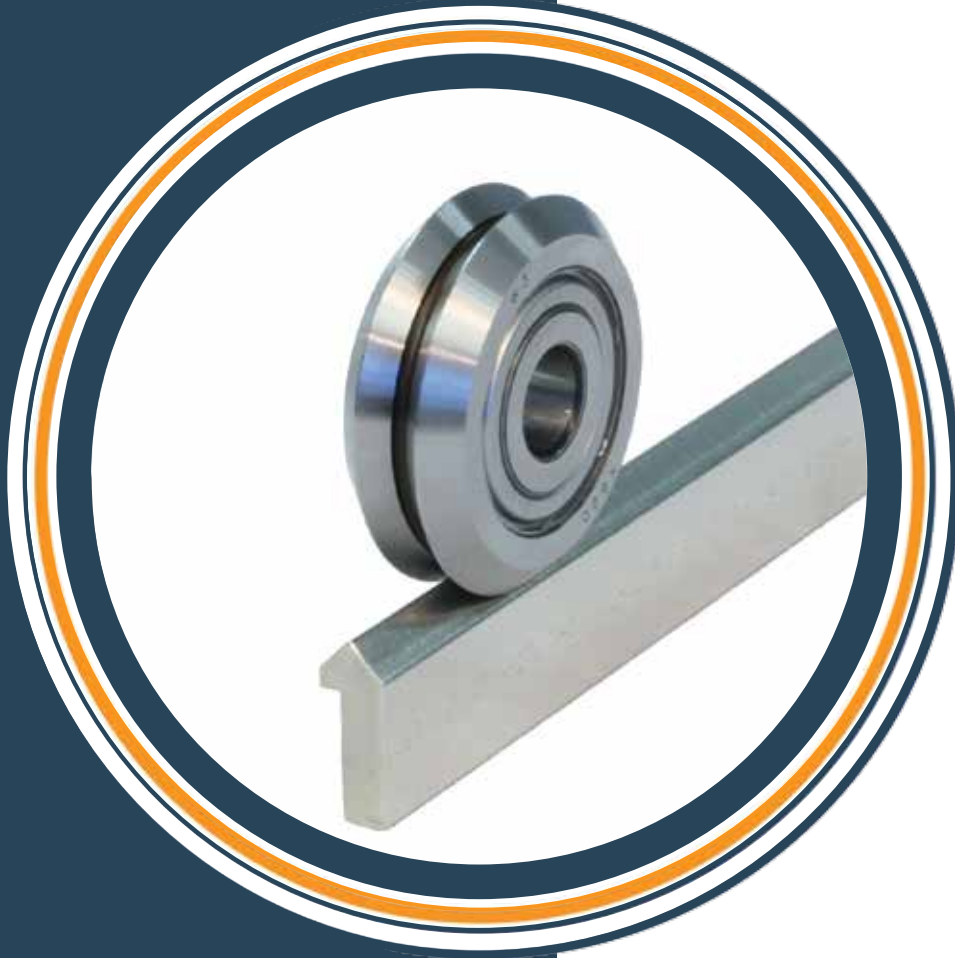


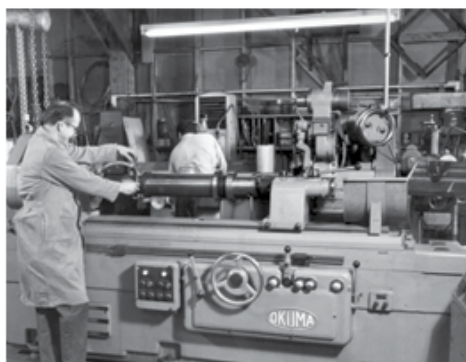
# **BWC**

*Motion Without Limits®*



## **DUAL VEE** Motion Technology®

**DualVee Motion Technology®** helps manufacturers and automation solution providers solve motion guidance requirements for critical and harsh environments. Simple to install and maintain, the self-aligning track paired with the constant sweeping action of our linear guide bearings result in a robust motion system. This superior design, perfected over 40 years and used by more than 20,000 customers, results in less noise, longer life, and lower total cost of ownership.



**BISHOPWISECARVER** GROUP  
A FAMILY OF SOLUTIONS

Located in the historic California steel town of Pittsburg, today's bustling 85,000 square-foot facility is a far cry from the humble Oakland machine shop where the company's founder got his start in the 1950s.

The **Bishop-Wisecarver Group** (BWG) is a WBENC certified woman-owned family of companies who operate within AS9100C and ISO 9001:2008 certifications to work with manufacturers to engineer, manufacture, and build linear and rotary motion solutions, custom complex assemblies, and optimal embedded intelligence systems. Through the integration of our mechanical, electrical, software, control and systems design engineering expertise, 62+ years of experience, and 20,000+ unique clients, we continue to provide a single point of service that results in custom designs, increased efficiencies, and accelerated time to market.

## BWC

**Bishop-Wisecarver Corporation** helps manufacturers and automation solution providers engineer linear and rotary motion solutions. With 60+ years of engineering expertise and manufacturing best practices working with over 20,000 customers, we understand our customers' design and application requirements which enables us to develop unique solutions that typically ship within 2 to 3 weeks. Customers achieve 50% faster time to market, up to 50-75% lower maintenance and installed costs, product differentiation, and longer product life.

{ [www.bwc.com](http://www.bwc.com)  
[info@bwc.com](mailto:info@bwc.com)  
888.580.8272 }

## WRW

**WRW Engineering** helps companies integrate mechanical, electrical and software engineering to deliver custom mechatronic solutions. By understanding the interplay between these three disciplines, we design and develop optimal embedded intelligence systems such as automated flexible testing stations, smart products, and autonomous machines. Through this holistic approach, our customers realize higher production efficiencies, faster time to market, and increased revenues.

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[info@wrweng.com](mailto:info@wrweng.com)  
888.580.8272 }

## BDM

**Black Diamond Manufacturing** is a specialty contract manufacturer of complex electro-mechanical sub-assemblies providing a single source solution from prototype to full production resulting in lower overall cost. BDM is different from other manufacturers because we have the ability to scale from prototype work to full production, and the ability to manage the customer's supply chain and hold consignment inventory. With 60+ years of in-house manufacturing experiences and capabilities BDM provides solutions for custom sub-assemblies.

{ [www.blackdiamondmfg.com](http://www.blackdiamondmfg.com)  
[info@blackdiamondmfg.com](mailto:info@blackdiamondmfg.com)  
888.580.8272 }

### CORPORATE HEADQUARTERS

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### FIND US ONLINE

WEBSITE: [www.bwc.com](http://www.bwc.com)  
BLOG: [www.bwcnews.blogspot.com](http://www.bwcnews.blogspot.com)  
TWITTER: @BWCnews  
YOUTUBE: [www.youtube.com/BishopWisecarver](http://www.youtube.com/BishopWisecarver)

# APPLICATION DATA SHEET

Company Name: \_\_\_\_\_

Contact Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

E-Mail: \_\_\_\_\_

I would like to receive the monthly e-newsletter (please check): ☐ Y ☐ NSystem Orientation: \_\_\_\_\_ ☐ horizontal ☐ verticalLoad: \_\_\_\_\_ ☐ lbs ☐ NStroke Length: \_\_\_\_\_ ☐ in ☐ mVelocity: \_\_\_\_\_ ☐ in/s ☐ m/sAccel/Decel: \_\_\_\_\_ ☐ in/s<sup>2</sup> ☐ m/s<sup>2</sup>Linear Accuracy: \_\_\_\_\_ ☐ in/ft ☐ mm/mRepeatability: \_\_\_\_\_ ☐ in ☐ mDuty Cycle: \_\_\_\_\_ ☐ in/day ☐ m/day

Environment: \_\_\_\_\_

Temperature: \_\_\_\_\_ ☐ °F ☐ °CAdditional Forces: \_\_\_\_\_ ☐ lbs ☐ N

Application Description: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Design Challenge/Issues to Solve: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Current Design Strengths to Be Reinforced/Maximized: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Market/Competitive Advantage Opportunities to Be Gained: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Expected Volume: \_\_\_\_\_ Deadline: \_\_\_\_\_

Please send this form, along with a drawing example, to  
 fax **925.439.5931** or email **info@bwc.com**

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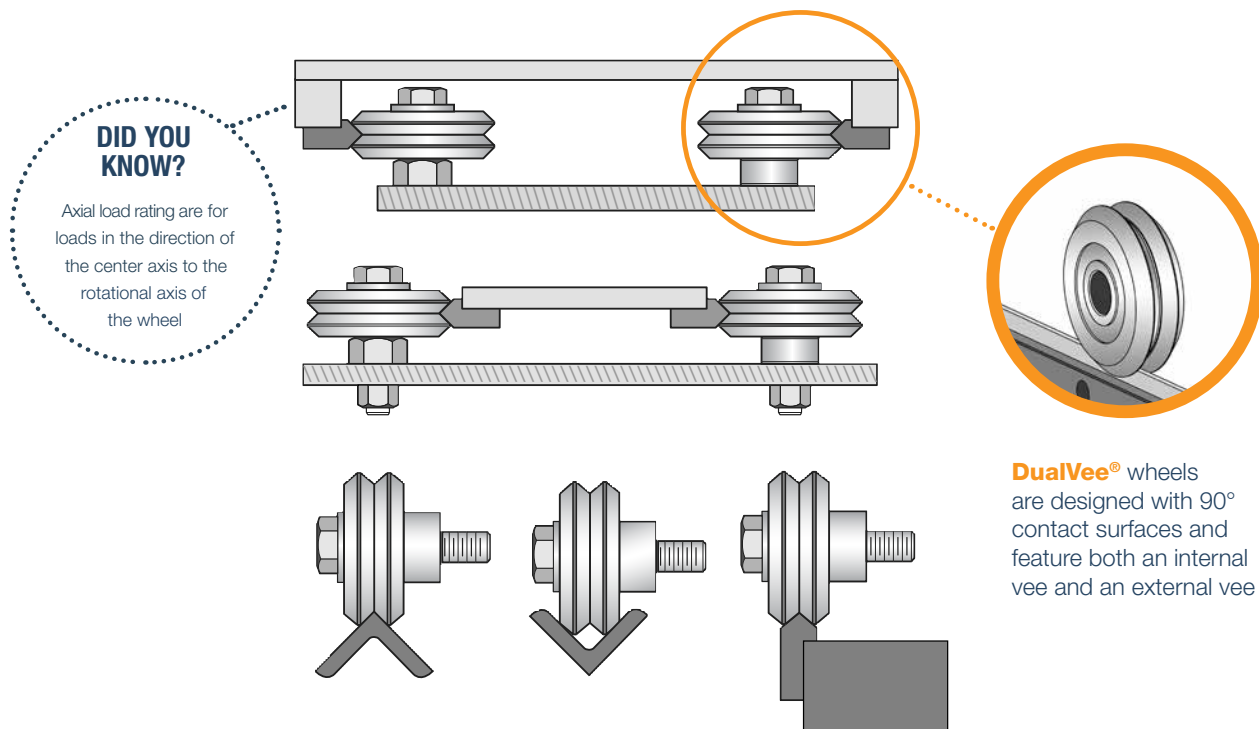
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# Introduction

Bishop-Wisecarver is recognized as the market leader for guide wheel technology. In 1967, Bud Wisecarver invented and patented **DualVee Motion Technology®** to provide a solution for harsh environment applications where existing technologies were ineffective. **DualVee** also proved excellent for long lengths, smooth motion, and low noise requirements.

More than 45 years later, our wide range of linear motion components and systems provide time proven, economical solutions for all types of application environments. From clean room to high debris, freezer to oven, Bishop-Wisecarver has the linear solution to fit your needs.



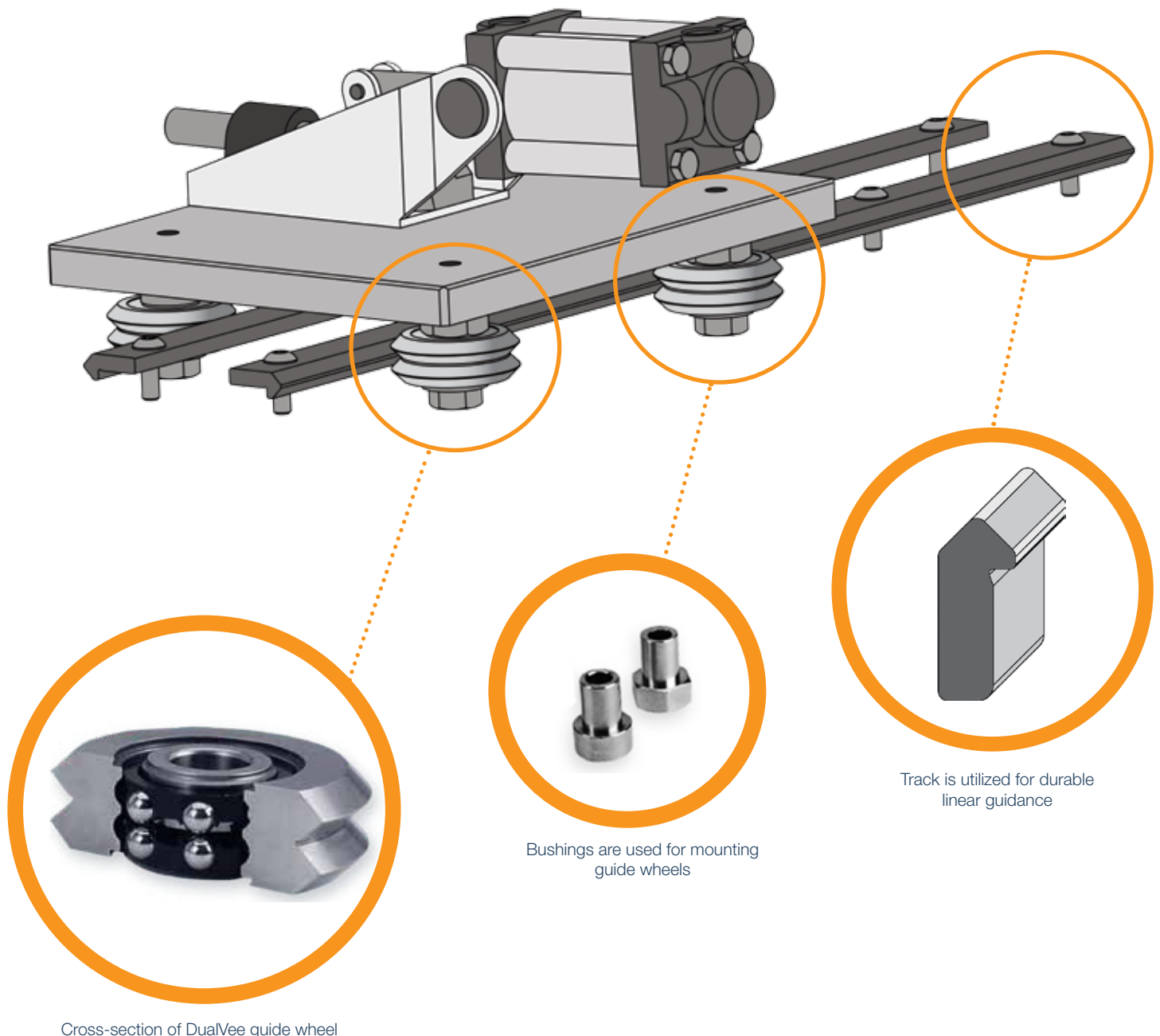
## Design Benefits

- Double row angular contact ball-bearing arrangement for dynamic loading conditions
- Sealed, shielded, or seal/shield combination to protect against contamination such as dirt, dust, metal chips, wood chips, textile fiber, food, slurry and deionized water
- Smooth, low friction motion
- High accuracy and repeatability
- Exceptionally long travel lengths and easily butt-jointed
- Radial load capacity ratings up to 3215 lbf per bearing
- Innovative track design with integrated mounting shoulder allows for accurate positioning and mounting of vee ways
- Speeds up to 5.5 meters per second
- Acceleration up to 5 g's
- Temperature ranges from -70°C to 260°C
- Track can be mounted to a variety of base materials without the need for precision ground or machined surfaces
- Low noise
- Flexible mounting options
- Track with mounting shoulder allows for accurate positioning of vee ways

# Application Example

This assembly depicts how **DualVee Motion Technology®** is used in a linear guide application.

The pneumatic cylinder can be reliably and accurately positioned anywhere along the guide wheel track for flexible workpiece clamping.





# Product Overview

## Original DualVee Guide Wheels

- Double row angular contact ball bearings offer excellent load carrying capacity in all orientations
- Internal rolling elements are isolated from the environment and protected from external contaminants by shields and seals
- Six standard sizes to accommodate design envelope and load carrying requirements



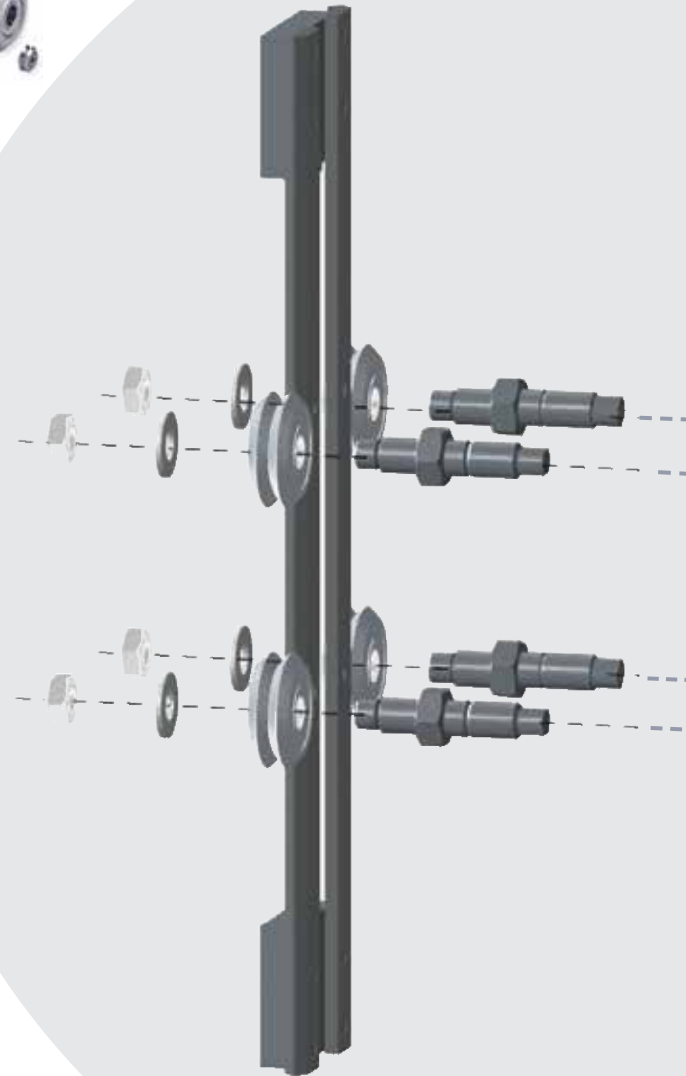
## DualVee Studded Wheels

- Guide wheel with threaded stud permanently swaged to the through bore provides simplified installation
- Low profile for compact applications
- Threaded studs with large threads allow for greater torque capacity
- Available for all versions of DualVee guide wheels



## DualVee Track With Integrated Mounting Shoulder

- Thin cross-section makes track compliant, assuring optimal installed accuracy (straightness and flatness of travel) when mounted against a machined register
- Accommodate heavy roll moment loads with a pair of tracks mounted in a wide spacing
- Available in standard lengths with or without mounting holes
- Available induction hardened and polished, or "as formed" in a soft condition
- Single piece track lengths up to 20 feet hardened or 22 feet unhardened
- AISI 1045 carbon steel and 420 stainless steel from stock
- Custom plating options include black oxide, thin dense chrome, electroless nickel, or zinc



## Lubricators

- Easy to install and available from stock
- Dispenses a thin film of oil along the vee way
- Lubrication increases load capacity and service life
- Stainless steel lubricator housings with mounting hardware
- Lubricant and felt replacements available upon request





## Bushings

- Designed for a fastener to pass through the bushing and the guide wheel, locking the elements into place against a mounting surface
- Concentric version with round flange for accurately aligning wheels to the fastener or mounting hole
- Eccentric version with hex flange allows for fit up and preload adjustments to guide track
- Standard and low profile head height configurations are available, providing flexibility in wheel height position
- Made from AISI 303 stainless steel



## Journals

- Allows for fit up adjustments from the opposite side of the mounting surface for designs where access to the guide wheel is prohibitive
- Incorporate bushing and fastener into a single element with washers and nuts included
- Reduces the overall number of components per guide wheel
- Concentric and eccentric configurations available
- Made from AISI 303 stainless steel

## Wheel Covers

- Available in kits that include the polymer cover housing, a vial of oil, felt inserts, and appropriate mounting hardware
- Sweeps away debris and dispenses a thin film of oil along the track vee way surfaces
- Maximizes service life, load capacity, and linear velocity
- Minimizes coefficient of friction, corrosion, and wear
- Satisfy safety requirements for elimination of possible pinch points by covering the rolling element and contact surface



# DualVee® Guide Wheels

## To Fit Any Application



CARBON STEEL



STAINLESS STEEL

STAINLESS STEEL  
HIGH TEMPERATURESTAINLESS STEEL  
LOW TEMPERATURESTUDDED WHEEL  
ASSEMBLIESSTAINLESS STEEL  
VACUUM WHEELSTAINLESS STEEL  
WASHDOWN WHEELPOLYMER STUDDED  
WHEEL ASSEMBLIES

WHEEL NAME	WHEEL SERIES	APPLICATION CONDITIONS	APPLICATION EXAMPLES	AVAILABLE SIZES	SEAL/ SHIELD	WHEEL MATERIAL	BALL RETAINER MATERIAL	TEMPERATURE RANGE	
								(°F)	(°C)
Original guide wheels carbon	W_	• General purpose factory floor conditions	<ul style="list-style-type: none"> <li>Automation</li> <li>Automotive</li> <li>Woodworking</li> <li>Printing</li> <li>Packaging</li> <li>Paper/textiles</li> </ul>	0, 1	Shield	52100 Steel	Nylon 6,6	-31° to +248°	-35° to +120°
	W_X			0, 1, 4XL	Seal	52100 Steel	Nylon 6,6	-22° to +212°	-30° to +100°
	W_X			2, 3, 4	Seal/shield	52100 Steel	Nylon 6,6	-22° to +212°	-30° to +100°
Original guide wheels stainless	W_S SX	• Corrosive conditions	<ul style="list-style-type: none"> <li>Medical</li> <li>Laboratory</li> <li>Food &amp; beverage</li> </ul>	1	Seal	440C Stainless steel	Nylon 6,6	-22° to +212°	-30° to +100°
				2, 3, 4, 4XL	Seal/shield	440C Stainless steel	Nylon 6,6	-22° to +212°	-30° to +100°
Studded polymer wheels	SWI_P	<ul style="list-style-type: none"> <li>Corrosive conditions</li> <li>Low noise requirements</li> </ul>	<ul style="list-style-type: none"> <li>Electronics</li> <li>Medical</li> <li>Laboratory</li> </ul>	0,1, 2	Shield	Polymer (overmold) 440C	300 Stainless steel	-4° to +248°	-20° to +120°
Vacuum wheels	W_S SVAC	• Vacuum conditions	<ul style="list-style-type: none"> <li>Material science</li> <li>Life sciences</li> </ul>	1, 2	Shield	440C Stainless steel	304 Stainless steel	-31° to +482°	-35° to +250°
Washdown wheels	WDW_S SX	• Washdown conditions	<ul style="list-style-type: none"> <li>Food processing</li> <li>Food packaging</li> </ul>	2, 3	Double seal	440C Stainless steel	Nylon 6,6	-22° to +212°	-30° to +100°
Original guide wheels for extreme conditions	W_S S227	<ul style="list-style-type: none"> <li>High temp conditions</li> <li>Corrosive conditions</li> </ul>	<ul style="list-style-type: none"> <li>Baking</li> <li>Welding</li> <li>Plasma cutters</li> </ul>	0,1, 2, 3, 4	Shield	440C Stainless steel	304 Stainless steel	-22° to +500°	-30° to +260°
	W_S S300	<ul style="list-style-type: none"> <li>Low temp conditions</li> <li>Subzero conditions</li> <li>Corrosive conditions</li> </ul>	<ul style="list-style-type: none"> <li>Aerospace</li> <li>Refrigeration</li> </ul>	1, 2, 3, 4	Shield	440C Stainless steel	304 Stainless steel	-94° to +230°	-70° to +110°

Shield material is 300 series stainless steel

Seal material is NBR

Seal/shield materials are 300 series stainless steel and NBR combination



# Original Guide Wheels

## Product Features

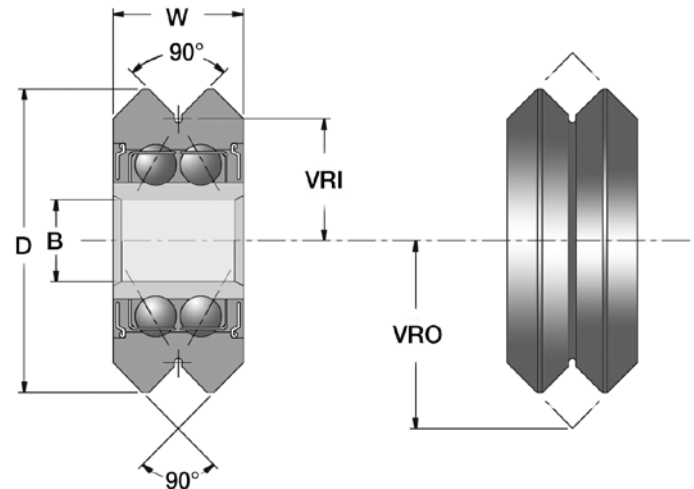
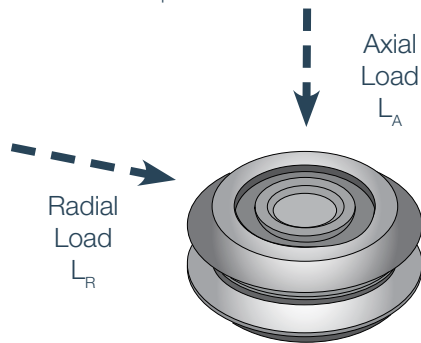
From factory automation projects to OEM designs, **DualVee Motion Technology®** components, and assemblies provide the design flexibility for virtually any guided motion application. Based on the **DualVee®** guide wheel, this technology offers a level of reliability unmatched in the industry.

DIMENSIONS	DUALVEE WHEEL SIZE	OUTER DIAMETER	WIDTH	BORE DIAMETER	VEE RADIUS INSIDE	VEE RADIUS OUTSIDE	WEIGHT (g)
		D	W	B	VRI	VRO	
	0	Ø0.584 [Ø14.83]	.250 [6.35]	Ø.1575+0.000/-0.0003 [Ø4.000+0.000/-0.008]	.234 [5.94]	.359 [9.12]	5.1
	1	Ø0.771 [Ø19.58]	.310 [7.87]	Ø.1875+0.000/-0.0003 [Ø4.760+0.000/-0.008]	.313 [7.95]	.468 [11.89]	11.1
	2	Ø1.210 [Ø30.73]	.438 [11.13]	Ø.3750+0.000/-0.0003 [Ø9.530+0.000/-0.008]	.500 [12.70]	.719 [18.26]	39.0
	3	Ø1.803 [Ø45.80]	.625 [15.88]	Ø.4724+0.000/-0.0003 [Ø12.000+0.000/-0.008]	.750 [19.05]	1.063 [27.00]	130.2
	4	Ø2.360 [Ø59.94]	.750 [19.05]	Ø.5906+0.000/-0.0003 [Ø15.001+0.000/-0.008]	1.000 [25.4]	1.375 [34.93]	276.0
	4XL	Ø2.968 [Ø75.39]	1.000 [25.4]	Ø.8661+0.000/-0.0004 [Ø22.000+0.000/-0.008]	1.250 [31.75]	1.750 [44.45]	575.0

### MATERIALS INCLUDE

Stainless steel  
Carbon steel  
Polymer

Values are in inches [millimeters]  
Manufactured to ABEC1 precision



LOAD CAPACITIES	DUALVEE WHEEL SIZE	WORKING RADIAL LOAD CAPACITY L <sub>R</sub>		WORKING AXIAL LOAD CAPACITY L <sub>A</sub>	
		N	lbf	N	lbf
	0	650	146	123	28
	1	1220	274	252	57
	2	2650	596	625	141
	3	5900	1326	1701	382
	4	9700	2181	4001	900
	4XL	14300	3215	6552	1473

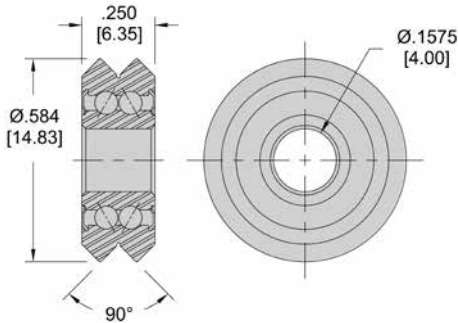
## Working Load Capacities

Working load capacities are based on empirical data on guide wheels used in general applications with static and dynamic load conditions. Guide wheels can routinely achieve travel life of one million cycles or higher when these specified load capacities are observed.

See product pages for specific load ratings

# Size 0

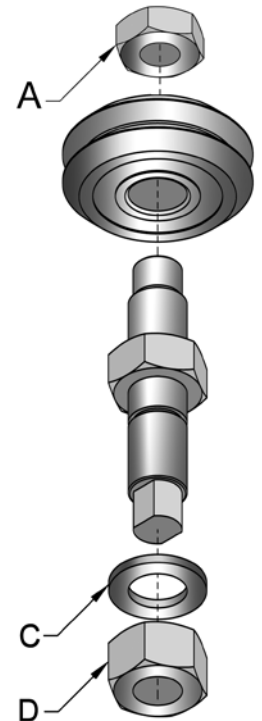
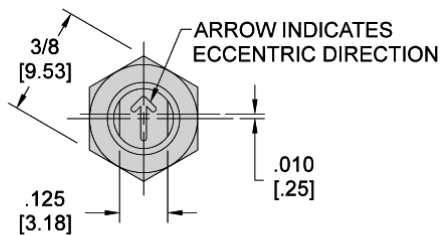
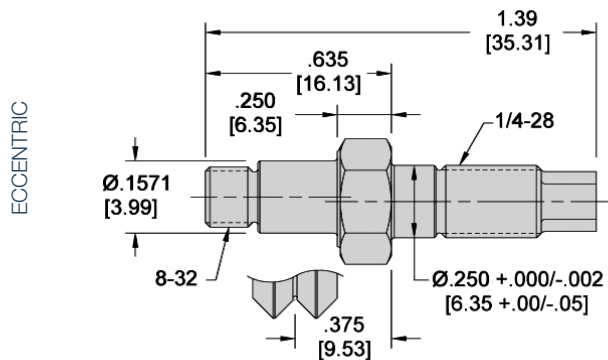
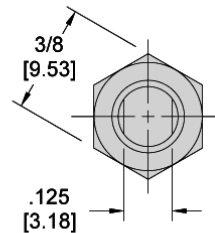
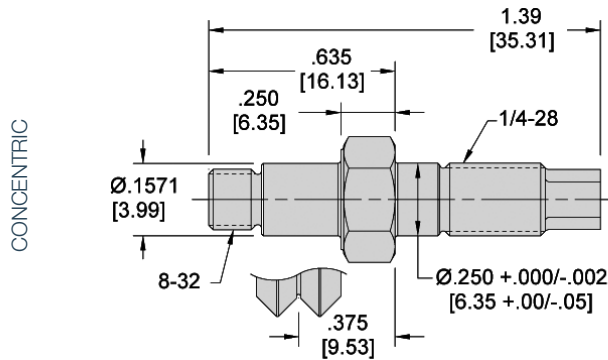
## Wheels — Original



STOCK CODE	MATERIAL	PROTECTION	WEIGHT (g)	TEMPERATURE RANGE	LOAD RATINGS (lbf)	
				DEGREES F	AXIAL $L_A$	RADIAL $L_R$
W0	52100 Steel	Shield	5.1	-31° To +248°	28	146
W0X	52100 Steel	Seal	5.1	-22° To +212°	28	146
W0SS227	440C Stainless	Shield	5.1	-22° To +500°	23	121

NOTE: To convert lbf to Newtons, multiply by 4.448  
To convert inches to millimeters, multiply by 25.4

## Journals

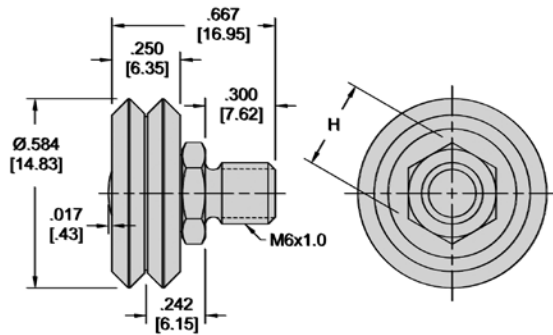


STOCK CODE	STYLE	WHEEL MOUNTING SIDE			JOURNAL MOUNTING SIDE				WEIGHT (g)
		MOUNTING SURFACE TO WHEEL VEE	WHEEL MOUNTING NUT	WHEEL MOUNTING WASHER	JOURNAL MOUNTING WASHER	JOURNAL MOUNTING NUT	MIN. MOUNTING PLATE THICKNESS	MAX. MOUNTING PLATE THICKNESS	
MJC0A	Concentric	.375	#8-32 Zinc plated Nylon locking	N/A	1/4 Flat washer stainless steel	1/4-28 Zinc plated Nylon locking	.125	.375	14
MJX0A	Eccentric								

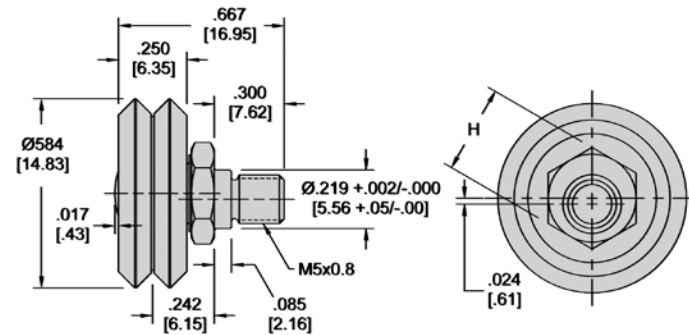
Values are in inches  
Journal material is AISI 303 stainless steel  
Supplied with mounting nuts and washer, without guide wheel

# Size 0

## Studded Wheels — SWS Series



CONCENTRIC



ECCENTRIC

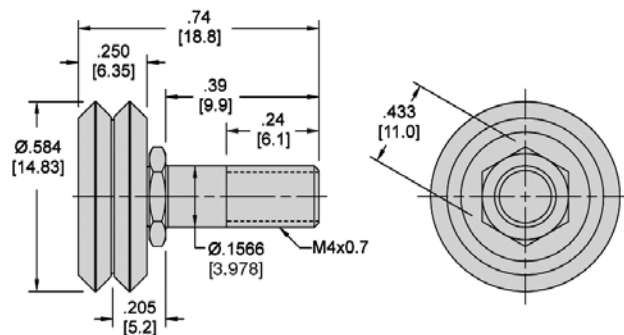
STOCK CODE		WHEEL	WHEEL STYLE	WEIGHT (g)	MOUNTING HEX	TEMPERATURE RANGE	LOAD RATINGS (lbf)	
CONCENTRIC STUD	ECCENTRIC STUD						AXIAL	RADIAL
SWIC0P	SWIE0P	Overmold	Polymer shield	6	11mm	-4° to +248°	3	6
SWSC0A	SWSE0A	W0	Carbon shield	9	3/8 in	-31° to +248°	28	146
SWSC0XA	SWSE0XA	W0X	Carbon sealed	9	3/8 in	-22° to +212°	28	146
SWSC0SS227A	SWSE0SS227A	W0SS227	Stainless high temp	9	3/8 in	-22° to +500°	23	121

Stud material is 303 stainless steel

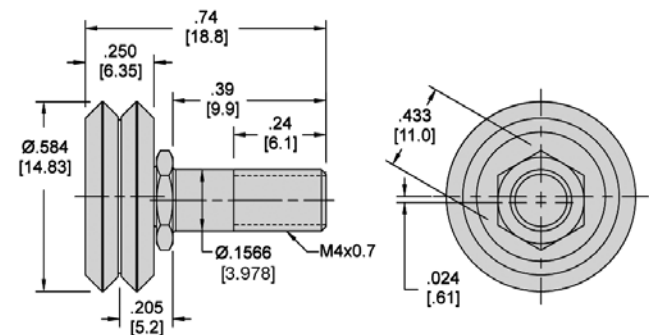
Recommended flange nut for eccentric wheel: NUTHXFLM5

See apage 44 for recommended mounting geometry

## Studded Wheel Assemblies — SWA Series



CONCENTRIC

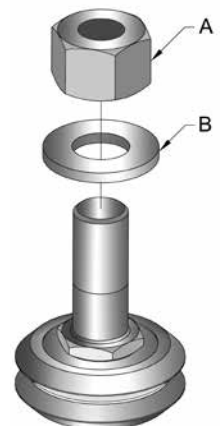


ECCENTRIC

STOCK CODE		WHEEL	WHEEL STYLE	WEIGHT (g)	NUT	WASHER
CONCENTRIC	ECCENTRIC				A	B
SWAC0	SWAE0	W0	Carbon shielded	9	M4 x 0.7	M4
SWAC0X	SWAE0X	W0X	Carbon sealed			
SWAC0SS227	SWAE0SS227	W0SS227	Stainless high temp			

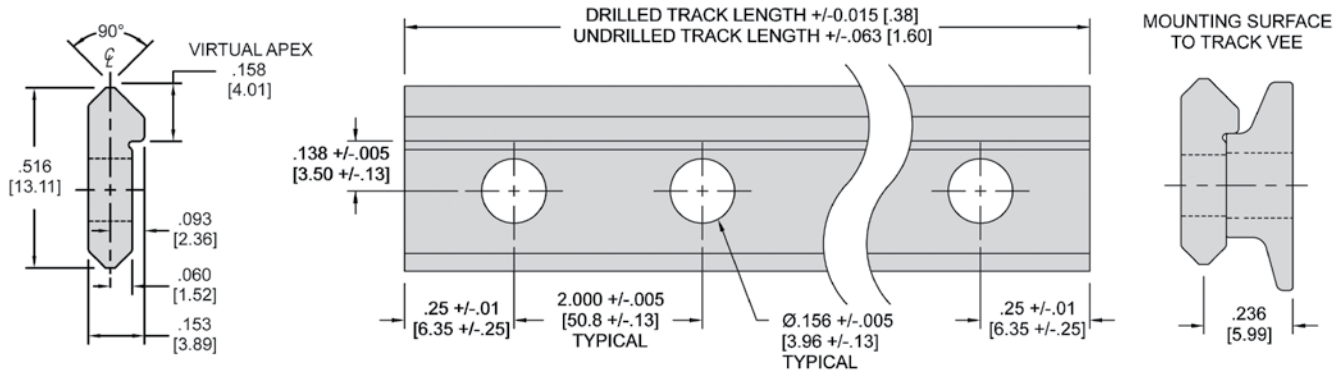
Stud material is 416 stainless steel

Nut and washer material are 18-8 stainless steel

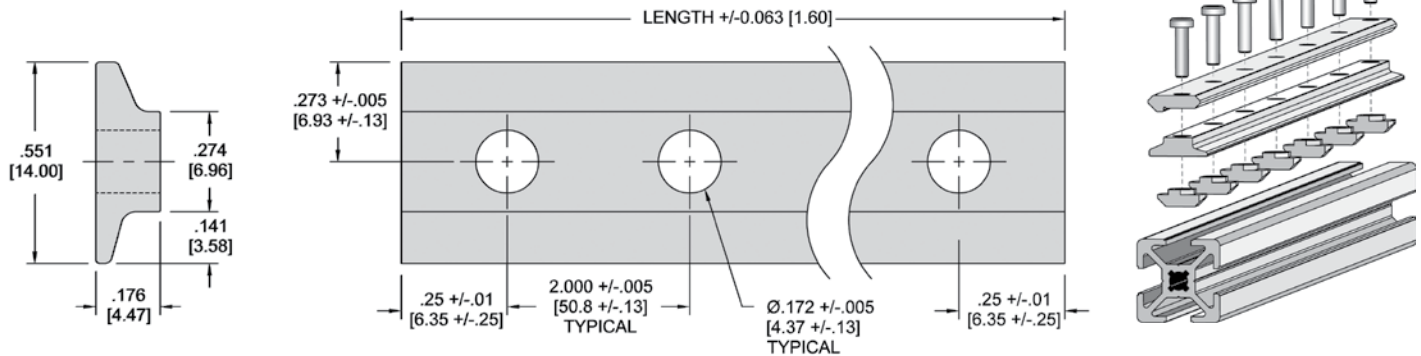


# Size 0

## Track



## Track Support



STOCK CODE PREFIX	MATERIAL	DESCRIPTION	HARDNESS	MAXIMUM LENGTH (ft)	WEIGHT (lbs./ft)	FINISHING
TD0-	1045 Carbon	Hardened	HRC 53 min.	18	.171	Polished & oiled
TDS0-		Soft	HRC 22-25	20		
MV0TS-	6063-T6 Aluminum	Track support	N/A	10	.079	Anodized

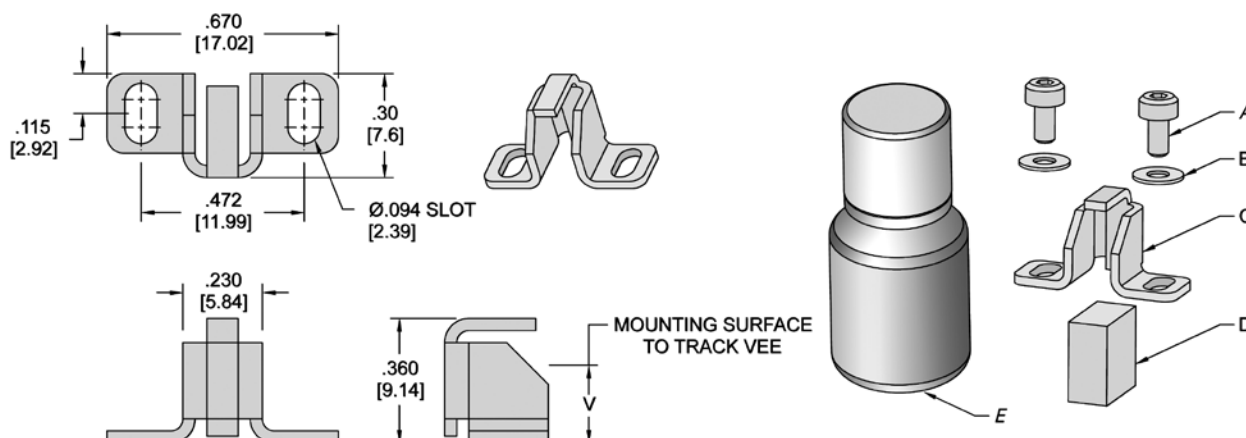
Hardened track is induction hardened and polished on the vee surfaces.  
Track without holes is available by the foot. Length tolerance is +/-0.063 inches.

STOCK CODES	HARDENED TRACK DRILLED	SOFT TRACK DRILLED	TRACK SUPPORT DRILLED	STANDARD LENGTHS (inches)	# OF HOLES
	TD0-650-4	TDS0-650-4	MV0TS-650-4	6.50	4
	TD0-1250-7	TDS0-1250-7	MV0TS-1250-7	12.50	7
	TD0-1850-10	TDS0-1850-10	MV0TS-1850-10	18.50	10
	TD0-2450-13	TDS0-2450-13	MV0TS-2450-13	24.50	13
	TD0-3050-16	TDS0-3050-16	MV0TS-3050-16	30.50	16
	TD0-3650-19	TDS0-3650-19	MV0TS-3650-19	36.50	19
	HARDENED TRACK UNDRILLED (NO HOLES)	SOFT TRACK UNDRILLED (NO HOLES)	TRACK SUPPORT UNDRILLED (NO HOLES)	STANDARD LENGTHS (FEET)	# OF HOLES
	TD0-1 THRU TD0-18	TDS0-1 THRU TDS0-20	N/A	1 THRU 18 OR 1 THRU 20	0

Available made-to-order with user specified length, hole spacing, and machining.

# Size 0

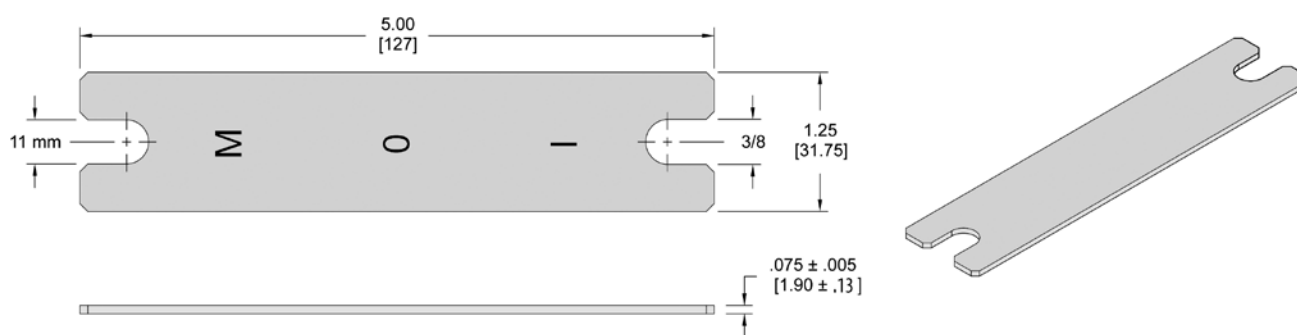
## Track Lubricators



STOCK CODE	COMPATIBLE WITH	MOUNTING SURFACE TO TRACK VEE	SCREWS	WASHERS	FELT HOLDER	FELTS	BOTTLE OF LUBRICANT	WEIGHT (g)
		V	A	B	C	D	E	
MV0TLA	Studded wheels	.205 - .242 [5.21 - 6.15]	M2x0.4x4mm Stainless	M2 stainless	300 Series stainless	White wool	Synthetic oil	2

Values are in inches [millimeters]

## Adjustment Wrench

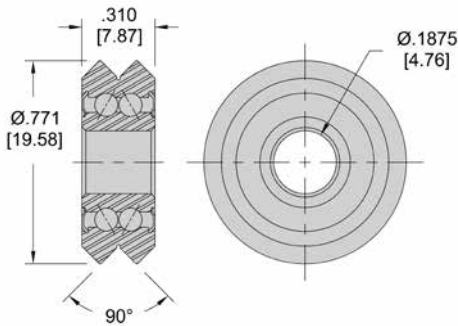


STOCK CODE	COMPATIBLE WITH	MATERIAL	HARDNESS	FINISH	WEIGHT (g)
BAW0	Bushings	4130 Steel	HRC 46 - 56	Black oxide	52
	Journals				
	Studded wheels				



# Size 1

## Wheels – Original

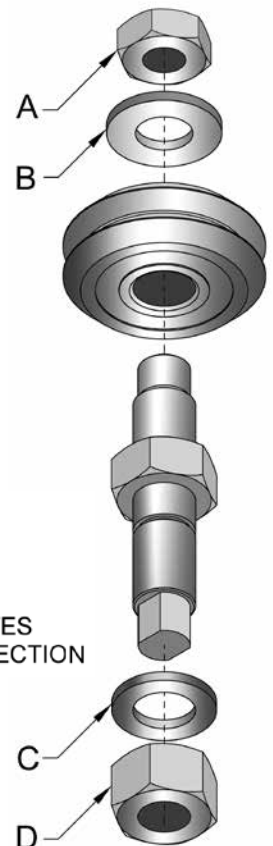
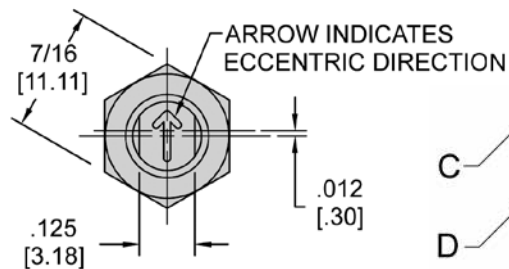
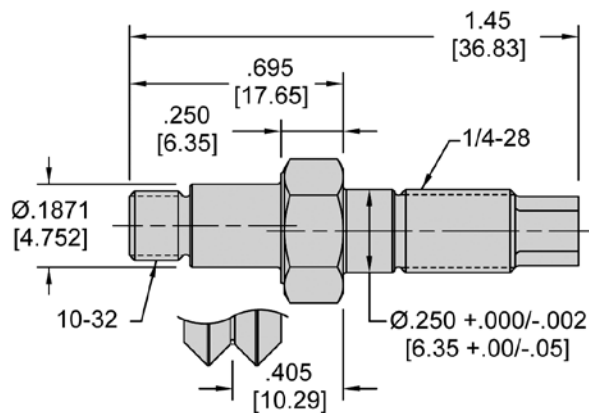
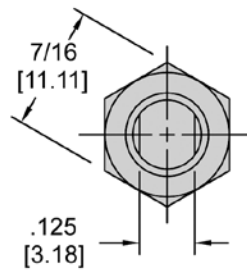
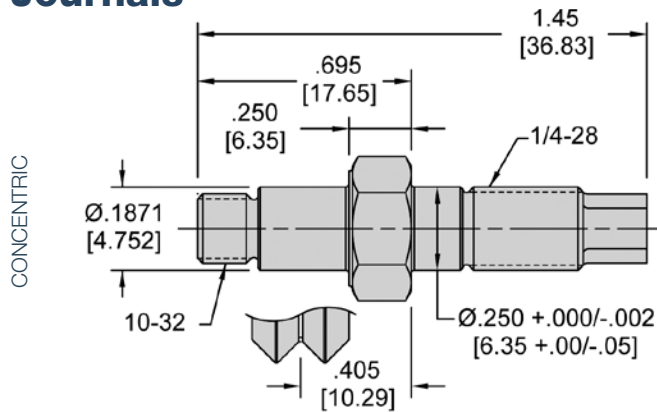


STOCK CODE	MATERIAL	PROTECTION	WEIGHT (g)	TEMPERATURE RANGE	LOAD RATINGS (lbf)	
				DEGREES F	AXIAL $L_A$	RADIAL $L_R$
W1	52100 Steel	Shield	11.1	-31° to +248°	57	274
W1X	52100 Steel	Seal	11.1	-22° to +212°	57	274
W1SSX	440C Stainless	Seal	11.1	-22° to +212°	57	274
W1SSVAC	440C Stainless	Shield	12	-31° to +482°	40	192
W1SS227	440C Stainless	Shield	11.1	-22° to +500°	47	228
W1SS300	440C Stainless	Shield	11.1	-94° to +230°	47	228

NOTE: To convert lbf to Newtons, multiply by 4.448

To convert inches to millimeters, multiply by 25.4

## Journals



STOCK CODE	STYLE	WHEEL MOUNTING SIDE			JOURNAL MOUNTING SIDE			MIN. MOUNTING PLATE THICKNESS	MAX. MOUNTING PLATE THICKNESS	WEIGHT (g)
		MOUNTING SURFACE TO WHEEL VEE	WHEEL MOUNTING NUT	WHEEL MOUNTING WASHER	JOURNAL MOUNTING WASHER	JOURNAL MOUNTING NUT				
MJC1A	Concentric	.405	#10-32 Zinc plated Nylon locking	#8 Flat washer stainless steel	1/4 Flat washer stainless steel	1/4-28 Zinc plated Nylon locking		.125	.375	16.1
MJX1A	Eccentric									

Values are in inches

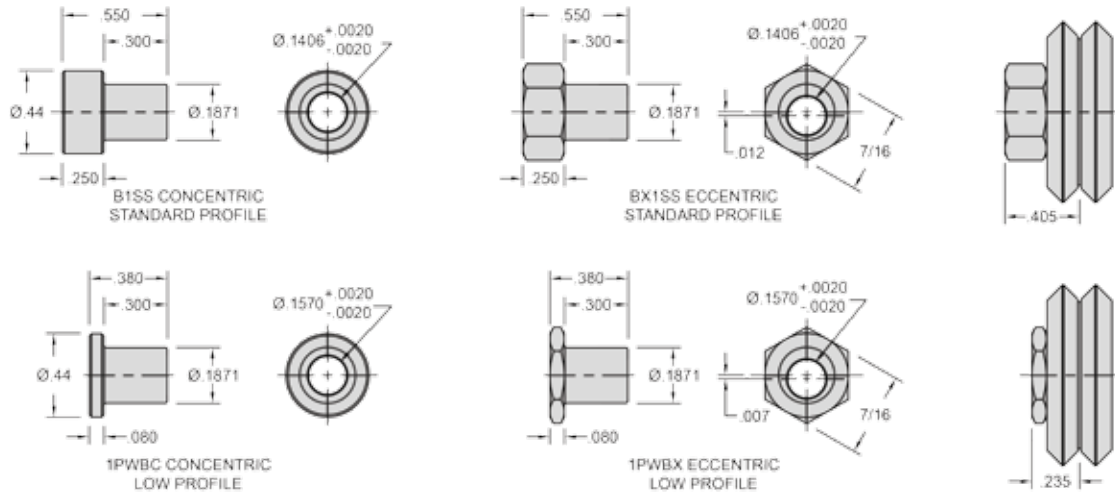
Journal material is AISI 303 stainless steel

Supplied with mounting nuts and washers, without guide wheel

# Size 1

## Bushings

INCHES

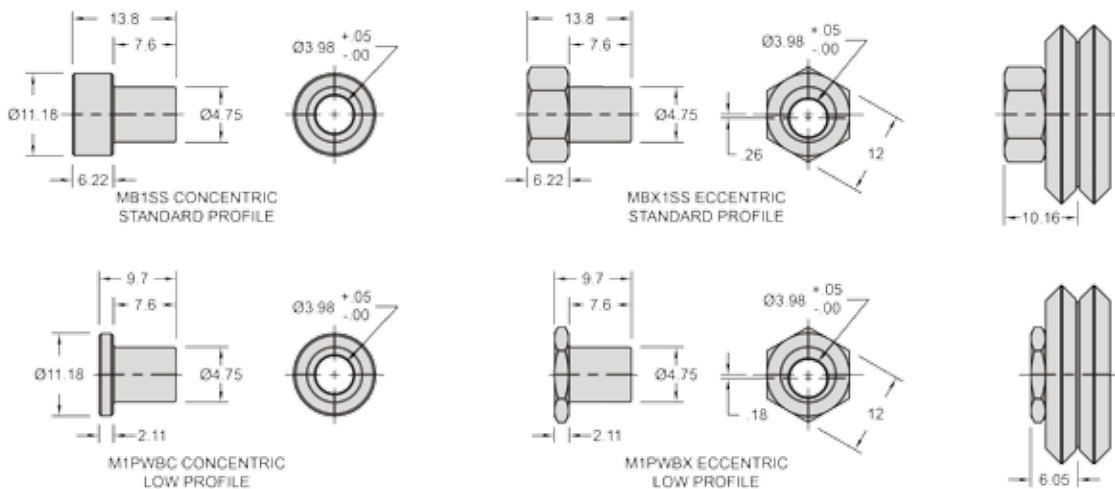


STOCK CODE	STYLE	HEAD PROFILE		MOUNTING SURFACE TO WHEEL VEE	WEIGHT (g)	RECOMMENDED FASTENER
B1SS	Concentric	Standard	.250	.405	4.6	#6
BX1SS	Eccentric		.250	.405	5.1	#6
1PWBC	Concentric	Low	.080	.235	1.5	M4
1PWBX	Eccentric		.080	.235	1.6	M4

Values are in inches

Bushing material is AISI 303 stainless steel

METRIC



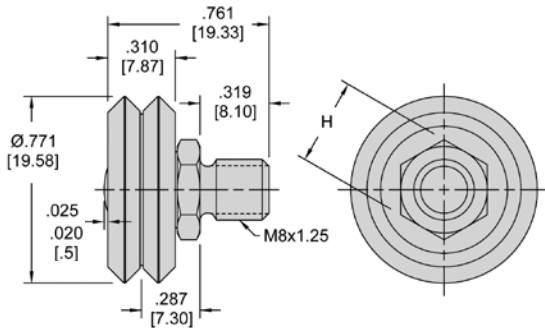
STOCK CODE	STYLE	HEAD PROFILE		MOUNTING SURFACE TO WHEEL VEE	WEIGHT (g)	RECOMMENDED FASTENER
MB1SS	Concentric	Standard	6.22	10.16	4.2	M4
MBX1SS	Eccentric		6.22	10.16	5.3	
M1PWBC	Concentric	Low	2.11	6.05	1.5	
M1PWBX	Eccentric		2.11	6.05	1.8	

Values are in millimeters

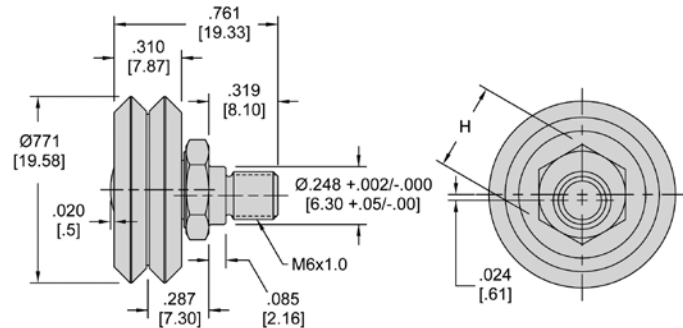
Bushing material is AISI 303 stainless steel

# Size 1

## Studded Wheels — SWS Series



CONCENTRIC



ECCENTRIC

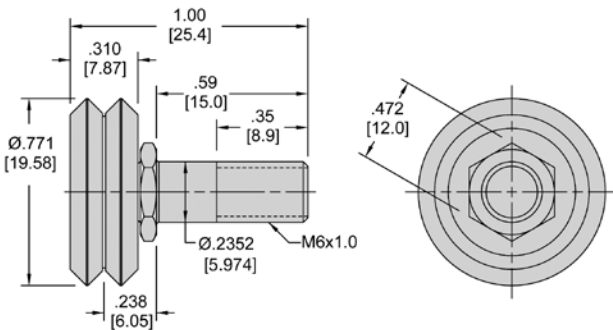
STOCK CODE		WHEEL	WHEEL STYLE	WEIGHT (g)	MOUNTING HEX	TEMPERATURE RANGE	LOAD RATINGS (lbf)	
CONCENTRIC STUD	ECCENTRIC STUD						AXIAL	RADIAL
SWIC1P	SWIE1P	Overmold	Polymer shielded	11	12 mm	-4° to +248°	6	12
SWSC1A	SWSE1A	W1	Carbon shielded	17	7/16 in	-31° to +248°	57	274
SWSC1XA	SWSE1XA	W1X	Carbon sealed	17	7/16 in	-22° to +212°	57	274
SWSC1SSXA	SWSE1SSXA	W1SSX	Stainless sealed	17	7/16 in	-22° to +212°	57	274
SWSC1SS227A	SWSE1SS227A	W1SS227	Stainless high temp	17	7/16 in	-22° to +500°	47	228
SWSC1SS300A	SWSE1SS300A	W1SS300	Stainless low temp	17	7/16 in	-94° to +230°	47	228
SWSC1SSVACA	SWSE1SSVACA	W1SSVAC	Stainless vacuum	18	7/16 in	-31° to +482°	40	192

Stud material is 303 stainless steel

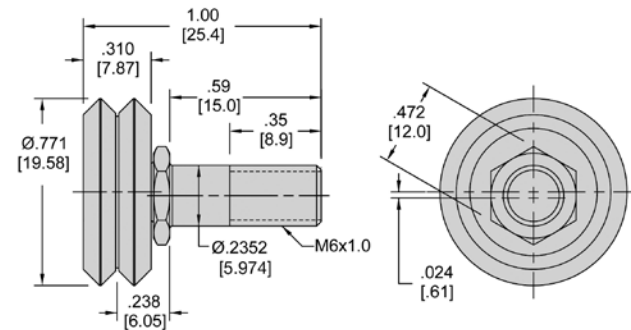
Recommended flange nut for eccentric wheel: NUTHXFLM6

See page 44 for recommended mounting geometry

## Studded Wheel Assemblies — SWA Series



CONCENTRIC

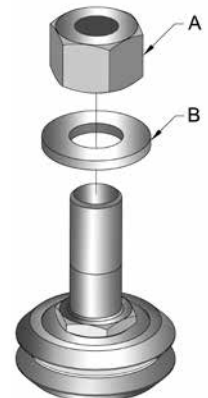


ECCENTRIC

STOCK CODE		WHEEL	WHEEL STYLE	WEIGHT (g)	NUT	WASHER
CONCENTRIC STUD	ECCENTRIC STUD				A	B
SWAC1	SWAE1	W1	Carbon shielded	20	M6 x 1.0	M6
SWAC1X	SWAE1X	W1X	Carbon sealed			
SWAC1SSX	SWAE1SSX	W1SSX	Stainless sealed			
SWAC1SS227	SWAE1SS227	W1SS227	Stainless high temp			
SWAC1SS300	SWAE1SS300	W1SS300	Stainless low temp			
SWAC1SSVAC	SWAE1SSVAC	W1SSVAC	Stainless vacuum			

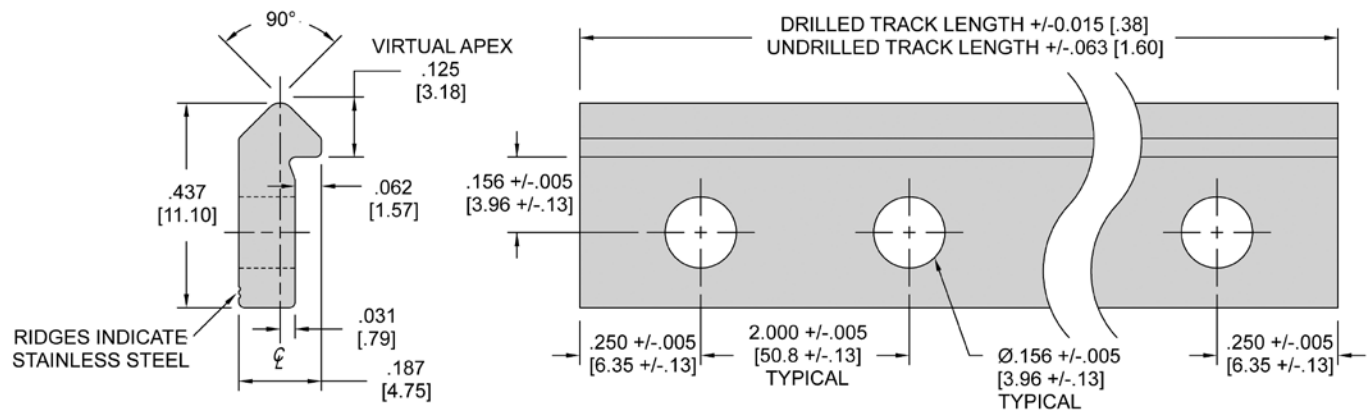
Stud material is 416 stainless steel

Nut and washer material are 18-8 stainless steel



# Size 1

## Track



STOCK CODE PREFIX	MATERIAL	DESCRIPTION	HARDNESS	MAXIMUM LENGTH (ft)	WEIGHT (lbs./ft)	FINISHING
T1-	1045 Carbon	Hardened	HRC 53 min.	20	.183	Polished & oiled
TS1-		Soft	HRC 22-25	22		
T1SS-	420 Stainless	Hardened	HRC 40 min.	20		
TS1SS-		Soft	HRC 20-22	22		

Hardened track is induction hardened and polished on the vee surfaces.

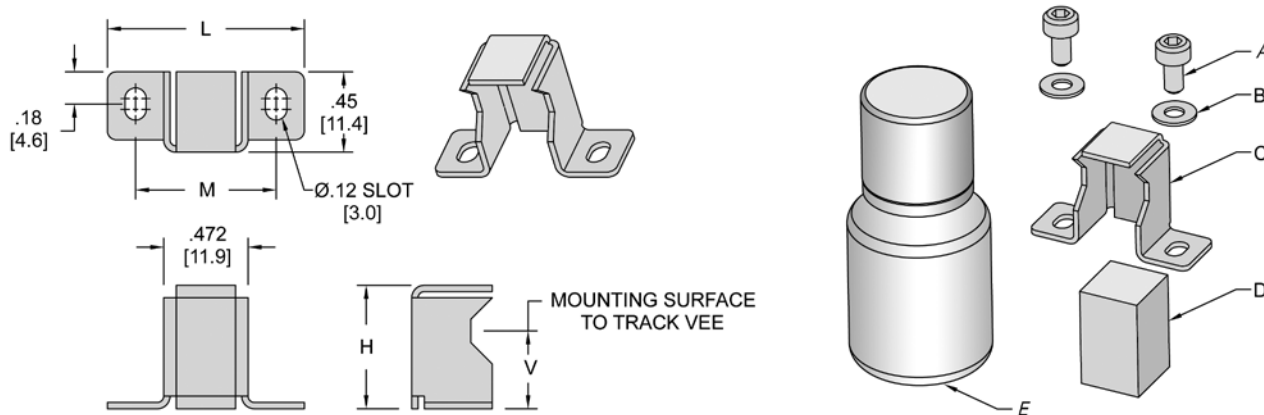
STOCK CODES				STANDARD LENGTHS (in)	# OF HOLES
1045 CARBON STEEL		420 STAINLESS STEEL			
HARDENED WITH HOLES	SOFT WITH HOLES	HARDENED WITH HOLES	SOFT WITH HOLES		
T1-1250-7	TS1-1250-7	T1SS-1250-7	TS1SS-1250-7	12.50	7
T1-2450-13	TS1-2450-13	T1SS-2450-13	TS1SS-2450-13	24.50	13
T1-3650-19	TS1-3650-19	T1SS-3650-19	TS1SS-3650-19	36.50	19
T1-4850-25	TS1-4850-25	T1SS-4850-25	TS1SS-4850-25	48.50	25
T1-6050-31	TS1-6050-31	T1SS-6050-31	TS1SS-6050-31	60.50	31
T1-7250-37	TS1-7250-37	T1SS-7250-37	TS1SS-7250-37	72.50	37
HARDENED UNDRILLED (NO HOLES)	SOFT UNDRILLED (NO HOLES)	HARDENED UNDRILLED (NO HOLES)	SOFT UNDRILLED (NO HOLES)	STANDARD LENGTHS (FEET)	# OF HOLES
T1-1 thru T1-20	TS1-1 thru TS1-22	T1SS-1 thru T1SS-20	TS1SS-1 thru TS1SS-22	1 thru 20 and 1 thru 22	0

Available undrilled by the foot. Length cut tolerance of undrilled track is  $\pm 0.063$  [1.60]

Available made-to-order with user specified length, hole spacing, and machining.

# Size 1

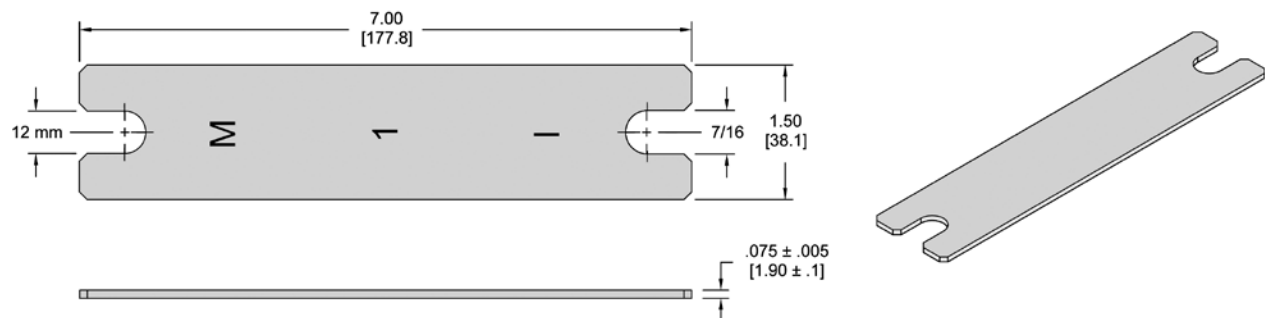
## Track Lubricators



STOCK CODE	COMPATIBLE WITH	HEIGHT H	LENGTH L	HOLE SPACING M	MOUNTING SURFACE TO TRACK VEE V	SCREWS A	WASHERS B	FELT HOLDER C	FELTS D	BOTTLE OF LUBRICANT E	WEIGHT (g)
TL1A	Bushings standard profile Journals	.690 [17.5]	1.10 [27.9]	.787 [20.0]	.370 - .500 [9.4 - 12.7]	M2 x 0.4 x 5mm Stainless	M2 Stainless	300 Series stainless	White wool	Synthetic Oil	6
TL1LPA	Bushings low profile	.533 [13.5]			.213 - .343 [5.4 - 8.7]						5
TL1BWPA	Studded wheels	.580 [14.7]	1.13 [28.6]	.799 [20.3]	.270 - .375 [6.9 - 9.5]						5

Values are in inches [millimeters]

## Adjustment Wrench

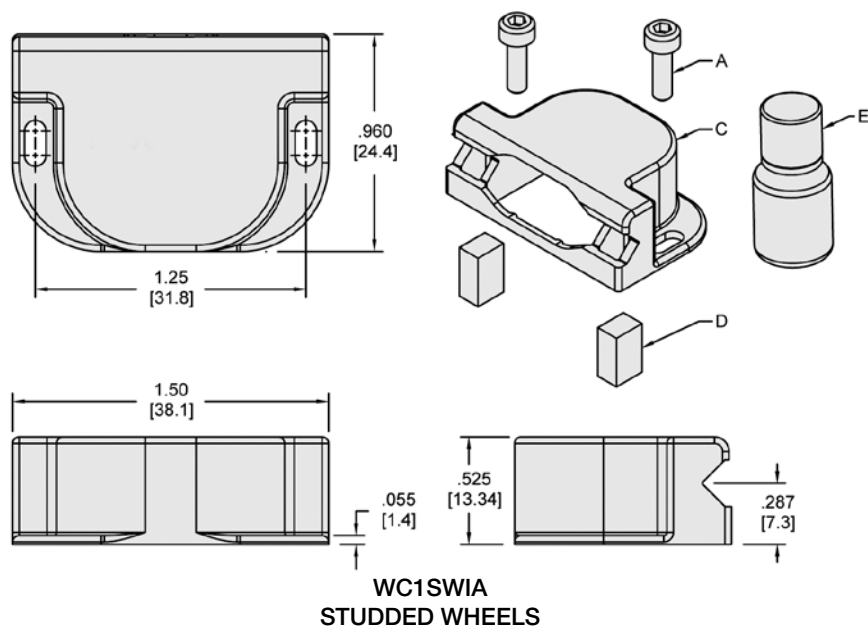
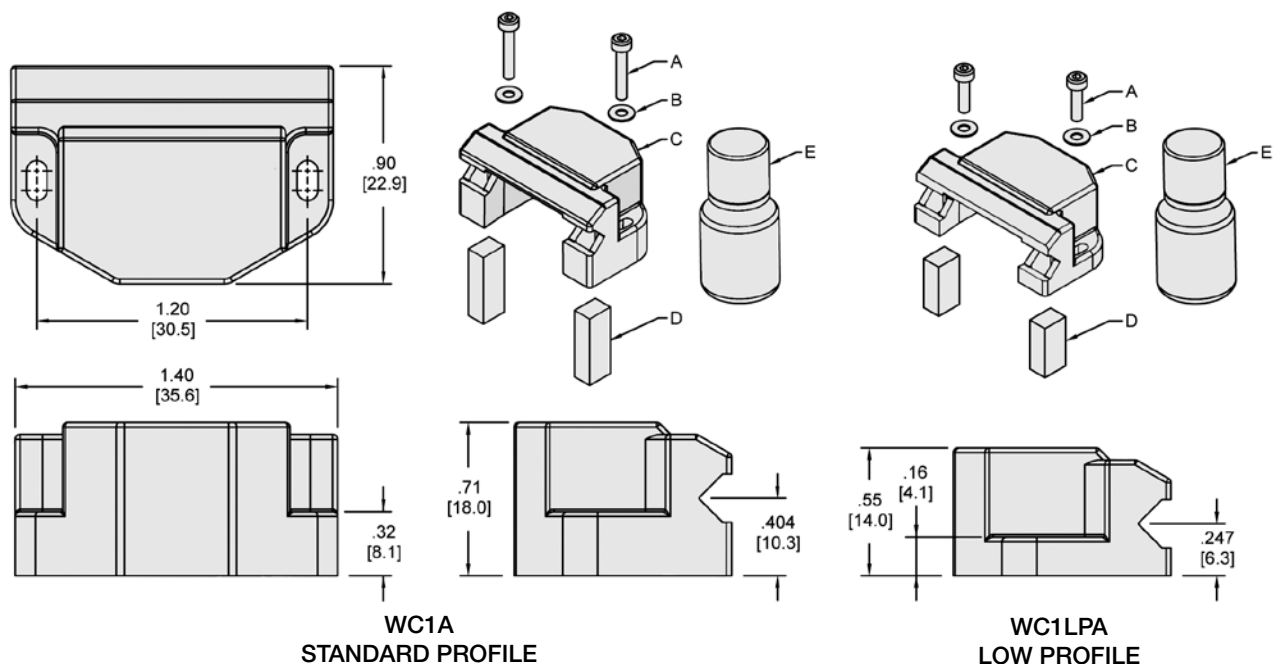


STOCK CODE	COMPATIBLE WITH	MATERIAL	HARDNESS	FINISH	WEIGHT (g)
BAW1	Bushings	4130 Steel	HRC 46 - 56	Black oxide	90
	Journals				
	Studded wheels				



# Size 1

## Wheel Covers

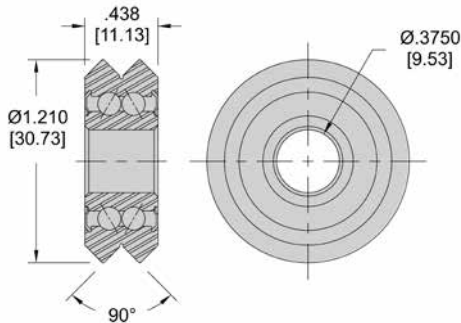


STOCK CODE	COMPATIBLE WITH	MOUNTING SURFACE TO TRACK VEE	SCREW	WASHER	WHEEL COVER	FELT	BOTTLE OF LUBRICANT	WEIGHT (g)
			A	B	C	D	E	
WC1A	Standard profile bushings	.404 [10.3]	M2 x 0.4 x 12mm Stainless	M2 Stainless	Black ABS	White wool	Synthetic oil	12
WC1LPA	Low profile bushings	.247 [6.3]	M2 x 0.4 x 8mm Stainless					12
WC1SWIA	Studded wheels	.287 [7.3]	M3 x 0.5 x 10mm Stainless	N/A	Black Nylon			8

Values are in inches [millimeters]

# Size 2

## Wheels – Original

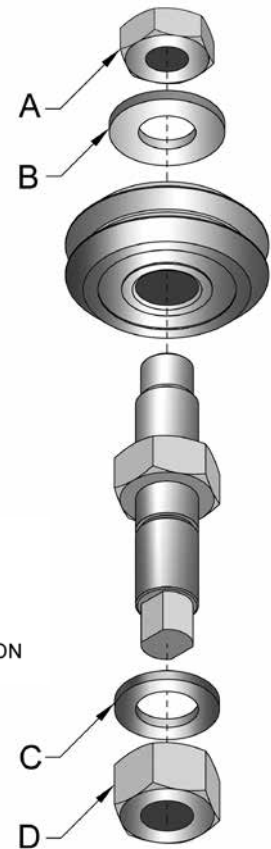
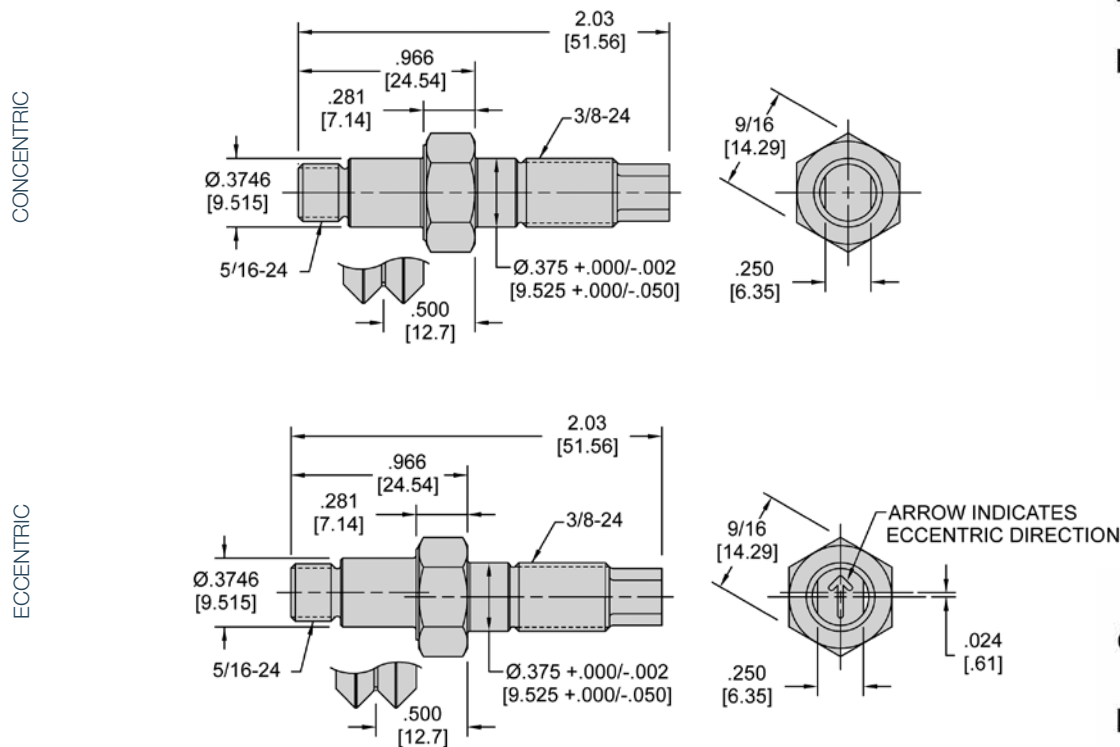


STOCK CODE	MATERIAL	PROTECTION	WEIGHT (g)	TEMPERATURE RANGE	LOAD RATINGS (lbf)	
				DEGREES F	AXIAL $L_A$	RADIAL $L_R$
W2X	52100 Steel	Seal shield	39	-22° to +212°	141	596
W2SSX	440C Stainless	Seal shield	39	-22° to +212°	141	596
W2SSVAC	440C Stainless	Shield	39	-31° to +482°	99	417
W2SS227	440C Stainless	Shield	39	-22° to +500°	117	494
W2SS300	440C Stainless	Shield	39	-94° to +230°	117	494
WDW2SSX	440C Stainless	Washdown	37.8	-22° to +212°	90	544

NOTE: To convert lbf to Newtons, multiply by 4.448

To convert inches to millimeters, multiply by 25.4

## Journals



STOCK CODE	STYLE	WEIGHT (g)	WHEEL MOUNTING SIDE			JOURNAL MOUNTING SIDE			
			MOUNTING SURFACE TO WHEEL VEE	WHEEL MOUNTING NUT	WHEEL MOUNTING WASHER	JOURNAL MOUNTING WASHER	JOURNAL MOUNTING NUT	MIN. MOUNTING PLATE THICKNESS	MAX. MOUNTING PLATE THICKNESS
MJC2A	Concentric	45.7	.500	5/16-24 Zinc plated Nylon locking	5/16 Flat washer stainless steel	3/8 Flat washer stainless steel	3/8-24 Zinc plated Nylon locking	.187	.500
MJX2A	Eccentric			5/16-24 Zinc plated Nylon locking	5/16 Flat washer stainless steel	3/8 Flat washer stainless steel	3/8-24 Zinc plated Nylon locking		

Values are in inches

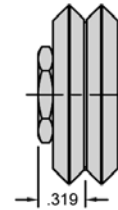
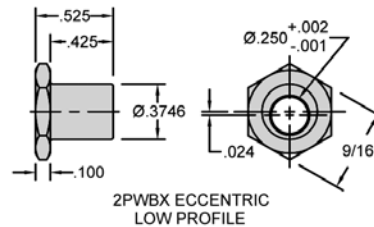
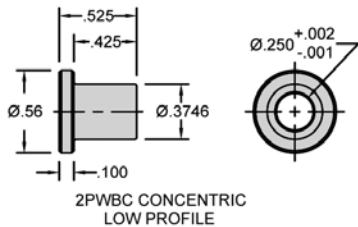
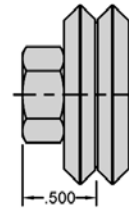
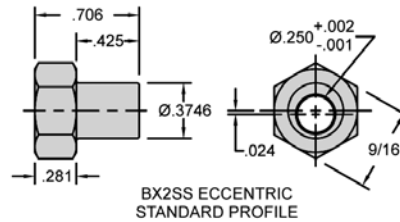
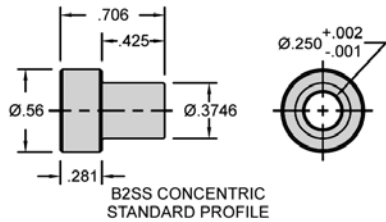
Journal material is AISI 303 stainless steel

Supplied with mounting nuts and washers, without guide wheel

# Size 2

## Bushings

INCHES

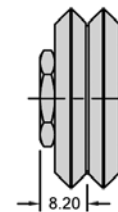
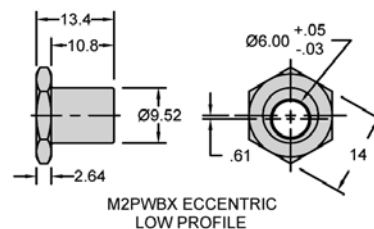
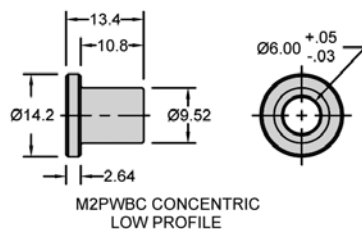
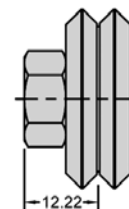
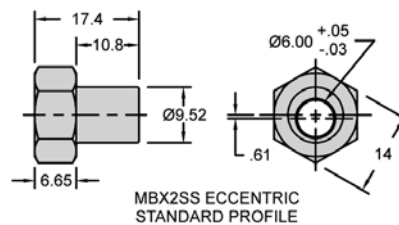
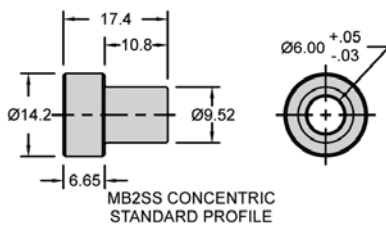


STOCK CODE	STYLE	HEAD PROFILE		MOUNTING SURFACE TO WHEEL VEE	WEIGHT (g)	RECOMMENDED FASTENER
B2SS	Concentric	Standard	.281	.500	10.3	1/4
BX2SS	Eccentric				11.0	
2PWBC	Concentric	Low	.100	.319	5.7	
2PWBX	Eccentric				6.0	

Values are in inches

Bushing material is AISI 303 stainless steel

METRIC



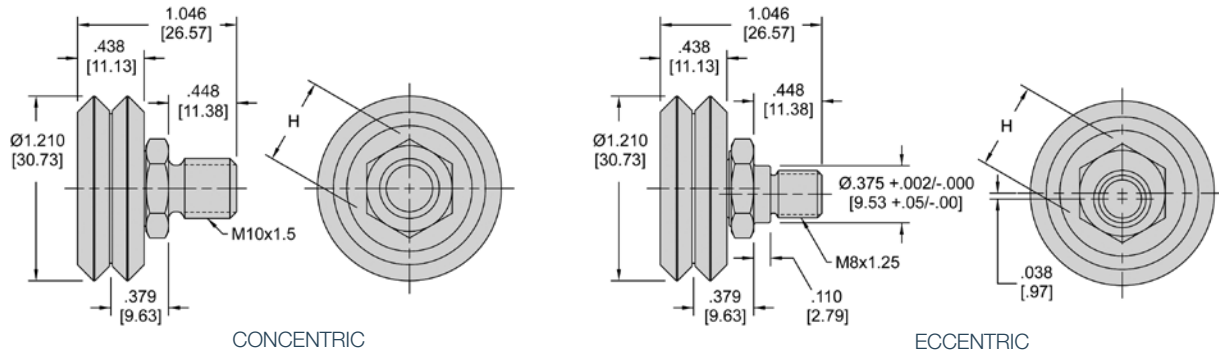
STOCK CODE	STYLE	HEAD PROFILE		MOUNTING SURFACE TO WHEEL VEE	WEIGHT (g)	RECOMMENDED FASTENER
MB2SS	Concentric	Standard	6.65	12.22	10.1	M6
MBX2SS	Eccentric				10.7	
M2PWBC	Concentric	Low	2.64	8.20	6.2	
M2PWBX	Eccentric				6.3	

Values are in millimeters

Bushing material is AISI 303 stainless steel

# Size 2

## Studded Wheels – SWS Series

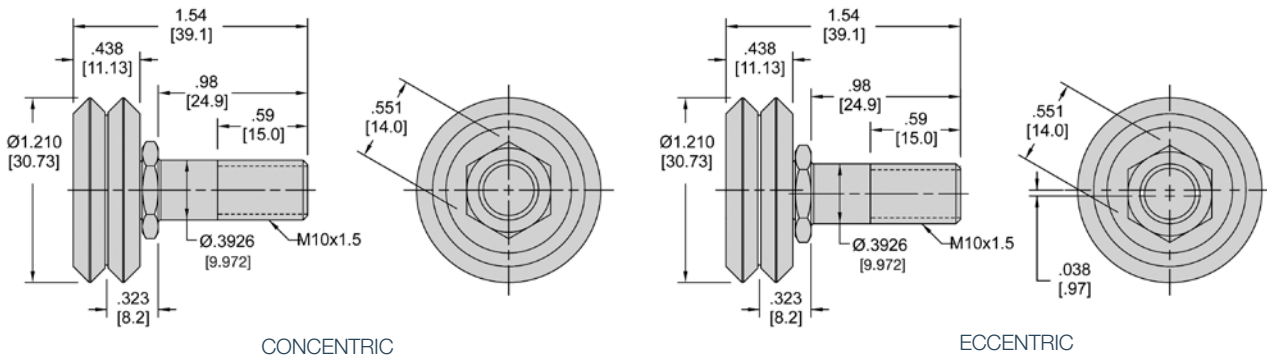


STOCK CODE		WHEEL	WHEEL STYLE	WEIGHT (g)	MOUNTING HEX	TEMPERATURE RANGE	LOAD RATINGS (lbf)	
CONCENTRIC STUD	ECCENTRIC STUD				H	DEGREES F	AXIAL L <sub>A</sub>	RADIAL L <sub>R</sub>
SWIC2P	SWIE2P	Overmold	Polymer shield	27	14mm	-4° to +248°	9	16
SWSC2XA	SWSE2XA	W2X	Carbon seal shield	56	9/16 in	-22° to +212°	141	596
SWSC2SSXA	SWSE2SSXA	W2SSX	Stainless seal shield	56	9/16 in	-22° to +212°	141	596
SWSC2SS227A	SWSE2SS227A	W2SS227	Stainless high temp	56	9/16 in	-22° to +500°	117	494
SWSC2SS300A	SWSE2SS300A	W2SS300	Stainless low temp	56	9/16 in	-94° to +230°	117	494
SWSC2SSVACA	SWSE2SSVACA	W2SSVAC	Stainless vacuum	56	9/16 in	-31° to +482°	90	417
SWSCWD2SSXA	SWSEWD2SSXA	WDW2SSX	Stainless washdown	56	9/16 in	-22° to +212°	90	544

Stud material is 303 stainless steel

Recommended flange nut for eccentric wheel: NUTHXFLM8

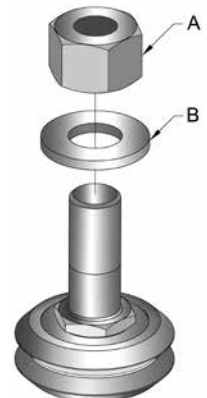
## Studded Wheel Assemblies – SWA Series



STOCK CODE		WHEEL	WHEEL STYLE	WEIGHT (g)	NUT	WASHER
CONCENTRIC STUD	ECCENTRIC STUD				A	B
SWAC2X	SWAE2X	W2X	Carbon seal shield	75	M10 x 1.5	M10
SWAC2SSX	SWAE2SSX	W2SSX	Stainless seal shield			
SWAC2SS227	SWAE2SS227	W2SS227	Stainless high temp			
SWAC2SS300	SWAE2SS300	W2SS300	Stainless low temp			
SWAC2SSVAC	SWAE2SSVAC	W2SSVAC	Stainless vacuum			
SWACWD2SSX	SWAEWD2SSX	WDW2SSX	Stainless washdown			

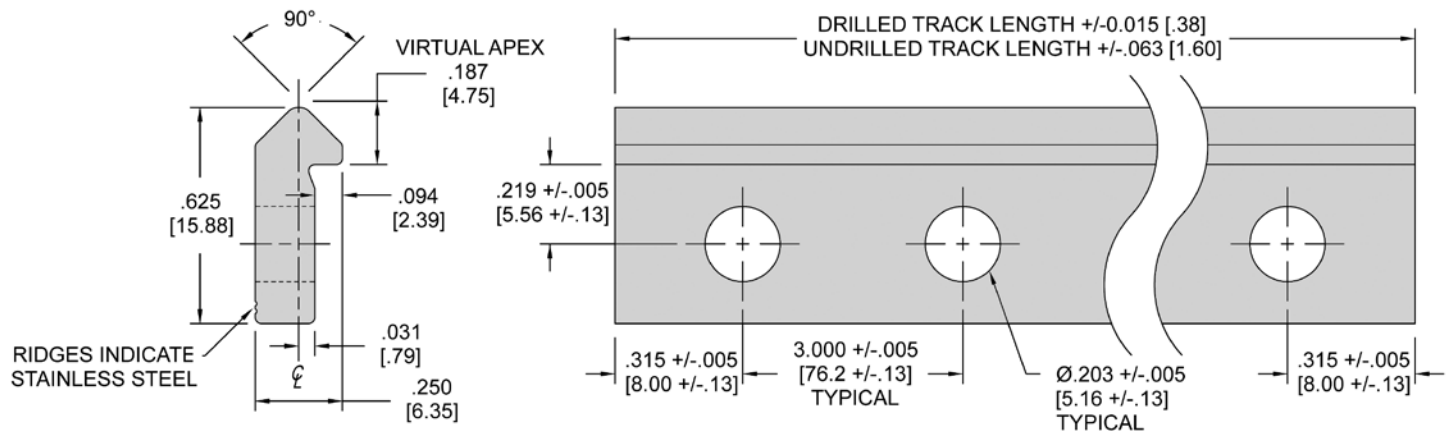
Stud material is 416 stainless steel

Nut and Washer material are 18-8 stainless steel



# Size 2

## Track



STOCK CODE PREFIX	MATERIAL	DESCRIPTION	HARDNESS	MAXIMUM LENGTH (ft)	WEIGHT (lbs./ft)	FINISHING
T2-	1045 Carbon	Hardened	HRC 53 min.	20	.343	Polished & oiled
TS2-		Soft	HRC 22-25	22		
T2SS-	420 Stainless	Hardened	HRC 40 min.	20		
TS2SS-		Soft	HRC 20-22	22		

Hardened track is induction hardened and polished on the vee surfaces.

STOCK CODES				STANDARD LENGTHS (in)	# OF HOLES
1045 CARBON STEEL		420 STAINLESS STEEL			
HARDENED WITH HOLES	SOFT WITH HOLES	HARDENED WITH HOLES	SOFT WITH HOLES		
T2-1263-5	TS2-1263-5	T2SS-1263-5	TS2SS-1263-5	12.63	5
T2-2463-9	TS2-1263-5	T2SS-1263-5	TS2SS-1263-5	24.63	9
T2-3663-13	TS2-3663-13	T2SS-3663-13	TS2SS-3663-13	36.63	13
T2-4863-17	TS2-4863-17	T2SS-4863-17	TS2SS-4863-17	48.63	17
T2-6063-21	TS2-6063-21	T2SS-6063-21	TS2SS-6063-21	60.63	21
T2-7263-25	TS2-7263-25	T2SS-7263-25	TS2SS-7263-25	72.63	25
HARDENED UNDRILLED (NO HOLES)	SOFT UNDRILLED (NO HOLES)	HARDENED UNDRILLED (NO HOLES)	SOFT UNDRILLED (NO HOLES)	STANDARD LENGTHS (FEET)	# OF HOLES
T2-1 thru T2-20	TS2-1 thru TS2-22	T2SS-1 thru T2SS-20	TS2SS-1 thru TS2SS-22	1 thru 20 and 1 thru 22	0

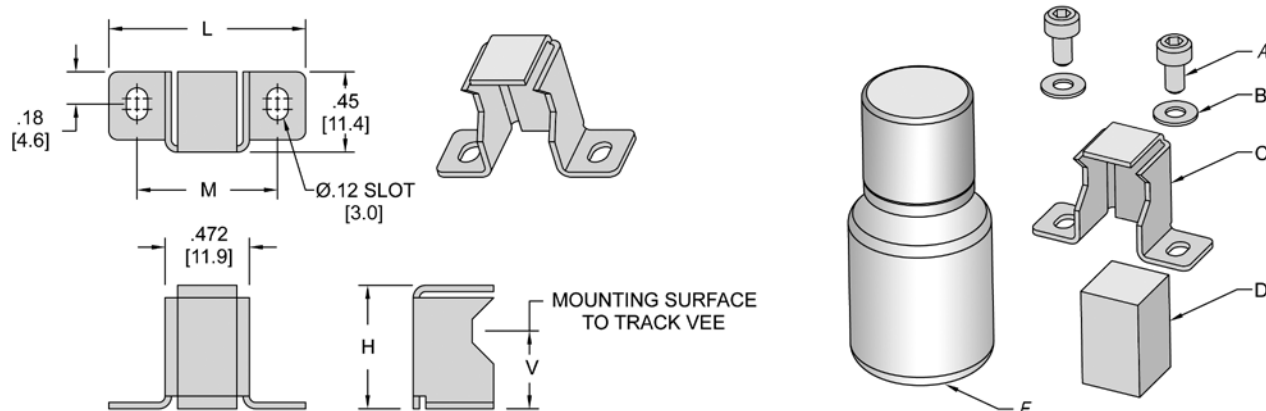
Available undrilled by the foot. Length cut tolerance of undrilled track is +/-0.063 [1.60]

Available made-to-order with user specified length, hole spacing, and machining.



# Size 2

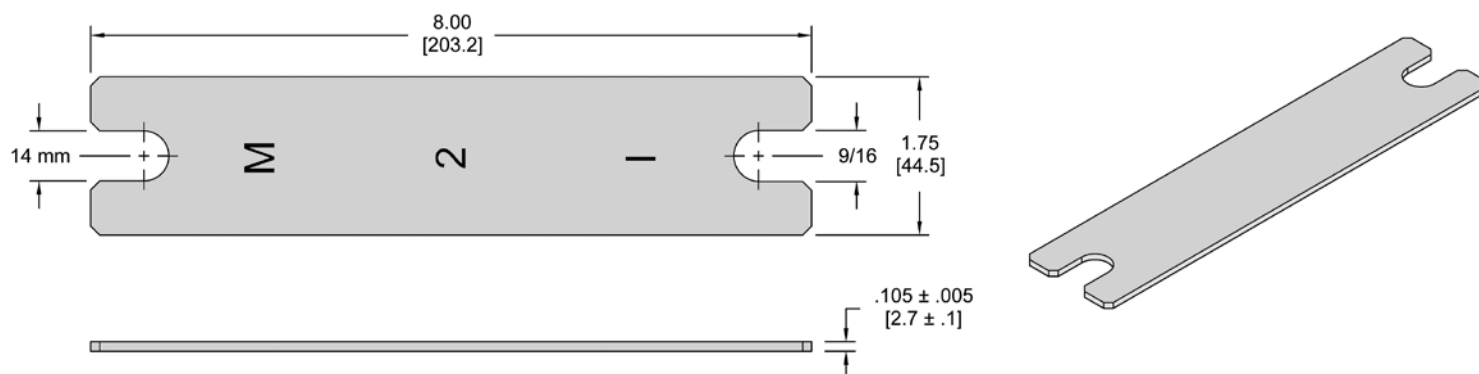
## Track Lubricators



STOCK CODE	COMPATIBLE WITH	HEIGHT	LENGTH	HOLE SPACING	MOUNTING SURFACE TO TRACK VEE	SCREWS	WASHERS	FELT HOLDER	FELTS	BOTTLE OF LUBRICANT	WEIGHT (g)
		H	L	M	V	A	A	B	C	D	
TL2A	Bushings standard profile	.690 [17.5]	1.10 [27.9]	.787 [20.0]	.370 - .500 [9.4 - 12.7]	M3 x 0.5 x 6mm stainless	M3 Stainless	300 Series stainless	White wool	Synthetic oil	7
TL2LPA	Journals	.533 [13.5]			.213 - .343 [5.4 - 8.7]						6
TL2BWPA	Bushings low profile	.580 [14.7]	1.13 [28.6]	.799 [20.3]	.270 - .375 [6.9 - 9.5]						6
	Studded wheels										

Values are in inches [millimeters]

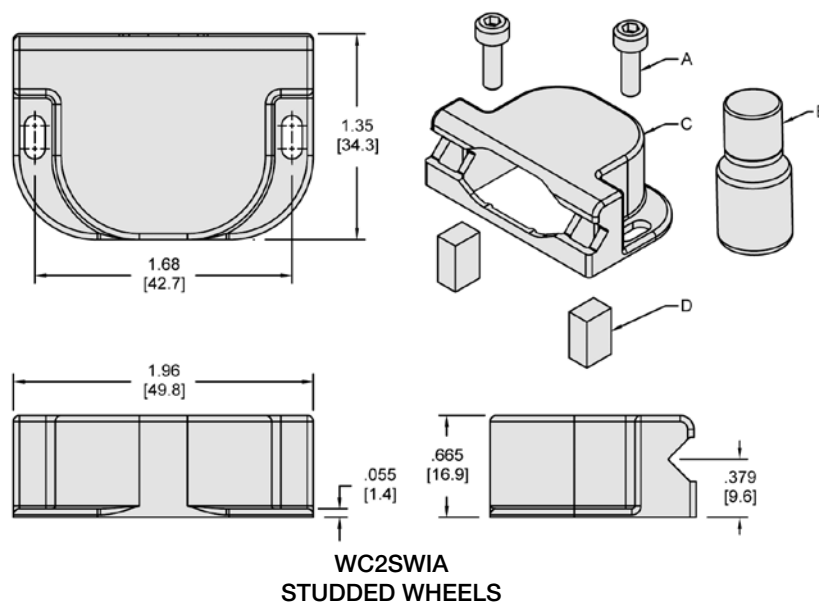
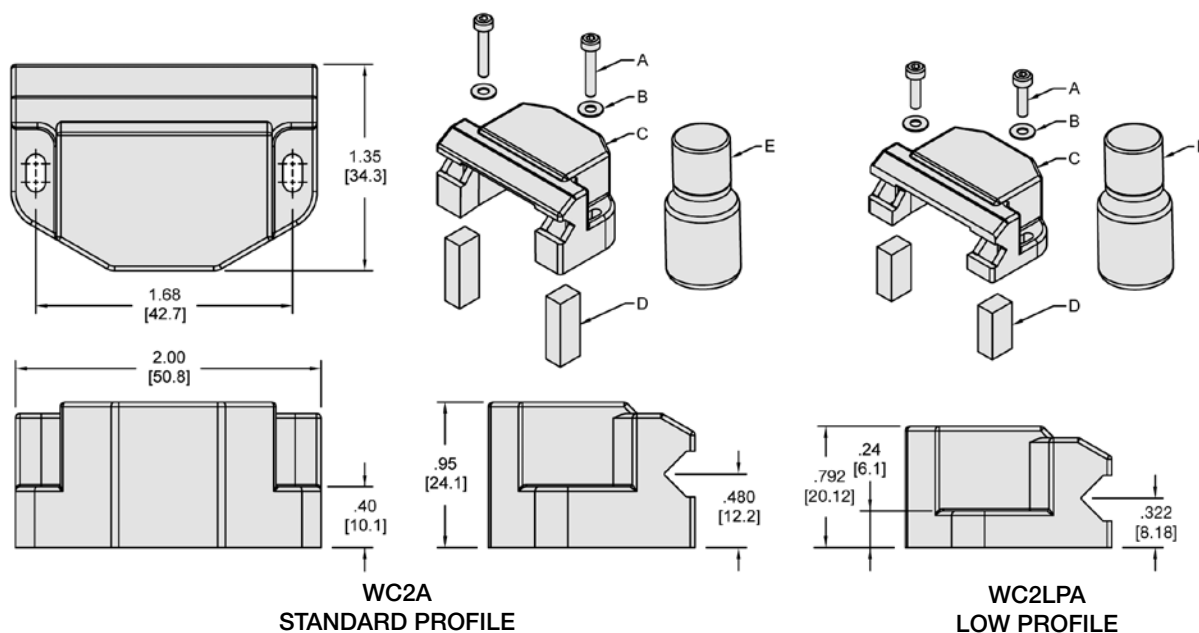
## Adjustment Wrench



STOCK CODE	COMPATIBLE WITH	MATERIAL	HARDNESS	FINISH	WEIGHT (g)
BAW2	Bushings	4130 Steel	HRC 46 - 56	Black oxide	170
	Journals				
	Studded wheels				

# Size 2

## Wheel Covers

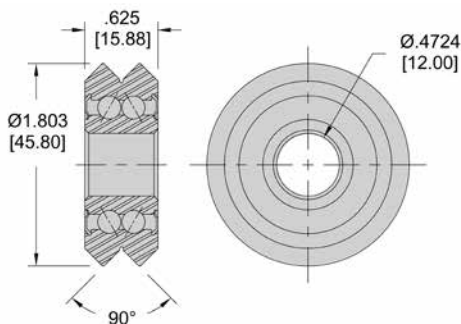


STOCK CODE	COMPATIBLE WITH	MOUNTING SURFACE TO TRACK VEE	SCREW	WASHER	WHEEL COVER	FELT	BOTTLE OF LUBRICANT	WEIGHT (g)
			A	B	C	D	E	
WC2A	Standard profile bushings	.480 [12.2]	M3 x 0.5 x 16mm Stainless	M3 Stainless	Black ABS	White wool	Synthetic oil	15
WC2LPA	Low profile bushings	.322 [8.18]	M3 x 0.5 x 12mm Stainless					16
WC2SWIA	Studded wheels	.379 [9.6]	M3 x 0.5 x 10mm Stainless	N/A	Black Nylon			12

Values are in inches [millimeters]

# Size 3

## Wheels – Original

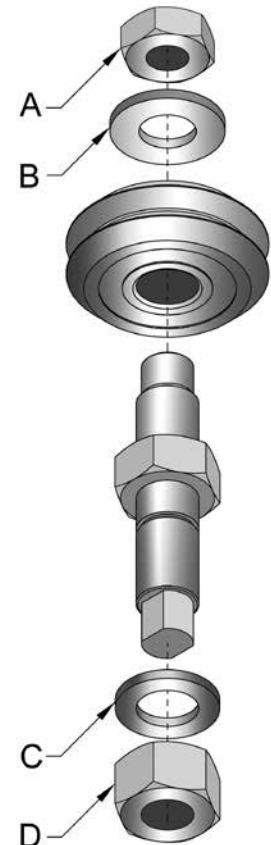
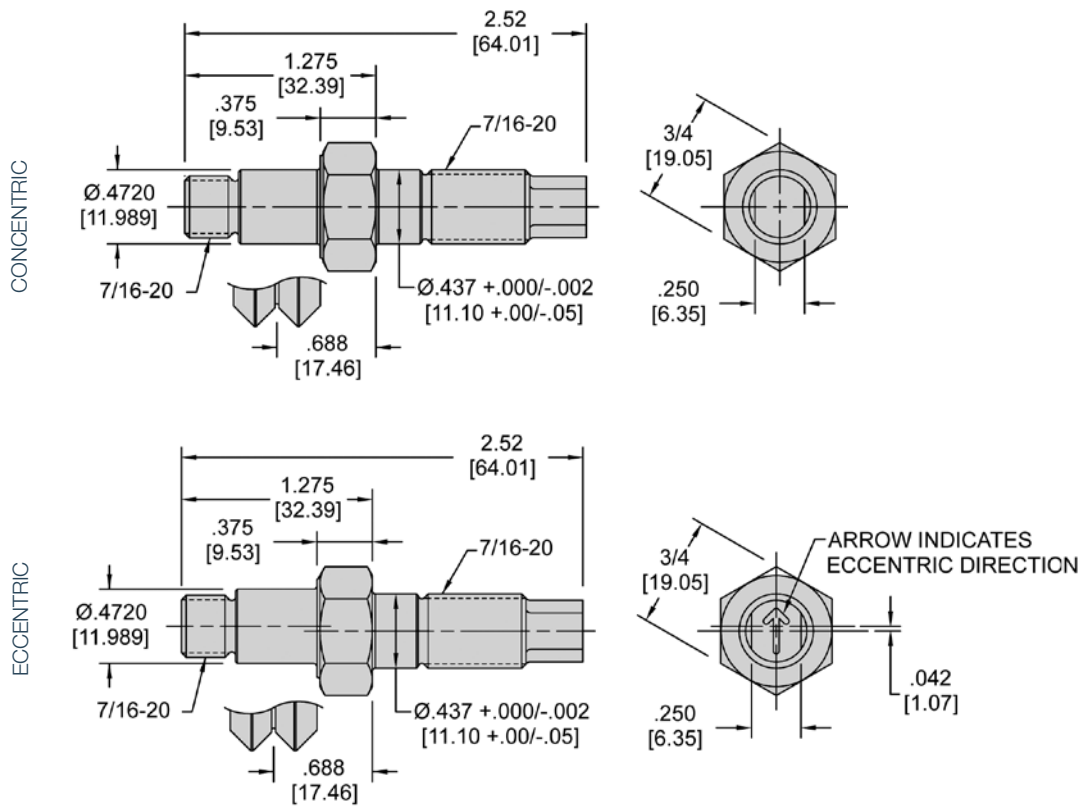


STOCK CODE	MATERIAL	PROTECTION	WEIGHT (g)	TEMPERATURE RANGE	LOAD RATINGS (lbf)	
				DEGREES F	AXIAL $L_A$	RADIAL $L_R$
W3X	52100 Steel	Seal shield	130.2	-22° to +212°	382	1326
W3SSX	440C Stainless	Seal shield	130.2	-22° to +212°	382	1326
W3SS227	440C Stainless	Shield	130.2	-22° to +500°	317	1101
W3SS300	440C Stainless	Shield	130.2	-94° to +230°	317	1101
WDW3SSX	440C Stainless	Washdown	128.3	-22° to +212°	130	1169

NOTE: To convert lbf to Newtons, multiply by 4.448

To convert inches to millimeters, multiply by 25.4

## Journals



STOCK CODE	STYLE	WEIGHT (g)	WHEEL MOUNTING SIDE			JOURNAL MOUNTING SIDE			
			MOUNTING SURFACE TO WHEEL VEE	WHEEL MOUNTING NUT A	WHEEL MOUNTING WASHER B	JOURNAL MOUNTING WASHER C	JOURNAL MOUNTING NUT D	MIN. MOUNTING PLATE THICKNESS	MAX. MOUNTING PLATE THICKNESS
MJC3A	Concentric	78	.688	7/16-20 Zinc plated nylon locking	7/16 Flat washer stainless steel	7/16 Flat washer stainless steel	7/16-20 Zinc plated Nylon locking	.250	.625
MJX3A	Eccentric								

Values are in inches

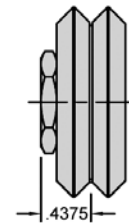
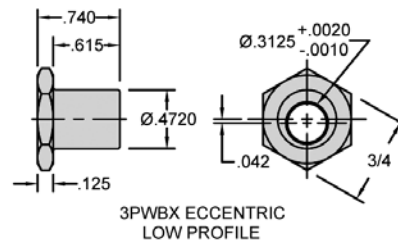
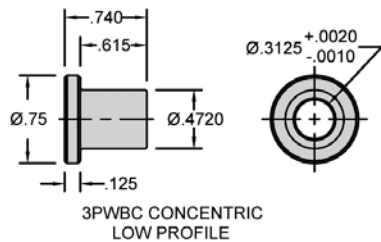
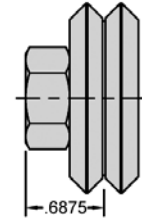
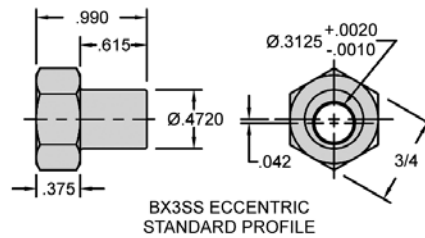
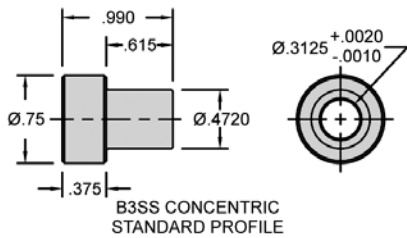
Journal material is AISI 303 stainless steel

Supplied with mounting nuts and washers, without guide wheel

# Size 3

## Bushings

INCHES

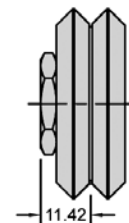
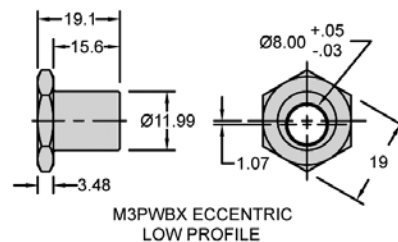
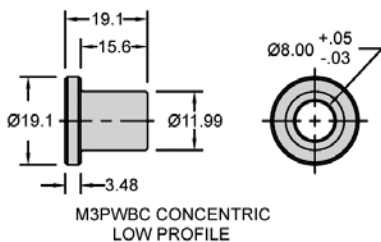
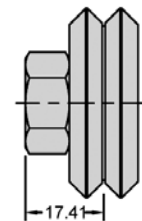
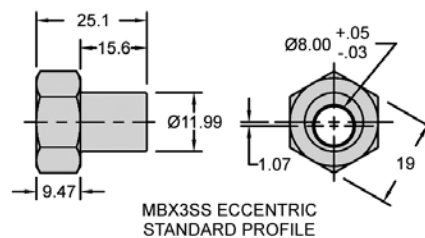
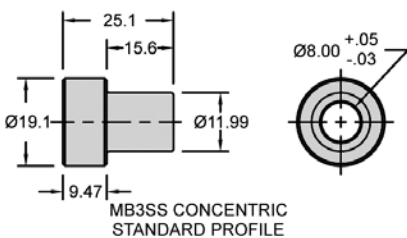


STOCK CODE	STYLE	HEAD PROFILE		MOUNTING SURFACE TO WHEEL VEE	WEIGHT (g)	RECOMMENDED FASTENER
B3SS	Concentric	Standard	.375	.6875	25.0	5/16
BX3SS	Eccentric				27.1	
3PWBC	Concentric	Low	.125	.4375	13.4	
3PWBX	Eccentric				14.1	

Values are in inches

Bushing material is AISI 303 stainless steel

METRIC



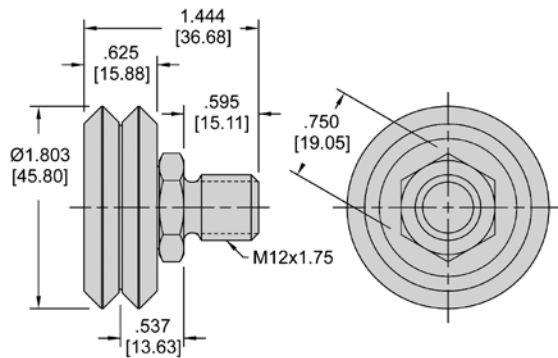
STOCK CODE	STYLE	HEAD PROFILE		MOUNTING SURFACE TO WHEEL VEE	WEIGHT (g)	RECOMMENDED FASTENER
MB3SS	Concentric	Standard	9.47	17.41	24.7	M8
MBX3SS	Eccentric				26.6	
M3PWBC	Concentric	Low	3.48	11.42	13.8	
M3PWBX	Eccentric				14.4	

Values are in millimeters

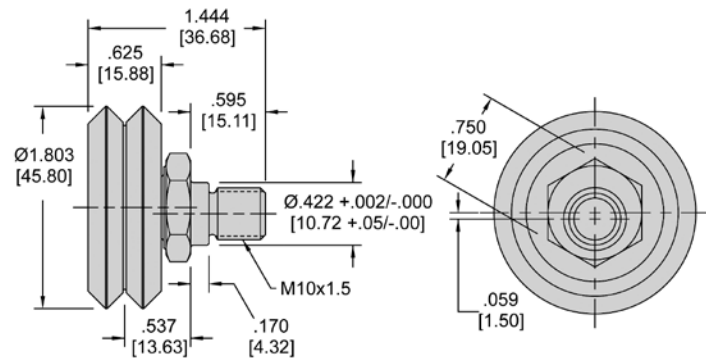
Bushing material is AISI 303 stainless steel

# Size 3

## Studded Wheels – SWS Series



CONCENTRIC



ECCENTRIC

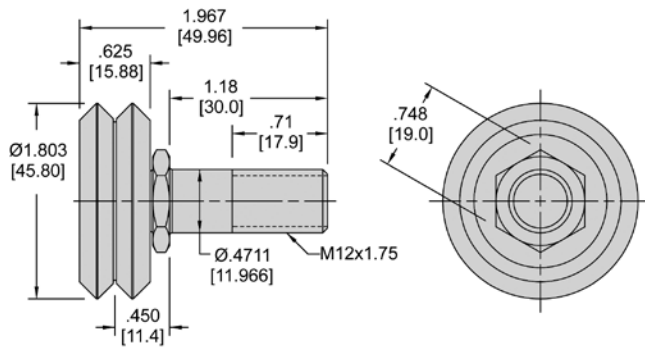
STOCK CODE		WHEEL	WHEEL STYLE	WEIGHT (g)	MOUNTING HEX	TEMPERATURE RANGE	LOAD RATINGS (LBF)	
CONCENTRIC STUD	ECCENTRIC STUD						AXIAL	RADIAL
						DEGREES F	L <sub>A</sub>	L <sub>R</sub>
SWSC3XA	SWSE3XA	W3X	Carbon seal shield	166	3/4 in	-22° to +212°	382	1326
SWSC3SSXA	SWSE3SSXA	W3SSX	Stainless seal shield		3/4 in	-22° to +212°	382	1326
SWSC3SS227A	SWSE3SS227A	W3SS227	Stainless high temp		3/4 in	-22° to +500°	317	1101
SWSC3SS300A	SWSE3SS300A	W3SS300	Stainless low temp		3/4 in	-94° to +230°	317	1101
SWSCWD3SSXA	SWSEWD3SSXA	WDW3SSX	Stainless washdown		3/4 in	-22° to +212°	130	1169

Stud material is 303 stainless steel

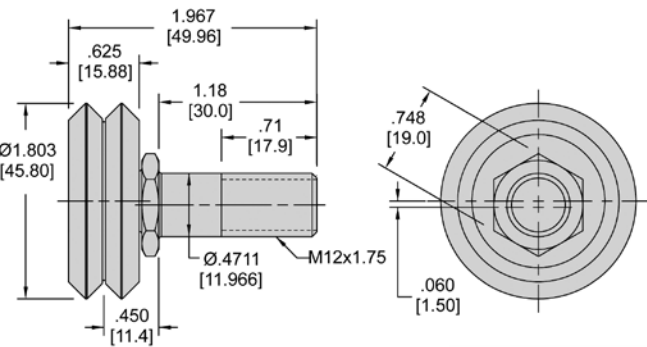
Recommended flange nut for eccentric wheel: NUTHXFLM10

See page 44 for recommended mounting geometry

## Studded Wheel Assemblies – SWA Series



CONCENTRIC

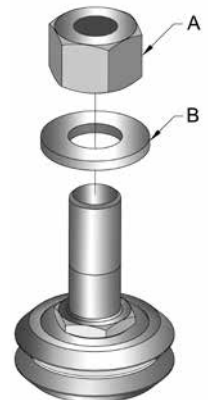


ECCENTRIC

STOCK CODE		WHEEL	WHEEL STYLE	WEIGHT (g)	NUT	WASHER
CONCENTRIC STUD	ECCENTRIC STUD				A	B
SWAC3X	SWAE3X	W3X	Carbon seal shield	193	M12 x 1.75	M12
SWAC3SSX	SWAE3SSX	W3SSX	Stainless seal shield			
SWAC3SS227	SWAE3SS227	W3SS227	Stainless high temp			
SWAC3SS300	SWAE3SS300	W3SS300	Stainless low temp			
SWACWD3SSX	SWAEWD3SSX	WDW3SSX	Stainless washdown			

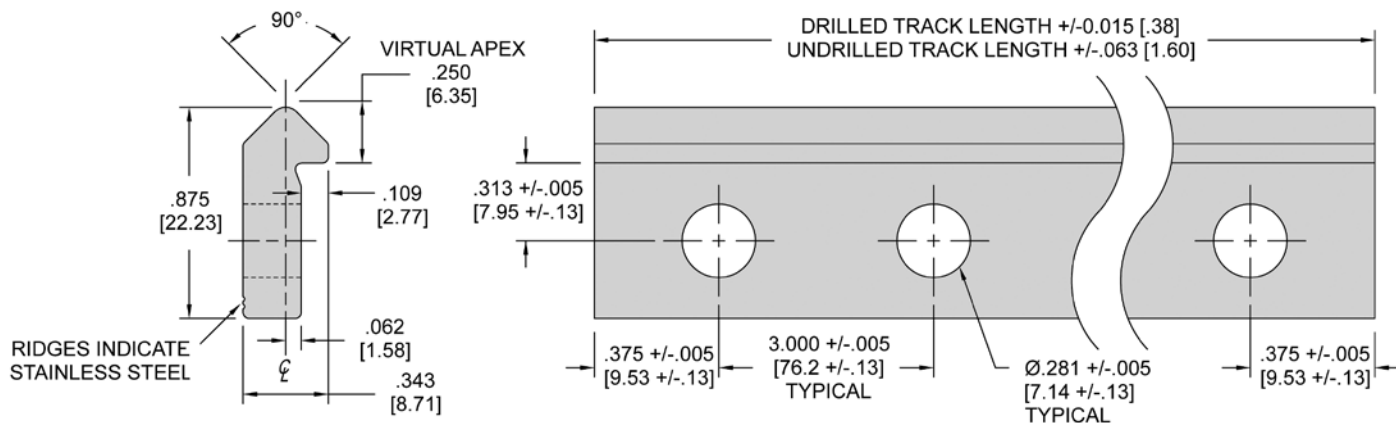
Stud material is 416 stainless steel

Nut and washer material are 18-8 stainless steel





## Track



STOCK CODE PREFIX	MATERIAL	DESCRIPTION	HARDNESS	MAXIMUM LENGTH (ft)	WEIGHT (lbs./ft)	FINISHING
T3-	1045 Carbon	Hardened	HRC 53 min.	20	.690	Polished & oiled
TS3-		Soft	HRC 22-25	22		
T3SS-	420 Stainless	Hardened	HRC 40 min.	20		
TS3SS-		Soft	HRC 20-22	22		

Hardened track is induction hardened and polished on the vee surfaces.

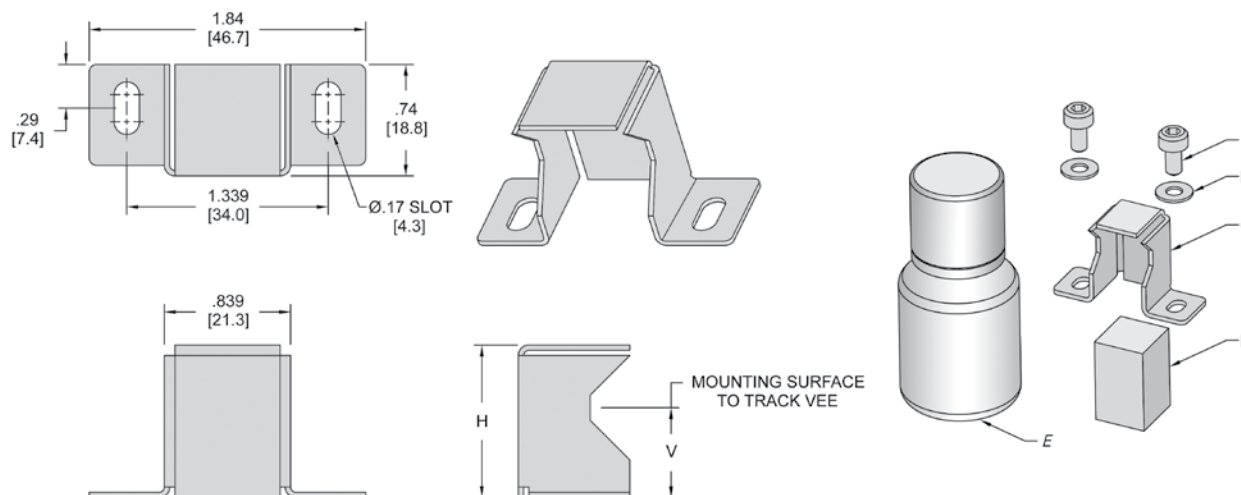
STOCK CODES				STANDARD LENGTHS (in)	# OF HOLES
1045 CARBON STEEL		420 STAINLESS STEEL			
HARDENED WITH HOLES	SOFT WITH HOLES	HARDENED WITH HOLES	SOFT WITH HOLES		
T3-1275-5	TS3-1275-5	T3SS-1275-5	TS3SS-1275-5	12.75	5
T3-2475-9	TS3-2475-9	T3SS-2475-9	TS3SS-2475-9	24.75	9
T3-3675-13	TS3-3675-13	T3SS-3675-13	TS3SS-3675-13	36.75	13
T3-4875-17	TS3-4875-17	T3SS-4875-17	TS3SS-4875-17	48.75	17
T3-6075-21	TS3-6075-21	T3SS-6075-21	TS3SS-6075-21	60.75	21
T3-7275-25	TS3-7275-25	T3SS-7275-25	TS3SS-7275-25	72.75	25
HARDENED UNDRILLED (NO HOLES)	SOFT UNDRILLED (NO HOLES)	HARDENED UNDRILLED (NO HOLES)	SOFT UNDRILLED (NO HOLES)	STANDARD LENGTHS (FEET)	# OF HOLES
T3-1 thru T3-20	TS3-1 thru TS3-22	T3SS-1 thru T3SS-20	TS3SS-1 thru TS3SS-22	1 thru 20 and 1 thru 22	0

Available undrilled by the foot. Length cut tolerance of undrilled track is +/-0.063 [1.60]

Available made-to-order with user specified length, hole spacing, and machining.

# Size 3

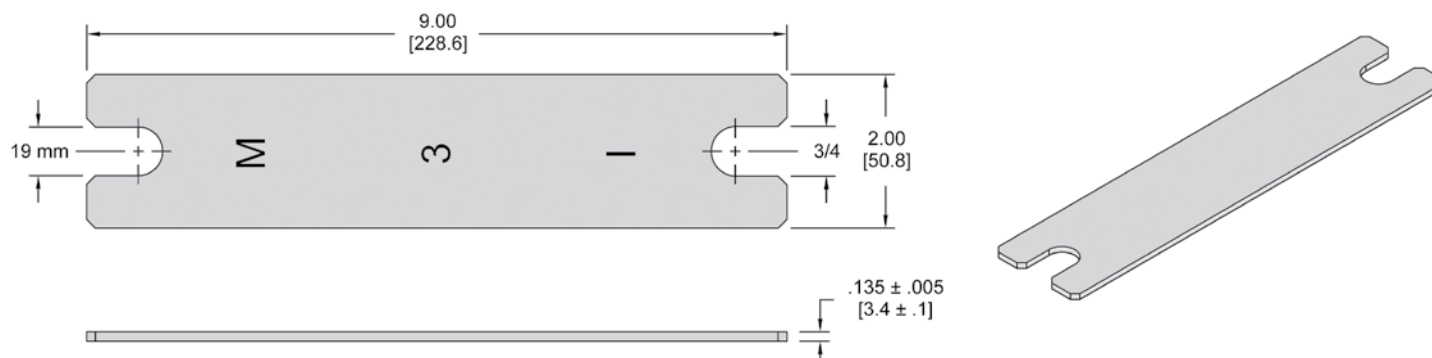
## Track Lubricators



STOCK CODE	COMPATIBLE WITH	HEIGHT	MOUNTING SURFACE TO TRACK VEE	SCREWS	WASHERS	FELT HOLDER	FELTS	BOTTLE OF LUBRICANT	WEIGHT (g)
		H	V	A	B	C	D	E	
TL3A	Bushings standard profile	1.20 [30.5]	.638 - .867 [16.2 - 22.0]	M3 x 0.5 x 6mm Stainless	M3 Stainless	300 Series stainless	White wool	Synthetic oil	17
TL3LPA	Bushings low profile	.84 [21.3]	.450 - .520 [11.4 - 13.2]						15
TL3BWPA	Studded wheels	1.01 [25.8]	.513 - .681 [13.0 - 17.3]						16

Values are in inches [millimeters]

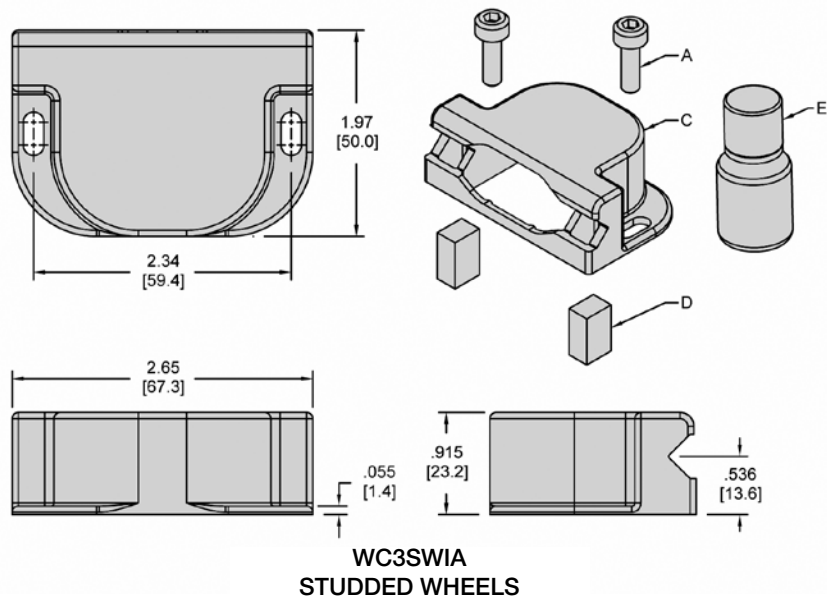
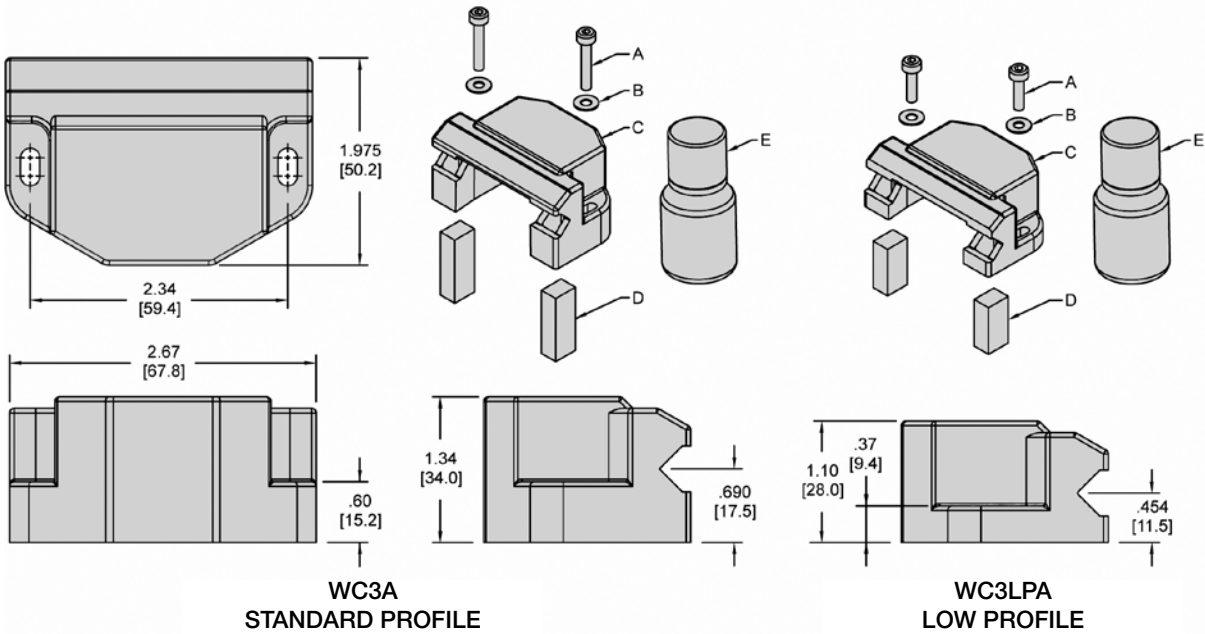
## Adjustment Wrench



STOCK CODE	COMPATIBLE WITH	MATERIAL	HARDNESS	FINISH	WEIGHT (g)
BAW3	Bushings	4130 Steel	HRC 46 - 56	Black oxide	282
	Journals				
	Studded wheels				

# Size 3

## Wheel Covers

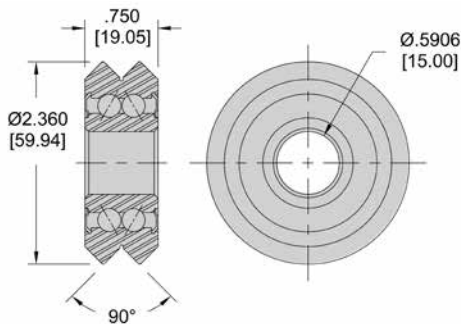


STOCK CODE	COMPATIBLE WITH	MOUNTING SURFACE TO TRACK VEE	SCREW	WASHER	WHEEL COVER	FELT	BOTTLE OF LUBRICANT	WEIGHT (g)
			A	B	C	D	E	
WC3A	Standard profile bushings	.690 [17.5]	M3 x 0.5 x 20mm Stainless	M3 Stainless	Black ABS	White wool	Synthetic oil	40
WC3LPA	Low profile bushings	.454 [11.5]	M3 x 0.5 x 16mm Stainless					18
WC3SWIA	Studded wheels	.536 [13.6]	M3 x 0.5 x 10mm Stainless	N/A	Black Nylon			18

Values are in inches [millimeters]

# Size 4

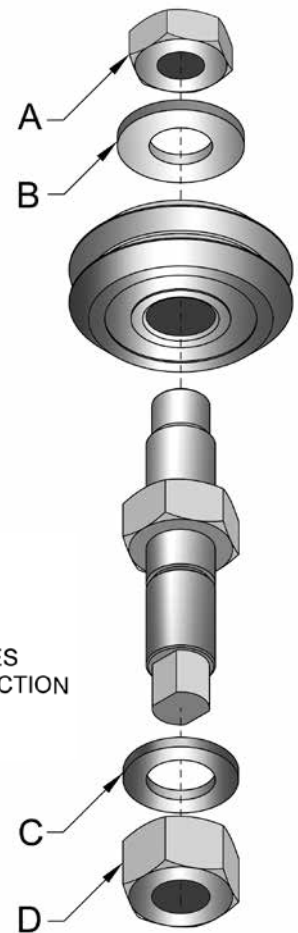
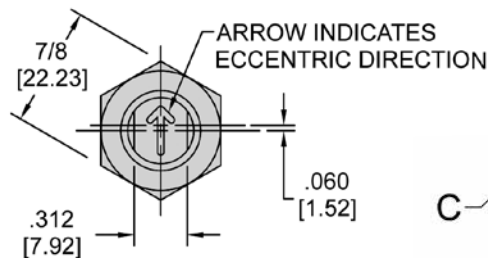
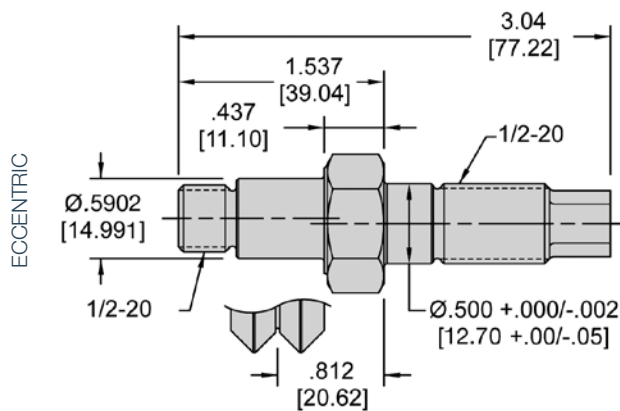
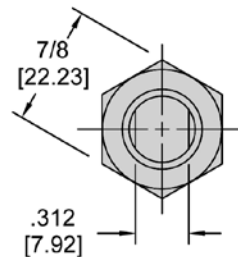
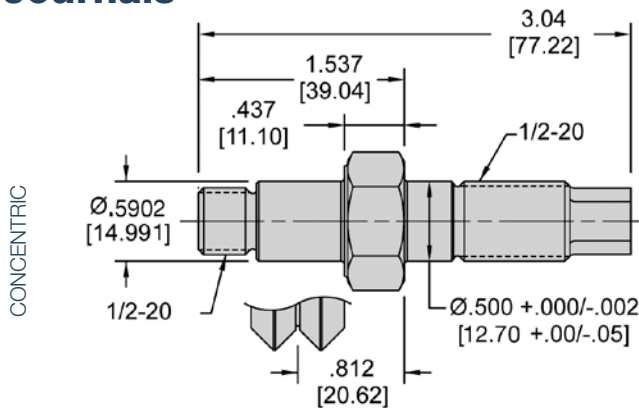
## Wheels – Original



STOCK CODE	MATERIAL	PROTECTION	WEIGHT (g)	TEMPERATURE RANGE	LOAD RATINGS (lbf)	
				DEGREES F	AXIAL $L_A$	RADIAL $L_R$
W4X	52100 Steel	Seal shield	276	-22° to +212°	900	2181
W4SSX	440C Stainless	Seal shield		-22° to +212°	900	2181
W4SS227	440C Stainless	Shield		-22° to +500°	747	1810
W4SS300	440C Stainless	Shield		-94° to +230°	747	1810

NOTE: To convert lbf to Newtons, multiply by 4.448  
To convert inches to millimeters, multiply by 25.4

## Journals



STOCK CODE	STYLE	WEIGHT (g)	WHEEL MOUNTING SIDE			JOURNAL MOUNTING SIDE			
			MOUNTING SURFACE TO WHEEL VEE	WHEEL MOUNTING NUT	WHEEL MOUNTING WASHER	JOURNAL MOUNTING WASHER	JOURNAL MOUNTING NUT	MIN. MOUNTING PLATE THICKNESS	MAX. MOUNTING PLATE THICKNESS
MJC4A	Concentric	133.1	.812	1/2-20 Zinc plated Nylon locking	1/2 Flat washer stainless steel	1/2 Flat washer stainless steel	1/2-20 Zinc plated Nylon locking	.375	.750
MJX4A	Eccentric		.812	1/2-20 Zinc plated Nylon locking	1/2 Flat washer stainless steel	1/2 Flat washer stainless steel	1/2-20 Zinc plated Nylon locking		

Values are in inches

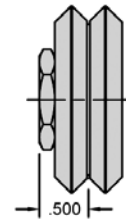
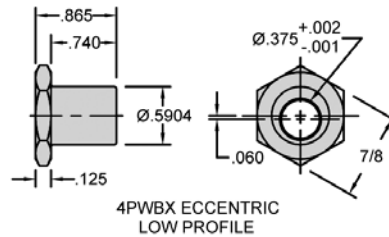
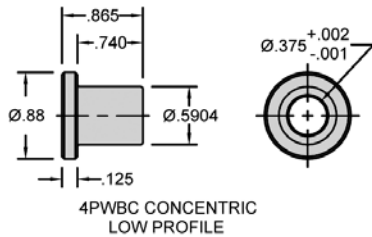
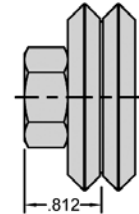
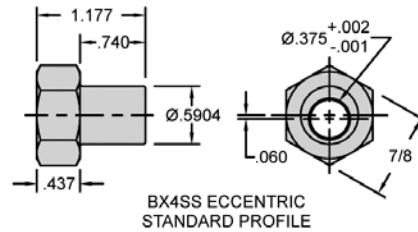
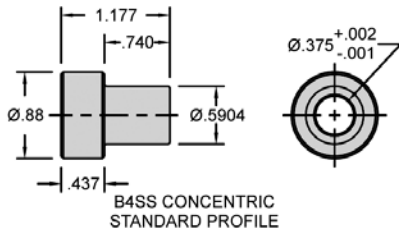
Journal material is AISI 303 stainless steel

Supplied with mounting nut and washer, without guide wheel

# Size 4

## Bushings

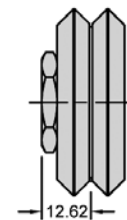
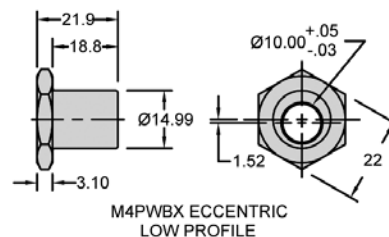
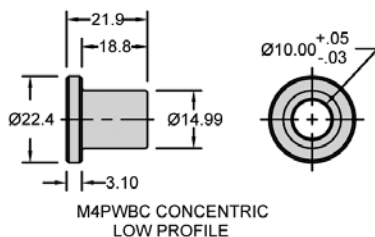
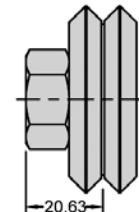
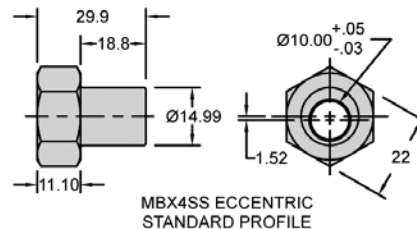
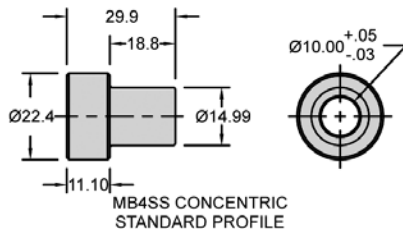
INCHES



STOCK CODE	STYLE	HEAD PROFILE		MOUNTING SURFACE TO WHEEL VEE	WEIGHT (g)	RECOMMENDED FASTENER
B4SS	Concentric	Standard	.437	.812	42.4	3/8
BX4SS	Eccentric				45.6	
4PWBC	Concentric	Low	.125	.500	23.0	
4PWBX	Eccentric				24.0	

Values are in inches  
Bushing material is AISI 303 stainless steel

METRIC

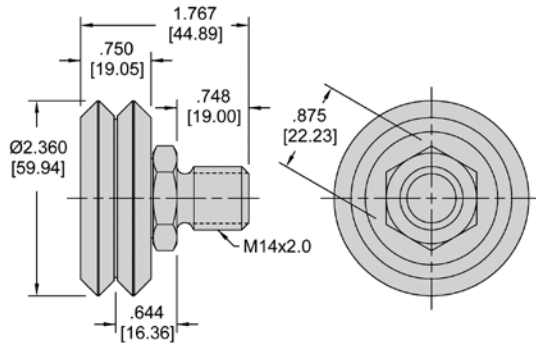


STOCK CODE	STYLE	HEAD PROFILE		MOUNTING SURFACE TO WHEEL VEE	WEIGHT (g)	RECOMMENDED FASTENER
MB4SS	Concentric	Standard	11.10	20.63	40.8	M10
MBX4SS	Eccentric				43.0	
M4PWBC	Concentric	Low	3.10	12.62	21.4	
M4PWBX	Eccentric				22.2	

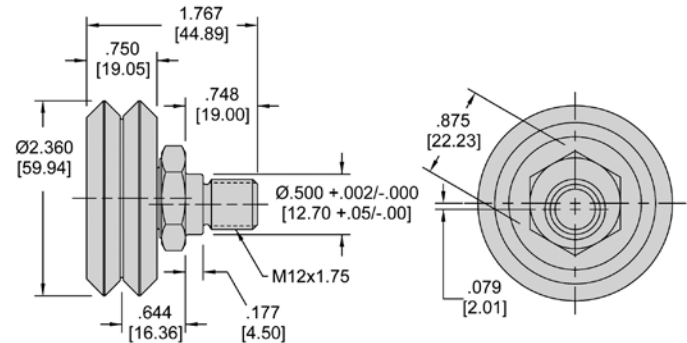
Values are in millimeters  
Bushing material is AISI 303 stainless steel

# Size 4

## Studded Wheels – SWS Series



CONCENTRIC



ECCENTRIC

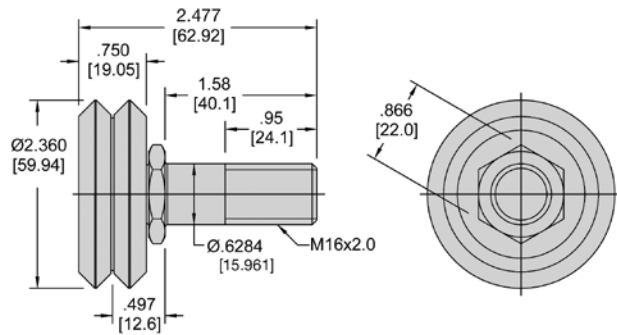
STOCK CODE		WHEEL	WHEEL STYLE	WEIGHT (g)	MOUNTING HEX	TEMPERATURE RANGE	LOAD RATINGS (lbf)	
CONCENTRIC STUD	ECCENTRIC STUD						AXIAL	RADIAL
SWSC4XA	SWSE4XA	W4X	Carbon seal shield	338	7/8 in	-22° to +212°	900	2181
SWSC4SSXA	SWSE4SSXA	W4SSX	Stainless seal shield		7/8 in	-22° to +212°	900	2181
SWSC4SS227A	SWSE4SS227A	W4SS227	Stainless high temp		7/8 in	-22° to +500°	747	1810
SWSC4SS300A	SWSE4SS300A	W4SS300	Stainless low temp		7/8 in	-94° to +230°	747	1810

Stud material is 303 stainless steel

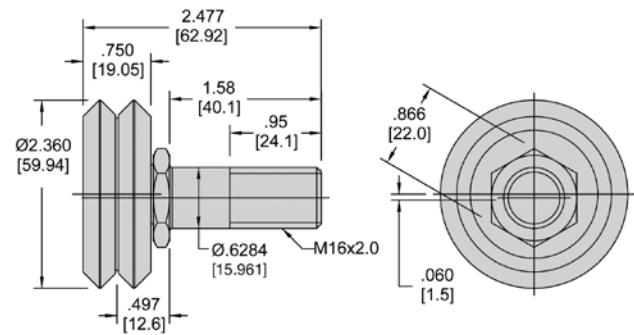
Recommended flange nut for eccentric wheel: NUTHXFLM12

See page 44 for recommended mounting geometry

## Studded Wheel Assemblies – SWA Series



CONCENTRIC

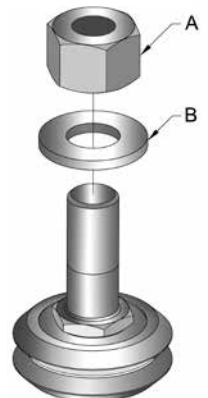


ECCENTRIC

STOCK CODE		WHEEL	WHEEL STYLE	WEIGHT (g)	NUT	WASHER
CONCENTRIC STUD	ECCENTRIC STUD				A	B
SWAC4X	SWAE4X	W4X	Carbon seal shield	403	M16 x 2.0	M16
SWAC4SSX	SWAE4SSX	W4SSX	Stainless seal shield			
SWAC4SS227	SWAE4SS227	W4SS227	Stainless high temp			
SWAC4SS300	SWAE4SS300	W4SS300	Stainless low temp			

Stud material is 416 stainless steel

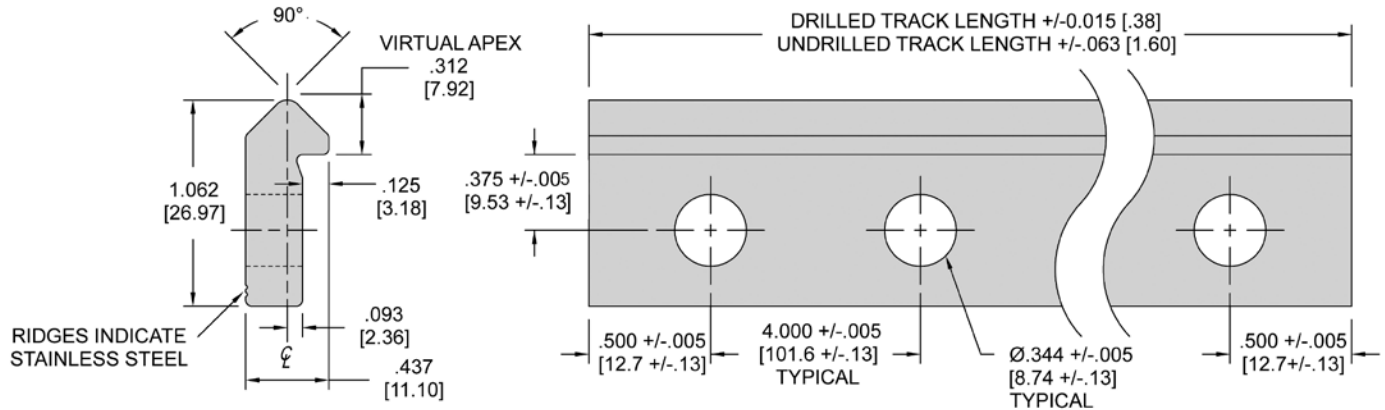
Nut and washer material are 18-8 stainless steel





# Size 4

## Track



STOCK CODE PREFIX	MATERIAL	DESCRIPTION	HARDNESS	MAXIMUM LENGTH (ft)	WEIGHT (lbs./ft)	FINISHING
T4-	1045 Carbon	Hardened	HRC 53 min.	20	1.100	Polished & oiled
TS4-		Soft	HRC 22-25	22		
T4SS-	420 Stainless	Hardened	HRC 40 min.	20		
TS4SS-		Soft	HRC 20-22	22		

Hardened track is induction hardened and polished on the vee surfaces.

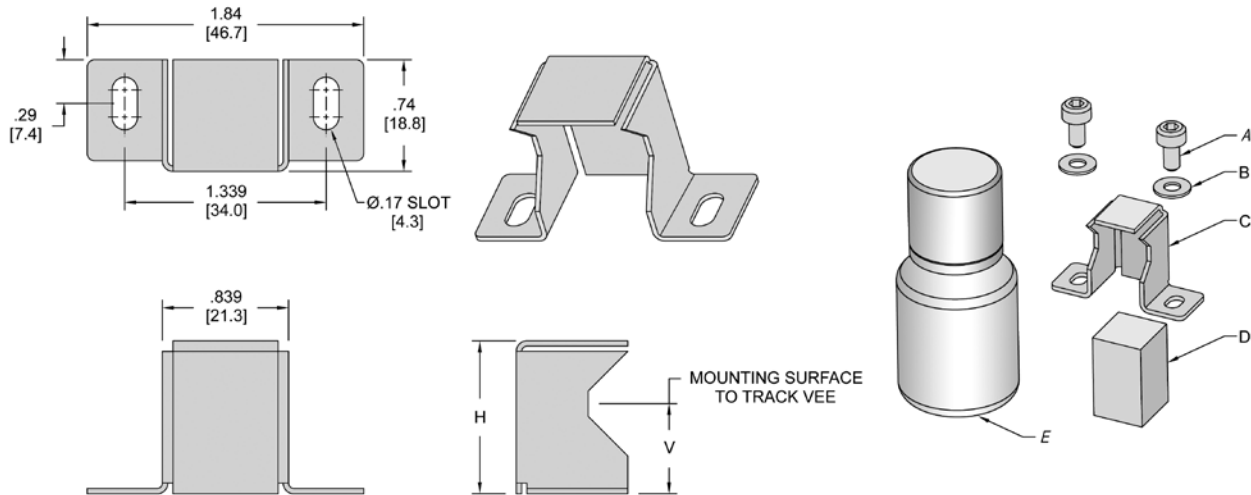
STOCK CODES				STANDARD LENGTHS (in)	# OF HOLES
1045 CARBON STEEL		420 STAINLESS STEEL			
HARDENED WITH HOLES	SOFT WITH HOLES	HARDENED WITH HOLES	SOFT WITH HOLES		
T4-1300-4	TS4-1300-4	T4SS-1300-4	TS4SS-1300-4	13.00	4
T4-2500-7	TS4-2500-7	T4SS-2500-7	TS4SS-2500-7	25.00	7
T4-3700-10	TS4-3700-10	T4SS-3700-10	TS4SS-3700-10	37.00	10
T4-4900-13	TS4-4900-13	T4SS-4900-13	TS4SS-4900-13	49.00	13
T4-6100-16	TS4-6100-16	T4SS-6100-16	TS4SS-6100-16	61.00	16
T4-7300-19	TS4-7300-19	T4SS-7300-19	TS4SS-7300-19	73.00	19
HARDENED UNDRILLED (NO HOLES)	SOFT UNDRILLED (NO HOLES)	HARDENED UNDRILLED (NO HOLES)	SOFT UNDRILLED (NO HOLES)	STANDARD LENGTHS (FEET)	# OF HOLES
T4-1 thru T4-20	TS4-1 thru TS4-22	T4SS-1 thru T4SS-20	TS4SS-1 thru TS4SS-22	1 thru 20 and 1 thru 22	0

Available undrilled by the foot. Length cut tolerance of undrilled track is +/- 0.063 [1.60]

Available made-to-order with user specified length, hole spacing, and machining.

# Size 4

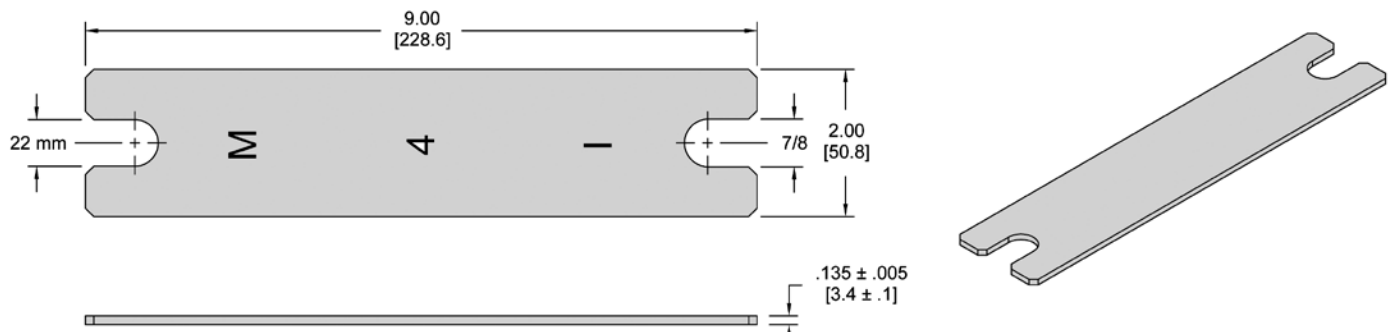
## Track Lubricators



STOCK CODE	COMPATIBLE WITH	HEIGHT	MOUNTING SURFACE TO TRACK VEE	SCREWS	WASHERS	FELT HOLDER	FELTS	BOTTLE OF LUBRICANT	WEIGHT (g)
		H	V	A	B	C	D	E	
TL4A	Bushings standard profile	1.20 [30.5]	.638 - .867 [16.2 - 22.0]	M4 x 0.7 x 8mm Stainless	M4 Stainless	300 Series stainless	White wool	Synthetic oil	20
TL4LPA	Bushings low profile	.84 [21.3]	.450 - .520 [11.4 - 13.2]						17
TL4BWPA	Studded wheels	1.01 [25.8]	.513 - .681 [13.0 - 17.3]						18

Values are in inches [millimeters]

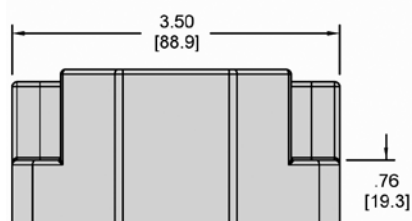
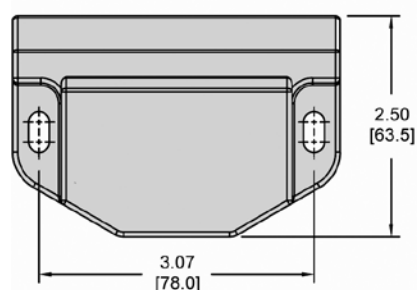
## Adjustment Wrench



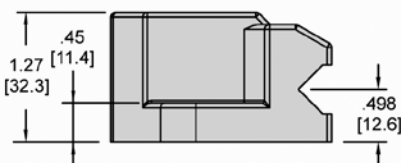
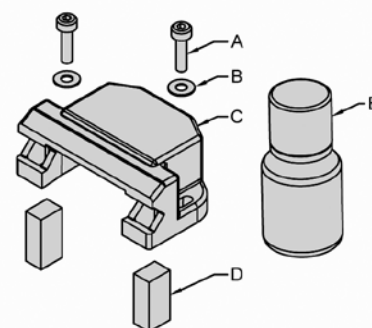
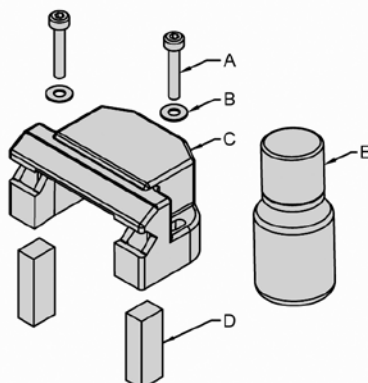
STOCK CODE	COMPATIBLE WITH	MATERIAL	HARDNESS	FINISH	WEIGHT (g)
BAW4	Bushings	4130 Steel	HRC 46 - 56	Black oxide	270
	Journals				
	Studded wheels				

# Size 4

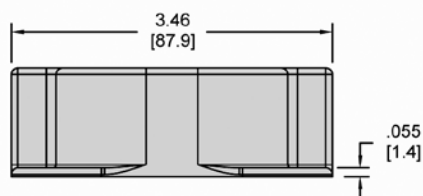
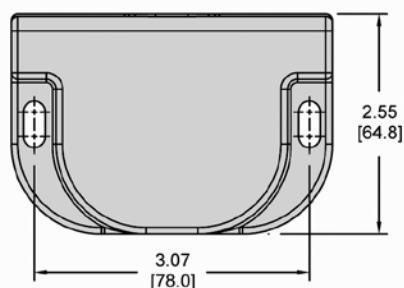
## Wheel Covers



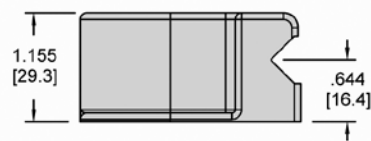
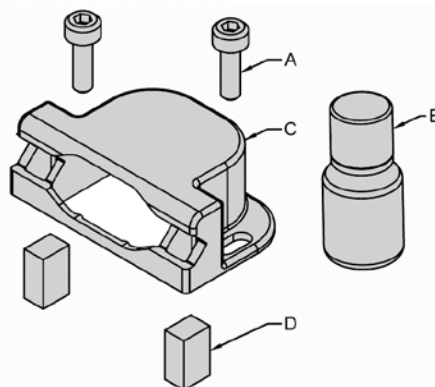
**WC4A  
STANDARD PROFILE**



**WC4LPA  
LOW PROFILE**



**WC4SWIA  
STUDED WHEELS**

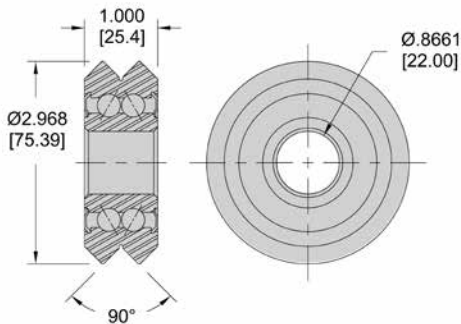


STOCK CODE	COMPATIBLE WITH	MOUNTING SURFACE TO TRACK VEE	SCREW	WASHER	WHEEL COVER	FELT	BOTTLE OF LUBRICANT	WEIGHT (g)
			A	B	C	D		
WC4A	Standard profile bushings	.813 [20.7]	M4 x 0.7 x 25mm Stainless	M4 Stainless	Black ABS	White wool	Synthetic oil	46
WC4LPA	Low profile bushings	.498 [12.6]	M4 x 0.7 x 20mm Stainless					36
WC4SWIA	Studded wheels	.644 [16.4]	M4 x 0.7 x 12mm Stainless	N/A	Black Nylon			34

Values are in inches [millimeters]

# Size 4XL

## Wheels – Original



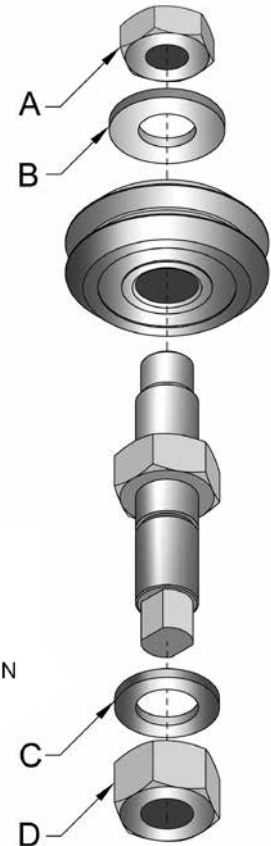
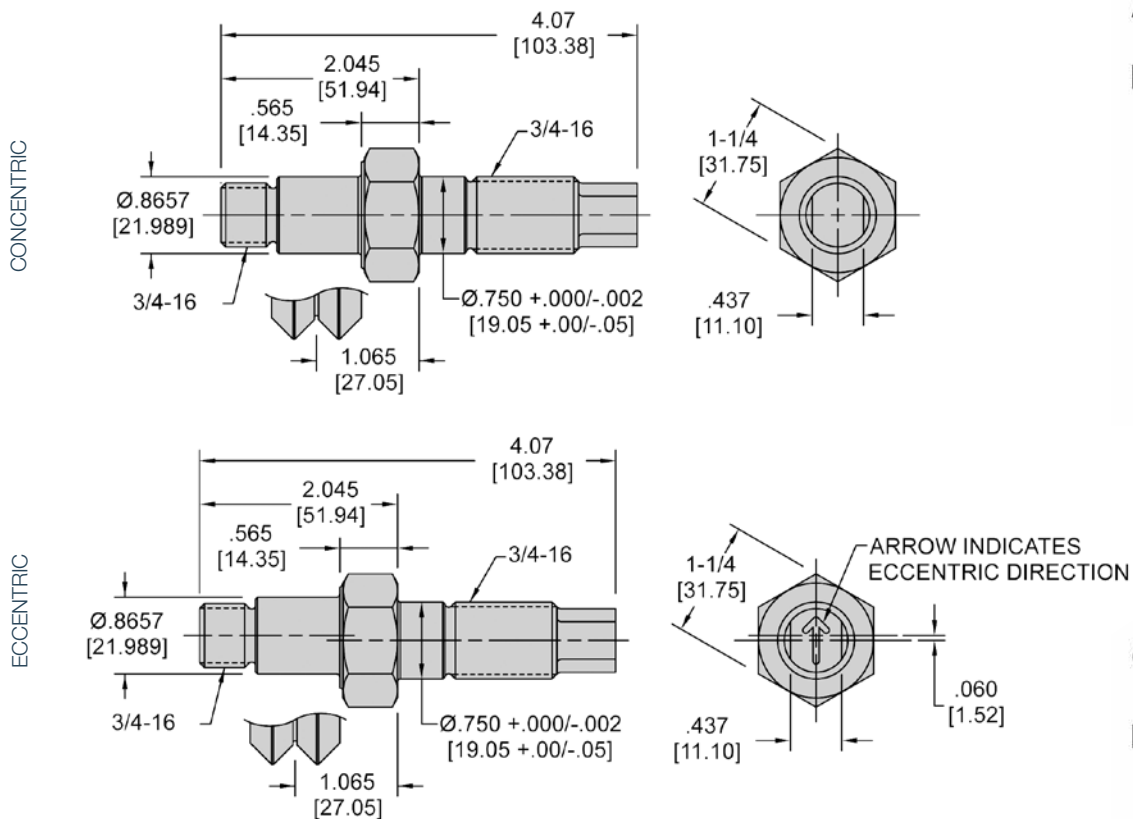
STOCK CODE	MATERIAL	PROTECTION	WEIGHT (g)	TEMPERATURE RANGE DEGREES F	LOAD RATINGS (lbf)	
					AXIAL L <sub>A</sub>	RADIAL L <sub>R</sub>
W4XXL	52100 Steel	Seal	575	-22° To +212°	1473	3215
W4SSXXL	440C Stainless	Seal shield	575	-22° To +212°	1473	3215

NOTE: To convert lbf to Newtons, multiply by 4.448

To convert inches to millimeters, multiply by 25.4

Size 4XL wheels are compatible with size 4 track on page 32

## Journals



STOCK CODE	STYLE	WEIGHT (g)	WHEEL MOUNTING SIDE			JOURNAL MOUNTING SIDE			
			MOUNTING SURFACE TO WHEEL VEE	WHEEL MOUNTING NUT A	WHEEL MOUNTING WASHER B	JOURNAL MOUNTING WASHER C	JOURNAL MOUNTING NUT D	MIN. MOUNTING PLATE THICKNESS	MAX. MOUNTING PLATE THICKNESS
MJC4XLA	Concentric	375.1	1.065	3/4-16 Zinc plated Nylon locking	3/4 Flat washer stainless steel	3/4 Flat washer stainless steel	3/4-16 Zinc plated Nylon locking	.750	1.125
MJX4XLA	Eccentric								

Values are in inches

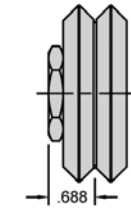
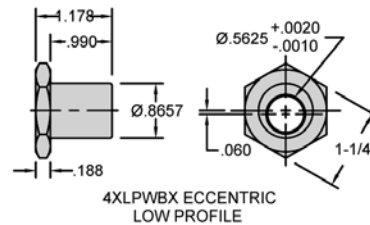
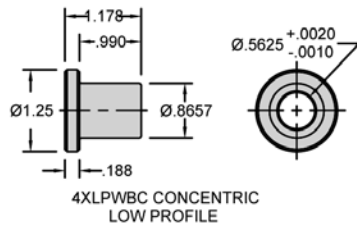
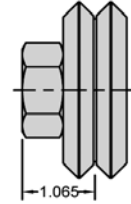
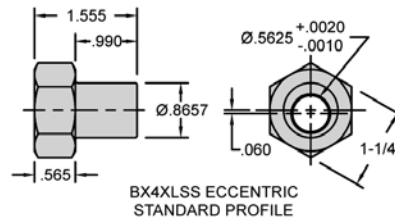
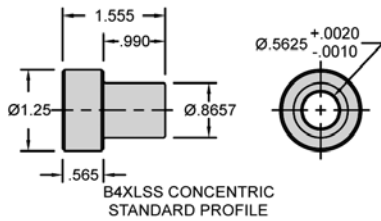
Journal material is AISI 303 stainless steel

Supplied with mounting nuts and washers, without guide wheel

# Size 4XL

## Bushings

INCHES



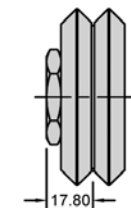
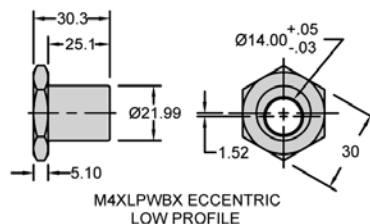
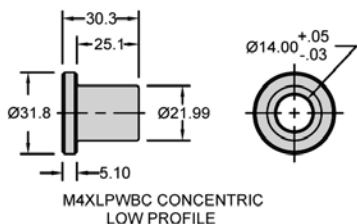
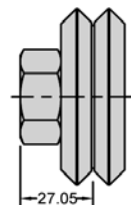
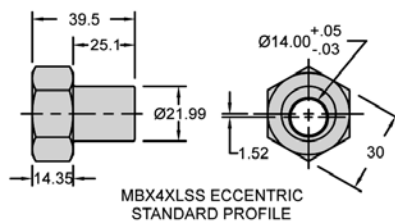
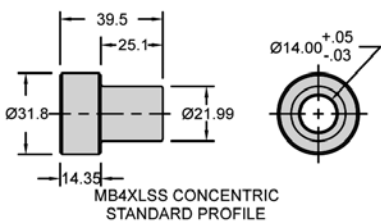
CONCENTRIC

ECCENTRIC

STOCK CODE	STYLE	HEAD PROFILE		MOUNTING SURFACE TO WHEEL VEE	WEIGHT (g)	RECOMMENDED FASTENER
B4XLSS	Concentric	Standard	.565	1.065	112.8	9/16
BX4XLSS	Eccentric				121.4	
4XLPWBC	Concentric	Low	.188	.688	68.2	
4XLPWBX	Eccentric				70.9	

Values are in inches

METRIC



CONCENTRIC

ECCENTRIC

STOCK CODE	STYLE	HEAD PROFILE		MOUNTING SURFACE TO WHEEL VEE	WEIGHT (g)	RECOMMENDED FASTENER
MB4XLSS	CONCENTRIC	STANDARD	14.35	27.05	115.8	M14
MBX4XLSS	ECCENTRIC				112.8	
M4XLPWBC	CONCENTRIC	LOW	5.10	17.80	69.2	
M4XLPWBX	ECCENTRIC				71.8	

Values are in millimeters

Bushing material is AISI 303 stainless steel

# Preloading Instructions

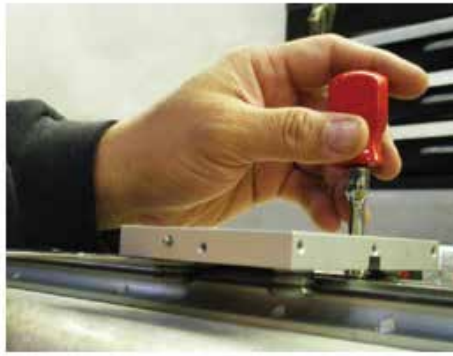


Figure 1



Figure 2



Figure 3

Preloading a **DualVee®** guide wheel requires only a few simple tools:

- For **DualVee®** guide wheels with swaged studs, an open end wrench and a socket wrench are required.
- For **DualVee®** guide wheels with separate bushings and fasteners, two open end wrenches are required.

Although there are slightly different tools required for each type of **DualVee®** guide wheel, the process is the same for all of them

**Step 1:** Begin by placing the carriage on the track assembly with the concentric wheels fully tightened and the eccentric wheels finger-tightened within their mounting holes. Using one hand, insert the open end wrench between the eccentric wheel and the mounting plate to engage the hex flats of the bushing or stud on the wheel. Use the other hand to hold the open end wrench or socket wrench on the wheel's fastener (see Figures 1 and 2).

**Step 2:** Use the wrench to slowly turn the hex clockwise until resistance is felt—this indicates that the wheel is contacting the track. Then, with the wrench still held in position with one hand, tighten the eccentric wheel's fastener to lock the wheel into the adjusted position. This clockwise assembly orientation reduces the likelihood of the wheel loosening and moving out of its adjusted position because any subsequent radial load

between the wheel and track will cause a clockwise, self-tightening torque to develop on the wheel fastener.

**Step 3:** To check the level of preload, hold the carriage in place with one hand and rotate the wheel with the index finger and thumb of the other hand; the wheel's running surfaces should be able to slide on the track when the wheel is rotated with moderate hand turning effort (see Figure 3). If the wheel cannot be rotated, adjust the wrench position to reduce the preload and try again.

**Step 4:** Manually slide the carriage along the entire length of the system to determine whether there are any noticeable variations in rolling resistance. If there are, readjust the eccentric wheel as necessary. If the variation is unacceptably large, the tracks are likely not parallel enough and will need to be realigned.

DualVee guide wheels have substantial load carrying capacities and will become more smooth under load. Use the palm of your hand to apply downward pressure on the adjusted carriage when sliding along the track.

**Step 5:** If there is more than one eccentric wheel on the carriage, repeat Steps 2 through 4 with all of the other eccentric wheels. Once all wheels are adjusted, recheck all wheels, concentric and eccentric, for preload using the stationary carriage wheel rotation and sliding resistance methods described above, and readjust if necessary.

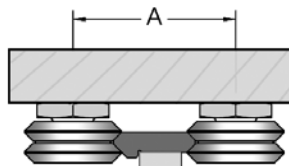


# Mounting Dimensions/Formulas

When fabricating a **DualVee®** linear guide from components the following formulas are applicable for mating wheel plate and track plate designs

## Size 0

- For size 0 double-edge track using size 0 guide wheels: **A** = 0.984 (25.0mm) (see Figure 1)



## Size 1-4XL

For sizes 1 through 4XL **DualVee®** single-edge track with equivalent sized guide wheels:

- Inboard mounting (see Figure 2): **A = B + X**
- Outboard mounting (see Figure 3): **A = C - X**
- Exterior mounting (see Figure 4): **A = D - Y**

**A** = hole centers for wheel plate

## Mounting Constraints

DUALVEE WHEEL SIZE	X		Y	
	( inches )	( mm )	( inches )	( mm )
1	.874	22.20	.934	23.72
2	1.374	34.90	1.436	36.47
3	2.000	50.80	2.124	53.95
4	2.624	66.60	2.750	69.85
4XL	3.124	79.35	3.500	88.90

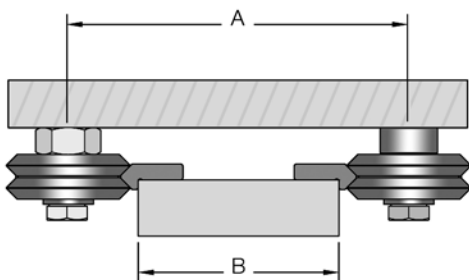


Figure 2: Inboard Mounting

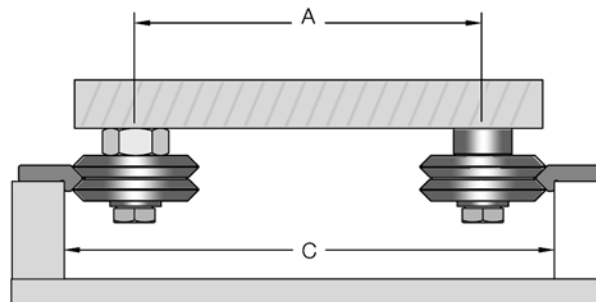


Figure 3: Outboard Mounting

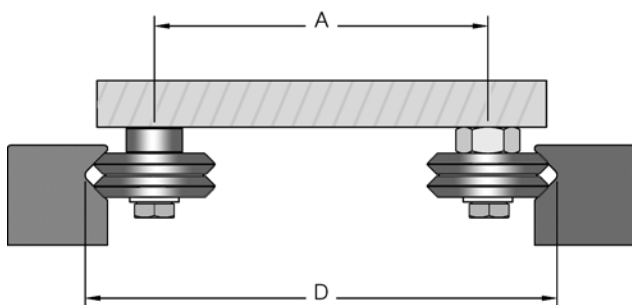
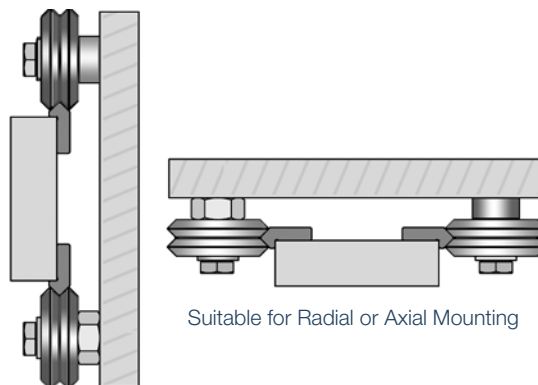


Figure 4: Exterior Mounting



Suitable for Radial or Axial Mounting

- Information above uses the same size DualVee track and wheel except for size 4XL which uses W4XL guide wheel with size T4 track.
- Side views shown only, length of wheel plates can be any length required.
- It is recommended that wheel plates be constructed with concentric bushings on one side of the plate and eccentric bushings on the opposing side.
- "D" dimension is to the theoretical sharp of the 90° angle.

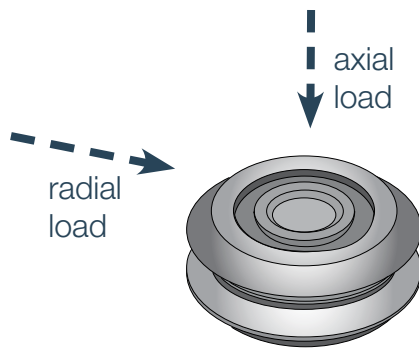
For complete technical details, go to: [www.bwc.com](http://www.bwc.com)

# Load/Life Relationship

## For Common Weight-Bearing Scenarios

### How long will your linear guide last?

Several factors influence the life of a **DualVee®** linear guide, and thus, **Bishop-Wisecarver** has devised a simple method to estimate the load/life relationship for a specific **DualVee®** guide mechanism under defined loading conditions. The methodology accounts for the size of the **DualVee®** bearing elements, relative spacing, and the orientation, location, and magnitude of the load. The equation is based upon clean and well lubricated track conditions. For applications where lubrication is prohibitive, a derating factor must be applied.



#### LOAD PER WHEEL

Because wheel plates use 4 wheels, 2 wheels absorb the load at both points 1 and 2. Divide the calculated load by 2 to obtain the load on each wheel.

### Step 1: Calculate the loads on each bearing in the system

Calculate the resultant radial and axial loads reflected to each bearing element in the linear guide design. All standard considerations involved in statics calculations must be accounted for: inertial forces, gravitational forces, external forces such as tool pressure, bearing element spacing, and magnitude and direction of the payload. Any external forces that generate a reaction through the wheel/track interface need to be accounted for.

#### Assumptions: Scenario 3

$$\begin{aligned}
 F &= 200 \text{ lbs} \\
 x &= 15 \text{ inches} \\
 y &= 5 \text{ inches} \\
 F_{A1} &= \frac{-200(15)}{5} = -600 \text{ lbs, or } -300 \text{ lbs per wheel} \\
 F_{A2} &= \frac{200(15)}{5} = 600 \text{ lbs, or } 300 \text{ lbs per wheel} \\
 F_{R1} &= 200 \text{ lbs, or } 100 \text{ lbs per wheel}
 \end{aligned}$$

#### Scenario 1

$F_A$  = Resultant axial force

$F_R$  = Resultant Radial force

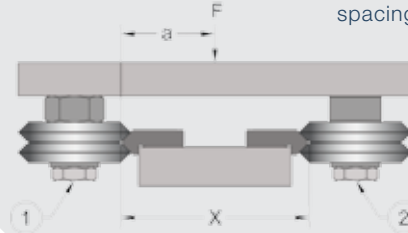
$$F_{A1} = \frac{F(x-a)}{x}$$

$F$  = Applied force

$a$  = Distance from force to wheel

$$F_{A2} = \frac{Fa}{x}$$

$x$  = Track vee apex spacing distance



#### Scenario 2

$F_A$  = Resultant axial force

$F_R$  = Resultant Radial force

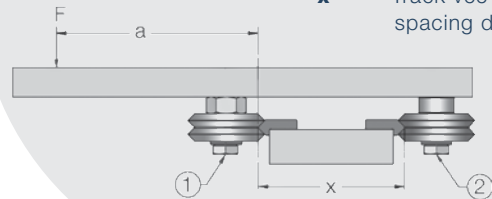
$$F_{A1} = \frac{F(x+a)}{x}$$

$F$  = Applied force

$a$  = Distance from track vee apex to force

$$F_{A2} = \frac{-Fa}{x}$$

$x$  = Track vee apex spacing distance



#### Scenario 3

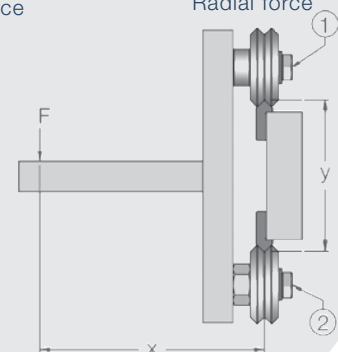
$F_A$  = Resultant axial force

$F_R$  = Resultant Radial force

$$F_{A1} = \frac{-Fx}{y}$$

$$F_{A2} = \frac{Fx}{y}$$

$$F_{R1} = F$$



# Load/Life Relationship

## Step 2: Calculate the load factor $L_F$ for the most heavily loaded bearing

As an example, let us use size W4X guide wheel  $F_{A(max)}$  and  $F_{R(max)}$  from the chart below)

$F_A$  = Resultant axial load on the guide wheel

$F_{A(max)}$  = The maximum axial working load capacity of the guide wheel

$F_R$  = Resultant radial load on the guide wheel

$F_{R(max)}$  = The maximum radial working load capacity of the guide wheel

$$L_F = \frac{F_A}{F_{A(max)}} + \frac{F_R}{F_{R(max)}} = \frac{300}{900} + \frac{100}{2181} = 0.38$$

## Step 3: Calculate life estimate by applying the load factor $L_F$ to the load/life equation

Varying application load/speed parameters and environmental conditions require that the appropriate adjustment factor be applied to the life equation.

### Adjustment Factor ( $A_F$ )

Application conditions include:  
contamination, duty, speed, cycle,  
acceleration, shock, presence of lubrication

1.0	LOW		
0.7		MEDIUM	
0.4			HIGH
0.1			

DUALVEE WHEEL SIZE	LIFE CONSTANT $L_c$	
	INCHES OF TRAVEL LIFE	KILOMETERS OF TRAVEL LIFE
0	$1.65 \times 10^6$	41
1	$2.19 \times 10^6$	55
2	$3.47 \times 10^6$	87
3	$5.19 \times 10^6$	130
4	$6.84 \times 10^6$	171
4XL	$8.58 \times 10^6$	215

$$\text{Life} = \left( \frac{L_c}{(L_F)^3} \right) A_F$$

WHERE  $L_F$  = Load factor  
 $L_c$  = Life constant  
 $A_F$  = Adjustment factor

$$\text{Life} = \frac{6.84 \times 10^6}{(0.38)^3} \times 1.0 = 124.7 \times 10^6 \text{ inches}$$

LOAD CAPACITIES	DUALVEE WHEEL SIZE	WORKING RADIAL LOAD CAPACITY $L_R$		WORKING AXIAL LOAD CAPACITY $L_A$	
		N	lbf	N	lbf
	0	650	146	123	28
	1	1220	274	252	57
	2	2650	596	625	141
	3	5900	1326	1701	382
	4	9700	2181	4001	900
	4XL	14300	3215	6552	1473

- The most heavily loaded bearing will have the highest load factor
- Bearings should be sized such that  $L_F \leq 1$

**WANT TO SEE  
MORE EXAMPLES OF  
LOAD/LIFE?**

Visit our website at  
[www.bwc.com](http://www.bwc.com)

**NEED ASSISTANCE?**

Having difficulty determining  
specific loads?

**CONTACT US**

an Applications Engineer  
can help:

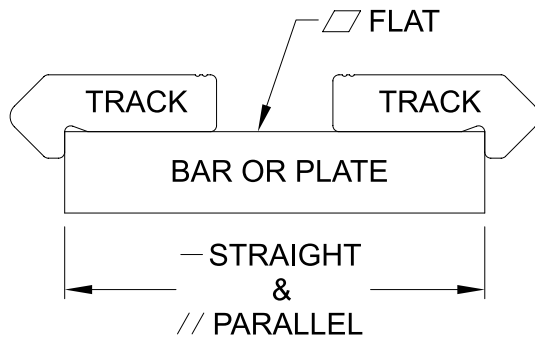
**888.580.8272**

# Technical Reference

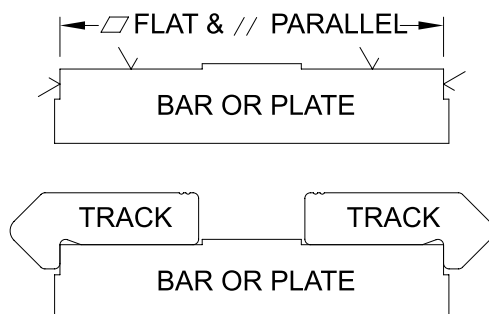
As a matter of good engineering practice the DualVee components should not be used where their wear or failure could cause personal injury.

## Track Mounting

In most DualVee applications, accuracy plays a small role in the successful implementation of a guide wheel system. The flatness, straightness, and parallelism of the plate or bar to which the DualVee track is attached (bolted) determine the accuracy of the system. Cold finished or extruded bar or plate is adequate for many applications. The DualVee track incorporates a mounting shoulder to locate the track on the bar or plate.



Greater accuracy can be obtained by using a plate or bar that has been ground flat and parallel on the mounting surfaces. To achieve straightness and flatness characteristics to within N grade accuracy levels is fairly routine ( $\pm .004$  inch;  $\pm .10$  mm). In fact, accuracies as high as  $\pm .001$  inch (.03 mm) can be achieved using carefully prepared mounting surfaces in relatively short stroke applications (1-3 feet; 0.3-1 m). For designs requiring accuracy levels of  $\pm .005$  inch and better, mounting surfaces must be prepared straight and flat, and appropriate doweling or reference edge assembly techniques should be employed.

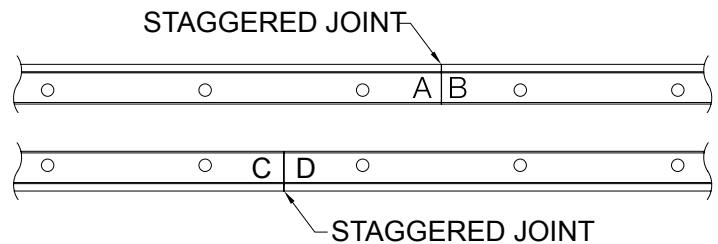


## Track life – Hardened / Unhardened Track

For maximum loading and heavy continuous use, the “T” series hard edge track should be used. For prototype or light duty intermittent use, the “TS” series unhardened track can be used at a lower cost. Hardened track is surface hardened and polished on the vee surfaces and can be easily drilled or machined in the soft shoulder area.

## Track Splicing Considerations for Long Travel Lengths

Precut lengths of track are not suitable for butting end to end. Please contact an Applications Engineer when track lengths longer than the maximum available single piece lengths are required. Track that is suitable for butting is available upon request. When constructing track systems longer than 20 feet, the joints on parallel tracks should be staggered for greater accuracy and smoothness.



## Harsh/Debris-Laden Environments and Wear Resistance

Since the circumference of the wheel is greater at the major diameter than at the minor diameter, each rotation creates a variation of velocity on the surface of the wheel. This wheel surface velocity variation results in a constant sweeping action. As such, DualVee guide wheels are successfully employed in a wide variety of harsh environments, including in the presence of metal chips, powders, fibers, slurries, and other environments. The presence of harsh contaminants will reduce the service life of all types of linear guides. However, the DualVee guide wheel will drastically exceed the service life of competing technologies in harsh, debris-laden environments.

The other main factor affecting wear resistance is lubrication. Wheel covers or lubricators should be designed in whenever possible. Both will distribute a thin coating of oil lubricant along the contact surface of the DualVee track. The wheel cover offers added protection by preventing debris from entering the wheel/track contact surface. Lubricated and relatively clean wheel/track contact surfaces will ensure maximum service life in the DualVee linear guide.

As the hardness of the contaminants approaches the hardness of the track and wheels, the wear rate will increase. For these cases, an adjustment factor should be applied to maximum axial and radial working load capacities to provide a longer operating life.

## Lubrication

Lubrication is the key to maximizing the life of DualVee linear guide products. Internally, DualVee guide wheels are lubricated for life with an extreme pressure, corrosion resistant grease. The lubrication of the wheel/track interface is the responsibility of the user.

Lubrication of the guide ways will maximize the load capacity of the system and will significantly increase the service life over a non-lubricated configuration under the same loads. A light machine oil, extreme pressure grease, vegetable oil, or dry lubricant will minimize wear, reduce the friction coefficient and associated stick slip, and inhibit corrosion on the guide ways of a DualVee-based design.

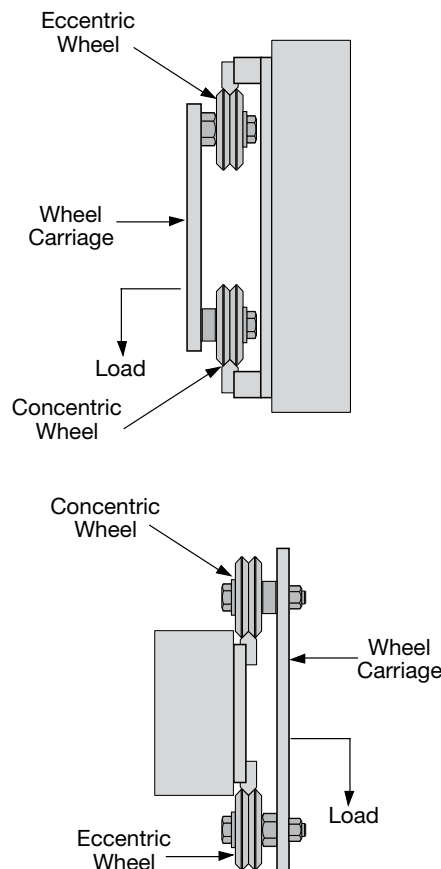
Lubrication will also increase the maximum linear velocity that a DualVee bearing arrangement can endure. In

applications where high speed or high acceleration rates are present, lubrication of the wheel/track interface is highly recommended. Lastly, lubrication will reduce the overall coefficient of friction of the guide, which, depending on the level of preload, can fall anywhere from 0.008 to 0.015. The availability of lubricators and wheel covers gives design engineers an opportunity to design lubrication right into the DualVee mechanism with little effort. See specifications on wheel covers and lubricators for more details.

## Wheel Carriage Configurations

In designing a wheel carriage, it is important to use the right combination of eccentric and concentric guide wheels. Linear guide systems should always have two concentric wheels and all the other guide wheels should be eccentric. The eccentric wheels are adjusted to remove the play between the wheels and track, equally loading all the wheels so they roll instead of sliding or skipping on the track. When the wheel carriage is loaded in the radial direction, the pair of concentric wheels should carry the primary load.

It is important to note the location of the eccentric wheel is dependent on whether the track guide way is on the outside or inside of the wheel carriage.



## Common Carriage Configurations

Below are several wheel carriage configurations. Typically, you have a 3 or 4 wheel carriage though you can have additional wheels by adding additional eccentric guide wheels.

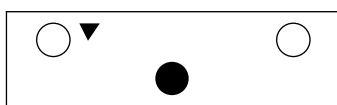
Diagram Symbols:

○ = Concentric guide wheel

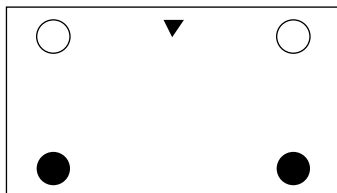
● = Eccentric guide wheel

▼ = Radial loading direction

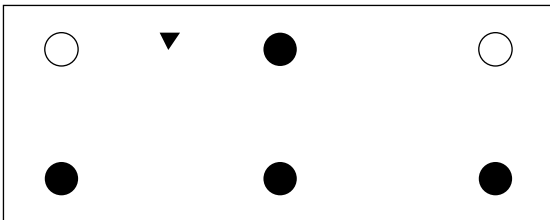
3 Wheel Carriage



4 Wheel Carriage



6 Wheel Carriage



## Wheel Preload

Generally, wheel preload is used to eliminate play between the wheel and track. Preload equals the radial load when the system is not loaded by another outside force. Preload can be determined by:

$$\text{Preload} = \left( \frac{\text{BF}}{\text{CoF}} \right) - \text{AL}$$

**WHERE:**

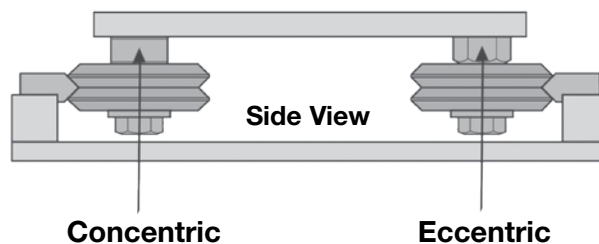
**BF** = Breakaway Force

**CoF** = Coefficient of Friction

**AL** = Applied Radial Load

Caution must be used when applying preload because too much preload on the wheels can cause undue stress and can lead to premature failure. The rated radial value should never be exceeded by the preload and subsequent radial loads applied to the wheel when in service. Note that in a four guide wheel assembly sustaining a load that runs along a linear beam, preload on the wheels cannot compensate for deflection on the beam.

Typically, in a guide wheel and carriage application, there should be two concentric mounted wheels and the rest of the wheels should be on eccentric mounts. The eccentric type guide wheels are used to create a cam action to preload the guide wheels against one side of the guide track.

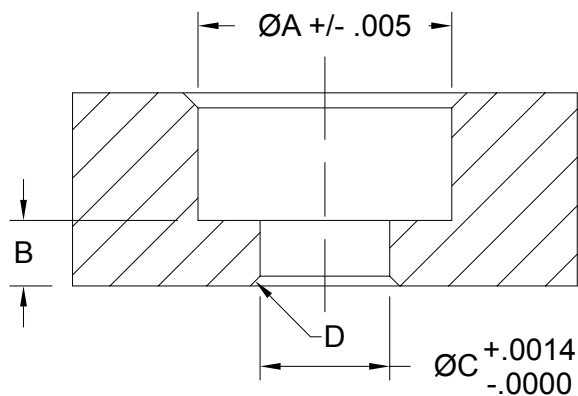


Normal adjustment is obtained by rotating the eccentric bushing, journal, or stud feature until all free play is removed from the carriage assembly. When the eccentrics are adjusted and the carriage plate is held firmly in place, one should be able to rotate by hand any one of the four guide wheels against the mating track. If rotation is not possible the preload should be reduced accordingly.

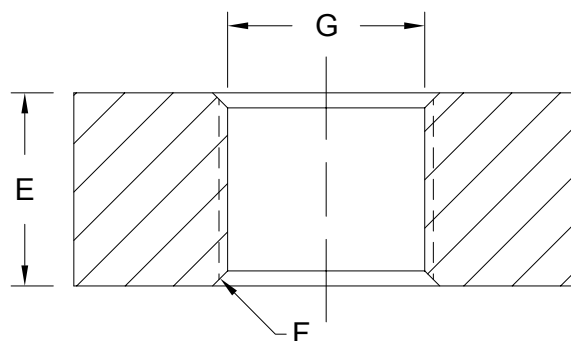


## Studded Wheel Mounting

Suggested machining for mounting studded wheels (SWS series and SWI polymer) is shown below:



ECCENTRIC STUD  
HOLE GEOMETRY



CONCENTRIC STUD  
HOLE GEOMETRY

WHEEL SIZE	C'BORE DIAMETER	REMAINING MATERIAL	REAMED HOLE DIAMETER	REAMED HOLE CHAMFER	MINIMUM THICKNESS	CHAMFER	THREAD
	A	B min	C	D	E	F	G
0	Ø.500 [12.7]	.097 [2.46]	Ø.2215 [5.63]	90° TO Ø.264 [6.70]	.305 [7.75]	90° TO Ø.248 [6.30]	M6 x 1.0
1	Ø.610 [15.49]	.095 [2.41]	Ø.2505 [6.36]	90° TO Ø.293 [7.44]	.342 [8.69]	90° TO Ø.329 [8.36]	M8 x 1.25
2	Ø.770 [19.56]	.129 [3.28]	Ø.3775 [9.59]	90° TO Ø.420 [10.67]	.459 [11.66]	90° TO Ø.410 [10.41]	M10 x 1.5
3	Ø.906 [23.01]	.205 [5.21]	Ø.4244 [10.78]	90° TO Ø.467 [11.86]	.615 [15.62]	90° TO Ø.490 [12.45]	M12 x 1.75
4	Ø1.100 [27.94]	.271 [6.88]	Ø.5025 [12.76]	90° TO Ø.545 [13.84]	.846 [21.49]	90° TO Ø.570 [14.48]	M14 x 2.0

Values are in inches [millimeters]



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**DualVee®** Guide Wheels

**LoPro®** Linear Motion System

**MadeWell®** Crown Rollers

**MadeWell®** Radial Wheels

**MinVee®** Linear Slide System

**UtiliTrak®** Linear Motion Guide

**UTCSK** Camera Slider Kit

**QuickTrak®** Modular Linear Guide Kit

#### **HepcoMotion®**

ALR Aluminum Rings

DAPDU2 Double Acting Profile Driven Unit

DLS Driven Linear System

DTS2 Driven Track System

GV3 Linear Guidance and Transmission System

HDCB Heavy Duty Compact Beam

HDCS Heavy Duty Compact Screw

HDLS Heavy Duty Driven Linear System

HDRT Heavy Duty Ring Slides and Track System

HDS2 Heavy Duty Slide System

MHD Heavy Duty Track Roller Guidance System

MCS Machine Construction System

PDU2 Profile Driven Unit

PDU2M Belt Driven Unit

PRT2 Precision Ring and Track System

PSD80 Screw Driven Linear Actuator

PSD120 Profile Screw Driven Unit

SBD Sealed Belt Drive

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SL2 Stainless Steel Based Slide System

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