

# **VOITH TURBO**

## **Installation and Operating Manual**

### **Turbo Couplings with Disk Pack (XP) Connection Couplings**

#### **Supplement to 3626-011000 en**

**ATTENTION!**

**Please be sure to read this manual prior to installation and commissioning and keep it for further use!**

**Revision: 17APR08**

# Turbo Couplings with Disk Pack (XP) Connection Couplings

## Table of Contents

<b>1. Introduction.....</b>	<b>3</b>
<b>2. Installation and Alignment Instructions.....</b>	<b>3</b>
2.1 Maximum operation speeds based on turbo coupling and disk pack hub type..	3
2.2 Installation of motor and reducer (output side) coupling halves.....	4
2.3 Shaft alignment.....	5
2.4 Installation of the fluid coupling.....	6
<b>3. Monitoring and Inspection.....</b>	<b>13</b>
3.1 Detection.....	13
<b>4. Analysis of Failed Disk Couplings.....</b>	<b>17</b>
<b>5. Spare Parts.....</b>	<b>20</b>
5.1 422 XP spares.....	21
5.2 487 XP spares.....	22
5.3 562 XP spares.....	23
5.4 650 XP spares.....	24
5.5 750 XP spares.....	25
5.6 866 XP spares.....	26
5.7 1000 XP spares.....	27
<b>6. Alignment Bracket.....</b>	<b>28,29,30</b>

This manual has been issued with great care. However, in case you should need any further information, please contact:

**Voith Turbo Inc. (U.S.A.)**  
25 Winship Road  
York, PA 17406  
U.S.A.  
Phone: (717) 767-3200 FAX: 3210

**Voith Turbo Inc. (Canada)**  
2-106 Rayette Road  
Concord, Ontario L4K 2G3  
Canada  
Phone: (905) 738-1829 FAX: 9462

Voith reserves the right for modifications.

## Turbo Couplings with Disk Pack (XP) Connection Couplings

### **1. Introduction**

Voith disk pack mount style fluid couplings provide for a radially removable mount style arrangement while at the same time providing a generous misalignment tolerance. This mount style also reduces the overhung load on the reducer or driven shaft.

The disk pack couplings are designed to provide years of trouble free operation provided the couplings are installed according to the attached instructions and periodic inspections are implemented to assure the original installed conditions are maintained, (alignment and bolt torque).

The four most important factors in achieving good service life on the disk pack mount style are:

1. Proper assembly i.e., thick washers and thin washers are in the proper locations as shown in the illustrations that follow.
2. Input and output shafts are aligned within the tolerances listed in the tables that follow.
3. The "gap" between the face of the motor side coupling half and the reducer (or output) shaft coupling half is adjusted after assembly to eliminate "oil canning" of the disk packs. The disk packs should not have a "wave" after final assembly and alignment. A "wave" or deflection of the disks indicates misalignment or improper "gap." The intermediate coupling half is provided with a Class 1 clearance fit and two set screws to allow for adjustment of the axial position on the coupling stub shaft.
4. The torque applied to the disk pack bolts is critical. The torque value for these bolts is indicated in the tables. The pattern for tightening the bolts is also critical, tighten bolts in a star pattern. Do not torque the bolts using an "around-the-clock" method or a disk may be pre-stressed.

### **2. Installation and Alignment Instructions**

#### **2.1 Maximum operation speeds based on turbo coupling and disk pack hub type.**

TABLE 1 is provided as reference for situations where a turbo coupling installation or operational parameters have changed. In all cases, our recommendation is that you contact us with the turbo coupling serial number for verification of the suitability of the unit for the new application. Please note that units are normally supplied with cast iron hubs.

**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**TABLE 1  
"Maximum Operation Speeds"**

HUB TYPE	422	487	562	650	750	866	1000
CAST IRON	2200 rpm	2000 rpm	1800 rpm	1800 rpm	1800 rpm	1500 rpm	1250 rpm
STEEL	2200 rpm	2000 rpm	1800 rpm	1800 rpm	1800 rpm	N/A	N/A

**2.2 Installation of motor and reducer (output side) coupling halves.**

Determine which hubs match the motor shaft diameter and reducer (or output) shaft diameter. The motor and reducer side coupling hubs are supplied with an interference fit. Both the motor side and reducer side coupling hubs may be heated up to 350°F (with disk pack hardware removed!) to facilitate installation onto the shafts. Use a torch with a rosebud tip, an oil bath or other method to assure uniform heating. Cooling of the shafts with dry ice is also acceptable. Do not spot heat the hubs or distortion may occur! Never use excessive force or "hammer" the hubs onto the shafts. Improper installation practices could seriously damage the drive components and result in premature failure. It is recommended that the face of the coupling half be mounted flush with the end of the shaft to facilitate radial removal of the fluid coupling. Be sure to remove all "burrs" from shaft and bore surfaces. Application of an anti-seize compound is recommended.

Adjust the shaft gap to the appropriate dimension in TABLE 2. (Face to face between the coupling halves, not at the raised "boss" area around the bolt holes.) The gaps shown are for units with all cast iron hubs. These dimensions will work for any hub configuration.

**TABLE 2  
"Shaft Gap"**

TYPE	422	487	562	650	750	866	1000	SIZE
T-XP	15.59"	17.30"	19.03"	21.43"	26.02"	29.41"	32.26"	GAP +.25" -.00"
TV-XP	17.13"	19.31"	21.45"	24.06"	28.94"	32.24"	36.44"	
TVV-XP	20.20"	22.66"	25.18"	28.39"	33.93"	38.07"	41.91"	
TVVS-XP	20.20"	22.66"	25.18"	28.39"	33.93"	38.07"	41.91"	

**2.3 Shaft alignment**

The large shaft gap required for disk pack mount style couplings makes alignment by conventional means (dial indicators) difficult. VTI highly recommends the use of an optical alignment tool. Dial indicators can also be used in conjunction with a specially designed alignment bracket available from Voith. Specific drawings to make this bracket are included toward the end of this manual.

Proceed by installing the alignment equipment onto the shafts as recommended by the manufacturer. The special Voith "dial indicator" bracket should be mounted onto the motor side hub.

The alignment values in TABLE 3 should be used when checking alignment prior to the installation of the fluid coupling.

**TABLE 3  
"Angular and Parallel Misalignment Tolerances"**

SIZE	MAX ANGULAR T.I.R.	MAX PARALLEL T.I.R.
422	.016"	T = .029" / TV = .033" / TVV & TVVS = .039"
487	.018"	T = .033" / TV = .037" / TVV & TVVS = .044"
562	.020"	T = .036" / TV = .041" / TVV & TVVS = .049"
650	.021"	T = .041" / TV = .046" / TVV & TVVS = .055"
750	.030"	T = .049" / TV = .055" / TVV & TVVS = .066"
866	.033"	T = .058" / TV = .064" / TVV & TVVS = .076"
1000	.036"	T = .064" / TV = .072" / TVV & TVVS = .080"

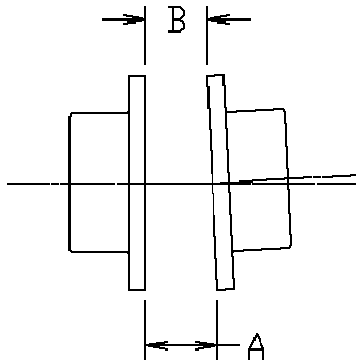
T.I.R. = Total Indicated Runout

Once a coupling is installed or for periodic checks of the alignment, the following allowable values are applicable for both the input and output disk pack assembly. The gap can be measured as follows:

Motor (input) end: Between hub face and input flange surface (attached to delay chamber).

Reducer (output) end: Between intermediate hub face and output hub face.

## Turbo Couplings with Disk Pack (XP) Connection Couplings



SIZE / TYPE	A-B MAX.
422 / ALL XP	.008"
487 / ALL XP	.009"
562 / ALL XP	.010"
650 / ALL XP	.010"
750 / ALL XP	.015"
866 / ALL XP	.016"
1000 / ALL XP	.018"

### **2.4 Installation of fluid coupling**

Review manual 3626-011000, Installation and Operating Manual, turbo Couplings with Constant Fill, section 6.

Verify that the existing gap between the hub faces is no shorter than the values listed in TABLE 2. Slightly larger shaft gaps (no greater than +1/4") can be easily accommodated by repositioning the intermediate hub (explained later in this section).

Assemble the input side disk pack hardware onto the motor hub and input flange as shown in FIGURE 1A or FIGURE 1B by performing the following steps. Note that the bolt holes in the hub, disk pack and flange are a very close tolerance fit to the special bolts provided. Care must be taken during assembly to prevent damaging the disk pack. Never "hammer" the bolts through the disk pack. Also note that each disk pack assembly is carefully engineered to provide long service life for each application. Never attempt to modify the assembly by substituting hardware or changing the number of disks.

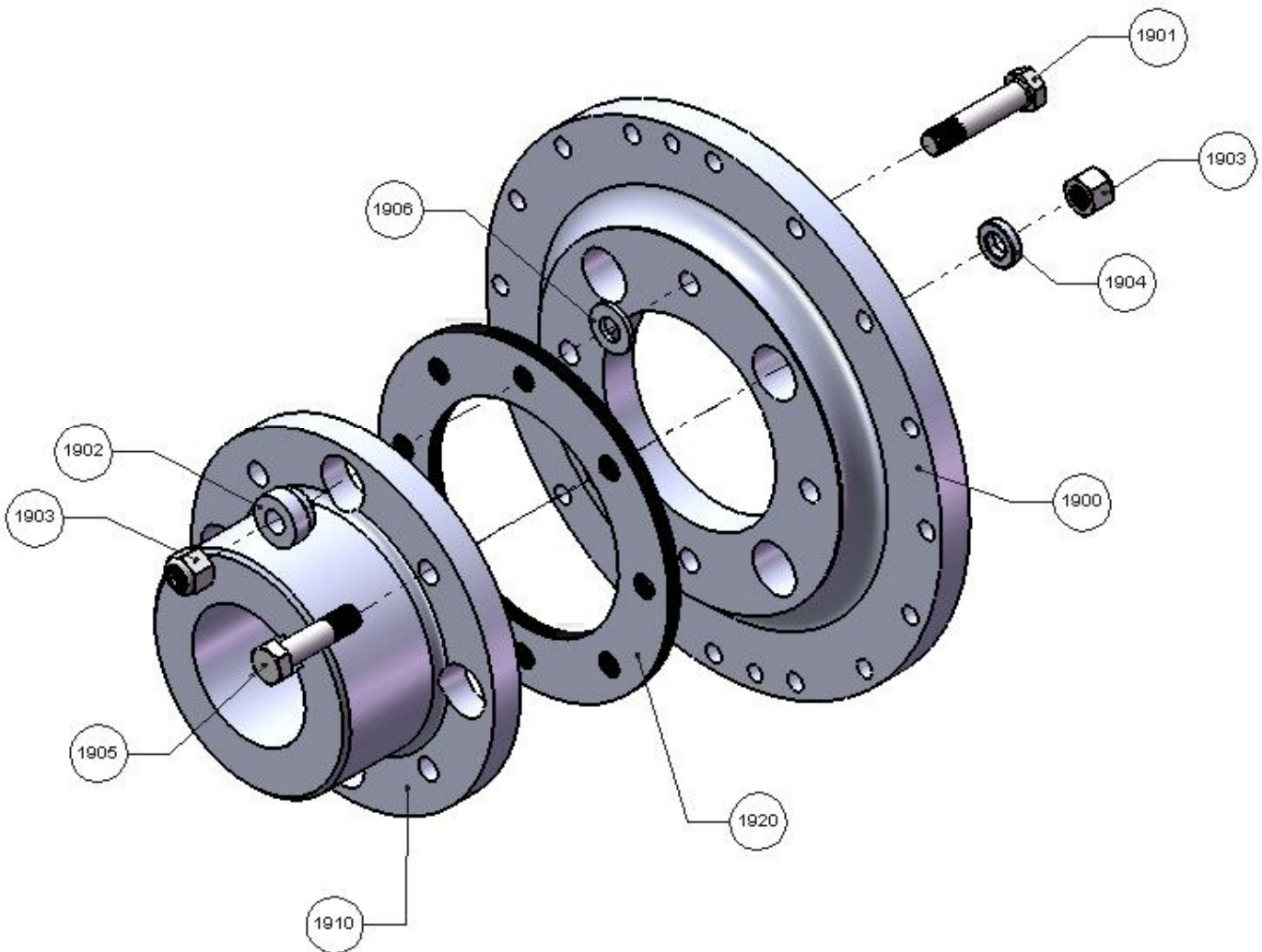
1. Install four short bolts (POS 1905) through the small holes of the motor hub.
2. If the motor hub is cast iron with raised bosses at the small holes, go to step 3. Otherwise, apply a thin washer (POS 1906) onto each bolt.
3. Slide the disk pack (POS 1920) onto the four bolts.
4. Apply one bevel washer (POS 1904) and thread one locknut (POS 1903) onto each short bolt (POS 1905).
5. Remove the adapter flange (POS 1900) from the turbo coupling and support the flange in position close to the previously installed motor side disk pack components.
6. Install four long bolts (POS 1901) through the small holes of the adapter flange (POS 1900).
7. Apply one thin washer (POS 1906) onto each bolt.
8. Position the adapter flange (POS 1900) with the applied hardware (POS 1901 & 1906) so that the bolts can pass through the remaining open holes on the disk pack (POS 1920).
9. Apply one pilot washer (POS 1902) and thread one locknut (POS 1903) onto each long bolt (POS 1901).

## Turbo Couplings with Disk Pack (XP) Connection Couplings

NOTE: THE DISK PACK (POS 1920) SHOULD NEVER BE FLAT AGAINST A FLANGE OR HUB!! SPACE SHOULD BE PRESENT BETWEEN THE DISK PACK AND HUB OR FLANGE TO ALLOW THE DISK PACK TO FLEX!!

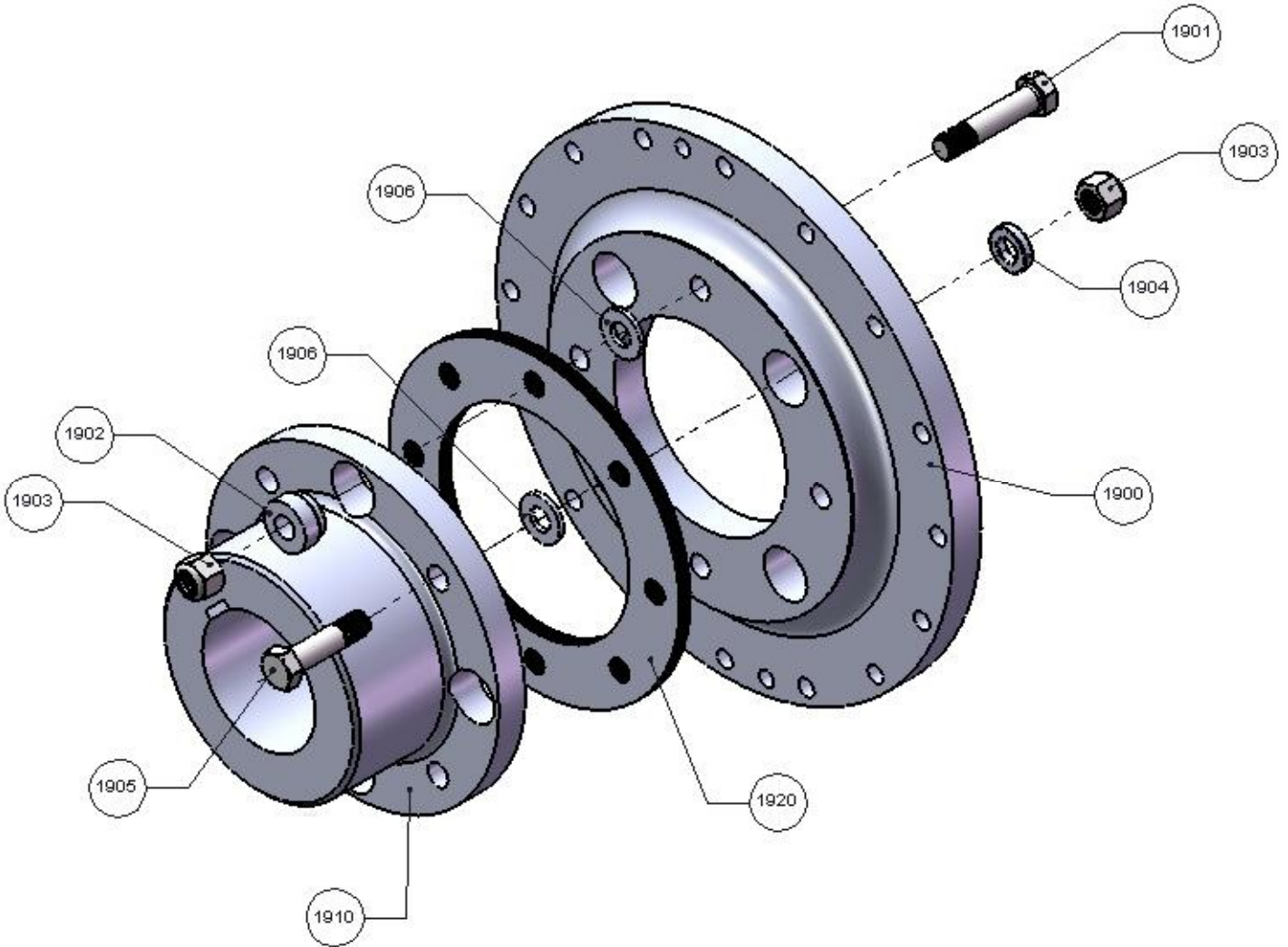
FIGURE 1A

### CAST IRON INPUT HUB



**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**FIGURE 1B  
STEEL INPUT HUB**



Once assembled, begin to torque the disk pack locknuts while holding the bolts stationary in a "criss-cross" pattern to one half the value listed in TABLE 4. Proceed to torque the locknuts while holding the bolts stationary to the full torque value utilizing the previously stated method. The use of a torque wrench is necessary for this step.



**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**TABLE 4  
“Bolt Torque”**

SIZE	DISK PACK BOLTS (oil lubricated)	ADAPTER FLANGE BOLTS (oil lubricated)
422	40 lb.ft.	45 lb.ft. (M12)
487	95 lb.ft.	55 lb.ft. (M12)
562	130 lb.ft.	45 lb.ft. (M12)
650	175 lb.ft.	100 lb.ft. (M16)
750	255 lb.ft.	100 lb.ft. (M16)
866	335 lb.ft.	185 lb.ft. (M20)
1000	425 lb.ft.	185 lb.ft. (M20)

With the input disk pack preassembled, the fluid coupling assembly can now be positioned between the motor and reducer. See TABLE 5 to determine the weight of the particular coupling unit you are installing.

Fasten the disk pack input flange (POS 1900) to the delay chamber using the bolts (POS 1830) and wave washers (POS 1840). The tightening torque is as listed previously in TABLE 4. Do not overtorque these fasteners or damage to the coupling helicoils may result!

Assemble the output side disk pack hardware onto the reducer hub and stub shaft hub as shown in FIGURE 2A or FIGURE 2B by performing the following steps.

1. Support the disk pack (POS 1920) between the reducer and stub shaft hub.
2. Install four short bolts (POS 1905) through the small holes of the reducer hub and the disk pack (POS 1920). If the reducer hub is cast iron with raised bosses at the small holes, go to step 3. Otherwise, apply a thin washer (POS 1906) between the reducer hub and disk pack (POS 1920) and then re-apply each short bolt (POS 1905).
3. Apply one bevel washer (POS 1904) and thread one locknut (POS 1903) onto each short bolt (POS 1905).
4. Install four long bolts (POS 1901) through the small holes of the stub shaft hub and disk pack (POS 1920). If the stub shaft hub is cast iron with raised bosses at the small holes, skip to step 5. Otherwise, apply a thin washer (POS 1906) between the stub shaft hub and disk pack (POS 1920) and then re-apply each long bolt (POS 1901).
5. Apply one pilot washer (POS 1902) and thread one locknut (POS 1903) onto each long bolt (POS 1901).

**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

NOTE: THE DISK PACK (POS 1920) SHOULD NEVER BE FLAT AGAINST A FLANGE OR HUB!! SPACE SHOULD BE PRESENT BETWEEN THE DISK PACK AND HUB OR FLANGE TO ALLOW THE DISK PACK TO FLEX!!

**TABLE 5  
"Coupling Weights"**

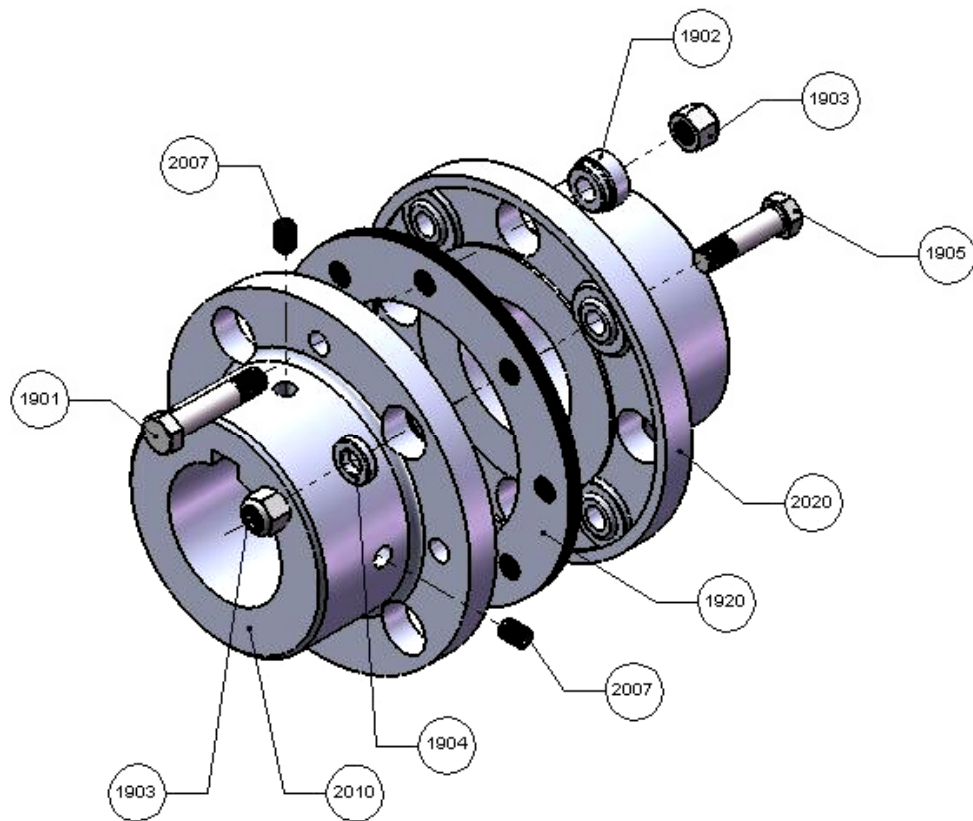
TYPE	422	487	562	650	750	866	1000
T-XP	230 lbs.	330 lbs.	485 lbs.	686 lbs.	1069 lbs.	1789 lbs.	2398 lbs.
TV-XP	234 lbs.	332 lbs.	490 lbs.	686 lbs.	1091 lbs.	1800 lbs.	2453 lbs.
TVV-XP	240 lbs.	350 lbs.	511 lbs.	719 lbs.	1135 lbs.	1855 lbs.	2530 lbs.
TVVS-XP	251 lbs.	365 lbs.	534 lbs.	756 lbs.	1175 lbs.	1965 lbs.	2680 lbs.

Once assembled, begin to torque the disk pack locknuts while holding the bolts stationary in a "criss-cross" pattern to one half the value listed in TABLE 4. Proceed to torque the locknuts while holding the bolts stationary to the full torque value utilizing the previously stated method. Inspect the input and output disk pack to see if any "oil-canning" is present. If required, loosen the setscrews (POS 2007) on the stub shaft hub and slide the hub to remove the "oil-canning" condition.

Proceed to torque the bolts to the full torque value utilizing the previously stated method. The use of a torque wrench is necessary for this step.

FIGURE 2A

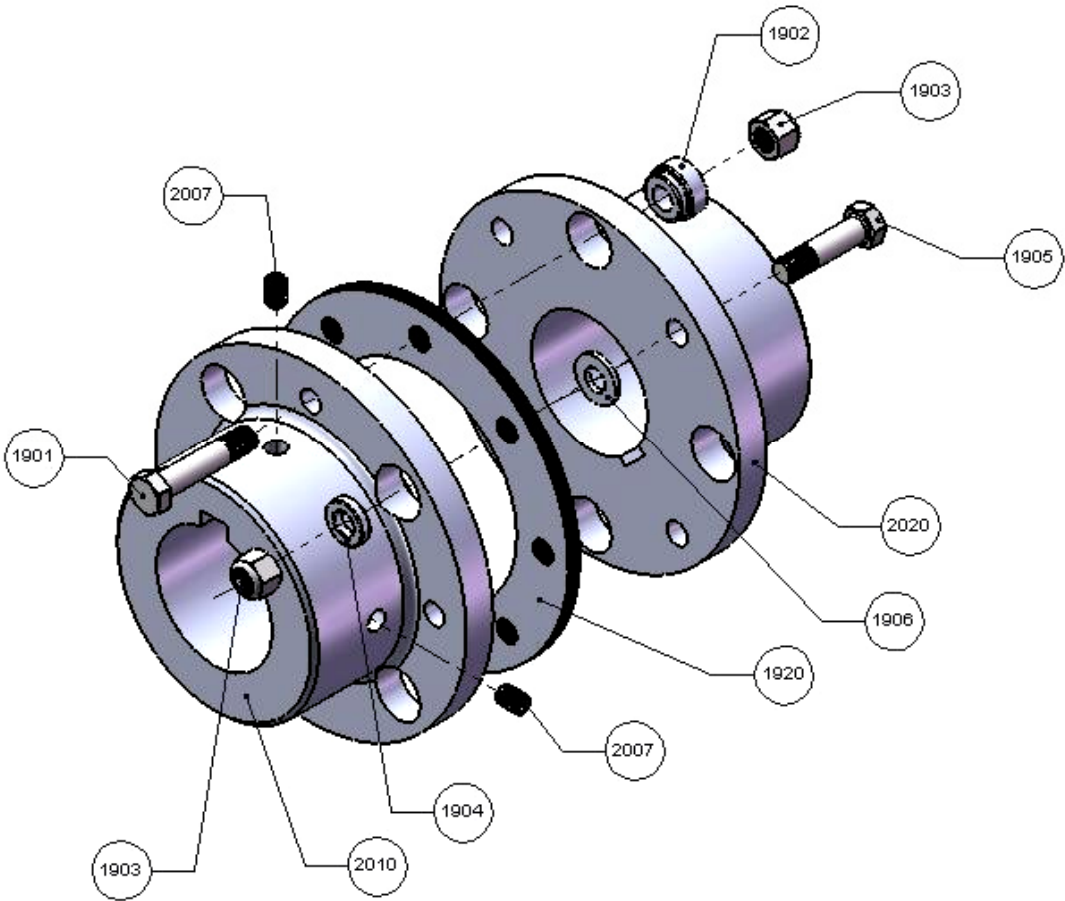
CAST IRON OUTPUT HUB



**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**FIGURE 2B**

**STEEL OUTPUT HUB**



## Turbo Couplings with Disk Pack (XP) Connection Couplings

### **3. Monitoring and Inspection**

The disk pack coupling is designed for long service life and will provide years of trouble free service if properly maintained. This requires periodic checks on the physical condition of the disks and occasional alignment checks.

The installation of a flexible disk coupling is critical. Various problems could arise during mounting of the hubs and the coupling assembly process. Burrs, dirt and grit on either the shaft or in the bores can cause the hubs to gall during mounting. Poorly fitted keys can also gall and not seat correctly.

Concentrated heat on the hubs will cause distortion. The coupling must be properly assembled and the locknuts tightened in accordance with the instructions. Loose bolts will cause elongation of the disk bolt holes and eventual failure.

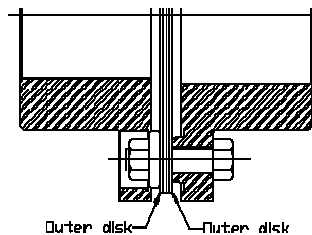
The most common form of failure is disk fatigue due to excessive flexure. This is usually caused by misalignment of the connected machines. It also can be brought about by operational conditions. The following gives some ideas for assuring the coupling is operating satisfactorily.

#### **3.1 Detection:**

The Voith disk pack coupling is easily inspected. Visual analysis may point to possible drive system problems. Proper evaluation of the disk packs and connecting parts may save considerable maintenance costs and downtime.

When a disk coupling starts to fail, it is usually from the outer disk of the laminated pack and progresses towards the center of the pack. See FIGURE 3.

Because of this progression, the deterioration of the coupling disk pack may be detected before ultimate failure.



**FIGURE 3**

## Turbo Couplings with Disk Pack (XP) Connection Couplings

### A. Detection of trouble with the equipment in operation.

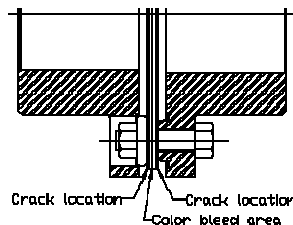
1. **Monitored Equipment.** Most equipment of this type is continuously monitored with vibration sensors. As a coupling disk pack deteriorates, it loses some pieces of the disk pack which causes unbalance. This unbalance can be detected by the vibration monitoring equipment. This piece-by-piece deterioration allows controlled shut down before ultimate disk pack failure.

2. **Unmonitored Equipment.** Couplings using a guard with either an open bottom ("U" Type) or open mesh can give early visual warnings. Pieces of the disk pack found under the open "U" guard or seen lying inside the expanded metal guard is a good reason to shut down the unit. Now inspect the coupling, replace the disk packs, and realign the equipment.

### B. Detection of trouble with equipment out of service and guard removed.

Here are some of the more evident visual inspection criteria and recommended corrective procedures.

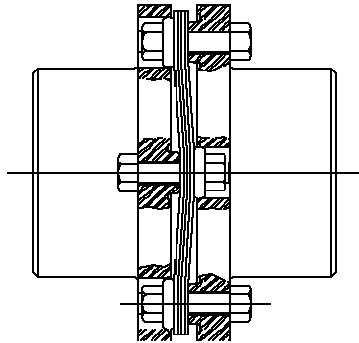
1. Reddish brown color bleeding out between disk laminations at the O.D. of the pack. This is an indication of fretting and or chemical attack of the disk material. See FIGURE 4.
2. Fine line crack starting in the outer disk, tangent to the washer O.D. See FIGURES 4 and 10. This can be seen by looking at the outside edge of the disk pack.



**FIGURE 4**

## Turbo Couplings with Disk Pack (XP) Connection Couplings

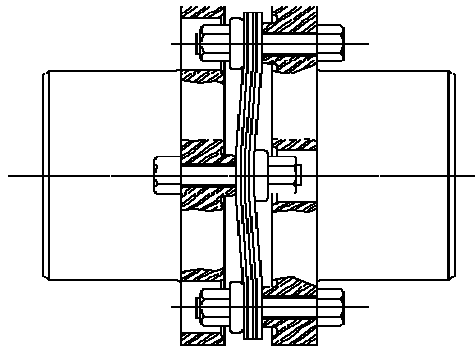
3. Disk pack is wavy and dimension between flange faces is smaller than indicated on installation instructions of applicable assembly. See FIGURE 5.



**“Compression“**  
**FIGURE 5**

The coupling has been installed in a compressed condition or equipment has shifted axially during operation. Check for shaft thermal growth conditions. Realign the axial position of the equipment so that the coupling operates with a neutral, flat disk pack.

4. Disk pack is wavy and dimension between flange face is larger than specified on installation instructions or applicable assembly drawing. See FIGURE 6.



**“Elongation“**  
**FIGURE 6**

The coupling has been installed in an elongated position or equipment has shifted axially during operation. Realign the axial position of the equipment so that the coupling operates with a neutral, flat disk pack.

## **Turbo Couplings with Disk Pack (XP) Connection Couplings**

5. Disk packs (both ends) are wavy. One end is compressed, and the other end is elongated (See FIGURE 7). The conditions can be reversed by moving the center member towards the elongated end. This is called "oil canned" disk packs. The disk pack has no neutral center where it remains flat and parallel with the end flanges.

This condition can be the result of:

- a) Tightening the disk pack locknuts while the disk packs are in the compressed or elongated coupling position. See FIGURES 5 and/or 6.
- b) Tightening of disk pack locknuts while coupling is misaligned or other end of fluid coupling assembly is hanging unsupported during installation.
- c) Bound up bolt(s) in the bolt hole(s).
- d) Damaged disks, which could be caused by abnormal running condition, misuse, or loose bolts.

To correct "oil canned" disk pack:

- a) Loosen all the disk pack locknuts. Correct the axial spacing of the coupling as necessary with the coupling aligned and turbo coupling fully supported. If "oil canned" condition disappears, re-torque the locknut while the coupling is in its neutral position.
- b) If (a) above is not successful, determine that all bolts, with locknuts loose, can be turned by hand. If any bolts are tight, the bolt holes should be cleaned out by reaming the flange so that the bolt turns by hand in the hole. Reassemble and torque the locknuts while coupling is in its neutral position.
- c) If the disks in the pack are permanently deformed, replace the disk pack with a new one and reassemble the coupling. This permanent deformation could be caused by a severe torque overload, abnormal axial loads, or even loose bolts. The cause of the deformation must be corrected before restart.



## Turbo Couplings with Disk Pack (XP) Connection Couplings

When assembled properly, the coupling should have a neutral center where the fluid coupling is free to float axially without snapping from one end to the other when moved by hand.

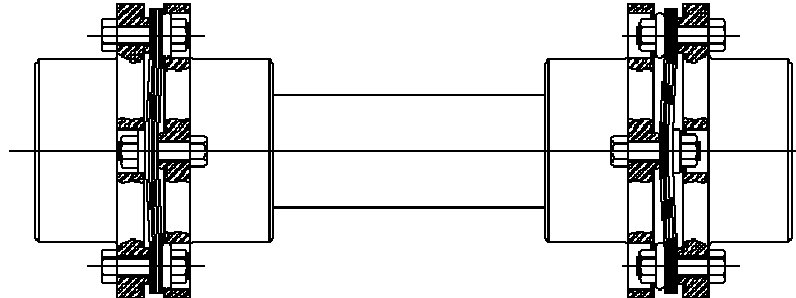
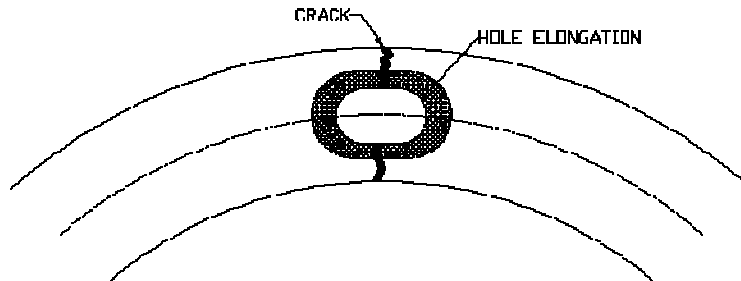


FIGURE 7

### 4. Analysis of Failed Disk Couplings

In the event of a coupling failure, a thorough investigation should be made to determine the cause. The most common causes of failure are improper assembly, excessive misalignment, and corrosive attack.

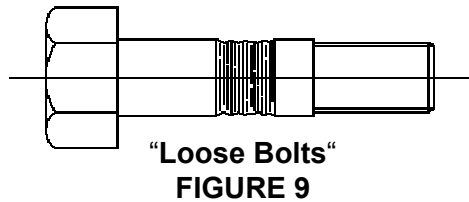
1. Disk broken through bolt hole indicates loose coupling bolts. See FIGURE 8. Replace disk pack and tighten locknuts to specified torque value.



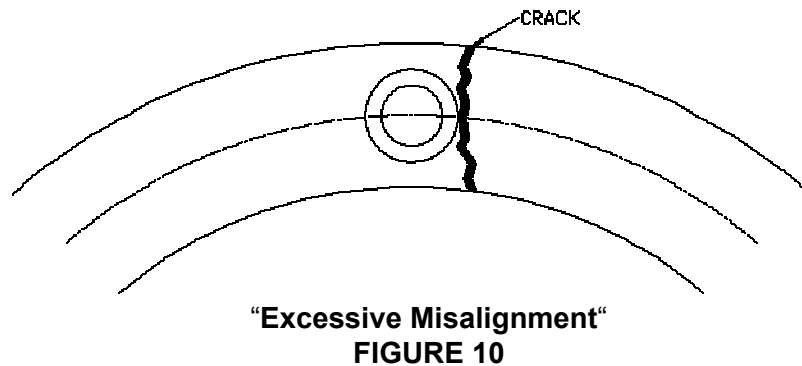
“Loose Bolts“  
FIGURE 8

2. Disks embedded into bolt body are usually the result of a loose bolt or a severe torque overload. This may also appear from turning the bolt during installation (See FIGURE 9). Replace the bolt and tighten the locknut to the proper torque keeping the bolt stationary. This will eliminate damage to the bolt during installation. Do not turn bolt and tighten locknut to proper torque. Do not turn bolt during locknut tightening process.

## Turbo Couplings with Disk Pack (XP) Connection Couplings

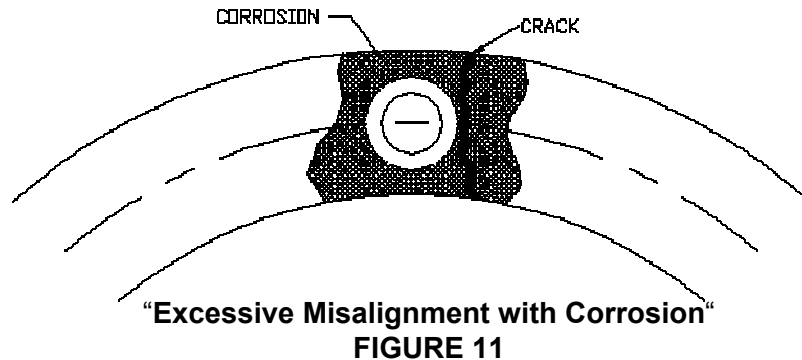


3. Disk broken adjacent to washer face usually indicates excessive shaft misalignment during operation. See FIGURE 10.



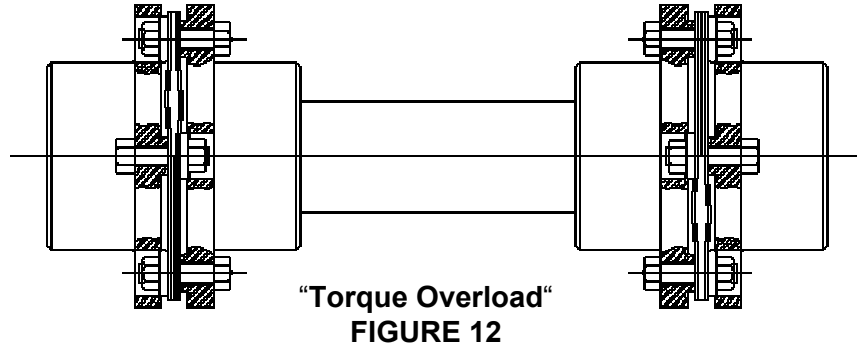
This type of disk failure usually starts with outer disk and progresses through the disk pack. Realign equipment and replace both disk packs. Make hot check of alignment to assure it is within coupling misalignment capacity.

4. Disk is broken adjacent to washer face with heavy corrosion present along area of break. Also, iron oxide will most likely be evident on outside of disk pack. See FIGURE 11. This failure is typical of couplings that usually have been in service for several years and/or operating in corrosive atmosphere. Breaks will first appear in outer disks and progress through the disk pack. Replace both disk packs and realign equipment. Different disk pack material may also be considered.



## Turbo Couplings with Disk Pack (XP) Connection Couplings

5. The disk pack has a bulge near the center or is bowed toward one flange in alternate chordal sections. See FIGURE 12.

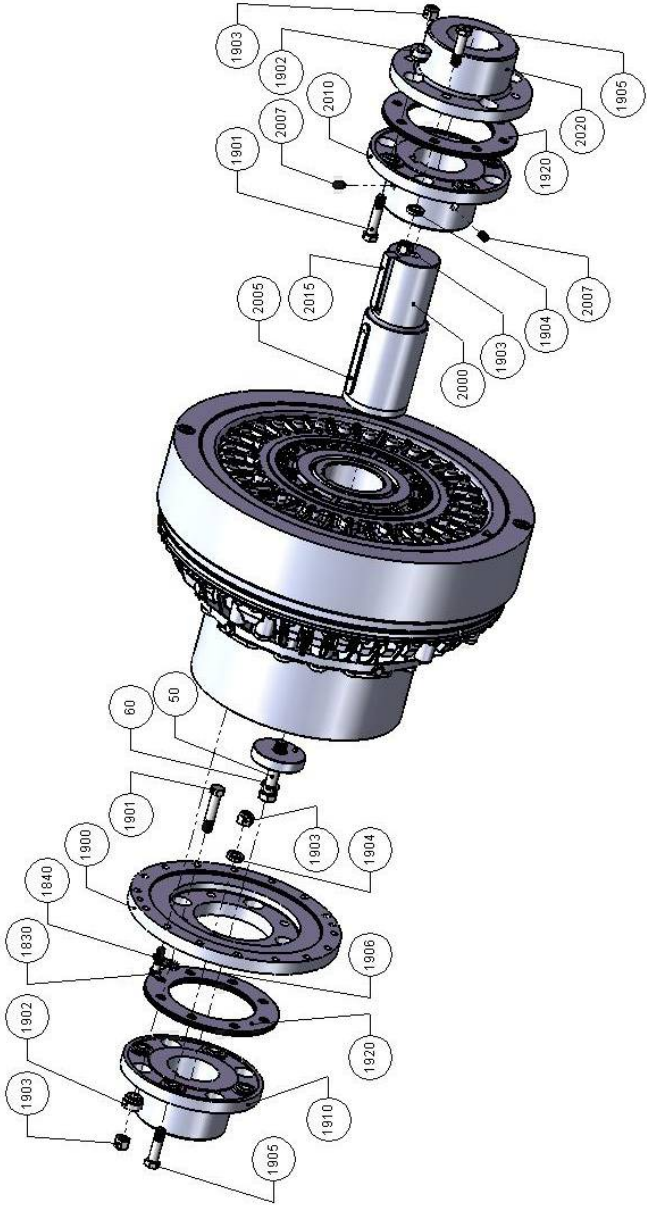


This condition is usually a result of a large torque overload induced into the system beyond the peak overload capacity of the coupling. The remaining disk pack chordal sections will be straight and tight. This indicates improper coupling selection. If bulged or bowed condition appears in one chordal section only, there may be a loose bolt on one side of the distortion. Loosen all coupling locknuts and unseat the bolts. The bulge should release and flatten out. Re-torque the locknuts. If the distortion does not disappear, replace disk pack and re-torque the locknuts.

# Turbo Couplings with Disk Pack (XP) Connection Couplings

## 5. Spare Parts

For T, TV, TVV, & TVVS fluid coupling parts, see "Installation & Operating Instructions for Turbo Couplings with Constant Filling", manual 3626-011000 en.



**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**5.1 T,TV,TVV,&TVVS-XP**

**Bill of Material**

**Size: 422**

ITEM NO.	PART NO.	QTY.	DESCRIPTION
50	304003528	1	Holding Bolt; 3/4-10x3.5 Lg.
60	304003641	1	Lock Washer; 3/4" Spring
1830	304001069	8	Hex Bolt; M-12 x 40 Grade 8.8
1840	304001149	8	Wave Washer; 12 mm
1900	304001715	1	Adapter Flange; 422
1901	304005726	8	Long Bolt; 7/16 dia. x 2.463 Lg.
1902	304009759	8	Pilot Washer
1903	304003657	16	Locknut
1904	304003658	8	Bevel Washer; 7/32 THK
1905	304003659	8	Short Bolt; 7/16 dia. x 2.000 Lg.
1906	304003647	4	Thin Washer; 1/8 THK
1910, 2020	304002094	2	Cast Iron Coupling Hub (312)
1920	304003668	2	Disc Pack (312)
2000	304001700	1	Output Shaft; 422
2005	TCR03160166	1	Hub Key; 422
2007	304001159	2	Cup Point Set Screw; 1/2-13x3/4 Lg.
2010	304001942	1	Cast Iron Stub Shaft Hub with Bore
2015	304001957	1	Stub Key; 422
1910,2010,2020	304002181	3	Steel Coupling Hub (312) <b>**OPTIONAL**</b>

For T, TV, TVV, & TVVS Fluid Coupling Parts, see "Installation & Operating Instructions for Turbo Couplings with Constant Filling", manual number 3626 - 011000 en.

\*NOTE: When utilizing steel hubs in place of cast iron (Items 1910, 2020), four (4) additional thin washers (Item 1906) are required per each steel hub. These act as the cast bosses shown in picture.

**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**5.2 T,TV,TVV,&TVVS-XP**

**Bill of Material**

**Size: 487**

ITEM NO.	PART NO.	QTY.	DESCRIPTION
50	304003528	1	Holding Bolt; 3/4-10x3.5 Lg.
60	304003641	1	Lock Washer; 3/4" Spring
1830	304001069	12	Hex Bolt; M-12 x 40 Grade 8.8
1840	304001149	12	Wave Washer; 12 mm
1900	304001716	1	Adapter Flange; 487
1901	304003777	8	Long Bolt; 17/32 dia. x 2.719 Lg.
1902	304003778	8	Pilot Washer
1903	304003768	16	Locknut
1904	304003769	8	Bevel Washer; 1/4 THK
1905	304003770	8	Short Bolt; 17/32 dia. x 2.281 Lg.
1906	304003771	4	Thin Washer; 1/8 THK
1910,2020	304002068	2	Cast Iron Coupling Hub (350)
1920	304003772	2	Disc Pack (350)
2000	304001701	1	Output Shaft; 487
2005	TCR03160174	1	Hub Key; 487
2007	304001159	2	Cup Point Set Screw; 1/2-13x3/4 Lg.
2010	304001945	1	Cast Iron Stub Shaft Hub with Bore
2015	304001958	1	Stub Key; 487
1910,2010,2020	304002069	3	Steel Coupling Hub (350) <b>**OPTIONAL**</b>

For T, TV, TVV, & TVVS Fluid Coupling Parts, see "Installation & Operating Instructions for Turbo Couplings with Constant Filling", manual number 3626 - 011000 en.

**\*NOTE:** When utilizing steel hubs in place of cast iron (Items 1910, 2020), four (4) additional thin washers (Item 1906) are required per each steel hub. These act as the cast bosses shown in picture.

**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**5.3 T,TV,TVV,&TVVS-XP**

**Bill of Material**

**Size: 562**

ITEM NO.	PART NO.	QTY.	DESCRIPTION
50	304003640	1	Holding Bolt; 3/4-10x4.0 Lg.
60	304003641	1	Lock Washer; 3/4" Spring
1830	304001070	16	Hex Bolt; M-12 x 45 Grade 8.8
1840	304001149	16	Wave Washer; 12 mm
1900	304001717	1	Adapter Flange; 562
1901	304003648	8	Long Bolt; 5/8 dia. x 3.062 Lg.
1902	304003649	8	Pilot Washer
1903	304003650	16	Locknut
1904	304003651	8	Bevel Washer; 9/32 THK
1905	304003652	8	Short Bolt; 5/8 dia. x 2.531 Lg.
1906	304003653	4	Thin Washer; 1/8 THK
1910,2020	304001896	2	Cast Iron Coupling Hub (375)
1920	304003654	2	Disc Pack (375)
2000	304001702	1	Output Shaft; 562
2005	TCR03160193	1	Hub Key; 562
2007	304001159	2	Cup Point Set Screw; 1/2-13x3/4 Lg.
2010	304001947	1	Cast Iron Stub Shaft Hub with Bore
2015	304001959	1	Stub Key; 562
1910,2010,2020	304002127	*	Steel Coupling Hub (375) **OPTIONAL**

For T, TV, TVV, & TVVS Fluid Coupling Parts, see "Installation & Operating Instructions for Turbo Couplings with Constant Filling", manual number 3626 - 011000 en.

\*NOTE: When utilizing steel hubs in place of cast iron (Items 1910, 2020), four (4) additional thin washers (Item 1906) are required per each steel hub. These act as the cast bosses shown in picture.

**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**5.4 T,TV,TVV,&TVVS-XP**

**Bill of Material**

**Size: 650**

ITEM NO.	PART NO.	QTY.	DESCRIPTION
50	304003640	1	Holding Bolt; 3/4-10x4.0 Lg.
60	304003641	1	Lock Washer; 3/4" Spring
1830	304001077	16	Hex Bolt; M-16 x 45 Grade 8.8
1840	304001150	16	Wave Washer; 16 mm
1900	304001718	1	Adapter Flange; 650
1901	304005727	8	Long Bolt; 11/16 dia. x 3.625 Lg.
1902	304005728	8	Pilot Washer
1903	304003642	16	Locknut
1904	304003643	8	Bevel Washer; 5/16 THK
1905	304003644	8	Short Bolt; 11/16 dia. x 2.812 Lg.
1906	304003645	4	Thin Washer; 1/8 THK
1910,2020	304002061	2	Cast Iron Coupling Hub (425)
1920	304003646	2	Disk Pack (425)
2000	304001703	1	Output Shaft; 650
2005	TCR03160215	1	Hub Key; 650
2007	304001159	2	Cup Point Set Screw; 1/2-13x3/4 Lg.
2010	304001953	1	Cast Iron Stub Shaft Hub with Bore
2015	304001960	1	Stub Key; 650
1910,2010,2020	304002062	*	Steel Coupling Hub (425) **OPTIONAL**

For T, TV, TVV, & TVVS Fluid Coupling Parts, see "Installation & Operating Instructions for Turbo Couplings with Constant Filling", manual number 3626 - 011000 en.

\*NOTE: When utilizing steel hubs in place of cast iron (Items 1910, 2020), four (4) additional thin washers (Item 1906) are required per each steel hub. These act as the cast bosses shown in picture.



**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**5.5 T,TV,TVV,&TVVS-XP**

**Bill of Material**

**Size: 750**

ITEM NO.	PART NO.	QTY.	DESCRIPTION
50	304003550	1	Holding Bolt; 3/4-10x5.5 Lg.
60	304003641	1	Lock Washer; 3/4" Spring
1830	304001077	20	Hex Bolt; M-16 x 45 Grade 8.8
1840	304001150	20	Wave Washer; 16 mm
1900	304001719	1	Adapter Flange; 750
1901	304009762	8	Long Bolt; 7/8 dia. x 4.781 Lg.
1902	304009760	8	Pilot Washer
1903	304002308	16	Locknut
1904	304002309	8	Bevel Washer; 25/64 THK
1905	304002310	8	Short Bolt; 7/8 dia. x 3.781 Lg.
1906	304002311	4	Thin Washer; 3/16 THK
1910,2020	304002100	2	Cast Iron Coupling Hub (550)
1920	304002312	2	Disk Pack (550)
2000	304001704	1	Output Shaft; 750
2005	TCR03160290	1	Hub Key; 750
2007	304001159	2	Cup Point Set Screw; 1/2-13x3/4 Lg.
2010	304001956	1	Cast Iron Stub Shaft Hub with Bore
2015	304001961	1	Stub Key; 750

For T, TV, TVV, & TVVS Fluid Coupling Parts, see "Installation & Operating Instructions for Turbo Couplings with Constant Filling", manual number 3626 - 011000 en.

\*NOTE: When utilizing steel hubs in place of cast iron (Items 1910, 2020), four (4) additional thin washers (Item 1906) are required per each steel hub. These act as the cast bosses shown in picture.

**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**5.6 T,TV,TVV,&TVVS-XP**

**Bill of Material**

**Size: 866**

ITEM NO.	PART NO.	QTY.	DESCRIPTION
50	304003550	1	Holding Bolt; 3/4-10x4.5 Lg.
60	304003641	1	Lock Washer; 3/4" Spring
1830	304001087	12	Hex Bolt; M-20 x 60 Grade 8.8
1840	304001151	12	Wave Washer; 20 mm
1900	304007089	1	Adapter Flange; 866
1901	304009763	8	Long Bolt
1902	304009761	8	Pilot Washer
1903	304007130	16	Locknut
1904	304007131	8	Bevel Washer
1905	304007132	8	Short Bolt
1906	304007133	4	Thin Washer
1910,2020	304007134	2	Cast Iron Coupling Hub (600)
1920	304007135	2	Disk Pack (600)
2000	304001705	1	Output Shaft; 866
2005	TCR03160292	1	Hub Key; 866
2007	304003996	2	Cup Point Set Screw; 1.0-8x3/4 Lg.
2010	304008059	1	Cast Iron Stub Shaft Hub with Bore
2015	304001962	1	Stub Key; 866

For T, TV, & TVV Fluid Coupling Parts, see "Installation & Operating Instructions for Turbo Couplings with Constant Filling", manual number 3626 - 011000 en.

\*NOTE: When utilizing steel hubs in place of cast iron (Items 1910, 2020), four (4) additional thin washers (Item 1906) are required per each steel hub. These act as the cast bosses shown in picture.

**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**5.7 T,TV,TVV,&TVVS-XP**

**Bill of Material**

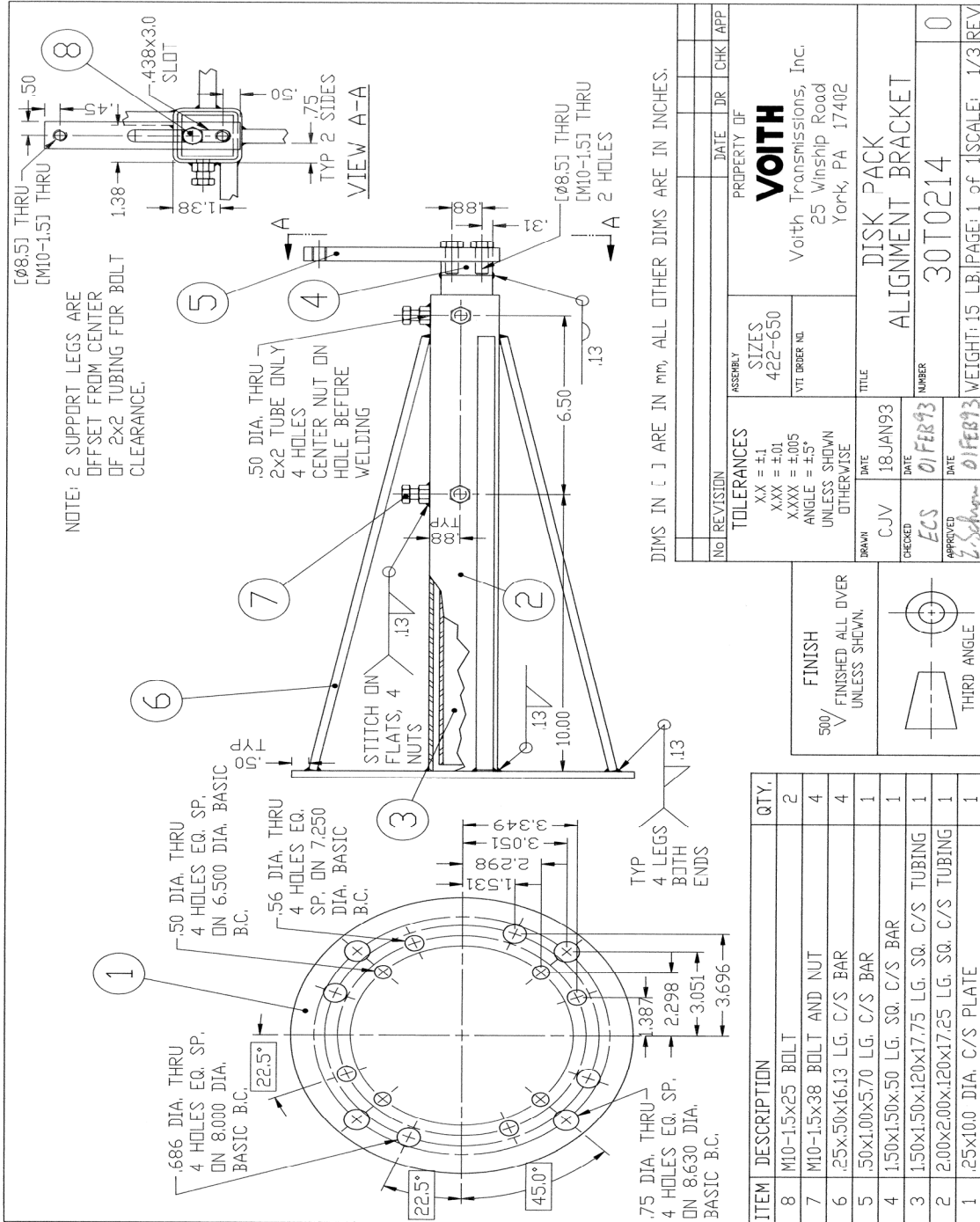
**Size: 1000**

ITEM NO.	PART NO.	QTY.	DESCRIPTION
50	304003415	1	Holding Bolt; 3/4-10x4.5 Lg.
60	304003641	1	Lock Washer; 3/4" Spring
1830	304001088	16	Hex Bolt; M-20 x 65 Grade 8.8
1840	304001151	16	Wave Washer; 20 mm
1900	304002870	1	Adapter Flange; 1000
1901	304009525	8	Long Bolt; 1 5/16 dia. x Lg.
1902	304009524	8	Pilot Washer
1903	304002370	16	Locknut
1904	304002371	8	Bevel Washer; 7/16 THK
1905	304002369	8	Short Bolt; 1 5/16 dia. x 4.6 Lg.
1906	304002372	4	Thin Washer; ¼ THK
1910,2020	304002367	2	Cast Iron Coupling Hub (700)
1920	304002368	2	Disk Pack (700)
2000	304001706	1	Output Shaft; 1000
2005	304002381	1	Hub Key; 1000
2007	304003996	2	Cup Point Set Screw; 1.0-8x3/4 Lg.
2010	304002373	1	Cast Iron Stub Shaft Hub with Bore
2015	304001963	1	Stub Key; 1000

For T, TV, & TVV Fluid Coupling Parts, see "Installation & Operating Instructions for Turbo Couplings with Constant Filling", manual number 3626 - 011000 en.

\*NOTE: When utilizing steel hubs in place of cast iron (Items 1910, 2020), four (4) additional thin washers (Item 1906) are required per each steel hub. These act as the cast bosses shown in picture.

# Turbo Couplings with Disk Pack (XP) Connection Couplings



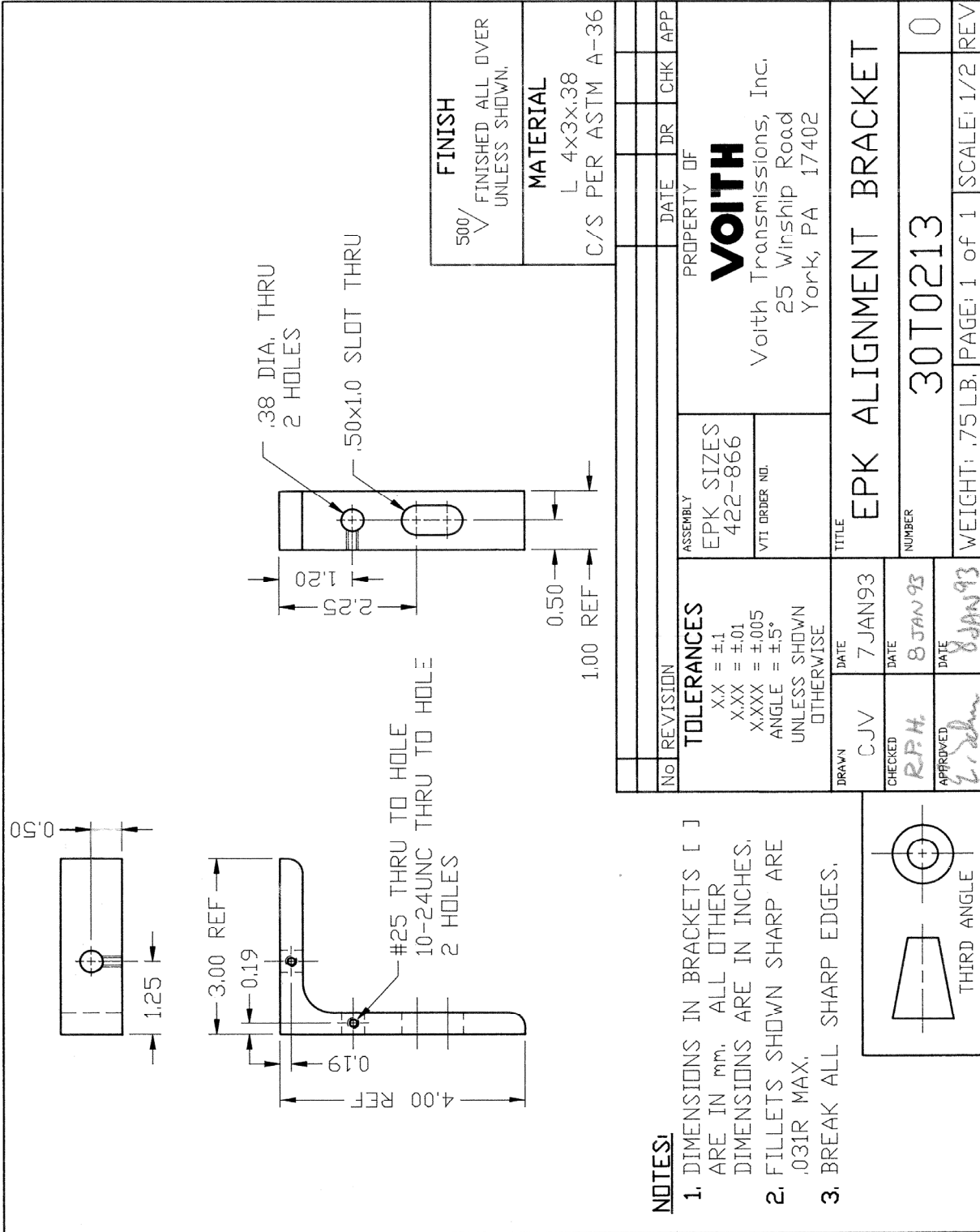
DIMS IN [ ] ARE IN mm, ALL OTHER DIMS ARE IN INCHES.

NO. REVISION	DATE	DR	CHK	APP
PROPERTY OF				
<b>VOITH</b>				
Voith Transmissions, Inc.				
25 W/Inship Road				
York, PA 17402				
ASSEMBLY SIZES 422-650		TITLE DISK PACK ALIGNMENT BRACKET		
VTI ORDER NO.		NUMBER 30T0214		
TOLERANCES XX = ±.1 X.XX = ±.01 X.XXX = ±.005 ANGLE = ±5° UNLESS SHOWN OTHERWISE		DATE 01FEB93	WEIGHT: 15 LB.   PAGE: 1 of 1   SCALE: 1/3 REV	
DATE 01FEB93	DATE 01FEB93	DRAWN ECS		
DATE 01FEB93	DATE 01FEB93	CHECKED ECS		
DATE 01FEB93	DATE 01FEB93	APPROVED E. Schuman		

500/ FINISH UNLESS ALL OVER UNLESS SHEWN.

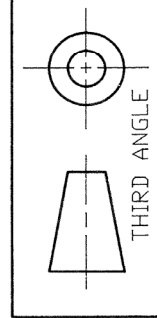
THIRD ANGLE

**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

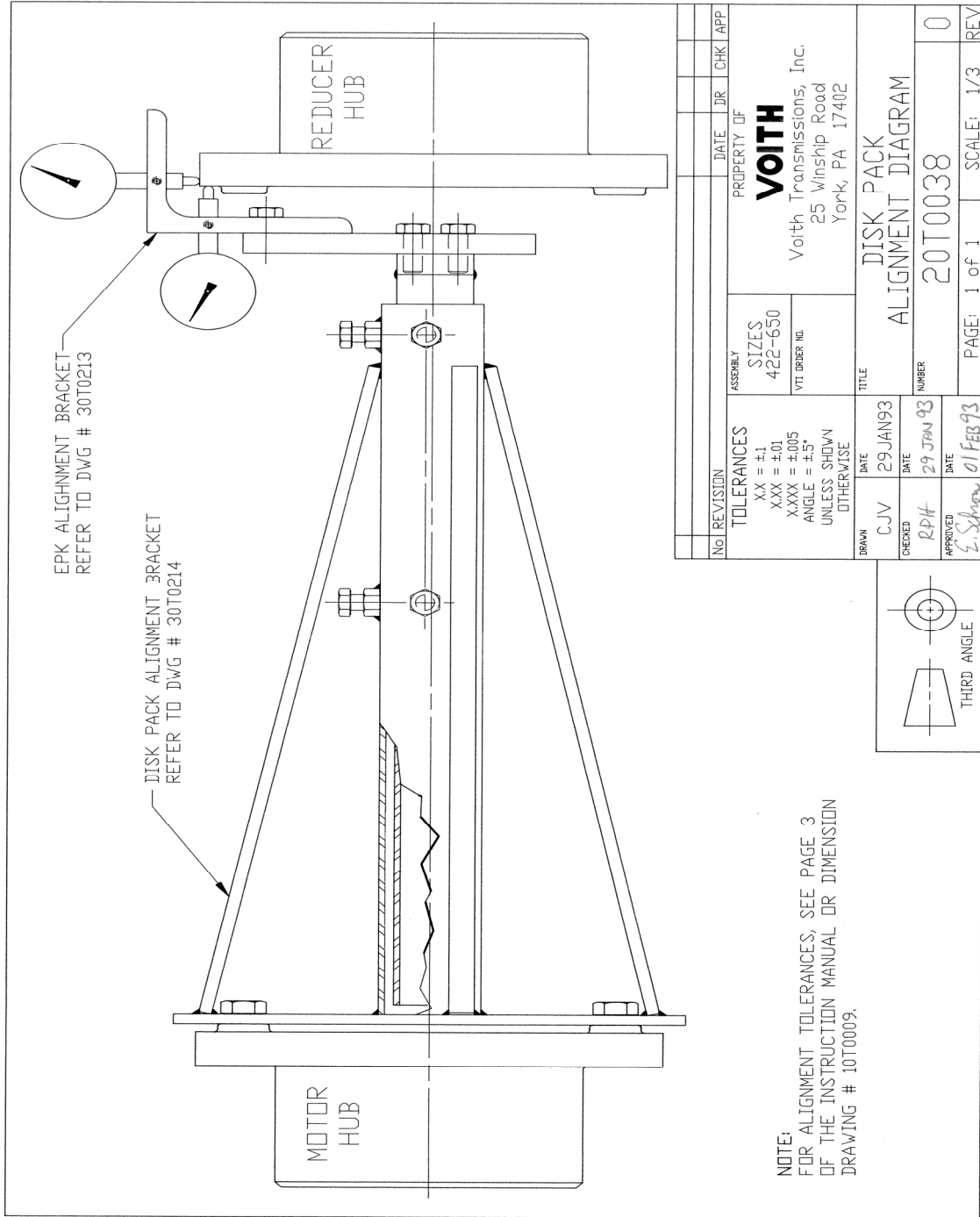


**NOTES:**

1. DIMENSIONS IN BRACKETS [ ] ARE IN mm, ALL OTHER DIMENSIONS ARE IN INCHES.
2. FILLETS SHOWN SHARP ARE .031R MAX.
3. BREAK ALL SHARP EDGES.



# Turbo Couplings with Disk Pack (XP) Connection Couplings



**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

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**Turbo Couplings with Disk Pack  
(XP) Connection Couplings**

**Voith Turbo Inc. (U.S.A.)**

25 Winship Road

York, PA 17406

Phone: (717) 767-3200

Fax: (717) 767-3210

E-Mail: [information@voithusa.com](mailto:information@voithusa.com)

<http://www.usa.voithturbo.com>

**Voith Turbo Inc. (Canada)**

2-106 Rayette Road

Concord, ONT L4K 2G3

Phone: (905) 738-1829

Fax: (905) 738-9462

**VOITH**

GROUP OF COMPANIES