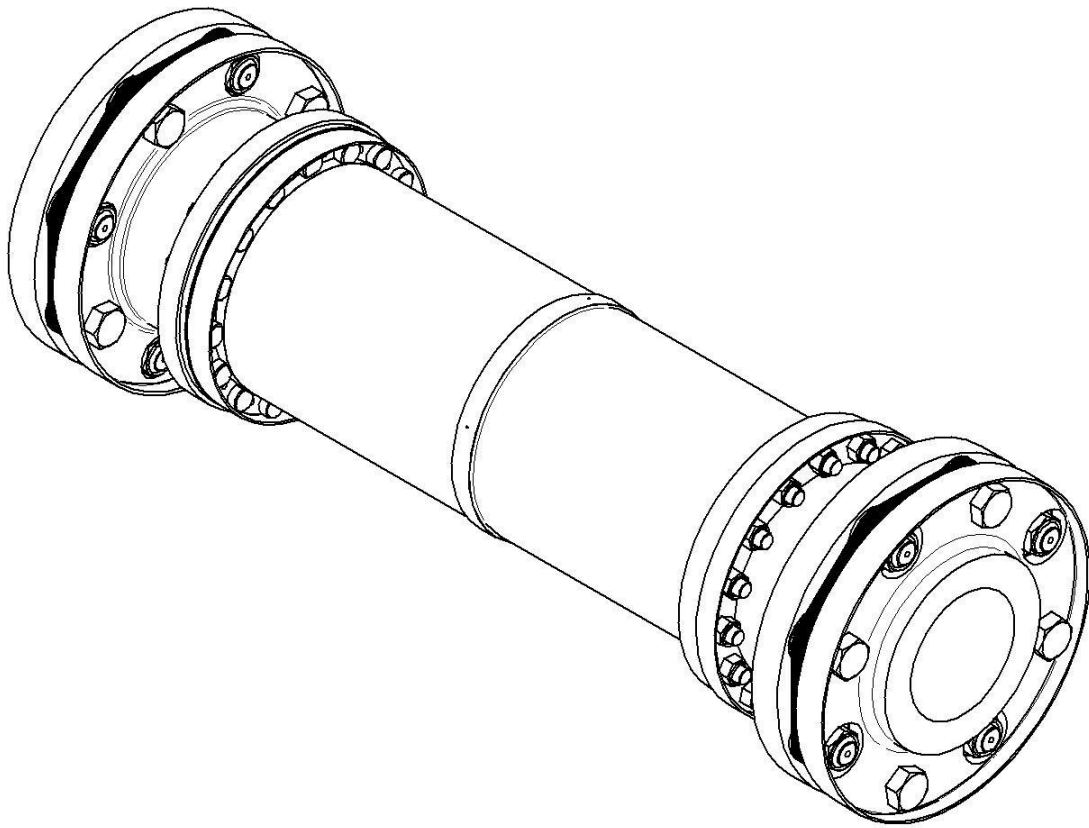


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**INSTALLATION, OPERATING AND
MAINTENANCE INSTRUCTIONS FOR
BIBBY TURBOFLEX COUPLINGS HAVING
REVERSED HUBS AND 3 PIECE SPACERS.**



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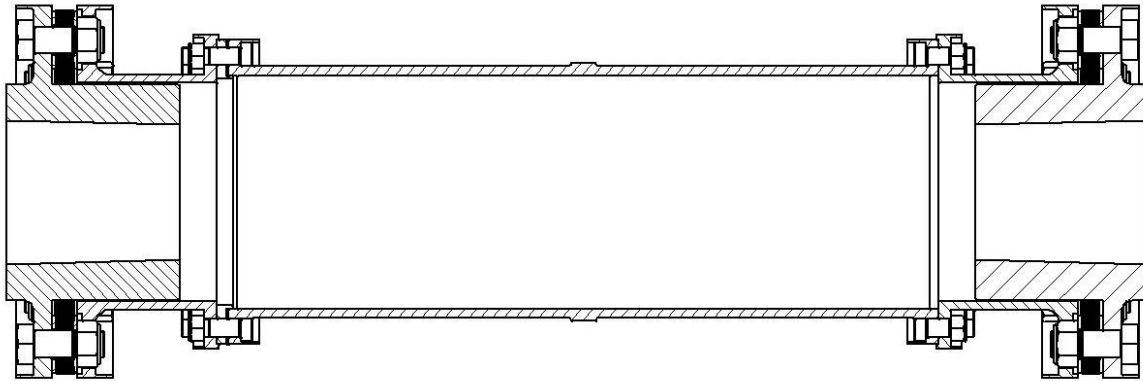
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Preface

This manual covers the general installation, maintenance and operating requirements of Bibby Turboflex disc couplings having the following configuration.

2RH, Couplings having reversed hubs supplied for both ends. They maybe supplied with packing rings and shims.



1 General Notes

It is essential that a competent person carry out all the instructions contained in the following documents. Should any problems be anticipated or encountered then **Bibby Turboflex** personnel are available for site visits or, alternatively, repairs and overhauls can be undertaken in our works.

Prior to performing any maintenance works (including inspections) it is essential that the power supply is isolated and that no accidental movement of rotating machinery is possible.

This product is designed for a specific purpose. It is vital that it is not used for any purpose other than that for which it is designed and supplied, and that the limits of its capacities, as detailed here or in any other document, are not exceeded.

No liability will be accepted and any warranty, either expressed or implied, will be null and void should any component of whatever kind, including nuts, bolts and washers, be used in the assembly, or modifications be made to all or part of the product which are not supplied, specified or agreed by **Bibby Turboflex**.

1.1 Do's

The following instructions should be read and understood prior to starting any assembly or maintenance work on the disc coupling.

Prior to fitting any component, care should be taken to ensure that it is clean and free from any dirt.

When tightening any bolts or screws, this should be done evenly, cylinder head fashion, to 50% torque then to 100% torque in the same sequence. Where specified it is essential that torque-tightening figures are not exceeded nor should it be allowed for them to be below specification.

Whilst installing and removing the transmission unit, the unit should be supported to ensure that the weight is not imposed on one side only.

Where hub/shaft connections require a standard interference fit the hubs may be heated in oil at 200-250 Celsius and rapidly positioned on the shaft. It is essential that this heat is evenly applied over the whole hub and that spot heating is avoided.

Record the Bibby Turboflex order number, coupling type and size and any relevant information for future use.

Contact Bibby Turboflex for refurbishment works and spare components.

1.2 Don'ts

Do not use any component that is not supplied or approved by **Bibby Turboflex** in the assembly of this product.

Do not attempt, where the weight of the unit is excessive, to lift the coupling without the use of lifting equipment.

The inherent balance of these couplings could be disturbed if they are allowed to be knocked either by striking or rolling. Care should be taken when transporting and fitting to avoid such knocks. This is particularly when a coupling is specifically balanced.

2 Description of Coupling

The coupling is of the dry laminated diaphragm or disc type. Flexibility is obtained by the deformation of the disc packs, within defined limits, which are separated by a tubular spacer.

Individual laminations are of regular polygonal profiles, which are assembled into a stack of previously designated thickness and secured by bushing. Flexibility is accomplished by connecting through the bushed holes, on a common pitch circle diameter, by means of bolts, alternately, to driving and driven components.

The bolts, bushes and associated holes are machined to close limits associated with “fitted bolts”. Due to the need for reasonable ease of assembly, interference fits are undesirable and, consequently, tolerances are such as to allow for a close slide or slight transition fit. To compensate for these clearances and to ensure the best possible concentricity between components, the pitch circle diameter of the bolt holes in the flexible element is made smaller than that of the mating holes in the adjacent components. On assembly, all inherent clearances are, therefore, eliminated. Coupling bolts are sized such that they are capable of inducing a load equivalent to 4 times the tensile load in the flexible element laminations, between driving and driven bolt, when transmitting the full rated continuous torque of the coupling. This assumes a coefficient of friction between the various components of 0.25 but experience has shown that, due to the high loads induced, minute compressive deformation is sufficient to raise this to about 0.3.

The reason for adopting this principle of using large, highly loaded, bolts is two-fold a) to prevent interface slip, as already mentioned, and b) to eliminate any chance of bolt bending due to the overhung radial loading imposed by the flexible element. Avoiding either slip or bending helps to avoid fretting which occurs when bolts are designed only to drive in shear.

In general, the design is identical to a large number of units already in operation.

3 Operating Conditions

In operation the flexible elements are subjected to both tensile and bending stresses, each having an influence on the allowable magnitude of the other. It is important, therefore, that the operating limits of the various deflections for which the coupling is designed to accommodate, are kept, as far as practicable, within those indicated on the “Allowable Misalignment Curve” which was individually supplied with the final engineering data.

In practice, the initial alignment of the coupling should be as close as possible and within the alignment limits given in the “Installation Instructions”. This will allow for changes during operation to remain within allowable limits.

As the Bibby Turboflex units are designed to transmit the torque in friction between the driving and driven bolts and the flexible elements, it is essential that, should the need arise, these bolts should be correctly tightened to the torque indicated on the assembly drawing or in the “Installation and Maintenance Instructions”.

Torque and speed should remain within the originally specified conditions.


4 Product identification/marketing for non-electrical equipment.

Scope: Disc Coupling Assemblies, excluding component spares.

Equipment manufactured or supplied by Bibby Transmissions is marked legibly and indelibly, in a variety of ways, with the following (subject to contractual obligations permitting): -

- Name and telephone number of manufacturer
- Designation of the series or type and size (Part Number)
- Contract/Order Number and if applicable the unique serial number

If applicable, for equipment intended for use in potentially explosive atmospheres, the following will be marked on the equipment in accordance with the ATEX Directive 2014/34/EU and EN 13463-1

- Name and address of manufacturer
- Designation of the series or type and size (Part Number)
- Contract/Order Number and if applicable the unique serial number
- CE Mark.
- Year of construction
- Document of Conformity identification to ATEX Directive
- The specific marking of explosion protection  followed by the symbol of the equipment group and category.
- The letter 'G' (concerning explosive atmospheres caused by gases, vapours or mists); and/or the letter 'D' (concerning explosive atmospheres caused by dust)
- The letter 'c' for constructional safety
- The ambient temperature range when different to -20 °C to 40 °C

5 Limitations of product use

Unless otherwise agreed with Bibby Transmissions, these products must be selected in accordance with the recommended selection procedure and must only be used within the performance criteria set out below: -

The rated torque capacities, which are stated in the product catalogue and/or product arrangement drawing.

A continuous temperature range of:-

General Purpose Disc Couplings

Series Designation D and DJ	-20 °C to 280 °C
Series Designation DJCFT	-20 °C to 80 °C

High Performance Disc Couplings

Alloy Steel Couplings	-40 °C to 280 °C
Alloy Steel/Composite Spacer Shafts	-20 °C to 80 °C

Within the permissible operating limits for angular, radial and axial misalignment.

6 Product servicing

Although with proper selection and careful installation a long working life and very high degree of operational safety can be expected we would recommend that for ATEX certified couplings the element assembly, coupling bolts and attachment screws are replaced at 50000 operational hour intervals.

The operation of a damaged coupling in a hazardous area is contrary to ATEX and in doing so becomes an explosive hazard and is wholly the end users responsibility.

7 Maintenance Instructions

General maintenance of the coupling consists of a check of the following during normal machinery maintenance schedules. API617 references this time period as 3 years for compressor applications.

Axial, Angular & Parallel misalignment to ensure that these are still within the acceptable limits and that no major movements have occurred.

All bolts to ensure that they are correctly tightened.

The flexible elements, by visual inspection, for signs of fatigue cracking local to the washer anchoring points or general signs of fretting corrosion. Slight bowing or “S” like distortion is not detrimental to the operation of the unit. Note that any cracking will begin at the outermost edge of the outside blade. This means that this inspection is still possible without disturbing the element bolting. The element packs should be replaced at the earliest opportunity should cracking / damage be detected.

Bibby Turboflex use self locking nuts containing a stainless steel spring insert. This gives a high level of performance over many reinstallations. It is recommended by Bibby Turboflex that these be replaced after being re-torqued 10-12 times.

Note: Any requirement for spare parts should be made quoting the original purchasers original purchase order number and the coupling serial number. (This will be etched on the major coupling flanges) and will appear on all documentation.

8 Alignment Instructions

Bibby Turboflex Ltd. couplings will accept substantial amounts of misalignment, the configuration of each individual unit defining the actual acceptable level. The allowable misalignment is shown graphically on a curve produced uniquely for any unit. This curve shows the maximum permitted level of misalignment for operation and is NOT intended to define set up limits.

8.1 Alignment Method:

Each company has its own method for aligning machinery all of which are well documented in both internal and freely available documents and books. Hence it is not our intention to describe methods for setting machines. Instead, the following gives guidelines for quick checks for alignment suitable after initial installation and for general maintenance checks.

8.2 Axial:

The suggested limits for axial set up distance between the machinery shafts will generally be specified in the installation instructions unique for the coupling. However, as a general rule, the following may be used:

- 4-bolt couplings:- +/- 0.4mm
- 6-bolt couplings:- +/- 0.3mm
- 8-bolt couplings:- +/- 0.2mm
- 10-bolt couplings:- +/- 0.2mm

These values may be exceeded in certain cases and, if no reference is made in the unique installation instructions, reference should be made to Bibby Turboflex Ltd.

8.3 Parallel / Radial / Angular:

Having basically aligned the machinery shafts using one of the established techniques, the coupling may be installed as per the instructions. It is then worth performing a check to establish that the overall alignment is correct for the particular coupling. This may be simply performed by one of the following two methods:

Attach a dial indicator securely to the back of one of the coupling flanges, with the needle in contact with the flange face the other side of the flexible element as near the outside periphery as possible. Rotate the machinery & coupling and locate the minimum reading position. At this position, set the dial reading to zero. Rotate the machinery again and record the maximum reading over 360 degrees. Divide this maximum value by the coupling flange diameter to gain a value in mm/mm, which should be no greater than that shown in the following list. (This should be repeated at both flexible elements in a spacer coupling).

An alternative method is, where possible, to accurately measure the distance across the flanges that sandwich the flexible element to obtain a maximum and minimum value. The difference between these two values should be divided by the flange outside diameter to obtain a value in mm/mm, which should be no greater than that shown in the following list. (This should be repeated at both flexible elements in a spacer coupling).

- 4-bolt couplings - 0.004 mm/mm
- 6-bolt couplings - 0.003 mm/mm
- 8-bolt couplings - 0.002 mm/mm
- 10-bolt couplings - 0.0015 mm/mm

NOTE: These values are intended as guides only and, in certain cases, may be exceeded. IF IN DOUBT, CONTACT BIBBY TURBOFLEX LTD.

9 Installation Instructions

No liability will be accepted, and any warranty, either expressed or implied, will be null and void should any components of whatsoever kind, including nuts, bolts and washers, be used in the assembly or any modifications be made to all or part of the unit which are not supplied, specified or agreed by **Bibby Turboflex**.

For general Safety, Alignment and Maintenance Instructions see other sections of this manual.

IMPORTANT: The main Coupling Bolts/Nuts at both ends are tightened by **Bibby Turboflex**, and should, under normal circumstances, **NOT BE TOUCHED** unless specified in the installation instructions.

When tightening any other bolt or screw, this should be done evenly, i.e. cylinder head fashion, to 50% torque then to 100% torque in the same sequence. Threads should be lubricated with Molybdenum Disulphide grease or equivalent.

Check that the parallel & axial misalignments of the shafts are within the limits defined on the separate alignment sheet or curves. **Bibby Turboflex** do not recommend any specific alignment method as this varies due to personnel preference, however the alignment should be within the operational envelope shown on the misalignment curve. (Section 8 and separate operating curves)

1. Reference any applicable drawings for sizes and dimensions. Ensure that all required tools and equipment are available.
2. The coupling is supplied in an assembled state with its misalignment capabilities locked by gaging blocks and installation screws near the element packs. The coupling is packed appropriately for transportation and storage. Inspect the coupling for:
 - Indication of deviation from specification to ensure that it conforms to requirements.
 - Potential damage due to transportation.
3. For balanced couplings, note any match markings, which must be aligned when the coupling is installed.
4. For 2RH couplings, the coupling must be split at the spacer joints to allow installation. Remove the spacer nuts and bolts from the spacer flanges and using jacking screws force the flanges apart. Store the nuts and bolts along with the packing ring and shims (if supplied) for future stages of installation.

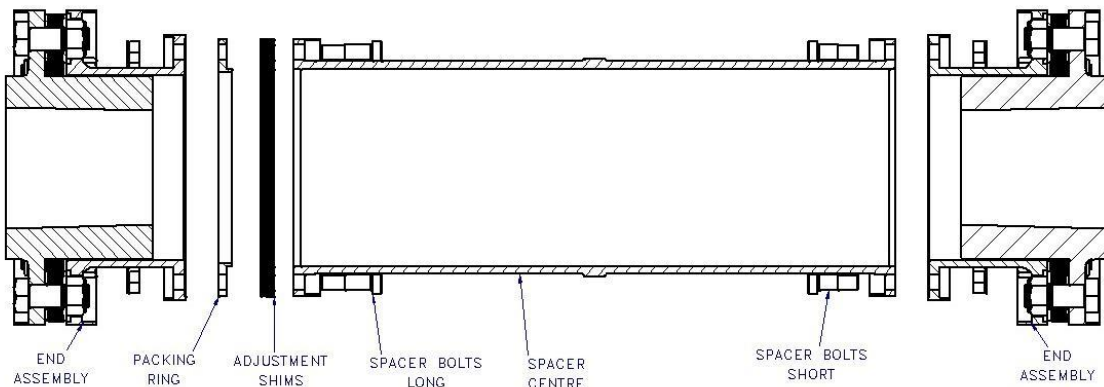
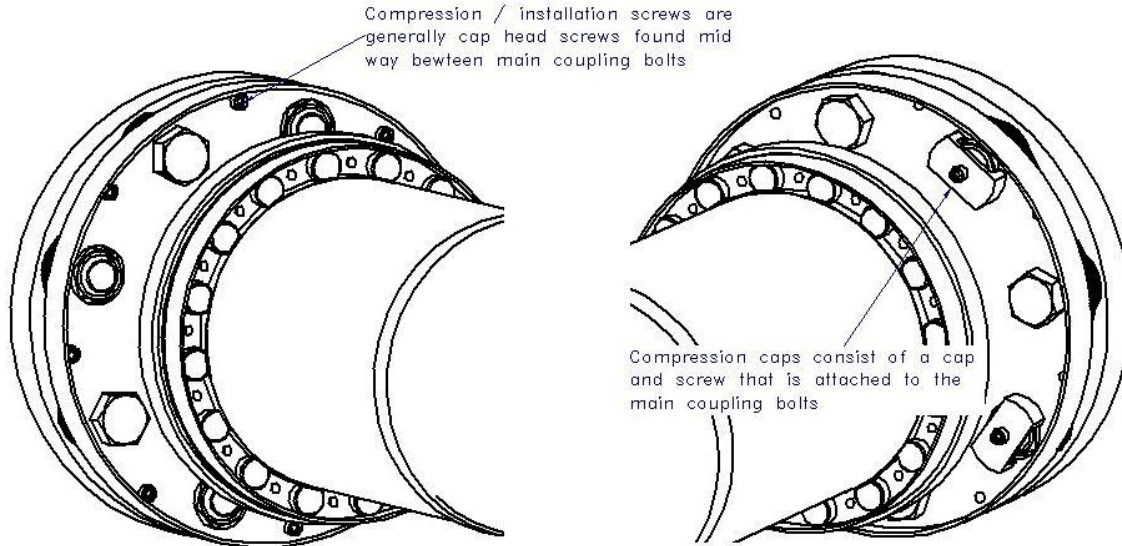


Figure 1: Typical coupling construction.

5. Check the shafts (or flange face) misalignments and DBSE (distance between shaft ends) are within allowable limits. (Reference Section 8 and also operating curves).
6. The hubs may now be fitted to the driver and driven shafts. Where hub/shaft connections require a standard interference fit the hubs may be heated in an oil bath or oven at 200-250 °Celsius and rapidly positioned on the shaft. It is essential that this heat is evenly applied over the whole hub and that spot heating is avoided. Ensure that one shaft rotates so that the coupling match marks can be aligned.

- The main bolts in the transmission unit are factory assembled and must not be disturbed. Whilst supporting the spacer ends. Release the installation screws or compression caps and remove the packing blocks if present. The coupling should now be in a relaxed state.



If no packing ring or shims are supplied, go to step 12.

- Measure the free distance between the spacer ends flange faces (DBFF). Adjust this length by either subtracting pre-stretch or adding pre-compression. If a packing plate is supplied, subtract this from the total. Record this value as Y.
- Reference the general assembly drawing and records the spacer centre length as X
- Calculated the required number of shims from the following equation

$$\text{Number of shims} = (Y-X) \div \text{shim thickness}$$

Round this value to a whole number of shims. Shim thickness is approximately 0.381mm
- Reference the assembly drawing. Fit the shims to the packing plate then mount this either to the spacer end or spacer centre flange as shown in the assembly drawing. Ensure match marks are aligned.
- Install the installation screws and tighten in cylinder head fashion, maintaining parallelism between the flange faces of the adaptor and spacer, until both elements packs are compressed by a minimum required amount to allow the transmission unit to be put into position. **Do not compress the elements beyond the value stated in "Maximum Element Compression" Values.**
- Position the spacer centre between the end assemblies, ensuring match marks are aligned on all flanges.
- Fit and tighten in cylinder head fashion the long spacer bolts that pass through the packing ring and shims.
- Release and remove the compression screws.
- Fit and tighten in cylinder head fashion the short spacer bolts that pass through the remaining flange. If a pre-stretch is present, it may be necessary to pull the flanges together using the connecting bolts.

17. Ensure all match marks are aligned, all tooling is removed and inspect the coupling before operation.

9.1 Maximum Element Compression.

It may be necessary to compress the element packs in order to fit the coupling. These values express the maximum amount of compression allowed per element pack. However, it is recommended to use the minimum amount of compression required when installing couplings.

Coupling bolt size	Maximum Compression (mm) per element pack
M6	1.75
M8	1.75
M10	2.0
M12	2.3
M14	2.3
M16	2.5
M18	2.5
M20	2.5
M22	3.0
M24	3.0
M27	3.0
M30	3.5
M33	3.5
M36	3.5
M39	4.0
M42	4.0

Contact Bibby Transmission for sizes not stated here.

10 Removal Instructions.

Coupling removal is a reverse of the above installation process ensuring that, upon re-installation, the above process is again followed in careful sequence.

11 Proposition 65 Compliance Warning.

WARNING: This product contains chemicals known to the State of California to cause cancer and/or birth defects or other reproductive harm.