

Torsiflex-i Disc Couplings for General Purpose Applications

**Now
Available With
Torsi-Lock®
Hubs**



 **Altra Couplings®**

*TB Wood's • Ameridrives • Huco
Bibby Turboflex • Lamiflex • Guardian*

Torsiflex-i Disc Couplings

Specifically designed for the process pump and general industrial markets.

Advantages

- Standard coupling is fully compliant with the requirements of API 610 / ISO 14691
- Plug-in spacer design allows installation and removal without disturbing the hubs
- Inch series hub attachment screws (Metric available upon request)
- Robust disc pack design allows for greater torque load in a smaller coupling, resulting in lower weight
- Large bolts for high clamp load, increasing frictional torque load, and reduced bolt bending stress
- Max bores matched to NEMA motor shafts, resulting in up to 60% weight savings per application
- Smaller diameter and lower weight per HP provide better inherent balance
- ATEX compliance is standard — ExII 2GDc135degC(T4)
- Built-in Anti-Flail Feature
- Zinc Phosphate coating standard
- Large hubs available on first two sizes
- Compliance with API 671 / ISO 10441 is available



Features

- Torsiflex-i couplings consist of 2 hubs and a factory assembled transmission unit. Installation involves fitting the hubs to the machinery shaft ends, introducing the transmission unit, then securing with the attachment screws
- MAXIMUM SPEEDS shown are for standard materials. When higher speeds are required please consult Ameridrives Couplings or Bibby Transmissions.
- PEAK TORQUE of 1.75 and MOMENTARY TORQUE of 2.7 times the stated ratings are accepted
- SPARK FREE overload protection is provided as a standard feature on all Torsiflex-i couplings, making them suitable for GAS ZONE environments
- STANDARD COUPLINGS are designed for general purpose applications and are suitable for the majority of process pump, fan, and compressors applications
- SPECIAL COUPLING versions available include:
 - Torque overload protection
 - Limited end float
 - Electrical Insulation
 - Bolted adapters suitable for high cyclic torques

Materials

The following standard materials of construction are used in the Torsiflex-i range. Alternative materials are available for special applications and are available on request.

Hubs: Carbon Steel

Spacers: Carbon Steel

Adapters: Carbon Steel

Discs: Stainless Steel (301)

Bolts: Alloy Steel

Nuts: Alloy steel

Overload Collars: High strength 'non-sparking' material

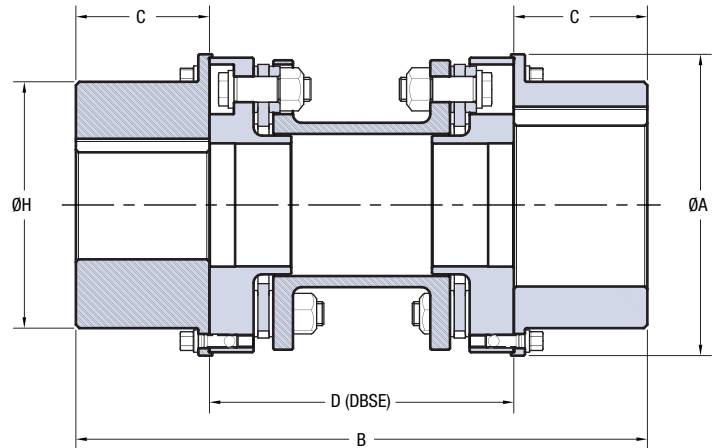
ATEX
Approval Certificate
No. SIRA 03XT205 R3



Dimensions

Coupling Size TFI	Rating		Max. Speed RPM	Coupling Dimensions (in.)				
	HP/100 RPM	lb.in.		A	B min.**	C	H	D min.**
27	3.79	2,390	20,000	3.35	5.91	1.57	2.143*	2.76
38	5.34	3,363	16,500	4.21	6.30	1.77	2.891*	2.76
140	19.7	12,391	12,000	5.00	9.84	2.95	3.757	3.94
260	36.5	23,013	10,000	6.06	11.42	3.35	4.662	4.72
400	56.2	35,404	8,500	6.93	13.78	4.13	5.568	5.51
750	105	66,383	7,500	7.99	16.14	4.72	6.46	6.69
1310	184	115,948	6,500	9.49	19.29	5.71	7.76	7.87
1900	267	168,169	5,600	10.98	19.69	5.91	9.17	7.87
2500	351	221,275	5,200	11.65	21.57	6.46	9.45	8.66
3300	463	292,083	4,900	12.84	23.78	7.17	10.63	9.45
6000	843	531,060	4,000	15.55	28.35	9.06	12.68	10.24
8500	1194	752,335	3,600	17.44	33.07	10.24	14.37	12.60
12000	1685	1,062,120	3,000	19.45	36.38	11.50	16.02	13.39

* For Large Hub H = A. ** The inclusion of additional features such as packing rings, shims and/or electrical insulation will increase the D min. (DBSE: Distance Between Shaft Ends) and B min. dimensions.



Specifications

Coupling Size TFI	Max. Bore				Weight Trans Unit (lbs.) Wt		Weight Unbored Hubs (lbs.) † Whu	
	Square Key		Reduced Key		Weight @ D min. Wtm	Add Per inch Wta	Std. †	Large †
	Standard Hub in.	Large Hub in.	Standard Hub in. (mm)	Large Hub in. (mm)				
27	1.56	2.25	1.69 (42)	2.25 (57)	3.0	0.17	1.9	3.80
38	2.19	3.00	2.25 (58)	3.00 (76)	4.3	0.25	3.81	6.75
140	2.75		2.94 (75)		10.1	0.39	9.76	-
260	3.44		3.69 (95)		17.2	0.57	16.94	-
400	4.19		4.50 (116)		28.4	0.80	29.63	-
750	4.63		5.00 (132)		46.7	1.26	46.1	-
1310	5.63		6.13 (162)		80.7	1.49	80.2	-
1900	6.75		7.00 (192)		100	1.84	109	-
2500	6.88		7.13 (197)		132	2.24	133	-
3300	7.63		8.25 (220)		179	2.73	186	-
6000	9.00		9.88 (265)		273	4.10	333	-
8500	10.63		11.00 (302)		439	5.39	485	-
12000	11.50		12.75 (337)		569	6.64	686	-

† See the Example Application on page 5 for instructions on how to calculate bored hub weights.

Selection Procedure

1. Select an appropriate service factor "SF"
2. Calculate rating $\frac{HP \times 63025 \times SF}{RPM}$
3. Select a coupling with sufficient rating
4. Check hub bore is capable of accommodating shafts
5. Check Speed is within the maximum for the coupling selected
6. Specify required dynamic balance
7. Specify the distance between shaft ends and check this is not less than the minimum for the selected coupling

Eg. 120 HP across the line electric motor
driving a centrifugal pump at 3,600 RPM.
Distance between shaft end = 5.50 in.
Rating = $\frac{120 \times 63025 \times 1.5}{3,600} = 3,151$ (lb.in.)

Selection TFi0038D5.50

Max hub bore = 3.00 in.

Service Factors

Driver	Driven	Service Factor (SF)
Turbines, Soft start motors	Steady Torque Eg. Centrifugal pumps	1.0
Across the Line Start Motors	Fluctuating Torque Pumps, Rotary compressors	1.5

For all other applications – please contact Ameridrives/Bibby in San Marcos

Misalignment Data

These will be supplied upon request with any order. Guidelines are available for assessment at preliminary stages. The methods of machinery alignment vary accordingly to personal preference. Simple recommended methods are highlighted in our Installation Instructions which are available upon request. The following is a guide to acceptable misalignments at installation.

Note, however, that if machinery growths are known the values may be adjusted in the form of pre-deflection, etc. In addition, please note that the values shown here are **MAXIMUM** values. Reduction in these values will reduce bearing loads and improve the allowance for misalignment due to machinery settlement, etc. thus ensuring greater machinery life and trouble free operation of the coupling.

Installation Alignment

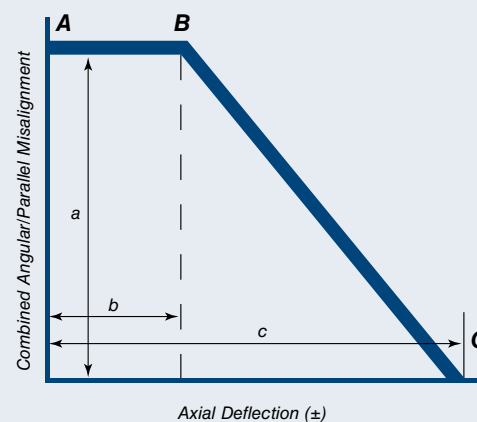
Recommended Installation Alignments shown as % of the Maximum Permitted values for the Couplings	
Allowable Angular / Radial Misalignment	Allowable Axial Misalignment
20% Maximum	20% Maximum

Note: Angular / Radial as percentage of stated value for 'Point A'. Axial as percentage of stated value for 'Point C'.

TFi Misalignment

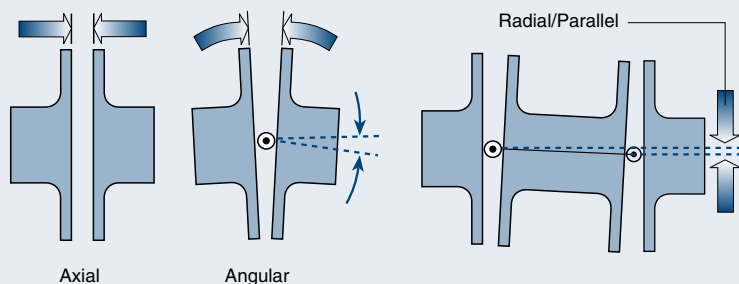
Coupling Size TFI	Max. Angular Misalignment (Deg.)	Bending Moment (ft.lb./deg.)	Max. Axial Deflection (Zero Angular Misalignment) (in.)	Max. Axial Thrust (lbf.)	Max. Axial Deflection at full Angular Misalignment (in.)	Axial Thrust (lbf.)
	Point A (1) (2)	(4)	Point C (3)		Point B (4)	
	Per Element		Per Assembly			
27	0.5	23	.067	126	.019	15
38	0.5	20	.087	112	.019	9
140	0.5	20	.106	287	.019	20
260	0.5	30	.130	542	.024	28
400	0.5	66	.169	917	.055	112
750	0.5	108	.197	1380	.071	202
1310	0.5	164	.236	1971	.087	292
1900	0.33	277	.197	2473	.059	337
2500	0.33	369	.212	2900	.067	337
3300	0.33	435	.236	3518	.071	405
6000	0.33	704	.295	5170	.094	607
8500	0.33	1025	.319	7531	.110	1124
12000	0.33	1261	.354	8587	.118	1124

Allowable Misalignments for Disc Couplings

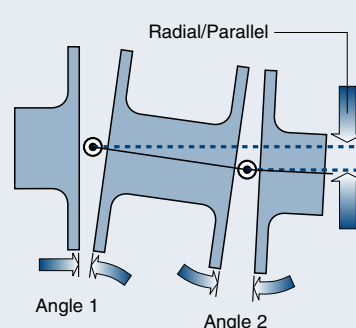


1. Combined angular/radial misalignment
2. 1 degree angle is equivalent to 0.017 in./in. radial misalignment
3. At zero speed (Static)
4. At maximum speed & continuous rated torque

Definition of Misalignments



Angular & Radial Misalignment in "Combination"



Torsiflex couplings are now available with Torsi-Lock® Hubs

Torsi-Lock provides the ease of a slip fit with the power of a shrink fit

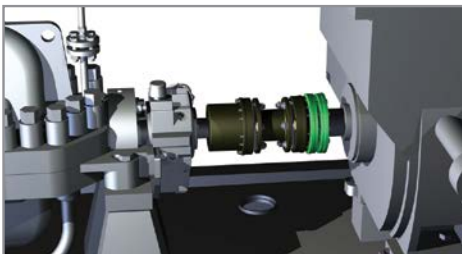
Altra Couplings has responded to industry demand for a cold-install hub that provides the secure torque transmission and balance repeatability of an interference fit. We've combined our Amerilock shaft locking devices with Torsiflex-i to provide a pre-engineered solution that meets the balance requirements of API 610.

- Cold Install means **NO HOT WORK PERMITS**, providing added safety and productivity in hazardous environments
- Easy, repeatable removal and installation
- Eliminates fretting of hub to shaft
- Compensates for variances in shaft spacing – slip on and fix in the needed location
- May be used with keyed or keyless shafts (half key recommended with keyed shafts)
- Fully pre-engineered solution
 - Correct material selection to prevent permanent shrink of hub to shaft
 - Lightest weight locking device/hub combination selected
 - Hub and locking device balanced and match marked to assure optimum balance performance



Torsi-Lock can be specified for one or both hubs, sized to accommodate a variety of shaft diameters

Example Application



Selection

Application Info: 675 HP (500kW) pump operating at 3600 RPM with a 7in DBSE, a 3.625 in motor shaft, and a 63mm pump shaft.

Using the torque rating selection procedure detailed on page 3, a TFi 0260 would be acceptable. However when considering the 3.625 motor shaft, the standard hub max bore for the TFi 0260 is 3.5 while the Torsi-Lock hub max bore is 3.74. So we are forced to choose between either the next larger size TFi 0400 with standard hubs, for which the max bore capacity is 4.25, or the TFi 0260 with a Torsi-Lock motor hub. The table at right details the comparison.

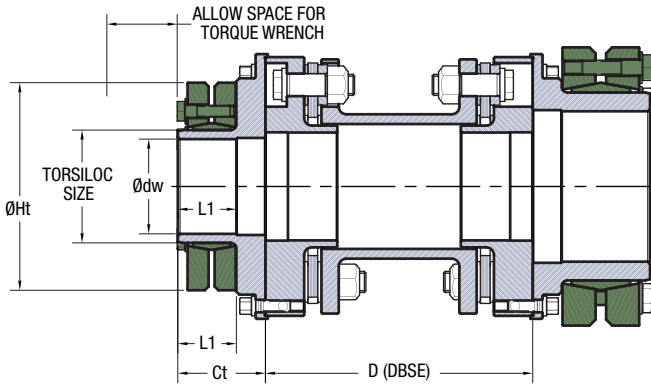
Weight Comparison

Component	Formula*	TFi 400 w/ Standard Hubs lb.	TFi 260 w/ Torsi-Lock Motor Hub lb.	Weight Savings %
Transmission Unit	$W_t = W_{tm} + W_{ta} (D-D \text{ min})$	29.6	18.5	38%
Motor Hub	Standard Hub $W_h = W_{hu} - \frac{(Bore^2 \times \pi \times C \times \rho)}{4}$	18.3	19.9	-9%
Pump Hub	Torsi-Lock Hub See the interpolation calculation method shown on page 6	24.8	11.9	52%
Total	$W = W_t + W_h (\text{motor}) + W_h (\text{pump})$	72.7	50.3	31%

* Variables used: W_h = Bored Hub Weight
 ρ = Hub Material Density (.283 lb/in³)
 All other variables are as defined in the Dimensions and Specifications Tables

- All Torsi-Lock devices must be sized to transmit the actual application Peak Torque. The data table shows a comparison of the Torsi-Lock torque transmissibility to the coupling Peak Torque Rating as a reference. The table below does not show all possible Torsi-Lock sizes and ranges. For any Torsi-Lock requirement beyond those detailed here, please consult Ameridrives/Bibby Engineering in San Marcos, TX (see the catalog back cover for contact information).
- To determine the actual transmissible torque, as well as the actual combined hub plus Torsi-Lock device weight, from the data table, linearly interpolate between the range of values given for min and max shaft diameter. See the example interpolation calculation to the right.
- The data table is applicable to keyless shaft applications only. For keyed shaft applications, either:
 - Use a half key in the shaft and deduct the transmissible torque value of the Torsi-Lock by 10%
 - Use a full height key and the overkey dimension as the Shaft Size (dw) to determine the correct Torsi-Lock size.

Torsi-Lock Size				20	22	24	30	36	40	44	48	50	55	62	68	75	80	90	100																																													
Shaft Size Range	dw	MIN (over)	in.	0.630	0.709	0.787	0.827	1.024	1.220	1.339	1.417	1.575	1.654	1.890	2.047	2.362	2.559	2.756	2.953																																													
			mm.	16	18	20	21	26	31	34	36	40	42	48	52	60	65	70	75																																													
		MAX (incl)	in.	0.709	0.787	0.827	1.024	1.220	1.339	1.417	1.575	1.654	1.890	2.047	2.362	2.559	2.756	2.953	3.150																																													
			mm.	18	20	21	26	31	34	36	40	42	48	52	60	65	70	75	80																																													
Transmissible Torque (x1000)		Tmin	lbf.in.	1.15	1.50	1.86	1.71	3.45	4.96	6.28	6.46	9.29	10.3	15.5	17.7	22.1	28.3	42.0	61.1																																													
		Tmax	lbf.in.	1.59	2.04	2.21	3.36	5.58	7.08	7.61	9.82	12.2	16.6	19.9	27.9	35.0	40.7	64.2	79.7																																													
Torsi-Lock Device DIMS	O.A.L.	L1	in.	0.89	0.89	0.91	0.98	1.07	1.11	1.18	1.18	1.26	1.36	1.38	1.38	1.50	1.50	1.75	1.95																																													
	O.D.	Ht	in.	1.89	1.89	1.97	2.36	2.83	2.95	3.15	3.15	3.54	3.94	4.33	4.53	5.43	5.71	6.10	6.69																																													
	Weight	WT	lb.	0.44	0.44	0.44	0.66	1.10	1.10	1.32	1.21	1.76	2.43	2.87	3.09	5.29	5.51	7.28	10.4																																													
Torsiflex-i Coupling Size	TFi0027			1.48 1.44 1.47	1.47 1.43 1.47	1.46 1.44 1.49	1.77 1.64 1.57	2.24 2.07 1.65	2.19 2.08 1.69	2.44 2.36 1.76	2.40 2.21 1.76	2.87 2.76 1.84	3.69 3.33 1.94																																																			
	TFi0038				2.57 2.53 1.65	2.56 2.53 1.67	2.87 2.72 1.75	3.32 3.13 1.83	3.25 3.12 1.87	3.49 3.40 1.94	3.44 3.23 1.94	3.89 3.77 2.02	4.70 4.30 2.12	5.14 4.84 2.14	5.43 4.76 2.14	7.53 7.04 2.26																																																
	TFi0140								3.79 3.67 1.69	4.04 3.95 1.76	3.99 3.80 1.76	4.46 4.35 1.84	5.29 4.92 1.94	5.76 5.48 1.96	6.08 5.47 1.96	8.23 7.78 2.08	8.40 7.91 2.08	10.8 10.2 2.33	14.8 14.1 2.53																																													
	TFi0260										6.29 6.08 1.94	6.74 6.62 2.02	7.55 7.16 2.12	7.99 7.69 2.14	8.28 7.62 2.14	10.4 9.89 2.26	10.5 9.98 2.26	12.9 12.3 2.51	16.8 16.1 2.71																																													
	TFi0400													9.69 9.40 2.14	9.99 9.32 2.14	12.1 11.6 2.26	12.2 11.7 2.26	14.6 14.0 2.51	18.5 17.8 2.71																																													
	TFi0750																	15.8 15.3 2.38	18.2 17.5 2.63	22.1 21.3 2.83																																												
	TFi1310																		25.4 24.7 2.80	29.2 28.4 2.99																																												
	TFi1900			Example (Coupling Size 1310):																																																												
	TFi2500			<table><tr><th>90</th><th>100</th><th>110</th><th>115</th><th>125</th><th>140</th><th>155</th><th>165</th><th>175</th><th>185</th><th>195</th></tr><tr><td>25.4</td><td>29.2</td><td>33.1</td><td>33.5</td><td>33.2</td><td>38.4</td><td>41.0</td><td>48.9</td><td>54.7</td><td>63.0</td><td>79.3</td></tr><tr><td>24.7</td><td>28.4</td><td>32.1</td><td>31.4</td><td>30.8</td><td>33.1</td><td>36.4</td><td>47.1</td><td>50.8</td><td>58.8</td><td>74.3</td></tr><tr><td>2.80</td><td>2.99</td><td>3.29</td><td>3.45</td><td>3.35</td><td>3.35</td><td>3.35</td><td>3.80</td><td>3.80</td><td>3.80</td><td>4.19</td></tr></table>													90	100	110	115	125	140	155	165	175	185	195	25.4	29.2	33.1	33.5	33.2	38.4	41.0	48.9	54.7	63.0	79.3	24.7	28.4	32.1	31.4	30.8	33.1	36.4	47.1	50.8	58.8	74.3	2.80	2.99	3.29	3.45	3.35	3.35	3.35	3.80	3.80	3.80	4.19				
	90	100	110	115	125	140	155	165	175	185	195																																																					
	25.4	29.2	33.1	33.5	33.2	38.4	41.0	48.9	54.7	63.0	79.3																																																					
	24.7	28.4	32.1	31.4	30.8	33.1	36.4	47.1	50.8	58.8	74.3																																																					
	2.80	2.99	3.29	3.45	3.35	3.35	3.35	3.80	3.80	3.80	4.19																																																					
	TFi3300			Transmits less than Peak Starting Torque Rating of the Coupling. Therefore the actual Transmissible Torque must be compared against the Application Peak Torque.													Transmits more than Peak Starting Torque Rating of the Coupling.																																															
	TFi6000																																																															
	TFi8500																																																															
	TFi12000																																																															



Example Interpolation Calculation

To interpolate Torsi-lock table data for a TFi 0260 with a size 115 Torsi-lock for a bore of 3.625:

Y	Z	3.346	dw MIN (Min. Bore)	Target Weight $w = w_1 + \frac{Z}{Y} (X)$
		3.625	B (Target Bore)	
		3.740	dw MAX (Max. Bore)	$W = 21.3 + \frac{(3.625 - 3.346)}{(3.74 - 3.346)} (19.3 - 21.3)$
				W = 19.9
X		21.3	w1 (Wt. @ dw MIN)	Where: Z = B - dw MIN Y = dw MAX - dw MIN X = w2 - w1
		W	(Target Wt.)	
		19.3	w2 (Wt. @ dw MAX)	

Note that the same method can be used to determine actual Torsilock transmissible torque ratings for bores that are in between the min and max.

110	115	125	140	155	165	175	185	195	200	220	240	260	280	300	320	340	350	360	380	390
3.150	3.346	3.740	4.134	4.921	5.512	5.709	6.102	6.496	6.890	7.283	7.874	8.465	9.252	9.843	10.630	11.417	12.008	12.205	12.598	12.992
80	85	95	105	120	140	145	155	165	175	185	200	215	235	250	270	290	305	310	320	330
3.346	3.740	4.134	4.921	5.512	5.709	6.102	6.496	6.890	7.283	7.874	8.465	9.252	9.843	10.630	11.417	12.008	12.205	12.598	12.992	13.780
85	95	105	125	140	145	155	165	175	185	200	215	235	250	270	290	305	310	320	330	350
63.7	81.4	93.4	124	99	283	345	412	558	655	733	1,000	1,204	1,513	1,885	2,301	2,655	3,292	3,186	3,850	4,470
95.6	133	122	181	257	341	407	478	642	748	929	1,190	1,478	1,841	2,257	2,664	2,983	3,540	3,673	4,133	5,098
2.24	2.40	2.31	2.31	2.31	2.76	2.76	2.76	3.15	3.15	3.71	3.71	4.03	4.50	4.50	4.58	4.58	5.31	5.31	5.87	5.87
7.28	7.28	7.28	8.66	9.65	10.24	10.83	11.61	12.40	12.99	13.58	14.57	15.55	16.73	18.11	19.49	21.06	21.46	21.85	23.03	23.43
13.0	13.2	13.2	17.6	22.1	30.9	35.3	44.1	59.5	66.2	77.2	97.0	106	132	165	185	221	265	276	331	344
20.7	21.3																			
19.9	19.3																			
3.01	3.16																			
22.4	23.0	22.8	28.2																	
21.6	21.0	20.7	23.3																	
3.01	3.16	3.07	3.07																	
26.0	26.5	26.2	31.6	34.4																
25.1	24.4	24.0	26.5	30.0																
3.13	3.28	3.19	3.19	3.19																
33.1	33.5	33.2	38.4	41.0	48.9	54.7	63.0	79.3												
32.1	31.4	30.8	33.1	36.4	47.1	50.8	58.8	74.3												
3.29	3.45	3.35	3.35	3.35	3.80	3.80	3.80	4.19												
41.5	42.0	41.6	46.8	49.2	57.1	62.8	71.0	87.2	91.0	109										
40.6	39.8	39.2	41.3	44.5	55.1	58.8	66.7	82.2	85.7	98.9										
3.37	3.52	3.43	3.43	3.43	3.88	3.88	3.88	4.27	4.27	4.84										
	50.0	49.4	54.5	56.7	64.3	69.9	78.0	94.0	97.5	115	137									
	47.7	46.9	48.8	51.7	62.3	65.7	7.5	88.8	92.0	105	126									
	3.70	3.60	3.60	3.60	4.05	4.05	4.05	4.44	4.44	5.01	5.01									
			62.0	64.2	71.7	77.4	85.4	101	105	122	144	157								
			56.2	59.2	69.7	73.2	80.9	96.2	99.5	112	133	141								
			3.60	3.60	4.05	4.05	4.05	4.44	4.44	5.01	5.01	5.32								
				87.6	95.0	101	108	124	128	148	166	179	207	244	262					
				82.5	93.0	96.3	104	119	122	135	155	162	192	222	239					
				3.75	4.19	4.19	4.19	4.59	4.59	5.15	5.15	5.47	5.94	5.94	6.02					
						132	140	155	158	175	196	208	236	271	289	321	364	381		
						127	135	150	152	164	184	191	220	249	265	302	357	366		
						4.43	4.43	4.82	4.82	5.39	5.39	5.70	6.17	6.17	6.25	6.25	6.99	6.99		
								191	193	210	231	243	270	305	322	353	396	413	487	499
								185	187	199	219	225	254	282	297	334	389	397	470	463
								4.98	4.98	5.55	5.55	5.86	6.33	6.33	6.41	6.41	7.15	7.15	7.70	7.70

79.3

74.4

4.19

Combined weight of the hub and Torsi-Lock device at the MIN shaft diameter.

Combined weight of the hub and Torsi-Lock device at the MAX shaft diameter.

Ct: Overall hub length thru bore (not including pilot lip)

A Global Footprint to Support Customers Around the World

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