Horsepower Ratings and Selection Guide Fixed Center Distance Drives

Fixed Center Distance Drives are horsepower rated at the driven shaft when the drive is at a 1:1 ratio or when the driven shaft is at the same RPM as the driver.

The HORSEPOWER output of the driven shaft will be constant as the driven RPM increases from driver RPM to maximum RPM and will decrease in direct proportion to decreases in driven RPM from driver RPM.

The TORQUE output of the driven shaft decreases in inverse proportion to driven shaft RPM increases from driver RPM and remains constant as the driven RPM decreases.

Example:
A MCW90 driver and 106TBR driven drive is rated at 5.00 H.P. at 1750 RPM. The maximum and minimum pitch diameters of the driver pulley are 8.75″ and 2.25″, respectively. The maximum and minimum pitch diameters of the driven pulley are 10.38″ and 4.44″ respectively. The 1:1 ratio pitch diameter is 6.67″.

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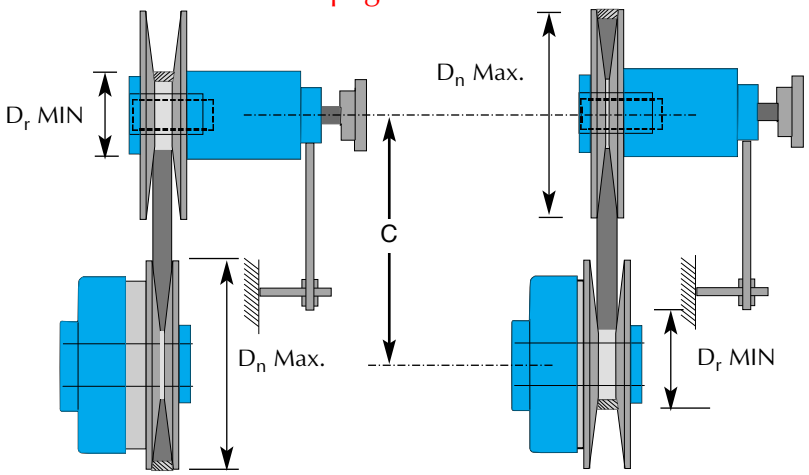


Driven RPM = $\frac{D_r}{D_n}$ x Driver RPM	HP Output at Driven Shaft Formula 1	Torque Output at Driven Shaft Formula 2
Mean = $\frac{6.67}{6.67}$ x 1750 = 1750	5.00	$\frac{5.00 \times 63{,}025}{1750}$ = 180
Max. = $\frac{8.75}{4.44}$ x 1750 = 3448	$\frac{94 \times 3348}{63{,}025}$ = 5.0	$\frac{5.00 \times 63{,}025}{3348}$ = 94
Min. = $\frac{2.25}{10.38}$ x 1750 = 380	$\frac{180 \times 380}{63{,}025}$ = 1.1	$\frac{1.10 \times 63{,}025}{380}$ = 180

D_r = Driver Pulley Pitch Diameter (P.D.)
D_n = Driven Pulley Pitch Diameter (P.D.)
D_m = Mean or 1-1 Pitch Diameter (P.D.)
C = Center Distance Between Shafts
C_2 = Min. RPM Center Distance
N_1 = Driver Shaft RPM
N_2 = Driven Shaft RPM

Hi-Lo Pulleys are not recommended for drives that are reversed without coming to a full stop.

Drive Selection Example

A drive system requires driven shaft speeds of 400 RPM min. and 2400 RPM max. The torque requirement has been determined at 115 in.-lbs. throughout the speed range. The service is normal duty operating up to 16 hours per day. The specified driver is a 1750 RPM electric motor.

Step 1. Determine the Horsepower Requirement

The maximum HP requirement is determined at the maximum driven RPM.

$$HP = \frac{\text{Torque} \times N_2(\text{max.})}{63{,}025} = \frac{115 \times 2400}{63{,}025} = 4.38$$

Step 2. Apply the Drive Service Factor

Require HP Capacity = Service Factor x Drive HP
= 1.1 x 4.38 = 4.8

Step 3. Select Hi-Lo Pulley System

From the drive system's HP and speed range requirements a MCW90/106TBR drive can be used.

MCW90/106TBR Specifications:
Horsepower 5.0 at 1750 RPM, Speed Range 380-3420 RPM

In this case, the maximum RPM speed stop should be set at approximately 2400 RPM. To increase the drive system's speed to the available 3420 RPM would increase the HP requirement to where a 5 HP motor could be burned out.

$$HP = \frac{115 \times 3420}{63{,}025} = 6.24$$

Step 4. Determine the Recommended Center Distance

$$C = \frac{D_n(\text{max.}) + 3D_r(\text{max.})}{2} = \frac{10 + 3(8.75)}{2} = 18$$

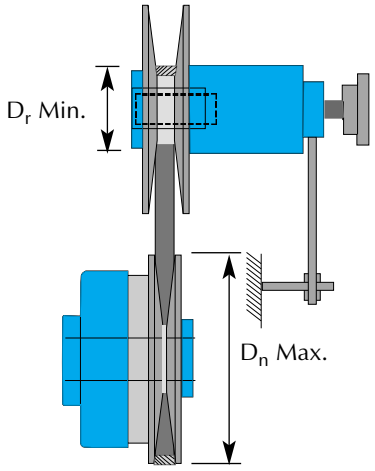
Step 5. Determine the Belt Size

From the pre-engineered belt and center distance selection tables (page 29), note that the closest center distance to the recommended one is 16.6 inches and the belt size listed above is 2322V541.

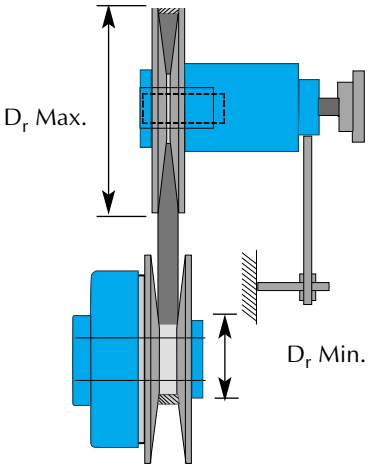
To find the belt length with a known center distance
$B.L. = 2C + 3.14D_m$
To find the center distance with a known belt length
$$C = \frac{B.L. - 3.14D_m}{2}$$

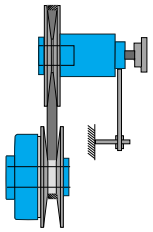
The correct center distance for an available belt length is necessary to obtain the full speed ratio of a Fixed Center Drive. Therefore, some center distance adjustment is required to adjust for belt length tolerances.

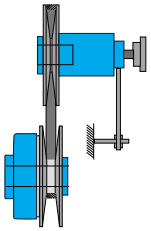
Min. RPM Position



Max. RPM Position







Drive Selection Worksheet

In order to select a Fixed Center Distance Drive you need to know and determine the following:

1. The horsepower or running torque requirement of the equipment. Hi-Lo Pulleys are rated in the catalog in conjunction with the rating of 1750 RPM and 1150 RPM electric motors.
2. The Service Factor of the drive. See charts below and on page 6 to determine other conditions that may affect drive selection.
3. The diameters of the driver shaft and driven shaft.
4. The RPM of the driver shaft.
5. The desired RPM range of the driven shaft.
6. The available center distance between the driver and driven shaft.
7. Determine the model Hi-Lo Pulley drive to be used, considering Horsepower and Speed Range requirement at the driven shaft.
8. Determine the belt to be used considering the Hi-Lo Pulley Drive selected and available center distance.

The Hi-Lo Catalog contains pre-engineered Belt Length and Center Distance selection tables for Hi-Lo Pulley Fixed Center Drives.

Service Factors for Hi-Lo Pulleys

	Operating Hours Per Day		
Service Environment	**0–8**	**8–16**	**16–24**
NORMAL DUTY: Where infrequent starting and peak loads do not exceed 160% of normal running load	1.00	1.10	1.30
MODERATE DUTY: Where occasional starting and peak loads do not exceed 250% of normal running loads	1.20	1.30	1.35
HEAVY DUTY: Where occasional starting and peak loads are in excess of 250% of normal running loads OR where starting loads, peak loads and overloads occur frequently	1.25	1.35	1.50

The service factors are important in selecting a variable speed pulley that will provide adequate service life.
Multiply the maximum running torque or horsepower of the drive by the appropriate service factor to determine the proper capacity Hi-Lo Pulley.

Fixed Center Distance Drives

HP Ratings Driven RPM 1750 to Max.	at Min.	Drive Ratio	RPM Range 1750 Motor	Driver Model #	Driven Model #	Face Diameter	Length	Belt Size	Standard Bore Sizes
V-BELT DRIVES									
				MCV 30		**3.38**			**.5•.625•.75**
.75	.38	4:1	875/3500		**30TBR**	3.38	6.18	A	.5•.625•.75
1.0	.39	3.1:1	687/2106		**40 TBR**	4.25	6.18	A	.5•.625•.75
				MCV 500		**5.00**			**.625•.75•.875**
1.5	.55	7.1:1	647/4625		**50 TBR**	5.00	7.50	B	.625•.75•.875
2.0	.64	5: 1	557/3014		**57-20 TBR**	5.75	7.50	B	.5•.625•.75•.875
2.0	.64	5.4:1	557/3014		**57 TBR**	5.75	9.01	B	.75•.875•1•1.125
2.0	.55	4.6:1	485/2248		**66 TBR**	6.63	8.00	B	.75•.875•1•1.125
2.0	.52	3.8:1	367/1408		**86 TBR**	8.63	8.00	B	.75•.875•1•1.125
				MCV 57		**5.75**			**.75•.875•1•1.125**
3.0	1.10	6.9:	1648/4500		**57 TBR**	5.75	9.01	B	.75•.875•1•1.125
3.0	.97	5.7:1	564/3214		**66 TBR**	6.63	9.01	B	.75•.875•1•1.125
5.0	1.22	4.0:1	427/1750		**86 TBR**	8.63	9.01	B	.75•.875•1•1.125
				MCW 600		**6.13**			**.625•.75•.875**
1.0	.31	10:1	550/5500		**60 TBR**	6.13	8.46	1422V	.625•.75•.875
1.5	.34	7.5:1	400/3000		**75 TBR**	7.50	8.46	1422V	.75•.875•1•1.125
				MCW 70		**7.13**			**.625•.75•.875•1**
2.0	.48	9.6:1	423/4075		**80 TBR**	8.00	9.88	1922V	.75•.875•1•1.125
3.0	.65	7.7:1	375/2863		**90-19 TBR**	9.00	10.57	1922V	510 Collet
3.0	.60	5.8:1	305/1776		**110TBR**	11.00	10.57	1922V	
				MCW 77		**7.75**			**.875•1•1.125**
3.0	.77	7.7:1	450/3470		**90-19 TBR**	9.00	11.34	1922V	510 Collet
5.0	1.00	5.8:1	365/2108		**110 TBR**	11.00	11.34	1922V	510 Collet
				MCW 90		**9.00**			**.875•1•1.125**
3.0	.77	10:1	450/4500		**90-23 TBR**	9.00	11.69	2322V	510 Collet
5.0	1.00	9:1	380/3420		**106 TBR**	10.60	11.69	2322V	510 Collet
5.0	.96	7.4:1	336/2490		**120 TBR**	12.00	11.69	2322V	510 Collet
				MCW 90-75		**9.00**			**1.125•1.25•1.375**
7.5	1.70	6:1	395/2397		**120 TBR**	12.00	11.74	2322V	510 Collet
ASYMMETRIC BELT DRIVES									
				MA 82		8.27			**1•1.125•1.375**
5.0	1.50	6:1	500/3000		**A 96**	9.63	9.00	23A	Collet No. 512
				MA 96		9.63			**1•1.125•1.375•1.625**
10.0	3.20	5.4:1	560/3000		**A 112**	11.20	12.30	26A	Collet No. 512
				MA 112		11.20			**1.375•1.625**
15.0	4.30	6:1	500/3000		**A 130**	13.0	12.70	26A	Collet No. 7713
				MA 112-33		11.20			**1.625•1.875**
30.0	9.80	5:1	600/3000		**A130-33**	13.00	13.30	33A	Collet No. 7713
				MA 136		13.60			**1.625•1.875•2.125**
40.0	11.40	5:1	600/3000		**A 164**	16.40	13.50	36A	SK Bushing
				MA 164		16.40			SK Bushing
50.0	21.00	4.5:1	717/3580		**A164**	16.40	14.70	36A	SK Bushing
60.0	30.00	4.6:1	700/3220		**A 177**	17.70	16.45	36A	SF Bushing
				MA 177		17.70			SF Bushing
75.0	55.00	3:1	1010/3000		**A 177**	17.70	18.13	36A	SF Bushing
100	40.00	4:1	595/2380		**A 221**	22.10	18.13	36A	SF Bushing
				MA 221		22.10			SF Bushing
125	75.80	2.5:1	838/2055		**A 221**	22.10	23.13	36A	SF Bushing