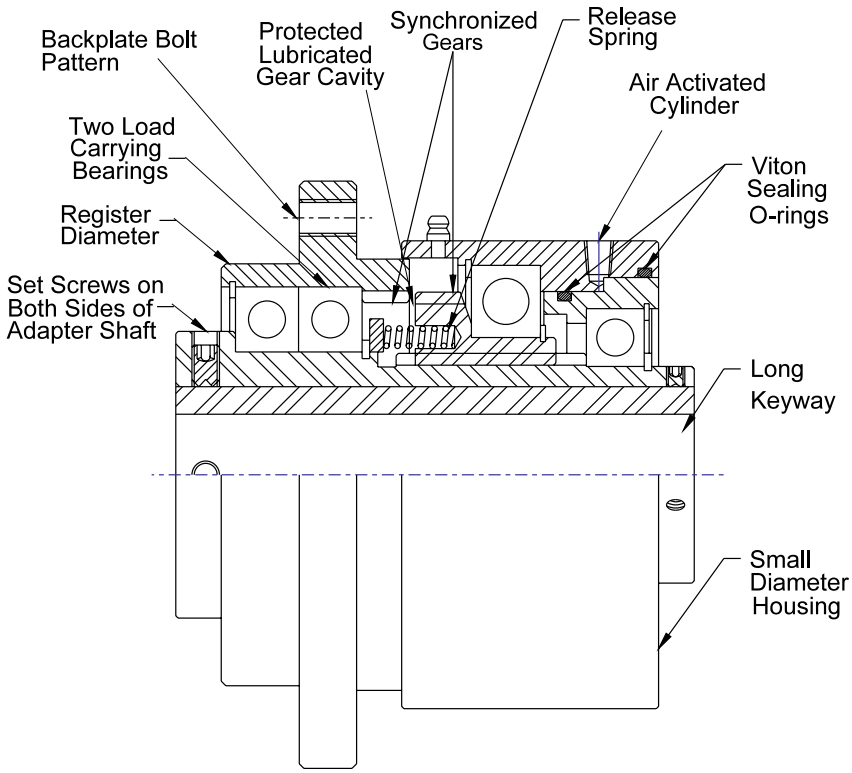
SPECIFICATIONS

MODEL		SAB112	SAB212	SAB116	SAB216
TORQUE (IN-LB)	NEW	18000	35000	39000	75000
	WORN	13500	26000	29000	56000
RELEASE PRESSURE		75 PSI	75 PSI	75 PSI	75 PSI
LINING AREA (IN^2)		160	320	275	550
HEAT CAPACITY (FT-LB)		170000	260000	270000	415000
MAX RPM		1800	1800	1800	1800
WEIGHT LBS.		185	225	305	375

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

PE POSITIVE ENGAGEMENT CLUTCH

- Air applied / spring release
- High torque
- Compact design
- Positive engagement
- Exact positioning



PE CLUTCH
ZERO SLIP HIGH TORQUE TOOTH CLUTCH

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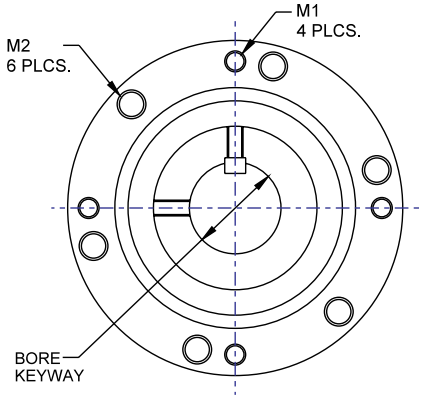
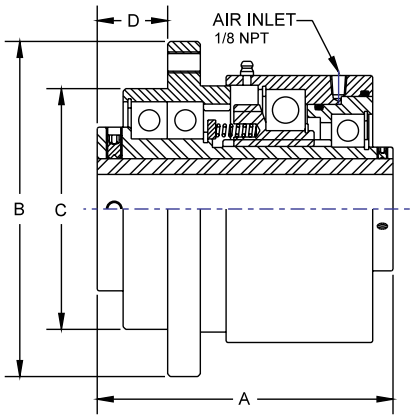
PE AIR APPLIED-SPRING RELEASE CLUTCH

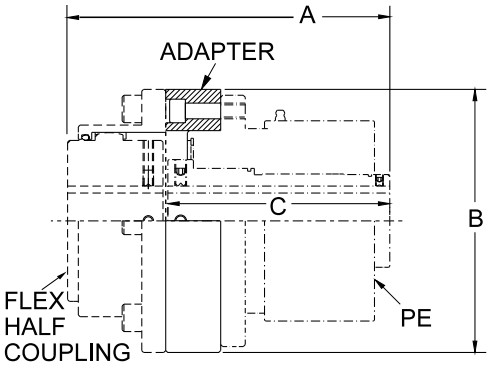




MODEL		PE2AS -1	PE2AS -2	PE4AS -1	PE4AS -2	PE10AS -1	PE10AS -2	PE25AS	PE50AS
BORE +.002 -.001		.750	.875	1.188	1.250	1.688	1.750	2.188	2.938
KEYWAY		3/16X1/16		1/4X3/32		3/8X3/32		1/2X1/8	3/4X3/16
A		4.56		5.19		6.13		7.06	8.18
B		4.13		4.88		6.06		8.00	9.50
C +.000 -.001		2.875		3.500		4.500		5.750	7.370
D		.938		.969		1.16		1.69	2.63
M1	TAP	.25-20		.25-20		.313-18		.50-13	-
	BCD	3.437		4.250		5.250		7.000	-
M2	TAP	.313-18		.313-18		.50-13		-	.50-13
	BCD	3.562		4.250		5.375		-	8.500
TORQUE IN/LB (Nm)		2,000		4,000		10,000		25,000	50,000
MAX. RPM		3600		3000		2000		1800	1800
NO. OF TEETH		46		60		48		58	78

PE WITH COUPLING ADAPTER

MODEL	PE10 AS/SA	PE25 AS	PE50 AS
ADAPTER PART NO.	4635A	4636A	4637A
A	8.125	10.250	12.563
B	6.250	8.375	9.438
C	6.063	7.063	8.812
TORQUE IN/LB	10,000	25,000	50,000
MAX. RPM	2000	1800	1800
NO. OF TEETH	48	58	78
FLEX-HALF COUPLING REQUIRED*	1015G	1025G	1030G



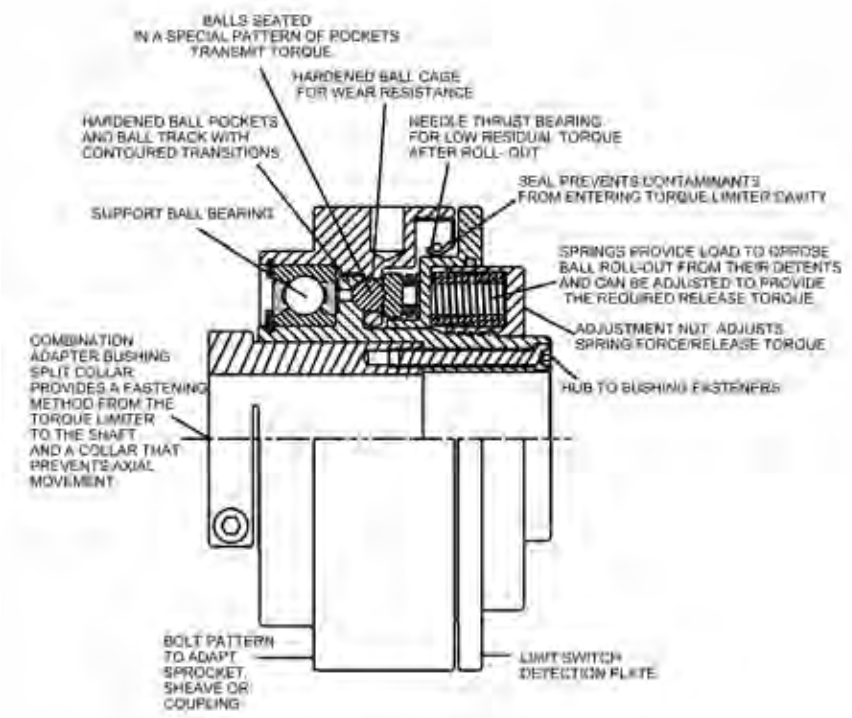
* Flex-Half Coupling supplied by customer (Falk or Equivalent)

NOTE: UNIT WILL NOT DISENGAGE UNDER LOAD
PE Clutches use O-rings as dynamic seals, therefore adequate lubrication must be provided in the actuating air circuit to ensure these O-rings do not run dry.

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

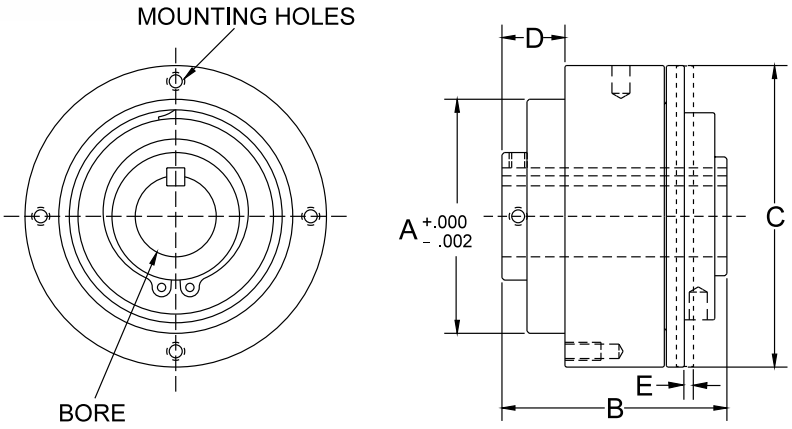
SINGLE POSITION TORQUE LIMITER

- Provides overload protection
- Totally enclosed housing
- Single position
- Automatic re-engagement
- Metal sensor switch plate
- Adjustable torque capability
- Combination split bushing / lock collar



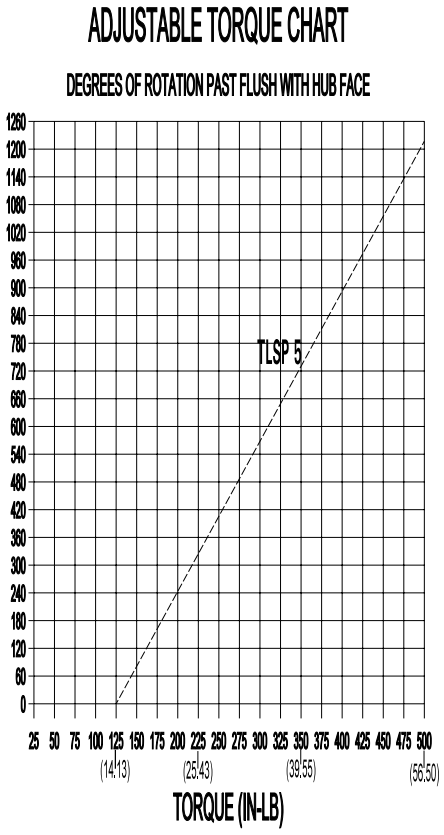
SINGLE POSITION TORQUE LIMITER OVERLOAD PROTECTION

MODEL TLSP5 SINGLE POSITION TORQUE LIMITER



MODEL	TLSP5
A	3.249
B	3.125
C	4.188
D	.875
E	.083
MOUNTING HOLES	1/4-20NC X 1/4 Deep4 Places Equal Spaced ON 3.750 B.C.D.

MODEL			
TLSP5		TLSPM5-3	
ASSEMBLY	BORE	ASSEMBLY	BORE
-1 -2 -3 -4 -5 -6	.750/.751 .875/.876 .938/.939 1.000/1.001 1.125/1.126 1.250/1.251		(- 30mm)
KEYWAY			
3/16X3/32 3/16X3/32 1/4X1/8 1/4X1/8 1/4X1/8 1/4X1/8		(8X7)	
TORQUE			
MINIMUM	125 IN-LB		
MAXIMUM	500 IN-LB		
MINIMUM SPROCKET			
CHAIN SIZE	35 40 50		
TEETH	40T 30T 25T		
WEIGHT APPROX.			
7 LB			
MAXIMUM RPM 1800			



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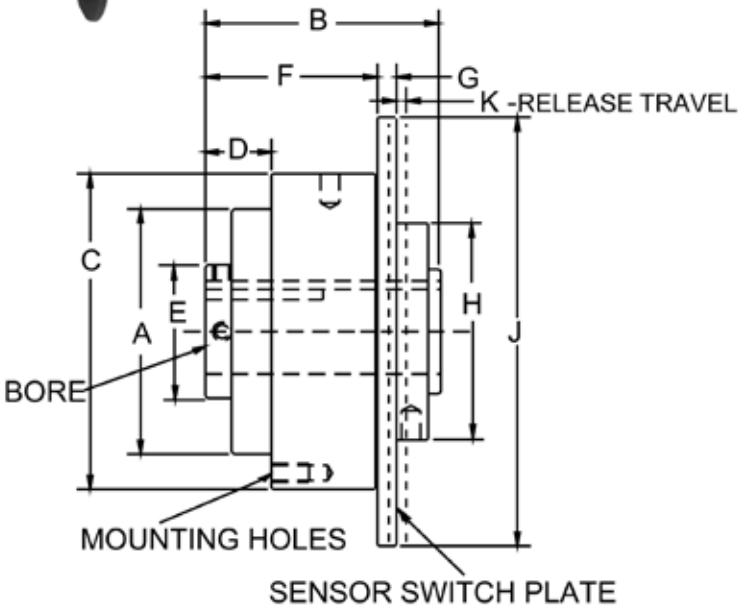
TLSP5U SINGLE POSITION TORQUE LIMITER



MODEL	TLSP5U
A	3.249
B	3.125
C	4.188
D	.875
E	1.741
F	2.284
G	.250
H	2.844
J	5.688
K	.0833
MOUNTING HOLES	1/4-20NC X 1/4 Dp. 4 Plcs. Eq. Spcd. ON 3.750 B.C.D.

MODEL	ASSEMBLY	BORE	KEYWAY
TLSP5U	-4 -5 -6	1.000/1.001 1.125/1.126 1.250/1.251	1/4X1/8 1/4X1/8 1/4X1/8
TLSP5UM-3		(15 - 30mm)	(8X7)
TORQUE			
MINIMUM		MAXIMUM	
125 IN-LB		500 IN-LB	
MINIMUM SPROCKET			
CHAIN SIZE		TEETH	
35 40 50		40T 30T 25T	
WEIGHT APPROXIMATE			
7 LB			
MAX. RPM 1800			

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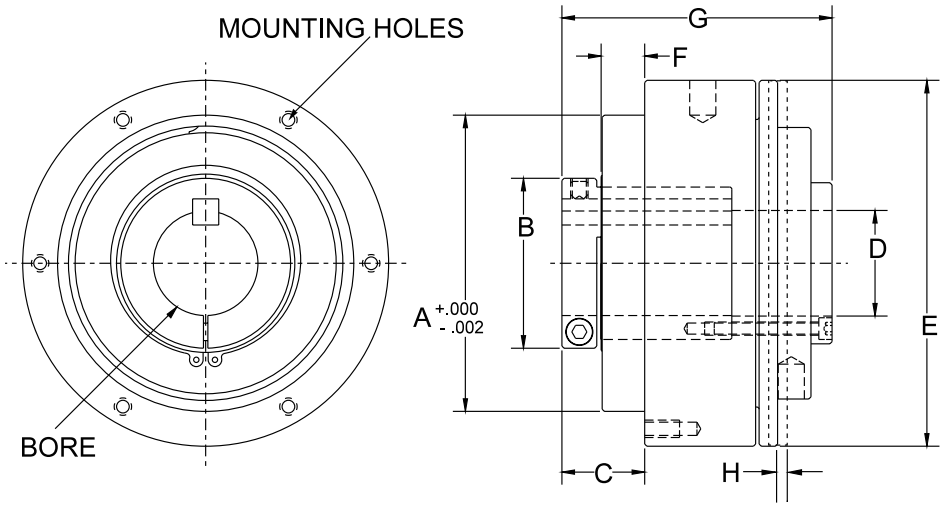
MODEL TLSP20 / TLSP60 TORQUE LIMITER

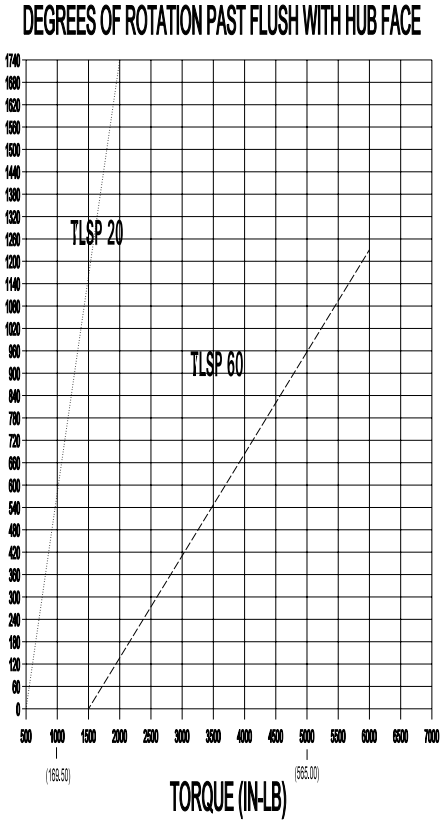


MODEL	TLSP20	TLSP60
A	4.249	5.499
B	2.438	3.125
C	1.188	1.625
D	1.515	2.015
E	5.250	6.625
F	.625	.750
G	3.875	4.750
H	.124	.144
MOUNTING HOLES	1/4-20,NC X 1/2 Dp.6 Plcs. Eq. Spcd. On 4.750 B.C.D.	5/16-18,NC X 9/16 Dp.6 Plcs. Eq. Spcd. On 6.000 B.C.D.

MODEL	ADAPTER BUSHING	BORE	KEYWAY
TLSP20	4456-1	.938/.939	1/4X1/8
	4456-2	1.000/1.001	1/4X1/8
	4456-3	1.125/1.126	1/4X1/8
	4456-4	1.250/1.251	1/4X1/8
	4456-5	1.375/1.376	5/16X5/32
	4456-6	1.438/1.439	3/8X3/16
	4456-7	1.500/1.501	3/8X3/16
TLSPM20		(24-38mm)	
MAXIMUM RPM			
1200			
WEIGHT APPROXIMATE			
11 LB			
TORQUE			
MINIMUM		MAXIMUM	
500 IN-LB		2000 IN-LB	
MINIMUM SPROCKET			
CHAIN SIZE		TEETH	
35		48T	
40		37T	
50		30T	
60		26T	
80		20T	

MODEL	ADAPTER BUSHING	BORE	KEYWAY
TLSP60	4410-1	1.250/1.251	1/4X1/8
	4410-2	1.375/1.376	5/16X5/32
	4410-3	1.438/1.439	3/8X3/16
	4410-4	1.500/1.501	3/8X3/16
	4410-5	1.625/1.626	3/8X3/16
	4410-6	1.750/1.751	3/8X3/16
	4410-7	1.875/1.876	1/2X1/4
	4410-8	1.938/1.939	1/2X1/4
	4410-9	2.000/2.001	1/2X1/4
TLSPM60		(30-50mm)	
MAXIMUM RPM			
20 LB			
WEIGHT APPROXIMATE			
900			
TORQUE			
MINIMUM		MAXIMUM	
1500 IN-LB		6000 IN-LB	
MINIMUM SPROCKET			
CHAIN SIZE		TEETH	
40		46T	
50		37T	
60		32T	
80		25T	

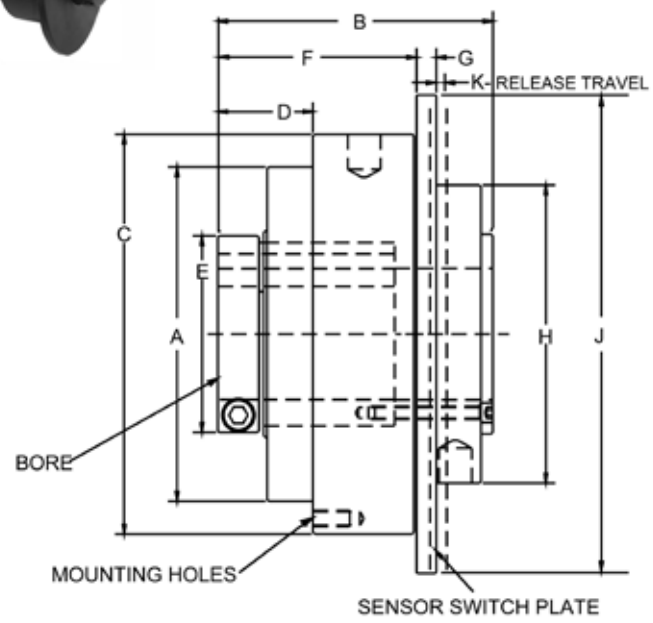
ADJUSTABLE TORQUE CHART



MAXIMUM RPM ALL UNITS 1800
Dimensions shown are for general information only.
Certified prints will be furnished for design and installation purposes.

C-2 Lubricated Air Required

MODEL TLSP20U / TLSP60U TORQUE LIMITER



MODEL	TLSP20U	TLSP60U
A	4.249	5.499
B	3.875	4.750
C	5.250	6.625
D	1.188	1.625
E	2.438	3.125
F	2.830	3.552
G	.265	.312
H	3.865	4.968
J	6.750	8.125
K	.125	.146
MOUNTING HOLES	1/4-20,NC X 1/2 Dp.6 Plcs. Eq. Spcd. On 4.750 B.C.D.	5/16-18,NC X 9/16 Dp.6 Plcs. Eq. Spcd. On 6.000 B.C.D.

MODEL	ADAPTER BUSHING	BORE	KEYWAY
TLSP20U	4456-1	.938/.939	1/4X1/8
	4456-2	1.000/1.001	1/4X1/8
	4456-3	1.125/1.126	1/4X1/8
	4456-4	1.250/1.251	1/4X1/8
	4456-5	1.375/1.376	5/16X5/32
	4456-6	1.438/1.439	3/8X3/16
	4456-7	1.500/1.501	3/8X3/16
TLSP20UM		(24 - 38mm)	

TORQUE	
MINIMUM	MAXIMUM
500 IN-LB	2000 IN-LB

MINIMUM SPROCKET	
CHAIN SIZE	TEETH
35	48T
40	37T
50	30T
60	26T
80	20T

WEIGHT APPROXIMATE
11 LB

MAXIMUM RPM
1200

MODEL	ADAPTER BUSHING	BORE	KEYWAY
TLSP60U	4410-1	1.250/1.251	1/4X1/8
	4410-2	1.375/1.376	5/16X5/32
	4410-3	1.438/1.439	3/8X3/16
	4410-4	1.500/1.501	3/8X3/16
	4410-5	1.625/1.626	3/8X3/16
	4410-6	1.750/1.751	3/8X3/16
	4410-7	1.875/1.876	1/2X1/4
	4410-8	1.938/1.939	1/2X1/4
	4410-9	2.000/2.001	1/2X1/4
TLSP60UM		(30 - 50mm)	

TORQUE	
MINIMUM	MAXIMUM
1500 IN-LB	6000 IN-LB

MINIMUM SPROCKET	
CHAIN SIZE	TEETH
40	46T
50	37T
60	32T
80	25T

WEIGHT APPROXIMATE
20 LB

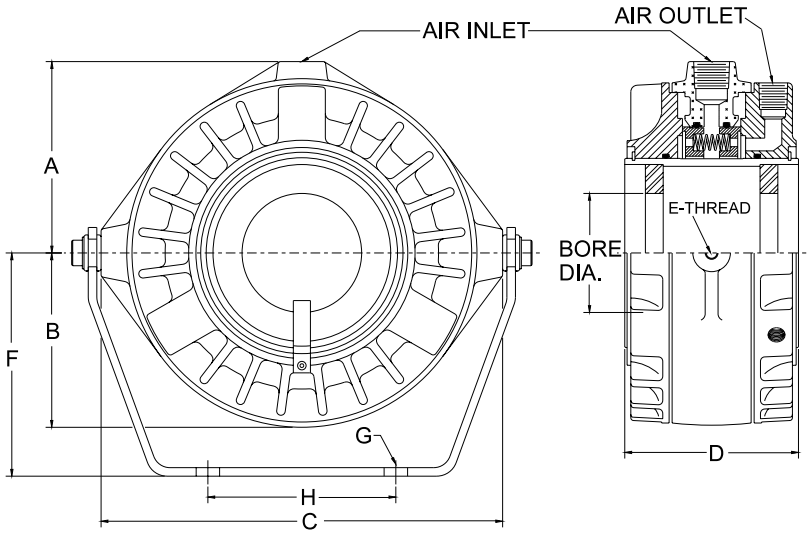
MAXIMUM RPM
900

MAXIMUM RPM ALL UNITS 1800
Dimensions shown are for general information only.
Certified prints will be furnished for design and installation purposes.

C-2 Lubricated Air Required

AIR SHAFT SEAL AROUND-THE-SHAFT AIR UNION

The air shaft seal **TRANSMITS AIR** from the air supply to the rotating members of air clutches and air brakes making possible new applications of air clutches and air brakes previously considered impractical for closed-end shafts. The **SLIP-ON INSTALLATION** eliminates long rifle drilling of air passages in shafts and permits easy installation.



MOUNTING BRACKET

SEAL MODEL	250	350	500
F	4 3/8	4 7/8	6 9/16
G DIA.	9/16	9/16	11/16
H	3 1/4	4 1/4	5 1/2
Repair Kits	4018-2	4018-3	4018-4
MAX RPM	1400	1150	900

MODEL		250	350	500	700
BORE (Max.)		2.5	3.5	5	7
BORE (Min.)		1.52	2.52	3.52	5.04
A		3 3/8	4	5 9/16	6 9/16
B		3 3/16	3 3/4	5 1/8	6 1/8
C		7	8 1/4	11 1/2	13 1/2
D		4 1/8	4 3/8	5	5 1/4
E		5/16-18	3/8-16	3/8-16	1/2-13
AIR INLET		3/8 NPT	3/8 NPT	3/4 NPT	3/4 NPT
AIR OUTLET	NO.	2	2	3	3
	SIZE	1/4 NPT	1/4 NPT	1/2 NPT	1/2 NPT
DRIVE KEY		1/2X1/4	1/2X1/4	1/2X1/4	3/4X3/8
WT. LBS. (Approx.)		15	18	39	57

To enable our Engineering Department to evaluate your installation, the following ***required*** information is needed with your shaft seal order:

1. Shaft diameter and keyway.
2. Description of application.
3. RPM at which seal will run.
4. Operating air pressure.
5. Mounting support bracket design.
6. Axial movement of shaft.

Dimensions shown are for general information only.
Certified prints will be furnished upon request for design and installation purposes.

The first step in selecting a clutch or brake is to IDENTIFY THE TYPE OF APPLICATION:

- **INFREQUENT ENGAGEMENT, e.g. power take-offs, compressor drives**
- **HIGH INERTIA ACCELERATION OR EMERGENCY "E" STOP, e.g. high inertia fans, coal pulverizers**
- **FREQUENT OR CYCLIC STARTS AND STOPS,e.g. punch presses, shears**
- **CONTINUAL SLIP OR CONSTANT TENSIONING, e.g. steel unwinders, paper tensioners**

Before these four categories are individually dealt with, some fundamentals in connection with clutch/brake selection will be discussed. These fundamentals, including WK^2 and placement of the clutch in drive, are used in many (though not all) applications.

1) WK^2, ROTATIONAL INERTIA OF A UNIT (also called WR^2). It is a measure of the unit's resistance to rotational speed change. Hence, WK^2 is a crucial factor in selection of a majority of clutches and brakes involving a change of RPM.

The torque required to accelerate a rotating body is the product of its mass moment of inertia (I) and the angular acceleration (**a**):

$$T = I\mathbf{a}$$

where $I = mK^2$

K=radius of gyration of the body

(for a rotating solid cylinder, K=0.71 X radius)

$m = \text{mass} = \frac{W}{g}$

W=weight of the body

g=acceleration due to gravity, a constant

$WK^2 = mgK^2 = (mK^2)g = Ig$

or, $I = \frac{WK^2}{g}$

$$\text{Torque } T = \frac{WK^2\mathbf{a}}{g}$$

$$\text{Since } \mathbf{a} = \frac{\Delta RPM}{t}$$

Where ΔRPM= difference between initial RPM and final RPM

t=time lapse to bring from initial to final speed

$$T = \frac{WK^2(\Delta RPM)}{gt} \qquad \textbf{Formula 1}$$

The WK^2 value of a system determines the time required to accelerate the system to a desired speed, given a certain torque.

If the proper units are introduced,

$$T = \frac{WK^2\ (\Delta RPM)}{25.6\ (t)} \quad \text{(1E)}$$

Where T (InLB), WK^2 ($Lb\ Ft^2$), t (sec)

$$T = \frac{WK^2\ (\Delta RPM)}{9.55\ (t)} \quad \text{(1M)}$$

Where T (NM), WK^2 (KgM^2), t (sec)

The WK^2 of every rotating part that the brake must stop or the clutch must bring to speed, including it's own inertia, must be accounted for in this calculation.

WK^2 values of all Carlson Co. clutches and brakes are given in this ENGINEERING SECTION.

There is also a page in this section that lists WK^2 of steel discs.

If any part of the load is to operate at a speed other than clutch speed, WK^2 must be compensated by means of the formula:

Formula 2

$$WK^2_e = WK^2_a \left[\frac{RPM}{RPM_c} \right]^2$$

WK^2_e=equivalent or reflected WK^2 referred to clutch speed

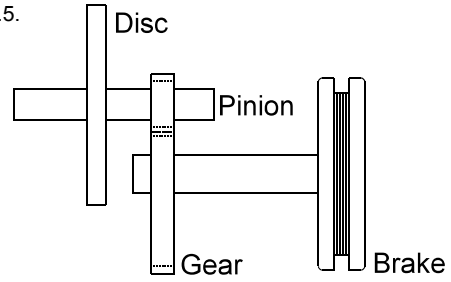
WK^2_a=actual WK^2 of load

RPM=speed of load

Rpm_c=speed of clutch

EXAMPLE:

Size a CARLSON CO. brake to stop a disc 13" (330 mm) diameter and 1 1/4" (32 mm) thick revolving at 2,000 RPM on a 2" (50 mm) diameter shaft 15" (380 mm) long. The brake is to be mounted on a 500 RPM shaft of 2 ½" (63.5 mm) diameter and 15" (380 mm) length. The gear on the high speed shaft has a WK^2 value of .015 $LbFt^2$ (.0006 KgM^2). The WK^2 VALUE of the gear on the slow shaft is 4 Lb Ft^2 (.1687 KgM^2). The system must be stopped within 1/5 second. Air pressure available is 90 PSI. The customer requires a service factor of at least 1.5.



SOLUTION:

The brake must stop the load inertia within 1/5 second. First, a rough estimate of its torque requirement can be made using Formula 1:

ENGLISH	**METRIC**
$T = \frac{WK^2 \Delta RPM}{25.6\ (t)}$	$T = \frac{WK^2 \Delta RPM}{9.55\ (t)}$

Total WK^2 of components on high speed shaft:

WK^2 of disc*=5.58X1.25	= 6.872	= .2914
WK^2 of 2" shaft*=.0031X15	= .046	= .0018
WK^2 of gear	= .015	= .0006
	6.933 Lb Ft^2	.2938 KgM^2

WK^2 of high-speed shaft reflected to brake shaft (using Formula 2):

$6.933\left[\frac{2000}{500}\right]^2$	= 110.930	=4.7008
WK^2 of gear	= 4.000	= .1687
WK^2 of 2 ½" shaft*	= .113	= .0047
Total WK^2 of the system to be stopped (rated at brake speed)	115 $LbFt^2$	4.8742 KgM^2

$$T = \frac{115\ (500)}{25.6\ (.2)} = 11{,}230\ \text{In Lb} \qquad T = \frac{4.8742\ (500)}{9.55\ (.2)} = 1{,}275\ \text{NM}$$

A Carlson Co. BK model brake is suitable for this application. The torque rating of a 12" brake at 90psi is 19,588 In Lb. (2,213 NM) This allows a service factor = $\frac{19{,}588}{11{,}230}$ =1.74 = $\frac{2{,}213}{1{,}275}$ =1.74

**From table "WK2 of steel Disc."*

A Carlson Co. 12BK can be tentatively selected for this application. The final selection can not be made until after including the WK^2 of the brake in the calculation.

WK^2 of rotating parts of a 12BK brake=8.47 Lb Ft^2 (.3573 KgM^2)

∴Total WK^2 of the system becomes 115 + 8.47 =123.47 Lb Ft^2 (4.8742 + .3573 = 5.23 KgM^2)

Now the time required to stop the system can be calculated by rewriting Formula 1:

$$t = \frac{WK^2\ \Delta RPM}{25.6\ (T)} \qquad t = \frac{WK^2\ \Delta RPM}{9.55\ (T)}$$

$$= \frac{123.47\ (500)}{25.6\ (19{,}588)} = .123\ \text{sec.} \qquad = \frac{5.23\ (500)}{9.55\ (2{,}213)} = .123\ \text{sec.}$$

Service Factor = $\frac{.2}{.123}$ = 1.6 Service Factor = $\frac{.2}{.123}$ = 1.6

The Carlson Co. 12BK brake will be suitable for this application.

2) SERVICE FACTOR FOR EVALUATING TORQUE REQUIREMENTS:

The type of prime mover driving the system strongly influences the choice of the clutch.

(A) **Light duty** or a steady power source with no shock or overloads:
A service factor of 1.5 is typical for these applications.
(B) **Normal duty** or a steady power source with occasional surge and/or shock or overload of moderate size: A service factor of 2.0 is recommended.
(C) **Heavy duty** or equipment with severe shock loads, high surges, continual overloads, or pulsating power sources: Service factor for heavy duty clutches should be a least 3.

3) LOCATION OF THE CLUTCH

The moderate speed shaft is, in most cases, the best place to install the clutch; providing a good balance between clutch durability and initial expense.
The clutch on the high speed shaft will be smaller in size and thus have less dissipation capacity and lining area. The clutch required on the low-speed shaft will be large and relatively expensive.
A clutch located on a medium speed shaft will have few balance or bearing failure problems.
The diameter of the mounting shaft must be verified to lie in the range between the minimum and maximum bore sides of the chosen clutch given in this catalog.

HEAVY DUTY INDUSTRIAL AIR CLUTCHES

WEIGHT (W) INERTIA (WK^2)

CLUTCH SIZE (INCHES)	MODEL CW (ONE OUTSIDE PLATE)*				MODEL CR (TWO OUTSIDE PLATES)**				ALL MODELS TORQUE ASSY.			
	W		WK^2		W		WK^2		W		WK^2	
	Lb	(Kg)	Lb Ft^2	(KgM^2)	Lb	(Kg)	Lb Ft^2	(KgM^2)	Lb	(Kg)	Lb Ft^2	(KgM^2)
8.5	8.4	3.8	0.92	.0388	19.0	8.6	2.10	.0886	10.3	4.7	0.70	.0295
10	10.9	4.9	1.59	.0670	23.9	10.9	3.43	.1447	15.0	6.8	1.35	.0569
12	18.0	8.2	3.80	.1602	40.5	18.4	8.47	.3574	20.8	9.4	2.79	.1176
14	26.0	11.8	6.90	.2910	52.0	23.6	12.45	.5253	32.0	14.5	5.90	.2488
16	37.0	16.8	12.40	.5230	76.9	34.9	23.16	.9773	41.1	18.7	9.57	.0436
18	48.0	21.8	20.57	.8676	102.0	46.3	40.00	1.688	50.0	22.7	14.64	.6175
20	70.5	32.0	37.74	1.591	145.5	66.1	71.84	3.031	73.5	33.4	26.30	1.109
22	85.4	38.8	54.02	2.278	174.5	79.2	102.60	4.329	93.5	42.4	40.10	1.619
25	134.9	61.2	110.29	4.652	266.9	121.2	199.90	8.435	136.0	61.7	76.05	3.208
28	189.0	85.8	182.80	7.710	384.0	174.3	357.60	1.509	185.5	84.2	122.20	5.154
32	260.0	118.0	334.60	14.11	550.0	249.7	667.00	2.814	267.5	121.4	233.80	9.861
36	390.5	77.3	618.80	26.10	824.0	374.1	1208.40	5.099	430.0	195.2	363.28	15.32

**Includes Pressure Plate & Cap Screws and Spacers.*
***Includes Pressure Plate, Backplate, Cap Screws and Spacers.*

SHOE BRAKE DRUM

WEIGHTS (W) lbs. **INERTIA (WK^2) Lb Ft^2**

MODEL SIZE INCHES	BORE DIAMETER		WEIGHT		WK^2	
	In	mm	Lb	Kg	Lb Ft^2	KgM^2
7	2.40	60.96	16.2	7.4	1.152	.0485
10	3.00	76.20	37.3	16.9	4.740	.1999
14	3.00	76.20	92.4	41.9	15.590	.6575
18	3.00	76.20	158.9	72.1	46.060	1.943
24	4.00	101.60	444.5	201.8	232.600	9.811

APPLICATION CATEGORIES:

Infrequent engagement is a common application. A machine falls into this category if it is of relatively low inertia and cycles at a rate of less than seven times per hour. The clutch must disconnect the prime mover from the machine at irregular intervals. The foremost criterion is estimating clutch torque based on rated horsepower of the prime mover:

$$T = P/RPM \qquad \text{Formula } \mathbf{3}$$

3E

$$T = \frac{63{,}025\ HP}{RPM}$$

Where T = (In Lb)

3M

$$T = \frac{5{,}310\ KW}{RPM}$$

Where T = (NM)

The above method is not valid when the application demands frequent engagements, prolonged acceleration and/or deceleration periods, or high inertia loads.

If the unit is to be a brake, it is often required to bring the load to a stop in an acceptable period. The time in seconds required to accelerate or decelerate a rotating mechanism:

$$t = \frac{WK^2\ (\Delta RPM)}{gT} \qquad \text{Formula } \mathbf{4}$$

4E

$$t = \frac{WK^2\ (\Delta RPM)}{25.6\ (T)}$$

Where
t (sec), WK^2 (Lb Ft^2), T (In Lb)

4M

$$t = \frac{WK^2\ (\Delta RPM)}{9.55\ (T)}$$

Where
t (sec), WK^2 (KgM^2), T (NM)

In some applications the clutch is performing load work while bringing the load inertia up to speed. In such cases, the clutch is required to not only bring the inertia of the load (flywheel, etc.) to speed, but also carry the torque of the load. Acceleration time then is:

$$t = \frac{WK^2 \Delta RPM}{g\ (\text{clutch torque - load torque})}$$

The above formula indicates that when the rated torque of the chosen clutch is close to the load torque, the acceleration period and hence the heat generated will be large. In such a case, a larger clutch is recommended. If any part of the load is to operate at a speed other than clutch speed, WK^2 must be compensated by means of Formula 2:

For occasional start stop, if possible, put the clutch or brake on the high speed shaft where torque is lowest.

High inertia start/stop applications involve heavy rotating rolls or flywheels. Engagement is infrequent but takes longer than in category #1, occasional start/stop. Any situation where the start/stop period is more than ½ second should definitely be brought under this category.

Formula 1

1E

$$T = \frac{WK^2(\Delta RPM)}{25.6\ (t)}$$

Where
T (In Lb), WK^2 (Lb Ft^2), t (sec)

1M

$$T = \frac{WK^2(\Delta RPM)}{9.55\ (t)}$$

Where
T (NM), WK^2 (KgM^2),t (sec)

Again, Formula 2 has to be used along with Formula 1 for parts driven by clutch and not rotating at clutch speed.

Any body which goes through a change in RPM undergoes a change of kinetic energy:

$$KE = \frac{WK^2\ (RPM_2^2 - RPM_1^2)}{2g} \qquad \text{Formula } \mathbf{5}$$

5E

$$KE = \frac{WK^2\ (RPM_2^2 - RPM_1^2)}{5{,}868}$$

Where
KE (FtLb), WK^2 (LbFt^2)

5M

$$KE = \frac{WK^2\ (RPM_2^2 - RPM_1^2)}{183}$$

Where
KE (Joule), WK^2 (KgM^2)

Each time the rotating parts change speed or are brought to a stop, heat equivalent to this energy is generated at the clutch (or brake) interface. In high inertia applications, clutch/brake heat sink values can be utilized, because the unit has time to cool between starts and stops. The clutch or brake is to be sized such that the rated heat sink value on Table 3 exceeds the value from Formula 5.

EXAMPLE:

A flywheel with a WK^2 value of 4,000 LbFt^2 (169 KgM^2) needs to be brought up to a speed of 1,375 RPM within two seconds. Size a Carlson Co. clutch for this application driven by a four-cylinder engine. All the driven and drive components are to be installed on the same shaft. 90 psi (6 Bar) air is available for the clutch.

SOLUTION:

The high WK2 value of 4,000 LbFt^2 (169 KgM^2), and an acceleration period longer than ½ second indicates that this application is in the “High inertia start/stop” category.

The first step is the determination of torque requirement using Formula 1

ENGLISH

$$T = \frac{(4{,}000)\ (1{,}375)}{25.6(2)} = 107{,}250\ \text{In Lb}$$

METRIC

$$T = \frac{(169)\ (1{,}375)}{9.55(2)} = 12{,}166\ \text{NM}$$

Since the prime mover is a four-cylinder engine operating above 700 RPM, a safety factor of 2.2 is recommended. So torque requirement=107,250 (2.2)=235,950 InLb (26,765 NM). A Carlson Co. model CW clutch is suitable for this application since there is a flywheel to which the clutch can be mounted on directly. A 25” clutch can be selected, which has a rating of 237,227 In Lb @ 90 psi (26,802 NM @ 6 Bar).

The heat sink requirement is determined using Formula 5

ENGLISH

$$KE = \frac{4{,}000(1{,}375\text{-}0^2)}{5{,}868} = 1{,}285{,}000\ \text{Ft Lb}$$

METRIC

$$KE = \frac{169\ (1{,}375^2\text{-}0^2)}{183} = 1{,}746{,}000\ \text{Joule}$$

A Carlson Co. 25 CW clutch has a rated heat sink value (Table 3)=10 million ft-lb (13.6 million Joule). The chosen clutch has the heat capacity required for this application. Therefore, the selection is a 25 CW clutch.

CYCLIC START-STOP applications are encountered in process machinery where stock is precisely located and then sheared stamped or formed. In contrast to the `Infrequent Engagement' category, the cycling rate of the clutch in this category is at least seven times an hour.
First the clutch is sized based on torque requirement calculated using Formulas 1 and 2.

Next the heat dissipation capacity of the clutch must be compared to the heat generated in the application.

$$P = \frac{WK^2 (RPM_2^2 - RPM_1^2) (f)}{2g} \quad \text{Formula } \mathbf{6}$$

6E

$$P = \frac{WK^2 (RPM_2^2 - RPM_1^2) (f)}{1.936 \times 10^8}$$

Where
P (HP), WK^2 (Lb Ft^2), f (Cycles/Min.)

6M

$$P = \frac{WK^2 (RPM_2^2 - RPM_1^2) (f)}{10.9 \times 10^6}$$

Where
P (KW), WK^2 (KgM^2), f (Cycles/Min.)

The factory should be consulted to determine if the rated heat dissipation value of the chosen clutch is enough to meet the thermal HP requirement calculated using Formula 6.

EXAMPLE:
Calculate the continuous heat dissipation requirement of a clutch which is required to bring a load inertia of 1,000 $LbFt^2$ (42.2 KgM^2) from rest to 1,800 RPM every six minutes.

SOLUTION:

Find the continuous heat dissipation required using formula 6.

ENGLISH $\frac{P = 1,000 (1,800^2 - 0) .166}{1.936 \times 10^8} = 2.8$ HP

METRIC $\frac{P = 42.2 (1,800^2 - 0) .166}{10.9 \times 10^6} = 2.1$ KW

TABLE 1 STATIC TORQUE In Lb (NM) VS. AIR PRESSURE PSI (BAR)

USING STANDARD LINING (.42 COEFFICIENT OF FRICTION)

	SIZE											
PSI (Bar)	8.5	10	12	14	16	18	20	22	25	28	32	36
10	330	1031	1454	3386	4214	7681	8673	14027	21008	34557	43169	73992
(0.68)	(37.3)	(116.5)	(164.3)	(382.6)	(476.2)	(867.9)	(980)	(1585.1)	(2373.9)	(3904.9)	(4878.1)	(8361.1)
20	896	2336	3721	7695	10497	17682	21369	32469	48035	75828	100055	163370
(1.36)	(101.2)	(263.9)	(420.5)	(869.5)	(1186.2)	(1998)	(2414.7)	(3668.9)	(5427.9)	(8568.6)	(11306.2)	(18460.8)
30	1462	3642	5988	12004	16781	27682	34065	50911	75063	117090	156941	252748
(2.04)	(165.2)	(411.5)	(676.6)	(1356.5)	(1896.3)	(3128.1)	(3849.3)	(5752.9)	(8482.1)	(13231.2)	(17734.3)	(28560.5)
40	2027	4947	8254	16313	23064	37682	46760	69352	102090	158370	213826	342126
(2.72)	(229.1)	(559)	(932.7)	(1843.4)	(2606.2)	(4258.1)	(5283.8)	(7836.8)	(11536.2)	(17895.8)	(24162.3)	(38660.2)
50	2593	6253	10521	20621	29347	47683	59456	87794	129118	199641	270712	431504
(3.4)	(293)	(706.6)	(1188.9)	(2330.1)	(3316.2)	(5388.2)	(6718.5)	(9920.7)	(14590.3)	(22559.4)	(30590.5)	(48759.9)
60	3158	7558	12788	24930	35630	57683	72152	106236	156145	240912	327598	520881
(4.08)	(356.9)	(854.1)	(1445)	(2817.1)	(4026.2)	(6518.2)	(8153.2)	(12004.7)	(17644.4)	(27223.1)	(37018.6)	(58859.5)
70	3724	8864	15055	29239	41913	67684	84847	124678	183172	282183	384484	610259
(4.76)	(420.8)	(1001.6)	(1701.2)	(3304)	(4736.69)	(7648.3)	(9587.7)	(14088.6)	(20698.4)	(31886.7)	(43446.7)	(68959.3)
80	4290	10169	17322	33548	48196	77684	97543	143120	210200	323454	441370	699637
(5.44)	(484.8)	(1149.1)	(1957.4)	(3790.9)	(5446.1)	(8778.3)	(11022.4)	(16172.6)	(23752.6)	(36550.3)	(49874.8)	(79058.9)
90	4855	11475	19588	37857	54479	87685	110239	161562	237227	364725	498256	789015
(6.12)	(548.6)	(1296.7)	(2213.4)	(4277.8)	(6156.1)	(9908.4)	(12457)	(18256.5)	(26806.7)	(41213.9)	(56302.9)	(89158.7)
100	5421	12780	21855	42166	60762	97685	122935	180004	264255	405996	555142	875393
(6.8)	(612.6)	(1444.1)	(2469.6)	(4764.8)	(6866.1)	(11038.4)	(13891.7)	(20340.5)	(29860.8)	(45877.5)	(62731)	(98919.4)
110	5986	14086	24122	46475	67045	107686	135630	198445	291282	447267	612028	967771
(7.48)	(676.4)	(1591.7)	(2725.8)	(5251.7)	(7576.1)	(12168.5)	(15326.2)	(22424.3)	(32914.9)	(50541.2)	(69159.2)	(109358.1)
120	6552	15391	26389	50784	73328	117686	148326	216887	318310	448538	668914	1057149
(8.16)	(740.4)	(1739.2)	(2981.9)	(5738.6)	(8286.1)	(13298.5)	(16760.8)	(24509.2)	(35968)	(50684.8)	(75587.3)	(119457.8)

TABLE 2 FOR TENSION OR CONTINUAL SLIP APPLICATION

DYNAMIC TORQUE In Lb (NM) VS AIR PRESSURE PSI (Bar) USING LO(CO LINING (.139 COEFFICIENT OF FRICTION)

	SIZE											
PSI (Bar)	8.5	10	12	14	16	18	20	22	25	28	32	36
10	109	341	481	1121	1395	2542	2870	4642	6953	11437	14287	24488
(0.68)	(12.3)	(38.5)	(54.4)	(126.7)	(157.6)	(287.2)	(324.3)	(524.5)	(785.7)	(1292.4)	(1614.4)	(2767.1)
20	297	773	1231	2547	3474	5852	7072	10746	15897	25096	33113	54068
(1.36)	(33.6)	(87.3)	(139.1)	(287.8)	(392.6)	(661.3)	(799.1)	(1214.3)	(1796.40)	(2835.8)	(3741.8)	(6109.7)
30	484	1205	1982	3973	5554	9161	11274	16849	24842	38754	51940	83647
(2.04)	(54.7)	(136.2)	(224)	(449)	(627.6)	(1035.2)	(1274)	(1904)	(2807.1)	(4379.2)	(5869.2)	(9452.1)
40	671	1637	2732	5399	7633	12471	15474	22952	33787	52413	70766	113227
(2.72)	(75.8)	(184.9)	(308.8)	(610.1)	(862.5)	(1409.2)	(1748.6)	(2593.6)	(3818)	(5922.7)	(7996.5)	(12794.6)
50	858	2069	3482	6825	9712	15781	19677	29056	42732	66072	89593	142807
(3.4)	(96.9)	(233.8)	(393.5)	(771.2)	(1097.5)	(1783.3)	(2223.5)	(3283.3)	(4828.7)	(7466.1)	(10124)	(16137.2)
60	1045	2501	4232	8251	11792	19090	23879	35159	51677	79730	108419	172387
(4.08)	(118.1)	(282.6)	(478.2)	(932.4)	(1332.5)	(2157.2)	(2698.3)	(3973)	(5839.5)	(9009.5)	(12251.3)	(19479.7)
70	1232	2933	4982	9677	13871	22400	28080	51262	60621	93389	127246	201967
(4.76)	(139.2)	(331.4)	(563	(1093.5)	(1567.4)	(2531.2)	(3173	(5792.6	(6850.2)	(10553)	(14378.8)	(22822.3)
80	1420	3366	5733	11103	15951	25710	32282	47366	69566	107048	146072	231547
(5.44)	(160.5)	(380.3)	(647.8)	(1254.6)	(1802.5)	(2905.2)	(3648	(5352.4)	(7860.9)	(12096.4)	(16506.1)	(26164.8)
90	1607	3798	6483	12529	18030	29019	36484	53469	78511	120707	164899	261126
(6.12)	(181.6)	(429.2)	(732.6)	(1415.8)	(2037.4)	(3279.1)	(4122.7)	(6042)	(8871.7)	(13639.9)	(18633.6)	(29507.2)
100	1794	4230	7233	13955	20109	32329	40686	59573	87456	134365	183725	290706
(6.8)	(202.7)	(478)	(817.3)	(1577	(2272.3)	(3653.2)	(4597.5)	(6731.7)	(9882.5)	(15183.2)	(20760.9)	(32849.7)
110	1981	4662	7983	15381	22189	35639	44887	65676	96401	148024	202552	320286
(7.48)	(223.9)	(526.8)	(902.10	(1738.1)	(2507.4)	(4027.2)	(5072.2)	(7421.4)	(10893.3)	(16726.7)	(22888.4)	(36192.3)
120	2168	5094	8733	16807	24268	38949	49089	71779	105345	161683	221379	349866
(8.16)	(244.90)	(575.6)	(986.8)	(1899.2)	(2742.3)	(4401.2)	(5547.1)	(8111)	(11903.9)	(18270.2)	(25015.8)	(39534.9)

TABLE 3 RATED HEAT SINK VALUE

CLUTCH SIZE	KINETIC ENERGY ABSORTION MILLION OF FT-LB (MILLION OF JOULE)	SHOE BRAKE SIZE	KINETIC ENERGY ABSORPTION MILLION OF FT-LB (MILLION OF JOULE)
8.5 10 12 14	.71 (.97) .89 (1.21) 1.52 (2.07) 1.95 (2.65)	7 10 14 18 24	.35 (.476) 1.06 (1.44) 2.83 (3.85) 4.78 (6.50) 14.16 (19.26)
16 18 20 22	2.88 (3.92) 3.82 (5.20) 5.44 (7.40) 6.53 (8.88)		
25 28 32 36	10.00 (13.60) 14.27 (19.41) 20.58 (28.20) 30.84 (41.94)		

Continuous Slip applications always require a high heat dissipation capacity of the clutch or brake. LO-CO LINING (coefficient of friction=.14) must be specified for slip applications.
A common slip application is the tension control of winding or unwinding rolls of paper, fabric, foils, etc. The following data is required to size a clutch or brake for this type of application.

1. Roll diameter (O.D.)
2. Core diameter (I.D.)
3. Web Width(W)
4. Unit Web Tension (U)
5. Web Speed (S)

From these calculate secondary data

1. Web Tension = W (U)
2. Maximum Torque = O.D. (W) (U)/2
3. Minimum Torque = I.D. (W) (U)/2
4. Maximum RPM = S/ π I.D.
5. Minimum RPM = S/ π O.D.

WINDING (CLUTCH):
A winding operation is usually done by turning the input to the clutch at a constant RPM and driving the wind-up roll with the output side of the clutch. The slip RPM increases as the roll builds up. First calculate the heat to be dissipated.
Slip clutch heat

P= Maximum Torque (RPM_{in} - Min RPM) **Formula 7**

7E

$$P = \frac{O.D.\ (W)\ (U)}{126{,}050}\left(RPM_{in} - \frac{12\ (S)}{\pi O.D.}\right)$$

Where
P (HP), O.D. (In), W In), U (Lb/In), S (Ft/Min)

7M

$$P = \frac{O.D.\ (W)\ (U)}{10{,}620}\left(RPM_{in} - \frac{60\ (S)}{\pi O.D.}\right)$$

Where
P (KW), O.D. (M), W (M), U (N/M), S (M/sec)

The heat dissipation capacity of the clutch increases with it's RPM.
Use the capacity at the minimum RPM.
Next check that the maximum and minimum torques are both within the clutch capacity with engagement pressures from 6 - 60 PSI, and with LO-CO lining.

UNWIND (BRAKE):
An unwind operation is usually done by applying brake torque to the roll producing the desired web tension.
The slip RPM increase as the roll gets smaller. Most unwind operation are considered constant velocity.

Slip brake heat

P = W (U) S **Formula 8**

8E

$$P = \frac{W\ (U)\ S}{33{,}000}$$

Where
P (HP), W (In), U (Lb/In), S (Ft/ Min)

8M

$$P = \frac{W\ (U)\ S}{556}$$

Where
P (KW), W (M), U (N/M), S (M/sec)

EXAMPLE 1
What is the torque and dissipation capacity required for a clutch on a winding application of brass sheet. The core diameter is 10" (.254 M) and is it is rolled up to 36" (.914 M) diameter. The material is 60" (1.524 M) wide and has a unit tension of 15 Lb/In (2,627 N/M). Web speed is 200 Ft/Min (1.02 M/sec). Input RPM is 75.

SOLUTION:

MAXIMUM TORQUE = $\frac{O.D.\ (W)\ U}{2}$

ENGLISH

$$\frac{36\ (60)\ 15}{2} = 16{,}200\ \text{In Lb}$$

METRIC

$$\frac{.914\ (1.524)\ 2{,}627}{2} = 1{,}830\ \text{NM}$$

MINIMUM RPM = S/ π (O.D.)

ENGLISH

MINIMUM RPM = $\frac{36\ (12)}{\pi\ (36)}$ = 21 RPM

METRIC

MINIMUM RPM = $\frac{1.02\ (60)}{\pi\ (.914)}$ = 21 RPM

Find heat dissipation required using formula 7

ENGLISH

$$P = \frac{36(60)(15)}{126{,}050}\ (75\text{-}21)$$

$$= .257\ (54) = 13.9\ \text{HP}$$

METRIC

$$P = \frac{.914(1.524)2{,}627}{10{,}620}\ (75\text{-}21)$$

$$= .345\ (54) = 18.61\ \text{KW}$$

Note: The clutch for this application must be able to dissipate the above power @ 22 RPM.

EXAMPLE 2: What is the torque and heat dissipation requirements for a brake tensioning a paper roll unwind. Web speed is 600 Ft/ Min (3 M/sec)
The roll diameter is 72" (1.83 M) and the core diameter is 10" (.254M) The material is 60" (1.524 M) wide and has a unit tension of 1.665 Lb/In (289 N/M).

SOLUTION:
MAXIMUM TORQUE = $\frac{O.D.\ (W)\ U}{2}$

ENGLISH

$$\frac{72\ (60)\ 1.65}{2} = 7{,}128\ \text{InLb}$$

METRIC

$$\frac{1.83\ (1.524)\ 289}{2} = 806\ \text{NM}$$

MINIMUM RPM = S/ π (O.D.)

ENGLISH

$$\frac{600\ (12)}{\pi\ (72)} = 32\ \text{RPM}$$

METRIC

$$\frac{3\ (60)}{\pi\ (1.83)} = 32\ \text{RPM}$$

Find heat dissipation required using formula 8.

ENGLISH

$$P = \frac{W(U)S}{33{,}000} = \frac{60\ (1.65)\ 600}{33{,}000} = 1.8\ \text{HP}$$

METRIC

$$P = \frac{W(U)S}{556} = \frac{1.524\ (289)\ 3}{556} = 2.38\ \text{KW}$$

Note: The brake for this application must be able to dissipate the above power @ 32 RPM.

WK2 OF STEEL DISC

To determine the WK^2 of a given diameter of disc: multiply the WK^2 value below by the length of the disc. For hollow shafts, subtract WK^2 of the inside diameter from WK^2 of the outside diameter and multiply by length. The chart values were generated using the following.

ENGLISH

$$\frac{WK^2}{IN} = \frac{D^4}{5195}$$

Where WK^2 = $LbFt^2$
D = In

For Conversion, Lb Ft^2 X .04218 = KgM^2

METRIC

$$\frac{WK^2}{M} = 770\ D^4$$

Where WK^2 = KgM^2
D = M

DIAMETER (In)	WK^2 (Lb $Ft.^2$)	DIAMETER (M)	WK^2 (KgM^2)
2	.00310	.050	.0048
2-1/2	.00752	.060	.0100
3	.0156	.070	.0185
3-1/2	.029	.080	.0315
4	.049	.090	.0505
4-1/2	.079	.100	.077
5	.120	.110	.113
5-1/2	.177	.120	.160
6	.250	.130	.220
6-1/2	.345	.140	.296
7	.464	.150	.390
7-1/2	.611	.160	.505
8	.791	.170	.643
8-1/2	1.00	.180	.808
9	1.27	.190	1.000
9-1/2	1.55	.200	1.23
10	1.93	.225	1.97
11	2.83	.250	3.01
12	4.00	.275	4.40
13	5.58	.300	6.24
14	7.42	.325	8.59
15	9.75	.350	11.55
16	12.61	.375	15.23
17	16.07	.400	19.71
18	20.21	.425	25.12
19	25.08	.450	31.58
20	30.79	.475	39.20
21	37.43	.500	48.12
22	45.09	.525	58.50
23	53.87	.550	70.46
24	63.86	.575	84.17
25	75.19	.600	99.79
26	87.96	.625	117.49
27	102.30	.650	137.45
28	118.31	.675	159.85
29	136.14	.700	184.88
30	155.92	.725	212.74
31	177.77	.750	243.63
32	201.8	.775	277.78
33	228.2	.800	315.39
34	257.2	.825	356.70
35	288.8	.850	401.94
36	323.2	.875	451.36
37	360.7	.900	505.20
38	401.3	.925	563.71
39	445.3	.950	627.17
40	492.8	.975	695.84
		1.000	770.00

FOR CAST IRON MULTIPLY THESE BY 0.91. FOR ALUMINUM, BY .35 AND FOR COPPER, BY 1.14

RECOMMENDED SPEED VS. BALANCE SPECIFICATION OF AIR CLUTCHES

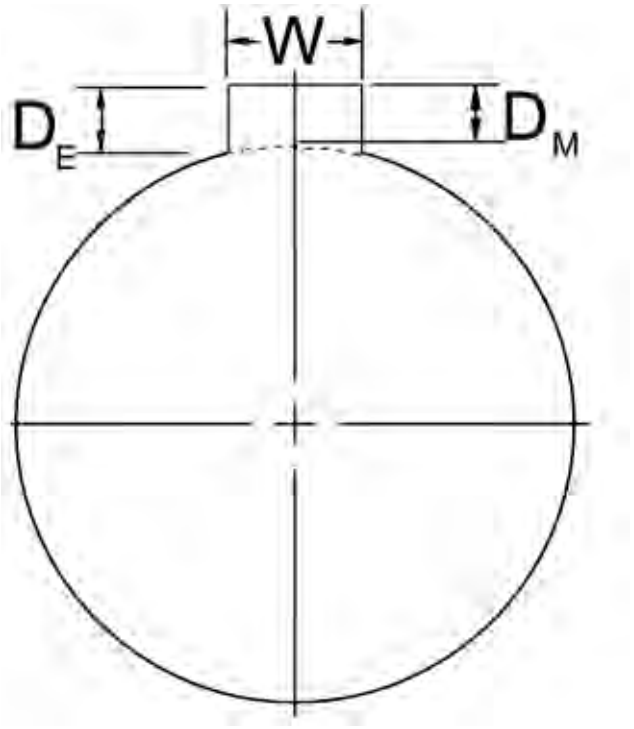
CLUTCH SIZE	STANDARD MODEL CW, CK, CR UNITS	
	MAXIMUM RPM WITH STATIC BALANCE	MAXIMUM RPM WITH DYNAMIC BALANCE
8.5	1200	3000
10	1200	2800
12	1000	2500
14	1000	2400
16	800	2200
18	800	2000
20	750	1800
22	600	1500
25	600	1200
28	500	1000
32	400	800
36	300	600
CLUTCH SIZE	STANDARD MODEL IM AND PM UNITS	
8.5	800	3000
10	800	2800
12	750	2500
14	700	2400
16	600	2200
18	600	2000
20	400	1800

NOTES:

1. All CARLSON CO. clutch and brake assemblies are furnished statically balanced. For operating above shown static balance Rpm, dynamic balancing is recommended. See price sheet for additional charges.

2. If clutch or brake unit is greater than 5% of total system weight, then dynamic balance is also recommended.

3. Clutches or brakes installed in applications requiring balanced condition must have pressure plate of assembly concentric with shaft center line.



KEYWAYS ENGLISH (In)

SHAFT DIA.		W WIDTH	D_E DEPTH	
OVER	TO		STANDARD	SHALLOW
.50	.563	.125	.063	
.563	.875	.188	.094	
.875	1.250	.250	.125	
1.250	1.375	.312	.156	
1.375	1.750	.375	.188	
1.750	2.250	.500	.250	.125
2.250	2.750	.625	.313	.188
2.750	3.250	.750	.375	.188
3.250	3.750	.875	.438	.250
3.750	4.500	1.000	.500	.250
4.500	5.500	1.250	.625	.250
5.500	6.500	1.500	.750	.250
6.500	7.500	1.750	.750	.250
7.500	9.000	2.000	.750	.375

KEYWAYS METRIC (mm)

SHAFT DIA.		W WIDTH	D_M DEPTH
OVER	TO		
6	8	2	1
8	10	3	1.4
10	12	4	1.8
12	17	5	2.3
17	22	6	2.8
22	30	8	3.3
30	38	10	3.3
38	44	12	3.3
44	50	14	3.8
50	58	16	4.3
58	65	18	4.4
65	75	20	4.9
75	85	22	5.4
85	95	25	5.4
95	110	28	6.4
110	130	32	7.4
130	150	36	8.4
150	170	40	9.4
170	200	45	10.4

Carlson Industrial

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- Visit our website at **WWW.CARLSONCOMPANY.COM**
- Contact our sales department, **sales@carlsoncompany.com** to obtain a General Line Catalog, or
- Contact your **Authorized Distributor.**

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