TOL-O-MATIC, INC.

CALIPER DISC BRAKES

Excellence In Motion®

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0701-4000B

CONTENTS

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ISO-9001 CERTIFICATED FIRM

DET NORSKE VERITAS INDUSTRY B.V., THE NETHERLANDS

Tol-O-Matic is proud to announce its quality systems have met the requirements to pass ISO 9001 certification

Tol-O-Matic morally and financially supports international organizations which help preserve and protect the environment on a global basis. When you are done with this catalog, please pass it along to someone else or recycle it again. Working together, we can make a difference!

This catalog is printed in the U.S.A. on recycled paper.
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CALIPER DISC BRAKES

Whether you need a hydraulic, pneumatic, mechanical or spring applied caliper, one of our products will fit your application. Tol-O-Matic caliper disc brakes put a stop to your problems, providing maximum performance and product longevity.

Since 1962, Tol-O-Matic has been developing pneumatic and hydraulic disc brakes to compliment its power transmission products. Over the years, the product line has grown to include hydraulic, pneumatic, mechanical and spring applied hydraulically released styles with over 400 different types of brake models to fill countless application requirements.

Tol-O-Matic features a quality line of power transmission products that continues to grow. Whether its a brake designed with a cooler operating special-vented disc or a caliper that combines both service and parking functions in one, we have a product for you! It's our job to uncover your braking design problems and then develop a cost-effective, efficient solution to improve your products performance.

Need a custom brake for your application? Our engineers and state of the art design tools can create a specialized design for your application in a timely manner. We can analyze the best way to solve your application problem and ensure customer input all along the way.

Our engineering lab pushes our products to the breaking point – running them 24 hours a day, 7 days a week for millions of cycles. If there is a way to improve design we'll find it. We test materials, manufacturing processes and design to insure every product executed on paper performs in the field as expected.

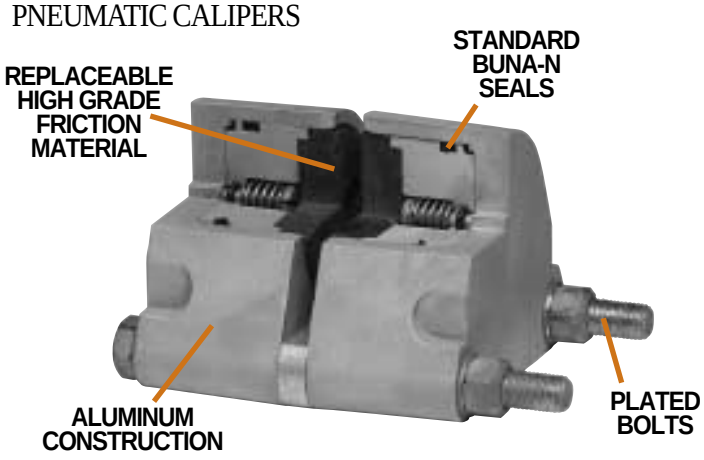
Parts are hand assembled and subject to 100% inspection. Our experienced professionals understand the product inside and out, checking quality in every assembly procedure and again in final assembly. All brakes are then pressure tested to maximum standards before it leaves our factory. You can be assured that, before it is shipped to you, it meets the specified product performance.

As our customer *you* set the delivery schedule. Normal lead time in the brake industry is measured in months. Standard Tol-O-Matic products deliveries are measured not in months or weeks but in days. Getting the product to you, when you need it, is just as important as product performance. We're ready to make sure you get both.

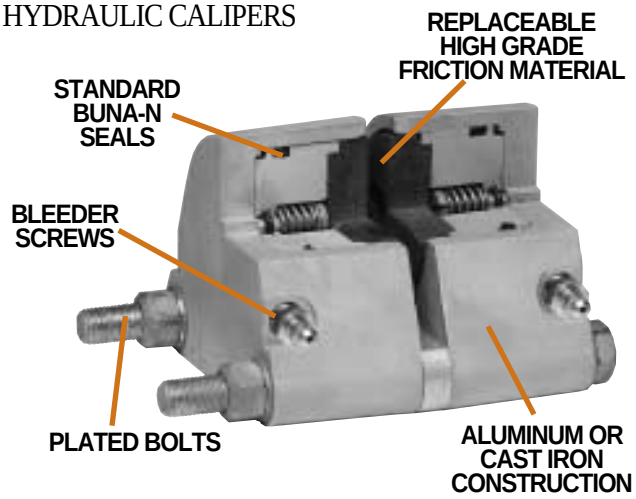
This catalog is designed to make it easier for you to select and order the brake that will work for your application. Graphs included show the performance of each model. Selecting the correct brake can be a complicated process. Our staff will do whatever it takes to be sure you get the brake that best fits your application. Call 1-800-328-2174 to get friendly experienced help.

FEATURES

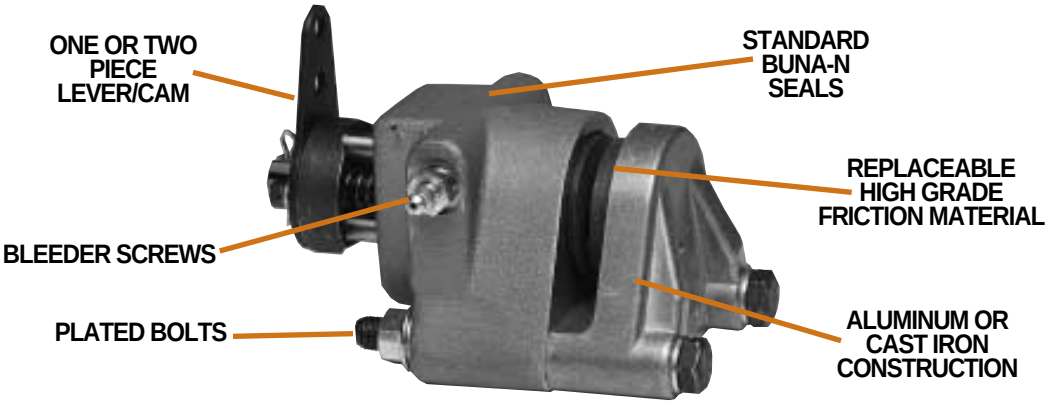
PNEUMATIC CALIPERS



HYDRAULIC CALIPERS



HYDRAULIC/MECHANICAL CALIPERS



PNEUMATIC BRAKES

Tol-O-Matic manufactures pneumatic brakes in three sizes: P-10 Series, P-20 Series and P-220 Series. Available in both double acting or single acting. These brakes feature replaceable pucks of high grade friction material, standard Buna-N seals, extruded aluminum construction and zinc chrome plated bolts. Options include EPR seals,Viton seals retractable pistons and floating bracket. (See pages 8 to 13)

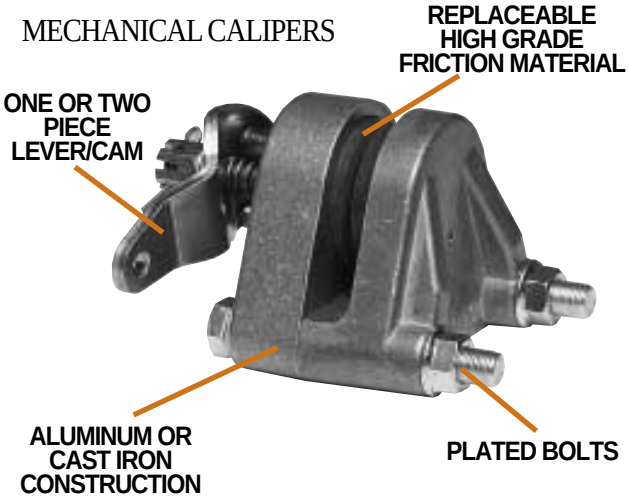
HYDRAULIC BRAKES

Tol-O-Matic hydraulic caliper disc brakes are available in the widest range of sizes, from the H-10 Series up to the H-960 Series these brakes are sure to supply the braking torque you need for your application. Available in both double acting or single acting. These brakes feature replaceable pucks (or pads) of high grade friction material, standard Buna-N seals, aluminum or cast iron construction, bleeder screws and zinc chrome plated bolts. Options include EPR seals,Viton seals, retractable pistons and floating brackets. (See pages 8 to 21)

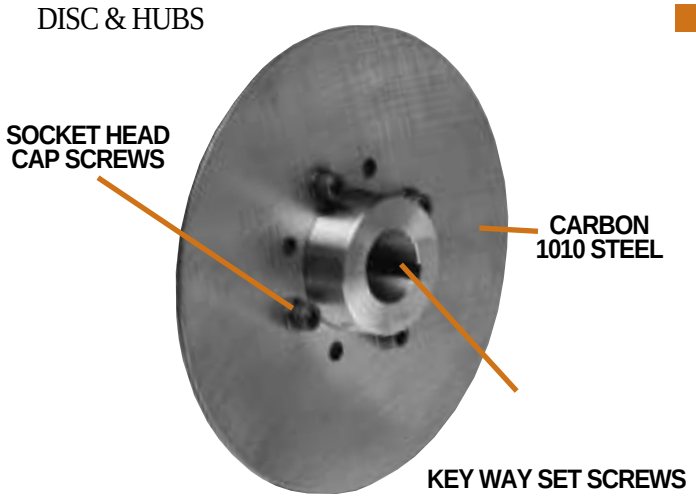
HYDRAULIC / MECHANICAL BRAKES

These Tol-O-Matic brakes combine hydraulic and mechanical braking in one caliper. Available in the H/ME-20 Series, H/ME-210 Series and H/ME-220 Series these single acting calipers deliver high braking torque in a small package. Features include: replaceable high grade friction material, standard Buna-N seals, aluminum or cast iron construction, bleeder screws and zinc chrome plated bolts. Options include EPR seals,Viton seals and floating brackets. (See pages 22 to 25)

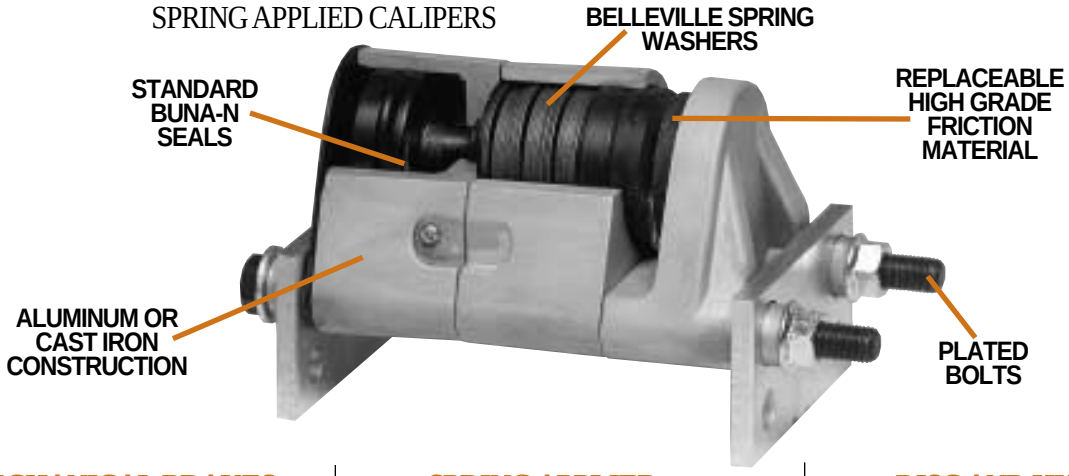
MECHANICAL CALIPERS



DISC & HUBS



SPRING APPLIED CALIPERS



MECHANICAL BRAKES

Tol-O-Matic manufactures a broad range of mechanical brakes in these series: ME-10, ME-20, ME210, ME220 and MB3. Designed for use in areas that do not have access to other types of power, these single acting calipers feature replaceable pucks (pads) of high grade friction material, cast aluminum or cast iron construction and zinc chrome plated bolts. (See pages 26 to 33)

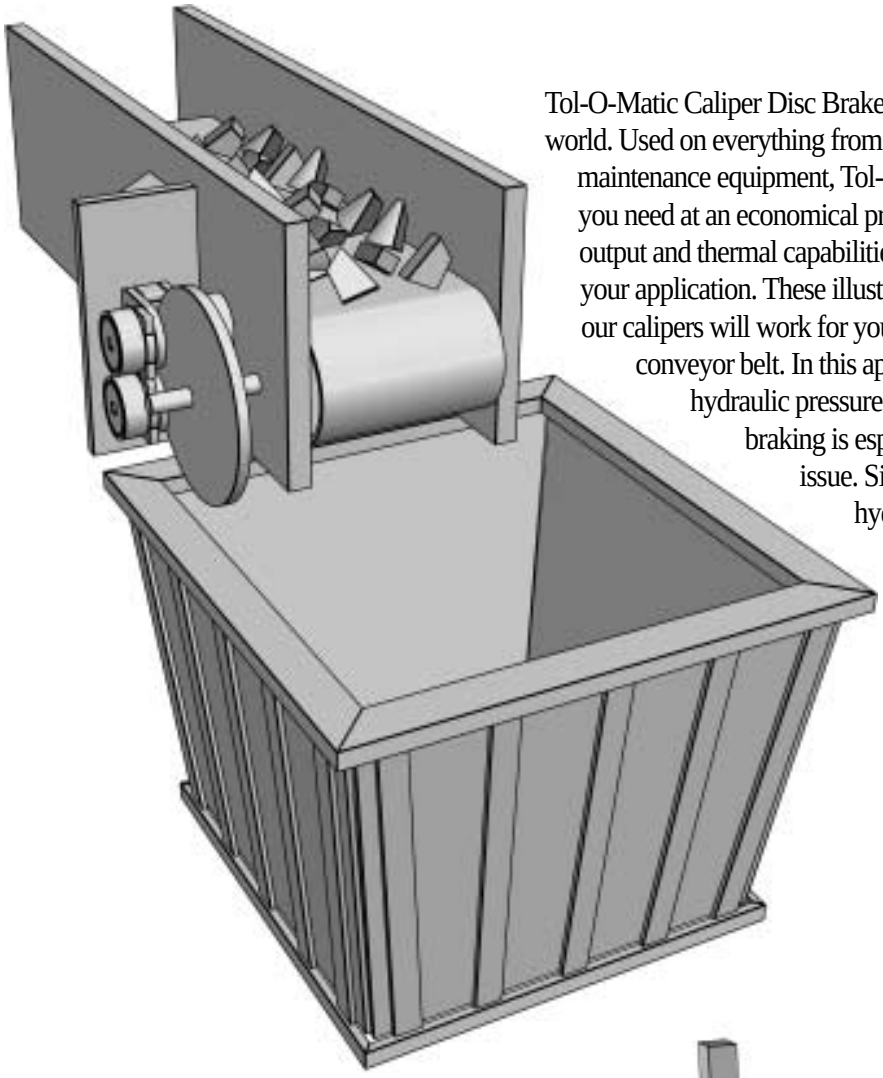
SPRING APPLIED BRAKES

Tol-O-Matic offers spring applied brakes in sizes ranging from FS-20 Series to FS-595 Series. These brakes require pressure (normally hydraulic) for disc release. Braking force is provided by a stack (or stacks) of Belleville spring washers. The concave washers are capable of storing enormous force. When the brake is pressurized the force moves a piston(s) to compress the spring washer stack(s), thus releasing the disc. These single acting calipers feature replaceable pucks of high grade friction material, aluminum or cast iron construction, Buna-N seals and cadmium plated bolts. Options include EPR seals, retractable pistons and manual compensators. (See pages 34 to 43)

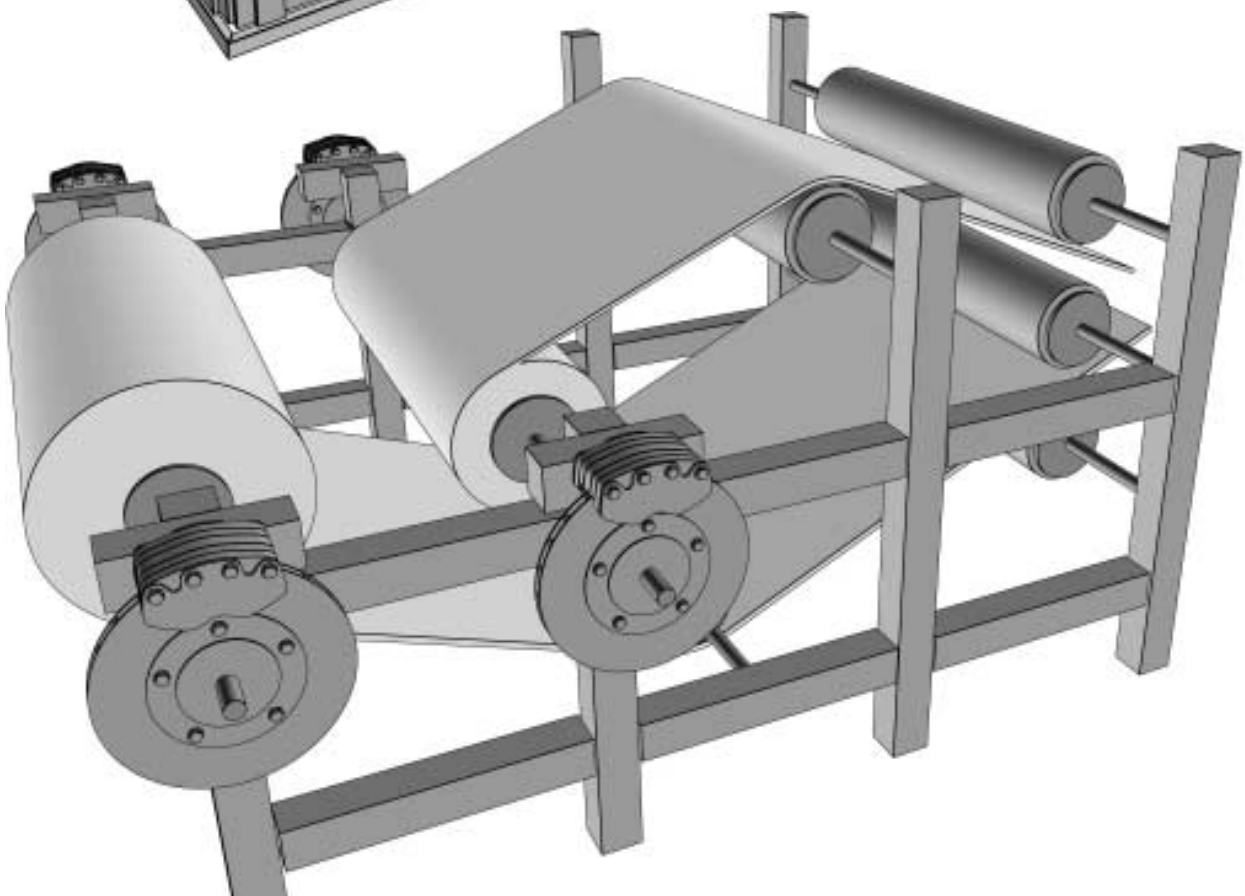
DISC AND HUBS

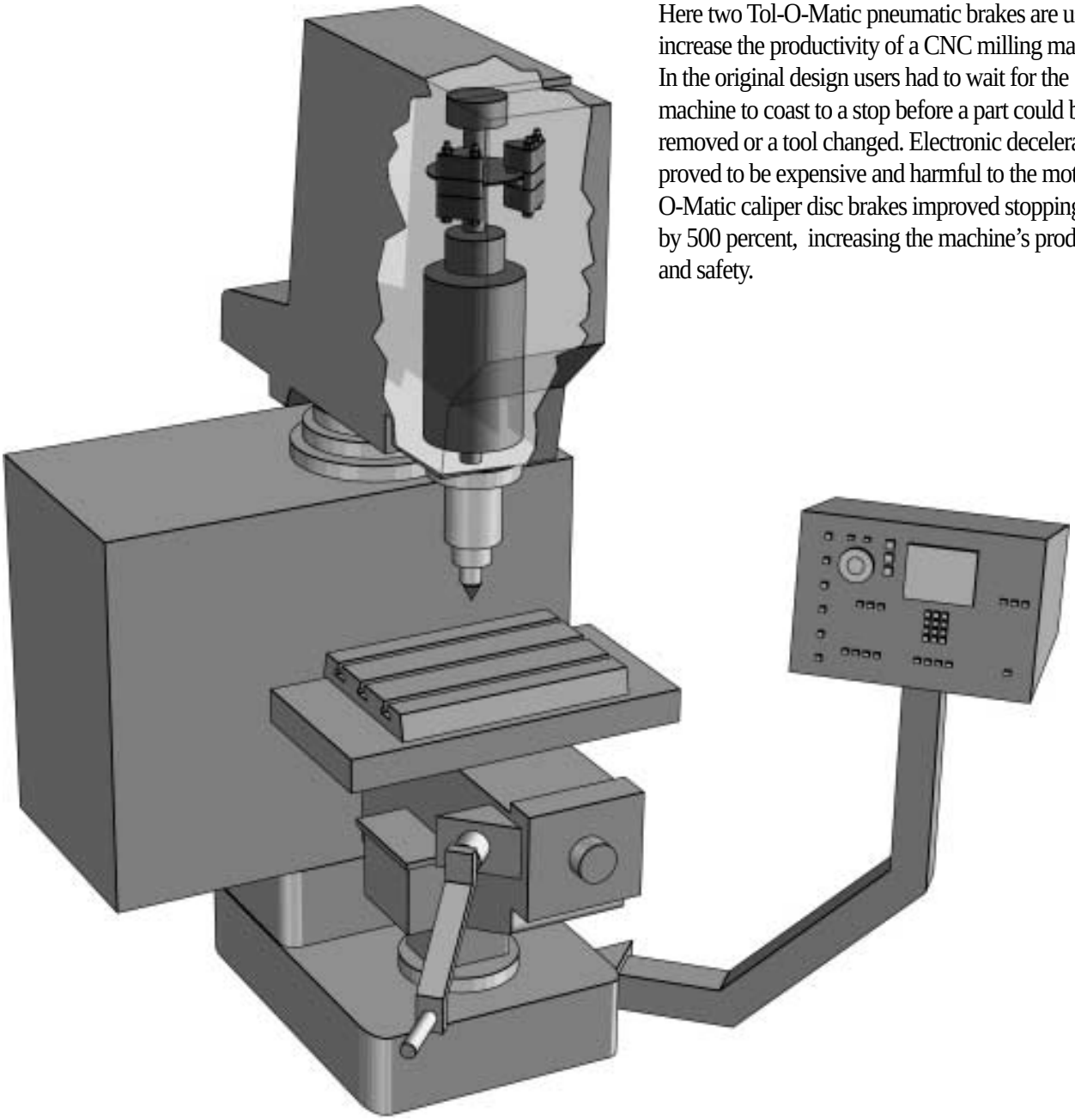
Tol-O-Matic offers several discs and hubs to fit your application. Most are made of carbon 1010 steel, are flat within .010 inch, stress relieved and blanchard ground to an 80 (RMS) microinch finish. Discs also feature socket head cap screw fasteners and key way set screws. Standard disc diameters are 6, 6-5/16, 8,10, 12, and 16 inches. Disc thicknesses range from 5/32" to 1/2". Available: Fixed Hub and Disc Assemblies, Fixed Hub and Disc Assemblies with Q.D. Bushings, Q.D. Bushings and Hubs, One-Piece Hub and Disc, Blank Disc, Disc with Bolt Circles and Pilot Holes, and Ventilated Disc. (See pages 44 to 51)

APPLICATIONS



Tol-O-Matic Caliper Disc Brakes find uses in industrial settings all over the world. Used on everything from assembly lines to wind generators and lawn maintenance equipment, Tol-O-Matic calipers offer the braking capacity you need at an economical price. The variety of sizes, maximum torque output and thermal capabilities insure you will find the optimal brake for your application. These illustrations are meant to help you to see ways that our calipers will work for you. At left a Spring Applied Brake is used on a conveyor belt. In this application it will provide braking when hydraulic pressure is *Not* provided to the brake. This type of braking is especially useful in situations where safety is an issue. Since a Spring Applied Brake requires hydraulic pressure to *Release* the brake, in a power shut down these brakes will engage providing positive braking.





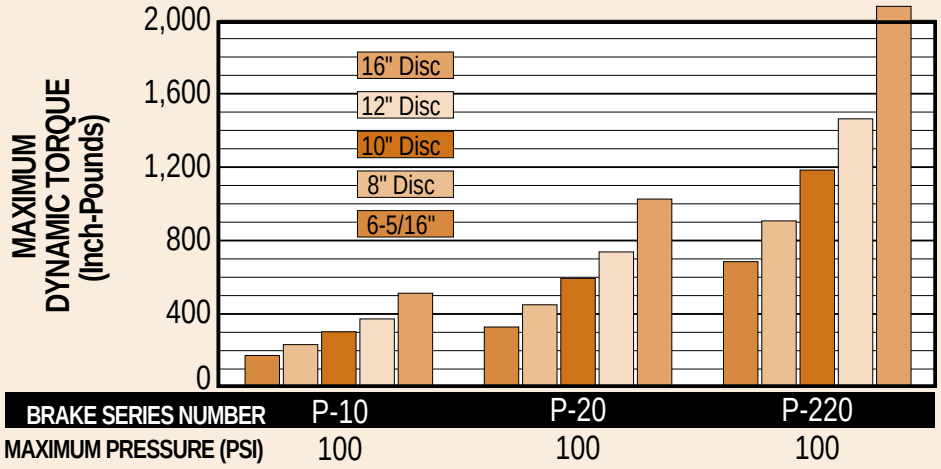
Here two Tol-O-Matic pneumatic brakes are used to increase the productivity of a CNC milling machine. In the original design users had to wait for the machine to coast to a stop before a part could be removed or a tool changed. Electronic deceleration proved to be expensive and harmful to the motor. Tol-O-Matic caliper disc brakes improved stopping time by 500 percent, increasing the machine's productivity and safety.

Illustrated on the opposite page is another great place for Tol-O-Matic brakes, tensioning/constant slip applications. Used in everything from mylar balloon fabrication to web presses, Tol-O-Matic pnuematic brakes provide dynamic tensioning that is adjusted by the air pressure supplied to the caliper. Because of the constant nature of this type of braking, caliper and disc are sized on thermal characteristics rather than torque.

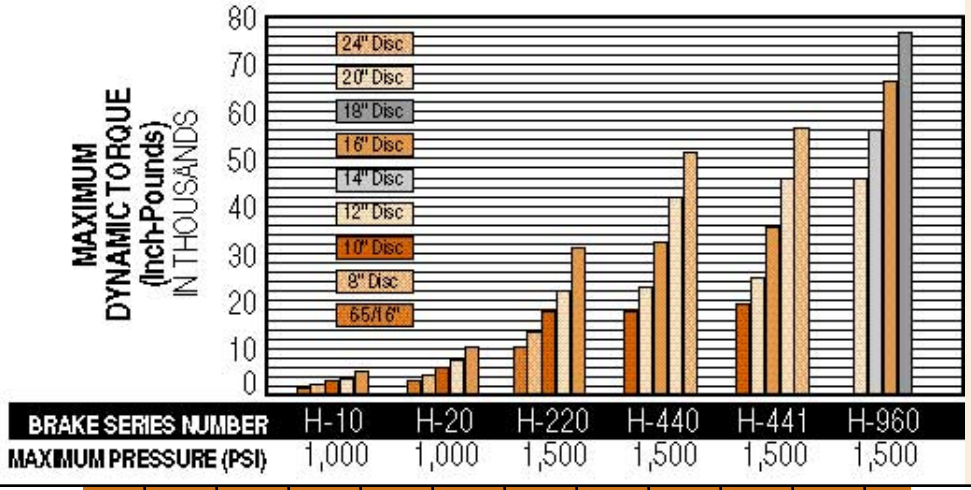
SELECTION CHARTS

PERFORMANCE DATA

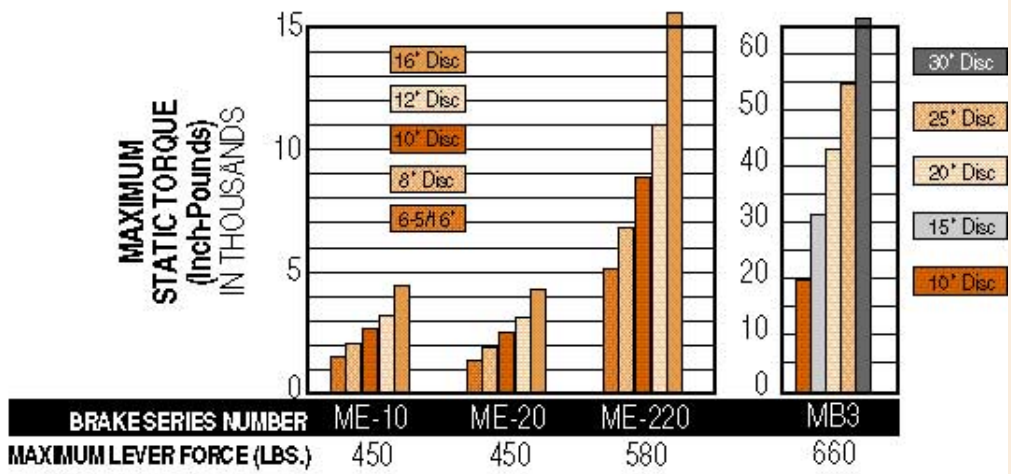
PNEUMATIC BRAKES – COMPARATIVE MAXIMUM TORQUE VALUES



HYDRAULIC BRAKES – COMPARATIVE MAXIMUM TORQUE VALUES



MECHANICAL BRAKES – COMPARATIVE MAXIMUM TORQUE VALUES



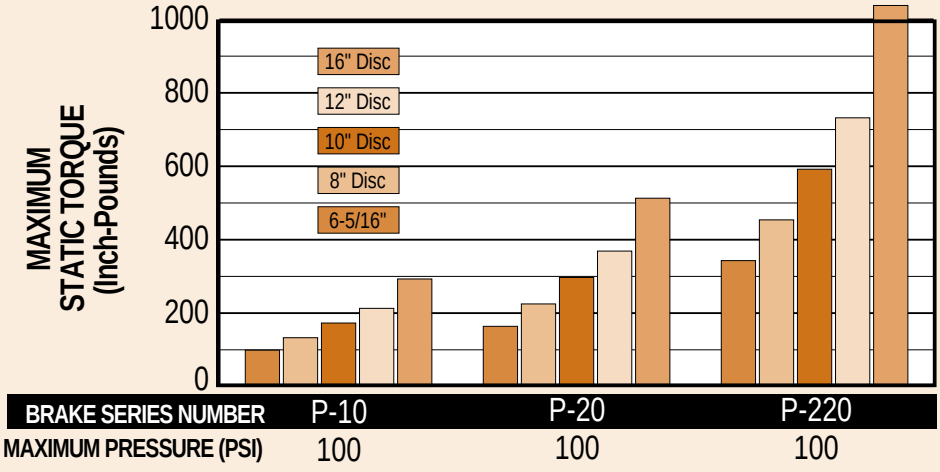
NOTE: Available Tol-O-Matic Disc Sizes 6 5/16", 8", 10", 12", and 16"

These graphs have been included for quick reference. Intended for use as a general guide, they reflect the maximum torque values possible with each brake and disc combination.

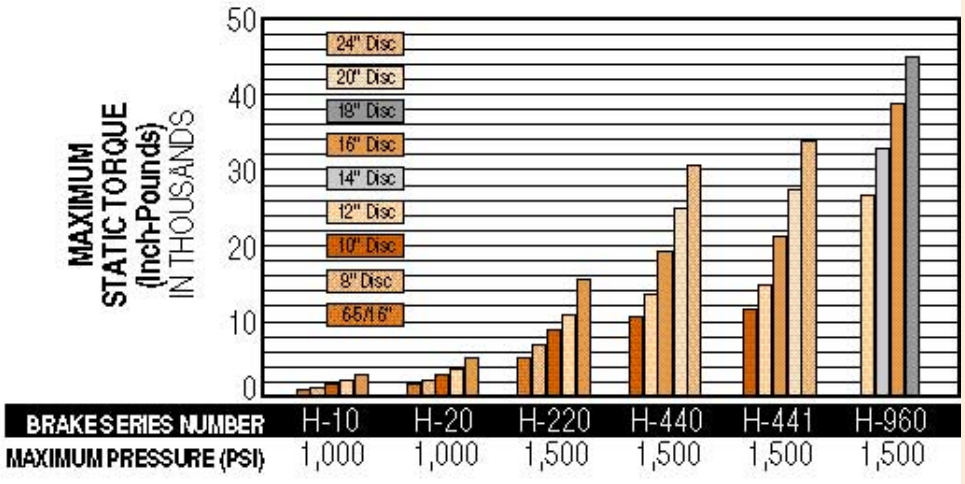
Performance Data

Selection instructions and formulae begin on page 54 of this catalog. Please refer to these instructions to determine if a particular brake disc combination will be adequate for your application.

Pneumatic Brakes – Comparative Maximum Torque Values

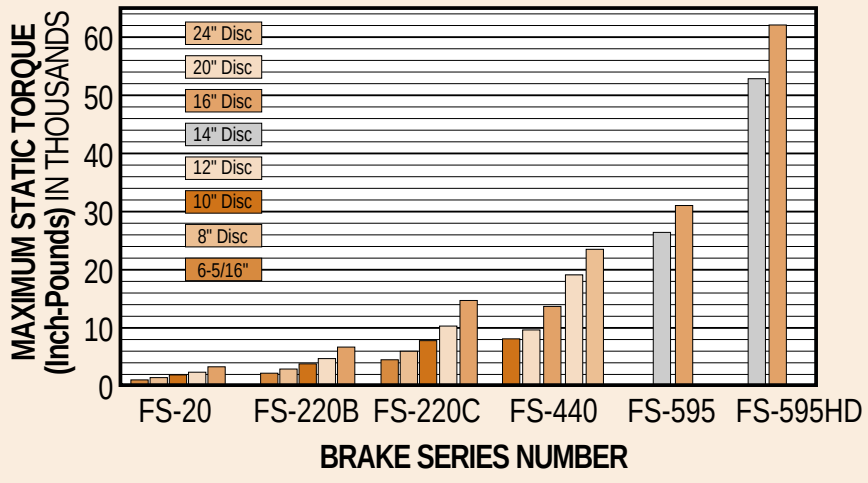


Hydraulic Brakes – Comparative Maximum Torque Values



Spring Applied Brakes – Comparative Maximum Torque Values

Tol-O-Matic is happy to help determine the brake that will best fit your application. Call 1-800-328-2174 for timely and accurate assistance .



NOTE: Available Tol-O-Matic Disc Sizes 6 5/16", 8", 10", 12", and 16"

P-10 & H-10 SERIES ALUMINUM

SINGLE ACTING
(For use with a 5/32"or 1/4" Floating Disc)

Weight: **.75 lbs.** (.34 kg.)

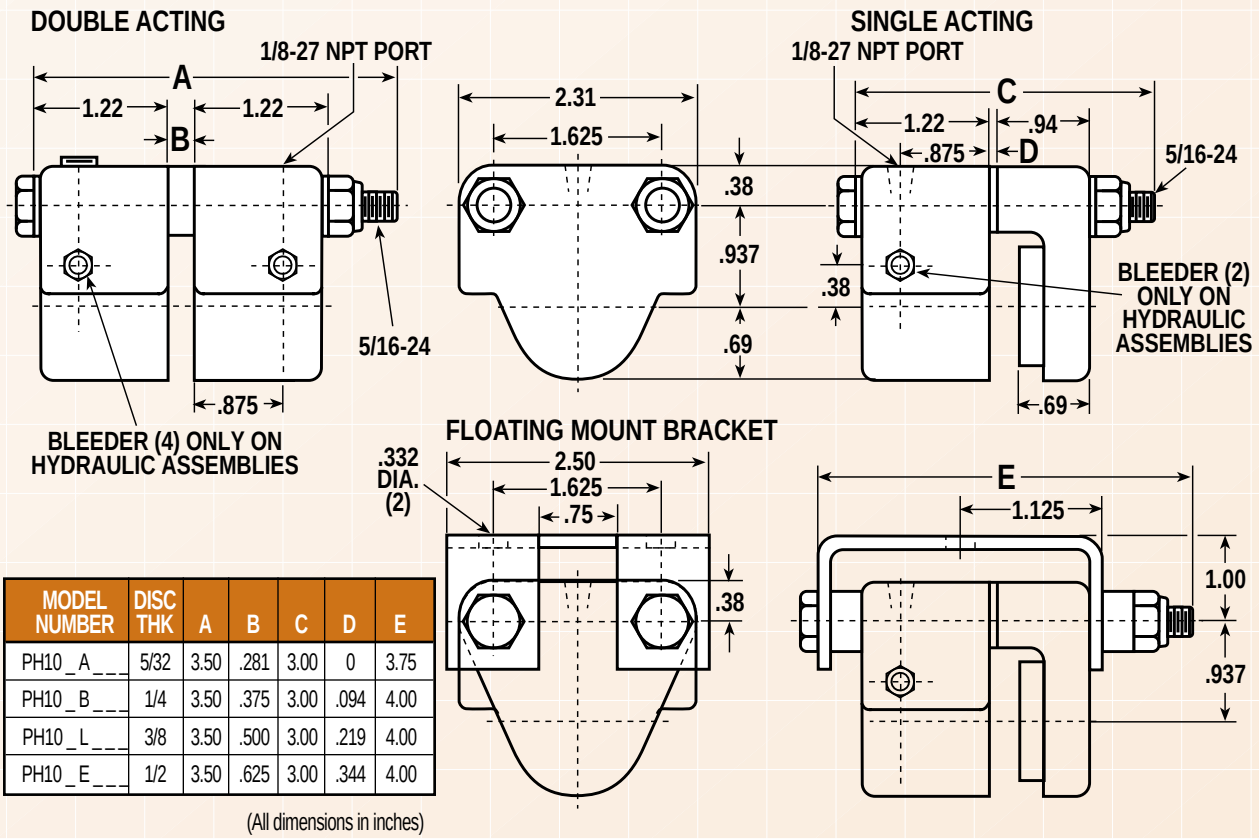
SINGLE ACTING W/ FLOATING BRACKET
(For use with a 5/32", 1/4" or 3/8" Fixed Disc)

Weight: **1.5 lbs.** (.68 kg.)

DOUBLE ACTING
(For use with a 5/32", 1/4", 3/8" or 1/2" Fixed Disc)

Weight: **1.0 lbs.** (.45 kg.)

DIMENSIONAL DATA



MODEL NUMBER	DISC THK	A	B	C	D	E
PH10 _ A ___	5/32	3.50	.281	3.00	0	3.75
PH10 _ B ___	1/4	3.50	.375	3.00	.094	4.00
PH10 _ L ___	3/8	3.50	.500	3.00	.219	4.00
PH10 _ E ___	1/2	3.50	.625	3.00	.344	4.00

(All dimensions in inches)

MAXIMUM PRESSURE RATING
PNEUMATIC = 100 PSI
HYDRAULIC = 1000 PSI

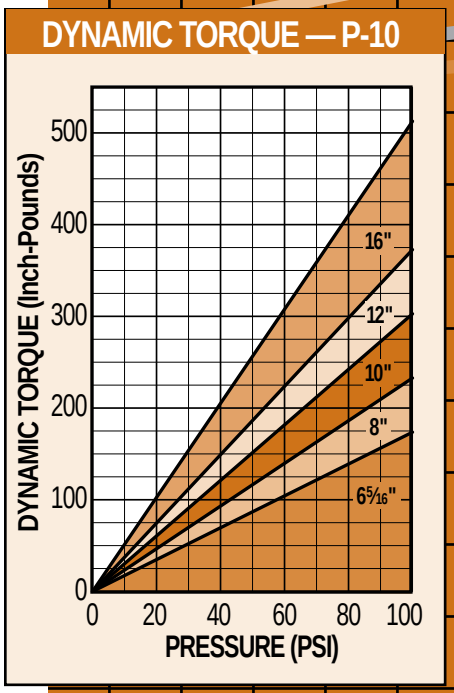
SEE PAGE 60 FOR ORDERING INFORMATION

DISC SIZING EQUATIONS:

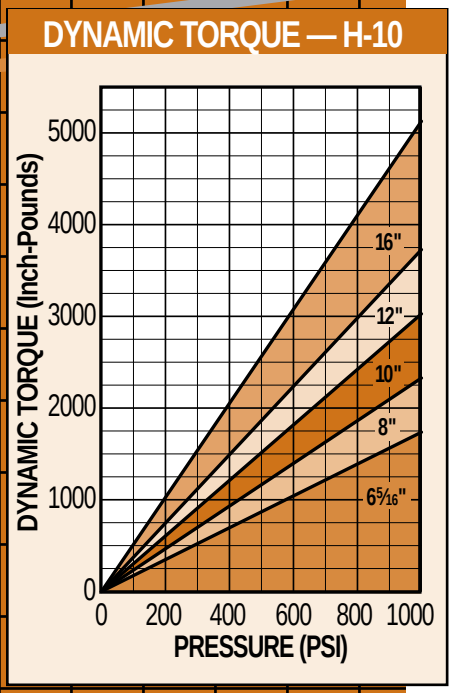
DYNAMIC TORQUE (IN. LBS.) = **0.70 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
STATIC (PARKING) TORQUE (IN. LBS.) = **0.40 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
BRAKING RADIUS (IN.) = **[DISC DIAMETER ÷ 2] - 0.675**

Performance Data

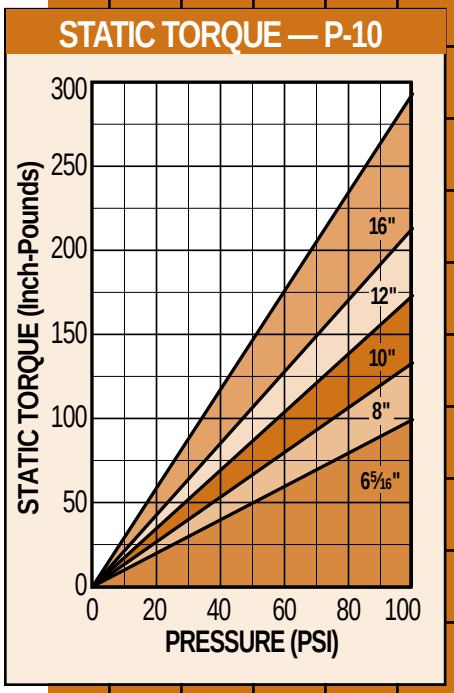
DYNAMIC TORQUE — P-10



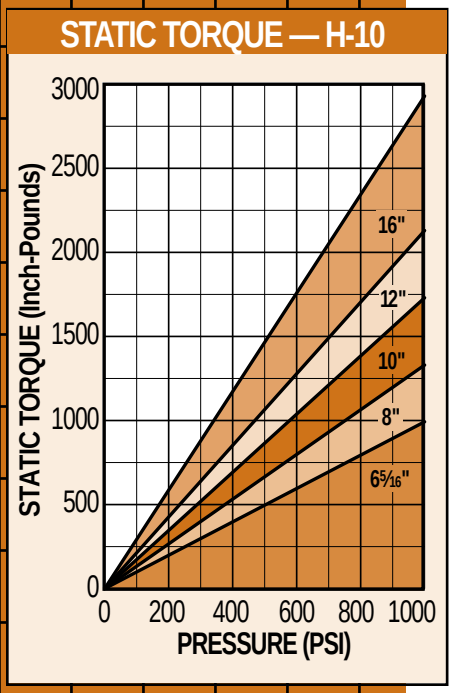
DYNAMIC TORQUE — H-10



STATIC TORQUE — P-10



STATIC TORQUE — H-10



16" DISC — 12" DISC — 10" DISC — 8" DISC — 6-5/16" DISC

USES

Lift Trucks, Farm Machinery, Mobile Equipment, Mining Machinery, Web Tensioning and Industrial Machinery.

FEATURES

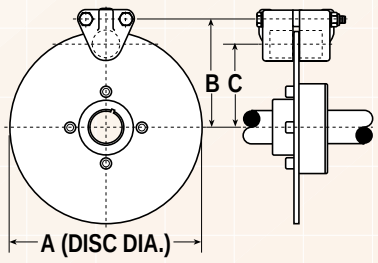
- Extruded aluminum construction
- Zinc chrome plated grade 5 bolts
- Standard Buna-N seals
- .46 cu. in. of wearable friction material*
- Replaceable pucks
- High grade friction material
- 2.00 sq. in. total puck area
- Puck diameter 1.125 in.
- No maximum disc diameter limitation
- Fluid displacement for non-retractable = 0.029 cu. in. for single acting and 0.029 cu. in. for double acting

OPTIONS

- EPR seals
- Retractable piston(s)
- Stamped steel floating bracket

*Wearable friction material in retractable models is .11 cu. in.

MOUNTING DIMENSIONS



A DISC DIA.	B	C BRAKING RADIUS
6.313	3.469	2.482
8.000	4.313	3.325
10.000	5.313	4.325
12.000	6.313	5.325
16.000	8.313	7.325

(All dimensions in inches)

P-20 & H-20 SERIES ALUMINUM

SINGLE ACTING
(For use with a 5/32", 1/4" or 3/8" Floating Disc)

Weight: **1.5 lbs.** (.68 kg.)

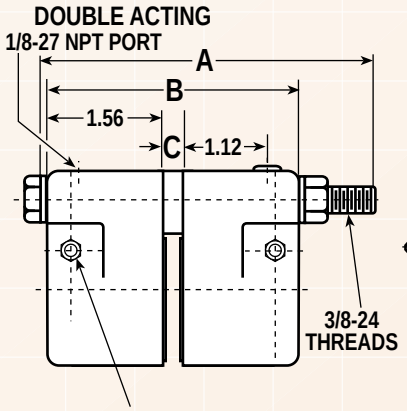
SINGLE ACTING W/ FLOATING BRACKET
(For use with a 5/32" or 1/4" Fixed Disc)

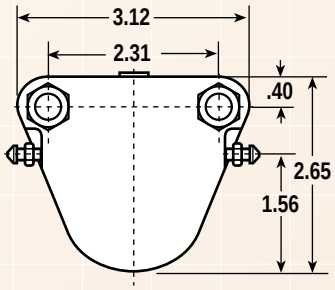
Weight: **2.0 lbs.** (.91 kg.)

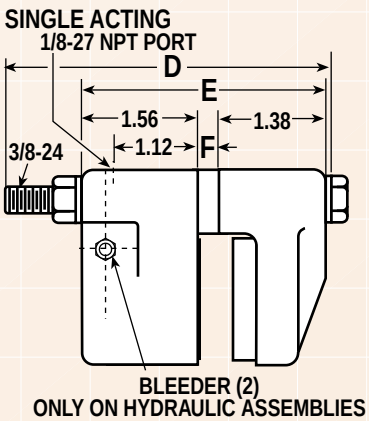
DOUBLE ACTING
(For use with a 5/32", 1/4", 3/8" or 1/2" Fixed Disc)

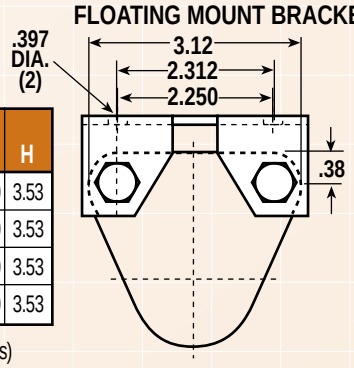
Weight: **2.0 lbs.** (.91 kg.)

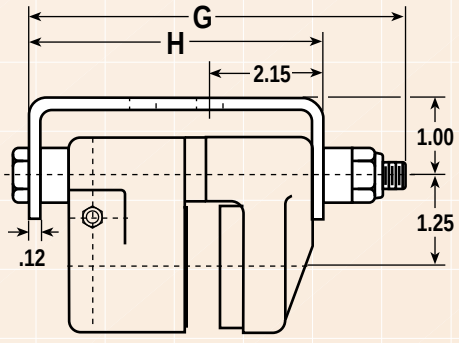
DIMENSIONAL DATA











MODEL NUMBER	DISC THK	A	B	C	D	E	F	G	H
PH20 _ A _ _ _	5/32	4.50	3.41	.281	3.75	2.94	0	4.50	3.53
PH20 _ B _ _ _	1/4	4.50	3.50	.375	3.75	3.03	.093	4.50	3.53
PH20 _ L _ _ _	3/8	4.50	3.62	.500	3.75	3.16	.219	4.50	3.53
PH20 _ E _ _ _	1/2	4.50	3.75	.625	3.75	3.28	.344	4.50	3.53

(All dimensions in inches)

MAXIMUM PRESSURE RATING
PNEUMATIC = 100 PSI
HYDRAULIC = 1000 PSI

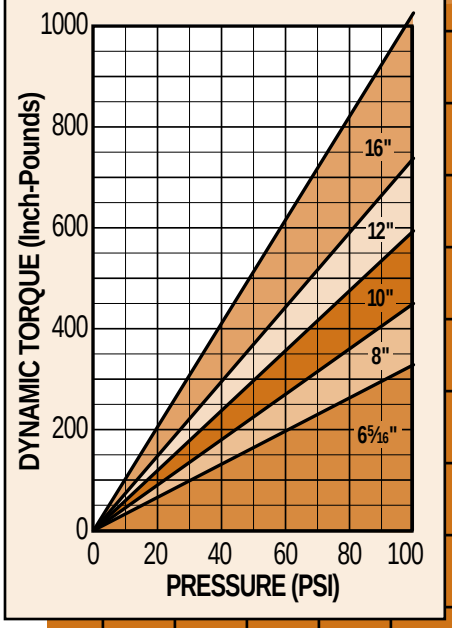
SEE PAGE 60 FOR ORDERING INFORMATION

DISC SIZING EQUATIONS:

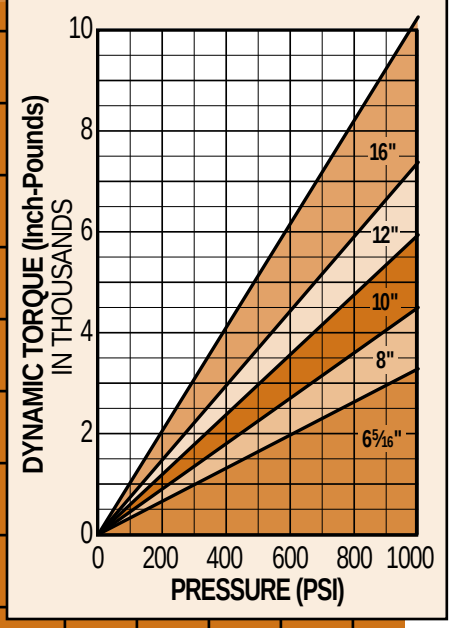
DYNAMIC TORQUE (IN. LBS.) = **1.44 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
STATIC (PARKING) TORQUE (IN. LBS.) = **0.72 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
BRAKING RADIUS (IN.) = **[DISC DIAMETER ÷ 2] - 0.875**

Performance Data

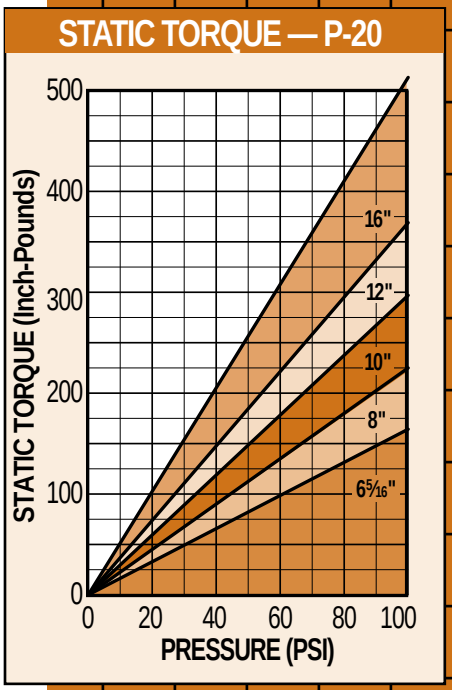
DYNAMIC TORQUE — P-20



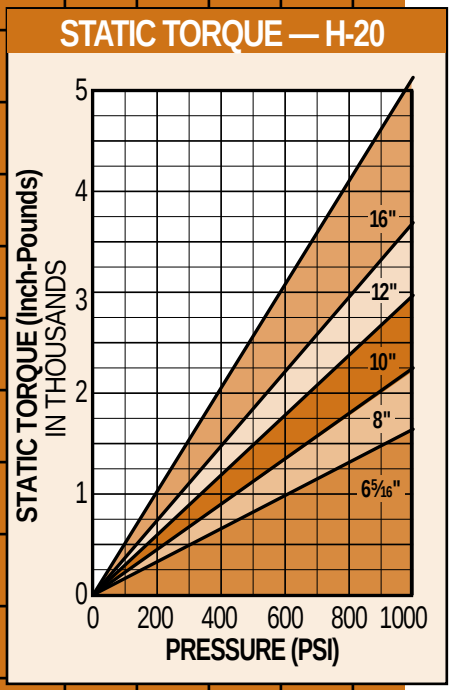
DYNAMIC TORQUE — H-20



STATIC TORQUE — P-20



STATIC TORQUE — H-20



16" DISC | 12" DISC | 10" DISC | 8" DISC | 6-5/16" DISC

USES

Lift Trucks, Farm Machinery, Mobile Equipment, Mining Machinery, Web Tensioning and Industrial Machinery

FEATURES

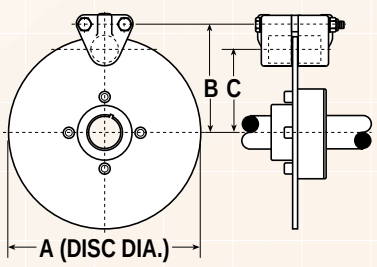
- Extruded aluminum construction
- Zinc chrome plated grade 8 bolts
- Standard Buna-N seals
- .83 cu. in. of wearable friction material*
- Replaceable pucks
- High grade friction material
- 4.00 sq. in. total puck area
- Puck diameter 1.625 in.
- No maximum disc diameter limitation
- Fluid displacement for non-retractable = 0.062 cu. in. for single acting and 0.062 cu. in. for double acting

OPTIONS

- EPR seals
- Retractable piston(s)
- Stamped steel floating bracket

*Wearable friction material in retractable models is .48 cu. in.

MOUNTING DIMENSIONS



A DISC DIA.	B	C BRAKING RADIUS
6.313	3.531	2.281
8.000	4.375	3.125
10.000	5.375	4.125
12.000	6.375	5.125
16.000	8.375	7.125
(All dimensions in inches)		

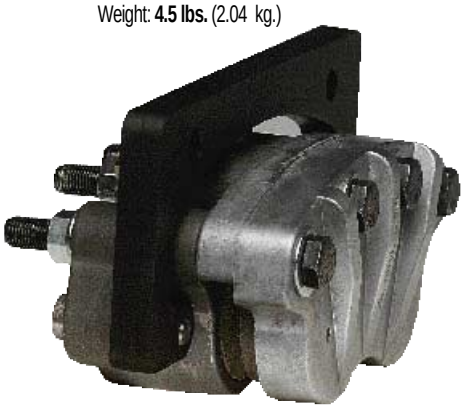
P-220 & H-220 SERIES ALUMINUM

SINGLE ACTING
(For use with a 5/32", 1/4" or 1/2" Floating Disc)

Weight: **3.00 lbs.** (1.36 kg.)

SINGLE ACTING W/ FLOATING BRACKET
(For use with a 5/32", 1/4" or 1/2" Fixed Disc)

Weight: **4.5 lbs.** (2.04 kg.)

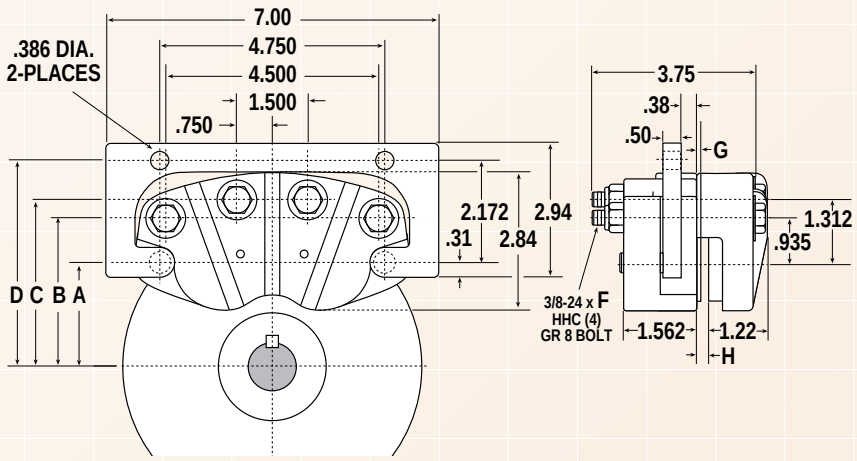


DOUBLE ACTING
(For use with a 5/32", 1/4" or 1/2" Fixed Disc)

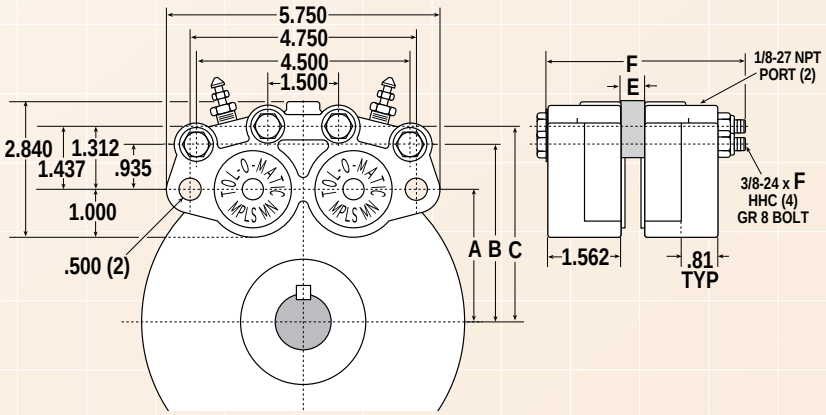
Weight: **4.0 lbs.** (1.82 kg.)

DIMENSIONAL DATA

SINGLE ACTING W/ FLOATING BRACKET



DOUBLE ACTING



(All dimensions in inches)

DISC DIAMETER	BRAKING RADIUS	A	B	C	D
6.312	2.38	2.13	3.07	3.45	4.30
8.000	3.15	3.00	3.94	4.32	5.17
10.000	4.11	4.00	4.94	5.32	6.17
12.000	5.08	5.00	5.94	6.32	7.17
16.000	7.21	7.09	8.03	8.41	9.26

(All dimensions in inches)

MODEL NO.	DISC THICKNESS	E	F	G	H
H&P220 _ A _ _ _	.156	.28	4.50	N/A	.25
H&P220 _ B _ _ _	.250	.38	4.50	.094	.34
H&P220 _ E _ _ _	.500	.62	5.00	.344	.59

MAXIMUM PRESSURE RATING
PNEUMATIC = 100 PSI
HYDRAULIC = 1500 PSI

SEE PAGE 60 FOR ORDERING INFORMATION

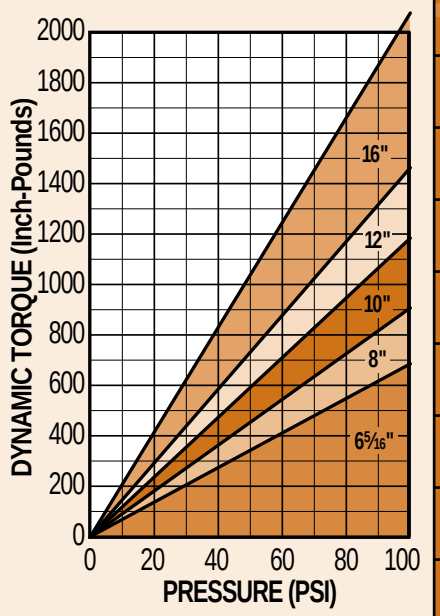
DISC SIZING EQUATIONS:

DYNAMIC TORQUE (IN. LBS.) = **2.88 x BRAKING RADIUS** (IN.) **x PRESSURE** (PSI)

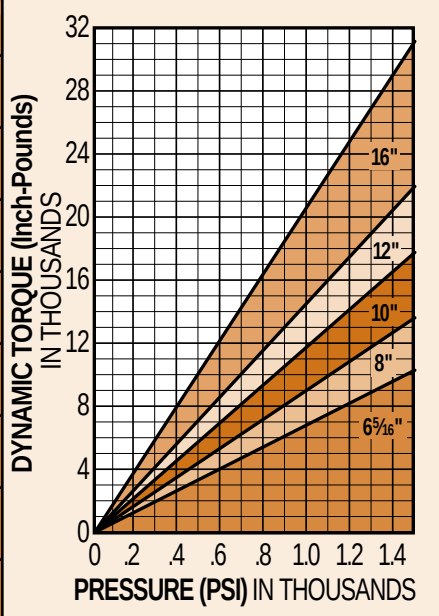
STATIC (PARKING) TORQUE (IN. LBS.) = **1.44 x BRAKING RADIUS** (IN.) **x PRESSURE** (PSI)

Performance Data

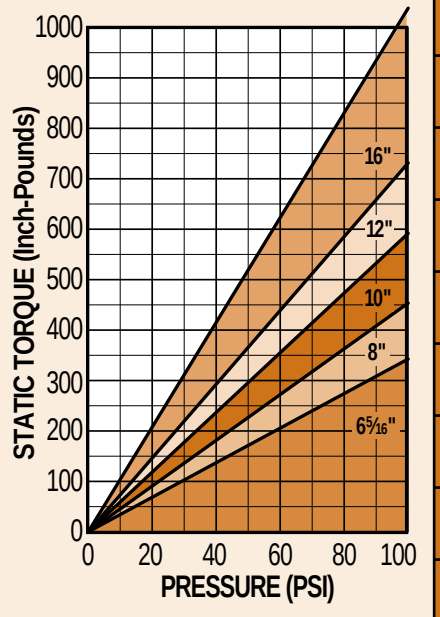
DYNAMIC TORQUE — P-220



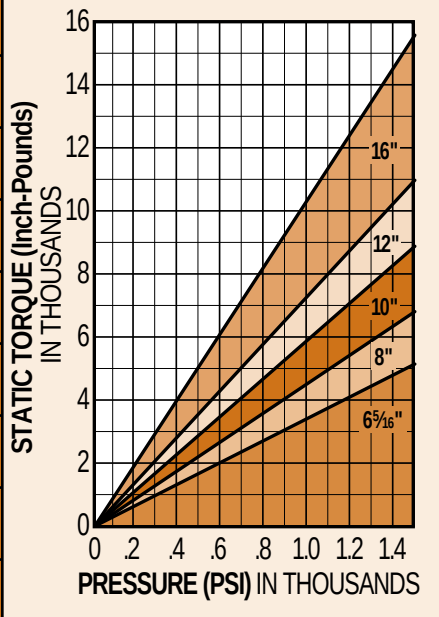
DYNAMIC TORQUE — H-220



STATIC TORQUE — P-220



STATIC TORQUE — H-220



16" DISC — 12" DISC — 10" DISC — 8" DISC — 6-5/16" DISC

USES

Mobile Off-the-Road Equipment, Mining Equipment, Web Tensioning and Industrial Machinery.

FEATURES

- Die cast aluminum construction
- Zinc chrome plated grade 8 bolts
- Standard Buna-N seals
- 1.66 cu. in. of wearable friction material*
- Replaceable pucks
- High grade friction material
- 8.00 sq. in. total puck area, 4.00 sq. in. active piston area
- Puck diameter 1.625 in.
- Accommodates 6" to 16" disc diameters
- Fluid displacement for non-retractable = 0.124 cu. in. for single acting and 0.124 cu. in. for double acting

OPTIONS

- EPR seals
- Retractable piston(s)
- Floating bracket

*Wearable friction material in retractable models is .95 cu. in.

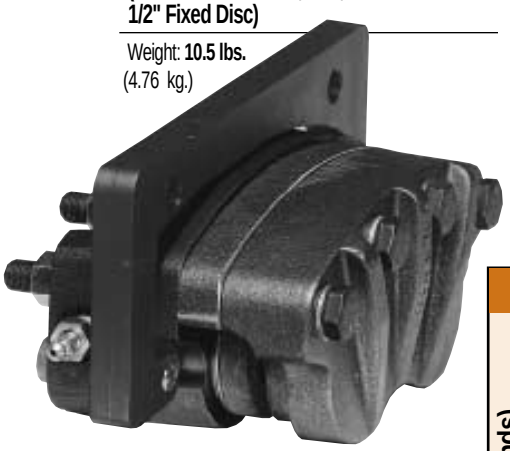
H-220I SERIES CAST IRON

SINGLE ACTING
(For use with a 5/32", 1/4", 3/8" or 1/2" Floating Disc)

Weight: **9.00 lbs.** (4.08 kg.)

SINGLE ACTING W/ FLOATING BRACKET
(For use with a 5/32", 1/4", 3/8" or 1/2" Fixed Disc)

Weight: **10.5 lbs.** (4.76 kg.)



DOUBLE ACTING
(For use with a 5/32", 1/4", 3/8" or 1/2" Fixed Disc)

Weight: **12.0 lbs.** (5.40 kg.)

MAXIMUM PRESSURE RATING
HYDRAULIC = 1500 PSI

SEE PAGE 61 FOR ORDERING INFORMATION

USES

Mobile Off-the-Road Equipment and Mining Machinery.

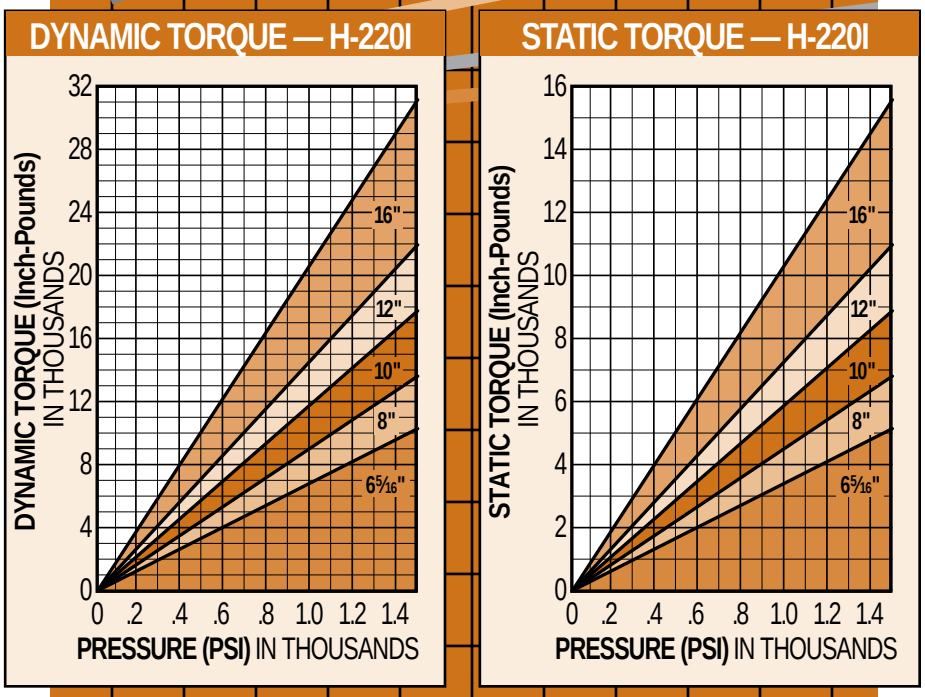
FEATURES

- Cast ductile iron housings
- Zinc chrome plated grade 8 bolts
- Standard Buna-N seals
- 2.35 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 9.4 sq. in. total puck area
- Piston diameter 1.625 in.
- Accommodates 6" to 16" disc diameters
- Fluid displacement for non-retractable = 0.124 cu. in. for single acting and 0.124 cu. in. for double acting

OPTIONS

- EPR seals
- Steel floating bracket

PERFORMANCE DATA



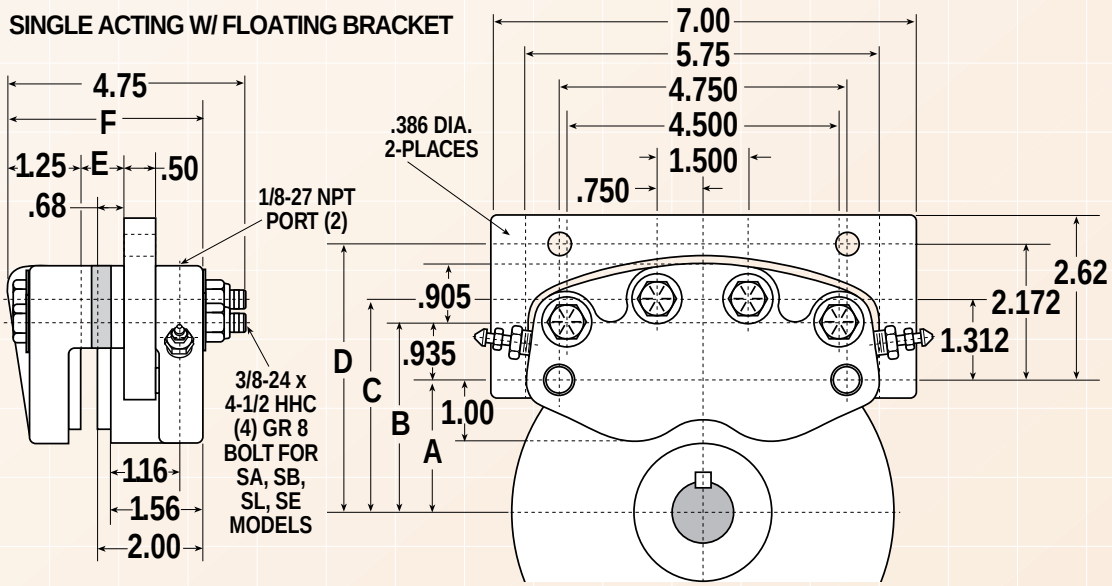
16" DISC | 12" DISC | 10" DISC | 8" DISC | 6-5/16" DISC

DISC SIZING EQUATIONS:

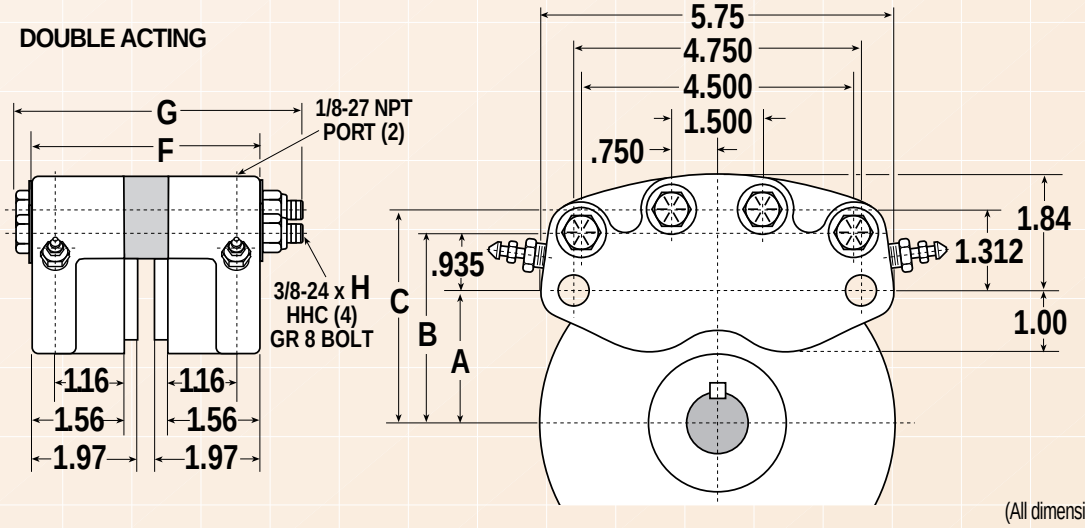
DYNAMIC TORQUE (IN. LBS.) = **2.88 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
STATIC (PARKING) TORQUE (IN. LBS.) = **1.44 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)

DIMENSIONAL DATA

SINGLE ACTING W/ FLOATING BRACKET



DOUBLE ACTING



(All dimensions in inches)

DISC DIAMETER	BRAKING RADIUS	A	B	C	D
6.312	2.38	2.13	3.07	3.45	4.30
8.000	3.15	3.00	3.94	4.32	5.17
10.000	4.11	4.00	4.94	5.32	6.17
12.000	5.08	5.00	5.94	6.32	7.71
16.000	7.21	7.09	8.03	8.41	9.26

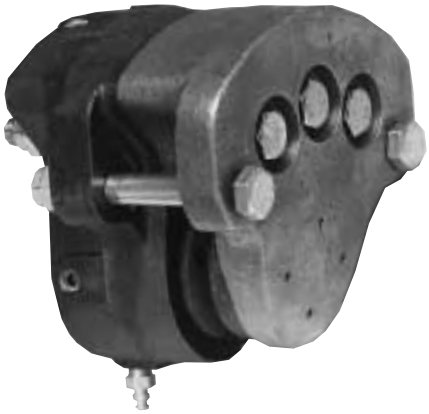
(All dimensions in inches)

MODEL NO.	DISC THICKNESS	E	F	G	H BOLT LNG
H220SACI _	.156	.83	3.45	4.25	4.00
H220DACI _	.156	N/A	4.15	5.25	5.00
H220SBCI _	.250	.92	3.54	4.25	4.00
H220DBCI _	.250	N/A	4.24	5.25	5.00
H220SLCI _	.375	1.05	3.67	4.25	4.00
H220DLCI _	.375	N/A	4.37	5.75	5.50
H220SECI _	.500	1.17	3.79	4.75	4.50
H220DECI _	.500	N/A	4.50	6.25	6.00
H220D_ CI	1.200	N/A	5.20	6.75	6.50

H-440 SERIES
DUCTILE IRON

SINGLE ACTING
(For use with a 3/8", 1/2", 1", 1-1/4" or 1-1/2" Floating Disc)

Weight: **23.0 lbs.** (10.43 kg.)



DOUBLE ACTING
(For use with a 3/8", 1/2", 1", 1-1/4" or 1-1/2" Fixed Disc)

Weight: **27.0 lbs.** (12.25 kg.)

MAXIMUM PRESSURE RATING
HYDRAULIC = 1500 PSI

SEE PAGE 61 FOR ORDERING INFORMATION

USES

Mobile Off-the Road Equipment and Mining Machinery

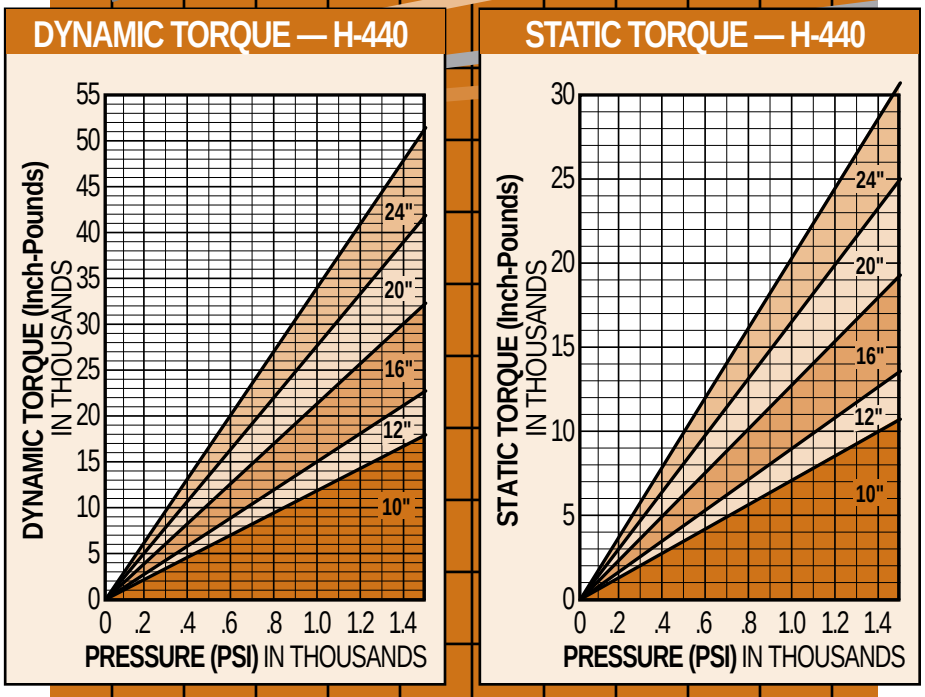
FEATURES

- Cast ductile iron housings
- Five bleed fitting positions
- Zinc chrome plated grade 8 bolts
- Standard Buna-N seals
- 4.15 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 8.30 sq. in. total puck area
- Puck diameter 2.37 in.
- Steel pistons
- No maximum disc diameter limitation
- Fluid displacement for .03 inch clearance = 0.147 cu. in. for single acting and 0.147 cu. in. for double acting

OPTIONS

- EPR seals

PERFORMANCE DATA



24" DISC | 20" DISC | 16" DISC | 12" DISC | 10" DISC

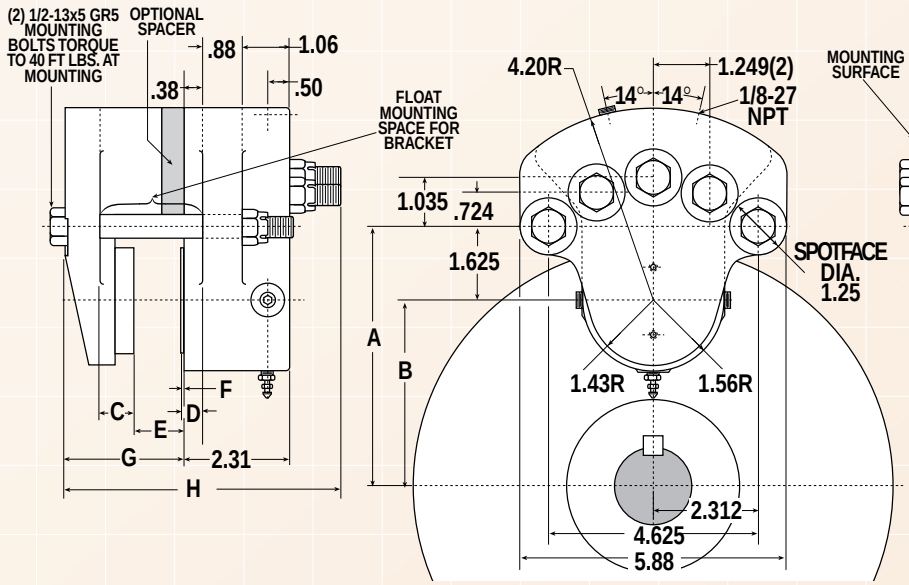
NOTE: Available Tol-O-Matic Disc Sizes 6 5/16", 8", 10", 12", and 16"

DISC SIZING EQUATIONS:

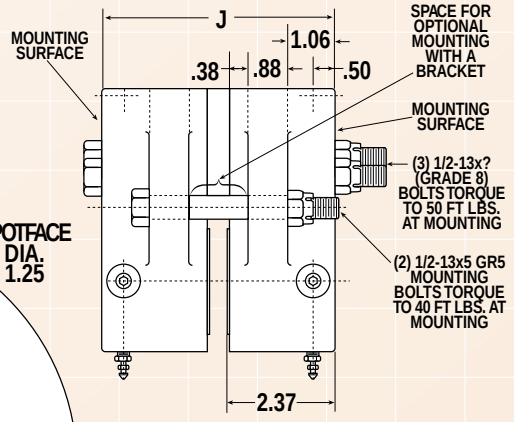
DYNAMIC TORQUE (IN. LBS.) = **3.19 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
STATIC (PARKING) TORQUE (IN. LBS.) = **1.905 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
BRAKING RADIUS (IN.)= **[DISC DIAMETER ÷ 2] - 1.250**

DIMENSIONAL DATA

SINGLE ACTING



DOUBLE ACTING



(All dimensions in inches)

DISC DIA.	A	B BRAKING RADIUS
10.00	5.315	3.75
12.00	6.315	4.75
16.00	8.315	6.75
20.00	10.315	8.75
24.00	12.315	10.75

(All dimensions in inches)

MODEL NO.	DISC THICKNESS	BOLT LENGTH	C	D	E	F	G	H	J
H440 _ LC_	.375	6.50	.83	.52	.56	.12	2.12	5.18	5.18
H440 _ EC_	.500	7.00	.77	.46	.63	.06	2.19	5.68	5.31
H440 _ NC_	1.000	7.50	.77	.46	1.13	.06	2.62	6.18	5.81
H440 _ OC_	1.250	7.50	.77	.46	1.38	.06	2.87	6.18	6.06
H440 _ QC_	1.500	8.00	.77	.46	1.63	.06	3.12	6.68	6.31

H-441 SERIES
DUCTILE IRON

DOUBLE ACTING
(For use with a Fixed Disc)

Weight: **17.0 lbs.** (7.71 kg.)

USES

Mobile Equipment and Mining Machinery

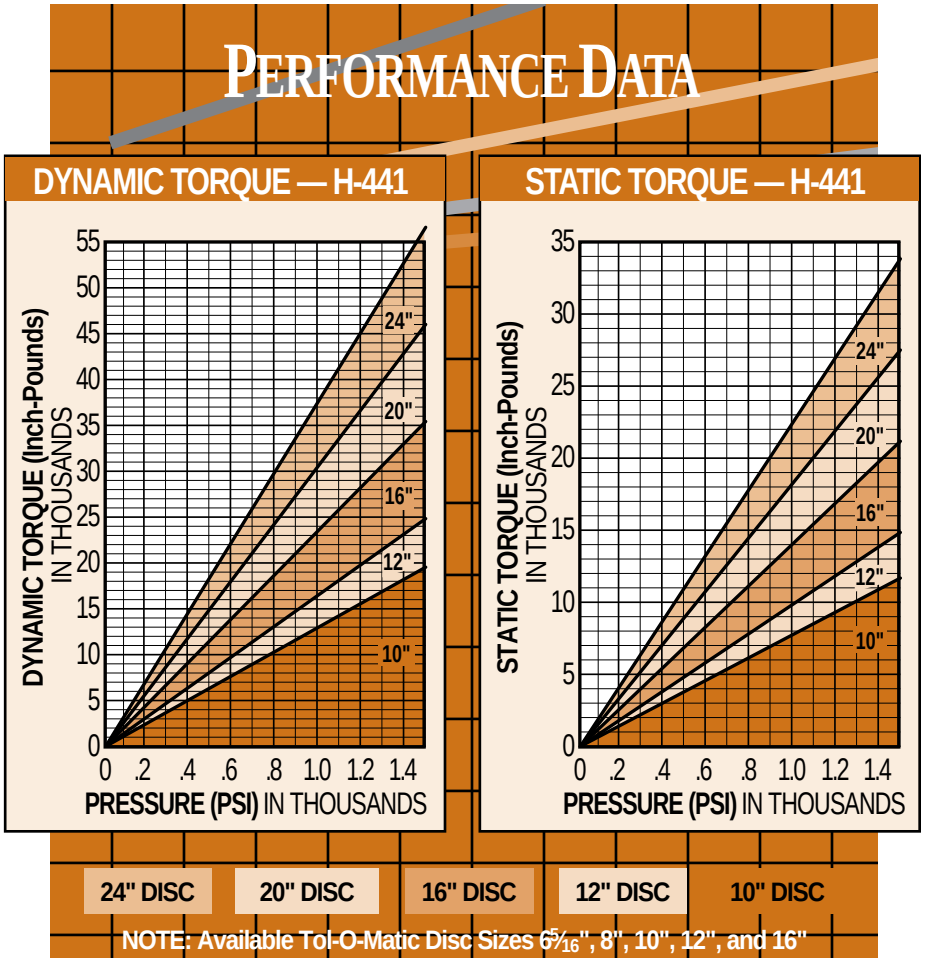
FEATURES

- Cast ductile iron housings
- Zinc chrome plated grade 5 bolts
- Standard Buna-N seals
- 3.71 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 9.14 sq. in. total puck area
- Puck diameter 2.50 in.
- 4.91 sq. in. piston area
- No maximum disc diameter limitation
- Fluid displacement for .03 inch clearance = 0.147 cu. in. for double acting
- Maximum combined allowable wear = 0.812 in.

OPTIONS

- EPR seals

PERFORMANCE DATA



MAXIMUM PRESSURE RATING
HYDRAULIC = 1500 PSI

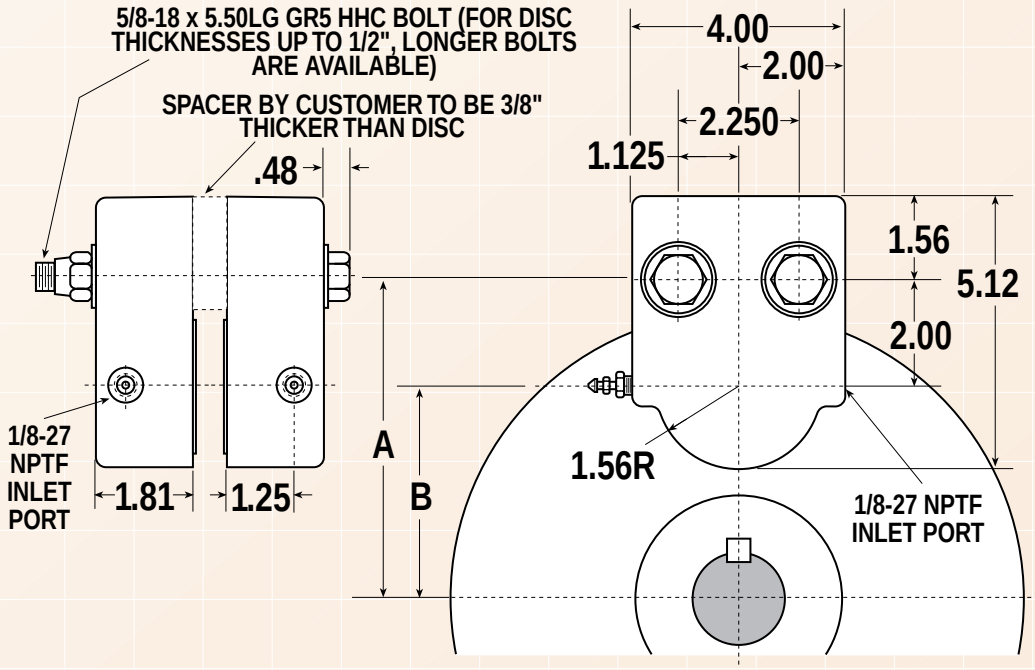
SEE PAGE 62 FOR ORDERING INFORMATION

DISC SIZING EQUATIONS:

DYNAMIC TORQUE (IN. LBS.) = **3.53 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
STATIC (PARKING) TORQUE (IN. LBS.) = **2.11 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
BRAKING RADIUS (IN.) = **[DISC DIAMETER ÷ 2] - 1.31**

DIMENSIONAL DATA

DOUBLE ACTING



(All dimensions in inches)

DISC DIA.	A	B BRAKING RADIUS
10.00	5.69	3.69
12.00	6.69	4.69
16.00	8.69	6.69
20.00	10.69	8.69
24.00	12.69	10.69

(All dimensions in inches)

H-960 SERIES
DUCTILE IRON

DOUBLE ACTING
(For use with a 1/2" Fixed Disc)

Weight: **35.0 lbs.** (15.88 kg.)

USES

Mobile Off-the-Road Equipment, Mining Machinery and Heavy Industrial Machinery

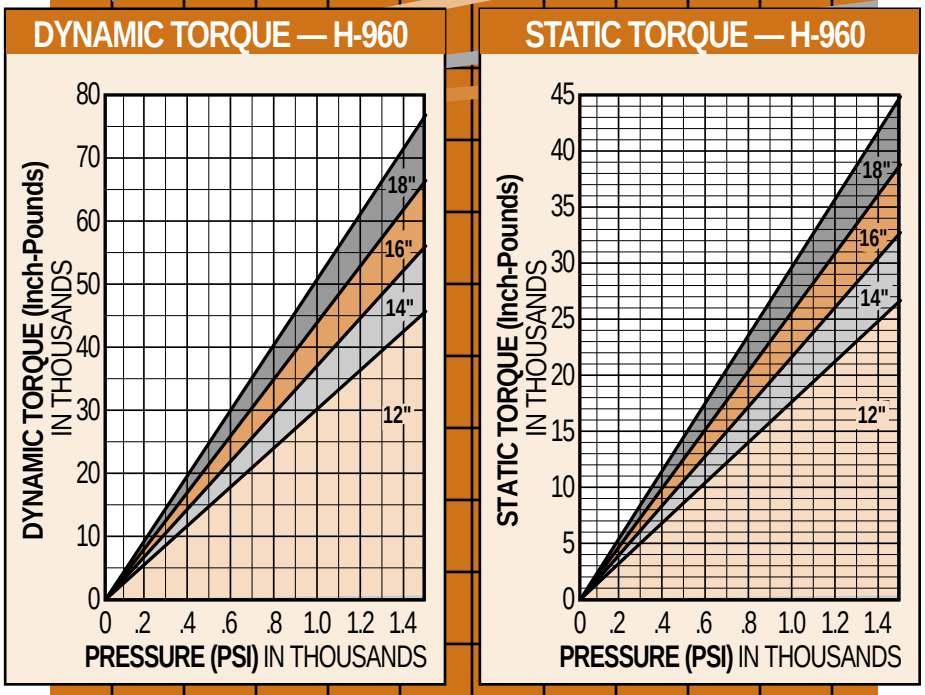
FEATURES

- Cast ductile iron housings
- Parkerized grade 5 bolts
- Standard Buna-N seals
- 8.0 cu. in. of wearable friction material
- Easily replaceable pads
- High grade friction material
- 32.0 sq. in. total pad area
- Piston diameter 3.50 in.
- Accommodates 12" to 18" inch disc diameters
- Fluid displacement = 0.576 cu. in. for double acting
- Maximum combined allowable wear=0.50 in.

OPTIONS

- EPR seals

PERFORMANCE DATA



18" DISC | 16" DISC | 14" DISC | 12" DISC

NOTE: Available Tol-O-Matic Disc Sizes 6 5/16", 8", 10", 12", and 16"

MAXIMUM PRESSURE RATING

HYDRAULIC = 1500 PSI
(Intermittent Duty)

HYDRAULIC = 1000 PSI
(Continuous Duty)

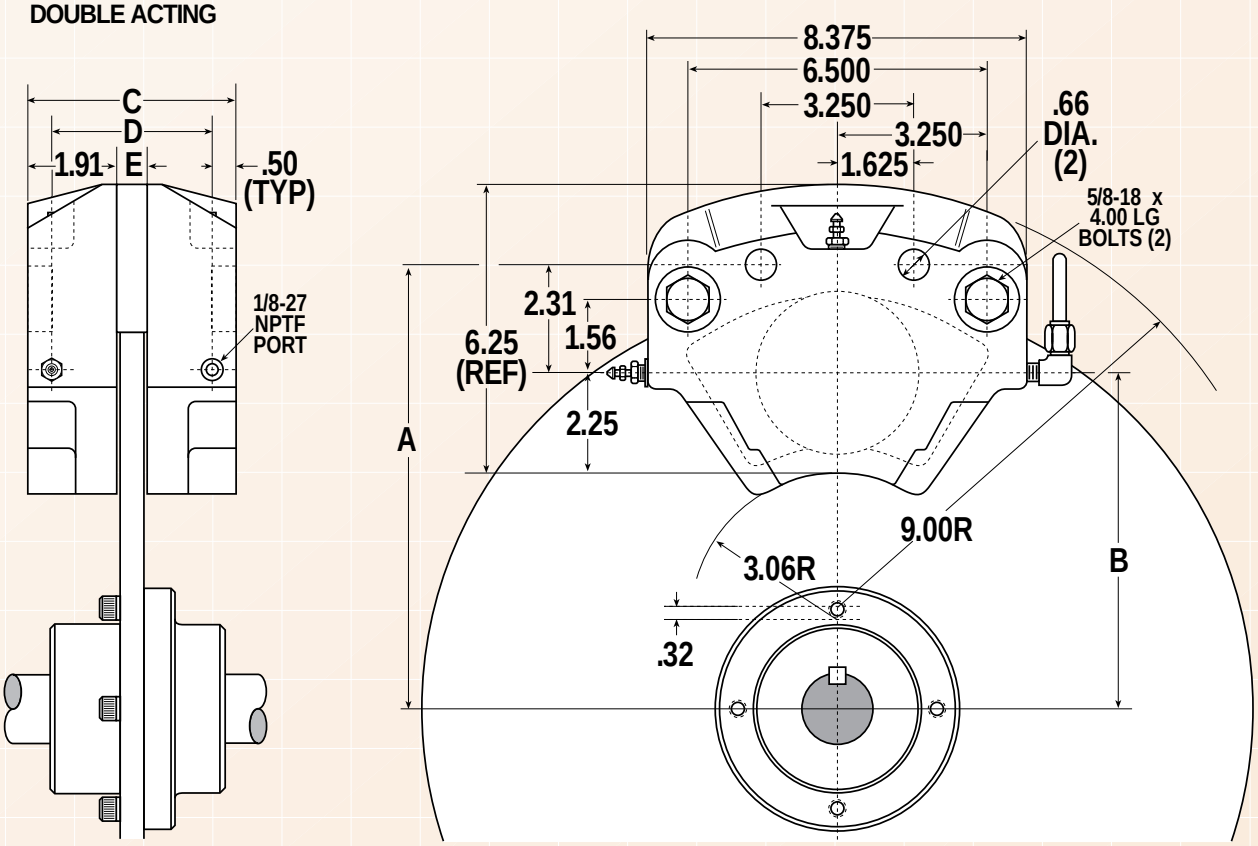
SEE PAGE 62 FOR ORDERING INFORMATION

DISC SIZING EQUATIONS:

DYNAMIC TORQUE (IN. LBS.) = **6.92 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
STATIC (PARKING) TORQUE (IN. LBS.) = **4.04 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
BRAKING RADIUS (IN.) = **[DISC DIAMETER ÷ 2] - 1.60**

Dimensional Data

DOUBLE ACTING



(All dimensions in inches)

DISC DIA.	A	B BRAKING RADIUS
12.00	6.712	4.40
14.00	7.712	5.40
16.00	8.712	6.40
18.00	9.712	7.40

(All dimensions in inches)

MODEL NO.	DISC THICKNESS	C	D	E
H960DECI	.500	4.44	3.44	.620
H960DECIG	.500	4.44	3.44	.620
H960DOCI	1.125	5.07	4.07	1.125
H960DOCIG	1.125	5.07	4.07	1.125

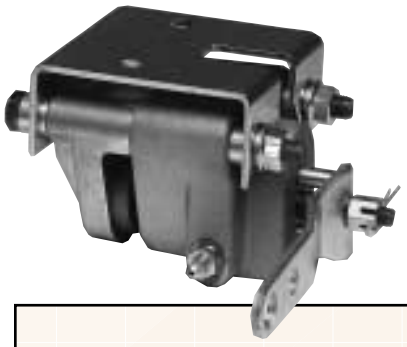
HME-20 SERIES ALUMINUM

"L" LONG LEVER (3.50")
(For use with a 5/32" or 1/4" Floating Disc)

Weight: **1.50 lbs.** (.68 kg.)

"L" LONG LEVER (3.50") WITH FLOATING BRACKET
(For use with a 5/32" or 1/4" Fixed Disc)

Weight: **2.25 lbs.** (1.02 kg.)

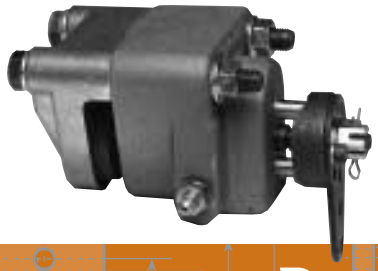


"M" MACHINED CAM LEVER (1.75")
(For use with a 5/32" or 1/4" Floating Disc)

Weight: **1.50 lbs.** (.68 kg.)

"M" MACHINED CAM LEVER (1.75") WITH FLOATING BRACKET
(For use with a 5/32" or 1/4" Fixed Disc)

Weight: **2.25 lbs.** (1.02 kg.)

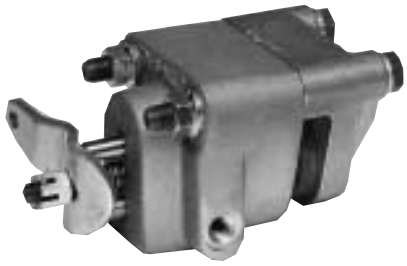


"S" SHORT LEVER (1.75")
(For use with a 5/32" or 1/4" Floating Disc)

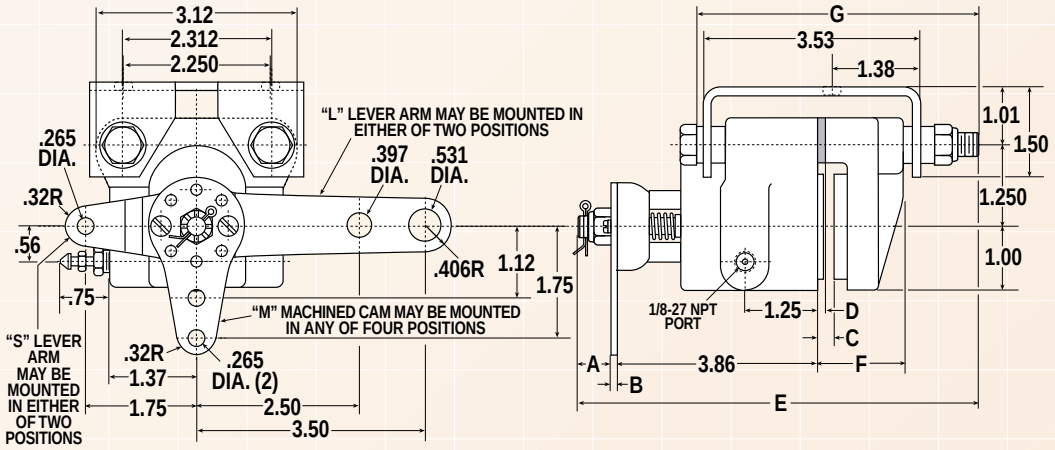
Weight: **1.50 lbs.** (.68 kg.)

"S" SHORT LEVER (1.75") WITH FLOATING BRACKET
(For use with a 5/32" or 1/4" Fixed Disc)

Weight: **2.25 lbs.** (1.02 kg.)



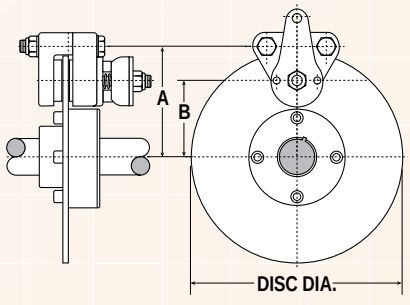
DIMENSIONAL DATA



MODEL	A	B	C	D	E	F	G
HME20MAFG	.61	.105	.25	–	6.49	1.38	4.50
HME20MBFG	.61	.105	.34	.094	6.58	1.47	4.50
HME20SAFG	.80	.164	.25	–	6.49	1.38	4.50
HME20SBFG	.80	.164	.34	.094	6.49	1.47	4.50
HME20LAFG	.80	.164	.25	–	6.49	1.38	4.50
HME20LBFG	.80	.164	.34	.094	6.49	1.47	4.50
HME20MAG	.61	.105	.25	–	5.99	1.38	3.75
HME20MBG	.61	.105	.34	.094	5.99	1.47	3.75
HME20SAG	.80	.164	.25	–	5.99	1.38	3.75
HME20SBG	.80	.164	.34	.094	6.08	1.47	3.75
HME20LAG	.80	.164	.25	–	5.99	1.38	3.75
HME20LBG	.80	.164	.34	.094	5.99	1.47	3.75

(All dimensions in inches)

MOUNTING DIMENSIONS



DISC DIA.	A	B BRAKING RADIUS
6.313	3.531	2.281
8.000	4.375	3.125
10.000	5.375	4.125
12.000	6.375	5.125
16.000	8.375	7.125

(All dimensions in inches)

MAXIMUM PRESSURE RATING
HYDRAULIC = 1000 PSI

MAXIMUM LEVER FORCE
MECHANICAL = 200 LBS.

SEE PAGE 62 FOR ORDERING INFORMATION

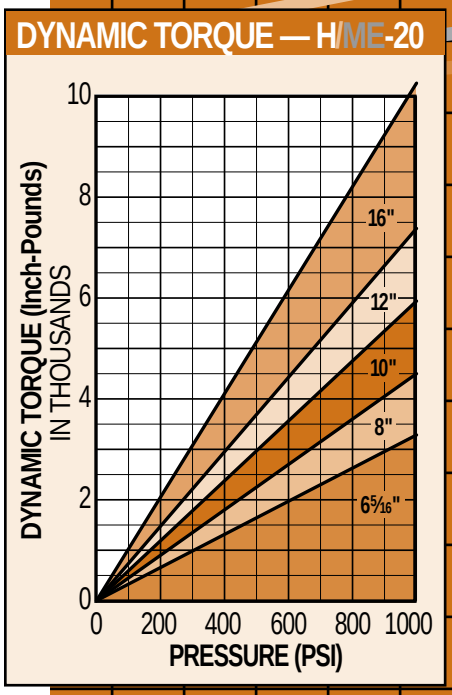
DISC SIZING EQUATIONS (HYDRAULIC):

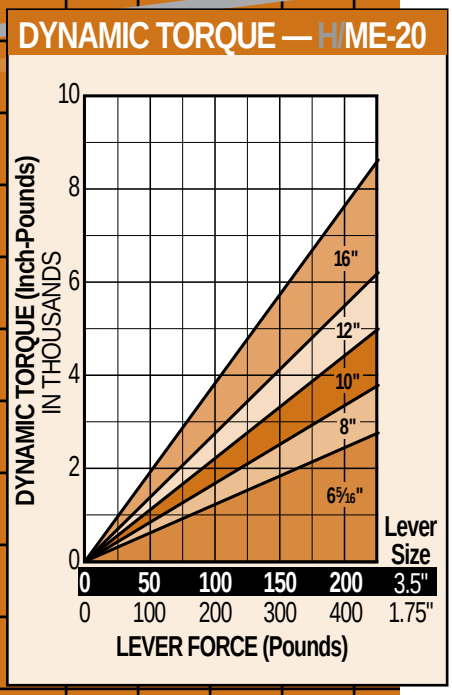
DYNAMIC TORQUE (IN. LBS.) = **1.44 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
STATIC (PARKING) TORQUE (IN. LBS.) = **0.72 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
BRAKING RADIUS (IN.) = **[DISC DIAMETER ÷ 2] - 0.875**

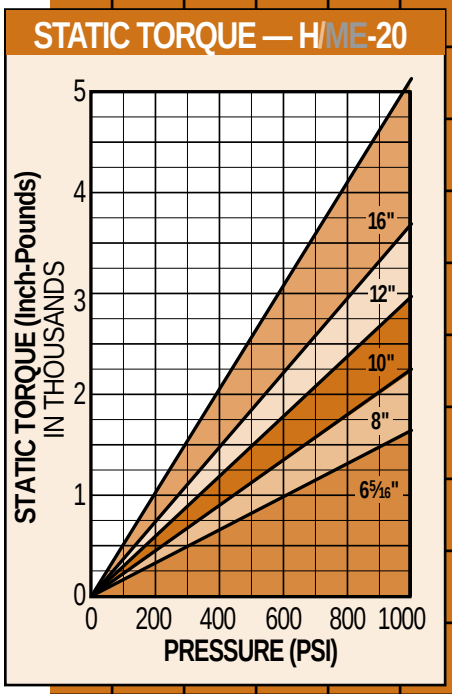
DISC SIZING EQUATIONS (MECHANICAL):

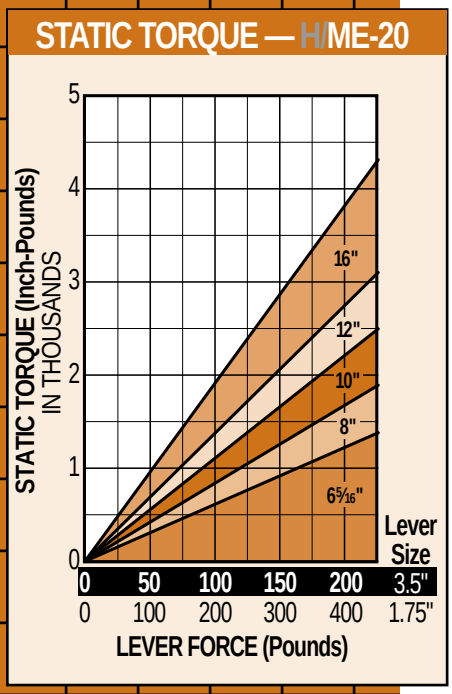
STATIC (PARKING) TORQUE (IN. LBS.) = **(L) 2.69 x BRAKING RADIUS** (IN.) x **LEVER FORCE** (LBS.)
STATIC (PARKING) TORQUE (IN. LBS.) = **(M&S) 1.345 x BRAKING RADIUS** (IN.) x **LEVER FORCE** (LBS.)
BRAKING RADIUS (IN.) = **[DISC DIAMETER ÷ 2] - 0.875**

Performance Data









16" DISC — 12" DISC — 10" DISC — 8" DISC — 6-5/16" DISC

USES

Lift Trucks, Farm Machinery, Mobile Equipment, Mining Machinery and Industrial Machinery

FEATURES

- Cast aluminum construction
- Zinc chrome plated grade 5 bolts
- Standard EPR seals
- .83 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 4.00 sq. in. total puck area
- Puck diameter 1.625 in.
- No maximum disc diameter limitation
- Fluid displacement = 0.062 cu. in.

OPTIONS

- Buna-N seals
- Stamped steel floating bracket

HME-220 SERIES ALUMINUM

SINGLE ACTING W/ FLOAT PIN HOLES
(For use with a 5/32", 1/4", 3/8" or 1/2" Disc)

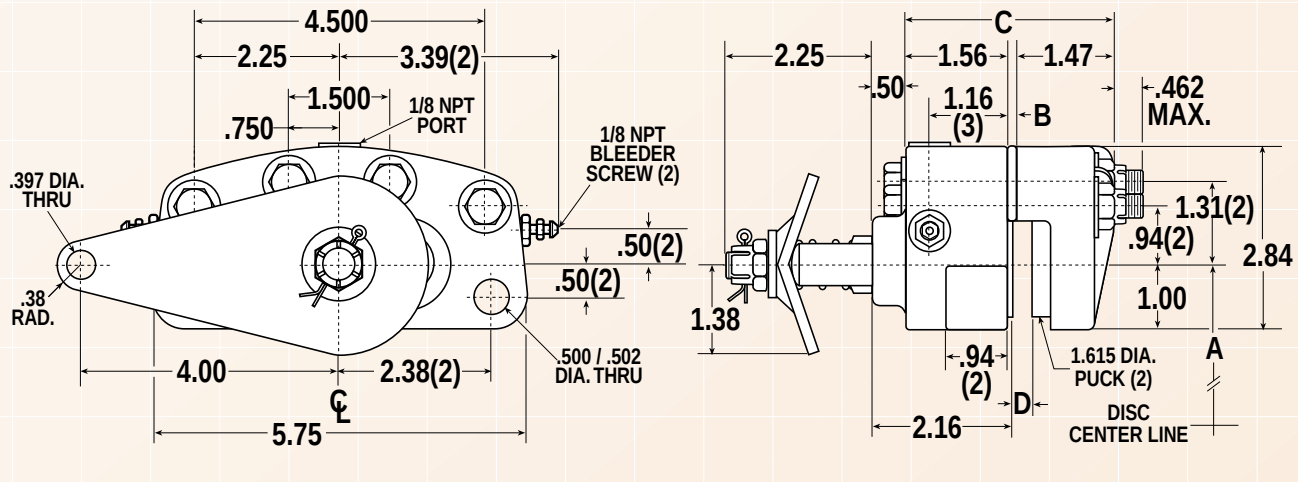
Weight: **6.00 lbs.** (2.72 kg.)

MAXIMUM PRESSURE RATING
HYDRAULIC = 1500 PSI

MAXIMUM LEVER FORCE
MECHANICAL = 580 LBS.

SEE PAGE 62 FOR ORDERING INFORMATION

DIMENSIONAL DATA



(All dimensions in inches)

DISC DIAMETER	A BRAKING RADIUS
6.312	2.13
8.000	3.00
10.000	4.00
12.000	5.00
16.000	7.03

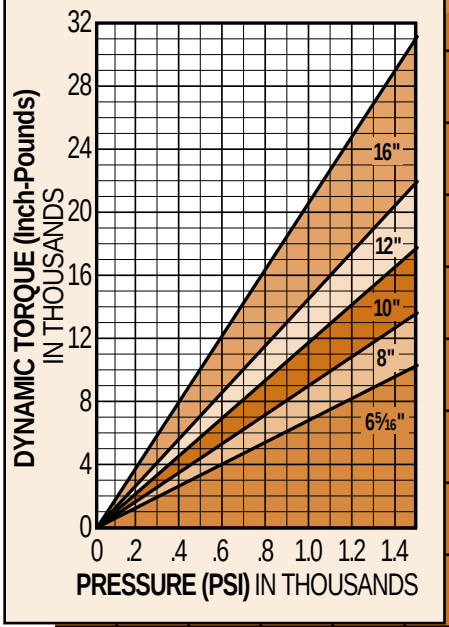
MODEL NO.	B	C	"D" DISC THICKNESS
HME220ACG	.094	3.124	.156
HME220BCG	.188	3.218	.250
HME220LCG	.313	3.343	.375
HME220ECG	.438	3.468	.500

(All dimensions in inches)

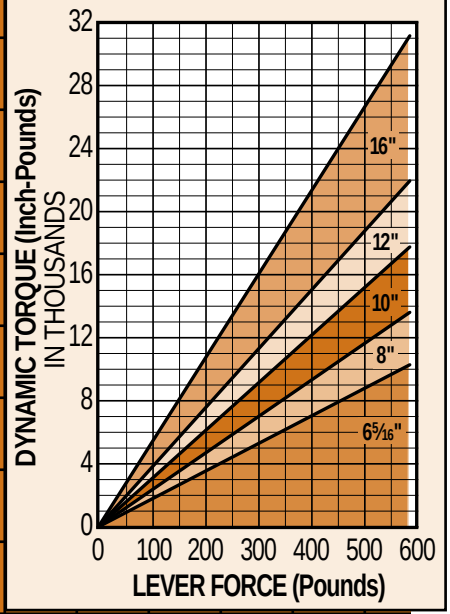
DISC SIZING EQUATIONS (HYDRAULIC):
DYNAMIC TORQUE (IN. LBS.) = **2.88 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
STATIC (PARKING) TORQUE (IN. LBS.) = **1.44 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
DISC SIZING EQUATIONS (MECHANICAL):
DYNAMIC TORQUE (IN. LBS.) = **7.45 x BRAKING RADIUS**(IN.) x **LEVER FORCE**(LBS.)
STATIC (PARKING) TORQUE (IN. LBS.) = **3.725 x BRAKING RADIUS**(IN.) x **LEVER FORCE**(LBS.)

Performance Data

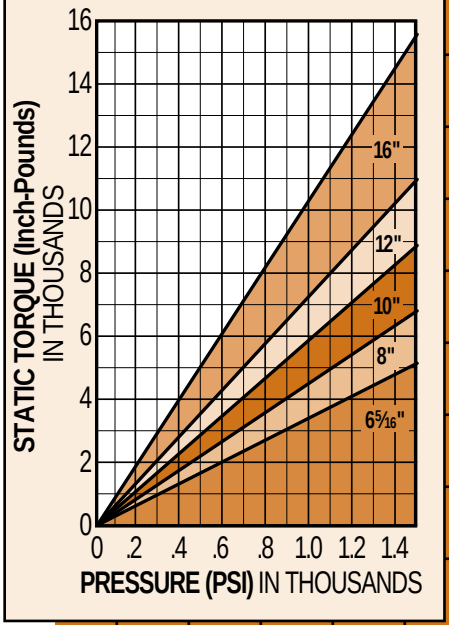
DYNAMIC TORQUE — H/ME-220



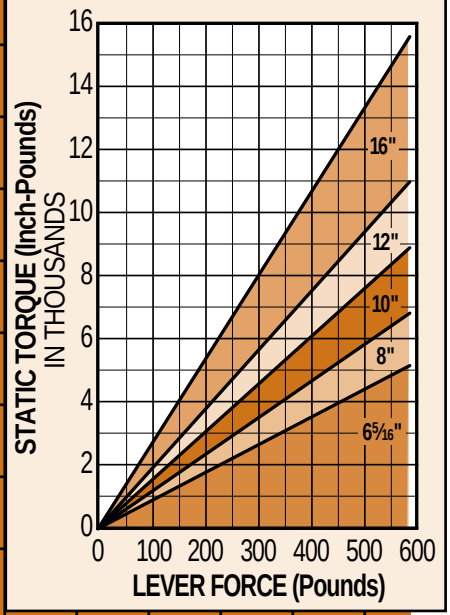
DYNAMIC TORQUE — H/ME-220



STATIC TORQUE — H/ME-220



STATIC TORQUE — H/ME-220



16" DISC — 12" DISC — 10" DISC — 8" DISC — 6-5/16" DISC

USES

Mobile Off-the-Road Equipment, Mining Equipment and Industrial Machinery

FEATURES

- Cast aluminum construction
- Zinc chrome plated grade 8 bolts
- Standard EPR seals
- 1.66 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 8.00 sq. in. total puck area, 4.00 sq. in. active piston area
- Puck diameter 1.610 in.
- Accommodates 6" to 16" disc diameters
- Fluid displacement = 0.124 cu. in.

OPTIONS

- Buna-N seals

ME-10 SERIES ALUMINUM

"L" LONG LEVER (3.50")
(For use with a 5/32"or 1/4" Floating Disc)

Weight: **.75 lbs.** (.34 kg.)

"L" LONG LEVER (3.50") WITH FLOATING BRACKET
(For use with a 5/32"or 1/4" Fixed Disc)

Weight: **1.25 lbs.** (.56 kg.)

"M" MACHINED CAM LEVER (1.75")
(For use with a 5/32"or 1/4" Floating Disc)

Weight: **.75 lbs.** (.34 kg.)

"M" MACHINED CAM LEVER (1.75") WITH FLOATING BRACKET
(For use with a 5/32"or 1/4" Fixed Disc)

Weight: **1.50 lbs.** (.68 kg.)

"S" SHORT LEVER (1.75")
(For use with a 5/32"or 1/4" Floating Disc)

Weight: **.75 lbs.** (.34 kg.)

"S" SHORT LEVER (1.75") WITH FLOATING BRACKET
(For use with a 5/32"or 1/4" Fixed Disc)

Weight: **1.25 lbs.** (.56 kg.)

MAXIMUM LEVER FORCE
(L) 3.50" LEVER = 225 LBS.
(M & S) 1.75" LEVER = 450 LBS.

SEE PAGE 62 FOR ORDERING INFORMATION

USES

Lift Trucks, Farm Machinery, Industrial Machinery and Light Mobile Equipment

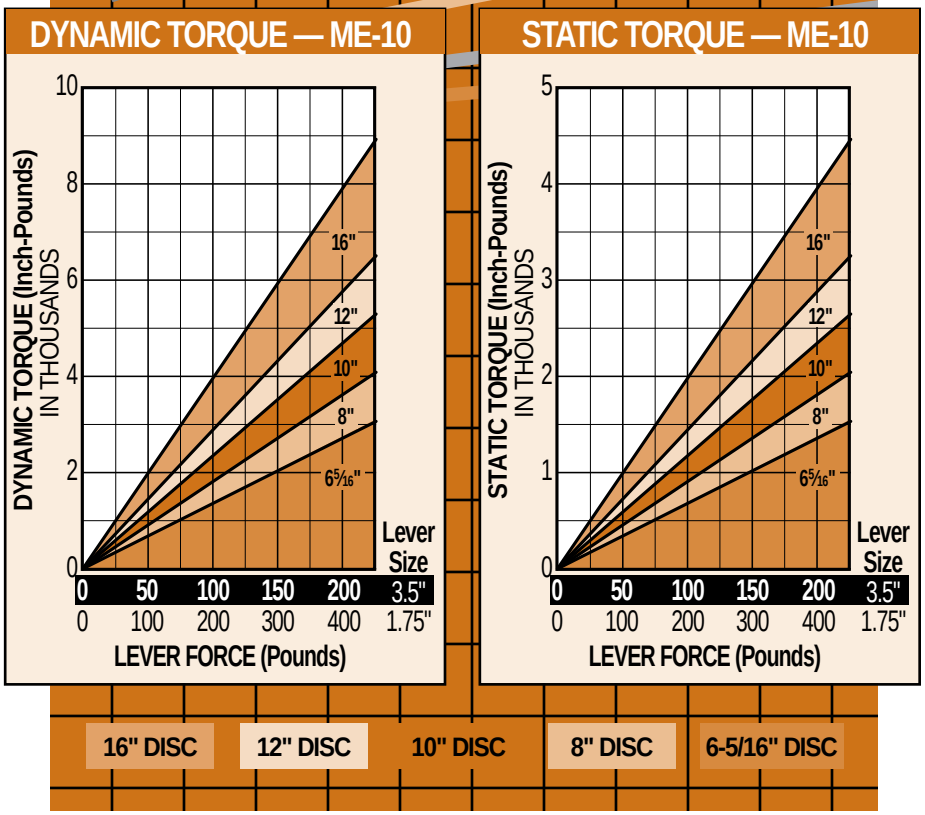
FEATURES

- Aluminum die cast construction
- Zinc chrome plated grade 5 bolts
- Floating bracket features zinc plated steel bushings
- .46 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 2.00 sq. in. total puck area
- Puck diameter 1.125 in.
- Machined lever features heat treated one piece lever/cam or machine "V" notch cam
- No maximum disc diameter limitation

OPTIONS

- Stamped steel floating bracket mount
- Additional lever positions may be available, consult factory

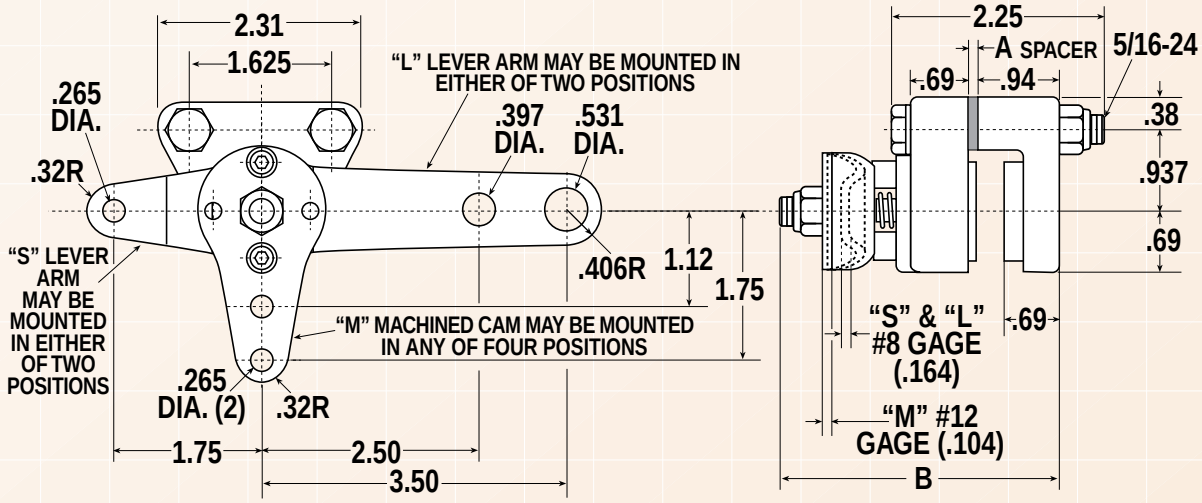
PERFORMANCE DATA



DISC SIZING EQUATIONS (L) 3.50" LEVER:
DYNAMIC TORQUE (IN. LBS.) = 5.38 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.)
STATIC (PARKING) TORQUE (IN. LBS.) = 2.69 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.)
DISC SIZING EQUATIONS (M & S) 1.75" LEVER:
DYNAMIC TORQUE (IN. LBS.) = 2.69 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.)
STATIC (PARKING) TORQUE (IN. LBS.) = 1.345 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.)
BRAKING RADIUS (IN.)= [DISC DIAMETER ÷ 2] - .625

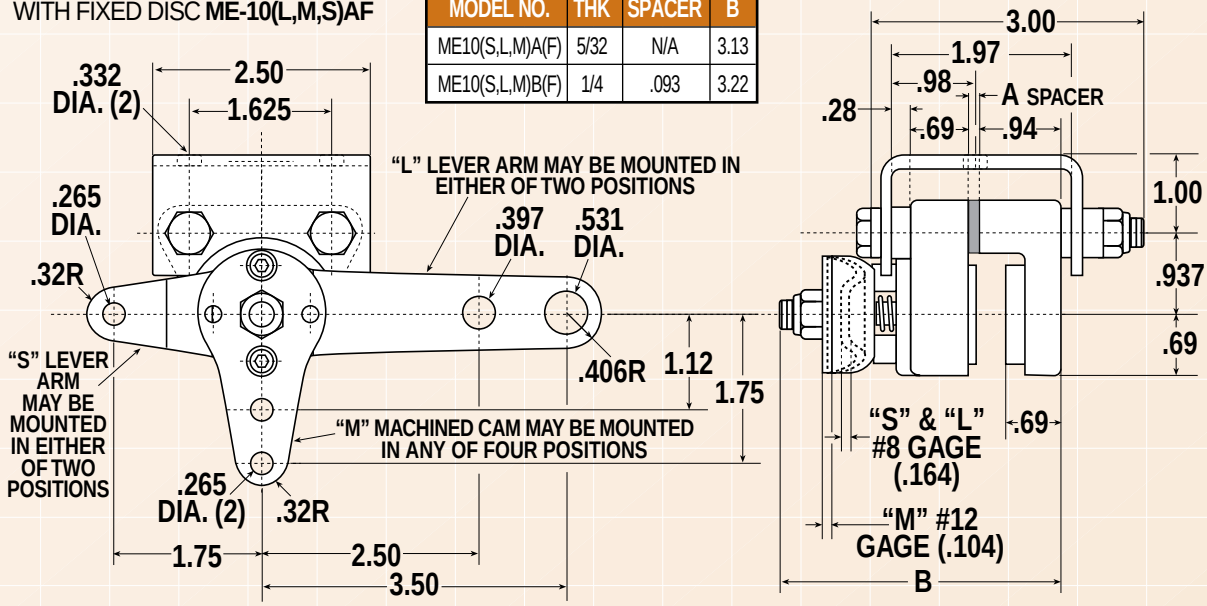
DIMENSIONAL DATA

FIXED MOUNT FOR USE WITH FLOATING DISC **ME-10(L,M,S)A**



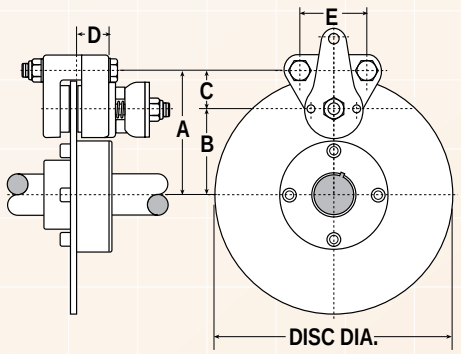
FLOATING MOUNT FOR USE WITH FIXED DISC **ME-10(L,M,S)AF**

MODEL NO.	DISC THK	A SPACER	B
ME10(S,L,M)A(F)	5/32	N/A	3.13
ME10(S,L,M)B(F)	1/4	.093	3.22



(All dimensions in inches)

MOUNTING DIMENSIONS



DISC DIA.	A	B BRAKING RADIUS	C	D	E
6.312	3.469	2.531	.938	.750	1.625
8.000	4.312	3.375	.938	.750	1.625
10.000	5.312	4.375	.938	.750	1.625
12.000	6.312	5.375	.938	.750	1.625
16.000	8.312	7.375	.938	.750	1.625

(All dimensions in inches)

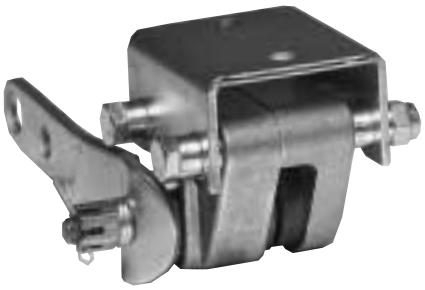
ME-20 SERIES ALUMINUM

"L" LONG LEVER (3.50")
(For use with a 5/32" or 1/4" Floating Disc)

Weight: **1.50 lbs.** (.68 kg.)

"L" LONG LEVER (3.50") WITH FLOATING BRACKET
(For use with a 5/32" or 1/4" Fixed Disc)

Weight: **2.25 lbs.** (1.02 kg.)



"M" MACHINED LEVER (1.75")
(For use with a 5/32" or 1/4" Floating Disc)

Weight: **1.50 lbs.** (.68 kg.)

"M" MACHINED LEVER (1.75") WITH FLOATING BRACKET
(For use with a 5/32" or 1/4" Fixed Disc)

Weight: **2.25 lbs.** (1.02 kg.)

"S" SHORT LEVER (1.75")
(For use with a 5/32" or 1/4" Floating Disc)

Weight: **1.50 lbs.** (.68 kg.)

"S" SHORT LEVER (1.75") WITH FLOATING BRACKET
(For use with a 5/32" or 1/4" Fixed Disc)

Weight: **2.25 lbs.** (1.02 kg.)

MAXIMUM LEVER FORCE
(L) 3.50" LEVER = 225 LBS.
(M & S) 1.75" LEVER = 450 LBS.

SEE PAGE 62 FOR ORDERING INFORMATION

USES

Lift Trucks, Farm Machinery, Industrial Machinery and Light Mobile Equipment

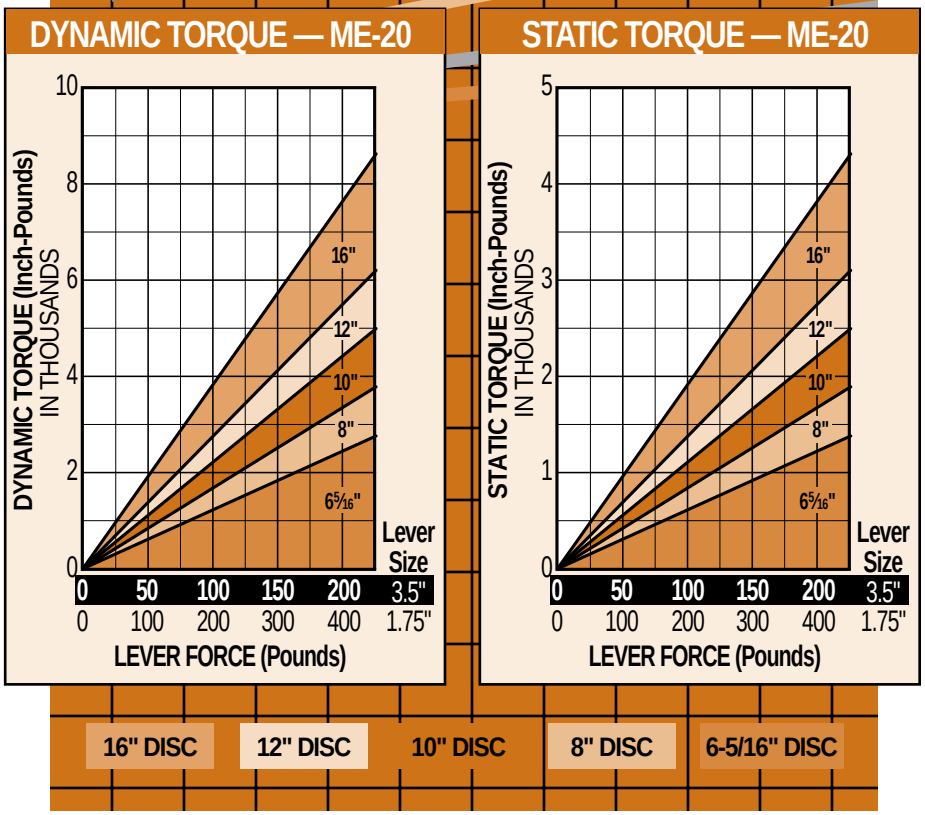
FEATURES

- Aluminum die cast construction
- Zinc chrome plated grade 5 bolts
- Floating bracket features zinc plated steel bushings
- .83 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 4.00 sq. in. total puck area,
- Puck diameter 1.625 in.
- Machined lever features heat treated one piece lever/cam or machine "V" notch cam
- No maximum disc diameter limitation

OPTIONS

- Stamped steel floating bracket mount
- Additional lever positions may be available, consult factory

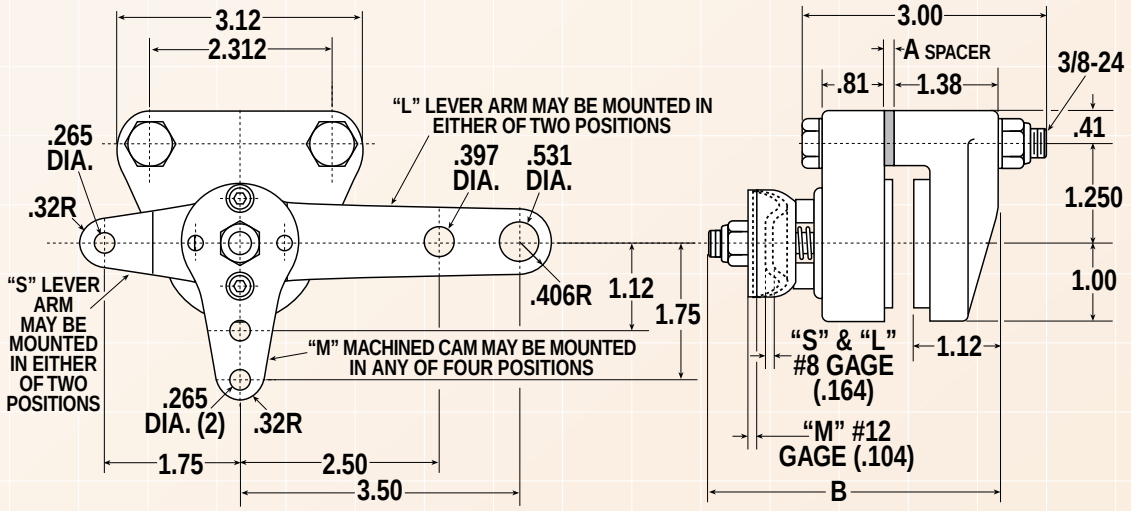
PERFORMANCE DATA



DISC SIZING EQUATIONS (L) 3.50" LEVER:
DYNAMIC TORQUE (IN. LBS.) = 5.38 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.)
STATIC (PARKING) TORQUE (IN. LBS.) = 2.69 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.)
DISC SIZING EQUATIONS (M & S) 1.75" LEVER:
DYNAMIC TORQUE (IN. LBS.) = 2.69 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.)
STATIC (PARKING) TORQUE (IN. LBS.) = 1.345 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.)
BRAKING RADIUS (IN.) = [DISC DIAMETER ÷ 2] - .875

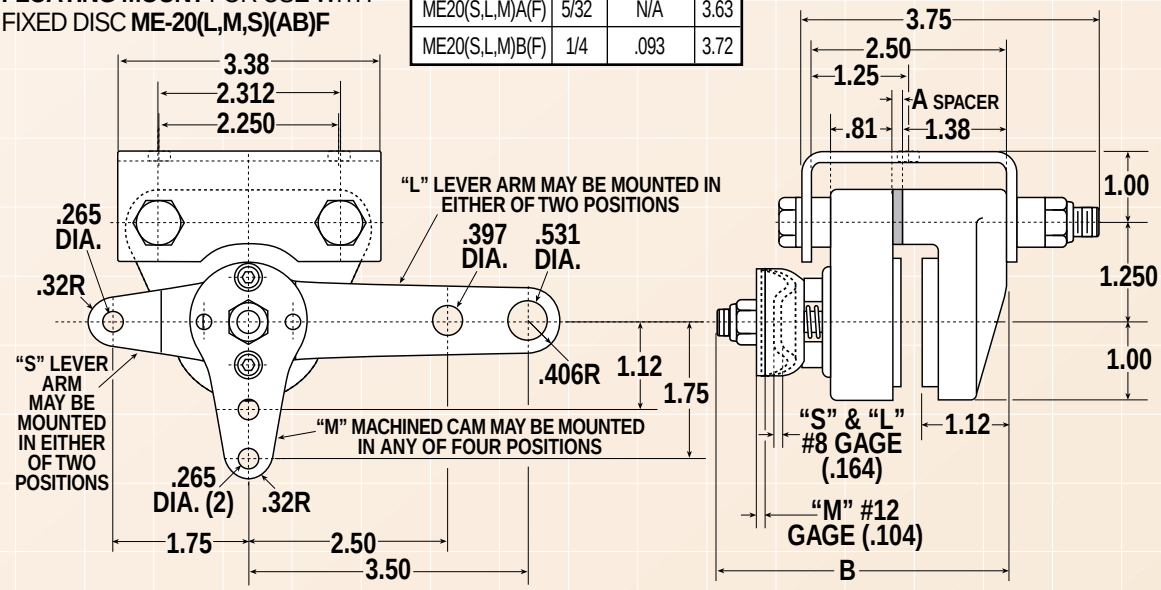
DIMENSIONAL DATA

FIXED MOUNT FOR USE WITH
FLOATING DISC **ME-20(L,M,S)(AB)**



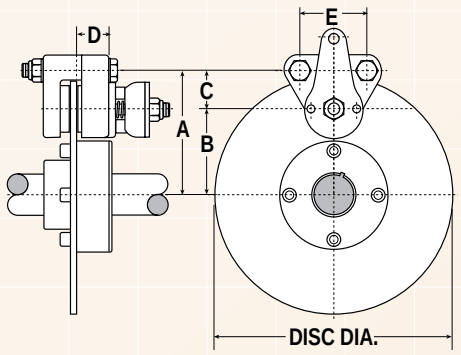
MODEL NO.	DISC THK	A SPACER	B
ME20(S,L,M)A(F)	5/32	N/A	3.63
ME20(S,L,M)B(F)	1/4	.093	3.72

FLOATING MOUNT FOR USE WITH
FIXED DISC **ME-20(L,M,S)(AB)F**



(All dimensions in inches)

MOUNTING DIMENSIONS



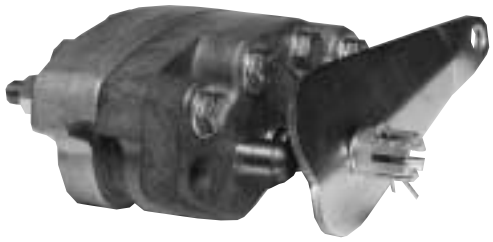
DISC DIA.	A	B BRAKING RADIUS	C	D	E
6.312	3.531	2.281	1.125	.875	2.312
8.000	4.375	3.125	1.125	.875	2.312
10.000	5.375	4.125	1.125	.875	2.312
12.000	6.375	5.125	1.125	.875	2.312
16.000	8.375	7.125	1.125	.875	2.312

(All dimensions in inches)

ME-220 SERIES
ALUMINUM OR CAST IRON

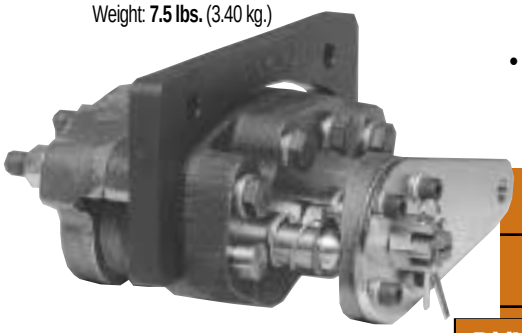
ME220_ FIXED MOUNT
(For use with a 5/32", 1/4", 3/8", or 1/2" Floating Disc)

Weight: **6.0 lbs.** (2.72 kg.)



ME220_F — WITH FLOATING BRACKET
(For use with a 5/32", 1/4", 3/8" or 1/2" Fixed Disc)

Weight: **7.5 lbs.** (3.40 kg.)



USES

Lift Trucks, Mobile Equipment, Mining Machinery, Industrial Machinery, Farm Machinery, Trailers, Hydrostatic Transmissions, Gear Reduction Input Shafts, Transaxles, Hydraulic Wheels and Hydraulic Motors

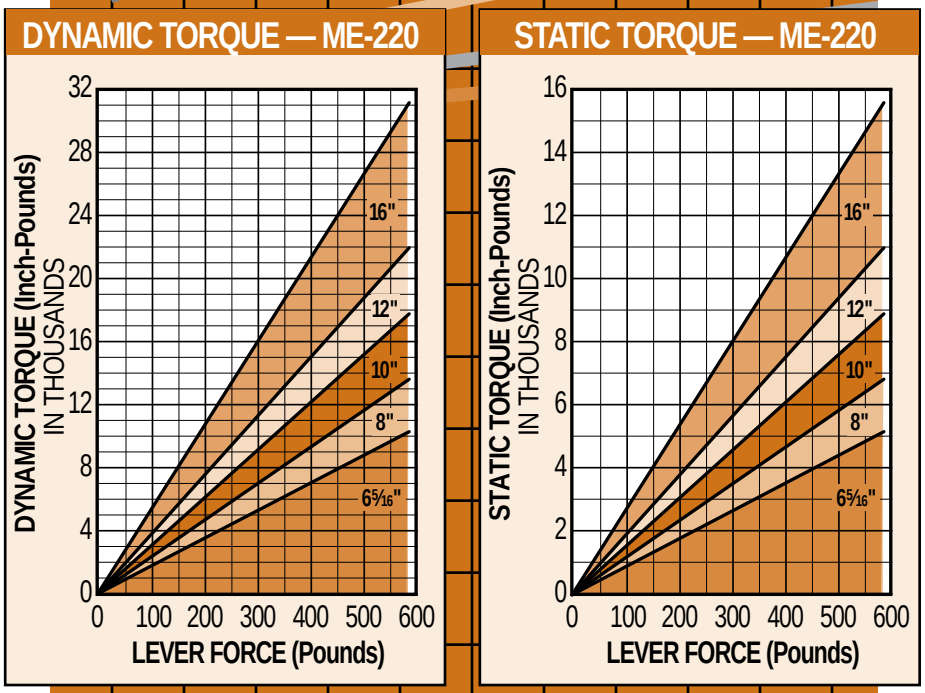
FEATURES

- Aluminum die cast construction
- Zinc chrome plated grade 8 bolts
- Linkage adjustment nut for puck wear
- 1.66 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 8.00 sq. in. total puck area,
- Puck diameter 1.610 in.
- Machined lever features heat-treated, one piece lever/cam
- Accommodates 6" to 16" disc diameters

OPTIONS

- Floating bracket mount

PERFORMANCE DATA



16" DISC | 12" DISC | 10" DISC | 8" DISC | 6-5/16" DISC

MAXIMUM LEVER FORCE
ALUMINUM 580 LBS.
CAST IRON 660 LBS.

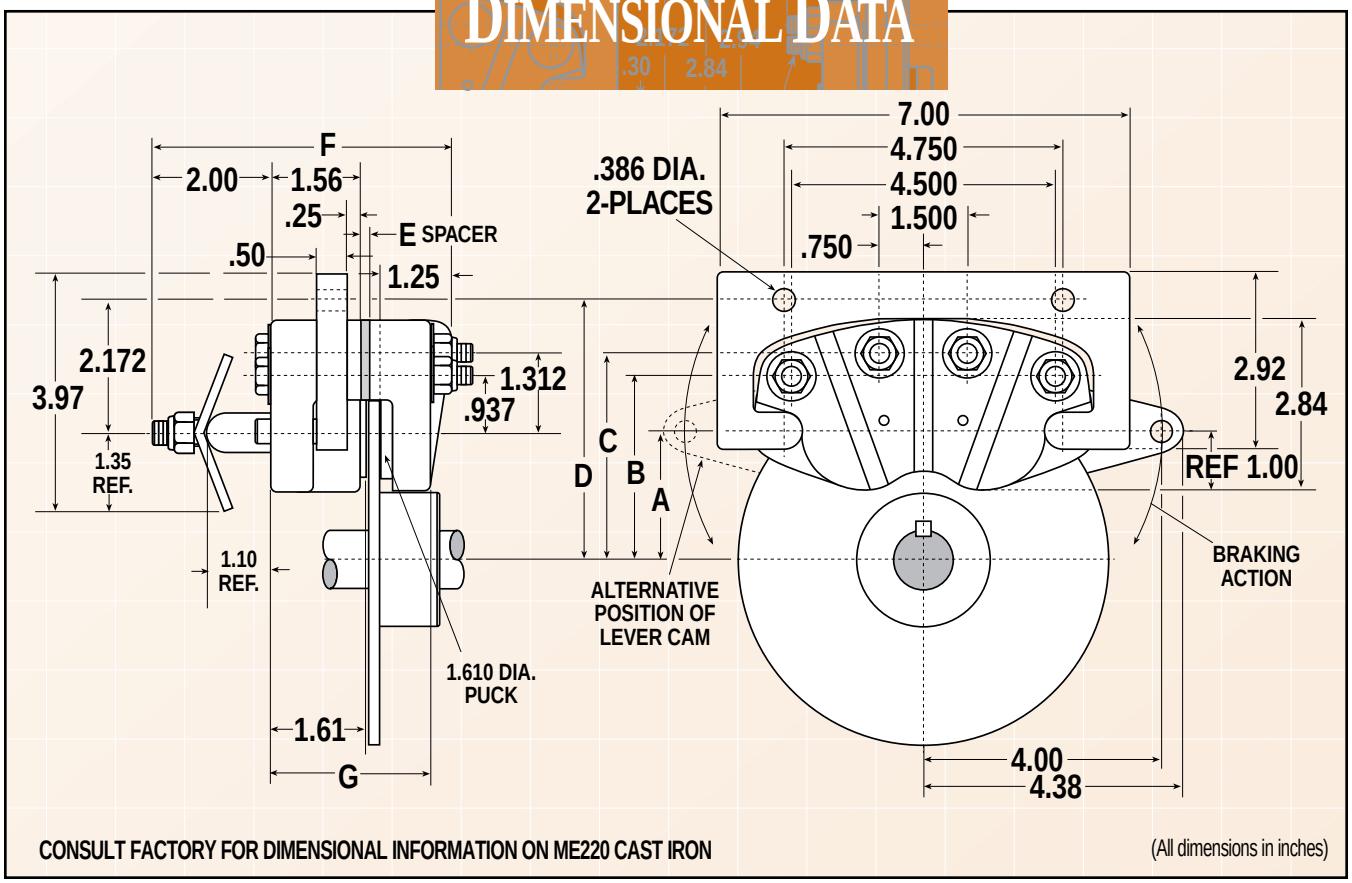
SEE PAGE 63 FOR ORDERING INFORMATION

DISC SIZING EQUATIONS:

DYNAMIC TORQUE (IN. LBS.) = **7.45 x BRAKING RADIUS** (IN.) x **LEVER FORCE** (LBS.)

STATIC (PARKING) TORQUE (IN. LBS.) = **3.725 x BRAKING RADIUS** (IN.) x **LEVER FORCE** (LBS.)

DIMENSIONAL DATA



CONSULT FACTORY FOR DIMENSIONAL INFORMATION ON ME220 CAST IRON

(All dimensions in inches)

DISC DIA.	BRAKING RADIUS	A	B	C	D
6.312	2.38	2.13	3.07	3.45	4.30
8.000	3.15	3.00	3.94	4.32	5.17
10.000	4.11	4.00	4.94	5.32	6.17
12.000	5.08	5.00	5.94	6.32	7.17
16.000	7.21	7.09	8.03	8.41	9.26

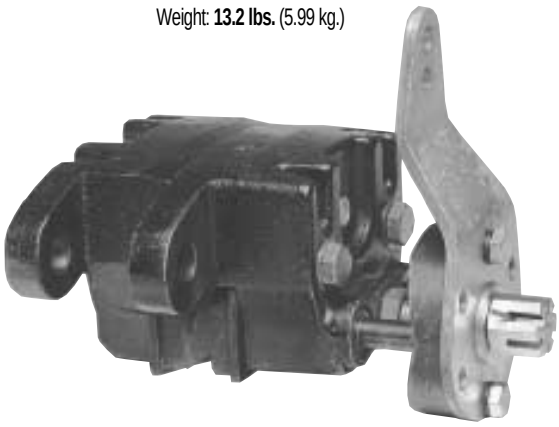
MODEL NO.	DISC THICKNESS	E	F	G
ME-220A(F)	5/32	N/A	5.50	2.72
ME-220B(F)	1/4	.094	5.50	2.81
ME-220E(F)	1/2	.344	5.75	3.06

(All dimensions in inches)

MB3 SERIES CAST IRON

MB3
(For use with a 3/8" or 1/2" Disc)

Weight: **13.2 lbs.** (5.99 kg.)



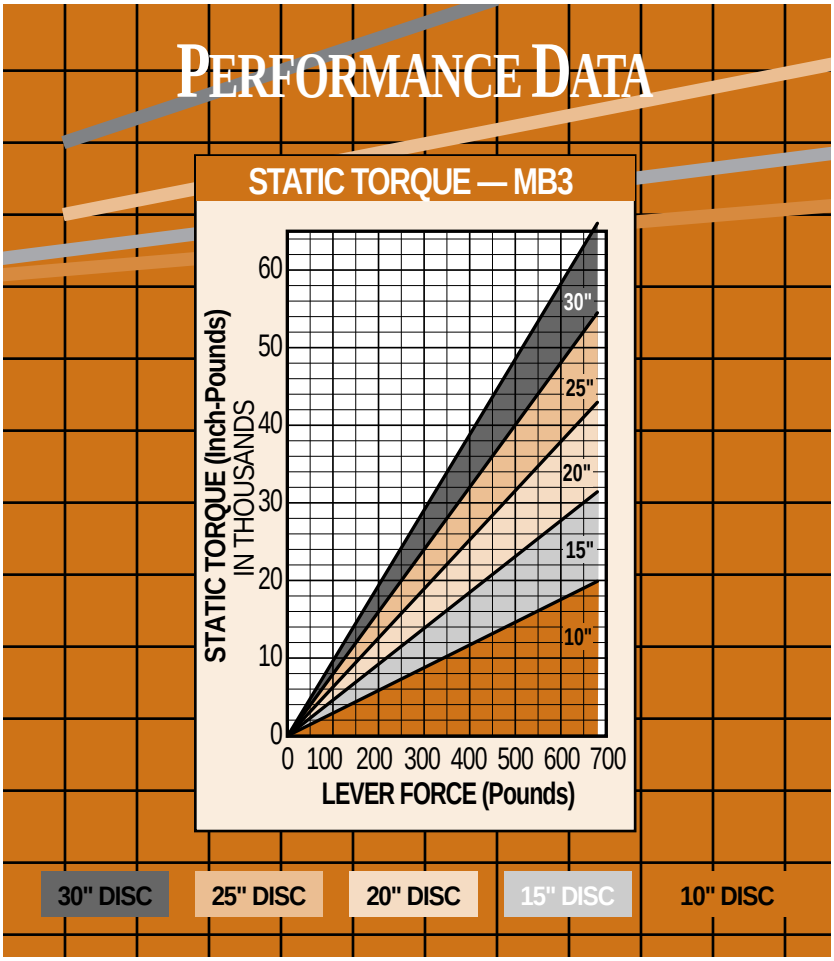
USES

Driveline and Wheel Mounted Parking Brake

FEATURES

- Capable of 10,000 lbs. clamp force
- Heavy-duty cast iron housing
- Zinc chrome plated grade 5 bolts
- One step pad wear adjustment
- Designed for fixed or floating mounts
- Machined cam allows lever positioning in 60° increments
- 6.06 cu. in. of wearable friction material
- Quick-change replaceable pads
- High grade friction material
- 9.69 sq. in. total pad area,
- Hardened-steel parts provide greater efficiency
- Accommodates 10" to 30" disc diameters
- Designed to be more efficient and priced lower than competitive brakes

PERFORMANCE DATA

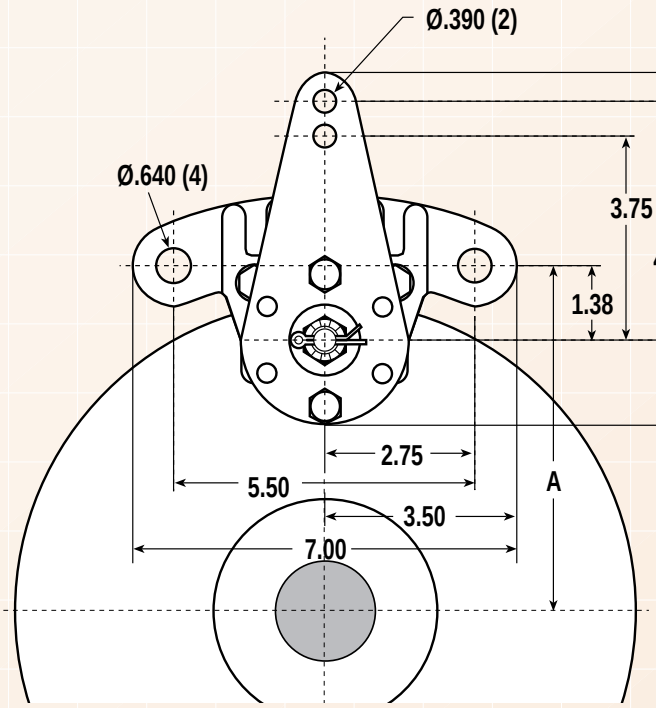


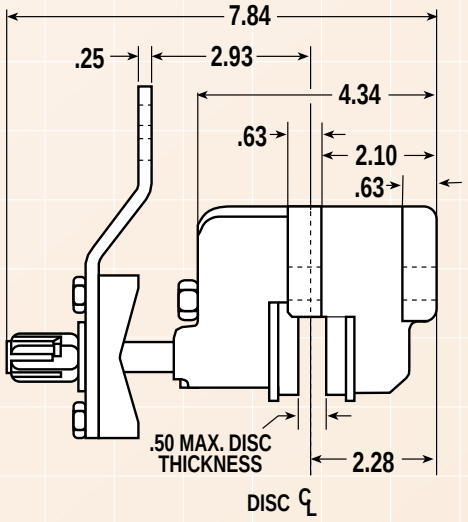
MAXIMUM LEVER FORCE
660 LBS.

SEE PAGE 63 FOR ORDERING INFORMATION

DISC SIZING EQUATIONS:
STATIC (PARKING) TORQUE (IN. LBS.) = **6.99 x BRAKING RADIUS** (IN.) x **LEVER FORCE** (LBS.)
BRAKING RADIUS (IN.) = **[DISC DIAMETER ÷ 2] - .688**

DIMENSIONAL DATA





SHOWN WITH A 12 O'CLOCK LEVER LOCATION. ADDITIONAL LEVER LOCATIONS CAN BE POSITIONED IN 60° INCREMENTS. CONSULT FACTORY FOR CUSTOM LEVER POSITIONING.

(All dimensions in inches)

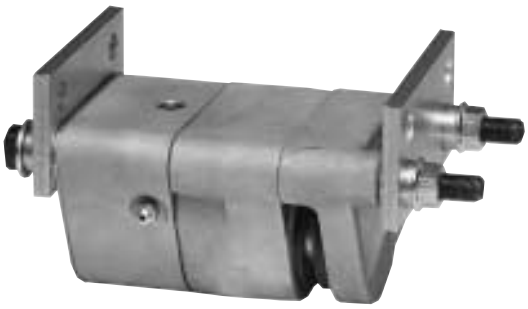
A	DISC DIA.	BRAKING RADIUS
5.42	10.00	4.312
7.92	15.00	6.812
10.42	20.00	9.312
12.92	25.00	11.812
15.42	30.00	14.312

(All dimensions in inches)

FS-20 SERIES ALUMINUM

EMERGENCY STOP WITH FLOATING BRACKET (For use with a 5/32" or 1/4" Fixed Disc)

Weight: **4.0 lbs.** (1.81 kg.)



USES

Mobile Equipment, Material Handling Equipment, Industrial Machinery, Mining Machinery, Farm Machinery, Hydrostatic Transmissions, Gear Reduction Input Shafts, Hydraulic Wheels and Hydraulic Motors

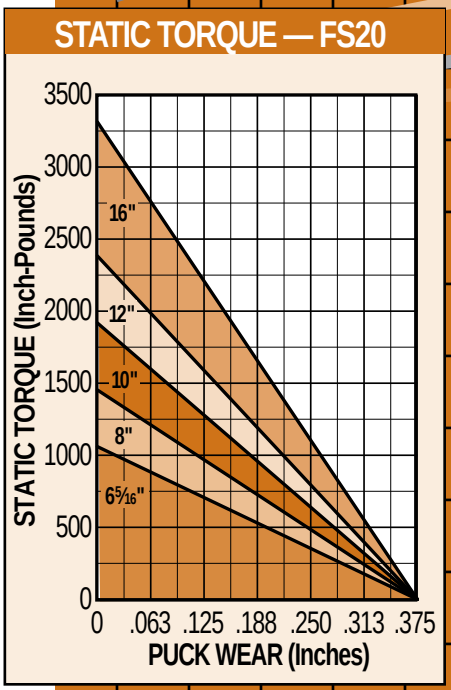
FEATURES

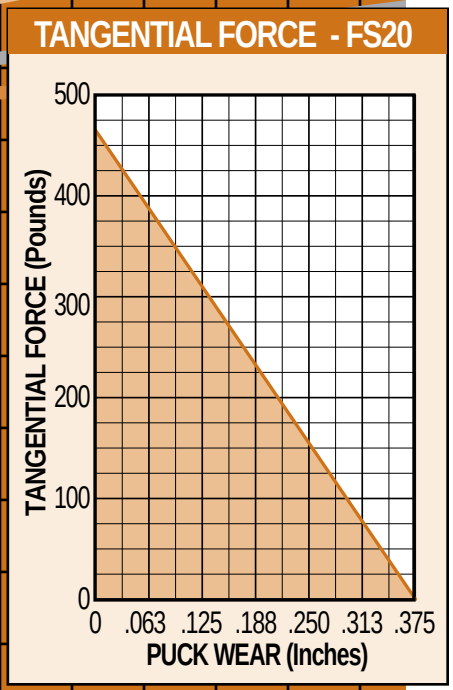
- Aluminum die cast construction
- Zinc plated grade 8 bolts
- Standard Buna-N seals
- .83 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 4.0 sq. in. total puck area
- Puck diameter 1.625 in.
- Steelplate floating brackets
- No maximum disc size limitation
- Fluid displacement for retraction = 0.56 cu. in.

OPTIONS

- EPR seals

PERFORMANCE DATA





16" DISC | 12" DISC | 10" DISC | 8" DISC | 6-5/16" DISC

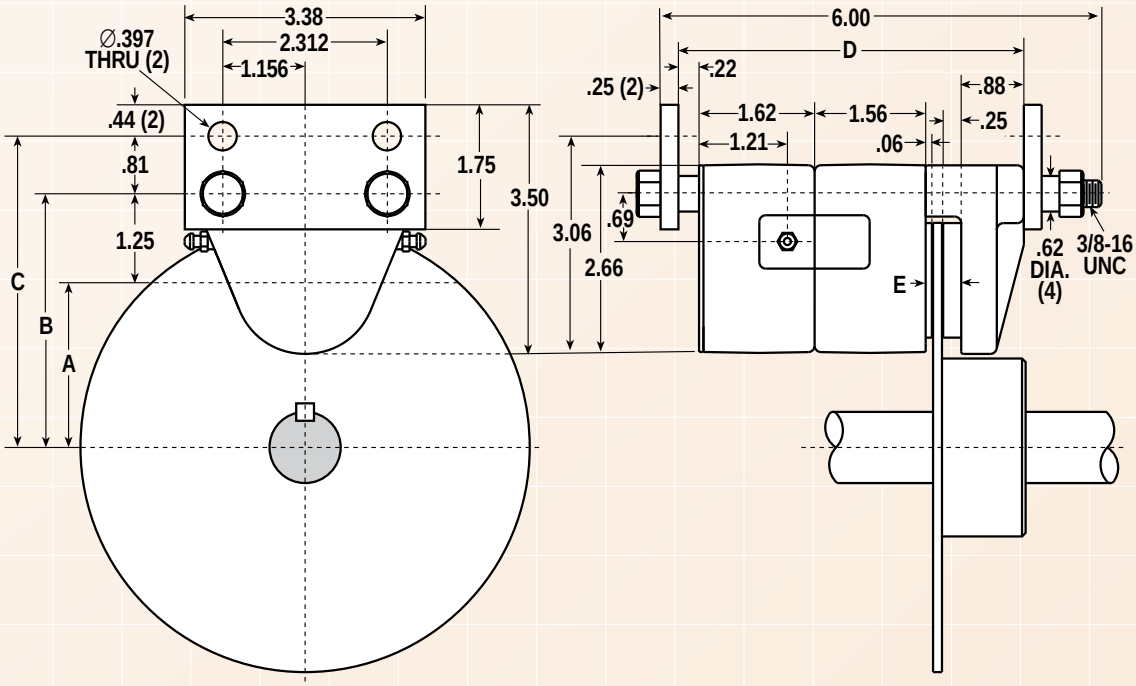
MAXIMUM HYDRAULIC PRESSURE RATING
1500 PSI Non Shock

MINIMUM HYDRAULIC PRESSURE TO RELEASE BRAKE
750 PSI

SEE PAGE 63 FOR ORDERING INFORMATION

DISC SIZING EQUATIONS:
STATIC (PARKING) TORQUE (IN. LBS.) = **TANGENTIAL FORCE** (LBS.) x **BRAKING RADIUS** (IN.)
BRAKING RADIUS (IN.) = **[DISC DIAMETER ÷ 2] - .875**

Dimensional Data



(All dimensions in inches)

DISC DIA.	A BRAKING RADIUS	B	C	MAXIMUM TORQUE (STATIC)
6.312	2.281	3.531	4.344	1060 in. lbs.
8.000	3.125	4.375	5.188	1453 in. lbs.
10.000	4.125	5.375	6.188	1918 in. lbs.
12.000	5.125	6.375	7.188	2383 in. lbs.
16.000	7.125	8.375	9.188	3313 in. lbs.

MODEL NO.	DISC THICKNESS	D	E
FS20A	.156	4.78	.500
FS20AG	.156	4.78	.500
FS20B	.250	4.87	.593
FS20BG	.250	4.87	.593

(All dimensions in inches)

FS-220 SERIES ALUMINUM

FS220B
(For use with a 5/32", 1/4", 3/8" or 1/2" Fixed Disc)

Weight: **8.0 lbs.** (3.63 kg.)

FS220C
(For use with a 5/32", 1/4", 3/8" or 1/2" Fixed Disc)

Weight: **11.0 lbs.** (4.99 kg.)

MAXIMUM HYDRAULIC PRESSURE RATING
2000 PSI Non Shock

MINIMUM HYDRAULIC PRESSURE TO RELEASE BRAKE
FS220B 750 PSI
FS220C 1500 PSI

SEE PAGE 63 FOR ORDERING INFORMATION

USES

Mobile Equipment, Industrial Machinery, Mining Machinery, Farm Machinery, Hydrostatic Transmissions, Gear Reduction Input Shafts, Hydraulic Wheels and Hydraulic Motors

FEATURES

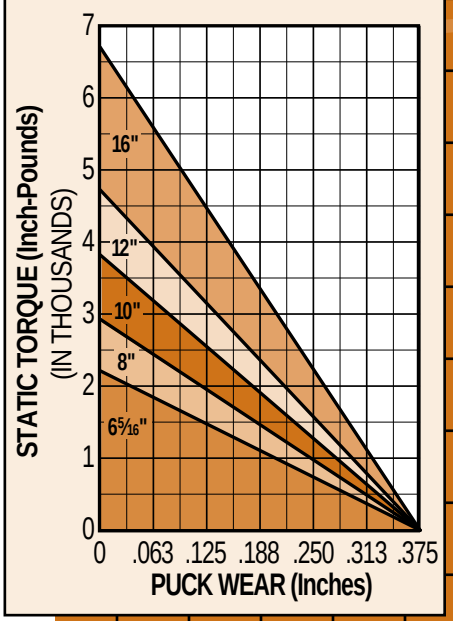
- Aluminum die cast construction
- Zinc chrome plated grade 8 bolts
- Standard Buna-N seals
- 1.66 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 8.0 sq. in. total puck area
- Puck diameter 1.610 in.
- Floating bracket
- Accommodates 6" to 16" disc diameters

OPTIONS

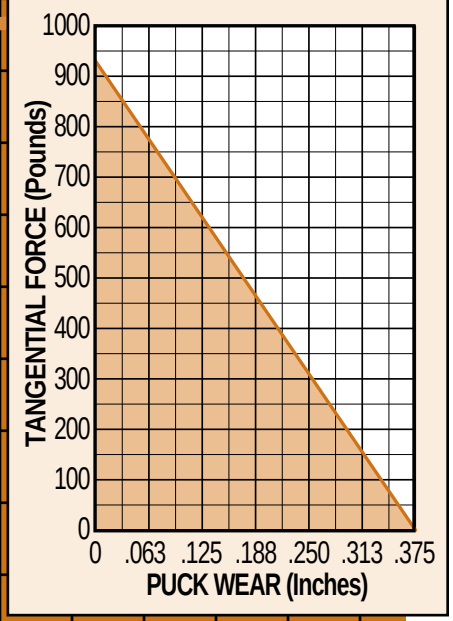
- EPR seals

PERFORMANCE DATA

STATIC TORQUE — FS220B



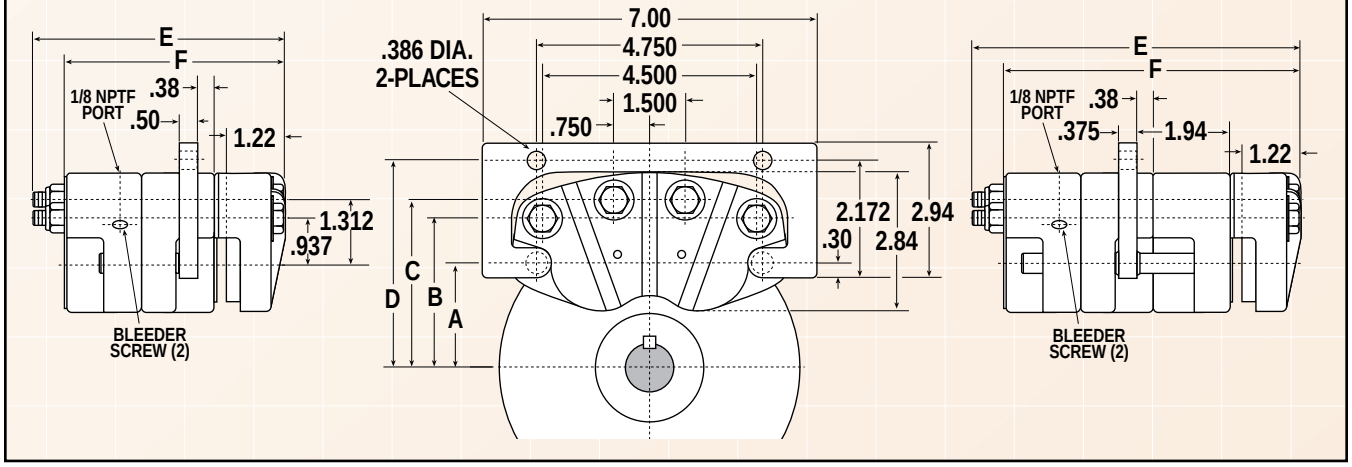
TANGENTIAL FORCE – FS220B



16" DISC | 12" DISC | 10" DISC | 8" DISC | 6-5/16" DISC

DISC SIZING EQUATION:
STATIC (PARKING) TORQUE (IN. LBS.) = **TANGENTIAL FORCE** (LBS.) x **BRAKING RADIUS** (IN.)

Dimensional Data



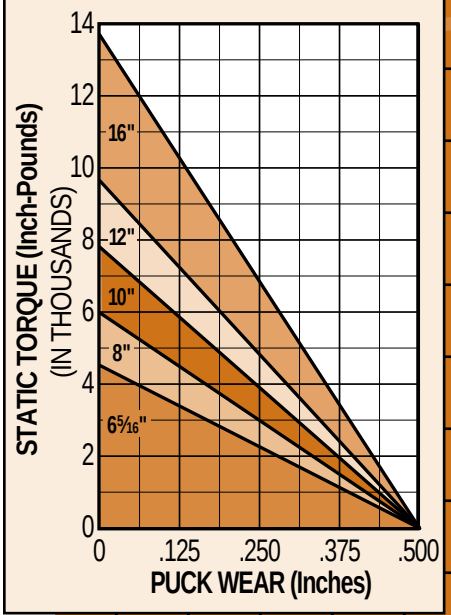
DISC DIA.	BRAKING RADIUS	A	B	C	D	FS220B MAXIMUM TORQUE (STATIC)	FS220C MAXIMUM TORQUE (STATIC)
6.312	2.38	2.13	3.07	3.45	4.30	2213 in. lbs.	4522 in. lbs.
8.000	3.15	3.00	3.94	4.32	5.17	2929 in. lbs.	5985 in. lbs.
10.000	4.11	4.00	4.94	5.32	6.17	3822 in. lbs.	7809 in. lbs.
12.000	5.08	5.00	5.94	6.32	7.17	4724 in. lbs.	9652 in. lbs.
16.000	7.21	7.09	8.03	8.41	9.26	6705 in. lbs.	13699 in. lbs.

MODEL NO.	DISC THICKNESS	E	F
FS220BA	.156	5.31	4.56
FS220BB	.250	5.31	4.65
FS220BL	.375	5.81	4.78
FS220BE	.500	5.81	4.90
FS220CA	.156	6.81	6.16
FS220CB	.250	6.81	6.25
FS220CL	.375	7.31	6.38
FS220CE	.500	7.31	6.50

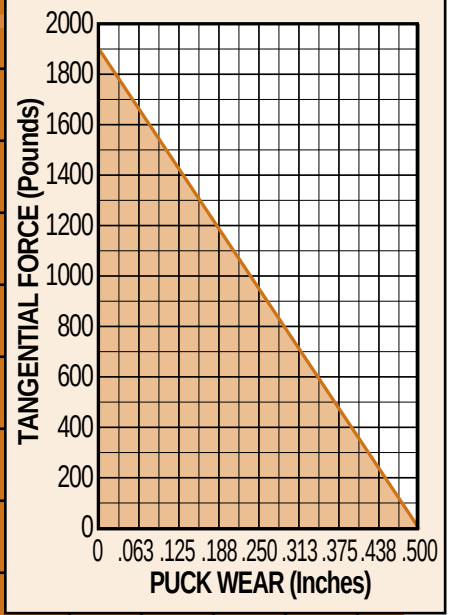
(All dimensions in inches)

Performance Data

STATIC TORQUE — FS220C



TANGENTIAL FORCE – FS220C



16" DISC | 12" DISC | 10" DISC | 8" DISC | 6-5/16" DISC

FS-220I SERIES
DUCTILE IRON

FS220B
(For use with a 5/32", 1/4", 3/8" or 1/2" Fixed Disc)

Weight: **14.5 lbs.** (6.58 kg.)

FS220C
(For use with a 5/32", 1/4", 3/8" or 1/2" Fixed Disc)

Weight: **20.0 lbs.** (9.07 kg.)

USES

Mobile Off-the-Road Equipment and Mining Machinery

FEATURES

- Cast iron construction
- Manual retractor
- Manual wear compensator
- Zinc chrome plated grade 8 bolts
- Standard Buna-N seals
- 2.35 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 9.4 sq. in. total puck area
- Puck diameter 1.610 in.
- Floating bracket
- Accommodates discs from 6" to 16" diameter
- Fluid displacement for retraction = .056 cubic inches

OPTIONS

- EPR seals

MAXIMUM HYDRAULIC PRESSURE RATING
2000 PSI Non Shock

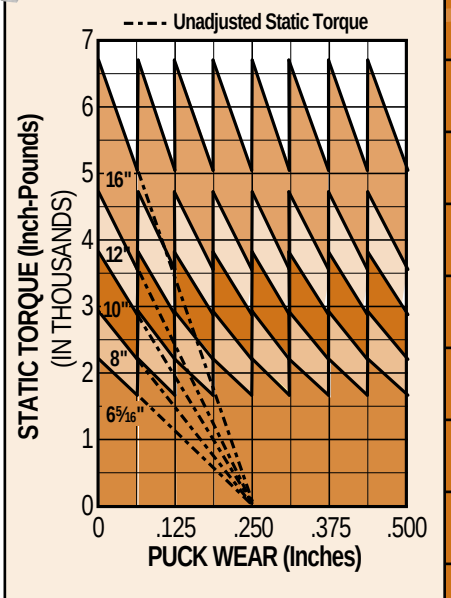
MINIMUM HYDRAULIC PRESSURE TO RELEASE BRAKE
FS220BI 750 PSI
(1000 PSI AFTER COMPENSATION)
FS220CI 1500 PSI

SEE PAGE 63 FOR ORDERING INFORMATION

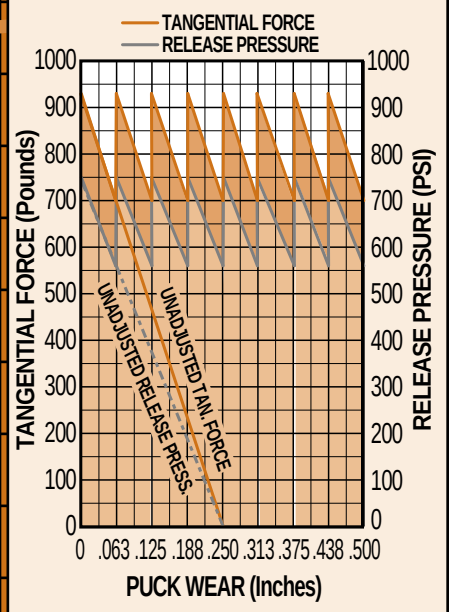
PERFORMANCE DATA

REFER TO FS220B PERFORMANCE DATA FOR CALIPERS WITHOUT "JK" OPTIONS

STATIC TORQUE — FS220BI & BI_JK



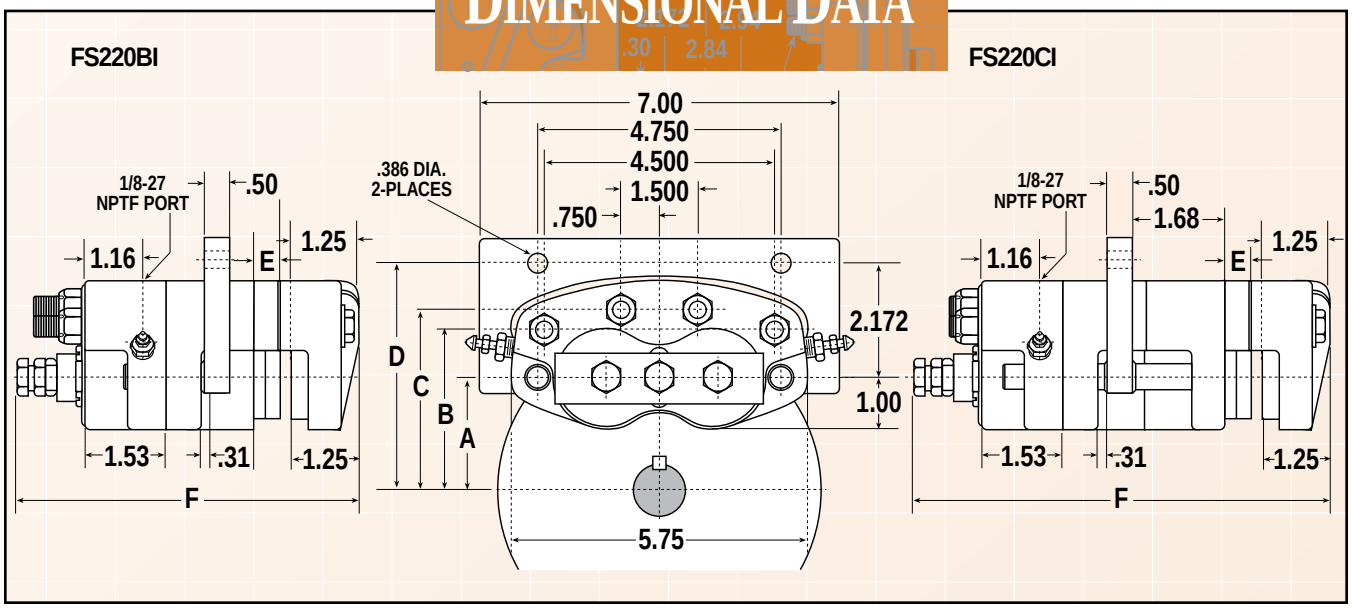
TANGENTIAL FORCE - FS220BI & BI_JK



16" DISC | 12" DISC | 10" DISC | 8" DISC | 6-5/16" DISC

DISC SIZING EQUATION:
STATIC (PARKING) TORQUE (IN. LBS.) **=** **TANGENTIAL FORCE** (LBS.) **x BRAKING RADIUS** (IN.)

DIMENSIONAL DATA



DISC DIA.	BRAKING RADIUS	A	B	C	D	FS220BI MAXIMUM TORQUE (STATIC)	FS220CI MAXIMUM TORQUE (STATIC)
6.312	2.38	2.13	3.07	3.45	4.30	2213 in. lbs.	4522 in. lbs.
8.000	3.15	3.00	3.94	4.32	5.17	2929 in. lbs.	5985 in. lbs.
10.000	4.11	4.00	4.94	5.32	6.17	3822 in. lbs.	7809 in. lbs.
12.000	5.08	5.00	5.94	6.32	7.17	4724 in. lbs.	9652 in. lbs.
16.000	7.21	7.09	8.03	8.41	9.26	6705 in. lbs.	13699 in. lbs.

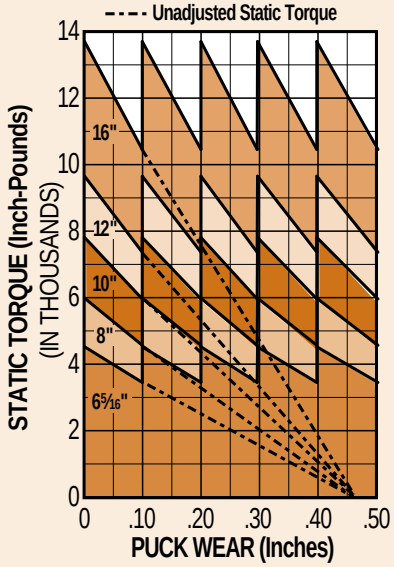
MODEL NO.	DISC THICKNESS	E	F
FS220BIA__	.156	.500	6.32
FS220BIB__	.250	.594	6.42
FS220BIL__	.375	.718	6.54
FS220BIE__	.500	.844	6.67
FS220BIA__	.156	.562	7.96
FS220BIB__	.250	.6.56	8.06
FS220BIL__	.375	.780	8.18
FS220BIE__	.500	.906	8.32

(All dimensions in inches)

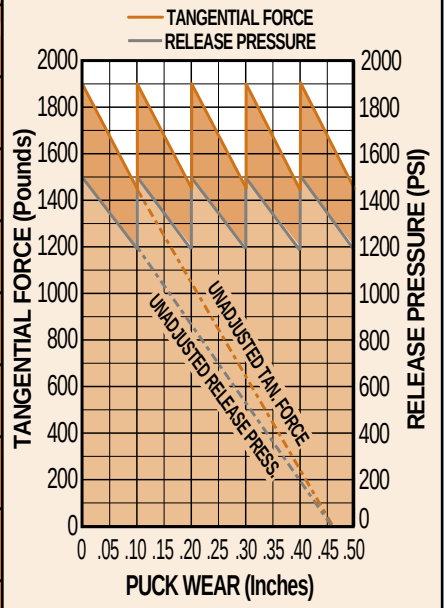
PERFORMANCE DATA

REFER TO FS220C PERFORMANCE DATA FOR CALIPERS WITHOUT "JK" OPTIONS

STATIC TORQUE — FS220CI & CI_JK



TANGENTIAL FORCE — FS220CI & CI_JK



16" DISC | 12" DISC | 10" DISC | 8" DISC | 6-5/16" DISC

RECOMMENDED WEAR COMPENSATION INTERVAL

FS220BI_JK = .06" PUCK WEAR

FS220CI_JK = .10" PUCK WEAR

FS-440 SERIES
DUCTILE IRON

EMERGENCY STOP WITH FLOATING BRACKET (For use with a 3/8", 1/2", 1", 1-1/4" or 1-1/2" Fixed Disc)

Weight: **27.0 lbs.** (12.25 kg.)

USES

Mobile Equipment, Material Handling Equipment, Industrial Machinery, Mining Machinery, Farm Machinery, Hydrostatic Transmissions, Gear Reduction Input Shafts, Hydraulic Wheels and Hydraulic Motors

FEATURES

- Cast ductile iron construction
- Cadmium plated grade 8 bolts
- Standard Buna-N seals
- .83 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 4.0 sq. in. total puck area
- Puck diameter 1.610 in.
- Accommodates 10" to 24" disc diameters
- Fluid displacement for retraction = 0.56 cu. in.

OPTIONS

- EPR seals

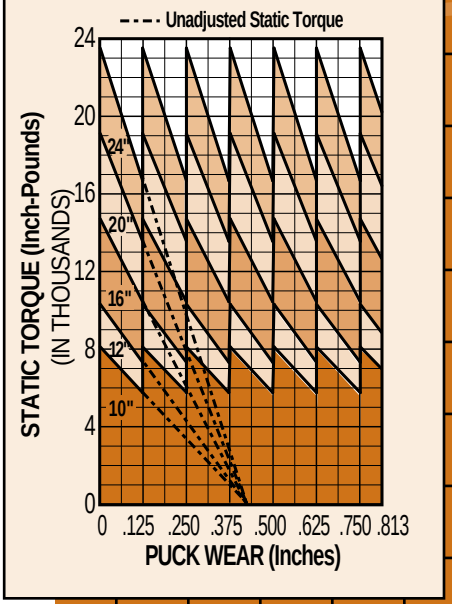
MAXIMUM HYDRAULIC PRESSURE RATING
2000 PSI Non Shock

MINIMUM HYDRAULIC PRESSURE TO RELEASE BRAKE
1310 PSI

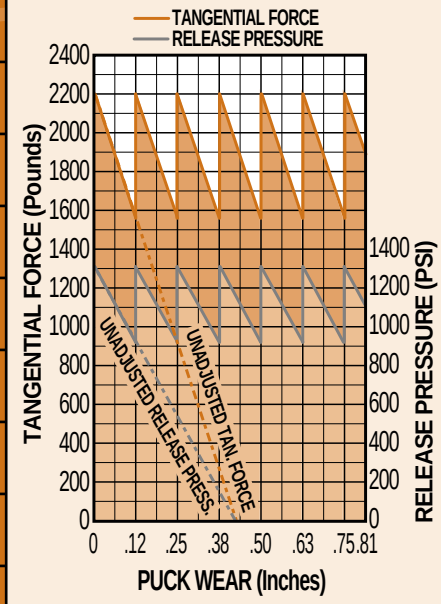
SEE PAGE 63 FOR ORDERING INFORMATION

PERFORMANCE DATA

STATIC TORQUE — FS440



TANGENTIAL FORCE - FS440



24" DISC | **20" DISC** | **16" DISC** | **12" DISC** | **10" DISC**

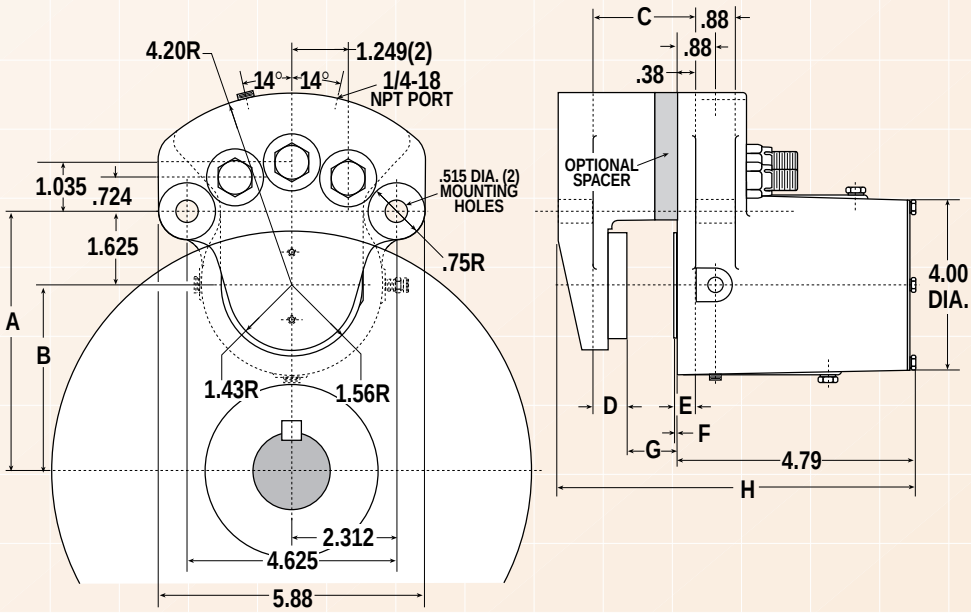
NOTE: Available Tol-O-Matic Disc Sizes 6 5/16", 8", 10", 12", and 16"

DISC SIZING EQUATIONS:

STATIC (PARKING) TORQUE (IN. LBS.) = **TANGENTIAL FORCE** (LBS.) x **BRAKING RADIUS** (IN.)

BRAKING RADIUS (IN.) = **[DISC DIAMETER ÷ 2] - 1.310**

DIMENSIONAL DATA



(All dimensions in inches)

DISC DIA.	A	B BRAKING RADIUS	MAXIMUM TORQUE (STATIC)
10.000	5.315	3.690	8,118 in. lbs.
12.000	6.315	4.690	10,318 in. lbs.
16.000	8.315	6.690	14,718 in. lbs.
20.000	10.315	8.690	19,118 in. lbs.
24.000	12.315	10.690	23,518 in. lbs.

MODEL NO.	DISC THICKNESS	C	D	E	F	G	H
FS-440L	.375	1.75	.83	.52	.12	.56	6.91
FS-440E	.500	1.75	.77	.46	.06	.62	6.91
FS-440N	1.000	2.25	.77	.46	.06	1.12	7.41
FS-440O	1.250	2.50	.77	.46	.06	1.38	7.66
FS-440Q	1.500	2.75	.77	.46	.06	1.62	7.91

(All dimensions in inches)

RECOMMENDED WEAR COMPENSATION INTERVAL
FS440 = .12" PUCK WEAR

Call 1-800-328-2174 For Assistance That Won't Stop

FS-595 SERIES
DUCTILE IRON

FS595
(For use with a 1/2", 1", 1-1/4" or 1-1/2" Fixed Disc)

Weight: **36.0 lbs.** (16.33 kg.)

FS595 DUAL
(For use with a 1/2", 1", 1-1/4" or 1-1/2" Fixed Disc)

Weight: **72.0 lbs.** (32.66 kg.)

MAXIMUM HYDRAULIC PRESSURE RATING
2000 PSI Non Shock

MINIMUM HYDRAULIC PRESSURE TO RELEASE BRAKE
1400 PSI

SEE PAGE 63 FOR ORDERING INFORMATION

USES

Mobile Off-the-Road Equipment, Industrial Machinery and Mining Machinery

FEATURES

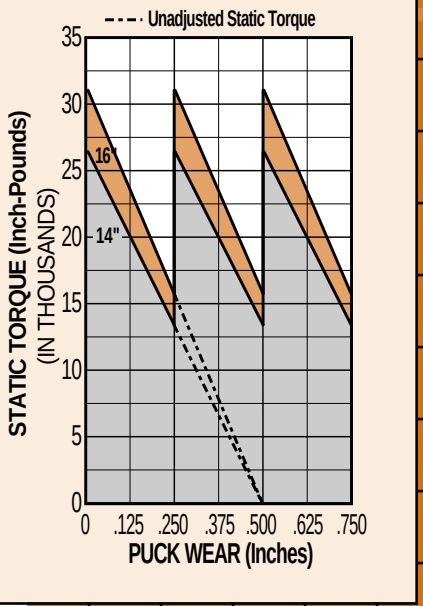
- Cast ductile iron housings
- Grade 8 bolts Cadmium plated
- Standard Buna-N seals
- .812 cu. in. of wearable friction material
- Replaceable pucks
- High grade friction material
- 9.14 sq. in. total puck area per brake
- Puck diameter 2.50 in.
- No maximum disc size limitation
- Fluid displacement for .030 clearance
  FS595 = .230 cu. in.
  FS595HD = .460 cu. in

OPTIONS

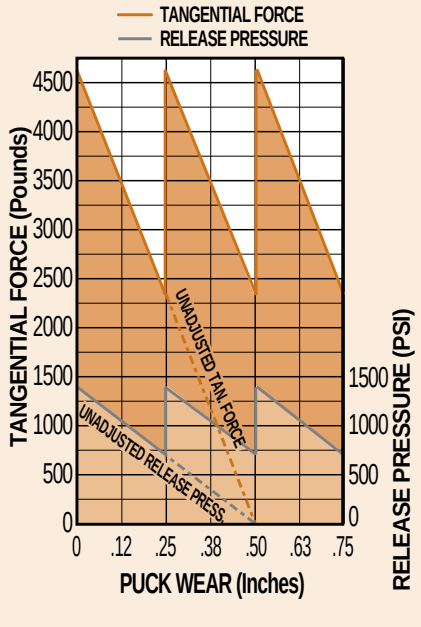
- EPR seals
- Adaptable to thinner discs, consult factory.

PERFORMANCE DATA

STATIC TORQUE — FS595



TANGENTIAL FORCE - FS595



16" DISC **14" DISC**

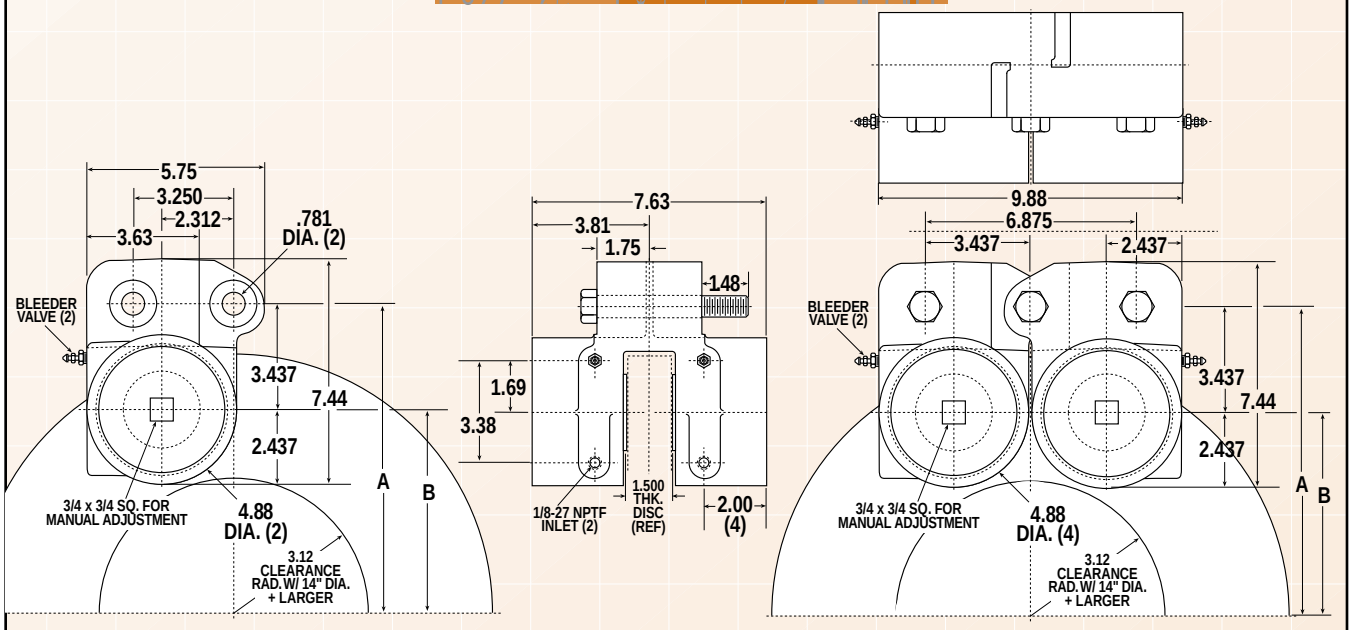
NOTE: Available Tol-O-Matic Disc Sizes 6 5/16", 8", 10", 12", and 16"

DISC SIZING EQUATIONS:

STATIC (PARKING) TORQUE (IN. LBS.) = **TANGENTIAL FORCE** (LBS.) x **BRAKING RADIUS** (IN.)

BRAKING RADIUS (IN.) = **[DISC DIAMETER ÷ 2] - 1.280**

DIMENSIONAL DATA



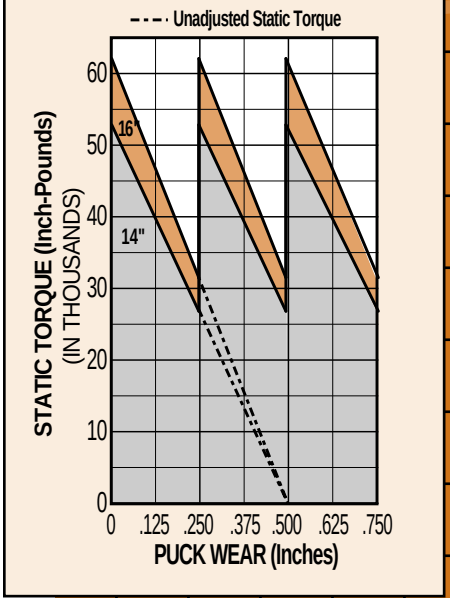
(All dimensions in inches)

DISC DIA.	A	B BRAKING RADIUS	FS595 MAXIMUM TORQUE (STATIC)	FS595DUAL MAXIMUM TORQUE (STATIC)
14.000	8.58	5.72	26,426 in. lbs.	52,852 in. lbs.
16.000	9.67	6.72	31,046 in. lbs.	62,092 in. lbs.

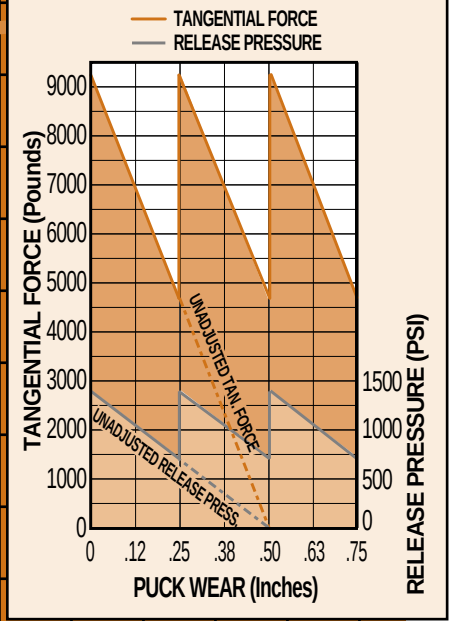
(All dimensions in inches)

PERFORMANCE DATA

STATIC TORQUE – FS595DUAL



TANGENTIAL FORCE - FS595DUAL



16" DISC 14" DISC

NOTE: Available Tol-O-Matic Disc Sizes 6 5/16", 8", 10", 12", and 16"

RECOMMENDED WEAR COMPENSATION INTERVAL
FS595 = .25" PUCK WEAR

MAXIMUM TOTAL WEAR
FS595 = .75" PUCK WEAR

FIXED HUB AND DISC ASSEMBLIES

HUB & DISC ASSEMBLY
(For use with Pneumatic, Hydraulic, Mechanical or Spring Applied Caliper Disc Brakes)

6.313 Diameter Disc Weight: **1.37 lbs.** (.62 kg.)
8.000 Diameter Disc Weight: **3.52 lbs.** (1.60 kg.)
10.000 Diameter Disc Weight: **5.46 lbs.** (2.48 kg.)
12.000 Diameter Disc Weight: **7.91 lbs.** (3.59 kg.)
16.000 Diameter Disc Weight: **14.06 lbs.** (3.38 kg.)

FEATURES

- Carbon 1010 steel discs, flat within .010 inch, stress relieved and blanchard ground to an 80 (RMS) micro-inch finish
- Hubs machined from cold rolled steel
- Socket head cap screw fasteners
- Key way set screws

DISC SIZE: 6-5/16"

ASSEMBLY NO.	BORE SIZE	KEY SIZE
0801-0008	.500	.125 x .125
0801-0010	.625	.188 x .188
0801-0012	.750	.188 x .188
0801-0014	.875	.188 x .188
0801-0016	1.000	.250 x .250

(All dimensions in inches)

DISC SIZE: 8"

ASSEMBLY NO.	BORE SIZE	KEY SIZE
0802-0016	1.000	.250 x .250
0802-0018	1.125	.250 x .250
0802-0020	1.250	.250 x .250
0802-0022	1.375	.313 x .313
0802-0024	1.500	.375 x .375
0802-0026	1.625	.375 x .375
0802-0028	1.750	.375 x .375

(All dimensions in inches)

DISC SIZE: 10"

ASSEMBLY NO.	BORE SIZE	KEY SIZE
0803-0016	1.000	.250 x .250
0803-0018	1.125	.250 x .250
0803-0020	1.250	.250 x .250
0803-0022	1.375	.313 x .313
0803-0024	1.500	.375 x .375
0803-0026	1.625	.375 x .375
0803-0028	1.750	.375 x .375

(All dimensions in inches)

DISC SIZE: 12"

ASSEMBLY NO.	BORE SIZE	KEY SIZE
0804-0024	1.500	.375 x .375
0804-0028	1.750	.375 x .375
0804-0032	2.000	.500 x .500
0804-0036	2.250	.500 x .500
0804-0040	2.500	.625 x .625

(All dimensions in inches)

DISC SIZE: 16"

ASSEMBLY NO.	BORE SIZE	KEY SIZE
0805-0024	1.500	.375 x .375
0805-0028	1.750	.375 x .375
0805-0032	2.000	.500 x .500
0805-0036	2.250	.500 x .500
0805-0040	2.500	.625 x .625

(All dimensions in inches)

PERFORMANCE DATA

MAXIMUM TORQUE RATINGS

DISC DIAMETER	TORQUE RATING
6.313	3,000 in. lbs.
8.000	12,000 in. lbs.
10.000	12,000 in. lbs.
12.000	36,000 in. lbs.
16.000	36,000 in. lbs.

(All dimensions in inches)

SINGLE STOP MAXIMUM ENERGY ABSORPTION CAPACITIES*

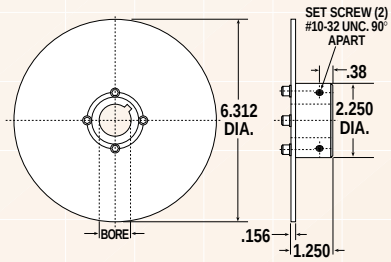
DISC DIAMETER	DISC THICKNESS	BTUs	JOULES
6.313	.156	43.55	45,942
8.000	.156	73.93	77,986
10.000	.156	120.05	126,625
12.000	.156	164.71	173,730
16.000	.250	494.12	521,191

*Disc Temperature 380° (All dimensions in inches)

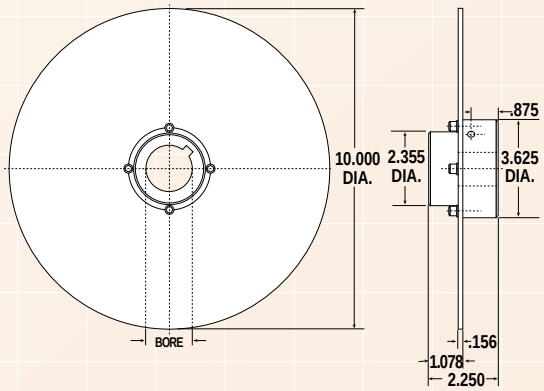
ALSO SEE PAGE 59 FOR MAXIMUM BTU/HR.

DIMENSIONAL DATA

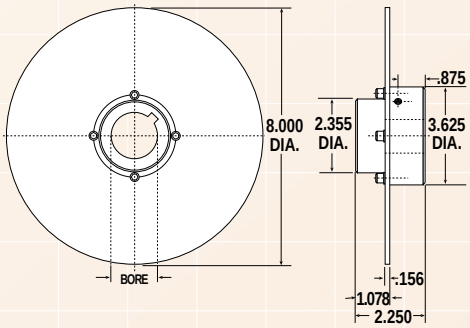
DISC SIZE 6-5/16"



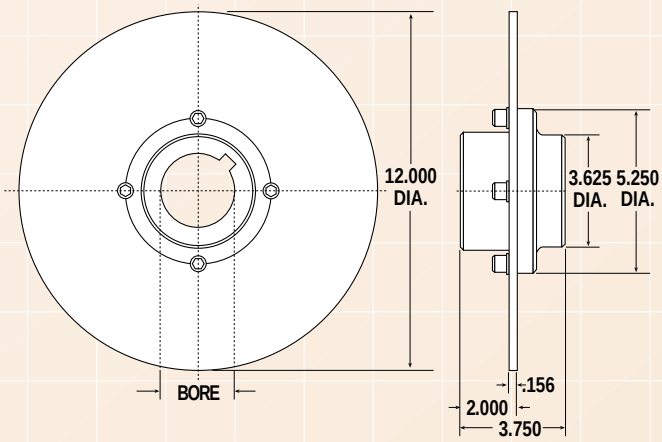
DISC SIZE 10"



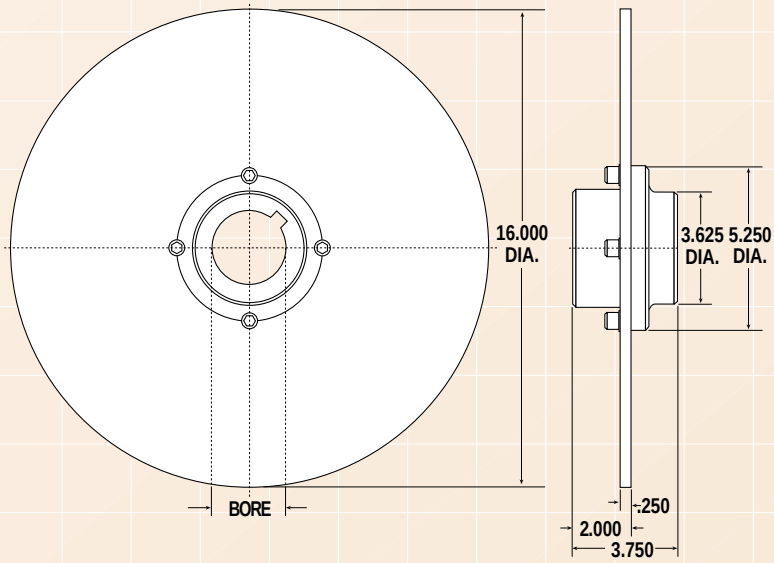
DISC SIZE 8"



DISC SIZE 12"



DISC SIZE 16"



FIXED HUB AND DISC ASSEMBLIES WITH Q.D.BUSHINGS

DISC SIZE: 6-5/16"

ASSEMBLY NO.	BORE SIZE	KEY SIZE
0801-0109	.563	.125 x .125
0801-0110	.625	.125 x .125
0801-0111	.688	.188 x .188
0801-0112	.750	.188 x .188
0801-0113	.813	.188 x .188
0801-0114	.875	.188 x .188
0801-0115	.938	.250 x .250
0801-0116	1.000	.250 x .250
0801-0117	1.063	.250 x .250

DISC SIZE: 8"

ASSEMBLY NO.	BORE SIZE	KEY SIZE
0802-0108	.500	.125 x .125
0802-0109	.563	.125 x .125
0802-0110	.625	.188 x .188
0802-0111	.688	.188 x .188
0802-0112	.750	.188 x .188
0802-0113	.813	.188 x .188
0802-0114	.875	.188 x .188
0802-0115	.938	.250 x .250
0802-0116	1.000	.250 x .250
0802-0117	1.063	.250 x .250
0802-0118	1.125	.250 x .250
0802-0119	1.188	.250 x .250
0802-0120	1.250	.250 x .250
0802-0121	1.313	.313 x .313
0802-0122	1.375	.313 x .313
0802-0123	1.438	.375 x .250*
0802-0124	1.500	.375 x .250*
0802-0125	1.563	.375 x .250*

DISC SIZE: 10"

ASSEMBLY NO.	BORE SIZE	KEY SIZE
0803-0108	.500	.125 x .125
0803-0109	.563	.125 x .125
0803-0110	.625	.188 x .188
0803-0111	.688	.188 x .188
0803-0112	.750	.188 x .188
0803-0113	.813	.188 x .188
0803-0114	.875	.188 x .188
0803-0115	.938	.250 x .250
0803-0116	1.000	.250 x .250
0803-0117	1.063	.250 x .250
0803-0118	1.125	.250 x .250
0803-0119	1.188	.250 x .250
0803-0120	1.250	.250 x .250
0803-0121	1.313	.313 x .313
0803-0122	1.375	.313 x .313
0803-0123	1.438	.375 x .250*
0803-0124	1.500	.375 x .250*
0803-0125	1.563	.375 x .250*

HUB & DISC ASSEMBLY WITH Q.D. BUSHINGS (For use with Pneumatic, Hydraulic, Mechanical or Spring Applied Caliper Disc Brakes)

FEATURES

- Carbon 1010 steel discs, flat within .010 inch, stress relieved and blanchard ground to an 80 (RMS) micro-inch finish
- Socket head cap screw fasteners
- Key way set screws
- Upper lock quick disconnect bushings

DISC SIZE: 12"

ASSEMBLY NO.	BORE SIZE	KEY SIZE
0804-0108	.500	.125 x .125
0804-0109	.563	.125 x .125
0804-0110	.625	.188 x .188
0804-0111	.688	.188 x .188
0804-0112	.750	.188 x .188
0804-0113	.813	.188 x .188
0804-0114	.875	.188 x .188
0804-0115	.938	.250 x .250
0804-0116	1.000	.250 x .250
0804-0117	1.063	.250 x .250
0804-0118	1.125	.250 x .250
0804-0119	1.188	.250 x .250
0804-0120	1.250	.250 x .250
0804-0121	1.313	.313 x .313
0804-0122	1.375	.313 x .313
0804-0123	1.438	.375 x .375
0804-0124	1.500	.375 x .375
0804-0125	1.563	.375 x .375
0804-0126	1.625	.375 x .375
0804-0127	1.688	.375 x .375
0804-0128	1.750	.375 x .375
0804-0129	1.813	.375 x .375
0804-0130	1.875	.500 x .500
0804-0131	1.938	.500 x .500
0804-0132	2.000	.500 x .500
0804-0133	2.063	.500 x .500
0804-0134	2.125	.500 x .500
0804-0135	2.188	.500 x .500
0804-0136	2.250	.500 x .500
0804-0137	2.313	.500 x .625*
0804-0138	2.375	.500 x .625*
0804-0139	2.438	.500 x .625*
0804-0140	2.500	.500 x .625*
0804-0141	2.563	.375 x .625*
0804-0142	2.625	.375 x .625*
0804-0143	2.688	.375 x .625*
0804-0144	2.750	.375 x .625*

DISC SIZE: 16"

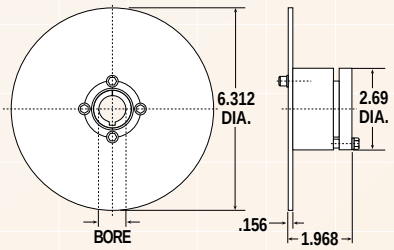
ASSEMBLY NO.	BORE SIZE	KEY SIZE
0805-0108	.500	.125 x .125
0805-0109	.563	.125 x .125
0805-0110	.625	.188 x .188
0805-0111	.688	.188 x .188
0805-0112	.750	.188 x .188
0805-0113	.813	.188 x .188
0805-0114	.875	.188 x .188
0805-0115	.938	.250 x .250
0805-0116	1.000	.250 x .250
0805-0117	1.063	.250 x .250
0805-0118	1.125	.250 x .250
0805-0119	1.188	.250 x .250
0805-0120	1.250	.250 x .250
0805-0121	1.313	.313 x .313
0805-0122	1.375	.313 x .313
0805-0123	1.438	.375 x .375
0805-0124	1.500	.375 x .375
0805-0125	1.563	.375 x .375
0805-0126	1.625	.375 x .375
0805-0127	1.688	.375 x .375
0805-0128	1.750	.375 x .375
0805-0129	1.813	.375 x .375
0805-0130	1.875	.500 x .500
0805-0131	1.938	.500 x .500
0805-0132	2.000	.500 x .500
0805-0133	2.063	.500 x .500
0805-0134	2.125	.500 x .500
0805-0135	2.188	.500 x .500
0805-0136	2.250	.500 x .500
0805-0137	2.313	.500 x .625*
0805-0138	2.375	.500 x .625*
0805-0139	2.438	.500 x .625*
0805-0140	2.500	.500 x .625*
0805-0141	2.563	.375 x .625*
0805-0142	2.625	.375 x .625*
0805-0143	2.688	.375 x .625*
0805-0144	2.750	.375 x .625*

*Non-standard keys are supplied along with hub and disc assemblies

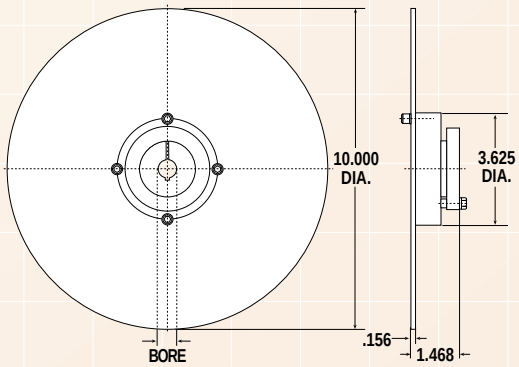
(All dimensions in inches)

Dimensional Data

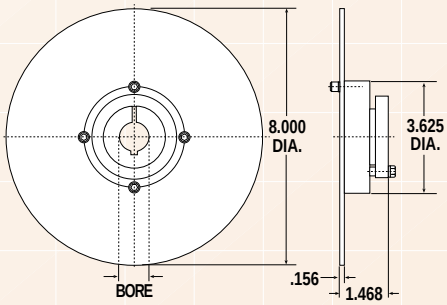
DISC SIZE 6-5/16"



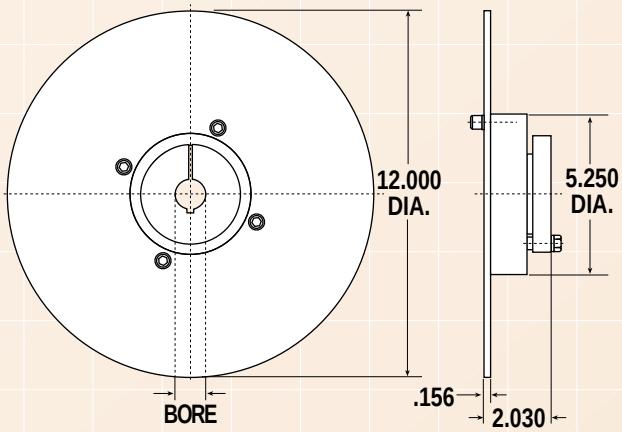
DISC SIZE 10"



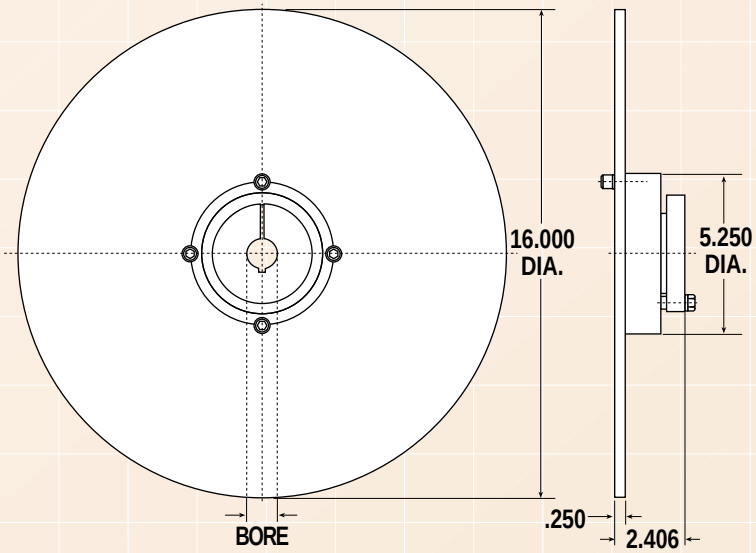
DISC SIZE 8"



DISC SIZE 12"



DISC SIZE 16"



Performance Data

NOTE: Do not use in any application that exceeds the rated torque capacity. Hub failure may result.

MAXIMUM TORQUE RATINGS

DISC DIAMETER	BUSHING STYLE	TORQUE RATING
6.313	SH	3,500 in. lbs.
8.000	SH	3,500 in. lbs.
10.000	SH	3,500 in. lbs.
12.000	SF	11,000 in. lbs.
16.000	SF	11,000 in. lbs.

(All dimensions in inches)

Q.D. BUSHINGS AND HUBS

Q.D. BUSHINGS
(MUST BE USDED WITH Q.D. HUBS
ON NEXT PAGE)

Q.D. BUSHINGS

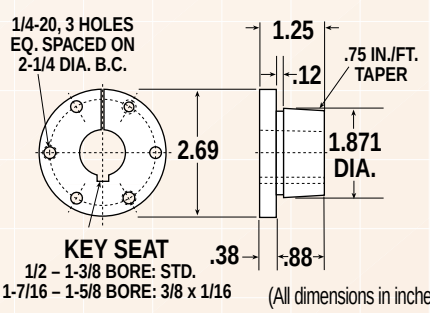
ASSY. NO.	TYPE	FITS DISC SIZES	BORE	KEY SIZE	WT. (LBS.)
0801-1122	SH	8.000 & 10.000	.500	.125 x .125	0.9
0801-1123	SH	6.313 & 8.000 & 10.000	.563	.125 x .125	0.9
0801-1124	SH	8.000 & 10.000	.625	.188 x .188	0.9
0801-1125	SH	6.313 & 8.000 & 10.000	.688	.188 x .188	0.8
0801-1126	SH	6.313 & 8.000 & 10.000	.750	.188 x .188	0.8
0801-1127	SH	6.313 & 8.000 & 10.000	.813	.188 x .188	0.8
0801-1128	SH	6.313 & 8.000 & 10.000	.875	.188 x .188	0.8
0801-1129	SH	6.313 & 8.000 & 10.000	.938	.250 x .250	0.8
0801-1131	SH	6.313 & 8.000 & 10.000	1.000	.250 x .250	0.7
0801-1132	SH	6.313 & 8.000 & 10.000	1.063	.250 x .250	0.7
0801-1133	SH	6.313 & 8.000 & 10.000	1.125	.250 x .250	0.7
0801-1134	SH	8.000 & 10.000	1.188	.250 x .250	0.6
0801-1135	SH	8.000 & 10.000	1.250	.250 x .250	0.6
0801-1136	SH	8.000 & 10.000	1.313	.313 x .313	0.5
0801-1137	SH	8.000 & 10.000	1.375	.313 x .313	0.5
0801-1138	SH	8.000 & 10.000	1.438	.375 x .250*	0.5
0801-1139	SH	8.000 & 10.000	1.500	.375 x .250*	0.4
0801-1140	SH	8.000 & 10.000	1.563	.375 x .250*	0.4
0801-1141	SH	8.000 & 10.000	1.625	.375 x .250*	0.4
0801-1142	SF	12.000 & 16.000	.500	.125 x .125	4.9
0801-1143	SF	12.000 & 16.000	.563	.125 x .125	4.9
0801-1144	SF	12.000 & 16.000	.625	.188 x .188	4.8
0801-1145	SF	12.000 & 16.000	.688	.188 x .188	4.8
0801-1146	SF	12.000 & 16.000	.750	.188 x .188	4.8
0801-1147	SF	12.000 & 16.000	.813	.188 x .188	4.7
0801-1148	SF	12.000 & 16.000	.875	.188 x .188	4.7
0801-1149	SF	12.000 & 16.000	.938	.250 x .250	4.6
0801-1150	SF	12.000 & 16.000	1.000	.250 x .250	4.6
0801-1151	SF	12.000 & 16.000	1.063	.250 x .250	4.5

ASSY. NO.	TYPE	FITS DISC SIZES	BORE	KEY SIZE	WT. (LBS.)
0801-1152	SF	12.000 & 16.000	1.125	.250 x .250	4.5
0801-1153	SF	12.000 & 16.000	1.188	.250 x .250	4.4
0801-1154	SF	12.000 & 16.000	1.250	.250 x .250	4.4
0801-1155	SF	12.000 & 16.000	1.313	.313 x .313	4.3
0801-1156	SF	12.000 & 16.000	1.375	.313 x .313	4.2
0801-1157	SF	12.000 & 16.000	1.438	.375 x .375	4.1
0801-1158	SF	12.000 & 16.000	1.500	.375 x .375	4.0
0801-1159	SF	12.000 & 16.000	1.563	.375 x .375	4.0
0801-1160	SF	12.000 & 16.000	1.625	.375 x .375	3.9
0801-1161	SF	12.000 & 16.000	1.688	.375 x .375	3.8
0801-1162	SF	12.000 & 16.000	1.750	.375 x .375	3.7
0801-1163	SF	12.000 & 16.000	1.875	.500 x .500	3.5
0801-1164	SF	12.000 & 16.000	1.938	.500 x .500	3.4
0801-1165	SF	12.000 & 16.000	2.000	500 x .500	3.3
0801-1166	SF	12.000 & 16.000	2.063	.500 x .500	3.2
0801-1167	SF	12.000 & 16.000	2.125	.500 x .500	3.1
0801-1168	SF	12.000 & 16.000	2.188	.500 x .500	3.0
0801-1169	SF	12.000 & 16.000	2.250	.500 x .500	2.9
0801-1170	SF	12.000 & 16.000	2.313	.500 x .625*	2.9
0801-1171	SF	12.000 & 16.000	2.375	.500 x .625*	2.8
0801-1172	SF	12.000 & 16.000	2.438	.500 x .625*	2.7
0801-1173	SF	12.000 & 16.000	2.500	.500 x .625*	2.6
0801-1174	SF	12.000 & 16.000	2.563	.375 x .625*	2.4
0801-1175	SF	12.000 & 16.000	2.625	.375 x .625*	2.3
0801-1176	SF	12.000 & 16.000	2.688	.375 x .625*	2.2
0801-1177	SF	12.000 & 16.000	2.750	.375 x .625*	2.0
0801-1178	SF	12.000 & 16.000	2.812	NONE	1.8
0801-1179	SF	12.000 & 16.000	2.937	NONE	1.5

*Non-standard keys are supplied along with hub and disc assemblies (Dimensions in inches)

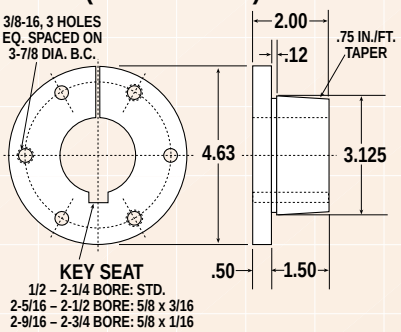
DIMENSIONAL DATA

FOR 6.313", 8.000" & 10.000" DIAMETER DISCS (SH STANDARD)



(All dimensions in inches)

FOR 10.000" THRU 16.000" DIAMETER DISCS (SF STANDARD)



BUSHING INSTALLATION TORQUE

When a wrench or length of pipe is used to increase leverage in tightening bushing screws, it is imperative to adhere to the wrench torque values given below.

When mounting the bushing, the tightening force on the screws is multiplied many times by the wedging action of the tapered surface. This action compresses the bushing for a snug fit on the shaft. The bushing screws should always be tightened alternately and progressively.

BUSHING	WRENCH TORQUE (IN.-LBS.)	WRENCH LENGTH (INCHES)	WRENCH PULL (POUNDS)
SH	108	4	27
SF	360	6	60

ONE-PIECE HUB AND DISC

Q.D. HUBS
(MUST BE USED WITH Q.D. BUSHINGS, SEE PREVIOUS PAGE)

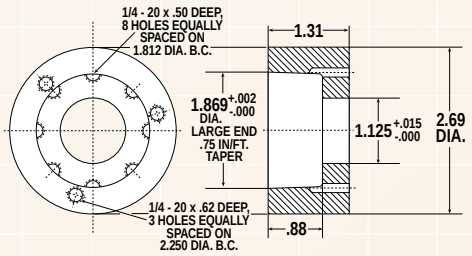
Q.D. HUBS

ASSEMBLY NO.	FITS DISC SIZES	WT. (LBS.)
0801-1119	6.313	1.23
0802-1137	8.000 & 10.000	1.56
0804-1141	12.000 & 16.000	4.70

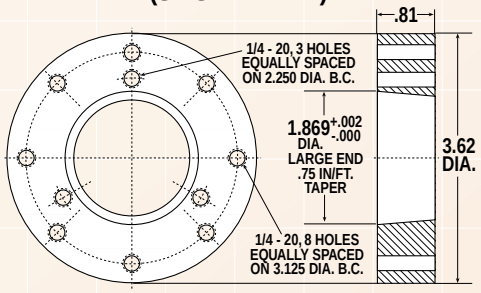
(Dimensions in inches)

DIMENSIONAL DATA

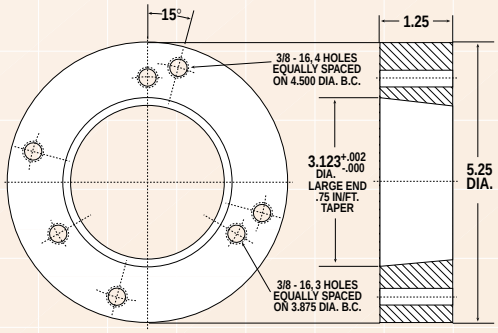
FOR 6.313" DIAMETER DISCS (SH STANDARD)



FOR 8.000" & 10.000" DIAMETER DISCS (SH STANDARD)



FOR 10.000" & 16.000" DIAMETER DISCS (SF STANDARD)



(All dimensions in inches)

ONE-PIECE HUB & DISC
(For use with Pneumatic, Hydraulic, Mechanical or Spring Applied Caliper Disc Brakes)

Weight: **1.37 lbs.** (.62 kg.)

DISC SIZE: 6"

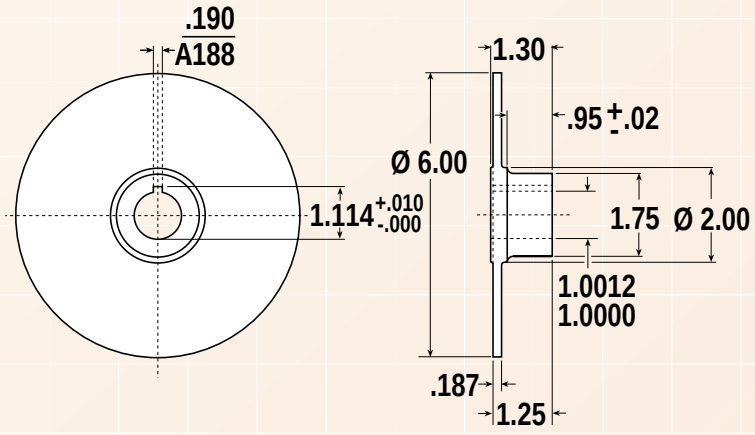
ASSEMBLY NO.	BORE SIZE	KEY SIZE	DIM "A"	WT. (LBS.)
0801-1210	1.000	.188 x .188	.190 / .188	1.79
0801-1211	1.000	.25 x .125	.253 / .251	1.82

DISC SIZE: 7.875"

ASSEMBLY NO.	BORE SIZE	KEY SIZE	DIM "A"	WT. (LBS.)
0801-1221	1.000	.188 x .188		2.85
0801-1221	1.000	.250 x .250		2.85

(Dimensions in inches)

DIMENSIONAL DATA

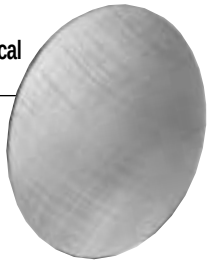


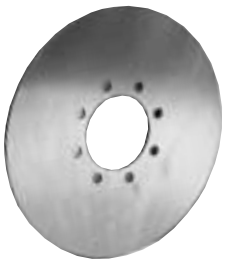
(All dimensions in inches)

OPTIONAL DISCS

BLANK DISC
(For use with Pneumatic, Hydraulic, Mechanical or Spring Applied Caliper Disc Brakes)

6.313 Diameter Disc Weight: **1.31 lbs.** (0.59 kg.)
8.000 Diameter Disc Weight: **2.20 lbs.** (1.00 kg.)
10.000 Diameter Disc Weight: **3.35 lbs.** (1.52 kg.)
12.000 Diameter Disc Weight: **4.78 lbs.** (2.17 kg.)
16.000 Diameter Disc Weight: **13.72 lbs.** (6.22 kg.)





DISC WITH BOLT CIRCLES AND PILOT HOLE
(For use with Pneumatic, Hydraulic, Mechanical or Spring Applied Caliper Disc Brakes)

6.313 Diameter Disc Weight: **1.24 lbs.** (0.56 kg.)
8.000 Diameter Disc Weight: **1.92 lbs.** (0.87 kg.)
10.000 Diameter Disc Weight: **3.19 lbs.** (1.47 kg.)
12.000 Diameter Disc Weight: **4.42 lbs.** (2.01 kg.)
16.000 Diameter Disc Weight: **13.15 lbs.** (5.97 kg.)
16.000 Diameter Disc (.500 thk.) Wt: **26.33 lbs.** (11.94 kg.)

BLANK DISCS

ASSEMBLY NUMBER	DISC DIAMETER	DISC THICKNESS
0801-1200	6.313	.156
0802-1200	8.000	.156
0803-1200	10.000	.156
0804-1200	12.000	.156
0805-1200	16.000	.250

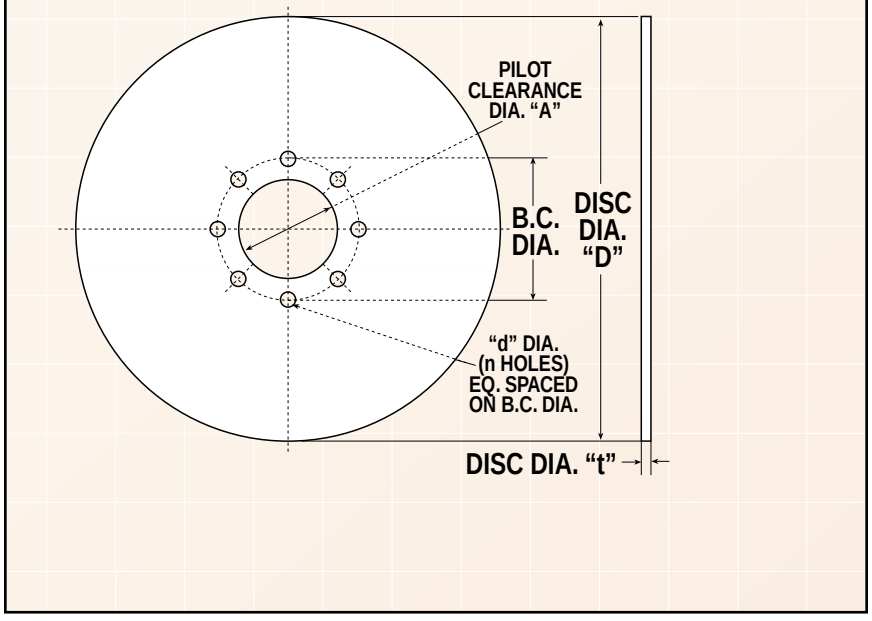
(All dimensions in inches)

DISCS WITH BOLT CIRCLES AND PILOT HOLE

ASSEMBLY NUMBER	DISC DIA. "D"	DISC THK "t"	B.C. DIAMETER	NO. OF BOLT HOLES	HOLE DIA. "d"	PILOT CLEAR. DIAMETER "A"
0801-1206	6.313	.156	1.812	8	.332	1.376
0802-1208	8.000	.156	3.125	8	.343	2.375
0803-1210	10.000	.156	3.125	8	.343	2.375
0804-1212	12.000	.156	4.500	4	.406	3.750
0805-1216	16.000	.250	4.500	4	.406	3.750
0805-1220	16.000	.500	4.500	4	.406	3.750

(All dimensions in inches)

DIMENSIONAL DATA



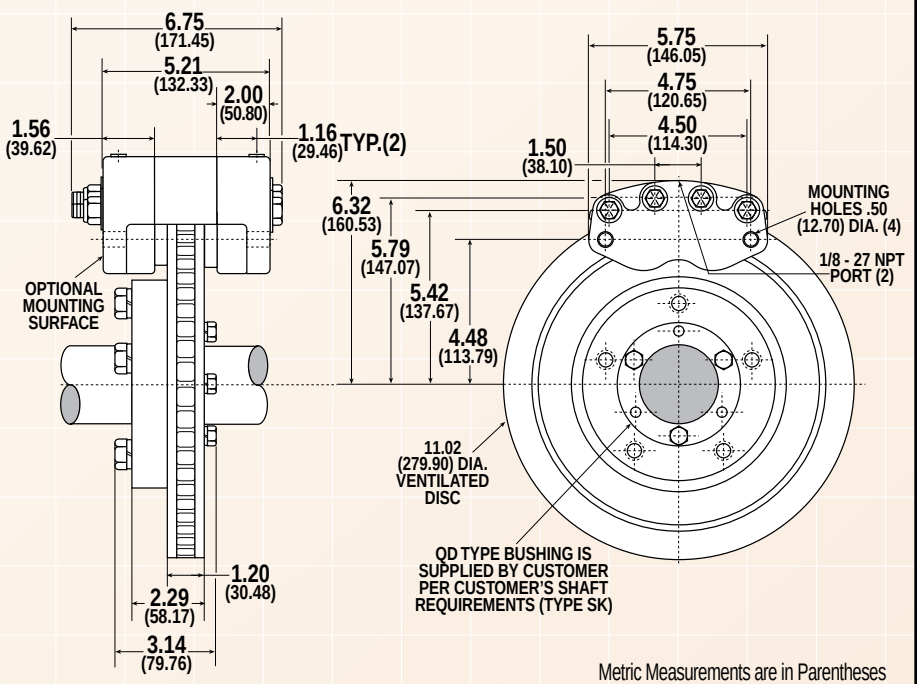
PLEASE CONSULT THE FACTORY FOR YOUR SPECIAL DISC REQUEST

TENSION CONTROL COMBINATIONS

VENTILATED DISC
(For use with Pneumatic or Hydraulic Caliper Disc Brakes)

Weight: **15.41 lbs.** (6.99 kg.)

DIMENSIONAL DATA



Metric Measurements are in Parentheses

ASSEMBLY NUMBER	DESCRIPTION	NO.
0803-0202	Ventilated Disc Assembly (includes pilot plates and fasteners)	
Ventilated Disc Assembly Components:		
0803-1213	Pilot Plate	1
0803-1214	Ventilated Disc	1
1039-2044	HHCS 1/2 – 13 x 1-1/2	5
1042-1036	Lockwashers	5

MODEL NUMBER	DESCRIPTION	ASSEMBLY NUMBER
P220DX	Pneumatic 220 Caliper for Ventilated Disc	0735-0704
H220DXC	Hydraulic 220 Caliper for Ventilated Disc	0735-0312

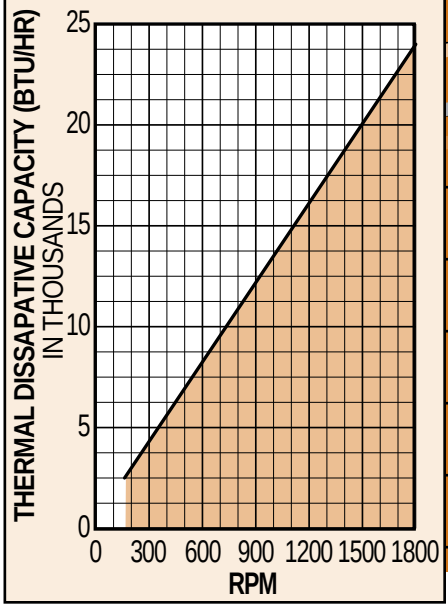
SEE PAGE 8 FOR P10 & H10 INFORMATION

SEE PAGE 10 FOR P20 & H20 INFORMATION

SEE PAGE 12 FOR P220 & H220 INFORMATION

THERMAL DISSIPATIVE CAPACITY OF VENTILATED DISC

(BASED ON A MAXIMUM DISC TEMPERATURE OF 375°F AND AN AMBIENT TEMPERATURE OF 75°F)



PERFORMANCE DATA

CALIPER TYPE	VENTILATED DISC BRAKING RADIUS	TANGENTIAL FORCE
P10 or H10	4.885	.70 lbs.
P20 or H20	4.635	1.44 lbs.
P220 or H220	4.603	2.88 lbs.

(Dimensions in inches)

TORQUE EQUATION:
TORQUE (IN. LBS.) **= TANGENTIAL FORCE** (LBS.) **x PSI x BRAKING RADIUS** (IN.)

INTENSIFIER

FOR USE WITH NON-RETRACTABLE TOL-O-MATIC CALIPERS (UP TO 220 SERIES)

Ideal for operating caliper disc brakes, the intensifier's higher output pressure makes it possible to obtain the brakes high output handling capacities without high pressure hydraulic systems. By operating at these higher pressures, the number of calipers can be reduced.

The intensifier is small, simple and inexpensive, yet operates at a 10:1 ratio of output pressure (hydraulic fluid) to inlet pressure (pneumatic). The displacement is 0.44 cubic inches.

The low pressure cylinder is made from hard-coated aluminum tubing for high strength and exceptionally low friction characteristics.

The low pressure piston seal is of conventional U-cup design for reliable operation.

The high pressure cylinder is made of aluminum. The high pressure piston uses an O-Ring of Buna-N, EPR, or VITON to be compatible with most fluids, to reduce friction and increase life to millions of cycles.

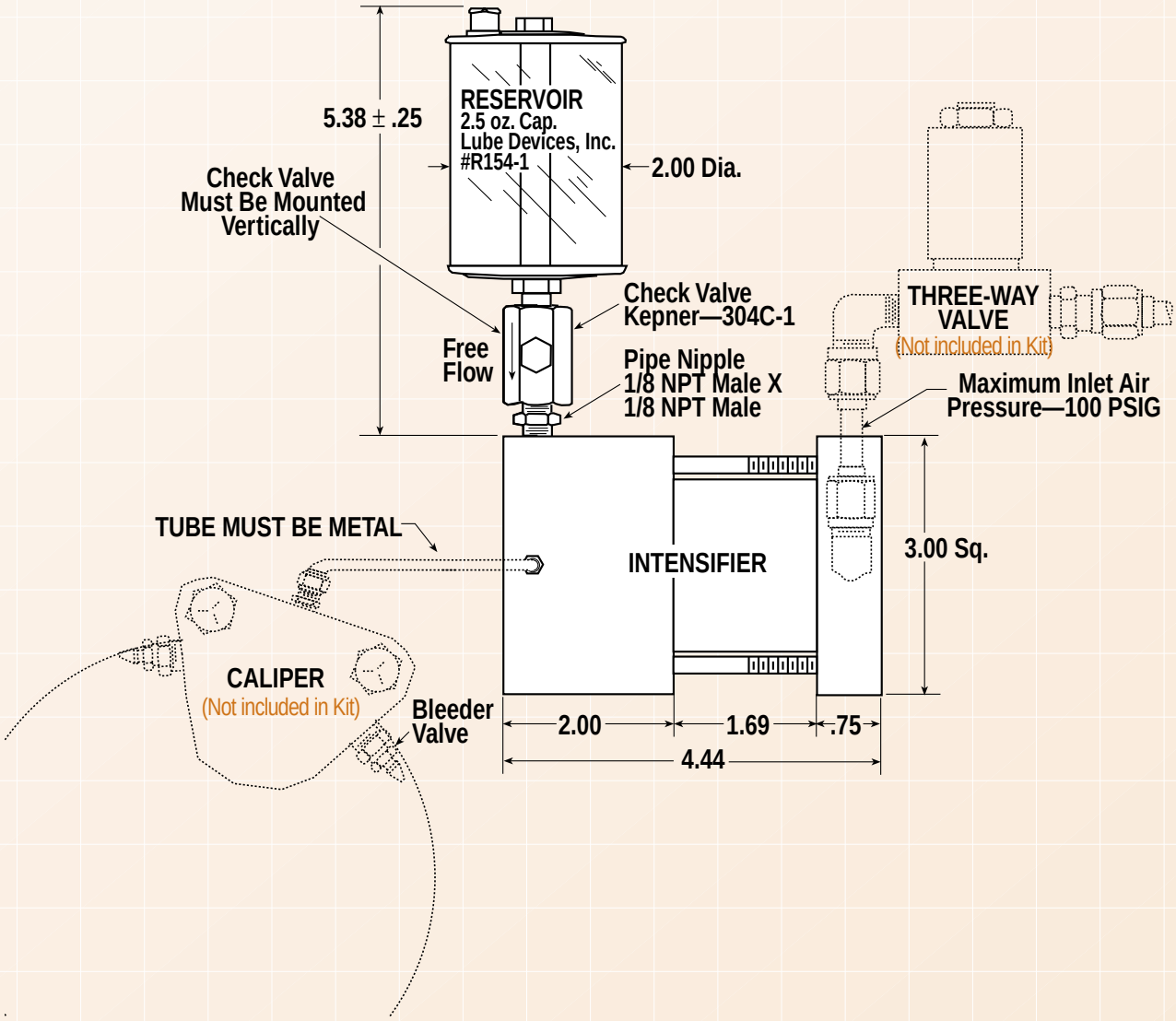
When air pressure is reduced or removed, a spring return in the booster allows the brake puck in the cylinder brakes to retract, eliminating the need for retractors in the brakes. The spring chamber is vented to eliminate back pressure and return air is filtered to remove entrapment of dirt or other foreign particles. A threaded port is provided for filling or connecting a pressure gauge. Bleeding and filling are external.

NOTE: Not Recommended for Spring Applied Brakes.

*KIT NO.	INTENSIFIER NO.	SEAL TYPE
1770-0002	1770-0000	Buna-N
1770-0003	1770-0001	EPR
1770-0004	1770-0005	Viton

* Kit includes Reservoir, Check Valve and Pipe Nipple

Dimensional Data



(All dimensions in inches)

SELECTION

Disc brakes are widely used in three areas: Stopping, retarding (tensioning) and holding. In any application it is necessary to determine how much torque is required, how much heat will be generated (thus to be dissipated) and the service life anticipated for the pucks or pads. Once these variables are determined, then find the combination of disc and caliper that will most economically develop these capacities.

1. DETERMINE THE KIND OF BRAKING TO BE DONE

- **Industrial**
- **Tensioning** (Constant Slip)
- **Vehicular**

2. DETERMINE AVAILABLE PRESSURE (LEVER FORCE) AVAILABLE

All torque calculations are based on the pressure (lever force) available for your application. Maximum pneumatic pressure for Tol-O-Matic caliper disc brakes is 100 PSI. Maximum hydraulic pressure varies by model between 1,000 PSI and 2,000 PSI. Maximum lever force for mechanical brakes varies with model and lever length. Refer to individual models for pressure (lever force) ratings.

3. CALCULATE THE TORQUE REQUIRED

In braking applications torque is the product of tangential force multiplied by the braking radius. Braking radius is the distance between the centerline of the braking disc and the center line of the braking piston(s). Tangential force is equal to puck area multiplied by the operating pressure, multiplied by the coefficient of friction of the puck(s). Torque varies between dynamic and static (parking) applications, because the coefficient of friction is different. In a dynamic application, there is a marked temperature increase in the puck, which raises the coefficient of friction. Because a static (parking) application does not provide such a temperature increase, it has a coefficient of friction less than that in a dynamic application. For convenience, we express the torque formulae separately for industrial applications, vehicular applications and tensioning applications. See the formulae section (pages 56-58) to determine the torque needed for your application.

4. CALCULATE HEAT DISSIPATION REQUIRED

The energy inputs will either be expressed as BTU input per hour (particularly for tensioning applications) or BTU input per stop. The formulae for reaching these results are different for industrial, tensioning and vehicular braking. See the formulae section (pages 56-58) to determine the heat generated for your application.

5. DETERMINE MAXIMUM DISC DIAMETER

There are two criteria to determine disc diameter:

- **Envelope Size** – how much room is allowed in the design for disc and caliper. This affects the braking radius and thus the torque caliper and disc can develop.
- **Heat Dissipation Required** – Cycle rate and torque are needed to determine the heat an application will produce per hour, and thus the heat that the disc will need to dissipate. Discs will normally dissipate heat at the rate of 3 BTU per hour, per square foot of disc space. This assumes a disc temperature of at least 80° F above ambient temperature. Discs rotating at extreme speeds may dissipate heat at rates as high as 5 BTU per hour, per square foot of disc space. If required torque, cycle rate and small envelope size combines to create heat dissipation requirements that are higher than a standard disc will dissipate, your choices are: 1.) A thicker disc that will act as a heat sink. 2.) Use of multiple discs/caliper brakes for the application. 3.) Use of a ventilated disc to dissipate the generated heat.

6. DETERMINE THE TYPE OF BRAKE POWER

Choose a brake type based on the power source available (pneumatic, hydraulic, etc.) and whether dynamic or static braking is required for the application.

Tol-O-Matic offers brakes powered in 5 different ways:

- **Pneumatic**
  Pneumatic actuation is used in industrial and tensioning applications because pneumatic service is easily controllable and readily available in most industrial settings.
- **Hydraulic**
  Hydraulic actuated brakes are normally used in vehicular applications or where higher torque output is needed. They may be operated with a variety of fluids including the standard mineral based hydraulic oils, automotive brake fluids and non-flammable phosphate ester fluids (each requires different seals).
- **Hydraulic/Mechanical Combos**
  Combination brakes give the added flexibility to apply mechanical braking as well as hydraulic braking from one caliper.
- **Mechanical**
  Mechanically actuated brakes are

often used as parking or emergency brakes for vehicles or in situations where pneumatic or hydraulic pressure is not available. Mechanical caliper disc brakes operate when the cam lever is rotated. This pushes the actuating pins against the piston's backing plate thus forcing the puck into the disc.

- **Spring Applied**
  These brakes require pressure (normally hydraulic) to release it from the disc. Braking force is provided by a stack (or stacks) of Belleville spring washers. The concave washers are capable of storing enormous force. When the brake is pressurized the force moves a piston(s) to compress the spring washer stack(s), thus releasing the disc. Because the force applied by the spring stack is reduced as the spring washers expand, spring applied brakes are used mainly for applications that require occasional holding or stopping. They should not be used in tension-constant slip applications or cyclic stop industrial applications.

7. CHOOSE TOL-O-MATIC BRAKE SIZE

Tol-O-Matic brakes are grouped by size. These sizes relate to the puck size for each brake. Because maximum pressure (lever force) generated differs between the type of brake (pneumatic, hydraulic, etc.) the maximum torque available differs. The graphs on pages 6 & 7 will be helpful in determining the approximate brake size that will work for your application. Go to each individual brake section to find the equations, and performance graphs for that brake.

For easy reference, torque output equations that apply to each series of brake are shown at the bottom of the page. (See sample on this page.) Each equation features [1.] a constant value, multiplied by [2.] braking radius multiplied by [3.] pressure (lever force). The constant value [1.] is a product of friction material area multiplied by the coefficient of friction. The braking radius [2.] for common disc sizes appears on the page with the dimensional drawing. The third variable of the formula, pressure in PSI (lever force) [3.] you will need to determine.

Performance data graphs represent these figures for common disc sizes in a convenient, visual way to quickly see how well each brake size will fit your application.

8. CHOOSE SINGLE ACTING OR DOUBLE ACTING BRAKE

- **Double acting brakes** feature two "live sides". Each side has a piston that actuates the puck, forcing it against the disc. Hydraulic and pneumatic brakes are available in double acting as well as single acting models.
- **Single acting brakes** have a piston that actuates the puck on the "live side", forcing it against the disc. The "dead side" has a non-actuated puck attached to the housing. Since only one side applies force to the disc, a means to allow movement to the disc or caliper must be provided. Spring applied, mechanical and hydraulic/mechanical brakes are generally single acting.

9. DETERMINE MOUNT FOR BRAKE AND DISC

- **For Double Acting Brakes**

  Fixed Caliper Mount/Fixed Disc – A double acting caliper can be fixed mounted since both pucks have pistons to move them. The disc is also fixed mounted.

- **For Single Acting Brakes**

  Floating Caliper Mount/Fixed Disc – A floating mounting bracket permits the caliper to slightly shift position when braking force is applied. The disc is rigidly mounted to the shaft.

  Fixed Caliper Mount/Floating Disc – The caliper is rigidly mounted and a floating disc mount attaches the disc to the shaft. The two forms of floating disc are: 1.) Disc and hub are mounted on a spline on the shaft.
  2.) Hub is rigidly keyed to the shaft and the disc is spring loaded to the hub, providing floating ability.

10 CONSIDER OPTIONS

Hydraulic brakes may operate with a variety of fluids. Tol-O-Matic brakes use Buna-N seals most commonly. These seals are suited for use with standard mineral based hydraulic oil. EPR seals, for use with automotive brake fluids, are available for most Tol-O-Matic brakes. Some models also give you the choice of VITON® seals, these seals are suited for use with nonflammable phosphate ester fluids.

Some Tol-O-Matic caliper disc brakes are available with retractable pistons. A brake with this feature has a small

DISC SIZING EQUATIONS:

DYNAMIC TORQUE (IN. LBS.) = **0.70 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
STATIC (PARKING) TORQUE (IN. LBS.) = **0.40 x BRAKING RADIUS** (IN.) x **PRESSURE** (PSI)
BRAKING RADIUS (IN.) = **[DIAMETER** (IN.) ÷ **2] - 0.675**

compression spring within the piston which causes it to retract from the disc when pressure is released. Retractable brakes are used in applications that require a brake with absolutely no residual drag from the pucks on the disc.

Almost all Tol-O-Matic calipers can be modified to fit a variety of disc thicknesses.

NOTE: Tol-O-Matic retractable brakes should not be used in vehicular applications with a master cylinder or with an intensifier.

11 DETERMINE LIFE EXPECTANCY OF PUCKS

Another consideration in selecting a brake is the life expectancy of the pucks. This factor is particularly important if the brake is to be placed in a hard to service location, faces long intervals between servicing, or is to be used in a tensioning-constant slip application.

Basically, puck life expectancy is a factor of the amount of heat transmitted through the pucks, which may be measured in total number of stops or hours of life. Both measurements may be reduced to horsepower hours of heat that the puck must endure. The Puck Material Life chart on page 59 shows the life expectancy of the puck material, plotted on a temperature curve.

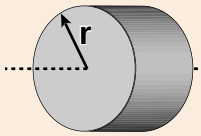
Tol-O-Matic offers pucks of two different materials. The standard puck is made of a non-asbestos organic material and has a peak performance at an operating temperature of 300°F. Sintered bronze pucks offer peak performance in temperatures from 400° to 500°F. See the formulae section to determine the puck life expectancy for your application.

RADIUS OF GYRATION FORMULAE

RADIUS OF GYRATION FOR GEOMETRIC FORMS

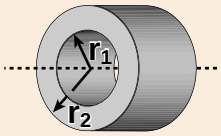
Radius of gyration is the distance from the center of rotation at which the entire rotating mass could be concentrated and still be equivalent to the actual distributed mass.

Solid Cylinder About its Own Axis



$$k^2 = \frac{r^2}{2}$$

Hollow Cylinder About its Own Axis



$$k^2 = \frac{r_1^2 + r_2^2}{2}$$

$$WK_e^2 = WK_S^2 + WK_1^2\left[\frac{N_1}{N_S}\right]^2 + \ldots \quad [2]$$

Where:

WK_e^2 = Equivalent WK^2 of the multiple shaft system

WK_S^2 = WK^2 of the shaft assembly on which the brake disc is mounted

WK_1^2 = WK^2 of the second shaft assembly

N_S = rpm of the shaft on which the brake disc is mounted

N_1 = rpm of the second shaft

The formula for the torque required to bring the multiple shaft system then becomes:

$$T = \frac{WK_e^2 N_s}{308t}, \text{ft. lbs.} \quad [3]$$

PUCK LIFE FORMULAE

CALCULATING SERVICE LIFE OF PUCK(S) / PAD(S)

The puck life per cubic inch shown by the curve in **Figure 1** (page 59) is based on horsepower hours.

To find the life in hours of puck(s):
(Primarily for tensioning-constant slip applications)

Ft. lbs./hr. = (BTU/hr. generated)(778) [17]

Refer to Formula [12]

$$\text{HP hrs./hr.} = \frac{\text{ft. lbs./hr.}}{1{,}980{,}000} \quad [18]$$

Refer to **Table 2** (page 59) to determine cubic inches of wearable material of various caliper sizes.

$$\text{Life in Hours} = \frac{(\text{number of calipers})(\text{cubic in. } \textit{Table 2})(\text{HP hrs./in}^3\ \textit{Figure 1})}{\text{HP hrs. / hr.}} \quad [19]$$

To find the life in stops of puck(s):
When a rotating mass is brought to rest, the kinetic energy removed can be calculated by the following formulae:

$$E = \frac{\pi TNt}{60}, \text{ft. lbs.} \quad [20]$$

or

$$E = \frac{WK^2N^2}{5872}, \text{ft. lbs.} \quad [21]$$

$$\text{HP hrs. / Stop} = \frac{E}{1{,}980{,}000} \quad [22]$$

$$\text{Life in Stops} = \frac{(\text{number of calipers})(\text{cubic in. } \textit{Table 2})(\text{HP hrs./in}^3\ \textit{Figure 1})}{\text{HP hrs. / Stop}} \quad [23]$$

Puck life calculations are **estimates** and do not account for foreign contaminants that may abrade the puck or disc and reduce wear life. When the life must be known accurately, field tests should be conducted under actual or simulated service conditions.

INDUSTRIAL APPLICATIONS FORMULAE

CALCULATION OF TORQUE REQUIRED

Many industrial applications are concerned with rotary motions that must be brought to rest in a specified time the the torque necessary to satisfy the time requirement must be determined. A convenient formula used to calculate the torque requirement of a single shaft system is:

$$T = \frac{WK^2N}{308t} \quad [1]$$

Where:

T	=	Torque, ft. lbs.
W	=	Weight of rotating member, lbs.
K	=	Radius of gyration of rotating member, ft.
N	=	rpm
t	=	Stopping time required, seconds

Industrial applications often consist of more than one rotating mass system, i.e., two or more shafts with gears, sheaves, drums, etc. interconnected by operating at different speeds. In such systems the rotating elements must be reduced to a common base. Since the energy of a rotating mass system is a function of the square of its rpm, the equivalent WK^2 of each rotating member relative to the shaft on which the brake disc is mounted can be calculated using the formulae in the Radius of Gyration Section:

CALCULATION OF HEAT GENERATION AND DISSIPATION REQUIRED

Heat is always developed in the disc and pucks of a brake when a rotating or moving body comes to rest. The kinetic energy in **BTUs per stop** may be expressed in the following formulae:

$$\text{BTU/Stop} = \frac{WK^2N^2}{4,570,000} \quad \text{for a single shaft system} \quad [4]$$

$$\text{BTU/Stop} = \frac{WK_e^2N_s^2}{4,570,000} \quad \text{for a multiple shaft system} \quad [5]$$

or

$$\text{BTU/Stop} = \frac{\pi TN_St}{46,680} \quad [6]$$

Where:

The weight and specific heat of the puck material is very small compared to the disc and can be ignored.

Since the amount of heat dissipated per hour by the disc at a given temperature above ambient is considered as being directly proportional to the exposed area of the disc, disc thickness should be kept small.

Standard thicknesses are 5/32" and 1/4".

For the best service life the disc temperature should not exceed 300°F.

Higher disc temperatures can be allowed, however, there will be a reduction in the life of the friction material. See **Figure 1** (page 59).

In many applications there are no restrictions to disc diameter (within reason). Convert your calculated BTU/Stop to BTU/hr. with the following formula:

$$\text{BTU/hr.} = (\text{BTU/stop})(\text{stops/hr.}) \quad [7]$$

Then solving for the number of square feet of exposed disc area to dissipate the heat generated:

$$\text{Sq. Ft. Disc Area} = \frac{\text{BTU/hr}}{660} \quad [8]$$

Refer to **Table 1** (page 59)for selection of proper disc diameter.

NOTE: The above formula **[8]** is based on a 220°F temperature rise and and 80°F ambient temperature. If a higher disc temperature is desired refer to formulae **[14], [15], [16]** in the Tensioning-Constant Slip Section.

If there is a restriction in the disc diameter(s) and there is sufficient time between stops or multiple of stops for heat dissipation then we can size the disc to act as a heat sink.

$$\text{Wd} = \frac{\text{BTU/hr.}}{(220)(\text{Sp})}, \text{lbs.} \quad [9]$$

Where:

Wd	=	Weight of disc, lbs.
Sp	=	Specific heat of disc may be taken as .12 for steel

Refer to **Table 1** (page 59)for selection. If your requirement falls outside of the standard(s) you may calculate the required thickness based on the maximum allowable diameter:

$$\text{Disc Thickness} = \frac{\text{Wd}}{(\text{A})(.28)}, \text{inches} \quad [10]$$

Where:

A	=	Area (sq. in.) of maximum allowable diameter.

If it is found the disc thickness is unrealistic from an economic or space limitation standpoint, multiple discs will have to be provided or force ventilation must be considered.

TENSIONING / CONSTANT SLIP APPLICATIONS FORMULAE

CALCULATION OF TORQUE REQUIRED

Applications involving tensioning or constant drag require a different set of formulae since they require a finite time to stop. Tensioning devices are designed to operate over an infinite period of time. The basic formula for calculating torque for web tensioning is:

T= (L) (F) (R), inch lbs. **[11]**

Where:

L = web width, inches
F = tension, lbs./inch of web width
R = maximum roll radius, inches

The basic formula for calculating BTUs generated per hour is:

$$\text{BTU/hr.} = \frac{(T)(rpm)}{24.75} \quad [12]$$

CALCULATION OF HEAT GENERATION AND DISSIPATION REQUIRED

In tensioning applications the amount of heat generated must be dissipated as well. Often **fpm** web velocity is given, this can be converted to **rpm** by:

$$\text{rpm} = \frac{\text{fpm}}{C} \quad [13]$$

Where:

C = Circumference of roll at maximum diameter, ft.

Therefore to solve for the sq. ft. of surface area of the disc(s):

$$\text{Sq. Ft. Disc Area} = \frac{\text{BTU/hr}}{660} \quad [14]$$

The constant of 660 is based on a maximum disc temperature of 300°F.

To develop a constant for higher disc temperature:

Constant = (3) (temperature rise above ambient) **[15]**

The actual disc temperature becomes:

Temperature Rise + Ambient, °F **[16]**

Refer to **Table 1.** Select disc or discs equal to (or greater than) calculated sq. ft. Remember the higher the disc temperature the lower the life of the friction material. See **Figure 1.**

Unit Conversion Table

Reference: Handbook of Tables for Applied Engineering Science

Present Units:	Convert To:	Multiply By:
Pounds	kilograms	0.45359
Pound-inches	Newton-meters	0.11299
Inches	millimeters	25.4
PSI	pascals	6.895×10^3
BTU	joules	1,054.8
BTU/hr.	watts	0.2931

Performance Data

TABLE 1

EXPOSED AREAS, WEIGHTS AND MAX. BTU/HR. OF COMMONLY USED DISCS

DISC DIAMETER	EXPOSED AREA SQ. IN.	SQ. FT.	WEIGHT LBS.	MAXIMUM BTU / HR.
6.313	62.58	.43	1.37	283.8
8.000	100.53	.70	3.52	462.0
10.000	157.08	1.09	5.46	719.4
12.000	226.20	1.57	7.91	1036.0
16.000	402.12	2.79	14.06	1841.4

TABLE 2

CUBIC INCHES OF WEARABLE FRICTION MATERIAL OF VARIOUS CALIPERS

CALIPER	CUBIC INCHES
Series 10	.46
Series 20	.83
Series 220 Aluminum	1.66
Series H-220 Cast Iron	2.35
Series FS-220 Cast Iron w/JK options	2.35
Series FS-220 Aluminum	1.66
Series H-440	4.15
Series FS-440	.83
Series 441	3.71
Series FS-595	.812
Series 960	8.0
MB3	6.06

TABLE 3

CAM TRAVEL DATA

ME-10 and ME-20 Calipers

1. 15° maximum travel when pucks are new and with 1/32" gap each side of disc.
2. Periodic tightening of lock nut will reduce travel of lever and will allow 1/4" wear on each puck.
3. 90° maximum travel after 3/16" wear on each puck without intermediate tightening of lock nut.

ME-220 Calipers

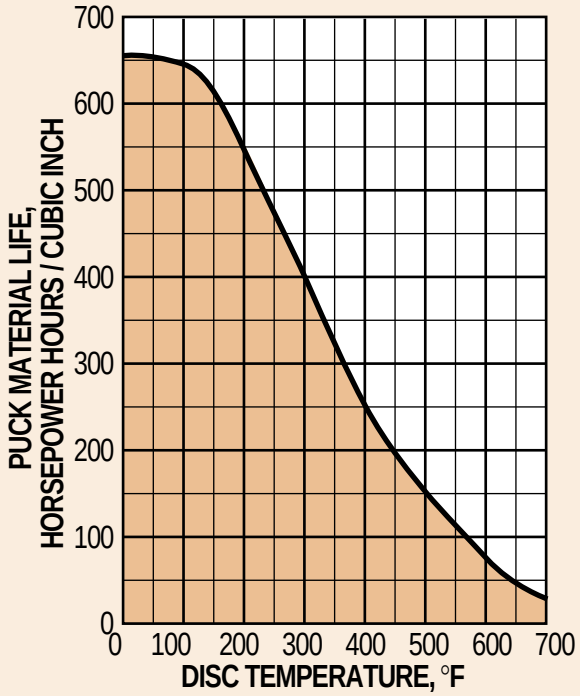
1. Gap between puck faces and disc when new = .048" total.
2. Angular movement required to actuate brake when new = 7° 30".
3. Maximum axial movement without intermediate adjustment = .387".
4. Wear allowed before adjustment .104" each side.

MB3 Calipers

1. 0° travel with .500" disc.
2. 90° maximum travel after .125" wear on each side of pad without intermediate tightening of the lock nut.

FIGURE 1

PUCK MATERIAL LIFE (NON-ASBESTOS ORGANIC MATERIAL)



ORDERING

MODEL NUMBER	DISC THK.	OPTIONS / DESCRIPTION	ASSEMBLY NUMBER
PNEUMATIC #10 SERIES (SEE PAGE 8)			
P10SA	5/32"	Single Acting	0705-0000
P10SB	1/4"	Single Acting	0703-0000
P10SAF	5/32"	Single Acting, Floating Bracket	0705-0001
P10SBF	1/4"	Single Acting, Floating Bracket	0703-0001
P10DA	5/32"	Double Acting	0701-0000
P10DAR	5/32"	Double Acting, Retractable Pistons	0708-0000
P10DB	1/4"	Double Acting	0702-0000
P10DBR	1/4"	Double Acting, Retractable Pistons	0709-0000
P10DER	1/2"	Double Acting, Retractable Pistons	0709-0003
P10DL	3/8"	Double Acting	0702-0002
P10DLR	3/8"	Double Acting, Retractable Pistons	0709-0002
HYDRAULIC #10 SERIES (SEE PAGE 8)			
H10SAFC	5/32"	Single Acting, Floating Bracket	0705-0011
H10SAFCG	5/32"	Single Acting, FtgBrkt,EPR Seals	0705-0009
H10SAC	5/32"	Single Acting	0705-0010
H10SACG	5/32"	Single Acting, EPR Seals	0705-0008
H10SBC	1/4"	Single Acting	0703-0010
H10DAC	5/32"	Double Acting	0701-0010
H10DACG	5/32"	Double Acting, EPR Seals	0701-0011
H10DBC	1/4"	Double Acting	0702-0010
H10DBCG	1/4"	Double Acting, EPR Seals	0702-0011
H10DARC	5/32"	Double Acting, Retractable Pistons	0708-0010
H10DARCG	5/32"	Double Acting, Retr Pist, EPR Seals	0708-0011
H10DBRC	1/4"	Double Acting, Retractable Pistons	0709-0010
H10DBRCG	1/4"	Double Acting, Retr Pist, EPR Seals	0709-0011
PNEUMATIC #20 SERIES (SEE PAGE 10)			
P20SA	5/32"	Single Acting	0724-0000
P20SB	1/4"	Single Acting	0722-0000
P20SL	3/8"	Single Acting	0722-0002
P20SAF	5/32"	Single Acting, Floating Bracket	0724-0001
P20SBF	1/4"	Single Acting, Floating Bracket	0722-0001
P20DA	5/32"	Double Acting	0720-0000
P20DB	1/4"	Double Acting	0721-0000
P20DL	3/8"	Double Acting	0720-0013
P20DE	1/2"	Double Acting	0725-0000
P20DAR	5/32"	Double Acting, Retractable Pistons	0728-0000
P20DBR	1/4"	Double Acting, Retractable Pistons	0729-0000
P20DLR	3/8"	Double Acting, Retractable Pistons	0729-0001
P20DER	1/2"	Double Acting, Retractable Pistons	0719-0000
HYDRAULIC #20 SERIES (SEE PAGE 10)			
H20SAC	5/32"	Single Acting	0724-0010
H20SACG	5/32"	Single Acting, EPR Seals	0724-0012
H20SBC	1/4"	Single Acting	0722-0010
H20SBCG	1/4"	Single Acting, EPR Seals	0722-0013
H20SAFC	5/32"	Sng Act, Floating Bracket, Bldr Ftg	0724-0011
H20SAFCG	5/32"	Sng Act, Fltg Brkt, Bldr Ftg, EPR Sls	0724-0013
H20SBFC	1/4"	Sng Act, Floating Bracket, Bldr Ftg	0722-0011
H20SBFCG	1/4"	Sng Act, Fltg Brkt, Bldr Ftg, EPR Sls	0722-0014
H20SLC	3/8"	Single Acting	0724-0014
H20DAC	5/32"	Double Acting	0720-0010
H20DACG	5/32"	Double Acting, EPR Seals	0720-0011
H20DBC	1/4"	Double Acting	0721-0010
H20DBCG	1/4"	Double Acting, EPR Seals	0721-0011
H20DEC	1/2"	Double Acting	0725-0010
H20DECG	1/2"	Double Acting, EPR Seals	0725-0011
H20DARC	5/32"	Double Acting, Retractable Pistons	0728-0010
H20DARCG	5/32"	Double Acting, Retr Pist, EPR Seals	0728-0011
H20DBRC	1/4"	Double Acting, Retractable Pistons	0729-0010
H20DBRCG	1/4"	Double Acting, Retr Pist, EPR Seals	0729-0011
H20DERC	1/2"	Double Acting, Retractable Pistons	0719-0010
H20DERCG	1/2"	Double Acting, Retr Pist, EPR Seals	0719-0011
H20DLRC	3/8"	Double Acting, Retractable Pistons	0729-0008
PNEUMATIC #220 SERIES (SEE PAGE 12)			
P220SA	5/32"	Single Acting	0733-0000
P220SB	1/4"	Single Acting	0733-0100
P220SE	1/2"	Single Acting	0733-0200
P220SAF	5/32"	Single Acting, Floating Bracket	0733-0020
P220SBF	1/4"	Single Acting, Floating Bracket	0733-0120
P220SEF	1/2"	Single Acting, Floating Bracket	0733-0220
P220DA	5/32"	Double Acting	0735-0100
P220DB	1/4"	Double Acting	0735-0200
P220DE	1/2"	Double Acting	0735-0300

A. . . 5/32" Thick Disc
B. . . 1/4" Thick Disc
C. . . With Bleeder Fitting
D. . . Double Acting
E. . . 1/2" Thick Disc
F. . . Floating Bracket Mount
FS. . . Spring Applied
G. . . EPR Seals
H. . . Hydraulic Brake
I. . . Iron
J. . . Retractable Piston
K. . . Manual Compensator

MODEL NUMBER	DISC THK.	OPTIONS / DESCRIPTION	ASSEMBLY NUMBER
P220DAR	5/32"	Double Acting, Retractable Pistons	0736-0110
P220DBR	1/4"	Double Acting, Retractable Pistons	0736-0210
P220DER	1/2"	Double Acting, Retractable Pistons	0736-0310
P220DX	1.20"	Caliper for Ventilated Disc	0735-0704

HYDRAULIC #220 SERIES (SEE PAGE 12)

H220SAC	5/32"	Single Acting	0733-0001
H220SACG	5/32"	Single Acting, EPR Seals	0733-0006
H220SBC	1/4"	Single Acting	0733-0101
H220SBCG	1/4"	Single Acting, EPR Seals	0733-0102
H220SEC	1/2"	Single Acting	0733-0201
H220SECG	1/2"	Single Acting, EPR Seals	0733-0202
H220SAFC	5/32"	Single Acting, Floating Bracket	0733-0021
H220SAFCG	5/32"	Sgl Act, Floating Bracket, EPR Seals	0733-0022
H220SBFC	1/4"	Sgl Act, Floating Bracket	0733-0121
H220SBFCG	5/32"	SglAct, Floating Bracket, EPR Seals	0733-0122
H220SEFC	1/2"	Sgl Act, Floating Bracket	0733-0221
H220SEFCG	5/32"	SglAct, Floating Bracket, EPR Seals	0733-0222
H220DAC	5/32"	Double Acting	0735-0101
H220DACG	5/32"	Double Acting, EPR Seals	0735-0103
H220DBC	1/4"	Double Acting	0735-0201
H220DBCG	1/2"	Double Acting, EPR Seals	0735-0202
H220DEC	1/2"	Double Acting	0735-0301
H220DECG	1/2"	Double Acting, EPR Seals	0735-0302
H220DARC	5/32"	Dbl Act, Retractable Pistons	0736-0111
H220DARCG	5/32"	DblAct, Retractable Pistons, EPR Seals	0736-0112
H220DBRC	1/4"	Dbl Act, Retractable Pistons	0736-0211
H220DBRCG	1/4"	DblAct, Retractable Pistons, EPR Seals	0736-0212
H220DERC	1/2"	Dbl Act, Retractable Pistons	0736-0311
H220DERCG	1/2"	DblAct, Retractable Pistons, EPR Seals	0736-0312

HYDRAULIC #220 SERIES, CAST IRON (SEE PAGE 14)

H220SACI	5/32"	Single Acting, Cast Iron	0733-0402
H220SACIG	5/32"	Single Acting, Cast Iron, EPR Seals	0733-0406
H220SBCI	1/4"	Single Acting, Cast Iron	0733-0403
H220SBCIG	1/4"	Single Acting, Cast Iron, EPR Seals	0733-0407
H220SLCI	3/8"	Single Acting, Cast Iron	0733-0404
H220SLCIG	3/8"	Single Acting, Cast Iron, EPR Seals	0733-0408
H220SECI	1/2"	Single Acting, Cast Iron	0733-0405
H220SECIG	1/2"	Single Acting, Cast Iron, EPR Seals	0733-0409
H220SAFCI	5/32"	Sgl Act, Floating Bracket, Cast Iron	0733-0422
H220SAFCIG	5/32"	SglAct, FtgBkt, Iron, EPR Seals	0733-0426
H220SBFCI	1/4"	Sgl Act, Floating Bracket, Cast Iron	0733-0423
H220SBFCIG	1/4"	SglAct, FtgBkt, Iron, EPR Seals	0733-0427
H220SLFCI	3/8"	Sgl Act, Floating Bracket, Cast Iron	0733-0424
H220SLFCIG	3/8"	Sgl Act, FtgBkt, Iron, EPR Seals	0733-0428
H220SEFCI	1/2"	Sgl Act, Floating Bracket, Cast Iron	0733-0425
H220SEFCIG	1/2"	Sgl Act, FtgBkt, Iron, EPR Seals	0733-0429
H220SEIC	1/2"	Single Acting, Cast Iron	0733-0225
H220SOIC	1-1/4"	Single Acting, Cast Iron	0733-0226
H220SEICG	1/2"	Single Acting, Cast Iron, EPR Seals	0733-0228
H220SOICG	1-1/4"	Single Acting, Cast Iron, EPR Seals	0733-0227
H220DACI	5/32"	Double Acting, Cast Iron	0735-0403
H220DACIG	5/32"	Double Acting, Cast Iron, EPR Seals	0735-0407
H220DBCI	1/4"	Double Acting, Cast Iron	0735-0404
H220DBCIG	1/4"	Double Acting, Cast Iron, EPR Seals	0735-0408
H220DLCI	3/8"	Double Acting, Cast Iron	0735-0405
H220DLCIG	3/8"	Double Acting, Cast Iron, EPR Seals	0735-0409
H220DECI	1/2"	Double Acting, Cast Iron	0735-0406
H220DECIG	1/2"	Double Acting, Cast Iron, EPR Seals	0735-0410

HYDRAULIC #440 SERIES (SEE PAGE 16)

H440SLC	3/8"	Single Acting	0769-0001
H440SLCG	3/8"	Single Acting, EPR Seals	0769-0012
H440SEC	1/2"	Single Acting	0769-0002
H440SECG	1/2"	Single Acting, EPR Seals	0769-0013
H440SNC	1"	Single Acting	0769-0003
H440SNCG	1"	Single Acting, EPR Seals	0769-0014
H440SOC	1-1/4"	Single Acting	0769-0004
H440SOCG	1-1/4"	Single Acting, EPR Seals	0769-0015
H440SQC	1-1/2"	Single Acting	0769-0005
H440SQCG	1-1/2"	Single Acting, EPR Seals	0769-0016
H440DLC	3/8"	Double Acting	0769-0006
H440DLCG	3/8"	Double Acting, EPR Seals	0769-0017
H440DEC	1/2"	Double Acting	0769-0007
H440DECG	1/2"	Double Acting, EPR Seals	0769-0018
H440DNC	1"	Double Acting	0769-0008
H440DNCG	1"	Double Acting, EPR Seals	0769-0019
H440DOC	1-1/4"	Double Acting	0769-0009

L. . . Long Cam (ME Brakes)
L. . . 3/8" Thick Disc
M. . . Machined Cam (ME Brakes)
ME. . . Mechanical Brake
N. . . 1" Thick Disc
O. . . 1-1/4" Thick Disc
P. . . Pneumatic Brake
Q. . . 1-1/2" Thick Disc
R. . . Retractable Piston(s)
S. . . Short Cam (ME Brakes)
S. . . Single Acting
V. . . Viton Seals

ORDERING

MODEL NUMBER	DISC THK.	OPTIONS / DESCRIPTION	ASSEMBLY NUMBER
HYDRAULIC #440 SERIES, CAST IRON (SEE PAGE 16) *continued*			
H440DOCG	1-1/4"	Double Acting, EPR Seals	0769-0020
H440DQC	1-1/2"	Double Acting	0769-0010
H440DQCG	1-1/2"	Double Acting, EPR Seals	0769-0021
HYDRAULIC #441 SERIES (SEE PAGE 18)			
H441D	N/A	Double Acting	0774-0000
H441DG	N/A	Double Acting, EPR Seals	0774-0001
SH441D	No. 635	Double Acting, w/#635	0774-0002
SH441DG	No.635	Double Acting, EPR Seals, w/#635	0774-0003
HYDRAULIC #960 SERIES (SEE PAGE 20)			
H960DECI	1/2"	Double Acting, Iron	0778-0003
H960DECIG	1/2"	Dbl Acting, Iron, EPR Seals	0778-0004
D960DEVI	1/2"	Double Acting, Iron, Viton Seals	0778-0005
H960DXI	1-1/8"	Double Acting, Iron	0778-0000
H960DNCI	1"	Double Acting, Iron	0778-0011
H960DXCI	3/16"	Double Acting, Iron	0778-0012
HYDRAULIC & MECHANICAL #20 SERIES (SEE PAGE 22)			
H/ME20MAFC	5/32"	Mach Cam, Floating Brkt	0755-0200
H/ME20MBF	1/4"	Machined Cam, Floating Bracket	0755-0210
H/ME20SAF	5/32"	Short Cam, Floating Bracket	0755-0230
H/ME20SBF	1/4"	Short Cam, Floating Bracket	0755-0240
H/ME20LAF	5/32"	Long Cam, Floating Bracket	0755-0260
H/ME20LBF	1/4"	Long Cam, Floating Bracket	0755-0270
H/ME20MA	5/32"	Machined Cam	0755-0300
H/ME20MB	1/4"	Machined Cam	0755-0310
H/ME20SA	5/32"	Short Cam	0755-0330
H/ME20SB	1/4"	Short Cam	0755-0340
H/ME20LA	5/32"	Long Cam	0755-0360
H/ME20LB	1/4"	Long Cam	0755-0370
H/ME20MAFG	5/32"	Mach Cam, Floating Brkt, EPR Seals	0755-0500
H/ME20MBFG	1/4"	Mach Cam, Floating Brkt, EPR Seals	0755-0510
H/ME20SAFG	5/32"	Short Cam, Floating Brkt, EPR Seals	0755-0530
H/ME20SBFG	1/4"	Short Cam, Floating Brkt, EPR Seals	0755-0540
H/ME20LAFG	5/32"	Long Cam, Floating Brkt, EPR Seals	0755-0560
H/ME20LBFG	1/4"	Long Cam, Floating Brkt, EPR Seals	0755-0570
H/ME20MAG	5/32"	Machined Cam, EPR Seals	0755-0600
H/ME20MBG	1/4"	Machined Cam, EPR Seals	0755-0610
H/ME20SAG	5/32"	Short Cam, EPR Seals	0755-0630
H/ME20SBG	1/4"	Short Cam, EPR Seals	0755-0640
H/ME20LAG	5/32"	Long Cam, EPR Seals	0755-0660
H/ME20LBG	1/4"	Long Cam, EPR Seals	0755-0670
HYDRAULIC & MECHANICAL #220 SERIES (SEE PAGE 24)			
H/ME220ACG	5/32"	EPR Seals	0744-0630
H/ME220BCG	1/4"	EPR Seals	0744-0640
H/ME220LCG	3/8"	EPR Seals	0744-0650
H/ME220ECG	1/2"	EPR Seals	0744-0660
MECHANICAL #10 SERIES (SEE PAGE 26)			
ME10SA	5/32"	Short Cam	0732-0000
ME10SAF	5/32"	Short Cam., Floating Bracket	0732-0001
ME10SBF	1/4"	Short Cam., Floating Bracket	0732-0005
ME10LA	5/32"	Long Cam	0732-0003
ME10LAF	5/32"	Long Cam, Floating Bracket	0732-0002
ME10LBF	1/4"	Long Cam, Floating Bracket	0732-0004
ME10MA	5/32"	Machined Cam	0707-0000
ME10MAF	5/32"	Machined Cam, Floating Bracket	0707-0001
MECHANICAL #20 SERIES (SEE PAGE 28)			
ME20SA	5/32"	Short Cam	0731-0000
ME20SB	1/4"	Short Cam	0731-0007
ME20SAF	5/32"	Short Cam, Floating Bracket	0731-0001
ME20SBF	1/4"	Short Cam, Floating Bracket	0731-0004
ME20LA	5/32"	Long Cam	0731-0003
ME20LB	1/4"	Long Cam	0731-0005
ME20LAF	5/32"	Long Cam, Floating Bracket	0731-0002
ME20LBF	1/4"	Long Cam, Floating Bracket	0731-0006
ME20MA	5/32"	Machined Cam	0726-0000
ME20MB	1/4"	Machined Cam	0726-0002
ME20MAF	5/32"	Machined Cam, Floating Bracket	0726-0001
ME20MBF	1/4"	Machined Cam, Floating Bracket	0726-0003

A. . . 5/32" Thick Disc
B. . . 1/4" Thick Disc
C. . . With Bleeder Fitting
D. . . Double Acting
E. . . 1/2" Thick Disc
F. . . Floating Bracket Mount
FS. . . Spring Applied
G. . . EPR Seals
H. . . Hydraulic Brake
I. . . Iron
J. . . Retractable Piston
K. . . Manual Compensator

MODEL NUMBER	DISC THK.	OPTIONS / DESCRIPTION	ASSEMBLY NUMBER
MECHANICAL #220 SERIES (SEE PAGE 30)			
ME220A	5/32"	Mechanical Brake	0745-0000
ME220B	1/4"	Mechanical Brake	0745-0010
ME220L	3/8"	Mechanical Brake	0745-0015
ME220E	1/2"	Mechanical Brake	0745-0020
ME220AF	5/32"	Floating Bracket	0745-0001
ME220BF	1/4"	Floating Bracket	0745-0011
ME220LF	3/8"	Floating Bracket	0745-0008
ME220EF	1/2"	Floating Bracket	0745-0021
ME220MAI	5/32"	Machined Cam, Cast Iron	0745-0002
ME220MBI	1/4"	Machined Cam, Cast Iron	0745-0012
ME220MAFI	5/32"	Mach Cam, Floating Bracket, Cast Iron	0745-0003
ME220MBFI	1/4"	Mach Cam, Floating Bracket, Cast Iron	0745-0013
ME220MLFI	3/8"	Mach Cam, Floating Bracket, Cast Iron	0745-0017
ME220MEFI	1/2"	Mach Cam, Floating Bracket, Cast Iron	0745-0024
ME220MQFI	1-1/2"	Mach Cam, Floating Bracket, Cast Iron	0745-0026
MECHANICAL MB3 SERIES (SEE PAGE 32)			
MB3	1/2"	Mechanical Brake	0790-0000
SPRING APPLIED #20 SERIES (SEE PAGE 34)			
FS20A	5/32"	Spring Applied	0760-0000
FS20AG	5/32"	EPR Seals	0760-0003
FS20B	1/4"	Spring Applied	0760-0001
FS20BG	1/4"	EPR Seals	0760-0004
FS20PB	1/4"	Pneumatically Released	0760-0016
SPRING APPLIED #220 SERIES (SEE PAGE 36)			
FS220BA	5/32"	Floating Bracket, "B" Strength	0740-0000
FS220BB	1/4"	Floating Bracket, "B" Strength	0740-0017
FS220BL	3/8"	Floating Bracket, "B" Strength	0740-0019
FS220BE	1/2"	Floating Bracket, "B" Strength	0740-0021
FS220CA	5/32"	Floating Bracket, "C" Strength	0741-0000
FS220CB	1/4"	Floating Bracket, "C" Strength	0741-0018
FS220CL	3/8"	Floating Bracket, "C" Strength	0741-0020
FS220CE	1/2"	Floating Bracket, "C" Strength	0741-0022

MODEL NUMBER	DISC THK.	OPTIONS / DESCRIPTION	ASSEMBLY NUMBER
SPRING APPLIED #220 SERIES, IRON (SEE PAGE 38)			
FS220BIA	5/32"	Floating Bracket, "B" Strength, Iron	0740-0001
FS220BIB	1/4"	Floating Bracket, "B" Strength, Iron	0740-0003
FS220BIL	3/8"	Floating Bracket, "B" Strength, Iron	0740-0004
FS220BIE	1/2"	Floating Bracket, "B" Strength, Iron	0740-0005
FS220BIAJK	5/32"	FtgBkt,"B"Stgh,Iron,ManRet,ManComp	0740-0006
FS220BIBJK	1/4"	FtgBkt,"B"Stgh,Iron,ManRet,ManComp	0740-0007
FS220BILJK	3/8"	FtgBkt,"B"Stgh,Iron,ManRet,ManComp	0740-0008
FS220BIOJK	1-1/4'	FtgBkt,"B"Stgh,Iron,ManRet,ManComp	0741-0034
FS220CIA	5/32"	Floating Bracket, "C" Strength, Iron	0741-0005
FS220CIL	1/4"	Floating Bracket, "C" Strength, Iron	0741-0007
FS220CIE	1/2"	Floating Bracket, "C" Strength, Iron	0741-0008
FS220CIAJK	5/32"	FtgBkt,"C"Stgh,Iron,ManRet,ManComp	0741-0009
FS220CIBJK	1/4"	FtgBkt,"C"Stgh,Iron,ManRet,ManComp	0741-0010
FS220CILJK	3/8"	FtgBkt,"C"Stgh,Iron,ManRet,ManComp	0741-0011
FS220CIEJK	1/2"	FtgBkt,"C"Stgh,Iron,ManRet,ManComp	0741-0012
SPRING APPLIED #440 SERIES (SEE PAGE 40)			
FS440L	3/8"	Iron, Man Wear Comp, Man Retractor	0768-0001
FS440E	1/2"	Iron, Man Wear Comp, Man Retractor	0768-0002
FS440N	1"	Iron, Man Wear Comp, Man Retractor	0768-0003
FS440O	1-1/4"	Iron, Man Wear Comp, Man Retractor	0768-0004
FS440Q	1-1/2"	Iron, Man Wear Comp, Man Retractor	0768-0005
SPRING APPLIED #595 SERIES (SEE PAGE 42)			
FS595DCIKQ	1-1/2"	Double Acting, Iron, Man Wear Comp	0781-0000
FS595DCIKQV	1-1/2"	Dbl Act, Iron, Man Comp, Viton Seals	0781-0001
FS595DCIKO	1-1/2"	DUAL	0782-0003

L. . . Long Cam (ME Brakes)
L. . . 3/8" Thick Disc
M. . . Machined Cam (ME Brakes)
ME. . . Mechanical Brake
N. . . 1" Thick Disc
O. . . 1-1/4" Thick Disc
P. . . Pneumatic Brake
Q. . . 1-1/2" Thick Disc
R. . . Retractable Piston(s)
S. . . Short Cam (ME Brakes)
S. . . Single Acting
V. . . Viton Seals

APPLICATION DATA

Use this form to request engineering assistance. The data you furnish will enable us to understand your application and recommend* the proper braking equipment. When available, please attach prints or dimensional drawings. For best results copy this page first then Fax to: (612) 478-8080 or Mail to: TOL-O-MATIC, INC., 3800 County Road 116, Hamel, MN 55340

NAME: _____

TITLE: _____

FIRM: _____

ADDRESS: _____

CITY: _____

STATE: _____ ZIP: _____

PHONE: (_____) _____

FAX: (_____) _____

TYPE OF EQUIPMENT BRAKES WILL BE USED ON:

_____

_____

_____

_____

_____

MODEL:_____ PROJECT #: _____

A. VEHICLE SPECIFICATIONS

PLEASE CONTACT FACTORY

B. TENSIONING DATA

_____

_____

_____

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_____

_____

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_____

_____

_____

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_____

_____

_____

_____

C. STATIONARY EQUIPMENT SPECIFICATIONS

CYCLIC STOPS? ☐ Yes ☐ No

W = Weight of rotating member

R = Radius of rotating member

WK_2 OF ROTATING PARTS_____RPM _____

DECELERATION NEEDED:

☐ Time_____ seconds from _____RPM

☐ _____ Radians per second^2

D. GENERAL APPLICATION DATA

FREQUENCY OF STOPS: ..... _____

COMPLETE OPERATING CYCLE: ..... _____

MAXIMUM ALLOWABLE DISC DIAMETER: ..... _____in.

THICKNESS: ..... _____in.

TYPE OF ACTUATION: ☐ Mechanical ☐ Spring Applied ☐ Pneumatic ☐ Hydraulic

MAXIMUM HYDRAULIC OR AIR PRESSURE: ..... _____psi

BACK PRESSURE: ..... _____

DRIVE SHAFT APPLICATIONS ONLY:

Gear ratio is_____in favor of_____, or against_____the brake

AVAILABLE DISPLACEMENT: ..... _____in.^{3}

TYPE OF FLUID: _____MAXIMUM TORQUE: _____in. lbs.

AMBIENT TEMPERATURES TO BE ENCOUNTERED: ..... _____

LINING LIFE DESIRED: ..... _____

E. ADDITIONAL COMMENTS

_____

_____

_____

_____

_____

_____

_____

_____

* Recommendation is based on information supplied by the customer. Final acceptance and approval is the responsibility of the customer after field testing or simulation of field testing on the machine it is designed for.

TOL-O-MATIC, INC. 3800 County Road 116 • Hamel, MN 55340
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Hamel, MN 55340
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