



POWER TRANSMISSION

GEARBOXES CALIPER DISC BRAKES CLUTCHES

OVER 50 YEARS OF PROVEN PERFORMANCE

PRODUCTS AND PEOPLE YOU NEED TO GET THE JOB DONE RIGHT.

At Tolomatic we have the resources and the experience to give you what you need when you need it. Working together we can find solutions whether it is a new feature, better performance or a whole new product line. Our sales department will make sure all your questions are answered. Our engineers will assist you with your application design. Our model shop will make all the tooling and specials you need for a new product —not in 6 months or a year—but when you need them.

QUALITY PRODUCTS, COMPETITIVELY PRICED, WHEN YOU WANT THEM.

Our engineering laboratory pushes our products to the breaking point running them 24 hours a day, 7 days a week for millions of cycles looking for ways to improve them. They work with R&D to develop new manufacturing techniques and to perfect new products. For each new product, detailed engineered drawings are converted into hand-crafted sample products for testing, then precision tooling is built on site by Tolomatic's own skilled craftsmen with the highest standards of quality, care and dedication to details. The products are tested again by engineering and by selected field representatives. Tolomatic has heavily invested in research to guarantee you delivery of the highest quality products not in months or weeks, but within days of your order, and with a warranty rate less than 1/2 of 1%.

UNCONDITIONAL 100% SATISFACTION GUARANTEE.

Tolomatic has built its reputation on customer satisfaction. For over 50 years it has been our policy that, if for any reason you have a problem with any Tolomatic product ordered, we will do whatever it takes to make sure you are 100% satisfied. Working together we will arrive at a solution that works best for you.

TOLOMATIC TRAINING CENTER

There is a Tolomatic product for just about every application that may come your way and it is our goal to remove every obstacle, give you every tool, device and piece of knowledge necessary to learn how to size and apply Tolomatic products. That is why we supply the most advanced in-depth training in the industry— free of charge to all our distributors and their customers.



Located in west suburban Minneapolis, Minnesota, Tolomatic headquarters (a 100,000 sq. ft. state-of-the-art facility) is designed for improved communication and manufacturing techniques to meet customer needs today and well into the future.

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ENGINEERING RESOURCES

www.tolomatic.com



The Tolomatic Difference

Over 50 Years of Proven Performance

EXCELLENT TECHNICAL SUPPORT



OUR PEOPLE MAKE The Difference!

Expect prompt, courteous replies to all of your application and product questions.

INDUSTRY LEADING DELIVERIES



STANDARD CATALOG PRODUCTS SHIP IN FIVE WORKING DAYS OR LESS - same day for many items. Modified and custom products ship weeks ahead of the competition. Every product is built with **CENTRAL CETTERING COPY** components and quality tested before shipment.

CONVENIENT ORDERING



www.tolomatic.com - Be assured of speedy service, quality products and great pricing, all at your convenience.



The Tolomatic Difference *Over 50 Years of Proven Performance*

CREATIVE SOLUTIONS...ENGINEERED DAILY

STANDARD PRODUCTS



ISO 9001 quality procedures combined with **ORDURANCE TECHNOLOGY** for trouble-free installation and start-up.

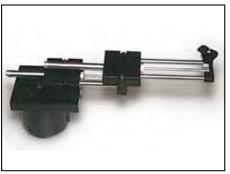
- Over 35 distinct product lines detailed in over 4,000 web pages.
- User specified stroke length is standard.

MODIFIED PRODUCTS



Modified products, like this spring applied brake with modified pressure chamber for low pressure release, extend the range of environments and applications where Tolomatic products can be used. Modifications include user specified tapped holes, materials, lubricants, coatings, and/or mounting brackets.

CUSTOM PRODUCTS



Challenges like this multi-axis actuator built to fit a manufacturer's motion, space and accuracy requirements are a regular part of our daily activities.

- Custom solutions for unique motion requirements.
- We will work with you to design a motion product within your space, budget, and time requirements.

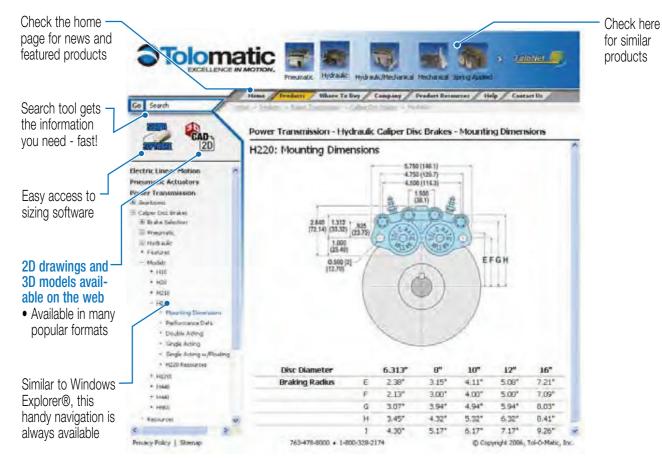


The Tolomatic Difference A USEFUL WEB SITE: www.tolomatic.com

COMPLETE INFORMATION AVAILABLE ONLINE

PRODUCT SUPPORT AVAILABLE 24/7 AT www.tolomatic.com

Our web site is your definitive source for EVERYTHING you need to know about Tolomatic and our products.



1.800.328.2174

Tolomatic

Caliper Disc Brakes



CALIPER DISC BRAKES

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Visit www.tolomatic.com for the latest updates and ordering.

CALIPER DISC Brakes

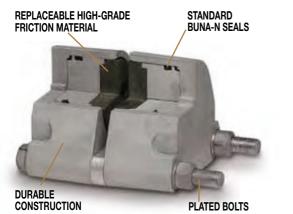




FEATURES APPLICATIONS

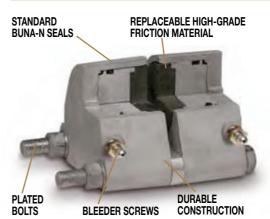
Caliper Disc Brakes FEATURES

PNEUMATIC BRAKES



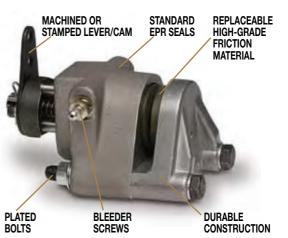
Tolomatic manufactures pneumatic brakes in three sizes: P10 Series, P20 Series and P220 Series. Available in both double acting or single acting. These brakes feature replaceable, high-grade friction material, standard Buna-N seals, aluminum construction and zinc plated bolts. Options include EPR seals,Viton® seals, retractable pistons and floating bracket. (See pages 32 to 37)

HYDRAULIC BRAKES



Tolomatic hydraulic caliper disc brakes are available in the widest range of sizes. From the H10 Series up to the H960 Series, these brakes are sure to supply the braking torque you need for your application. Available in both double acting or single acting (depending on model). These brakes feature replaceable, high-grade friction material, standard Buna-N seals, aluminum or cast iron construction (depending on model), bleeder screws and zinc plated bolts. Options include EPR seals, Viton® seals, retractable pistons and floating brackets. (See pages 38 to 49)

HYDRAULIC / MECHANICAL BRAKES



These Tolomatic brakes combine hydraulic and mechanical braking in one caliper. Available in the H/ME20 Series and H/ME20 Series these single acting calipers deliver high braking torque in a small package. Features include: replaceable, high-grade friction material, standard EPR seals, aluminum or cast iron construction (depending on model), bleeder screws and zinc plated bolts. Options include Buna-N seals, Viton® seals and floating brackets. (See pages 50 to 55)



SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H2201 H441 HOUU HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220 MECHANICAL BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS

INTENSIFIER SELECTION

WORKSHEET

CALIPER BRAKES

> P10 P20 P220

> > H10 H20

H220 H220I

H441

H960

BRAKE

ME10

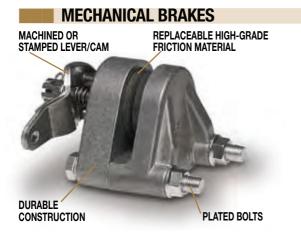
ME20

ME220

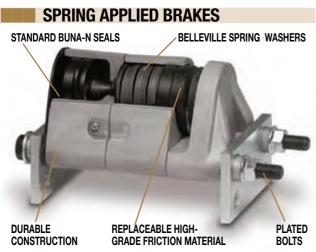
MB3

FS20 FS220 FS2201 FS595 DISCS

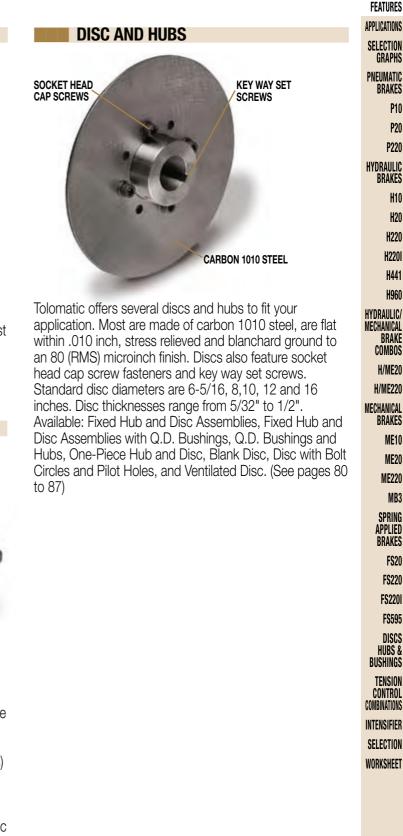
Caliper Disc Brakes **FEATURES**



Tolomatic manufactures a broad range of mechanical brakes in these series: ME10, ME20, ME220 and MB3. Designed for use in areas that do not have access to other types of power, these single acting calipers feature replaceable, high-grade friction material, aluminum or cast iron construction (depending on model) and zinc plated bolts. (See pages 56 to 65)



Tolomatic offers spring applied brakes in sizes ranging from FS20 Series to FS595 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 a piston(s) moves to compress the spring washer stack(s), thus releasing the disc. These calipers feature replaceable, high-grade friction material, aluminum or cast iron construction (depending on model), Buna-N seals and zinc plated bolts. Options include EPR seals, retractable pistons and manual compensators. (See pages 66 to 79)



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Caliper Disc Brakes APPLICATIONS

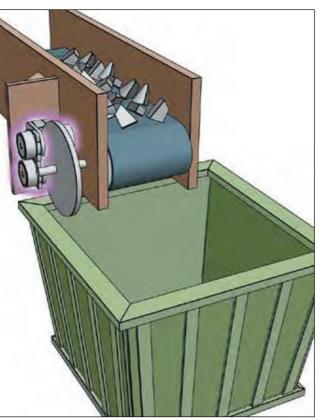
FEATURES APPLICATIONS SELECTION GRAPHS **PNEUMATIC** BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 HOUU HYDRAULIC/ MECHANICAL BRAKE COMBOS **H/ME20** H/ME220 MECHANICAL BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS

INTENSIFIER

SELECTION

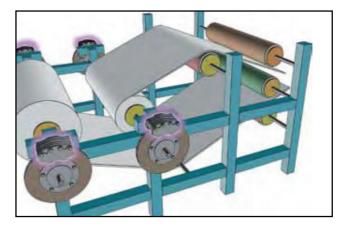
WORKSHEET

CONVEYOR BELT EMERGENCY BRAKE



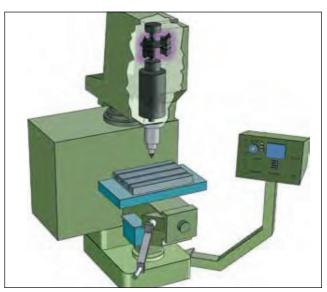
Tolomatic caliper disc brakes find uses in industrial settings all over the world. Used on everything from assembly lines to wind generators and lawn maintenance equipment, Tolomatic calipers offer the braking capacity you need at an economical price. The variety of sizes, maximum torque output and thermal 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. Above 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.

TENSIONING APPLICATION



Another great place for Tolomatic brakes is tensioning/ constant slip applications. Used in everything from mylar balloon fabrication to web presses, Tolomatic pneumatic 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.

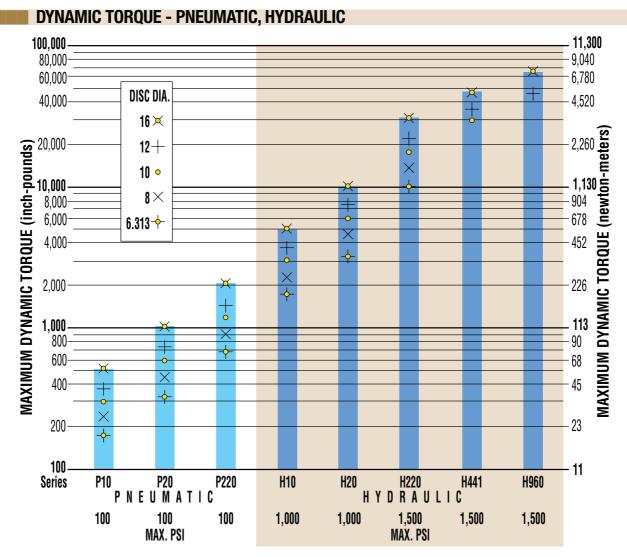
MACHINE COMPONENTS



Here two Tolomatic 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. Tolomatic caliper disc brakes improved stopping time by 500 percent, increasing the machine's productivity and safety.

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Caliper Disc Brakes SELECTION GRAPH & TABLE



The table below includes the same information as the graph above (adding discs not sold by Tolomatic) with the maximum dynamic torque [inch-pounds] for each series brake using the disc size in left column and PSI at the bottom of the table.

Tolomatic

Disc								
Dia.	P10	P20	P220	H10	H20	H220	H441	H960
6.313	174	328	685	1,737	3,285	10,282		
8	233	450	907	2,328	4,500	13,608		
10	303	594	1,184	3,028	5,940	17,755	19,539	
12	373	738	1,463	3,728	7,380	21,946	24,834	45,672
14	443	882	1,771	4,428	8,820	26,568	30,129	56,052
16	513	1,026	2,076	5,128	10,260	31,147	35,424	66,432
18							40,719	76,812
20							46,014	
22							51,309	
24							56,606	
	100	100	100	1,000	1,000	1,500	1,500	1,500
		MAX. PS	I			MAX. PS	51	
	PNE	UMA	TIC		НΥ	DRAI	JLIC	
NOTE: GREV	BACKCDO	סומאו מאוור	ATES DISC S	TES NOT		EDOM TOL	MATIC	

NOTE: GREY BACKGROUND INDICATES DISC SIZES NOT AVAILABLE FROM TOLOMATIC.

Note: Selection instructions and formulae begin on page 89 of this catalog. Please refer to these instructions or call 1-800-328-2174 for assistance. APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 H960 HYDRAULIC/ MECHANICAL BRAKE COMBOS **H/ME20** H/ME220 MECHANICAL BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS

TENSION

CONTROL

COMBINATIONS

INTENSIFIER

SELECTION

WORKSHEET

CALIPER DISC BRAKES

FEATURES

Caliper Disc Brakes

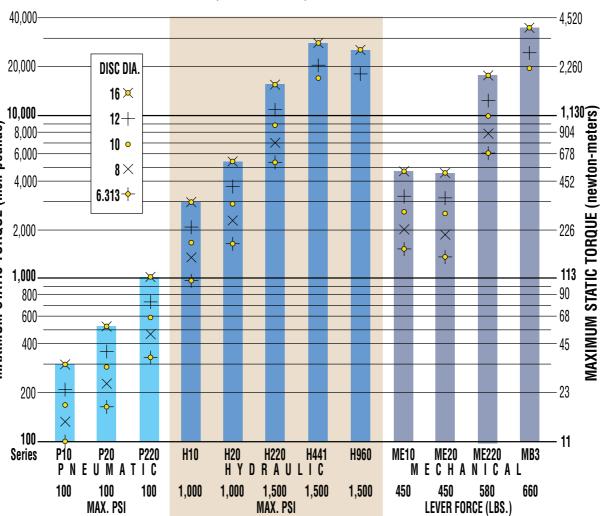
CALIPER DISO Brakes

FEATURES APPLICATIONS STATIC TORQUE - PNEUMATIC, HYDRAULIC, MECHANICAL SELECTION GRAPHS 40.000 PNEUMATIC BRAKES P10 20,000 **DISC DIA** P20 16 × P220 10,000 12 +HYDRAULIC MAXIMUM STATIC TORQUE (inch-pounds) 8.000 BRAKES 10 • 6,000 H10 $8 \times$ H20 4,000 ╀ H220 6.313+ H220I \times 2,000 H441 -\ H960 X HYDRAULIC/ 1,000 MECHANICAL Brake -0-800 _ COMBOS 600 0 H/ME20 X X 400 H/ME220 +-**-**-MECHANICAL 0 BRAKES \times 200 **ME10** 0 -**\ ME20 ME220** 100 P10 Series P20 P220 H10 H20 MB3 ΡN EUMATIC SPRING APPLIED 100 100 100 1,000 1,000 BRAKES MAX. PSI FS20 FS220 The table below includes the same information as the graph above (adding discs not sold by Tolomatic) with the maximum static torque [inch-pounds] for each series brake using the disc size in left column and PSI (or Lever Force) at the bottom of the table. FS2201 FS595 Disc -114.0 DISCS HUBS & BUSHINGS

Dia.	P10	P20	P220	H10	H20	H220	H441	H960	ME10	ME20	ME220	MB3
6.313	99	164	343	993	1,642	5,141				1,502	1,381	5,851
8	133	225	454	1,330	2,250	6,804				2,012	1,891	7,744
10	173	297	592	1,730	2,970	8,878	11,679		2,618	2,497	10,104	19,893
12	213	369	732	2,130	3,690	10,973	14,844	26,664	3,223	3,102	12,489	24,506
14	253	441	886	2,530	4,410	13,284	18,009	32,724	3,828	3,707	15,120	29,120
16	293	513	1,038	2,930	5,130	15,574	21,174	38,784	4,433	4,312	17,726	33,733
18							24,339	44,844				38,347
20							27,504					42,960
22							30,669					47,573
24							33,834					52,187
26												56,800
28												61,414
30												66,027
	100	100	100	1,000	1,000	1,500	1,500	1,500	450	450	580	660
		MAX. PS	l	MAX. PSI					N	1AX. LEVE	R FORCE ((LBS.)
	PNE	UMA	TIC		НҮІ	DRAU	LIC		М	ЕСН	ANIO	CAL
DTE: GREY BACKGROUND INDICATES DISC SIZES NOT AVAILABLE FROM TOLOMATIC.												

Tolomatic

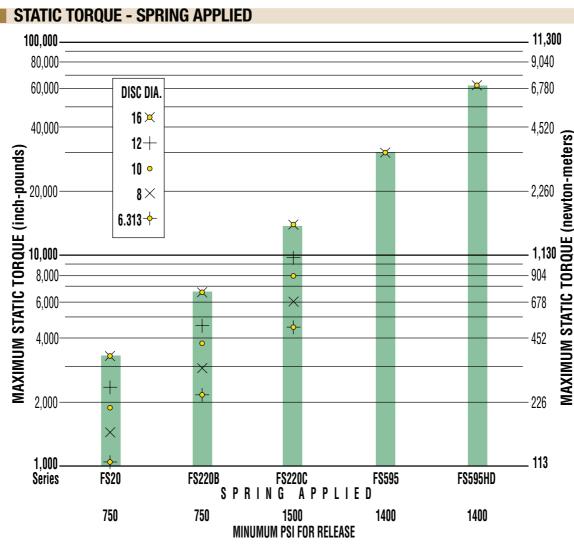




TENSION CONTROL COMBINATIONS INTENSIFIER SELECTION WORKSHEET

1.800.328.2174

Caliper Disc Brakes SELECTION GRAPH & TABLE



The table below includes the same information as the graph above (adding discs not sold by Tolomatic) with the maximum static torque [inch-pounds] for each series brake using the disc size in left column and release pressure (PSI) at the bottom of the table.

Disc Dia.	FS20	FS220B	FS220C	FS595	FS595 Dual				
6.313	1,061	2,213	4,522						
8	1,453	2,930	5,985						
10	1,918	3,822	7,809						
12	2,383	4,724	9,652						
14	2,848	5,715	11,676	26,426	52,853				
16	3,313	6,705	13,699	31,046	62,093				
18				35,666	71,333				
20				40,286	80,573				
22				44,906	89,813				
24				49,526	99,053				
26				54,146	108,293				
28				58,766	117,533				
30				63,386	126,733				
	750	750	1500	1400	1400				
	MINIMUM PSI FOR RELEASE								

NOTE: GREY BACKGROUND INDICATES DISC SIZES NOT AVAILABLE FROM TOLOMATIC.

Note: Selection instructions and formulae begin on page 89 of this catalog. Please refer to these instructions or call 1-800-328-2174 for assistance. H/ME220

BRAKES ME10

ME20

MECHANICAL

CALIPER DISC BRAKES

FEATURES Applications

SELECTION

PNEUMATIC

GRAPHS

BRAKES

ME220 MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS295 DISCS HUBS & BUSHINGS TENSION

CONTROL COMBINATIONS

INTENSIFIER Selection

WORKSHEET





FEATURES APPLICATIONS

SELECTION GRAPHS

PNEUMATIC Brakes

P10

P20

P220

HYDRAULIC

BRAKES

H10

H20

H220

H220I

H441 H960

HYDRAULIC/

MECHANICAL BRAKE

COMBOS

H/ME20 H/ME220

Caliper Disc Brakes P10 SERIES - ALUMINUM

AVAILABLE STYLES

Double Acting FIXED MOUNT - FIXED DISC

PICTURED: 0701-0000

Single Acting **FIXED MOUNT - FLOATING DISC**



PICTURED: 0705-0000

Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



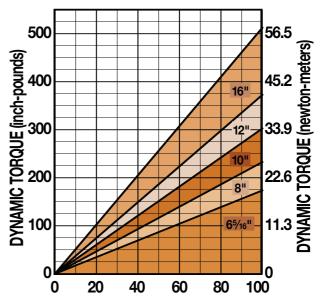
P10 SPECIFICATIONS

MECHANICAL		
BRAKES	Maximum Pressure Rating:	100 PSI
ME10	Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
ME20	Maximum disc diameter:	none
	Housing Material:	Extruded aluminum
ME220	Bolts:	Zinc plated grade 5
MB3	Seals:	Buna-N Standard
SPRING	Wearable friction material:	0.47 in ³
APPLIED	Wearable friction material/retractable models:	0.13 in ³
BRAKES	Friction material:	Replaceable, high-grade
FS20	Total lining area:	1.84 in ²
F\$220	Total lining area/retractable models:	1.64 in ²
FS2201	Piston diameter:	1.125 in.
F\$595	Fluid displacement, non-retractable:	Single acting = 0.029 in ³
		Double acting = 0.029 in^3
DISCS HUBS &	OPTIONS	
BUSHINGS	Seals:	EPR seals
TENSION	Pistons:	Retractable piston(s)
CONTROL	Floating bracket:	1 ()
COMBINATIONS	J	

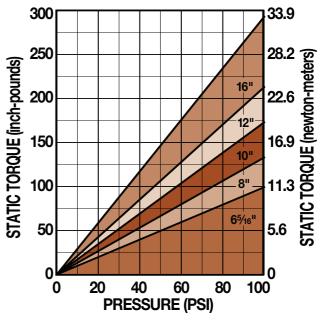
COMBINATIONS INTENSIFIER SELECTION WORKSHEET

PERFORMANCE DATA

Dynamic Torque vs Pressure



Static Torque vs Pressure



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] - 0.624



Caliper Disc Brakes P10 SERIES - ALUMINUM

		BLE MOUNT					
Accommoda	ates disc	c thicknes	ss: 5/3	2" 1/4" 3/8" 1/2"			
		Weig	jht 1.0	lbs45 kgs.			
1/8-27 NPT PORT (39.6) B (39.6) (39.6)							
MODEL Code	disc Thk.	A	В	OPTIONS / Description	ASSEMBLY NUMBER		
P10DA	5/32"	3.50"	.281"	Double Acting	0701-0000		
P10DAR	5/32"	3.50"	.281"	Double Acting, Retractable Pistons	0708-0000		
P10DB	1/4"	3.50"	.375"	Double Acting	0702-0000		
P10DBR	1/4"	3.50"	.375"	Double Acting, Retractable Pistons	0709-0000		
P10DER	1/2"	4.00"	.625"	Double Acting, Retractable Pistons	0709-0003		
	0.401	4.00	E00"	Daubla Asting	0700 0000		
P10DL	3/8"	4.00"	.500"	Double Acting	0702-0002		

Accommo	FIXED		- FLOA	TING DISC	
		Weig	ght .75	lbs34 kgs.	
↓ .38 (9.7) ^ .937 (23.80) ↓ .69 (17.5) ↓		27 NPT P (39.6) (25.4) (25.4)	− C — > (23.94) C —	5/16-24 5,76-24	
MODEL Code	disc Thk.	C	D	OPTIONS / Description	ASSEMBLY NUMBER
P10SA	5/32"	3.00"	-	Single Acting	0705-0000
P10SB	1/4"	3.00"	.094"	Single Acting	0703-0000

SINGLE ACTING WITH FLOATING	APPLICATIONS
BRACKET FLOATING MOUNT - FIXED DISC	SELECTION GRAPHS
Accommodates disc thickness: 5/32" 1/4"	PNEUMATIC Brakes
Weight 1.5 lbs68 kgs.	P10
$\begin{array}{c} -2.50 (63.5) \longrightarrow \\ 1.625 \longrightarrow \\ (41.28) \end{array}$	P20
$ \begin{array}{c c} \sigma .332 \left[2 \right] & (41.28) \\ \hline (8.43) & (75 \rightarrow) \\ \hline (19.1) & (19.1) \\ \hline \end{array} $	P220
	HYDRAULIC Brakes
	H10
	H20
0.468 (11.89)	H220
	H220I

CALIPER DISC Brakes

FEATURES

> H441 H960

MECHANICAL BRAKE Combos H/ME20 H/ME220 MECHANICAL BRAKES **ME10** ME20 ME220 MB3

SPRING

APPLIED

BRAKES

FS20

FS220

FS2201

FS595

DISCS HUBS & BUSHINGS

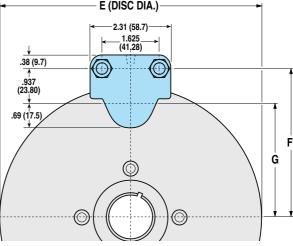
TENSION CONTROL COMBINATIONS

INTENSIFIER SELECTION WORKSHEET

See SINGLE ACTING dimensional drawing for additional measurements

H960 Hydraulic/	ASSEMBLY NUMBER	OPTIONS / Description	D	C	disc Thk.	MODEL Code
MECHANICAL	0705-0001	Single Acting, Floating Bracket	-	3.00"	5/32"	P10SAF
BRAKE	0703-0001	Single Acting, Floating Bracket	.094"	3.00"	1/4"	P10SBF

MOUNTING DIMENSIONS							
Disc Diameter	Е	6.313"	8"	10"	12"	16"	
	F	3.469"	4.313"	5.313"	6.313"	8.313"	
Braking Radius	G	2.532"	3.376"	4.376"	5.376"	7.376"	



BRAKE MODEL LETTER CODES

Tolomatic

A 5/32" Thick Disc	E 1/2" Thick Disc	P Pneumatic Brake
B 1/4" Thick Disc	F Floating Bracket Mount	R Retractable Piston(s)
D Double Acting	L 3/8" Thick Disc	S Single Acting



Caliper Disc Brakes P20 SERIES - ALUMINUM

FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC Brakes P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 H960 HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220 MECHANICA BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201

FS595 DISCS HUBS &

BUSHINGS TENSION CONTROL COMBINATIONS

INTENSIFIER

SELECTION WORKSHEET

AVAILABLE STYLES

Double Acting FIXED MOUNT - FIXED DISC

PICTURED: 0720-0000



Single Acting

PICTURED: 0724-0000

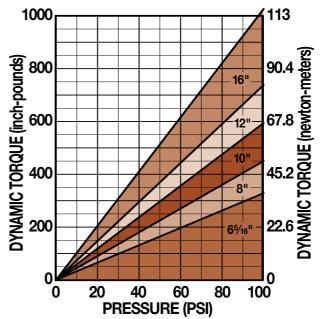
Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



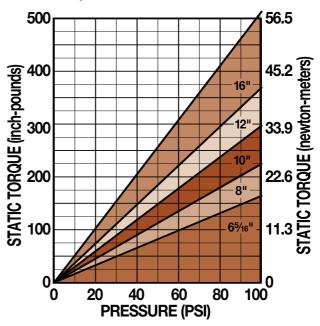
P20 SPECIFICATIO	DNS
Maximum Pressure Rating:	100 PSI
Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
Maximum disc diameter:	none
Housing Material:	Extruded aluminum
Bolts:	Zinc plated grade 8
Seals:	Buna-N Standard
Wearable friction material:	0.8 in ³
Wearable friction material/retractable models:	0.5 in ³
Friction material:	Replaceable, high-grade
Total lining area:	3.75 in ²
Piston diameter:	1.625 in.
Fluid displacement, non-retractable:	Single acting = 0.062 in ³ Double acting = 0.062 in ³
OPTIONS	
Seals:	EPR seals
Pistons:	Retractable piston(s)
Floating bracket:	Stamped steel construction

PERFORMANCE DATA

Dynamic Torque vs Pressure



Static Torque vs Pressure



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



Caliper Disc Brakes

P20 SERIES - ALUMINUM

DOUBLE ACTING

P20DER

3.75"

.625'

1/2"

	FIXED	MOUNT	- FIXED	DISC		B
Accommo	odates dis	c thicknes	s: 5/3	2" 1/4" 3/8" 1/2"		F
		Weig	ht 2.0	lbs91 kgs.		Accommodat
	4.5 A	0 (114.3) → (28.4) 		3/8-24	Ø.397 (10.08	3.12 (2.3 (58.7 (57.7)
MODEL	DISC Thk.		B	OPTIONS / Description	ASSEMBLY NUMBER	<u> </u>
						· · · · ·
P20DA	5/32"	3.41"	.281"	Double Acting	0720-0000	
P20DA P20DAR	5/32" 5/32"	3.41" 3.41"	.281" .281"	Double Acting Double Acting, Retractable Pistor	0720-0000	See SINGLE
		-	-	9	0720-0000	See SINGLE
P20DAR	5/32"	3.41"	.281"	Double Acting, Retractable Pistor	0720-0000 is 0728-0000 0721-0000	
P20DAR P20DB	5/32" 1/4"	3.41" 3.50"	.281" .375"	Double Acting, Retractable Pistor Double Acting	0720-0000 is 0728-0000 0721-0000	MODEL D
P20DAR P20DB P20DBR	5/32" 1/4" 1/4"	3.41" 3.50" 3.50"	.281" .375" .375"	Double Acting, Retractable Pistor Double Acting Double Acting, Retractable Pistor	0720-0000 is 0728-0000 0721-0000 is 0729-0000 0720-0013	MODEL D Code 1
P20DAR P20DB P20DBR P20DL	5/32" 1/4" 1/4" 3/8"	3.41" 3.50" 3.50" 3.62"	.281" .375" .375" .500"	Double Acting, Retractable Pistor Double Acting Double Acting, Retractable Pistor Double Acting	0720-0000 is 0728-0000 0721-0000 is 0729-0000 0720-0013	MODEL CODEE DP20SAF5

Double Acting, Retractable Pistons

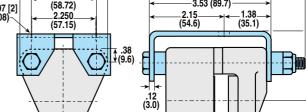
0719-0000

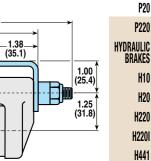
Tolomatic

	SINGL	<u>e ac</u>	TING			
	FIXED MO	DUNT - F	LOATING	DISC		
Accomm	odates disc th	iickness:	5/32"	1/4"	3/8"	
		Weight	1.5 lbs.	.68 kç	JS.	
3/8-24	7 NPT PORT 					
MODEL	DISC		OP	FIONS /		ASSEMBLY

CODE	disc Thk.	C	D	OPTIONS / DESCRIPTION	ASSEMBLY NUMBER
P20SA	5/32"	2.94"	-	Single Acting	0724-0000
P20SB	1/4"	3.03"	.093"	Single Acting	0722-0000
P20SL	3/8"	3.16"	.219"	Single Acting	0722-0002

SINGLE AC BRACKET	TING	WITH FLOATING
FLOATING MOUNT	T - FIXED	DISC
Accommodates disc thickness:	5/32"	1/4"
Weight	2.0 lbs.	.91 kgs.
<	←	





CALIPER DISC Brakes

FEATURES **APPLICATIONS**

SELECTION GRAPHS PNEUMATIC Brakes

P10

H960

BRAKE Combos H/ME20 H/ME220

MECHANICAL BRAKES

ME10

ME20 ME220 MB3

SPRING

APPLIED

BRAKES

FS20

FS220 FS2201 FS595 DISCS HUBS & BUSHINGS

TENSION CONTROL COMBINATIONS

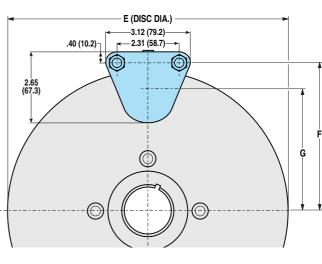
INTENSIFIER SELECTION WORKSHEET

ACTING dimensional drawing for additional measurements

MODEL Code	DISC Thk.	C	D	OPTIONS / Description	ASSEMBLY NUMBER	HYDRAULIC/ Mechanical Brake
P20SAF	5/32"	2.94"	-	Single Acting, Floating Bracket	0724-0001	COMBOS
P20SBF	1/4"	3.03"	.093"	Single Acting, Floating Bracket	0722-0001	H/ME20

MOUNTING DIMENSIONS Disc Diameter E 6 313" ۵۳ 10" 12"

Disc Diameter	Е	6.313"	8"	10"	12"	16"
	F	3.531"	4.375"	5.375"	6.375"	8.375"
Braking Radius	G	2.281"	3.125"	4.125"	5.125"	7.125"



BRAKE MODEL LETTER CODES

A 5/32" Thick Disc	E 1/2" Thick Disc	P Pneumatic Brake
B 1/4" Thick Disc	F Floating Bracket Mount	R Retractable Piston(s)
D Double Acting	L 3/8" Thick Disc	S Single Acting

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Caliper Disc Brakes **P220 SERIES - ALUMINUM**

FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 H960 BRAKE COMBOS H/ME20 H/ME220 BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES

HYDRAULIC/ MECHANICAL MECHANICAL FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS TENSION

AVAILABLE STYLES

Double Acting FIXED MOUNT - FIXED DISC

PICTURED: 0735-0100

Single Acting **FIXED MOUNT - FLOATING DISC**



PICTURED: 0733-0000

Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



IONS
100 PSI
6-5/16", 8", 10", 12", 16"
16"
Die cast aluminum
Zinc plated grade 8
Buna-N Standard
1.6 in ³
1.0 in ³
Replaceable, high-grade
7.5 in ²
1.625 in.
Single acting = 0.124 in^3 Double acting = 0.124 in^3
EPR seals
Retractable piston(s)
Available

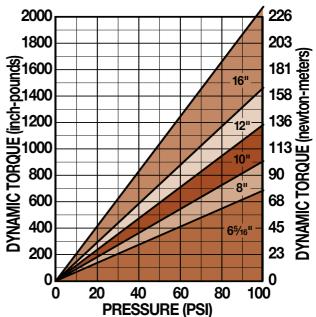
CONTROL COMBINATIONS INTENSIFIER SELECTION WORKSHEET

DISC SIZING EQUATIONS

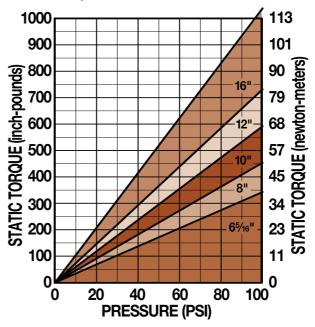
DYNAMIC TORQUE (IN.-LBS.) = 2.88 x BRAKING RADIUS (IN.) x PRESSURE (PSI) STATIC (PARKING) TORQUE (IN.-LBS.) = 1.44 x BRAKING RADIUS (IN.) x PRESSURE (PSI)

PERFORMANCE DATA

Dynamic Torque vs Pressure



Static Torque vs Pressure





CALIPER DISC Brakes

FEATURES

P10

P20

P220

BRAKES H10

H20

H220

H220I

H441

H960

BRAKE

H/ME20

BRAKES **ME10 ME20** ME220 MB3

FS20

FS220

FS595

Caliper Disc Brakes P220 SERIES - ALUMINUM

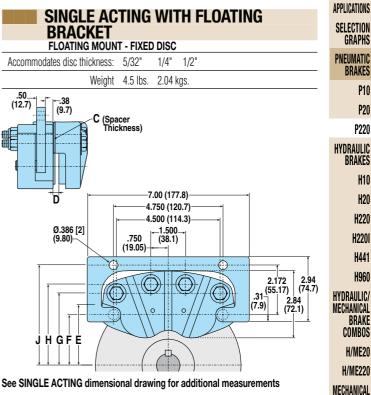
FIXED MOUNT - FIXED DISC					
Accommod	dates disc	c thickne	ss: 5/3	2" 1/4" 1/2"	
		Weig	ght 4.0	lbs. 1.82 kgs.	
PORT [2] 					
MODEL Code	DISC Thk.	A	В	OPTIONS / Description	ASSEMBLY NUMBER
P220DA	5/32"	.281"	4.50"	Double Acting	0735-0100
P220DAR	5/32"	.281"	4.50"	Double Acting, Retractable Pistons	0736-0110
P220DB	1/4"	.375"	4.50"	Double Acting	0735-0200
P220DBR	1/4"	.375"	4.50"	Double Acting, Retractable Pistons	0736-0210
P220DE	1/2"	.625"	5.00"	Double Acting	0735-0300
P220DER	1/2"	.625"	5.00"	Double Acting, Retractable Pistons	0736-0310

FIXED MOUNT - FLOATING DISC						
Accommo	dates dis	c thickne	ss: 5/32	." 1/4" 1/2"		
		Weig	ght 3.0 I	bs. 1.36 kgs.		
	Weight 3.0 lbs. 1.36 kgs. 3.75 (95.3) C (Spacer Thickness) 3/8-24 x 3.75 [4] 1.562 (39.67) D					
MODEL Code	disc Thk.	C	D	OPTIONS / Description	ASSEMBLY NUMBER	
P220SA	5/32"	-	.25"	Single Acting	0733-0000	
P220SB	1/4"	.094"	.34"	Single Acting	0733-0100	
P220SE	1/2"	.344"	.59"	Single Acting	0733-0200	

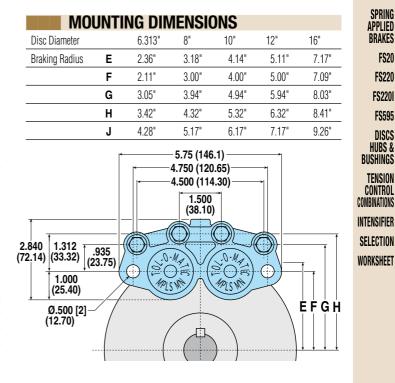
BRAKE MODEL LETTER CODES

A 5/32" Thick Disc	E 1/2" Thick Disc	R Retractable Piston(s)
B 1/4" Thick Disc	F Floating Bracket Mount	S Single Acting
D Double Acting	P Pneumatic Brake	

Tolomatic



MODEL Code	DISC Thk.	C	D	OPTIONS / Description	ASSEMBLY NUMBER
P220SAF	5/32"	-	.25"	Single Acting, Floating Bracket	0733-0020
P220SBF	1/4"	.094"	.34"	Single Acting, Floating Bracket	0733-0120
P220SEF	1/2"	.344"	.59"	Single Acting, Floating Bracket	0733-0220



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FEATURES APPLICATIONS

SELECTION GRAPHS

PNEUMATIC BRAKES

P10

P20 P220

BRAKES

H10

H20

H220

H220I

H441

H960

HYDRAULIC/

MECHANICAL BRAKE

COMBOS

H/ME20

H/ME220

Caliper Disc Brakes H10 SERIES - ALUMINUM

AVAILABLE STYLES

Double Acting FIXED MOUNT - FIXED DISC



PICTURED: 0701-0010

PICTURED: 0705-0010

Single Acting

FIXED MOUNT - FLOATING DISC

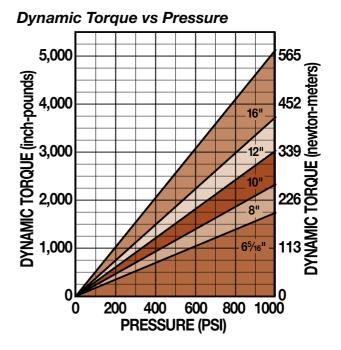
Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



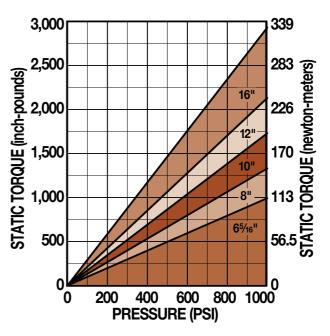
H10 SPECIFICATIONS

MECHANICAL		
BRAKES	Maximum Pressure Rating:	1,000 PSI
ME10	Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
ME20	Maximum disc diameter:	none
	Housing Material:	Extruded aluminum
ME220	Bolts:	Zinc plated grade 5
MB3	Seals:	Buna-N Standard
SPRING	Wearable friction material:	0.47 in ³
APPLIED Brakes	Wearable friction material/retractable models:	0.13 in ³
	Friction material:	Replaceable, high-grade
F\$20	Total lining area:	1.84 in ²
FS220	Total lining area/retractable materials:	1.64 in ²
FS2201	Piston diameter:	1.125 in.
F\$595	Fluid displacement, non-retractable:	Single acting = 0.029 in ³
DISCS		Double acting = 0.029 in ³
HUBS &	OPTIONS	
BUSHINGS	Seals:	EPR seals
TENSION	Pistons:	Retractable piston(s)
CONTROL	Floating bracket:	Stamped steel construction
COMBINATIONS	·	

PERFORMANCE DATA



Static Torque vs Pressure



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] - 0.624

Tolomatic

1.800.328.2174

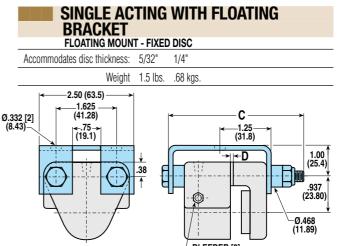
INTENSIFIER

SELECTION WORKSHEET

Caliper Disc Brakes *H10 SERIES - ALUMINUM*

FIXED MOUNT - FIXED DISC					
Accommodates d					
	Weig	ht 1.0	lbs45 kgs.		
1/8-27 NPT PORT					
BLEEDER [4]	<_1.00 (25.4)				
	<_1.00_→ (25.4) A	B	OPTIONS / Description	ASSEMBLY NUMBER	
[4] MODEL DISC		B .281"			
[4] Model Disc Code Thk.	A	-	DESCRIPTION	NUMBER	
[4]MODEL CODEDISC THK.H10DAC5/32"	A 3.50"	.281"	Description Double Acting	NUMBER 0701-0010	
[4] MODEL CODE DISC THK. H10DAC 5/32" H10DACG 5/32"	A 3.50" 3.50"	.281" .281"	Description Double Acting Double Acting, EPR Seals	NUMBER 0701-0010 0701-0011	
[4] MODEL DISC CODE THK. H10DACC 5/32" H10DACG 5/32" H10DARC 5/32"	A 3.50" 3.50" 3.50"	.281" .281" .281"	Deuble Acting Double Acting, EPR Seals Double Acting, Retractable Pistons	NUMBER 0701-0010 0701-0011 0708-0010	
[4] MODEL DISC CODE H10DACC 5/32" H10DACC 5/32" H10DARC 5/32" H10DARCG 5/32"	A 3.50" 3.50" 3.50" 3.50"	.281" .281" .281" .281" .281"	Deuble Acting Double Acting, EPR Seals Double Acting, Retractable Pistons Double Acting, Retr Pist, EPR Seals	NUMBER 0701-0010 0701-0011 0708-0010 0708-0011	
[4] MODEL DISC CODE H10DAC 5/32" H10DACG 5/32" H10DARC 5/32" H10DARCG 5/32" H10DARCG 5/32"	A 3.50" 3.50" 3.50" 3.50" 3.50"	.281" .281" .281" .281" .281" .375"	Deuble Acting Double Acting, EPR Seals Double Acting, Retractable Pistons Double Acting, Retr Pist, EPR Seals Double Acting	NUMBER 0701-0010 0701-0011 0708-0010 0708-0011 0702-0010	

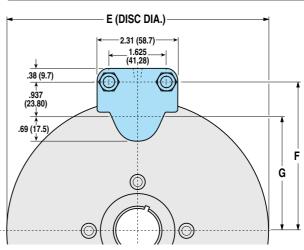
	SINGLE ACTING FIXED MOUNT - FLOATING DISC Accommodates disc thickness: 5/32" 1/4" Weight .75 lbs. .34 kos.					
↓ -38 (9.7) -937 (23.80) -38 (-38 (-38)	1/8-27 NPT PORT (39.6) (39.6) (23.9					
MODEL Code	DISC Thk.	C	D	OPTIONS / Description	Assembly Number	
H10SAC	5/32"	3.00"	_	Single Acting	0705-0010	
H10SACG	5/32"	3.00"	-	Single Acting, EPR Seals	0705-0008	
H10SBC	1/4"	3.00"	.094"	Single Acting	0703-0010	



See SINGLE ACTING dimensional drawing for additional measurements

MODEL Code	DISC Thk.	C	D	OPTIONS / Description	ASSEMBLY NUMBER
H10SAFC	5/32"	3.75"	-	Single Acting, Floating Bracket	0705-0011
H10SAFCG	5/32"	3.75"	-	Single Acting, FtgBrkt, EPR Seals	0705-0009
H10SBFC	1/4"	3.75"	.094"	Single Acting, Floating Bracket	0703-0013

MOUNTING DIMENSIONS						
Disc Diameter	Е	6.313"	8"	10"	12"	16"
	F	3.469"	4.313"	5.313"	6.313"	8.313"
Braking Radius	G	2.532"	3.376"	4.376"	5.376"	7.376"



BRAKE MODEL LETTER CODES

Tolomatic

A 5/32" Thick Disc	D Double Acting	H Hydraulic Brake
B 1/4" Thick Disc	F Floating Bracket Mount	R Retractable Piston(s)
C With Bleeder Fitting	G EPR Seals	S Single Acting

BLEEDER [2]

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BRAKES FEATURES APPLICATIONS SELECTION GRAPHS

PNEUMATIC

BRAKES

P10

P20

P220

HYDRAULIC

BRAKES

H10

H20 H220

H220I

H441

H960 Hydraulic/ Mechanical Brake Combos H/Me20 H/Me220 Mechanical

BRAKES ME10 ME20 ME220 MB3 SPRING

APPLIED BRAKES

FS20

FS220

FS2201 FS595

DISCS HUBS & Bushings

TENSION CONTROL COMBINATIONS INTENSIFIER SELECTION WORKSHEET

CALIPER DISC Brakes



FEATURES APPLICATIONS

SELECTION GRAPHS

PNEUMATIC BRAKES

P10 P20

P220

HYDRAULIC

BRAKES

H10 H20

H220

H220I

H441 H960

HYDRAULIC/

MECHANICAL BRAKE COMBOS

H/ME20

H/ME220

CONTROL COMBINATIONS

INTENSIFIER

SELECTION WORKSHEET

Caliper Disc Brakes H20 SERIES - ALUMINUM

AVAILABLE STYLES

Double Acting FIXED MOUNT - FIXED DISC



PICTURED: 0720-0010

PICTURED: 0724-0010

Single Acting

FIXED MOUNT - FLOATING DISC

Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC

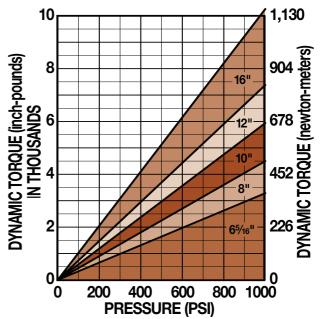


H20 SPECIFICATIONS

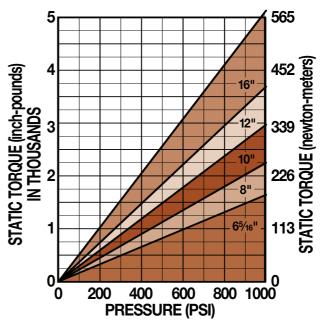
MECHANICAL		
BRAKES	Maximum Pressure Rating:	1,000 PSI
ME10	Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
ME20	Maximum disc diameter:	none
	Housing Material:	Extruded aluminum
ME220	Bolts:	Zinc plated grade 8
MB3	Seals:	Buna-N Standard
SPRING	Wearable friction material:	0.8 in ³
APPLIED Brakes	Wearable friction material/retractable models:	0.5 in ³
	Friction material:	Replaceable, high-grade
F\$20	Total lining area:	3.75 in ²
F\$220	Piston diameter:	1.625 in.
FS2201	Fluid displacement, non-retractable:	Single acting = 0.062 in ³
F\$595		Double acting = 0.062 in ³
DISCS	OPTIONS	
HUBS &	Seals:	EPR seals
BUSHINGS	Pistons:	Retractable piston(s)
TENSION	Floating bracket:	Stamped steel construction

PERFORMANCE DATA

Dynamic Torque vs Pressure



Static Torque vs Pressure



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



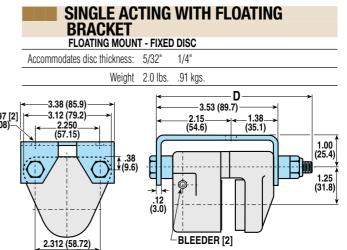
Caliper Disc Brakes H20 SERIES - ALUMINUM

DOUBLE ACTING

	FIXED	MOUN	T - FIX	ED DISC	0			BRA	CKE	T			ILU
Accommod	ates dis	c thickn	ess: 5	/32"	1/4" 3/8" 1/2"			FLOATI	NG MO	UNT - F	IXED D	ISC	
		We	ight 2	.0 lbs.	.91 kgs.		Accommoda	tes disc	thickne	ss: 5/3	32" 1,	/4"	
1/8-27 NPT P	— A — B ∂—+C⊦	←1.12→ (28.4)	╧╢╴			Ø.397 [2 (10.08)—	3.38 (i 3.12 (i 2.22 (57.	79.2)́— 50		<u>, , , , , , , , , , , , , , , , , , , </u>)1 kgs. 3.53 	D 3 (89.7) ≺
MODEL	DISC THK.	A		/8-24 SLEEDEF 1] C	r Options / Description	ASSEMBLY NUMBER	0				.12 3.0)		
H20DAC	5/32"	4.50"	3.41"	.281"	Double Acting	0720-0010	2.312 (58.72)			<i>–</i> Е	BLEEDE	R [2]
H20DACG	5/32"	4.50"	3.41"	.281"	Double Acting, EPR Seals	0720-0011	See SINGLE	ACTIN	G dime	nsional	drawing	g for add	ditional
H20DARC	5/32"	4.50"	3.41"	.281"	Dbl. Acting, Retractable Pistons	0728-0010	MODEL	DISC				OPTION	IC /
H20DARCG	5/32"	4.50"	3.41"	.281"	Dbl. Acting, Retr Pist, EPR Seals	0728-0011	CODE	THK.	D	Ε	F	DESCR	
H20DBC	1/4"	4.50"	3.50"	.375"	Double Acting	0721-0010	H20SAFC	5/32"	4.50"	2.94"	-	Sng Ad	ct, Float
H20DBCG	1/4"	4.50"	3.50"	.375"	Double Acting, EPR Seals	0721-0011	H20SAFCG	5/32"	4.50"	2.94"	-	Sng Ad	ct, Fltg I
H20DBRC	1/4"	4.50"	3.50"	.375"	Dbl. Acting, Retractable Pistons	0729-0010	H20SBFC	1/4"	4.50"	3.03"	.094"	Sng Ad	ct, Float
H20DBRCG	1/4"	4.50"	3.50"	.375"	Dbl. Acting, Retr Pist, EPR Seals	0729-0011	H20SBFCG	1/4"	4.50"	3.03"	.094"	Sng Ad	ct, Fltg I
H20DLRC	3/8"	4.50"	3.62"	.500"	Dbl. Acting, Retractable Pistons	0729-0008							
H20DEC	1/2"	5.00"	3.75"	.625"	Double Acting	0725-0010							
H20DECG	1/2"	5.00"	3.75"	.625"	Double Acting, EPR Seals	0725-0011		10U	NTI	IG D	IME	NSIO	NS
H20DERC	1/2"	5.00"	3.75"	.625"	Dbl. Acting, Retractable Pistons	0719-0010	Disc Diam	eter	G	6.313"	8	11	10"
H20DERCG	1/2"	5.00"	3.75"	.625"	Dbl. Acting, Retr Pist, EPR Seals	0719-0011			Н	3.531"	4	.375"	5.375

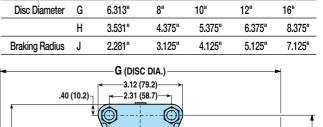
SINGLE ACTING

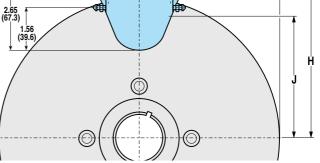
	FIXED	MOUNT	' - FL0/	ATING	DISC		
Accommod	lates dis	c thickne	ss: 5/3	32"	1/4"	3/8"	
		Weig	ght 1.5	5 lbs.	.68 kį	JS.	
1/8-27 3/8-24 BLEEDER [2]	× NPT P(— D— — E— → F ← 2 →	-1.38				
MODEL Code	DISC Thk.	D	E	F		OPTIONS / Description	ASSEMBLY NUMBER
H20SAC	5/32"	3.75"	2.94"	-		Single Acting	0724-0010
H20SACG	5/32"	3.75"	2.94"	-		Single Acting, EPR Seals	0724-0012
H20SBC	1/4"	3.75"	3.03"	.094'	I	Single Acting	0722-0010
H20SBCG	1/4"	3.75"	3.03"	.094'		Single Acting, EPR Seals	0722-0013
H20SLC	3/8"	4.00"	3.16"	.219'	1	Single Acting	0724-0014
H20SLCG	3/8"	4.00"	3.16"	.219'	1	Single Acting, EPR Seals	0724-0016



FING dimensional drawing for additional measurements

							11000
MODEL Code	DISC Thk.	D	E	F	OPTIONS / Description	ASSEMBLY NUMBER	HYDRAULIC/ Mechanical
H20SAFC	5/32"	4.50"	2.94"	-	Sng Act, Floating Bracket	0724-0011	BRAKE Combos
H20SAFCG	5/32"	4.50"	2.94"	-	Sng Act, Fltg Brkt, EPR Seals	0724-0013	H/ME20
H20SBFC	1/4"	4.50"	3.03"	.094"	Sng Act, Floating Bracket	0722-0011	H/ME20
H20SBFCG	1/4"	4.50"	3.03"	.094"	Sng Act, Fltg Brkt, EPR Seals	0722-0014	
							MECHANICAL





BRAKE MODEL LETTER CODES

A 5/32" Thick Disc	E 1/2" Thick Disc	L 3/8" Thick Disc
B 1/4" Thick Disc	F Floating Bracket Mount	R Retractable Piston(s)
C With Bleeder Fitting	G EPR Seals	S Single Acting
D Double Acting	H Hydraulic Brake	



CALIPER DISC Brakes

FEATURES APPLICATIONS

SELECTION

PNEUMATIC

GRAPHS

BRAKES

P10

P20

P220

H10

H20

H220 H220I

H441

H960 HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220

> BRAKES **ME10**

> > **ME20**

ME220

MB3

SPRING APPLIED

BRAKES

FS20

FS220

FS2201 FS595

DISCS HUBS & BUSHINGS

TENSION CONTROL COMBINATIONS **INTENSIFIER** SELECTION WORKSHEET

HYDRAULIC BRAKES



Caliper Disc Brakes H220 SERIES - ALUMINUM

FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H2201 H441 H960 HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220 MECHANICAL BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595

AVAILABLE STYLES

Double Acting FIXED MOUNT - FIXED DISC Single Acting FIXED MOUNT - FLOATING DISC



PICTURED: 0735-0301

PICTURED: 0733-0201

Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



H220 SPECIFICATIONS

Maximum Pressure Rating:	1,500 PSI
Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
Maximum disc diameter:	16"
Housing Material:	Die cast aluminum
Bolts:	Zinc plated grade 8
Seals:	Buna-N Standard
Wearable friction material:	1.6 in ³
Wearable friction material/retractable models:	1.0 in ³
Friction material:	Replaceable, high-grade
Total lining area:	7.5 in ²
Piston diameter:	1.625 in.
Fluid displacement, non-retractable:	Single acting = 0.124 in^3 Double acting = 0.124 in^3
OPTIONS	
Seals:	EPR seals
Pistons:	Retractable piston(s)
Floating bracket:	Available

COMBINATIONS Intensifier Selection Worksheet

DISCS

HUBS & Bushings

TENSION CONTROL

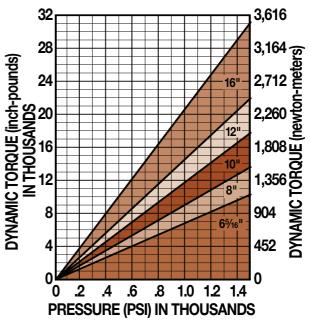
DISC SIZING EQUATIONS

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)

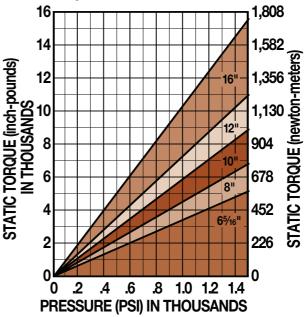
Tolomatic

PERFORMANCE DATA

Dynamic Torque vs Pressure



Static Torque vs Pressure



BRAKE MODEL LETTER CODES

A 5/32" Thick Disc	D Double Acting	H Hydraulic Brake
B 1/4" Thick Disc	E 1/2" Thick Disc	R Retractable Piston(s)
C With Bleeder Fitting	F Floating Bracket Mount	S Single Acting
	G EPR Seals	

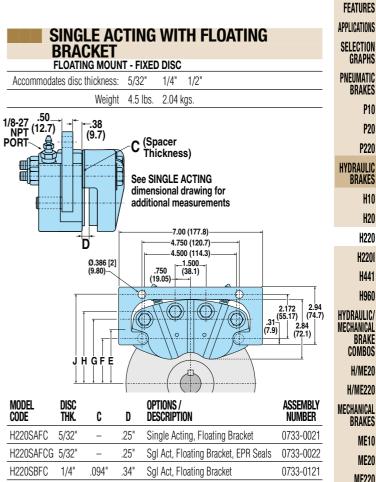


Caliper Disc Brakes H220 SERIES - ALUMINUM

			ACT		
Accommoda					
		Wei) lbs. 1.82 kgs.	
1.562 (39.67)	- B		3/8-	-1/8-27 NPT PORT [2] 24 x B [4]	
MODEL CODE	DISC Thk.	TY: A	P. B	OPTIONS / Description	ASSEMBLY NUMBER
H220DAC	5/32"	.281"	4.50"	Double Acting	0735-0101
H220DACG	5/32"	.281"	4.50"	Double Acting, EPR Seals	0735-0103
H220DARC	5/32"	.281"	4.50"	Dbl Act, Retractable Pistons	0736-0111
H220DARCG	5/32"	.281"	4.50"	Dbl Act, Retractable Pistons, EPR Seals	0736-0112
H220DBC	1/4"	.375"	4.50"	Double Acting	0735-0201
H220DBCG	1/4"	.375"	4.50"	Double Acting, EPR Seals	0735-0202
H220DBRC	1/4"	.375"	4.50"	Dbl Act, Retractable Pistons	0736-0211
H220DBRCG	1/4"	.375"	4.50"	Dbl Act, Retractable Pistons, EPR Seals	0736-0212
H220DEC	1/2"	.625"	5.00"	Double Acting	0735-0301
H220DECG	1/2"	.625"	5.00"	Double Acting, EPR Seals	0735-0302
H220DERC	1/2"	.625"	5.00"	Dbl Act, Retractable Pistons	0736-0311
-					

SINGLE ACTING MOUNT - FLOATING DISC

	-		DISC	
es disc th	ickness:	5/32"	1/4" 1/2"	
	Weight	3.0 lbs.	1.36 kgs.	
		1 22		
	D.	(31.0)		
disc Thk.	C	D	OPTIONS / Description	ASSEMBLY NUMBER
	C —	D .25"		
THK.	C - -	-	DESCRIPTION	NUMBER 0733-0001
THK. 5/32"	C - .094"	.25"	DESCRIPTION Single Acting	NUMBER 0733-0001
THK. 5/32" 5/32"	-	.25" .25"	DESCRIPTION Single Acting Single Acting, EPR Seals	NUMBER 0733-0001 0733-0006 0733-0101
THK. 5/32" 5/32" 1/4"	_ 	.25" .25" .34"	DESCRIPTION Single Acting Single Acting, EPR Seals Single Acting	NUMBER 0733-0001 0733-0006 0733-0101
		Bis disc thickness: Weight 3.75 (95.3) 562 (39.67) D	Weight 3.0 lbs.	Weight 3.0 lbs. 1.36 kgs.



		•	-		
H220SAFC	5/32"	_	.25"	Single Acting, Floating Bracket	0733-0021
H220SAFCG	5/32"	-	.25"	Sgl Act, Floating Bracket, EPR Seals	0733-0022
H220SBFC	1/4"	.094"	.34"	Sgl Act, Floating Bracket	0733-0121
H220SBFCG	1/4"	.094"	.34"	Sgl Act, Floating Bracket, EPR Seals	0733-0122
H220SEFC	1/2"	.344"	.59"	Sgl Act, Floating Bracket	0733-0221
H220SEFCG	1/2"	.344"	.59"	SglAct, Floating Bracket, EPR Seals	0733-0222

ł

Tolomatic

MOUNTING DIMENSIONS Disc Diameter 6.313" 8" 10" 12" 16" Braking Radius Е 2.36' 3.18" 4.14" 5.11" 7.17" F 3.00' 4.00" 5.00" 7.09" 2.11' G 3.94" 4.94" 5.94" 8.03" 3.05" Н 8.41" 3.42" 4.32" 5.32" 6.32" 6.17" J 4.28 5.17" 7.17" 9.26" 5.75 (146.1) 4.750 (120.65) 4.500 (114.30) _1/8-27 NPT PORT [2] _1.500_ (38.10) 2.840 (72.14) (33.32) (.935 (23.75) 0-M_1 0-0-5 .O.M. 4 1.000 (25.40) MPLS W PLSM ĖFĠĤ Ø.500 [2] (12.70)

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CALIPER DISC Brakes

P10

P20

P220

H10

H20

H220

H220I

H441 H960

BRAKE

ME10

ME20

ME220

MB3 SPRING

APPLIED

BRAKES

FS20

FS220

FS2201

FS595

DISCS

HUBS & BUSHINGS

TENSION

CONTROL

COMBINATIONS

INTENSIFIER

SELECTION

WORKSHEET



FEATURES

P10

P20

H10

H20

H220

H220I

H441

H960

HYDRAULIC/

MECHANICAL BRAKE COMBOS

H/ME20

H/ME220

HUBS (BUSHINGS

Caliper Disc Brakes H220I SERIES - CAST IRON

APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P220 HYDRAULIC BRAKES

AVAILABLE STYLES

Double Acting FIXED MOUNT - FIXED DISC



PICTURED: 0735-0403

PICTURED: 0733-0402

Single Acting

FIXED MOUNT - FLOATING DISC

Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



H220I SPECIFICATIONS

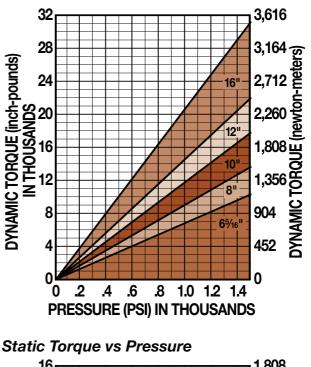
MECHANICAL		
BRAKES	Maximum Pressure Rating:	1,500 PSI
ME10	Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
ME20	Maximum disc diameter:	16"
	Housing Material:	Cast ductile iron
ME220	Bolts:	Zinc plated grade 8
MB3	Seals:	Buna-N Standard
SPRING	Wearable friction material:	2.7 in ³
APPLIED Brakes	Friction material:	Replaceable, high-grade
	Total lining area:	9.6 in ²
FS20	Piston diameter:	1.625 in.
F\$220	Fluid displacement:	
FS2201	· · · · · · · · · · · · · · · · · · ·	Double acting = 0.124 in ³
FS595	OPTIONS	
	Seals:	EPR seals
DISCS	Floating bracket:	
HUBS &	FIUdility Didukel.	Availabit

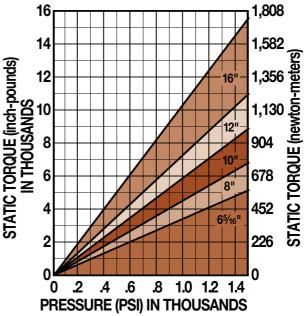
TENSION CONTROL COMBINATIONS INTENSIFIER

SELECTION WORKSHEET

PERFORMANCE DATA

Dynamic Torque vs Pressure





BRAKE MODEL LETTER CODES

A 5/32" Thick Disc	E 1/2" Thick Disc	L 3/8" Thick Disc
B 1/4" Thick Disc	F Floating Bracket Mount	I Iron
C With Bleeder Fitting	G EPR Seals	0 1-1/4" Thick Disc
D Double Acting	H Hydraulic Brake	S Single Acting

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)

1.800.328.2174



CALIPER DISC Brakes

FEATURES **APPLICATIONS** SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES

H10 H20 H220 H220I H441 H960 HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220

> > FS20

FS220

FS2201

FS595

DISCS

HUBS & BUSHINGS

TENSION

CONTROL

COMBINATIONS

INTENSIFIER SELECTION

WORKSHEET

Caliper Disc Brakes H220I SERIES - CAST IRON

		BLE /	-	-	
Accommoda	ates disc	c thicknes	ss: 5/3	2" 1/4" 3/8" 1/2"	
		Weig	ıht 12.	0 lbs. 5.40 kgs.	
		A		1/8-27 NPT Port [2]	
1.56 1.97 (39.6) – (50.0)			1.16 (29.5)	3/8-24 x B [4]	
MODEL Code	DISC Thk.	A	В	OPTIONS / Description	ASSEMBLY NUMBER
		A 1.031"	B 5.00"		
CODE	THK. 5/32"		-	DESCRIPTION	NUMBER
CODE H220DACI	THK. 5/32"	1.031"	5.00"	DESCRIPTION Double Acting, Cast Iron	NUMBER 0735-0403
CODE H220DACI H220DACIG	THK. 5/32" 5/32"	1.031" 1.031"	5.00" 5.00"	Description Double Acting, Cast Iron Double Acting, Cast Iron, EPR Seals	NUMBER 0735-0403 0735-0407
CODE H220DACI H220DACIG H220DBCI	THK. 5/32" 5/32" 1/4"	1.031" 1.031" 1.125"	5.00" 5.00" 5.00"	Deuble Acting, Cast Iron Double Acting, Cast Iron, EPR Seals Double Acting, Cast Iron	NUMBER 0735-0403 0735-0407 0735-0404
CODE H220DACI H220DACIG H220DBCI H220DBCIG	THK. 5/32" 5/32" 1/4" 1/4"	1.031" 1.031" 1.125" 1.125"	5.00" 5.00" 5.00" 5.00"	Double Acting, Cast Iron Double Acting, Cast Iron, EPR Seals Double Acting, Cast Iron Double Acting, Cast Iron Double Acting, Cast Iron, EPR Seals	NUMBER 0735-0403 0735-0407 0735-0404 0735-0404 0735-0408
CODE H220DACI H220DACIG H220DBCI H220DBCIG H220DLCI	THK. 5/32" 5/32" 1/4" 1/4" 3/8"	1.031" 1.031" 1.125" 1.125" 1.250"	5.00" 5.00" 5.00" 5.00" 5.00"	Deuble Acting, Cast Iron Double Acting, Cast Iron, EPR Seals Double Acting, Cast Iron, EPR Seals Double Acting, Cast Iron, EPR Seals Double Acting, Cast Iron	NUMBER 0735-0403 0735-0407 0735-0404 0735-0404 0735-0408 0735-0405

FIXED MOUNT - FLOATING DISC									
Accommodat					3/8"	1/2"			
		Weigh	it 9.0	lbs. 4.08	kgs.				
+ D + 1.25 + (31.8) 2.00 (50.8)	1.16 (29.5)	+ 1/8-27 Port [3/8 + 1.56 (3	2] -24 x B [4]						
MODEL CODE	DISC Thk.	B	D	OPTIONS Descrip			ASSEMBLY NUMBER		
H220SACI	5/32"	4.00"	3.45"	Single Ad	cting, Ca	ast Iron	0733-0402		
H220SACIG	5/32"	4.00"	3.45"	Single A	cting, Ca	ast Iron, EPR Seals	0733-0406		
H220SBCI	1/4"	4.00"	3.55"	Single Ad	cting, Ca	ast Iron	0733-0403		
H220SBCIG	1/4"	4.00"	3.55"	Single Ac	cting, Ca	ast Iron, EPR Seals	0733-0407		
H220SLCI	3/8"	4.00"	3.67"	Single Ac	cting, Ca	ast Iron	0733-0404		
H220SLCIG	3/8"	4.00"	3.67"	Single Ac	cting, Ca	ast Iron, EPR Seals	0733-0408		
H220SECI	1/2"	4.50"	3.79"	Single Ac	cting, Ca	ast Iron	0733-0405		
H220SECIG	1/2"	4.50"	3.79"	Single Ac	cting, Ca	ast Iron, EPR Seals	0733-0409		
	Call FAC	CTORY	for dim	nensions f	or the f	ollowing models:			
H220SOIC	1-1/	4"	Sing	le Acting, C	0733-0226				
H220SOICG	1-1/	4"	Sing	le Acting, C	Cast Iror	ı, EPR Seals	0733-0227		

SINGLE ACTING WITH FLOATING BRACKET FLOATING MOUNT - FIXED DISC Accommodates disc thickness: 5/32" 1/4" 3/8" 1/2"	
Weight 10.5 lbs. 4.76 kgs.	2.62 (66.5)
1.312 (55.17) (33.32) 2.640 (72.14) (72.14) (25.40)	EFGHJ
MODEL DISC OPTIONS / CODE THK B C D DESCRIPTION	ASSEMBLY NUMBER

MUDEL	DISC THK.	D	c	n		ASSEMBLY	
CODE	IUV.	В	C	D	DESCRIPTION	NUMBER	H/ME220
H220SAFCI	5/32"	4.00"	.83"	3.45"	Sgl Act, Floating Bracket, Cast Iron	0733-0422	MECHANICAL
H220SAFCIG	5/32"	4.00"	.83"	3.45"	SglAct, Ftg Bkt, Iron, EPR Seals	0733-0426	BRAKES
H220SBFCI	1/4"	4.00"	.92"	3.55"	Sgl Act, Floating Bracket, Cast Iron	0733-0423	ME10
H220SBFCIG	1/4"	4.00"	.92"	3.55"	SglAct, Ftg Bkt, Iron, EPR Seals	0733-0427	ME20
H220SLFCI	3/8"	4.00"	1.05"	3.67"	Sgl Act, Floating Bracket, Cast Iron	0733-0424	ME220
H220SLFCIG	3/8"	4.00"	1.05"	3.67"	Sgl Act, Ftg Bkt, Iron, EPR Seals	0733-0428	MB3
H220SEFCI	1/2"	4.50"	1.17"	3.79"	Sgl Act, Floating Bracket, Cast Iron	0733-0425	SPRING
H220SEFCIG	1/2"	4.50"	1.17"	3.79"	Sgl Act, Ftg Bkt, Iron, EPR Seals	0733-0429	APPLIED

MOUNTING DIMENSIONS Disc Diameter 6.313" 8" 10" 12" 16" Braking Radius Е 2.36" 3.18" 4.14" 5.11" 7.17" F 2.11" 3.00' 4.00" 5.00" 7.09" G 3.05" 3.94" 4.94" 5.94" 8.03" 5.32" 6.32" Н 3.42" 4.32" 8.41" 9.26" J 4.28" 5.17" 6.17" 7.17' 5.75 (146.1) 4.750 (120.65) 4.500 (114.30) 1.312 (33.32) 1.500 (38.10) (\mathbb{C}) \bigcirc \mathfrak{C} 2.840 (72.14) .935 (23.75) ĖĖĠH _Ø.500 [2] (12,70) / 1.000 (25.40) £1

Tolomatic



Caliper Disc Brakes H441 SERIES - DUCTILE IRON

AVAILABLE STYLES

Double Acting FIXED MOUNT - FIXED DISC



PICTURED: 0774-0000

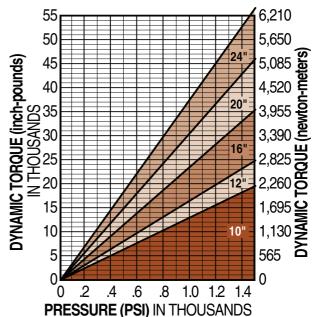
H441 SPECIFICATIONS

Maximum Pressure Rating:	1,500 PSI
Accommodates Tolomatic disc diameters:	10", 12", 16"
Maximum disc diameter:	none
Housing Material:	Cast ductile iron
Bolts:	Zinc plated grade 5
Seals:	Buna-N Standard
Wearable friction material:	3.87 in ³
Metallic:	3.38 in ³
Friction material:	Replaceable, high-grade
Total lining area:	9.14 in ²
Metallic:	7.36 in ²
Piston diameter:	2.50 in.
Fluid displacement: for .03 inch clearance	Double acting = 0.147 in ³
OPTIONS	
Seals:	EPR seals
Friction material:	Sintered metallic

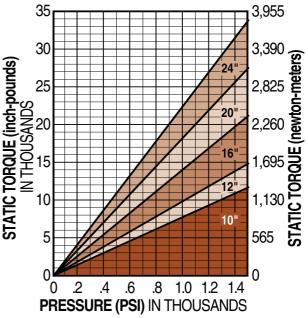
BRAKE N	IODEL LETTER C	ODES
Double Acting	G EPR Seals	H Hydraulic Brake

PERFORMANCE DATA

Dynamic Torque vs Pressure



Static Torque vs Pressure



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

> Tolomatic EXCELLENCE IN MOTION

D

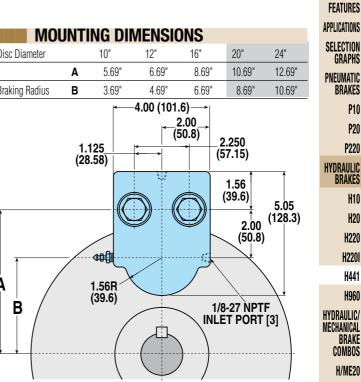
INTENSIFIER

SELECTION WORKSHEET

Caliper Disc Brakes Strakes H441 SERIES - DUCTILE IRON

DOUBLE ACTING FIXED MOUNT - FIXED DISC Disc Diameter 10" Accommodates disc thickness: N/A 5.69" Α Weight 17.0 lbs.7.71 kgs. Braking Radius в 3.69 5/8-18 x 5.50 LONG FOR DISC THICKNESSES UP TO 1/2" [LONGER BOLTS ARE AVAILABLE] SPACER BY CUSTOMER TO BE 3/8" THICKER THAN DISC 1.125 (28.58)←.49 (12.4)1. 1 - Hereite - Ee ٢ 0 Α 1.56R (39.6) 1/8-27 NPTF В INLET 1.25 1.81 PORT ^{*} → (31.8) (46.0) [3] ASSEMBLY MODEL DISC **OPTIONS /** CODE THK. DESCRIPTION NUMBER H441D N/A **Double Acting** 0774-0000 Double Acting, EPR Seals H441DG 0774-0001 N/A SH441D N/A Double Acting, w/Sintered Metal Pads 0774-0002

0774-0003



APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 H960 HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220 MECHANICAL BRAKES **ME10 ME20** ME220 MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS INTENSIFIER SELECTION

CALIPER DISC Brakes

www.tolomatic.com

SH441DG

N/A

Double Acting, EPR Seals, w/Sintered Metal Pads



WORKSHEET



FEATURES APPLICATIONS

SELECTION GRAPHS

PNEUMATIC

BRAKES P10

P20

P220

HYDRAULIC

BRAKES

H10

H20

H220

H220I

H441

H960 HYDR/

FS20

FS220

FS2201

FS595

DISCS

HUBS &

BUSHINGS

TENSION

CONTROL

Caliper Disc Brakes H960 SERIES - DUCTILE IRON

AVAILABLE STYLES

Double Acting FIXED MOUNT - FIXED DISC



PICTURED: 0778-0003

H960 SPECIFICATIONS

Maximum Pressure Rating:	1,500 PSI (intermittent duty) 1,000 PSI (continuous duty)
Accommodates Tolomatic disc diameters:	12", 16"
Maximum disc diameter:	18"
Housing Material:	Cast ductile iron
Bolts:	Zinc plated grade 5
Seals:	Buna-N Standard
Wearable friction material:	9.9 in ³
Friction material:	Replaceable, high-grade
Total lining area:	32.0 in ²
Piston diameter:	3.50 in.
Fluid displacement:	Double acting = 0.576 in^3
OPTIONS	
Seals:	EPR seals
Seals:	Viton [®] seals
	Accommodates Tolomatic disc diameters: Maximum disc diameter: Housing Material: Bolts: Seals: Wearable friction material: Total lining area: Piston diameter: Fluid displacement: OPTIONS Seals:

BRAKE MODEL LETTER CODES							
C With Bleeder Fitting	H Hydraulic Brake	V Viton [®] Seals					
D Double Acting	I Iron	X Non-standard Disc					
E 1/2" Thick Disc	N 1" Thick Disc	Thickness					
G EPR Seals	T .188" Thick Disc						

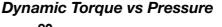
COMBINATIONS INTENSIFIER SELECTION WORKSHEET

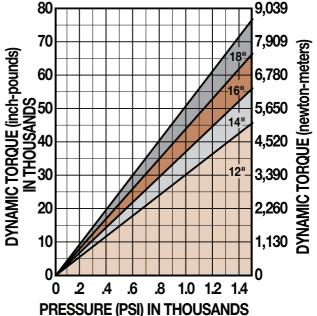
DISC SIZING EQUATIONS

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

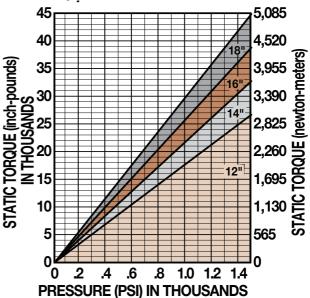
Tolomatic

PERFORMANCE DATA





Static Torque vs Pressure



Caliper Disc Brakes H960 SERIES - DUCTILE IRON

	JBLE						UNTI	-	NENSIC	NS	_	APPLICATIONS Selection
Accommodates d	D MOUN			/2" 1" 1-1/8"		– Disc Diameter		12"	14"	16"	18"	GRAPHS
				15.88 kgs.			D	6.712"	7.712"	8.712"	9.712"	PNEUMATIC
	110	igni o	0.0 103.	10.00 kg3.		– Braking Radius	E	4.40"	5.40"	6.40"	7.40"	BRAKES
A B		→					<u>ا</u>		5 (212.73) —) (165.10) —			P10
1.91	→		0 (10 7)						0`(82.55)́→			P20
(48.5)→ C	t l		0 (12.7) TYP.]						←3.250 (82 _1.625_) (41.28)	2.55)→	-Ø.66 [2] (16.8)	P220
						*			(41.28)		(16.8)	HYDRAULIC BRAKES
^j	<u>(</u>							X			5/8-18 (2)	H10
		1/	8-27			<u>↑</u>				- A		H20
		Ň	IPTF Ort			6.25 2.31 (158.8) (58.7) 1.56 (39.6)			1000 - 100 -	-		H220
@	@					[REF] (39.6)	0			}		H220
						2.25 (57.2)		ĴĹ	1 /	The first of the second	\sim	H441
								1:5->				H960
							/	3.06R	9.	DOR 28.6)	E	HYDRAULIC/ MECHANICAL
							.32 +	(77.7)			Ī \	BRAKE COMBOS
							(8.1)↑					H/ME20
											Ļ	H/ME220
)									MECHANICAL
		∥ ⊿								//	1	BRAKES
MODEL DISC Code Thk.	Α	В	C	OPTIONS / Description	ASSEMBLY NUMBER							ME10
H960DTCI 3/16		3.13"	.31"	Double Acting, Iron	0778-0012)						ME20
H960DECI 1/2"	4.45"	3.45"	.63"	Double Acting, Iron	0778-0003	_						ME220
H960DECIG 1/2"	4.45"	3.45"	.63"	Double Acting, Iron, EPR Seals	0778-0004	_ 						MB3
H960DECIV 1/2"	4.45"	3.45"	.63"	Double Acting, Iron, Viton [®] Seals	0778-0005							SPRING
H960DNCI 1"	4.95"	3.95"	1.13"	Double Acting, Iron	0778-0011							APPLIED BRAKES
H960DXCI 1-1/8	" 5.08"	4.08"	1.26"	Double Acting, Iron	0778-0000)						FS20
												F\$20
												F\$220
												FS595
												DISCS HUBS &
												BUSHINGS

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www.tolomatic.com



TENSION Control Combinations

INTENSIFIER Selection Worksheet

CALIPER DISC Brakes

FEATURES



FEATURES APPLICATIONS

SELECTION

PNEUMATIC BRAKES

GRAPHS

P10 P20 P220

BRAKES H10

H20

H220 H220I

H441

HOUU

HYDRAULIC/

MECHANICAL

BRAKE COMBOS H/ME20 H/ME220 MECHANICAL BRAKES

ME10

ME20 ME220

MB3

SPRING APPLIED

BRAKES

FS20 FS220

FS2201 FS595 DISCS

HUBS & BUSHINGS

TENSION CONTROL

COMBINATIONS

SELECTION

WORKSHEET

Caliper Disc Brakes H/ME20 SERIES - ALUMINUM

AVAILABLE STYLES

"L" Long Lever (3.50") Single Acting FIXED MOUNT - FLOATING DISC



PICTURED: 0755-0360

"L" Long Lever (3.50") Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



PICTURED: 0755-0260

"M" Machined Cam Lever (1.75") Single Acting **FIXED MOUNT - FLOATING DISC**



PICTURED: 0755-0300

"M" Machined Cam Lever (1.75") Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



PICTURED: 0755-0200

"S" Short Lever (1.75") Single Acting **FIXED MOUNT - FLOATING DISC**



PICTURED: 0755-0330

"S" Short Lever (1.75") Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



DISC SIZING EQUATIONS

INTENSIFIER 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)

"L" LONG LEVER (3.50"):

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.)

"M" MACHINED CAM (1.75") & "S" SHORT LEVER (1.75"):

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.)

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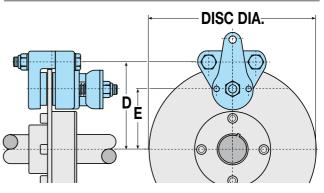
BRAKING RADIUS (IN.) = [DISC DIAMETER ÷ 2] - 0.875



1,000 PSI
225 Lbs.
450 Lbs.
6-5/16", 8", 10", 12", 16"
none
Cast aluminum
Zinc plated grade 5
EPR Standard
0.8 in ³
Replaceable, high-grade
3.75 in ²
1.625 in.
Single acting = 0.062 in ³
Buna-N seals
Stamped steel construction

MOUNTING DIMENSIONS

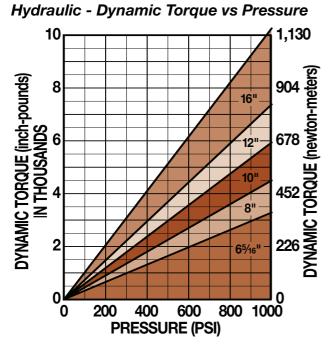
Disc Diameter		6.313"	8"	10"	12"	16"
	D	3.531"	4.375"	5.375"	6.375"	8.375"
Braking Radius	Е	2.281"	3.125"	4.125"	5.125"	7.125"



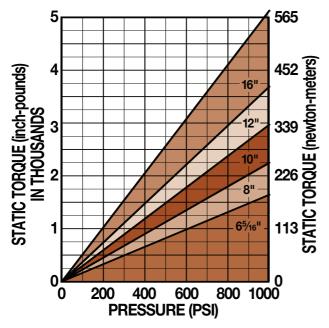


Caliper Disc Brakes *H/ME20 SERIES - ALUMINUM*

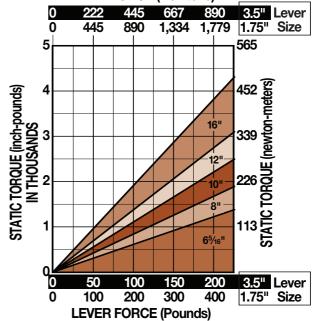
PERFORMANCE DATA



Hydraulic - Static Torque vs Pressure



Mechanical - Dynamic Torque vs Lever Force **LEVER FORCE (Newtons)** 3.5" Lever 0 222 445 667 890 1,334 1,779 1.75" Size 0 445 890 10 1,130 newton-meters DYNAMIC TORQUE (inch-pounds) IN THOUSANDS 904 8 16" 6 678 12" 452 10 8" **DYNAMIC** 226 2 65/16 50 200 3.5" Lever 100 150 0 0 300 400 1.75" Size 100 200 **LEVER FORCE (Pounds)** Mechanical - Static Torque vs Lever Force **LEVER FORCE (Newtons)**



FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H2201 H441 H960 HYDRAULIC/ MECHANICAL BRAKE H/ME20 H/ME220 MECHANICAL BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS INTENSIFIER SELECTION WORKSHEET



FEATURES

Caliper Disc Brakes H/ME20 SERIES - ALUMINUM

"	" I ON	IG I	FV	FR -	SINGLE ACTIN	G
						u .
Accommodates	s disc thick	iness:	5/32'	' 1/4		
	N	/eight	1.5 lt	os68	kgs.	
├ ──				→ "	L'' LONG LEVER	
Æ	← <u>2.312</u>	(58.72		_	IN EITHER OF	
) ~	+) }·'	Ø.397 Ø.531	
				77	(10.08) (13.49)	
(14.2) (14.2)			L	_	-406B	
1 2	1 37	÷		J	(10.31)	
(19.1)	(34.8)	*	-2.50		—→I 8.9)———→	
			0.75 (05 0)		
			•	· ·		
	_F					
			[
A→	$ \downarrow $	$\langle \mathcal{P} \rangle$		╏┝┝└		
	1/8-27 ŃPT PORT	- (1.25 31.8)			
		• •		°Β∺_(28	3.7)	
	6.49 (6.58 (164.8) 167.1)	5/32" T 1/4" Th	hick Diso ick Disc	>	
MODEL	DISC				OPTIONS /	ASSEMBLY
CODE	THK.	A	В	C	DESCRIPTION	NUMBER
H/ME20LAC	5/32" .*	164"	.25"	-	Long Lever, Buna-N Seals	0755-0360
H/ME20LACG	5/32" .:	164"	.25"	-	Long Lever	0755-0660
H/ME20LBC	1/4" .:	164"	.34"	.094"	Long Lever, Buna-N Seals	0755-0370
H/ME20LBCG	1/4" .:	164"	.34"	.094"	Long Lever	0755-0670
	Accommodates	FIXED MOU Accommodates disc thick W Accommodates disc thick W Accommodates disc thick W A A A A A A A A A A A A A A A A A A	FIXED MOUNT - F Accommodates disc thickness: Weight	FIXED MOUNT - FLOAT Accommodates disc thickness: 5/32' Weight 1.5 lt	FIXED MOUNT - FLOATING DIS Accommodates disc thickness: 5/32" 1/4 Weight 1.5 lbs. 68 Image: Commodates disc thickness: 5/32" 1/4 Weight 1.5 lbs. 68 Image: Commodates disc thickness: 5/32" 1/4 Image: Commodates disc thickness: Image: Co	Weight 1.5 lbs68 kgs. Weight 1.5 lbs68 kgs. May BE MOUNTED IN EITHER OF TWO POSITIONS 0.397 0.531 (10.08) (13.49) (13.49) (10.08) (13.49) (10.08) (13.49) (10.08) (13.49) (10.08) (13.49) (10.08) (13.49) (10.08) (13.49) (10.08) (13.49) (10.08) (13.49) (10.31) (10.31) (10.31) (10.31) (10.31) (10.31) (10.31) (10.31) (10.31) (10.31) (10.31) (10.31) (10.25) (10.11) (14) (14) (16.4) (13.5) (13.7) (13.6) (13.7) (14) (16.4) (15) (13.7) (14) (16.4) (14) (14) (15) (14) (14) (14)

"L" LONG LEVER - SINGLE ACTING WITH FLOATING BRACKET FLOATING MOUNT - FIXED DISC Accommodates disc thickness: 5/32" 1/4" Weight 2.25 lbs. 1.02 kgs. -3.38 (85.9)-Ø.397 [2] (10.08) -2.250 (57.15) "L" LONG LEVER MAY BE MOUNTED IN EITHER OF TWO POSITIONS Ø.397 (10.08) Ø.531 (13.49) Œ -.56 (14.2) .406R (10.31) ⊷.75– (19.1) _1.37_ (34.8) -2.50 (63.5) 3.50 (88.9) 4.50 (114.3) 3.53 (89.7) 1.38 (35.1) 1.01 (25.7) 1.50 +l⊱C (38.1) - - - -1.250 (31.75) 1.00 (25.4) O _1.25_ (31.8) 1/8-27 NPT PORT 1.13 -3.86 (98.0) R (28.7)_6.49 (164.8) 5/32" Thick Disc 6.58 (167.1) 1/4" Thick Disc

MODEL Code	DISC Thk.	A	В	C	OPTIONS / Description	Assembly Number
H/ME20LAFC	5/32"	.164"	.25"	-	Long Lever, Fltng Brkt, Buna-N	0755-0260
H/ME20LAFCG	5/32"	.164"	.25"	-	Long Lever, Fltng Brkt	0755-0560
H/ME20LBFC	1/4"	.164"	.34"	.094"	Long Lever, Fltng Brkt, Buna-N	0755-0270
H/ME20LBFCG	1/4"	.164"	.34"	.094"	Long Lever, Fltng Brkt,	0755-0570

CAM TRAVEL DATA

- 1. 15° maximum travel when linings 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 lining.
- 3. 90° maximum travel after 3/16" wear on each lining without intermediate tightening of lock nut.

BRAKE MODEL LETTER CODES

Tolomatic

A 5/32" Thick Disc	G EPR Seals	ME Mechanical Brake
B 1/4" Thick Disc	H Hydraulic Brake	S Short Lever (ME Brakes)
C With Bleeder Fitting	L Long Lever (ME Brakes)	
F Floating Bracket Mount	M Machined Cam (ME Brakes)	

1.800.328.2174

FS220 FS2201 FS595 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS INTENSIFIER SELECTION

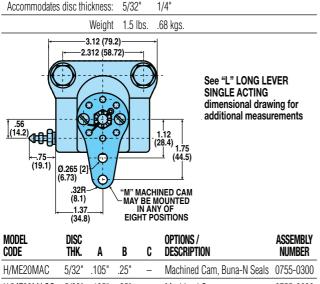
WORKSHEET

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Caliper Disc Brakes H/ME20 SERIES - ALUMINUM

"M" MACHINED CAM - SINGLE ACTING

FIXED MOUNT - FLOATING DISC



CODE	THK.	A	В	C	DESCRIPTION	NUMBER
H/ME20MAC	5/32"	.105"	.25"	-	Machined Cam, Buna-N Seals	0755-0300
H/ME20MACG	5/32"	.105"	.25"	-	Machined Cam	0755-0600
H/ME20MBC	1/4"	.105"	.34"	.094"	Machined Cam, Buna-N Seals	0755-0310
H/ME20MBCG	1/4"	.105"	.34"	.094"	Machined Cam	0755-0610

Accommodat			FLOATIN		•		GRAPHS
	tes disc th		5/32"	1/4"			PNEUMATIC
		Weight 3.12 (79.2		.68 k	gs.		BRAKES
ſ		312 (79.2 312 (58.7					P10
Ø.265 -	()				See "L" LONG LE	VED	P20
(6.73) .32R				1	SINGLE ACTING		P220
(8.1)					dimensional drav additional measu		HYDRAULIC Brakes
		\leftarrow	/				H10
.75 (19.1)	1.37	"s	" SHORT I	.EVER			H20
~	(34.8) -1.75 (44.5	5) →	" SHORT I AY BE MOU IN EITHER	OF			H220
		т	WO POSIT	IONS			H2201
MODEL	DISC				OPTIONS /	ASSEMBLY	H441
CODE	THK.	A	В		DESCRIPTION	NUMBER	H960
H/ME20SAC	5/32"	.164"	.25"	-	Short Lever, Buna-N Seals	0755-0330	HYDRAULIC/
H/ME20SACG	G 5/32"	.164"	.25"	-	Short Lever	0755-0630	MECHANICAL
H/ME20SBC	1/4"	.164"	.34" .()94"	Short Lever, Buna-N Seals	0755-0340	BRAKE Combos
H/ME20SBCG	G 1/4"	.164"	.34" .()94"	Short Lever	0755-0640	
							H/ME20
							H/ME220
	C)) CI	רסטנ		ED			MECHANICAL Brakes
"	S" Sł NITH	iori FL 0	Γ LEV	ER ·	- SINGLE ACTI	NG	BRAKES
	NITH	FLO/	ATING	G BF	RACKET	NG	BRAKES ME10
	LOATING	FLO	LEV ATINC T - Fixel 5/32"	G BF	RACKET	NG	BRAKES ME10 ME20
F	LOATING	FLO	ATING IT - FIXEI 5/32"	B BF D DISC 1/4"	RACKET	NG	BRAKES ME10 ME20 ME220
F Accommodat Ø.397 [2]	NITH LOATING tes disc th	FLO MOUN ickness: Weight -3.38 (85	ATING IT - FIXEI 5/32" 2.25 lbs .9)	B BF D DISC 1/4"	RACKET	NG	BRAKES ME10 ME20 ME220 MB3
F	NITH LOATING tes disc th	FLO G MOUN ickness: Weight	ATING IT - FIXEI 5/32" 2.25 lbs .9)	B BF D DISC 1/4"	RACKET	NG	BRAKES ME10 ME20 ME220 MB3 Spring Applied
F Accommodat Ø.397 [2]	NITH LOATING tes disc th	FLO MOUN ickness: Weight -3.38 (85	ATING IT - FIXEI 5/32" 2.25 lbs .9)	B BF D DISC 1/4"	RACKET		BRAKES ME10 ME20 ME220 MB3 Spring
Ø.265	NITH LOATING tes disc th	FLO MOUN ickness: Weight -3.38 (85	ATING IT - FIXEI 5/32" 2.25 lbs .9)	B BF D DISC 1/4"	RACKET	EVER WITH	BRAKES ME10 ME20 ME220 MB3 Spring Applied
Accommodal Ø.397 [2] (10.08) Ø.265 (6.73)	NITH LOATING tes disc th	FLO MOUN ickness: Weight -3.38 (85	ATING IT - FIXEI 5/32" 2.25 lbs .9)	B BF D DISC 1/4"	RACKET	EVER WITH KET	BRAKES ME10 ME20 ME220 MB3 Spring Applied Brakes FS20
Ø.397 [2] Ø.397 [2] (10.08) Ø.265 (6.73) .32R (8.1)	NITH LOATING tes disc th	FLO MOUN ickness: Weight -3.38 (85	ATING IT - FIXEI 5/32" 2.25 lbs .9)	B BF D DISC 1/4"	RACKET	EVER WITH KET ving for	BRAKES ME10 ME20 ME220 MB3 Spring Applied Brakes FS20
Ø.397 [2] (10.08) Ø.265 (6.73) .32R (8.1) .56		FLO MOUN ickness: Weight -3.38 (85	ATING IT - FIXEI 5/32" 2.25 lbs .9)	B BF D DISC 1/4"	RACKET	EVER WITH KET ving for	BRAKES ME10 ME20 MB3 SPRING APPLIED BRAKES FS20 FS220 FS220
6.73) 0.397 [2] 0.397 [2] (10.08) 0.265 (6.73) .32R (8.1) .56 (14.2) .75 .75	NITH ELOATING tes disc th	FLO/ a MOUN ickness: Weight -3.38 (85 2.250 (57	ATING IT - FIXEI 5/32" 2.25 lbs .9)	B BF D DISC 1/4"	RACKET	EVER WITH KET ving for	BRAKES ME10 ME20 MB3 SPRING APPLIED BRAKES FS20 FS220 FS220
Ø.397 [2] [↑] (10.08) Ø.265 (6.73) .32R (8.1) .56 (1(4.2)		FLO2 a MOUN ickness: Weight -3.38 (85 2.250 (57	ATINC IT - FIXE 5/32" 2.25 lbs .9) .15) 	BF D DISC 1/4" . 1.02	RACKET	EVER WITH KET ving for	BRAKES ME10 ME20 MB3 SPRING APPLIED BRAKES FS20 FS220 FS220 FS220 FS220 FS255 DISCS HUBS &
6.73) 0.397 [2] 0.397 [2] (10.08) 0.265 (6.73) .32R (8.1) .56 (14.2) .75 .75	NITH ELOATING tes disc th	FLO/ a MOUN ickness: Weight -3.38 (85 2.250 (57 	ATIN(iT - FIXEI 5/32" 2.25 lbs .9)	BF D DISC 1/4" 5. 1.02	RACKET	EVER WITH KET ving for	BRAKES ME10 ME20 MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS255 DISCS HUBS & BUSHINGS
Accommodal 0.397 [2] (10.08) 0.265 (6.73) .32R (8.1) .56 (14.2) .75 (19.1) MODEL	NITH ELOATING tes disc th International Inte	FLO/ a MOUN ickness: Weight 3.38 (85 2.250 (57 5) M	ATINC IT - FIXE 5/32" 2.25 lbs .9) .15) 	LEVERE LEVERE DUNTEC	RACKET	EVER WITH KET ving for irements	BRAKES ME10 ME20 MB3 Spring Applied Brakes FS20 FS220 FS220 FS220 FS255 Discs HUBS & BUSHINGS TENSION CONTROL
Accommodal Ø.397 [2] (10.08) Ø.265 (6.73) .32R (8.1) .5 (14.2) .75 (19.1) MODEL CODE	NITH LOATING tes disc th Loating tes disc th Loating (34.6 -1.75 (44 DISC THK.	FLOA A MOUN ickness: Weight -3.38 (85 2.250 (57 	ATINC IT - FIXE 5/32" 2.25 lbs 9) 15) 15) S" SHORT S" ST	BEF D DISC 1/4" 3. 1.02	RACKET kgs. See "L" LONG LE SINGLE ACTING FLOATING BRAC dimensional drav additional measu Cons / CRIPTION	EVER WITH KET ving for irements	BRAKES ME10 ME20 MB3 SPRING APPLIED BRAKES FS20 FS220 FS220 FS220 FS295 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS
Accommodal Ø.397 [2] (10.08) Ø.2655 (6.73) .32R (8.1) (14.2) .75 (19.1) MODEL CODE H/ME20SAFC	NITH LOATING tes disc th Loating Last (34.6 DISC THK	FLO/ a MOUN ickness: Weight -3.38 (85 2.250 (57 	ATINC IT - FIXEI 5/32" 2.25 lbs 9) 15) 5" S" SHORT AY BE MC IN EITHEI TWO POS B C 25" –	BF D DISC 1/4" 5. 1.02 5. 1.02	RACKET kgs. See "L" LONG LE SINGLE ACTING FLOATING BRAC dimensional drav additional measu ONS / CRIPTION t Lever, Fltng Brkt, Buna-N	EVER WITH KET ving for irements ASSEMBLY NUMBER 0755-0230	BRAKES ME10 ME20 MB3 SPRING APPLIED BRAKES FS20 FS220 FS220 FS220 FS220 FS255 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS INTENSIFIER
Accommodal Ø.397 [2] (10.08) Ø.265 (6.73) .32R (8.1) .5 (14.2) .75 (19.1) MODEL CODE	NITH ELOATING tes disc th I.3. (.34. I.3. (.35. (.35.)) (.35.) (.35	FLO/ a MOUN ickness: Weight 3.38 (85 2.250 (57 5) M M .164" .164"	ATINC IT - FIXE 5/32" 2.25 lbs 9) 15) 15) S" SHORT S" ST	BF D DISC 1/4" 5. 1.02 5. 1.02	RACKET kgs. See "L" LONG LE SINGLE ACTING FLOATING BRAC dimensional drav additional measu Cons / CRIPTION	EVER WITH KET ving for irements	BRAKES ME10 ME20 MB3 SPRING APPLIED BRAKES FS20 FS220 FS220 FS220 FS255 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS

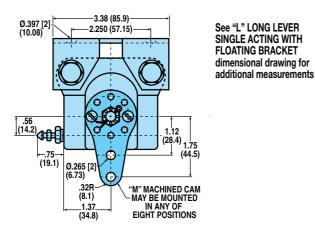
H/ME20SBFCG 1/4" .164" .34" .094" Short Lever, Fltng Brkt

"S" SHORT LEVER - SINGLE ACTING

FIXED MOUNT - FLOATING DISC

"M" MACHINED WITH FLOATING	CAM - SINGLE ACTING G BRACKET				
FLOATING MOUNT - FIXED DISC					
Accommodates disc thickness: 5/32"	1/4"				

Weight 2.25 lbs. 1.02 kgs.



MODEL Code	DISC Thk.	A	В	C	OPTIONS / Description	ASSEMBLY NUMBER
H/ME20MAFC	5/32"	.105"	.25"	-	Mach Cam, Fltng Brkt, Buna-N	0755-0200
H/ME20MAFCO	G 5/32"	.105"	.25"	-	Mach Cam, Fltng Brkt	0755-0500
H/ME20MBFC	1/4"	.105"	.34"	.094"	Mach Cam, Fltng Brkt, Buna-N	0755-0210
H/ME20MBFCG	G 1/4"	.105"	.34"	.094"	Mach Cam, Fltng Brkt	0755-0510



0755-0540

CALIPER BRAKES

FEATURES APPLICATIONS

SELECTION



FEATURES APPLICATIONS

SELECTION GRAPHS

PNEUMATIC BRAKES

P10

P20

P220

HYDRAULIC

BRAKES

H10

H20

H220

H2201

H441

BRAKES

FS20

FS220

FS2201

FS595

DISCS

HUBS &

BUSHINGS

TENSION CONTROL

COMBINATIONS

INTENSIFIER

SELECTION

WORKSHEET

Caliper Disc Brakes H/ME220 SERIES - ALUMINUM

AVAILABLE STYLES

Single Acting with Float Pin Holes FIXED MOUNT - FLOATING DISC or FLOATING MOUNT - FIXED DISC



PICTURED: 0744-0630

	H/ME	E220 SP	ECIFIC	ATIONS
--	------	---------	--------	--------

11000		
H960	Maximum Hydraulic Pressure Rating:	1,500 PSI
HYDRAULIC/	Maximum lever force:	580 Lbs.
MECHANICAL Brake	Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
COMBOS	Maximum disc diameter:	16"
H/ME20	Housing Material:	Cast aluminum
	Bolts:	Zinc plated grade 8
H/ME220	Seals:	EPR Standard
MECHANICAL Brakes	Wearable friction material:	1.6 in ³
	Friction material:	Replaceable, high-grade
ME10	Total lining area:	7.5 in ²
ME20	Piston diameter:	1.625 in.
ME220	Fluid displacement:	Single acting = 0.124 in ³
MB3	OPTIONS	
SPRING	Seals:	Buna-N seals
APPLIED		

CAM TRAVEL DATA

- 1. Gap between lining 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.

DISC SIZING EQUATIONS

HYDRAULIC:

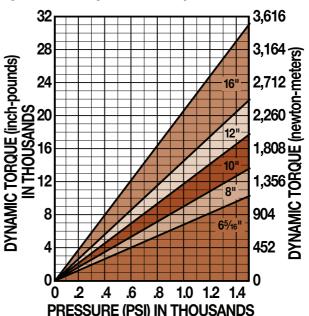
DYNAMIC TORQUE (IN.-LBS.) = 2.88 x BRAKING RADIUS (IN.) x PRESSURE (PSI) STATIC (PARKING) TORQUE (IN.-LBS.) = 1.44 x BRAKING RADIUS (IN.) x PRESSURE (PSI)

MECHANICAL:

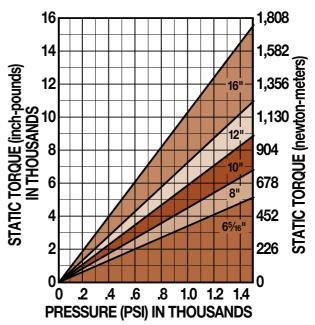
DYNAMIC TORQUE (IN.-LBS.) = 7.45 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.) STATIC (PARKING) TORQUE (IN.-LBS.) = 3.725 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.)

PERFORMANCE DATA

Hydraulic - Dynamic Torque vs Pressure



Hydraulic - Static Torque vs Pressure



CALIPER DISC Brakes

FEATURES APPLICATIONS

SELECTION GRAPHS

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BRAKES

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P20

P220

HYDRAULIC

BRAKES H10

H20

H220

H220I

H441

H960

ME220

MB3

SPRING

APPLIED

BRAKES

FS20

FS220

FS2201

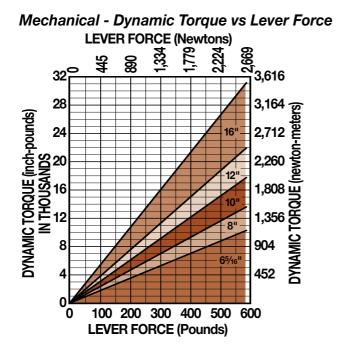
FS595

DISCS

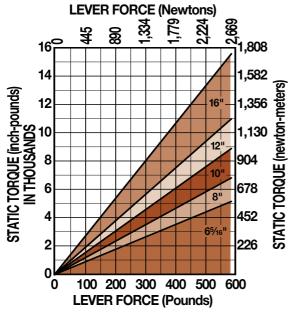
TENSION

Caliper Disc Brakes H/ME220 SERIES - ALUMINUM

PERFORMANCE DATA



Mechanical - Static Torque vs Lever Force



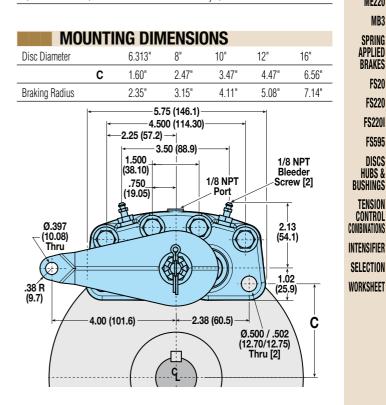
BRAKE MODEL LETTER CODES					
A 5/32" Thick Disc	E 1/2" Thick Disc	L 3/8" Thick Disc			
B 1/4" Thick Disc	G EPR Seals	ME Mechanical Brake			
C With Bleeder Fitting	H Hydraulic Brake	S Single Acting			

Tolomatic

SINGL	E ACTING W	/ITH FLOA	FPIN HOLES
FIXED MOUNT - FLOA	ATING DISC or FL	OATING MOUNT	- FIXED DISC
Accommodates disc thi	ickness: 5/32" 1/4	4" 3/8" 1/2"	
	Weight 6.00 lbs.	2.72 kgs.	
	$ \begin{array}{c} $	6 <u>1.47</u> (37.3) ←A	.462
		(2 1.0 (25.	

HYDRAULIC/ MECHANICAL BRAKE COMBOS				2.16 (54.9	-	
H/ME20 H/ME220	ASSEMBLY	OPTIONS /			DISC	MODEL
MECHANICAL	NUMBER	DESCRIPTION	В	Α	THK.	CODE
BRAKES	0744-0630	Hyd./Mech. Brake	3.144"	.084"	5/32"	H/ME220SACG
ME10	0744-0640	Hyd./Mech. Brake	3.238"	.178"	1/4"	H/ME220SBCG
ME20	0744-0650	Hyd./Mech. Brake	3.363"	.303"	3/8"	H/ME220SLCG
ME220	0744-0660	Hyd./Mech. Brake	3.488"	.428"	1/2"	H/ME220SECG

(23.9)



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SELECTION

PNEUMATIC BRAKES

GRAPHS

P10 P20 P220 HYDRAULIC BRAKES H10 H20

H220 H220I H441

HOUU

BRAKE

ME10 ME20

ME220

MB3

SPRING APPLIED

BRAKES

FS20

FS220 FS2201 FS595 DISCS

COMBOS H/ME20 H/ME220 MECHANICAL BRAKES

HYDRAULIC/ MECHANICAL

Caliper Disc Brakes **ME10 SERIES - ALUMINUM**

AVAILABLE STYLES

"L" Long Lever (3.50") Single Acting FIXED MOUNT - FLOATING DISC



"L" Long Lever (3.50") Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



PICTURED: 0732-0003

"M" Machined Cam Lever (1.75") Single Acting FIXED MOUNT - FLOATING DISC



"M" Machined Cam Lever (1.75") Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



PICTURED: 0707-0001

"S" Short Lever (1.75") Single Acting FIXED MOUNT - FLOATING DISC



PICTURED: 0732-0000

BUSHINGS TENSION CONTROL COMBINATIONS

HUBS &

INTENSIFIER SELECTION WORKSHEET

"S" Short Lever (1.75") Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



PICTURED: 0732-0001

DISC SIZING EQUATIONS

"L" LONG LEVER (3.50"): 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.)

"M" MACHINED CAM (1.75") & "S" SHORT LEVER (1.75"):

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] - 0.624

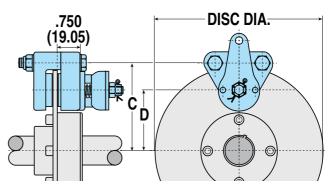


ME10 SPECIFICATIONS

OPTIONS	
Lever / Cam:	Heat treated one-piece lever/cam or machined "V" notch cam
3	1.84 in ²
Friction material:	Replaceable, high-grade
Wearable friction material:	0.47 in ³
Bolts:	Zinc plated grade 5
Housing Material:	Cast aluminum
Maximum disc diameter:	none
Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
Maximum lever force "M" & "S" Levers:	450 Lbs.
Maximum lever force "L" Long Lever:	225 Lbs.

OPTIONS	
Floating bracket:	Stamped steel construction with zinc plated steel bushings
Additional lever positions:	Consult factory

MOUNTING DIMENSIONS						
Disc Diameter		6.313"	8"	10"	12"	16"
	С	3.469"	4.312"	5.312"	6.312"	8.312"
Braking Radius	D	2.532"	3.376"	4.376"	5.376"	7.376"



CAM TRAVEL DATA

- 1. 15° maximum travel when linings 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 lining.
- 3. 90° maximum travel after 3/16" wear on each lining without intermediate tightening of lock nut.

1.800.328.2174

CALIPER DISC Brakes

FEATURES APPLICATIONS

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HYDRAULIC

BRAKES

H10

H20

H220

H220I

H441

H960

HYDRAULIC/ MECHANICAL BRAKE

COMBOS

H/ME20

H/ME220

ME10

ME20

MECHANICAL BRAKES

ASSEMBLY

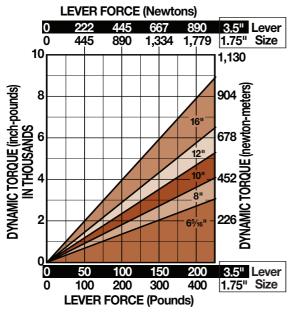
NUMBER

Caliper Disc Brakes

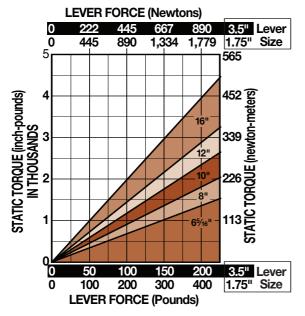
ME10 SERIES - ALUMINUM

PERFORMANCE DATA

Dynamic Torque vs Lever Force



Static Torque vs Lever Force



BRAKE MODEL LETTER CODES

A 5/32" Thick Disc	L Long Lever (ME Brakes)	ME Mechanical Brake
B 1/4" Thick Disc	M Machined Cam (ME Brakes)	S Short Lever (ME Brakes)
F Floating Bracket Mount		

ME10LA 5/32"		Long Lovor	0732-0003	
ME10LA 5/32"		Long Lever	0732-0003	ME220
				MB3
FLOA	ONG LEV TING BR	ACKET	ACTING WITH	SPRING Applied Brakes
Accommodates disc				FS20
	Weight 1.2	5 lbs56 kgs.		FS220
	0 (63.5)	1		F\$2201
(8.43)	5 (41.28)→	"I" LONG LEVER	Arm May Be	F\$595
.938 (23.83)		"L" LONG LEVER Mounted in Either o Ø.397 (10.08) (10.08) (10.08) (10.08) (10.08) (10.08) (10.08) (10.08) (10.08)	Min Positions Ø.531 (13.49) See "S" SHORT LEVER SINGLE ACTING WITH 406R FLOATING (10.31) BRACKET dimensional drawing for additional measurements	DISCS HUBS & BUSHINGS TENSION CONTROL Combinations Intensifier Selection Worksheet
MODEL DISC Code Thk.	A B	OPTIONS / Description	ASSEMBLY NUMBER	

"L" LONG LEVER - SINGLE ACTING

.34 kgs.

"L" LONG LEVER Arm May Be Mounted in Either of Two Positions

Ø.397 (10.08)

5/16-24

.38 (9.7)

.937 (23.80)

.69 (17.5)

OPTIONS /

DESCRIPTION

Ø.531

(13.49)

.406R

(10.31)

FIXED MOUNT - FLOATING DISC

2.50 (63.5)

2.25 (57.2)

.94 (23.9)

.69 (17.5)

.69 (17.5)

"S" & "L" –#8 Gage .164 (4.17)

"M" #12 Gage —104 (2.64)

DISC

THK.

3.15 (80.0)

3.50 (88.9)

Weight

5/32'

.75 lbs.

Accommodates disc thickness:

-2.31 (58.7)

 \bigcirc

-1.625 (41.28)

.938

(23.83)

MODEL

CODE

Tolomatic

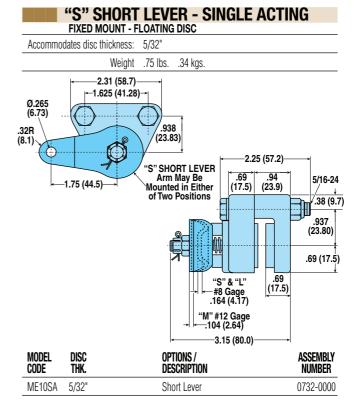
CODE	DISC THK.	A	B	DESCRIPTION	ASSEMBLY
ME10LAF	5/32"	-	3.15"	Long Lever, Floating Bracket	0732-0002
ME10LBF	1/4"	.094"	3.24"	Long Lever, Floating Bracket	0732-0004

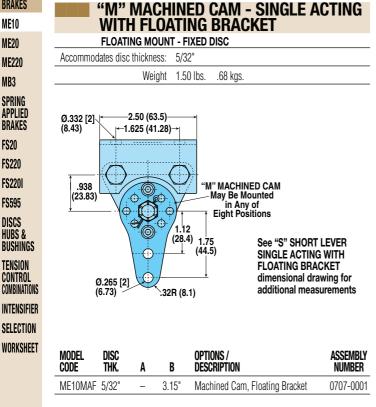
Caliper Disc Brakes

ME10 SERIES - ALUMINUM

APPLICATIONS "M" MACHINED CAM - SINGLE ACTING SELECTION **FIXED MOUNT - FLOATING DISC** Accommodates disc thickness: 5/32 PNEUMATIC Weight .75 lbs. .34 kgs -2.31 (58.7) -1.625 (41.28) .938 (23.83) "M" MACHINED CAM $(\bigcirc$ May Be Mounted in Any of Eight Positions Ġ. 1.12 Ó (28.4) 1.75 (44.5) See "S" SHORT LEVER \oplus SINGLE ACTING dimensional drawing for additional measurements Ø.265 [2] (6.73) .32R (8.1)

C/	MODEL	disc	OPTIONS /	ASSEMBLY
	Code	Thk.	Description	NUMBER
ĂĹ	ME10MA	5/32"	Machined Cam	0707-0000





"S" SHORT LEVER - SINGLE ACTING WITH FLOATING BRACKET **FLOATING MOUNT - FIXED DISC**

Accommodates disc thickness: 5/32" 1/4' Weight 1.25 lbs. .56 kas -2.50 (63.5) Ø.332 [2] (8.43) -1.625 (41.28)→ 3.00 (76.2) Ø.265 (6.73) 1.97 (50.0) .938 (23.83) .32R (8.1) (24.9) (8 A Spacer .28 C 0 .69 (17.5) .94 (23.9) (7.1) S" SHORT LEVER Arm May Be Mounted in Either 1.00 -1.75 (44.5)-(25.4)of Two Positions .937 (23.80) .69 (17.5) "S" & "L" --#8 Gage .164 (4.17) .69 (17.5) "M" #12 Gage —.104 (2.64) B ASSEMBLY MODEL DISC **OPTIONS /** B DESCRIPTION CODE THK. A NUMBER ME10SAF 5/32 3.15' Short Lever, Floating Bracket 0732-0001 ME10SBF .094" 3.24" 0732-0005 1/4" Short Lever, Floating Bracket

Tolomatic

P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H2201 H441 HOUU HYDRAULI MECHANIC BRAKE COMBOS H/ME20 H/ME220 MECHANICAL BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS INTENSIFIER SELECTION

CALIPER DISC Brakes

FEATURES

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BRAKES

Caliper Disc Brakes Strakes

AVAILABLE STYLES

"L" Long Lever (3.50") Single Acting FIXED MOUNT - FLOATING DISC



"L" Long Lever (3.50") Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



PICTURED: 0731-0002

"M" Machined Cam Lever (1.75") Single Acting FIXED MOUNT - FLOATING DISC



"M" Machined Cam Lever (1.75") Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



PICTURED: 0726-0001

"S" Short Lever (1.75") Single Acting FIXED MOUNT - FLOATING DISC



PICTURED: 0731-0000

"S" Short Lever (1.75") Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



PICTURED: 0731-0001

DISC SIZING EQUATIONS

"L" LONG LEVER (3.50"): 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.)

"M" MACHINED CAM (1.75") & "S" SHORT LEVER (1.75"): 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] - 0.875

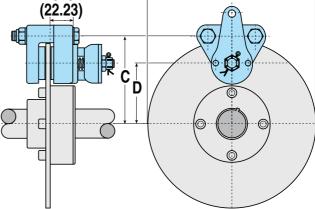
ME20 SPECIFICATIONS

Maximum lever force "L" Long Lever:	225 Lbs.
Maximum lever force "M" & "S" Levers:	450 Lbs.
Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
Maximum disc diameter:	none
Housing Material:	Cast aluminum
Bolts:	Zinc plated grade 5
Wearable friction material:	0.8 in ³
Friction material:	Replaceable, high-grade
Total lining area:	3.75 in ²
Lever / Cam:	Heat treated one-piece lever/cam or machined "V" notch cam
OPTIONS	
Floating bracket:	Stamped steel construction

	riouting bruchot.	with zinc plated steel bushings
Ad	ditional lever positions:	Consult factory

MOUNT	ING DIN	IENSIC	INS		
Disc Diameter	6.313"	8"	10"	12"	16"
C	3.531"	4.375"	5.375"	6.375"	8.375

.87	5			DISC	DIA.	
Braking Radius	D	2.281"	3.125"	4.125"	5.125"	7.125"
	С	3.531"	4.375"	5.375"	6.375"	8.375"



CAM TRAVEL DATA

- 1. 15° maximum travel when linings 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 lining.
- 90° maximum travel after 3/16" wear on each lining without intermediate tightening of lock nut.

Tolomatic

WORKSHEET

CALIPER DISC BRAKES

FEATURES Applications

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FEATURES Applications

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H2201

H441

H960

HYDRAULIC/

MECHANICAL Brake Combos

H/ME20

H/ME220 Mechanical

BRAKES

ME10

ME20

ME220

MB3

SPRING

APPLIED

BRAKES

FS20

FS220

FS2201

FS595

DISCS

HUBS &

BUSHINGS

TENSION

CONTROL

COMBINATIONS

INTENSIFIER

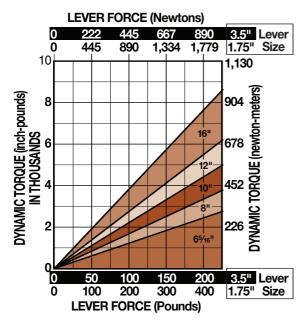
SELECTION

Caliper Disc Brakes

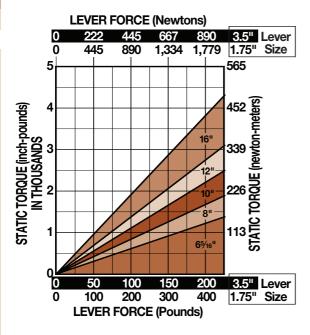
ME20 SERIES - ALUMINUM

PERFORMANCE DATA

Dynamic Torque vs Lever Force



Static Torque vs Lever Force

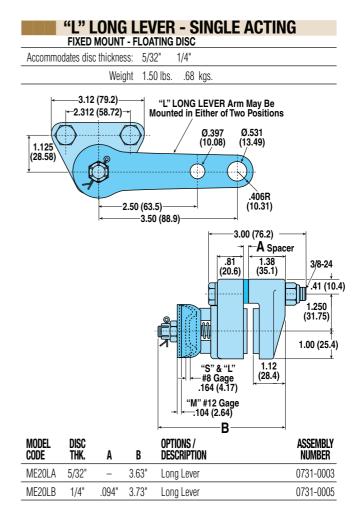


WORKSHEET	
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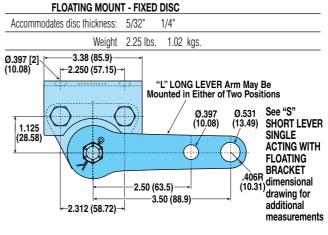
BRAKE MODEL LETTER	CODES
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A 5/32" Thick Disc	L Long Lever (ME Brakes)	ME Mechanical Brake
B 1/4" Thick Disc	M Machined Cam (ME Brakes)	S Short Lever (ME Brakes)
F Floating Bracket Mount		

Tolomatic



"L" LONG LEVER - SINGLE ACTING WITH FLOATING BRACKET



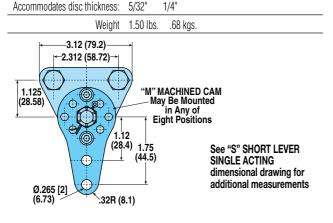
MODEL Code	DISC Thk.	A	В	OPTIONS / Description	ASSEMBLY NUMBER
ME20LAF	5/32"	-	3.63"	Long Lever, Floating Bracket	0731-0002
ME20LBF	1/4"	.094"	3.73"	Long Lever, Floating Bracket	0731-0006



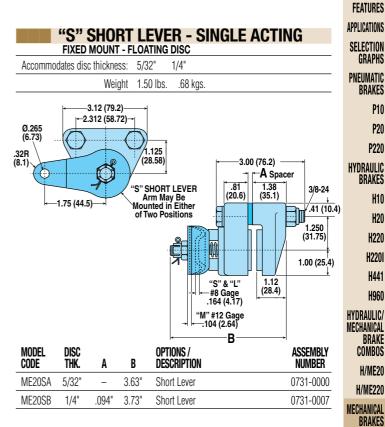
Caliper Disc Brakes *ME20 SERIES - ALUMINUM*

"M" MACHINED CAM - SINGLE ACTING

FIXED MOUNT - FLOATING DISC



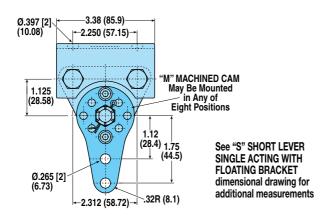
MODEL Code	disc Thk.	A	В	OPTIONS / Description	ASSEMBLY NUMBER
ME20MA	5/32"	-	3.63"	Machined Cam	0726-0000
ME20MB	1/4"	.094"	3.73"	Machined Cam	0726-0002



CALIPER DISC BRAKES

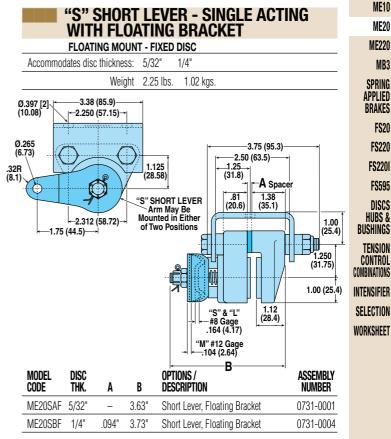
"M" MACHINED CAM - SINGLE ACTING WITH FLOATING BRACKET FLOATING MOUNT - FIXED DISC Accommodates disc thickness: 5/32" 1/4"

Weight 2.25 lbs. 1.02 kgs



MODEL DISC Code thk.	A	В	OPTIONS / Description	ASSEMBLY NUMBER
ME20MAF 5/32"	-	3.63"	Machined Cam, Floating Bracket	0726-0001
ME20MBF 1/4"	.094"	3.73"	Machined Cam, Floating Bracket	0726-0003

Tolomatic



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SELECTION GRAPHS

PNEUMATIC

HYDRAULIC

BRAKES

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H20

H220

H220I

H441

HOUU

BRAKE

COMBOS

H/ME20

H/ME220 MECHANICAL

BRAKES

P10

P20 P220

Caliper Disc Brakes **ME220 SERIES - ALUMINUM OR CAST IRON**

AVAILABLE STYLES

Aluminum Single Acting **FIXED MOUNT - FLOATING DISC**



PICTURED: 0745-0000

Cast Iron Single Acting **FIXED MOUNT - FLOATING DISC**



PICTURED: 0745-0002

Aluminum Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



PICTURED: 0745-0001

Cast Iron Single Acting with Floating Bracket FLOATING MOUNT - FIXED DISC



PICTURED: 0745-0003

ME220 SPECIFICATIONS

Maximum lever force Aluminum Housing:	580 Lbs.
Maximum lever force Cast Iron Housing:	660 Lbs.
Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
Maximum disc diameter:	16"
Housing Material:	Cast aluminum or Cast ductile iron
Bolts:	Zinc plated grade 8
Wearable friction material:	1.6 in ³
Friction material:	Replaceable, high-grade
Total lining area:	7.5 in ²
Lever / Cam:	Heat treated one-piece lever/cam or machine "V" notch cam
Lining Wear Adjustment:	One step procedure
OPTIONS	
Floating bracket:	Available

CAM TRAVEL DATA

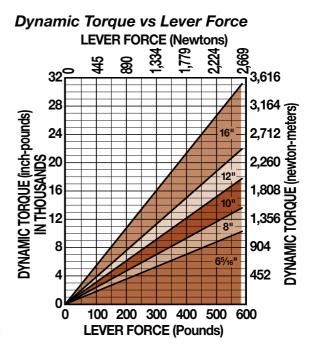
- 1. Gap between lining faces and disc when new = .048" total.
- 2. Angular movement required to actuate brake when new = 7° 30".
- 3. Maximum axial movement without intermediate adjustment = .387".
- 4. Wear allowed before adjustment .104" each side.

DISC SIZING EQUATIONS

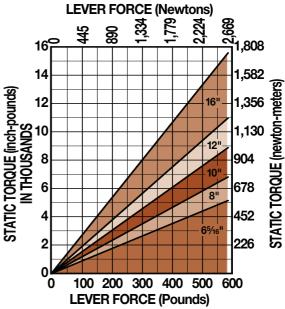
DYNAMIC TORQUE (IN.-LBS.) = 7.45 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.) STATIC (PARKING) TORQUE (IN.-LBS.) = 3.725 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.)

oomati

PERFORMANCE DATA



Static Torque vs Lever Force



BRAKE MODEL LETTER CODES

A 5/32" Thick Disc	L 3/8" Thick Disc
B 1/4" Thick Disc	M Machined Cam (ME Brakes)
E 1/2" Thick Disc	ME Mechanical Brake
F Floating Bracket Mount	Q 1-1/2" Thick Disc
l Iron	

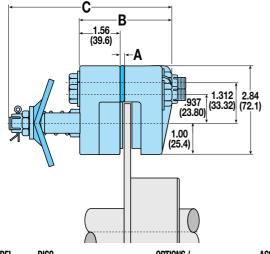
INTENSIFIER

SELECTION

WORKSHEET

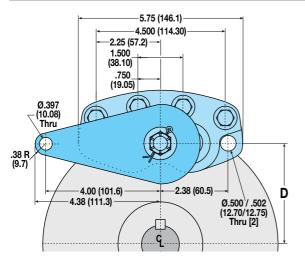
Caliper Disc Brakes Stress ME220 SERIES - ALUMINUM OR CAST IRON

SINGLE AC	TING			
FIXED MOUNT - F	LOATING	DISC		
Accommodates disc thickness:	5/32"	1/4"	3/8"	1/2"
Aluminum Weight	6.0 lbs.	2.72 k	(gs.	
Cast Iron Weight	10.9 lbs.	4.94	kgs.	



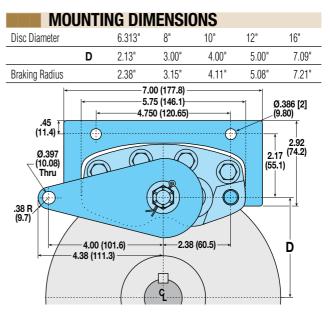
MODEL Code	DISC Thk.	A	В	C	OPTIONS / Description	ASSEMBLY NUMBER
ME220A	5/32"	-	3.03"	5.12"	Mechanical Brake	0745-0000
ME220MAI	5/32"	.500"	3.45"	5.64"	Machined Cam, Cast Iron	0745-0002
ME220B	1/4"	.094"	3.13"	5.22"	Mechanical Brake	0745-0010
ME220MBI	1/4"	.594"	3.55"	5.73"	Machined Cam, Cast Iron	0745-0012
ME220L	3/8"	.218"	3.25"	5.34"	Mechanical Brake	0745-0015
ME220E	1/2"	.344"	3.38"	5.47"	Mechanical Brake	0745-0020

MOUNTING DIMENSIONS						
Disc Diameter		6.313"	8"	10"	12"	16"
	D	2.13"	3.00"	4.00"	5.00"	7.09"
Braking Radius		2.38"	3.15"	4.11"	5.08"	7.21"

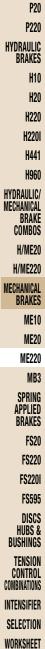


SINGLE ACTING WITH FLOATING BRACKET
FLOATING MOUNT - FIXED DISC
Accommodates disc thickness: 5/32" 1/4" 3/8" 1/2" 1-1/2"
Aluminum Weight 7.5 lbs. 3.40 kgs.
Cast Iron Weight 12.4 lbs. 5.62 kgs.
C (39.6) .50 (12.7) .50 (12
MODEL DISC OPTIONS / ASSEMBL

MODEL Code	DISC Thk.	A	В	C	OPTIONS / Description	ASSEMBLY NUMBER
ME220AF	5/32"	-	3.03"	5.12"	Floating Bracket	0745-0001
ME220MAFI	5/32"	.500"	3.45"	5.64"	Fltg Brkt, Mach Cam, Cast Iron	0745-0003
ME220BF	1/4"	.094"	3.13"	5.22"	Floating Bracket	0745-0011
ME220MBFI	1/4"	.594"	3.55"	5.73"	Fltg Brkt, Mach Cam, Cast Iron	0745-0013
ME220LF	3/8"	.218"	3.25"	5.34"	Floating Bracket	0745-0008
ME220MLFI	3/8"	.718"	3.67"	5.86"	Fltg Brkt, Mach Cam, Cast Iron	0745-0017
ME220EF	1/2"	.344"	3.38"	5.47"	Floating Bracket	0745-0021
ME220MEFI	1/2"	.844"	3.80"	5.98"	Fltg Brkt, Mach Cam, Cast Iron	0745-0024
ME220MQFI	1-1/2"	1.844"	4.80"	6.98"	Fltg Brkt, Mach Cam, Cast Iron	0745-0026



Tolomatic



CALIPER DISC Brakes

FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10



Caliper Disc Brakes *MB3 SERIES - CAST IRON*

FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 H960 HYDRA MECHAI BRAKE COMBO H/ME2 H/ME2 MECHAI Brake **ME10 ME20 ME220** MB3 SPRING

APPLIED

BRAKES

FS20 FS220

FS2201

FS595 DISCS

HUBS & Bushings Tension

CONTROL Combinations

INTENSIFIER

SELECTION

WORKSHEET



AVAILABLE STYLES

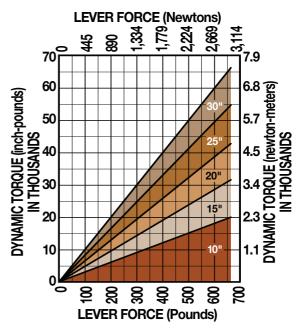
PICTURED: 0790-0000

MB3 SPECIFICATIONS

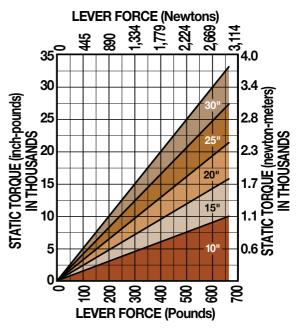
	Maximum lever force:	660 Lbs.
Ac	commodates Tolomatic disc diameters:	10", 12", 16"
	Maximum disc diameter:	30"
	Housing Material:	Cast iron
	Bolts:	Zinc plated grade 5
	Wearable friction material:	6.06 in ³
	Friction material:	Replaceable, high-grade
	Total lining area:	9.69 in ²
	Machined Cam:	Positioning in 60° increments
	Lining Wear Adjustment:	One step procedure
Des	signed to be more efficient and priced lo	wer than competitive brakes

PERFORMANCE DATA

Dynamic Torque vs Lever Force



Static Torque vs Lever Force



CAM TRAVEL DATA

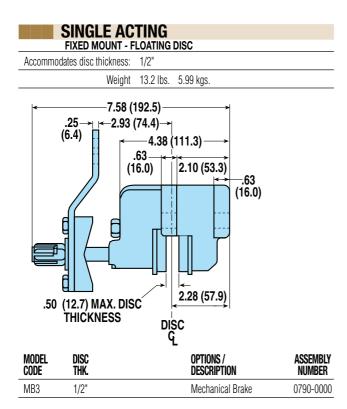
- 1. 0° travel with .500" disc.
- 2. 90° maximum travel after .125" wear on each side of lining without intermediate tightening of the lock nut.

DISC SIZING EQUATIONS

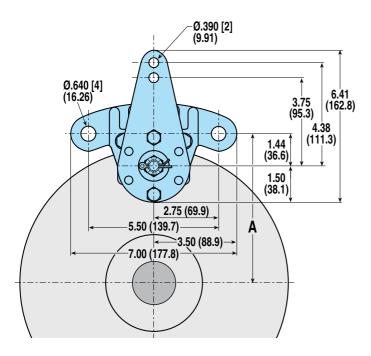
DYNAMIC TORQUE (IN.-LBS.) = 6.99 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.) STATIC (PARKING) TORQUE (IN.-LBS.) = 3.49 x BRAKING RADIUS (IN.) x LEVER FORCE (LBS.) BRAKING RADIUS (IN.) = [DISC DIAMETER ÷ 2] - 0.688



Caliper Disc Brakes *MB3 SERIES - CAST IRON*



MOUNTING DIMENSIONS						
Disc Diameter		10"	15"	20"	25"	30"
	Α	5.50"	8.00"	10.50"	13.00"	15.50"
Braking Radius		4.09"	6.59"	9.09"	11.59"	14.09"



CALIPER DISC
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H/ME220 Mechanical
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ME220
MB3 SPRING
APPLIED
BRAKES FS20
F\$220
F\$2201
F\$595
DISCS HUBS &
BUSHINGS
TENSION Control
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SELECTION

PNEUMATIC BRAKES

GRAPHS

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P20 P220

BRAKES

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H220I

H441 H960

DISCS

Caliper Disc Brakes

FS20 SERIES - ALUMINUM

AVAILABLE STYLES

Single Acting -Hydraulically Released FLOATING MOUNT - FIXED DISC



PICTURED: 0760-0000

Single Acting -**Pneumatically Released** FLOATING MOUNT - FIXED DISC



PICTURED: 0760-0016

FS20 SPECIFICATIONS

HYDRAULIC/		
MECHANICAL	Maximum hydraulic pressure:	1,500 PSI non shock
BRAKE Combos	Maximum pneumatic pressure:	100 PSI non shock
•••••	Minimum hydraulic pressure to release brake:	750 PSI
H/ME20	Minimum pneumatic pressure to release brake:	80 PSI (FS20P only)
H/ME220	Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
MECHANICAL	Maximum disc diameter:	none
BRAKES	Housing Material:	Die cast aluminum
ME10	Bolts:	Zinc plated grade 8
ME20	Seals:	Buna-N Standard
ME220	Wearable friction material, hydraulic:	.53 in ³
MB3	Wearable friction material, pneumatic:	.24 in ³
	Friction material:	Replaceable, high-grade
SPRING Applied	Total lining area:	3.8 in ²
BRAKES	Floating bracket:	Standard
FS20	Fluid displacement, hydraulic:	0.056 in ³
	Fluid displacement, pneumatic:	0.359 in ³
FS220	OPTIONS	
FS2201	Seals:	EPR seals
F\$595		

HUBS & BUSHINGS TENSION CONTROL COMBINATIONS INTENSIFIER

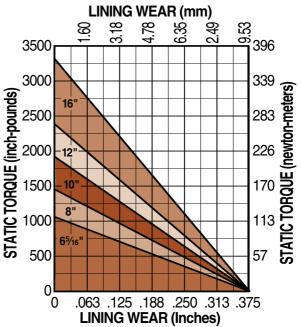
SELECTION

WORKSHEET

BRAKE	MODEL LETTER	CODES
A 5/32" Thick Disc	FS Spring Applied	P Pneumatically Released
B 1/4" Thick Disc	G EPR Seals	

PERFORMANCE DATA

*Hydraulic Static Torque vs Lining Wear *For pneumatically released units (FS20P) see Disc Sizing Equations below



Tangential Force LINING WEAR (mm) ∞ 20 ഒ В 숙 ജ <u>5</u>2.2 500 **[ANGENTIAL FORCE (pounds)** 300 101 101 ANGENTIAL FORCE (newtons) 1.8 HIDRAULC N THOUSANDS 1.3 .89 44 0 .063 .125 .188 .250 .313 .375 0 LINING WEAR (Inches)

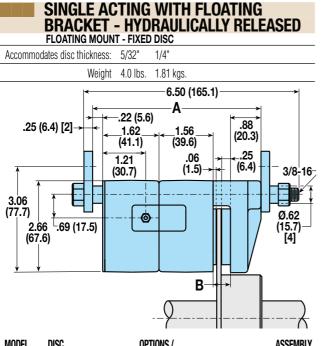
DISC SIZING EQUATIONS

STATIC (PARKING) TORQUE (IN.-LBS.) = TANGENTIAL FORCE (LBS.) x BRAKING RADIUS (IN.) BRAKING RADIUS (IN.) = [DISC DIAMETER ÷ 2] - 0.875



1.800.328.2174

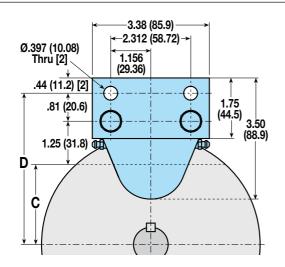
Caliper Disc Brakes *FS20 SERIES - ALUMINUM*

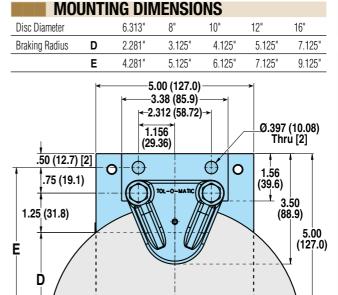


model Code	disc Thk.	A	В	OPTIONS / Description	ASSEMBLY NUMBER
FS20A	5/32"	4.78"	.500"	Spring Applied	0760-0000
FS20AG	5/32"	4.78"	.500"	Spring Applied, EPR Seals	0760-0003
FS20B	1/4"	4.87"	.594"	Spring Applied	0760-0001
FS20BG	1/4"	4.87"	.594"	Spring Applied, EPR Seals	0760-0004

Accommo	BRA	CKE ING MO	T – Pl UNT - Fl SS: 5/32	XED DISC	H FLOATING	-
(5) Breathe (1/8-27 NF) 00 0.8) r	1.8 (46.				2.06 (52.3) _{3.06} (77.7)
MODEL Code	DISC Thk.	A	В	C	OPTIONS / Description	ASSEMBLY NUMBER
FS20PA	5/32"	6.09"	.16"	1.59"	Spring Applied	0760-0023
FS20PB	1/4"	6.18"	.26"	1.68"	Spring Applied	0760-0016

MOUNTING DIMENSIONS						
Disc Diameter		6.313"	8"	10"	12"	16"
Braking Radius	С	2.281"	3.125"	4.125"	5.125"	7.125"
	D	4.344"	5.188"	6.188"	7.188"	9.188"







CALIPER DISC Brakes

FEATURES

FS595 DISCS HUBS & Bushings Tension Control Combinations

INTENSIFIER Selection

WORKSHEET



Caliper Disc Brakes Stress

FS220B SERIES - ALUMINUM

AVAILABLE STYLES

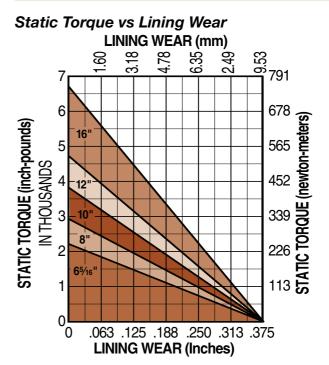
Single Acting - B - 750 PSI Release FLOATING MOUNT - FIXED DISC



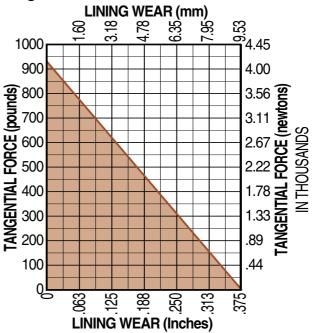
PICTURED: 0740-0000

FS220B SPECIFIC	ΔΤΙΩΝΟ
Maximum hydraulic pressure:	2,000 PSI non shock
Minimum hydraulic pressure to release brake:	750 PSI
Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
Maximum disc diameter:	16"
Housing Material:	Die cast aluminum
Bolts:	Zinc plated grade 8
Seals:	Buna-N Standard
Wearable friction material:	1.6 in ³
Friction material:	Replaceable, high-grade
Total lining area:	7.5 in ²
Floating bracket:	Standard
Fluid displacement:	0.113 in ³

PERFORMANCE DATA







DISC SIZING EQUATIONS

BRAKE MODEL LETTER CODES

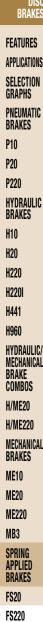
E 1/2" Thick Disc

FS Spring Applied

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

L 3/8" Thick Disc

Tolomatic



FS2201

FS595

DISCS

HUBS &

BUSHINGS

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A 5/32" Thick Disc

B 1/4" Thick Disc

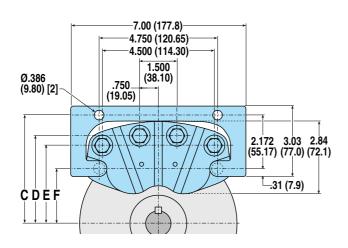
Caliper Disc Brakes Street

FS220B SERIES - ALUMINUM

BLEEDER SCREW [2]

MODEL Code	disc Thk.	A	В	OPTIONS / Description	ASSEMBLY NUMBER
FS220BA	5/32"	5.31"	4.56"	Floating Bracket, "B" Strength	0740-0000
FS220BB	1/4"	5.31"	4.65"	Floating Bracket, "B" Strength	0740-0017
FS220BL	3/8"	5.81"	4.78"	Floating Bracket, "B" Strength	0740-0019
FS220BE	1/2"	5.81"	4.90"	Floating Bracket, "B" Strength	0740-0021

MOUNTING DIMENSIONS							
Disc Diameter		6.313"	8"	10"	12"	16"	
Braking Radius		2.38"	3.15"	4.11"	5.08"	7.21"	
	С	4.30"	5.17"	6.17"	7.17"	9.17"	
	D	3.45"	4.32"	5.32"	6.32"	8.41"	
	Е	3.07"	3.94"	4.94"	5.94"	8.03"	
	F	2.13"	3.00"	4.00"	5.00"	7.09"	



CALIPER DISC
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HYDRAULIC MECHANICAL BRAKE COMBOS
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F\$595
DISCS HUBS 8 Bushings
TENSION Control
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SELECTION
WORKSHEET





Caliper Disc Brakes Street

FS220C SERIES - ALUMINUM

AVAILABLE STYLES

Single Acting - C - 1500 PSI Release



PICTURED: 0741-0000

FS220C SPECIFIC	ATIONS
Maximum hydraulic pressure:	2,000 PSI non shock
Minimum hydraulic pressure to release brake:	1500 PSI
Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
Maximum disc diameter:	16"
Housing Material:	Die cast aluminum
Bolts:	Zinc plated grade 8
Seals:	Buna-N Standard
Wearable friction material:	1.6 in ³
Friction material:	Replaceable, high-grade
Total lining area:	7.5 in ²
Floating bracket:	Standard
Fluid displacement:	0.113 in ³

BRAKE MODEL LETTER CODES					
A 5/32" Thick Disc	E 1/2" Thick Disc	L 3/8" Thick Disc			
B 1/4" Thick Disc	FS Spring Applied				

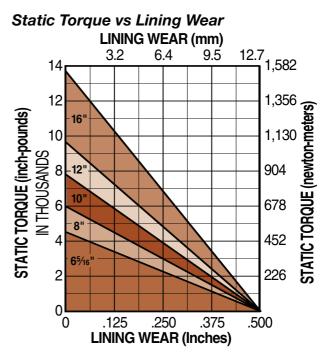
INTENSIFIER Selection Worksheet

DISC SIZING EQUATIONS

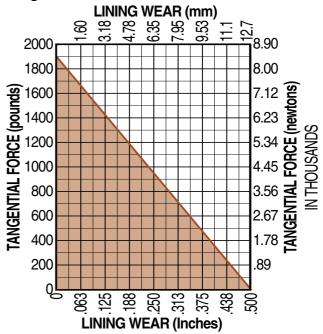
STATIC (PARKING) TORQUE (IN.-LBS.) = TANGENTIAL FORCE (LBS.) x BRAKING RADIUS (IN.)

Tolomatic

PERFORMANCE DATA



Tangential Force



1.800.328.2174

H/ME220 Mechanica Brakes

ME10

ME20

ME220

MB3

SPRING APPLIED

BRAKES

FS20

FS220

FS2201 FS595

DISCS HUBS &

BUSHINGS TENSION

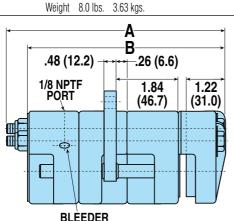
CONTROL

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70

Caliper Disc Brakes FS220C SERIES - ALUMINUM

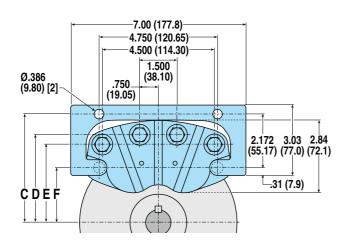
SINGLE ACTING WITH FLOATING BRACKET FLOATING MOUNT - FIXED DISC Accommodates disc thickness: 5/32" 1/4" 3/8" 1/2"



BLEEDER SCREW [2]

MODEL Code	DISC Thk.	A	В	OPTIONS / Description	ASSEMBLY NUMBER
FS220CA	5/32"	6.81"	6.16"	Floating Bracket, "C" Strength	0741-0000
FS220CB	1/4"	6.81"	6.25"	Floating Bracket, "C" Strength	0741-0018
FS220CL	3/8"	7.31"	6.38"	Floating Bracket, "C" Strength	0741-0020
FS220CE	1/2"	7.31"	6.50"	Floating Bracket, "C" Strength	0741-0022

MOUNTING DIMENSIONS							
Disc Diameter		6.313"	8"	10"	12"	16"	
Braking Radius		2.38"	3.15"	4.11"	5.08"	7.21"	
	С	4.30"	5.17"	6.17"	7.17"	9.17"	
	D	3.45"	4.32"	5.32"	6.32"	8.41"	
	Е	3.07"	3.94"	4.94"	5.94"	8.03"	
	F	2.13"	3.00"	4.00"	5.00"	7.09"	



CALIPER DISC Brakes
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CALIPER





SELECTION GRAPHS

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H960 HYDRA

SPRING APPLIED

BRAKES

FS20

HYDRAULIC BRAKES

Caliper Disc Brakes FS220BI SERIES - DUCTILE IRON

AVAILABLE STYLES

Single Acting - B - 750 PSI Release FLOATING MOUNT - FIXED DISC



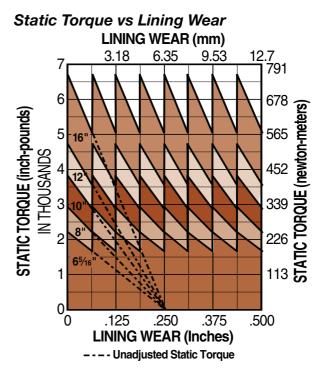
PICTURED: 0740-0001

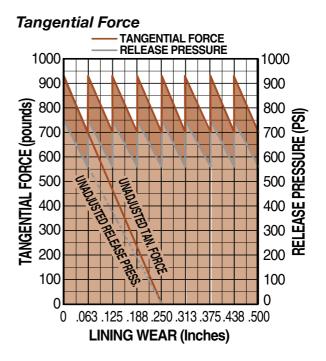
FS220BI SPECIFICATIONS

H960		
HYDRAULIC/	Maximum hydraulic pressure:	2,000 PSI non shock
MECHANICAL Brake	Minimum hydraulic pressure to release brake:	750 PSI
COMBOS	Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
H/ME20	Maximum disc diameter:	16"
H/ME220	Housing Material:	Cast ductile iron
	Bolts:	Zinc plated grade 8
MECHANICAL Brakes	Seals:	Buna-N Standard
	Wearable friction material:	2.7 in ³
ME10	Friction material:	Replaceable, high-grade
ME20	Total lining area:	9.6 in ²
ME220	Floating bracket:	Standard
MB3	Fluid displacement:	0.113 in ³
SPRING	Recommended wear compensation interval:	.06 in. lining wear

BRAKE MODEL LETTER CODES					
A 5/32" Thick Disc	FS Spring Applied	K Manual Compensator			
B 1/4" Thick Disc	I Iron	L 3/8" Thick Disc			
E 1/2" Thick Disc	J Manual Retractor				

PERFORMANCE DATA





DISC SIZING EQUATIONS

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

Tolomatic



1.800.328.2174

Caliper Disc Brakes **FS220BI SERIES - DUCTILE IRON**

SINGLE ACTING WITH FLOATING

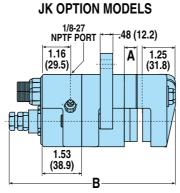
BRACKET FLOATING MOUNT - FIXED DISC

Accommodates disc thickness: 5/32" 1/4" 3/8" 1/2"

Weight 14.5 lbs. 6.58 kgs.

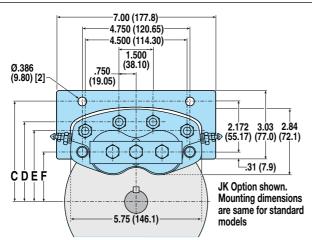
B

STANDARD MODELS 1/8-27 NPTF PORT -.48 (12.2) 1.16 (29.5) A 1.25 (31.8) Ē Ô 1.53 (38.9) B



MODEL Code	DISC Thk.	A	В	OPTIONS / Description	ASSEMBLY NUMBER
FS220BIA	5/32"	_	5.27"	Floating Bracket, "B" Strength	0740-0001
FS220BIB	1/4"	.093"	5.77"	Floating Bracket, "B" Strength	0740-0003
FS220BIL	3/8"	.218"	5.77"	Floating Bracket, "B" Strength	0740-0004
FS220BIE	1/2"	.344"	5.77"	Floating Bracket, "B" Strength	0740-0005
FS220BIAJK	5/32"	.500"	6.32"	Ftg Bkt, "B"Stgh, ManRet, ManComp	0740-0006
FS220BIBJK	1/4"	.594"	6.42"	Ftg Bkt, "B"Stgh, ManRet, ManComp	0740-0007
FS220BILJK	3/8"	.718"	6.54"	Ftg Bkt, "B"Stgh, ManRet, ManComp	0740-0008
FS220BIEJK	1/2"	.844"	6.67"	Ftg Bkt, "B"Stgh, ManRet, ManComp	0740-0009

MOUNTING DIMENSIONS						
Disc Diameter		6.313"	8"	10"	12"	16"
Braking Radius		2.38"	3.15"	4.11"	5.08"	7.21"
	С	4.30"	5.17"	6.17"	7.17"	9.17"
	D	3.45"	4.32"	5.32"	6.32"	8.41"
	Е	3.07"	3.94"	4.94"	5.94"	8.03"
	F	2.13"	3.00"	4.00"	5.00"	7.09"





CALIPER Disc Brakes
FEATURES
APPLICATIONS
SELECTION GRAPHS
PNEUMATIC Brakes
P10
P20
P220
HYDRAULIC Brakes
H10
H20
H220
H220I
H441
H960
HYDRAULIC/ Mechanical Brake Combos
H/ME20
H/ME220
MECHANICAL Brakes
ME10
ME20
ME220
MB3
SPRING Applied Brakes
F\$20
F\$220
FS220
FS595 Discs
HUBS & BUSHINGS
TENSION
CONTROL COMBINATIONS
INTENSIFIER
SELECTION
WORKSHEET



FEATURES Applications

SELECTION GRAPHS

Caliper Disc Brakes FS220CI SERIES - DUCTILE IRON

AVAILABLE STYLES

Single Acting - C - 1500 PSI Release FLOATING MOUNT - FIXED DISC



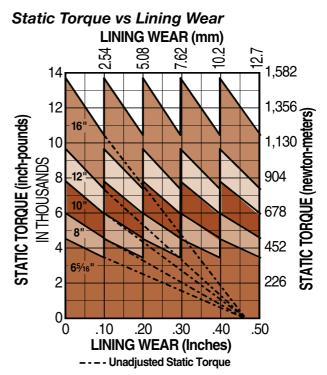
PICTURED: 0741-0009 (Shown with JK Option)

FS220CI SPECIFICATIONS

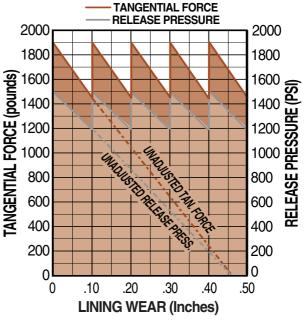
Maximum hydraulic pressure:	2,000 PSI non shock
Minimum hydraulic pressure to release brake:	1500 PSI
Accommodates Tolomatic disc diameters:	6-5/16", 8", 10", 12", 16"
Maximum disc diameter:	16"
Housing Material:	Cast ductile iron
Bolts:	Zinc plated grade 8
Seals:	Buna-N Standard
Wearable friction material:	2.7 in ³
Friction material:	Replaceable, high-grade
Total lining area:	9.6 in ²
Floating bracket:	Standard
Fluid displacement:	0.113 in ³
Recommended wear compensation interval:	.10 in. lining wear

BRAKE MODEL LETTER CODES			
A 5/32" Thick Disc	FS Spring Applied	K Manual Compensator	
B 1/4" Thick Disc	I Iron	L 3/8" Thick Disc	
E 1/2" Thick Disc	J Manual Retractor		

PERFORMANCE DATA



Tangential Force



1.800.328.2174

DISC SIZING EQUATIONS

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

Tolomatic

FS20

FS220

FS2201

FS595

DISCS

HUBS &

BUSHINGS

TENSION

CONTROL

COMBINATION

INTENSIFIER

SELECTION

WORKSHEET

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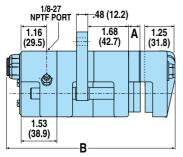
Caliper Disc Brakes Stress FS220CI SERIES - DUCTILE IRON

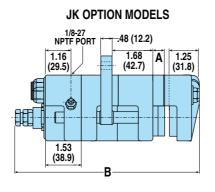
SINGLE ACTING WITH FLOATING BRACKET

FLOATING MOUNT - FIXED DISC

Accommodates disc thickness: 5/32" 1/4" 3/8" 1/2" Weight 20.0 lbs. 9.07 kgs.

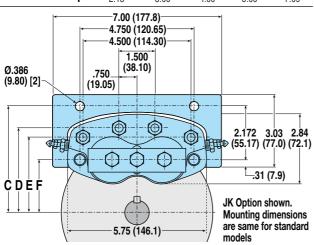
STANDARD MODELS





MODEL Code	DISC Thk.	A	В	OPTIONS / Description	ASSEMBLY NUMBER
FS220CIA	5/32"	_	6.77"	Floating Bracket, "C" Strength	0741-0005
FS220CIB	1/4"	.093"	6.77"	Floating Bracket, "C" Strength	0741-0006
FS220CIL	3/8"	.218"	7.27"	Floating Bracket, "C" Strength	0741-0007
FS220CIE	1/2"	.344"	7.27"	Floating Bracket, "C" Strength	0741-0008
FS220CIAJK	5/32"	.562"	7.96"	Ftg Bkt, "C"Stgh, ManRet, ManComp	0741-0009
FS220CIBJK	1/4"	.656"	8.06"	Ftg Bkt, "C"Stgh, ManRet, ManComp	0741-0010
FS220CILJK	3/8"	.780"	8.18"	Ftg Bkt, "C"Stgh, ManRet, ManComp	0741-0011
FS220CIEJK	1/2"	.906"	8.32"	Ftg Bkt, "C"Stgh, ManRet, ManComp	0741-0012

MOUNTING DIMENSIONS Disc Diameter 6.313' 8" 10" 12" 16" Braking Radius 2.38" 3.15" 4.11" 5.08" 7.21" 9.17" С 4.30" 5.17" 6.17" 7.17" 6.32" D 3.45" 4.32" 5.32" 8.41" 4 94" 3.07" 3 94" 5.94" 8.03" Ε F 2.13" 3.00" 4.00" 5.00" 7.09"





CALIPER BRAKES FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 H960 HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220 MECHANICAL BRAKES **ME10 ME20**

ME220 MB3 Spring Applied Brakes FS20 FS220 FS2201 FS255 Discs HUBS & BUSHINGS

> TENSION CONTROL COMBINATIONS INTENSIFIER SELECTION

WORKSHEET

75



SELECTION GRAPHS

PNEUMATIC

HYDRAULIC

BRAKES

H10

H20

H220 H2201

H441

H960 HYDRA MECHA

FS220

FS2201

FS595 DISCS

HUBS &

BUSHINGS

TENSION

CONTROL

COMBINATIONS

INTENSIFIER SELECTION

WORKSHEET

BRAKES

P10

P20 P220

Caliper Disc Brakes **FS595 SERIES - DUCTILE IRON**

AVAILABLE STYLES

Double Acting FLOATING MOUNT - FIXED DISC



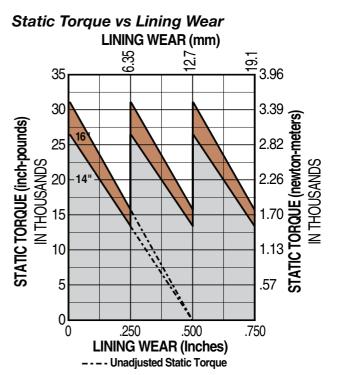
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FS595 SPECIFICATIONS

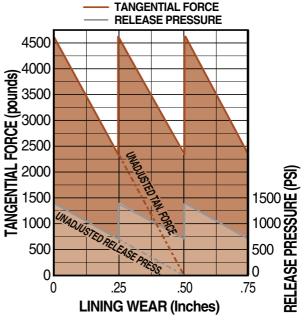
1900		
HYDRAULIC/	Maximum hydraulic pressure:	2,000 PSI non shock
MECHANICAL Brake	Minimum hydraulic pressure to release brake:	1,400 PSI
COMBOS	Accommodates Tolomatic disc diameters:	16"
H/ME20	Minimum disc diameter:	14 [°]
H/ME220	Maximum disc diameter:	none
	Housing Material:	Cast ductile iron
MECHANICAL Brakes	Bolts:	Zinc plated grade 8
	Seals:	Buna-N Standard
ME10	Wearable friction material:	3.43 in ³
ME20	Friction material:	Replaceable, high-grade
ME220	Total lining area:	9.14 in ²
MB3	Fluid displacement for .03 inch clearance:	0.230 in ³
SPRING	Recommended wear compensation interval:	.25 in. lining wear
APPLIED	OPTIONS	
BRAKES	Seals:	Viton [®] seals
FS20	Adaptable to thinner discs:	Consult factory

BRAKE MODEL LETTER CODES C With Bleeder Fittings FS Spring Applied 0 1-1/4" Thick Disc D Double Acting I Iron Q 1-1/2" Thick Disc V Viton[®] Seals E 1/2" Thick Disc K Manual Compensator

PERFORMANCE DATA



Tangential Force

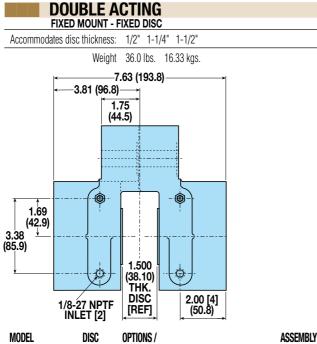


DISC SIZING EQUATIONS

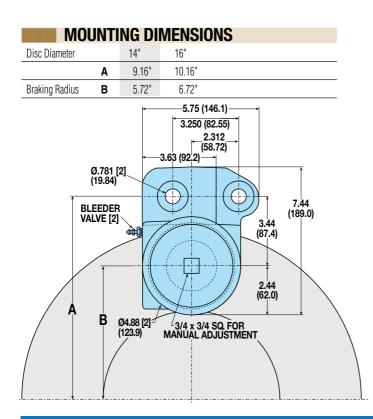
STATIC (PARKING) TORQUE (IN.-LBS.) = TANGENTIAL FORCE (LBS.) x BRAKING RADIUS (IN.) BRAKING RADIUS (IN.) = [DISC DIAMETER ÷ 2] - 1.280



Caliper Disc Brakes Stress FS595 SERIES - DUCTILE IRON



CODE	disc Thk.	OPTIONS / Description	ASSEMBLY NUMBER
FS595DCIKE	1/2"	Double Acting, Iron, Man Wear Comp	0781-0011
FS595DCIKO	1-1/4"	Double Acting, Iron, Man Wear Comp	0781-0018
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



CALIPER Disc Brakes
FEATURES
APPLICATIONS
SELECTION GRAPHS
PNEUMATIC Brakes
P10
P20
P220
HYDRAULIC Brakes
H10
H20
H220
H220I
H441
H960
HYDRAULIC/ Mechanical Brake Combos
H/ME20
H/ME220
MECHANICAL Brakes
ME10
ME20
ME220
MB3
SPRING Applied Brakes
F\$20
FS220
F\$2201
FS595

DISCS

HUBS & BUSHINGS

TENSION

CONTROL

COMBINATIONS INTENSIFIER

SELECTION

WORKSHEET

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SEE NEXT PAGE FOR FS595 DUAL





SELECTION GRAPHS

PNEUMATIC

BRAKES

P10 P20

P220 HYDRAULIC

BRAKES H10

H20

H220

H2201 H441

H960 HYDR

FS20

FS220

FS2201

FS595 DISCS

HUBS & BUSHINGS

TENSION CONTROL

COMBI

INTEN

Caliper Disc Brakes **FS595 DUAL SERIES - DUCTILE IRON**

AVAILABLE STYLES

Double Acting FLOATING MOUNT - FIXED DISC

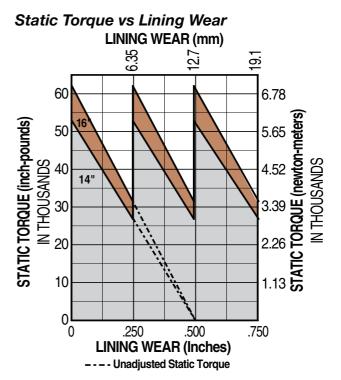


PICTURED: 0782-0003

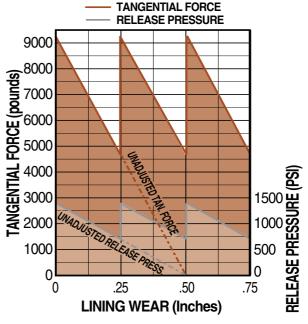
FS595 DUAL SPECIFICATIONS

N900		
HYDRAULIC/	Maximum hydraulic pressure:	2,000 PSI non shock
MECHANICAL Brake	Minimum hydraulic pressure to release brake:	1,400 PSI
COMBOS	Accommodates Tolomatic disc diameters:	16"
H/ME20	Minimum disc diameter:	14"
	Maximum disc diameter:	none
H/ME220	Housing Material:	Cast ductile iron
MECHANICAL Brakes	Bolts:	Zinc plated grade 8
	Seals:	Buna-N Standard
ME10	Wearable friction material:	6.86 in ³
ME20	Friction material:	Replaceable, high-grade
ME220	Total lining area:	18.28 in ²
MB3	Fluid displacement for .03 inch clearance:	0.460 in ³
SPRING	Recommended wear compensation interval:	.25 in. lining wear
APPLIED	OPTIONS	
BRAKES	Adaptable to thinner discs:	Consult factory

PERFORMANCE DATA



Tangential Force



BRAKE MODEL LE	TTER CODES

INATIONS	C With Bleeder Fittings	FS Spring Applied	L 3/8" Thick Disc
NSIFIER	D Double Acting	I Iron	N 1" Thick Disc
CTION	E 1/2" Thick Disc	K Manual Compensator	Q 1-1/2" Thick Disc

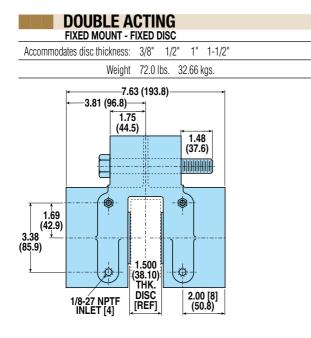
SELE WORKSHEET

DISC SIZING EQUATIONS

STATIC (PARKING) TORQUE = TANGENTIAL FORCE x BRAKING RADIUS BRAKING RADIUS = [DISC DIAMETER ÷ 2] - 1.280

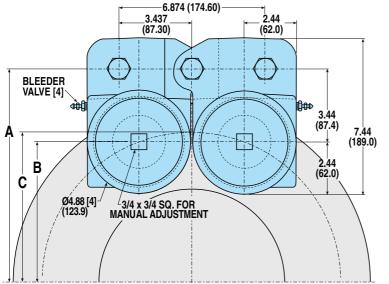


Caliper Disc Brakes Stress FS595 DUAL SERIES - DUCTILE IRON

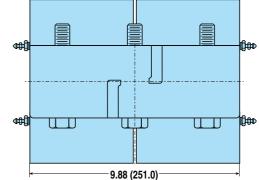


MODEL Code	DISC Thk.	OPTIONS / Description	Assembly Number
FS595DCIKL-Dual	3/8"	DUAL, Double Acting, Iron, Man Wear Comp	0782-0006
FS595DCIKE-Dual	1/2"	DUAL, Double Acting, Iron, Man Wear Comp	0782-0007
FS595DCIKN-Dual	1"	DUAL, Double Acting, Iron, Man Wear Comp	0782-0008
FS595DCIKQ-Dual	1-1/2"	DUAL, Double Acting, Iron, Man Wear Comp	0782-0003

MOUNTING DIMENSIONS					
Disc Diameter	14"	16"			
Α	8.58"	9.67"			
В	5.23"	6.23"			
Braking Radius C	5.72"	6.72"			



Top View



CALIPER DISC Brakes FEATURES **APPLICATIONS** SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 H960 HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220 MECHANICAL BRAKES **ME10** ME20 ME220 MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS TENSION CONTROL

COMBINATIONS INTENSIFIER SELECTION

WORKSHEET





FEATURES

Caliper Disc Brakes FIXED HUB & DISC ASSEMBLIES

AVAILABLE STYLES

Hub & Disc Assembly



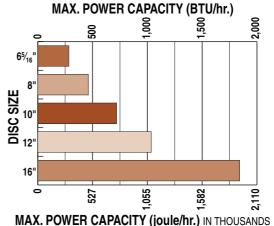
PICTURED: 0802-0020

FIXED HUB & DISC SPECIFICATIONS

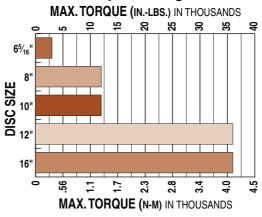
1900		
HYDRAULIC/	Disc material:	Carbon 1010 steel
MECHANICAL Brake Combos	Disc manufacturing details:	Flat within .010 inch, stress relieved and blanchard ground to an 80 (RMS) micro-inch finish
H/ME20	Hub material:	Machined from cold rolled steel
H/ME220	Included fasteners:	
MECHANICAL Brakes		Keyway set screws
ME10		
ME20		
ME220		
MB3		
SPRING Applied Brakes		
F\$20		
F\$220		
F\$2201		
F\$595		
DISCS HUBS & Bushings		
TENSION Control Combinations		
INTENSIFIER		
SELECTION		
WORKSHEET		

PERFORMANCE DATA

Maximum Power Capacity

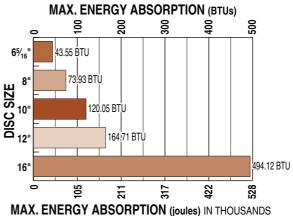


Maximum Torque Ratings



Single Stop Maximum Energy

Absorption Capacities* *Disc temperature 380° F

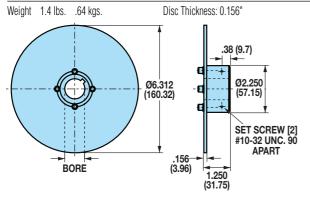


Tolomatic EXCELLENCE IN MOTION

Caliper Disc Brakes **FIXED HUB & DISC ASSEMBLIES**

65/16" DISC

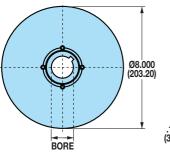
For use with pneumatic, hydraulic, mechanical or spring applied caliper disc brakes



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

8" DISC

For use with pneumatic, hydraulic, mechanical or spring applied caliper disc brakes Weight 3.5 lbs. 1.59 kgs. Disc Thickness: 0.156"



BORE

1.000'

1.125'

1.250'

1.375'

KEY SIZE

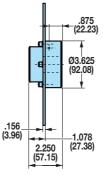
ASSY NO.

0802-0016

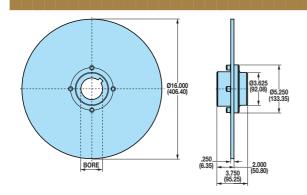
0802-0018

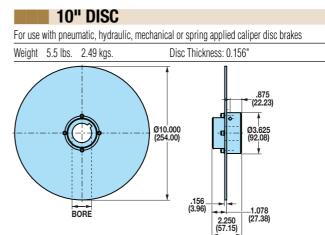
0802-0020

0802-0022



.250" x .250"	ASSY NO.	BORE	KEY SIZE
.250" x .250"	0802-0024	1.500"	.375" x .375"
.250" x .250"	0802-0026	1.625"	.375" x .375"
.313" x .313"	0802-0028	1.750"	.375" x .375"





ASSY NO.	BORE	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"

12" DISC

For use with pneumatic, hydraulic, mechanical or spring applied caliper disc brakes Weight 7.9 lbs. 3.58 kgs. Disc Thickness: 0.156"

ASSY NO.

0803-0024

0803-0026

0803-0028

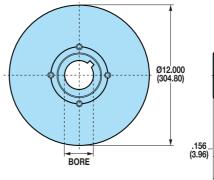
BORE

1.500"

1.625"

1.750"

KEY SIZE



BORE	BORE KEY SIZE	
1.500"	.375" x .375"	ASS
1.750"	.375" x .375"	0804
2.000"	.500" x .500"	0804

16" DISC

.156_ (3.96)		→	03.625 (92.08) 05.250 (133.35) 2.000 (50.80)
Y NO.	.	BOR	KEY SIZE
4-0036	3 2	.250"	.500" x .500

SSY NO.	BORE	KEY SIZE
304-0036	2.250"	.500" x .500"
304-0040	2.500"	.625" x .625"

TENSION CONTROL COMBINATIONS INTENSIFIER SELECTION

WORKSHEET

ASSY NO.	BORE	KEY SIZE
0805-0024	1.500"	.375" x .375"
0805-0028	1.750"	.375" x .375"
0805-0032	2.000"	.500" x .500"

Disc Thickness: 0.250'

For use with pneumatic, hydraulic, mechanical or spring applied caliper disc brakes

CALIPER DISC Brakes

FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 .375" x .375" H960 .375" x .375" HYDRAULIC/ .375" x .375" MECHANICAL BRAKE COMBOS **H/ME20** H/ME220 MECHANICAL BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS

Weight 14.1 lbs. 6.40 kgs.

ASSY NO.

0804-0024

0804-0028

0804-0032



Caliper Disc Brakes

FIXED HUB & DISC ASSEMBLIES WITH QUICK DISCONNECT (Q.D.) BUSHINGS

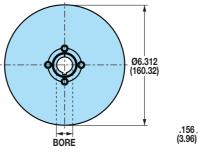
AVAILABLE STYLES

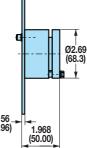
Hub & Disc Assembly with Quick Disconnect (Q.D.) Bushings



65/16" DISC

For use with pneumatic, hydraulic, mechanical or spring applied caliper disc brakes Weight 2.1 lbs. .95 kgs. Disc Thickness: 0.156"

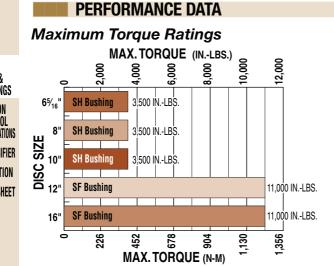




ASSY NO.	BORE	KEY SIZE	ASSY NO.	BORE	KEY SIZE
0801-0109	.563"	.125" x .125"	0801-0114	.875"	.188" x .188"
0801-0110	.625"	.188" x .188"	0801-0115	.938"	.250" x .250"
0801-0111	.688"	.188" x .188"	0801-0116	1.000"	.250" x .250"
0801-0112	.750"	.188" x .188"	0801-0117	1.063"	.250" x .250"

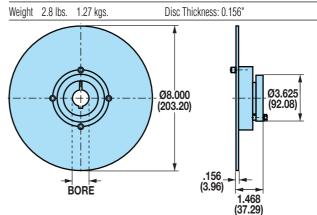
FIXED HUB & DISC SPECIFICATIONS

	 Disc material:	Carbon 1010 steel
)	Disc manufacturing details:	Flat within .010 inch, stress relieved and
CAL		blanchard ground to an 80 (RMS) micro-inch finish
	Bushings:	Upper lock quick disconnect
	Included fasteners:	Socket head cap screws Key way set screws



8" DISC

For use with pneumatic, hydraulic, mechanical or spring applied caliper disc brakes



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

*NON-STANDARD KEYS ARE SUPPLIED ALONG WITH HUB AND DISC ASSEMBLIES

FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 H960 HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220 MECHANIC BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS INTENSIFIER SELECTION WORKSHEET

CALIPER DISC Brakes

FEATURES

Caliper Disc Brakes

FIXED HUB & DISC ASSEMBLIES with QUICK DISCONNECT (Q.D.) BUSHINGS

KEY SIZE

.250" x .250"

.250" x .250" .313" x .313"

.313" x .313"

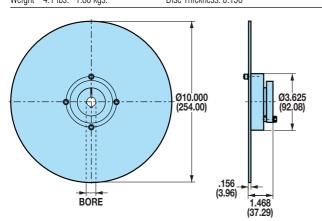
.375" x .250"*

.375" x .250"*

.375" x .250"*

10" DISC

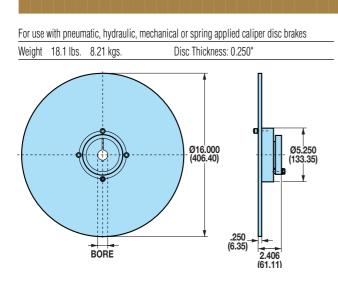
For use with pneumatic, hydraulic, mechanical or spring applied caliper disc brakes Disc Thickness: 0.156" Weight 4.1 lbs. 1.86 kgs.



ASSY NO.	BORE	KEY SIZE	ASSY NO.	BORE
0803-0110	.625"	.188" x .188"	0803-0119	1.188"
0803-0111	.688"	.188" x .188"	0803-0120	1.250"
0803-0112	.750"	.188" x .188"	0803-0121	1.313"
0803-0114	.875"	.188" x .188"	0803-0122	1.375"
0803-0115	.938"	.250" x .250"	0803-0123	1.438"
0803-0116	1.000"	.250" x .250"	0803-0124	1.500"
0803-0117	1.063"	.250" x .250"	0803-0125	1.563"
0803-0118	1.125"	.250" x .250"		

FEAT						
APPLIC				SC	2" DI	1
SELEC	c brakes	d caliper dis	ical or spring applied			
- PNEU			Disc Thickness: 0.			Weight 9.3 l
BR		Π	4			
					ł	
	A	d			6	/
	Ø5.250		Ø12.000))		/ 0
HYDR	(133.35)	╶╢╴╺╟╴	(304.80)))	((⊕	
BR		∥⊫		/ /		
						\backslash
			Ļ			
		→┨┥	<u> </u>			
	1	2.030 (51.56	(0.00		BORE	
	, Key size	BORE	ASSY NO.	KEY SIZE	BORE	ASSY NO.
-	.375" x .375"	1.750"	0804-0128	.125" x .125"	.500"	0804-0108
HYDRA	.500" x .500"	1.875"	0804-0130	.188" x .188"	.750"	0804-0112
MECHA B	.500" x .500"	1.938"	0804-0131	.188" x .188"	.875"	0804-0114
- COI	.500" x .500"	2.000	0804-0132	.250" x .250"	.938"	0804-0115
- H/	.500" x .500"	2.063	0804-0133	.250" x .250"	1.000"	0804-0116
H/N	.500" x .500"	2.125"	0804-0134	.250" x .250"	1.063"	0804-0117
MECHA	.500" x .500"	2.188"	0804-0135	.250" x .250"	1.125"	0804-0118
BR	.500" x .500"	2.250"	0804-0136	.250" x .250"	1.188"	0804-0119
			0004 0407	.250" x .250"	1.250"	0804-0120
	.500" x .625"*	2.313"	0804-0137	.200 X.200	1.200	
	.500" x .625"* .500" x .625"*	2.313" 2.375"	0804-0137 0804-0138	.230 x .230 .313" x .313"	1.313"	0804-0121
-						0804-0121 0804-0122
N	.500" x .625"*	2.375"	0804-0138	.313" x .313"	1.313"	
Ň	.500" x .625"* .500" x .625"*	2.375" 2.438"	0804-0138 0804-0139	.313" x .313" .313" x .313"	1.313" 1.375"	0804-0122
SF AP	.500" x .625"* .500" x .625"* .500" x .625"*	2.375" 2.438" 2.500"	0804-0138 0804-0139 0804-0140	.313" x .313" .313" x .313" .375" x .375"	1.313" 1.375" 1.438"	0804-0122 0804-0123
- SF	.500" x .625"* .500" x .625"* .500" x .625"* .375" x .625"*	2.375" 2.438" 2.500" 2.563"	0804-0138 0804-0139 0804-0140 0804-0141	.313" x .313" .313" x .313" .375" x .375" .375" x .375"	1.313" 1.375" 1.438" 1.500"	0804-0122 0804-0123 0804-0124
API	.500" x .625"* .500" x .625"* .500" x .625"* .375" x .625"* .375" x .625"*	2.375" 2.438" 2.500" 2.563" 2.625"	0804-0138 0804-0139 0804-0140 0804-0141 0804-0142	.313" x .313" .313" x .313" .375" x .375" .375" x .375" .375" x .375"	1.313" 1.375" 1.438" 1.500" 1.563"	0804-0122 0804-0123 0804-0124 0804-0125

*NON-STANDARD KEYS ARE SUPPLIED ALONG WITH HUB AND DISC ASSEMBLIES



	10 1	0130	
ASSY NO.	BORE	KEY SIZE	AS
0805-0108	.500"	.125" x .125"	08
0805-0112	.750"	.188" x .188"	30
0805-0114	.875"	.188" x .188"	30
0805-0116	1.000"	.250" x .250"	30
0805-0117	1.063"	.250" x .250"	30
0805-0118	1.125"	.250" x .250"	30
0805-0119	1.188"	.250" x .250"	80
0805-0120	1.250"	.250" x .250"	30
0805-0121	1.313"	.313" x .313"	30
0805-0122	1.375"	.313" x .313"	80
0805-0123	1.438"	.375" x .375"	08
0805-0124	1.500"	.375" x .375"	08
0805-0125	1.563"	.375" x .375"	08
0805-0126	1.625"	.375" x .375"	

	.010 A.020	2.100	
F\$220			
F\$2201			
FS595	KEY SIZE	BORE	ASSY NO.
DISCS	.375" x .375"	1.750"	0805-0128
HUBS & Bushings	.500" x .500"	1.875"	0805-0130
	.500" x .500"	1.938"	0805-0131
TENSION Control	.500" x .500"	2.000	0805-0132
COMBINATIONS	.500" x .500"	2.125"	0805-0134
INTENSIFIER	.500" x .500"	2.188"	0805-0135
SELECTION	.500" x .625"*	2.313"	0805-0137
WORKSHEET	.500" x .625"*	2.375"	0805-0138
WUNKJILLI	.500" x .625"*	2.438"	0805-0139
	.500" x .625"*	2.500"	0805-0140
	.375" x .625"*	2.563"	0805-0141
	.375" x .625"*	2.688"	0805-0143
	.375" x .625"*	2.750"	0805-0144

www.tolomatic.com





SELECTION GRAPHS

PNEUMATIC

HYDRAULIC

BRAKES

H10 H20

H220 H2201 H441

H960

BRAKE COMBOS

H/ME20

H/ME220

BRAKES

ME10

MF20

ME220

BRAKES

P10

P20 P220

Caliper Disc Brakes QUICK DISCONNECT (Q.D.) BUSHINGS & HUBS

AVAILABLE STYLES

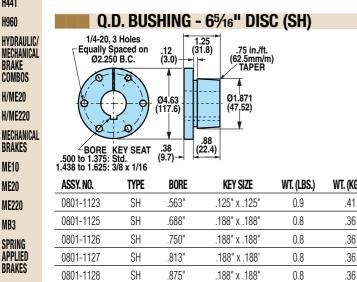
Quick Disconnect (Q.D.) Bushings must be used with Quick Disconnect (Q.D.) Hubs





PICTURED: 0801-1151

PICTURED: 0801-1119



0801-1122	SH	.500"	.125" x .125"	0.9	.41
0801-1123	SH	.563"	.125" x .125"	0.9	.41
0801-1124	SH	.625"	.188" x .188"	0.9	.41
0801-1125	SH	.688"	.188" x .188"	0.8	.36
0801-1126	SH	.750"	.188" x .188"	0.8	.36
0801-1127	SH	.813"	.188" x .188"	0.8	.36
0801-1128	SH	.875"	.188" x .188"	0.8	.36
0801-1129	SH	.938"	.250" x .250"	0.8	.36
0801-1131	SH	1.000"	.250" x .250"	0.7	.32
0801-1132	SH	1.063"	.250" x .250"	0.7	.32
0801-1133	SH	1.125"	.250" x .250"	0.7	.32
0801-1134	SH	1.188"	.250" x .250"	0.6	.27
0801-1135	SH	1.250"	.250" x .250"	0.6	.27
0801-1136	SH	1.313"	.313" x .313"	0.5	.23
0801-1137	SH	1.375"	.313" x .313"	0.5	.23
0801-1138	SH	1.438"	.375" x .250"*	0.5	.23
0801-1139	SH	1.500"	.375" x .250"*	0.4	.18
0801-1140	SH	1.563"	.375" x .250"*	0.4	.18
0801-1141	SH	1.625"	.375" x .250"*	0.4	.18

Q.D. BUSHING - 8" & 10" DISC (SH)

(31.8)

.88 (22.4)

KEY SIZE

12

(3.0)

Ø4.63 (117.6)

.38 (9.7)

BORE

.75 in./ft. (62.5mm/m) / TAPER

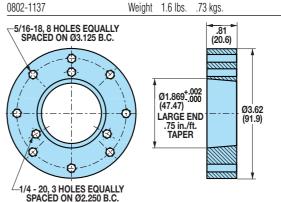
Ø1.871

(47.52)

*NON-STANDARD KEYS ARE SUPPLIED ALONG WITH HUB AND DISC ASSEMBLIES

Q.D. HUB - 8" & 10" DISC (SH)

For use with quick disconnect (Q.D.) bushing



1.000 .250" x .250' 0.7 .32 1.063 .250" x .250" 07 .32 1.125 .32 0.7 .250" x .250'

0.8

.36

.250" x .250'

Q.D. HUB - 65/16" DISC (SH) For use with quick disconnect (Q.D.) bushing 0801-1119 Weight 1.2 lbs. .54 kgs. 1.31 (33.3) Ø1.869+.002 (47.47) -.000 1.125 +.015 Ø2.69 LARGE END (68.3) (28.58) .75 in./ft. TAPER .88 (22.4) 1/4 - 20 x .62 DEEP, 3 HOLES EQUALLY SPACED ON Ø2.250 B.C.



WT. (LBS.)

WT.(KGS.)

WT. (KGS.) .41 .36 .36

1/4-20. 3 Holes

Equally Spaced on

Ø2.250 B.C.

Ø

A

ASSY. NO.

.500 to 1.375: Std. 1.438 to 1.625: 3/8 x 1/16

KEY SEAT

TYPE

MB3 SPRING APPLIED BRAKES FS20

0801-1129

0801-1131

0801-1132

0801-1133

SH

SH

SH

SH

.938'

FS220 FS2201

FS595 DISCS HUBS &

TENSION CONTROL COMBINATIONS

BUSHINGS

INTENSIFIER SELECTION WORKSHEET

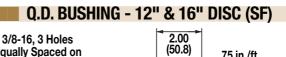
Caliper Disc Brakes States QUICK DISCONNECT (Q.D.) BUSHINGS & HUBS

0.D. BUSHING INSTALLATION

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 (INLBS.)	WRENCH LENGTH (INCHES)	WRENCH PULL (POUNDS)
SH	108	4	27
SF	360	6	60



Ø4.63 (117.6)

⊷.12 (3.0)

3/8-16, 3 Holes

Equally Spaced on

Ø3.875 B.C.

R

Ø

			17.0)	(79.30)		HYDRAULIC BRAKES
×7-	- %		1.50			H10
	RE KE	SEAT	50 (38.1)			H20
2.313 to 2	2.50 : 5/8	x 3/16	2.7) ->	1		H220
2.563 to 2	2.75 : 5/8	x 1/16				H220
ASSY. NO.	TYPE	BORE	KEY SIZE	WT. (LBS.)	WT. (KGS.)	
0801-1142	SF	.500"	.125" x .125"	4.9	2.22	H441
0801-1143	SF	.563"	.125" x .125"	4.9	2.22	H960
0801-1144	SF	.625"	.188" x .188"	4.8	2.18	HYDRAULIC/
0801-1145	SF	.688"	.188" x .188"	4.8	2.18	MECHANICAL BRAKE
0801-1146	SF	.750"	.188" x .188"	4.8	2.18	COMBOS
0801-1147	SF	.813"	.188" x .188"	4.7	2.13	H/ME20
0801-1148	SF	.875"	.188" x .188"	4.7	2.13	H/ME220
0801-1149	SF	.938"	.250" x .250"	4.6	2.09	
0801-1150	SF	1.000"	.250" x .250"	4.6	2.09	MECHANICAL BRAKES
0801-1151	SF	1.063"	.250" x .250"	4.5	2.04	
0801-1152	<u>SF</u> SF	<u>1.125"</u> 1.188"	.250" x .250" .250" x .250"	4.5	2.04	ME10
<u>0801-1153</u> 0801-1154	<u>SF</u>	1.100	.250 x .250 .250" x .250"	<u>4.4</u> 4.4	<u>2.00</u> 2.00	ME20
0801-1155	SF	1.313"	.313" x .313"	4.4	1.95	ME220
0801-1156	SF	1.375"	.313" x .313"	4.2	1.91	MB3
0801-1157	SF	1.438"	.375" x .375"	4.1	1.86	SPRING
0801-1158	SF	1.500"	.375" x .375"	4.0	1.81	APPLIED
0801-1159	SF	1.563"	.375" x .375"	4.0	1.81	BRAKES
0801-1160	SF	1.625"	.375" x .375"	3.9	1.77	FS20
0801-1161	SF	1.688"	.375" x .375"	3.8	1.72	FS220
0801-1162	SF	1.750"	.375" x .375"	3.7	1.68	F\$2201
0801-1163	SF	1.875"	.500" x .500"	3.5	1.59	F\$595
0801-1164	SF	1.938"	.500" x .500"	3.4	1.54	
0801-1165	SF	2.000"	.500" x .500"	3.3	1.50	DISCS HUBS &
0801-1166	SF	2.063"	.500" x .500"	3.2	1.45	BUSHINGS
0801-1167	SF	2.125"	.500" x .500"	3.1	1.41	TENSION
0801-1168	SF	2.188"	.500" x .500"	3.0	1.36	CONTROL
0801-1169	SF	2.250"	.500" x .500"	2.9	1.32	COMBINATIONS
0801-1170	SF	2.313"	.500" x .625"*	2.9	1.32	INTENSIFIER
0801-1171	SF	2.375"	.500" x .625"*	2.8	1.27	SELECTION
0801-1172 0801-1173	SF SF	2.438" 2.500"	.500" x .625"* .500" x .625"*	<u>2.7</u> 2.6	<u>1.22</u> 1.18	WORKSHEET
0801-1173	SF	2.563"	.375" x .625"*	2.0	1.09	TOTAOTEET
0801-1175	SF	2.625"	.375" x .625"*	2.4	1.04	
0801-1176	SF	2.688"	.375" x .625"*	2.2	1.00	
0801-1177	SF	2.750"	.375" x .625"*	2.0	.91	
0801-1178	SF	2.812"	NONE	1.8	.82	
0801-1179	SF	2.937"	NONE	1.5	.68	

		16 1			
For use with	quick disconnect (Q	.D.) bushir	ng		
0804-1141		Weight	4.70 lbs.	2.13 kgs.	
io-	HOLES EQUALLY ON Ø4.500 B.C.	O.	4 (79.32) LARGE I .75 in./ TAPE	END (133.4)	

0.D. HUB - 12" & 16" DISC (SF)

*NON-STANDARD KEYS ARE SUPPLIED ALONG WITH HUB AND DISC ASSEMBLIES

.75 in./ft.

(62.5mm/m)

TAPER

Ø3.125

(79.38)

CALIPER

SELECTION

PNEUMATIC

GRAPHS

BRAKES

P10

P20

P220





SELECTION GRAPHS

PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220

H220I H441 H960

HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220 MECHANICAL BRAKES

Caliper Disc Brakes **ONE-PIECE HUB AND DISC**

AVAILABLE STYLES

One-Piece Hub and Disc



6" DISC

AVAILABLE STYLES

BLANK DISC

Blank Disc



PICTURED: 0801-1200

PICTURED: 0801-1210

ONE-PIECE HUB & DISC SPECIFICATIONS

Disc material:	Grey cast iron (G3000)
Disc manufacturing details:	Flat within .010 inch, 80 (RMS) micro-inch finish
Included fasteners:	none

BLANK DISC SPECIFICATIONS

Disc material:	SAE 1010-1020 CRS
Disc manufacturing details:	Flat within .010 inch, 80 (RMS) micro-inch finish
Included fasteners:	none

For use with pneumatic, hydraulic, mechanical or spring applied caliper disc brakes Weight 1.8 lbs. Disc Thickness: 0.187 .82 kgs. 1.30 (33.0) .95 +.02 .05 +.02 (24.1 +.5) <u>_</u>_A (12.7 +.5) 5/16-18 /-UNC-2B THRU [0801-1230 ONLY] Ø6.00 1.114+.010 (152.4) 1.75 Ø2.00 (44.5) (50.8) _1.0025 (25.463) 1.0000 (25.400) BUSHINGS .187_ (4.75) 1.25 CONTROL (31.8) COMBINATIONS ASSY, NO. BORE **KEY SIZE** DIM "A" INTENSIFIER 0801-1210 1.000" .188" x .188' .190" / .188' SELECTION 0801-1230 .253" / .251" 1.000" .25" x .125"

65/16", 8", 10", 12" & 16" DISCS

For use with pneumatic, hydraulic, mechanical or spring applied caliper disc brakes

NO DIMENSIONAL DRAWING REQUIRED

ASSY. NO.	DISC DIAMETER	DISC THICKNESS	WT. (LBS.)	WT. (KGS.)
0801-1200	6.313"	.156"	1.3	.59
0802-1200	8.000"	.156"	2.2	1.00
0803-1200	10.000"	.156"	3.4	1.54
0804-1200	12.000"	.156"	4.8	2.18
0805-1200	16.000"	.250"	13.7	6.21



ME10 ME20 ME220 MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201

FS595 DISCS HUBS &

TENSION

WORKSHEET

86

Caliper Disc Brakes Store

DISC WITH BOLT CIRCLES & PILOT HOLE

AVAILABLE STYLES

Disc with Bolt Circles & Pilot Hole



PICTURED: 0801-1208

DISC SPECIFICATIONS

Disc material:	SAE 1010-1020 CRS
Disc manufacturing details:	Flat within .010 inch, 80 (RMS) micro-inch finish
Included fasteners:	none

INTENSIFIER

AVAILABLE STYLES	•
la la se l'Cara	



PICTURED: 1770-0000

NOTE: NOT FOR USE WITH SPRING APPLIED OR SPRING RETRACTING CALIPER DISC BRAKES

INTENSIFIER SPECIFICATIONS

		100 PSI	H441
	Piston seal:	U-cup design	H960
	Cylinder material:	Hard coated aluminum	
	Input to output ratio:	1:10	HYDRAULIC/ Mechanical
OUTPUT:	Hydraulic pressure, maximum:	1,000 PSI	BRAKE
	Hydraulic fluid displacement:	0.44 in ³	COMBOS
	Cylinder seal:	O-ring, Buna-N	H/ME20
	Cylinder material:	Aluminum	H/ME220
	1/8 NPT Port:	Standard, for oil reservoir and/or pressure gauge	MECHANICAL BRAKES

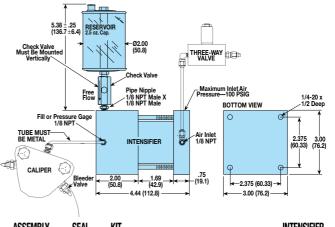
Options:

Tolomatic

Hydraulic cylinder seal:	O-ring, EPR
Hydraulic cylinder seal:	O-ring, Viton®

INTENSIFIER KIT

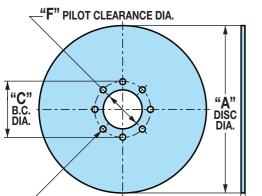
For use with non-spring retracting hydraulic caliper disc brakes, Tolomatic series: H10, H20, H/ME20, H220, H/ME220



Assembly NUMBER	seal Type	kit Includes:	INTENSIFIER NUMBER
1770-0002	Buna-N	Intensifier, reservoir, check valve & pipe nipple	1770-0000
1770-0003	EPR	Intensifier, reservoir, check valve & pipe nipple	1770-0001
1770-0004	Viton®	Intensifier, reservoir, check valve & pipe nipple	1770-0005

6⁵/16["], 8["], 10["], 12["] & 16["] DISCS

For use with pneumatic, hydraulic, mechanical or spring applied caliper disc brakes



EQ. SPACED ON B.C. DIA. THICKNESS

ASSEMBLY NUMBER	"A" Disc Dia.	"B" Disc Thk	"C" B.C. DIA.	"D" No. of Bolt Holes	"E" Hole Dia.	"F" Pilot Clear. Dia.
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"

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CALIPER DISC BRAKES FEATURES

APPLICATIONS

SELECTION

PNEUMATIC BRAKES P10 P20 P220 Hydraulic Brakes

GRAPHS

H10

H20

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H220I

ME10

ME20

ME220 MB3

SPRING

APPLIED

BRAKES FS20 FS220

FS2201

FS595 DISCS HUBS & BUSHINGS

TENSION

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SELECTION

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SELECTION

PNEUMATIC

GRAPHS

BRAKES

P10

Caliper Disc Brakes TENSION CONTROL COMBINATIONS

AVAILABLE STYLES

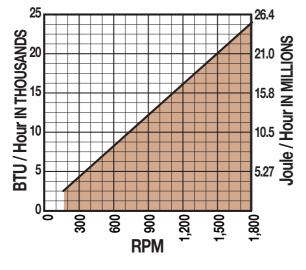
Ventilated Disc FIXED MOUNT - FIXED DISC



PICTURED: 0803-1214

DISC PERFORMANCE DATA

Thermal Dissipative Capacity of Ventilated Disc (BASED ON A MAXIMUM DISC TEMPERATURE OF 375°F AND AN AMBIENT TEMPERATURE OF 75°F)



	11"	DISC		
For use	with hydrau	ılic caliper disc brakes		
Weight	15.4 lbs.	6.99 kgs.	Disc Thickness: 1.20"	

SEE CALIPER & DISC DRAWING AT RIGHT FOR DISC DIMENSIONS

I	ASSY. NO.	DESCRIPTION	COMPONENTS INCLUDED
T	0803-0202	Ventilated Disc Assembly	Ventilated Disc, Pilot Plate HHCS (1/2"-13 x 1-1/2")[5], Lockwashers [5]

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

PERFORMANCE DATA GRAPHS ARE REPEATED FROM:

PAGE 36 - PNEUMATIC PAGE 42 - HYDRAULIC

> 2.260 ş

.808

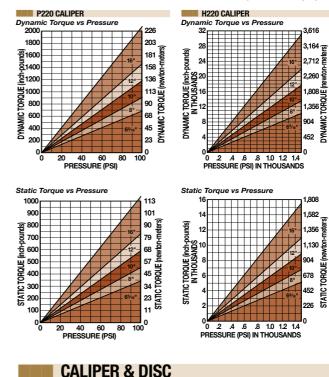
1.582

.356

904

TC TOROUE (newton

STA



6.75 (171.45) 5.75 5.21 4.75 2.00 4.50 1.56 1.19 (30.2) TYP. 1.50 MOUNTING 6.32 IOLES Ø .50 (12.70) (4) 5.79 (147.07) 1/8 - 27 NPT PORT (2) 5.42 (137.67) 4.48 (113.79) F (279.90) VENTILATED QD TYPE BÚS -1.20 2.29 (58.17) 3.14

Calipers for Ventilated Disc MODEL CODE DESCRIPTION ASSY NO

A001. NU.		DEJOHII HON
0735-0304	P220DX	Pneumatic, Double Acting
0735-0704	P220DX	Pneumatic, Double Acting w/Segmented Pucks
0735-0312	H220DXC	Hydraulic, Double Acting w/Bleeder Fittings

BRAKE MODEL LETTER CODES

C w/ bleeder fittings	H Hydraulic	X Non-standard Disc
D Dual Acting	P Pneumatic	Thickness

INTENSIFIER

SELECTION WORKSHEET

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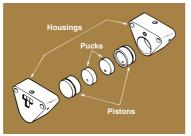


Caliper Disc Brakes SELECTION: GENERAL

HOW CALIPER DISC BRAKES WORK

Basically, a caliper disc brake functions like an ordinary rod cylinder. Components consist of a piston, a puck (or pad) of wearable friction material, a housing, and opposing side and a disc on which the brake acts. When pressure is applied to the

piston, the puck is moved into contact with the disc, causing the disc to stop rotating or, in a tensioning application, to supply constant drag. The housing contains the piston and



puck and is located above the disc. There are always two sides to a caliper disc brake: One is known as the "live side" with the piston and puck; the other may be either another "live side" or it may be a "dead side" (another puck which contacts the disc when the "live side" piston is actuated).

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 (and thus, to be dissipated) and the anticipated service life of the linings. Once these variables are determined, then find the combination of disc and caliper that will most economically meet these requirements.

DETERMINE THE KIND OF BRAKING TO BE DONE

- Industrial
 - Tensioning
 - Constant Slip)
- Vehicular

DETERMINE PRESSURE (LEVER FORCE) AVAILABLE

All torque calculations (except for spring applied brakes) are based on the pressure (lever force) available for your application. Maximum pneumatic pressure for Tolomatic 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.

CALCULATE THE TORQUE REQUIRED

For convenience, we express the torque formulae separately for industrial applications, vehicular applications and tensioning applications. See the formulae section (pages 92-95) to determine the torque needed for your application.

CALCULATE HEAT DISSIPATION REQUIRED

The energy generated will either be expressed as BTU per hour (particularly for tensioning applications) or BTU per stop. The formulae for calculating these values are different for industrial, tensioning and vehicular braking. See the formulae section (pages 92-95) to determine the heat generated for your application.

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 that the caliper can develop.
- HEAT DISSIPATION REQUIRED Cycle rate and torque are needed to determine the heat an application will generate 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 inch of disc area. This assumes a disc temperature of 220° F above ambient temperature of 80°F. Discs rotating at extreme speeds may dissipate heat at rates as high as 5 BTU per hour, per square inch of disc area. If required torque, cycle rate and small envelope size combine to create heat dissipation requirements that are greater than standard disc capabilities, your choices are:
 - **1.)** Use a thicker disc (that will act as a heat sink).
- **2.)** Use multiple discs/calipers for the application.
- **3.)** Use a ventilated disc (to increase the heat dissipation rate).
- 4.) Cool disc with forced air (to increase the heat dissipation rate).

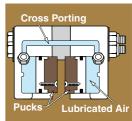
DETERMINE THE TYPE OF BRAKE ACTUATION

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

Tolomatic offers brakes actuated 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.



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SELECTION

WORKSHEET

FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 H960 HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220 MECHANICAL BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS INTENSIFIER

CALIPER DISC BRAKES



FEATURES Applications

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PNEUMATIC

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BRAKES

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HYDRAULIC

BRAKES

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H20

H220

H2201

H441

HOUU

HYDRAULIC/

MECHANICAL

BRAKE COMBOS

H/ME20

H/ME220

BRAKES

ME10

ME20

ME220

MB3 Spring

APPLIED

BRAKES

FS20

FS220

FS2201

FS595

DISCS

HUBS &

BUSHINGS

TENSION

CONTROL

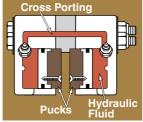
COMBINATIONS

MECHANICAL

Caliper Disc Brakes SELECTION: GENERAL

HYDRAULIC

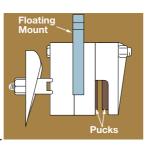
Hydraulic actuated brakes are normally used in applications where higher torque output is needed. They may be operated with a variety of fluids including the standard mineral based



hydraulic oils, automotive brake fluids and nonflammable phosphate ester fluids (each requires different seals).

MECHANICAL

Mechanically actuated brakes are often used for emergency stopping or holding brakes 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 lining's backing plate thus forcing the lining into the disc.

• HYDRAULIC / MECHANICAL COMBOS

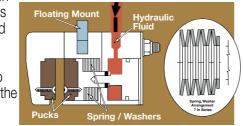
Combination brakes give the added flexibility to apply mechanical braking as well as hydraulic braking from one caliper.

• 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 conical washers are capable of storing enormous

force. When the brake is pressurized the force moves a piston(s) to compress the spring washer

INTENSIFIER Selection Worksheet

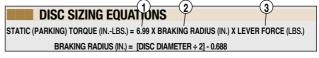


stack(s), thus releasing the disc. Because the force applied by the spring stack is reduced as the spring washers expand, spring applied brakes are used mainly for applications that require occasional stopping or holding. They should not be used in tension-constant slip applications or cyclic stopping industrial applications.

CHOOSE TOLOMATIC BRAKE SIZE

Tolomatic brakes are grouped by size. These sizes relate to the piston 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 29 to 31 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.

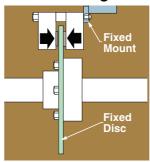
For easy reference, torque output equations that apply to each series of brake are shown at the bottom of the page (see example below). Each equation features: [1.] a constant value (A product of brake piston area, the coefficient of friction and a safety factor.), multiplied by [2.] braking radius (Common disc sizes appear on the page with the dimensional drawing.), multiplied by [3.] pressure (lever force) (You will need to determine.).



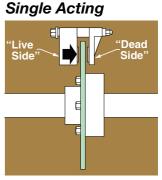
The performance data graphs represent these equations for common disc sizes in a convenient, visual way to quickly see how well each brake size will fit your application.

CHOOSE DOUBLE ACTING OR SINGLE ACTING BRAKE

Double Acting



 Double acting brakes feature two "live sides". Each side has a piston that actuates the lining, 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 lining on the "live side", forcing it against the disc. The "dead side" has a stationary lining attached to the housing. Since only one side has a moving piston, the brakes mounting must allow it to float. Spring applied, mechanical and hydraulic/mechanical brakes are generally single acting.



CALIPER DISC BRAKES

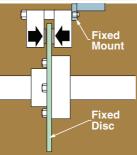
FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 H960 HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220 MECHANICAL BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS TENSION CONTROL COMBINATIONS INTENSIFIER SELECTION WORKSHEET

Caliper Disc Brakes SELECTION: GENERAL

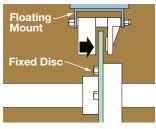
DETERMINE MOUNT FOR BRAKE AND DISC

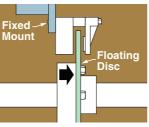
• For Double Acting Brakes

FIXED CALIPER MOUNT/ FIXED DISC – A double acting caliper can be fixed mounted since both linings have pistons to move them. The disc is also fixed mounted.



•For Single Acting Brakes





FLOATING CALIPER MOUNT/FIXED DISC – A floating mount bracket permits the caliper to 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.

CONSIDER OPTIONS

Hydraulic brakes may operate with a variety of fluids. Tolomatic 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 Tolomatic brakes. Some models also give you the choice of Viton® seals, these seals are suited for use with nonflammable phosphate ester fluids.

Some Tolomatic brakes are available with retractable pistons. A brake with this feature has a small 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 linings on the disc.

Almost all Tolomatic brakes can be modified to fit a variety of disc thicknesses.

NOTE: TOLOMATIC RETRACTABLE BRAKES SHOULD NOT BE USED IN VEHICULAR APPLICATIONS WITH A MASTER CYLINDER OR WITH AN INTENSIFIER.

DETERMINE LIFE EXPECTANCY OF LININGS

Another consideration in selecting a brake is the life expectancy of the linings. 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, lining life expectancy is a factor of the amount of energy transmitted through the lining and may be measured in total number of stops or hours of life. Both measurements may be reduced to horsepower hours of heat that the lining must endure.

Tolomatic's standard lining is made of a non-asbestos organic material and has a maximum operating temperature of 300°F. An optional sintered metallic lining (depending on model) offers maximum operating temperatures from 400° to 500°F. See the formulae section to determine the lining life expectancy for your application.





FEATURES APPLICATIONS SELECTION GRAPHS PNEUMATIC BRAKES P10 P20 P220 HYDRAULIC BRAKES H10 H20 H220 H220I H441 HOUU HYDRAULIC/ MECHANICAL BRAKE COMBOS H/ME20 H/ME220 MECHANICAL BRAKES **ME10 ME20 ME220** MB3 SPRING APPLIED BRAKES FS20 FS220 FS2201 FS595 DISCS HUBS & BUSHINGS

TENSION Control Combination

INTENSIFIER Selection Worksheet

Caliper Disc Brakes SELECTION: FORMULAE: INDUSTRIAL

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 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:

$T = \frac{WK^2N}{308t}$	0 7	[1a]
Where: T =	Torque; ft-lbs	
W =	Weight of rotating member; lbs.	
Κ =	Radius of gyration of rotating member; ft.	
N =	Speed of rotating shaft; rpm	
t =	Stopping time required; seconds	
Or: $T = \frac{WK^2N}{3,696t}$		[1b]
Where: T =	Torque; in-Ibs	
Κ =	Radius of gyration of rotating member; in.	

Industrial applications often consist of more than one rotating mass system (i.e., two or more shafts with gears, sheaves, drums, etc.) interconnected and 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 speed, an 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 (page 93).

Calculation of Heat Generation and Required Dissipation (Industrial)

Heat is always developed in the disc and linings 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:

S	BTU/Stop = $\frac{WK^2N^2}{4,570,000}$	for a single shaft system	[4]
NS Er	BTU/Stop = $\frac{WK_e^2 N_s^2}{4,570,000}$	for a multiple shaft system	[5]
N et	BTU/Stop = $\begin{bmatrix} \pi \overline{I} N_s t \\ 46,680 \end{bmatrix}$ Where: T = Torque; ft	-lbs	[6]
	K = Radius of	gyration of rotating member; ft.	

The weight and specific heat of the lining 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 94).

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

BTU/hr. = (BTU/stop)(stops/hr.)	7	1		
---------------------------------	---	---	--	--

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

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

Refer to Table 1 (page 94) for selection of proper disc diameter.

NOTE: THE ABOVE FORMULA [8] IS BASED ON A 220°F TEMPERATURE RISE AND AN 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.

$$Wd = \frac{BTU/hr.}{(220)(Sp)}$$

Where: Wd = Weight of disc; lbs.

Refer to Table 1 (page 94) for selection. If your requirement falls outside of the standard(s) you may calculate the required thickness based on the maximum allowable diameter:

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

Where: Thickness is in inches

A = Area of maximum allowable diameter; in²

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





Caliper Disc Brakes

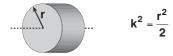
SELECTION: FORMULAE: RADIUS OF GYRATION, TENSIONING

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



Hollow Cylinder About its Own Axis

$$\mathbf{k}^2 = \begin{bmatrix} \mathbf{r}_1^2 + [\mathbf{r}_2^2] \\ \mathbf{r}_2 \end{bmatrix}$$

Where: K = Radius of gyration of rotating member; ft.

R = Radius of rotating member; ft.

$$WK_e^2 = WK_S^2 + WK_1^2 \left[\frac{N_1}{N_s}\right]^2 + \dots$$
 [2]

Where: WK_e^2 = Equivalent WK² of the multiple shaft system; lbs-ft²

 WK_s^2 = WK² of the shaft assembly on which the brake disc is mounted; lbs-ft²

 WK_1^2 = WK² of the second shaft assembly; lbs-ft²

- N_c = speed of the shaft on which the brake disc is mounted; rpm
- N_{i} = speed of the second shaft; rpm

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

$$T = \frac{WK_e^2 N_s}{308t}$$
 [3a]

Where: T = Torque; ft-lbs

WK²N_s Τ= [3b] or 3,696t

T = Torque; in-lbs (WK_{P}^{2} is in lbs-in²) Where:

TENSIONING / CONSTANT SLIP APPLICATIONS FORMULAE

Calculation of Torque Required

Applications involving tensioning or constant drag require a different set of formulae since there is not a finite time to stop. Tensioning devices are designed to operate over an infinite period of time. The basic formula for calculating toraue for web tensioning is:

T = (L) (F	F) (R)	U U	[11]
Where:	T =	Torque; in-Ibs	
	L =	web width, in.	
	F =	tension; lbs./inch of web width	
	R =	maximum roll radius; in.	

The basic formula for calculating BTUs generated per hour is:

BTU/hr. =	(T)(rpm)	[12]
	24.75	

Calculation of Heat Generation and Required Dissipation (Tensioning)

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

$$\mathbf{rpm} = \frac{\mathbf{rpm}}{\mathbf{C}}$$
[13]

Where: C = Circumference of roll at maximum diameter; ft.

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

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

Disc Temperature = 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 (page 94).

CALIPER DISC Brakes

FEATURES APPLICATIONS



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BRAKES

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P220

HYDRAULIC

BRAKES

H10 H20

H220 H2201 H441 HOUU HYDRAULIC/

MECHANICAL

BRAKE COMBOS

H/ME20

H/ME220 MECHANICAL BRAKES

ME10

ME20 ME220

MB3

SPRING APPLIED

BRAKES

FS20

FS220

FS2201

FS595

DISCS HUBS &

BUSHINGS

TENSION

CONTROL

COMBINATIONS

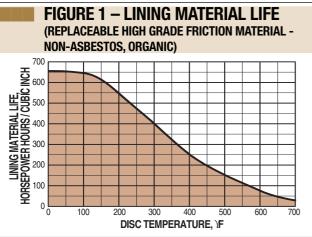
Caliper Disc Brakes

SELECTION: LINING LIFE

LINING LIFE FORMULAE

Calculating Service Life of Lining(s)

The lining life per cubic inch shown by Figure 1 below is based on horsepower hours.



To find the life in hours of lining(s):

(Primarily for tensioning-constant slip applications)

Ft-lbs/hr = (BTU/hr generated)(778)	[17]
Refer to Formula [12]	
HP hrs/hr =	[18]

Refer to Table 2 to determine cubic inches of wearable material of various caliper sizes.

Life in = $\begin{pmatrix} number & of \\ calipers & \end{pmatrix} \begin{pmatrix} cubic & in. \\ Table & 2 \end{pmatrix} \begin{pmatrix} HP & hrs./in^3 \\ Figure & 1 \end{pmatrix}$ [19] Hours HP hrs. / hr.

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

$$\mathbf{E} = \bigcup_{\mathbf{60}}^{\mathcal{T}} \underbrace{\mathbf{Nt}}_{\mathbf{60}}$$

$$\overset{\text{Or}}{\mathbf{F}} \mathbf{WK^2N^2}$$
[20]

[21] 5872 Where: E = Kinetic Energy; ft-lbs

INTENSIFIER

HP hrs./Stop =

Ε 1,980,000

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

LINING LIFE CALCULATIONS ARE ESTIMATES AND DO NOT ACCOUNT FOR FOREIGN CONTAMINANTS THAT MAY ABRADE THE LINING OR DISC AND REDUCE LIFE. WHEN THE LIFE MUST BE KNOWN ACCURATELY, FIELD TESTS SHOULD BE CONDUCTED UNDER ACTUAL OR SIMULATED SERVICE CONDITIONS.

	FABL	E1-	DISC	SPE	CIFI	CATIONS	5
DISC Diameter	EXPOSI IN ²	ED AREA Sq. ft.	SQ MM	WEIGH LBS.	T* KGS.	MAXIMUM BTU / HR.	Maximum Joule/Hr.
6.313	62.58	0.43	40,374	1.37	0.62	283.8	299,360
8.000	100.53	0.70	64,858	3.52	1.60	462.0	487,329
10.000	157.08	1.09	101,342	5.46	2.48	719.4	758,842
12.000	226.20	1.57	145,935	7.91	3.59	1,036.0	1,092,799
16.000	402.12	2.79	259,432	14.06	6.38	1,841.4	1,942,356

*BASED ON A STEEL DISC 1/4" THICK

(EXCEPT FOR Ø6.313 WHICH IS BASED ON A STEEL DISC 5/32" THICK).

		2 <mark>- Cubic</mark> Ble Frict		ES OF Material
CALIPER Series	CUBIC Inches	CALIPER SERIES	CUBIC INCHES	SERIES INCHES
			INCHES	– FS440 1.75
10	.46	FS220 Aluminum	1.66	H441 3.71
20	.83	FS220	1.00	- FS595 4.57
H220 Aluminum	1.66	Cast Iron w/	2.35	H960 8.00
H220		JK options		- MB3 6.06
Cast Iron	2.35	H440	3.32	-

CALIPER CUBIC

TABLE 3 – CAM TRAVEL DATA

ME10 and ME20 Calipers

- 1. 15° maximum travel when linings 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 lining.
- 3. 90° maximum travel after 3/16" wear on each lining without intermediate tightening of lock nut.

ME220 Calipers

- 1. Gap between lining faces and disc when new = .048" total.
- 2. Angular movement required to actuate brake when $new = 7^{\circ} 30''$.
- 3. Maximum axial movement without intermediate adjustment = .387".
- 4. Wear allowed before adjustment .104" each side.

MB3 Calipers

[22]

Tolomatic

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



Caliper Disc Brakes SELECTION: FORMULAE: VEHICULAR

VEHICULAR APPLICATIONS FORMULAE

Calculation of Torque Required

 $WR\left[\frac{a}{g}+\frac{b}{100}\right]$ [24] Dynamic T = -(D) Where: T = Torque perAxle, vehicle, or wheel; in-lbs

- W = Weight on axle including weight transfer, if any, vehicle or wheel; lbs.
- R = Loaded tire radius; in.

g = 32.2 ft./sec²

- b = % of grade
- **D** = Gear Reduction, if drive line mounted

a = Deceleration rate; ft/sec²
And
$$a = \frac{V}{t} = \frac{V^2}{2S}$$
 [25]

- V = Velocity of vehicle, ft./sec., at moment of brake Where: application
 - t = Stopping time required; seconds
 - S = Stopping distance of vehicle; ft.

$$Parking T = \frac{WR\left[\frac{b}{100}\right]}{D}$$
[26]

$E = \frac{WV^2}{2q}$	d Dissipation (Vehicula	(י
E =		L-
Where: E	= Kinetic Energy; ft-lbs	
W	= Weight of axle, vehicle, or whe	el; lbs.
v	<pre>/ = Design speed of vehicle; ft/sec</pre>	C.
BTU/hr. = generated	(E) (stopping frequency/hr.) 778	[2
	g for the number of square feet ipate the heat generated:	of exposed of
Sq. Ft. Dis	c Area = $\frac{\text{BTU/hr}}{660}$	[1
The constant temperature	nt of 660 is based on a maximu e of 300°F.	ım disc
sufficient tin	restriction in the disc diameter(s ne between stops or multiple of then we can size the disc to act	stops for he
$Wd = \frac{BTU}{(220)}$	//hr. (Sp)	
Where: Wd	I = Weight of disc; lbs.	
	= Specific heat of disc may be ta	aken as 12 for
	steel; BTU/lbs-°F	
Sp Refer to Tak falls outside	steel; BTU/lbs-°F ble 1 (page 94) for selection. If y of the standard(s) you may cal ckness based on the maximum	our requirem
Sp Refer to Tak falls outside required this	steel; BTU/lbs-°F ole 1 (page 94) for selection. If y of the standard(s) you may cal ckness based on the maximum	our requirem

economic or space limitation standpoint, multiple discs will have to be provided or force ventilation must be considered.

SELECTION WORKSHEET

CALIPER





SELECTION Graphs

PNEUMATIC Brakes

Caliper Disc Brakes **APPLICATION DATA WORKSHEET**

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: (763) 478-8080 or Mail to: Tolomatic, 3800 County Road 116, Hamel, MN 55340

BRAKES	NAME:	TYPE OF EQUIPMENT BRAKES WILL BE USED ON:
P10	TITLE:	
P20	FIRM:	
P220	ADDRESS:	
HYDRAULIC Brakes	CITY:	
H10	STATE: ZIP:	
H20	PHONE: ()	
H220	FAX: ()	D. GENERAL APPLICATION DATA
H220I	A. VEHICLE SPECIFICATIONS	FREQUENCY OF STOPS:
H441		COMPLETE OPERATING CYCLE:
H960	PLEASE CONTACT FACTORY	MAXIMUM ALLOWABLE DISC DIAMETER:in.
HYDRAULIC/ Mechanical	B. TENSIONING DATA	MAXIMUM ALLOWABLE DISC THICKNESS:in.
BRAKE	D. TENSIONING DATA	TYPE OF ACTUATION: Mechanical Spring Applied
COMBOS		Pneumatic Hydraulic
H/ME20		MAXIMUM HYDRAULIC OR AIR PRESSURE:
H/ME220 Mechanical		BACK PRESSURE:
BRAKES		DRIVE SHAFT APPLICATIONS ONLY:
ME10		Gear ratio isin favor of, or againstthe brake
ME20		AVAILABLE DISPLACEMENT:
ME220		TYPE OF FLUID:MAXIMUM TORQUE:inlbs.
MB3		AMBIENT TEMPERATURES TO BE ENCOUNTERED:
SPRING APPLIED		LINING LIFE DESIRED:
BRAKES		LEVER FORCE AVAILABLE
F\$20		
F\$220		E. ADDITIONAL COMMENTS
F\$2201	C. STATIONARY EQUIPMENT	
F\$595	SPECIFICATIONS	
DISCS HUBS &	CYCLIC STOPS? Yes No	
BUSHINGS	W = Weight of rotating member, lbs.	
TENSION CONTROL	R = Radius of rotating member, ft.	
COMBINATIONS	WK ² OF ROTATING PARTS@RPM	
INTENSIFIER	DECELERATION NEEDED:	
SELECTION	Time seconds from RPM	
WORKSHEET	Radians per sec. ²	* Recommendation is based on information supplied by the customer. Final
	RELEASE PRESSURE FOR SPRING-APPLIED BRAKES	acceptance and approval is the responsibility of the customer after field test- ing or simulation of field testing on the machine it is designed for.
	Constitution	3800 County Road 116 • Hamel, MN 55340 Telephone: (763) 478-8000 • Fax: (763) 478-8080





Engineering Resources GLOSSARY

GLOSSARY Conversion Tables

AXIAL LOADING: A load with a force directed along an axis, such as a shaft.

D

- **BACKING PLATE:** Steel plate on which brake linings are mounted.
- **BLEEDING:** Method of purging air from a brake system's hydraulic lines and cylinders. Air is compressible and contaminates brake fluid. It is released via a "bleeder valve".
- **BONDED LINING:** Brake lining (friction material) attached to the backing plate with adhesive.
- BRAKE BALANCE: The ratio of braking force distributed between the front and rear wheels.
- BRAKE DISC (OR ROTOR): The basis of a disc brake system: a round metal disc which rotates with the road wheel and, in order to generate braking power, is clamped by a caliper holding two friction linings (pads).
- **BRAKE FADE:** Reduction (or complete loss) of braking performance, usually caused by too much heat in the system.
- **BRAKE FEEL:** Sensation transmitted to the driver during a braking action via the brake pedal.
- BRAKE FLUID: Liquid formulated specifically to be used in hydraulic brake systems.
- BRAKE HOSE: Flexible rubber (or synthetic) hose used to join hydraulic brake components.
- **BRAKE LINE:** Rigid tubing which links various hydraulic components in a brake system.
- BRAKE LINING: Common name for Friction Material.
- **BRAKE PAD:** The component in a disc brake system which is fitted with brake lining and clamped against the brake disc to cause friction.
- BUNA-N: A widely used copolymer (artificial rubber) used for making seals. Buna-N seals should never be used with automotive brake fluid.

C

- **CALIPER:** A type of clamp which grips a disc rotor to create friction and thereby generate stopping power.
- CENTER OF GRAVITY: (Center of Mass) The point a which the entire weight of a body may be considered as concentrated so that if supported at this point the body would remain in equilibrium in any position.
- COEFFICIENT OF FRICTION: The measurement of friction of one object sliding across another. Symbolized by the Greek letter Mu (m) it is defined as the tangent of the angle of repose of a static body. The coefficient is expressed in decimal values (clean iron on clean iron is 1.0, while metal on solid rubber may range from 1.0 up to 4.0). When objects are wet, the coefficient of friction decreases.
- CROSS-DRILLED DISC: Disc with friction surfaces which have been drilled with rows of holes to improve cooling, reduce weight and provide an escape route for dirt and gasses which can be wedged between the pads and disc. High-performance rotors can be both cross-drilled and slotted.

CURVED VANE DISC: Ventilated rotor in which the cooling channels (or vanes) have been curved to increase their ability to pump out hot air and cool the disc. Curved vane rotors are more efficient than conventional ventilated rotors and, as a side benefit, tend to be stronger.

D

- **DISC BRAKE:** The most popular and effective type of automotive brake. It uses a rotor (a round grey metal plate) which is squeezed by a caliper to create friction and thereby generate stopping power.
- DISC THICKNESS VARIATION: A variation in thickness between two points on the friction surface of a disc rotor (usually caused by poor manufacture, poor machining or rubbing of the rotor against the caliper when the brakes are "off").
- DISCARD THICKNESS: Alternative term for Minimum Thickness.
- DOUBLE-ACTING BRAKES: Double-acting brakes apply pressure to pucks on each side of the disc. Both disc and brake may be fixed mounted.
- DRUM BRAKE: A type of older but still popular and effective - automotive brake in which a circular drum rotates around a set of brake shoes which are fixed to the hub and act on the drum by expanding.

F

- FLAT BASE: Mounting style for Float-A-Shaft standard series
- FLOATING BRACKET: Method of mounting single acting caliper disc brake that allows the force of the brake to be applied to both sides of the disc.
- **FOOT MOUNT:** Mounting style for Float-A-Shaft compact series.
- FRICTION MATERIAL: Material which is pushed against a disc by a shoe or caliper to generate friction.
- FRICTION SURFACES: Any of the surfaces designed to rub together in a brake system to create friction and therefore stopping power.

.

GLAZING: The process whereby a brake lining or disc rotor becomes smooth and glossy due to excess heat.

H

- HEAT DISSIPATION: The process whereby braking components rid themselves of heat caused by friction. The heat in a disc system is mostly dissipated into the surrounding air. Dissipation can be accelerated by various forms of ventilation.
- **HEAT SPOTS:** Shiny dark areas on a rotor caused by extreme heat.
- **HERRINGBONE PATTERN:** Pattern found on the surface of a disc which has been poorly machined.
- HYDRAULIC SYSTEM: The delivery system of a modern braking set-up. It uses fluid to transmit the force applied at the pedal to activate the disc calipers.
- HYGROSCOPIC: A characteristic whereby something tends to absorb water. Brake fluid is hygroscopic.

J

JOURNAL BEARING: A type of bearing material used in Float-A-Shafts for applications with lower torque requirements.

Κ

- KEY: A demountable machinery part, which, when assembled into a keyseat, provides a positive means for transmitting torque between two other machine parts.
- KEYWAY: An axially-located groove in the length of a shaft along which a key might move.

Μ

- MANUAL BRAKES: Braking system which does not use power-assistance to magnify the pedal effort.
- MASTER CYLINDER: The engine-room of a brake system, where the force applied at the pedal is converted into hydraulic pressure.
- MINIMUM THICKNESS: The thickness at which a disc rotor must be discarded. Through wear and machining a disc rotor becomes thinner over time; as a result it becomes less able to dissipate heat and more prone to warping and other problems. The minimum thickness is usually determined by the vehicle manufacturer.

MODIFIED STANDARD PRODUCTS:

Tolomatic can easily accommodate your special needs. Our standard products are often customized with extra mounting holes, different materials and other requests. This can often be done within our normal 5 day production time. We welcome modifications as well as completely new custom products.

Ν

- NEEDLE BEARING: A type of roller bearing where the journal turns on small-diameter, hardened needle-like rollers which roll easily in a metal race.
- NON-ASBESTOS LINING: Friction material which uses no asbestos, thereby being easier on public health (breathing asbestos dust can cause the disease asbestosis).

0

- **ORIGINAL EQUIPMENT:** Industry term for a component supplied with a new vehicle or as an official replacement part. Known as OEM or "Original Equipment Manufacturer" parts, they are not necessarily produced by the vehicle-maker in question.
- **OUT-OF-ROUND:** Effect where a disc is no longer true to its original shape, as a result of either warping, inconsistent wear or other damage. This can cause pulsing, grabbing, additional noise and lowered performance.

Ρ

- **PARALLELISM:** A term which refers to the relationship between the two friction surfaces on a disc brake rotor.
- PROPORTIONING VALVE: Hydraulic control designed to stop the rear wheels from locking up (rear wheels become "light" under heavy braking and therefore more likely to skid).

- **PULLING:** Tendency of a vehicle to pull to one side under braking.
- PULSING: Uneven or stutter-like force transmitted through the brake pedal during braking, usually caused by problems with disc rotors or linings.

R

- **RESERVOIR:** Chamber connected to the master cylinder (usually by hoses) and used for storing hydraulic fluid.
- ROLLER BEARING: An anti-friction device consisting of a journal which rests on freerolling, hardened cylinders in a race. ROTOR: Alternative name for brake disc.
- RUN-OUT: Rotors which are warped or out-oftrue have excess "run-out", meaning the surface varies or wobbles as it rotates around a fixed point.

S

- SINGLE-ACTING BRAKES: Single-acting brakes have piston and puck on "live side" and a non-actuated puck on the "dead side". Since only one side applies force to the disc, a means to allow movement of the disc or caliper must be provided.
- SLOTTED DISC: Type of disc brake rotor which has a series of slots or grooves across its friction surfaces. These are designed to improve the bite of the pads and break down the build-up of gas and dirt which can occur between pad and rotor. High-performance rotors can be both slotted and cross-drilled.
- **SOLID ROTOR:** Disc rotor with solid metal between the two friction surfaces.
- **SPONGY PEDAL:** Pedal which feels springlike, perhaps due to the presence of air in the hydraulic system.
- SWEPT AREA: Total friction area contacted by the pads during one revolution of the rotor.

Т

- TENSILE STRENGTH: The greatest longitudinal stress a substance can bear without permanent deformation.
- T.I.R. (Total Indicated Reading): An industryaccepted standard for measuring straightness and roundness.
- **TOLERANCE:** A specified allowance for error from a desired or measured quantity.
- **TORQUE:** A force that produces rotation. A turning or twisting force. (From the Latin torquere to twist.)

V

- VENTILATED ROTOR: Disc rotor which has a series of fins (or cooling passages) between the two friction surfaces to aid in heat dissipation.
- VITON®: A DuPont Chemical Co. trademark for a fluorocarbon rubber used in high temperature applications. At Tolomatic, Viton® is used for seals in high temperature situations and for brakes designed to be operated with non-flammable hydraulic fluids such as phosphate-ester.

1.800.328.2174

Engineering Resources

CONVERSION TABLES

(TO CONVERT FROM A TO B, MULTIPLY BY ENTRY IN TABLE)

Length

AB	in	ft	yd	mm	cm	m
in	1	0.0833	0.028	25.4	2.54	0.0254
ft	12	1	0.333	304.8	30.48	0.3048
yd	36	3	1	914.4	91.44	0.914
mm	0.03937	0.00328	0.00109	1	0.1	0.001
cm	0.3937	0.03281	0.0109	10	1	0.01
m	39.37	3.281	1.09	1,000	100	1

Mass

B	gm	kg	slug	lb(m)	oz(m)
gm	1	0.001	6.852 x 10 ⁻⁵	2.205 x 10 ⁻³	0.03527
kg	1,000	1	6.852 x 10 ⁻²	2.205	35.274
slug	14,590	14.59	1	32.2	514.72
lb(m)	453.6	0.45359	0.0311	1	16
oz(m)	28.35	0.02835	1.94 x 10 ⁻³	0.0625	1

Pressure

A	atm	bar	millibar	lbs/sqr ft (PSF)	lbs/sqr in (PSI)	N/sqr m (NSM)	N/sqr mm (NSMM)
atm	1	1.01325	1,013.25	2116.22	14.6454	101,325	0.101325
bar	0.986923	1	1,000	2088.54	14.5037	100000	0.1
millibar	0.000987	0.001	1	2.08854	0.014504	100	0.0001
PSF	0.000473	0.000479	0.478803	1	0.006944	47.880	0.000048
PSI	0.068046	0.068948	68.94757	144	1	6,894.757	0.006895
NSM	0.00001	0.00001	0.01	0.020885	0.000145	1	0.000001
NSMM	98,692	10	10,000	20,885.43	145.0377	1,000,000	1

Temperature

°F = (1.8 x°C) + 32	
°C = .555 (°F - 32)	

Gravity

(Acceleration Constant)
g = 386 in/s ² = 32.2 ft/s ² = 9.8 m/s ²

1

1.84 x 10⁻³

1.53 x 10⁻⁴

ft-lb/s

0.74

738

550

543

1

8.3 x 10⁻²

in-lb/s

8.88

8,880

6,600

6,516

12

1

Force

NOTE: $lb(f) = 1 slug x 1 ft/s^2$

AB	lb(f)	N	dyne	oz(f)	kg(f)	gm(f)
lb(f)	1	4.4482	4.448 x 10 ⁵	16	0.45359	453.6
N	0.22481	1	100,000	3.5967	0.10197	101.97
dyne	2.248 x 10 ⁻⁶	0.00001	1	3.59 x 10⁻⁵	1.02 x 10 ⁻⁶	0.00102
oz(f)	0.0625	0.27801	2.78 x 104	1	.02835	28.35
kg(f)	2.205	9.80665	980,665	35.274	1	1,000
gm(f)	2.205 x 10 ⁻³	0.0098	980.665	0.03527	0.001	1
gm(t)	2.205 X 10	0.0098	980.665	0.03527	0.001	1

B Watts KW HP (English) HP(Metric) Watts 1 x 10⁻³ 1.34 x 10 ⁻³ 1.36 x 10⁻³ 1 1,000 1.34 1.36 kw 1 hp(English) 746 0.746 1 1.01

0.986

1.82 x 10⁻³

1.52 x 10⁻⁴

0.736

1.36 x 10⁻³

1.13 x 10⁻⁴

 $N = 1 \text{ kg x } 1 \text{ m/s}^2$ dyne = 1gm x 1 cm/s²

Power

hp(Metric)

ft-lb/s

in-lb/s

736

1.36

0.113

A

Abbreviated Terms

atm = atmosphere (STD)	g = gravity	kg = kilogram	mm = millimeter	rad = radians
C = Celsius	gm = gram	kg(f) = kilogram force	m = meter	rpm = revs per minute
cm = centimeter	gm(f) = gram force	kw = Kilowatt	N = Newton	rps = revs per second
F = Fahrenheit	hp = horse power	Ib(f) = pound force	oz(f) = ounce force	s = seconds
ft = foot	in = inch	Ib(m) = pound mass min = minute	oz(m) = ounce mass	sqr = square

STolomatic

ENGINEERING RESOURCES

GLOSSARY CONVERSION TABLES ENGINEERING RESOURCES

Engineering Resources

CONVERSION TABLES

GLOSSARY Conversion Tables

(TO CONVERT FROM A TO B, MULTIPLY BY ENTRY IN TABLE)

Torque

AB	dyne-cm	gm-cm	oz-in	kg-cm	lb-in	N-m	lb-ft	kg-m
dyne-cm	1	1.019 x 10 ⁻²	1.416 x 10 ⁻⁵	1.0197 x 10 ⁻⁶	8.850 x 10 ⁻⁷	10 ⁻⁷	7.375 x 10 ⁻⁶	1.019 x 10 ⁻⁶
gm-cm	980.665	1	1.388 x 10 ⁻²	10-3	8.679 x 10 ⁻⁴	9.806 x 10 ⁻⁵	7.233 x 10 ⁻⁵	10 ⁻⁵
oz-in	7.061 x 10 ⁴	72.007	1	7.200 x 10 ⁻²	6.25 x 10 ⁻²	7.061 x 10 ⁻³	5.208 x 10 ⁻³	7.200 x 10 ⁻⁴
kg-cm	9.806 x 10 ⁵	1,000	13.877	1	0.8679	9.806 x 10 ⁻²	7.233 x 10 ⁻²	10 ⁻²
lb-in	1.129 x 10 ⁶	1.152 x 10 ³	16	1.152	1	0.112	8.333 x 10 ⁻²	1.152 x 10 ⁻²
N-m	10 ⁷	1.019 x 10 ⁴	141.612	10.197	8.850	1	0.737	0.102
lb-ft	1.355 x 10 ⁷	1.382 x 10 ⁴	192	13.825	12	1.355	1	0.138
kg-m	9.806 x 10 ⁷	10 ⁵	1.388 x 10 ³	100	86.796	9.806	7.233	1

Inertia (Rotary) NOTE: Mass inertia = $\frac{\text{wt. inertia}}{g}$

AB	gm-cm²	oz-in²	gm-cm-s²	kg-cm²	lb-in²	oz-in-s²	lb-ft ²	kg-cm-s²	lb-in-s²	lb-ft-s² or slug-ft-s²
gm-cm ²	1	5.46 x 10 ⁻²	1.01 x 10 ⁻³	10 ⁻³	3.417 x 10 ⁻⁴	1.41 x 10 ⁻⁵	2.37 x 10 ⁻⁶	1.01 x 10 ⁻⁴	8.85 x 10 ⁻⁷	7.37 x 10 ⁻⁴
oz-in ²	182.9	1	0.186	0.182	0.0625	2.59 x 10 ⁻²	4.34 x 10 ⁻⁴	1.86 x 10 ⁻⁴	1.61 x 10 ⁻⁴	1.34 x 10⁻⁵
gm-cm-s ²	980.6	5.36	1	0.9806	0.335	1.38 x 10 ⁻²	2.32 x 10 ⁻³	10 ⁻³	8.67 x 10 ⁻⁴	7.23 x 10 ⁻⁵
kg-cm ²	1,000	5.46	1.019	1	0.3417	1.41 x 10 ⁻²	2.37 x 10 ⁻³	1.019 x 10 ⁻³	8.85 x 10 ⁻⁴	7.37 x 10 ⁻⁵
lb-in ²	2.92 x 10 ³	16	2.984	2.925	1	4.14 x 10 ⁻²	6.94 x 10 ⁻³	2.96 x 10 ⁻³	2.59 x 10 ⁻³	2.15 x 10 ⁻⁴
oz-in-s ²	7.06 x 10 ⁴	386.08	72.0	70.615	24.13	1	0.1675	7.20 x 10 ⁻²	6.25 x 10 ⁻²	5.20 x 10 ⁻³
lb-ft ²	4.21 x 10 ⁵	2,304	429.71	421.40	144	5.967	1	0.4297	0.3729	3.10 x 10 ⁻²
kg-cm-s ²	9.8 x 10 ⁵	5.36 x 10 ³	1,000	980.66	335.1	13.887	2.327	1	0.8679	7.23 x 10 ⁻²
lb-in-s ²	1.129 x 10 ⁴	6.177 x 10 ³	1.152 x 10 ³	1.129 x 10 ³	386.08	16	2.681	1.152	1	8.33 x 10 ⁻²
lb-ft-s ²	1.355 x 10 ⁷	7.41 x 10 ⁴	1.38 x 10 ⁴	1.35 x 10 ⁴	4.63 x 10 ³	192	32.17	13.825	12	1

Angular Velocity

AB	deg/s	rad/s	rpm	rps
deg/s	1	1.75 x 10 ⁻²	0.167	2.78 x 10 ⁻³
rad/s	57.3	1	9.55	0.159
rpm	6	0.105	1	1.67 x 10 ⁻²
rps	360	6.28	60	1

Linear Velocity

AB	in/min	ft/min	in/sec	ft/sec	mm/sec	m/sec
in/min	1	0.0833	0.0167	1.39 x 10 ⁻³	0.42	4.2 x 10 ⁻⁴
ft/min	12	1	.2	0.0167	5.08	5.08 x 10 ⁻³
in/sec	60	5	1	0.083	25.4	0.0254
ft/sec	720	60	12	1	304.8	0.3048
cm/sec	23.62	1.97	0.3937	0.0328	10	0.01
m	2,362.2	196.9	39.37	3.281	1,000	1



TERMS / CONDITIONS OF SALE

- 1. ORDER ACCEPTANCE. All orders or services are subject to acceptance in Minnesota by the written approval of an authorized official of Tolomatic, Inc.. Any such order shall be subject to these Terms and Conditions of Sale, and acceptance shall be conditioned on Purchaser's assent to such conditions. Purchaser's assent shall be deemed given unless Purchaser shall expressly notify Tolomatic, Inc. in writing to the contrary within five (5) days after receipt of acknowledgment to confirmation of an order.
- 2. CANCELLATION AND CHANGES. No order accepted by Tolomatic, Inc. may be modified in any manner by Purchaser unless agreed to in writing, by an authorized official of Tolomatic, Inc.. Order cancellations, including reductions to order quantities, and changes shall be governed by the following:
 - a. Any standard product order scheduled for shipment within five (5) working days of purchaser's request to cancel or modify will be shipped as previously acknowledged and purchaser agrees to accept shipment and payment responsibility, in full, at the price agreed upon.
 - b. "Customer Special" orders scheduled for shipment within twenty (20) working days of purchaser's request to cancel or modify will be shipped as previously acknowledged and purchaser agrees to accept shipment and payment responsibility, in full, at the price agreed upon.
 - c. All work in connection with "Customer Special" orders, not covered under Paragraph b, will be stopped immediately upon notification, and purchaser agrees to reimburse Tolomatic, Inc. for all work-inprocess and any materials or supplies used, or for which commitments have been made by Tolomatic, Inc. in connection therewith.
- 3. QUOTATIONS AND PRICES. Written quotations automatically expire 30 calendar days from the date issued unless terminated sooner by written notice. (Verbal quotations expire, unless accepted in writing, the same day.)

All published prices and discounts are subject to change without notice. In the event of a net price change, the price of product(s) on order will be the price in effect on the date of order acknowledgment. Any addition to an outstanding order will be accepted at prices in effect when the addition is made.

- MINIMUM BILLING. Orders amounting to less than \$35.00 net will be billed at \$35.00
- TAXES. Any Manufacturer's Tax, 5. Retailers Occupation Tax, Use Tax, Sales Tax, Excise Tax, Duty, Customer, Inspection or Testing Fee, or any other tax, fee or charge of any nature whatsoever, imposed by any government authority, on or measured by any transactions between Tolomatic. Inc. and Purchaser shall be paid by the Purchaser in addition to the prices quoted or involved. In the event Tolomatic, Inc. shall be required to pay any such tax, fee or charge, Purchaser shall reimburse therefore.
- 6. TERMS OF PAYMENT. Net invoice amount is due within 30 days from date of invoice subject to credit approval. A 2% per month service charge shall apply to all invoices not paid within 30 days. All clerical errors are subject to correction. Any invoice in not paid within 60 days will subject that account to an immediate shipping hold.
- 7. F.O.B. POINT. All sales are F.O.B. Tolomatic, Inc.'s facility in Hamel, Minnesota, unless quoted otherwise.
- 8. DELIVERY. Delivery of product(s) by Tolomatic, Inc. to a carrier shall constitute delivery to Purchaser, and regardless of freight payment, title and all risk or loss or damage in transit shall pass to Purchaser at that time.

Should shipment be held beyond scheduled date, upon request of Purchaser, product will be billed and Purchaser agrees to accept any charges for warehousing, trucking and other expenses as may be incident to such delay.

Great care is taken by Tolomatic, Inc. in crating its product. Tolomatic, Inc. cannot be held responsible for breakage after having received "In Good Order" receipts from the transporting carrier. All claims for loss and damage must be made by Purchaser to the carrier within 14 days from receipt of goods. Tolomatic, Inc. will assist insofar as practical in securing satisfactory adjustment of such claims wherever possible. Claims for shortages or other errors must be made, in writing, within ten (10) days to Tolomatic, Inc. and any additional expense of the method or route of shipment specified by Purchaser shall be borne by the Purchaser.

9. SHIPPING SCHEDULES. All quoted shipping schedules are approximate and will depend upon prompt receipt from Purchaser of confirming copy of Purchase Order. Dimensional drawings and specifications submitted by Tolomatic, Inc. to Purchaser for approval must be returned to Tolomatic, Inc. within 10 working days, with approval granted, and any exceptions noted, in order to avoid delay in manufacturing schedules.

Orders which include penalty clauses for failure to meet shipping schedules will not be acceptable, except in those cases specifically approved in writing by the General Manager of Tolomatic, Inc..

Tolomatic, Inc. shall not be liable for damage as a result of any delay due to any cause beyond Tolomatic, Inc.'s reasonable control, including, without limitation, an Act of Nature; act of Purchaser; embargo, or other government act, regulation or request; fire; accident; strike; slow down; war; riot; flood; delay in transportation; and inability to obtain necessary labor, materials or manufacturing facilities. In the event of any such delay, the date of delivery shall be extended for a period equal to the time loss by reason of the delay. The acceptance of the product when delivered shall constitute a waiver of all claims for damages caused by any such delays.

- 10. RETURN OF PRODUCT. No product may be returned without first obtaining a Return Goods Authorization form and confirming memorandum from Tolomatic, Inc.. Product, if accepted for credit, shall be subject to a minimum service charge of 35% of the invoice price and all transportation charges shall be prepaid by the Purchaser; however, assembled products classified as "special, such as Cable Cylinders and other products which have been modified or built as "Customer Specials," are not returnable to Tolomatic, Inc..
- 11. WARRANTY. Tolomatic, Inc., WARRANTS PRODUCT MANUFACTURED BY IT TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF

ONE YEAR FROM DATE OF SHIPMENT BY Tolomatic, Inc.. IF WITHIN SUCH PERIOD ANY SUCH PRODUCT SHALL BE PROVED TO Tolomatic, Inc.'s SATISFACTION TO BE SO DEFECTIVE, SUCH PRODUCT SHALL EITHER BE REPAIRED OR REPLACED AT Tolomatic, Inc.'s OPTION.

- THIS WARRANTY SHALL NOT APPLY:
 - a. TO PRODUCT NOT MANUFACTURED BY Tolomatic, Inc. WITH RESPECT TO PRODUCT NOT MANUFACTURED BY Tolomatic, Inc.. THE WARRANTY OBLIGATIONS OF Tolomatic, Inc. SHALL IN ALL RESPECTS CONFORM AND BE LIMITED TO THE WARRANTY ACTUALLY EXTENDED TO Tolomatic, Inc. BY ITS SUPPLIER.
 - b. TO PRODUCT WHICH SHALL HAVE BEEN REPAIRED OR ALTERED BY PARTIES OTHER THAN Tolomatic, Inc. SO AS, IN Tolomatic, Inc.'s JUDGMENT, TO AFFECT THE SAME ADVERSELY, OR
 - c. TO PRODUCT WHICH SHALL HAVE BEEN SUBJECT TO NEGLIGENCE, ACCIDENT, OR DAMAGE BY CIRCUMSTANCES BEYOND THE CONTROL OF Tolomatic, Inc. OR TO IMPROPER OPERATION MAINTENANCE OR STORAGE, OR TO OTHER THAN NORMAL USE AND SERVICE.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, Tolomatic, Inc. SHALL NOT BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES WHATSOEVER WITH PRODUCT RESPECT TO MANUFACTURED OR SUPPLIED BY Tolomatic, Inc. OR SERVICE RENDERED BY IT.

- CONSEQUENTIAL DAMAGE. Tolomatic, Inc., shall not, under any circumstances be liable for consequential damages.
- **13. SERVICE CHARGES.** Should the Purchaser request the service of any erector, demonstrator or service man (except as specifically provided for and included in the price of the product) such service will be rendered at the rate outlined in the schedule of field service charges in effect at the date of request.



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