TSE

T SERIES CLOSE COUPLED COUPLINGS

Installation Instructions

Foreward

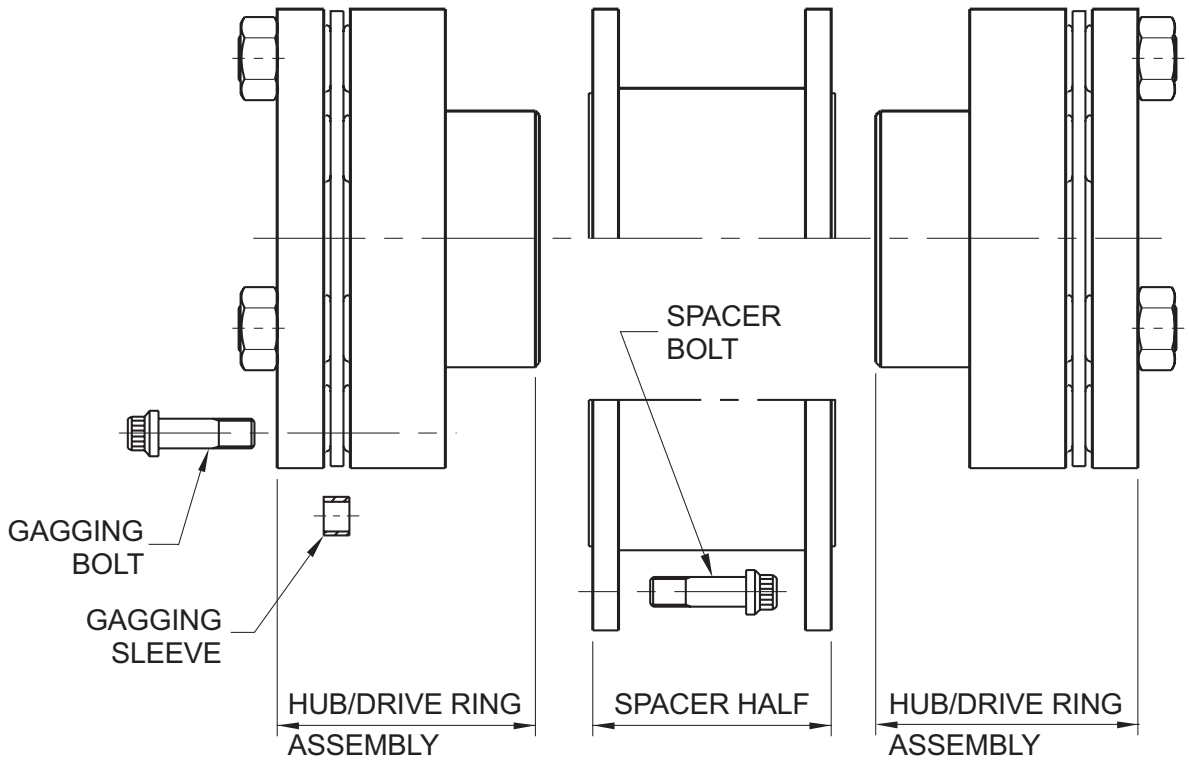
The TSE coupling is a precision built 6-link close-coupled design comprising two flexible disc assemblies connected by an axially-split torque tube. The flexing discs are stainless steel, the bolts high tensile steel and the other components forged and machined carbon steel. Alternate materials are available and, if supplied, are listed on the assembly drawing.

This coupling is designed to allow replacement of the disc packs without having to move the connected equipment.

Handling and Storage

1. The coupling is normally shipped with standard commercial packing. The packing case should contain a copy of the appropriate assembly drawing (if requested), the installation and maintenance instructions and a balancing certificate (if dynamic balancing is required).
2. During transport, handling and storage, the gagging sleeves (painted red for identification) should be in position.
   NOTE: *Gagging sleeves are supplied only when required for the application, NOT with every coupling.*
3. The coupling should be stored horizontally and should not be kept on end for long periods.
4. Avoid shocks during handling and protect against corrosion if stored for long periods.
5. On receipt and immediately before assembly, check that items are undamaged and that pilots and recesses are free from burrs. If a balanced unit is supplied, note the location and orientation of any match marks.

FIGURE 1



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Installation Instructions

Installation Procedure

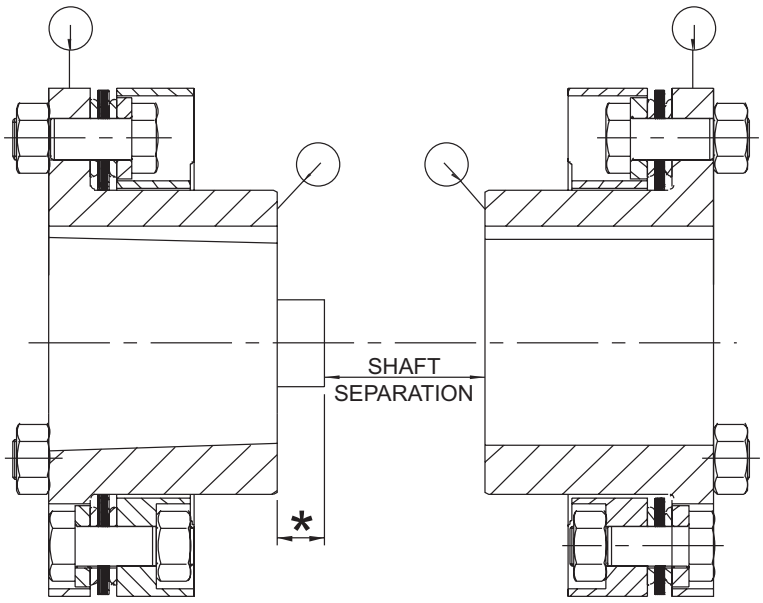
1. Reference the assembly drawing(s) for all dimensions.
2. Inspect the coupling to insure that it is undamaged and note any match marks that must be aligned when the coupling is installed.
3. Disassemble the coupling by removing the spacer bolts, on each end. Lift off each spacer half. Fit the appropriate hub/drive ring assembly to the driver and driven shafts in the usual manner ensuring that the shaft ends are flush with the faces of the hubs (Figure 2). Hubs for tapered shafts are machined to permit extension of the threaded shaft end beyond the hub face. For "interference fits" we recommend heating the hubs in oil or oven and quickly positioning on shafts (do not use spot heat or exceed 350°F as this may cause flange distortion).

   If hubs are to be hydraulically fitted, refer to CI-01 for recommended procedure.

   NOTE: *If axial setting adjustments are necessary (see Step 5) corrections can be made on straight cylindrical shafts by overhanging the hub. Hub overhang should not exceed 0.13 inch. Axial adjustment of hubs is not recommended for tapered shafts.*
4. Check that the hub-flange diameters are concentric to the center of rotation to within 0.004 inch total indicator runout (TIR), and that the hub face is square to the center of rotation to within 0.004 TIR (Figure 2). Refer to any specific requirements or standards for maximum allowable value.
5. Check the distance between shaft ends (DBSE) taking into account, where applicable, any axial movement that may occur in operation (i.e., thermal expansion, magnetic center location, etc.). The final operating distance must equal that shown on the assembly drawing.

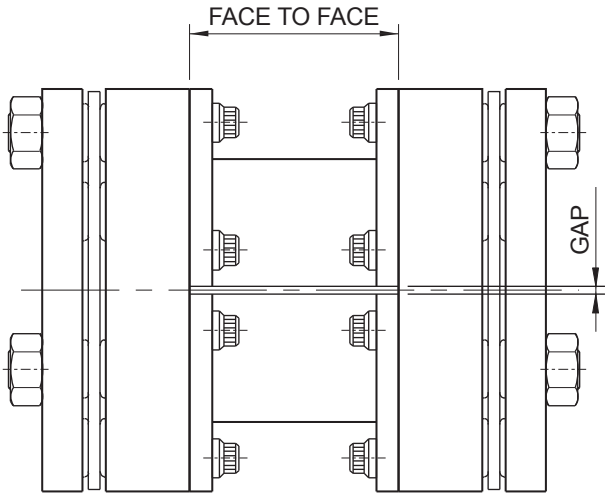
   NOTE: *When equipment can not be moved to obtain the correct DBSE, axial adjustments are possible by overhanging hubs on cylindrical straight shafts. If hub adjustments are made, the mating face-to-face dimension (taking into account any axial movement that may occur in operation) must equal the overall length of the split spacer (Figure 3).*
6. Check that all pilots and recesses on drive rings and spacer halves are free of burrs. Bring the split spacer halves into position between the drive rings, making sure to align any match marks (compression of the hub/drive ring assembly may be necessary; the spacer bolts can be used to draw back the drive rings by tightening the bolts and compressing the hub/drive ring assembly). Ensure the gaps between spacer halves are equal on each side of the coupling, install the spacer bolts and tighten to the torque values listed below.

FIGURE 2



*** IMPORTANT** For hubs supplied blank, this distance to be removed from standard hub to allow for locking nut on tapered shafts.

FIGURE 3



Tightening torques

The bolts are supplied prelubricated and no further lubricant should be applied. Table 1 below gives figures for normal use. Occasionally, for particular duties, the figure may vary and in such cases the required torque values will be quoted on the assembly drawing(s) supplied with the coupling.

TABLE 1

Coupling Size	Torque (ft. lbs.)	Coupling Size	Torque (ft. lbs.)
0075	10	0500	40
0135	10	0740	40
0230	20	0930	40
0350	40	1400	60

All spacer bolts must be installed correctly and tightened to the correct torque. Use only John Crane Flexibox supplied spacer bolts. Inferior substitutions will jeopardize the integrity and safety of the coupling.

Maintenance and Inspection

1. Under normal operating conditions, no servicing or maintenance should be necessary. Periodically, the bolts should be checked for tightness and the discs checked for any visible signs of distress. If the hubs or shafts have been disturbed for any reason, alignment must be checked. If the coupling has been dynamically balanced, any dismantling or remedial work on the disc units will invalidate the original balance.
2. In the event of failure, it is essential that the true cause of failure is found and corrected before a new unit is put into service. The most likely faults will be excessive misalignment, extreme overload or a combination of both.

Alignment

Align the center lines of the driving and driven machine shafts as follows:

- Move the equipment into position.
- Check for any soft foot. Correct before commencing alignment.
- With one machine firmly bolted down, set the distance between guard rings (as shown in Figure 3) to equal the split-spacer length flange to flange.

IMPORTANT Distance between guard rings should be measured with the membranes in the neutral position with the compression screws loose.

Align the shaft center lines both horizontally and vertically, ideally using the shafts. However, if access prohibits this then align using the hub bosses or flanges. John Crane recommends the reverse periphery method for accurate alignment. This can be done using dial gauges or with a laser shaft alignment kit. Further details on recommended laser alignment vendors are available from John Crane on request. Recheck the distance between guard rings after the shafts have been aligned.

IMPORTANT The misalignment tolerances quoted in literature and on drawings, allow for dynamic conditions and variations. For the best service from the coupling, John Crane recommends that installed misalignment is no more than 10% of the maximum allowable misalignment, allowance being made for any anticipated movements which will occur during operation (e.g., thermal movements on hot pumps).

Coupling Repair

In the event the coupling requires repairing, the following procedure should be followed.

Disassembly

1. Remove the spacer bolts and spacer halves. The spacer bolts (or other correctly sized bolts) can be used to draw back the drive rings by tightening the bolts and compressing the hub/drive ring assembly.
2. Remove the three locknuts from the hub flange at the failed end. Remove corresponding drive bolts and overload collars (see Figure 4). Repeat this procedure for the remaining three nuts, bolts and overload collars at the affected end.
3. Slide the drive ring to the opposite side of the coupling and remove the failed discs by passing them between the hub faces.
4. Visually inspect the holes in the hub and drive ring for elongation or rough surface finish. Replace all damaged components as necessary. John Crane Flexibox recommends the replacement of all disc pack hardware (drive bolts, locknuts, spacer washers, overload collars and discs).
5. It is recommended that while replacing all necessary hardware, visually inspect the opposite end of the coupling for possible damage to that disc pack, also.

Assembly

1. Slide the new discs between the hub faces and position next to the hub flange with curvature of the discs in the same direction to ease assembly.
2. With the overload collars and spacer washers fitted on the drive bolts, install three drive bolts through the discs, spacer washers and into the drive ring bushings. Fit locknuts finger tight on drive bolts and slide the dive ring back into position with the bolt heads located within the hub clearance holes (Figures 4 and 5). Repeat the above procedure for the remaining drive bolts.

Do not turn the drive bolts at any time as this could damage the discs.

3. With all bolts and nuts installed, check the assembly to insure flush fits and that the discs are not buckled. Disassemble and refit as necessary.
4. Tighten all locknuts to the torque values shown below in Table 2:

TABLE 2

Coupling Size	Torque (ft. lbs.)	Coupling Size	Torque (ft. lbs.)
0075	22	0500	166
0135	48	0740	225
0230	77	0930	313
0350	118	1400	387

Tighten all three locknuts on the hub, then the other three locknuts on the drive ring. Use a non-hardening, anaerobic adhesive such as "Loctite Blue 242" or equivalent.

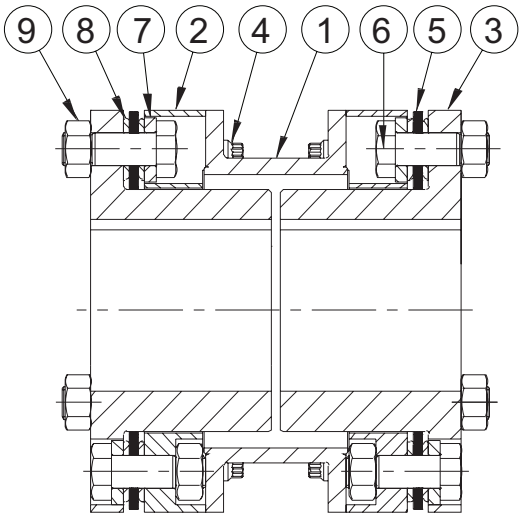
Do not turn the drive bolts at any time as this could damage the discs.

5. After repair is complete, refer to installation procedures above.

NOTE: *Disassembly of the coupling for any reason invalidates any dynamic balance correction made at the factory. Therefore, it may be necessary to check the balance characteristics of any repaired coupling prior to operation.*

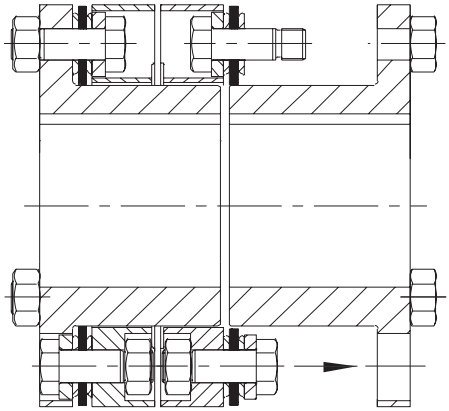
All rotating power transmission products are potentially dangerous. They should be used according to the manufacturer's recommendations and appropriate safety standards. It is the responsibility of the user to comply with any such standards.

FIGURE 4



1 – Axially-split spacer
2 – Drive ring
3 – Hub
4 – Spacer bolt
5 – Flexing disc
6 – Drive bolt
7 – Overload collar
8 – Spacer washer
9 – Locknut

FIGURE 5



This section refers to couplings that bear the CE and ATEX required markings:

CE / ATEX Marking

All couplings that comply with CE and ATEX legislation will be marked as shown. This will be etched on the spacer element of the transmission unit if enough room is available.

A) Ambient temperature is standard (40ºC max)

CE Ex I $M2_C$ Ex II $2GD_C$ T6 (T85°C) john crane SL1 4LU, UK. XX

Where John Crane's Metastream metal membrane couplings are required for use in higher ambient temperatures, John Crane UK Ltd certifies that the equipment complies with the temperature classification range listed below in Table 3, and in all other respects complies with the type certificates.

TABLE 3

Ambient Range Marking		Group II, Category 2 GD **	Group I, Category 2 M2	Marking Option
Min.	Max.			
Unknown		T3 (T200°C)	Not Applicable	B
-55°C <	Ta < 150°C	T3 (T200°C)	Not Applicable	B
-55°C <	Ta < 90°C	T4 (T135°C)	150°C	C
-55°C <	Ta < 55°C	T5 (T100°C)	150°C	C
-55°C <	Ta < 40°C	T6 (T85°C)	150°C	A

B) Ambient temperature is (-55°C < Ta < 150ºC) OR ambient temperature is unspecified, the equipment is not suitable for mining applications, Group I, Category 2.

CE Ex II $2GD_C$ T3 (T200°C) john crane SL1 4LU, UK. XX

C) Ambient temperature is (-55°C < Ta < 90ºC)

When the ambient temp. is specified, 'T3' is replaced by the following 'T' mark (**) according to Table 3.

CE Ex I $M2_C$ Ex II $2GD_C$ ** john crane SL1 4LU, UK. XX

NOTE:

'XX' is the year of manufacture and will change. For example, for year 2016; XX = 16.
CE and EX marks must meet requirements of Annex II in Reg. (EC) No. 765/2008 and Annex II in Dir. 84/47/EEC respectively.

Operation in aggressive atmospheres

The following components contain non-metallic materials. Confirm compatibility or provide suitable protection if the coupling is to operate in an aggressive atmosphere.

- The hub electrical insulation (if supplied option) – reinforced thermosetting plastic
- Limited end float bearings (if supplied option) – PTFE based plastic

Temperature classification of John Crane's Metastream couplings

John Crane's Metastream metal membrane couplings, supplied in conformance with Directive 2014/34/EU, have to meet the classifications specified in Table 3 when used in accordance with instructions and information supplied.

T, L and H series couplings, using the disk type flexible elements, are covered by type examination certificate **Sira 02ATEX9403**.

M series couplings, using the diaphragm type flexible elements, are covered by type examination certificate **Sira 02ATEX9404**.

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Declaration of Conformity

EEC Directive 2014/34/EU of 26.02.2014
and resultant legislation and standards

We, the manufacturers – John Crane UK Ltd, – confirm that the explosion prevention requirements have been implemented for

Metastream® metal-membrane couplings

Equipment complies with the requirements of directive 2014/34/EU. It is in accordance with article 1 3. (a) of the directive and the fundamental Health and Safety requirements of Annex II, are fulfilled.

The current Type Examination Certificates for the couplings are:-

'T', 'L' & 'H' Series -	Sira 02ATEX9403
'M' Series -	Sira 02ATEX9404

The technical documentation is deposited with the designated notified body in accordance with article 13 (b) (ii) of the Directive 2014/34/EU.

SIRA Certification Services
Unit 6, Hawarden Industrial Park
Hawarden, Chester, CH5 3US
United Kingdom

Signed: 

Date: 20th July 2016

S. Pennington
(Engineering Manager - Couplings)

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Declaration of Incorporation

E.C. Machinery Directive (2006/42/EC)

Section 1.0 - Machinery Description:
Flexible Power Transmission Ring and Diaphragm Form Membrane Couplings
Types:

'H', 'T', 'L' & 'M' Series

Section 2.0 - Applicable Harmonised Standards
ISO13709 (API 610) for centrifugal pumps
ISO14691 couplings for - General-purpose applications
ISO10441 (API 671) (opt) couplings for - Special-purpose applications

Section 3.0 - Declaration:
We, John Crane declare that under our sole responsibility for the supply of the machinery defined in Section 1.0 above, the said machinery parts are intended to be incorporated into other machinery or assembled with other machinery to constitute machinery as covered by this Directive.

The machinery parts, covered by this declaration must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive.

Signed: 

Date: 20th July 2016

S. Pennington
(Engineering Manager - Couplings)

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