Contents

The V-Belt Drive is industry's most popular means of power transmission. It is easy to select, simple to install, and will provide years of reliable performance. Even when misapplied, improperly installed or completely ignored, the V-Belt Drive will usually deliver some kind of performance. However, with proper installation and maintenance, many years of operating efficiency can be added to the life span of the V-Belt Drive. It is hoped that the information contained herein will help you receive the greatest possible value from your V-Belts and sheaves.

Bushing Installation Instructions

Q-D® Instructions

⚠ WARNING

- Read and follow all instructions carefully.
- Disconnect and lock-out power before installation and maintenance. Working on or near energized equipment can result in severe injury or death.
- Do not operate equipment without guards in place. Exposed equipment can result in severe injury or death.

NOTICE

- Failure to use the cap screws that came with the Product may lead to an unsafe assembly.

⚠ CAUTION

- Periodic inspections should be performed. Failure to perform proper maintenance can result in premature product failure and personal injury.
- All electrical work should be performed by qualified personnel and compliant with local and national electrical codes.
- To avoid damage, supporting structure including shafts and bearings must be designed to handle transmitted loads and belt tension(s).

Before Installation:

1. Make sure the shaft, bushing barrel and bore, Q-D bushed product bore, key and keyway are free of burrs, paint etc. Make sure the key, as applicable, will slide in both shaft keyseat and bushing bore keyway.

   NOTICE: Lubricant on bushing barrel, hub or screws could lead to breakage.

2. For proper operation, make sure the shaft size is within the size limits shown in Table 1. Some applications may benefit from tighter shaft tolerances

   NOTICE: Mounting a Q-D® Bushing on a shaft smaller than the size limits shown in Table 1 may result in a faulty assembly. The assembly may come off the shaft or undesirable assembly runout may result.

Mounting:

3. For light weight products, the bushing may first be loosely installed into the Q-D bored product, hereafter referred to as “product”, and then the assembly slid onto the shaft (Illustration 1A and B). For heavier products, it is usually easier to either first slide the bushing onto the shaft, then slide the product onto the bushing (Illustration 2A), or first position the product over the shaft, next slide the bushing onto the shaft, and then pull the product onto the bushing (Illustration 2B). The “light weight products” method is common, however if the bushing barrel has collapsed, it must be wedged open (described below), and the “heavy product” procedure may be easier.

Heavier product may require a hoist or other means of holding the product in position until the bushing is inserted into the product. When mounting on a vertical shaft, make sure the bushing and the product do not drop during installation.

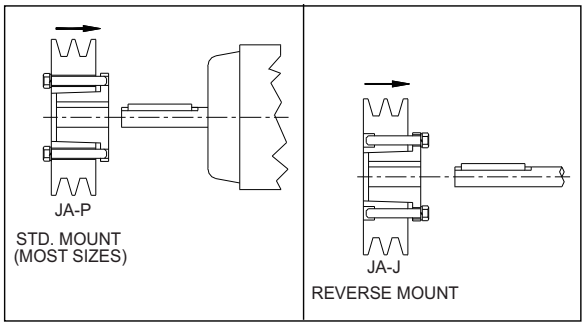


ILLUSTRATION 1A - - QD ASS'Y, FLANGE IN BOARD

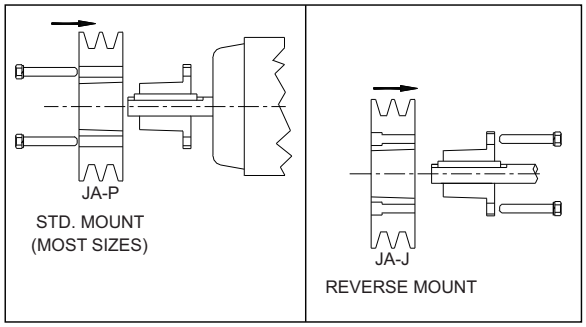


ILLUSTRATION 2A - - QD COMPONENTS, FLANGE INBOARD

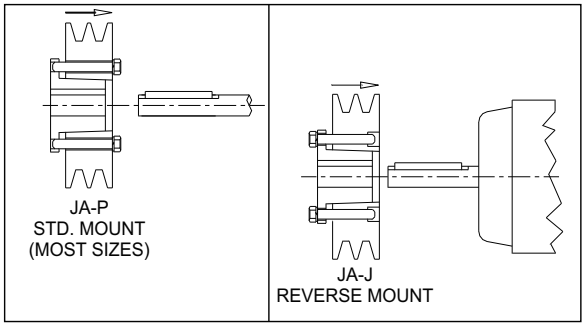
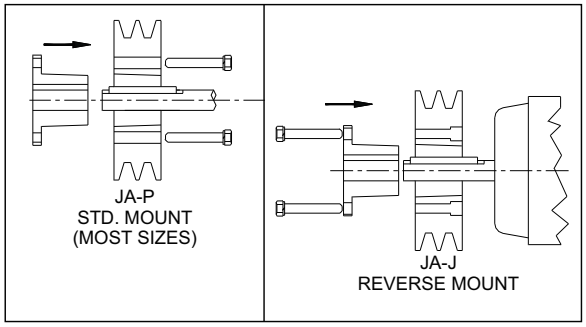


ILLUSTRATION 1 B - - QD ASS'Y, FLANGE OUTBOARD



ILUSTRATION 2B - - QD COMPONENTS, FLANGE OUTBOUND

Bushing Installation Instructions

Q-D® Instructions

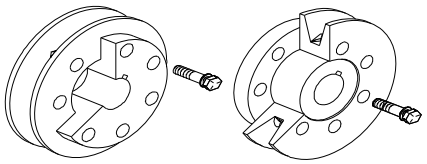
4. It may be necessary to slightly wedge open the saw slot on some bushings in order to start the bore and position the bushing onto the shaft. A narrow edged regular screw driver may be used.

NOTICE: Excessive wedging forces in Bushing saw slot may damage or break Bushing. AVOID.

5. Align the shaft keyseat as applicable with the bushing bore keyway and install the key. Make sure the key runs the entire length of the bushing bore.

6. For standard Q-D mounting, align the non-threaded holes in the product with the threaded holes in the bushing flange. For reverse Q-D mounting, align the non-threaded holes in the bushing flange with the threaded holes in the product. See illustration below. Some Q-D products can only be reverse mounted. Insert the cap screws and thread them by hand three or four turns.

INSTALLATION



Reverse Mount Std Mount

7. Position the bushing - product assembly axially on the shaft such that it is aligned with its running mate. Be sure to check for adequate clearance between the assembly and other nearby components if applicable. If the bushing has a setscrew over the keyway, tighten it to the torque value in Table 2.

NOTICE: Tightening the set screw to a torque higher than shown in Table 2 may lead to Bushing damage or breakage. AVOID.

8. If the bushing - product assembly is not between the shaft bearings, then locating the assembly closer to a bearing will reduce the load and increase the life of both bearings. Check for adequate clearance as stated in Step 7.

9. Using a torque wrench and appropriate socket, tighten the capscrews with lock washers sequentially until each is tightened to the torque shown in Table 2. When the capscrew torque is at or near recommended torque, make at least two more sequential rounds to assure all capscrews are at the Table 2 capscrew torque value.

NOTICE: Tightening the cap screws to a torque higher than shown in Table 2 may lead to Bushing damage or breakage. AVOID.

10. If cap screws are provided with the product, use them instead of the ones provided with the bushing.

11. Since tightening the capscrews may affect the axial position of the product, confirm that it is still properly aligned with its running mate. If not, determine how much the assembly must be moved to be in proper alignment.

12. If axial adjustment is required, (following removal procedure), reposition the assembly and repeat step 9.

13. Check installation gap - there must be a gap between the bushing flange and the product face. If there is no gap between them, disassemble the parts (following removal procedure) and determine the reason(s) for the faulty assembly.

Removal:

1. Heavier product may require a hoist or other means of supporting the product during the removal procedure. When removing from a vertical shaft, make sure the bushing and product do not drop during removal.

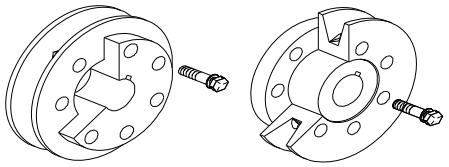
2. Remove all capscrews sequentially. If the bushing has a keyway setscrew, loosen it.

3. For standard Q-D removal, insert capscrews into all threaded holes in product. For reverse Q-D removal, insert cap screws into all threaded holes in bushing flange. In both cases, insert the removal screws from the same side of the assembly, wherever possible, from which the capscrews were just removed. See illustration below.

4. Tighten the capscrews against the face until the screw force releases the product from the bushing.

5. Remove the bushing and product from the shaft using appropriate means.

REMOVAL



Reverse Removal Std. Removal

Table 1: Shaft Size Limits for Q-D Bushings

Shaft Size Range (IN)		Lower Shaft Size Limit (IN)	Shaft Size Range (MM)		Lower Shaft Size Limit (MM)
Through	Above		Through		
-	1 1/2	-0.003	-	38.1	-0.076
1 1/2	2 1/2	-0.004	38.1	63.5	-0.102
2 1/2	4	-0.005	63.5	101.6	-0.127
4	6	-0.006	101.6	152.4	-0.152
6	8	-0.007	152.4	203.2	-0.178
8	9	-0.008	203.2	228.6	-0.203
9	-	-0.009	228.6	-	-0.229

Note: Upper limit is + 0 whether units are inches or millimeters.

Table 2: Tightening Torques

Bushing	SAE Grade 5.1 or 5 Cap Screw		Cap Screw Torque			Set Screw Size	Set Screw Torque		
	No.	Size	(In-Lbs)	(Ft-Lbs)	(N -M)		(In-Lbs)	(Ft-Lbs)	(N -M)
JA	3	#10 -24NC	60	5	6.8	—	—	—	—
SH-SDS -SD	3	1/4 -20NC	108	9	12.2	1/4 -20NC	87	7.25	9.8
SK	3	5/16 -18NC	180	15	20.3	1/4 -20NC	87	7.25	9.8
SF	3	3/8 -16NC	360	30	40.7	5/16 -18NC	165	13.8	18.6
E	3	1/2 -13NC	720	60	81.4	3/8 -16NC	290	24.2	32.8
F	3	9/16 -12NC	900	75	101.7	3/8 -16NC	290	24.2	32.8
J	3	5/8 -11NC	1620	135	183.1	3/8 -16NC	290	24.2	32.8
M	4	3/4 -10NC	2700	225	305.1	3/8 -16NC	290	24.2	32.8
N	4	7/8 -9NC	3600	300	406.8	1/2 -13NC	620	51.7	70.1
P	4	1 -8NC	5400	450	610.2	1/2 -13NC	620	51.7	70.1

(N-M) = Newton Meters

Gearbelt Installation Instructions

Gearbelt Pulley Alignment

Before installing bushings, refer to QD® Instructions and Split Taper Instructions. After installing the bushings in the pulleys and the resulting assemblies onto the shafts, use a straight edge, piano wire, or string placed on the outside face of both pulleys to adjust parallel offset and angular alignments. The straight edge, piano wire, or string should be close to the shafts and contact each pulley in two places on the flanges (or on the face of an unflanged pulley). The objective is to have the shafts parallel and the center lines of the two pulley faces in line.

⚠WARNING

Disconnect power before installation and maintenance. Failure to do so can result in severe injury or death.

See Figure 1 below.

⚠CAUTION

Shaft horizontal drives must have at least one flanged pulley; shaft vertical drives must have all pulleys flanged, otherwise belt may come off.

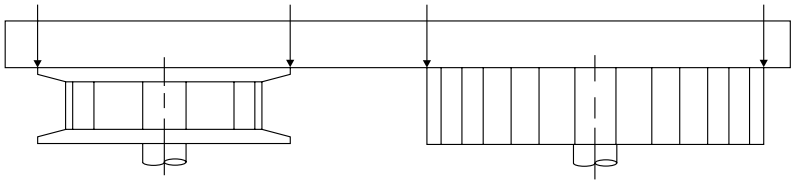


Figure 1

Belt drives should be aligned as perfect as possible to maximize drive life. The practical maximum misalignment is stated as the angle at which the belt enters the pulley. This angle is a result of both angular and parallel offset misalignment, and is 1/4 degree.

Gearbelt Installation

Condition A – One Flanged Pulley and One Unflanged Pulley.

After pulleys have been mounted and aligned, reduce the shaft center distance as shown in Table 1. Put the belt over the flanged pulley first, then slip onto the unflanged pulley.

Condition B – Both Pulleys Flanged.

After pulleys have been mounted and aligned, reduce the shaft center distance as shown in Table 1. Put the belt over the larger pulley first, then the smaller pulley.

Condition C – Minimum Center Distance Adjustment.

1. Mount one pulley onto the shaft loosely and put the belt on it.
2. Put the other pulley into the belt loop and slip it onto the other shaft (bushing loosely installed).
3. Align the drive and tighten the bushings.

Timing belts have been designed to have proper pitch dimensions under correct tensions. Belts may not fully seat in large diameter pulleys without applying proper tension to the belt.

⚠CAUTION

Do not pry or otherwise force belts onto sprockets. Doing so can result in permanent damage to the belt.

TABLE 1 INSTALLATION AND TAKE-UP ALLOWANCES (Inches)

Belt Pitch	Allowance for Installation (Inches)			Allowance for Take-Up
	Condition A	Condition B	Condition C	
XL	.5	.6	.1	.1
L	.6	.7	.14	.14
H	.7	.8	.16	.16
XH	1.3	1.5	.40	.40
XXH	1.8	2.0	.50	.50

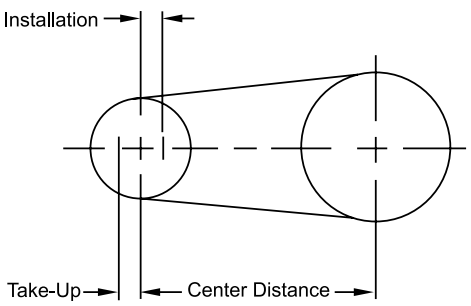


Figure 2

Gearbelt Installation Instructions

Tensioning Gearbelts

Calculate or measure the belt span length as shown in Figure 3. Calculate the required deflection by multiplying this number by 1/64. For example, if the belt span is 32 inches, 32 x 1/64 = 1/2 inch deflection. Increase the belt tension by increasing the center distance (or adjusting the idler, if present). Apply the force listed in Table 2 evenly across the width of the belt at the center of the belt span. A strip of keystock or similar material may be used to help distribute the force evenly across the belt width. Drives with shock loading or other unusual conditions may require increased tension. Always check to be sure bearings can handle the loads.

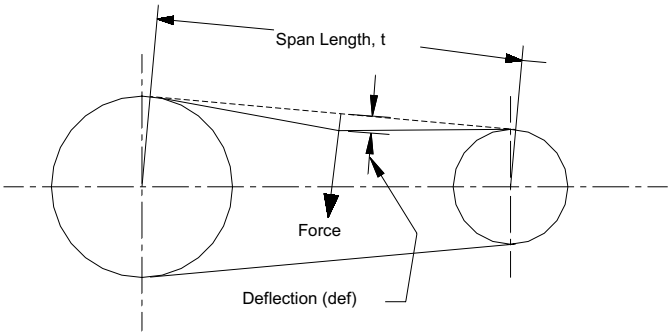
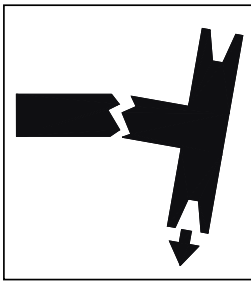


Figure 3

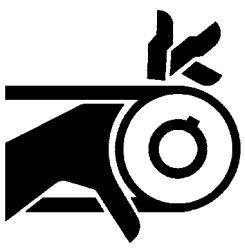
TABLE 2
DEFLECTION FORCE FOR HPT BELTS (Lbs)

	BELT WIDTHS (Inches)									
Cross-Section	1/4	3/8	1/2	3/4	1	1 1/2	2	3	4	5
XL	0.4	0.5								
L			1.0	1.6	2.2					
H				4.0	6.0	9.0	12.0	19.0		
XH							17.0	26.0	37.0	
XXH							20.0	32.0	45.0	58.0



⚠CAUTION

To avoid damage, supporting structure including shafts and bearings must be designed to handle transmitted loads and belt tension(s).



⚠WARNING

Operating drives without guards in place can result in severe injury or death.

Belt Tension Checker Instruction Sheet

PowerDrive belt tension checker capable of testing force and belt tension on single strand belts with in the mention ranges on belts.

Recommended For : BELTS — A, AX, B, BX, C, CX ,D; 3V, 3VX, 5V, 5VX, 8V; 3L, 4L, 5L

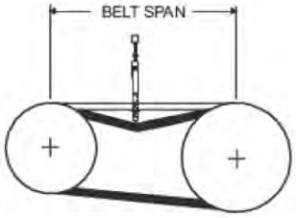
RANGE — FORCE : 0-35 lbs.; TENSION: 0-560lbs.

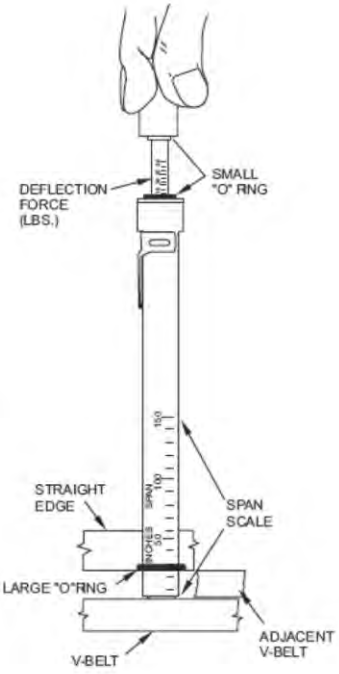
Operation :

Uses the universally accepted method of determining belt tension by depressing the belt 1/64 of an inch per inch of span. This results in an "F" over "T" ratio of 1 to 16. The maximum tension capability of this instrument therefore is 16 times 35, or 560 lbs.

Tension Measurement Procedure :

- ⇨ Measure the length of span from sheave tangent points. (Refer sketch)
- ⇨ Set the bottom of the large "0" ring at the correct point (on "50" if it is a 50-inch span) and set the top (small "0" ring) down against the instrument's flange.
- ⇨ Depress the instrument downward at the center of the span until the large "0" ring at the base of the instrument is in line with the tangent point of the drive. (This may be accomplished with a straight-edge, or a neighboring belt in a multiple-belt drive).
- ⇨ Read the number of pounds of force indicated by the small '0' ring on the plunger rod and multiply by 16 to determine belt tension.





PowerDrive Belt Tension Checker

Note :
1. Ideal tension is the lowest tension at which the belt will not slip under peak load conditions.
2. Check tension frequently during the first 24 hours of operation. Check after jog start or 1-3 minutes of operation, at 8 hours, 24 hours, 100 hours and periodically thereafter are recommended.
3. Over tensioning shortens belt and bearing life.
4. Keep belts free of foreign material which may cause slip.
5. Make v-drive inspection on a periodic basis. Under-tensioned belt drives often produce audible squeal noise. Tension when slipping. Never apply belt dressing as this will damage the belt and cause early failure.

⚠WARNING

Disconnect power before installation and maintenance. Failure to do so can result in severe injury or death.

⚠WARNING

Operating drives without guards in place can result in severe injury or death.

Belt Tension Checker Instruction Sheet

Table : No. 1 SHEAVE DIAM - INCHES

DEFLECTION FORCE - LB
Belt Deflection Force

Cross Section	Smallest Sheave Diameter Range	RPM Range	Individual and Banded-Wrapped Belts		Individual and Banded-Notched Belts	
			Used Belt	New Belt	Used Belt	New Belt
A,AX	3.0 - 3.6	1000-2500	3.7	5.5	4.1	6.1
		2501-4000	2.8	4.2	3.4	5.0
	3.8 - 4.8	1000-2500	4.5	6.8	5.0	7.4
		2501-4000	3.8	5.7	4.3	6.4
	5.0 - 7.0	1000-2500	5.4	8.0	5.7	8.4
		2501-4000	4.7	7.0	5.1	7.6
B,BX	3.4 - 4.2	860-2500	-	-	4.9	7.2
		2501-4000	-	-	4.2	6.2
	4.4 - 5.6	860-2500	5.3	7.9	7.1	10.5
		2501-4000	4.5	6.7	6.1	9.1
	5.8 - 8.6	860-2500	6.3	9.4	8.5	12.6
		2501-4000	6.0	8.9	7.3	10.9
C,CX	7.0 - 9.0	500-1740	11.5	17.0	14.7	21.8
		1741-3000	9.4	13.8	11.9	17.5
	9.5 - 16.0	500-1740	14.1	21.0	15.9	23.5
		1741-3000	12.5	18.5	14.6	21.6
D	12.0 - 16.0	200-850	24.9	37.0	-	-
		851-1500	21.2	31.3	-	-
	18.0 - 20.0	200-850	30.4	45.2	-	-
		851-1500	25.6	38.0	-	-
3V,3VX	2.2 - 2.4	1000-2500	-	-	3.3	4.9
		2501-4000	-	-	2.9	4.3
	2.65 - 3.65	1000-2500	3.6	5.1	4.2	6.2
		2501-4000	3.0	4.4	3.8	5.6
	4.12 - 6.90	1000-2500	4.9	7.3	5.3	7.9
		2501-4000	4.4	6.6	4.9	7.3
5V,5VX	4.4 - 6.7	500-1749	-	-	10.2	15.2
		1750-3000	-	-	8.8	13.2
		3001-4000	-	-	5.6	8.5
	7.1 - 10.9	500-1740	12.7	18.9	14.8	22.1
		1741-3000	11.2	16.7	13.7	20.1
	11.8 - 16.0	500-1740	15.5	23.4	17.1	25.5
		1741-3000	14.6	21.8	16.8	25.0
8V	12.5 - 17.0	200-850	33.0	49.3	-	-
		851-1500	26.8	39.9	-	-
	18.0 - 22.4	200-850	39.6	59.2	-	-
		851-1500	35.3	52.7	-	-

SHEAVE DIAM - INCHES
DEFLECTION FORCE - LBS.

Belt Cross Section	Smallest Sheave Diameter Range	Belt Deflection Force	
		Used Belt	New Belt
3L	1.25 - 1.75	3/8	5/8
	2.00 - 2.25	3/4	1 1/4
	2.50 - 3.00	1	1 1/2
4L	2.10 - 2.80	5/8	1
	3.00 - 3.50	1 5/8	2 1/2
	3.70 - 5.00	2	3
5L	3.00 - 4.20	1 1/2	2 5/8
	4.50 - 5.20	2 1/2	3 1/2

⚠CAUTION

To avoid damage, supporting structure including shafts and bearings must be designed to handle transmitted loads and belt tension(s).

Note:

1) For multiple or banded belts the belt deflection force shown in Table 2 must be multiplied be the number of belts or number of ribs in the banded belt. Lay a narrow steel bar such as keystock across the belt(s) and apply the belt deflection force to the bar such that all the individual belts or ribs are deflected evenly.
2) For drives with service factor greater than 1.5, consult PowerDrive. For exact tension calculations, use the PowerDrive Advance Drives Solutions selection program at www.powerdrive.com.